

White paper 5G and Factory-of-the-Future

The trends of servitization and global value chains are changing the manufacturing sector profoundly.

- 53% of manufacturers will offer connected products by 2016
- More revenue from services than from products by 2025?

•Novel data-driven production-related services:

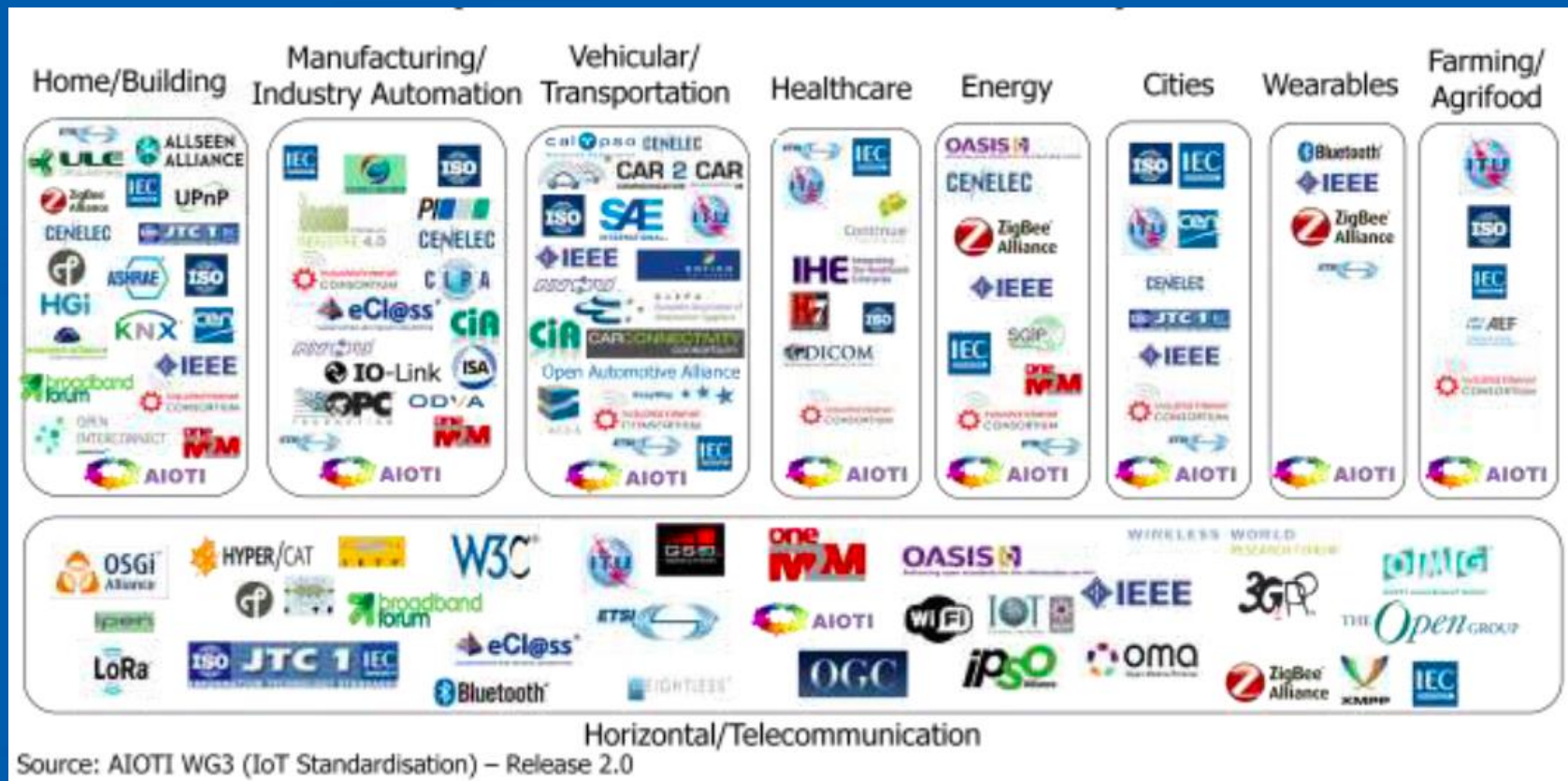
- **New roles:**
 - **Factory Network management: co-ownership, seamless connectivity**
 - **Machines / Tools “as-a-Service”**
 - **Flexible, collaborative Robotics: HR-service for robotics?**
 - **Smart clothing (e.g. gloves) supporting productivity goals**

•Novel data-driven product-related services:

- **New data-driven services to improve product design based on:**
 - **(Connected Machines) Productivity and performance**
 - **(Connected Products) Product usage data, transport data, production-data**

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IoT Standards and Associations Landscape (AIOTI)



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Process automation protocols



Industrial Communication Protocols



IEC 61158, Industrial communication networks – Fieldbus specifications

IEC 61784 Industrial communication networks – Profiles

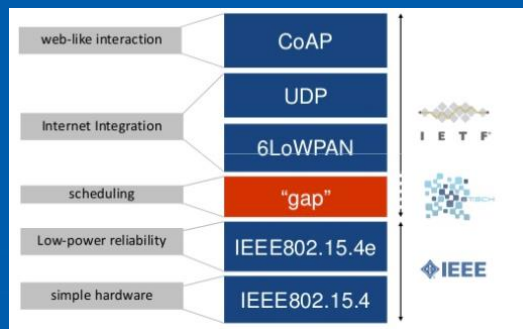
IEC 62591

IEC 62734

WirelessHART

ISA100 Wireless

IoT Protocol Stack



4G → 5G Public Cellular Networks



improved indoor coverage
support for massive number of low throughput devices
low delay sensitivity
ultra-low device cost
low device power consumption
low-cost infrastructure

NB-IOT

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Key take-aways

- New, disruptive business models expected driven by continuous connectivity
- Convergence in wireless access in FoF?
 - Factory-managed: wireless HART / ISA100.11a (IEC), ...
 - Telco-managed: 2G, 4G NB-IoT, ...

Challenge: offer “unified experience” in application layer for end-users and network administrators