Qualcomm
TECHNOLOGIES, INC

QTI Tethering Interface on MDM9x25 and MDM9x35 LE Release

User Guide

80-NC254-62 C

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Revision history

Revision	Date	Description
A	May 2013	Initial release
B	Dec 2013	Updated Section 2.3.1
C	Apr 2014	Added information for MDM9x35

1 Introduction

1.1 Purpose

The QTI Tethering Interface feature provides data connectivity to tethered laptops/PCs by supporting the following standard USB tethering technologies:

- Remote Network Driver Interface Specification (RNDIS)
- Standard Ethernet Control Model (ECM)
- RmNet tethering

This document describes the usage of these USB tethering technologies.

1.2 Scope

This document is intended for engineers, test equipment vendors, infrastructure interoperability test partners, and carriers involved in the development, integration, and deployment of the QTI Tethering Interface feature.

1.3 Conventions

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

Shading indicates content that has been added or changed in this revision of the document.

1.4 References

Reference documents are listed in Table 1-1. Reference documents that are no longer applicable are deleted from this table; therefore, reference numbers may not be sequential.

Table 1-1 Reference documents and standards

Ref.	Document	
Qualcomm Technologies		
Q1	*Application Note: Software Glossary for Customers*	CL93-V3077-1
Q2	*RM Network (RmNet) Feature Desciption Document*	80-VT270-1
Q3	*Reference Connection Manager for QCMobileAP Software for MDM9x25 User Guide*	80-NC254-23
Q4	*Reference Connection Manager for QCMobileAP Software for MDM9x35 User Guide*	80-NH740-4

1.5 Technical assistance

For assistance or clarification on information in this document, submit a case to Qualcomm Technologies, Inc. (QTI) at https://support.cdmatech.com/.

If you do not have access to the CDMATech Support Service website, register for access or send email to support.cdmatech@qti.qualcomm.com.

1.6 Acronyms

For definitions of terms and abbreviations, see [Q1].

2 Types of USB Tethering

2.1 RNDIS

RNDIS is a USB tethering protocol that provides a virtual Ethernet link over USB to host machines that support RNDIS tethering (Windows 7, Windows XP, and some distributions of Linux). The QTI Tethering Interface supports RNDIS tethering over USB, providing data connectivity to the tethered host machine without the need to install any host drivers.

The QTI Tethering Interface and Qualcomm Mobile Access Point (QCMobileAP) applications are responsible for providing data connectivity to the RNDIS tethered host machine. These applications run on Cortex-A5 on MDM9x25 releases and on Cortex-A7 on MDM9x35 releases.

Usage of RNDIS tethering on MDM9x25/MDM9x35 LE releases is described below:

- The device must be set in one of the USB compositions that support RNDIS.
- Upon USB cable connection, the host PC will be assigned a private IP address and should be able to access the RNDIS interface gateway IP address.
- If WLAN is enabled through QCMobileAP, the RNDIS tethered host will also be able to communicate with other WLAN clients.
- WWAN connectivity for the RNDIS tethered host is managed by the QCMobileAP application. The RNDIS tethered host will be able to access the WWAN network when QCMobileAP brings up the backhaul connection. QCMobileAP brings up WWAN connectivity automatically upon USB cable connection only if autoconnect is enabled in /etc/mobileap_cfg.xml. To enable this, set the <AutoConnect> XML tag value to 1 in /etc/mobileap_cfg.xml, i.e., <AutoConnect>1</AutoConnect>.

For usage of the QCMobileAP application on MDM9x25, see [Q3]. For MDM9x35, see [Q4].

2.2 Standard ECM

Standard ECM is a USB tethering protocol supported on Linux and Mac OS. It provides a virtual Ethernet link over USB. MDM9x25 and MDM9x35 LE releases support Standard ECM, providing data connectivity to the tethered Linux/Mac OS machines without the need to install any host drivers.

The QTI Tethering Interface and QCMobileAP applications are responsible for providing data connectivity to the Standard ECM tethered host machine. These applications run on Cortex-A5 on MDM9x25 releases and on Cortex-A7 on MDM9x35 releases.

Usage of Standard ECM tethering on MDM9x25 and MDM9x35 LE releases is described below:

- The device must be set in one of the USB compositions which support Standard ECM.
- Upon USB cable connection, the host PC will be assigned a private IP address and should be able to access the Standard ECM interface gateway IP address.
- If WLAN is enabled through QCMobileAP, the Standard ECM tethered host will also be able to communicate with other WLAN clients.
- WWAN connectivity for the Standard ECM tethered host is managed by the QCMobileAP application. The Standard ECM tethered host will be able to access the WWAN network when QCMobileAP brings up the backhaul connection. QCMobileAP brings up WWAN connectivity automatically upon USB cable connection only if autoconnect is enabled in /etc/mobileap_cfg.xml. To enable this, set the <AutoConnect> XML tag value to 1 in /etc/mobileap_cfg.xml, i.e., <AutoConnect>1</AutoConnect>.

For usage of the QCMobileAP application on MDM9x25, see [Q3]. For MDM9x35, see [Q4].

2.3 RmNet tethering

RmNet tethering is a QTI proprietary USB tethering solution that requires RmNet host drivers to be installed on the host machine. MDM9x25/9x35 releases support RmNet tethering and provide data connectivity to the tethered host.

Usage of RmNet tethering requires the device to be set in a USB composition that support RmNet USB tethering. Upon USB cable connection, the device will enumerate the RmNet network adapter on the host PC and allow IP connectivity to the tethered host.

For details about RmNet tethering, see [Q2].

For MDM9x25 releases only

To support RmNet autoconnect on MDM9x25 LE releases, configuration changes are necessary. The configurable XML tag values are:

- <autoconnect> – Can be configured as disabled/enabled
- <link_prot> – Can be configured as IP (IP mode)
- <ul_tlp> – Can be configured as ul_qc_ncm_enabled/disabled
- <dl_data_agg_protocol> – Can be configured as dl_qc_ncm_enabled/disabled

1. Configure the rmnet_config.txt file present in the modem EFS root folder to support autoconnect. (Add the file if it is not present.)

   Sample contents of rmnet_config.txt with autoconnect enabled are:

```
<config>
<instance_9>
<instance>9</instance>
<autoconnect>enabled</autoconnect>
<link_prot>IP</link_prot>
</instance_9>
</config>
```

   For MDM9x25 LE.2.0 Release 2.0.30 (M9625AAATWNLZD2030) and later releases, sample contents of rmnet_config.txt with autoconnect enabled are:

```
<config>
<instance_12>
<instance>12</instance>
<autoconnect>enabled</autoconnect>
<link_prot>IP</link_prot>
</instance_12>
</config>
```

   This change is required to support the multi-RmNet feature on MDM9x25 LE 2.0 releases.

2. Configure /etc/rmnet_config.txt present on Cortex-A5. This is required to configure the IPA hardware with the correct configuration for supporting RmNet autoconnect.

   Sample contents present in /etc/rmnet_config.txt on Cortex-A5 with autoconnect enabled are:

```
<config>
<autoconnect>enabled</autoconnect>
<link_prot>IP</link_prot>
<ul_tlp>ul_qc_ncm_enabled</ul_tlp>
<dl_data_agg_protocol>dl_qc_ncm_enabled</dl_data_agg_protocol>
</config>
```

   The settings for <autoconnect> and <link_prot> should be the same in the modem EFS file rmnet_config.txt and Cortex-A5 /etc/rmnet_config.txt.

3. Reset the phone to enable the changes to take effect.

   RmNet autoconnect will be triggered upon USB cable plug-in.

NOTE: This does not apply to MDM9x35 devices