INTELLIGENTE
6G SYSTEME FÜR DIE
FERTIGUNGSINDUSTRIE

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SEPTEMBER 2023
Intelligent 6G Systems for Manufacturing

Agenda
- NXP
- 6G drivers
- 6G requirements (industrial)
- 6G use cases (examples)
- 6G purposeful network
- Summary
OUR DIGITALLY ENHANCED WORLD IS EVOLVING TO ANTICIPATE AND AUTOMATE

NXP Semiconductors N.V. (NASDAQ: NXPI) enables a smarter, safer and more sustainable world through innovation. As the world leader in secure connectivity solutions for embedded applications, NXP is pushing boundaries in the automotive, industrial & IoT, mobile, and communication infrastructure markets.
A POSITION OF STRENGTH TO BETTER SERVE OUR 26,000+ CUSTOMERS

We accelerate breakthroughs that advance the world through our semiconductor technology leadership

EMPLOYEES IN

30+ COUNTRIES

Headquartered in Eindhoven, Netherlands

~34,500
TEAM MEMBERS

9,500
Patent Families

$13.21B
Annual Revenue ¹

60+
Year History

~11,000
Engineers

¹ Posted revenue for 2022 – Please refer to the Financial Information page of the Investor Relations section of our website at www.nxp.com/investor for additional information
Seamless multi-access continuity - what is available today?
INTELLIGENT 6G SYSTEMS FOR MANUFACTURING

Wikipedia:

- Intelligence
  The capacity for abstraction, logic, understanding, self-awareness, learning, emotional knowledge, reasoning, planning, creativity, critical thinking, and problem solving...

- System
  A group of interacting or interrelated elements that act according to a set of rules to form a unified whole

- Manufacturing
  Creation or production of goods with the help of equipment, labor, machines, tools and chemical or biological processing or formulation...

→ Requirements of an Intelligent 6G System for Manufacturing?
6G DRIVERS

SEAMLESS

Wireline Replacement
100 GHz-THz bands
Multi-access connectivity
Miniaturization
AI-Based Networks
Resilience
Edge computing
Carbon Neutrality
Extreme Energy Efficiency

PURPOSEFUL

Fluid Computing
Sensing and Positioning
Programmable Client
Dynamic Deployment

SUSTAINABLE
6G INDUSTRIAL REQUIREMENTS

- Ubiquitous
- Purposeful
- Context-Aware
- Intelligent
- Massive
- Compute-Aware
- High Bandwith
- Autonomous
- Resilient
- Deterministic
- Mesh
- Low latency
- Ultra-reliable
- Cognitive
- Heterogeneous

IMP LE MENTATION

- Non-Terrestrial Networks
- Non-3GPP Networks
- Public and Private
- Network Functions and Services
- Multiple Security & Trust Models
- Mega Hz to Tera Hz
- “all” Industrial Protocols
- “all” Wireless Connectivity
- …
HIGH DIVERSITY

• Wireless connectivity

- UWB
- V2X

• Main industrial protocols

- Modbus
- POWERLINK
- PROFINET
- EtherCAT
- EtherNet/IP
- SERCOS Interface
- CC-Link IE
6G IMPLEMENTATION CHALLENGE

• 6G roll-out 2030+

• Understand (industrial) use cases

• System(s) definition

• Product(s) definition
EXAMPLE 1: 6G JOINT COMMUNICATION AND SENSING IN FACTORY

- 6G JCAS – Joint Communication and Sensing
  - Communication (robot - factory environment)
  - Sensing (radar, behavioral, …)

Source: Unpacking joint communication and sensing in 6G - Ericsson
**EXAMPLE 2: INTELLIGENT REFLECTIVE SURFACES**

- IRS grid receives Rx Signals from a Line-Of-Sight Basestation
- IRS is UE position/location aware
- Smart algorithms extrapolate information from received signal
- Intelligent Surfaces generates beam & in the direction of UE
- Signal received from IRS will be near BS-LOS quality
- Independent of Operator, Bands (?)

**Use case / Applications**
- Line-of-sight
- Redundancy
- Beam Forming
- Operator Agnostic
- Signal boosting
- Secure, Anomaly Detection

**Focus / Areas of Interests**
- Processors
- ML/Crypto Accelerators
- Antenna Processors
- Beamforming
- Surfaces
- Power Management
- Re-usable/re-configurable
6G purposeful network: full dimensional coverage

Ecosystem

Seamless end-to-end service

- Sensing & actuating
- Edge processing
- RAN
- Cloud

AI-driven data processing & network management

Seamless multi-access continuity

Personal connectivity

People
INTELLIGENT 6G SYSTEMS FOR MANUFACTURING - SUMMARY

• 6G - high complexity

• Requirements 6G → requirements for Intelligent 6G Systems for Manufacturing

• Understand use cases

• Creation of purposeful systems

• Definition of 6G products
Thank you!
SECURE CONNECTIONS FOR A SMARTER WORLD