



Nokia Digital Automation Cloud

Broadband Everywhere
July 2020

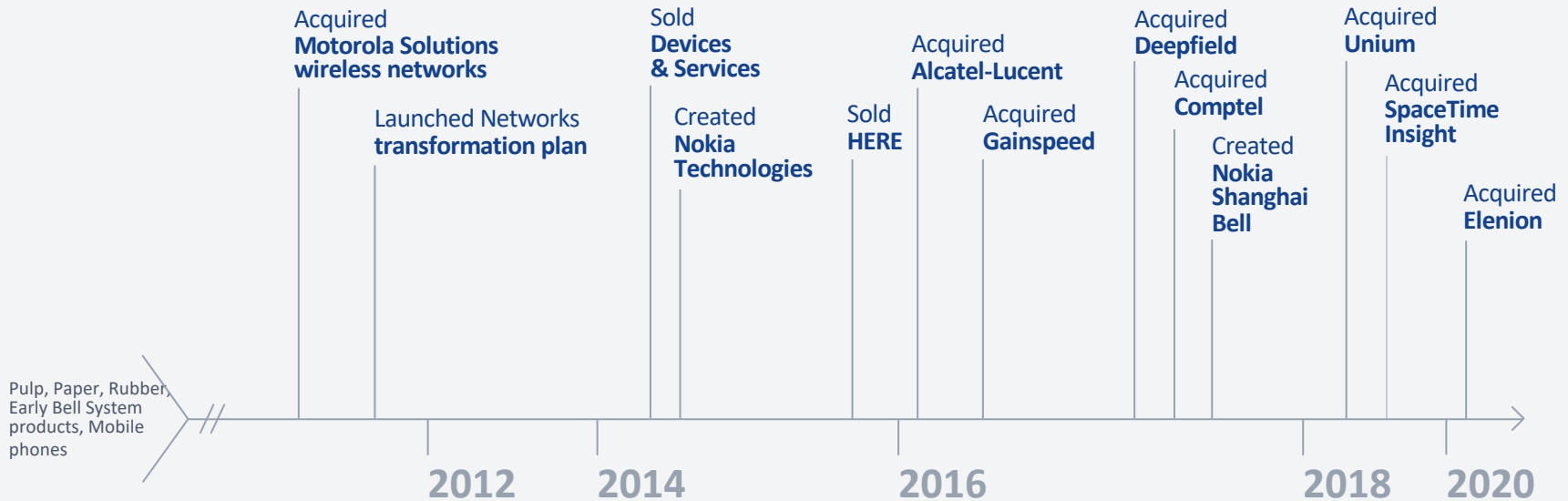
Frank Shelton

The technology to keep
everyone, everywhere
connected has never
been more important

Public

NOKIA

Disciplined execution for successful integration and transformation



Pulp, Paper, Rubber, Early Bell System products, Mobile phones

Creating the technology to connect the world in a sustainable way

Improving lives with our technology



Excellent housekeeping practices

Operational environmental management & circularity, responsible sourcing, health & safety, preventing the misuse of technology and labor practices in our operations

Integrity is the foundation of our business

Nokia is a trusted and valued partner to many of the largest companies worldwide. We work tirelessly to earn and keep trust by adhering to the highest standards of ethics, integrity and compliance.

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Nokia Private Wireless

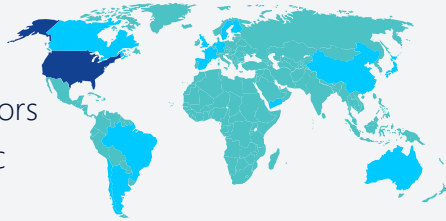
Enabling
IT intelligence,
digitalization, and
automation
for higher education campuses
and remote learning



End-to-end private wireless network & automation platform made easy

Spectrum availability

- CBRS in USA
- CSP – Mobile NW operators
- Vertical – industry specific
- Unlicensed (incl MulteFire)



■ Vertical, unlicensed or CSP spectrum ■ CBRS or CSP spectrum ■ Unlicensed or CSP spectrum

Simple & easy to deploy



Can scale to multi-local indoor & outdoor industry sites

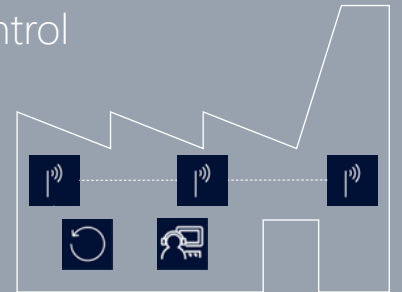
Ecosystem of 4G & 5G industrial devices



>2500 non-phone form factor LTE devices
GSACOM data, 03/2019

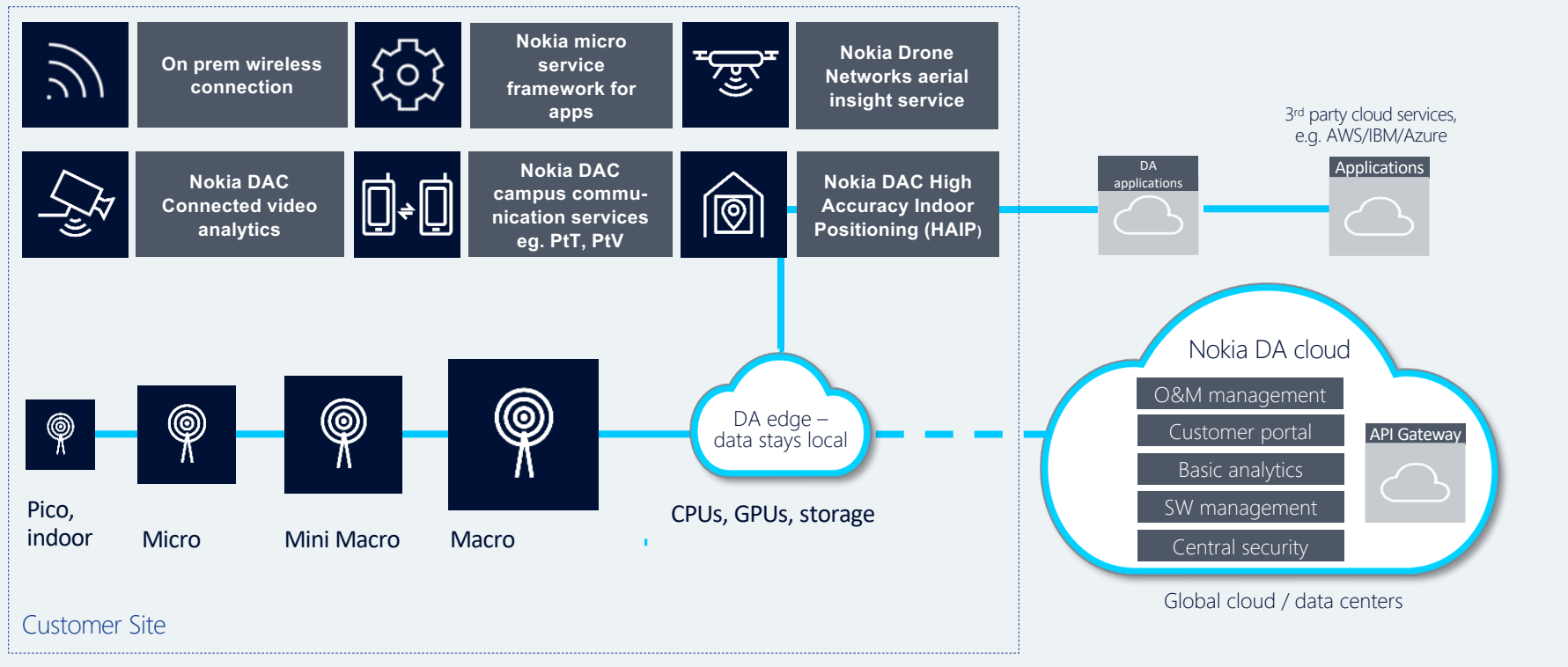
...while keeping full control

- Dedicated network
- Enterprise data stays local even in cloud architecture
- Full visibility and control of connectivity, devices and applications from your management interface

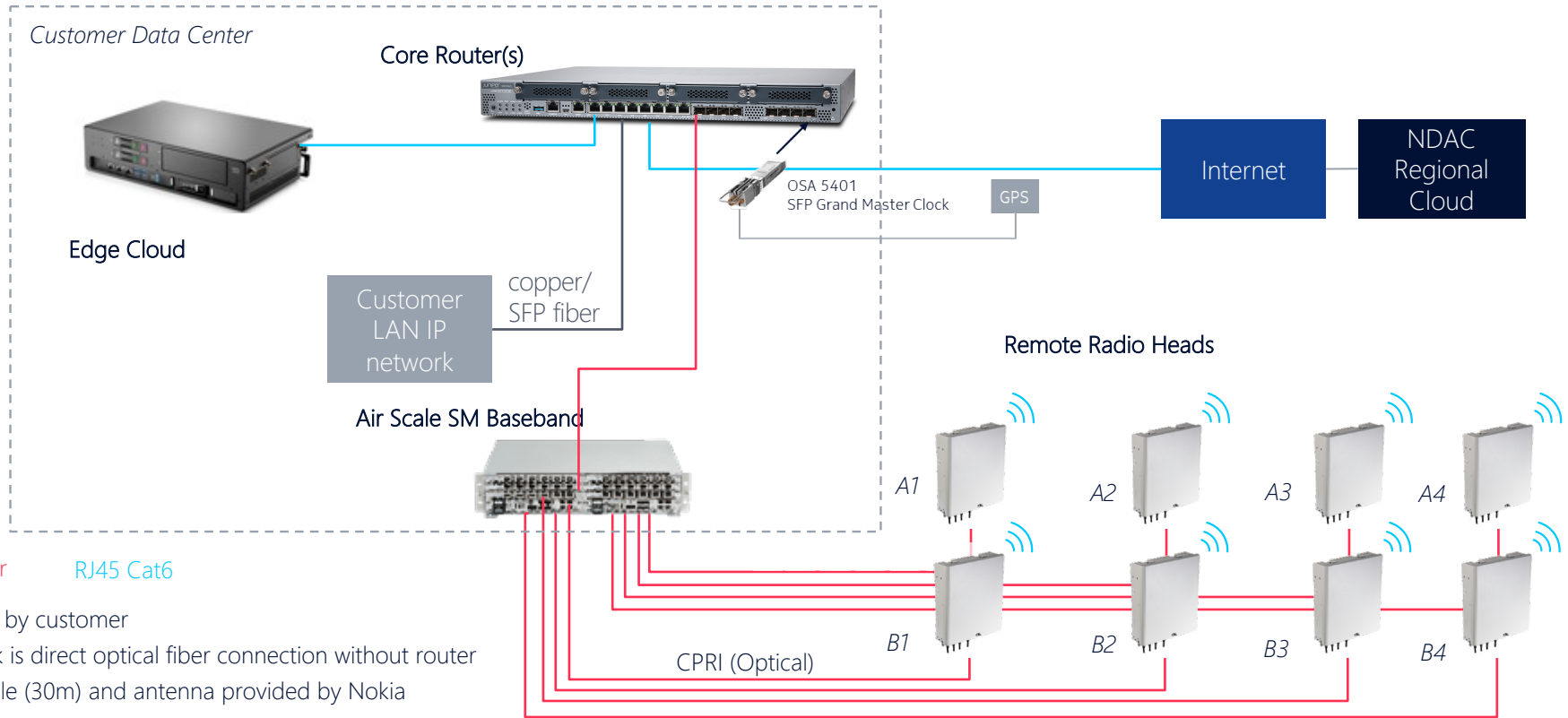


Nokia Digital Automation Cloud overview

Nokia Digital Automation Cloud on-prem, plug in service enablers, APIs



Architecture Example – Edge Cloud

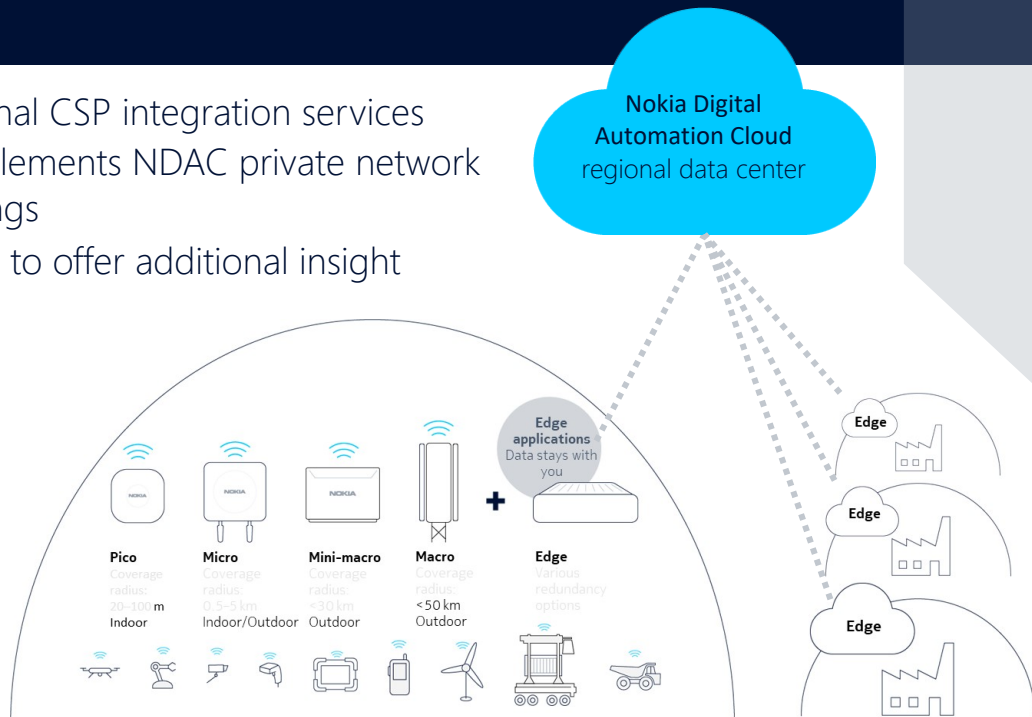


SFP fiber RJ45 Cat6

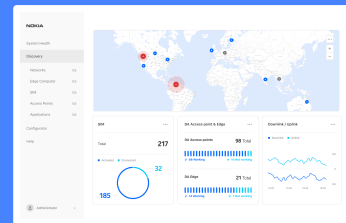
All wires by customer
CPRI link is direct optical fiber connection without router
GPS cable (30m) and antenna provided by Nokia

CSP connector with NewCore Wireless

- Optional CSP integration services
- Complements NDAC private network offerings
- Ability to offer additional insight



- Standard NDAC services for private network management and applications
- Regional DCs available in key markets



Full CSP peering capability with VoLTE, emergency calls, SMS, LI, Charging, Roaming, PSTN, Internet



Nokia DAC – remote installation service for customers/partners

...added peace of mind to complement the plug & play experience

Hardware can be installed & configured remotely

- Edge cloud/SRX and radios preconfigured by Nokia DA prior to delivery
- Dedicated project manager and operations support assigned to customer for guided installation and network commissioning
- Webex/video calls/cams used to effectively guide NDAC installation, switch on and activate for use
- Remote connection access allows for configuration modifications to be performed as needed
- Access to NDAC online courses, NDAC info center support materials
- As-built documentation and network test results provided by customer/partner to start subscription and operations



Nokia Digital Automation Cloud O&M toolbox

Set of tools for different needs – for easy network configuration



Customer web portal

- IP configurations
- SIM management
- Individual user performance
- Basic troubleshooting



Nokia DAC OSS API

- Connect your own OSS (e.g. Open NMS) with the Nokia DAC API for troubleshooting
- Performance management
- Fault management



Partner web portal

- Software management
- Configuration management
- Hardware resource management
- User management



Advanced troubleshooting suite

- Radio troubleshooting

Easy to use Customer Portal

Self-service webportal for SIM card mgt. and operations & maintenance

The screenshot displays the Nokia Digital Automation Cloud interface. At the top, it says "NOKIA | Digital Automation Cloud" and "Home". Below that, it shows "My networks: Overview of 1 networks" with tabs for "Overview" and "My Private Network".

Key components of the dashboard include:

- Equipment location:** A map showing the location of the network in Scandinavia (Norge, Sverige, Suomi).
- Network statistics:** A line graph showing "Data transfer speed 16.20 Bits/s" over a 24-hour period.
- Devices:** A card showing "Connected 2" terminals.
- DA access point status:** A card stating "100% of the DA access points are working" with a target icon and a legend for "Working: 1" and "Not working: 0".
- DA edge status:** A card stating "100% of the DA edges are working" with a target icon and a legend for "Working: 1" and "Not working: 0".
- SIM status:** A card showing "Activated 2" SIM cards.

Annotations with blue lines point to these features:

- "Network performance information" points to the Network statistics graph.
- "Connected terminals" points to the Devices card.
- "Status of the network" points to the DA access point status card.
- "SIM card management" points to the SIM status card.

Below the main dashboard, there is a detailed view of SIM card management. It includes a table with columns: ICCID, Network, Connection, Status, QoS, Static IP, and APN. The table lists several SIM cards, all with "Active" status and "internet-DEFAULT_API" APN.

ICCID	Network	Connection	Status	QoS	Static IP	APN
890009910000020	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API
8900099100000206	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API
8900099100000206	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API
8900099100000206	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API
8900099100000206	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API
8900099100000206	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API
8900099100000206	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API
8900099100000206	Demo Munchen	ON	Active	DEFAULT		internet-DEFAULT_API

At the bottom of the SIM management view, it says "Total: 25 Activated: 25".

Status of the network

Network performance information

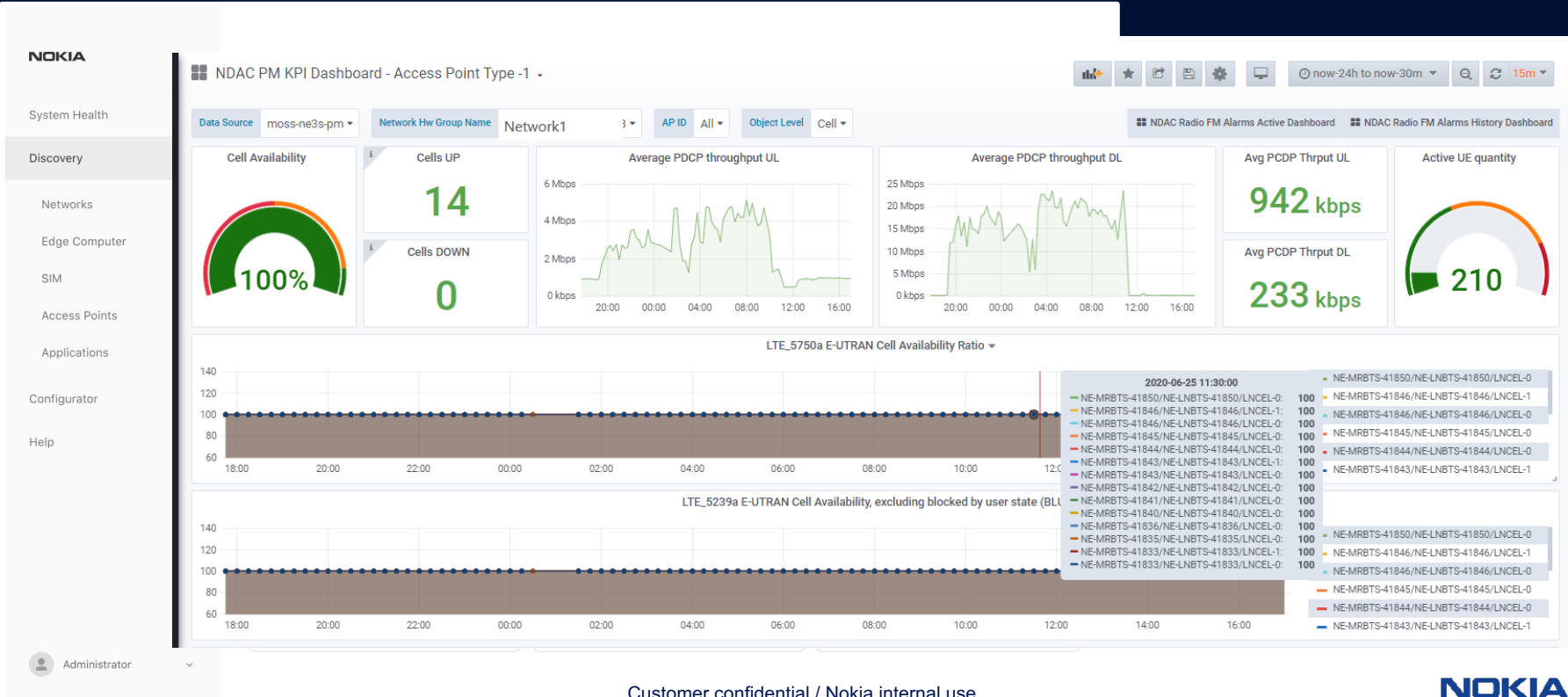
Connected terminals

SIM card management

- Activation/Deactivation
- Priorities
- Fixed IP addresses

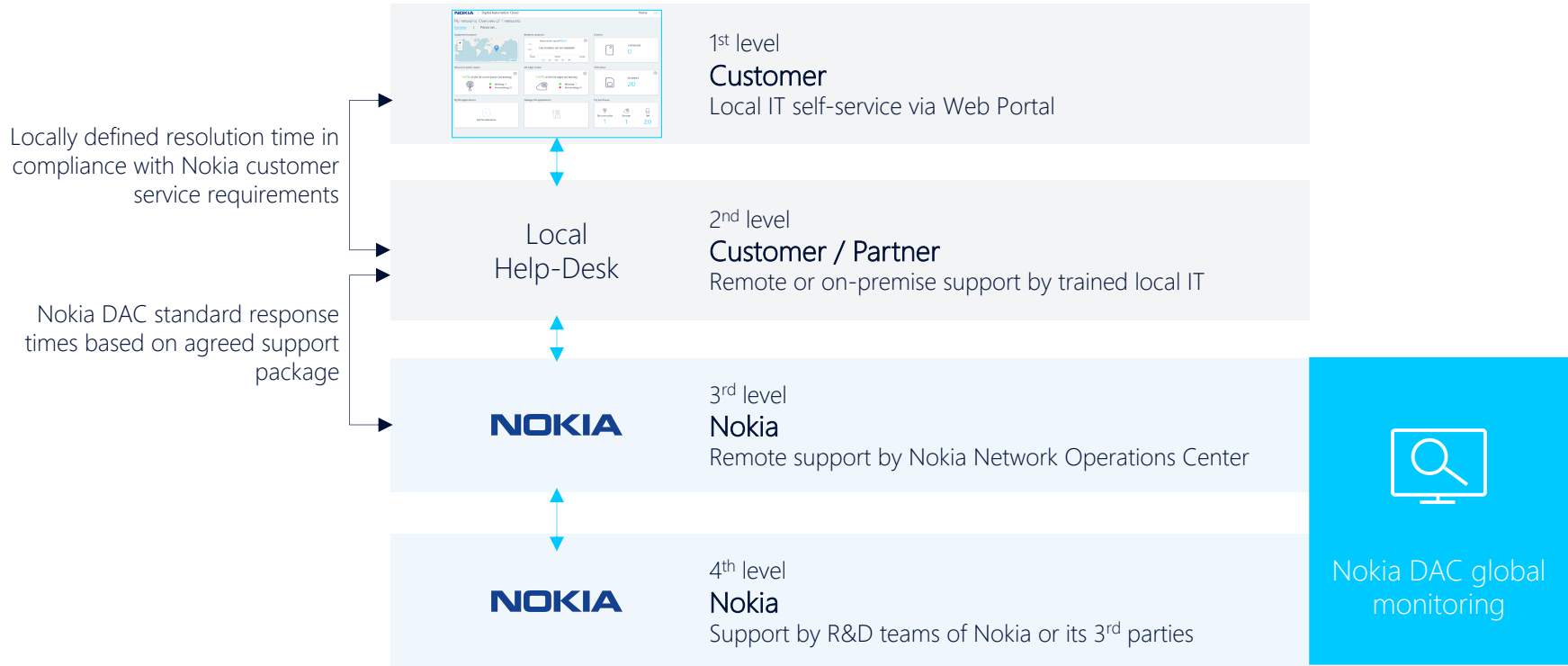
Nokia Digital Automation Cloud – Modern UIs

Quick overviews & detailed analytics in standard html viewers



Nokia Digital Automation Cloud – Operate

Network operations support



NDAC Edge hardware for high performance 5G

- Edge HW must have adequate CPU resources and at minimum 10 GE interfaces
- 5G enables over 1 Gbps speeds for a single UE with 100 MHz spectrum or more
- Practical throughput may be some 100's of Mbps per UE, but there will be many simultaneously active UEs



Airframe
Open Edge

- Intel Xeon family (up to 28 cores)
- RAM up to 6 x 64 GB DIMM
- 2 x 10/25 GE (extension options)
- Scalable up to 5 server sleds



HPE EL1000

- Intel Xeon 16 cores
- Up to 128 GB RAM
- 2 x 10 GE

Nokia Digital Automation

Global <http://dac.nokia.com>

Digital.Automation@nokia.com