

# Holistic Mobile Transport Network Framework

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01/17-19/2017

IEEE 1914.1 TF



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**IEEE 1914**  
**Next Generation Fronthaul Interface**  
**Jingri Huang, Huangjinri@chinamobile.com**

**Holistic Mobile Transport Network Framework**

**Date:** 2017-01-17 – 2017-01-19

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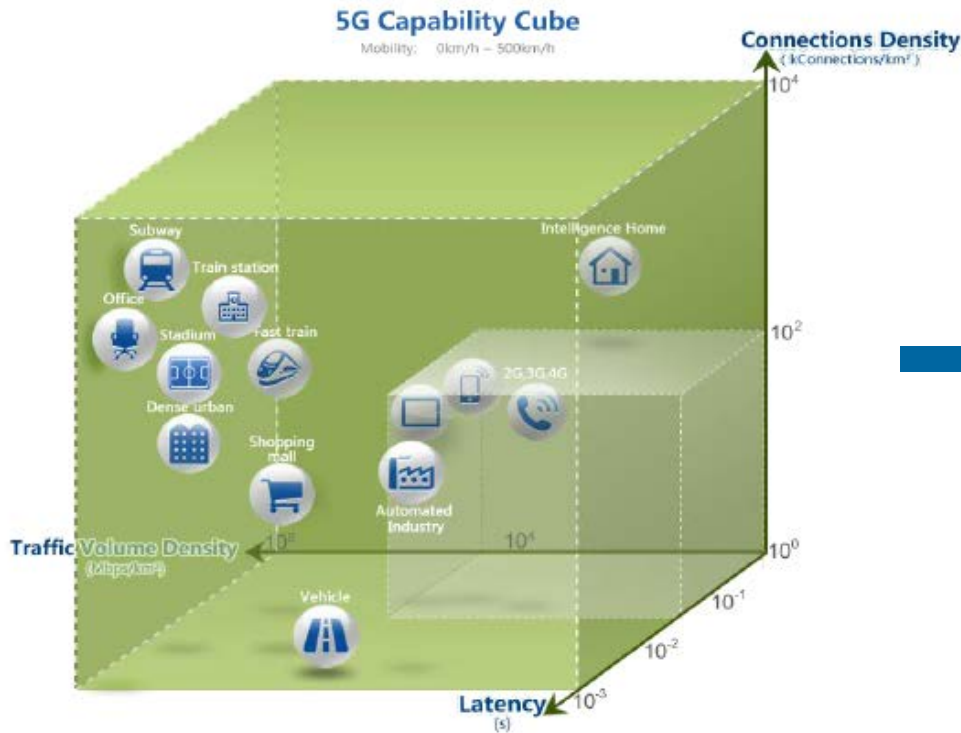
# Agenda

- ❑ Highly Diversified Requirements -> Network Slicing-Customized for EACH
- ❑ Network Slicing Framework
- ❑ Network Slicing Orchestration
- ❑ Mobile Transport Network Paradigm

# Spectrum of 5G Apps and Requirements

## Capability Cube of Future IMT Systems

IMT-2020



Highly Diversified

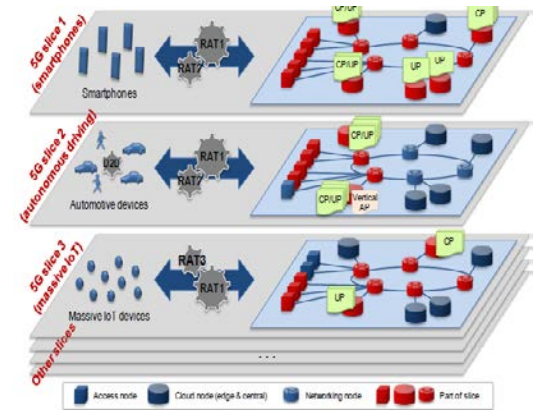
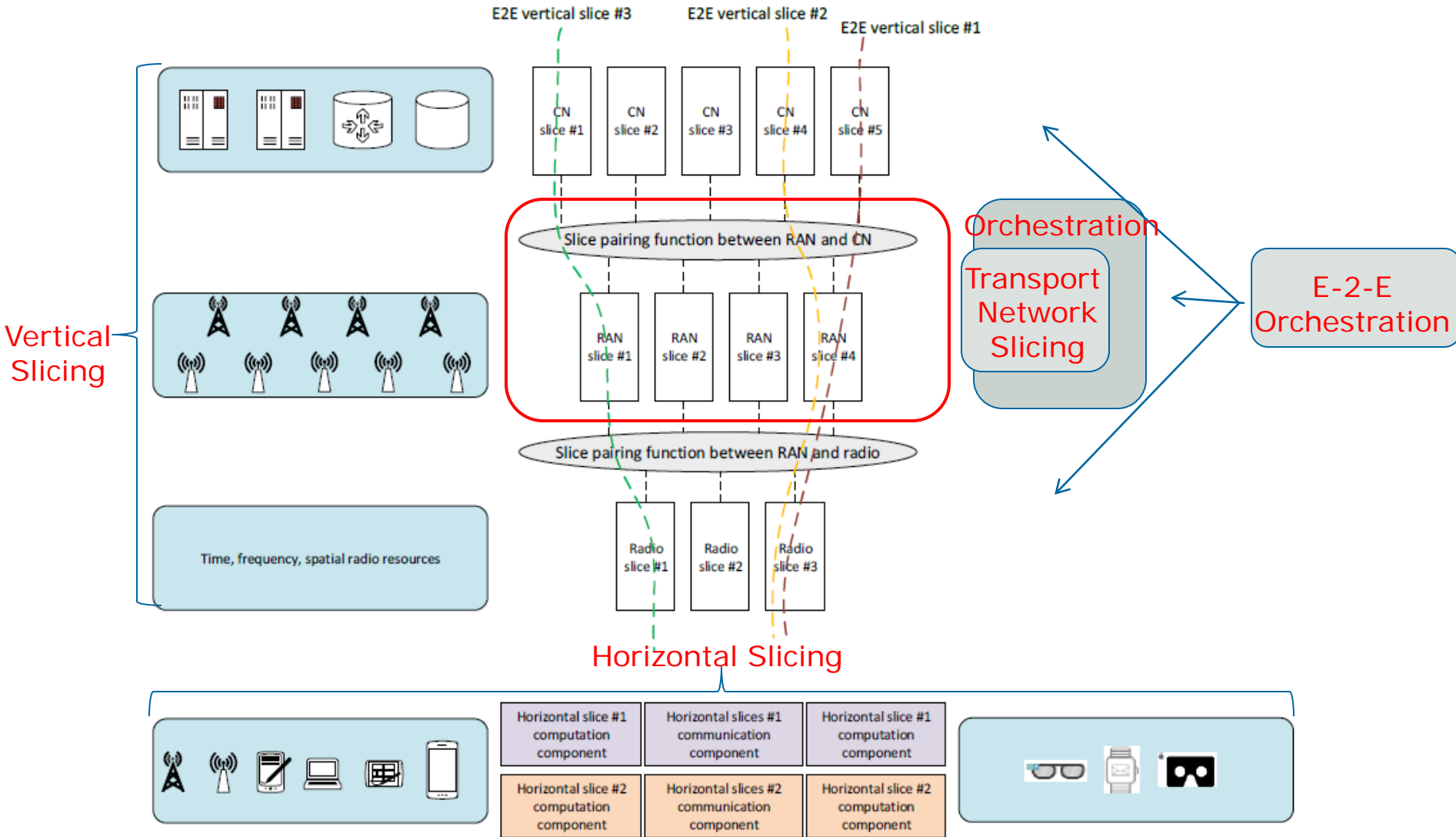


Figure 9: 5G network slices implemented on the same infrastructure

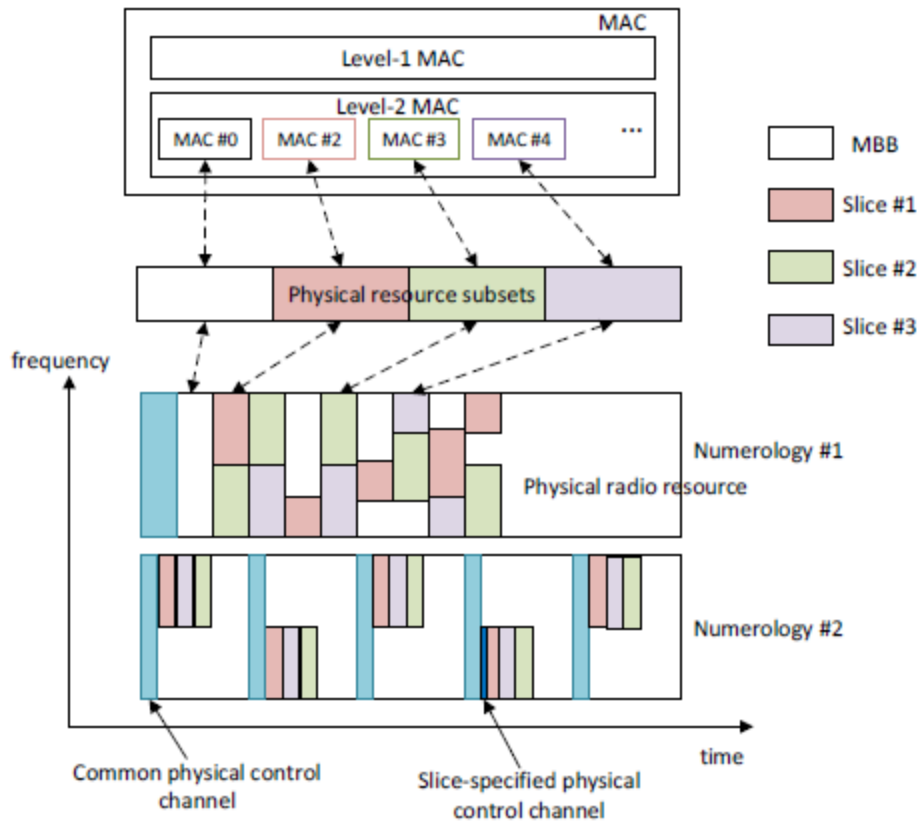
Network Slicing  
Customized for EACH

# E-2-E Mobile Network Slicing

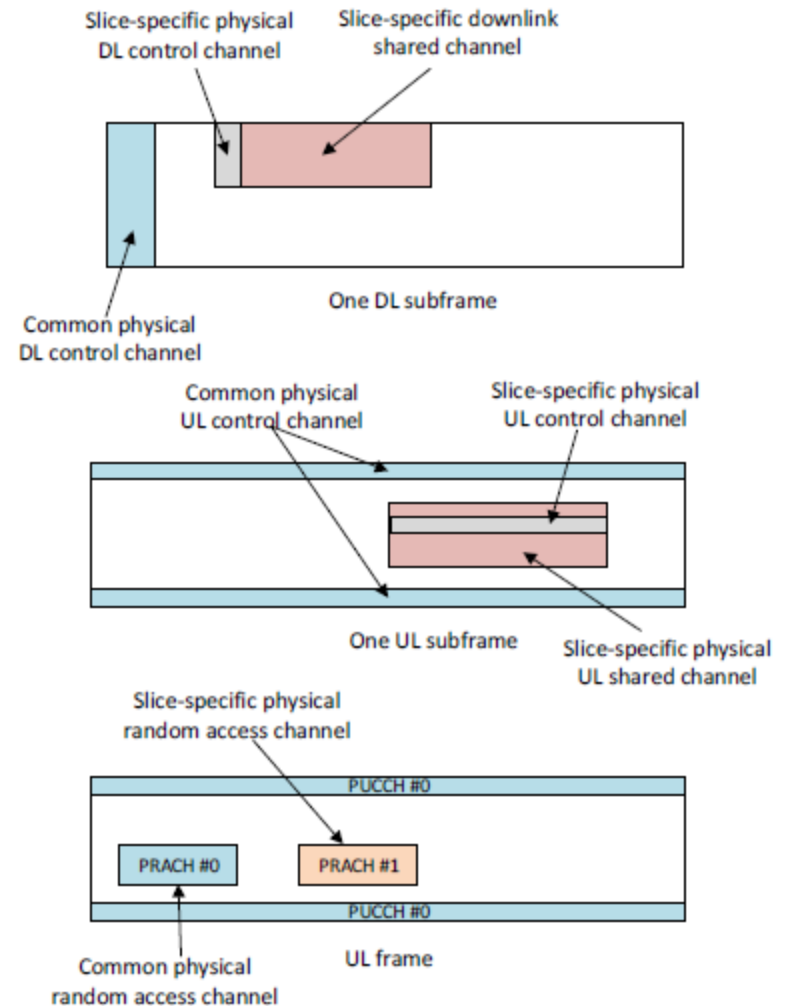


Reference: An end-to-end network slicing framework for 5G wireless communication systems, Qian LI, Geng Wu, Apostolos Papatthanassiou, Udayan Mukherjee, Intel Corporation, USA

# Network Slicing - RAN



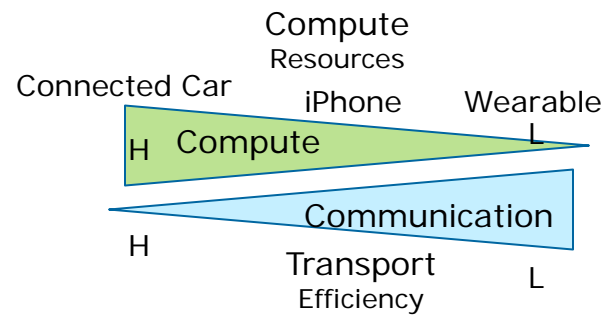
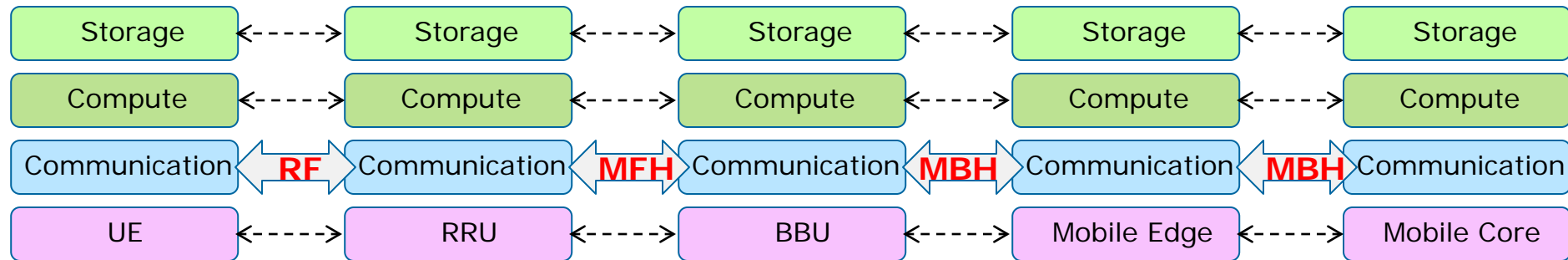
(a) Exemplary PHY and MAC architecture for air interface slicing



(b) Exemplary slice-specific physical channels

Reference: An end-to-end network slicing framework for 5G wireless communication systems, Qian LI, Geng Wu, Apostolos Papanthassiou, Udayan Mukherjee, Intel Corporation, USA

# E-2-E Network Resources Framework



- ❑ Widely Diversified Resources and Capabilities
- ❑ Often Inversed Relationship
- ❑ Customized for EACH

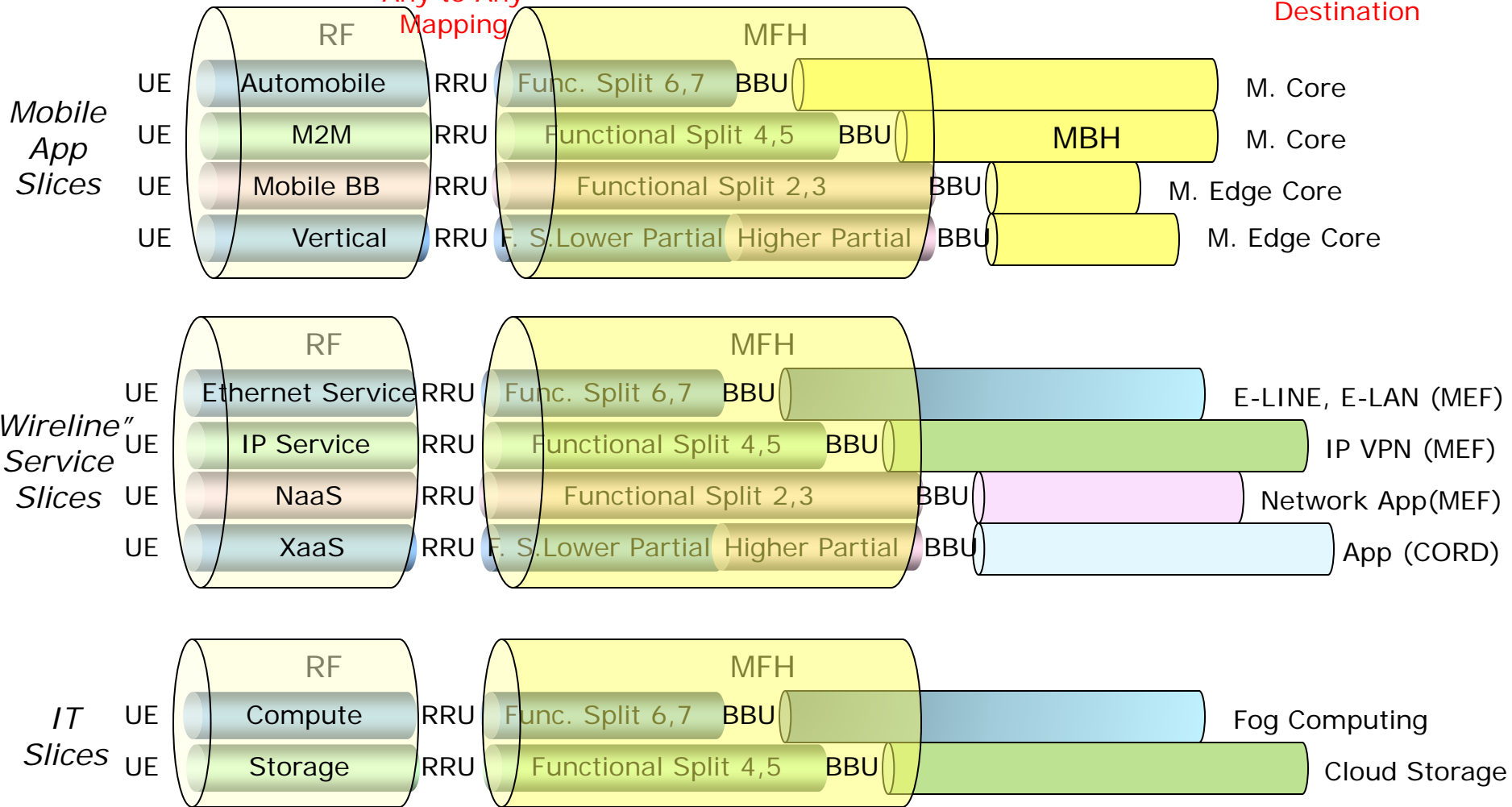


# Network Slicing Framework

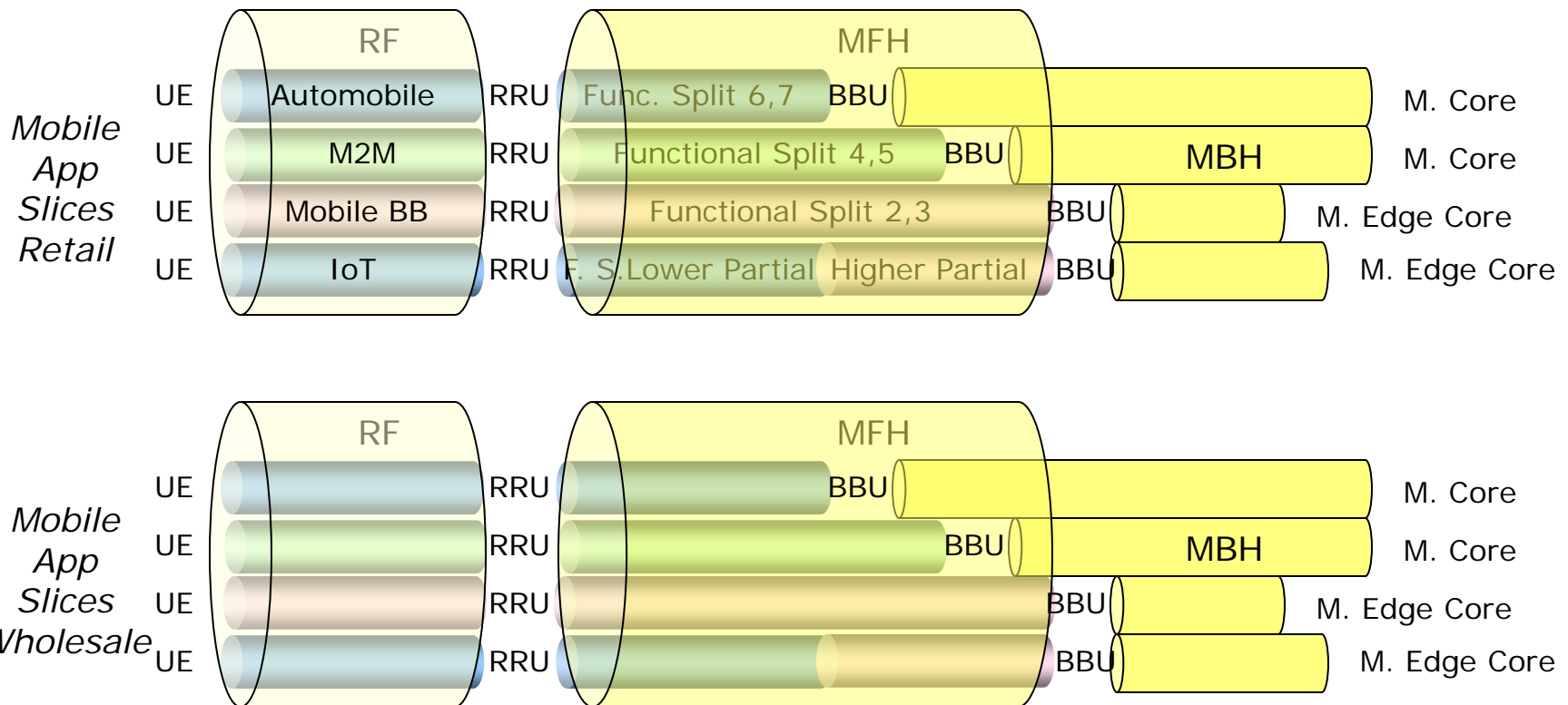
Any to Any Mapping

Different Location

Different Destination

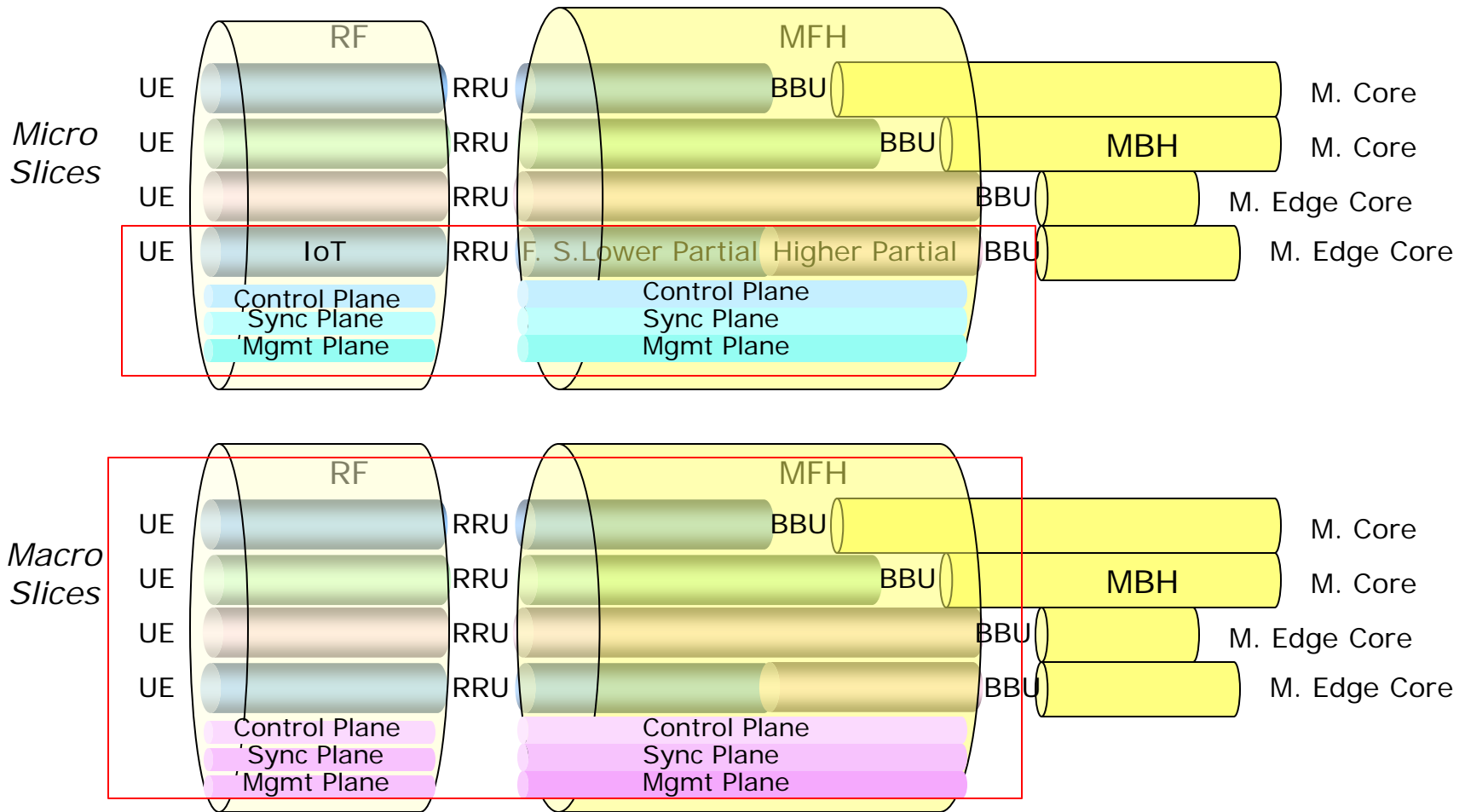


# Network Slicing Ownership



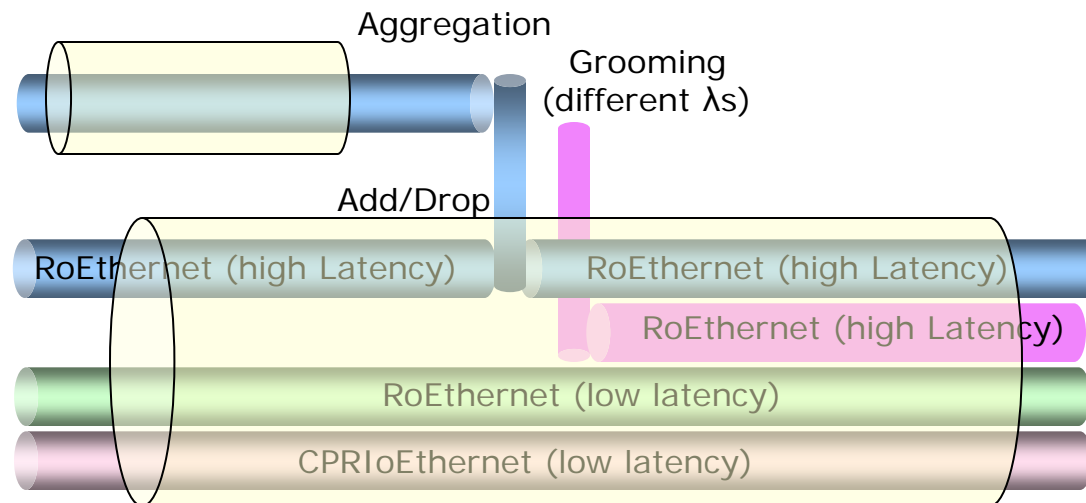
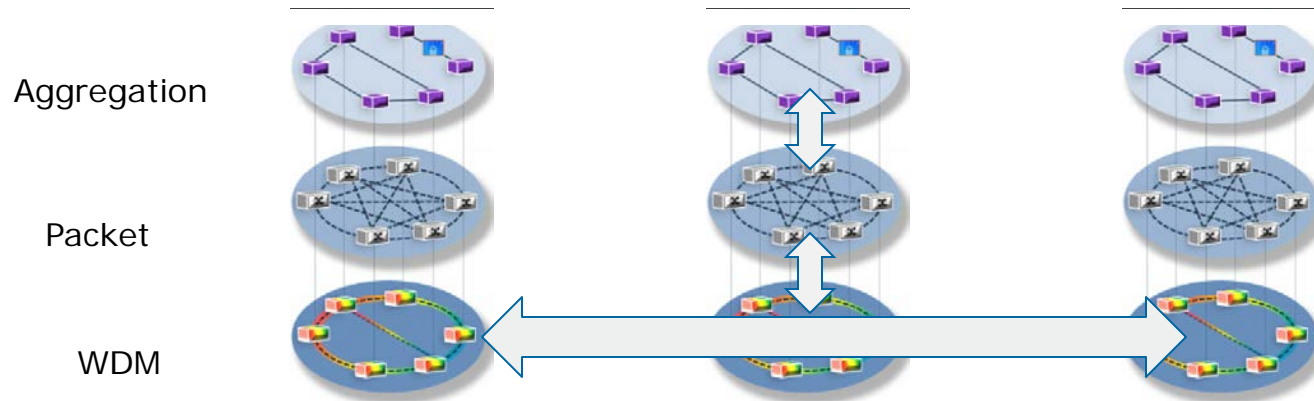
- ❑ Retail Slice – Provider owns the slice and the next layer of granularity
- ❑ Wholesale Slice – Buyer owns the slice and the next layer of granularity
- ❑ Different Operating Model for Each

# Network Slicing Operation Planes



- ❑ Operation Planes – Individual Slice and Aggregated Slice
- ❑ Operation Planes – In-Band and Out-of-Band

# Network Slicing – Transport Networking



Separate Fiber (Express & Local) (Packet Layer)  
or Separate  $\lambda$ s on same Fiber (Packet & WDM Layer)

Transport when you can  
Switch only if you must

# Network Slicing - Service Framework

- ❑ Service Type: MFH, MBH, Ethernet Services, etc.
- ❑ Service Name: Ethernet Services – E-LINE, E-LAN, E-Access, E-Transit, E-Tree
- ❑ Service Construct: Ethernet Services – EVC(Ethernet Virtual Circuit)
- ❑ Service Interface: UNI(User Network I/F), ENNI(External Network to Network I/F)
- ❑ Service Profile and Attributes: Ethernet Services – B.W. Profile
- ❑ Service OAM: Ethernet – ITU-T Y.1731
- ❑ Service SLA/KPIs: Ethernet Services - Delay, Delay Variation, Frame Loss Ratio, Availability
- ❑ Service Timing: Ethernet MBH – Frequency, Phase and Time Synchronization
- ❑ Service Agility: Ethernet Services – Bandwidth On-Demand

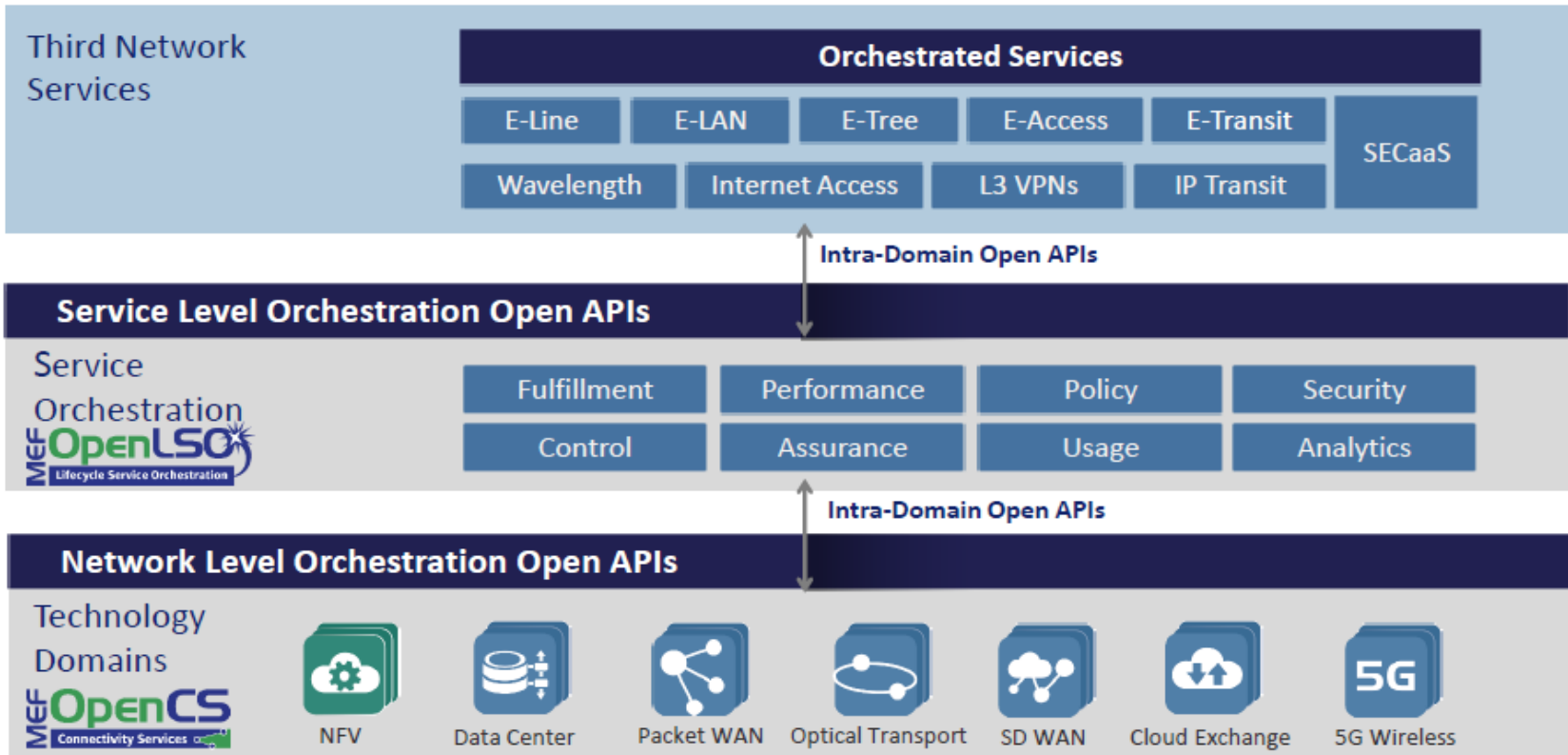
# Network Slicing - Network Framework

- ❑ Network Technology: Ethernet, Time Sensitive Networking (IEEE8201.CM), WDM
- ❑ Network Connectivity : Ethernet – Point-to-Point, Multipoint-to-Multipoint
- ❑ Network Traffic Engineering: Ethernet – Classification, Marking, Policing, Shaping, Congestion Management
- ❑ Network Connectivity OAM: Ethernet – IEEE 802.1ag
- ❑ Network SLA/KPI: Ethernet – Delay, Delay Variation, Frame Loss Ratio, Availability
- ❑ Network Availability: Ethernet – ITU-T G.8031.G.8032, LAG/MC-LAG,
- ❑ Network Availability: Optical – 1:1 Protection Switching, Dual Node Interworking
- ❑ Network Timing: Ethernet – SyncE, IEEE 1588v2
- ❑ Network Agility: Ethernet – Bandwidth On-Demand

# Lifecycle Service Orchestration (LSO)

## MEF Framework

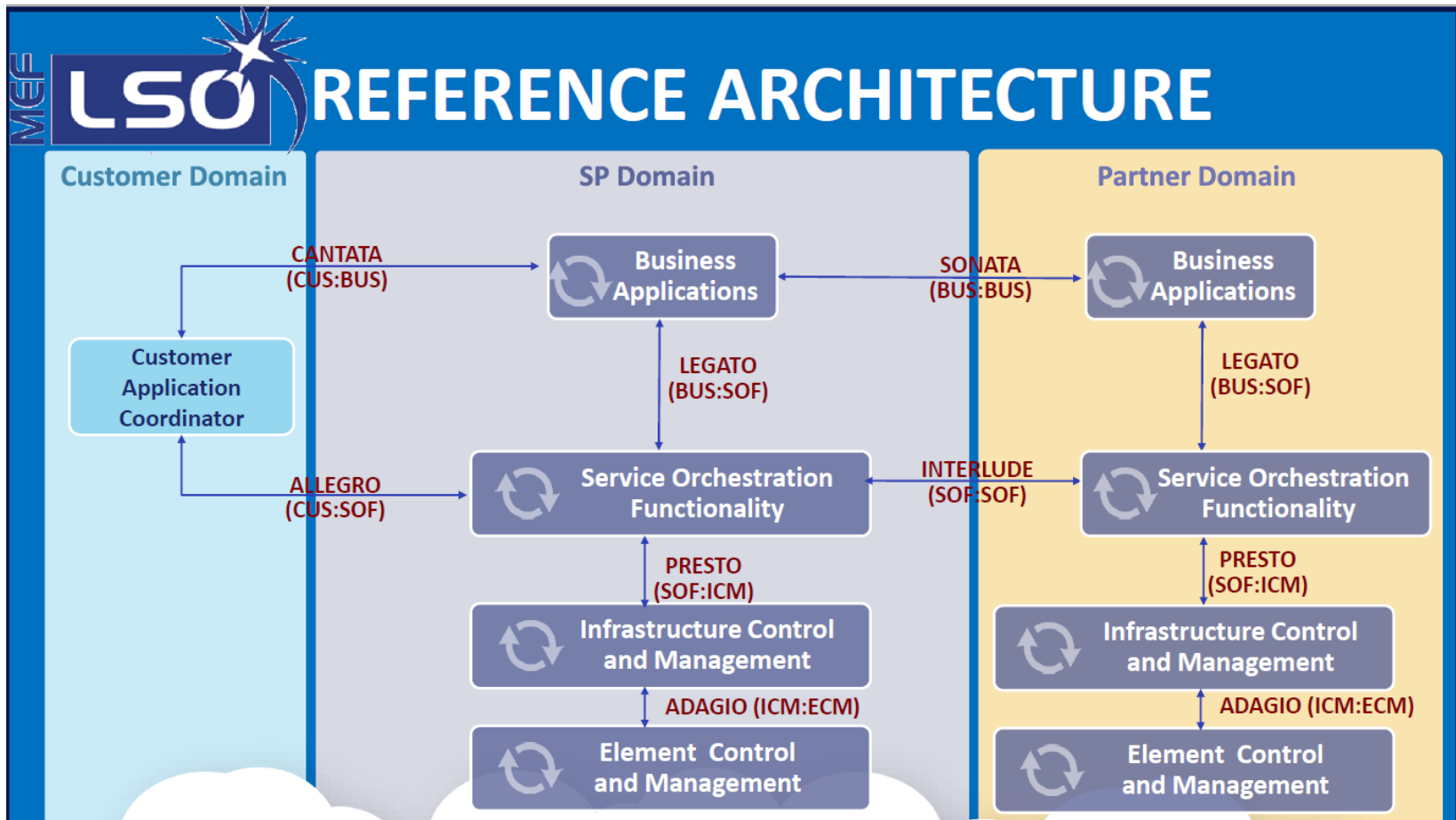
### Intra-Operator APIs and Open Initiatives



- ❑ Leverage MEF LSO Framework
- ❑ Multi-Layer (Ethernet, Time Sensitive Networking and Optical) Orchestration

# LSO Reference Architecture

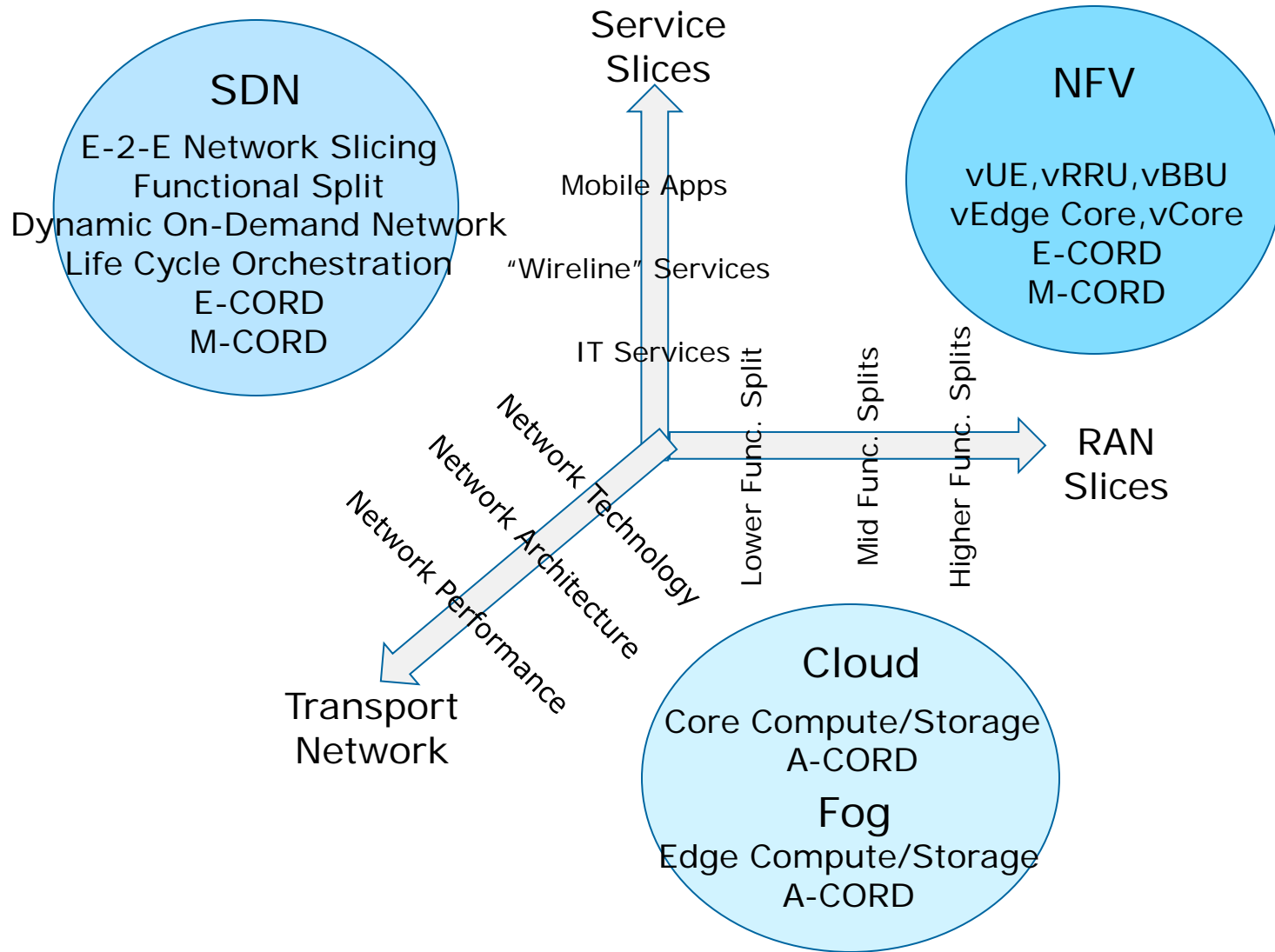
## MEF Framework



- ❑ Leverage MEF LSO Framework
- ❑ Multi-Layer (Ethernet, Time Sensitive Networking and Optical) Orchestration



# Mobile Transport Network Paradigm



# Summary

- ❑ Highly Diversified Requirements -> Network Slicing-Customized for EACH
  
- ❑ Network Slicing Framework
  - ❑ Network Models
  - ❑ Transport Networking
  - ❑ Services and Network Framework
  
- ❑ Network Slicing Orchestration
  - ❑ Lifecycle Service Orchestration Framework and Reference Architecture
  
- ❑ Mobile Transport Network Paradigm
  - ❑ RAN Slices and Service Sliced -> Transport Network
  - ❑ Technology Threads - SDN, NFV, Cloud and Fog Computing