BC65&BC92

Firmware Download and Log Capture Application Note

NB-IoT Module Series

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About the Document

Revision History

Revision	Date	Author	Description
1.0	2020-02-11	Fonda FANG/ Louis GU/ Quinten SONG	Initial

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1 Introduction

This document mainly introduces how to download firmware through QFlash, and how to capture logs with CoolWatcher and ArmTracer for Quectel BC65 and BC92 modules.

2 Software and Hardware Preparation

This chapter describes the required hardware and software environment before the tools are used for firmware download and log capture.

NOTE

Before starting the tools and connecting the module, please power on the module.

2.1. Hardware Preparation

- BC65 or BC92 modules
- PC
- USB cable

Power on the module and connect it to the PC with the USB cable.

2.2. Software Preparation

Before the firmware download and log capture, it is necessary to install the corresponding serial port driver on the PC. Then, acquire the tools QFlash, CoolWatcher, and ArmTracer to be uncompressed and saved to the root directory of local disk C.

NOTE

To acquire QFlash, CoolWatcher and ArmTracer, please contact Quectel Technical Support.

3 Firmware Download

The firmware of BC65 and BC92 can be downloaded into the modules through QFlash. This chapter introduces the method to download firmware into modules.

3.1. Check the Serial Port

After powering on the module, open the **Device Manager** to view the debug port number of the current device, which will be referred to during the setting of the corresponding serial port in QFlash, as shown below.

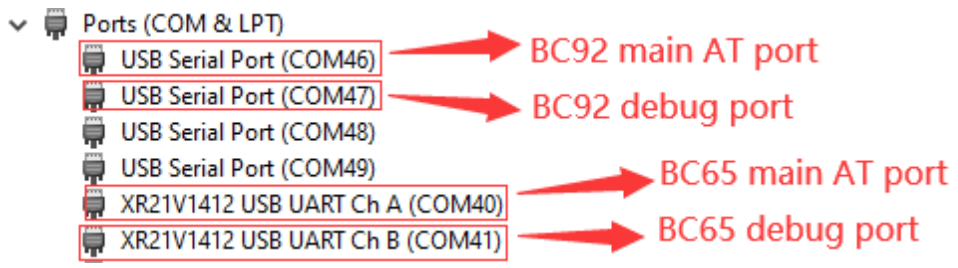

Figure 1: The Current Serial Port Number of Devices

3.2. Firmware Download with QFlash

3.2.1. Configure QFlash

Open QFlash, select the corresponding debug port number in the drop-down list of "**COM Port**", and select "**921600**" in "**Baudrate**" drop-down list, as shown below.

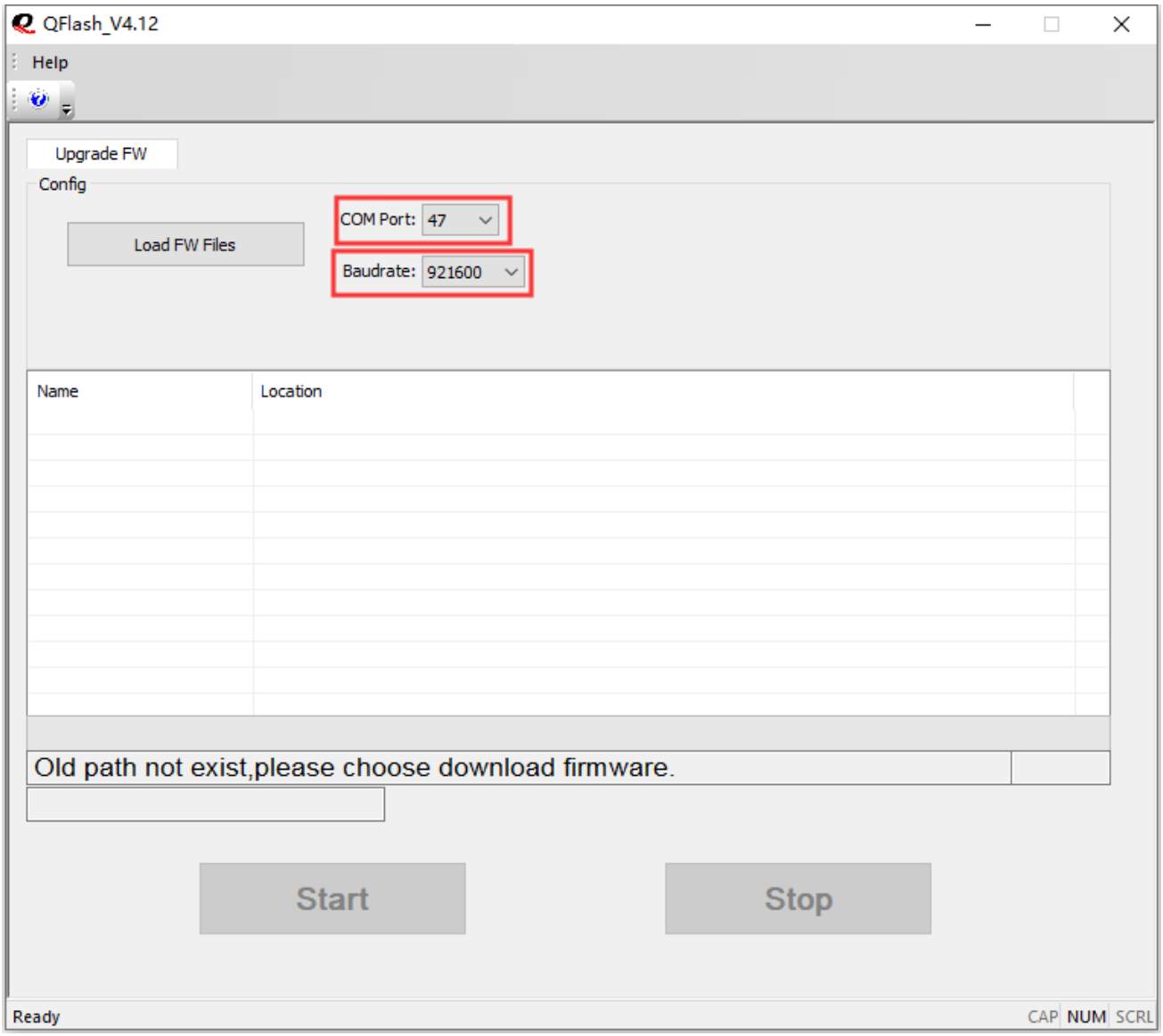

Figure 2: QFlash Configuration

3.2.2. Select and Download Target Firmware

3.2.2.1. Select Target Firmware

Click the "**Load FW Files**" button in QFlash to pop up the firmware selecting window, and select the target firmware file with suffix *.lod* to be downloaded. Then, click "**Open**" to complete target firmware selection, as shown below.

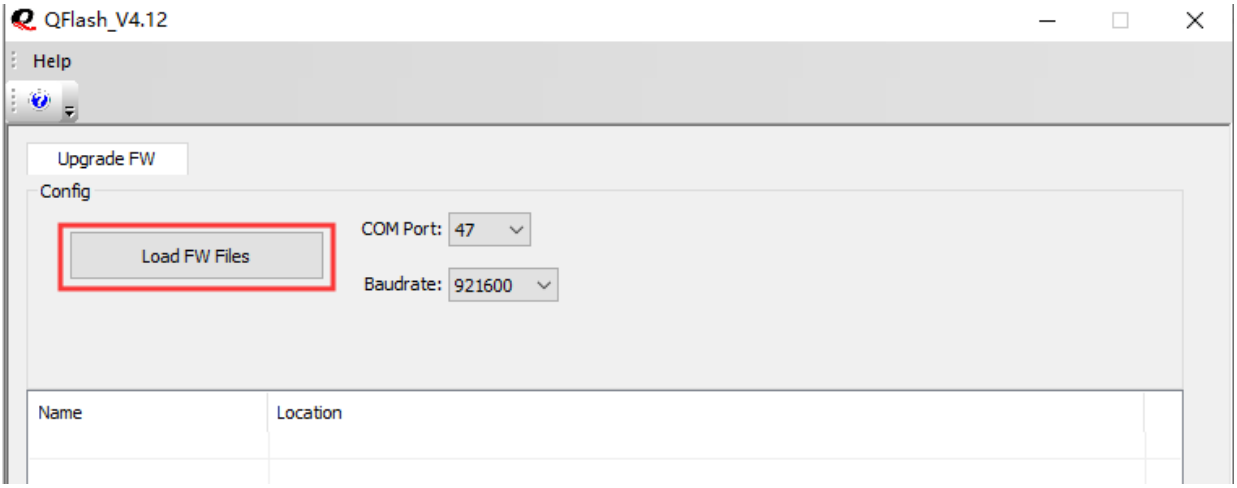

Figure 3: Click "Load FW Files"

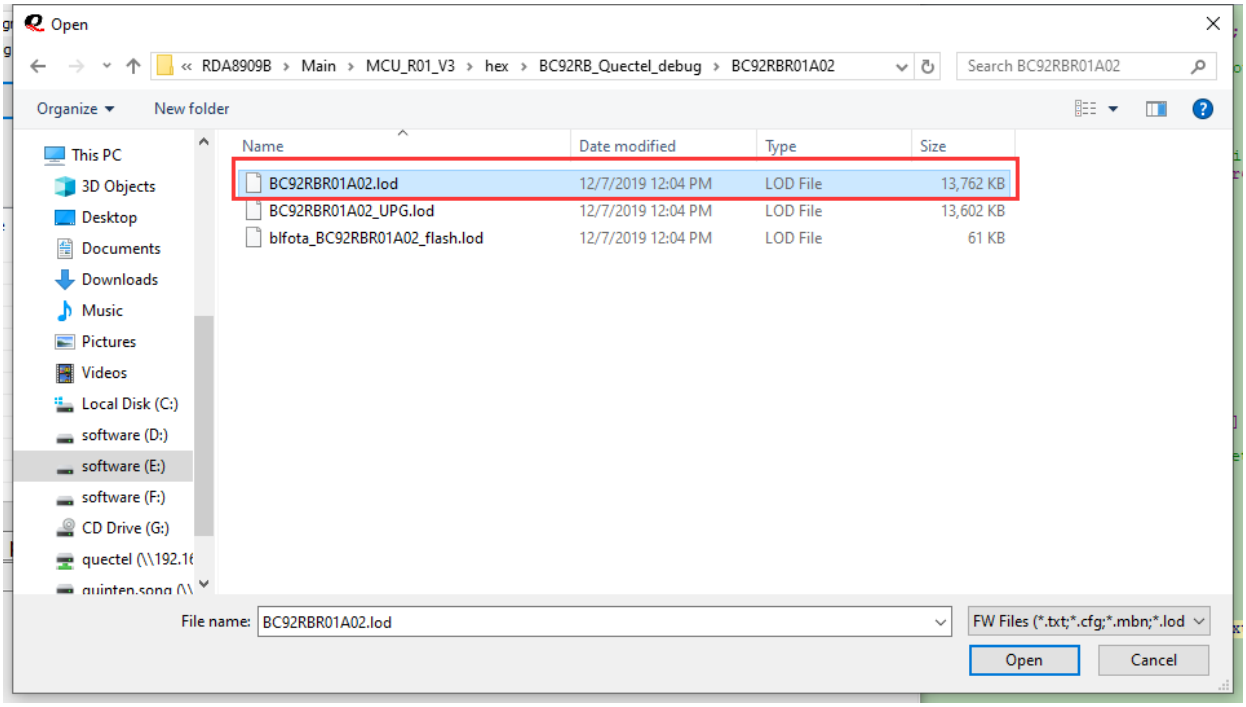

Figure 4: Select Target Firmware

3.2.2.2. Download Target Firmware

After the target firmware is selected and added, click the "**Start**" button to start downloading the firmware to the module, as shown below.

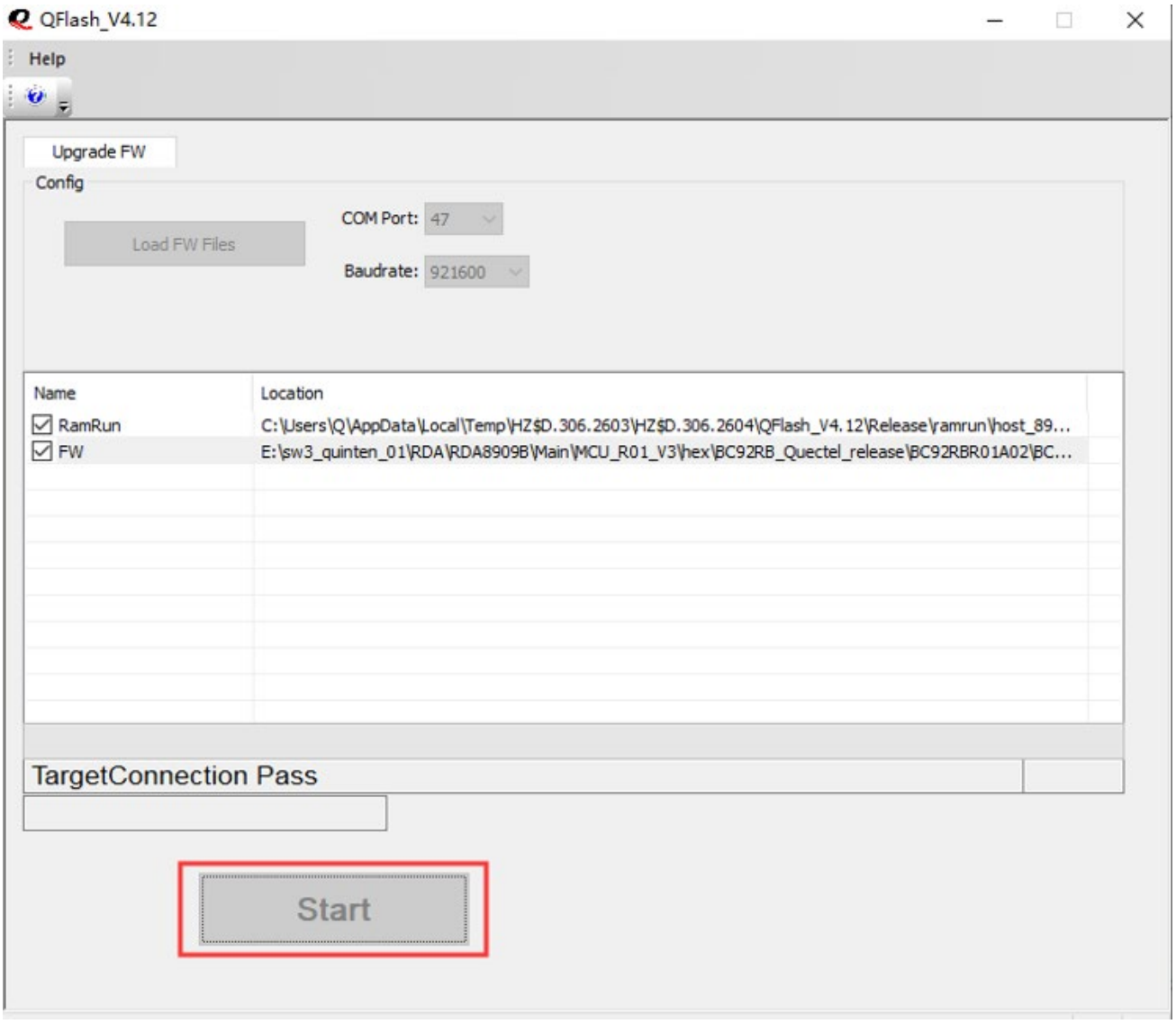

Figure 5: Download Firmware

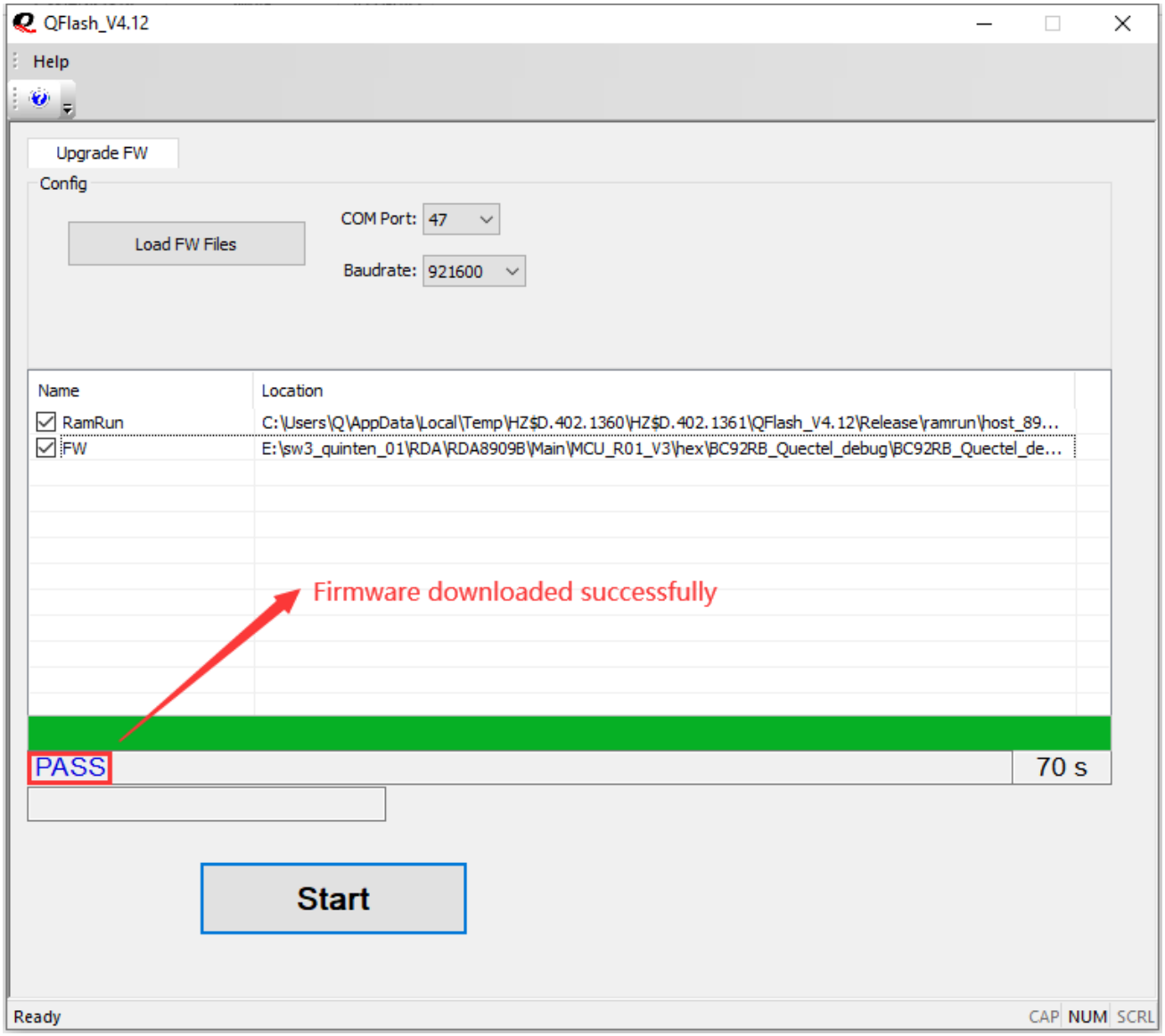

Figure 6: Firmware Downloaded Successfully

When "**PASS**" appears, the firmware is downloaded successfully, as shown in the above figure. At this time, reboot the module and execute **ATI** command to query whether the current version is the downloaded target firmware version.

NOTE

For the detailed instruction about QFlash, please refer to *Quectel_QFlash_User_Guide*.

3.3. Exceptions

If the firmware download fails, please troubleshoot following the aspects listed below:

1. Confirm whether the debug port is correctly selected:

   - Four serial ports will appear for BC92, sorting by serial number. The first is the main UART port and the second is the debug port.
   - Two serial ports will appear for BC65, Ch A is the main AT port and Ch B is the debug port.

2. Confirm whether the baud rate is correctly selected. The baud rate of debug port is 921600bps.

3. If jumper wire outlet is needed for the device, please confirm whether the selected serial port conversion chip supports the baud rate of 921600bps.
4. Check on the path of firmware. The firmware path cannot contain Chinese characters, and the path structure should not be too complicated.
5. It is recommended to reboot the module and execute **AT+QSCLK=0** to turn off deep sleep mode before downloading because the module cannot download firmware in deep sleep mode.

4 Log Capture

This chapter mainly describes how to use CoolWatcher with and without ArmTracer to capture and view the logs. CoolWatcher is used to capture raw log that has not been decoded. ArmTracer is a decoding tool which can decode the log that is captured through CoolWatcher.

4.1. Enable Log Reporting

Generally speaking, the module reports event information without detailed log information, so, please enable log reporting manually before log capturing.

AT command **AT^TRACECTRL** is used to enable/disable log reporting, the command and response are shown as below.

```
AT^TRACECTRL=0          //Disable log reporting.
OK
AT^TRACECTRL=1          //Enable log reporting.
OK
```

NOTE

The above configuration is still valid after rebooting.

4.2. Capture Log through CoolWatcher without ArmTracer

1. Open CoolWatcher, click "**Plugins**" → "**Activate Tracer**" in the menu bar to enter "Set Trace Levels" window, as shown below.

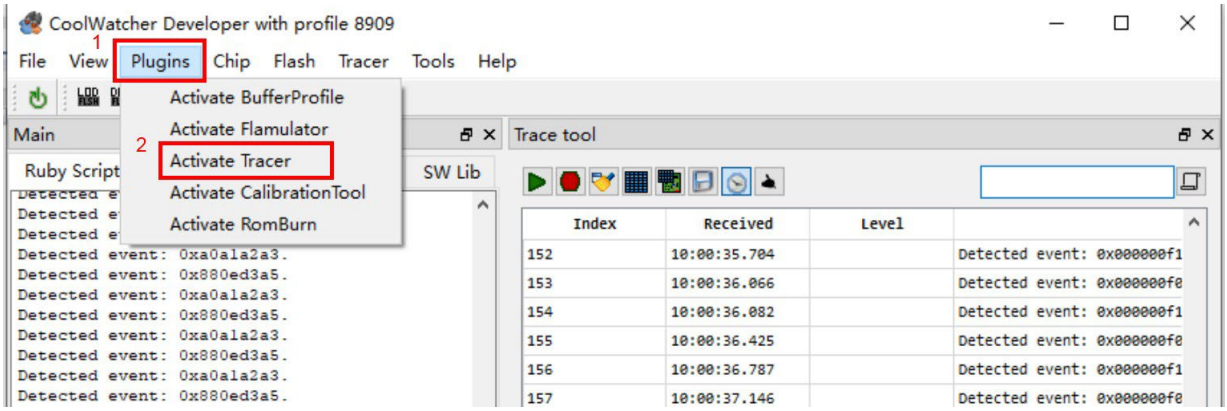

Figure 7: Enter "Set Trace Levels" Window

2. Select "**All**" to enable the output for all log, as shown by the following figure.

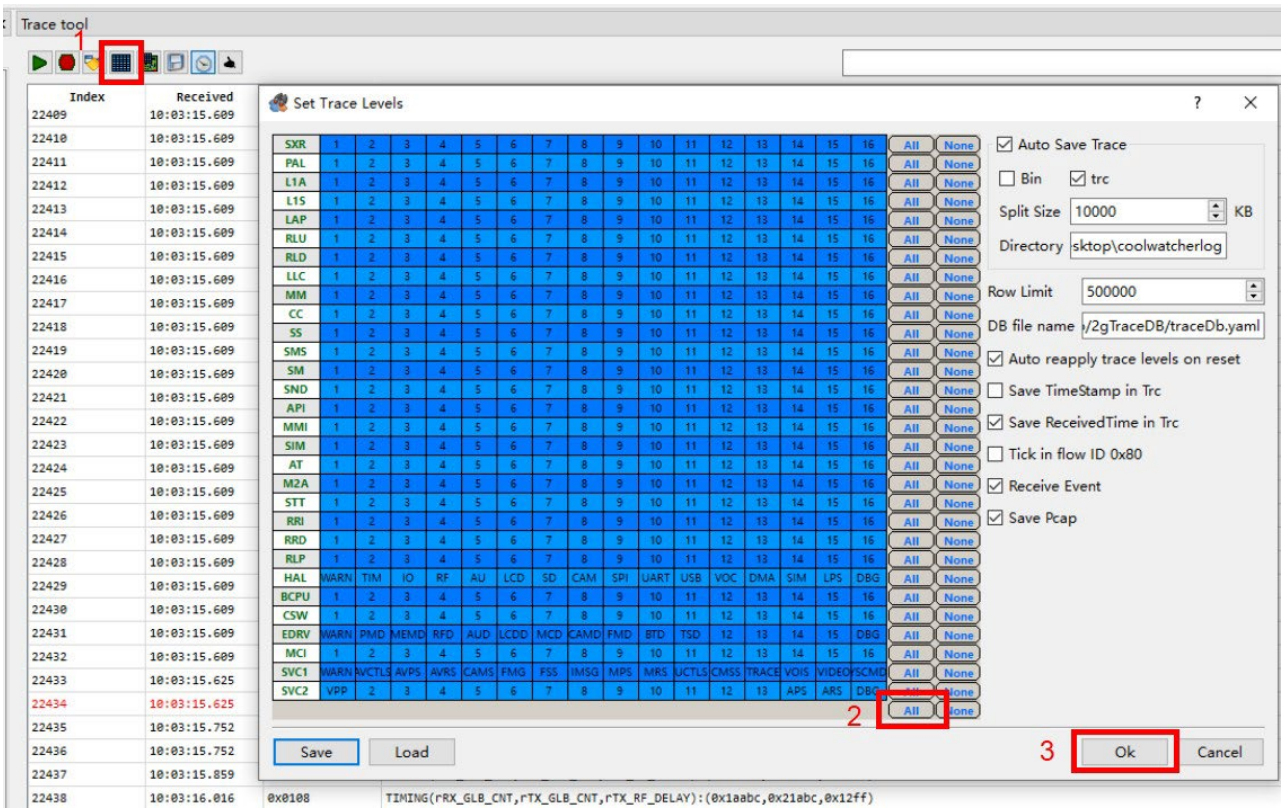

Figure 8: Enable All Log Outputs

3. Click "**Start**" button marked in the figure below to receive log.

   For other operations such as clearing, saving and keyword filtering, please refer to the following figure also.

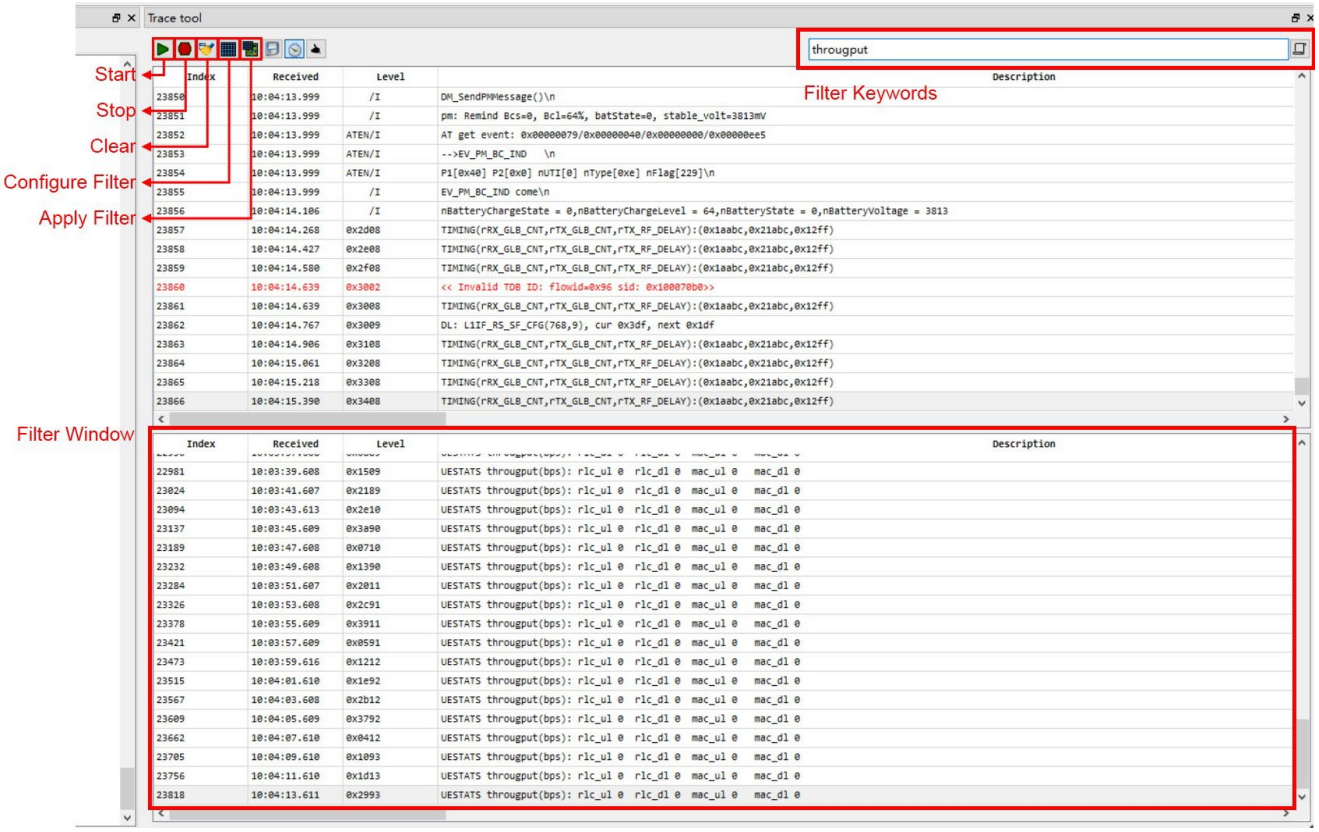

Figure 9: Receive/Clear/Save Log

4. According to the size limitation configured by CoolWatcher, the log will be automatically divided into multiple segments and saved in the folder *logs* under the root directory of the tool.

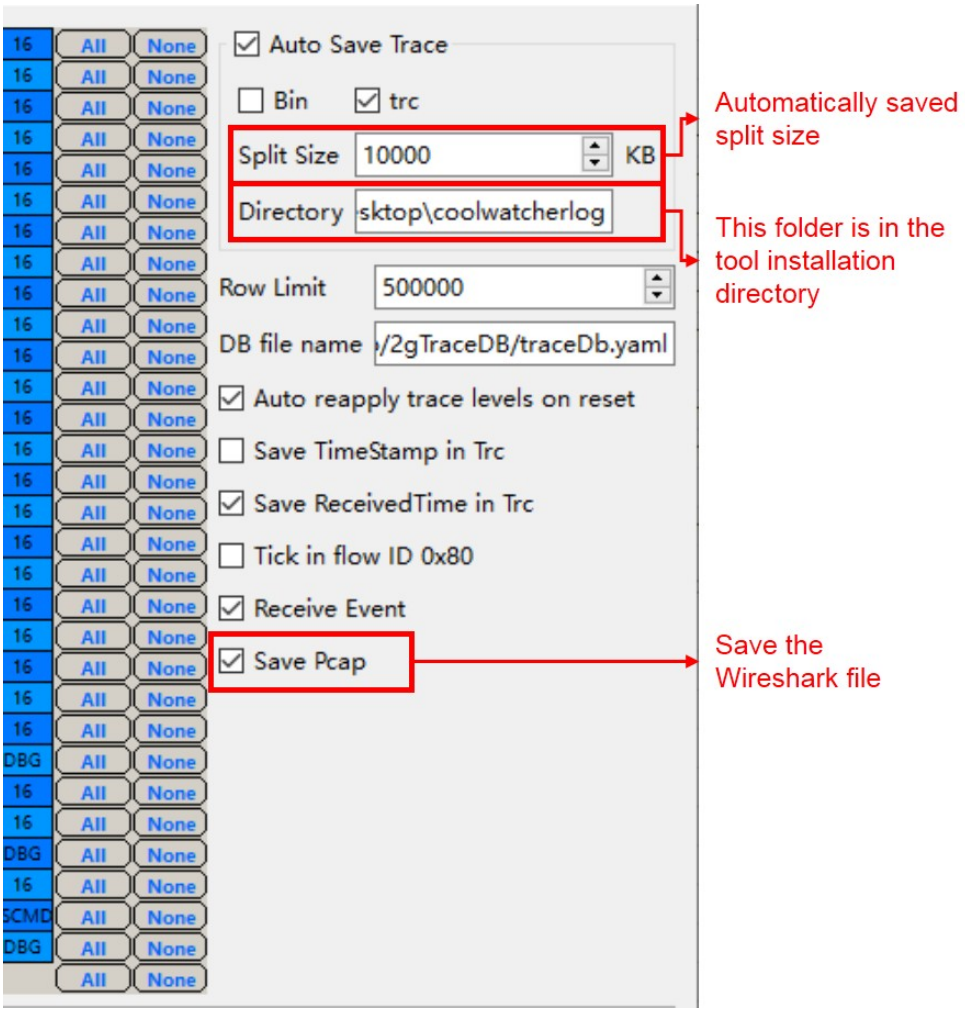

Figure 10: Log Segmentation and Saving

4.3. Capture Log through CoolWatcher with ArmTracer

4.3.1. Brief Introduction on ArmTracer

ArmTracer is a decoding tool which can decode the log that is captured by CoolWatcher. Thus, ArmTracer has to be used together with CoolWatcher. The log captured with ArmTracer is already decoded, so, the configuration information can be viewed just by clicking the log.

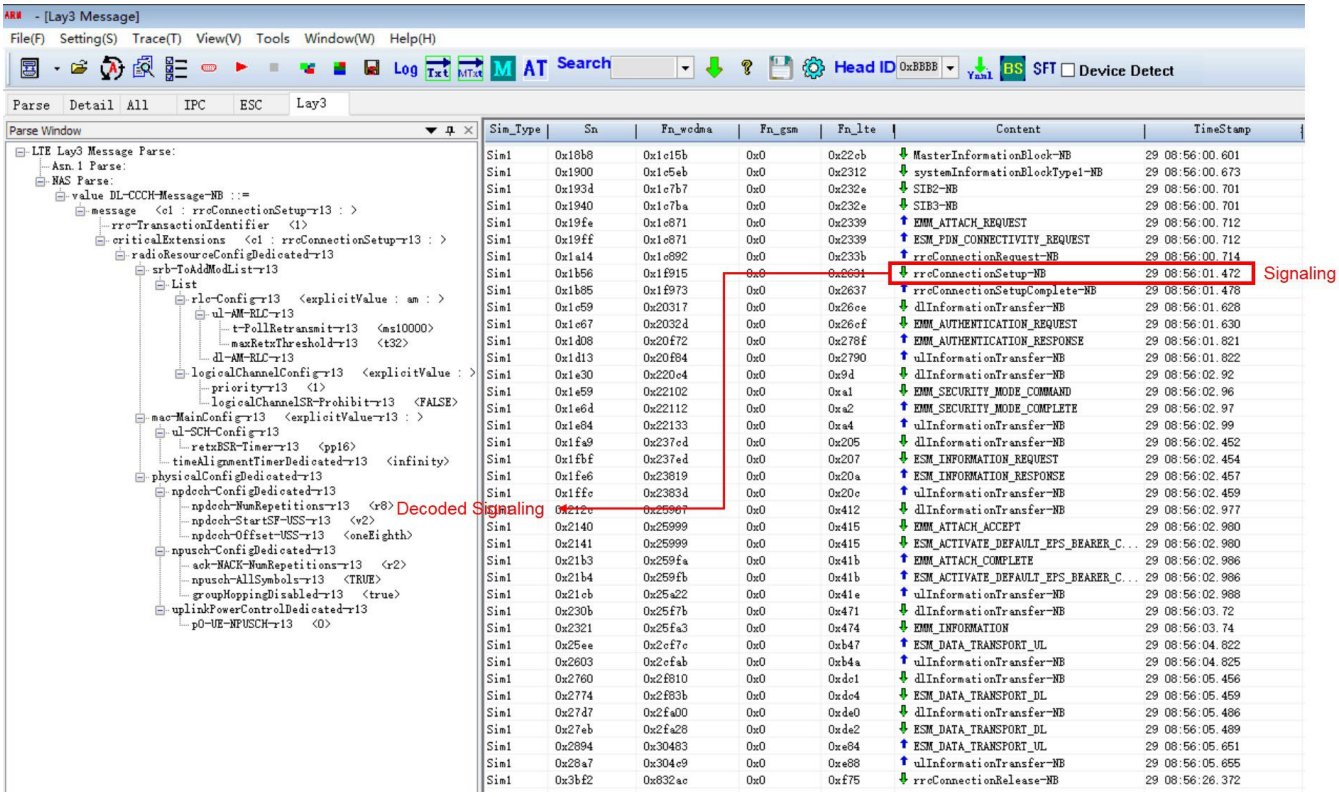

Figure 11: View the Decoded Log Information

4.3.2. Configure ArmTracer

1. After opening and configuring CoolWatcher, keep CoolWatcher opened. Then, run ArmTracer and click the button marked with the red frame in the figure below to select and set "**CoolHost**".

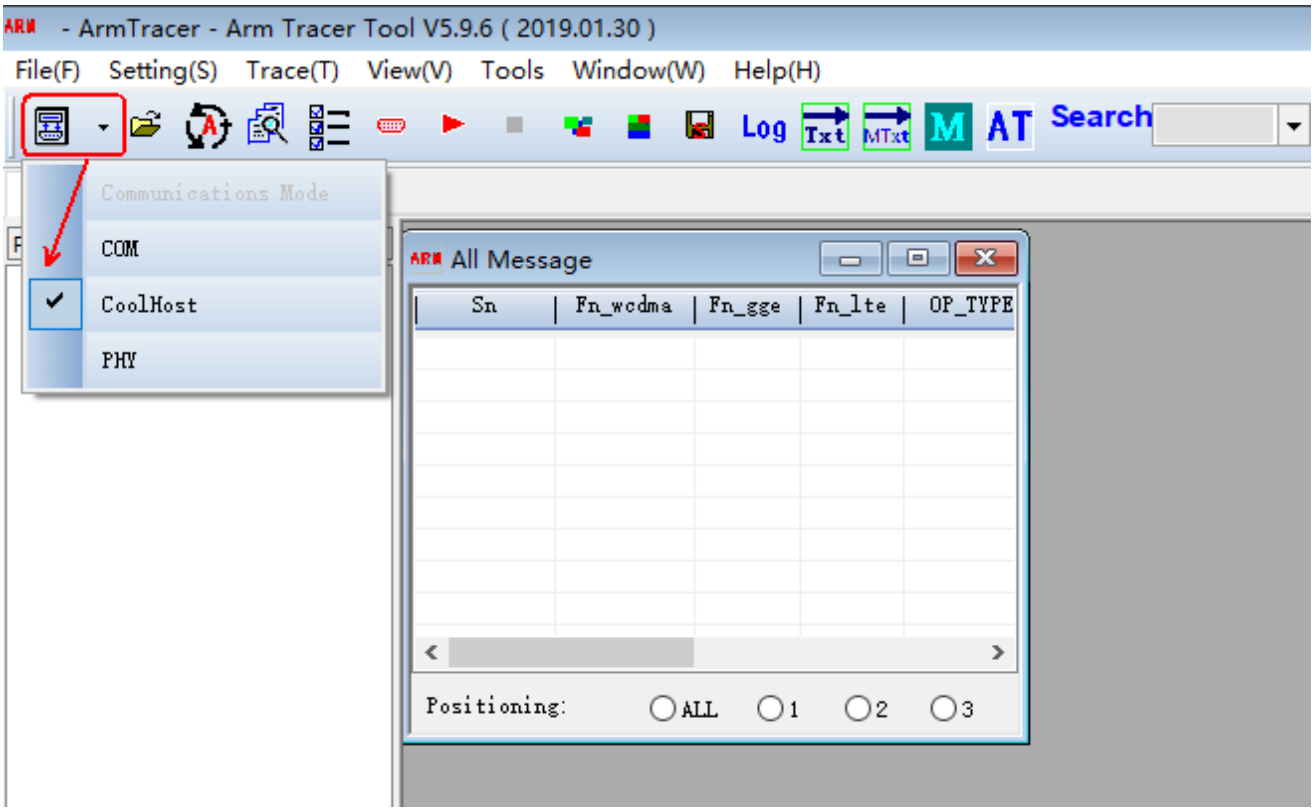

Figure 12: Configure ArmTracer

2. Click the button marked with the red frame in the following figure to pop up the “communications parameters for CoolHost” window and select the corresponding debug port number for "**CoolHost Port**", as shown in the figure below.

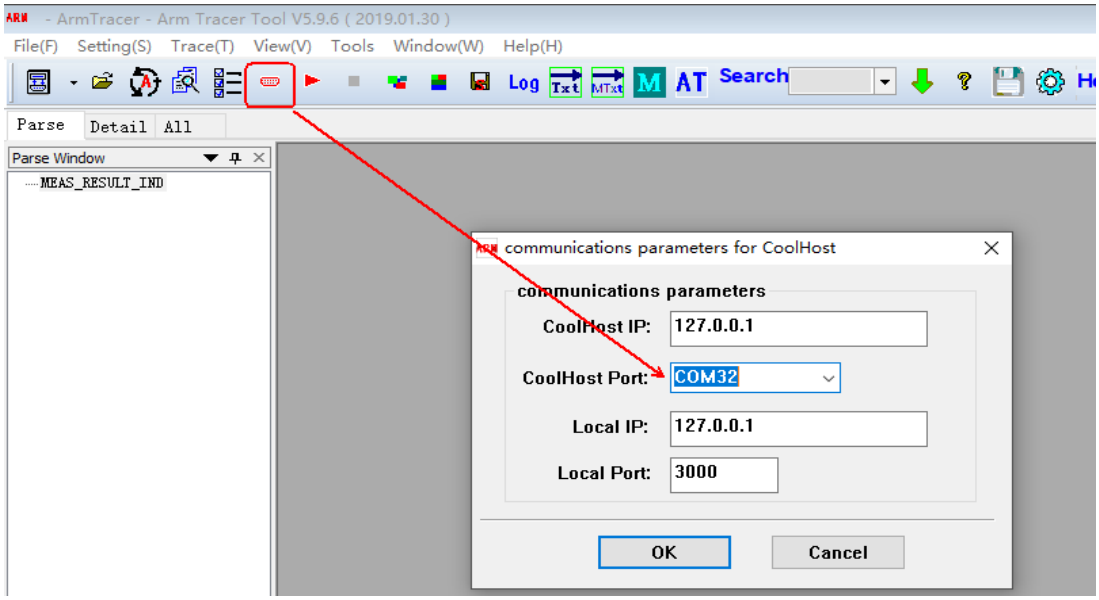

Figure 13: Select Debug Port

3. Click the button marked with red frame in the figure below to pop up the “log setting” window where log storage path can be selected and log file name can be customized. After the setting is finished, click "**OK**" to capture log.

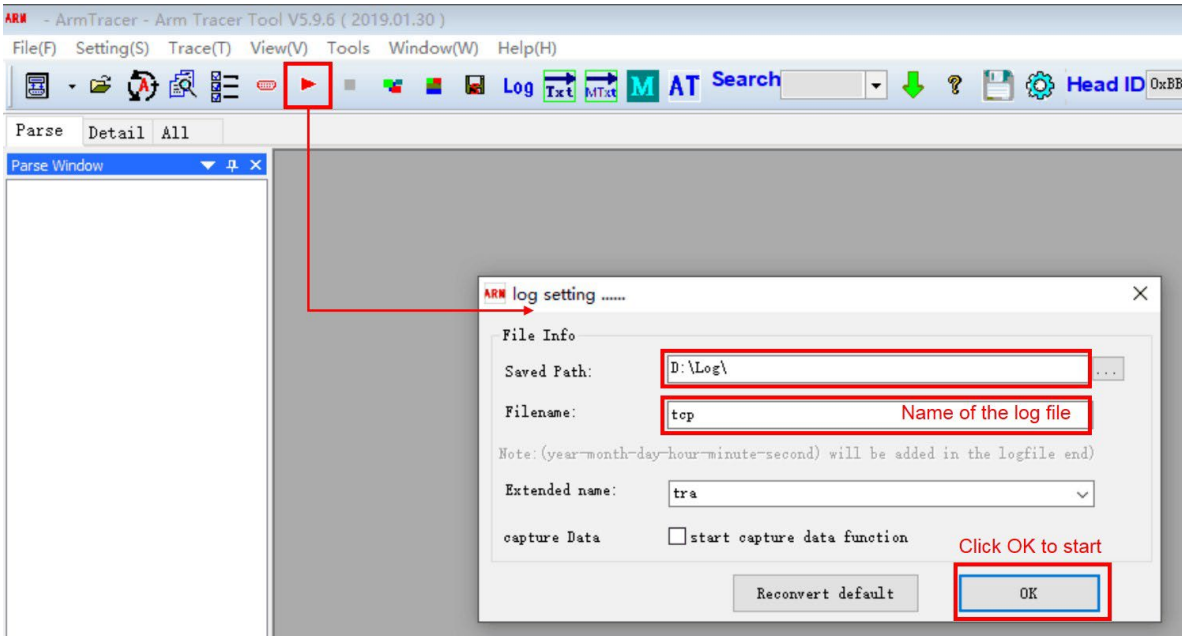

Figure 14: Save the Log with ArmTracer

4.3.3. View Logs

4.3.3.1. View the Log of Network Attaching Test

ArmTracer is mainly used to view the log of the signaling on Layer 3. As shown in the following figure, after the first and second log marked with red frame referring to the system messages (MIB and SIB), the logs reported during network attaching, data transmission and reception can be viewed.

All Message

SimType	Sn	Fn_wcdma	Fn_gge	Fn_lte	OP_TYPE	Content	Time
Sim1	0x1449	0x2bbc5	0x0	0xbe6	LTE_NL3	↓ MasterInformationBlock-NB	27 09:36:38.126
Sim1	0x1464	0x2bdc7	0x0	0xc06	LTE_NL3	↓ systemInformationBlockType1-NB	27 09:36:38.158
Sim1	0x1878	0x34931	0x0	0x1488	LTE_NL3	↓ SIB2-NB	27 09:36:40.336
Sim1	0x187a	0x34933	0x0	0x1488	LTE_NL3	↓ SIB3-NB	27 09:36:40.336
Sim1	0x187c	0x34934	0x0	0x1488	LTE_NL3	↓ SIB5-NB	27 09:36:40.336
Sim1	0x1916	0x34a14	0x0	0x1496	LTE_NL3	↑ EMM_ATTACH_REQUEST	27 09:36:40.350
Sim1	0x1917	0x34a14	0x0	0x1496	LTE_NL3	↑ ESM_PDN_CONNECTIVITY_REQUEST	27 09:36:40.350
Sim1	0x192c	0x34a41	0x0	0x1499	LTE_NL3	↑ rrcConnectionRequest-NB	27 09:36:40.353
Sim1	0x1a44	0x36e9d	0x0	0x16d1	LTE_NL3	↓ rrcConnectionSetup-NB	27 09:36:40.921
Sim1	0x1a6e	0x36ef8	0x0	0x16d6	LTE_NL3	↑ rrcConnectionSetupComplete-NB	27 09:36:40.926
Sim1	0x1b4f	0x37bea	0x0	0x17a1	LTE_NL3	↓ dlInformationTransfer-NB	27 09:36:41.128
Sim1	0x1b5d	0x37c03	0x0	0x17a2	LTE_NL3	↓ EMM_AUTHENTICATION_REQUEST	27 09:36:41.130
Sim1	0x1c4e	0x3943d	0x0	0x191d	LTE_NL3	↑ EMM_AUTHENTICATION_RESPONSE	27 09:36:41.509
Sim1	0x1c58	0x39450	0x0	0x191e	LTE_NL3	↑ ulInformationTransfer-NB	27 09:36:41.510
Sim1	0x1db8	0x3c2a3	0x0	0x1bf2	LTE_NL3	↓ dlInformationTransfer-NB	27 09:36:42.233
Sim1	0x1ddc	0x3c2dc	0x0	0x1bf5	LTE_NL3	↓ EMM_SECURITY_MODE_COMMAND	27 09:36:42.237
Sim1	0x1df1	0x3c2f5	0x0	0x1bf7	LTE_NL3	↑ EMM_SECURITY_MODE_COMPLETE	27 09:36:42.238
Sim1	0x1e08	0x3c31a	0x0	0x1bf9	LTE_NL3	↑ ulInformationTransfer-NB	27 09:36:42.241
Sim1	0x1ef0	0x3c9e5	0x0	0x1c63	LTE_NL3	↓ dlInformationTransfer-NB	27 09:36:42.347
Sim1	0x1f06	0x3ca0b	0x0	0x1c65	LTE_NL3	↓ ESM_INFORMATION_REQUEST	27 09:36:42.349
Sim1	0x1f2c	0x3ca38	0x0	0x1c68	LTE_NL3	↑ ESM_INFORMATION_RESPONSE	27 09:36:42.352
Sim1	0x1f43	0x3ca67	0x0	0x1c6b	LTE_NL3	↑ ulInformationTransfer-NB	27 09:36:42.355
Sim1	0x22b5	0x44b43	0x0	0x2448	LTE_NL3	↓ dlInformationTransfer-NB	27 09:36:44.368
Sim1	0x22ca	0x44b88	0x0	0x244d	LTE_NL3	↓ EMM_ATTACH_ACCEPT	27 09:36:44.372
Sim1	0x22cb	0x44b88	0x0	0x244d	LTE_NL3	↓ ESM_ACTIVATE_DEFAULT_EPS_BE...	27 09:36:44.372
Sim1	0x2339	0x44bf5	0x0	0x2453	LTE_NL3	↑ EMM_ATTACH_COMPLETE	27 09:36:44.379
Sim1	0x233a	0x44bf5	0x0	0x2453	LTE_NL3	↑ ESM_ACTIVATE_DEFAULT_EPS_BE...	27 09:36:44.379
Sim1	0x2353	0x44c21	0x0	0x2456	LTE_NL3	↑ ulInformationTransfer-NB	27 09:36:44.382
Sim1	0x2523	0x451d9	0x0	0x24af	LTE_NL3	↓ dlInformationTransfer-NB	27 09:36:44.471
Sim1	0x2539	0x45200	0x0	0x24b2	LTE_NL3	↓ EMM_INFORMATION	27 09:36:44.474
Sim1	0x3ad4	0x9efd5	0x0	0x474	LTE_NL3	↓ rrcConnectionRelease-NB	27 09:37:06.940
Sim1	0x3cee	0xa3157	0x0	0x873	LTE_NL3	↓ MasterInformationBlock-NB	27 09:37:07.963
Sim1	0x90a9	0x21a8a3	0x0	0x5e2	LTE_NL3	↓ MasterInformationBlock-NB	27 09:38:41.827
Sim1	0x90e6	0x21b3aa	0x0	0x68e	LTE_NL3	↓ systemInformationBlockType1-NB	27 09:38:42.0
Sim1	0x94b1	0x229608	0x0	0x145f	LTE_NL3	↓ SIB2-NB	27 09:38:45.537
Sim1	0x94b3	0x22960a	0x0	0x145f	LTE_NL3	↓ SIB3-NB	27 09:38:45.537
Sim1	0x19324	0x81fa22	0x0	0x1edb	LTE_NL3	↑ EMM_DETACH_REQUEST_UL	27 09:45:07.101
Sim1	0x1933c	0x81fa53	0x0	0x1ede	LTE_NL3	↑ rrcConnectionRequest-NB	27 09:45:07.104
Sim1	0x19461	0x82196b	0x0	0x20c4	LTE_NL3	↓ rrcConnectionSetup-NB	27 09:45:07.589
Sim1	0x1948b	0x8219c6	0x0	0x20c9	LTE_NL3	↑ rrcConnectionSetupComplete-NB	27 09:45:07.595
Sim1	0x195cd	0x827c96	0x0	0x26d1	LTE_NL3	↓ rrcConnectionRelease-NB	27 09:45:09.139

Initiate a network attach request

RRC establishes a connection

Authentication

Encryption

Network attached successfully

RRC connection release without data transmission and reception

Figure 15: View the Log with ArmTracer

4.4. Exceptions

4.4.1. Capture Log When the Module is Rebooted

When the module is rebooted, please follow the steps below to capture logs:

1. Execute **AT^FORCENOWDT=1** command to debug.

NOTE

The above configuration is invalid after rebooting.

2. If the information exhibited in the following figure appears in ArmTracer, the module has been rebooted. At this time, input **elfdump "xxx.elf"** in QCOM to export the dump information. Several progress bars will appear on the right side of "**Command**" in turn. The dump information will be exported successfully until all the process bars are finished.

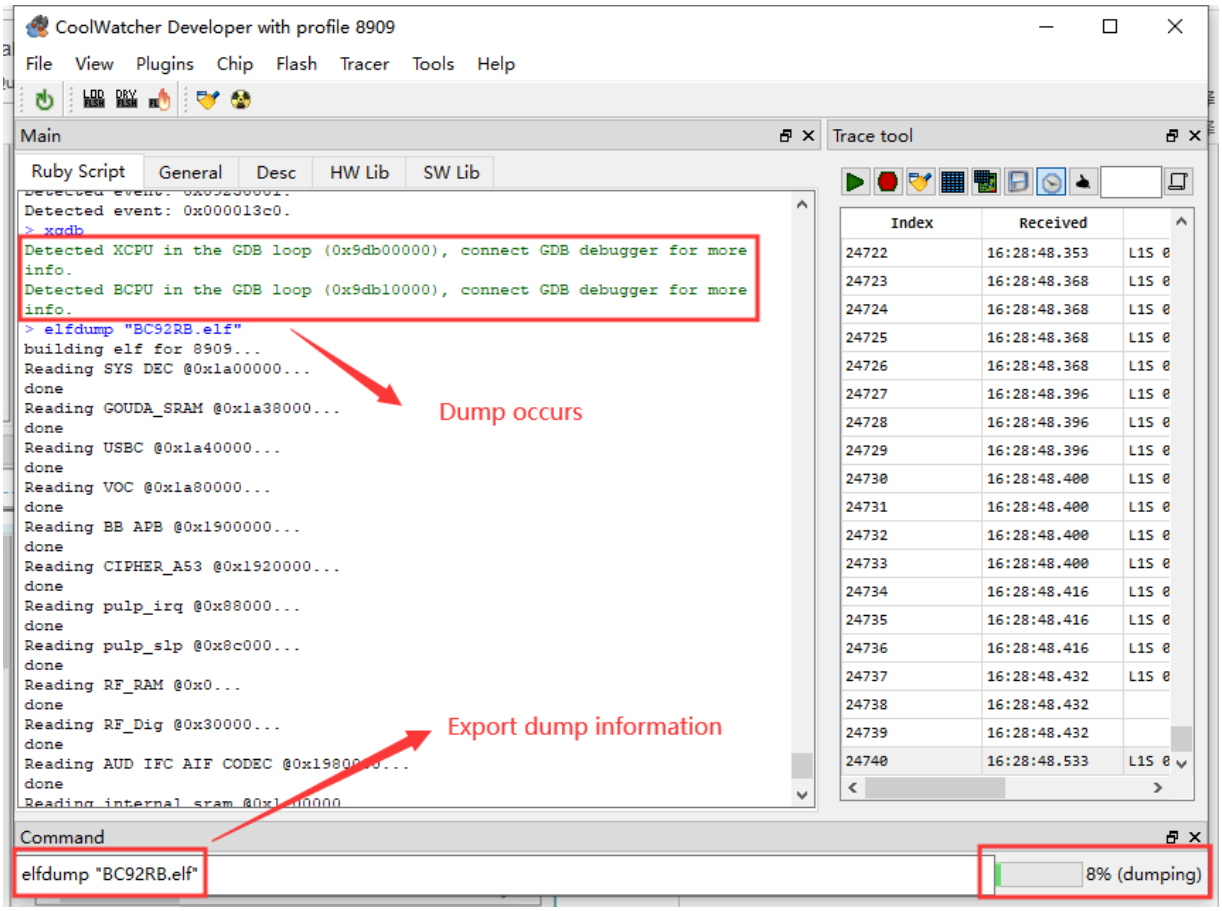

Figure 16: Export Dump Information When the Module is Rebooted

NOTE

In the command **elfdump "xxx.elf"**, **xxx** refers to the file name which is customizable by users. For instance, **elfdump "BC92RB.elf"** in the above figure.

3. The following figure exhibits the response when the dump is exported successfully. The file with dump information will be saved in the root directory of CoolWatcher. Users can sort the files in root directory according to modification date and copy all latest files to another folder for later analysis.

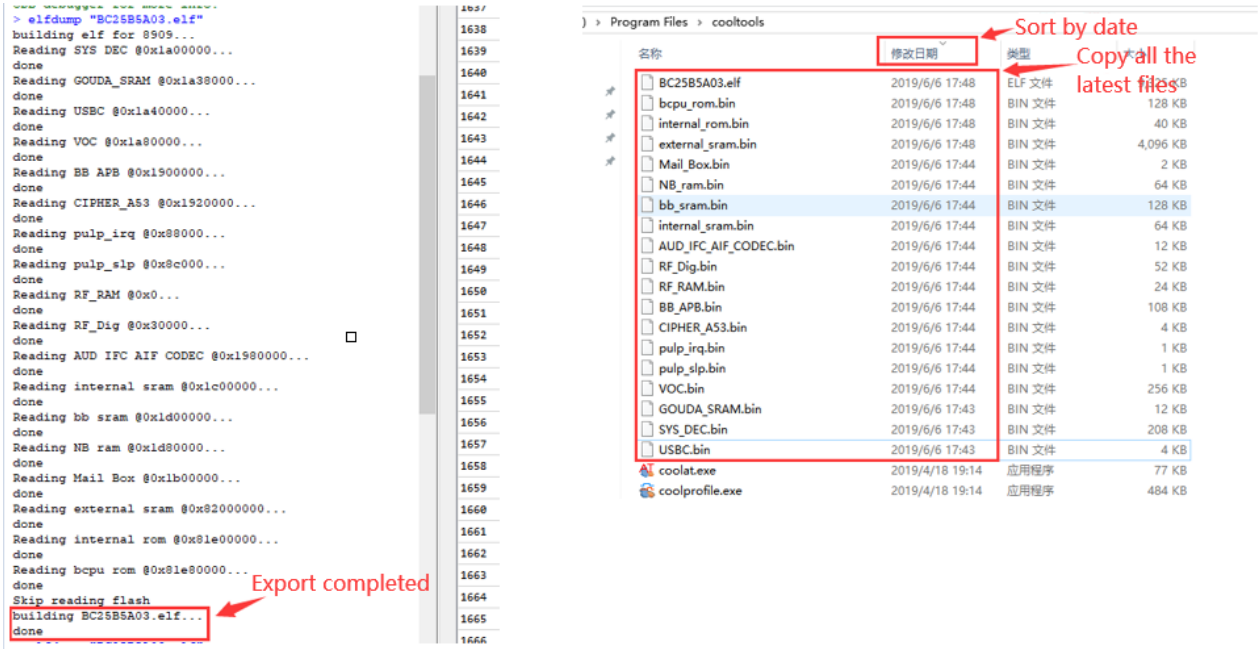

Figure 17: Dump Information Exporting Successfully

4. Then, the Heap Report file needs to be exported synchronously to assist the analysis of problems. The specific exporting steps are illustrated by the following figures.

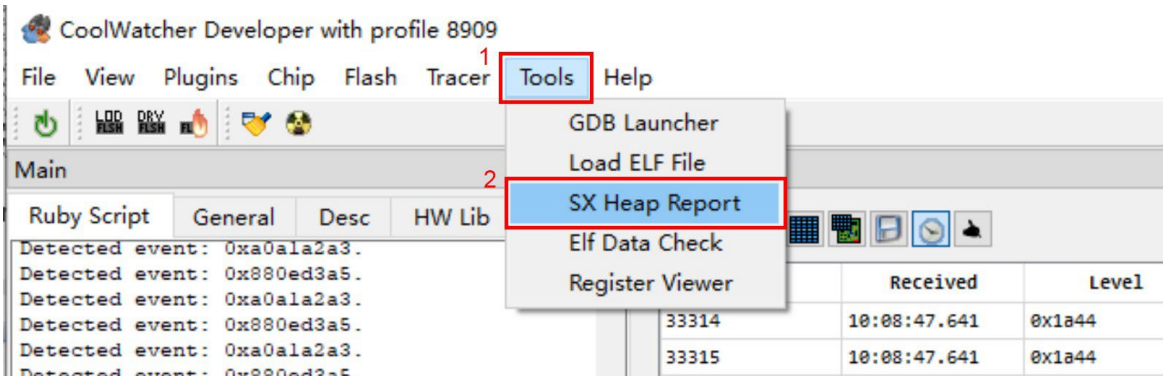

Figure 18: Export Heap Report Files (Step 1)

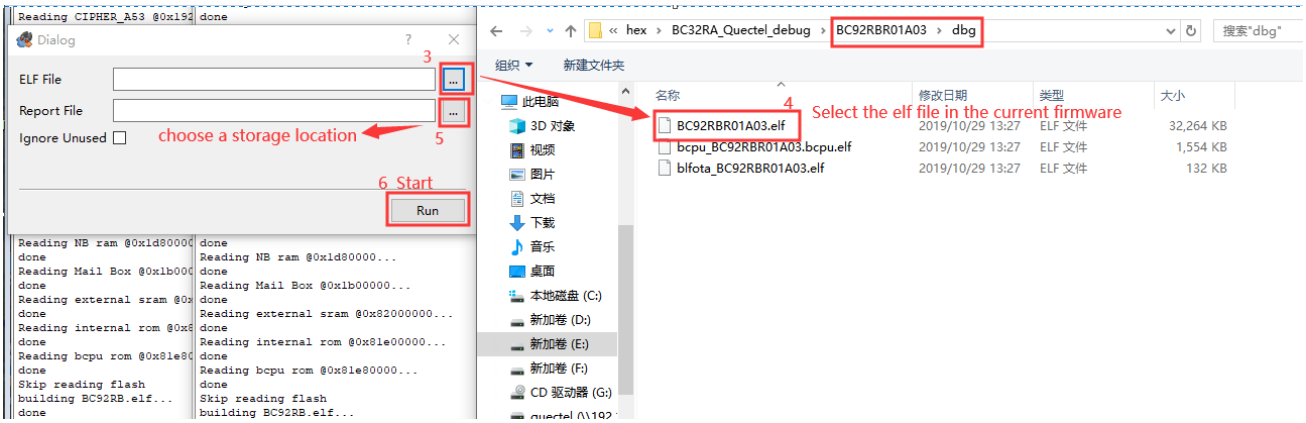

Figure 19: Export Heap Report Files (Step 2)

5 Appendix A References

Table 1: Related Documents

SN	Document Name	Remark
[1]	Quectel_QFlash_User_Guide	The user guide for QFlash

Table 2: Terms and Abbreviations

Abbreviation	Description
MIB	Management Information Base
PC	Personal Computer
SIB	Service Implementation Bean
USB	Universal Serial Bus