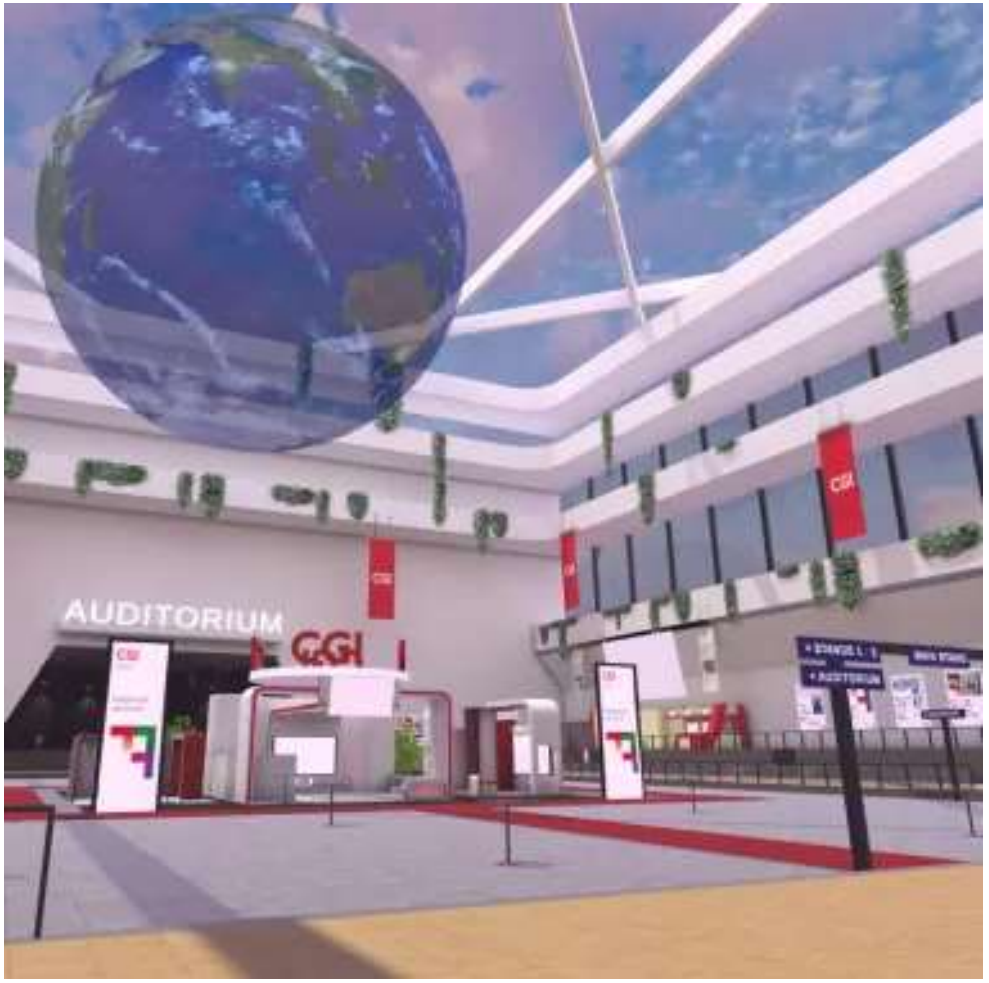
How do we address the network and connectivity challenge of creating the metaverse

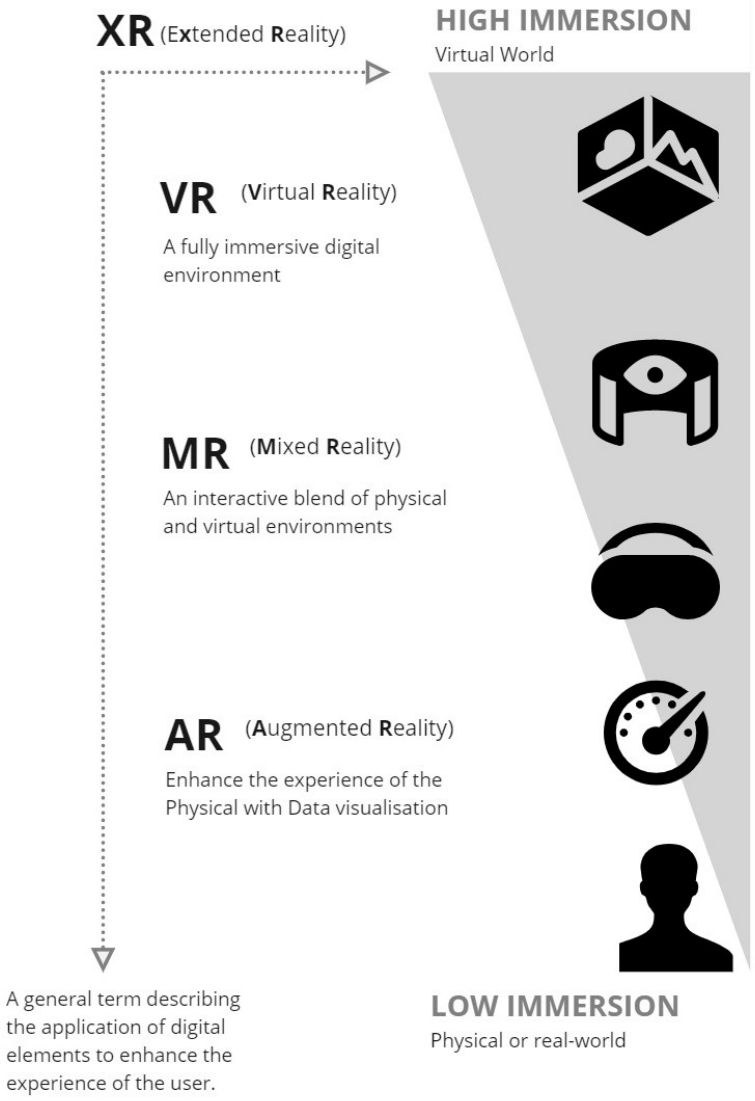
Jeevan Namboodiri
Lead Consultant – 5G SME

11th January 2023



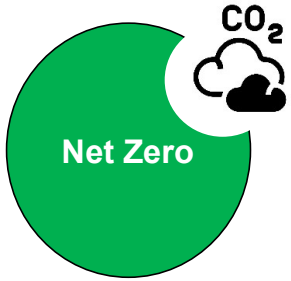
What is the Metaverse?

- The Metaverse is a continuum of technologies that bridge the gap between physical and virtual worlds and create an immersive experience for the user.
- E**x**tended **R**eality (XR) is the collective term and ranges from something as mundane as the use of Google maps (a real-time data overlay to provide an enhanced travel experience) at the left end of the scale to complex, persistent virtual worlds with full 3D and haptic feedback at the far right.
- These and their relationship to each other is outlined in the diagram shown.

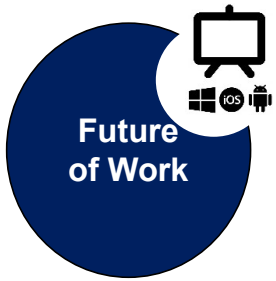


Post Pandemic – Impact & Trends

- Increase in costs
- Affordability and reduced spending capability
- Global Market Uncertainty



- Customer Green Agenda
- Sustainable initiatives explosion
- Workforce Management to reduce Carbon Footprint
- Smart Places and Communities



- Shift in employee ecosystem (HR disruption)
- Hybrid ways of working (Workforce disruption)
- New expectations for Customer channels
- Virtual / digital engagement

Typical Current Bandwidth Requirements

Resolution of Live streaming	Minimum Bandwidth Required
480p	3 Mbps
720p	4 Mbps
1080p	5 Mbps
4K	25 Mbps

Video Conferencing Types	Minimum Bandwidth Required
Standard VC	1 Mbps
HD VC	1.5 Mbps
HD video teleconferencing	6 Mbps

Game Types	Minimum Bandwidth Required
Game Console	3 Mbps
Multiplayer Game	4 Mbps

Bandwidth Requirements for Metaverse

Bandwidth and latency requirements for various VR technologies. The target for extreme VR asks for 1-2.35 Gb/s with 10 ms latency. Today's connectivity network must be scalable to meet these requirements to enable Extreme VR experience.

	VR Resolution	FPS	Equivalent Resolution	Maximum Throughput (Mbps)	Maximum Streaming Latency (ms)	Maximum Interactive Latency
Early VR	1K X 1K	30	240p	25	40	10
Entry VR	2K X 2K	30	SD	100	30	10
Advanced VR	4K X 4K	60	HD	400	20	10
Extreme VR	8K X 8K	120	4K	1000-2350	10	10

Source: WBA Industry report 2023

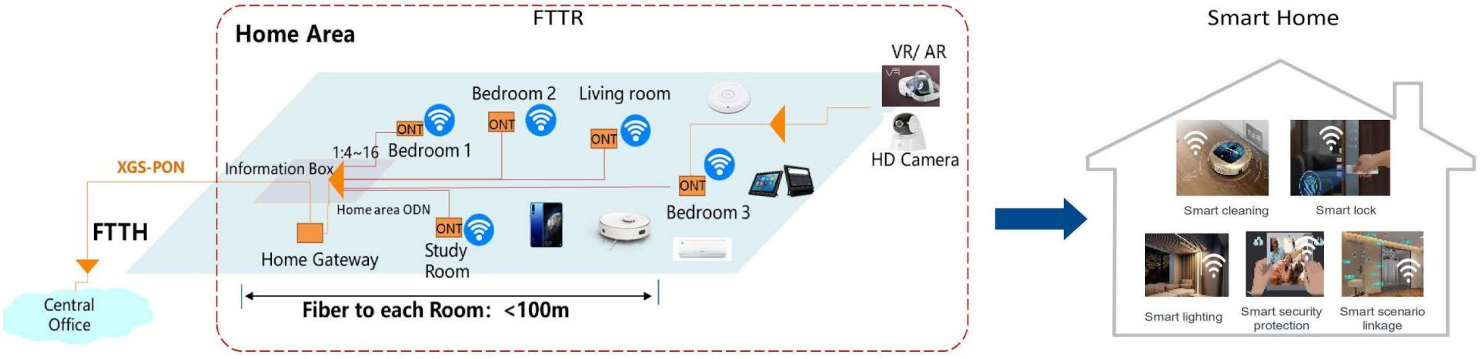
Use Case & QoE based Networks for Different Environments

1. In Urban, Dense & Business Enterprise environments

- Extending FTTH to FTTR clubbed with Wi-Fi 6 for enabling home working, enterprise office environments, high def streaming, gaming, internet access, home working etc.
- Metaverse based use cases for different applications / scenarios as a service over a network slice of the public 5G network

- Fiber on premises: future proof for bandwidth upgrade and lifetime (30years+)
- Bring Gbit/s to end-system with last few meters wireless
- Cascaded XG(S)-PONs (may upgrade with higher speed PON)
  - Shorter loop length (up to 1km) and less splitting ratio
  - Different cost structure (e.g. consumer)

- ONT: merged with WiFi for unified user experience and device compatibility
  - Lower wireless launch power, less interference, lower power
- Advanced feature:
  - Coordinative multi-AP with optimized experience through fibre (C-RAN like Wifi)
  - CPN Slicing



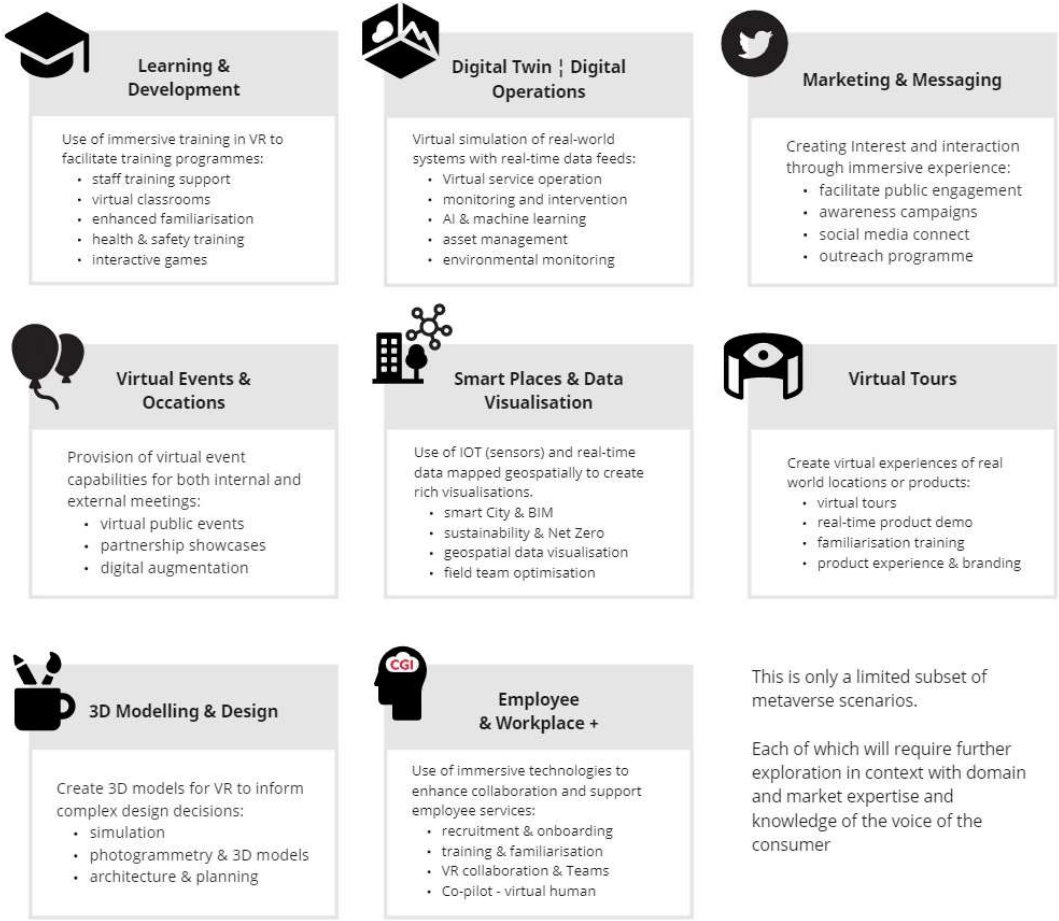
Source: Above picture from ETSI

Use Case & QoE based Networks for Different Environments

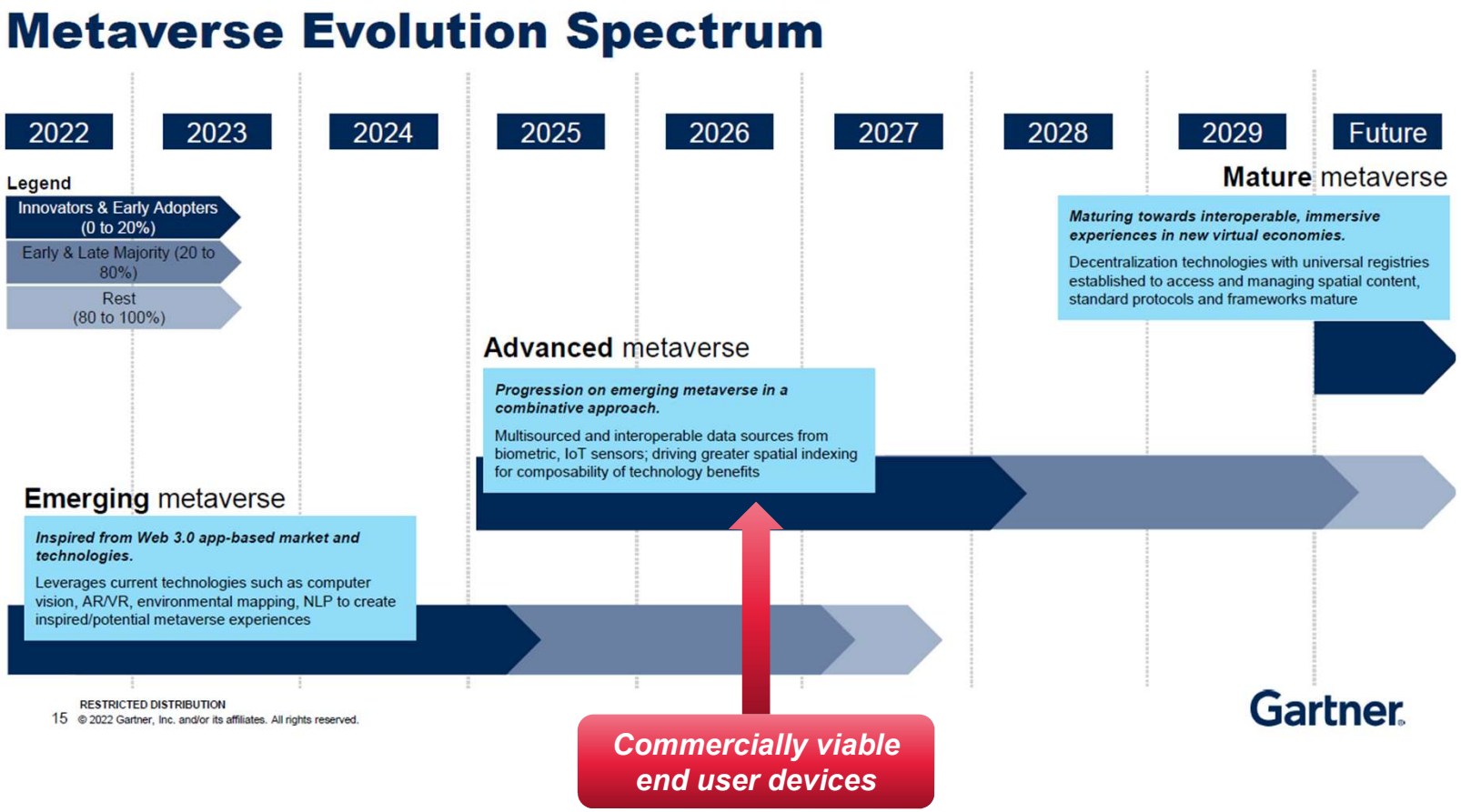
2. In Rural or Semi Rural Areas and similar environments,
   - Progressing with Gigabit broadband programme & extending terrestrial coverage
   - In addition using Satellite Comms as backhaul to enable Hybrid Networks for providing dedicated Metaverse based use cases

Metaverse Immersive Opportunities

These are few examples of use cases where an immersive experience can improve service outcomes, customer and colleague experiences.



Future Predictions of Metaverse Evolution



Moving Forward Together