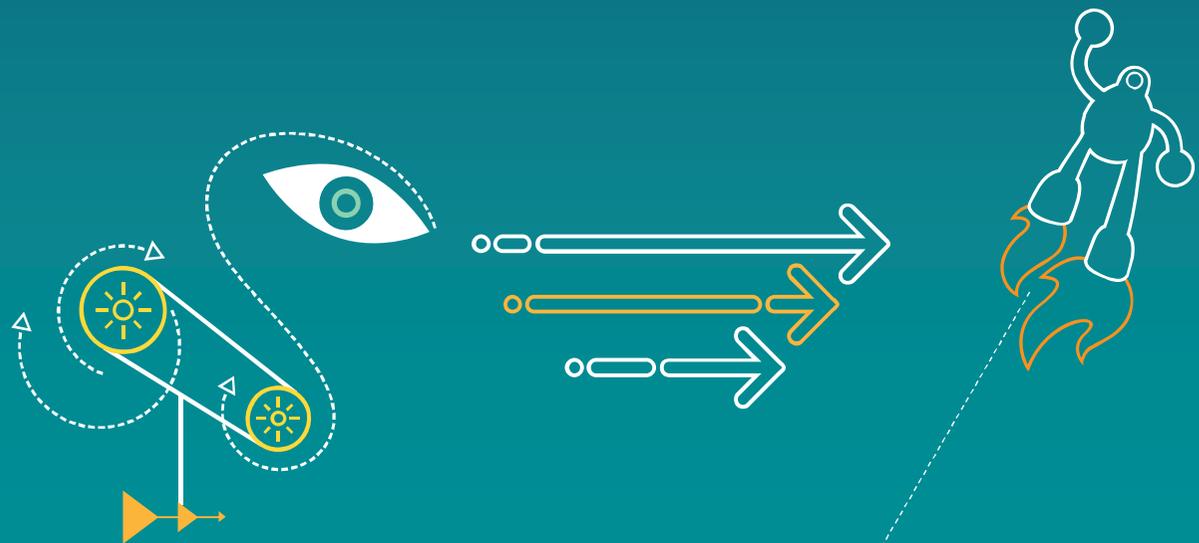


Vinosh Babu James

Lead, Technical Standards

On the need for, EMF Modeling and Profiling in 5G Specific Use cases



Evolving wireless and mobile networks

2002

Mobile surpassed
fixed voice



Redefined telephony

by mobilizing
communications

2010

Mobile surpassed
fixed BB



**Redefined
computing**

by mobilizing
the Internet

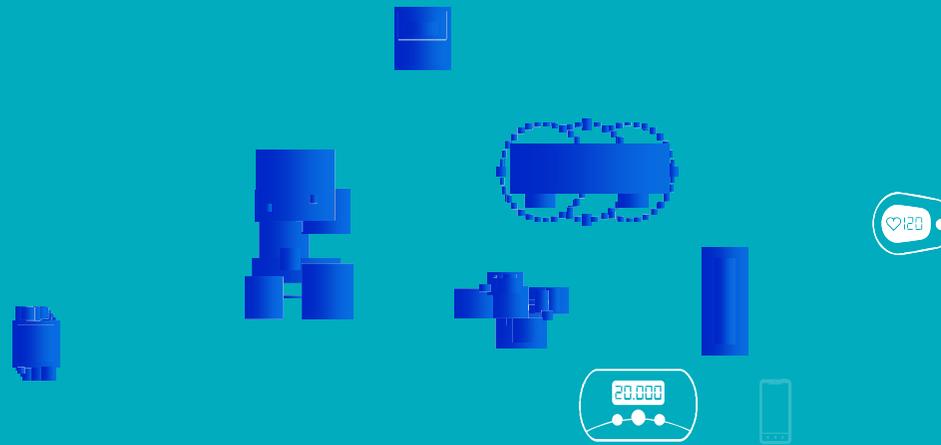
Today



**Redefining
everything**

by creating the connectivity
fabric for everything

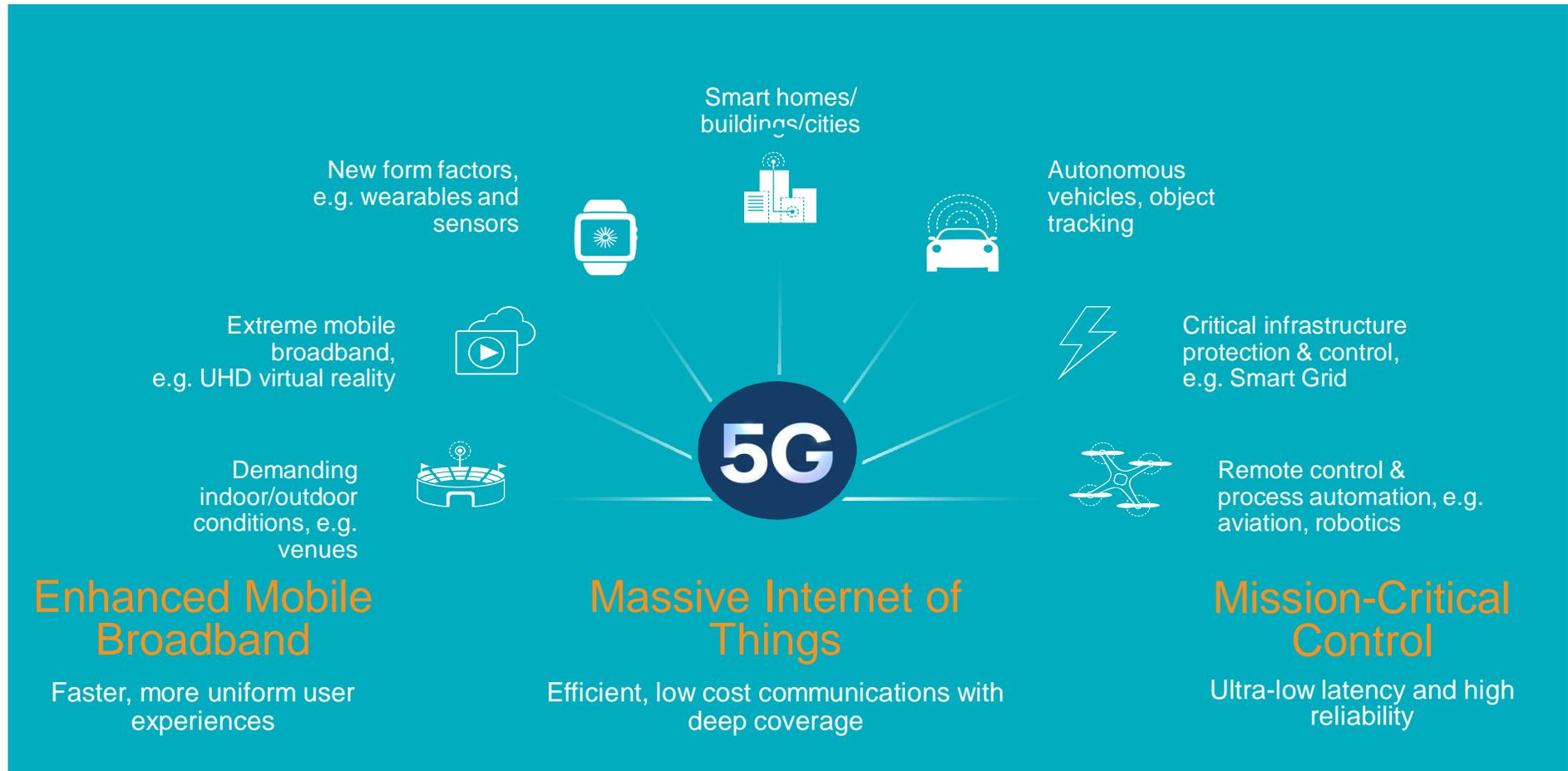
Creating the connectivity fabric for everything



Requires a new connectivity paradigm

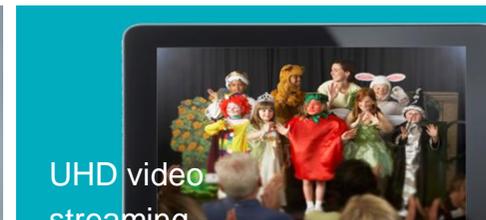
- Human communication ▶ Scaling to connect virtually anything, anywhere
- Devices as end-points ▶ New and intelligent ways to connect & interact
- Best effort data services ▶ Also, new kinds of control & discovery services
- Disparate networks ▶ Convergence of access, spectrum types, services

5G will enhance existing and expand to new use cases



5G: not just a new generation, but a new kind of network

Enhanced mobile broadband



Extreme throughput

multi-gigabits per second

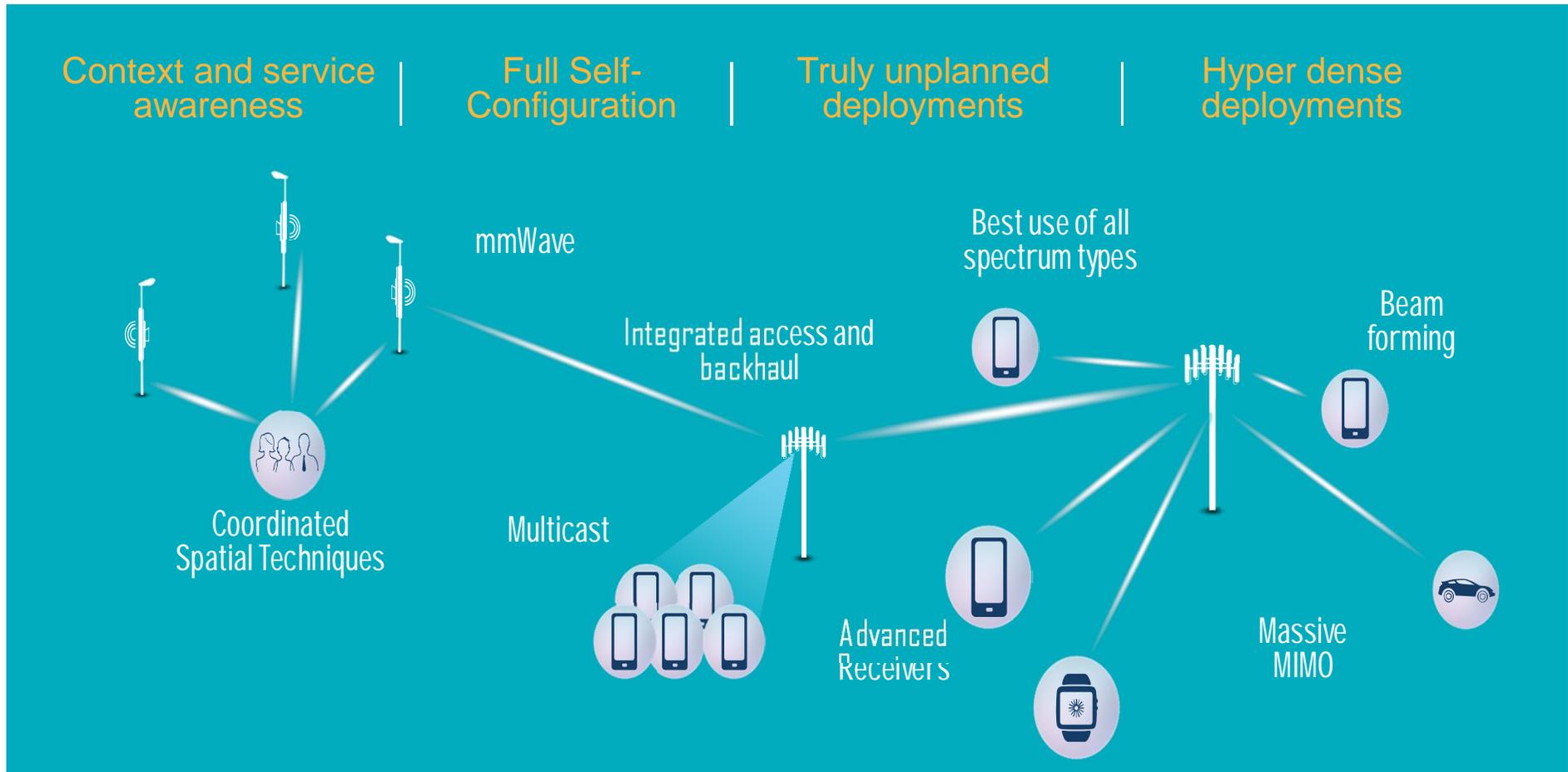
Ultra-low latency

down to 1ms e2e latency

Uniform experience

with much more capacity

Natively incorporate solutions to efficiently grow capacity



Massive Internet of Things



Power efficient

Multi-year battery life

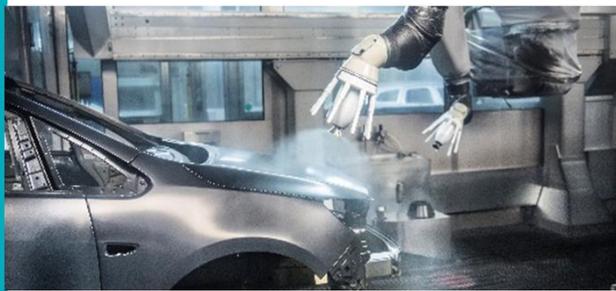
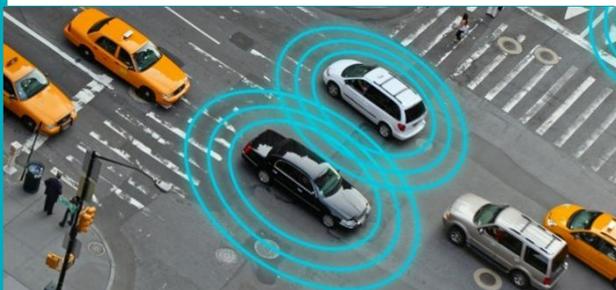
Low complexity

Low device and network cost

Long range

Deep coverage

Mission-critical control



High reliability

Extremely low loss rate

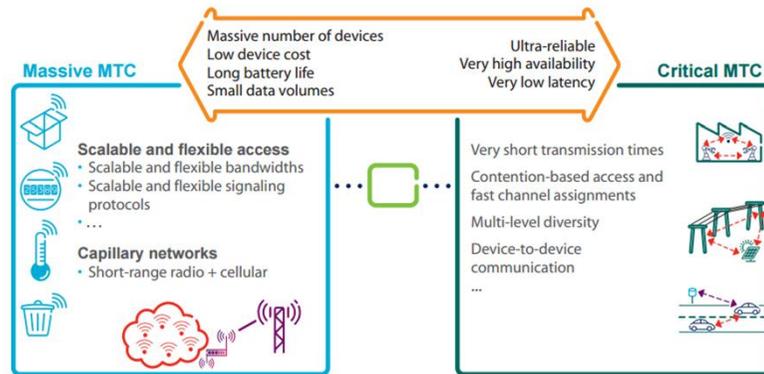
Ultra-low latency

Down to 1ms e2e latency

High availability

Multiple links for failure tolerance and mobility

Bottom-line



- There are going to be new category of devices, a lot of them closer to the body than before
- A lot of new configurations for radiation emissions are going to evolve
- The spectrum situation is not going to drastically improve, resulting in a lot of spectrum reuse, especially wrt. Unlicensed spectrum
- India usually employs very stringent emission norms, but are yet to provide a full fledged framework for PAN / BAN network and devices
- India's "Make In India" initiative aims to become the manufacturing hub for the world. It is therefore imperative that we start looking into this essential criterion (which would otherwise impede this

EMF compliance standards

› IEC (International)

- 62209-1 (SAR measurements of wireless devices used at the ear, also EN)
- 62209-2 (SAR measurements of wireless devices used near the body, also EN)
- **62232 (Assessing RF exposure from base stations)**
- 62311 (Generic standard, 0 – 300 GHz, also EN and harmonised standard under R&TTE)
- 62479 (Low power equipment, exclusions, also EN and harmonised standard under R&TTE)

› ITU (International)

- **ITU-T K.52 (Guidance on complying with EMF limits)**
- **ITU-T K.61 (Telecommunication installations)**
- **ITU-T K.MPIS (Put into service of base stations, draft)**

› CENELEC (Europe)

- EN 50360 (Mobile phones, product standard, harmonised standard under R&TTE)
- **EN 50383 (RBS, place on the market, basic standard, harmonised standard)**
- **EN 50385 (RBS, place on the market, product standard)**
- **EN 50400 (RBS, put into service, basic standard)**
- **EN 50401 (RBS, put into service, product standard)**
- **EN 50492 (RBS, in situ measurement standard)**
- EN 50566 (Wireless devices used near the body, product standard, harmonised standard)

› IEEE (USA/International)

- 1528 (SAR measurements of wireless devices used at the ear)

Thank you

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