A Framework for Enhanced Virtual Private Networks (VPN+)

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Recap of this Document

• Describes a framework for enhanced VPN service (VPN+)
  • To meet the requirements of 5G network slicing and other generic scenarios
• Analyses candidate technologies in different planes/layers
  • Enhanced underlay data plane
    • Mechanisms to provide different levels of service SLA guarantee
  • Virtual network instantiation
    • Data plane
    • Control plane
  • Management plane
    • Dynamic creation, modification and deletion of virtual networks with required SLA
  • OAM, Resiliency, etc.
VPN+ Architecture

Service Requests

Network Controller

Service interface/data models

Centralized management & control

Virtual networks

Enhanced data plane
Updates after IETF 104 -- Definition

- Describes the role of transport network in 5G network slicing
  - 5G end-to-end network slice consists of three major network segments:
    - Radio Access Network (RAN), Transport Network (TN) and Core Network (CN).
    - Transport network provides the required connectivity within and between RAN and CN parts of a 5G network slice, with specific performance commitment.

- Provides a definition of transport network slice
  - A transport network slice is a virtual (logical) network with a particular network topology and a set of shared or dedicated network resources, which are used to provide the network slice consumer with the required connectivity, appropriate isolation and specific Service Level Agreement (SLA).
Updates after IETF 104 -- Data plane

• Reduce & refine the description of segment routing (SR)
  • SR is one of the candidate technologies for virtual network instantiation
  • Analyzes the gaps in current SR, and the direction for possible enhancement
    • Current SR SIDs as topological instructions, SR-TE steering at the link granularity
    • Fine-granular packet steering may be introduced in SR for enhanced characteristics
Updates after IETF 104 -- Management plane

• Applicability of existing data models in enhanced VPN management

3GPP Network Slice Management Architecture

- CSMF
- NSMF
- TN-NSSMF

ACTN Architecture

- CNC
- MDSC

Customer facing VN Model

- VN Telemetry Model (VN Telemetry)

Customer facing LxSM Model

- TE Service Mapping

MDSC

- VN Model
- VN Telemetry Model

The diagram illustrates the data models and functions related to network slice management, including TE Tunnel/Topology Models, L2 and L3 VPN service delivery, VN service delivery, and topology abstraction.
Other Updates

• Add descriptions of Telemetry

• Improve the scalability considerations

• Improve the security considerations

• Editorial changes
Relationship with NS Design Team

• NS design team reached some agreement on transport network slice definition
  • Aligns with the definition provided in this document

• The current scope of NS design team will focus on northbound interface and data models
  • This document describes a complete architecture

• Suggestions about reusing existing work
  • Use VPN+ framework as the base for transport network slice definition and architecture
  • New drafts on use cases and data models as design team deliverables
Next Steps

• Solve received comments

• Work together with design team to polish the definition and architecture in this document

• Make this document ready for WG last call
  • Finish operational considerations
  • Go through and refine the whole document