**3GPP TSG-SA5 Meeting #135e *S5-211128***

**January 25 – Feburary 3, 2021, e-Meeting** *s5-2abcde*

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| *CR-Form-v11.4* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.313** | **CR** | **-** | **rev** | **-** | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *For* [***HELP***](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 |  |

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|  | | | | | | | | | | |
| ***Title:*** | Add LBO use cases, requirements, and related information | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Intel | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eSON\_5G | | | | |  | ***Date:*** | | | 2021-01-15 |
|  |  | | | |  | |  | | |  |
| ***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 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:*** | | LBO use cases, requirements, and related information are needed to complete the Rel. 17 eSON\_5G WI | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add LBO use cases, requirements, and related information | | | | | | | | |
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| ***Consequences if not approved:*** | | Rel. 17 eSON\_5G WI cannot be completed. | | | | | | | | |
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| ***Clauses affected:*** | | 6.4.1.x(new), 6.1.1.x (new), 6.4.2.x (new), 6.1.2.x (new), 7.1.x(new), 7.2.x (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 is input to the Rel-17 28.313 draft CR for eSON\_5G | | | | | | | | |

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| **First Modified Sections** |

## 6.4 Use cases

### 6.4.1 Distributed SON management

#### 6.4.1.x LBO (Load Balancing Optimisation)

| Use case stage | Evolution/Specification | <<Uses>> Related use |
| --- | --- | --- |
| **Goal** | To automatically distribute user traffic among neighboring cells to ensure the radio resources are efficiently used, while providing quality end-user experience and performance. |  |
| **Actors and Roles** | D-SON management function to support LBO function. |  |
| **Telecom resources** | * The producer of provisioning MnS |  |
| **Assumptions** | N/A |  |
| **Pre-conditions** | * D-LBO is in operation. |  |
| **Begins when** | The D-SON management function decides to enable D-LBO function. |  |
| **Step 1 (M)** | The D-SON management function requests the producer of provisioning MnS to set the handover and/or reselection parameters ranges (see clause 15.5.1.4 in TS 38.300 [7]), and to enable the D-LBO function. |  |
| **Step 3 (M)** | The D-LBO function perform load balancing as describe in clause 15.5 in TS 38.300 [7])” and may notify D-LBO management function when the LBO action has been performed. |  |
| **Step 4 (M)** | The D-SON management function collects LBO related measurements. |  |
| **Step 5 (M)** | The D-SON management function analyses the measurements to evaluate the LBO performape, and may request the producer of provisioning MnS to update the ranges for handover parameters. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The LBO performance has been optimized. |  |
| **Traceability** | **REQ-DLBO-FUN-1, REQ-DLBO-FUN-2, REQ-DLBO-FUN-3** |  |

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| **Next Modified Sections** |

## 6.1 Requirements

### 6.1.1 Distributed SON management

#### 6.1.1.2 LBO (Load Balancing Optimisation)

**REQ-DLBO-FUN-1** Provisioning MnS for D-LBO function should have a capability allowing an authorized consumer to set or update the HO offset ranges, and control parameters for LBO function.

**REQ-DLBO-FUN-2** Performance assurance MnS for D-LBO function should have a capability allowing the authorized consumer to collect the LBO related performance measurements that are used to evaluate the LBO performance.

**REQ-DLBO-FUN-3** Provisioning MnS for D-LBO function should have a capability to notify the authorized consumer about the LBO actions being performed.

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| **Next Modified Sections** |

### 6.4.2 Centralized SON

#### 6.4.2.x LBO (Load Balancing Optimisation)

| Use case stage | Evolution/Specification | <<Uses>> Related use |
| --- | --- | --- |
| **Goal** | To automatically distribute user traffic among neighboring cells to ensure the radio resources are efficiently used, while providing quality end-user experience and performance. |  |
| **Actors and Roles** | C-LBO function to support LBO. |  |
| **Telecom resources** | * The producer of provisioning MnS |  |
| **Assumptions** | Both Domain Centralized SON and Cross-Domain Centralized SON are supported. |  |
| **Pre-conditions** | * The C-LBO has been enabled. |  |
| **Begins when** | The C-LBO function decides to enable C-LBO function. |  |
| **Step 1 (M)** | The C-LBOfunction collects LBO load measurements by consuming the MnS of performance assurance. |  |
| **Step 2 (M)** | The C-LBOfunction analyses measurements to determine the actions to optimize the traffic load distributions among neighboring cells that include consuming the MnS of provisioning to update the ranges for handover parameters. |  |
| **Step 3 (M)** | The C-LBOfunction collects LBO related measurements, and analyses them to evaluate the LBO performance, and may request the producer of provisioning MnS to update the ranges for handover parameters. |  |
| **Ends when** | All the steps identified above are successfully completed. |  |
| **Exceptions** | One of the steps identified above fails. |  |
| **Post-conditions** | The LBO performance has been optimized. |  |
| **Traceability** | **REQ-CLBO-FUN-1, REQ-CLBO-FUN-2** |  |

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| **Next Modified Sections** |

### 6.1.2 Centralized SON

#### 6.1.2.x LBO (Load Balancing Optimisation)

**REQ-CLBO-FUN-1** Provisioning MnS for C-LBO function should have a capability allowing an authorized consumer to set or update the HO offset ranges for LBO function.

**REQ-CLBO-FUN-2** Performance assurance MnS for C-LBO function should have a capability allowing the authorized consumer to collect the LBO load and LBO related performance measurements.

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| **Next Modified Sections** |

# 7 Management services for SON

## 7.1 Management services for D-SON management

### 7.1.x LBO (Load Balancing Optimisation)

#### 7.1.x.1 MnS component type A

Table 7.1.x.1-1: D-LBO type A

|  |  |
| --- | --- |
| MnS Component Type A | Note |
| Operations and notifications defined in clause 5 of TS 28.532 [3]:  - createMOI operation  - getMOIAttributes operation  - modifyMOIAttributes operation  - deleteMOI operation  - notifyMOIAttributeValueChanges  - notifyMOICreation  - notifyMOIDeletion  - notifyMOIChanges | It is supported by Provisioning MnS for NF, as defined in TS 28.531 [11]. |
| Operations defined in clause 11.3.1.1.1 in TS 28.532 [3] and clause 6.2.3 of TS 28.550 [12]:  - establishStreamingConnection operation  - notifyFileReady operation  - reportStreamData operation | It is supported by Performance Assurance MnS for NFs, as defined in TS 28.550 [12]. |

#### 7.1.x.2 MnS Component Type B definition

##### 7.1.x.2.1 Control information

The parameter is used to control the LBO function.

Table 7.1.x.2.1-1: D-LBO control information

| Control parameter | Definition | Legal Values |
| --- | --- | --- |
| D-LBO function control | This attribute allows the operator to enable/disable the LBO functionality. | Boolean  On, off |

##### 7.1.x.2.2 Parameters to be updated

#### 7.1.x.3 MnS Component Type C definition

##### 7.1.x.3.1 Performance measurements

Performance measurements related LBO are captured in Table 7.1.x.3.1.-1:

Table 7.1.x.3.1-1. D-LBO related performance measurements

| Performance measurements | Description | Note |
| --- | --- | --- |
| DL Total PRB Usage | This measurement provides the total usage (in percentage) of physical resource blocks (PRBs) on the downlink (see clause 5.1.1.2.1 in TS 28.552 [5]). |  |
| UL Total PRB Usage | This measurement provides the total usage (in percentage) of physical resource blocks (PRBs) on the uplink (see clause 5.1.1.2.2 in TS 28.552 [5]). |  |
| Distribution of DL Total PRB Usage | This distribution measurement is to monitor when a cell may experience overload situation in the downlink (see clause 5.1.1.2.3 in TS 28.552 [5]). |  |
| Distribution of UL Total PRB Usage | This distribution measurement is to monitor when a cell may experience overload situation in the uplink (see clause 5.1.1.2.4 in TS 28.552 [5]). |  |
| DL PRB used for data traffic | This measurement provides the number of physical resource blocks (PRBs) in average used in downlink for data traffic (see clause 5.1.1.2.5 in TS 28.552 [5]). |  |
| UL PRB used for data traffic | This measurement provides the number of physical resource blocks (PRBs) in average used in uplink for data traffic (see clause 5.1.1.2.7 in TS 28.552 [5]). |  |
| Mean number of RRC Connections | This measurement provides the mean number of users in RRC connected mode during the granularity period (see clause 5.1.1.4.1 in TS 28.552 [5]). |  |
| Max number of RRC Connections | This measurement provides the maximum number of users in RRC connected mode during the granularity period (see clause 5.1.1.4.2 in TS 28.552 [5]). |  |
| Mean number of stored inactive RRC Connections | This measurement provides the mean number of users in RRC inactive mode during each granularity period (see clause 5.1.1.4.3 in TS 28.552 [5]). |  |
| Max number of stored inactive RRC Connections | This measurement provides the maximum number of users in RRC inactive mode during each granularity period (see clause 5.1.1.4.3 in TS 28.552 [5]). |  |

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| **Next Modified Sections** |

### 7.2 Management services for C-SON7.2.x LBO (Load Balancing Optimisation)

#### 7.2.x.1 MnS component type A

Table 7.2.x.1-1: C-LBO type A

|  |  |
| --- | --- |
| MnS Component Type A | Note |
| Operations and notifications defined in clause 11.1.1 of TS 28.532 [3]:  - createMOI operation  - getMOIAttributes operation  --- modifyMOIAttributes operation  - - deleteMOI operation  - - notifyMOIAttributeValueChanges  - notifyMOICreation  - notifyMOIDeletion  - notifyMOIChanges | It is supported by Provisioning MnS for NF, as defined in 28.531 [11]. |
| Operations defined in clause 11.3.1.1.1 in TS 28.532 [3] and clause 6.2.3 of TS 28.550 [12]:  - establishStreamingConnection operation  - notifyFileReady operation  - reportStreamData operation | It is supported by Performance Assurance MnS for NFs, as defined in 28.550 [12]. |

#### 7.2.x.2 MnS Component Type B definition

##### 7.2.x.2.1 Control information

The parameter is used to control the LBO function.

Table 7.2.x.2.1-1: C-LBO control information

| Control parameter | Definition | Legal Values |
| --- | --- | --- |
| C-LBO function control | This attribute allows the operator to enable/disable the LBO functionality. | Boolean  On, off |

##### 7.2.x.2.2 Parameters to be updated

#### 7.2.x.3 MnS Component Type C definition

##### 7.2.x.3.1 Performance measurements

Table 7.2.x.3.1-1. lists the performance measurements that are used to monitor the load of NR cells (see clause 15.5.1.2 in TS 38.300 [7]).

Table 7.2.x.3.1-1. C-LBO load performance measurements

|  |  |  |
| --- | --- | --- |
| Performance measurements | Description | Note |
| DL Total PRB Usage | This measurement provides the total usage (in percentage) of physical resource blocks (PRBs) on the downlink (see clause 5.1.1.2.1 in TS 28.552 [5]). |  |
| UL Total PRB Usage | This measurement provides the total usage (in percentage) of physical resource blocks (PRBs) on the uplink (see clause 5.1.1.2.2 in TS 28.552 [5]). |  |
| Distribution of DL Total PRB Usage | This distribution measurement is to monitor when a cell may experience overload situation in the downlink (see clause 5.1.1.2.3 in TS 28.552 [5]). |  |
| Distribution of UL Total PRB Usage | This distribution measurement is to monitor when a cell may experience overload situation in the uplink (see clause 5.1.1.2.4 in TS 28.552 [5]). |  |
| DL PRB used for data traffic | This measurement provides the number of physical resource blocks (PRBs) in average used in downlink for data traffic (see clause 5.1.1.2.5 in TS 28.552 [5]). |  |
| UL PRB used for data traffic | This measurement provides the number of physical resource blocks (PRBs) in average used in uplink for data traffic (see clause 5.1.1.2.7 in TS 28.552 [5]). |  |
| Mean number of RRC Connections | This measurement provides the mean number of users in RRC connected mode during the granularity period (see clause 5.1.1.4.1 in TS 28.552 [5]). |  |
| Max number of RRC Connections | This measurement provides the maximum number of users in RRC connected mode during the granularity period (see clause 5.1.1.4.2 in TS 28.552 [5]). |  |
| Mean number of stored inactive RRC Connections | This measurement provides the mean number of users in RRC inactive mode during each granularity period (see clause 5.1.1.4.3 in TS 28.552 [5]). |  |
| Max number of stored inactive RRC Connections | This measurement provides the maximum number of users in RRC inactive mode during each granularity period (see clause 5.1.1.4.3 in TS 28.552 [5]). |  |

Table 7.2.x.3.1-2 lists the performance measurements used to monitor the LBO performance:

Table 7.2.x.3.1-2. C-LBO related performance measurements

| Performance measurements | Description | Note |
| --- | --- | --- |
| Attempted RRC connection establishments | Includes the number of RRC connection establishment attempts (see clause 5.1.1.15.1 in TS 28.552 [5]). |  |
| Successful RRC connection establishments | Includes the number of successful RRC establishments (see clause 5.1.1.15.2 in TS 28.552 [5]). |  |
| Number of RRC connection re-establishment attempts | Includes the number of RRC connection re-establishment attempts (see clauses 5.1.1.17.1 in TS 28.552 [5]). |  |
| Successful RRC connection re-establishment | Includes the number of successful RRC connection re-establishment (see clauses 5.1.1.17.2 and 5.1.1.17.3 in TS 28.552 [5]). |  |
| Number of RRC connection resuming attempts | Includes Number of RRC connection resuming attempts (see clause 5.1.1.18.1 in TS 28.552 [5]). |  |
| Successful RRC connection resuming | Includes the number of successful RRC connection resuming (see clause 5.1.1.18.2 in TS 28.552 [5]). |  |

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| **End of Modified Sections** |