

5G Mobile Private Network @stürmsfs

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17th September 2024

The Nokia logo, consisting of the word 'NOKIA' in a white, sans-serif font, positioned inside a large white arrow shape pointing to the left.

NOKIA

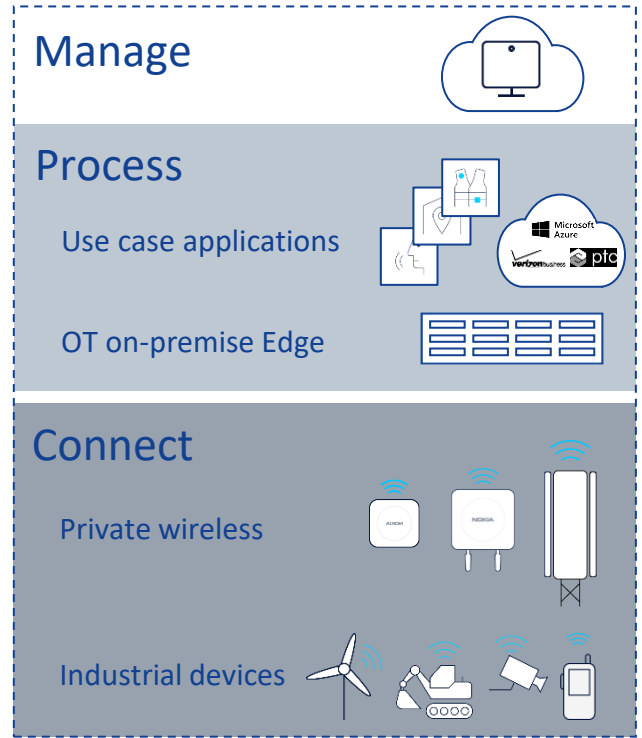
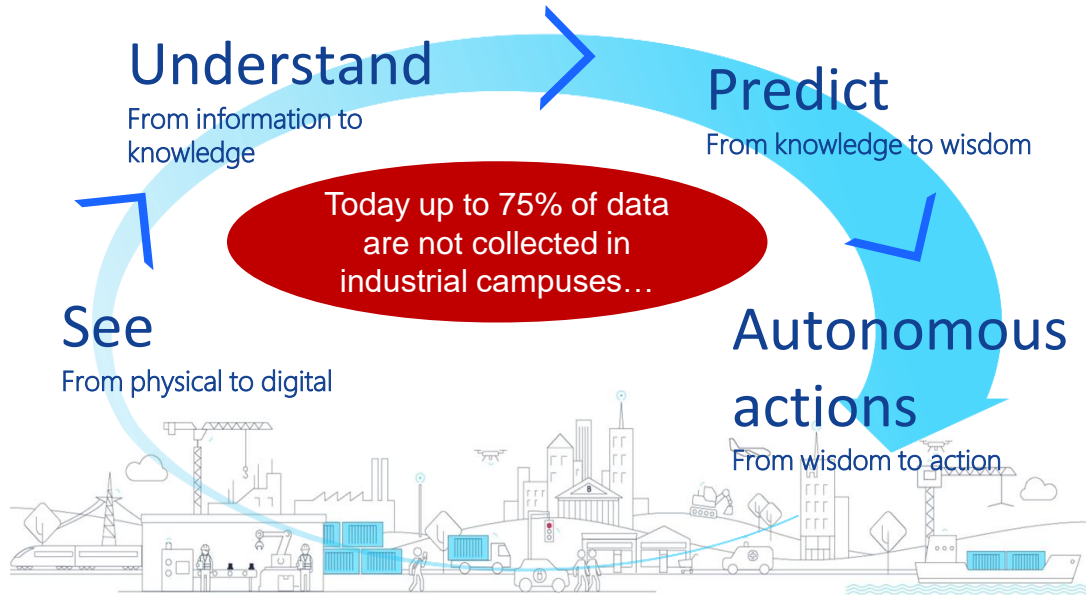
5G Mobile Private Network @ stürmsfs

stürmsfs



Why Industrial Private Wireless?

Tackling Industry 4.0 transformation steps with Nokia end-to-end Industry digitalization solution

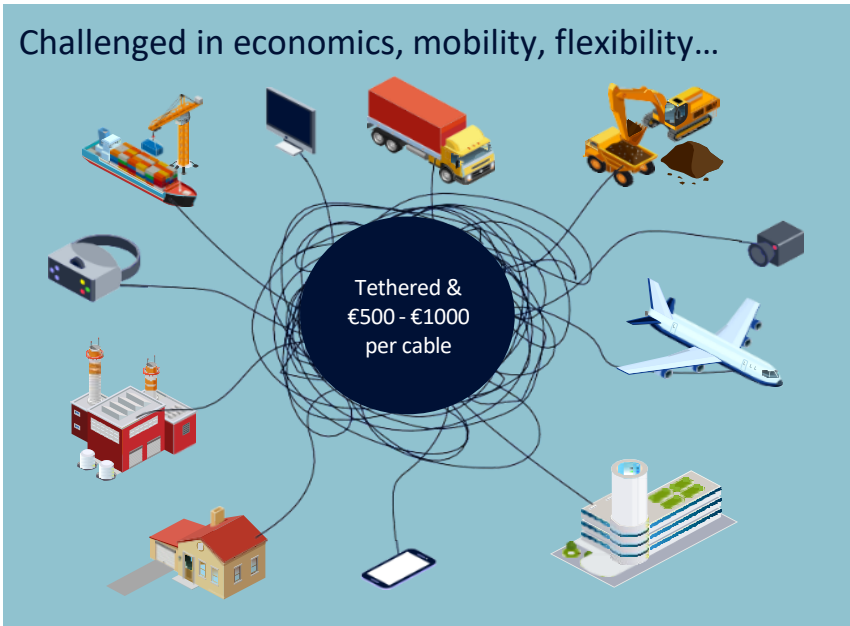


Current connectivity options are not sufficient for Industry 4.0

*“43% of European enterprises consider **network transformation to be a key challenge** [...] recognizing that **current networks cannot support the future growth** [...] in areas such as **IoT and digital transformation**”*

LAN cables & other wired technologies

Challenged in economics, mobility, flexibility...



Current wireless technologies challenges

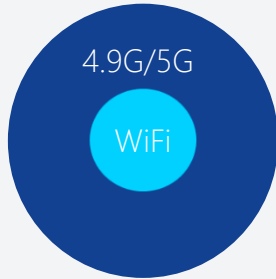
	lte 5G	P25 TETRA	WiFi 802.11 ac	WirelessHART	sigfox LoRa	
Security						
Reliability						
High data-rate / low latency						
Predictable performance						
Coverage						
LP-WAN						
Mobile						
Voice						

WiFi 6: Better capacity, latency and data rate but still IT centric...

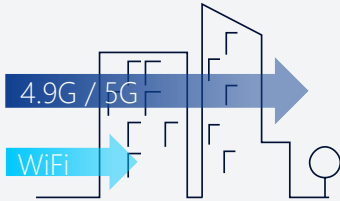
Private 4G/LTE and 5G fit for OT application requirements

Wide and deep coverage

4-100x coverage

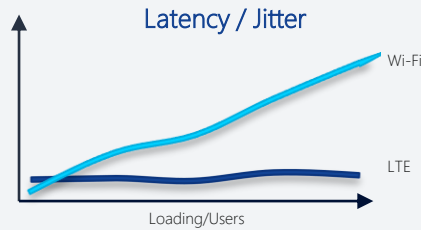


>3 extra walls of penetration

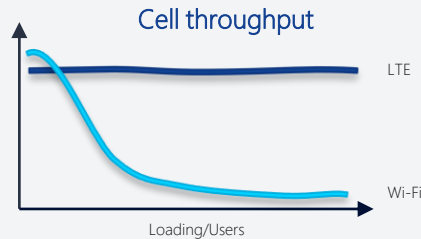


Predictable performance

Stable <15ms latency



25x multi-user capacity



Military grade security

HACKED

Wi-Fi - WPA2/3



4.9G/5G
SIM authentication
E2E encryption

One network for all apps

Wi-Fi 5/6

- Does not include IIoT LP capabilities

LTE integrates LPWAN

- Narrow band, low power applications on same radio



High speed mobility



WiFi

Up to 15 sec latency on fast hand-over

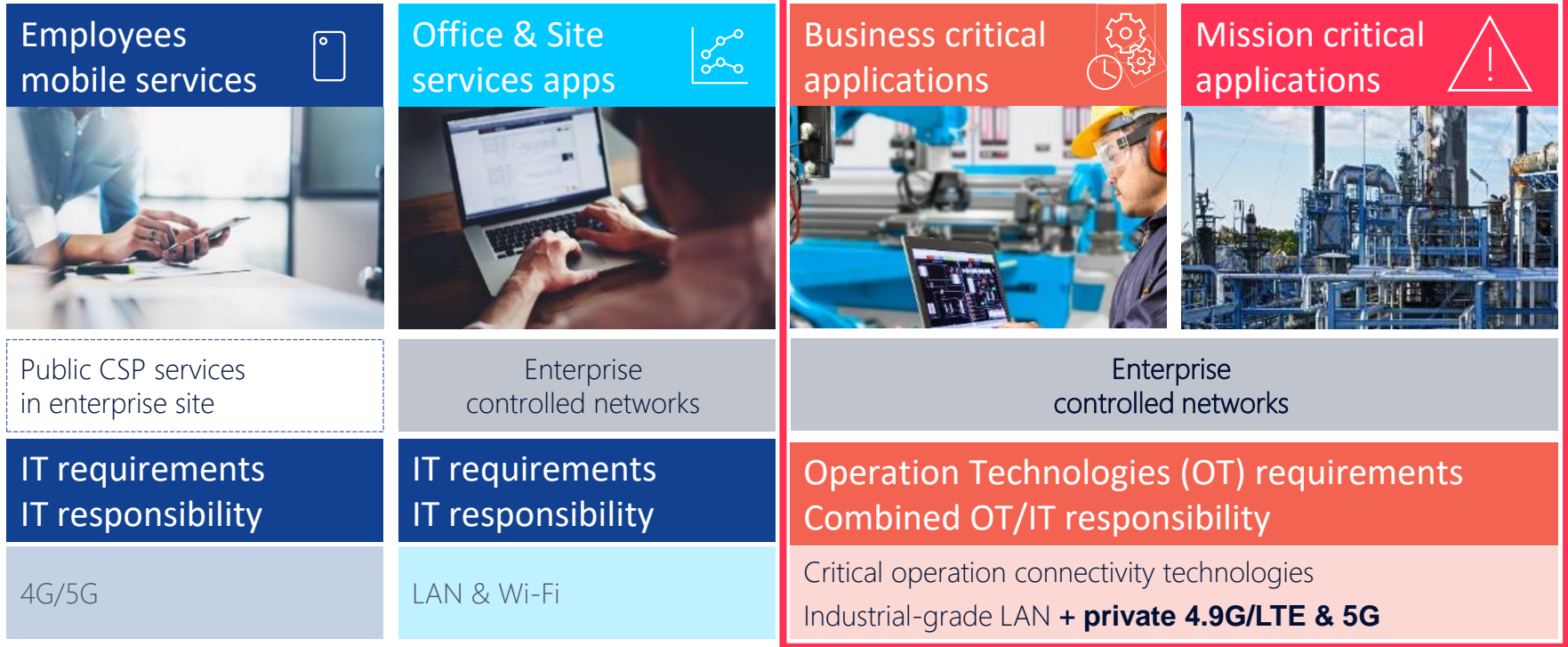


4.9G/5G

Smooth hand over up to 350kph

Different application domains in same industrial site

Different technologies for different requirements



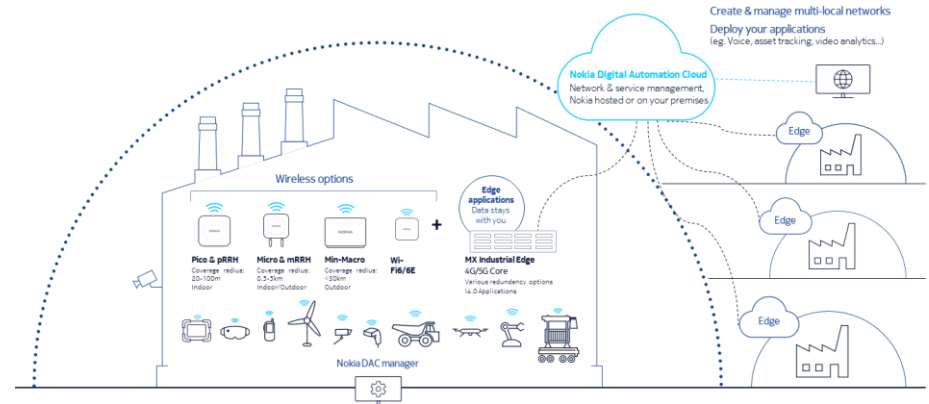
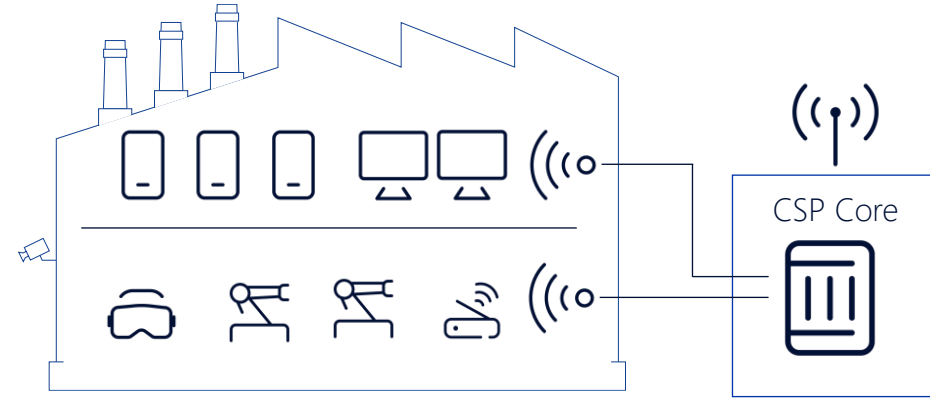
Provider Solution vs. Nokia Private Wireless

Provider Solution:

- Focus connectivity for everything

Nokia Private Wireless:

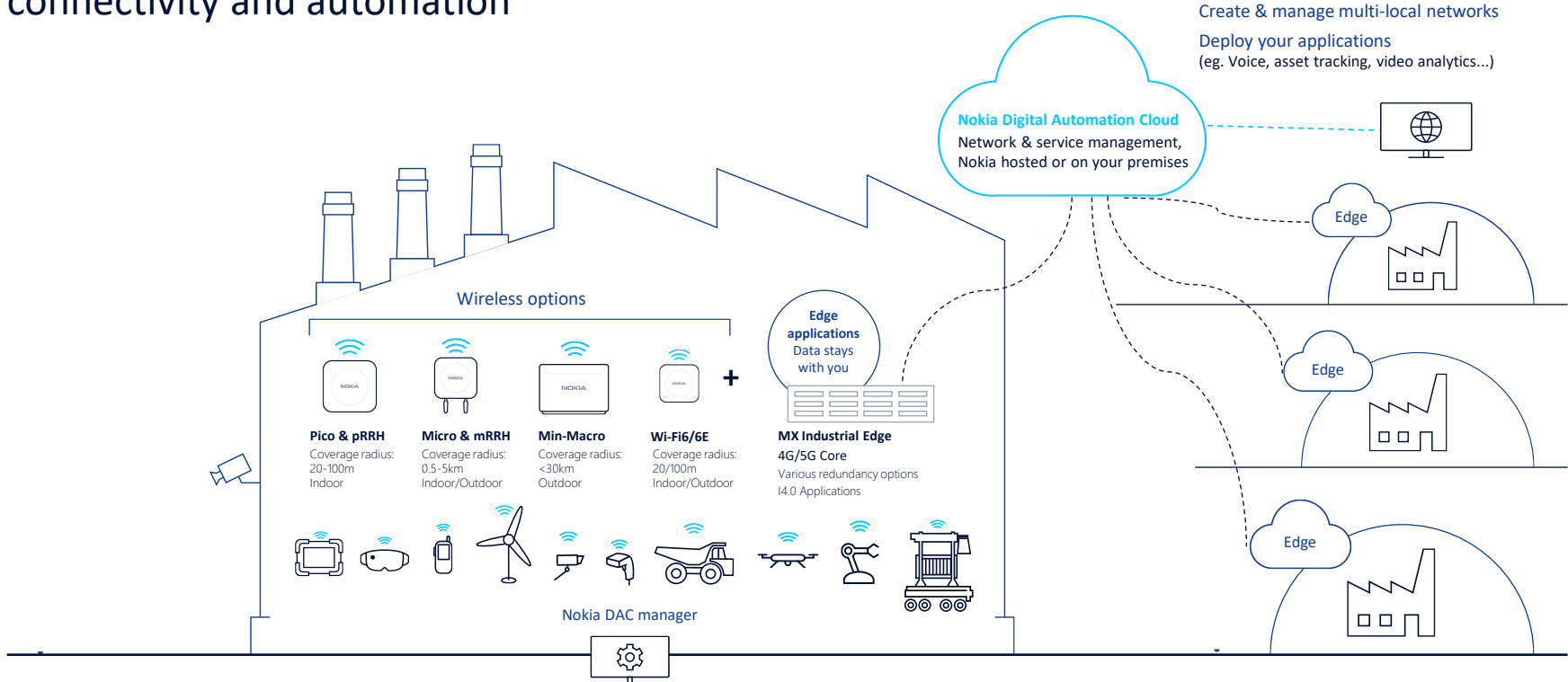
- Focus Mission & Business Critical Networks
- Reliability & Availability
- Self Management
- Customer customized network
- Independent from carrier network
- Data on premise (security)



Nokia Digital Automation Cloud (NDAC)

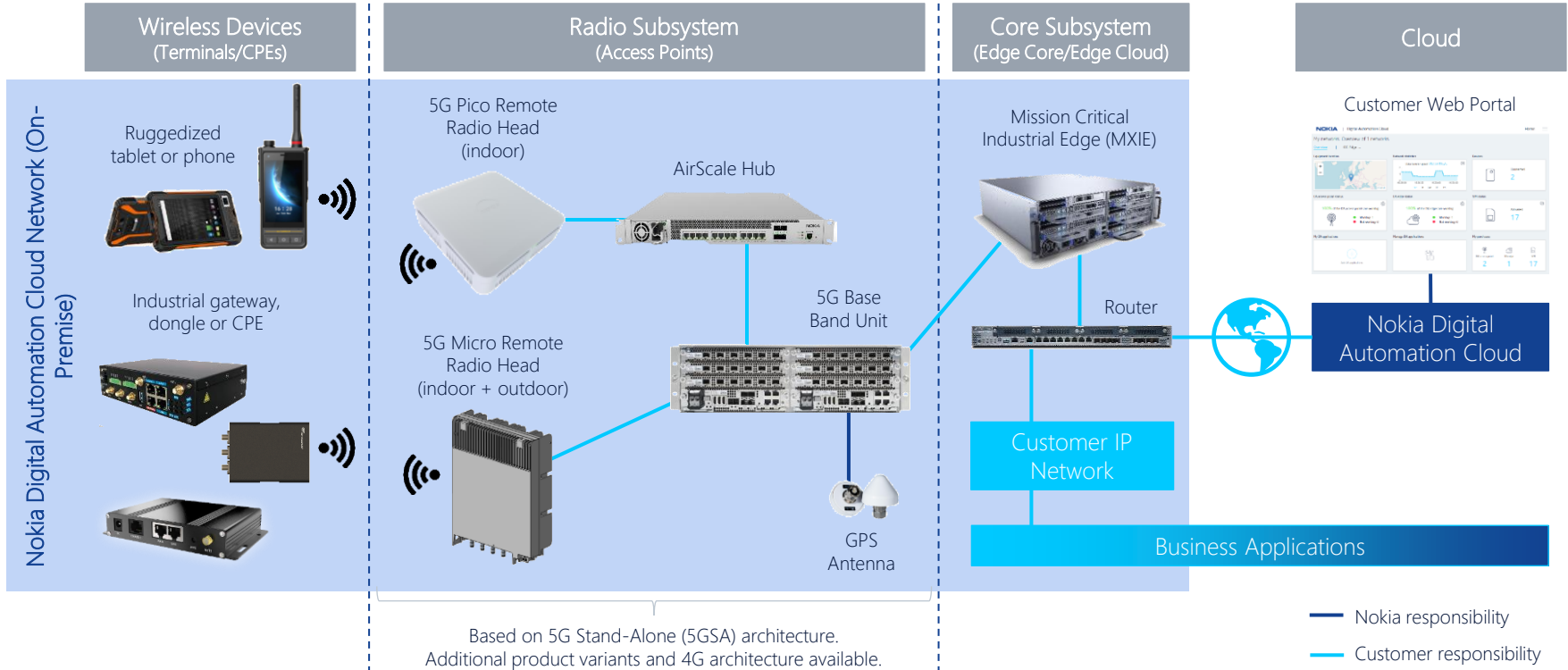
Nokia Digital Automation Cloud

An end-to-end application platform for private wireless connectivity and automation



Industrial private wireless network based on Nokia's Digital Automation Cloud

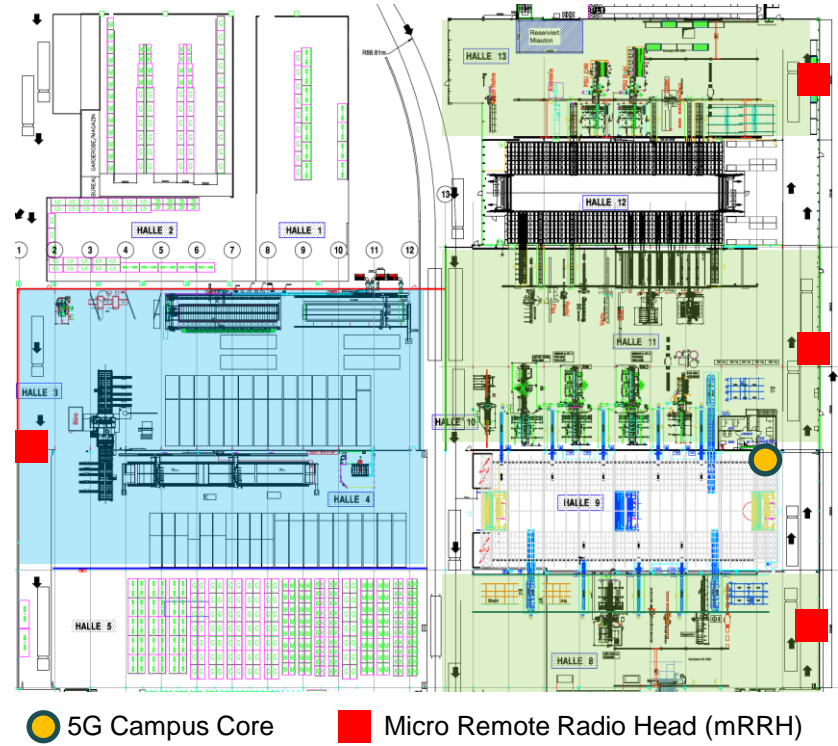
On-premise radio & core subsystem with cloud-based network management



5G Campus Network Implementation @ stürmsfs

Realization in two phases

- **2022: Pilot project** (blue) covering an area of 60x95m with one mRRH and two external antennas
- **2023: Extension** of the system to connect 3 more halls (green) with one mRRH each with integrated antenna system
- **Project Summary:**
 - Total indoor coverage of all halls with manufacturing activity (~15.000 m²)
 - Four Micro Remote Radio Heads instead of >60 WiFi access points



5G Campus Network Implementation @ stürmsfs

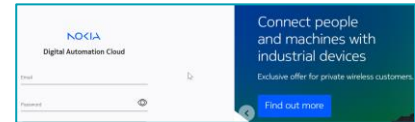
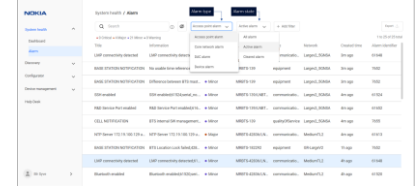
Testing Wireless Devices



Radio and Core Subsystems (Access Points, BBU, Edge Core)



Nokia Digital Automation Cloud



NOKIA



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Smart Factory @stürmsfs

17.09.2024

Freris Niko

«Technologie ist
unsere
Leidenschaft
– we know how.»

 **NOSER**
ENGINEERING

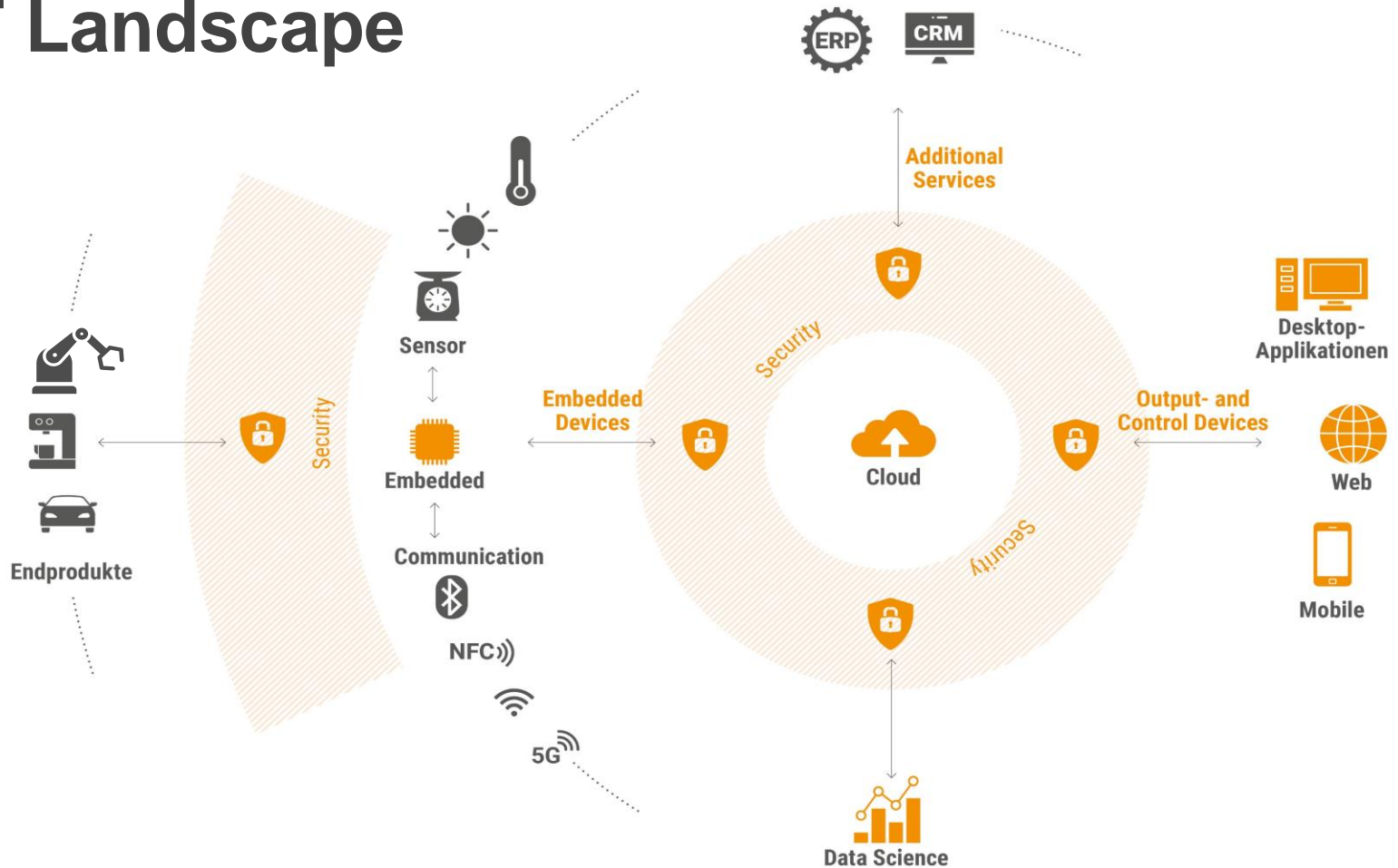
Agenda

- Ziel des Vorhabens – konkreter Use Case
- Umsetzung – Aktueller Stand
- Herausforderungen & Learnings
- Ausblick

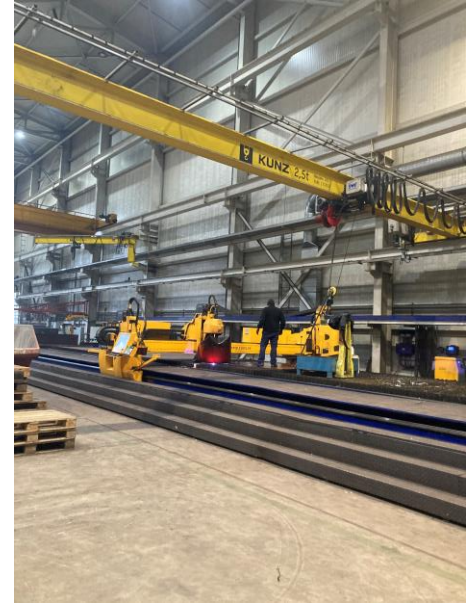
Ziel des Vorhabens – Use Case

- Auslastung der Produktionsanlagen sichtbar machen
- Daten erheben, zur exakten Dauer von Aufträgen
- Daten in Auftragsplanung zurückspielen
- Exakte Kalkulation der Durchlaufzeiten
 - Erhöhung der Auslastung von Produktionsanlagen
 - Benchmarking einzelner Anlagen wird möglich

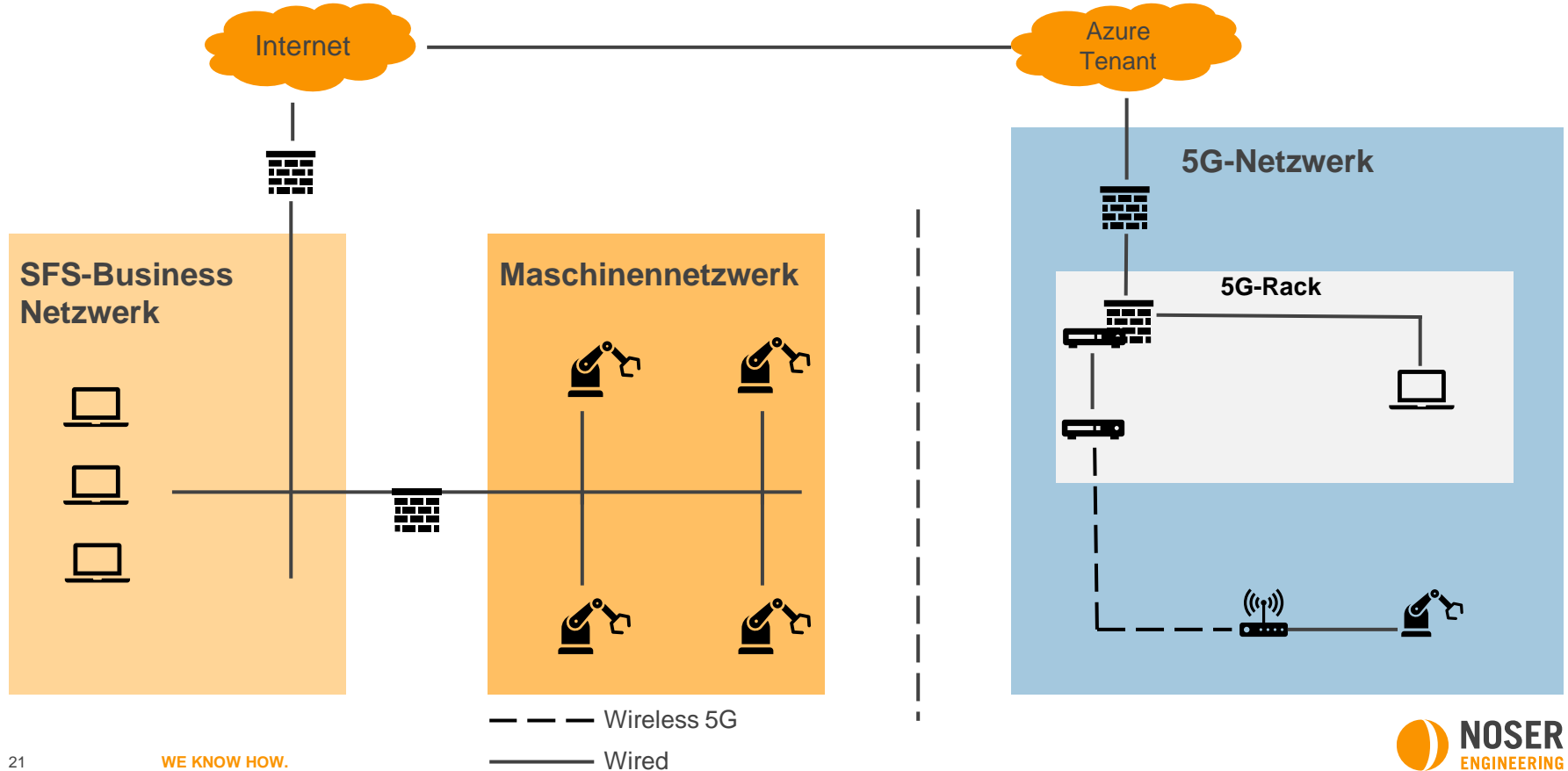
IoT Landscape



Produktionshallen – Use Case Umgebung

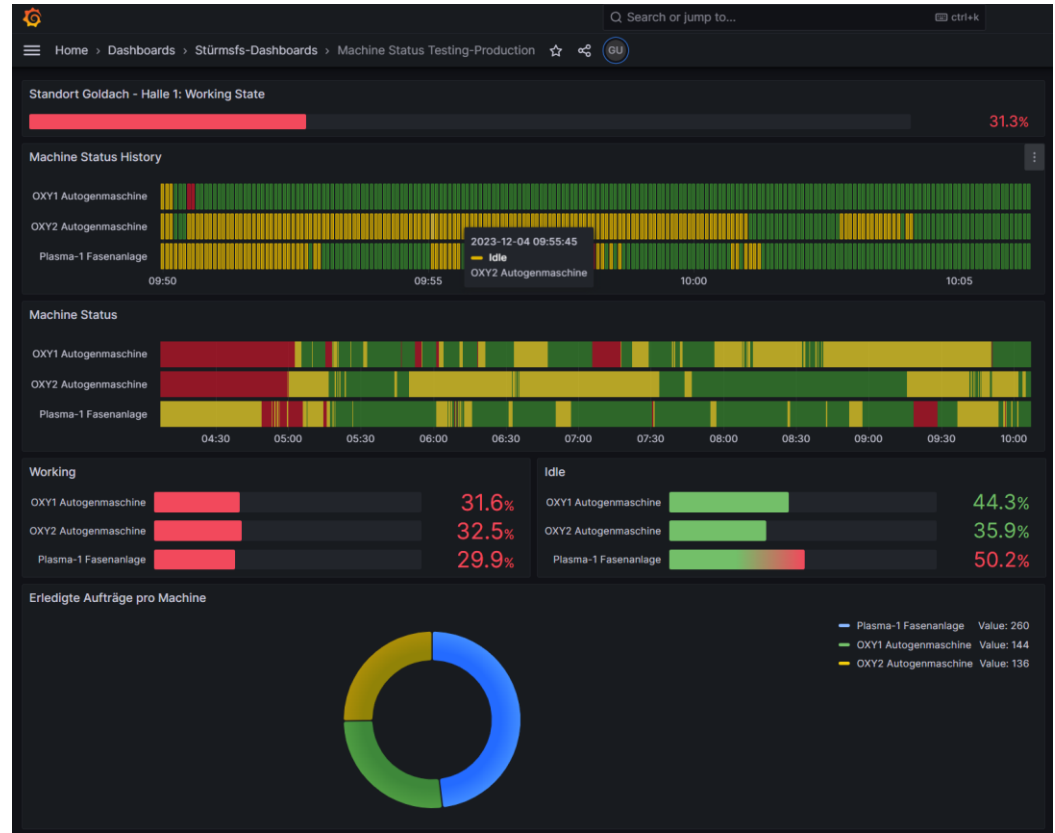


Netzwerktopologie



Aktueller Stand

- “Durchstich” erfolgt
- Dashboard via Browser
- Zustände anzeigen
- Erste Analysen möglich

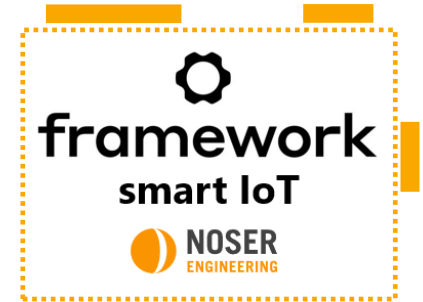


Herausforderungen & Learnings

- Historisch gewachsener Maschinenpark
- Verschiedene Ausstattungen – Anbindungsmöglichkeiten
- Kooperation mit Maschinenherstellern
- Interdisziplinäres Projektteam (Anbieter – und Kundenseitig)

Ausblick

- Anbinden weiterer Maschinen
- IoT Framework für max. Komptabilität
- Gewonnene Daten nutzbar aufbereiten
- Integration vom 5G-Netzwerk in die bestehende OT-Infrastruktur
- Weitere Use Cases – 5G als Enabling-Technology
- Videomonitoring, Handhelds, mobile Objekte einbinden





«Technologie
ist unsere
Leidenschaft
– we know how.»

Wir freuen uns auf den
persönlichen Austausch!



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