**3GPP TSG-RAN WG3 #115eR3-222910**

**Online,** **21st Feb – 3rd March 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **36.300** | **CR** |  | **rev** |  | **Current version:** | **.7.0** |  |
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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 | **X** | Core Network | **X** |

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| ***Title:***  | BLCR to 36.300\_Addition of SON features enhancement |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_ENDC\_SON\_MDT\_enh |  | ***Date:*** | 2022-02-09 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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 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:*** | Add the support of SON enhancement related features. |
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| ***Summary of change:*** | **RAN3 #110-e:*** Include the agreed TP in R3-207007

**RAN3#115-e:*** Include the agreed TP in R3-222766
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| ***Consequences if not approved:*** | SON features enhancement are not supported |
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| ***Clauses affected:*** | 22.4.1.1; 22.4.1.2; 22.4.1.2.x (new); 22.4.4.1; 22.4.4.2.x (new); 22.4.4.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**--------------------------------------------------------------- Change Start-------------------------------------------------------**

### 22.4.1 Support for Mobility Load Balancing

#### 22.4.1.1 General

The objective of load balancing is to distribute cell load evenly among cells or to transfer part of the traffic from congested cells. This is done by the means of self-optimisation of mobility parameters or handover actions.

Self-optimisation of the intra-LTE, inter-RAT and inter-system mobility parameters to the current load in the cell and in the adjacent cells can improve the system capacity compared to static/non-optimised cell reselection/handover parameters. Such optimisation can also minimize human intervention in the network management and optimisation tasks.

Support for mobility load balancing consists of one or more of following functions:

- Load reporting (for intra-LTE, inter-RAT, EN-DC and inter-system scenarios);

- Load balancing action based on handovers;

- Adapting handover and/or reselection configuration.

Triggering of each of these functions is optional and depends on implementation. Functional architecture is presented in Figure 22.4.1.1-1.

**--------------------------------------------------------------- Next Change-------------------------------------------------------**

#### 22.4.1.2 Load reporting

The load reporting function is executed by exchanging cell specific load information between neighbour eNBs over the X2 interface (intra-LTE scenario) or S1 (inter-RAT scenario and EN-DC scenario). The load reporting function for inter-system load balancing is executed by exchanging load information between E-UTRAN and NG-RAN.

**--------------------------------------------------------------- Next Change-------------------------------------------------------**

#### 22.4.1.2.x Load reporting for inter-system load balancing

Both event-triggered and periodic inter-system load reporting are supported. Event-triggered inter-system load reports are sent when the reporting node detects crossing of cell load thresholds.

The following load related information should be supported which consists of:

- Cell Capacity Class value (UL/DL relative capacity indicator);

- Capacity value (per cell: UL/DL available capacity);

- RRC connections (number of RRC connections, and available RRC Connection Capacity);

- Number of active UEs.

- PRB usage (per cell: UL/DL)

NGAP procedures used for inter-system load balancing are Uplink RAN Configuration Transfer and Downlink RAN Configuration Transfer.

S1AP procedures used for inter-system load balancing are eNB Configuration Transfer and MME Configuration Transfer.

**--------------------------------------------------------------- Next Change-------------------------------------------------------**

22.4.4 Support for Energy Saving

22.4.4.1 General

The aim of this function is to reduce operational expenses through energy savings.

The function allows, for example in a deployment where capacity boosters can be distinguished from cells providing basic coverage, to optimize energy consumption enabling the possibility for a E-UTRA or EN-DC cell or NR cell providing additional capacity via single or dual connectivity, to be switched off when its capacity is no longer needed and to be re-activated on a need basis. The basic coverage may be provided by

- E-UTRAN, UTRAN or GERAN cells, in the case of E-UTRA cells;

- E-UTRA cells, in the case of EN-DC cells.

22.4.4.2 Solution description

22.4.4.2.1 E-UTRA cell case

The solution builds upon the possibility for the eNB owning a capacity booster cell to autonomously decide to switch-off such cell to lower energy consumption (dormant state). The decision is typically based on cell load information, consistently with configured information. The switch-off decision may also be taken by O&M.

The eNB may initiate handover actions in order to off-load the cell being switched off and may indicate the reason for handover with an appropriate cause value to support the target node in taking subsequent actions, e.g. when selecting the target cell for subsequent handovers.

All peer eNBs are informed by the eNB owning the concerned cell about the switch-off actions over the X2 interface, by means of the eNB Configuration Update procedure. The eNB indicates the switch-off action to a GERAN and/or UTRAN node by means of the eNB Direct Information Transfer procedure over S1.

All informed nodes maintain the cell configuration data, e.g., neighbour relationship configuration, also when a certain cell is dormant. If basic coverage is ensured by E-UTRAN cells, eNBs owning non-capacity boosting cells may request a re-activation over the X2 interface if capacity needs in such cells demand to do so. This is achieved via the Cell Activation procedure. If basic coverage is ensured by UTRAN or GERAN cells, the eNB owning the capacity booster cell may receive a re-activation request from a GERAN or UTRAN node by means of the MME Direct Information Transfer procedure over S1. The eNB owning the capacity booster cell may also receive from the sending GERAN or UTRAN node the minimum time before that cell switches off; during this time, the same eNB may prevent idle mode UEs from camping on the cell and may prevent incoming handovers to the same cell.

The eNB owning the dormant cell should normally obey a request. The switch-on decision may also be taken by O&M. All peer eNBs are informed by the eNB owning the concerned cell about the re-activation by an indication on the X2 interface. The eNB indicates the re-activation action to a GERAN and/or UTRAN node by means of the eNB Direct Information Transfer procedure over S1. The eNB owning the concerned cell may choose to delay or not to send indication(s) if the sending GERAN or UTRAN node has included the minimum activation time in the re-activation request.

22.4.4.2.2 EN-DC cell case

The solution applies to an en-gNB supporting EN-DC operation.

The en-gNB may autonomously decide to switch-off NR cells to lower energy consumption. MeNBs are informed by the en-gNB owning the concerned cell about the switch-off actions over the X2 interface, by means of the EN-DC Configuration Update procedure.

The en-gNB may initiate dual connectivity procedures towards the MeNB in order to off-load the cell being switched off, and may indicate the reason for release or modification with an appropriate cause value to support the master node in taking subsequent actions.

The MeNB may request a re-activation over the X2 interface if capacity needs demand to do so. This is achieved via the EN-DC Cell Activation procedure. The en-gNB owning the dormant NR cell should normally obey a request. The switch-on decision may also be taken by O&M. All peer eNBs are informed by the en-gNB owning the concerned NR cell about the re-activation by an indication on the X2 interface.

22.4.4.2.x NR cell case

For Inter-RAT Inter-system energy saving, in case the eNB provides basic coverage, it may request a NR cell re-activation based on its own cell load information or neighbour cell load information and receive the cell re-activation reply. The switch-on decision may also be taken by O&M. The eNB can be notified of the status of the concerned NR cell. The cell activation, cell activation reply and cell status notification information are transferred over S1 interface and NG interface.

22.4.4.3 O&M requirements

Operators should be able to configure the energy saving function.

The configured information should include:

- The ability of an eNB to perform autonomous cell switch-off.

- The ability of an eNB to request the re-activation of a configured list of dormant cells owned by a peer eNB.

- The ability of an eNB to request the re-activation of a configured list of dormant cells owned by a peer gNB.

O&M may also configure

- policies used by the eNB for cell switch-off decision.

- policies used by peer eNBs for requesting the re-activation of a dormant cell.

**----------------------------------------------------------------- Change Stop-------------------------------------------------------**