5G Release 18: Network Architecture

RADCOM

5GC Reference Points

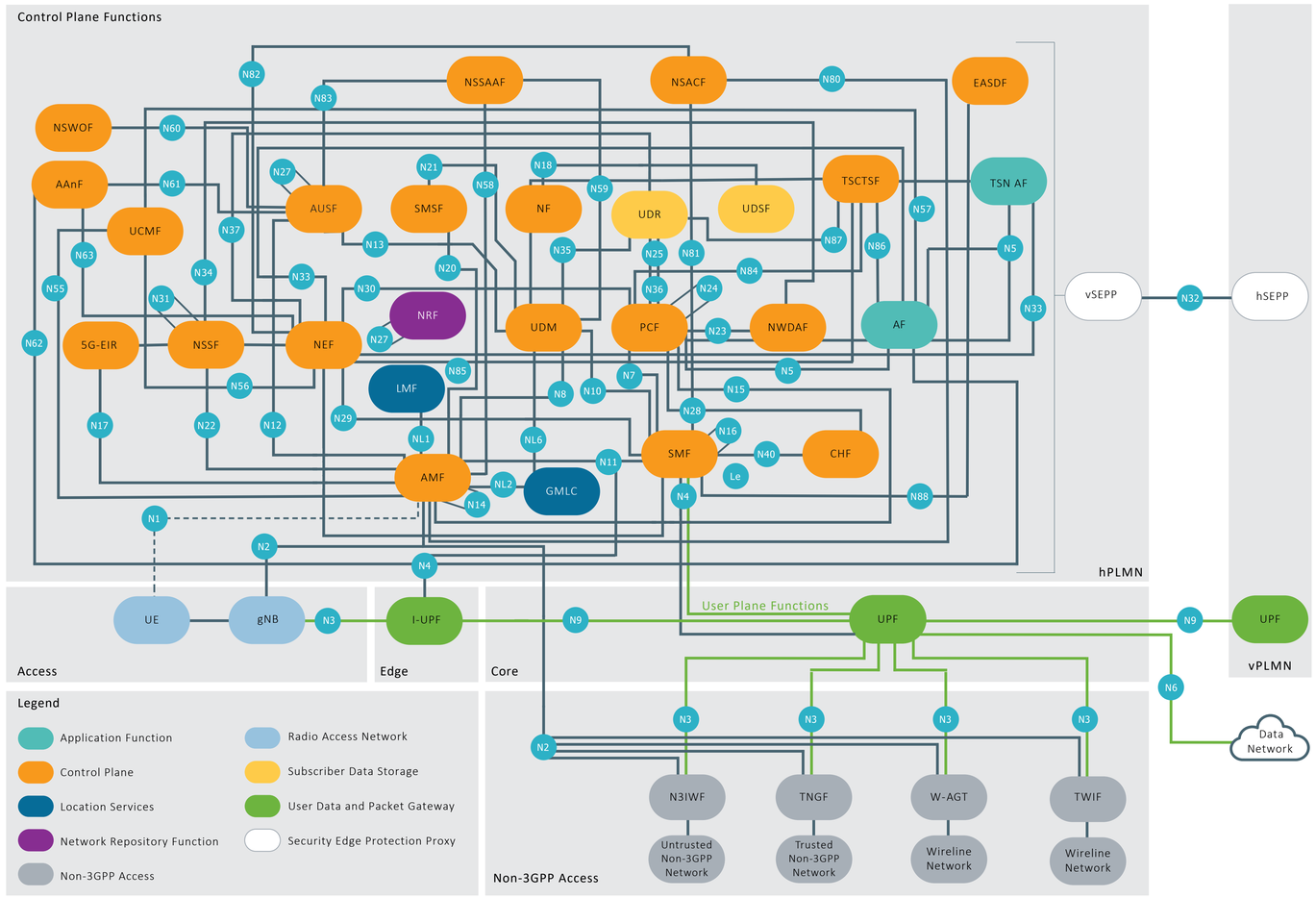
Reference Point	Between	Between	3GPP Spec	Protocol Stack
N1	UE	AMF	TS 23.501	IP | SCTP | NG-AP | NAS
N2	(R)AN	AMF	TS 23.501	IP | SCTP | NG-AP
N3	(R)AN	UPF	TS 23.501	IP | UDP | GTP-U
N4^	UPF	SMF	TS 23.501	CP: IP | UDP | PFCP UP: IP | UDP | GTP-U
N5*	PCF	AF	TS 23.501	IP | TCP | HTTP2 | JSON
N6	UPF	DN	TS 23.501	IP | Application
N7*	SMF	PCF	TS 23.501	IP | TCP | HTTP2 | JSON
N8*	AMF	UDM	TS 23.501	IP | TCP | HTTP2 | JSON
N9	UPF	UPF	TS 23.501	IP | UDP | GTP-U
N10*	SMF	UDM	TS 23.501	IP | TCP | HTTP2 | JSON
N11*	AMF	SMF	TS 23.501	IP | TCP | HTTP2 | JSON
N12*	AMF	AUSF	TS 23.501	IP | TCP | HTTP2 | JSON
N13*	AUSF	UDM	TS 23.501	IP | TCP | HTTP2 | JSON
N14*	AMF	AMF	TS 23.501	IP | TCP | HTTP2 | JSON
N15*	AMF	PCF	TS 23.501	IP | TCP | HTTP2 | JSON
N16*	SMF	SMF	TS 23.501	IP | TCP | HTTP2 | JSON
N17*	AMF	5G-EIR	TS 23.501	IP | TCP | HTTP2 | JSON
N18*	NF	UDSF	TS 23.501	IP | TCP | HTTP2 | JSON
N19*	PSA	PSA	TS 23.501	IP | UDP | GTP-U
N20*	AMF	SMSF	TS 23.501	IP | TCP | HTTP2 | JSON
N21*	SMSF	UDM	TS 23.501	IP | TCP | HTTP2 | JSON
N22*	AMF	NSSF	TS 23.501	IP | TCP | HTTP2 | JSON
N23*	PCF	NWDAF	TS 23.501	IP | TCP | HTTP2 | JSON
N24*	PCF	PCF	TS 23.501	IP | TCP | HTTP2 | JSON
N25*	UDR	PCF	TS 29.513	IP | TCP | HTTP2 | JSON
N26	AMF	MME	TS 23.502	IP | UDP | GTP-C
N27*	NRF	NRF	TS 23.501	IP | TCP | HTTP2 | JSON
N28*	PCF	CHF	TS 32.240	IP | TCP | HTTP2 | JSON
N29*	NEF	SMF	Depreciated	IP | TCP | HTTP2 | JSON
N30*	NEF	PCF	TS 29.554	IP | TCP | HTTP2 | JSON
N31*	NSSF	NSSF	TS 23.501	IP | TCP | HTTP2 | JSON
N32*	SEPP	SEPP	TS 23.501	IP | TCP | HTTP2 | JSON
N33*	NEF	AF	TS 23.501	IP | TCP | HTTP2 | JSON
N34*	NSSF	NWDAF	TS 23.501	IP | TCP | HTTP2 | JSON
N35*	UDM	UDR	TS 23.501	IP | TCP | HTTP2 | JSON
N36*	PCF	UDR	TS 23.501	IP | TCP | HTTP2 | JSON
N37*	NEF	UDR	TS 23.501	IP | TCP | HTTP2 | JSON
N40*	SMF	CHF	TS 23.501	IP | TCP | HTTP2 | JSON
N50*	AMF	CBCF	TS 23.501	IP | TCP | HTTP2 | JSON
N51*	AMF	NEF	TS 23.501	IP | TCP | HTTP2 | JSON
N51i*	AMF	I-NEF	TS 23.501	IP | TCP | HTTP2 | JSON
N52*	NEF	UDM	TS 23.501	IP | TCP | HTTP2 | JSON
N53*	I-NEF	NEF	TS 23.501	IP | TCP | HTTP2 | JSON
N55*	AMF	UCMF	TS 23.501	IP | TCP | HTTP2 | JSON
N56*	NEF	UCMF	TS 23.501	IP | TCP | HTTP2 | JSON
N57*	AF	UCMF	TS 23.501	IP | TCP | HTTP2 | JSON
N58*	AMF	NSSAAF	TS 23.501	IP | TCP | HTTP2 | JSON
N59*	UDM	NSSAAF	TS 23.501	IP | TCP | HTTP2 | JSON
N60*	AUSF	NSWOF	TS 23.501	IP | TCP | HTTP2 | JSON
N61*	AAnF	AUSF	TS 33.535	IP | TCP | HTTP2 | JSON
N62*	AAnF	AF (internal)	TS 33.535	IP | TCP | HTTP2 | JSON
N63*	AAnF	NEF	TS 33.535	IP | TCP | HTTP2 | JSON
N65*	BSF	HSS	TS 33.220	IP | TCP | HTTP2 | JSON
N66*	BSF	NAF	TS 33.220	IP | TCP | HTTP2 | JSON
N67*	Push-NAF	GBA BSF	TS 29.309	IP | TCP | HTTP2 | JSON
N68*	BSF	UDM	TS 33.220	IP | TCP | HTTP2 | JSON
N70*	I/S-CSCF	HSS	TS 23.228	IP | TCP | HTTP2 | JSON
N71*	AS (IMS)	HSS	TS 23.228	IP | TCP | HTTP2 | JSON
N80*	AMF	NSACF	TS 23.501	IP | TCP | HTTP2 | JSON
N81*	SMF	NSACF	TS 23.501	IP | TCP | HTTP2 | JSON
N82*	NSACF	NEF	TS 23.501	IP | TCP | HTTP2 | JSON
N83*	AUSF	NSSAAF	TS 23.501	IP | TCP | HTTP2 | JSON
N84*	TSCTSF	PCF	TS 23.501	IP | TCP | HTTP2 | JSON
N85*	TSCTSF	NEF	TS 23.501	IP | TCP | HTTP2 | JSON
N86*	TSCTSF	AF	TS 23.501	IP | TCP | HTTP2 | JSON
N87*	TSCTSF	UDR	TS 23.501	IP | TCP | HTTP2 | JSON
N88*	SMF	EASDF	TS 23.501	IP | TCP | HTTP2 | JSON
N89*	TSCTSF	AMF	TS 23.501	IP | TCP | HTTP2 | JSON
N96*	TSC TSF	NRF	TS 23.501	IP | TCP | HTTP2 | JSON
N97*	NSACF	NSACF (within same PLMN)	TS 23.501	IP | TCP | HTTP2 | JSON
N99*	NSACF	NSACF (in different PLMNs)	TS 23.501	IP | TCP | HTTP2 | JSON
NL1*	AMF	LMF	TS 23.273, TS 29.572	IP | TCP | HTTP2 | JSON
NL2*	GMLC	AMF	TS 23.273	IP | TCP | HTTP2 | JSON
NL3*	HGMLC	VGMLC	TS 23.273	IP | TCP | HTTP2 | JSON
NL5*	NEF	GMLC	TS 23.273	IP | TCP | HTTP2 | JSON
NL6*	HGMLC	UDM	TS 23.273	IP | TCP | HTTP2 | JSON
NL7*	LMF	LMF	TS 23.273, TS 29.572	IP | TCP | HTTP2 | JSON
NL8*	LMF	NWDAF	TS 23.273	IP | TCP | HTTP2 | JSON
NL9*	NWDAF	GMLC	TS 23.273	IP | TCP | HTTP2 | JSON
NL10*	LMF	GMLC	TS 23.273	IP | TCP | HTTP2 | JSON
Le	LCS Client	GMLC or LRF	TS 23.273	IP | TCP | HTTP2 | MLP
MWu*	UE	N3IWF	TS 23.501	CP: IP | IPsec | Inner IP | GRE UP: IP | IKEv2
PC1	ProSe application in the UE	ProSe Application Server	TS 29.555	IP | TCP | HTTP2 | JSON
PC3a*	UE	5G DDNMF	TS 24.334	IP | TCP | HTTP
PC5 *	ProSe-enabled UE	ProSe-enabled UE	TS 24.587	PHY | MAC | RLC | PDCP | PC5
PC8 *	UE	5G PKMF	TS 29.559	Over IP
Npc2*	ProSe Application Server	5G DDNMF	TS 29.555	IP | TCP | HTTP2 | JSON
Npc4*	UDM	5G DDNMF	TS 23.304	IP | TCP | HTTP2 | JSON
Npc6*	5G DDNMF (in the HPLMN)	5G DDNMF (in a Local PLMN)	TS 23.304	IP | TCP | HTTP2 | JSON
Npc7*	5G DDNMF (in the HPLMN)	5G DDNMF (in the VPLMN)	TS 23.304	IP | TCP | HTTP2 | JSON
Npc8*	PCF	5G DDNMF	TS 23.304	IP | TCP | HTTP2 | JSON
Npc9*	5G PKMF (5G ProSe Remotr UE)	5G PKMF (5GproSe UE-to-Network Relay)	TS 33.503	IP | TCP | HTTP2 | JSON
Npc10*	5G PKMF	UDM	TS 33.503	IP | TCP | HTTP2 | JSON
Y1	UE	Non-3GPP Network	N/A	Not specified by 3GPP
Y2	Non-3GPP Network	N3IWF	N/A	Not specified by 3GPP
NR-Uu	UE	(R)AN	TS 38.305	PHY | MAC | RLC | PDCP | RRC
Nmb1*	MB-SMF	MBSF	TS 26.502	IP | TCP | HTTP2 | JSON
Nmb2*	MB-SMF	AF/AS	TS 26.502	IP | TCP | HTTP2 | JSON
Nmb5*	MBSF	NEF	TS 26.502	IP | TCP | HTTP2 | JSON
Nmb8*	MBSTF	AF/AS	TS 26.502	IP | TCP | HTTP2 | JSON
Nmb9*	MB-UPF	MBSTF	TS 26.502	IP | UDP | GTP-U
Nmb10*	MBSF	AF/AS	TS 26.502	IP | TCP | HTTP2 | JSON
Nmb12*	MBSF	PCF	TS 26.502	IP | TCP | HTTP2 | JSON
Nmb13*	MB-SMF	AF/AS	TS 26.502	IP | TCP | HTTP2 | JSON
N3mb	(R)AN	MB-UPF	TS 26.502	IP | UDP | GTP-U
N4mb	MB-SMF	MB-UPF	TS 26.502	IP | UDP | GTP-U
N6mb	MB-UPF	AF/AS	TS 26.502	IP | UDP | GTP-U
N7mb*	MB-SMF	PCF	TS 26.502	IP | TCP | HTTP2 | JSON
N11mb*	AMF	MB-SMF	TS 26.502	IP | TCP | HTTP2 | JSON
N16mb*	SMF	MB-SMF	TS 26.502	IP | TCP | HTTP2 | JSON
N19mb	UPF	MB-UPF	TS 26.502	IP | UDP | GTP-U
N29mb*	MB-SMF	NEF	TS 26.502	IP | TCP | HTTP2 | JSON
SR1	Sidelink (SL) Positioning and Ranging function in the UE	SL Positioning/Ranging Server	TS 23.586	Not specified by 3GPP
SR5	Sidelink (SL) Positioning and Ranging function in the UE	Sidelink (SL) Positioning and Ranging function in the UE	TS 23.586	carried over PC5-U
CAPIF-1	API invoker	CAPIF core function	TS 23.222	
CAPIF-1e	API invoker (external)	CAPIF core function	TS 23.222	
CAPIF-2	API invoker	API exposing function	TS 23.222	
CAPIF-2e	API invoker (external)	API exposing function	TS 23.222	
CAPIF-3	API exposing function	CAPIF core function	TS 23.222	
CAPIF-3e	API exposing function (external)	CAPIF core function	TS 23.222	
CAPIF-4	API publishing function	CAPIF core function	TS 23.222	
CAPIF-4e	API publishing function (external)	CAPIF core function	TS 23.222	
CAPIF-5	API management function	CAPIF core function	TS 23.222	
CAPIF-5e	API management function (external)	CAPIF core function	TS 23.222	
CAPIF-6	CAPIF core function	CAPIF core function	TS 23.222	
CAPIF-6e	CAPIF core function (external)	CAPIF core function	TS 23.222	
CAPIF-7	API exposing function	API exposing function	TS 23.222	
CAPIF-7e	API exposing function (external)	API exposing function	TS 23.222	

*a Service-based Interface
*CP and UP on the same interface

Legend

- Common 5GC
- EPS to 5GS
- Cell Broadcast Service
- Authentication and Key Management for Applications
- Generic Bootstrapping Architecture
- IMS
- Location Management Services
- Non-3GPP Access
- Air interface
- 5G multicast-broadcast services
- Ranging based services and Sidelink Positioning
- Common AFI Framework for 3GPP Northbound APIs

5G Service-based Architecture (SBA)



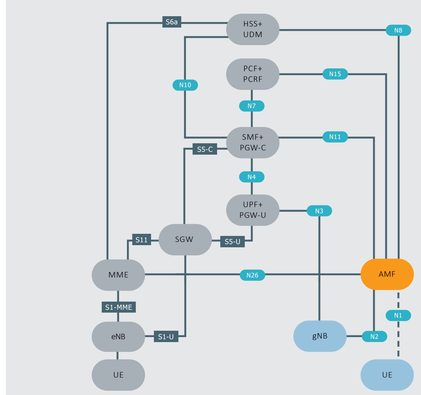
5GC Network Entities

Abbreviation	Network Function	Role
5G DDNMF	Direct Discovery Name Management Function	The logical function handling network related actions required for dynamic 5G ProSe Direct Discovery.
5G-EIR	5G-Equipment Identity Register	Enables authentication of devices in the network. Protects networks and revenues against the use of stolen and unauthorized devices.
AAnF	AKMA Anchor Function	The anchor function in the HPLMN that generates the key material to be used between the UE and the AF and maintains UE AKMA contexts.
ADRF	Analytical Data Repository Function	Stores and retrieves analytics generated by NWDAFs and other collected data.
AF	Application Function	Performs the same function as the EPC AF.
AnLF	Analytical Logical Function	Responsible for collecting the analytical request and sending the response to the consumer. AnLF requires the model endpoints, which is provided by the MTLF (Model Training Logical Function).
AKMA	Authentication and Key Management for Applications	Similar to the Generic Bootstrapping Architecture (GBA) in earlier generations, this function leverages an operator authentication infrastructure in order to secure the communication between the UE and an Application Function (AF).
AMF	Access and Mobility Management Function	Performs most of the functions that the MME performs in a 4G network.
AUSF	Authentication Server Function	Performs the authentication function of 4G HSS.
BSF	Binding Support Function	Used for binding an application-function request to a specific Policy Control Function (PCF) instance. It is comparable to the PCRF binding function provided by a 4G Diameter Routing Agent (DRA), for VoLTE.
CAPIF	Common API Framework	Provides a unified and standardized northbound API framework across several 3GPP functions that allows for the utilization of 5G capabilities exposed on 5G networks.
CBCF	Cell Broadcast Center Function	Supports public warning system functionality.
CCS	Convergent Charging System Function	Provides account management, rating and charging functions.
CHF	Charging Function	Allows charging services to be offered to authorized network functions
DCCF	Data Collection Coordination Function	Multiple NWDAFs may need the same raw data (the input to the NWDAF) and multiple network functions may need the same analytics data (the output of the NWDAF). To avoid duplicate requests for the same data the DCCF function coordinates these interactions.
DN	Data Network	e.g. Internet access or 3rd party services.
EASDF	Edge Application Server Discovery Function	Registers to the NRF for EASDF discovery and selection. Handles the DNS messages according to the instructions from the SMF, exchanges DNS messages from the UE. Forwards DNS messages to C-DNS or L-DNS for DNS Queries.
GMLC	Gateway Mobile Location Centre	The Gateway Mobile Location Centre (GMLC) also provides functionality required to support location-based services (LBS). The GMLC is the first node an external LBS client accesses in a PLMN. AFs and NFs may access GMLC directly or via the NEF.
I-NEF	Intermediate Network Exposure Function	Provides a mechanism for securely exposing services and features of the 5G core.
I-UPF	Network not defined by 3GPP	Examples of these are a Wi-Fi, and DSL network.
LMF	Location Management Function	The Location Management Function (LMF) supports location-based services (LBS) for a UE.
MBSF	Multicast/Broadcast Service Function	Performs service level functionality and interworking with MBMS. Interacting with AF and MB-SMF for MBS session operations, determination of transport parameters, and session transport.
MB-SMF	Multicast/Broadcast Session Management Function	Handles MBS session management (including QoS control), configures the MB-UPF for multicast and broadcast data transport and allocates/de-allocates TMGIs.
MBSTF	Multicast/Broadcast Service Transport Function	Functions as a media anchor for MBS data traffic. Sources IP Multicast and generic packet transport functionalities available to any IP multicast enabled application.
MB-UPF	Multicast/Broadcast User Plane Function	Handles packet filtering of incoming downlink packets for multicast and broadcast flows. QoS enforcement (MFBR) and interactions with MB-SMF for receiving multicast and broadcast data.
MFAF	Messaging Framework Adaptor Function	The messaging framework in which the analytics or event notifications (carrying raw data for the NWDAF to process) can be distributed around the network. Its operation is not standardized by the 3GPP.
MTLF	Model Training Logical Function	AnLF requires the model endpoints, which is provided by the MTLF. The MTLF trains and deploys the model inference microservice.
N3IWF	Non-3GPP Interworking Function	Responsible for interworking between untrusted non-3GPP networks and the 5G Core.
NAF	Network Application Function	Identifies a Service-based Interface for the Application Function.
NEF	Network Exposure Function	Provides a mechanism for securely exposing services and features of the 5G core.

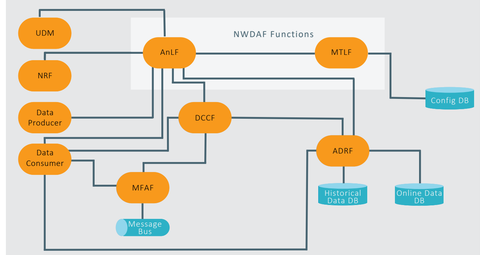
Abbreviation	Network Function	Role
NF	Network Function	a logical node within the network that has well-defined external interfaces and well-defined functional behavior
Non-3GPP Network	Networks not defined by 3GPP	Examples of these are a Wi-Fi, and DSL network.
NRF	Network Repository Function	Allows every network function to discover the services offered by other network functions.
NSACF	Network Slice Access Control Function	Monitors and controls the number of registered UEs per network slice and/or the number of PDU Sessions per network slice for the network slices that are subject to Network Slice Admission Control (NSAC).
NSSAAF	Network Slice-Specific Authentication and Authorization Function	Provides slice-specific authentication and authorization for a given UE. The NSSAAF acts as a NF Service Producer, while the AMF is the NF Service Consumer.
NSSF	Network Slice Selection Function	Redirects traffic to a network slice.
NSWOF	Non-Seamless WLAN Offload Function	Interfaces to the WLAN access network using the SWa interface and interfaces to the AUSF using the Nausf Service Based Interface (SBI) to support WLAN connection using 5G credentials without 5GS registration.
NWDAF	Network Data Analytics Function	Responsible for providing network analysis information upon request from network functions.
PCF	Policy Control Function	Governs the network behavior by supporting a unified policy framework. Also, provides policy rules to Control Plane functions.
PFDF	Packet Flow Description Function	A repository which stores PFDs (Packet Flow Descriptions) that can be managed and updated by third party service providers. The PFDF is functionality within the NEF.
PSA	PDU Session Anchor	The user plane function that terminates the N6 interface of a PDU session within a 5G core network.
RAN	Radio Access Network	Using radio technology provides access to the core network.
RE-NWDAF	Roaming Exchange NWDAF	NWDAF with roaming exchange capability used as exchange point to exchange analytics and to collect input data for analytics with other PLMNs.
SCP	Service Communication Proxy	A new network function enabling dynamic scaling and management of communication and services in the 5G network. The SCP has a role similar to the Diameter Signaling Controller (DSC) in 4G.
SEPP	Security Edge Protection Proxy	Protects control plane traffic that is exchanged between different 5G operator networks.
SMF	Session Management Function	Handles management of UE sessions.
SMSF	Short Message Service Function	Supports the transfer of SMS over NAS.
TNGF	Trusted Non-3GPP Gateway Function	Enables the UE to connect to the 5G Core over WLAN access technology.
TSCTSF	Time Sensitive Communication Time Synchronization Function	TSCTSF controls the DS-TT(s) and NW-TT for the (g)PTP based time synchronization service. In addition, TSCTSF supports TSC assistance container related functionalities.
TSN AF	Time-Sensitive Networking Application Function	Stores the binding relationship between a port on UE/DS-TT side and a PDU Session during reporting of 5GS TSN bridge information. The TSN AF also stores the information about ports on the UPF/NW-TT side.
UAS-NF	Uncrewed Aerial Systems Network Function	Provides the UAS-specific NEF services to NF service consumers (e.g. AMF, SMF). The UAS-NF is functionality within the NEF.
TWIF	Trusted WLAN Interworking Function	A new 5G function for interoperability with legacy devices. Some devices may support 5G SIM authentication but do not support 5G NAS signaling over trusted Wi-Fi access. TWIF contains the NAS protocol stack and exchanges NAS messages with the AMF on behalf of these types of devices.
UCMF	UE radio Capability Management Function	Allows NF service consumers to create, update and delete UCMF dictionary entries for Manufacturer-assigned UE Radio Capability IDs.
UDM	Unified Data Management	Performs parts of the 4G HSS function.
UDR	Unified Data Repository	A converged repository of subscriber information that can be used to service a number of network functions.
UDSF	Unstructured Data Storage Function	Part of the UDM entity. Network Functions (NFs) can store/retrieve "unstructured" data from an Unstructured Data Storage Function (UDSF).
UE	User Equipment	Any device used directly by an end-user to communicate (a handheld phone, laptop etc.).
UPF	User Plane Function	A combination of the data plane parts of the SGW and PGW in 4G.
W-AGF	Wireline Access Gateway Function	Enables wireline access to the 5G Core.

NWDAF, Broadcast/Multicast, and Proximity Service Architectures and Interworking between 4G and 5G

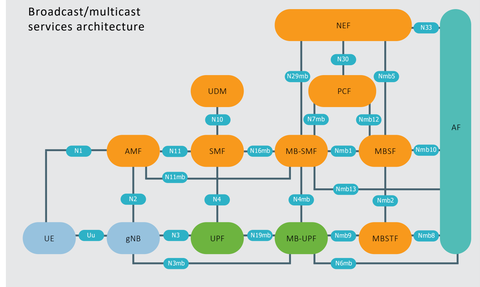
Non-roaming architecture for interworking between 4G EPC and 5G core



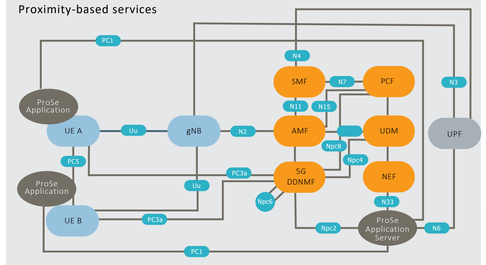
NWDAF analytics architecture



Broadcast/multicast services architecture



Proximity-based services



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