**3GPP TSG- Meeting #**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** | 1 | **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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:***  |  |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | EE\_5G |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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 canbe 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)* |
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| ***Reason for change:*** | The ES probing procedure is omitted for energy saving management while this procedure existed for LTE as defined in TS 32.551. |
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| ***Summary of change:*** | A reference is added to TS 32.551. The definition paragraph of the ES probing procedure is given in the Terms section. Two examples are added for activating a capacity booster cell for Inter-Frequency Intra-RAT and the Inter-RAT energy saving scenario. These example sentences explain the usage of the ES probing procedure. |
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| ***Consequences if not approved:*** | ES probing will not be specified while it can provide important input about possible traffic to be served when a capacity booster cell needs to be activated and transferred to **notEnergySaving state**. This capacity booster cell activation is one of the important identified questions of area based energy saving management in TR 28.813. |
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| ***Clauses affected:*** | 2; 3.1 ; 5.1.3.3 |
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|  | **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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| **1st Change** |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] ETSI ES 203 228: "Environmental Engineering (EE); Assessment of mobile network energy efficiency".

[3] ETSI ES 202 336-1 V1.2.1: "Environmental Engineering (EE); Monitoring and Control Interface for Infrastructure Equipment (Power, Cooling and Building Environment Systems used in Telecommunication Networks) Part 1: Generic Interface".

[4] ETSI ES 202 336-12 V1.1.1: "Environmental Engineering (EE); Monitoring and control interface for infrastructure equipment (power, cooling and building environment systems used in telecommunication networks); Part 12: ICT equipment power, energy and environmental parameters monitoring information model".

[5] 3GPP TS 28.550: "Management and orchestration; Performance assurance".

[6] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[7] 3GPP TS 28.545: "Management and orchestration; Fault Supervision (FS)".

[8] 3GPP TS 32.432: "Telecommunication management; Performance measurement: File format definition".

[9] 3GPP TS 32.435: "Telecommunication management; Performance measurement; eXtensible Markup Language (XML) file format definition".

[10] 3GPP TS 32.436: "Telecommunication management; Performance measurement: Abstract Syntax Notation 1 (ASN.1) file format definition".

[11] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[12] 3GPP TS 38.401: "NG-RAN; Architecture description".

[13] 3GPP TS 38.300: "NR; Overall description; Stage-2".

[14] 3GPP TR 37.816: "Study on RAN-centric data collection and utilization for LTE and NR".

[15] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[16] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[17] 3GPP TS 32.551: "Energy Saving Managament (ESM); Concepts and requirements".

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| **Next Change** |

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**Candidate cell:** cell which can provide coverage when the original cell goes into energySaving state.

**energySaving state:** state in which some functions of a cell or a network element or network function are powered-down.

Note 1: In energySaving state, the cell or network element or network function is still controllable.

Note 2: This is the state when the traffic goes below a certain threshold.

**notEnergySaving state:** state when no energy saving in progress.

Note 3: This is the state when the traffic goes above a certain threshold.

**ES activation:** procedure to power down a cell or network element or network function for energy saving purposes.

Note 4: As a result, the subject cell or network element or network function goes into energySaving state.

**ES deactivation:** procedure to power up a cell or network element or network function.

Note 5: As a result, the subject cell or network element or network function goes into notEnergySaving state.

**ES Probing procedure:** procedure executed by an ES probing capable cell triggered by Cell Activation procedure or ES deactivation procedure. The ES probing procedure [17] assists the decision whether the cell will transfer to notEnergySaving state or remain in energySaving state.

Note 6: During the ES probing procedure the ES probing capable cell is not carrying traffic, while it can perform measurements and be visible to the UEs in its coverage.

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| **Next Change** |

#### 5.1.3.3 Capacity booster cell fully overlaid by candidate cell(s)

An NG-RAN node, which connects with 5GC to provide boost capacity, may enter into energySaving state if there is radio coverage by other radio systems – be another NG-RAN node or an entity of another radio access technology - for the whole coverage area of the NG-RAN node in question, see figure 5.1.3.3-1 for gNB capacity booster cell fully overlaid by candidate cell(s) case.

Figure 5.1.3.3-1: gNB capacity booster cell fully overlaid by candidate cell(s)

This use case applies both for Intra- and Inter-RAT Energy Saving.

**Inter-frequency Intra-RAT gNB Coverage**

Two gNB cells (Cell A, Cell B) with separate frequency bands cover the same geographical area. Cell B has a smaller size than Cell A and is covered totally by Cell A. Generally, Cell A is deployed to provide continuous coverage of the area, while Cell B increases the capacity of the special sub-areas, such as hot spots. The ES activation procedure in the coverage of Cell B (ES area) may be triggered in case that light traffic in Cell B is detected. Cell B ES activation may also be triggered when the traffic of ES area (measured by candidate Cell A) resumes to a high level. A Cell B capable of ES probing can execute the ES probing procedure and based on Cell B measurements the centralized or distributed ES management can decide if the Cell B needs to be activated and take portion of the traffic from Cell A.

**Inter-RAT gNB Coverage**

Two IRAT cells (Cell A, Cell B) cover the same geographical area. gNB Cell B is totally covered by inter-RAT Cell A (such as legacy system UMTS or LTE). Cell A is deployed to provide continuous coverage of basic eMBB services in the area, while Cell B enhances the capability of the area to support eMBB services with high data rate or URLLC services. The ES activation in the coverage of Cell B (ES area) may be triggered in case that no eMBB services with high data rate or URLLC traffic in Cell B is detected or load threshold for going into energySaving state is reached. Cell B ES deactivation may be triggered when the eMBB services with high data rate or URLLC service request in ES area is restarted again, or load threshold for going out of energySaving state (i.e. going into notEnergySaving state) is reached. A Cell B capable of ES probing can execute the ES probing procedure and based on Cell B measurements the centralized or distributed ES management can decide if the Cell B needs to be activated and take portion of the traffic from Cell A,

Different scenarios of gNB capacity booster cell fully overlaid by candidate cell(s) are listed in below table 5.1.3.3-1.

**Table 5.1.3.3-1: Different scenarios of gNB capacity booster cell fully overlaid by candidate cell(s)**

|  |  |  |  |
| --- | --- | --- | --- |
| Scenario | Capacity booster | Coverage provider | Scenario |
| 1 | gNB | eNB | Inter-RAT ES |
| 2 | gNB | gNB | Intra-RAT ES |
| 3 | gNB | eNB and gNB | Intra-RAT ES, Inter-RAT ES |
| 4 | gNB | NB | Inter-RAT ES |
| 5 | gNB | eNB and NB | Inter-RAT ES |

Traceability: REQ-ESCOL-FUN-1, REQ-ESCOL-FUN-2, REQ-ESCOL-FUN-3, REQ-ESCOL-FUN-4, REQ-ESCOL-FUN-5, REQ-ESCOL-FUN-6, REQ-ESCOL-FUN-7.

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| **End of change** |