LM940 QMI Command Reference Guide

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APPLICABILITY TABLE

PRODUCT
LM940

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Contents

1. Introduction

1.1. Scope

The scope of this document is to provide the Qualcomm Messaging Interface (QMI) service messages of Telit LM940 module.

1.2. Audience

This document is intended for customers integrating LM940 module in their project.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

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To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Document Organization

This document contains the following chapters (sample):

"Chapter 1: "Introduction" provides a scope for this document, target audience, contact and support information, and text conventions.

"Chapter 2: "QMI Overview" gives an overview of the framework and protocol of the Qualcomm QMI services.

"Chapter 3: "Common Constant Definitions (QMI_COMMON)" describes in detail the QMI_COMMON service.

"Chapter 4: "Control Service (QMI_CTL)" describes in detail the QMI_CTL service.

"Chapter 5: "Wireless Data Service (QMI_WDS)" describes in detail the QMI_WDS service.

"Chapter 6: "Device Management Service (QMI_DMS)" describes in detail the QMI_DMS service.

"Chapter 7: "Network Access Service (QMI_NAS)" describes in detail the QMI_NAS service.

"Chapter 8: "Wireless Message Service (QMI_WMS)" describes in detail the QMI_WMS service.

"Chapter 9: "User Identity Module Service (QMI_UIM)" describes in detail the QMI_UIM service.

"Chapter 10: "Location Service (QMI_LOC)" describes in detail the QMI_LOC service.

"Chapter 11: "Persistent Device Configuration Service (QMI_PDC)" describes in detail the QMI_PDC service.

"Chapter 12: "Firmware Over The Air Service (QMI_FOTA)" describes in details the QMI_FOTA service.

"Chapter 13: "Telit General Modem Service (QMI_GMS)" describes in detail the QMI_GMS service.

"Chapter 14: "Telit General Application Service (QMI_GAS)" describes in detail the QMI_GAS service.

"Chapter 15: "Appendix" gives useful additional information for each QMI services.

"Chapter 16: "Acronyms and Abbreviations" lists the acronyms and abbreviations.

"Chapter 17: "Document History" lists revisions.

1.5. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

Function declarations, function names, type declarations, and code samples appear in a different font, e.g., `#include`.

An asterisk (*) in a TLV indicates that it is applicable only for 3GPP2.

A double asterisk (**) in a TLV indicates that it is applicable only for 3GPP.

Parameter types are indicated by arrows:

→ Designates an input parameter

← Designates an output parameter

↔ Designates a parameter used for both input and output

1.6. Related Documents

- Qualcomm Messaging Interface (QMI) Architecture Document, 80-VB816-1
- Qualcomm QMI COMMON 1.10 for MPSS.TH.2.0.1 (QMI Common Constant Definitions Spec), 80-NV406-2
- Qualcomm QMI CTL 1.11 for MPSS.TH.2.0.1 (QMI Control Svc Spec), 80-NV406-3
- Qualcomm QMI WDS 1.117 for MPSS.TH.2.0 (QMI Wireless Data Service Spec), 80-NV404-5
- Qualcomm QMI DMS 1.52 for MPSS.TH.2.0 (QMI Device Management Service) Spec, 80-NV404-4
- Qualcomm QMI NAS 1.169 for MPSS.TH.2.0.1 (QMI Network Access Service Spec), 80-NV406-6
- Qualcomm QMI WMS 1.25 Spec for MPSS.TH.2.0 (QMI Wireless Message Service Spec), 80-NV404-9
- Qualcomm QMI UIM 1.54 for MPSS.TH.2.0 (QMI User Identity Module Spec), 80-NV404-12 B
- Qualcomm QMI LOC 2.49 for MPSS.TH.2.0.1 (QMI Location Svc Spec), 80-NV406-17 A
- Qualcomm QMI PDC 1.9 for MPSS.TH.2.0.1 (QMI Persistent Device Configuration Svc Spec), 80-NV406-38 A

2. QMI Overview

This chapter describes the QUALCOMM® MSM™ Interface (QMI) architecture and framework. The QMI allows applications on attached Terminal Equipment (TE) devices to access various Services provided by devices based on QUALCOMM's MSM chipsets and AMSS software.

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2.1. QMI Framework

The QMI framework defines an interface between the TE and a processor running AMSS, enabling applications on the tethered processor to make use of functionality on the AMSS processor.

The QMI framework is composed of:

- Properties of the interconnection between an MSM chipset and the TE, including orthogonal control and data channels
- An enumeration of logical devices emulated by the MSM device over the interconnection
- A messaging protocol for messaging on the control channels of each logic device that allows applications running on the TE to access MSM-based Services

Figure 2-1 illustrates the layering of the QMI between the applications executing on a TE device and the MSM device.

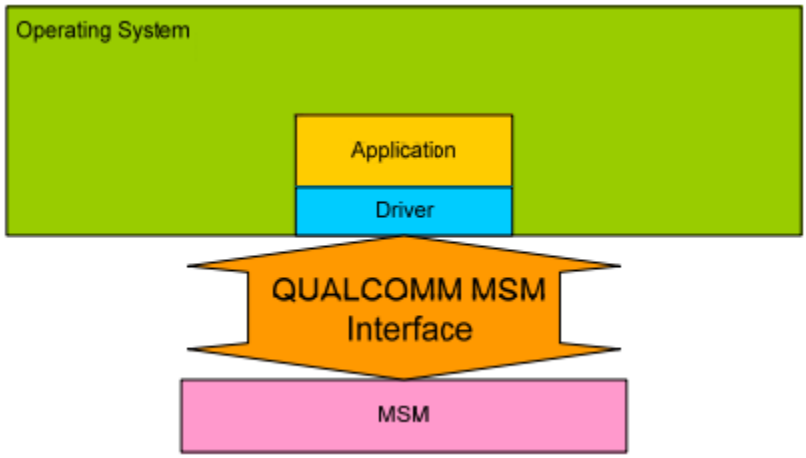

Figure 2-1 QUALCOMM MSM interface

2.1.1. MSM-TE interconnection

QMI connects an MSM device to the TE (see Figure 2-2). The term TE is inclusive of all form factors, including devices such as PCs, notebooks, PDAs, and smartphones. The TE consists of an application environment (and possibly an operating system) executing on a separate processor, which is connected to the MSM processor via some form of interconnect.

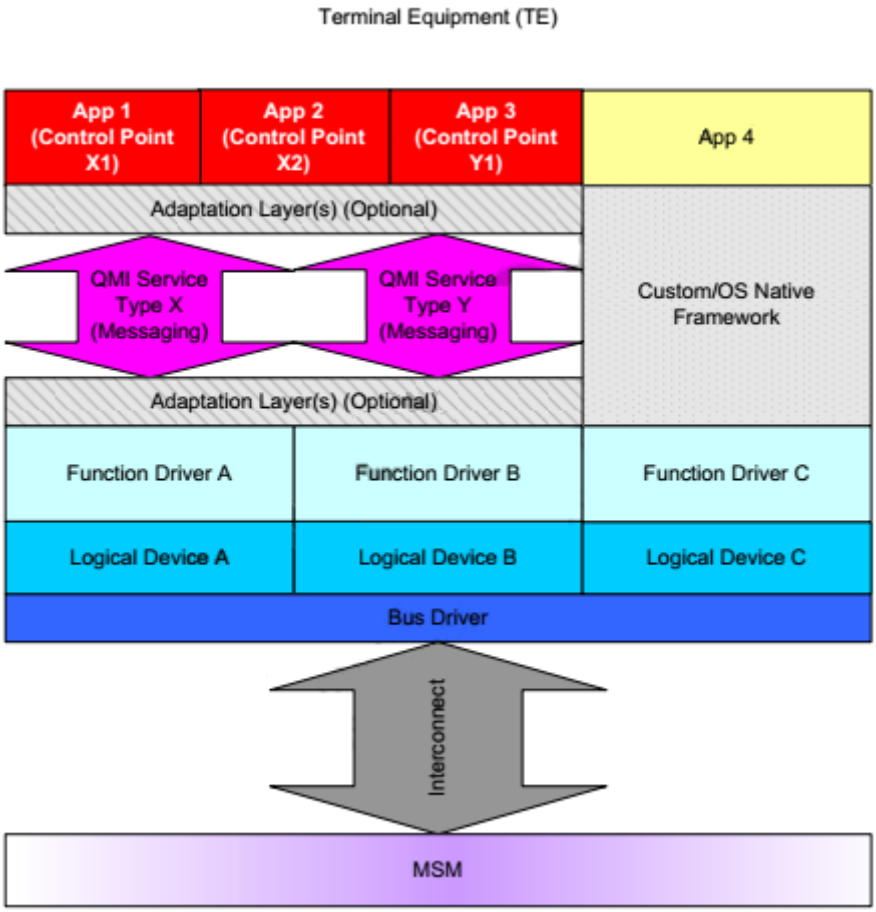

Figure 2-2 QMI architecture

The TE can be attached to the MSM over various bus interconnects, e.g., serial buses like USB, RS-232, PCI, or PCMCIA; wireless links like Bluetooth® or 802.11; shared memory interfaces, etc.

Regardless of which interconnect is used, QMI enumerates a number of logical devices. The interconnection must provide a mechanism for multiplexing multiple logical devices over a single physical connection.

Each logical device consists of at least one communication channel, and the underlying interconnect must provide for independent data and control communication channels for each logical device. Channel independence implies that each channel must act as if there were no physical coupling between the communication channels, including (but not limited to) separate Tx and Rx path queuing, independent flow control mechanisms, and independent data transmission scheduling.

A logical device uses at least one communication channel but need not have both (see Figure 2-3). For example, the existing MSM diagnostic interface consists of a data channel only.

For both QMI control and data channels, the interconnection must provide for framing of messages exchanged, i.e., delineating packet boundaries to the transport protocol (e.g., 802.3).

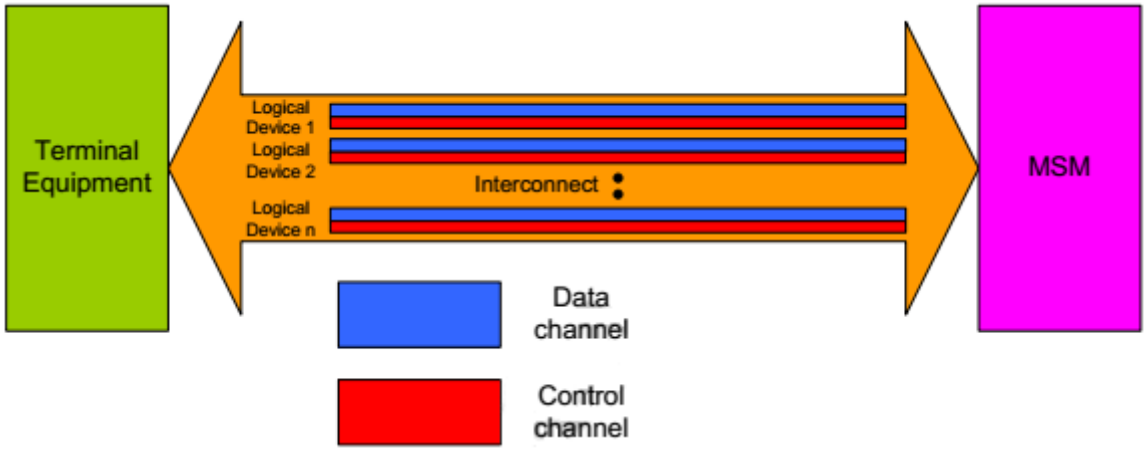

Figure 2-3 QMI MSM-TE interconnection

2.1.2. Logical device enumeration

Logical devices include both those that leverage QMI messaging protocols, such as an Rm network (RmNet) device.

Existing non-QMI devices are enumerated as well, such as:

- Legacy modem device
- Diagnostic interface
- NMEA device

Each logical device that is capable of exchanging QMI messages must provide orthogonal data and control channels. QMI messages are exchanged on the control channel.

The RmNet device presents an IP network interface to the TE provided by the wireless data-enabled QMI device.

2.1.3. Control channel messaging protocol

The QMI defines the protocol for communication over the control channel of a QMI logical device, consisting of:

- The QMUX transport protocol, which carries all control channel messages
- A communication reference model defining communication endpoints known as Control Points and Services, described below message definition; all QMI Service interfaces, including Services that conform to this generalized Service protocol and also custom QMI Services, are outside the scope of this document and are described in detail in their own specification document
- A special QMI_CTL Service that is used by the QMI drivers on both the TE and MSM devices to negotiate client IDs and special control Services; QMI_CTL conforms to general

Each logical device that is capable of exchanging QMI messages must provide orthogonal data and control channels. QMI messages are exchanged on the control channel.

2.1.3.1. Endpoint model

Applications and device drivers on the TE communicate with a QMI-enabled MSM device by exchanging QMI Service messages over the QMUX transport protocol. These control messages are sent on the control channel of a QMI logical device (see Figure 2-4).

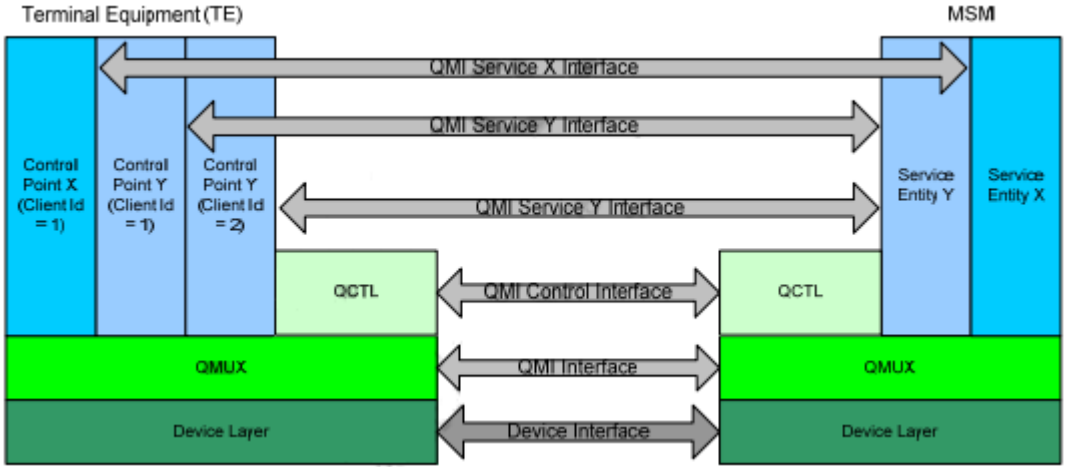

Figure 2-4 QMI control channel messaging endpoint model

All controlling applications are referred to as Control Points. A Control Point is a client of a particular QMI Service.

The software module that receives the QMI Service message and performs the function is referred to as a QMI Service.

A Control Point is to the Service as a client is to a server in the standard software engineering client/server model.

If an application makes use of several QMI Services, it will comprise a Control Point for each of the utilized Services.

2.1.4. Usage

Connection manager applications and device drivers on the TE are expected to interface to the QMI-enabled MSM device using QMI Service protocols.

Other applications on the TE may also be capable of using QMI Services.

2.2. QMI Generalized Service Message Protocol

This chapter describes the generalized message format and procedures that QMI Services should follow to ease implementation.

If a particular QMI Service diverges from this protocol, the corresponding QMI Service specification will document the superseding message format and/or procedures for that particular Service.

2.2.1. Service message format

2.2.1.1. QMI message structure

A single QMI Service message is formatted as described in Figure 2-5.

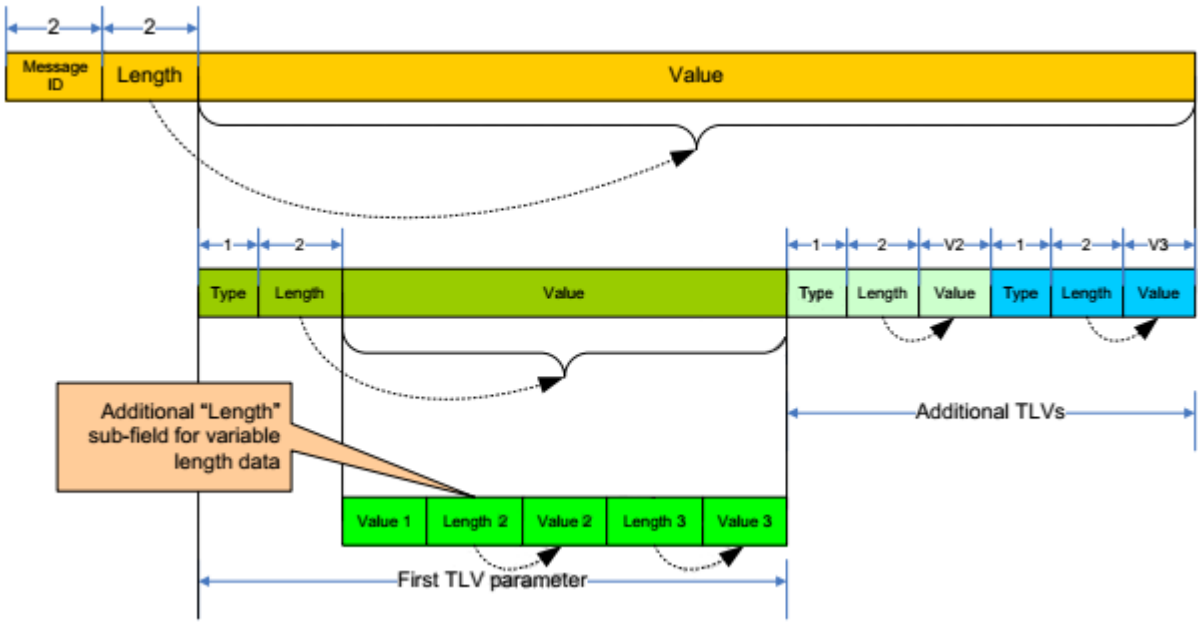

Figure 2-5 Generalized QMI Service message and parameter formats

The QMI Service messages are distinguished by QMI message ID.

Each QMI Service type has its own set of QMI messages, defined in the QMI Service specification document.

The same message ID value is used in corresponding request and response messages. If an indication message is defined corresponding to the request and response, it will share the same message ID value.

The length field following the message ID indicates the total number of bytes in the message following the length field, i.e., the total length of all parameters included in the message.

The value portion of the message consists of zero or more parameters associated with the message. The value typically contains the information required to execute the requested action or results of the action.

2.2.1.2. QMI message parameter structure

Figure 2-5 illustrates parameters within the value portion of the QMI message.

Message parameters are defined separately for each request, response, or indication message. Message parameters are formatted with three sections, type, length, and value. Because of this, message parameters are sometimes referred to as TLVs.

2.2.1.2.1. Parameter types

The parameter type field indicates which parameter is being specified.

A unique TLV parameter type is defined for each parameter that may be specified within a given message type. The same parameter type may have a different meaning in the context of other messages.

2.2.1.2.2. Parameter length

The parameter length indicates the length in bytes of the following value field.

The expected length will be documented per parameter in the QMI Service specification. This will be a fixed value when the value field is a fixed structure. If the parameter contains a string or other variable-length data, this will be defined as a calculated value. For example, if the value section includes a variable length string, the length field will tell the receiver how many bytes are in that string.

2.2.1.2.3. Parameter value

The value of a parameter contains the actual information communicated by including the parameter in the message.

The entire parameter, as defined in the Service specification, must be present. Any flexibility in format of the value portion of the parameter will be described in the parameter value description. All numeric data are positive (unsigned) binary values unless stated otherwise in the parameter description.

2.2.2. QMI message types

The generalized QMI Service transaction format defines three basic message types. All three message types follow the generalized QMI Service message format described in Section 2.2.1.1.

2.2.2.1. Request

A request message may be used to set parameters, query parameter values, or configure the generation of indications.

The request message is issued by the Control Point.

A valid request always generates a response from the Service.

2.2.2.2. Response

A response message is issued by the Service, in response to a received request.

Each response contains at least the result parameter indicating that the request succeeded or failed, and the error status, indicating the result of the operation requested. Additional parameters may be present to communicate data associated with the operation.

2.2.2.3. Indication

An indication is sent by a QMI Service to inform Control Point(s) of changes in state.

The indication message is issued by the Service without any solicitation by a Control Point.

2.2.2.3.1. Unicast vs. broadcast indications

Indications from the Service are either broadcast to all Control Points or unicast to a specific Control Point. Indication type is indicated by the value of the client ID field in the QMUX header.

The definition of the indication message (in the associated QMI Service specification document) specifies whether it shall be unicast or broadcast.

2.2.3. State variables

QMI Services may keep track of state related to the internal functionality accessed through that Service in Service global state variables. The Service may also keep track of Control Point settings and state in Control Point state variables.

When a Control Point is allocated a new client ID, and when that client ID is released, that client ID's state variables are set to the default settings.

Upon powerup, and when the QMI link is disconnected, Service global state variables are reset to their default settings.

The handling of state variables and their impact on the system is described in the QMI Service specification document.

2.2.4. Control Point arbitration

It is possible to have multiple Control Points interact with a single Service on the QMI device.

In cases where multiple Control Points issue messages related to a common resource, the default policy is that the actions will be executed in the order received; hence, the "last request wins."

In some cases, more careful arbitration of a common resource is managed by keeping track of Control Point requests via state variables. In such cases, the message definition may describe any the arbitration policy for the common resource.

2.2.5. QMI Service versioning

QMI Control Points and QMI Services are written to a particular version of a QMI Service specification document. Since the Service specifications are compiled to over time, Control Points may want to know the Service version implemented on a device, to know whether specific functionality within the Service is supported.

2.2.5.1. Version format

Each QMI Service has its own version number that is independent of other QMI Services. A QMI Service version is represented as M.n where:

- M = major version, 2 bytes
- n = minor version, 2 bytes

2.2.5.2. Learning QMI Service versions

The QMI driver on the TE provides an API to learn the Service version.

2.2.5.3. Service versioning rules

2.2.5.3.1. Major versions

As the major version of the Service is incremented, the Service specification is changed in a way that breaks backward compatibility with the previous version.

Control Points should not assume interoperability with a Service that has a different major version.

A QMI Service is required only to support one major version of a QMI Service. A QMI Service may implement multiple major versions of a QMI Service.

2.2.5.3.2. Miner versions

The minor version of the Service is incremented when the Service specification is modified without breaking backward compatibility with previous versions sharing the same major revision number.

Control Points may assume interoperability with a Service that has a different minor version.

2.2.5.4. Message and parameter updates

Each message definition will indicate the QMI Service version in which it was first defined. The Control Point should consider this the minimum required Service version to carry out the operation associated with that request.

Each parameter definition will indicate the QMI Service version in which it was last modified. Since the backward compatibility requirement implicit to QMI ensures that parameters will not be changed in a way that

renders an older minor revision incompatible, it is not critical for the application to take action based on the last modified version. This is provided as a quick means for the application writer to identify updated fields in a newer Service specification that might be handled by the application; however, the application will work without implementing any of these changes.

3. Common Constant Definitions (QMI_COMMON)

QMI_COMMON enumerates the global constant definitions used by all QMI services. The definitions include enumerated values for QMI service types, result codes, and error codes.

3.1. QMI service type values

Table 3-1 lists QMI service type values that are currently defined. These values are used to specify to which QMI service the messages are routed.

Table 3-1 QMI service and values

QMI service	QMI service type value
QMI_CTL (Control Service)	0x00
QMI_WDS (Wireless Data Service)	0x01
QMI_DMS (Device Management Service)	0x02
QMI_NAS (Network Access Service)	0x03
QMI_WMS (Wireless Messaging Service)	0x05
QMI_UIM (User Identity Module Service)	0x0B
QMI_LOC (Location Service)	0x10
QMI_PDC (Persistent Device Configuration Service)	0x24
QMI_FOTA (Firmware Over The Air Service)	0xE6
QMI_GMS (Telit General Modem Service)	0xE7
QMI_GAS (Telit General Application Service)	0xE8

3.2. QMI result codes

For QMI services that conform to the generalized QMI service message protocol, the result Type-Length-Value (TLV) is present in all response messages. The Result Code TLV consists of two parameters: qmi_result and qmi_error.

3.2.1. qmi_result code

The qmi_result parameter contains one of the values in Table 3-2.

Table 3-2 qmi_result parameter values

Result code	Hex value
QMI_RESULT_SUCCESS	0x0000
QMI_RESULT_FAILURE	0x0001

All other values are reserved for future assignment.

3.2.2. qmi_error codes

The qmi_result parameter contains one of the values in Table 3-3.

Table 3-3 qmi_error parameter values

Error code	Hex value
QMI_ERR_NONE	0x0000
QMI_ERR_MALFORMED_MSG	0x0001
QMI_ERR_NO_MEMORY	0x0002
QMI_ERR_INTERNAL	0x0003
QMI_ERR_ABORTED	0x0004
QMI_ERR_CLIENT_IDS_EXHAUSTED	0x0005
QMI_ERR_UNABORTABLE_TRANSACTION	0x0006
QMI_ERR_INVALID_CLIENT_ID	0x0007
QMI_ERR_NO_THRESHOLDS	0x0008
QMI_ERR_INVALID_HANDLE	0x0009
QMI_ERR_INVALID_PROFILE	0x000A
QMI_ERR_INVALID_PINID	0x000B
QMI_ERR_INCORRECT_PIN	0x000C
QMI_ERR_NO_NETWORK_FOUND	0x000D
QMI_ERR_CALL_FAILED	0x000E
QMI_ERR_OUT_OF_CALL	0x000F
QMI_ERR_NOT_PROVISIONED	0x0010
QMI_ERR_MISSING_ARG	0x0011
QMI_ERR_ARG_TOO_LONG	0x0013
QMI_ERR_INVALID_TX_ID	0x0016
QMI_ERR_DEVICE_IN_USE	0x0017
QMI_ERR_OP_NETWORK_UNSUPPORTED	0x0018
QMI_ERR_OP_DEVICE_UNSUPPORTED	0x0019
QMI_ERR_NO_EFFECT	0x001A
QMI_ERR_NO_FREE_PROFILE	0x001B
QMI_ERR_INVALID_PDP_TYPE	0x001C
QMI_ERR_INVALID_TECH_PREF	0x001D
QMI_ERR_INVALID_PROFILE_TYPE	0x001E
QMI_ERR_INVALID_SERVICE_TYPE	0x001F
QMI_ERR_INVALID_REGISTER_ACTION	0x0020
QMI_ERR_INVALID_PS_ATTACH_ACTION	0x0021
QMI_ERR_AUTHENTICATION_FAILED	0x0022
QMI_ERR_PIN_BLOCKED	0x0023
QMI_ERR_PIN_PERM_BLOCKED	0x0024
QMI_ERR_SIM_NOT_INITIALIZED	0x0025
QMI_ERR_MAX_QOS_REQUESTS_IN_USE	0x0026
QMI_ERR_INCORRECT_FLOW_FILTER	0x0027
QMI_ERR_NETWORK_QOS_UNAWARE	0x0028
QMI_ERR_INVALID_QOS_ID/QMI_ERR_INVALID_ID	0x0029
QMI_ERR_REQUESTED_NUM_UNSUPPORTED	0x002A
QMI_ERR_INTERFACE_NOT_FOUND	0x002B
QMI_ERR_FLOW_SUSPENDED	0x002C
QMI_ERR_INVALID_DATA_FORMAT	0x002D
QMI_ERR_GENERAL	0x002E
QMI_ERR_UNKNOWN	0x002F
QMI_ERR_INVALID_ARG	0x0030
QMI_ERR_INVALID_INDEX	0x0031

QMI_ERR_NO_ENTRY	0x0032
QMI_ERR_DEVICE_STORAGE_FULL	0x0033
QMI_ERR_DEVICE_NOT_READY	0x0034
QMI_ERR_NETWORK_NOT_READY	0x0035
QMI_ERR_CAUSE_CODE	0x0036
QMI_ERR_MESSAGE_NOT_SENT	0x0037
QMI_ERR_MESSAGE_DELIVERY_FAILURE	0x0038
QMI_ERR_INVALID_MESSAGE_ID	0x0039
QMI_ERR_ENCODING	0x003A
QMI_ERR_AUTHENTICATION_LOCK	0x003B
QMI_ERR_INVALID_TRANSITION	0x003C
QMI_ERR_NOT_A_MCAST_IFACE	0x003D
QMI_ERR_MAX_MCAST_REQUESTS_IN_USE	0x003E
QMI_ERR_INVALID_MCAST_HANDLE	0x003F
QMI_ERR_INVALID_IP_FAMILY_PREF	0x0040
QMI_ERR_SESSION_INACTIVE	0x0041
QMI_ERR_SESSION_INVALID	0x0042
QMI_ERR_SESSION_OWNERSHIP	0x0043
QMI_ERR_INSUFFICIENT_RESOURCES	0x0044
QMI_ERR_DISABLED	0x0045
QMI_ERR_INVALID_OPERATION	0x0046
QMI_ERR_INVALID_QMI_CMD	0x0047
QMI_ERR_TPDU_TYPE	0x0048
QMI_ERR_SMSC_ADDR	0x0049
QMI_ERR_INFO_UNAVAILABLE	0x004A
QMI_ERR_SEGMENT_TOO_LONG	0x004B
QMI_ERR_SEGMENT_ORDER	0x004C
QMI_ERR_BUNDLING_NOT_SUPPORTED	0x004D
QMI_ERR_OP_PARTIAL_FAILURE	0x004E
QMI_ERR_POLICY_MISMATCH	0x004F
QMI_ERR_SIM_FILE_NOT_FOUND	0x0050
QMI_ERR_EXTENDED_INTERNAL	0x0051
QMI_ERR_ACCESS_DENIED	0x0052
QMI_ERR_HARDWARE_RESTRICTED	0x0053
QMI_ERR_ACK_NOT_SENT	0x0054
QMI_ERR_INJECT_TIMEOUT	0x0055
QMI_ERR_INCOMPATIBLE_STATE	0x005A
QMI_ERR_FDN_RESTRICT	0x005B
QMI_ERR_SUPS_FAILURE_CAUSE	0x005C
QMI_ERR_NO_RADIO	0x005D
QMI_ERR_NOT_SUPPORTED	0x005E
QMI_ERR_NO_SUBSCRIPTION	0x005F
QMI_ERR_CARD_CALL_CONTROL_FAILED	0x0060
QMI_ERR_NETWORK_ABORTED	0x0061
QMI_ERR_MSG_BLOCKED	0x0062
QMI_ERR_INVALID_SESSION_TYPE	0x0064
QMI_ERR_INVALID_PB_TYPE	0x0065
QMI_ERR_NO_SIM	0x0066
QMI_ERR_PB_NOT_READY	0x0067
QMI_ERR_PIN_RESTRICTION	0x0068
QMI_ERR_PIN2_RESTRICTION	0x0069
QMI_ERR_PUK_RESTRICTION	0x006A

QMI_ERR_PUK2_RESTRICTION	0x006B
QMI_ERR_PB_ACCESS_RESTRICTED	0x006C
QMI_ERR_PB_DELETE_IN_PROG	0x006D
QMI_ERR_PB_TEXT_TOO_LONG	0x006E
QMI_ERR_PB_NUMBER_TOO_LONG	0x006F
QMI_ERR_PB_HIDDEN_KEY_RESTRICTION	0x0070
QMI_ERR_PB_NOT_AVAILABLE	0x0071
QMI_ERR_DEVICE_MEMORY_ERROR	0x0072
QMI_ERR_NO_PERMISSION	0x0073
QMI_ERR_TOO_SOON	0x0074
QMI_ERR_TIME_NOT_ACQUIRED	0x0075
QMI_ERR_OP_IN_PROGRESS	0x0076
QMI_ERR_FW_WRITE_FAILED	0x0184
QMI_ERR_FW_INFO_READ_FAILED	0x0185
QMI_ERR_FW_FILE_NOT_FOUND	0x0186
QMI_ERR_FW_DIR_NOT_FOUND	0x0187
QMI_ERR_FW_ALREADY_ACTIVATED	0x0188
QMI_ERR_FW_CANNOT_GENERIC_IMAGE	0x0189
QMI_ERR_FW_FILE_OPEN_FAILED	0x0190
QMI_ERR_FW_UPDATE_DISCONTINOUS_FRAME	0x0191
QMI_ERR_FW_UPDATE_FAILED	0x0192

0xF000 to 0xFFFE – Vendor-defined error codes

All codes in the range 0x0000 to 0xEFFF, except those that were previously mentioned in this section, are reserved for future assignment.

Refer to the individual service specification documents for the meanings of the error codes.

4. Control Service (QMI_CTL)

QMI_CTL is a QMI service within the QMI framework defined in 80-VB816-1. QMI_CTL messages are transported over the QMUX Control Message Transport Protocol.

QMI_CTL provides the QMUX layer on the Terminal Equipment (TE), e.g., the host driver, commands related to the QMUX link, and client management:

- QMUX link identification
- QMI service version identification
- QMI service client ID allocation and deallocation/revocation

It is expected that the QMI function-level driver and/or QMUX layer implementation on the TE will use QMI_CTL to access this functionality on the MSM™ device.

4.1. Theory of Operation

4.1.1. Generalized QMI Service Compliance

The QMI_CTL service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Compliance exceptions include:

- The QMI_CTL PDU format differs from the Generalized QMI Service PDU format in that the transaction ID is a single byte in length.
- Multiple QMI_CTL messages (SDUs) cannot be transmitted (bundled) in a single QMUX PDU.

Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

4.1.2. CTL Service Type

CTL is assigned QMI service type 0x00.

4.1.3. Message Definition Template

4.1.3.1. Byte Ordering

Numeric values in QMI_CTL messages are encoded in little-endian format.

String values in QMI_CTL messages are sent from the first to the last character (i.e., the same order that is stored in memory for most architectures).

4.1.3.2. QMI_CTL PDU

QMI_CTL messages consist of a short PDU header that is followed by the QMI_CTL message, as illustrated in Figure 4-1.

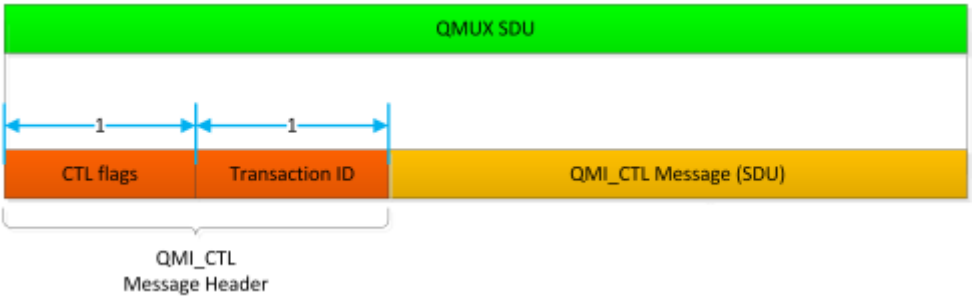

Figure 4-1 QMI_CTL PDU format

Figure 4-1 also illustrates how QMI_CTL messages are carried in a QMUX SDU.

NOTE:

The QMI_CTL PDU must contain only one QMI_CTL message.

Table 4-1 provides details regarding the fields in the QMI_CTL header.

Table 4-1 QMI_CTL header format

Header field	Bit number	Description
Control flags	0 to 1 (least-significant bits)	Type of QMI_CTL message (SDU) following the header. Valid values: • 00 – Request • 01 – Response • 10 – Indication • 11 – Reserved
	2 to 7	Reserved (must be set to 0).
Tx ID	0 to 7	Transaction ID that must be incremented each time the control point issues a new message; used to associate a response with the corresponding request.

The QMI_CTL message (SDU) conforms to the QMI Generalized Service Message (SDU) format described in 80-VB816-1.

4.1.3.3. Response Message Result TLV

This Type-Length-Value (TLV) is present in all Response messages defined in this document. It is not present in the Indication messages.

Name	Version introduced	Version last modified
Result Code	Corresponding response's *Version*	Corresponding response's *Version*

	introduced	*last modified*

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x02			1	Result Code
Length	4			2	
Value	→	uint16	qmi_result	2	Result code • QMI_RESULT_SUCCESS • QMI_RESULT_FAILURE
		uint16	qmi_error	2	Error code – Possible error code values are described in the error codes section of each message definition

4.1.4. QMI_CTL Fundamental Concepts

4.1.4.1. QMI_CTL Control Point

The QMUX endpoints on the TE (e.g., host driver) and the device use QMI_CTL to exchange information related to QMI services and to QMI client management within those services.

Client ID 0x00 is implicitly assigned to the host driver for the purpose of exchanging QMI_CTL messages; therefore, the client_id field of all QMI_CTL messages it sends and receives is 0x00. This is required, since QMI_CTL provides the client ID management function and cannot assign a client ID to itself.

4.1.4.2. QMI_CTL Service Version

QMI_CTL provides a means to learn the versions of each QMI service supported by the MSM device.

The QMI_CTL control point on the TE (e.g., driver) should first verify that the QMI_CTL service version is compatible before it performs client ID management operations.

4.1.4.3. QMI Link ID

A QMI-enabled MSM device can support multiple logical QMI connections to a TE. Each is capable of exchanging QMI messages and is referred to as a QMI link.

In cases where the QMI-enabled devices need to be distinguished on the host (e.g., connecting two such devices to the same TE), a QMI link ID can be assigned to each QMI link using primitives provided by this service. It is good practice to do so, in case this scenario arises.

4.1.4.4. Client ID Management

QMI_CTL defines procedures for assigning unique client IDs to allow other QMI services (besides QMI_CTL) on the MSM device to serve multiple control points. For example, the TE driver can use QMI_CTL to request multiple client IDs from a QMI service on the MSM, and can assign these client IDs to control points on the TE on request.

Unique client IDs enable a resource manager on the MSM to enforce arbitration policies when messages are processed from different QMI control points. When applications request a client ID for any QMI service, the QMI_CTL control point may provide the service version supported by the device. This enables the application to identify the extent of service-specific functionality that is supported.

4.1.5. Service State Variables

4.1.5.1. State Variables Per Control Point

Name	Description	Possible values	Default value
report_svc_available	Indicates whether available QMI services are to be reported.	• 0 – Do not report • 1 – Report available QMI services	0

4.2. QMI_CTL Messages

Table 4-2 QMI_CTL messages

Command	ID	Description
QMI_CTL_SET_INSTANCE_ID	0x0020	Generates a unique ID to distinguish the QMI link over which the message is sent.
QMI_CTL_GET_VERSION_INFO	0x0021	Queries the versions of all QMI services supported by the device.
QMI_CTL_GET_CLIENT_ID	0x0022	Requests a client ID for the specified QMI service type.
QMI_CTL_RELEASE_CLIENT_ID	0x0023	Releases a previously assigned client ID.
QMI_CTL_REVOKE_CLIENT_ID_IND	0x0024	Indicates that a client ID has been revoked by the service.
QMI_CTL_INVALID_CLIENT_ID_IND	0x0025	Indicates that a client ID/service type pair specified in a QMUX header is invalid.
QMI_CTL_SET_DATA_FORMAT	0x0026	Indicates the MSM device of the data format used by the driver.

4.2.1. QMI_CTL_SET_INSTANCE_ID

Generates a unique ID to distinguish the QMI link over which the message is sent.

CTL message ID

0x0020

Version introduced

Major – 1, Minor – 0

4.2.1.1. Request – QMI_CTL_SET_INSTANCE_ID_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Host Driver Instance	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Host Driver Instance
Length	1			2	
Value	→	uint8	host_driver_instance	1	Host-unique QMI instance for this device driver.

Optional TLVs

None

4.2.1.2. Response – QMI_CTL_SET_INSTANCE_ID_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
QMI Link ID	1.0	1.0
Result Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	QMI Link ID
Length	2			2	
Value	→	uint16	qmi_id	2	Unique QMI link ID assigned to the link over which the message is exchanged. The upper byte is assigned by the QMI_CTL service and the lower byte is assigned by the host (the value passed in the request).

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request

4.2.1.3. Description of QMI_CTL_SET_INSTANCE_ID REQ/RESP

This command facilitates the assignment of a unique QMI link ID to the physical channel carrying the QMUX messages.

The QMI_CTL control point on the TE is required to send this message when there is a need to distinguish QMI links. This occurs in the following interconnection configurations:

- Multiple QMI-enabled MSM devices connected to a single TE
- Multiple Tes connected to a single QMI-enabled MSM device

The returned QMI link ID is the concatenation of the host identifier byte with the device identifier byte.

4.2.2. QMI_CTL_GET_VERSION_INFO

Queries the versions of all QMI services supported by the device.

CTL message ID

0x0021

Version introduced

Major – 1, Minor – 0

4.2.2.1. Request – QMI_CTL_GET_VERSION_INFO_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

4.2.2.2. Response – QMI_CTL_GET_VERSION_INFO_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
QMUX Service Version List	1.0	1.0
Result Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	QMUX Service Version List
Length	Var			2	
Value	→	uint8	service_version_list_len	1	Number of sets of the following elements: • qmi_svc_type • major_ver • minor_ver

		uint8	qmi_svc_type	1	QMI service type, as defined in 80-VB816-1.
		Uint16	major_ver	2	Major version number of the QMI service specified by qmi_svc_type.
		Uint16	minor_ver	2	Minor version number of the QMI service specified by qmi_svc_type.

Optional TLVs

Name	Version introduced	Version last modified
Addendum Version List	1.2	1.2

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	QMUX Service Version List
Length	Var			2	
Value	→	uint8	addendum_label_len	1	Number of sets of the following elements: • addendum_label
		string	addendum_label	Var	Label describing the addendum.
		Uint8	addendum_version_list_len	1	Number of sets of the following elements: • qmi_svc_type • addendum_major_ver • addendum_minor_ver
		uint8	qmi_svc_type	1	QMI service type, as defined in 80-VB816-1.
		Uint16	addendum_major_ver	2	Addendum major version number of the QMI service specified by qmi_svc_type.
		Uint16	addendum_minor_ver	2	Addendum minor version number of the QMI service specified by qmi_svc_type.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

4.2.2.3. Description of QMI_CTL_GET_VERSION_INFO REQ/RESP

This command queries the major and minor version numbers of all QMI services, including QMI_CTL, supported by the QMI-enabled device.

Each QMI service version can be represented as a base version (Addendum version).

Every QMI service has a base version that is represented by major and minor version numbers given by the QMI service version list mandatory TLV, described in Section 3.2.2.

When a QMI service wants to advertise additional functionality supported on top of the base version, the service has an addendum version given by the Addendum Version optional TLV.

The addendum label name is a text string that is a label for the overall QMI addendum. An addendum major and minor version is present for each QMI service that wants to advertise additional functionality.

Addendum major and minor versions are returned only for services that have additional functionality to advertise on top of their base version.

4.2.3. QMI_CTL_GET_CLIENT_ID

Requests a client ID for the specified QMI service type.

CTL message ID

0x0022

Version introduced

Major – 1, Minor – 0

4.2.3.1. Request – QMI_CTL_GET_CLIENT_ID_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
QMI Service Type	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	QMI Service Type
Length	1			2	
Value	→	uint8	qmi_svc_type	1	QMI service type for which a client ID is requested.

Optional TLVs

None

4.2.3.2. Response – QMI_CTL_GET_CLIENT_ID_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Assigned Client ID	1.0	1.0
Result Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Assigned Client ID
Length	2			2	
Value	→	uint8	qmi_svc_type	1	QMI Service type.
		Uint8	client_id	1	Client ID.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_CLIENT_IDS_EXHAUSTED	Maximum number of concurrently assignable client IDs have already been allocated by the service
QMI_ERR_INVALID_SERVICE_TYPE	QMI service type is not supported by the device, or the QMI service does not assign client IDs dynamically

4.2.3.3. Description of QMI_CTL_GET_CLIENT_ID REQ/RESP

This command obtains a client ID from the specified QMI service. The client ID is assigned by the issuer of this request to a specific control point (application).

The service type cannot be QMI_CTL. There is only a single control point (the QMI driver on the TE) for the QMI_CTL service.

4.2.4. QMI_CTL_RELEASE_CLIENT_ID

Releases a previously assigned client ID.

CTL message ID

0x0023

Version introduced

Major – 1, Minor – 0

4.2.4.1. Request – QMI_CTL_RELEASE_CLIENT_ID_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Client ID to Release	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Client ID to Release
Length	2			2	
Value	→	uint8	qmi_svc_type	1	QMI Service type.
		Uint8	client_id	1	Client ID.

Optional TLVs

None

4.2.4.2. Response – QMI_CTL_RELEASE_CLIENT_ID_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Released Client ID	1.0	1.0
Result Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Released Client ID
Length	2			2	
Value	→	uint8	qmi_svc_type	1	QMI Service type.
		Uint8	client_id	1	Client ID.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_INVALID_CLIENT_ID	Client ID to be released was not allocated by the specified QMI service
QMI_ERR_INVALID_SERVICE_TYPE	QMI service type is not supported by the device, or the QMI service does not assign client IDs dynamically

4.2.4.3. Description of QMI_CTL_RELEASE_CLIENT_ID REQ/RESP

This command releases a client ID that was previously assigned by the specified QMI service.

4.2.5. QMI_CTL_REVOKE_CLIENT_ID_IND

Indicates that a client ID has been revoked by the service.

CTL message ID

0x0024

Version introduced

Major – 1, Minor – 0

4.2.5.1. Indication – QMI_CTL_REVOKE_CLIENT_ID_IND

Message type

Indication

Sender

Service

Indication scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Revoked Client ID	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Revoked Client ID
Length	2			2	
Value	→	uint8	qmi_svc_type	1	QMI Service type.
		Uint8	client_id	1	Client ID.

Optional TLVs

None

4.2.5.2. Description of QMI_CTL_REVOKE_CLIENT_ID_IND

This indication is sent if the service determines that it needs to revoke an assigned client ID.

The receiver should ensure that no further messages are sent using the revoked client ID, unless it has been subsequently reassigned via a QMI_CTL_GET_CLIENT_ID request.

4.2.6. QMI_CTL_INVALID_CLIENT_ID_IND

Indicates that a client ID/service type pair specified in a QMUX header is invalid.

CTL message ID

0x0025

Version introduced

Major – 1, Minor – 0

4.2.6.1. Indication – QMI_CTL_INVALID_CLIENT_ID_IND

Message type

Indication

Sender

Service

Indication scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Invalid Client ID	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Invalid Client ID
Length	2			2	
Value	→	uint8	qmi_svc_type	1	QMI Service type.
		Uint8	client_id	1	Client ID.

Optional TLVs

None

4.2.6.2. Description of QMI_CTL_INVALID_CLIENT_ID_IND

This indication may be generated when a QMI service message is received with an invalid client ID specified.

NOTE:

There is no guarantee that this message will be generated. The QMI_CTL service may limit the generation rate of this indication to avoid overflowing the control path with frequent indications such as these.

4.2.7. QMI_CTL_SET_DATA_FORMAT

Indicates the MSM device of the data format used by the driver.

CTL message ID

0x0026

Version introduced

Major – 1, Minor – 1

4.2.7.1. Request – QMI_CTL_SET_DATA_FORMAT_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Data Format	Unknown	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Data Format
Length	1			2	
Value	→	enum8	data_format	1	Data format used by the driver. Values: • 0 – No QOS flow header • 1 – QOS flow header present

Optional TLVs

Name	Version introduced	Version last modified
Underlying Link Layer Protocol	Unknown	1.3
Uplink Data Aggregation Protocol	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Underlying Link Layer Protocol
Length	2			2	
Value	→	mask16	link_prot	2	Bitmask of the link protocols supported by the driver. If multiple protocols are supported, they are OR'ed together as a mask. Values: • 0x1 – 802.3 • 0x2 – IP
Type	0x11			1	Uplink Data Aggregation Protocol
Length	1			2	
Value	→	enum8	ul_data_agg_setting	1	Data aggregation protocol to be used for uplink data transfer. Values:

					• 0x0 – Disable data aggregation • 0x1 – TLP (Thin Layer Protocol)

4.2.7.2. Response – QMI_CTL_SET_DATA_FORMAT_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
Result Code	1.0	1.3

Optional TLVs

Name	Version introduced	Version last modified
Underlying Link Layer Protocol	Unknown	1.3
Configured Uplink Data Aggregation Protocol	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Underlying Link Layer Protocol
Length	2			2	
Value	→	mask16	link_prot	2	Link protocol used by the driver. Only one protocol in the response indicates the mode to be used. Values: • 0x1 – 802.3 • 0x2 – IP
Type	0x11			1	Configured Uplink Data Aggregation Protocol
Length	1			2	
Value	→	enum8	ul_data_agg_setting	1	Data aggregation protocol configured on the device. Values: • 0x0 – Disabled • 0x1 – TLP (Thin Layer Protocol)

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_INVALID_DATA_FORMAT	Value of the data format was incorrect

4.2.7.3. Description of QMI_CTL_SET_DATA_FORMAT REQ/RESP

Any change in data format should be performed only when the driver is initializing. The format should not be changed dynamically.

When the data format in the mandatory Data Format TLV is set to 1, the driver must add a 6-byte QOS flow header to the start of the data packet. This header is useful only if you want to access QOS when you are using a device that supports the QMI_QOS service. In the absence of QMI_QOS, the driver should not use this message. Instead, the driver should use the default data format (i.e., the QOS flow header is not present) or should set the data format to 0 if the driver needs to use this message for other TLVs.

If the driver does not receive a response or it receives an error response, the driver should assume that this data format is not supported. The default data format should be used (i.e., send the data packets without the QOS flow header).

Figure 4-2 illustrates the fields of the QOS flow header.

Field	Value
Version	1
Resvd	0 (for future use)
Flow_id	4-byte flow identifier indicating the flow to which the packet belongs; must be set to 0 if the packet belongs to the default (best effort) flow

Figure 4-2 QOS flow header

Figure 4-2 also illustrates how QMI_CTL messages are carried in a QMUX SDU.

NOTE:

The QOS flow header is present only in the up (reverse) link direction. It is not present in the down (forward) link direction.

If QOS in not used, the data format in the Mandatory Data Format TLV in the request must be set to a value of 0.

The default underlying link layer protocol is 802.3. To change the protocol to use another mode, such as Raw IP, the underlying link layer protocol optional TLV in the request must be used to specify the modes supported by the driver. The device then chooses the protocol and uses the underlying link layer protocol-optional TLV in the response to indicate the mode which is to be used by the driver.

The default data aggregation protocol setting is disabled by default on the device. To change the setting, the Uplink Data Aggregation Protocol optional TLV must be included in the request. The device then uses the

Configured Uplink Data Aggregation Protocol optional TLV in the response to reflect whether the setting took effect.

NOTE:

In the future, this interface will be deprecated and will be replaced by a new API.

5. Wireless Data Service (QMI_WDS)

The QMI_WDS provides a command set to interface to a wireless mobile station, providing IP connectivity and related value-added services. The QMI_WDS provides the following applications running on a host PC with commands related to IP data service over wireless radio networks:

- Data call setup and teardown
- Network registration and attach
- Packet transmission statistics
- Data bearer rate
- Data session profile management

It is expected that user-level applications, for example, connection managers and device drivers on the Terminal Equipment (TE), use QMI_WDS to access this functionality on the MSM™ device.

QMI_WDS is a QMI native service that conforms to the generalized behavior defined for QMI services, as defined in 80-VB816-1.

5.1. Theory of Operation

5.1.1. Generalized QMI Service Compliance

The QMI_WDS service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

5.1.2. WDS Service Type

WDS is assigned QMI service type 0x01.

5.1.3. Message Definition Template

5.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

5.1.4. QMI_WDS Fundamental Concepts

All data session related messages apply to RmNet only unless explicitly specified for DUN.

5.1.4.1. Data Session

A wireless MSM device supporting QMI_WDS provides packet data (Internet Protocol) service through a wireless network. This service provides APIs to start and end the wireless data session. Multiple control points might need to use the packet data session. If at least one control point has requested it, the wireless device attempts to establish the packet data session. If multiple control points request a wireless data session, the device maintains the session until all requesting control points release the data session.

5.1.4.2. Data Session Handle

A packet data handle is an opaque identifier that represents an active wireless data connection. When the control point starts a data session, the service assigns a pkt_data_handle to the control point. It is provided back to the service in the message issued by the control point to release its use of IP services.

5.1.4.3. Data Connection Status

The wireless data service can report various state information about the wireless data connection. The fundamental status reported to all control points is the connectivity status, or Packet_data_connection_state. This is a primary sequencing signal for the TE to begin using, that is, start Ipv4 address configuration, or discontinue use of Ipv4 service. Other state information that is exposed by the WDS service includes packet statistics, channel rate, and radio technology serving the data session. The control point can obtain this information via a polling interface (request/response messages) or by configuring the device to asynchronously report changes in other state information via indication messages.

5.1.4.4. QMI_WDS Profile

A QMI_WDS profile is a collection of configurable data session-related settings stored on the MSM device in persistent storage. When a data session is established using QMI_WDS, a profile might be referenced as the basis of the data session-related settings negotiated with the serving network. When a configured profile is referenced in this case, the device attempts to negotiate the preferred settings defined in the profile. The network might assign different settings to the device, however. The device might support storage of one or more QMI_WDS profiles. Each profile is uniquely identified by a profile index. A control point might add, modify, or delete a profile, and might refer to the profile when starting a data session. As of WDS version 1.1, profile parameters are defined only for 3GPP devices. The meanings of these parameters are further explained in 80-VB816-1. To date, only primary Packet Data Protocol (PDP) profiles are supported.

5.1.5. Service State Variables

5.1.5.1. Shared State Variables

Name	Description	Possible values	Default value	Arbitration
packet_data_ connection_ state	• Indicates whether a network connection has been established • Value of authenticating indicates that authentication started but not connected • Value of suspended indicates when the radio interface is in use by other services, for example, voice and data transfer are suspended temporarily	• Connected • Not connected • Authenticating • Suspended	Not connected when the device is initialized unless autoconnect is enabled and proper state conditions are met	• Connectivity attempted when at least one control point requests data service or enables autoconnect • Disconnected when all control points no longer require data service and autoconnect is disabled

5.1.5.2. State Variables Per Control Point

Name	Description	Possible values	Default value
report_channel_rate	Whether change in data channel Rx or Tx rate is reported to control point	• FALSE • TRUE	FALSE
pkt_stats_report_period	Period in seconds between transfer statistic reports	• 0 – Do not report • 1 to 255 (sec)	0
pkt_stats_report_mask	Which packet statistics to be reported (bitmask)	0x00 to 0x3F	0x00
report_data_bearer_tech	Whether change in data bearer technology is reported to control point	• FALSE • TRUE	FALSE
report_dormancy_status	Whether change in traffic-channel state is reported to control point	• FALSE • TRUE	FALSE
report_mip_status	Whether change in MIP status is reported to control point	• FALSE • TRUE	FALSE
report_current_data_ bearer_tech	Whether change in current data bearer technology is reported to control point	• FALSE • TRUE	FALSE
report_evdo_page_ monitor_period_change	Whether EV-DO page monitor period change event is reported to control point	• FALSE • TRUE	FALSE
report_data_call_status	Whether change in data call status is reported to control point	• FALSE • TRUE	FALSE
report_preferred_data_system	Whether change in preferred data system is reported to control point	• FALSE • TRUE	FALSE
report_data_system_status	Whether change in data system status is reported to control point	• FALSE • TRUE	FALSE
report_data_bearer_tech_ex	Whether change in data bearer technology extended is reported to control point	• FALSE • TRUE	FALSE
report_embms_tmgi_list	Whether to report the eMBMS TMGI list	• FALSE • TRUE	FALSE
suppress_pkt_srvc_ind	Whether to suppress the packet service status indication	• FALSE • TRUE	FALSE
report_extended_ip_config_change	Whether change in extended IP configuration is reported to control point	• FALSE • TRUE	FALSE

report_lte_attach_pdn_list_change	Whether change in LTE attach PDN list is reported to control point	• FALSE • TRUE	FALSE
report_reverse_ip_transport_filter_ setup	Whether to report a reverse IP transport filter setup	• FALSE • TRUE	FALSE
report_handoff_information	Whether to report handoff information	• FALSE • TRUE	FALSE

5.2. QMI_WDS Messages

Table 5-1 QMI_WDS messages

Command	ID	Description
QMI_WDS_SET_EVENT_REPORT	0x0001	Sets the wireless data connection state reporting conditions for the requesting control point.
QMI_WDS_SET_EVENT_REPORT_IND	0x0001	Indicates the WDS connection related state change.
QMI_WDS_ABORT	0x0002	Aborts a previously issued QMI_WDS command.
QMI_WDS_START_NETWORK_INTERFACE	0x0020	Activates a packet data session (if not already started) on behalf of the requesting control point.
QMI_WDS_STOP_NETWORK_INTERFACE	0x0021	Deactivates a packet data session (unless in use by other control points) on behalf of the requesting control point.
QMI_WDS_GET_PKT_SRVC_STATUS	0x0022	Queries the current packet data connection status.
QMI_WDS_GET_PKT_SRVC_STATUS_IND	0x0022	Indicates a change in the current packet data connection status.
QMI_WDS_GET_CURRENT_CHANNEL_ RATE	0x0023	Queries the current bitrate of the packet data connection.
QMI_WDS_MODIFY_PROFILE_SETTINGS	0x0028	Changes the settings in a configured profile.
QMI_WDS_GET_PROFILE_LIST	0x002A	Retrieves a list of configured profiles present on the wireless device.
QMI_WDS_GET_PROFILE_SETTINGS	0x002B	Retrieves the settings from a configured profile
QMI_WDS_GET_RUNTIME_SETTINGS	0x002D	Retrieves the packet data session settings currently in use.
QMI_WDS_GET_DORMANCY_STATUS	0x0030	Queries the current traffic channel status.
QMI_WDS_GET_DATA_BEARER_ TECHNOLOGY	0x0037	Queries the current data bearer technology. (Deprecated)
QMI_WDS_GET_CURRENT_DATA_BEARER_ TECHNOLOGY	0x0044	Queries the current data bearer technology. (Deprecated)
QMI_WDS_SET_CLIENT_IP_FAMILY_PREF	0x004D	Sets the control point IP preference.
QMI_WDS_GET_DATA_BEARER_ TECHNOLOGY_EX	0x0091	Queries the data bearer technology.

5.2.1. QMI_WDS_SET_EVENT_REPORT

Sets the wireless data connection state reporting conditions for the requesting control point.

WDS message ID

0x0001

Version introduced

Major – 1, Minor – 0

5.2.1.1. Request – QMI_WDS_SET_EVENT_REPORT_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Current Channel Rate Indicator	1	1
Transfer Statistics Indicator	Unknown	1.24
Data Bearer Technology Indicator	1.4	1.22 (Deprecated)
Dormancy Status indicator	1.3	1.3
MIP Status Indicator	Unknown	1.12
Current Data Bearer Technology Indicator	Unknown	1.102 (Deprecated)
Data Call Status Change Indicator	Unknown	1.16
Current Preferred Data System Indicator	Unknown	1.16
EV-DO Page Monitor Period Change Indicator	Unknown	1.14
Data System Status Change Indicator	Unknown	1.102 (Deprecated)
Uplink Flow Control Indicator	1.26	1.26
Limited Data System Status Change Indicator	1.34	1.102 (Deprecated)
Additional PDN Filters Removal Indicator	1.36	1.36
Data Bearer Technology Extended Indicator	1.41	1.41
Delay Dormancy Result Indicator	1.107	1.107

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Current Channel Rate Indicator
Length	1			2	
Value	→	boolean	report_channel_rate	1	Values: • 0 – Do not report • 1 – Report channel rate when it changes
Type	0x11			1	Transfer Statistics Indicator
Length	5			2	
Value	→	uint8	stats_period	1	Period between transfer statistics reports.

					Values: • 0 – Do not report • Other – Period between reports (in seconds)
		mask32	stats_mask	4	Requested statistic bitmask. Values: • 0x00000001 – Tx packets OK • 0x00000002 – Rx packets OK • 0x00000004 – Tx packet errors • 0x00000008 – Rx packet errors • 0x00000010 – Tx overflows • 0x00000020 – Rx overflows • 0x00000040 – Tx bytes OK • 0x00000080 – Rx bytes OK • 0x00000100 – Tx packets dropped • 0x00000200 – Rx packets dropped Each bit set causes the corresponding optional TLV to be sent in QMI_WDS_EVENT_REPORT_IND. All unlisted bits are reserved for future use and must be set to zero.
Type	0x12			1	Data Bearer Technology Indicator (Deprecated)
Length	1			2	
Value	→	boolean	report_data_bearer_tech	1	Values: • 0 – Do not report • 1 – Report radio interface used for data transfer when it changes
Type	0x13			1	Dormancy Status indicator
Length	1			2	
Value	→	boolean	report_dormancy_status	1	Values: • 0 – Do not report • 1 – Report traffic channel state of interface used for data connection
Type	0x14			1	MIP Status Indicator
Length	1			2	
Value	→	boolean	report_mip_status	1	Values: • 0 – Do not report • 1 – Report MIP status
Type	0x15			1	Current Data Bearer Technology Indicator (Deprecated)
Length	1			2	
Value	→	boolean	report_current_data_ bearer_tech	1	Values: • 0 – Do not report • 1 – Report current data bearer technology when it changes
Type	0x17			1	Data Call Status Change Indicator
Length	1			2	
Value	→	boolean	report_data_call_status_ change	1	Values: • 0 – Do not report • 1 – Report data call status change when it changes
Type	0x18			1	Current Preferred Data System Indicator
Length	1			2	
Value	→	boolean	report_preferred_data_	1	Values:

			system		• 0 – Do not report • 1 – Report preferred data system when it changes
Type	0x19			1	EV-DO Page Monitor Period Change Indicator
Length	1			2	
Value	→	boolean	report_evdo_page_ monitor_period_change	1	Values: • 0 – Do not report • 1 – Report EV-DO page monitor period change event
Type	0x1A			1	Data System Status Change Indicator (Deprecated)
Length	1			2	
Value	→	boolean	report_data_system_status	1	Values: • 0 – Do not report • 1 – Report data system status change event
Type	0x1B			1	Uplink Flow Control Indicator
Length	1			2	
Value	→	boolean	report_uplink_flow_control	1	Values: • 0 – Do not report • 1 – Report uplink flow control change event
Type	0x1C			1	Limited Data System Status Change Indicator (Deprecated)
Length	1			2	
Value	→	boolean	limited_data_system_status	1	Values: • 0 – Do not report limited data system status • 1 – Report interfamily transition of data system status Indications for transition between RATs belonging to two different families are reported. Control points are expected to deregister from Data System Status Change Indicator reporting (using TLV 0x1A) and register for the Limited Data System Status Change Indicator (to only get QMI_WDS_EVENT_REPORT_IND with the Data System Status TLV (0x24) for interfamily system status changes). WCDMA family : • WCDMA • HSDPA • HSUPA • HSDPA+ • DC_HSDPA+ • 64_QAM GSM family • GPRS • EDGE

					LTE family • LTE TD-SCDMA family • TD-SCDMA
Type	0x1D			1	Additional PDN Filters Removal Indicator
Length	1			2	
Value	→	boolean	report_additional_pdn_ filters_removal	1	Values: • 0 – Do not report • 1 – Report additional PDN filters removal event
Type	0x1E			1	Data Bearer Technology Extended Indicator
Length	1			2	
Value	→	boolean	report_data_bearer_ tech_ex	1	Values: • 0 – Do not report • 1 – Report data bearer technology extended when it changes
Type	0x1F			1	Delay Dormancy Result Indicator
Length	1			2	
Value	→	boolean	report_delay_dormancy_ result	1	Values: • 0 – Do not report • 1 – Report delay dormancy result

5.2.1.2. Response – QMI_WDS_SET_EVENT_REPORT_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request

5.2.1.3. Description of QMI_WDS_SET_EVENT_REPORT REQ/RESP

The control point event reporting state variables are modified to reflect the settings indicated in the TLVs that are present in the request message. The service maintains a set of state variables for each control point. See Section 5.1.5.2 for a list of state variables and their explanations.

Relevant wireless data connection state changes are communicated to the registered WDS control point via the QMI_WDS_EVENT_REPORT_IND indication.

The AT command equivalents to this command are AT+CMER, AT+CIND, and AT+CIEV (refer to 3GPP TS 27.007).

5.2.2. QMI_WDS_SET_EVENT_REPORT_IND

Indicates the WDS connection related state change.

WDS message ID

0x0001

Version introduced

Major – 1, Minor – 0

5.2.2.1. Indication – QMI_WDS_EVENT_REPORT_IND

Message type

Indication

Sender

Service

Indication scope

Unicast (per control point)

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Tx Packets OK	1.0	1.0
Rx Packets OK	1.0	1.0
Tx Packet Errors	1.0	1.0
Rx Packet Errors	1.0	1.0
Tx Overflows	1.0	1.0
Rx Overflows	1.0	1.0
Channel Rate	1.0	1.0
Data Bearer Technology	1.0	1.30 (Deprecated)
Dormancy Status	Unknown	1.3
Tx Bytes OK	Unknown	1.1
Rx Bytes OK	Unknown	1.1
MIP Status	Unknown	1.12
Current Data Bearer Technology	1.1	1.102 (Deprecated)
Data Call Status Change	Unknown	1.16
Current Preferred Data System	1.16	1.22
Data Call Type	Unknown	1.19
EV-DO Page Monitor Period Change	Unknown	1.14
Data System Status	1.18	1.102 (Deprecated)
Tx Packets Dropped	1.24	1.24
Rx Packets Dropped	1.24	1.24
Uplink Flow Control	1.26	1.26
Data Call Address Family	1.29	1.29
Additional PDN Filters Removed	1.36	1.36

Data Bearer Technology Extended	1.41	1.101
Uplink Flow Control Sequence Number	1.5	1.5
Delay Dormancy Result Indicator	1.107	1.107

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Tx Packets OK
Length	4			2	
Value	→	uint32	tx_ok_count	4	Number of packets transmitted without error.
Type	0x11			1	Rx Packets OK
Length	4			2	
Value	→	uint32	rx_ok_count	4	Number of packets received without error.
Type	0x12			1	Tx Packet Errors
Length	4			2	
Value	→	uint32	tx_err_count	4	Number of outgoing packets with framing errors.
Type	0x13			1	Rx Packet Errors
Length	4			2	
Value	→	uint32	rx_err_count	4	Number of incoming packets with framing errors.
Type	0x14			1	Tx Overflows
Length	4			2	
Value	→	uint32	tx_ofl_count	4	Number of packets dropped because Tx buffer overflowed (out of memory).
Type	0x15			1	Rx Overflows
Length	4			2	
Value	→	uint32	rx_ofl_count	4	Number of packets dropped because Rx buffer overflowed (out of memory).
Type	0x16			1	Channel Rate
Length	8			2	
Value	→	uint32	current_channel_tx_rate	4	Max channel Tx rate in bits per second.
		Uint32	current_channel_rx_rate	4	Max channel Rx rate in bits per second.
Type	0x17			1	Data Bearer Technology (Deprecated)
Length	1			2	
Value	→	enum8	data_bearer_tech	1	Values: • 0x01 – cdma2000® 1X • 0x02 – cdma2000® HRPD (1xEV-DO) • 0x03 – GSM • 0x04 – UMTS • 0x05 –cdma2000® HRPD (1xEV-DO RevA) • 0x06 – EDGE • 0x07 – HSDPA and WCDMA • 0x08 – WCDMA and HSUPA • 0x09 – HSDPA and HSUPA • 0x0A – LTE • 0x0B – cdma2000® EHRPD • 0x0C – HSDPA+ and WCDMA • 0x0D – HSDPA+ and HSUPA • 0x0E – DC_HSDPA+ and WCDMA • 0x0F – DC_HSDPA+ and HSUPA • 0x10 – HSDPA+ and 64QAM • 0x11 – HSDPA+, 64QAM, and HSUPA

					• 0x12 – TD-SCDMA • 0x13 – TD-SCDMA and HSDPA • 0x14 – TD-SCDMA and HSUPA • 0x15 – IWLAN S2B • -1 – Unknown
Type	0x18			1	Dormancy Status
Length	1			2	
Value	→	enum8	dormancy_status	1	Values: • WDS_DORMANCY_STATUS_ DORMANT (0x01) – Traffic channel Dormant • WDS_DORMANCY_STATUS_ ACTIVE (0x02) – Traffic channel active
Type	0x19			1	Tx Bytes OK
Length	8			2	
Value	→	uint64	tx_ok_bytes_count	8	Number of bytes transmitted without error
Type	0x1A			1	Rx Bytes OK
Length	8			2	
Value	→	uint64	rx_ok_bytes_count	8	Number of bytes received without error
Type	0x1B			1	MIP Status
Length	1			2	
Value	→	uint8	mip_status	1	Status of the last MIP call (or attempt). Values: • 0x00 – Success • 0 – Error code (as defined in RFC 2002)
Type	0x1D			1	Current Data Bearer Technology (Deprecated)
Length	9			2	
Value	→	enum8	current_nw	1	Current network type of data bearer. Values: • WDS_CURRENT_NETWORK_ UNKNOWN (0x00) – Unknown • WDS_CURRENT_NETWORK_3GPP2 (0x01) – 3GPP2 • WDS_CURRENT_NETWORK_3GPP (0x02) – 3GPP
		uint32	rat_mask	4	RAT mask to indicate the type of technology. A RAT mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE • 0x8000 – NULL_BEARER CDMA RAT mask: • 0x01 – CDMA_1X • 0x02 – EVDO_REV0 • 0x04 – EVDO_REVA • 0x08 – EVDO_REVB • 0x10 – EHRPD • 0x20 – FMC UMTS RAT mask: • 0x01 – WCDMA • 0x02 – GPRS

					• 0x04 – HSDPA • 0x08 – HSUPA • 0x10 – EDGE • 0x20 – LTE • 0x40 – HSDPA+ • 0x80 – DC_HSDPA+ • 0x100 – 64_QAM • 0x200 – TD-SCDMA
		uint32	so_mask	4	SO mask to indicate the service option or type of application. An SO mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE CDMA 1X SO mask: • 0x01 – CDMA_1X_IS95 • 0x02 – CDMA_1X_IS2000 • 0x04 – CDMA_1X_IS2000_REL_A CDMA EV-DO Rev 0 SO mask: • 0x01 – DPA CDMA EV-DO Rev A SO mask: • 0x01 – DPA • 0x02 – MFPA • 0x04 – EMPA • 0x08 – EMPA_EHRPD CDMA EV-DO Rev B SO mask: • 0x01 – DPA • 0x02 – MFPA • 0x04 – EMPA • 0x08 – EMPA_EHRPD • 0x10 – MMPA • 0x20 – MMPA_EHRPD
Type	0x1F			1	Data Call Status Change
Length	1			2	
Value	→	enum8	data_call_status	1	Values: • WDS_DATA_CALL_UNKNOWN (0x00) – Unknown • WDS_DATA_CALL_ACTIVATED (0x01) – Data call activated • WDS_DATA_CALL_TERMINATED (0x02) – Data call terminated
Type	0x20			1	Current Preferred Data System
Length	4			2	
Value	→	enum	current_sys	4	Values: • WDS_CURR_PREF_SYS_UNKNOWN (0x00) – Unknown • WDS_CURR_PREF_SYS_CDMA_ 1X (0x01) – CMDA_1X • WDS_CURR_PREF_SYS_EVDO (0x02) – EVDO

					• WDS_CURR_PREF_SYS_GPRS (0x03) – GPRS • WDS_CURR_PREF_SYS_WCDMA (0x04) – WCDMA • WDS_CURR_PREF_SYS_LTE (0x05) – LTE • WDS_CURR_PREF_SYS_TDSCDMA (0x06) – TD-SCDMA
Type	0x22			1	Data Call Type
Length	2			2	
Value	→	enum8	data_call_type	1	Values: • WDS_DATA_CALL_NONE (0x00) –None • WDS_DATA_CALL_EMBEDDED (0x01) – Embedded call (application) • WDS_DATA_CALL_TETHERED (0x02) – Tethered call • WDS_DATA_CALL_MODEM_ EMBEDDED (0x03) – Modem embedded call
		enum8	tethered_call_type	1	Values: • WDS_TETHERED_CALL_NONE (0x00) – Non-tethered call • WDS_TETHERED_CALL_RMNET (0x01) – RmNet call • WDS_TETHERED_CALL_DUN (0x02) – DUN call
Type	0x23			1	EV-DO Page Monitor Period Change
Length	2			2	
Value	→	enum8	evdo_page_monitor_ period_change	1	EV-DO slot cycle and long sleep info.
		Boolean	evdo_force_long_sleep	1	Set to 1 if EV-DO is forced to ignore the slot cycle setting and instead sleep for long periods, potentially missing pages
Type	0x24			1	Data System Status (Deprecated)
Length	Var			2	
Value	→	enum8	preferred_network	1	Values: • WDS_SYS_NETWORK_3GPP (0x00) – 3GPP • WDS_SYS_NETWORK_3GPP2 (0x01) – 3GPP2
		uint8	network_info_len	1	Number of sets of the following elements: • network • rat_mask • so_mask
		enum8	network	1	Values: • WDS_SYS_NETWORK_3GPP (0x00) – 3GPP • WDS_SYS_NETWORK_3GPP2 (0x01) – 3GPP2
		uint32	rat_mask	4	RAT mask to indicate the type of technology. A RAT mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE • 0x8000 – NULL_BEARER

					CDMA RAT mask: • 0x01 – CDMA_1X • 0x02 – EVDO_REV0 • 0x04 – EVDO_REVA • 0x08 – EVDO_REVB • 0x10 – EHRPD • 0x20 – FMC UMTS RAT mask: • 0x01 – WCDMA • 0x02 – GPRS • 0x04 – HSDPA • 0x08 – HSUPA • 0x10 – EDGE • 0x20 – LTE • 0x40 – HSDPA+ • 0x80 – DC_HSDPA+ • 0x100 – 64_QAM • 0x200 – TD-SCDMA • 0x400 – LTE FDD • 0x800 – LTE TDD
		uint32	so_mask	4	SO mask to indicate the service option or type of application. An SO mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE CDMA 1X SO mask: • 0x01 – CDMA_1X_IS95 • 0x02 – CDMA_1X_IS2000 • 0x04 – CDMA_1X_IS2000_REL_A CDMA EV-DO Rev 0 SO mask: • 0x01 – DPA CDMA EV-DO Rev A SO mask: • 0x01 – DPA • 0x02 – MFPA • 0x04 – EMPA • 0x08 – EMPA_EHRPD CDMA EV-DO Rev B SO mask: • 0x01 – DPA • 0x02 – MFPA • 0x04 – EMPA • 0x08 – EMPA_EHRPD • 0x10 – MMPA • 0x20 – MMPA_EHRPD
Type	0x25			1	Tx Packets Dropped
Length	4			2	
Value	→	uint32	tx_dropped_count	4	Number of outgoing packets dropped.
Type	0x26			1	Rx Packets Dropped
Length	4			2	

Value	→	uint32	rx_dropped_count	4	Number of incoming packets dropped.
Type	0x27			1	Uplink Flow Control
Length	1			2	
Value	→	boolean	uplink_flow_control	1	Uplink flow control status. Values: • 0 – Not flow controlled • 1 – Flow controlled
Type	0x28			1	Data Call Address Family
Length	4			2	
Value	→	enum	data_call_addr_family	4	Data call address family. This TLV is sent in conjunction with the Data Call Status Change TLV (0x1F) to indicate the IP family type of the call activated or terminated. Values: • WDS_DATA_CALL_ADDR_FAMILY_ UNKNOWN (0) – Unknown • WDS_DATA_CALL_ADDR_FAMILY_ IPV4 (4) – Ipv4 • WDS_DATA_CALL_ADDR_FAMILY_ IPV6 (6) – Ipv6 Note: For legacy control points that do not bind to an IP type or do not specify the IP type when bringing up a call, unknown is returned if the call fails.
Type	0x29			1	Additional PDN Filters Removed
Length	Var			2	
Value	→	uint8	removed_filter_handles_ len	1	Number of sets of the following elements: • removed_filter_handles
		uint32	removed_filter_handles	Var	Removed filter handles. This TLV contains the list of all removed filters that were set by the client on the RmNet port. Each filter is identified by a filter handle.
Type	0x2A			1	Data Bearer Technology Extended
Length	16			2	
Value	→	enum	technology	4	Technology type. Values: • WDS_BEARER_TECH_NETWORK_ 3GPP (0) – 3GPP • WDS_BEARER_TECH_NETWORK_ 3GPP2 (1) – 3GPP2
		enum	rat_value	4	RAT value. Values: • WDS_BEARER_TECH_RAT_EX_ NULL_BEARER (0x00) – NULL bearer • WDS_BEARER_TECH_RAT_EX_ 3GPP_WCDMA (0x01) – 3GPP WCDMA • WDS_BEARER_TECH_RAT_EX_ 3GPP_GERAN (0x02) – 3GPP GERAN • WDS_BEARER_TECH_RAT_EX_ 3GPP_LTE (0x03) – 3GPP LTE • WDS_BEARER_TECH_RAT_EX_ 3GPP_TDSCDMA (0x04) – 3GPP TD-SCDMA • WDS_BEARER_TECH_RAT_EX_ 3GPP_WLAN (0x05) – 3GPP WLAN • WDS_BEARER_TECH_RAT_EX_ 3GPP_MAX (0x64) – 3GPP maximum • WDS_BEARER_TECH_RAT_EX_

					3GPP2_1X (0x65) – 3GPP2 1X • WDS_BEARER_TECH_RAT_EX_ 3GPP2_HRPD (0x66) – 3GPP2 HRPD • WDS_BEARER_TECH_RAT_EX_ 3GPP2_EHRPD (0x67) – 3GPP2 EHRPD • WDS_BEARER_TECH_RAT_EX_ 3GPP2_WLAN (0x68) – 3GPP2 WLAN • WDS_BEARER_TECH_RAT_EX_ 3GPP2_MAX (0xC8) – 3GPP2 maximum
		mask	so_mask	8	SO mask to indicate the service option or type of application. An SO mask value of zero indicates that this field is ignored. Values: • 0x00 – SO mask unspecified 3GPP SO mask: • 0x01 – WCDMA • 0x02 – HSDPA • 0x04 – HSUPA • 0x08 – HSDPAPLUS • 0x10 – DC HSDPAPLUS • 0x20 – 64 QAM • 0x40 – HSPA • 0x80 – GPRS • 0x100 – EDGE • 0x200 – GSM • 0x400 – S2B • 0x800 – LTE limited service • 0x1000 – LTE FDD • 0x2000 – LTE TDD • 0x4000 – TD-SCDMA • 0x8000 – DC HSUPA • 0x10000 – LTE CA DL • 0x20000 – LTE CA UL 3GPP2 SO mask: • 0x01000000 – 1X IS95 • 0x02000000 – 1X IS2000 • 0x04000000 – 1X IS2000 REL A • 0x08000000 – HDR REV0 DPA • 0x10000000 – HDR REVA DPA • 0x20000000 – HDR REVB DPA • 0x40000000 – HDR REVA MPA • 0x80000000 – HDR REVB MPA • 0x100000000 – HDR REVA EMPA • 0x200000000 – HDR REVB EMPA • 0x400000000 – HDR REVB MMPA • 0x800000000 – HDR EVDO FMC
Type	0x2B			1	Uplink Flow Control Sequence Number
Length	2			2	
Value	→	uint16	uplink_fc_seq_num	2	Sequence number of each flow enable and disable event. This TLV is sent with the Uplink Flow Control TLV. Each time the flow

					is disabled (flow controlled), the sequence number is increased. It can be used in conjunction with the QMAP in-band flow control sequence number to determine the validity of the message received by the control point.
Type	0x2C			1	Delay Dormancy Result Indicator
Length	5			2	
Value	→	uint8	status	1	Status. Values: • 0x00 – Success • 0x01 – Failure
		enum	dormancy_failure_reason	4	Values: • WDS_DORM_FAIL_NONE (0) – No failure • WDS_DORM_FAIL_RRC (1) – Failure – RRC • WDS_DORM_FAIL_DATA_ACTIVITY (2) – Failure – Data activity • WDS_DORM_FAIL_OTHER_PDN_ UP (3) – Failure – Another PDN is up • WDS_DORM_FAIL_INVALID_ PDN_STATE (4) – Failure – Invalid PDN state

5.2.2.2. Description of QMI_WDS_SET_EVENT_REPORT_IND

This unsolicited command is sent by the service to relevant control points when the device state corresponds to any TLV changes. Relevant control points are those that previously registered for the corresponding state to be reported, using the QMI_WDS_SET_EVENT_REPORT_REQ command.

The data transfer statistic TLVs included in the indication are based on the control point pkt_stats_report_mask state variable. The indication command is sent each pkt_stats_report_period seconds.

When a control point report_data_bearer_tech state variable is set, an indication command, including the data bearer technology TLV, is sent when the data bearer changes. This TLV is deprecated from QMI WDS version 1.4. The TLV is retained for backward compatibility, but no additional functionality is added to it.

When a control point report_current data_bearer_tech state variable is set, an indication command, including the current data bearer technology TLV, is sent when the current data bearer technology changes.

This TLV is deprecated from QMI WDS version 1.102. Both the Data Bearer Technology and Current Data Bearer Technology TLVs are replaced by the Data Bearer Technology Extended TLV.

When a control point report_channel_rate state variable is set, an indication command including the channel rate TLV is sent when the channel rates change. The Channel Rate TLV indicates the maximum channel rates that are supported for the current serving radio interface.

When a control point report_dormancy_status variable is set, the Dormancy Status TLV is included if the traffic channel state has changed since an indication was last sent to the control point.

When a control point report_mip_error variable is set, the MIP Status TLV is included if a MIP error is received from the network. Such errors do not mean the data connection request has failed and the current state must be queried using the QMI_WDS_GET_PKT_SRVC_STATUS request (see Section 5.2.6).

When a control point report_evdo_page_monitor_period_change state variable is set, an indication command is sent when the EV-DO slot cycle changes. The EV-DO slot cycle can be changed by the network, by a QMI_WDS control point, or autonomously by the modem for example, EV-DO session close.

When a control point report_data_call_status_change variable is set, an indication command including the Data Call Status Change TLV is sent when there is a data call status change, that is, a new packet data call is established or a packet data call is terminated. Additional TLVs might be present based on the version (Data Call Type TLV in revision 1.19 and newer, Data Call Address Family TLV in revision 1.29 and newer).

These TLVs provide additional information about the packet data call status.

When a control point report_preferred_data_system variable is set, an indication command including the Preferred Data System TLV is sent when the preferred data system changes. The Preferred Data System TLV provides the preferred data system specified by the current state of the modem. The preferred data system indicates the cellular packet data system that is the preferred system among multiple potentially available data systems for providing data services.

When a control point report_data_system_status state variable is set, an indication is sent when the system status changes (for example, during handoff process). The indication has the system status information about the preferred network and the RAT and SO mask for all the networks. This TLV is deprecated in favor of QMI_DSD_SYSTEM_STATUS_CHANGE.

When a control point limited_data_system_status state variable is set, an indication is sent when the system status changes between interfamily RATs (for example, during the handoff process between RATs belonging to two different families). The indication has the system status information about the preferred network and the RAT and SO mask for all the networks. If both limited_data_system_status and report_data_system_status state variables are set, an indication is sent for all data system status changes (that is, inter and intra family RAT changes). This TLV is deprecated, instead use limit_so_mask_change_ind within QMI_DSD_SYSTEM_STATUS_CHANGE.

When a control point report_uplink_flow_control state variable is set, an indication is sent when the uplink flow control status changes. The Uplink Flow Control TLV and Uplink Flow Control Sequence Number TLV indicate whether the current data call is flow controlled on the uplink.

When a control point report_additional_pdn_filters_removal variable is set, an indication is sent when the additional PDN filters are removed on the device. The filters are removed when the packet data session that was used by the additional PDN is ended. The indication contains the Additional PDN Filters Removed TLV, which holds the list of filter handles that were removed.

When a control point report_delay_dormancy_result state variable is set and the control point sends the QMI_WDS_GO_DORMANT request with success in the response message to the device, an indication is sent with the delay_dormancy_result TLV after delay_timer expires (if it is configured in the QMI_WDS_GO_DORMANT request) or immediately if delay_timer is not configured in the QMI_WDS_GO_DORMANT request.

The AT command equivalents of this command are AT+CMER, AT+CIND, and AT+CIEV defined in 3GPP TS 27.007.

5.2.3. QMI_WDS_ABORT

Aborts a previously issued QMI_WDS command.

WDS message ID

0x0002

Version introduced

Major – 1, Minor – 0

5.2.3.1. Request – QMI_WDS_ABORT_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
TX_ID	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	TX_ID
Length	2			2	
Value	→	uint16	tx_id	2	Transaction ID of the request to be aborted.

Optional TLVs

None

5.2.3.2. Response – QMI_WDS_ABORT_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request

QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_INVALID_TX_ID	TX_ID supplied in the request does not match any pending transaction in WDS, that is, either the transaction was not received or it has already been executed by the device
QMI_ERR_UNABORTABLE_ TRANSACTION	Transaction cannot be aborted
QMI_ERR_INCOMPATIBLE_STATE	Request from a client whose subscription does not match the subscription of the current data session (incompatible subscription)

5.2.3.3. Description of QMI_WDS_ABORT REQ/RESP

This command aborts a previously issued QMI_WDS command. It is useful for requests that take a long time to execute, in the case where the user is no longer interested in the result.

The following QMI_WDS message can be aborted:

- QMI_WDS_START_NETWORK_INTERFACE_REQ

5.2.4. QMI_WDS_START_NETWORK_INTERFACE

Activates a packet data session (if not already started) on behalf of the requesting control point.

WDS message ID

0x0020

Version introduced

Major – 1, Minor – 0

5.2.4.1. Request – QMI_WDS_START_NETWORK_INTERFACE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Primary DNS Address Preference	Unknown	1.1
Secondary DNS Address Preference	Unknown	1.1
Primary NetBIOS Name Server Address Preference	Unknown	1.1
Secondary NBNS Address Preference	Unknown	1.1
Context Access Point Node Name	Unknown	1.1
IP Address Preference	Unknown	1.1
Authentication Preference	Unknown	1.1
Username	Unknown	1.1
Password	Unknown	1.1
IP Family Preference	Unknown	1.7
Technology Preference	Unknown	1.1
3GPP Configured Profile Identifier	Unknown	1.1
3GPP2 Configured Profile Identifier	Unknown	1.6
Enable Autoconnect	Unknown	1.12
Extended Technology Preference	Unknown	1.132
Call Type Identifier	Unknown	1.8
Handoff Context	1.44	1.44
IP Stream ID	1.45	1.45
APN Type Enum	1.84	1.122
Disallow Data Call In Roaming	1.126	1.126
Enable MO Exceptional Data Capability	1.131	1.131

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Primary DNS Address Preference
Length	4			2	

Value	→	uint32	primary_DNS_Ipv4_address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x11			1	Secondary DNS Address Preference
Length	4			2	
Value	→	uint32	secondary_DNS_Ipv4_address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x12			1	Primary NetBIOS Name Server (NBNS) Address Preference
Length	4			2	
Value	→	uint32	primary_nbns_address_pref	4	Primary NBNS address. The specified Ipv4 address is requested as the primary NBNS server during data session establishment. If it is not provided, the primary NBNS server address is obtained automatically from the network. The result of negotiation (the assigned address) is provided to the host via DHCP
Type	0x13			1	Secondary NBNS Address Preference
Length	4			2	
Value	→	uint32	secondary_nbns_address_pref	4	Secondary NetBIOS name server address. The specified Ipv4 address is requested as the secondary NBNS server during data session establishment. If not provided, the secondary NBNS server address is obtained automatically from the network. The result of negotiation (the assigned address) is provided to the host via DHCP.
Type	0x14			1	Context Access Point Node (APN) Name
Length	Var			2	
Value	→	string	apn_name	Var	String parameter that is a logical name used to select the GGSN and external packet data network. If the value is NULL or omitted, the subscription default value is requested. QMI_ERR_ARG_TOO_LONG is returned if the APN name is too long. This TLV is ignored if the 3GPP-configured profile TLV is present, that is, the APN name cannot be overridden.
Type	0x15			1	IP Address Preference
Length	4			2	
Value	→	uint32	ipv4_address_pref	4	The preferred Ipv4 address to be assigned to the TE. The actual assigned address is negotiated with the network and might differ from this value. If not specified, the Ipv4 Address is obtained automatically from the

					network. The assigned value is provided to the host via DHCP.
Type	0x16			1	Authentication Preference
Length	1			2	
Value	→	mask8	authentication_preference	1	Bitmap that indicates the authentication algorithm preference. Values: Bit 0 – PAP preference: • 0 – PAP is never performed • 1 – PAP might be performed Bit 1 – CHAP preference: • 0 – CHAP is never performed • 1 – CHAP might be performed All other bits are reserved and ignored even if they are set in the request. If more than one bit is set, the device decides which authentication procedure is performed while setting up the data session. For example, the device might have a policy to select the most secure authentication mechanism.
Type	0x17			1	Username
Length	Var			2	
Value	→	string	username	Var	Username to use during data network authentication. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x18			1	Password
Length	Var			2	
Value	→	string	password	Var	Password used during data network authentication. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x19			1	IP Family Preference
Length	1			2	
Value	→	enum8	ip_family_preference	1	If this TLV is absent, the device attempts to bring up a call on default IP preference (currently Ipv4, to maintain current behavioral backward compatibility). Values: • 4 – Ipv4 • 6 – Ipv6 • 8 – Unspecified
Type	0x30			1	Technology Preference
Length	1			2	
Value	→	mask8	technology_preference	1	Bitmap that indicates the technology preference. A single connection is attempted using the following specified technology preferences: • Bit 0 – 3GPP • Bit 1 – 3GPP2 All other bits are reserved and ignored even if

					they are set in the request. If a single value of the technology preference bitmask is set, the device attempts to use that technology. If two or more bits in the technology preference bitmask are set, the device determines which technology to use from the bits specified. If this TLV is absent, the device assumes that all supported technologies are acceptable.
Type	0x31			1	3GPP Configured Profile Identifier
Length	1			2	
Value	→	uint8	profile_index	1	Index of the configured profile on which data call parameters are based (other TLVs present override the profile settings). If this TLV is not present, the data call parameters are based on device default settings for each parameter.
Type	0x32			1	3GPP2 Configured Profile Identifier
Length	1			2	
Value	→	uint8	profile_index_3gpp2	1	Index of the configured profile on which data call parameters are based (other TLVs present override the profile settings). If this TLV is not present, data call parameters are based on device default settings for each parameter.
Type	0x33			1	Enable Autoconnect
Length	1			2	
Value	→	boolean	enable_autoconnect	1	• 1 – TRUE – Device attempts to bring up a call automatically • 0 – FALSE – Default **Note:** When this TLV is used, the override parameters passed in other TLVs in this message are ignored by the device.
Type	0x34			1	Extended Technology Preference
Length	2			2	
Value	→	enum16	ext_technology_preference	2	Technology preference used while attempting a packet data connection. Values: • -32767 – CDMA • -32764 – UMTS • -30590 – eMBMS • -30584 – Modem Link Local • -30588 – Non IP Modem Link Local is an interface for transferring data between entities on the AP and modem.
Type	0x35			1	Call Type Identifier
Length	1			2	
Value	→	enum8	call_type	1	Type of call to be originated. Values: • WDS_CALL_TYPE_LAPTOP_CALL (0x00) – Laptop call • WDS_CALL_TYPE_EMBEDDED_CALL (0x01) – Embedded call If this TLV is not present, by default the call is considered to be a laptop call.
Type	0x36			1	Handoff Context

					Context information needed if the TE is handing off a call to the modem.
Length	21			2	
Value	→	uint32	ipv4_addr	4	Ipv4 address of the PDN.
		Uint8	ipv6_address	16	Ipv6 address of the PDN.
		Enum8	bearer_ip_type	1	Type of bearer IP. Values: • WDS_IP_SUPPORT_TYPE_IPV4 (0x00) – Ipv4 • WDS_IP_SUPPORT_TYPE_IPV6 (0x01) – Ipv6 • WDS_IP_SUPPORT_TYPE_IPV4V6 (0x02) – Ipv4 and Ipv6
Type	0x37			1	IP Stream ID
Length	1			2	
Value	→	uint8	ips_id	1	IP stream ID associated with the data call.
Type	0x38			1	APN Type Enum
Length	4			2	
Value	→	enum	apn_type	4	Values: • WDS_APN_TYPE_UNSPECIFIED (0) – APN type unspecified • WDS_APN_TYPE_INTERNET (1) – APN type for internet traffic • WDS_APN_TYPE_IMS (2) – APN type for IMS • WDS_APN_TYPE_VSIM (3) – APN type for virtual or remote SIM
Type	0x39			1	Disallow Data Call In Roaming
Length	1			2	
Value	→	boolean	disallow_in_roaming	1	Values: • 1 – TRUE – Disallow the call if the device is in roaming during call bring up • 0 – FALSE – Default
Type	0x3A			1	Enable MO Exceptional Data Capability
Length	1			2	
Value	→	boolean	mo_exceptional_data_capability	1	Values: • 1 – TRUE – Device attempts to bring up a call that supports mobile-originated (MO) exceptional data. Applications should only bring up an MO exceptional call when they want to send MO exception data. • 0 – FALSE – Default

5.2.4.2. Response – QMI_WDS_START_NETWORK_INTERFACE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Packet Data Handle	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Packet Data Handle
Length	4			2	
Value	→	uint32	pkt_data_handle	4	The handle identifying the call instance providing packet service. The packet data handle must be retained by the control point and specified in the STOP_NETWORK_INTERFACE message issued when the control point is finished with the packet data session.

Optional TLVs

Name	Version introduced	Version last modified
Call End Reason	Unknown	1.3
Verbose Call End Reason	1.8	1.113
Peripheral End Point ID	1.54	1.77
Mux ID	1.54	1.54

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Call End Reason
Length	2			2	
Value	→	enum16	call_end_reason	2	Reason the call ended; see Appendix A for the definition of these values.
Type	0x11			1	Verbose Call End Reason
Length	4			2	
Value	→	enum16	call_end_reason_type	2	Call end reason type. Values: • WDS_VCER_TYPE_UNSPECIFIED (0x00) – Unspecified • WDS_VCER_TYPE_MOBILE_ IP (0x01) – Mobile IP • WDS_VCER_TYPE_INTERNAL (0x02) – Internal • WDS_VCER_TYPE_CALL_ MANAGER_DEFINED (0x03) – Call manager defined • WDS_VCER_TYPE_3GPP_SPEC_ DEFINED (0x06) – 3GPP specification defined • WDS_VCER_TYPE_PPP (0x07) – PPP • WDS_VCER_TYPE_EHRPD (0x08) – EHRPD • WDS_VCER_TYPE_IPV6 (0x09) – Ipv6 • WDS_VCER_TYPE_HANDOFF (0x0c) – Handoff

		uint16	call_end_reason	2	Reason the call ended.
Type	0x12			1	Peripheral End Point ID Peripheral end point of the RmNet instance where a data call is already present.
Length	8	2			
Value	→	enum	ep_type	4	Peripheral endpoint type. Values: • DATA_EP_TYPE_RESERVED (0x00) – Reserved • DATA_EP_TYPE_HSIC (0x01) – High-speed inter-chip interface • DATA_EP_TYPE_HSUSB (0x02) – High-speed universal serial bus • DATA_EP_TYPE_PCIE (0x03) – Peripheral component interconnect express • DATA_EP_TYPE_EMBEDDED (0x04) – Embedded • DATA_EP_TYPE_BAM_DMUX (0x05) – Bus access manager data multiplexer All other values are reserved and are ignored.
		Uint32	iface_id	4	Peripheral interface number.
Type	0x13			1	Mux ID
Length	1			2	
Value	→	uint8	mux_id	1	Mux ID of the RmNet instance where a data call is already present.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_ARG_TOO_LONG	Argument passed in a TLV is larger than the available storage in the device
QMI_ERR_INVALID_PROFILE	Specified configured profile index does not exist
QMI_ERR_NO_EFFECT	Control point has already started the network interface
QMI_ERR_CALL_FAILED	Data call failed
QMI_ERR_INVALID_TECH_PREF	Invalid technology preference
QMI_ERR_INVALID_PDP_TYPE	Invalid PDP type
QMI_ERR_ACCESS_DENIED	Autoconnect feature is unavailable at this time
QMI_ERR_INVALID_IP_FAMILY_ PREF	Invalid IP family preference

5.2.4.3. Description of QMI_WDS_START_NETWORK_INTERFACE REQ/RESP

This command is used by a control point to request packet data service. The wireless device starts a packet data session if one is not already in progress. By issuing this command, the control point registers its interest in (binds itself to) the WWAN data connection. The data session remains connected while at least one control point is bound to the WWAN data connection.

The call is established either using the default call parameters (if a configured profile TLV is not present in the request) or using parameters from a stored profile (if a configured profile TLV is present in the request). The default call parameters are defined outside the scope of this document.

The optional Autoconnect TLV causes the session to automatically reconnect if the packet data session is disconnected and persists over device power cycles. This support has been deprecated. Clients must use QMI_WDS_SET_AUTOCONNECT_SETTING (see Section 3.51.3) to modify autoconnect settings. Optional TLVs 0x10 through 0x18, included in the START_NETWORK_INTERFACE request command, supersede (override) the call parameters (default or configured profile) selected.

The technology preference value included in the optional Extended Technology Preference TLV 0x34 in the START_NETWORK_INTERFACE request command supersedes the value in the technology preference optional TLV 0x30. Qualcomm recommends that all clients use the newer Extended Technology Preference TLV, as the older TLV is planned to be deprecated over time.

The optional Handoff Context TLV is included if the TE wants to hand off an existing call to the modem and must convey some context information. For a dual IP PDN, the TLV must include both the Ipv4 and Ipv6 address, with bearer_ip_type set to WDS_IP_SUPPORT_TYPE_IPV4V6. Also, the same TLV is to be present on both the QMI_WDS_START_NETWORK_INTERFACE_REQ messages from the Ipv4 client and Ipv6 client.

The optional APN Type Enum TLV specifies the type of APN on which the call is being attempted. In the absence of this TLV, the APN type default is WDS_APN_TYPE_UNSPECIFIED.

The QMI_WDS_START_NETWORK_INTERFACE_RESP command is returned only when the packet data session is established, or sooner if an error occurs. After the response is sent, the tethered device can perform IP address configuration.

A successful QMI_WDS_START_NETWORK_INTERFACE_REQ modifies the packet_data_connection_state shared state variable.

If the Result TLV indicates failure and the qmi_error field is set to QMI_ERR_CALL_FAILED, the Call End Reason and Verbose Call End Reason optional TLVs are included with the response conveying the additional call failure reason.

If the Verbose Call End Reason TLV indicates that a data call with the same policy is already present on another RmNet instance (internal CALL_ALREADY_PRESENT error), the optional Peripheral End Point ID and Mux ID TLVs are included to identify the RmNet instance where the data call is present.

The AT command equivalents of this command are ATD and AT+CGACT defined in 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131.

5.2.5. QMI_WDS_STOP_NETWORK_INTERFACE

Deactivates a packet data session (unless in use by other control points) on behalf of the requesting control point.

WDS message ID

0x0021

Version introduced

Major – 1, Minor – 0

5.2.5.1. Request – QMI_WDS_STOP_NETWORK_INTERFACE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Packet Data Handle	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Packet Data Handle
Length	4			2	
Value	→	uint32	pkt_data_handle	4	Handle identifying the call instance from which to unbind the control point. The value must be the handle previously returned by QMI_WDS_START_NETWORK_INTERFACE_REQ.

Optional TLVs

Name	Version introduced	Version last modified
Disable Autoconnect	Unknown	1.12
Local Abort	1.117	1.117

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Disable Autoconnect
Length	1			2	
Value	→	boolean	disable_autoconnect	1	• 1 – TRUE – Device disables autoconnect; the calls must be made manually until the setting is enabled again • 0 – FALSE – Default. Note: When this TLV is present, the client must use a global handle (0xFFFFFFFF) in the Packet Data Handle TLV.

Type	0x11			1	Local Abort
Length	1			2	
Value	→	boolean	local_abort	1	• 1 – TRUE – OTA teardown request is not triggered by the modem when the data call is torn down and only results in local clean up of the PDN on the UE • 0 – FALSE – Triggers an OTA teardown and local clean up of the PDN (default)

5.2.5.2. Response – QMI_WDS_STOP_NETWORK_INTERFACE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 5.2.3.1) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_INVALID_HANDLE	Packet_data_handle provided in the request is not valid, that is, it is not assigned to the control point

5.2.5.3. Description of QMI_WDS_STOP_NETWORK_INTERFACE REQ/RESP

This command is used by a control point to end packet data service. By issuing this command, the control point releases its interest in (unbinds itself from) the WWAN data connection. The wireless device ends the current packet data session when all control points release their binding using this message.

The control point considers that the packet_data_connection_state is unchanged until notified of the state change via the QMI_WDS_PKT_SRVC_STATUS_IND indication.

Requests using the global packet data handle (0xFFFFFFFF) and a nonzero value for the optional Disable Autoconnect TLV disables the autoconnect of the device. This support is deprecated. Clients must use QMI_WDS_SET_AUTOCONNECT_SETTINGto modify autoconnect settings.

The AT command equivalents of this command are ATD and AT+CGACT defined in 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131.

5.2.6. QMI_WDS_GET_PKT_SRVC_STATUS

Queries the current packet data connection status.

WDS message ID

0x0022

Version introduced

Major – 1, Minor – 0

5.2.6.1. Request – QMI_WDS_GET_PKT_SRVC_STATUS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

5.2.6.2. Response – QMI_WDS_GET_PKT_SRVC_STATUS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Connection status.	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Connection status.
Length	1			2	
Value	→	enum8	connection_status	1	Current link status. Values: • WDS_CONNECTION_STATUS_ DISCONNECTED (0x01) – Disconnected • WDS_CONNECTION_STATUS_

					CONNECTED (0x02) – Connected • WDS_CONNECTION_STATUS_ SUSPENDED (0x03) – Suspended • WDS_CONNECTION_STATUS_ AUTHENTICATING (0x04) – Authenciating

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INCOMPATIBLE_STATE	Request from a client whose subscription does not match the subscription of the current data session (incompatible subscription)

5.2.6.3. Description of QMI_WDS_GET_PKT_SRVC_STATUS REQ/RESP

This command queries the state of the packet data connection provided by wireless device. It returns the current value of Packet_data_connection_state value.

A data connection being established does not imply that the IP address has been assigned to the host. This is only an indication that address configuration can commence.

The QMI_WDS_PKT_DATA_AUTHENTICATING connection status is not always supported. In such cases, the device directly transitions to the connected state without entering the authenticating state.

The AT command equivalents of this command are ATD and AT+CGACT, defined in 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131.

5.2.7. QMI_WDS_GET_PKT_SRVC_STATUS_IND

Indicates a change in the current packet data connection status.

WDS message ID

0x0022

Version introduced

Major – 1, Minor – 0

5.2.7.1. Indication – QMI_WDS_PKT_SRVC_STATUS_IND

Message type

Indication

Sender

Service

Scope

Unicast

Mandatory TLVs

Name	Version introduced	Version last modified
Packet Service Status	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Packet Service Status
Length	2			2	
Value	→	enum8	connection_status	1	Current link status. Values: • WDS_CONNECTION_STATUS_ DISCONNECTED (0x01) – Disconnected • WDS_CONNECTION_STATUS_ CONNECTED (0x02) – Connected • WDS_CONNECTION_STATUS_ SUSPENDED (0x03) – Suspended • WDS_CONNECTION_STATUS_ AUTHENTICATING (0x04) – Authenciating
		boolean	reconfiguration_required	1	Indicates whether the network interface on the host must be reconfigured. Values: • 0 – Not necessary to reconfigure • 1 – Reconfiguration required

Optional TLVs

Name	Version introduced	Version last modified
Call End Reason	Unknown	1.3
Verbose Call End Reason	1.8	1.132

IP Family	Unknown	1.9
Technology Name	Unknown	1.25
Bearer ID	1.50	1.50
XLAT Capability	1.87	1.87

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Call End Reason
Length	2			2	
Value	→	enum16	call_end_reason	2	See Appendix A for the definition of these values.
Type	0x11			1	Verbose Call End Reason
Length	4			2	
Value	→	enum16	call_end_reason_type	2	Call end reason type. Values: • WDS_VCER_TYPE_UNSPECIFIED (0x00) – Unspecified • WDS_VCER_TYPE_MOBILE_ IP (0x01) – Mobile IP • WDS_VCER_TYPE_INTERNAL (0x02) – Internal • WDS_VCER_TYPE_CALL_ MANAGER_DEFINED (0x03) – Call manager defined • WDS_VCER_TYPE_3GPP_SPEC_ DEFINED (0x06) – 3GPP specification defined • WDS_VCER_TYPE_PPP (0x07) – PPP • WDS_VCER_TYPE_EHRPD (0x08) – EHRPD • WDS_VCER_TYPE_IPV6 (0x09) – Ipv6 • WDS_VCER_TYPE_HANDOFF (0x0c) – Handoff
		uint16	call_end_reason	2	Reason the call
Type	0x12			1	IP Family
Length	1			2	
Value	→	enum8	ip_family	1	IP family of the packet data connection. Values: • WDS_IP_FAMILY_IPV4 (0x04) – Ipv4 • WDS_IP_FAMILY_IPV6 (0x06) – Ipv6
Type	0x13			1	Technology Name
Length	2			2	
Value	→	enum16	tech_name	2	Technology name of the packet data connection. Values: • WDS_TECHNOLOGY_NAME_CDMA (-32767) – 0x8001 – CDMA • WDS_TECHNOLOGY_NAME_UMTS (-32764) – 0x8004 – UMTS • WDS_TECHNOLOGY_NAME_ WLAN_LOCAL_BRKOUT (-32736) –

					0x8020 – WLAN_LOCAL_BRKOUT • WDS_TECHNOLOGY_NAME_ IWLAN_S2B (-32735) – 0x8021 – IWLAN_S2B • WDS_TECHNOLOGY_NAME_EPC (-30592) – 0x8880 – EPC • WDS_TECHNOLOGY_NAME_ EMBMS (-30590) – 0x8882 – EMBMS • WDS_TECHNOLOGY_NAME_ MODEM_LINK_LOCAL (-30584) – 0x8888 – Modem link local EPC is a logical interface to support LTE/eHRPD handoff; it is returned if the device supports IP session continuity. Modem Link Local is an interface for transferring data between entities on the AP and modem.
Type	0x14			1	Bearer ID
Length	1			2	
Value	→	uint8	bearer_id	1	Bearer ID (3GPP) or RLP ID (3GPP2) of the packet data connection.
Type	0x15			1	XLAT Capability
Length	1			2	
Value	→	boolean	xlat_capable	1	Indicates XLAT capability of the data session. Values: • 0 – XLAT not capable • 1 – XLAT capable

5.2.7.2. Description of QMI_WDS_GET_PKT_SRVC_STATUS_IND

This indication communicates changes in the Packet_data_connection_state value.

When the IP address assigned to the host is no longer valid, the reconfiguration required value is set to one.

If the indication is sent because of a disconnected state change, the Call End Reason and Verbose Call End Reason optional TLVs are included and contain the reason the call was terminated. These include network and user-generated reasons. The Call End Reason TLV is kept for backwards compatibility, and all new QMI clients must use the newer Verbose Call End Reason TLV. Any new Call End Reason is added only to the new TLV.

The QMI_WDS_PKT_DATA_AUTHENTICATING connection status is not always supported. In such cases, the device directly transitions to the connected state without entering the authenticating state.

The optional IP Family TLV indicates the IP type of the packet data connection.

The optional XLAT Capability TLV indicates whether the packet data session is XLAT capable.

For QMI_WDS revision 1.35 and newer, this indication has been changed from broadcast to unicast. By default, the indication is sent to all control points on the QMI link that have a packet data connection status change. If a control point is bound to an IP family type using QMI_WDS_SET_CLIENT_IP_FAMILY_PREF, it does not receive the packet data connection status indication for a different IP type. Control points can also suppress the indication by using the QMI_WDS_INDICATION_REGISTER command.

5.2.8. QMI_WDS_GET_CURRENT_CHANNEL_RATE

Queries the current bitrate of the packet data connection.

WDS message ID

0x0023

Version introduced

Major – 1, Minor – 0

5.2.8.1. Request – QMI_WDS_GET_CURRENT_CHANNEL_RATE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

5.2.8.2. Response – QMI_WDS_GET_CURRENT_CHANNEL_RATE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Channel Rate	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	
Length	16			2	
Value	→	uint32	current_channel_tx_rate	4	Instantaneous channel Tx rate in bits per second.
		Uint32	current_channel_rx_rate	4	Instantaneous channel Rx rate in bits per second.
		Uint32	max_channel_tx_rate	4	Maximum Tx rate that can be assigned

					to the device by the serving system in bits per second.
		Uint32	max_channel_rx_rate	4	Maximum Rx rate that can be assigned to the device by the serving system in bits per second.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INCOMPATIBLE_STATE	Request from a client whose subscription does not match the subscription of the current data session (incompatible subscription)

5.2.8.3. Description of QMI_WDS_GET_CURRENT_CHANNEL_RATE

This command is used to obtain the current and maximum (for the current serving radio interface) Tx and Rx channel rates. If this request is issued when a network connection is not yet started, only the maximum channel rates are returned and the current channel rates are set to zero. If this request is issued when a network connection is in progress, but the current channel rates are not available from the device, a value of 0xFFFFFFFF is returned.

The AT command is roughly based on AT+CHSC, defined in 3GPP2 C.S0017-003-A. It also applies to packet data service rather than circuit-switched data.

5.2.9. QMI_WDS_MODIFY_PROFILE_SETTINGS

Changes the settings in a configured profile.

WDS message ID

0x0028

Version introduced

Major – 1, Minor – 0

5.2.9.1. Request – QMI_WDS_MODIFY_PROFILE_SETTINGS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Profile Identifier	Unknown	1.11

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Profile Identifier
Length	2			2	
Value	→	enum8	profile_type	1	Identifies the technology type of the profile. Values: • WDS_PROFILE_TYPE_3GPP (0x00) – 3GPP • WDS_PROFILE_TYPE_3GPP2 (0x01) – 3GPP2 • WDS_PROFILE_TYPE_EPC (0x02) – EPC
		uint8	profile_index	1	Index identifying the profile.

Optional TLVs

Name	Version introduced	Version last modified
Profile Name **	Unknown	1.11
PDP Type **	Unknown	1.132
PDP Header Compression Type **	Unknown	1.11
PDP Data Compression Type **	Unknown	1.11
Context Access Point Node Name **	Unknown	1.11
Primary DNS Ipv4 Address Preference **	Unknown	1.11
Secondary DNS Ipv4 Address Preference **	Unknown	1.11
UMTS Requested QoS **	Unknown	1.11
UMTS Minimum QoS **	Unknown	1.11
GPRS Requested QoS **	Unknown	1.11
GRPS Minimum QoS **	Unknown	1.11

Username **	Unknown	1.11
Password **	Unknown	1.11
Authentication Preference **	Unknown	1.11
Ipv4 Address Preference **	Unknown	1.11
PCSCF Address Using PCO Flag **	Unknown	1.3
PDP Access Control Flag **	Unknown	1.11
PCSCF Address Using DHCP **	Unknown	1.11
IM CN flag **	Unknown	1.11
Traffic Flow Template ID1 Parameters **	Unknown	1.11
TFT ID2 Parameters **	Unknown	1.11
PDP Context Number **	Unknown	1.11
PDP Context Secondary Flag **	Unknown	1.11
PDP Context Primary ID **	Unknown	1.11
Ipv6 Address Preference **	Unknown	1.11
UMTS Requested QoS with Signaling Indication Flag **	Unknown	1.11
UMTS Minimum QoS with Signaling Indication **	Unknown	1.11
Primary DNS Ipv6 Address Preference **	Unknown	1.11
Secondary DNS Ipv6 Address Preference **	Unknown	1.11
DHCP/NAS Preference **	Unknown	1.11
3GPP LTE QoS Parameters **	Unknown	1.11
APN Disabled Flag **	Unknown	1.13
PDN Inactivity Timeout **	Unknown	1.13
APN Class **	1.13	1.13
APN Bearer **	1.26	1.26
Support Emergency Calls **	1.31	1.31
Operator Reserved PCO ID **	1.37	1.37
Mobile Country Code **	1.37	1.37
Mobile Network Code **	1.37	1.37
Max PDN Connections Per Time Block **	1.46	1.116
Max PDN Connections Timer **	1.46	1.46
PDN Request Wait Timer **	1.46	1.46
3GPP Application User Data **	1.57	1.57
Roaming Disallow Flag **	1.63	1.63
PDN Disconnect Wait Timer **	1.63	1.63
DNS Address Using DHCP **	1.74	1.74
LTE Roaming PDP Type **	1.93	1.109
UMTS Roaming PDP Type **	1.93	1.109
IWLAN to LTE Roaming Handover Allowed Flag **	1.93	1.93
LTE to IWLAN Roaming Handover Allowed Flag **	1.93	1.93
3GPP PDN Throttling Timer 1-10 **	1.1	1.1
Override Home PDP Type **	1.109	1.109
List of PCO IDs **	1.119	1.119
MSISDN Using PCO Flag **	1.120	1.120
Common PCSCF Address Using DHCP ** *	1.74	1.74
Common DNS Address Using DHCP ** *	1.74	1.74
Common PDP Type ** *	1.65	1.109
Common Application User Data ***	1.59	1.59
Common Mobile Network Code ***	1.59	1.59

Common Mobile Country Code ***	1.59	1.59
Common Operator Reserved PCO ID ***	1.59	1.59
Common Authentication Password ***	1.59	1.59
Common User ID ***	1.59	1.59
Common Authentication Protocol ***	1.59	1.59
Common PCSCF Address Using PCO Flag ***	1.59	1.59
Common Allow/Disallow Lingering of Interface ***	1.59	1.59
Common Secondary DNS Ipv6 Address Preference ***	1.59	1.59
Common Primary DNS Ipv6 Address Preference ***	1.59	1.59
Common Secondary DNS Ipv4 Address Preference ***	1.59	1.59
Common Primary DNS Address Preference ***	1.59	1.59
Common APN Class ***	1.59	1.59
Common APN Disabled Flag ***	1.59	1.59
Negotiate DNS Server Preference *	Unknown	1.11
PPP Session Close Timer for DO *	Unknown	1.11
PPP Session Close Timer for 1X *	Unknown	1.11
Allow/Disallow Lingering of Interface *	Unknown	1.11
LCP ACK Timeout *	Unknown	1.11
IPCP ACK Timeout *	Unknown	1.11
Authentication Timeout *	Unknown	1.11
LCP Configuration Request Retry Count Value *	Unknown	1.11
IPCP Configuration Request Retry Count *	Unknown	1.11
AUTH Retry *	Unknown	1.11
Authentication Protocol *	Unknown	1.33
User ID *	Unknown	1.11
Authentication Password *	Unknown	1.11
Data Rate *	Unknown	1.11
Application Type *	Unknown	1.11
Data Mode *	Unknown	1.11
Application Priority *	Unknown	1.11
APN String *	Unknown	1.11
PDN Type *	Unknown	1.11
Is PCSCF Address Needed *	Unknown	1.11
Ipv4 Primary DNS Address *	Unknown	1.11
Ipv4 Secondary DNS Address *	Unknown	1.11
Primary Ipv6 DNS Address *	Unknown	1.11
Secondary Ipv6 DNS address *	Unknown	1.11
RAT Type *	Unknown	1.13
APN Enabled *	Unknown	1.13
PDN Inactivity Timeout *	Unknown	1.13
APN Class 3GPP2 *	1.13	1.13
PDN Level Auth Protocol *	Unknown	1.34
PDN Level User ID *	Unknown	1.19
PDN Level Auth Password *	Unknown	1.19
PDN Label *	Unknown	1.19
Operator Reserved PCO ID *	1.37	1.37
Mobile Country Code *	1.37	1.37
Mobile Network Code *	1.37	1.37

PDN Throttling Timer 1-6 *	1.42	1.42
PDN Disallow Timer 1-6 *	1.42	1.42
3GPP2 Application User Data *	1.57	1.57
PCSCF Address Using DHCP 3GPP2 *	1.74	1.74
DNS Address Using DHCP *	1.74	1.74
CLAT Enabled * **	1.116	1.116
Ipv6 Prefix Delegation Flag * **	1.66	1.66

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Profile Name **
Length	Var			2	
Value	!	string	profile_name	Var	One or more bytes describing the profile. The description can be a user-defined name for the profile. QMI_ERR_ARG_TOO_LONG is returned if the profile_name is too long.
Type	0x11			1	PDP Type **
Length	1			2	
Value	→	enum8	pdp_type	1	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile. Values: • WDS_PDP_TYPE_PDP_IPV4 (0x00) – PDP-IP (Ipv4) • WDS_PDP_TYPE_PDP_PPP (0x01) – PDP-PPP • WDS_PDP_TYPE_PDP_IPV6 (0x02) – PDP-Ipv6 • WDS_PDP_TYPE_PDP_IPV4V6 (0x03) – PDP-Ipv4 and Ipv6 • WDS_PDP_TYPE_PDP_NON_ IP (0x04) – PDP-NON IP
Type	0x12			1	PDP Header Compression Type **
Length	1			2	
Value	→	enum8	pdp_hdr_compression_type	1	Values: • WDS_PDP_HDR_COMPR_TYPE_ OFF (0x00) – PDP header compression is off • WDS_PDP_HDR_COMPR_TYPE_ MANUFACTURER_PREF (0x01) – Manufacturer preferred compression • WDS_PDP_HDR_COMPR_TYPE_ RFC_1144 (0x02) – PDP header compression based on RFC 1144 • WDS_PDP_HDR_COMPR_TYPE_ RFC_2507 (0x03) – PDP header compression based on RFC 2507 • WDS_PDP_HDR_COMPR_TYPE_ RFC_3095 (0x04) – PDP header compression based on RFC 3095
Type	0x13			1	PDP Data Compression Type **
Length	1			2	

Value	→	enum8	pdp_data_compression_ type	1	Values: • WDS_PDP_DATA_COMPR_TYPE_ OFF (0x00) – PDP data compression is off • WDS_PDP_DATA_COMPR_TYPE_ MANUFACTURER_PREF (0x01) – Manufacturer preferred compression • WDS_PDP_DATA_COMPR_TYPE_ V42 (0x02) – V.42BIS data compression • WDS_PDP_DATA_COMPR_TYPE_ V44 (0x03) – V.44 data compression
Type	0x14			1	Context Access Point Node (APN) Name **
Length	Var			2	
Value	→	string	apn_name	Var	String parameter that is a logical name used to select the GGSN and external packet data network. If the value is NULL or omitted, the subscription default value is requested. QMI_ERR_ARG_TOO_LONG is returned if the APN name is too long.
Type	0x15			1	Primary DNS Ipv4 Address Preference **
Length	4			2	
Value	→	uint32	primary_DNS_Ipv4_ address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x16			1	Secondary DNS Ipv4 Address Preference **
Length	4			2	
Value	→	uint32	secondary_DNS_Ipv4_ address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x17			1	UMTS Requested QoS **
Length	33			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per

					second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrate	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs los or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values: • WDS_DELIVERY_ERRONEOUS_SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the

					other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
Type	0x18			1	UMTS Minimum QoS **
Length	33			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrate	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_ bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_ SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_ OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$

					• 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values: • WDS_DELIVERY_ERRONEOUS_SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
Type	0x19			1	GPRS Requested QoS **
Length	20			2	
Value	→	uint32	precedence_class	4	Precedence class
		uint32	delay_class	4	Delay class
		uint32	reliability_class	4	Reliability class
		uint32	peak_throughput_class	4	Peak throughput class
		uint32	mean_throughput_class	4	Mean throughput class
Type	0x1A			1	GRPS Minimum QoS **
Length	20			2	
Value	→	uint32	precedence_class	4	Precedence class
		uint32	delay_class	4	Delay class
		uint32	reliability_class	4	Reliability class
		uint32	peak_throughput_class	4	Peak throughput class
		uint32	mean_throughput_class	4	Mean throughput class
Type	0x1B			1	Username **
Length	Var			2	
Value	→	string	username	Var	Username used during data network authentication. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless

					device is insufficient in size to hold the value.
Type	0x1C			1	Password **
Length	Var			2	
Value	→	string	password	Var	Password to be used during data network authentication. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x1D			1	Authentication Preference **
Length	1			2	
Value	→	mask8	authentication_preference	1	Bitmap that indicates the authentication algorithm preference. Values: Bit 0 – PAP preference: • 0 – PAP is never performed • 1 – PAP can be performed Bit 1 – CHAP preference: • 0 – CHAP is never performed • 1 – CHAP can be performed All other bits are reserved and ignored. They must be set to zero by the client. If more than one bit is set, the device decides which authentication procedure is performed while setting up the data session. For example, the device can have a policy to select the most secure authentication mechanism.
Type	0x1E			1	Ipv4 Address Preference **
Length	4			2	
Value	→	uint32	ipv4_address_preference	4	The preferred Ipv4 address assigned to the TE. The actual assigned address is negotiated with the network and might differ from this value. If not specified, the Ipv4 Address is obtained automatically from the network. The assigned value is provided to the host via DHCP.
Type	0x1F			1	PCSCF Address Using PCO Flag **
Length	1			2	
Value	→	boolean	pcscf_addr_using_pco	1	Values: • 1 – TRUE – Request PCSCF address using PCO • 0 – FALSE – Do not request (default)
Type	0x20			1	PDP Access Control Flag **
Length	1			2	
Value	→	enum8	pdp_access_control_flag	1	Values: • WDS_PDP_ACCESS_CONTROL_NONE (0x00) – None • WDS_PDP_ACCESS_CONTROL_REJECT (0x01) – Reject • WDS_PDP_ACCESS_CONTROL_PERMISSION (0x02) – Permission
Type	0x21			1	PCSCF Address Using DHCP **

Length	1			2	
Value	→	boolean	pcscf_addr_using_dhcp	1	Values: • 1 – TRUE – Request PCSCF address using the DHCP • 0 – FALSE – Do not request (default)
Type	0x22			1	IM CN flag **
Length	1			2	
Value	→	boolean	im_cn_flag	1	Values: • 1 – TRUE – Request the IM CN flag for this profile • 0 – FALSE – Do not request the IM CN flag for this profile
Type	0x23			1	Traffic Flow Template (TFT) ID1 Parameters **
Length	39			2	
Value	→	uint8	filter_id	1	Filter identifier.
		Uint8	eval_id	1	Evaluation precedence index.
		Enum8	ip_version	1	IP version number. Values: • WDS_IP_VERSION_IPV4 (0x04) – Ipv4 • WDS_IP_VERSION_IPV6 (0x06) – Ipv6
		uint8	source_ip	16	Values: • Ipv4 – Fill the first 4 bytes • Ipv6 – Fill all the 16 bytes
		uint8	source_ip_mask	1	Mask value for the source address.
		Uint8	next_header	1	Next header/protocol value.
		Uint16	dest_port_range_start	2	Start value for the destination port range.
		Uint16	dest_port_range_end	2	End value for the destination port range.
		Uint16	src_port_range_start	2	Start value for the source port range.
		Uint16	src_port_range_end	2	End value for the source port range.
		Uint32	ipsec_spi	4	IPSec security parameter index.
		Uint16	tos_mask	2	TOS mask (traffic class for Ipv6).
		Uint32	flow_label	4	Flow label.
Type	0x24			1	TFT ID2 Parameters **
Length	39			2	
Value	→	uint8	filter_id	1	Filter identifier.
		Uint8	eval_id	1	Evaluation precedence index.
		Enum8	ip_version	1	IP version number. Values: • WDS_IP_VERSION_IPV4 (0x04) – Ipv4 • WDS_IP_VERSION_IPV6 (0x06) – Ipv6
		uint8	source_ip	16	Values: • Ipv4 – Fill the first 4 bytes • Ipv6 – Fill all the 16 bytes
		uint8	source_ip_mask	1	Mask value for the source address.
		Uint8	next_header	1	Next header/protocol value.
		Uint16	dest_port_range_start	2	Start value for the destination port range.
		Uint16	dest_port_range_end	2	End value for the destination port range.
		Uint16	src_port_range_start	2	Start value for the source port range.
		Uint16	src_port_range_end	2	End value for the source port range.
		Uint32	ipsec_spi	4	IPSec security parameter index.

		Uint16	tos_mask	2	TOS mask (traffic class for Ipv6).
		Uint32	flow_label	4	Flow label.
Type	0x25			1	PDP Context Number **
Length	1			2	
Value	→	uint8	pdp_context	1	PDP context number
Type	0x26			1	PDP Context Secondary Flag **
Length	1			2	
Value	→	boolean	secondary_flag	1	Values: • 1 – TRUE – This is the secondary profile • 0 – FALSE – This is not the secondary profile
Type	0x27			1	PDP Context Primary ID **
Length	1			2	
Value	→	uint8	primary_id	1	PDP context number primary ID.
Type	0x28			1	Ipv6 Address Preference **
Length	16			2	
Value	→	uint8	ipv6_address_preference	16	The preferred Ipv6 address to be assigned to the TE. The actual assigned address is negotiated with the network and can differ from this value; if not specified, the Ipv6 address is obtained automatically from the network.
Type	0x29			1	UMTS Requested QoS with Signaling Indication Flag **
Length	34			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrat e	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_ bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_ SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_ OFF (0x02) – Delivery order off

		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values: • WDS_DELIVERY_ERRONEOUS_SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
		Boolean	sig_ind	1	Signaling indication flag. Values: • 0 – Signaling indication off • 1 – Signaling indication on
Type	0x2A			1	UMTS Minimum QoS with Signaling Indication **

Length	34			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrate	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_ bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_ SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_ OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values:

					• WDS_DELIVERY_ERRONEOUS_ SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_ SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_ SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_ SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
		Boolean	sig_ind	1	Signaling indication flag. Values: • 0 – Signaling indication off • 1 – Signaling indication on
Type	0x2B			1	Primary DNS Ipv6 Address Preference **
Length	16			2	
Value	→	uint8	primary_dns_ipv6_ address_preference	16	The value can be used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x2C			1	Secondary DNS Ipv6 Address Preference **
Length	16			2	
Value	→	uint8	licit r_dns_ipv6_ address_preference	16	The value can be used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x2D			1	DHCP/NAS Preference **
Length	1			2	
Value	→	enum8	addr_allocation_preference	1	Indicate the address allocation preference. Values: • WDS_ADDR_ALLOC_PREF_NAS (0x00) – NAS signaling is used for address allocation • WDS_ADDR_ALLOC_PREF_DHCP

					(0x01) – DHCP is used for address allocation
Type	0x2E			1	3GPP LTE QoS Parameters **
Length	17			2	
Value	→	uint8	qci	1	For LTE, the requested QoS must be specified using the QoS Class Identifier (QoS). Values: • QCI value 0 – Requests the network to assign the appropriate QCI value • QCI values 1 to 4 – Associated with guaranteed bitrates • QCI values 5 to 9 – Associated with nonguaranteed bitrates, the values specified as guaranteed and maximum bitrates are ignored.
		Uint32	g_dl_bit_rate	4	Guaranteed DL bitrate.
		Uint32	max_dl_bit_rate	4	Maximum DL bitrate.
		Uint32	g_ul_bit_rate	4	Guaranteed UL bitrate.
		Uint32	max_ul_bit_rate	4	Maximum UL bitrate.
Type	0x2F			1	APN Disabled Flag **
Length	1			2	
Value	→	boolean	apn_disabled_flag	1	Setting this flag disables the use of this profile for making data calls. Any data call with this profile fails locally. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0x30			1	PDN Inactivity Timeout **
Length	4			2	
Value	→	uint32	pdn_inactivity_timeout	4	Duration of the inactivity timer in seconds. When a PDP context or PDN connection is inactive (that is, no data Rx or Tx) for this duration of time, the PDP context or PDN connection is disconnected. The default setting of zero is treated as an infinite value.
Type	0x31			1	APN Class **
Length	1			2	
Value	→	uint8	apn_class	1	An opaque, numeric identifier representing the APN in the profile. This can be transparently set for any profile and queried later.
Type	0x35			1	APN Bearer **
Length	8			2	
Value	→	mask	apn_bearer	8	APN bearer mask. Specifies whether a data call is allowed on specific RAT types. Values: • 0x0000000000000001 – GSM • 0x0000000000000002 – WCDMA • 0x0000000000000004 – LTE • 0x8000000000000000 – Any
Type	0x36			1	Support Emergency Calls **
Length	1			2	
Value	→	boolean	support_emergency_calls	1	When this flag is set, the user can make

					emergency calls using this profile. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0x37			1	Operator Reserved PCO ID **
Length	2			2	
Value	→	uint16	op_pco_id	2	Container ID of this PCO. If op_pco_id is configured, the UE sends the operator PCO with the container ID that is configured. Once configured, the profile cannot be unconfigured.
Type	0x38			1	Mobile Country Code **
Length	2			2	
Value	→	uint16	pco_mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
Type	0x39			1	Mobile Network Code **
Length	3			2	
Value	→	uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLVs. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for example, a reported value of 90 corresponds to an MNC value of 90
Type	0x3A			1	Max PDN Connections Per Time Block **
Length	2			2	
Value	→	uint16	max_pdn_conn_per_block	2	Specifies the maximum number of PDN connections that the UE is allowed to perform with the network in a specified time block. The time block size is defined by a configuration item. The default value is 20. Range: 0 to 1023.
Type	0x3B			1	Max PDN Connections Timer **
Length	2			2	
Value	→	uint16	max_pdn_conn_timer	2	Specifies the time duration in seconds during which the UE counts the PDN connections already made. The default value is 300. Range: 0 to 3600 seconds.
Type	0x3C			1	PDN Request Wait Timer **
Length	2			2	
Value	→	uint16	pdn_req_wait_interval	2	Specifies the minimum time interval between the new PDN connection request and the last successful UE initiated PDN disconnection. The default value is 0. Range: 0 to 1023 sec.
Type	0x3D			1	3GPP Application User Data **
Length	4			2	

Value	→	uint32	app_user_data_3gpp	4	An opaque, numeric identifier representing the user data in the profile. This can be transparently set for any profile and queried later.
Type	0x3E			1	Roaming Disallow Flag **
Length	1			2	
Value	→	boolean	roaming_disallowed	1	Indicates whether the UE is allowed to connect to the APN specified by the profile while roaming.
Type	0x3F			1	PDN Disconnect Wait Timer **
Length	1			2	
Value	→	uint8	pdn_discon_wait_timer	1	Indicates the delay that the control point expects to be available for successful deregistration with the network before the modem disconnects the PDN(s). When the default value of zero is specified, the modem disconnects the PDN immediately upon moving to the roaming network, without waiting for the control point. Range: 0-255 minutes.
Type	0x40			1	DNS Address Using DHCP **
Length	1			2	
Value	→	boolean	dns_addr_using_dhcp	1	Values: • 1 – TRUE – Request DNS address using the DHCP • 0 – FALSE – Do not request (default)
Type	0x41			1	LTE Roaming PDP Type **
Length	4			2	
Value	→	enum	lte_roaming_pdp_type	4	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile, while roaming in LTE. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6 • WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x42			1	UMTS Roaming PDP Type **
Length	4			2	
Value	→	enum	umts_roaming_pdp_type	4	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile, while roaming in UMTS. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6

					• WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x43			1	IWLAN to LTE Roaming Handover Allowed Flag **
Length	1			2	
Value	→	boolean	iwlan_to_lte_roaming_ho_allowed_flag	1	Specifies whether handover from IWLAN to LTE is allowed while roaming in LTE.
Type	0x44			1	LTE to IWLAN Roaming Handover Allowed Flag **
Length	1			2	
Value	→	boolean	lte_to_iwlan_roaming_ho_allowed_flag	1	Specifies whether handover from LTE to IWLAN is allowed while roaming in LTE.
Type	0x45			1	3GPP PDN Throttling Timer 1-10 **
Length	40			2	
Value	→	uint32	failure_timer_3gpp	40	Back-off time (in seconds) to be used after a PDN connection or IP address assignment failure. For example, following a third consecutive PDN connection request failure, the UE waits failure_timer[2] seconds before sending the fourth request.
Type	0x46			1	Override Home PDP Type **
Length	4			2	
Value	→	enum	override_home_pdp_type	4	Specifies the override type of data payload exchanged over the airlink when the packet data session is established with this profile, when in home network. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6 • WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x47			1	List of PCO IDs **
Length	20			2	
Value	→	uint16	op_reserved_pco_id_list	20	Specifies the list of operator reserved PCO IDs for which the device can query the list of PCOs. Valid values for PCO IDs are from 0xFF00 to 0xFFFF. The control point must fill the rest of the entries as 0.
Type	0x48			1	MSISDN Using PCO Flag **
Length	1			2	
Value	→	uint8	msisdn_flag	1	Values: • 1 – TRUE – Request MSISDN using PCO • 0 – FALSE – Do not request (default)
Type	0x7D			1	Common PCSCF Address Using DHCP ** *

Length	1			2	
Value	→	boolean	common_pcscf_addr_using_dhcp	1	Values: • 1 – TRUE – Request PCSCF address using the DHCP • 0 – FALSE – Do not request (default)
Type	0x7E			1	Common DNS Address Using DHCP ***
Length	1			2	
Value	→	boolean	common_dns_addr_using_dhcp	1	Values: • 1 – TRUE – Request DNS address using the DHCP • 0 – FALSE – Do not request (default)
Type	0x7F			1	Common PDP Type ** *
Length	4			2	
Value	→	enum	common_pdp_type	4	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6 • WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x80			1	Common Application User Data ***
Length	4			2	
Value	→	uint32	common_app_user_data	4	Opaque, numeric identifier representing the user data in the profile. This can be transparently set for any profile and queried later.
Type	0x81			1	Common Mobile Network Code ***
Length	3			2	
Value	→	uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLVs. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for example, a reported value of 90 corresponds to an MNC value of 90
Type	0x82			1	Common Mobile Country Code ***
Length	2			2	
Value	→	uint16	common_pco_mcc	2	16-bit integer representation of MCC. Range: 0 to 999.
Type	0x83			1	Common Operator Reserved PCO ID ***
Length	2			2	
Value	→	uint16	common_op_pco_id	2	Container ID of this PCO. If op_pco_id is configured, the UE sends the operator PCO with the container ID that is

					configured. Once configured, the profile cannot be unconfigured.
Type	0x84			1	Common Authentication Password ***
Length	Var			2	
Value	→	string	common_auth_password	Var	Password used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x85			1	Common User ID ***
Length	Var			2	
Value	→	string	common_user_id	Var	User ID used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x86			1	Common Authentication Protocol ***
Length	1			2	
Value	→	enum8	common_auth_protocol	1	Values: • WDS_PROFILE_AUTH_PROTOCOL_NONE (0) – None • WDS_PROFILE_AUTH_PROTOCOL_PAP (1) – PAP • WDS_PROFILE_AUTH_PROTOCOL_CHAP (2) – CHAP • WDS_PROFILE_AUTH_PROTOCOL_PAP_CHAP (3) – PAP or CHAP
Type	0x87			1	Common PCSCF Address Using PCO Flag ***
Length	1			2	
Value	→	boolean	common_is_pcscf_address_needed	1	Values: • 1 – TRUE – Request PCSCF address using PCO • 0 – FALSE – Do not request (default)
Type	0x88			1	Common Allow/Disallow Lingering of Interface ***
Length	3			2	
Value	→	boolean	common_allow_linger	1	Values: • 1 – TRUE – Allow lingering • 0 – FALSE – Do not allow lingering
		uint16	common_linger_timeout	2	Value of linger timeout in milliseconds.
Type	0x89			1	Common Secondary DNS Ipv6 Address Preference ***
Length	16			2	
Value	→	uint8	common_secodnary_dns_ipv6_address_preference	16	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.

Type	0x8A			1	Common Primary DNS Ipv6 Address Preference ***
Length	16			2	
Value	→	uint8	common_primary_dns_ipv6_address_preference	16	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x8B			1	Common Secondary DNS Ipv4 Address Preference ***
Length	4			2	
Value	→	uint32	common_secondary_DNS_Ipv4_address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x8C			1	Common Primary DNS Address Preference ***
Length	4			2	
Value	→	uint32	common_primary_DNS_Ipv4_address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x8D			1	Common APN Class ***
Length	1			2	
Value	→	uint8	common_apn_class	1	An opaque, numeric identifier representing the APN in the profile. The APN class can be transparently set for any profile and queried later.
Type	0x8E			1	Common APN Disabled Flag ***
Length	1			2	
Value	→	boolean	common_apn_disabled_flag	1	Setting this flag disables the use of this profile for making data calls. Any data call with this profile fails locally. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0x90			1	Negotiate DNS Server Preference *
Length	1			2	
Value	→	boolean	negotiate_dns_server_preference	1	Values: • 1 – TRUE – Request DNS address from the PDSN (default) • 0 – FALSE – Do not request DNS addresses from the PDSN
Type	0x91			1	PPP Session Close Timer for DO *
Length	4			2	
Value	→	uint32	ppp_session_close_timer_DO	4	Timer value (in seconds) on the DO indicating how long the PPP session lingers before closing down.
Type	0x92			1	PPP Session Close Timer for 1X *

Length	4			2	
Value	→	uint32	ppp_session_close_timer_1x	4	Timer value (in seconds) on 1X indicating how long the PPP session lingers before closing down.
Type	0x93			1	Allow/Disallow Lingering of Interface *
Length	1			2	
Value	→	boolean	allow_linger	1	Values: • 1 – TRUE – Allow lingering • 0 – FALSE – Do not allow lingering
Type	0x94			1	LCP ACK Timeout *
Length	2			2	
Value	→	uint16	lcp_ack_timeout	2	Value of LCP ACK timeout in milliseconds.
Type	0x95			1	IPCP ACK Timeout *
Length	2			2	
Value	→	uint16	ipcp_ack_timeout	2	Value of IPCP ACK timeout in milliseconds.
Type	0x96			1	Authentication Timeout *
Length	2			2	
Value	→	uint16	auth_timeout	2	Value of authentication timeout in milliseconds.
Type	0x97			1	LCP Configuration Request Retry Count Value *
Length	1			2	
Value	→	uint8	lcp_creq_retry_count	1	LCP configuration request retry count value.
Type	0x98			1	IPCP Configuration Request Retry Count *
Length	1			2	
Value	→	uint8	ipcp_creq_retry_count	1	IPCP configuration request retry count value.
Type	0x99			1	AUTH Retry *
Length	1			2	
Value	→	uint8	auth_retry_count	1	Authentication retry count value.
Type	0x9A			1	Authentication Protocol *
Length	1			2	
Value	→	enum8	auth_protocol	1	Values: • WDS_PROFILE_AUTH_PROTOCOL_NONE (0) – None • WDS_PROFILE_AUTH_PROTOCOL_PAP (1) – PAP • WDS_PROFILE_AUTH_PROTOCOL_CHAP (2) – CHAP • WDS_PROFILE_AUTH_PROTOCOL_PAP_CHAP (3) – PAP or CHAP
Type	0x9B			1	User ID *
Length	Var			2	
Value	→	string	user_id	Var	User ID used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the

					value.
Type	0x9C			1	Authentication Password *
Length	Var			2	
Value	→	string	auth_password	Var	Password used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x9D			1	Data Rate *
Length	1			2	
Value	→	enum8	data_rate	1	Values: • WDS_PROFILE_DATA_RATE_ LOW (0) – Low (Low speed Service Options (SO15) only) • WDS_PROFILE_DATA_RATE_ MEDIUM (1) – Medium (SO33 + low R-SCH) • WDS_PROFILE_DATA_RATE_ HIGH (2) – High (SO33 + high R-SCH) Note: Default is 2.
Type	0x9E			1	Application Type *
Length	4			2	
Value	→	enum	app_type	4	Values: • WDS_PROFILE_APP_TYPE_ DEFAULT (0x00000001) – Default application type • WDS_PROFILE_APP_TYPE_ LBS (0x00000020) – LBS application type • WDS_PROFILE_APP_TYPE_ TETHERED (0x00000040) – Tethered application type Note: Application type value in a profile cannot be modified. It can only be used to search for the profile ID numbers that have the specified application type. Note: An error message is returned if this TLV is included in the request.
Type	0x9F			1	Data Mode *
Length	1			2	
Value	→	enum8	data_mode	1	Values: • WDS_PROFILE_DATA_MODE_ CDMA_HDR (0) – CDMA or HDR (Hybrid 1X and 1xEV-DO) • WDS_PROFILE_DATA_MODE_ CDMA (1) – CDMA only (1X only) • WDS_PROFILE_DATA_MODE_ HDR (2) – HDR only (1xEV-DO only) Note: Default is 0.
Type	0xA0			1	Application Priority *
Length	1			2	
Value	→	uint8	app_priority	1	Numerical one byte value defining the application priority; higher value implies

					higher priority. Note: Application priority value in a profile cannot be modified. It is listed for future extensibility of profile ID search based on application priority. Note: An error message is returned if this TLV is included in the request.
Type	0xA1			1	APN String *
Length	Var			2	
Value	→	string	apn_string	Var	String representing the APN; the maximum length allowed is 100 bytes. QMI_ERR_ARG_TOO_LONG is returned if the APN name is too long.
Type	0xA2			1	PDN Type *
Length	1			2	
Value	→	enum8	pdn_type	1	Values: • WDS_PROFILE_PDN_TYPE_ IPV4 (0) – Ipv4 PDN type • WDS_PROFILE_PDN_TYPE_ IPV6 (1) – Ipv6 PDN type • WDS_PROFILE_PDN_TYPE_ IPV4_IPV6 (2) – Ipv4 or Ipv6 PDN type • WDS_PROFILE_PDN_TYPE_ UNSPECIFIED (3) – Unspecified PDN type (implying no preference)
Type	0xA3			1	Is PCSCF Address Needed *
Length	1			2	
Value	→	boolean	is_pcscf_address_needed	1	Controls whether the PCSCF address is requested from PDSN. Values: • 1 – TRUE – Request for PCSCF value from the PDSN • 0 – FALSE – Do not request for PCSCF value from the PDSN
Type	0xA4			1	Ipv4 Primary DNS Address *
Length	4			2	
Value	→	uint32	primary_v4_dns_address	4	Primary Ipv4 DNS address statically assigned to the UE.
Type	0xA5			1	Ipv4 Secondary DNS Address *
Length	4			2	
Value	→	uint32	secondary_v4_dns_addre ss	4	Secondary Ipv4 DNS address statically assigned to the UE.
Type	0xA6			1	Primary Ipv6 DNS Address *
Length	16			2	
Value	→	uint8	primary_v6_dns_address	16	Primary Ipv6 DNS address statically assigned to the UE.
Type	0xA7			1	Secondary Ipv6 DNS address *
Length	16			2	
Value	→	uint8	secondary_v6_dns_addre ss	16	Secondary Ipv6 DNS address statically assigned to the UE.
Type	0xA8			1	RAT Type *
Length	1			2	
Value	→	enum8	rat_type	1	Values: • WDS_RAT_TYPE_HRPD (1) – HRPD

					• WDS_RAT_TYPE_EHRPD (2) – EHRPD • WDS_RAT_TYPE_HRPD_EHRPD (3) – HRPD_EHRPD
Type	0xA9			1	APN Enabled *
Length	1			2	
Value	→	boolean	apn_enabled_3gpp2	1	Specifies whether the APN in that profile is enabled or disabled. Values: • 1 – Enabled (default value) • 0 – Disabled; the data call cannot be established using that APN.
Type	0xAA			1	PDN Inactivity Timeout *
Length	4			2	
Value	→	uint32	pdn_inactivity_timeout_3gpp2	4	Duration of inactivity timer in minutes. If a PDP context or PDN connection is inactive (that is, no data Rx or Tx) for this duration of time, the PDP context or PDN connection is disconnected. The default setting of zero is treated as an infinite value.
Type	0xAB			1	APN Class 3GPP2 *
Length	1			2	
Value	→	uint8	apn_class_3gpp2	1	An opaque, numeric identifier representing the APN in the profile. This can be transparently set for any profile and queried later.
Type	0xAD			1	PDN Level Auth Protocol *
Length	1			2	
Value	! →	enum8	pdn_level_auth_protocol	1	Authentication protocol used during PDN level authentication. Values: • WDS_PROFILE_PDN_LEVEL_AUTH_PROTOCOL_NONE (0) – None • WDS_PROFILE_PDN_LEVEL_AUTH_PROTOCOL_PAP (1) – PAP • WDS_PROFILE_PDN_LEVEL_AUTH_PROTOCOL_CHAP (2) – CHAP • WDS_PROFILE_PDN_LEVEL_AUTH_PROTOCOL_PAP_CHAP (3) – PAP or CHAP
Type	0xAE			1	PDN Level User ID *
Length	Var				
Value	! →	string	pdn_level_user_id	Var	User ID used during PDN level authentication. Maximum length allowed is 127 bytes.
Type	0xAF			1	PDN Level Auth Password *
Length	Var			2	
Value	→	string	pdn_level_auth_password	Var	Password used during PDN level authentication. Maximum length allowed is 127 bytes.
Type	0xB0			1	PDN Label *
Length	Var			2	
Value	→	string	pdn_label	Var	Logical name used to map the APN name for selecting the packet data

					network. Maximum length allowed is 100 bytes.
Type	0xBD			1	Operator Reserved PCO ID *
Length	2			2	
Value	→	uint16	op_pco_id_3gpp2	2	Container ID of this PCO. If op_pco_id is configured, the UE sends the operator PCO with the container ID that is configured. Once configured, the profile cannot be unconfigured.
Type	0xBE			1	Mobile Country Code *
Length	2			2	
Value	→	uint16	pco_mcc_3gpp2	2	16-bit integer representation of MCC. Range: 0 to 999.
Type	0xBF			1	Mobile Network Code *
Length	3			2	
Value	→	uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLVs. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for example, a reported value of 90 corresponds to an MNC value of 90
Type	0xC0			1	PDN Throttling Timer 1-6 *
Length	24			2	
Value	→	uint32	failure_timer	24	Back-off time (in seconds) to be used after a PDN connection or IP address assignment failure. For example, following a third consecutive PDN connection request failure, the UE waits failure_timer[2] seconds before sending the fourth request. Following failures of six or greater, failure_timer[5] is used.
Type	0xC1			1	PDN Disallow Timer 1-6 *
Length	24			2	
Value	→	uint32	disallow_timer	24	Back-off time (in seconds) to be used after the network refuses to grant the requested IP address type, such as when an Ipv6 address is requested from a network that only grants the Ipv4 address. For example, after a third consecutive PDN connection request is denied, the UE waits disallow_timer[2] seconds before sending the fourth request. Following failures of six or greater, disallow_timer[5] is used.
Type	0xC2			1	3GPP2 Application User Data *
Length	4			2	
Value	→	uint32	app_user_data_3gpp2	4	Opaque, numeric identifier representing the user data in the profile. This can be transparently set for any profile and queried later.

Type	0xC3			1	PCSCF Address Using DHCP 3GPP2 *
Length	1			2	
Value	→	boolean	pcscf_addr_using_dhcp_3gpp2	1	Values: • 1 – TRUE – Request PCSCF address using the DHCP • 0 – FALSE – Do not request (default)
Type	0xC4			1	DNS Address Using DHCP *
Length	1			2	
Value	→	boolean	dns_addr_using_dhcp_3gpp2	1	Values: • 1 – TRUE – Request DNS address using the DHCP • 0 – FALSE – Do not request (default)
Type	0xDE			1	CLAT Enabled * **
Length	1			2	
Value	→	boolean	clat_enabled	1	Enables CLAT. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0xDF			1	Ipv6 Prefix Delegation Flag * **
Length	1			2	
Value	→	boolean	ipv6_prefix_delegation	1	Enables Ipv6 prefix delegation. Values: • 0 – FALSE (default) • 1 – TRUE

5.2.9.2. Response – QMI_WDS_MODIFY_PROFILE_SETTINGS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
Extended Error Code	Unknown	1.25

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0xE0			1	Extended Error Code
Length	2			2	
Value	→	Enum16	Extended_error_code	2	Error code from the DS profile. These error codes are explained in Appendix C.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_ARG_TOO_LONG	Argument passed in a TLV is larger than the available storage in the device
QMI_ERR_INVALID_PROFILE	Invalid profile index specified
QMI_ERR_INVALID_PROFILE_TYPE	Invalid profile type specified
QMI_ERR_INVALID_PDP_TYPE	PDP type specified is not supported
QMI_ERR_EXTENDED_INTERNAL	Error from the DS profile module; the extended error code from the DS profile is populated in an additional optional TLV

5.2.9.3. Description of QMI_WDS_MODIFY_PROFILE_SETTINGS REQ/RESP

This command modifies the parameters of a configured profile.

Changing a profile that was used for an active data session does not affect the runtime settings of that data session. A configured profile is only referenced at the start of a data session.

TLV values 0xE1 through 0xEA are reserved for OEM use.

5.2.10. QMI_WDS_GET_PROFILE_LIST

Retrieves a list of configured profiles present on the wireless device.

WDS message ID

0x002A

Version introduced

Major – 1, Minor – 1

5.2.10.1. Request – QMI_WDS_GET_PROFILE_LIST_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Profile Type	1.11	1.59

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Profile Type
Length	1			2	
Value	→	enum8	profile_type	1	Identifies the technology type of the profile. Values: • WDS_PROFILE_TYPE_3GPP (0x00) – 3GPP • WDS_PROFILE_TYPE_3GPP2 (0x01) – 3GPP2 • WDS_PROFILE_TYPE_EPC (0x02) – EPC

5.2.10.2. Response – QMI_WDS_GET_PROFILE_LIST_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Profile list	Unknown	1.11

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Profile list
Length	Var			2	
Value	→	uint8	profile_list_len	1	Number of sets of the following elements: • profile_type • profile_index • profile_name_len • profile_name
		enum8	profile_type	1	Identifies the technology type of the profile. Values: • WDS_PROFILE_TYPE_3GPP (0x00) – 3GPP • WDS_PROFILE_TYPE_3GPP2 (0x01) – 3GPP2 • WDS_PROFILE_TYPE_EPC (0x02) – EPC
		uint8	profile_index	1	Profile number identifying the profile.
		Uint8	profile_name_len	1	Number of sets of the following elements: • profile_name
		string	profile_name	Var	One or more bytes describing the profile. The description can be a user-defined name for the profile.

Optional TLVs

Name	Version introduced	Version last modified
Extended Error Code	Unknown	1.25

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0xE0			1	Extended Error Code
Length	2			2	
Value	→	Enum16	extended_error_code	2	Error code from the DS profile. These error codes are explained in Appendix C.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_EXTENDED_INTERNAL	Error from the DS profile module; the extended error code from the DS profile is populated in an additional optional TLV

5.2.10.3. Description of QMI_WDS_GET_PROFILE_LIST REQ/RESP

This command requests a list of configured profile indexes from the device.

The control point can use the returned profile numbers when issuing the QMI_WDS_GET_PROFILE_SETTINGS_REQ command to retrieve the complete set of parameters for a single profile. The key-value pair search option (published in Rev N) of this document has been deprecated due to overlapping TLV types. This functionality is supported with a new command instead.

5.2.11. QMI_WDS_GET_PROFILE_SETTINGS

Retrieves the settings from a configured profile.

WDS message ID

0x002B

Version introduced

Major – 1, Minor – 1

5.2.11.1. Request – QMI_WDS_GET_PROFILE_SETTINGS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Profile Identifier	Unknown	1.11

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Profile Identifier
Length	2			2	
Value	→	enum8	profile_type	1	Identifies the technology type of the profile. Values: • WDS_PROFILE_TYPE_3GPP (0x00) – 3GPP • WDS_PROFILE_TYPE_3GPP2 (0x01) – 3GPP2 • WDS_PROFILE_TYPE_EPC (0x02) – EPC
		uint8	profile_index	1	Index identifying the profile.

Optional TLVs

None

5.2.11.2. Response – QMI_WDS_GET_PROFILE_SETTINGS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
Profile Name **	Unknown	1.11
PDP Type **	Unknown	1.132
PDP Header Compression Type **	Unknown	1.11
PDP Data Compression Type **	Unknown	1.11
Context Access Point Node Name **	Unknown	1.11
Primary DNS Address Preference **	Unknown	1.11
Secondary DNS Address Preference **	Unknown	1.11
UMTS Requested QoS **	Unknown	1.11
UMTS Minimum QoS **	Unknown	1.11
GPRS Requested QoS **	Unknown	1.11
GRPS Minimum QoS **	Unknown	1.11
Username **	Unknown	1.11
Password **	Unknown	1.11
Authentication Preference **	Unknown	1.11
Ipv4 Address Preference **	Unknown	1.11
PCSCF Address Using PCO Flag **	Unknown	1.3
PDP Access Control Flag **	Unknown	1.11
PCSCF Address Using DHCP **	Unknown	1.11
IM CN flag **	Unknown	1.11
Traffic Flow Template ID1 Parameters **	Unknown	1.11
TFT ID2 Parameters **	Unknown	1.11
PDP Context Number **	Unknown	1.11
PDP Context Secondary Flag **	Unknown	1.11
PDP Context Primary ID **	Unknown	1.11
Ipv6 Address Preference **	Unknown	1.11
UMTS Requested QoS with Signaling Indication Flag **	Unknown	1.11
UMTS Minimum QoS with Signaling Indication **	Unknown	1.11
Primary DNS Ipv6 Address Preference **	Unknown	1.11
Secondary DNS Ipv6 Address Preference **	Unknown	1.11
DHCP/NAS Preference **	Unknown	1.11
3GPP LTE QoS Parameters **	Unknown	1.11
APN Disabled Flag **	Unknown	1.13
PDN Inactivity Timeout **	Unknown	1.13
APN Class **	1.13	1.13
APN Bearer **	1.26	1.26
Support Emergency Calls **	1.31	1.31
Operator Reserved PCO ID **	1.37	1.37
Mobile Country Code **	1.37	1.37
Mobile Network Code **	1.37	1.37
Max PDN Connections Per Time Block **	1.46	1.116
Max PDN Connections Timer **	1.46	1.46
PDN Request Wait Timer **	1.46	1.46
3GPP Application User Data **	1.57	1.57
Roaming Disallow Flag **	1.63	1.63
PDN Disconnect Wait Timer **	1.63	1.63
DNS Address Using DHCP **	1.74	1.74

LTE Roaming PDP Type **	1.93	1.109
UMTS Roaming PDP Type **	1.93	1.109
IWLAN to LTE Roaming Handover Allowed Flag **	1.93	1.93
LTE to IWLAN Roaming Handover Allowed Flag **	1.93	1.93
3GPP PDN Throttling Timer 1-10 **	1.100	1.1
Override Home PDP Type **	1.109	1.109
List of PCO IDs **	1.119	1.119
MSISDN Using PCO Flag **	1.120	1.120
Common PCSCF Address Using DHCP ** *	1.74	1.74
Common DNS Address Using DHCP ** *	1.74	1.74
Common PDP Type ** *	1.65	1.109
Common Application User Data ***	1.59	1.59
Common Mobile Network Code ***	1.59	1.59
Common Mobile Country Code ***	1.59	1.59
Common Operator Reserved PCO ID ***	1.59	1.59
Common Authentication Password ***	1.59	1.59
Common User ID ***	1.59	1.59
Common Authentication Protocol ***	1.59	1.59
Common PCSCF Address Using PCO Flag ***	1.59	1.59
Common Allow/Disallow Lingering of Interface ***	1.59	1.59
Common Secondary DNS Ipv6 Address Preference ***	1.59	1.59
Common Primary DNS Ipv6 Address Preference ***	1.59	1.59
Common Secondary DNS Ipv4 Address Preference ***	1.59	1.59
Common Primary DNS Address Preference ***	1.59	1.59
Common APN Class ***	1.59	1.59
Common APN Disabled Flag ***	1.59	1.59
Profile Persistence Flag * **	1.112	1.112
Negotiate DNS Server Preference *	Unknown	1.11
PPP Session Close Timer for DO *	Unknown	1.11
PPP Session Close Timer for 1X *	Unknown	1.11
Allow/Disallow Lingering of Interface *	Unknown	1.11
LCP ACK Timeout *	Unknown	1.11
IPCP ACK Timeout *	Unknown	1.11
AUTH Timeout *	Unknown	1.11
LCP Configuration Request Retry Count Value *	Unknown	1.11
IPCP Configuration Request Retry Count *	Unknown	1.11
Authentication Retry *	Unknown	1.11
Authentication Protocol *	Unknown	1.33
User ID *	Unknown	1.11
Authentication Password *	Unknown	1.11
Data Rate *	Unknown	1.11
Application Type *	Unknown	1.11
Data Mode *	Unknown	1.11
Application Priority *	Unknown	1.11
APN String *	Unknown	1.11
PDN Type *	Unknown	1.11

Is PCSCF Address Needed *	Unknown	1.11
Ipv4 Primary DNS Address *	Unknown	1.11
Ipv4 Secondary DNS Address *	Unknown	1.11
Primary Ipv6 DNS Address *	Unknown	1.11
Secondary Ipv6 DNS Address *	Unknown	1.11
RAT Type *	Unknown	1.13
APN Enabled *	Unknown	1.13
PDN Inactivity Timeout *	Unknown	1.13
APN Class *	1.13	1.13
PDN Level Auth Protocol *	Unknown	1.34
PDN Level User ID *	Unknown	1.19
PDN Level Auth Password *	Unknown	1.19
PDN Label *	Unknown	1.19
Operator Reserved PCO ID *	1.37	1.37
Mobile Country Code *	1.37	1.37
Mobile Network Code *	1.37	1.37
PDN Throttling Timer 1-6 *	1.42	1.42
PDN Disallow Timer 1-6 *	1.42	1.42
3GPP2 Application User Data *	1.57	1.57
PCSCF Address Using DHCP 3GPP2 *	1.74	1.74
DNS Address Using DHCP *	1.74	1.74
CLAT Enabled * **	1.116	1.116
Ipv6 Prefix Delegation Flag * **	1.66	1.66
Profile Extended Error Code *	Unknown	1.25

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Profile Name **
Length	Var			2	
Value	→	string	profile_name	Var	One or more bytes describing the profile. The description can be a user-defined name for the profile. QMI_ERR_ARG_TOO_LONG is returned if the profile_name is too long
Type	0x11			1	PDP Type **
Length	1			2	
Value	→	enum8	pdp_type	1	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile. Values: • WDS_PDP_TYPE_PDP_IPV4 (0x00) – PDP-IP (Ipv4) • WDS_PDP_TYPE_PDP_PPP (0x01) – PDP-PPP • WDS_PDP_TYPE_PDP_IPV6 (0x02) – PDP-Ipv6 • WDS_PDP_TYPE_PDP_IPV4V6 (0x03) – PDP-Ipv4 and Ipv6 • WDS_PDP_TYPE_PDP_NON_ IP (0x04) – PDP-NON IP
Type	0x12			1	PDP Header Compression Type **
Length	1			2	
Value	→	enum8	pdp_hdr_compression_	1	Values:

			type		• WDS_PDP_HDR_COMPR_TYPE_ OFF (0x00) – PDP header compression is off • WDS_PDP_HDR_COMPR_TYPE_ MANUFACTURER_PREF (0x01) – Manufacturer preferred compression • WDS_PDP_HDR_COMPR_TYPE_ RFC_1144 (0x02) – PDP header compression based on RFC 1144 • WDS_PDP_HDR_COMPR_TYPE_ RFC_2507 (0x03) – PDP header compression based on RFC 2507 • WDS_PDP_HDR_COMPR_TYPE_ RFC_3095 (0x04) – PDP header compression based on RFC 3095
Type	0x13			1	PDP Data Compression Type **
Length	1			2	
Value	→	enum8	pdp_data_compression_ type	1	Values: • WDS_PDP_DATA_COMPR_TYPE_ OFF (0x00) – PDP data compression is off • WDS_PDP_DATA_COMPR_TYPE_ MANUFACTURER_PREF (0x01) – Manufacturer preferred compression • WDS_PDP_DATA_COMPR_TYPE_ V42 (0x02) – V.42BIS data compression • WDS_PDP_DATA_COMPR_TYPE_ V44 (0x03) – V.44 data compression
Type	0x14			1	Context Access Point Node Name **
Length	Var			2	
Value	→	string	apn_name	Var	String parameter that is a logical name used to select the GGSN and external packet data network. If the value is NULL or omitted, the subscription default value is requested. QMI_ERR_ARG_TOO_LONG is returned if the APN name is too long.
Type	0x15			1	Primary DNS Address Preference **
Length	4			2	
Value	→	uint32	primary_DNS_Ipv4_ address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x16			1	Secondary DNS Address Preference **
Length	4			2	
Value	→	uint32	secondary_DNS_Ipv4_ address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x17			1	UMTS Requested QoS **

Length	33			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrate	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_ bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_ SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_ OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values:

					• WDS_DELIVERY_ERRONEOUS_ SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_ SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_ SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_ SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
Type	0x18			1	UMTS Minimum QoS **
Length	33			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrat e	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_ bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_ SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_ OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost

					or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values: • WDS_DELIVERY_ERRONEOUS_SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
Type	0x19			1	GPRS Requested QoS **
Length	20			2	
Value	→	uint32	precedence_class	4	Precedence class
		uint32	delay_class	4	Delay class
		uint32	reliability_class	4	Reliability class
		uint32	peak_throughput_class	4	Peak throughput class
		uint32	mean_throughput_class	4	Mean throughput class

Type	0x1A			1	GRPS Minimum QoS **
Length	20			2	
Value	→	uint32	precedence_class	4	Precedence class
		uint32	delay_class	4	Delay class
		uint32	reliability_class	4	Reliability class
		uint32	peak_throughput_class	4	Peak throughput class
		uint32	mean_throughput_class	4	Mean throughput class
Type	0x1B			1	Username **
Length	Var			2	
Value	→	string	username	Var	Username used during data network authentication. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x1C			1	Password **
Length	Var			2	
Value	→	string	password	Var	Password to be used during data network authentication. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x1D			1	Authentication Preference **
Length	1			2	
Value	→	mask8	authentication_preference	1	Bitmap that indicates the authentication algorithm preference. Values: Bit 0 – PAP preference: • 0 – PAP is never performed • 1 – PAP can be performed Bit 1 – CHAP preference: • 0 – CHAP is never performed • 1 – CHAP can be performed All other bits are reserved and ignored. They must be set to zero by the client. If more than one bit is set, the device decides which authentication procedure is performed while setting up the data session. For example, the device might have a policy to select the most secure authentication mechanism.
Type	0x1E			1	Ipv4 Address Preference **
Length	4			2	
Value	→	uint32	ipv4_address_preference	4	Preferred Ipv4 address assigned to the TE. Actual assigned address is negotiated with the network and can differ from this value. If not specified, the Ipv4 Address is obtained automatically from the network. The assigned value is provided to the host via DHCP.
Type	0x1F			1	PCSCF Address Using PCO Flag **
Length	1			2	

Value	→	boolean	pcscf_addr_using_pco	1	Values: • 1 – TRUE – Request PCSCF address using PCO • 0 – FALSE – Do not request (default)
Type	0x20			1	PDP Access Control Flag **
Length	1			2	
Value	→	enum8	pdp_access_control_flag	1	Values: • WDS_PDP_ACCESS_CONTROL_ NONE (0x00) – None • WDS_PDP_ACCESS_CONTROL_ REJECT (0x01) – Reject • WDS_PDP_ACCESS_CONTROL_ PERMISSION (0x02) – Permission
Type	0x21			1	PCSCF Address Using DHCP **
Length	1			2	
Value	→	boolean	pcscf_addr_using_dhcp	1	Values: • 1 – TRUE – Request PCSCF address using DHCP • 0 – FALSE – Do not request (default)
Type	0x22			1	IM CN flag **
Length	1			2	
Value	→	boolean	im_cn_flag	1	Values: • 1 – TRUE – Request IM CN flag for this profile • 0 – FALSE – Do not request IM CN flag for this profile
Type	0x23			1	Traffic Flow Template (TFT) ID1 Parameters **
Length	39			2	
Value	→	uint8	filter_id	1	Filter identifier.
		Uint8	eval_id	1	Evaluation precedence index.
		Enum8	ip_version	1	IP version number. Values: • WDS_IP_VERSION_IPV4 (0x04) – Ipv4 • WDS_IP_VERSION_IPV6 (0x06) – Ipv6
		uint8	source_ip	16	Values: • Ipv4 – Fill the first 4 bytes • Ipv6 – Fill all the 16 bytes
		uint8	source_ip_mask	1	Mask value for the source address.
		Uint8	next_header	1	Next header/protocol value.
		Uint16	dest_port_range_start	2	Start value for the destination port range.
		Uint16	dest_port_range_end	2	End value for the destination port range.
		Uint16	src_port_range_start	2	Start value for the source port range.
		Uint16	src_port_range_end	2	End value for the source port range.
		Uint32	ipsec_spi	4	IPSec security parameter index.
		Uint16	tos_mask	2	TOS mask (traffic class for Ipv6).
		Uint32	flow_label	4	Flow label.
Type	0x24			1	TFT ID2 Parameters **
Length	39			2	
Value	→	uint8	filter_id	1	Filter identifier.
		Uint8	eval_id	1	Evaluation precedence index.
		Enum8	ip_version	1	IP version number. Values:

					• WDS_IP_VERSION_IPV4 (0x04) – Ipv4 • WDS_IP_VERSION_IPV6 (0x06) – Ipv6
		uint8	source_ip	16	Values: • Ipv4 – Fill the first 4 bytes • Ipv6 – Fill all the 16 bytes
		uint8	source_ip_mask	1	Mask value for the source address.
		Uint8	next_header	1	Next header/protocol value.
		Uint16	dest_port_range_start	2	Start value for the destination port range.
		Uint16	dest_port_range_end	2	End value for the destination port range.
		Uint16	src_port_range_start	2	Start value for the source port range.
		Uint16	src_port_range_end	2	End value for the source port range.
		Uint32	ipsec_spi	4	IPSec security parameter index.
		Uint16	tos_mask	2	TOS mask (traffic class for Ipv6).
		Uint32	flow_label	4	Flow label.
Type	0x25			1	PDP Context Number **
Length	1			2	
Value	→	uint8	pdp_context	1	PDP context number.
Type	0x26			1	PDP Context Secondary Flag **
Length	1			2	
Value	→	boolean	secondary_flag	1	Values: • 1 – TRUE – This is the secondary profile • 0 – FALSE – This is not the secondary profile
Type	0x27			1	PDP Context Primary ID **
Length	1			2	
Value	→	uint8	primary_id	1	PDP context number primary ID.
Type	0x28			1	Ipv6 Address Preference **
Length	16			2	
Value	→	uint8	ipv6_address_preference	16	Preferred Ipv6 address to be assigned to the TE; actual assigned address is negotiated with the network and can differ from this value; if not specified, the Ipv6 address is obtained automatically from the network.
Type	0x29			1	UMTS Requested QoS with Signaling Indication Flag **
Length	34			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per

					second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrate	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values: • WDS_DELIVERY_ERRONEOUS_SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the

					other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
		Boolean	sig_ind	1	Signaling indication flag. Values: • 0 – Signaling indication off • 1 – Signaling indication on
Type	0x2A			1	UMTS Minimum QoS with Signaling Indication **
Length	34			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_ SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_ CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_ STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_ INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_ BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrate	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_ bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_ SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_ OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error

					ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$ • 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values: • WDS_DELIVERY_ERRONEOUS_SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
		Boolean	sig_ind	1	Signaling indication flag. Values: • 0 – Signaling indication off • 1 – Signaling indication on
Type	0x2B			1	Primary DNS Ipv6 Address Preference **
Length	16			2	
Value	→	uint8	primary_dns_ipv6_address_preference	16	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x2C			1	Secondary DNS Ipv6 Address Preference **
Length	16			2	
Value	→	uint8	licit r_dns_ipv6_address_preference	16	Used as a preference during negotiation with the network; if not specified, the

					wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x2D			1	DHCP/NAS Preference **
Length	1			2	
Value	→	enum8	addr_allocation_preference	1	Indicates the address allocation preference. Values: • WDS_ADDR_ALLOC_PREF_NAS (0x00) – NAS signaling is used for address allocation • WDS_ADDR_ALLOC_PREF_DHCP (0x01) – DHCP is used for address allocation
Type	0x2E			1	3GPP LTE QoS Parameters **
Length	17			2	
Value	→	uint8	qci	1	For LTE, the requested QoS must be specified using the QoS Class Identifier (QoS). Values: • QCI value 0 – Requests the network to assign the appropriate QCI value • QCI values 1 to 4 – Associated with guaranteed bitrates • QCI values 5 to 9 – Associated with nonguaranteed bitrates, the values specified as guaranteed and maximum bitrates are ignored.
		Uint32	g_dl_bit_rate	4	Guaranteed DL bitrate.
		Uint32	max_dl_bit_rate	4	Maximum DL bitrate.
		Uint32	g_ul_bit_rate	4	Guaranteed UL bitrate.
		Uint32	max_ul_bit_rate	4	Maximum UL bitrate.
Type	0x2F			1	APN Disabled Flag **
Length	1			2	
Value	→	boolean	apn_disabled_flag	1	Setting this flag disables the use of this profile for making data calls. Any data call with this profile fails locally. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0x30			1	PDN Inactivity Timeout **
Length	4			2	
Value	→	uint32	pdn_inactivity_timeout	4	Duration of inactivity timer in seconds. If a PDP context or PDN connection is inactive (that is, no data Rx or Tx) for this duration of time, PDP context or PDN connection is disconnected. The default setting of zero is treated as an infinite value.
Type	0x31			1	APN Class **
Length	1			2	
Value	→	uint8	apn_class	1	An opaque, numeric identifier representing the APN in the profile. The APN class can be transparently set for any profile and queried later.

Type	0x35			1	APN Bearer **
Length	8			2	
Value	→	mask	apn_bearer	8	APN bearer mask. Specifies whether a data call is allowed on specific RAT types. Values: • 0x0000000000000001 – GSM • 0x0000000000000002 – WCDMA • 0x0000000000000004 – LTE • 0x8000000000000000 – Any
Type	0x36			1	Support Emergency Calls **
Length	1			2	
Value	→	boolean	support_emergency_calls	1	When this flag is set, the user can make emergency calls using this profile. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0x37			1	Operator Reserved PCO ID **
Length	2			2	
Value	→	uint16	op_pco_id	2	Container ID of this PCO. If op_pco_id is configured, the UE sends the operator PCO with the container ID that is configured. Once configured, the profile cannot be unconfigured.
Type	0x38			1	Mobile Country Code **
Length	2			2	
Value	→	uint16	pco_mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
Type	0x39			1	Mobile Network Code **
Length	3			2	
Value	→	uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLVs. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for example, a reported value of 90 corresponds to an MNC value of 90
Type	0x3A			1	Max PDN Connections Per Time Block **
Length	2			2	
Value	→	uint16	max_pdn_conn_per_block	2	Specifies the maximum number of PDN connections that the UE is allowed to perform with the network in a specified time block. The time block size is defined by a configuration item. The default value is 20. Range: 0 to 1023.
Type	0x3B			1	Max PDN Connections Timer **
Length	2			2	
Value	→	uint16	max_pdn_conn_timer	2	Specifies the time duration in seconds during which the UE counts the PDN connections already made. The default

					value is 300. Range: 0 to 3600 seconds.
Type	0x3C			1	PDN Request Wait Timer **
Length	2			2	
Value	→	uint16	pdn_req_wait_interval	2	Specifies the minimum time interval between the new PDN connection request and the last successful UE initiated PDN disconnection. The default value is 0. Range: 0 to 1023 sec.
Type	0x3D			1	3GPP Application User Data **
Length	4			2	
Value	→	uint32	app_user_data_3gpp	4	An opaque, numeric identifier representing the user data in the profile. This can be transparently set for any profile and queried later.
Type	0x3E			1	Roaming Disallow Flag **
Length	1			2	
Value	→	boolean	roaming_disallowed	1	Specifies whether the UE is allowed to connect to the APN specified by the profile while roaming.
Type	0x3F			1	PDN Disconnect Wait Timer **
Length	1			2	
Value	→	uint8	pdn_discon_wait_timer	1	Indicates the delay that the control point expects to be available for successful deregistration with the network before the modem disconnects the PDN(s). When the default value of zero is specified, the modem disconnects the PDN immediately upon moving to the roaming network, without waiting for the control point. Range: 0-255 minutes.
Type	0x40			1	DNS Address Using DHCP **
Length	1			2	
Value	→	boolean	dns_addr_using_dhcp	1	Values: • 1 – TRUE – Request DNS address using the DHCP • 0 – FALSE – Do not request (default)
Type	0x41			1	LTE Roaming PDP Type **
Length	4			2	
Value	→	enum	lte_roaming_pdp_type	4	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile, while roaming in LTE. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6 • WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x42			1	UMTS Roaming PDP Type **

Length	4			2	
Value	→	enum	umts_roaming_pdp_type	4	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile, while roaming in UMTS. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6 • WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x43			1	IWLAN to LTE Roaming Handover Allowed Flag **
Length	1			2	
Value	→	boolean	iwlan_to_lte_roaming_ho_allowed_flag	1	Specifies whether handover from IWLAN to LTE is allowed while roaming in LTE.
Type	0x44			1	LTE to IWLAN Roaming Handover Allowed Flag **
Length	1			2	
Value	→	boolean	lte_to_iwlan_roaming_ho_allowed_flag	1	Specifies whether handover from LTE to IWLAN is allowed while roaming in LTE.
Type	0x45			1	3GPP PDN Throttling Timer 1-10 **
Length	40			2	
Value	→	uint32	failure_timer_3gpp	40	Back-off time (in seconds) to be used after a PDN connection or IP address assignment failure. For example, following a third consecutive PDN connection request failure, the UE waits failure_timer[2] seconds before sending the fourth request.
Type	0x46			1	Override Home PDP Type **
Length	4			2	
Value	→	enum	override_home_pdp_type	4	Specifies the override type of data payload exchanged over the airlink when the packet data session is established with this profile, when in home network. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6 • WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x47			1	List of PCO IDs **
Length	20			2	
Value	→	uint16	op_reserved_pco_id_list	20	Specifies the list of operator reserved PCO IDs for which the device can query

					the list of PCOs. Valid values for PCO IDs are from 0xFF00 to 0xFFFF. The control point must fill the rest of the entries as 0.
Type	0x48			1	MSISDN Using PCO Flag **
Length	1			2	
Value	→	uint8	msisdn_flag	1	Values: • 1 – TRUE – Request MSISDN using PCO • 0 – FALSE – Do not request (default)
Type	0x7D			1	Common PCSCF Address Using DHCP ** *
Length	1			2	
Value	→	boolean	common_pcscf_addr_using_dhcp	1	Values: • 1 – TRUE – Request PCSCF address using the DHCP • 0 – FALSE – Do not request (default)
Type	0x7E			1	Common DNS Address Using DHCP ** *
Length	1			2	
Value	→	boolean	common_dns_addr_using_dhcp	1	Values: • 1 – TRUE – Request DNS address using the DHCP • 0 – FALSE – Do not request (default)
Type	0x7F			1	Common PDP Type ** *
Length	4			2	
Value	→	enum	common_pdp_type	4	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile. Values: • WDS_COMMON_PDP_TYPE_PDP_IPV4 (0x00) – Ipv4 • WDS_COMMON_PDP_TYPE_PDP_IPV6 (0x01) – Ipv6 • WDS_COMMON_PDP_TYPE_PDP_IPV4V6 (0x02) – Ipv4 and Ipv6 • WDS_COMMON_PDP_TYPE_PDP_MAX (0xFF) – Nothing is configured
Type	0x80			1	Common Application User Data ***
Length	4			2	
Value	→	uint32	common_app_user_data	4	Opaque, numeric identifier representing the user data in the profile. This can be transparently set for any profile and queried later.
Type	0x81			1	Common Mobile Network Code ***
Length	3			2	
Value	→	uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLVs. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for

					example, a reported value of 90 corresponds to an MNC value of 90
Type	0x82			1	Common Mobile Country Code ***
Length	2			2	
Value	→	uint16	common_pco_mcc	2	16-bit integer representation of MCC. Range: 0 to 999.
Type	0x83			1	Common Operator Reserved PCO ID ***
Length	2			2	
Value	→	uint16	common_op_pco_id	2	Container ID of this PCO. If op_pco_id is configured, the UE sends the operator PCO with the container ID that is configured. Once configured, the profile cannot be unconfigured.
Type	0x84			1	Common Authentication Password ***
Length	Var			2	
Value	→	string	common_auth_password	Var	Password used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x85			1	Common User ID ***
Length	Var			2	
Value	→	string	common_user_id	Var	User ID used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x86			1	Common Authentication Protocol ***
Length	1			2	
Value	→	enum8	common_auth_protocol	1	Values: • WDS_PROFILE_AUTH_PROTOCOL_NONE (0) – None • WDS_PROFILE_AUTH_PROTOCOL_PAP (1) – PAP • WDS_PROFILE_AUTH_PROTOCOL_CHAP (2) – CHAP • WDS_PROFILE_AUTH_PROTOCOL_PAP_CHAP (3) – PAP or CHAP
Type	0x87			1	Common PCSCF Address Using PCO Flag ***
Length	1			2	
Value	→	boolean	common_is_pcscf_address_needed	1	Values: • 1 – TRUE – Request PCSCF address using PCO • 0 – FALSE – Do not request (default)
Type	0x88			1	Common Allow/Disallow Lingering of Interface ***
Length	3			2	

Value	→	boolean	common_allow_linger	1	Values: • 1 – TRUE – Allow lingering • 0 – FALSE – Do not allow lingering
		uint16	common_linger_timeout	2	Value of linger timeout in milliseconds.
Type	0x89			1	Common Secondary DNS Ipv6 Address Preference ***
Length	16			2	
Value	→	uint8	common_secodnary_dns_ipv6_address_preference	16	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x8A			1	Common Primary DNS Ipv6 Address Preference ***
Length	16			2	
Value	→	uint8	common_primary_dns_ipv6_address_preference	16	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x8B			1	Common Secondary DNS Ipv4 Address Preference ***
Length	4			2	
Value	→	uint32	common_secondary_DNS_Ipv4_address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x8C			1	Common Primary DNS Address Preference ***
Length	4			2	
Value	→	uint32	common_primary_DNS_Ipv4_address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via the DHCP.
Type	0x8D			1	Common APN Class ***
Length	1			2	
Value	→	uint8	common_apn_class	1	An opaque, numeric identifier representing the APN in the profile. The APN class can be transparently set for any profile and queried later.
Type	0x8E			1	Common APN Disabled Flag ***
Length	1			2	
Value	→	boolean	common_apn_disabled_flag	1	Setting this flag disables the use of this profile for making data calls. Any data call with this profile fails locally. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0x8F			1	Profile Persistence Flag * **

Length	1			2	
Value	→	boolean	persistent	1	Indicates whether the profile is persistent or not. Values: • 1 – TRUE – Profile is persistent • 0 – FALSE – Profile is not persistent
Type	0x90			1	Negotiate DNS Server Preference *
Length	1			2	
Value	→	boolean	negotiate_dns_server_ preference	1	Values: • 1 – TRUE – Request DNS address from the PDSN (default) • 0 – FALSE – Do not request DNS address from the PDSN
Type	0x91			1	PPP Session Close Timer for DO *
Length	4			2	
Value	→	uint32	ppp_session_close_timer _ DO	4	Timer value (in seconds) on DO indicating how long the PPP session lingers before closing down.
Type	0x92			1	PPP Session Close Timer for 1X *
Length	4			2	
Value	→	uint32	ppp_session_close_timer _ 1x	4	Timer value (in seconds) on 1X indicating how long the PPP session lingers before closing down.
Type	0x93			1	Allow/Disallow Lingering of Interface *
Length	1			2	
Value	→	boolean	allow_linger	1	Values: • 1 – TRUE – Allow lingering • 0 – FALSE – Do not allow lingering
Type	0x94			1	LCP ACK Timeout *
Length	2			2	
Value	→	uint16	lcp_ack_timeout	2	Value of LCP ACK timeout in milliseconds.
Type	0x95			1	IPCP ACK Timeout *
Length	2			2	
Value	→	uint16	ipcp_ack_timeout	2	Value of IPCP ACK timeout in milliseconds.
Type	0x96			1	AUTH Timeout *
Length	2			2	
Value	→	uint16	auth_timeout	2	Value of authentication timeout in milliseconds.
Type	0x97			1	LCP Configuration Request Retry Count Value *
Length	1			2	
Value	→	uint8	lcp_creq_retry_count	1	LCP configuration request retry count value.
Type	0x98			1	IPCP Configuration Request Retry Count *
Length	1			2	
Value	→	uint8	ipcp_creq_retry_count	1	IPCP configuration request retry count value.
Type	0x99			1	Authentication Retry *
Length	1			2	
Value	→	uint8	auth_retry_count	1	Authentication retry count value.
Type	0x9A			1	Authentication Protocol *

Length	1			2	
Value	→	enum8	auth_protocol	1	Values: • WDS_PROFILE_AUTH_PROTOCOL_ NONE (0) – None • WDS_PROFILE_AUTH_PROTOCOL_ PAP (1) – PAP • WDS_PROFILE_AUTH_PROTOCOL_ CHAP (2) – CHAP • WDS_PROFILE_AUTH_PROTOCOL_ PAP_CHAP (3) – PAP or CHAP
Type	0x9B			1	User ID *
Length	Var			2	
Value	→	string	user_id	Var	User ID used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x9C			1	Authentication Password *
Length	Var			2	
Value	→	string	auth_password	Var	Password used during data network authentication; maximum length allowed is 127 bytes. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x9D			1	Data Rate *
Length	1			2	
Value	→	enum8	data_rate	1	Values: • WDS_PROFILE_DATA_RATE_ LOW (0) – Low (Low speed Service Options (SO15) only) • WDS_PROFILE_DATA_RATE_ MEDIUM (1) – Medium (SO33 + low R-SCH) • WDS_PROFILE_DATA_RATE_ HIGH (2) – High (SO33 + high R-SCH) Note: Default is 2.
Type	0x9E			1	Application Type *
Length	4			2	
Value	→	enum	app_type	4	Values: • WDS_PROFILE_APP_TYPE_ DEFAULT (0x00000001) – Default application type • WDS_PROFILE_APP_TYPE_ LBS (0x00000020) – LBS application type • WDS_PROFILE_APP_TYPE_ TETHERED (0x00000040) – Tethered application type Note: The application type value in a profile cannot be modified. It can only be used to search for the profile ID numbers

					that have the specified application type.
Type	0x9F			1	Data Mode *
Length	1			2	
Value	→	enum8	data_mode	1	Values: • WDS_PROFILE_DATA_MODE_ CDMA_HDR (0) – CDMA or HDR (Hybrid 1X and 1xEV-DO) • WDS_PROFILE_DATA_MODE_ CDMA (1) – CDMA only (1X only) • WDS_PROFILE_DATA_MODE_ HDR (2) – HDR only (1xEV-DO only) Note: Default is 0.
Type	0xA0			1	Application Priority *
Length	1			2	
Value	→	uint8	app_priority	1	Numerical one byte value defining the application priority; higher value means higher priority. Note: Application priority value in a profile cannot be modified. It is listed for future extensibility of profile ID search based on application priority.
Type	0xA1			1	APN String *
Length	Var			2	
Value	→	string	apn_string	Var	String representing the APN; maximum length allowed is 100 bytes. QMI_ERR_ARG_TOO_LONG is returned when the APN name is too long.
Type	0xA2			1	PDN Type *
Length	1			2	
Value	→	enum8	pdn_type	1	Values: • WDS_PROFILE_PDN_TYPE_ IPV4 (0) – Ipv4 PDN type • WDS_PROFILE_PDN_TYPE_ IPV6 (1) – Ipv6 PDN type • WDS_PROFILE_PDN_TYPE_ IPV4_IPV6 (2) – Ipv4 or Ipv6 PDN type • WDS_PROFILE_PDN_TYPE_ UNSPECIFIED (3) – Unspecified PDN type (implying no preference)
Type	0xA3			1	Is PCSCF Address Needed *
Length	1			2	
Value	→	boolean	is_pcscf_address_needed	1	Controls whether the PCSCF address is requested from PDSN. Values: • 1 – TRUE – Request PCSCF value from the PDSN • 0 – FALSE – Do not request PCSCF value from the PDSN
Type	0xA4			1	Ipv4 Primary DNS Address *
Length	4			2	
Value	→	uint32	primary_v4_dns_address	4	Primary Ipv4 DNS address that can be statically assigned to the UE.
Type	0xA5			1	Ipv4 Secondary DNS Address *
Length	4			2	
Value	→	uint32	secondary_v4_dns_addre	4	Secondary Ipv4 DNS address that can be

			ss		statically assigned to the UE.
Type	0xA6			1	Primary Ipv6 DNS Address *
Length	16			2	
Value	→	uint8	primary_v6_dns_address	16	Primary Ipv6 DNS address that can be statically assigned to the UE.
Type	0xA7			1	Secondary Ipv6 DNS Address *
Length	16			2	
Value	→	uint8	secondary_v6_dns_addre ss	16	Secondary Ipv6 DNS address that can be statically assigned to the UE.
Type	0xA8			1	RAT Type *
Length	1			2	
Value	→	enum8	rat_type	1	Values: • WDS_RAT_TYPE_HRPD (1) – HRPD • WDS_RAT_TYPE_EHRPD (2) – EHRPD • WDS_RAT_TYPE_HRPD_EHRPD (3) – HRPD_EHRPD
Type	0xA9			1	APN Enabled *
Length	1			2	
Value	→	boolean	apn_enabled_3gpp2	1	Specifies whether the APN in that profile is enabled or disabled. Values: • 1 – Enabled (default value) • 0 – Disabled; the data call cannot be established using that APN
Type	0xAA			1	PDN Inactivity Timeout *
Length	4			2	
Value	→	uint32	pdn_inactivity_timeout_ 3gpp2	4	Duration of inactivity timer in minutes. If a PDP context or PDN connection is inactive (that is, no data Rx or Tx) for this duration of time, the PDP context or PDN connection is disconnected. The default setting of zero is treated as an infinite value.
Type	0xAB			1	APN Class *
Length	1			2	
Value	→	uint8	apn_class_3gpp2	1	An opaque, numeric identifier representing the APN in the profile. This can be transparently set for any profile and queried later.
Type	0xAD			1	PDN Level Auth Protocol *
Length	1			2	
Value	→	enum8	pdn_level_auth_protocol	1	Authentication protocol used during PDN level authentication. Values: • WDS_PROFILE_PDN_LEVEL_ AUTH_PROTOCOL_NONE (0) – None • WDS_PROFILE_PDN_LEVEL_ AUTH_PROTOCOL_PAP (1) – PAP • WDS_PROFILE_PDN_LEVEL_ AUTH_PROTOCOL_CHAP (2) – CHAP • WDS_PROFILE_PDN_LEVEL_ AUTH_PROTOCOL_PAP_CHAP (3) – PAP or CHAP

Type	0xAE			1	PDN Level User ID *
Length	Var			2	
Value	→	string	pdn_level_user_id	Var	User ID used during PDN level authentication. Maximum length allowed is 127 bytes.
Type	0xAF			1	PDN Level Auth Password *
Length	Var			2	
Value	→	string	pdn_level_auth_passwor d	Var	Password used during PDN level authentication. Maximum length allowed is 127 bytes.
Type	0xB0			1	PDN Label *
Length	Var			2	
Value	→	string	pdn_label	Var	Logical name used to map the APN name for selecting the packet data network. Maximum length allowed is 100 bytes.
Type	0xBD			1	Operator Reserved PCO ID *
Length	2			2	
Value	→	uint16	op_pco_id_3gpp2	2	Container ID of this PCO. If op_pco_id is configured, the UE sends the operator PCO with the container ID that is configured. Once configured, the profile cannot be unconfigured.
Type	0xBE			1	Mobile Country Code *
Length	2			2	
Value	→	uint16	pco_mcc_3gpp2	2	16-bit integer representation of MCC. Range: 0 to 999.
Type	0xBF			1	Mobile Network Code *
Length	3			2	
Value	→	uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolea n	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLVs. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for example, a reported value of 90 corresponds to an MNC value of 90
Type	0xC0			1	PDN Throttling Timer 1-6 *
Length	24			2	
Value	→	uint32	failure_timer	24	Back-off time (in seconds) to be used after a PDN connection or IP address assignment failure. For example, following a third consecutive PDN connection request failure, the UE waits failure_timer[2] seconds before sending the fourth request. Following failures of six or greater, failure_timer[5] is used.
Type	0xC1			1	PDN Disallow Timer 1-6 *
Length	24			2	
Value	→	uint32	disallow_timer	24	Back-off time, in seconds, to be used after the network refuses to grant the

					requested IP address type, such as when an Ipv6 address is requested from a network that only grants the Ipv4 address. For example, after a third consecutive PDN connection request is denied, the UE waits disallow_timer[2] seconds before sending the fourth request. Following failures of six or greater, disallow_timer[5] is used.
Type	0xC2			1	3GPP2 Application User Data *
Length	4			2	
Value	→	uint32	app_user_data_3gpp2	4	Opaque, numeric identifier representing the user data in the profile. This can be transparently set for any profile and queried later.
Type	0xC3			1	PCSCF Address Using DHCP 3GPP2 *
Length	1			2	
Value	→	boolean	pcscf_addr_using_dhcp_3gpp2	1	Values: • 1 – TRUE – Request PCSCF address using the DHCP • 0 – FALSE – Do not request (default)
Type	0xC4			1	DNS Address Using DHCP *
Length	1			2	
Value	→	boolean	dns_addr_using_dhcp_3gpp2	1	Values: • 1 – TRUE – Request DNS address using the DHCP • 0 – FALSE – Do not request (default)
Type	0xDE			1	CLAT Enabled * **
Length	1			2	
Value	→	boolean	clat_enabled	1	Enables CLAT. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0xDF			1	Ipv6 Prefix Delegation Flag * **
Length	1			2	
Value	→	boolean	ipv6_prefix_delegation	1	Enables Ipv6 prefix delegation. Values: • 0 – FALSE (default) • 1 – TRUE
Type	0xE0			1	Profile Extended Error Code *
Length	2			2	
Value	→	enum16	extended_error_code	2	Extended error code received from the DS profile subsystem. These error codes are explained in Appendix C.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INVALID_PROFILE	Invalid profile index is specified
QMI_ERR_INVALID_PROFILE_TYPE	Invalid profile type is specified
QMI_ERR_EXTENDED_INTERNAL	Error from the DS profile module; the extended error code from the DS

	profile is populated in an additional optional TLV

5.2.11.3. Description of QMI_WDS_GET_PROFILE_SETTINGS REQ/RESP

This command retrieves the settings stored in the configured profile, specified by profile type and index.

The Password TLV is not returned for 3GPP2 security reasons (to prevent malicious users from stealing service).

TLV values 0xE1 through 0xEA are reserved for OEM use.

5.2.12. QMI_WDS_GET_RUNTIME_SETTINGS

Retrieves the packet data session settings currently in use.

WDS message ID

0x002D

Version introduced

Major – 1, Minor – 2

5.2.12.1. Request – QMI_WDS_GET_RUNTIME_SETTINGS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Requested Settings	Unknown	1.119

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Requested Settings
Length	4			2	
Value	→	mask32	requested_settings	4	Set bits to 1, corresponding to requested information. All other bits must be set to 0. If the values are not available, the corresponding TLVs are not returned in the response. Absence of this mask TLV results in the device returning all of the available information corresponding to bits 0 through 12. In cases where the information from bit 13 or greater is required, this TLV with all the necessary bits set must be present in the request. Values: • Bit 0 – Profile identifier • Bit 1 – Profile name • Bit 2 – PDP type • Bit 3 – APN name • Bit 4 – DNS address • Bit 5 – UMTS/GPRS granted QoS • Bit 6 – Username

					• Bit 7 – Authentication Protocol • Bit 8 – IP address • Bit 9 – Gateway information (address and subnet mask) • Bit 10 – PCSCF address using a PCO flag • Bit 11 – PCSCF server address list • Bit 12 – PCSCF domain name list • Bit 13 – MTU • Bit 14 – Domain name list • Bit 15 – IP family • Bit 16 – IM_CM flag • Bit 17 – Technology name • Bit 18 – Operator reserved PCO • Bit 19 – Operator reserved PCO list • Bit 20 – MSISDN information

5.2.12.2. Response – QMI_WDS_GET_RUNTIME_SETTINGS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
Profile Name **	Unknown	1.2
PDP Type **	Unknown	1.132
Context APN Name **	Unknown	1.2
Primary DNS Address Preference * **	Unknown	1.2
Secondary DNS Address Preference * **	Unknown	1.2
UMTS Requested QoS **	Unknown	1.2
GPRS Requested QoS **	Unknown	1.2
Username **	Unknown	1.2
Authentication Preference **	Unknown	1.2
Ipv4 Address Preference * **	Unknown	1.2
Profile Identifier **	Unknown	1.2
Ipv4 Gateway Address * **	Unknown	1.2
Ipv4 Subnet Mask * **	Unknown	1.2
PCSCF Address Using PCO Flag **	Unknown	1.3
PCSCF Ipv4 Server Address List **	Unknown	1.3
PCSCF FQDN List **	Unknown	1.3
Ipv6 Address * **	Unknown	1.9
Ipv6 Gateway Address * **	Unknown	1.9
Primary Ipv6 DNS Address * **	Unknown	1.7
Secondary Ipv6 DNS Address * **	Unknown	1.7
MTU * **	Unknown	1.8

Domain Name List * **	Unknown	1.8
IP Family * **	Unknown	1.8
IM CN Flag *	Unknown	1.8
Technology Name * **	Unknown	1.25
PCSCF Ipv6 Address List * **	Unknown	1.11
Operator Reserved Protocol Information * **	1.37	1.37
Operator Reserved Protocol List Information **	1.119	1.119
MSISDN Information **	1.119	1.119

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Profile Name **
Length	Var			2	
Value	→	string	profile_name	Var	One or more bytes describing the profile. The description can be a user-defined name for the profile. QMI_ERR_ARG_TOO_LONG is returned when the profile_name is too long
Type	0x11			1	PDP Type **
Length	1			2	
Value	→	enum8	pdp_type	1	Specifies the type of data payload exchanged over the airlink when the packet data session is established with this profile. Values: • WDS_PDP_TYPE_PDP_IPV4 (0x00) – PDP-IP (Ipv4) • WDS_PDP_TYPE_PDP_PPP (0x01) – PDP-PPP • WDS_PDP_TYPE_PDP_IPV6 (0x02) – PDP-Ipv6 • WDS_PDP_TYPE_PDP_IPV4V6 (0x03) – PDP-Ipv4 and Ipv6 • WDS_PDP_TYPE_PDP_NON_ IP (0x04) – PDP-NON IP
Type	0x14			1	Context APN Name **
Length	Var			2	
Value	→	string	apn_name	Var	String parameter that is a logical name used to select the GGSN and external packet data network. If the value is NULL or omitted, the subscription default value is requested. QMI_ERR_ARG_TOO_LONG is returned if the APN name is too long.
Type	0x15			1	Primary DNS Address Preference * **
Length	4			2	
Value	→	uint32	primary_DNS_Ipv4_ address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x16			1	Secondary DNS Address Preference * **

Length	4			2	
Value	→	uint32	secondary_DNS_Ipv4_address_preference	4	Used as a preference during negotiation with the network; if not specified, the wireless device attempts to obtain the DNS address automatically from the network. The negotiated value is provided to the host via DHCP.
Type	0x17			1	UMTS Requested QoS **
Length	33			2	
Value	→	enum8	traffic_class	1	Traffic class. Values: • WDS_TRAFFIC_CLASS_SUBSCRIBED (0x00) – Subscribed • WDS_TRAFFIC_CLASS_CONVERSATIONAL (0x01) – Conversational • WDS_TRAFFIC_CLASS_STREAMING (0x02) – Streaming • WDS_TRAFFIC_CLASS_INTERACTIVE (0x03) – Interactive • WDS_TRAFFIC_CLASS_BACKGROUND (0x04) – Background
		uint32	max_uplink_bitrate	4	Maximum uplink bitrate in bits per second.
		Uint32	max_downlink_bitrate	4	Maximum downlink bitrate in bits per second.
		Uint32	guaranteed_uplink_bitrate	4	Guaranteed uplink bitrate in bits per second.
		Uint32	guaranteed_downlink_bitrate	4	Guaranteed downlink bitrate in bits per second.
		Enum8	qos_delivery_order	1	Values: • WDS_QOS_DELIVERY_ORDER_SUBSCRIBE (0x00) – Subscribe • WDS_QOS_DELIVERY_ORDER_ON (0x01) – Delivery order on • WDS_QOS_DELIVERY_ORDER_OFF (0x02) – Delivery order off
		uint32	max_sdu_size	4	Maximum SDU size.
		Enum8	sdu_error_ratio	1	Target value for the fraction of SDUs lost or detected as erroneous. Values: • 0 – Subscribe • 1 – $1x10^2$ • 2 – $7x10^3$ • 3 – $1x10^3$ • 4 – $1x10^4$ • 5 – $1x10^5$ • 6 – $1x10^6$ • 7 – $1x10^1$
		enum8	residual_bit_error_ratio	1	Target value for the undetected bit error ratio in the delivered SDUs. Values: • 0 – Subscribe • 1 – $5x10^2$ • 2 – $1x10^2$ • 3 – $5x10^3$ • 4 – $4x10^3$

					• 5 – $1x10^3$ • 6 – $1x10^4$ • 7 – $1x10^5$ • 8 – $1x10^6$ • 9 – $6x10^8$
		enum8	delivery_erroneous_SDUs	1	Delivery of erroneous SDUs. Indicates whether SDUs detected as erroneous are delivered or not. Values: • WDS_DELIVERY_ERRONEOUS_SDUS_SUBSCRIBE (0x00) – Subscribe • WDS_DELIVERY_ERRONEOUS_SDUS_NO_DETECTION (0x01) – No detection • WDS_DELIVERY_ERRONEOUS_SDUS_YES (0x02) – Erroneous SDU is delivered • WDS_DELIVERY_ERRONEOUS_SDUS_NO (0x03) – Erroneous SDU is not delivered
		uint32	transfer_delay	4	Transfer delay. Indicates the targeted time between a request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds; if the parameter is set to 0, the subscribed value is requested.
		Uint32	traffic_handling_priority	4	Traffic handling priority. Specifies the relative importance for handling of SDUs that belong to the UMTS bearer, compared to the SDUs of other bearers. If the parameter is set to 0, the subscribed value is requested.
Type	0x19			1	GPRS Requested QoS **
Length	20			2	
Value	→	uint32	precedence_class	4	Precedence class
		uint32	delay_class	4	Delay class
		uint32	reliability_class	4	Reliability class
		uint32	peak_throughput_class	4	Peak throughput class
		uint32	mean_throughput_class	4	Mean throughput class
Type	0x1B			1	Username **
Length	Var			2	
Value	→	string	username	Var	Username used during data network authentication. QMI_ERR_ARG_TOO_LONG is returned if the storage on the wireless device is insufficient in size to hold the value.
Type	0x1D			1	Authentication Preference **
Length	1			2	
Value	→	mask8	authentication_preference	1	Bitmap that indicates the authentication algorithm preference. Values: Bit 0 – PAP preference: • 0 – PAP is never performed • 1 – PAP can be performed Bit 1 – CHAP preference:

					• 0 – CHAP is never performed • 1 – CHAP can be performed All other bits are reserved and are ignored. If more than one bit is set, the device decides which authentication procedure is performed while setting up the data session. For example, the device can have a policy to select the most secure authentication mechanism.
Type	0x1E			1	Ipv4 Address Preference * **
Length	4			2	
Value	→	uint32	ipv4_address_preference	4	Preferred Ipv4 address assigned to the TE. The actual assigned address is negotiated with the network and can differ from this value. If not specified, the Ipv4 address is obtained automatically from the network. The assigned value is provided to the host via DHCP.
Type	0x1F			1	Profile Identifier **
Length	2			2	
Value	→	enum8	profile_type	1	Values: • WDS_PROFILE_TYPE_3GPP (0x00) – 3GPP • WDS_PROFILE_TYPE_3GPP2 (0x01) – 3GPP2 • WDS_PROFILE_TYPE_EPC (0x02) – EPC
		uint8	profile_index	1	Index of the profile whose settings are loaded before session parameter negotiation for the current call; if this TLV is not present, the data call parameters are based on the device default settings for each parameter.
Type	0x20			1	Ipv4 Gateway Address * **
Length	4			2	
Value	→	uint32	ipv4_gateway_addr	4	Gateway address.
Type	0x21			1	Ipv4 Subnet Mask * **
Length	4			2	
Value	→	uint32	ipv4_subnet_mask	4	Subnet mask.
Type	0x22			1	PCSCF Address Using PCO Flag **
Length	1			2	
Value	→	boolean	pcscf_addr_using_pco	1	Values: • 1 – TRUE – PCSCF address is requested using PCO • 0 – FALSE – PCSCF address is not requested
Type	0x23			1	PCSCF Ipv4 Server Address List ** PCSCF Ipv4 server address.
Length	Var			2	
Value	→	uint8	pcscf_ipv4_addr_list_len	1	Number of sets of the following elements: • pcscf_ipv4_address

		uint32	pcscf_ipv4_address	4	PCSCF Ipv4 server address.
Type	0x24			1	PCSCF FQDN List **
Length	Var			2	
Value	→	uint8	fqdn_list_len	1	Number of sets of the following elements: • fqdn_len • fqdn
		uint16	fqdn_len	2	Number of sets of the following elements: • fqdn
		string	fqdn	Var	FQDN string.
Type	0x25			1	Ipv6 Address * **
Length	17			2	
Value	→	uint8	ipv6_addr	16	Ipv6 address (in network byte order). The address is a 16-element array of 8-bit numbers, each of which is in big-endian format.
		Uint8	ipv6_prefix_length	1	Ipv6 prefix length in number of bits. Range: 0 to 128.
Type	0x26			1	Ipv6 Gateway Address * **
Length	17			2	
Value	→	uint8	ipv6_addr	16	Ipv6 address (in network byte order). The address is a 16-element array of 8-bit numbers, each of which is in big-endian format.
		Uint8	ipv6_prefix_length	1	Ipv6 prefix length in number of bits. Range: 0 to 128.
Type	0x27			1	Primary Ipv6 DNS Address * **
Length	16			2	
Value	→	uint8	primary_dns_Ipv6_address	16	Primary Ipv6 DNS address in network byte order; an 8-element array of 16-bit numbers, each of which is in big-endian format.
Type	0x28			1	Secondary Ipv6 DNS Address * **
Length	16			2	
Value	→	uint8	secondary_dns_Ipv6_address	16	Secondary Ipv6 DNS address in network byte order; an 8-element array of 16-bit numbers, each of which is in big-endian format.
Type	0x29			1	MTU * **
Length	4			2	
Value	→	uint32	mtu	4	MTU.
Type	0x2A			1	Domain Name List * **
Length	Var			2	
Value	→	uint8	domain_name_list_len	1	Number of sets of the following elements: • domain_name_len • domain_name
		uint16	domain_name_len	2	Number of sets of the following elements: • domain_name
		string	domain_name	Var	Domain name.
Type	0x2B			1	IP Family * **

Length	1			2	
Value	→	enum8	ip_family	1	Values: • WDS_IP_FAMILY_IPV4 (0x04) – Ipv4 • WDS_IP_FAMILY_IPV6 (0x06) – Ipv6
Type	0x2C			1	IM CN Flag *
Length	1			2	
Value	→	boolean	im_cn_flag	1	Values: • 0 – FALSE • 1 – TRUE
Type	0x2D			1	Technology Name * **
Length	2			2	
Value	→	enum16	technology_name	2	Technology on which current packet data session is in progress. Values: • WDS_TECHNOLOGY_NAME_CDMA (-32767) – 0x8001 – CDMA • WDS_TECHNOLOGY_NAME_UMTS (-32764) – 0x8004 – UMTS • WDS_TECHNOLOGY_NAME_ WLAN_LOCAL_BRKOUT (-32736) – 0x8020 – WLAN_LOCAL_BRKOUT • WDS_TECHNOLOGY_NAME_ IWLAN_S2B (-32735) – 0x8021 – IWLAN_S2B • WDS_TECHNOLOGY_NAME_EPC (-30592) – 0x8880 – EPC • WDS_TECHNOLOGY_NAME_ EMBMS (-30590) – 0x8882 – EMBMS • WDS_TECHNOLOGY_NAME_ MODEM_LINK_LOCAL (-30584) – 0x8888 – Modem link local EPC is a logical interface to support LTE and eHRPD handoff; it is returned if the device supports IP session continuity. Modem Link Local is an interface for transferring data between entities on the AP and modem.
Type	0x2E			1	PCSCF Ipv6 Address List * ** PCSCF Ipv6 server address (in network byte order); An 8-element array of 16-bit numbers, each of which is in big endian format.
Length	Var			2	
Value	→	uint8	pcscf_ipv6_addr_list_len	1	Number of sets of the following elements: • pcscf_ipv6_addr
		uint8	pcscf_ipv6_addr	16	PCSCF Ipv6 server address (in network byte order); this is an 8-element array of 16-bit numbers, each of which is in big-endian format
Type	0x2F			1	Operator Reserved Protocol Information * ** Operator reserved PCO information that

					the device retrieved from the network. If there is no information available, a value of 0 is returned.
Length	Var			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLV. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for example, a reported value of 90 corresponds to an MNC value of 90
		uint8	app_specific_info_len	1	Number of sets of the following elements: • app_specific_info
		uint8	app_specific_info	Var	Points to the application-specific information from the network. The format for this field complies with 3GPP TS 24.008. The field is populated in this format for both 3GPP and 3GPP2.
		Uint16	container_id	2	Container ID of this PCO.
Type	0x30			1	Operator Reserved Protocol List Information ** Operator reserved PCO list information that the device retrieved from the network. If there is no information available, this TLV is absent.
Length	Var			2	
Value	→	uint8	pco_info_len	1	Number of sets of the following elements: • pco_id • mcc • mnc • mnc_includes_pcs_digit • app_specific_info_len • app_specific_info • container_id
		uint16	pco_id	2	PCO ID of this PCO. Range: 0xFF00 to 0xFFFF.
		Uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	Interprets the length of the corresponding MNC reported in the TLV. Values: • TRUE – MNC is a three-digit value; for example, a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; for example, a reported value of 90

					corresponds to an MNC value of 90
		uint8	app_specific_info_len	1	Number of sets of the following elements: • app_specific_info
		uint8	app_specific_info	Var	Points to the application-specific information from the network. The format for this field complies with 3GPP TS 24.008. The field is populated in this format for both 3GPP and 3GPP2.
		Uint16	container_id	2	Container ID of this PCO.
Type	0x31			1	MSISDN Information **
Length	Var			2	
Value	→	uint8	msisdn_len	1	Number of sets of the following elements: • msisdn
		uint8	msisdn	Var	MSISDN information that the device retrieved from the network for the APN of the current call. If there is no information available, this TLV is absent

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OUT_OF_CALL	Request was issued when the packet data session was disconnected
QMI_ERR_INCOMPATIBLE_STATE	Request from a client whose subscription does not match the subscription of the current data session (incompatible subscription)

5.2.12.3. Description of QMI_WDS_GET_RUNTIME_SETTINGS REQ/RESP

This command retrieves the settings for the current data session. Note that these settings might not be identical to the referenced profile number, since the settings are negotiated with the network and the assigned values from the network can be different from the profile values. Also, some of the profile values can be overridden in the QMI_WDS_START_NETWORK_INTERFACE request, hence the preferred values are a combination of the profile values and those overrides.

The runtime settings are those in use for an active data session. If no data session has been started, there are no runtime settings. Password TLV is not returned.

5.2.13. QMI_WDS_GET_DORMANCY_STATUS

Queries the current traffic channel status.

WDS message ID

0x0030

Version introduced

Major – 1, Minor – 3

5.2.13.1. Request – QMI_WDS_GET_DORMANCY_STATUS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

5.2.13.2. Response – QMI_WDS_GET_DORMANCY_STATUS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Dormancy status	Unknown	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Dormancy status
Length	1			2	
Value	→	enum8	dormancy_status	1	Values: • WDS_DORMANCY_STATUS_ DORMANT (0x01) – Traffic channel dormant • WDS_DORMANCY_STATUS_

					ACTIVE (0x02) – Traffic channel active

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OUT_OF_CALL	Dormancy status cannot be returned, because the call is not up
QMI_ERR_INFO_UNAVAILABLE	Dormancy status information is unavailable at this point
QMI_ERR_INCOMPATIBLE_STATE	Request from a client whose subscription does not match the subscription of the current data session (incompatible subscription)

5.2.13.3. Description of QMI_WDS_GET_DORMANCY_STATUS REQ/RESP

This command queries the state of the traffic channel. It returns dormant or active based on the traffic channel state, implying that the data connection must be established to obtain a valid traffic channel state.

5.2.14. QMI_WDS_GET_DATA_BEARER_TECHNOLOGY

Queries the current data bearer technology. (Deprecated)

WDS message ID

0x0037

Version introduced

Major – 1, Minor – 12

Version deprecated

Major – 1, Minor – 40

5.2.14.1. Request – QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

5.2.14.2. Response – QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Data Bearer Technology	1.12	1.30

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Data Bearer Technology
Length	1			2	
Value	→	enum8	data_bearer_tech	1	Values: • 0x01 – cdma2000® 1X

					• 0x02 – cdma2000® HRPD (1xEV-DO) • 0x03 – GSM • 0x04 – UMTS • 0x05 –cdma2000® HRPD (1xEV-DO RevA) • 0x06 – EDGE • 0x07 – HSDPA and WCDMA • 0x08 – WCDMA and HSUPA • 0x09 – HSDPA and HSUPA • 0x0A – LTE • 0x0B – cdma2000® EHRPD • 0x0C – HSDPA+ and WCDMA • 0x0D – HSDPA+ and HSUPA • 0x0E – DC_HSDPA+ and WCDMA • 0x0F – DC_HSDPA+ and HSUPA • 0x10 – HSDPA+ and 64QAM • 0x11 – HSDPA+, 64QAM, and HSUPA • 0x12 – TD-SCDMA • 0x13 – TD-SCDMA and HSDPA • 0x14 – TD-SCDMA and HSUPA • 0x15 – IWLAN S2B • -1 – Unknown

Optional TLVs

Name	Version introduced	Version last modified
Last Call Data Bearer Technology	1.12	1.30

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Last Call Data Bearer Technology
Length	1			2	
Value	→	enum8	last_call_data_bearer_tech	1	Returned only if not in a call and when the previous call was made using RmNet (for any devices that support QMI_WDS_GET_DUN_CALL_INFO). Values: • 0x01 – cdma2000® 1X • 0x02 – cdma2000® HRPD (1xEV-DO) • 0x03 – GSM • 0x04 – UMTS • 0x05 –cdma2000® HRPD (1xEV-DO RevA) • 0x06 – EDGE • 0x07 – HSDPA and WCDMA • 0x08 – WCDMA and HSUPA • 0x09 – HSDPA and HSUPA • 0x0A – LTE • 0x0B – cdma2000® EHRPD • 0x0C – HSDPA+ and WCDMA • 0x0D – HSDPA+ and HSUPA • 0x0E – DC_HSDPA+ and WCDMA • 0x0F – DC_HSDPA+ and HSUPA • 0x10 – HSDPA+ and 64QAM

					• 0x11 – HSDPA+, 64QAM, and HSUPA • 0x12 – TD-SCDMA • 0x13 – TD-SCDMA and HSDPA • 0x14 – TD-SCDMA and HSUPA • 0x15 – IWLAN S2B • -1 – Unknown

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_OUT_OF_CALL	Data bearer is not returned because a call is not active

5.2.14.3. Description of QMI_WDS_GET_DATA_BEARER_TECHNOLOGY REQ/RESP

This command queries the current data bearer technology. The data connection must be established to obtain a valid current data bearer technology.

If the error code returned is QMI_ERR_OUT_OF_CALL, the Last Call Data Bearer TLV is present in QMI_WDS_GET_DATA_BEARER_RESP.

This command is deprecated from QMI WDS version 1.40. The command is retained for backward compatibility, but no additional functionality is added to it. The data bearer technology is reported in the new format using the QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_EX command.

5.2.15. QMI_WDS_GET_CURRENT_DATA_BEARER_TECHNOLOGY

Queries the current data bearer technology. (Deprecated)

WDS message ID

0x0044

Version introduced

Major – 1, Minor – 4

Version deprecated

Major – 1, Minor – 102

5.2.15.1. Request – QMI_WDS_GET_CURRENT_DATA_BEARER_TECHNOLOGY_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

5.2.15.2. Response – QMI_WDS_GET_CURRENT_DATA_BEARER_ TECHNOLOGY_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Current Data Bearer Technology	1.10	1.24

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Current Data Bearer Technology
Length	9			2	
Value	→	enum8	current_nw	1	Current network type of data bearer.

					Values: • WDS_CURRENT_NETWORK_ UNKNOWN (0x00) – Unknown • WDS_CURRENT_NETWORK_3GPP2 (0x01) – 3GPP2 • WDS_CURRENT_NETWORK_3GPP (0x02) – 3GPP
		uint32	rat_mask	4	RAT mask to indicate the type of technology. A RAT mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE • 0x8000 – NULL_BEARER CDMA RAT mask: • 0x01 – CDMA_1X • 0x02 – EVDO_REV0 • 0x04 – EVDO_REVA • 0x08 – EVDO_REVB • 0x10 – EHRPD • 0x20 – FMC UMTS RAT mask: • 0x01 – WCDMA • 0x02 – GPRS • 0x04 – HSDPA • 0x08 – HSUPA • 0x10 – EDGE • 0x20 – LTE • 0x40 – HSDPA+ • 0x80 – DC_HSDPA+ • 0x100 – 64_QAM • 0x200 – TD-SCDMA
		uint32	so_mask	4	SO mask to indicate the service option or type of application. An SO mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE CDMA 1X SO mask: • 0x01 – CDMA_1X_IS95 • 0x02 – CDMA_1X_IS2000 • 0x04 – CDMA_1X_IS2000_REL_A CDMA EV-DO Rev 0 SO mask: • 0x01 – DPA CDMA EV-DO Rev A SO mask: • 0x01 – DPA • 0x02 – MFPA • 0x04 – EMPA • 0x08 – EMPA_EHRPD CDMA EV-DO Rev B SO mask: • 0x01 – DPA • 0x02 – MFPA

					• 0x04 – EMPA • 0x08 – EMPA_EHRPD • 0x10 – MMPA • 0x20 – MMPA_EHRPD

Optional TLVs

Name	Version introduced	Version last modified
Last Call Bearer Technology	1.12	1.24

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Last Call Bearer Technology
Length	9			2	
Value	→	enum8	current_nw	1	Current network type of data bearer. Values: • WDS_CURRENT_NETWORK_ UNKNOWN (0x00) – Unknown • WDS_CURRENT_NETWORK_3GPP2 (0x01) – 3GPP2 • WDS_CURRENT_NETWORK_3GPP (0x02) – 3GPP
		uint32	rat_mask	4	RAT mask to indicate the type of technology. A RAT mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE • 0x8000 – NULL_BEARER CDMA RAT mask: • 0x01 – CDMA_1X • 0x02 – EVDO_REV0 • 0x04 – EVDO_REVA • 0x08 – EVDO_REVB • 0x10 – EHRPD • 0x20 – FMC UMTS RAT mask: • 0x01 – WCDMA • 0x02 – GPRS • 0x04 – HSDPA • 0x08 – HSUPA • 0x10 – EDGE • 0x20 – LTE • 0x40 – HSDPA+ • 0x80 – DC_HSDPA+ • 0x100 – 64_QAM • 0x200 – TD-SCDMA
		uint32	so_mask	4	SO mask to indicate the service option or type of application. An SO mask value of zero indicates that this field is ignored. Values: • 0x00 – DONT_CARE

					CDMA 1X SO mask: • 0x01 – CDMA_1X_IS95 • 0x02 – CDMA_1X_IS2000 • 0x04 – CDMA_1X_IS2000_REL_A CDMA EV-DO Rev 0 SO mask: • 0x01 – DPA CDMA EV-DO Rev A SO mask: • 0x01 – DPA • 0x02 – MFPA • 0x04 – EMPA • 0x08 – EMPA_EHRPD CDMA EV-DO Rev B SO mask: • 0x01 – DPA • 0x02 – MFPA • 0x04 – EMPA • 0x08 – EMPA_EHRPD • 0x10 – MMPA • 0x20 – MMPA_EHRPD

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OUT_OF_CALL	Data bearer technology cannot be returned, because the call is not up
QMI_ERR_INFO_UNAVAILABLE	Data bearer technology information is unavailable at this point

5.2.15.3. Description of QMI_WDS_GET_CURRENT_DATA_BEARER_TECHNOLOGY REQ/RESP

This command queries the current data bearer technology. The data connection must be established to obtain a valid current data bearer technology. This command has been deprecated in favor of QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_EX.

5.2.16. QMI_WDS_SET_CLIENT_IP_FAMILY_PREF

Sets the control point IP preference.

WDS message ID

0x004D

Version introduced

Major – 1, Minor – 9

5.2.16.1. Request – QMI_WDS_SET_CLIENT_IP_FAMILY_PREF_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
IP Family Preference	Unknown	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	IP Family Preference
Length	1			2	
Value	→	enum8	ip_preference	1	Values: • WDS_IP_FAMILY_IPV4 (0x04) – Ipv4 • WDS_IP_FAMILY_IPV6 (0x06) – Ipv6

Optional TLVs

None

5.2.16.2. Response – QMI_WDS_SET_CLIENT_IP_FAMILY_PREF_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_INVALID_ARG	Invalid IP preference

5.2.16.3. Description of QMI_WDS_SET_CLIENT_IP_FAMILY_PREF REQ/RESP

This command allows a control point to choose its IP family preference. When the service successfully sets the IP preference for a control point, it binds the control point to that IP family until it gets another request with a different IP preference.

Any subsequent QMI_WDS_START_NETWORK_INTERFACE requests from the control point cause a data call to be attempted with an IP family preference that it is bound to. This allows two control points to bring up data calls of a different IP family type (for example, Ipv4 and Ipv6) on the same port.

5.2.17. QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_EX

Queries the data bearer technology.

WDS message ID

0x0091

Version introduced

Major – 1, Minor – 41

5.2.17.1. Request – QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_EX_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

5.2.17.2. Response – QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_EX_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
Data Bearer Technology	1.41	1.101
Last Call Bearer Technology	1.41	1.101

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Data Bearer Technology
Length	16			2	
Value	→	enum	technology	4	Technology type. Values: • WDS_BEARER_TECH_NETWORK_3GPP (0) – 3GPP

					• WDS_BEARER_TECH_NETWORK_ 3GPP2 (1) – 3GPP2
		enum	rat_value	4	RAT value. Values: • WDS_BEARER_TECH_RAT_EX_ NULL_BEARER (0x00) – NULL bearer • WDS_BEARER_TECH_RAT_EX_ 3GPP_WCDMA (0x01) – 3GPP WCDMA • WDS_BEARER_TECH_RAT_EX_ 3GPP_GERAN (0x02) – 3GPP GERAN • WDS_BEARER_TECH_RAT_EX_ 3GPP_LTE (0x03) – 3GPP LTE • WDS_BEARER_TECH_RAT_EX_ 3GPP_TDSCDMA (0x04) – 3GPP TD-SCDMA • WDS_BEARER_TECH_RAT_EX_ 3GPP_WLAN (0x05) – 3GPP WLAN • WDS_BEARER_TECH_RAT_EX_ 3GPP_MAX (0x64) – 3GPP maximum • WDS_BEARER_TECH_RAT_EX_ 3GPP2_1X (0x65) – 3GPP2 1X • WDS_BEARER_TECH_RAT_EX_ 3GPP2_HRPD (0x66) – 3GPP2 HRPD • WDS_BEARER_TECH_RAT_EX_ 3GPP2_EHRPD (0x67) – 3GPP2 EHRPD • WDS_BEARER_TECH_RAT_EX_ 3GPP2_WLAN (0x68) – 3GPP2 WLAN • WDS_BEARER_TECH_RAT_EX_ 3GPP2_MAX (0xC8) – 3GPP2 maximum
		mask	so_mask	8	SO mask to indicate the service option or type of application. An SO mask value of zero indicates that this field is ignored. Values: • 0x00 – SO mask unspecified 3GPP SO mask: • 0x01 – WCDMA • 0x02 – HSDPA • 0x04 – HSUPA • 0x08 – HSDPAPLUS • 0x10 – DC HSDPAPLUS • 0x20 – 64 QAM • 0x40 – HSPA • 0x80 – GPRS • 0x100 – EDGE • 0x200 – GSM • 0x400 – S2B • 0x800 – LTE limited service • 0x1000 – LTE FDD • 0x2000 – LTE TDD

					• 0x4000 – TD-SCDMA • 0x8000 – DC HSUPA • 0x10000 – LTE CA DL • 0x20000 – LTE CA UL 3GPP2 SO mask: • 0x01000000 – 1X IS95 • 0x02000000 – 1X IS2000 • 0x04000000 – 1X IS2000 REL A • 0x08000000 – HDR REV0 DPA • 0x10000000 – HDR REVA DPA • 0x20000000 – HDR REVB DPA • 0x40000000 – HDR REVA MPA • 0x80000000 – HDR REVB MPA • 0x100000000 – HDR REVA EMPA • 0x200000000 – HDR REVB EMPA • 0x400000000 – HDR REVB MMPA • 0x800000000 – HDR EVDO FMC
Type	0x11			1	Last Call Bearer Technology
Length	16			2	
Value	→	enum	technology	4	Technology type. Values: • WDS_BEARER_TECH_NETWORK_ 3GPP (0) – 3GPP • WDS_BEARER_TECH_NETWORK_ 3GPP2 (1) – 3GPP2
		enum	rat_value	4	RAT value. Values: • WDS_BEARER_TECH_RAT_EX_ NULL_BEARER (0x00) – NULL bearer • WDS_BEARER_TECH_RAT_EX_ 3GPP_WCDMA (0x01) – 3GPP WCDMA • WDS_BEARER_TECH_RAT_EX_ 3GPP_GERAN (0x02) – 3GPP GERAN • WDS_BEARER_TECH_RAT_EX_ 3GPP_LTE (0x03) – 3GPP LTE • WDS_BEARER_TECH_RAT_EX_ 3GPP_TDSCDMA (0x04) – 3GPP TD-SCDMA • WDS_BEARER_TECH_RAT_EX_ 3GPP_WLAN (0x05) – 3GPP WLAN • WDS_BEARER_TECH_RAT_EX_ 3GPP_MAX (0x64) – 3GPP maximum • WDS_BEARER_TECH_RAT_EX_ 3GPP2_1X (0x65) – 3GPP2 1X • WDS_BEARER_TECH_RAT_EX_ 3GPP2_HRPD (0x66) – 3GPP2 HRPD • WDS_BEARER_TECH_RAT_EX_ 3GPP2_EHRPD (0x67) – 3GPP2 EHRPD • WDS_BEARER_TECH_RAT_EX_ 3GPP2_WLAN (0x68) – 3GPP2 WLAN

					• WDS_BEARER_TECH_RAT_EX_ 3GPP2_MAX (0xC8) – 3GPP2 maximum
		mask	so_mask	8	SO mask to indicate the service option or type of application. An SO mask value of zero indicates that this field is ignored. Values: • 0x00 – SO mask unspecified 3GPP SO mask: • 0x01 – WCDMA • 0x02 – HSDPA • 0x04 – HSUPA • 0x08 – HSDPAPLUS • 0x10 – DC HSDPAPLUS • 0x20 – 64 QAM • 0x40 – HSPA • 0x80 – GPRS • 0x100 – EDGE • 0x200 – GSM • 0x400 – S2B • 0x800 – LTE limited service • 0x1000 – LTE FDD • 0x2000 – LTE TDD • 0x4000 – TD-SCDMA • 0x8000 – DC HSUPA • 0x10000 – LTE CA DL • 0x20000 – LTE CA UL 3GPP2 SO mask: • 0x01000000 – 1X IS95 • 0x02000000 – 1X IS2000 • 0x04000000 – 1X IS2000 REL A • 0x08000000 – HDR REV0 DPA • 0x10000000 – HDR REVA DPA • 0x20000000 – HDR REVB DPA • 0x40000000 – HDR REVA MPA • 0x80000000 – HDR REVB MPA • 0x100000000 – HDR REVA EMPA • 0x200000000 – HDR REVB EMPA • 0x400000000 – HDR REVB MMPA • 0x800000000 – HDR EVDO FMC

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OUT_OF_CALL	Data bearer technology cannot be returned, because the call is not up
QMI_ERR_INFO_UNAVAILABLE	Data bearer technology information is unavailable at this point

5.2.17.3. Description of QMI_WDS_GET_DATA_BEARER_TECHNOLOGY_EX REQ/RESP

This command queries the current data bearer technology. The data connection must be established to obtain a valid current data bearer technology.

6. Device Management Service (QMI_DMS)

The QMI_DMS provides applications running on a tethered device, such as Terminal Equipment (TE), with the following commands related to device management:

- Device identification (manufacturer, model, firmware revision, phone number, serial number)
- Device capabilities (data service type, SIM, data rate)
- Device power state (battery level, power source)

It is expected that user-level applications, for example, connection managers and/or device drivers on the TE, use QMI_DMS to access this functionality on the MSM™ device.

6.1. Theory of Operation

6.1.1. Generalized QMI Service Compliance

The QMI_DMS service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

6.1.2. DMS Service Type

The DMS is assigned QMI service type 0x02.

6.1.3. Message Definition Template

6.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

6.1.4. QMI_DMS Fundamental Concepts

The QMI_DMS service enables the control points to query device identification-related information. Available information includes:

- Manufacturer name, device model ID, software and hardware revision

- Voice and network identification number of the device
- Device capabilities, including the maximum channel rates, data service, SIM support, and radio technologies supported
- Device serial numbers corresponding to the wireless technologies supported by the device
- Power status information (such as power source and battery level)
- UIM-related functions (verify, change, unblock pins, and set pin protection)
- Device time

The QMI_DMS service also enables additional device management functionality. This includes:

- Managing the operating mode of the device
- User-controlled persistent lock state and code maintained by the device

The control point can generally obtain the above information via a polling mechanism (Request and Response messages). The power status change can also be reported via asynchronous indications. These are generated on a change in the value for all parameters, except the battery level. The notification of a battery level change is reported only when a threshold percentage (specified by a control point) is passed. These event-reporting settings registered by the control point are stored in the service state variables of the control point. The Reset command can be used to clear these settings, restoring them to their default values. The details for UIM and PIN-related terms used in Sections 3.11 through 3.14 of this document are located in 3GPP TS 31.102, 3GPP TS 51.011, and 80-V5329-1. The QMI_DMS UIM commands are only supported for 3GPP devices.

6.1.5. Service State Variables

6.1.5.1. Shared State Variables

No QMI_DMS state variables are shared across control points.

6.1.5.2. State Variables Per Control Point

Name	Description	Possible values	Default value
report_power_state	Indicates whether a power state change is reported to the control point	• TRUE • FALSE	FALSE
battery_lvl_lower_limit	Specifies the battery strength value (as %) below which a report to the control point is sent	0 to 100	0
battery_lvl_upper_limit	Battery strength value (as %) above which a report to the control point is sent	0 to 100	100
report_activation_state	Indicates whether a change in data-bearer technology is reported to the control point	• TRUE • FALSE	FALSE
report_operating_mode	Indicates whether an operating mode change is reported to the control point	• TRUE • FALSE	FALSE
report_uim_state	Indicates whether a UIM state change is reported to the control point	• TRUE • FALSE	FALSE

report_wireless_disable	Indicates whether a wireless disable state change is reported to the control point	• TRUE • FALSE	FALSE
report_prl_init	Indicates whether a PRL initialized notification is reported to the control point	• TRUE • FALSE	FALSE

6.2. QMI_DMS Messages

Table 6-1 QMI_DMS messages

Command	ID	Description
QMI_DMS_SET_EVENT_REPORT	0x0001	Sets the device management state reporting conditions for the requesting control point.
QMI_DMS_GET_DEVICE_CAP	0x0020	Requests the device capabilities.
QMI_DMS_GET_DEVICE_MFR	0x0021	Requests the device the manufacturer information.
QMI_DMS_GET_DEVICE_MODEL_ID	0x0022	Requests the device model identification.
QMI_DMS_GET_DEVICE_REV_ID	0x0023	Requests the device firmware revision identification.
QMI_DMS_GET_MSISDN	0x0024	Requests the assigned voice number.
QMI_DMS_GET_DEVICE_SERIAL_NUMBERS	0x0025	Requests the serial numbers of the device.
QMI_DMS_GET_POWER_STATE	0x0026	Requests the power status of the device.
QMI_DMS_GET_DEVICE_HARDWARE_REV	0x002C	Queries the hardware revision of the device.
QMI_DMS_GET_OPERATING_MODE	0x002D	Queries the current operating mode of the device.
QMI_DMS_SET_OPERATING_MODE	0x002E	Sets the operating mode of the device.
QMI_DMS_RESTORE_FACTORY_DEFAULTS	0x003A	Requests that the device reset all settings to factory defined values.
QMI_DMS_VALIDATE_SERVICE_ PROGRAMMING_CODE	0x003B	Requests the device to validate a specified service programming code.
QMI_DMS_UIM_GET_ICCID	0x003C	Queries the Integrated Circuit Card ID (ICCID) of the UIM for the device. (Deprecated)
QMI_DMS_UIM_GET_IMSI	0x0043	Queries the International Mobile Station Identity (IMSI) of the UIM for the device. (Deprecated)
QMI_DMS_GET_CURRENT_PRL_INFO	0x0053	Queries the active PRL information of the device.

6.2.1. QMI_DMS_SET_EVENT_REPORT

Sets the device management state reporting conditions for the requesting control point.

DMS message ID

0x0001

Version introduced

Major – 1, Minor – 0

6.2.1.1. Request – QMI_DMS_SET_EVENT_REPORT_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Power State Reporting	1.0	1.0
Battery Level Report Limits	1.0	1.0
PIN State Reporting	Unknown	1.41 (Deprecated)
Activation State Reporting	Unknown	1.6
Operating Mode Reporting	Unknown	1.3
UIM State Reporting	Unknown	1.41 (Deprecated)
Wireless Disable State Reporting	Unknown	1.6
PRL Init Reporting	Unknown	1.7
CDMA Lock Mode Reporting	1.24	1.24
Device Multisim Information	1.31	1.31

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Power State Reporting
Length	1			2	
Value	→	boolean	report_power_state	1	Values: • 0 – Do not report • 1 – Report on change in power state
Type	0x11			1	Battery Level Report Limits
Length	2			2	
Value	→	uint8	battery_lvl_lower_limit	1	The battery level is reported to the control point if the battery level falls below this lower limit (specified as percentage of remaining battery power from 0 to 100).
		Uint8	battery_lvl_upper_limit	1	The battery level is reported to the control point if the battery level rises above the upper

					limit (specified as percentage of remaining battery power from 0 to 100).
Type	0x12			1	PIN State Reporting (Deprecated)
Length	1			2	
Value	→	boolean	report_pin_state	1	Values: • 0 – Do not report • 1 – Report on change in PIN state
Type	0x13			1	Activation State Reporting
Length	1			2	
Value	→	boolean	report_activation_state	1	Values: • 0 – Do not report • 1 – Report activation state changes
Type	0x14			1	Operating Mode Reporting
Length	1			2	
Value	→	boolean	report_oprt_mode_state	1	Values: • 0 – Do not report • 1 – Report operating mode changes
Type	0x15			1	UIM State Reporting (Deprecated)
Length	1			2	
Value	→	boolean	report_uim_state	1	Values: • 0 – Do not report • 1 – Report UIM state changes
Type	0x16			1	Wireless Disable State Reporting
Length	1			2	
Value	→	boolean	report_wireless_disable_state	1	Values: • 0 – Do not report • 1 – Report wireless disable state changes
Type	0x17			1	PRL Init Reporting
Length	1			2	
Value	→	boolean	report_prl_init	1	Values: • 0 – Do not report • 1 – Report PRL initialized notification
Type	0x18			1	CDMA Lock Mode Reporting
Length	1			2	
Value	→	boolean	report_cdma_lock_mode	1	Values: • 0 – Do not report (default value) • 1 – Report CDMA Lock mode state changes
Type	0x19			1	Device Multisim Information
Length	1			2	
Value	→	boolean	report_device_multisim_info	1	Values: • 0 – Do not report (default value) • 1 – Report device multisim changes

6.2.1.2. Response – QMI_DMS_SET_EVENT_REPORT_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

6.2.1.3. Indication – QMI_DMS_EVENT_REPORT_IND

Message type

Indication

Sender

Service

Scope

Per control point (unicast)

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Power State	1.0	1.0
PIN 1 Status	Unknown	1.41 (Deprecated)
PIN 2 Status	Unknown	1.41 (Deprecated)
Activation State	Unknown	1.6
Operating Mode	1.3	1.12
UIM State	Unknown	1.41 (Deprecated)
Wireless Disable State	Unknown	1.6
PRL Init Notification	Unknown	1.7
CDMA Lock Mode State	1.24	1.24
Device Multisim Capability	1.31	1.31 (Deprecated)
Device Multisim Voice Data Capability	1.37	1.37
Current Subscription Capability	1.37	1.37
Subscription Voice Data Capability of the Device	1.37	1.37
Maximum Active Data Subscriptions	1.40	1.40
PRL Information	1.44	1.44
Maximum Device Configuration List	1.46	1.46

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Power State
Length	2			2	
Value	→	mask8	power_status	1	Power status flags. Values: Bit 0 – Power source • 0 – Powered by battery • 1 – Powered by external source Bit 1 – Battery connected • 0 – Not connected • 1 – Connected

					Bit 2 – Battery charging • 0 – Not charging • 1 – Charging Bit 3 – Power fault • 0 – No power fault • 1 – Recognized power fault, calls inhibited
		uint8	battery_lvl	1	Level of the battery. Values: • 0x00 – Battery is exhausted or the mobile device does not have a battery connected • 1 through 100 (0x64) – Percentage of battery capacity remaining
Type	0x11			1	PIN 1 Status (Deprecated)
Length	3			2	
Value	→	enum8	status	1	Current status of the PIN. Values: • DMS_PIN_STATUS_NOT_INITIALIZED (0x00) – PIN is not initialized • DMS_PIN_STATUS_ENABLED_NOT_VERIFIED (0x01) – PIN is enabled, not verified • DMS_PIN_STATUS_ENABLED_VERIFIED (0x02) – PIN is enabled, verified • DMS_PIN_STATUS_DISABLED (0x03) – PIN is disabled • DMS_PIN_STATUS_BLOCKED (0x04) – PIN is blocked • DMS_PIN_STATUS_PERMANENTLY_BLOCKED (0x05) – PIN is permanently blocked • DMS_PIN_STATUS_UNBLOCKED (0x06) – PIN is unblocked • DMS_PIN_STATUS_CHANGED (0x07) – PIN is changed
		uint8	verify_retries_left	1	Number of retries left, after which the PIN is blocked.
		Uint8	unblock_retries_left	1	Number of unblock retries left, after which the PIN is permanently blocked and the UIM is unusable.
Type	0x12			1	PIN 2 Status (Deprecated)
Length	3			2	
Value	→	enum8	status	1	Current status of the PIN. Values: • DMS_PIN_STATUS_NOT_INITIALIZED (0x00) – PIN is not initialized • DMS_PIN_STATUS_ENABLED_NOT_VERIFIED (0x01) – PIN is enabled, not verified • DMS_PIN_STATUS_ENABLED_VERIFIED (0x02) – PIN is enabled, verified • DMS_PIN_STATUS_DISABLED (0x03) – PIN is disabled • DMS_PIN_STATUS_BLOCKED (0x04) – PIN is blocked • DMS_PIN_STATUS_PERMANENTLY_BLOCKED (0x05) – PIN is permanently

					blocked • DMS_PIN_STATUS_UNBLOCKED (0x06) – PIN is unblocked • DMS_PIN_STATUS_CHANGED (0x07) – PIN is changed
		uint8	verify_retries_left	1	Number of retries left, after which the PIN is blocked.
		Uint8	unblock_retries_left	1	Number of unblock retries left, after which the PIN is permanently blocked and the UIM is unusable.
Type	0x13			1	Activation State
Length	2			2	
Value	→	enum16	activation_state	2	Service activation state. Values: • DMS_ACTIVATION_NOT_ACTIVATED (0x00) – Service is not activated • DMS_ACTIVATION_ACTIVATED (0x01) – Service is activated • DMS_ACTIVATION_CONNECTING (0x02) – Activation connecting – Network connection is in progress for automatic activation of service • DMS_ACTIVATION_CONNECTED (0x03) – • DMS_ACTIVATION_OTASP_SEC_ AUTHENTICATED (0x4) – OTASP security is authenticated • DMS_ACTIVATION_OTASP_NAM_ DOWNLOADED (0x05) – OTASP NAM is downloaded • DMS_ACTIVATION_OTASP_MDN_ DOWNLOADED (0x06) – OTASP MDN is downloaded • DMS_ACTIVATION_OTASP_IMSI_ DOWNLOADED (0x07) – OTASP IMSI downloaded • DMS_ACTIVATION_OTASP_PRL_ DOWNLOADED (0x08) – OTASP PRL is downloaded • DMS_ACTIVATION_OTASP_SPC_ DOWNLOADED (0x09) – OTASP SPC is downloaded • DMS_ACTIVATION_OTASP_SETTINGS _COMMITTED (0x0A) – OTASP settings are committed
Type	0x14			1	Operating Mode
Length	1			2	
Value	→	enum8	operating_mode	1	Current operating mode. Values: • DMS_OP_MODE_ONLINE (0x00) – Online • DMS_OP_MODE_LOW_POWER (0x01) – Low power • DMS_OP_MODE_FACTORY_TEST_ MODE (0x02) – Factory Test mode • DMS_OP_MODE_OFFLINE (0x03) –

					Offline • DMS_OP_MODE_RESETTING (0x04) – Resetting • DMS_OP_MODE_SHUTTING_DOWN (0x05) – Shutting down • DMS_OP_MODE_PERSISTENT_LOW_ POWER (0x06) – Persistent low power • DMS_OP_MODE_MODE_ONLY_LOW_ POWER (0x07) – Mode-only low power • DMS_OP_MODE_NET_TEST_ GW (0x08) – Conducting network test for GSM/WCDMA
Type	0x15			1	UIM State (Deprecated)
Length	1			2	
Value	→	enum8	uim_state	1	UIM state. Values: • DMS_UIM_INITIALIZATION_ COMPLETED (0x00) – UIM initialization has completed • DMS_UIM_INITIALIZATION_FAILED (0x01) – UIM has failed • DMS_UIM_NOT_PRESENT (0x02) – UIM is not present • DMS_UIM_STATE_UNAVAILABLE (-1) – UIM state is unavailable
Type	0x16			1	Wireless Disable State
Length	1			2	
Value	→	enum8	wireless_disable_state	1	Wireless disable state. Values: • DMS_WIRELESS_DISABLE_ OFF (0x00) – Wireless disable switch is turned off • DMS_WIRELESS_DISABLE_ ON (0x01) – Wireless disable switch is turned on
Type	0x17			1	PRL Init Notification
Length	1			2	
Value	→	enum8	prl_init	1	PRL initialized. Values: • DMS_PRL_INIT_COMPLETED (0x01) – PRL is completely loaded into the device (could be the default PRL)
Type	0x18			1	CDMA Lock Mode State
Length	4			2	
Value	→	enum	cdma_lock_mode_state	4	CDMA Lock mode state. Values: • DMS_CDMA_LOCK_MODE_OFF (0) – Phone is not CDMA locked • DMS_CDMA_LOCK_MODE_ON (1) – Phone is CDMA locked
Type	0x19			1	Device Multisim Capability (Deprecated) This TLV is deprecated. Use Device Multisim Voice Data Capability to support multiple simultaneously active radio interfaces.
Length	Var			2	
Value	→	uint8	max_subscriptions	1	Maximum number of subscriptions that can be supported simultaneously.
		Uint8	subscription_config_lis t_ len	1	Number of sets of the following elements: • max_active • subscription_ list
		uint8	max_active	1	Maximum number of subscriptions listed in

					this configuration that can be simultaneously active. If this number is less than max_subscriptions, it implies that any combination of the subscriptions in this configuration can be active and the remaining can be in standby.
		Uint8	subscription_list_len	1	Number of sets of the following elements: • subscription_list
		mask	subscription_list	Var	Array of max_subscriptions entries where each entry is a mask of capabilities. The client ignores any bits in the mask that it does not recognize. Values: • DMS_SUBS_CAPABILITY_AMPS (0x00000001) – AMPS • DMS_SUBS_CAPABILITY_CDMA (0x00000002) – CDMA • DMS_SUBS_CAPABILITY_HDR (0x00000004) – HDR • DMS_SUBS_CAPABILITY_GSM (0x00000008) – GSM • DMS_SUBS_CAPABILITY_WCDMA (0x00000010) – WCDMA • DMS_SUBS_CAPABILITY_LTE (0x00000020) – LTE • DMS_SUBS_CAPABILITY_TDS (0x00000040) – TDS
Type	0x1A			1	Device Multisim Voice Data Capability Device voice and data capability for supporting multiple simultaneously active radio interfaces.
Length	2			2	
Value	→	uint8	max_subscriptions	1	The maximum number of subscriptions that can be supported simultaneously.
		Uint8	max_active	1	The maximum number of subscriptions that can be simultaneously active. If this number is less than max_subscriptions, it implies that any combination of the subscriptions in this configuration can be active and the remaining can be in standby.
Type	0x1B			1	Current Subscription Capability
Length	Var			2	
Value	→	uint8	current_subscription_capability_len	1	Number of sets of the following elements: • current_subscription_ capability
		mask	current_subscription_capability	Var	An array of max_subscriptions entries where each entry is a mask of capabilities. The client ignores any bits in the mask that it does not recognize. Values: • DMS_SUBS_CAPABILITY_AMPS (0x00000001) – AMPS • DMS_SUBS_CAPABILITY_CDMA (0x00000002) – CDMA • DMS_SUBS_CAPABILITY_HDR

					(0x00000004) – HDR • DMS_SUBS_CAPABILITY_GSM (0x00000008) – GSM • DMS_SUBS_CAPABILITY_WCDMA (0x00000010) – WCDMA • DMS_SUBS_CAPABILITY_LTE (0x00000020) – LTE • DMS_SUBS_CAPABILITY_TDS (0x00000040) – TDS
Type	0x1C			1	Subscription Voice Data Capability of the Device Voice and data capability of each subscription of the device.
Length	Var			2	
Value	→	uint8	subs_voice_data_capability_len	1	Number of sets of the following elements: • subs_voice_data_capability • simul_voice_data_capable
		enum	subs_voice_data_capability	4	The simultaneous voice and data capability type of a subscription. Values: • DMS_SUBS_VOICE_DATA_CAPABILITY_NORMAL (0x01) – Normal • DMS_SUBS_VOICE_DATA_CAPABILITY_SGLTE (0x02) – SGLTE • DMS_SUBS_VOICE_DATA_CAPABILITY_CSFB (0x03) – CSFB • DMS_SUBS_VOICE_DATA_CAPABILITY_SVLTE (0x04) – SVLTE • DMS_SUBS_VOICE_DATA_CAPABILITY_ SRLTE (0x05) – SRLTE
		boolean	simul_voice_data_capable	1	The simultaneous voice and data capability of a subscription.
Type	0x1D			1	Maximum Active Data Subscriptions
Length	1			2	
Value	→	uint8	max_active_data_subscriptions	1	The maximum number of subscriptions that can be simultaneously active for data activity. If this value is less than max_subscriptions, it implies that any combination of the subscriptions in this configuration can be active and the remaining can be in standby.
Type	0x1E			1	PRL Information This TLV contains prl_version, prl_source, and prl_pref_only information.
Length	7			2	
Value	→	uint16	prl_version	2	PRL version.
		Boolean	prl_only	1	Values: • 0 – Unset • 1 – Set
		enum	prl_source	4	Values: • DMS_PRL_SOURCE_INFO_UNDETERMINED (0) – PRL is not loaded • DMS_PRL_SOURCE_INFO_DEFAULT (1) – PRL source is the default PRL • DMS_PRL_SOURCE_INFO_NV (2) – PRL

					source is the nonvolatile memory • DMS_PRL_SOURCE_INFO_CARD (3) – PRL source is the card
Type	0x1F			1	Maximum Device Configuration List This TLV gives the list of maximum configurations and current configuration of the device.
Length	Var			2	
Value	→	uint8	max_subscriptions	1	The maximum number of subscriptions that can be supported simultaneously.
		Uint8	max_active	1	The maximum number of subscriptions that can be simultaneously active out of all listed configurations. If this number is less than max_subscriptions, it implies that any combination of the subscriptions in these configurations can be active and the remaining can be in standby.
		Uint8	device_cfg_list_len	1	Number of sets of the following elements: • subs_cfg_list
		uint8	subs_cfg_list_len	1	Number of sets of the following elements: • subs_cfg_list
		mask	subs_cfg_list	Var	Array of max_subscriptions entries where each entry is a mask of capabilities. The client ignores any bits in the mask that it does not recognize. Values: • DMS_SUBS_CAPABILITY_AMPS (0x00000001) – AMPS • DMS_SUBS_CAPABILITY_CDMA (0x00000002) – CDMA • DMS_SUBS_CAPABILITY_HDR (0x00000004) – HDR • DMS_SUBS_CAPABILITY_GSM (0x00000008) – GSM • DMS_SUBS_CAPABILITY_WCDMA (0x00000010) – WCDMA • DMS_SUBS_CAPABILITY_LTE (0x00000020) – LTE • DMS_SUBS_CAPABILITY_TDS (0x00000040) – TDS
		uint8	current_config_index	1	The current device configuration is pointed by the configuration at this index from the list in device_cfg_list.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Some of the TLVs, such as report_uim_state, are not supported because the device lacks underlying support. This error is returned even if the message contains a mix of supported and unsupported TLVs. The

	control point is expected to register separately for each event in such a situation.

6.2.1.4. Description of QMI_DMS_SET_EVENT_REPORT

The control point state variables controlling event reporting are modified according to the TLVs present in the request. The service maintains a separate set of state variables for each control point. See Section 6.1.5.2 for more details regarding control point state variables. Specific device management state changes are communicated to the registered DMS control point via the QMI_DMS_EVENT_REPORT_IND indicator message. The AT command equivalents to this command are AT+CMER, AT+CIND, and AT+CIEV (refer to 3GPP TS 27.007).

This command is sent to specific control points when the device state corresponding to one of the previous TLVs has changed. The specific control points are those that previously registered for the corresponding state to be reported using the QMI_DMS_SET_EVENT_REPORT_REQ message.

The Power State TLV is included when any of the following occurs:

- The control point sets the battery level limits, and the battery level triggers either the upper or lowerlimit, i.e., the Request message.
- The control point enables power state reporting and the power state changes.
- The PIN1 Status or PIN2 Status TLVs are included when the control point has enabled PIN status reporting and the PIN status has changed.

The following TLVs are included when there is a change in the device multisim configuration :

- Device Multisim Information
- Device Multisim Capability
- Device Multisim Voice Data Capability
- Current Subscription Capability
- Subscription Voice Data Capability of the Device

The AT command equivalents to this command are AT+CMER, AT+CIND, and AT+CIEV (refer to 3GPP TS 27.007).

- The Activation State TLV is included when the activation state of the device has changed.
- The Operating Mode TLV is included when the control point has enabled Operating Mode reporting and the operating mode of the device has changed.
- The UIM State TLV is included when the control point has enabled UIM state reporting and the UIM state of the device has changed.
- The Wireless Disable TLV is included when the wireless disable signal state for the device has changed.
- The PRL Init Notification TLV is included when the PRL is loaded to the device.
- The PRL Information TLV is included to convey the prl_version, prl_source, and prl_pref_only values along with the PRL Init Notification TLV when the control point has enabled prl_init notification reporting.

6.2.2. QMI_DMS_GET_DEVICE_CAP

Requests the device capabilities.

DMS message ID

0x0020

Version introduced

Major – 1, Minor – 0

6.2.2.1. Request – QMI_DMS_GET_DEVICE_CAP_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.2.2. Response – QMI_DMS_GET_DEVICE_CAP_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Device Capabilities	Unknown	1.10

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Device Capabilities
Length	Var			2	
Value	→	uint32	max_tx_channel_rate	4	Maximum Tx transmission rate in bits per second (bps) supported by the device. The value 0xFFFFFFFF implies a rate greater than or equal to 0xFFFFFFFF (4Gbps). In multitechnology devices, this value is the greatest rate among all

					supported technologies.
		Uint32	max_rx_channel_rate	4	Maximum Rx transmission rate in bits per second (bps) supported by the device. The value 0xFFFFFFFF implies rate greater than or equal to 0xFFFFFFFF (4Gbps). In multitechnology devices, this value is the greatest rate among all supported technologies.
		Enum8	data_service_capability	1	Values: • DMS_DATA_CAP_NONE (0x00) – No data services supported • DMS_DATA_CAP_CS_ONLY (0x01) – Only circuit-switched (CS) services are supported • DMS_DATA_CAP_PS_ONLY (0x02) – Only packet-switched (PS) services are supported • DMS_DATA_CAP_SIMUL_CS_AND_PS (0x03) – Simultaneous CS and PS • DMS_DATA_CAP_NONSIMUL_CS_AND_PS (0x04) – Nonsimultaneous CS and PS
		enum8	sim_capability	1	Values: • DMS_SIM_NOT_SUPPORTED (0x01) – SIM is not supported • DMS_SIM_SUPPORTED (0x02) – SIM is supported
		uint8	radio_if_list_len	1	Number of sets of the following elements: • radio_if_list
		enum8	radio_if_list	Var	List of N one-byte elements describing the radio interfaces supported by the device. Values: • DMS_RADIO_IF_1X (0x01) – CDMA2000 1X • DMS_RADIO_IF_1X_EVDO (0x02) – CDMA2000 HRPD (1xEV-DO) • DMS_RADIO_IF_GSM (0x04) – GSM • DMS_RADIO_IF_UMTS (0x05) – UMTS • DMS_RADIO_IF_LTE (0x08) – LTE • DMS_RADIO_IF_TDS (0x09) – TDS

Optional TLVs

Name	Version introduced	Version last modified
Device Service Capability	1.11	1.11
Voice Support Capability	1.11	1.11
Simultaneous Voice and Data Capability	1.13	1.29
Device Multisim Capability	1.22	1.31 (Deprecated)
Device Multisim Voice Data Capability	1.37	1.37
Current Subscription Capability	1.37	1.37
Subscription Voice Data Capability of the	1.37	1.37

Device		
Subscription Feature Mode of the Device	1.39	1.48
Maximum Active Data Subscriptions	1.40	1.40
Maximum Subscription Capability	1.46	1.46
Maximum Device Configuration List	1.46	1.46

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Device Service Capability
Length	4			2	
Value	→	enum	device_service_capability	4	Values: • DMS_DEVICE_CAP_DATA_ONLY (0x01) – Only data services are supported • DMS_DEVICE_CAP_VOICE_ ONLY (0x02) – Only voice services are supported • DMS_DEVICE_CAP_SIMUL_ VOICE_AND_DATA (0x03) – Simultaneous voice and data • DMS_DEVICE_CAP_NONSIMUL_ VOICE_AND_DATA (0x04) – Nonsimultaneous voice and data
Type	0x11			1	Voice Support Capability
Length	8			2	
Value	→	mask	voice_support_capability	8	Bitmask of voice support available on device. Values: Bit 0 – GW CSFB • 0 – Not capable • 1 – Capable Bit 1 – 1x CSFB • 0 – Not capable • 1 – Capable Bit 2 – VoLTE • 0 – Not capable • 1 – Capable
Type	0x12			1	Simultaneous Voice and Data Capability
Length	8			2	
Value	→	mask	simul_voice_and_data_capability	8	Bitmask of simultaneous voice and data support available on the device. Values: • Bit 0 – SVLTE capability • Bit 1 – SVDO capability • Bit 2 – SGLTE capability Note: Zero bits set means that none of the defined capabilities are supported.
Type	0x13			1	Device Multisim Capability (Deprecated) This TLV is deprecated. Use Device Multisim Voice Data Capability to support multiple simultaneously active radio interfaces.
Length	Var			2	
Value	→	uint8	max_subscriptions	1	Maximum number of subscriptions that can be supported simultaneously.
		Uint8	subscription_config_list_len	1	Number of sets of the following elements: • max_active

					• subscription_list
		uint8	max_active	1	Maximum number of subscriptions listed in this configuration that can be simultaneously active. If this number is less than max_subscriptions, it implies that any combination of the subscriptions in this configuration can be active and the remaining can be in standby.
		Uint8	subscription_list_len	1	Number of sets of the following elements: • subscription_list
		mask	subscription_list	Var	Array of max_subscriptions entries where each entry is a mask of capabilities. The client ignores any bits in the mask that it does not recognize. Values: • DMS_SUBS_CAPABILITY_AMPS (0x00000001) – AMPS • DMS_SUBS_CAPABILITY_CDMA (0x00000002) – CDMA • DMS_SUBS_CAPABILITY_HDR (0x00000004) – HDR • DMS_SUBS_CAPABILITY_GSM (0x00000008) – GSM • DMS_SUBS_CAPABILITY_WCDMA (0x00000010) – WCDMA • DMS_SUBS_CAPABILITY_LTE (0x00000020) – LTE • DMS_SUBS_CAPABILITY_TDS (0x00000040) – TDS
Type	0x14			1	Device Multisim Voice Data Capability Device voice and data capability for supporting multiple simultaneously active radio interfaces.
Length	2			2	
Value	→	uint8	max_subscriptions	1	The maximum number of subscriptions that can be supported simultaneously.
		Uint8	max_active	1	The maximum number of subscriptions that can be simultaneously active. If this number is less than max_subscriptions, it implies that any combination of the subscriptions in this configuration can be active and the remaining can be in standby.
Type	0x15			1	Current Subscription Capability
Length	Var			2	
Value	→	uint8	current_subscription_capability_len	1	Number of sets of the following elements: • current_subscription_capability
		mask	current_subscription_capability	Var	An array of max_subscriptions entries where each entry is a mask of capabilities. The client ignores any bits in the mask that it does not recognize. Values: • DMS_SUBS_CAPABILITY_AMPS (0x00000001) – AMPS • DMS_SUBS_CAPABILITY_CDMA

					(0x00000002) – CDMA • DMS_SUBS_CAPABILITY_HDR (0x00000004) – HDR • DMS_SUBS_CAPABILITY_GSM (0x00000008) – GSM • DMS_SUBS_CAPABILITY_WCDMA (0x00000010) – WCDMA • DMS_SUBS_CAPABILITY_LTE (0x00000020) – LTE • DMS_SUBS_CAPABILITY_TDS (0x00000040) – TDS
Type	0x16			1	Subscription Voice Data Capability of the Device Voice and data capability of each subscription of the device
Length	Var			2	
Value	→	uint8	subs_voice_data_capability_len	1	Number of sets of the following elements: • subs_voice_data_capability • simul_voice_data_capable
		enum	subs_voice_data_capability	4	The simultaneous voice and data capability type of a subscription. Values: • DMS_SUBS_VOICE_DATA_CAPABILITY_NORMAL (0x01) – Normal • DMS_SUBS_VOICE_DATA_CAPABILITY_SGLTE (0x02) – SGLTE • DMS_SUBS_VOICE_DATA_CAPABILITY_CSFB (0x03) – CSFB • DMS_SUBS_VOICE_DATA_CAPABILITY_SVLTE (0x04) – SVLTE • DMS_SUBS_VOICE_DATA_CAPABILITY_ SRLTE (0x05) – SRLTE
		boolean	simul_voice_data_capable	1	The simultaneous voice and data capability of a subscription.
Type	0x17			1	Subscription Feature Mode of the Device
Length	Var			2	
Value	→	uint8	subs_device_feature_mode_len	1	Number of sets of the following elements: • subs_device_feature_mode
		enum	subs_device_feature_mode	Var	Device feature mode of each subscription. Values: • DMS_DEVICE_SUBS_FEATURE_MODE_NORMAL (0) – Normal • DMS_DEVICE_SUBS_FEATURE_MODE_SGLTE (1) – SGLTE • DMS_DEVICE_SUBS_FEATURE_MODE_SVLTE (2) – SVLTE • DMS_DEVICE_SUBS_FEATURE_MODE_SRLTE (3) – SRLTE • DMS_DEVICE_SUBS_FEATURE_MODE_DUAL_MULTIMODE (4) – Dual multimode
Type	0x18			1	Maximum Active Data Subscriptions
Length	1			2	
Value	→	uint8	max_active_data_subscri	1	The maximum number of subscriptions that

			ptions		can be simultaneously active for data activity. If this value is less than max_subscriptions, it implies that any combination of the subscriptions in this configuration can be active and the remaining can be in standby.
Type	0x19			1	Maximum Subscription Capability
Length	Var			2	
Value	→	uint8	device_max_subscription_static_capability_len	1	Number of sets of the following elements: • device_max_subscription_static_capability
		mask	device_max_subscription_static_capability	Var	Array of max_subscriptions entries where each entry is a mask of capabilities. This TLV gives the static maximum RAT capability for the device configuration supported by hardware per each subscription. The client ignores any bits in the mask that it does not recognize. Values: • DMS_SUBS_CAPABILITY_AMPS (0x00000001) – AMPS • DMS_SUBS_CAPABILITY_CDMA (0x00000002) – CDMA • DMS_SUBS_CAPABILITY_HDR (0x00000004) – HDR • DMS_SUBS_CAPABILITY_GSM (0x00000008) – GSM • DMS_SUBS_CAPABILITY_WCDMA (0x00000010) – WCDMA • DMS_SUBS_CAPABILITY_LTE (0x00000020) – LTE • DMS_SUBS_CAPABILITY_TDS (0x00000040) – TDS
Type	0x1A			1	Maximum Device Configuration List List of maximum configurations and the current configuration of the device.
Length	Var			2	
Value	→	uint8	max_subscriptions	1	The maximum number of subscriptions that can be supported simultaneously.
		Uint8	max_active	1	The maximum number of subscriptions that can be simultaneously active out of all listed configurations. If this number is less than max_subscriptions, it implies that any combination of the subscriptions in these configurations can be active and the remaining can be in standby.
		Uint8	device_cfg_list_len	1	Number of sets of the following elements: • subs_cfg_list
		uint8	subs_cfg_list_len	1	Number of sets of the following elements: • subs_cfg_list
		mask	subs_cfg_list	Var	Array of max_subscriptions entries where each entry is a mask of capabilities. The client ignores any bits in the mask that it does not recognize. Values: • DMS_SUBS_CAPABILITY_AMPS

					(0x00000001) – AMPS • DMS_SUBS_CAPABILITY_CDMA (0x00000002) – CDMA • DMS_SUBS_CAPABILITY_HDR (0x00000004) – HDR • DMS_SUBS_CAPABILITY_GSM (0x00000008) – GSM • DMS_SUBS_CAPABILITY_WCDMA (0x00000010) – WCDMA • DMS_SUBS_CAPABILITY_LTE (0x00000020) – LTE • DMS_SUBS_CAPABILITY_TDS (0x00000040) – TDS
		uint8	current_config_index	1	The current device configuration is pointed by the configuration at this index from the list in device_cfg_list.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

6.2.2.3. Description of QMI_DMS_GET_DEVICE_CAP REQ/RESP

This command obtains the high-level capabilities of the device. The AT command equivalent to this command is AT+GCAP (refer to 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131).

The Device Multisim Voice Data Capability TLV includes a list of supported multisim configurations. Each entry in this list includes a max_active field and a max_subscriptions field. The order of the bitmask fields in this list does not correspond to any type of subscription index. Each bitmask field represents capabilities of a single subscription.

For example, consider a device where max_subscriptions is 3. One entry in the subscription configuration list has max_active = 2, with the following values:

subscription list[0] = DMS_SUBS_CAPABILITY_GSM | DMS_SUBS_CAPABILITY_WCDMA

subscription list[1] = DMS_SUBS_CAPABILITY_GSM

subscription list[2] = DMS_SUBS_CAPABILITY_GSM

This means the device supports a configuration with three GSM subscriptions, a configuration with two GSM subscriptions, and one WCDMA subscription. For any of these configurations the device supports any two being active simultaneously with any remaining subscriptions on standby.

NOTE:

In the Simultaneous Voice and Data Capability TLV, the SGLTE bitmask is set only when both the device and the current configuration supports SGLTE.

6.2.3. QMI_DMS_GET_DEVICE_MFR

Requests the device the manufacturer information.

DMS message ID

0x0021

Version introduced

Major – 1, Minor – 0

6.2.3.1. Request – QMI_DMS_GET_DEVICE_MFR_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.3.2. Response – QMI_DMS_GET_DEVICE_MFR_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Device Manufacturer	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Device Manufacturer
Length	Var			2	
Value	→	string	device_manufacturer	Var	String identifying the device manufacturer.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

6.2.3.3. Description of QMI_DMS_GET_DEVICE_MFR REQ/RESP

This command returns a string identifying the device manufacturer. The AT command equivalent to this command is AT+GMI (refer to 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131).

6.2.4. QMI_DMS_GET_DEVICE_MODEL_ID

Requests the device model identification.

DMS message ID

0x0022

Version introduced

Major – 1, Minor – 0

6.2.4.1. Request – QMI_DMS_GET_DEVICE_MODEL_ID_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.4.2. Response – QMI_DMS_GET_DEVICE_MODEL_ID_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Device Model	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Device Model
Length	Var			2	
Value	→	string	device_model_id	Var	String identifying the device model.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

6.2.4.3. Description of QMI_DMS_GET_DEVICE_MODEL_ID REQ/RESP

This command returns a string identifying the model of the device. This usually corresponds to the manufacturer's model name under which the device is marketed. The AT command equivalent to this command is AT+GMM (refer to 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131).

6.2.5. QMI_DMS_GET_DEVICE_REV_ID

Requests the device firmware revision identification.

DMS message ID

0x0023

Version introduced

Major – 1, Minor – 0

6.2.5.1. Request – QMI_DMS_GET_DEVICE_REV_ID_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.5.2. Response – QMI_DMS_GET_DEVICE_REV_ID_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Revision ID	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Revision ID
Length	Var			2	
Value	→	string	device_rev_id	Var	String containing the device revision ID.

Optional TLVs

Name	Version introduced	Version last modified
Boot Code Revision	Unknown	1.6

PRI Revision	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Boot Code Revision
Length	Var			2	
Value	→	string	boot_code_rev	Var	String containing the boot code revision.
Type	0x11			1	PRI Revision
Length	Var			2	
Value	→	string	pri_rev	Var	String containing the device PRI revision.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

6.2.5.3. Description of QMI_DMS_GET_DEVICE_REV_ID REQ/RESP

This command returns a string identifying the firmware revision of the device. This usually corresponds to the manufacturer's software revision loaded on the device. The AT command equivalent to this command is AT+GMR (refer to 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131).

If supported by the device, one or more optional TLVs are also returned:

- Boot Code Revision – Revision of the boot software used to power up the device
- PRI Revision – Revision of the factory configuration loaded to the device

6.2.6. QMI_DMS_GET_MSISDN

Requests the assigned voice number.

DMS message ID

0x0024

Version introduced

Major – 1, Minor – 0

6.2.6.1. Request – QMI_DMS_GET_MSISDN_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.6.2. Response – QMI_DMS_GET_MSISDN_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Voice Number	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Voice Number
Length	Var			2	
Value	→	string	voice_number	Var	String containing the voice number in use by the device.

Optional TLVs

Name	Version introduced	Version last modified

Mobile ID	Unknown	1.3
International Mobile Subscriber ID	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Mobile ID
Length	Var			2	
Value	→	string	mobile_id_number	Var	String containing the mobile ID number of the device.
Type	0x11			1	International Mobile Subscriber ID
Length	Var			2	
Value	→	string	imsi	Var	String containing the international mobile subscriber ID of the device.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_NOT_PROVISIONED	Device does not support voice service or the value is not provisioned in the device

6.2.6.3. Description of QMI_DMS_GET_MSISDN REQ/RESP

The voice number is the MDN or MSISDN assigned to the mobile. If it is available in the device provisioning, an optional mobile ID and IMSI is returned. The AT command equivalent to this command is AT+CNUM (refer to TIA/EIA/IS-131).

6.2.7. QMI_DMS_GET_DEVICE_SERIAL_NUMBERS

Requests the serial numbers of the device.

DMS message ID

0x0025

Version introduced

Major – 1, Minor – 0

6.2.7.1. Request – QMI_DMS_GET_DEVICE_SERIAL_NUMBERS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.7.2. Response – QMI_DMS_GET_DEVICE_SERIAL_NUMBERS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
ESN	1.0	1.0
IMEI	1.0	1.0
MEID	1.0	1.0
IMEI SVN	Unknown	1.5

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	ESN
Length	Var			2	
Value	→	string	esn	Var	String containing the ESN of the device.
Type	0x11			1	IMEI

Length	Var			2	
Value	→	string	imei	Var	String containing the IMEI of the device.
Type	0x12			1	MEID
Length	Var			2	
Value	→	string	meid	Var	String containing the MEID of the device.
Type	0x13			1	IMEI SVN
Length	Var			2	
Value	→	string	imeisv_svn	Var	IMEI software version number

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_NOT_PROVISIONED	Device does not support voice service or the value is not provisioned in the device

6.2.7.3. Description of QMI_DMS_GET_DEVICE_SERIAL_NUMBERS REQ/RESP

This command returns all serial numbers assigned to the device as follows:

- ESN is included for 3GPP2 devices
- IMEI is included for 3GPP devices
- MEID is included for devices that support it, for example, 3GPP or 3GPP2
- IMEI software version number is included for 3GPP devices

The AT command equivalent to this command is AT+GSN (refer to 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131).

6.2.8. QMI_DMS_GET_POWER_STATE

Requests the power status of the device.

DMS message ID

0x0026

Version introduced

Major – 1, Minor – 0

6.2.8.1. Request – QMI_DMS_GET_POWER_STATE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.8.2. Response – QMI_DMS_GET_POWER_STATE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Power State	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Power State
Length	2			2	
Value	→	mask8	power_status	1	Power status flags. Values: Bit 0 – Power source • 0 – Powered by battery • 1 – Powered by external source Bit 1 – Battery connected

					• 0 – Not connected • 1 – Connected Bit 2 – Battery charging • 0 – Not charging • 1 – Charging Bit 3 – Power fault • 0 – No power fault • 1 – Recognized power fault, calls inhibited
		uint8	battery_lvl	1	Level of the battery. Values: • 0x00 – Battery is exhausted or the mobile device does not have a battery connected • 1 through 100 (0x64) – Percentage of battery capacity remaining

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

6.2.8.3. Description of QMI_DMS_GET_POWER_STATE REQ/RESP

This command obtains information regarding the power status of the device. The information returned is described in the Mandatory TLVs section. The external power source can be one of the following:

- Wall-mounted power source
- USB charger

The AT command equivalent to this command is AT+CBC (refer to TIA/EIA/IS-131).

6.2.9. QMI_DMS_GET_DEVICE_HARDWARE_REV

Queries the hardware revision of the device.

DMS message ID

0x002C

Version introduced

Major – 1, Minor – 2

6.2.9.1. Request – QMI_DMS_GET_DEVICE_HARDWARE_REV_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.9.2. Response – QMI_DMS_GET_DEVICE_HARDWARE_REV_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
Hardware Revision	Unknown	1.2

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Hardware Revision
Length	Var			2	
Value	→	string	hardware_rev	Var	String containing the hardware revision of the device.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

6.2.9.3. Description of QMI_DMS_GET_DEVICE_HARDWARE_REV REQ/RESP

This command queries the hardware revision of the device that returns an extension of the MSM version.

6.2.10. QMI_DMS_GET_OPERATING_MODE

Queries the current operating mode of the device.

DMS message ID

0x002D

Version introduced

Major – 1, Minor – 2

6.2.10.1. Request – QMI_DMS_GET_OPERATING_MODE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.10.2. Response – QMI_DMS_GET_OPERATING_MODE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
Operating Mode	1.2	1.2

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Operating Mode
Length	1			2	
Value	→	enum8		1	Selected operating mode. Values: • DMS_OP_MODE_ONLINE (0x00) – Online • DMS_OP_MODE_LOW_POWER (0x01) – Low power • DMS_OP_MODE_FACTORY_TEST_

					MODE (0x02) – Factory Test mode • DMS_OP_MODE_OFFLINE (0x03) – Offline • DMS_OP_MODE_RESETTING (0x04) – Resetting • DMS_OP_MODE_SHUTTING_DOWN (0x05) – Shutting down • DMS_OP_MODE_PERSISTENT_ LOW_POWER (0x06) – Persistent low power • DMS_OP_MODE_MODE_ONLY_ LOW_POWER (0x07) – Mode-only low power • DMS_OP_MODE_NET_TEST_ GW (0x08) – Conducting network test for GSM/WCDMA

Optional TLVs

Name	Version introduced	Version last modified
Offline Reason	Unknown	1.6
Hardware-Restricted Mode	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Offline Reason
Length	2			2	
Value	→	mask16	offline_reason	2	Offline reason bitmask. All unlisted bits are reserved for future use and are ignored. Values: • 0x0001 – Host image misconfiguration • 0x0002 – PRI image misconfiguration • 0x0004 – PRI version incompatible • 0x0008 – Device memory is full, cannot copy PRI information
Type	0x11			1	Hardware-Restricted Mode
Length	1			2	
Value	→	boolean	hardware_controlled_mode	1	Hardware-Restricted mode. Values: • 0x01 – TRUE

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

6.2.10.3. Description of QMI_DMS_GET_OPERATING_MODE REQ/RESP

This command queries the current operating mode of the device. The following operating modes are available:

- Online – Indicates that the device can acquire a system and make calls
- Low Power – Lowest power consumption state from which the device can return to Online mode; indicates that the device has temporarily disabled RF

- Persistent Low Power – Same as Low Power mode, but persists even if the device is reset
- Factory Test – Special mode for manufacturer use
- Offline – Phone has deactivated RF and partially shutdown; the device must be power cycled before it can reacquire service from this mode
- Resetting – Device is in the process of power cycling
- Shutting Down – Device is in the process of shutting down
- Device is conducting a network test for GSM/WCDMA. This mode cannot be set by clients

If the operating mode returned is Offline, an optional Offline Reason TLV is provided indicating the cause of the current state. If the offline reason is not known, the TLV is omitted.

If the current operating mode was set due to a hardware override, the optional Hardware-Restricted Mode TLV is supplied with the value set to 0x01. Otherwise this TLV is omitted.

6.2.11. QMI_DMS_SET_OPERATING_MODE

Sets the operating mode of the device.

DMS message ID

0x002E

Version introduced

Major – 1, Minor – 2

6.2.11.1. Request – QMI_DMS_SET_OPERATING_MODE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Operating Mode	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Operating Mode
Length	1			2	
Value	→	enum8	operating_mode	1	Selected operating mode. Values: • DMS_OP_MODE_ONLINE (0x00) – Online • DMS_OP_MODE_LOW_POWER (0x01) – Low power • DMS_OP_MODE_FACTORY_TEST_ MODE (0x02) – Factory Test mode • DMS_OP_MODE_OFFLINE (0x03) – Offline • DMS_OP_MODE_RESETTING (0x04) – Resetting • DMS_OP_MODE_SHUTTING_DOWN (0x05) – Shutting down • DMS_OP_MODE_PERSISTENT_LOW_ POWER (0x06) – Persistent low power • DMS_OP_MODE_MODE_ONLY_LOW_ POWER (0x07) – Mode-only low power • DMS_OP_MODE_NET_TEST_ GW (0x08) – Conducting network test for GSM/WCDMA

Optional TLVs

None

6.2.11.2. Response – QMI_DMS_SET_OPERATING_MODE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_DEVICE_IN_USE	Device is in use (for example, in a call)
QMI_ERR_INVALID_ARG	Selected operating mode is invalid
QMI_ERR_INVALID_TRANSITION	Selected operating mode transition from the current operating mode is invalid
QMI_ERR_HARDWARE_RESTRICTED	Selected operating mode is invalid with the current wireless disable setting
QMI_ERR_DEVICE_NOT_READY	Temporary failure because the device is not ready yet

6.2.11.3. Description of QMI_DMS_SET_OPERATING_MODE REQ/RESP

This command transitions operating modes based on the current mode of the device, and the mode selected. Valid transitions include:

- Online to low power, persistent low power, factory test, offline, or shut down
- Low power to online, persistent low power, offline, or shut down
- Persistent low power to online, low power, offline or shut down
- Factory test to online
- Offline to reset

Only Low Power mode can be used to change the device to Low Power mode, but does not modify the Persistent Low Power mode setting. If the device is not in Persistent Low Power mode, mode-only requests change the device to Low Power mode. If the device is already in Persistent Low Power mode, mode-only requests have no effect on the current mode.

NOTE:

When in Persistent Low Power mode, only transitions to Online or regular Low Power mode cause the board to go online. Transitions to Offline (then Reset) and Shut Down power cycle the device, but upon startup, the device remains in Persistent Low Power mode.

Specifying an operating mode that is not in the valid range for the device elicits a QMI_ERR_INVALID_ARG error.

Specifying an operating mode that results in a transition not listed above elicits a QMI_ERR_INVALID_TRANSITION error.

For devices that allow hardware-controlled operating mode, it is possible that the current operating mode is enforced due to a hardware control. This hardware control can restrict changing the current operating mode to a selected mode, and any such requests elicit a QMI_ERR_HARDWARE_RESTRICTED error.

6.2.12. QMI_DMS_RESTORE_FACTORY_DEFAULTS

Requests that the device reset all settings to factory defined values.

DMS message ID

0x003A

Version introduced

Major – 1, Minor – 6

6.2.12.1. Request – QMI_DMS_RESTORE_FACTORY_DEFAULTS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Service Programming Code	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Service Programming Code
Length	6			2	
Value	→	char	spc	6	Service programming code in ASCII format (digits 0 to 9 only).

Optional TLVs

None

6.2.12.2. Response – QMI_DMS_RESTORE_FACTORY_DEFAULTS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_AUTHENTICATION_ FAILED	Authentication of supplied SPC failed
QMI_ERR_AUTHENTICATION_LOCK	Maximum number of authentication failures has been reached
QMI_ERR_INVALID_ARG	SPC contains one or more invalid values
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device

6.2.12.3. Description of QMI_DMS_RESTORE_FACTORY_DEFAULTS REQ/RESP

This command is a service programming request and is protected by the service programming security of QMI. Only the SPC, not a one-time-subsidy-lock code, can be used to restore the factory default settings of the device. The correct service programming authentication code must be specified for this command. Requests with an invalid SPC elicit a QMI_ERR_AUTHENTICATION_FAILED error. If too many requests are made with an invalid SPC by any control point, the device enters an authentication locked state and elicits a QMI_ERR_AUTHENTICATION_LOCK error. Once the authentication lock state is reached, the device automatically issues a power-down procedure and shuts down. Upon rebooting, the authentication lock state is removed and the device processes service programming requests.

This command resets the factory provisioned settings of the device and results in the removal of all user subscription information. The device must be power cycled before the reset settings take effect. After the device has been restored, new user account information must be provisioned before the device can be used again.

Error checking is performed on all specified parameters before any updates are committed to the device. Any request made with an invalid parameter results in the provisioning aborting and elicits a QMI_ERR_INVALID_ARG error.

3GPP devices that do not use an SPC must specify six zeros in this request.

6.2.13. QMI_DMS_VALIDATE_SERVICE_PROGRAMMING_CODE

Requests the device to validate a specified service programming code.

DMS message ID

0x003B

Version introduced

Major – 1, Minor – 3

6.2.13.1. Request – QMI_DMS_VALIDATE_SERVICE_PROGRAMMING_CODE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Programming Code	Unknown	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Programming Code
Length	6			2	
Value	→	char	spc	6	Service programming code in ASCII format (digits 0 to 9 only).

Optional TLVs

None

6.2.13.2. Response – QMI_DMS_VALIDATE_SERVICE_PROGRAMMING_CODE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_AUTHENTICATION_ FAILED	Authentication of supplied SPC failed
QMI_ERR_AUTHENTICATION_LOCK	Maximum number of authentication failures has been reached

6.2.13.3. Description of QMI_DMS_VALIDATE_SERVICE_PROGRAMMING_CODE REQ/RESP

This command is a service programming request and is protected by the service programming security of QMI. Only the SPC, not the one-time-subsidy-lock code, can be used to restore the factory default settings of the device. The correct service programming authentication code must be specified for this command. Requests with an invalid SPC elicit a QMI_ERR_AUTHENTICATION_FAILED error. If too many requests with an invalid SPC are made by any control point, the device enters an authentication locked state and elicits a QMI_ERR_AUTHENTICATION_LOCK error. Once the authentication lock state is reached, the device automatically issues a power-down procedure and shuts down. Upon rebooting, the authentication lock state is removed and the device processes service programming requests.

This command validates a specified SPC against the SPC provisioned for the device. No other operation is performed and the SPC is not remembered by the device. The SPC must still be provided in future command requests, as required.

3GPP devices that do not use an SPC must specify six zeros in this request.

6.2.14. QMI_DMS_GET_CURRENT_PRL_INFO

Queries the active PRL information of the device.

DMS message ID

0x0053

Version introduced

Major – 1, Minor – 9

6.2.14.1. Request – QMI_DMS_GET_CURRENT_PRL_INFO_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

6.2.14.2. Response – QMI_DMS_GET_CURRENT_PRL_INFO_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
PRL Version	Unknown	1.9
PRL Only Preference	Unknown	1.9
PRL Source	1.44	1.44

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	PRL Version
Length	2			2	
Value	→	uint16	prl_version	2	PRL version
Type	0x11			1	PRL Only Preference
Length	1			2	

Value	→	boolean	prl_only	1	Values: • 0 – Unset • 1 – Set
Type	0x12			1	PRL Source
Length	4			2	
Value	→	enum	prl_source	4	Values: • DMS_PRL_SOURCE_INFO_ UNDETERMINED (0) – PRL is not loaded • DMS_PRL_SOURCE_INFO_DEFAULT (1) – PRL source is the default PRL • DMS_PRL_SOURCE_INFO_NV (2) – PRL source is the nonvolatile memory • DMS_PRL_SOURCE_INFO_CARD (3) – PRL source is the card

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INFO_UNAVAILABLE	PRL has not been loaded onto the device
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device

6.2.14.3. Description of QMI_DMS_GET_CURRENT_PRL_INFO REQ/RESP

This command queries the active PRL information of the device. This is valid only for CDMA devices (devices containing a PRL). This command returns the PRL that is loaded to the device and can change during device power-up or operating mode change. Control points can register for the PRL Init Reporting event using QMI_DMS_SET_EVENT_REPORT and send this command again to query new values when the PRL Init Notification indication is received. An optional prl_source is included in the response to convey the source of PRL.

7. Network Access Service (QMI_NAS)

QMI_NAS provides applications running on a host PC with commands related to network access:

- Signal strength
- Network registration and attach
- Serving system
- Network scan
- Home, preferred, and forbidden networks

It is expected that user-level applications, e.g., connection managers and/or device drivers on the Terminal Equipment (TE), use QMI_NAS to access this functionality on the MSM™ device.

7.1. Theory of Operation

7.1.1. Generalized QMI Service Compliance

The QMI_NAS service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

7.1.2. NAS Service Type

NAS is assigned QMI service type 0x03.

7.1.3. Message Definition Template

7.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

7.1.4. QMI_NAS Fundamental Concepts

The QMI_NAS service provides NAS to its control points. These services include interfaces to control registration, attachment, and network selection performed by the device, as well as interfaces to obtain status information regarding the visible and serving networks.

To get service, the MSM device must register with a network and select the type of service it desires.

The registration procedure is performed to notify the network of the mobile's presence and to validate that the user is allowed to use the network. The control point can select Automatic Registration mode, in which the device chooses the network with which to register. The control point can also select Manual Registration mode, in which it can specify a particular PLMN (MCC + MNC) with which to register. Note that the concept of user-driven manual registration is defined only in the 3GPP wireless standard. In 3GPP2 standards, the device always operates in Automatic Registration mode.

QMI_NAS also allows control points to perform a 3GPP network scan to discover the 3GPP networks that are currently visible to the device. The control point can then use this information to select a network for manual registration.

In the 3GPP wireless standard, the device must be attached to a service domain when it is registered on a network. This is a way to identify to the network which services may be used by the device during its registration. Service domains include Packet-Switched (PS) and Circuit-Switched (CS) data services.

QMI control points can control this registration, network selection, and service domain attachment using QMI_NAS. The control points can also query the home network of the device. The home network of the device includes the MCC and MNC derived from the IMSI.

In the 3GPP wireless standard, there is a list of preferred and forbidden networks stored on a UIM, such as a SIM.

The preferred networks list is a list of networks which the device prefers to register to in priority order. During automatic registration, the device gives preference to the listed networks over other visible networks.

The forbidden networks list is a list of networks with which the device will not register.

QMI_NAS enables the control point to query and update these preferred and forbidden network lists. QMI_NAS control points can also learn the network providing service and details of that service provided to the device. This includes the registration state, available service domains, registered network, and the radio technology in use.

A wireless device obtains a number of services, e.g., voice service and IP data service, via a radio that may act in accordance with different wireless standards. The radio technology indicates which wireless standard is currently in use by the device.

QMI control points may wish to monitor the signal strength measured by the device.

Generally, the control point can obtain the above information via a polling mechanism (Request and Response messages).

The signal strength change can also be reported via asynchronous indications. The control point can register signal strength thresholds. An asynchronous indication is sent when the current signal strength crosses one of the thresholds registered by the control point.

These event-reporting settings registered by the control point are stored in the control point's service state variables.

The Reset message can be used to clear these settings, restoring them to their default values.

7.1.5. Service State Variables

7.1.5.1. Shared State Variables

No QMI_NAS state variables are shared across control points.

7.1.5.2. State Variables Per Control Point

Name	Description	Possible values	Default value
report_signal_strength	Whether a change in signal strength is reported to a control point	• FALSE • TRUE	FALSE
report_signal_strength_threshold_list	Sequence of thresholds delimiting signal strength bands; threshold is a signed 1 byte value	-128 to +127	-128
report_rf_band_info	Whether a change in the radio interface is reported to a control point	• FALSE • TRUE	FALSE
report_reg_reject	Whether registration reject reasons are reported to a control point	• FALSE • TRUE	FALSE
report_rssi	Whether a change in RSSI is reported to a control point	• FALSE • TRUE	FALSE
rssi_delta	RSSI delta; an unsigned 1 byte value	0 to 255	N/A
report_ecio	Whether a change in ECIO is reported to a control point	• FALSE • TRUE	FALSE
ecio_delta	ECIO delta; an unsigned 1 byte value	0 to 255	N/A
report_io	Whether a change in IO is reported to a control point	• FALSE • TRUE	FALSE
io_delta	IO delta; an unsigned 1 byte value	0 to 255	N/A
report_sinr	Whether a change in SINR is reported to a control point	• FALSE • TRUE	FALSE
sinr_delta	SINR delta; an unsigned 1 byte value	0 to 255	N/A
report_rsrq	Whether a change in RSRQ is reported to a control point	• FALSE • TRUE	FALSE
rsrq_delta	RSRQ delta; an unsigned 1 byte value	5	N/A
report_lte_snr	Whether a change in LTE SNR is reported to a control point	• FALSE • TRUE	FALSE
lte_snr_delta	LTE SNR delta; an unsigned 2 byte value	0 to 255	N/A
report_lte_rsrp	Whether a change in LTE RSRP is reported to a control point	• FALSE • TRUE	FALSE
lte_rsrp_delta	LTE RSRP delta; an unsigned 1 byte value	0 to 255	N/A
req_serving_system	Whether serving system events are reported to a control point	• FALSE • TRUE	TRUE
reg_sys_sel_pref	Whether system selection preferences are reported to a control point	• FALSE • TRUE	FALSE
reg_ddtm_events	Whether DDTM events are reported to a control point	• FALSE • TRUE	FALSE

7.2. QMI_NAS Messages

Table 7-1 QMI_NAS messages

Command	ID	Description
QMI_NAS_SET_EVENT_REPORT	0x0002	Sets the NAS state reporting conditions for the requesting control point.
QMI_NAS_GET_SIGNAL_STRENGTH	0x0020	Queries the current signal strength as measured by the device.
QMI_NAS_INITIATE_NETWORK_REGISTER	0x0022	Initiates a network registration.
QMI_NAS_GET_SERVING_SYSTEM	0x0024	Queries information regarding the system that currently provides service.
QMI_NAS_SERVING_SYSTEM_IND	0x0024 indication	Indicates a change in the current serving system registration state and/or radio technology.
QMI_NAS_GET_HOME_NETWORK	0x0025	Retrieves information about the home network of the device.
QMI_NAS_SET_TECHNOLOGY_PREFERENCE	0x002A	Sets the technology preference.
QMI_NAS_GET_RF_BAND_INFO	0x0031	Queries radio band/channel information regarding the system currently providing service.
QMI_NAS_GET_AN_AAA_STATUS	0x0032	Queries the status of the last AN-AAA authentication request for the current 1xEV-DO session.
QMI_NAS_SET_SYSTEM_SELECTION_ PREFERENCE	0x0033	Sets the different system selection preferences of the device.
QMI_NAS_GET_SYSTEM_SELECTION_ PREFERENCE	0x0034	Queries the different system selection preferences of the device.
QMI_NAS_SET_DDTM_PREFERENCE	0x0037	Sets the Data Dedicated Transmission Mode (DDTM) preference for the device.
QMI_NAS_DDTM	0x0038	Provides the DDTM status of the device.
QMI_NAS_GET_CELL_LOCATION_INFO	0x0043	Retrieves cell location-related information.
QMI_NAS_GET_PLMN_NAME	0x0044	Queries the operator name for a specified network.
QMI_NAS_GET_SYS_INFO	0x004D	Provides the system information.
QMI_NAS_GET_SIG_INFO	0x004F	Queries information regarding the signal strength.
QMI_NAS_GET_HDR_COLOR_CODE	0x0057	Retrieves the HDR color code value.
QMI_NAS_GET_TX_RX_INFO	0x005A	Retrieves the detailed Tx/Rx information.
QMI_NAS_GET_LTE_CPHY_CA_INFO	0x00AC	Retrieves the previous carrier aggregation event information.

7.2.1. QMI_NAS_SET_EVENT_REPORT

Sets the NAS state reporting conditions for the requesting control point.

NAS message ID

0x0002

Version introduced

Major – 1, Minor – 0

7.2.1.1. Request – QMI_NAS_SET_EVENT_REPORT_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

At least one of the following optional TLVs must be included in this request.

Name	Version introduced	Version last modified
Signal Strength Indicator	Unknown	1.0
RF Band Information	Unknown	1.1
Registration Reject Reason**	Unknown	1.1
RSSI Indicator	Unknown	1.1
ECIO Indicator	Unknown	1.1
IO Indicator*	Unknown	1.1
SINR Indicator*	Unknown	1.1
Error Rate Indicator	Unknown	1.1
RSRQ Indicator*	Unknown	1.3
ECIO Threshold	Unknown	1.7
SINR Threshold	Unknown	1.7
LTE SNR Delta	1.15	1.40
RSRP Delta	1.15	1.15

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Signal Strength Indicator
Length	Var			2	
Value	→	boolean	report_signal_strength	1	Values: • 0 – Do not report • 1 – Report
		uint8	num_signal_strength_ thresholds	1	Number of sets of the following elements: • report_signal_strength_threshold_list
		int8	report_signal_strength_ threshold_list	Var	A sequence of thresholds delimiting signal strength Var bands. Each threshold specifies

					the signal strength (in dBm) at which an event report indication, including the current signal strength, will be sent to the requesting control point. Threshold is a signed 1 byte value. Valid values: -128 dBm to +127 dBm.
Type	0x11			1	RF Band Information
Length	1			2	
Value	→	boolean	report_rf_band_info	1	Values: • 0 – Do not report • 1 – Report
Type	0x12			1	Registration Reject Reason**
Length	1			2	
Value	→	boolean	report_reg_reject	1	Values: • 0 – Do not report • 1 – Report
Type	0x13			1	RSSI Indicator
Length	2			2	
Value	→	boolean	report_rssi	1	Values: • 0 – Do not report • 1 – Report
		uint8	rssi_delta	1	RSSI delta (in dBm) at which an event report indication, including the current RSSI, will be sent to the requesting control point. RSSI delta is an unsigned 1 byte value.
Type	0x14			1	ECIO Indicator
Length	2			2	
Value	→	boolean	report_ecio	1	Values: • 0 – Do not report • 1 – Report
		uint8	ecio_delta	1	ECIO delta at which an event report indication, ecio_delta including the current ECIO, will be sent to the requesting control point. ECIO delta is an unsigned 1 byte value that increments in negative 0.5 dB, e.g., ecio_delta of 2 means a change of -1 dB.
Type	0x15			1	IO Indicator*
Length	2			2	
Value	→	boolean	report_io	1	Values: • 0 – Do not report • 1 – Report
		uint8	io_delta	1	IO delta (in dBm) at which an event report indication, io_delta including the current IO, will be sent to the requesting control point. IO delta is an unsigned 1 byte value.
Type	0x16			1	SINR Indicator*
Length	2			2	
Value	→	boolean	report_sinr	1	Values: • 0 – Do not report • 1 – Report
		uint8	sinr_delta	1	SINR delta level at which an event report indication, sinr_delta including the current SINR, will be sent to the requesting control point. SINR delta level is an unsigned 1 byte

					value.
Type	0x17			1	Error Rate Indicator
Length	1			2	
Value	→	boolean	report_error_rate	1	Values: • 0 – Do not report • 1 – Report
Type	0x18			1	RSRQ Indicator*
Length	2			2	
Value	→	boolean	report_rsrq	1	Values: • 0 – Do not report • 1 – Report
		uint8	rsrq_delta	1	RSRQ delta level at which an event report indication, including the current RSRQ, will be sent to the requesting control point. RSRQ delta level is an unsigned 1 byte value.
Type	0x19			1	ECIO Threshold
Length	Var			2	
Value	→	boolean	report_ecio	1	Values: • 0 – Do not report • 1 – Report
		uint8	threshold_list_len	1	Number of sets of the following elements: • threshold_list
		int16	threshold_list	Var	A sequence of thresholds delimiting ECIO event reporting bands. Every time a new ECIO value crosses a threshold value, an event report indication message with the new ECIO value is sent to the requesting control point. For this field: • Each threshold value is a signed 2 byte value • Maximum number of threshold values is 10 • At least one value must be specified (if report_ecio is set)
Type	0x1A			1	SINR Threshold
Length	Var			2	
Value	→	boolean	report_sinr	1	Values: • 0 – Do not report • 1 – Report
		uint8	threshold_list_len	1	Number of sets of the following elements: • threshold_list
		uint8	threshold_list	Var	A sequence of thresholds delimiting SINR event reporting bands. Every time a new SINR value crosses a threshold value, an event report indication message with the new SINR value is sent to the requesting control point. For this field: • Each threshold value will be an unsigned 1 byte value • Maximum number of threshold values is 5 • At least one value must be specified (if report_sinr is set)
Type	0x1B			1	LTE SNR Delta
Length	3			2	
Value	→	boolean	report_lte_snr	1	Values:

					• 0 – Do not report • 1 – Report
		uint16	lte_snr_delta	2	LTE SNR delta level at which an event report indication, including the current SNR, will be sent to the requesting control point. LTE SNR delta level is an unsigned 2 byte value, representing the delta in units of 0.1 dB, e.g., lte_snr_delta of 3 means a change 0.3 dB.
Type	0x1C			1	RSRP Delta
Length	2			2	
Value	→	boolean	report_lte_rsrp	1	Values: • 0 – Do not report • 1 – Report
		uint8	lte_rsrp_delta	1	LTE RSRP delta level at which an event report indication, including the current RSRP, will be sent to the requesting control point. LTE RSRP delta level is an unsigned 1 byte value, representing the delta in dB.

7.2.1.2. Response – QMI_NAS_SET_EVENT_REPORT_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_INVALID_HANDLE	Packet_data_handle provided in the request is not valid, that is, it is not assigned to the control point
QMI_ERR_ARG_TOO_LONG	More than the maximum allowed thresholds were specified
QMI_ERR_NO_THRESHOLDS	No thresholds were specified in an enable signal strength request

7.2.1.3. Description of QMI_NAS_SET_EVENT_REPORT REQ/RESP

The control point state variables that control event reporting are modified to reflect the settings indicated in the TLVs that are present in the request message. The service maintains a separate set of state variables for each control point. See Section 7.1.5.2 for a list of state variables and their explanations.

The control point learns of changes in state via the QMI_NAS_EVENT_REPORT_IND indication.

The AT command equivalents to this command are AT+CMER, AT+CIND, and AT+CIEV (refer to 3GPP TS 27.007).

7.2.2. QMI_NAS_GET_SIGNAL_STRENGTH

Queries the current signal strength as measured by the device.

NAS message ID

0x0020

Version introduced

Major – 1, Minor – 0

7.2.2.1. Request – QMI_NAS_GET_SIGNAL_STRENGTH_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Request Mask	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Request Mask
Length	2			2	
Value	→	mask16	request_mask	2	Request additional signal information for: Bit 0 (0x01) – QMI_NAS_REQUEST_SIG_INFO_RSSI_MASK; values: • 0 – Do not request additional information for RSSI • 1 – Request additional information for RSSI Bit 1 (0x02) – QMI_NAS_REQUEST_SIG_INFO_ECIO_MASK; values: • 0 – Do not request additional information for ECIO • 1 – Request additional information for ECIO Bit 2 (0x04) – QMI_NAS_REQUEST_SIG_INFO_IO_MASK; values: • 0 – Do not request additional information for IO • 1 – Request additional information for IO Bit 3 (0x08) – QMI_NAS_REQUEST_SIG_INFO_SINR_MASK; values: • 0 – Do not request additional information for SINR • 1 – Request additional information for SINR Bit 4 (0x10) – QMI_NAS_REQUEST_SIG_INFO_ERROR_RATE_MASK; values: • 0 – Do not request additional information for Error Rate

					• 1 – Request additional information for Error Rate Bit 5 (0x20) – QMI_NAS_REQUEST_SIG_INFO_RSRQ_MASK; values: • 0 – Do not request additional information for RSRQ • 1 – Request additional information for RSRQ Bit 6 (0x40) – QMI_NAS_REQUEST_SIG_INFO_LTE_SNR_MASK; values: • 0 – Do not request additional information for LTE SNR • 1 – Request additional information for LTE SNR Bit 7 (0x80) – QMI_NAS_REQUEST_SIG_INFO_LTE_RSRP_MASK; values: • 0 – Do not request additional information for LTE RSRP • 1 – Request additional information for LTE RSRP

7.2.2.2. Response – QMI_NAS_GET_SIGNAL_STRENGTH_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. This TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Signal Strength	Unknown	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Signal Strength
Length	2			2	
Value	→	int8	sig_strength	1	Received signal strength in dBm: • For CDMA and UMTS, this indicates forward link pilot Ec • For GSM, this indicates received signal strength • For LTE, this indicates the total received wideband power observed by the UE
		enum8	radio_if	1	Radio interface technology of the signal being measured. Values: • 0x00 – RADIO_IF_NO_SVC – None (no service) • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE

Optional TLVs

Name	Version introduced	Version last modified
Signal Strength List	Unknown	1.0
RSSI List	Unknown	1.3
ECIO List	Unknown	1.1
IO	Unknown	1.1
SINR	Unknown	1.1
Error Rate List	Unknown	1.1
RSRQ	Unknown	1.3
LTE SNR	Unknown	1.15
LTE RSRP	Unknown	1.15

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Signal Strength List
Length	Var			2	
Value	→	uint16	num_instances	2	Number of sets of the following elements: • sig_strength • radio_if
		int8	sig_strength	1	Received signal strength in dBm: • For CDMA and UMTS, this indicates forward link pilot Ec • For GSM, this indicates received signal strength
		enum8	radio_if	1	Radio interface technology of the signal being measured. Values: • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO)
Type	0x11			1	RSSI List
Length	Var			2	
Value	→	uint16	num_instances	2	Number of sets of the following elements: • rssi • radio_if
		uint8	rssi	1	RSSI represented as a positive value; control points need to convert this to negative to get actual value in dBm: • For CDMA and UMTS, this indicates forward link pilot Ec • For GSM, this indicates received signal strength
		enum8	radio_if	1	Radio interface technology of the signal being measured. Values: • 0x00 – RADIO_IF_NO_SVC – None (no service) • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE
Type	0x12			1	ECIO List
Length	Var			2	
Value	→	uint16	num_instances	2	Number of sets of the following elements: • ecio

					• radio_if
		uint8	ecio	1	ECIO value representing negative 0.5 dB increments, i.e., 2 means -1 dB (14 means -7 dB, 63 means -31.5 dB).
		Enum8	radio_if	1	Radio interface technology of the signal being measured. Values: • 0x00 – RADIO_IF_NO_SVC – None (no service) • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS
Type	0x13			1	IO
Length	4			2	
Value	→	uint32	io	4	Received IO in dBm. IO is only applicable for 1xEV-DO.
Type	0x14			1	SINR
Length	1			2	
Value	→	enum8	sinr	1	SINR level. SINR is only applicable for 1xEV-DO. Valid levels are 0 to 8, where the maximum value for: • 0x00 – SINR_LEVEL_0 is -9 dB • 0x01 – SINR_LEVEL_1 is -6 dB • 0x02 – SINR_LEVEL_2 is -4.5 dB • 0x03 – SINR_LEVEL_3 is -3 dB • 0x04 – SINR_LEVEL_4 is -2 dB • 0x05 – SINR_LEVEL_5 is +1 dB • 0x06 – SINR_LEVEL_6 is +3 dB • 0x07 – SINR_LEVEL_7 is +6 dB • 0x08 – SINR_LEVEL_8 is +9 dB
Type	0x15			1	Error Rate List
Length	Var			2	
Value	→	uint16	num_instances	2	Number of sets of the following elements: • error_rate • radio_if
		uint16	error_rate	2	Error rate value corresponds to the RAT that is currently registered. For CDMA, the error rate reported is Frame Error Rate: • Valid error rate values between 1 and 10000 are returned to indicate percentage, e.g., a value of 300 means the error rate is 3% • A value of 0xFFFF indicates that the error rate is unknown or unavailable For HDR, the error rate reported is Packet Error Rate: • Valid error rate values between 1 and 10000 are returned to indicate percentage, e.g., a value of 300 means the error rate is 3% • A value of 0xFFFF indicates that the error rate is unknown or unavailable For GSM, the error rate reported is Bit Error Rate: • Valid values are 0, 100, 200, 300, 400, 500, 600, and 700

					• The reported value divided by 100 gives the error rate as an RxQual value as defined in3GPP TS 45.008Section 8.2.4, e.g., a value of 300 represents an RxQual value of 3 • A value of 25500 indicates No Data For WCDMA, the error rate reported is Block Error Rate (BLER): • Valid values are 1 to 10000 • The reported value divided by 100 provides the error rate in percentages, e.g., a value of 300 represents a BLER of 3% • A value of 0 indicates No Data
		enum8	radio_if	1	Radio interface technology of the signal being measured. Values: • 0x00 – RADIO_IF_NO_SVC – None (no service) • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS
Type	0x16			1	RSRQ
Length	2			2	
Value	→	int8	rsrq	1	RSRQ value in dB (signed integer value). Range: -3 to -20 (-3 means -3 dB, -20 means -20 dB).
		Uint8	radio_if	1	Radio interface technology of the signal being measured. Values: • 0x08 – LTE
Type	0x17			1	LTE SNR
Length	2			2	
Value	→	int16	snr	2	LTE SNR level as a scaled integer in units of 0.1 dB; e.g., -16 dB has a value of -160 and 24.6 dB has a value of 246. LTE SNR is included only when the current serving system is LTE.
Type	0x18			1	LTE RSRP
Length	2			2	
Value	→	int16	lte_rsrp	2	Current LTE RSRP in dBm as measured by L1. Range: -44 to -140 (-44 means -44 dBm, -140 means -140 dBm). LTE RSRP is included only if the current serving system is LTE.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

7.2.2.3. Description of QMI_NAS_GET_SIGNAL_STRENGTH REQ/RESP

This command queries the current pilot signal strength (in dBm) and the associated radio technology as measured by the receiver.

The optional Signal Strength List TLV is present if the device has more than one signal strength to indicate, e.g., in 3GPP2 Hybrid mode, both the mandatory Signal Strength TLV and the optional Signal Strength List TLV is returned to indicate the signal strengths of CDMA and EV-DO technologies.

A sig_strength value of -125 dBm or lower is used to indicate No Signal.

The optional Request Mask TLV can be used in the request to query additional signal information, such as RSSI, ECIO, IO, SINR, and error rate, which are returned in the RSSI, ECIO List, IO, SINR, and Error Rate List TLVs respectively, if available. If the device has more that one signal, e.g., in 3GPP2 Hybrid mode, the signal information is returned as a list TLV, such as RSSI List, ECIO List, and Error Rate List.

The AT command equivalent to this command is AT+CSQ, as defined in 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131.

7.2.3. QMI_NAS_INITIATE_NETWORK_REGISTER

Initiates a network registration.

NAS message ID

0x0022

Version introduced

Major – 1, Minor – 0

7.2.3.1. Request – QMI_NAS_INITIATE_NETWORK_REGISTER_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Register Action	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Register Action
Length	1			2	
Value	→	enum8	register_action	1	Specifies one of the following actions: • 0x01 – NAS_AUTO_REGISTER – Device registers according to its provisioning; optional TLVs supplied with the command are ignored • 0x02 – NAS_MANUAL_REGISTER – Device registers to a specified network; the optional Manual Network Register Information TLV must also be included for the command to process successfully; supported only for 3GPP

Optional TLVs

Name	Version introduced	Version last modified
Manual Network Register Information**	Unknown	1.17
Change Duration**	Unknown	1.5
MNC PCS Digit Include Status	Unknown	1.12

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Manual Network Register Information**
Length	5			2	
Value	→	uint16	mobile_country_code	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mobile_network_	2	A 16-bit integer representation of MNC. Range: 0 to

			code		999.
		Enum8	radio_access_technology	1	Radio access technology for which to register. Values: • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE • -1 – RADIO_IF_NO_CHANGE – No change in the mode preference
Type	0x11			1	Change Duration**
Length	1			2	
Value	→	enum8	change_duration	1	Duration of the change. Values: • 0x00 – Power cycle – Remains active until the next device power cycle • 0x01 – Permanent – Remains active through power cycles until changed by the client Note: The device will use “0x00 – Power cycle” as the default value if the TLV is omitted.
Type	0x12			1	MNC PCS Digit Include Status
Length	1			2	
Value	→	boolean	mnc_includes_pcs_digit	1	This TLV applies to the MNC field of the manual_network_register_info data structure. Values: • TRUE – MNC is a three-digit value • FALSE – MNC is a two-digit value If this TLV is not included in the case of a manual register option, the value of the MNC value specified in manual_network_register_info is interpreted as follows: • If the MNC value is less than 100, the MNC value provided is interpreted as a two-digit value. • If the MNC value is greater than or equal to 100, the MNC value provided is interpreted as a three-digit value.

7.2.3.2. Response – QMI_NAS_INITIATE_NETWORK_REGISTER_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_DEVICE_IN_USE	Operation cannot be performed; radio is currently in use, e.g., in a call
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_INVALID_REGISTER_ ACTION	Invalid register action value was specified in the request
QMI_ERR_NO_NETWORK_FOUND	Network specified in the manual registration request cannot be found
QMI_ERR_INVALID_ARG	Value field of one or more TLVs in the request message contains an invalid value

7.2.3.3. Description of QMI_NAS_INITIATE_NETWORK_REGISTER REQ/RESP

This command initiates an automatic or manual registration to the specified network.

If the Result Code TLV indicates success, the device has started the requested operation.

The control point must always process the QMI_NAS_SERVING_SYSTEM_IND indication to learn the current registration state of the device.

The AT command equivalent to this command is AT+COPS, as defined in 3GPP TS 27.007.

7.2.4. QMI_NAS_GET_SERVING_SYSTEM

Queries information regarding the system that currently provides service.

NAS message ID

0x0024

Version introduced

Major – 1, Minor – 0

7.2.4.1. Request – QMI_NAS_GET_SERVING_SYSTEM_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.4.2. Response – QMI_NAS_GET_SERVING_SYSTEM_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Serving System	Unknown	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Serving System
Length	Var			2	
Value	→	enum8	registration_state	1	Registration state of the mobile. Values: • 0x00 – NOT_REGISTERED – Not registered; mobile is not currently searching for a new network to provide service • 0x01 – REGISTERED – Registered with a network • 0x02 – NOT_REGISTERED_SEARCHING – Not

					registered, but mobile is currently searching for a new network to provide service • 0x03 – REGISTRATION_DENIED – Registration denied by the visible network • 0x04 – REGISTRATION_UNKNOWN – Registration state is unknown
		enum8	cs_attach_state	1	Circuit-switched domain attach state of the mobile. Values: • 0x00 – CS_UNKNOWN – Unknown or not applicable • 0x01 – CS_ATTACHED – Attached • 0x02 – CS_DETACHED – Detached
		enum8	ps_attach_state	1	Packet-switched domain attach state of the mobile. Values: • 0x00 – PS_UNKNOWN – Unknown or not applicable • 0x01 – PS_ATTACHED – Attached • 0x02 – PS_DETACHED – Detached
		enum8	selected_network	1	Type of selected radio access network. Values: • 0x00 – SELECTED_NETWORK_UNKNOWN – Unknown • 0x01 – SELECTED_NETWORK_3GPP2 – 3GPP2 network • 0x02 – SELECTED_NETWORK_3GPP – 3GPP network
		uint8	in_use_radio_if_list_num	1	Number of sets of the following elements: • radio_if
		enum8	radio_if	Var	Radio interface currently in use. Values: • 0x00 – RADIO_IF_NO_SVC – None (no service) • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE

Optional TLVs

Name	Version introduced	Version last modified
Roaming Indicator Value	Unknown	1.0
Data Service Capability	Unknown	1.4
Current PLMN	Unknown	1.0
CDMA System ID	Unknown	1.1
CDMA Base Station Information	Unknown	1.1
Roaming Indicator List	Unknown	1.3
Default Roaming Indicator	Unknown	1.1
3GGP2 Time Zone	Unknown	1.1
CDMA P_Rev in Use	Unknown	1.1
3GPP Time Zone	Unknown	1.4
3GPP Network Daylight Saving Adjustment	Unknown	1.4
3GPP Location Area Code	Unknown	1.5
At least one of the following optional TLVs must be included in this request.	Unknown	1.5

3GPP2 Concurrent Service Info	Unknown	1.5
3GPP2 PRL Indicator	Unknown	1.5
Dual Transfer Mode Indication	Unknown	1.5
Detailed Service Information	Unknown	1.5
CDMA System Info	Unknown	1.6
HDR Personality	Unknown	1.7
TAC Information for LTE	Unknown	1.7
Call Barring Status	Unknown	1.12
UMTS Primary Scrambling Code	Unknown	1.14
MNC PCS Digit Include Status	Unknown	1.17
HS Call Status	1.23	1.125
3GPP Network Name Source	1.113	1.113

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Roaming Indicator Value
Length	1			2	
Value	→	enum8	roaming_indicator	1	Roaming indicator. Values: • 0x00 – ROAMING_IND_ON – Roaming • 0x01 – ROAMING_IND_OFF – Home • 0x02 and above – Operator-defined values
Type	0x11			1	Data Service Capability
Length	Var			2	
Value	→	uint8	data_capability_ list_len	1	Number of sets of the following elements: • data_capabilities
		enum8	data_capabilities	Var	List of data capabilities (each is 1 byte) of the current serving system. Possible values: • 0x01 – DATA_CAPABILITIES_GPRS – GPRS • 0x02 – DATA_CAPABILITIES_EDGE – EDGE • 0x03 – DATA_CAPABILITIES_HSDPA – HSDPA • 0x04 – DATA_CAPABILITIES_HSUPA – HSUPA • 0x05 – DATA_CAPABILITIES_WCDMA – WCDMA • 0x06 – DATA_CAPABILITIES_CDMA – CDMA • 0x07 – DATA_CAPABILITIES_EVDO_REV_O – EV-DO REV 0 • 0x08 – DATA_CAPABILITIES_EVDO_REV_A – EV-DO REV A • 0x09 – DATA_CAPABILITIES_GSM – GSM • 0x0A – DATA_CAPABILITIES_EVDO_REV_B – EV-DO REV B • 0x0B – DATA_CAPABILITIES_LTE – LTE • 0x0C –

					DATA_CAPABILITIES_HSDPA_PLUS – HSDPA+ • 0x0D – DATA_CAPABILITIES_DC_HSDPA_ PLUS – DC-HSDPA+
Type	0x12			1	Current PLMN
Length	Var			2	
Value	→	uint16	mobile_country_code	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mobile_network_code	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Uint8	network_description_ length	1	Number of sets of the following elements: • network_ description
		string	network_description	Var	An optional string containing the network name or description.
Type	0x13			1	CDMA System ID
Length	4			2	
Value	→	uint16	sid	2	System ID.
		Uint16	nid	2	Network ID.
Type	0x14			1	CDMA Base Station Information
Length	10			2	
Value	→	uint16	base_id	2	Base station identification number.
		Int32	base_lat	4	Base station latitude in units of 0.25 sec, expressed as a two's complement signed number with positive numbers signifying North latitudes.
		Int32	base_long	4	Base station longitude in units of 0.25 sec, expressed as a two's complement signed number with positive numbers signifying East longitude.
Type	0x15			1	Roaming Indicator List
Length	Var			2	
Value	→	uint8	num_instances	1	Number of sets of the following elements: • radio_if • roaming_ indicator
		enum8	radio_if	1	Radio interface currently in use. Values: • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE
		enum8	roaming_indicator	1	Roaming indicator. Values: • 0x00 – ROAMING_IND_ON – Roaming • 0x01 – ROAMING_IND_OFF – Home Values from 2 onward are applicable only for 3GPP2. Refer to3GPP2 C.R1001-Ffor the meanings of these values.

Type	0x16			1	Default Roaming Indicator
Length	1			2	
Value	→	enum8	def_roam_ind	1	Roaming indicator. Values: • 0x00 – ROAMING_IND_ON – Roaming • 0x01 – ROAMING_IND_OFF – Home Values from 2 onward are applicable only for 3GPP2. Refer to3GPP2 C.R1001-Ffor the meanings of these values.
Type	0x17			1	3GGP2 Time Zone
Length	3			2	
Value	→	uint8	lp_sec	1	Number of leap seconds since the start of CDMA system time.
		Int8	ltm_offset	1	Offset of local time from system time in units of 30 min. The value in this field conveys the offset as an 8-bit two's complement number.
		Boolean	daylt_savings	1	Daylight saving indicator. Values: • 0x00 – OFF (daylight saving not in effect) • 0x01 – ON (daylight saving in effect)
Type	0x18			1	CDMA P_Rev in Use
Length	1			2	
Value	→	uint8	p_rev_in_use	1	P_Rev that is currently in use.
Type	0x1A			1	3GPP Time Zone
Length	1			2	
Value	→	int8	time_zone	1	Offset from Universal time, i.e., difference between local time and Universal time, in increments of 15 min (signed value).
Type	0x1B			1	3GPP Network Daylight Saving Adjustment
Length	1			2	
Value	→	uint8	adj	1	3GPP network daylight saving adjustment. Values: • 0x00 – No adjustment for Daylight Saving Time • 0x01 – 1 hr adjustment for Daylight Saving Time • 0x02 – 2 hr adjustment for Daylight Saving Time
Type	0x1C			1	3GPP Location Area Code
Length	2			2	
Value	→	uint16	lac	2	Location area code.
Type	0x1D			1	3GPP Cell ID
Length	4			2	
Value	→	uint32	cell_id	4	3GPP cell ID.
Type	0x1E			1	3GPP2 Concurrent Service Info
Length	1			2	
Value	→	uint8	ccs	1	3GPP2 concurrent service information. Values: • 0x00 – Concurrent service not available • 0x01 – Concurrent service available
Type	0x1F			1	3GPP2 PRL Indicator
Length	1			2	
Value	→	uint8	prl_ind	1	3GPP2 PRL indicator. Values: • 0x00 – System not in PRL

					• 0x01 – System is in PRL
Type	0x20			1	Dual Transfer Mode Indication (GSM Only)
Length	1			2	
Value	→	uint8	dtm_ind	1	Dual Transfer mode indication. Values: • 0x00 – DTM not supported • 0x01 – DTM supported
Type	0x21			1	Detailed Service Information
Length	5			2	
Value	→	uint8	srv_status	1	Service status. Values: • 0x00 – No service • 0x01 – Limited service • 0x02 – Service available • 0x03 – Limited regional service • 0x04 – MS in power save or deep sleep
		uint8	srv_capability	1	System's service capability. Values: • 0x00 – No service • 0x01 – Circuit-switched only • 0x02 – Packet-switched only • 0x03 – Circuit-switched and-packet switched • 0x04 – MS found the right system but not yet registered/attached
		uint8	hdr_srv_status	1	HDR service status. Values: • 0x00 – No service • 0x01 – Limited service • 0x02 – Service available • 0x03 – Limited regional service • 0x04 – MS in power save or deep sleep
		uint8	hdr_hybrid	1	HDR hybrid information. Values: • 0x00 – System is not hybrid • 0x01 – System is hybrid
		uint8	is_sys_forbidden	1	Forbidden system information. Values: • 0x00 – System is not a forbidden system • 0x01 – System is a forbidden system
Type	0x22			1	CDMA System Info
Length	3			2	
Value	→	uint16	mcc	2	Mobile country code.
		Uint8	imsi_11_12	1	IMSI_11_12.
Type	0x23			1	HDR Personality
Length	1			2	
Value	→	enum8	hdr_personality	1	HDR personality information. Values: • 0x00 – Unknown • 0x01 – HRPD • 0x02 – eHRPD
Type	0x24			1	TAC Information for LTE
Length	2			2	
Value	→	uint16	tac	2	Tracking area code information for LTE.
Type	0x25			1	Call Barring Status
Length	8			2	
Value	→	enum	cs_bar_status	4	Call barring status for circuit-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only

					• 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
		enum	ps_bar_status	4	Call barring status for packet-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
Type	0x26			1	UMTS Primary Scrambling Code
Length	2			2	
Value	→	uint16	umts_psc	2	Primary scrambling code.
Type	0x27			1	MNC PCS Digit Include Status
Length	5			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the TLVs (in this table) with an mnc or mobile_network_code field. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
Type	0x28			1	HS Call Status
Length	1			2	
Value	→	enum8	hs_call_status	1	Call status on high speed (only applicable for WCDMA). Values: • SYS_HS_IND_HSDPA_HSUPA_UNSUPP_

					CELL (0x00) – HSDPA and HSUPA are unsupported • SYS_HS_IND_HSDPA_SUPP_CELL (0x01) – HSDPA is supported • SYS_HS_IND_HSUPA_SUPP_CELL (0x02) – HSUPA is supported • SYS_HS_IND_HSDPA_ HSUPA_SUPP_CELL (0x03) – HSDPA and HSUPA are supported • SYS_HS_IND_HSDPAPLUS_SUPP_CELL (0x04) – HSDPA+ is supported • SYS_HS_IND_HSDPAPLUS_HSUPA_SUP P_ CELL (0x05) – HSDPA+ and HSUPA are supported • SYS_HS_IND_DC_HSDPAPLUS_SUPP_CE LL (0x06) – Dual-cell HSDPA+ is supported • SYS_HS_IND_DC_HSDPAPLUS_HSUPA_ SUPP_ CELL (0x07) – Dual-cell HSDPA+ and HSUPA are supported • SYS_HS_IND_HSDPAPLUS_64QAM_HSU PA_ SUPP_CELL (0x08) – Dual-cell HSDPA+, 64 QAM, and HSUPA are supported • SYS_HS_IND_HSDPAPLUS_64QAM_SUP P_ CELL (0x09) – Dual-cell HSDPA+ and 64 QAM are supported • SYS_HS_IND_DC_HSDPAPLUS_DC_HSU PA_ SUPP_CELL (0x0A) – Dual-cell HSDPA+ and dual-cell HSUPA are supported
Type	0x29			1	3GPP Network Name Source
Length	4			2	
Value	→	enum	nas_3gpp_nw_name_sou rce	4	Network name source. Values: • NAS_NW_NAME_SOURCE_UNKNOWN (0x00) – Unknown • NAS_NW_NAME_SOURCE_OPL_ PNN (0x01) – Operator PLMN list and PLMN network name • NAS_NW_NAME_SOURCE_CPHS_ ONS (0x02) – Common PCN handset specification and operator name string • NAS_NW_NAME_SOURCE_NITZ (0x03) – Network identity and time zone • NAS_NW_NAME_SOURCE_SE13 (0x04) – GSMA SE13 table • NAS_NW_NAME_SOURCE_MCC_ MNC (0x05) – Mobile country code and mobile network code

					• NAS_NW_NAME_SOURCE_SPN (0x06) – Service provider name

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INFO_UNAVAILABLE	Information is not available at this time

7.2.4.3. Description of QMI_NAS_GET_SERVING_SYSTEM REQ/RESP

This command queries current serving system and registration information, including system identification, registration state, and radio technology information.

The roaming indicator and the current PLMN are not included in the response when the device is not registered.

If registered on the 3GPP network, and relevant information has been sent from the network, the 3GPP Time Zone and/or 3GPP Network Daylight Saving Adjustment TLVs are included.

The 3GPP Location Area Code and 3GPP Cell ID TLVs are included if the UE is registered on the 3GPP network. The 3GPP2 Concurrent Service Info and 3GPP2 PRL Indicator TLVs are included if the UE is registered on the 3GPP2 network. The Dual Transfer Mode Indication TLV is included if the UE is registered on the GSM network. The Detailed Service Information TLV is included so clients can retrieve detailed information about the Call Manager layer to fine-tune their internal states.

The Call Barring Status TLV is included only in GSM or WCDMA networks.

The AT command equivalent to this command is AT+CSS, as defined in 3GPP TS 27.007, 3GPP2 C.S0017-003-A, and TIA/EIA/IS-131.

The MNC PCS Digit Include Status TLV is used to indicate if pcs_digit is included in mnc. This TLV is present when the Current PLMN (TLV 0x12) is also present.

7.2.5. QMI_NAS_SERVING_SYSTEM_IND

Indicates a change in the current serving system registration state and/or radio technology.

NAS message ID

0x0024

Version introduced

Major – 1, Minor – 0

7.2.5.1. Indication – QMI_NAS_SERVING_SYSTEM_IND_MSG

Message type

Indication

Sender

Service

Scope

Per control point (unicast)

Mandatory TLVs

Name	Version introduced	Version last modified
Serving System	Unknown	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Serving System
Length	Var			2	
Value	→	enum8	registration_state	1	Registration state of the mobile. Values: • 0x00 – NOT_REGISTERED – Not registered; mobile is not currently searching for a new network to provide service • 0x01 – REGISTERED – Registered with a network • 0x02 – NOT_REGISTERED_SEARCHING – Not registered, but mobile is currently searching for a new network to provide service • 0x03 – REGISTRATION_DENIED – Registration denied by the visible network • 0x04 – REGISTRATION_UNKNOWN – Registration state is unknown
		enum8	cs_attach_state	1	Circuit-switched domain attach state of the mobile. Values: • 0x00 – CS_UNKNOWN – Unknown or not applicable • 0x01 – CS_ATTACHED – Attached • 0x02 – CS_DETACHED – Detached

		enum8	ps_attach_state	1	Packet-switched domain attach state of the mobile. Values: • 0x00 – PS_UNKNOWN – Unknown or not applicable • 0x01 – PS_ATTACHED – Attached • 0x02 – PS_DETACHED – Detached
		enum8	selected_network	1	Type of selected radio access network. Values: • 0x00 – SELECTED_NETWORK_UNKNOWN – Unknown • 0x01 – SELECTED_NETWORK_3GPP2 – 3GPP2 network • 0x02 – SELECTED_NETWORK_3GPP – 3GPP network
		uint8	in_use_radio_if_list_num	1	Number of sets of the following elements: • radio_if
		enum8	radio_if	Var	Radio interface currently in use. Values: • 0x00 – RADIO_IF_NO_SVC – None (no service) • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE

Optional TLVs

Name	Version introduced	Version last modified
Roaming Indicator Value	Unknown	1.0
Data Service Capability	Unknown	1.4
Current PLMN	Unknown	1.0
CDMA System ID	Unknown	1.1
CDMA Base Station Information	Unknown	1.1
Roaming Indicator List	Unknown	1.3
At least one of the following optional TLVs must be included in this request.	Unknown	1.1
3GGP2 Time Zone	Unknown	1.1
CDMA P_Rev in Use	Unknown	1.1
3GPP PLMN Name Flag	Unknown	1.6
3GPP Time Zone	Unknown	1.4
3GPP Network Daylight Saving Adjustment	Unknown	1.4
3GPP Universal Time and Local Time Zone	Unknown	1.4
3GPP Location Area Code	Unknown	1.5
3GPP Cell ID	Unknown	1.5
3GPP2 Concurrent Service Info	Unknown	1.5
3GPP2 PRL Indicator	Unknown	1.5
Dual Transfer Mode Indication	Unknown	1.5
Detailed Service Information	Unknown	1.5

CDMA System Info Ext	Unknown	1.7
HDR Personality	Unknown	1.7
TAC Information for LTE	Unknown	1.7
Call Barring Status	Unknown	1.12
PLMN Change Status	Unknown	1.13
UMTS Primary Scrambling Code	Unknown	1.14
MNC PCS Digit Include Status	Unknown	1.17
At least one of the following optional TLVs must be included in this request.	1.23	1.125
3GPP Network Name Source	1.113	1.113

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Roaming Indicator Value
Length	1			2	
Value	→	enum8	roaming_indicator	1	Roaming indicator. Values: • 0x00 – ROAMING_IND_ON – Roaming • 0x01 – ROAMING_IND_OFF – Home • 0x02 – ROAMING_IND_FLASHING – Flashing • 0x03 and above – Operator-defined values
Type	0x11			1	Data Service Capability
Length	Var			2	
Value	→	uint8	data_capability_ list_lent	1	Number of sets of the following elements: • data_capabilities
		enum8	data_capabilities	Var	List of data capabilities (each is 1 byte) of the current serving system. Possible values: • 0x01 – DATA_CAPABILITIES_GPRS – GPRS • 0x02 – DATA_CAPABILITIES_EDGE – EDGE • 0x03 – DATA_CAPABILITIES_HSDPA – HSDPA • 0x04 – DATA_CAPABILITIES_HSUPA – HSUPA • 0x05 – DATA_CAPABILITIES_WCDMA – WCDMA • 0x06 – DATA_CAPABILITIES_CDMA – CDMA • 0x07 – DATA_CAPABILITIES_EVDO_REV_O – EV-DO REV 0 • 0x08 – DATA_CAPABILITIES_EVDO_REV_A – EV-DO REV A • 0x09 – DATA_CAPABILITIES_GSM – GSM • 0x0A – DATA_CAPABILITIES_EVDO_REV_B – EV-DO REV B • 0x0B – DATA_CAPABILITIES_LTE – LTE • 0x0C – DATA_CAPABILITIES_HSDPA_PLUS –

					HSDPA+ • 0x0D – DATA_CAPABILITIES_DC_HSDPA_ PLUS – DC-HSDPA+
Type	0x12			1	Current PLMN
Length	Var			2	
Value	→	uint16	mobile_country_code	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mobile_network_code	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Uint8	network_description_ length	1	Number of sets of the following elements: • network_description
		string	network_description	Var	An optional string containing the network name or description.
Type	0x13			1	CDMA System ID
Length	4			2	
Value	→	uint16	sid	2	System ID.
		Uint16	nid	2	Network ID.
Type	0x14			1	CDMA Base Station Information
Length	10			2	
Value	→	uint16	base_id	2	Base station identification number.
		Int32	base_lat	4	Base station latitude in units of 0.25 sec, expressed as a two's complement signed number with positive numbers signifying North latitudes.
		Int32	base_long	4	Base station longitude in units of 0.25 sec, expressed as a two's complement signed number with positive numbers signifying East longitude.
Type	0x15			1	Roaming Indicator List
Length	Var			2	
Value	→	uint8	num_instances	1	Number of sets of the following elements: • radio_if • roaming_indicator
		enum8	radio_if	1	Radio interface currently in use. Values: • 0x01 – RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE
		enum8	roaming_indicator	1	Roaming indicator. Values: • 0x00 – ROAMING_IND_ON – Roaming • 0x01 – ROAMING_IND_OFF – Home Values from 2 onward are applicable only for 3GPP2. Refer to3GPP2 C.R1001-Ffor the meanings of these values.
Type	0x16			1	Default Roaming Indicator
Length	1			2	

Value	→	enum8	def_roam_ind	1	Roaming indicator. Values: • 0x00 – ROAMING_IND_ON – Roaming • 0x01 – ROAMING_IND_OFF – Home Values from 2 onward are applicable only for 3GPP2. Refer to3GPP2 C.R1001-Ffor the meanings of these values.
Type	0x17			1	3GGP2 Time Zone
Length	3			2	
Value	→	uint8	lp_sec	1	Number of leap seconds since the start of CDMA system time.
		Int8	ltm_offset	1	Offset of local time from system time in units of 30 min. The value in this field conveys the offset as an 8-bit two's complement number.
		Boolean	daylt_savings	1	Daylight saving indicator. Values: • 0x00 – OFF (daylight saving not in effect) • 0x01 – ON (daylight saving in effect)
Type	0x18			1	CDMA P_Rev in Use
Length	1			2	
Value	→	uint8	p_rev_in_use	1	P_Rev that is currently in use.
Type	0x19			1	3GPP PLMN Name Flag
Length	1			2	
Value	→	boolean	plmn_description_ changed	1	Flag indicating that the 3GPP EONS network description changed. Values: • 0x01 – PLMN name changed
Type	0x1A			1	3GPP Time Zone
Length	1			2	
Value	→	int8	time_zone	1	Offset from Universal time, i.e., difference between local time and Universal time, in increments of 15 min (signed value).
Type	0x1B			1	3GPP Network Daylight Saving Adjustment
Length	1			2	
Value	→	uint8	adj	1	3GPP network daylight saving adjustment. Values: • 0x00 – No adjustment for Daylight Saving Time • 0x01 – 1 hr adjustment for Daylight Saving Time • 0x02 – 2 hr adjustment for Daylight Saving Time
Type	0x1C			1	3GPP Universal Time and Local Time Zone
Length	8			2	
Value	→	uint16	year	2	Year.
		Uint8	month	1	Month.
		Uint8	day	1	Day.
		Uint8	hour	1	Hour.
		Uint8	minute	1	Minute.
		Uint8	second	1	Second.
		Int8	time_zone	1	Offset from Universal time, i.e., difference between local time and Universal time, in increments of 15 min (signed value).
Type	0x1D			1	3GPP Location Area Code
Length	2			2	

Value	→	uint16	lac	2	Location area code.
Type	0x1E			1	3GPP Cell ID
Length	4			2	
Value	→	uint32	cell_id	4	3GPP cell ID.
Type	0x1F			1	3GPP2 Concurrent Service Info
Length	1			2	
Value	→	uint8	ccs	1	3GPP2 concurrent service information. Values: • 0x00 – Concurrent service not available • 0x01 – Concurrent service available
Type	0x20			1	3GPP2 PRL Indicator
Length	1			2	
Value	→	uint8	prl_ind	1	3GPP2 PRL indicator. Values: • 0x00 – System not in PRL • 0x01 – System is in PRL
Type	0x21			1	Dual Transfer Mode Indication (GSM Only)
Length	1			2	
Value	→	uint8	dtm_ind	1	Dual Transfer mode indication. Values: • 0x00 – DTM not supported • 0x01 – DTM supported
Type	0x22			1	Detailed Service Information
Length	5			2	
Value	→	uint8	srv_status	1	Service status. Values: • 0x00 – No service • 0x01 – Limited service • 0x02 – Service available • 0x03 – Limited regional service • 0x04 – MS in power save or deep sleep
		uint8	srv_capability	1	System's service capability. Values: • 0x00 – No service • 0x01 – Circuit-switched only • 0x02 – Packet-switched only • 0x03 – Circuit-switched and-packet switched • 0x04 – MS found the right system but not yet registered/attached
		uint8	hdr_srv_status	1	HDR service status. Values: • 0x00 – No service • 0x01 – Limited service • 0x02 – Service available • 0x03 – Limited regional service • 0x04 – MS in power save or deep sleep
		uint8	hdr_hybrid	1	HDR hybrid information. Values: • 0x00 – System is not hybrid • 0x01 – System is hybrid
		uint8	is_sys_forbidden	1	Forbidden system information. Values: • 0x00 – System is not a forbidden system • 0x01 – System is a forbidden system
Type	0x23			1	CDMA System Info Ext
Length	3			2	
Value	→	uint16	mcc	2	Mobile country code.
		Uint8	imsi_11_12	1	IMSI_11_12.
Type	0x24			1	HDR Personality
Length	1			2	

Value	→	enum8	hdr_personality	1	HDR personality information. Values: • 0x00 – Unknown • 0x01 – HRPD • 0x02 – eHRPD
Type	0x25			1	TAC Information for LTE
Length	2			2	
Value	→	uint16	tac	2	Tracking area code information for LTE.
Type	0x26			1	Call Barring Status
Length	8			2	
Value	→	enum	cs_bar_status	4	Call barring status for circuit-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
		enum	ps_bar_status	4	Call barring status for packet-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
Type	0x27			1	PLMN Change Status
Length	1			2	
Value	→	boolean	srv_sys_no_change	1	Flag used to notify clients that a request to select a network ended with no change in the PLMN. Values: • 0x01 – No change in serving system information
Type	0x28			1	UMTS Primary Scrambling Code
Length	2			2	
Value	→	uint16	umts_psc	2	Primary scrambling code.
Type	0x29			1	MNC PCS Digit Include Status
Length	5			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of MCC.

					Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the TLVs (in this table) with an mnc or mobile_network_code field. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
Type	0x2A			1	HS Call Status
Length	1			2	
Value	→	enum8	hs_call_status	1	Call status on high speed (only applicable for WCDMA). Values: • SYS_HS_IND_HSDPA_HSUPA_UNSUPP_CELL (0x00) – HSDPA and HSUPA are unsupported • SYS_HS_IND_HSDPA_SUPP_CELL (0x01) – HSDPA is supported • SYS_HS_IND_HSUPA_SUPP_CELL (0x02) – HSUPA is supported • SYS_HS_IND_HSDPA_HSUPA_SUPP_CELL (0x03) – HSDPA and HSUPA are supported • SYS_HS_IND_HSDPAPLUS_SUPP_CELL (0x04) – HSDPA+ is supported • SYS_HS_IND_HSDPAPLUS_HSUPA_SUPP_ CELL (0x05) – HSDPA+ and HSUPA are supported • SYS_HS_IND_DC_HSDPAPLUS_SUPP_CELL (0x06) – Dual-cell HSDPA+ is supported • SYS_HS_IND_DC_HSDPAPLUS_HSUPA_SUPP_ CELL (0x07) – Dual-cell HSDPA+ and HSUPA are supported • SYS_HS_IND_HSDPAPLUS_64QAM_HSUPA_ SUPP_CELL (0x08) – Dual-cell HSDPA+, 64 QAM, and HSUPA are supported • SYS_HS_IND_HSDPAPLUS_64QAM_SUPP_ CELL (0x09) – Dual-cell HSDPA+ and 64 QAM are supported • SYS_HS_IND_DC_HSDPAPLUS_DC_HSUPA_ SUPP_CELL (0x0A) – Dual-cell HSDPA+ and dual-cell HSUPA are supported

Type	0x2B			1	3GPP Network Name Source
Length	4			2	
Value	→	enum	nas_3gpp_nw_name_source	4	Network name source. Values: • NAS_NW_NAME_SOURCE_UNKNOWN (0x00) – Unknown • NAS_NW_NAME_SOURCE_OPL_ PNN (0x01) – Operator PLMN list and PLMN network name • NAS_NW_NAME_SOURCE_CPHS_ ONS (0x02) – Common PCN handset specification and operator name string • NAS_NW_NAME_SOURCE_NITZ (0x03) – Network identity and time zone • NAS_NW_NAME_SOURCE_SE13 (0x04) – GSMA SE13 table • NAS_NW_NAME_SOURCE_MCC_ MNC (0x05) – Mobile country code and mobile network code • NAS_NW_NAME_SOURCE_SPN (0x06) – Service provider name

7.2.5.2. Description of QMI_NAS_SERVING_SYSTEM_IND

This broadcast indication is sent (intended for all control points) when the current serving system registration state and/or radio technology changes.

The roaming indicator and the current PLMN are not included in the response when the device is not registered.

If registered on the 3GPP network and time zone, and relevant information has been sent from the network, the 3GPP Universal Time and Local Time Zone, 3GPP Time Zone, and/or 3GPP Network Daylight Saving Adjustment TLVs are included.

If registered, the presence of the optional 3GPP PLMN Name Flag TLV indicates that the operator name may have changed. The QMI_NAS_GET_PLMN_NAME command must be used to query the updated network name for the current PLMN.

The 3GPP Location Area Code and 3GPP Cell ID TLVs are included if the UE is registered on the 3GPP network. The 3GPP2 Concurrent Service Info and 3GPP2 PRL Indicator TLVs are included if the UE is registered on the 3GPP2 network. The Dual Transfer Mode Indication TLV is included if the UE is registered on the GSM network. The Detailed Service Information TLV is included so clients can retrieve detailed information about the Call Manager layer to fine-tune their internal states.

The Call Barring Status TLV is included only in GSM or WCDMA networks.

The AT command equivalent to this command is AT+CSS, defined in 3GPP2 C.S0017-003-A and TIA/EIA/IS-131, and AT+CREG is defined in 3GPP TS 27.007.

The MNC PCS Digit Include Status TLV is used to indicate if pcs_digit is included in mnc. This TLV is present when the Current PLMN (TLV 0x12) is also present.

7.2.6. QMI_NAS_GET_HOME_NETWORK

Retrieves information about the home network of the device.

NAS message ID

0x0025

Version introduced

Major – 1, Minor – 0

7.2.6.1. Request – QMI_NAS_GET_HOME_NETWORK_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.6.2. Response – QMI_NAS_GET_HOME_NETWORK_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Home Network	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Home Network
Length	Var			2	
Value	→	uint16	mobile_country_code	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mobile_network_code	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Uint8	network_description_ length	1	Number of sets of the following elements: • network_description

		string	network_description	Var	An optional string containing the network name or description.

Optional TLVs

Name	Version introduced	Version last modified
Home System ID	Unknown	1.1
3GPP2 Home Network Ext	Unknown	1.25
3GPP Home Network MNC	1.47	1.47
3GPP Network Name Source	1.106	1.106

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Home System ID
Length	4			2	
Value	→	uint16	sid	2	System ID.
		Uint16	nid	2	Network ID.
Type	0x11			1	3GPP2 Home Network Ext
Length	Var			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Enum8	network_desc_display	1	Whether the network name is to be conditionally displayed: • 0x00 – Do not display • 0x01 – Display • 0xFF – Unknown Note: This value is ignored if the network_description_len is zero.
		Enum8	network_desc_encoding	1	Encoding of the network description. Refer to 3GPP2 C.R1001-Ftable 9.1.1 for a list of all defined values. Common (but not all) values include: • 0x00 – Octet, unspecified • 0x02 – 7-bit ASCII • 0x04 – Unicode (refer toISO/IEC 10646) • 0x09 – GSM 7-bit default (refer to3GPP TS 23.038) Note: This value is ignored if the network_description_len is zero. If the encoding type is not recognized the network_description is ignored.
		Uint8	network_description_ length	1	Number of sets of the following elements: • network_desc
		opaque	network_desc	Var	Length of network description string that follows. If the network name is unknown or not included, the length is 0.
Type	0x12			1	3GPP Home Network MNC (includes PCS digit status)

Length	2			2	
Value	→	boolean	is_3gpp_network	1	TRUE if TLV 0x01 corresponds to a 3GPP network; otherwise FALSE.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the mobile_network_code reported in TLV 0x01. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90 Note: This value is ignored if is_3gpp_network is FALSE.
Type	0x13			1	3GPP Network Name Source
Length	4			2	
Value	→	enum	nas_3gpp_nw_name_source	4	Network name source. Values: • NAS_NW_NAME_SOURCE_UNKNOWN (0x00) – Unknown • NAS_NW_NAME_SOURCE_OPL_ PNN (0x01) – Operator PLMN list and PLMN network name • NAS_NW_NAME_SOURCE_CPHS_ ONS (0x02) – Common PCN handset specification and operator name string • NAS_NW_NAME_SOURCE_NITZ (0x03) – Network identity and time zone • NAS_NW_NAME_SOURCE_SE13 (0x04) – GSMA SE13 table • NAS_NW_NAME_SOURCE_MCC_ MNC (0x05) – Mobile country code and mobile network code • NAS_NW_NAME_SOURCE_SPN (0x06) – Service provider name

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_NOT_PROVISIONED	Home network is not provisioned on the device

7.2.6.3. Description of QMI_NAS_GET_HOME_NETWORK REQ/RESP

This command returns the home network (MCC and MNC) and a description string, when available.

If available in the device provisioning, this command returns an optional System ID and Network ID (SID and NID).

If available in the device provisioning, this command returns an optional 3GPP2 Home Network Ext TLV.

This TLV includes the 3GPP2 home network (MCC and MNC), network description and encoding, if available, and display setting.

7.2.7. QMI_NAS_SET_TECHNOLOGY_PREFERENCE

Sets the technology preference.

NAS message ID

0x002A

Version introduced

Major – 1, Minor – 7

7.2.7.1. Request – QMI_NAS_SET_TECHNOLOGY_PREFERENCE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Technology Preference	Unknown	1.7

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Technology Preference
Length	3			2	
Value	→	mask16	technology_pref	2	Bitmask representing the radio technology preference set. No bits set indicates to the device to automatically determine the technology to use. Values: • Bit 0 – Technology is 3GPP2 • Bit 1 – Technology is 3GPP Any combination of the following may be returned: • Bit 2 – Analog – AMPS if 3GPP2, GSM if 3GPP • Bit 3 – Digital – CDMA if 3GPP2, WCDMA if 3GPP • Bit 4 – HDR • Bit 5 – LTE • Bits 6 to 15 – Reserved Note: Bits 0 and 1 are exclusive; only one may be set at a time. All unlisted bits are reserved for future use and are ignored.
		Enum8	duration	1	Preference duration. Values: • 0x00 – Permanent – Preference is used permanently • 0x01 – Power cycle – Preference is used until the next device power cycle

Optional TLVs

None

7.2.7.2. Response – QMI_NAS_SET_TECHNOLOGY_PREFERENCE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_INVALID_ARG	Value field of one or more TLVs in the request message contains an invalid value
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device

7.2.7.3. Description of QMI_NAS_SET_TECHNOLOGY_PREFERENCE REQ/RESP

This command writes the specified technology preference to the device. This setting is global to the device and is not unique to each control point.

When setting the technology preference, a duration must be specified that signifies whether the new preference is permanent or whether the preference represents how long the specified preference is to remain active. These values may be specified as:

- Permanent – The technology preference takes effect immediately and is written to persistent storage to remain set after the device is power cycled.
- Power cycle – The technology preference takes effect immediately and remains active until the device is power cycled. Once power cycled, the technology preference is reset to the persistent value stored on the device.

Regardless of duration, the technology preference is overwritten by a subsequent request to set the technology preference.

Requests to set an invalid technology preference for the current device configuration elicit a QMI_ERR_OP_DEVICE_UNSUPPORTED error.

Success of this command indicates that the specified technology change has been accepted by the device. Regardless of the specified duration, the specified technology preference takes effect immediately, or if the phone is in the Active state, waits until the next session.

7.2.8. QMI_NAS_GET_RF_BAND_INFO

Queries radio band/channel information regarding the system currently providing service.

NAS message ID

0x0031

Version introduced

Major – 1, Minor – 1

7.2.8.1. Request – QMI_NAS_GET_RF_BAND_INFO_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.8.2. Response – QMI_NAS_GET_RF_BAND_INFO_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
RF Band Information List	Unknown	1.142

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	RF Band Information List
Length	Var			2	
Value	→	uint8	num_instances	1	Number of sets of the following elements: • radio_if • active_band • active_channel
		enum8	radio_if	1	Radio interface currently in use. Values: • 0x01 – cdma2000® 1X

					• 0x02 – cdma2000® HRPD (1xEV-DO) • 0x03 – AMPS • 0x04 – GSM • 0x05 – UMTS • 0x08 – LTE • 0x09 – TD-SCDMA
		enum16	active_band	2	Active band class (see TableA-1for details). Values: • 00 to 39 – CDMA band classes • 40 to 79 – GSM band classes • 80 to 91 – WCDMA band classes • 120 to 163 – LTE band classes • 200 to 205 – TD-SCDMA band classes
		uint16	active_channel	2	Active channel. If the channel is not relevant to the technology, a value of 0 is returned.

Optional TLVs

Name	Version introduced	Version last modified
RF Dedicated Band Information List	1.102	1.142
RF Band Information List, Extended Format	1.112	1.142
RF Bandwidth Information List	1.158	1.158

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	RF Dedicated Band Information List
Length	Var			2	
Value	→	uint8	num_instances	1	Number of sets of the following elements: • radio_if • dedicated_band
		enum8	radio_if	1	Radio interface currently in use. Values: • 0x01 – cdma2000® 1X • 0x02 – cdma2000® HRPD (1xEV-DO) • 0x03 – AMPS • 0x04 – GSM • 0x05 – UMTS • 0x08 – LTE • 0x09 – TD-SCDMA
		enum16	dedicated_band	2	Dedicated band class (see TableA-1for details). Values: • 00 to 39 – CDMA band classes • 40 to 79 – GSM band classes • 80 to 91 – WCDMA band classes • 120 to 163 – LTE band classes • 200 to 205 – TD-SCDMA band classes • 0xFFFF is invalid; indicates that the UE moved out from the dedicated band
Type	0x11			1	RF Band Information List, Extended Format (Extended sizes to accommodate LTE.)
Length	Var			2	

Value	→	uint8	num_instances	1	Number of sets of the following elements: • radio_if • active_band • active_channel
		enum8	radio_if	1	Radio interface currently in use. Values: • 0x01 – cdma2000® 1X • 0x02 – cdma2000® HRPD (1xEV-DO) • 0x03 – AMPS • 0x04 – GSM • 0x05 – UMTS • 0x08 – LTE • 0x09 – TD-SCDMA
		enum16	active_band	2	Active band class (see TableA-1for details). Values: • 00 to 39 – CDMA band classes • 40 to 79 – GSM band classes • 80 to 91 – WCDMA band classes • 120 to 163 – LTE band classes • 200 to 205 – TD-SCDMA band classes
		uint32	active_channel	4	Active channel. If the channel is not relevant to the technology, a value of 0 is returned.
Type	0x12			1	RF Bandwidth Information List
Length	Var			2	
Value	→	uint8	num_instances	1	Number of sets of the following elements: • radio_if • bandwidth
		enum8	radio_if	1	Radio interface currently in use. Values: • NAS_RADIO_IF_NO_SVC (0x00) – None (no service) • NAS_RADIO_IF_CDMA_1X (0x01) – cdma2000® 1X • NAS_RADIO_IF_CDMA_1XEVDO (0x02) – cdma2000® HRPD (1xEV-DO) • NAS_RADIO_IF_AMPS (0x03) – AMPS • NAS_RADIO_IF_GSM (0x04) – GSM • NAS_RADIO_IF_UMTS (0x05) – UMTS • NAS_RADIO_IF_WLAN (0x06) – WLAN • NAS_RADIO_IF_GPS (0x07) – GPS • NAS_RADIO_IF_LTE (0x08) – LTE • NAS_RADIO_IF_TDSCDMA (0x09) – TD-SCDMA • NAS_RADIO_IF_NO_CHANGE (-1) – No change
		enum	bandwidth	4	Bandwidth. Values: • NAS_LTE_BW_NRB_6 (0) – 1.4 MHz bandwidth • NAS_LTE_BW_NRB_15 (1) – 3 MHz bandwidth • NAS_LTE_BW_NRB_25 (2) – 5 MHz bandwidth • NAS_LTE_BW_NRB_50 (3) – 10

					MHz bandwidth • NAS_LTE_BW_NRB_75 (4) – 15 MHz bandwidth • NAS_LTE_BW_NRB_100 (5) – 20 MHz bandwidth

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INFO_UNAVAILABLE	Information is not available at this time
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device

7.2.8.3. Description of QMI_NAS_GET_RF_BAND_INFO REQ/RESP

This command queries radio band and channel information for the current serving system, but is only returned when the device has registered with a network.

Requests for radio band and channel information while the device is not registered elicit a QMI_ERR_INFO_UNAVAILABLE error.

7.2.9. QMI_NAS_GET_AN_AAA_STATUS

Queries the status of the last AN-AAA authentication request for the current 1xEV-DO session.

NAS message ID

0x0032

Version introduced

Major – 1, Minor – 1

7.2.9.1. Request – QMI_NAS_GET_AN_AAA_STATUS_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.9.2. Response – QMI_NAS_GET_AN_AAA_STATUS_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
AN-AAA Authentication Status	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	AN-AAA Authentication Status
Length	1			2	
Value	→	enum8	an_aaa_status	1	Status of the last AN-AAA authentication request, if any, for the current 1xEV-DO session. Values: • 0 – AAA_STATUS_FAILED – Authentication failed

					• 1 – AAA_STATUS_SUCCESS – Authentication success • 2 – AAA_STATUS_NO_REQUEST – No authentication requested

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device

7.2.9.3. Description of QMI_NAS_GET_AN_AAA_STATUS REQ/RESP

This command queries the last AN-AAA authentication status of the current cdma2000® HRPD (1xEV-DO) session for the current serving system. AN-AAA authentication is initiated by the serving system and can be requested multiple times, or not at all, for a single 1xEV-DO session.

AN-AAA authentication is applicable to CDMA devices supporting 1xEV-DO only. Attempts to read the AN-AAA status from a device that does not support 1xEV-DO elicit a QMI_ERR_OP_DEVICE_UNSUPPORTED error.

7.2.10. QMI_NAS_SET_SYSTEM_SELECTION_PREFERENCE

Sets the different system selection preferences of the device.

NAS message ID

0x0033

Version introduced

Major – 1, Minor – 1

7.2.10.1. Request – QMI_NAS_SET_SYSTEM_SELECTION_PREFERENCE_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Emergency Mode	Unknown	1.1
Mode Preference	Unknown	1.16
Band Preference	Unknown	1.16
CDMA PRL Preference	Unknown	1.1
Roaming Preference	Unknown	1.1
LTE Band Preference (Deprecated; use LTE Band Preference Extended)	1.16	1.138 (Deprecated)
Network Selection Preference	1.5	1.69
Change Duration	Unknown	1.5
Service Domain	1.34	1.121
GSM/WCDMA Acquisition Order	Unknown	1.11
MNC PCS Digit Include Status	Unknown	1.10
Service Domain Preference	1.34	1.121
GSM/WCDMA Acquisition Order Preference	Unknown	1.11
TDSCDMA Band Preference	Unknown	1.13
Acquisition Order Preference	Unknown	1.20
Network Selection Registration Restriction Preference	1.34	1.34
CSG ID	1.41	1.41
Usage Preference	1.67	1.67
Radio Access Technology	1.69	1.69
Voice Domain Preference	1.92	1.92
LTE Band Preference Extended	1.138	1.138
Force Preferences	1.140	1.140

Field	Field value	Field type	Parameter	Size (byte)	Description

Type	0x10			1	Emergency Mode
Length	1			2	
Value	→	boolean	emergency_mode	1	Values: • 0x00 – OFF (normal) • 0x01 – ON (emergency)
Type	0x11			1	Mode Preference
Length	2			2	
Value	→	mask16	mode_pref	2	Bitmask representing the radio technology mode preference to be set. Values: • Bit 0 (0x01) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_1X – cdma2000® 1X • Bit 1 (0x02) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_HRPD – cdma2000® HRPD (1xEV-DO) • Bit 2 (0x04) – QMI_NAS_RAT_MODE_PREF_ GSM – GSM • Bit 3 (0x08) – QMI_NAS_RAT_MODE_PREF_ UMTS – UMTS • Bit 4 (0x10) – QMI_NAS_RAT_MODE_PREF_ LTE – LTE • Bit 5 (0x20) – QMI_NAS_RAT_MODE_PREF_ TDSCDMA – TD-SCDMA All unlisted bits are reserved for future use and the service point ignores them if used.
Type	0x12			1	Band Preference
Length	8			2	
Value	→	mask	band_pref	8	Bitmask representing the band preference to be set. See TableA-2for details.
Type	0x13			1	CDMA PRL Preference
Length	2			2	
Value	→	enum16	prl_pref	2	PRL preference to be set for band class 0 (BC0) prl_pref. Values: • 0x0001 – PRL_PREF_A_SIDE_ONLY – Acquire available system only on the A side • 0x0002 – PRL_PREF_B_SIDE_ONLY – Acquire available system only on the B side • 0x3FFF – PRL_PREF_ANY – Acquire any available systems
Type	0x14			1	Roaming Preference
Length	2			2	
Value	→	enum16	roam_pref	2	Roaming preference to be set. Values: • 0x01 – ROAMING_PREF_OFF – Acquire only systems for which the roaming indicator is off • 0x02 – ROAMING_PREF_NOT_OFF – Acquire a system as long as its roaming indicator is not off • 0x03 – ROAMING_PREF_NOT_FLASING

					– Acquire only systems for which the roaming indicator is off or solid on, i.e., not flashing; CDMA only • 0xFF – ROAMING_PREF_ANY – Acquire systems, regardless of their roaming indicator
Type	0x15			1	LTE Band Preference (Deprecated; use LTE Band Preference Extended)
Length	8			2	
Value	→	mask	lte_band_pref	8	Bitmask representing the LTE band preference to be set. See TableA-3for details.
Type	0x16			1	Network Selection Preference
Length	5			2	
Value	→	enum8	net_sel_pref	1	Specifies one of the following actions: • 0x00 – NAS_NET_SEL_PREF_AUTOMATIC – Device registers according to its provisioning; mcc and mnc fields must also contain valid values if Radio Access Technology (TLV 0x22) is present. Otherwise, mcc and mnc are ignored. • 0x01 – NAS_NET_SEL_PREF_MANUAL – Device registers to specified network; mcc and mnc fields must also contain valid values. All other values are reserved.
		Uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
Type	0x17			1	Change Duration
Length	1			2	
Value	→	enum8	change_duration	1	Duration of the change. Values: • 0x00 – Power cycle – Remains active until the next device power cycle • 0x01 – Permanent – Remains active through power cycles until changed by the client Note: The device will use “0x01 – Permanent” as the default value if the TLV is omitted.
Type	0x18			1	Service Domain
Length	4			2	
Value	→	enum	srv_domain_pre	f 4	Service domain preference. Values: • QMI_SRV_DOMAIN_PREF_CS_ONLY (0x00) – Circuit-switched only • QMI_SRV_DOMAIN_PREF_PS_ONLY (0x01) – Packet-switched only • QMI_SRV_DOMAIN_PREF_CS_PS (0x02) – Circuit-switched and packet-switched • QMI_SRV_DOMAIN_PREF_PS_ATTACH (0x03) – Packet-switched attach • QMI_SRV_DOMAIN_PREF_PS_DETACH (0x04) – Packet-switched detach • QMI_SRV_DOMAIN_PREF_PS_DETACH_NO_PREF_CHANGE (0x05) – Packet-switched

					• QMI_SRV_DOMAIN_PREF_ON_DEMAND_ PS_ATTACH (0x06) – Packet-switched detach with no change in the service domain preference • QMI_SRV_DOMAIN_PREF_FORCE_PS_ DETACH (0x07) – Packet-switched detach where PS service loss is done forcibly by the modem.
Type	0x19			1	GSM/WCDMA Acquisition Order
Length	4			2	
Value	→	enum	gw_acq_order_pref	4	GSM/WCDMA acquisition order preference. Values: • 0x00 – NAS_GW_ACQ_ORDER_PREF_ AUTOMATIC – Automatic • 0x01 – NAS_GW_ACQ_ORDER_PREF_ GSM_WCDMA – GSM then WCDMA • 0x02 – NAS_GW_ACQ_ORDER_PREF_ WCDMA_GSM – WCDMA then GSM
Type	0x1A			1	MNC PCS Digit Include Status
Length	1			2	
Value	→	boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the Network Selection Preference TLV (0x16). Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
Type	0x1B			1	Service Domain Preference (duplicate of 0x18)
Length	0			2	
Value	→	duplica te	srv_domain_pref	0	Duplicate of Service Domain Preference
Type	0x1C			1	GSM/WCDMA Acquisition Order Preference (duplicate of 0x19)
Length	0			2	
Value	→	duplica te	gw_acq_order_pref	0	GSM/WCDMA acquisition order preference. Values: • 0x00 – NAS_GW_ACQ_ORDER_PREF_ AUTOMATIC – Automatic • 0x01 – NAS_GW_ACQ_ORDER_PREF_ GSM_WCDMA – GSM then WCDMA • 0x02 – NAS_GW_ACQ_ORDER_PREF_ WCDMA_GSM – WCDMA then GSM
Type	0x1D			1	TDSCDMA Band Preference
Length	8			2	

Value	→	mask	tdscdma_band_pref	8	Bitmask representing the TD-SCDMA band preference to be set. Values: • 0x01 – NAS_TDSCDMA_BAND_A – TD-SCDMA Band A • 0x02 – NAS_TDSCDMA_BAND_B – TD-SCDMA Band B • 0x04 – NAS_TDSCDMA_BAND_C – TD-SCDMA Band C • 0x08 – NAS_TDSCDMA_BAND_D – TD-SCDMA Band D • 0x10 – NAS_TDSCDMA_BAND_E – TD-SCDMA Band E • 0x20 – NAS_TDSCDMA_BAND_F – TD-SCDMA Band F All other bits are reserved.
Type	0x1E			1	Acquisition Order Preference
Length	Var			2	
Value	→	uint8	acq_order_len	1	Number of sets of the following elements: • acq_order
		enum8	acq_order	Var	Acquisition order preference to be set. Values: • 0x01 – NAS_RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – NAS_RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x04 – NAS_RADIO_IF_GSM – GSM • 0x05 – NAS_RADIO_IF_UMTS – UMTS • 0x08 – NAS_RADIO_IF_LTE – LTE • 0x09 – NAS_RADIO_IF_TDSCDMA – TD-SCDMA
Type	0x1F			1	Network Selection Registration Restriction Preference
Length	4			2	
Value	→	enum	srv_reg_restriction	4	Registration restriction preference. Specifies one of the following modifiers to net_sel_pref: • 0x00 – NAS_SRV_REG_RESTRICTION_UNRESTRICTED – Device follows the normal registration process • 0x01 – NAS_SRV_REG_RESTRICTION_CAMPED_ONLY – Device camps on the network according to its provisioning, but does not register • 0x02 – NAS_SRV_REG_RESTRICTION_LIMITED – Device selects the network for limited service All other values are reserved.
Type	0x20			1	CSG ID
Length	10			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of CSG MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of CSG MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the TLVs (in

					this table) with an mnc or mobile_network_code field. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
		uint32	id	4	Closed subscriber group identifier.
		Enum8	rat	1	Radio interface technology of the CSG network. Values: • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE • 0x09 – RADIO_IF_TDSCDMA – TDS
Type	0x21			1	Usage Preference
Length	4			2	
Value	→	enum	usage_setting	4	Modem usage preference to be set. Values: • NAS_USAGE_VOICE_CENTRIC (1) – Voice centric • NAS_USAGE_DATA_CENTRIC (2) – Data centric
Type	0x22			1	Radio Access Technology
Length	1			2	
Value	→	enum8	rat	1	Radio access technology for the corresponding PLMN ID in the Network Selection Preference TLV (0x16). If this TLV is present and the net_sel_pref field is set to automatic, the provided MCC, MNC, and RAT are searched for first. If they are not found, the selection falls back to automatic. This TLV can also be used with the net_sel_pref field set to manual to indicate the RAT of the specified MCC and MNC. Values: • 0x04 – NAS_RADIO_IF_GSM – GSM • 0x05 – NAS_RADIO_IF_UMTS – UMTS • 0x08 – NAS_RADIO_IF_LTE – LTE • 0x09 – NAS_RADIO_IF_TDSCDMA – TD-SCDMA
Type	0x23			1	Voice Domain Preference
Length	4			2	
Value	→	enum	voice_domain_pref	4	Voice domain preference to be set. Values: • NAS_VOICE_DOMAIN_PREF_CS_ONLY (0x00) – Circuit-switched (CS) voice only • NAS_VOICE_DOMAIN_PREF_PS_ONLY (0x01) – Packet-switched (PS) voice only • NAS_VOICE_DOMAIN_PREF_CS_PREF (0x02) – CS is preferred; PS is secondary • NAS_VOICE_DOMAIN_PREF_PS_PREF (0x03) – PS is preferred; CS is secondary
Type	0x24			1	LTE Band Preference Extended

Length	32			2	
Value	→	uint64	bits_1_64	8	Bits 1 to 64 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_65_128	8	Bits 65 to 128 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_129_192	8	Bits 129 to 192 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_193_256	8	Bits 193 to 256 of the 256-bit LTE E-UTRA Operating Band bitmask
Type	0x25			1	Force Preferences
Length	1			2	
Value	→	boolean	force	1	When TRUE, indicates that the UE cannot process the request due to an LPM transition, the lower layer is busy, etc. The request is buffered and processed as soon as possible instead of returning an error. The default value is FALSE.

7.2.10.2. Response – QMI_NAS_SET_SYSTEM_SELECTION_PREFERENCE_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
At least one of the following optional TLVs must be included in this request.	Operation is not supported by the device
QMI_ERR_INVALID_ARG	Value field of one or more TLVs in the request message contains an invalid value
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_INVALID_OPERATION	Operation is not supported by the device

7.2.10.3. Description of QMI_NAS_SET_SYSTEM_SELECTION_PREFERENCE REQ/RESP

This command writes the specified system selection preference to the device. This setting is global to the device and is not unique to each control point. The preference is written to persistent storage to remain set

after the device is power cycled.

A system selection preference is overwritten by a subsequent request to set the system selection preference.

Requests to set an invalid system selection preference for the current device configuration elicit a QMI_ERR_OP_DEVICE_UNSUPPORTED error.

Success of this command indicates that the specified change has been requested. The control point must always process the QMI_NAS_SYSTEM_SELECTION_PREFERENCE_IND indication to learn the current system selection of the device.

At least one optional TLV specifying a system selection preference must be present in the request. If not, a QMI_ERR_MISSING_ARG error is returned.

The control point must include the Emergency Mode TLV with a value set to ON if users want to enable Emergency mode. All other TLVs included in the command are ignored. To exit Emergency mode, the control point can either include the Emergency Mode TLV with a value set to OFF or include the Mode Preference TLV. When coming out of Emergency mode, the mode preference is set to whatever the Mode Preference TLV specifies (if the TLV is included) or to whatever mode preference that is set in persistent memory (if the Mode Preference TLV is not included).

When the Network Selection Preference TLV (0x16) is included, its information is used to control which networks the modem selects.

The Acquisition Order Preference TLV (0x1E) takes priority over the GSM/WCDMA Acquisition Order Preference TLV (0x1C); if both are sent, the Acquisition Order Preference TLV is used. If the Acquisiton Order Preference TLV is not supported, a QMI_ERR_INVALID_OPERATION error is returned. Only the listed radio interfaces are supported. If a different radio interface is sent, or there are duplicates in the list, a QMI_ERR_INVALID_ARG error is returned.

The acquisition order preference list contains a list of RATs (1X, 1xEV-DO, ..., LTE, TD-SCDMA, etc.). When the client attempts to change its order, the client must provide a list that contains the same RATs but in a different order. A RAT that was there previously cannot be removed and a new RAT cannot be added.

When the optional Service Domain Preference TLV (0x18) is sent as QMI_SRV_DOMAIN_PREF_PS_ATTACH, PS will be added to the current preference. If PS is already in the service domain preference, the request for the attach returns an error. If the TLV is sent as QMI_SRV_DOMAIN_PREF_PS_DETACH, PS is removed from the current preference. If the device was already PS_ONLY, the UE moves to Power Save mode. A value of QMI_SRV_DOMAIN_PREF_PS_DETACH_NO_PREF_CHANGE performs the PS detach without modifying the service domain preference.

The optional Network Selection Registration Restriction Preference TLV (0x1F) is used to put the device into or pull it out of Limited mode or Camped Only mode. When using this TLV with a value other than

NAS_SRV_REG_RESTRICTION_UNRESTRICTED, the Change Duration TLV (0x17) must be set to "Power cycle".

Only one of the LTE Band Preference TLVs, either TLV 0x15 (deprecated) or TLV 0x24, can be included in the request; otherwise, a QMI_ERR_INVALID_ARG error is returned.

7.2.11. QMI_NAS_GET_SYSTEM_SELECTION_PREFERENCE

Queries the different system selection preferences of the device.

NAS message ID

0x0034

Version introduced

Major – 1, Minor – 1

7.2.11.1. Request – QMI_NAS_GET_SYSTEM_SELECTION_PREFERENCE_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.11.2. Response – QMI_NAS_GET_SYSTEM_SELECTION_PREFERENCE_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

At least one of the following optional TLVs are present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Emergency Mode	Unknown	1.1
Mode Preference	Unknown	1.16
Band Preference	Unknown	1.16
CDMA PRL Preference	Unknown	1.1
Roaming Preference	Unknown	1.1
LTE Band Preference (Deprecated; use LTE Band Preference Extended)	Unknown	1.138 (Deprecated)
Network Selection Preference	1.5	1.5
Service Domain Preference	Unknown	1.34
GSM/WCDMA Acquisition Order Preference	Unknown	1.11

TDSCDMA Band Preference	Unknown	1.13
Manual Network Selection PLMN	Unknown	1.19
At least one of the following optional TLVs must be included in this request.	Unknown	1.20
Network Selection Registration Restriction Preference	1.34	1.34
CSG ID	1.41	1.41
Usage Preference	1.67	1.67
Voice Domain Preference	1.92	1.92
LTE Disable Cause	1.100	1.100
Disabled RAT Bitmask	1.132	1.132
LTE Band Preference Extended	1.138	1.138

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Emergency Mode
Length	1			2	
Value	→	boolean	emergency_mode	1	Values: • 0x00 – OFF (normal) • 0x01 – ON (emergency)
Type	0x11			1	Mode Preference
Length	2			2	
Value	→	mask16	mode_pref	2	Bitmask representing the radio technology mode preference to be set. Values: • Bit 0 (0x01) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_1X – cdma2000® 1X • Bit 1 (0x02) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_HRPD – cdma2000® HRPD (1xEV-DO) • Bit 2 (0x04) – QMI_NAS_RAT_MODE_PREF_ GSM – GSM • Bit 3 (0x08) – QMI_NAS_RAT_MODE_PREF_ UMTS – UMTS • Bit 4 (0x10) – QMI_NAS_RAT_MODE_PREF_ LTE – LTE • Bit 5 (0x20) – QMI_NAS_RAT_MODE_PREF_ TDSCDMA – TD-SCDMA All unlisted bits are reserved for future use and the service point ignores them if used.
Type	0x12			1	Band Preference
Length	8			2	
Value	→	mask	band_pref	8	Bitmask representing the band preference to be set. See TableA-2for details.
Type	0x13			1	CDMA PRL Preference
Length	2			2	
Value	→	enum16	prl_pref	2	PRL preference to be set for band class 0 (BC0)

					prl_pref. Values: • 0x0001 – PRL_PREF_A_SIDE_ONLY – Acquire available system only on the A side • 0x0002 – PRL_PREF_B_SIDE_ONLY – Acquire available system only on the B side • 0x3FFF – PRL_PREF_ANY – Acquire any available systems
Type	0x14			1	Roaming Preference
Length	2			2	
Value	→	enum16	roam_pref	2	Roaming preference to be set. Values: • 0x01 – ROAMING_PREF_OFF – Acquire only systems for which the roaming indicator is off • 0x02 – ROAMING_PREF_NOT_OFF – Acquire a system as long as its roaming indicator is not off • 0x03 – ROAMING_PREF_NOT_FLASING – Acquire only systems for which the roaming indicator is off or solid on, i.e., not flashing; CDMA only • 0xFF – ROAMING_PREF_ANY – Acquire systems, regardless of their roaming indicator
Type	0x15			1	LTE Band Preference (Deprecated; use LTE Band Preference Extended)
Length	8			2	
Value	→	uint64	band_pref_ext	8	Bitmask representing the LTE band preference to be set. Values: • Bit 0 – E-UTRA Operating Band 1 • Bit 1 – E-UTRA Operating Band 2 • Bit 2 – E-UTRA Operating Band 3 • Bit 3 – E-UTRA Operating Band 4 • Bit 4 – E-UTRA Operating Band 5 • Bit 5 – E-UTRA Operating Band 6 • Bit 6 – E-UTRA Operating Band 7 • Bit 7 – E-UTRA Operating Band 8 • Bit 8 – E-UTRA Operating Band 9 • Bit 9 – E-UTRA Operating Band 10 • Bit 10 – E-UTRA Operating Band 11 • Bit 11 – E-UTRA Operating Band 12 • Bit 12 – E-UTRA Operating Band 13 • Bit 13 – E-UTRA Operating Band 14 • Bit 16 – E-UTRA Operating Band 17 • Bit 17 – E-UTRA Operating Band 18 • Bit 18 – E-UTRA Operating Band 19 • Bit 19 – E-UTRA Operating Band 20 • Bit 20 – E-UTRA Operating Band 21 • Bit 23 – E-UTRA Operating Band 24 • Bit 24 – E-UTRA Operating Band 25 • Bit 32 – E-UTRA Operating Band 33 • Bit 33 – E-UTRA Operating Band 34 • Bit 34 – E-UTRA Operating Band 35 • Bit 35 – E-UTRA Operating Band 36 • Bit 36 – E-UTRA Operating Band 37 • Bit 37 – E-UTRA Operating Band 38

					• Bit 38 – E-UTRA Operating Band 39 • Bit 39 – E-UTRA Operating Band 40 • Bit 40 – E-UTRA Operating Band 41 • Bit 41 – E-UTRA Operating Band 42 • Bit 42 – E-UTRA Operating Band 43 All other bits are reserved.
Type	0x16			1	Network Selection Preference
Length	1			2	
Value	→	enum8	net_sel_pref	1	Network selection preference. Values: • 0x00 – Automatic network selection • 0x01 – Manual network selection
Type	0x18			1	Service Domain Preference
Length	4			2	
Value	→	enum	srv_domain_pref	4	Service domain preference. Values: • 0x00 – QMI_SRV_DOMAIN_PREF_CS_ONLY – Circuit-switched only • 0x01 – QMI_SRV_DOMAIN_PREF_PS_ONLY – Packet-switched only • 0x02 – QMI_SRV_DOMAIN_PREF_CS_PS – Circuit-switched and packet-switched
Type	0x19			1	GSM/WCDMA Acquisition Order Preference
Length	4			2	
Value	→	duplicate	gw_acq_order_pref	0	GSM/WCDMA acquisition order preference. Values: • 0x00 – NAS_GW_ACQ_ORDER_PREF_AUTOMATIC – Automatic • 0x01 – NAS_GW_ACQ_ORDER_PREF_GSM_WCDMA – GSM then WCDMA • 0x02 – NAS_GW_ACQ_ORDER_PREF_WCDMA_GSM – WCDMA then GSM
Type	0x1A			1	TDSCDMA Band Preference
Length	8			2	
Value	→	mask	tdscdma_band_pref	8	Bitmask representing the TD-SCDMA band preference to be set. Values: • 0x01 – NAS_TDSCDMA_BAND_A – TD-SCDMA Band A • 0x02 – NAS_TDSCDMA_BAND_B – TD-SCDMA Band B • 0x04 – NAS_TDSCDMA_BAND_C – TD-SCDMA Band C • 0x08 – NAS_TDSCDMA_BAND_D – TD-SCDMA Band D • 0x10 – NAS_TDSCDMA_BAND_E – TD-SCDMA Band E • 0x20 – NAS_TDSCDMA_BAND_F – TD-SCDMA Band F All other bits are reserved.
Type	0x1B			1	Manual Network Selection PLMN
Length	5			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to

					999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the TLVs (in this table) with an mnc or mobile_network_code field. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
Type	0x1C			1	Acquisition Order Preference
Length	Var			2	
Value	→	uint8	acq_order_len	1	Number of sets of the following elements: • acq_order
		enum8	acq_order	Var	Acquisition order preference to be set. Values: • 0x01 – NAS_RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – NAS_RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x04 – NAS_RADIO_IF_GSM – GSM • 0x05 – NAS_RADIO_IF_UMTS – UMTS • 0x08 – NAS_RADIO_IF_LTE – LTE • 0x09 – NAS_RADIO_IF_TDSCDMA – TD-SCDMA
Type	0x1D			1	Network Selection Registration Restriction Preference
Length	4			2	
Value	→	enum	srv_reg_restriction	4	Registration restriction preference. Specifies one of the following modifiers to net_sel_pref: • 0x00 – NAS_SRV_REG_RESTRICTION_UNRESTRICTED – Device follows the normal registration process • 0x01 – NAS_SRV_REG_RESTRICTION_CAMPED_ONLY – Device camps on the network according to its provisioning, but does not register • 0x02 – NAS_SRV_REG_RESTRICTION_LIMITED – Device selects the network for limited service All other values are reserved.
Type	0x1E			1	CSG ID
Length	10			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of CSG MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of CSG MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the TLVs (in this table) with an mnc or

					mobile_network_code field. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
		uint32	id	4	Closed subscriber group identifier.
		Enum8	rat	1	Radio interface technology of the CSG network. Values: • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE • 0x09 – RADIO_IF_TDSCDMA – TDS
Type	0x1F			1	Usage Preference
Length	4			2	
Value	→	enum	usage_setting	4	Modem usage preference to be set. Values: • NAS_USAGE_UNKNOWN (0) – Unknown • NAS_USAGE_VOICE_CENTRIC (1) – Voice centric • NAS_USAGE_DATA_CENTRIC (2) – Data centric
Type	0x20			1	Voice Domain Preference
Length	4			2	
Value	→	enum	voice_domain_pref	4	Voice domain preference. Values: • NAS_VOICE_DOMAIN_PREF_CS_ONLY (0x00) – Circuit-switched (CS) voice only • NAS_VOICE_DOMAIN_PREF_PS_ONLY (0x01) – Packet-switched (PS) voice only • NAS_VOICE_DOMAIN_PREF_CS_PREF (0x02) – CS is preferred; PS is secondary • NAS_VOICE_DOMAIN_PREF_PS_PREF (0x03) – PS is preferred; CS is secondary
Type	0x21			1	LTE Disable Cause
Length	4			2	
Value	→	enum	lte_disable_cause	4	LTE disable cause. Values: • NAS_LTE_DISABLE_CAUSE_NONE (0x00) – LTE is not disabled • NAS_LTE_DISABLE_CAUSE_PERMANENT_ DS (0x01) – LTE is disabled by DS permanently, e.g., T3316 expiry • NAS_LTE_DISABLE_CAUSE_TEMP_DS (0x02) – LTE is disabled by DS temporarily • NAS_LTE_DISABLE_CAUSE_DOM_SEL (0x03) – LTE disable procedure is called for domain selection purpose • NAS_LTE_DISABLE_CAUSE_DAM (0x04) – LTE disable procedure is called for device aggression management recovery

					• NAS_LTE_DISABLE_CAUSE_USER (0x05) – LTE disable procedure is called due to user action, e.g., mode_pref change or PS_DETACH triggered by ATCOP/QMI • NAS_LTE_DISABLE_CAUSE_NO_CHANGE (0x06) – No change in LTE disable cause
Type	0x22			1	Disabled RAT Bitmask
Length	2			2	
Value	→	mask16	rat_disabled_mask	2	Bitmask representing the radio technologies that are disabled. Values: • Bit 0 (0x01) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_1X – cdma2000® 1X • Bit 1 (0x02) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_HRPD – cdma2000® HRPD (1xEV-DO) • Bit 2 (0x04) – QMI_NAS_RAT_MODE_PREF_ GSM – GSM • Bit 3 (0x08) – QMI_NAS_RAT_MODE_PREF_ UMTS – UMTS • Bit 4 (0x10) – QMI_NAS_RAT_MODE_PREF_ LTE – LTE • Bit 5 (0x20) – QMI_NAS_RAT_MODE_PREF_ TDSCDMA – TD-SCDMA All unlisted bits are reserved for future use and the service point ignores them if used.
Type	0x23			1	LTE Band Preference Extended
Length	32			2	
Value	→	uint64	bits_1_64	8	Bits 1 to 64 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_65_128	8	Bits 65 to 128 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_129_192	8	Bits 129 to 192 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_193_256	8	Bits 193 to 256 of the 256-bit LTE E-UTRA Operating Band bitmask

7.2.11.3. Indication – QMI_NAS_SYSTEM_SELECTION_PREFERENCE_IND_MSG

Message type

Indication

Sender

Service

Scope

Per control point (unicast)

Mandatory TLVs

None

Optional TLVs

At least one of the following optional TLVs are present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Emergency Mode	Unknown	1.1
Mode Preference	Unknown	1.16
Band Preference	Unknown	1.16
CDMA PRL Preference	Unknown	1.1
Roaming Preference	Unknown	1.1
LTE Band Preference (Deprecated; use LTE Band Preference Extended)	1.16	1.138 (Deprecated)
Network Selection Preference	1.5	1.5
Service Domain Preference	Unknown	1.34
GSM/WCDMA Acquisition Order Preference	Unknown	1.11
TDSCDMA Band Preference	Unknown	1.13
Manual Network Selection PLMN	Unknown	1.19
Acquisition Order Preference	Unknown	1.20
Network Selection Registration Restriction Preference	1.34	1.34
CSG ID	1.41	1.41
Usage Preference	1.67	1.67
Voice Domain Preference	1.92	1.92
LTE Disable Cause	1.100	1.100
Disabled RAT Bitmask	1.132	1.132
LTE Band Preference Extended	1.138	1.138

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Emergency Mode
Length	1			2	
Value	→	boolean	emergency_mode	1	Values: • 0x00 – OFF (normal) • 0x01 – ON (emergency)
Type	0x11			1	Mode Preference
Length	2			2	
Value	→	mask16	mode_pref	2	Bitmask representing the radio technology mode preference to be set. Values: • Bit 0 (0x01) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_1X – cdma2000® 1X • Bit 1 (0x02) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_HRPD – cdma2000® HRPD (1xEV-DO)

					• Bit 2 (0x04) – QMI_NAS_RAT_MODE_PREF_ GSM – GSM • Bit 3 (0x08) – QMI_NAS_RAT_MODE_PREF_ UMTS – UMTS • Bit 4 (0x10) – QMI_NAS_RAT_MODE_PREF_ LTE – LTE • Bit 5 (0x20) – QMI_NAS_RAT_MODE_PREF_ TDSCDMA – TD-SCDMA All unlisted bits are reserved for future use.
Type	0x12			1	Band Preference
Length	8			2	
Value	→	mask	band_pref	8	Bitmask representing the band preference to be set. See TableA-2for details.
Type	0x13			1	CDMA PRL Preference
Length	2			2	
Value	→	enum16	prl_pref	2	PRL preference to be set for band class 0 (BC0) prl_pref. Values: • 0x0001 – PRL_PREF_A_SIDE_ONLY – Acquire available system only on the A side • 0x0002 – PRL_PREF_B_SIDE_ONLY – Acquire available system only on the B side • 0x3FFF – PRL_PREF_ANY – Acquire any available systems
Type	0x14			1	Roaming Preference
Length	2			2	
Value	→	enum16	roam_pref	2	Roaming preference to be set. Values: • 0x01 – ROAMING_PREF_OFF – Acquire only systems for which the roaming indicator is off • 0x02 – ROAMING_PREF_NOT_OFF – Acquire a system as long as its roaming indicator is not off • 0x03 – ROAMING_PREF_NOT_FLASING – Acquire only systems for which the roaming indicator is off or solid on, i.e., not flashing; CDMA only • 0xFF – ROAMING_PREF_ANY – Acquire systems, regardless of their roaming indicator
Type	0x15			1	LTE Band Preference (Deprecated; use LTE Band Preference Extended)
Length	8			2	
Value	→	mask	lte_band_pref	8	Bitmask representing the LTE band preference to be set. See TableA-3for details.
Type	0x16			1	Network Selection Preference
Length	1			2	
Value	→	enum8	net_sel_pref	1	Network selection preference. Values: • 0x00 – Automatic network selection • 0x01 – Manual network selection
Type	0x18			1	Service Domain Preference
Length	4			2	

Value	→	enum	srv_domain_pref	4	Service domain preference. Values: • 0x00 – QMI_SRV_DOMAIN_PREF_CS_ONLY – Circuit-switched only • 0x01 – QMI_SRV_DOMAIN_PREF_PS_ONLY – Packet-switched only • 0x02 – QMI_SRV_DOMAIN_PREF_CS_PS – Circuit-switched and packet-switched
Type	0x19			1	GSM/WCDMA Acquisition Order Preference
Length	4			2	
Value	→	enum	gw_acq_order_pref	4	GSM/WCDMA acquisition order preference. Values: • 0x00 – NAS_GW_ACQ_ORDER_PREF_AUTOMATIC – Automatic • 0x01 – NAS_GW_ACQ_ORDER_PREF_GSM_WCDMA – GSM then WCDMA • 0x02 – NAS_GW_ACQ_ORDER_PREF_WCDMA_GSM – WCDMA then GSM
Type	0x1A			1	TDSCDMA Band Preference
Length	8			2	
Value	→	mask	tdscdma_band_pref	8	Bitmask representing the TD-SCDMA band preference to be set. Values: • 0x01 – NAS_TDSCDMA_BAND_A – TD-SCDMA Band A • 0x02 – NAS_TDSCDMA_BAND_B – TD-SCDMA Band B • 0x04 – NAS_TDSCDMA_BAND_C – TD-SCDMA Band C • 0x08 – NAS_TDSCDMA_BAND_D – TD-SCDMA Band D • 0x10 – NAS_TDSCDMA_BAND_E – TD-SCDMA Band E • 0x20 – NAS_TDSCDMA_BAND_F – TD-SCDMA Band F All other bits are reserved.
Type	0x1B			1	Manual Network Selection PLMN
Length	5			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the TLVs (in this table) with an mnc or mobile_network_code field. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
Type	0x1C			1	Acquisition Order Preference

Length	Var			2	
Value	→	uint8	acq_order_len	1	Number of sets of the following elements: • acq_order
		enum8	acq_order	Var	Acquisition order preference to be set. Values: • 0x01 – NAS_RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – NAS_RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x04 – NAS_RADIO_IF_GSM – GSM • 0x05 – NAS_RADIO_IF_UMTS – UMTS • 0x08 – NAS_RADIO_IF_LTE – LTE • 0x09 – NAS_RADIO_IF_TDSCDMA – TD-SCDMA
Type	0x1D			1	Network Selection Registration Restriction Preference
Length	4			2	
Value	→	enum	srv_reg_restriction	4	Registration restriction preference. Specifies one of the following modifiers to net_sel_pref: • 0x00 – NAS_SRV_REG_RESTRICTION_UNRESTRICTED – Device follows the normal registration process • 0x01 – NAS_SRV_REG_RESTRICTION_CAMPED_ONLY – Device camps on the network according to its provisioning, but does not register • 0x02 – NAS_SRV_REG_RESTRICTION_LIMITED – Device selects the network for limited service All other values are reserved.
Type	0x1E			1	CSG ID
Length	10			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of CSG MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of CSG MNC. Range: 0 to 999.
		Boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the TLVs (in this table) with an mnc or mobile_network_code field. Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90
		uint32	id	4	Closed subscriber group identifier.
		Enum8	rat	1	Radio interface technology of the CSG network. Values: • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE • 0x09 – RADIO_IF_TDSCDMA – TDS
Type	0x1F			1	Usage Preference

Length	4			2	
Value	→	enum	usage_setting	4	Usage preference to be set. Values: • NAS_USAGE_UNKNOWN (0) – Unknown • NAS_USAGE_VOICE_CENTRIC (1) – Voice centric • NAS_USAGE_DATA_CENTRIC (2) – Data centric
Type	0x20			1	Voice Domain Preference
Length	4			2	
Value	→	enum	voice_domain_pref	4	Voice domain preference. Values: • NAS_VOICE_DOMAIN_PREF_CS_ONLY (0x00) – Circuit-switched (CS) voice only • NAS_VOICE_DOMAIN_PREF_PS_ONLY (0x01) – Packet-switched (PS) voice only • NAS_VOICE_DOMAIN_PREF_CS_PREF (0x02) – CS is preferred; PS is secondary • NAS_VOICE_DOMAIN_PREF_PS_PREF (0x03) – PS is preferred; CS is secondary
Type	0x21			1	LTE Disable Cause
Length	4			2	
Value	→	enum	lte_disable_cause	4	LTE disable cause. Values: • NAS_LTE_DISABLE_CAUSE_NONE (0x00) – LTE is not disabled • NAS_LTE_DISABLE_CAUSE_PERMANENT_ DS (0x01) – LTE is disabled by DS permanently, e.g., T3316 expiry • NAS_LTE_DISABLE_CAUSE_TEMP_DS (0x02) – LTE is disabled by DS temporarily • NAS_LTE_DISABLE_CAUSE_DOM_SEL (0x03) – LTE disable procedure is called for domain selection purpose • NAS_LTE_DISABLE_CAUSE_DAM (0x04) – LTE disable procedure is called for device aggression management recovery • NAS_LTE_DISABLE_CAUSE_USER (0x05) – LTE disable procedure is called due to user action, e.g., mode_pref change or PS_DETACH triggered by ATCOP/QMI • NAS_LTE_DISABLE_CAUSE_NO_CHANGE (0x06) – No change in LTE disable cause
Type	0x22			1	Disabled RAT Bitmask
Length	2			2	
Value	→	mask16	rat_disabled_mask	2	Bitmask representing the radio technologies that are disabled. Values: • Bit 0 (0x01) – QMI_NAS_RAT_MODE_PREF_ CDMA2000_1X – cdma2000® 1X • Bit 1 (0x02) – QMI_NAS_RAT_MODE_PREF_

					CDMA2000_HRPD – cdma2000® HRPD (1xEV-DO) • Bit 2 (0x04) – QMI_NAS_RAT_MODE_PREF_ GSM – GSM • Bit 3 (0x08) – QMI_NAS_RAT_MODE_PREF_ UMTS – UMTS • Bit 4 (0x10) – QMI_NAS_RAT_MODE_PREF_ LTE – LTE • Bit 5 (0x20) – QMI_NAS_RAT_MODE_PREF_ TDSCDMA – TD-SCDMA All unlisted bits are reserved for future use and the service point ignores them if used.
Type	0x23			1	LTE Band Preference Extended
Length	32			2	
Value	→	uint64	bits_1_64	8	Bits 1 to 64 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_65_128	8	Bits 65 to 128 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_129_192	8	Bits 129 to 192 of the 256-bit LTE E-UTRA Operating Band bitmask
		uint64	bits_193_256	8	Bits 193 to 256 of the 256-bit LTE E-UTRA Operating Band bitmask

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_INVALID_ARG	Value field of one or more TLVs in the request message contains an invalid value
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request

7.2.11.4. Description of QMI_NAS_GET_SYSTEM_SELECTION_PREFERENCE

This command queries the preferred system selection settings for the device.

For more information regarding the preference settings and the description of QMI_NAS_SET_SYSTEM_SELECTION_PREFERENCE, see Section 7.2.10.

The Manual Network Selection PLMN TLV is included only when the Network Selection Preference TLV is set to “Manual network selection”.

If the Emergency Mode TLV is set to “ON”, the Mode Preference TLV will be populated with the last received non-emergency value.

The CSG ID TLV is included only when the PLMN listed is a CSG network.

Description of QMI_NAS_SYSTEM_SELECTION_PREFERENCE_IND

This indication communicates the current preferred system selection settings for the device.

The Manual Network Selection PLMN TLV is included only when the current network selection preference is set to manual.

If the Emergency Mode TLV is set to “ON”, the Mode Preference TLV will be populated with the last received non-emergency value.

The CSG ID TLV is included only when the PLMN listed is a CSG network.

7.2.12. QMI_NAS_SET_DDTM_PREFERENCE

Sets the Data Dedicated Transmission Mode (DDTM) preference for the device.

NAS message ID

0x0037

Version introduced

Major – 1, Minor – 1

7.2.12.1. Request – QMI_NAS_SET_DDTM_PREFERENCE_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
DDTM Preference	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	DDTM Preference
Length	Var			2	
Value	→	enum8	ddtm_pref	1	DDTM preference setting. Values: • 0x00 – DDTM_PREF_OFF – Disable DDTM • 0x01 – DDTM_PREF_ON – Enable DDTM • 0x02 – DDTM_PREF_NO_CHANGE – Do not change DDTM preference
		uint16	ddtm_action	2	Bitmask (with each bit specifying action) representing what combined DDTM actions should take place. Values: • Bit 0 – QMI_NAS_DDTM_ACTION_ SUPPRESS_L2ACK_BIT – Do not send L2 ACK on 1X • Bit 1 – QMI_NAS_DDTM_ACTION_ SUPPRESS_REG_BIT – Suppress 1X registrations • Bit 2 – QMI_NAS_DDTM_ACTION_IGNORE_ SO_PAGES_BIT – Ignore 1X pages with specified service options • Bit 3 – QMI_NAS_DDTM_ACTION_ SUPPRESS_MO_DBM_BIT – Block MO SMS and DBM To enable all masks, a value of 0x3FFF must be sent in this field.
		Enum8	so_list_action	1	Action to be taken with the specified SO list in

					the SO field. Values: • 0x00 – SO_LIST_ACTION_ADD – Add the specified Sos to the current DDTM SO list • 0x01 – SO_LIST_ACTION_REPLACE – Replace the current DDTM SO list • 0x02 – SO_LIST_ACTION_DELETE – Delete the specified Sos from the DDTM SO list • 0x03 – SO_LIST_ACTION_NO_CHANGE – No change in the DDTM SO list
		uint8	num_so_instances	1	Number of sets of the following elements: • so
		uint16	so	Var	Service option for which SO pages are ignored when DDTM status is ON. Refer to3GPP2 C.R1001-F Table 3.1-1 for standard SO number assignments. To ignore all SO pages, a value of 0xFFFF must be specified.

Optional TLVs

None

7.2.12.2. Response – QMI_NAS_SET_DDTM_PREFERENCE_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section2.3.1) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
At least one of the following optional TLVs must be included in this request.	More than the maximum allowed thresholds were specified

7.2.12.3. Description of QMI_NAS_SET_DDTM_PREFERENCE REQ/RESP

This command sets the DDTM preference. This command is applicable only for 3GPP2 devices.

7.2.13. QMI_NAS_GET_CELL_LOCATION_INFO

Retrieves cell location-related information.

NAS message ID

0x0043

Version introduced

Major – 1, Minor – 4

7.2.13.1. Request – QMI_NAS_GET_CELL_LOCATION_INFO_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.13.2. Response – QMI_NAS_GET_CELL_LOCATION_INFO_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
GERAN Info	Unknown	1.9
UMTS Info	Unknown	1.4
CDMA Info	Unknown	1.9
LTE Info – Intrafrequency	Unknown	1.9
LTE Info – Interfrequency	Unknown	1.9
LTE Info – Neighboring GSM	Unknown	1.9
LTE Info – Neighboring WCDMA	Unknown	1.9
UMTS Cell ID	Unknown	1.22
WCDMA Info – LTE Neighbor Cell Info Set	1.46	1.46
CDMA Rx Info	1.64	1.64
HDR Rx Info	1.64	1.64

GSM Cell Info Ext	1.64	1.64
WCDMA Cell Info Ext	1.64	1.64
WCDMA GSM Neighbor Cell Ext	1.64	1.64
LTE Info – Timing Advance	1.70	1.70
WCDMA Info – Active Set	1.70	1.70
WCDMA Info – Active Set Reference Radio Link	1.70	1.70
At least one of the following optional TLVs must be included in this request.	1.91	1.91
UMTS Extended Info	1.91	1.91
Extended WCDMA Info – Active Set	1.91	1.91
Scell GERAN Config	1.91	1.91
Current L1 Timeslot	1.91	1.91
Doppler Measurement	1.105	1.105
LTE Info Extended – Intrafrequency EARFCN	1.112	1.112
LTE Info Extended – Interfrequency EARFCN	1.112	1.112
WCDMA Info Extended – LTE Neighbor Cell Info EARFCN	1.112	1.112
NAS Info – EMM State	1.144	1.144
NAS Info – EMM Substate	1.144	1.144
NAS Info – RRC State	1.144	1.144

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	GERAN Info
Length	Var			2	
Value	→	uint32	cell_id	4	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
		Char	plmn	3	MCC/MNC information coded as octet 3, 4, and 5 in 3GPP TS 24.008Section 10.5.1.3. (This field is ignored when cell_id is not present.)
		uint16	lac	2	Location area code. (This field is ignored when cell_id is not present.)
		uint16	arfcn	2	Absolute RF channel number.
		Uint8	bsic	1	Base station identity code.
		Uint32	timing_advance	4	Measured delay (in bit periods; 1 bit period = 48/13 microsecond) of an access burst transmission on the RACH or PRACH to the expected signal from an MS at zero distance under static channel conditions. (0xFFFFFFFF indicates timing advance information is not present.)
		uint16	rx_lev	2	Serving cell Rx measurement. Values range between 0 and 63, which is mapped to a measured signal level: • Rxlev 0 is a signal strength less than -110 dBm • Rxlev 1 is -110 dBm to -109 dBm • Rxlev 2 is -109 dBm to -108 dBm • ... • Rxlev 62 is -49 dBm to -48 dBm • Rxlev 63 is greater than -48 dBm
		uint8	nmr_inst	1	Number of sets of the following elements:

					• nmr_cell_id • nmr_plmn • nmr_lac • nmr_arfcn • nmr_bsic • nmr_rx_lev
		uint32	nmr_cell_id	4	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
		Char	nmr_plmn	3	MCC/MNC information coded as octet 3, 4, and 5 in 3GPP TS 24.008Section 10.5.1.3. (This field is ignored when nmr_cell_id is not present.)
		uint16	nmr_lac	2	Location area code. (This field is ignored when nmr_cell_id is not present.)
		uint16	nmr_arfcn	2	Absolute RF channel number.
		Uint8	nmr_bsic	1	Base station identity code.
		Uint16	nmr_rx_lev	2	Cell Rx measurement. Values range between 0 and 63, which is mapped to a measured signal level: • Rxlev 0 is a signal strength less than -110 dBm • Rxlev 1 is -110 dBm to -109 dBm • Rxlev 2 is -109 dBm to -108 dBm • ... • Rxlev 62 is -49 dBm to -48 dBm • Rxlev 63 is greater than -48 dBm
Type	0x11			1	UMTS Info
Length	Var			2	
Value	→	uint16	cell_id	2	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
		Char	plmn	3	MCC/MNC information coded as octet 3, 4, and 5 in 3GPP TS 24.008Section 10.5.1.3.
		uint16	lac	2	Location area code.
		Uint16	uarfcn	2	UTRA absolute RF channel number.
		Uint16	psc	2	Primary scrambling code.
		Int16	rscp	2	Received signal code power; the received power on one code measured in dBm on the primary CPICH channel of the serving cell.
		Int16	ecio	2	ECIO; the received energy per chip divided by the power density in the band measured in dBm on the primary CPICH channel of the serving cell.
		Uint8	umts_inst	1	Number of sets of the following elements: • umts_uarfcn • umts_psc • umts_rscp • umts_ecio
		uint16	umts_uarfcn	2	UTRA absolute RF channel number.
		Uint16	umts_psc	2	Primary scrambling code.
		Int16	umts_rscp	2	Received signal code power; the received power on one code measured in dBm on the primary CPICH channel of the neighbor/monitored cell.

		Int16	umts_ecio	2	ECIO; the received energy per chip divided by the power density in the band measured in dBm on the primary CPICH channel of the neighbor/monitored cell.
		Uint8	geran_inst	1	Number of sets of the following elements: • geran_arfcn • geran_bsic_ncc • geran_bsic_bcc • geran_rssi
		uint16	geran_arfcn	2	Absolute RF channel number.
		Uint8	geran_bsic_ncc	1	Base station identity code network color code (0xFF indicates information is not present).
		Uint8	geran_bsic_bcc	1	Base station identity code base station color code (0xFF indicates information is not present).
		Int16	geran_rssi	2	Received signal strength indicator.
Type	0x12			1	CDMA Info
Length	16			2	
Value	→	uint16	sid	2	System ID.
		Uint16	nid	2	Network ID.
		Uint16	base_id	2	Base station ID.
		Uint16	refpn	2	Reference PN.
		Uint32	base_lat	4	Latitude of the current base station in units of 0.25 sec.
		uint32	base_long	4	Longitude of the current base station in units of 0.25 sec.
Type	0x13			1	LTE Info – Intrafrequency
Length	Var			2	
Value	→	boolean	ue_in_idle	1	TRUE if the UE is in Idle mode; otherwise FALSE.
		Uint8	plmn	3	PLMN ID coded as octet 3, 4, and 5 in3GPP TS 24.008Section 10.5.1.3.
		uint16	tac	2	Tracking area code.
		Uint32	global_cell_id	4	Global cell ID in the system information block.
		Uint16	earfcn	2	E-UTRA absolute radio frequency channel number of the serving cell. Range: 0 to 65535.
		Uint16	serving_cell_id	2	LTE serving cell ID. Range: 0 to 503. This is the cell ID of the serving cell and can be found in the cell list.
		Uint8	cell_resel_priority	1	Priority for serving frequency. Range: 0 to 7. (This field is only valid when ue_in_idle is TRUE.)
		uint8	s_non_intra_search	1	S non-intra search threshold to control non-intrafrequency searches. Range: 0 to 31. (This field is only valid when ue_in_idle is TRUE.)
		uint8	thresh_serving_low	1	Serving cell low threshold. Range: 0 to 31. (This field is only valid when ue_in_idle is TRUE.)
		uint8	s_intra_search	1	S intra search threshold. Range: 0 to 31. The current

					cell measurement must fall below this threshold to consider intrafrequency for reselection. (This field is only valid when ue_in_idle is TRUE.)
		uint8	cells_len	1	Number of sets of the following elements: • pci • rsrq • rsrp • rssi • srxlev
		uint16	pci	2	Physical cell ID. Range: 0 to 503.
		Int16	rsrq	2	Current RSRQ in 1/10 dB as measured by L1. Range: -200 to -30 (e.g., -200 means -20.0 dB).
		Int16	rsrp	2	Current RSRP in 1/10 dBm as measured by L1. Range: -1400 to -440 (e.g., -440 means -44.0 dBm).
		Int16	rssi	2	Current RSSI in 1/10 dBm as measured by L1. Range: -1200 to 0 (e.g., -440 means -44.0 dBm).
		Int16	srxlev	2	Cell selection Rx level (Srxlev) value. Range: -128 to 128. (This field is only valid when ue_in_idle is TRUE.)
Type	0x14			1	LTE Info – Interfrequency
Length	Var			2	
Value	→	boolean	ue_in_idle	1	TRUE if the UE is in Idle mode; otherwise FALSE.
		Uint8	freqs_len	1	Number of sets of the following elements: • earfcn • licit_low • licit_high • cell_resel_priority • pci • rsrq • rsrp • rssi • srxlev
		uint16	earfcn	2	E-UTRA absolute radio frequency channel number. Range: 0 to 65535.
		Uint8	licit_low	1	Cell Srxlev low threshold. Range: 0 to 31. When the serving cell does not exceed thresh_serving_low, the value of an evaluated cell must be smaller than this value to be considered for reselection.
		Uint8	licit_high	1	Cell Srxlev high threshold. Range: 0 to 31. When the serving cell exceeds thresh_serving_low, the value of an evaluated cell must be greater than this value to be considered for reselection.
		Uint8	cell_resel_ priority	1	Cell reselection priority. Range: 0 to 7. (This field is only valid when ue_in_idle is TRUE.)

		uint8	cells_len	1	Number of sets of the following elements: • pci • rsrq • rsrp • rssi • srxlev
		uint16	pci	2	Physical cell ID. Range: 0 to 503.
		Int16	rsrq	2	Current RSRQ in 1/10 dB as measured by L1. Range: -200 to -30 (e.g., -200 means -20.0 dB).
		Int16	rsrp	2	Current RSRP in 1/10 dBm as measured by L1. Range: -1400 to -440 (e.g., -440 means -44.0 dBm).
		Int16	rssi	2	Current RSSI in 1/10 dBm as measured by L1. Range: -1200 to 0 (e.g., -440 means -44.0 dBm).
		Int16	srxlev	2	Cell selection Rx level (Srxlev) value. Range: -128 to 128. (This field is only valid when ue_in_idle is TRUE.)
Type	0x15			1	LTE Info – Neighboring GSM
Length	Var			2	
Value	→	boolean	ue_in_idle	1	TRUE if the UE is in Idle mode; otherwise FALSE.
		Uint8	freqs_len	1	Number of sets of the following elements: • cell_resel_priority • thresh_gsm_high • thresh_gsm_low • ncc_permitted • arfcn • band_1900 • cell_id_valid • bsic_id • rssi • srxlev
		uint8	cell_resel_ priority	1	Priority of this frequency group. Range: 0 to 7. (This field is only valid when ue_in_idle is TRUE.)
		uint8	thresh_gsm_ high	1	Reselection threshold for high priority layers. Range: 0 to 31. (This field is only valid when ue_in_idle is TRUE.)
		uint8	thresh_gsm_ low	1	Reselection threshold for low priority layers. Range: 0 to 31. (This field is only valid when ue_in_idle is TRUE.)
		uint8	ncc_permitted	1	Bitmask specifying whether a neighbor with a specific network color code is to be reported. Range: 0 to 255. Bit n set to 1 means a neighbor with NCC n must be included in the report. This flag is synonymous with a blacklist in other RATs. (This field is only valid when ue_in_idle is TRUE.)

		uint8	cells_len	1	Number of sets of the following elements: • arfcn • band_1900 • cell_id_valid • bsic_id • rssi • srxlev
		uint16	arfcn	2	GSM frequency being reported. Range: 0 to 1023.
		Boolean	band_1900	1	Band indicator for the GSM ARFCN (this field is only valid if arfcn is in the overlapping region). If TRUE and the cell is in the overlapping region, the ARFCN is on the 1900 band. If FALSE, it is on the 1800 band.
		Boolean	cell_id_valid	1	Flag indicating whether the base station identity code ID is valid.
		Uint8	bsic_id	1	Base station identity code ID, including base station color code and network color code. The lower 6 bits can be set to any value.
		Int16	rssi	2	Measured RSSI value in 1/10 dB. Range: -2000 to 0 (e.g., -800 means -80.0 dB).
		Int16	srxlev	2	Cell selection Rx level (Srxlev) value. Range: -128 to 128. (This field is only valid when ue_in_idle is TRUE.)
Type	0x16			1	LTE Info – Neighboring WCDMA
Length	Var			2	
Value	→	boolean	ue_in_idle	1	TRUE if the UE is in Idle mode; otherwise FALSE.
		Uint8	freqs_len	1	Number of sets of the following elements: • uarfcn • cell_resel_priority • thresh_Xhigh • thresh_Xlow • psc • cpich_rscp • cpich_ecno • srxlev
		uint16	uarfcn	2	WCDMA layer frequency. Range: 0 to 16383.
		Uint8	cell_resel_priority	1	Cell reselection priority. Range: 0 to 7. (This field is only valid when ue_in_idle is TRUE.)
		uint16	thresh_Xhigh	2	Reselection low threshold. Range: 0 to 31. (This field is only valid when ue_in_idle is TRUE.)
		uint16	thresh_Xlow	2	Reselection high threshold. Range: 0 to 31. (This field is only valid when ue_in_idle is TRUE.)
		uint8	cells_len	1	Number of sets of the following elements: • psc • cpich_rscp • cpich_ecno • srxlev
		uint16	psc	2	Primary scrambling code. Range: 0 to 511.
		Int16	cpich_rscp	2	Absolute power level (in 1/10 dBm) of the

					common pilot channel as received by the UE. Range: -1200 to -250 (e.g., -250 means -25.0 dBm). Defined in3GPP TS 25.304.
		int16	cpich_ecno	2	CPICH Ec/No; ratio (in 1/10 dB) of the received energy per PN chip for the CPICH to the total received power spectral density at the UE antenna connector. Range: -500 to 0 (e.g., -25 means -2.5 dB). Defined in3GPP TS 25.304.
		int16	srxlev	2	Cell selection Rx level (Srxlev) value. Range: -128 to 128. (This field is only valid when ue_in_idle is TRUE.)
Type	0x17			1	UMTS Cell ID
Length	4			2	
Value	→	uint32	umts_cell_id	4	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
Type	0x18			1	WCDMA Info – LTE Neighbor Cell Info Set
Length	Var			2	
Value	→	enum	wcdma_rrc_state	4	WCDMA RRC states. Values: • 0x00 – NAS_WCDMA_RRC_STATE_ DISCONNECTED – WCDMA RRC state is IDLE defined in3GPP TS 25.331 • 0x01 – NAS_WCDMA_RRC_STATE_CELL_ PCH – WCDMA RRC state is CELL_PCH defined in3GPP TS 25.331 • 0x02 – NAS_WCDMA_RRC_STATE_URA_PCH – WCDMA RRC state is URA_PCH defined in 3GPP TS 25.331 • 0x03 – NAS_WCDMA_RRC_STATE_CELL_ FACH – WCDMA RRC state is CELL_FACH defined in3GPP TS 25.331 • 0x04 – NAS_WCDMA_RRC_STATE_CELL_ DCH – WCDMA RRC state is CELL_DCH defined in3GPP TS 25.331
		uint8	umts_lte_nbr_cell_len	1	Number of sets of the following elements: • earfcn • pci • rsrp • rsrq • srxlev • cell_is_tdd
		uint16	earfcn	2	E-UTRA absolute RF channel number of the detected cell.
		Uint16	pci	2	Physical cell ID of the detected cell. Range is defined in3GPP TS 36.211.
		float	rsrp	4	Current received signal strength indication (in dBm) of the detected cell.

		Float	rsrq	4	Current reference signal received quality (in dB) of the detected cell.
		Int16	srxlev	2	Cell selection Rx level (Srxlev) value of the detected cell in linear scale. (This field is only valid when wcdma_rrc_state is not NAS_WCDMA_RRC_STATE_CELL_FACH or NAS_WCDMA_RRC_STATE_CELL_DCH.)
		boolean	cell_is_tdd	1	TRUE if the cell is TDD; FALSE if the cell is FDD.
Type	0x19			1	CDMA Rx Info
Length	8			2	
Value	→	float	rx0_agc	4	Rx power 0 in dB.
		Float	rx1_agc	4	Rx power 1 in dB.
Type	0x1A			1	HDR Rx Info
Length	8			2	
Value	→	float	rx0_agc	4	Rx power 0 in dB.
		Float	rx1_agc	4	Rx power 1 in dB.
Type	0x1B			1	GSM Cell Info Ext
Length	4			2	
Value	→	uint16	g_ta	2	Range of the UE from the base station in steps.
		Uint16	g_bcch	2	Channel number assigned to the frequency.
Type	0x1C			1	WCDMA Cell Info Ext
Length	10			2	
Value	→	float	w_agc	4	Power in dB.
		Float	w_txagc	4	Tx power in dB.
		Uint16	w_dl_bler	2	Downlink block error rate percentage.
Type	0x1D			1	WCDMA GSM Neighbor Cell Ext
Length	Var			2	
Value	→	uint8	gncell_bcch_len	1	Number of sets of the following elements: • gncell_bcch
		uint16	gncell_bcch	Var	Channel number assigned to the frequency for the neighboring GSM cells.
Type	0x1E			1	LTE Info – Timing Advance
Length	4			2	
Value	→	int32	timing_advance	4	Timing advance of the LTE cell in microseconds. (0xFFFFFFFF indicates timing advance information is not present.)
Type	0x1F			1	WCDMA Info – Active Set
Length	Var			2	
Value	→	uint8	wcdma_aset_inst	1	Number of sets of the following elements: • psc • cell_id • rscp • ecio • uarfcn
		uint16	psc	2	Primary scrambling code.
		Uint32	cell_id	4	Cell ID.
		Int16	rscp	2	Received signal code power; the received power on

					one code measured in dBm on the primary CPICH channel of the active set cell.
		Int16	ecio	2	ECIO; the received energy per chip divided by the power density in the band measured in dBm on the primary CPICH channel of the active set cell.
		Uint16	uarfcn	2	UTRA absolute RF channel number.
Type	0x20			1	WCDMA Info – Active Set Reference Radio Link
Length	15			2	
Value	→	uint32	cell_id	4	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
		Char	plmn	3	MCC/MNC information coded as octet 3, 4, and 5 in 3GPP TS 24.008Section 10.5.1.3.
		uint16	lac	2	Location area code.
		Uint16	uarfcn	2	UTRA absolute RF channel number.
		Uint16	psc	2	Primary scrambling code.
		Uint16	rac	2	Routing area code.
Type	0x21			1	Extended GERAN Info
Length	Var			2	
Value	→	uint32	cell_id	4	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
		Char	plmn	3	MCC/MNC information coded as octet 3, 4, and 5 in 3GPP TS 24.008Section 10.5.1.3. (This field is ignored when cell_id is not present.)
		uint16	lac	2	Location area code. (This field is ignored when cell_id is not present.)
		uint16	arfcn	2	Absolute RF channel number.
		Uint8	bsic	1	Base station identity code.
		Uint32	timing_advance	4	Measured delay (in bit periods; 1 bit period = 48/13 microsecond) of an access burst transmission on the RACH or PRACH to the expected signal from an MS at zero distance under static channel conditions. (0xFFFFFFFF indicates timing advance information is not present.)
		uint16	rx_lev	2	Serving cell Rx measurement. Values range between 0 and 63, which is mapped to a measured signal level: • Rxlev 0 is a signal strength less than -110 dBm • Rxlev 1 is -110 dBm to -109 dBm • Rxlev 2 is -109 dBm to -108 dBm • ... • Rxlev 62 is -49 dBm to -48 dBm • Rxlev 63 is greater than -48 dBm
		uint8	nmr_inst	1	Number of sets of the following elements: • nmr_cell_id • nmr_plmn • nmr_lac

					• nmr_arfcn • nmr_bsic • nmr_rx_lev • nmr_c1 • nmr_c2 • nmr_c31 • nmr_c32
		uint32	nmr_cell_id	4	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
		Char	nmr_plmn	3	MCC/MNC information coded as octet 3, 4, and 5 in 3GPP TS 24.008Section 10.5.1.3. (This field is ignored when nmr_cell_id is not present.)
		uint16	nmr_lac	2	Location area code. (This field is ignored when nmr_cell_i is not present.)
		uint16	nmr_arfcn	2	Absolute RF channel number.
		Uint8	nmr_bsic	1	Base station identity code.
		Uint16	nmr_rx_lev	2	Cell Rx measurement. Values range between 0 and 63, which is mapped to a measured signal level: • Rxlev 0 is a signal strength less than -110 dBm • Rxlev 1 is -110 dBm to -109 dBm • Rxlev 2 is -109 dBm to -108 dBm • ... • Rxlev 62 is -49 dBm to -48 dBm • Rxlev 63 is greater than -48 dBm
		int32	nmr_c1	4	C1 as defined in3GPP TS 45.008Section 6.4. Default: 0.
		Int32	nmr_c2	4	C2 as defined in3GPP TS 45.008Section 6.4. Default: 0.
		Int32	nmr_c31	4	C31 as defined in3GPP TS 45.008Section 10.1.2. Default: 0.
		Int32	nmr_c32	4	C32 as defined in3GPP TS 45.008Section 10.1.2. Default: 0.
Type	0x22			1	UMTS Extended Info
Length	Var			2	
Value	→	uint16	cell_id	2	Cell ID (0xFFFFFFFF indicates cell ID information is not present).
		Char	plmn	3	MCC/MNC information coded as octet 3, 4, and 5 in 3GPP TS 24.008Section 10.5.1.3.
		uint16	lac	2	Location area code.
		Uint16	uarfcn	2	UTRA absolute RF channel number.
		Uint16	psc	2	Primary scrambling code.
		Int16	rscp	2	Received signal code power; the received power on one code measured in dBm on the primary CPICH channel of the serving cell.
		Int16	ecio	2	ECIO; the received energy per chip divided by the power density in the band measured in dBm on the primary CPICH channel of the

					serving cell.
		Int16	squal	2	Squal; cell selection quality value in dB.
		Int16	srxlev	2	Srxlev; cell selection Rx level value in dB.
		Uint8	umts_inst	1	Number of sets of the following elements: • umts_uarfcn • umts_psc • umts_rscp • umts_ecio • umts_squal • umts_srxlev • umts_rank • umts_set
		uint16	umts_uarfcn	2	UTRA absolute RF channel number.
		Uint16	umts_psc	2	Primary scrambling code.
		Int16	umts_rscp	2	Received signal code power; the received power on one code measured in dBm on the primary CPICH channel of the neighbor/monitored cell.
		Int16	umts_ecio	2	ECIO; the received energy per chip divided by the power density in the band measured in dBm on the primary CPICH channel of the neighbor/monitored cell.
		Int16	umts_squal	2	Squal; cell selection quality value in dB.
		Int16	umts_srxlev	2	Srxlev; cell selection Rx level value in dB.
		Int16	umts_rank	2	Rank of the cell.
		Uint8	umts_set	1	Set of the cell.
		Uint8	geran_inst	1	Number of sets of the following elements: • geran_arfcn • geran_bsic_ncc • geran_bsic_bcc • geran_rssi • geran_rank
		uint16	geran_arfcn	2	Absolute RF channel number.
		Uint8	geran_bsic_ncc	1	Base station identity code network color code (0xFF indicates information is not present).
		Uint8	geran_bsic_bcc	1	Base station identity code base station color code (0xFF indicates information is not present).
		Int16	geran_rssi	2	Received signal strength indicator.
		Int16	geran_rank	2	Rank of the cell.
Type	0x23			1	Extended WCDMA Info – Active Set
Length	Var			2	
Value	→	uint8	wcdma_active_set_cells_len	1	Number of sets of the following elements: • psc • cell_id • rscp • ecio • uarfcn • sf • phy_chan_type • slot_format • is_compressed_mode_on
		uint16	psc	2	Primary scrambling code.

		Uint32	cell_id	4	Cell ID.
		Int16	rscp	2	Received signal code power; the received power on one code measured in dBm on the primary CPICH channel of the active set cell.
		Int16	ecio	2	ECIO; the received energy per chip divided by the power density in the band measured in dBm on the primary CPICH channel of the active set cell.
		Uint16	uarfcn	2	UTRA absolute RF channel number.
		Enum	sf	4	Spreading factor of the channel. Values: • 0x00 – NAS_WCDMA_L1_SF_4 • 0x01 – NAS_WCDMA_L1_SF_8 • 0x02 – NAS_WCDMA_L1_SF_16 • 0x03 – NAS_WCDMA_L1_SF_32 • 0x04 – NAS_WCDMA_L1_SF_64 • 0x05 – NAS_WCDMA_L1_SF_128 • 0x06 – NAS_WCDMA_L1_SF_256 • 0x07 – NAS_WCDMA_L1_SF_512 • 0x08 – NAS_WCDMA_L1_NUM_SF
		enum	phy_chan_type	4	Physical channel type. Values: • 0x00 – NAS_WCDMA_L1_DL_PHYCHAN_ PCCPCH_S • 0x01 – NAS_WCDMA_L1_DL_PHYCHAN_ PCCPCH_N • 0x02 – NAS_WCDMA_L1_DL_PHYCHAN_ SCCPCH0 • 0x03 – NAS_WCDMA_L1_DL_PHYCHAN_ SCCPCH1 • 0x04 – NAS_WCDMA_L1_DL_PHYCHAN_ PICH • 0x05 – NAS_WCDMA_L1_DL_PHYCHAN_ AICH • 0x06 – NAS_WCDMA_L1_DL_PHYCHAN_ HS_RACH_AICH • 0x07 – NAS_WCDMA_L1_DL_PHYCHAN_ DPCH • 0x08 – NAS_WCDMA_L1_DL_PHYCHAN_ HS_RACH_FDPCH • 0x09 – NAS_WCDMA_L1_DL_PHYCHAN_ FDPCH • 0x0A – NAS_WCDMA_L1_DL_PHYCHAN_ PDSCH • 0x0B – NAS_WCDMA_L1_NUM_DL_ PHYCHAN • 0x0C – NAS_WCDMA_L1_DL_PHYCHAN_

					NOCHAN
		uint8	slot_format	1	Indicates slot format. Values range between 0 and 6 per3GPP TS 25.211.
		boolean	is_compressed_ mode_on	1	Indicates whether the compressed mode is ON or OFF.
Type	0x24			1	Scell GERAN Config
Length	3			2	
Value	→	uint8	pbcch_present	1	Presence of PBCCH in the cell: • 0 – No • 1 – Yes • 0xff – Invalid
		uint8	gprs_rxlev_access_min	1	Rx level access minimum. Range: 0 to 63; 0xff is invalid;3GPP TS 45.008.
		uint8	gprs_ms_txpwr_max_ cch	1	MS Tx power maximum CCH. Range: 0 to 31; 0xff is invalid;3GPP TS 45.008and3GPP TS 45.005.
Type	0x25			1	Current L1 Timeslot
Length	1			2	
Value	→	uint8	current_l1_ts	1	Timeslot number. Range: 0 to 7.
Type	0x26			1	Doppler Measurement
Length	2			2	
Value	→	uint16	doppler_measurement	2	Doppler measurement in Hz. Range: 0 to 400. Value 0xFFFF indicates that the measurement is yet to be done.
Type	0x27			1	LTE Info Extended – Intrafrequency EARFCN
Length	4			2	
Value	→	uint32	lte_intra_earfcn	4	LTE intrafrequency EARFCN extended size.
Type	0x28			1	LTE Info Extended – Interfrequency EARFCN
Length	Var			2	
Value	→	uint8	lte_inter_earfcn_len	1	Number of sets of the following elements: • lte_inter_earfcn
		uint32	lte_inter_earfcn	Var	LTE interfrequency EARFCN extended size.
Type	0x29			1	WCDMA Info Extended – LTE Neighbor Cell Info EARFCN
Length	Var			2	
Value	→	uint8	lte_earfcn_len	1	Number of sets of the following elements: • lte_earfcn
		uint32	lte_earfcn	Var	LTE neighbor cell information EARFCN.
Type	0x2A			1	NAS Info – EMM State
Length	4			2	
Value	→	enum	emm_state	4	NAS Extended Mobility Management (EMM) state. Values: • NAS_EMM_NULL (0) – Null • NAS_EMM_DEREGISTERED (1) – Deregistered • NAS_EMM_REGISTERED_INITIATED (2) – Registered, initiated • NAS_EMM_REGISTERED (3) –

					Registered • NAS_EMM_TRACKING_AREA_ UPDATING_INITIATED (4) – Tracking area update initiated • NAS_EMM_SERVICE_REQUEST_ INITIATED (5) – Service request initiated • NAS_EMM_DEREGISTERED_ INITIATED (6) – Deregistered, initiated
Type	0x2B			1	NAS Info – EMM Substate (Unused/Ignored)
Length	4			2	
Value	→	enum	emm_substate	4	NAS EMM substate. Values: • NAS_EMM_DEREGISTERED_ NO_IMSI (0) – Deregistered, no IMSI • NAS_EMM_DEREGISTERED_ PLMN_SEARCH (1) – Deregistered, PLMN search • NAS_EMM_DEREGISTERED_ ATTACH_NEEDED (2) – Deregistered, attach needed • NAS_EMM_DEREGISTERED_ NO_CELL_AVAILABLE (3) – Deregistered, no cell is available • NAS_EMM_DEREGISTERED_ ATTEMPTING_TO_ATTACH (4) – Deregistered, attempting to attach • NAS_EMM_DEREGISTERED_ NORMAL_SERVICE (5) – Deregistered, normal service • NAS_EMM_DEREGISTERED_ LIMITED_SERVICE (6) – Deregistered, limited service • NAS_EMM_REGISTERED_NORMAL_ SERVICE (7) – Registered, normal service • NAS_EMM_REGISTERED_UPDATE_ NEEDED (8) – Registered, update needed • NAS_EMM_REGISTERED_ATTEMPTING _ TO_UPDATE (9) – Registered, attempting to update • NAS_EMM_REGISTERED_NO_ CELL_AVAILABLE (10) – Registered, no cell is available • NAS_EMM_REGISTERED_PLMN_ SEARCH (11) – Registered, PLMN search • NAS_EMM_REGISTERED_LIMITED_ SERVICE (12) – Registered, limited service • NAS_EMM_REGISTERED_ATTEMPTING _ TO_UPDATE_MM (13) – Registered, licit r to update MM • NAS_EMM_REGISTERED_IMSI_

					DETACH_INITIATED (14) – Registered, IMSI detach initiated • NAS_EMM_INTERNAL_SUBSTATE (15) – Internal substate
Type	0x2C			1	NAS Info – RRC State
Length	4			2	
Value	→	enum	emm_connection_ state	4	NAS RRC state. Values: • NAS_RRC_IDLE (0) – Status: Idle • NAS_RRC_CONNECTED (1) – Status: Connected

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_NETWORK_FOUND	UE is in a no service area or cell location information is not available

7.2.13.3. Description of QMI_NAS_GET_CELL_LOCATION_INFO REQ/RESP

This command retrieves cell location-related information. Depending on current serving system, TLV 0x10 or TLV 0x11 or TLV 0x12 is included in the response message. If the UE is registered in the LTE network, TLVs 0x13, 0x14, 0x15, and 0x16 are returned.

If TLV 0x11 (UMTS Info) is returned for the UMTS system, the following TLVs are also included:

- TLV 0x17 (UMTS Cell ID) – Returns a full cell ID
- TLV 0x1C (WCDMA Cell Info Ext) – Returns additional information for the WCDMA system
- TLV 0x1D (WCDMA GSM Neighbor Cell Ext) – Returns additional information for GSM neighbor cells, with the indices matching the information from TLV 0x11

If TLV 0x10 (GERAN Info) is returned for the GSM system, TLV 0x1B (GSM Cell Info Ext) is also included to return additional information.

7.2.14. QMI_NAS_GET_PLMN_NAME

Queries the operator name for a specified network.

NAS message ID

0x0044

Version introduced

Major – 1, Minor – 6

7.2.14.1. Request – QMI_NAS_GET_PLMN_NAME_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
PLMN	Unknown	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	PLMN
Length	4			2	
Value	→	uint16	mcc	2	A 16-bit integer representation of MCC. Range: 0 to 999.
		Uint16	mnc	2	A 16-bit integer representation of MNC. Range: 0 to 999.

Optional TLVs

Name	Version introduced	Version last modified
Suppress SIM Error	1.27	1.27
MNC PCS Digit Include Status	1.28	1.28
Always Send PLMN Name	1.29	1.29
Use Static Table Only	1.31	1.31
CSG ID	1.41	1.41
Radio Access Technology	1.49	1.59
Send All Information	1.57	1.57

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Suppress SIM Error
Length	1			2	
Value	→	boolean	suppress_sim_error	1	Suppress the QMI_NAS_SIM_NOT_INITIALIZED

					error, so to allow network name retrieval even when the SIM is not initialized. Values: • FALSE – SIM initialization is checked; an error is returned if the SIM is not available (default value) • TRUE – SIM initialization is not checked; if the SIM is not available, retrieving the name from the SIM files is skipped
Type	0x11			1	MNC PCS Digit Include Status
Length	1			2	
Value	→	boolean	mnc_includes_pcs_digit	1	This field is used to interpret the length of the corresponding MNC reported in the PLMN TLV (0x01). Values: • TRUE – MNC is a three-digit value; e.g., a reported value of 90 corresponds to an MNC value of 090 • FALSE – MNC is a two-digit value; e.g., a reported value of 90 corresponds to an MNC value of 90 If this TLV is not present, an MNC smaller than 100 is assumed to be a two-digit value, and an MNC greater than or equal to 100 is assumed to be a three-digit value.
Type	0x12			1	Always Send PLMN Name
Length	1			2	
Value	→	boolean	always_send_plmn_name	1	Indicates that the client wants to receive the PLMN name regardless of the EF display condition. Values: • FALSE – EF SPN PLMN display condition is looked at before attempting to retrieve the name • TRUE – PLMN name is returned regardless of the EF SPN PLMN display condition.
Type	0x13			1	Use Static Table Only
Length	1			2	
Value	→	boolean	use_static_table_only	1	Indicates that the client wants to receive the network name only from the SE.13 GSM Mobile Network Codes and Names Static Table. Values: • FALSE – Normal procedure is followed when determining the network name (default value) • TRUE – SIM initialization state and the EF SPN PLMN display condition are ignored; the network name is read directly from the table
Type	0x14			1	CSG ID
Length	4			2	
Value	→	uint32	csg_id	4	Closed subscriber group identifier.
Type	0x15			1	Radio Access Technology
Length	1			2	
Value	→	enum8	rat	1	Radio access technology. Values:

					• 0x04 – NAS_RADIO_IF_GSM – GSM • 0x05 – NAS_RADIO_IF_UMTS – UMTS • 0x08 – NAS_RADIO_IF_LTE – LTE • 0x09 – NAS_RADIO_IF_TDSCDMA – TD-SCDMA
Type	0x16			1	Send All Information
Length	1			2	
Value	→	boolean	send_all_information	1	Indicates that the client wants to receive all available information, including display byte information, without the modem influencing the name sent. Values: • FALSE – Follow the normal procedure (default value) • TRUE – Send all available information

7.2.14.2. Response – QMI_NAS_GET_PLMN_NAME_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
At least one of the following optional TLVs must be included in this request.	1.6	1.6
Display Bit Information	1.57	1.57
Network Information	1.57	1.57
3GPP EONS PLMN Name with Language ID	1.89	1.89
Additional Information	1.95	1.95
Network Name Source	1.106	1.106
Service Provider Name Ext	1.118	1.118

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	3GPP EONS PLMN Name
Length	Var			2	
Value	→	enum8	spn_enc	1	Coding scheme for the service provider name. Values: • 0x00 – NAS_CODING_SCHEME_ CELL_BROADCAST_GSM – SMS default 7-bit coded alphabet as defined in3GPP TS 23.038with bit 8 set to 0 • 0x01 – NAS_CODING_SCHEME_ UCS2 – UCS2 (16 bit, little-endian)3GPP TS 23.038 Note: This value is ignored if spn_len is zero.

		Uint8	spn_len	1	Number of sets of the following elements: • spn
		char	spn	Var	Service provider name string.
		Enum8	plmn_short_name_enc	1	Coding scheme for plmn_short_name. Values: • 0x00 – NAS_CODING_SCHEME_ CELL_BROADCAST_GSM – SMS default 7-bit coded alphabet as defined in3GPP TS 23.038with bit 8 set to 0 • 0x01 – NAS_CODING_SCHEME_ UCS2 – UCS2 (16 bit, little-endian)3GPP TS 23.038 Note: This value is ignored if plmn_short_name_len is zero.
		Enum8	plmn_short_name_ci	1	Indicates whether the country initials are to be added to the plmn_short_name. Values: • 0x00 – Do not add the letters for the country's initials to the name • 0x01 – Add the country's initials and a text string to the name • 0xFF – Not specified Note: This value is ignored if plmn_short_name_len is zero.
		Enum8	plmn_short_spare_bits	1	Values: • 0x01 – Bit 8 is spare and set to 0 in octet n • 0x02 – Bits 7 and 8 are spare and set to 0 in octet n • 0x03 – Bits 6 to 8 (inclusive) are spare and set to 0 in octet n • 0x04 – Bits 5 to 8 (inclusive) are spare and set to 0 in octet n • 0x05 – Bits 4 to 8 (inclusive) are spare and set to 0 in octet n • 0x06 – Bits 3 to 8 (inclusive) are spare and set to 0 in octet n • 0x07 – Bits 2 to 8 (inclusive) are spare and set to 0 in octet n • 0x00 – Carries no information about the number of spare bits in octet n Note: This value is ignored if plmn_short_name_len is zero.
		Uint8	plmn_short_name_len	1	Number of sets of the following elements: • plmn_short_name
		char	plmn_short_name	Var	PLMN short name. If no short name is available for the specified PLMN ID, MCC and MNC values are included in ASCII format with the MCC followed by the MNC within double quotes. For example, for an MCC of 123 and an MNC of 678, the ASCII string "123678" is returned when the short name is not available.
		Enum8	plmn_long_name_enc	1	Coding scheme for plmn_long_name. Values: • 0x00 – NAS_CODING_SCHEME_ CELL_BROADCAST_GSM – SMS default 7-bit coded alphabet as defined in3GPP TS

					23.038with bit 8 set to 0 • 0x01 – NAS_CODING_SCHEME_ UCS2 – UCS2 (16 bit, little-endian)3GPP TS 23.038 Note: This value is ignored if plmn_long_name_len is zero.
		Enum8	plmn_long_name_ci	1	Indicates whether the country initials are to be added to the plmn_long_name. Values: • 0x00 – Do not add the letters for the country's initials to the name • 0x01 – Add the country's initials and a text string to the name • 0xFF – Not specified Note: This value is ignored if plmn_long_name_len is zero.
		Enum8	plmn_long_spare_bits	1	Values: • 0x01 – Bit 8 is spare and set to 0 in octet n • 0x02 – Bits 7 and 8 are spare and set to 0 in octet n • 0x03 – Bits 6 to 8 (inclusive) are spare and set to 0 in octet n • 0x04 – Bits 5 to 8 (inclusive) are spare and set to 0 in octet n • 0x05 – Bits 4 to 8 (inclusive) are spare and set to 0 in octet n • 0x06 – Bits 3 to 8 (inclusive) are spare and set to 0 in octet n • 0x07 – Bits 2 to 8 (inclusive) are spare and set to 0 in octet n • 0x00 – Carries no information about the number of spare bits in octet n Note: This value is ignored if plmn_long_name_len is zero.
		Uint8	plmn_long_name_len	1	Number of sets of the following elements: • plmn_long_name
		char	plmn_long_name	Var	PLMN long name. If no long name is available for the specified PLMN ID, MCC and MNC values are included in ASCII format with the MCC followed by the MNC within double quotes. For example, for an MCC of 123 and an MNC of 678, the ASCII string "123678" is returned when the long name is not available.
Type	0x11			1	Display Bit Information
Length	8			2	
Value	→	enum	is_spn_set	4	Whether the SPN display bit is set. Values: • NAS_TRI_FALSE (0) – Status: FALSE • NAS_TRI_TRUE (1) – Status: TRUE • NAS_TRI_UNKNOWN (2) – Status: Unknown
		enum	is_plmn_set	4	Whether the PLMN display bit is set. Values: • NAS_TRI_FALSE (0) – Status: FALSE • NAS_TRI_TRUE (1) – Status: TRUE • NAS_TRI_UNKNOWN (2) – Status:

					Unknown
Type	0x12			1	Network Information
Length	4			2	
Value	→	enum	is_home_network	4	Whether the network is the home network. Values: • NAS_TRI_FALSE (0) – Status: FALSE • NAS_TRI_TRUE (1) – Status: TRUE • NAS_TRI_UNKNOWN (2) – Status: Unknown
Type	0x13			1	3GPP EONS PLMN Name with Language ID
Length	Var			2	
Value	→	uint8	lang_plmn_names_len	1	Number of sets of the following elements: • plmn_long_name_len • plmn_long_name • plmn_short_name_len • plmn_short_name • lang_id
		uint8	plmn_long_name_len	1	Number of sets of the following elements: • plmn_long_name
		uint16	plmn_long_name	Var	PLMN long name, in UCS2 (16 bit, little-endian) encoded format.
		Uint8	plmn_short_name_len	1	Number of sets of the following elements: • plmn_short_name
		uint16	plmn_short_name	Var	PLMN short name, in UCS2 (16 bit, little-endian) encoded format.
		Enum	lang_id	4	Language ID for the PLMN long and short names. Values: • NAS_LANG_ID_UNKNOWN (0x00) – Unknown language ID • NAS_LANG_ID_ZH_TRAD (0x01) – Traditional Chinese • NAS_LANG_ID_ZH_SIMP (0x02) – Simplified Chinese
Type	0x14			1	Additional Information
Length	Var			2	
Value	→	uint8	addl_info_len	1	Number of sets of the following elements: • addl_info
		uint16	addl_info	Var	Additional information provided for the PLMN, in UCS2 (16 bit little-endian) encoded format.
Type	0x15			1	Network Name Source
Length	4			2	
Value	→	enum	nw_name_source	4	Network name source. Values: • NAS_NW_NAME_SOURCE_UNKNOWN (0x00) – Unknown • NAS_NW_NAME_SOURCE_OPL_PNN (0x01) – Operator PLMN list and PLMN network name • NAS_NW_NAME_SOURCE_CPHS_ONS (0x02) – Common PCN handset specification and operator name string • NAS_NW_NAME_SOURCE_NITZ (0x03)

					– Network identity and time zone • NAS_NW_NAME_SOURCE_SE13 (0x04) – GSMA SE13 table • NAS_NW_NAME_SOURCE_MCC_MNC (0x05) – Mobile country code and mobile network code • NAS_NW_NAME_SOURCE_SPN (0x06) – Service provider name
Type	0x16			1	Service Provider Name Ext
Length	Var			2	
Value	→	string16	spn_ext	Var	Service provider name.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
At least one of the following optional TLVs must be included in this request.	Value field of one or more TLVs in the request message contains an invalid value
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_UIM_NOT_INITIALIZED	UIM is not initialized
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device

7.2.14.3. Description of QMI_NAS_GET_PLMN_NAME REQ/RESP

This command queries available operator name data for a specified network. The operator name is derived according to 3GPP TS 22.101.

7.2.15. QMI_NAS_GET_SYS_INFO

Provides the system information.

NAS message ID

0x004D

Version introduced

Major – 1, Minor – 8

7.2.15.1. Request – QMI_NAS_GET_SYS_INFO_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.15.2. Response – QMI_NAS_GET_SYS_INFO_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
CDMA Service Status Info	Unknown	1.8
HDR Service Status Info	Unknown	1.8
GSM Service Status Info	Unknown	1.8
WCDMA Service Status Info	Unknown	1.8
LTE Service Status Info	Unknown	1.8
CDMA System Info	Unknown	1.13
HDR System Info	Unknown	1.8
GSM System Info	Unknown	1.13
WCDMA System Info	Unknown	1.23
LTE System Info	Unknown	1.13
Additional CDMA System Info	Unknown	1.9

Additional HDR System Info	Unknown	1.9
Additional GSM System Info	Unknown	1.9
Additional WCDMA System Info	Unknown	1.9
Additional LTE System Info	Unknown	1.9
GSM Call Barring System Info	Unknown	1.9
WCDMA Call Barring System Info	Unknown	1.9
At least one of the following optional TLVs must be included in this request.	Unknown	1.11
GSM Cipher Domain Sys Info	Unknown	1.11
WCDMA Cipher Domain Sys Info	Unknown	1.11
TDSCDMA Service Status Info	Unknown	1.16
TDSCDMA System Info	Unknown	1.23
LTE eMBMS Coverage Info (Deprecated; use LTE eMBMS Coverage Info Extended)	Unknown	1.114 (Deprecated)
SIM Reject Information	Unknown	1.19
WCDMA EUTRA Status Information	Unknown	1.22
IMS Voice Support Status on LTE	1.25	1.25
LTE Voice Domain	1.27	1.27
CDMA Reg Zone ID	1.30	1.30
GSM RAC	1.30	1.30
WCDMA RAC	1.30	1.30
CDMA Resolved Mobile Country Code	1.33	1.33
Network Selection Registration Restriction	1.34	1.34
TDSCDMA Registration Domain	1.34	1.34
LTE Registration Domain	1.34	1.34
WCDMA Registration Domain	1.34	1.34
GSM Registration Domain	1.34	1.34
LTE eMBMS Coverage Info Trace ID	1.38	1.38
WCDMA CSG Information	1.41	1.41
HDR Voice Domain	1.52	1.52
HDR SMS Domain	1.52	1.52
LTE SMS Domain	1.52	1.52
LTE Emergency Bearer Support	1.56	1.71
GSM Voice Domain	1.68	1.68
GSM SMS Domain	1.68	1.68
WCDMA Voice Domain	1.68	1.68
WCDMA SMS Domain	1.68	1.68
LTE Emergency Access Barred	1.71	1.71
CDMA Voice Domain	1.74	1.74
CDMA SMS Domain	1.74	1.74
TDSCDMA Voice Domain	1.74	1.74
TDSCDMA SMS Domain	1.74	1.74
LTE CSG Information	1.75	1.75
LTE Cell Access Status Info	1.77	1.77
HDR Subnet Mask Length	1.84	1.84
LTE eMBMS Coverage Info Extended	1.114	1.114

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	CDMA Service Status Info
Length	2			2	
Value	→	enum8	srv_status	1	Service status of the system. Values:

					• 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		boolean	is_pref_data_path	1	Whether the RAT is the preferred data path: • 0x00 – Not preferred • 0x01 – Preferred
Type	0x11			1	HDR Service Status Info
Length	2			2	
Value	→	enum8	srv_status	1	Service status of the system. Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		boolean	is_pref_data_path	1	Whether the RAT is the preferred data path: • 0x00 – Not preferred • 0x01 – Preferred
Type	0x12			1	GSM Service Status Info
Length	3			2	
Value	→	enum8	srv_status	1	Service status of the system. Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		enum8	true_srv_status	1	True service status of the system (not applicable to CDMA/HDR). Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		boolean	is_pref_data_path	1	Whether the RAT is the preferred data path: • 0x00 – Not preferred • 0x01 – Preferred

Type	0x13			1	WCDMA Service Status Info
Length	3			2	
Value	→	enum8	srv_status	1	Service status of the system. Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		enum8	true_srv_status	1	True service status of the system (not applicable to CDMA/HDR). Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		boolean	is_pref_data_path	1	Whether the RAT is the preferred data path: • 0x00 – Not preferred • 0x01 – Preferred
Type	0x14			1	LTE Service Status Info
Length	3			2	
Value	→	enum8	srv_status	1	Service status of the system. Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		enum8	true_srv_status	1	True service status of the system (not applicable to CDMA/HDR). Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		boolean	is_pref_data_path	1	Whether the RAT is the preferred data path: • 0x00 – Not preferred • 0x01 – Preferred

Type	0x15			1	CDMA System Info
Length	42			2	
Value	→	boolean	srv_domain_valid	1	Indicates whether the service domain is valid.
		Enum8	srv_domain	1	Service domain registered on the system. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	srv_capability_ valid	1	Indicates whether the service capability is valid.
		Enum8	srv_capability	1	Current system's service capability. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	roam_status_valid	1	Indicates whether the roaming status is valid.
		Uenum 8	roam_status	1	Current roaming status. Values: • 0x00 – SYS_ROAM_STATUS_OFF – Off • 0x01 – SYS_ROAM_STATUS_ON – On • 0x02 – SYS_ROAM_STATUS_BLINK – Blinking • 0x03 – SYS_ROAM_STATUS_OUT_OF_ NEIGHBORHOOD – Out of the neighborhood • 0x04 – SYS_ROAM_STATUS_OUT_OF_BLDG – Out of the building • 0x05 – SYS_ROAM_STATUS_PREF_SYS – Preferred system • 0x06 – SYS_ROAM_STATUS_AVAIL_SYS – Available system • 0x07 – SYS_ROAM_STATUS_ALLIANCE_ PARTNER – Alliance partner • 0x08 – SYS_ROAM_STATUS_PREMIUM_ PARTNER – Premium partner • 0x09 – SYS_ROAM_STATUS_FULL_SVC – Full service • 0x0A – SYS_ROAM_STATUS_PARTIAL_SVC – Partial service • 0x0B – SYS_ROAM_STATUS_BANNER_ON – Banner is on • 0x0C –

					SYS_ROAM_STATUS_BANNER_OFF – Banner is off Remainder of the values are per3GPP2 C.R1001-F. Values from 0x02 onward are only applicable for 3GPP2.
		Boolean	is_sys_forbidden_ valid	1	Indicates whether the forbidden system is valid.
		Boolean	is_sys_forbidden	1	Whether the system is forbidden: • 0x00 – Not forbidden • 0x01 – Forbidden
		boolean	is_sys_prl_match_valid	1	Indicates whether the system PRL match is valid.
		Boolean	is_sys_prl_match	1	Indicates whether the system is in a PRL (only applies to CDMA/HDR). Values: • 0x00 – System is not in a PRL • 0x01 – System is in a PRL If the system is not in a PRL, roam_status carries the value from the default roaming indicator in the PRL. If the system is in a PRL, roam_status is set to the value based on the standard specification.
		Boolean	p_rev_in_use_valid	1	Indicates whether the P_Rev in use is valid.
		Uint8	p_rev_in_use	1	The lesser of the base station P_Rev and mobile P_Rev (only applicable for CDMA).
		Boolean	bs_p_rev_valid	1	Indicates whether the base station P_Rev is valid.
		Uint8	bs_p_rev	1	Base station P_Rev (only applicable for CDMA).
		Boolean	ccs_ supported_ valid	1	Indicates whether the supported concurrent service is valid.
		Boolean	ccs_supported	1	Whether concurrent service is supported (only applicable for CDMA): • 0x00 – Not supported • 0x01 – Supported
		boolean	cdma_sys_id_valid	1	Indicates whether the CDMA system ID is valid.
		Uint16	sid	2	System ID.
		Uint16	nid	2	Network ID.
		Boolean	bs_info_valid	1	Indicates whether the base station information is valid.
		Uint16	base_id	2	Base station identification number.
		Int32	base_lat	4	Base station latitude in units of 0.25 sec, expressed as a two's complement signed number with positive numbers signifying North latitudes.
		Int32	base_long	4	Base station longitude in units of 0.25 sec, expressed as a two's complement signed number with positive numbers signifying East longitude.
		Boolean	packet_zone_valid	1	Indicates whether the packet zone is valid.
		Uint16	packet_zone	2	Packet zone (8-bit). 0xFFFF indicates no packet zone. (Only applicable for CDMA.)
		boolean	network_id_valid	1	Indicates whether the network ID is valid.
		Char	mcc	3	MCC digits in ASCII characters. For CDMA, the MCC wildcard value is returned as {'3', 0xFF, 0xFF}.

		Char	mnc	3	MNC digits in ASCII characters. For this field: • Unused byte is set to 0xFF • In the case of two-digit MNC values, the third (unused) digit is set to 0xFF. For example, 15 (a two-digit MNC) is reported using the byte stream 0x35 0x31 0xFF. For CDMA, the MNC wildcard value is returned as {'7', 0xFF, 0xFF}.
Type	0x16			1	HDR System Info
Length	31			2	
Value	→	boolean	srv_domain_valid	1	Indicates whether the service domain is valid.
		Enum8	srv_domain	1	Service domain registered on the system. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	srv_capability_ valid	1	Indicates whether the service capability is valid.
		Enum8	srv_capability	1	Current system's service capability. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	roam_status_valid	1	Indicates whether the roaming status is valid.
		Uenum 8	roam_status	1	Current roaming status. Values: • 0x00 – SYS_ROAM_STATUS_OFF – Off • 0x01 – SYS_ROAM_STATUS_ON – On • 0x02 – SYS_ROAM_STATUS_BLINK – Blinking • 0x03 – SYS_ROAM_STATUS_OUT_OF_ NEIGHBORHOOD – Out of the neighborhood • 0x04 – SYS_ROAM_STATUS_OUT_OF_BLDG – Out of the building • 0x05 – SYS_ROAM_STATUS_PREF_SYS – Preferred system • 0x06 – SYS_ROAM_STATUS_AVAIL_SYS – Available system • 0x07 – SYS_ROAM_STATUS_ALLIANCE_ PARTNER – Alliance partner • 0x08 – SYS_ROAM_STATUS_PREMIUM_ PARTNER – Premium partner

					• 0x09 – SYS_ROAM_STATUS_FULL_SVC – Full service • 0x0A – SYS_ROAM_STATUS_PARTIAL_SVC – Partial service • 0x0B – SYS_ROAM_STATUS_BANNER_ON – Banner is on • 0x0C – SYS_ROAM_STATUS_BANNER_OFF – Banner is off Remainder of the values are per3GPP2 C.R1001-F. Values from 0x02 onward are only applicable for 3GPP2.
		Boolean	is_sys_forbidden_ valid	1	Indicates whether the forbidden system is valid.
		Boolean	is_sys_forbidden	1	Whether the system is forbidden: • 0x00 – Not forbidden • 0x01 – Forbidden
		boolean	is_sys_prl_match_valid	1	Indicates whether the system PRL match is valid.
		Boolean	is_sys_prl_match	1	Indicates whether the system is in a PRL (only applies to CDMA/HDR). Values: • 0x00 – System is not in a PRL • 0x01 – System is in a PRL If the system is not in a PRL, roam_status carries the value from the default roaming indicator in the PRL. If the system is in a PRL, roam_status is set to the value based on the standard specification.
		Boolean	hdr_personality_ valid	1	Indicates whether the HDR personality is valid.
		Enum8	hdr_personality	1	HDR personality information (only applicable for HDR). Values: • 0x00 – SYS_PERSONALITY_NONE – None • 0x02 – SYS_PERSONALITY_HRPD – HRPD • 0x03 – SYS_PERSONALITY_EHRPD – eHRPD
		boolean	hdr_active_prot_valid	1	Indicates whether the HDR active protocol revision information is valid.
		Enum8	hdr_active_prot	1	HDR active protocol revision information (only applicable for HDR). Values: • 0x00 – SYS_ACTIVE_PROT_NONE – None • 0x02 – SYS_ACTIVE_PROT_HDR_REL0 – HDR Rel 0 • 0x03 – SYS_ACTIVE_PROT_HDR_RELA – HDR Rel A • 0x04 – SYS_ACTIVE_PROT_HDR_RELB – HDR Rel B
		boolean	is856_sys_id_valid	1	Indicates whether the IS-856 system ID is valid.
		Uint8	is856_sys_id	16	IS-856 system ID (only applicable for HDR).
Type	0x17			1	GSM System Info
Length	30			2	
Value	→	boolean	srv_domain_valid	1	Indicates whether the service domain is valid.

		Enum8	srv_domain	1	Service domain registered on the system. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	srv_capability_ valid	1	Indicates whether the service capability is valid.
		Enum8	srv_capability	1	Current system's service capability. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	roam_status_valid	1	Indicates whether the roaming status is valid.
		Uenum 8	roam_status	1	Current roaming status. Values: • 0x00 – SYS_ROAM_STATUS_OFF – Off • 0x01 – SYS_ROAM_STATUS_ON – On • 0x02 – SYS_ROAM_STATUS_BLINK – Blinking • 0x03 – SYS_ROAM_STATUS_OUT_OF_ NEIGHBORHOOD – Out of the neighborhood • 0x04 – SYS_ROAM_STATUS_OUT_OF_BLDG – Out of the building • 0x05 – SYS_ROAM_STATUS_PREF_SYS – Preferred system • 0x06 – SYS_ROAM_STATUS_AVAIL_SYS – Available system • 0x07 – SYS_ROAM_STATUS_ALLIANCE_ PARTNER – Alliance partner • 0x08 – SYS_ROAM_STATUS_PREMIUM_ PARTNER – Premium partner • 0x09 – SYS_ROAM_STATUS_FULL_SVC – Full service • 0x0A – SYS_ROAM_STATUS_PARTIAL_SVC – Partial service • 0x0B – SYS_ROAM_STATUS_BANNER_ON – Banner is on • 0x0C – SYS_ROAM_STATUS_BANNER_OFF – Banner is off Remainder of the values are per3GPP2 C.R1001-

					F. Values from 0x02 onward are only applicable for 3GPP2.
		Boolean	is_sys_forbidden_ valid	1	Indicates whether the forbidden system is valid.
		Boolean	is_sys_forbidden	1	Whether the system is forbidden: • 0x00 – Not forbidden • 0x01 – Forbidden
		boolean	lac_valid	1	Indicates whether the location area code is valid.
		Uint16	lac	2	Location area code (only applicable for 3GPP).
		Boolean	cell_id_valid	1	Indicates whether the cell ID is valid.
		Uint32	cell_id	4	Cell ID.
		Boolean	reg_reject_info_valid	1	Indicates whether the registration reject information is valid.
		Enum8	reject_srv_domain	1	Type of service domain in which the registration is rejected. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		uint8	rej_cause	1	Reject cause values sent are specified in3GPP TS 24.008Sections 10.5.3.6 and 10.5.5.14, and3GPP TS 24.301Section 9.9.3.9.
		boolean	network_id_valid	1	Indicates whether the network ID is valid.
		Char	mcc	3	MCC digits in ASCII characters. For CDMA, the MCC wildcard value is returned as {‘3’, 0xFF, 0xFF}.
		Char	mnc	3	MNC digits in ASCII characters. For this field: • Unused byte is set to 0xFF • In the case of two-digit MNC values, the third (unused) digit is set to 0xFF. For example, 15 (a two-digit MNC) is reported using the byte stream 0x35 0x31 0xFF. For CDMA, the MNC wildcard value is returned as {‘7’, 0xFF, 0xFF}.
		Boolean	egprs_supp_valid	1	Indicates whether EGPRS support is valid.
		Boolean	egprs_supp	1	EGPRS support indication (only applicable for GSM). Values: • 0x00 – SYS_EGPRS_SUPPORT_NOT_AVAIL – Not available • 0x01 – SYS_EGPRS_SUPPORT_AVAIL – Available
		boolean	dtm_supp_valid	1	Indicates whether Dual Transfer mode support is

					valid.
		Boolean	dtm_supp	1	Dual Transfer mode support indication (only applicable for GSM). Values: • 0x00 – SYS_DTM_SUPPORT_NOT_AVAIL – Not available • 0x01 – SYS_DTM_SUPPORT_AVAIL – Available
Type	0x18			1	WCDMA System Info
Length	33			2	
Value	→	boolean	srv_domain_valid	1	Indicates whether the service domain is valid.
		Enum8	srv_domain	1	Service domain registered on the system. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	srv_capability_ valid	1	Indicates whether the service capability is valid.
		Enum8	srv_capability	1	Current system's service capability. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	roam_status_valid	1	Indicates whether the roaming status is valid.
		Uenum8	roam_status	1	Current roaming status. Values: • 0x00 – SYS_ROAM_STATUS_OFF – Off • 0x01 – SYS_ROAM_STATUS_ON – On • 0x02 – SYS_ROAM_STATUS_BLINK – Blinking • 0x03 – SYS_ROAM_STATUS_OUT_OF_ NEIGHBORHOOD – Out of the neighborhood • 0x04 – SYS_ROAM_STATUS_OUT_OF_BLDG – Out of the building • 0x05 – SYS_ROAM_STATUS_PREF_SYS – Preferred system • 0x06 – SYS_ROAM_STATUS_AVAIL_SYS – Available system • 0x07 – SYS_ROAM_STATUS_ALLIANCE_ PARTNER – Alliance partner • 0x08 – SYS_ROAM_STATUS_PREMIUM_ PARTNER – Premium partner • 0x09 – SYS_ROAM_STATUS_FULL_SVC – Full service

					• 0x0A – SYS_ROAM_STATUS_PARTIAL_SVC – Partial service • 0x0B – SYS_ROAM_STATUS_BANNER_ON – Banner is on • 0x0C – SYS_ROAM_STATUS_BANNER_OFF – Banner is off Remainder of the values are per3GPP2 C.R1001-F. Values from 0x02 onward are only applicable for 3GPP2.
		Boolean	is_sys_forbidden_ valid	1	Indicates whether the forbidden system is valid.
		Boolean	is_sys_forbidden	1	Whether the system is forbidden: • 0x00 – Not forbidden • 0x01 – Forbidden
		boolean	lac_valid	1	Indicates whether the location area code is valid.
		Uint16	lac	2	Location area code (only applicable for 3GPP).
		Boolean	cell_id_valid	1	Indicates whether the cell ID is valid.
		Uint32	cell_id	4	Cell ID.
		Boolean	reg_reject_info_valid	1	Indicates whether the registration reject information is valid.
		Enum8	reject_srv_domain	1	Type of service domain in which the registration is rejected. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		uint8	rej_cause	1	Reject cause values sent are specified in3GPP TS 24.008Sections 10.5.3.6 and 10.5.5.14, and3GPP TS 24.301Section 9.9.3.9.
		boolean	network_id_valid	1	Indicates whether the network ID is valid.
		Char	mcc	3	MCC digits in ASCII characters. For CDMA, the MCC wildcard value is returned as {‘3’, 0xFF, 0xFF}.
		Char	mnc	3	MNC digits in ASCII characters. For this field: • Unused byte is set to 0xFF • In the case of two-digit MNC values, the third (unused) digit is set to 0xFF. For example, 15 (a two-digit MNC) is reported using the byte stream 0x35 0x31 0xFF. For CDMA, the MNC wildcard value is returned as {‘7’, 0xFF, 0xFF}.
		Boolea	hs_call_status_valid	1	Indicates whether the high-speed call status is

		n			valid.
		Enum8	hs_call_status	1	Call status on high speed (only applicable for WCDMA). Values: • 0x00 – SYS_HS_IND_HSDPA_HSUPA_ UNSUPP_CELL – HSDPA and HSUPA are unsupported • 0x01 – SYS_HS_IND_HSDPA_SUPP_CELL – HSDPA is supported • 0x02 – SYS_HS_IND_HSUPA_SUPP_CELL – HSUPA is supported • 0x03 – SYS_HS_IND_HSDPA_HSUPA_SUPP_ CELL – HSDPA and HSUPA are supported • 0x04 – SYS_HS_IND_HSDPAPLUS_SUPP_ CELL – HSDPA+ is supported • 0x05 – SYS_HS_IND_HSDPAPLUS_HSUPA_ SUPP_CELL – HSDPA+ and HSUPA are supported • 0x06 – SYS_HS_IND_DC_HSDPAPLUS_SUPP_ CELL – Dual-cell HSDPA+ is supported • 0x07 – SYS_HS_IND_DC_HSDPAPLUS_ HSUPA_SUPP_CELL – Dual-cell HSDPA+ and HSUPA are supported • 0x08 – SYS_HS_IND_HSDPAPLUS_64QAM_ HSUPA_SUPP_CELL – Dual-cell HSDPA+, 64 QAM, and HSUPA are supported • 0x09 – SYS_HS_IND_HSDPAPLUS_64QAM_ SUPP_CELL – Dual-cell HSDPA+ and 64 QAM are supported • 0x0A – SYS_HS_IND_DC_HSDPAPLUS_ DC_HSUPA_SUPP_CELL – Dual-cell HSUPA is supported
		boolean	hs_ind_valid	1	Indicates whether the high-speed service indication is valid.
		Enum8	hs_ind	1	High-speed service indication (only applicable for WCDMA). Values: • 0x00 – SYS_HS_IND_HSDPA_HSUPA_ UNSUPP_CELL – HSDPA and HSUPA are unsupported • 0x01 – SYS_HS_IND_HSDPA_SUPP_CELL – HSDPA is supported • 0x02 – SYS_HS_IND_HSUPA_SUPP_CELL – HSUPA is supported • 0x03 – SYS_HS_IND_HSDPA_HSUPA_SUPP_ CELL – HSDPA and HSUPA are supported • 0x04 – SYS_HS_IND_HSDPAPLUS_SUPP_ CELL – HSDPA+ is supported • 0x05 –

					SYS_HS_IND_HSDPAPLUS_HSUPA_ SUPP_CELL – HSDPA+ and HSUPA are supported • 0x06 – SYS_HS_IND_DC_HSDPAPLUS_SUPP_ CELL – Dual-cell HSDPA+ is supported • 0x07 – SYS_HS_IND_DC_HSDPAPLUS_ HSUPA_SUPP_CELL – Dual-cell HSDPA+ and HSUPA are supported • 0x08 – SYS_HS_IND_HSDPAPLUS_64QAM_ HSUPA_SUPP_CELL – Dual-cell HSDPA+, 64 QAM, and HSUPA are supported • 0x09 – SYS_HS_IND_HSDPAPLUS_64QAM_ SUPP_CELL – Dual-cell HSDPA+ and 64 QAM are supported • 0x0A – SYS_HS_IND_DC_HSDPAPLUS_ DC_HSUPA_SUPP_CELL – Dual-cell HSUPA is supported
		boolean	psc_valid	1	Indicates whether the primary scrambling code is valid.
		Uint16	psc	2	Primary scrambling code.
Type	0x19			1	LTE System Info
Length	29			2	
Value	→	boolean	srv_domain_valid	1	Indicates whether the service domain is valid.
		Enum8	srv_domain	1	Service domain registered on the system. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	srv_capability_ valid	1	Indicates whether the service capability is valid.
		Enum8	srv_capability	1	Current system's service capability. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	roam_status_valid	1	Indicates whether the roaming status is valid.
		Uenum 8	roam_status	1	Current roaming status. Values: • 0x00 – SYS_ROAM_STATUS_OFF – Off • 0x01 – SYS_ROAM_STATUS_ON – On • 0x02 – SYS_ROAM_STATUS_BLINK –

					Blinking • 0x03 – SYS_ROAM_STATUS_OUT_OF_ NEIGHBORHOOD – Out of the neighborhood • 0x04 – SYS_ROAM_STATUS_OUT_OF_BLDG – Out of the building • 0x05 – SYS_ROAM_STATUS_PREF_SYS – Preferred system • 0x06 – SYS_ROAM_STATUS_AVAIL_SYS – Available system • 0x07 – SYS_ROAM_STATUS_ALLIANCE_ PARTNER – Alliance partner • 0x08 – SYS_ROAM_STATUS_PREMIUM_ PARTNER – Premium partner • 0x09 – SYS_ROAM_STATUS_FULL_SVC – Full service • 0x0A – SYS_ROAM_STATUS_PARTIAL_SVC – Partial service • 0x0B – SYS_ROAM_STATUS_BANNER_ON – Banner is on • 0x0C – SYS_ROAM_STATUS_BANNER_OFF – Banner is off Remainder of the values are per3GPP2 C.R1001-F. Values from 0x02 onward are only applicable for 3GPP2.
		Boolean	is_sys_forbidden_ valid	1	Indicates whether the forbidden system is valid.
		Boolean	is_sys_forbidden	1	Whether the system is forbidden: • 0x00 – Not forbidden • 0x01 – Forbidden
		boolean	lac_valid	1	Indicates whether the location area code is valid.
		Uint16	lac	2	Location area code (only applicable for 3GPP).
		Boolean	cell_id_valid	1	Indicates whether the cell ID is valid.
		Uint32	cell_id	4	Cell ID.
		Boolean	reg_reject_info_valid	1	Indicates whether the registration reject information is valid.
		Enum8	reject_srv_domain	1	Type of service domain in which the registration is rejected. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		uint8	rej_cause	1	Reject cause values sent are specified in3GPP TS

					24.008Sections 10.5.3.6 and 10.5.5.14, and3GPP TS 24.301Section 9.9.3.9.
		boolean	network_id_valid	1	Indicates whether the network ID is valid.
		Char	mcc	3	MCC digits in ASCII characters. For CDMA, the MCC wildcard value is returned as {'3', 0xFF, 0xFF}.
		Char	mnc	3	MNC digits in ASCII characters. For this field: • Unused byte is set to 0xFF • In the case of two-digit MNC values, the third (unused) digit is set to 0xFF. For example, 15 (a two-digit MNC) is reported using the byte stream 0x35 0x31 0xFF. For CDMA, the MNC wildcard value is returned as {'7', 0xFF, 0xFF}.
		Boolean	tac_valid	1	Indicates whether the tracking area code is valid.
		Uint16	tac	2	Tracking area code (only applicable for LTE).
Type	0x1A			1	Additional CDMA System Info
Length	4			2	
Value	→	uint16	geo_sys_idx	2	System table index referencing the beginning of the geo in which the current serving system is present. When the system index is not known, 0xFFFF is used.
		Uint16	reg_prd	2	Registration period after the CDMA system is acquired. When the CDMA registration period is not valid, 0xFFFF is used.
Type	0x1B			1	Additional HDR System Info
Length	2			2	
Value	→	uint16	geo_sys_idx	2	System table index referencing the beginning of the geo in which the current serving system is present. When the system index is not known, 0xFFFF is used.
Type	0x1C			1	Additional GSM System Info
Length	6			2	
Value	→	uint16	geo_sys_idx	2	System table index referencing the beginning of the geo in which the current serving system is present. When the system index is not known, 0xFFFF is used.
		Enum	cell_ broadcast_cap	4	Cell broadcast capability of the serving system. Values: • 0x00 – NAS_CELL_BROADCAST_CAP_ UNKNOWN – Cell broadcast support is unknown • 0x01 – NAS_CELL_BROADCAST_CAP_OFF – Cell broadcast is not supported • 0x02 – NAS_CELL_BROADCAST_CAP_ON – Cell broadcast is supported
Type	0x1D			1	Additional WCDMA System Info
Length	6			2	
Value	→	uint16	geo_sys_idx	2	System table index referencing the beginning of the geo in which the current serving system is

					present. When the system index is not known, 0xFFFF is used.
		Enum	cell_ broadcast_cap	4	Cell broadcast capability of the serving system. Values: • 0x00 – NAS_CELL_BROADCAST_CAP_ UNKNOWN – Cell broadcast support is unknown • 0x01 – NAS_CELL_BROADCAST_CAP_OFF – Cell broadcast is not supported • 0x02 – NAS_CELL_BROADCAST_CAP_ON – Cell broadcast is supported
Type	0x1E			1	Additional LTE System Info
Length	2			2	
Value	→	uint16	geo_sys_idx	2	System table index referencing the beginning of the geo in which the current serving system is present. When the system index is not known, 0xFFFF is used.
Type	0x1F			1	GSM Call Barring System Info
Length	8			2	
Value	→	enum	cs_bar_status	4	Call barring status for circuit-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
		enum	ps_bar_status	4	Call barring status for packet-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
Type	0x20			1	WCDMA Call Barring System Info
Length	8			2	
Value	→	enum	cs_bar_status	4	Call barring status for circuit-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY

					– Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
		enum	ps_bar_status	4	Call barring status for packet-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
Type	0x21			1	LTE Voice Support Sys Info
Length	1			2	
Value	→	boolean	voice_support_on_ lte	1	Indicates voice support status on LTE. Values: • 0x00 – Voice is not supported • 1x01 – Voice is supported
Type	0x22			1	GSM Cipher Domain Sys Info
Length	1			2	
Value	→	enum8	gsm_cipher_domain	1	Ciphering on the service domain. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched
Type	0x23			1	WCDMA Cipher Domain Sys Info
Length	1			2	
Value	→	enum8	wcdma_cipher_ domain	1	Ciphering on the service domain. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched
Type	0x24			1	TDSCDMA Service Status Info
Length	3			2	
Value	→	enum8	srv_status	1	Service status of the system. Values:

					• 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		enum8	true_srv_status	1	True service status of the system (not applicable to CDMA/HDR). Values: • 0x00 – SYS_SRV_STATUS_NO_SRV – No service • 0x01 – SYS_SRV_STATUS_LIMITED – Limited service • 0x02 – SYS_SRV_STATUS_SRV – Service • 0x03 – SYS_SRV_STATUS_LIMITED_ REGIONAL – Limited regional service • 0x04 – SYS_SRV_STATUS_PWR_SAVE – Power save
		boolean	is_pref_data_path	1	Whether the RAT is the preferred data path: • 0x00 – Not preferred • 0x01 – Preferred
Type	0x25			1	TDSCDMA System Info
Length	50			2	
Value	→	boolean	srv_domain_valid	1	Indicates whether the service domain is valid.
		Enum8	srv_domain	1	Service domain registered on the system. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	srv_capability_ valid	1	Indicates whether the service capability is valid.
		Enum8	srv_capability	1	Current system's service capability. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED – Camped
		boolean	roam_status_valid	1	Indicates whether the roaming status is valid.
		Uenum 8	roam_status	1	Current roaming status. Values: • 0x00 – SYS_ROAM_STATUS_OFF – Off • 0x01 – SYS_ROAM_STATUS_ON – On

					• 0x02 – SYS_ROAM_STATUS_BLINK – Blinking • 0x03 – SYS_ROAM_STATUS_OUT_OF_ NEIGHBORHOOD – Out of the neighborhood • 0x04 – SYS_ROAM_STATUS_OUT_OF_BLDG – Out of the building • 0x05 – SYS_ROAM_STATUS_PREF_SYS – Preferred system • 0x06 – SYS_ROAM_STATUS_AVAIL_SYS – Available system • 0x07 – SYS_ROAM_STATUS_ALLIANCE_ PARTNER – Alliance partner • 0x08 – SYS_ROAM_STATUS_PREMIUM_ PARTNER – Premium partner • 0x09 – SYS_ROAM_STATUS_FULL_SVC – Full service • 0x0A – SYS_ROAM_STATUS_PARTIAL_SVC – Partial service • 0x0B – SYS_ROAM_STATUS_BANNER_ON – Banner is on • 0x0C – SYS_ROAM_STATUS_BANNER_OFF – Banner is off Remainder of the values are per3GPP2 C.R1001-F. Values from 0x02 onward are only applicable for 3GPP2.
		Boolean	is_sys_forbidden_ valid	1	Indicates whether the forbidden system is valid.
		Boolean	is_sys_forbidden	1	Whether the system is forbidden: • 0x00 – Not forbidden • 0x01 – Forbidden
		boolean	lac_valid	1	Indicates whether the location area code is valid.
		Uint16	lac	2	Location area code (only applicable for 3GPP).
		Boolean	cell_id_valid	1	Indicates whether the cell ID is valid.
		Uint32	cell_id	4	Cell ID.
		Boolean	reg_reject_info_valid	1	Indicates whether the registration reject information is valid.
		Enum8	reject_srv_domain	1	Type of service domain in which the registration is rejected. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched • 0x04 – SYS_SRV_DOMAIN_CAMPED –

					Camped
		uint8	rej_cause	1	Reject cause values sent are specified in3GPP TS 24.008Sections 10.5.3.6 and 10.5.5.14, and3GPP TS 24.301Section 9.9.3.9.
		boolean	network_id_valid	1	Indicates whether the network ID is valid.
		Char	mcc	3	MCC digits in ASCII characters. For CDMA, the MCC wildcard value is returned as {‘3’, 0xFF, 0xFF}.
		Char	mnc	3	MNC digits in ASCII characters. For this field: • Unused byte is set to 0xFF • In the case of two-digit MNC values, the third (unused) digit is set to 0xFF. For example, 15 (a two-digit MNC) is reported using the byte stream 0x35 0x31 0xFF. For CDMA, the MNC wildcard value is returned as {‘7’, 0xFF, 0xFF}.
		Boolean	hs_call_status_valid	1	Indicates whether the high-speed call status is valid.
		Enum8	hs_call_status	1	Call status on high speed (only applicable for WCDMA). Values: • 0x00 – SYS_HS_IND_HSDPA_HSUPA_ UNSUPP_CELL – HSDPA and HSUPA are unsupported • 0x01 – SYS_HS_IND_HSDPA_SUPP_CELL – HSDPA is supported • 0x02 – SYS_HS_IND_HSUPA_SUPP_CELL – HSUPA is supported • 0x03 – SYS_HS_IND_HSDPA_HSUPA_SUPP_ CELL – HSDPA and HSUPA are supported • 0x04 – SYS_HS_IND_HSDPAPLUS_SUPP_ CELL – HSDPA+ is supported • 0x05 – SYS_HS_IND_HSDPAPLUS_HSUPA_ SUPP_CELL – HSDPA+ and HSUPA are supported • 0x06 – SYS_HS_IND_DC_HSDPAPLUS_SUPP_ CELL – Dual-cell HSDPA+ is supported • 0x07 – SYS_HS_IND_DC_HSDPAPLUS_ HSUPA_SUPP_CELL – Dual-cell HSDPA+ and HSUPA are supported • 0x08 – SYS_HS_IND_HSDPAPLUS_64QAM_ HSUPA_SUPP_CELL – Dual-cell HSDPA+, 64 QAM, and HSUPA are supported • 0x09 – SYS_HS_IND_HSDPAPLUS_64QAM_ SUPP_CELL – Dual-cell HSDPA+ and 64 QAM are supported • 0x0A – SYS_HS_IND_DC_HSDPAPLUS_ DC_HSUPA_SUPP_CELL – Dual-cell HSUPA

					is supported
		boolean	hs_ind_valid	1	Indicates whether the high-speed service indication is valid.
		Enum8	hs_ind	1	High-speed service indication (only applicable for WCDMA). Values: • 0x00 – SYS_HS_IND_HSDPA_HSUPA_ UNSUPP_CELL – HSDPA and HSUPA are unsupported • 0x01 – SYS_HS_IND_HSDPA_SUPP_CELL – HSDPA is supported • 0x02 – SYS_HS_IND_HSUPA_SUPP_CELL – HSUPA is supported • 0x03 – SYS_HS_IND_HSDPA_HSUPA_SUPP_ CELL – HSDPA and HSUPA are supported • 0x04 – SYS_HS_IND_HSDPAPLUS_SUPP_ CELL – HSDPA+ is supported • 0x05 – SYS_HS_IND_HSDPAPLUS_HSUPA_ SUPP_CELL – HSDPA+ and HSUPA are supported • 0x06 – SYS_HS_IND_DC_HSDPAPLUS_SUPP_ CELL – Dual-cell HSDPA+ is supported • 0x07 – SYS_HS_IND_DC_HSDPAPLUS_ HSUPA_SUPP_CELL – Dual-cell HSDPA+ and HSUPA are supported • 0x08 – SYS_HS_IND_HSDPAPLUS_64QAM_ HSUPA_SUPP_CELL – Dual-cell HSDPA+, 64 QAM, and HSUPA are supported • 0x09 – SYS_HS_IND_HSDPAPLUS_64QAM_ SUPP_CELL – Dual-cell HSDPA+ and 64 QAM are supported • 0x0A – SYS_HS_IND_DC_HSDPAPLUS_ DC_HSUPA_SUPP_CELL – Dual-cell HSUPA is supported
		boolean	cell_parameter_id_ valid	1	Indicates whether the cell parameter ID is valid.
		Uint16	cell_parameter_id	2	Cell parameter ID.
		Boolean	cell_broadcast_ cap_valid	1	Indicates whether the cell broadcast capability is valid.
		Enum	cell_broadcast_cap	4	Cell broadcast capability of the serving system. Values: • 0x00 – NAS_CELL_BROADCAST_CAP_ UNKNOWN – Cell broadcast support is unknown • 0x01 – NAS_CELL_BROADCAST_CAP_OFF – Cell broadcast is not supported • 0x02 – NAS_CELL_BROADCAST_CAP_ON – Cell broadcast is supported
		boolean	cs_bar_status_valid	1	Indicates whether the circuit-switched call

					barring status is valid.
		Enum	cs_bar_status	4	Call barring status for circuit-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
		boolean	ps_bar_status_valid	1	Indicates whether the packet-switched call barring status is valid.
		Enum	ps_bar_status	4	Call barring status for packet-switched calls. Values: • 0x00 – NAS_CELL_ACCESS_NORMAL_ONLY – Cell access is allowed for normal calls only • 0x01 – NAS_CELL_ACCESS_EMERGENCY_ ONLY – Cell access is allowed for emergency calls only • 0x02 – NAS_CELL_ACCESS_NO_CALLS – Cell access is not allowed for any call type • 0x03 – NAS_CELL_ACCESS_ALL_CALLS – Cell access is allowed for all call types • -1 – NAS_CELL_ACCESS_UNKNOWN – Cell access type is unknown
		boolean	cipher_domain_valid	1	Indicates whether the cipher domain is valid.
		Enum8	cipher_domain	1	Ciphering on the service domain. Values: • 0x00 – SYS_SRV_DOMAIN_NO_SRV – No service • 0x01 – SYS_SRV_DOMAIN_CS_ONLY – Circuit-switched only • 0x02 – SYS_SRV_DOMAIN_PS_ONLY – Packet-switched only • 0x03 – SYS_SRV_DOMAIN_CS_PS – Circuit-switched and packet-switched
Type	0x26			1	LTE eMBMS Coverage Info (Deprecated; use LTE eMBMS Coverage Info Extended)
Length	1			2	
Value	→	boolean	lte_embms_coverage	1	Values: • TRUE – Current LTE system supports eMBMS • FALSE – Current LTE system does not support eMBMS
Type	0x27			1	SIM Reject Information
Length	4			2	
Value	→	enum	sim_rej_info	4	Current reject state information of the SIM. Values: • 0 – NAS_SIM_NOT_AVAILABLE – SIM is not available

					• 1 – NAS_SIM_AVAILABLE – SIM is available • 2 – NAS_SIM_CS_INVALID – SIM has been marked by the network as invalid for circuit-switched services • 3 – NAS_SIM_PS_INVALID – SIM has been marked by the network as invalid for packet-switched services • 4 – NAS_SIM_CS_PS_INVALID – SIM has been marked by the network as invalid for circuit-switched and packet-switched services
Type	0x28			1	WCDMA EUTRA Status Information
Length	1			2	
Value	→	enum8	wcdma_eutra_status	1	E-UTRA detection status. Values: • 0 – NAS_EUTRA_CELL_PRESENT – E-UTRA cell is detected • 1 – NAS_EUTRA_CELL_NOT_PRESENT – E-UTRA cell is not detected • 2 – NAS_EUTRA_CELL_PRESENCE_ UNKNOWN – E-UTRA cell information is unknown due to a state transition • 3 – NAS_EUTRA_CELL_DETECTION_ UNSUPPORTED – E-UTRA detection is not supported
Type	0x29			1	IMS Voice Support Status on LTE
Length	1			2	
Value	→	boolean	lte_ims_voice_avail	1	Values: • 0x00 – Support is not available • 0x01 – Support is available
Type	0x2A			1	LTE Voice Domain
Length	4			2	
Value	→	enum	lte_voice_status	4	LTE voice domain. Values: • 0 – NAS_DOMAIN_SEL_DOMAIN_NO_VOICE – Data-centric devices: No voice, stay on LTE • 1 – NAS_DOMAIN_SEL_DOMAIN_IMS – Voice is supported over the IMS network • 2 – NAS_DOMAIN_SEL_DOMAIN_1X – Voice is supported over the 1X network • 3 – NAS_DOMAIN_SEL_DOMAIN_3GPP – Voice is supported over the 3GPP network
Type	0x2B			1	CDMA Reg Zone ID
Length	2			2	
Value	→	uint16	cdma_reg_zone	2	CDMA registration zone ID.
Type	0x2C			1	GSM RAC
Length	1			2	
Value	→	uint8	gsm_rac	1	GSM routing area code.
Type	0x2D			1	WCDMA RAC
Length	1			2	
Value	→	uint8	wcdma_rac	1	WCDMA routing area code.
Type	0x2E			1	CDMA Resolved Mobile Country Code
Length	2			2	
Value	→	uint16	cdma_mcc_resolved_via_ sid_lookup	2	MCC derived by looking up the IFAST SID conflict table and configured SID-MCC table

					(static and NV) with the SID received from the network as the key. If the lookup is not successful, 0xFFFF is used. Note: This MCC value is determined solely from the SID and may differ from the MCC value sent by the network.
Type	0x2F			1	Network Selection Registration Restriction
Length	4			2	
Value	→	enum	srv_reg_restriction	4	Registration restriction. Values: • 0x00 – NAS_SRV_REG_RESTRICTION_ UNRESTRICTED – Device follows the normal registration process • 0x01 – NAS_SRV_REG_RESTRICTION_ CAMPED_ONLY – Device follows the camp-only registration process All other values are reserved.
Type	0x30			1	TDSCDMA Registration Domain
Length	4			2	
Value	→	enum	tdscdma_reg_domain	4	TD-SCDMA registration domain. Values: • 0 – NAS_POSSIBLE_REG_DOMAIN_NA – Not applicable because the UE is not in Camp Only mode • 1 – NAS_POSSIBLE_REG_DOMAIN_CS_ONLY – UE is in Camp Only mode and the PLMN can provide CS service only • 2 – NAS_POSSIBLE_REG_DOMAIN_PS_ONLY – UE is in Camp Only mode and the PLMN can provide PS service only • 3 – NAS_POSSIBLE_REG_DOMAIN_CS_PS – UE is in Camp Only mode and the PLMN can provide CS and PS service • 4 – NAS_POSSIBLE_REG_DOMAIN_ LIMITED_SERVICE – UE is in Camp Only mode, but the PLMN cannot provide any service
Type	0x31			1	LTE Registration Domain
Length	4			2	
Value	→	enum	lte_reg_domain	4	LTE registration domain. Values: • 0 – NAS_POSSIBLE_REG_DOMAIN_NA – Not applicable because the UE is not in Camp Only mode • 1 – NAS_POSSIBLE_REG_DOMAIN_CS_ONLY – UE is in Camp Only mode and the PLMN can provide CS service only • 2 – NAS_POSSIBLE_REG_DOMAIN_PS_ONLY – UE is in Camp Only mode and the PLMN can provide PS service only • 3 – NAS_POSSIBLE_REG_DOMAIN_CS_PS – UE is in Camp Only mode and the PLMN can provide CS and PS service • 4 – NAS_POSSIBLE_REG_DOMAIN_

					LIMITED_SERVICE – UE is in Camp Only mode, but the PLMN cannot provide any service
Type	0x32			1	WCDMA Registration Domain
Length	4			2	
Value	→	enum	wcdma_reg_domain	4	WCDMA registration domain. Values: • 0 – NAS_POSSIBLE_REG_DOMAIN_NA – Not applicable because the UE is not in Camp Only mode • 1 – NAS_POSSIBLE_REG_DOMAIN_CS_ONLY – UE is in Camp Only mode and the PLMN can provide CS service only • 2 – NAS_POSSIBLE_REG_DOMAIN_PS_ONLY – UE is in Camp Only mode and the PLMN can provide PS service only • 3 – NAS_POSSIBLE_REG_DOMAIN_CS_PS – UE is in Camp Only mode and the PLMN can provide CS and PS service • 4 – NAS_POSSIBLE_REG_DOMAIN_ LIMITED_SERVICE – UE is in Camp Only mode, but the PLMN cannot provide any service
Type	0x33			1	GSM Registration Domain
Length	4			2	
Value	→	enum	gsm_reg_domain	4	GSM registration domain. Values: • 0 – NAS_POSSIBLE_REG_DOMAIN_NA – Not applicable because the UE is not in Camp Only mode • 1 – NAS_POSSIBLE_REG_DOMAIN_CS_ONLY – UE is in Camp Only mode and the PLMN can provide CS service only • 2 – NAS_POSSIBLE_REG_DOMAIN_PS_ONLY – UE is in Camp Only mode and the PLMN can provide PS service only • 3 – NAS_POSSIBLE_REG_DOMAIN_CS_PS – UE is in Camp Only mode and the PLMN can provide CS and PS service • 4 – NAS_POSSIBLE_REG_DOMAIN_ LIMITED_SERVICE – UE is in Camp Only mode, but the PLMN cannot provide any service
Type	0x34			1	LTE eMBMS Coverage Info Trace ID
Length	2			2	
Value	→	int16	lte_embms_coverage_ trace_id	2	LTE eMBMS coverage information trace ID. Values: • 0 to 32768 – Valid trace ID • -1 – Trace ID is not used
Type	0x35			1	WCDMA CSG Information
Length	Var			2	
Value	→	uint32	id	4	Closed subscriber group identifier.
		Uint8	name_len	1	Number of sets of the following elements: • name
		uint16	name	Var	Home Node B (HNB) or Home eNode B (HeNB)

					name in UTF-16. The network name is not guaranteed to be NULL terminated.
Type	0x36			1	HDR Voice Domain
Length	4			2	
Value	→	enum	hdr_voice_status	4	HDR voice domain. Values: • 0 – NAS_DOMAIN_SEL_DOMAIN_NO_VOICE – Data-centric devices: No voice, stay on HDR • 1 – NAS_DOMAIN_SEL_DOMAIN_IMS – Voice is supported over the IMS network • 2 – NAS_DOMAIN_SEL_DOMAIN_1X – Voice is supported over the 1X network
Type	0x37			1	HDR SMS Domain
Length	4			2	
Value	→	enum	hdr_sms_status	4	HDR SMS domain. Values: • 0 – NAS_SMS_STATUS_NO_SMS – Data-centric devices: No SMS, stay on HDR • 1 – NAS_SMS_STATUS_IMS – SMS is supported over the IMS network • 2 – NAS_SMS_STATUS_1X – SMS is supported over the 1X network
Type	0x38			1	LTE SMS Domain
Length	4			2	
Value	→	enum	lte_sms_status	4	LTE SMS domain. Values: • 0 – NAS_SMS_STATUS_NO_SMS – Data-centric devices: No SMS, stay on LTE • 1 – NAS_SMS_STATUS_IMS – SMS is supported over the IMS network • 2 – NAS_SMS_STATUS_1X – SMS is supported over the 1X network • 3 – NAS_SMS_STATUS_3GPP – SMS is supported over the 3GPP network
Type	0x39			1	LTE Emergency Bearer Support
Length	4			2	
Value	→	enum	lte_is_eb_supported	4	Whether LTE emergency bearer is supported. Values: • NAS_TRI_FALSE (0) – Status: FALSE • NAS_TRI_TRUE (1) – Status: TRUE • NAS_TRI_UNKNOWN (2) – Status: Unknown The TLV status is NAS_TRI_UNKNOWN for scenarios where information is not available from the lower layers; e.g., if the UE powers up while acquiring service or in the middle of an attach procedure.
Type	0x3A			1	GSM Voice Domain
Length	4			2	
Value	→	enum	gsm_voice_status	4	GSM voice domain. Values: • 0 – NAS_DOMAIN_SEL_DOMAIN_NO_VOICE – Data-centric devices: No voice, stay on GSM • 1 – NAS_DOMAIN_SEL_DOMAIN_IMS – Voice is supported over the IMS network • 2 – NAS_DOMAIN_SEL_DOMAIN_1X – Voice is supported over the 1X network

Type	0x3B			1	GSM SMS Domain
Length	4			2	
Value	→	enum	gsm_sms_status	4	GSM SMS domain. Values: • 0 – NAS_SMS_STATUS_NO_SMS – Data-centric devices: No SMS, stay on GSM • 1 – NAS_SMS_STATUS_IMS – SMS is supported over the IMS network • 2 – NAS_SMS_STATUS_1X – SMS is supported over the 1X network
Type	0x3C			1	WCDMA Voice Domain
Length	4			2	
Value	→	enum	wcdma_voice_status	4	WCDMA voice domain. Values: • 0 – NAS_DOMAIN_SEL_DOMAIN_NO_VOICE – Data-centric devices: No voice, stay on WCDMA • 1 – NAS_DOMAIN_SEL_DOMAIN_IMS – Voice is supported over the IMS network • 2 – NAS_DOMAIN_SEL_DOMAIN_1X – Voice is supported over the 1X network
Type	0x3D			1	WCDMA SMS Domain
Length	4			2	
Value	→	enum	wcdma_sms_status	4	WCDMA SMS domain. Values: • 0 – NAS_SMS_STATUS_NO_SMS – Data-centric devices: No SMS, stay on WCDMA • 1 – NAS_SMS_STATUS_IMS – SMS is supported over the IMS network • 2 – NAS_SMS_STATUS_1X – SMS is supported over the 1X network
Type	0x3E			1	LTE Emergency Access Barred
Length	4			2	
Value	→	enum	emergency_access_barred	4	Whether LTE emergency access is barred on the current system. Values: • NAS_TRI_FALSE (0) – Status: FALSE • NAS_TRI_TRUE (1) – Status: TRUE • NAS_TRI_UNKNOWN (2) – Status: Unknown The TLV status is NAS_TRI_UNKNOWN for scenarios where information is not available from the lower layers; e.g., if the UE powers up while acquiring service or in the middle of an attach procedure.
Type	0x3F			1	CDMA Voice Domain
Length	4			2	
Value	→	enum	cdma_voice_status	4	CDMA voice domain. Values: • 0 – NAS_DOMAIN_SEL_DOMAIN_NO_VOICE – Data-centric devices: No voice, stay on CDMA • 1 – NAS_DOMAIN_SEL_DOMAIN_IMS – Voice is supported over the IMS network • 2 – NAS_DOMAIN_SEL_DOMAIN_1X – Voice is supported over the 1X network
Type	0x40			1	CDMA SMS Domain
Length	4			2	
Value	→	enum	cdma_sms_status	4	CDMA SMS domain. Values:

					• 0 – NAS_SMS_STATUS_NO_SMS – Data-centric devices: No SMS, stay on CDMA • 1 – NAS_SMS_STATUS_IMS – SMS is supported over the IMS network • 2 – NAS_SMS_STATUS_1X – SMS is supported over the 1X network
Type	0x41			1	TDSCDMA Voice Domain
Length	4			2	
Value	→	enum	tdscdma_voice_status	4	TD-SCDMA voice domain. Values: • 0 – NAS_DOMAIN_SEL_DOMAIN_NO_VOICE – Data-centric devices: No voice, stay on TD-SCDMA • 1 – NAS_DOMAIN_SEL_DOMAIN_IMS – Voice is supported over the IMS network • 2 – NAS_DOMAIN_SEL_DOMAIN_1X – Voice is supported over the 1X network
Type	0x42			1	TDSCDMA SMS Domain
Length	4			2	
Value	→	enum	tdscdma_sms_status	4	TD-SCDMA SMS domain. Values: • 0 – NAS_SMS_STATUS_NO_SMS – Data-centric devices: No SMS, stay on TD-SCDMA • 1 – NAS_SMS_STATUS_IMS – SMS is supported over the IMS network • 2 – NAS_SMS_STATUS_1X – SMS is supported over the 1X network
Type	0x43			1	LTE CSG Information
Length	Var			2	
Value	→	uint32	id	4	Closed subscriber group identifier.
		Uint8	name_len	1	Number of sets of the following elements: • name
		uint16	name	Var	Home Node B (HNB) or Home eNode B (HeNB) name in UTF-16. The network name is not guaranteed to be NULL terminated.
Type	0x44			1	LTE Cell Access Status Info
Length	4			2	
Value	→	enum	lte_cell_status	4	Cell access status for LTE calls. Values: • NAS_CELL_ACCESS_NORMAL_ ONLY (0x00) – Cell access is allowed for normal calls only • NAS_CELL_ACCESS_EMERGENCY_ ONLY (0x01) – Cell access is allowed for emergency calls only • NAS_CELL_ACCESS_NO_CALLS (0x02) – Cell access is not allowed for any call type • NAS_CELL_ACCESS_ALL_CALLS (0x03) – Cell access is allowed for all call types • NAS_CELL_ACCESS_UNKNOWN (-1) – Cell access type is unknown
Type	0x45			1	HDR Subnet Mask Length
Length	1			2	
Value	→	uint8	hdr_subnet_mask_len	1	HDR subnet mask length.
Type	0x46			1	LTE eMBMS Coverage Info Extended
Length	4			2	

Value	→	enum	embms_coverage_ status	4	eMBMS coverage status. Values: • NAS_LTE_RRC_EMBMS_COVERAGE_ STATUS_NOT_AVAILABLE (0) – Not available • NAS_LTE_RRC_EMBMS_COVERAGE_ STATUS_AVAILABLE (1) – Available • NAS_LTE_RRC_EMBMS_COVERAGE_ STATUS_NOT_AVAIL_DUE_TO_UEMODE (2) – Not available due to the UE mode • NAS_LTE_RRC_EMBMS_COVERAGE_ STATUS_NOT_AVAIL_DUE_TO_EMERGENCY (3) – Not available due to an emergency • NAS_LTE_RRC_EMBMS_COVERAGE_ STATUS_UNKNOWN (4) – Unknown

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INFO_UNAVAILABLE	Information is not available at this time

7.2.15.3. Description of QMI_NAS_GET_SYS_INFO REQ/RESP

This command queries current serving system information, including registration information and system property. The registration information TLVs (i.e., TLVs 0x10 through 0x14) for all RATs specified in the mode capability setting are included regardless of registration status.

The RAT-specific system property TLVs (i.e., TLV 0x15 and above) are included only for RATs that are specified in the mode capability setting and which are not in either No Service or Power Save modes.

The optional WCDMA EUTRA Status Information TLV (0x28) is included when WCDMA is in service and contains LTE detection information.

7.2.16. QMI_NAS_GET_SIG_INFO

Queries information regarding the signal strength.

NAS message ID

0x004F

Version introduced

Major – 1, Minor – 8

7.2.16.1. Request – QMI_NAS_GET_SIG_INFO_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.16.2. Response – QMI_NAS_GET_SIG_INFO_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
CDMA Signal Strength Info	Unknown	1.16
HDR Signal Strength Info	Unknown	1.16
GSM Signal Strength Info	Unknown	1.8
WCDMA Signal Strength Info	Unknown	1.16
LTE Signal Strength Info	Unknown	1.16
TDSCDMA Signal Strength Info	Unknown	1.16
TDSCDMA Signal Strength Info Extended	1.43	1.43

Field	Field value	Field type	Parameter	Size (byte)	Description
Value	→	int8	rssi	1	RSSI in dBm (signed value); a value of -125

					dBm or lower is used to indicate No Signal: • For CDMA, this indicates forward link pilot Power (AGC) + Ec/Io • For UMTS, this indicates forward link pilot Ec • For GSM, this indicates received signal strength
		int16	ecio	2	ECIO value representing negative 0.5 dB increments, i.e., 2 means -1 dB (14 means -7 dB, 63 means -31.5 dB).
Type	0x11			1	HDR Signal Strength Info
Length	8			2	
Value	→	int8	rssi	1	RSSI in dBm (signed value); a value of -125 dBm or lower is used to indicate No Signal: • For CDMA, this indicates forward link pilot Power (AGC) + Ec/Io • For UMTS, this indicates forward link pilot Ec • For GSM, this indicates received signal strength
		int16	ecio	2	ECIO value representing negative 0.5 dB increments, i.e., 2 means -1 dB (14 means -7 dB, 63 means -31.5 dB).
		Enum8	sinr	1	SINR level. SINR is only applicable for 1xEV-DO. Valid levels are 0 to 8, where the maximum value for: • 0x00 – SINR_LEVEL_0 is -9 dB • 0x01 – SINR_LEVEL_1 is -6 dB • 0x02 – SINR_LEVEL_2 is -4.5 dB • 0x03 – SINR_LEVEL_3 is -3 dB • 0x04 – SINR_LEVEL_4 is -2 dB • 0x05 – SINR_LEVEL_5 is +1 dB • 0x06 – SINR_LEVEL_6 is +3 dB • 0x07 – SINR_LEVEL_7 is +6 dB • 0x08 – SINR_LEVEL_8 is +9 dB
		int32	io	4	Received IO in dBm. IO is only applicable for 1xEV-DO.
Type	0x12			1	GSM Signal Strength Info
Length	1			2	
Value	→	int8	gsm_sig_info	1	GSM signal strength is the RSSI in dBm (signed value). A value of -125 dBm or lower is used to indicate No Signal.
Type	0x13			1	WCDMA Signal Strength Info
Length	3			2	
Value	→	int8	rssi	1	RSSI in dBm (signed value); a value of -125 dBm or lower is used to indicate No Signal: • For CDMA, this indicates forward link pilot Power (AGC) + Ec/Io • For UMTS, this indicates forward link pilot Ec • For GSM, this indicates received signal strength

		int16	ecio	2	ECIO value representing negative 0.5 dB increments, i.e., 2 means -1 dB (14 means -7 dB, 63 means -31.5 dB).
Type	0x14			1	LTE Signal Strength Info
Length	6			2	
Value	→	int8	rssi	1	RSSI in dBm (signed value); a value of -125 dBm or lower is used to indicate No Signal: • For CDMA and UMTS, this indicates forward link pilot Ec • For GSM, this indicates received signal strength
		int8	rsrq	1	RSRQ value in dB (signed integer value) as measured by L1. Range: -3 to -20 (-3 means -3 dB, -20 means -20 dB).
		Int16	rsrp	2	Current RSRP in dBm as measured by L1. Range: -44 to -140 (-44 means -44 dBm, -140 means -140 dBm).
		Int16	snr	2	SNR level as a scaled integer in units of 0.1 dB; e.g., -16 dB has a value of -160 and 24.6 dB has a value of 246.
Type	0x15			1	TDSCDMA Signal Strength Info
Length	1			2	
Value	→	int8	rscp	1	RSCP of the Primary Common Control Physical Channel (PCCPCH) in dBm. Measurement range: -120 dBm to -25 dBm.
Type	0x16			1	TDSCDMA Signal Strength Info Extended
Length	16			2	
Value	→	float	rssi	4	Measured RSSI in dBm.
		Float	rscp	4	Measured RSCP in dBm.
		Float	ecio	4	Measured ECIO in dB.
		Float	sinr	4	Measured SINR in dB. -15 dB is sent to clients if the actual SINR is less than -15 dB.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INFO_UNAVAILABLE	Information is not available at this time

7.2.16.3. Description of QMI_NAS_GET_SIG_INFO REQ/RESP

This command queries the signal strength information for currently active RATs. TLVs 0x10 through 0x14 are reported only if the corresponding RATs have signal strength values to be reported.

If no signal strength information is available for any RAT, the response message contains only the mandatory response message (TLV 0x02).

7.2.17. QMI_NAS_GET_HDR_COLOR_CODE

Retrieves the HDR color code value.

NAS message ID

0x0057

Version introduced

Major – 1, Minor – 9

7.2.17.1. Request – QMI_NAS_GET_HDR_COLOR_CODE_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.17.2. Response – QMI_NAS_GET_HDR_COLOR_CODE_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
Color Code Value	Unknown	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Color Code Value
Length	1			2	
Value	→	uint8	color_code	1	Color code corresponding to the sector to which the AT is sending the access probe (refer to3GPP2 C.S0024-Bsection 7.11.6.2.1).

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device

7.2.17.3. Description of QMI_NAS_GET_HDR_COLOR_CODE REQ/RESP

This command retrieves the current HDR color code.

7.2.18. QMI_NAS_GET_TX_RX_INFO

Retrieves the detailed Tx/Rx information.

NAS message ID

0x005A

Version introduced

Major – 1, Minor – 9

7.2.18.1. Request – QMI_NAS_GET_TX_RX_INFO_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Radio Interface	1.9	1.106

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Radio Interface
Length	1			2	
Value	→	enum8	radio_if	1	Radio interface from which to get the information. Values: • 0x01 – NAS_RADIO_IF_CDMA_1X – cdma2000® 1X • 0x02 – NAS_RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x04 – NAS_RADIO_IF_GSM – GSM • 0x05 – NAS_RADIO_IF_UMTS – UMTS • 0x08 – NAS_RADIO_IF_LTE – LTE • 0x09 – NAS_RADIO_IF_TDSCDMA – TD-SCDMA

Optional TLVs

None

7.2.18.2. Response – QMI_NAS_GET_TX_RX_INFO_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
Rx Chain 0 Info	Unknown	1.9
Rx Chain 1 Info	Unknown	1.9
Tx Info	Unknown	1.9
At least one of the following optional TLVs must be included in this request.	1.107	1.107
LTE Uplink Modulation	1.107	1.107
Rx Chain 2 Info	1.115	1.115
Rx Chain 3 Info	1.115	1.115

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Rx Chain 0 Info
Length	21			2	
Value	→	boolean	is_radio_tuned	1	Whether Rx is tuned to a channel: • 0x00 – Not tuned • 0x01 – Tuned If the radio is tuned, instantaneous values are set for the signal information fields below. If the radio is not tuned, or is delayed or invalid, the values are set depending on each technology.
		Int32	rx_pwr	4	Rx power value in 1/10 dbm resolution.
		Int32	ecio	4	ECIO in 1/10 dB; valid for CDMA, HDR, GSM, WCDMA, and LTE.
		Int32	rscp	4	Received signal code power in 1/10 dbm; valid for WCDMA.
		Int32	rsrp	4	Current reference signal received power in 1/10 dbm; valid for LTE.
		Uint32	phase	4	Phase in 1/100 degrees; valid for LTE. When the phase is unknown, 0xFFFFFFFF is used.
Type	0x11			1	Rx Chain 1 Info
Length	21			2	
Value	→	boolean	is_radio_tuned	1	Whether Rx is tuned to a channel: • 0x00 – Not tuned • 0x01 – Tuned If the radio is tuned, instantaneous values are set for the signal information fields below. If the radio is not tuned, or is delayed or invalid, the values are set depending on each technology.
		Int32	rx_pwr	4	Rx power value in 1/10 dbm resolution.
		Int32	ecio	4	ECIO in 1/10 dB; valid for CDMA, HDR, GSM, WCDMA, and LTE.
		Int32	rscp	4	Received signal code power in 1/10 dbm;

					valid for WCDMA.
		Int32	rsrp	4	Current reference signal received power in 1/10 dbm; valid for LTE.
		Uint32	phase	4	Phase in 1/100 degrees; valid for LTE. When the phase is unknown, 0xFFFFFFFF is used.
Type	0x12			1	Tx Info
Length	5			2	
Value	→	boolean	is_in_traffic	1	Whether the device is in traffic. The tx_pwr field is only meaningful when in the device is in traffic. If it is not in traffic, tx_pwr is invalid.
		Int32	tx_pwr	4	Tx power value in 1/10 dbm.
Type	0x13			1	LTE Downlink Modulation
Length	Var			2	
Value	→	uint8	downlink_mod_len	1	Number of sets of the following elements: • downlink_mod
		enum	downlink_mod	Var	LTE downlink modulation. Values: • CMAPI_LTE_API_MODULATION_ BPSK (0x00) – BPSK • CMAPI_LTE_API_MODULATION_ QPSK (0x01) – QPSK • CMAPI_LTE_API_MODULATION_ 16QAM (0x02) – 16-QAM • CMAPI_LTE_API_MODULATION_ 64QAM (0x03) – 64-QAM
Type	0x14			1	LTE Uplink Modulation
Length	Var			2	
Value	→	uint8	uplink_mod_len	1	Number of sets of the following elements: • uplink_mod
		enum	uplink_mod	Var	LTE uplink modulation. Values: • CMAPI_LTE_API_MODULATION_ BPSK (0x00) – BPSK • CMAPI_LTE_API_MODULATION_ QPSK (0x01) – QPSK • CMAPI_LTE_API_MODULATION_ 16QAM (0x02) – 16-QAM • CMAPI_LTE_API_MODULATION_ 64QAM (0x03) – 64-QAM
Type	0x15			1	Rx Chain 2 Info
Length	21			2	
Value	→	boolean	is_radio_tuned	1	Whether Rx is tuned to a channel: • 0x00 – Not tuned • 0x01 – Tuned If the radio is tuned, instantaneous values are set for the signal information fields below. If the radio is not tuned, or is delayed or invalid, the values are set depending on each technology.
		Int32	rx_pwr	4	Rx power value in 1/10 dbm resolution.
		Int32	ecio	4	ECIO in 1/10 dB; valid for CDMA, HDR, GSM, WCDMA, and LTE.
		Int32	rscp	4	Received signal code power in 1/10 dbm; valid for

					WCDMA.
		Int32	rsrp	4	Current reference signal received power in 1/10 dbm; valid for LTE.
		Uint32	phase	4	Phase in 1/100 degrees; valid for LTE. When the phase is unknown, 0xFFFFFFFF is used.
Type	0x16			1	Rx Chain 3 Info
Length	21			2	
Value	→	boolean	is_radio_tuned	1	Whether Rx is tuned to a channel: • 0x00 – Not tuned • 0x01 – Tuned If the radio is tuned, instantaneous values are set for the signal information fields below. If the radio is not tuned, or is delayed or invalid, the values are set depending on each technology.
		Int32	rx_pwr	4	Rx power value in 1/10 dbm resolution.
		Int32	ecio	4	ECIO in 1/10 dB; valid for CDMA, HDR, GSM, WCDMA, and LTE.
		Int32	rscp	4	Received signal code power in 1/10 dbm; valid for WCDMA.
		Int32	rsrp	4	Current reference signal received power in 1/10 dbm; valid for LTE.
		Uint32	phase	4	Phase in 1/100 degrees; valid for LTE. When the phase is unknown, 0xFFFFFFFF is used.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_NO_RADIO	Specified radio interface is not in service

7.2.18.3. Description of QMI_NAS_GET_TX_RX_INFO REQ/RESP

This command retrieves Tx/Rx information for a radio interface. The Rx chain TLVs (i.e., 0x10 and 0x11) are included in the response message only if they are enabled. If the radio interface is not in service, a QMI_ERR_NO_RADIO error is returned. If the modem does not support the requested radio interface, a QMI_ERR_OP_DEVICE_UNSUPPORTED error is returned.

7.2.19. QMI_NAS_GET_LTE_CPHY_CA_INFO

Retrieves the previous carrier aggregation event information.

NAS message ID

0x00AC

Version introduced

Major – 1, Minor – 138

7.2.19.1. Request – QMI_NAS_GET_LTE_CPHY_CA_INFO_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

7.2.19.2. Response – QMI_NAS_GET_LTE_CPHY_CA_INFO_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
Result Code	1.138	1.138
Physical Carrier Aggregation of Scell Indicator Type	1.138	1.138
Physical Carrier Aggregation Downlink Bandwidth for Scell	1.138	1.138
Scell Information (Deprecated; use Scell Information Array)	1.138	1.166 (Deprecated)
Pcell Information	1.138	1.159
Scell Index (Deprecated; use Scell Information Array)	1.138	1.166 (Deprecated)
Scell Information Array	1.166	1.166

Optional TLVs

Name	Version introduced	Version last modified
Physical Carrier Aggregation of Scell Indicator Type	1.138	1.138
Physical Carrier Aggregation Downlink Bandwidth for Scell	1.138	1.138
Scell Information (Deprecated; use Scell Information Array)	1.138	1.166 (Deprecated)
Pcell Information	1.138	1.159
Scell Index (Deprecated; use Scell Information Array)	1.138	1.166 (Deprecated)
Scell Information Array	1.166	1.166

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Physical Carrier Aggregation of Scell Indicator Type
Length	8			2	
Value	→	uint16	pci	2	Physical cell ID of the Scell. Range: 0 to 503.
		Uint16	freq	2	Absolute cell's frequency. Range: 0 to 65535.
		Enum	scell_state	4	Scell state. Values: • NAS_LTE_CPHY_SCELL_STATE_DECONFIGURED (0x00) – Deconfigured • NAS_LTE_CPHY_SCELL_STATE_CONFIGURED_DEACTIVATED (0x01) – Configured and deactivated • NAS_LTE_CPHY_SCELL_STATE_CONFIGURED_ACTIVATED (0x02) – Configured and activated All other values are reserved.
Type	0x11			1	Physical Carrier Aggregation Downlink Bandwidth for Scell
Length	4			2	
Value	→	enum	cphy_ca_dl_bandwidth	4	Downlink bandwidth. Values: • NAS_LTE_CPHY_CA_BW_NRB_6 (0x00) – 1.4 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_15 (0x01) – 3 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_25 (0x02) – 5 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_50 (0x03) – 10 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_75 (0x04) – 15 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_100 (0x05) – 20 MHz bandwidth All other values are reserved.
Type	0x12			1	Scell Information (Deprecated; use Scell Information Array)
Length	14			2	
Value	→	uint16	pci	2	Physical cell ID of the Scell. Range: 0 to 503.

		Uint16	freq	2	Absolute cell's frequency. Range: 0 to 65535.
		Enum	cphy_ca_dl_bandwidth	4	Downlink bandwidth. Values: • NAS_LTE_CPHY_CA_BW_NRB_6 (0x00) – 1.4 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_15 (0x01) – 3 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_25 (0x02) – 5 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_50 (0x03) – 10 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_75 (0x04) – 15 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_100 (0x05) – 20 MHz bandwidth All other values are reserved.
		Enum16	band	2	Band. Values: • 120 to 163 – LTE band classes
		enum	scell_state	4	Scell state. Values: • NAS_LTE_CPHY_SCELL_STATE_DECONFIGURED (0x00) – Deconfigured • NAS_LTE_CPHY_SCELL_STATE_CONFIGURED_DEACTIVATED (0x01) – Configured and deactivated • NAS_LTE_CPHY_SCELL_STATE_CONFIGURED_ACTIVATED (0x02) – Configured and activated All other values are reserved.
Type	0x13			1	Pcell Information
Length	10			2	
Value	→	uint16	pci	2	Physical cell ID of the Pcell. Range: 0 to 503.
		Uint16	freq	2	Absolute cell's frequency. Range: 0 to 65535.
		Enum	cphy_ca_dl_bandwidth	4	Downlink bandwidth. Values: • NAS_LTE_CPHY_CA_BW_NRB_6 (0x00) – 1.4 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_15 (0x01) – 3 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_25 (0x02) – 5 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_50 (0x03) – 10 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_75 (0x04) – 15 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_100 (0x05) – 20 MHz bandwidth All other values are reserved.
		Enum16	band	2	Band. Values: • 120 to 168 – LTE band classes
Type	0x14			1	Scell Index (Deprecated; use Scell Information Array)
Length	1			2	
Value	→	uint8	scell_idx	1	Scell index.

Type	0x15			1	Scell Information Array
Length	Var			2	
Value	→	uint8	cphy_scell_info_list_len	1	Number of sets of the following elements: • pci • freq • cphy_ca_dl_bandwidth • band • scell_state • scell_idx
		uint16	pci	2	Physical cell ID of the Scell. Range: 0 to 503.
		Uint16	freq	2	Absolute cell's frequency. Range: 0 to 65535.
		Enum	cphy_ca_dl_bandwidth	4	Downlink bandwidth. Values: • NAS_LTE_CPHY_CA_BW_NRB_ 6 (0x00) – 1.4 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_ 15 (0x01) – 3 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_ 25 (0x02) – 5 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_ 50 (0x03) – 10 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_ 75 (0x04) – 15 MHz bandwidth • NAS_LTE_CPHY_CA_BW_NRB_ 100 (0x05) – 20 MHz bandwidth All other values are reserved.
		Enum16	band	2	Band. Values: • 120 to 168 – LTE band classes
		enum	scell_state	4	Scell state. Values: • NAS_LTE_CPHY_SCELL_STATE_ DECONFIGURED (0x00) – Deconfigured • NAS_LTE_CPHY_SCELL_STATE_ CONFIGURED_DEACTIVATED (0x01) – Configured and deactivated • NAS_LTE_CPHY_SCELL_STATE_ CONFIGURED_ACTIVATED (0x02) – Configured and activated All other values are reserved.
		Uint8	scell_idx	1	Scell index. Range: 0 to 7.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_INVALID_ARG	Value field of one or more TLVs in the request message contains an invalid value
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_INFO_UNAVAILABLE	Information is not available at this time

7.2.19.3. Description of QMI_NAS_GET_LTE_CPHY_CA_INFO REQ/RESP

This command retrieves the information from the previous QMI_NAS_LTE_CPHY_CA_IND indication sent in response to a carrier aggregation event in the 3GPP LTE network.

8. Wireless Message Service (QMI_WMS)

QMI_WMS provides commands related to wireless messaging to applications running on a host PC, including:

- Sending raw data
- Writing, reading, and deleting data to/from device memory
- Modifying tags
- Setting and reading routes
- Reading and setting Short Message Service Center (SMSC) addresses

It is expected that user-level applications, e.g., connection managers and/or device drivers residing on the Terminal Equipment (TE), will use QMI_WMS to access such functionality on the MSM™ device. QMI_WMS is a QMI native service, conforming to the generalized behavior for QMI services, as defined in 80-VB816-1.

8.1. Theory of Operation

8.1.1. Generalized QMI Service Compliance

The QMI_WMS service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

8.1.2. WMS Service Type

WMS is assigned QMI service type 0x05.

8.1.3. Message Definition Template

8.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

8.1.4. QMI_WMS Fundamental Concepts

8.1.4.1. Wireless Message Network Architecture

A network supports wireless messaging with three main components:

- A wireless MSM device supporting WMS is designated as an Endpoint (EP) (refer to 3GPP2 C.S0015-A) within a larger network. WMS Eps are capable of both originating and terminating WMS messages.
- A wireless network may include one or more SMSCs (refer to 3GPP2 C.S0015-A). These are responsible for routing WMS messages between the origination and destination Eps.
- Relay points are included in the wireless network and are responsible for safely transferring messages between Eps and SMSCs within the network.

These components are the main building blocks that make up a short messaging network and can be found in both CDMA and WCDMA networks, although the names may be slightly different.

When the MSM device sends a WMS message, it is submitted to the wireless network using a Base Station (BS). The BS relays the WMS message to the SMSC, which acknowledges the message, then the BS, in turn, relays the acknowledgment back to the MSM device. The SMSC is then responsible for routing and delivery of the WMS to the destination EP.

The WMS architecture for a CDMA network can be found in 3GPP2 C.S0015-A Figure 1.5.1. The WMS architecture for a WCDMA network can be found in 3GPP TS 23.040 Figure 4 and Figure 5.

8.1.4.2. Wireless Message Types

QMI_WMS supports the message types defined in the standardized protocols for CDMA in 3GPP2 C.S0015-A and WCDMA in 3GPP TS 23.040. Both CDMA and WCDMA support Point-to-Point (PP) and Broadcast (BC) (refer to 3GPP2 C.S0015-A) message functionality. Messages are further classified into Mobile-Originated (MO) and Mobile-Terminated (MT) messages (refer to 3GPP2 C.S0015-A), relative to the control point.

The WMS protocol dictates that a PP WMS message solicits a response or Acknowledgment (ACK) (refer to 3GPP2 C.S0015-A) to the network upon receipt by the addressee. The ACK is relayed to the network SMSC verifying delivery, but not to the originator unless requested in the original message.

QMI_WMS supports point-to-point messaging and associated WMS types, and broadcast messaging. It also supports sending ACKs to the network.

8.1.4.3. WMS Client/Service Architecture

The WMS service provides its clients the means to send messages over the wireless network, read and write messages to persistent storage on the device, and to configure various WMS service configuration options.

The WMS service running on the MSM device supports multiple clients. In addition, other WMS service clients may operate within the MSM device.

Note that, even if no QMI_WMS or other WMS clients are active, the WMS service is still running on the MSM device. This allows the MSM device to accept, store (if configured to allow), and acknowledge delivery of incoming WMS messages.

8.1.4.4. Incoming Message Indication

Each QMI_WMS control point may independently enable indications of new MT messages. When the WMS service accepts a new MT message from the wireless network, a QMI_WMS indication message is sent to each QMI_WMS control point that has enabled notification.

Resetting the QMI_WMS control point returns an MT message indication back to the default disabled state. After each reset, the control point must again register for these indications using the QMI_WMS_SET_EVENT_REPORT message.

8.1.4.5. WMS Message Layers

The WMS message layers are:

- WMS teleservice layer – This layer is also known as the Transfer Protocol data unit (TPDU) layer in GSM/WCDMA. In this layer, the message is sent, received, and presented to users. The message structure in this layer includes a message body encoded with a specified encoding, a message identifier that enables the MSM device to transfer messages to/from the wireless network, the date of reception, etc. Refer to 3GPP2 C.S0015-A Section 4 and 3GPP TS 23.040 Section 9.2.3 for details of the parameters defined for this layer.
- WMS transport layer – In addition to carrying the WMS teleservice layer message, the message in this layer is considered as a sequence of octets containing information, such as a teleservice ID, message originator or recipient address, bearer reply option in CDMA, or service center address in GSM/WCDMA. Refer to 3GPP2 C.S0015-A Section 3.4 and 3GPP TS 23.040 Section 9.2.3.24 for details of the parameters defined for this layer.

8.1.4.6. Raw Message Parameters

The raw QMI_WMS messages defined later in this document take or return transport layer encoded messages as parameters.

8.1.4.7. Routes

A message category is defined as a unique tuple of:

- WMS message type (PP or BC)
- WMS message class

For each message type, PP or BC, there are one or more message classes, depending on the message protocol in use. CDMA defines one message class, while WCDMA defines five unique classes.

A message action is defined as a unique tuple of:

- WMS action, when receiving a message of this type and class
- WMS storage type (for store actions)

When a new message arrives, its type and class determine how the message is processed. When the message is delivered from the network, there are four possibilities: discard, store and notify, transfer only, or transfer and ACK. Discard accepts the message and then deletes it without storing the message. Store and notify writes the message to the designated memory storage on the MSM device and then sends notification to all QMI_WMS control points that have enabled incoming message notification. Transfer only transfers the message to the client and lets the client send the ACK to the network. Transfer and ACK transfers the message to the client and sends the ACK to the network.

There are other routing actions provided by the MSM WMS service that are not applicable to QMI_WMS. Route actions that are not supported by QMI_WMS are returned as unknown by the QMI_WMS_GET_ROUTES response message. If one of these actions is set by an external MSM WMS client, unexpected licit r results.

A message route refers to the action associated with a message category. Consequently, a message route is described by its message category and the action performed when a message matching that category is received by the device.

8.1.4.8. Device Memory Storage

The types of memory that are available on the MSM device to store messages are:

- User Identity Module (UIM) – Removable media used by the phone
- Nonvolatile (NV) – Persistent memory located within the phone

Each WMS protocol supporting these storage types is allocated its own storage. These storage types are unique to each protocol and cannot be accessed by the other protocols.

8.1.5. Service State Variables

8.1.5.1. Shared State Variables

The following is a shared state variable for all control points using the QMI_WMS service:

Name	Description	Possible values
message_mode	System mode used for a WMS message	• CDMA • WCDMA

NOTE:

If the device is capable of supporting more than one message protocol, this shared state variable will not be maintained.

8.1.5.2. State Variables Per Control Point

Name	Description	Possible values	Default value
report_mt_message	Whether new MT messages are reported to a control point	• FALSE • TRUE	FALSE
report_call_control_info	Whether MO SMS call control information is	• FALSE	FALSE

	reported to a control point	• TRUE	
report_mwi_message	Whether new MWI messages are reported to a control point	• FALSE • TRUE	FALSE

8.2. QMI_WMS Messages

Table 8-1 QMI_WMS messages

Command	ID	Description
QMI_WMS_RAW_SEND	0x0020	Sends a new message in its raw format.
QMI_WMS_RAW_READ	0x0022	Reads a message from the device memory storage and returns the message in its raw format.
QMI_WMS_MODIFY_TAG	0x0023	Modifies the metadata tag of a message in the MSM device storage.
QMI_WMS_DELETE	0x0024	Deletes the message in a specified memory location.
QMI_WMS_GET_MESSAGE_PROTOCOL	0x0030	Queries the message protocol currently in use for the WMS client.
QMI_WMS_LIST_MESSAGES	0x0031	Requests a list of WMS message indices and meta information within the specified memory storage, matching a specified message tag.

8.2.1. QMI_WMS_RAW_SEND

Sends a new message in its raw format.

WMS message ID

0x0020

Version introduced

Major – 1, Minor – 1

8.2.1.1. Request – QMI_WMS_RAW_SEND_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Raw Message Data	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Raw Message Data
Length	Var			2	
Value	→	enum8	format	1	Message format. Values: • 0x00 – MESSAGE_FORMAT_CDMA – CDMA • 0x02 to 0x05 – Reserved • 0x06 – MESSAGE_FORMAT_GW_PP – GW_PP
		uint16	len	2	Number of sets of the following elements: • raw_message
		uint8	raw_message	Var	Raw message data.

Optional TLVs

Name	Version introduced	Version last modified
Force on DC*	Unknown	1.1
Follow on DC*	Unknown	1.1
Link Control**	Unknown	1.2
SMS on IMS	1.4	1.9
Retry Message	Unknown	1.5
Retry Message ID	Unknown	1.5
Link Control Enabling Information**	1.15	1.15

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Force on DC*
Length	2			2	
Value	→	boolean	force_on_dc	1	Force the message to be sent on the CDMA dedicated channel. Values: • 0x00 – Do not care about the channel on which the message is sent • 0x01 – Request to send the message over the dedicated channel
		enum8	so	1	Service option. Values: • 0x00 – SO_AUTO – AUTO (choose the best service option while setting up the DC) • 0x06 – SO_6 – Service option 6 • 0x0E – SO_14 – Service option 14
Type	0x11			1	Follow on DC*
Length	1			2	
Value	→	enum8	follow_on_dc	1	Flag to request to not disconnect the CDMA dedicated channel after the send operation is completed; this TLV can be included if more messages are expected to follow. Values: • 0x01 – FOLLOW_ON_DC_ON – On (do not disconnect the DC after the send operation) Any value other than 0x01 in this field is treated as an absence of this TLV.
Type	0x12			1	Link Control**
Length	1			2	
Value	→	uint8	link_timer	1	Keeps the GW SMS link open for the specified number of seconds; can be enabled if more messages are expected to follow
Type	0x13			1	SMS on IMS
Length	1			2	
Value	→	boolean	sms_on_ims	1	Indicates whether the message is to be sent on IMS. Values: • 0x00 – Message is not to be sent on IMS • 0x01 – Message is to be sent on IMS • 0x02 to 0xFF – Reserved Note: In minor version 9, the implementation was changed in such a way that inclusion of this TLV may affect the SMS routing differently.
Type	0x14			1	Retry Message
Length	1			2	
Value	→	enum8	retry_message	1	Indicates this message is a retry message. Values: • 0x01 – WMS_MESSAGE_IS_A_ RETRY – Message is a retry message

					Note: Any value other than 0x01 in this field is treated as an absence of this TLV.
Type	0x15			1	Retry Message ID
Length	4			2	
Value	→	uint32	retry_message_id	4	Message ID to be used in the retry message. The message ID specified here is used instead of the licit ID encoded in the raw message. Note: This TLV is valid only if the Retry Message TLV is specified and set to 0x01.
Type	0x16			1	Link Control Enabling Information**
Length	1			2	
Value	→	boolean	link_enable_mode	1	Indicates whether to keep the link control enabled, until the option is modified by the client. Values: • 0x00 – Enable link control once so that the lower layer keeps the link up for a specified time until the next MO SMS is requested or the timer expires • 0x01 – Always enable link control Note: This TLV is valid only if the Link Control TLV is specified and is set to a valid timer value.

8.2.1.2. Response – QMI_WMS_RAW_SEND_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLVs are always present in the response.

Name	Version introduced	Version last modified
Result Code	1.1	1.1
Message ID	1.1	1.19

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Message ID
Length	2			2	
Value	→	uint16	message_id	2	WMS message ID.

Optional TLVs

If the Result Code TLV indicates failure and the qmi_error field is set to QMI_ERR_CAUSE_CODE, the following parameters are returned.

Name	Version introduced	Version last modified
Cause Code*	1.1	1.1
Error Class*	Unknown	1.2
GW Cause Info**	Unknown	1.3
Message Delivery Failure Type	Unknown	1.4
Message Delivery Failure Cause	Unknown	1.5
Call Control Modified Information**	Unknown	1.5

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Cause Code*
Length	2			2	
Value	→	enum16	cause_code	2	WMS cause code per 3GPP2 N.S0005-0 Section 6.5.2.125; see Table A-1 for more information
Type	0x11			1	Error Class*
Length	1			2	
Value	→	enum8		1	Error class. Values: • 0x00 – ERROR_CLASS_TEMPORARY • 0x01 – ERROR_CLASS_PERMANENT
Type	0x12			1	GW Cause Info**
Length	3			2	
Value	→	enum16	rp_cause	2	GW RP cause per 3GPP TS 24.011 Section 8.2.5.4; see Table A-2 for more information.
		Enum8	tp_cause	1	GW TP cause per 3GPP TS 23.040 Section 9.2.3.22; see Table A-3 for more information.
Type	0x13			1	Message Delivery Failure Type
Length	1			2	
Value	→	enum8	message_delivery_failure_type	1	Message delivery failure type. Values: • 0x00 – WMS_MESSAGE_DELIVERY_FAILURE_TEMPORARY • 0x01 – WMS_MESSAGE_DELIVERY_FAILURE_PERMANENT
Type	0x14			1	Message Delivery Failure Cause
Length	1			2	
Value	→	enum8	message_delivery_failure_cause	1	Message delivery failure cause. Values: • 0x00 – WMS_MESSAGE_BLOCKED_DUE_TO_CALL_CONTROL
Type	0x15			1	Call Control Modified Information**
Length	Var			2	
Value	→	uint8	alpha_id_len	1	Number of sets of the following elements: • alpha_id
		uint8	alpha_id	Var	Alpha ID.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing

QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_ARG_TOO_LONG	Argument passed in a TLV was larger than the available storage in the device
QMI_ERR_MISSING_ARG	A required TLV was not provided
QMI_ERR_INVALID_ARG	One of the parameters specified contains an invalid value
QMI_ERR_CAUSE_CODE	SMS cause code: For CDMA, refer to 3GPP2 N.S0005-0 Section 6.5.2.125; for GW, refer to 3GPP TS 27.005 Section 3.2.5
QMI_ERR_ENCODING	Message is not encoded properly
QMI_ERR_INVALID_MESSAGE_ID	Message ID specified for the message is invalid
QMI_ERR_MESSAGE_NOT_SENT	Message could not be sent
QMI_ERR_MESSAGE_DELIVERY_ FAILURE	Message could not be delivered
QMI_ERR_DEVICE_NOT_READY	Device is not ready to send the message
QMI_ERR_NETWORK_NOT_READY	Network is not ready to send the message
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Selected operation is not supported by the device
QMI_ERR_OP_NETWORK_ UNSUPPORTED	Selected operation is not supported by the network
QMI_ERR_SMSC_ADDR	SMSC address specified is invalid
QMI_ERR_CALL_FAILED	Cannot bring up the CDMA dedicated channel
QMI_ERR_MSG_BLOCKED	Message is blocked because the recipient is not on the FDN
QMI_ERR_INVALID_OPERATION	SMS on IMS TLV is set to TRUE; however, IMS is not registered

8.2.1.3. Description of QMI_WMS_RAW_SEND REQ/RESP

This command requests that a WMS message be sent by the MSM device.

Raw send can be used only with transport layer-encoded messages:

- For 3GPP2 devices, transport layer messages are in Layer 3 format (refer to 3GPP2 C.S0015-A. The control point must ensure that the raw message the following fields encoded (refer to 3GPP2 C.S0015-A Section 3.4.2 for a detailed description of these fields):
  - Teleservice ID
  - Destination Address
  - Bearer Reply Option – Used to configure the setting to get the transport layer acknowledgment (only if the control point is interested in receiving the transport layer acknowledgment)
- For 3GPP devices, transport layer messages are in PDU format (refer to 3GPP TS 27.005). The raw message in PDU format must include the SMSC address length identifier as the first byte of the message. If this byte is set to zero, the SMSC provisioned for the device is used (as specified using QMI_WMS_SET_SMSC_ADDRESS). Otherwise, the first byte indicates the length, in bytes, of the SMSC address that is included after the first byte, but before the start of the actual PDU message. The equivalent AT command for this request is AT+CMGS (refer to 3GPP TS 27.005).

If a raw message is not in transport layer format or includes transport layer parameters that cannot be processed for any reason, the command fails and returns a QMI_ERR_ENCODING error. A successful result value in the response implies that the given message send request is complete. The message is not stored in

memory; it is only sent by the MSM device. To store the message in memory, the QMI_WMS_RAW_WRITE command must be used.

The behaviors of the Force on DC and Follow on DC TLVs are as follows:

- For 3GPP2 devices, the Force on DC TLV can be included in the request, with value TRUE, to send the message over the CDMA dedicated channel. If the service fails to bring up the dedicated channel, a QMI_ERR_CALL_FAILED error is returned in the response.
- If more messages are expected, the Follow on DC TLV can be included in the request.
- If the Follow on DC TLV is absent and the Force on DC TLV is present (with value TRUE or FALSE), the service attempts to tear down the CDMA dedicated channel after the send operation. However, this disconnection is not guaranteed immediately, e.g., if there are pending messages. The service does not wait for the disconnection to send the QMI_WMS_RAW_SEND_RESP.
- The Follow on DC TLV is ignored if it is sent in the absence of the Force on DC TLV in the request.

For GW, if more messages are expected, the Link Control TLV can be included. The link is kept open for the specified number of seconds. The link can be kept open for a maximum of 5 sec; setting the link timer to a value greater than 5 elicits a QMI_ERR_INVALID_ARG error. The suggested value for the link timer is 5 sec. If multiple messages are expected, the link control can be kept enabled by setting the optional Link Control Enabling Information TLV to 1. If this optional TLV is not present, the default behavior is to keep the link open for the number of seconds specified in the Link Control TLV. The Link Control TLV is required to enable link control; setting the Link Control Enabling Information TLV without the Link Control TLV elicits a QMI_ERR_MISSING_ARG error.

If the Result Code TLV indicates failure and the qmi_error field is set to QMI_ERR_CAUSE_CODE, 3GPP2 devices return the Cause Code and the Error Class TLVs. 3GPP devices return the GW Cause Information TLV.

If the Result Code TLV indicates failure and the qmi_error field is set to QMI_ERR_MESSAGE_DELIVERY_FAILURE, the mobile may return the Message Delivery Failure Type TLV.

If the message was successfully sent but modified due to call control, the mobile may return the Call Control Modified Information TLV.

The Retry Message TLV may be included to indicate this is a retry message. Sending a message as a retry changes the behavior of the message; a message should be specified as a retry only after the message has been sent once and failed. There are two options for setting the message ID for a retry message:

- Retry Message ID TLV not included – The message ID encoded in the raw message is left unchanged.
- Retry Message ID TLV included – The message ID encoded in the raw message is updated with this specified value.

Messages should be sent one at a time. The client should wait for the response from the previous message before sending the next message.

If the SMS on IMS TLV is not included, WMS uses IMS whenever possible, i.e., IMS is the preferred transport. If the TLV is included with value 0x00 (FALSE), WMS does not use IMS as the transport. If the TLV is included with value 0x01 (TRUE) and IMS cannot be used, a QMI_ERR_INVALID_OPERATION error is returned.

8.2.2. QMI_WMS_RAW_READ

Reads a message from the device memory storage and returns the message in its raw format.

WMS message ID

0x0022

Version introduced

Major – 1, Minor – 1

8.2.2.1. Request – QMI_WMS_RAW_READ_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Message Memory Storage Identification	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Message Memory Storage Identification
Length	5			2	
Value	→	enum8	storage_type	1	Memory storage. Values: • 0x00 – STORAGE_TYPE_UIM – UIM • 0x01 – STORAGE_TYPE_NV – NV
		uint32	storage_index	4	Memory index. (Start from 0)

Optional TLVs

Name	Version introduced	Version last modified
Message Mode	Unknown	1.2
SMS on IMS	1.4	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Message Mode
Length	1			2	
Value	→	enum8	message_mode	1	Message mode. Values: • 0x00 – MESSAGE_MODE_CDMA – CDMA • 0x01 – MESSAGE_MODE_GW – GW
Type	0x11			1	SMS on IMS
Length	1			2	
Value	→	boolean	sms_on_ims	1	Indicates whether the message is to be read from IMS. Values:

					• 0x00 – Message is not to be read from IMS • 0x01 – Message is to be read from IMS • 0x02 to 0xFF – Reserved Note: This TLV is deprecated from minor version 9.

8.2.2.2. Response – QMI_WMS_RAW_READ_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLVs are present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Raw Message Data	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Raw Message Data
Length	Var			2	
Value	→	enum8	tag_type	1	Message tag. Value: • 0x00 – TAG_TYPE_MT_READ • 0x01 – TAG_TYPE_MT_NOT_READ • 0x02 – TAG_TYPE_MO_SENT • 0x03 – TAG_TYPE_MO_NOT_SENT
		enum8	format	1	Message format. Value: • 0x00 – MESSAGE_FORMAT_CDMA – CDMA • 0x02 to 0x05 – Reserved • 0x06 – MESSAGE_FORMAT_GW_PP – GW_PP • 0x08 – MESSAGE_FORMAT_MWI – MWI
		uint16	len	2	Number of sets of the following elements: • data
		uint8	data	Var	Raw message data.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	A required TLV was not provided
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Selected operation is not supported by the device
QMI_ERR_INVALID_ARG	One of the parameters specified contains an invalid value
QMI_ERR_INVALID_INDEX	Memory storage index specified in the request is invalid
QMI_ERR_NO_ENTRY	No message exists at the specified memory storage designation
QMI_ERR_TDPU_TYPE	Message in memory contains a TPDU type that cannot be read as a raw message

8.2.2.3. Description of QMI_WMS_RAW_READ REQ/RESP

This command reads a WMS message from memory storage on the MSM device.

The message is returned in the response in its raw, teleservice layer encoding without being decoded.

- For 3GPP2 devices, transport layer messages are in Layer 3 format (refer to 3GPP2 C.S0015-A).
- For 3GPP devices, transport layer messages are in PDU format (refer to 3GPP TS 27.005). The raw message returned in PDU format includes the SMSC address length identifier as the first byte of the message. This byte indicates the length, in bytes, of the SMSC address that is included after the first byte, but before the start of the actual PDU message. The equivalent AT command for this request is AT+CMGR (refer to 3GPP TS 27.005).

The response also includes metadata for the message, including the tag and format.

For 3GPP devices, requests to read messages of an invalid TPDU type (refer to 3GPP TS 27.005) elicit a QMI_ERR_TPDU_TYPE error.

The Message Mode TLV must be included if the device is capable of supporting more than one protocol. If the TLV is not included, a QMI_ERR_MISSING_ARG error is returned.

8.2.3. QMI_WMS_MODIFY_TAG

Modifies the metadata tag of a message in the MSM device storage.

WMS message ID

0x0023

Version introduced

Major – 1, Minor – 1

8.2.3.1. Request – QMI_WMS_MODIFY_TAG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
WMS Message Tag	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	WMS Message Tag
Length	6			2	
Value	→	enum8	storage_type	1	Memory storage. Values: • 0x00 – STORAGE_TYPE_UIM • 0x01 – STORAGE_TYPE_NV
		uint32	storage_index	4	Memory index. (Start from 0)
		enum8	tag_type	1	Message tag. Values: • 0x00 – TAG_TYPE_MT_READ • 0x01 – TAG_TYPE_MT_NOT_READ • 0x02 – TAG_TYPE_MO_SENT • 0x03 – TAG_TYPE_MO_NOT_SENT

Optional TLVs

Name	Version introduced	Version last modified
Message Mode	Unknown	1.2

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Message Mode
Length	1			2	
Value	→	enum8	message_mode	1	Message mode. Values: • 0x00 – MESSAGE_MODE_CDMA – CDMA • 0x01 – MESSAGE_MODE_GW – GW

8.2.3.2. Response – QMI_WMS_MODIFY_TAG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INVALID_ARG	One of the parameters specified contains an invalid value
QMI_ERR_INVALID_INDEX	Memory storage index specified in the request is invalid
QMI_ERR_NO_ENTRY	No message exists at the specified memory storage designation
QMI_ERR_MISSING_ARG	A required TLV was not provided
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Selected operation is not supported by the device

8.2.3.3. Description of QMI_WMS_MODIFY_TAG REQ/RESP

This command modifies the metadata tag of the message at the specified index in the specified memory storage.

The response is sent after all necessary operations are complete.

If the request attempts to modify the tag of an empty storage index, a QMI_ERR_NO_ENTRY error results. The Message Mode TLV must be included if the device is capable of supporting more than one protocol. If the TLV is not included, a QMI_ERR_MISSING_ARG error is returned.

8.2.4. QMI_WMS_DELETE

Deletes the message in a specified memory location.

WMS message ID

0x0024

Version introduced

Major – 1, Minor – 1

8.2.4.1. Request – QMI_WMS_DELETE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Memory Storage	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Memory Storage
Length	1			2	
Value	→	enum8	storage_type	1	Memory storage. Values: • 0x00 – STORAGE_TYPE_UIM • 0x01 – STORAGE_TYPE_NV

Optional TLVs

Name	Version introduced	Version last modified
Memory Index	Unknown	1.1
Message Tag	Unknown	1.1
Message Mode	Unknown	1.2

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Memory Index
Length	4			2	
Value	→	uint32	index	4	Indicates the storage index of the relevant message. (Start from 0)
Type	0x11			1	Message Tag
Length	1			2	
Value	→	enum8	tag_type	1	Message tag. Values: • 0x00 – TAG_TYPE_MT_READ • 0x01 – TAG_TYPE_MT_NOT_READ • 0x02 – TAG_TYPE_MO_SENT

					• 0x03 – TAG_TYPE_MO_NOT_SENT
Type	0x12			1	Message Mode
Length	1			2	
Value	→	enum8	message_mode	1	Message mode. Values: • 0x00 – MESSAGE_MODE_CDMA – CDMA • 0x01 – MESSAGE_MODE_GW – GW

8.2.4.2. Response – QMI_WMS_DELETE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INVALID_ARG	One of the parameters specified contains an invalid value
QMI_ERR_INVALID_INDEX	Memory storage index specified in the request is invalid
QMI_ERR_NO_ENTRY	No message exists at the specified memory storage designation
QMI_ERR_MISSING_ARG	A required TLV was not provided
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Selected operation is not supported by the device

8.2.4.3. Description of QMI_WMS_DELETE REQ/RESP

This command deletes one or more WMS messages from a given memory storage on the MSM device. If no optional TLVs are specified, all messages are deleted from the storage location specified in the mandatory message store parameter.

The optional storage index and message tag parameters narrow the range of messages being deleted. If a message index is specified, the single message at that index from the specified memory store is deleted. If a message tag is specified, all messages in the specified memory store with a tag that matches the specified tag are deleted.

There are three ways to use this message:

- Specify the memory storage only – Deletes all messages from the memory storage

- Specify the memory storage and a message tag – Deletes all messages from the memory storage that match the specific message tag
- Specify the memory storage and a message index – Deletes only the message at the specific index from the memory storage

The message index and message tag TLVs may not be specified in the same request message. Doing so results in the QMI_ERR_INVALID_ARG error.

The Message Mode TLV must be included if the device is capable of supporting more than one protocol. If the TLV is not included, a QMI_ERR_MISSING_ARG error is returned.

All deletions are complete when the response is sent.

8.2.5. QMI_WMS_GET_MESSAGE_PROTOCOL

Queries the message protocol currently in use for the WMS client.

WMS message ID

0x0030

Version introduced

Major – 1, Minor – 1

8.2.5.1. Request – QMI_WMS_GET_MESSAGE_PROTOCOL_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

8.2.5.2. Response – QMI_WMS_GET_MESSAGE_PROTOCOL_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLV is present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Message Protocol	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Message Protocol
Length	1			2	
Value	→	enum8	message_protocol	1	WMS message protocol. Values: • 0x00 – MESSAGE_PROTOCOL_ CDMA • 0x01 – MESSAGE_PROTOCOL_ WCDMA

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	A required TLV was not provided
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Selected operation is not supported by the device

8.2.5.3. Description of QMI_WMS_GET_MESSAGE_PROTOCOL REQ/RESP

This command queries the current messaging mode of the device.

If the device is capable of supporting more than one message protocol, a QMI_ERR_OP_DEVICE_UNSUPPORTED error is returned.

8.2.6. QMI_WMS_LIST_MESSAGES

Requests a list of WMS message indices and meta information within the specified memory storage, matching a specified message tag.

WMS message ID

0x0031

Version introduced

Major – 1, Minor – 1

8.2.6.1. Request – QMI_WMS_LIST_MESSAGES_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Requested Memory Storage	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Requested Memory Storage
Length	1			2	
Value	→	enum8	storage_type	1	Memory storage. Values: • 0x00 – STORAGE_TYPE_UIM • 0x01 – STORAGE_TYPE_NV

Optional TLVs

Name	Version introduced	Version last modified
Requested Tag	Unknown	1.1
Message Mode	Unknown	1.2

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Requested Tag
Length	1			2	
Value	→	enum8	tag_type	1	Message tag. Values: • 0x00 – TAG_TYPE_MT_READ • 0x01 – TAG_TYPE_MT_NOT_READ • 0x02 – TAG_TYPE_MO_SENT • 0x03 – TAG_TYPE_MO_NOT_SENT
Type	0x11			1	Message Mode
Length	1			2	
Value	→	enum8	message_mode	1	Message mode. Values:

					• 0x00 – MESSAGE_MODE_CDMA – CDMA • 0x01 – MESSAGE_MODE_GW – GW

8.2.6.2. Response – QMI_WMS_LIST_MESSAGES_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response. The following mandatory TLVs are present if the result code is QMI_RESULT_SUCCESS.

Name	Version introduced	Version last modified
Message List	Unknown	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Message List
Length	Var			2	
Value	→	uint32	N_messages	4	Number of sets of the following elements: • message_index • tag_type
		uint32	message_index	4	Message index of each matched message. (Start from 0)
		enum8	tag_type	1	Message tag. Values: • 0x00 – TAG_TYPE_MT_READ • 0x01 – TAG_TYPE_MT_NOT_READ • 0x02 – TAG_TYPE_MO_SENT • 0x03 – TAG_TYPE_MO_NOT_SENT

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	A required TLV was not provided
QMI_ERR_INVALID_ARG	One of the parameters specified contains an invalid value
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Selected operation is not supported by the device

8.2.6.3. Description of QMI_WMS_LIST_MESSAGES REQ/RESP

This command generates and returns the number of WMS messages within the specified MSM memory storage.

An optional tag can be used to narrow the search criteria. When this optional tag is specified, only messages within the specified memory storage that match the specified tag are returned.

A successful response includes a count of messages matching the search criteria, along with a list of indices and tags for each matching message.

The Message Mode TLV must be included if the device is capable of supporting more than one protocol. If the TLV is not included, a QMI_ERR_MISSING_ARG error is returned.

9. User Identity Module Service (QMI_UIM)

The QMI_UIM provides applications running on a tethered device, such as Terminal Equipment (TE), to perform operations and to access the SIM card on Qualcomm MSM™ devices.

9.1. Theory of Operation

9.1.1. Generalized QMI Service Compliance

The QMI_UIM service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

9.1.2. UIM Service Type

The UIM is assigned QMI service type 0x0B.

9.1.3. Message Definition Template

9.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

9.1.4. QMI_UIM Fundamental Concepts

9.1.4.1. UIM Overview

The UIM module is used to access the card available on the device. The implementation supports SIM and USIM cards used for GSM/WCDMA devices, as well as RUIM and CSIM cards used for CDMA devices.

9.1.4.2. Multiple Applications on the Same Card

Multimode UICC cards allow true multimode operation with a single smart card. Previously, only one application was accessed. Up to two active provisioning applications are now possible, and application-specific requests are required to specify the application to which the request pertains.

9.1.4.3. Sessions

To access each application available on the card, sessions are used, as described in 80-VT475-1. The service automatically opens six sessions to the provisioning applications for both 1X and GSM/WCDMA and to the card in each slot for the files under MF. Depending on the capabilities of the target, some of these sessions might be invalid. The same notion of sessions is also used in the case of ICC cards, even though they do not support logical channels or applications.

In addition to providing access to files in the provisioning applications, the service also makes it possible to access other files, specifying the Application Identifier (AID) or the slot of the card; in these cases, an additional session is opened on-the-fly and maintained by the QMI service.

See Appendix A for more information, including a list of session types.

9.1.4.4. Commands Supported via QMI_UIM

The QMI_UIM module enables access to several features of the card.

- Access to files on the card
  - Read transparent and records
  - Write transparent and records
  - Get file attributes
- PIN operation
  - Enable and disable
  - Verify
  - Unblock
  - Change
- Other tasks
  - Support for file refresh operations
  - Support for personalization
  - Power up/power down the card
  - Authentication
  - Select provisioning applications from the card
  - Get modem configuration
  - Send raw APDUs to the card
  - SIM Access Profile

A control point can register for notification of card events. The QMI layer maintains a cached status of the card and updates the status with notifications from the modem.

9.1.4.5. Refresh Procedure via QMI_UIM

The card can automatically start a refresh procedure. Refresh is one of the proactive commands; however, it must be handled by the modem in a special way, because it might impact many other modules (e.g., call manager, phonebook).

During the refresh procedure, the control point receives multiple events at different stages.

Details about the events and the call flows for the various refresh scenarios are described in 80-VM566-1.

9.1.5. Service State Variables

9.1.5.1. Shared State Variables

No QMI_UIM state variables are shared across control points.

9.2. QMI_UIM Messages

Table 9-1 QMI_UIM messages

Command	ID	Description
QMI_UIM_READ_TRANSPARENT	0x0020	Provides read access to any transparent file in the card and provides access by the path.
QMI_UIM_GET_CARD_STATUS	0x002F	Retrieves the current status of the card.

9.2.1. QMI_UIM_READ_TRANSPARENT

Provides read access to any transparent file in the card and provides access by the path.

UIM message ID

0x0020

Version introduced

Major – 1, Minor – 0

9.2.1.1. Request – QMI_UIM_READ_TRANSPARENT_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Session Information	1.0	1.30
File ID	1.0	1.0
Read Transparent	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Session Information
Length	Var			2	
Value	→	enum8	session_type	1	Indicates the session type. Valid values: 0 through 24. See Table A-1 for the list of available session types with their values and descriptions.
		Uint8	aid_len	1	Number of sets of the following elements: • aid
		uint8	aid	Var	Application identifier value or channel ID. This value is required for nonprovisioning and for logical channel session types. It is ignored in all other cases.
Type	0x02			1	File ID
Length	Var			2	
Value	→	uint16	file_id	2	File ID.
		Uint8	path_len	1	Number of sets of the following elements: • aid
		uint8	path	Var	File path. This value must be the complete path of the file, which is a sequence block of 2 bytes (e.g., 0x3F00 0x7FFF).
Type	0x03			1	Read Transparent
Length	4			2	
Value	→	uint16	offset	2	Offset for the Read operation.
		Uint16	length	2	Length of the content to be read. The value 0 is used to read the complete file.

Optional TLVs

Name	Version introduced	Version last modified
Response in Indication	1.12	1.12
Encrypt Data	1.18	1.18
Encrypt Request Data	1.45	1.45

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Response in Indication
Length	4			2	
Value	→	uint32	indication_token	4	When this TLV is present, it indicates that the result must be provided in a subsequent indication.
Type	0x11			1	Encrypt Data
Length	1			2	
Value	→	boolean	encryption	1	Indicates whether the data read from the card is to be encrypted.
Type	0x12			1	Encrypt Request Data
Length	4			2	
Value	→	boolean	encryption_ext	1	Indicates whether the session information, file ID, and data read from the card are to be encrypted.

9.2.1.2. Response – QMI_UIM_READ_TRANSPARENT_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
Result Code	1.0	1.29

Optional TLVs

Name	Version introduced	Version last modified
Card Result	1.0	1.0
Read Result	1.0	1.0
Response in Indication	1.12	1.12
Encrypted Data	1.18	1.18
Requested Length	1.20	1.20
Long Data Token	1.35	1.35
Read Result With Request Information	1.45	1.45

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Card Result

Length	2			2	
Value	→	uint8	sw1	1	SW1 status code received from the card.
		Uint8	sw2	1	SW2 status code received from the card.
Type	0x11			1	Read Result
Length	Var			2	
Value	→	uint16	content_len	2	Number of sets of the following elements: • content
		uint8	content	Var	Read content; sequence of bytes as read from the card.
Type	0x12			1	Response in Indication
Length	4			2	
Value	→	uint32	indication_token	4	When this TLV is present, it indicates that the result is provided in a subsequent indication.
Type	0x13			1	Encrypted Data
Length	1			2	
Value	→	boolean	encryption	1	Indicates whether the data from the card passed in read_result is encrypted.
Type	0x14			1	Requested Length
Length	2			2	
Value	→	uint16	file_length	2	When this TLV is present, the requested length exceeds the maximum size supported by the QMI UIM. QMI_ERR_INSUFFICIENT_RESOURCES is returned to the client and this value indicates the total length.
Type	0x15			1	Long Data Token
Length	4			2	
Value	→	uint32	long_data_token	4	When this TLV is present, the requested length exceeds the maximum size supported by QMI UIM. QMI_ERR_INSUFFICIENT_RESOURCES is returned to the client, and the result is provided in subsequent indications. Long data token is used to reconstruct the entire read response, possibly spanning multiple indications.
Type	0x16			1	Read Result With Request Information
Length	Var			2	
Value	→	uint16	read_result_ext_len	2	Number of sets of the following elements: • read_result_ext
		opaque	read_result_ext	Var	Read request information and content. Includes session information, file ID as provided in the read request, and the sequence of bytes as read from the card. See Section D.5 for the result format.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate the response.
QMI_ERR_ACCESS_DENIED	Access to the requested file is denied. This can occur when there is an attempt to access a PIN-protected file.
QMI_ERR_SIM_FILE_NOT_FOUND	File is not present on the card.

QMI_ERR_ARG_TOO_LONG	Path in the request was too long.
QMI_ERR_INVALID_ARG	Parameters passed as input were invalid (e.g., an odd length of the path).
QMI_ERR_DEVICE_NOT_READY	Device is not ready.
QMI_ERR_INSUFFICIENT_ RESOURCES	Response is longer than the maximum supported size.
QMI_ERR_NOT_PROVISIONED	File is not provisioned on the card.

9.2.1.3. Description of QMI_UIM_READ_TRANSPARENT REQ/RESP

This function provides read access to any transparent file in the card and access by the path.

The client using this function is only able to access files that have a flat data structure. An error is reported for all other cases.

The response contains the status code received from the card (SW1 and SW2) when the card responded to the read request.

The client can pass a token in the request to receive the result in a subsequent QMI_UIM_READ_TRANSPARENT_IND indication. In this case, the immediate response indicates only whether the command was received correctly for processing. The service passes the token back in the immediate response to indicate that it supports the indication. The service then passes the same token in the indication, so that the client can match it with the original request.

A client must be able to accommodate the case where the optional indication is not supported by the service and the return of the complete result in the response, even when the request indicates that the indication is to be used.

A client can request to encrypt the data read from the card. This procedure guarantees protection against a man-in-the-middle attack between the service and the client. The security algorithm and keys used for the encryption are not part of this document. The service might not support the encryption and provide a non-encrypted response.

A client can request to encrypt the session and file information in addition to the data read from the card.

A client can request either to encrypt the data read from the card or to encrypt session and file information along with the data read from the card.

The service returns QMI_ERR_INSUFFICIENT_RESOURCES when the file being read is too large, in which case the file_length field contains the total length of the file. The client can use this information to request the data with multiple operations that read smaller blocks. Additionally, the Long Data Token TLV is sent. The service then sends one or more QMI_UIM_READ_TRANSPARENT_LONG_IND indications to the client. The client can use the long_data_token and file_length fields to reconstruct the final data for the read operation.

Other error codes not listed in the preceding table are handled as QMI_ERR_INTERNAL.

9.2.2. QMI_UIM_GET_CARD_STATUS

Retrieves the current status of the card.

UIM message ID

0x002F

Version introduced

Major – 1, Minor – 0

9.2.2.1. Request – QMI_UIM_GET_CARD_STATUS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Extended Card Status	1.30	1.30

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Extended Card Status
Length	1			2	
Value	→	boolean	extended_card_status	1	Indicates whether the extended card status is requested. Valid values: • 0 – Legacy card status (up to 2 cards) • 1 – Extended card status If the Extended Card Status TLV is missing, the legacy card status with support for only 2 cards is returned.

9.2.2.2. Response – QMI_UIM_GET_CARD_STATUS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified

Result Code	1.0	1.0

Optional TLVs

Name	Version introduced	Version last modified
Card Status	1.0	1.37
Hot-Swap Status	1.13	1.14
Valid Card Status	1.23	1.23
Extended Card Status	1.30	1.37
Extended Hot-Swap Status	1.30	1.30
SIM Busy Status	1.35	1.35

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Card Status
Length	Var			2	
Value	→	uint16	index_gw_pri	2	Index of the primary GW provisioning application. The most significant byte indicates the slot (starting from 0), while the least significant byte indicates the application for that slot (starting from 0). The value 0xFFFF identifies that the session does not exist.
		Uint16	index_1x_pri	2	Index of the primary 1X provisioning application. The most significant byte indicates the slot (starting from 0), while the least significant byte indicates the application for that slot (starting from 0). The value 0xFFFF identifies that the session does not exist.
		Uint16	index_gw_sec	2	Index of the secondary GW provisioning application. The most significant byte indicates the slot (starting from 0), while the least significant byte indicates the application for that slot (starting from 0). The value 0xFFFF identifies that the session does not exist.
		Uint16	index_1x_sec	2	Index of the secondary 1X provisioning application. The most significant byte indicates the slot (starting from 0), while the least significant byte indicates the application for that slot (starting from 0). The value 0xFFFF identifies that the session does not exist.
		Uint8	num_slot	1	Indicates the number of slots available on the device. The following block is repeated for each slot.
		Enum8	card_state	1	Indicates the state of the card. Valid values: • UIM_CARD_STATE_ABSENT (0x00) – Absent • UIM_CARD_STATE_PRESENT (0x01) – Present • UIM_CARD_STATE_ERROR (0x02) – Error
		enum8	upin_state	1	Indicates the state of UPIN. Valid values: • UIM_PIN_STATE_UNKNOWN (0x00) – Unknown •

					UIM_PIN_STATE_ENABLED_NOT_VERIFIED (0x01) – Enabled and not verified • UIM_PIN_STATE_ENABLED_VERIFIED (0x02) – Enabled and verified • UIM_PIN_STATE_DISABLED (0x03) – Disabled • UIM_PIN_STATE_BLOCKED (0x04) – Blocked • UIM_PIN_STATE_PERMANENTLY _BLOCKED (0x05) – Permanently blocked
		uint8	upin_retries	1	Indicates the number of retries remaining to verify the UPIN.
		Uint8	upuk_retries	1	Indicates the number of retries remaining to unblock the UPIN.
		Enum8	error_code	1	Indicates the reason for the card error, and is valid only when the card state is Error. Valid values: • UIM_CARD_ERROR_CODE_UNKNOWN (0x00) – Unknown • UIM_CARD_ERROR_CODE_POWER_DOWN (0x01) – Power down • UIM_CARD_ERROR_CODE_POLL_ERROR (0x02) – Poll error • UIM_CARD_ERROR_CODE_NO_ATR _RECEIVED (0x03) – No ATR received • UIM_CARD_ERROR_CODE_VOLT _MISMATCH (0x04) – Volt mismatch • UIM_CARD_ERROR_CODE_PARITY_ERROR (0x05) – Parity error • UIM_CARD_ERROR_CODE_POSSIBLY _REMOVED (0x06) – Unknown, possibly removed • UIM_CARD_ERROR_CODE_SIM _TECHNICAL_PROBLEMS (0x07) – Card returned technical problems • UIM_CARD_ERROR_CODE_NULL_BYTES (0x08) – Card returned NULL bytes • UIM_CARD_ERROR_CODE_SAP _CONNECTED (0x09) – Terminal in SAP mode Other values are possible and reserved for future use. When an unknown value is received, it is to be handled as “Unknown”.
		Uint8	num_app	1	Number of sets of the following elements: • app_type • app_state • perso_state • perso_feature • perso_retries • perso_unblock_retries • aid_len • aid_value • univ_pin • pin_state

					• pin_retries • puk_retries • pin_state • pin_retries • puk_retries
		enum8	app_type	1	Indicates the type of the application. Valid values: • UIM_APP_TYPE_UNKNOWN (0x00) – Unknown • UIM_APP_TYPE_SIM (0x01) – SIM card • UIM_APP_TYPE_USIM (0x02) – USIM application • UIM_APP_TYPE_RUIM (0x03) – RUIM card • UIM_APP_TYPE_CSIM (0x04) – CSIM application • UIM_APP_TYPE_ISIM (0x05) – ISIM application Other values are reserved for the future and are to be handled as “Unknown”.
		Enum8	app_state	1	Indicates the state of the application. Valid values: • UIM_APP_STATE_UNKNOWN (0x00) – Unknown • UIM_APP_STATE_DETECTED (0x01) – Detected • UIM_APP_STATE_PIN1_OR_UPIN_REQ (0x02) – PIN1 or UPIN is required • UIM_APP_STATE_PUK1_OR_PUK_REQ (0x03) – PUK1 or PUK for UPIN is required • UIM_APP_STATE_PERSON_CHECK_REQ (0x04) – Personalization state must be checked • UIM_APP_STATE_PIN1_PERM_BLOCKED (0x05) – PIN1 is blocked • UIM_APP_STATE_ILLEGAL (0x06) – Illegal • UIM_APP_STATE_READY (0x07) – Ready
		enum8	perso_state	1	Indicates the state of the personalization for the application. Valid values: • UIM_PERSO_STATE_UNKNOWN (0x00) – Unknown • UIM_PERSO_STATE_IN_PROGRESS (0x01) – Personalization operation is in progress • UIM_PERSO_STATE_READY (0x02) – Ready • UIM_PERSO_STATE_CODE_ REQ (0x03) – Personalization code is required • UIM_PERSO_STATE_PUK_REQ (0x04) – PUK for personalization code is required • UIM_PERSO_STATE_PERMANENTLY _BLOCKED (0x05) – Permanently blocked
		enum8	perso_feature	1	Indicates the personalization feature. This applies only when a personalization code is required to deactivate or unblock personalization. Valid values: • UIM_PERSO_FEATURE_STATUS_ GW_NETWORK (0x00) – GW network personalization • UIM_PERSO_FEATURE_STATUS_GW

					_NETWORK_SUBSET (0x01) – GW network subset personalization • UIM_PERSO_FEATURE_STATUS_GW _SERVICE_PROVIDER (0x02) – GW service provider personalization • UIM_PERSO_FEATURE_STATUS_GW _CORPORATE (0x03) – GW corporate personalization • UIM_PERSO_FEATURE_STATUS_GW_UIM (0x04) – GW UIM personalization • UIM_PERSO_FEATURE_STATUS_1X _NETWORK_TYPE_1 (0x05) – 1X network type 1 personalization • UIM_PERSO_FEATURE_STATUS_1X _NETWORK_TYPE_2 (0x06) – 1X network type 2 personalization • UIM_PERSO_FEATURE_STATUS_1X_HRPD (0x07) – 1X HRPD personalization • UIM_PERSO_FEATURE_STATUS_1X _SERVICE_PROVIDER (0x08) – 1X service provider personalization • UIM_PERSO_FEATURE_STATUS_1X _CORPORATE (0x09) – 1X corporate personalization • UIM_PERSO_FEATURE_STATUS_1X_RUIM (0x0A) – 1X RUIM personalization • UIM_PERSO_FEATURE_STATUS _UNKNOWN (0x0B) – Unknown
		uint8	perso_retries	1	Indicates the number of retries remaining to disable the personalization. This value is set to 0xFF if the modem configuration allows unlimited retries.
		Uint8	perso_unblock_retries	1	Indicates the number of retries remaining to unblock the personalization.
		Uint8	aid_len	1	Number of sets of the following elements: • aid_value
		uint8	aid_value	Var	Application identifier value.
		Enum8	univ_pin	1	Indicates whether UPIN replaces PIN1. Valid values: • UIM_UNIV_PIN_PIN1_USED (0x00) – PIN1 is used • UIM_UNIV_PIN_UPIN_REPLACES_PIN1 (0x01) – UPIN replaces PIN1
		enum8	pin1_state	1	Indicates the state of PIN1. Valid values: • UIM_PIN_STATE_UNKNOWN (0x00) – Unknown • UIM_PIN_STATE_ENABLED_NOT _VERIFIED (0x01) – Enabled and not verified • UIM_PIN_STATE_ENABLED_VERIFIED (0x02) – Enabled and verified • UIM_PIN_STATE_DISABLED (0x03) – Disabled • UIM_PIN_STATE_BLOCKED (0x04) – Blocked

					• UIM_PIN_STATE_PERMANENTLY _BLOCKED (0x05) – Permanently blocked
		uint8	pin1_retries	1	Indicates the number of retries remaining to verify PIN1.
		Uint8	puk1_retries	1	Indicates the number of retries remaining to unblock PIN1.
		Enum8	pin2_state	1	Indicates the state of PIN2. Valid values: • UIM_PIN_STATE_UNKNOWN (0x00) – Unknown • UIM_PIN_STATE_ENABLED_NOT _VERIFIED (0x01) – Enabled and not verified • UIM_PIN_STATE_ENABLED_VERIFIED (0x02) – Enabled and verified • UIM_PIN_STATE_DISABLED (0x03) – Disabled • UIM_PIN_STATE_BLOCKED (0x04) – Blocked • UIM_PIN_STATE_PERMANENTLY _BLOCKED (0x05) – Permanently blocked
		uint8	pin2_retries	1	Indicates the number of retries remaining to verify PIN2.
		Uint8	puk2_retries	1	Indicates the number of retries remaining to unblock PIN2.
Type	0x11			1	Hot-Swap Status
Length	Var			2	
Value	→	uint8	hot_swap_len	1	Number of sets of the following elements: • hot_swap
		enum8	hot_swap	Var	Indicates the status of the hot-swap switch. Valid values: • UIM_HOT_SWAP_NOT_SUPPORTED (0x00) – Hot-swap is not supported • UIM_HOT_SWAP_STATUS_NOT _SUPPORTED (0x01) – Hot-swap is supported, but the status of the switch is not supported • UIM_HOT_SWAP_STATUS_PRESENT (0x02) – Switch indicates that the card is present • UIM_HOT_SWAP_STATUS_NOT_PRESENT (0x03) – Switch indicates that the card is not present
Type	0x12			1	Valid Card Status
Length	Var			2	
Value	→	uint8	card_status_validity_len	1	Number of sets of the following elements: • card_status_validity
		boolean	card_status_validity	Var	Indicates whether the reported status of the card on the corresponding slot is valid. Valid values: • 0 – Status of the card is unknown (even when reported as absent) • 1 – Status of the card is valid
Type	0x13			1	Extended Card Status
Length	Var			2	
Value	→	uint8	index_gw_len	1	Number of sets of the following elements: • index_gw
		uint16	index_gw	Var	Index of the primary GW provisioning application. The most significant byte indicates the slot

					(starting from 0), while the least significant byte indicates the application for that slot (starting from 0). The value 0xFFFF identifies that the session does not exist.
		Uint8	index_1x_len	1	Number of sets of the following elements: • index_1x
		uint16	index_1x	Var	Index of the primary 1X provisioning application. The most significant byte indicates the slot (starting from 0), while the least significant byte indicates the application for that slot (starting from 0). The value 0xFFFF identifies that the session does not exist.
		Uint8	num_slot	1	Number of sets of the following elements: • card_state • pin_state • pin_retries • puk_retries • error_code • app_type • app_state • perso_state • perso_feature • perso_retries • perso_unblock_retries • aid_len • aid_value • univ_pin • pin_state • pin_retries • puk_retries • pin_state • pin_retries • puk_retries
		enum8	card_state	1	Indicates the state of the card. Valid values: • UIM_CARD_STATE_ABSENT (0x00) – Absent • UIM_CARD_STATE_PRESENT (0x01) – Present • UIM_CARD_STATE_ERROR (0x02) – Error • UIM_EXTENDED_CARD_STATE _UNKNOWN (0x03) – Unknown
		enum8	upin_state	1	Indicates the state of UPIN. Valid values: • UIM_PIN_STATE_UNKNOWN (0x00) – Unknown • UIM_PIN_STATE_ENABLED_NOT _VERIFIED (0x01) – Enabled and not verified • UIM_PIN_STATE_ENABLED_VERIFIED (0x02) – Enabled and verified • UIM_PIN_STATE_DISABLED (0x03) – Disabled • UIM_PIN_STATE_BLOCKED (0x04) – Blocked • UIM_PIN_STATE_PERMANENTLY

					_BLOCKED (0x05) – Permanently blocked
		uint8	upin_retries	1	Indicates the number of retries remaining to verify the UPIN.
		Uint8	upuk_retries	1	Indicates the number of retries remaining to unblock the UPIN.
		Enum8	error_code	1	Indicates the reason for the card error, and is valid only when the card state is Error. Valid values: • UIM_CARD_ERROR_CODE_UNKNOWN (0x00) – Unknown • UIM_CARD_ERROR_CODE_POWER_DOWN (0x01) – Power down • UIM_CARD_ERROR_CODE_POLL_ERROR (0x02) – Poll error • UIM_CARD_ERROR_CODE_NO_ATR _RECEIVED (0x03) – No ATR received • UIM_CARD_ERROR_CODE_VOLT _MISMATCH (0x04) – Volt mismatch • UIM_CARD_ERROR_CODE_PARITY_ERROR (0x05) – Parity error • UIM_CARD_ERROR_CODE_POSSIBLY _REMOVED (0x06) – Unknown, possibly removed • UIM_CARD_ERROR_CODE_SIM _TECHNICAL_PROBLEMS (0x07) – Card returned technical problems • UIM_CARD_ERROR_CODE_NULL_BYTES (0x08) – Card returned NULL bytes • UIM_CARD_ERROR_CODE_SAP _CONNECTED (0x09) – Terminal in SAP mode Other values are possible and reserved for future use. When an unknown value is received, it is to be handled as “Unknown”.
		Uint8	num_app	1	Number of sets of the following elements: • app_type • app_state • perso_state • perso_feature • perso_retries • perso_unblock_retries • aid_len • aid_value • univ_pin • pin_state • pin_retries • puk_retries • pin_state • pin_retries • puk_retries
		enum8	app_type	1	Indicates the type of the application. Valid values: • UIM_APP_TYPE_UNKNOWN (0x00) – Unknown • UIM_APP_TYPE_SIM (0x01) – SIM card

					• UIM_APP_TYPE_USIM (0x02) – USIM application • UIM_APP_TYPE_RUIM (0x03) – RUIM card • UIM_APP_TYPE_CSIM (0x04) – CSIM application • UIM_APP_TYPE_ISIM (0x05) – ISIM application Other values are reserved for the future and are to be handled as “Unknown”.
		Enum8	app_state	1	Indicates the state of the application. Valid values: • UIM_APP_STATE_UNKNOWN (0x00) – Unknown • UIM_APP_STATE_DETECTED (0x01) – Detected • UIM_APP_STATE_PIN1_OR_UPIN_REQ (0x02) – PIN1 or UPIN is required • UIM_APP_STATE_PUK1_OR_PUK_REQ (0x03) – PUK1 or PUK for UPIN is required • UIM_APP_STATE_PERSON_CHECK_REQ (0x04) – Personalization state must be checked • UIM_APP_STATE_PIN1_PERM_BLOCKED (0x05) – PIN1 is blocked • UIM_APP_STATE_ILLEGAL (0x06) – Illegal • UIM_APP_STATE_READY (0x07) – Ready
		enum8	perso_state	1	Indicates the state of the personalization for the application. Valid values: • UIM_PERSO_STATE_UNKNOWN (0x00) – Unknown • UIM_PERSO_STATE_IN_PROGRESS (0x01) – Personalization operation is in progress • UIM_PERSO_STATE_READY (0x02) – Ready • UIM_PERSO_STATE_CODE_ REQ (0x03) – Personalization code is required • UIM_PERSO_STATE_PUK_REQ (0x04) – PUK for personalization code is required • UIM_PERSO_STATE_PERMANENTLY _BLOCKED (0x05) – Permanently blocked
		enum8	perso_feature	1	Indicates the personalization feature. This applies only when a personalization code is required to deactivate or unblock personalization. Valid values: • UIM_PERSO_FEATURE_STATUS_ GW_NETWORK (0x00) – GW network personalization • UIM_PERSO_FEATURE_STATUS_GW _NETWORK_SUBSET (0x01) – GW network subset personalization • UIM_PERSO_FEATURE_STATUS_GW _SERVICE_PROVIDER (0x02) – GW service provider personalization • UIM_PERSO_FEATURE_STATUS_GW _CORPORATE (0x03) – GW corporate personalization • UIM_PERSO_FEATURE_STATUS_GW_UIM

					(0x04) – GW UIM personalization • UIM_PERSO_FEATURE_STATUS_1X _NETWORK_TYPE_1 (0x05) – 1X network type 1 personalization • UIM_PERSO_FEATURE_STATUS_1X _NETWORK_TYPE_2 (0x06) – 1X network type 2 personalization • UIM_PERSO_FEATURE_STATUS_1X_HRPD (0x07) – 1X HRPD personalization • UIM_PERSO_FEATURE_STATUS_1X _SERVICE_PROVIDER (0x08) – 1X service provider personalization • UIM_PERSO_FEATURE_STATUS_1X _CORPORATE (0x09) – 1X corporate personalization • UIM_PERSO_FEATURE_STATUS_1X_RUIM (0x0A) – 1X RUIM personalization • UIM_PERSO_FEATURE_STATUS _UNKNOWN (0x0B) – Unknown
		uint8	perso_retries	1	Indicates the number of retries remaining to disable the personalization. This value is set to 0xFF if the modem configuration allows unlimited retries.
		Uint8	perso_unblock_retries	1	Indicates the number of retries remaining to unblock the personalization.
		Uint8	aid_len	1	Number of sets of the following elements: • aid_value
		uint8	aid_value	Var	Application identifier value.
		Enum8	univ_pin	1	Indicates whether UPIN replaces PIN1. Valid values: • UIM_UNIV_PIN_PIN1_USED (0x00) – PIN1 is used • UIM_UNIV_PIN_UPIN_REPLACES_PIN1 (0x01) – UPIN replaces PIN1
		enum8	pin1_state	1	Indicates the state of PIN1. Valid values: • UIM_PIN_STATE_UNKNOWN (0x00) – Unknown • UIM_PIN_STATE_ENABLED_NOT_VERIFIED (0x01) – Enabled and not verified • UIM_PIN_STATE_ENABLED_VERIFIED (0x02) – Enabled and verified • UIM_PIN_STATE_DISABLED (0x03) – Disabled • UIM_PIN_STATE_BLOCKED (0x04) – Blocked • UIM_PIN_STATE_PERMANENTLY _BLOCKED (0x05) – Permanently blocked
		uint8	pin1_retries	1	Indicates the number of retries remaining to verify PIN1.
		Uint8	puk1_retries	1	Indicates the number of retries remaining to unblock PIN1.
		Enum8	pin2_state	1	Indicates the state of PIN2. Valid values: • UIM_PIN_STATE_UNKNOWN (0x00) –

					Unknown • UIM_PIN_STATE_ENABLED_NOT_VERIFIED (0x01) – Enabled and not verified • UIM_PIN_STATE_ENABLED_VERIFIED (0x02) – Enabled and verified • UIM_PIN_STATE_DISABLED (0x03) – Disabled • UIM_PIN_STATE_BLOCKED (0x04) – Blocked • UIM_PIN_STATE_PERMANENTLY _BLOCKED (0x05) – Permanently blocked
		uint8	pin2_retries	1	Indicates the number of retries remaining to verify PIN2.
		Uint8	puk2_retries	1	Indicates the number of retries remaining to unblock PIN2.
Type	0x14			1	Extended Hot-Swap Status
Length	Var			2	
Value	→	uint8	extended_hot_swap_len	1	Number of sets of the following elements: • extended_hot_swap
		enum8	extended_hot_swap	Var	Indicates the status of the hot-swap switch. Valid values: • UIM_HOT_SWAP_NOT_SUPPORTED (0x00) – Hot-swap is not supported • UIM_HOT_SWAP_STATUS_NOT _SUPPORTED (0x01) – Hot-swap is supported, but the status of the switch is not supported • UIM_HOT_SWAP_STATUS_PRESENT (0x02) – Switch indicates that the card is present • UIM_HOT_SWAP_STATUS_NOT_PRESENT (0x03) – Switch indicates that the card is not present
Type	0x15			1	SIM Busy Status
Length	Var			2	
Value	→	uint8	sim_busy_status_len	1	Number of sets of the following elements: • sim_busy_status
		boolean	sim_busy_status	Var	Indicates whether the card on the corresponding slot is busy. Valid values: • 0 – SIM card is not busy • 1 – SIM card is busy

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate the response.

9.2.2.3. Description of QMI_UIM_GET_CARD_STATUS REQ/RESP

This function retrieves the current status of the cards and the status of all applications available on the cards. The function also returns support information for the hot-swap feature and the status of the switch used to detect a card removal/insertion.

Support of the hot-swap feature is independent of the presence of the optional TLV with the hot-swap switch status.

The result of this function can be used by the client to determine the number of slots supported by the specific target.

During power-up, the status of the card can be unknown for a short period of time. An optional TLV indicates whether the reported status is valid. If the TLV is missing, the client assumes that the status of the card is valid.

The extended card status is used on targets with three cards or more. A client must be able to handle the legacy card status as a response, even if it requested the extended card status.

If a session is associated with a card in slot 3 or higher, the legacy card status indicates the session as invalid.

Other error codes not listed in the preceding table are handled as QMI_ERR_INTERNAL.

10. Location Service (QMI_LOC)

QMI_LOC provides applications running on a tethered device or on the HLOS's side of a dual processor MSM device with commands related to location and position determination, including commands to do the following:

- Determine current position
- Manage configurations for the MSM GPS service
- Inject external assistance data to improve performance (coarse position, time, etc.)
- Respond to network-initiated requests for position fixes or measurements

10.1. Theory of Operation

10.1.1. Generalized QMI Service Compliance

The QMI_LOC service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in the QMI Generalized Message Protocol section of 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

10.1.2. LOC Service Type

LOC is assigned QMI service type 0x10.

10.1.3. Message Definition Template

10.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

10.1.4. QMI_LOC Design Fundamentals

The primary features of the QMI_LOC API are as follows:

- Acknowledgment of receipt of REQ messages is returned in a RESP message. The actual results are returned in an IND message.

- QMI_LOC has a concept of solicited/unsolicited IND messages. Solicited IND messages are those that are output in response to a REQ message. Unsolicited IND messages are also known as asynchronous events. Solicited IND messages are sent only to the client that sent the REQ message that triggered the IND message. Unsolicited IND messages are multicast to all clients that have registered to receive the particular IND message. Clients need not register for receipt of solicited IND messages; only for unsolicited IND messages.
- Each different asynchronous event is output with its own QMI message to allow for future extensibility.
- QMI_LOC has an over-arching rule that there is an IND message for (almost) every REQ message. Every REQ message has a corresponding RESP and IND (with a few minor exceptions), even if the IND contains nothing more than a success/error indicator. The exceptions are: QMI_LOC_INFORM_CLIENT_REVISION, QMI_LOC_REG_EVENTS, QMI_LOC_START, and QMI_LOC_STOP.
- Fix criteria has been changed in QMI_LOC from the previous position determination service to allow more freedom for QMI_LOC to choose the optimal positioning method "under the hood."
- Fix criteria is local to a client in QMI_LOC (with limitations to be described later in this document).
- Fix criteria is (an optional) part of the START request in QMI_LOC.
- Positioning mode is a separate message in QMI_LOC so that it can be limited to only privileged clients. Allowing clients to select the positioning mode severely impairs QMI_LOC's ability to choose the best positioning method and to support simultaneous positioning by multiple clients, since positioning modes are typically mutually exclusive. The Positioning Mode message should not be used except for testing purposes.
- QMI_LOC takes advantage of the Optional TLV concept in QMI to allow clients to omit parameters (such as fix criteria) and thus allow QMI_LOC to use defaults for anything that the client does not specify.

10.1.5. QMI_LOC Fundamental Concepts

10.1.5.1. GNSS

GNSS uses a network of orbiting satellites to provide the MSM with accurate location measurements. Refer to Understanding GPS: Principles and Applications, Second Edition (ISBN-10: 1-58053-894-0) for a detailed explanation.
A wireless device supporting QMI_LOC provides control and accessibility to the GNSS functionality of the device.

10.1.5.2. Position Determination Methods

The location engine supports five methods for determining the position: MS-assisted, MS-based, Cell ID-based, Standalone, and WWAN-based. The primary difference between these methods is in how the final position calculations are performed. An MS-assisted fix is one in which a network entity (PDE or PDM) does the final position calculations. In an MS-based fix, the final position is calculated by the location engine, but the location engine may get additional assistance from the PDE/PDM. Cell ID-based positioning uses the

current geographic site as a seed to find the current location. A standalone fix is one in which the entire position fix process is done within the location engine without interaction with the PDE/PDM. For WWAN-based positioning, the location engine uses WWAN measurement information to compute a location. Each has advantages and disadvantages. For example, MS-assisted fixes are usually capable of obtaining position information in harsher environments, such as indoors, at the expense of greater network traffic and a longer time-to-fix.

10.1.5.2.1. MS-assisted PD

In MS-assisted PD, the MS assists a PDE in determining the position. The device communicates with the PDE to get satellite acquisition assistance data to assist it in performing satellite pseudo range measurements. These measurements are performed and then sent to the PDE, where the MS position is calculated and returned to the MS. This procedure is repeated each time the MS position is requested, and for each fix, the location engine must communicate with the PDE over TCP/IP or via a control channel.

- Client Request

  The client request for MS-assisted fixes is performed in the following sequence:
  1. The client first selects the operation mode by sending in the message QMI_LOC_SET_OPERATION_MODE (operationMode=0x00000003).
  2. The PD process begins when the client application sends the QMI_LOC_START message.

10.1.5.2.2. MS-based PD

In MS-based PD, the MS communicates with a PDE to acquire almanac and ephemeris information, which it then uses to generate satellite acquisition assistance. As in MS-assisted PD, the MS uses the ephemeris, reference time, and position to compute a final position.
To compute the position locally, the MS must also begin with a coarse estimate of its current location. This seed position is often obtained by performing an MS-assisted PD session prior to beginning an MS-based operation. Because the coarse position must be obtained prior to beginning an MS-based session, MS-based sessions are most useful when performed in the context of position tracking applications where the MS position is determined at regular intervals.

- Client Request

  The client request for MS-assisted fixes is performed in the following sequence:
  1. The client first selects the operation mode by sending in the message QMI_LOC_SET_OPERATION_MODE (operationMode=0x00000002).
  2. The PD process begins when the client application sends the QMI_LOC_START message.

10.1.5.2.3. Cell ID-based PD

Cell ID-based positioning uses the current geographic site as a seed to find the current location. The location engine allows this positioning source when the phone is configured for User Plane MO method and, in that case, will perform a SUPL call flow to get a cell ID position. The Set ID Capabilities approach is used to get the Cell ID, i.e., the SUPL Start message sends a NULL in the Set Capabilities field, signaling the SLP to respond with a SUPL End message containing the Cell ID position.

- Client Request

  The client request for MS-assisted fixes is performed in the following sequence:

1. The client first selects the operation mode by sending in the message QMI_LOC_SET_OPERATION_MODE (operationMode=0x00000004).
2. The PD process begins when the client application sends the QMI_LOC_START message.

10.1.5.2.4. Standalone Fix

Cell ID-based positioning uses the current geographic site as a seed to find the current location. The location engine allows this positioning source when the phone is configured for User Plane MO method and, in that case, will perform a SUPL call flow to get a cell ID position. The Set ID Capabilities approach is used to get the Cell ID, i.e., the SUPL Start message sends a NULL in the Set Capabilities field, signaling the SLP to respond with a SUPL End message containing the Cell ID position.

- Client Request

  The client request for MS-assisted fixes is performed in the following sequence:
  1. The client first selects the operation mode by sending in the message QMI_LOC_SET_OPERATION_MODE (operationMode=0x00000005).
  2. The PD process begins when the client application sends the QMI_LOC_START message.

10.1.5.3. Multiple-Client Support

QMI_LOC supports multiple controlling clients, each connected as a separate QMI control point. Different position fix criteria may be specified by each client. Some clients may not even be positioning clients. Some clients may exist solely for the purpose of providing assistance data to the GNSS subsystem, such as an eXTended Receiver Assistance (XTRA) client.
Each QMI_LOC positioning client may specify a different desired fix criteria. QMI_LOC will attempt to satisfy all of the fix criteria of each client, as long as the fix criteria are not mutually exclusive. When mutually exclusive requests are made, QMI_LOC is forced to select the closest set of criteria that meet the client's requirements and still allow all clients to be serviced. Because of this, many fix criteria items are considered optional or desired parameters. QMI_LOC cannot guarantee that all criteria will be honored when there are multiple clients attempting to use QMI_LOC simultaneously.
When multiple clients request position fixes, QMI_LOC services those requests via an internal deadline-first scheduling algorithm. This algorithm works well for single-shot position fix clients or position fix clients with large TBFs (Time-Between-Fixes), but does not work so well for servicing multiple, periodic positioning clients with similar (or identical) TBFs. The deadline-first scheduling algorithm can cause the actual TBF for each client to be greater than what the client requested, especially when multiple clients are attempting to obtain 1-Hz position fixes. For example, if two clients request a TBF of 1 Hz, the deadline-first scheduling algorithm will service the clients in an alternating fashion such that each client gets a fix every two seconds.

10.1.5.4. Single-Shot Position Fix Sessions

A QMI control point may request a single fix (single-shot fix) from the GPS service (as opposed to a tracking session). The control point uses the command QMI_LOC_START_REQ to initiate this request and set the desired timeout, accuracy, etc. The GPS service attempts to compute a fix until the accuracy threshold is reached or until the number of seconds specified in the timeout parameter has elapsed. During the session, all control points receive NMEA sentences, satellite information reports, and parsed position reports, if registered for them.

10.1.5.5. Auto-Tracking Sessions

Tracking sessions are used to request and obtain a continuous stream of fixes from the MSM GNSS subsystem. A tracking session can be requested with the same QMI_LOC_START_REQ message as that used for single-shot fixes, but with a different value supplied for fix_recurrence in the (optional) fix criteria that can be provided with this message.
Auto-tracking continues to run the GNSS subsystem until all clients requesting auto-tracking request that auto-tracking be stopped. The periodic rate of position outputs as well as a number of other parameters can be set by the client requesting a position fix.
Auto-tracking for a particular client is stopped under the following circumstances:

- The client QMI_LOC control point explicitly disables it through a QMI command
- The client QMI_LOC control point resets
- The client QMI_LOC control point is closed

10.1.5.6. NMEA Sentence Data

QMI_LOC supports the output of NMEA sentences. Control points that have optionally registered for NMEA event reports will receive NMEA sentences sent as QMI indications. QMI_LOC provides messages to configure various NMEA settings:

- Which NMEA sentence types are to be generated
- How often NMEA sentences are generated (while the fix is being performed)

NMEA configuration is global, and any change made by a QMI_LOC control point affects the generation of NMEA sentence data for all clients.

10.2. QMI_LOC Messages

Table 10-1 QMI_LOC messages

Command	ID	Description
QMI_LOC_REG_EVENTS	0x0021	Used by the control point to register for events from the location subsystem.

10.2.1. QMI_LOC_REG_EVENTS

Used by the control point to register for events from the location subsystem.

LOC message ID

0x0021

Version introduced

Major – 2, Minor – 0

10.2.1.1. Request – QMI_LOC_REG_EVENTS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Event Registration Mask	2.0	2.44

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Event Registration Mask
Length	8			2	
Value	→	mask	eventRegMask	8	Specifies the events that the control point is interested in receiving. Valid bitmasks: • QMI_LOC_EVENT_MASK_POSITION _REPORT (0x00000001) – The control point must enable this mask to receive position report event indications. • QMI_LOC_EVENT_MASK_GNSS_SV_INFO (0x00000002) – The control point must enable this mask to receive satellite report event indications. These reports are sent at a 1 Hz rate. • QMI_LOC_EVENT_MASK_NMEA (0x00000004) – The control point must enable this mask to receive NMEA reports for position and satellites in view. The report is at a 1 Hz rate. • QMI_LOC_EVENT_MASK_NI_NOTIFY _VERIFY_REQ (0x00000008) – The control point must enable this mask to receive NI Notify/Verify request event indications. • QMI_LOC_EVENT_MASK_INJECT_TIME _REQ (0x00000010) – The control point must enable this mask to receive time injection request event indications. • QMI_LOC_EVENT_MASK_INJECT _PREDICTED_ORBITS_REQ (0x00000020) –

					The control point must enable this mask to receive predicted orbits request event indications. • QMI_LOC_EVENT_MASK_INJECT _POSITION_REQ (0x00000040) – The control point must enable this mask to receive position injection request event indications. • QMI_LOC_EVENT_MASK_ENGINE_STATE (0x00000080) – The control point must enable this mask to receive engine state report event indications. • QMI_LOC_EVENT_MASK_FIX_SESSION _STATE (0x00000100) – The control point must enable this mask to receive fix session status report event indications. • QMI_LOC_EVENT_MASK_WIFI_REQ (0x00000200) – The control point must enable this mask to receive Wi-Fi position request event indications. • QMI_LOC_EVENT_MASK_SENSOR _STREAMING_READY_STATUS (0x00000400) – The control point must enable this mask to receive notifications from the location engine indicating its readiness to accept data from the sensors (accelerometer, gyroscope, etc.). • QMI_LOC_EVENT_MASK_TIME_SYNC _REQ (0x00000800) – The control point must enable this mask to receive time sync requests from the GPS engine. Time sync enables the GPS engine to synchronize its clock with the sensor processor's clock. QMI_LOC_EVENT_MASK_SET_SPI _STREAMING_REPORT (0x00001000) – The control point must enable this mask to receive Stationary Position Indicator (SPI) streaming report indications. • QMI_LOC_EVENT_MASK_LOCATION _SERVER_ CONNECTION_REQ (0x00002000) – The control point must enable this mask to receive location server requests. These requests are generated when the service wishes to establish a connection with a location server. • QMI_LOC_EVENT_MASK_NI_GEOFENCE _NOTIFICATION (0x00004000) – The control point must enable this mask to receive notifications related to network-initiated Geofences. These events notify the client when a network-initiated Geofence is added, deleted, or edited. • QMI_LOC_EVENT_MASK_GEOFENCE_GEN _ALERT (0x00008000) – The control point must enable this mask to receive Geofence alerts. These alerts are generated to inform the client of the changes that may affect a Geofence, for example, if GPS is turned off or if the network is unavailable. • QMI_LOC_EVENT_MASK_GEOFENCE

					_BREACH_NOTIFICATION (0x00010000) – The control point must enable this mask to receive notifications when a Geofence is breached. These events are generated when a UE enters or leaves the perimeter of a Geofence. This breach report is for a single Geofence. • QMI_LOC_EVENT_MASK_PEDOMETER _CONTROL (0x00020000) – The control point must enable this mask to register for pedometer control requests from the location engine. The location engine sends this event to control the injection of pedometer reports. • QMI_LOC_EVENT_MASK_MOTION_DATA _CONTROL (0x00040000) – The control point must enable this mask to register for motion data control requests from the location engine. The location engine sends this event to control the injection of motion data. • QMI_LOC_EVENT_MASK_BATCH_FULL _NOTIFICATION (0x00080000) – The control point must enable this mask to receive notification when a batch is full. The location engine sends this event to notify of Batch Full for ongoing batching session. • QMI_LOC_EVENT_MASK_LIVE_BATCHED _POSITION_REPORT (0x00100000) – The control point must enable this mask to receive position report indications along with an ongoing batching session. The location engine sends this event to notify the batched position report while a batching session is ongoing. • QMI_LOC_EVENT_MASK_INJECT_WIFI_AP _DATA_REQ (0x00200000) – The control point must enable this mask to receive Wi-Fi Access Point (AP) data inject request event indications. • QMI_LOC_EVENT_MASK_GEOFENCE _BATCH_BREACH_NOTIFICATION (0x00400000) – The control point must enable this mask to receive notifications when a Geofence is breached. These events are generated when a UE enters or leaves the perimeter of a Geofence. This breach notification is for multiple Geofences. Breaches from multiple Geofences are all batched and sent in the same notification. • QMI_LOC_EVENT_MASK_VEHICLE_DATA _READY_STATUS (0x00800000) – The control point must enable this mask to receive notifications from the location engine indicating its readiness to accept vehicle data (vehicle accelerometer, vehicle angular rate, vehicle odometry, etc.). • QMI_LOC_EVENT_MASK_GNSS _MEASUREMENT_REPORT (0x01000000) – The control point must enable this mask to receive system clock and satellite measurement report

					events (system clock, SV time, Doppler, etc.). Reports are generated only for the GNSS satellite constellations that are enabled using QMI_LOC_SET_GNSS_ CONSTELL_REPORT _CONFIG. • QMI_LOC_EVENT_MASK_GNSS_SV _POLYNOMIAL_REPORT (0x02000000) – The control point must enable this mask to receive satellite position reports as polynomials. Reports are generated only for the GNSS satellite constellations that are enabled using QMI_LOC_SET_GNSS_CONSTELL_REPORT _CONFIG. • QMI_LOC_EVENT_MASK_GEOFENCE _PROXIMITY_NOTIFICATION (0x04000000) – The control point must enable this mask to receive notifications when a Geofence proximity is entered and exited. The proximity of a Geofence may be due to different contexts. These contexts are identified using the context ID in this indication. The context of a Geofence may contain Wi-Fi area ID lists, Ibeacon lists, Cell-ID list, and so forth. • QMI_LOC_EVENT_MASK_GDT_UPLOAD _BEGIN_REQ (0x08000000) – The control point must enable this mask to receive Generic Data Transport (GDT) session begin request event indications. • QMI_LOC_EVENT_MASK_GDT_UPLOAD _END_REQ (0x10000000) – The control point must enable this mask to receive GDT session end request event indications. • QMI_LOC_EVENT_MASK_GEOFENCE _BATCH_DWELL_NOTIFICATION (0x20000000) – The control point must enable this mask to receive notifications when a Geofence is dwelled. These events are generated when a UE enters or leaves the perimeter of a Geofence and dwells inside or outside for a specified time. This dwell notification is for multiple Geofences. Dwells from multiple Geofences are all batched and sent in the same notification. • QMI_LOC_EVENT_MASK_GET_TIME_ZONE _REQ (0x40000000) – The control point must enable this mask to receive requests for time zone information from the service. These events are generated when there is a need for time zone information in the service. • QMI_LOC_EVENT_MASK_BATCHING _STATUS (0x80000000) – The control point must enable this mask to receive asynchronous events related to batching. Multiple events can be registered by Oring the individual masks and sending them in this TLV. All unused bits in this

					mask must be set to 0.

Optional TLVs

None

10.2.1.2. Response – QMI_LOC_REG_EVENTS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INVALID_HANDLE	Invalid client handle was received

10.2.1.3. Description of QMI_LOC_REG_EVENTS REQ/RESP

This command informs the service about the asynchronous events that the control point is interested in receiving. A client receives the events for which it has registered through the indication messages (QMI_LOC_EVENT_*_IND). This message does not impact the global state of the service, and it is safe if more than one client sends this message.

11. Persistent Device Configuration Service (QMI_PDC)

QMI_PDC provides an interface to manage device configuration files. These files can be used to modify the behavior of various subsystems within the device.

11.1. Theory of Operation

11.1.1. Generalized QMI Service Compliance

The QMI_PDC service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

11.1.2. PDC Service Type

The PDC is assigned QMI service type 0x24.

11.1.3. Message Definition Template

11.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

11.1.4. QMI_PDC Fundamental Concepts

The QMI_PDC service provides interfaces to manage device configuration files for the various device subsystems. The subsystems currently supported are:

- Modem platform
- Modem software

11.1.5. Service State Variables

11.1.5.1. Shared State Variables

No QMI_PDC state variables are shared across control points.

11.2. QMI_PDC Messages

Table 11-1 QMI_PDC messages

Command	ID	Description
QMI_PDC_RESET	0x0000	Resets the PDC state variables of the requesting control point.
QMI_PDC_GET_SUPPORTED_MSGS	0x001E	Queries the set of messages implemented by the currently running software.
QMI_PDC_GET_SUPPORTED_FIELDS	0x001F	Queries the fields supported for a single command as implemented by the currently running software.
QMI_PDC_INDICATION_REGISTER	0x0020	Maintains control point registration for service indications.
QMI_PDC_CONFIG_CHANGE_IND	0x0021	Indication that a configuration has changed.
QMI_PDC_GET_SELECTED_CONFIG	0x0022	Gets the active configuration.
QMI_PDC_GET_SELECTED_CONFIG_IND	0x0022 indication	Indication with the read selected configuration result.
QMI_PDC_SET_SELECTED_CONFIG	0x0023	Sets an available configuration for the device.
QMI_PDC_SET_SELECTED_CONFIG_IND	0x0023 indication	Indication with the set selected configuration result.
QMI_PDC_LIST_CONFIGS	0x0024	Lists the configurations currently available on the device.
QMI_PDC_LIST_CONFIGS_IND	0x0024 indication	Indication with the list configuration result.
QMI_PDC_DELETE_CONFIG	0x0025	Deletes a configuration from the device.
QMI_PDC_DELETE_CONFIG_IND	0x0025 indication	Indication with the delete configuration result.
QMI_PDC_LOAD_CONFIG	0x0026	Loads the specified configuration to device memory.
QMI_PDC_LOAD_CONFIG_IND	0x0026 indication	Indication with the load configuration result.
QMI_PDC_ACTIVATE_CONFIG	0x0027	Activates a pending configuration for the component.
QMI_PDC_ACTIVATE_CONFIG_IND	0x0027 indication	Indication with the activate configuration result.
QMI_PDC_GET_CONFIG_INFO	0x0028	Queries additional information for a configuration.
QMI_PDC_GET_CONFIG_INFO_IND	0x0028 indication	Indication with the read configuration information result.
QMI_PDC_GET_CONFIG_LIMITS	0x0029	Queries the maximum and current sizes for each configuration memory store.
QMI_PDC_GET_CONFIG_LIMITS_IND	0x0029 indication	Indication with the read configuration limits result.
QMI_PDC_GET_DEFAULT_CONFIG_INFO	0x002A	Gets the default configuration information for a specified configuration type currently embedded with the loaded image.
QMI_PDC_GET_DEFAULT_CONFIG_INFO_ IND	0x002A indication	Indication with the default configuration result information.
QMI_PDC_DEACTIVATE_CONFIG	0x002B	Deactivates an active configuration for the component.
QMI_PDC_DEACTIVATE_CONFIG_IND	0x002B	Indication with the deactivate configuration

	indication	result.
QMI_PDC_VALIDATE_CONFIG	0x002C	Validates a specified configuration for the component.
QMI_PDC_VALIDATE_CONFIG_IND	0x002C indication	Indication with the validate configuration result.
QMI_PDC_GET_FEATURE	0x002D	Gets the configuration features.
QMI_PDC_GET_FEATURE_IND	0x002D indication	Indication with the read configuration feature result.
QMI_PDC_SET_FEATURE	0x002E	Sets configuration features for the device.
QMI_PDC_SET_FEATURE_IND	0x002E indication	Indication with the set feature configuration result.

11.2.1. QMI_PDC_RESET

Resets the PDC state variables of the requesting control point.

PDC message ID

0x0000

Version introduced

Major – 1, Minor – 1

11.2.1.1. Request – QMI_PDC_RESET_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

11.2.1.2. Response – QMI_PDC_RESET_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response

11.2.1.3. Description of QMI_PDC_RESET REQ/RESP

This command resets the issuing control point state kept by the service. This is equivalent to releasing the client and reopening it again.

The control point state variables change to their default values before the response is sent.

11.2.2. QMI_PDC_GET_SUPPORTED_MSGS

Queries the set of messages implemented by the currently running software.

PDC message ID

0x001E

Version introduced

Major – 1, Minor – 4

11.2.2.1. Request – QMI_PDC_GET_SUPPORTED_MSGS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

11.2.2.2. Response – QMI_PDC_GET_SUPPORTED_MSGS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
List of Supported Messages	1.6	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	List of Supported Messages
Length	Var			2	
Value	→	uint16	supported_msgs_len	2	Number of sets of the following elements: • supported_msgs

		uint8	supported_msgs	Var	This array of uint8 is a bitmask where each bit represents a message ID, i.e., starting with the LSB, bit 0 represents message ID 0, bit 1 represents message ID 1, etc. The bit is set to 1 if the message is supported; otherwise, it is set to zero. For example, if a service supports exactly four messages with IDs 0, 1, 30, and 31 (decimal), the array (in hexadecimal) is 4 bytes [03 00 00 c0].

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response
QMI_ERR_INFO_UNAVAILABLE	Information is not available

11.2.2.3. Description of QMI_PDC_GET_SUPPORTED_MSGS REQ/RESP

This command queries the set of messages implemented by the currently running software. This may be a subset of the messages defined in this revision of the service.

11.2.3. QMI_PDC_GET_SUPPORTED_FIELDS

Queries the fields supported for a single command as implemented by the currently running software.

PDC message ID

0x001F

Version introduced

Major – 1, Minor – 4

11.2.3.1. Request – QMI_PDC_GET_SUPPORTED_FIELDS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Service Message ID	1.6	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Service Message ID
Length	2			2	
Value	→	uint16	msg_id	2	ID of the command for which the supported fields are requested.

Optional TLVs

None

11.2.3.2. Response – QMI_PDC_GET_SUPPORTED_FIELDS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
List of Supported Request Fields	1.6	1.6

List of Supported Response Fields	1.6	1.6
List of Supported Indication Fields	1.6	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	List of Supported Request Fields
Length	Var			2	
Value	→	uint8	request_fields_len	1	Number of sets of the following elements: • request_fields
		uint8	request_fields	Var	This field describes which optional field IDs are supported in the QMI request. The array of uint8 is a bitmask where each bit represents a field (TLV) ID. Because fields 0 to 15 (decimal) are mandatory by definition, the first bit represents field ID 16. Starting with the LSB, bit 0 represents field ID 16, bit 1 represents field ID 17, etc. The bit is set to 1 if the field ID is supported; otherwise, it is set to zero. For example, if a service supports exactly four fields with IDs 16, 17, 30, and 31 (decimal), the array (in hexadecimal) is 2 bytes [03 c0].
Type	0x11			1	List of Supported Response Fields
Length	Var			2	
Value	→	uint8	response_fields_len	1	Number of sets of the following elements: • response_fields
		uint8	response_fields	Var	This field describes which optional field IDs are supported in the QMI response. Its format is the same as request_fields.
Type	0x12			1	List of Supported Indication Fields
Length	Var			2	
Value	→	uint8	indication_fields_len	1	Number of sets of the following elements: • indication_fields
		uint8	indication_fields	Var	This field describes which optional field IDs are supported in the QMI indication. Its format is the same as request_fields.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_NO_MEMORY	Device could not allocate memory to formulate a response

QMI_ERR_REQUESTED_NUM_ UNSUPPORTED	Requested message ID is not supported by the currently running software
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission
QMI_ERR_INFO_UNAVAILABLE	Information is not available

11.2.3.3. Description of QMI_PDC_GET_SUPPORTED_FIELDS REQ/RESP

This command queries the fields supported for a single command as implemented by the currently running software.

If the request, response, or indication is supported for the given message ID, the corresponding optional array is included in QMI_<SVC>_GET_SUPPORTED_FIELDS_RESP, even if the message does not contain any optional fields. This enables the client to distinguish this case from one where the service does not support the request, response, or indication.

Examples are:

- If the specified message ID is not supported by the service, the response has qmi_result = QMI_RESULT_FAILURE and qmi_error = QMI_ERR_REQUESTED_NUM_UNSUPPORTED.
- If the specified message ID is an empty message, the response has qmi_result = QMI_RESULT_SUCCESS and qmi_error = QMI_ERR_NONE. None of the optional arrays are included.
- If the specified message ID supports the request with 0 optional fields, the response with 3 optional fields (16, 17, and 18 decimal), and does not support an indication, the response has the following:
  - qmi_result = QMI_RESULT_SUCCESS
  - qmi_error = QMI_ERR_NONE
  - request_fields array is included with length zero
  - response_fields array is included with length 1 value [07]
  - indication_fields array is not included

Trailing zero bytes are omitted from the response. For example, if the message defines 20 different fields but the response only contains 16 bits, the client is to assume the last four fields are not supported.

11.2.4. QMI_PDC_INDICATION_REGISTER

Maintains control point registration for service indications.

PDC message ID

0x0020

Version introduced

Major – 1, Minor – 0

11.2.4.1. Request – QMI_PDC_INDICATION_REGISTER_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Component Configuration	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Component Configuration
Length	1			2	
Value	→	boolean	reg_config_change	1	Controls the reporting of QMI_PDC_CONFIG_CHANGE_IND. Values: • 0x00 – Disable (default) • 0x01 – Enable

11.2.4.2. Response – QMI_PDC_INDICATION_REGISTER_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid

11.2.4.3. Description of QMI_PDC_INDICATION_REGISTER REQ/RESP

This command allows a control point to register and deregister for service indications.

11.2.5. QMI_PDC_CONFIG_CHANGE_IND

Indication that a configuration has changed.

PDC message ID

0x0021

Version introduced

Major – 1, Minor – 0

11.2.5.1. Indication – QMI_PDC_CONFIG_CHANGE_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
New Configuration	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	New Configuration
Length	Var			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** Clients are to ignore configuration types that are invalid or unknown.
		Uint8	config_id_len	1	Number of sets of the following elements: • config_id
		uint8	config_id	Var	Unique ID for the configuration.

Optional TLVs

None

11.2.5.2. Description of QMI_PDC_CONFIG_CHANGE_IND

This indication is received when a configuration has changed.

11.2.6. QMI_PDC_GET_SELECTED_CONFIG

Gets the active configuration.

PDC message ID

0x0022

Version introduced

Major – 1, Minor – 0

11.2.6.1. Request – QMI_PDC_GET_SELECTED_CONFIG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration Type	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Subscription ID	1.6	1.6
Slot ID	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	Subscription ID
Length	4			2	
Value	→	uint32	subscription_id	4	Subscription ID from which to query selected configuration. **Note:** If the value is greater than or equal to the number of subscriptions device allows, the service responds with QMI_ERR_NOT_SUPPORTED
Type	0x12			1	Slot ID
Length	4			2	
Value	→	uint32	slot_id	4	Slot ID from which to query selected configuration. **Note:** If the value is greater than or equal to the number of slots device allows, the service responds with QMI_ERR_NOT_SUPPORTED

11.2.6.2. Response – QMI_PDC_GET_SELECTED_CONFIG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified

11.2.6.3. Description of QMI_PDC_GET_SELECTED_CONFIG REQ/RESP

This command queries the active and pending configurations for specified subscription ID. Subscription ID 0

is used if no subscription ID is provided.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.7. QMI_PDC_GET_SELECTED_CONFIG_IND

Indication with the read selected configuration result.

PDC message ID

0x0022

Version introduced

Major – 1, Minor – 0

11.2.7.1. Indication – QMI_PDC_GET_SELECTED_CONFIG_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0010 – QMI_ERR_NOT_ PROVISIONED – Specified configuration was not found

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Active Configuration ID	1.0	1.0
Pending Configuration ID	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token

Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated this indication.
Type	0x11			1	Active Configuration ID
Length	Var			2	
Value	→	uint8	active_config_id_len	1	Number of sets of the following elements: • active_config_id
		uint8	active_config_id	Var	Unique ID for the active configuration.
Type	0x12			1	Pending Configuration ID
Length	Var			2	
Value	→	uint8	pending_config_id_len	1	Number of sets of the following elements: • pending_config_id
		uint8	pending_config_id	Var	Unique ID for the pending configuration.

11.2.7.2. Description of QMI_PDC_GET_SELECTED_CONFIG_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value. The remaining optional TLVs may be included when the Indication Error Code TLV is set to QMI_ERR_NONE.

This indication notifies the control point that the active configuration has been read. The Pending Configuration ID TLV is included when the configuration is set to a value other than what is currently active.

11.2.8. QMI_PDC_SET_SELECTED_CONFIG

Sets an available configuration for the device.

PDC message ID

0x0023

Version introduced

Major – 1, Minor – 0

11.2.8.1. Request – QMI_PDC_SET_SELECTED_CONFIG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
New Configuration	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	New Configuration
Length	Var			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.
		Uint8	config_id_len	1	Number of sets of the following elements: • config_id
		uint8	config_id	Var	Unique ID for the configuration.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Subscription ID	1.6	1.6
Slot ID	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	Subscription ID
Length	4			2	
Value	→	uint32	subscription_id	4	Subscription ID to set the selected configuration. **Note:** If the value is greater than or equal to the number of subscriptions the device allows, the service responds with QMI_ERR_NOT_SUPPORTED
Type	0x12			1	Slot ID
Length	4			2	
Value	→	uint32	slot_id	4	Slot ID to set the selected configuration. **Note:** If the value is greater than or equal to the number of slots the device allows, the service responds with QMI_ERR_NOT_SUPPORTED

11.2.8.2. Response – QMI_PDC_SET_SELECTED_CONFIG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified

QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.8.3. Description of QMI_PDC_SET_SELECTED_CONFIG REQ/RESP

This command selects the configuration used by the device for the specified subscription ID. Subscription ID 0 is used if no subscription ID is provided. Only configurations that are already stored on the device may be selected; a list of available configurations can be read using QMI_PDC_LIST_CONFIGS.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.9. QMI_PDC_SET_SELECTED_CONFIG_IND

Indication with the set selected configuration result.

PDC message ID

0x0023

Version introduced

Major – 1, Minor – 0

11.2.9.1. Indication – QMI_PDC_SET_SELECTED_CONFIG_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0003 – QMI_ERR_ INVALID_ID – Specified argument already exists

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated this indication.

11.2.9.2. Description of QMI_PDC_SET_SELECTED_CONFIG_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the active configuration has been set. Once set, the configuration does not take effect until the device is power cycled or QMI_PDC_ACTIVATE_CONFIG is requested.

11.2.10. QMI_PDC_LIST_CONFIGS

Lists the configurations currently available on the device.

PDC message ID

0x0024

Version introduced

Major – 1, Minor – 0

11.2.10.1. Request – QMI_PDC_LIST_CONFIGS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
List Configuration Type	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	List Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

11.2.10.2. Response – QMI_PDC_LIST_CONFIGS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.10.3. Description of QMI_PDC_LIST_CONFIGS REQ/RESP

This command queries the available configurations within the device.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.11. QMI_PDC_LIST_CONFIGS_IND

Indication with the list configuration result.

PDC message ID

0x0024

Version introduced

Major – 1, Minor – 0

11.2.11.1. Indication – QMI_PDC_LIST_CONFIGS_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Configuration List	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.
Type	0x11			1	Configuration List

Length	Var			2	
Value	→	uint8	config_list_len	1	Number of sets of the following elements: • config_type • config_id_len • config_id
		enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** Clients are to ignore configuration types that are invalid or unknown.
		Uint8	config_id_len	1	Number of sets of the following elements: • config_id
		uint8	config_id	Var	Unique ID for the configuration.

11.2.11.2. Description of QMI_PDC_LIST_CONFIGS_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the list of available configurations has been read.

11.2.12. QMI_PDC_DELETE_CONFIG

Deletes a configuration from the device.

PDC message ID

0x0025

Version introduced

Major – 1, Minor – 0

11.2.12.1. Request – QMI_PDC_DELETE_CONFIG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration Type	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Configuration Type	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	Configuration ID
Length	Var			2	
Value	→	uint8	config_id_len	1	Number of sets of the following elements: • config_id
		uint8	config_id	Var	Unique ID for the configuration.

11.2.12.2. Response – QMI_PDC_DELETE_CONFIG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.12.3. Description of QMI_PDC_DELETE_CONFIG REQ/RESP

This command deletes configurations from the device. If the Configuration ID TLV is specified in the request, only the matching configuration is deleted. If this TLV is not specified, all configurations of the specified type are deleted from memory.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.13. QMI_PDC_DELETE_CONFIG_IND

Indication with the delete configuration result.

PDC message ID

0x0025

Version introduced

Major – 1, Minor – 0

11.2.13.1. Indication – QMI_PDC_DELETE_CONFIG_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0029 – QMI_ERR_INTERNAL – Specified argument already exists

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.

11.2.13.2. Description of QMI_PDC_DELETE_CONFIG_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the specified configuration has been deleted.

11.2.14. QMI_PDC_LOAD_CONFIG

Loads the specified configuration to device memory.

PDC message ID

0x0026

Version introduced

Major – 1, Minor – 0

11.2.14.1. Request – QMI_PDC_LOAD_CONFIG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Load Configuration	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Load Configuration
Length	Var			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.
		Uint8	config_id_len	1	Number of sets of the following elements: • config_id
		uint8	config_id	Var	Unique ID for the configuration.
		Uint32	total_config_size	4	Total size of the configuration.
		Uint16	config_frame_len	2	Number of sets of the following elements: • config_frame
		Uint8	config_frame	Var	Next frame of the configuration data to • be stored.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Storage Mode	1.6	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	Storage Mode
Length	4			2	
Value	→	enum	storage	4	Storage mode. Values: • PDC_STORAGE_LOCAL (0x00) – Local storage for the configuration • PDC_STORAGE_REMOTE (0x01) – Remote storage for the configuration **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

11.2.14.2. Response – QMI_PDC_LOAD_CONFIG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
Frame Data Reset	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Frame Data Reset
Length	1			2	
Value	→	boolean	frame_data_reset	1	Frame data has been reset due to an error. Value: • 0x01 – Frame data reset

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large
QMI_ERR_DEVICE_IN_USE	Another control point is using this request
QMI_ERR_ACCESS_DENIED	Access to the remote file path is denied or has failed

11.2.14.3. Description of QMI_PDC_LOAD_CONFIG REQ/RESP

This command loads a new configuration into the device.
If no storage mode is provided, local storage is used and the configuration is loaded into the device memory. The configuration may be split into multiple requests that are issued sequentially. The configuration is authenticated and stored in device memory once the sum of the bytes received equals the total configuration size. After the configuration is stored in memory, the configuration must be selected before it can be used by the device; see QMI_PDC_SET_SELECTED_CONFIG for more information.
If the storage mode is specified as remote, the configuration is stored in the remote file system. The configuration data frame must contain the remote path in string format and the total configuration size must be the string length of the remote path.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.
If an error is returned, the Frame Data Reset TLV is included in the response. This TLV specifies that data received from the control point has been discarded. Following any error, clients must resend the configuration data from the beginning.
Any data received from the control point is discarded if the control point resets, either by releasing its client ID or calling QMI_PDC_RESET.
Requests that have a frame larger than the service allows licit a QMI_ERR_ARG_TOO_LONG error. If the frame size is less than the maximum, the control point must independently verify that the size of the whole request is not too large for the underlying transport being used. For example, if a control point sends a QMI_PDC_LOAD_CONFIG request with a frame that is too large for the underlying transport, the control point may not receive a QMI_PDC_LOAD_CONFIG response.

11.2.15. QMI_PDC_LOAD_CONFIG_IND

Indication with the load configuration result.

PDC message ID

0x0026

Version introduced

Major – 1, Minor – 0

11.2.15.1. Indication – QMI_PDC_LOAD_CONFIG_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0002 – QMI_ERR_NO_MEMORY – Insufficient memory to store the configuration • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0022 – QMI_ERR_ AUTHENTICATION_FAILED – Configuration authentication failed • 0x0029 – QMI_ERR_INVALID_ID – Specified argument already exists • 0x0030 – QMI_ERR_INVALID_ARG – Sum of the frame data is greater than the total

Optional TLVs

Name	Version introduced	Version last modified

Indication Token	1.0	1.0
Received Configuration Size	1.0	1.0
Remaining Configuration Size	1.0	1.0
Frame Data Reset	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.
Type	0x11			1	Received Configuration Size
Length	4			2	
Value	→	uint32	received_config_size	4	Total size of the configuration data received.
Type	0x12			1	Remaining Configuration Size
Length	4			2	
Value	→	uint32	remaining_config_size	4	Total size of the configuration data remaining.
Type	0x13			1	Frame Data Reset
Length	1			2	
Value	→	boolean	frame_data_reset	1	Frame data has been reset due to an error. Value: • 0x01 – Frame data reset

11.2.15.2. Description of QMI_PDC_LOAD_CONFIG_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value. The remaining optional TLVs may be included if the Indication Error Code TLV is set to QMI_ERR_NONE.

This indication notifies the control point that the frame data in the request has been processed. The Received Configuration Size TLV specifies the sum of the data received from the control point, and the Remaining Configuration Size TLV specifies the sum of the data that is still pending. The sum of these values equals the total size specified in the request.

The configuration may be split into multiple requests that are issued sequentially. The configuration is authenticated and stored in device memory once the sum of the bytes received equals the total configuration size specified. After the configuration is stored in memory, the configuration must be selected before it can be used by the device; see QMI_PDC_SET_SELECTED_CONFIG (Section 3.30) for more information.

If an error is returned, the Frame Data Reset TLV is included in the indication. This TLV specifies that data received from the control point has been discarded. Following any error, clients must resend the configuration data from the beginning.

11.2.16. QMI_PDC_ACTIVATE_CONFIG

Activates a pending configuration for the component.

PDC message ID

0x0027

Version introduced

Major – 1, Minor – 0

11.2.16.1. Request – QMI_PDC_ACTIVATE_CONFIG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration Type	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Activation Type	1.7	1.7
Subscription ID	1.7	1.7
Slot ID	1.7	1.7

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	Activation Type
Length	4			2	
Value	→	enum	activation_type	4	Type of activation. Values: • PDC_ACTIVATION_REGULAR (0x00) – Regular activation for selected configuration(s). • PDC_ACTIVATION_REFRESH_ ONLY (0x01) – Refresh modem without selecting any configuration; used for APPS centric configuration update. **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.
Type	0x12			1	Subscription ID
Length	4			2	
Value	→	uint32	subscription_id	4	Subscription ID from which to activate.
Type	0x13			1	Slot ID
Length	4			2	
Value	→	uint32	slot_id	4	Slot ID associated with the Subscription ID from which to activate; the mapping of the Slot ID and Subscription ID should be consistent with the UIM session type.

11.2.16.2. Response – QMI_PDC_ACTIVATE_CONFIG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid

QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.16.3. Description of QMI_PDC_ACTIVATE_CONFIG REQ/RESP

This command activates the currently selected configurations for the component. The operation started by this request may be different for each type of configuration. If the active configuration is different from the configuration specified in this request, the operation is reverted prior to switching to the specified configuration. If there are multiple subscriptions, it is recommended to set the selected configuration for all subscriptions prior to activation.
If the activation type is set to refresh only, the device will apply the configuration change without a reset. This is used for APPS-centric updates without using a modem configuration framework.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.17. QMI_PDC_ACTIVATE_CONFIG_IND

Indication with the activate configuration result.

PDC message ID

0x0027

Version introduced

Major – 1, Minor – 0

11.2.17.1. Indication – QMI_PDC_ACTIVATE_CONFIG_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0010 – QMI_ERR_NOT_ PROVISIONED – Specified configuration was not found

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token passed in the request that generated.

11.2.17.2. Description of QMI_PDC_ACTIVATE_CONFIG_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the operation to enable the pending configuration is in progress. This process is specific to the component being configured:

- Modem platform – Modem restart
- Modem software – Modem restart

11.2.18. QMI_PDC_GET_CONFIG_INFO

Queries additional information for a configuration.

PDC message ID

0x0028

Version introduced

Major – 1, Minor – 0

11.2.18.1. Request – QMI_PDC_GET_CONFIG_INFO_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration ID	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration ID
Length	Var			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.
		Uint8	config_id_len	1	Number of sets of the following elements: • config_id
		uint8	config_id	Var	Unique ID for the configuration.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description

Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.

11.2.18.2. Response – QMI_PDC_GET_CONFIG_INFO_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.18.3. Description of QMI_PDC_GET_CONFIG_INFO REQ/RESP

This command queries additional information for a specified configuration.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.19. QMI_PDC_GET_CONFIG_INFO_IND

Indication with the read configuration information result.

PDC message ID

0x0028

Version introduced

Major – 1, Minor – 0

11.2.19.1. Indication – QMI_PDC_GET_CONFIG_INFO_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0029 – QMI_ERR_INVALID_ID – Specified argument already exists • 0x0052 – QMI_ERR_ACCESS_ DENIED – Access to the remote file path is denied or failed

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Configuration Size	1.0	1.0
Configuration Description	1.0	1.0
Configuration Version	1.3	1.3
Storage Mode	1.6	1.6
Path	1.6	1.6

Configuration Base Version	1.8	1.8

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.
Type	0x11			1	Configuration Size
Length	4			2	
Value	→	uint32	config_size	4	Size of the configuration in memory.
Type	0x12			1	Configuration Description
Length	Var			2	
Value	→	uint8	config_desc_len	1	Number of sets of the following elements: • config_desc
		uint8	config_desc	Var	ASCII string containing the description of the configuration read from memory.
Type	0x13			1	Configuration Version
Length	4			2	
Value	→	uint32	config_version	4	Version of the configuration in memory.
Type	0x14			1	Storage Mode
Length	4			2	
Value	→	enum	storage	4	Storage mode. Values: • PDC_STORAGE_LOCAL (0x00) – Local storage for the configuration • PDC_STORAGE_REMOTE (0x01) – Remote storage for the configuration
Type	0x15			1	Path
Length	Var			2	
Value	→	string16	path	Var	ASCII string containing the last truncated 255 characters of the configuration path on the remote.
Type	0x16			1	Configuration Base Version
Length	4			2	
Value	→	uint32	base_version	4	Base version of the configuration in memory.

11.2.19.2. Description of QMI_PDC_GET_CONFIG_INFO_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value. The remaining optional TLVs may be included if the Indication Error Code TLV is set to QMI_ERR_NONE.

This indication notifies the control point that the additional information about the configuration has been read. This additional information includes:

- Configuration size – Size of the configuration in memory
- Configuration description – Description embedded within the configuration and stored in memory
- Configuration version – Version embedded within the configuration and stored in memory

11.2.20. QMI_PDC_GET_CONFIG_LIMITS

Queries the maximum and current sizes for each configuration memory store.

PDC message ID

0x0029

Version introduced

Major – 1, Minor – 0

11.2.20.1. Request – QMI_PDC_GET_CONFIG_LIMITS_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration Type	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.

11.2.20.2. Response – QMI_PDC_GET_CONFIG_LIMITS_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified

11.2.20.3. Description of QMI_PDC_GET_CONFIG_LIMITS REQ/RESP

This command queries the memory size limit for a specified type of configuration.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.21. QMI_PDC_GET_CONFIG_LIMITS_IND

Indication with the read configuration limits result.

PDC message ID

0x0029

Version introduced

Major – 1, Minor – 0

11.2.21.1. Indication – QMI_PDC_GET_CONFIG_LIMITS_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.0	1.0
Maximum Configuration Size	1.0	1.0
Current Configuration Size	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.
Type	0x11			1	Maximum Configuration Size

Length	8			2	
Value	→	uint64	max_config_size	8	Maximum size of the configurations in memory.
Type	0x12			1	Current Configuration Size
Length	8			2	
Value	→	uint64	curr_config_size	8	Current size of the configurations in memory.

11.2.21.2. Description of QMI_PDC_GET_CONFIG_LIMITS_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value. The remaining optional TLVs may be included if the Indication Error Code TLV is set to QMI_ERR_NONE.

This indication notifies the control point that the configuration memory has been read. The Maximum Configuration Size TLV specifies the total amount of memory allowed for the specified configuration type. The Current Configuration Size TLV specifies the amount of memory the available configurations are currently using.

11.2.22. QMI_PDC_GET_DEFAULT_CONFIG_INFO

Gets the default configuration information for a specified configuration type currently embedded with the loaded image.

PDC message ID

0x002A

Version introduced

Major – 1, Minor – 0

11.2.22.1. Request – QMI_PDC_GET_DEFAULT_CONFIG_INFO_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration Type	1.3	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.3	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.

11.2.22.2. Response – QMI_PDC_GET_DEFAULT_CONFIG_INFO_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.22.3. Description of QMI_PDC_GET_DEFAULT_CONFIG_INFO REQ/RESP

This command queries information for a specified default configuration type.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.23. QMI_PDC_GET_DEFAULT_CONFIG_INFO_IND

Indication with the default configuration result information.

PDC message ID

0x002A

Version introduced

Major – 1, Minor – 0

11.2.23.1. Indication – QMI_PDC_GET_DEFAULT_CONFIG_INFO_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.3	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.3	1.3
Configuration Version	1.3	1.3
Configuration Size	1.3	1.3
Configuration Description	1.3	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.

Type	0x11			1	Configuration Version
Length	4			2	
Value	→	uint32	config_version	4	Version of the configuration in memory.
Type	0x12			1	Configuration Size
Length	4			2	
Value	→	uint32	config_size	4	Size of the configuration in memory.
Type	0x13			1	Configuration Description
Length	Var			2	
Value	→	uint8	config_desc_len	1	Number of sets of the following elements: • config_desc
		uint8	config_desc	Var	ASCII string containing the description of the configuration read from memory.

11.2.23.2. Description of QMI_PDC_GET_DEFAULT_CONFIG_INFO_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the information about the default configuration has been read. This information includes:

- Configuration version – Version embedded within the configuration and stored in memory
- Configuration size – Size of the configuration in memory
- Configuration description – Description embedded within the configuration and stored in memory

11.2.24. QMI_PDC_DEACTIVATE_CONFIG

Deactivates an active configuration for the component.

PDC message ID

0x002B

Version introduced

Major – 1, Minor – 5

11.2.24.1. Request – QMI_PDC_DEACTIVATE_CONFIG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration Type	1.3	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.5	1.5
Subscription ID	1.6	1.6

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	Subscription ID
Length	4			2	
Value	→	uint32	subscription_id	4	Subscription ID to deactivate configuration from **Note:** If the value is greater than or equal to the number of subscriptions device allows, the service responds with QMI_ERR_NOT_SUPPORTED

11.2.24.2. Response – QMI_PDC_DEACTIVATE_CONFIG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.24.3. Description of QMI_PDC_DEACTIVATE_CONFIG REQ/RESP

This command deactivates the currently active configuration for the component. Subscription ID 0 is used if no subscription ID is provided. The operation started by this request may be different for each type of configuration.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.25. QMI_PDC_DEACTIVATE_CONFIG_IND

Indication with the deactivate configuration result.

PDC message ID

0x002B

Version introduced

Major – 1, Minor – 0

11.2.25.1. Indication – QMI_PDC_DEACTIVATE_CONFIG_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.5	1.5

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0010 – QMI_ERR_NOT_PROVISIONED – Specified configuration was not found

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.5	1.5

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token passed in the request that generated.

11.2.25.2. Description of QMI_PDC_DEACTIVATE_CONFIG_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the operation to deactivate the active configuration is complete. This process is specific to the component being configured.

11.2.26. QMI_PDC_VALIDATE_CONFIG

Validates a specified configuration for the component.

PDC message ID

0x002C

Version introduced

Major – 1, Minor – 8

11.2.26.1. Request – QMI_PDC_VALIDATE_CONFIG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Configuration Type	1.3	1.3

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Configuration Type
Length	4			2	
Value	→	enum	config_type	4	Type of configuration. Values: • PDC_CONFIG_TYPE_MODEM_ PLATFORM (0x00) – Modem platform configuration type • PDC_CONFIG_TYPE_MODEM_ SW (0x01) – Modem software configuration type **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.8	1.8
Configuration ID	1.8	1.8
Subscription ID	1.6	1.6
Path	1.8	1.8

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	

Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.
Type	0x11			1	Configuration ID
Length	Var			2	
Value	→	uint8	config_id_len	1	Number of sets of the following elements: • config_id
		uint8	config_id	Var	Unique ID for the configuration to be validated
Type	0x12			1	Subscription ID
Length	4			2	
Value	→	uint32	subscription_id	4	Subscription ID to validate configuration from **Note:** If the value is greater than or equal to the number of subscriptions device allows, the service responds with QMI_ERR_NOT_SUPPORTED
Type	0x13			1	Path
Length	Var			2	
Value	→	string16	path	Var	ASCII string containing diff file path to be stored on the remote file server.

11.2.26.2. Response – QMI_PDC_VALIDATE_CONFIG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.26.3. Description of QMI_PDC_VALIDATE_CONFIG REQ/RESP

This command validates the specified configuration for the component. Subscription ID 0 is used if no subscription ID is provided. Current active configuration is used if no configuration ID is provided.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.27. QMI_PDC_VALIDATE_CONFIG_IND

Indication with the validate configuration result.

PDC message ID

0x002C

Version introduced

Major – 1, Minor – 8

11.2.27.1. Indication – QMI_PDC_VALIDATE_CONFIG_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.8	1.8

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0010 – QMI_ERR_NOT_PROVISIONED – Specified configuration was not found

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.8	1.8
Result Format	1.8	1.8
Frame Index	1.8	1.8
Result Data Frame	1.8	1.8

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token

Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.
Type	0x11			1	Result Format
Length	4			2	
Value	→	uint32	result_format	4	The version of result.
Type	0x12			1	Frame Index
Length	4			2	
Value	→	uint32	frame_index	4	The index of data frame starting from 0, 0xFFFFFFFF inidicates the last frame.
Type	0x13			1	Result Data Frame
Length	Var			2	
Value	→	uint16	result_frame_len	2	Number of sets of the following elements: • result_frame
		uint8	result_frame	Var	Next frame of the configuration data to be stored.

11.2.27.2. Description of QMI_PDC_VALIDATE_CONFIG_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the operation to validate the active configuration is complete. It may return multiples indications with result data frame in sequential frame index for client to reassemble the result data and analyze based on the result format number. The serial of indications will be terminated with frame index set to 0xFFFFFFFF or with any none-zero error code.

If the remote path is specified in the request, the result data will be stored in the specified path.

11.2.28. QMI_PDC_GET_FEATURE

Gets the configuration features.

PDC message ID

0x002D

Version introduced

Major – 1, Minor – 9

11.2.28.1. Request – QMI_PDC_GET_FEATURE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Slot ID	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Slot ID
Length	4			2	
Value	→	uint32	slot_id	4	Slot ID from which to query configuration features. **Note:** If the value is greater than or equal to the number of slots device allows, the service responds with QMI_ERR_NOT_SUPPORTED

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.

11.2.28.2. Response – QMI_PDC_GET_FEATURE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified

11.2.28.3. Description of QMI_PDC_GET_FEATURE REQ/RESP

This command queries the configuration feature for specified slot ID.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.29. QMI_PDC_GET_FEATURE_IND

Indication with the read configuration feature result.

PDC message ID

0x002D

Version introduced

Major – 1, Minor – 9

11.2.29.1. Indication – QMI_PDC_GET_FEATURE_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0010 – QMI_ERR_NOT_PROVISIONED – Specified configuration was not found

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.9	1.9
Selection Mode	1.9	1.9
Selection Carrier	1.9	1.9
Flexible Mapping	1.9	1.9
Refresh Mode	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description

Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated this indication.
Type	0x11			1	Selection Mode
Length	4			2	
Value	→	enum	selection_mode	4	Type of selection mode. Values: • PDC_SELECTION_MODE_DISABLE (0x00) – Selection disabled • PDC_SELECTION_MODE_IIN (0x01) – IIN based selection • PDC_SELECTION_MODE_IMSI (0x02) – IMSI based selection • PDC_SELECTION_MODE_HYBRID (0x03) – IIN selection first, then IMSI based selection if there's mismatch
Type	0x12			1	Selection Carrier
Length	4			2	
Value	→	enum	carrier	4	Type of selection subsidized carrier or open market. Values: • PDC_SELECTION_OPEN_MARKET (0x00) • PDC_SELECTION_CARRIER_ VZW (0x01) • PDC_SELECTION_CARRIER_ SPRINT (0x02) • PDC_SELECTION_CARRIER_ ATT (0x03) • PDC_SELECTION_CARRIER_ VODAFONE (0x04) • PDC_SELECTION_CARRIER_ TMOBILE (0x05) • PDC_SELECTION_CARRIER_ TELUS (0x06) • PDC_SELECTION_CARRIER_ KDDI (0x07) • PDC_SELECTION_CARRIER_ GEN_UMTS_EU (0x08) • PDC_SELECTION_CARRIER_ GEN_UMTS_NA (0x09) • PDC_SELECTION_CARRIER_ GEN_C2K (0x0A) • PDC_SELECTION_CARRIER_ ORANGE (0x0B) • PDC_SELECTION_CARRIER_ TELEFONICA (0x0C) • PDC_SELECTION_CARRIER_ DOCOMO (0x0D) • PDC_SELECTION_CARRIER_ TEL_ITALIA (0x0E)

					• PDC_SELECTION_CARRIER_ TELSTRA (0x0F) • PDC_SELECTION_CARRIER_ LUCACELL (0x10) • PDC_SELECTION_CARRIER_ BELL_MOB (0x11) • PDC_SELECTION_CARRIER_ TELCOM_NZ (0x12) • PDC_SELECTION_CARRIER_ CHINA_TEL (0x13) • PDC_SELECTION_CARRIER_ C2K_OMH (0x14) • PDC_SELECTION_CARRIER_ CHINA_UNI (0x15) • PDC_SELECTION_CARRIER_ AMX (0x16) • PDC_SELECTION_CARRIER_NORX (0x17) • PDC_SELECTION_CARRIER_US_CELLULAR (0x18) • PDC_SELECTION_CARRIER_WONE (0x19) • PDC_SELECTION_CARRIER_AIRTEL (0x1A) • PDC_SELECTION_CARRIER_RELIANCE (0x1B) • PDC_SELECTION_CARRIER_SOFTBANK (0x1C) • PDC_SELECTION_CARRIER_ DT(0x1F) • PDC_SELECTION_CARRIER_CMCC (0x20) • PDC_SELECTION_CARRIER_VIVO (0x21) • PDC_SELECTION_CARRIER_ EE(0x22) • PDC_SELECTION_CARRIER_CHERRY (0x23) • PDC_SELECTION_CARRIER_IMOBILE (0x24) • PDC_SELECTION_CARRIER_SMARTFREN (0x25) • PDC_SELECTION_CARRIER_ LGU(0x26) • PDC_SELECTION_CARRIER_ SKT(0x27) • PDC_SELECTION_CARRIER_ TTA(0x28) • PDC_SELECTION_CARRIER_BEELINE (0x29)
Type	0x13			1	Flexible Mapping
Length	1			2	
Value	→	boolean	flex_mapping	1	Flexible mapping setting.
Type	0x14			1	Refresh Mode

Length	4			2	
Value	→	enum	refresh_mode	4	Type of refresh mode. Values: • PDC_REFRESH_MODE_DISABLED (0x00) – Refresh disabled • PDC_REFRESH_MODE_ENABLED (0x01) – Refresh enabled

11.2.29.2. Description of QMI_PDC_GET_FEATURE_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value. The remaining optional TLVs may be included when the Indication Error Code TLV is set to QMI_ERR_NONE.

This indication notifies the control point that the configuration feature has been read.

11.2.30. QMI_PDC_SET_FEATURE

Sets configuration features for the device.

PDC message ID

0x002E

Version introduced

Major – 1, Minor – 9

11.2.30.1. Request – QMI_PDC_SET_FEATURE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Slot ID	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Slot ID
Length	4			2	
Value	→	uint32	slot_id	4	Slot ID from which to query configuration features. **Note:** If the value is greater than or equal to the number of slots device allows, the service responds with QMI_ERR_NOT_SUPPORTED

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.9	1.9
Selection Mode	1.9	1.9
Selection Carrier	1.9	1.9
Flexible Mapping	1.9	1.9
Refresh Mode	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token used to identify the indication sent when the request is complete.

Type	0x11			1	Selection Mode
Length	4			2	
Value	→	enum	selection_mode	4	Type of selection mode. Values: • PDC_SELECTION_MODE_DISABLE (0x00) – Selection disabled • PDC_SELECTION_MODE_IIN (0x01) – IIN based selection • PDC_SELECTION_MODE_IMSI (0x02) – IMSI based selection • PDC_SELECTION_MODE_HYBRID (0x03) – IIN selection first, then IMSI based selection if there's mismatch **Note:** All other values are reserved, and the service responds with QMI_ERR_NOT_SUPPORTED.
Type	0x12			1	Selection Carrier
Length	4			2	
Value	→	enum	carrier	4	Type of selection subsidized carrier or open market. Values: • PDC_SELECTION_OPEN_MARKET (0x00) • PDC_SELECTION_CARRIER_ VZW (0x01) • PDC_SELECTION_CARRIER_ SPRINT (0x02) • PDC_SELECTION_CARRIER_ ATT (0x03) • PDC_SELECTION_CARRIER_ VODAFONE (0x04) • PDC_SELECTION_CARRIER_ TMOBILE (0x05) • PDC_SELECTION_CARRIER_ TELUS (0x06) • PDC_SELECTION_CARRIER_ KDDI (0x07) • PDC_SELECTION_CARRIER_ GEN_UMTS_EU (0x08) • PDC_SELECTION_CARRIER_ GEN_UMTS_NA (0x09) • PDC_SELECTION_CARRIER_ GEN_C2K (0x0A) • PDC_SELECTION_CARRIER_ ORANGE (0x0B) • PDC_SELECTION_CARRIER_ TELEFONICA (0x0C) • PDC_SELECTION_CARRIER_ DOCOMO (0x0D) • PDC_SELECTION_CARRIER_ TEL_ITALIA (0x0E) • PDC_SELECTION_CARRIER_ TELSTRA (0x0F)

					• PDC_SELECTION_CARRIER_ LUCACELL (0x10) • PDC_SELECTION_CARRIER_ BELL_MOB (0x11) • PDC_SELECTION_CARRIER_ TELCOM_NZ (0x12) • PDC_SELECTION_CARRIER_ CHINA_TEL (0x13) • PDC_SELECTION_CARRIER_ C2K_OMH (0x14) • PDC_SELECTION_CARRIER_ CHINA_UNI (0x15) • PDC_SELECTION_CARRIER_ AMX (0x16) • PDC_SELECTION_CARRIER_NORX (0x17) • PDC_SELECTION_CARRIER_US_CELLU LAR (0x18) • PDC_SELECTION_CARRIER_WONE (0x19) • PDC_SELECTION_CARRIER_AIRTEL (0x1A) • PDC_SELECTION_CARRIER_RELIANCE (0x1B) • PDC_SELECTION_CARRIER_SOFTBANK (0x1C) • PDC_SELECTION_CARRIER_ DT(0x1F) • PDC_SELECTION_CARRIER_CMCC (0x20) • PDC_SELECTION_CARRIER_VIVO (0x21) • PDC_SELECTION_CARRIER_ EE(0x22) • PDC_SELECTION_CARRIER_CHERRY (0x23) • PDC_SELECTION_CARRIER_IMOBILE (0x24) • PDC_SELECTION_CARRIER_SMARTFRE N (0x25) • PDC_SELECTION_CARRIER_ LGU(0x26) • PDC_SELECTION_CARRIER_ SKT(0x27) • PDC_SELECTION_CARRIER_ TTA(0x28) • PDC_SELECTION_CARRIER_BEELINE (0x29)
Type	0x13			1	Flexible Mapping
Length	1			2	
Value	→	boolean	flex_mapping	1	Flexible mapping setting.
Type	0x14			1	Refresh Mode
Length	4			2	
Value	→	enum	refresh_mode	4	Type of refresh mode. Values:

					• PDC_REFRESH_MODE_DISABLED (0x00) – Refresh disabled • PDC_REFRESH_MODE_ENABLED (0x01) – Refresh enabled

11.2.30.2. Response – QMI_PDC_SET_FEATURE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_NO_MEMORY	Service could not allocate memory to formulate a response
QMI_ERR_NOT_SUPPORTED	Operation is not supported
QMI_ERR_INVALID_ARG	Specified parameter is invalid
QMI_ERR_MISSING_ARG	Required TLV is not specified
QMI_ERR_ARG_TOO_LONG	Specified argument size is too large

11.2.30.3. Description of QMI_PDC_SET_FEATURE REQ/RESP

This command selects the configuration feature used by the device for the specified slot ID.
If QMI_RESULT_SUCCESS is returned in the Result Code TLV, an indication is sent when the operation is complete. The Indication Token TLV is included in the indication when it is specified in the request to link the request/response and indication.

11.2.31. QMI_PDC_SET_FEATURE_IND

Indication with the set feature configuration result.

PDC message ID

0x002D

Version introduced

Major – 1, Minor – 9

11.2.31.1. Indication – QMI_PDC_SET_FEATURE_IND

Message type

Indication

Sender

Service

Scope

Unicast (per control point)

Mandatory TLVs

Name	Version introduced	Version last modified
Indication Error Code	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication Error Code
Length	2			2	
Value	→	enum16	error	2	Error code. Values: • 0x0000 – QMI_ERR_NONE – Success • 0x0003 – QMI_ERR_INTERNAL – Internal error • 0x0029 – QMI_ERR_INVALID_ID – Specified argument already exists

Optional TLVs

Name	Version introduced	Version last modified
Indication Token	1.9	1.9

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Indication Token
Length	4			2	
Value	→	uint32	ind_token	4	Token passed in the request that generated.

11.2.31.2. Description of QMI_PDC_SET_FEATURE_IND

This indication is sent when the Result Code TLV in the response returns QMI_RESULT_SUCCESS. The Indication Token TLV is included when specified in the request, regardless of the Indication Error Code TLV value.

This indication notifies the control point that the configuration feature has been set.

12. Firmware Over The Air Service (QMI_FOTA)

The QMI_FOTA provides applications running on a tethered device, such as Terminal Equipment (TE), with the following commands related to device management services through OTA:

- Firmware download and upgrade
- Sprint OMA-DM (except FUMO)

It is expected that user-level applications, for example, connection managers and/or device drivers on the TE, use QMI_FOTA to access this functionality on the MSM™ device.

NOTE:

LM940 does not support Sprint OMA-DM FOTA functionality due to Sprint OMA-DM server limitation of max delta package size 5MB.

12.1. Theory of Operation

12.1.1. Generalized QMI Service Compliance

The QMI_FOTA service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

12.1.2. FOTA Service Type

FOTA is assigned QMI service type 0xE6.

12.1.3. Message Definition Template

12.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

12.1.4. QMI_FOTA Fundamental Concepts

The QMI_FOTA service provides OTA device management services. Device management includes:

- Download firmware update from FTP server
- Firmware update
- Sprint OMA-DM (except FUMO)

12.1.5. Service State Variables

12.1.5.1. Shared State Variables

No QMI_FOTA state variables are shared across control points.

12.2. QMI_FOTA Messages

Table 12-1 QMI_FOTA messages

Command	ID	Description
QMI_FOTA_RUN_FTPGETOTA	0x000B	This command is used to download an update package from an FTP server.
QMI_FOTA_DO_UPGRADE	0x000C	This command is used to start an update process.
QMI_FOTA_EVENT_INDICATOR	0x000D	Unsolicited indicator of FOTA session status changes during an FTP FOTA session.

12.2.1. QMI_FOTA_RUN_FTPGETOTA

This command is used to download an update package from FTP server.

FOTA message ID

0x000B

Version introduced

Major – 1, Minor – 0

12.2.1.1. Request – QMI_FOTA_RUN_FTPGETOTA_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	FTP Server URL
Length	1024			2	
Value	→	char	ftpurl	1024	
Type	0x02			1	Complete path to the file to be downloaded
Length	1024			2	
Value	→	char	remotefile	1024	

Optional TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Port
Length	2			2	
Value	→	uint8	ftpport	2	
Type	0x11			1	Username
Length	256			2	
Value	→	char	username	256	
Type	0x12			1	Password
Length	256			2	
Value	→	char	password	1	

12.2.1.2. Response – QMI_FOTA_RUN_FTPGETOTA_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.2.1.3. Description of QMI_FOTA_RUN_FTPGETOTA REQ/RESP

This command is used to download an update package from FTP server. Passive and Binary modes are used by default and cannot be changed. A client receives the event for the session state change through the indication message (QMI_FOTA_EVENT_INDICATOR).

12.2.2. QMI_FOTA_DO_UPGRADE

This command is used to start an update process.

FOTA message ID

0x000C

Version introduced

Major – 1, Minor – 0

12.2.2.1. Request – QMI_FOTA_DO_UPGRADE _REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

12.2.2.2. Response – QMI_FOTA_DO_UPGRADE_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.2.2.3. Description of QMI_ FOTA_DO_UPGRADE REQ/RESP

This command is used to start firmware update. Firmware package should be downloaded through QMI_FOTA_RUN_FTPGETOTA message to start update process. During the firmware update process, the

modem will be reboot several times. A client receives the result of firmware update through the indication message (QMI_FOTA_EVENT_INDICATOR).

12.2.3. QMI_FOTA_EVENT_INDICATOR

Unsolicited indicator of FOTA session status changes during FTP FOTA session.

FOTA message ID

0x000D

Version introduced

Major – 1, Minor – 0

12.2.3.1. Indication – QMI_FOTA_EVENT_INDICATOR_MSG

Message type

Indication

Sender

Service

Scope

To all control points (broadcast)

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication type
Length	4			2	
Value	→	uint32	status	4	Status enum. Values: • FOTA_FTP_DOWNLOAD_START (0) • FOTA_FTP_DOWNLOAD_COMPLETE (1) • FOTA_INSTALL_START (2) • FOTA_INSTALL_RESULT (3)
Type	0x02			1	Result code
Length	4			2	
Value	→	uint32	err	4	Result code enum. Values: • SUCCESS (0) • NO_UPDATE (1) • OPERATION_CANCELED (2) • SERVER_UNREACHABLE (3) • NETWORK_ERROR (4) • BAD_CREDENTIAL (5) • FW_UPDATE_FAILED (6) • GENERAL_ERROR (7)

Optional TLVs

None

12.2.3.2. Description of QMI_ FOTA_EVENT_INDICATOR

This broadcast indication is sent (intended for all control points) when the FTP FOTA session status changes and firmware update is done.

12.3. QMI_FOTA Messages for Sprint OMA-DM

Table 12-2 QMI_FOTA messages for Sprint OMA-DM

Command	ID	Description
QMI_FOTA_SPRINT_START_SESSION	0x0000	This command is used to start client initiated session.
QMI_FOTA_SPRINT_CANCEL_SESSION	0x0001	This command is used to cancel current session.
QMI_FOTA_SPRINT_NOTIFICATIONS_REG	0x0002	This command is used to register or unregister for unsolicited OMA-DM notifications and NI alerts.
QMI_FOTA_SPRINT_SEND_ALERT_SELECTION	0x0003	This command is used to send response to NI alert.
QMI_FOTA_SPRINT_EVENT_INDICATOR	0x0004	Unsolicited indicator of OMADM session status changes during an OMADM session, and NI alerts.
QMI_FOTA_SPRINT_GET_SETTING	0x0005	This command is used to get OMA-DM related settings.
QMI_FOTA_SPRINT_SET_SETTING	0x0006	This command is used to set OMA-DM related settings.
QMI_FOTA_SPRINT_GET_SESSION_INFO	0x0007	This command is used to get information about current session.
QMI_FOTA_SPRINT_OMASTAT_INDICATOR	0x001D	Unsolicited indicator of OMADM status changes with timestamp and numeric code

12.3.1. QMI_FOTA_SPRINT_START_SESSION

This command is used to start client initiated session.

FOTA message ID

0x0000

Version introduced

Major – 1, Minor – 0

12.3.1.1. Request – QMI_FOTA_SPRINT_START_SESSION_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Session Type
Length	1			2	
Value	→	uint8	Type	1	0 – DC, 1 – PRL, 2 – FUMO

Optional TLVs

None

12.3.1.2. Response – QMI_FOTA_SPRINT_START_SESSION_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the

	message was corrupted during transmission

12.3.1.3. Description of QMI_FOTA_SPRINT_START_SESSION REQ/RESP

This command is used to start client initiated OMA-DM session. LM940 does not support Sprint OMA-DM FOTA functionality due to Sprint OMA-DM server limitation of max delta package size 5MB. As a result, FUMO operation will always end with No Package available. A client receives the event for the session state change through the indication message (QMI_FOTA_SPRINT_EVENT_INDICATOR).

12.3.2. QMI_FOTA_SPRINT_CANCEL_SESSION

This command is used to cancel current session.

FOTA message ID

0x0001

Version introduced

Major – 1, Minor – 0

12.3.2.1. Request – QMI_FOTA_SPRINT_CANCEL_SESSION_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Session Type
Length	1			2	
Value	→	uint8	Type	1	0 – DC, 1 – PRL, 2 – FUMO, 255 – All

Optional TLVs

None

12.3.2.2. Response – QMI_FOTA_SPRINT_CANCEL_SESSION_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.3.2.3. Description of QMI_ FOTA_SPRINT_CANCEL_SESSION REQ/RESP

This command is used to cancel current OMA-DM session. A client receives the result of firmware update through the indication message (QMI_FOTA_SPRINT_EVENT_INDICATOR).

12.3.3. QMI_FOTA_SPRINT_NOTIFICATIONS_REG

This command is used register or unregister for unsolicited OMA-DM notifications and NI alerts.

FOTA message ID

0x0002

Version introduced

Major – 1, Minor – 0

12.3.3.1. Request – QMI_FOTA_SPRINT_NOTIOFICATIONS_REG_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Registration mode
Length	1			2	
Value	→	uint8	regMode	1	0 – Unregister, 1 – Register

Optional TLVs

None

12.3.3.2. Response – QMI_FOTA_SPRINT_NOTIFICATIONS_REG_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.3.3.3. Description of QMI_ FOTA_SPRINT_NOTIFICATIONS_REG REQ/RESP

This command is used to register or unregister for unsolicited OMA-DM notification and NI alerts. When notification is registered, client receives the OMA-DM session status message through the indication message (QMI_FOTA_SPRINT_OMASTAT_INDICATOR).

12.3.4. QMI_FOTA_SPRINT_SEND_ALERT_SELECTION

This command is used to send response to NI alert confirmation.

FOTA message ID

0x0003

Version introduced

Major – 1, Minor – 0

12.3.4.1. Request – QMI_FOTA_SPRINT_SEND_ALERT_SELECTION_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Response
Length	1			2	
Value	→	uint8	action	1	0 – Reject, 1 – Accept

Optional TLVs

None

12.3.4.2. Response – QMI_FOTA_SPRINT_SEND_ALERT_SELECTION_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.3.4.3. Description of QMI_ FOTA_SPRINT_SEND_ALERT_SELECTION REQ/RESP

This command is used to send response to NI alert confirmation. LM940 does not support Sprint OMA-DM FOTA functionality due to Sprint OMA-DM server limitation of max delta package size 5MB. It is recommended to use QMI_FOTA_RUN_FTPGETOTA to upgrade firmware viz OTA.

12.3.5. QMI_FOTA_SPRINT_EVENT_INDICATOR

Unsolicited indicator of OMADM session status changes during an OMADM session, and NI alerts.

FOTA message ID

0x0004

Version introduced

Major – 1, Minor – 0

12.3.5.1. Indication – QMI_FOTA_SPRINT_EVENT_INDICATOR_MSG

Message type

Indication

Sender

Service

Scope

To all control points (broadcast)

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication type
Length	4			2	
Value	→	uint32	status	4	Status enum. Values: • SPRINT_DM_START (0) • SPRINT_DM_COMPLETE (1) • SPRINT_PRL_START (2) • SPRINT_PRL_COMPLETE (3) • SPRINT_FUMO_START (4) • SPRINT_FUMO_COMPLETE (5) • SPRINT_HFA_DM_START (6) • SPRINT_HFA_DM_COMPLETE (7) • SPRINT_HFA_PRL_START (8) • SPRINT_HFA_PRL_COMPLETE (9) • SPRINT_HFA_FUMO_START (10) • SPRINT_HFA_FUMO_COMPLETE (11) • SPRINT_NI_START (12) • SPRINT_NI_COMPLETE (13) • SPRINT_WAIT_DOWNLOAD_CONFIRM (14) (Deprecated) • SPRINT_WAIT_UPDATE_CONFIRM (15) (Deprecated) • SPRINT_NI_WAIT_USER_ACTION (16)
Type	0x02			1	Result code
Length	4			2	
Value	→	uint32	err	4	Result code enum. Values: • SUCCESS (0) • NO_UPDATE (1) • OPERATION_CANCELED (2)

					• SERVER_UNREACHABLE (3) • NETWORK_ERROR (4) • BAD_CREDENTIAL (5) • FW_UPDATE_FAILED (6) (Deprecated) • GENERAL_ERROR (7)

Optional TLVs

None

12.3.5.2. Description of QMI_ FOTA_SPRINT_EVENT_INDICATOR

This broadcast indication is sent (intended for all control points) when the OMADM session status changes.

12.3.6. QMI_FOTA_SPRINT_GET_SETTING

This command is used to get OMADM related settings.

FOTA message ID

0x0005

Version introduced

Major – 1, Minor – 0

12.3.6.1. Request – QMI_FOTA_SPRINT_GET_SETTING_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

12.3.6.2. Response – QMI_FOTA_SPRINT_GET_SETTING_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	Enable or disable auto firmware download
Length	1			2	
Value	→	uint8	autoDownload	1	0 – Disable, 1 – Enable (Deprecated)
Type	0x04			1	Enable or disable auto firmware update
Length	1			2	
Value	→	uint8	autoUpdate	1	0 – Disable, 1 – Enable (Deprecated)
Type	0x05			1	Set auto NI alert response
Length	1			2	
Value	→	uint8	autoNIResponse	1	0 – Disable, 1 – Enable, 2 – Enable reject

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.3.6.3. Description of QMI_ FOTA_SPRINT_GET_SETTING REQ/RESP

This command is used to get OMADM related settings. LM940 does not support Sprint OMA-DM FOTA functionality due to Sprint OMA-DM server limitation of max delta package size 5MB. It is recommended to use QMI_FOTA_RUN_FTPGETOTA and QMI_FOTA_DO_UPGRADE to upgrade firmware through OTA.

12.3.7. QMI_FOTA_SPRINT_SET_SETTING

This command is used to set OMADM related settings.

FOTA message ID

0x0006

Version introduced

Major – 1, Minor – 0

12.3.7.1. Request – QMI_FOTA_SPRINT_SET_SETTING_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Enable or disable auto firmware download
Length	1			2	
Value	→	uint8	autoDownload	1	0 – Disable, 1 – Enable (Deprecated)
Type	0x02			1	Enable or disable auto firmware update
Length	1			2	
Value	→	uint8	autoUpdate	1	0 – Disable, 1 – Enable (Deprecated)
Type	0x03			1	Set auto NI alert response
Length	1			2	
Value	→	uint8	autoNIResponse	1	0 – Disable, 1 – Enable, 2 – Enable reject

Optional TLVs

None

12.3.7.2. Response – QMI_FOTA_SPRINT_SET_SETTING_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.3.7.3. Description of QMI_ FOTA_SPRINT_SET_SETTING REQ/RESP

This command is used to set OMADM related settings. LM940 does not support Sprint OMA-DM FOTA functionality due to Sprint OMA-DM server limitation of max delta package size 5MB. It is recommended to use QMI_FOTA_RUN_FTPGETOTA and QMI_FOTA_DO_UPGRADE to upgrade firmware through OTA.

12.3.8. QMI_FOTA_SPRINT_GET_SESSION_INFO

This command is used to get information about current session.

FOTA message ID

0x0007

Version introduced

Major – 1, Minor – 0

12.3.8.1. Request – QMI_FOTA_SPRINT_GET_SESSION_INFO_REQ_MSG

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

12.3.8.2. Response – QMI_FOTA_SPRINT_GET_SESSION_INFO_RESP_MSG

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	Session state
Length	1			2	
Value	→	uint8	state	1	0 – Idle, 1 – Active, 2 – Pending, 3 - Complete
Type	0x04			1	Session type
Length	4			2	
Value	→	uint32	session_type	4	Session type enum. Values: • SPRINT_SESSION_IDLE (0) • SPRINT_CI_DC (1) • SPRINT_CI_PRL (2) • SPRINT_CI_FUMO (3) • SPRINT_HFA_DC (4) • SPRINT_HFA_PRL (5) • SPRINT_HFA_FUMO (6)

					• SPRINT_NI_DC (7) • SPRINT_NI_PRL (8) • SPRINT_NI_FUMO(9)
Type	0x05			1	Firmware status
Length	1			2	
Value	→	uint8	firmware_status	1	(Deprecated) 0 – Not available 1 – Checking 2 – Downloading 3 – Downloaded 4 – Update completed
Type	0x06			1	Activation status
Length	1			2	
Value	→	uint8	activation_status	1	0 – Not activated, 1 – Activated
Type	0x07			1	Retry count
Length	1			2	
Value	→	uint8	Retry_count	1	How many retries are left

Optional TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Session state
Length	1			2	
Value	→	uint8	download_progress	1	Download progress in percentage. Only available when firmware_status is downloading status.

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

12.3.8.3. Description of QMI_ FOTA_SPRINT_GET_SESSION_INFO REQ/RESP

This command is used to get information about current session. LM940 does not support Sprint OMA-DM FOTA functionality due to Sprint OMA-DM server limitation of max delta package size 5MB. It is recommended to use QMI_FOTA_RUN_FTPGETOTA and QMI_FOTA_DO_UPGRADE to upgrade firmware through OTA.

12.3.9. QMI_FOTA_SPRINT_OMASTAT_INDICATOR

Unsolicited indicator of OMADM status changes with timestamp and numeric code.

FOTA message ID

0x001D

Version introduced

Major – 1, Minor – 0

12.3.9.1. Indication – QMI_FOTA_SPRINT_OMASTAT_INDICATOR_MSG

Message type

Indication

Sender

Service

Scope

To all control points (broadcast)

Mandatory TLVs

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Indication type
Length	512			2	
Value	→	char	msgBuf	512	OMADM status message string

Optional TLVs

None

12.3.9.2. Description of QMI_ FOTA_SPRINT_OMASTAT_INDICATOR

This broadcast indication is sent (intended for all control points) when the OMADM session status changes. To receive this indication, client should register notification through QMI_FOTA_SPRINT_NOTIFIACTIONS_REG message. The indication message string contains time stamp and OMADM numeric status code in the following format:

<day of week> <month> <day> <hh:mm:ss> <year> OMA-DM: <status code>

OMA DM status codes	
Code	**Description**
100	OMA NIA Received
101	Connecting to OMA DM server
102	Connection to OMA DM server failed
103	OMA session completed

200	Starting CI DC
201	CI DC Completed
202	CI DC Failed
203	Starting CI PRL
204	CI PRL Completed
205	CI PRL Failed
206	Starting CI FUMO
207	CI FUMO Completed
208	CI FUMO Failed
300	Radio reset required
301	Radio reset complete
302	Waiting on idle/dormant state for radio reset
400	Downloading FUMO Binary
401	Download of FUMO Binary Complete
402	Rebooting for FUMO install
403	FUMO install completed
404	No FUMO Update available
405	Waiting for next maintenance window for reset or reboot
500	Conditions in DM-HFA-05 requires HFA to run
501	HFA Completed
502	407 code Received from DM server
503	Waiting for HFA Retry

13. Telit General Modem Service (QMI_GMS)

The QMI_GMS provides applications running on a tethered device, such as Terminal Equipment (TE), with the following commands related to extended service by Telit on modem processor:

- Network access (debugging, carrier aggregation information)
- Test (simple testing)
- Location/Position determination (NMEA data)

It is expected that user-level applications, for example, connection managers and/or device drivers on the TE, use QMI_GMS to access this functionality on the MSM™ device.

13.1. Theory of Operation

13.1.1. Generalized QMI Service Compliance

The QMI_GMS service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

13.1.2. GMS Service Type

The GMS is assigned QMI service type 0xE7.

13.1.3. Message Definition Template

13.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

13.1.4. QMI_GMS Fundamental Concepts

The QMI_GMS service enables the control points to use extended functionalities by Telit on modem processor. Available information includes:

- Getting debugging information, carrier aggregation information performed by modem device

- Simple test to set/get value
- NMEA data indication enable/disable

13.1.5. Service State Variables

13.1.5.1. Shared State Variables

No QMI_GMS state variables are shared across control points.

13.2. QMI_GMS Messages

Table 13-1 QMI_GMS messages

Command	ID	Description
QMI_GMS_NAS_GET_DEBUG_INFO	0x0300	This command used to get some variables for NAS DEBUG
QMI_GMS_NAS_GET_CA_INFO	0x0301	This command used to get some variables for NAS CA
QMI_GMS_TEST_SET_VALUE	0x0F00	This command used to set some variables for TEST
QMI_GMS_TEST_GET_VALUE	0x0F01	This command used to get some variables for TEST
QMI_GMS_LOC_NMEA_DATA_IND_REG	0x1000	This command used to enable/disable NMEA DATA indications. Once this indication enabled, string format NMEA-DATA sent to client whenever NMEA DATA changed.

13.2.1. QMI_GMS_NAS_GET_DEBUG_INFO

This command used to get some variables for NAS DEBUG.

GMS message ID

0x0300

Version introduced

Major – 1, Minor – 1

13.2.1.1. Request – QMI_GMS_NAS_GET_DEBUG_INFO_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

13.2.1.2. Response – QMI_GMS_NAS_GET_DEBUG_INFO_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
Radio interface	1.1	1.1
Temperature	1.1	1.1
Operating mode	1.1	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	Radio interface
Length	4			2	
Value	→	enum	radio_if	4	Radio interface technology of the signal being measured. Values: • 0x00 – RADIO_IF_NO_SVC – None (no service) • 0x01 – RADIO_IF_CDMA_1X –cdma2000® 1X

					• 0x02 – RADIO_IF_CDMA_1XEVDO – cdma2000® HRPD (1xEV-DO) • 0x03 – RADIO_IF_AMPS – AMPS • 0x04 – RADIO_IF_GSM – GSM • 0x05 – RADIO_IF_UMTS – UMTS • 0x08 – RADIO_IF_LTE – LTE supported technologies.
Type	0x04			1	temperature
Length	2			2	
Value	→	int16	temperature	2	module temperature information. The value range is -40-120.
Type	0x05			1	operating mode
Length	4			2	
Value	→	enum	operating_mode	4	Operating mode. Values: • 0x00 – ONLINE (0) • 0x01 – LOW_POWER (1) • 0x02 – FACTORY_TEST_MODE (2) • 0x03 – OFFLINE (3) • 0x04 – RESETTING (4) • 0x05 – SHUTTING_DOWN (5)

Optional TLVs

Name	Version introduced	Version last modified
LTE Information	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	LTE Information
Length	31			2	
Value	→	uint8	ims_reg	1	Indicates whether IMS is registered 0 – not registered 1 – registered
		uint8	band_class	1	LTE band class. (band number – band class) BAND 1 – 120 BAND 2 –121 BAND 3 – 122 BAND 4 – 123 BAND 5 – 124 BAND 6 – 125 BAND 7 – 126 BAND 8 – 127 BAND 9 – 128 BAND 10 – 129 BAND 11 – 130 BAND 12 – 131 BAND 13 – 132 BAND 14 – 133 BAND 17 – 134 BAND 33 – 135 BAND 34 – 136 BAND 35 – 137

					BAND 36 – 138 BAND 37 – 139 BAND 38 – 140 BAND 39 – 141 BAND 40 – 142 BAND 18 – 143 BAND 19 – 144 BAND 20 – 145 BAND 21 – 146 BAND 24 – 147 BAND 25 – 148 BAND 41 – 149 BAND 42 – 150 BAND 43 – 151 BAND 23 – 152 BAND 26 – 153 BAND 32 – 154 BAND 125 – 155 BAND 126 – 156 BAND 127 – 157 BAND 28 – 158 BAND 29 – 159 BAND 30 – 160 BAND 66 – 161 BAND 250 – 162 BAND 46 – 163 BAND 27 – 164 BAND 31 – 165 BAND 47 – 166 BAND 48 – 167 BAND 71 – 168
		uint8	bandwidth	1	Bandwidth. Values: • NAS_LTE_BW_NRB_6 (0) – 1.4 MHz bandwidth • NAS_LTE_BW_NRB_15 (1) – 3 MHz bandwidth • NAS_LTE_BW_NRB_25 (2) – 5 MHz bandwidth • NAS_LTE_BW_NRB_50 (3) – 10 MHz bandwidth • NAS_LTE_BW_NRB_75 (4) – 15 MHz bandwidth • NAS_LTE_BW_NRB_100 (5) – 20 MHz bandwidth
		enum	downlink_mod	4	LTE downlink modulation. Values: • CMAPI_LTE_API_MODULATION_ BPSK (0x00) – BPSK • CMAPI_LTE_API_MODULATION_ QPSK (0x01) – QPSK • CMAPI_LTE_API_MODULATION_ 16QAM (0x02) – 16-QAM • CMAPI_LTE_API_MODULATION_ 64QAM (0x03) – 64-QAM • CMAPI_LTE_API_MODULATION_ 256QAM (0x04) – 256-QAM • CMAPI_LTE_API_MODULATION_UNKNOWN

					(0x05) – UNKNOWN
		enum	uplink_mod	4	LTE uplink modulation. Values: • CMAPI_LTE_API_MODULATION_ BPSK (0x00) – BPSK • CMAPI_LTE_API_MODULATION_ QPSK (0x01) – QPSK • CMAPI_LTE_API_MODULATION_ 16QAM (0x02) – 16-QAM • CMAPI_LTE_API_MODULATION_ 64QAM (0x03) – 64-QAM • CMAPI_LTE_API_MODULATION_ 256QAM (0x04) – 256-QAM • CMAPI_LTE_API_MODULATION_UNKNOWN (0x05) – UNKNOWN
		uint16	rx_channel	2	E-UTRA absolute radio frequency channel number of the serving cell. Range: 0 to 65535.
		Uint16	tx_channel	2	E-UTRA TX radio frequency channel. Range: 0 to 65535.
		Enum	emm_state	4	NAS Extended Mobility Management (EMM) state. Values: • NAS_EMM_NULL (2018) – Null • NAS_EMM_DEREGISTERED (2018) – Deregistered • NAS_EMM_REGISTERED_INITIATED (2) – Registered, initiated • NAS_EMM_REGISTERED (3) – Registered • NAS_EMM_TRACKING_AREA_ UPDATING_INITIATED (4) – Tracking area update initiated • NAS_EMM_SERVICE_REQUEST_ INITIATED (5) – Service request initiated • NAS_EMM_DEREGISTERED_ INITIATED (6) – Deregistered, initiated
		enum	emm_substate	4	NAS EMM substate. Values: • NAS_EMM_DEREGISTERED_ NO_IMSI (2018) –Deregistered, no IMSI • NAS_EMM_DEREGISTERED_PLMN_SEARCH (2018) – Deregistered, PLMN search • NAS_EMM_DEREGISTERED_ATTACH _NEEDED (2) – Deregistered, attach needed • NAS_EMM_DEREGISTERED_NO_CELL _AVAILABLE (3) – Deregistered, no cell is available • NAS_EMM_DEREGISTERED_ATTEMPTING _TO_ATTACH (4) – Deregistered, attempting to attach • NAS_EMM_DEREGISTERED_NORMAL _SERVICE (5) – Deregistered, normal service • NAS_EMM_DEREGISTERED_LIMITED

					_SERVICE (6) – Deregistered, limited service • NAS_EMM_REGISTERED_NORMAL _SERVICE (7) – Registered, normal service • NAS_EMM_REGISTERED_UPDATE_ NEEDED (8) – Registered, update needed •NAS_EMM_REGISTERED_ATTEMPTING_TO _UPDATE (9) – Registered, attempting to update • NAS_EMM_REGISTERED_NO_CELL _AVAILABLE (10) – Registered, no cell is available • NAS_EMM_REGISTERED_PLMN_ SEARCH (11) – Registered, PLMN search • NAS_EMM_REGISTERED_LIMITED_SERVICE (12) – Registered, limited service • NAS_EMM_REGISTERED_ATTEMPTING_TO _UPDATE_MM (13) – Registered, attempting to update MM • NAS_EMM_REGISTERED_IMSI_DETACH _INITIATED (14) – Registered, IMSI detach initiated • NAS_EMM_INTERNAL_SUBSTATE (15) –Internal substate
		enum	ps_attach_state	4	Packet-switched domain attach state of the mobile. Values: • 0x00 – PS_UNKNOWN – Unknown or not applicable • 0x01 – PS_ATTACHED – Attached • 0x02 – PS_DETACHED – Detached
		enum	emm_connection_state	4	NAS RRC state. Values: • EMM_IDLE_STATE_V01 (0) • EMM_WAITING_FOR_RRC_CONFIRMATION _STATE_V01 (1) • EMM_CONNECTED_STATE_V01 (2) • EMM_RELEASING_RRC_CONNECTION _STATE_V01 (3)

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

13.2.1.3. Description of QMI_GMS_NAS_GET_DEBUG_INFO REQ/RESP

This command used to get the debugging information of device.

13.2.2. QMI_GMS_NAS_GET_CA_INFO

This command used to get some variables for NAS CA.

GMS message ID

0x0301

Version introduced

Major – 1, Minor – 1

13.2.2.1. Request – QMI_GMS_NAS_GET_CA_INFO_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

13.2.2.2. Response – QMI_GMS_NAS_GET_CA_INFO_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
PCC CA Information	1.0	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	PCC CA Information
Length	26			2	
Value	→	uint8	band_class	1	LTE band class. (band number – band class) BAND 1 – 120 BAND 2 –121 BAND 3 – 122 BAND 4 – 123 BAND 5 – 124

					BAND 6 – 125 BAND 7 – 126 BAND 8 – 127 BAND 9 – 128 BAND 10 – 129 BAND 11 – 130 BAND 12 – 131 BAND 13 – 132 BAND 14 – 133 BAND 17 – 134 BAND 33 – 135 BAND 34 – 136 BAND 35 – 137 BAND 36 – 138 BAND 37 – 139 BAND 38 – 140 BAND 39 – 141 BAND 40 – 142 BAND 18 – 143 BAND 19 – 144 BAND 20 – 145 BAND 21 – 146 BAND 24 – 147 BAND 25 – 148 BAND 41 – 149 BAND 42 – 150 BAND 43 – 151 BAND 23 – 152 BAND 26 – 153 BAND 32 – 154 BAND 125 – 155 BAND 126 – 156 BAND 127 – 157 BAND 28 – 158 BAND 29 – 159 BAND 30 – 160 BAND 66 – 161 BAND 250 – 162 BAND 46 – 163 BAND 27 – 164 BAND 31 – 165 BAND 47 – 166 BAND 48 – 167 BAND 71 – 168
		uint32	channel	4	E-UTRA absolute radio frequency channel number of the serving cell. Range: 0 to 65535.
		Uint8	dl_bw	1	Bandwidth. Values: • NAS_LTE_BW_NRB_6 (0) – 1.4 MHz bandwidth • NAS_LTE_BW_NRB_15 (1) – 3 MHz bandwidth • NAS_LTE_BW_NRB_25 (2) – 5 MHz bandwidth

					• NAS_LTE_BW_NRB_50 (3) – 10 MHz bandwidth • NAS_LTE_BW_NRB_75 (4) – 15 MHz bandwidth • NAS_LTE_BW_NRB_100 (5) – 20 MHz bandwidth
		uint16	pci	2	Physical Cell Id. Range : 0 to 503.
		Int32	rsrp	4	Current RSRP in 1/10 dBm as measured by L1. Range : -44 to -140 dbm
		int32	rssi	4	Current RSSI in 1/10 dBm as measured by L1. Range : 0 to -120 dbm
		int32	rsrq	4	Current RSRQ in 1/10 dB as measured by L1. Range : -3 to -20 dbm
		int32	sinr	4	Measured SINR in dB. Range : 0 to 250
		uint16	tac	2	Tracking area code information for LTE.

Optional TLVs

Name	Version introduced	Version last modified
SCC 0 CA Information	1.0	1.1
SCC 1 CA Information	1.0	1.1
SCC 2 CA Information	1.1	1.1
SCC 3 CA Information	1.1	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	SCC 0 CA Information
Length	28			2	
Value	→	uint8	band_class	1	LTE band class. (band number – band class) BAND 1 – 120 BAND 2 –121 BAND 3 – 122 BAND 4 – 123 BAND 5 – 124 BAND 6 – 125 BAND 7 – 126 BAND 8 – 127 BAND 9 – 128 BAND 10 – 129 BAND 11 – 130 BAND 12 – 131 BAND 13 – 132 BAND 14 – 133 BAND 17 – 134 BAND 33 – 135 BAND 34 – 136 BAND 35 – 137 BAND 36 – 138 BAND 37 – 139 BAND 38 – 140 BAND 39 – 141

					BAND 40 – 142 BAND 18 – 143 BAND 19 – 144 BAND 20 – 145 BAND 21 – 146 BAND 24 – 147 BAND 25 – 148 BAND 41 – 149 BAND 42 – 150 BAND 43 – 151 BAND 23 – 152 BAND 26 – 153 BAND 32 – 154 BAND 125 – 155 BAND 126 – 156 BAND 127 – 157 BAND 28 – 158 BAND 29 – 159 BAND 30 – 160 BAND 66 – 161 BAND 250 – 162 BAND 46 – 163 BAND 27 – 164 BAND 31 – 165 BAND 47 – 166 BAND 48 – 167 BAND 71 – 168
		uint32	channel	4	E-UTRA absolute radio frequency channel number of the serving cell. Range: 0 to 65535.
		Uint8	dl_bw	1	Bandwidth. Values: • NAS_LTE_BW_NRB_6 (0) – 1.4 MHz bandwidth • NAS_LTE_BW_NRB_15 (1) – 3 MHz bandwidth • NAS_LTE_BW_NRB_25 (2) – 5 MHz bandwidth • NAS_LTE_BW_NRB_50 (3) – 10 MHz bandwidth • NAS_LTE_BW_NRB_75 (4) – 15 MHz bandwidth • NAS_LTE_BW_NRB_100 (5) – 20 MHz bandwidth
		uint16	pci	2	Physical Cell Id. Range : 0 to 503.
		Int32	rsrp	4	Current RSRP in 1/10 dBm as measured by L1. Range : -44 to -140 dbm
		int32	rssi	4	Current RSSI in 1/10 dBm as measured by L1. Range : 0 to -120 dbm
		int32	rsrq	4	Current RSRQ in 1/10 dB as measured by L1. Range : -3 to -20 dbm
		int32	sinr	4	Measured SINR in dB. Range : 0 to 250
		enum	state	4	Current SCC 0 state.

					• INIT (0) • CONFIGURED (1) • ACTIVE (2)
Type	0x11			1	SCC 1 CA Information
Length	28			2	
Value	→	uint8	band_class	1	LTE band class. (band number – band class) BAND 1 – 120 BAND 2 –121 BAND 3 – 122 BAND 4 – 123 BAND 5 – 124 BAND 6 – 125 BAND 7 – 126 BAND 8 – 127 BAND 9 – 128 BAND 10 – 129 BAND 11 – 130 BAND 12 – 131 BAND 13 – 132 BAND 14 – 133 BAND 17 – 134 BAND 33 – 135 BAND 34 – 136 BAND 35 – 137 BAND 36 – 138 BAND 37 – 139 BAND 38 – 140 BAND 39 – 141 BAND 40 – 142 BAND 18 – 143 BAND 19 – 144 BAND 20 – 145 BAND 21 – 146 BAND 24 – 147 BAND 25 – 148 BAND 41 – 149 BAND 42 – 150 BAND 43 – 151 BAND 23 – 152 BAND 26 – 153 BAND 32 – 154 BAND 125 – 155 BAND 126 – 156 BAND 127 – 157 BAND 28 – 158 BAND 29 – 159 BAND 30 – 160 BAND 66 – 161 BAND 250 – 162 BAND 46 – 163 BAND 27 – 164 BAND 31 – 165 BAND 47 – 166

					BAND 48 – 167 BAND 71 – 168
		uint32	channel	4	E-UTRA absolute radio frequency channel number of the serving cell. Range: 0 to 65535.
		Uint8	dl_bw	1	Bandwidth. Values: • NAS_LTE_BW_NRB_6 (0) – 1.4 MHz bandwidth • NAS_LTE_BW_NRB_15 (1) – 3 MHz bandwidth • NAS_LTE_BW_NRB_25 (2) – 5 MHz bandwidth • NAS_LTE_BW_NRB_50 (3) – 10 MHz bandwidth • NAS_LTE_BW_NRB_75 (4) – 15 MHz bandwidth • NAS_LTE_BW_NRB_100 (5) – 20 MHz bandwidth
		uint16	pci	2	Physical Cell Id. Range : 0 to 503.
		Int32	rsrp	4	Current RSRP in 1/10 dBm as measured by L1. Range : -44 to -140 dbm
		int32	rssi	4	Current RSSI in 1/10 dBm as measured by L1. Range : 0 to -120 dbm
		int32	rsrq	4	Current RSRQ in 1/10 dB as measured by L1. Range : -3 to -20 dbm
		int32	sinr	4	Measured SINR in dB. Range : 0 to 250
		enum	state	4	Current SCC 1 state. • INIT (0) • CONFIGURED (1) • ACTIVE (2)
Type	0x12			1	SCC 2 CA Information
Length	28			2	
Value	→	uint8	band_class	1	LTE band class. (band number – band class) BAND 1 – 120 BAND 2 –121 BAND 3 – 122 BAND 4 – 123 BAND 5 – 124 BAND 6 – 125 BAND 7 – 126 BAND 8 – 127 BAND 9 – 128 BAND 10 – 129 BAND 11 – 130 BAND 12 – 131 BAND 13 – 132 BAND 14 – 133 BAND 17 – 134 BAND 33 – 135 BAND 34 – 136 BAND 35 – 137

					BAND 36 – 138 BAND 37 – 139 BAND 38 – 140 BAND 39 – 141 BAND 40 – 142 BAND 18 – 143 BAND 19 – 144 BAND 20 – 145 BAND 21 – 146 BAND 24 – 147 BAND 25 – 148 BAND 41 – 149 BAND 42 – 150 BAND 43 – 151 BAND 23 – 152 BAND 26 – 153 BAND 32 – 154 BAND 125 – 155 BAND 126 – 156 BAND 127 – 157 BAND 28 – 158 BAND 29 – 159 BAND 30 – 160 BAND 66 – 161 BAND 250 – 162 BAND 46 – 163 BAND 27 – 164 BAND 31 – 165 BAND 47 – 166 BAND 48 – 167 BAND 71 – 168
		uint32	channel	4	E-UTRA absolute radio frequency channel number of the serving cell. Range: 0 to 65535.
		Uint8	dl_bw	1	Bandwidth. Values: • NAS_LTE_BW_NRB_6 (0) – 1.4 MHz bandwidth • NAS_LTE_BW_NRB_15 (1) – 3 MHz bandwidth • NAS_LTE_BW_NRB_25 (2) – 5 MHz bandwidth • NAS_LTE_BW_NRB_50 (3) – 10 MHz bandwidth • NAS_LTE_BW_NRB_75 (4) – 15 MHz bandwidth • NAS_LTE_BW_NRB_100 (5) – 20 MHz bandwidth
		uint16	pci	2	Physical Cell Id. Range : 0 to 503.
		Int32	rsrp	4	Current RSRP in 1/10 dBm as measured by L1. Range : -44 to -140 dbm
		int32	rssi	4	Current RSSI in 1/10 dBm as measured by L1. Range : 0 to -120 dbm
		int32	rsrq	4	Current RSRQ in 1/10 dB as measured by L1.

					Range : -3 to -20 db
		int32	sinr	4	Measured SINR in dB. Range : 0 to 250
		enum	state	4	Current SCC 2 state. • INIT (0) • CONFIGURED (1) • ACTIVE (2)
Type	0x13			1	SCC 3 CA Information
Length	28			2	
Value	→	uint8	band_class	1	LTE band class. (band number – band class) BAND 1 – 120 BAND 2 –121 BAND 3 – 122 BAND 4 – 123 BAND 5 – 124 BAND 6 – 125 BAND 7 – 126 BAND 8 – 127 BAND 9 – 128 BAND 10 – 129 BAND 11 – 130 BAND 12 – 131 BAND 13 – 132 BAND 14 – 133 BAND 17 – 134 BAND 33 – 135 BAND 34 – 136 BAND 35 – 137 BAND 36 – 138 BAND 37 – 139 BAND 38 – 140 BAND 39 – 141 BAND 40 – 142 BAND 18 – 143 BAND 19 – 144 BAND 20 – 145 BAND 21 – 146 BAND 24 – 147 BAND 25 – 148 BAND 41 – 149 BAND 42 – 150 BAND 43 – 151 BAND 23 – 152 BAND 26 – 153 BAND 32 – 154 BAND 125 – 155 BAND 126 – 156 BAND 127 – 157 BAND 28 – 158 BAND 29 – 159 BAND 30 – 160 BAND 66 – 161 BAND 250 – 162

					BAND 46 – 163 BAND 27 – 164 BAND 31 – 165 BAND 47 – 166 BAND 48 – 167 BAND 71 – 168
		uint32	channel	4	E-UTRA absolute radio frequency channel number of the serving cell. Range: 0 to 65535.
		Uint8	dl_bw	1	Bandwidth. Values: • NAS_LTE_BW_NRB_6 (0) – 1.4 MHz bandwidth • NAS_LTE_BW_NRB_15 (1) – 3 MHz bandwidth • NAS_LTE_BW_NRB_25 (2) – 5 MHz bandwidth • NAS_LTE_BW_NRB_50 (3) – 10 MHz bandwidth • NAS_LTE_BW_NRB_75 (4) – 15 MHz bandwidth • NAS_LTE_BW_NRB_100 (5) – 20 MHz bandwidth
		uint16	pci	2	Physical Cell Id. Range : 0 to 503.
		Int32	rsrp	4	Current RSRP in 1/10 dBm as measured by L1. Range : -44 to -140 dbm
		int32	rssi	4	Current RSSI in 1/10 dBm as measured by L1. Range : 0 to -120 dbm
		int32	rsrq	4	Current RSRQ in 1/10 dB as measured by L1. Range : -3 to -20 dbm
		int32	sinr	4	Measured SINR in dB. Range : 0 to 250
		enum	state	4	Current SCC 3 state. • INIT (0) • CONFIGURED (1) • ACTIVE (2)

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

NOTE:

The 32.00.0XX model could support 5CA and 24.01.5XX could 3CA. So 32.00.0XX model could have SCC 2 CA Information(0x12), SCC 3 CA Information(0x13) but those type(0x12, 0x13) never be included in 24.01.5XX.

13.2.2.3. Description of QMI_GMS_NAS_GET_CA_INFO REQ/RESP

This command used to get the carrier aggregation information of LTE.

13.2.3. QMI_GMS_TEST_SET_VALUE

This command used to set some variables for TEST.

GMS message ID

0x0F00

Version introduced

Major – 1, Minor – 0

13.2.3.1. Request – QMI_GMS_TEST_SET_VALUE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	test mandatory value
Length	1			2	
Value	→	uint8	m_value	1	Value range is 0-255

Optional TLVs

Name	Version introduced	Version last modified
test optional value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	test optional value
Length	1			2	
Value	→	uint8	o_value	1	Value range is 0-255

13.2.3.2. Response – QMI_GMS_TEST_SET_VALUE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

13.2.3.3. Description of QMI_GMS_TEST_SET_VALUE REQ/RESP

This command used to check if GMS service is running, properly by setting and getting simple variables

13.2.4. QMI_GMS_TEST_GET_VALUE

This command used to set some variables for TEST.

GMS message ID

0x0F01

Version introduced

Major – 1, Minor – 0

13.2.4.1. Request – QMI_GMS_TEST_GET_VALUE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

13.2.4.2. Response – QMI_GMS_TEST_GET_VALUE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	test mandatory value
Length	1			2	
Value	→	uint8	m_value	1	Value range is 0-255

Optional TLVs

Name	Version introduced	Version last modified
test optional value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	test optional value
Length	1			2	
Value	→	uint8	o_value	1	Value range is 0-255

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

13.2.4.3. Description of QMI_GMS_TEST_GET_VALUE REQ/RESP

This command used to check if GMS service is running, properly by setting and getting simple variables.

13.2.5. QMI_GMS_LOC_NMEA_DATA_IND_REG

This command used to enable/disable NMEA DATA indications. Once this indication enabled, string format NMEA-DATA sent to client whenever NMEA DATA changed.

GMS message ID

0x1000

Version introduced

Major – 1, Minor – 0

13.2.5.1. Request – QMI_GMS_LOC_NMEA_DATA_IND_REG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
NMEA data indication registration	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	NMEA data indication registration
Length	1			2	
Value	→	uint8	enable	1	Value: • 0 – Disable • 1 – Enable

Optional TLVs

None

13.2.5.2. Response – QMI_GMS_LOC_NMEA_DATA_IND_REG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

13.2.5.3. Indication – QMI_GMS_LOC_NMEA_DATA_IND

Message type

Indication

Sender

Service

Scope

Per control point (unicast)

Mandatory TLVs

Name	Version introduced	Version last modified
NMEA event type	Unknown	1.0
NMEA location data	Unknown	1.0
size to write	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	NMEA event type
Length	4			2	
Value	→	enum	event_indication	4	Values: • 0 – Normal nmea event • Other value is not specified
Type	0x02			1	NMEA location data
Length	256			2	
Value	→	char	nmea_data	256	
Type	0x03			1	size to write
Length	4			2	
Value	→	uint32	nmea_data_size	4	

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

13.2.5.4. Description of QMI_GMS_LOC_NMEA_DATA_IND_REG REQ/RESP/IND

This command enable/disable NMEA DATA indication occurred on modem processor and it allows the clients run on application processor to control NMEA indication.

NMEA DATA is equivalent to NMEA URC string format, which is defined in AT Command User Guide. Refer to $GPSNMUN command in AT user guide for more detailed information.

14. Telit General Application Service (QMI_GAS)

The QMI_GAS provides applications running on a tethered device, such as Terminal Equipment (TE), with the following commands related to extended service by Telit on application processor:

- Device management (USB configuration, Modem firmware management)
- Test (simple testing)

It is expected that user-level applications, for example, connection managers and/or device drivers on the TE, use QMI_GAS to access this functionality on the MSM™ device.

14.1. Theory of Operation

14.1.1. Generalized QMI Service Compliance

The QMI_GAS service complies with the generalized QMI service specification, including the rules for messages, indications and responses, byte ordering, arbitration, constants, result, and error code values described in 80-VB816-1. Extensions to the generalized QMI service theory of operation are noted in subsequent sections of this chapter.

14.1.2. GAS Service Type

The GAS is assigned QMI service type 0xE8.

14.1.3. Message Definition Template

14.1.3.1. Response Message Result TLV

This Type-Length-Value (TLV) (defined in Section 4.1.3.3) is present in all Response messages defined in this document. It is not present in the Indication messages.

14.1.4. QMI_GAS Fundamental Concepts

The QMI_GAS service enables the control points to use extended functionalities by Telit on application processor. Available information includes:

- USB configuration
- Changing device status, activation/update/insert/remove modem firmware, getting modem firmware information

- Simple test to set/get value

14.1.5. Service State Variables

14.1.5.1. Shared State Variables

No QMI_GAS state variables are shared across control points.

14.2. QMI_GAS Messages

Table 14-1 QMI_GAS messages

Command	ID	Description
QMI_GAS_DMS_USB_CFG_SET	0x0203	This command is for setting USB configuration.
QMI_GAS_DMS_USB_CFG_GET	0x0204	This command is for getting USB configuration.
QMI_GAS_DMS_MODE_SET	0x0205	This command is for changing device status to firmware upgrade. (Deprecated)
QMI_GAS_DMS_ACTIVE_FW	0x0206	This command is used for activation specific modem f/w.
QMI_GAS_DMS_SET_FW	0x0207	This command is used for update or insert modem f/w. (Deprecated)
QMI_GAS_DMS_GET_FW	0x0208	This command is used for getting stored modem f/w information.
QMI_GAS_DMS_CELAR_FW	0x0209	This command is used for remove stored modem f/w.
QMI_GAS_TEST_SET_VALUE	0x0F00	This command used to set some variables for TEST
QMI_GAS_TEST_GET_VALUE	0x0F01	This command used to get some variables for TEST
QMI_GAS_PSM_GET_PSM_EVT_CFG	0xE400	This command used to get wakeup event mask from PSM
QMI_GAS_PSM_SET_PSM_EVT_CFG	0xE401	This command used to set wakeup event mask from PSM
QMI_GAS_PSM_GET_WAKEN_CFG_REQ	0xE402	This command used to get WAKE_N pin configuration.
QMI_GAS_PSM_SET_WAKEN_CFG_REQ	0xE403	This command used to set WAKE_N pin configuration.
QMI_GAS_PSM_GET_WDISA_CFG_REQ	0xE404	This command used to get W_DISABLE_N pin configuration (get Power Saving Mode)
QMI_GAS_PSM_SET_WDISA_CFG_REQ	0xE405	This command used to set W_DISABLE_N pin configuration (set Power Saving Mode)
QMI_GAS_PSM_GET_EVT_REQ	0xE406	This command used to get last wake up source during PSM

14.2.1. QMI_GAS_DMS_USB_CFG_SET

This command is for setting USB configuration.

GAS message ID

0x0203

Version introduced

Major – 1, Minor – 0

14.2.1.1. Request – QMI_GAS_DMS_USB_CFG_SET_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
Selected USB composition	Unknown	1.0
hsic	Unknown	1.0
persistence	Unknown	1.0
immediate	Unknown	1.0
reboot	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	Selected USB composition
Length	4			2	
Value	→	uint32	pid	4	Values: • 0x1040 • 0x1041 • 0x1042 • 0x1043 • 0x1045 (* Please refer to AT Commands Guide for detailed information for each PID)
Type	0x02			1	Hsic
Length	1			2	
Value	→	uint8	hsic	1	Values: • 0 – HSUSB • 1 – HSIC (Not Supported)
Type	0x03			1	persistence
Length	1			2	
Value	→	boolean	persistence	1	Values: • 0 – No (Not Supported) • 1 – Yes
Type	0x04			1	immediate

Length	1			2	
Value	→	boolean	immediate	1	Values: • 0 – No • 1 – Yes (Not Supported)
Type	0x05			1	reboot
Length	1			2	
Value	→	boolean	reboot	1	Values: • 0 – No (Not Supported) • 1 – Yes

Optional TLVs

None

14.2.1.2. Response – QMI_GAS_DMS_USB_CFG_SET_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission

14.2.1.3. Description of QMI_GAS_DMS_USB_CFG_SET REQ/RESP

This command set the USB configuration. The USB CFG configuration set result TLV is only returned if no errors occur.

14.2.2. QMI_GAS_DMS_USB_CFG_GET

This command is for getting USB configuration.

GMS message ID

0x0204

Version introduced

Major – 1, Minor – 0

14.2.2.1. Request – QMI_GAS_DMS_USB_CFG_GET_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

14.2.2.2. Response – QMI_GAS_DMS_USB_CFG_GET_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	Selected USB composition
Length	4			2	
Value	→	uint32	pid	4	Values: • 0x1042 • 0x1040 • 0x1041 • 0x1043 • 0x1045

					(* Please refer to AT Commands Guide for detailed information for each PID)
Type	0x04			1	hsic
Length	1			2	
Value	→	uint8	hsic	1	Values: • 0 – HSUSB • 1 – HSIC (Not Supported)
Type	0x05			1	persistence
Length	1			2	
Value	→	boolean	persistence	1	Values: • 0 – No (Not Supported) • 1 – Yes
Type	0x06			1	immediate
Length	1			2	
Value	→	boolean	immediate	1	Values: • 0 – No • 1 – Yes (Not Supported)
Type	0x07			1	reboot
Length	1			2	
Value	→	boolean	reboot	1	Values: • 0 – No (Not Supported) • 1 – Yes

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.2.3. Description of QMI_GAS_DMS_USB_CFG_GET REQ/RESP

This command returns the USB configuration. The USB configuration result TLV is only returned if no errors occur.

14.2.3. QMI_GAS_DMS_MODE_SET

This command is for changing device status to firmware upgrade. (Deprecated)

GAS message ID

0x0205

Version introduced

Major – 1, Minor – 0

14.2.3.1. Request – QMI_GAS_DMS_MODE_SET_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
operate_type	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	operate_type
Length	1			2	
Value	→	enum	operate_type	1	Tow be changed mode type for f/w upgrade. Values: • 0 – dload mode in SBL1 • 1 – fastboot mode in LK

Optional TLVs

None

14.2.3.2. Response – QMI_GAS_DMS_MODE_SET_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_ARG_TOO_LONG	String size too long
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_INVALID_ARG	Invalid parameter in the request
QMI_ERR_FW_WRITE_FAILED	F/w file write failed
QMI_ERR_FW_INFO_READ_FAILED	Stored f/w read failed
QMI_ERR_FW_FILE_NOT_FOUND	There is no matched f/w file by conditions
QMI_ERR_FW_DIR_NOT_FOUND	There is no matched f/w directory by conditions
QMI_ERR_FW_ALREADY_ACTIVATED	Already activated

14.2.3.3. Description of QMI_GAS_DMS_MODE_SET REQ/RESP

This command is to change status of device mode for entire f/w upgrading.

NOTE:

This command is not supported on 24.01.5X0-B006 version.

14.2.4. QMI_GAS_DMS_ACTIVE_FW

This command is used for activation specific modem f/w.

GAS message ID

0x0206

Version introduced

Major – 1, Minor – 0

14.2.4.1. Request – QMI_GAS_DMS_ACTIVE_FW_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

Name	Version introduced	Version last modified
Carrier name structure	1.0	1.0
Slot index	1.0	1.0
Version structure	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Carrier name structure
Length	Var			2	
Value	→	uint8	name_len	1	Number of length the following elements: - name
		string	name	Var	carrier name which want to activate. (length limit 100 bytes) Supported values: • Generic • Verizon • ATT • Sprint
Type	0x11			1	Slot index
Length	Var			2	
Value	→	uint8	slot_index	1	number of index which want to activate. (available range: 1 to 4)
Type	0x12			1	Version structure
Length	Var			2	
Value	→	uint8	versions_len	1	Number of length the following elements: - version
		string	versions	Var	f/w version which want to activate. (length limit 100 bytes)

14.2.4.2. Response – QMI_GAS_DMS_ACTIVE_FW_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_ARG_TOO_LONG	String size too long
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_INVALID_ARG	Invalid parameter in the request
QMI_ERR_FW_WRITE_FAILED	F/w file write failed
QMI_ERR_FW_INFO_READ_FAILED	Stored f/w read failed
QMI_ERR_FW_FILE_NOT_FOUND	There is no matched f/w file by conditions
QMI_ERR_FW_DIR_NOT_FOUND	There is no matched f/w directory by conditions
QMI_ERR_FW_ALREADY_ACTIVATED	Already activated

14.2.4.3. Description of QMI_GAS_DMS_ACTIVE_FW REQ/RESP

This command is used for switching stored modem firmware. Also, it can be selected through index, f/w version as well as carrier name.

14.2.5. QMI_GAS_DMS_SET_FW

This command is used for update or insert modem f/w to the device. (Deprecated)

GAS message ID

0x0207

Version introduced

Major – 1, Minor – 0

14.2.5.1. Request – QMI_GAS_DMS_SET_FW_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
data information struct which to be transferred	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	data information struct which to be transferred
Length	Var			2	
Value	→	uint32	total_pdu_cnt	4	total pdu count to be transferred.
		Uint32	current_pdu_idx	4	current pdu index.
		Uint16	rawdata_len	2	length of rawdata which to be transferred.
		Uint8	rawdata	Var	Actual rawdata to be transferred (max 4096 byte)

Optional TLVs

Name	Version introduced	Version last modified
Carrier name structure	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Carrier name structure
Length	Var			2	
Value	→	uint32	name_len	1	Number of length the following elements: - name
		string	name	Var	carrier name which want to activate. (length limit 100 bytes) Supported values: • Generic • Verizon • ATT

					• Sprint

14.2.5.2. Response – QMI_GAS_DMS_SET_FW_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_ARG_TOO_LONG	String size too long
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_INVALID_ARG	Invalid parameter in the request
QMI_ERR_FW_WRITE_FAILED	F/w file write failed
QMI_ERR_FW_INFO_READ_FAILED	Stored f/w read failed
QMI_ERR_FW_FILE_NOT_FOUND	There is no matched f/w file by conditions
QMI_ERR_FW_DIR_NOT_FOUND	There is no matched f/w directory by conditions
QMI_ERR_FW_ALREADY_ACTIVATED	Already activated

14.2.5.3. Description of QMI_GAS_DMS_SET_FW REQ/RESP

This command is used for update or insert modem f/w to the device. If name field is filed in last pdu for updating f/w, device will be switched specified f/w that matched the carrier name after update process is complete. The rawdata_len of 1st command should be 400 byte because it's filled with header information and it can't be transmitted separately. From the rawdata_len of 2nd command, it can be 4KB or smaller.

NOTE:

This command is not supported on 24.01.5X0-B006 version.

14.2.6. QMI_GAS_DMS_GET_FW

This command is used for getting stored modem f/w information.

GAS message ID

0x0208

Version introduced

Major – 1, Minor – 1

14.2.6.1. Request – QMI_GAS_DMS_GET_FW_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
operate mode to get firmware information	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	operate mode to get firmware information
Length	1			2	
Value	→	uint8	operate_mode	1	operate_mode (valid range: 0 to 2) Supported values: • 0 – activated (executed) f/w • 1 – all stored f/w • 2 – specific f/w with condition

Optional TLVs

Name	Version introduced	Version last modified
Index condition	1.0	1.0
Carrier name structure	1.0	1.0
Version structure	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Index condition
Length	1			2	
Value	→	uint8	slot_index	1	Number of index which want to get f/w information. (available range: 1 to 4)
Type	0x11			1	Carrier name structure
Length	Var			2	
Value	→	uint8	name_len	1	Number of length the following elements: - name
		string	name	Var	carrier name which want to activate.

					(length limit 100 bytes) Supported values: • Generic • Verizon • ATT • Sprint
Type	0x12			1	Version structure
Length	Var			2	
Value	→	uint8	versions_len	1	Number of length the following elements: - version
		string	versions	Var	f/w version which want to activate. (length limit 100 bytes)

14.2.6.2. Response – QMI_GAS_DMS_GET_FW_RESP

Message type

Response

Sender

Service

Mandatory TLVs

Name	Version introduced	Version last modified
operate_mode	1.0	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x02			1	Result code
Length	4			2	
Value	→	uint16	result	2	Result code • QMI_RESULT_SUCCESS • QMI_RESULT_FAILURE
		uint16	error	2	Error code – Possible error code values are described in the error codes section of each message definition
Type	0x01			1	Show requested operate mode
Length	1			2	
Value	→	uint8	operate_mode	1	operate_mode (valid range: 0 to 2) Supported values: • 0 – activated (executed) f/w • 1 – all stored f/w • 2 – specific f/w with condition

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

Name	Version introduced	Version last modified
stored firmware information 1	1.0	1.1
stored firmware information 2	1.0	1.1

stored firmware information 3	1.0	1.1
stored firmware information 4	1.0	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	stored firmware information 1
Length	1			2	
Value	→	uint8	index	1	Index number stored firmware
		uint8	name_len	1	Number of length the following elements: - name
		string	name	Var	Carrier name (length limit 100 bytes)
		uint8	versions_len	1	Number of length the following elements: - version
		string	versions	Var	Modem f/w version (length limit 100 bytes)
		uint8	pri_rev_len	1	Number of length the following elements: - pri_rev
		string	pri_rev	Var	PRI revision (length limit 100 bytes)
Type	0x11			1	stored firmware information 2
Length	1			2	
Value	→	uint8	index	1	Index number stored firmware
		uint8	name_len	1	Number of length the following elements: - name
		string	name	Var	Carrier name (length limit 100 bytes)
		uint8	versions_len	1	Number of length the following elements: - version
		string	versions	Var	Modem f/w version (length limit 100 bytes)
		uint8	pri_rev_len	1	Number of length the following elements: - pri_rev
		string	pri_rev	Var	PRI revision (length limit 100 bytes)
Type	0x12			1	stored firmware information 3
Length	1			2	
Value	→	uint8	index	1	Index number stored firmware
		uint8	name_len	1	Number of length the following elements: - name
		string	name	Var	Carrier name (length limit 100 bytes)
		uint8	versions_len	1	Number of length the following elements: - version
		string	versions	Var	Modem f/w version (length limit 100 bytes)
		uint8	pri_rev_len	1	Number of length the following elements: - pri_rev
		string	pri_rev	Var	PRI revision (length limit 100 bytes)
Type	0x13			1	stored firmware information 4
Length	1			2	
Value	→	uint8	index	1	Index number stored firmware
		uint8	name_len	1	Number of length the following elements: - name
		string	name	Var	Carrier name (length limit 100 bytes)
		uint8	versions_len	1	Number of length the following elements: - version
		string	versions	Var	Modem f/w version (length limit 100

					bytes)
		uint8	pri_rev_len	1	Number of length the following elements: - pri_rev
		string	pri_rev	Var	PRI revision (length limit 100 bytes)

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_ARG_TOO_LONG	String size too long
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_INVALID_ARG	Invalid parameter in the request
QMI_ERR_FW_WRITE_FAILED	F/w file write failed
QMI_ERR_FW_INFO_READ_FAILED	Stored f/w read failed
QMI_ERR_FW_FILE_NOT_FOUND	There is no matched f/w file by conditions
QMI_ERR_FW_DIR_NOT_FOUND	There is no matched f/w directory by conditions
QMI_ERR_FW_ALREADY_ACTIVATED	Already activated

14.2.6.3. Description of QMI_GAS_DMS_GET_FW REQ/RESP

This command is used for getting stored modem f/w information into the device.

14.2.7. QMI_GAS_DMS_CLEAR_FW

This command is used to remove stored modem f/w.

GAS message ID

0x0209

Version introduced

Major – 1, Minor – 1

14.2.7.1. Request – QMI_GAS_DMS_CLEAR_FW_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
operate mode to clear modem firmware	1.0	1.1

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x01			1	operate mode to clear modem firmware
Length	1			2	
Value	→	uint8	operate_mode	1	Operate mode to clear modem f/w into the device. Supported values: • 0 – clear all modem f/w • 1 – specific modem f/w with condition

Optional TLVs

Name	Version introduced	Version last modified
Index condition	1.0	1.1
Carrier name structure	1.0	1.0
Version structure	1.0	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	Index condition
Length	1			2	
Value	→	uint8	slot_index	1	Number of index which want to get f/w information. (available range: 1 to 4)
Type	0x11			1	Carrier name structure
Length	Var			2	
Value	→	uint8	name_len	1	Number of length the following elements: - name
		string	name	Var	carrier name which want to activate.

					(length limit 100 bytes) Supported values: • Generic • Verizon • ATT • Sprint
Type	0x12			1	Version structure
Length	Var			2	
Value	→	Uint8	versions_len	1	Number of length the following elements: - version
		string	versions	Var	f/w version which want to activate. (length limit 100 bytes)

14.2.7.2. Response – QMI_GAS_DMS_CLEAR_FW_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point, or the message was corrupted during transmission
QMI_ERR_MISSING_ARG	One or more required TLVs were missing in the request
QMI_ERR_ARG_TOO_LONG	String size too long
QMI_ERR_OP_DEVICE_ UNSUPPORTED	Operation is not supported by the device
QMI_ERR_INVALID_ARG	Invalid parameter in the request
QMI_ERR_FW_WRITE_FAILED	F/w file write failed
QMI_ERR_FW_INFO_READ_FAILED	Stored f/w read failed
QMI_ERR_FW_FILE_NOT_FOUND	There is no matched f/w file by conditions
QMI_ERR_FW_DIR_NOT_FOUND	There is no matched f/w directory by conditions
QMI_ERR_FW_ALREADY_ACTIVATED	Already activated

14.2.7.3. Description of QMI_GAS_DMS_FW_CLEAR REQ/RESP

This command removed stored modem f/w image of the device. If activated f/w is removed by this command, modem will reboot to avoid ambiguous state and will activate as Generic image. Hence, stored Generic f/w can’t be removed through this command.

14.2.8. QMI_GAS_TEST_SET_VALUE

This command used to set some variables for TEST.

GAS message ID

0x0F00

Version introduced

Major – 1, Minor – 0

14.2.8.1. Request – QMI_GAS_TEST_SET_VALUE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	test mandatory value
Length	1			2	
Value	→	uint8	m_value	1	Value range is 0-255

Optional TLVs

Name	Version introduced	Version last modified
test optional value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	test optional value
Length	1			2	
Value	→	uint8	o_value	1	Value range is 0-255

14.2.8.2. Response – QMI_GAS_TEST_SET_VALUE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.8.3. Description of QMI_GAS_TEST_SET_VALUE REQ/RESP

This command used to check if GAS service is running, properly by setting and getting simple variables

14.2.9. QMI_GAS_TEST_GET_VALUE

This command used to set some variables for TEST.

GAS message ID

0x0F01

Version introduced

Major – 1, Minor – 0

14.2.9.1. Request – QMI_GAS_TEST_GET_VALUE_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

14.2.9.2. Response – QMI_GAS_TEST_GET_VALUE_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	test mandatory value
Length	1			2	
Value	→	uint8	m_value	1	Value range is 0-255

Optional TLVs

Name	Version introduced	Version last modified
test optional value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x10			1	test optional value
Length	1			2	
Value	→	uint8	o_value	1	Value range is 0-255

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.9.3. Description of QMI_GAS_TEST_GET_VALUE REQ/RESP

This command used to check if GAS service is running, properly by setting and getting simple variables.

14.2.10. QMI_GAS_PSM_GET_PSM_EVT_CFG

This command used to get Wakeup event mask.

GAS message ID

0xE400

Version introduced

Major – 1, Minor – 0

14.2.10.1. Request – QMI_GAS_PSM_GET_PSM_EVT_CFG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

14.2.10.2. Response – QMI_GAS_PSM_SET_PSM_EVT_CFG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	mandatory value
Length	1			2	
Value	→	uint32	psmevtcfg	4	0x01: Mobile SMS 0x02: Network De-registration 0x04: Voice call

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.10.3. Description of QMI_GAS_PSM_GET_PSM_EVT_CFG REQ/RESP

This command used to get Wakeup event mask

14.2.11. QMI_GAS_PSM_SET_PSM_EVT_CFG

This command used to set Wakeup event mask.

GAS message ID

0xE401

Version introduced

Major – 1, Minor – 0

14.2.11.1. Request – QMI_GAS_PSM_SET_PSM_EVT_CFG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x1			1	mandatory value
Length	4			2	
Value	→	uint32	psmevtcfg	4	

14.2.11.2. Response – QMI_GAS_PSM_SET_PSM_EVT_CFG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.11.3. Description of QMI_GAS_PSM_SET_EVT_CFG REQ/RESP

This command used to set Wakeup event mask

14.2.12. QMI_GAS_PSM_GET_WAKEN_CFG

This command used to get WAKE_N pin configuration.

GAS message ID

0xE402

Version introduced

Major – 1, Minor – 0

14.2.12.1. Request – QMI_GAS_PSM_GET_WAKEN_CFG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

14.2.12.2. Response – QMI_GAS_PSM_GET_WAKEN_CFG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	Number_of_waken_value
Length	4			2	
Value	→	uint32	Number_of_waken	4	
Type	0x04			1	number of tring value.
Length	4			2	
Value	→	uint32	tring	4	
Type	0x05			1	number of tpause value.
Length	4			2	
Value	→	uint32	tpause	4	

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.12.3. Description of QMI_GAS_PSM_GET_WAKEN_CFG REQ/RESP

This command used to get WAKE_N pin configuration

14.2.13. QMI_GAS_PSM_SET_WAKEN_CFG

This command used to set WAKE_N pin configuration.

GAS message ID

0xE403

Version introduced

Major – 1, Minor – 0

14.2.13.1. Request – QMI_GAS_PSM_SET_WAKEN_CFG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x1			1	number of waken value
Length	4			2	
Value	→	uint32	number_of_waken	4	
Type	0x2			1	number of tring value
Length	4			2	
Value	→	uint32	tring	4	
Type	0x3			1	number of tpause value
Length	4			2	
Value	→	uint32	tpause	4	

14.2.13.2. Response – QMI_GAS_PSM_SET_ WAKEN_CFG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.13.3. Description of QMI_GAS_PSM_SET_ WAKEN_CFG REQ/RESP

This command used to set WAKE_N pin configuration

14.2.14. QMI_GAS_PSM_GET_WDISA_CFG

This command used to get W_DISABLE_N pin configuration.

GAS message ID

0xE404

Version introduced

Major – 1, Minor – 0

14.2.14.1. Request – QMI_GAS_PSM_GET_WDISA_CFG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

14.2.14.2. Response – QMI_GAS_PSM_GET_WDISA_CFG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	w_disable_cfg value.
Length	1			2	
Value	→	uint32	w_disable_cfg	4	

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.14.3. Description of QMI_GAS_PSM_GET_WDISA_CFG REQ/RESP

This command used to get w_disable_n pin configuration (Power Save mode)

14.2.15. QMI_GAS_PSM_SET_WDISA_CFG

This command used to set Wakeup event mask.

GAS message ID

0xE405

Version introduced

Major – 1, Minor – 0

14.2.15.1. Request – QMI_GAS_PSM_SET_WDISA_CFG_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x1			1	w_disable_cfg value.
Length	4			2	
Value	→	uint32	w_disable_cfg	4	

14.2.15.2. Response – QMI_GAS_PSM_SET_WDISA_CFG_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Optional TLVs

None

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.15.3. Description of QMI_GAS_PSM_SET_EVT_CFG REQ/RESP

This command used to get last wakeup source and timestamp.

14.2.16. QMI_GAS_PSM_GET_EVT

This command used to get wake up event details.

GAS message ID

0xE406

Version introduced

Major – 1, Minor – 0

14.2.16.1. Request – QMI_GAS_PSM_GET_EVT_REQ

Message type

Request

Sender

Control point

Mandatory TLVs

None

Optional TLVs

None

14.2.16.2. Response – QMI_GAS_PSM_GET_EVT_RESP

Message type

Response

Sender

Service

Mandatory TLVs

The Result Code TLV (defined in Section 4.1.3.3) is always present in the response.

Name	Version introduced	Version last modified
test mandatory value	Unknown	1.0

Field	Field value	Field type	Parameter	Size (byte)	Description
Type	0x03			1	Wake up source mask
Length	4			2	
Value	→	uint32	src_mask	4	
Type	0x04			1	Last wakeup source
Length	4			2	
Value	→	uint32	last_src	4	
Type	0x05			1	timestamp
Length	\8			2	
Value	→	uint64	timestamp_micro	8	

Error codes

QMI_ERR_NONE	No error in the request
QMI_ERR_INTERNAL	Unexpected error occurred during processing
QMI_ERR_MALFORMED_MSG	Message was not formulated correctly by the control point or the message was corrupted during transmission

14.2.16.3. Description of QMI_GAS_PSM_GET_EVT REQ/RESP

This command used to get last wakeup source and timestamp.

15. Appendix

if present

16. Acronyms and Abbreviations

Term	Definition
AAA	address assignment acknowledgment
AAM	agent advertisement message
ACB	access class barring
ACC	asynchronous communication channel
ACCOLC	access overload class
ACK	acknowledgment
ACL	access control list
ACSGL	allowed CSG list
AES	Advanced Encryption Standard
AMP	Address Management Protocol
AMPS	analog mobile phone system
AMSS	Advanced Mobile Subscriber Software
AN	access network
AP	application processor
APN	access point name
ARFCN	absolute radio frequency channel number
AT	access terminal
ATCOP	AT command processor
BC	broadcast
BPLMN	background public land mobile network
BS	base station
BSR	better system reselection
CAM	channel assignment message
CATPT	card application toolkit protocol teleservice
CBC	cipher block chaining
CBS	cell broadcast service
CCO	cell change order
CHAP	Challenge Handshake Authentication Protocol
CK	control key
CLAT	customer-side translator
CMAS	Commercial Mobile Alert System
CN	core network
CPICH	common pilot channel
CS	content server
CSG	closed subscriber group
CSP	customer service profile
CSPDN	circuit-switched public data networks
CTR	counter
DBM	data burst messaging
DC	dedicated channel
DCE	data circuit terminating equipment
DCM	Data Connection Management
DCS	data coding scheme
DCTM	data call throttling manager
DDS	designated data subscription

DDTM	Data Dedicated Transmission mode
DHCP	Dynamic Host Configuration Protocol
DL	download
DM	Device Management
DMS	Device Management Service
DNS	domain name server
DO	data optimizer
DOS	data over signaling
DPA	default packet application
DRB	Data Radio Bearer
DRX	discontinuous reception
DS	download server
DSDA	dual SIM dual active
DSDS	dual SIM dual standby
DTC	dedicated traffic channel
DTE	data terminal equipment
DTM	dual transfer mode
DUN	dial-up networking
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
ECBM	Emergency Callback mode
eDRX	extended DRX
EF	elementary file
EGPRS	enhanced general packet radio service
eHRPD	Evolved High Rate Packet Data
eMBMS	evolved multimedia broadcast/multicast services
EMC	electromagnetic compatibility
EMM	EPS Mobility Management
EMPA	enhanced multiflow packet application
EONS	enhanced operator name string
EP	endpoint
EPC	Evolved Packet Core
ePDG	evolved packet data gateway
EPS	evolved packet system
ERI	extended roaming indicator
ERMES	European Radio Messaging System
ESM	Event Signaling Message
ESN	electronic serial number
ESP	encapsulating security payload
ETWS	Earthquake and Tsunami Warning System
FA	foreign agent
FDD	frequency division duplex
FDN	fixed dialing number
FEC	forward error correction
FMC	Fixed Mobile Convergence
FOTA	Firmware over-the-air
FTP	File transfer protocol
GAUP	Generic Attribute Update Protocol
GGSN	gateway GPRS support node
GMM	GPRS mobility management
GPRS	general packet radio services
GSMA	GSM Association
GW	gateway

GW	GSM/WCDMA
HA	home agent
HDR	high data rate
HDR	high data range
HLR	home location register
HPT	high priority traffic
HSIC	high-speed inter-chip interface
HSS	home subscriber server
HSUSB	high-speed universal serial bus
ICCID	integrated circuit card ID
ID	identification
IM	instant messenger
IMEI	international mobile equipment identity
IMS	IP multimedia subsystem
IMSI	International Mobile Station/Subscriber Identity
IPCP	Internet Protocol Control Protocol
IPSec	Internet Protocol security
IRAT	Inter Radio Access Technology
ISDN	Integrated Services Digital Network
LAC	location area code
LBS	location-based services
LCP	link control protocol
LLC	logical link control
LTE	long term evolution
MAC	message authentication code
MAC	media access control
MBMS	multimedia broadcast/multicast services
MBSFN	multicast broadcast single frequency network
MC	multicell
MC	message center
MCC	mobile country code
MCS	modulation and coding scheme
MDN	mobile directory number
ME	mobile equipment
MEID	mobile equipment identifier
MFPA	multiflow packet application
MIN	mobile identification number
MIP	Mobile Interface Protocol
MMPA	multilink multiflow packet application
MMTEL	multimedia telephony
MN	mobile network
MNC	mobile network code
MO	mobile-originating call (originating a call)
MS	mobile station
MSC	mobile switching center
MSISDN	mobile station international subscriber directory number
MT	Mobile terminating call (receiving a call)
MTCH	multicast traffic channel
MTU	maximum transmission unit
Multisim	multiple simultaneous (active radio interfaces)
MWI	message waiting indicator
NAI	network access identifier

NAM	number assignment module
NAS	Network Access Service
NAT	network address translation
NBNS	NetBIOS name server
NITZ	network identity and time zone
NSAPI	netscape server application programming interface
NV	nonvolatile
NW	network
OCSGL	operator CSG list
OOS	out of service
OTA	over the air
OTASP	over-the-air service programming
PAP	Password Authentication Protocol
PCCPCH	primary common control physical channel
PCI	physical cell ID
PCIE	peripheral component interconnect express
PCO	protocol configuration option
PCS	personal communications service
P-CSCF	proxy call session control function
PDN	packet data network
PDP	Packet Data Protocol
PDSN	packet data serving node
PDU	protocol data unit
PID	protocol identifier data
PLMN	public land mobile network
PMCH	physical multicast channel
PN	pseudorandom noise
PP	point-to-point
PPP	Point-to-Point Protocol
PR	Parameter Retrieval
PRACH	packet random access channel
PRI	product release information
PRL	preferred roaming list
PS	packet-switched
PSPDN	packet-switched private data network
PSTN	public switched telephone network
PTI	procedure transaction ID
PUK	PIN unlock key
QMI	Qualcomm Messaging Interface
QMUX	QMI Multiplexing Protocol
QOS	quality of service
RAB	radio access bearer
RAC	routing area code
RACH	random access channel
RAT	radio access technology
RD	reduced dormancy
R-data	relay data
RF	radio frequency
RLF	radio link failure
RLP	Radio Link Protocol
RP	Relay Protocol
RPM	radio policy manager

RRC	radio resource control
RRP	registration reply
RSCP	received signal code power
RSRP	reference signal received power
RSRQ	reference signal received quality
RSSI	received signal strength indicator
RTP	Real-time Transport Protocol
RTRE	runtime R-UIM enable
RUIM	removable user identity module
Rx	receive
SA	security association
SAI	service area identity
SAP	service access point
SC	service center
SCI	slot cycle index
SCRM	supplemental channel request message
SDU	service data unit
SGLTE	simultaneous GSM and LTE
SGSN	Serving GPRS Service Node
SI	service interval
SIB	system information block
SIM	subscriber identity module
SINR	signal-to-interface plus noise ratio
SIP	session initiation protocol
SKU	stock keeping unit
SLIMbus	serial low-power inter-chip media bus
SM	short message
SME	station management entity
SMS	short message service
SMSC	short message service center
SMSP	short message service parameters
SNDCP	Subnetwork-Dependent Convergence Protocol
SNR	signal-to-noise ratio
SO	service option
SPC	service programming code
SPI	security parameter index
SPN	service provider name
SRVCC	single radio voice call continuity
SSAC	service-specific access class
SVLTE	simultaneous voice and LTE
SVN	software version number
SWM	Software Management
TDD	time division duplex
TDS	test data service
TDSCDMA	test data service code division multiple access
TD-SCDMA	time division synchronous code division multiple access
TE	terminal equipment
TFT	traffic flow template
TLV	type-length-value
TMGI	temporary mobile group identity
TOI	transport object identifier
TOS	type of service

TP	Transport Layer Protocol
TPDU	Transfer Protocol data unit
TSI	transport session identifier
Tx	transmit
UATI	unique access terminal identifier
UCI	universal computer interface
UD	unsolicited data
UE	user equipment
UIM	user identity module
UL	upload
UMTS	universal mobile telecommunications system
USIM	universal subscriber identity module
VPF	validity period format
WAP	Wireless Access Protocol
WDA	Wireless Data Administrative
WDS	Wireless Data Service
WMS	Wireless Message Service
WQE	Wi-Fi quality estimation
WWAN	wireless wide area network

17. Document History

Revision	Date	Changes	Message (TLV) / Note
Rev.0	2017-04-07	Initial	Initial release
Rev.1	2017-10-20	Updated	New: - Add QMI_PDC service for managing device configuration - Add QMI_FOTA service for device management Update: - Change type size of rawdata_len field in QMI_GAS_DMS_SET_FW_REQ - Add error field in QMI_GAS_DMS_GET_FW_RESP - Add pri_rev parameter for all of carrier modem firmware in QMI_GAS_DMS_GET_FW_RESP - Update TLVs and description in QMI_GAS_DMS_USB_CFG_SET, QMI_GAS_DMS_USB_CFG_GET, QMI_GAS_DMS_CLEAR_FW - Add mandatory TLVs in QMI_FOTA_EVENT_INDICATOR - Fix typo in QMI_NAS, QMI_GAS, QMI_FOTA services Remove: - Remove QMI_DMS_UIM_GET_ICCID, QMI_DMS_UIM_GET_IMSI
Rev.2	2018-04-20	Updated	New: - Add QMI_GAS_PSM_GET_PSM_EVT_CFG, QMI_GAS_PSM_SET_PSM_EVT_CFG, QMI_GAS_PSM_GET_WAKEN_CFG_REQ, QMI_GAS_PSM_SET_WAKEN_CFG_REQ, QMI_GAS_PSM_GET_WDISA_CFG_REQ, QMI_GAS_PSM_SET_WDISA_CFG_REQ, QMI_GAS_PSM_GET_EVT_REQ Update: - Add the SCC2 and SCC3 field and add lte band class. Change the PCC to mandatory and change the RSSI range on QMI_GMS_NAS_GET_CA_INFO_RESP - Update APPLICABILITY TABLE
Rev.3	2018-06-28	Updated	New: Add QMI_FOTA service for Sprint OMA-DM. Update: - Change the RSSI and RSRQ range on QMI_GMS_NAS_GET_CA_INFO_RESP