

EC2x&EG9x&EG2x-G Series

Software Configuration for AT&T 3G Sunset Guide

LTE Standard Module Series

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About the Document

Revision History

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-	2021-04-09	Jarvis FENG	Creation of the document
1.0	2021-04-21	Jarvis FENG	First official release
1.1	2021-06-25	Jarvis FENG	<ol style="list-style-type: none">1. Optimized the software configuration solutions (Chapter 3).2. Added FAQs (Chapter 4).

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1 Introduction

AT&T will have its 3G network sunset on February 22nd, 2022 and has informed Quectel. Since Quectel's LTE Standard EC2x series, EG9x series, EG2x-G modules have the Ue_Usage_Setting, which basically tells the network what's more important for that UE (voice or data) configured as Voice Centric, if the user device does not support VoLTE after AT&T's 3G sunset, the network service of the device will be shut down by then. Therefore, AT&T requires Quectel and its customers to modify Ue_Usage_Setting from Voice Centric to Data Centric when performing AT&T certification and actual network use.

This document introduces the software configuration and FAQs of modifying Ue_Usage_Setting of the above-mentioned applicable modules to Data Centric to meet the requirements of the AT&T 3G network sunset solution.

1.1. Applicable Modules

Table 1: Applicable Modules

Module Series	Module
EC2x	EC21 Series
	EC25 Series
EG9x	EG91 Series
	EG95 Series
EG2x-G	EG21-G
	EG25-G

2 Background and Technology

This chapter mainly introduces the related background and technology of AT&T 3G network sunset.

2.1. Background

AT&T will have its 3G network sunset on February 22nd, 2022, and the figure below shows the solution required by AT&T for 3G network sunset.

<p><CDR-IOT-180></p> <p>Data Only module and device configuration</p> <p>Summary: Cat 1 and above Data Only (DO) modules and devices shall operate in CS/PS mode 2 (3GPP TS 24.301, section 4.3.1) and perform combined EPS/IMSI Attach & TAU with the Additional Update Type set to “SMS only” (3GPP TS 24.301, section 9.9.3.0B). Per 3GPP TS 24.301, sections 8.2.4.13 and 8.2.29.19, UE Usage and Voice Domain Reference Information Elements (IEs) are omitted for a data-only product.</p>
<p><CDR-IOT-190></p> <p>Data + Voice module and device UE Usage and Voice Domain Preference Setting</p> <p>Summary: Cat 1 and above Data + Voice modules and devices shall operate in CS/PS mode 2 (3GPP TS 24.301, section 4.3.1) and perform combined EPS/IMSI Attach & TAU with UE’s Usage Setting of “Data centric”. Voice Domain Preference for E-UTRAN shall be set to either “IMS PS Voice preferred, CS Voice as secondary” or “IMS PS Voice Only” depending on the support of CS voice in the product. Modules and devices set to “IMS PS Voice only” shall also include the Additional Update Type set to “SMS only” (3GPP TS 24.301, section 9.9.3.0B).</p>

Figure 1: Solution Required by AT&T for 3G Network Sunset

2.2. Technology

2.2.1. Voice Centric

If Ue_Usage_Setting is Voice Centric, the device must support voice in the current RAT. The following are three scenarios where the device camps on the RAT.

1. When the device registers on LTE, the network responds with a registration message of EPS/IMSI joint registration, and supports CS service (2G and 3G networks), then the device can camp on the RAT.
2. When the device register on LTE, the network responds with a registration message of EPS/IMSI joint registration, and does not support CS service (2G or 3G networks), then the device will check whether to obtain VoLTE service:
 - If yes, the device can still camp on the RAT, and supports both data and VoLTE services;
 - If not, the device will restrict the current RAT, and search supported RATs like 2G and 3G to get VoLTE service. If the network does not support 2G/3G, the device is out of service (No data or VoLTE service).
3. When the device registers on LTE, the network responds with a registration message of EPS only, then the device will check whether to obtain VoLTE service:
 - If yes, the device can still camp on the RAT;
 - If not, the device will restrict the current RAT, and search supported RATs like 2G and 3G to get VoLTE service. If the network does not support 2G/3G, the device is out of service (No data or VoLTE service).

2.2.2. Data Centric

If Ue_Usage_Setting is Data Centric, the device must support data in the current RAT. The following are three scenarios where the device camps on the RAT.

1. When the device registers on LTE, the network responds with a registration message of EPS/IMSI joint registration, and supports CS service (2G and 3G networks), then the device can camp on the RAT. And the device supports both voice and VoLTE services.
2. When the device register on LTE, the network responds with a registration message of EPS/IMSI joint registration, and does not support CS service (2G or 3G networks), then the device will check whether to obtain VoLTE service:
 - If yes, the device can still camp on the RAT, and supports both data and VoLTE services;
 - If not, the device can still camp on the RAT, and only support data service.
3. When the device registers on LTE, the network responds with a registration message of EPS only, then the device will check whether to obtain VoLTE service:

- If yes, the device can still camp on the RAT, and supports both data and VoLTE services;
- If not, the device can still camp on the RAT, and only support data service.

3 Software Configuration

This chapter will introduce the process of configuring Ue_Usage_Setting of the terminal device as Data Centric required by AT&T based on the terminal device type and application scenarios..

3.1. Data-only Terminal Device

If the terminal device is Data-only and does not require voice services (voice services include CS voice under 2G/3G and VoLTE under LTE), you can modify the module Ue_Usage_Setting to Data Centric on the MCU according to the flow chart below (without confirming operator and roaming information).

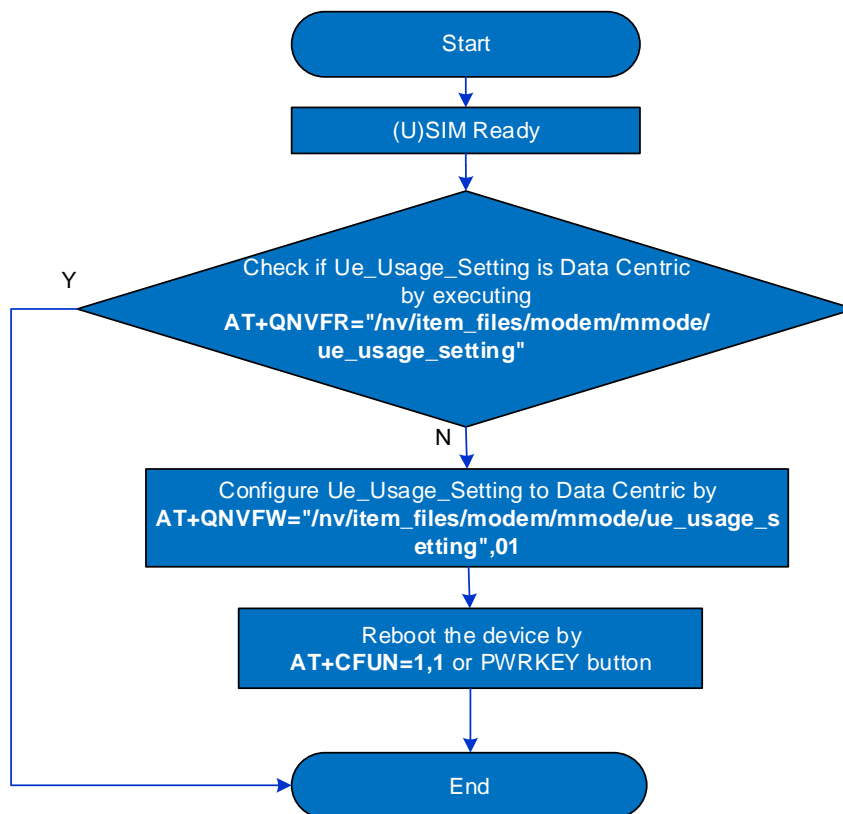


Figure 2: Software Configuration Flow Chart of Data-only Device

Check whether Ue_Usage_Setting is configured as Data Centric required by AT&T. If not, execute **AT+QNVFW="/nv/item_files/modem/mmode/ue_usage_setting",01** to configure Ue_Usage_Setting to Data Centric.

```

AT+QNVFR="/nv/item_files/modem/mmode/ue_usage_setting" //Query current configuration.
+QNVFR: 01 //01 stands for Data Centric and 00 stands for voice centric.

OK
AT+QNVFW="/nv/item_files/modem/mmode/ue_usage_setting",01 //Configure Ue_Usage_Setting
as Data Centric.

OK
    
```

For detailed information about the above AT commands, please contact Quectel Technical Supports (support@quectel.com).

3.2. Data + Voice Terminal Device Without Roaming

For the terminal device supports both voice and data services without roaming, and voice services (includes CS voice under 2G/3G and VoLTE under LTE) are required (for example, if a Telus (U) SIM card is inserted, the device will only be used under the Telus network; if an AT&T (U) SIM card is inserted, the device will only be used under the AT&T network, and so on) you can modify the module Ue_Usage_Setting to Data Centric on the MCU according to the flow chart below (by confirming the operator information only).

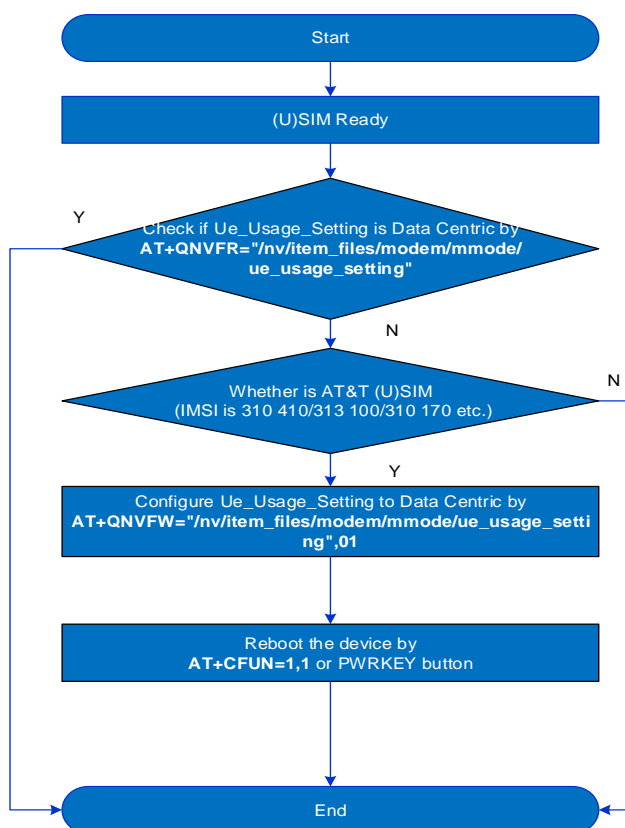


Figure 3: Software Configuration Flow Chart for Data + Voice Device Without Roaming Service

Check whether Ue_Usage_Setting is configured as Data Centric required by AT&T. If not, execute **AT+QNVFW="/nv/item_files/modem/mmode/ue_usage_setting",01** to configure it to Data Centric.

```

AT+QNVFR="/nv/item_files/modem/mmode/ue_usage_setting" //Query current configuration.
+QNVFR: 01 //01 stands for Data Centric and 00 stands for voice centric.

OK
AT+QNVFW="/nv/item_files/modem/mmode/ue_usage_setting",01 //Configure Ue_Usage_Setting
as Data Centric.

OK
    
```

By executing **AT+CIMI**, the first six digits of the returned IMSI value (such as 310410 /313100/310170/310150 etc.) can be used to determine whether the operator of the current (U)SIM card is AT&T or FirstNet. For details on how to confirm the operator by IMSI, See **Chapter 4.1**.

You can also execute **AT+QMBNCFG="List"** to query whether AT&T is included in the currently activated MBN. See an example as follows:

```

AT+QMBNCFG="List" //Query current MBN information.
+QMBNCFG:"List",0,0,0,"ROW_Generic_3GPP",0x0501081F,201901141
+QMBNCFG: "List",1,1,1,"VoLTE-ATT",0x0501033C,201909271 //AT&T is activated.

OK
    
```

NOTE

1. For detailed information about **AT+CIMI**, see *document [1]*.
2. For more information about **AT+QMBNCFG="List"**, see *document [2]*.

3.3. Data + Voice Terminal Device with Roaming

For the terminal device supports both voice and data services, and voice service is required (voice services include CS voice under 2G/3G and VoLTE under LTE), and a SIM card of another operator (such as Telus) inserted into the device or a virtual operator roams to AT&T, you can modify the module to Data Centric on the MCU according to the flow chart below (after confirming the operator and roaming information):

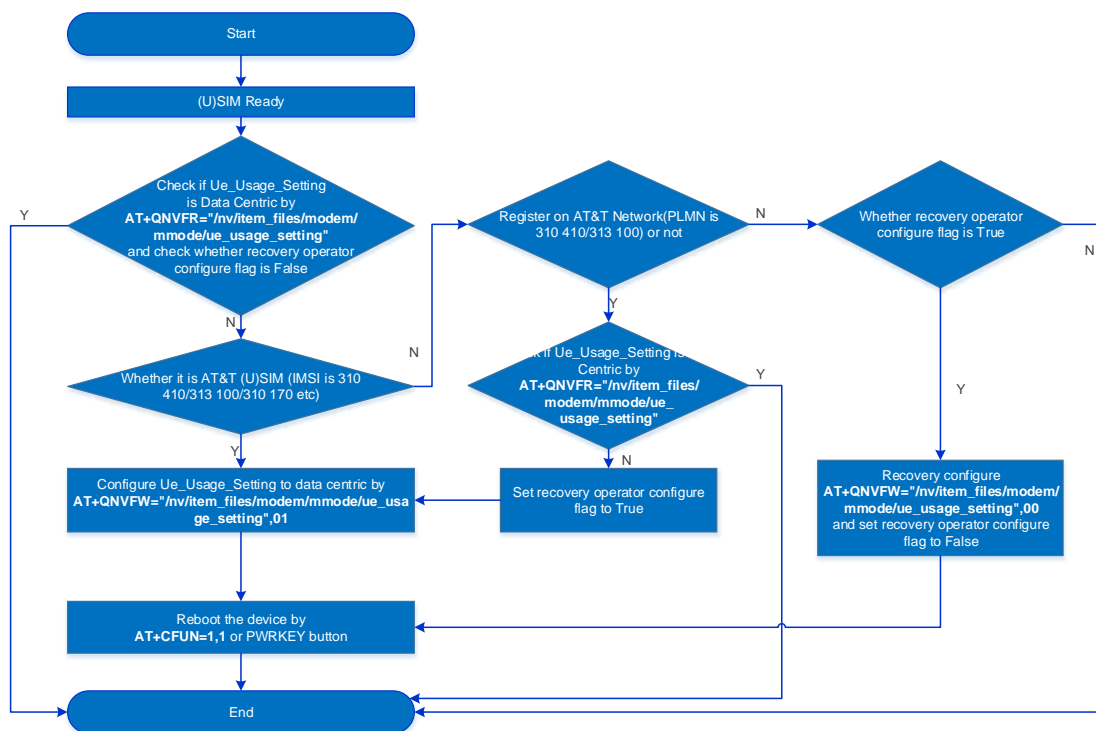


Figure 4: Software Configuration Flow Chart for Data + Voice Device with Roaming Service

Execute the relevant commands in sequence according to **Chapter 3.2**.

Execute **AT+COPS?** to query all current network operator information, check whether the module has registered to AT&T, and to confirm whether the PLMN information is 310410/313100.

NOTE

1. For detailed information about **AT+COPS?**, see **document [1]**.
2. This solution is not applicable to the case of switching (U)SIM cards between different operators in roaming scenarios. Since it is difficult for the MCU to obtain the (U)SIM switching state and refresh MBN, it is not recommended to implement this solution in the MCU.

4 FAQs

4.1. Unable to Identify IMSI of (U)SIM Card

The IMSI list of AT&T, FirstNet and Cricket (U)SIM cards is shown in the following table. When any IMSI in the list is encountered, Ue_Usage_Setting of the terminal device needs to be configured as the Data Centric required by AT&T.

Table 2: IMSI List

SIM Card	IMSI
AT&T	310 030
	310 170
	310 280
	310 410
	310 560
	311 180
	310 950
FirstNet	313 100
	312 670
	313 130
Cricket	313 140
	310 150

4.2. Recommendations for Terminal Device in Different States

4.2.1. For Device in Field

For devices in field, it is recommended for virtual operator users to directly follow **Chapter 3.1** without distinguishing whether the device is Data-only (for virtual operator users). You can also operate in accordance with the software configuration scheme in **Chapter 3** according to the requirements of various operators.

4.2.2. For Device with Certificates in Progress

For devices with certificates in progress, it is recommended to give priority to the modules delivered by Quectel after August 2021, so as to use Quectel's complete 3G sunset solution. If the certification plan is earlier than August 2021, it is recommended to follow the software configuration solution in **Chapter 3** to be processed by the MCU.

NOTE

Please contact Quectel Technical Supports for complete 3G sunset (including AT&T 3G sunset) solution.

4.2.3. For Device under Planning

For devices under planning, it is recommended to give priority to the modules delivered by Quectel after August 2021, so as to use Quectel's complete 3G sunset solution.

5 Appendix References

Table 3: Related Documents

Document Name
[1] Quectel_EC2x&EG9x&EG2x-G&EM05_Series_AT_Commands_Manual
[2] Quectel_EC2x&EG9x&EG2x-G&EM05_Series_IMS_Application_Note

Table 4: Terms and Abbreviations

Abbreviation	Description
CS	Circuit Switching
EPS	Evolved Packet System
IMS	IP Multimedia Subsystem
IMSI	Internation Mobile Subscriber Identity
LTE	Long-Term Evolution
MCU	Microcontroller Unit/Microprogrammed Control Unit
PLMN	Public Land Mobile Network
RAT	Radio Access Technology
SIM	Subscriber Identity Module
UE	User Equipment
VoLTE	Voice over Long-Term Evolution