

Author:	Sierra Wireless				Date:	Sep 07, 2018				
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Hardware Compatibility	Product Line	AirPrime	Series	WP76xx						
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Software Compatibility	ALL			Document Type	Application Note	<input checked="" type="checkbox"/>	Technical Note			



1 Version

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2 Introduction

This document is provided to Sierra Wireless distributors and clients to aid more rapid development of embedded applications using the Sierra Wireless portfolio of cellular solutions. To request a new application/technical note, contact your regional Sierra Wireless Product Marketing Manager.

3 Glossary

Term/Initials	Definition
Secure Debug	Secure Boot component that disables debug features
RAM Dump tool	Application that provides detailed RAM dump information after a module crash

4 Application Note Description

This document describes Secure Debug, a component of the Secure Boot functionality that Sierra Wireless WP series modules automatically provide for firmware images, the limitations it places on debugging modules, and the process for bypassing (on a specific module) the feature with the assistance of Sierra Wireless.

5 Secure Debug

All Secure Boot-enabled devices incorporate the Secure Debug feature to enhance device security. Secure Debug disables various debug features, such as RAM dump collection.

The Secure Debug feature cannot be disabled by users. However, if a module requires advanced module crash analysis (via RAM dump collection), Sierra Wireless can provide a temporary-use debug-enabled image.

Note: The debug-enabled image should be used solely to provide details requested by Sierra Wireless, and then should be immediately replaced with the original image to ensure the device is protected via Secure Debug.

6 Module Crash Analysis

If a modem crashes for an undetermined reason, the generated crash string can be provided to Sierra Wireless for analysis. If the analysis requires additional details (in the form of a RAM dump), Sierra Wireless can create a module-specific debug-enabled image that will allow RAM dump collection for further debug analysis.

When contacting Sierra Wireless to assist in crash analysis for a specific module:

1. Collect the following details from the affected module using the ramdump tool (if previously obtained from Sierra Wireless), or AT commands indicated below:
 - Module crash string – Use AT!GCDUMP to display the string.
 - FSN, IMEI, and Revision number – Use AT! to display these details.

2. Contact your support representative (see 9 Support) to report the issue.
The support representative will request the information above to determine whether the issue can be identified with the crash string or if a full RAM dump is required for further analysis.
3. If a full RAM dump is required, Sierra Wireless will build and sign a module-specific debug image and provide instructions on how to proceed. The process will resemble the following:
 - a. The support representative will request a module-specific debug image be built by Sierra Wireless based on the module information that was collected in step 1.
 - b. Sierra Wireless will use the module information to build and sign a module-specific debug image. If necessary, the support representative will collect additional details needed to create the image.
 - c. Sierra Wireless will provide the image to the support representative.
 - d. The support representative will provide the image and the ramdump tool to the customer, and will provide assistance where required to install the image and use the tool.
 - e. The customer will check the module (using AT!) to confirm the current image version, so the same version can be restored later.
 - f. The customer will update the module with the module-specific debug image, using FDT or fwupdate.
The module will reboot to start the firmware update process and, if the image installs successfully, full RAM dump collection will now be enabled.

Note: If the module-specific debug image does not match the module, the update will be rejected and error code 0x93 ("Secboot auth failure") will be returned.

- g. The customer will configure the module to remain in boot mode when a crash occurs:

```

AT!EROPTION=0
OK
AT!EROPTION?
!EROPTION:
0 - USB Memory Download

OK
  
```

- h. The customer will reproduce the crash.
When the module reboots, it will enumerate to the host with a single USB port (DM port).
- i. The customer will run the ramdump tool on a Windows or Linux host from the command line.
The RAM contents will be dumped to a subfolder (MemDumpOut) and the module will reset. (The number and size of files created in MemDumpOut will vary, depending on the module model.)
- j. If possible, the customer will return the module to a working state, then run the following commands, capture the output to a text file, and save the file to the MemDumpOut subfolder.

```

ATI
ATI8
AT!GC_DUMP
  
```

- k. The customer will create a .zip archive of the ramdump folder and provide it to the support representative for further analysis.
- l. The customer will clear the RAM dump data.

```

AT!GCCLR
  
```

- m. The customer will reload the module with the original firmware image version to re-secure the module.

Note: Sierra Wireless strongly recommends that all copies of the module-specific debug image be deleted after the original image has been reloaded, to ensure the module cannot be mistakenly reloaded with the debug image, which would degrade device security and may affect device functionality.

7 Standard AT Commands

AT commands used for this application note are described below. For additional details, refer to AirPrimeWP8548/WP75xx/WP76xx/WP77xx AT Command Reference (Document #4118047, available from <https://source.sierrawireless.com>).

AT Command Syntax		
ATI		
Parameters	Values	Description
None	n/a	n/a
ATI8		
Parameters	Values	Description
None	n/a	n/a
ATIEROPTION		
Parameters	Values	Description
None	n/a	n/a
ATIGCCLR		
Parameters	Values	Description
None	n/a	n/a
ATIGCDUMP		
Parameters	Values	Description
None	n/a	n/a

8 Software Compatibility Matrix

Firmware	Legato Application Framework	Library/Libraries
From FW Release 7		

9 Support

For direct clients: contact your Sierra Wireless FAE

For distributor clients: contact your distributor FAE

For distributors: contact your Sierra Wireless FAE

10 Document History

Level	Date	History
1.0	Sep 07, 2018	Creation

11 Legal Notice

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

Safety and Hazards

Do not operate the Sierra Wireless modem in areas where cellular modems are not advised without proper device certifications. These areas include environments where cellular radio can interfere such as explosive atmospheres, medical equipment, or any other equipment which may be susceptible to any form of radio interference. The Sierra Wireless modem can transmit signals that could interfere with this equipment. Do not operate the Sierra Wireless modem in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless modem **MUST BE POWERED OFF**. When operating, the Sierra Wireless modem can transmit signals that could interfere with various onboard systems.

Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Sierra Wireless modems may be used at this time.

The driver or operator of any vehicle should not operate the Sierra Wireless modem while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offence.

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