**3GPP TSG-SA5 Meeting #142-e *S5-222380***

**e-meeting, 4 - 12 April 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | 28.552 | **CR** | **Draft CR** | **rev** | 1 | **Current version:** | **17.6.0** |  |
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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 |  |

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|  |
| ***Title:***  | Add NROperatorCellDU as measurement object class to support MOCN network sharing with multiple Cell Identity broadcast scenarios |
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| ***Source to WG:*** | ZTE |
| ***Source to TSG:*** | SA5 |
|  |  |
| ***Work item code:*** | MANS |  | ***Date:*** | 2022-03-23 |
|  |  |  |  |  |
| ***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 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:*** | In MOCN network sharing with multiple Cell Identity broadcast scenarios, some measurements which are based on the message with PLMN Id information, can be measured per POP, so it is necessary to add NROperatorCellDU as the measurement object class. |
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| ***Summary of change:*** | Add NROperatorCellDU as measurement object class in some measurements which are based on the message with PLMN Id information. |
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| ***Consequences if not approved:*** | The measurements which are based on the message with PLMN Id information will not be able to be collected per POP in MOCN network sharing with multiple Cell Identity broadcast scenarios. |
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| ***Clauses affected:*** | 5.1.1.1.1, 5.1.1.1.2, 5.1.1.1.3, 5.1.1.1.4, 5.1.1.3.1, 5.1.1.3.2, 5.1.1.3.3, 5.1.1.3.4, 5.1.1.3.5, 5.1.1.3.6, 5.1.1.23.1, 5.1.1.23.2, 5.1.1.23.3, 5.1.1.23.4, 5.1.3.4.2, 5.1.3.4.3 |
|  |  |
|  | **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:*** |  |

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| **First change** |

#### 5.1.1.1 Packet Delay

##### 5.1.1.1.1 Average delay DL air-interface

a) This measurement provides the average (arithmetic mean) time it takes for packet transmission over the air-interface in the downlink direction. The measurement is calculated per PLMN ID and per QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

b) DER (n=1)

c) This measurement is obtained as: sum of (point in time when the last part of an RLC SDU packet was sent to the UE which was consequently confirmed by reception of HARQ ACK from UE for UM mode or point in time when the last part of an RLC SDU packet was sent to the UE which was consequently confirmed by reception of RLC ACK for AM mode, minus time when corresponding RLC SDU part arriving at MAC layer) divided by total number of RLC SDUs transmitted to UE successfully. The measurement is performed per PLMN ID and per QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

d) Each measurement is a real representing the mean delay in 0.1 millisecond. The number of measurements is equal to the number of PLMNs multiplied by the number of QoS levels or multiplied by the number of supported S-NSSAIs.

[Total No. of measurement instances] x [No. of filter values for all measurements] (DL and UL) ≤ 100.

e) The measurement name has the form DRB.AirIfDelayDl\_Filter,
Where filter is a combination of PLMN ID and QoS level and S-NSSAI.

Where PLMN ID represents the PLMN ID, QoS representes the mapped 5QI or QCI level, and SNSSAI represents S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.1.2 Distribution of delay DL air-interface

a) This measurement provides the distribution of the time it takes for packet transmission over the air-interface in the downlink direction. The measurement is calculated per PLMN ID andper QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

b) DER (n=1)

c) This measurement is obtained by 1) calculating the DL delay for an RLC SDU packet by: point in the time when the last part of an RLC SDU packet was sent to the UE which was consequently confirmed by reception of HARQ ACK for UM mode or point in time when the last part of an RLC SDU packet was sent to the UE which was consequently confirmed by reception of RLC ACK for AM mode, minus the time when corresponding RLC SDU part arriving at MAC layer; and 2) incrementing the corresponding bin with the delay range where the result of 1) falls into by 1 for the counters. If the RLC SDU needs retransmission (for Acknowledged Mode) the delay will still include only one contribution (the original one) to this measurement. The measurement is performed per PLMN ID and per QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

d) Each measurement is an integer representing the number of RLC SDU packets measured with the delay within the range of the bin. The number of measurements is equal to the number of PLMNs multiplied by the number of QoS levels or multiplied by the number of supported S-NSSAIs.

[Total No. of measurement instances] x [No. of filter values for all measurements] (DL and UL) ≤ 100.

e) DRB.AirIfDelayDist.Bin\_Filter, where Bin indicates a delay range which is vendor specific;

Where filter is a combination of PLMN ID and QoS level and S-NSSAI.

Where PLMN ID represents the PLMN ID, QoS representes the mapped 5QI or QCI level, and SNSSAI represents S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.1.3 Average delay UL on over-the-air interface

a) This measurement provides the average (arithmetic mean) over-the-air packet delay on the uplink. The measurement is calculated per PLMN ID and per QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

b) DER (n=1)

c) This measurement is obtained according to the definition in TS 38.314 [29], named "Average over-the-air interface packet delay in the UL per DRB per UE". The measurement is performed per PLMN ID and per QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

d) Each measurement is a real representing the mean delay in 0.1 millisecond. The number of measurements is equal to the number of PLMNs multiplied by the number of QoS levels or multiplied by the number of supported S-NSSAIs.

[Total No. of measurement instances] x [No. of filter values for all measurements] (DL and UL) ≤ 100.

e) The measurement name has the form DRB.AirIfDelayUl\_Filter,

Where filter is a combination of PLMN ID and QoS level and S-NSSAI.

Where PLMN ID represents the PLMN ID, QoS representes the mapped 5QI or QCI level, and SNSSAI represents S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario).

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.1.4 Average RLC packet delay in the UL

a) This measurement provides the average (arithmetic mean) RLC packet delay on the uplink, ie the delay within the gNB-DU. The measurement is calculated per PLMN ID and per QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

b) DER (n=1)

c) This measurement is obtained according to the definition in TS 38.314 [29], named "Average RLC packet delay in the UL per DRB per UE". The measurement is performed per PLMN ID and per QoS level (mapped 5QI or QCI in NR option 3) and per supported S-NSSAI.

d) Each measurement is a real representing the mean delay in the unit 0.1 milliseconds. The number of measurements is equal to the number of PLMNs multiplied by the number of QoS levels or multiplied by the number of supported S-NSSAIs.

[Total No. of measurement instances] x [No. of filter values for all measurements] (DL and UL) ≤ 100.

e) The measurement name has the form DRB.RlcDelayUl\_Filter,

Where filter is a combination of PLMN ID and QoS level and S-NSSAI.

Where PLMN ID represents the PLMN ID, QoS representes the mapped 5QI or QCI level, and SNSSAI represents S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario).

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

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| **Next change** |

#### 5.1.1.3 UE throughput

##### 5.1.1.3.1 Average DL UE throughput in gNB

a) This measurement provides the average UE throughput in downlink. This measurement is intended for data bursts that are large enough to require transmissions to be split across multiple slots. The UE data volume refers to the total volume scheduled for each UE regardless if using only primary- or also supplemental aggregated carriers. The measurement is optionally split into subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcounters per supported S-NSSAI, and subcounters per PLMN ID.

b) DER(N=1)

c) This measurement is obtained according to the following formula based on the "ThpVolDl" and "ThpTimeDl" defined below. Separate counters are maintained for each mapped 5QI (or QCI for option 3) and for each supported S-NSSAI, and for each PLMN ID.

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeDl>0$, $\frac{\sum\_{UEs}^{}\sum\_{}^{}ThpVolDl}{\sum\_{UEs}^{}\sum\_{}^{}ThpTimeDl}$×1000 [kbit/s]

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeDl=0$, 0 [kbit/s]

For small data bursts, where all buffered data is included in one initial HARQ transmission, , otherwise 

|  |  |
| --- | --- |
| ThpTimeDl | The time to transmit a data burst excluding the data transmitted in the slot when the buffer is emptied. A sample of "ThpTimeDl" for each time the DL buffer for one DataRadioBearer (DRB) is emptied. |
|  | The point in time after T2 when data up until the second last piece of data in the transmitted data burst which emptied the RLC SDU available for transmission for the particular DRB was successfully transmitted, as acknowledged by the UE.  |
|  | The point in time when the first transmission begins after a RLC SDU becomes available for transmission, where previously no RLC SDUs were available for transmission for the particular DRB. |
|  | The RLC level volume of a data burst, excluding the data transmitted in the slot when the buffer is emptied. A sample for ThpVolDl is the data volume, counted on RLC SDU level, in kbit successfully transmitted (acknowledged by UE) in DL for one DRB during a sample of ThpTimeDl. (It shall exclude the volume of the last piece of data emptying the buffer). |

d) Each measurement is a real value representing the throughput in kbit per second. The number of measurements is equal to one. If the optional QoS level subcounter and S-NSSAI subcounter and PLMN ID subcounter measurements are performed, the number of measurements is equal to the number of mapped 5QIs and the number of supported S-NSSAIs, and the number of PLMN IDs.

e) The measurement name has the form
DRB.UEThpDl, or optionally DRB.UEThpDl.*QOS,* where *QOS* identifies the target quality of service class, and DRB.UEThpDl.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI, and DRB.UEThpDl.*PLMN,* where *PLMN* identifies the PLMN ID.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.3.2 Distribution of DL UE throughput in gNB

a) This measurement provides the distribution of the UE throughput in downlink. This measurement is intended for data bursts that are large enough to require transmissions to be split across multiple slots. The UE data volume refers to the total volume scheduled for each UE regardless if using only primary- or also supplemental aggregated carriers. The measurement is optionally split into subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcounters per supported S-NSSA, and subcounters per PLMN IDI.

b) CC

c) Considering there are n samples during measurement time T and each sample has the same time period tn, the measurement of one sample is obtained by the following formula for a measurement period tn:

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeDl>0$, $\frac{\sum\_{UEs}^{}\sum\_{}^{}ThpVolDl}{\sum\_{UEs}^{}\sum\_{}^{}ThpTimeDl}$×1000 [kbit/s]

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeDl=0$, 0 [kbit/s]

For small data bursts, where all buffered data is included in one initial HARQ transmission, , otherwise 

|  |  |
| --- | --- |
| ThpTimeDl | The time to transmit a data burst excluding the data transmitted in the slot when the buffer is emptied. A sample of "ThpTimeDl" for each time the DL buffer for one DataRadioBearer (DRB) is emptied. |
|  | The point in time after T2 when data up until the second last piece of data in the transmitted data burst which emptied the RLC SDU available for transmission for the particular DRB was successfully transmitted, as acknowledged by the UE.  |
|  | The point in time when the first transmission begins after a RLC SDU becomes available for transmission, where previously no RLC SDUs were available for transmission for the particular DRB. |
|  | The RLC level volume of a data burst, excluding the data transmitted in the slot when the buffer is emptied. A sample for ThpVolDl is the data volume, counted on RLC SDU level, in kbit successfully transmitted (acknowledged by UE) in DL for one DRB during a sample of ThpTimeDl. (It shall exclude the volume of the last piece of data emptying the buffer). |

Alternatively, for small data bursts, that are successfully transmitted in any given slot (i.e. the requirement that data bursts need to span across several slots excluding transmission of the last piece of the data in a data burst does not apply). where all buffered data is included in one initial HARQ transmission, fraction of the slot time ($ThpTimeDL)$$ThpTimeUL)$ may be counted and obtained by the formula:



|  |  |
| --- | --- |
| *slot* | Duration of the slot |
| *TBVol* | Volume of the TB related to one slot burst |
| *PaddingVol* | Volume of padding bits added into Transport Block related to one slot burst. |

For each measurement sample, the bin corresponding to the DL throughput experienced by the UE is incremented by one. Separate counters are maintained for each mapped 5QI (or QCI for option 3) and for each supported S-NSSAI.

d) A set of integers, each representing the (integer) number of samples with a DL UE throughput in the range represented by that bin. If the optional QoS level subcounter and S-NSSAI subcounter and PLMN ID subcounter measurements are performed, the number of measurements is equal to the number of mapped 5QIs and the number of supported S-NSSAIs, and the number of PLMN IDs.

e) The measurement name has the form
DRB.UEThpDlDist.Bin where Bin represents the bin, or optionally DRB.UEThpDlDist.Bin.*QOS,* where *QOS* identifies the target quality of service class, and DRB.UEThpDlDist.Bin*.SNSSAI,* where *SNSSAI* identifies the S-NSSAI, and DRB.UEThpDlDist.Bin.*PLMN,* where *PLMN* identifies the PLMN ID.

NOTE: Number of bins and the range for each bin is left to implementation

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.3.3 Average UL UE throughput in gNB

a) This measurement provides the average UE throughput in uplink. This measurement is intended for data bursts that are large enough to require transmissions to be split across multiple slots. The UE data volume refers to the total volume scheduled for each UE regardless if using only primary- or also supplemental aggregated carriers. The measurement is optionally split into subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcounters per supported S-NSSAI, and subcounters per PLMN ID.

B) DER(N=1)

c) This measurement is obtained according to the following formula based on the "ThpVolUl" and "ThpTimeUl" defined below. Separate counters are maintained for each mapped 5QI (or QCI for option 3) and for each supported S-NSSAI, and for each PLMN ID.

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeUl>0$, $\frac{\sum\_{UEs}^{}\sum\_{}^{}ThpVolUl}{\sum\_{UEs}^{}\sum\_{}^{}ThpTimeUl}$×1000 [kbit/s]

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeUl=0$, 0 [kbit/s]

For small data bursts, where all buffered data is included in one initial HARQ transmission otherwise:



|  |  |
| --- | --- |
| ThpTimeUl | The time to transmit a data burst excluding the data transmitted in the slot when the buffer is emptied. A sample of "ThpTimeUl" for each time the UL buffer for one DataRadioBearer (DRB) is emptied. |
|  | The point in time when the data up until the second last piece of data in data burst has been successfully received for a particular DRB  |
|  | The point in time when transmission is started for the first data in data burst for a particular DRB. |
|  | The RLC level volume of a data burst, excluding the data transmitted in the slot when the buffer is emptied. A sample for ThpVolUl is the data volume counted on RLC SDU level in kbit received in UL for one DRB during a sample of ThpTimeUl, (It shall exclude the volume of the last piece of data emptying the buffer). |

d) Each measurement is a real value representing the throughput in kbit per second. The number of measurements is equal to one. If the optional QoS level subcounter and S-NSSAI subcounter and PLMN ID subcounter measurements are performed, the number of measurements is equal to the number of mapped 5QIs and the number of supported S-NSSAIs, and the number of PLMN IDs.

e) The measurement name has the form
DRB.UEThpUl, or optionally DRB.UEThpUl.*QOS,* where *QOS* identifies the target quality of service class and DRB.UEThpUl.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI, and DRB.UEThpUl.*PLMN,* where *PLMN* identifies the PLMN ID.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.3.4 Distribution of UL UE throughput in gNB

a) This measurement provides the distribution of the UE throughput in uplink. This measurement is intended for data bursts that are large enough to require transmissions to be split across multiple slots. The UE data volume refers to the total volume scheduled for each UE regardless if using only primary- or also supplemental aggregated carriers. The measurement is optionally split into subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcounters per supported S-NSSAI, and subcounters per PLMN ID.

b) CC

c) Considering there are n samples during measurement time T and each sample has the same time period tn, the measurement of one sample is obtained by the following formula for a measurement period tn:

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeUl>0$, $\frac{\sum\_{UEs}^{}\sum\_{}^{}ThpVolUl}{\sum\_{UEs}^{}\sum\_{}^{}ThpTimeUl}$×1000 [kbit/s]

If $\sum\_{UEs}^{}\sum\_{}^{}ThpTimeUl=0$, 0 [kbit/s]

For small data bursts, where all buffered data is included in one initial HARQ transmission otherwise:



|  |  |
| --- | --- |
| ThpTimeUl | The time to transmit a data burst excluding the data transmitted in the slot when the buffer is emptied. A sample of "ThpTimeUl" for each time the UL buffer for one DataRadioBearer (DRB) is emptied. |
| T1 | The point in time when the data up until the second last piece of data in data burst has been successfully received for a particular DRB  |
| T2 | The point in time when transmission is started for the first data in data burst for a particular DRB. |
| ThpVolUL | The RLC level volume of a data burst, excluding the data transmitted in the slot when the buffer is emptied. A sample for ThpVolUl is the data volume counted on RLC SDU level in kbit received in UL for one DRB during a sample of ThpTimeUl, (It shall exclude the volume of the last piece of data emptying the buffer). |

Alternatively, for small data bursts, that are successfully transmitted in any given slot (i.e. the requirement that data bursts need to span across several slots excluding transmission of the last piece of the data in a data burst does not apply). where all buffered data is included in one initial HARQ transmission, fraction of the slot time ($ThpTimeUL)$ may be counted and obtained by the formula:



|  |  |
| --- | --- |
| *slot* | Duration of the slot |
| *TBVol* | Volume of the TB related to one slot burst |
| *PaddingVol* | Volume of padding bits added into Transport Block related to one slot burst. |

For each measurement sample, the bin corresponding to the UL throughput experienced by the UE is incremented by one. Separate counters are maintained for each mapped 5QI (or QCI for option 3) and for each supported S-NSSAI, and for each PLMN ID.

d) A set of integers, each representing the (integer) number of samples with a UL UE throughput in the range represented by that bin. If the optional QoS level subcounter and S-NSSAI subcounter and PLMN ID subcounter measurements are performed, the number of measurements is equal to the number of mapped 5QIs and the number of supported S-NSSAIs, and the number of PLMN IDs.

e) The measurement name has the form
DRB.UEThpUlDist.Bin where Bin represents the bin, or optionally DRB.UEThpUlDist.Bin.*QOS,* where *QOS* identifies the target quality of service class, and DRB.UEThpUlDist.Bin.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI, and DRB.UEThpUlDist.Bin.*PLMN,* where *PLMN* identifies the PLMN ID.

NOTE: Number of bins and the range for each bin is left to implementation

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.3.5 Percentage of unrestricted DL UE data volume in gNB

a) This measurement provides the percentage of DL data volume for UEs in the cell that is classified as unrestricted, i.e., when the volume is so low that all data can be transferred in one slot and no UE throughput sample could be calculated. The UE data volume refers to the total volume scheduled for each UE regardless if using only primary- or also supplemental aggregated carriers. The measurement is optionally split into subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcounters per supported S-NSSAI, and subcounters per PLMN ID.

b) SI.

c) For periods when no data is transferred at all *Percentage Unrestricted Volume DL = 0*, otherwise:

 

|  |  |
| --- | --- |
| ThpUnresVolDl | The volume of a data burst that is transmitted in the slot when the buffer is emptied (which could be the only slot needed to transmit the data burst) and not included in the UE throughput measurement. A sample for ThpUnresVolDl is the data volume counted on RLC SDU level in kbits sent in DL for one DRB. |
| ThpVolDl | The volume of a data burst, excluding the data transmitted in the slot when the buffer is emptied. A sample for ThpVolDl is the data volume counted on RLC SDU level in kbits sent in DL for one DRB.  |

d) Each measurement is a single integer value from 0 to 100. The number of measurements is equal to one. If the optional QoS level subcounter and S-NSSAI subcounter and PLMN ID subcounter measurements are perfomed, the number of measurements is equal to the number of mapped 5QIs and the number of supported S-NSSAIs, and the number of PLMN IDs.

e) The measurement name has the form
DRB.UEUnresVolDl or optionally DRB.UEUnresVolDl.*QOS,* where *QOS* identifies the target quality of service class, or DRB.UEUnresVolDl.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI, and DRB.UEUnresVolDl.*PLMN,* where *PLMN* identifies the PLMN ID.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.3.6 Percentage of unrestricted UL UE data volume in gNB

a) This measurement provides the percentage of UL data volume for UEs in the cell that is classified as unrestricted, i.e., when the volume is so low that all data can be transferred in one slot and no UE throughput sample could be calculated. The UE data volume refers to the total volume scheduled for each UE regardless if using only primary- or also supplemental aggregated carriers. The measurement is optionally split into subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcounters per supported S-NSSAI, and subcounters per PLMN ID.

b) SI

c) For periods when no data is transferred at all *Percentage Unrestricted Volume UL = 0*, otherwise:



|  |  |
| --- | --- |
| ThpUnresVolUl | The volume of a data burst that is transmitted in the slot when the buffer is emptied (which could be the only slot needed to transmit the data burst) and not included in the UE throughput measurement. A sample for ThpUnresVolUl is the data volume counted on RLC SDU level in kbits received in UL for one DRB. |
| ThpVolUl | The volume of a data burst, excluding the data transmitted in the slot when the buffer is emptied. A sample for ThpVolUl is the data volume counted on RLC SDU level in kbits received in UL for one DRB.  |

d) Each measurement is a single integer value from 0 to 100. The number of measurements is equal to one. If the optional QoS level subcounter and S-NSSAI subcounter and PLMN ID subcounter measurements are performed, the number of measurements is equal to the number of mapped 5QIs and the number of supported S-NSSAIs, and the number of PLMN IDs.

e) The measurement name has the form
DRB.UEUnresVolUl or optionally DRB.UEUnresVolUl.*QOS,* where *QOS* identifies the target quality of service class , and DRB.UEUnresVolUl.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI, and DRB.UEUnresVolUl.*PLMN,* where *PLMN* identifies the PLMN ID.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario).

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

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| **Next change** |

#### 5.1.1.23 Number of Active Ues

##### 5.1.1.23.1 Mean number of Active UEs in the DL per cell

a) This measurement provides the mean number of active DRBs for UEs in an NRCellDU. The measurement is calculated per PLMN ID and per QoS level (mapped 5QI or/and QCI in NR option 3) and per supported S-NSSAI.

b) DER (n=1).

c) This measurement is obtained by aggregating the measurement " Mean number of Active UEs in the DL per DRB per cell " (see clause 4.2.1.3.2 in TS 38.314 [29]). The measurement is performed per PLMN ID and per QoS level (mapped 5QI or/and QCI in NR option 3) and per supported S-NSSAI.

d) Each measurement is a single integer value. The number of measurements is equal to the number of PLMNs multiplied by the number of QoS levels or multiplied by the number of supported S-NSSAIs.

[Total No. of measurement instances] x [No. of filter values for all measurements] (DL and UL) ≤ 100.

e) The measurement name has the form DRB.MeanActiveUeDl\_Filter,
Where filter is a combination of PLMN ID and QoS level and S-NSSAI.

Where PLMN ID represents the PLMN ID, QoS representes the mapped 5QI or/and QCI level, and SNSSAI represents S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario).

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.23.2 Max number of Active UEs in the DL per cell

a) This measurement provides the max number of active DRBs for UEs in an NRCellDU. The measurement is calculated per PLMN ID and per QoS level (mapped 5QI or/and QCI in NR option 3) and per supported S-NSSAI.

b) DER (n=1).

c) This measurement is defined according to measurement " Max number of Active UEs in the DL per DRB per cell " (see clause 4.2.1.3.3 in TS 38.314 [29]). The measurement is performed per PLMN ID and per QoS level (mapped 5QI or/and QCI in NR option 3) and per supported S-NSSAI. d) Each measurement is a single integer value. The number of measurements is equal to the number of PLMNs multiplied by the number of QoS levels or multiplied by the number of supported S-NSSAIs.

[Total No. of measurement instances] x [No. of filter values for all measurements] (DL and UL) ≤ 100.

e) The measurement name has the form DRB.MaxActiveUeDl\_Filter,
Where filter is a combination of PLMN ID and QoS level and S-NSSAI.

Where PLMN ID represents the PLMN ID, QoS representes the mapped 5QI or/and QCI level, and SNSSAI represents S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario).

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.23.3 Mean number of Active UEs in the UL per cell

a) This measurement provides the mean number of active DRBs for UEs in an NRCellDU. The measurement is calculated per PLMN ID and per QoS level (mapped 5QI or/and QCI in NR option 3) and per supported S-NSSAI.

b) DER (n=1)

c) This measurement is obtained by aggregating the measurement " Mean number of Active UEs in the UL per DRB per cell " (see clause 4.2.1.3.4 in TS 38.314 [29]). The measurement is performed per PLMN ID and per QoS level (mapped 5QI or/and QCI in NR option 3) and per supported S-NSSAI.

d) Each measurement is a single integer value. The number of measurements is equal to the number of PLMNs multiplied by the number of QoS levels or multiplied by the number of supported S-NSSAIs.

[Total No. of measurement instances] x [No. of filter values for all measurements] (DL and UL) ≤ 100.

e) The measurement name has the form DRB.MeanActiveUeUl\_Filter,
Where filter is a combination of PLMN ID and QoS level and S-NSSAI.

Where PLMN ID represents the PLMN ID, QoS representes the mapped 5QI or/and QCI level, and SNSSAI represents S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario).

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.1.23.4 Max number of Active UEs in the UL per cell

a) This measurement provides the max number of active DRBs for UEs in an NRCellDU. The measurement is optionally split into subcounters per QoS level (mapped 5QI or/and QCI in NR option 3) and subcounters per S-NSSAI.

b) DER (n=1)

c) This measurement is defined by the measurement " Max number of Active UEs in the UL per DRB per cell " (see clause 4.2.1.3.5 in TS 38.314 [29]). Separate counters are optionally maintained for each mapped 5QI (or/and QCI for option 3) and for each S-NSSAI.

d) The number of measurements is equal to one. If the optional QoS level measurement is perfomed, the number of measurements is equal to the number of mapped 5QIs (or/and number of QCI for option 3), and the number of S-NSSAIs.

e) The measurement name has the form DRB.MaxActiveUeUl,
DRB.MaxActiveUeUl.*QOS* where *QOS* identifies the target quality of service class, and
DRB.MaxActiveUeUl.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario).

g) Valid for packet switched traffic.

h) 5GS.

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

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| **Next change** |

#### 5.1.3.4 IP Latency measurements

##### 5.1.3.4.1 General information

This clause defines the DL latency in gNB-DU. DL latency measurements for CU-UP and F1-U are not defined.

##### 5.1.3.4.2 Average IP Latency DL in gNB-DU

a) This measurement provides the average IP Latency in DL (arithmetic mean) within the gNB-DU, when there is no other prior data to be transmitted to the same UE in the gNB-DU. The measurement is optionally split into subcounters per QoS level and subcounters per S-NSSAI.

b) DER (n=1)

c) This measurement is obtained as: sum of (time when the first piece of an RLC SDU transmitted on the air interface, minus time of arrival of the same packet at the RLC ingress F1-U termination, for IP packets arriving when there is no other prior data to be transmitted to the same UE in the gNB-DU) divided by total number of RLC SDUs arriving at the RLC ingress F1-U termination when there is no other prior data to be transmitted to the same UE in the gNB-DU. Separate counters are optionally maintained for each mapped 5QI (or QCI for option 3) and for each S-NSSAI.

d) Each measurement is a real representing the average latency in 0.1 millisecond. The number of measurements is equal to one. If the optional QoS level subcounters and S-NSSAI subcounters are measurement is performed, the number of measurements is equal to the sum of number of supported mapped 5QIs and the number of S-NSSAIs.

e) The measurement name has the form DRB.RlcSduLatencyDl,
optionally DRB.RlcSduLatencyDl.*QOS* where *QOS* identifies the target quality of service class, and
optionally DRB.RlcSduLatencyDl.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

##### 5.1.3.4.3 Distribution of IP Latency DL in gNB-DU

a) This measurement provides the distribution of IP Latency in DL within the gNB-DU, when there is no other prior data to be transmitted to the same UE in the gNB-DU. The measurement is split into subcounters per QoS level and subcounters per S-NSSAI.

b) DER (n=1)

c) This measurement is obtained by 1) calculating the latency on the downlink within the gNB-DU for a RLC SDU packet by: time when the first piece of an RLC SDU transmitted on the air interface, minus time of arrival of the same packet at the RLC ingress F1-U termination, for IP packets arriving when there is no other prior data to be transmitted to the same UE in the gNB-DU; and 2) incrementing the corresponding bin with the latency range where the result of 1) falls into by 1 for the subcounters per QoS level (mapped 5QI or QCI in NR option 3) and subcunters per S-NSSAI.

d) Each measurement is an integer representing the number of RLC SDU packets measured with the latency within the range of the bin.

e) DRB.RlcSduLatencyDlDist.*bin*.*QOS,* where *QOS* identifies the target quality of service class, and *Bin* indicates a latency range which is vendor specific;
DRB.RlcSduLatencyDlDist.*bin*.*SNSSAI,* where *SNSSAI* identifies the S-NSSAI, and *Bin* indicates a latency range which is vendor specifics.

f) NRCellDU (for all scenarios except MOCN network sharing with multiple Cell Identity broadcast scenario),

NROperatorCellDU (for MOCN network sharing with multiple Cell Identity broadcast scenario)

g) Valid for packet switched traffic

h) 5GS

i) One usage of this measurement is for performance assurance within integrity area (user plane connection quality).

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| **End of changes** |