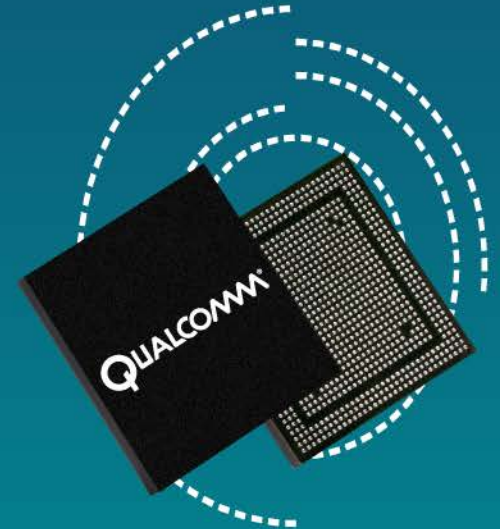


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Download/Flash Customizations and Automation Overview

80-NN648-1 A



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Revision History

Revision	Date	Description
A	May 2014	Initial release

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Contents

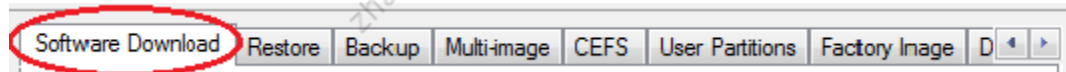
- Flash Chips and Their Characteristics
- NOR Flash Software Download
- NAND Secure Boot 1.0 Software Download
- NAND Secure Boot 2.0 Software Download
- NAND Secure Boot 3.0 Software Download
- eMMC Software Download
- Using eMMC Software Download
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Flash Chips and Their Characteristics

- NOR Flash
 - Code can execute directly from the chip (random access)
 - Write/erase slower than NAND Flash
 - Low standby power
- NAND Flash
 - Denser and more cost-effective than NOR Flash
 - Requires controller hardware and error correction
 - Reads are slower, no random access
 - Flash space partitioning is enforced by software
 - Low active power
- eMMC and Universal Flash Storage (UFS) (see [R1])
 - Flash space partitioning is controlled by hardware
 - Flash chip behaves like a mass storage peripheral
 - Built-in wear leveling to extend the device's lifetime, and other features

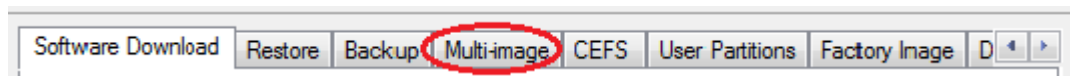
NOR Flash Software Download

- One image file written to the entire Flash chip
 - Flash programmer is downloaded to device RAM using DMSS Download Protocol (see [Q4]).
 - The image is then programmed using the Streaming Download Protocol (see [Q5]).
- Current status – In most applications, made obsolete by NAND Flash chips; DMSS download protocol has been replaced by the Sahara protocol (see [Q2]) in newer Qualcomm Technologies, Inc. (QTI) modem chipsets



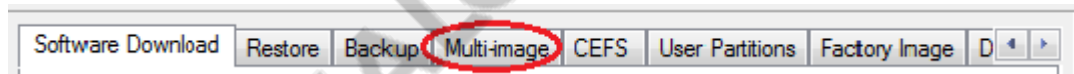
NAND Secure Boot 1.0 Software Download

- Flash memory space is partitioned to hold multiple binary images
- Download sequence
 - Flash programmer is downloaded to device RAM using DMSS download protocol. The Flash programmer uses the Streaming download protocol to write images to Flash.
 - The partition table is downloaded.
 - Images are downloaded to partitions.
- Files downloaded are PBL, QCSBLH, QCSBL, OEMSBLH, OEMSBL, etc.
- Current status – Replaced by Secure Boot 3.0; DMSS download protocol has been replaced by the Sahara protocol in the newer QTI modem chipsets



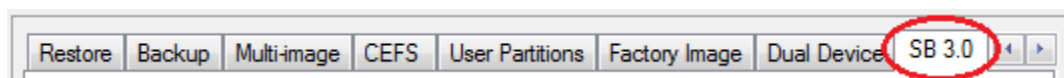
NAND Secure Boot 2.0 Software Download

- Partitioning is the same as Secure Boot 1.0.
- Files downloaded are DBL, FSBL, OSBL, etc.
- The current status is the same as Secure Boot 1.0.



NAND Secure Boot 3.0 Software Download

- Partitioning is the same as Secure Boot 1.0.
- Images are downloaded to partitions, but unlike Secure Boot 1.0/2.0, the partition names are not predefined; they are defined by the build. The list of files to download and corresponding partition names are defined in contents.xml and partition_nand.xml.
 - The partition file is downloaded first.
 - When an image is downloaded, it must be downloaded into a partition with a name that matches a partition in the partition table.
- The Sahara protocol is used to download the Flash programmer. Then each image is downloaded to a partition with the Streaming download protocol.
- Current status – Supported by MDM9x35
- Usage
 - Browse for the COM port.
 - Browse for contents.xml in the build tree.
 - Click **Start**.

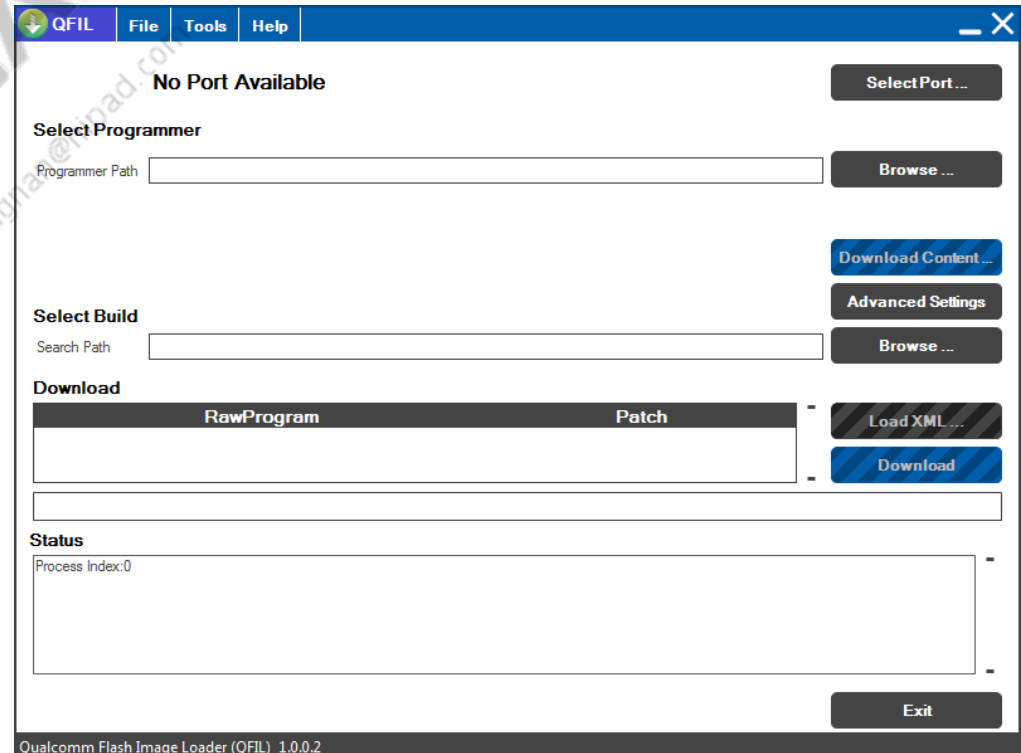
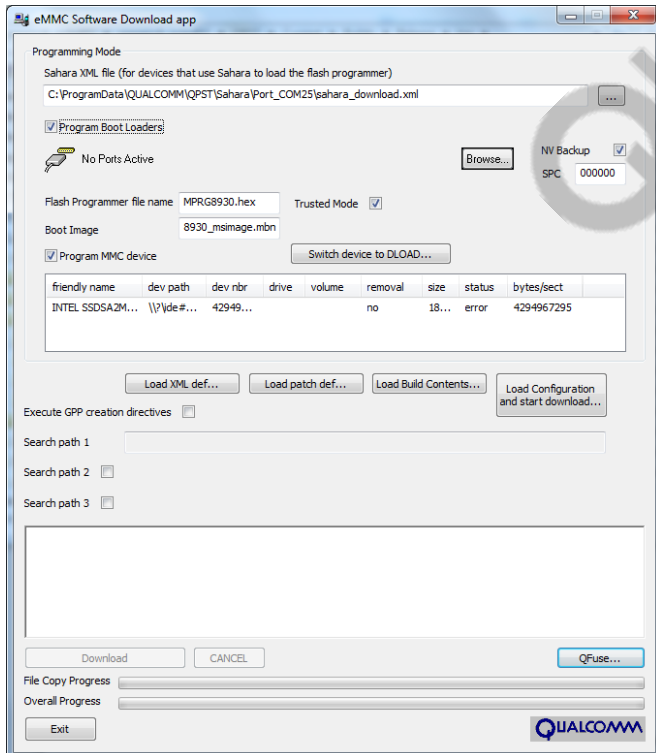


eMMC Software Download

- Original design – eMMC Flash chip enumerates over USB as mass storage
 - Advantages
 - Looks like an unformatted storage device, easy to program
 - Fast programming with no additional protocol stack required to transfer data
 - Disadvantages
 - On Windows (starting with Vista), the programming software must run in Administrator mode because writing to eMMC is formatting a hard drive.
 - Windows only supports a limited number of drive letters, making it difficult to support more than one or two devices per PC. Drive letter exhaustion will cause Windows kernel APIs to freeze.
 - If the device enumerates more than one partition, Windows does not guarantee that they are enumerated in a predictable order.
- Current design – eMMC chip is programmed over the COM port using the Firehose protocol (see [Q3]).
 - Better scaling to multiple devices per PC
 - Firehose protocol is nearly as fast as mass storage
 - Administrator privilege is not required for programming

eMMC Software Download (cont.)

- Supported by two applications
 - eMMC software download (left image) uses mass storage
 - QFIL (right image) uses the Firehose protocol over a COM port
- Users should begin switching to QFIL as soon as possible



Using eMMC Software Download

- Program boot loaders – User selection; if this option is selected:
 - Sahara .xml file is required
 - Port browse – Selecting a COM port is required
- NV backup – Optional selection; an NV backup is only possible if starting the download process with the device in normal Diagnostics mode and a COM port is selected; SPC is required if NV backup is selected
- Trusted mode – Should always set (checked)
- Program MMC device – User selection; selecting a device from the list of mass storage interfaces is required if this option is selected; note that you will have to run this application and the QPST server process in Admin mode if you intend to use this option
- Load Build contents – Required; select the contents.xml file here; this .xml file defines the search paths and files to download, including:
 - Flash programmer filename – Should be read from contents.xml
 - Boot image – Should be read from contents.xml
- Click **Download** to start the device software download process (**Note:** For some devices, you must disable crash dump auto reset)
 1. Start QPST Configuration and select the **Ports** tab.
 2. Right-click the COM port and select **Sahara Configuration**.
 3. Uncheck Auto Reset after collecting memory dump.

Using QFIL Software Download

1. Start QFIL and select **Help... Help Topic** to view the user guide. The user guide has details regarding flat vs metabuilds. You must shut down the QPST server process to use QFIL.
2. Select **Port** (required). Select **COM** port. The Firehose protocol uses the COM port, not a mass storage interface.
3. For programmer path (required), select the Firehose device programmer (.mbn file).
4. For search path (optional), select the build location.
5. Load XML (required). First select the raw program .xml file(s) and click **Open**. Then, select the patch .xml file(s) and click **Open**.
6. Click **Download** to start the device software download process.

UFS Software Download

- Supported by QFIL, not supported by any of the other applications mentioned in this document
- Available on some QTI reference devices since late 2013

Software Download Automation

- Some features and devices are supported through the QPST scripting (automation) server.
 - Older NOR/NAND/eMMC configurations are available but not recommended.
 - NAND Secure Boot 3.0 (using contents.xml) is supported.
- The Firehose protocol is not currently supported.

References

Ref.	Document	
Qualcomm Technologies		
Q1	Application Note: Software Glossary for Customers	CL93-V3077-1
Q2	Sahara Protocol Specification	80-N1008-1
Q3	Firehose Protocol V1.0 Definition Document	80-NG319-1
Q4	DMSS Download Protocol Interface Specification and Operational Description (ISOD)	80-39912-1
Q5	Streaming Download Protocol Specification	80-V5348-1
Resources		
R1	Universal Flash Organization	http://universalfash.org/

Questions?

<https://support.cdmatech.com>

