Horizon Networks

Converged Core Network Family

- EPC Core for 4G LTE and 5G Non-Standalone
- 5G Core for 5G Standalone

Commercial Product Catalog



Horizon Networks

Two Core Products on a Shared Platform

- **EPC Core** — Packet core for 4G LTE and EPC-based 5G Non-Standalone, with 2G/3G packet-data interworking through an existing SGSN where required.
- **5G Core** — Service-based packet core for public and private 5G Standalone networks.
- **Shared Platform** — Kubernetes-based deployment and unified network management through Argus NMS.



EPC Core

4G LTE / 5G NSA

- Packet core for 4G LTE
- EPC-based 5G Non-Standalone (EN-DC)
- 2G/3G packet-data interworking via SGSN (where required)



5G Core

5G SA

- Service-based packet core (SBA)
- For public and private 5G Standalone networks



SGSN
(2G / 3G Packet Data)

Shared Platform

Cloud-Native Platform
Kubernetes-based Deployment

Argus NMS
Unified Network Management

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Choose the Core for Your Network

Deployment Objective	Core Product	Key Dependency
4G LTE — **Operate or expand LTE**	**EPC Core**	■ LTE RAN (eNB) and standard LTE devices.
4G LTE + 5G NR — **Add 5G NR using an LTE anchor**	**EPC Core** (with an agreed EN-DC profile)	■ LTE anchor (eNB) plus 5G NR (en-gNB) with EN-DC. ■ RAN support for the selected EN-DC option (e.g., Option 3 / 3a / 3x). ■ UE (device) support for EN-DC (LTE + NR).
5G SA — **Launch 5G Standalone**	**5G Core**	■ 5G NR RAN (gNB) with SA configuration. ■ UE (device) support for 5G SA (e.g., 3GPP Release 15+).
4G LTE + 5G SA — **Operate LTE and 5G SA in parallel**	**EPC Core** + **5G Core**	■ LTE RAN (eNB) and 5G NR RAN (gNB) in parallel. ■ Interworking between EPC and 5GC where required (e.g., mobility, policy, charging and subscriber data). ■ Devices supporting LTE and/or 5G SA.
Deploy a private mobile network	**EPC Core** or **5G Core**	■ Select EPC or 5GC based on the radio access (LTE or 5G NR), device ecosystem and service requirements (e.g., coverage, latency, slicing, mission-critical services).

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EPC Core for LTE and 5G NSA

Operate LTE packet services and introduce 5G NR through EPC-based Non-Standalone.

- LTE mobile broadband and fixed wireless access.
- EN-DC deployment profiles for Options 3, 3a and 3x.
- IMS-based VoLTE integration and cellular IoT support within the selected deployment scope.

Measured Throughput

≈150 Gbps

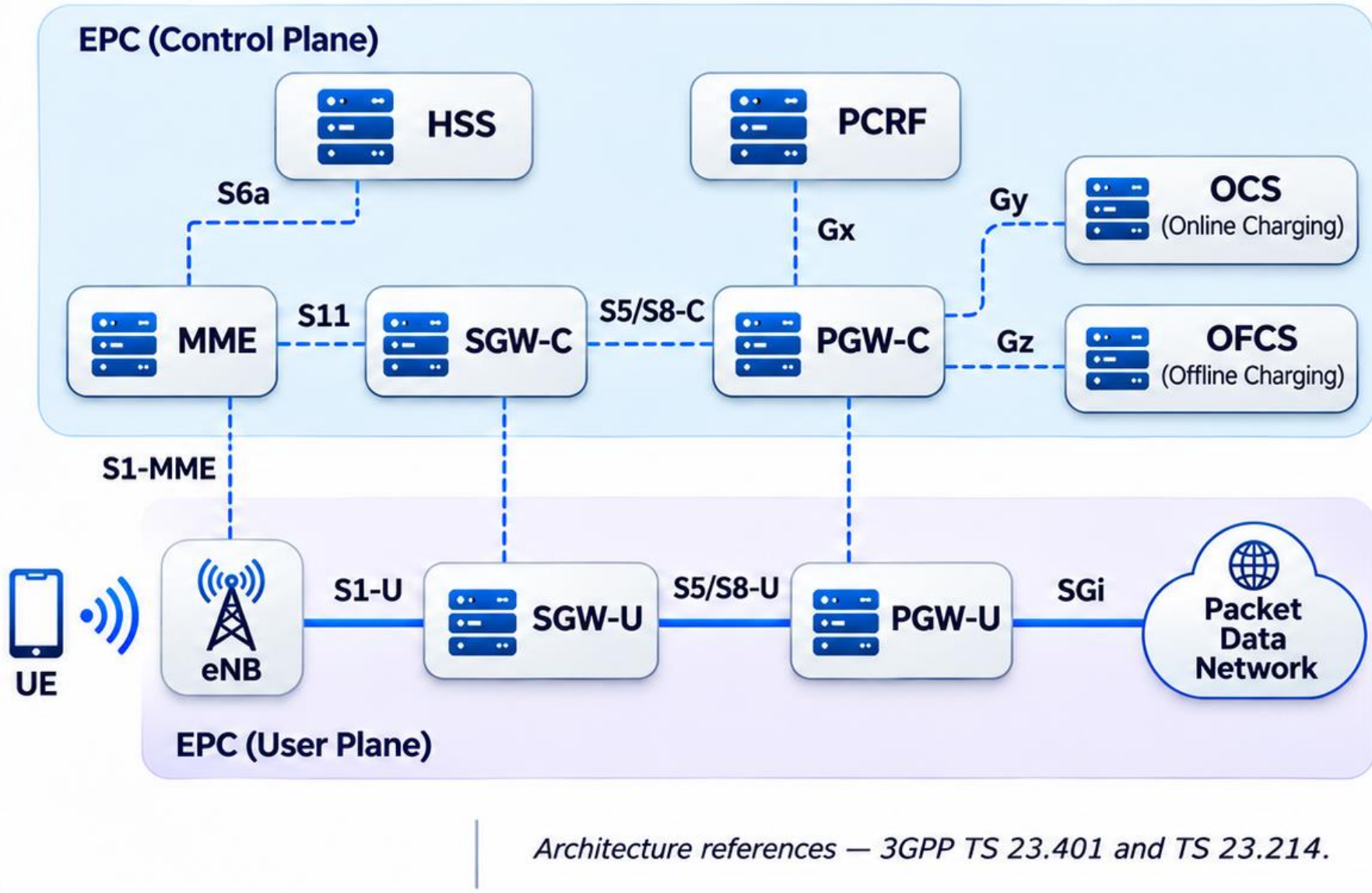
EPC user plane · Single Gen11 server



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EPC Reference Architecture

- **Mobility and subscriber management** — MME and HSS.
- **Session control and packet forwarding** — SGW-C/U and PGW-C/U.
- **Policy and signaling integration** — PCRF and Diameter routing where required.
- **Packet data network connectivity** — SGi access to external networks.
- **Charging** — OCS and OFCS. Online and offline charging (real-time and CDR-based).



Control Plane (Signaling)

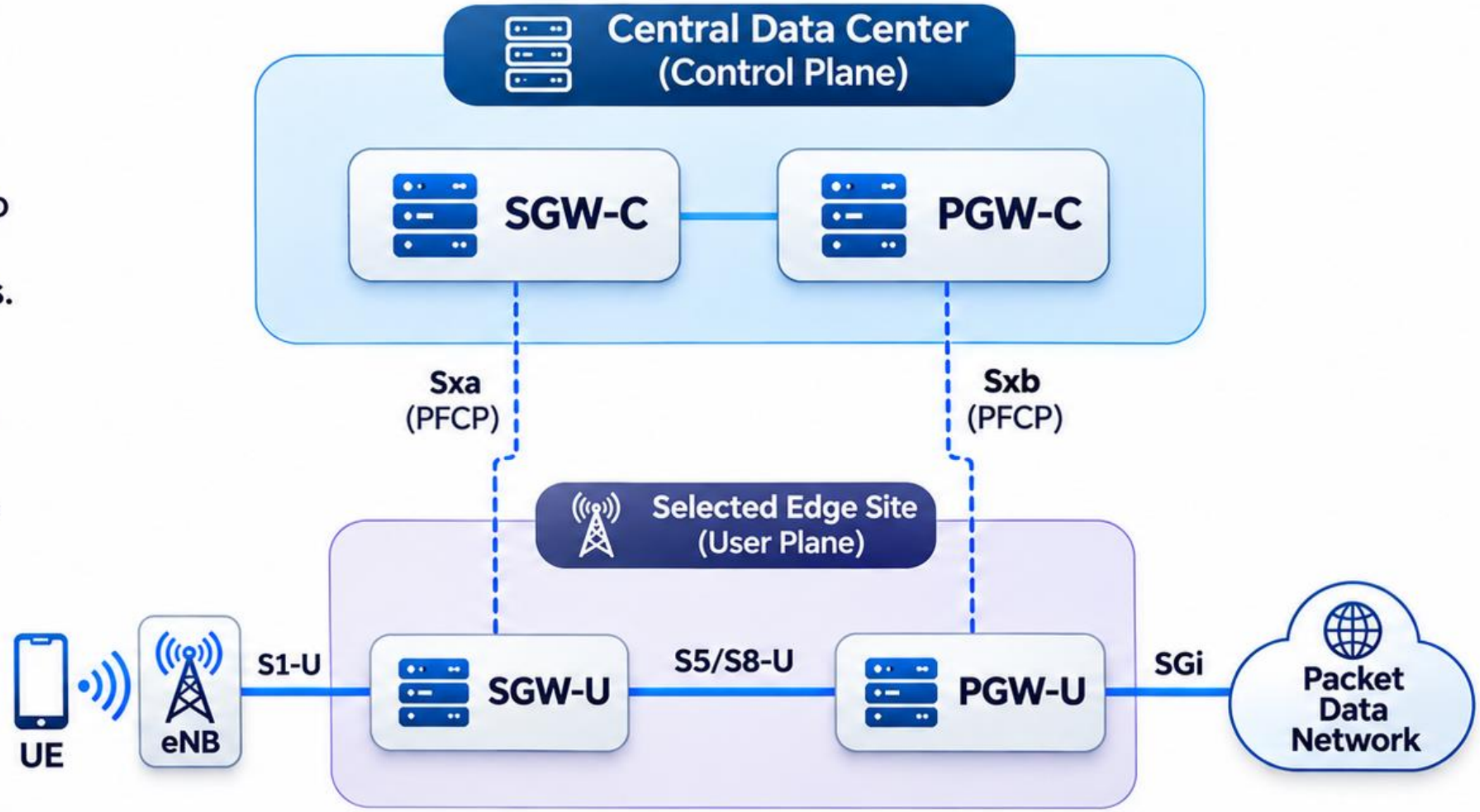
User Plane (User Data)

Architecture references — 3GPP TS 23.401 and TS 23.214.

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EPC CUPS and Distributed User Plane

- Size gateway control and packet forwarding independently.
- Use PFCP over Sxa and Sxb to control the respective gateway user-plane functions.
- Place SGW-U and PGW-U centrally or at selected edge sites according to traffic demand and transport design.
- Add user-plane instances as demand grows and validate aggregate capacity under the proposed topology.



Control Plane (PFCP)

User Plane (User Data)

Architecture references — 3GPP TS 23.214 and TS 29.244.

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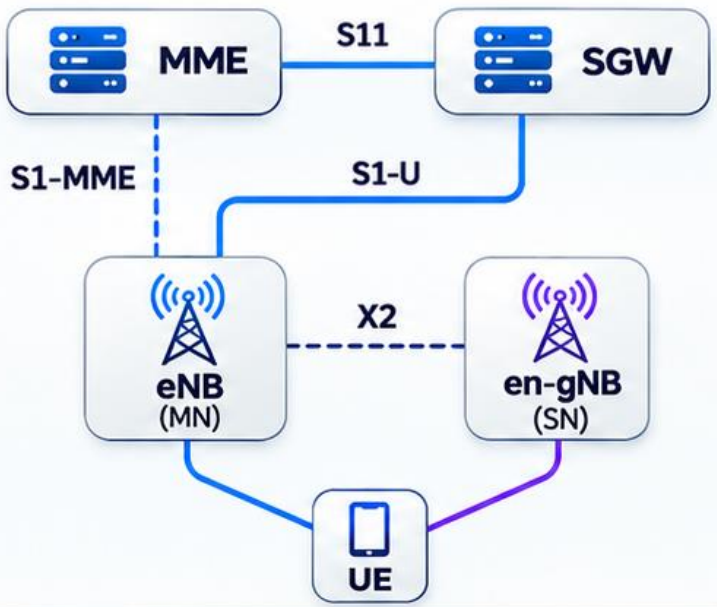
5G NSA with EN-DC

Introduce NR alongside an LTE anchor using the EPC.

- The LTE eNB acts as the Master Node and the en-gNB acts as the Secondary Node.
- S1-MME terminates at the LTE eNB.
- S1-U termination and bearer routing depend on the selected EN-DC option.

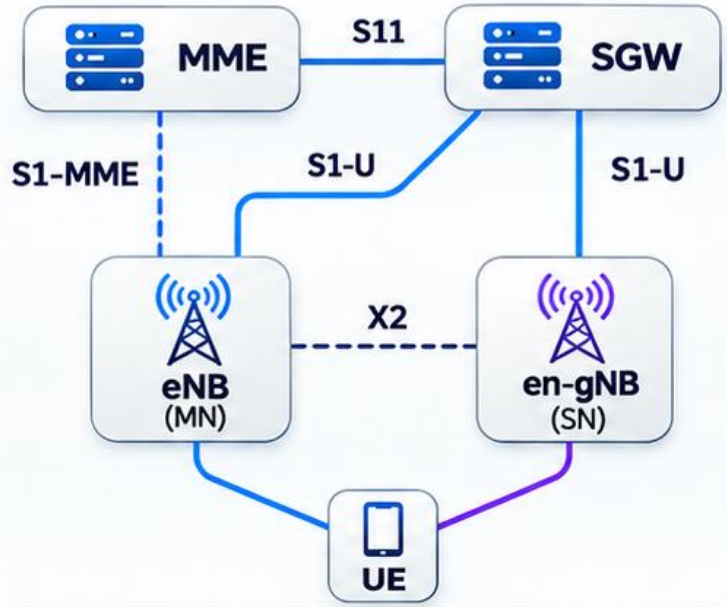
Option 3

Split bearer at eNB (Master Node)



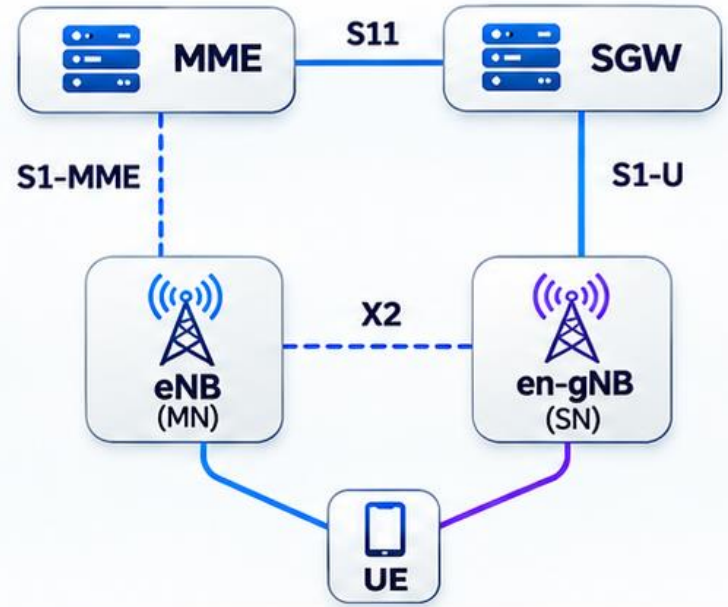
Option 3a

Separate S1-U to eNB and en-gNB



Option 3x

Split bearer at en-gNB (Secondary Node)



Control Plane (Signaling) — User Plane – LTE Bearer — User Plane – NR Bearer

Architecture reference — 3GPP TS 37.340.

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LTE Services and Integration

Service	EPC Contribution	External Dependency
 **Voice** IMS-based VoLTE	■ EPC bearer and session management (attach, default and dedicated bearers). ■ QoS and policy enforcement for voice (e.g., GBR).	■ **IMS** (P-CSCF/I-CSCF/S-CSCF, AS) for VoLTE call control and service delivery.
 **Cellular IoT** NB-IoT and LTE-M	■ Connectivity and mobility management for NB-IoT/LTE-M devices. ■ Support for IoT optimizations (e.g., PSM and eDRX) where supported.	■ **RAN** with NB-IoT/LTE-M capability (eNB/eNB+NR) and compatible IoT devices (e.g., Cat-NB1/NB2, Cat-M1/M2).
 **Policy and Charging** Policy control and service charging	■ PCRF-based policy control (Gx) for QoS, bandwidth and service rules. ■ Integration with online and offline charging (Gy/Gz) for usage and service events.	■ **PCRF** (policy and QoS control). ■ **Charging systems** — OCS (Gy, online) and OFCS (Gz, offline).
 **Roaming and Legacy Interworking** Roaming and 2G/3G interworking	■ Roaming support with Home-Routed (HR) and Local-Breakout (LBO) profiles. ■ Interworking with SGSN for 2G/3G packet data where required.	■ **Partner network** (visited operator) and roaming agreements (e.g., S8, S6a, Gx). ■ Inter-operator connectivity (IPX/GRX) for signaling and data.

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EPC Deployment Profiles





Public Mobile Networks

LTE expansion and EPC-based 5G NSA.

Key Prerequisite

LTE/NR RAN compatibility (eNB and en-gNB) and device support for EN-DC.



Fixed Wireless Access

LTE or NSA broadband for homes and businesses.

Key Prerequisite

Compatible FWA CPE (LTE or EN-DC) and suitable spectrum and coverage.



Private LTE

Dedicated connectivity for industrial sites and campuses.

Key Prerequisite

On-site or dedicated RAN (eNB) and enterprise integration (e.g., LAN/OT/IoT).



MVNO and Cellular IoT

Profiles tailored to subscriber, policy and reporting requirements.

Key Prerequisite

Tenant policy and reporting scope (e.g., VPN/APN, QoS, usage and charging models).

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5G Core for Standalone Networks

- Service-Based Architecture for 5G control-plane functions.
- Flexible UPF placement for centralized and edge deployments.
- Service differentiation through QoS flows and network slicing.
- High-speed packet processing with DPDK and SR-IOV in the applicable deployment profile.

≈250 Gbps

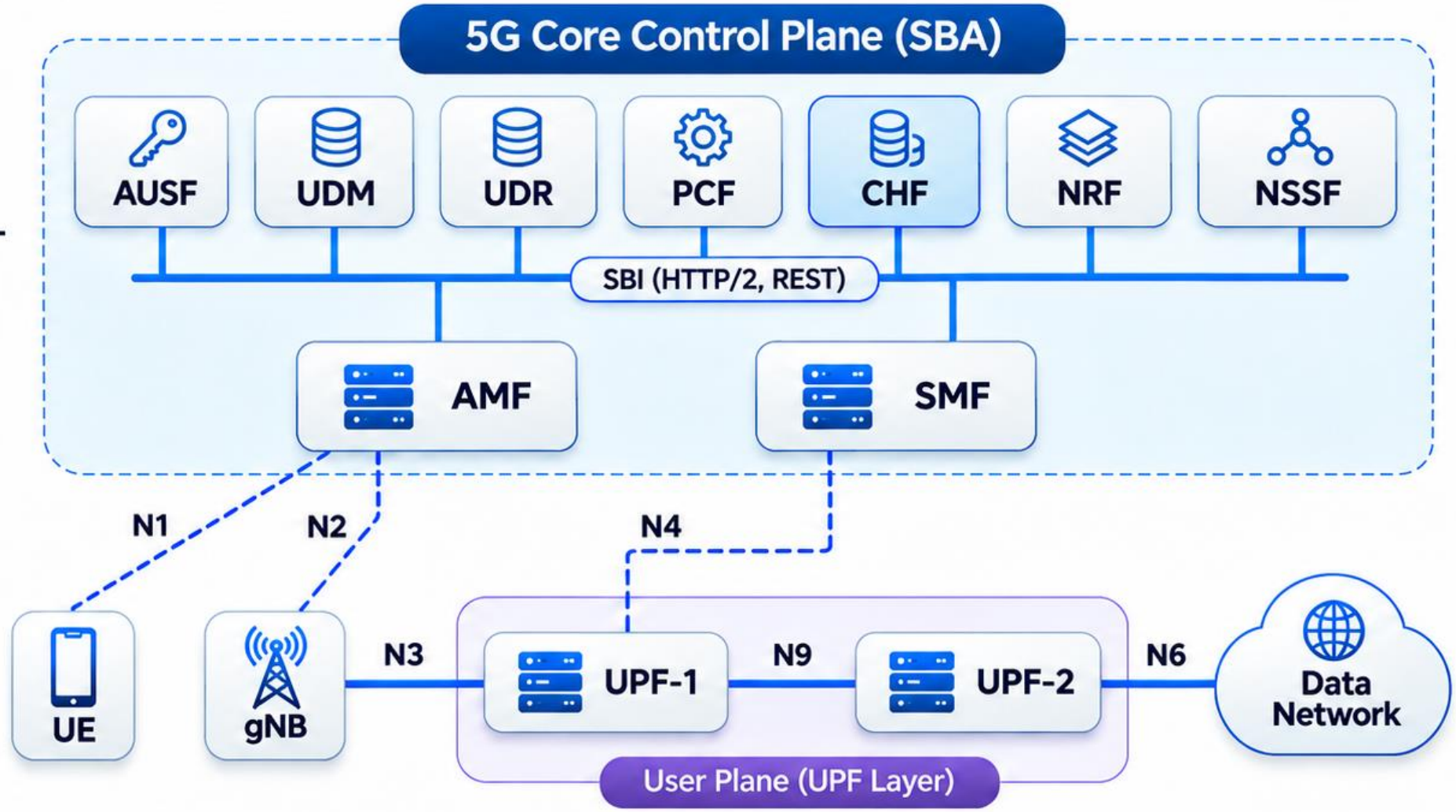
5GC UPF · Single Gen11 server



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5G Core Service-Based Architecture

- **Access and mobility —** AMF.
- **Session management and packet forwarding —** SMF and UPF.
- **Authentication and subscriber data —** AUSF, UDM and UDR.
- **Policy, service discovery and slice selection —** PCF, NRF and NSSF.
- **Charging — CHF.** Online and offline charging (real-time and CDR-based).

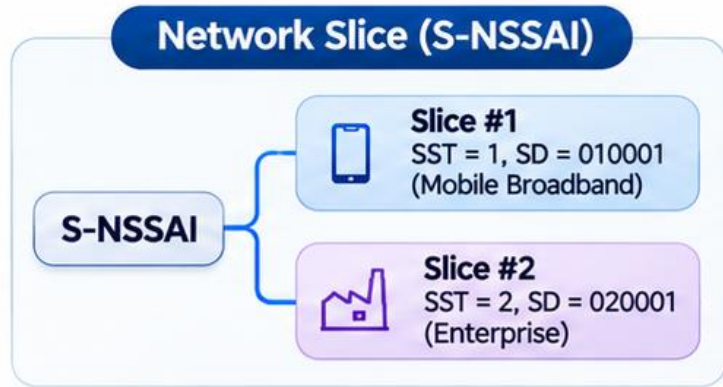


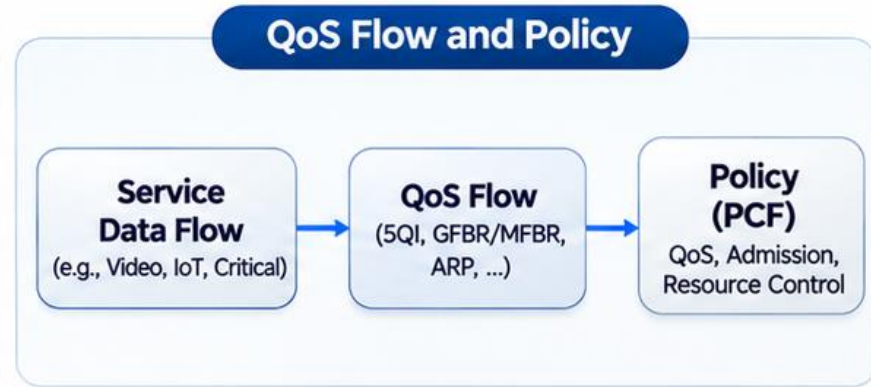
Architecture reference — 3GPP TS 23.501.

Horizon Networks

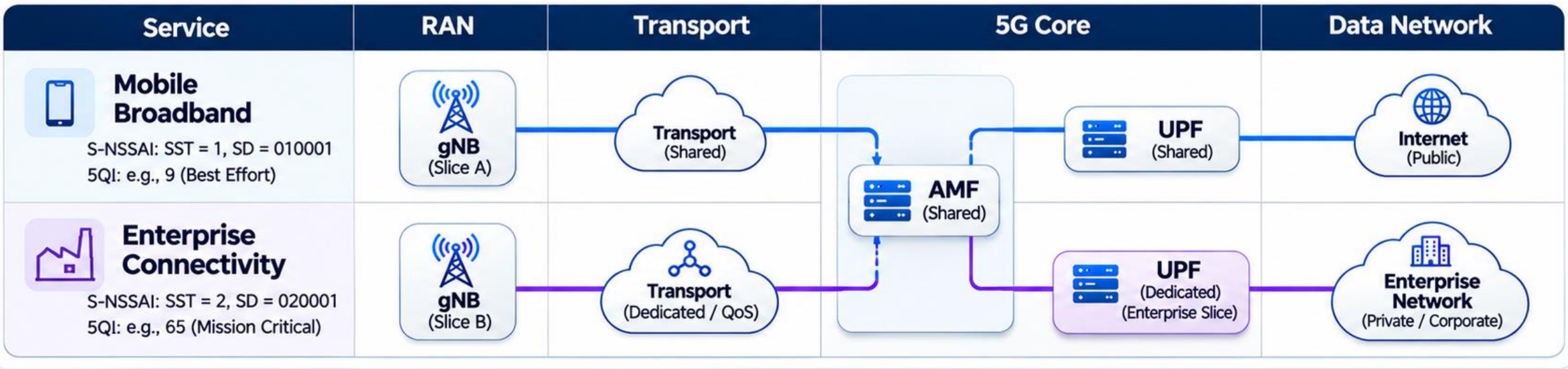
Network Slicing and Service Differentiation

- Identify network slices using S-NSSAI.
- Apply QoS-flow treatment using 5QI and configured policy rules.
- Use shared or dedicated core resources according to the deployment design.
- Coordinate RAN, transport, core and operations to meet end-to-end service objectives.





Example Deployment



Slice #1 – Mobile Broadband (User Plane)

Slice #2 – Enterprise Connectivity (User Plane)

Control Plane (Shared)

SST: Slice/Service Type *SD: Slice Differentiator*

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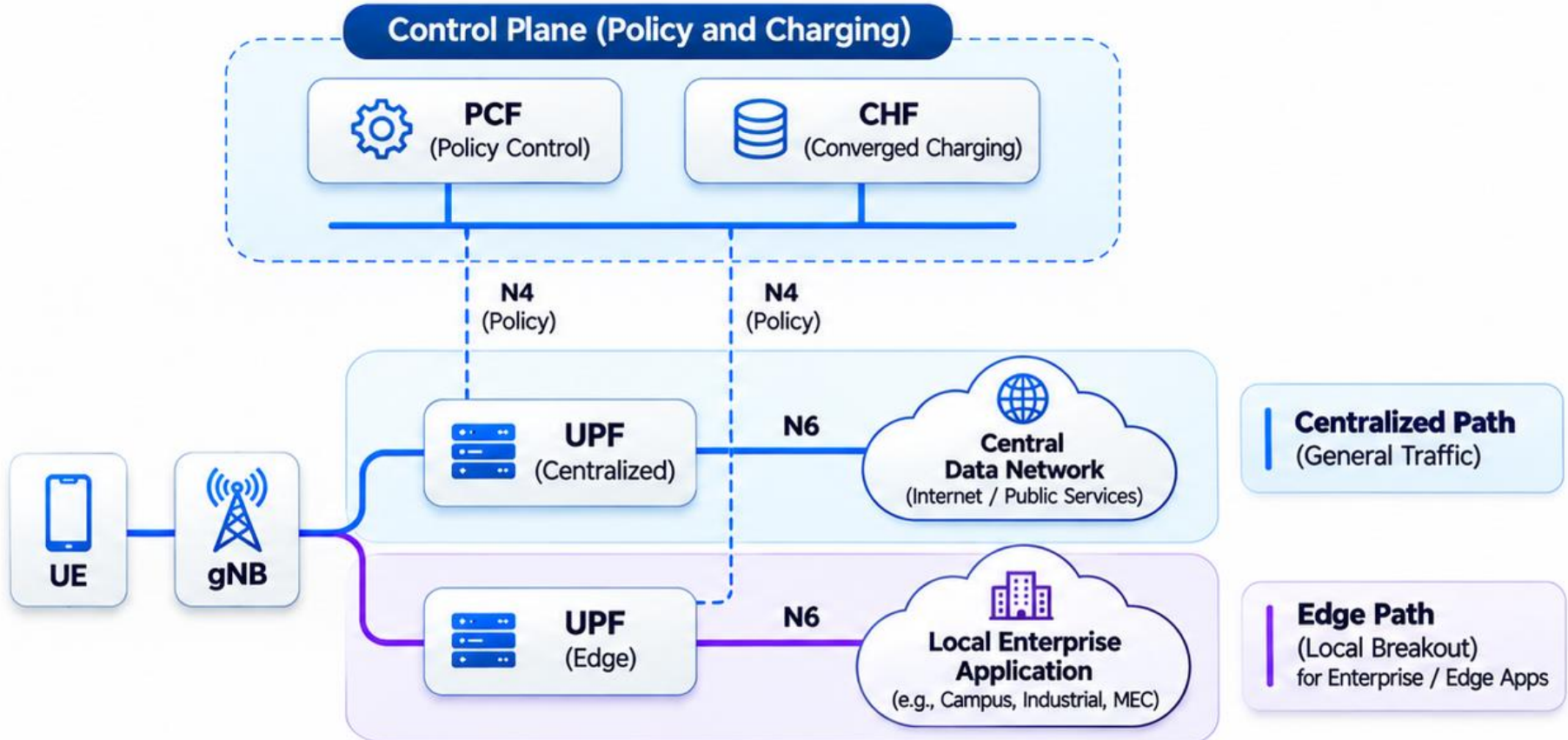
User Plane, Policy and Charging

Centralized UPF
Access to data networks through a central deployment.

Edge UPF
Local breakout for eligible enterprise or edge application traffic.

PCF
Policy control for sessions and service data flows (e.g., QoS, slicing, traffic steering).

CHF
Converged charging within the agreed integration scope (online, offline, or converged).



Example Performance
(One-way User-Plane Latency)

Centralized UPF
≈ 35 ms
(UE ↔ Central Data Network)

Edge UPF
≈ 8 ms
(UE ↔ Local Enterprise Application)

Test Conditions
- 5G SA (N78, 100 MHz), single session (TCP/UDP).
- Latency measured at the UE and the application server.
- E2E path: UE → gNB → UPF → DN (RTT / 2 for one-way).
- Typical lab environment; results may vary by deployment.

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5G Security and Roaming

Subscriber protection

SUPI concealment through SUCI under the applicable protection scheme.

Authentication

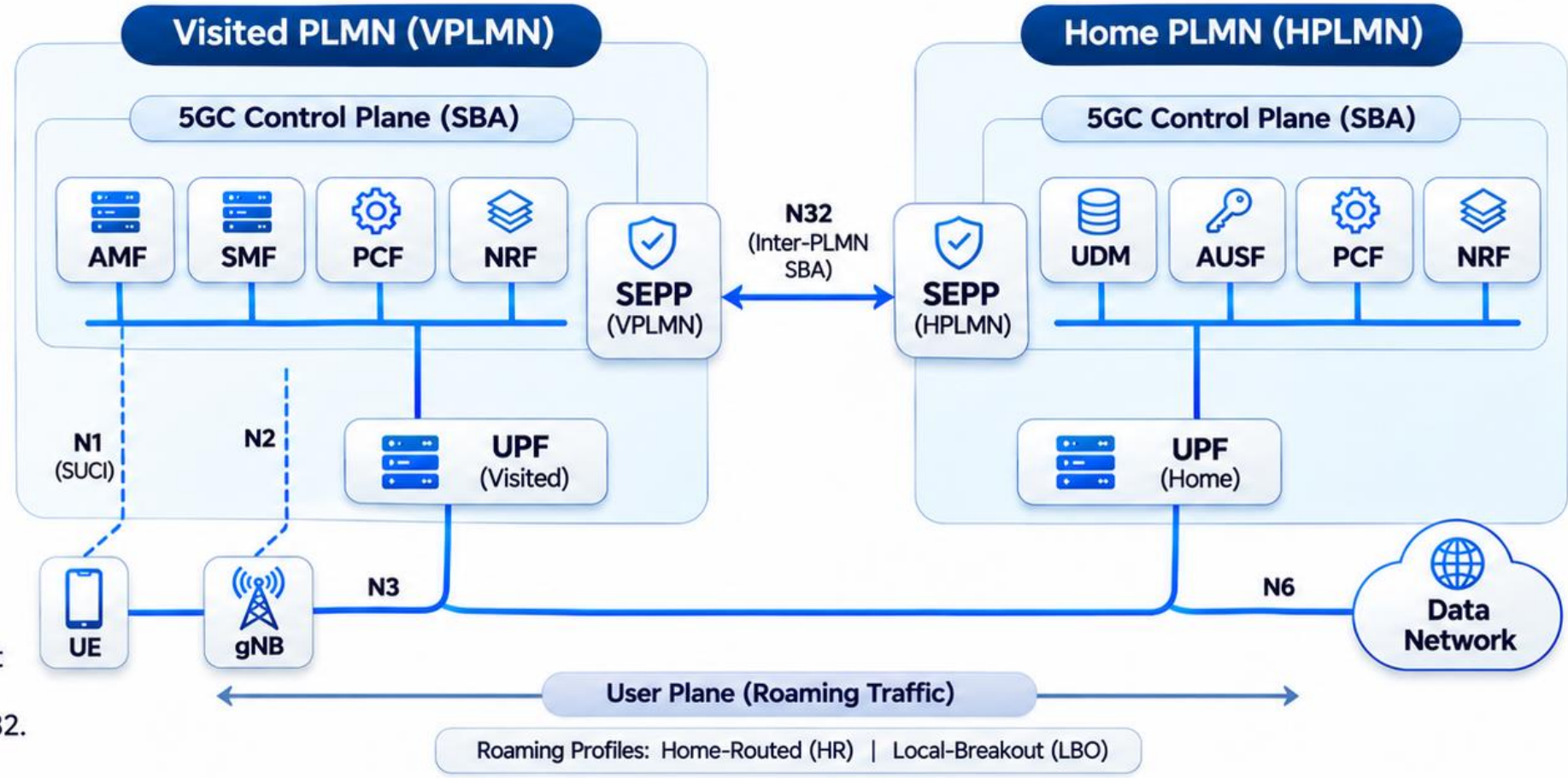
5G-AKA or EAP-AKA'.

Service security

Protected and authorized communication under the selected SBA security profile.

Roaming

Home-routed and local-breakout profiles, with SEPP protection for inter-PLMN signaling over N32.



Key Security Mechanisms

- **SUCI / SUPI** (Identity Protection)
- **5G-AKA / EAP-AKA'** (Authentication)
- **SBA Security** (TLS, Authorization) (Service Protection)
- **SEPP over N32** (Inter-PLMN Protection) (Roaming Security)

Control Plane (SBA / Signaling)

User Plane (User Data)

Horizon Networks

Network Exposure and Analytics

NEF

Expose selected network capabilities and events to authorized applications.

NWDAF

Provide analytics to authorized network functions for supported use cases.

Integration Scope

Confirm available APIs, analytics IDs, data sources and automation workflows for the target release.

Network Exposure (NEF)

Authorized Application
(e.g., Enterprise App, OTT, Vertical Service)

API
(HTTP/2, REST)

NEF
(Network Exposure Function)

Network Analytics (NWDAF)

Network Function Consumer
(e.g., PCF, AMF, SMF, NSSF)

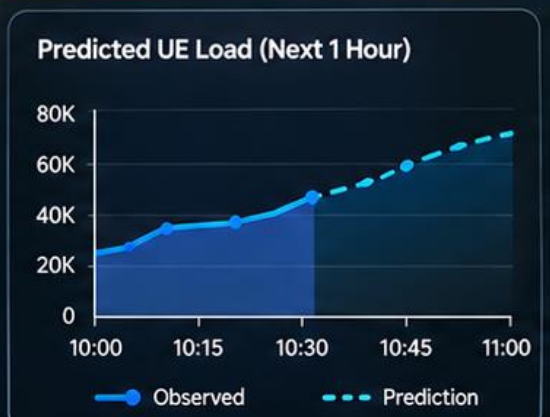
Analytics
(Nnwdaf)

NWDAF
(Network Data Analytics Function)

Sample NEF API Response

```
{
    "event": "locationChange",
    "ueId": "supi-***8341",
    "time": "2026-01-11T10:24:36Z",
    "location": {
       "tai": "001-01-0A3C",
       "trackingAreaChanged": true,
       "accessType": "3GPP-5GS"
    },
    "subscriptionId": "app-001",
    "eventId": "ev-9f7e2a6b"
}
```

Sample NWDAF Analytics Output



Analytics ID
ue-load-prediction

Time Granularity
15 min

Target Slice (S-NSSAI)
1-010001

Confidence
0.92

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Shared Cloud-Native Platform

Common Platform
Run EPC and 5GC functions on a common Kubernetes-based platform.

Elastic Scaling
Scale selected control-plane and user-plane functions according to workload.

Flexible Placement
Place packet-processing functions centrally or at the edge.

Resilience & Lifecycle
Define redundancy, recovery and upgrade behavior for the selected infrastructure and topology.

Management and Observability

- **Unified NMS** (Configuration · Fault · Performance)
- **Monitoring** (Metrics · Logs · Traces)
- **Alerting and Events**
- **Automation** (Provisioning · Scaling)
- **Lifecycle** (Upgrade · Rollback)

EPC and 5GC Functions

- **EPC (4G Core)**: MME | SGW-C/U | PGW-C/U | HSS | PCRF | DRA | ...
- **5GC (SA)**: AMF | SMF | UPF | PCF | UDM | AUSF | ...

Kubernetes Platform

- **Kubernetes** (Container Orchestration)
- **Docker** (Containers)
- **Istio** (Service Mesh)
- **Envoy** (Proxy · LB)
- **GitOps** (CI/CD)

Infrastructure

- **Compute** (x86 COTS)
- **Storage** (SSD / NVMe)
- **Networking** (10/25/40/100 GbE)
- **Acceleration** (DPDK · SR-IOV)

Deployment Profile A: Bare Metal



- High performance (UPF, GW-U)
- Low latency / high throughput
- DPDK / SR-IOV (as applicable)
- Recommended for high-capacity and edge UPF deployments

Deployment Profile B: Virtualized (VM)



- Run on VMware / OpenStack (or compliant)
- Flexible resource allocation
- Suitable for control-plane and medium-scale UPF
- Faster rollout and easier lifecycle management

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Argus NMS for Unified Network Management

Unified Management

Manage EPC and 5GC through a common operating environment.

Web GUI and CLI

Use a web GUI and scriptable CLI backed by a common data model.

Monitoring & Operations

Monitor configuration, alarms and performance, with role-based access and operational audit trails.

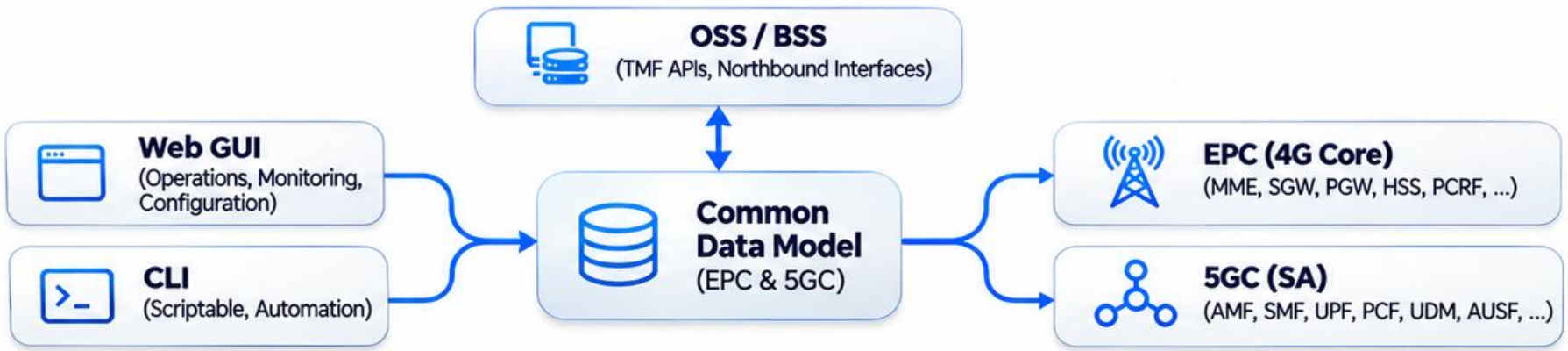
OSS/BSS Integration

Integrate with operator OSS/BSS through the agreed northbound interfaces (e.g., TMF REST, northbound APIs).





Argus NMS v3.0.2 | Environment: Production (Kubernetes, Linux)



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EPC and 5GC Interworking

Parallel Operation

Run LTE and 5G SA in parallel during phased migration.

N26 Interworking

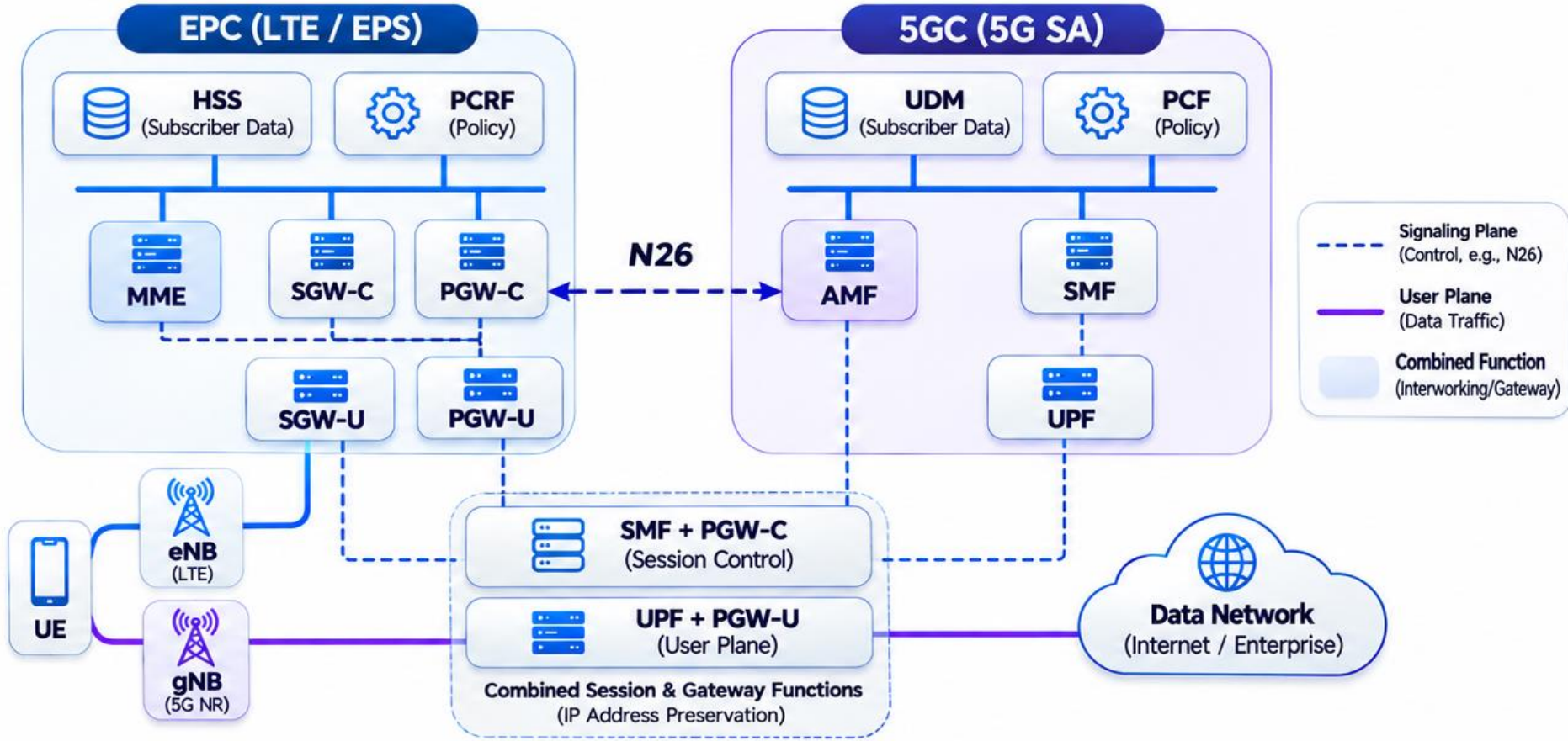
Use N26 between MME and AMF for applicable inter-system mobility procedures.

Combined Gateway

Use combined gateway and session functions to support IP address preservation for eligible sessions.

Requirements Alignment

Confirm device, subscription, APN/DNN and mobility requirements for the chosen interworking profile.



Interworking Highlights

- LTE (EPC) and 5G SA (5GC) coexistence
- N26 (MME ↔ AMF) for inter-system mobility
- Common gateway for session continuity
- IP address preservation for eligible sessions

Session Continuity

- Inter-RAT mobility (LTE ↔ 5G SA)
- Maintain IP address and user session
- Seamless service experience (e.g., TCP/UDP)

Key Prerequisites

- Device support (LTE, 5G SA, N26)
- Subscription and policy alignment (APN/DNN, QoS)
- Defined mobility procedures and roaming scope
- Verified interworking profile and test cases

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Migration and Voice Strategy

1. Establish LTE/EPC baseline

Confirm current services, coverage and operating requirements.

2. Introduce NSA where applicable

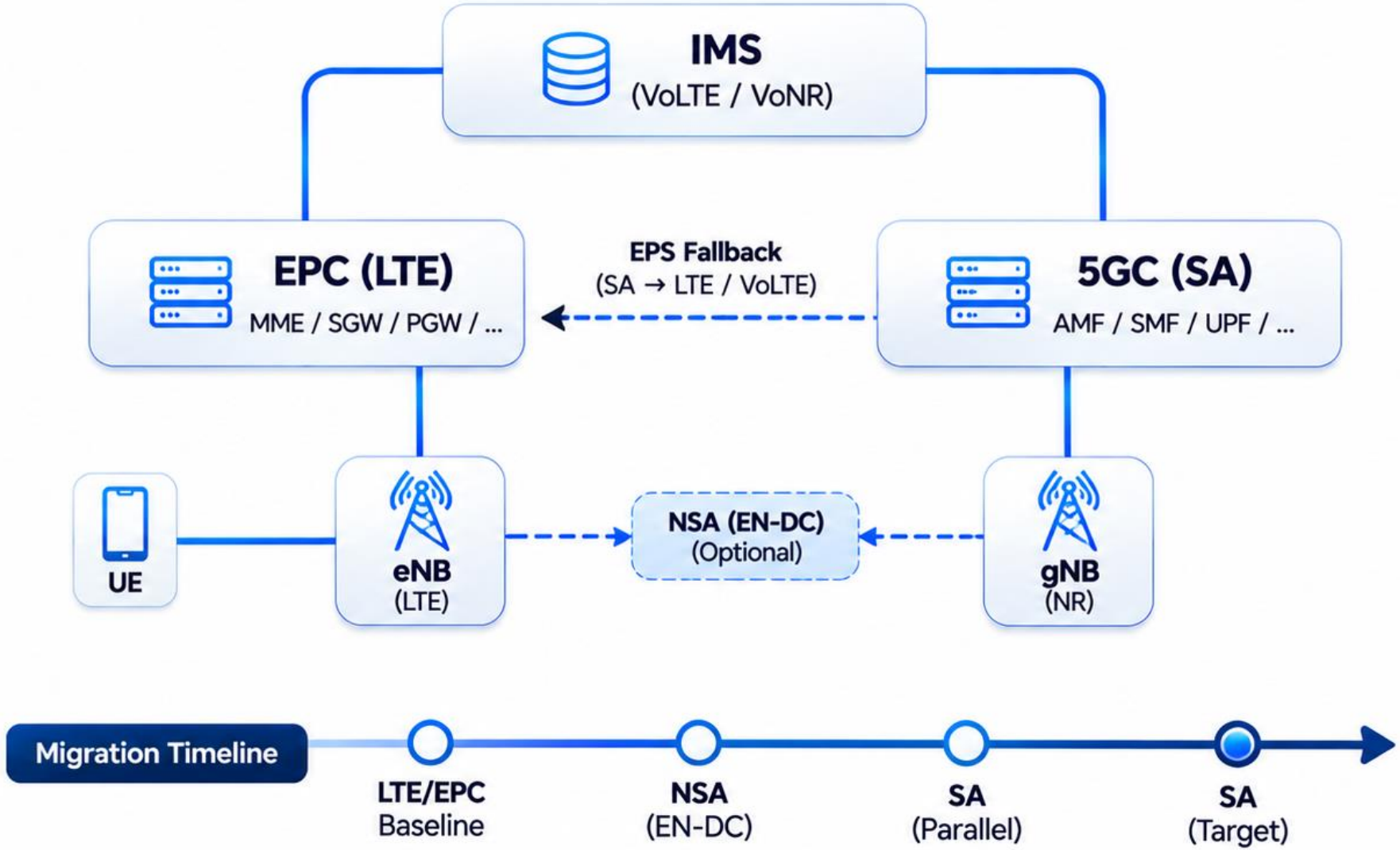
Add EN-DC according to the rollout plan.

3. Launch SA alongside EPC

Expand by device and subscriber cohort.

4. Validate the voice profile

Verify VoLTE, EPS Fallback and VoNR as applicable to the deployment.



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Standards and Operator Acceptance

Evaluate the proposed release against your network requirements.

- Review feature-level 3GPP and GSMA references, interfaces and dependencies.
- Agree the RAN, device and OSS/BSS interoperability matrix.
- Define acceptance tests for mobility, voice, charging, throughput, failover and recovery.
- Confirm production sizing and resilience criteria for the agreed deployment.

Capability	Product Release (EPC / 5GC)	Dependency (Standards / Interfaces)	Test Evidence (Operator Acceptance)
EN-DC Bearer Handling	**R2.0** (EPC + 5GC)	3GPP TS 37.340 (EN-DC) S1 / X2 EPC (MME/SGW/PGW)	EN-DC setup and bearer split QoS continuity (DL/UL) Inter-frequency handover
SA Registration and PDU Session	**R2.0** (5GC SA)	3GPP TS 23.502 (Registration) 3GPP TS 23.501 (Session) N1 / N2 / N3 / N4	UE registration (5G SA) PDU session establishment / release Throughput and QoS (5QI)
N26 Mobility	**R2.0** (EPC + 5GC)	3GPP TS 23.502 (Interworking) N26 (MME ↔ AMF) Mobility procedures (TAU/Registration)	Inter-system mobility (LTE ↔ 5G SA) Service continuity (data/voice) IP address preservation (if applicable)
Site Failover	**R2.0** (EPC + 5GC)	3GPP TS 23.501 (Resilience) N+K / Georedundancy State replication and recovery	NF/UPF failure detection and switchover Session and service recovery Target recovery time (e.g., ≤ 30 s)

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Request a Technical Workshop

Review your target architecture, deployment options and integration scope with the Horizon Networks engineering team.

Request a product demonstration or a proof-of-concept workshop.

- **Sales** — sales@hnzplus.com
- **General enquiries** — info@hnzplus.com
- **Technical support** — support@hnzplus.com
- **Phone** — 1-800-HORIZON
- **Website** — hnzplus.com

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Shams Business Centre,
Sharjah Media City Free Zone
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Horizon Networks

EPC Interface and Service Matrix

Access
S1-MME and S1-U.

Mobility and gateway signaling
S10, S11 and S5/S8.

Subscriber data and policy
S6a, Gx and Rx, where applicable.

Forwarding and CUPS
S5/S8, Sxa, Sxb and SGi.

Charging and legacy interworking
Gy, Gz, S3, S4, S12 and other deployment-dependent interfaces.

	Interface	Description	Endpoints	Protocol	Reference	Notes
MME Interfaces	S1-MME	Access (Control Plane)	eNB ↔ MME	S1AP (SCTP)	3GPP TS 36.413	Core
	S6a	Subscriber Data (Authentication)	MME ↔ HSS	Diameter (S6a)	3GPP TS 29.272	Core
	S11	MME–SGW Signaling	MME ↔ SGW	GTP-C (UDP)	3GPP TS 29.274	Core
	S10	MME-to-MME Mobility	MME ↔ MME	S10AP (SCTP)	3GPP TS 29.272	Core
	S3	Inter-RAT Mobility (2G/3G ↔ LTE)	MME ↔ SGSN	S3AP (SCTP)	3GPP TS 29.276	Inter-RAT
	S13	Equipment Identity (EIR)	MME ↔ EIR	Diameter (S13)	3GPP TS 29.272	Optional
	SGs	CS Fallback / SMS	MME ↔ MSC / VLR	SGsAP (SCTP)	3GPP TS 29.118	CSFB / SMS
	Sv	SRVCC (LTE ↔ CS)	MME ↔ MSC Server	SvAP (SCTP)	3GPP TS 29.118	SRVCC
	SGd	SMS over EPC	MME ↔ SMS-GMSC / IWMSC	SGdAP (SCTP)	3GPP TS 29.118	SMS
	SLg	Location Services (Control)	MME ↔ GMLC	LCS (SLg, Diameter)	3GPP TS 29.171	LCS
	SLs	Location Services (User Plane)	MME ↔ E-SMLC	LCS (SLs, Diameter)	3GPP TS 29.172	LCS
	N26	EPC – 5GC Interworking	MME ↔ AMF	GTP-C (UDP)	3GPP TS 29.274	5GC Interworking
SGW Interfaces	S11	Control from MME	SGW ↔ MME	GTP-C (UDP)	3GPP TS 29.274	Core
	S5/S8	Control to PGW (Home/Roaming)	SGW ↔ PGW	GTP-C (UDP)	3GPP TS 29.274	Core / Roaming
	Sxa	CUPS Control (SGW)	SGW ↔ SGW-U	PFCP (UDP)	3GPP TS 29.244	Core (CUPS)
	S4	Control to SGSN (2G/3G)	SGW ↔ SGSN	GTP-C (UDP)	3GPP TS 29.274	Inter-RAT
	S12	Direct Tunnel from MSC/VLR (User Plane)	SGW ↔ MSC / VLR	GTP-U (UDP)	3GPP TS 29.274	Direct tunnel (MSC/VLR traffic)
	Rf	Charging Interface (Online)	SGW ↔ CDF (OCS)	Diameter (Rf)	3GPP TS 32.299	Online Charging
	Gz	Charging Interface (Offline)	SGW ↔ CDF/CGF (OFCS)	Diameter (Gz)	3GPP TS 32.299	Offline Charging (CDR Export)

Others S1-U, Sxb, SGi, Gx, Rx, Gy and other service interfaces are also supported according to the deployment scope.

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EPC Interface and Service Matrix (Cont.)

Access
S1-U and S5/S8-U.

Mobility and gateway signaling
S5/S8, S9 and S2b.

Subscriber data and policy
S6a, Gx and Rx, where applicable.

Forwarding and CUPS
S5/S8-U, Sxa, Sxb and SGi.

Charging and legacy interworking
Gy, Gz, S3, S4 and other deployment-dependent interfaces.

	Interface	Description	Endpoints	Protocol	Reference	Notes
PGW Interfaces	**S5/S8** (C)	Control (PGW-C)	SGW-C ↔ PGW-C	GTP-C (UDP)	3GPP TS 29.274	Core / Roaming
	S5/S8 (U)	User Plane (PGW-U)	SGW-U ↔ PGW-U	GTP-U (UDP)	3GPP TS 29.274	Core / Roaming
	S2b	Policy and Charging Control	PGW-C ↔ PCRF	Gx (Diameter)	3GPP TS 29.212	Policy Control
	Gx	Policy and Charging Control	PGW-C ↔ PCRF	Gx (Diameter)	3GPP TS 29.212	Policy Control
	Rx	Policy and Service Information	AF (e.g., IMS) ↔ PCRF	Diameter (Rx)	3GPP TS 29.214	Policy Control
	Gy	Charging (CCA)	PGW-C ↔ OCS	Diameter (Gy)	3GPP TS 32.299	Online Charging
	Gz	Charging (CDR)	PGW-C ↔ CDF/CGF (OFCS)	Diameter (Gz)	3GPP TS 32.299	Offline Charging (CDR Export)
	SGi	External Packet Data Network	PGW-U ↔ PDN	IP (e.g., IPv4/IPv6)	3GPP TS 29.061	Internet / PDN
HSS Interfaces	**S6a**	Subscriber Data (Authentication)	MME ↔ HSS	Diameter (S6a)	3GPP TS 29.272	Core
	S5	HSS to SGW (Legacy)	HSS ↔ SGW	Diameter (S5)	3GPP TS 29.272	Legacy
	S9	HSS to MME (Roaming)	HSS ↔ MME	Diameter (S9)	3GPP TS 29.272	Roaming
	S2b	HSS to PCRF (Policy)	HSS ↔ PCRF	Diameter (S2b)	3GPP TS 29.212	Policy Control
	SWx	HSS to MSC/VLR (Legacy)	HSS ↔ MSC/VLR	Diameter (SWx)	3GPP TS 29.272	Legacy
	SLh	HSS to LCS (Home Location)	HSS ↔ HLR/LR	Diameter (SLh)	3GPP TS 29.272	Location Services
	Sh	HSS to EIR (Equipment Check)	HSS ↔ EIR	Diameter (Sh)	3GPP TS 29.272	Equipment Identity

Others | S1-U, S5/S8-U, Sxb, SGi, Gx, Rx, Gy and other service interfaces are also supported according to the deployment scope.

Horizon Networks

5GC Functions and Interfaces

Core functions

AMF, SMF, UPF, AUSF, UDM, UDR, PCF and NRF.

Deployment-dependent functions

NSSF, NEF, NWDAF, CHF, SEPP, BSF, UDSF and SCP, according to the agreed scope.

Reference points

N1, N2, N3, N4, N6, N9, N26 and N32, where applicable.

5GC Function	Role (According to 3GPP)	Product Status
AMF	Access and Mobility Management (registration, mobility, access control)	GA
SMF	Session Management (PDU session, IP address, policy and UPF selection)	GA
UPF	User Plane Function (data forwarding, QoS, traffic steering)	GA
AUSF	Authentication Server (UE authentication, 5G-AKA/EAP)	GA
UDM	Unified Data Management (subscriber data, credentials, policy data)	GA
UDR	Unified Data Repository (structured data storage and exposure)	GA
PCF	Policy Control (policy decision and control for sessions and services)	GA
NRF	Network Repository (NF registration, discovery and profile management)	GA
NSSF	Network Slice Selection (slice selection and NSSAI management)	Optional
NEF	Network Exposure (secure exposure of network capabilities and events)	Optional
NWDAF	Network Data Analytics (analytics and predictions for supported use cases)	Optional
CHF	Charging Function (converged online/offline charging)	Optional
SEPP	Security Edge Protection Proxy (secure inter-PLMN communication)	Optional
BSF	Binding Support Function (UE–PDU session binding)	Optional
UDSF	Unstructured Data Storage Function (non-structured data storage)	Optional
SCP	Service Communication Proxy (routing, load balancing and service resilience)	Optional

Reference Point	Endpoints	Protocol
N1	UE ↔ AMF	NAS (5GMM / 5GSM)
N2	(R)AN ↔ AMF	NGAP (SCTP)
N3	(R)AN ↔ UPF	GTP-U (UDP)
N4	SMF ↔ UPF	PFCP (UDP)

Reference Point	Endpoints	Protocol
N6	UPF ↔ Data Network (DN)	IP (IPv4/IPv6)
N9	UPF ↔ UPF	GTP-U (UDP)
N26	MME ↔ AMF	SCTP (3GPP)
N32	SEPP ↔ SEPP	TLS (HTTPS)

SCP (Service Communication Proxy) Deployment Note: Supported in the released version with both direct models (A/B) and indirect models (C/D) (according to 3GPP TS 29.500). The deployment model can be selected based on the target architecture and interworking requirements.

Horizon Networks

GGSN Module (2G/3G) – Packet Processing

Purpose

Serving GPRS/UMTS (2G/3G) packet data (PDN) and providing connectivity to external data networks.

Platform Role

Packet Processing (PS Core) module.

Key Functions

PDP session management, IP address allocation, policy and charging integration, and data forwarding.

Deployment

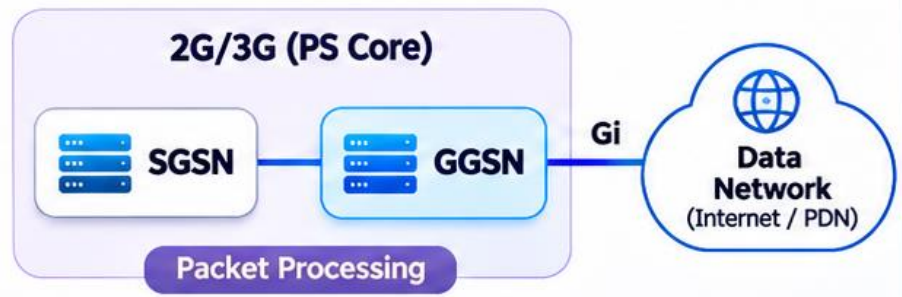
Used in 2G (GPRS/EDGE) and 3G (UMTS/HSPA) networks.

GGSN Function	Description	Product Status
PDP Context Management	Create, modify and delete PDP contexts for packet data sessions.	GA
IP Address Allocation	Allocate and manage UE IP addresses (IPv4/IPv6, static or dynamic).	GA
Packet Processing	Forward user data between RAN (SGSN) and external data networks (Gi).	GA
Policy and Charging Control	Integrate with PCRF (Gx) for policy control and with charging systems (Gy/Gz) for online and offline charging.	GA
Mobility and Interworking	Support PS mobility within 2G/3G and interworking with LTE/5G (via S4, S5/S8).	GA
QoS Enforcement	Enforce QoS profiles for packet data services.	GA

GGSN Interfaces

Interface	Endpoint(s)	Protocol	Reference (3GPP)
Gn	SGSN ↔ GGSN	GTP-C/U (UDP)	TS 29.060
Gi	GGSN ↔ Data Network	IP (e.g., IPv4/IPv6)	TS 23.002 / TS 29.061
Gx	GGSN ↔ PCRF	Diameter (Gx)	TS 29.212
Gy	GGSN ↔ OCS (Online)	Diameter (Gy)	TS 32.299
Gz	GGSN ↔ OFCS (Offline)	Diameter (Gz)	TS 32.299
S4*	GGSN ↔ SGW	GTP-C/U (UDP)	TS 29.274

Position in Architecture



Note: * The S4 interface is used for interworking with EPC (optional, depending on the deployment and network evolution scenario).

Horizon Networks

Feature and Standards Traceability

Map each offered capability to the applicable specification, specification version, product release and test evidence.

Capability	Specification	Spec Version	Product Release	Status	Evidence
EPC and CUPS EPC Core with Control/User Plane Separation (CUPS)	3GPP TS 23.401 3GPP TS 23.214 3GPP TS 29.244	v17.11.0 v17.8.0 v17.9.0	**R2.0**	Verified	**TR-EPC-001** (Interoperability & KPI Test)
EN-DC E-UTRA–NR Dual Connectivity (Non-Standalone)	3GPP TS 37.340	v17.6.0	**R2.0**	Verified	**TR-ENDC-001** (EN-DC Interworking Test)
5GS architecture, procedures and policy 5G System (SA) and Policy Control	3GPP TS 23.501 3GPP TS 23.502 3GPP TS 23.503	v17.10.0 v17.10.0 v17.8.0	**R2.0**	Verified	**TR-5GS-001** (Registration, PDU Session & Policy)
Security and IMS voice profiles Security, VoLTE/VoNR (IMS)	3GPP TS 33.401 3GPP TS 33.501 GSMA IR.92 GSMA NG.114	v17.9.0 v17.8.0 v12.0 v2.2	**R2.0**	Verified	**TR-IMS-001** (VoLTE/VoNR & Security Test)

Horizon Networks

Measured Throughput and Deployment Validation



EPC User Plane
(SGW-U / PGW-U)

Measurement scope

User plane data forwarding
(GTP-U) with full-feature configuration

Measured Throughput
≈150 Gbps

Tested server count
One Gen11 server



5GC UPF

Measurement scope

User plane data forwarding
(IP, GTP-U) with full-feature configuration

Measured Throughput
≈250 Gbps

Tested server count
One Gen11 server

Project acceptance

Validate throughput, packet loss, latency, session scale, signaling rates and recovery behavior against the operator's agreed workload and deployment topology.

**Throughput figures are rounded and apply to their respective test configurations.*