FIDAL

FIELD TRIALS BEYOND 5G

On Advancing Application – Network Interaction and 5G and beyond business models: Considering FIDAL Multi-media Use Cases

Presenter: Håkon Lønsethagen, Telenor R&I

6G-IA and 5G-MAG joint Workshop on multimedia systems and services,
13th May 2024

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Problem space - Intro -

1. **Alignment of expectations**
2. **Customer / User Experience**

Dynamic alignment between App and Network is needed

Project Name: **FIDAL - Field Trials beyond 5G**

SNS JU Call 1 Stream D

Key objective:

To support beyond 5G experiments, field trials, and environments for rapid prototyping and largescale validation of advanced, forward-looking applications.

A special focus is put on Network Applications (aka. nApps).

Project website: fidal-he.eu

fidal field trials beyond 5G

Co-funded by the European Union

6GSNS

NOVA

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Driven by Passion for Innovation

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Objectives

To extend and deliver:

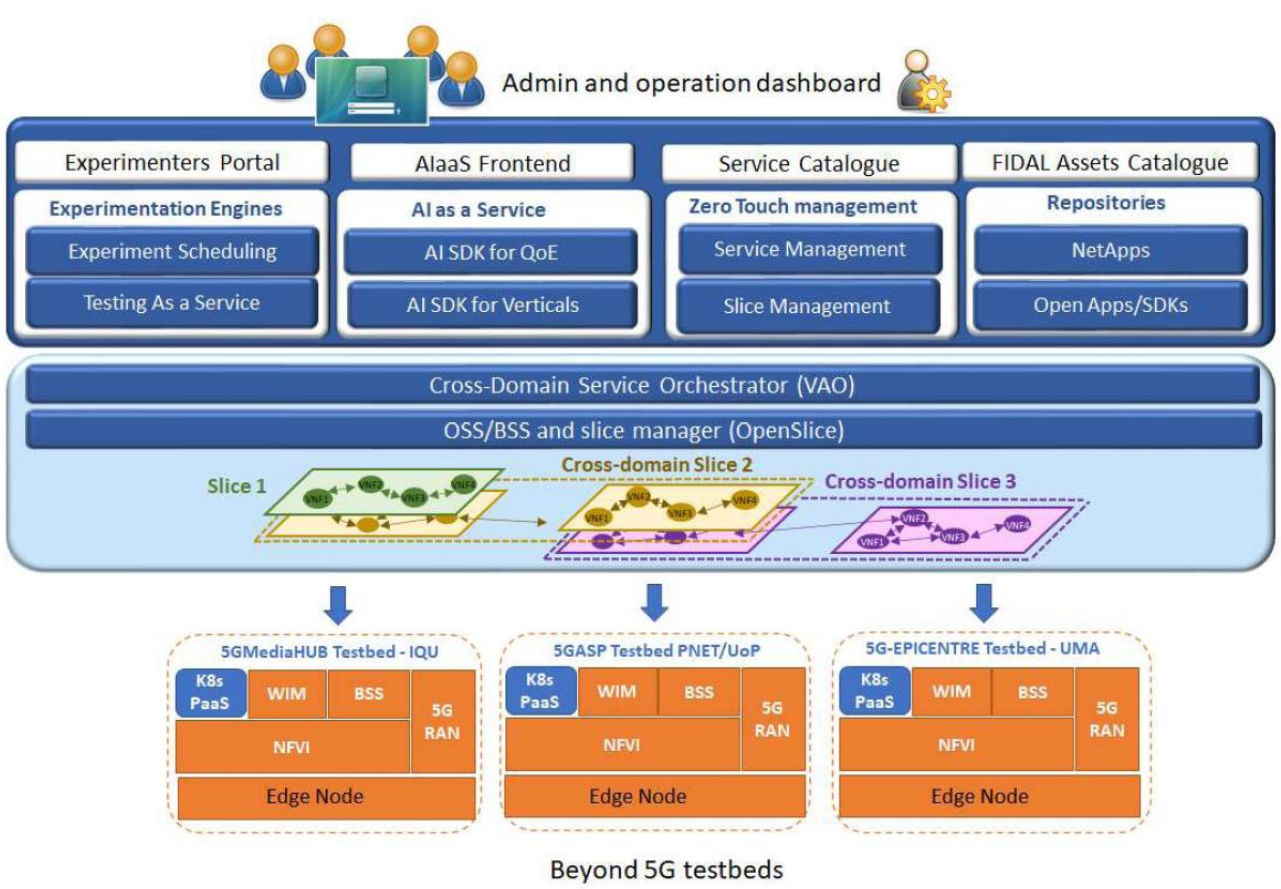
1. Advanced future proof Evolved 5G test infrastructures, anticipating the evolution into the next SNS Phase

2. Open & accessible infrastructures to support 3rd party vertical experiments

3. Test environments for rapid prototyping and large-scale validation of advanced, forward-looking applications

Key Platform Components and Technologies Investigated

- **Unified orchestration and service management**
- **Zero Touch management**
- **Network Applications**
- **AI and AIaaS tools**
- **Security Frameworks**



Large Scale Beyond 5G test infrastructures

FIDAL Use Cases

Two verticals:

Media

UC1

Internet of Senses/Haptic sensing

UC4

Advanced Sports and Media Services

UC5

Virtual Reality Networked music performance

UC7

Smart village engagement services

PPDR

UC2

Digital Twin for first responders

UC3

City security event / incident

UC6

XR-assisted services for public safety

Networked Music Performance

Virtual Reality Networked Music Performance

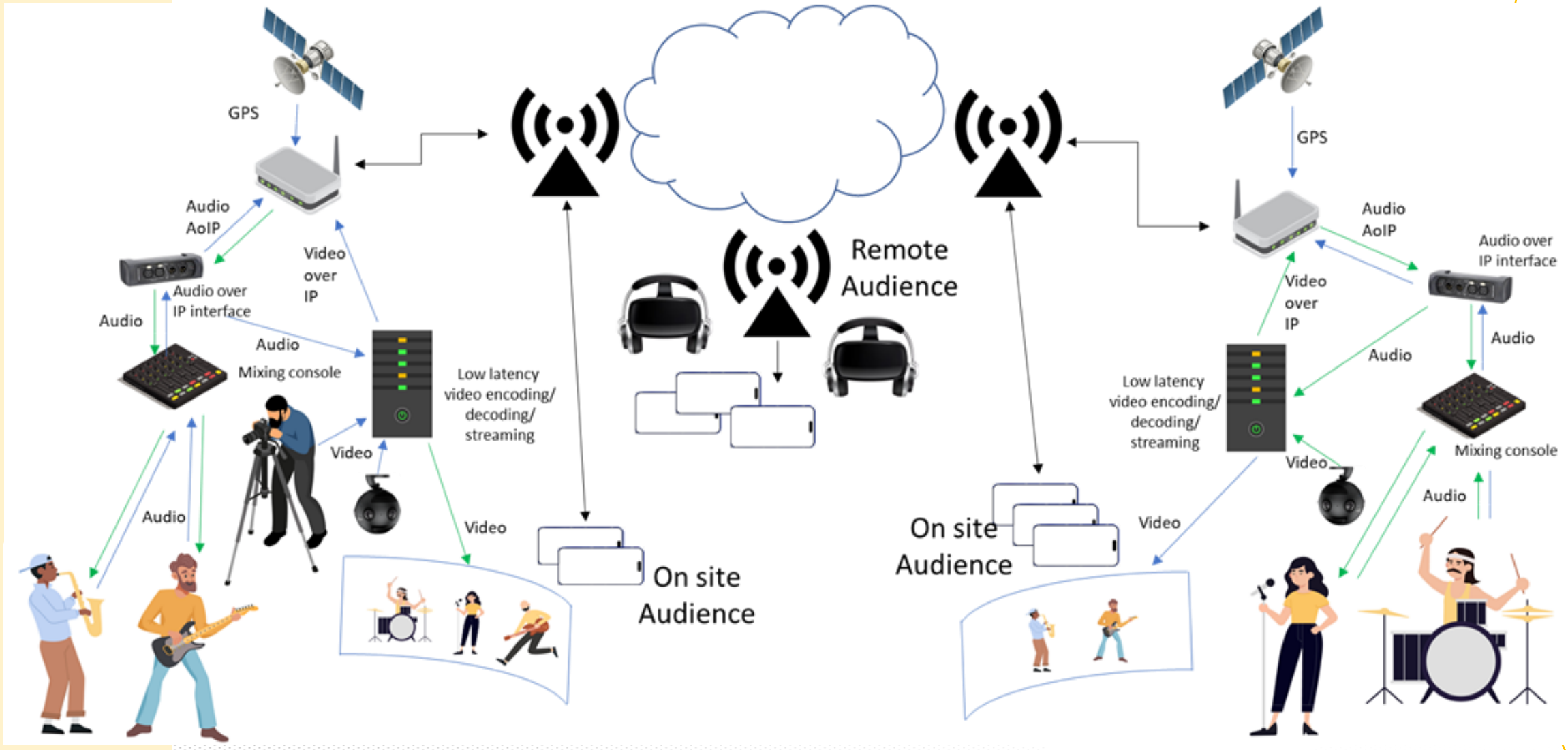
Music played live, between remote musicians, through audio over IP technology, with or without the use of accompanying video

Example of a Networked Music Performance from https://mdessen.medium.com/networked-music-performance-an-introduction-for-musicians-and-educators-d31d33716bd2

Figure from: https://dl.acm.org/doi/pdf/10.1145/3561212.3561237

Audio total latency has to be <= 30 ms

FIDAL UC5 - Virtual Reality Networked Music Performance



Problem space

1. Alignment of expectations
2. Customer / User Experience

3. **Resource efficiency end-to-end**
4. Evolved experimental platforms
5. Business model innovation

Need dynamic alignment between App and Netw

Application – Network Interaction (ANI)

App:

- Can you provide connectivity with performance range
Perf::Acceptable – Excellent
- Observed connectivity performance

Netw:

- Ok / Not Ok

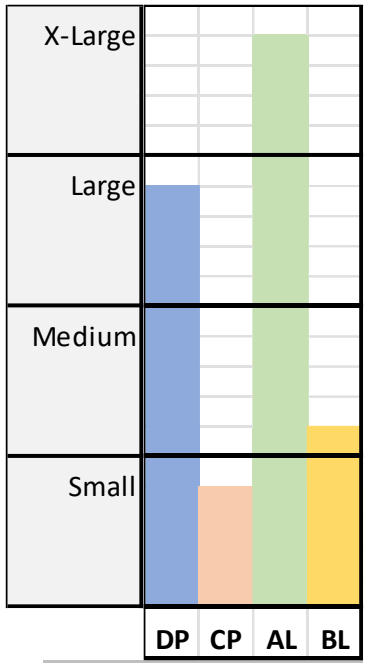
- Likely connectivity performance in given area;
Specialized Connectivity
Service level offer X, Y, Z

- Updated connectivity performance delivered

Opportunity space to be explored (Hypothesis)

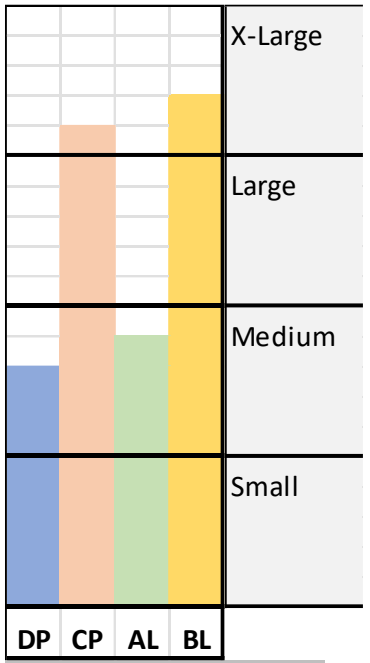
Comparing Use of Resources

Without ANI



“Best-Effort”

With ANI



“Signaling”

CAMARA API

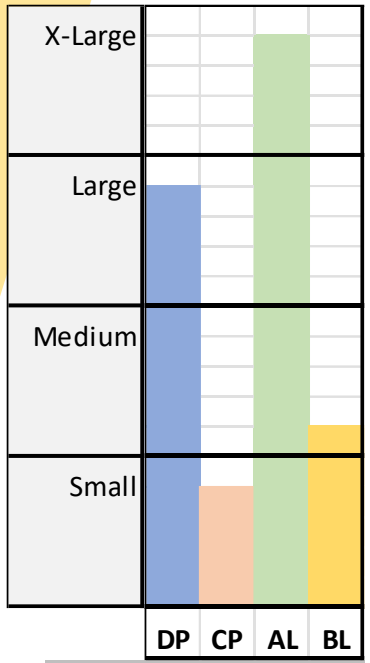
CAMARA API
- https://www.gsma.com/solutions-and-impact/gsma-open-gateway/gsma-open-gateway-api-descriptions/

BL	Business Layer
AL	Application Layer
CP	Control Plane
DP	Data Plane

Opportunity space to be explored (Hypothesis)

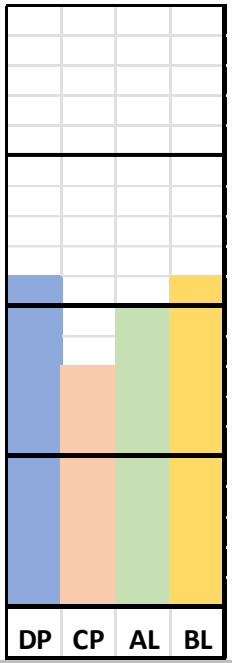
Comparing Use of Resources

Without ANI



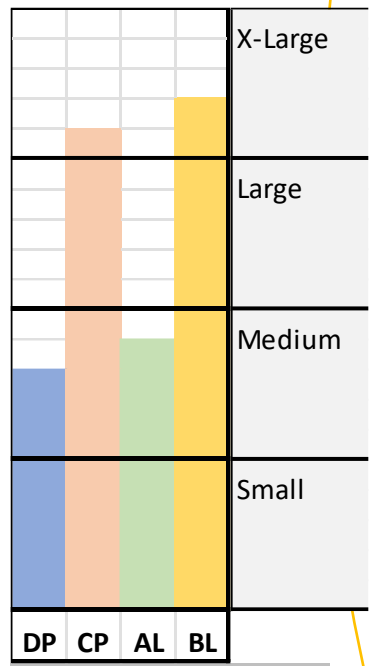
"Best-Effort"

With Smart ANI



Multi-Layer Best-Effort (*)

With ANI



"Signaling"

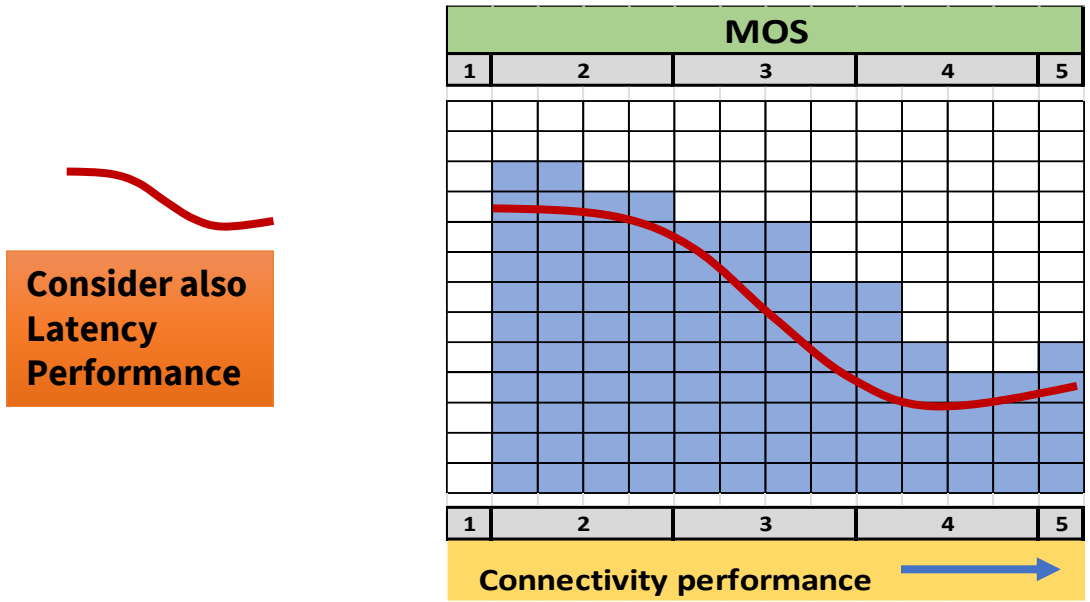
(*) "Toward Smart Public Interconnected Networks and Services - Approaching the Stumbling Blocks"
See - https://ieeexplore.ieee.org/document/10328196

BL	Business Layer
AL	Application Layer
CP	Control Plane
DP	Data Plane

Opportunity space to be explored (Hypothesis)

Comparing nApp resources use as fnc. of Connectivity performance

Without ANI | **With Smart ANI** | **With ANI**



"Best-Effort" | **Multi-Layer Best-Effort (*)** | **"Signaling"**

nApp - Network (Media) Application

(*) "Toward Smart Public Interconnected Networks and Services - Approaching the Stumbling Blocks"
See - https://ieeexplore.ieee.org/document/10328196

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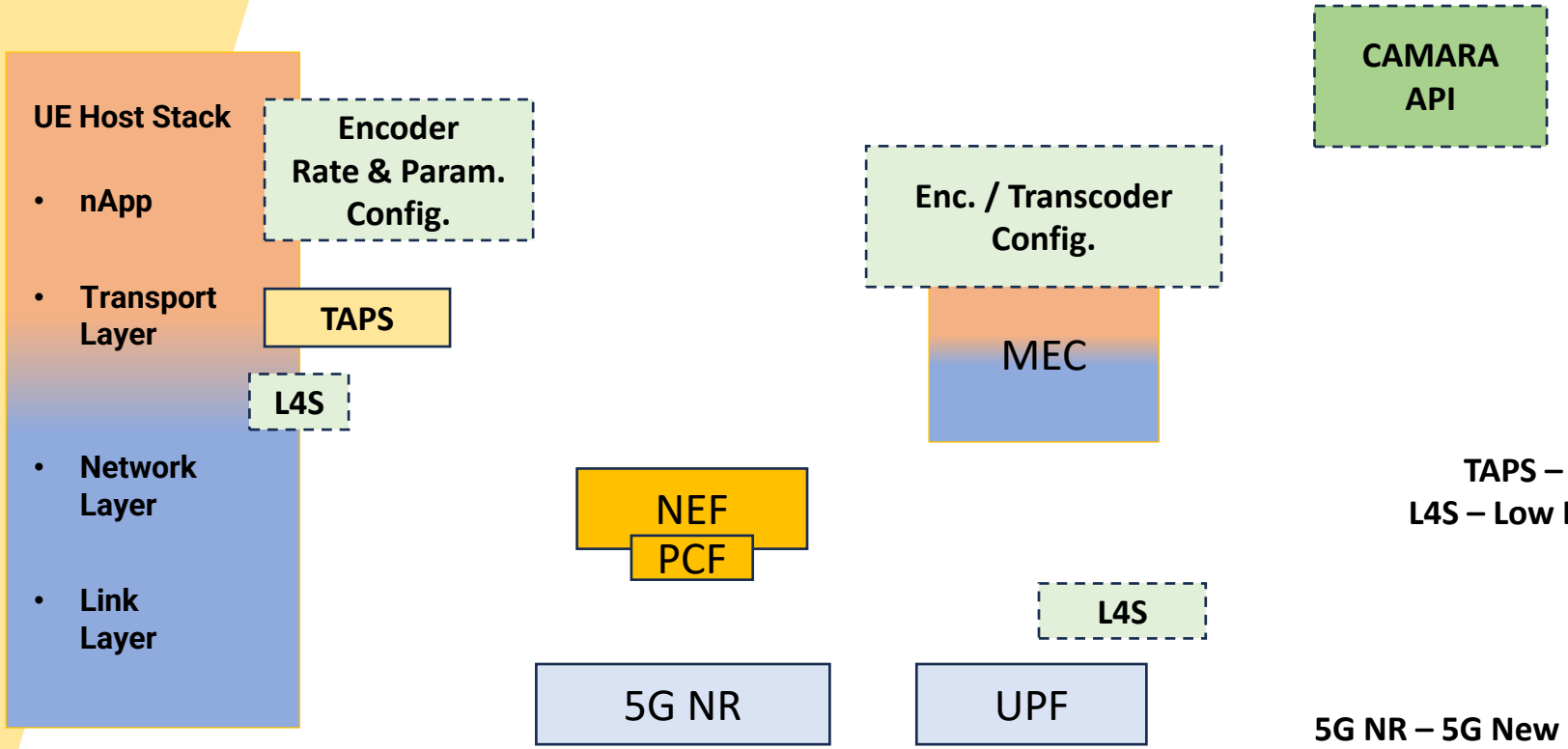
Potential Mechanisms to enable ANI

Layered control and feedback

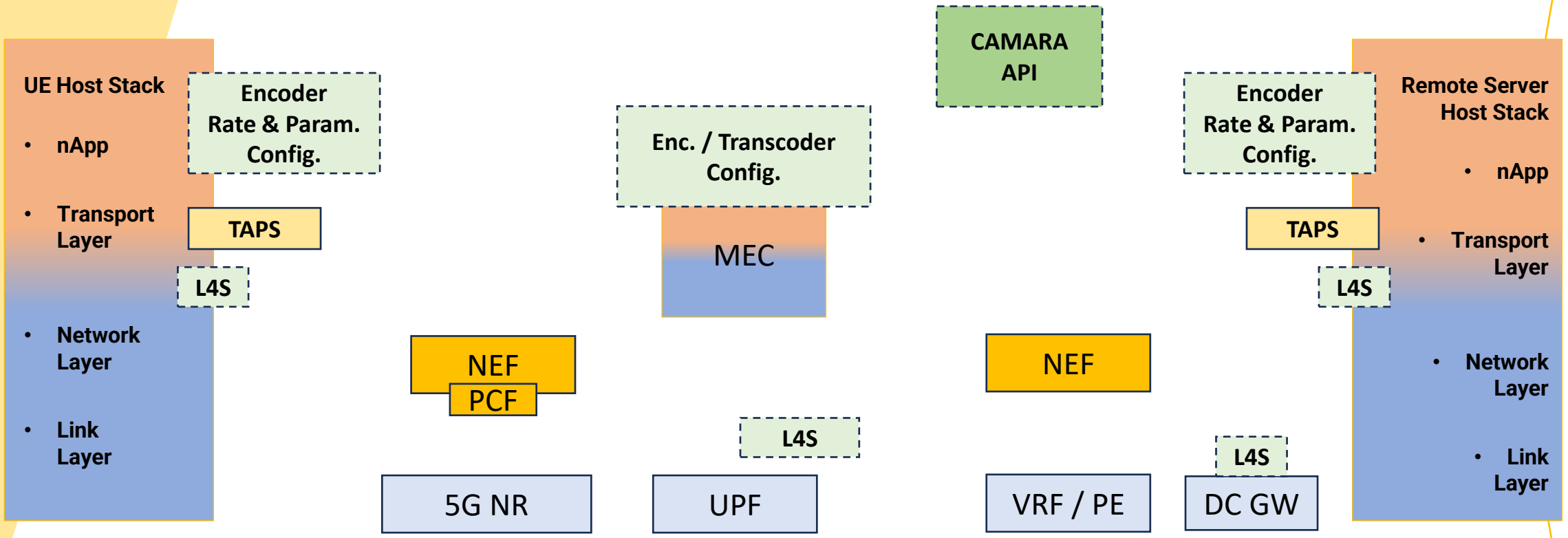


TAPS – (IETF) Transport Services (e.g. taps-interface-26)
L4S – Low Latency Low Loss Scalable throughput (RFC9330)
MEC – Multi-Access Edge Cloud (Data Centre)
NEF – Network Exposure Function
PCF – Policy Control Function
UPF – User Plane Function
5G NR – 5G New Radio (Radio Access Network with QoS support)

- 5G architecture support for XR and media services - https://www.3gpp.org/technologies/xr-sa2
- 5G System overview - https://www.3gpp.org/technologies/5g-system-overview
- CAMARA API - https://www.gsma.com/solutions-and-impact/gsma-open-gateway/gsma-open-gateway-api-descriptions/
- Quality of Outcome - https://datatracker.ietf.org/doc/draft-ietf-ippm-qoo/
- Understand latency webinars - https://understandinglatency.com/
- An Abstract Application Layer Interface to Transport Services - https://datatracker.ietf.org/doc/draft-ietf-taps-interface/

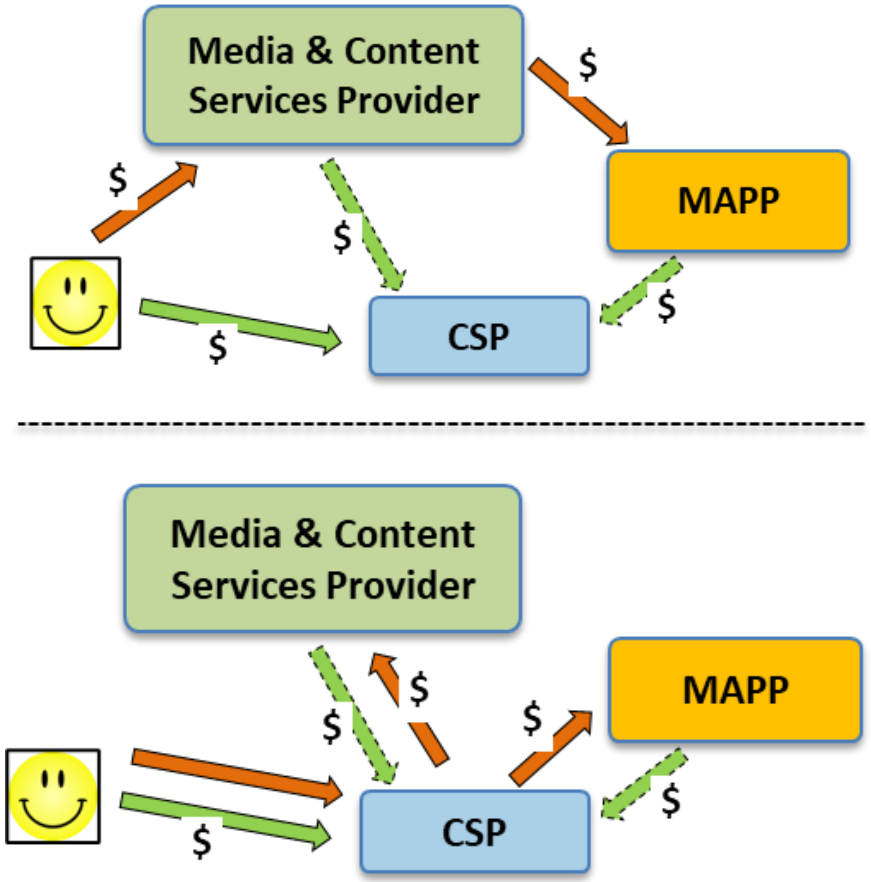
Potential Mechanisms to enable ANI end-to-end

Layered control and feedback



Towards Sustainability-oriented Bus. Model Innovation

ANI ➔ alignment on service level expectation ➔ Sust. BM Innovation



Need to develop support of a variety of Business Models and money flows

MAPP – Media Processing Application Provider
CSP – Communication Service Provider (MNO / Telco)

See also: 5G and Beyond 5G Ecosystem Business Modelling May 2023 - https://5g-ppp.eu/white-papers/

Summary and Concluding Remarks

- 5G and Edge Compute offers a great innovation space for advanced media applications and services
- New and challenging requirements by advanced media use cases
- Many scenarios and options
- Experimentation, testing and validation to provide insight
- Application – Network Interaction to align expectations under dynamic conditions
- Opens up for new business models; consider sustainability objectives

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Thank You

Håkon Lønsethagen, Telenor R&I
(hakon.lonsethagen@telenor.com)