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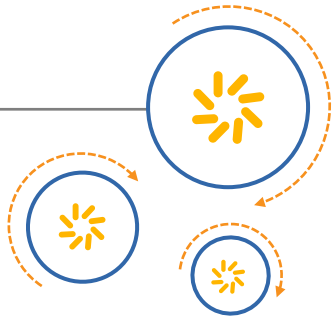

Data Protocol Logging Feature User Guide

80-VA810-1 E

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Revision history

Revision	Date	Description
A	Dececember 2005	Initial release
B	September 2006	Revised Chapter 3
C	January 2008	Revised Chapter 3 (removed non-applicable table)
D	April 2012	Added text at beginning of Section 2.2; added Section 2.2.2; updated Section 2.5; updated Section 3.1
E	February 2016	Added Section 2.3.1; updated Section 2.2.1 and 2.2.2

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1 Introduction

1.1 Purpose

The Data Protocol Logging (DPL) feature provides a means for developers and testers to log data protocol packets that pass through the MSM™ ASIC protocol stack above the MAC layer by using a diagnostic tool, such as QXDM Professional™ (QXDM Pro).

1.2 Scope

This document is intended to aid debugging by software and test engineers involved in the development and testing of data protocols and applications. The user is assumed to have relevant knowledge of the data networking concepts and protocols under test.

1.3 Conventions

Function declarations, function names, type declarations, attributes, and code samples appear in a different font, for example, `#include`.

Code variables appear in angle brackets, for example, `<number>`.

Commands to be entered appear in a different font, for example, **`copy a:*.* b:`**.

Button and key names appear in bold font, for example, click **Save** or press **Enter**.

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

1.4 Technical assistance

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

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

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2 DPL user guide

This section describes the overview of DPL usage, modem configuration, log configuration, and how to view and analyze the PCAP file.

2.1 Overview of DPL use

The protocols that needs to be logged are configured using a configuration screen provided by the diagnostic tool, such as QXDM Pro. While the device is used for data transfer, testing, etc., the diagnostic tool collects DPL configuration information and all logged packet data into memory.

When data is transferred, save the logged information by selecting File → Save items on the diagnostic tool. The tool prompts for a filename.

The PCAPGenerator post processing tool, included with QCAT and APEX releases, reads the log file saved by the diagnostic tool and produces a standard PCAP format file containing the logged data. This file can be input into any number of network analysis tools, such as a packet parsing tool like Wireshark.

See Chapter 3 for minimum tool version requirements to use this feature.

2.2 Configuring modem logging settings using QXDM Pro

Logging settings can be configured on the modem using QXDM Pro in two ways:

- Using Data Protocol Logging view – deprecated
- Using Log Packets in Message View Configuration window

2.2.1 Using the Data Protocol Logging View window (deprecated)

NOTE: Numerous changes were made in this section.

This option is deprecated from chipset MSM8909, MSM8994, and MDM9x45 onwards.

2.2.2 Using log packets

NOTE: Numerous changes were made in this section.

Open the Message View Configuration or Log View Configuration window in QXDM Pro, which provides an interface for configuring log packets.

To enable logging, go to **Log Packets > Known Log Items > Common** > **Data Services** > **Data Protocol Logging**.

1. Enable the [0x11EB] Protocol Services Data log packet.

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2. Enable one of the supported logging options:
    a. Data Protocol Logging Interface Full
    b. Data Protocol Logging Interface Partial
    c. Data Protocol Logging IP Header Only
    d. Data Protocol Logging Physical Link Full (Currently Not Supported)
    e. Data Protocol Logging Physical Link Partial (Currently Not Supported)
3. Optionally enable the [0x189E] to get Iface Description and APN name.

The data protocols logging options are described as follows:

- Data Protocol Logging Interface Full – Entire IP packet will be logged on the interface on which it was received or sent.
- Data Protocol Logging Interface Partial – Only the first 100 bytes of the IP packet will be logged on the interface on which it was received or sent.
- Data Protocol Logging IP Header – Only IP header of each packet will be logged on the interface on which the packet was received or sent.
- Data Protocol Logging Physical Link Full – Entire IP packet will be logged on the Bearer on which it was received or sent. Modem software currently does not support this option.
- Data Protocol Logging Physical Link Partial – Only the first 100 bytes of the IP packet will be logged on the Bearer on which it was received or sent. Modem software does not support this option.

NOTE: The order of logging options also determine their priority. If multiple logging options are selected, the top one among them will take effect. For example, if Data Protocol Logging Interface Full and Data Protocol Logging Interface Partial are selected, the option Data Protocol Logging Interface Full will be enabled first.

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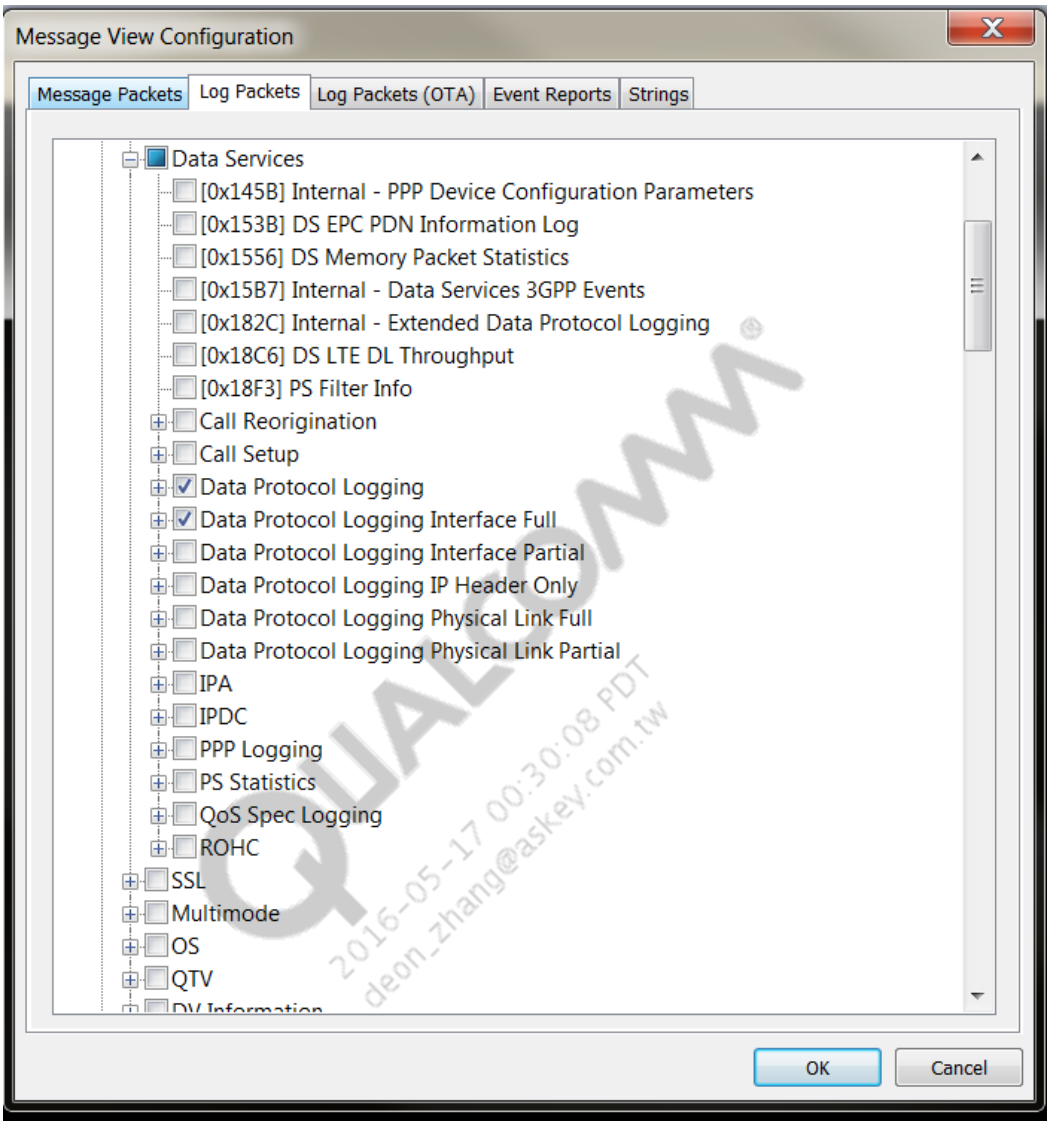

Figure 2-1 Message view configuration window

2.2.2.1 Log packet description

Under each of the logging options, log codes for the following sub-options are available:

- Data Protocol Logging Interface Full
  - [0x1574] Network IP Rm Tx Full – Enables logging an entire packet in a downlink direction at the IP layer on the Rm interface
  - [0x1575] Network IP Rm Rx Full – Enables logging an entire packet in an uplink direction at the IP layer on the Rm interface
  - [0x1578] Network IP Um Tx Full – Enables logging an entire packet in an uplink direction at the IP layer on the Um interface
  - [0x1579] Network IP Um Rx Full – Enables logging an entire packet in a downlink direction at the IP layer on the Um interface

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- Data Protocol Logging Interface Partial
  - [0x1572] Network IP Rm Tx 100 Bytes – Enables logging 100 bytes of each packet in a downlink direction at the IP layer on the Rm interface
  - [0x1573] Network IP Rm Rx 100 Bytes – Enables logging 100 bytes of each packet in an uplink direction at the IP layer on the Rm interface
  - [0x1576] Network IP Um Tx 100 Bytes – Enables logging 100 bytes of each packet in an uplink direction at the IP layer on the Um interface
  - [0x1577] Network IP Um Rx 100 Bytes – Enables logging 100 bytes of each packet in a downlink direction at the IP layer on the Um interface
- Data Protocol Logging IP Header
  - [0x1910] Network IP Header Rm Tx – Enables logging of IP header of the packet in a downlink direction at IP layer on the Rm interface
  - [0x1911] Network IP Header Rm Rx – Enables logging of IP header of the packet in an uplink direction at IP layer on the Rm interface
  - [0x1912] Network IP Header Um Tx – Enables logging of IP header of the packet in an uplink direction at IP layer on the Um interface
  - [0x1912] Network IP Header Um Rx – Enables logging of IP header of the packet in a downlink direction at IP layer on the Um interface

The above sub-options are used only to configure data protocol logging settings. The actual data is logged using the 0x11EB log code, regardless of which of the above options are enabled.

The individual control on these sub-options is not currently supported. So if any one of the sub-options is enabled the user will get the packets in all directions and on all the interfaces for that type of logging.

2.3 Logging data packets

When tests are run, the logged packets selected for the interface display in the Filtered View and Item View windows of QXDM Pro. The QXDM Pro saves the logged data packets in RAM/swap space during the tests.

2.3.1 Dropped IP packet logging

NOTE: This section was added to this document revision.

If the DPL logging is enabled, then any dropped IP packets in the data path will be logged in a separate PCAP file using the same logging options selected by the user for DPL logging.

2.4 Saving logged data

After the logging session, save the log using the QXDM Pro File menu. From the **File** menu, select **Save Items**. Information contained in the Item View window is saved in a .isf file in the location specified.

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2.5 Postprocessing – generating a PCAP file from a log file

Use the PCAPGenerator tool included in the QCAT and APEX software releases.

Syntax

```
PCAPGenerator <input-file> <output-path> [-dlf]
```

The -dlf option is used if the input file is a .dlf file rather than .isf, e.g., PCAPGenerator c:\temp\dpl.dlf c:\temp\pcap -dlf or PCAPGenerator c:\temp\dpl.isf c:\temp\pcap.

The output of the PCAPGenerator is one PCAP file for each interface, protocol, and instance combination on which packets were logged.

The output PCAP filename is currently generated as:

```
<source filename>_<interface_description>_<protocol>.pcap
```

For example, DPL_Rm - SIO UMTS_IP.pcap.

If interface description messages are not available, the filename is generated as:

```
<source filename>_iface<iid>_<protocol>.pcap
```

For example, DPL_iface35_IP.pcap.

Interface iid definitions are located in modem\api\datamodem\ps_logging_defs.h.

2.6 Analyzing/viewing the PCAP file

A packet parsing tool, such as Wireshark, can open the output PCAP file, interpret the contents of the logged packets, and display it in human-readable format.

Since the diagnostic link is not reliable, in some cases a diagnostic log frame may be dropped. If this occurs to a DPL log frame, a portion or all of the logged data packet is lost. In this case, the PCAPGenerator postprocessing tool creates a partial record in the PCAP file for the data packet that was incompletely logged. PCAPGenerator represents data loss scenarios, as shown in Table 2-1.

Table 2-1 PCAPGenerator data loss scenarios

Scenario	Capture length	Packet length
Full packet, n bytes, logged	N	N
Full packet, n bytes, logged; segment containing byte(s) b onward lost	B	N
Partial packet, n bytes, logged with partial length, p	P	N
Missing entire packet from logging stream	0	1

In any of these cases where capture length is not equal to packet length, i.e., data is missing, Wireshark displays Malformed packet in the short description field. Malformed packet may also appear if the contents of the packet are malformed, not just incorrectly logged. Hence, it is important to distinguish data dropped on the diagnostic link vs data dropped on the logged data stream.

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Data dropped over the diagnostic link may be distinguished from partially logged packets, limited by the user-configured partial log length, by examining capture and packet lengths.

- If capture length is equal to user-configured partial length, no data was lost on the diagnostic link.
- Otherwise, if packet length is one greater than the capture length, data was lost over the diagnostic channel.

NOTE: The first criteria supersedes the second criteria.

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3 Tools support for DPL

3.1 Minimum versions

The following Qualcomm tool versions, or later, provide configuration support for the DPL feature:

- QXDM Pro – 3.9.06+, method described in Section 2.2.2 is supported in 3.14.137+
- QCAT – 4.21.00+, includes PCAPGenerator postprocessing tool
- APEX – 4.2.2+
- CAIT – Currently not supported
- Wireshark – All revisions; available at www.wireshark.org/

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A References

A.1 Related documents

Title	Number
Qualcomm Technologies, Inc.	
Application Note: Software Glossary for Customers	CL93-V3077-1
Resources	
Wireshark Network Protocol Analyzer	www.wireshark.org

A.2 Acronyms and terms

Acronym or term	Definition
DPL	Data Protocol Logging

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