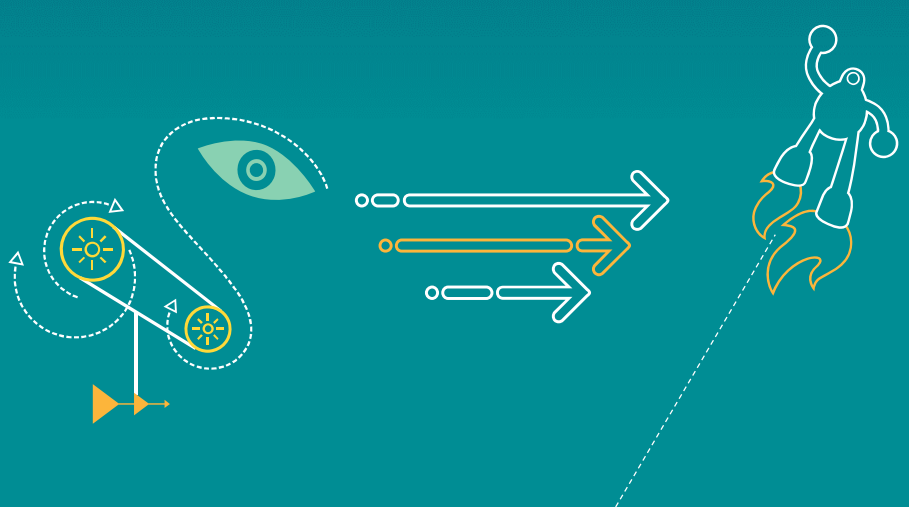
Linux Android Stability Issue Analysis

Qualcomm Technologies, Inc.



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Revision History

Revision	Date	Description
A	July 2016	Initial release

Contents

Introduction

This document provides a summary about analysis of Android crash issues on Qualcomm platforms, and is meant for engineers who work on such issues.

Getting Full Crash Dump

- Theory
  - Kernel
    - msm-poweroff.c (msm-restart.c)
    - MSM_DLOAD_MODE
    - scm_set_dload_mode
  - SBL
  - WARM reset
    - msm_restart_prepare
- Hang issue
  - Long press power key to trigger dump
  - pull_down PS_HOLD in 200ms
  - Solution 00031242 How to collect log for a phone hang/screen freeze issue
    - For example, MSM8994:
    - kernel/arch/arm64/boot/dts/qcom/msm-pm8994.dtsi

```
qcom,pon_1 {
        qcom,pon-type = <0>;
        qcom,pull-up = <1>;
        linux,code = <116>;
        qcom,support-reset = <1>;
        qcom,s1-timer = <10256>;
        qcom,s2-timer = <2000>;
        qcom,s2-type = <1>;
};
qcom,pon_3 {
```

Parser Tool

- QCAP
  - Qualcomm web based parser tool (cap.qit.qualcomm.com)
  - Solution 00031425 -- How to use QCAP to parse a dump and raise a stability case correctly
- Ram parser
  - Qualcomm developed tools, parse Linux side dump, provide more information from kernel
  - Solution 00027972 -- How to use Linux Ramdump Parser (ramparse.py) to extract Linux Android logs
- Trace32 simulator
  - Used to perform dump analysis, check kernel structure, disassemble code, memory content
- Redhat Crash
  - Open source tools maintained by Redhat; provides similar features as the Trace32 simulator
  - Command line tools; could use remotely

QCAP Environment Setup

1. Internet Explorer; install latest Java（http://java.com/en/download/）。
2. Restart Internet Explorer
3. QCAP：https://cap.qti.qualcomm.com。
4. Browser will prompt for running app

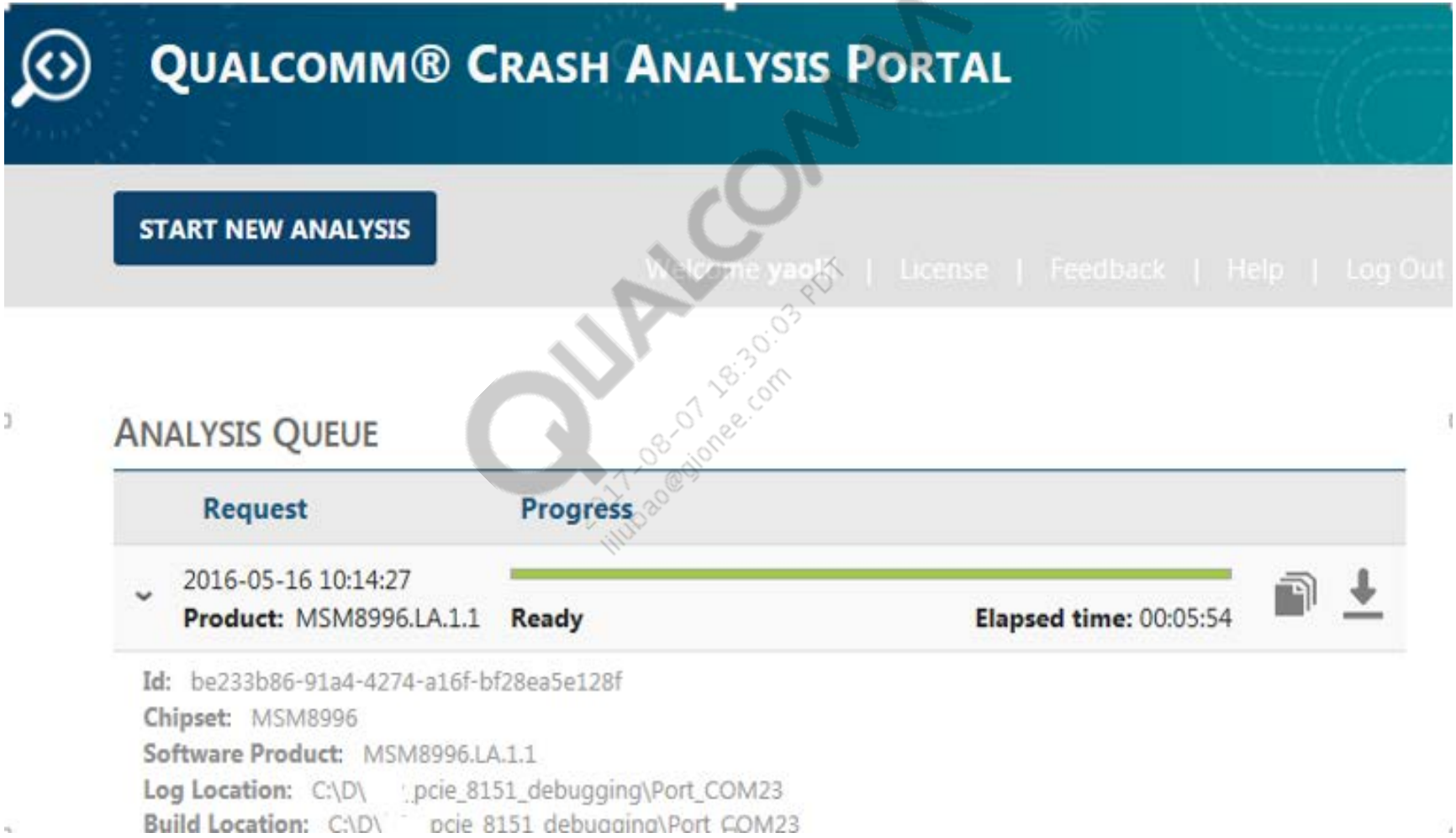
References:

- QCAP training video:
  https://virtuallearning.qualcomm.com/p7ssobajxig/

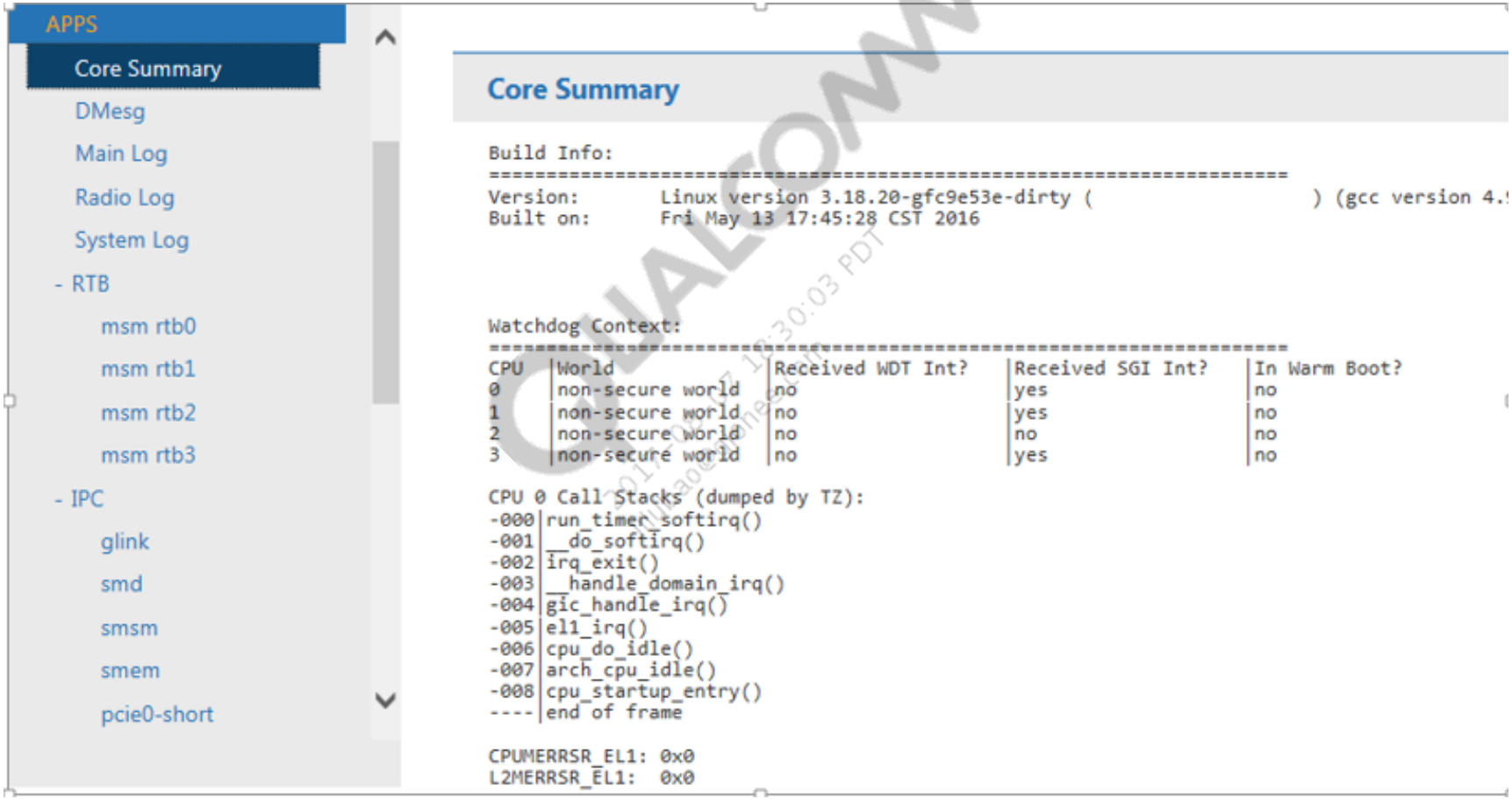
QCAP documents:

- 80-NR964-54 QCAP_Start_Up_Guide
- 80-NR964-54SC QCAP_Start_Up_Guide (Chinese)
- VD80-NR964-54C QCAP Start-Up Training Video/Chinese

QCAP Interface



QCAP Log Example



Stability Issue Classification

- Panic
  - Bug_on
  - Null pointer
  - Invalid instruction
- Non secure dog bark
- Non secure dog bite
- Secure dog bite
  - Secure dog bark is used to kick dog
- Freeze/hang
  - Adb login ok
  - USB port enumerate
  - No USB port
- Subsystem crash

How to Raise a Stability Case

Go to **https://createpoint.qti.qualcomm.com** and click Cases

- Description
  - How did it happen? Scenario
  - Could be reproduced?
  - Only on specific phone or phones?
- Initial parser
  - QCAP and ram parser result
- Initial analysis
  - Extract key information
- Raise a clear case title
  - Behavior, Position, Step, and Other Info is useful

    This helps to quickly find the relationship between different crashes from the same OEM and similar issues from different OEMs
    - **Behaviour:** BugON|Data abort|Null Point|Prefetch abort|dog bark|NS Dogbite|S Dogbite|Hang|L1 cache error|XPU|NOC ….
    - **Position:** C function name|C file name|process name|CPU No
    - **Step:** monkey |aging test|standby|resume|reboot test|daily use|market return|camera|play video
    - **Other info:** Only 1 phone, 1 time, Random, 100% reproduce, 3 in 10 times, 24 hours, e.g.

    Null point in msm_poweroff.c+121 |msm_restart_prepare() in reboot test of 24 hours

Tracking Stability Issues Effectively

To effectively track one-time issues or hard to reproduce issues:

1. Record useful information
   - Build ID
   - Chip/device id/IMEI
   - Case number
   - Test step
   - Crash signature
2. Keep dump/elf symbols
   - Modify your build script to keep each build symbol file

References

Title	Number
Qualcomm Technologies, Inc.	
QCAP_Start_Up_Guide	80-NR964-54N
QCAP_Start_Up_Guide (Chinese)	80-NR964-54SC
QCAP Start-Up Training Video/Chinese	VD80-NR964-54C

Acronym or term	Definition
QCAP	Qualcomm Crash Analysis Portal
SBL	Secondary Boot Loader

Questions?

https://createpoint.qti.qualcomm.com