**3GPP TSG-SA2 Meeting #144-e *S2-2102126***

**Online, , 12th Apr 2021 - 16th Apr 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **23.501** | **CR** | **2689** | **rev** | **-** | **Current version:** | **17.0.0** |  |
|  |
| *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 |  |

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| --- |
|  |
| ***Title:***  | 5MBS architecture |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, Ericsson, LG Electronics |
| ***Source to TSG:*** | S2 |
|  |  |
| ***Work item code:*** | 5MBS |  | ***Date:*** | 2021-03-30 |
|  |  |  |  |  |
| ***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 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)* |
|  |  |
| ***Reason for change:*** | The 5MBS architecture as defined in 3GPP TS 23.247 based on conclusions of TR 23.757 needs to be introduced. |
|  |  |
| ***Summary of change:*** | The 5MBS architecture and related network functions and reference points are defined via references to 3GPP TS 23.247. |
|  |  |
| ***Consequences if not approved:*** | The 5MBS architecture is not documented in 23.501. |
|  |  |
| ***Clauses affected:*** | 3.2, 4.2.2, new 4.2.x, 4.2.6, 4.2.7, 5.17.1.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

1st change

## 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-VN 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-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

AKMA Authentication and Key Management for Applications

AnLF Analytics Logical Function

AMF Access and Mobility Management Function

AS Access Stratum

ATSSS Access Traffic Steering, Switching, Splitting

ATSSS-LL ATSSS Low-Layer

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

DAPS Dual Active Protocol Stacks

DCCF Data Collection Coordination Function

DL Downlink

DN Data Network

DNAI DN Access Identifier

DNN Data Network Name

DRX Discontinuous Reception

DS-TT Device-side TSN translator

ePDG evolved Packet Data Gateway

EBI EPS Bearer Identity

EUI Extended Unique Identifier

FAR Forwarding Action Rule

FN-BRG Fixed Network Broadband RG

FN-CRG Fixed Network Cable RG

FN-RG Fixed Network RG

FQDN Fully Qualified Domain Name

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

I-SMF Intermediate SMF

I-UPF Intermediate UPF

LADN Local Area Data Network

LBO Local Break Out (roaming)

LMF Location Management Function

LoA Level of Automation

LPP LTE Positioning Protocol

LRF Location Retrieval Function

MBS Multicast/Broadcast Service

MBSF Multicast/Broadcast Service Function

MBSTF Multicast/Broadcast Service Transport Function

MB-SMF Multicast/Broadcast Session Management Function

MB-UPF Multicast/Broadcast User Plane Function

MFAF Messaging Framework Adaptor Function

MCX Mission Critical Service

MDBV Maximum Data Burst Volume

MFBR Maximum Flow Bit Rate

MICO Mobile Initiated Connection Only

ML Machine Learning

MPS Multimedia Priority Service

MPTCP Multi-Path TCP Protocol

MTLF Model Training Logical Function

N3IWF Non-3GPP InterWorking Function

N5CW Non-5G-Capable over WLAN

NAI Network Access Identifier

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

NSAC Network Slice Admission Control

NSACF Network Slice Admission Control Function

NSI ID Network Slice Instance Identifier

NSSAA Network Slice-Specific Authentication and Authorization

NSSAAF Network Slice-Specific Authentication and Authorization Function

NSSAI Network Slice Selection Assistance Information

NSSF Network Slice Selection Function

NSSP Network Slice Selection Policy

NW-TT Network-side TSN translator

NWDAF Network Data Analytics Function

PCF Policy Control Function

PDB Packet Delay Budget

PDR Packet Detection Rule

PDU Protocol Data Unit

PEI Permanent Equipment Identifier

PER Packet Error Rate

PFD Packet Flow Description

PNI-NPN Public Network Integrated Non-Public Network

PPD Paging Policy Differentiation

PPF Paging Proceed Flag

PPI Paging Policy Indicator

PSA PDU Session Anchor

PTP Precision Time Protocol

QFI QoS Flow Identifier

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

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

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

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

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

TSCAI TSC Assistance Information

TSN Time Sensitive Networking

TSN GM TSN Grand Master

TSP Traffic Steering Policy

TT TSN Translator

TWIF Trusted WLAN Interworking 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

2nd change

### 4.2.2 Network Functions and entities

The 5G System architecture consists of the following network functions (NF).

- Authentication Server Function (AUSF).

- Access and Mobility Management Function (AMF).

- Data Network (DN), e.g. operator services, Internet access or 3rd party services.

- Unstructured Data Storage Function (UDSF).

- Network Exposure Function (NEF).

- Network Repository Function (NRF).

- Network Slice Admission Control Function (NSACF).

- Network Slice Specific Authentication and Authorization Function (NSSAAF).

- Network Slice Selection Function (NSSF).

- Policy Control Function (PCF).

- Session Management Function (SMF).

- Unified Data Management (UDM).

- Unified Data Repository (UDR).

- User Plane Function (UPF).

- UE radio Capability Management Function (UCMF).

- Application Function (AF).

- User Equipment (UE).

- (Radio) Access Network ((R)AN).

- 5G-Equipment Identity Register (5G-EIR).

- Network Data Analytics Function (NWDAF).

- 5G Direct Discovery Name Management Function (5G DDNMF).

- CHarging Function (CHF).

NOTE 1: The functional description on architecture and principles of the CHF is specified in TS 32.240 [41].

- Data Collection Coordination Function (DCCF).

- Analytics Data Repository Function (ADRF).

- Messaging Framework Adaptor Function (MFAF).

NOTE 2: The functionalities provided by DCCF and/or ADRF can also be hosted by an NWDAF.

- Multicast/Broadcast Session Management Function (MB-SMF)

- Multicast/Broadcast User Plane Function (MB-UPF)

- Multicast/Broadcast Service Function (MBSF)

- Multicast/Broadcast Service Transport Function (MBSTF)

NOTE X: The MB-SMF, MB-UPF, MBSF and MBSTF are defined in TS 23.247 [129].

The 5G System architecture also comprises the following network entities:

- Service Communication Proxy (SCP).

- Security Edge Protection Proxy (SEPP).

The functional descriptions of these Network Functions and entities are specified in clause 6.

- Non-3GPP InterWorking Function (N3IWF).

- Trusted Non-3GPP Gateway Function (TNGF).

- Wireline Access Gateway Function (W-AGF).

- Trusted WLAN Interworking Function (TWIF).

3rd change

### 4.2.x Architecture for 5G multicast-broadcast services

The architectural for 5G multicast-broadcast services is defined inTS 23.247 [129].

4th change

### 4.2.6 Service-based interfaces

The 5G System Architecture contains the following service-based interfaces:

**Namf:** Service-based interface exhibited by AMF.

**Nsmf:** Service-based interface exhibited by SMF.

**Nnef:** Service-based interface exhibited by NEF.

**Npcf:** Service-based interface exhibited by PCF.

**Nudm:** Service-based interface exhibited by UDM.

**Naf:** Service-based interface exhibited by AF.

**Nnrf:** Service-based interface exhibited by NRF.

**Nnsacf:** Service-based interface exhibited by NSACF.

**Nnssaaf:** Service-based interface exhibited by NSSAAF.

**Nnssf**: Service-based interface exhibited by NSSF.

**Nausf:** Service-based interface exhibited by AUSF.

**Nudr:** Service-based interface exhibited by UDR.

**Nudsf:** Service-based interface exhibited by UDSF.

**N5g-eir:** Service-based interface exhibited by 5G-EIR.

**Nnwdaf:** Service-based interface exhibited by NWDAF.

**Nchf:** Service-based interface exhibited by CHF.

**Nucmf:** Service-based interface exhibited by UCMF.

**Ndccf:** Service based interface exhibited by DCCF.

**Nmfaf:** Service based interface exhibited by MFAF.

**Nadrf:** Service based interface exhibited by ADRF.

**Naanf:** Service-based interface exhibited by AANF.

NOTE: The Service-based interface exhibited by AANF is defined in TS 33.535 [124].

**N5g-ddnmf:** Service-based interface exhibited by 5G DDNMF.

**Nmbsmf** Service-based interface exhibited by MB-SMF

NOTE: The Service-based interface exhibited by MB-SMF is defined in in TS 23.247 [129].

5th change

### 4.2.7 Reference points

The 5G System Architecture contains the following reference points:

**N1:** Reference point between the UE and the AMF.

**N2:** Reference point between the (R)AN and the AMF.

**N3:** Reference point between the (R)AN and the UPF.

**N4:** Reference point between the SMF and the UPF.

**N6:** Reference point between the UPF and a Data Network.

NOTE 1: The traffic forwarding details of N6 between a UPF acting as an uplink classifier and a local data network are not specified in this Release of the specification.

**N9:** Reference point between two UPFs.

The following reference points show the interactions that exist between the NF services in the NFs. These reference points are realized by corresponding NF service-based interfaces and by specifying the identified consumer and producer NF service as well as their interaction in order to realize a particular system procedure.

**N5:** Reference point between the PCF and an AF.

**N7:** Reference point between the SMF and the PCF.

**N8:** Reference point between the UDM and the AMF.

**N10:** Reference point between the UDM and the SMF.

**N11:** Reference point between the AMF and the SMF.

**N12:** Reference point between AMF and AUSF.

**N13:** Reference point between the UDM and Authentication Server function the AUSF.

**N14:** Reference point between two AMFs.

**N15:** Reference point between the PCF and the AMF in the case of non-roaming scenario, PCF in the visited network and AMF in the case of roaming scenario.

**N16:** Reference point between two SMFs, (in roaming case between SMF in the visited network and the SMF in the home network).

**N16a:** Reference point between SMF and I-SMF.

**N17:** Reference point between AMF and 5G-EIR.

**N18:** Reference point between any NF and UDSF.

**N19:** Reference point between two PSA UPFs for 5G LAN-type service.

**N22:** Reference point between AMF and NSSF.

**N23:** Reference point between PCF and NWDAF.

**N24:** Reference point between the PCF in the visited network and the PCF in the home network.

**N27:** Reference point between NRF in the visited network and the NRF in the home network.

**N28:** Reference point between PCF and CHF.

**N29:** Reference point between NEF and SMF.

**N30:** Reference point between PCF and NEF.

NOTE 2: The functionality of N28 and N29 and N30 reference points are defined in TS 23.503 [45].

**N31:** Reference point between the NSSF in the visited network and the NSSF in the home network.

NOTE 2: In some cases, a couple of NFs may need to be associated with each other to serve a UE.

**N32:** Reference point between SEPP in the visited network and the SEPP in the home network.

NOTE 5: The functionality of N32 reference point is defined in TS 33.501 [29].

**N33:** Reference point between NEF and AF.

**N34:** Reference point between NSSF and NWDAF.

**N35:** Reference point between UDM and UDR.

**N36:** Reference point between PCF and UDR.

**N37:** Reference point between NEF and UDR.

**N38:** Reference point between I-SMFs.

**N40:** Reference point between SMF and the CHF.

**N41:** Reference point between AMF and CHF in HPLMN.

**N42:** Reference point between AMF and CHF in VPLMN.

NOTE 3: The reference points from N40 up to and including N49 are reserved for allocation and definition in TS 23.503 [45].

**N50:** Reference point between AMF and the CBCF.

**N51:** Reference point between AMF and NEF.

**N52:** Reference point between NEF and UDM.

**N55:** Reference point between AMF and the UCMF.

**N56:** Reference point between NEF and the UCMF.

**N57:** Reference point between AF and the UCMF.

NOTE 4: The Public Warning System functionality of N50 reference point is defined in TS 23.041 [46].

**N58:** Reference point between AMF and the NSSAAF.

**N59:** Reference point between UDM and the NSSAAF.

**N60:** Reference point between AMF and NSACF.

The reference points to support SMS over NAS are listed in clause 4.4.2.2.

The reference points to support Location Services are listed in TS 23.273 [87].

The reference points to support SBA in IMS (N5, N70 and N71) are described in TS 23.228 [15].

The reference points to support AKMA (N61, N62 and N63) are described in TS 33.535 [124].

The reference points to support ProSe (N64, N65 and N66) are described in TS 23.304 [128].

The reference points to support 5MBS (MB-N9, Nx1, Nx2, Nx3) are described in TS 23.247 [129].

6th change

#### 5.17.1.1 General

Clause 5.17.1 describes the UE and network behaviour for the migration from EPC to 5GC.

Deployments based on different 3GPP architecture options (i.e. EPC based or 5GC based) and UEs with different capabilities (EPC NAS and 5GC NAS) may coexist at the same time within one PLMN.

It is assumed that a UE that is capable of supporting 5GC NAS procedures may also be capable of supporting EPC NAS (i.e. the NAS procedures defined in TS 24.301 [13]) to operate in legacy networks e.g. in the case of roaming.

The UE will use EPC NAS or 5GC NAS procedures depending on the core network by which it is served.

In order to support smooth migration, it is assumed that the EPC and the 5GC have access to a common subscriber database, that is HSS in the case of EPC and the UDM in the case of 5GC, acting as the master data base for a given user as defined in TS 23.002 [21]. The PCF has access to the UDR that acts as a common subscriber database for a given user identified by a SUPI using the Nudr services defined in TS 23.502 [3].



Figure 5.17.1.1-1: Architecture for migration scenario for EPC and 5G CN

A UE that supports only EPC based Dual Connectivity with secondary RAT NR:

- always performs initial access through E-UTRA (LTE-Uu) but never through NR;

- performs EPC NAS procedures over E-UTRA (i.e. Mobility Management, Session Management etc) as defined in TS 24.301 [13].

A UE that supports camping on 5G Systems with 5GC NAS:

- performs initial access either through E-UTRAN that connects to 5GC or NR towards 5GC;

- performs initial access through E-UTRAN towards EPC, if supported and needed;

- performs EPC NAS or 5GC NAS procedures over E-UTRAN or NR respectively (i.e. Mobility Management, Session Management etc) depending on whether the UE requests 5GC access or EPC access, if the UE also supports EPC NAS.

When camping on an E-UTRA cell connected to both EPC and 5GC, a UE supporting EPC NAS and 5GC NAS shall select a core network type (EPC or 5GC) and initiate the corresponding NAS procedure as specified in TS 23.122 [17].

In order to support different UEs with different capabilities in the same network, i.e. both UEs that are capable of only EPC NAS (possibly including EPC based Dual Connectivity with secondary NR) and UEs that support 5GC NAS procedures in the same network:

- eNB that supports access to 5GC shall broadcast that it can connect to 5GC. Based on that, the UE AS layer indicates "E-UTRA connected to 5GC" capability to the UE NAS layer. In addition the eNB broadcasts the supported CIoT 5GS Optimisations that the UE uses for selecting a core network type.

- It is also expected that the UE AS layer is made aware by the UE NAS layer whether a NAS signalling connection is to be initiated to the 5GC. Based on that, UE AS layer indicates to the RAN whether it is requesting 5GC access (i.e. "5GC requested" indication). The RAN uses this indication to determine whether a UE is requesting 5GC access or an EPC access. RAN routes NAS signalling to the applicable AMF or MME accordingly.

NOTE: The UE that supports EPC based Dual Connectivity with secondary RAT only does not provide this "5GC requested" indication at Access Stratum when it performs initial access and therefore eNB uses the "default" CN selection mechanism to direct this UE to an MME

The 5GC network may steer the UE from 5GC based on:

- Core Network type restriction (e.g. due to lack of roaming agreements) described in clause 5.3.4.1.1;

- Availability of EPC connectivity;

- UE indication of EPC Preferred Network Behaviour; and

- Supported Network Behaviour.

The UE that wants to use functionalities not supported by 5G System, when in CM-IDLE may disable all the related radio capabilities that allow the UE to access 5G System. The triggers to disable and re-enable the 5GS capabilities to access 5G System in this case are left up to UE implementation.

End of changes