



# The Role of 5G Non-Public Networks for Media Production

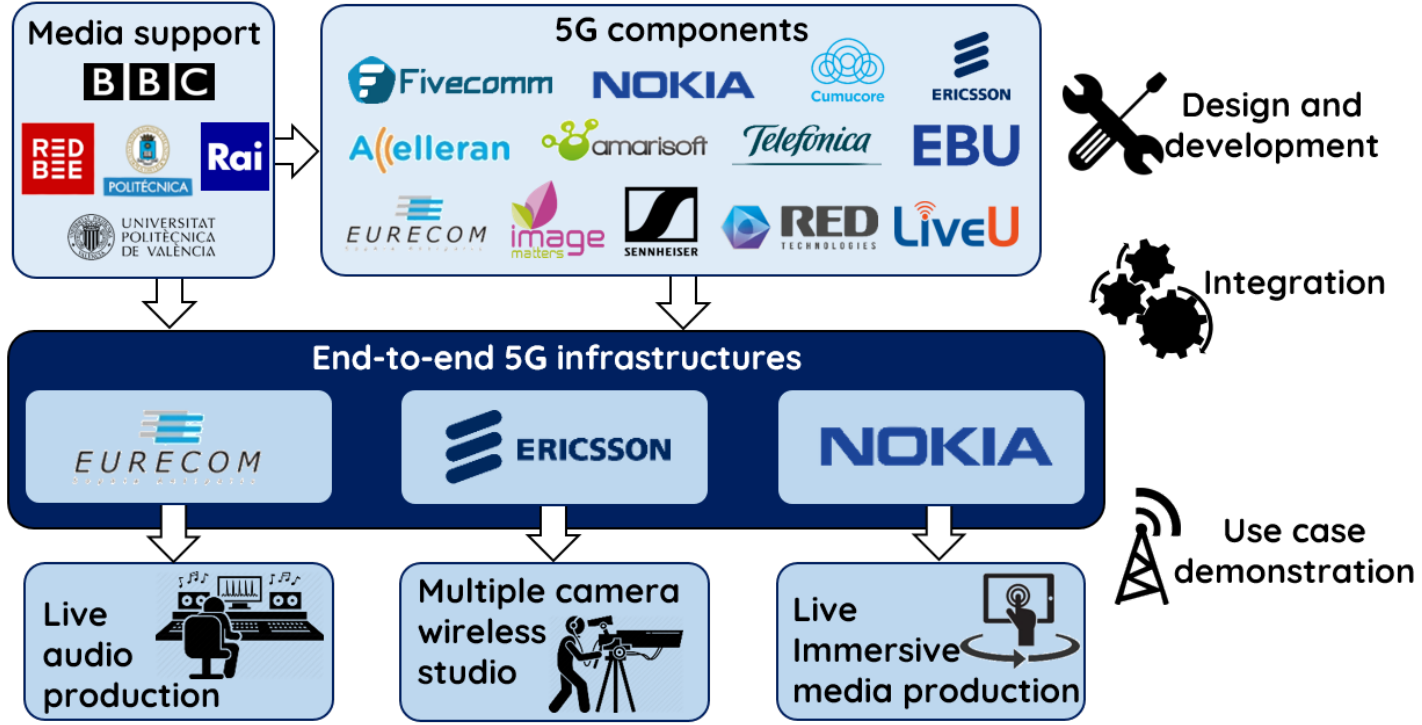
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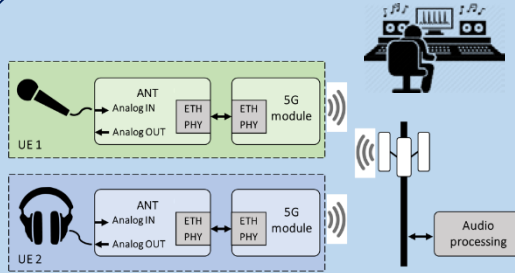
European Broadcasting Union (EBU)

# 5G-Records



## Live Audio Production

5G RECORDS



- Open and Virtualised RAN**
- NR-RedCap & URLLC**
- Software Defined Radio**
- Dynamic Spectrum Access**



### Design

of 5G components for professional content production



### Development

of state-of-the-art 5G prototypes



### Integration

into end-to-end 5G infrastructures



### Validation

in the context of real production use cases

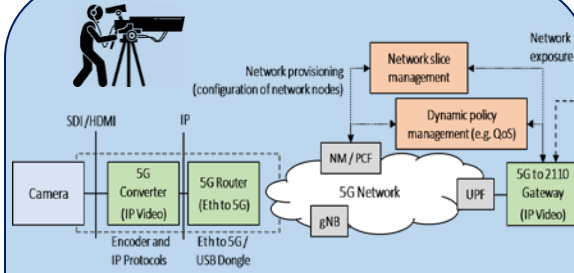


### Demonstration

of the potential value for the sector

## Multiple Camera Wireless Studio

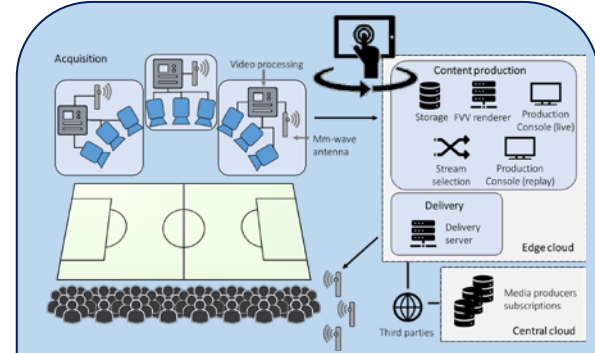
5G RECORDS



- Non-Public Networks**
- Timing and Synchronization**
- Network Slicing**
- Media Orchestration**

## Live Immersive Media Production

5G RECORDS



- Edge Computing**
- mm-Wave Antennas/Devices**
- Centralized/Distributed 5GC**

# Use Cases and Requirements

Technical Specifications Group Services and Equipment Aspects  
Study on User Stories and Service Requirements  
Stage 1  
Phase 1 TS

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## Specifications for Video, Imaging and Audio TS 22.263 Normative requirements

3GPP TSG-SA WG1 Meeting #87  
Suzhou, China, 6 - 10 May 2019

S1-192374  
(revision of S1-19xxxx)

Title: Cover Sheet for Presentation of TS 22.263v0.1.0 to TSG SA#87 for Information

Agenda Item: x

Source: Rapporteur BBC

Contact: Ian.Wagdin@bbc.co.uk

Abstract: This document provides a revision of the consolidated potential requirements of AV/PGD. The changes include a revision of the performance consolidated requirements and the service consolidated requirements.

The changes for the performance consolidated requirements are:

- the packet error rate is shown now as a ratio and not as a percentage
- improvement the quasi-error free formula for determining the video packet error ratio

The changes regarding the consolidated service requirements are:

- text revision to make it more generic
- Revision of requirement regarding a list of core network connectivity
- Missing requirement on core network connectivity to the NPN subclause from the service continuity subclause
- Propagating service requirement changes of use case in section 5.12 from contributions S1-191369 and S1-191569

Abstract of document:

This document describes the service and performance requirements for the operation of professional video, audio and imaging via a 5G system, including a UR, NG-RAN and 5G Core network.

The aspects addressed in this document include:

- Network service requirements specific for the operation of professional video, imaging and audio for PLMN and non-public networks (NPN)
- Network performance requirements specific for the operation of professional video, imaging and audio for PLMN and non-public networks (NPN)

Changes since last presentation to TSG Meeting:

This is the initial presentation for information.

Outstanding Issues:

8 Consolidated potential requirements

### 8.1 Performance requirements

Every line in each table should be considered as an independent requirement.

Table 8.1-1: Performance requirements of low latency periodic deterministic communication service

Profile	# of active UEs	UE Speed	Service Area	R2E Max delay (Order 1)	Transfer interval (Order 1)	Packet size rate (Order 1)	Data rate UL	Data rate DL
Active	30	5 km/h	100 m x 100 m	3 ms	3 ms	300 kbps		

## Study on AV Production TR 22.827

### Sets out user stories and requirements

Expected Output and Time s

Work item Rapporteur(s)

# Key Areas

- High Bandwidth support up to 1GB/s
- Open IP broadcast standard support
- QoS (low PER)
- PTP to act as a master clock
- Low latency
- Audio for radio mics, In ear monitoring etc
- Requirements for NPNs
- Managed networks
- 'Roaming' for PLMN and NPN

Expected Output and Time scale	Description of change	Target completion	Priority
	Documented existing TRSs, also see per specification. Considerable work on completion		
22.281.0	Add new clause to refer to specific TS, and add 1	TSG#800	H
	Document service requirements		
	TS 23.282 per specification	TSG#800	H



# The real applications

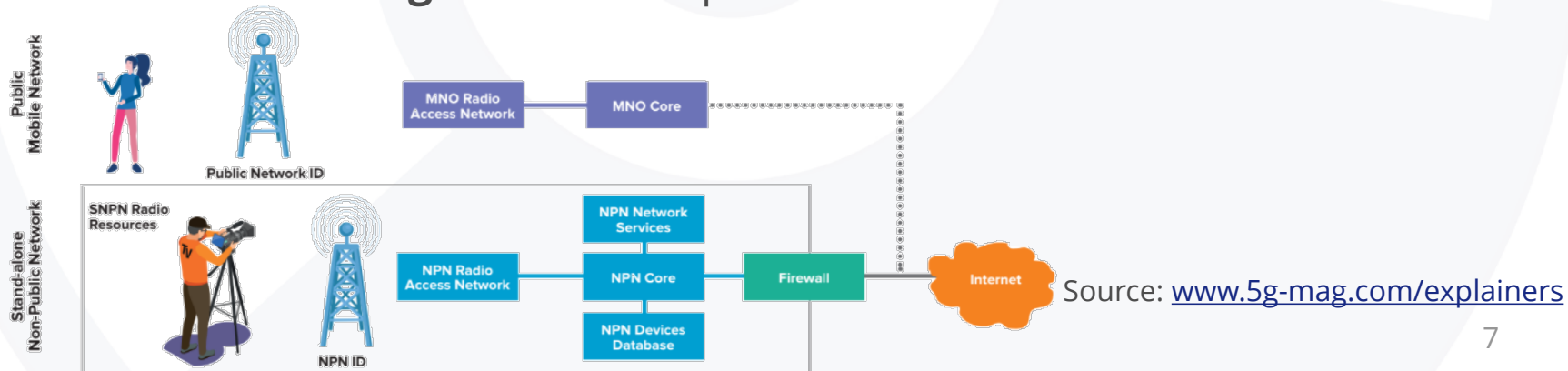


PorscheCup in Sweden running 3 times 9 Mbps using adaptive bitrate



# Non-Public Networks and 5G-Records

- Non-Public Networks (NPNs) are a configuration option to make a 5G network fit private use
  - Supporting stringent **requirements**
  - High degree of **security** and traffic **isolation**
  - Control on selected **devices**
  - **Self-management** and operation



# NPN Deployment Options

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- How to deploy them?
  - **Two** models to operate Non-Public Networks

STANDALONE NPN

Self-deployment

PUBLIC NETWORK  
INTEGRATED NPN

Deployed in collaboration  
with Public Network



# Standalone NPNs

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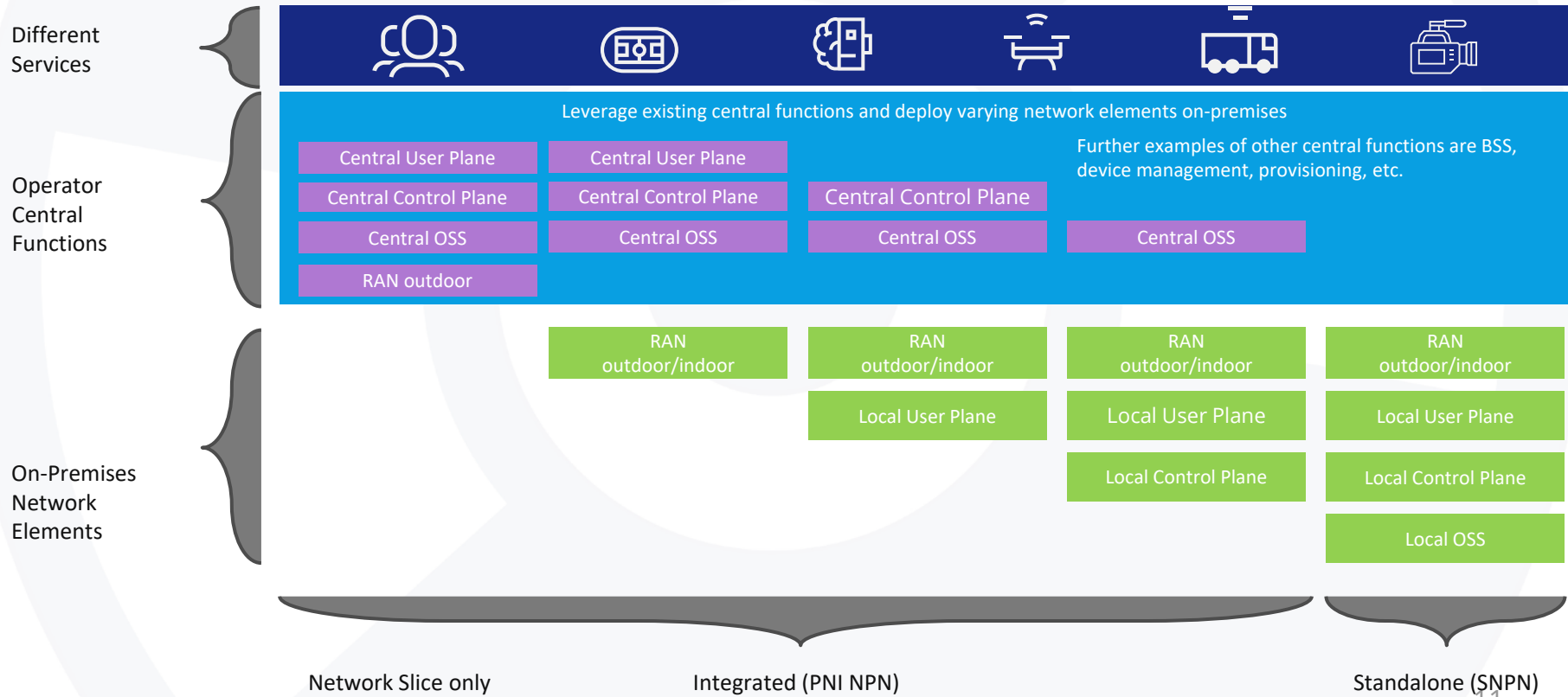
- Deployment not dependent of existing mobile network
- Deployable anytime, anywhere
- Bring your own equipment
- Ad-hoc coverage and performance
- Can be configured to meet high demanding requirements for production

# Public-Network Integrated NPN

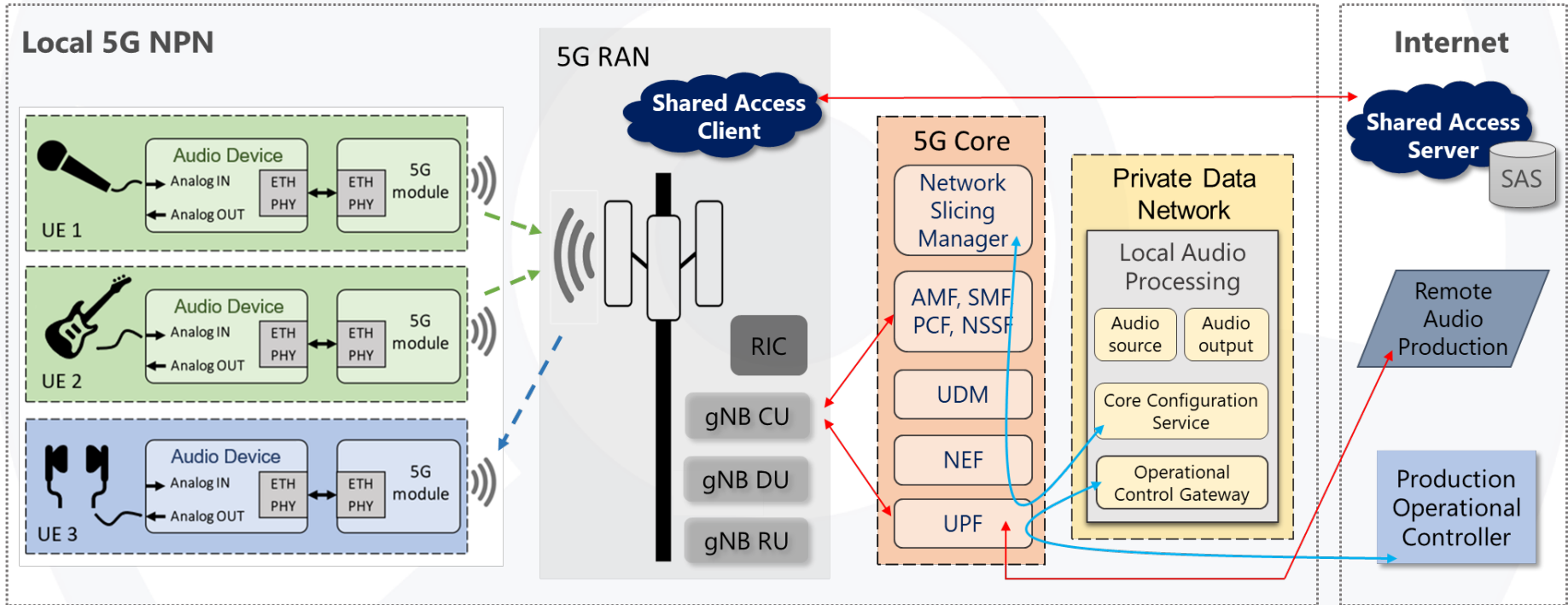
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- Deployment dependent of existing public mobile network operators
  - Different degrees of integration
- Less demanding requirements
  - Those that can be met by a public mobile network
- Service level agreement and commercial arrangements are needed
  - Quality of service may be guaranteed by **network slicing**

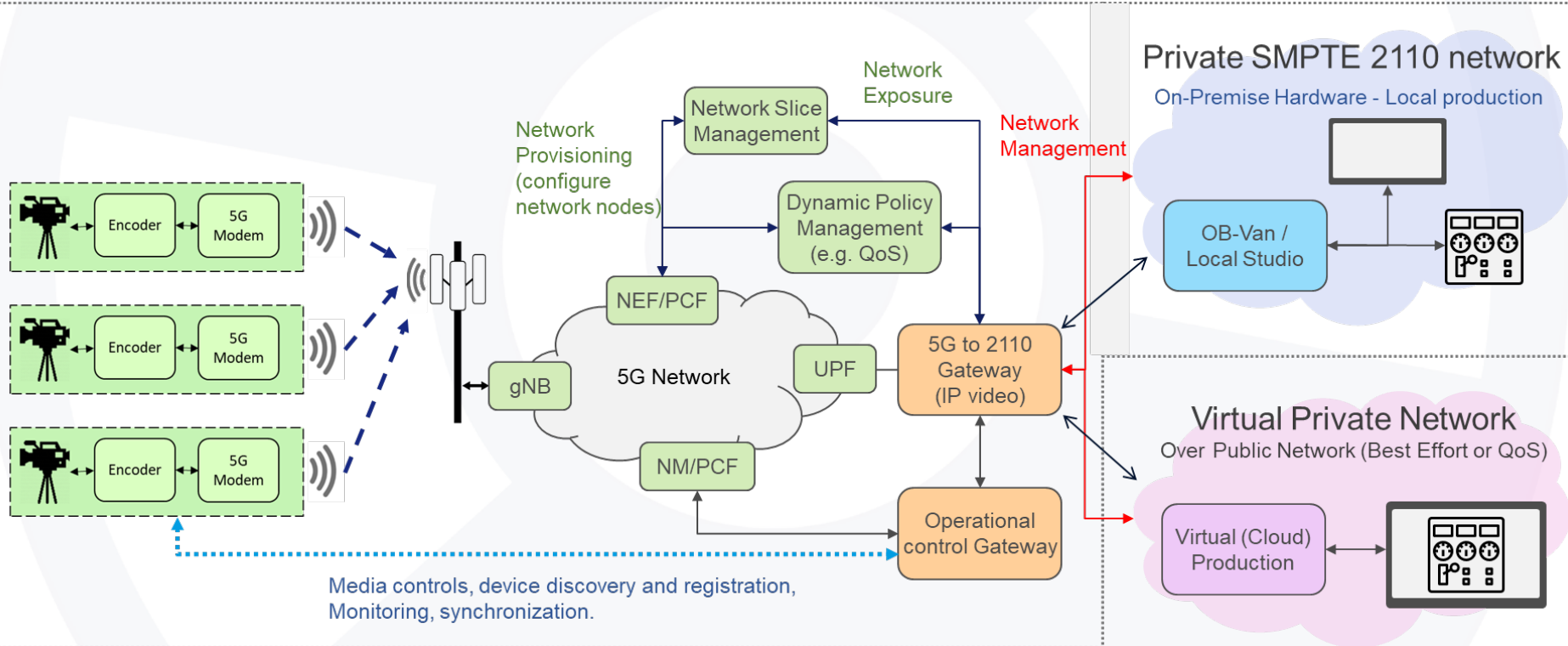
# NPN Deployment Options



# NPN for Live Audio Production

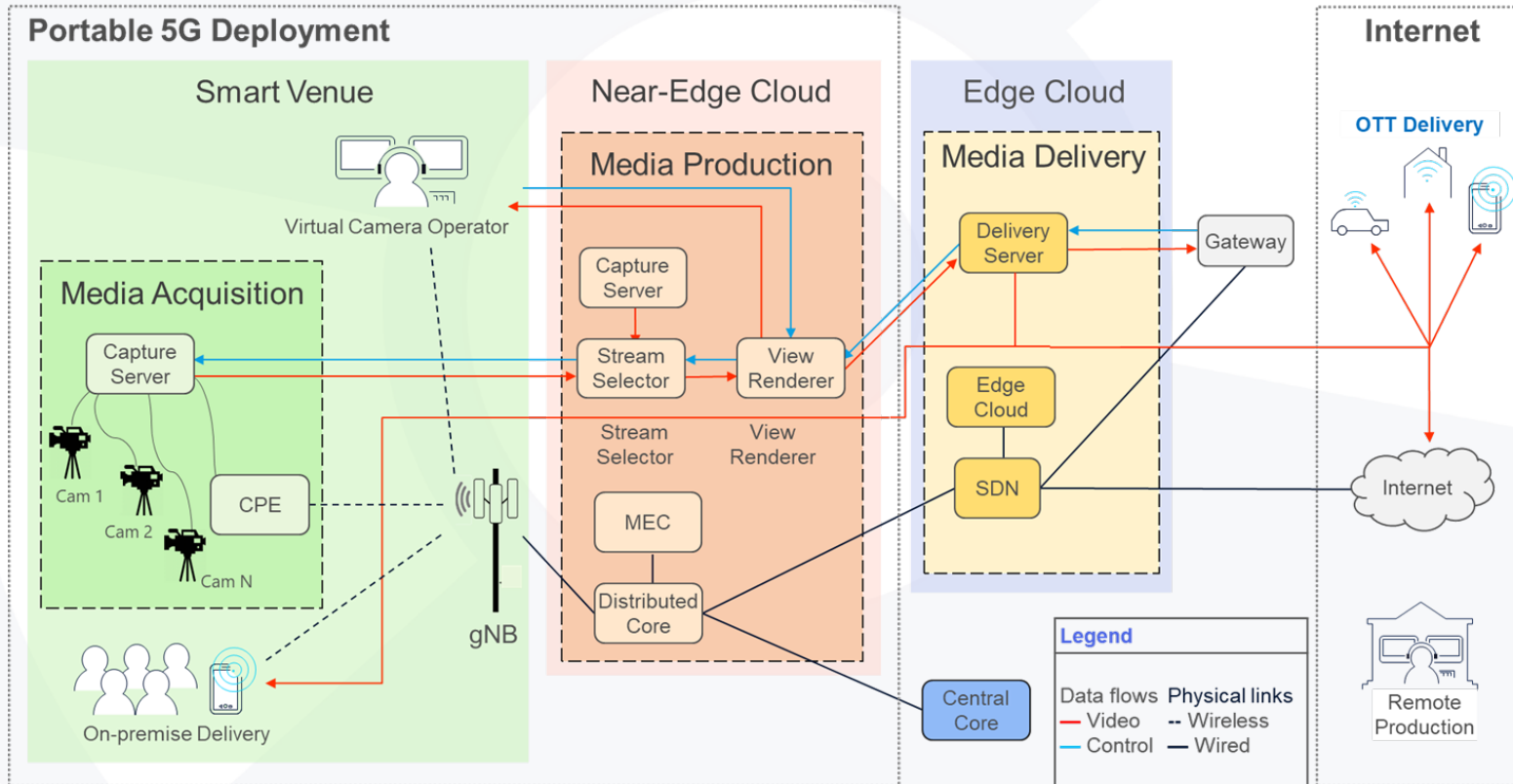


# NPN for Multi-Camera Wireless Studio





# NPN for Live Immersive Media Production



# What is next?

- 5G-Records members are contributing to work in:
  - Standardisation at 3GPP
  - Industry forum: 5G Media Action Group



A GLOBAL INITIATIVE



MEDIA ACTION GROUP

TSG SA Meeting SA#91-e	SP-210241
18 <sup>th</sup> – 29 <sup>th</sup> March 2021, Electronic meeting	revision of SP-210041
3GPP TSG-SA4 Meeting #112e	S4-210326
1–10 Feb, 2021	
Source:	SA WG4
Title:	New SI on Media Production over 5G NPNs [SID:FS_5G_4_AVProd]
Document for:	Approval
Agenda Item:	6.3

## 3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>  
 See also the [3GPP Working Procedures](#), article 39 and the TSG Working Methods in [3GPP TR 21.900](#)

Title: Study on Media Production over 5G NPN  
 Acronym: FS\_NPN4AVProd  
 Unique identifier: 910001  
 Potential target Release: Rel-17

1 Impacts

The work is supported by **Ericsson**, AT&T, IRT b-com, **BBC**, **Dolby** Laboratories, **European Broadcasting Union**, Orange, **Sennheiser**, Tencent, Qualcomm and Verizon.



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**Thanks for your attention!  
Any questions?**