**3GPP TSG-WG SA2 Meeting #164 *S2-2408306***

**19 - 23 August, 2024, Maastricht, Netherland**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **23.501** | **CR** | **5562** | **rev** | **-** | **Current version:** | **19.0.0** |  |
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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 | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Support N3GPP device behind UE/5G-RG |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon, InterDigital Inc. |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | UIA |  | ***Date:*** | 2024-08-09 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *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)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | To add the support of Non-3GPP devices connecting behind a UE as concluded in the TR 23.700-32 KI#4.  |
|  |  |
| ***Summary of change:*** | To support identifiable Non-3GPP device connecting behind the UE the following changes are needed:1. Introduction of new definition (in clause 3.1) of Identifiable Non-3GPP device in order to distinsguish them from the AUN3 and NAUN3 type of device. The reference to AUN3 and NAUN3 definitions are also added.
2. Definition of support of Frame routing for Identifiable Non-3GPP device.
3. How to identify the Identifiable Non-3GPP devices connecting behind a UE.
4. QoS differentiation.
5. Session management.
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|  |  |
| ***Consequences if not approved:*** | Complete the UIA specification. |
|  |  |
| ***Clauses affected:*** | 3.1, 3.2, 5.16.14, 5.9.x (new), 5.x (new), 6.2.5.0 |
|  |  |
|  | **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 Changes \* \* \*

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**5G VN Group:** A set of UEs using private communication for 5G LAN-type service.

**5G Access Network:** An access network comprising a NG-RAN and/or non-3GPP AN connecting to a 5G Core Network.

**5G Access Stratum-based Time Distribution:** A time synchronization distribution method that is used by an NG-RAN to provide the 5GS time to the UE(s) over the radio interface using procedures specified in TS 38.331 [28].

**5G Core Network:** The core network specified in the present document. It connects to a 5G Access Network.

**5G LAN-Type Service:** A service over the 5G system offering private communication using IP and/or non-IP type communications.

**5G LAN-Virtual Network:** A virtual network over the 5G system capable of supporting 5G LAN-type service.

**5G NSWO:** The 5G NSWO is the capability provided by 5G system and by UE to enable the connection to a WLAN access network using 5GS credentials without registration to 5GS.

**5G QoS Flow or QoS Flow:** The finest granularity for QoS forwarding treatment in the 5G System. All traffic mapped to the same 5G QoS Flow receive the same forwarding treatment (e.g. scheduling policy, queue management policy, rate shaping policy, RLC configuration, etc.). Providing different QoS forwarding treatment requires separate 5G QoS Flow.

**5G QoS Identifier:** A scalar that is used as a reference to a specific QoS forwarding behaviour (e.g. packet loss rate, packet delay budget) to be provided to a 5G QoS Flow. This may be implemented in the access network by the 5QI referencing node specific parameters that control the QoS forwarding treatment (e.g. scheduling weights, admission thresholds, queue management thresholds, link layer protocol configuration, etc.).

**5G System:** 3GPP system consisting of 5G Access Network (AN), 5G Core Network and UE.

**5G-BRG:** The 5G-BRG is a 5G-RG defined in BBF.

**5G-CRG:** The 5G-CRG is a 5G-RG specified in DOCSIS MULPI [89].

**5G-RG:** A 5G-RG is a RG capable of connecting to 5GC playing the role of a UE with regard to the 5G core. It supports secure element and exchanges N1 signalling with 5GC. The 5G-RG can be either a 5G-BRG or 5G-CRG.

**Access Traffic Steering:** The procedure that selects an access network for a new data flow and transfers the traffic of this data flow over the selected access network. Access traffic steering is applicable between one 3GPP access and one non-3GPP access.

**Access Traffic Switching:** The procedure that moves all traffic of an ongoing data flow from one access network to another access network in a way that maintains the continuity of the data flow. Access traffic switching is applicable between one 3GPP access and one non-3GPP access.

**Access Traffic Splitting:** The procedure that splits the traffic of a data flow across multiple access networks. When traffic splitting is applied to a data flow, some traffic of the data flow is transferred via one access and some other traffic of the same data flow is transferred via another access. Access traffic splitting is applicable between one 3GPP access and one non-3GPP access.

**Allowed NSSAI**: Indicating the S-NSSAIs values the UE could use in the Serving PLMN in the current Registration Area.

**Allowed Area:** Area where the UE is allowed to initiate communication as specified in clause 5.3.2.3.

**Alternative S-NSSAI:** Indicating a compatible S-NSSAI for an S-NSSAI in the Allowed NSSAI that the AMF uses to replace an S-NSSAI when the S-NSSAI is not available or congested, as specified in clause 5.15.19.

**AMF Region:** An AMF Region consists of one or multiple AMF Sets.

**AMF Set:** An AMF Set consists of some AMFs that serve a given area and Network Slice(s). AMF Set is unique within an AMF Region and it comprises of AMFs that support the same Network Slice(s). Multiple AMF Sets may be defined per AMF Region. The AMF instances in the same AMF Set may be geographically distributed but have access to the same context data.

**Application Identifier:** An identifier that can be mapped to a specific application traffic detection rule.

**AUSF Group ID:** This refers to one or more AUSF instances managing a specific set of SUPIs. An AUSF Group consists of one or multiple AUSF Sets.

**Binding Indication:** Information included by a NF service producer to a NF service consumer in request responses or notifications to convey the scope within which selection/reselection of target NF/NF Services may be performed, or information included by the NF service consumer in requests or subscriptions to convey the scope within which selection/reselection of notification targets or the selection of other service(s) that the NF consumer produces for the same data context may be performed. See clause 6.3.1.0.

**BSF Group ID:** This refers to one or more BSF instances managing a specific set of SUPIs or GPSIs. A BSF Group consists of one or multiple BSF Sets.

**Configured NSSAI:** NSSAI provisioned in the UE applicable to one or more PLMNs.

**CHF Group ID:** This refers to one or more CHF instances managing a specific set of SUPIs.

**Credentials Holder:** Entity which authenticates and authorizes access to an SNPN separate from the Credentials Holder.

**Data Burst:** A set of multiple PDUs generated and sent by the application in a short period of time.

NOTE 1: A Data Burst can be composed of one or multiple PDU Sets.

**Default UE credentials:** Information configured in the UE to make the UE uniquely identifiable and verifiably secure to perform UE onboarding.

**Default Credentials Server (DCS):** An entity that can perform authentication based on the Default UE credentials or provide means for another entity to perform authentication based on the Default UE credentials.

**Delegated Discovery:** This refers to delegating the discovery and associated selection of NF instances or NF service instances to an SCP.

**Direct Communication:** This refers to the communication between NFs or NF services without using an SCP.

**Disaster Condition:** See definition in TS 22.261 [2].

**Disaster Inbound Roamer:** See definition in TS 22.261 [2].

**Disaster Roaming:** See definition in TS 22.261 [2].

**DN Access Identifier (DNAI):** Identifier of a user plane access to one or more DN(s) where applications are deployed.

**Emergency Registered:** A UE is considered Emergency Registered over an Access Type in a PLMN when registered for emergency services only over this Access Type in this PLMN.

**Endpoint Address:** An address in the format of an IP address or FQDN, which is used to determine the host/authority part of the target URI. This Target URI is used to access an NF service (i.e. to invoke service operations) of an NF service producer or for notifications to an NF service consumer.

**En-gNB:** as defined in TS 37.340 [31].

**Expected UE Behaviour:** Set of parameters provisioned by an external party to 5G network functions on the foreseen or expected UE behaviour, see clause 5.20.

**Feeder link:** As defined in TS 38.300 [27].

**Fixed Network Residential Gateway:** A Fixed Network RG (FN-RG) is a RG that it does not support N1 signalling and it is not 5GC capable.

**Fixed Network Broadband Residential Gateway:** A Fixed Network RG (FN-BRG) is a FN-RG specified in BBF TR‑124 [90].

**Fixed Network Cable Residential Gateway:** A Fixed Network Cable RG (FN-CRG) is a FN-RG with cable modem specified in DOCSIS MULPI [89].

**Forbidden Area:** An area where the UE is not allowed to initiate communication as specified in clause 5.3.2.3.

**GBR QoS Flow:** A QoS Flow using the GBR resource type or the Delay-critical GBR resource type and requiring guaranteed flow bit rate.

**Group ID for Network Selection (GIN):** An identifier used during SNPN selection to enhance the likelihood of selecting a preferred SNPN that supports a Default Credentials Server or a Credentials Holder.

**(g)PTP-based Time Distribution:** a method to distribute timing among entities in a (g)PTP domain using PTP messages generated by a GM (in the case the GM is external to 5GS) or by 5GS (in the case the 5GS acts as a GM for a given (g)PTP domain). Possible dependencies between (g)PTP-based Time Distribution and 5G Access Stratum-based Time Distribution are described in clause 5.27.1. The synchronization process is described in clause 5.27.1 and follows the applicable profiles of IEEE Std 802.1AS [104] or IEEE Std 1588 [126].

**Home Network Public Key Identifier:** An identifier used to indicate which public/private key pair is used for SUPI protection and de-concealment of the SUCI as specified in TS 23.003 [19].

**IAB-donor:** This is a NG-RAN node that supports Integrated access and backhaul (IAB) feature and provides connection to the core network to IAB-nodes. It supports the CU function of the CU/DU architecture for IAB defined in TS 38.401 [42].

**IAB-node:** A relay node that supports wireless in-band and out-of-band relaying of NR access traffic via NR Uu backhaul links. It supports the UE function and the DU function of the CU/DU architecture for IAB defined in TS 38.401 [42].

*Marco’s comment to be removed: the TR conclusion :*

*“Device Identifier is a permanent identifier and will be a generic string, and the allocation of the Device Identifier is out of scope of 3GPP.”*

*“Authentication for non-3GPP device is performed by UE or 5G-RG, which is not in the scope of 3GPP.”*

*Option 1: only identifier*

**Non-3GPP Device Identifier :**
A permanent identifier specifically assigned to a Non-3GPP device that connects indirectly to a 5GS through a UE or a 5G-RG. This identifier enables the 5GS to recognize and manage traffic that originates from or is directed to the non-3GPP device, ensuring proper handling within the 5G network, even if the device does not connect directly to the 5G core.

NOTE X: This identifier is not intended to be used as a SUPI for Non-3GPP device, to identify a PINE, a NAUN3 device (see TS 23.316) and a AUN3 device (see TS 23.316)

*Marco’s comment to be removed: the above definition shall not overalp with PINE and PIN ID (i.e. this identifier shall be not used as PIN ID for PINE), this shal not be used for NAUN3 and AUN3, and prose.*

*Option 2: device and identifier.*

**Identifiable Non-3GPP (IN3) device:** A Non-3GPP device that is connected indirectly to a 5GS through a UE or a 5G-RG without undergoing authentication with the 5G Core (5GC) and that the traffic originates from or is directed to this device is recognised and managed by 5GS.

NOTE X: This device may also capable of operate in one or more different roles, for example, in scenarios where it may be authenticated when connecting directly via a trusted or untrusted Non-3GPP access networkis, as PINE, a NAUN3 device (see TS 23.316) and a AUN3 device (see TS 23.316)

**Identifiable Non-3GPP Device Identifier :**
A permanent identifier specifically assigned to IN3 device. This identifier enables the 5GS to recognize and manage traffic that originates from or is directed to the IN3 device, ensuring proper handling within the 5G network, even if the device does not connect directly to the 5G core.

NOTE X: This identifier is not intended to be used as a SUPI for Non-3GPP device, to identify a PINE, a NAUN3 device (see TS 23.316) and a AUN3 device (see TS 23.316)

**Indirect Communication:** This refers to the communication between NFs or NF services via an SCP.

**Initial Registration:** UE registration in RM-DEREGISTERED state as specified in clause 5.3.2.

**Intermediate SMF (I-SMF):** An SMF that is inserted to support a PDU session as the UE is located in an area which cannot be controlled by the original SMF because the UPF(s) belong to a different SMF Service Area.

**Local Area Data Network:** a DN that is accessible by the UE only in specific locations, that provides connectivity to a specific DNN, and whose availability is provided to the UE.

**Local Break Out (LBO):** Roaming scenario for a PDU Session where the PDU Session Anchor and its controlling SMF are located in the serving PLMN (VPLMN).

**LTE-M:** a 3GPP RAT type Identifier used in the Core Network only, which is a sub-type of E-UTRA RAT type, and defined to identify in the Core Network the E-UTRA when used by a UE indicating Category M.

**MA PDU Session:** A PDU Session that provides a PDU connectivity service, which can use one access network at a time, or simultaneously one 3GPP access network and one non-3GPP access network.

**Mobile Base Station Relay:** A mobile base station acts as a relay between a UE and the 5G network. Such mobile base station relay can for example be mounted on a moving vehicle and serve UEs that can be located inside or outside the vehicle (or entering/leaving the vehicle). See description of TS 22.261 [2]. A mobile Base Station Relay is supported in 5GS with the IAB-architecture with mobility as specified in clause 5.35A and that described in TS 38.401 [42].

**Master RAN node:** A Master node as defined in TS 37.340 [31].

**Mobility Pattern:** Network concept of determining within the AMF the UE mobility parameters as specified in clause 5.3.2.4.

**Mobility Registration Update:** UE re-registration when entering new TA outside the TAI List as specified in clause 5.3.2.

**MPS-subscribed UE:** A UE having a USIM with MPS subscription.

**Multi-USIM UE:** A UE with multiple USIMs, capable of maintaining a separate registration state with a PLMN for each USIM at least over 3GPP Access and supporting one or more of the features described in clause 5.38.

**NB-IoT UE Priority:** Numerical value used by the NG-RAN to prioritise between different UEs accessing via NB-IoT.

**NGAP UE association:** The logical per UE association between a 5G-AN node and an AMF.

**NGAP UE-TNLA-binding:** The binding between a NGAP UE association and a specific TNL association for a given UE.

**Network Function:** A 3GPP adopted or 3GPP defined processing function in a network, which has defined functional behaviour and 3GPP defined interfaces.

NOTE 2: A network function can be implemented either as a network element on a dedicated hardware, as a software instance running on a dedicated hardware, or as a virtualised function instantiated on an appropriate platform, e.g. on a cloud infrastructure.

**Network Instance**: Information identifying a domain. Used by the UPF for traffic detection and routing.

**Network Slice:** A logical network that provides specific network capabilities and network characteristics.

**Network Slice Area of Service (NS-AoS):** The area where a network slice is available i.e. the UE can access and get service of a particular network slice as more than zero resources are allocated to the network slice in the NG-RAN cells. This area may be, depending on the specific network slice, the whole PLMN, one or more TAs, or one or more cells when the NS-AoS does not match deployed TAs as defined in clause 5.15.18.

**Network Slice instance:** A set of Network Function instances and the required resources (e.g. compute, storage and networking resources) which form a deployed Network Slice.

**Non-GBR QoS Flow:** A QoS Flow using the Non-GBR resource type and not requiring guaranteed flow bit rate.

**NSI ID:** an identifier for identifying the Core Network part of a Network Slice instance when multiple Network Slice instances of the same Network Slice are deployed, and there is a need to differentiate between them in the 5GC.

**NF instance:** an identifiable instance of the NF.

**NF service:** a functionality exposed by a NF through a service-based interface and consumed by other authorized NFs.

**NF service instance:** an identifiable instance of the NF service.

**NF service operation:** An elementary unit a NF service is composed of.

**NF Service Set:** A group of interchangeable NF service instances of the same service type within an NF instance. The NF service instances in the same NF Service Set have access to the same context data.

**NF Set:** A group of interchangeable NF instances of the same type, supporting the same services and the same Network Slice(s). The NF instances in the same NF Set may be geographically distributed but have access to the same context data.

**NG-RAN:** A radio access network that supports one or more of the following options with the common characteristics that it connects to 5GC:

1) Standalone New Radio.

2) New Radio is the anchor with E-UTRA extensions.

3) Standalone E-UTRA.

4) E-UTRA is the anchor with New Radio extensions.

**Non-3GPP QoS Assistance Information:** A set of QoS assistance information provided to the UE (e.g. PEGC) to enable the UE to perform QoS differentiation for the connected devices in the non-3GPP network behind the UE.

**Non-Allowed Area:** Area where the UE is allowed to initiate Registration procedure but no other communication as specified in clause 5.3.2.3.

Non-Public Network: See definition in TS 22.261 [2].

**Non-Seamless Non-3GPP offload:** The offload of user plane traffic via non-3GPP access without traversing either N3IWF/TNGF or UPF.

**Non-Seamless WLAN offload:** Non-Seamless Non-3GPP offload when the non-3GPP access network is WLAN.

**Onboarding Network:** Either a PLMN enabling Remote Provisioning for a registered UE, or an Onboarding SNPN.

**Onboarding Standalone Non-Public Network:** An SNPN providing Onboarding access and enabling Remote Provisioning for a UE registered for Onboarding as specified in clause 4.2.2.2.4 of TS 23.502 [3].

**Partially Allowed NSSAI:** Indicating the S-NSSAIs values the UE could use in the Serving PLMN or SNPN in some of the TAs in the current Registration Area. Each S-NSSAI in the Partially Allowed NSSAI is associated with a list of TAs where the S-NSSAI is supported.

**PCF Group ID:** This refers to one or more PCF instances managing a specific set of SUPIs. A PCF Group consists of one or multiple PCF Sets.

**PDU Connectivity Service:** A service that provides exchange of PDUs between a UE and a Data Network.

**PDU Session:** Association between the UE and a Data Network that provides a PDU connectivity service.

**PDU Session Type:** The type of PDU Session which can be IPv4, IPv6, IPv4v6, Ethernet or Unstructured.

**PDU Set:** One or more PDUs carrying the payload of one unit of information generated at the application level (e.g. frame(s) or video slice(s) etc. for eXtended Reality (XR) Services). All the PDUs of a PDU set are transmitted within the same QoS Flow.

**Pending NSSAI:** NSSAI provided by the Serving PLMN during a Registration procedure, indicating the S-NSSAI(s) for which the network slice-specific authentication and authorization procedure is pending.

**Periodic Registration Update:** UE re-registration at expiry of periodic registration timer as specified in clause 5.3.2.

**Personal IoT Network (PIN):** A network with group of elements (i.e. UE or non-3GPP device) that are able to communicate with each other directly, communicate with each other via intermediate element(s), communicate with each other via 5GS, or communicate with external DN via 5GS.

**PIN Element (PINE):** A UE or non-3GPP device that is part of the group of elements in a PIN.

**PIN Element with Gateway Capability (PEGC):** A PINE with the ability to provide DN connectivity via the 5G network for other PINEs and/or a PINE with the ability to provide relay functionality for communication between PINEs. Only a UE is able to act as a PEGC. A PIN includes at least one PEGC.

NOTE 3: In the context of PIN, the terms PEGC and UE with PEGC capability are synonymous, therefore when the term PEGC is used, it is also intended as UE.

**PIN Element with Management Capability (PEMC):** A PINE with capability to manage the PIN and the management is supported by an AF if deployed. A PIN includes at least one PEMC.

NOTE 4: A UE that is a PINE may both act as PEMC and PEGC in a PIN.

**PIN management traffic:** The traffic among PINE, PEGC, PEMC and AF for PIN related to the management of PIN.

**PIN-DN communication:** The communication between PINE and DN via a PEGC and 5G network, as well as the communication between PEGC and DN via 5G network. The communication includes both the data traffic and the PIN management traffic (e.g. the data traffic towards the internet or the PIN management traffic towards the AF for PIN).

**PIN direct communication:** The communication without traversing 5G network between two PINEs (e.g. between a PINE and a PEGC, between a PINE and a PEMC, between a PEMC and a PEGC and between two PEGCs). The communication traverses intermediate PINE(s) or not. The communication includes both the data traffic and the PIN management traffic (e.g. the data traffic between 2 PINEs or the PIN management traffic between PINE and PEMC).

**PIN indirect communication:** The communication with traversing 5G network between PINEs connected to different PEGCs of the same PIN, and between a PINE and a PEMC via PEGC and 5G network. The communication includes both the data traffic and the PIN management traffic (e.g. the data traffic between 2 PINEs or the PIN management traffic between PINE and PEMC).

**PLMN with Disaster Condition:** A PLMN to which a Disaster Condition applies.

**Pre-configured 5QI:** Pre-defined QoS characteristics configured in the AN and 5GC and referenced via a non-standardized 5QI value. Corresponding to Operator-specific 5QI in TS 24.501 [47].

**Primary cell:** as defined in TS 36.331 [51].

**Primary RAT:** RAT of the Master RAN node, when Dual Connectivity is used; otherwise RAT of the RAN node.

**Private communication:** See definition in TS 22.261 [2].

**Provisioning Server:** Entity that provisions network credentials and other data in the UE to enable SNPN access.

**PTP domain:** As defined in IEEE Std 1588 [126].

**Public network integrated NPN:** A non-public network deployed with the support of a PLMN.

**(Radio) Access Network**: See 5G Access Network.

**RAT type:** Identifies the transmission technology used in the access network for both 3GPP accesses and non-3GPP Accesses, for example, NR, NB-IOT, Untrusted Non-3GPP, Trusted Non-3GPP, Trusted IEEE 802.11 Non-3GPP access, Wireline, Wireline-Cable, Wireline-BBF, etc.

**NR RedCap:** a 3GPP RAT type Identifier used in the Core Network only, which is a sub-type of NR RAT type, and defined to identify in the Core Network the NR when used by a UE indicating NR RedCap.

**NR eRedCap:** a 3GPP RAT type Identifier used in the Core Network only, which is a sub-type of NR RAT type, and defined to identify in the Core Network the NR when used by a UE indicating NR eRedCap.

**Requested NSSAI:** NSSAI provided by the UE to the Serving PLMN during registration.

**Residential Gateway:** The Residential Gateway (RG) is a device providing, for example voice, data, broadcast video, video on demand, to other devices in customer premises.

**Routing Binding Indication:** Information included in a request or notification and that can be used by the SCP for discovery and associated selection to of a suitable target. See clauses 6.3.1.0 and 7.1.2

**Routing Indicator:** Indicator that allows together with SUCI/SUPI Home Network Identifier to route network signalling to AUSF and UDM instances capable to serve the subscriber.

**RRC\_IDLE, RRC\_CONNECTED, RRC\_INACTIVE:** As defined in TS 38.331 [28] and TS 38.306 [69].

**SCP Domain:** A configured group of one or more SCP(s) and zero or more NF instances(s). An SCP within the group can communicate with any NF instance or SCP within the same group directly, i.e. without passing through an intermediate SCP.

**Secondary RAN node:** A Secondary node as defined in TS 37.340 [31].

**Secondary RAT:** RAT of the secondary RAN node.

**Service link:** As defined in TS 38.300 [27]

**SNPN-enabled UE:** A UE configured to use stand-alone Non-Public Networks.

**SNPN access mode:** A UE operating in SNPN access mode only selects stand-alone Non-Public Networks over Uu, Yt, NWu.

NOTE 5: If there are multiple instances of Uu/Yt/NWu, whether the UE is in SNPN access mode is determined for each instance independently. NWu can be either direct access via untrusted non-3GPP access or access via underlay network (see Annex D, clause D.3).

**Service based interface:** It represents how a set of services is provided/exposed by a given NF.

**Service Continuity:** The uninterrupted user experience of a service, including the cases where the IP address and/or anchoring point change.

**Service Data Flow Filter:** A set of packet flow header parameter values/ranges used to identify one or more of the (IP or Ethernet) packet flows constituting a Service Data Flow.

**Service Data Flow Template:** The set of Service Data Flow filters in a policy rule or an application identifier in a policy rule referring to an application detection filter, required for defining a Service Data Flow.

**Session Continuity:** The continuity of a PDU Session. For PDU Session of IPv4 or IPv6 or IPv4v6 type "session continuity" implies that the IP address is preserved for the lifetime of the PDU Session.

**SMF Service Area:** The collection of UPF Service Areas of all UPFs which can be controlled by one SMF.

**SNPN ID:** PLMN ID and NID identifying an SNPN.

**Stand-alone Non-Public Network:** A non-public network not relying on network functions provided by a PLMN

**Subscribed S-NSSAI**: S-NSSAI based on subscriber information, which a UE is subscribed to use in a PLMN

**Subscription Owner Standalone Non-Public Network:** A Standalone Non-Public Network owning the subscription of a UE and providing subscription data to the UE via a Provisioning Server during the onboarding procedure.

**Survival Time:** The time that an application consuming a communication service may continue without an anticipated message.

NOTE 6: Taken from clause 3.1 of TS 22.261 [2].

**Target NSSAI:** NSSAI provided by the Serving PLMN to the NG-RAN to cause the NG-RAN to attempt to steer the UE to a cell supporting the Network Slices identified by the S-NSSAIs in this NSSAI. See clause 5.3.4.3.3 for more details.

**Time Sensitive Communication (TSC):** A communication service that supports deterministic communication (i.e. which ensures a maximum delay) and/or isochronous communication with high reliability and availability. It is about providing packet transport with QoS characteristics such as bounds on latency, loss, and reliability, where end systems and relay/transmit nodes may or may not be strictly synchronized.

**TSN working domain:** Synchronization domain for a localized set of devices collaborating on a specific task or work function in a TSN network, corresponding to a gPTP domain defined in IEEE 802.1AS [104].

**UDM Group ID:** This refers to one or more UDM instances managing a specific set of SUPIs. An UDM Group consists of one or multiple UDM Sets.

**UDR Group ID:** This refers to one or more UDR instances managing a specific set of SUPIs. An UDR Group consists of one or multiple UDR Sets.

**UE-DS-TT Residence Time:** The time taken within the UE and DS-TT to forward a packet, i.e. between the ingress of the UE and the DS-TT port in the DL direction, or between the DS-TT port and the egress of the UE in the UL direction. UE-DS-TT Residence Time is provided at the time of PDU Session Establishment by the UE to the network.

NOTE 7: UE-DS-TT Residence Time is the same for uplink and downlink traffic and applies to all QoS Flows.

**UPF Service Area**: An area consisting of one or more TA(s) within which PDU Session associated with the UPF can be served by (R)AN nodes via a N3 interface between the (R)AN and the UPF without need to add a new UPF in between or to remove/re-allocate the UPF.

**Uplink Classifier:** UPF functionality that aims at diverting Uplink traffic, based on filter rules provided by SMF, towards Data Network.

**WB-E-UTRA:** In the RAN, WB-E-UTRA is the part of E-UTRA that excludes NB-IoT. In the Core Network, WB-E-UTRA also excludes LTE-M.

**Wireline 5G Access Network:** The Wireline 5G Access Network (W-5GAN) is a wireline AN that connects to a 5GC via N2 and N3 reference points. The W-5GAN can be either a W-5GBAN or W-5GCAN.

**Wireline 5G Cable Access Network:** The Wireline 5G Cable Access Network (W-5GCAN) is the Access Network defined in CableLabs.

**Wireline BBF Access Network:** The Wireline 5G BBF Access Network (W-5GBAN) is the Access Network defined in BBF.

**Wireline Access Gateway Function (W-AGF):** The Wireline Access Gateway Function (W-AGF) is a Network function in W-5GAN that provides connectivity to the 5G Core to 5G-RG and FN-RG.

NOTE 8: If one AUSF/PCF/UDR/UDM group consists of multiple AUSF/PCF/UDR/UDM Sets, AUSF/PCF/UDR/UDM instance from different Set may be selected to serve the same UE. The temporary data which is not shared across different Sets may be lost, e.g. the event subscriptions stored at one UDM instance are lost if another UDM instance from different Set is selected and no data shared across the UDM Sets.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 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 TR 21.905 [1].

5GC 5G Core Network

5G DDNMF 5G Direct Discovery Name Management Function

5G LAN 5G Local Area Network

5GS 5G System

5G-AN 5G Access Network

5G-AN PDB 5G Access Network Packet Delay Budget

5G-EIR 5G-Equipment Identity Register

5G-GUTI 5G Globally Unique Temporary Identifier

5G-BRG 5G Broadband Residential Gateway

5G-CRG 5G Cable Residential Gateway

5G GM 5G Grand Master

5G NSWO 5G Non-Seamless WLAN offload

5G-RG 5G Residential Gateway

5G-S-TMSI 5G S-Temporary Mobile Subscription Identifier

5G VN 5G Virtual Network

5QI 5G QoS Identifier

ADRF Analytics Data Repository Function

AF Application Function

AI/ML Artificial Intelligence/Machine Learning

AKMA Authentication and Key Management for Applications

AnLF Analytics Logical Function

AMF Access and Mobility Management Function

AoI Area of Interest

AS Access Stratum

ATSSS Access Traffic Steering, Switching, Splitting

ATSSS-LL ATSSS Low-Layer

AUN3 Authenticable Non-3GPP device

AUSF Authentication Server Function

BMCA Best Master Clock Algorithm

BSF Binding Support Function

CAG Closed Access Group

CAPIF Common API Framework for 3GPP northbound APIs

CH Credentials Holder

CHF Charging Function

CN PDB Core Network Packet Delay Budget

CP Control Plane

CQRCI Clock Quality Reporting Control Information

DAPS Dual Active Protocol Stacks

DCCF Data Collection Coordination Function

DCS Default Credentials Server

DetNet Deterministic Networking

DL Downlink

DN Data Network

DNAI DN Access Identifier

DNN Data Network Name

DRX Discontinuous Reception

DS-TT Device-side TSN translator

EAC Early Admission Control

ePDG evolved Packet Data Gateway

EBI EPS Bearer Identity

EUI Extended Unique Identifier

FAR Forwarding Action Rule

FL Federated Learning

FN-BRG Fixed Network Broadband RG

FN-CRG Fixed Network Cable RG

FN-RG Fixed Network RG

FQDN Fully Qualified Domain Name

GBA Generic Bootstrapping Architecture

GEO Geostationary Orbit

GFBR Guaranteed Flow Bit Rate

GIN Group ID for Network Selection

GMLC Gateway Mobile Location Centre

GPSI Generic Public Subscription Identifier

GUAMI Globally Unique AMF Identifier

HMTC High-Performance Machine-Type Communications

HR Home Routed (roaming)

IAB Integrated access and backhaul

IMEI/TAC IMEI Type Allocation Code

IPUPS Inter PLMN UP Security

IN3 Identifiable Non-3GPP

IN3DID Idetifiable Non-3GPP Device Identifier

I-SMF Intermediate SMF

I-UPF Intermediate UPF

LADN Local Area Data Network

LBO Local Break Out (roaming)

LEO Low Earth Orbit

LMF Location Management Function

LoA Level of Automation

LPP LTE Positioning Protocol

LRF Location Retrieval Function

L4S Low Latency, Low Loss and Scalable Throughput

MBS Multicast/Broadcast Service

MBSF Multicast/Broadcast Service Function

MBSR Mobile Base Station Relay

MBSTF Multicast/Broadcast Service Transport Function

MB-SMF Multicast/Broadcast Session Management Function

MB-UPF Multicast/Broadcast User Plane Function

MEO Medium Earth Orbit

MFAF Messaging Framework Adaptor Function

MCX Mission Critical Service

MDBV Maximum Data Burst Volume

MFBR Maximum Flow Bit Rate

MICO Mobile Initiated Connection Only

MINT Minimization of Service Interruption

ML Machine Learning

MPQUIC Multi-Path QUIC

MPS Multimedia Priority Service

MPTCP Multi-Path TCP Protocol

MTLF Model Training Logical Function

N3IWF Non-3GPP InterWorking Function

N3QAI Non-3GPP QoS Assistance Information

N5CW Non-5G-Capable over WLAN

NAI Network Access Identifier

NAUN3 Non-Authenticable Non-3GPP

NCR Network Controlled Repeater

NCR-MT NCR Mobile Termination

NEF Network Exposure Function

NF Network Function

NGAP Next Generation Application Protocol

NID Network identifier

NPN Non-Public Network

NR New Radio

NRF Network Repository Function

NS-AoS Network Slice Area of Service

NSAC Network Slice Admission Control

NSACF Network Slice Admission Control Function

NSAG Network Slice AS Group

NSI ID Network Slice Instance Identifier

NSSAA Network Slice-Specific Authentication and Authorization

NSSAAF Network Slice-specific and SNPN Authentication and Authorization Function

NSSAI Network Slice Selection Assistance Information

NSSF Network Slice Selection Function

NSSP Network Slice Selection Policy

NSSRG Network Slice Simultaneous Registration Group

NSWO Non-Seamless WLAN offload

NSWOF Non-Seamless WLAN offload Function

NW-TT Network-side TSN translator

NWDAF Network Data Analytics Function

ONN Onboarding Network

ON-SNPN Onboarding Standalone Non-Public Network

PCF Policy Control Function

PDB Packet Delay Budget

PDR Packet Detection Rule

PDU Protocol Data Unit

PDV Packet Delay Variation

PEGC PIN Element with Gateway Capability

PEI Permanent Equipment Identifier

PEMC PIN Element with Management Capability

PER Packet Error Rate

PFD Packet Flow Description

PIN Personal IoT Network

PINE PIN Element

PLR Packet Loss Rate

PNI-NPN Public Network Integrated Non-Public Network

PPD Paging Policy Differentiation

PPF Paging Proceed Flag

PPI Paging Policy Indicator

PSA PDU Session Anchor

PSDB PDU Set Delay Budget

PSER PDU Set Error Rate

PSIHI PDU Set Integrated Handling Information

PTP Precision Time Protocol

PVS Provisioning Server

QFI QoS Flow Identifier

QMC QoE Measurement Collection

QoE Quality of Experience

RACS Radio Capabilities Signalling optimisation

(R)AN (Radio) Access Network

RG Residential Gateway

RIM Remote Interference Management

RQA Reflective QoS Attribute

RQI Reflective QoS Indication

RSN Redundancy Sequence Number

RTT Round Trip Time

SA NR Standalone New Radio

SBA Service Based Architecture

SBI Service Based Interface

SCP Service Communication Proxy

SD Slice Differentiator

SEAF Security Anchor Functionality

SEPP Security Edge Protection Proxy

SF Service Function

SFC Service Function Chain

SMF Session Management Function

SMSF Short Message Service Function

SN Sequence Number

SNPN Stand-alone Non-Public Network

S-NSSAI Single Network Slice Selection Assistance Information

SO-SNPN Subscription Owner Standalone Non-Public Network

SSC Session and Service Continuity

SSCMSP Session and Service Continuity Mode Selection Policy

SST Slice/Service Type

SUCI Subscription Concealed Identifier

SUPI Subscription Permanent Identifier

SV Software Version

TA Tracking Area

TAI Tracking Area Identity

TNAN Trusted Non-3GPP Access Network

TNAP Trusted Non-3GPP Access Point

TNGF Trusted Non-3GPP Gateway Function

TNL Transport Network Layer

TNLA Transport Network Layer Association

TSC Time Sensitive Communication

TSCAC TSC Assistance Container

TSCAI Traffic Assistance Information

TSCTSF Time Sensitive Communication and Time Synchronization Function

TSN Time Sensitive Networking

TSN GM TSN Grand Master

TSP Traffic Steering Policy

TSS Timing Synchronization Status

TT TSN Translator

TWIF Trusted WLAN Interworking Function

UAS NF Uncrewed Aerial System Network Function

UCMF UE radio Capability Management Function

UDM Unified Data Management

UDR Unified Data Repository

UDSF Unstructured Data Storage Function

UL Uplink

UL CL Uplink Classifier

UPF User Plane Function

URLLC Ultra Reliable Low Latency Communication

URRP-AMF UE Reachability Request Parameter for AMF

URSP UE Route Selection Policy

VID VLAN Identifier

VLAN Virtual Local Area Network

W-5GAN Wireline 5G Access Network

W-5GBAN Wireline BBF Access Network

W-5GCAN Wireline 5G Cable Access Network

W-AGF Wireline Access Gateway Function

\* \* \* Next Change \* \* \*

\* \* \* Next Change \* \* \*

### 5.9.x Indetification of a Non-3GPP Device connected behind a UE.

The **Non-3GPP Device Identifier**  is a permanent identifier in generic string format, which uniquely identifies the Non-3GPP device which is connected behind a UE in the PLMN. The identifier may be in a Network Access Identifier (NAI) format as defined in RFC 7542 [20]. How the UE binds the traffic from a Non-3GPP device connecting behind the UE ??? to the identifier is based on locally configured policies or via the application layer and is not specified by 3GPP.

NOTE: The allocation of the this device identifier is out of the scope of this specification.

\* \* \* Next Change \* \* \*

## 5.x Non-3GPP device connecting behind the UE

### 5.x.1 General

The Identifiable Non-3GPP (IN3) device is a device capable of connecting to a UE via non-3GPP access, e.g. WLAN access. An IN3 does not support NAS and is not to be authenticated by 5GC. The IN3 device is associated with an identity that the 5GC can use to identify the device. In the UE Requested PDU Session Establishment procedure or the PDU Session Modifcation procedure, the UE or 5G-RG provides the identifier of the IN3 device connecting behind the UE to the 5GC. The 5GC identifies the traffic from the IN3 devices and, based on the UE subscription data, authorizes the association of traffic from IN3 device with the identifier of the IN3 device. The 5GC performs differentiated QoS control based on the corresponding QoS/Policies for an authorised IN3 device. The 5GC may restrict the max number of simultaneously active IN3 devices requiring traffic differentiation per UE.

The identifier of the IN3 device is defined in clause 5.9.x.

The 5GC is enhanced to support the PDU session management for IN3 device as specified in clause 5.x.3 and to support differentiated QoS control as specified in clause 5.x.4.

The support of IN3 device connecting behind a 5G-RG is specified in TS 23.316 [84].

NOTE: The IN3 device connecting behind a FN-RG is not supported in this release.

### 5.x.3 Session management enhancement for IN3 device

For IP PDU Session Type, if supported by UE and network, the UE can obtain the Framed Route information in the PDU Session establishment (i.e. delivered in NAS PDU Session Establishment Accept) from the SMF as defined in clause 5.6.14. In case of NAT, the UE shall allocate the IP address to the IN3 device belonging to one of the Framed Routes associated with the PDU Session and shall ensure that it does not NAT the traffic from different IN3 devices to the same IP address and port number range combination.

For Ethernet PDU Session Type, the UE may send the IN3DID and MAC address and/or the VLAN tag ID that is associated with the IN3 devices’s traffic to the SMF in PDU session modification procedure.

Based on URSP policy, the UE shall associate the traffic of the IN3 device identified by the IN3DID and connected behind the UE to the PDU session with the access network indicated by the matching URSP rule identified by the same IN3DID in the URSP Traffic Descriptor as defined in TS 23.503 [45].

### 5.x.4 QoS differentiation for IN3 device

When the UE supports the IN3 device, the UE can, based on locally configured policies, bind the traffic from the IN3 device to a IN3DID and the 5GC can apply QoS differentiation per each single identified IN3 device sharing the same PDU Session (using different QoS Flows) or between different PDU Sessions (one per each IN3 device). For IN3 devices sharing a PDU Session, the QoS Flows are provisioned in the UE using PDU Session Modification procedure. For IN3 devices using a dedicated PDU Session, QoS Flows are provisioned in the UE using PDU Session Estabishment procedure.

The UE sends the IN3DID, or sends the IN3DID and UE IP Address(es) / Port Number(s) that carry the IN3 device’s traffic in PDU Session Establishment procedure or PDU session Modification procedure for both new PDU session establishment and PDU session modification.

NOTE: In case of NAT, the IP address assigned to the IN3 device is a private IP address which is locally assigned by UE or an IP address belonging to one of the Framed Routes associated with the PDU Session.

Editor’s note: The DHCP based solution is FFS.

The SMF shall forward this information to the PCF and the PCF shall take it into account for policy decisions considering also the information retrived from the IN3 device profile in the UE policy data.

Based on the application layer mechanisms between UE and AF which is out of 3GPP scope, an AF session with required QoS may be implemented as per clause 4.15.6.6 of TS 23.502 [3] for the corresponding non-3GPP device.

The UE shall support the traffic from non-3GPP devices that do not have an associated IN3DID. URSP Rules can be used to steer traffic from Non-3GPP devices that are not an IN3 to different PDU Sessions.

\* \* \* Next Change \* \* \*

#### 6.2.5.0 NEF functionality

The Network Exposure Function (NEF) supports the following independent functionality:

- Exposure of capabilities and events:

 NF capabilities and events may be securely exposed by NEF for e.g. 3rd party, Application Functions, Edge Computing as described in clause 5.13.

 NEF stores/retrieves information as structured data using a standardized interface (Nudr) to the Unified Data Repository (UDR).

- Secure provision of information from external application to 3GPP network:

 It provides a means for the Application Functions to securely provide information to 3GPP network, e.g. Expected UE Behaviour, 5G-VN group information, time synchronization service information and PDU Set handling service specific information. In that case the NEF may authenticate and authorize and assist in throttling the Application Functions.

- Translation of internal-external information:

 It translates between information exchanged with the AF and information exchanged with the internal network function. For example, it translates between an AF-Service-Identifier and internal 5G Core information such as DNN, S-NSSAI, as described in clause 5.6.7.

 In particular, NEF handles masking of network and user sensitive information to external AF's according to the network policy.

- Redirecting the AF to a more suitable NEF/L-NEF e.g. when serving an AF request for local information exposure and detecting there is a more appropriate NEF instance to serve the AF's request.

- The Network Exposure Function receives information from other network functions (based on exposed capabilities of other network functions). NEF stores the received information as structured data using a standardized interface to a Unified Data Repository (UDR). The stored information can be accessed and "re-exposed" by the NEF to other network functions and Application Functions, and used for other purposes such as analytics.

- A NEF may also support a PFD Function: The PFD Function in the NEF may store and retrieve PFD(s) in the UDR and shall provide PFD(s) to the SMF on the request of SMF (pull mode) or on the request of PFD management from NEF (push mode), as described in TS 23.503 [45].

- A NEF may also support a 5G-VN Group Management Function: The 5G-VN Group Management Function in the NEF may store the 5G-VN group information in the UDR via UDM as described in TS 23.502 [3].

- Support management of ECS Address Information.

- Support management of relationship between DNAI and EAS Address Information.

- Exposure of analytics:

 NWDAF analytics may be securely exposed by NEF for external party, as specified in TS 23.288 [86].

- Retrieval of data from external party by NWDAF:

 Data provided by the external party may be collected by NWDAF via NEF for analytics generation purpose. NEF handles and forwards requests and notifications between NWDAF and AF, as specified in TS 23.288 [86].

- Support of Non-IP Data Delivery:

 NEF provides a means for management of NIDD configuration and delivery of MO/MT unstructured data by exposing the NIDD APIs as described in TS 23.502 [3] on the N33/Nnef reference point. See clause 5.31.5.

- Charging data collection and support of charging interfaces.

- Support of Member UE selection assistance functionality:

- NEF may provide one or more list(s) of candidate UE(s) (among the list of target member UE(s) provided by the AF) and additional information to the AF based on the parameters contained in the request from the AF as described in clause 5.46.2. NEF supports the translation of the member UE selection filtering criteria parameters received from the AF to the corresponding event or analytics filters that can be understood by the 5GC NFs for events or analytics related data collection. NEF interacts with 5GC NFs using existing services in order to collect the corresponding data and then derive the list(s) of candidate UE(s) and other assistance information as described in clause 4.15.13 of TS 23.502 [3].

- Support of Multi-member AF session with required QoS for a set of UEs identified by a list of UE addresses:

- Details are specified in clause 4.15.6.13 of TS 23.502 [3].

- Support of UAS NF functionality:

 Details are defined in TS 23.256 [136].

- Support of EAS deployment functionality:

 Details are defined in TS 23.548 [130].

- Support of SBI-based MO SM transmit for MSISDN-less MO SMS:

 Details are defined in TS 23.540 [142].

- Support PDU Set Handling as defined in clause 5.37.5.

- Support management of common EAS and common DNAI:

 Details are defined in TS 23.548 [130].

- Support of Identifable Non-3GPP Devices:

 Provisioning of Indentifable Non-3GPP Device Identifiers and their corresponding QoS/Policies associated with a UE/5G-RG subscription.

A specific NEF instance may support one or more of the functionalities described above and consequently an individual NEF may support a subset of the APIs specified for capability exposure.

NOTE: The NEF can access the UDR located in the same PLMN as the NEF.

The services provided by the NEF are specified in clause 7.2.8.

For external exposure of services related to specific UE(s), the NEF resides in the HPLMN. Depending on operator agreements, the NEF in the HPLMN may have interface(s) with NF(s) in the VPLMN.

When a UE is capable of switching between EPC and 5GC, an SCEF+NEF is used for service exposure. See clause 5.17.5 for a description of the SCEF+NEF.

\* \* \*End Changes \* \* \*