2G 3G 4G Registration Process

Application Note

80000NT11696A Rev. 2 – 2021-01-26

APPLICABILITY TABLE

PRODUCTS	PLATFORM VERSION ID [1]
GE866-QUAD	16
GL865-SERIES	
GE910 SERIES	13 -16
GL865-QUAD V4	34
GE310-GNSS	35
UL865 SERIES	12
UE910 SERIES	
UE866 SERIES	
HE910 SERIES	
LE910 SERIES	20 - 25
ME910 SERIES	30 - 37
ML865 SERIES	
ME310 SERIES	
NE310H2	26
NL865H2	

[1] Platform Version ID is a reference used in the document. It identifies the different SW versions, e.g. 13 for SW version 13.xx.xxx, 16 for SW version 16.xx.xxx, etc.

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1. INTRODUCTION

1.1. 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.

1.2. Audience

This document is intended for Telit customers, especially system integrators, about to implement their applications using the Telit modules family.

1.3. Contact Information, Support

For general contact, technical support services, technical questions and report of documentation errors contact Telit Technical Support at:

- *TS-EMEA@telit.com*
- *TS-AMERICAS@telit.com*
- *TS-APAC@telit.com*
- *TS-SRD@telit.com*
- *TS-ONEEDGE@telit.com*

Alternatively, use:

http://www.telit.com/support

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 the user feedback on our information.

1.4. Symbol Convention

	**Danger:** This information MUST be followed or catastrophic equipment failure or personal injury may occur.
	**Warning:** Alerts the user on important steps about the module integration.
	**Note/Tip:** Provides advice and suggestions that may be useful when integrating the module.
	**Electro-static Discharge:** Notifies the user to take proper grounding precautions before handling the product.

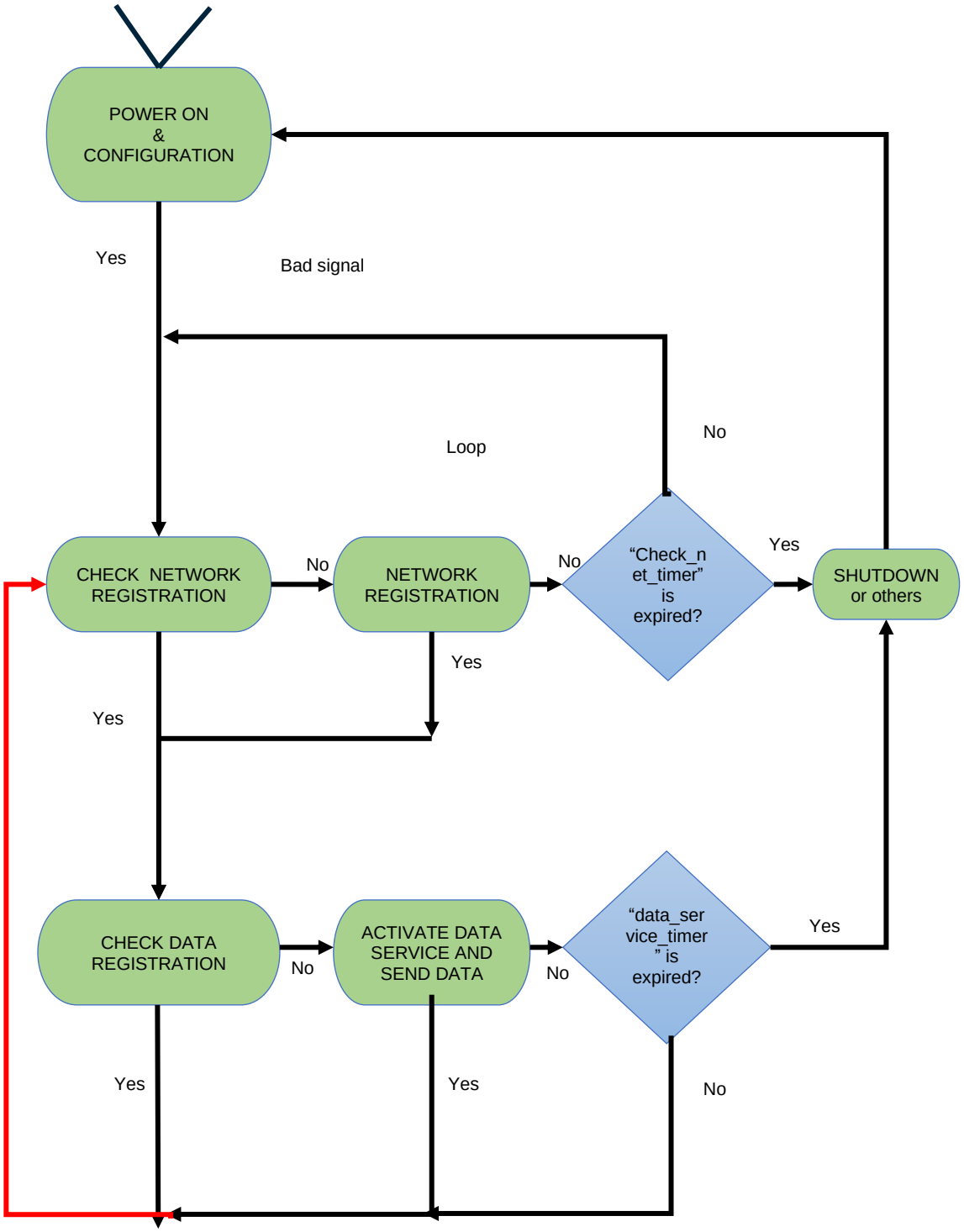
Table 1: Symbol Conventions

All dates are in ISO 8601 format, that is. YYYY-MM-DD.

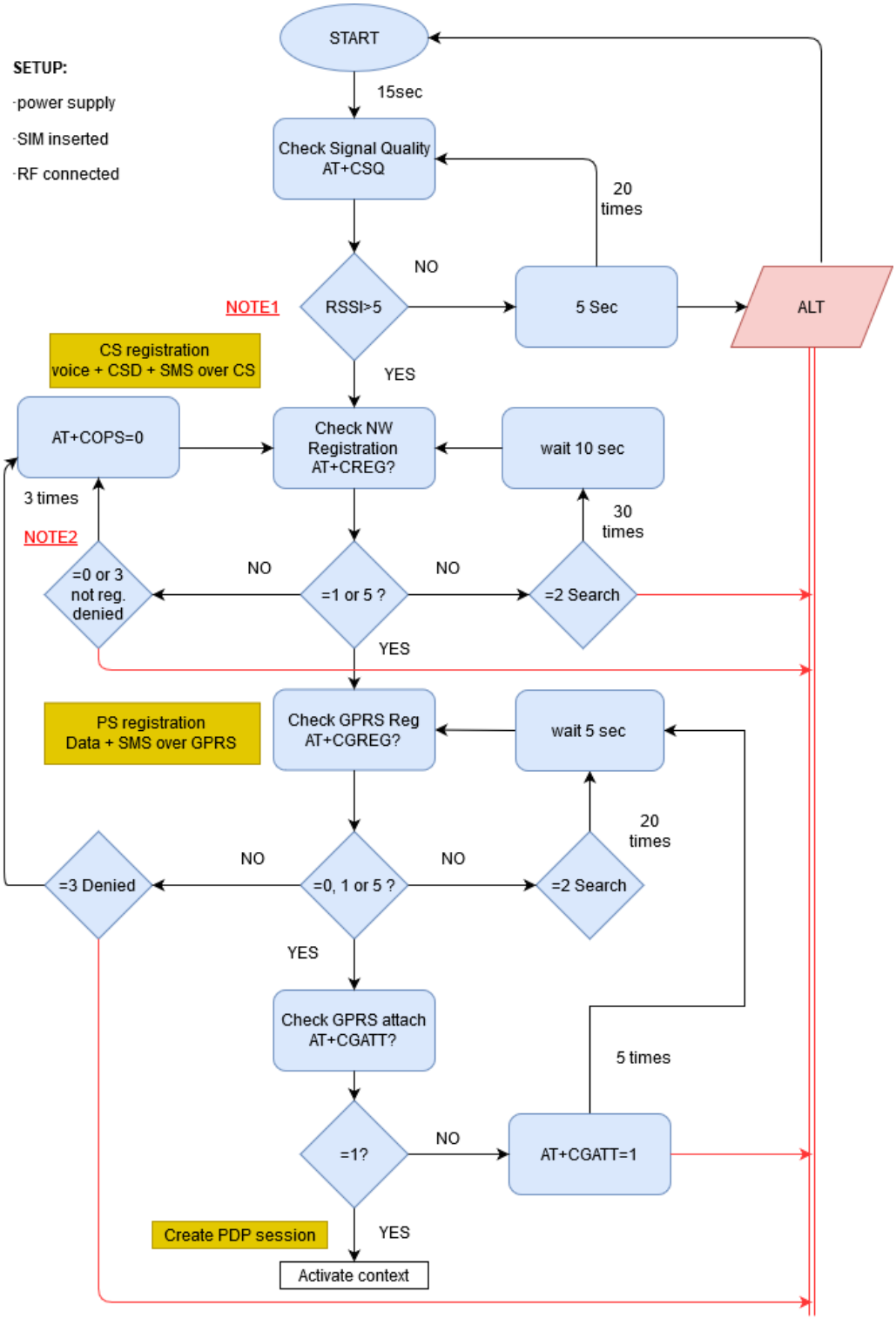
1.5. Related Documents

- LE910 V2 SERIES AT COMMANDS REFERENCE GUIDE 80446ST10707A
- HE910/UE910/UL865/UE866 AT Commands Reference Guide 80378ST10091A
- ME910C1/NE910C1/ML865C1 AT Commands Reference Guide 80529ST10815A
- 2G AT Commands Reference Guide 80000ST10025a
- LE910C1 AT Commands Reference Guide 80502ST10950A
- ME310G1/ME910G1/ML865G1 AT Commands Reference Guide 80617ST10991A
- NE310H2_NL865H2_AT Commands Reference Guide 1VV0301611
- GL865-QUAD V4 AT Commands Reference Guide 80585ST10926A
- GE310-GNSS AT Commands Reference Guide 80598ST10945A
- Telit_IP_Easy_User_Guide 80000ST10028A
- Modules_Software_User_Guide_2G3G4G 1vv0300784

2. MAIN REGISTRATION FLOW



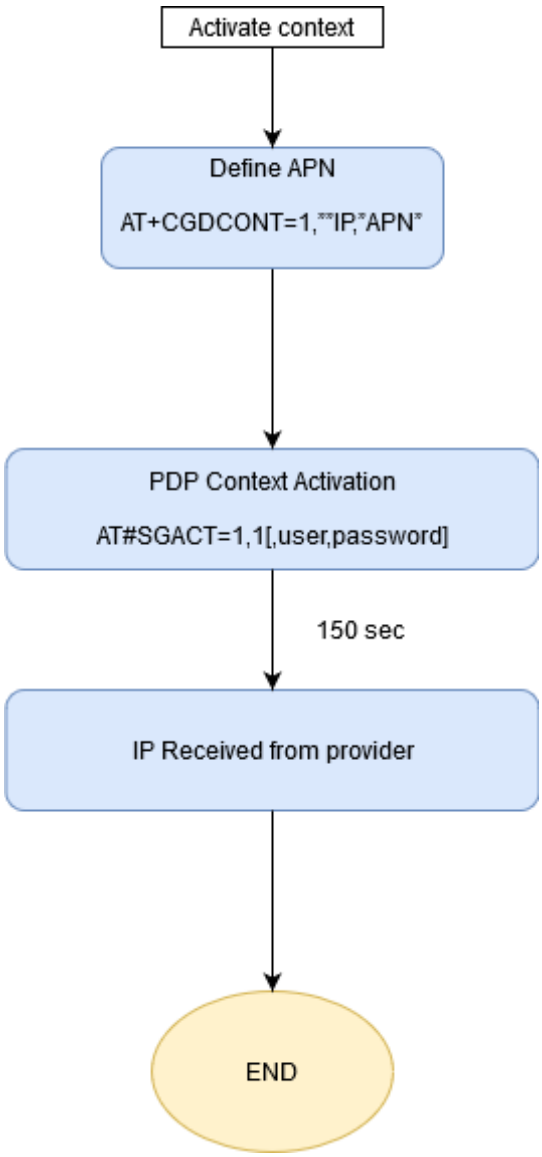
3. 2G & 3G NETWORK



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*

3.1. 2G & 3G PDP context



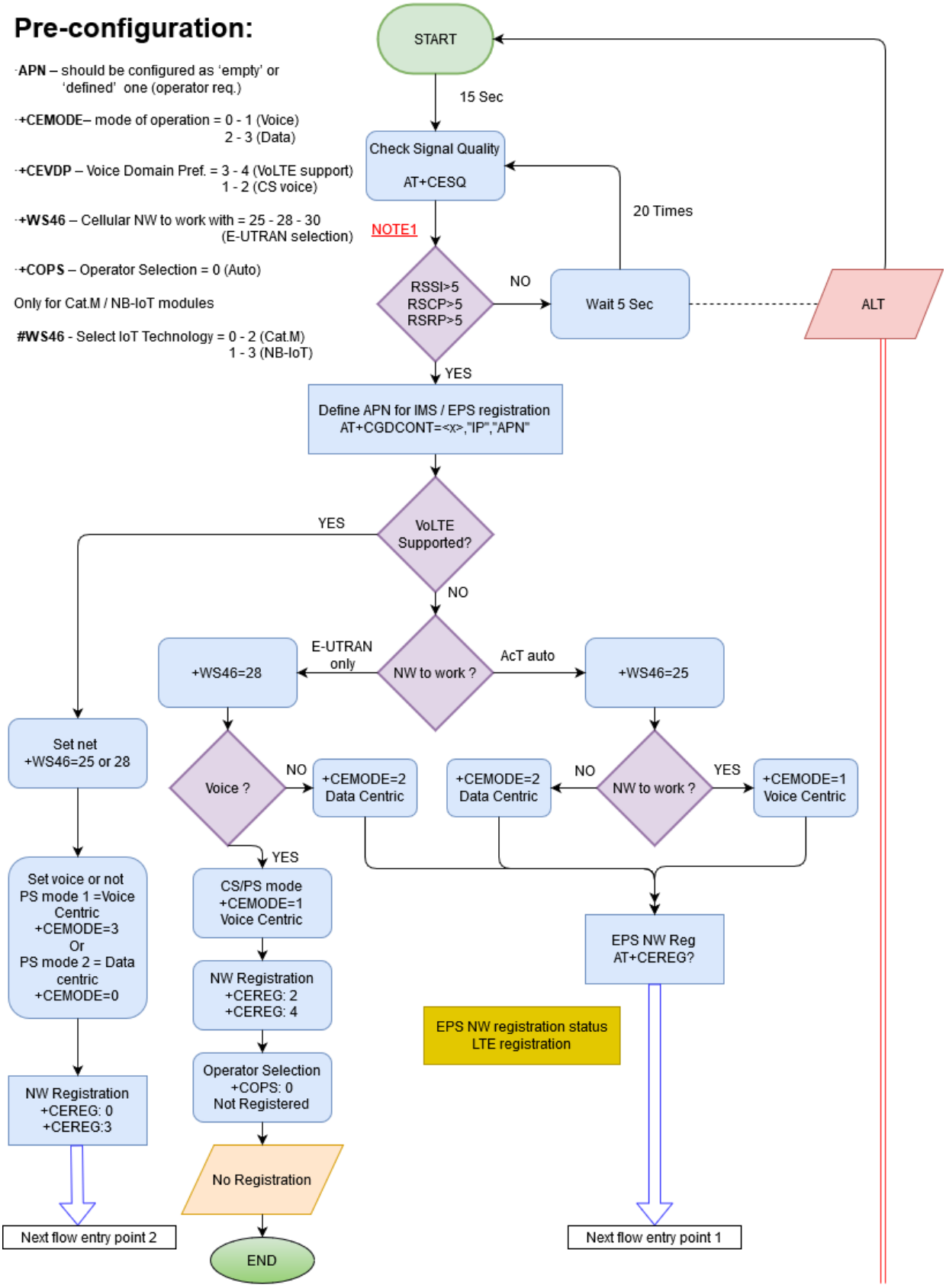
4. 4G NETWORK

Pre-configuration:

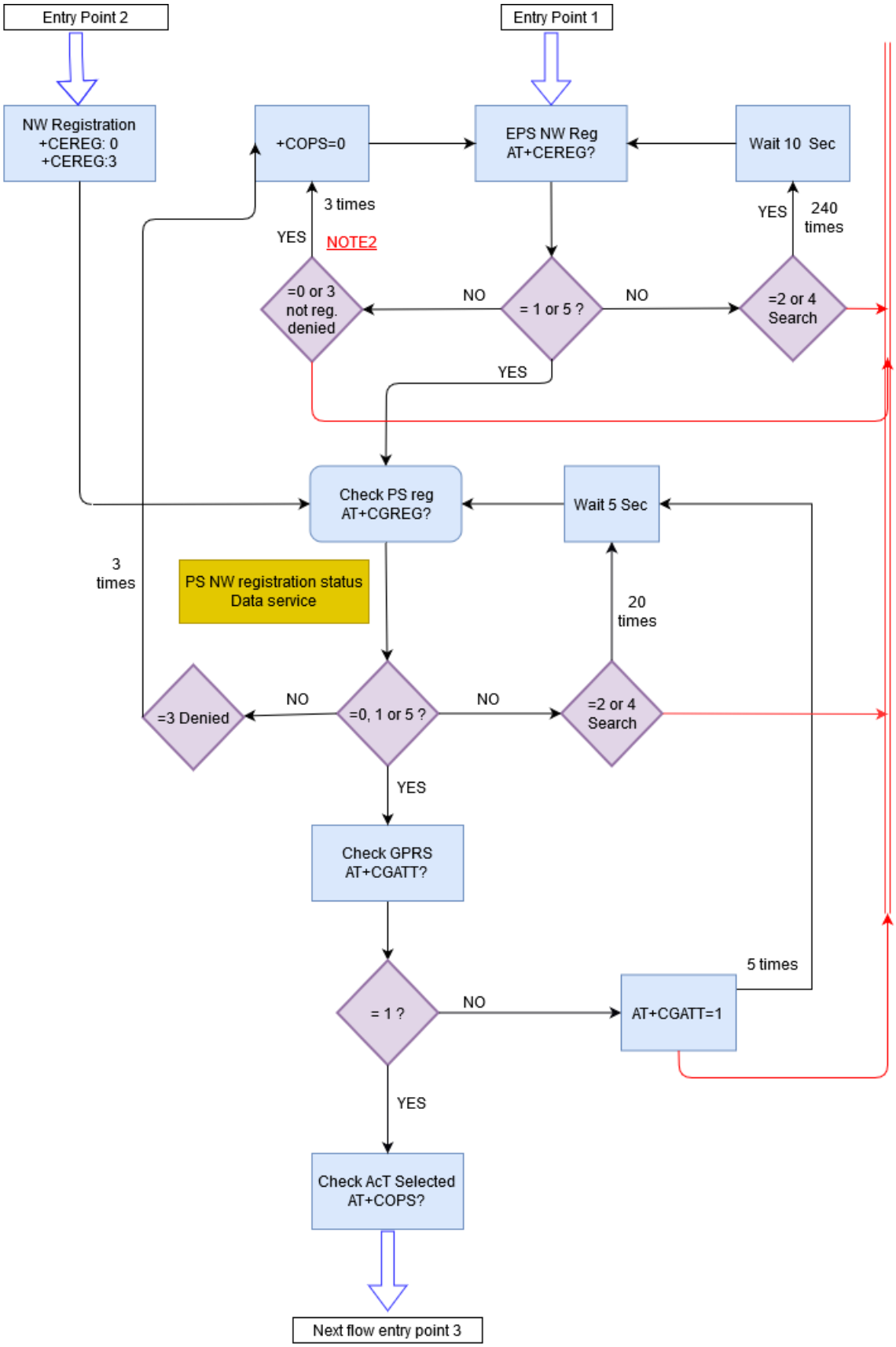
- **APN** – should be configured as 'empty' or 'defined' one (operator req.)
- **+CEMODE**– mode of operation = 0 - 1 (Voice) 2 - 3 (Data)
- **+CEVDP** – Voice Domain Pref. = 3 - 4 (VoLTE support) 1 - 2 (CS voice)
- **+WS46** – Cellular NW to work with = 25 - 28 - 30 (E-UTRAN selection)
- **+COPS** – Operator Selection = 0 (Auto)

Only for Cat.M / NB-IoT modules

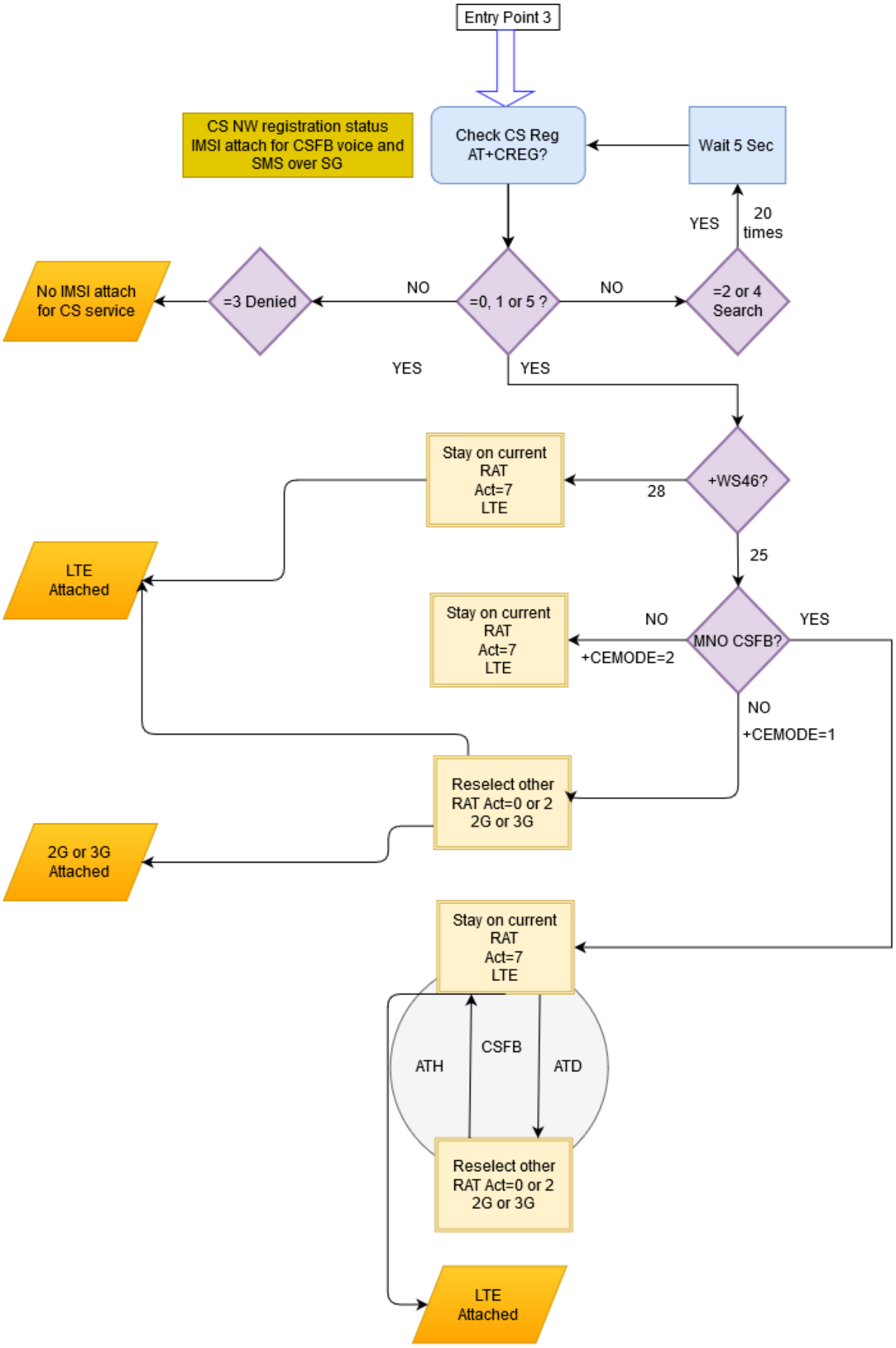
#WS46 - Select IoT Technology = 0 - 2 (Cat.M) 1 - 3 (NB-IoT)



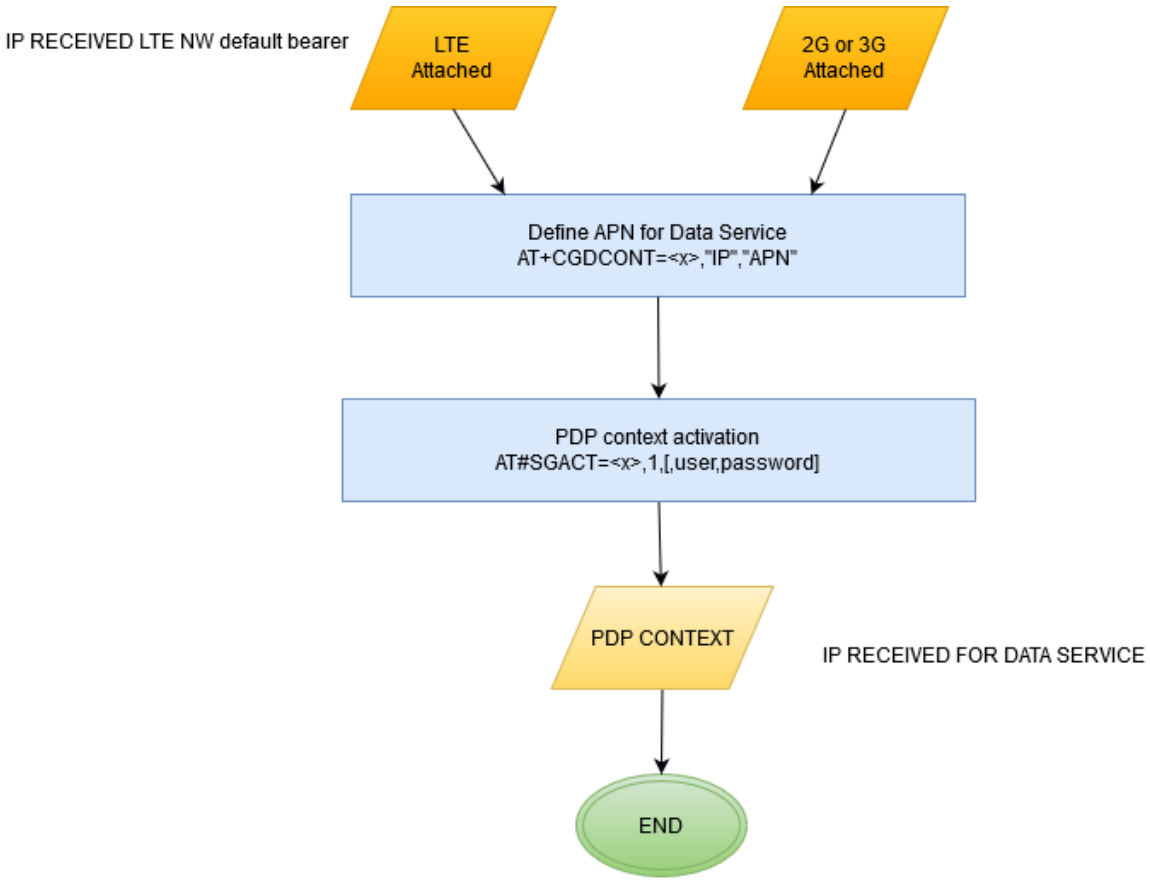
NOTE1: *the suggested theshold level can be adapted depending on final application requirements*



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*



4.1. 4G PDP context



Legend:

- **CS** – Circuit Switch
- **PS** – Packet Switch
- **AcT** – Access Technology
- **NW** – Network / Carrier
- **RAT** – Radio Access Technology
- **CSFB** – Circuit Switched FallBack
- **PDN** – Packet Data Network
- **LTE** – Long Term Evolution
- **VoLTE** – Voice Over LTE
- **MNO** – Mobile Network Operator
- **PDP** – Packet Data Protocol
- **E-UTRAN** – Evolved UMTS Terrestrial Radio

5. RAT/PLMN SELECTION

5.1. Automatic selection

The search order during RAT/PLMN selection is determined by either the module setting (NV parameters) and files in the (U)SIM card, which have higher priority.
The module should select last registered PLMN (LRPLMN) or equivalent PLMN (if it is available) using all access technologies that the MS is capable of.
As reported in the 3GPP 23.122 [1], section 4.4.3.1, if there is no LRPLMN, or if registration is not possible due to the PLMN being unavailable or registration failure at switch on or recovery from lack of coverage, the module should selects and attempts registration on PLMNs if available and allowable using all access technologies that the module is capable in the following order:

I. 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);
II. each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
III. 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)
IV. other PLMN/access technology combinations with received high quality signal in random order;
V. other PLMN/access technology combinations in order of decreasing signal quality.

High quality signal is defined by:

- 3GPP TS 43.022 [2] for the GSM radio access technology as a signal level (RSSI) stronger than -85 dBm;
- 3GPP TS 25.304 [6] for the UMTS radio access technology as a signal level (RSCP) stronger than -96dBm;
- 3GPP TS 36.304 [9] for the LTE radio access technology as a signal level (RSRP) stronger than -110dBm;

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).

5.1.1. Roaming registration on VPLM

If the module is in a VPLMN (Visitor PLMN), it shall periodically search for its HPLMN or a higher priority PLMN/access technology combination listed in II and III as defined in the RAT/PLMN selection chapter. Specific timer may be stored in the USIM.
In steps I, II and III of subclause 4.4.3.1.1 the MS shall limit its attempts to access PLMN/access technology combinations of the same country as the current serving VPLMN.
More information can be found on 3GPP 23.122 [1] section "4.4.3.3 In VPLM".

5.1.2. How to delete EFLOCI file in the USIM

In the particular scenario where the module is tested on country A and deployed on country B, in order to skip point (I.) the last registered PLMN (LRPLMN) can be deleted (for all the other cases, deleting the LRPLMN 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 USIM field (EFLOCI - Location Information - Identifier: '6F7E'). 3 methods are possible:
1) Using **AT+CSIM** and opening a USIM logical channel

```
AT+CSIM=14,"00A40804022F00"
+CSIM:
76,"6222820542210020183022F00A506C00140DE01008A01058B032F060380020020880
1F09000"
OK
AT+CSIM=10,"00B2010420"
+CSIM:
68,"61124F10A0000000871002FFFFFFFF89060400FFFFFFFFFFFFFFFFFFFFFFFF900
0"
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 USIM;

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
OK

Note/Tip: It could happen that between first **+CSIM** and second one, module access the USIM 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 USIM access happened in between) they must be sent again.

Once the AID of a USIM 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 USIM and then clear it out the LRPLMN).

AT+CRSM=176,28542,0,0,11 // Reads EFLOCI field (28542 is 6F7E in decimal format)
+CRSM: 144,0,A80B7CDB22F210D5BDFF00 //PLMN info

OK

AT+CRSM=214,28542,0,0,11,FFFFFFFFFFFFFFFFFFFFFFFF //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,FFFFFFFFFFFFFFFFFFFFFFFF

OK

5.1.3. 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

5.1.4. Forbidden PLMN in USIM

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 USIM 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.

Note/Tip: 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.

5.1.5. 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

5.2. GERAN Frequency scan and cell selection

The MS should search for a network at lack (or loss) of coverage - i.e. if the received signal strength or quality is no longer sufficient to camp on the registered network. The state Loss of coverage is achieved, if in the current cell the path loss criterion (C1, GSM) or the criterion for a downlink signalling failure (GSM) are fulfilled or the cell selection criterion S is NOT fulfilled (UMTS) and a cell reselection is not possible - i.e. there is no suitable cell available in the registered network.
The module scans all the RF channels for the specific technology:

For GSM:

- 3GPP TS 03.22. (Release 99) or TS 43.022 [2] (Release 4 and higher) Chapter 4.5 'Cell selection process'
- 3GPP TS 05.08. (Release 99) or TS 45.008 [3] (Release 4 and higher) Chapter 6.5 'Downlink signalling failure' Chapter 6.6.2 'Path loss criteria and timings for cell reselection'

According to 3GPP TS 43.022 [2], in normal cell-selection state MS has no prior knowledge of which RF channels are BCCH or CPBCCH carriers.
The module lists the channels from the strongest to the weakest to see which are BCCH or CPBCCH carriers (3GPP paragraph 3.2.1 require to list up to 30 GSM850/900 and 40 DCS1800/PCS1900 channels while Telit algorithm lists up to 60 + 80 channels)
The first BCCH or CPBCCH carrier found which is from a suitable cell and on which there is a normal priority indication is taken and that cell is camped on.
If at least the number, given in subclause 3.2.1, of the strongest RF channels have been tried and the only suitable cells found have low priority indication the module shall camp on the strongest of these cells.
If, after searching the number of RF channels given for each frequency band, with the strongest received signal level, a BCCH or CPBCCH carrier has been found but no suitable cell of the selected PLMN has been found, the module can stop the attempt to find a suitable cell of the selected PLMN.

Telit 2G modules (Platform ID 13 - 16) supports a special AT command to change the number of channels in low (850/900) and high (1800/1900) bands that will be listed during frequency scan. It could be required to increase the number of channels scanned in specific network scenarios where GSM frequencies are refarmed to LTE or in any other case where LTE saturates the GSM bands.

AT#SERCHLIM =<GSMSearchLim>,<DCSPCSSearchLim>

Where:

- <GSMSearchLim>: setting the ARFCN number search limit for GSM 850 and GSM 900 bands. Default value is 60 and lower limit is 40. Upper limit is the maximum GSM ARFCN number available for the specific product.
- <DCSPCSSearchLim>: setting the ARFCN number search limit for DCS 1800 and PCS 1900 bands. Default value is 80 and lower limit is 60. Upper limit is the maximum DCS/PCS ARFCN number available for the specific product.

Note/Tip: On 3G and 4G modules (Platform ID 12 - 20 – 25 - 30 – 37) the command is not required even if they support 2G fallback. The channel list is filled with the maximum number of ARFCN channels available.

5.3. UTRAN Frequency scan and cell selection

The UE shall scan all RF channels in the UTRA bands according to its capabilities to find available PLMNs. On each carrier, the UE shall search for the strongest cell and read its system information, in order to find out which PLMN the cell belongs to. If the UE can read one or several PLMN identities in the strongest cell, each found PLMN (see the PLMN reading in [5]) shall be reported to the NAS as a high quality PLMN (but without the RSCP value), provided that the following high quality criterion is fulfilled:

- For an FDD cell, the measured primary CPICH RSCP value shall be greater than or equal to -95 dBm
- For a TDD cell, the measured P-CCPCH RSCP shall be greater than or equal to -84 dBm.

Found PLMNs that do not satisfy the high quality criterion, but for which the UE has been able to read the PLMN identities are reported to the NAS together with the CPICH RSCP value for UTRA FDD cells and P-CCPCH RSCP for UTRA TDD cells.

The quality measure reported by the UE to NAS shall be the same for each PLMN found in one cell. The search for PLMNs on the rest of the carriers may be stopped on request of the NAS. The UE may optimise this search by using stored information of carrier frequencies and optionally also information on cell parameters, e.g. scrambling codes, from previously received measurement control information elements.

Once the UE has selected a PLMN, the cell selection procedure shall be performed in order to select a suitable cell of that PLMN to camp on.
Different types of measurements are used in different RATs and modes for the cell selection and reselection. The performance requirements for the measurements are specified in 3GPP TS 25.133 [4] and 3GPP TS 34.123.

For UTRAN:

- 3GPP TS 25.304 [6]
  Chapter 5.2 'Cell selection and reselection in idle mode'
- 3GPP TS 25.133 [4]
  Chapter 4.2 'Cell Re-selection'

5.4. EUTRAN Frequency scan and cell selection

The UE shall scan all RF channels in the E-UTRA bands according to its capabilities to find available PLMNs. On each carrier, the UE shall search for the strongest cell and read its system information, in order to find out which PLMN(s) the cell belongs to. If the UE can read one or several PLMN identities in the strongest cell, each found PLMN (see the PLMN reading in [8]) shall be reported to the NAS as a high quality PLMN (but without the RSRP value), provided that the following high quality criterion is fulfilled:

- For an E-UTRAN cell, the measured RSRP value shall be greater than or equal to -110 dBm.

Found PLMNs that do not satisfy the high quality criterion, but for which the UE has been able to read the PLMN identities are reported to the NAS together with the RSRP value. The quality measure reported by the UE to NAS shall be the same for each PLMN found in one cell. The search for PLMNs may be stopped on request of the NAS. The UE may optimise PLMN search by using stored information e.g. carrier frequencies and optionally also information on cell parameters from previously received measurement control information elements. Once the UE has selected a PLMN, the cell selection procedure shall be performed in order to select a suitable cell of that PLMN to camp on.
UE shall perform measurements for cell selection and reselection purposes as specified in 3GPP TS 36.133 [7]

For E-UTRAN (cat.M or higher, NB-IoT):

- 3GPP TS 36.304 [9]
  Chapter 5.2 Cell selection and reselection

The Radio Access Technology (RAT) to operate can be configured with **AT+WS46**.

5.5. EUTRAN Cat.M and NB-IoT selection (Platform ID 30-37)

The dual-mode Cat M1/NB1/NB2 modules offer the possibility to work on enhanced machine-type communication (eMTC) and Narrowband IoT (NB-IoT) technologies.

In order to optimize network registration time, related AT commands can be used to set the IoT searching sequence, RAT(s) to be searched, PLMN under LTE RAT, and preferred bands.

AT#WS46=<LTE_technology>

The device is configured as one of (0) M1 only, (1) NB1/NB2 only, (2) M1 preferred, or (3) NB1/NB2 preferred device.

To limit the scan time specific bands can be enabled with **AT#BND** and **AT#IOTBND** commands.

Note/Tip: Specially on WW variants, it could be required to limit the bands used on a specific region (NA, LATAM, EMEA, APAC) because of the high numbers of band supported by the module.

At power up, during very first registration (module/SIM system never registered before on a specific country) the device does a full scan over the applicable RF bands for the preferred system (**AT#WS46**) and, if unavailable, for the other systems.
Full scan can take several tens of minutes depending on number of RAT(s) and bands enabled (up to 3 minutes to scan a single NB-IoT band).
To keep first registration time short it could be required to limit the number of RAT(s) and bands used by the device or choose a PLMN in manual selection.
If the device camps on the non-preferred system, it will perform periodic searches for the priority system in the foreground every 60 minutes (IRAT timer)

Telit developed a dedicated command to customize the IRAT timer:
AT#IRATTIMER (available from 30.00.xx9 and 37.00.xx2).

When OOS (out-of-service) in the camped RAT/system, the device performs periodic search for any available PLMN in the same RAT and different bands before switching to another RAT.

Warning: After a network detach (e.g. shutdown) the last RAT is saved in NV parameter in the module. At next power on, the module will search for last RAT used, even if not preferred. This implementation allows to keep the registration time as short as possible.

Warning: There is no idle or connect state mobility across M1 and NB1 systems. (i.e. Inter-RAT mobility, not supported.)

To change the SNR level used when scanning the network the following command can be used:
AT#SNRSET (available from 30.00.xx9 and 37.00.xx2).
It sets a specifc NV item "snr_level_scan_scope" in the module:

- 1: UE tries SNR level 0 band scan; (fastest scan time – high signal level)
- 2: UE tries SNR level 0 and level 1 band scan;
- 3: UE tries SNR level 0, level 1, and level 2 band scan.(slowest scan time – low signal levell)

6. PDP CONTEXT ACTIVATION AND DEACTIVATION

PDP activation and deactivation timeouts are defined by 3GPP 24.008 [10] 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
PDP deact

Note/Tip: PDP deactivation is performed in backgroud after the OK. Check AT#SGACT? to verify the status, before a new activation of the same CID.

Note/Tip: in case PDP activation on CIDx is failing, while USB port is connected to an external device/PC running Windows or Linux O.S., verify that WWAN port is not enabled, taking control of that specific PDP context

7. REFERENCES

[1] 3GPP TS 23.122 “Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode”.

[2] 3GPP TS 43.022 “Functions related to Mobile Station (MS) in idle mode and group receive mode”.

[3] 3GPP TS 45.008 "Radio subsystem link control".

[4] 3GPP TS 25.133 "Requirements for support of radio resource management (FDD)".

[5] 3GPP TS 25.331: "Radio Resource Control (RRC); protocol specification".

[6] 3GPP TS 25.304 “User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode”.

[7] 3GPP TS 36.133 "Requirements for support of radio resource management"

[8] 3GPP TS 36.331: "E-UTRA; Radio Resource Control (RRC) - Protocol Specification"

[9] 3GPP TS 36.304 "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

[10] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification, Core Network Protocols - Stage 3".

8. PRODUCT AND SAFETY INFORMATION

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8.3. Safety Recommendations

Make sure the use of this product is allowed in your country and in the environment required. The use of this product may be dangerous and has to be avoided in areas where:

- it can interfere with other electronic devices, particularly in environments such as hospitals, airports, aircrafts, etc.
- there is a risk of explosion such as gasoline stations, oil refineries, etc. It is the responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conformed to the security and fire prevention regulations. The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself. Same cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.

The system integrator is responsible for the functioning of the final product. Therefore, the external components of the module, as well as any project or installation issue, have to be handled with care. Any interference may cause the risk of disturbing the GSM network or external devices or having an impact on the security system. Should there be any doubt, please refer to the technical documentation and the regulations in force. Every module has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed carefully in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

The equipment is intended to be installed in a restricted area location.

The equipment must be supplied by an external specific limited power source in compliance with the standard EN 62368-1:2014.

The European Community provides some Directives for the electronic equipment introduced on the market. All of the relevant information is available on the European Community website:

https://ec.europa.eu/growth/sectors/electrical-engineering_en

9. GLOSSARY

RAT	Radio Access Technology
PLMN	Public Land Mobile Network
LRPLMN	Last Regisered Public Land Mobile Network
HPLMN	Home Public Land Mobile Network
EHPLMN	Equivalent Home Public Land Mobile Network
VPLMN	Visited Public Land Mobile Network
GSM	Global System Mobile
UMTS	Universal Mobile Telecommunication System
LTE	Long Term Evolution
(U)SIM	Universal Subscriber Identity Module
EF	Elementary File (SIM/USIM)
LOCI	LOCation Information
AID	Application Identifier
APDU	Application Protocol Data Unit
VSIM	Virtual Subscriber Identity Module
FPLMN	Forbidden Public Land Mobile Network
MCC	Mobile Country Code
MNC	Mobile Network Code
C1	Path loss criterion parameter
MS	Mobile Station
RF	Radio Frequency
BCCH	Broadcast Control Channel
CPBCCH	Compact Packet Broadcast Control Channel
DCS	Digital Cellular System
PCS	Personal Communications Service
UE	User Equipment
UTRA	UMTS Terrestrial Radio Access
NAS	Non Access Stratum
RSCP	Received Signal Code Power

FDD	Frequency Division Duplex
TDD	Time Division Duplex
CPICH	Common Pilot Channel
CCPCH	Common Control Physical Channel
3GPP	Third Generation Partnership Projet
GERAN	GSM EDGE Radio Access Network
UTRAN	UMTS Terrestrial Radio Access Network
EUTRAN	Evolved UMTS Terrestrial Radio Access Network
RSRP	Reference Signal Received Power
NB	Narrow Band
SNR	Signal to Noise Ratio
PDP	Packet Data Protocol
CID	Context Identifier
WWAN	Wireless Wide Area Network
USB	Universal Serial Bus

10. DOCUMENT HISTORY

Revision	Date	Changes
2	2021-01-26	Modified paragraphs 3 and 4 flow charts Updated legend on paragraphs 4.1 Added new paragraphs 5.1.1, 5.2, 5.3, 5.4, 5.5, 6, 7, 8, 9 and 10
1	2018-06-18	Added new method to delete EF_LOCI in 5.1.2 New paragraphs 5.1.2, 5.1.4, 5.1.5, 5.2
0	2018-06-03	First issue

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