**3GPP TSG-SA5 Meeting #145-e *S5-225097***

e-meeting, 15 - 24 Aug 2022

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.104** | **CR** | **0001** | **rev** | **-** | **Current version:** | **17.0.1** |  |
|  | | | | | | | | |
| *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:*** | Rel-17 CR 28.104 Rectifying attribute properties | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI17 | | | | |  | ***Date:*** | | | 2022-08-04 |
|  |  | | | |  | |  | | |  |
| ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Incorrect attribute properties(isUnique and isOrdered) specified for attributes with multiplicity 1 and more than 1.  Incomplete reference to parameters in 28.622.  Incorrect attributes type mentioned | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Incorrect attributes properties are corrected for attributes with multiplicity 1 and more than 1  Reference to definitions from 28.622 corrected | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Incorrect attribute properties for attributes like type, isOrdered and isUnique leading to ambiguity | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.4.1.1, 8.4.6, 8.5.1, 8.5.4, 8.4.3.1, 8.4.5.1, 8.4.2.5, 8.4.2.3, 8.5.11, 8.5.12, 8.4.1.2, 8.5.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

***Start of first change***

#### 8.4.1.1 Coverage problem analysis

##### 8.4.1.1.1 MDA type

The MDA type for coverage problem analysis is: CoverageAnalytics.CoverageProblemAnalysis.

##### 8.4.1.1.2 Enabling data

The enabling data for CoverageAnalytics.CoverageProblemAnalysis MDA type are provided in table 8.4.1.1.2-1.

For general information about enabling data, see clause 8.2.1.

Table 8.4.1.1.2-1: Enabling data for coverage problem analysis

| Data category | Description | References |
| --- | --- | --- |
| Performance measurements | SS-RSRP distribution per SSB (beam) of serving NR cell | SS-RSRP distribution per SSB (clause 5.1.1.22.1 of TS 28.552 [4]). |
| SS-RSRP distribution per SSB (beam) of neighbor NR cell | SS-RSRP distribution per SSB of neighbor NR cell (clause 5.1.1.22.2 of TS 28.552 [4]) |
| RSRP distribution of neighbor E-UTRA cell for an NR cell | RSRP distribution per neighbor E‑UTRAN cell (clause 5.1.1.22.3 of TS 28.552 [4]) |
| Power headroom distribution for NR cell | Type 1 power headroom distribution (clause 5.1.1.26.1 of TS 28.552 [4]). |
| Wideband CQI distribution for NR cell | Wideband CQI distribution (clause 5.1.1.11.1 of TS 28.552 [4]). |
| Timing Advance distribution for NR cell | Timing Advance distribution for NR Cell (clause 5.1.1.33.1 of TS 28.552 [4]) |
| Number of UE Context Release Request (gNB-DU initiated) | Number of UE Context Release Request (gNB-DU initiated) (clause 5.1.3.5.1 of TS 28.552 [4]). |
| Number of UE Context Release Request per SSB (gNB-DU initiated) | Number of UE Context Release Request (gNB-DU initiated) (clause 5.1.3.5.1 of TS 28.552 [4]). |
| Number of UE Context Release Requests (gNB-CU initiated) | Number of UE Context Release Request (gNB-CU initiated) (clause 5.1.3.5.2 of TS 28.552 [4]). |
| Number of UE Context Release Requests per SSB (gNB-CU initiated) | Number of UE Context Release Request (gNB-CU initiated) (clause 5.1.3.5.2 of TS 28.552 [4]). |
| RSRP related measurements for ng-eNB | RSRP related measurements (clause 6.1 of TS 32.425 [12]). |
| UE power headroom related measurements for ng-eNB | UE power headroom related measurements (clause 6.3 of TS 32.425 [12]). |
| Wideband CQI distribution for ng-eNB | Wideband CQI distribution (clause 4.10.1.1 of TS 32.425 [12]). |
| Average sub-band CQI for ng-eNB | Average sub-band CQI (clause 4.10.1.2 of TS 32.425 [12]). |
| UE Rx - Tx time difference related measurements for ng-eNB | UE Rx - Tx time difference related measurements (clause 6.4 of TS 32.425 [12]). |
| AOA related measurements for ng-eNB | AOA related measurements (clause 6.5 of TS 32.425 [12]). |
| Timing Advance distribution for ng-eNB | Timing Advance Distribution (clause 4.10.2 of TS 32.425 [12]). |
| Number of UE CONTEXT Release Request initiated by ng-eNodeB | Number of UE CONTEXT Release Request initiated by eNodeB/RN (clause 4.1.5.1 of TS 32.425 [12]). |
| MDT reports | MDT reports containing RSRPs of the serving cell and neighbour cells, and UE location. | RSRPs and UE location of M1 measurements for NR in TS 32.422 [6] and TS 32.423 [7]. |
| RLF reports | RLF reports containing RSRPs of the last serving cell and neighbour cells, and UE location. | RLF data collection and RLF reporting in TS 32.422 [6], and rlf-Report-r16 in TS 38.331 [13]. |
| RCEF reports | RCEF reports containing RSRPs of NR cell where the RRC connection establishment failed and neighbour cells, and UE location. | RCEF data collection and RCEF reporting in TS 32.422 [6], and ConnEstFailReport-r16 in TS 38.331 [13]. |
| UE location reports | UE location information provided by the LMF services which can be used to correlate with the MDT reports. | The UE location information provided by LMF via service-based interface (see TS 23.273 [14]). |
| Geographical data | The geographical information (longitude, latitude, altitude) of the deployed RAN (NG-RAN and E-UTRAN). | The geographical information (longitude, latitude, altitude) information (see the peeParametersList attribute of the ManagedFunction IOC in TS 28.622 [19]). |
| Configuration data | The NRMs containing the attributes affecting the coverage for (NG-RAN and E-UTRAN). | NRCellDU IOC, NRSectorCarrier IOC, BWP IOC, CommonBeamformingFunction IOC, and Beam IOC in TS 28.541 [15];  EUtranGenericCell IOC in TS 28.658 [16];  SectorEquipmentFunction IOC, AntennaFunction IOC, and TMAFunction IOC in TS 28.662 [17]. |

##### 8.4.1.1.3 Analytics output

The specific information elements of the analytics output for coverage problem analysis, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.1.1.3-1.

Table 8.4.1.1.3-1: Analytics output for coverage problem analysis

| Information element | Definition | Support qualifier | Properties |
| --- | --- | --- | --- |
| coverageProblemId | The identifier of the coverage problem. | M | type: string  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| coverageProblemType | Indication of type of the coverage Problem.  The allowed value is one of the enumerated values: WeakCoverage, CoverageHole, PilotPollution, Overshoot coverage, DlUlChannelCoverageMismatch, Other. | M | type: enumeration  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| coverageProblemAreas | Geographical location areas where the coverage problem occurred. | O | type: GeoArea (see TS 28.622, to be confirmed)  multiplicity: \*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| problematicCells | The CGIs of cells where the coverage problem occurred. | M | type: Integer  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| recommendedActions | The recommended actions to solve the coverage problem.  The recommended action may be (but not limited to):  - creation of new beam(s), or cell(s);  - change the transmission power of the NR sector carrier;  - delete some unwanted beam(s) or cell(s). | M | type: RecommendedAction  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| radioEnvironmentMap | The graphical description of the observed radio coverage characteristics. The graphic may be for the RSRP or SINR of the selected cluster of cells mapped against the physical geographical information (longitude, latitude, altitude) of the area where the RAN (NG-RAN and E-UTRAN) cells are deployed.  It is a list of paired tuples of geographical information (longitude, latitude, altitude) and coverage (RSRP or SINR) values. | O | type: List  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| cellConfigurations | The cell configurations for a new cell or reconfigurations of existing cells derived based on the characteristics in the radioEnvironmentMap.  The cell configurations are the changes to the NRMs attributes affecting the cell coverage (NG-RAN and E-UTRAN). | O | type: may differ as defined in  NRCellDU IOC, NRSectorCarrier IOC, BWP IOC, CommonBeamformingFunction IOC, and Beam IOC in TS 28.541 [15]; EUtranGenericCell IOC in TS 28.658 [16];  SectorEquipmentFunction IOC, AntennaFunction IOC, and  TMAFunction IOC in TS 28.662 [17].  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |

***Start of next changes***

### 8.5.1 RecommendedAction <<dataType>>

#### 8.5.1.1 Definition

This data type specifies the type of recommended action in the analytics output.

#### 8.5.1.2 Information elements

Table 8.5.1.2-1

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Definition | Support qualifier | Properties |
| recommended3GPPActions | It contains the recommendations actions concerning 3GPP defined operations on MOIs. | O | type: Recommended3GPPAction  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| recommendedHumanReadableActions | It contains the recommendations on human readable actions.  NOTE: Further details of recommended human readable actions are not specified. | O | type: string  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |

***Start of next changes***

### 8.5.4 EsRecommendation <<dataType>>

#### 8.5.4.1 Definition

This data type specifies the type of energy saving recommendations in the analytics output.

#### 8.5.4.2 Information elements

Table 8.5.4.2-1

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Definition | Support qualifier | Properties |
| esRecommendationsOnNRcells | It contains the energy saving recommendations on NR cells. | M | type: EsRecommendationsOnNRcell  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| esRecommendationsOnUPFs | It contains the energy saving recommendations on UPFs. | M | type: EsRecommendationsOnUPF  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |

***Start of next changes***

### 8.5.13 HOTargetType <<dataType>>

#### 8.5.13.1 Definition

This data type specifies the information about the target cell and gNB for handover.

The attribute isOptimal specify if the cell (served by gNB) is optimal for handover considering the current virtual, physical and radio resource consumption by the gNB and/or the cell. The value TRUE imply that the target is not resource deprived at present and can be selected for handover.

The attribute futureOptimalInfo specify if the cell (served by the gNB) will be optimal for handover at a future point of time considering the future virtual and radio resource consumption by the gNB and/or the cell . This will also provide projection of future virtual, and radio resource consumptions.

#### 8.5.13.2 Information elements

Table 8.5.13.2-1

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Definition | Support qualifier | Properties |
| gNBId | See clause 4.4.1 of TS 28.541 [15]. | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| cellLocalId | See clause 4.4.1 of TS 28.541 [15]. | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: NULL  isNullable: False |
| isOptimal | This specifies if the cell (served by the gNB) is optimal for handover with respect to the virtual and physical resource consumption of its gNB and its own radio resource consumption. The value TRUE indicates that the gNB is optimal at present.  Allowed Values: TRUE and FALSE. | M | type: Boolean  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: TRUE  isNullable: False |
| futureOptimalInfo | This specifies related information when the cell is optimal for handover in future. | O | type: FutureOptimal  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |

***Start of next changes***

### 8.4.6 Maintenance management related analytics

#### 8.4.6.1 Maintenance management analysis

##### 8.4.6.1.1 MDA type

The MDA type for maintenance management is: Maintenance.MaintenanceAnalytics.

##### 8.4.6.1.2 Enabling data

The enabling data for Maintenance.MaintenanceAnalytics MDA type are provided in table 8.4.6.1.2-1.

For general information about enabling data, see clause 8.2.1.

Table 8.4.6.1.2-1: Enabling data for maintenance analysis

|  |  |  |
| --- | --- | --- |
| Data category | Description | References |
| Performance Measurements | Number of Active DRB | Mean number of DRBs being allocated (clause 5.1.1.10.9 of TS 28.552 [4]). |
| Number of bearers undergoing handover | Number of requested preparations for handovers from 5GS to EPS (clause 5.1.1.6.3.1 of TS 28.552 [4]).  Number of requested resource allocations for handovers from EPS to 5GS (clause 5.1.1.6.3.4 of TS 28.552 [4])  Number of requested preparations for EPS fallback handovers (clause 5.1.1.6.3.10 of TS 28.552 [4])  Number of successful executions for EPS fallback handovers (clause 5.1.1.6.3.13 of TS 28.552 [4]) |
| Number of bearers being recovered from the error state | Editors Note: to be defined in TS 28.552. |
| Number of successful bearer modification | Number of QoS flows attempted to modify (clause 5.1.1.13.4.1 of TS 28.552 [4]) |

##### 8.4.6.1.3 Analytics output

The specific information elements of the analytics output for maintenance management analysis, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.6.1.3-1.

Table 8.4.6.1.3-1: Analytics output for maintenance analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Information element | Definition | Support qualifier | Properties |
| currentUpgradeOptimal | This data type defines whether gNB can be upgrade at present | M | type: CurrentUpgrade  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: none  isNullable: False |
| futureUpgradeOptimal | This data type defines whether the gNB can be upgrade in future and when | M | type: FutureUpgrade  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: none  isNullable: False |
| gNBID | This identifies the gNB |  | type: String  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: none  isNullable: False |

***Start of next changes***

### 8.4.3 MDA assisted fault management

#### 8.4.3.1 MDA assisted failure prediction

##### 8.4.3.1.1 MDA type

The MDA type for failure prediction analysis is: MDAAssistedFaultManagement.FailurePrediction.

##### 8.4.3.1.2 Enabling data

The enabling data for MDAAssistedFaultManagement.FailurePrediction MDA type are provided in table 8.4.3.1.2-1.

For general information about enabling data, see clause 8.2.1.

Table 8.4.3.1.2-1: Enabling data for fault predication analysis

|  |  |  |
| --- | --- | --- |
| Data category | Description | References |
| Performance measurements | The deteriorated performance or the abnormal performance measurements based on certain performance monitoring threshold.  3GPP management system may monitor a set of performance measurements and their thresholds, so as to support the analytics of prediction of a network service failure. | The performance measurements as defined in TS 28.552 [4] |
| Alarm notifications | Alarm information, e.g. the alarm notification of network functions. | Alarm information and notifications as per TS 28.532 [11] |
| Configuration data | MOIs of the cells, UPFs and SMFs. | TS 28.541 [15] |
| Network analytics data | The control plane analysis result from the NWDAF, e.g. observed service experience related network data analytics. | TS 23.288 [10] |

##### 8.4.3.1.3 Analytics output

The specific information elements of the analytics output for failure prediction analysis, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.3.1.3-1.

Table 8.4.3.1.3-1: Analytics output for fault prediction analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Information element | Definition | Support qualifier | Properties |
| failurePredictionObject | Indication of NR cells or NFs where the failure related issues occurred or potentially occur. | M | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| potentialFailureType | Indication of type of issues that can cause the failures.  NOTE 1: The values can be defined as a list of example values: "Operational Violation", "Physical Violation" and "Time Domain Violation". See alarmType described in TS 28.532 [11]. | M | type: string  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| eventTime | This field holds the time of potential failure predicted.  Examples: "20:15:00", "20:15:00-08:00" (for 8 hours behind UTC). | M | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| issueID | This filed holds the ID of this failure prediction which is reported.  When reports, this identifier can be used to provide the information to management system to maintain. | M | type: string  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| perceivedSeverity | This field holds the value to indicate relative level of urgency for operator attention.  NOTE 2: The value can be Critical, Major, Minor, Warning, Indeterminate, Cleared, see Recommendation ITU-T X.733 [27]. | M | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |

***Start of next changes***

#### 8.4.5.1 Mobility performance analysis

##### 8.4.5.1.1 MDA type

The MDA type for mobility performance analysis is: MobilityManagementAnalytics.MobilityPerformanceAnalysis.

##### 8.4.5.1.2 Enabling data

The enabling data for MobilityManagementAnalytics.MobilityPerformanceAnalysis MDA type are provided in table 8.4.5.1.2-1.

For general information about enabling data, see clause 8.2.1.

Table 8.4.5.1.2-1: Enabling data for mobility performance analysis

|  |  |  |
| --- | --- | --- |
| Data category | Description | References |
| Performance measurements | Inter-gNB handovers | Inter-gNB handovers (clause 5.1.1.6.1 of TS 28.552 [4]). |
| Intra-gNB handovers | Inter-gNB handovers (clause 5.1.1.6.4 of TS 28.552 [4]). |
| Inter-gNB DAPS handovers | Inter-gNB handovers (clause 5.1.1.6.2 of TS 28.552 [4]). |
| Intra-gNB DAPS handovers | Inter-gNB handovers (clause 5.1.1.6.3 of TS 28.552 [4]). |
| Inter-gNB conditional handovers | Inter-gNB handovers (clause 5.1.1.6.6 of TS 28.552 [4]). |
| Intra-gNB conditional handovers | Inter-gNB handovers (clause 5.1.1.6.7 of TS 28.552 [4]). |

##### 8.4.5.1.3 Analytics output

The specific information elements of the analytics output (MDA report) for mobility performance analysis, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.5.1.3‑1.

Table 8.4.5.1.3-1: Analytics output for Mobility Performance analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Information element | Definition | Support qualifier | Properties |
| mobilityPerformance IssueIdentifier | The identifier of the mobility performance issue analysis; | M | type: integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mobilityPerformance IssueRootCause | The root cause of mobility performance issues.  The allowed value is one of the enumerated values: too long mobility interruption time, poor coverage of the cell-edge, inappropriate handover parameters, other. | M | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| mobilityPerformance IssueLocation | Geographical location areas where the mobility performance issue occurred. | O | type: GeoCoordinate (TS 28.622 [19])  multiplicity: \*  isOrdered: True  isUnique: True  defaultValue: None  isNullable: False |

***Start of next changes***

#### 8.4.2.5 Network slice load analysis

##### 8.4.2.5.1 MDA type

The MDA type for Capability- Network slice load analysis is: SLSAnalysis.NetworkSliceLoadAnalysis.

##### 8.4.2.5.2 Enabling data

The enabling data for SLSAnalysis.NetworkSliceLoadAnalysis MDA type are provided in table 8.4.2.5.2-1.

Table 8.4.2.5.2-1: Enabling data for network slice load analysis

|  |  |  |
| --- | --- | --- |
| Data category | Description | References |
| Performance measurements | Number of PDU sessions of network slice | Mean number of PDU sessions of network and network Slice Instance (clause 6.4.1 in TS 28.554 [5]). |
| Number of PDU Sessions successfully setup | Number of PDU Sessions successfully setup (clause 5.1.1.5 in TS28.552 [4]). |
| Mean Number of PDU sessions | Number of PDU sessions(Mean) (clause 5.3.1.1 in TS 28.552 [4]). |
| Network Data Analytics | Analysis results from the control plane produced by NWDAF | Analytics data from NWDAF in TS 23.288 [10] including e.g. Slice load level related network data analytics clause 6.3, and the analytics for user plane performance (i.e. average/maximum traffic rate, average/maximum packet delay, average packet loss rate in clause 6.14. |
| Configuration data | MOIs of the cells, NW slice/NW slice subnet, 5GC NFs | NRM information TS 28.541 [15]. |

##### 8.4.2.5.3 Analytics output

The specific information elements of the analytics output for network slice load analysis, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.2.5.3-1.

Table 8.4.2.5.3-1: Analytics output for network slice load analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Information element | Definition | Support qualifier | Properties |
| networkSliceLoadIssueId | The identifier indicates the output is for Network slice instance load analysis | M | type: string  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| networkSliceLoadIssueDomain | Indicates the domain of the network slice instance load issue  The allowed value is one of the enumerated values:  - RAN issue;  - CN issue | M | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| networkSliceLoadIssuePhase | Indicates the phase of the network slice instance load issue  The allowed value is one of the enumerated values: historic network slice load issue, ongoing network slice load issue, potential network slice load issue | M | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| networkSliceLoadIssueType | Indicates the type of the network slice instance load issue  The allowed value is one of the enumerated values: overload network slice load issue, underutilized network slice load issue | M | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| affectedObjects | The managed object instances involved in the network slice instance load problem | O | type: DN  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| networkSliceLoadDistribution | Describes the detailed load distribution or predictive distribution, e.g. load distribution for a network slice instance at a certain location or in a certain time period | O | type: Integer  multiplicity: \*  isOrdered: True  isUnique: False  defaultValue: None  isNullable: False |

***Start of next changes***

#### 8.4.2.3 Network slice traffic prediction

##### 8.4.2.3.1 MDA type

The MDA type for capability Network slice traffic prediction is: SLSAnalysis.NetworkSliceTrafficAnalysis.

##### 8.4.2.3.2 Enabling data

The enabling data for SLSAnalysis.NetworkSliceTrafficAnalysis MDA type are provided in table 8.4.2.3.2-1.

Table 8.4.2.3.2-1: Enabling data for network slice traffic prediction analysis

|  |  |  |
| --- | --- | --- |
| Data category | Description | References |
| Performance measurements | UL/DL throughput for network slice. | Upstream throughput for network and Network Slice Instance (clause 6.3.3 in TS 28.554 [5]); Downstream throughput for Single Network Slice Instance (clause 6.3.4 in TS 28.554 [5]). |
| Number of incoming and outgoing octets of GTP packet on N3 | See clauses 5.4.1.4 and 5.4.1.3 in TS 28.541 [5]). |
| UL/DL UE throughput for network slice | RAN UE Throughput (clause 6.3.6 in TS 28.554 [5]). |
| Number of PDU sessions of network slice | Mean number of PDU sessions of network and network Slice Instance (clause 6.4.1 in TS 28.554 [5]). |
| Number of registered subscribers of a network slice instance | Mean registered subscribers of network and network slice through AMF (see clause 6.2.1 in TS 28.554 [5]). |
| Maximum packet size for a network slice | Maximum packet size for a network slice subnet (see clause 6.3.11 of TS 28.541 [5]). |

##### 8.4.2.3.3 Analytics output

The specific information elements of the analytics output for network slice traffic prediction analysis, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.2.3.3-1.

Table 8.4.2.3.3-1: Analytics output for network slice traffic prediction analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Information element | Definition | Support qualifier | Properties |
| trafficProjections | This specifies the traffic projections for a slice. | M | type: TrafficProjections  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |

***Start of next changes***

### 8.5.11 UPFProj <<dataType>>

#### 8.5.11.1 Definition

This data type specifies the traffic projection for a UPF.

#### 8.5.11.2 Information elements

Table 8.5.11.2-1

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Definition | Support qualifier | Properties |
| uLThroughput | The projected average UL throughput for a single UPF in the slice, over the time duration indicated by projectionTime attribute. The unit is kbit/s.  This is the projection of the Upstream Throughput at N3 interface KPI defined in TS 28.554 [5] | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| dLThroughput | The projected average DL throughput for a single UPF in the slice, over the time duration indicated by projectionTime attribute. The unit is kbit/s.  This is the projection of the Downstream Throughput at N3 interface KPI defined in TS 28.554 [5]. | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| maxPktSize | The projected average maximum packet size for a single UPF in the slice, over the time duration indicated by projectionTime attribute. | O | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |

### 8.5.12 gNBProj <<dataType>>

#### 8.5.12.1 Definition

This data type specifies the traffic projection for a gNB.

#### 8.5.12.2 Information elements

Table 8.5.12.2-1

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Definition | Support qualifier | Properties |
| uLUEThroughput | The projected average UL UE throughput in the slice, over the time duration indicated by projectionTime attribute. The unit is kbit/s.  This is the projection of the UL RAN UE throughput KPI defined in TS 28.554 [5]. | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| dLUEThroughput | The projected average DL throughput in the slice, over the time duration indicated by projectionTime attribute. The unit is kbit/s.  This is the projection of the DL RAN UE throughput KPI defined in TS 28.554 [5]. | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |

***Start of next changes***

#### 8.4.1.2 Paging Optimization

##### 8.4.1.2.1 MDA type

The MDA type for Capability-Paging Optimization: SLSAnalysis.PagingOptimization.

##### 8.4.1.2.2 Enabling data

The enabling data for paging optimization are provided in table 8.4.1.2.2-1.

Table 8.4.1.2.2-1: Enabling data for Paging Optimization Analysis

|  |  |  |
| --- | --- | --- |
| Data category | Description | References |
| MDT Data | MDT reports indicating UE location information | MDT measurements defined in TS 32.423 [7]. |
| Performance measurements | Measurement for 5G Paging from AMF | See clause 5.2.5.2 in TS 28.552 [4]. |

##### 8.4.1.2.3 Analytics output

The specific information elements of the analytics output for paging optimization, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.1.2.3-1.

**Table 8.4.1.2.3-1: Analytics output for paging optimization analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| Information element | Definition | Support qualifier | Properties |
| oOCDuration | This specify the time window during which UE is out-of-coverage. | M | type: ProjectionDuration  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| oOCLocation | This specifies the last known location of the UEs before it goes out-of-coverage. This would be within the area indicated by the "areaScope" of the MDA request. | CM | type: GeoCoordinate  multiplicity: 1..\*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| oOCMap | This specifies the geographical region within which the paging issues are experienced by a group of UEs. This would be within the area indicated by the "areaScope" of the MDA request. | CM | type: GeoCoordinate  multiplicity: 1..\*  isOrdered: True  isUnique: True  defaultValue: None  isNullable: False |

***Start of next changes***

### 8.5.3 TrafficLoadTrend <<dataType>>

#### 8.5.3.1 Definition

This data type specifies the type of TrafficLoadTrend.

#### 8.5.3.2 Information elements

Table 8.5.3.2-1

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Definition | Support qualifier | Properties |
| cellId | It indicates the cell for which the traffic load prediction is performed. | M | type: DN  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| startTime | It indicates the start time that are used for traffic load prediction. | M | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| endTime | It indicates the end time that are used for traffic load prediction. | M | type: DateTime  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| trafficLoadList | It provides a list of PRB usage based on a specific granularity. | M | type: Integer  multiplicity: 1..\*  isOrdered: False  isUnique: False  defaultValue: None  isNullable: False |

***End of changes***