NOKIA Bell Labs

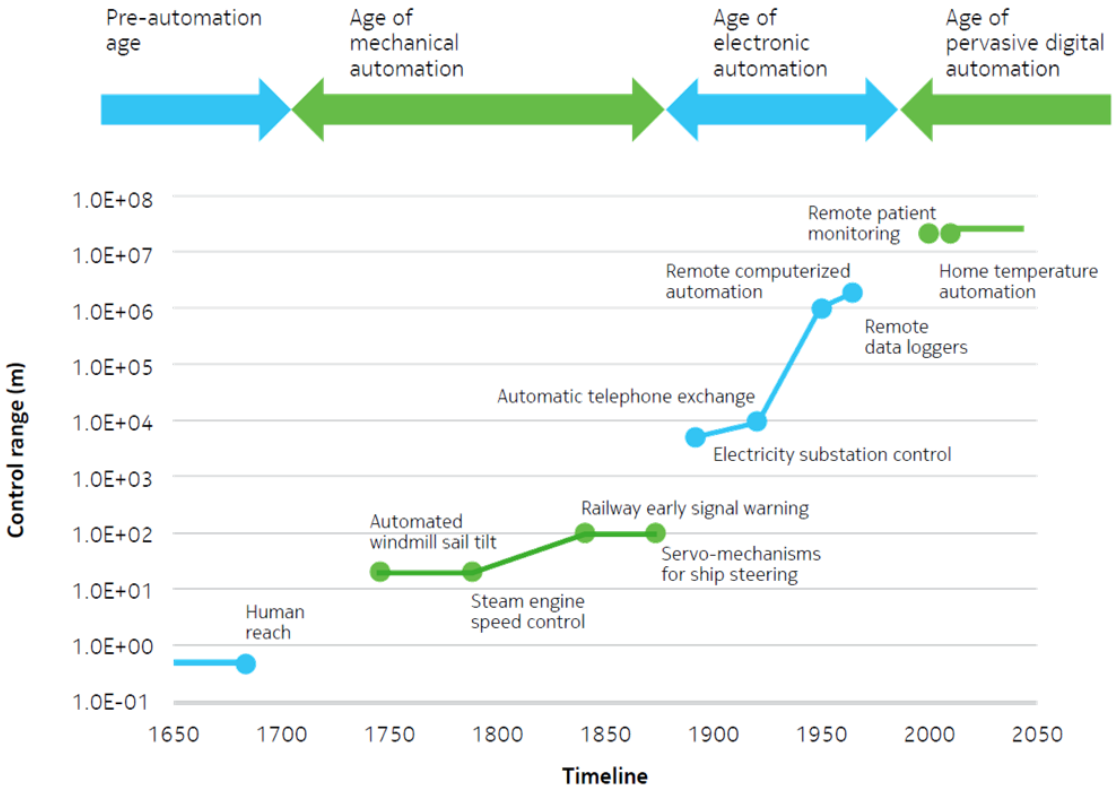
Future of IoT

The Transformation to Pervasive Digital Automation

Christele Bouchat

This presentation does not include mission critical communication

The Four Ages of Automation



We are at the threshold of a new era in automation that dwarfs the previous eras in scale, speed, reach, diversity with major impact to how we live

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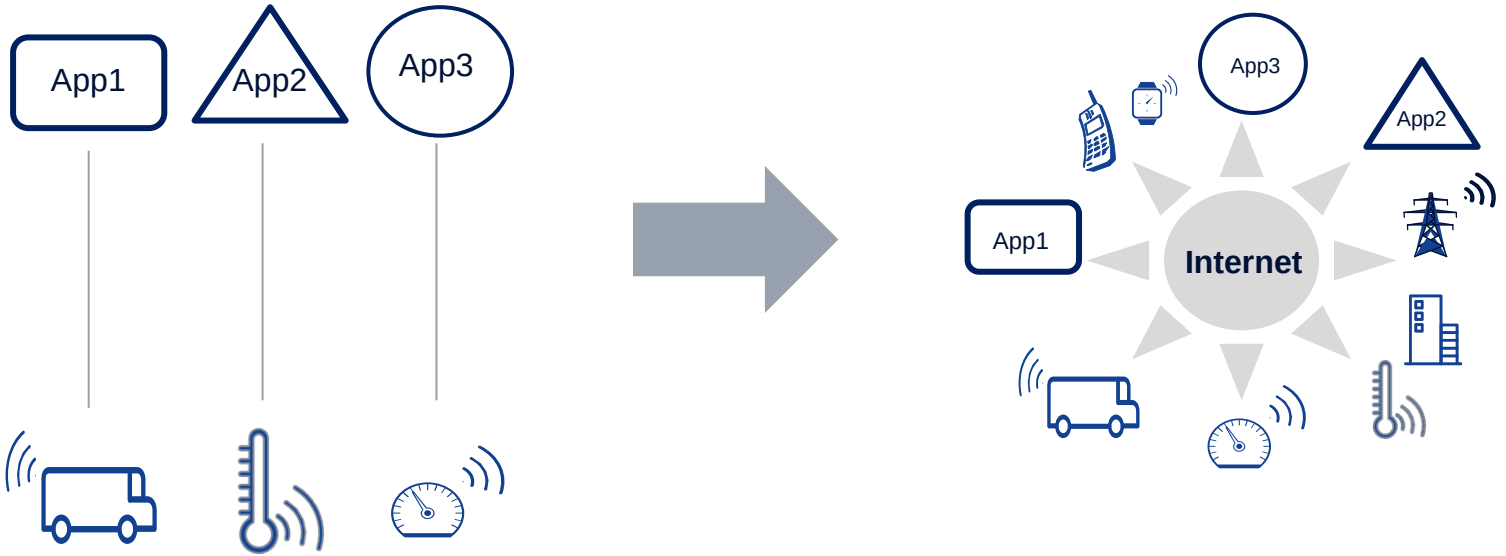
The Transformation from Point Solutions to IoT

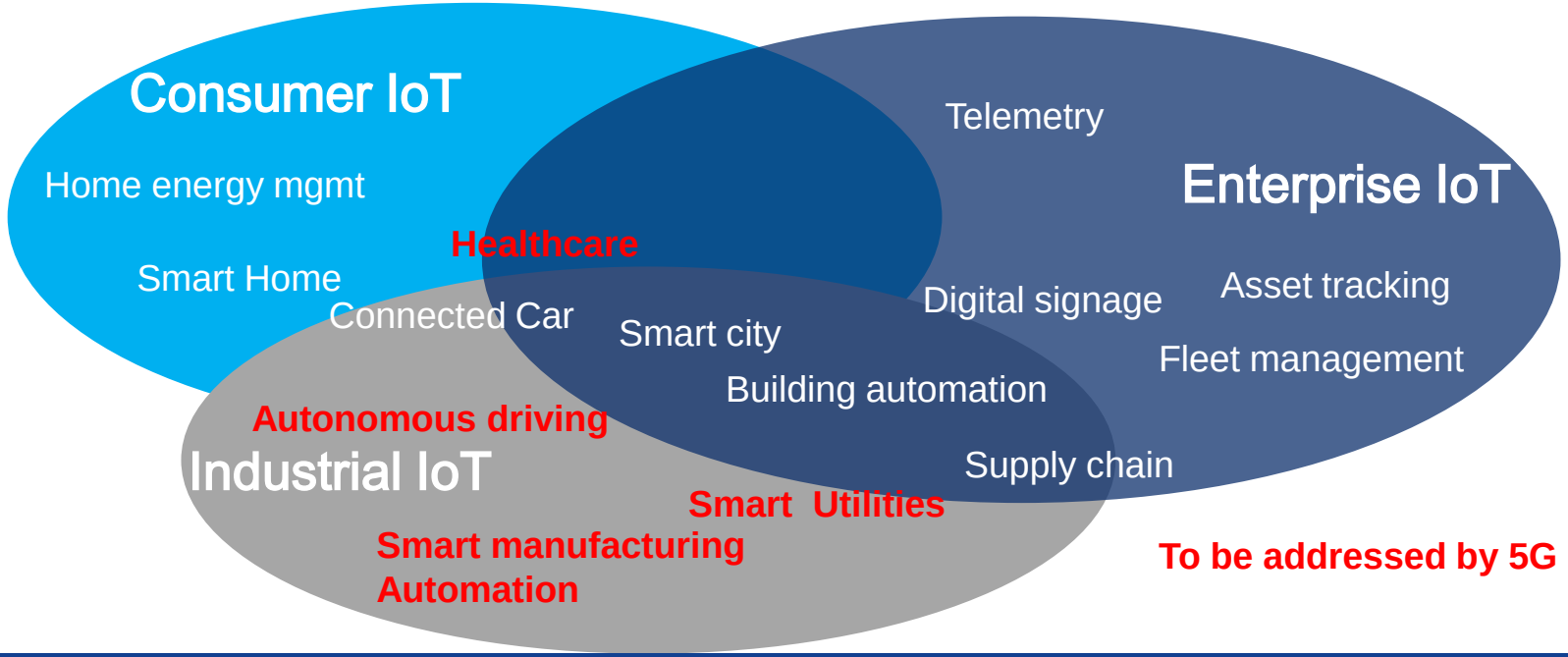
From the Intranet of Things to the Internet of Things



A shift from point to point monitoring and control solutions to a connection to the Internet is driving the large scale digitization of things

Segmentation in to Verticals

Consumer, Enterprise and Industrial IoT

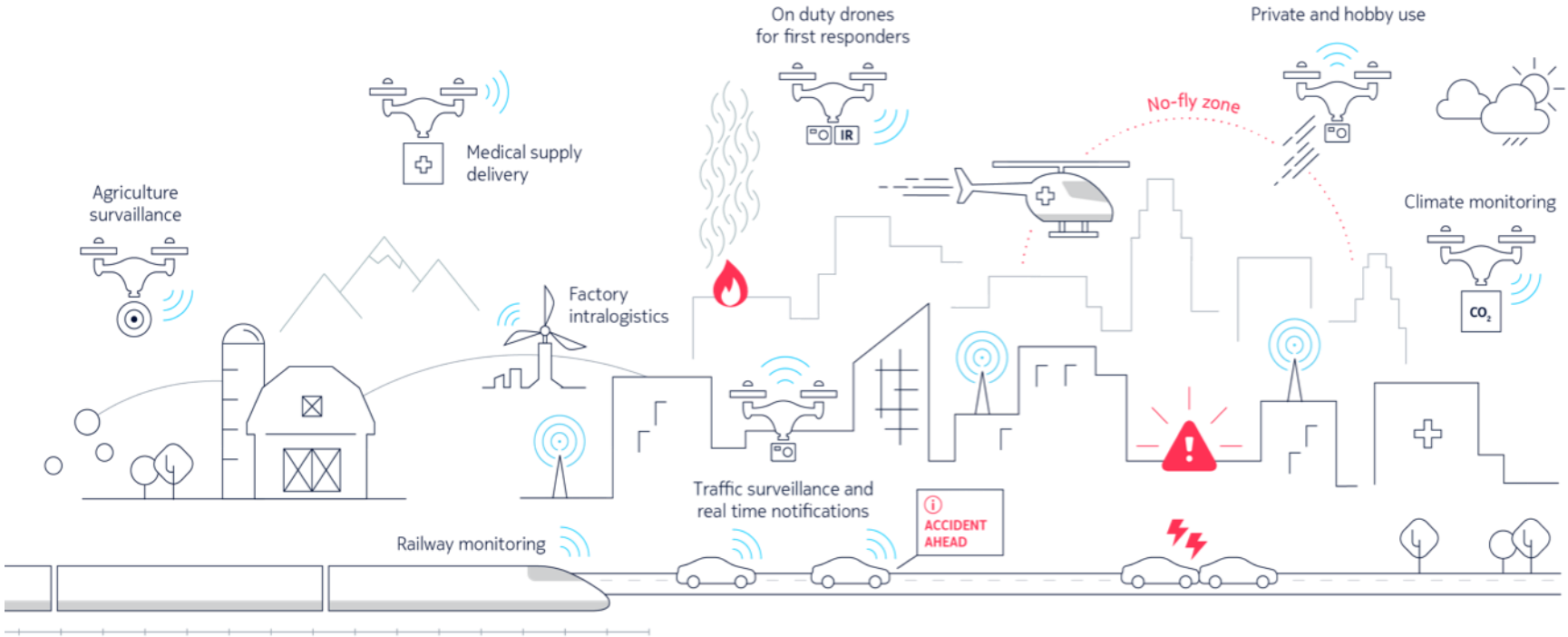


Significant variation in market penetration and growth across verticals with Industrial IoT in infancy & Consumer and Enterprise IoT accelerating

Unmanned Aerial Vehicles for Smart Solutions

With LTE: not very efficient because of interferences

5G to improve the quality of the link



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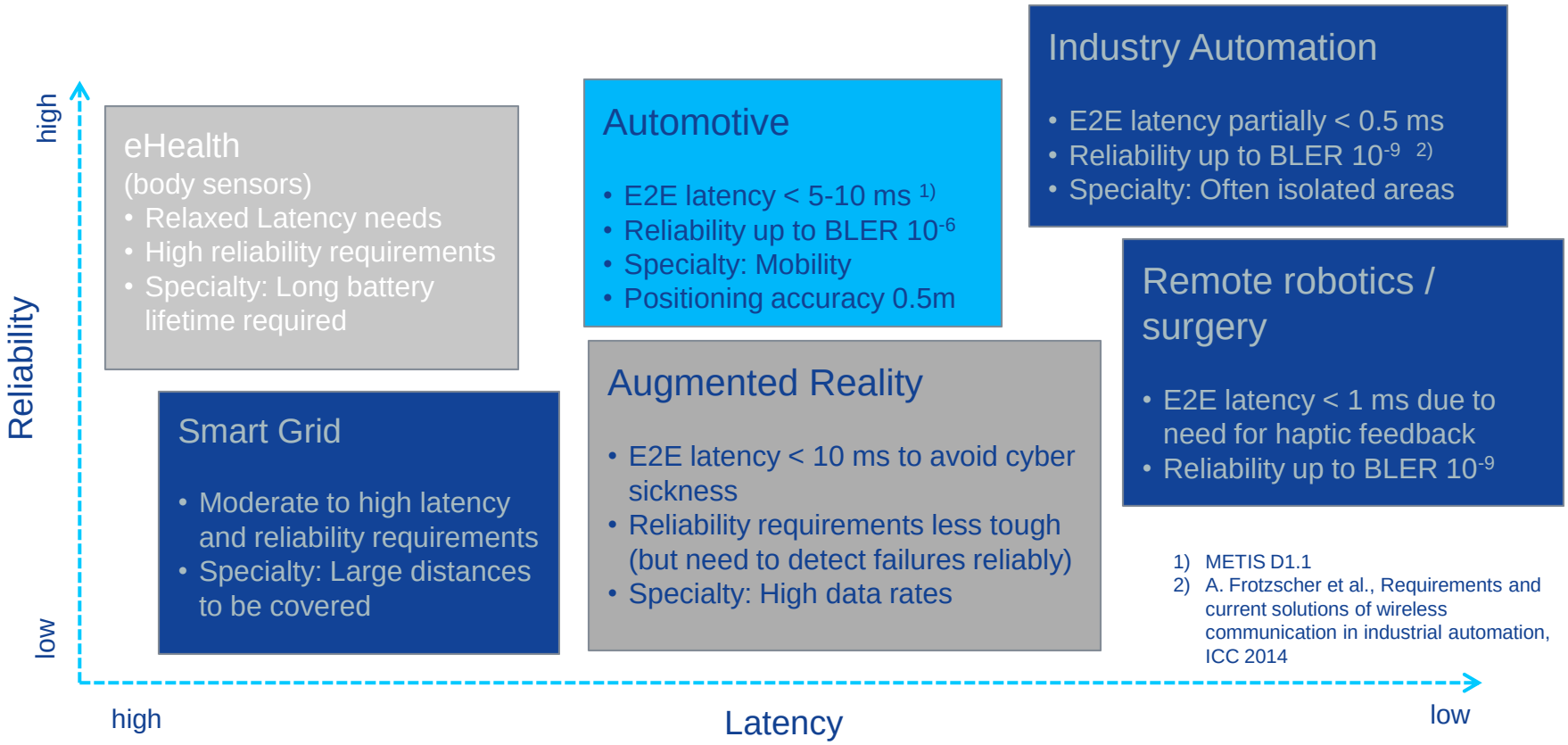
Latency and Reliability Requirements



1) METIS D1.1
2) A. Frotzscher et al., Requirements and current solutions of wireless communication in industrial automation, ICC 2014

Technologies Enabling the Pervasive Digital Automation

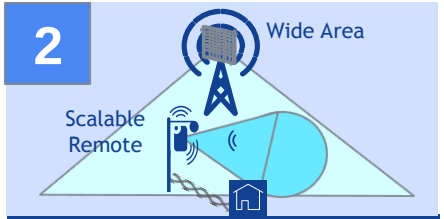
Smart Devices

1

Lost cost, energy efficient/autonomous, secure, miniaturized devices for machine connectivity

Massive Scale Connectivity

2

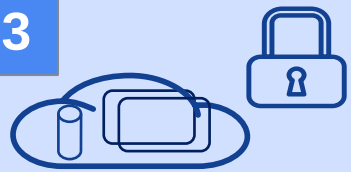


Wide area , short Range, low latency, ultra reliable, and Device to Device suitable for a broad range of applications

Secure IoT Platforms

Cloud based application enablement tools and connectivity management capabilities

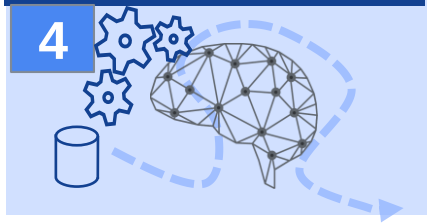
3



Intelligent IoT Analytics

Real-time predictive analytics to drive autonomous systems

4



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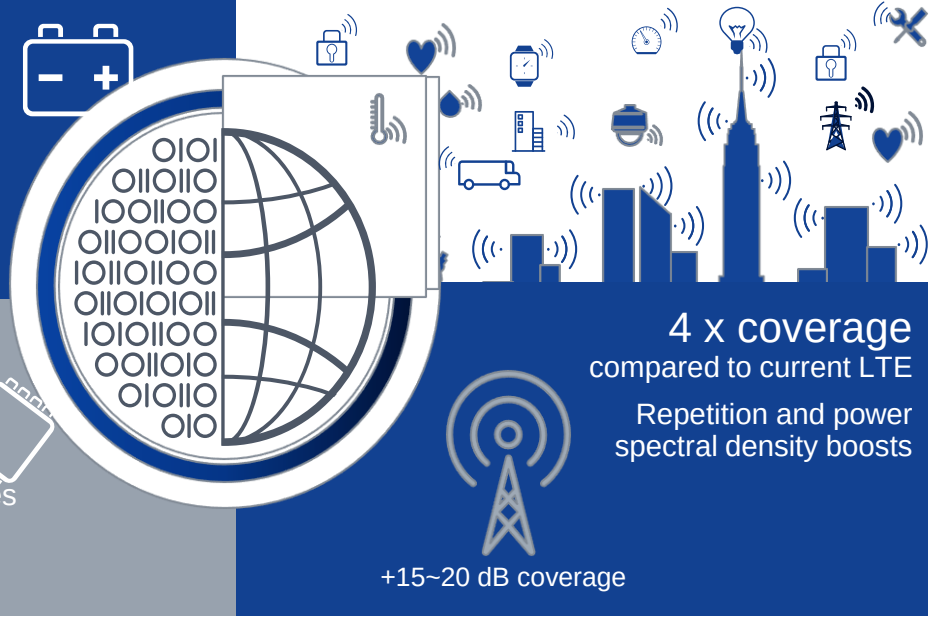
Low cost & power for massive machine type communication
3GPP LTE-M and NB-IoT

> 10 Years Battery life

Longer sleeping cycles

Less signaling for wakeup

Power save mode



Low Cost Device

Narrowband transmission

Reduced transmit power

Limited downlink transmission modes

UE processing relaxations

4 x coverage

compared to current LTE

Repetition and power spectral density boosts

+15~20 dB coverage

Standardized in 2016

In 3GPP LTE

Need to be deployed

And learned from it

IoT to be included

In latter phase of 5G

Expanding Cellular Connectivity to new IoT Application categories

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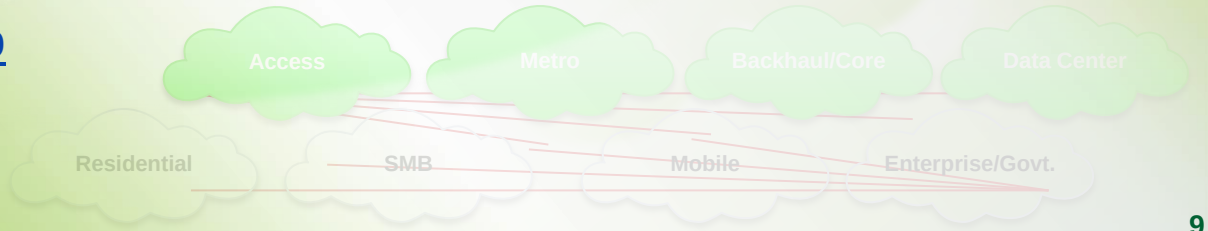
broadband forum

Open Broadband

Click here for more info



Open Broadband

Open Broadband is collaborative space for the integration and testing of new open source, standards-based and vendor provided implementations

Collaboration between Open Broadband and other industry projects

- OB-I is the infrastructure platform that will provide physical lab resources to facilitate integration, testing, etc.
  - With other organizations such as ETSI NFV ISG, ONF, IETF, etc.
  - With open source projects (OPNFV, Open-O, OCP, ONOS, OpenCORD, Open Daylight, OpenStack, etc.) will provide implementations into the Open Broadband
  - With BBF projects such as CloudCO, BBF service modeling, the virtualized broadband network, 5G services, IoT,…
- Enables testing of integration for commercial deployments and vendor provided solutions