# Transport Network Aware Mobility for 5G

draft-clt-dmm-tn-aware-mobility-04

IETF 105 DMM Session

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# What is being solved

## Background

REL15: TS23.501/502 specify 5G architecture and procedures for gNB mobility, which is similar to 4G mobility scenarios. These specifications also specify new mobility scenarios which are specific to 5G, viz., UPF mobility.

## Problems

1. With various SSTs (eMBB, URLLC, MIOT):
   - different traffic characteristics needing low and deterministic latency, real-time, mission-critical or networked AR/VR on 5G networks (end-to-end) i.e. including N3/N9.
   - However, with current approach, it is difficult to provide SLA guarantees for the above, in various 5G procedures (including mobility).
   - This is mostly because 5G architecture focused only on Radio Access Network and Core Network and backhaul transport network is not seen in an integrated fashion.
2. An under specified mapping function from 3GPP PDU session to transport network paths. Where multiple technologies are possible in backhaul network to create the transport path.

# Recap (presented previously)

**This work was first presented at IETF102, DMM WG**

## Objective

- Creating  reference architecture to integrate the transport backhaul network in 5G Service based Architecture.
- Providing a clear mapping function to integrate the PDU session to the underlay TE paths, which can be established with various IETF transport technologies.
- Describe how Preferred Path Routing (PPR) [I-D.chunduri-lsr-isis-preferred-path-routing] fits into this framework in various 5G mobility scenarios (with all SSC modes) including N9 interface.
- Framework defined here supports other IETF TE technologies

## Note

- This proposal doesn’t remove GTP, rather assumes a overlay like GTP is existing
  - The approach specified does not change introduce any 3GPP architectural change
  - And it can work with any encapsulation (including GTP-U) for the N9 interface

# Changes in Revision 04

## 1. Mapping between 5G, Transport slices (addressed in new Ch 2.2) *

a) How to map slice, QoS of user in 5G domain to transport domain?

5G QoS (5QI) and slice information (NSSAI) based on service offered to UE (client).
Transport Network QoS and slice related to service it offers to clients (5G domain, CDN, etc.)
Mapping NSSAI, 5QI of PDU session to "transport slice" needed.

b) Separate Transport Network edge and 5G User Plane Network Function

5G User Plane Network Functions may not host transport Provider Edge (PE)
This was identified in draft-ietf-dmm-5g-uplane-analysis

c) Transport between 2 5G functions may cross multiple L2 networks

5G UP functions may be hosted in data centers, with backhaul network in between.
Carrying slice mapping info in IP layer (header extensions ?) avoids L2 issues.

## 2. Revision of Integrated approach (Ch 2.1), PPR underlay (Ch 3)

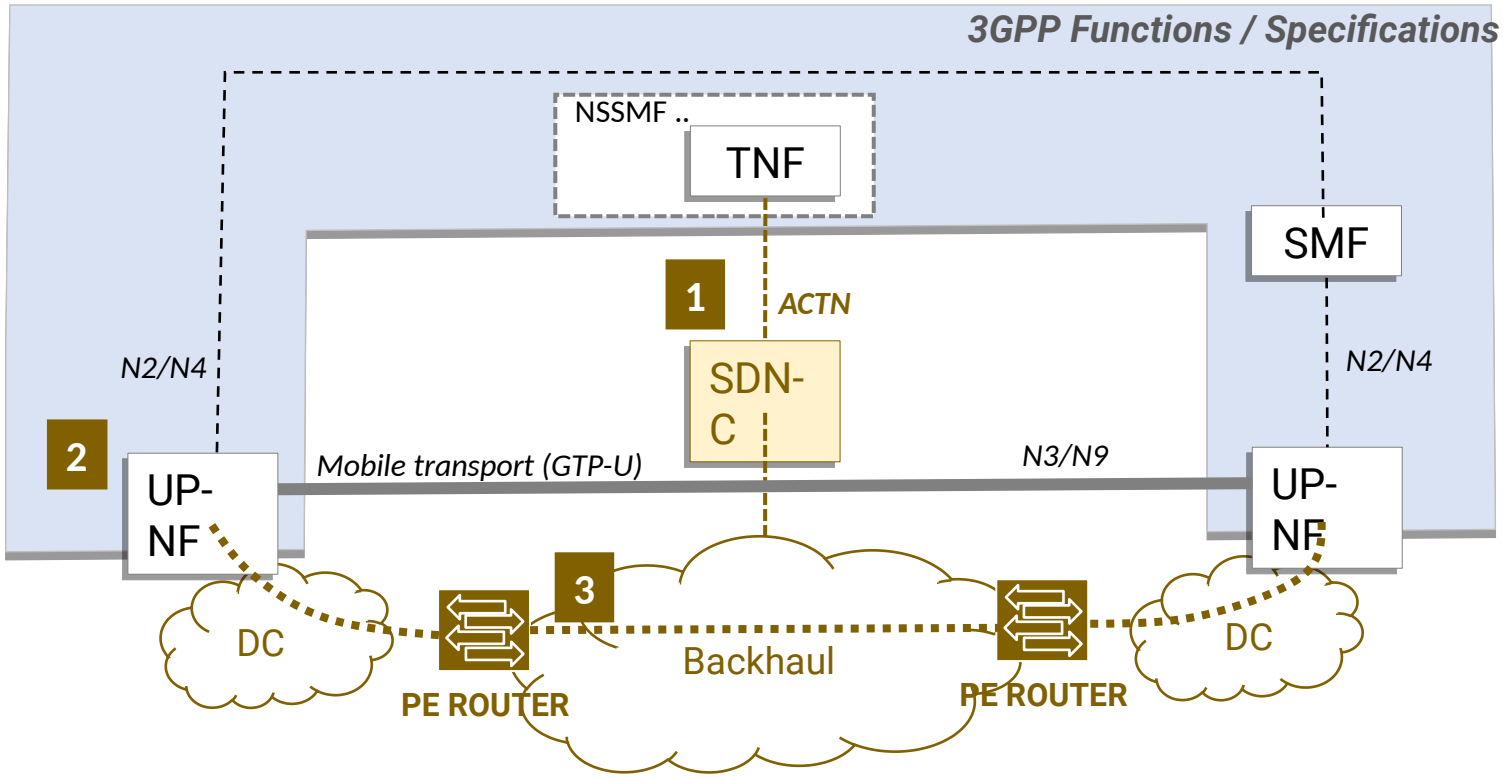
* NOTE: draft-lee-teas-actn-5g-transport-00 addresses this from an ACTN / Transport network side.

# Transport Context Identifier

*MTNC (Mobile Transport Network Context)*

- Identifier that maps a class of service (QCI, slice) in 3GPP domain to slice instance in transport domain.
- Generated by TNF, unique id per path and service offered in transport network
- Not a 1:1 association between PDU session and MTNC identifiers
- MTNC generated prior to PDU session establishment – thus no additional delay
- Identifier scales well.
  "T" traffic classes across "N" sites require only a maximum of (N* (N-1)/2) * T
  (E.g., T = 3, N = 25; MTNC ids required is 900)

# Mapping 5G slice/QoS to Transport Network path



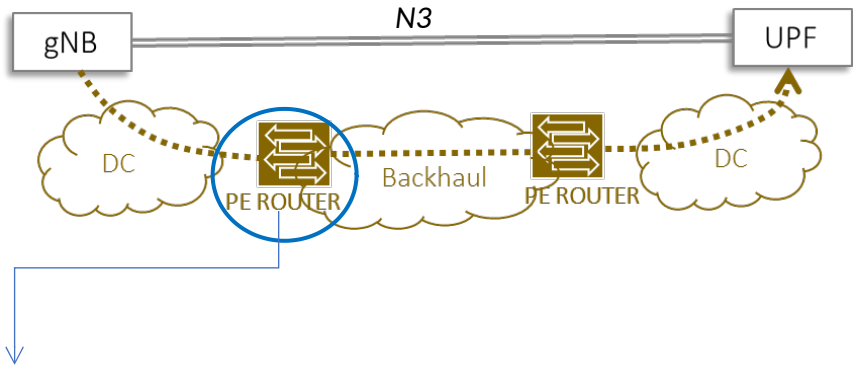

1. Program MTNC identifier: TNF ⎵ SDN-C ⎵ PE Router
2. UP-NF classifies PDU session packet; inserts MTNC identifier
3. PE router inspects MTNC identifier; grants provisioned resources (segments/labels, …)

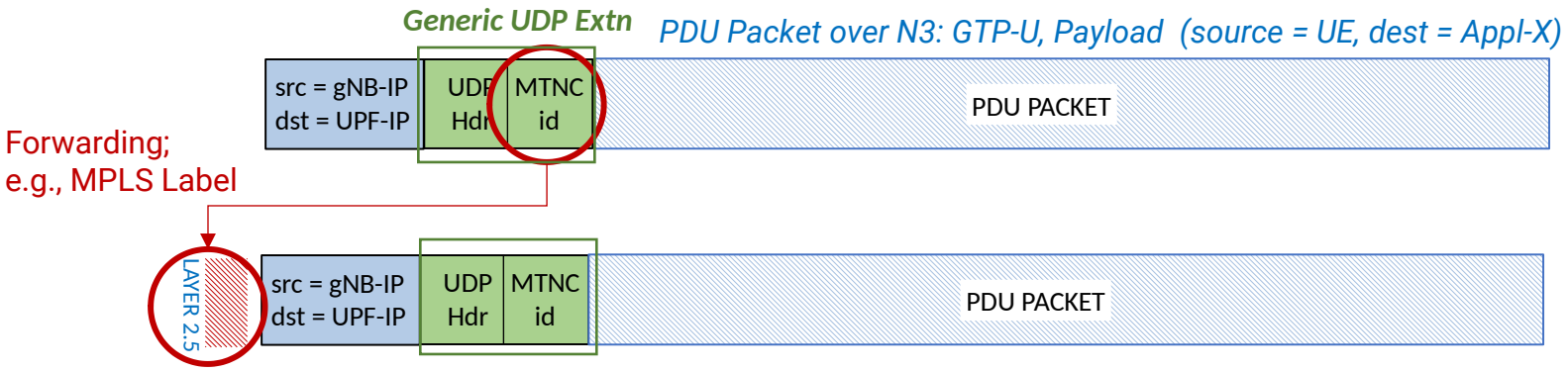
# Carrying Transport Context in IP Packet Header Extensions

- L2 not suitable: More than one L2 networks between 5G functions
- GTP-U Extension not ideal: this is for signaling between 3GPP functionality
- DSCP, IPv6 Flow label fields are not immutable (thus not suitable)

GUE, SRv6 are potential candidates for carrying this data.

Example: Processing at PE Router with GUE:
(gNB classifies and inserts MTNC identifier)




(NOTE - Similar mechanism with SRv6 is possible)

# Next Steps

Looking for comments and suggestions.

Any input / thoughts on slide 7?

Will be working to unify both approaches in next revision.

Also note related draft:
draft-lee-teas-actn-5g-transport-00 in TEAS WG
Addresses VN provisioning concerns from an ACTN / Transport network side.