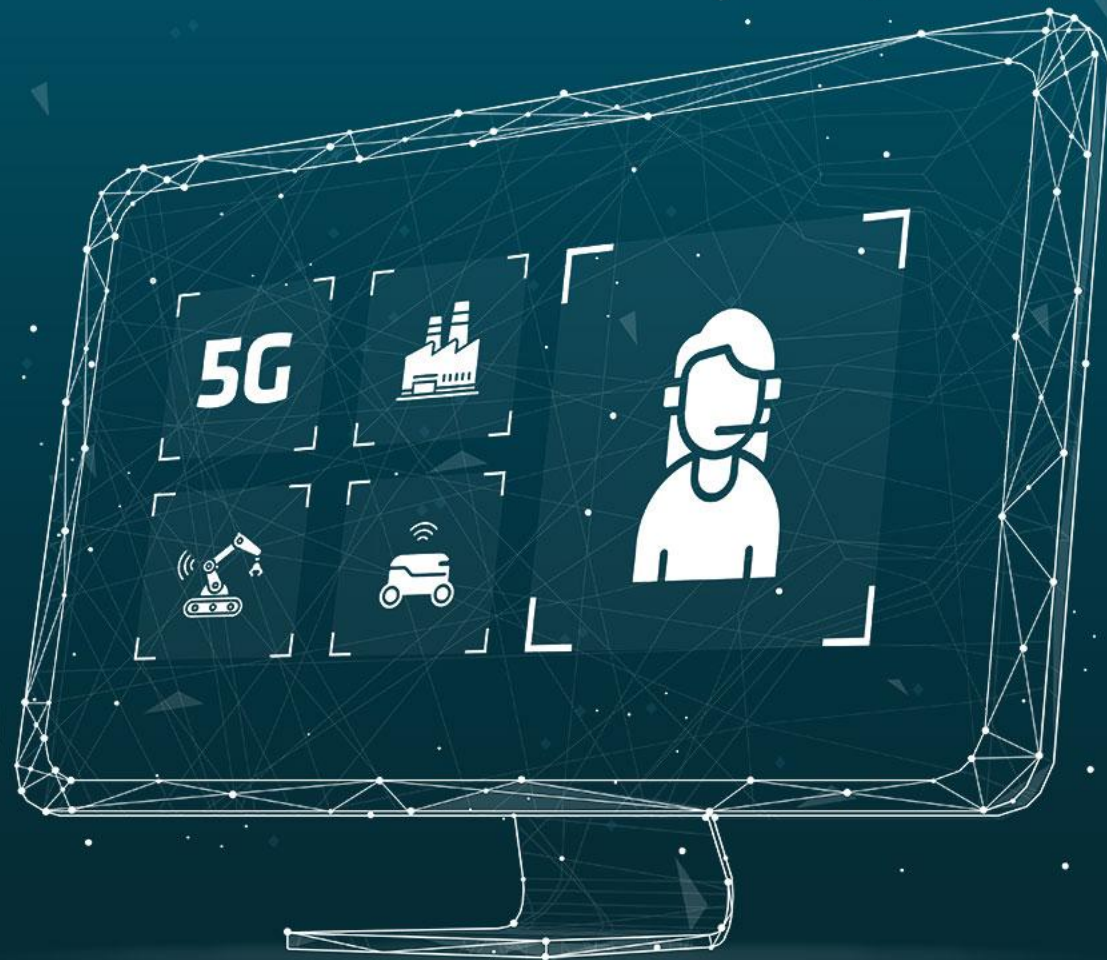


5G-ACIA Web Seminar

Industry Perspective: Future Industrial Networks and Automation

Dr. Xueli An (Huawei), 5G-ACIA WG1 Vice-Chair



Major Achievements So Far



ICT / OT Collaboration

To speak the same language



Use Cases & Requirements

What is needed / desired?



Standardization

Many key features specified



Private Networks

Addressing industrial needs



Shopfloor Integration

Interworking with TSN, OPC UA, etc.



IT Integration

Seamless integration in enterprise IT



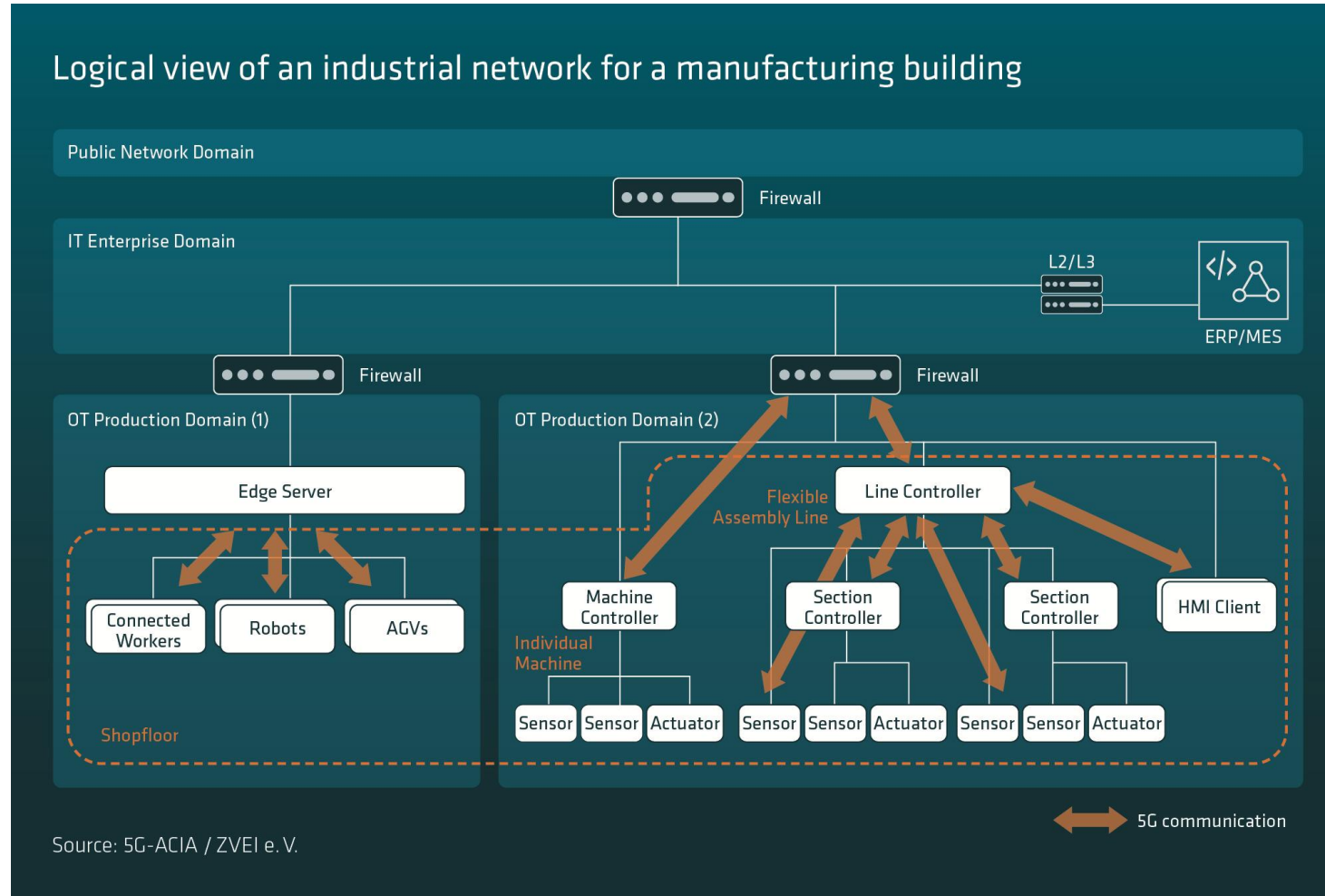
Testbeds & PoCs

Solid learnings in real-world scenarios

The Industrial 5G Ecosystem !

Industrial Network

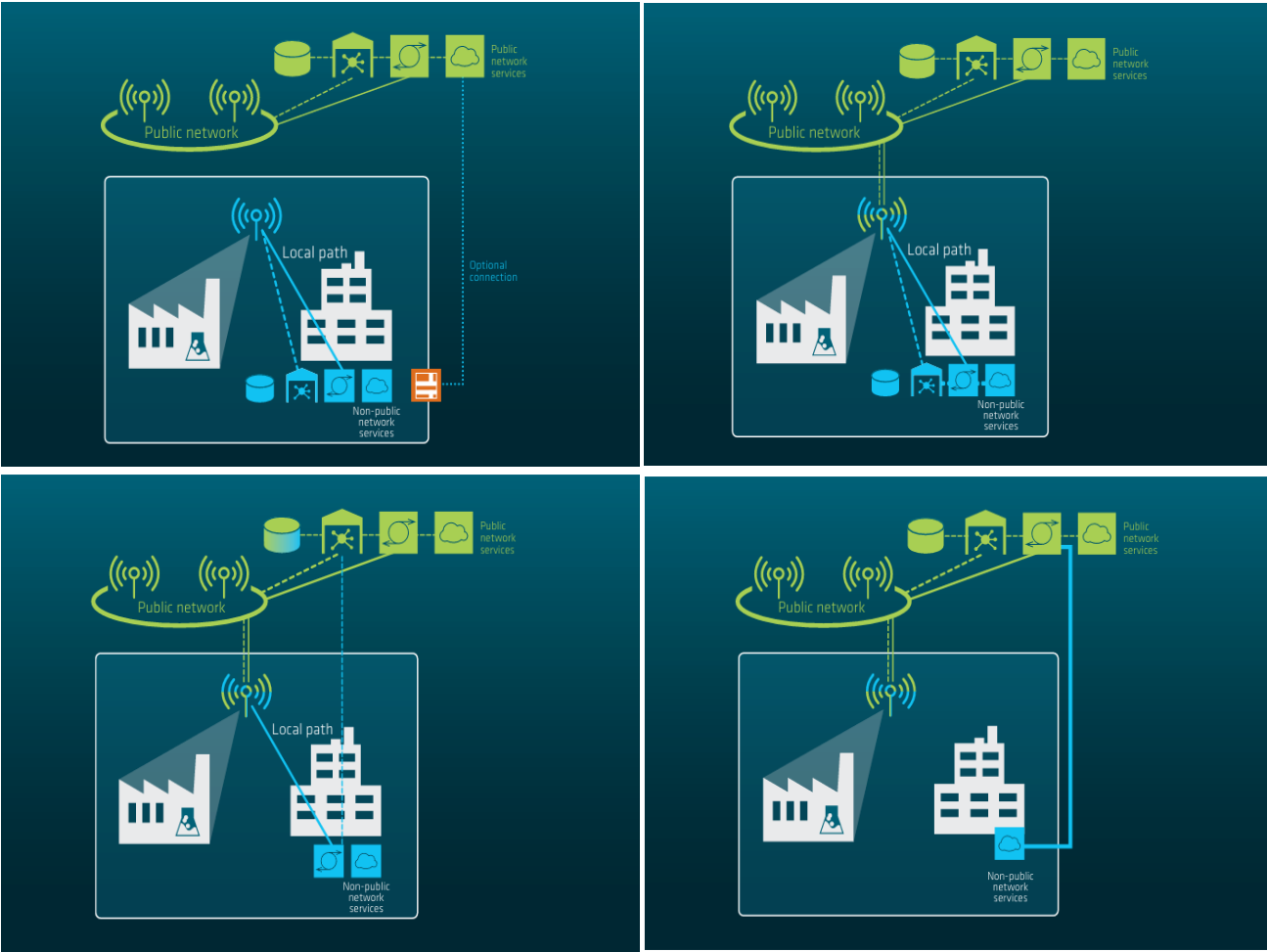
5G Communication



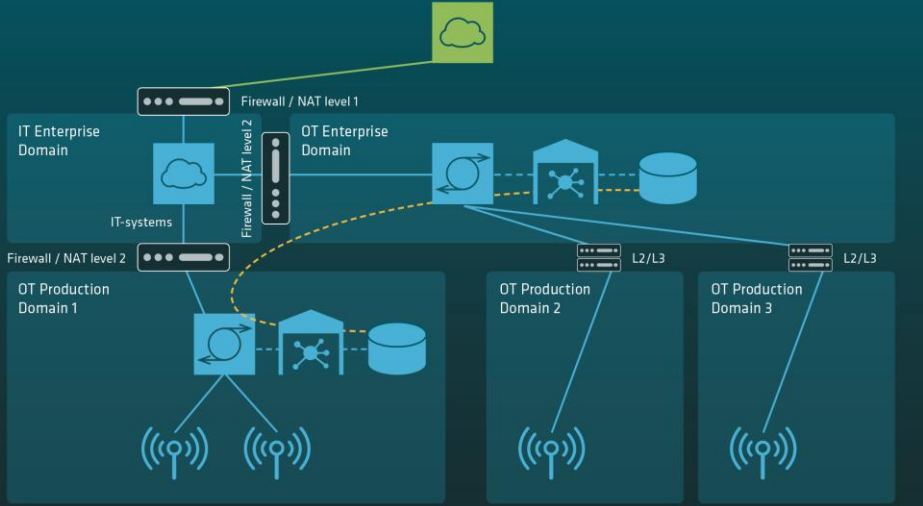
- Industrial network that consists of different domains is used in communication from the use cases
- 5G can replace wires where it makes most sense
- Combined wired and wireless network

Non Public Network (NPN)

Deployment Scenarios

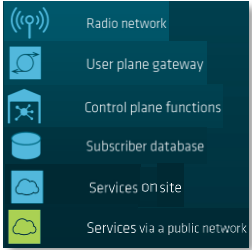


Private 5G NPN deployment: manufacturing enterprise



Source: 5G-ACIA / ZVEI e. V.

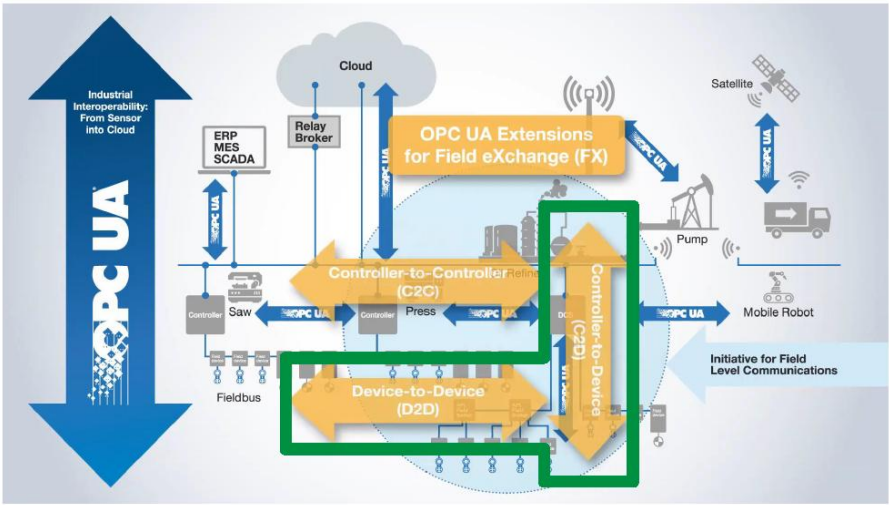
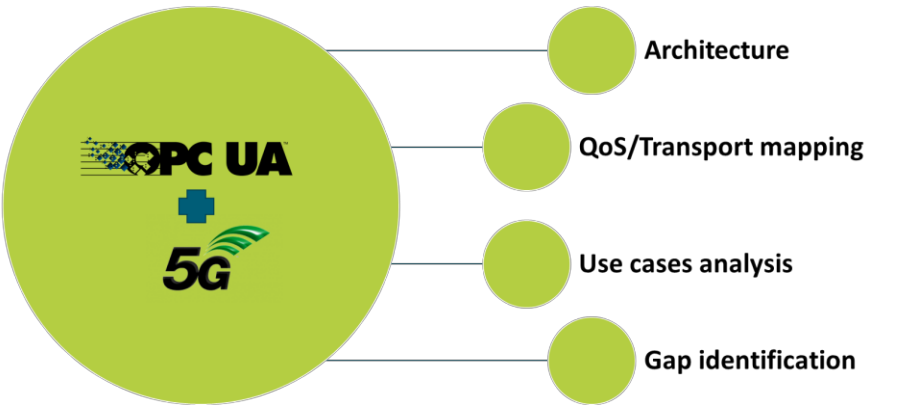
Example - on premises NPN – All of the communication happens on the site



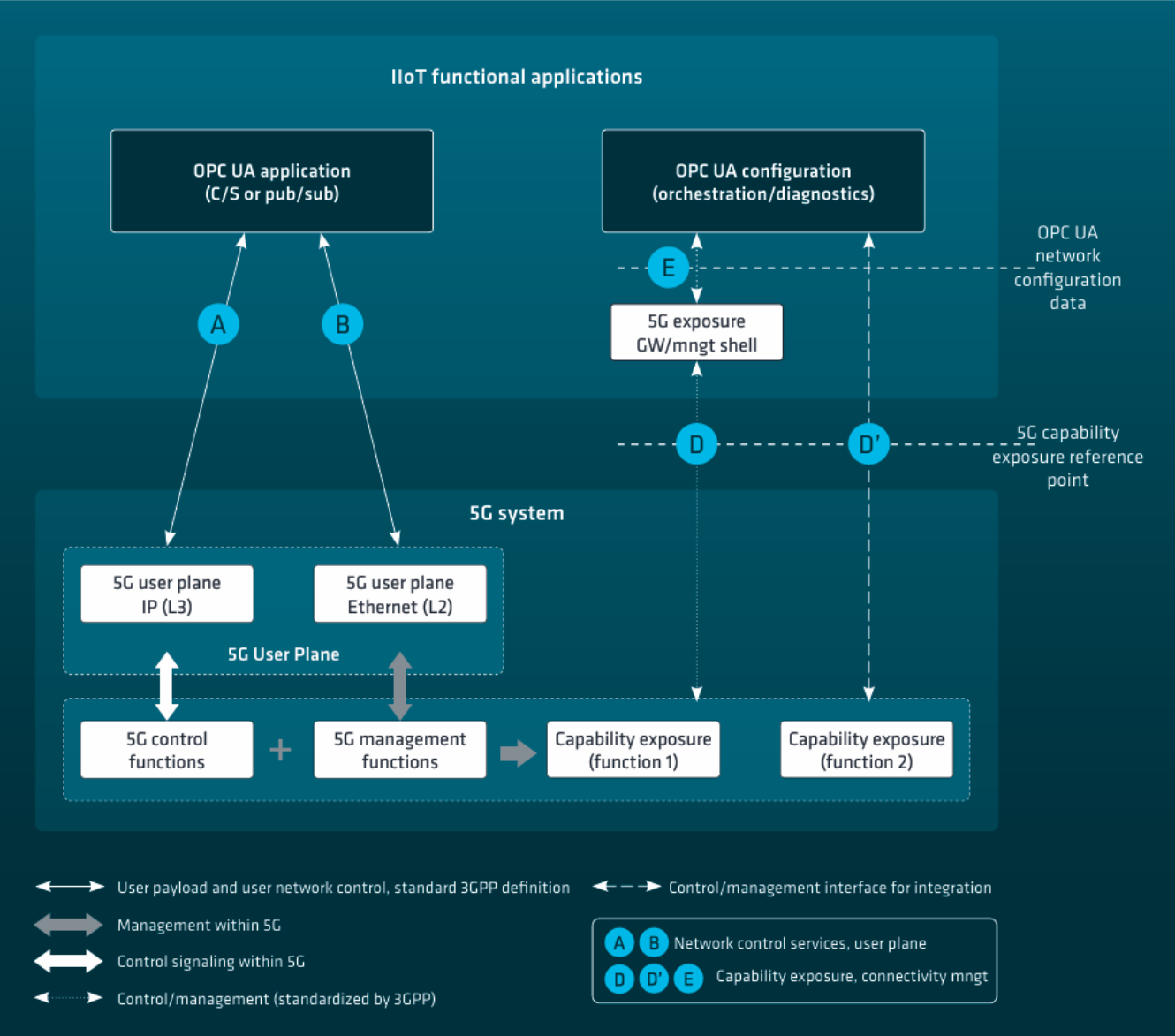
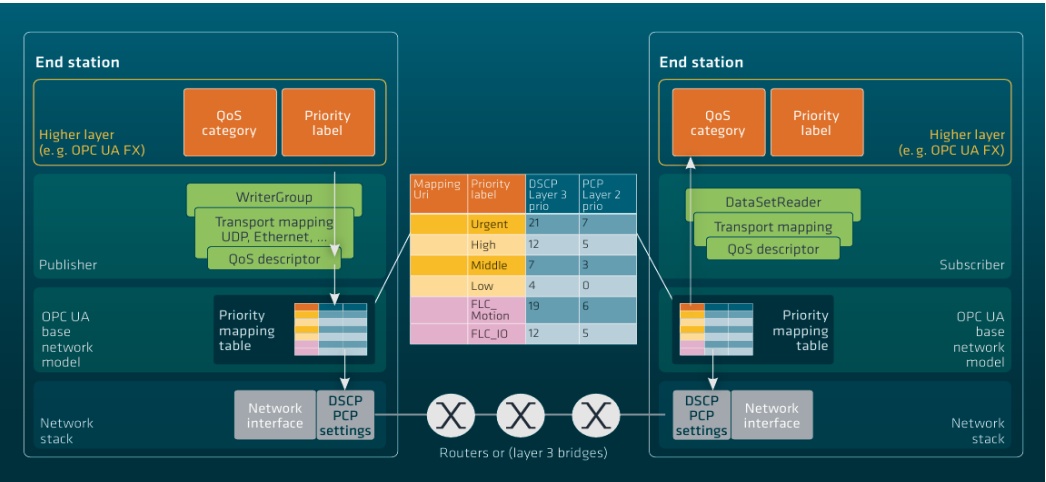
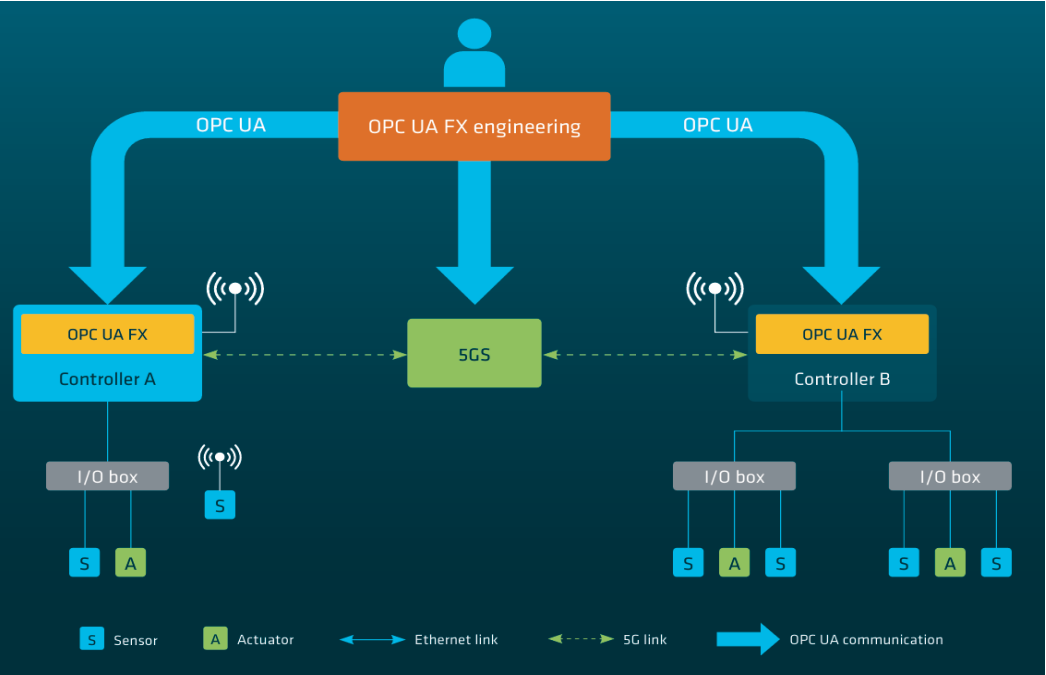
Industrial Domain & 5G integration (1/2)



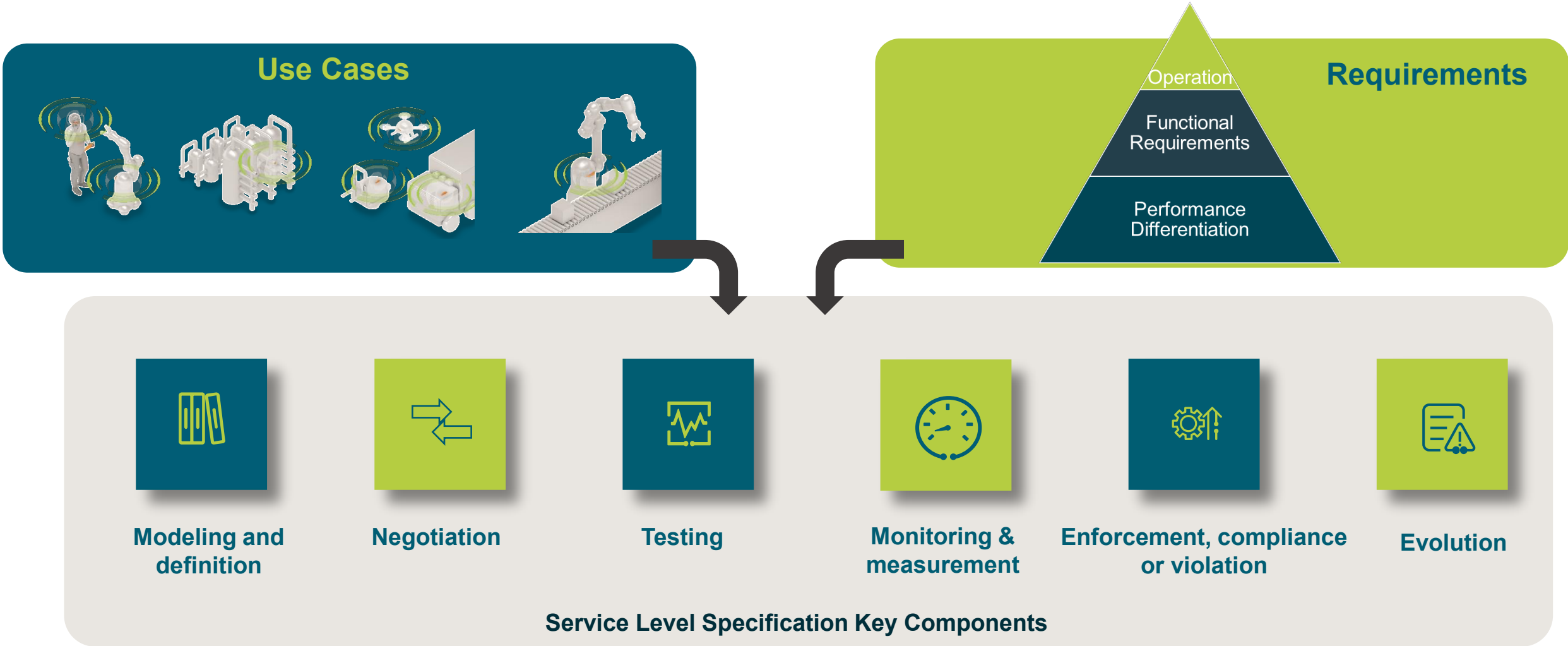
OPC UA and 5G Integration



Industrial Domain & 5G integration (2/2)



Service Level Specification



Observation

What the users/customers want?



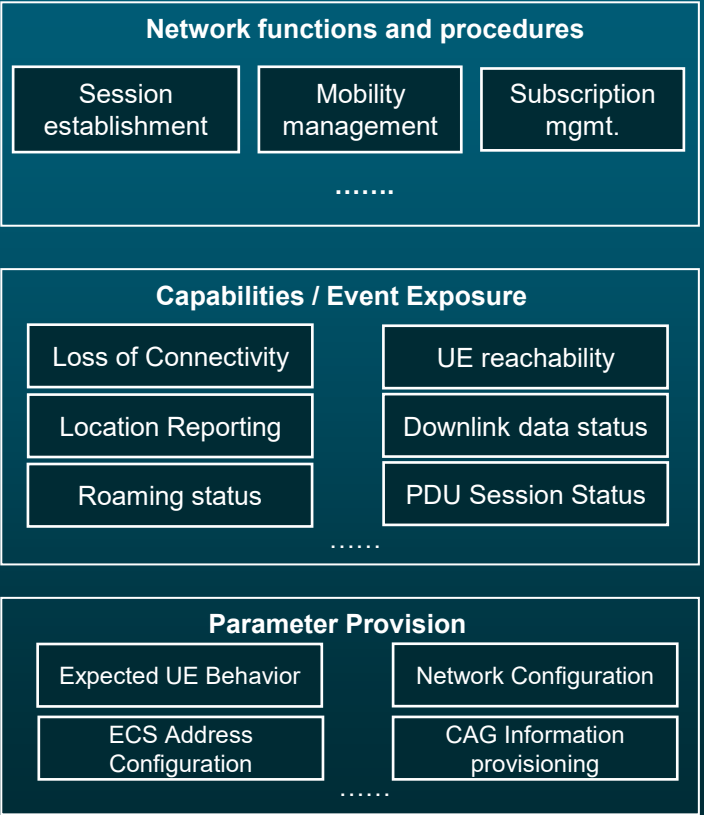
- I want to see a video stream from production line A with 4k quality.
- I want to take XR/AR training on the next 1 hour on train to plant X.
- I want to remote control the robot in my office to click button Y.
- I want to setup a network for a customized production line D which will only run from Oct 1-7.
-

New requirements, applications and terminals are emerging.

Gaps

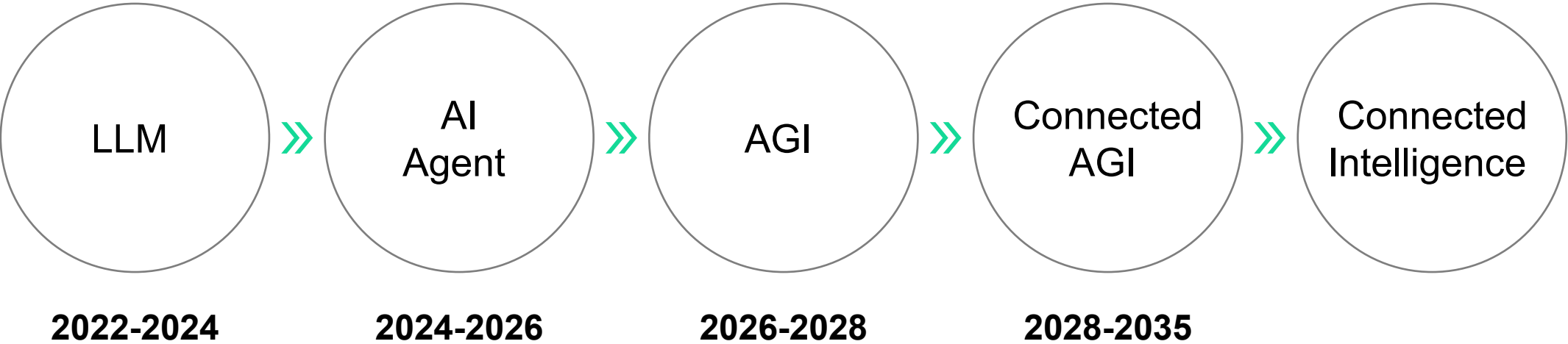
It is challenging for verticals to be aware, understand and use such 3GPP capabilities.

What defined in 3GPP



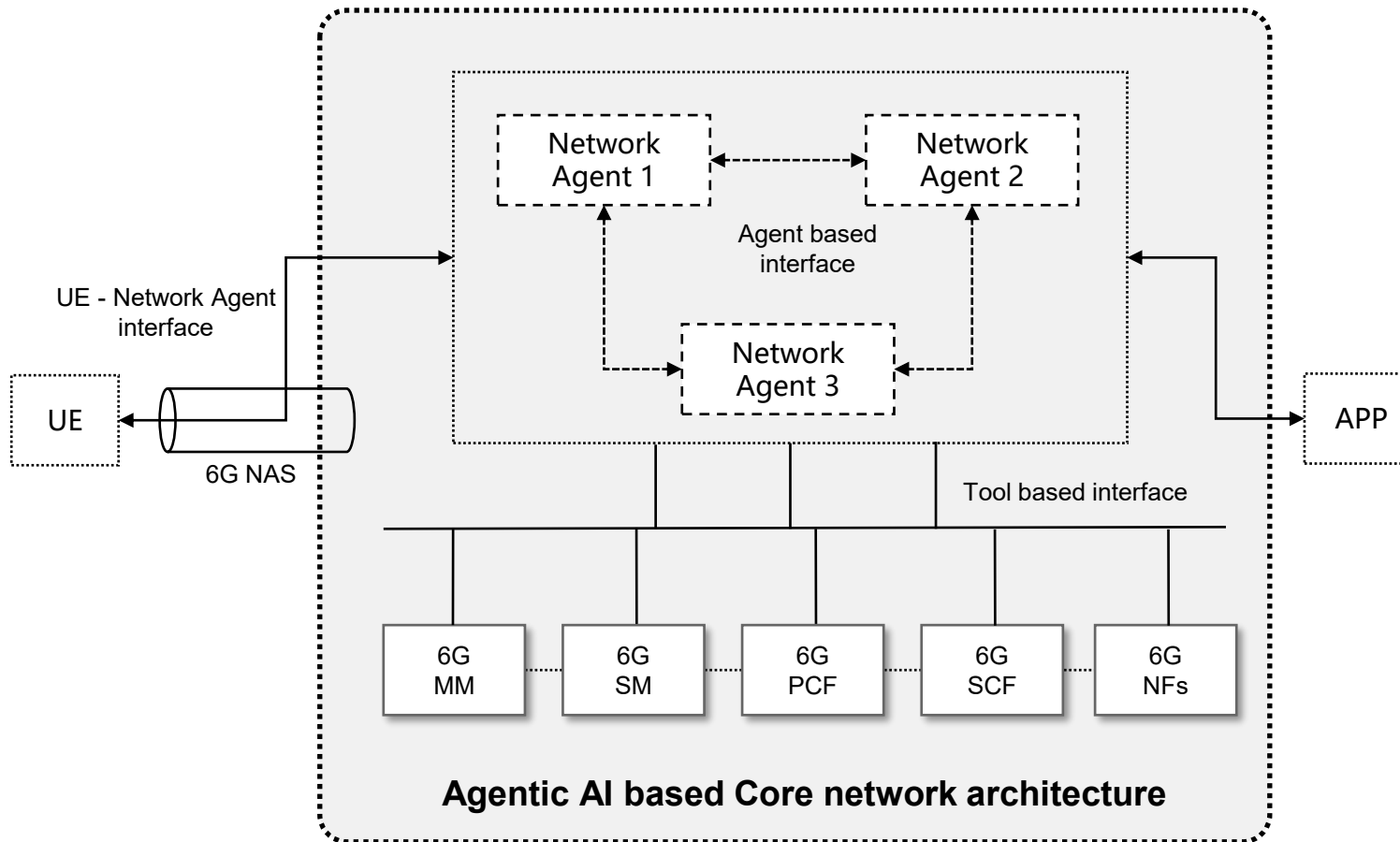
More features for each release to be added in 3GPP.

AI-led Path to 6G



6G Agentic AI based Network Architecture

Proposal for Ongoing 3GPP SA2 Discussion



Function:

- Define necessary AI Agents in core network
- Define common components used by AI Agents, e.g. Tools, Data management

Interface:

- Define agent-based interfaces among AI Agents (e.g. 3GPP defined A2A interfaces)
- Define interfaces between AI Agents and tools (e.g. 3GPP defined MCP interfaces)
- Define interface between AI Agents and UE (e.g. 3GPP NAS for agent interaction)

Protocol:

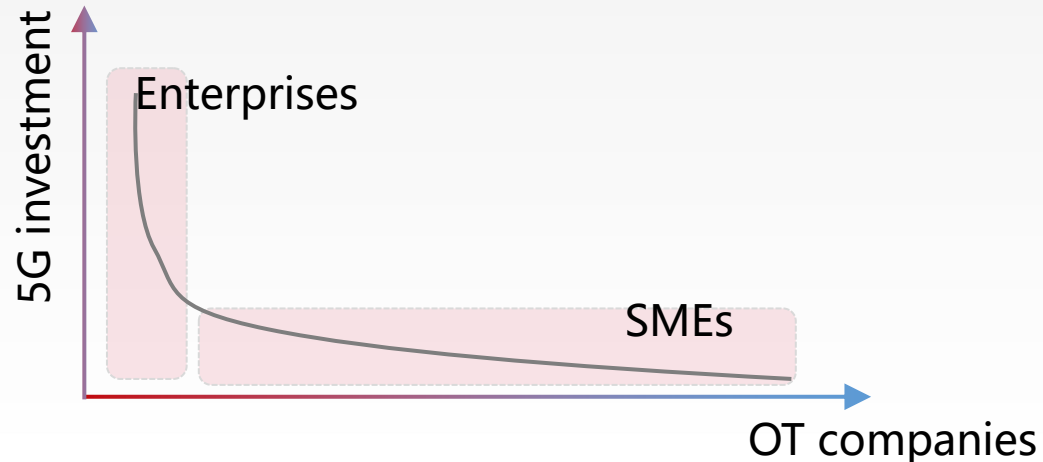
- Support new protocols, e.g. http 3.0, JSON-RPC 2.0, among AI Agents and tools

Co-creation of Network and Vertical Services

Why AI-Native 6G is relevant to verticals?

6G shall address Industrial 5G challenges:

- (1) Long tail effect
- (2) Highly customized requirements
- (3) Integration complexity even with network exposure capability
- (4) ...



- 1) Easy industry domain integration – Provide Seamless integration and native support of Industrial Communication Domains in NPN.
- 2) Intent based approach to resolve ultimate customization dilemma.
- 3) True zero touch: run time operation and monitoring, closed loop control and optimization



Flexible Modular Assembly Area
Communication of mobile assets (AGVs, mobile robots, ...)



Industrial Automation
Wireless communication between PLCs and devices



Industry 4.0: Flexible Manufacturing
Dynamically configured production processes, mobility

The Industrial 5G Hype Cycle



From Theory to Practice

- 1** Significant adoption of private 5G for addressing coverage challenge already today (e.g., mining, ports, chem. plants)
- 2** Increasing availability of IIoT features
- 3** Increasing device ecosystem available, targeting particularly at industrial users
- 4** Significant activities of many industry leaders ongoing, esp. in areas such as car or aircraft manufacturing
- 5** Significant momentum and investments all around the world, incl. in the US, Japan, China and Korea

 **Industrial 5G is coming later than originally expected, but it is coming!**