Overview of Enhanced VPN Framework (VPN+)

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Purpose of This Draft

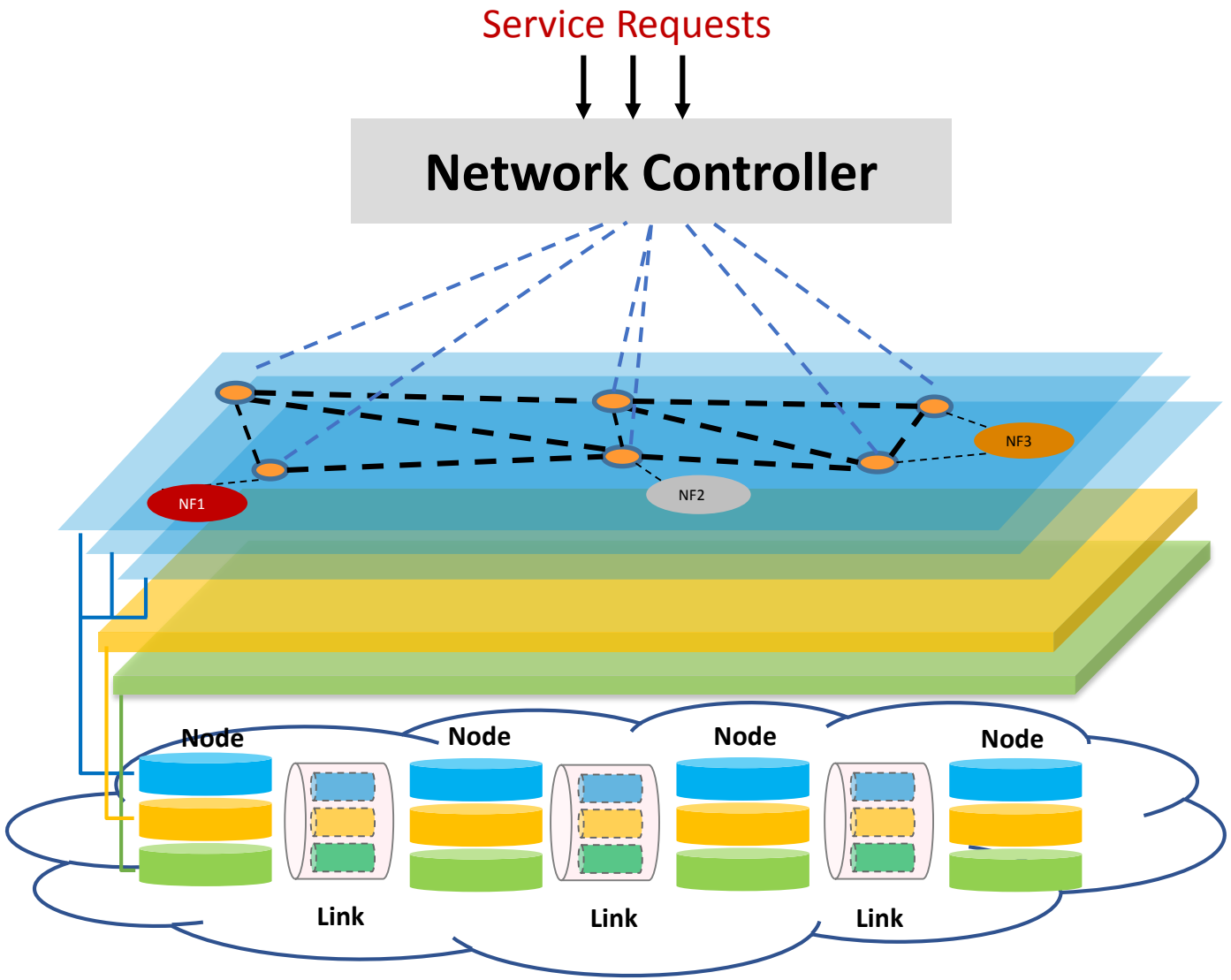
- Describes an architecture and the potential enhancements to VPN services to support emerging new requirements, particularly network slicing in a 5G scenario.

- Guides the integration of the existing, enhanced, and new technologies to build a solution for enhanced VPN services

Enhanced VPN Why?

- New applications
  - Particularly applications associated with 5G services
  - “Enhanced overlay services”
- New requirements
  - Isolation from other services
    - Changes in network load or events in other services have no effect on the throughput or latency of this service
    - Drives some form of “partitioning” of the network – Network Slicing
  - Performance guarantees
    - Bandwidth, latency limits, jitter bounds
  - Some level of client control of underlay resources
- Existing technologies
  - VPNs have served the industry well
    - Provides groups of users with logically isolated access to a common network
  - Re-using existing tools, techniques, and experience is very effective
  - Look for an approach based on existing VPN technologies
    - Add features that specific services require over and above traditional VPNs – Enhanced VPN (VPN+)

Architecture of Enhanced VPN



Service Interface/models

Centralized control & management

Customized Virtual Networks
(overlay & underlay integration)

Enhanced data plane
(resource reservation, scheduling)

Slicing Explained

Scope of This Document

- Enhanced data plane
  - Different levels of isolation (from soft isolation to hard isolation)
  - Determinism of packet loss and delay
  - Identification of network slice and the associated network resources
- Control protocols
  - Both centralized and distributed
  - Information distribution, collection and computation to build the required virtual networks
  - Scalability considerations: the amount of state introduced
- Management plane
  - Life-cycle management: planning, creation, modification and deletion
- OAM, protection, inter-domain/inter-layer considerations

Candidate Technologies

Layer 2 Underlay Data Plane	• Flexible Ethernet (FlexE) • Dedicated queues • Time Sensitive Networking (TSN) • …
Layer 3 Underlay Data Plane	• MPLS-TE • SR-MPLS/SRv6 • Detnet • …
Control Plane	• Distributed: RSVP-TE, IGP, BGP… • Centralized: PCEP, BGP-LS…
Management Plane	• ACTN architecture and data models • Service models: L3SM, L2SM, etc.

Enhanced Data Plane

- The foundation of service performance assurance
- Many new work in progress to solve the requirement of low/bounded latency, jitter and packet loss, scalability, etc.
- Need to figure out which and how to integrate into VPN+ architecture
- See further discussion about soft and hard isolation

Next Steps

- This document has been adopted by the TEAS working group
- Incremental updates have been made according to received comments
- Plan to update the draft to reflect the new requirements and technologies introduced recently