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5G Facts, Fiction, & Impacts for the Future of Broadcasting

5G-Xcast – A Unified Framework for Common Content Delivery in 5G

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09.Oct.2018

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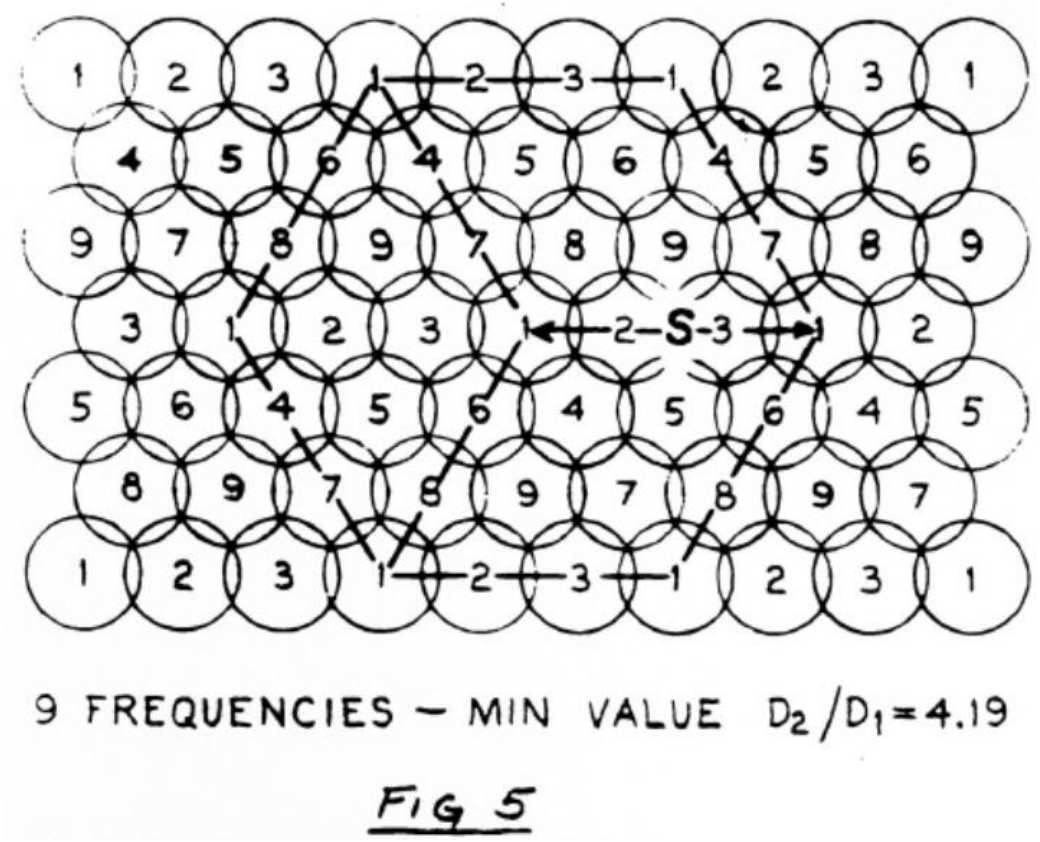
5G – An evolution of the past or a revolutionary new approach?

Traditional Cellular Networks – Time for Change?



Source: D.H. Ring, "Mobile Telephony – Wide Area Coverage," Bell Laboratories Technical Memorandum, December 11, 1947.

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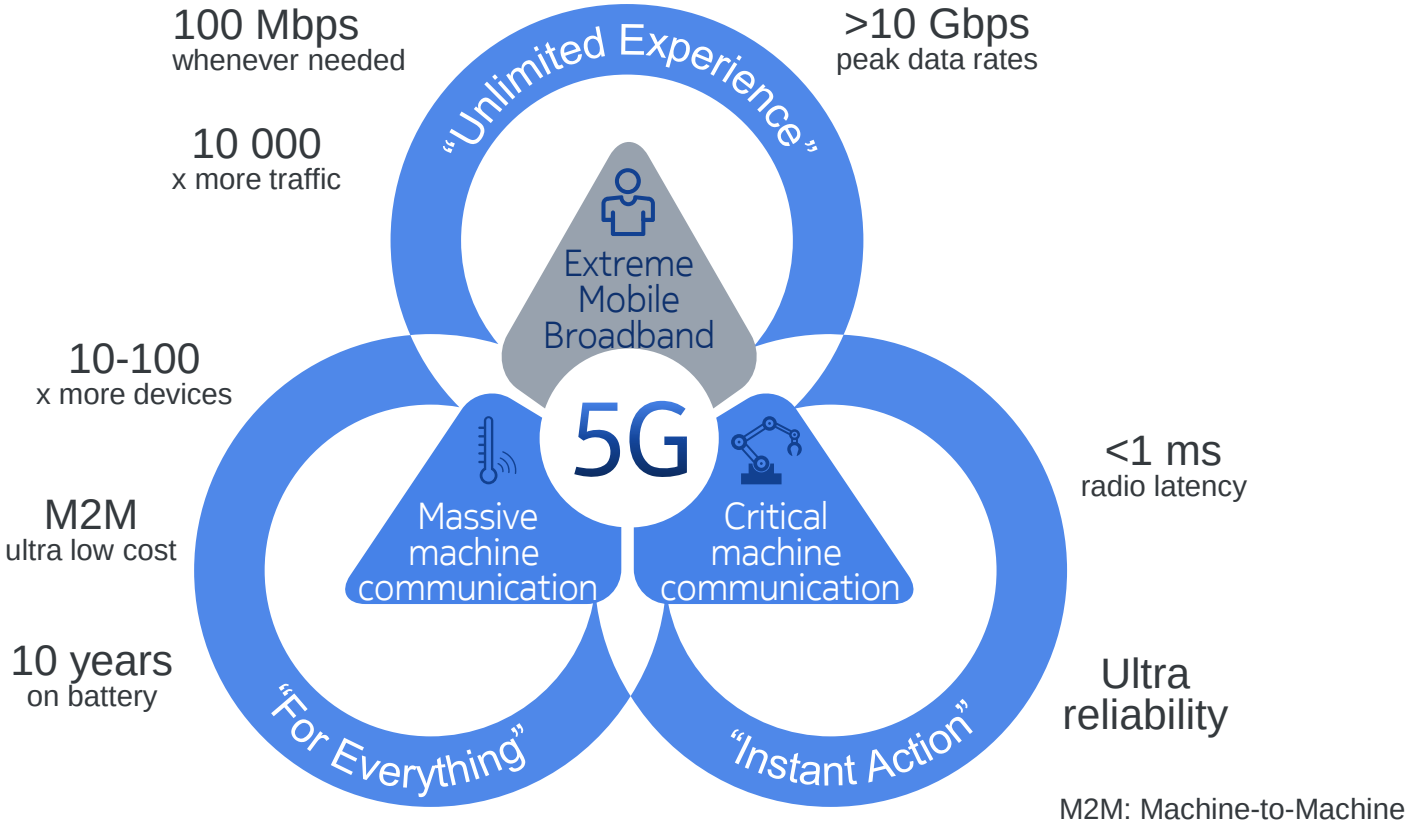
5G Enables New Capabilities
Beyond Mobile Broadband



M2M: Machine-to-Machine

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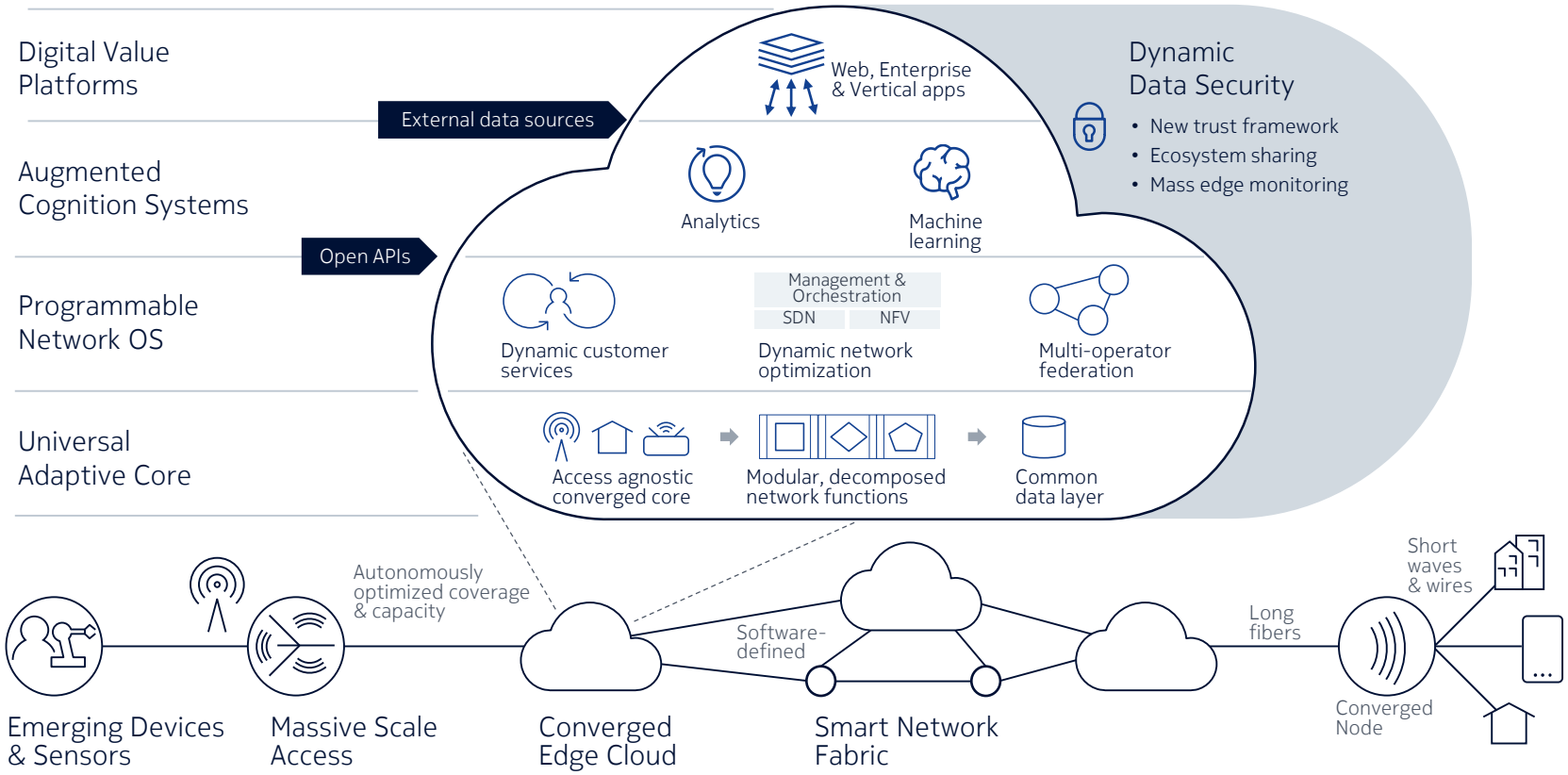
Future X Architecture – Scalable, Open & Agile



Source: M. Weldon, The Future X Network: A Bell Labs Perspective. CRC Press, March 2016.

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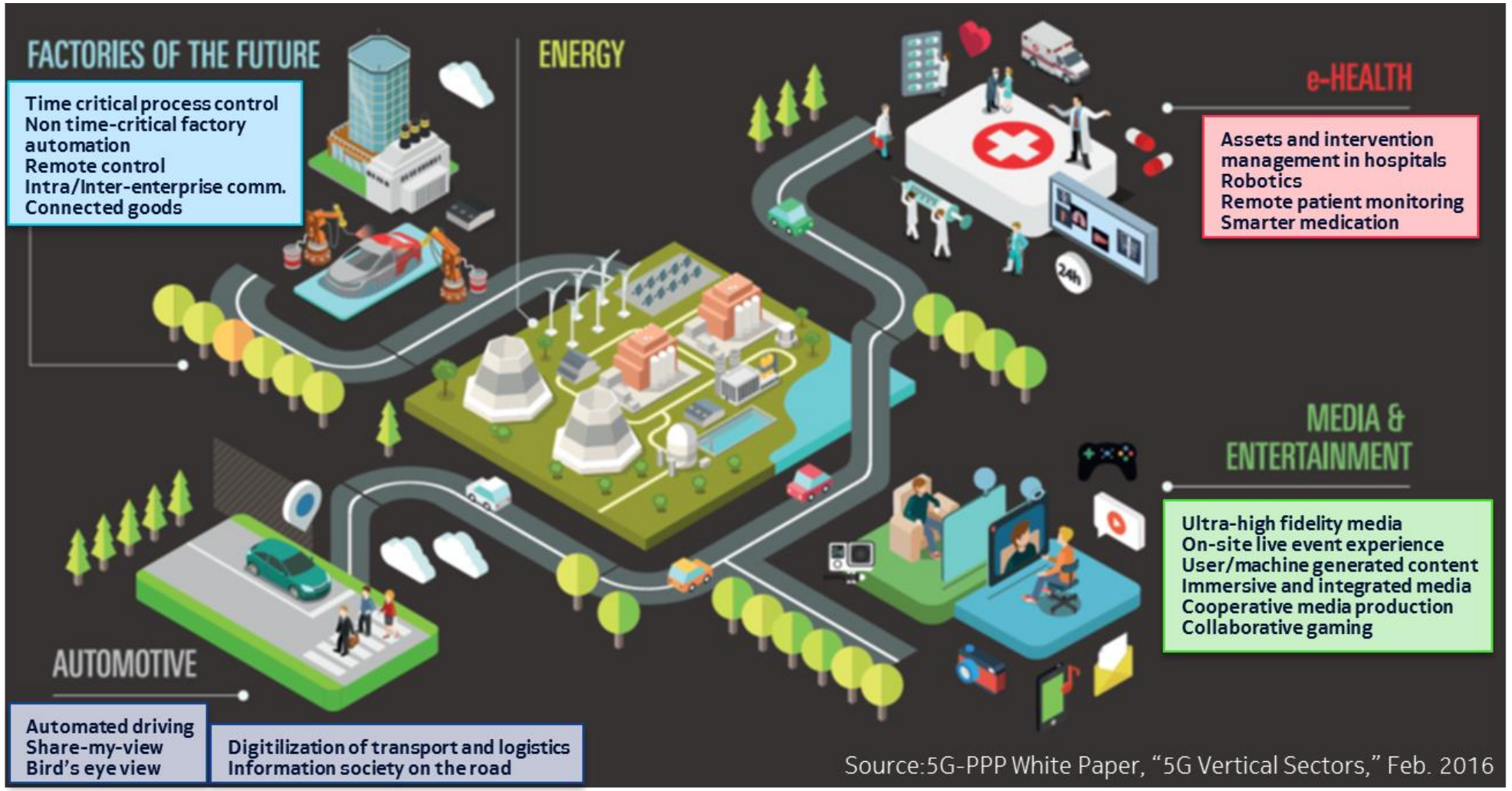
5G Vision – Enabling New Verticals & Use Cases



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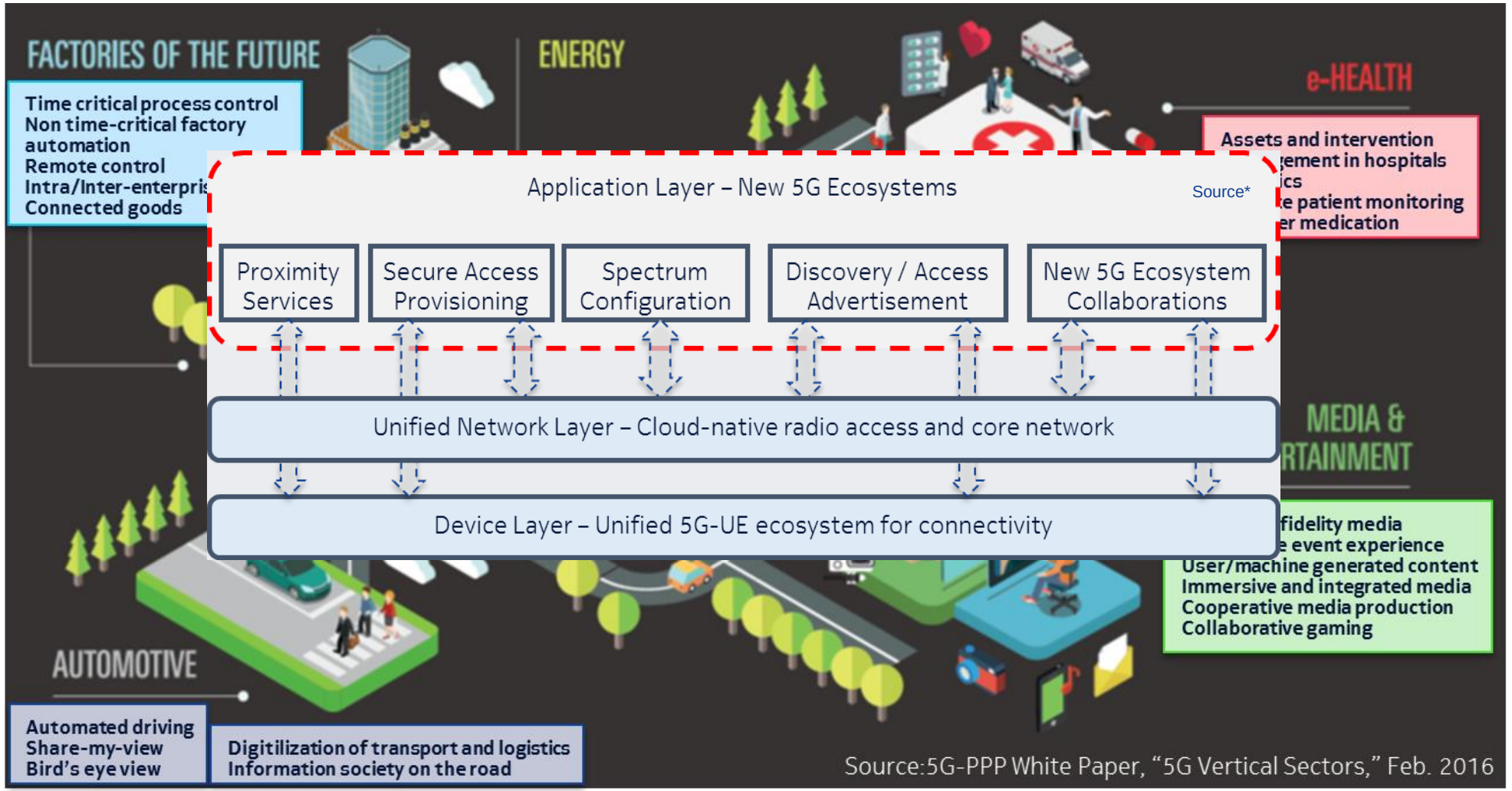
5G Vision – Enabling New Verticals & Use Cases



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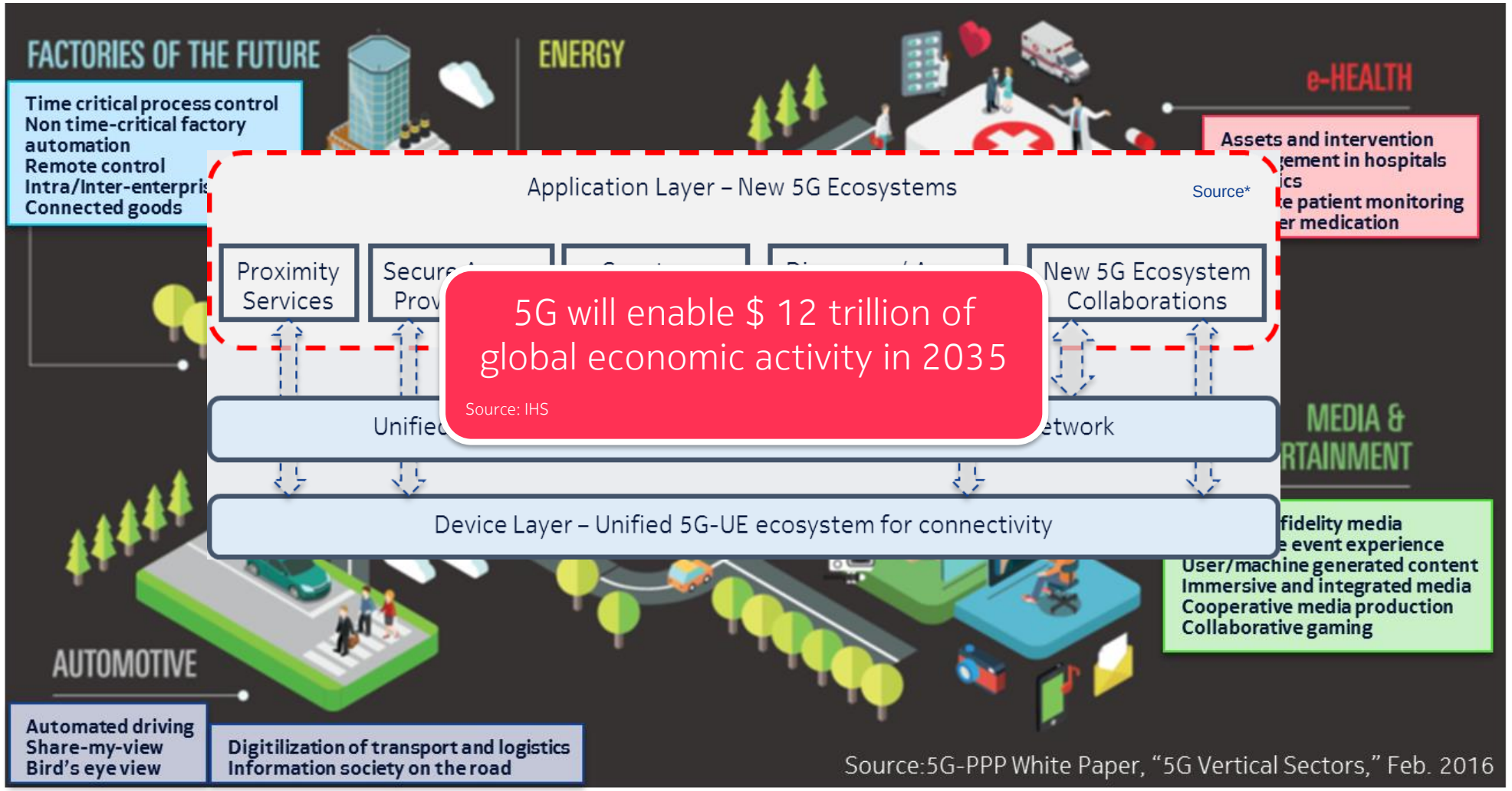
*Source: A. Prasad, Z. Li, S. Holtmanns, M.A. Uusitalo, "5G Micro-Operator Networks – A Key Enabler for New Verticals and Markets," IEEE 25th Telecommunications Forum (TELFOR), Belgrade, Nov. 2017.

5G Vision – Enabling New Verticals & Use Cases



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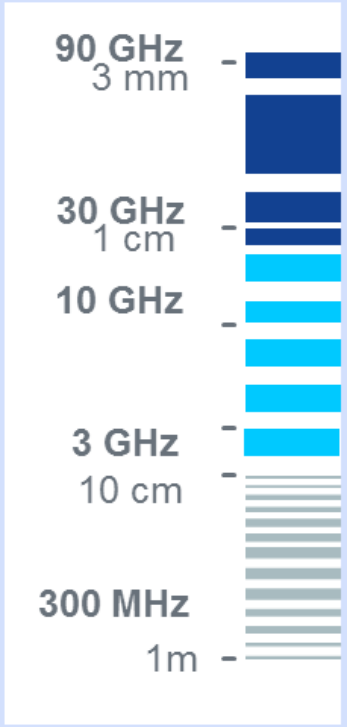
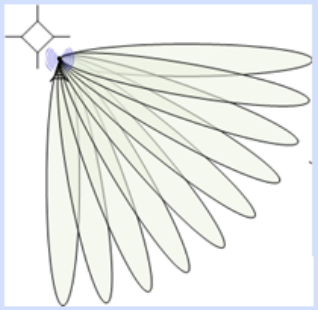
*Source: A. Prasad, Z. Li, S. Holtmanns, M.A. Uusitalo, "5G Micro-Operator Networks – A Key Enabler for New Verticals and Markets," IEEE 25th Telecommunications Forum (TELFOR), Belgrade, Nov. 2017.

5G Key Technology Components

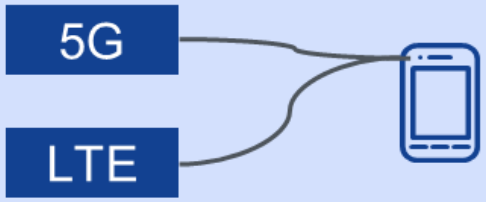
#1 New spectrum



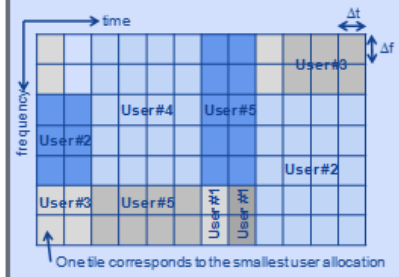
#2 Beamforming



#4 Dual-connectivity



#3 Slicing and flexibility



- Multi-service
- Flexibility
- Lean carrier

#5 Edge computing

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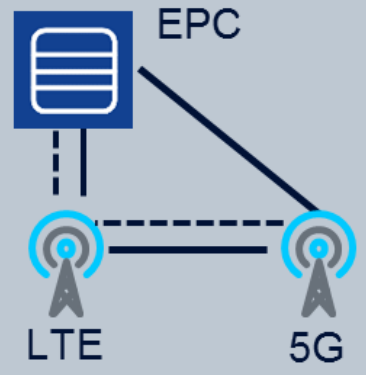
5G Architecture Options in Release 15

NSA = Non-Standalone
SA = Standalone

Why Dual Connectivity with NSA?

Option 3x | **LTE+5G under EPC**



- Available 6 months earlier than SA
- Existing EPC core used
- Existing LTE idle mode used
- Data rate aggregation LTE + 5G
- VoLTE in LTE

Why Standalone SA?

Option 2 | **SA 5G under 5GC**

- 5G end-to-end for new services
- Lower latency without LTE leg
- Lower setup time in 5G

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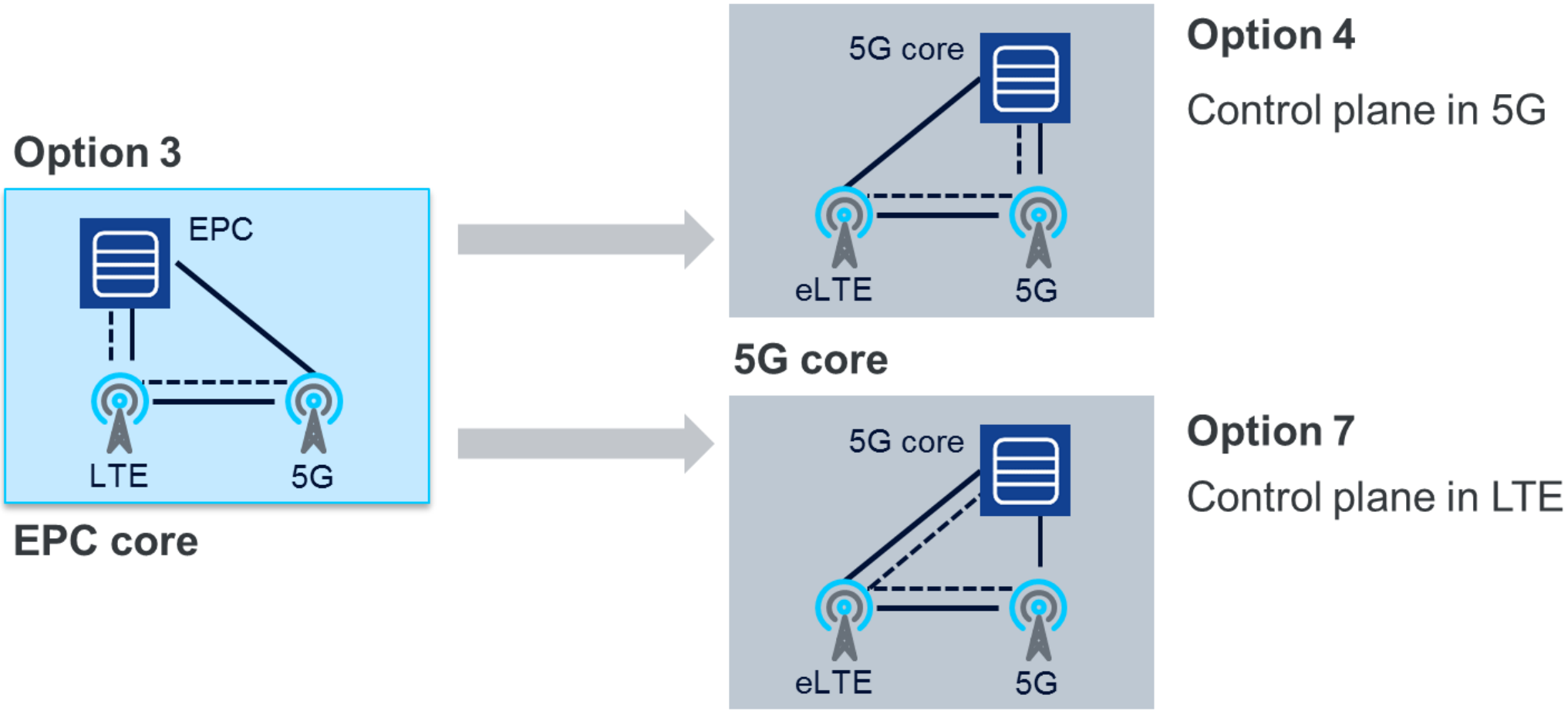
Evolution of Non-Standalone Option to 5G Core



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5G Technology Adoption

- ‡GSA has identified **154 operators in 66 countries** that have demonstrated, are testing or trialing, or have been licensed to conduct, field trials of 5G-enabling and candidate technologies
  - **Up from 134 operators in April 2018**

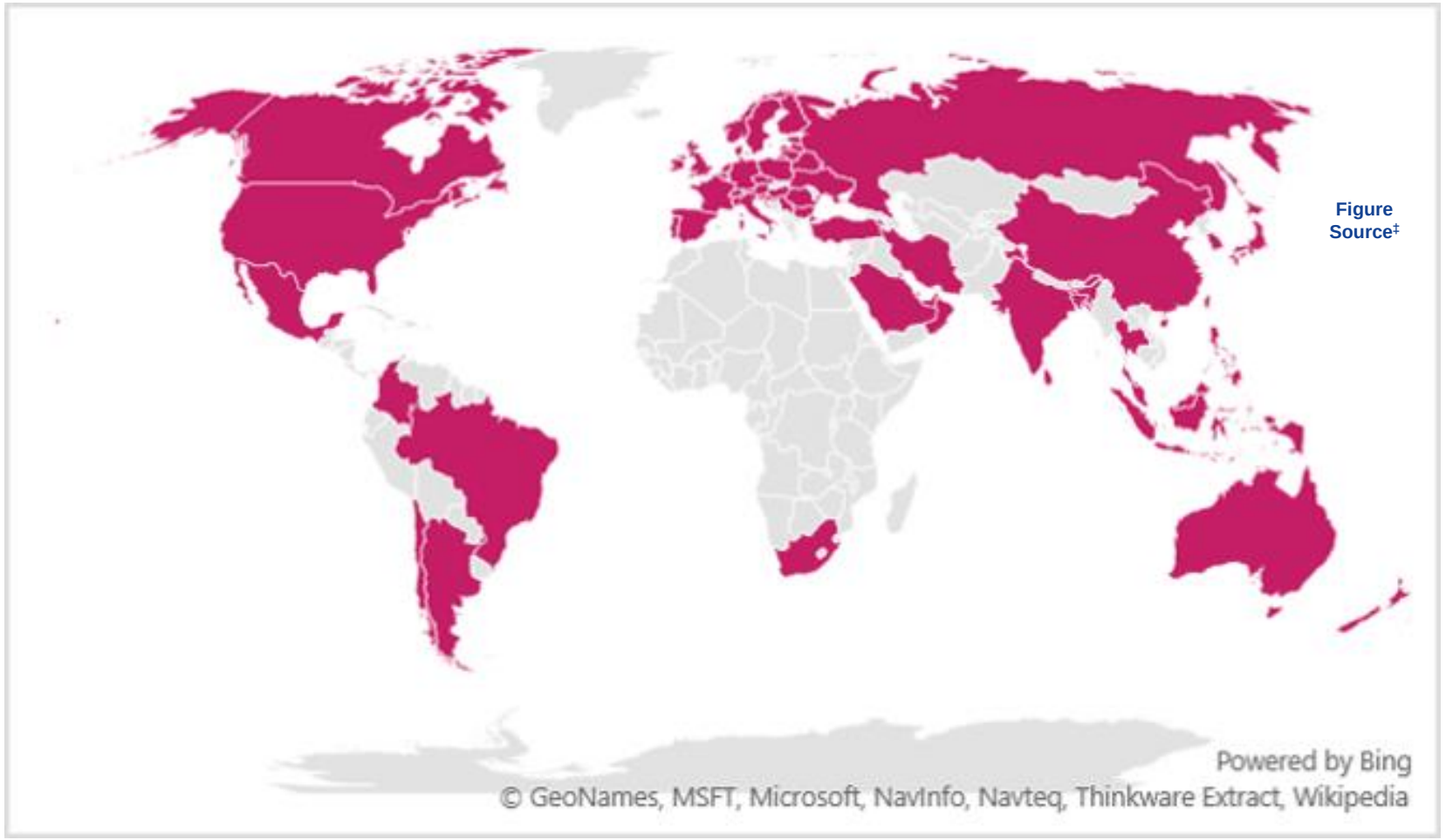

Figure Source‡

‡**Source**: GSA Report: "Evolution from LTE to 5G: Global Market Status," Aug. 2018 (https://gsacom.com/)

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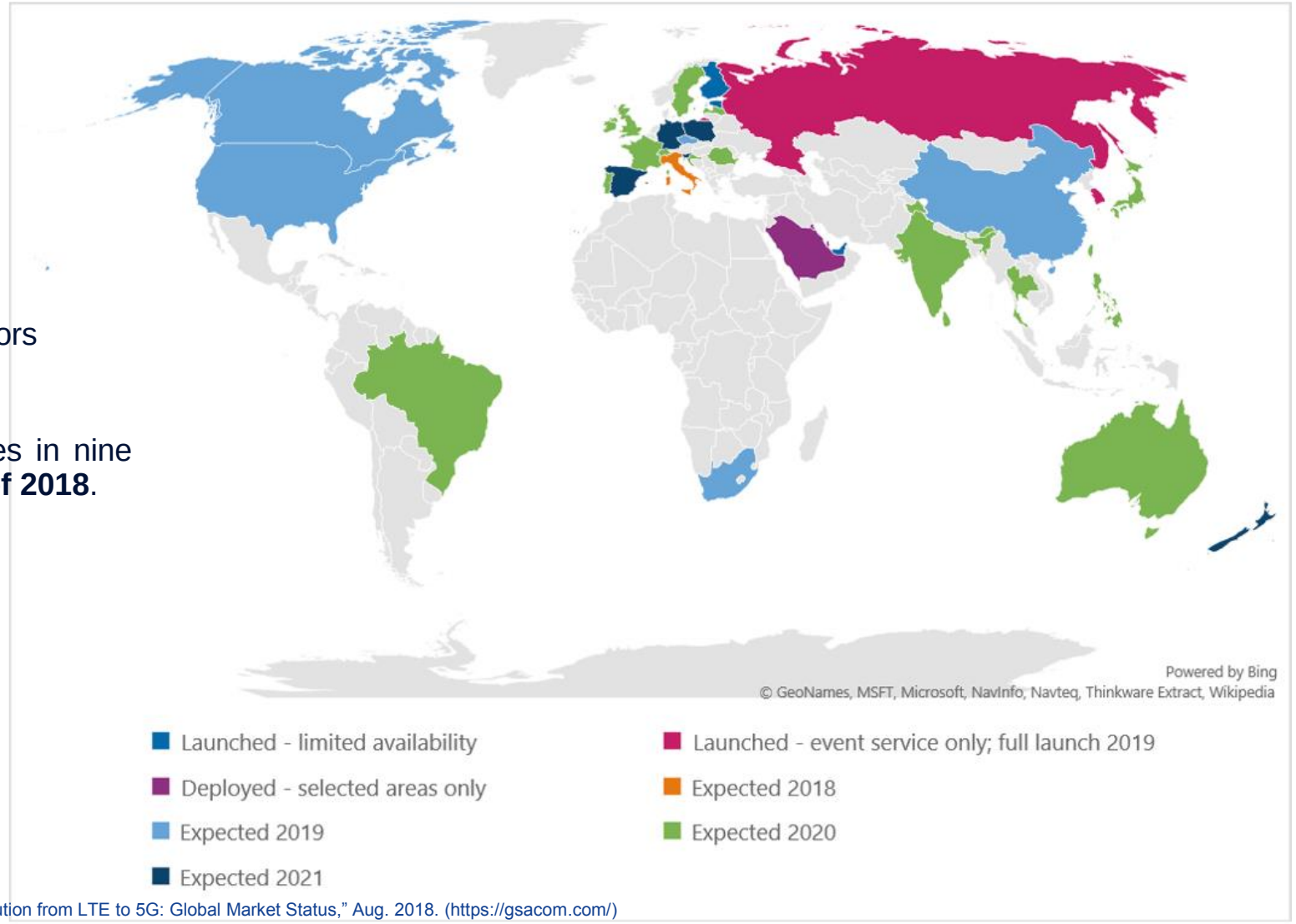
5G Technology Adoption
Deployment Plans

67 telecom operators in **39** countries that have announced intentions of making 5G available to their customers between **2018 – 2022**

Figure only includes countries where operators have announced their plans

Beyond limited scale launches, ten launches in nine countries planned to take place by the **end of 2018**.



Source: GSA Report: "Evolution from LTE to 5G: Global Market Status," Aug. 2018. (https://gsacom.com/)

5G-Xcast – Unified Framework for Common Content Delivery

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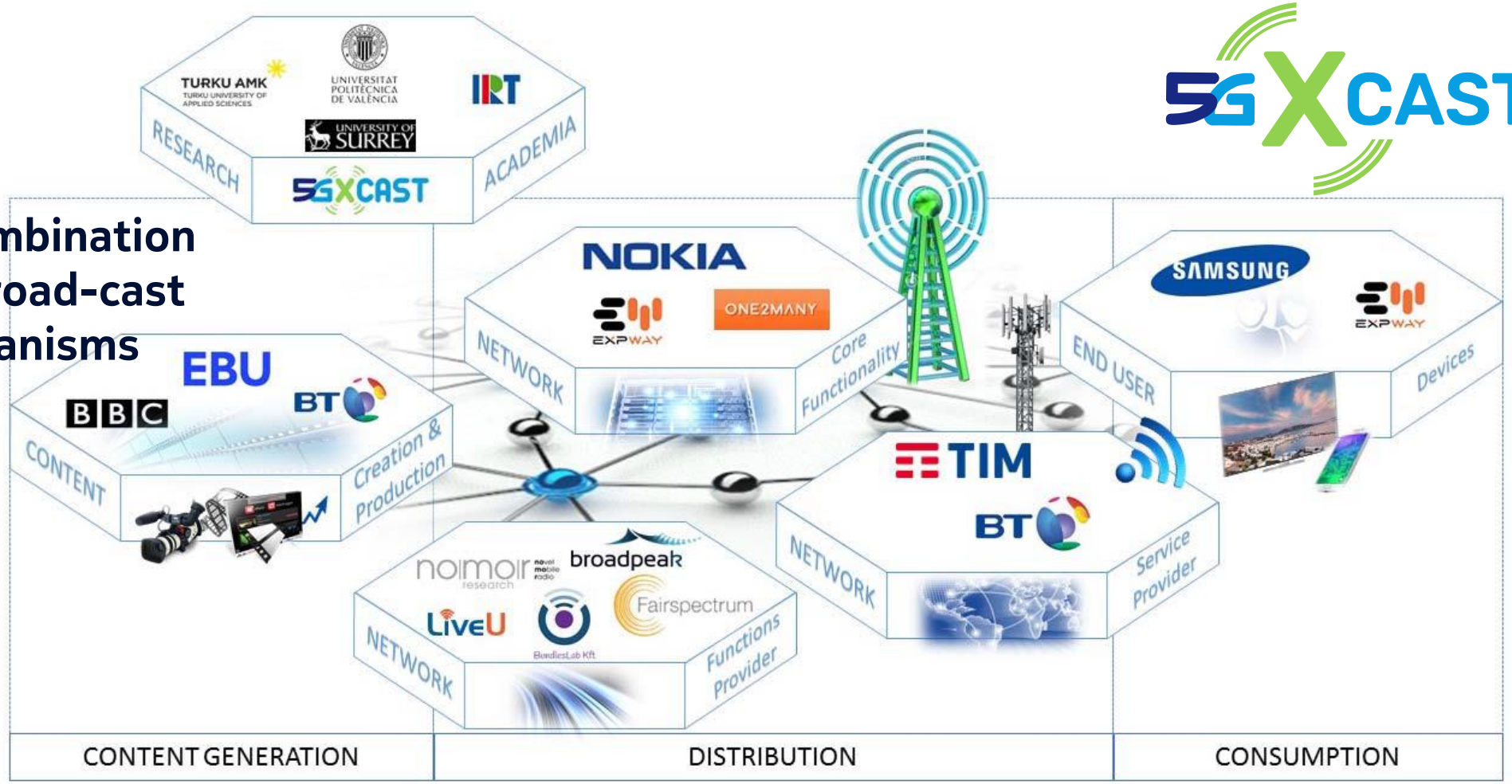
5G-Xcast Consortium

Xcast: An efficient combination of uni-, multi-, and broad-cast transmission mechanisms



- Broadcast and Multicast Communication Enablers for the Fifth-Generation of Wireless Systems (5G-Xcast)
  - Start and end date: June 2017 – May 2019 (24 months)
  - European Union funded project; Call **H2020-ICT-2016-2**; Grant Number: **761498**

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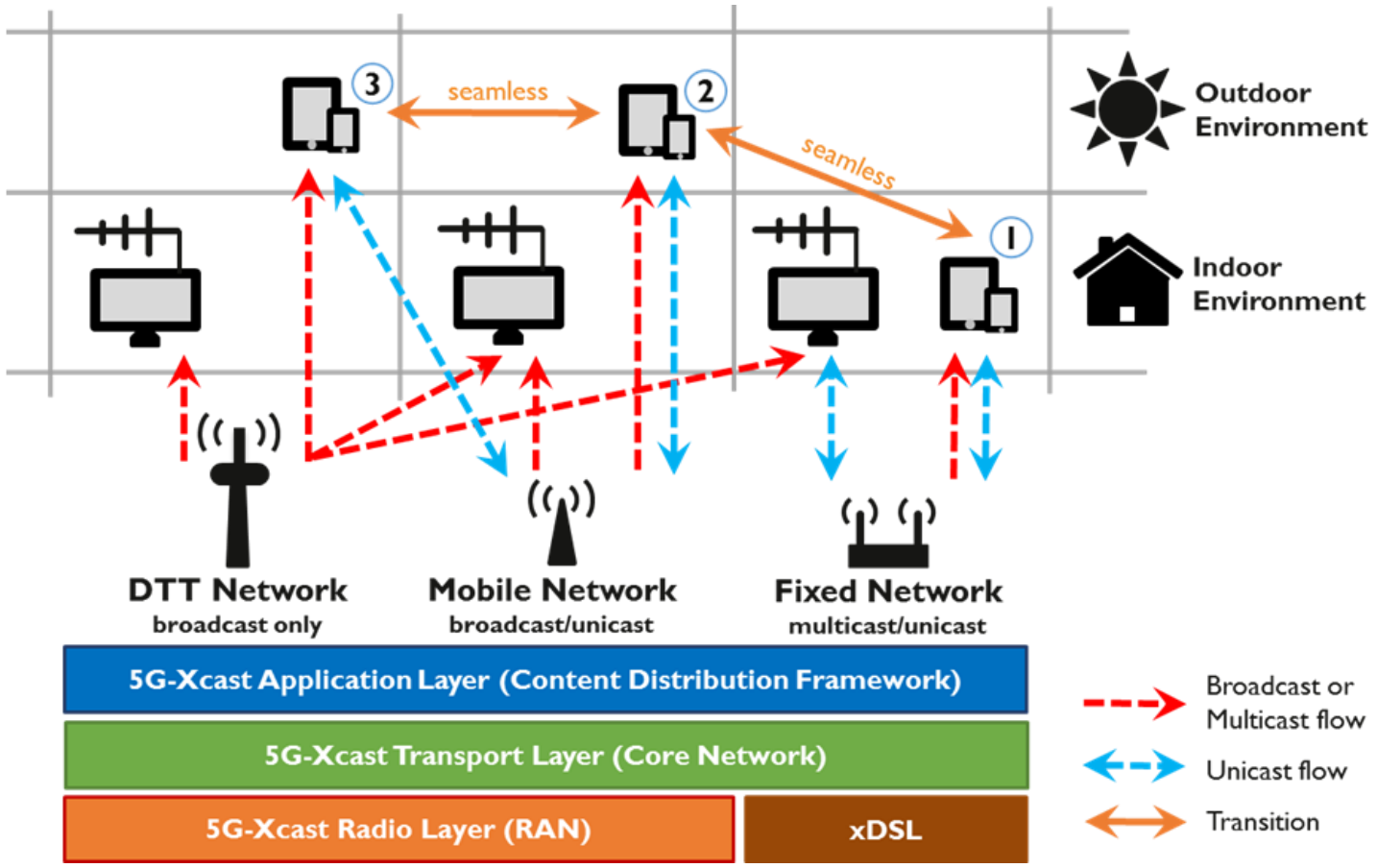
Convergence Vision

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.



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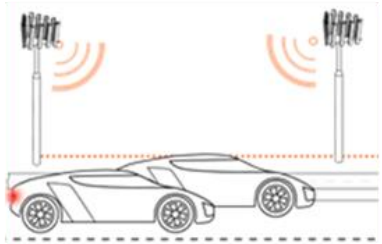
5G-Xcast Vision

Multimedia & Entertainment

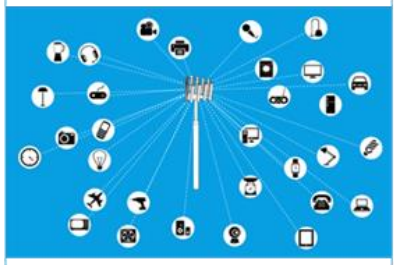
- UHDTV delivery
- VR, AR, 360° video
- Content prepositioning
- Push to X (talk/video)

Automotive



- Autonomous driving information
- Infotainment
- Safety applications
- Signage information

Internet of Things



- Software & firmware updates
- Common control messages to devices

Public Warning

- Disaster alerts (e.g. tsunami, earthquake)
- Emergency alerts (e.g. hazar, amber alerts)

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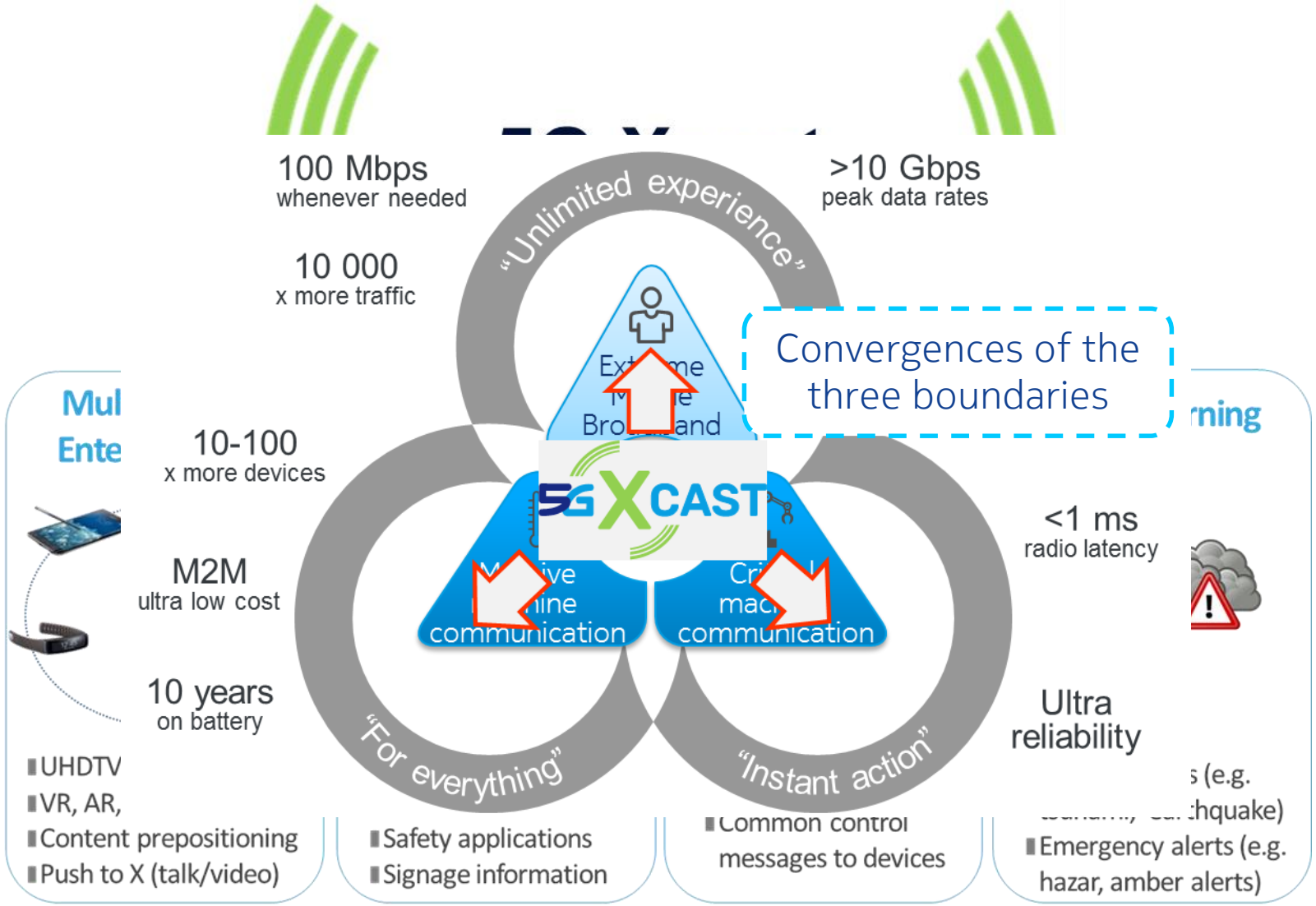

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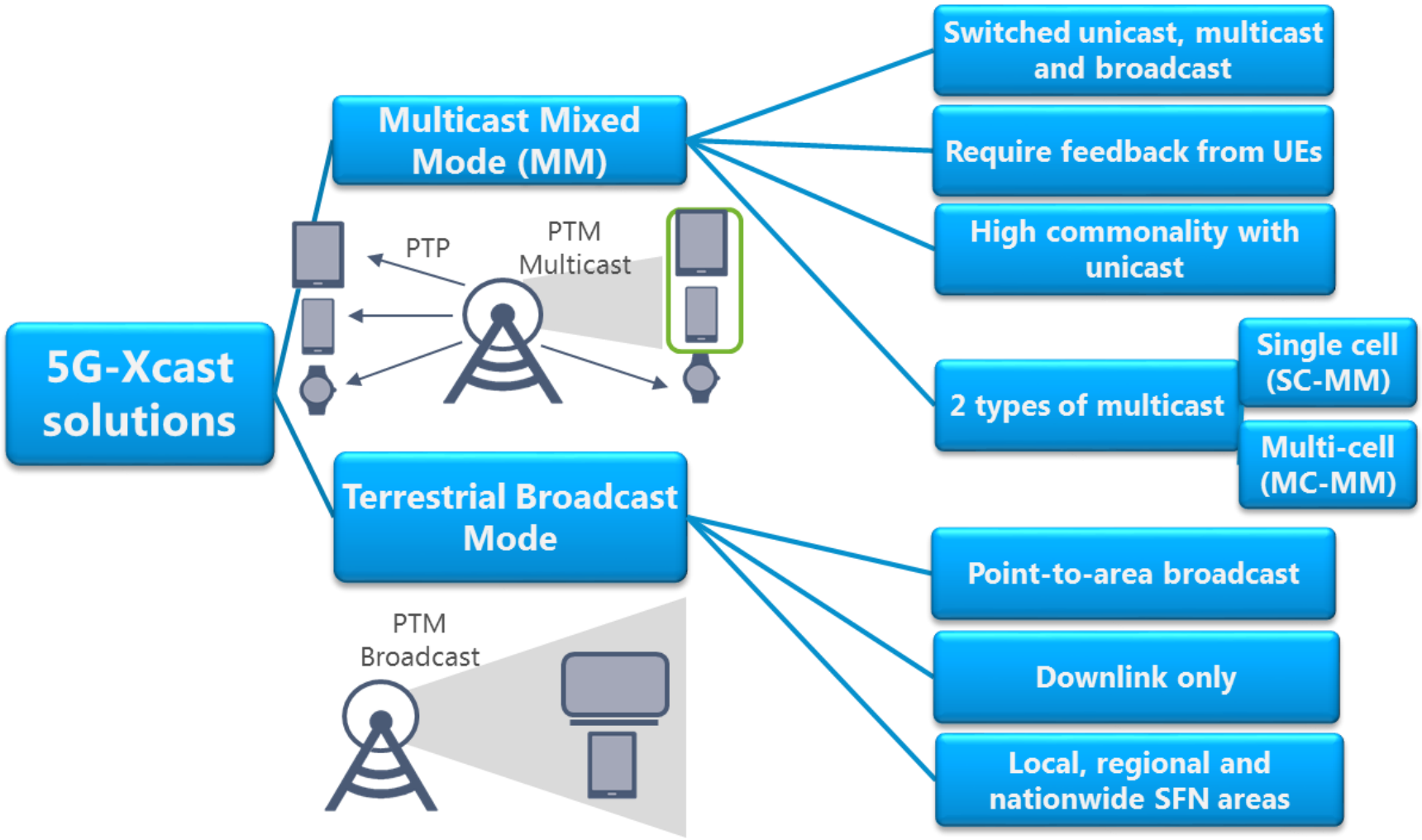
Multicast Mixed Mode and Terrestrial Broadcast Mode



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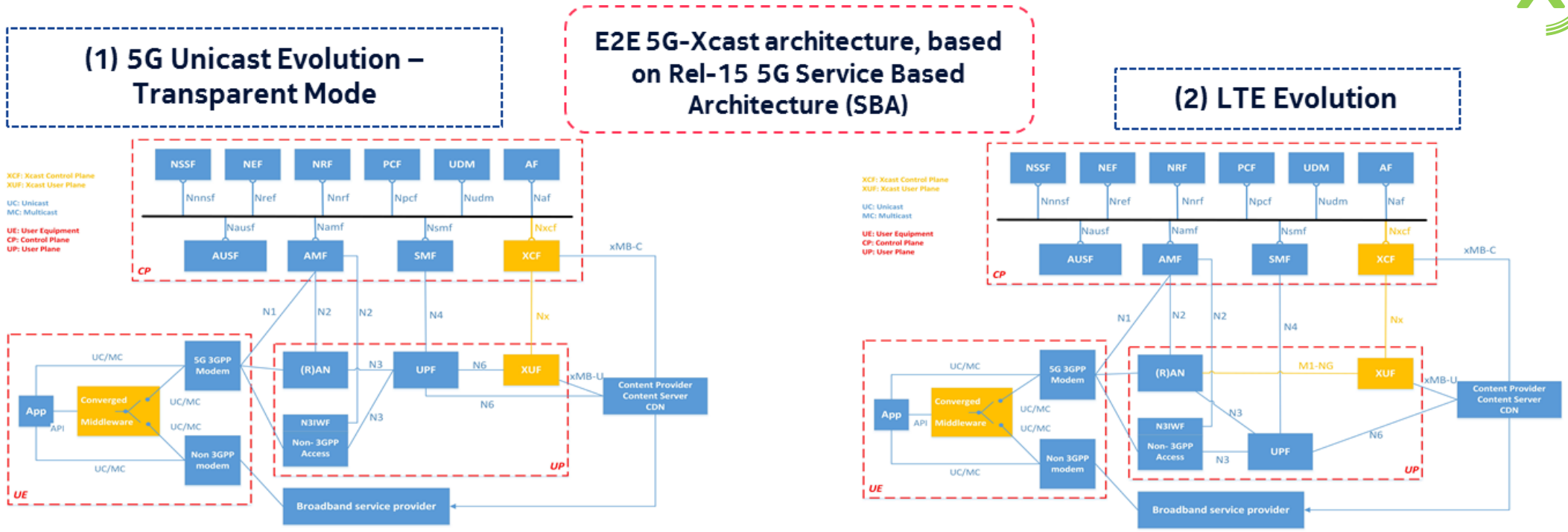

- Analysis of the limitations of multicast/broadcast capabilities in LTE and designed building blocks to enable multicast/broadcast in the service-based 5G architecture (D4.1)
- Description of the key drivers, benefits and use cases for full fixed-mobile network convergence (D4.2 on-going) and call flows (D4.3 on-going)
  - **D4.1:**
    - http://5g-xcast.eu/wp-content/uploads/2018/07/5G-Xcast_D4.1_v1.1_web-1.pdf
  - **Tutorial WP4:**
    - http://5g-xcast.eu/wp-content/uploads/2018/07/5G-Xcast_Tutorial_06_WP4_CoreNetwork.pdf

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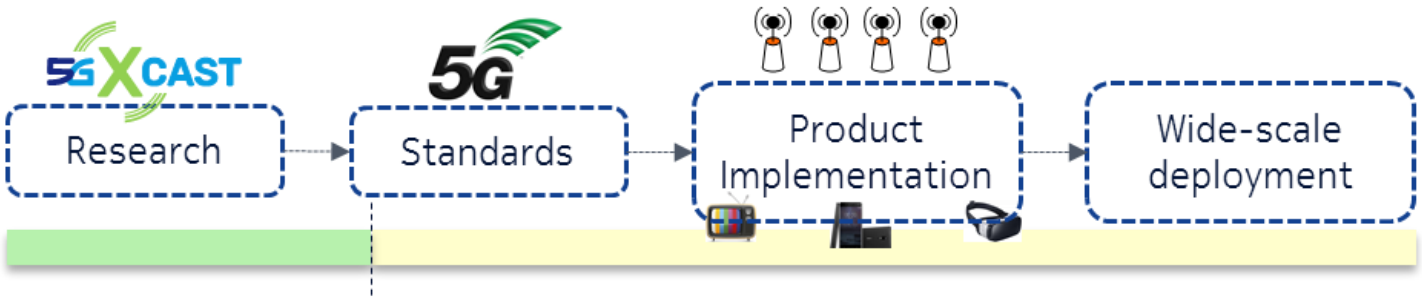
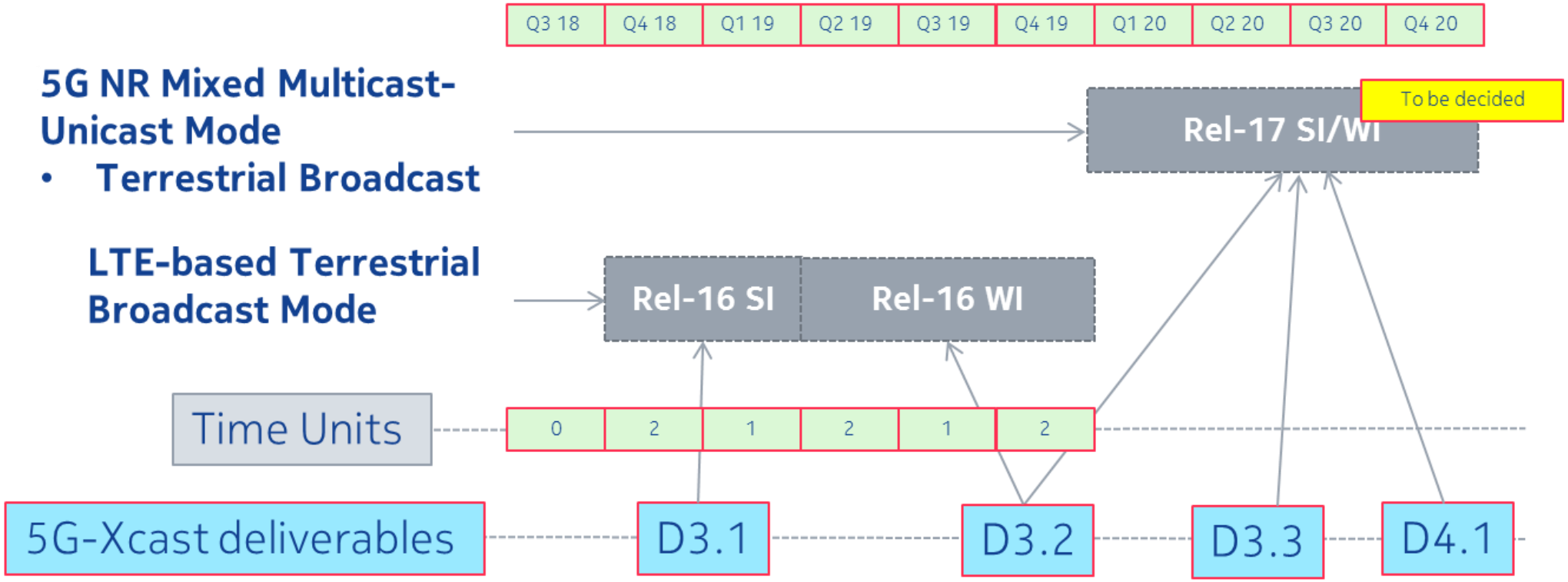
5G-Xcast and 3GPP from Vision to Reality





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5G Value Proposition

- MNOs / BNOs
  - Simplified and efficient transport, with reduced transport network load and total cost of ownership for Xcast content
    - Leveraging OTT innovations and ecosystem partnerships
  - Novel collaborations with content providers for advertisements / new revenue streams, efficient transport of '*elephant pipes*'
    - Supporting new business models using AR/VR deployments
- Content Providers
  - Controllable QoE and seamless multi-access connectivity with Xcasting
  - Access to the massive and global end-to-end 5G ecosystem
- UE Vendors
  - Simplified implementation with minimal testing complexity
  - Empowering new use cases and features with minimal added cost

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Public deliverables, scientific papers, presentations:
http://5g-xcast.eu/documents/

Website:
www.5g-xcast.eu

Twitter:
@5Gxcast

LinkedIn:
https://linkedin.com/company/5g-xcast

Videos:
https://www.youtube.com/channel/UCCl2iSgTDx42UiLoRcDyDBg
https://youtu.be/daFOf30NG2U

DISCLAIMER: This work was supported in part by the European Commission under the 5G-PPP project Broadcast and Multicast Communication Enablers for the Fifth-Generation of Wireless Systems 5G-Xcast (H2020-ICT-2016-2 call, grant number 761498). The views expressed in this contribution are those of the authors and do not necessarily represent the project.