



IEEE 5G Summit

Broadcast and Multicast Communication Enablers for 5G

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Contents

- **5G Drivers**
- Broadcast in 5G
- The Media & Entertainment Challenge
- The 5G-Xcast Project
- Outlook on 5G Broadcast



DRIVEN
BY NEW
USE CASES

5G

DESIGNED FOR
NEW VERTICAL
INDUSTRIES



FACTORIES OF THE FUTURE

- 1 Time-critical process control
- 2 Non time-critical factory automation
- 3 Remote control
- 4 Intra/Inter-enterprise communication
- 5 Connected goods

ENERGY

- 1 Grid access
- 2 Grid backhaul
- 3 Grid backbone

e-HEALTH

- 1 Assets and interventions management in Hospital
- 2 Robotics
- 3 Remote monitoring
- 4 Smarter medication

MEDIA & ENTERTAINMENT

- 1 Ultra High Fidelity Media
- 2 On-site Live Event Experience
- 3 User/Machine Generated Content
- 4 Immersive and Integrated Media
- 5 Cooperative Media Production
- 6 Collaborative Gaming

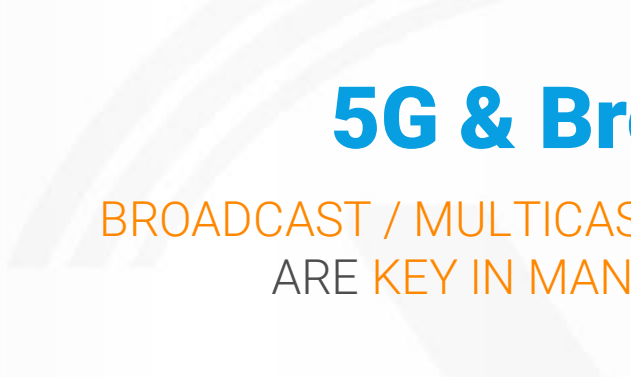
AUTOMOTIVE

- 1 Automated driving
- 2 Share My View

- 3 Bird's Eye View
- 4 Digitalization of Transport and Logistics
- 5 Information Society on the road

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5G & Broadcast

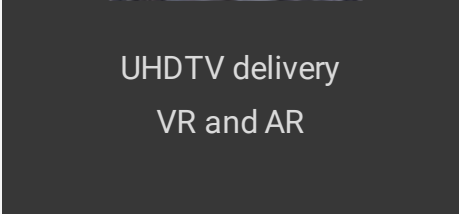
BROADCAST / MULTICAST
ARE KEY IN MANAGING

roadcast

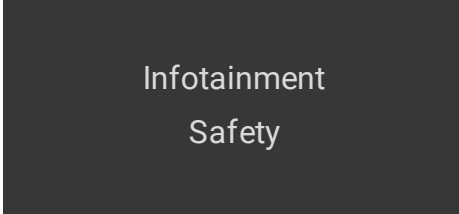
ST PTM TRANSMISSIONS

Y 5G USE CASES

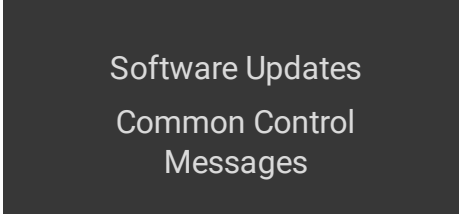
MULTIMEDIA & ENTERTAINMENT



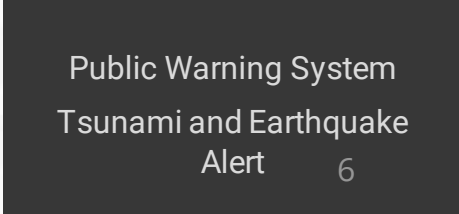
CONNECTED
AUTOMOTIVE



INTERNET OF THINGS



PUBLIC WARNING AND SAFETY



5G and Broadcast



5G for large-scale media delivery?

- MNOs are increasingly entering the pay TV market
- Tablets and TVs have increased potential to become 5G connected
- Spectrum now available for 5G used to be for UHF broadcasting

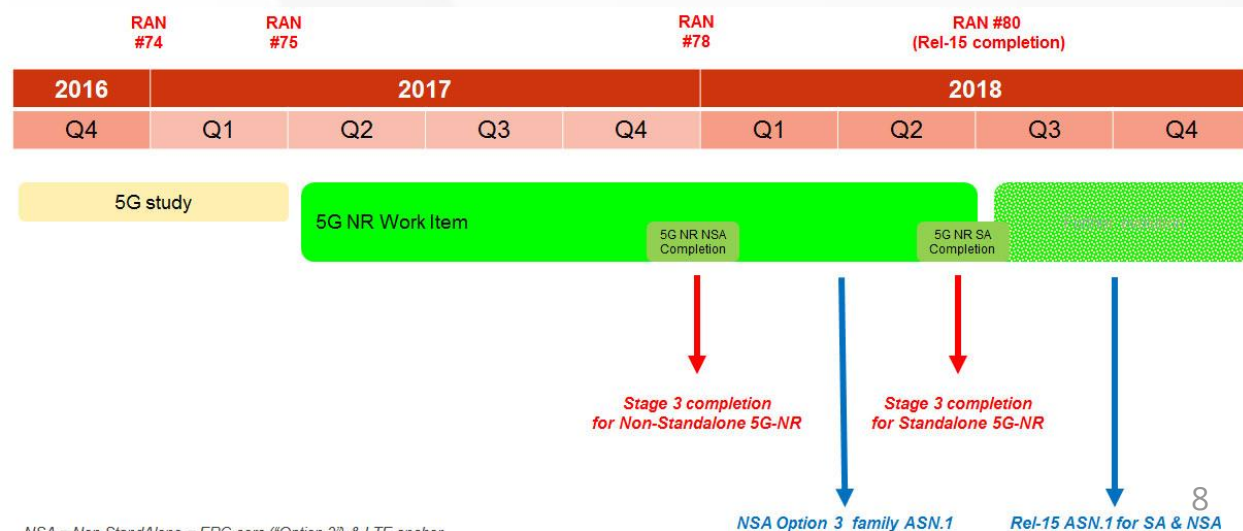
5G is expected to provide the main means to **deliver new immersive audio-visual media** including their consumer interactivity

5G and Broadcast



5G is **expected to provide unprecedented communication capabilities**

-Tight Schedule, not all promised features will be in first release



5G Broadcast Outlook & Summary



- 5G Broadcast **not included** in first 5G release (Rel'15)
- Innovative 5G **use cases require PTM** transmissions
- **PTM transmissions** as **delivery optimization tool** (together with caching)
- Broadcasters interest in 3GPP technologies has increased recently
- Big Potential in **convergence of fixed and mobile broadband networks for large-scale media delivery**

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Media & Entertainment Challenge / User Devices



Media & Entertainment Challenge / User Devices

The Evolution of Samsung Galaxy

Samsung GALAXY S



ANNOUNCED
DISPLAY
RESOLUTION
CAMERA
VIDEO

MARCH 2010
4" Super AMOLED
480 x 800 pixels
5MP (2560 x 1920 pixels)
720p at 30fps

Samsung GALAXY S II



FEBRUARY 2011
4.3" Super AMOLED Plus
480 x 800 pixels
8MP (3264 x 2448 pixels)
1080p at 30fps

Samsung GALAXY S III



MAY 2012
4.8" HD Super AMOLED
720 x 1280 pixels
8MP (3264 x 2448 pixels)
1080p at 30fps

Samsung GALAXY S4



MARCH 2013
5" Full HD Super AMOLED
1080 x 1920 pixels
13MP (4128 x 3096 pixels)
1080p at 30fps



Galaxy S8



Galaxy S8+

S8: 2960 x 1440 resolution
Octa-core (2.35GHz Quad + 1.9GHz Quad)

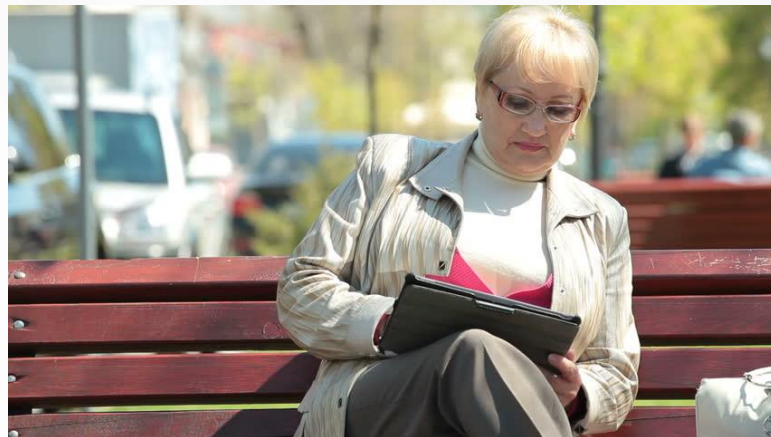
**GREATER
PROCESSING
POWER**



**LARGER
HIGH-RES
DISPLAYS**



Media & Entertainment Challenge / User Environment



Media & Entertainment Challenge / Distribution

GOAL >

Deliver the content
and services to all
interested users

> AT >

the right time
the right place
the required quality
the right price point

> ON >

the right device

A Balance of

- Optimising the user experience
- Network resource management
- Business objectives
- Regulatory requirements and constraints

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- 5G Drivers
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- The Media & Entertainment Challenge
- **The 5G-Xcast Project**
 - Technical Challenges
 - Vision
- Outlook on 5G Broadcast



Technical Challenges / Our Focus

USE CASES

Identify and define requirements and KPIs for: **M&E, Automotive, IoT** and **PWS** verticals.

BROADCAST PTM RAN

Comprehensive and holistic, design will include the **radio interface**, RAT **protocols** and RAN **architecture**.

CONVERGED CORE NETWORK

Combining **fixed, mobile and broadcast** networks. Using mix of **Unicast, broadcast transport** and **caching** capabilities.



Technical Challenges / Our Focus

CONTENT DISTRIBUTION FRAMEWORK

Network-agnostic, Combining unicast, multicast, broadcast and caching for **dynamic network resource optimisation**. **Simple interface** between content service provider and network operator

PROOF-OF-CONCEPT PROTOTYPES

For the **5G-Xcast Radio, transport** and **application layer** key components



Proof of concepts / Demonstrators & Test beds

x3

Demonstration Use Cases

Object-based broadcast service, hybrid broadcast service and PWS

x3

Test-beds

5GIC (Surrey, UK); IRT (Munich, Germany);
TUAS(Turku, Finland)

DEMOs

European Championships 2018 (Showcase),
IBC 2018, MWC 2019

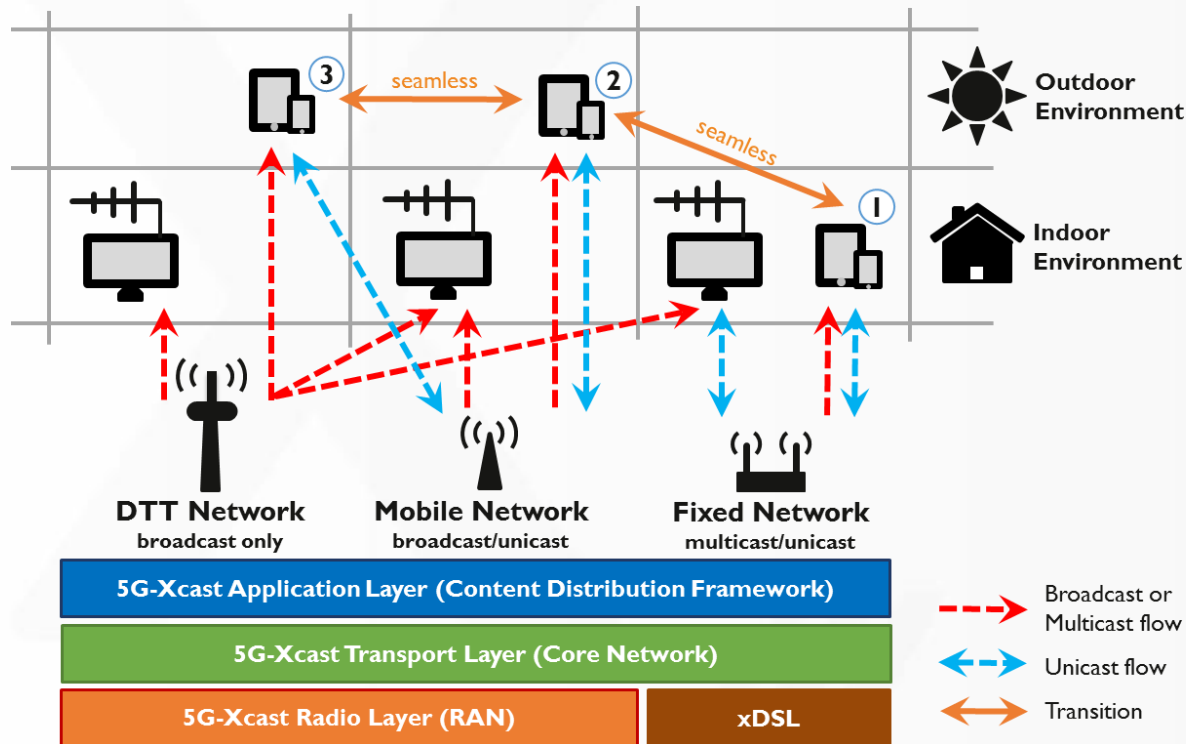
CHANGE OF PARADIGM

Treat **multicast, broadcast and caching** as **built-in internal network delivery optimisations** not as a service to be offered to content service providers.

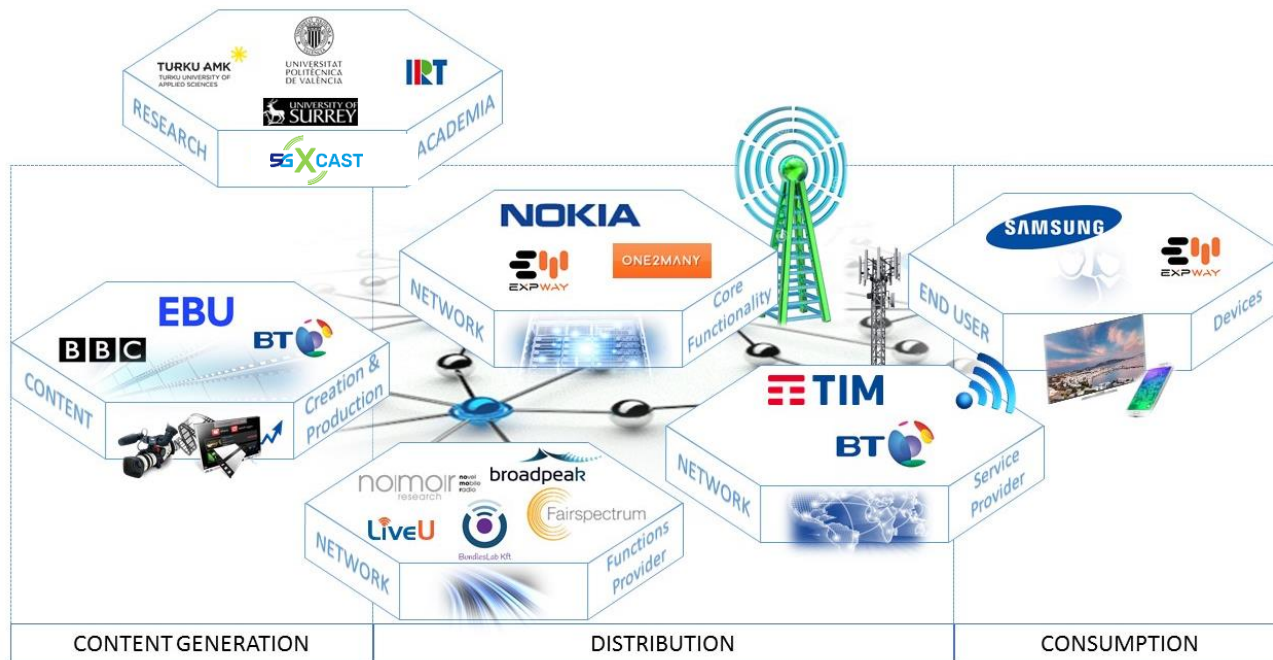
Network slice broadcast service that would use PTM capabilities.

5G XCAST Convergence Vision

The **converged media delivery architecture** of 5G-Xcast over **fixed broadband, mobile broadband and terrestrial broadcast networks** allows a **seamless, uninterrupted service** to be offered to the users as they move.



Media & Entertainment Value Chain



5G-Xcast External Advisory Board



- (SWR)Südwestrundfunk, Germany
- **Avanti**, UK
- **Ericsson**, Germany
- **TDF**, France
- **Technical University of Braunschweig (TUBS)**, Germany
- **Teracom**, Sweden
- **Thales Alenia Space**, France
- **Dutch Ministry of Security and Justice (MSJ)**, The Netherlands
- Electronics and Telecommunications Research Institute (**ETRI**), South Korea

- Communications Research Center (**CRC**), Canada
- **Qualcomm**, USA
- National Engineering Research Center (**NERC**), China
- Nippon Hōsō Kyōkai (**NHK**), Japan
- WISSEA, China

Expressed Interest: Sony, Digita,
Cellnext, RAI

LIVE

5G XCAST

Stay Tuned!



www.5g-xcast.eu



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Thank You



Any Questions ?