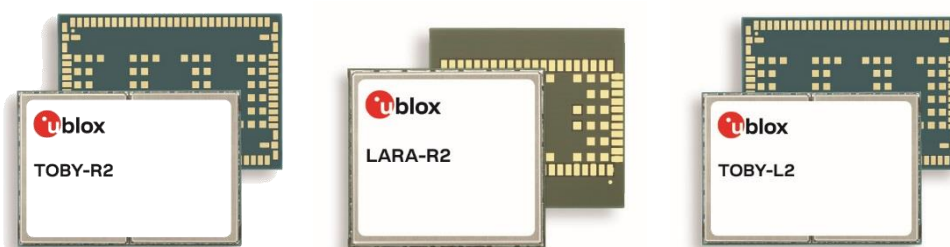# LTE initial default bearer

A quick overview
Application note

Abstract

Introduction to LTE initial default bearer for TOBY-R2, LARA-R2 and TOBY-L2 series modules.

Document information

Title	**LTE initial default bearer**	
Subtitle	A quick overview	
Document type	Application note	
Document number	UBX-20015573	
Revision and date	R01	10-Jun-2020
Disclosure restriction		

This document applies to the following products:

Product name
TOBY-R2 series
LARA-R2 series
TOBY-L2 series

Contents

1 Scope

The scope of this document is to provide a quick and direct overview about the configuration of the LTE initial default bearer and the related settings for TOBY-R2, LARA-R2 and TOBY-L2 series modules.

The reader shall consult this document along with the u-blox AT commands manual [1] and u-blox AT commands examples application note [2].

2 LTE initial default bearer

LTE networks are all-IP networks, which means that all services available to the end-user are based on IP protocols.

LTE devices are "always-on", which means that an IP address is always assigned to the device when it is registering on LTE network. In other words, in LTE there is always an IP connection between the device and a PDN, which means that one PDP context must always be active.

The **initial default EPS bearer** is the PDP context enabled during the EPS attach (i.e., the network registration phase).

2.1 APN for the initial default bearer

If **no APN** has been specified by the device, the network will assign a **default one**, the so-called **anchor APN**, in this way a PDP context is active and the module has an IP address.

☞ The PDP context with the anchor APN guarantees the LTE signaling but does not assure IP connectivity to the Internet (it depends on MNO policies, e.g., it might be used by BIP or OMA-DM clients only for administrative purposes).

It is strongly recommended to use a **proper APN** for the initial default bearer; its value shall be provided by the SIM card provider.

The APN for the initial default bearer must be set when the module is in the de-registered state.

2.1.1 Setting the initial default bearer on TOBY-L2 series

☞ This section does not apply to **TOBY-L201** in Verizon configuration for which the APN setting for the initial default bearer is managed automatically and the user/application must not change it.

☞ On **TOBY-L200** and **TOBY-L201** (in AT&T configuration) the factory programmed value for <APN> parameter is "**broadband**", that is AT&T (US).

☞ On **TOBY-L210-62S / TOBY-L210-65S** the factory programmed value for <APN> parameter is "**4gsmarthphone**", that is Softbank (JP).

☞ On **TOBY-L210-0x / TOBY-L210-50S /TOBY-L210-60S / TOBY-L220 / TOBY-L280** the factory-programmed value of <APN> parameter is an empty string.

To set the initial default bearer on TOBY-L2 series modules, the **+UCGDFLT** AT command shall be used and the module shall be in a de-registered state to configure this APN.

The initial default bearer is defined on **<cid>=4** if no other PDP context has been defined before (for more details see u-blox AT commands manual [1] and u-blox AT commands examples application note [2]). To be sure that the initial default bearer is on <cid>=4, the user/application can delete previously defined context with **+CGDEL=<cid>**.

Command	Response	Description
AT+CFUN=4	OK	Set the module in airplane mode.
AT+CGDEL=4	OK	Delete <cid>=4 (initial default bearer)
AT+UCGDFLT=1,"IP","ibox.tim.it"	OK	Define the APN for the initial default bearer by using the correct <PDP_type> and APN value. ☞ Authentication type, username and password can be set with +UCGDFLT (see u-blox AT commands manual [1]).
AT+CFUN=1	OK	Set the module in full mode.

2.1.2 Setting the initial default bearer on TOBY-R2 and LARA-R2 series

☞ This section does not apply to **LARA-R204** in factory programmed VZW configuration, for which the APN setting for the initial default bearer is managed automatically, which means that the user/application must not change it.

☞ On **TOBY-R200, TOBY-R202, LARA-R202, LARA-R203, LARA-R202-82B** and **TOBY-R200-82B** the factory programmed value for <APN> parameter is "**nxtgenphone**", that is AT&T (US).

☞ On **TOBY-R200-42B** product versions the factory programmed MNO configuration is "Global Data Only". The module is configured as data only, and all supported LTE bands are enabled. IMS service is enabled if LTE registration fails for non-EPS services; the initial default bearer (<cid>=1) is configured with empty APN.

To set the initial default bearer on TOBY-R2/LARA-R2 series modules, the **+CGDCONT** AT command shall be used and the module shall be in de-registered state to set/change this APN.

The initial default bearer is always defined on **<cid>=1**.

Command	Response	Description
AT+CFUN=4	OK	Set the module in airplane mode.
AT+CGDCONT=1,"IP","ibox.tim.it"	OK	Define the APN for the initial default bearer by using the correct PDP_type and APN value. ☞ Authentication type, username and password can be set with + UAUTHREQ (see u-blox AT commands manual [1]).
AT+CFUN=1	OK	Set the module in full mode.

2.2 Verizon APN setting for initial default bearer

In all products in VZW configuration, the user/application is not entitled to change or modify the APN used for the initial default bearer, this APN is automatically configured by the module.

The VZW APNs are defined as classes, and the APN for the IMS client is defined as Class 1 APN (APN1) and is used by the initial default bearer as per VZW requirements.

The APNs reserved for data connectivity for users are the APN3 and the APN6; APN3 can be used for the initial default bearer in case of IMS registration failure.

All the other APNs are reserved and used automatically by the module when needed. Users are not entitled to change/modify/use them, but the NW can update them by over-the-air provisioning via OMA-DM.

APN value	APN class	Description
VZWIMS or IMS	APN1	Verizon IMS PDN (initial default bearer) factory-programmed value
VZWADMIN	APN2	Verizon administrative PDN factory-programmed value
VZWINTERNET	APN3	Verizon Internet PDN, factory-programmed value
VZWAPP	APN4	Verizon Application PDN factory-programmed value
ENTERPRISE	APN6	Verizon Enterprise PDN factory-programmed value

The VZW APNs can be read using the +VZWAPNE read command.

With the set command the VZW APN table on the module can be overwritten: only Class 3 and 6 APNs can be overwritten to any customer defined string (for more details refer to u-blox AT commands manual [1]).

3   How to have an internal data context active in LTE

☞   This section does not apply to products in Verizon configuration.

An internal data context is a PDP context using the internal TCP/IP stack (for more details, see u-blox AT commands manual [1] and u-blox AT commands examples application note [2]). On the contrary an external PDP context is a data connection using an external IP stack (e.g., Windows dial-up) and PPP link over the AT interface.

Once the module is registered on an LTE network then the initial default bearer is active and if the APN has been properly configured then the data connectivity is available on this PDP context.

If the user/application needs an internal PDP context active (**+UPSD**), if the MNO policy allows activation of more than one PDP context with the same APN, then just configure the internal profile and activate it (**+UPSDA**).

If the MNO policy does not allow activation of more than one PDP context with the same APN, then the user/application must map the internal profile to the initial default bearer.

Command	Response	Description
	+CREG: 2 +CGEV: ME PDN ACT 4 +CREG: 1,"3AA3","0AAFC429",7 +CEREG: 1,"3AA3","0AAFC429",7	Wait for the module to be registered. The initial default bearer is activated during network attach.
AT+CGDCONT?	+CGDCONT: 4,"IP","ibox.tim.it.mnc001.mcc222.gprs","10.161.31.11",0,0,0,0,0 OK	The initial default bearer is mapped on <cid>=4. ☞ Be aware that the initial default bearer is typically on <cid>=1 for TOBY-R2 / LARA-R2 series, while for TOBY-L2 series is on <cid>=4.
AT+UPSD=0,100,4	OK	Map the internal profile to the initial default bearer.
AT+UPSD=0,0,0	OK	Set the PDP type to same type of the mapped context.
AT+UPSDA=0,3	OK	Activate the internal context.
	+UUPSDA: 0," 10.161.31.11"	URC indicating that the internal profile #0 has been successfully activated and the IPv4 assigned to the activated PDP context. The IP address is the same of the <cid>=4.

3.1   Internal context for Verizon

In Verizon configuration, the user is entitled to use APN class 3 for data connectivity, therefore if the internal TCP/IP stack has to be used, the internal profile (**+UPSD**) shall be mapped to the PDP context associated to APN class 3.

4 FAQ

- How can I know if my SIM card is LTE enabled?

  LTE is a feature enabled at the network level, it is not possible to know with AT commands. This information shall be asked to the MNO.

- Why cannot I activate more than one PDP context with the same APN?

  This is a network policy, some MNOs allow activation of more PDP contexts with the same APN, other MNOs not. Typically what the application observes is that the activation of the second PDP context, with the same APN, is always rejected by the network. There is no specific error message associated with this and furthermore it might depend on the MNO. If the activation of a PDP context is always rejected, the general recommendation is to check if there is already a PDP context active with the same APN.

- My SIM card is LTE-enabled but the module does not register on 4G network. What is the reason?

  If the SIM is LTE enabled and LTE networks are available, a common error is the usage of a wrong APN for the initial default bearer. Check that the correct APN has been set. A typical error occurs when switching SIM cards belonging to different network operators without changing the APN of the initial default bearer.

- How can I know if my anchor APN provides data connectivity?

  We suggest to try a data transfer (i.e., ping a known IP address with internal or external stack).

- Why is the APN value in the +CGDCONT AT command different from the one set?

  The APN value is displayed accordingly to the 3GPP TS 23.003. The APN value consists of different labels separated by dots: e.g., label1.label2.label3 (for more details, see 3GPP TS 23.003 [3]). The last label shall be ".gprs" e.g., the APN set is "ibox.tim.it", the value read is "ibox.tim.it.mnc001.mcc222.gprs".

Appendix

A   Glossary

Abbreviation	Definition
3GPP	3rd Generation Partnership Project
APN	Access Point Name
EPS	Enhanced Packet Switched
IP	Internet Protocol
MNO	Mobile Network Operator
PDN	Packet Data Network
PDP	Packet Data Protocol
URC	Unsolicited Result Code

Table 1: Explanation of the abbreviations and terms used

Related documents

[1]   u-blox AT commands manual, UBX-13002752
[2]   AT commands examples application note, UBX-13001820
[3]   3GPP TS 23.003, "Numbering, addressing and identifications"

☞   For regular updates to u-blox documentation and to receive product change notifications, register
        on our homepage (www.u-blox.com).

Revision history

Revision	Date	Name	Comments
R01	10-Jun-2020	mace	Initial release

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