

# Realization of Composite Network Slices

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# Background

- RFC 9543 describes the concept and general framework for requesting and operating network slices using IETF technology
  - Network slice services can be realized by mapping one or a group of slice connectivity constructs to a network resource partition (NRP)
- In some scenarios, the network slices and NRPs may span multiple domains, or may be further sliced to provide connectivity and fine-granular resources in a hierarchical manner
  - These multi-domain or hierarchical network slices are called composite network slices
  - This document describes the possible use cases of composite network slices
  - It also provide some realization considerations of composite network slices in data plane, control plane and management plane
  - Protocol extensions are not in the scope of this document

# Composite Network Slice Use Cases

- 5G end-to-end network slice
  - 5G end-to-end network slices consists of slice subnets in RAN, Mobile Core and Transport networks
  - In transport network, 5G E2E slices may be supported using multi-domain IETF network slices
  - A multi-domain IETF network slice can be mapped to a multi-domain NRP
    - Similar to inter-domain VPN, with additional resource and performance commitments
- Hierarchical network slices
  - Customer network slices in each industrial network slice
  - Application network slices in each customer network slice
  - Network slice services provided in each wholesale network slice

# Composite Network Slice Realization Considerations

- Resource Partitioning
  - Network resource needs to be partitioned in each network domain or hierarchy
  - Technologies used for resource partitioning could be different in different domains or hierarchies
- Network slice related identifiers
  - Inter-domain NRP ID may be needed when the assignment of NRP ID in different domains can not be coordinated
  - 5G network slice ID (S-NSSAI) may need to be visible in transport network for 5G slice service mapping and monitoring
- Data plane encapsulation
  - The encapsulation of multi-domain NRP ID and hierarchical NRP ID
- Control plane considerations
  - The role of centralized controller and distributed control plane
- Management plane considerations
  - The planning and management of NRPs in different domain/hierarchy needs to be coordinated

# Updates in -02 version

- Aligns the descriptions with IETF network slice framework (RFC 9543)
- Adds a reference to IP/MPLS network slice solution draft
- Elaborates the scenarios in which multi-domain NRP ID may be needed
- Clarifies that for hierarchical network slices, NRPs may need to be partitioned hierarchically
- Elaborates the control plane of composite network slices

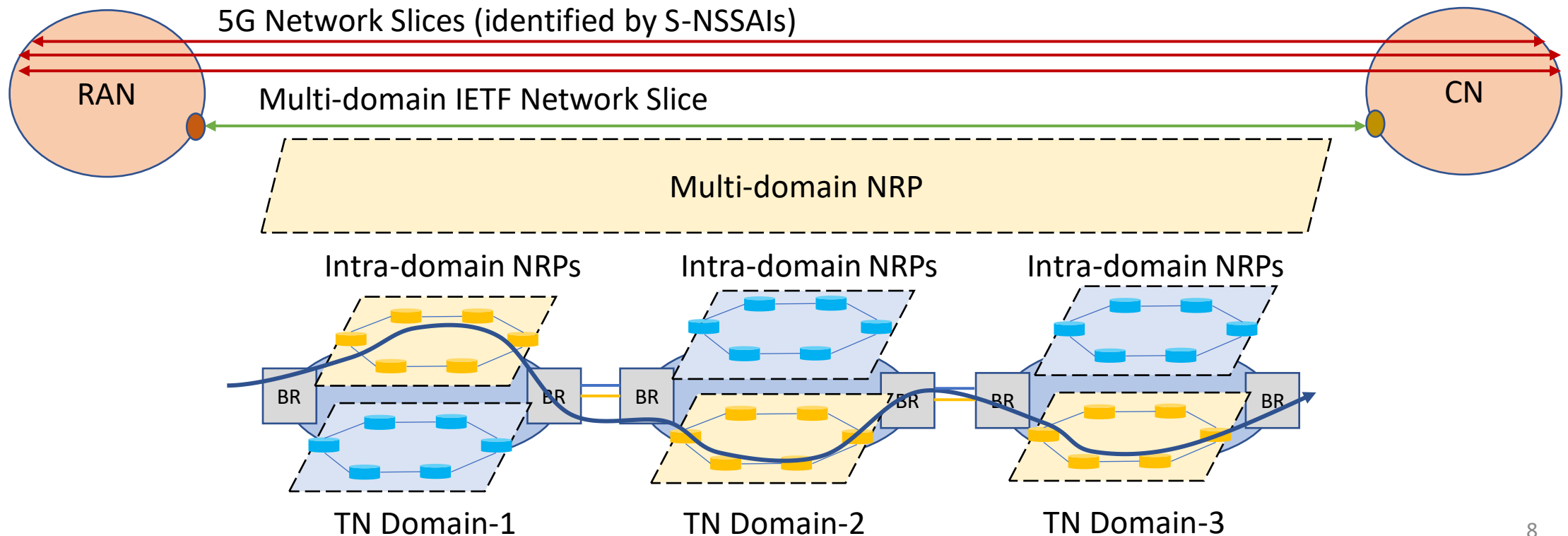
# Next Steps

- Multi-domain and hierarchical network slices are considered advanced applications of RFC 9543 network slice
  - This document is complementary to the base network slice framework and other documents on network slice realization
- The content of this document becomes stable
- Further comments and feedbacks are welcome
- Consider WG adoption?

Thank You

# Multi-domain IETF network slice Use Case

- 5G End-to-End network slice as an example
  - 5G end-to-end network slices consists of slice subnets in RAN, Mobile Core and Transport networks
  - In transport network, 5G E2E slices can be carried in a multi-domain IETF network slice
  - The multi-domain IETF network slice can be mapped to a multi-domain NRP
    - Similar to inter-domain VPN, with additional resource and performance commitments





# Hierarchical IETF Network Slice Use Cases

- Multiple customer network slices in an industrial network slice
  - Level-1: Education network slice
  - Level-2: University-A network slice
- Multiple application network slices in a customer network slice
  - Level-1: hospital network slice
  - Level-2: medical service network slice
- Provide network slice services in a wholesale network slice
  - Level-1: wholesale network slice
  - Level-2: customer network slice

