**3GPP TSG-CT WG1 Meeting #128-eC1-21XXX**

**Electronic meeting, 25 February – 5 March 2021 *was C1-210955***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **27.007** | **CR** | **0713** | **rev** | **1** | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | AT command for CAG selection | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GProtoc17, Vertical\_LAN | | | | |  | ***Date:*** | | | 2021-02-18 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) ... Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Currently there is no AT command to support the CAG related functions. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | New AT commands added to support the CAG feature | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No AT command for CAG feature | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.2, 7.4X (new), 10.1.47 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\*\*\* start of 1st change\*\*\*\*\*

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

5GCN 5G Core Network

5GS 5G System

AT ATtention; this two‑character abbreviation is always used to start a command line to be sent from TE to TA

ASCI Advanced Speech Call Items, including VGCS, VBS and eMLPP

BCD Binary Coded Decimal

BL Bandwidth reduced Low complexity

CAG Closed Access Group

CBR Channel Busy Ratio

CSG Closed Subscriber Group

eMLPP Enhanced Multi-Level Precedence and Pre-emption Service

ETSI European Telecommunications Standards Institute

FTM Frame Tunnelling Mode (refer 3GPP TS 27.001 [41] and 3GPP TS 29.007 [42])

HRNN Human-Readable Network Name

HSCSD High Speed Circuit Switched Data

IMEI International Mobile station Equipment Identity

IRA International Reference Alphabet (ITU‑T Recommendation T.50 [13])

IrDA Infrared Data Association

ISO International Standards Organization

ITU‑T International Telecommunication Union ‑ Telecommunications Standardization Sector

ME Mobile Equipment

MMTEL Multimedia Telephony

MoU Memorandum of Understanding (GSM operator joint)

MT Mobile Termination

MTU Maximum Transfer Unit

NB-IoT NarrowBand Internet of Things

NG-RAN Next Generation Radio Access Network

NSLPI NAS Signalling Low Priority Indication

PCCA Portable Computer and Communications Association

PTT Push to Talk

RDI Restricted Digital Information

RLP Radio Link Protocol

SIM Subscriber Identity Module

TA Terminal Adaptor, e.g. a GSM data card (equal to DCE; Data Circuit terminating Equipment)

TE Terminal Equipment, e.g. a computer (equal to DTE; Data Terminal Equipment)

TIA Telecommunications Industry Association

UDI Unrestricted Digital Information

UE User Equipment

UICC Universal Integrated Circuit Card

USAT USIM Application Toolkit

USIM Universal Subscriber Identity Module

VAE V2X Application Enabler

VBS Voice Broadcast Service

VGCS Voice Group Call Service

\*\*\*\*\* end of 1st change\*\*\*\*\*

\*\*\*\*\* start of 2nd change\*\*\*\*\*

## 7.X CAG selection +CCAGS

Table 7.43: +CCAGS parameter command syntax

|  |  |
| --- | --- |
| Command | Possible response(s) |
| +CCAGS=[<mode>[,<format>[,<CAGinfo>[,<AcT>]]]] | +CCAGS*: <AcT>* |
| +CCAGS? | +CCAGS: <mode>[,<format>,<CAGinfo>[,<AcT>]] |
| +CCAGS=? | +CCAGS: (list of supported <mode>s) |

**Description**

Set command triggers the MT to select and register on a CAG cell. <mode> is used to determine whether the selection is done automatically by the MT or is done in manual selection mode on the CAG cell identified by <CAGinfo> (which shall be given in format <format>) to a certain access technology, indicated in <AcT>. If the selected CAG cell is not available, then the MT shall follow the procedures described in 3GPP TS 23.122 subclause 4.4.3.1.2. The selected CAG info format shall apply to further read commands (+CCAGS?) also. <mode>=0 forces an attempt to register to the CAG cell in NR/5GS network. <mode>=1 forces an attempt to do manual CAG selection to a CAG cell as per information in CAGinfo <CAGinfo>.

This command is used when the ME has successfully registered to a PLMN i.e. the UE executed Operator Selection (+COPS) command successfully.

Read command returns the current CAG selection mode, the currently selected CAG cell information <CAGinfo> and the current Access Technology. If the ME is not camped on a CAG cell when read command is issued, +CME ERROR: XX (Not camped on CAG cell) shall be issued.

Test command returns a set of four parameters. A set consists of an integer indicating the availability of the CAG cell in provisioned CAG list or pre-configured CAG list <stat>, HRNN, CAG ID and Associated PLMN MCC MNC<CAGinfo>, numeric format representation of the CAG ID and Asssociated PLMN MCC MNC <CAGinfo> and access technology <AcT>. <CAGinfo> consist of HRNN, CAG ID and Associated PLMN MCC MNC, each delimited by a comma.. See 3GPP TS 23.003 [7] for details of HRNN and CAG ID representation. Any of the formats may be unavailable and should then be an empty field. The list of found CAG's shall be in order: CAG's in the "Allowed CAG list", other CAG's.

It is recommended (although optional) that after the CAG list TA returns lists of supported <mode>s and <format>s. These lists shall be delimited from the CAG list by two commas.

**Defined values**

<mode>: integer type

0 automatic CAG selection mode (<CAGinfo> field is ignored)

1 manual CAG selection mode (<CAGinfo> field shall be present, and <AcT> optionally)

<format>: integer type

0 alphanumeric <CAGinfo>

1 numeric <CAGinfo>

<CAGinfo>: string type; <format> indicates if the format is alphanumeric or numeric

CAGinfo consists of HRNN, CAG ID and Associated PLMN MCC MNC, each delimited by a comma and in this particular order only. If any of the HRNN,CAG ID is unavailable, it shall be an empty field. When selecting the CAG using the set command with <mode> as 1, the CAG ID and associated PLMN MCC MNC are mandatory while the HRNN is optional.

In the alphanumeric format HRNN, CAG ID and Associated PLMN MCC MNC would be displayed while in numeric format only CAG ID and CAG Associated PLMN MCC MNC would be displayed.

<stat>: integer type

0 unknown CAG

1 present in "Allowed CAG list"

<AcT>: integer type; access technology selected

0 NR

**Implementation**

Optional.

This command is only applicable to UEs in NG-RAN.

\*\*\*\*\* end of 2nd change\*\*\*\*\*\*\*\*\*\* start of 3rd change\*\*\*\*\*

### 10.1.47 5GS network registration status +C5GREG

Table 10.1.47-1: +C5GREG parameter command syntax

|  |  |
| --- | --- |
| Command | Possible response(s) |
| +C5GREG=[<n>] | *+CME ERROR: <err>* |
| +C5GREG? | **when <n>=0, 1, 2 or 3 and command successful:**  +C5GREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed\_NSSAI\_length>],[<Allowed\_NSSAI>][,<cause\_type>,<reject\_cause>]]  **when <n>=4 or 5 and command successful:**  +C5GREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>][,[<cause\_type>],[<reject\_cause>]]] |
| +C5GREG=? | +C5GREG: (list of supported <n>s) |

**Description**

The set command controls the presentation of an unsolicited result code +C5GREG: <stat> when <n>=1 and there is a change in the MT's network registration status in 5GS, or unsolicited result code +C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed\_NSSAI\_length>],[<Allowed\_NSSAI>]] when <n>=2 and there is a change of the network cell in 5GS or the network provided an Allowed NSSAI. The parameters <AcT>, <tac>, <ci>, <Allowed\_NSSAI\_length> and <Allowed\_NSSAI> are provided only if available. The value <n>=3 further extends the unsolicited result code with [,<cause\_type>,<reject\_cause>], when available, when the value of <stat> changes. The value <n>=4 extends the unsolicited result code with [,<cag\_stat>] when the value of <cag\_stat> changes. The value <n>=5 extends the unsolicited result code with [,<caginfo>] when UE camps on a CAG cell. <caginfo> is displayed only when <cag\_stat> is 1.

Refer subclause 9.2 for possible <err> values.

NOTE 1: If the 5G MT in GERAN/UTRAN/E-UTRAN also supports one or more of the circuit mode services, GPRS services or EPS services, the +CREG command and +CREG: result codes, the +CGREG command and +CGREG: result codes and the +CEREG command and +CEREG: result codes apply to the registration status and location information for those services.

The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements <tac>, <ci> and <AcT>, and parameters <Allowed\_NSSAI\_length>, <Allowed\_NSSAI>, if available, are returned only when <n>=2 and MT is registered in the network. The parameters [,<cause\_type>,<reject\_cause>], if available, are returned when <n>=3.

Test command returns values supported as a compound value. The parameter [,<cag\_stat>], if available, is returned when <n>=4. The parameter [,<caginfo>], if available, is returned when <n>=5.

**Defined values**

<n>: integer type

0 disable network registration unsolicited result code

1 enable network registration unsolicited result code +C5GREG: <stat>

2 enable network registration and location information unsolicited result code +C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed\_NSSAI\_length>],[<Allowed\_NSSAI>]]

3 enable network registration, location information and 5GMM cause value information unsolicited result code +C5GREG: <stat>[,[<tac>],[<ci>],[<AcT>],[<Allowed\_NSSAI\_length>],[<Allowed\_NSSAI>][,<cause\_type>,<reject\_cause>]]

4 enable network registration, location information, cause value information, CAG cell status information unsolicited result code +C5GREG: <stat>[,[<lac>],[<ci>],[<AcT>][,<cause\_type>,<reject\_cause>]][,<cag\_stat>]

5 enable network registration, location information, cause value information, CAG cell status information and CAG cell information unsolicited result code +C5GREG: <stat>[,[<lac>],[<ci>],[<AcT>][,<cause\_type>,<reject\_cause>]][,<cag\_stat>][,<caginfo>]

<stat>: integer type; indicates the NR registration status.

0 not registered, MT is not currently searching an operator to register to

1 registered, home network

2 not registered, but MT is currently trying to attach or searching an operator to register to

3 registration denied

4 unknown (e.g. out of NR coverage)

5 registered, roaming

6 registered for "SMS only", home network (not applicable)

7 registered for "SMS only", roaming (not applicable)

8 registered for emergency services only (See NOTE 2)

9 registered for "CSFB not preferred", home network (not applicable)

10 registered for "CSFB not preferred", roaming (not applicable)

11 attached for access to RLOS (See NOTE 2a) (not applicable)

NOTE 2: 3GPP TS 24.501 [161] specifies the condition when the MT is considered as registered for emergency services.

NOTE 2a: 3GPP TS 24.301 [83] specifies the condition when the MT is considered as attached for access to RLOS.

<tac>: string type; three byte tracking area code in hexadecimal format (e.g. "0000C3" equals 195 in decimal).

<ci>: string type; five byte NR cell ID in hexadecimal format.

<Allowed\_NSSAI\_length>: integer type; indicates the number of octets of the <Allowed\_NSSAI> information element.

<Allowed\_NSSAI>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs received from the network. The <Allowed\_NSSAI> is coded as a list of <S-NSSAI>s separated by colons. Refer parameter <S-NSSAI> in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per +CSCS.

<AcT>: integer type; indicates the access technology of the serving cell.

0 GSM (not applicable)

1 GSM Compact (not applicable)

2 UTRAN (not applicable)

3 GSM w/EGPRS (see NOTE 3) (not applicable)

4 UTRAN w/HSDPA (see NOTE 4) (not applicable)

5 UTRAN w/HSUPA (see NOTE 4) (not applicable)

6 UTRAN w/HSDPA and HSUPA (see NOTE 4) (not applicable)

7 E-UTRAN (not applicable)

8 EC-GSM-IoT (A/Gb mode) (see NOTE 5) (not applicable)

9 E-UTRAN (NB-S1 mode) (see NOTE 6) (not applicable)

10 E-UTRA connected to a 5GCN (see NOTE 7)

11 NR connected to a 5GCN (see NOTE 7)

12 NG-RAN (not applicable)

13 E-UTRA-NR dual connectivity (see NOTE 8) (not applicable)

NOTE 3: 3GPP TS 44.018 [156] specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

NOTE 4: 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

NOTE 5: 3GPP TS 44.018 [156] specifies the EC-SCH INFORMATION message which, if present, indicates that the serving cell supports EC-GSM-IoT.

NOTE 6: 3GPP TS 36.331 [86] specifies the System Information blocks which give the information about whether the serving cell supports NB-IoT, which corresponds to E-UTRAN (NB-S1 mode).

NOTE 7: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is connected to a 5GCN.

NOTE 8: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

<cause\_type>: integer type; indicates the type of <reject\_cause>.

0 Indicates that <reject\_cause> contains an EMM cause value, see 3GPP TS 24.301 [83] Annex A.

1 Indicates that <reject\_cause> contains a manufacturer-specific cause.

<reject\_cause>: integer type; contains the cause of the failed registration. The value is of type as defined by <cause\_type>.

<cag\_stat>: integer type; indicates the camping status on a CAG cell

0 Indicates UE is not camped on CAG cell.

1 Indicates UE is currently camped on CAG cell.

<CAGinfo>: string type;

CAGinfo consists of HRNN, CAG ID and Associated PLMN MCC MNC each delimited by a comma and in this particular order only. If any of the HRNN or CAG ID is unavailable, it shall be an empty field.

The display format is based on <format> value in +CCAGS command. In the alphanumeric format HRNN, CAG ID and Associated PLMN MCC MNC would be displayed while in numeric format only CAG ID and CAG Associated PLMN MCC MNC would be displayed. See 3GPP TS 23.003 [7] for details of HRNN and CAG ID representation.

**Implementation**

Optional. This command is only applicable to UEs supporting 5GS.

\*\*\*\*\* end of 3rd change\*\*\*\*\*