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QUALCOMM®
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MDM9615/9x25 QMI Communications Between Processors

80-N5576-26 E

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Revision History

Version	Date	Description
A	Jul 2011	Initial release
B	Aug 2011	Corrected acronym on slide 9; additional editorial updates to conform to Qualcomm standards
C	Aug 2011	Updated product terminology
D	Jun 2012	Updated slides 4, 6; added slides 27-30
E	Aug 2012	Updated the presentation throughout to include MDM9x25

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- Legacy QMI and IDL QMI
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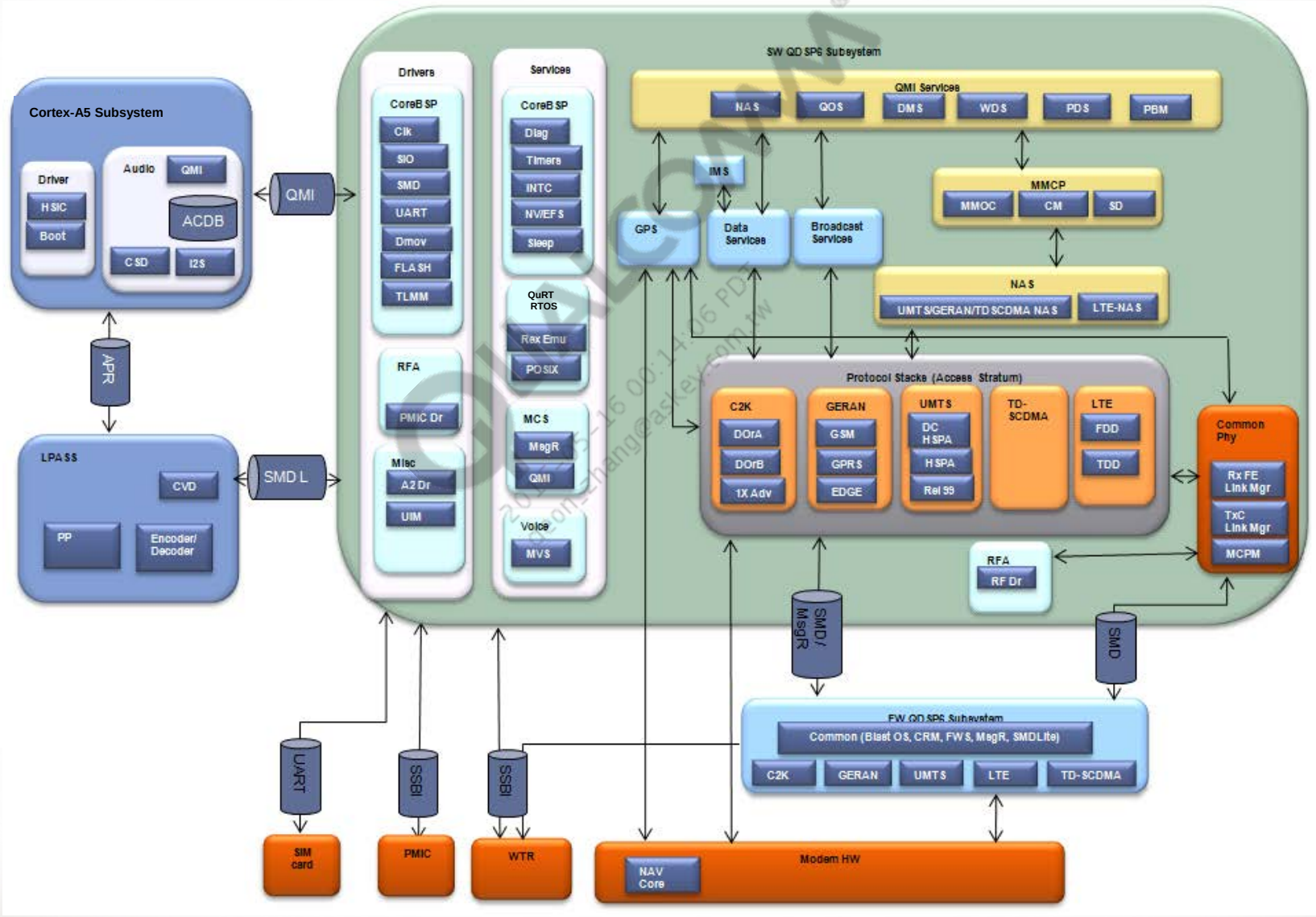
- Interprocessor Communication Between External AP and MDM9x15/9x25 – QMI Message Filter
- Interprocessor Communication Between A5 and Hexagon™
- AMSS 9x15/9x25 QCCI/QCSI/Core Framework
- References
- Questions?

Introduction

Introduction

- QMI is used for interprocessor communications
- Interprocessor communication between external AP and MDM9x15/9x25
  - QMI services reside on both:
    - Modem (Hexagon™) – QMI_NAS, QMI_WDS, QMI_CAT, QMI_WMS…
    - Apps (Cortex-A5) – QMI_CSD
- Interprocessor communication between A5 and Hexagon

MDM9x15/9x25 Software Architecture

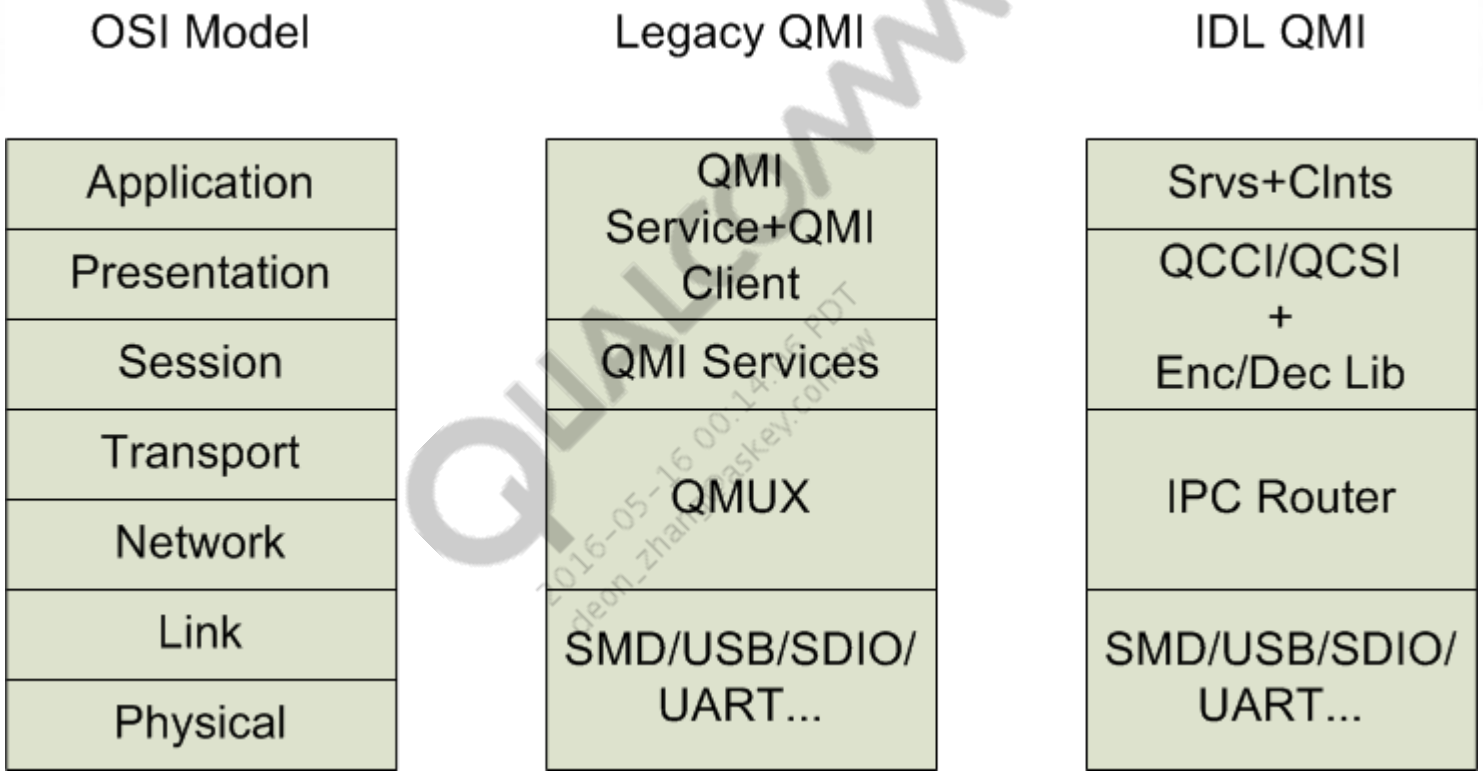


Legacy QMI and IDL QMI

Legacy QMI and IDL QMI

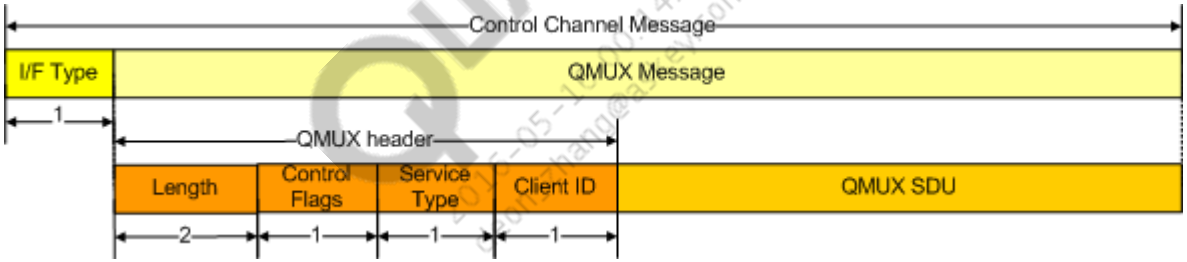
Legacy QMI	Document No	Transport layer
Voice – CDMA/UMTS/Supplementary Services	80-VB816-10	Qmux
NAS – Network Access	80-VB816-6	Qmux
WMS – Wireless Messaging (SMS)	80-VB816-9	Qmux
PBM – Phone Book Manager	80-VB816-15	Qmux
WDS – Wireless Data	80-VB816-5	Qmux
QoS – Quality of Service	80-VB816-7	Qmux
DMS – Device Management	80-VB816-4	Qmux
UIM – User Identity Module (SIM)	80-VB816-12	Qmux
CAT – Card App (SIM Toolkit)	80-VB816-11	Qmux
IDL		
GPS (LOC 2.0)	80-VB816-17	IPC
Remote Storage	80-VB816-18	IPC
CSD (Core Sound Driver)	TBD	IPC

Legacy QMI and IDL QMI (cont.)



Legacy QMI

- Simple multiplexing over a point-to-point link, nonroutable
- Control flags indicate the type of originator – Service or control point (client)
- Service type and client ID are similar to UDP/TCP ports, except source and destination, i.e., direction of data flow, are specified by the control flag



IDL QMI

- Disadvantage of the legacy QMI
  - Qmux is a point-to-point protocol and is not routable.
  - All the clients must reside on one end of the point-to-point link and services on the other.
  - There is no IDL-generated marshaling of QMI messages – Creation of new services and clients would be tedious and error-prone.
- Next-generation framework involves two major projects:
  - What converged as QCSI/QCCI set out to solve the marshaling issue by creating IDL defined messages, as well as presenting the clients and services with a unified API.
  - What ended up as IPC router set out to introduce a peer-to-peer, message-oriented, routable network protocol with support for location transparency (name service) and end-point failure notification.

IDL/QCSI/QCCI

IDL and QCCI

- IDL language and IDL compiler
  - Syntax of QCT IDL is similar to the C programming language IDL compiler which generates the source file and header file
- QCCI
  - C library that includes interfaces for all QMI services autogenerated from IDL
  - Registers clients with a service
  - Performs encoding/decoding of QMI messages
  - Exchanges messages
    - Synchronous and asynchronous command/response
    - Asynchronous indications
  - QMI link layer
    - QCCI/QCSI decides to use Qmux or IPC router based on Service ID
    - Qmux/QMI_CTL service used for legacy services
    - IPC router used for new services
    - QCCI/QCSI interface is the same, even though Qmux and IPC router interfaces are different

QCSI

- QCSI wraps the QMI framework and provides service interface analogous to QCCI
- Performs encoding/decoding of QMI messages
- Includes autogenerated files for all QMI service interfaces
- C language library with functions to:
  - Register a service
  - Inform the service of client registration/deregistration
  - Deliver a request from a client and send a response
  - Send asynchronous indications
- Pairs up the service response with the request transaction

Interprocessor Communication Between External AP and MDM9x15/9x25 – QMI Service Access Proxy (QSAP)

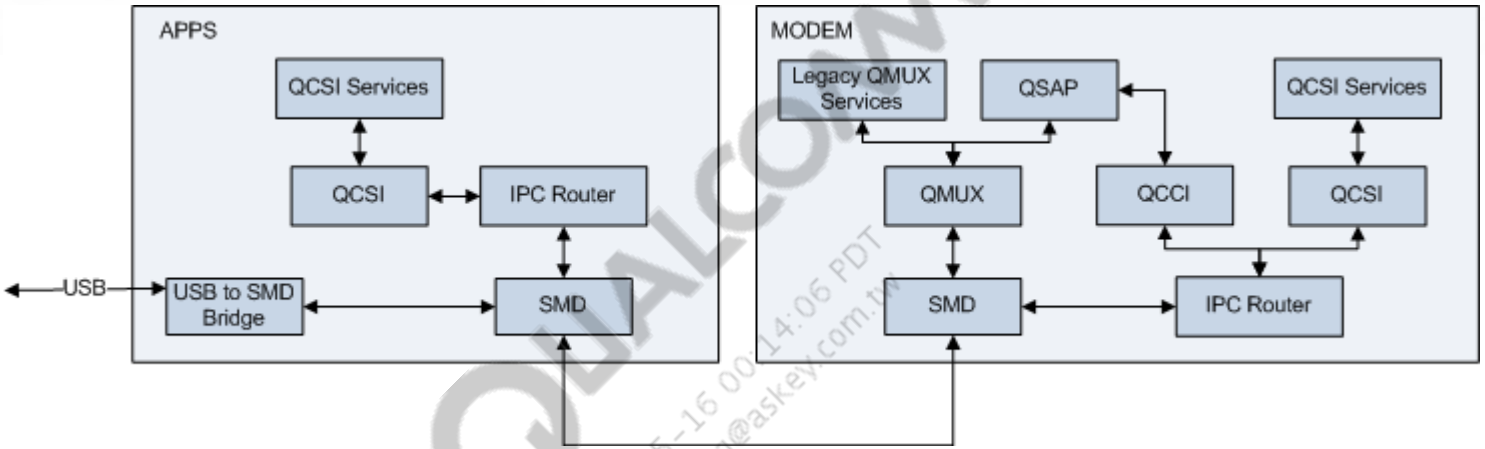
QSAP Overview

- Provides support to leverage the new QMI framework over the legacy Qmux off-target protocol
- QSAP acts as a proxy on top of Qmux, rerouting messages meant for QCSI services through the new QMI framework, then routing the responses back through Qmux

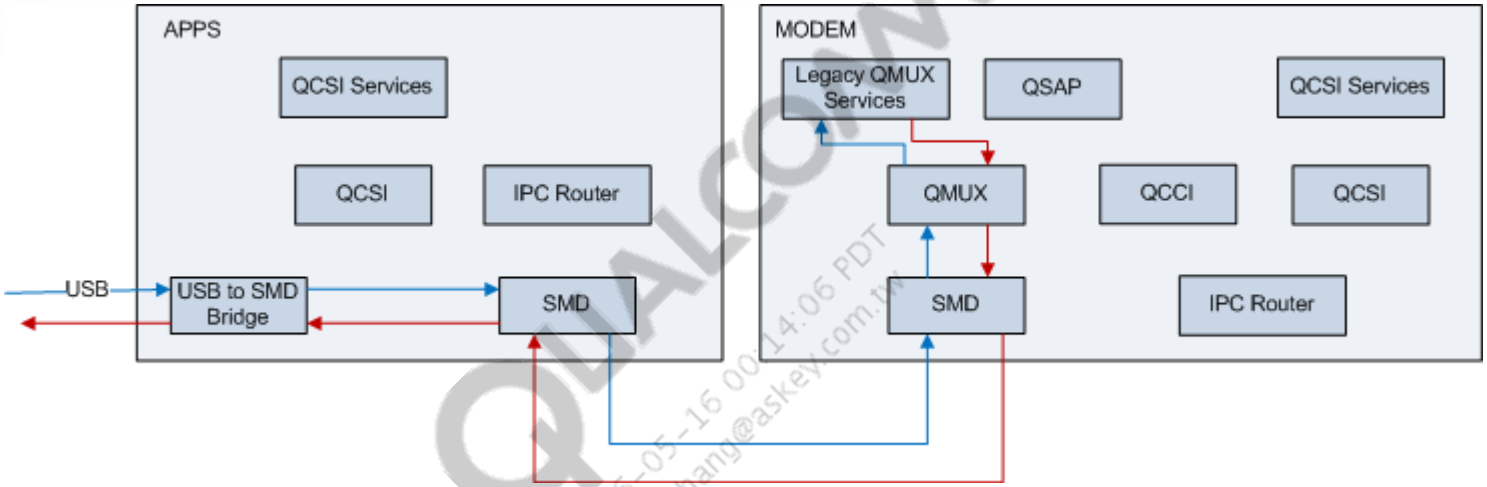
QSAP Advantages

- Clean and simple
- No layering violation
- Uses existing framework and introduces only QSAP
- No duplicate functionality of existing layers
- Works for any OS that runs on the apps

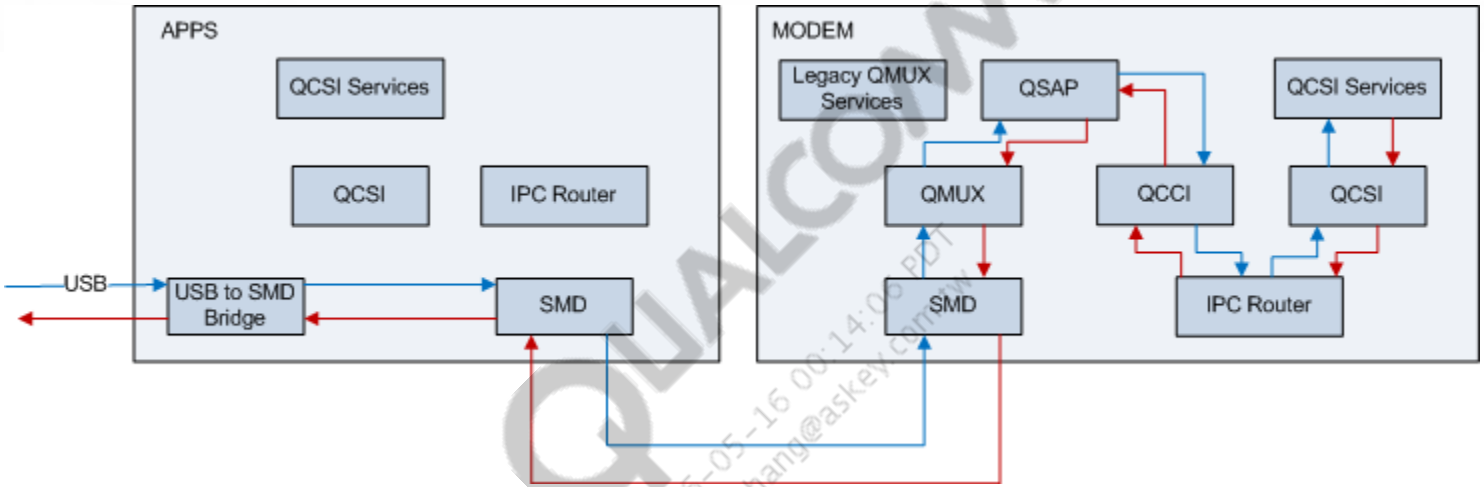
All Possible Data Paths



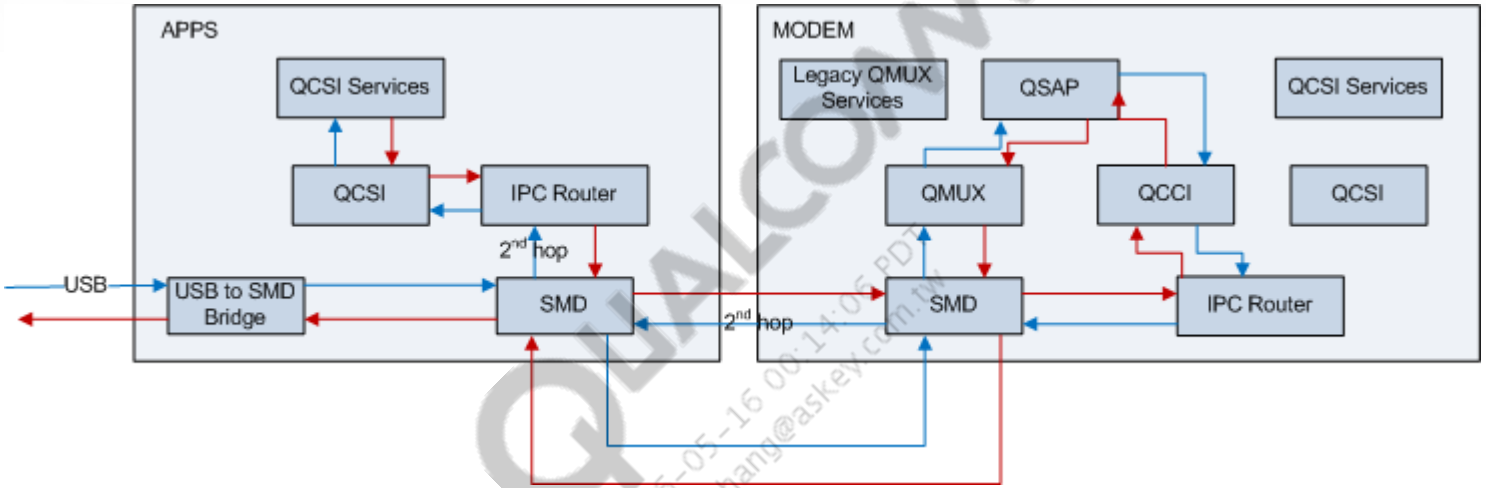
Message from External AP to Legacy Qmux Service

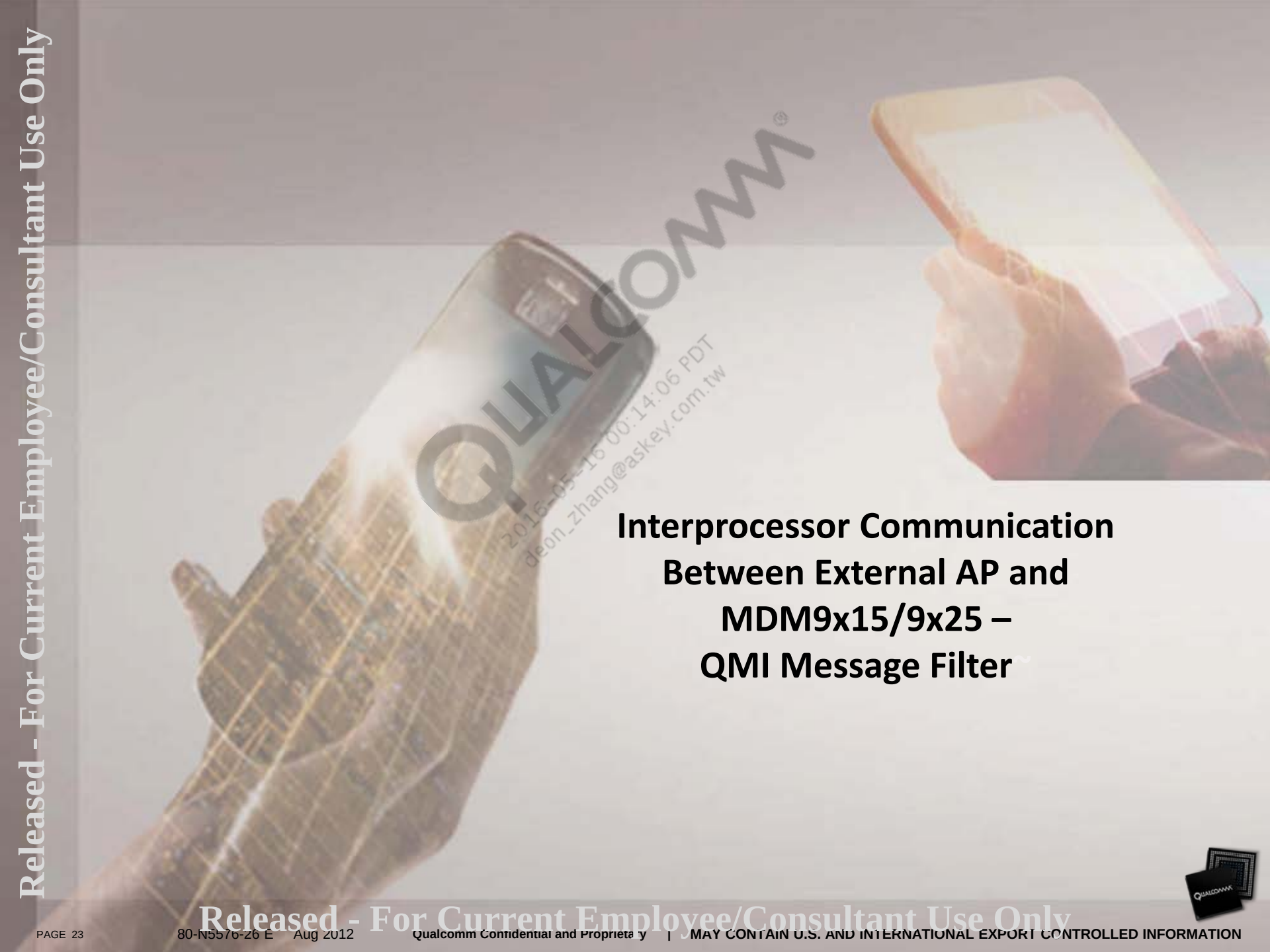


Message from External AP to QCSI Service on Modem Processor



Message from External AP to QCSI Service on Apps Processor



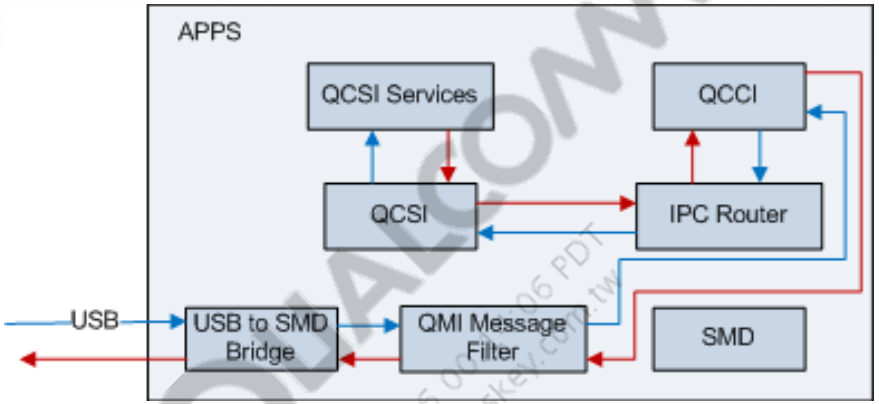


Interprocessor Communication Between External AP and MDM9x15/9x25 – QMI Message Filter

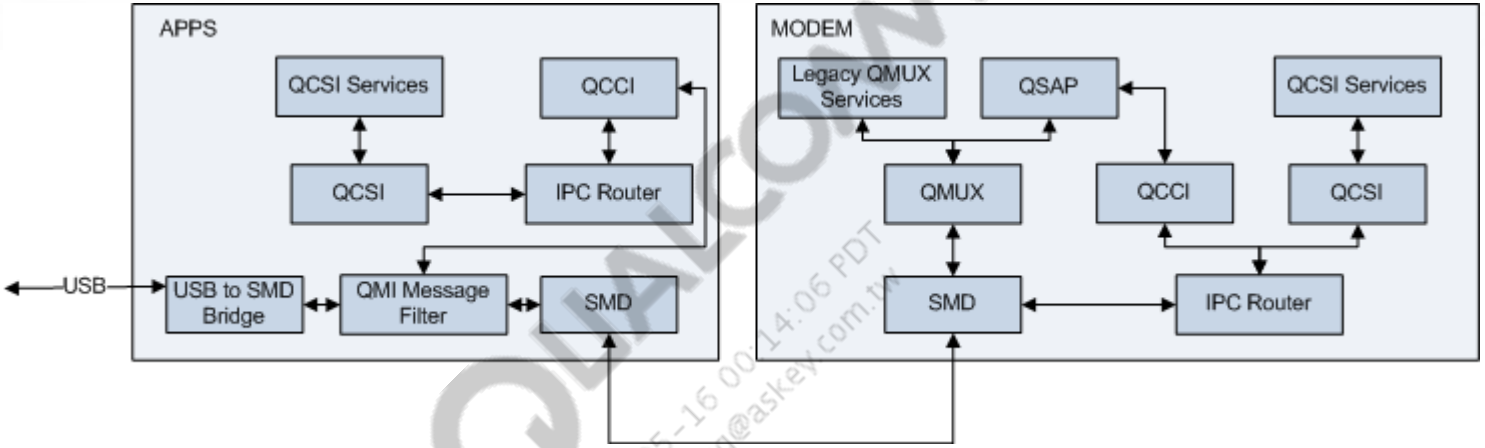
QMI Message Filter

- QMI message filter (official name is still to be determined) will reside on the apps processor and intercept messages whose destination is on the apps processor and route them to the service
- Reduced latency for QMI services on apps processor
- Reduces coupling to modem for QMI services on apps processor

Message from External AP to QCSI Service on Apps Processor



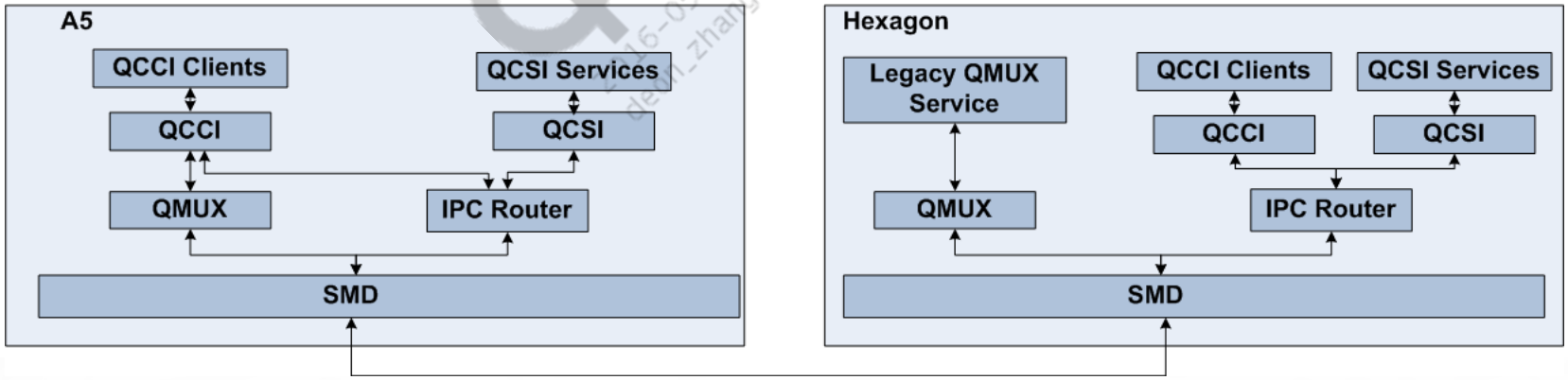
All Possible Data Paths (with QMI Message Filter)



Interprocessor Communication Between A5 and Hexagon

Interprocessor Communication between A5 and Hexagon

- QCCI decides to use Qmux or IPC router based on Service ID
- Qmux/QMI_CTL service used for legacy services
- IPC router used for new services
- QCCI/QCSI interface is the same, even though Qmux and IPC router interfaces are different



AMSS 9x15/9x25 QCCI/QCSI/ Core Framework

AMSS 9x15/9x25 QCCI/QCSI/Core Framework

A5		Hexagon		
New QMI framework		Legacy QMI framework	New QMI framework	
QCCI/QCSI	Core service framework on top of QCSI		QCCI/QCSI	Core service framework on top of QCSI
▪ apps_proc\core\mproc\qmi\qcci ▪ apps_proc\core\mproc\qmi\qcsi	apps_proc\core\mproc\qmi\core_server	modem_proc\modem\datamodem\interface\qmicore\src	modem_proc\core\mproc\qmi\qccimodem_proc\core\mproc\qmi\qcsi	modem_proc\core\mproc\qmi\core_server

References

Ref.	Document	
Qualcomm		
Q1	*Application Note: Software Glossary for Customers*	CL93-V3077-1
Q2	*QMI IDL/QCCI/QCSI Overview*	80-N4863-1

Questions?

https://support.cdmatech.com