



5G RECORDS

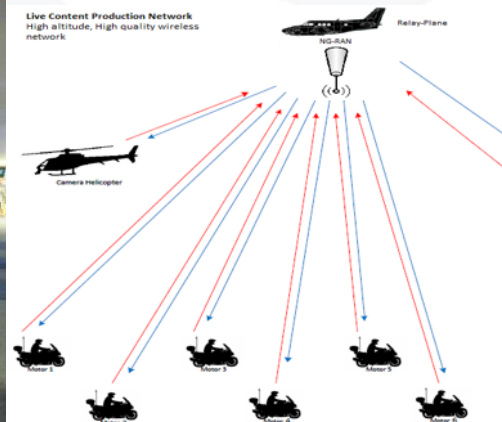
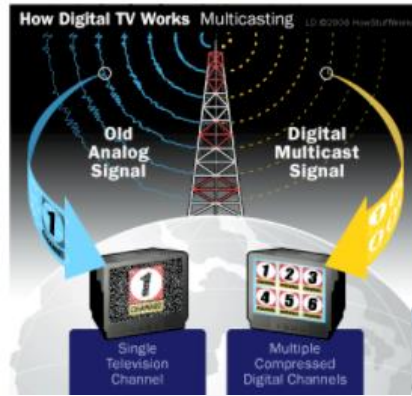
5G in content production
The European perspective

Ian Wagdin
BBC

In the beginning, it was analogue.



And then we went digital.....



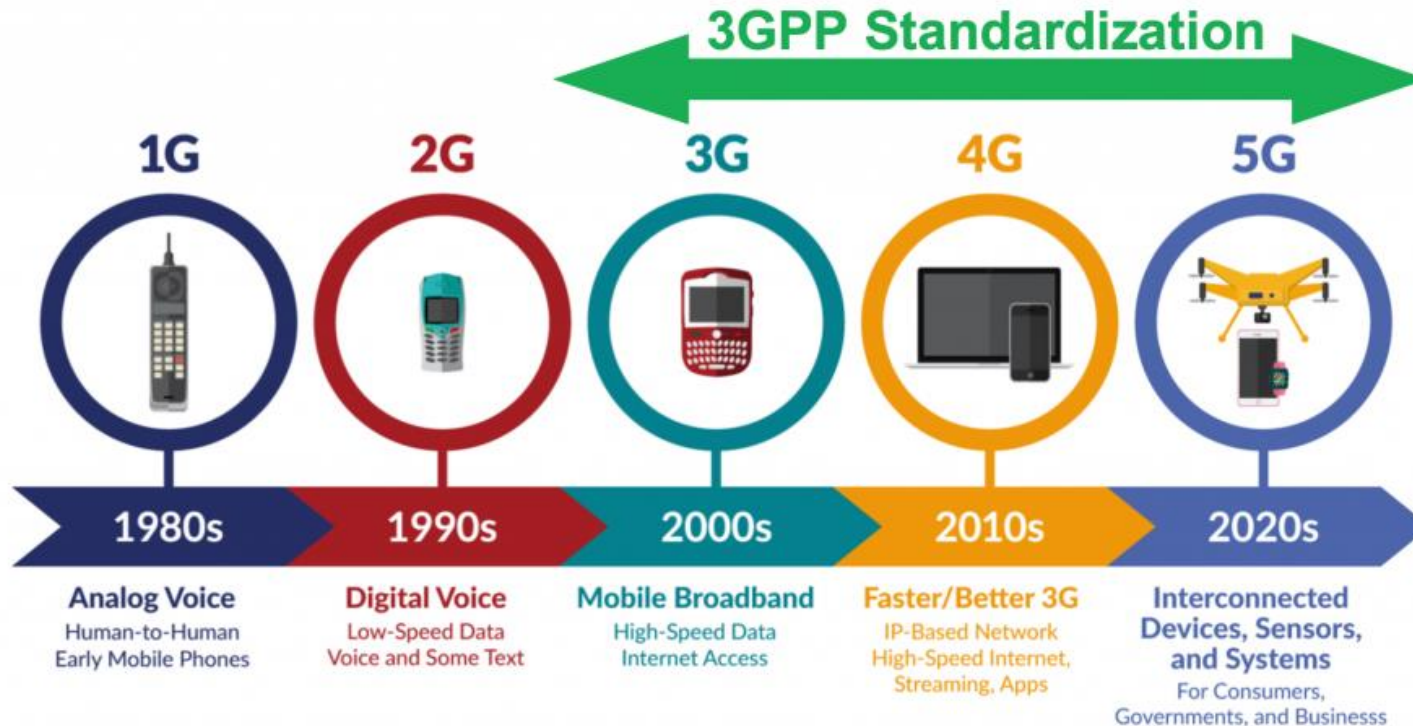
And now we have IP



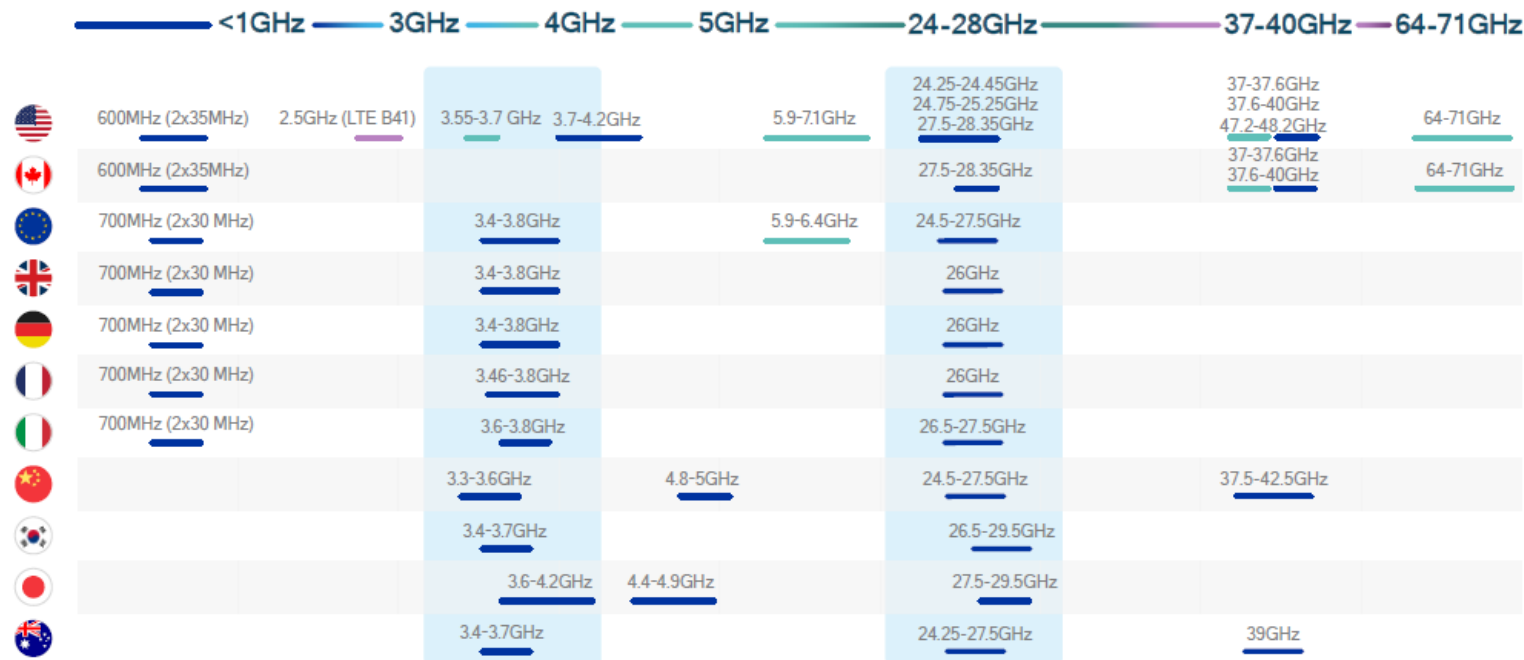
And it's not just us



And it's not just us



Spectrum



Global snapshot of 5G spectrum

Around the world, these bands have been allocated or targeted

New 5G band

- Licensed
- Unlicensed/shared
- Existing band

Spectrum (in Europe)

BBC Design + Engineering

3

ERC RECOMMENDATION 25-10

Bands				
A1:	29.7	MHz	47	MHz
A2:	174	MHz	216	MHz
A3:	470	MHz	694	MHz
A4:	694	MHz	790	MHz
A5:	823	MHz	832	MHz
A6:	863	MHz	865	MHz
A7:	1350	MHz	1400	MHz
A8:	1518	MHz	1525	MHz
A9:	1785	MHz	1805	MHz
B1:	174	MHz	216	MHz
B2:	470	MHz	694	MHz
B3:	694	MHz	790	MHz
C1:	2010	MHz	2025	MHz
C2:	2025	MHz	2110	MHz
C3:	2200	MHz	2300	MHz
C4:	2300	MHz	2400	MHz
C5:	2400	MHz	2500	MHz
C6:	2700	MHz	2900	MHz
C7:	7	GHz	8.5	GHz
C8:	10	GHz	10.68	GHz
C9:	21.2	GHz	24.5	GHz
C10:	47.2	GHz	50.2	GHz

Audio PMSE

Video PMSE

Spectrum (in Europe)

BBC Design + Engineering

ERC RECOMMENDATION 25-10

Bands				
A1:	29.7	MHz	47	MHz
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C10:	47.2	GHz	50.2	GHz

Audio PMSE

Video PMSE

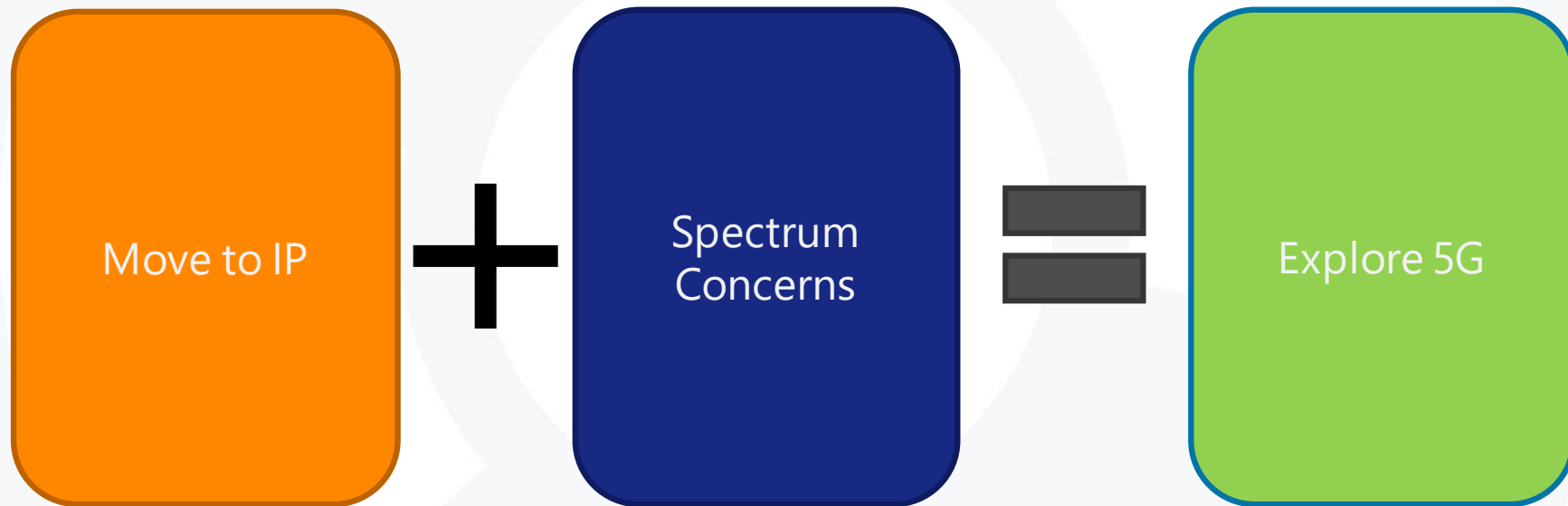
3GPP NR BANDS

NR FR1/2	Uplink (UL) Operating Band (MHz)		Downlink (DL) Operating Band (MHz)		Bandwidth (MHz)	Duplex Mode
	BS Receive / UE Transmit	$f_{UL_low} - f_{UL_high}$	BS Transmit / UE Receive	$f_{DL_low} - f_{DL_high}$		
n1	1920	1980	2110	2170	60	FDD
n2	1850	1910	1930	1990	60	FDD
n3	1710	1785	1805	1880	75	FDD
n5	824	849	869	894	25	FDD
n7	2500	2570	2620	2690	70	FDD
n8	880	915	925	960	35	FDD
n20	832	862	791	821	30	FDD
n28	703	748	758	803	45	FDD
n38	2570	2620	2570	2620	50	TDD
n41	2496	2690	2496	2690	194	TDD
n50	1432	1517	1432	1517	85	TDD
n51	1427	1432	1427	1432	5	TDD
n66	1710	1780	2110	2200	70/90	FDD
n70	1695	1710	1995	2020	15/25	FDD
n71	663	698	617	652	35	FDD
n74	1427	1470	1475	1518	43	FDD
n75	N/A	N/A	1432	1517	85	SDL
n76	N/A	N/A	1427	1432	5	SDL
n77	3300	4200	3300	4200	900	TDD
n78	3300	3800	3300	3800	500	TDD
n79	4400	5000	4400	5000	600	TDD
n80	1710	1785	N/A	N/A	75	SUL
n81	880	915	N/A	N/A	35	SUL
n82	832	862	N/A	N/A	30	SUL
n83	703	748	N/A	N/A	45	SUL
n84	1920	1980	N/A	N/A	60	SUL
n257	26500	29500	26500	29500	3000	TDD
n258	24250	27500	24250	27500	3250	TDD
n260	37000	40000	37000	40000	3000	TDD

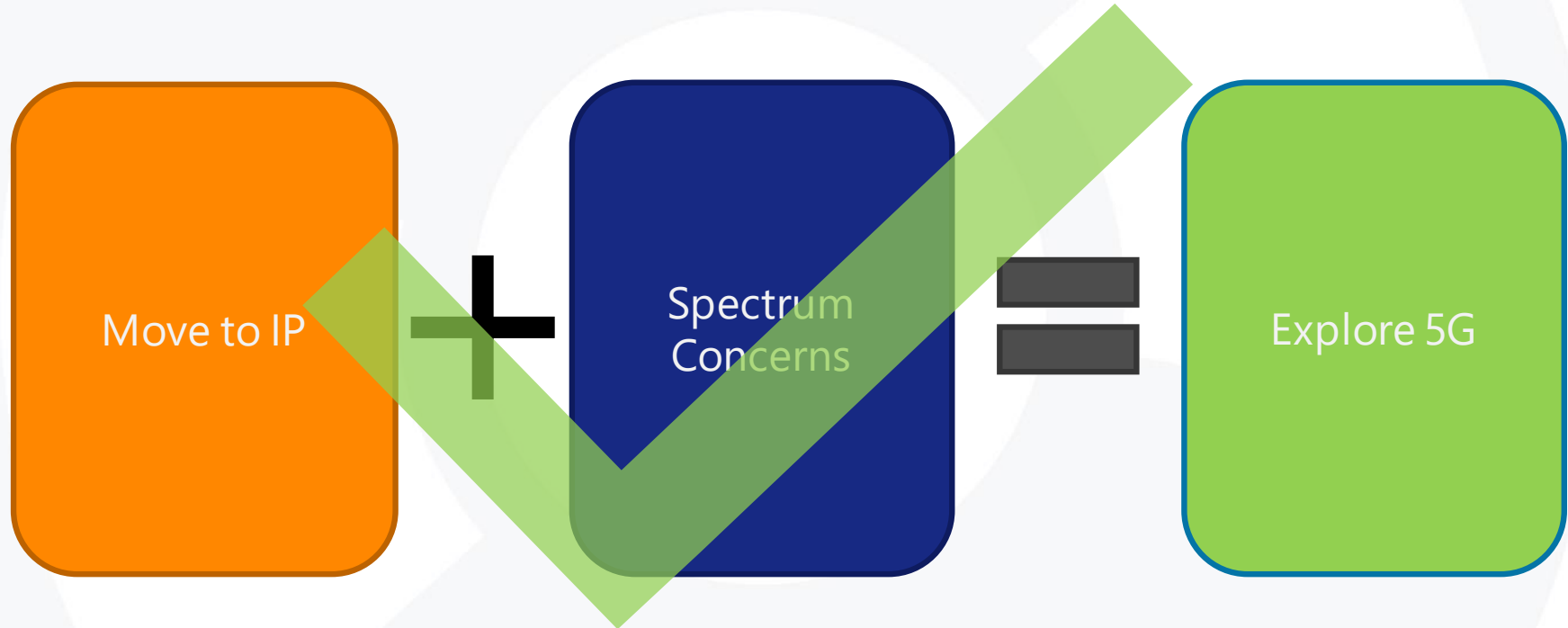
Zscaler Security
Private Access Turned On.

4

Why 5G?

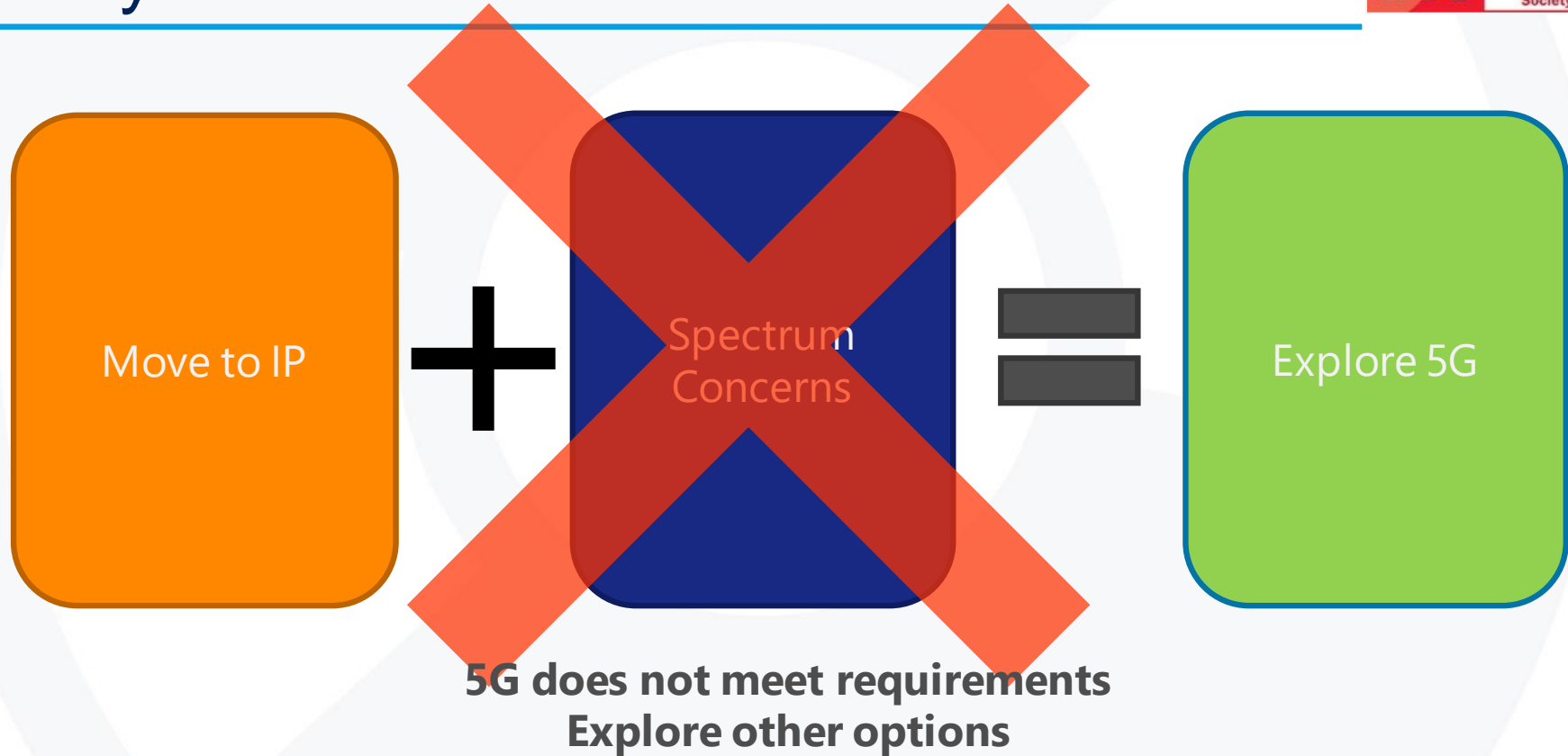


Why 5G? Answer 1



**5G is good enough for Production
Adopt technologies**

Why 5G? Answer 2



What we are doing

EBU
OPERATING EUROVISION AND EURO-RADIO

TECHNOLOGY & INNOVATION

NEWS EVENTS PUBLICATIONS OUR WORK ABOUT LOGIN


5G IN CONTENT PRODUCTION

Gathers Members and the industry to identify requirements in content production that need to be met in the 5G context

5G is a new broadband technology that will enable new services for consumers and business users. It is expected to provide super-fast, low latency and highly reliable wireless connections, which may allow broadcasters to produce content in a more efficient way and improve their offering to viewers and listeners.

Broadcasters hope that 5G can be used to improve technical and operational efficiency, increase flexibility, and reduce production cost. 5G is also hoped to enable new production workflows, in particular in news gathering, remote production, coverage of live events, and user engagement.

For these opportunities to materialize it is necessary to identify specific technical and other requirements in content production that need to be met in the 5G context.



Goals


[JOIN OUR GROUP >](#)

[VISIT THE WORKSPACE >](#)

CHAIR
Ian Wagdin (BBC)

RELATED GROUP
[5G Deployments](#)

STRATEGIC PROGRAMME
[Distribution](#)

CONTACT US

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What we are doing



What we are doing

3rd Generation Partnership Project
Technical Specification Group Services and System Aspects
Study on the Use of 5G Radio Access Technology for the 4G-LTE
Stage 1
(Release 15)

Table of Contents

1 Introduction

2 Scope

3 Normative references

4 Definitions, abbreviations and acronyms

5 Study on AV Production

6 Study on AV Production

7 Study on AV Production

8 Consolidated potential requirements

9 Consolidated potential requirements

10 Consolidated potential requirements

11 Consolidated potential requirements

12 Consolidated potential requirements

13 Consolidated potential requirements

14 Consolidated potential requirements

15 Consolidated potential requirements

16 Consolidated potential requirements

17 Consolidated potential requirements

18 Consolidated potential requirements

19 Consolidated potential requirements

20 Consolidated potential requirements

21 Consolidated potential requirements

22 Consolidated potential requirements

23 Consolidated potential requirements

24 Consolidated potential requirements

25 Consolidated potential requirements

26 Consolidated potential requirements

27 Consolidated potential requirements

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Study on AV Production TR 22.827 Sets out user stories and requirements

Specifications for Video, Imaging and Audio TS 22.263 Normative requirements

Abstract: This document provides a revision of the consolidated potential requirements of AVVPD. 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 loss of core network connectivity
- Moving requirement on core network connectivity to the 4G-LTE subclause from the service continuity subclause
- Propagating service requirement changes of use case in section 5.12 from contributions S1-191359 and S1-191560

8 Consolidated potential requirements

8.1 Performance requirements

Every line in sub-clause should be considered as an independent requirement.

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

Profile	Service	Service Area	QoS	Packet error rate (Chen 1)	Packet error rate (Chen 2)	Packet error rate (Chen 3)	Packet error rate (Chen 4)	Packet error rate (Chen 5)	Packet error rate (Chen 6)
Active	3G	3G	3G	100	100	100	100	100	100

Page 1 of 10

Abstract of document: This document contains the cover sheet for the presentation of TS 22.263v1.0 to TSG SA#85 for information.

Agenda item: x

Source: Rapporteur BBC

Contact: Ian.Wagdy@bbc.co.uk

Abstract of document: This document describes the service and performance requirements for the operation of professional video, audio and imaging via 5G systems, including a 4G-LTE, 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:

Key Themes

- **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**

Key Themes

5GCP - 5G in Con... f a s i n p o a a t l i n a s m c g y Google MacVideo Google Maps

NEWS

5G FOR PROFESSIONAL MEDIA PRODUCTION AND CONTRIBUTION

Tech Report 056

TECHNICAL REPORTS 07 Oct 2020



The scope of this document is to explore the possibilities provided by 5G rather than other forms of wireless solution. To this end, several challenges need to be addressed and these can be broken down into four key areas: standardisation, technology availability, regulation, and business models

[OPEN FILE \(PDF, 1.2 MB\)](#)

5G represents an opportunity and challenges for the content creation industry. 5G offers much in terms of bandwidth, reduced latency, timing and quality of service. It is also expected that standardised 5G-based solutions would bring down the costs and increase the flexibility of production.

But the 5G roll-out is a gradual evolution and will take time to achieve the capabilities promised by the marketing hype, if it ever does. The media industry is engaging well with the standards bodies and regulatory bodies. Innovative ways of

RECOMMENDED



**5G in content
production**

Why production
will move to 5G



BroadThinking 2020

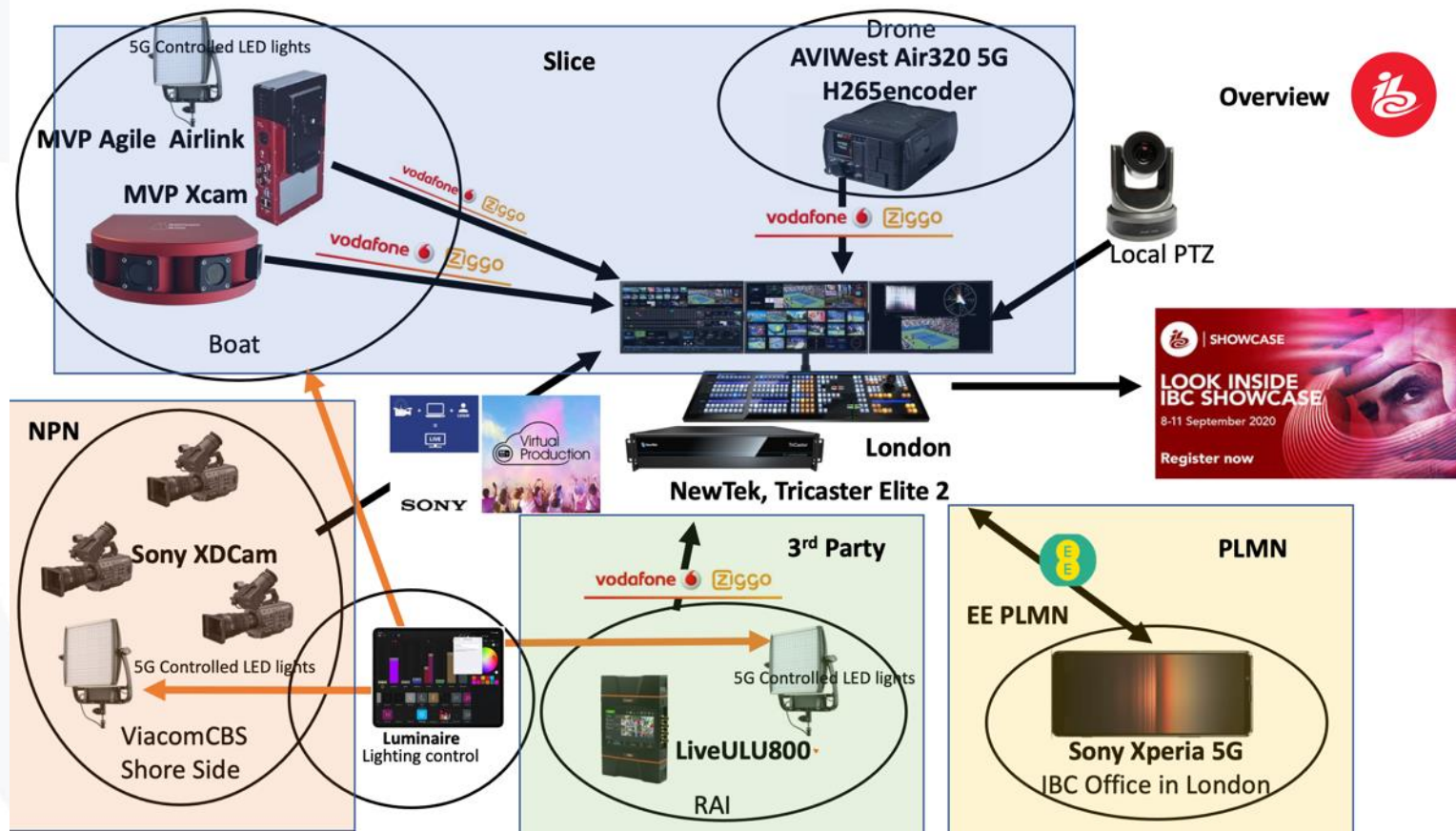
5G
in Media



**5G for the distribution
of media content**

5G-MAG
Media and 5G

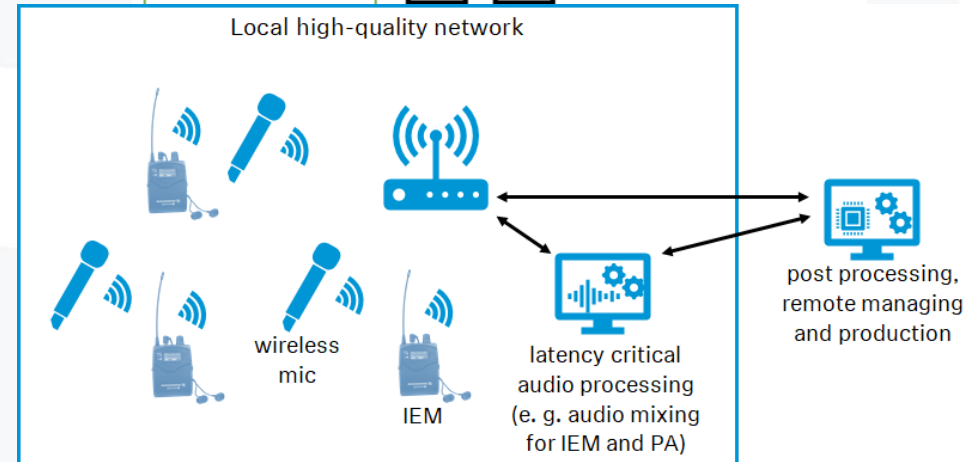
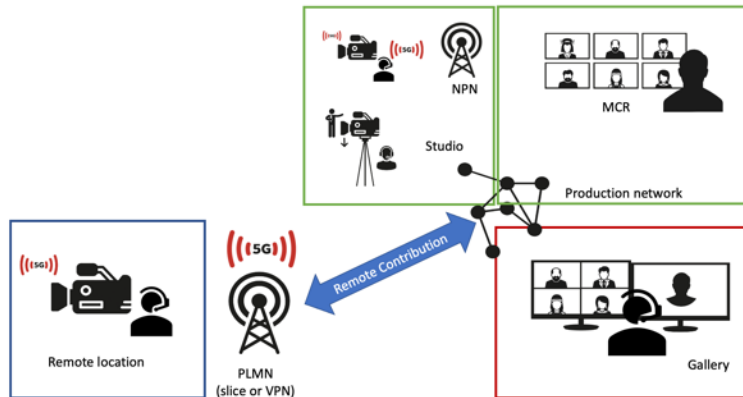
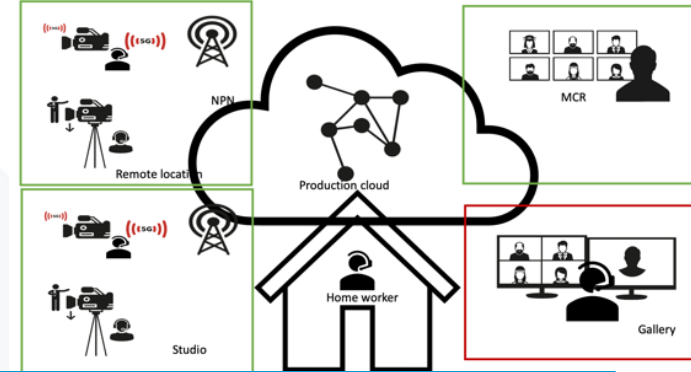
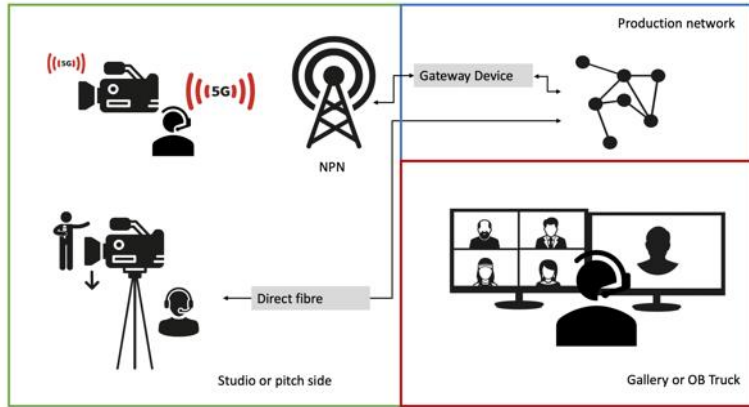
What we are doing



It will take time

	Crawl	Walk	Run
	×	×	×
	×	×	×
	✓	×	×
	✓	×	×
	✓	✓	×

It won't be one size fits all



It won't be one size fits all

PLMN

Traffic
Prioritisation

Slice

PNI-NPN

SA-NPN

It won't be one size fits all

Public network

Contractual agreement

Owned or
operated

PLMN

Traffic
Prioritisation

Slice

PNI-NPN

SA-NPN

It won't be one size fits all

Public network

Contractual agreement

Owned or
operated

PLMN

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Slice

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SA-NPN

Less control

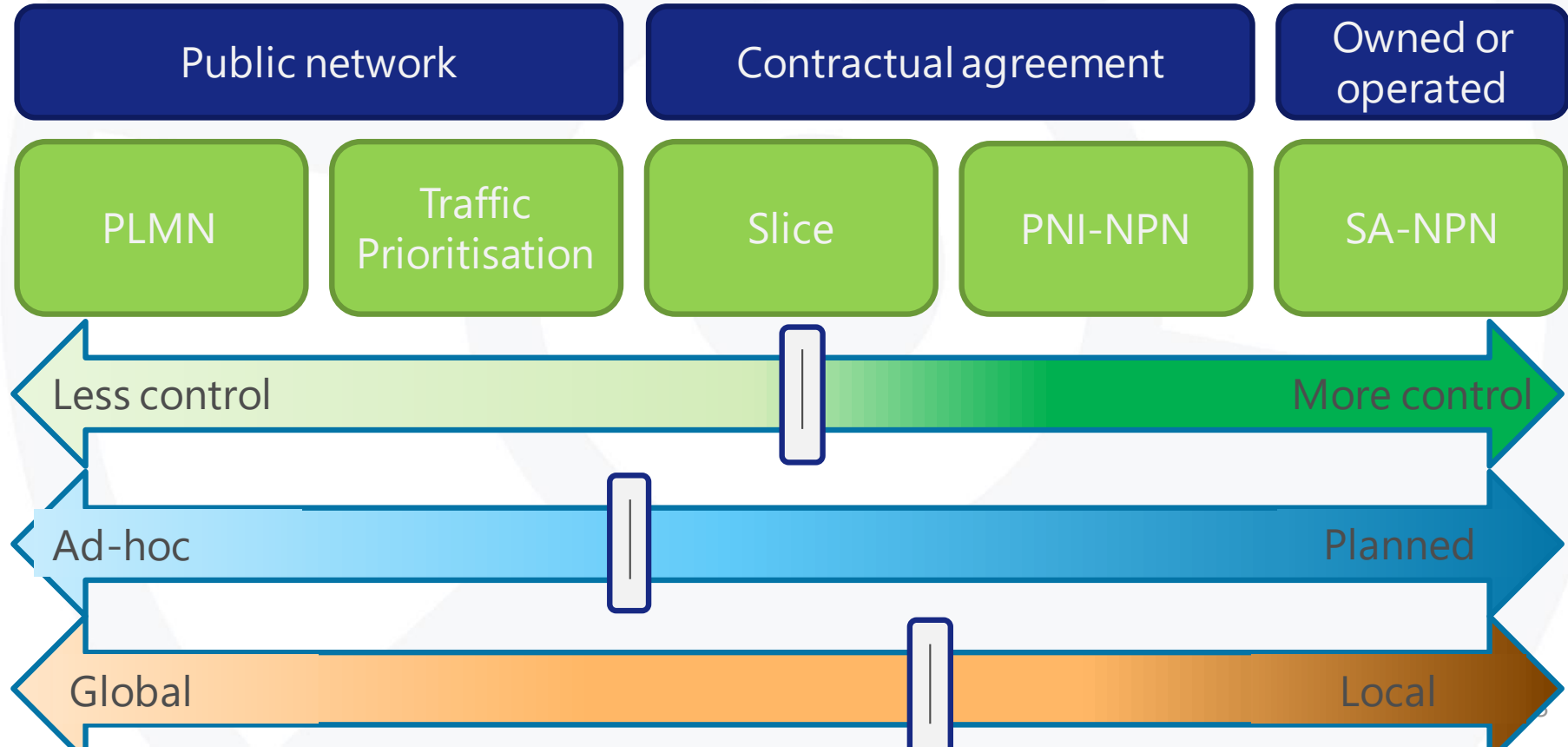
More control

Ad-hoc

Planned

Global

Local



It won't be one size fits all



PorscheCup in Sweden running 3 times 9 Mbps using adaptive bitrate



Conclusion



Mobility



Flexibility



Reliability



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Thanks for your attention Any questions?