Slicing the transport network for 5G

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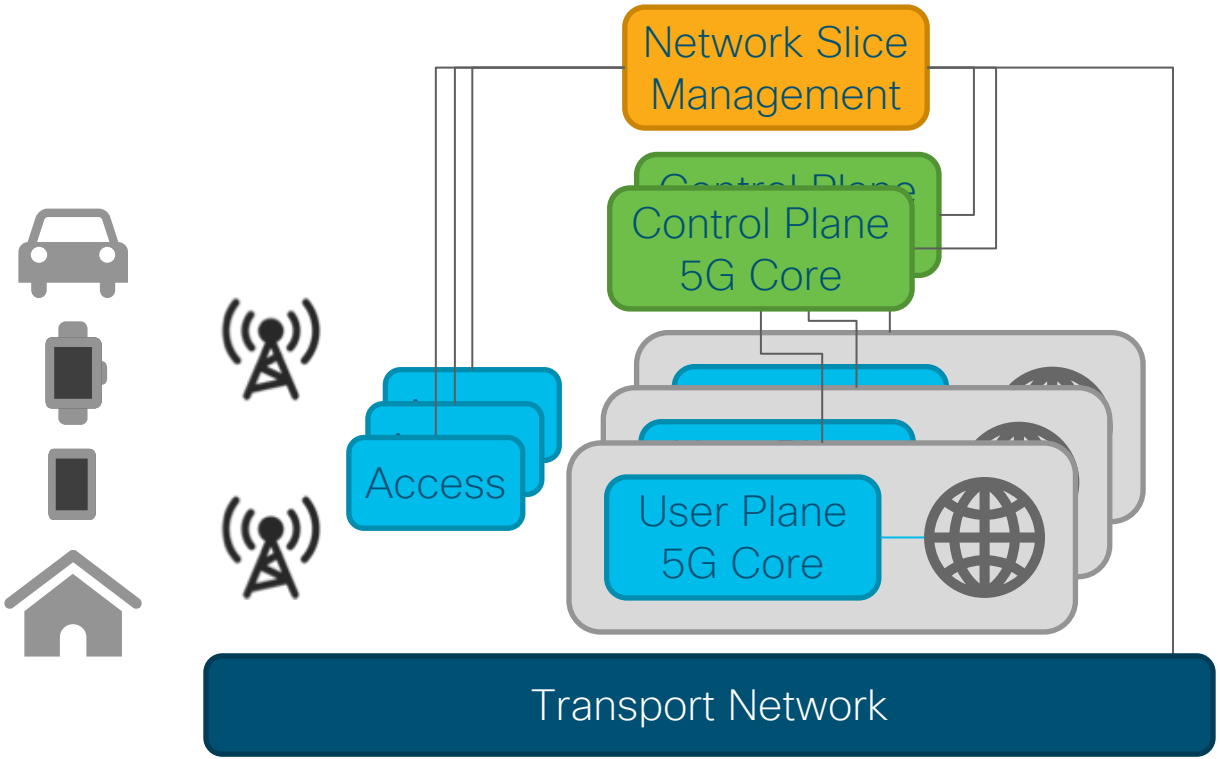
Network Slicing is fundamentally an end-to-end partitioning of the network resources and network functions so that selected applications/services/connections may run in isolation from each other for a specific business purpose

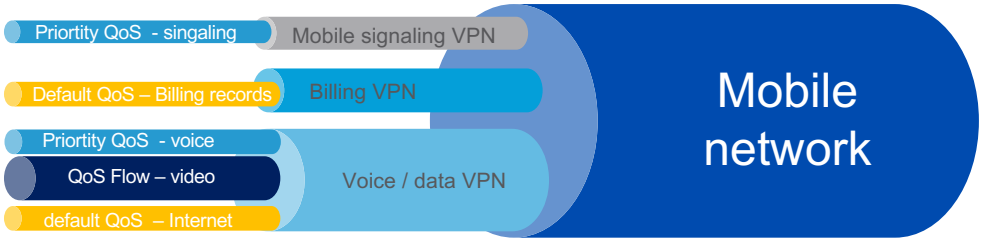
Network Slicing – Customized Network Instances

- Partitioned network resources
  - Replication
  - Configuration
  - Separation
  - Reservation
  - Segmentation
- Separate business purposes
  - Unique service assurance characteristics
  - Alternate policy and charging structure
  - Increased service security
  - Slice allocation through device identity



What is a 5G transport slice

Combination of Virtual Private Networks and QoS separation



The 5G transport slice – what is it ?

- Its evolving rapidly
- Multiple groups involved: NGMN, 3GPP, IETF, ITU-T, MEF

MAIN FEATURES

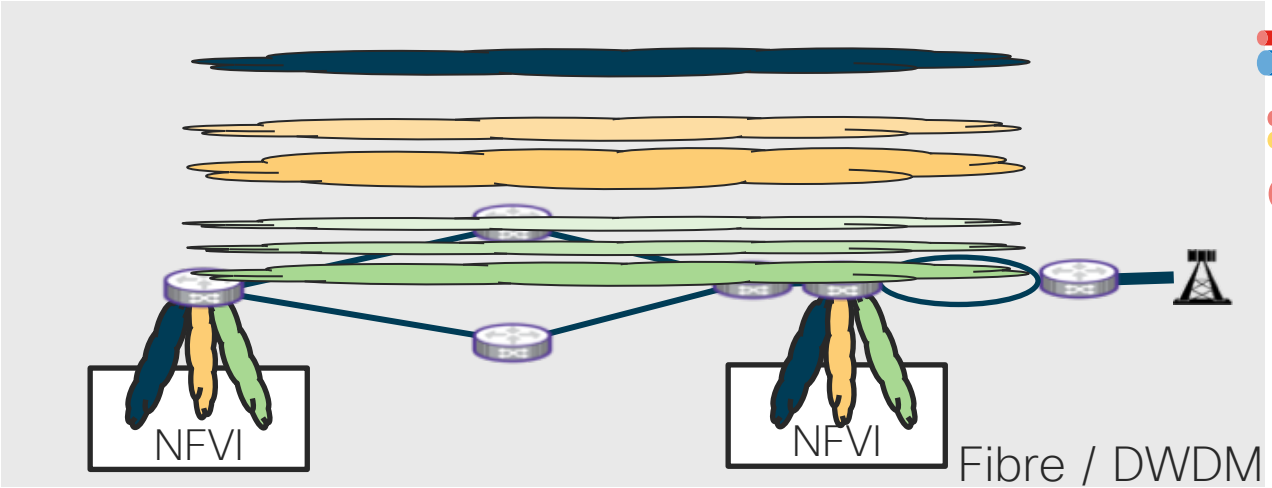
- Management of the network slice
  - Definition of the transport slice
  - Create, deletion and modification of the slice
  - Per slice OAM
- Resource reservation for slice
- Slice Isolation
  - Performance, operational, security, reliability
- Abstraction
  - Virtualization of network function
  - Use of shared compute resources

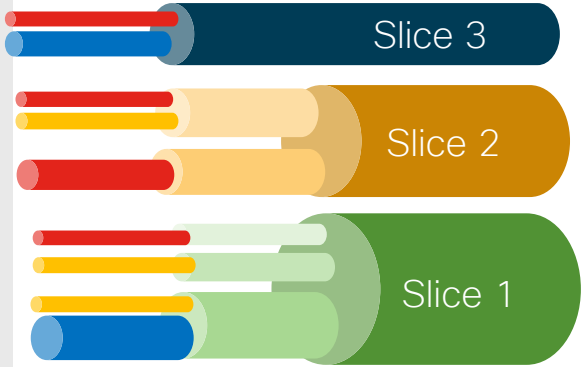
How to construct the slice at the Transport Layer
Hard or soft partitioning

Hard versus soft slicing

- Term coined in IETF
- Hard slicing refers to the provision of resources in such a way that they are dedicated to a specific NSI. Data-plane resources are provided in the data-plane through the allocation of a lambda, through the allocation of a time domain multiplexed resource such as a FlexE channel or through a service such as an MPLS hard-pipe.
- Soft slicing refers to the provision of resources in such a way that whilst the slices are separated such that they cannot statically interfere with each other, they can interact dynamically which means they may compete for some particular resource at some specific time.

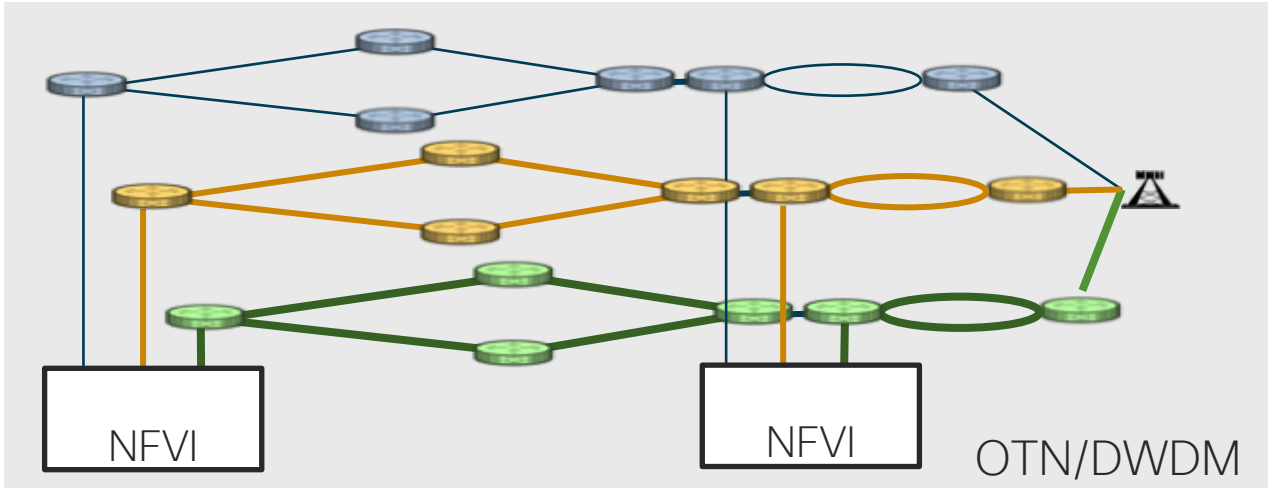
Transport Slicing: The soft slice

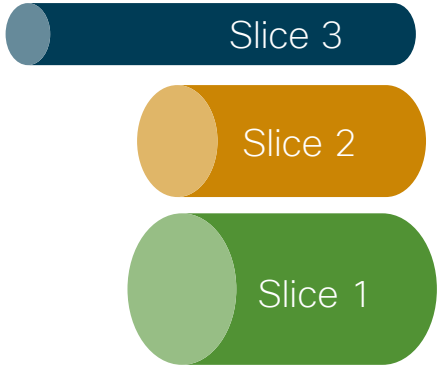




- Common underlay packet transport network
  - Common high bandwidth links
  - Common control plane
  - Diffserv QoS architecture
  - A multi-service platform for both consumer, business, fixed and mobile traffic
- One or more L2/L3 VPNs per slice running over the top
  - VPNs for signaling, billing and user data for traffic separation
  - Use of diffsev QoS to get correct service behaviour
- Realization: Common E2E packet transport underlay network with either network or overlay VPNs. How multi-service SLA enabled mobile and multi-service networks have been built for 20 years

Transport Slicing: The hard slice





- Dedicated packet bandwidth per slice (hard)

  TDM slots or lambdas per slice

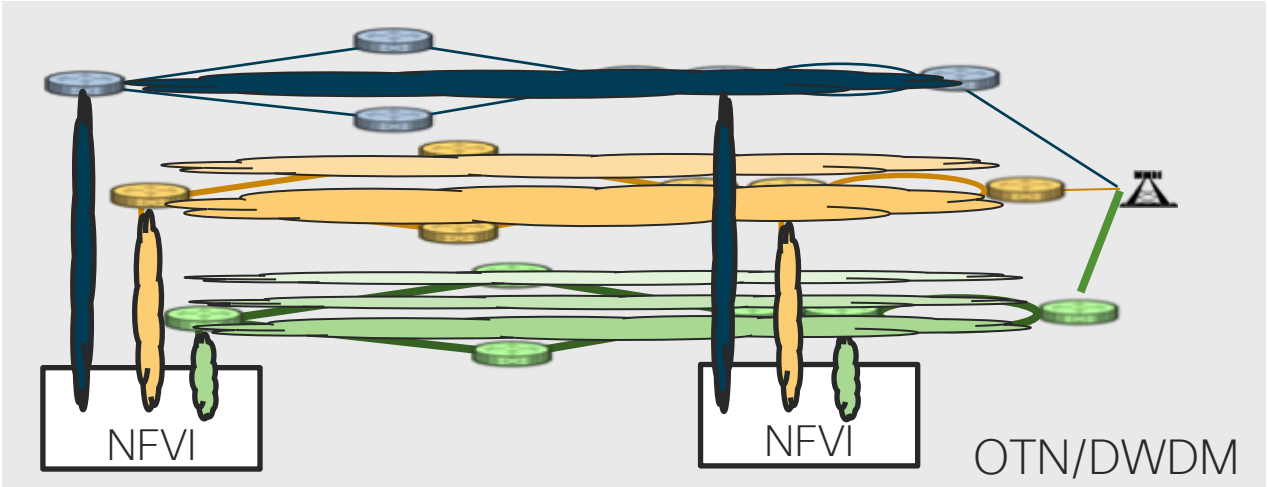
  Use of channelised or sub-tended FlexE onto OTN transport

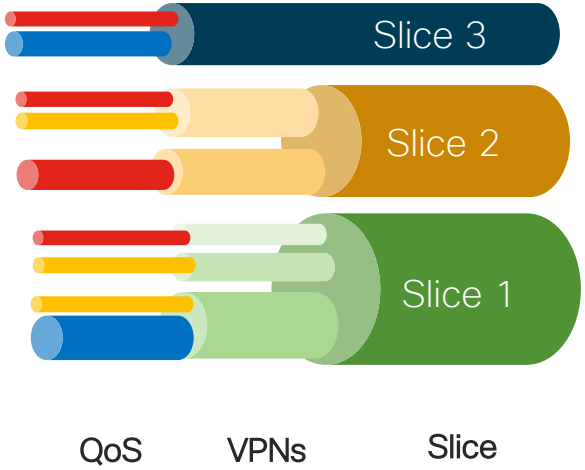
- Dedicated packet transport infrastructure per slice (hardest)

  Dedicated routing resources

- Realization: Multiple E2E packet transport underlay networks using Virtual Routers (slice routers) onto dedicated bandwidth derived from an underlying OTN or DWDM infrastructure

Can a hard slice, by itself, support 5G transport requirements?





- SIMPLE ANSWER IS NO! All a hard slice does is create a discrete L3 network
- We still need:
- IP QoS awareness and scheduling for different traffic types
- VPNs for isolation of different functions within the slice

EVEN A HARD SLICE NEEDS TO IMPLEMENT SOFT SLICES, UNLESS YOU BUILD A DISCRETE NETWORK PER VPN PER QoS CLASS

Summary

- 5G Network Slicing is about creating discrete mobile networks
- Transport slicing is one component of the slice requirement
- Cisco’s SR / diffserv / VPN is a well proven soft slice approach
- Traffic Engineering can harden the approach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