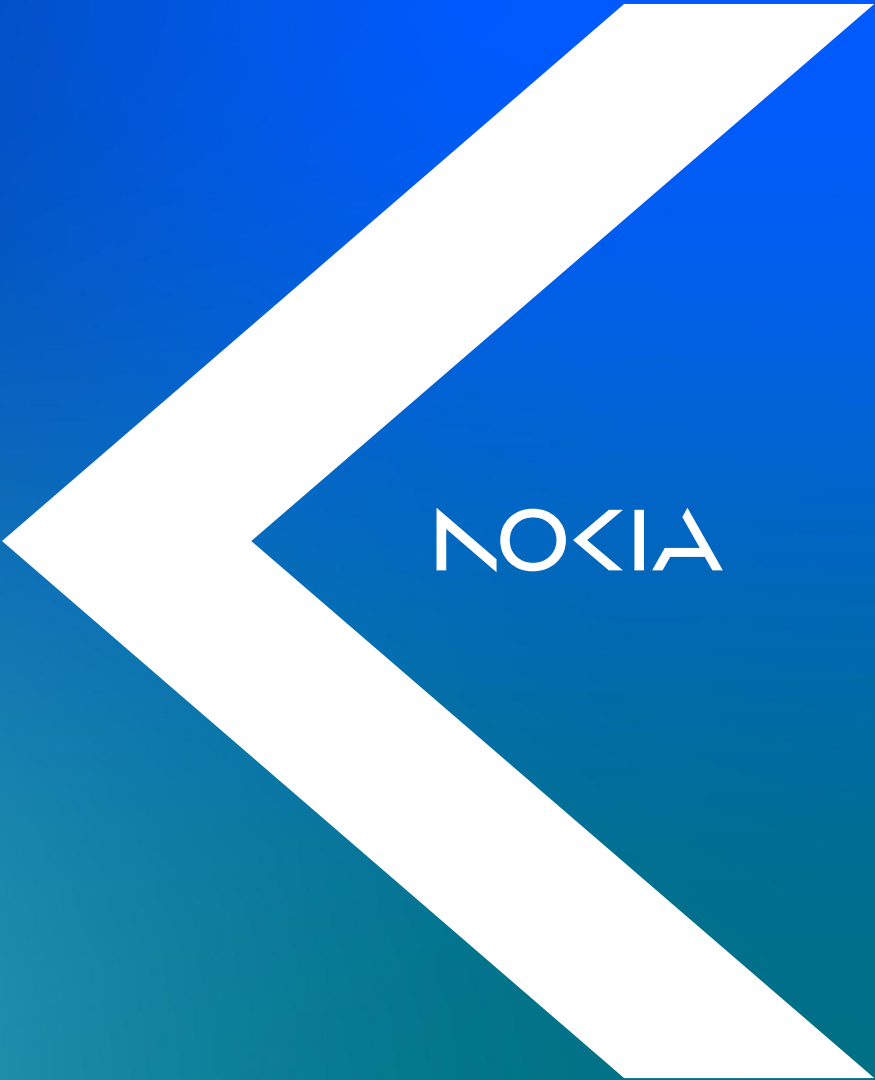


Nokia Drone Networks

UAV based, real-time data collection



Market

The Nokia logo is positioned inside a large, white, stylized arrow that points to the left. The arrow is composed of two parallel diagonal lines that meet at a point on the left side. The background of the slide is a gradient of blue, transitioning from a darker shade at the top to a lighter shade at the bottom.

NOKIA

The potential of 5G connected drones

A growing industry that is waiting for the power of 5G



€32 bn

Expected global revenue by
industrial drones in 2025

8.3%

Annual growth (CAGR) of
industrial drones until 2030

1

End-to-end 5G UAV platform for
automated data collection at the edge:
Nokia Drone Networks

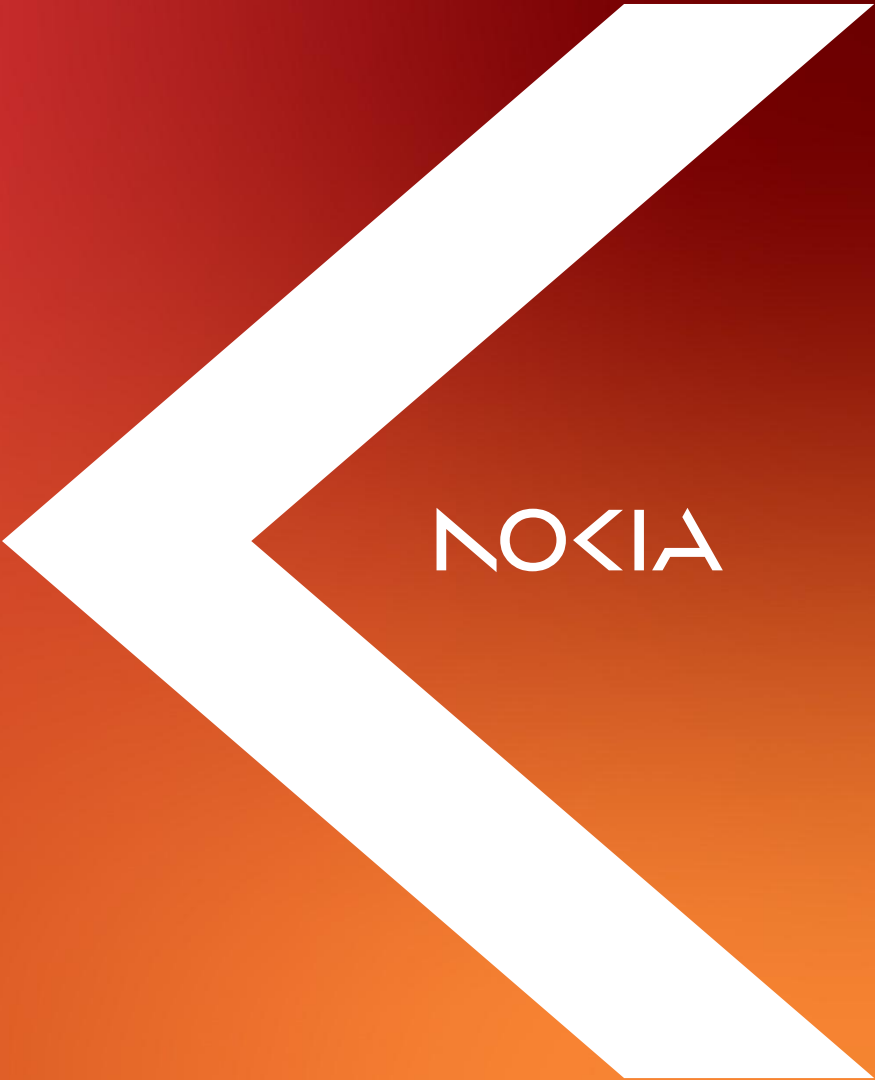
The potential of 5G connected drones

Market overview and customer verticals

Coloured = Target vertical for Nokia Drone Networks

Agriculture	Cargo	Public Administration	Transportation Infrastructure	Health Care & Disaster Relief
Arts & Entertainment	Information & Motion Picture	Public Emergency Services	Waste Management & Remediation Services	Safety & Security
Construction	Insurance	Real Estate & Industrial plants	Educational, Science, Technical Services	Telecommunication
Energy	Mining & Quarrying			

Architecture

The Nokia logo is a large, white, stylized chevron shape pointing to the left, set against a background of red and orange diagonal stripes. The word "NOKIA" is written in white, uppercase, sans-serif font inside the right-hand triangular area of the chevron.

NOKIA

Deployment Option 1: Private Networks

Nokia Drone Networks



UAV



Payload



Docking Station



4G/5G

Nokia Digital Automation Cloud / MXIE / MPW



RAN



Backhaul



EdgeCloud

Customer IT



WWW



UAV Control



Data Storage



NDN Drone SW



NDN Electric Drone

- Connectivity
- Use-Case Data
- Telemetry



- HD-Camera
- Thermographics

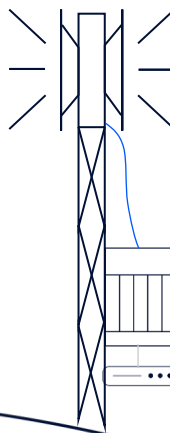


NDN Docking Station

- Charging
- Heating / Cooling
- Maintenance
- Precision landing



- HD-Camera
- Thermographics



- BBU
- Router
- Core
- EdgeCloud (MXIE / NDAC)



- Flight management
- Video management
- Web frontend
- Public APIs



- Cockpit
- Flight operations
- Maintenance
- Telemetry

Deployment Option 2: Public Networks

Nokia Drone Networks



UAV



Payload



Docking Station



4G/5G

CSP / Operator Network



RAN



Core



OAM

Customer IT



EdgeCloud



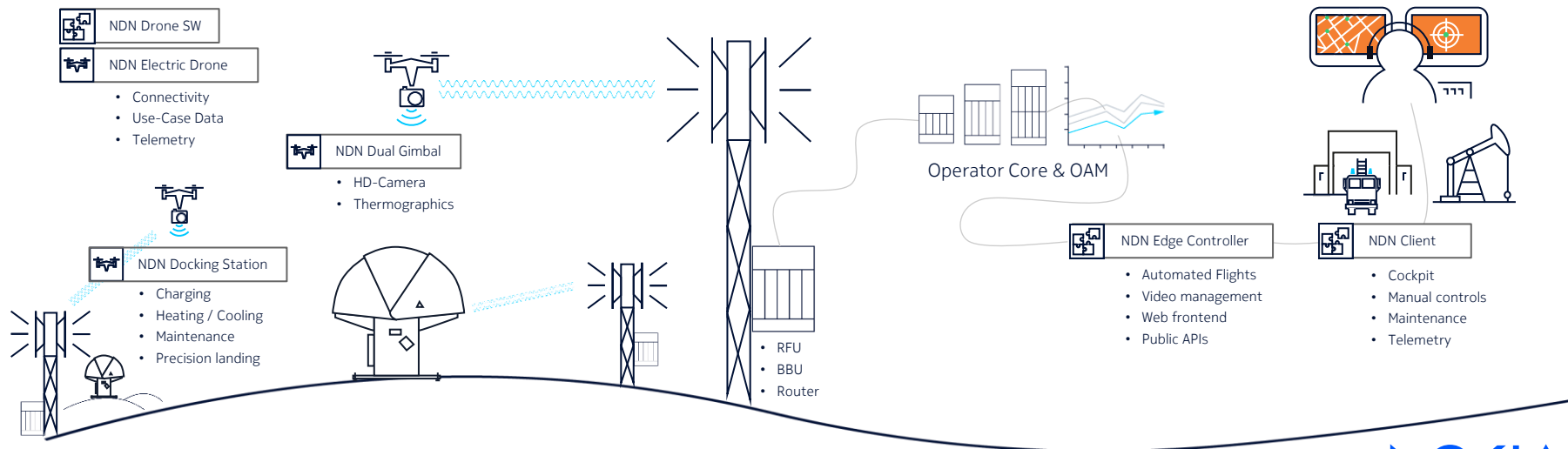
WWW



GCS



Storage & Analytics



Technology

The Nokia logo is a large, stylized white 'N' that serves as a background for the word 'NOKIA'. The 'N' is composed of two concentric shapes: an outer ring and an inner circle. The word 'NOKIA' is written in a white, sans-serif, uppercase font, centered within the inner circle of the 'N'.

NOKIA

Nokia Drone Networks – Technology

Connectivity features and overview



Nokia electric drone

Industrial grade, 4G/5G hexa-copter
Up to 55 minutes flight time
FCC/CE Certified
Integrated safety features
Robust and modular design
Dust and water resistant (IP54)



Payloads and sensors

Gimbal mounted HD
and thermal camera
30x optical zoom
Customizable sensors with payload
development kit
Dust and water resistant (IP54)
3D LiDAR payloads by YellowScan
Network measurement payloads
by Rohde & Schwarz
Gremsy payloads



Docking station

Enables full automation and BVLOS
Precision landing and charging
Integrated heating and cooling
Fully integrated to public APIs
Outdoor rated and certified

- 3GPP Release 16
- 4G and 5G
- Public wireless networks
- Multi-operator
- Quad SIM
- eSIM
- Dual modem
- Private wireless networks
- OnBoard GPU and data processing
- Remote ID/Wi-Fi

Nokia Drone Networks – Technology

3 Software components



NDN Ground Control Station

NDN Edge Controller

NDN Electric Drone

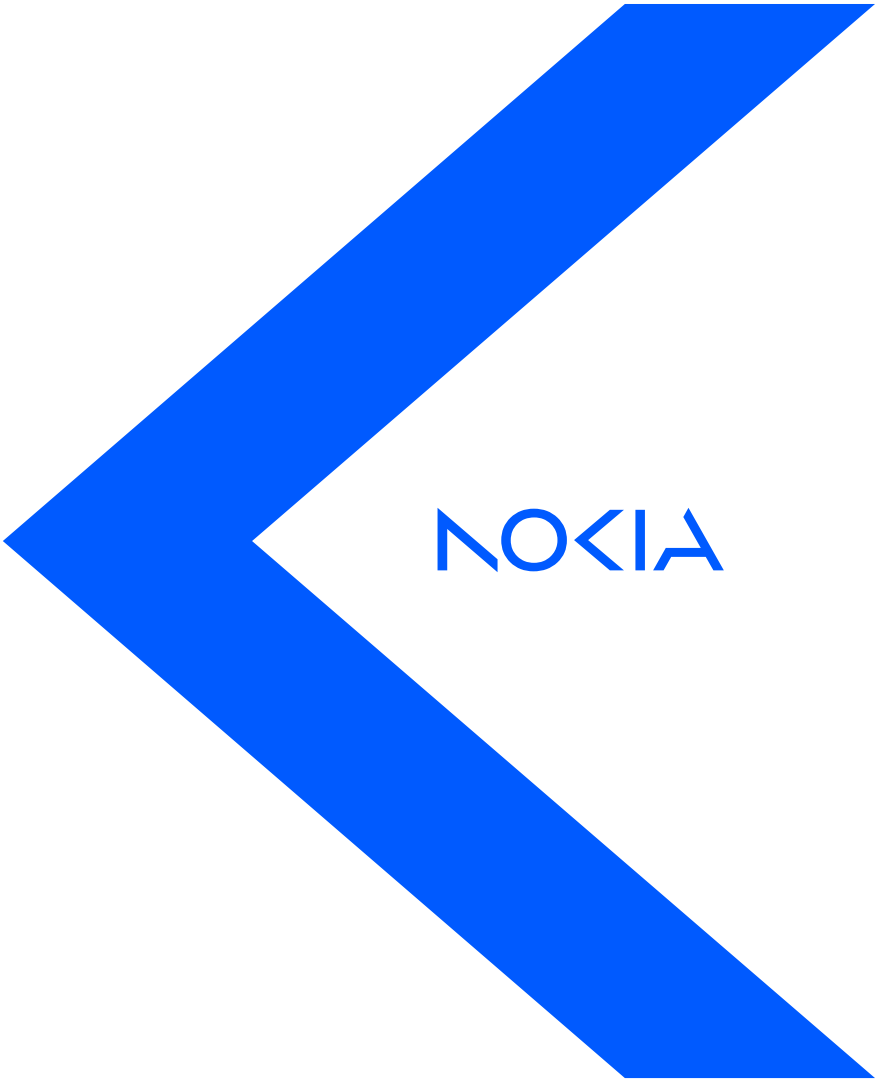
Nokia Drone Networks

- Cockpit
- Manual controls
- Maintenance
- Telemetry

- Flight management
- Video management
- Data processing
- Web frontend
- Public APIs

- Connectivity
- Telemetry
- HD- / Thermal Camera
- 3D LiDAR scanning
- RF Measurements

Use cases



NOKIA

Nokia Drone Networks in Switzerland

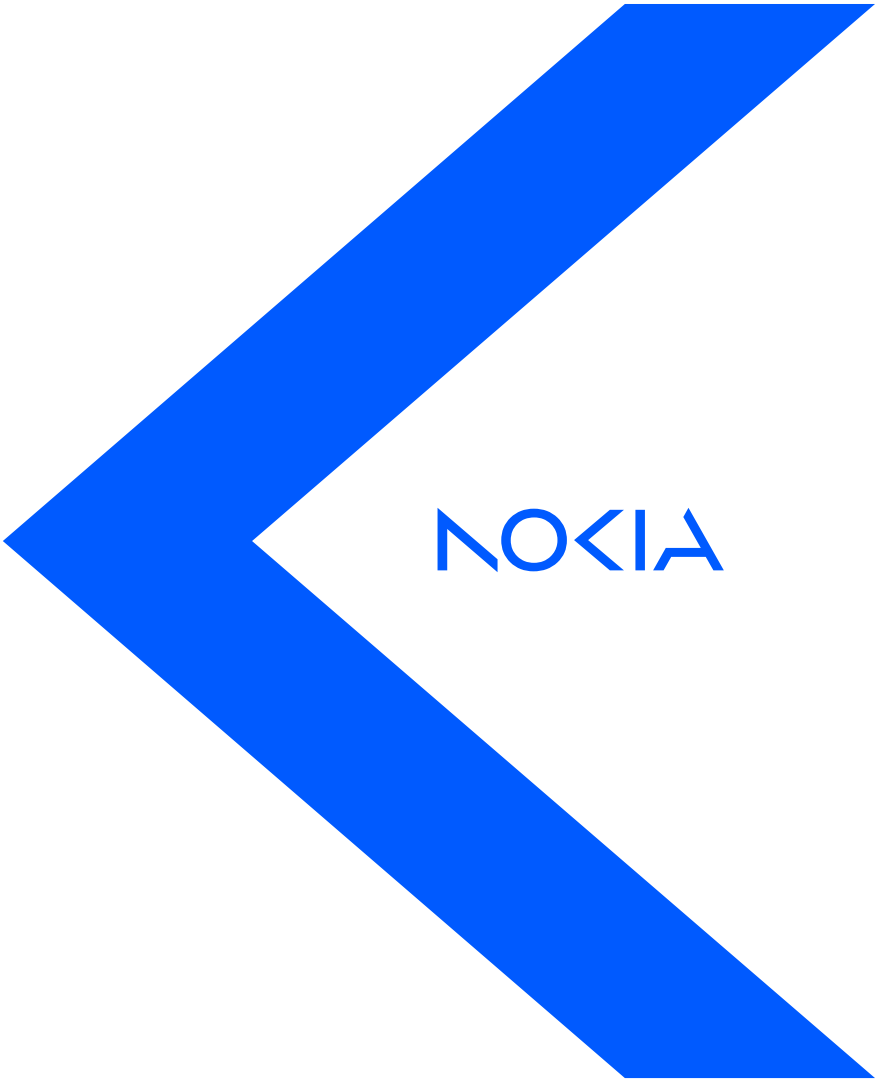
Largest Drones-as-a-Service network in the world

- Nationwide drone network across Switzerland with 300 Nokia Drone-in-a-Box units
- The drone network will enhance safety and operational efficiency for public safety and industrial use cases
 - Emergency and rescue services
 - Inspection flights
 - Perimeter protection
 - 3D modeling
- Collaboration enables advancement of drone automation, beyond visual line of sight (BVLOS) operations, and the expansion of 3GPP technologies for drone use in Switzerland



Press Release Nokia: [Nokia and Swisscom Broadcast to deploy largest Drones-as-a-Service network](#) | Nokia
Press Release Swisscom Broadcast: [Drones as a service for the whole of Switzerland](#) | Swisscom

Why Nokia Drones?

A large blue chevron shape pointing to the left, which serves as a background for the Nokia logo.

NOKIA

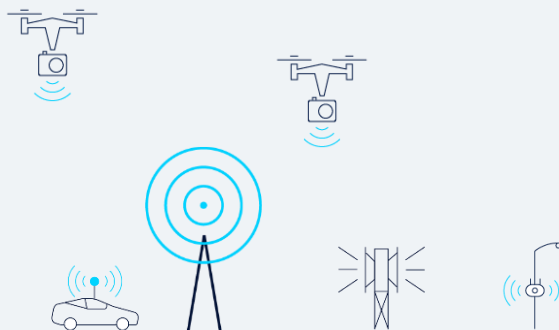
Nokia Drone Networks - Unique selling points

Connectivity



Traditional Systems:

- Point-to-point WiFi connectivity
- Specific drone flight for one purpose
- Low data security due to WiFi standard
- Low reliability as open spectrum
- Low cost consumer implementation



Nokia Drone Networks:

- 4G / 5G connected Drones, network based
- Platform for multiple use-cases
- 3GPP based security & reliability
- Integration into existing platforms & M2M IoT
- Connectivity customization, controlled spectrum

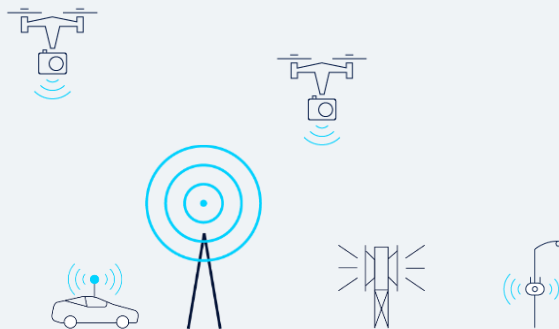
Nokia Drone Networks - Unique selling points

Automation



Traditional Systems:

- Fly with a remote controller
- 1 Pilot controls 1 Drone
- Operate within “visual line of sight”
- Operate manually, no automation
- Proprietary Software to control drones



Nokia Drone Networks:

- Command center based control (PC)
- 1 Control station / operator, multiple drones
- Built for remote Beyond Visual Line of Sight operations with docking station
- Full pre-flight planning, automation, scheduling
- APIs to connect any 3rd party SW for automation

The awesome potential of automated UAVs - YouTube



NOKIA

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