5G era network architecture - based on 3GPP release 15





Control plane protocol stacks between the 5G-AN and the 5G Core: N2





HeNB

User plane for S1-U interface for HeNB without HeNB GW

User plane and control plane protocol stacks between the UE and the 5GC







Control plane for S1-1: MME Interface for HeNB to MME without the HeNB GW

Glossary

Network elements

(R)AN	(radio) access network
5G-AN	5G access network
5G-BRG	5G broadband residential gateway
5GC	5G core network
5G-CRG	5G cable residential gateway
5G-EIR	5G equipment identity register
5G-GUTI	5G globally unique temporary identifier
5GLAN	5G local area network
5G-RG	5G residential gateway
5GS	5G system
5G-S-TMSI	5G S-temporary mobile subscription identifier
5QI	5G QoS identifier
AAA	Authentication authorization & accounting
AF	Application function
AMF	Access and mobility management function
AS	Application server
AS	Access stratum
ATSSS	Access traffic steering, switching, splitting
ATSSS-LL	ATSSS-low layer
AUC	Authentication center
AUSF	Authentication server function
BBERF	Bearer binding and event reporting function

BGCF	Breakout gateway control function
BSC	Base station controller
BSF	Binding support function
BSS	Base station subsystem
BTS	Base transceiver station
CAG	Closed access group
CAPIF	Common API framework for 3GPP northbound
	APIs
CBCF	Cell broadcast center function
CCS	Convergent charging system function
CDF	Charging data function
CGF	Charging gateway function
CHF	Charging function
CIOT	Cellular internet of things
СР	Control plane
CSCF	Call service control function
CSCF-I	Call session control function-interrogating
CSCF-P	Call session control function-proxy
CSCF-S	Call session control function-serving
CS-MGW	Circuit switch media gateway
CU	Control unit
DL	Downlink
DN	Data network
DNAI	DN access identifier

RCCE Breakout dateway control function

DNN	Data network name
DRX	Discontinuous reception
DU	Distributed unit
eAN	Evolved access network
EATF	Emergency access transfer function
EBI	EPS bearer identity
E-CSCF	Emergency call session control function
EIR	Equipment identity register
eNB	Evolved NodeB
eNodeB	Evolved NodeB
ePCF	Evolved policy control function
ePDG	Evolved packet data gateway
EPS	Evolved packet system
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
GGSN	Gateway GPRS support node
GMLC	Gateway mobile location center
GMSC	Gateway mobile switching center
GMSC-S	Gateway mobile switch center server
gNB	Next generation NodeB

PSI	Generic public subscription identifier
JAMI	Globally unique AMF identifier
.R ₹	Home location register
	Home routed (roaming)
SGW	HRPD serving gateway
SS CF	Home subscriber server
CF	Interconnection border control function
IS	IP multimedia subsystem
IS-AGW	IP multimedia subsystem access gateway
IS-MGW	IP multimedia subsystem media gateway
	Intelligent network
NEF	Intermediate network exposure function
-SM-GW	IP short-messaging gateway
DN	Integrated services digital network
SMF	Intermediate SMF
DN	Local area data network
10	Local breakout (roaming)
80 :S MF 8F	Client location services client
/IF	Location management function
	Location retrieval function
CX	Mission critical service
DBV	Maximum data burst volume
e EC	Mobile equipment
EC	Multi-access edge computing



	Interface between IBCF & TrGW	N5g-ei
	Interface between TrGW & TrGW belonging to a	N6
	different IM CN subsystem network	N7
	Interface between LRF & LCS client	N8
	Interface between I-CSCF & AS	N9
	Interface between CS-MGW & IDSN/PSTN	N10
	MGW & MRFP	N11
	Reference point between MSCs or TSCs and its	N12
(controlled MGws	N13
	Interface between MGCF & I,S-CSCF	
	Interface between CSCF & BGCF	N14
	Interface between BGCF & MGCF	N15
	Interface between BGCF/IMS ALG & BGCF	
	Interface between CSCF & IBCF	
	Interface between MCGF & IMS MGW	N16
	Interface between MRFC & MRFP	
	Interface between CSCF & MRFC, AS & MRFC	
	Interface between CSCF & CSCF	N16a
	Interface between CSCF/BGCF & IBCF	N17
	Interface between UE & AMF. N3IWF & untrusted non-	N18
:	3GPP access	N19
	Reference point between the (R)AN and the AMF	
	Reference point between the (R)AN and the UPF	N20
	Reference point between the SMF and the UPF	N21

Inter	faces	F	Reference point between MSC and EIR
inter	lucco	G	Reference point between VLRs
Α	Reference point between MSC and BSC	Ga	Interface between MTG-IWF & CDF/CGF
Abis	Reference point between BTS and BSC in GSM, RIT &	Gc	Interface between HLR & GGSN
	BSC in CDMA	Gd	Interface between SMS-GMSC/SMS-IWMSC & S
A3	Interface between BSC & BSC	Ge	The Ge is an interface between the gprsSSF enti
A7	Interface between BSC & BSC		in SGSN and the gsmSCF entity in SCP. It is used
A8	Interface between BSC & HSGW		handle CAMEL dialogues using the CAP protoco
A9	Interface between BSC & HSGW		(supported by Wireshark).
A10	Interface between MSC/VLR & HSGW	Gf Gi	Interface between EIR & SGSN
A11	Interface between MSC/VLR & HSGW	Gi	Reference point between GGSN and external pace
В	Reference point between MSC and VLR		data network such as the internet
CAP	Interface between CS-MGW & IDSN/PSTN	Gm	Interface between UE & P-CSCF
CIOT-Um	CIOT radio interface between the mobile and the radio	Gn	Carries signaling and data traffic between GSNs
_	access network - GSM		GTP protocol
CIOT-Uu	CIOT radio interface between the mobile and the radio	Gp	Carries signaling and GTP traffic between GSNs
	access network - UMTS & LTE		different PLMNs
CPRI	Interface between baseband & radio	Gr	Interface between SGSN and HLR
Cr	Interface between MRFC & AS	Gs	An interface between SGSN and MSC/VLR for PS
Сх	Interface between I/S-CSCF & HSS		CS interoperability. Using the Gs interface for BS
D	Reference point between VLR and HLR		procedures to perform combined GPRS/IMSI att
Dh	Interface between AS & SLF		combined location updates and page the subscr
Dx	Interface between I-CSCF & SLF		using PS facilities.
E	Reference point between MSCs or TSCs	Gw	Interface between PFDF & PCEF
eCPRI	Interface between baseband & radio	GwN	Interface between PFDF & TDF

G Reference point between VLRS					
Ga	Interface between MTG-IWF & CDF/CGF				
Gc	Interface between HLR & GGSN				
Gd	Interface between SMS-GMSC/SMS-IWMSC & SGSN				
Ge	The Ge is an interface between the gprsSSF entity				
	in SGSN and the gsmSCF entity in SCP. It is used to				
	handle CAMEL dialogues using the CAP protocol				
	(supported by Wireshark).				
Gf	Interface between EIR & SGSN				
Gi	Reference point between GGSN and external packet				
	data network such as the internet				
Gm	Interface between UE & P-CSCF				
Gn	Carries signaling and data traffic between GSNs using				
	GTP protocol				

 GTP protocol

 Cprices signaling and GTP traffic between GSNs in different PLMNs

 Gr
 Interface between SGSN and HLR

 Gs
 An interface between SGSN and MSC/VLR for PS/

CS interoperability. Using the Gs interface for BSSAP+ procedures to perform combined GPRS/IMSI attaches, combined location updates and page the subscriber IuPS using PS facilities. Interface between PFDF & PCEF GwN Interface between PFDF & TDF

Gx It provides transfer of (QoS) policy and charging rules from PCRF to policy and charging enforcement

	rules normal of to policy and enarging enforcement
	function (PCEF) in the PDN GW.
Gxa	Interface between PCRF & WAG
Gxc	Interface between PCRF & BBERF
Gxx	Interface between PCRF & BBERF
Gy	Interface between PCEF/GGSN & OCS
Gyn	Interface between OCS & TDF
Gz	Interface between OFCS & GGSN
Gzn	Interface between OFCS & TDF
H	Reference point between HLR and AuC
14	Interface between E-CSCF & EATF
lci	Interface between IBCF & internet
INAP	Intelligent network application protocol
lq	Interface between IMS-ALG & IMS AGW
IS41	Interface between HLR & HSGW
ISC	Interface between S-CSCF & AS
ISUP	Interface between CS-MGW & IDSN/PSTN
lub	Interface between an RNC and a Node B
luCS	Reference point between the circuit switched core
	network (via MGw) and the IMTS radio network
luPS	Interface between the UTRAN (RNC) and the packet
	switched core network (SGSN)
lur	Interface between the two RNCs (used for switching calls
	that had have been deal as a formation and DNO to the athers)

that had been handed over from one RNC to the other) N5 Reference point between the PCF and an AF

7	Home Touleu (Toanning)
SGW	HRPD serving gateway
SS	Home subscriber server
CF	Interconnection border control function
IS	IP multimedia subsystem
IS-AGW	IP multimedia subsystem access gateway
IS-MGW	IP multimedia subsystem media gateway
	Intelligent network
NEF	Intermediate network exposure function
-SM-GW	IP short-messaging gateway
DN	Integrated services digital network
SMF	Intermediate SMF
ADN .	Local area data network
30	Local breakout (roaming)
S AF	Client location services client
	Location management function
RF	Location retrieval function
СХ	Mission critical service
DBV E EC	Maximum data burst volume
E	Mobile equipment
EC	Multi-access edge computing

N5g-eir Service-based interface ex Reference point between Reference point between

N21 Reference point between SMSF and ODM N22 Reference point between AMF and NSSF

5G SA model*

E-UTRAN NR Dual Connectivity (EN-DC)



User plane protocol stacks

				PDU Laye	r
	elay GTP-U	GTP-U	day GTP-U	GTP-U	
5G-AN protocol	UDP/IP	UDP/IP	UDP/IP	UDP/IP	
layers	L2	L2	L2	L2	
	L1	L1	L1	L1	
56	-AN	U	PF	UPF (PDU Session Ar	nchor)
	N User plane pr			N9	Ne
n •	User plane pr g-eNB SDAP			N9	N
n 	User plane pr g-eNB SDAP NR PDCP			N9	Ne
n ←───→ +───→	User plane pr g-eNB SDAP			N9	Né
n ++ ++	User plane pr g-eNB SDAP NR PDCP			N9	Ne

Fronthaul functional split



eNB/gNB functional split

	0	2
	PDCP	PDCP
	RLC	RLC
BBU	MAC	MAC
	PHY	PHY _P
т		PHY
RRH	RF	RF

	Maximum flow bit rate	Non-3GPP	Networks not defined by 3GPP i.e. a Wi-Fi,	PEI	Permanent equipment identifier	SA NR	Standalone new radio
	Media gateway control function	Network	and DSL network	PER	Packet error rate	SAE	System architecture evolution
	Media gateway	NPN	Non-public network	PFD	Packet flow description	SBA	Service-based architecture
	Mobile initiated connection only	NR	New radio	PFDF	Packet flow description function	SBI	Service-based interface
	Mobility management entity	NRF	Network repository function	PGW-C	Packet gateway control plane	SCEF	Service capability exposure f
	Multimedia priority service	NSI ID	Network slice instance identifier	PGW-U	Packet gateway user plane	SCP	Service control point
	Multipath TCP protocol	NSS	Network switching subsystem	PLMN	Public land mobile network	SCP	Service communication proxy
	Media resource broker	NSSAI	Network slice selection assistance information	PPD	Paging policy differentiation	SCS	Subcarrier spacing
	Multimedia resource function controller	NSSF	Network slice selection function	PPF	Paging proceed flag	SD	Slice differentiator
	Multimedia resource function processor	NSSP	Network slice selection policy	PPI	Paging policy indicator	SEAF	Security anchor functionality
	Mobile station	NWDAF	Network data analytics function	PSA	PDU session anchor	SEPP	Security edge protection prox
	Mobile switch center server	OCS	Online charging system	PSTN	Public switched telephone network	SGSN	Serving GPRS support node
	Machine type communication	OFCS	Offline charging system	QFI	QoS flow identifier	SGW	Signaling gateway
/F	Interworking function	OSS	Operations support system	QoE	Quality of experience	S-GW	Serving gateway
	Non-3GPP interworking function	OSS-RC	Operations support system RC	RAN	Radio access network	SIM	Subscriber identification mod
	Network access identifier	PCC	Policy and charging control	RCAF	RAN congestion awareness function	SLF	Subscription locator function
	NodeB UMTS	PCEF	Policy and charging enforcement function	RG	Residential gateway	SME	Short message entity
	Network exposure function	PCF	Policy control function	RIT	Radio interface technology	SMF	Session management function
	Network function	PCRF	Policy charging and rules function	RNC	Radio network controller	SMSF	Short message service funct
	Next generation application protocol	PCU	Packet control unit	RNS	Radio network subsystem		SMS gateway mobile services
}	Next generation evolved NodeB	PDN GW	Public data network gateway	RQA	Reflective QoS attribute	SMS-IWMSC	SMS interworking mobile ser
CU		PDR	Packet detection rule	RQI	Reflective QoS indication		center
DU	Next generation evolved NodeB distributed unit	PDSN	Packet data serving node	RSN	Redundancy sequence number	SN	Sequence number
	Network identifier	PDU	Protocol data unit	RU	Radio unit	SNPN	Stand-alone non-public netwo

3A	Service-based architecture
31	Service-based interface
EF	Service capability exposure function
P	Service control point
P	Service communication proxy
CP CP CS	Subcarrier spacing
	Slice differentiator
AF	Security anchor functionality
PP	Security edge protection proxy
SSN	Serving GPRS support node
SW	Signaling gateway
GW	Serving gateway
М	Subscriber identification module
.F	Subscription locator function
ΛE	Short message entity
٨F	Session management function
/ISF	Short message service function
	SMS gateway mobile services switching center
/IS-IWMSC	SMS interworking mobile services switching
	center
1	Sequence number
NPN	Stand-alone non-public network

	Information
SPR	Subscription profile repository
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
TDF	Traffic detection function
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
TrGW	Transition gateway
TSC	Time sensitive communication
TSN	Time sensitive networking
TSP	Traffic steering policy
TSSF	Traffic steering support function
TTG	Tunnel termination gateway
UDM	Unified data management
UDR	Unified data repository
UDSF	Unstructured data storage function
UE	Use equipment

S5

S5-U

S6a

S6n S6t

S-NSSAI Single network slice selection assistance



Service-based interface exhibited by 5G-EIR	R N23	Reference point between PCF and NWDAF	N51i	Reference point between AMF and I-NEF	Nwu
Reference point between the UPF and a dat	ta network N24	Reference point between the PCF in the visited	N52	Reference point between NEF and UDM	
Reference point between the SMF and the F	PCF	network and the PCF in the home network	N53	Reference point between NEF and I-NEF	Rc
Reference point between the UDM and the	AMF N25	Reference point between UDR and PCF	N55	Reference point between UCMF and AMF	Rf
Reference point between two UPFs	N26	Inter-CN interface between the MME and 5GS AMF for	N56	Reference point between UCMF and NEF	Ro
Reference point between the UDM and the S	SMF	interworking between EPC and the NG core	N57	Reference point between UCMF and AF	Rx
Reference point between the AMF and the S	SMF N27	Reference point between the NRF in the visited	N58	Reference point between AF and NEF	
Reference point between the AMF and the A	AUSF	network and the NRF in the home network	Naf	Service-based interface exhibited by AF	S1-C
Reference point between the UDM and auth	nentication N28	Reference point between PCF and CHF	Namf	Service-based interface exhibited by AMF	S1-MME
server function the AUSF	N29	Reference point between NEF and SMF	Nausf	Service-based interface exhibited by AUSF	
Reference point between two AMFs	N29i	Reference point between I-NEF and SMF in the VPLMN	Nb	Reference point between two media gateways	S1-U
Reference point between the PCF and the A	MF in non- N30	Reference point between NEF and PCF	Nc	Reference point between MSCs or TSCs	_
roaming scenario, PCF in the visited networ	rk and AMF N31	Reference point between the NSSF in the visited	Nchf	Service-based interface exhibited by CHF	_
in roaming scenario		network and the NSSF in the home network	Nnef	Service-based interface exhibited by NEF	_
Reference point between two SMFs (in roar	ming N32	Reference point between the SEPP in the visited	Nnrf	Service-based interface exhibited by NRF	_
scenario between the SMF in the visited net	twork and	network and the SEPP in the home network	Nnssf	Service-based interface exhibited by NSSF	S2a
the SMF in the home network)	N33	Reference point between NEF and AF	Nnwdaf	Service-based interface exhibited by NWDAF	S2b
Reference point between SMF and I-SMF	N34	Reference point between NSSF and NWDAF	Np	Interface between RCAF & PCRF	S3
Reference point between AMF and 5G-EIR	N35	Reference point between UDM and UDR	Npcf	Service-based interface exhibited by PCF	
Reference point between any NF and UDSF		Reference point between PCF and UDR	Nsmf	Service-based interface exhibited by SMF	_
Reference point between two PSA UPFs for	r 5G N37	Reference point between NEF and UDR	Nt	Interface between PCRF & SCEF	_
LAN-type service	N38	Reference point between I-SMFs	Nu	Interface between PFDF & SCEF	S4
Reference point between SMSF and AMF	N40	Reference point between SMF and the CHF	Nudm	Service-based interface exhibited by UDM	_
Reference point between SMSF and UDM	N50	Reference point between AMF and CBCF	Nudr	Service-based interface exhibited by UDR	
Reference point between AMF and NSSF	N51	Reference point between AMF and NEF	Nudsf	Service-based interface exhibited by UDSF	

/u	Interface between N3IWF & untrusted non-3GPP
	access
	Interface between AS & MRB

- Interface between CSCF & OFC Interface among AS, MRFC, S-CSCF The Rx reference point resides between the AF and the S5-C PCRF Between eNB and MME/S-GW control plane IME Reference point for the control plane protocol between
- E-UTRAN and MME Between eNB and MME/S-GW user plane, reference point between E-UTRAN and the serving GW for the per bearer user plane tunneling and inter-eNodeB path switching during handworer. S1-U does not apply to control plane CloT EPS optimization. Interface between PDN GW & SGW Interface between PDN GW & ePDG Caulto and the state of the state of
- Enables user and bearer information exchange for inter-3GPP access network mobility in idle and/or active state. This reference point can be used intra-PLMN or inter-PLMN (e.g., in the case of inter-PLMN HO). It provides related control and mobility support
- between GPRS core and the 3GPP anchor function of the serving GW. In addition, if direct tunnel is not established, it provides user plane tunneling.
- It provides user plane tunneling and tunnel management between the serving GW and PDN GW. It is used for serving GW relocation due to UE mobility and if the serving GW needs to connect to a non-collocated PDN GW for the required PDN connectivity. It provides user plane tunneling and tunnel management between serving GW and PDN GW (control plane). It is used for serving GW relocation due to UE mobility and if the serving GW needs to connect
- to a non-collocated PDN GW for the required PDN S10 connectivity. It provides user plane tunneling and tunnel management between the serving GW and PDN GW (user plane). It is used for serving GW relocation due to UE mobility and if the serving GW needs to connect to a non-collocated
- PDN GW for the required PDN connectivity. It enables transfer of subscription and authentication data for authenticating/authorizing user access to the evolved system (AAA interface) between MME and
- Interface between AAA server/proxy & PDN GW Interface between MTG-IWF & HSS Interface between MTC & HSS or respectively S12 is an opera S13 Enables UE ide Interface between HSS & SCEF
- PCRF in the VI (QoS) policy a the home PC support local l Reference poi and MME-to-M point can be the case of int Reference poi and serving G plane CloT El provides user Reference poi user plane tun It is based on







- 2 New split option 7 (eCPRI)
- **3** New split option 2

*NON-ROAMING ARCHITECTURE FOR INTERWORKING

	eHRPD	Evolved high-rate packet data	BSSAP	Base station subsystem application part	L2RCOP	Layer 2 relay character oriented protocol
ssifier	GPRS	General packet radio service	BSSGP	Base station system GPRS protocol	LAPD	Link access procedure, D channel
e function	GSM	Global system for mobile	BTSM	Base transceiver station management	LLC	Logical link control
ble low latency communication	UMTS	Universal mobile telecommunications system	CAMEL	Customized application for mobile network	M2UA/M3U	A MTP2 user adaptation/MTP3 user adaptatio
ability request parameter for AMF	LTE	Long-term evolution		enhanced logic	MAC	Media access control
selection policy	EPC	Evolved packet core	CAP	CAMEL application part	MAP	Mobile application part
oscriber identification module	IMS	IP multimedia subsystem	CC	Call control	MEGACO	Media gateway control protocol
ntifier	5G-NR	Fifth generation new radio	CODEC	Coder-decoder	MM	Mobility management
al area network	5G-SA	5G standalone	CPCHFP	Common packet channel framing protocol	MTP	Message transfer part
ation register	5G-NSA	5G non-standalone	DCHFP	Dedicated channel framing protocol	MTP1/2/3	Message transfer part level 1/2/3
licy charging and rules function	WCDMA	Wide code division multiple access	DIAMETER	Authentication, authorization and accounting	NBAP	NodeB application part
G access network	WLAN	Wireless local area network		protocol	NNI	Network node interface
BF access network	M2M	Machine to machine	DSCHFP	Downlink shared channel framing protocol	NS	Network service
G cable access network	MIOT	Mobile internet of things	EDCHFP	Enhanced dedicated channel framing protocol	PCHFP	Paging channel framing protocol
ss gateway	NB-IoT	Narrowband IoT	FACHFP	Forward access channel framing protocol	PDCP	Packet data convergence protocol
ccess gateway function			GMM	GPRS mobility management	PMIP	Proxy mobile internet protocol
VLAN access point trusted	Proto		GTP	GPRS tunneling protocol	RACHFP	Random access channel framing protocol
) WLAN access point	FIULU		GTP-C	GPRS tunneling protocol control plane	RANAP	Radio access network application part
	AAL2/AAL	5 ATM adaptation layer type 2/type 5	GTP-U	GPRS tunneling protocol user plane	RLC	Radio link control
nologies	ALCAP	Access link control application protocol	HS-DSCHFF	P High-speed downlink shared channel framing	RLP	Radio linked protocol
noiogics	AMR	Adaptive multirate		protocol	RNSAP	Radio network subsystem application part
ion multiple access	ATM	Asynchronous transfer mode	INAP	Intelligent network application part	RR	Radio resource
it switch	BICC	Bearer independent carrier control	IP	Internet protocol	RRC	Radio resource control
et switch	BMC	Broadcast multicast control	ISUP	ISDN user part		
ference point providing user and control	S14	Interface between Ue & WLAN AP (trusted)	SWm l	nterface between ePDG & AAA		
the serving GW in the VPLMN and the		Interface between two SGSNs		nterface between untrusted non-IP access & ePDG		
HPLMN. S8 is the inter-PLMN variant of		Interface between PCF & MME		nterface between Ue & WLAN AP (untrusted)		
		Interface between MSC/VLR & MME		nterface between HSS & AAA		
een PCRF in the HPLMN (H-PCRF) &		Interface between HSGW & S-GW		nterface between PCRF & OCS		
DI MNI (V. DODE) It provides trapefor of		Interface between HSGW & S-GW		nterface between PCRF & UCS		

S8	Inter-PLMN reference point providing user and control	S14	Interface between Ue & WLAN AP (trusted)	SWm	Interface between ePDG & AAA
	plane between the serving GW in the VPLMN and the	S16	Interface between two SGSNs	Swn	Interface between untrusted non-IP access & ePDG
	PDN GW in the HPLMN. S8 is the inter-PLMN variant of	S101	Interface between PCF & MME	Swu	Interface between Ue & WLAN AP (untrusted)
	S5.	S102	Interface between MSC/VLR & MME	SWx	Interface between HSS & AAA
S9	Interface between PCRF in the HPLMN (H-PCRF) &	S103	Interface between HSGW & S-GW	Sy	Interface between PCRF & OCS
-	PCRF in the VPLMN (V- PCRF). It provides transfer of	SBc	Reference point between CBC and MME for warning	Sy T4	Interface between SMS-GMSC/SMS-IWMSC & MTG-
	(QoS) policy and charging control information between		message delivery and control functions.		IWF
	the home PCRF and the visited PCRF in order to	Sd	Interface between PCRF & TDF	T6a	Interface between the MME and the SCEF
	support local breakout function.	SGd	Interface between SMS-GMSC/SMS-IWMSC & MME	T6b	Interface between the SGSN and the SCEF
S10	Reference point between MMEs for MME relocation	Sgi	It is the reference point between the PDN GW and the	T8	Reference point for northbound application
	and MME-to-MME information transfer. This reference	•	packet data network. The packet data network may		programming interfaces (APIs), SCS & SCEF
	point can be used intra-PLMN or inter-PLMN (e.g., in		be an operator external public or private packet data	Tsms	Interface between SMS-GMSC/SMS-IWMSC & SME
	the case of inter-PLMN HO).		network or an intra-operator packet data network, e.g.,	Tsp Um	Interface between MTC-IWF & SCS
S11	Reference point providing control plane between MME		for provision of IMS services. This reference point	Um	Reference point between MS and BTS
	and serving GW. In addition, in order to support control		corresponds to Gi for 3GPP accesses.	ut	Interface between UE & AS
_	plane CIoT EPS optimization, the S11-U reference point	SGs	The SGs interface is an optional interface between a	Uu	Radio resource control (RRC)
	provides user plane between MME and serving GW.		2G (GERAN)/3G (UTRAN) MSC and an LTE/EPC MME.	V1-C	Between eNB-DU and eNB-CU control plane
S12	Reference point between UTRAN and serving GW for	Sh	Interface between AS (SIP AS or OSA CSCF) & HSS	V1-U	Between eNB-DU and eNB-CU user plane
	user plane tunneling when direct tunnel is established.	SIP	Interface between CS-MGW & IDSN/PSTN	X2	Interface between eNodeB & eNodeB
	It is based on the lu-u/Gn-u reference point using the	Sp	Interface between PCRF & SPR	Xn-C	Interface between Ng-eNB-CU & eNB-CU
	GTP-U protocol as defined between SGSN and UTRAN	St	Interface between TSSF & PCRF	Xn-U	Interface between Ng-eNB-CU & eNB-CU
_	or respectively between SGSN and GGSN. Usage of	Sta	Interface between HSS/AAA & WAG	Y1	Interface between UE & untrusted non-3GPP access
	S12 is an operator configuration option.	SV	Interface between the mobility management entity	Y2	Interface between N3IWF & untrusted non-3GPP
S13	Enables UE identity check procedure between MME		(MME) or serving GPRS support node (SGSN) and		access
	and EIR.		3GPP MSC server enhanced for SRVCC		

Reference poster 5G era network architecture



EXFO





Multi-technology network poster

SC.

based on 3GPP release 15

2.

