

# YateUCN5G

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## **YateUCN5G - Unified Core Network solution for GSM/3G/LTE and 5G SA/NSA**

### **Unified 5G/EPC core network**

The YateUCN5G is a unified core network solution intended for new 5G SA / NSA networks combined with LTE networks.

The YateUCN software-defined core implements all the functions and protocols of the LTE core network in software, and uses commodity hardware. It integrates the EPC layers MME, S-GW, P-GW, and PCEF.

It communicates with the 5G gNodeB using NGAP/GTP and LTE eNodeB over S1AP/GTP protocols and uses a JSON API for configuration and management.

### **Remote access for operations and management**

YateUCN5G is easy to operate and manage remotely using the Yate Mobile Management Interface (MMI) online. The interface makes it accessible to add a new YateUCN5G unit, to setup a cluster of YateUCN5Gs, to configure a single YateUCN5G function (SGW, PGW, SMF, AMF, UPF, SMSF), to configure YateUCN5G equipment with all its 5G SA/5G NSA/LTE functions and more. With YateMMI operators can remotely manage their entire network equipment using a single web interface.

## Features & benefits

- ✓ The YateUCN runs on commodity hardware, allowing for a simplified network architecture and lower deployment costs.
- ✓ Enables carriers to deploy LTE networks with reduced initial investment
- ✓ Allows for scaling as you go. You can add more servers or separate the functionality as more users adopt your service.
- ✓ Increases network resiliency; in case of equipment failure you can easily configure another server to take up the functions of the fault node.
- ✓ The SIP protocol establishes connection between the YateUCN and the YateBTS, allowing the SatSite base station to communicate with any YateUCN in the network. A Base Station Controller (BSC) is not needed between the YateBTS- powered SatSite and the YateUCN
- ✓ Has low idle traffic, which allows transport technologies like satellite

## Components

### API Interface

All 5G Core components support CAPIF to implement the Service Based Architecture.

- HTTP/2 support by default
- HTTP/2 over TLS (needs a proper certificate installed)
- Configurable support for HTTP/2 over TCP without upgrade
- Configurable support for HTTP/1 for test purposes

## AMF

Provides management of UE mobility

CAPIF interfaces	Direction	Interface	Node
Namf_Communication	Incoming	N11	SMF
		N20	SMSF
Nausf_UEAuthentication	Outgoing	N12	AUSF
Nudm_UEContextManagement	Outgoing	N8	UDM
Nudm_SubscriberDataManagement	Outgoing	N8	UDM
Nsmf_SMSService	Outgoing	N20	SMSF
Nsmf_PDUSession	Outgoing	N11	SMF
		N11	V-SMF
<b>Non-API</b>			
5G NAS	Bidir	N1	UE
NGAP	Bidir	N2	gNB

## SMF

- Provides management of user data sessions
- Can work as standalone SMF, V-SMF or H-SMF

CAPIF interfaces	Direction	Interface	Node
Nsmf_PDUSession	Incoming	N11	AMF
		N16	V-SMF
Nsmf_PDUSession	Outgoing	N16	H-SMF
Nudm_SubscriberDataManagement	Outgoing	N8	UDM

## SMSF

Provides support for SMS transfer over 5G NAS

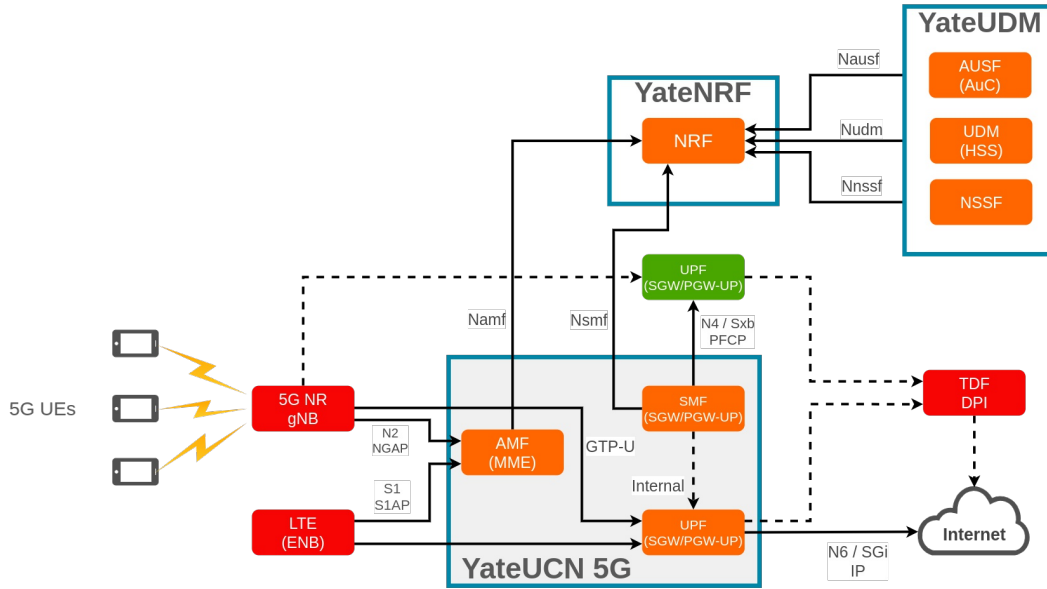
CAPIF interfaces	Direction	Interface	Node
Nsmsf_SMSservice	Incoming	N20	AMF
Nudm_UEContextManagement	Outgoing	N21	UDM
Nudm_SubscriberDataManagement	Outgoing	N21	UDM
Namf_Communication	Outgoing	N20	AMF
<b>Non-API</b>			
GSM/MAP SMS transfer	Bidir	MAP	E SMSC

## UPF

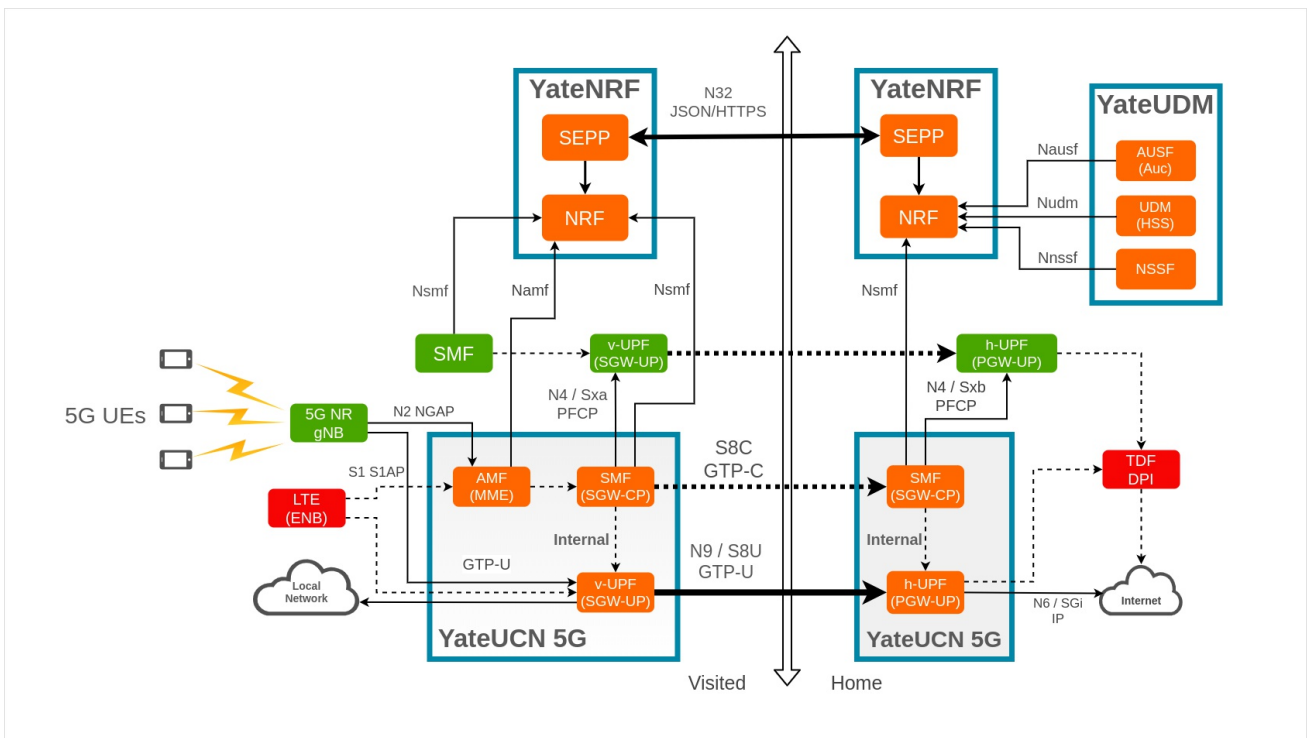
- Provides handling of user plane data
- Can work as standalone UPF, V-UPF or H-UPF
- Internal control interface, no external interface is implemented

<b>Non-API</b>			
GTP-U RAN	Bidir	N3	gNB
GTP-U Home Routed	Bidir	N9	UPF
IP	Bidir	N6	Data Services

### 5G Core network Non-Roaming diagram



### 5G Core network Roaming diagram



## Software Specifications

SS7 connectivity	<ul style="list-style-type: none"> <li>• SIGTRAN, SCTP with CRC checksum</li> <li>• M2UA, M2PA, M3UA</li> <li>• ITU MTP, SCCP, TCAP</li> <li>• ANSI MTP, SCCP</li> <li>• ITU MAP v3</li> <li>• CAMEL phase 2</li> </ul>
Voice interconnect	<ul style="list-style-type: none"> <li>• SIP and RTP</li> <li>• ISUP using external MGCP gateway</li> </ul>
SCCP GTT	<ul style="list-style-type: none"> <li>• E.212 (ANSI)</li> <li>• E.214 (ITU) translation table</li> <li>• E.164</li> </ul>
MME	<p>ETSI MAP v3</p> <p>S1AP r11</p> <p>GTP v1</p> <p>Supported operations:</p> <ul style="list-style-type: none"> <li>• MME &lt;-&gt; AuC messages (authentication)</li> <li>• MME &lt;-&gt; EIR messages (equipment identification, optional)</li> <li>• MME &lt;-&gt; HLR messages (data mobility management, roaming)</li> </ul>
SIP	<ul style="list-style-type: none"> <li>• Supported standards (RFC3261)</li> <li>• Registrar function</li> <li>• B2BUA for calls</li> <li>• RTP (RFC3550) with sideband DTMF (RFC2833)</li> <li>• SMS and USSD over IP</li> </ul>

Interfaces	<ul style="list-style-type: none"><li>• C Interface (MAP, HLR ↔ GMSC)</li><li>• D Interface (MAP, HLR ↔ VLR)</li><li>• E Interface (MAP, MSC ↔ MSC)</li><li>• S1 Interface (S1AP &amp; GTP, YateENodeB ↔ EPC)</li><li>• Gi Interface (IP, connects to Public Data Network)</li><li>• Gn/Gp Interface (GTP, SGSN and GGSN)</li><li>• Gr Interface (MAP, SGSN ↔ HSS)</li><li>• Gc Interface (GTP or SS7/MAP, interface to HLR) (optional)</li></ul>
SMS	<ul style="list-style-type: none"><li>• Format: SMS PDU (MO and MT)</li><li>• MAP/SS7 transport (T-PDU format)</li><li>• SIP MESSAGE transport (SMS over IP, R-PDU format)</li></ul>
CDR	<ul style="list-style-type: none"><li>• File format</li><li>• Rotation interval</li><li>• File transfer: FTP</li></ul>
CODECS and transcoders	<ul style="list-style-type: none"><li>• G.711a, G.711u</li><li>• GSM-FR 06.10</li><li>• iSAC</li><li>• iLBC</li></ul>
Operating system	Linux based