Enabling ICN in 3GPP's 5G NextGen Core Architecture

https://www.ietf.org/id/draft-ravi-icnrg-5gc-icn-04.txt

Ravi Ravindran, Prakash Suthar, Dirk Trossen, Chonggang Wang, Greg White

IETF-105, ICN RG, July 2019

Introduction

- Related WG Draft
  - draft-irtf-icnrg-icn-lte-4g-03 (Native Deployment of ICN in LTE, 4G Mobile Networks), enabling ICN over 4G systems.
  - draft-trossen-icnrg-ip-icn-5glan-00 (IP over ICN over 5GLAN), utilizing solutions outlined in 5GLAN section

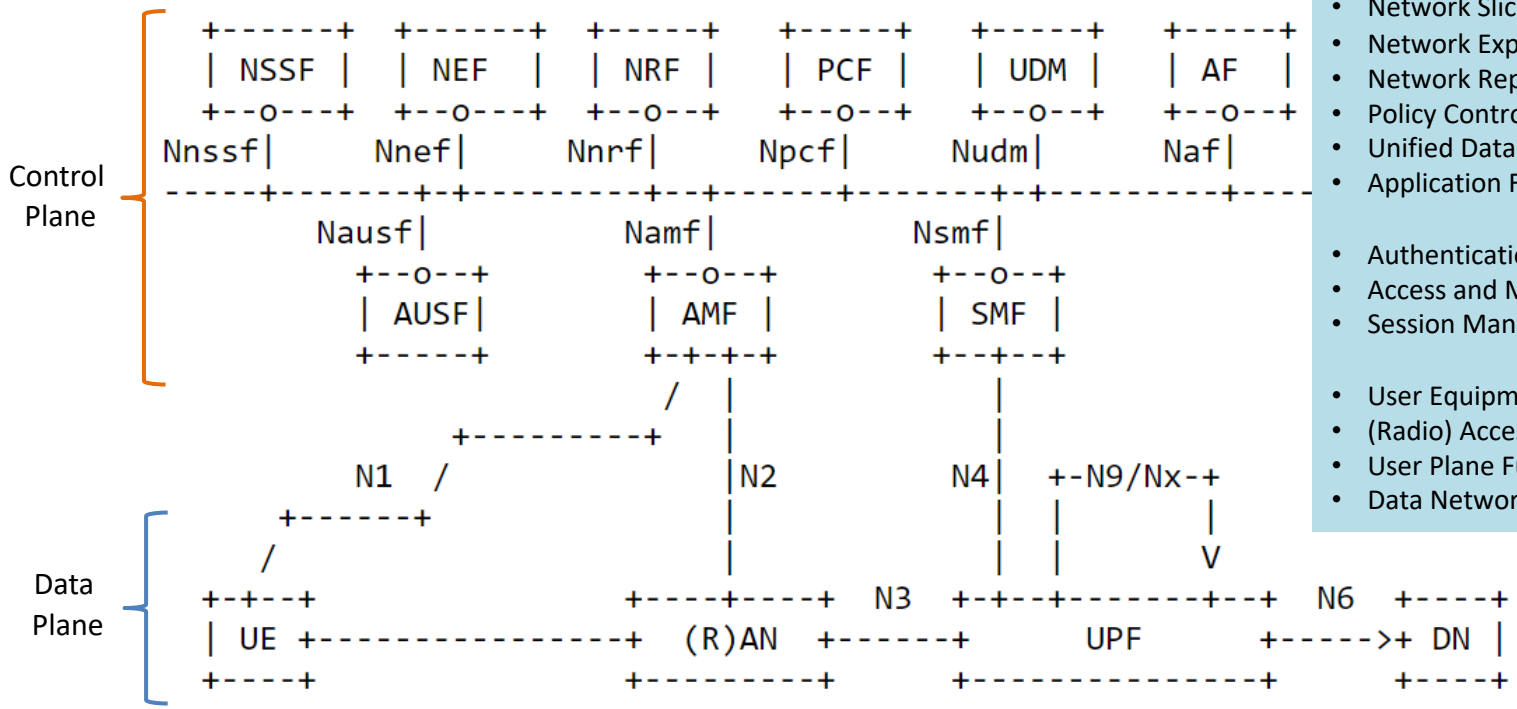
- The present I-D: draft-ravi-icnrg-5gc-icn-04
  - To enable ICN over 5G systems.
  - Leverage some similar design principle in draft-irtf-icnrg-icn-lte-4g-03 with some extensions unique to 5G systems.

Updates in v04

- Combined “4. 5G NextGen Core Architecture” & “5. 5GC Architecture with ICN Support” from v03
- Simplified “6. 5GC Architecture with 5GLAN Support” from v03
  - Removed “IP over ICN over 5GLAN” to a separate I-D (draft-trossen-icnrg-ip-icn-5glan-00)
  - Only kept “ICN over 5GLAN” in current v04.
- Added new description on “Deployment Considerations” in current v04.
  - Based on guidelines outlined in draft-irtf-icnrg-deployment-guidelines-06

Recap : 5GC Architecture

Non-Roaming & Service-Based Interfaces (SBI)



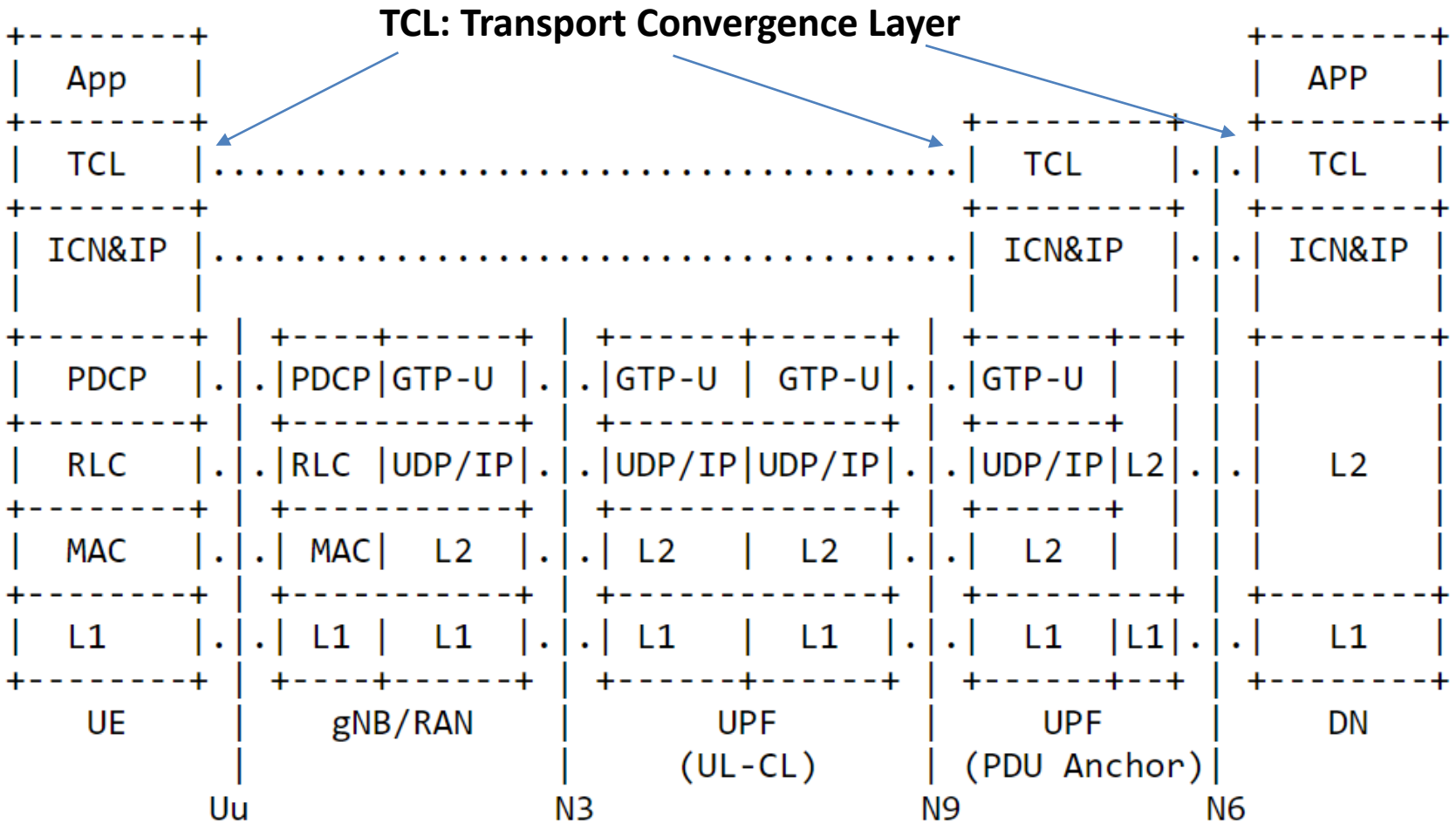
- Network Slice Selection Function (NSSF)
- Network Exposure Function (NEF)
- Network Repository Function (NRF)
- Policy Control Function (PCF)
- Unified Data Management (UDM)
- Application Function (AF)

- Authentication Server Function (AUSF)
- Access and Mobility Mgmt Function (AMF)
- Session Management Function (SMF)

- User Equipment (UE)
- (Radio) Access Network ((R)AN)
- User Plane Function (UPF)
- Data Network (DN)

5GC Design Principles

ICN over 5GS – User Plane Dual Stack

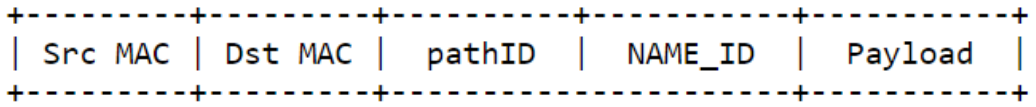


ICN over 5GLAN

- Path-based Forwarding over Nx Interface for End-to-End LAN Communication
  - Path between UPFs encoded through a path identifier.
  - Path identifiers are bidirectional and can therefore be used for request/response communication without incurring any need for path computation on the return path.
  - Several path identifiers can be combined into multicast path identifiers, used in IPoICNo5G draft for multicast of HTTP responses

- Realizes sending a packet from one Layer 2 device (UE) connected to one UPF (via a RAN) to another L2 device connected to another UPF through
  - Provide MAC address of the destination and perform path-based forwarding between ingress to egress UPF
  - Upon arrival at the egress UPF, the end destination MAC address is being used for UPF-local forwarding, creating the perception of a link-local L2 communication between the end source and destination devices.

General Packet Structure:



Next Steps

- Collect feedback from ICNRG
  - Address any comments during/after the IETF 105

- Request for WG adoption
  - To be a companion WG document to draft-irtf-icnrg-icn-lte-4g-03