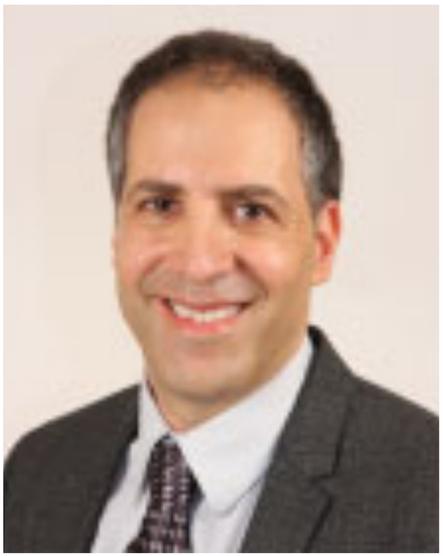




MEF19



MEF and 5G – Orchestrating 5G Services



Rami Yaron

Marketing & Education
Committee Co-Chair, MEF
Strategic Advisor, Infovista



Sibylle Schaller

Project Manager
NEC Labs

Outline

- Introduction
- Transport for 5G
- Orchestrating 5G Services
- 5G Network Slices
- MEF Services over 5G Network Slices
- Summary

5G: a Societal Disruptor



5 Billion

people forecast to be accessing the Internet via mobile by 2025

5G coverage will roll out rapidly to cover **40%** of the global population by 2025

5G will account for **1 in 7** connections (14%) by 2025

Global penetration rate for all mobile connections will reach **110%** worldwide by 2025

9 Billion

mobile connections by 2025

5.9 Billion

unique subscribers by 2025

25 Billion IoT devices in 2025
(11.4B consumer, 13.7B industrial)

Global mobile annual revenue of **\$1.1T** in 2025

5G: a Technical Disruptor

 Peak Data Rate	1 - 20 Gbps	 Connection Density	10k - 1m devices / km ²	 Reliability	99.999% (of packets)
 User Experienced Data Rate	10 - 100 Mbps	 Network Energy Efficiency	×1 - ×100	 Position accuracy	10m - <1m
 Spectral Efficiency	×1 - ×3	 Area Traffic Capacity	0.1 - 10 Mbps / m ²	 Security	Strong subscriber authentication, user privacy and network security
 Mobility	350 - 500 km/h	 Availability	99.999% (of time)		
 Latency	1 - 10 ms	 Battery life	10 years*		

*For low power IoT devices
Source: ITU-R, NGMN, 3GPP

The Big 3 Dimensions of 5G and their Use Cases

High Density

Low cost, low energy
small data volumes
massive numbers



SMART
METER



SMART
AGRICULTURE



LOGISTICS



TRACKING



FLEET
MANAGEMENT



INDUSTRIAL
APPLICATION &
CONTROL



TRAFFIC SAFETY
& CONTROL



REMOTE
MANUFACTURING



REMOTE
TRAINING



REMOTE
SURGERY

Low Latency

Ultra reliable very low
latency
very high availability

High Speed

Enhanced Mobile
Broadband



ENTERPRISE



HOME



VENUES



MOBILE/
WIRELESS/
FIXED



NON-SIM
DEVICES



SMARTPHONES



4K/8K UHD



BROADCASTING



VR/AR

MEF 5G Focus



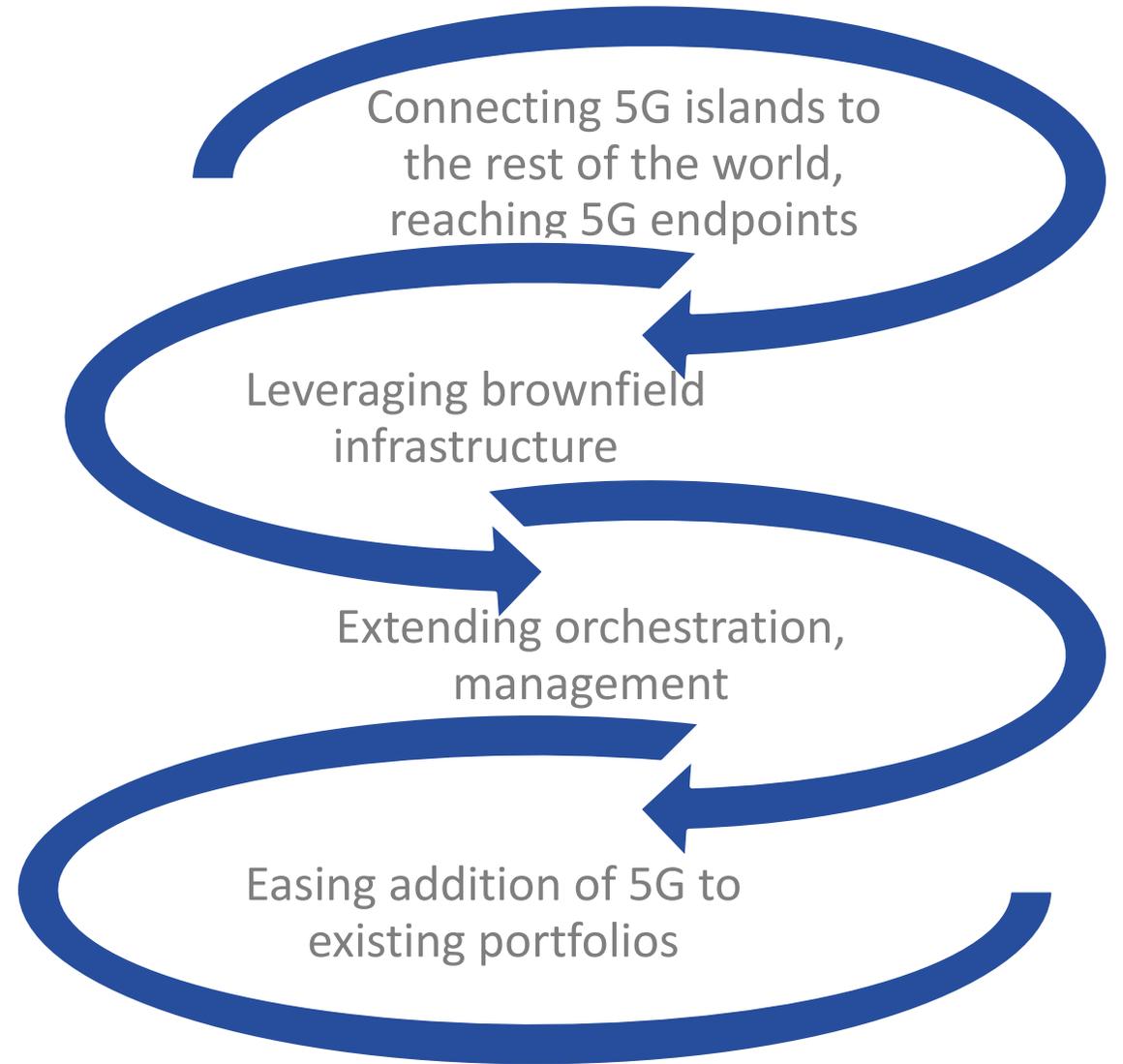
MEF Services supporting 5G



MEF Services over 5G



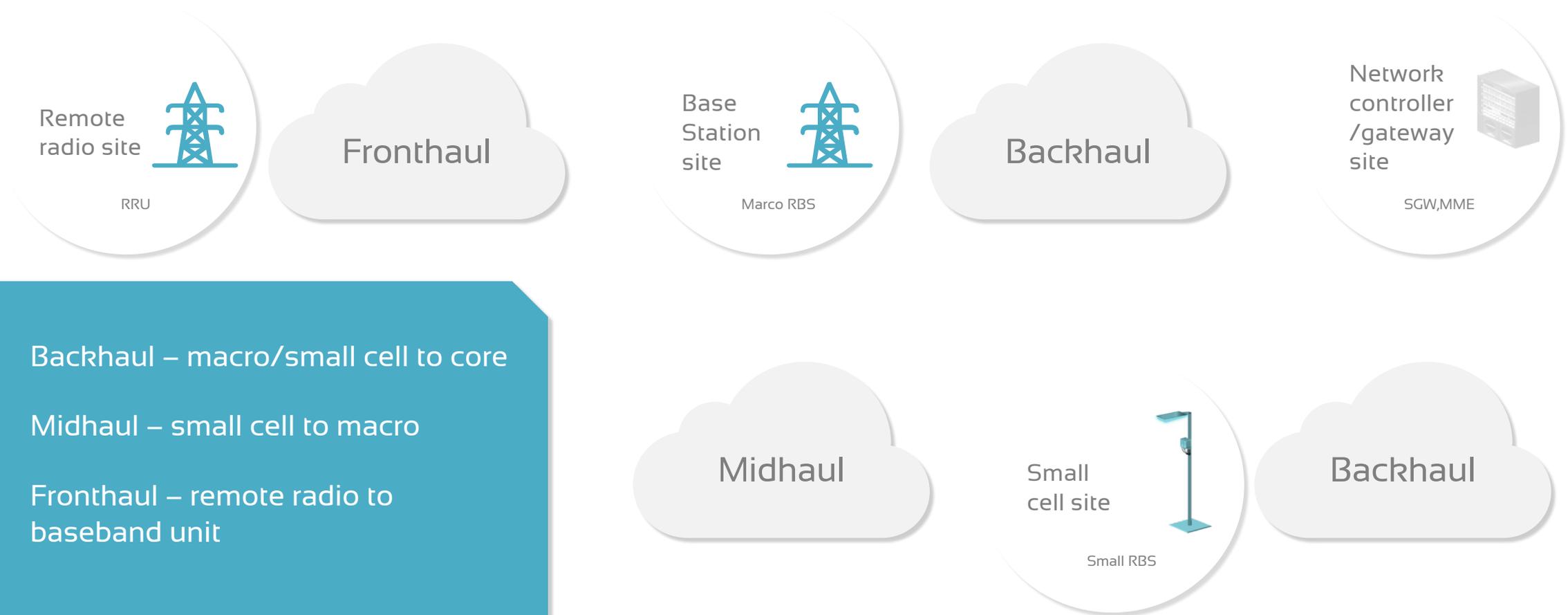
Network Slicing



Transport for 5G



MEF 22.3 Transport for Mobile Networks (MEF 22.3.1 for 5G)*



Backhaul – macro/small cell to core

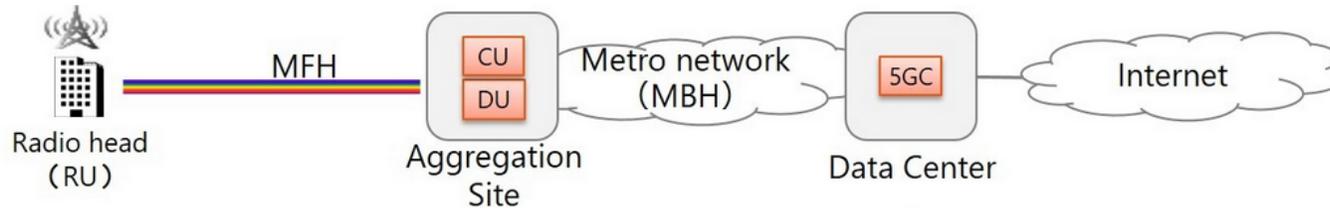
Midhaul – small cell to macro

Fronthaul – remote radio to baseband unit

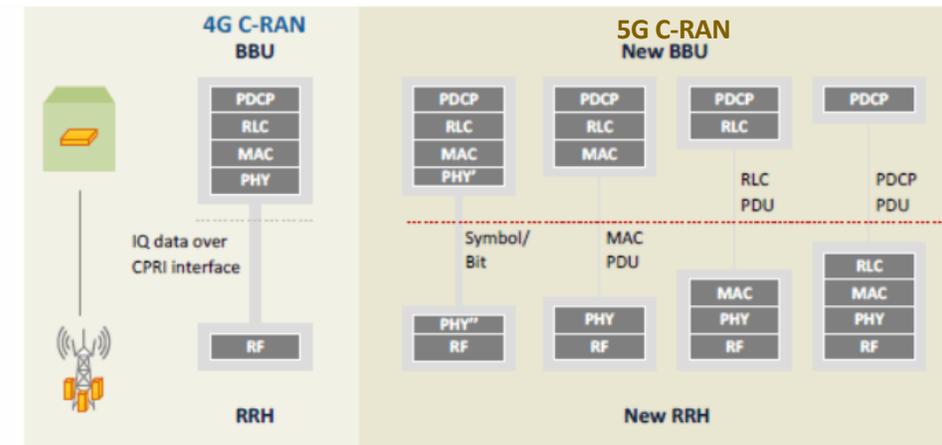
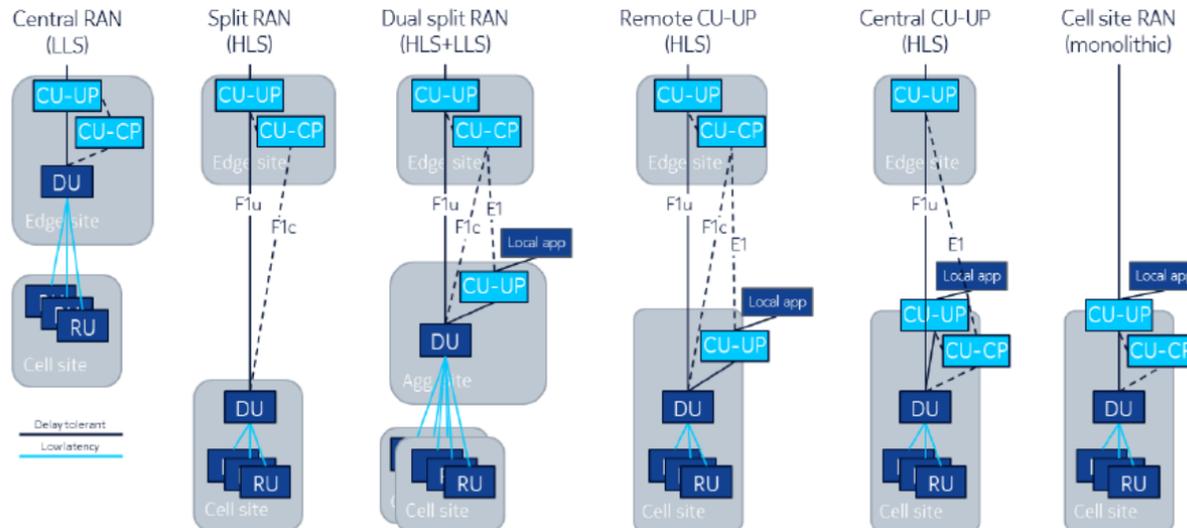
*Working Draft; resolving comments from CfCB #4.

What is 5G Transport?

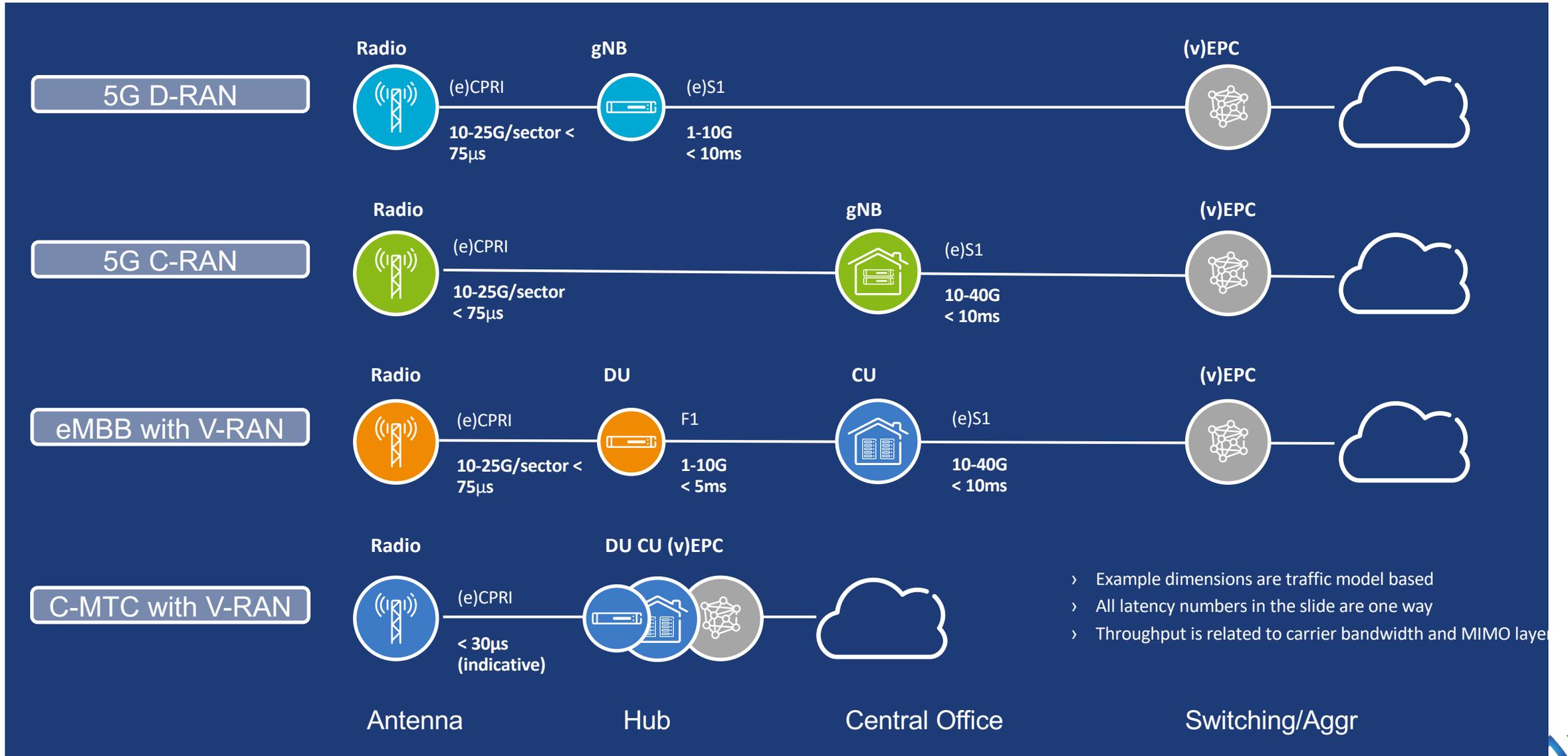
- Connectivity/Network(s) between 3GPP/5G network functions



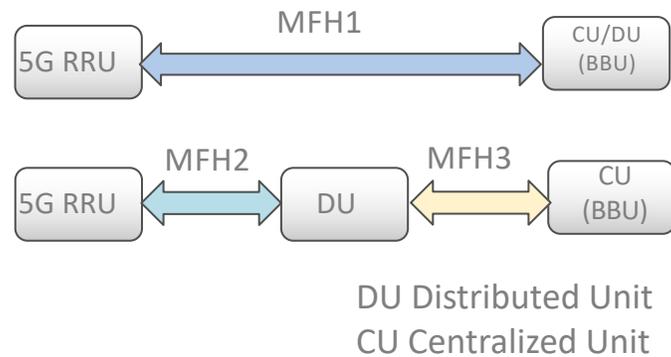
- Different deployment options for RU, DU, CU
 - Different functional splits have different KPIs



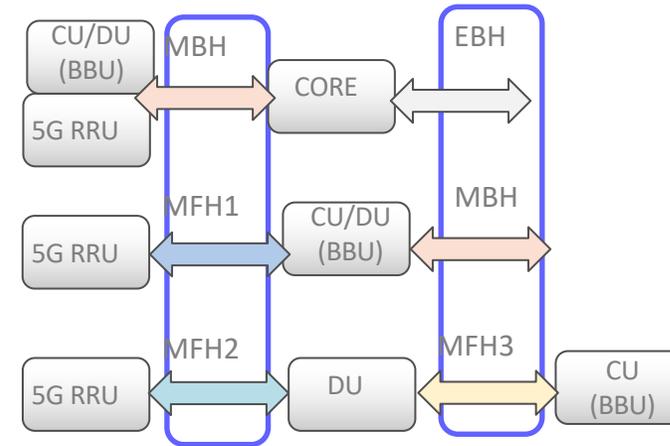
5G Transport – Dimensioning Examples



MEF 22 Phase 4 - Transport for 5G



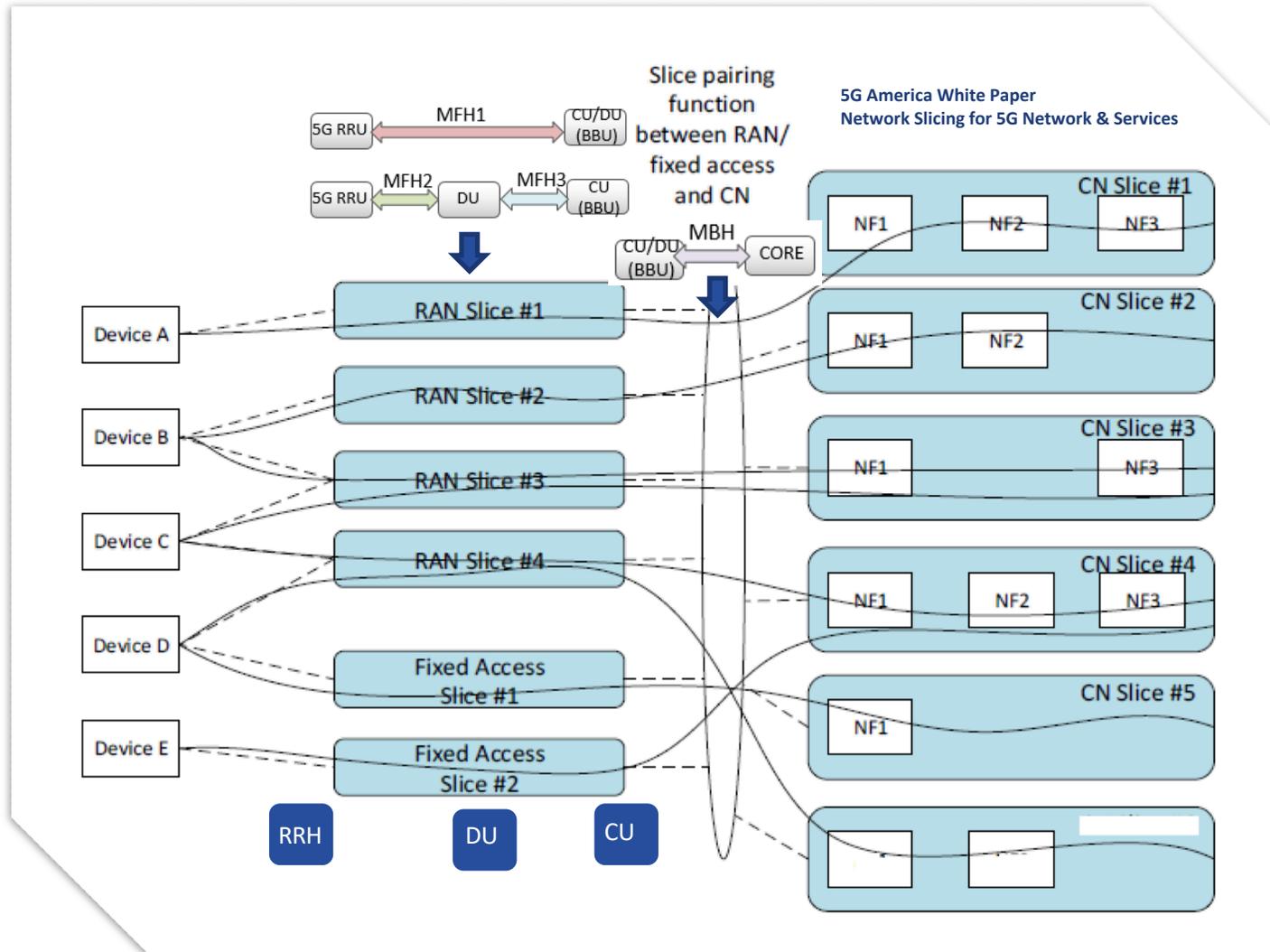
- Functional Splits can be in 1 or 2 stages (RRH-DU-CU)
- Three types of Fronthaul Networks
- Each has its own KPIs



- RRH, CU, DU, and Core distributed based on Services KPIs
- Multiple configurations can be co-located
- Transport Network can provide support for all

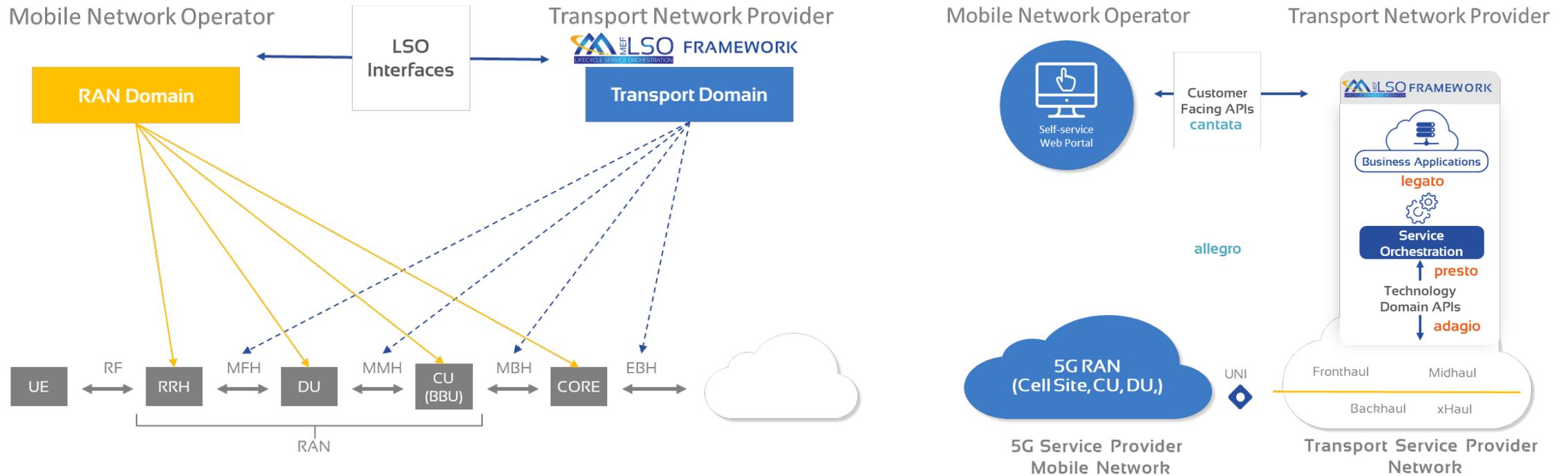
- MEF Ethernet Service Types – Mobile Fronthaul 1,2,3, Mobile Backhaul, Ethernet Backhaul
- Multiple Ethernet Service Types can co-exist

3GPP Network Slicing – E-2-E Service View



- Fronthaul is inside the RAN Slice between RRH and BBU or between RRH & DU and DU and CU(BBU)
- Backhaul is between RAN and Mobile Core Network or between RAN and Wireline Network for Wireline Services
- There is an East-West association between RAN, Core, and Transport

MEF Services Supporting 5G Transport



MEF 22.3 - Transport Services for Mobile Networks:

- Identifies the requirements for MEF Ethernet Services and MEF External Interfaces (EIs such as UNIs) for use in Mobile Backhaul networks based on MEF specifications

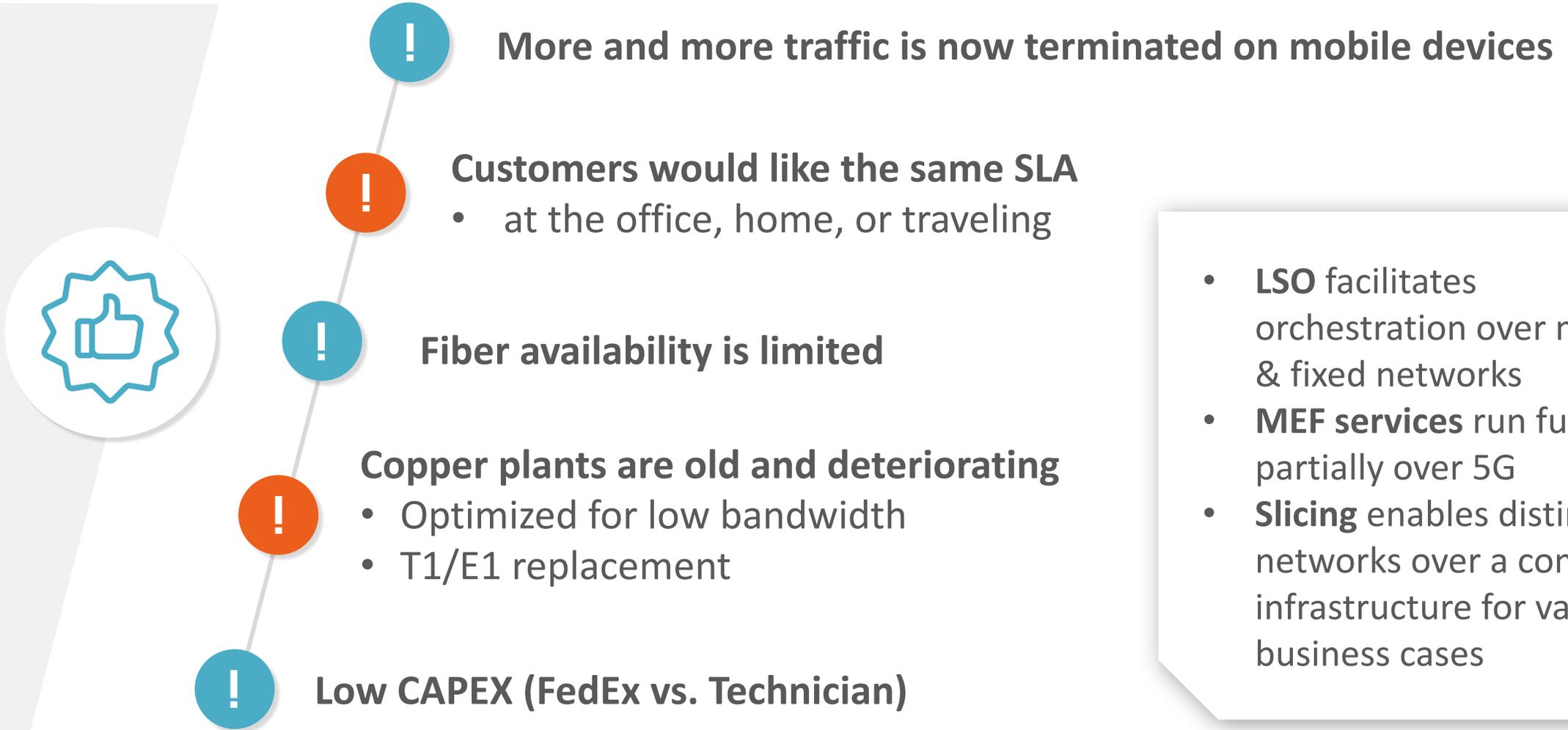
MEF 22.3.1 - Amendment:

- Add or amend text, figures, tables and requirements in MEF 22.3 to allow support for Mobile Fronthaul Services (MFHS)

Orchestrating 5G Services



Why Deliver MEF Services Over 5G?

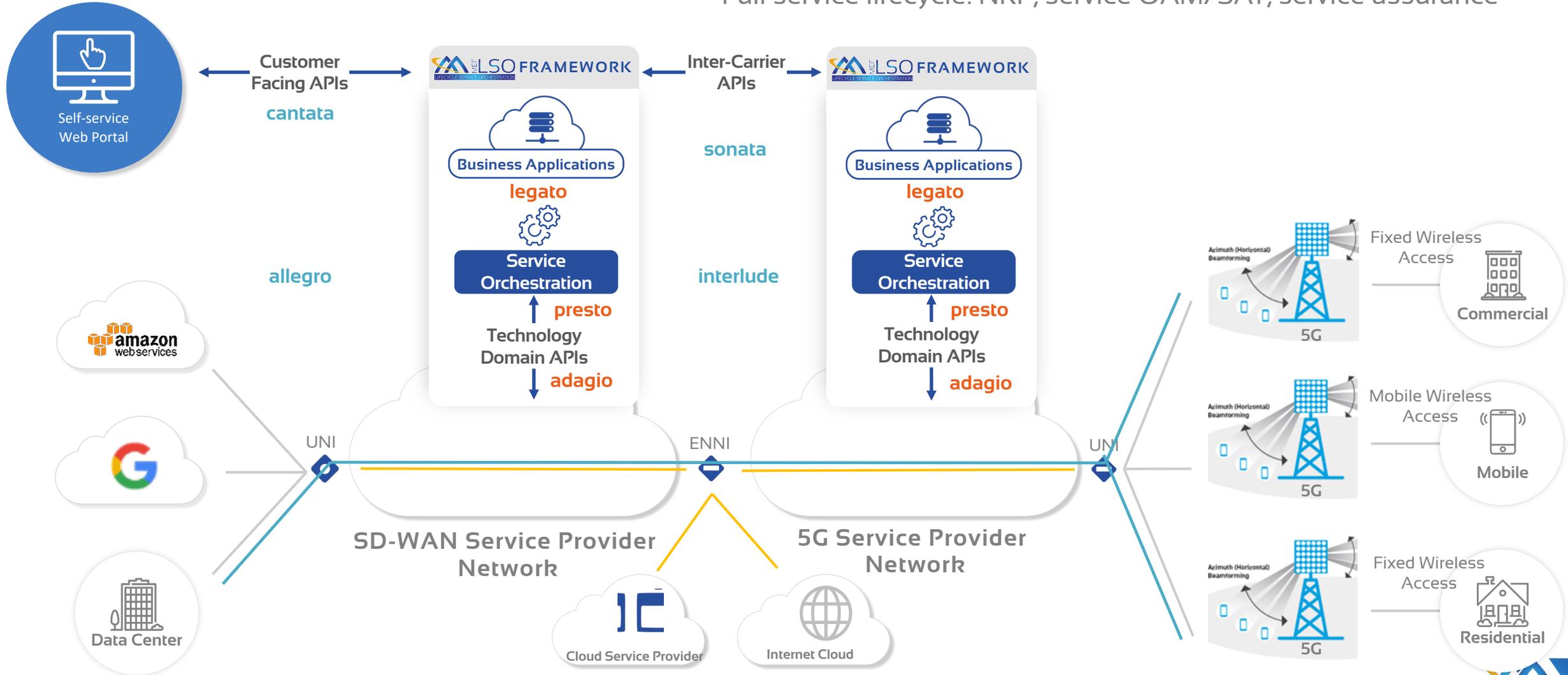


- **LSO** facilitates orchestration over mobile & fixed networks
- **MEF services** run fully or partially over 5G
- **Slicing** enables distinct networks over a common infrastructure for various business cases

Orchestrating 5G Services With LSO Sonata

Example: SD-WAN

- End-to-End Orchestration
- Multi-operator, multi-technology
- Full service lifecycle: NRP, service OAM/SAT, service assurance

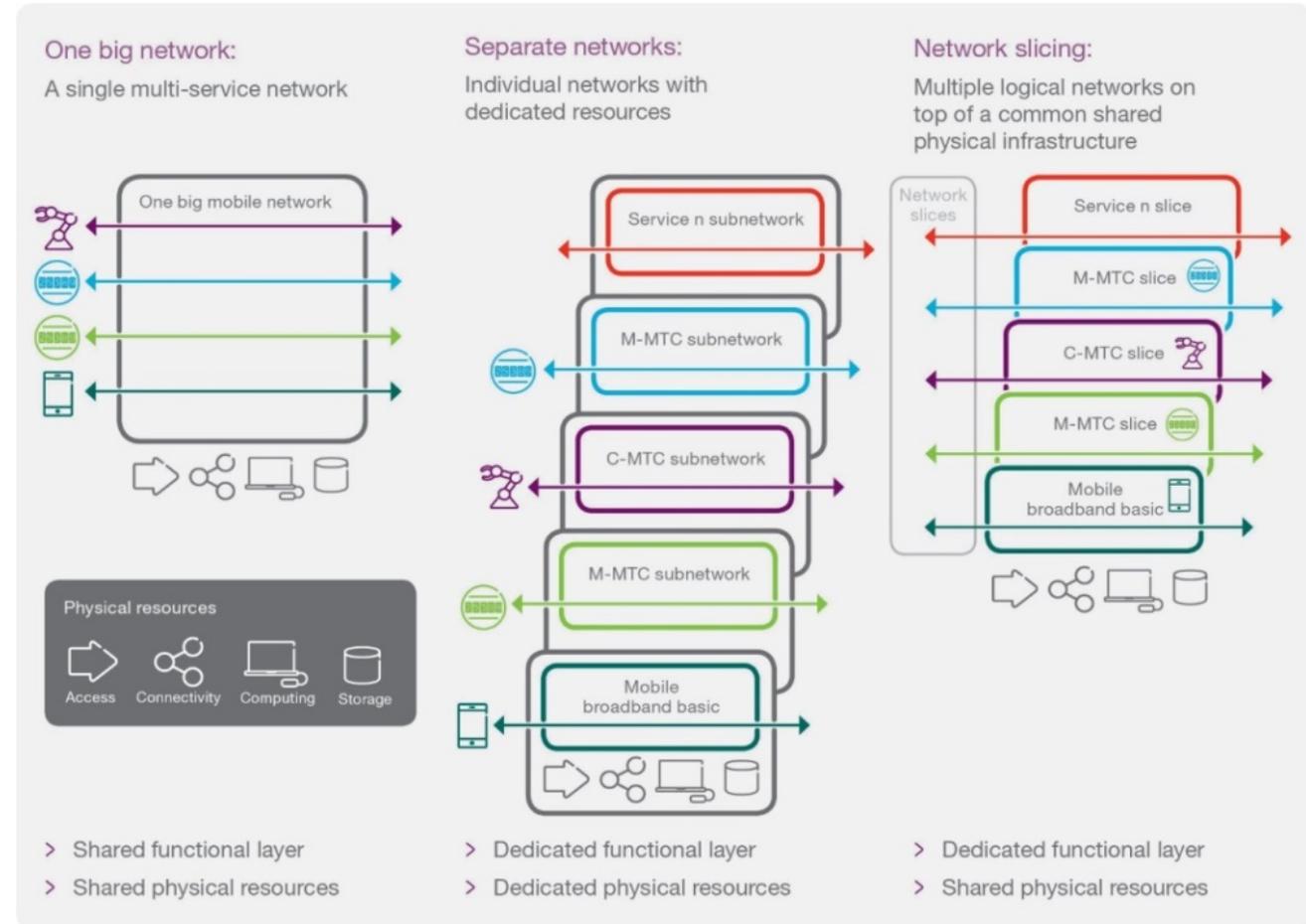


5G Network Slices



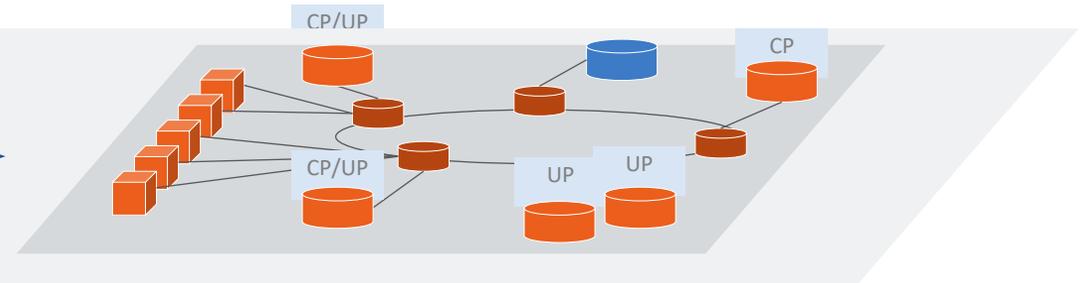
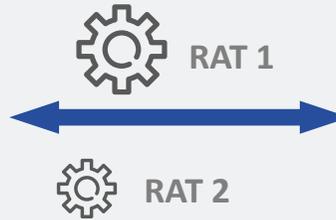
Three Alternative Network Scenarios Modeled

- Comparison of 3 potential network scenarios for deployment of new services:
 - One big network
 - Separate networks
 - Network slicing
- Although network slicing can extend end-to-end across the radio and transport network domains, this study was restricted to evaluating the impacts of slicing in the core network only.

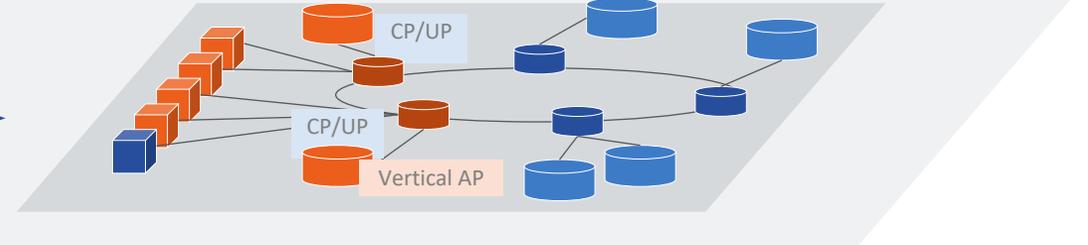
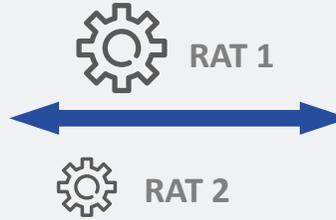


Network Slicing - Virtual Technology for Different Characteristic Objectives

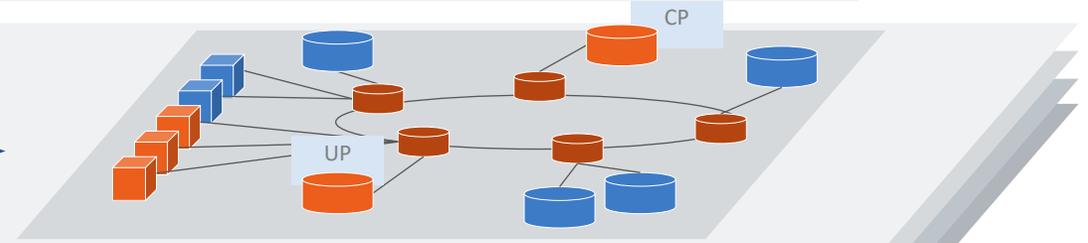
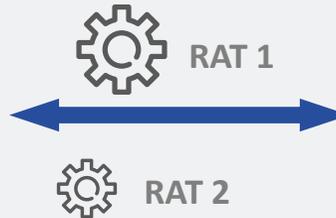
5G slice 1
(smartphones)



5G slice 2
(autonomous driving)



5G slice 3
(massive IoT)



Other slices

Source: NGMN 5G White Paper



Access node



Cloud node (edge & central)

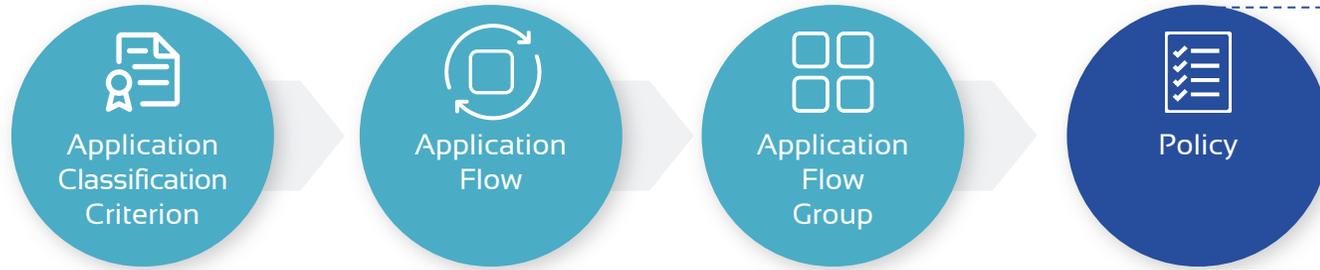


Networking node

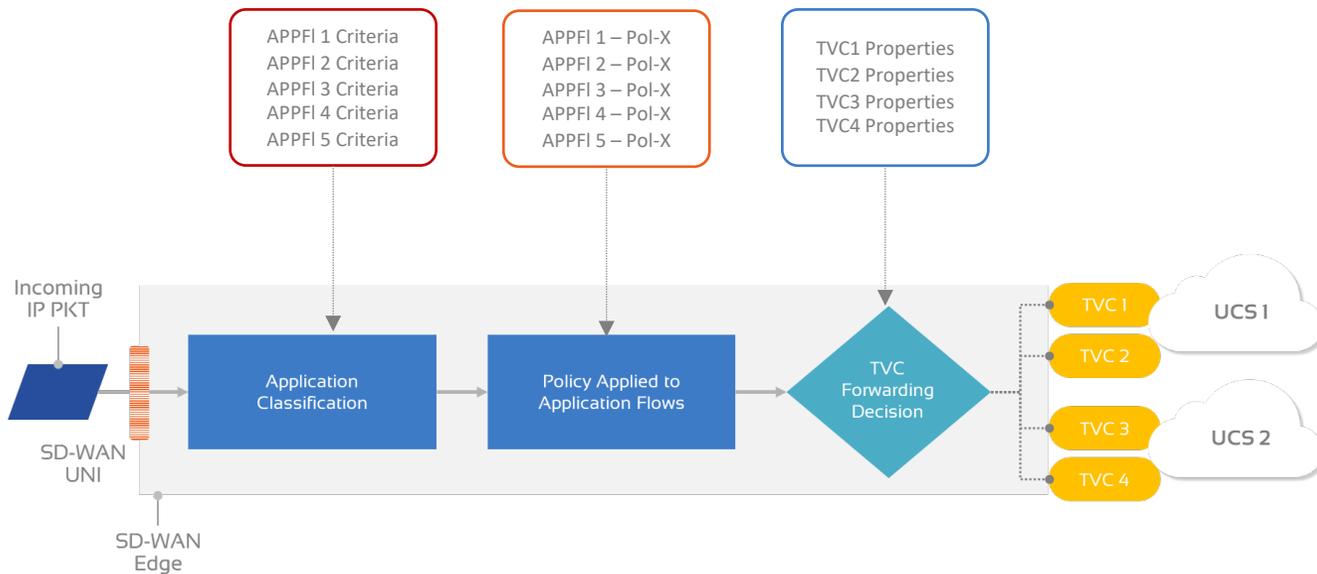


Part of slice

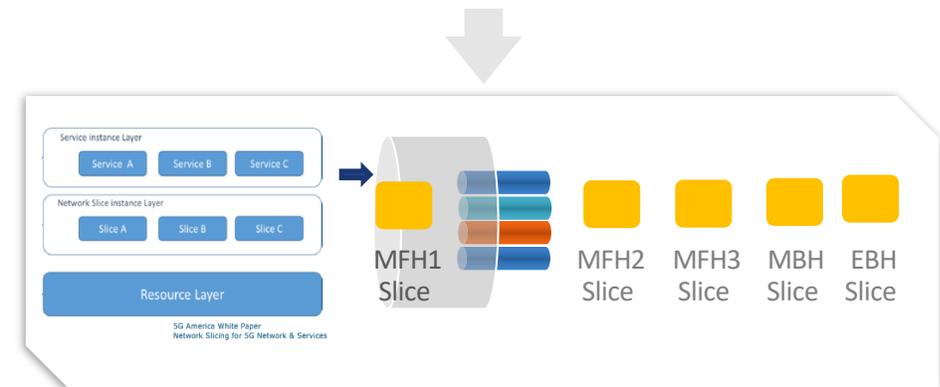
Mapping from Applications to 5G slices



CoS Names	Generic Traffic Classes mapping to CoS Names			
	4 CoS Names	3 CoS Names	2 CoS Names	2 CoS Names
Very High (H⁺) Defined in this IA	Synchronization	-	-	-
High (H) Defined in [20]	Conversational, Signaling, Network Management and Control	Synchronization, Conversational, Signaling, Network Management and Control	Synchronization, Conversational, Signaling, Network Management Control, and Streaming media	Synchronization, Conversational, Signaling, Network Management, Control, and Streaming media
Medium (M) Defined in [20]	Streaming media	Streaming media	-	Interactive and Background
Low (L) Defined in [20]	Interactive and Background	Interactive and Background	Interactive and Background	



SD-WAN CoS Policy

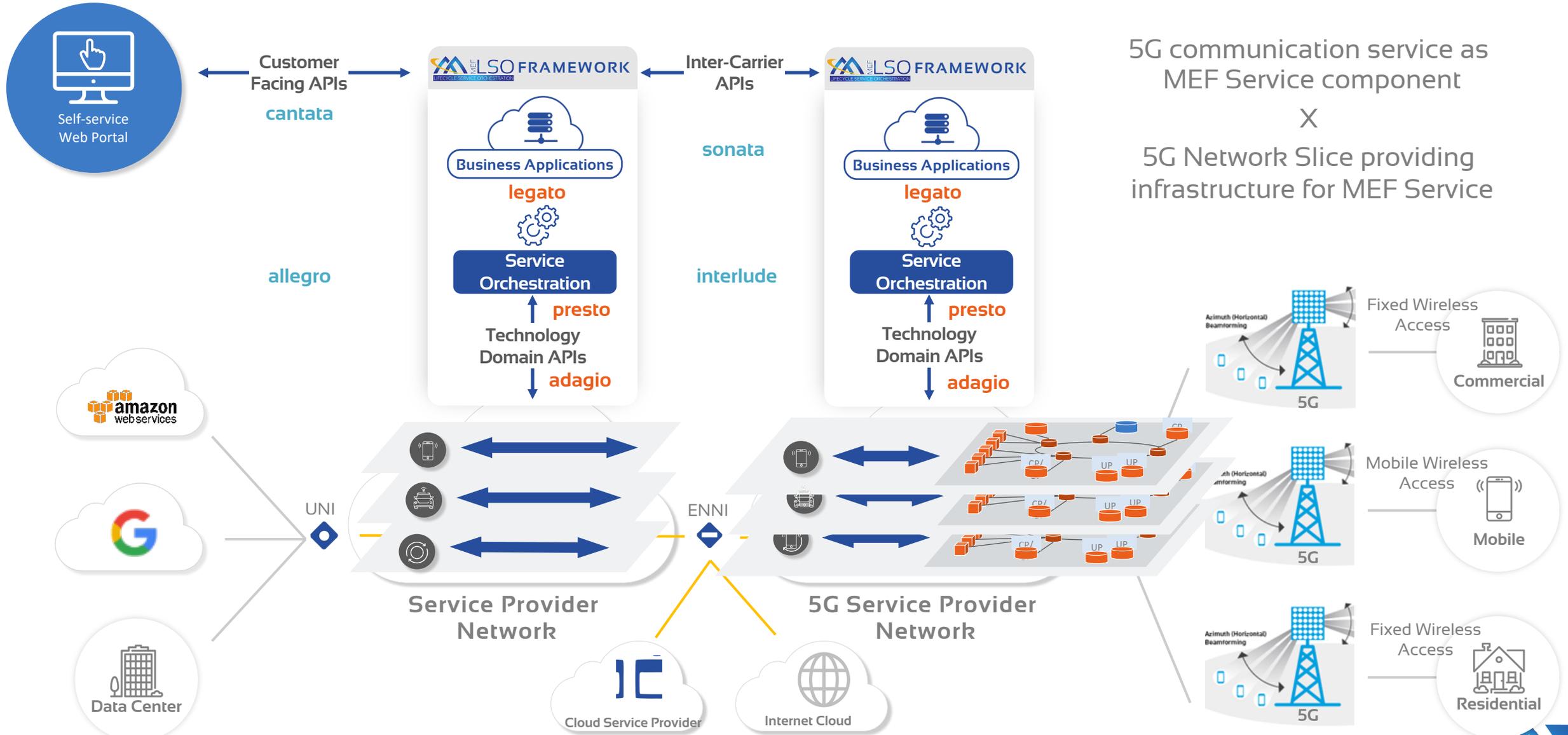


5G Transport Slices

MEF Services over 5G Network Slices



MEF 3.0 Services Over 5G Network Slices



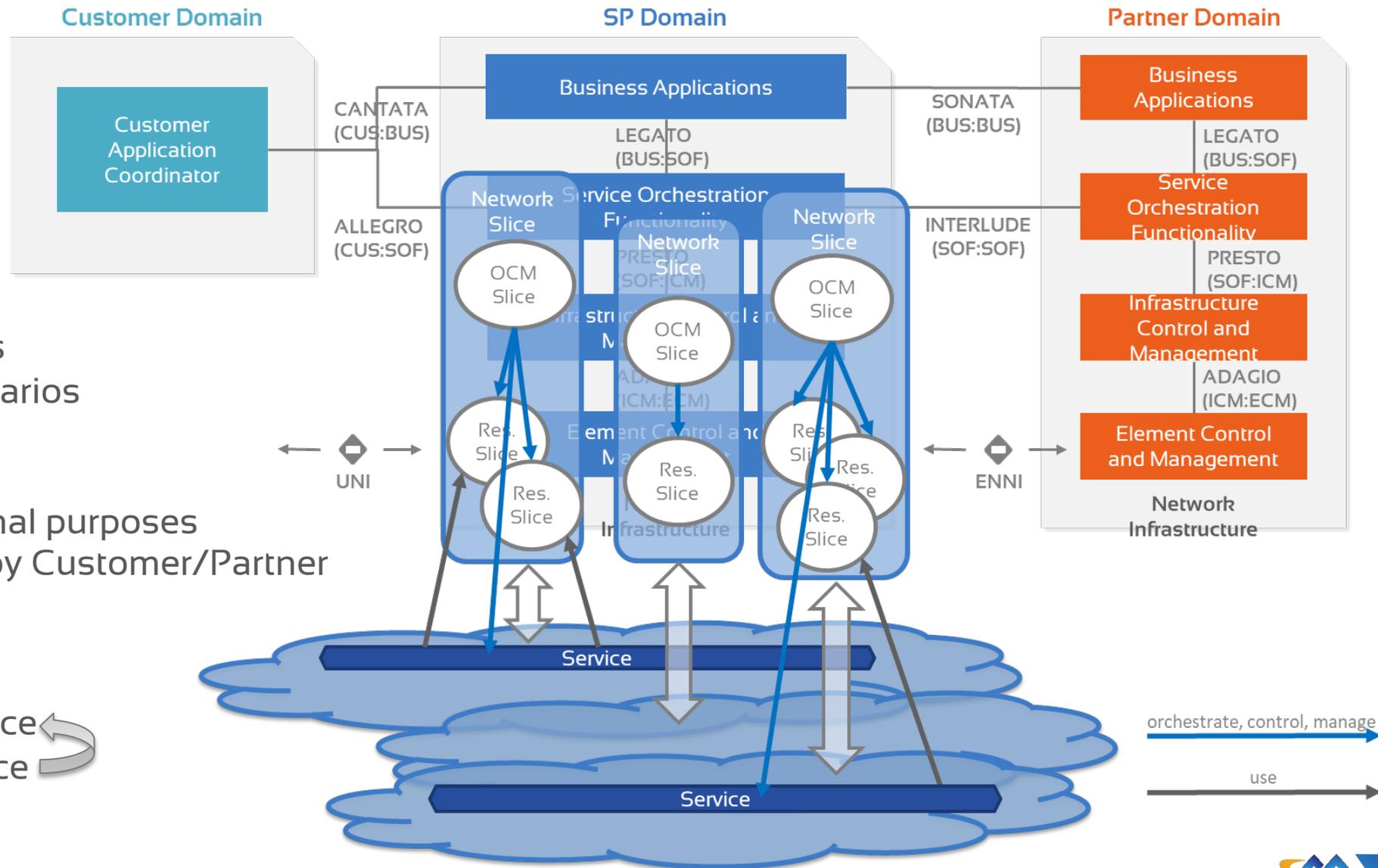
LSO Framework & Network Slicing

Network Slicing

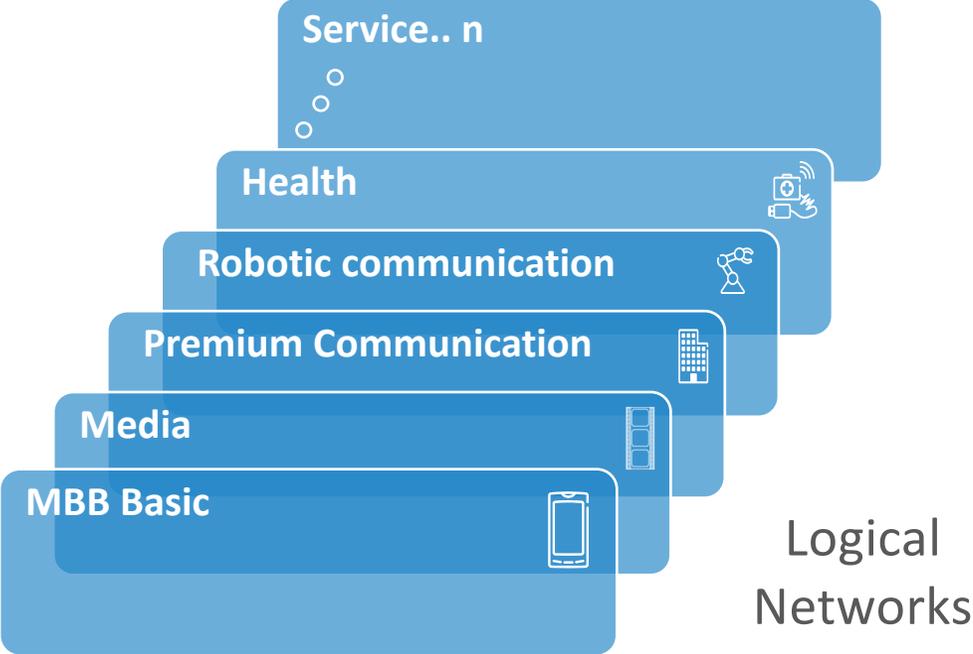
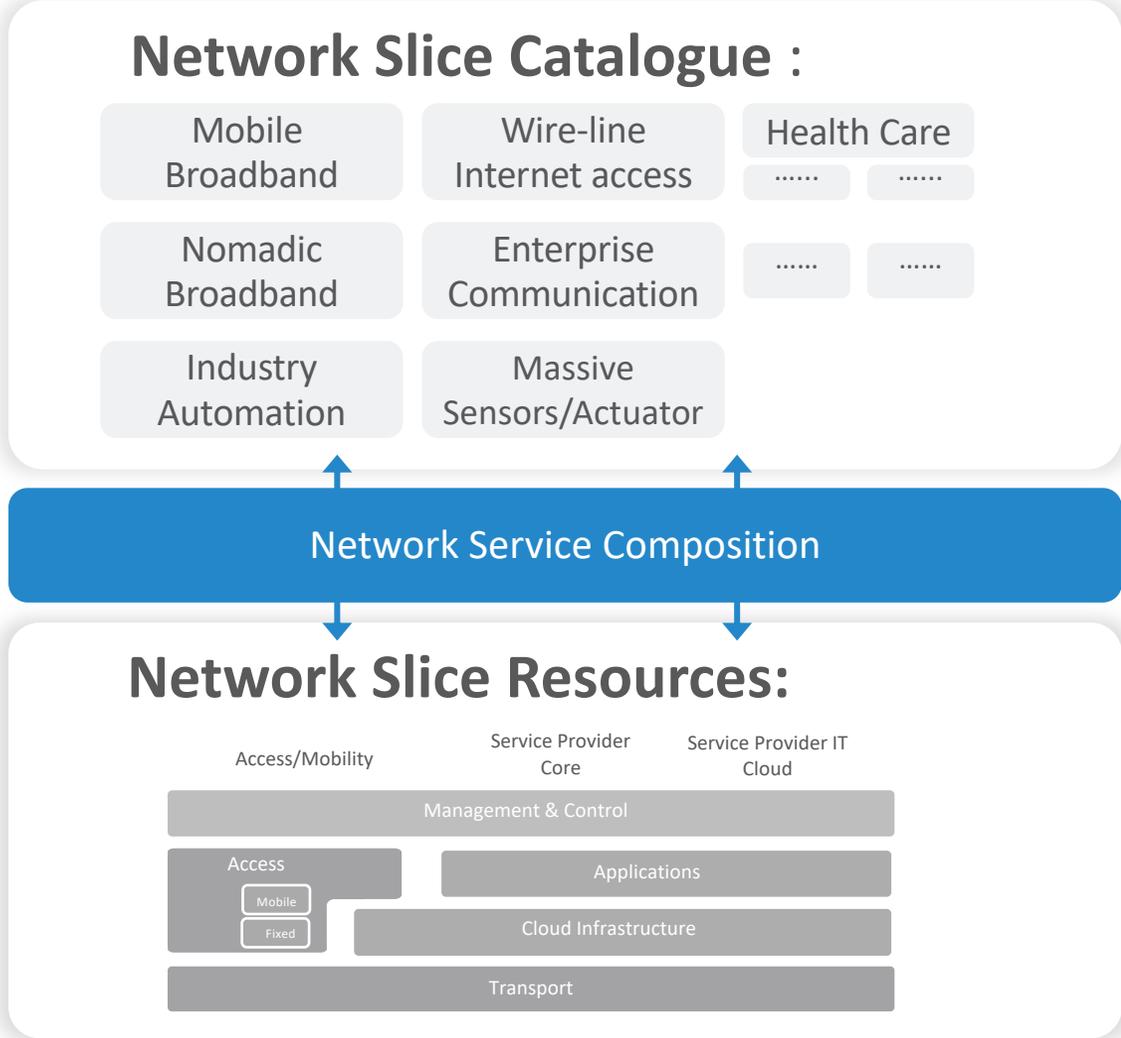
- A means to
- structure and organize infrastructure and management to
- provide flexible solutions for different market scenarios

Network Slices

- For Service Provider internal purposes
- For exposure to and use by Customer/Partner



Network Slices and Service Orchestration

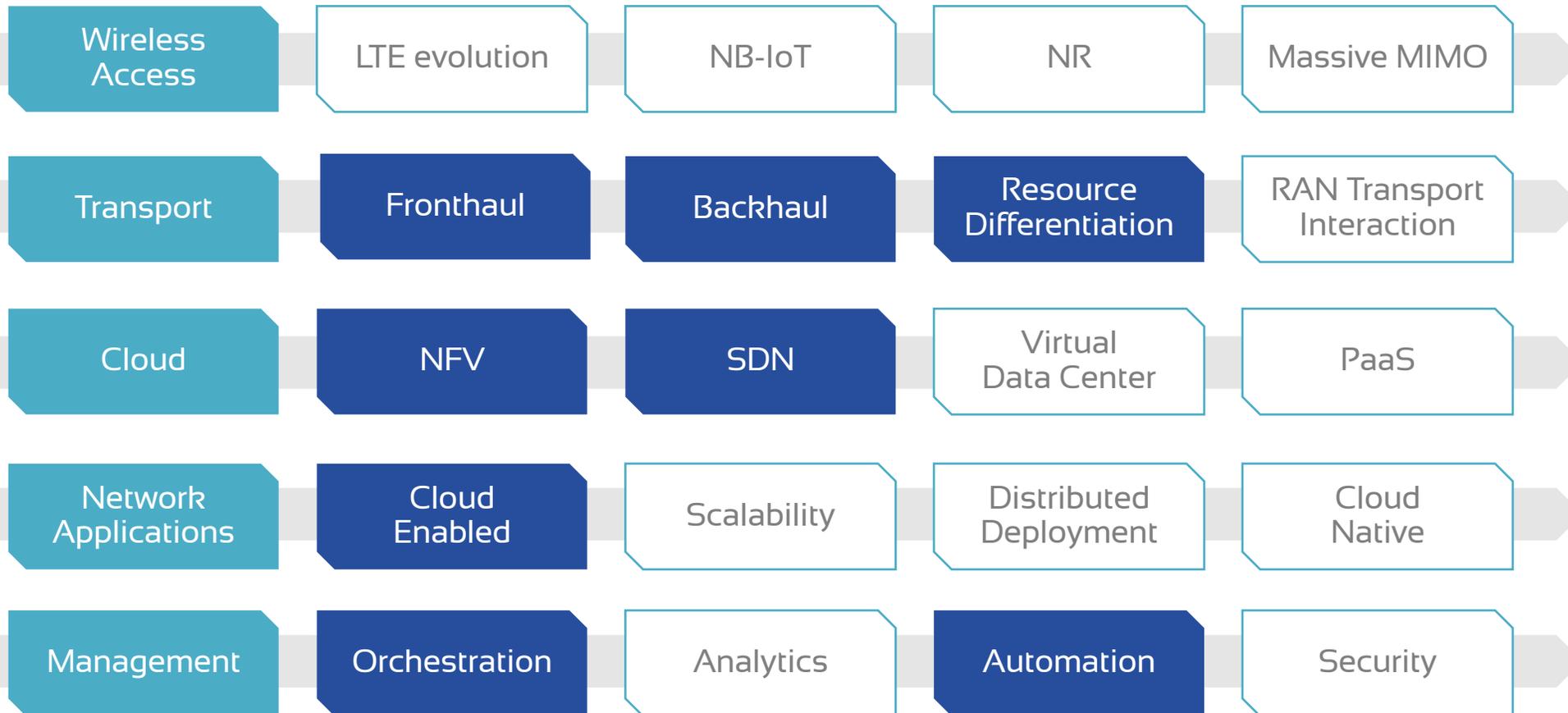


Physical Resources
(Access, Connectivity, Computing, Storage, ..)

Summary



Main Components of 5G and MEF areas of work



Summary

- 5G brings new use cases and business opportunities
- Multiple transport options could support 5G interfaces
- LSO can facilitate orchestration of mobile and fixed networks
- Application driven network calls for network slicing
- MEF Services could run fully/partially over 5G



MEF19

