



5G Network Slicing and Convergence: Key technologies in Next Generation Networks.

FITCE Conference

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What's driving the need for 5G?

The next generation of telecoms networks is NOT just about faster broadband

Enhanced Mobile Broadband – UHD Video, Virtual/Augmented Reality, Interactive gaming, Tactile Internet, Fixed Wireless Access



Growing demand for Mobile Broadband

Mission Critical Machine Type Comms – self/assisted driving, traffic safety and control, industry automation, remote surgery



Traditional services declining

High expectations for the evolution of connected devices

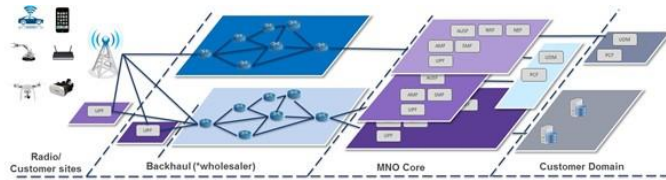
Massive Machine Type Comms – IoT, Smart Home/Building/Factory/Energy, Smart Agriculture, Logistics, Asset Tracking



Digital transformation across all industries

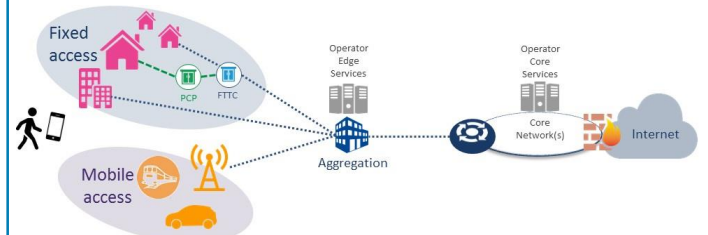
5G technologies will transform the way we architect our networks

5G network slicing is needed end-to-end



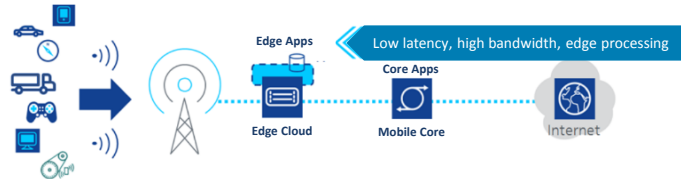
Network Slicing

Convergence can help drive cost down and increase QoE



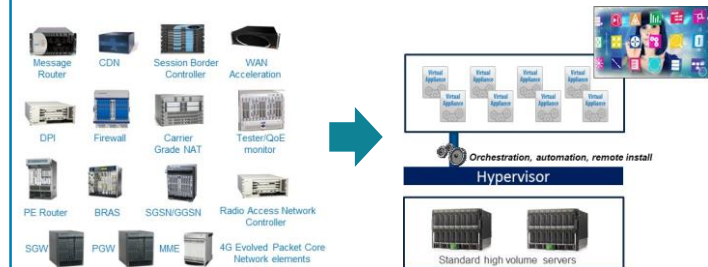
Network Convergence

5G use cases require **Flexible Distribution of Functions**



Edge Computing

NFV and SDN are key underlying enablers



NFV and SDN

Multiple virtual networks dedicated to different services/service types

The diagram illustrates the architecture of 5G network slicing across three slices:

- 5G slice 1 (smartphones):** Shows smartphones connected to the network via RAT1 and RAT2. The network topology includes access nodes, cloud nodes (edge and central), and networking nodes. The slice is represented by a set of red and blue cylinders.
- 5G slice 2 (autonomous driving):** Shows automotive devices connected to the network via RAT1 and RAT2. The network topology includes access nodes, cloud nodes (edge and central), and networking nodes. The slice is represented by a set of red and blue cylinders.
- 5G slice 3 (massive IoT):** Shows massive IoT devices connected to the network via RAT1 and RAT3. The network topology includes access nodes, cloud nodes (edge and central), and networking nodes. The slice is represented by a set of red and blue cylinders.

Other slices are shown stacked below the main three slices.

Legend:

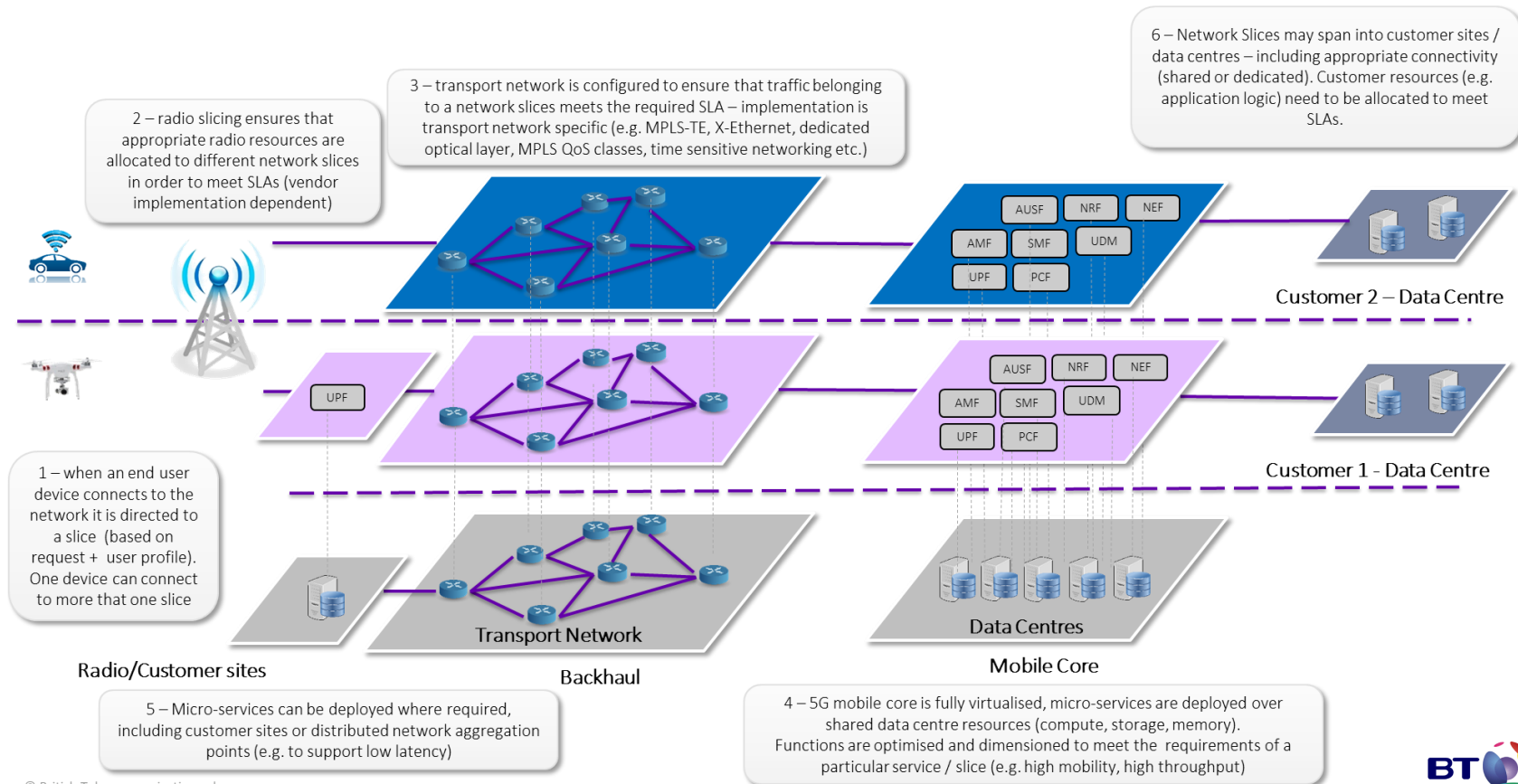
- Access node
- Cloud node (edge & central)
- Networking node
- Part of slice

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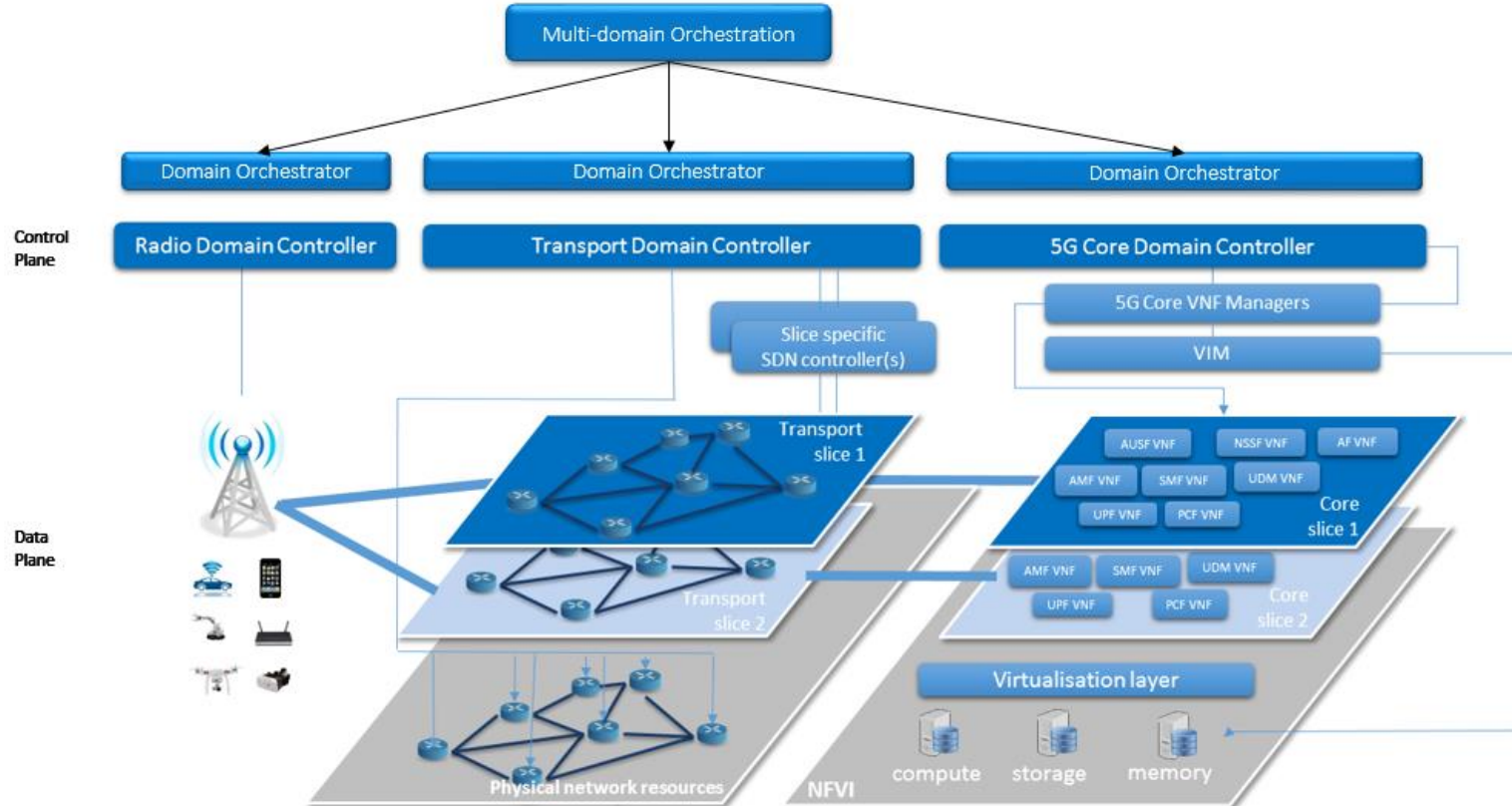
- Some functional requirements may be **mutually exclusive**, e.g. high data throughput versus low latency or highly-mobile versus fixed access.
- **Optimisation** of each slice for the specific functionality required (e.g. non-mobile slice)
- There may be alternative approaches to meet this particular goal (e.g. flexible anchor points, early detection of mobile devices etc.)

Network Slicing

It is all about ensuring end-to-end Service Level Agreements (SLAs)

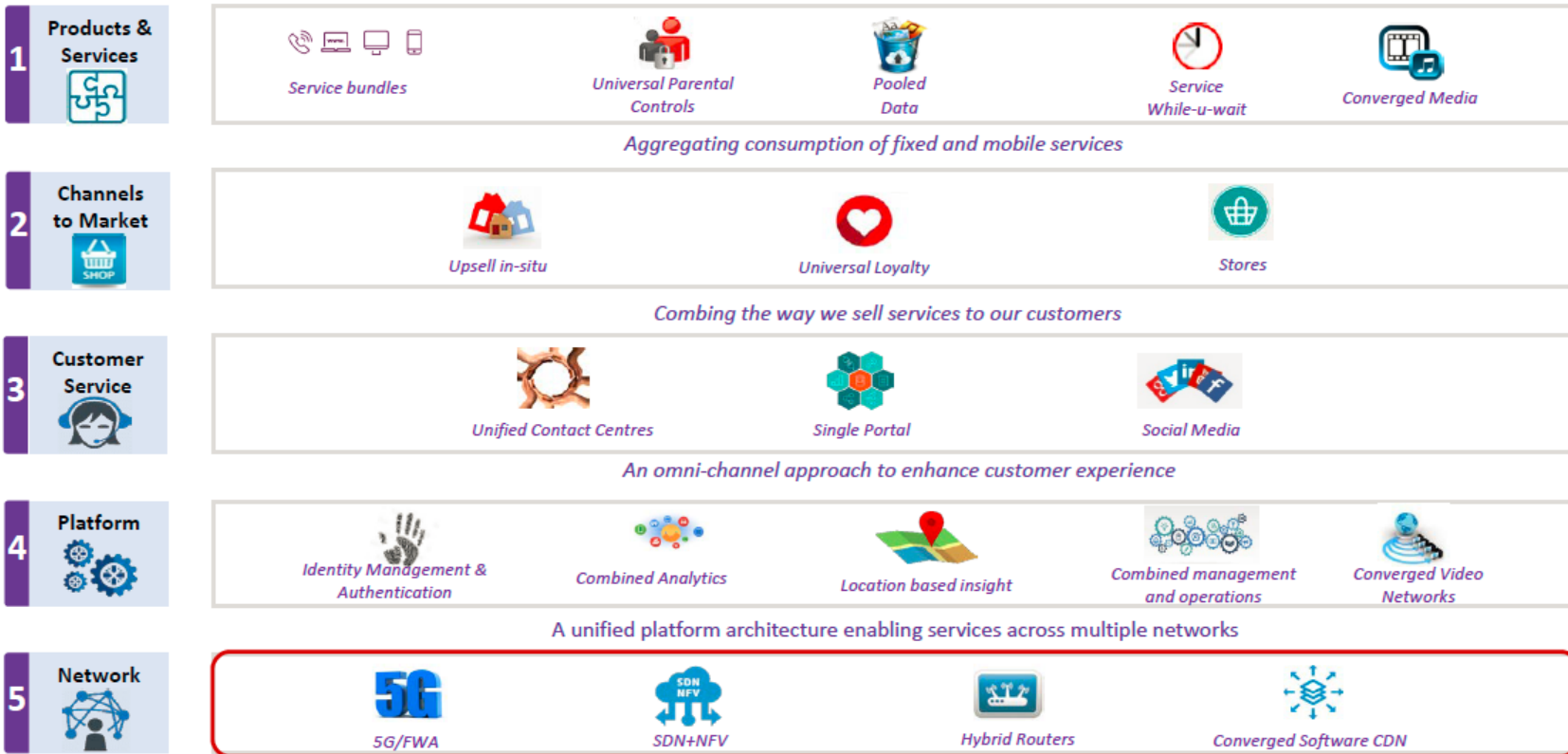


Network Slicing Orchestration



Types of Convergence

Convergence is a broad topic , different forms of convergence leverage different assets across fixed and mobile domains.



What is “network” Convergence

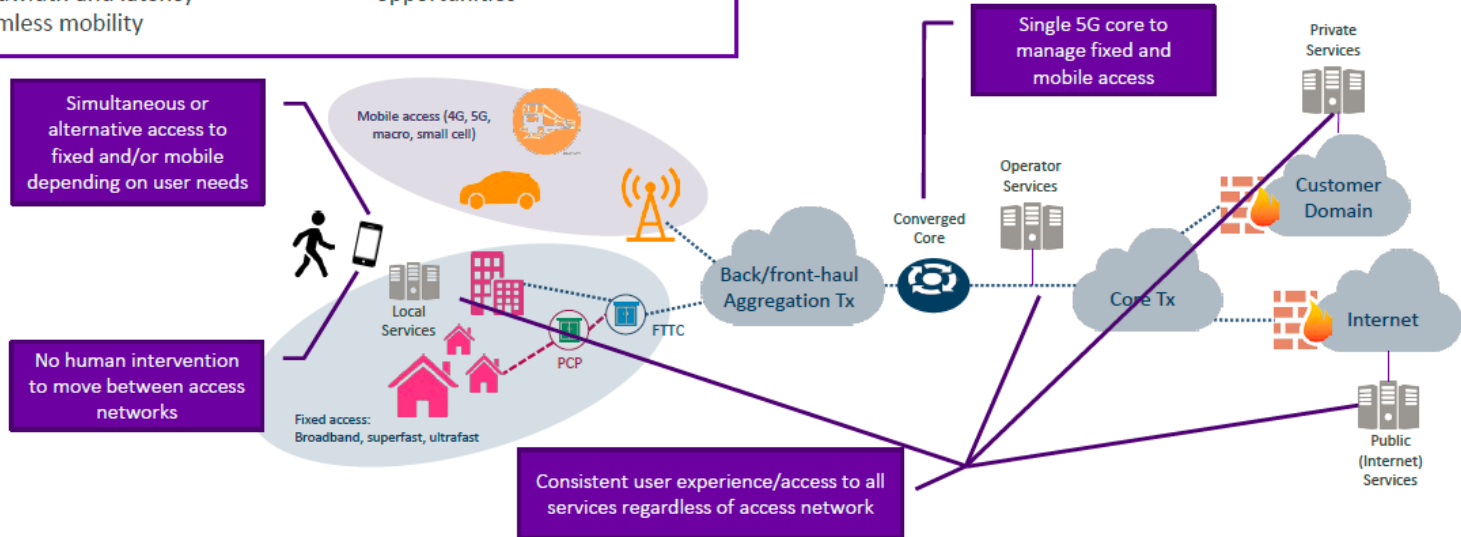
and what can it offer to end users and operators?

Seamless User Experience

- Best possible customer experience
- Single set of identities and credentials
- Consistent policies and services
- Best available network for bandwidth and latency
- Seamless mobility

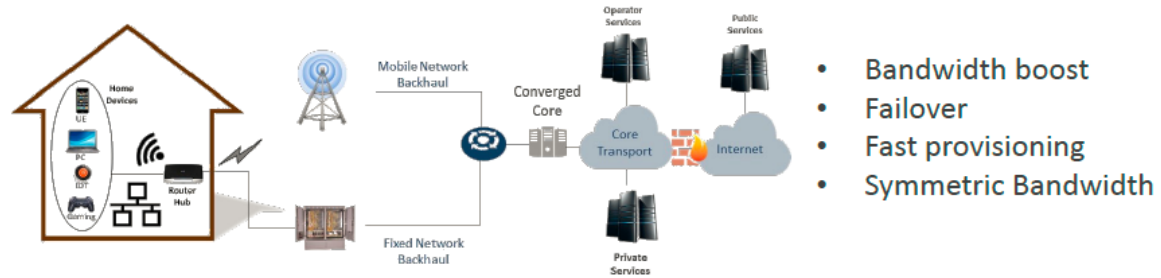
Network optimisation

- Best use of networks
- Improved reliability
- Asset reuse
- Simplified OSS
- New service and revenue opportunities

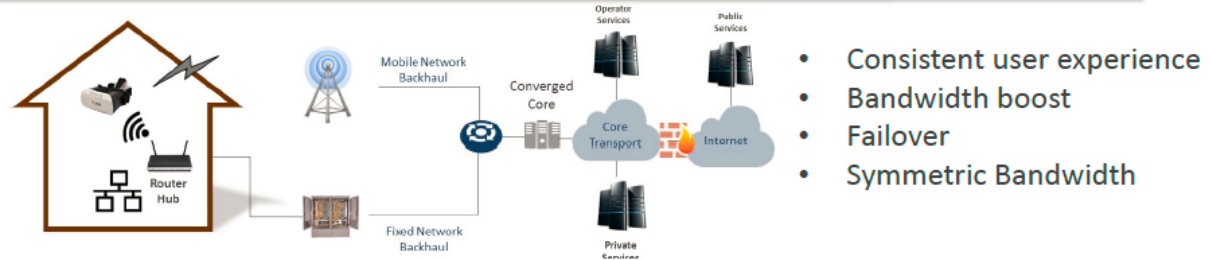


Converged Use Cases

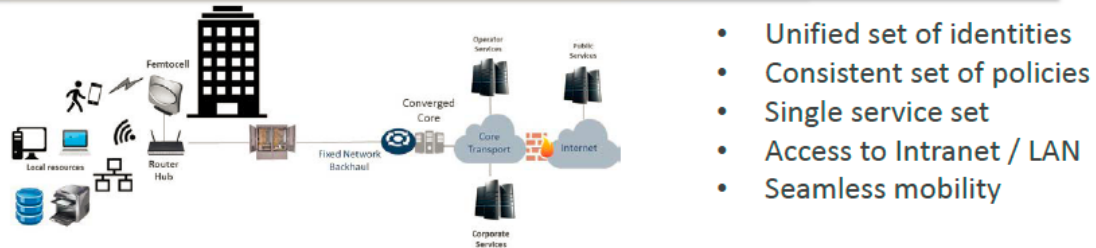
Hybrid Broadband



Multi-connected Broadband

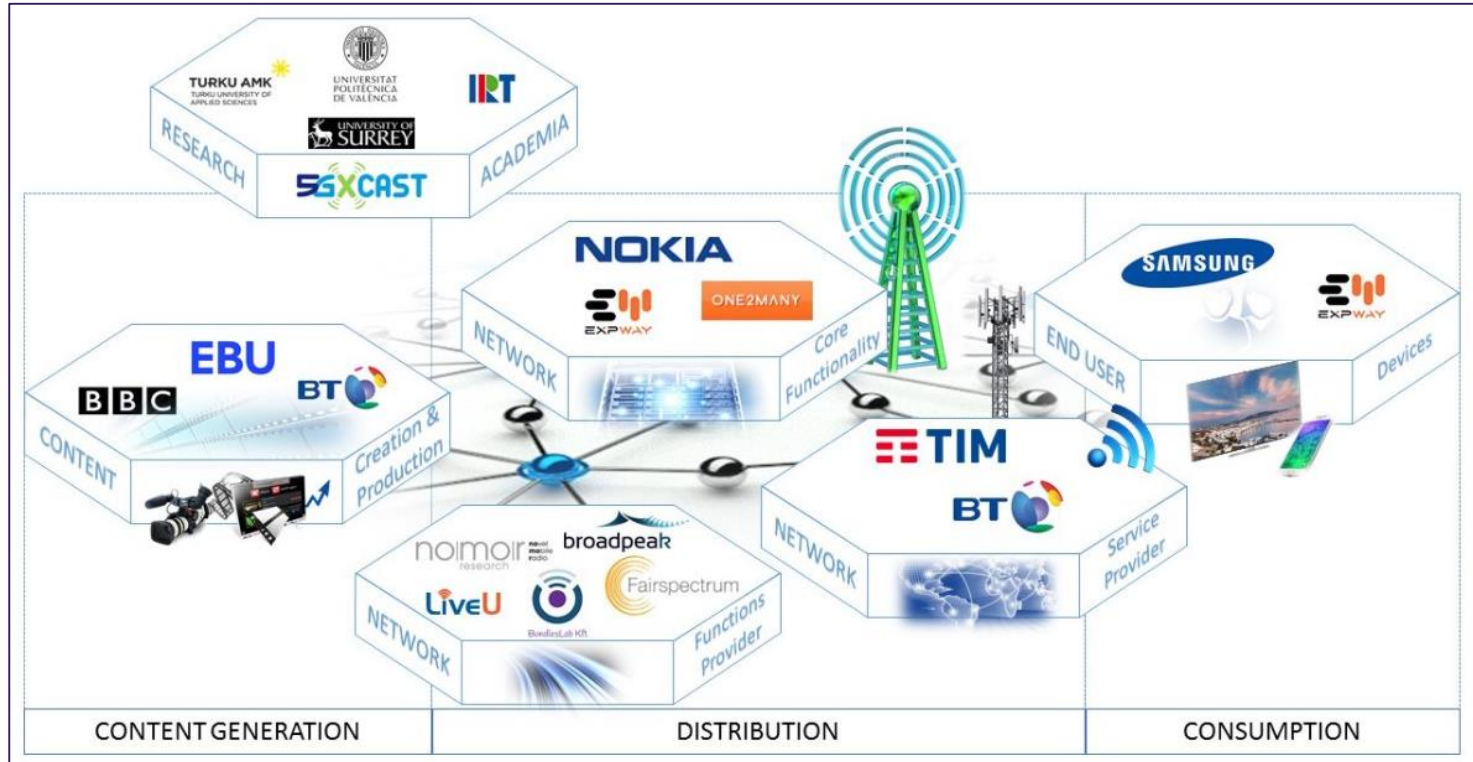


Multi-access private network



5G-Xcast Overview

- 5G-Xcast is a 5GPPP Phase II project focused on **Broadcast and Multicast Communication Enablers For the Fifth Generation of Wireless Systems**.
- To design a dynamically adaptable 5G network architecture enabling seamlessly switching between unicast, multicast and broadcast and exploiting built-in caching capabilities.



5G-Xcast Use Cases

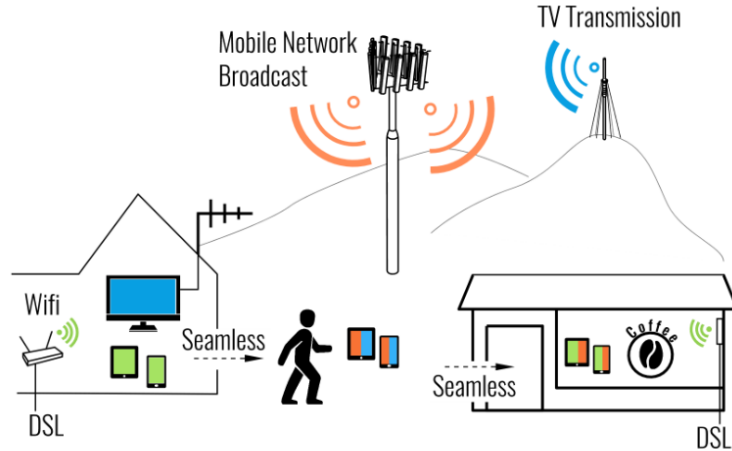


Figure 1 – Use case M&E 1: Hybrid broadcast service; combinations of networks and technologies give a seamless experience as the user moves between different locations

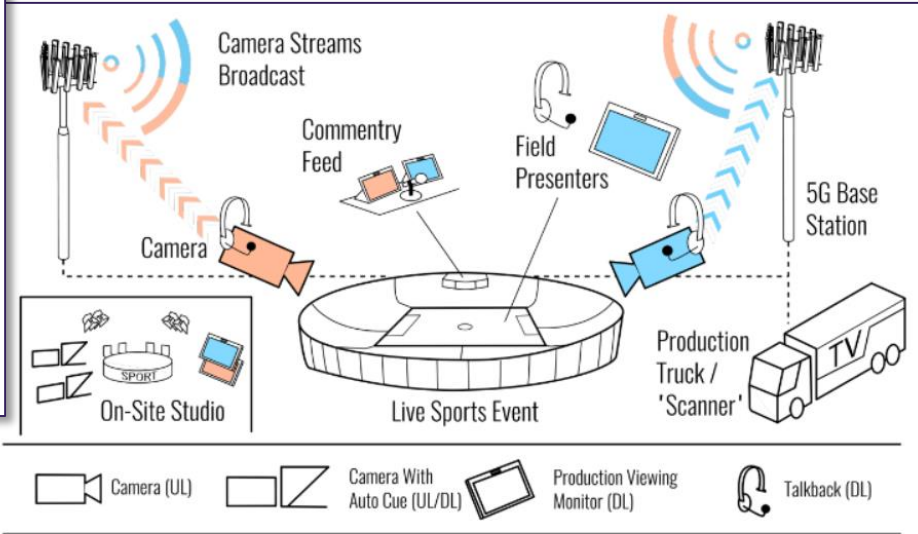


Figure 3 – Use case M&E 3: Remote live production; multiple users often require the same feed, making the use of point-to-multipoint more efficient than point-to-point

Summary

- 5G services present a huge opportunity to operators, which need to be ready to meet this demand.
- Network slicing is a key technology that enables **agility without disruption, slice isolation, functional optimisation** for an operator. However, there are still challenges in regards to **management and orchestration**.
- 5G presents a possibility for industry to define a **flexible and modular** architecture allowing network providers to operate and manage a **single 5G core network** supporting **all access types** (= network convergence).
- Network Convergence has to be **economically viable**, not just an architectural dream – **cost optimisation is key**.
- Current reality is that :
 - the current **cost-base** of fixed and mobile networks is radically different
 - **not all services** need or benefit from convergence
- It is key that the **Broadband Forum** and **3GPP** (amongst others) work together to achieve this vision.