Transport Network Aware Mobility for 5G
draft-clt-dmm-tn-aware-mobility-05
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Authors: Uma Chunduri (presenter)   John Kaippallimalil (presenter)
Richard Li   Jeff Tantsura
Sridhar Bhaskaran   Luis Contreras
Praveen Muley

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Recap..

1. This draft was first presented in July 2018, @IETF102, Montreal ('00' version)

2. An updated version is presented Nov 2018 @IETF103 Bangkok

3. At last IETF, July 2019
   2 approaches presented for the framework and multiple options for carrying MTNC-ID

   Current version unifies these approaches and narrows down the choices to carry MTNC-ID

What is being solved (Recap..)

Background

REL15: TS23.501/502 specify 5G architecture and procedures for UE mobility, which in addition to 4G-like mobility (SSC mode 1), also specifies SSC mode 2 (PDU session break before make) and SSC mode 3 (PDU session make before break).

Problems

1. No transport network awareness -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 @ IETF105)
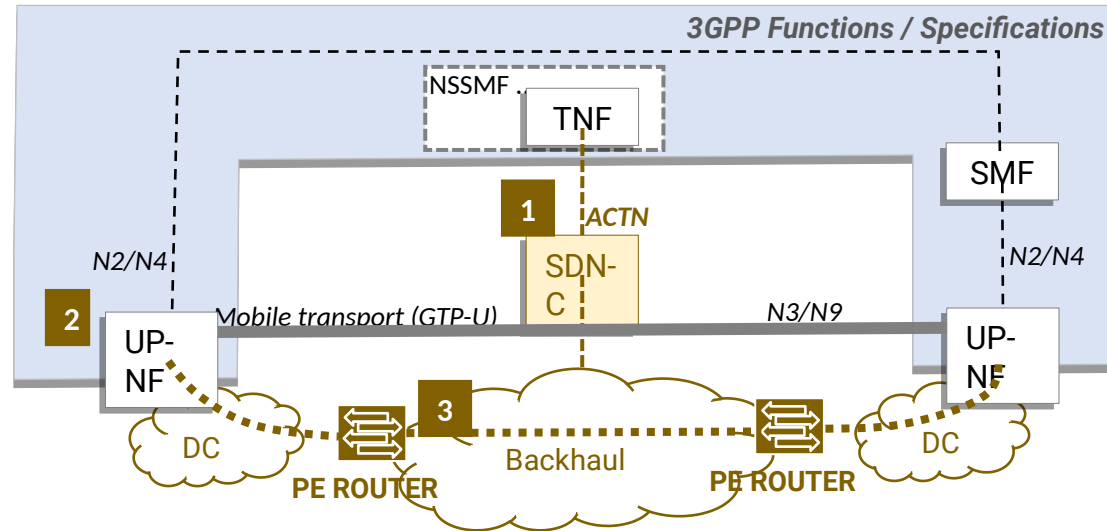
This work was last presented at IETF105, DMM WG

- Introduced concept of Mobile Transport Network Context Identifier (to carry service/3GPP slice mapping in IP header)
  And mechanisms to provision the MTNC, insert MTNC in IP packet using SRv6, GUE.

- Comment regarding how to carry the context identifier in IP packet
  (suggestion to encode it in lower 64 bits of IPv6 address.)

- Commented that we would be working to unify the discrete and integrated approach.
- Chair & AD comment on right time to liaise with 3GPP

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Changes in Current Version/Revision 05

1. **Simplified Solution Approach (Chapter 2)**
    Last Revision had two alternatives: Discrete and Integrated
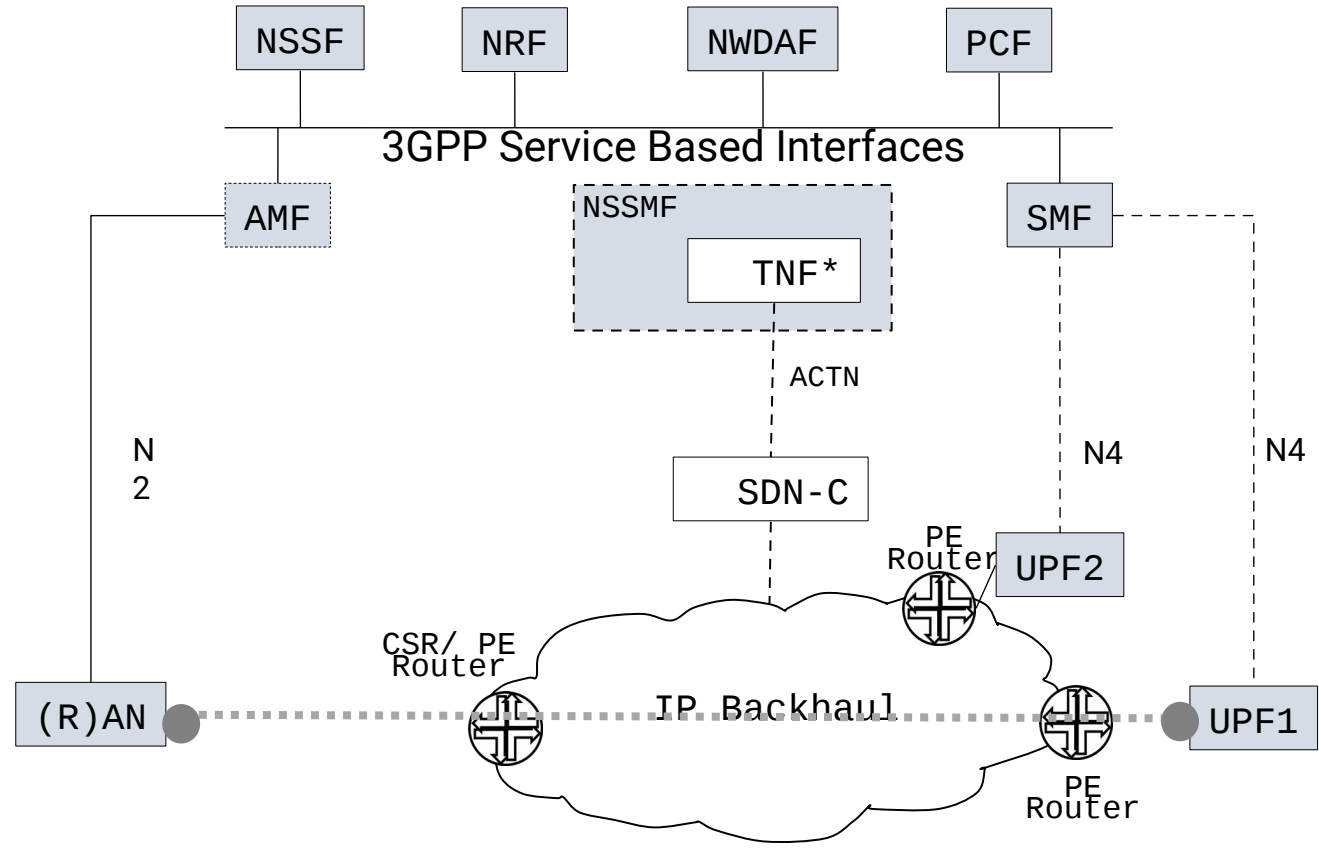   New version has one approach:

2. **Carrying Transport Context in IP Packet Header**
    Added option for encoding context id in outer header $\underline{\pi}$ source UDP Port;
    (removed Generic UDP Extension)

3. **PPR underlay (Chapter 3)**
    Minor updates to reflect changes in the reference architecture.

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Solution Approach: Map 5G slice to Transport Netwo...

NSSF   NRF   NWDAF   PCF

3GPP Service Based Interfaces

AMF

NSSMF
TNF*

SMF

ACTN

N2

SDN-C

N4   N4

PE
Router   UPF2

CSR/ PE
Router

(R)AN   IP Backhaul   UPF1

PE
Router

1. Estimate traffic per slice/path; Provision MTNC Identifier
   TNF ⊐ SDN-C ⊐ PE Router

2. SMF Programs UP-NFs:
   NSSAI (3GPP slice info) ⊐ MTNC-ID

3. UP-NF (RAN, UPF) maps the MTNC-ID in user plane packets from user

4. PE router inspects mapped slice identifier; grants provisioned transport resources.

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Carrying Transport Context in IP Packet Header Extensions

Carrying slice instance information in IP Packet:
- DSCP (not an immutable field)
- VLAN (L2, cannot cross L3 boundaries)
- L3 VPN (rigid provisioning)
- GTP Extn Header / QFI (too deep for per packet inspection)

- PPR (as it's a pure underlay TE mechanism for IPv4/IPv6/MPLS−
  this is orthogonal & MTNC value can be used for path mapping)
- SRv6 as overlay with or without GTP− for IPv6 networks (not for IPv4)
- Source UDP Port of encapsulated Packet (works for IPv4 and IPv6)
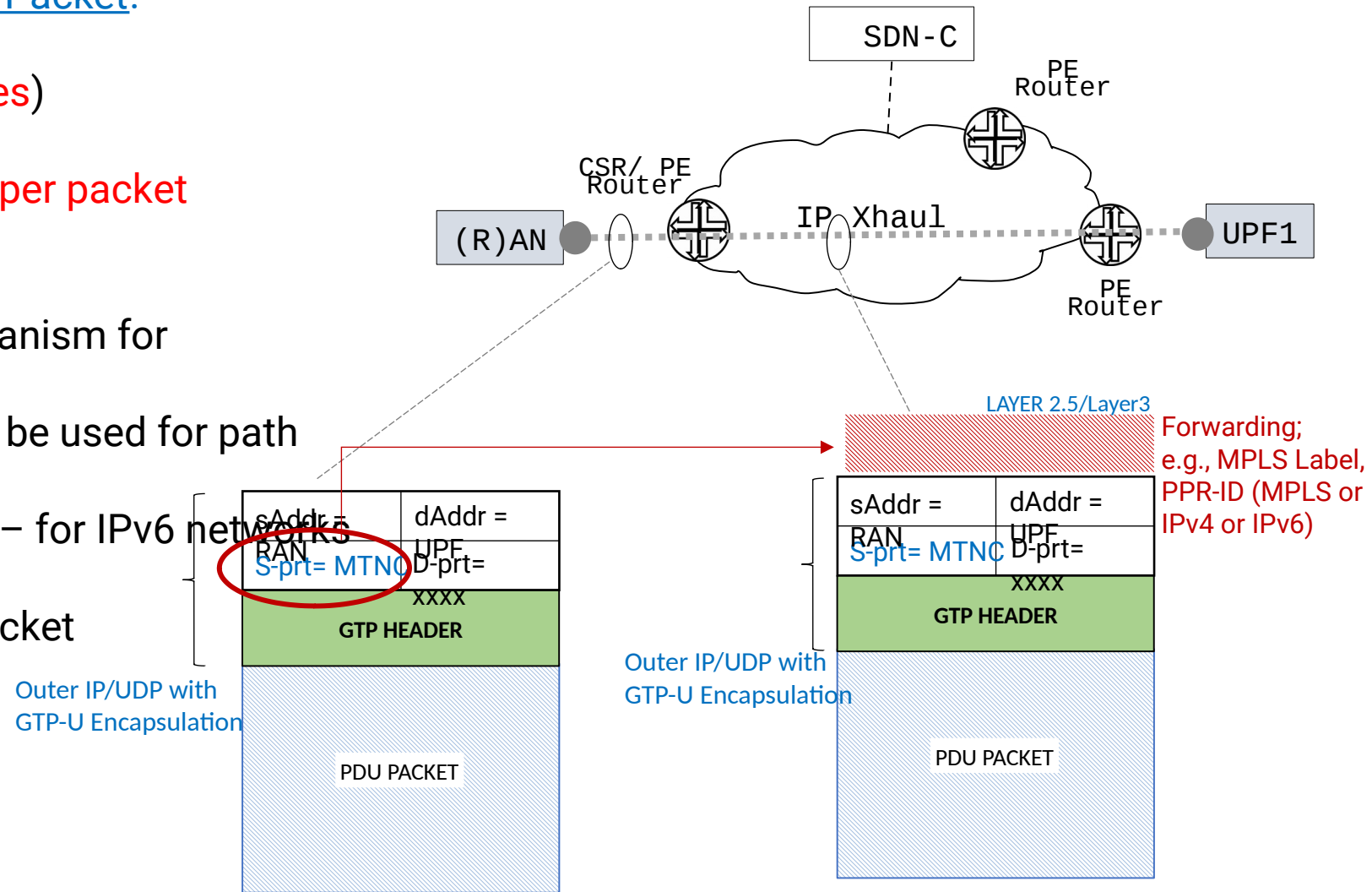
(NOTE - Similar mechanism with SRv6 is possible)

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Further comments on the draft?

Next Steps:

We ask for WG adoption.

Thank You!

Backup Slides

Transport Context IDentifier

MTNC (Mobile Transport Network Context)

o Identifier that maps a class of service (QCI, slice) in 3GPP domain to slice instance in transport domain.

o Generated by TNF, unique id per path and service offered in transport network

o Not a 1:1 association between PDU session and MTNC identifiers

o MTNC generated prior to PDU session establishment – thus no additional delay

o 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)