**3GPP TSG-CT3 Meeting #116e C3-213054\_r2**

**E-Meeting, 19th – 28th May 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.522** | **CR** | **0342** | **rev** | **1** | **Current version:** | **17.1.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | New Network slice status reporting events for the MonitoringEvent API | | | | | | | | | |
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| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNS\_Ph2 | | | | |  | ***Date:*** | | | 2021-05-24 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | SA2 has started the Stage 2 normative work on eNS\_Ph2 WI and specified in 3GPP TS 23.501 and TS 23.502 the Network slice status reporting functionality to enable the reporting of the current number of registered UEs and/or established PDU Sessions for a network slice that is subject to Network Slice Admission Control towards core network NFs or external party entities. Therefore, the MonitoringEvent API needs to be updated accordingly. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | This CR proposes to:   * Update clause 4.4.2 to describe the associated procedures. * Update clause 5.3 to indicate that the new defined "NSAC" feature in C3-213053 is applicable only to 5G. | | | | | | | | |
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| ***Consequences if not approved:*** | | * Requirements from Stage 2 on Network slice status reporting for the purpose of Network Slice Admission Control not implemented in Stage 3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.2, 4.4.2, 5.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 23.501 CR S2-2103478 (#2838)  TS 23.502 CR S2-2103479 (#2715) | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR introduces backwards compatible changes to the OpenAPI specification file of the Nudr\_DataRepository API for Application Data. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev 1:   * Remove the event "NUM\_OF\_REGD\_UES\_AND\_ESTD\_PDU\_SESSIONS" for the time being as it is not yet clear enough from stage 2 requirements that an AF can request to subscribe to both events at the same time. * Add ENs to capture the current aspects that are not yet clear enough from Stage 2 requirements. * Remove the added "snssai" attribute to the MonitoringEventReport data type in order to respect the guidelines of clause 5.9.2.3 of TS 33.501. | | | | | | | | |

\* \* \* Start of changes \* \* \* \*

# 2 References

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

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

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

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

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

[2] 3GPP TS 23.502: "Procedures for the 5G system".

[3] 3GPP TS 23.501: "System Architecture for the 5G".

[4] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".

[5] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.

[6] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[7] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[8] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[9] 3GPP TS 29.521: "5G System; Binding Support Management Service; Stage 3".

[10] Void.

[11] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".

[12] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".

[13] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[14] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".

[15] Void.

[16] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".

[17] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[18] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[19] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".

[20] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".

[21] 3GPP TR 21.900: "Technical Specification Group working methods".

[22] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

[23] 3GPP TS 29.519: "5G System; Usage of the Unified Data Repository service for Policy Control Data, Application Data and Structured Data for Exposure; Stage 3".

[24] 3GPP TS 29.541: "5G System; Network Exposure (NE) function services for Non-IP Data Delivery (NIDD); Stage 3".

[25] 3GPP TS 29.542: "5G System, Session management services for Non-IP Data Delivery (NIDD); Stage 3".

[26] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[27] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[28] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G system (5GS)".

[29] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[30] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[31] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to Vehicle-to-Everything (V2X) services".

[32] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[33] 3GPP TS 24.588: "Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3".

[34] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

[35] 3GPP TS 29.515: "5G System; Gateway Mobile Location Services; Stage 3".

[36] 3GPP TS 23.273: "5G System Location Services (LCS)".

[37] 3GPP TS 33.535: "Authentication and Key Management for Applications (AKMA) based on 3GPP credentials in the 5G System (5GS)".

[38] 3GPP TS 29.535: "5G System; AKMA Anchor Services".

[39] 3GPP TS 33.220: "Generic Authentication Architecture (GAA); Generic Bootstrapping Architecture (GBA)".

[40] IETF RFC 7542: "The Network Access Identifier".

[aa] 3GPP TS 29.536: "5G System; Network Slice Admission Control Services; Stage 3".

\* \* \* Next changes \* \* \* \*

## 3.2 Abbreviations

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

A-KID AKMA Key IDentifier

A-TID AKMA Temporary UE IDentifier

AAnF AKMA Anchor Function

ACS Auto-Configuration Server

AF Application Function

AKMA Authentication and Key Management for Applications

BDT Background Data Transfer

CAPIF Common API Framework

CP Communication Pattern

DN Data Network

DNAI DN Access Identifier

DNN Data Network Name

GMLC Global Mobile Location Centre

GPSI Generic Public Subscription Identifier

IPTV Internet Protocol Television

KAF AKMA Application Key

MO-LR Mobile Originated Location Request

NEF Network Exposure Function

NSAC Network Slice Admission Control

NSACF Network Slice Admission Control Function

PCF Policy Control Function

PCRF Policy and Charging Rule Function

PFD Packet Flow Description

PFDF Packet Flow Description Function

REST Representational State Transfer

SCEF Service Capability Exposure Function

S-NSSAI Single Network Slice Selection Assistance Information

UDR Unified Data Repository

UP User Plane

WB Wide Band

\* \* \* Next changes \* \* \* \*

### 4.4.2 Procedures for Monitoring

The procedures for monitoring as described in subclause 4.4.2 of 3GPP TS 29.122 [4] shall be applicable in 5GS with the following differences:

- description of the SCS/AS applies to the AF;

- description of the SCEF applies to the NEF;

- description of the HSS applies to the UDM, and the NEF shall interact with the UDM by using Nudm\_EventExposure service as defined in 3GPP TS 29.503 [17];

- description of the MME/SGSN applies to the AMF, and the NEF shall interact with the AMF by using Namf\_EventExposure service as defined in 3GPP TS 29.518 [18];

- description about the PCRF is not applicable;

- description about the change of IMSI-IMEI(SV) association monitoring event applies to the change of SUPI-PEI association monitoring event;

- after validation of the AF request, the NEF may determine a monitoring expiry time, based on operator policy and take into account the monitoring expire time if included in the request; and the NEF may provide a expiry time (determined by the NEF, UDM or AMF) to the AF even the AF does not provided before.

- if the "Loss\_of\_connectivity\_notification" as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, values 0-5 are not applicable for the lossOfConnectReason attribute within MonitoringEventReport data type, the lossOfConnectReason attribute shall be set to 6 if the UE is deregistered, 7 if the maximum detection timer expires or 8 if the UE is purged.

- the AF may include a periodic reporting time indicated by the "repPeriod" attribute within MonitoringEventSubscription data type, which is only applicable for Location\_notification and Number\_of\_UEs\_in\_an\_area\_notification\_5G features in the NEF.

-- if the "locationType" attribute sets to "LAST\_KNOWN\_LOCATION", the "maximumNumberOfReports" attribute shall set to 1 as a One-time Monitoring Request.

description about the PDN connectivity status event applies to the PDU session status event, the description of the MME/SGSN applies to the SMF during the reporting of monitoring event procedure, the NEF receives the event notification via Nsmf\_EventExposure service as defined in 3GPP TS 29.508 [26];

- when sending the UDM/AMF/SMF event report to the AF, the NEF may store the event data in the report in the UDR as part of the data for exposure as specified in 3GPP TS 29.519 [23] by using Nudr\_DataRepository service as specified in 3GPP TS 29.504 [20].

- If the "Downlink\_data\_delivery\_status\_5G" as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support the downlink data delivery status notification,

- the AF shall send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the following difference:

- within the MonitoringEventSubscription data structure the AF may additionally include packet filter descriptor(s) within the "dddTraDescriptors" attribute and the list of monitoring downlink data delivery status event(s) within the "dddStati" attribute;

- the NEF shall subscribe the events to the appropriate UDM(s) within the network by invoking the Nudm\_EventExposure\_Subscribe service operation as defined in subclause 5.5.2.2 of 3GPP TS 29.503 [17].

- when the NEF receives the event notification as defined in subclause 4.4.2 of 3GPP TS 29.508 [26], the NEF shall send an HTTP POST message to the AF as defined in subclause 4.4.2.3 of 3GPP TS 29.122 [4] with the difference that within each MonitoringEventReport data structure, the NEF shall include:

- the downlink data delivery status within the "dddStatus" attribute;

- the downlink data descriptor impacted by the downlink data delivery status change within the "dddTraDescriptor" attribute;

- the estimated buffering time within the "maxWaitTime" attribute if the downlink data delivery status is set to "BUFFERED";

- If the "Availability\_after\_DDN\_failure\_notification\_enhancement" feature as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, the AF shall send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the difference that within the MonitoringEventSubscription data structure, the AF shall include packet filter descriptions within the "dddTraDescriptors" attribute.

- If the "eLCS" feature as defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, the AF may send an HTTP POST message to the NEF to the resource "Monitoring Event Subscriptions" as defined in subclause 5.3.3.2 of 3GPP TS 29.122 [4] for creating an subscription or send an HTTP PUT message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3 of 3GPP TS 29.122 [4] for updating the subscription with the following difference:

- within the MonitoringEventSubscription data structure, the AF may additionally include location QoS requirement within the "locQoS" attribute, the service identifier with the "svcId" attribute, Location deferred requested event type within the "ldrType" attribute, the validity start time and the validity end time in the "locTimeWindow" attribute, the maximum age of location estimate within the "maxAgeOfLocEst" attribute, the requesting target UE velocity within the "velocityRequested" attribute, the linear distance within the "linearDistance" attribute, the reporting target UE location estimate indication within the "reportingLocEstInd" attribute, the sampling interval within the "samplingInterval" attribute, the maximum reporting expire interval within the "maxRptExpireIntvl" attribute, the supported GAD shapes within the "supportedGADShapes" attribute, the Code word within the "codeword" attribute, and other attributes as defined in subclause 5.3.2.3.2 of 3GPP TS 29.122 [4] for location information subscription;

- if the NEF identifies the location request precision higher than cell level location accuracy is required based on the "locQos" attribute received, the NEF shall interact with the appropriate GMLC within the network by invoking the Ngmlc\_Location\_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35];

- if the location request precision is lower than or equal to cell level, based on implementation, the NEF may interact with the GMLC by invoking the Ngmlc\_Location\_ProvideLocation service operation as defined in subclause 6.1 of 3GPP TS 29.515 [35]; or retrieve the UE location privacy information from the UDM by using Nudm\_SDM service as described in subclause 5.2 of 3GPP TS 29.503 [17] and if the privacy setting is verified, the NEF shall interact with the UDM for the serving AMF address by invoking the Nudm\_UECM service as described in subclause 5.3 of 3GPP TS 29.503 [17]. After receiving the serving AMF address from the UDM, the NEF shall interact with the AMF by invoking the Namf\_EventExposure\_Subscribe service operation as defined in subclause 5.3 of 3GPP TS 29.518 [18]; or may interact with UDM by using Nudm\_EventExposure service as defined in subclause 5.5 of 3GPP TS 29.503 [17] and the NEF receives the location event notification from the AMF via Namf\_EventExposure service as defined in in subclause 5.5 of 3GPP TS 29.518 [18].

Upon receipt of successful location response from the GMLC or the AMF, the NEF shall create or update the resource and then send an HTTP POST or PUT response to the AF as defined in subclause 4.4.2.3 of 3GPP TS 29.122 [4].Upon receipt of the location Report from the GMLC or the AMF, the NEF shall determine the monitoring event subscription associated with the corresponding Monitoring Event Report as defined in subclause 4.4.2.3 of 3GPP TS 29.122 [4].

In order to delete a previous active configured monitoring event subscription at the NEF, the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Monitoring Event Subscription" which is received in the response to the request that has created the monitoring events subscription resource. The NEF shall interact with the GMLC or the AMF or the UDM to remove the request, upon receipt of the successful response from the GMLC or the AMF or the UDM, the NEF shall delete the active resource "Individual Monitoring Event Subscription" addressed by the URI and send an HTTP response to the AF with a "204 No Content" status code, or a "200 OK" status code including the monitoring event report if received.

- If the "NSAC" feature defined in subclause 5.3.4 of 3GPP TS 29.122 [4] is supported, in order to support the network slice status reporting,

- the AF shall send an HTTP POST message to the NEF to the "Monitoring Event Subscriptions" resource as defined in subclause 5.3.3.2.3.4 of 3GPP TS 29.122 [4] for creating a subscription, or send an HTTP PUT message to the NEF to the "Individual Monitoring Event Subscription" resource as defined in subclause 5.3.3.3.3.2 of 3GPP TS 29.122 [4] for updating an existing subscription with the following differences:

- within the MonitoringEventSubscription data structure,

a) the concerned network slice identified by the "snssai" attribute shall be provided;

b) the value of the "monitoringType" attribute shall be set to "NUM\_OF\_REGD\_UES" to indicate that the AF requests to be notified of the current number of registered UEs for the network slice or "NUM\_OF\_ESTD\_PDU\_SESSIONS" to indicate that the AF requests to be notified of the current number of established PDU Sessions for the network slice; and

c) a targeted reporting threshold within the "tgtNsThreshold" attribute or a reporting periodicity within the "repPeriod" attribute may be provided, wherein, the "tgtNsThreshold" attribute and the "repPeriod" attribute are mutually exclusive;

- the NEF shall then further interact with the NSACF to create or update the associated subscription to notifications by invoking the Nnsacf\_SliceEventExposure\_Subscribe service operation as specified in 3GPP TS 29.536 [aa];

- when the NEF receives the event report from the NSACF as defined in 3GPP TS 29.536 [aa], the NEF shall send an HTTP POST message to the AF as defined in subclause 5.3.3a.2.3 of 3GPP TS 29.122 [4] with the difference that within the MonitoringEventReport data type of the MonitoringNotification data type,

- the value of the "monitoringType" attribute shall be set to "NUM\_OF\_REGD\_UES" or "NUM\_OF\_ESTD\_PDU\_SESSIONS" as the same value during the HTTP POST or PUT request that created or modified the subscription;

- the current network slice status information as the "nSStatusInfo" attribute shall be provided, wherein:

- if the event reporting is threshold based (i.e. the "tgtNsThreshold" was provided within the MonitoringEventSubscription data type), the "nSStatusInfo" attribute shall contain a confirmation for reaching the targeted threshold value, i.e. by resending the subscribed threshold value, for the network slice identified by the "snssai" attribute provided during subscription creation;

- if the event reporting is periodical (i.e. the "repPeriod" was provided within the MonitoringEventSubscription data type), the "nSStatusInfo" attribute shall provide the current network slice status information, i.e. the current number of registered UEs or the current number of established PDU Sessions for the network slice identified by the "snssai" attribute provided during subscription creation.

- the AF shall send an HTTP DELETE message to the NEF to the resource "Individual Monitoring Event Subscription" as defined in subclause 5.3.3.3.3.5 of 3GPP TS 29.122 [4] to delete an existing network slice reporting subscription. Then the NEF shall interact with the NSACF to delete the associated subscription to notifications by invoking the Nnsacf\_SliceEventExposure\_Unsubscribe service operation as specified in 3GPP TS 29.536 [aa].

Editor's Note: It is FFS whether an AF can request to subscribe to be notified of both the the current number of registered UEs and the current number of established PDU Sessions for a network slice during a subscription to network slice information reporting.

Editor's Note: It is FFS whether a reporting type (periodical or threshold based) attribute is needed during a subscription to network slice information reporting.

\* \* \* Next changes \* \* \* \*

## 5.3 Reused APIs

This subclause describes the northbound APIs which are applicable for both EPS and 5GS.

Table 5.3-1: Reused APIs applicable for both EPS and 5GS

|  |  |
| --- | --- |
| API Name | Differences |
| ResourceManagementOfBdt | - The "LocBdt\_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "Group\_Id" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may be supported in 5G.  - The "BdtNotification\_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| PfdManagement | The "FailureLocation\_5G" feature as described in subclause 5.11.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| MonitoringEvent | - The "Number\_of\_UEs\_in\_an\_area\_notification\_5G" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "Downlink\_data\_delivery\_status\_5G" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "Availability\_after\_DDN\_failure\_notification\_enhancement" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - For the "Pdn\_connectivity\_status" feature, APN is equivalent to DNN; the non-IP PDN type is equivalent to the unstructured PDU session type; and the enumeration InterfaceIndication value "PDN\_GATEWAY" stands for PDU session anchored in UPF in 5G.  - The "eLCS" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "NSAC" feature described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| DeviceTriggering |  |
| CpProvisioning | - The "ExpectedUMT\_5G" and "ExpectedUmtTime\_5G" features as described in subclause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "ScheduledCommType\_5G" feature as described in subclause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| ChargeableParty | - The "EthChgParty\_5G" and "MacAddressRange\_5G" features as described in subclause 5.5.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The events (i.e. LOSS\_OF\_BEARER, RECOVERY\_OF\_BEARER and RELEASE\_OF\_BEARER) do not apply for 5G. |
| AsSessionWithQoS | - The "EthAsSessionQoS\_5G", "QoSMonitoring\_5G", "MacAddressRange\_5G" and "AlternativeQoS\_5G" features as described in subclause 5.14.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The events (i.e. LOSS\_OF\_BEARER, RECOVERY\_OF\_BEARER and RELEASE\_OF\_BEARER) do not apply for 5G. |
| MsisdnLessMoSms |  |
| NpConfiguration | The "NpExpiry\_5G” feature as described in subclause 5.13.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| NIDD |  |
| RacsParameterProvisioning |  |
| ECRControl | The "ECR\_WB\_5G” feature as described in subclause 5.12.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |

\* \* \* End of changes \* \* \* \*