AGrandTech 5GC Product Description

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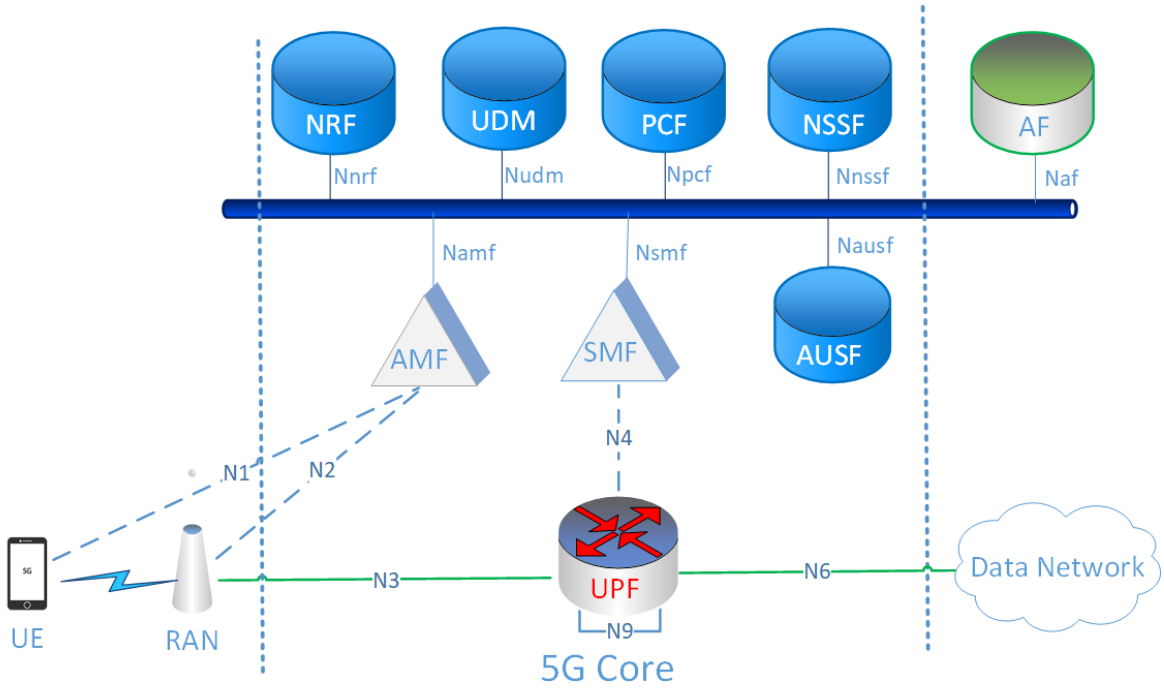
1 Product description

1.1 Introduction

The lightweight 5G core network (5GC) follows 3GPP technical specification recommendations and supports both Standalone (SA) and Non-Standalone (NSA) system architectures. 5G core network adopts new ICT technologies and adopts a service-oriented architecture to split network element functions into fine-grained network service function nodes, completely changing The 5G core network adopts a new ICT technology and adopts a service-oriented architecture to break down the network element functions into fine-grained network service function nodes, completely changing the equipment form of the past generations of core networks, which were dominated by point-to-point signaling control and a variety of services integrated and tightly coupled, into a software-based function form with distributed network functions instead of hierarchical nodes in the past. Virtualization (NFV) is the key technology to realize the cloud-based networking of 5G systems. Virtualization brings many benefits to the core network, such as being easy to expand, reduce capacity, upgrade, and cutover, which can greatly save resources, reduce maintenance difficulties and costs, and provide the possibility of compact and lightweight of core network equipment. The lightweight core network can be widely used in small and medium-sized telecom operators, government and enterprise private network users, universities and research institutes, rescue and disaster relief, emergency protection, etc.

1.2 Network structure



5G SA network structure

5GC includes NFs as follow:

1. AMF: Access and Mobility Management Function
2. SMF: Session Management Function
3. AUSF: Authentication Server Function
4. UDM: Unified Data Management
5. UPF: User plane Function
6. PCF: Policy Control Function
7. NSSF: Network Slice Selection Function
8. NRF: Network Repository Function

1.3 Network interface

1.3.1 Serivce interface

Service-based control plane network function can authorize other network function to access its services

Name	Description
Naf	AF function service interface
Namf	AMF function service interface
Nsmf	SMF function service interface
Nausf	AUSF function service interface
Nudm	UDM function service interface
Nupf	UPF function service interface
Npcf	PCF function service interface
Nnssf	NSSF function service interface
Nnrf	NRF function service interface

1.3.2 Service type

5GC supports businesses as follow:

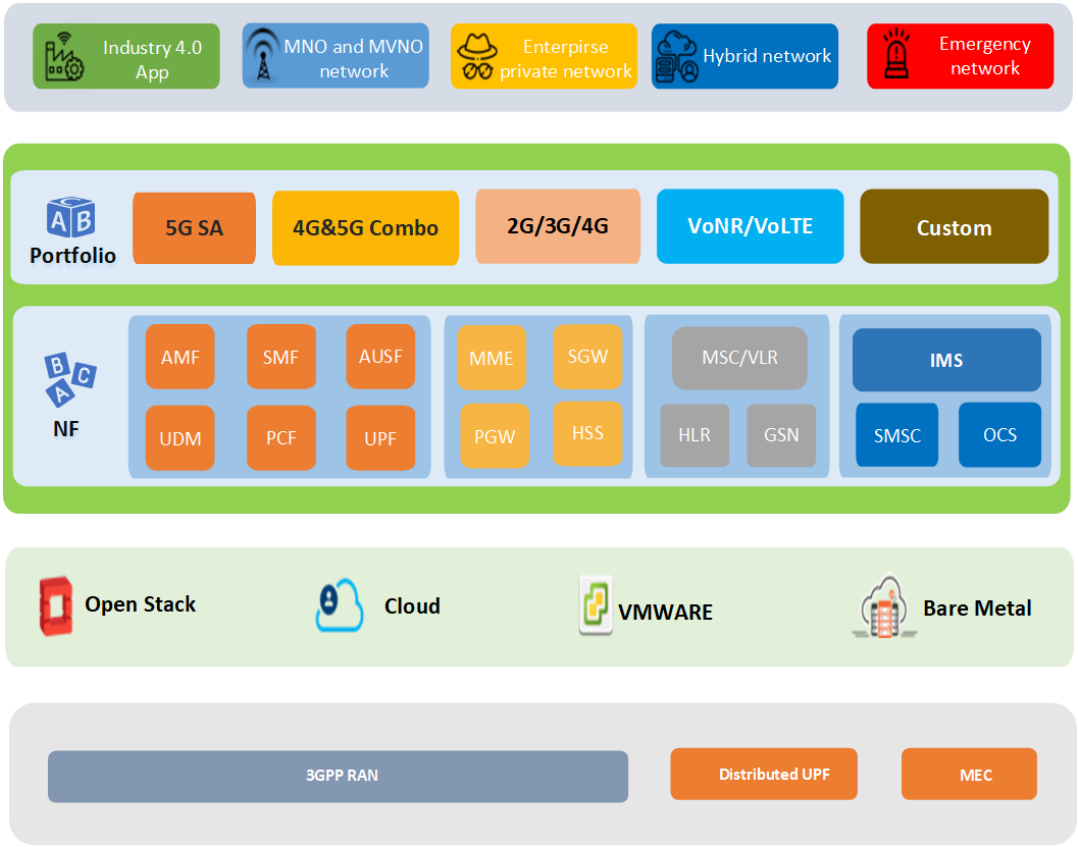
Service	Description
Data service	eMBB(enhanced Mobile Broadband) 5G UE upstream and downstream peak traffic: 240M/1.4Gbps
Voice call	VoNR(IMS as converged)
SMS service	VoNR(IMS as converged) or 5G SMS over NAS
Network slicing	Support policy control based on NSSAI (Network Slice Selection Assistance Information), location information, slice capacity, etc., intelligently select slices

1.4 Capacity

Feature	Description
Capacity	20000 subscribers 100 NodeBs
DNN	128
PDU/PFCP Session	40000
Data Throughput	Single UPF >= 10Gbps, Support Multi-UPF deployment

1.5 Lightweight and Virtualization

Agrandtech’s 5GC has cloud-native architecture, support cloud and virtualization deployment.



Agrandtech Converged Core Network Solution

1.6 Open and customized interface

Agrandtech's 5G core network supports open interfaces, which can achieve customized service, to better reflect 5G innovative applications to meet industry needs.

1.7 Tailoring of network functions

To simplify deployment and reduce unnecessary message interactions to improve the corresponding capabilities of the system, Agrandtech's lightweight 5G core network supports the co-location of 5G network elements and the tailoring of interfaces between network elements, including:

- AMF/AUSF joint establishment
- UDM/UDR/NSSF joint establishment
- SMF/PCF joint establishment

The interface between the network elements after the combination is called internally through the interface function, rather than through the HTTP message.

1.8 High reliability

Feature	Description
Redundant design	1+1 active and standby disaster recovery to ensure uninterrupted operation of the system Hot backup and smooth handover
Index requirements	Reliability and availability index requirements: Typical configuration system high availability HA ≥ 99% Mean time to repair MTTR ≤0.5h The success rate of main/standby switchover ≥ 95%

2 Hardware specification

A typical configuration recommendation for lightweight 5GC hardware specifications (5 NodeBs, 1000 subscribers).

Quantity	Hardware and software accessories parameters
1	PowerEdge R440 MLK mainboard
2	Intel Xeon E-4210 2.2GHz, 13.75M cache, 10C/20T, turbo (85W)
1	iDRAC Group Manager enable
1	3.5’ chassis with up to 4 hot-swappable hard drives and software RAID
1	PCIe Riser, 1x FH x8 PCIe Gen3 slot, 1x LP x4 PCIe Gen3 slot
1	PowerEdge R440 for 3.5-inch hard drive chassis
2	32GB 2666MT/s DDR4 ECC UDIMM
1	IDRAC9, Enterprise Edition
2	2TB 7.2K RPM SATA 6Gbps 512n 3.5-inch hot-swappable hard drive (RAID1)
2	Dell EMC PowerEdge SFP+ SR Optic 10GbE 850nm
1	Single hot plug power supply 350W
1	Power cord-C13, 2M, 250V, 10A
1	Intel X710 Dual Port 10GbE Direct Attach SFP+ Adapter, PCIe Full Height
1	Mainboard integrated LOM
1	Standard fan

The hardware resources are allocated as follows:

NF	Memory(G)	HD(G)	vCPU (Intel Xeon Silver and above, shareable)	Network port
AMF	8	100	4	1Gb electrical port*1 (all network elements share 1Gb electrical port)
SMF	8	100	4	1Gb electrical port*1 (shared)
AUSF	8	100	4	1Gb electrical port*1 (shared)
UDM/UDR	8	100	4	1Gb electrical port*1 (shared)
UPF	16	100	8	10Gb optical port*2 1Gb electrical port*1 (shared)
PCF	8	100	4	1Gb electrical port*1 (shared)
NSSF	4	100	4	1Gb electrical port*1 (shared)
NRF	4	100	4	1Gb electrical port*1 (shared)
EMS	4	400	4	1Gb electrical port*1 (shared)