**ƒ3GPP TSG-RAN WG2 Meeting #109e *R2-2002346***

**Elbonia, 24 February – 6 March 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** | **2** | **Current version:** |  |  |
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| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network | **x** |

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| ***Title:*** | Non-Public Networks | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia , China Telecom (Rapporteurs) | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NG\_RAN\_PRN | | | | |  | ***Date:*** | | | 2020-03 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | 16 |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This CR introduces the support for Non-Public Networks in NG-RAN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | High level description of Non-Public Networks is added: first an overview of Stand-Alone NPN and then one of the Public Network Integrated NPN are given. | | | | | | | | |
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| ***Consequences if not approved:*** | | No Stage 2 description of Non-Public Networks for NG-RAN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.1, 3.2, 4.x (new), 8.2, 16.x (new), 16.y (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.331 CR 1468 TS 38.304 CR 0148 | | |
| ***affected:*** | |  | **x** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*First Modified Subclause*

## 3.1 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], in TS 36.300 [2] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1] and TS 36.300 [2].

5GC 5G Core Network

5QI 5G QoS Identifier

A-CSI Aperiodic CSI

AKA Authentication and Key Agreement

AMBR Aggregate Maximum Bit Rate

AMC Adaptive Modulation and Coding

AMF Access and Mobility Management Function

ARP Allocation and Retention Priority

BA Bandwidth Adaptation

BCH Broadcast Channel

BPSK Binary Phase Shift Keying

C-RNTI Cell RNTI

CAG Closed Access Group

CBRA Contention Based Random Access

CCE Control Channel Element

CD-SSB Cell Defining SSB

CFRA Contention Free Random Access

CMAS Commercial Mobile Alert Service

CORESET Control Resource Set

DFT Discrete Fourier Transform

DCI Downlink Control Information

DL-SCH Downlink Shared Channel

DMRS Demodulation Reference Signal

DRX Discontinuous Reception

ETWS Earthquake and Tsunami Warning System

GFBR Guaranteed Flow Bit Rate

HRNN Human-Readable Network Name

I-RNTI Inactive RNTI

INT-RNTI Interruption RNTI

LDPC Low Density Parity Check

MDBV Maximum Data Burst Volume

MIB Master Information Block

MICO Mobile Initiated Connection Only

MFBR Maximum Flow Bit Rate

MMTEL Multimedia telephony

MNO Mobile Network Operator

MU-MIMO Multi User MIMO

NCGI NR Cell Global Identifier

NCR Neighbour Cell Relation

NCRT Neighbour Cell Relation Table

NGAP NG Application Protocol

NID Network Identifier

NPN Non-Public Network

NR NR Radio Access

P-RNTI Paging RNTI

PCH Paging Channel

PCI Physical Cell Identifier

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PNI-NPN Public Network Integrated NPN

PO Paging Occasion

PRACH Physical Random Access Channel

PRB Physical Resource Block

PRG Precoding Resource block Group

PSS Primary Synchronisation Signal

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

PWS Public Warning System

QAM Quadrature Amplitude Modulation

QFI QoS Flow ID

QPSK Quadrature Phase Shift Keying

RA-RNTI Random Access RNTI

RACH Random Access Channel

RANAC RAN-based Notification Area Code

REG Resource Element Group

RMSI Remaining Minimum SI

RNA RAN-based Notification Area

RNAU RAN-based Notification Area Update

RNTI Radio Network Temporary Identifier

RQA Reflective QoS Attribute

RQoS Reflective Quality of Service

RS Reference Signal

RSRP Reference Signal Received Power

RSRQ Reference Signal Received Quality

SD Slice Differentiator

SDAP Service Data Adaptation Protocol

SFI-RNTI Slot Format Indication RNTI

SIB System Information Block

SI-RNTI System Information RNTI

SLA Service Level Agreement

SMC Security Mode Command

SMF Session Management Function

SNPN Stand-alone Non-Public Network

S-NSSAI Single Network Slice Selection Assistance Information

SPS Semi-Persistent Scheduling

SR Scheduling Request

SRS Sounding Reference Signal

SS Synchronization Signal

SSB SS/PBCH block

SSS Secondary Synchronisation Signal

SST Slice/Service Type

SU-MIMO Single User MIMO

SUL Supplementary Uplink

TA Timing Advance

TPC Transmit Power Control

UCI Uplink Control Information

UL-SCH Uplink Shared Channel

UPF User Plane Function

URLLC Ultra-Reliable and Low Latency Communications

Xn-C Xn-Control plane

Xn-U Xn-User plane

XnAP Xn Application Protocol

## 3.2 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1], in TS 36.300 [2] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1] and TS 36.300 [2].

**CAG Cell:** a cell broadcasting at least one Closed Access Group identity.

**CAG Member Cell:** for a UE, a cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN, and for that PLMN, a CAG identifier belonging to the Allowed CAG list of the UE for that PLMN.

**CAG-only cell:** a cell providing access only to CAGs.

**Cell-Defining SSB:** an SSB with an RMSI associated.

**CORESET#0**: the control resource set for at least SIB1 scheduling, can be configured either via MIB or via dedicated RRC signalling.

**gNB**: node providing NR user plane and control plane protocol terminations towards the UE, and connected via the NG interface to the 5GC.

**Intra-system Handover:** Handover that does not involve a CN change (EPC or 5GC).

**Inter-system Handover:** Handover that involves a CN change (EPC or 5GC).

**MSG1**: preamble transmission of the random access procedure.

**MSG3**: first scheduled transmission of the random access procedure.

**ng-eNB**: node providing E-UTRA user plane and control plane protocol terminations towards the UE, and connected via the NG interface to the 5GC.

**NG-C**: control plane interface between NG-RAN and 5GC.

**NG-U**: user plane interface between NG-RAN and 5GC.

**NG-RAN node**: either a gNB or an ng-eNB.

**Numerology**: corresponds to one subcarrier spacing in the frequency domain. By scaling a reference subcarrier spacing by an integer *N*, different numerologies can be defined.

**SNPN Access Mode:** mode of operation whereby a UE only accesses SNPNs.

**SNPN-only cell:** a cell providing access only to SNPNs.

**Xn:** network interface between NG-RAN nodes.

*Next Modified Subclause (new)*

## 4.x Non-Public Networks

A Non-Public Network (NPN) is a network for non-public use (see 3GPP TS 22.261 [19]), which can be deployed as (see 3GPP TS 23.501 [3]):

- a Stand-alone Non-Public Network (SNPN) when not relying on network functions provided by a PLMN; or

- a Public Network Integrated (PNI) NPN when relying on the support of a PLMN.

*Next Modified Subclause*

## 8.2 Network Identities

The following identities are used in NG-RAN for identifying a specific network entity:

- AMF Name: used to identify an AMF.

- NR Cell Global Identifier (NCGI): used to identify NR cells globally. The NCGI is constructed from the PLMN identity the cell belongs to and the NR Cell Identity (NCI) of the cell.

- gNB Identifier (gNB ID): used to identify gNBs within a PLMN. The gNB ID is contained within the NCI of its cells.

- Global gNB ID: used to identify gNBs globally. The Global gNB ID is constructed from the PLMN identity the gNB belongs to and the gNB ID. The MCC and MNC are the same as included in the NCGI.

- Tracking Area identity (TAI): used to identify tracking areas. The TAI is constructed from the PLMN identity the tracking area belongs to and the TAC (Tracking Area Code) of the Tracking Area.

- Single Network Slice Selection Assistance information (S-NSSAI): identifies a network slice.

- Network Identifier (NID): identifies an SNPN in combination with a PLMN ID.

- Closed Access Group Identifier: identifies a CAG within a PLMN. *Next Modified Subclause (new)*

## 16.x Stand-Alone NPN

### 16.x.1 General

A SNPN is a network deployed for non-public use which does not rely on network functions provided by a PLMN (see subclause 4.x). An SNPN is identified by a PLMN ID and NID (see subclause 8.2) broadcast in SIB1.

An SNPN-capable UE supports the SNPN access mode. When the UE is set to operate in SNPN access mode, the UE only selects and registers with SNPNs. When the UE is not set to operate in SNPN access mode, the UE performs normal PLMN selection procedures.

Emergency services are not supported in SNPN.

### 16.x.2 Mobility

The same principles as described in 9.2 apply to SNPN except for what is described below.

UEs operating in SNPN access mode only (re)select cells within the selected/registered SNPN and a cell can only be considered as suitable if the PLMN and NID broadcast by the cell matches the selected/registered SNPN.

An SNPN-only cell can only be suitable for its subscribers and is barred otherwise.

In addition, manual selection of SNPN(s) is supported, for which HRNN(s) can be optionally provided.

## 16.y Public Network Integrated NPN

### 16.y.1 General

A PNI-NPN is a network deployed for non-public use which relies on network functions provided by a PLMN (see subclause 4.x). In PNI-NPN, a Closed Access Groups (CAG) identifies a group of subscribers who are permitted to access one or more CAG cells associated to the CAG. A CAG is identified by a CAG identifier broadcast in SIB1.

A CAG-capable UE can be configured with the following per PLMN (see clause 5.30.3.3 of TS 23.501 [3]):

- an Allowed CAG list containing the CAG identifiers which the UE is allowed to access; and

- a CAG-only indication if the UE is only allowed to access 5GS via CAG cells.

### 16.y.2 Mobility

The same principles as described in 9.2 apply to CAG cells except for what is described below.

Cell selection/reselection to CAG cells may be based on a UE autonomous search function, which determines itself when/where to search, but cannot contradict the dedicated cell reselection priority information if any is stored.

A range of PCI values reserved by the network for use by CAG cells maybe broadcast.

A CAG Member Cell for a UE is a cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN, and for that PLMN, a CAG identifier belonging to the Allowed CAG list of the UE for that PLMN. The UE checks the suitability of CAG cells based on the Allowed CAG list provided by upper layers and a CAG-only cell can only be suitable for its subscribers but can be acceptable for the rest.

NOTE: A Rel-15 UE considers a CAG-only cell as acceptable cell if the cell is not barred to Rel-15 UEs, and if a PLMN ID without CAG list is broadcast and that PLMN is forbidden (e.g. by use of a PLMN ID for which all registration attempts are rejected such that the PLMN ID becomes forbidden). When the UE is configured with a CAG-only indication, only CAG Member Cells can be suitable. A non-suitable cell can be acceptable though if the UE is configured with a CAG-only indication for one of the PLMN broadcast by the cell.

In addition, manual selection of CAG cell(s) is supported, for which an HRNN(s) can be optionally provided.

Annex A (informative):  
WG Agreements

This temporary annex lists all agreements reached in RAN2 and RAN3 and will be removed in the final version.

## RAN2#107

Agreements

1 The SNPNs (identified by PLMN ID + NID) are broadcasted in SIB1,

FFS whether this is achieved by extending the legacy network list or by introducing a new SNPN specific network list or both.

2 The size and format of the NID will not be discussed in RAN2 (we will be informed by other groups)

3 Up to 12 different SNPNs can be broadcasted in a cell.

4 If “mixed” network sharing is allowed (i.e. a cell can contain both PLMNs and NPNs), the total number of networks indicated in SIB1 (i.e. #PLMN + #SNPN + #PNI-NPN) shall not exceed 12.

5 If HRNN are broadcast then the HRNN should a be broadcasted in a separate SIB (i.e. different from SIB1).

6 SNPN selection functions similar to normal PLMN selection: AS reports the found SNPNs (identified by PLMN ID + NID) to NAS which selects the network. In case of manual selection, the human readable network name (if broadcasted) may also be provided from AS to NAS.

7 Once the UE has selected an SNPN, cell selection/re-selection is only performed within the SNPN, i.e. a cell is only considered suitable if the broadcasted SNPN identifier matches the selected SNPN.

Agreements

1 The PNI-NPNs (identified by PLMN ID + CAG ID) are broadcasted in SIB1

FFS whether this is achieved by extending the legacy network list or by introducing a new PNI-NPN specific network list or both

2 The size and format of the CAG ID will not be discussed in RAN2 (we will be informed by other groups)

3 Up to 12 different PNI-NPNs can be broadcasted in a cell.

4 If HRNN are broadcast then the HRNN should a be broadcasted in a separate SIB (i.e. different from SIB1).

5 Network selection is triggered by NAS whereby AS reports the available PNI-NPNs (identified by PLMN ID + CAG ID) to NAS which selects the network to use. In case of manual network selection, the human readable network name (if broadcasted) may also be provided from AS to NAS.

6 The Allowed CAG list and “CAG only” indication received from upper layers are taken into account in the cell suitability check during cell selection/re-reselection.

Agreements

1 There is no issue identified to support E1 for Rel-16 UEs.

2 (Regarding question E2) Rel-16 UEs not supporting the CAG feature can camp on a CAG cell as an acceptable cell to obtain limited service

3 There is no issue identified to support RS1 for Rel-16 UEs

4 RS2 and RS3 can be supported from RAN2 point of view

## RAN2#107bis

Agreements:

1. no new mechanism is introduced to handle the priority of a frequency layer of a CAG cell on which the UE is camped (beyond what cellReselectionPriority provides in SIB4 and in RRCRelease).
2. the UE can optionally implement an autonomous search function of CAG cells. FFS on the relationship with dedicated priorities.
3. reserving a PCI range for CAG cells is purely a deployment issue (does not need to be reflected in the spec)
4. the PCI list of CAG cells can optionally be signalled to UEs. FFS on details of the list
5. FFS whether proximity indication in CONNECTED mode is needed
6. no preliminary access check for CAG cells in CONNECTED mode. The Allowed CAG list is provided to the gNB by the AMF.
7. no new mechanism is introduced to handle the priority of a frequency layer of an SNPN cell on which the UE is camped (beyond what cellReselectionPriority provides in SIB4 and in RRCRelease).
8. There is no autonomous search function of SNPN cells.
9. reserving a PCI range for SNPN cells is purely a deployment issue (does not need to be reflected in the spec)
10. FFS whether PCI range of SNPN cells can optionally be signalled to UEs.
11. No proximity indication in CONNECTED mode is needed for SNPN.
12. no preliminary access check for SNPN cells in CONNECTED mode.

Agreements:

1. SIB1 of NPN-only cell prevents access attempts by Rel-15 UEs for normal services.
2. SIB1/MIB supports prevention of access attempts by Rel-15 UEs on a SNPN-only cell for emergency services.
3. SIB1/MIB supports prevention of access attempts by Rel-15 UEs on a CAG-only cell for emergency services (this does not mean that access attempts by Rel-15 UEs for emergency services on CAG-only cell are always not allowed. This is still FFS.The feasibility of allowing emergency services on CAG-only for Rel-15 UEs will be discussed in the email discussion on RRC aspects/SIB1 design)
4. Access attempts by Rel-15 UEs for emergency services on SNPN-only cell are not allowed.
5. In a NPN-only cell, access attempts for normal services by Rel-16 UEs without support for NPN is not allowed.
6. In a SNPN-only cell, access attempts for emergency services by Rel-16 UEs without support for SNPNs is not allowed.
7. For a PLMN+NPN cell, Rel-15 UEs should be able to access PLMNs associated with the cell for normal and/or limited service.
8. A new Rel-16 IE is needed with a role similar to role of *cellReservedForOtherUse*for Rel-15 UEs (FFS whether this will be PLMN specific)
9. SIB1 allows indication of TAC, RANAC, cellIdentity per SNPN (per PLMN ID + NID). FFS on other IEs. FFS whether Rel-15 IEs or Rel-16 IEs are used for the indication.
10. SIB1 allows indication of TAC, RANAC, cellIdentity for each CAG. FFS on other IEs. The fields are indicated per PLMN-ID. FFS whether Rel-15 IEs or Rel-16 IEs are used for the indication.

## RAN2#108

Agreements:

1. Access attempts by Rel-15 UEs for emergency services on CAG cell could be allowed based on operator's preference
2. cellReservedForOtherUse is used to prevent Rel-15 UEs to access the cell.
3. NPN information is outside PLMN-IdentityInfoList as a new Rel-16 IE for NPN-only cell and PLMN+NPN cell (the total number of network IDs is still 12)

Working assumption:

1. The new Rel-16 IE with a role similar to role of cellReservedForOtherUse for Rel-15 UEs is cell specific.

Agreements:

1. At least one of the following conditions must be satisfied for a cell to be considered as suitable by a Rel-16 UE not in SNPN AM:

a. Cell is part of either the selected PLMN or the registered PLMN or PLMN of the Equivalent PLMN list of the UE for which the PLMN-ID is broadcast by the cell with no associated CAG-IDs and for which CAG-only indication is absent or false;

b. Cell is part of either the selected PLMN or the registered PLMN or PLMN of the Equivalent PLMN list of the UE for which Allowed CAG list includes a CAG-ID broadcast by the cell.

2. Each SNPN-only cell is treated by Rel-16 UEs not in SNPN AM as if cell status is barred.

3. A CAG cell which is not considered as suitable can be an acceptable cell for a Rel-16 UE not in SNPN AM.

4. A PLMN-only cell or an SNPN+PLMN cell be an acceptable cell for a Rel-16 UE not in SNPN AM for which CAG-only indication is true for any PLMN-ID broadcast by the cell.

5. The following are necessary conditions for an SNPN cell to be considered as a suitable cell by a Rel-16 UE in SNPN AM:

a. the cell is part of either the selected SNPN or the registered SNPN of the UE;

b. the cell is part of at least one TA that is not part of the list of "Forbidden Tracking Areas" which belongs to either the selected SNPN or the registered SNPN of the UE

c. the cell is not barred,

d. the cell selection criteria in clause 5.2.3.2 are fulfilled.

Agreements:

1. Add the following note in TS 38.304 :

NOTE: UE is not required to support manual search and selection of PLMN or CAG or SNPN while in RRC CONNECTED state. The UE may use local release of RRC connection to perform manual search if it is not possible to perform the search while RRC connected.

2. In the UE on request of NAS, the AS shall scan all RF channels in the NR bands according to its capabilities to find available CAGs. On each carrier, the UE shall at least search for the strongest cell, read its system information and report available CAG ID(s) together with their HRNN (if broadcast) and PLMN(s) to the NAS. The search for available CAGs may be stopped on request of the NAS.

If NAS has selected a CAG and provided this selection to AS, the UE shall search for an acceptable or suitable cell belonging to the selected CAG to camp on.

3. In the UE on request of NAS, the AS shall scan all RF channels in the NR bands according to its capabilities to find available SNPNs. On each carrier, the UE shall at least search for the strongest cell, read its system information and report available SNPN identifiers together with their HRNN (if broadcast) to the NAS. The search for available SNPNs may be stopped on request of the NAS.”

1. All the R16 UEs will treat the cell as barred when the legacy IE cellReservedForOtherUse is set to “True” and this cell does not broadcast any CAG-IDs or NIDs.

Agreements:

1. Allow autonomous cell search even in situations when frequency priorities are broadcast in system information.
2. UE follows dedicated frequency priorities as in legacy behaviour. If UE run autonomous cell search and at the same time have dedicated frequency priorities, the result from autonomous cell search should not go against that indicated by dedicated frequency priorities (when they are valid).

Agreements:

1. From RAN2 point of view there is no requirement for CAG ID to be included in RRC signalling at RRC connection establishment.
2. For SNPN, include the SNPN ID in the RRCSetupComplete message. Stage 3 detalls are FFS
3. For SNPN, there is no need to include SNPN ID in the RRCResumeComplete message since the UE context is known to the network.
4. Send a LS to SA3 with Agreement#1 with SA2 and RAN3 in To.

## RAN2#109e

Agreements:

1. RAN2 understanding is that all mandatory features apply to NPN (we might check this again for Rel-16 features if any problems are found)
2. Remove the following Editor’s Notes without introducing any other changes

Editor's Note: The need for list of NIDs depends on the RAN sharing scenarios to be supported.

Editor's Note: The support of sharing logical cells is FFS.

1. No PCI range of SNPN cells will be signalled
2. Clarify in Stage 2 that a Rel-15 UE considers a CAG-only cell as acceptable cell if the cell is not barred to Rel-15 UEs, and if a PLMN ID without CAG list is broadcast and that PLMN is "not allowed" (e.g. by use of PLMN ID for which all registration attempts are rejected such that the PLMN ID becomes not allowed). Discuss wording as part of the Stage 2 discussion
3. Proximity indication is not supported CAGs
4. EN-DC is not supported for NPN

Agreements via email (from first round of [117][PRN]):

2.1 When a cell broadcasts any CAG IDs or NIDs, NPN-capable Rel-16 UE can treat the cell with cellReservedForOtherUse = true as a candidate during cell selection and cell reselection.

3.2 For CAG-capable Rel-16 UE, emergency calls in a CAG-only cell can be supported by setting *cellReservedForOtherUse=true* and allowing the Rel-16 Ues to ignore this flag and access the PLMNs in the NPN list in limited service state.

4.1 For unlicensed spectrum and a UE in SNPN AM, if the highest ranked cell or best cell according to absolute priority reselection rules is a cell which is not suitable due to not broadcasting the registered or selected SNPN ID, the UE shall not consider this cell as candidate for cell reselection but should continue to consider other cells on the same frequency for cell reselection.

4.3 UE in SNPN AMdoes not ignore *intraFreqReselection* broadcast by a SNPN cell in licensed spectrum.

5.2 UE not in SNPN AMdoes not ignore *intraFreqReselection* broadcast by a CAG cell in licensed spectrum.

8. High quality criteria is not considered for SNPNs in Rel-16.

10. CAG-capable UE is not allowed to reselect to a CAG member cell ignoring highest ranked cell or best cell acc. To absolute priority reselection rules

11. No enhancement in Rel-16 to include NID/CAG ID or network type indicator along with the inter-frequency carrier info in SIB4.

Agreements via email (from second round of [117][PRN]):

9. If the cell broadcast multiple CAG identities, CAG identities associated to the same PLMN identity is listed in the same cag-IdentityList in the cell

Agreements online:

1. FFS whether PCI values for CAGs are signalled per PLMN per frequency or no new ASN.1 IEs are introduced in Rel-16 for signalling of PCI values for CAGs
   1. For unlicensed spectrum and for a UE with non-empty allowed CAG list, if the highest ranked cell or best cell according to absolute priority reselection rules is a cell which is not suitable due to not broadcasting the selected/registered/equivalent PLMN, the UE with no empty allowed CAG list shall behave according to NR-U agreement. FFS how to handle the case when the cell belongs to the correct operator but it’s not a CAG member cell. (We might come back to this if serious concerns / problems are found with this)
2. Definition for NPN-only cell: A cell that is only available for normal service for NPNs’ subscriber. From a UE point of view this is determined by detecting the setting of the cellReservedForOtherUse IE to true while the npn-IdentityInfoList-r16 IE is present in CellAccessRelatedInfo (this only applies for Rel-16 and later NPN-capable UEs)

Agreements:

1. For cells shared between PLMNs and NPNs, non-NPN capable UEs use the first PLMN ID in the Rel-15 PLMN list for the SIB validity check.
2. To index NPNs, build on the existing plmn-IdentityIndex (to avoid ASN.1 changes other than in SIB1).
3. In RAN sharing scenarios, the lowest index values belong to the PLMNs (using legacy indexing) and the highest index values belong to NPNs.
4. Add a condition that NPN-only cell generating NPN-indexes (for PNI-NPNs and SNPNs) shall count the PLMN-index part as zero.
5. There is no need to include CAG ID in RRCResumeComplete message for UE in automatic CAG selection mode.

FFS:

1. Whether the selectedPLMN-Identity can refer to a NPN in the description of RRCSetupComplete RRCResumComplete messages and the relevant procedures.

Agreements via email from first round of [118][PRN]):

4.1: Extend the current measurement reporting procedures to include NPN information to support ANR. (It is FFS if it is mandatory for all Rel-16 UEs to support it.)

4.2: The CAG ID/SNPN NID information shall be added into the CGI-InfoNR. (It is FFS if it is mandatory for all Rel-16 UEs to support it.)

Agreements via email from second round of [118][PRN]):

1.1 For NPN-only cells, the first NPN ID (PLMN ID and NID or PLMN ID and CAG ID) is used for the SIB validity check by NPN capable UEs.

2.1 There is no need to create any order between SNPNs and PNI-NPNs during the indexing.

4.3 There is no need for the CAG-UE to report the MemberStatus and corresponding identity of reported cell acquired from system information in the measurement report message as what the LTE CSG-UEs execute.

5.1 Normal network controlled mobility procedure can apply for a UE leaving a CAG cell in connected mode.

Agreements online:

1.2 For cells shared between PLMNs and NPNs, NPN capable UEs use the first PLMN ID in the Rel-15 PLMN list.

3.1 The selectedPLMN-Identity can refer to a NPN (a SNPN or a PNI-NPN) or set of PNI-NPNs having the same PLMN ID (in case CAG ID is not sent in the RRC message) in the description of RRCSetupComplete message and the relevant procedures.

Agreements via email (from first round of [119][PRN]):

1a. HRNN is broadcast in a new SIB.

1b. Associate the HRNN and the Network ID implicitly. The SIB for HRNN shall have the same amount of HRNN elements as the number of CAGs and NIDs in SIB1. These elements can also be absent.

1c. ASN.1 in Proposal 1c in R2-2001682 can be taken as a baseline.

3. The UAC parameters per SNPN are configured by reusing the existing uac-BarringPerPLMN-List.

3a. The UAC parameters should be configured per SNPN.