Wireless Technologies in Industrial Automation

Core technology for advanced manufacturing
Challenge and solutions

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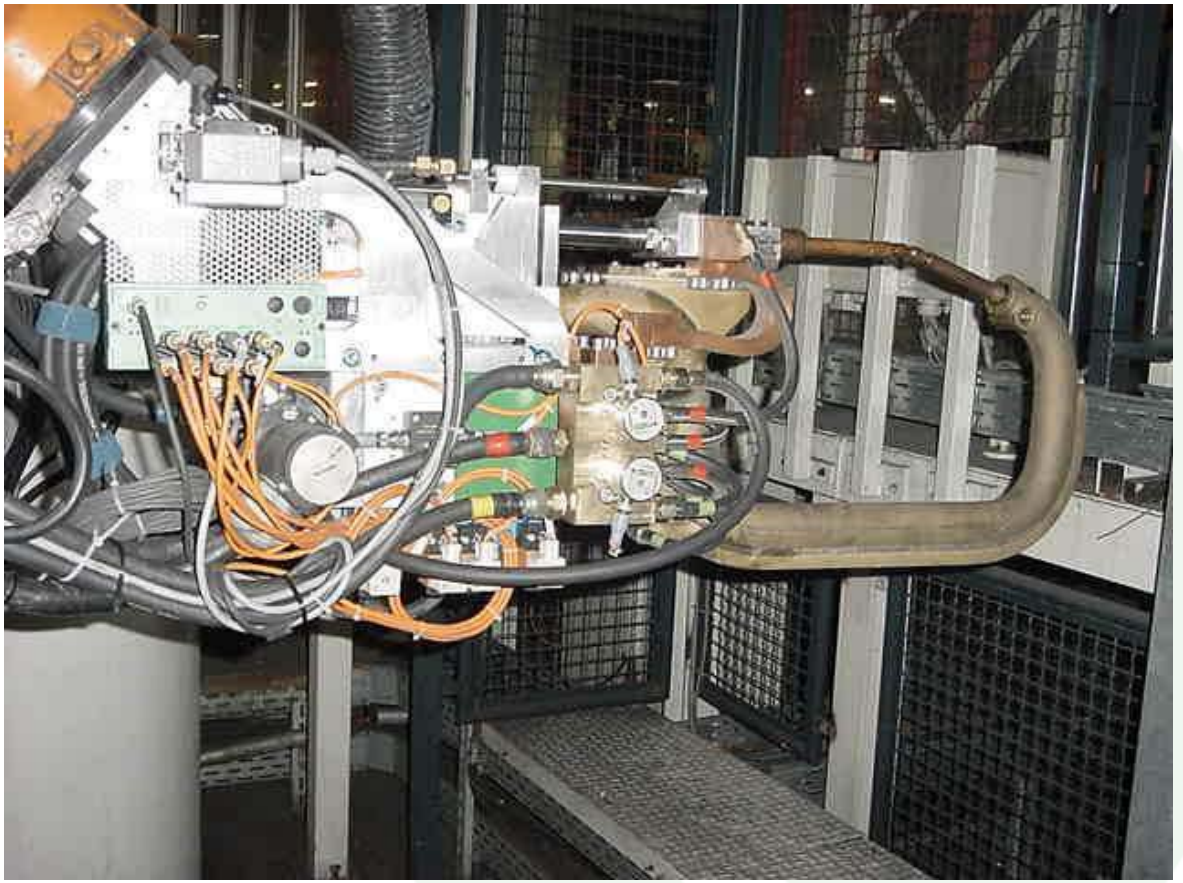
Example: Wireless technologies in the automotive industry

Welding tools that are used in car manufacturing

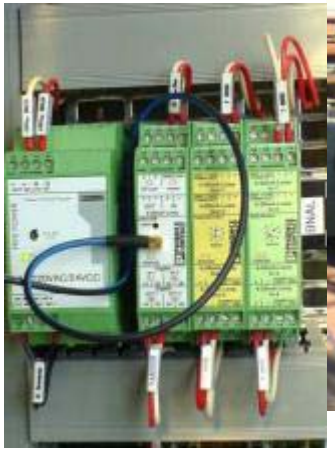


Example: Wireless technologies for logistical purposes

Autonomous vehicles

Example: Wireless technologies in the oil and gas industries

Control of flare system with lots of metal present



Example: Wireless technologies in the mining industry

Maintenance free wireless link

Plurality of Technologies in Industrial Automation

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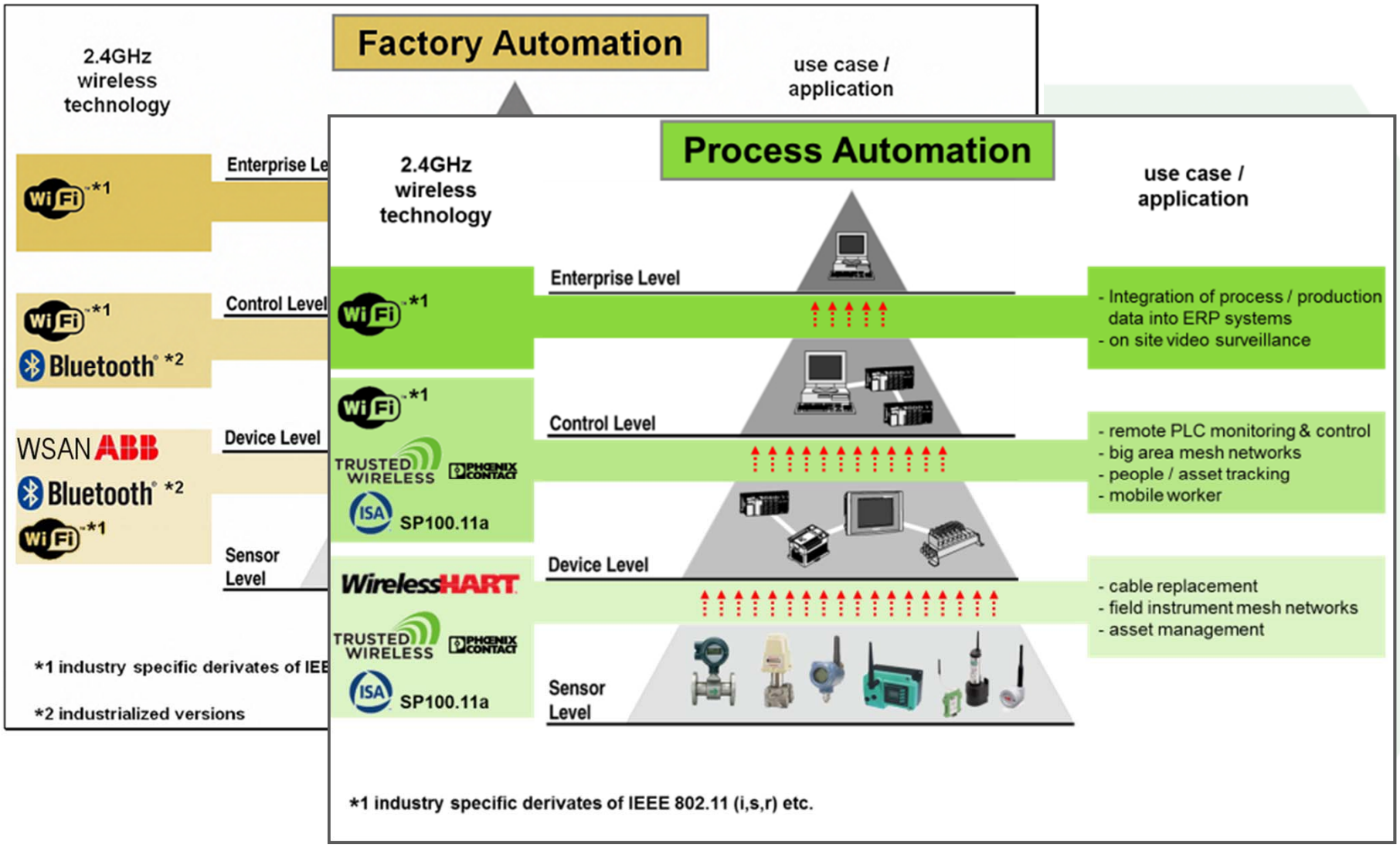

Requirements for Wireless Technologies in Industrial Automation

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Manufacturing- and Process- automation need

- Transmission distance (Extended plants and non line of sight)
- Determinism (Temporal definition)
- Short latency (Fast response)
- Robustness (Availability of the link, data integrity)
- Co-existence (Plant management)
- Energy efficiency (Battery operated devices)

Main reasons for 2.4 GHz SRD-Band

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Industrial Automation uses the licence free 2.4 GHz band because:

- It is above the range of typical electromagnetic interferences (welding processes, frequency inverters, …).
- It offers acceptable propagation characteristics regarding distances and material penetration for non line of sight links. Higher frequencies are less suitable as attenuation increases and propagation becomes quasi-optical.
- The bandwidth in combination with frequency management is sufficient.
- The band is globally established with similar regulatory details. Thus it enables competitive solutions for the international market.

Long term operational experience is available:

- Different wireless technologies in the 2.4 GHz band are operative in industrial applications for many years: coexistence difficulties have not been reported.
- Frequency planning, heat map analysis and signal strength verification are state of the art and ensure coexistence.

Latest versions of EN 300 328 and resulting problems

Revision of EN300328

- v1.8.x requires devices with more than 10mW power to automatically adapt e.g. "*listen before talk*" (LBT).
- Devices must **immediately** search any other transmission and if any are detected they must cancel their transmission need **at once**.
- This kind of adaptivity is aligned with the requirements of consumers, offices and IT applications. It does not reflect the needs of industrial automation.

Resulting problems

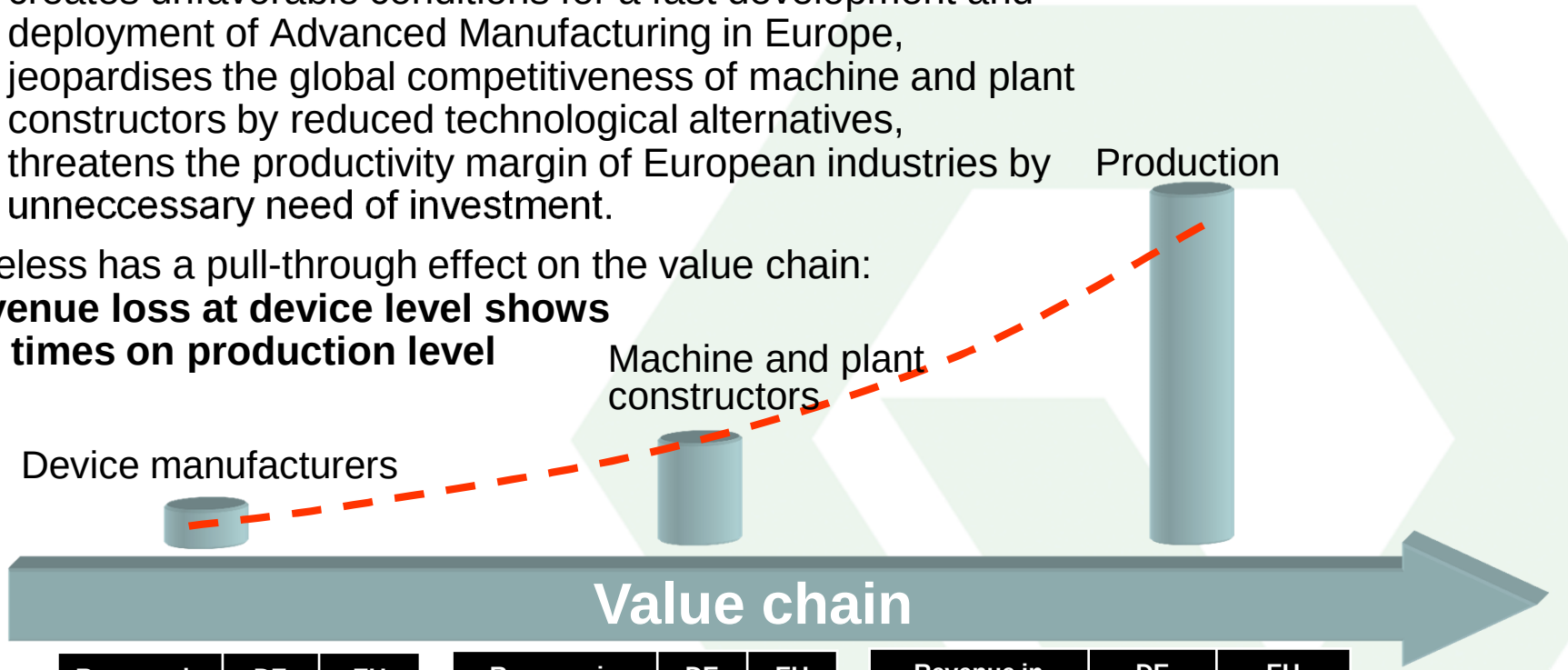
- The kind of automation mechanisms in the version v1.8.x is detrimental for determinism, latency and energy efficiency.

Economic consequences for Advanced Manufacturing

The special European path for the 2.4GHz band:

- creates unfavorable conditions for a fast development and deployment of Advanced Manufacturing in Europe,
- jeopardises the global competitiveness of machine and plant constructors by reduced technological alternatives,
- threatens the productivity margin of European industries by unneccessary need of investment.

Wireless has a pull-through effect on the value chain:
Revenue loss at device level shows 100 times on production level



Revenue in Mrd. €	DE 2012	EU 2012
Automation	38,1	96,2

Revenue in Mrd. €	DE 2012	EU 2012
Machine constr.	205	622

Revenue in Mrd. €	DE 2012	EU 2012
Processing trade	1.738	6.900
Chemical	189	520
Automotive	362	845
Electrical	167	600

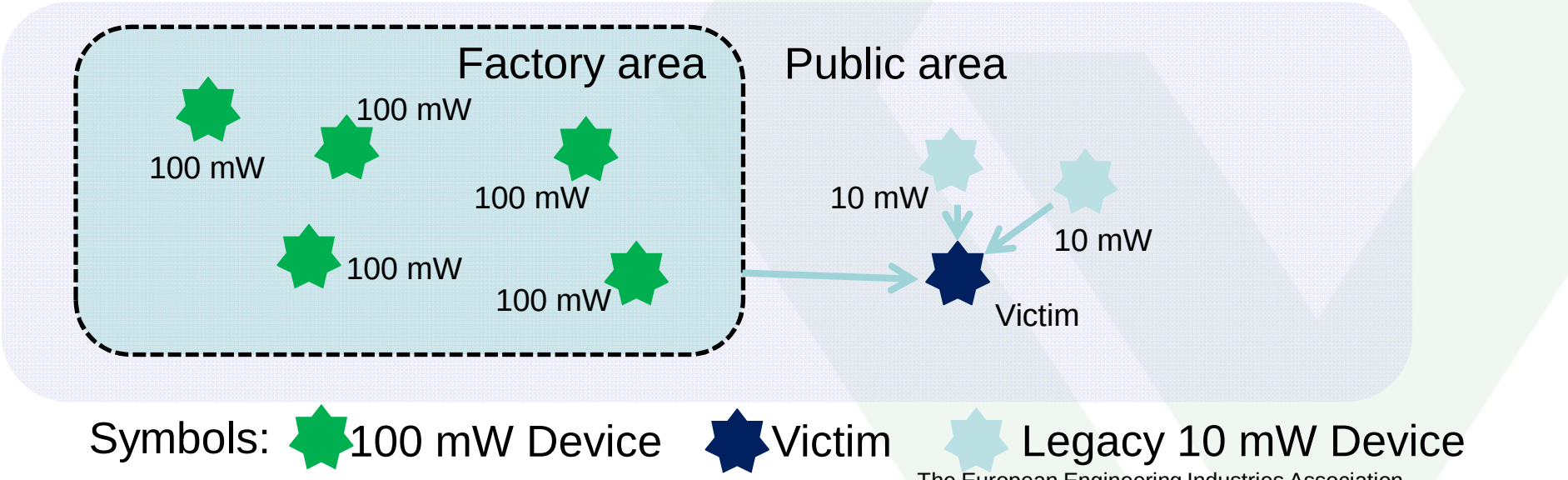
Challenge and request to the European Commission

- Shipments of wireless devices fulfilling the requirements of industrial automation must be continued beyond 2014
- A compromise is necessary
- A procedure is needed to put this compromise into effect before end of 2014

Proposed compromise

The “10 mW-Factory” compromise:

- Devices outside the factory – presumed victims - shall sense devices located inside the factory not stronger than any legacy 10mW devices in permitted short distance.
- Devices located inside the factory may be operated at 100 mW with a shared access mechanism suitable for industrial applications.



Proposed way to proceed

- European Commission to add a note in the OJEU on EN 300 328 v.1.8.1 before end 2014 to allow the application of the “10 mW-Factory” compromise.

- ETSI to be requested to integrate the compromise in the next edition of EN 300 328