Discussion on mobility management 5G standardization and role of ICN

CT4 study item

- 3GPP CT4 has initiated a study item to study different mobility management protocols for potential replacement of GTP tunnels between UPFs (N9 Interface) in the 3GPP 5G system architecture of Release 16 (5G Phase 2)
- References:
  - 3GPP TS 29.281 (V15.1.0): GPRS Tunnelling Protocol User Plane (GTPv1-U)
  - 3GPP TR 29.891 (V15.0.0): 5G System – Phase 1; CT4 Aspects
  - 3GPP TS 23.501 (V15.0.0): System Architecture for the 5G System
  - 3GPP TS 23.503 (V15.0.0): Policy and Charging Control Framework for the 5G System, Stage 2
  - ETSI GR NGP 004 (V1.1.1): Next Generation Protocol (NGP): Evolved Architecture for mobility using Identity Oriented Networks
- Several protocol candidates in IETF: SRv6, LISP, ILA, hICN etc
- Document prepared in DMM WG as submission to CT4 for consideration

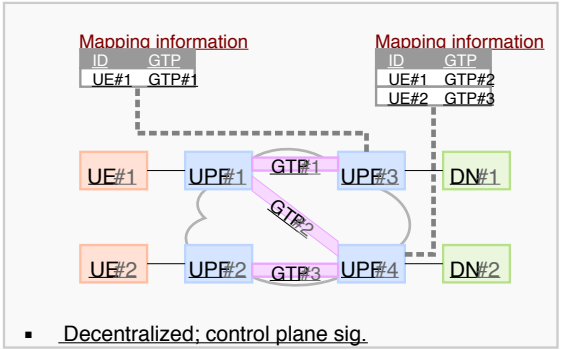
Identified objectives wrt GTP-U

Definition of a simplified and more efficient mobility management with:

- No tunnels, no anchors (neither in UP nor in CP)
- No operation for static/mobile consumers
- Latency-optimized user plane updates
- Access-agnostic approach
- Seamless integration of hetnet
- …

Mobility architectures

Locator-based

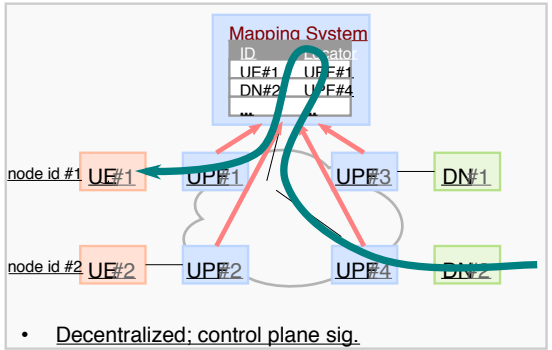


- Decentralized; control plane sig.

- **GTP-U**
- **SRv6**

- Locators used as identifiers: semantic overloading that complexifies mobility (anchors/tunnels)
- Lack of flexibility, complex management of synch, does not allow dynamic offload at edge

ID/Loc separation

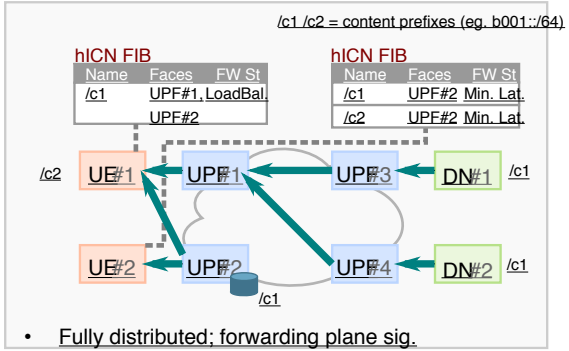


- Decentralized; control plane sig.

- **LISP** (ILSR/ILNP)
- **ILA**
- **SRv6**

- Mapping system where to keep udpated / verify Loc/ID binding
- Challenges : scalability, latency for the verification, issues in caching and synchronization of a distributed mapping system

ID-based

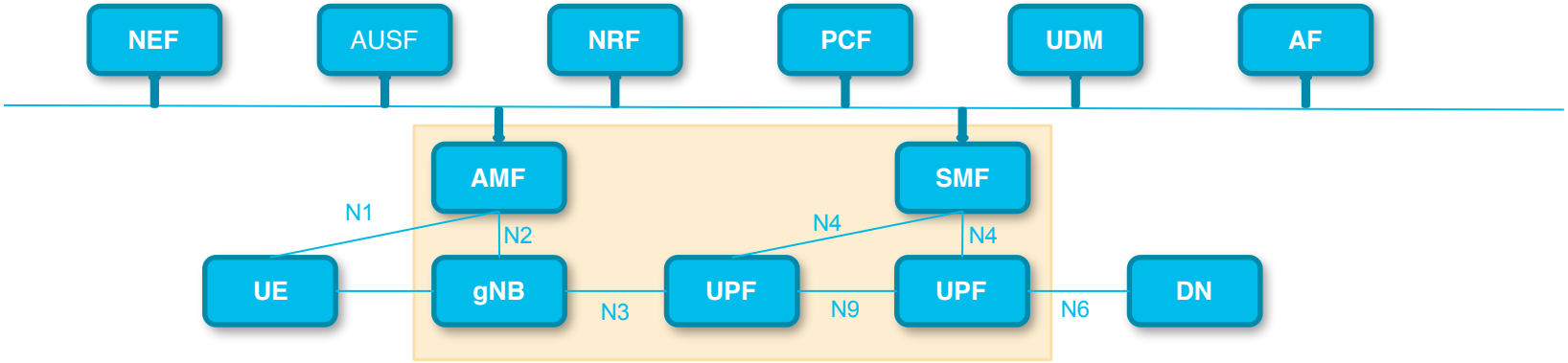


- Fully distributed; forwarding plane sig.
  - *(draft-vonhugo-5gandip-ip-issues-03)*

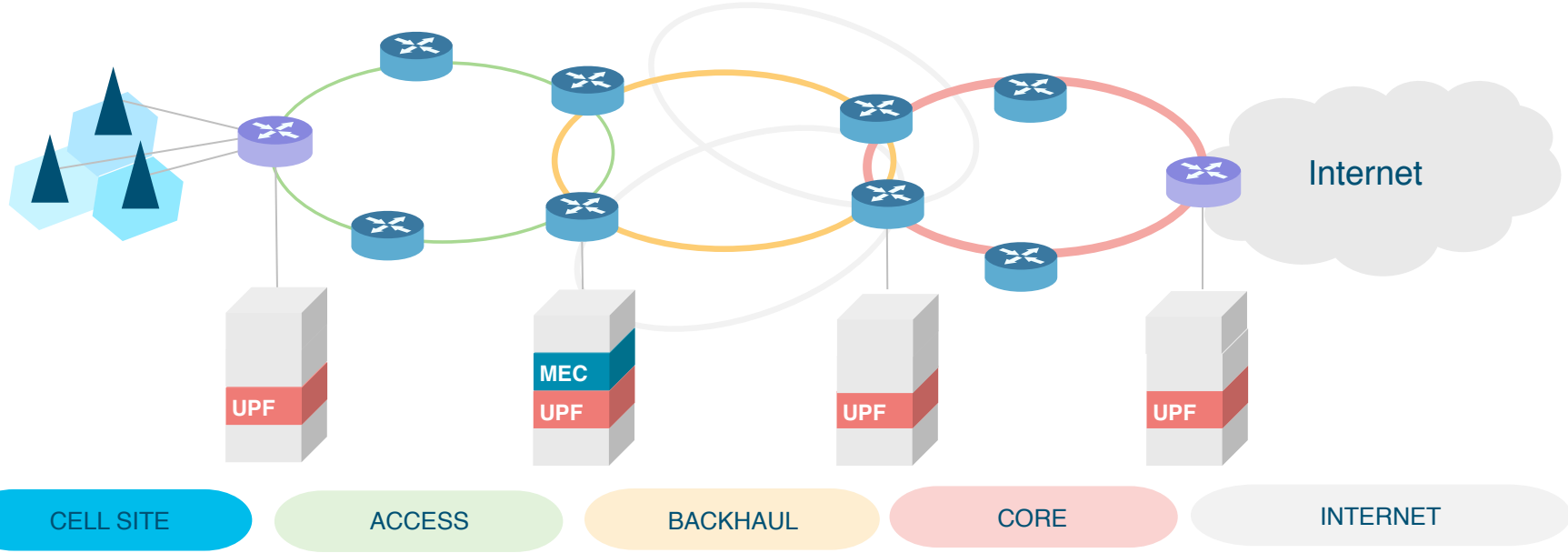
- **ICN**
- **hICN**

- no anchors (neither in UP nor in CP)
- No operation for static/mobile cons.
- latency-optimized user plane updates
- access-agnostic approach
- seamless integration of hetnet

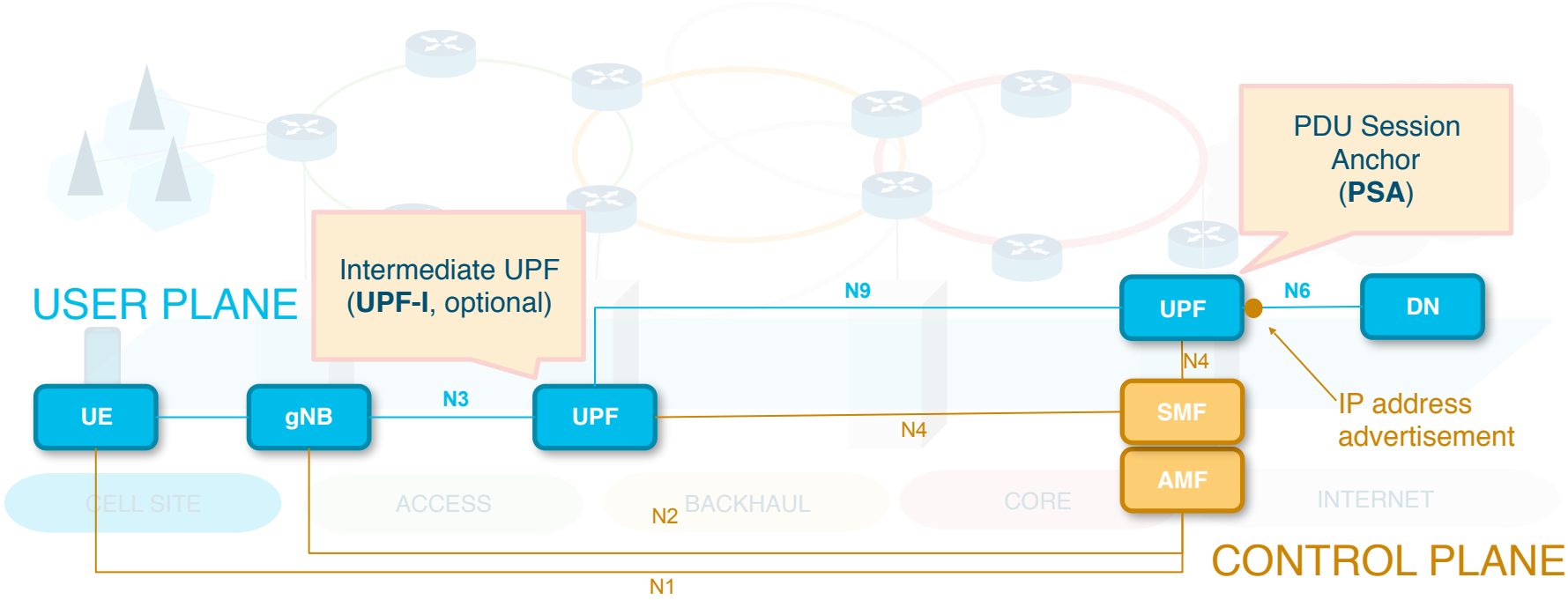
5G Service Based Architecture



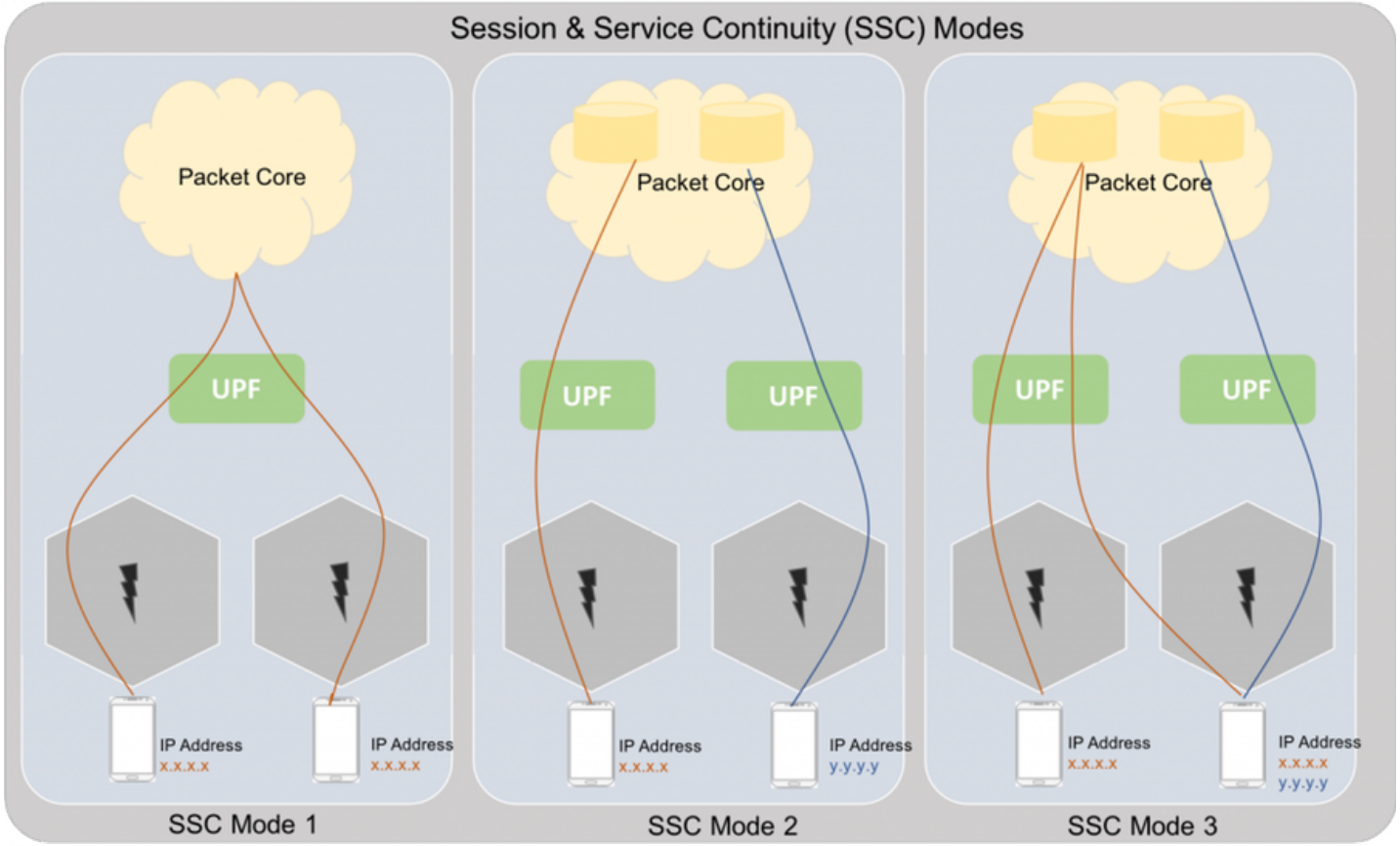
Mobile network architecture



Mobility management subsystem



SSC modes


Session & Service Continuity (SSC) Modes
Packet Core
UPF
IP Address
x.x.x.x
IP Address
x.x.x.x
SSC Mode 1
Packet Core
UPF
UPF
IP Address
x.x.x.x
IP Address
y.y.y.y
SSC Mode 2
Packet Core
UPF
UPF
IP Address
x.x.x.x
IP Address
x.x.x.x
y.y.y.y
SSC Mode 3

Deployment options

Two modes of integration for alternative data planes:

1

«INTERWORKING» MODEL

deployment in MEC (within a UPF)

2

INTEGRATED MODEL

replacement of GTP-U in N9 (and N3) interfaces

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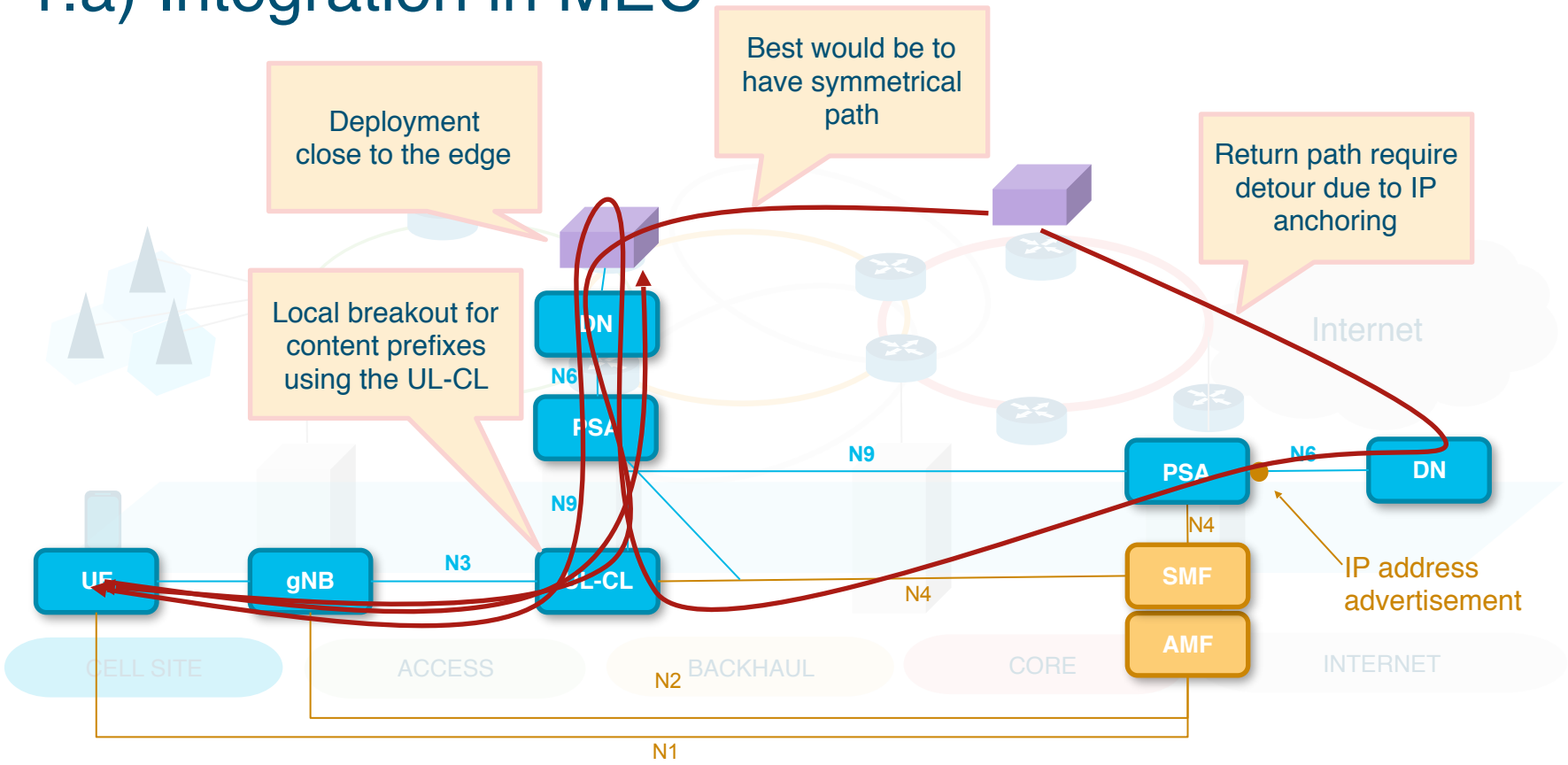
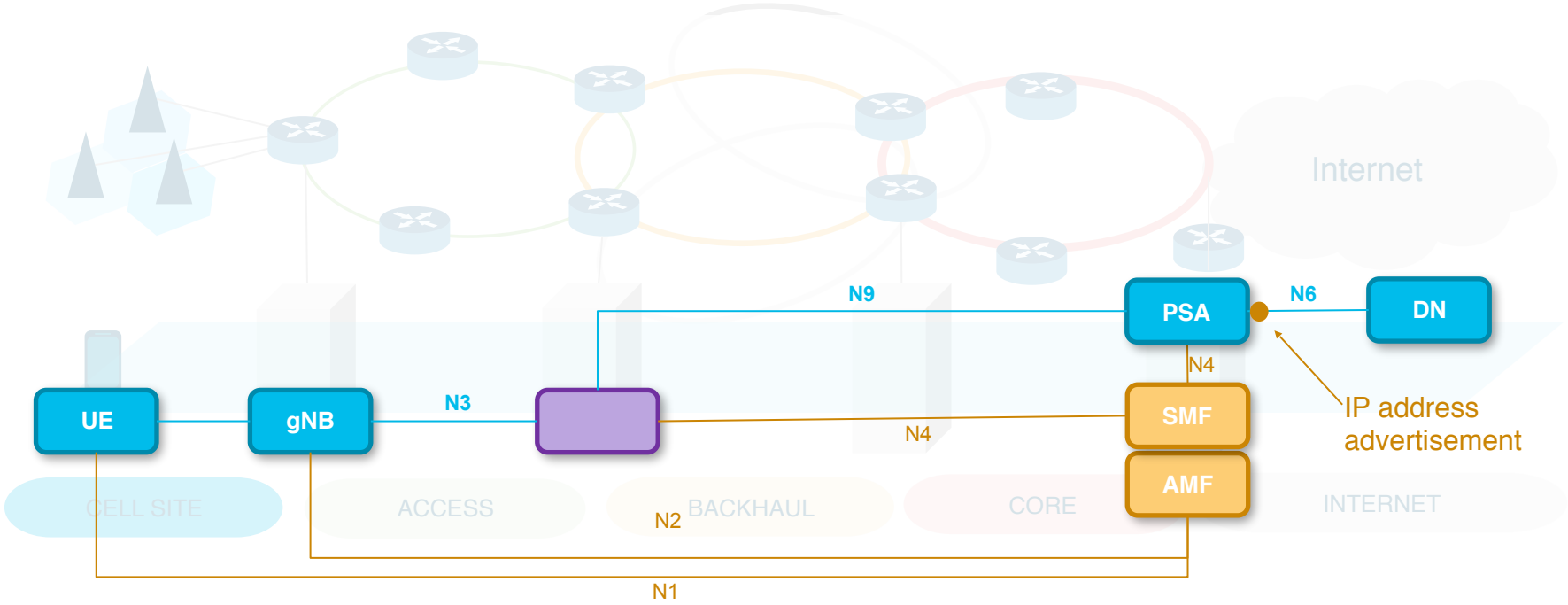
1.a) Integration in MEC



1.b) hICN as a UPF



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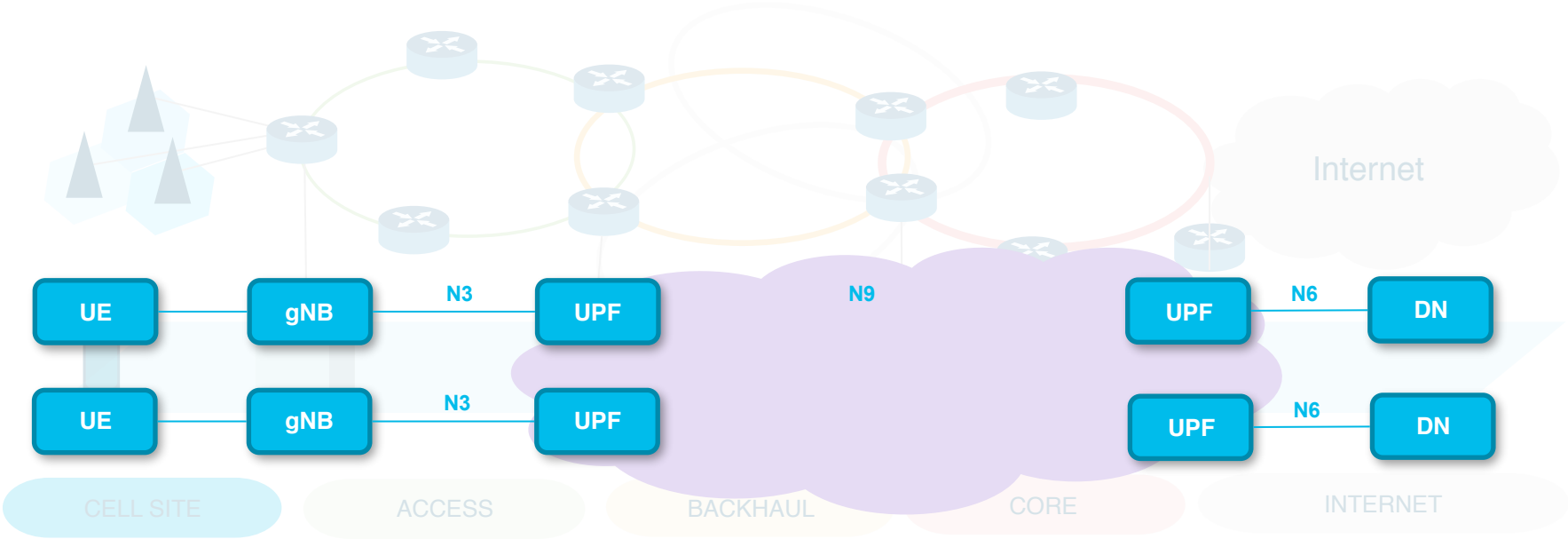
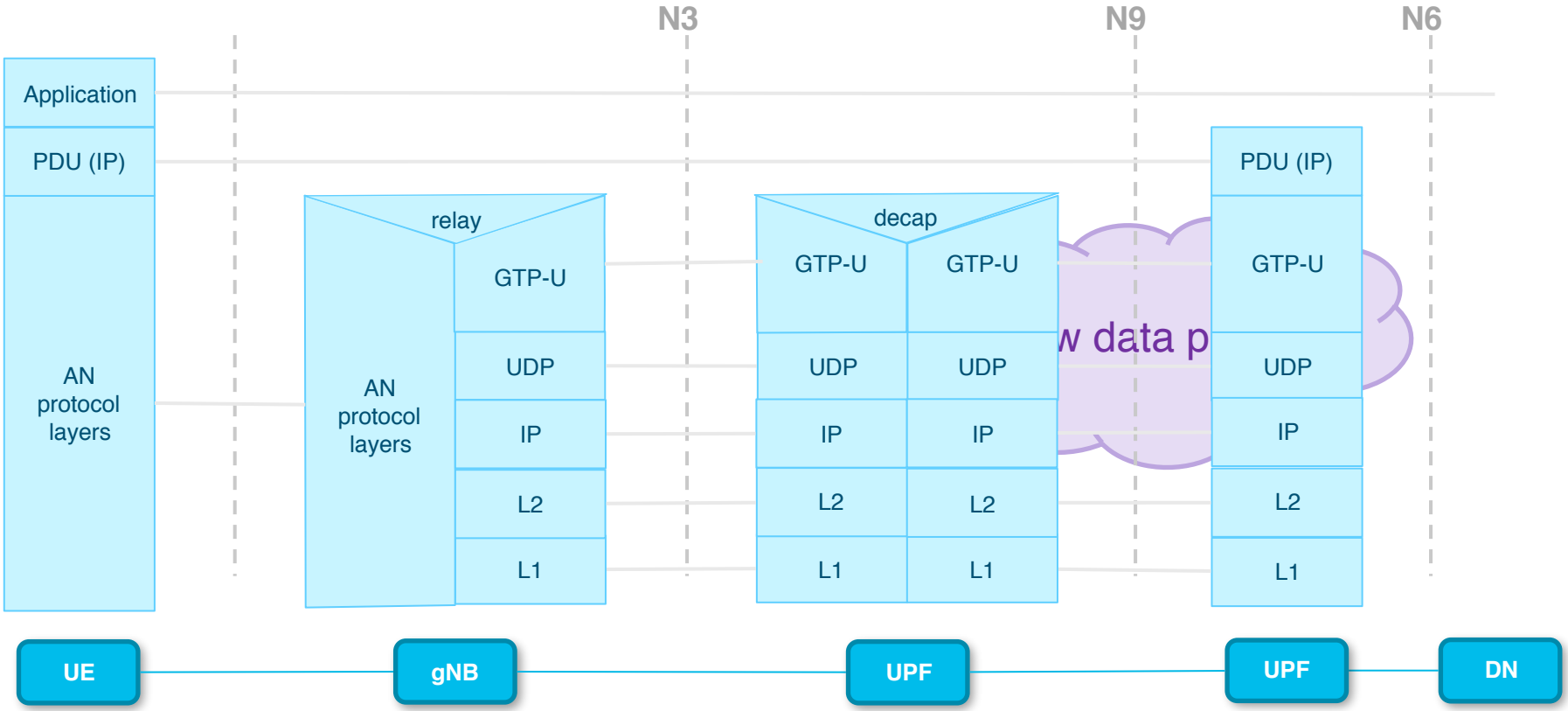
replacement of GTP-U in N9 (and N3) interfaces

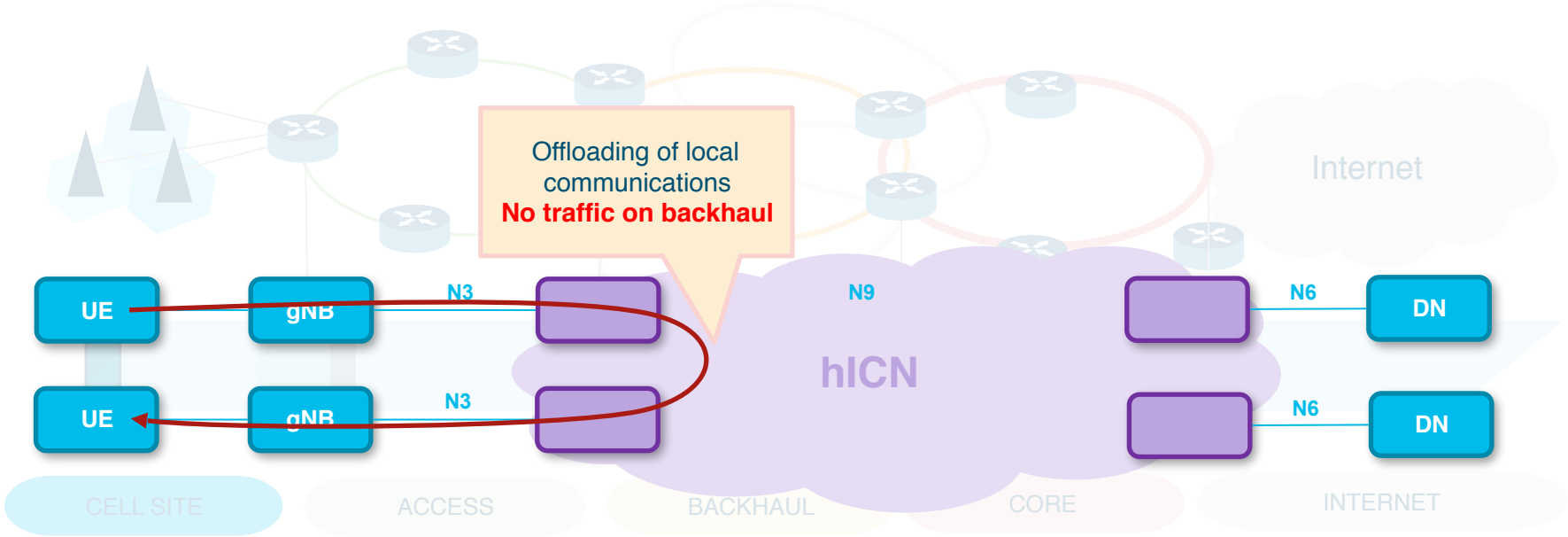
2.a) Replacement of N9 interface



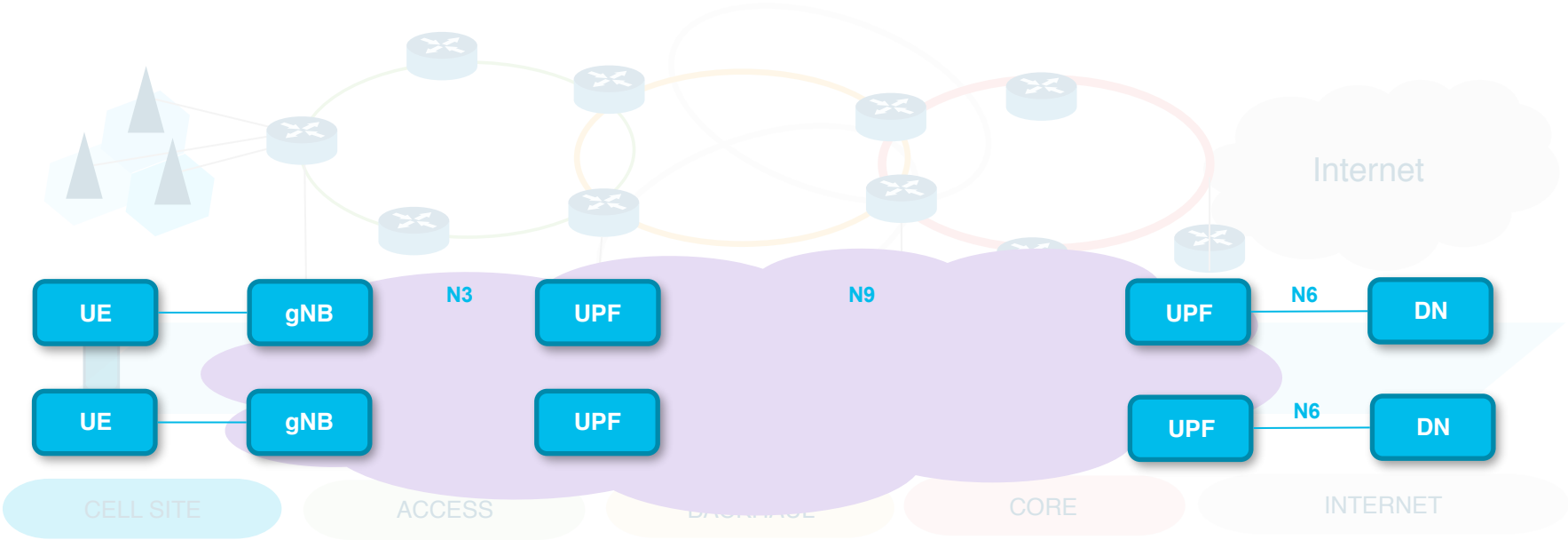
Impact on protocol stack



Anchorless mobility



2.b) Replacement of N9 and N3 interfaces



Impact on protocol stack