Key Media & Content use cases in the context of 6G

NEM & NetWorld Europe

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Media & Internet Research Director

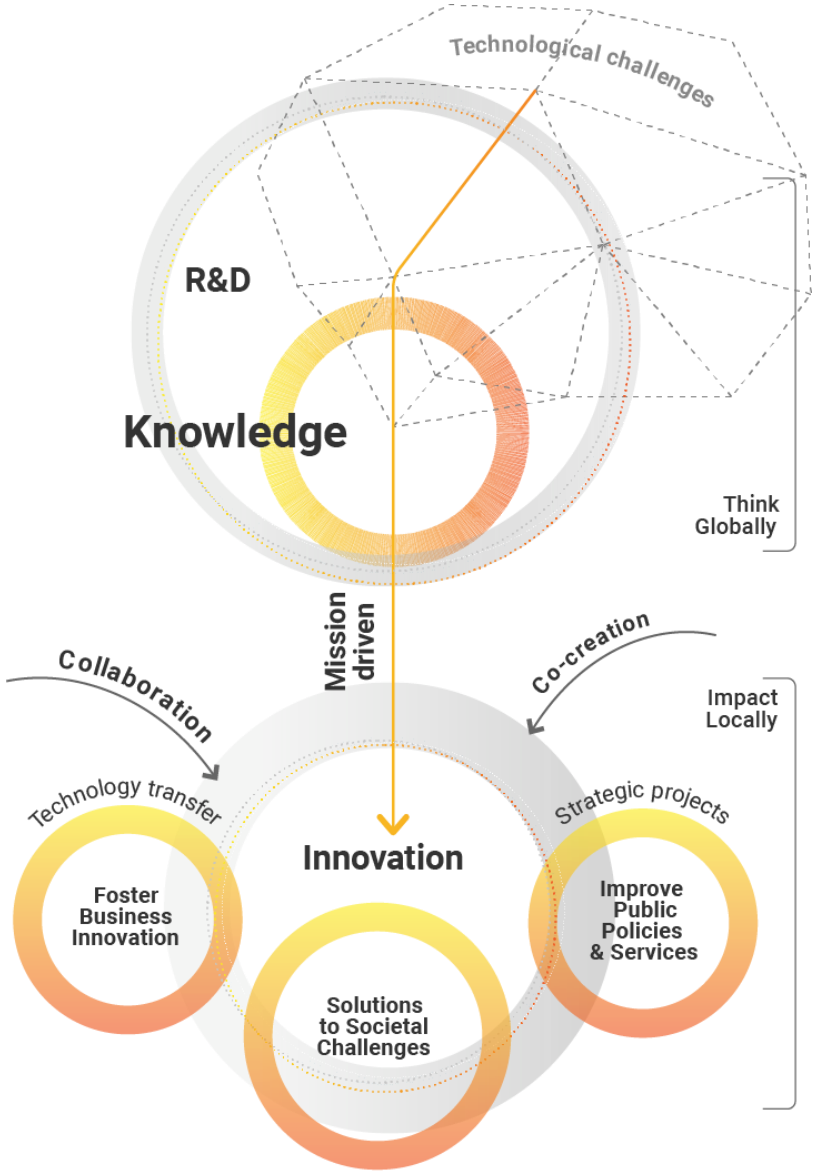
NEM Strategy VP

i2CAT in a nutshell

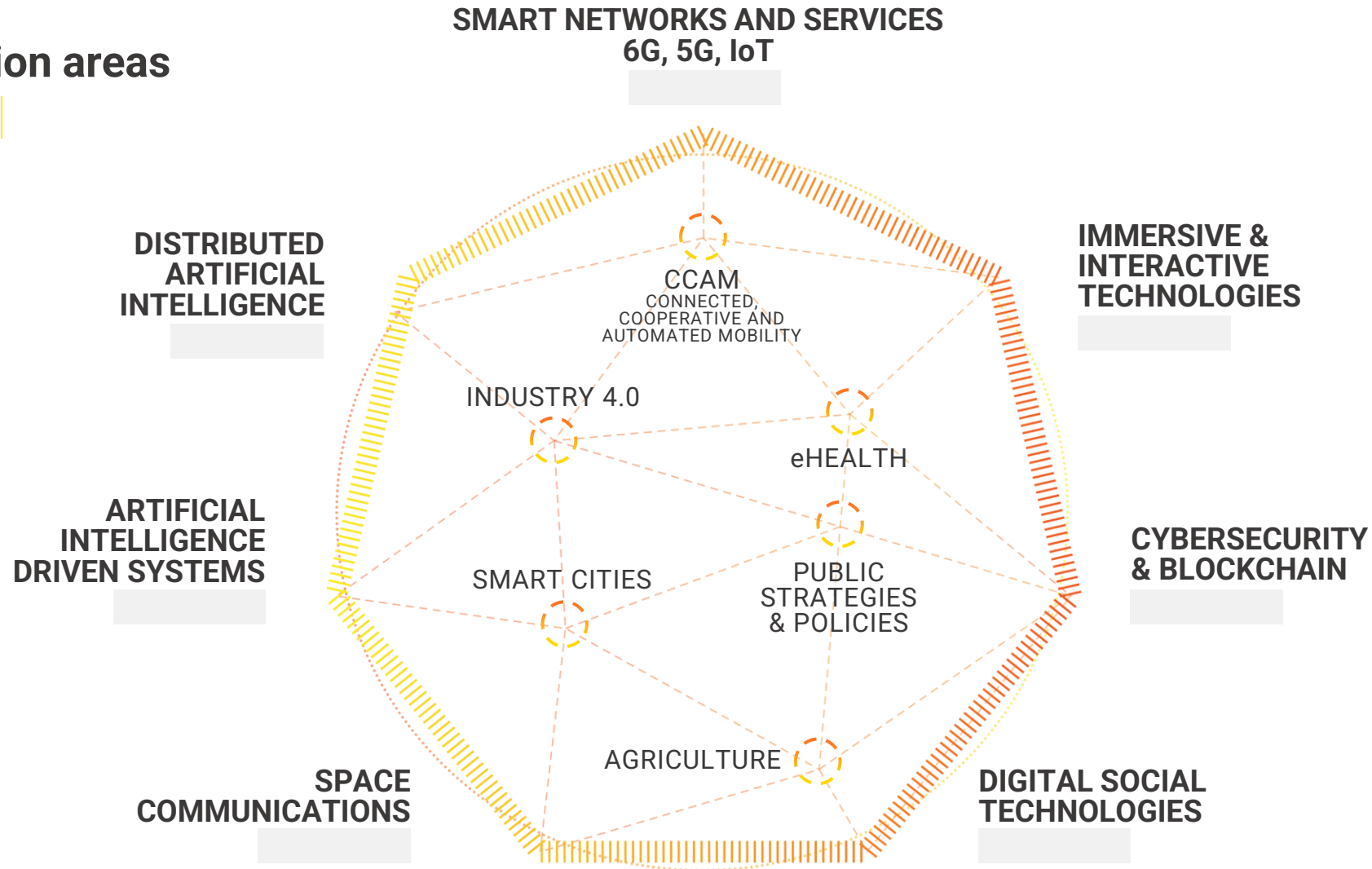
Never stop designing the digital future

Vision

i2CAT wants to lead the challenge of designing the digital society of the future based on research and innovation in advanced digital technologies.



Research and Innovation areas



MEDIA TOWARDS 6G

Never stop designing the digital future

i2CAT .net

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https://nem-initiative.org/

WHO WE ARE

BECOME A NEM MEMBER

- NEM Initiative / New European Media Initiative is leading European Network for Media and Creative Industries
- NEM Initiative mission is to foster the impact of interactive technologies on the future of new media

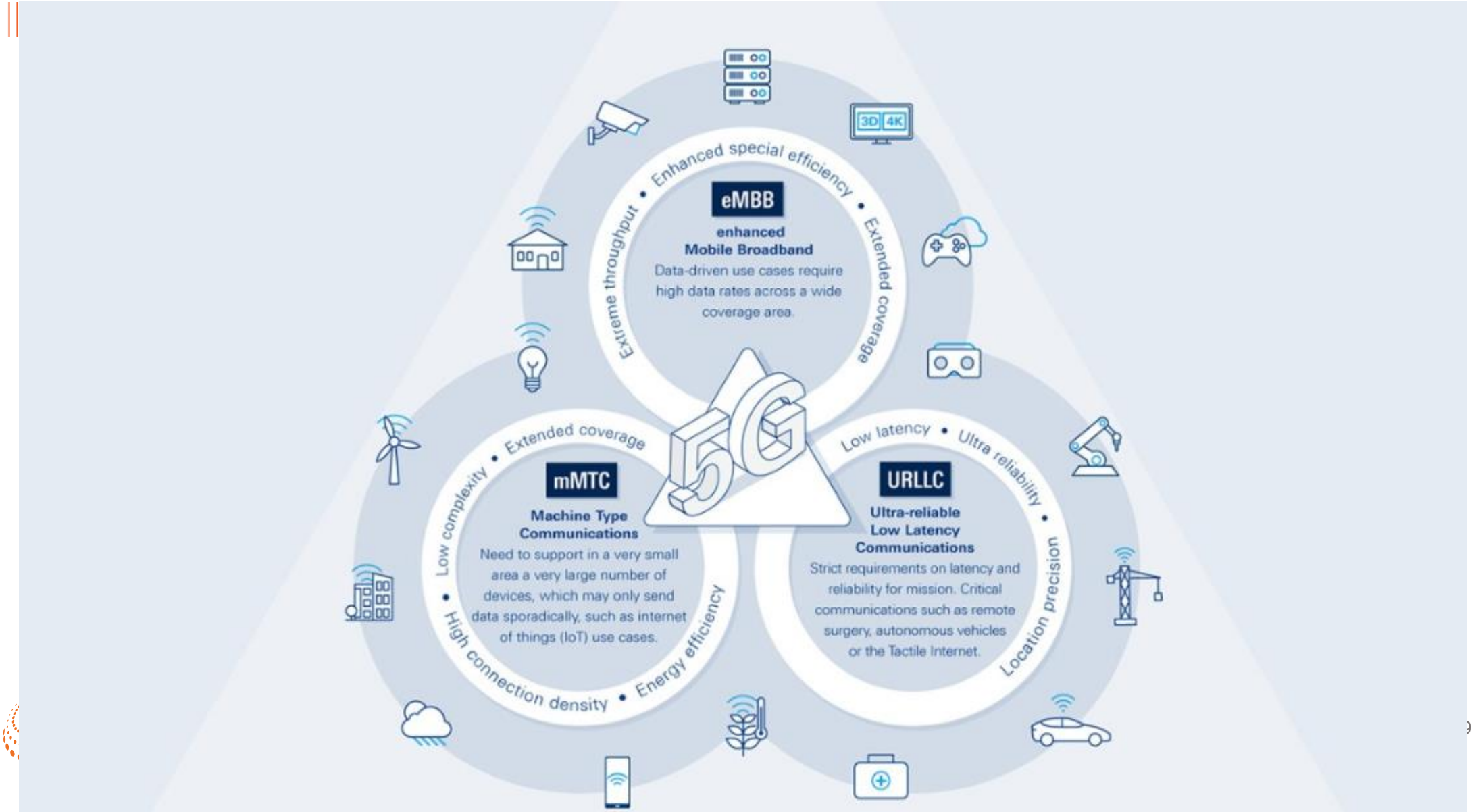
RECENT NEWS

EU grants for news media – webinar 6 April 11h CET

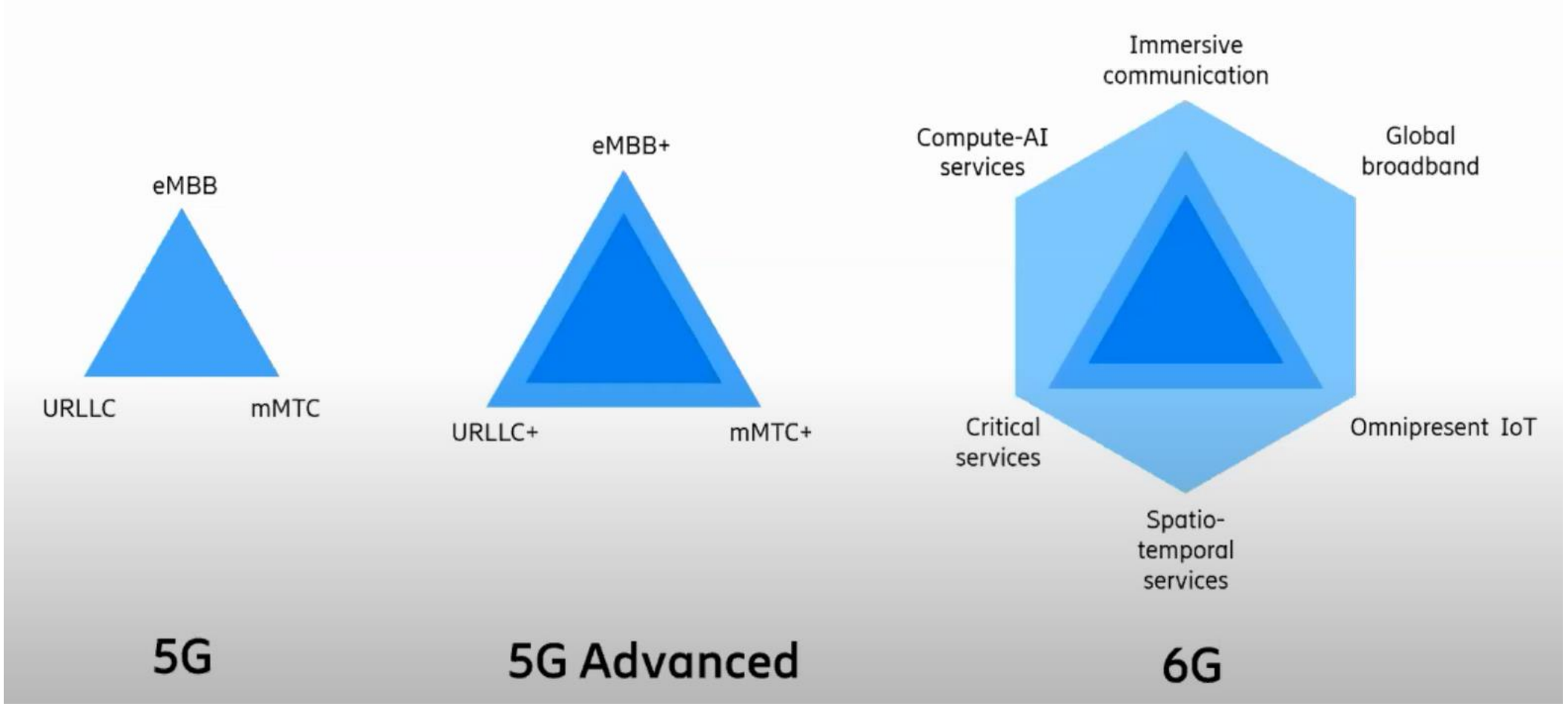
META-FORUM 2021: Using the European

https://www.networldeurope.eu/

5G Pyramid


Extreme throughput • Enhanced special efficiency • Extended coverage
eMBB
enhanced
Mobile Broadband
Data-driven use cases require high data rates across a wide coverage area.
Low complexity • Extended coverage
mMTC
Machine Type
Communications
Need to support in a very small area a very large number of devices, which may only send data sporadically, such as internet of things (IoT) use cases.
High connection density • Energy efficiency
Low latency • Ultra reliability • Location precision
URLLC
Ultra-reliable
Low Latency
Communications
Strict requirements on latency and reliability for mission. Critical communications such as remote surgery, autonomous vehicles or the Tactile Internet.
5G

From 5G to 6G


eMBB
URLLC
mMTC
5G
eMBB+
URLLC+
mMTC+
5G Advanced
Immersive communication
Compute-AI services
Global broadband
Critical services
Omnipresent IoT
Spatio-temporal services
6G

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Access here:

https://nem-initiative.org/wp-content/uploads/2022/01/key-media-content-use-cases-in-the-context-of-6g.pdf?x79264

Objectivo:

-Determinar casos de uso con un uso intensivo/extremo de las capacidades de red

-Determinar los requisitos que estos casos de uso generan a los proveedores de red

-Influenciar en la definición del programa SNS (Smart Network & Services)

-Influenciar en la definición del Work Programme del Cluster 4 (Digital, Industry & Space)

Media Use Cases Towards 6G

Use case 1: Professional Content Production

Use case 2: Holoconferencing and Social XR

Use case 3: Multi-source media time synchronization

Use case 4: Ad-hoc local production

Use case 5: Network Assisted Bonding Video Uplink Delivery

Use case 6: Immersive telecontrol

Use case 7: Content storage optimised management

Use case 8: CDN orchestration

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Application requirements:

- Work with uncompressed, or slightly compressed, 4K-8K production video
- Allow for distributed production architectures
- Allow for remote production architectures (hybrid: on-site Outside Broadcast (OB) Van; fully remote: cloud or remote studio)
- Allow for multi-source media feed synchronization (various levels of precision, one frame or even lower for some audio productions)
- Ability to seamlessly connect and manage new equipment
- IP-Based
- Support new media paradigms, such as Virtual/Augmented/Mixed Reality (VR/AR/MR) and holographic communications
- Capable of working anywhere, including cell edges.

Network requirements:

- Support for extremely high bandwidth (Gbps) in uplink
- Support for low-latency communications, either for low bandwidth or high bandwidth streams (several level of latency requirements; including sub 1 msec for some very tight audio productions)
- Low jitter in latency and bandwidth
- Non-Public-Networks (NPN) deployment capabilities as well as commercial, PN-based enhanced Mobile BroadBand (eMBB) remote production
- Easily configurable Radio Access Network (RAN) parameters
- Service Level agreement (SLA)-based network slicing for Public Land Mobile Networks (PLMN)
- Very high power edge computing capabilities for some applications.

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Application requirements:

- Allow for AI-enabled acquisition and error-resilient scalable compression of HQ multi-sensory XR content including photorealistic VV and 3D light-field, as well as virtual, alongside other sensory modalities (e.g. haptic, 3D audio etc.).
- Allow for multi-user immersive applications with interactive features.
- Use of VR, AR, MR and holoportation with full sensing capabilities.
- Allow for immersive representations in high-detail 360-degree virtual content or highly photorealistic (e.g. VV, 3D lightfields).
- Provide an enhanced experience over current conferencing tools.

Network requirements:

- Enable the deployment of specific computational efforts on edge nodes.
- Ensure high bandwidth capacity among micro services that, in turn, are distributed across the network, between cloud DPCs, edge computation nodes, and the client devices.
- lowest latency, tactile network, specially for collaborative or interactive environments that have a replica in the physical world (e.g., driving a car remotely).
- handover capabilities that include, not only at transmission level, but also to transfer computational efforts that need to be available and continuous in mobility environments (e.g., edge rendering, edge volume reconstruction, AI components based on upload data streams, compression algorithms, distributed volume capture systems, etc.).

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Application requirements:

- Support readily-available time synchronization mechanisms, such as PTP and NTP, GPS-based synch or network-based solutions
- Support media transmission protocols that allow inter-stream synchronization, such as RTP
- Support different type of media essences timestamping (audio, video, 3D video)
- Allow for different time “profiles” or requirements

Network requirements:

- Go beyond current 5G Time-Sensitive Networks (TSN) features, e.g., not only being “sensitive” to time, but also providing accurate time and support/enable “guaranteed” time-based QoS for applications at various tens of msec, msec and sub-msec accuracies.
- Support readily-available time synchronization mechanisms, such as PTP and NTP, specific solutions within the network protocols which are also exposed to external applications on both UE and CN side
- Network needs to be a time-aware component that does not introduce high delay but most importantly, does not introduce any jitter (sub-frame in 60fps).
- Optimized RAN for low jitter and latency
- Optimized CN for low jitter and latency
- Network needs to have a similar UL-DL delay
- Provide high-power edge computing

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Application requirements:

- Allow equipment to work with wireless capabilities
- Allow for multi-source feed synchronization
- Ability to seamlessly connect and manage new equipment
- IP-Based

Network requirements:

- Support for extremely high bandwidth (up to Gbps) in uplink
- Support for low-latency communications, either for low bandwidth or high bandwidth streams
- Low jitter in both latency and bandwidth
- Easily configurable RAN parameters

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Application requirements:

- Stream multiplexing and de-multiplexing over multiple connections, from different network operators
- Support for multiple types of media essences (video, audio, 3D video, holograms)

Network requirements:

- High-bandwidth, UL focused network (Gbps)
- High-reliability connections

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Application requirements:

- 3D displays/headsets, high resolution screens.
- Rich input devices (in terms of sensed interaction, haptic interfaces, etc.).
- High quality audio.
- Edge support (for low latency video processing, AI, etc.).

Network requirements:

- Ultra-reliable low-latency communications.
- High bandwidth UL capabilities.
- Provide high-power edge computing with very low latency.

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Application requirements:

- remote content visualisation (picture, sound, video, XR, documents, …)
- access right management by the content owner

Network requirements:

- High uplink bandwidth to upload content on a cloud server or to distribute content to one authorised remote device
- End2end Security to avoid content hacking
- able to take advantage of a network based on multiple access technologies (e.g. cellular, wireless, wireline, satellite,...)
- Multicast, broadcast capabilities

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Application requirements:

- Energy-efficient application software
- Support for ML/AI, e.g. for dynamic and intelligent VNF/CNF placement

Network requirements:

- Ready for fully virtualized/containerised and orchestrated workloads
- Multi-access Edge Computing (MEC) architecture and framework in place with a rich ecosystem of APIs and services
- Support for a multi-access convergent architecture
- Support for multipath protocols at transport layer (MPTCP/MPQUIC)
- Support for very high DL bandwidth (Gbps)
- Energy-efficient hardware

Media requirements

- Support for extremely high bandwidth (Gbps) in uplink
- Support for low-latency communications (including sub 1 msec for audio productions)
- Network stability (low jitter, low bandwidth variance)
- Network elasticity and deployment capabilities: Non-Public-Networks (NPN), PNbased enhanced Mobile BroadBand (eMBB) remote production, Easily configurable Radio Access Network (RAN), (SLA)-based network slicing for Public Land Mobile Networks (PLMN)
- Edge computing resources and negotiation protocols for application
- Edge computing handover
- Time-awareness (guaranteed time-based QoS)

GRACIAS!!

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