Telit 2G 3G LTE Modules registration flow

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APPLICABILITY TABLE

PRODUCTS

- GE866-QUAD
- GE910 SERIES
- GL865 SERIES
- UL865 SERIES
- UE910 SERIES
- UE866 SERIES
- HE910 SERIES
- LE910 SERIES
- ME910 SERIES

CONTENTS

0 Introduction

0.1 Scope

Scope of this document is to give an overview and basic flow for Telit module registration. It is an indication that need to be adapted to the customer needs.

0.2 Audience

This document is intended for customers who want to use and test the ME910 and LE910 product.

0.3 Contact Information, Support

For general contact, technical support services, technical questions and report documentation errors contact Telit Technical Support at:
TS-EMEA@telit.com

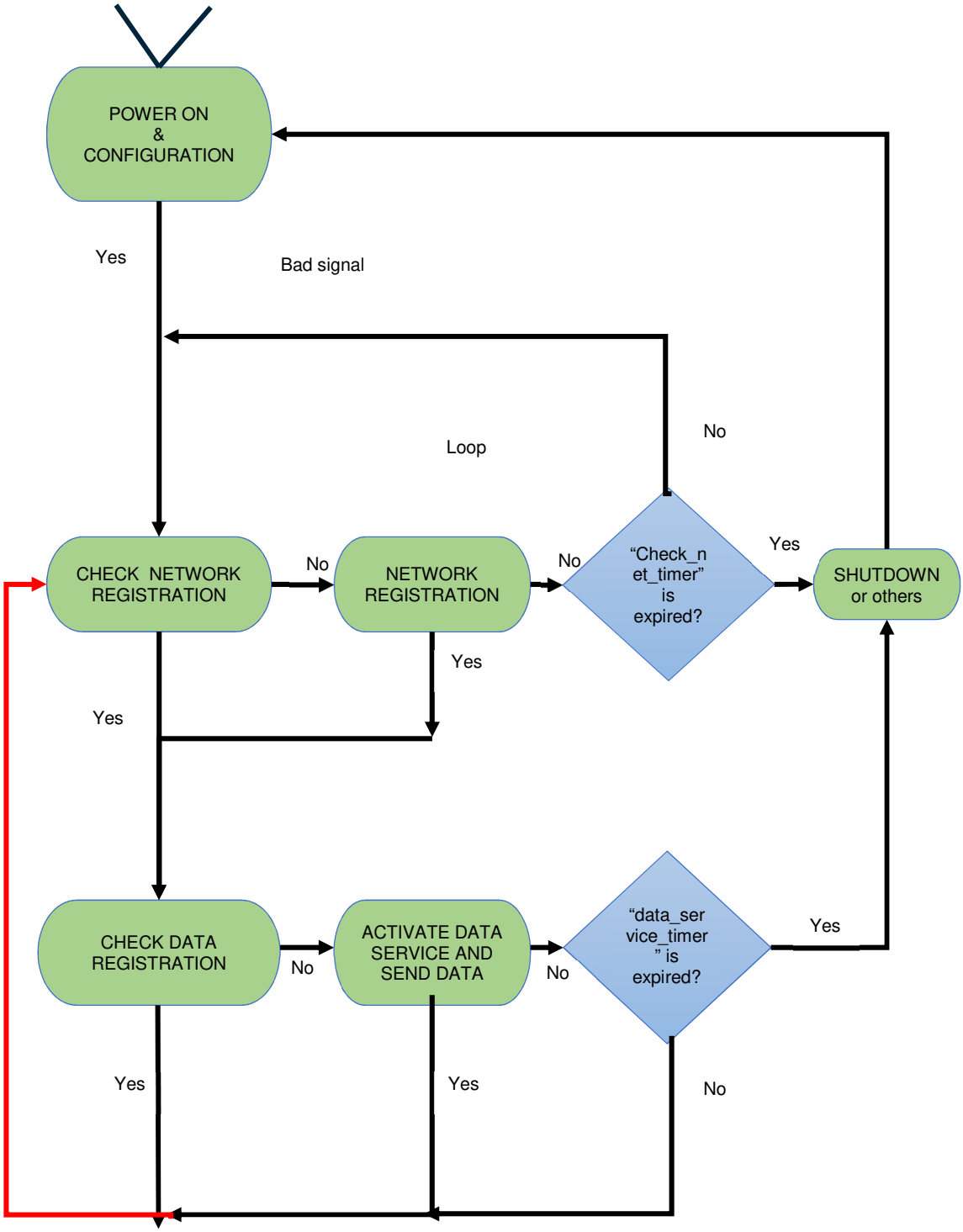
For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:
http://www.telit.com

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.
Telit appreciates feedback from the users of our information.

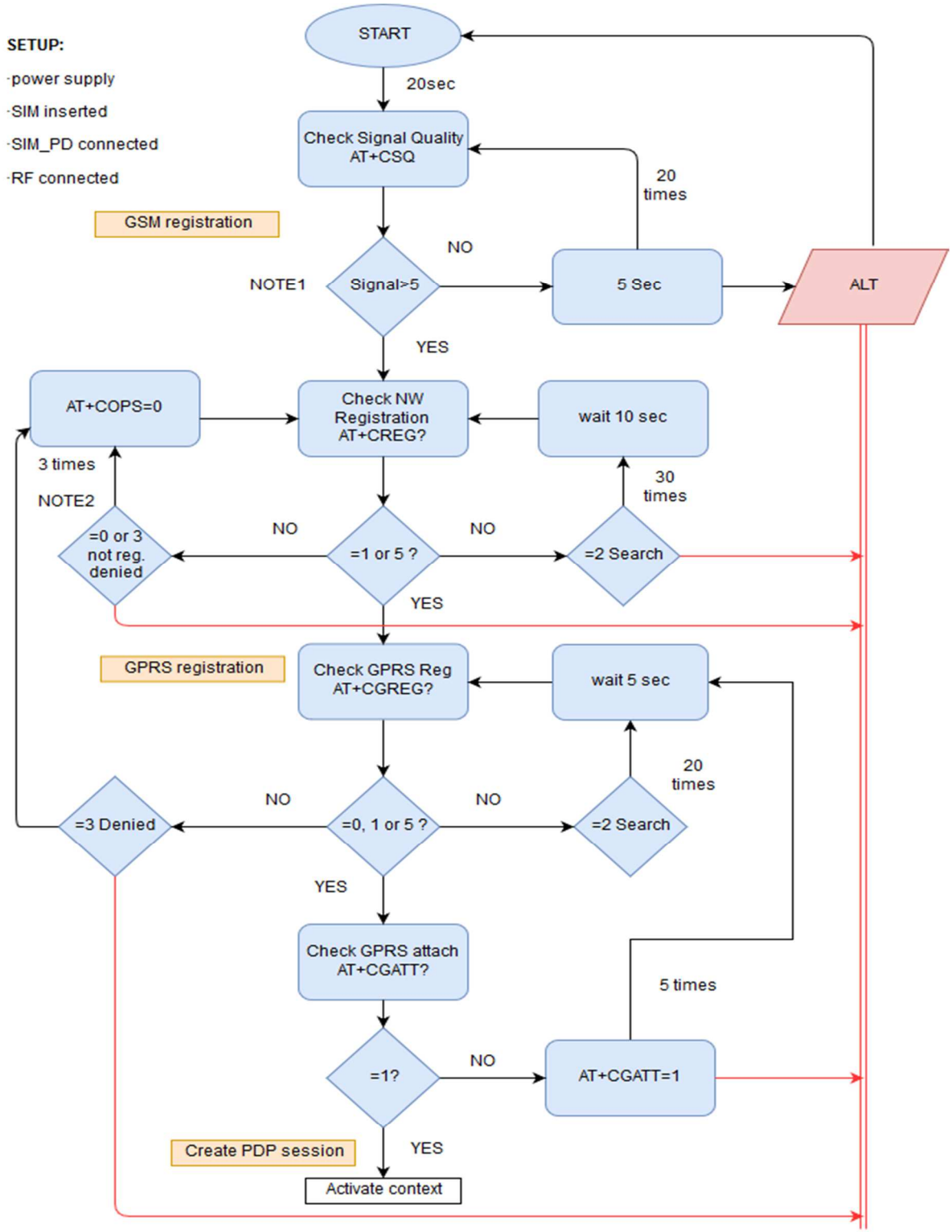
0.4 Related Documents

- LE910 V2 SERIES AT COMMANDS REFERENCE GUIDE 80446ST10707A Rev.3
- HE910/UE910/UL865/UE866 AT Commands Reference Guide 80378ST10091A Rev. 12
- ME910C1 AT Commands Reference Guide 80529ST10815A Rev.2
- AT Commands Reference Guide 80000ST10025a Rev. 25
- LE920A4/ LE910C1 AT Commands Reference Guide 80490ST10778A Rev.2

1 Main Registration Flow



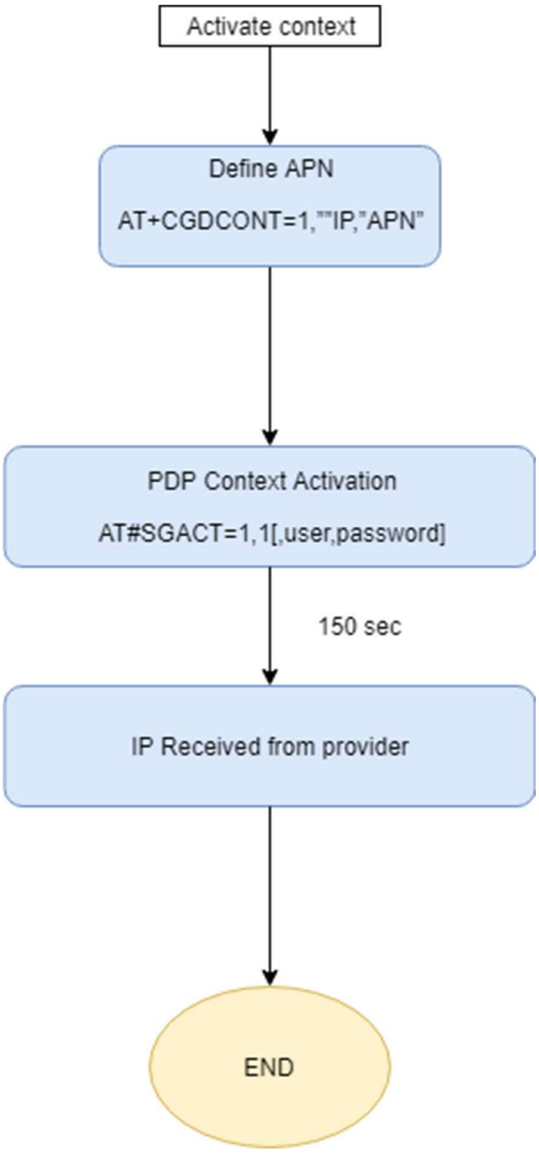
2 2G & 3G network



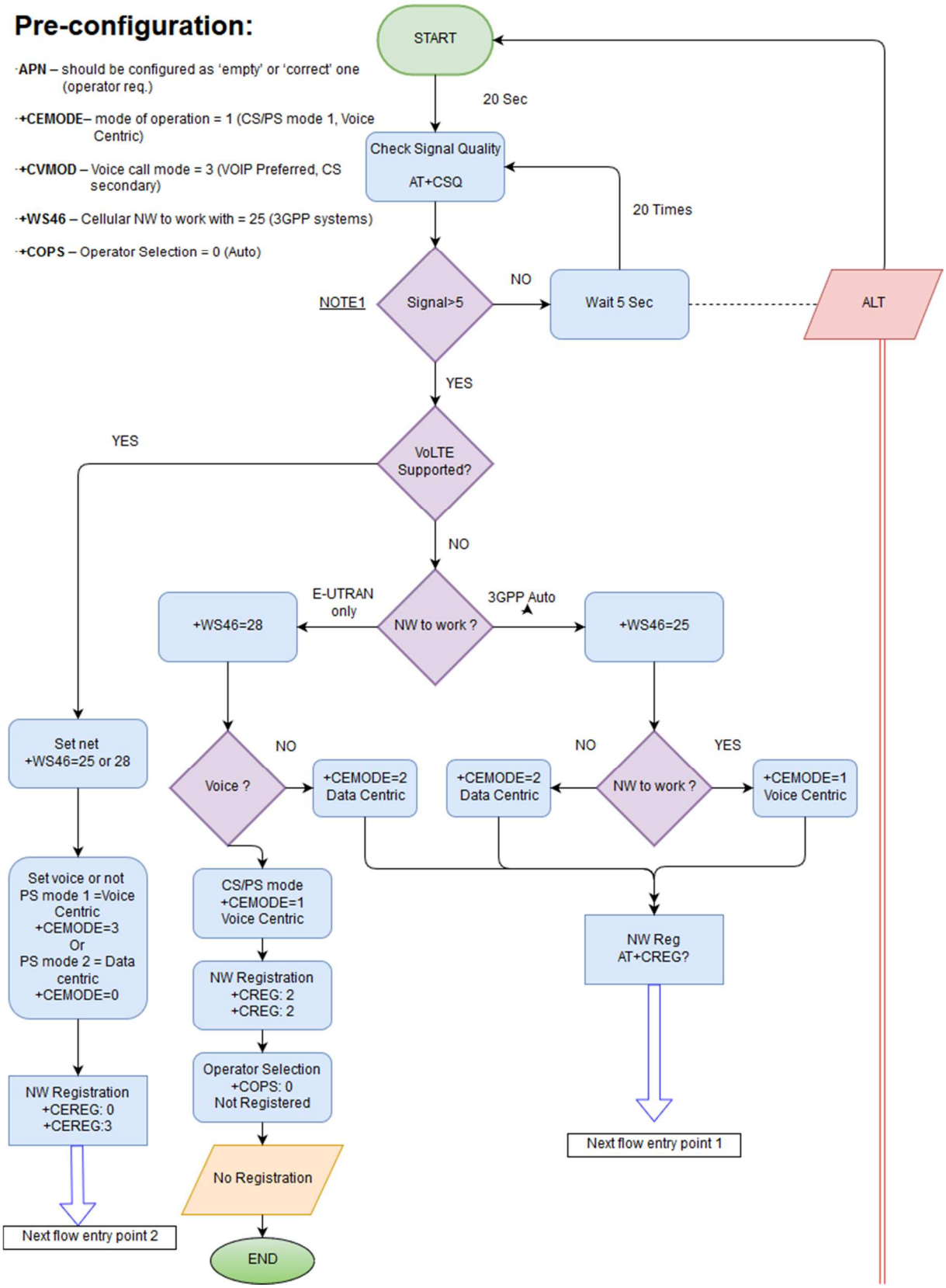
NOTE1: *the suggested theshold level can be adapted depending on final application requirements*

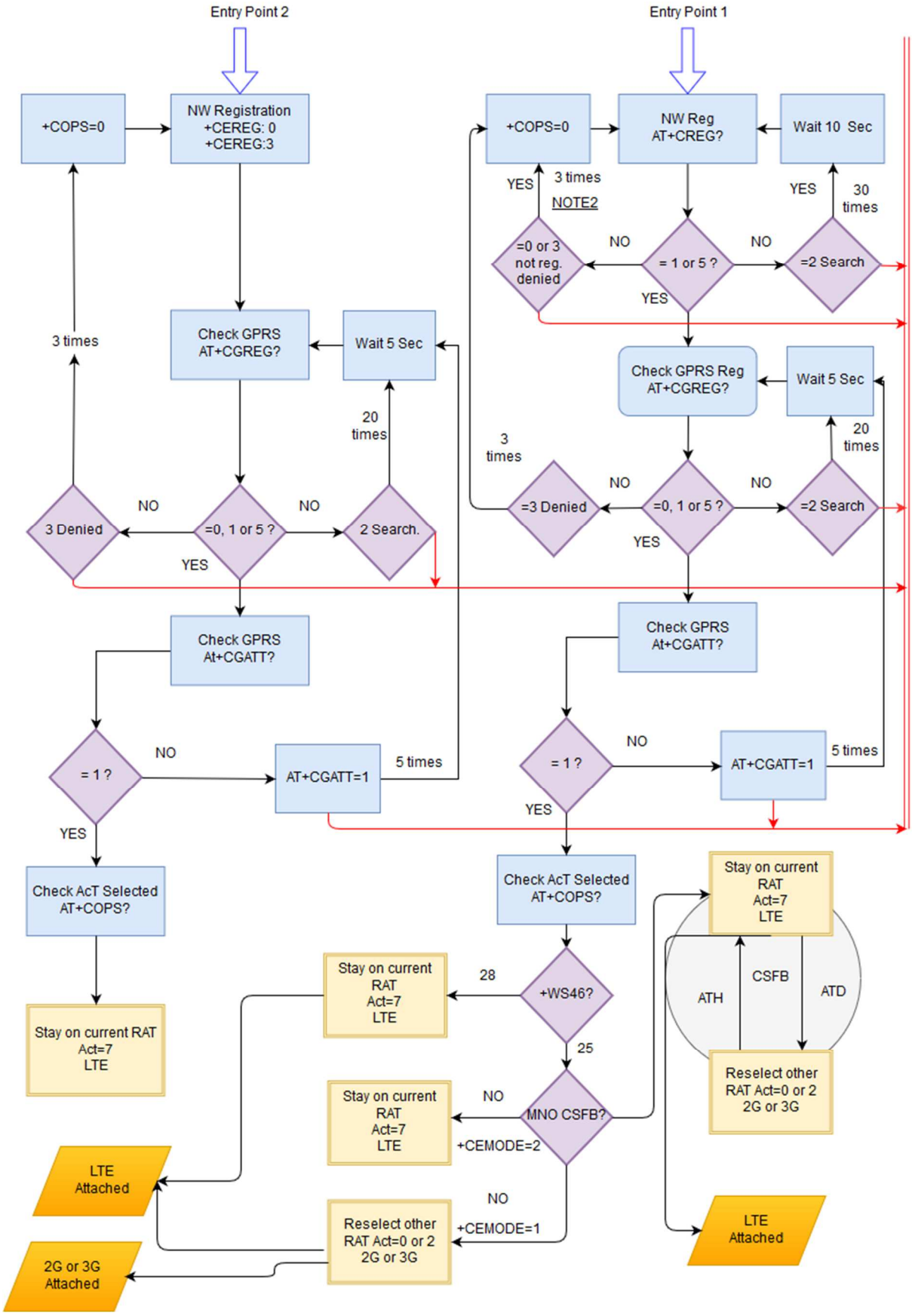
NOTE2: *If AT+COPS=0 keeps returning CREG: 3, verify AT#CEERNET error cause and if needed delete the forbidden PLMN list with AT#FPLMN*

2.1 2G&3G PDP context

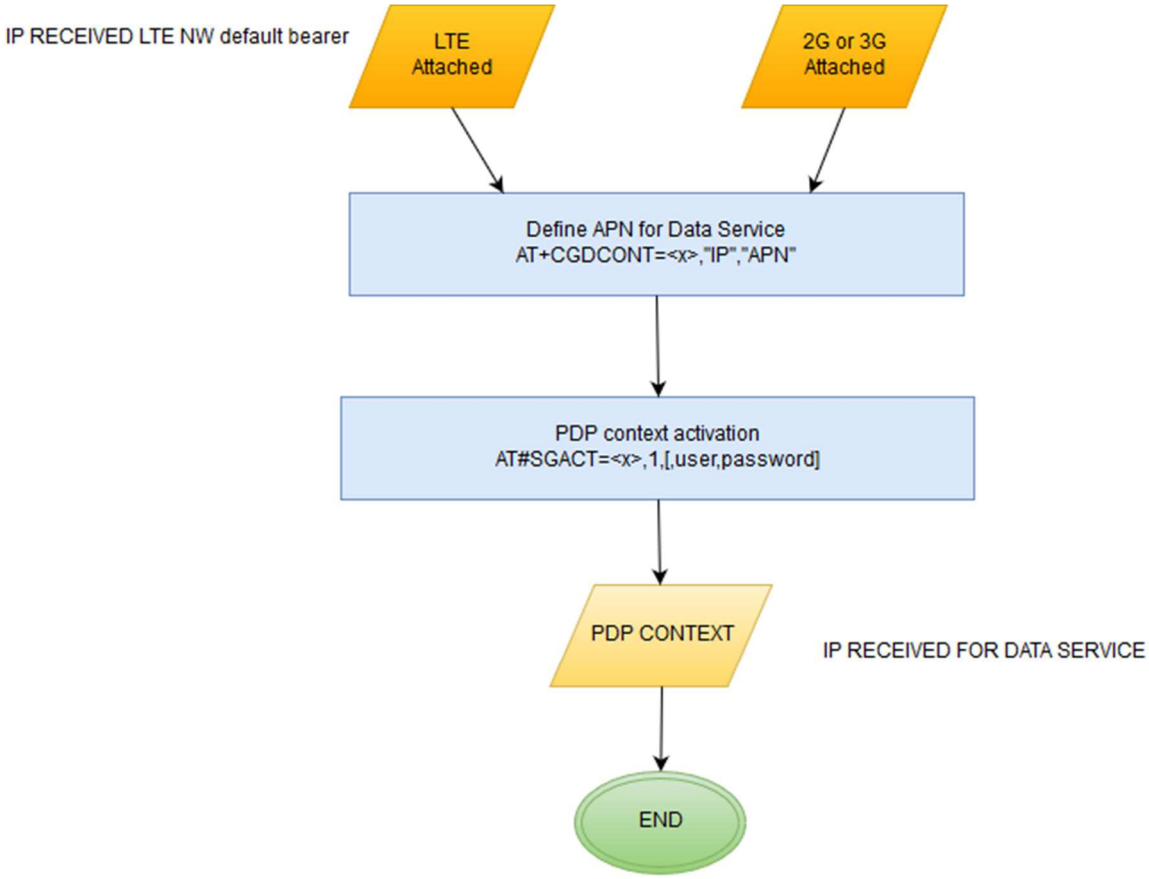


3 LTE network





3.1 LTE PDP context



Legend:

- **CS** – Circuit Switch
- **PS** – Packet Switch
- **AcT** – Access Technology
- **RAT** – Radio Access Technology
- **CSFB** – Circuit Switched FallBack
- **PDN** – Packet Data Network
- **LTE** – Long Term Evolution
- **VoLTE** – Voice Over LTE
- **MNO** – Mobile Network Operator

4 Appendix

4.1 PLMN selection

As reported in the 3GPP 23.122, section 4.4.3.1 at switch on or recovery from lack of coverage the module should follow the following order to attempt a new registration using automatic network selection:

I. last registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of;
II. either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present);
III. each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
IV. each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order); (Steering SIMs only)
V. other PLMN/access technology combinations with received high quality signal in random order (RxLev > -85dBm);
VI. other PLMN/access technology combinations in order of decreasing signal quality.

In ii and iii, the MS should limit its search for the PLMN to the access technology or access technologies associated with the PLMN in the appropriate PLMN Selector with Access Technology list (User Controlled or Operator Controlled selector list).

4.1.1 How to delete EFLOCI file in the SIM

In the particular scenario where the module is tested on country A and deployed on country B, in order to skip point (I.) the registered PLMN (RPLMN) can be deleted (for all the other cases, deleting the RPLMN may result in longer registration times, since the module will have to perfom a full RF scan).
The last registered PLMN is stored in a SIM field (EFLOCI - Location Information - Identifier: '6F7E'). 3 methods are possible:

1) Using AT+CSIM and opening a SIM logical channel

AT+CSIM=14,"00A40804022F00"
+CSIM:
76,"6222820542210020**20**0183022F00A506C00140DE01008A01058B032F
0603800200208801F09000"
OK
AT+CSIM=10,"00B20104**20**"
+CSIM:
68,"61124F10A0000000871002FFFFFFFF89060400FFFFFFFFFFFFFF
FFFFFFFFFF9000"
OK

The string out from previous CSIM in blue (AID) is 16 bytes after 4F10;
Now it is possible to open a logical channel with the SIM;

AT+CCHO="A0000000871002FFFFFFFF89060400FF"

+CCHO: 2 // *could be 1 2 3*
AT+CGLA=2,18,"02A4080C047FFF6F7E"
+CGLA: 4,"9000"
OK

First parameter (2) and first byte of APDU (02) is the number returned by CCHO in red;

AT+CGLA=2,32,"02D600000BFFFFFFFFFFFFFFFFFFFFFF"
+CGLA: 4,"9000" // *EFLOCI deleted*

First parameter (2) and first byte of APDU (02) is the number returned by CCHO. You can verify the EFLOCI content with:

AT+CGLA=2,10,"02B000000B"
+CGLA: 26," FFFFFFFFFFFFFFFFFFFFFF9000"
OK

Last bytes are status SW1 SW2: 9000 = SUCCES;
To close the logical channel (+CCHO: 2):

AT+CCHC=2

Note
It could happen that between first +CSIM and second one, module access the SIM and this is something that can't be blocked. To get the AID to be used with CCHO the two CSIM must be sent in a fast sequence and, if the AID is not returned (so an extra SIM access happened in between) they must be sent again.
Once the AID of a SIM is known the two CSIM are no more required;

2) Using AT+CRSM. (not supported by HE910/UE910/UL865/UE866)
   It is possible to read the field in 28542 ('6F7E' file in decimal format) on the SIM and then clear it out the RPLMN).

AT+CRSM=176,28542,0,0,11
Read EFLOCI field (28542 is 6F7E in decimal form)

+CRSM: 144,0,A80B7CDB22F210D5BDFF00
PLMN info

OK

AT+CRSM=214,28542,0,0,11,FFFFFFFFFFFFFFFFFFFFFF
Write EFLOCI field (in this case we're erasing the file)

+CRSM: 144,0

OK

AT+CRSM=176,28542,0,0,11
Read the field again

+CRSM: 144,0,FFFFFFFFFFFFFFFFFFFFFF

OK

4.1.2 How to delete EFLOCI file with simWISE

Module with simWISE service enabled, and VSIM profile selected shall delete the EF_LOCI file with the dedicated command:

AT#VSIMEDITSIMDATA=0

4.1.3 Roaming registration on VPLM

For roaming registration, more information can be found on 3GPP 23.122 section “4.4.3.3 In VPLM”.

4.1.4 Forbidden PLMN in SIM

The EF_FPLMN is a file contained in any SIM/USIM which includes up to four Forbidden PLMNs (FPLMN). It is read by the module as part of the SIM initialization procedure and indicates PLMNs which the module shall not automatically attempt to access.

A PLMN is written in the EF if a network rejects a Location Update with cause # 11 - “PLMN not allowed”.
In case the FPLM list is full, the rejection of a further PLMN with cause # 11 will cause new FPLMN to be stored in 4th position, shifting the ones in the list, causing the previous content of the 1st position to be lost.

Since roaming agreements can change, it could be necessary to delete the FPLMN list from time to time, to avoid module not using PLMNs that are no more forbidden.
This can be done using the AT#FPLMN command. Refer to Telit AT Command Guides for more information about this command.

Another option is to force a manual registration with AT+COPS=1,2,”MCCMNC” (e.g. AT+COPS=1,2,”22201”). In this case the

module will try to register to the selected PLMN even if stored in the FPLMN list.

4.1.5 Forbidden PLMN with simWISE

Module with simWISE service enabled, and VSIM profile selected shall delete the EF_FPLMN file with the dedicated command:

AT#VSIMEDITSIMDATA=1,FFFFFFFFFFFFFFFFFFFFFFFF

4.2 PDP Context activation and deactivation

PDP activation and deactivation timeouts are defined by 3GPP 24.008 and they involves 2 NW timers.

When an application tries to active a PDP context (e.g. AT#SGACT=1,1) module sends an “ACTIVATE PDP CONTEXT REQUEST” and network timer T3380 (30s) is started waiting for a PDP CONTEXT ACCEPT or REJECT. In case of no network response this procedure is repeated 4 times, i.e. on the 5th expiry of timer T3380 the module will release all resources allocated and abort the procedure.

Total timeout is 5 x 30s = 150s

In case of PDP deactivation (e.g. AT#SGACT=1,0), module sends a “DEACTIVATE PDP CONTEXT REQUEST” and network timer T3390 (8s) is started waiting for a DEACTIVATE PDP CONTEXT ACCEPT.

This procedure is repeated 4 times, i.e. on the 5th expiry of timer T3390 the module will release all resources allocated and erase the PDP context data.

Total timeout is 5 x 8s = 40s

5 Document History

Revision	Date	Changes
0	2018-06-03	First registered issue
1	2018-06-18	Added new method to delete EF_LOCI in 4.1.1 New sections 4.1.2, 4.1.4, 4.1.5, 4.2

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Link to **www.telit.com** and contact our technical support team for any questions related to technical issues.

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Telit Communications S.p.A.
Via Stazione di Prosecco, 5/B
I-34010 Sgonico (Trieste), Italy

Telit IoT Platforms LLC
5300 Broken Sound Blvd, Suite 150
Boca Raton, FL 33487, USA

Telit Wireless Solutions Inc.
3131 RDU Center Drive, Suite 135
Morrisville, NC 27560, USA

Telit Wireless Solutions Co., Ltd.
8th Fl., Shinyoung Securities Bld.
6, Gukjegeumyung-ro8-gil, Yeongdeungpo-gu
Seoul, 150-884, Korea

Telit Wireless Solutions Ltd.
10 Habarzel St.
Tel Aviv 69710, Israel

Telit Wireless Solutions
Technologia e Servicos Ltda
Avenida Paulista, 1776, Room 10.C
01310-921 São Paulo, Brazil

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