A Realistic View at the Deployment and Use Cases of 5G

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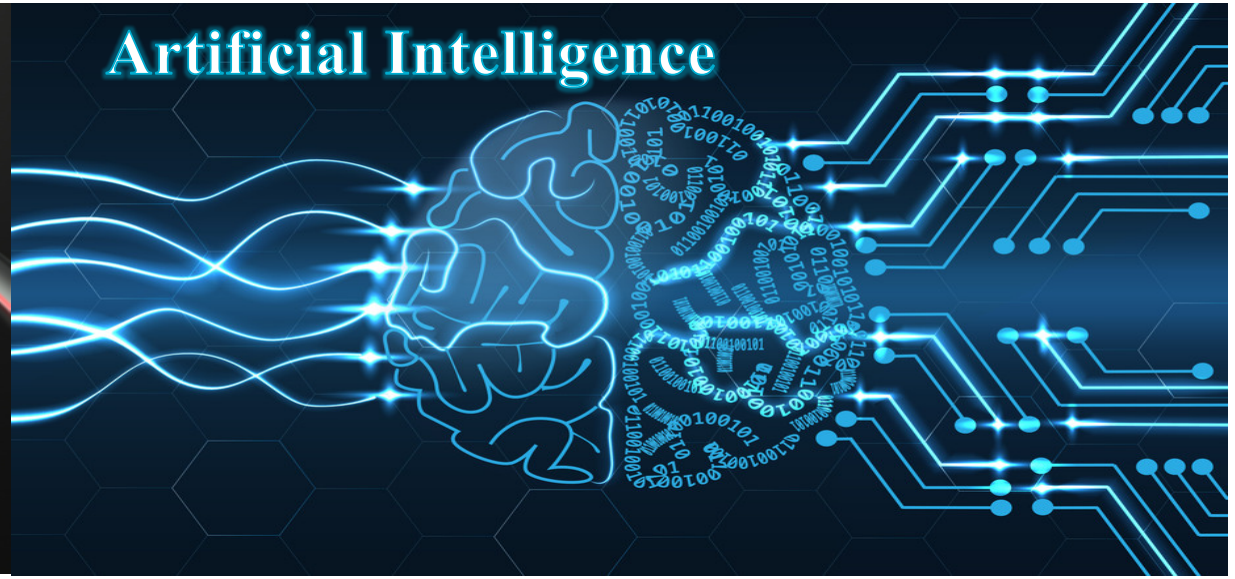
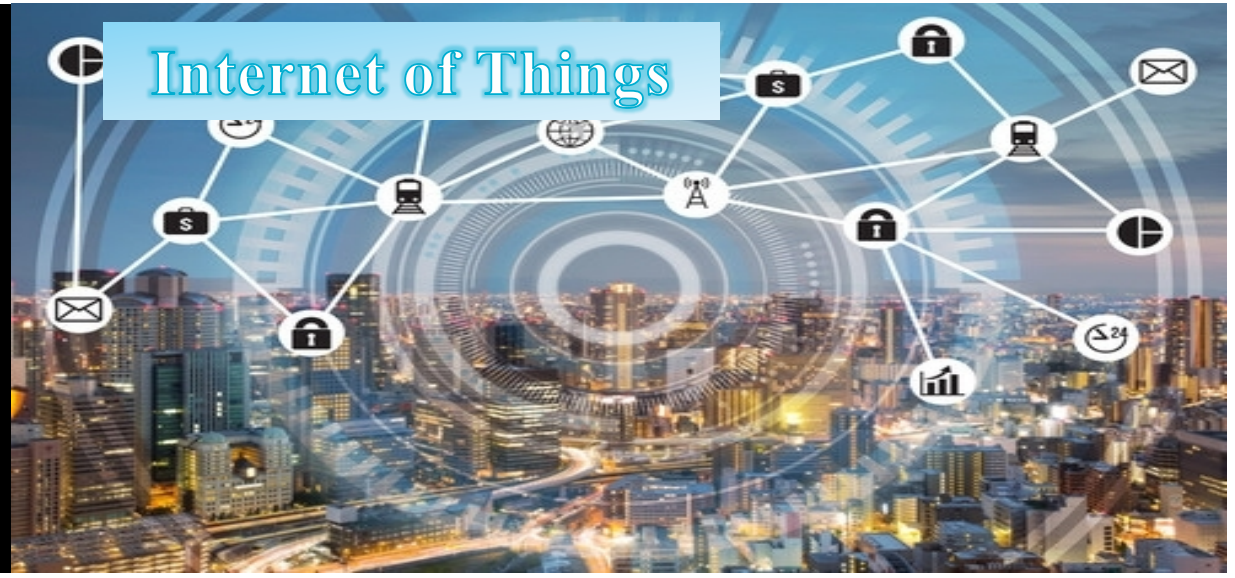
add life to life

EITC/du Next Generation Network

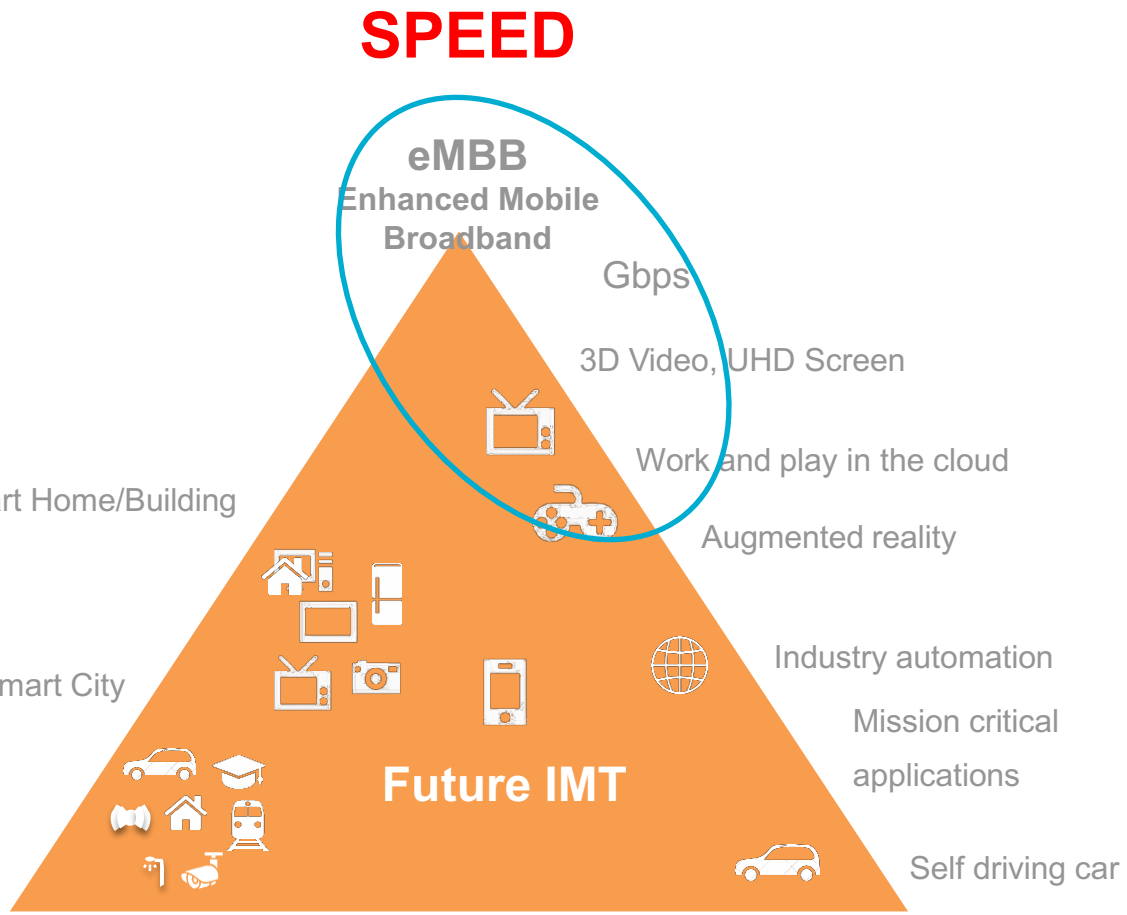




5G Technology Variations will Confuse the Market Again

Technology	3GPP Version	Technology Component Examples	Spectrum
LTE A-Pro	12 to 14	Carrier Aggregation From 4x4 MIMO to Massive MIMO	Same as existing LTE
LTE Enhancement	15 and later	Enhanced LTE A-Pro	Same as existing LTE
Pre-standard 5G	Not related	Any technology components	Any spectrum
5G NR	**15 and later**	**Multiple OFDM subcarrier spacing** **Wider Maximum channel bandwidth (e.g. 100MHz)**	**Less than 6GHz**
5G NR Millimeter wave	15 and later	Same as 5G NR	Millimeter wave
5G NR + 5G NR Millimeter wave	15 and later	Aggregation of 5G NR and 5G NR Millimeter wave	Both less than 6GHz and millimeter wave
5G NR interworked with LTE	15 and later	LTE - NR Dual Connectivity in addition to 5G NR	Less than 6GHz
5G NR Millimeter wave interworked with LTE	15 and later	Same as 5G NR integrated with LTE	Both less than 6GHz and millimeter wave

5G Categories of Use Cases



Source: ITU-R WP5D

CAPACITY

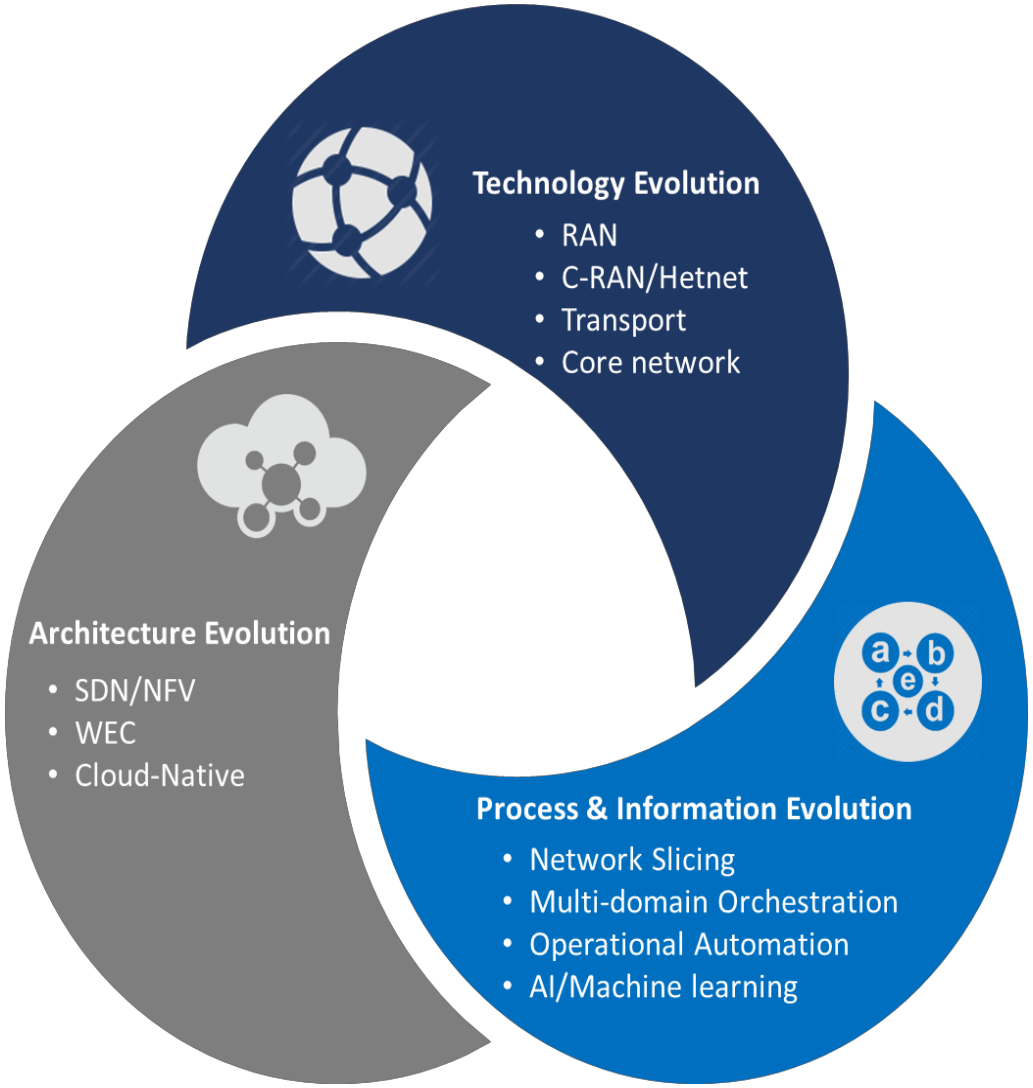
mMTC
Massive Machine Type Communications

LATENCY

uRLLC
Ultra-reliable and Low-latency Communications

The 5G “Eco System”

5G is not just an enhanced Radio Access Network

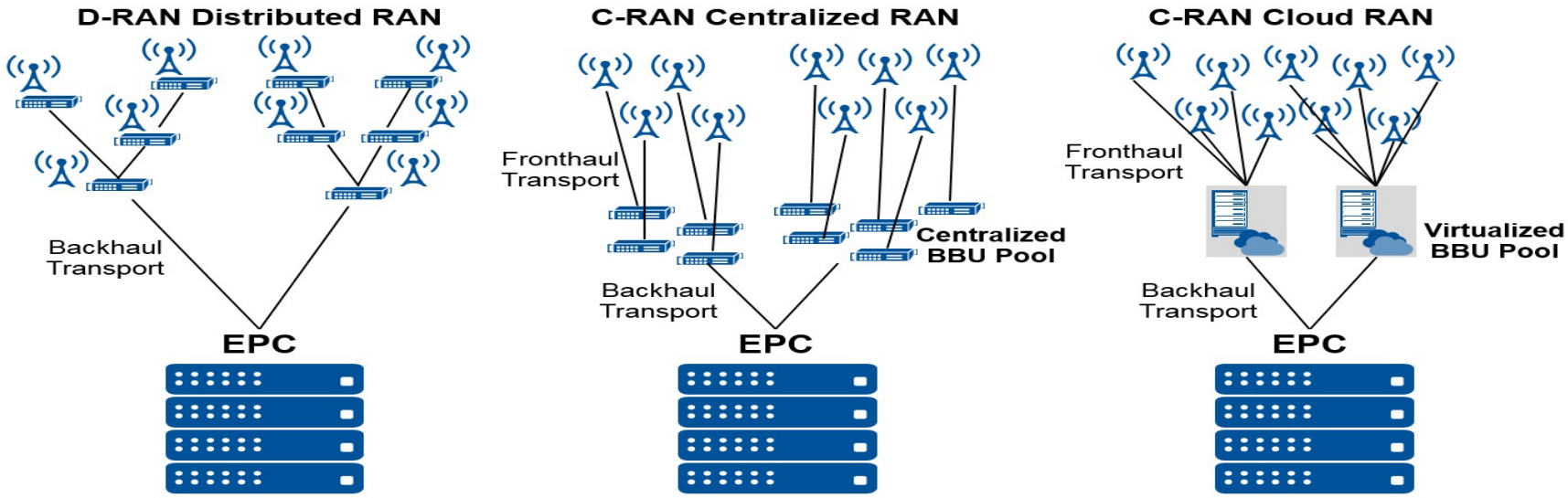


Source: Gartner

The 5G "Eco System"

Centralized RAN and the Transport Network

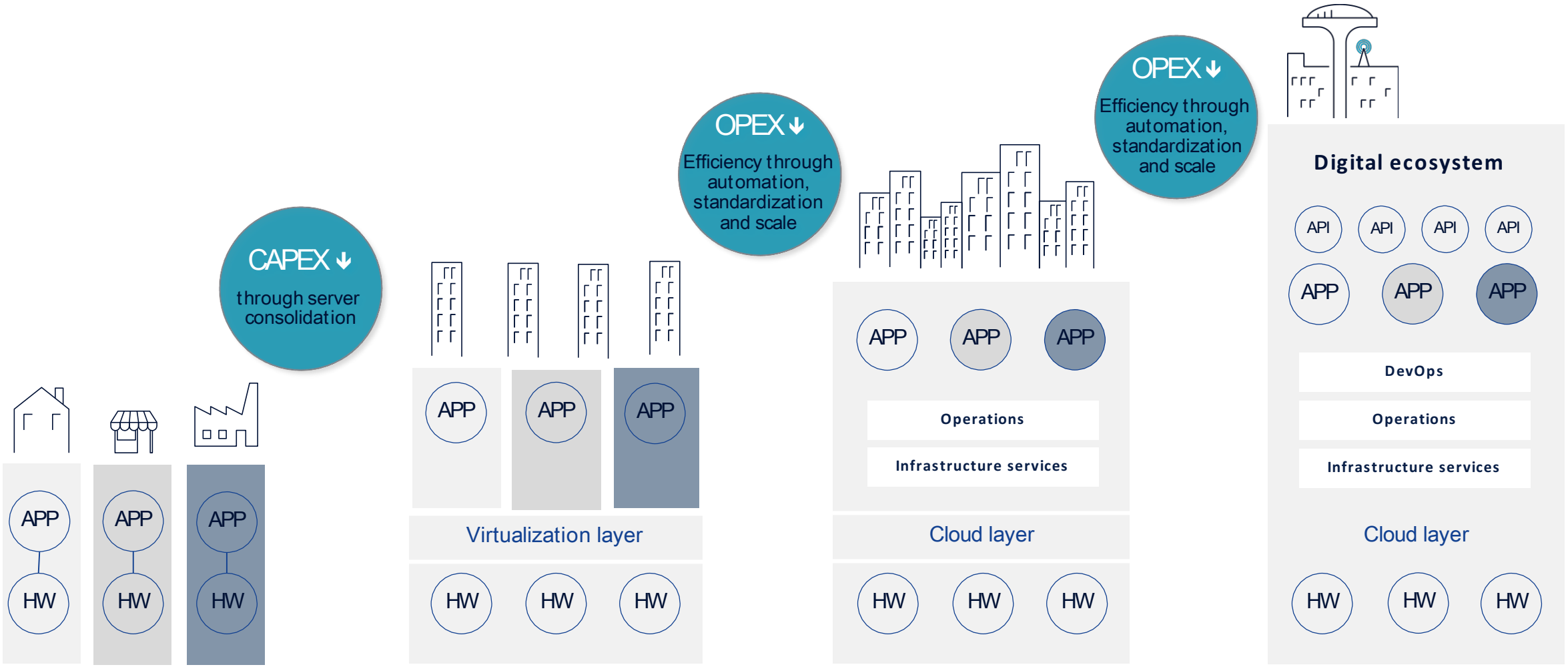
- Centralized-RAN will be promising on 5G but could need more fronthaul capacities.
  - D-RAN: several hundred Mbps on the backhaul
  - C-RAN: multiple Gbps on the fronthaul by CPRI interface
- eCPRI specification was announced August 2017 and more functions would be allocated on the radio side.



BBU = baseband unit; EPC = Evolved Packet Core; RAN = radio access network

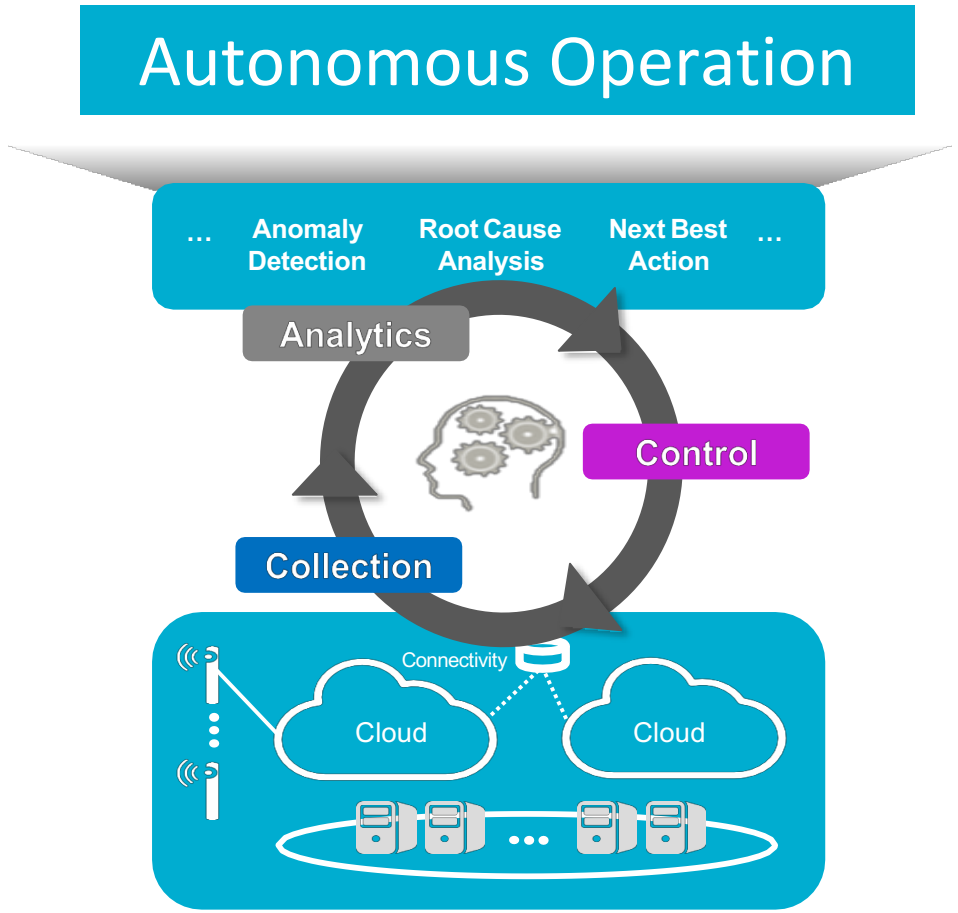
The 5G “Eco System”

Cloudification Journey towards Cloud Native



The 5G "Eco System"

The next Generation OSS – Autonomous Operation

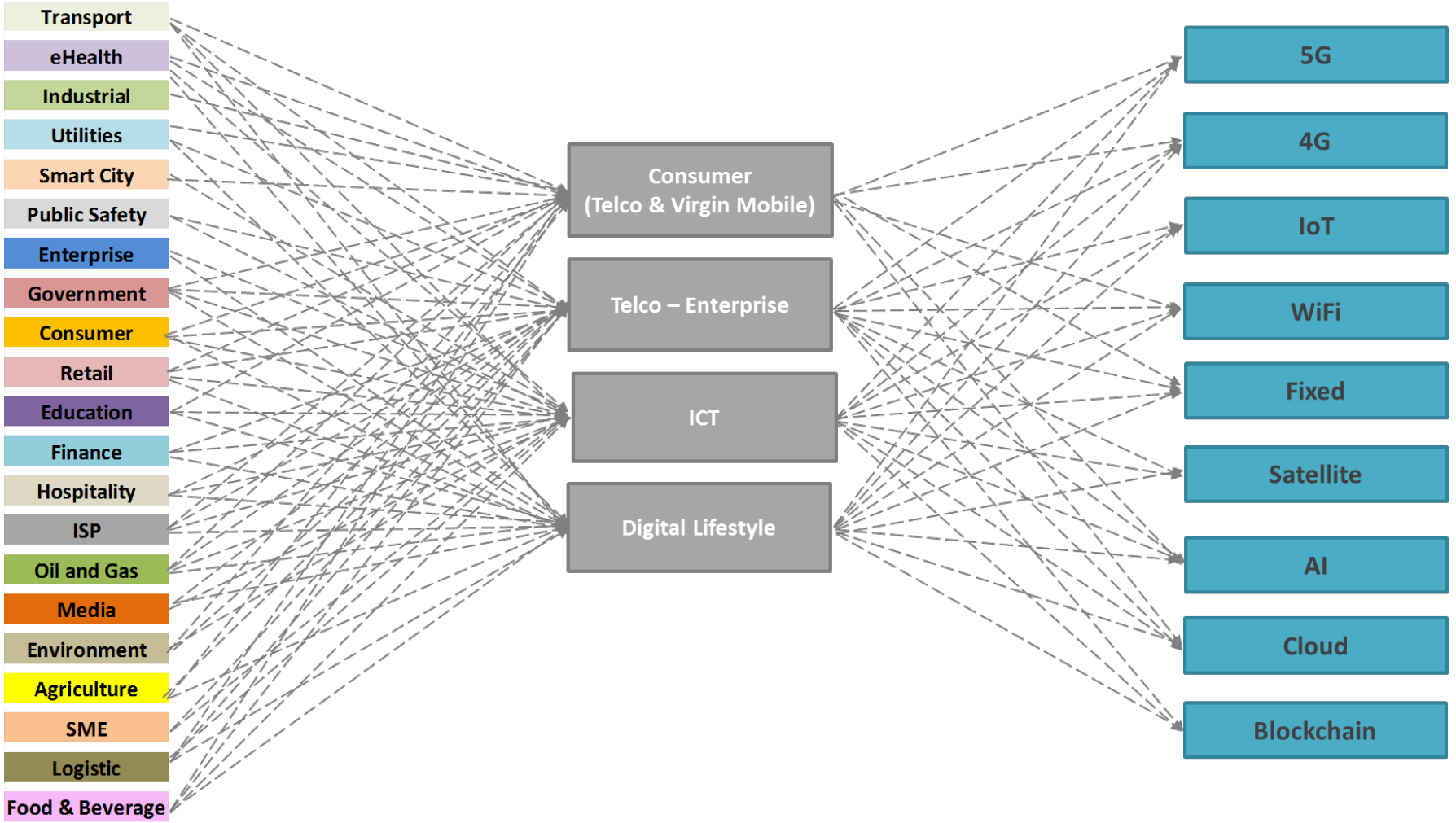


Fast Reactive & Proactive Operation

Zero-touch Network Optimization

Predictive maintenance

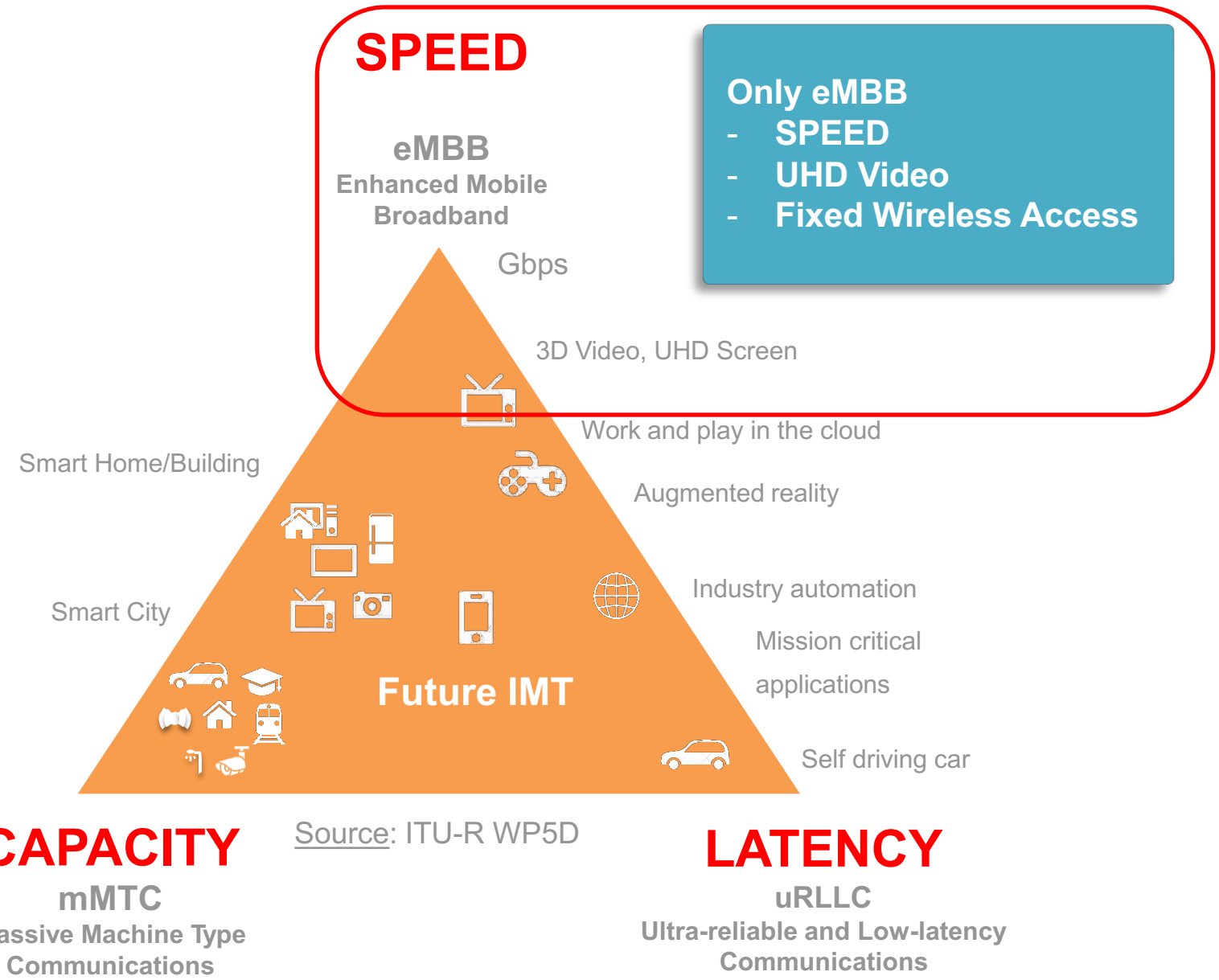
EITC Use Cases Catalog (UCC)



5G Use Cases – The Rules

- Should be Need-oriented:
  - Educating the potential customers about the capabilities, then discussing the pain-points within their businesses and openly identify any potential use of 5G for such pain points.
- More Focus on Enterprise business; Versus consumer business
- Identifying Use cases that can resolve existing constraints/restrictions:
  - Distance → Webex-Like with mobility
  - Time difference → Chatbot by AI/ML during off-hour, AR glass to train newcomers at smart factories, etc.
  - Language → Simultaneous interpretion via translation platform
  - Communication reliability → assure quality of communications towards the cloud
  - Uplink communication (Edge Computing → Significant UL Traffic increase)
  - Five senses
    - Sight → Autonomous car with several 4K/8K Camera sensors
    - Touch → Tactile internet with robots
    - Others: Hearing / Taste / Smell

Early 5G deployment

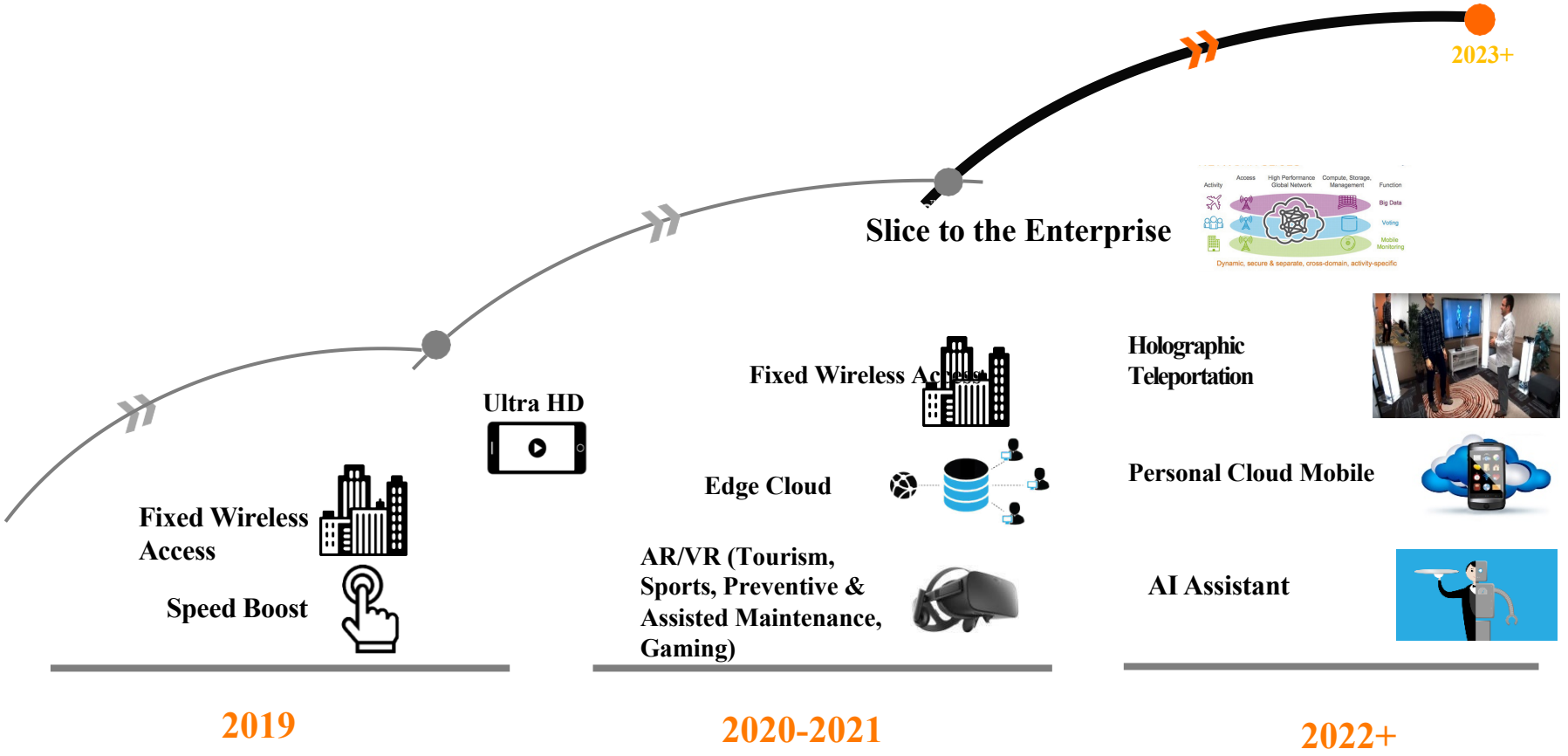


Other 5G Use Cases Except eMBB?

- Practically, there would be only enhanced MBB until 2020, because
  - Massive MTC
    - Existing LTE extensions* can satisfy most of the IoT requirements.
    - The collaboration between telecom industry and vertical industries (e.g. automotive) has started but could take several years at least.
  - Ultra-reliable and low latency
    - New installation of C-RAN, Edge computing and SDN/NFV could still be very limited in 2020.
    - 5G standardization would be defined only by telecom industry and its requirement and target might not satisfy demands from vertical industries.
    - 3GPP release 15 would only study part of this use cases.

* LTE-M and NB-IoT

Focused Use Cases Roadmap Vs. Timeline



*Fixed Wireless Access

Future is Now