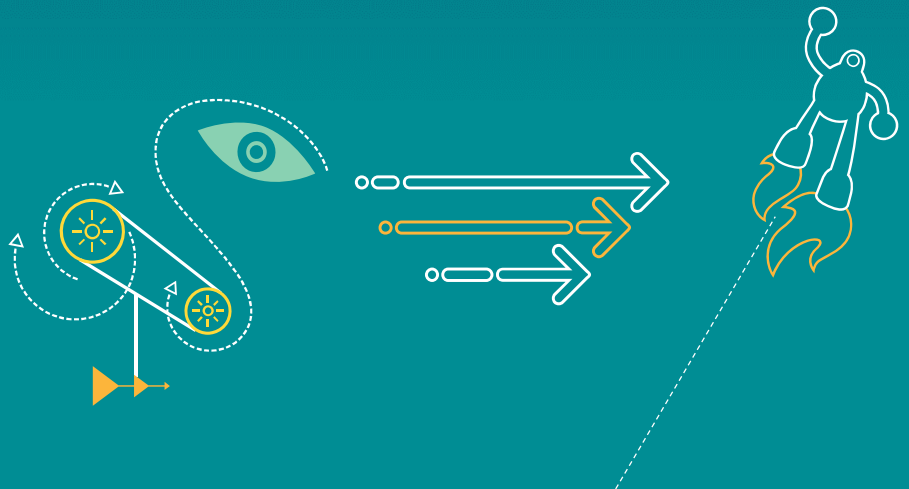
MSM8937/MSM8917/MSM8940/MSM8920 Software Architecture Overview

Qualcomm Technologies, Inc.



80-P2485-19 E

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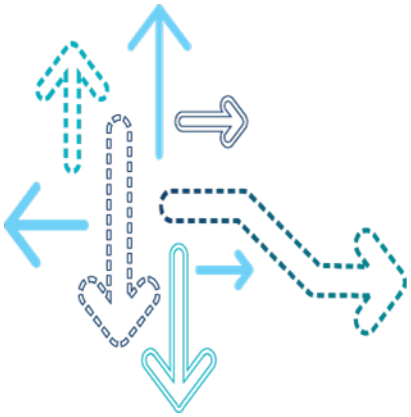
Revision History

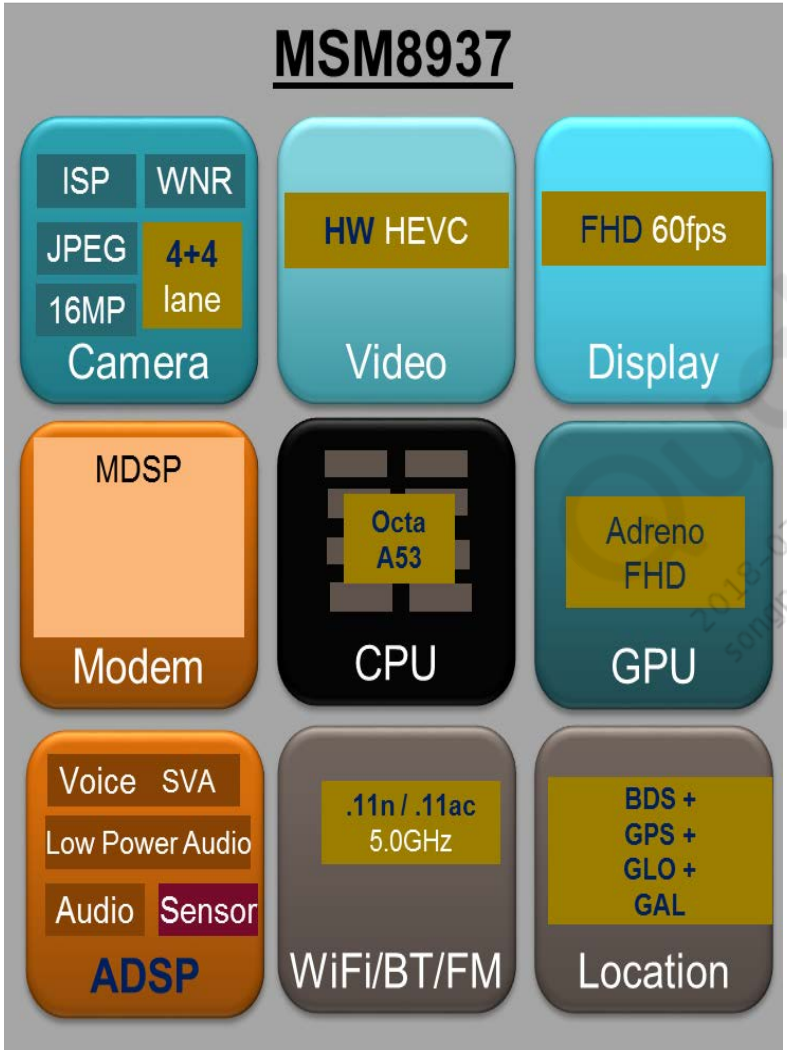
Revision	Date	Description
A	December 2015	Initial release
B	March 2016	Updated slides 9 and 10
C	May 2016	Added slide 13; updated the document title and slides 6-12, 39, 46-47
D	February 2017	Numerous updates have been made for MSM8920 details. The presentation must be read in its entirety.
E	March 2017	Updated content in slides 7, 10, 16, 34, and 56, and the entire presentation to conform to QTI standards

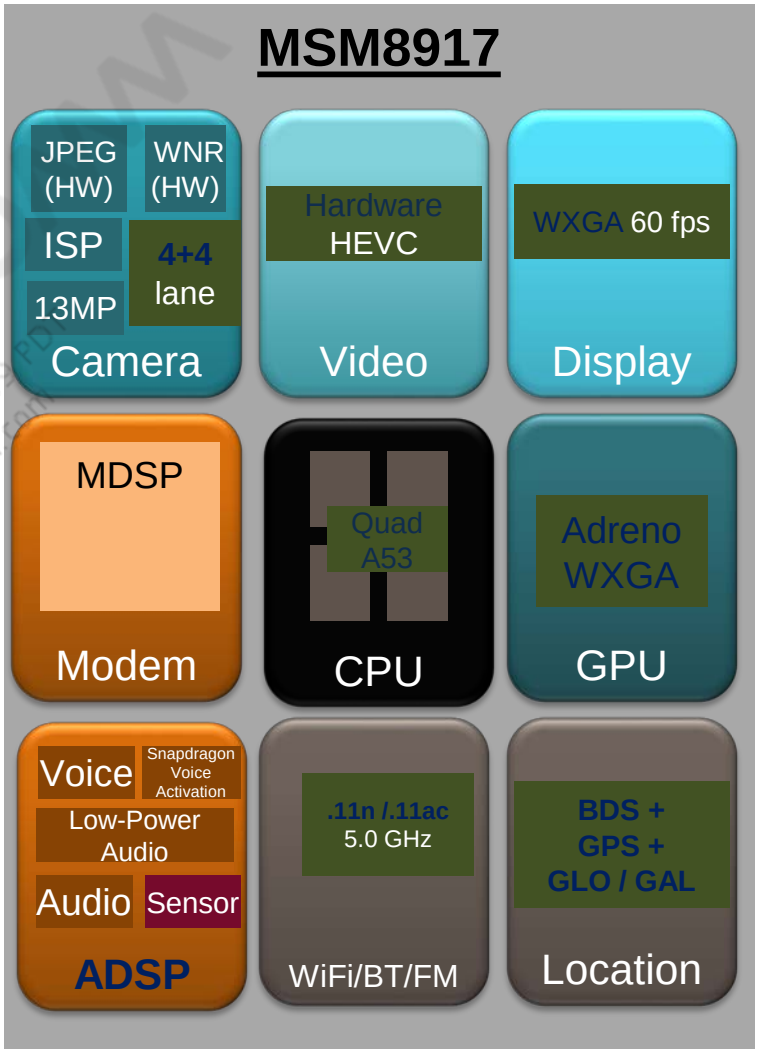
Contents

MSM8937/MSM8917/MSM8940/MSM8920 Overview



MSM8937/MSM8940/MSM8917/MSM8920 High-Level Block Diagram





MSM8937/MSM8917 – Cat4 modem
MSM8940/MSM8920 – Cat6 modem

100% P2P and software compatible

MSM8937/MSM8940/MSM8917/MSM8920 Chipset Components

Core PMIC/Codec

PM8937

PM8940

Wi-Fi

WCN3615
WCN3660B
WCN3680B

RF Transceiver

LTE

WTR 2965

CA

WTR 2965

12 x 14 mm2

MSM8937/MSM8917/
MSM8940/MSM8920

Interface PMIC

PMI8937

PMI8952

PMI8940

Codec Option

WCD9326

WSA Option

WSA8810

GPS (for APQ)

WGR7640

RF

LB/MB/GSM PA + AS

QFE 4320

HB PA

QPA 2340

GSM/HB PA +AS

QPA 4373

APT

QFE 2101

NFC

NQ 210

NFC + eSE

NQ 220

Note: PM8940 is applicable only to MSM8940

MSM8917/MSM8920/MSM8937/MSM8940 Feature Set Comparison

Feature	MSM8909	MSM8917/MSM8920	MSM8916	MSM8937/MSM8940
Package	12×11.1 mm non-PoP	12×14 mm non-POP	14×12.1 mm non-PoP	12×14 mm non-POP
CPU	Quad Core 4xA7 at 1.1 GHz – 1.3 GHz	Quad Core 4xA53 at 1.4 GHz	Quad Core 4xA53 at 1.2 GHz	Octa Core 4xA53 at 1.4 GHz 4xA53 at 1.1 GHz
Memory	1X 533 MHz LPDDR2/3	1X 32 667 MHz LPDDR3 (MSM8917) 1X 32 740 MHz LPDDR3 (MSM8920)	1X 533 MHz LPDDR2/3	1X 32 800 MHz LPDDR3 (MSM8937) 1X 32 921 MHz LPDDR3 (MSM8940)
Modem + Nav	LTE Cat 4, 2x10 CA	LTE Cat 4, 2x10 CA(MSM8917) LTE Cat 6, 2x20 CA (MSM8920)	LTE Cat 4	LTE Cat 4, 2x10 CA (MSM8937) LTE Cat 6, 2x20 CA (MSM8940)
App DSP	Shared with modem Qualcomm® Hexagon™ DSP	Hexagon DSP v56 256 KB	Shared with Modem Hexagon DSP	Hexagon v56 256 KB
GPU APIs	Qualcomm Adreno™ GPU HD at 60 fps	Adreno GPU 1280 x 800 at 60 fps 600 MHz (MSM8917) 650 MHz (MSM8920)	Adreno GPU HD at 60 fps	Adreno GPU 505 1920 x 1200 at 60 fps, UBWC, QSMMU v2, xPU
	OpenGL ES 3.0	OpenGL ES 3.0	OpenGL ES 3.0	OpenGL ES 3.1+, 2D, DX11, AEP OpenCL 2.0
Display resolution interface	720p 60 fps UI	1280 x 800 60 fps UI + 720p30	1280 x 800 60 fps UI + 720p30	SDE515: 1920 x 1200 60 fps Primary, 1080p 60 HDMI or 720p30 Miracast, UBWC
	DSI 4 lanes	DSI 4 lanes	DSI 4-lane	Dual DSI 4 lanes
Camera performance interface	8MP at 30 ZSL	13 MP at 30 ZSL, WNR, Enhanced AF, LTM, JPEG, PDAF	13 MP at 30 ZSL, JPEG, WNR, PDAF	Dual ISP 8MP+8MP, 21MP at 30 ZSL, Hardware WNR/JPEG, Enhanced AF, LTM, PDAF Acceleration
	CSI 2+1 lanes	CSI2: 4+4 lanes	CSI: 4+2 lane	CSI2: 4+4 lanes

MSM8917/MSM8920 and MSM8937/MSM8940 Feature Set Comparison

Feature		MSM8909	MSM8917/MSM8920	MSM8916	MSM8937/MSM8940
Video	Decode (Dec)	1080p 30 fps – HEVC, H.264, VP8	1080p 30 fps – HEVC, H.264, VP8	1080p30 H264, VP8	1080p 30 fps – HEVC, H.264, VP8
	Encode (Enc)	1080p 30 fps – H264/ MP4/ VP8	1080p 30 fps – H264/ MP4/ VP8	1080p30 H264, VP8	1080p 30 fps – H264/ MP4/ VP8
	Dec + Enc	720p30 dec + 720p30 enc	720p30 dec + 720p30 enc	1080p30 dec + 720p30enc	1080p30 dec + 720p30 enc
Audio	Analog	Integrated PM8916/PM8909	Integrated PM8937	Integrated PM8916	Integrated PM8937/PM8940
	Interface	I2S	I2S, SLIMbus	I2S	I2S, SLIMbus
	Audio	HD Audio	HD Audio, Qualcomm Snapdragon™ Voice Activation	HD Audio	HD Audio, Snapdragon Voice Activation
	Voice	Wideband, Qualcomm Fluence™ noise cancellation technology	Superwideband (PS), Wideband, Fluence v6, HD and “AlwaysHD”	Superwideband (PS), Wideband, Fluence v5, HD and “AlwaysHD”	Superwideband (PS), Wideband, Fluence v6.1, FENS v2, MBDRC v3, Native 44.1 kHz with WCD9326
Sensor		CPU-based	ADSP-based	CPU-based	ADSP-based
Storage		eMMC 4.5	eMMC 5.1	eMMC 4.5	eMMC 5.1
Peripherals		1xUSB 2.0	1xUSB 2.0	1xUSB2.0	1xUSB 2.0
Security		SecureMSM™, Qualcomm Snapdragon StudioAccess™ content protection technology, CPZ	SecureMSM ARM, StudioAccess, CPZ	Secure MSM, StudioAccess, CPZ	SecureMSM ARM, StudioAccess with CPZ for GPU
BT/WLAN/FM		802.11b/g/n, Bluetooth/FM	802.11b/g/n/ac, BT/FM	802.11b/g/n, BT/FM	802.11b/g/n/ac, BT/FM
PMIC		PM8909/PM8916	PM8937 + PMI8937	PM8916	PM8937 + PMI8937/PMI8952 (MSM8937) PM8940 + PMI8940/PMI8952 (MSM8940)

MSM8937 Overall Software Leverage

Core	MSM8937 software leverage
Audio	
Audio - I/O IF	
Audio - LPASS	
Audio - LPM	
Audio - Timers	
Infrastructure	
Indus (BIMC)	
NoCs	
QTimer	
Clocks	
DDR PHY	
MPM	
PMIC Arbiter	
QDSS	
QGIC	
RPM Subsystem	
TLMM	
IMEM	
PDM (perph_web)	
PRNG	
SAW2	
SPDM	

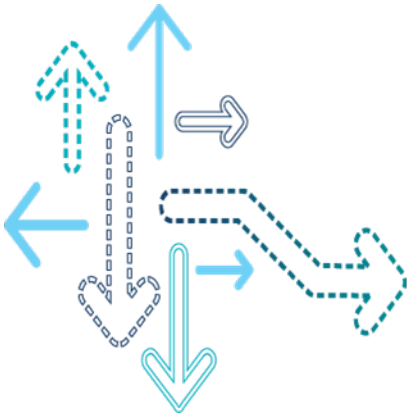
Core	MSM8937/MSM8940 software leverage
Modem	
Modem Core	**MSM8909 (MSM8937)** **MSM8953 (MSM8940)**
Multimedia	
CCI	
Camera SS	
JPEG codec	
Adreno GPU	**MSM8996**
VBIF	
Venus	**MSM8909**
CSI	
MDP	**MSM8996**
DSI	
VFE3	
Peripherals	
BLSP	
SPMI	
BAM	
QUP	
UART_DM	
SDCC	
USB Core (Link)	
USB HS PHY	

Core	MSM8937 software leverage
Processors	
Hexagon DSP	
MDSP	
ACPU	
Security	
Crypto5	
TrustZone IMEM (OCIMEM)	
Security Controller	**MSM8976**
VMIDMT	
xPU	
SMMU	
QSMMU	**MSM8996**
Wireless LAN/BT/FM	
Bluetooth	
Wireless LAN	
FM	

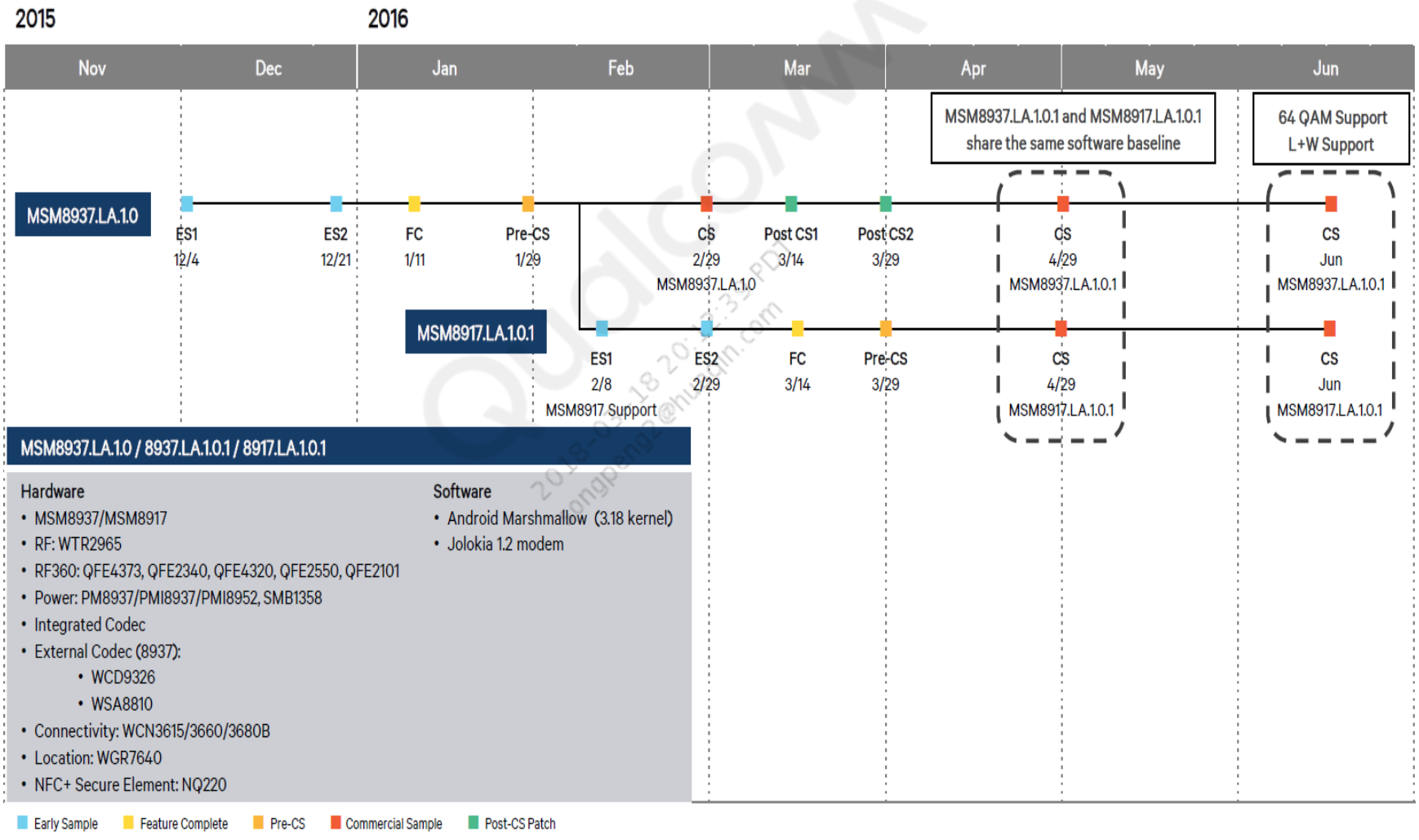
Software leverage from MSM8952

Software leverage from other MSMs

MSM8937/MSM8917/MSM8940/MSM8920 Software Release Plan

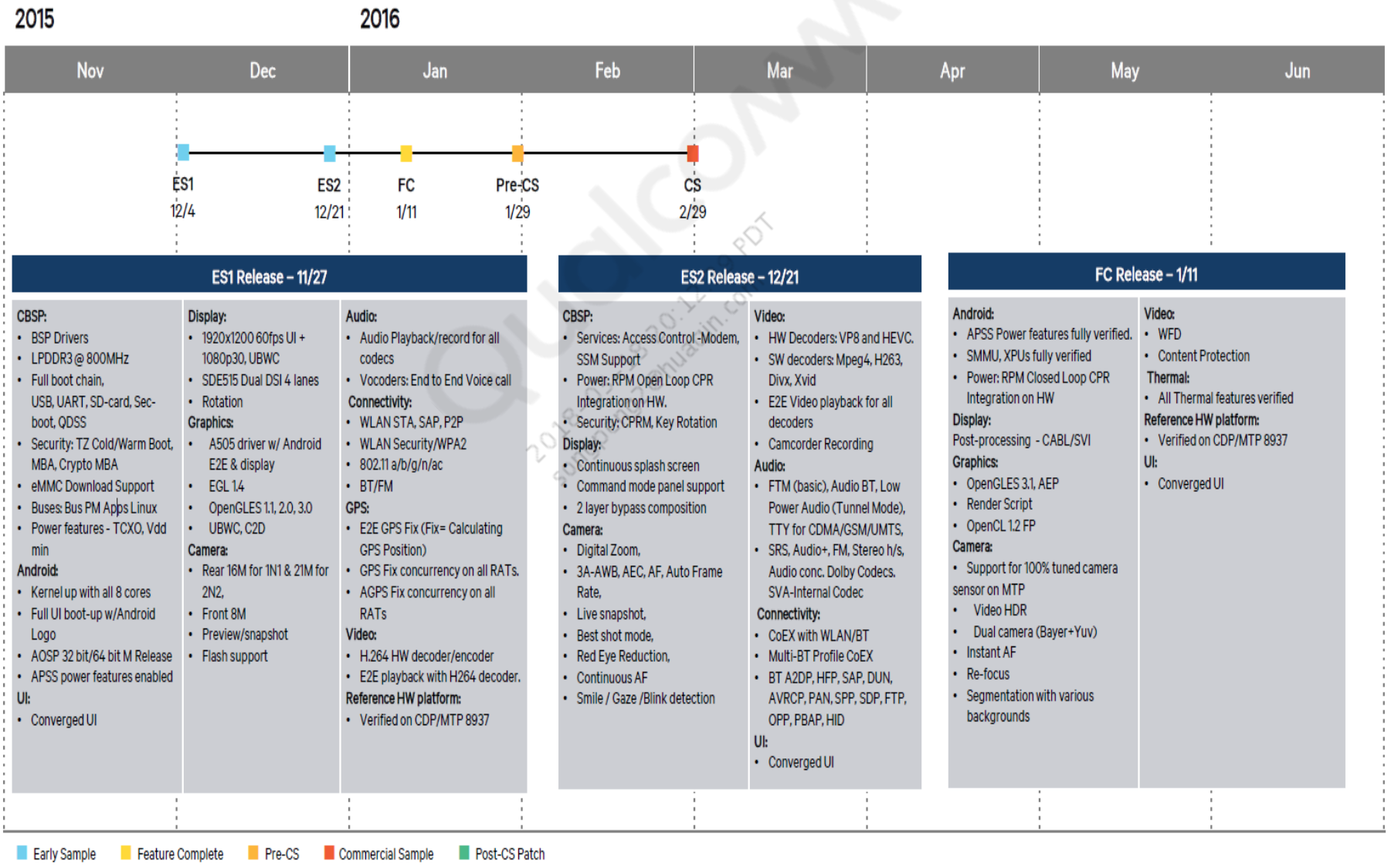


MSM8937.LA.1.0/MSM8917.LA.1.0.1 Release Plan

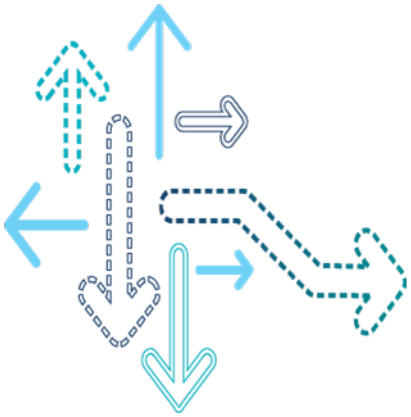


Note: For the latest dates and plans, refer to *Android Software Release Plan - May 2016* (80-N9912-37).

MSM8937 LA 1.0 Android M Feature Release Plan



Software Deliverables



Software Components

Proprietary

* Consider MSM8937 instead of MSM8626; this is an example

Qualcomm ChipCode™

Products » MSM8626.LA.1.0 » qualcomm_msm8626-la-1-0_amss_oem

MSM8926.LA.1.0 » qualcomm_msm8926-la-1-0_amss_oem

The data contained in this repository can be downloaded to your computer using a Git client.

Installing Git on Windows

Installing Git on Linux

Git https://git.chipcode.qti.qualcomm.com/qualcomm_msm8626-la

root @ master

Name	Size	Revision ID
LINUX		d8070b89
adsp_proc		d8070b89
boot_images		d8070b89
common		d8070b89
debug_image		9d842668
modem_proc		d8070b89
rpm_proc		d8070b89
trustzone_images		d8070b89
wcnss_proc		9d842668
about.html	2.2 kB	d8070b89
contents.xml	17.7 kB	d8070b89

Open Source

CodeAurora FORUM
a Linux Foundation Labs Project

Android releases

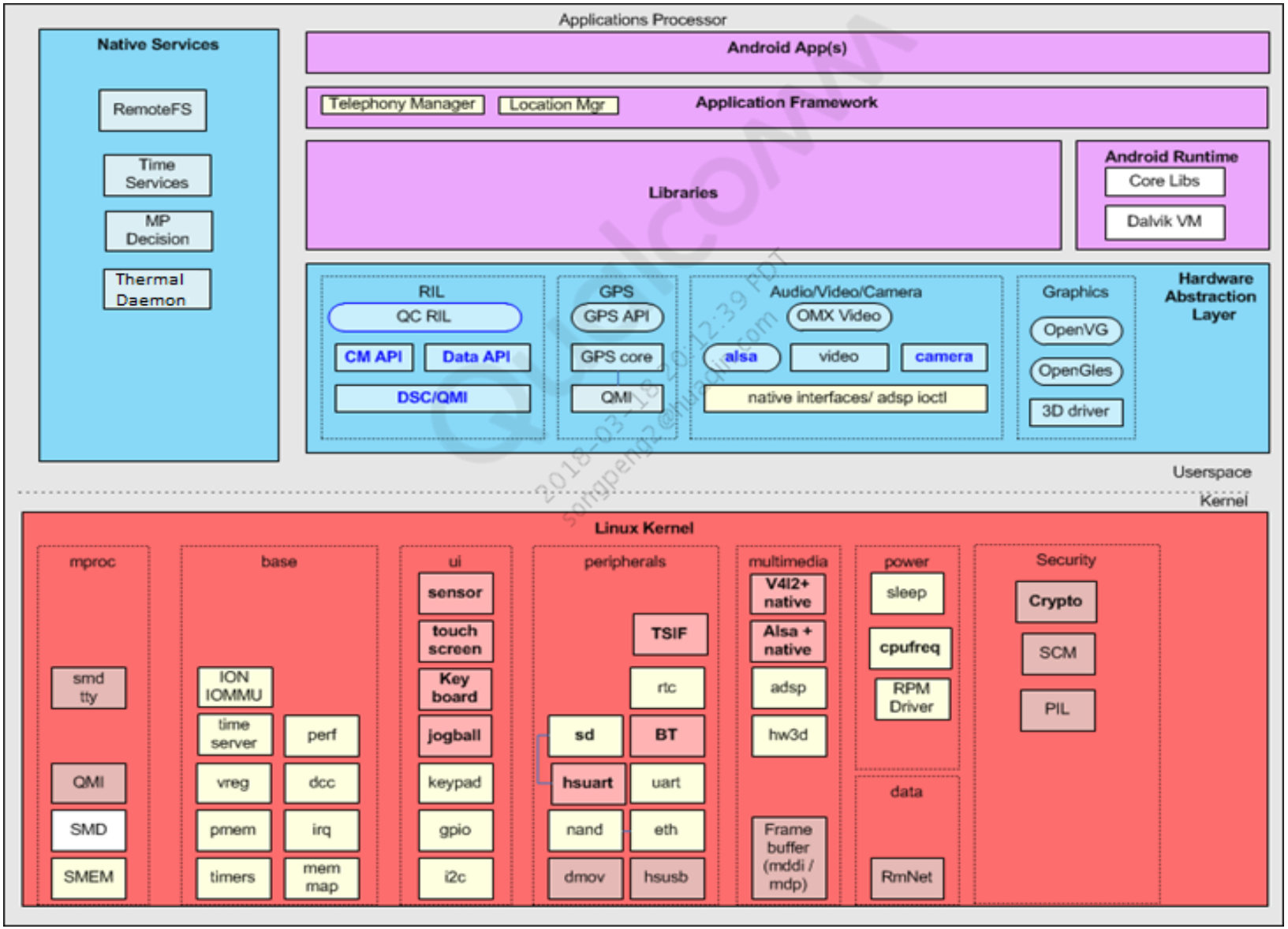
Last modified by Android QAEP Service on 2013/10/22 13:11

Date	Tag / Build ID	Chipset	Manifest	Android Version
October 14, 2013	LNX.LA.3.2-05920-8x26.0	msm8226	LNX.LA.3.2-05920-8x26.0.xml	04.03.00

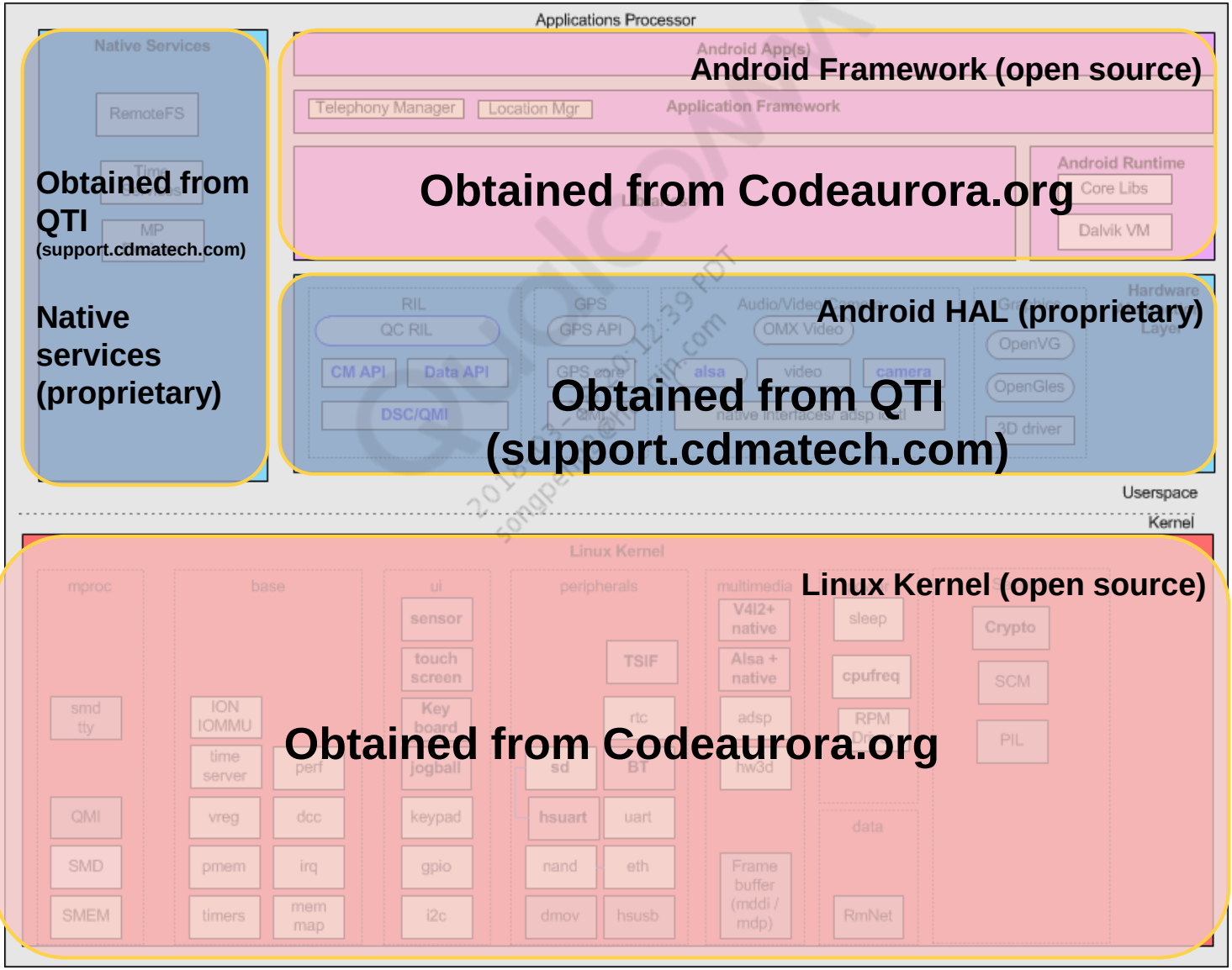
Software Tools and Patches

- Portal and starting point referenced in documentation at: https://createpoint.qti.qualcomm.com/
- Presentation layer for distribution system at: https://chipcenter.qti.qualcomm.com
- Repository layer for distribution system
  - The Qualcomm ChipCode™ repository holds software code using the Git repository at: https://chipcode.qti.qualcomm.com
- Patches
  - Proprietary software patches to be distributed at: https://chipcode.qti.qualcomm.com
  - Open source software patches to be distributed at: https://www.codeaurora.org/patches/quic/la

Software Deliverables – Applications Processor

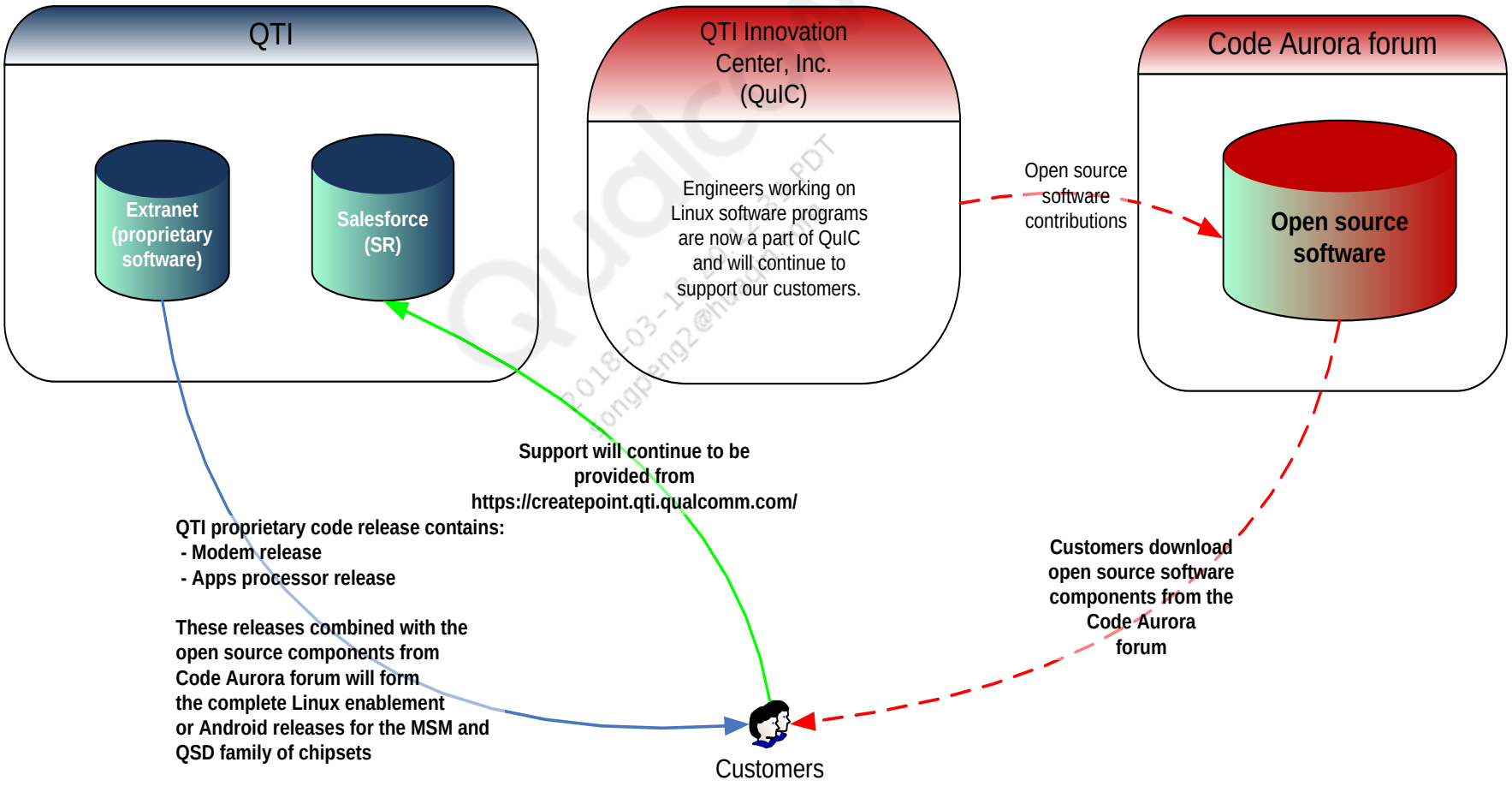


Software Deliverables – Applications Processor (cont.)

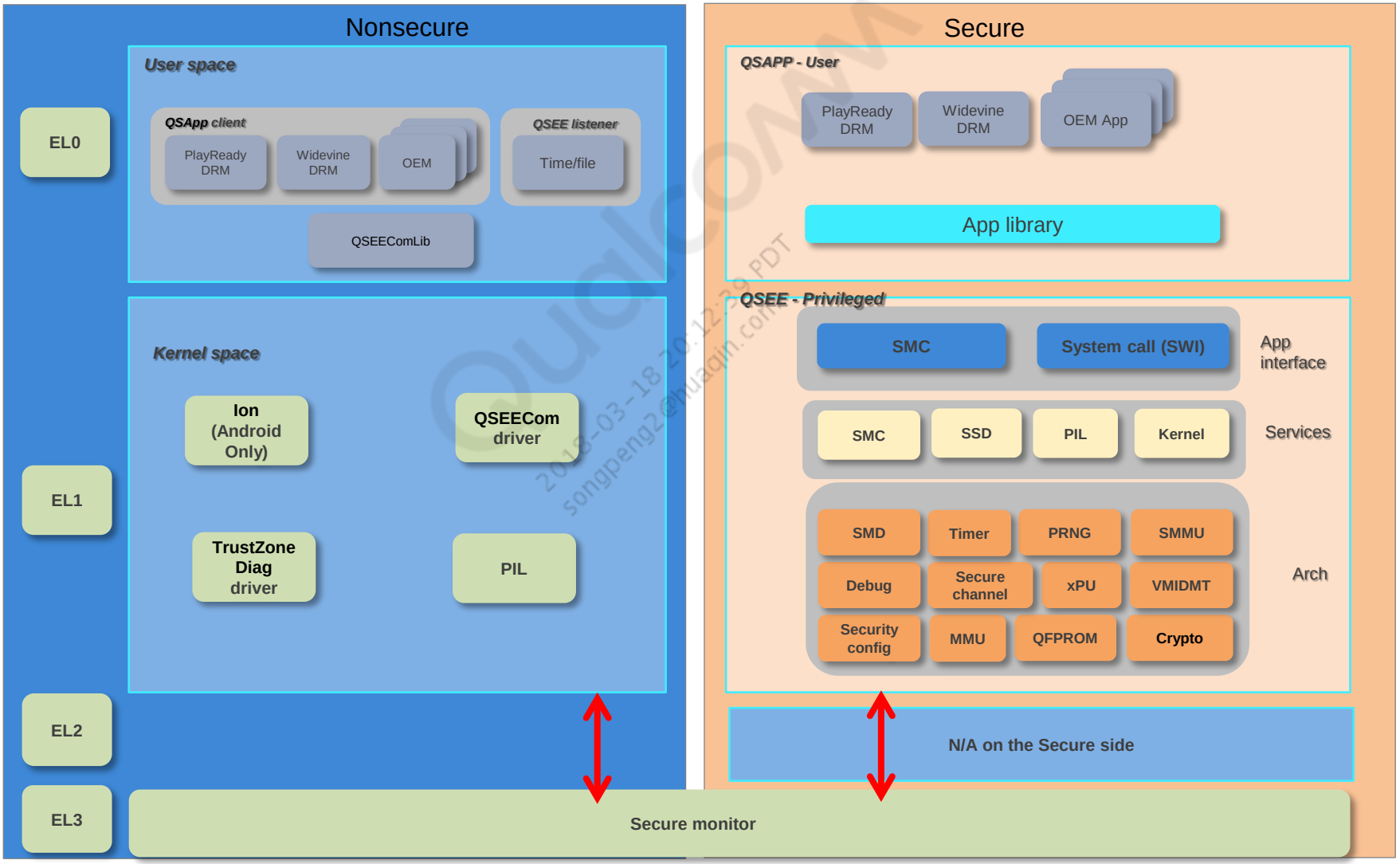


QTI and QuIC

- Linux release distribution and support

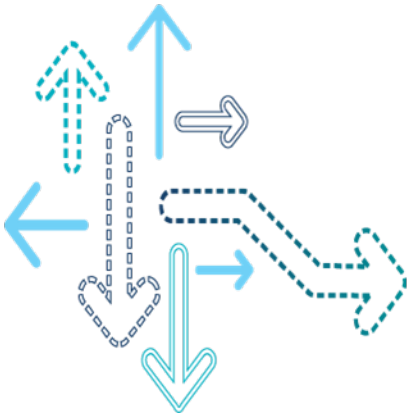


MSM8937/MSM8917/MSM8940/MSM8920 LA Software Architecture

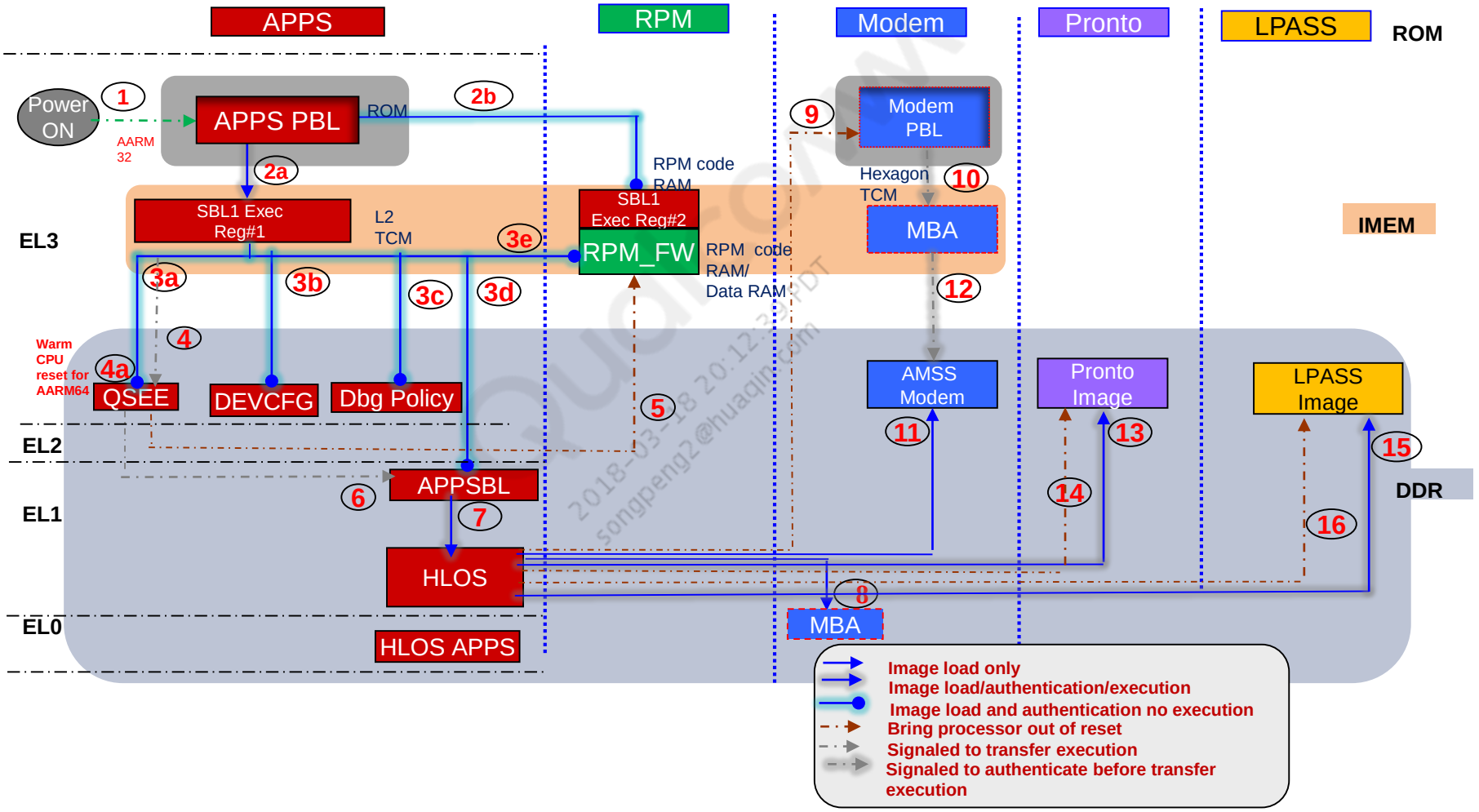


Note: On the nonsecure side, MSM8937 does not have an EL2 (Hypervisor) image.

Secure Boot Flow

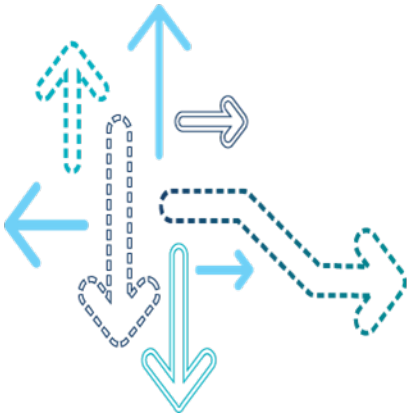


MSM8937/MSM8917/MSM8940/MSM8920 Boot Architecture



Note: For details on Boot architecture, refer to *MSM8937/MSM8953/MSM8940/MSM8920/MSM8917 Boot Architecture Overview* (80-P2485-1).

TrustZone



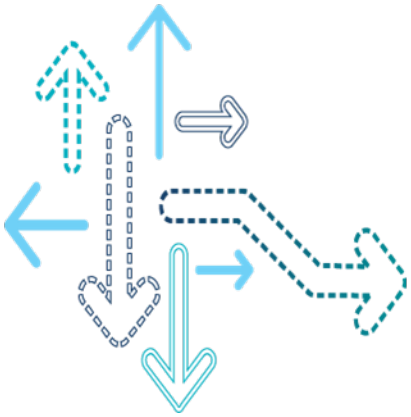
About TrustZone

- TrustZone is a hardware-based security environment
- It is also the Secure mode of the A53 processor, which is similar to the Supervisor mode. In the Secure mode:
  - Transition goes through a secure monitor
  - Linux runs in Nonsecure mode
- TrustZone software has two major components:
  - TrustZoneBSP
  - TrustZoneOS/Qualcomm Secure Execution Environment (QSEE), which provides the following two functionalities:
    - Initializes the system security environment for both software and hardware during bootup and wake-up from power collapse
    - Provides memory and other subsystem protection (xPU), and services during runtime

About TrustZone (cont.)

- TrustZone software image is loaded by the secondary boot loader (SBL) during the initial device bootup process.
- MSM8937 is based on TrustZone 4.0 architecture:
  - Binary only software releases for platform-independent software
  - Platform-dependent changes are mostly configurations (Device configuration)
  - For more information, refer to the following documents:
    - *TrustZone.BF.4.0 TrustZone Architecture Overview for MSM8937/MSM8940/MSM8953* (80-P2485-21)
    - *MSM8937/MSM8953/MSM8940/MSM8920/MSM8917 Boot Architecture Overview* (80-P2485-1).

Interprocessor Communication

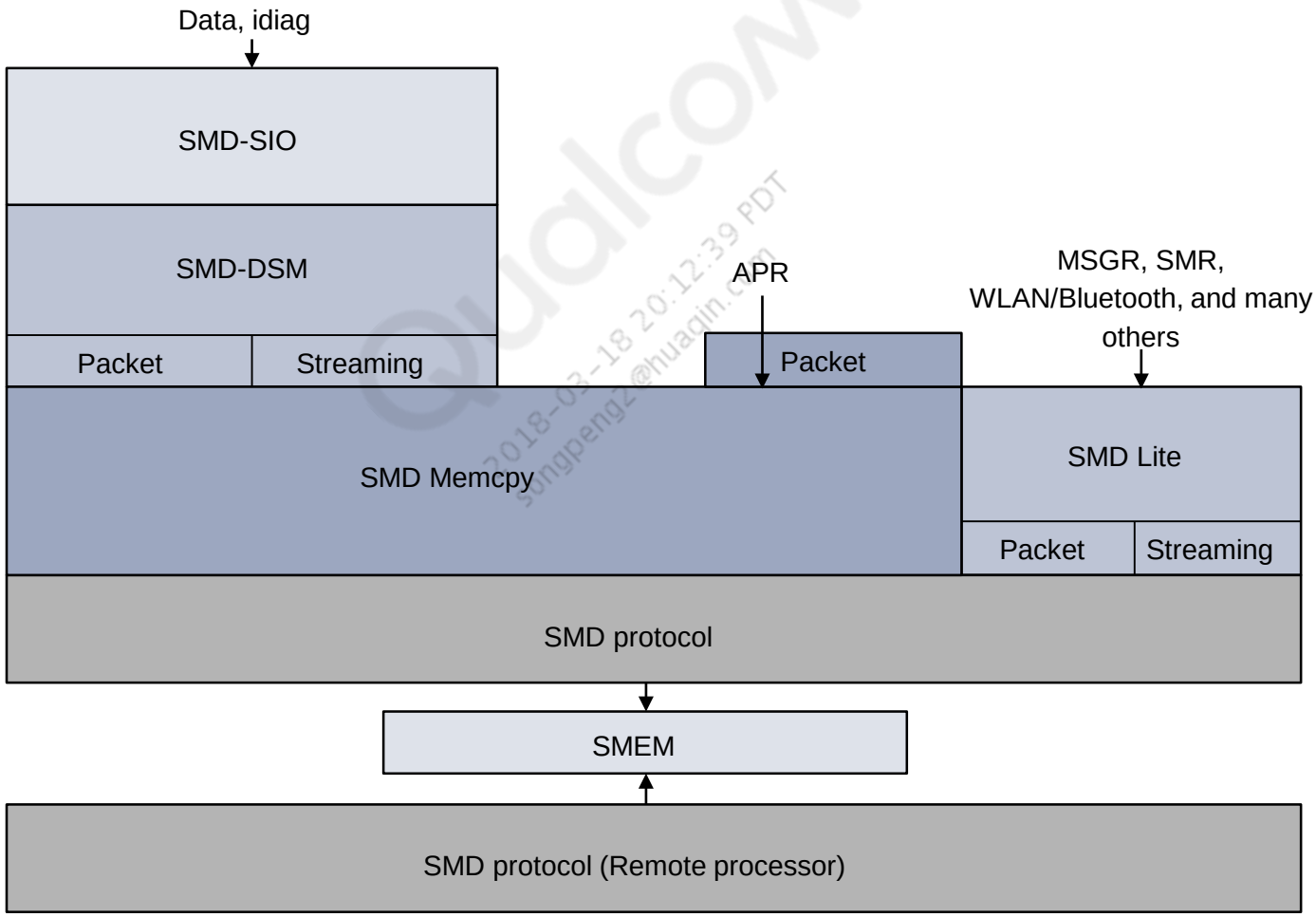


Shared Memory, Shared Memory State Machine, and Shared Memory Driver

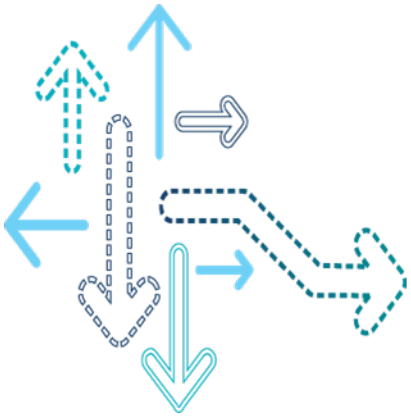
- Shared memory (SMEM) is a section of the physical memory used for interprocessor communication.
  - Shared by all the processors in the system
  - SMEM logging facilitates the log events chronologically in to the shared memory
- Shared memory state machine (SMSM) is a low-level protocol used to provide processor synchronization through a state owned by each processor saved in the shared memory.
  - Licensees in different processors register with SMSM to monitor the bits of interests.
  - Licensees set and clear the state bits owned by the processor, and read the state bits of any of the processors.
  - APIs are located at – msm_smsm.h
- Shared memory driver (SMD) is a low-level device driver used to move the data between processors through SMEM.
  - Provides the Packet or Streaming modes, serial input/output (SIO)-compatible interface on top of data service memory (DSM).
  - APIs are located at – msm_smd.h

SMD Layers

Clients shown are prominent examples and are not exhaustive.



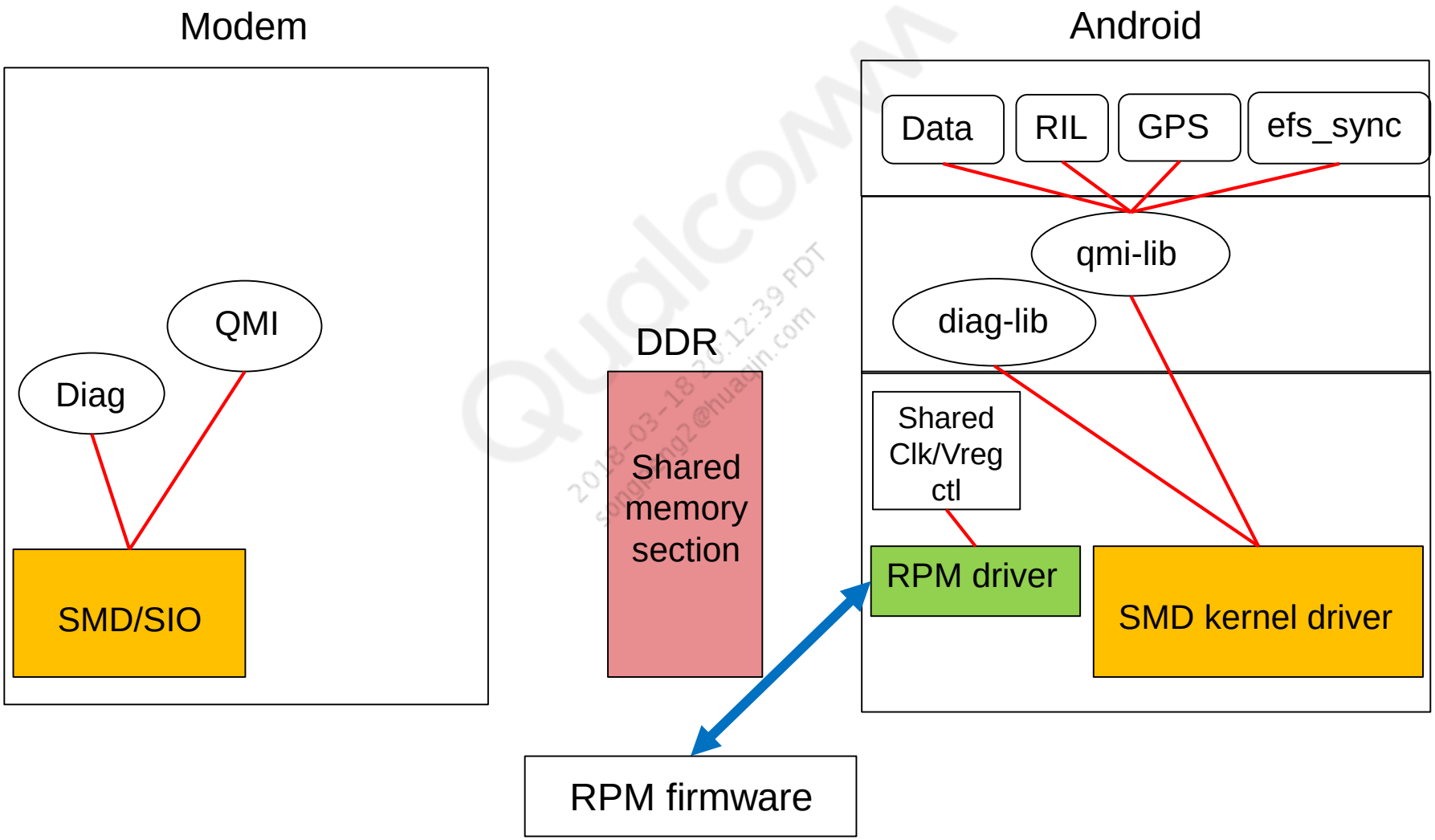
Qualcomm MSM™ Interface



Background

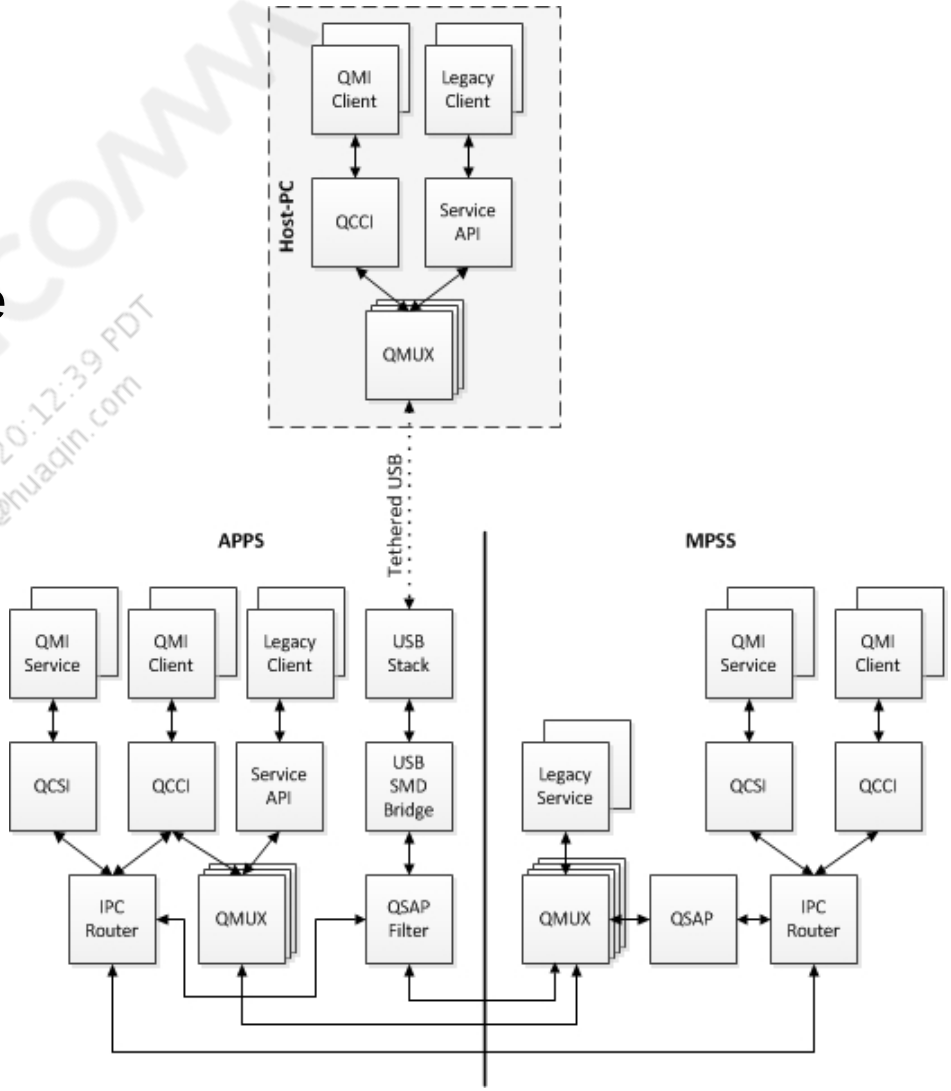
- Deployed from 2005 through 2006
  - All services are originally designed and maintained by the Data team
  - Functionality was modeled after the AT command standards:
    - Primarily used by connection manager-type applications
    - Available to PCs over a tethered USB connection (QMUX transport)
- In 2009, Qualcomm MSM Interface (QMI) became a replacement for RPC, the following is the expanded scope after the replacement:
  - RILs began to transition to QMI and necessary support was defined
  - Ownership of nondata services were transferred to individual tech teams
  - Enhanced communication (IPCRouter transport) is available between on-chip processors over SMD
- Interface definition language (IDL) is created to model API
  - Coupled QMI API and implementation
  - Test tools support changes using data that is autogenerated from IDL
- Common libraries are made available to clients and services
  - Optimized functionality-provided – Message encode/decode and service utilities that are IDL-based

QMI and Services

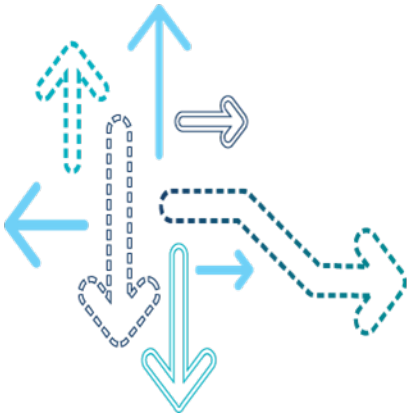


High-Level Architecture

- QMUX – QMI multiplexor (legacy)
- QCCI – QMI client interface,
  For example, Gobi API
- QCSI – QMI server interface,
  for example, services provided are OEM-defined
- QSAP – QMI services written on top of QCSI are only visible over the IPC router. This router presents problems for the legacy and off-chip clients that communicate through QMUX, but communicates with the service.
- QSAP is written to bridge the QMUX client connections to QCSI services in a transparent manner.



Resource Power Manager



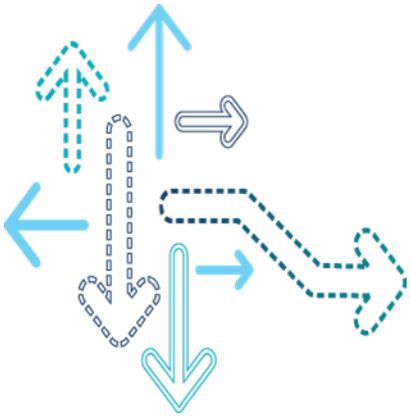
Introduction

- Resource power manager (RPM) is a processor whose overall goal is to lower the MSM average power consumption. Its features are:
  - Power-efficient, flexible, and extensible module:
    - Dedicated to effective, static power management to focus on power leaks
    - Avoids use of high-power processors
  - Derives its code image exclusively from internal RAM (SRAM)
  - Effective and dynamic power management
    - Enables rapid configuration of system resources like clocks, voltages
    - Enables power-level configuration of shared resources:
      - Without impacting the active processes
      - Without workarounds to avoid the use of affected resources
      - Provides the optimal hardware configuration for a specified set of applications
      - Improves power efficiency of the overall system while maintaining QoS
      - Scales voltage and clock to optimally track dynamic power curve
      - Minimizes overhead cost of voltage and clock change control decision
  - RPM is not a boot processor anymore; instead, A53 is the boot processor and loads the RPM

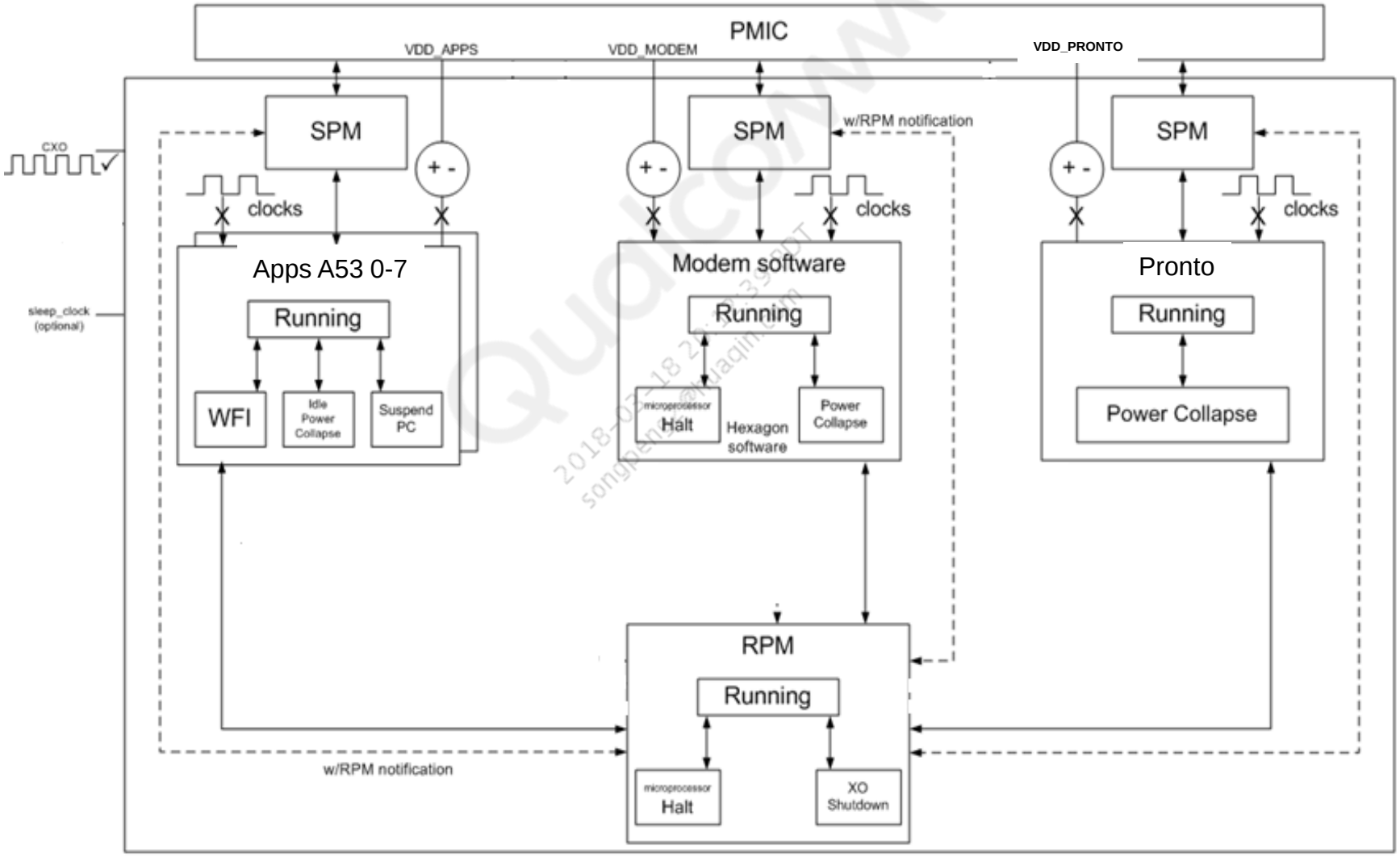
Introduction (cont.)

- For more information, refer to:
  - *MSM8956/MSM8976/MSM8937/MSM8940/MSM8920 RPM Overview and Debug* (80-NU154-10)
  - *MSM8937/MSM8940 Clock Plan* (80-P2485-20)
  - *MSM8917/MSM8920 Clock Plan* (80-P6548-1)

Power Management and Thermal Management



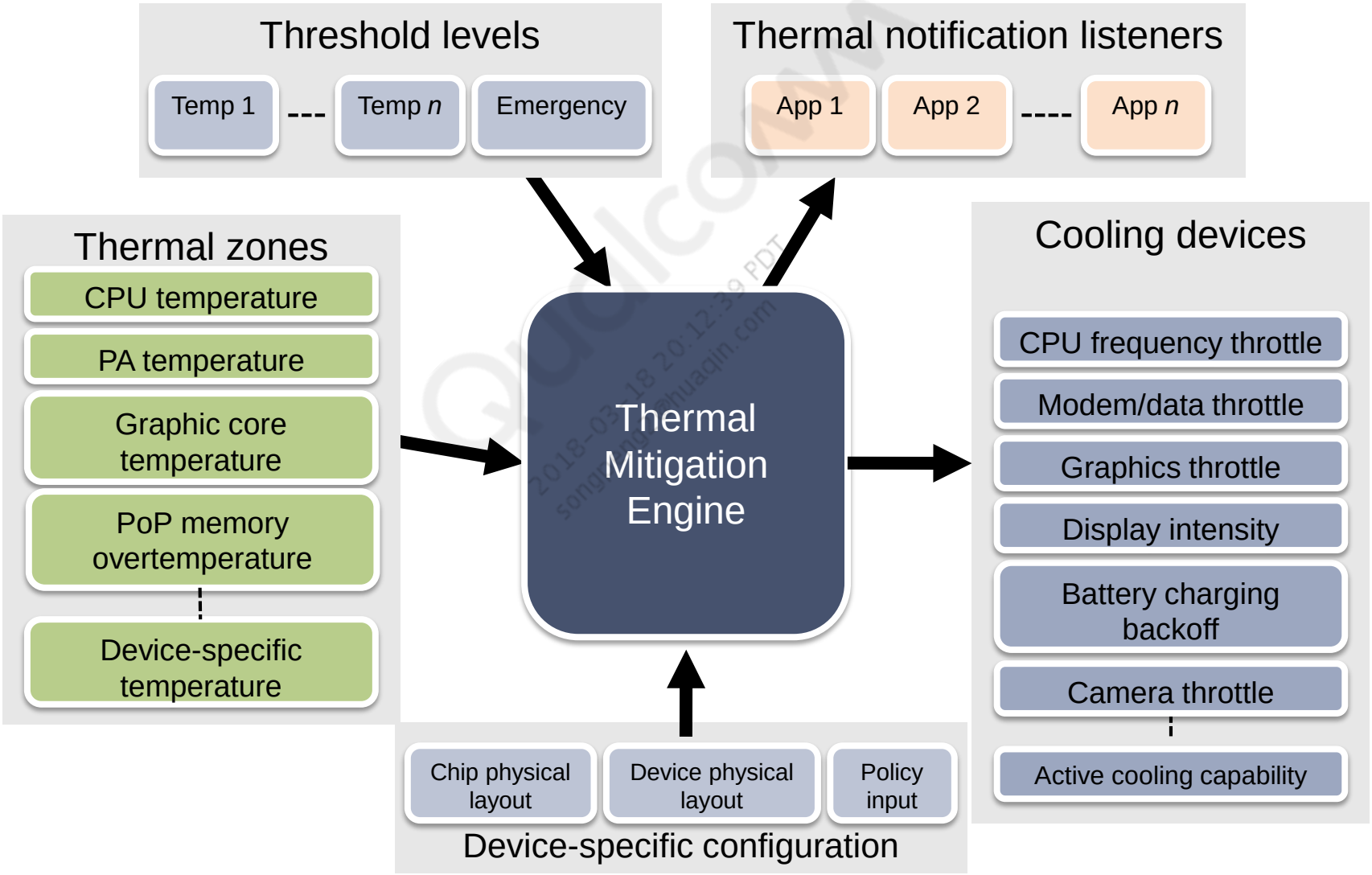
Power Management Block Diagram



Linux Power Modes

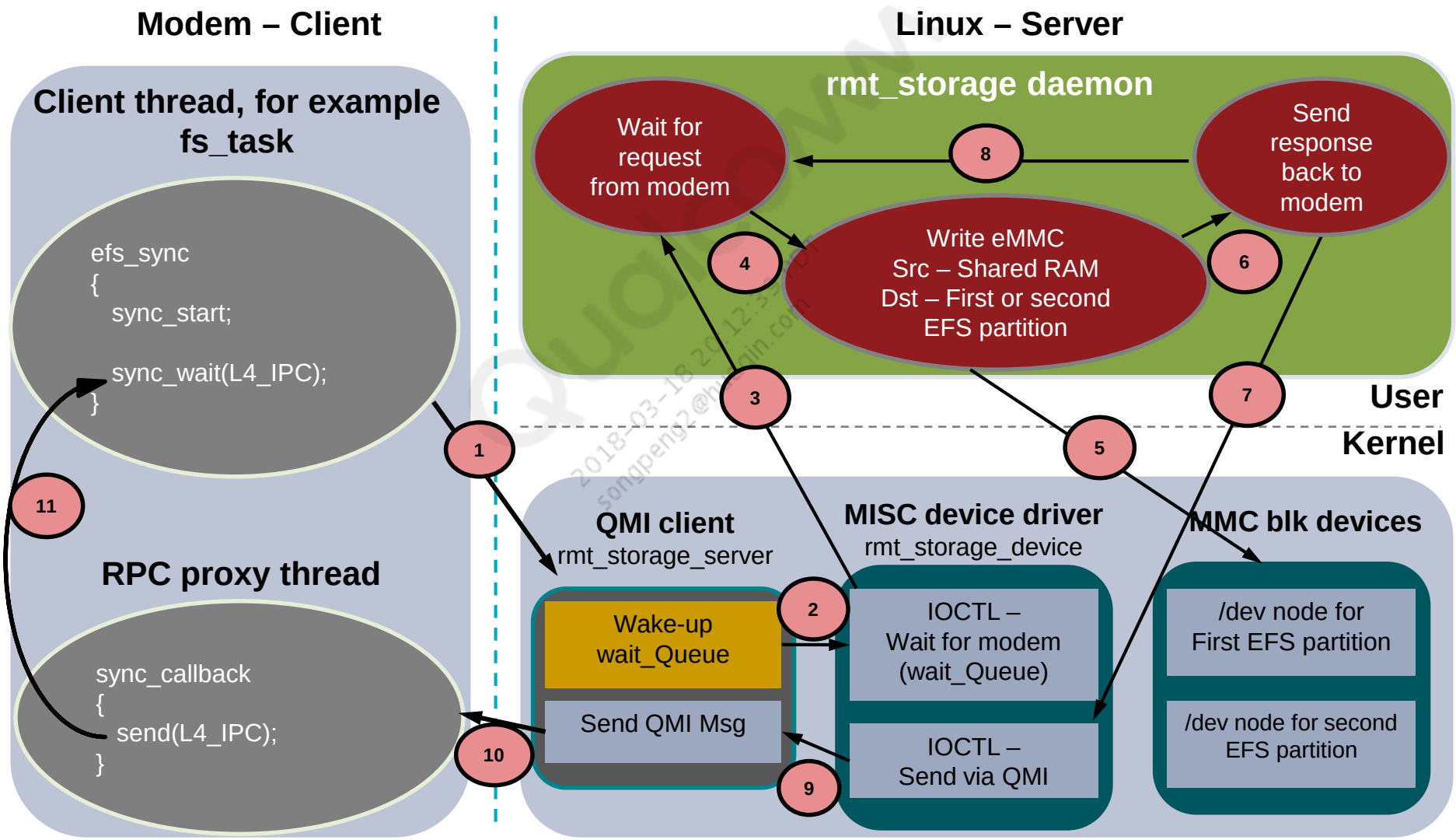
- The following power modes are supported:
  - Running
  - Suspend – Invoked by the user (using the Power key)
    - Stand-alone power-collapse (without RPM)
      - Second fastest low-power mode to enter/exit
      - Wake-up interrupts are still handled by GIC
    - Power-collapse (with RPM)
      - Slowest power mode to enter/exit
      - Requires programming of sleep sets, active sets, wake-up interrupts, and state information; wake-up interrupts are monitored by MPM (RPM subsystem)
  - Idle
    - Power-collapse (with RPM)
      - Slowest power mode to enter/exit
      - Requires programming of sleep sets, active sets, wake-up interrupts, and state information; wake-up interrupts are monitored by MPM (RPM subsystem)
    - Stand-alone power-collapse (without RPM)
      - Second fastest low-power mode to enter/exit
      - Wake-up interrupts are handled by GIC
  - WFI only – APPS executes the WFI instruction – Least power savings and fastest to enter/exit
  - APPS CPU spins – perpetual loop
  - For MSM8937 details, refer to *MSM8937 System Power Overview* (80-P2485-4).

Thermal Mitigation Software Concept Architecture

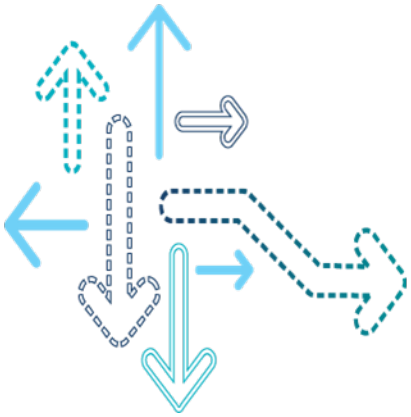


Note: For more information, refer to *MSM8917/MSM8937/MSM8940 Linux Android Thermal Management Overview* (80-P2485-13).

EFS Sync – Remote File System Storage



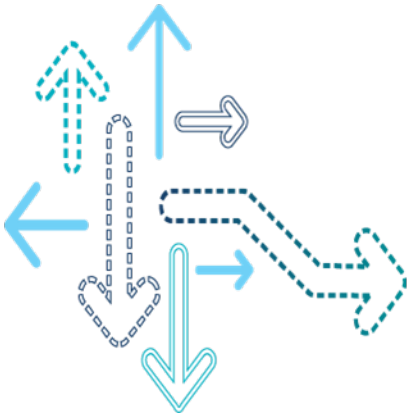
Linux BSP



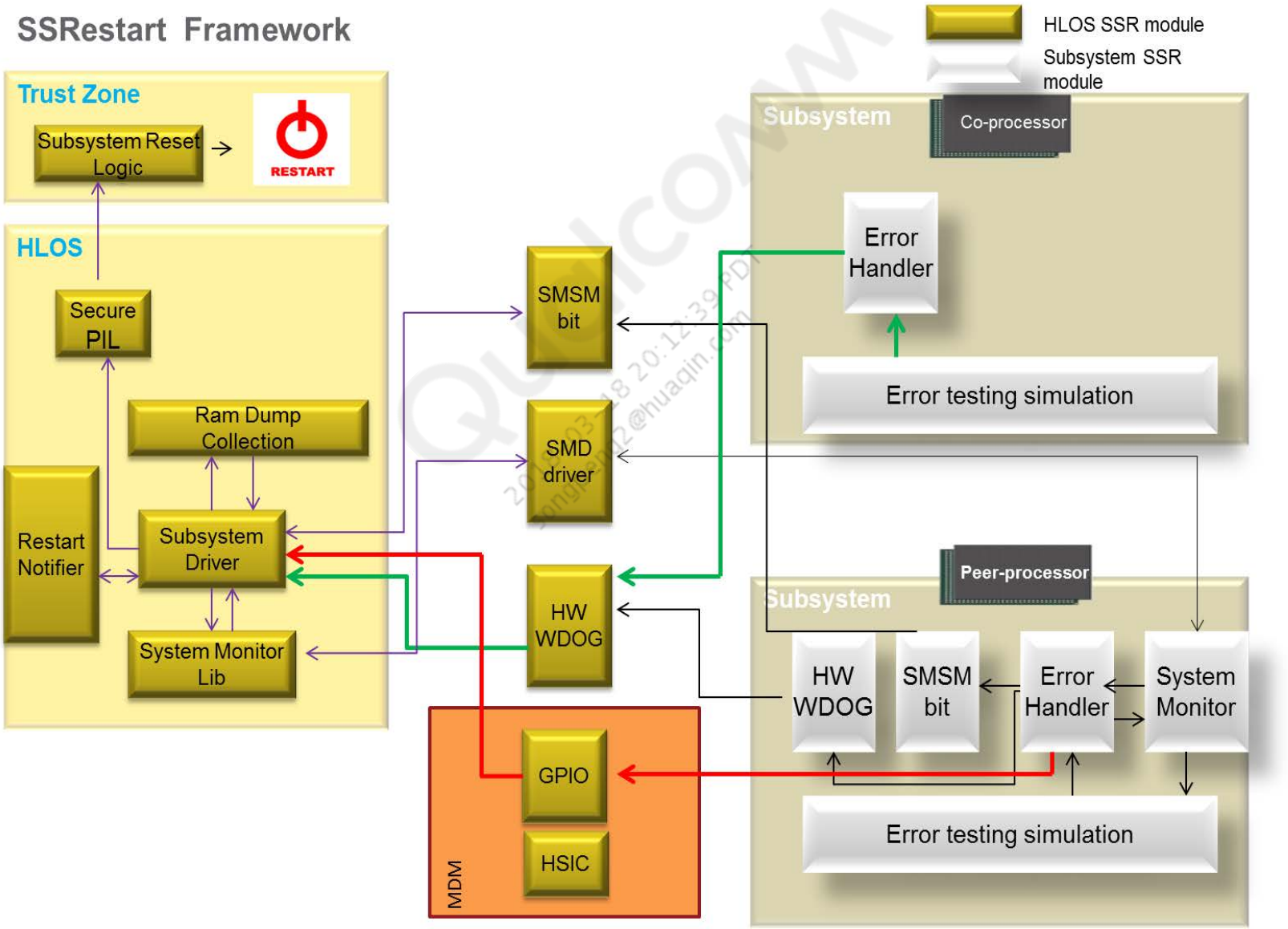
Linux BSP Migration

- Linux BSP software for MSM8937 is migrated/reused from the previous QTI platforms, and includes the following key changes:
  - Linux kernel v3.18 upgrade with Android Marshmallow release
  - Clock plan updates
  - Debug enhancements
- For details on the MSM8952 software from which the code is migrated, refer to *MSM8952 Software Architecture Overview* (80-NV610-2)
- For more information, refer to *MSM8937/MSM8940 Clock Plan* (80-P2485-20) and *MSM8917/MSM8920 Clock Plan (80-P6548-1)*

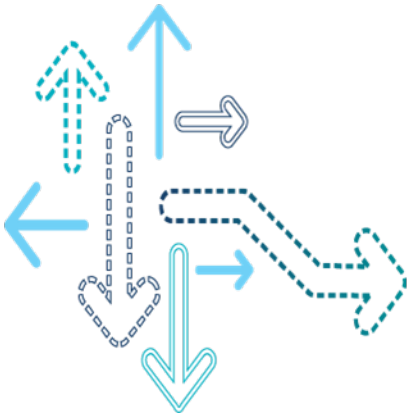
Subsystem Restart



Subsystem Restart Framework



Peripherals



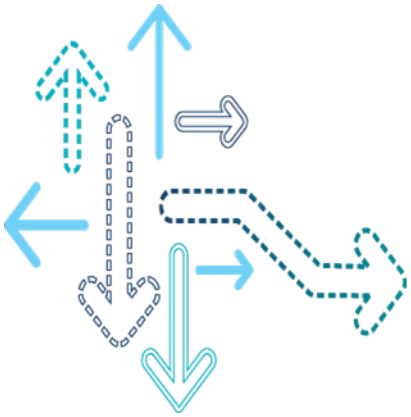
Linux USB Features

Feature	MSM8952	MSM8937/MSM8917/MSM8940/MSM8920	Comments
Peripheral ADB	Supported	Supported	Google driver
Peripheral mass storage	Supported	Supported	Open source driver
Peripheral diag	Supported	Supported	QTI driver
Peripheral DUN	Supported	Supported	QTI driver
Peripheral QMI RmNet	Supported	Supported	QTI driver
Peripheral RNDIS	Supported	Supported	Open source driver
Peripheral MBIM	Not supported	Not supported	Not supported on LA
Peripheral MTP	Supported	Supported	Google driver
Google open accessory	Supported	Supported	–
Peripheral digital audio	Supported	Supported	–
Peripheral HSIC	Not supported	Not supported	Not supported at the chipset level

Linux USB Features (cont.)

Feature	MSM8952	MSM8937/MSM8917/MSM8940/MSM8920	Comments
Host HS-USB	Supported	Supported	–
Host HSIC	Not supported	Not Supported	–
Host HID/MS/hub driver	Supported	Supported	–
Host digital audio driver	Supported	Supported	–
Host video driver	Supported	Supported	Verified on limited webcam models
Host HSIC link power management	Not supported	Not supported	–
USB host PC charging (SDP)	BC1.2 charger detection	Type-C charger detection supported.	–
USB wall charging (DCP)	BC1.2 charger detection	Type-C charger detection supported.	–
USB UICC	MegaSIM support	Not supported	–

Qualcomm Debug Subsystem



Features

- Compliant with the ARM CoreSight system specifications
- Provides hardware-based debug features
- Refines and improves performance and power tuning
- Provides extensions to debug known and difficult scenarios such as WDT reset and Bus timeout
- Provides system instrumentation to add software messages and a provision to enable up to 32 hardware events
- Hardware event can break or reset any or all processors simultaneously
- Trace data accessible through USB2, TPIU, and TPIU (6) behind SDCC2 pins

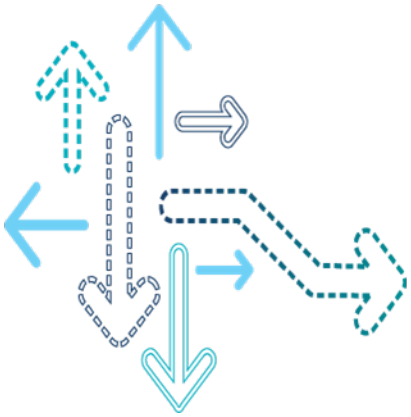
Components

- ARM CoreSight compliant processors
  - Secure and nonsecure/invasive and noninvasive debug enables support for tracing of hardware events and software messaging
- Support debug of the watchdog timeout resets
  - Allows SoC state to be dumped after a watchdog reset fires
- Support debug of memory access bus timeouts
  - Captures syndrome information of transaction causing Bus hangs
- Embedded trace macro (ETM)
  - Supports program trace on RPM, ADSP, MDSS, and WCNSS
- Program flow trace macro (PFTM)
  - Supports program trace APSS (A53s)
- System trace macro (STM)
  - Software instrumentation
  - Hardware signals and QTI extensions
  - Hardware detection of bus hangs and watchdog bite failure scenarios
- Common timestamp across all the subsystem trace sources

Components (cont.)

- Embedded trace buffer (ETB) – 8 KB
- Replicator
  - Duplicate output from ETB
  - USB or DDR and TPIU or TPIU (6)
- Cross trigger macro (CTM) – Break or reset any or all subsystems on a selected hardware event
- Embedded trace router (ETR) – Direct trace data to DDR or USB
- Trace port interface unit (TPIU) – Full TPIU for ETM 4.9 Gbps (ETM support)
  - Six-pin TPIU behind SDCC2 using SDCC adapter (~ 800 Mbps)
- For more information, refer to CoreSight Components Technical Reference Manual.

Flashing Software



Flashing Methods

- JTAG/TRACE32 is connected to RPM and A53 core 0 to flash boot loaders. Fastboot is then used to flash the rest of the images
- QFIL is used to flash all images onto an empty device with USB
- For details on flashing the system images, refer to *MSM8937 Linux Android Software User Manual* (SP80-P2485-4).

References

Title	Number
Qualcomm Technologies, Inc.	
System Drivers PMIC Overview	80-P2485-18
Linux Android PMIC Software Drivers Overview	80-P2485-2
RPM PMIC Software Driver Overview	80-NN255-1
MSM8937/MSM8953/MSM8940/MSM8920/MSM8917 Boot Architecture Overview	80-P2485-1
MSM8937/MSM8940 Clock Plan	80-P2485-20
MSM8937 System Power Overview	80-P2485-4
MSM8917/MSM8937/MSM8940 Linux Android Thermal Management Overview	80-P2485-13
TZ.BF.4.0 TrustZone Architecture Overview for MSM8937/MSM8940/MSM8920/MSM8953 Devices	80-P2485-21
MSM8937 Linux Android Software User Manual	SP80-P2485-4
MSM8937/MSM8940 Linux Android Software Debug Manual	SP80-P2485-5
MSM8937/MSM8940 Linux Android Software Porting Manual	SP80-P2485-6
MSM8937/MSM8917/MSM8940 Android Camera KPIs Overview	80-P2485-10
MSM8937/MSM8917/MSM8940/MSM8920 Linux Android Audio Overview	80-P2485-5
MSM8917/MSM8937/MSM8940/MSM8920 Linux Android Display Overview	80-P2485-7

References (cont.)

Title	Number
Qualcomm Technologies, Inc.	
MSM8937/MSM8917/MSM8940/MSM8920 Linux Android Graphics Overview	80-P2485-8
MSM8937/MSM8917/MSM8940/MSM8920 Linux Android Video Overview	80-P2485-9
MSM89x7 Modem Software Overview	80-P2485-12
MSM89x7 RF Software Overview	80-P2485-3
QCA WCN36X0 Software Architecture	80-Y0513-1SC
MSM8956/MSM8976/MSM8937/MSM8940/MSM8920 RPM Overview and Debug	80-NU154-10
MSM8952 Software Architecture Overview	80-NV610-2
MSM8940/MSM8920 Modem Software Overview	80-P5687-2
Android Software Release Plan - May 2016	80-N9912-37
MSM8917/MSM8920 Clock Plan	80-P6548-1
Resources	
CoreSight Components Technical Reference Manual	http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.ddi0314h/index.html

References (cont.)

Acronym or term	Definition
CTM	Cross trigger macro
DSM	Data service memory
ETB	Embedded trace buffer
ETM	Embedded trace macro
ETR	Embedded trace router
GNSS	Global navigation satellite system
IDL	Interface definition language
PFTM	Program flow trace macro
PIL	Peripheral image loader
QCCI	QMI client interface
QCSI	QMI server interface
QDSS	Qualcomm debug subsystem
QMI	Qualcomm MSM interface
QMUX	QMI multiplexor
QSAP	QMI services
QSEE	Qualcomm Secure Execution Environment
RPM	Resource power manager

References (cont.)

Acronym or term	Definition
SIO	Serial input/output
SMD	Shared memory driver
SMEM	Shared memory
SMMU	System memory management unit
SMSM	Shared memory state machine
STM	System trace macro
TPIU	Trace port interface unit

Questions?

https://createpoint.qti.qualcomm.com