

# Routing and Forwarding in Support of Network Slicing

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# What Do I Mean By Network Slicing?

- A two layer network where:
  - The underlay provides the resources and the overlay serves the tenant.
  - The tenant can have the degree of static and dynamic isolation needed to support soft and hard slicing, and the complete spectrum in between.
    - Hard slicing – model is separate physical networks.
    - Soft slicing – model is classic packet multiplexing.
  - The underlay provides compute and storage in addition to connectivity.
  - The overlay is specific about its demands on the underlay – much tighter coupling between the underlay and overlay than usual.
  - The underlay provides the tenant with a rich instruction set to specify the actions to be performed on the packets.

# Main Use Cases (for the infrastructure)

- Construction of bespoke networks
  - Tenant/Application class gets the connectivity and compute topology that suits its needs.
- Construction of assured networks:
  - Critical applications that would normally need a private standalone n/w (Emergency Services, Power distribution control etc.)
  - Deterministic application
  - Regulated applications
- Transport of new network types
- Enhancing the capabilities of the Internet network layer will cause new applications to emerge.

# What IETF Work is in Progress/Needed

- Current Activities
  - Segment Routing
  - Service Function Chaining
  - Deterministic Networking
  - ACTN in TEAS
- New Activities
  - Enhance SR with more instructions
  - Fine grained path specification
  - Integrate SR and SFC
  - Carry integrated SR and SFC over IP
  - Strategies to reduce the impact of head of line blocking
- The new activities allow us to build an enhanced VPN (VPN+) which is of general utility.

# What non-IETF Work is Relevant

- Flexible Ethernet – A system for applying a hop by hop TDM structure to Ethernet and is a candidate underlay for NS. (OIF)
- ETSI NGP - An attempt redefining both the N/W layer and the transport layer. Not sure if it will find traction. (ETSI)
- Information Centric Networking – A type of CDN/search engine built into the network layer. (The research community)
- Given that ICN and NGP are both examples of alien network layers and new ones are likely, it is prudent to develop a technical design that can transport such protocols.

# Relevant IETF Drafts

- draft-bryant-rtgwg-enhanced-vpn (will be presented in more detail @ RTGWG on Friday)
- draft-bryant-mpls-unified-ip-sr
- draft-xu-mpls-unified-source-routing-instruction
- draft-xu-mpls-service-chaining
- draft-geng-netslices-architecture
- draft-qiang-netslices-gap-analysis