Nokia Drone Networks

UAV based, real-time data collection

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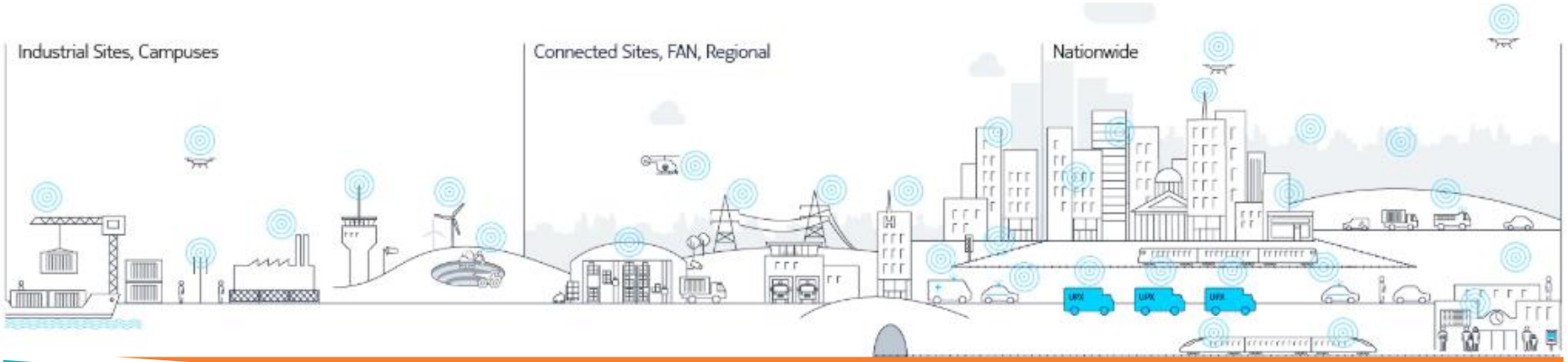
Architecture

Dedicated connectivity for drone network

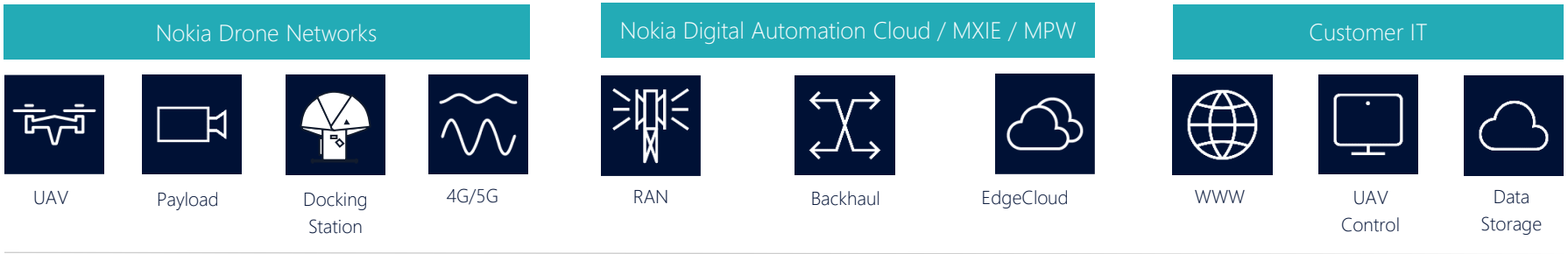
4.9G/LTE or/and 5G wireless network focused solely on enterprises' OT critical needs with tailored coverage & dedicated capacity to reliably and securely connect industrial assets

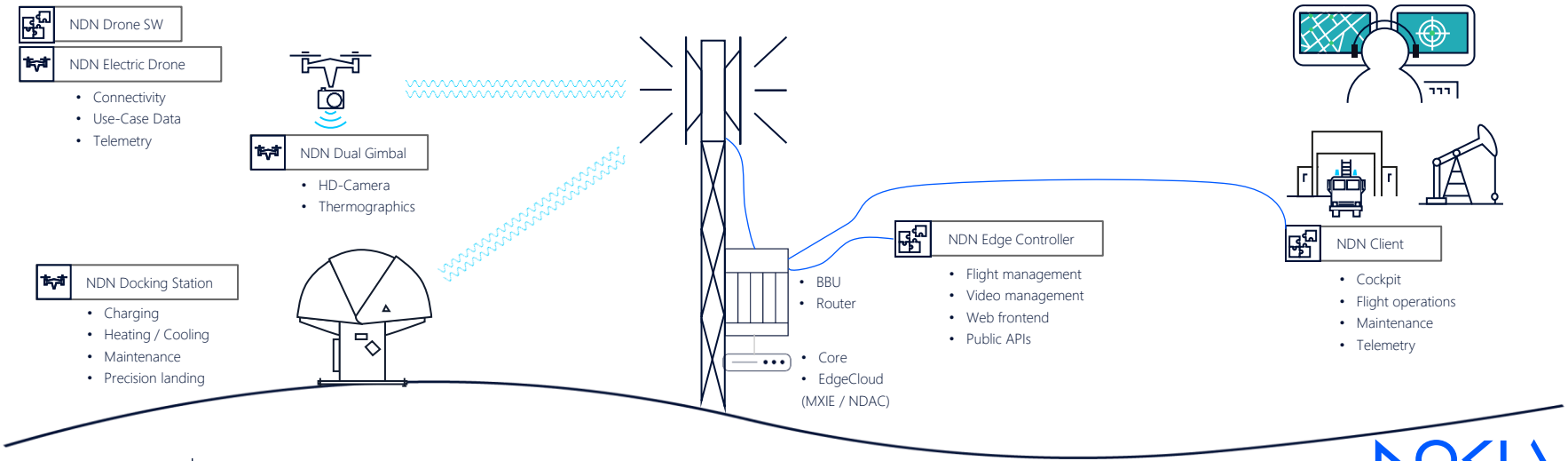


- Dedicate capacity and tailored coverage
- Maximum availability and reliability
- Full data privacy (even control channel traffic)
- Full control

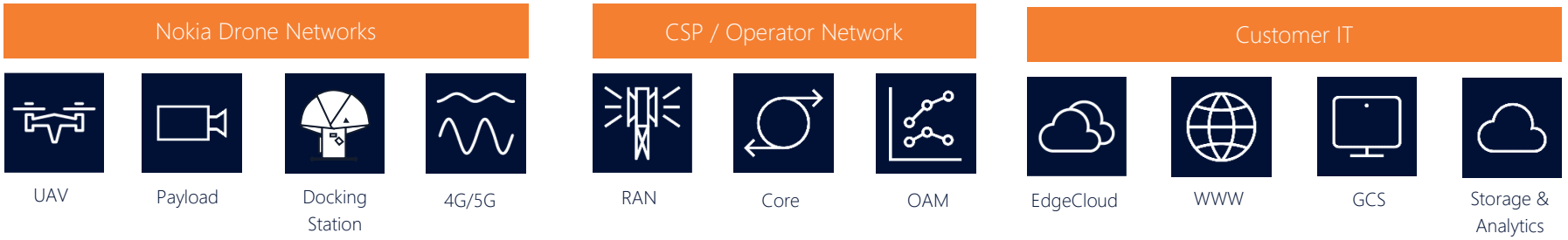
- Large coverage
- Support for all RAT & LPWAN
- International roaming
- Lower upfront cost

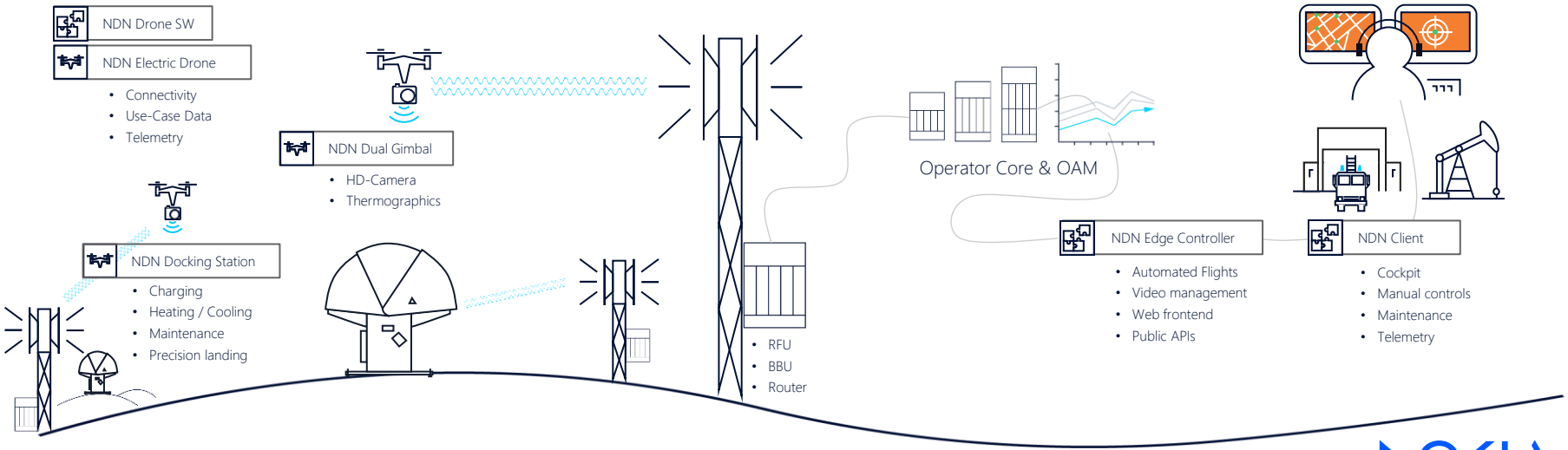
Deployment Option 1: Private Networks





Deployment Option 2: Public Networks





Use Cases

Belgium: World's first nationwide drone network

Real-time, aerial data collection to support first responders

We've been impressed with Nokia as our partner for reliable wireless connectivity and an outstanding turnkey Drone-in-a-Box solution that we can customize to our specific needs. Together, we're making Belgium safer and proving just how innovative we are as a nation.

Hans Similon, General Manager, Citymesh Safety Drone

CITYMESH

>>Press release

Challenges/context

- Belgium's emergency services can receive more than two million calls a year, and typically police and fire brigades are dispatched with incomplete data that can stymie the efficiency of their response.
- Citymesh, a mobile service provider, that focus on B2B connectivity was looking for a solution to improve first responders' situational awareness in the critical first minutes following an emergency call.

Solution

- The Nokia Drone Networks platform including 70 Drone-in-a-Box units, will provide secure 5G-connected drone services across Belgium
- Equipped with video and thermal cameras, drones are on stand-by 24/7 and remotely managed from five centralized operations centers
- Drones can be operated remotely and comply with aviation regulatory bodies such as EASA in Europe and FAA in the United States.

Benefits

- The drones capture real-time aerial footage – such as smoke plumes, fire parameters, and number/location of people – and transfer it to control centers even before emergency teams have had time to leave.
- These aerial images are essential to identifying a plan of action that can save lives and limit damage to affected assets and natural resources.

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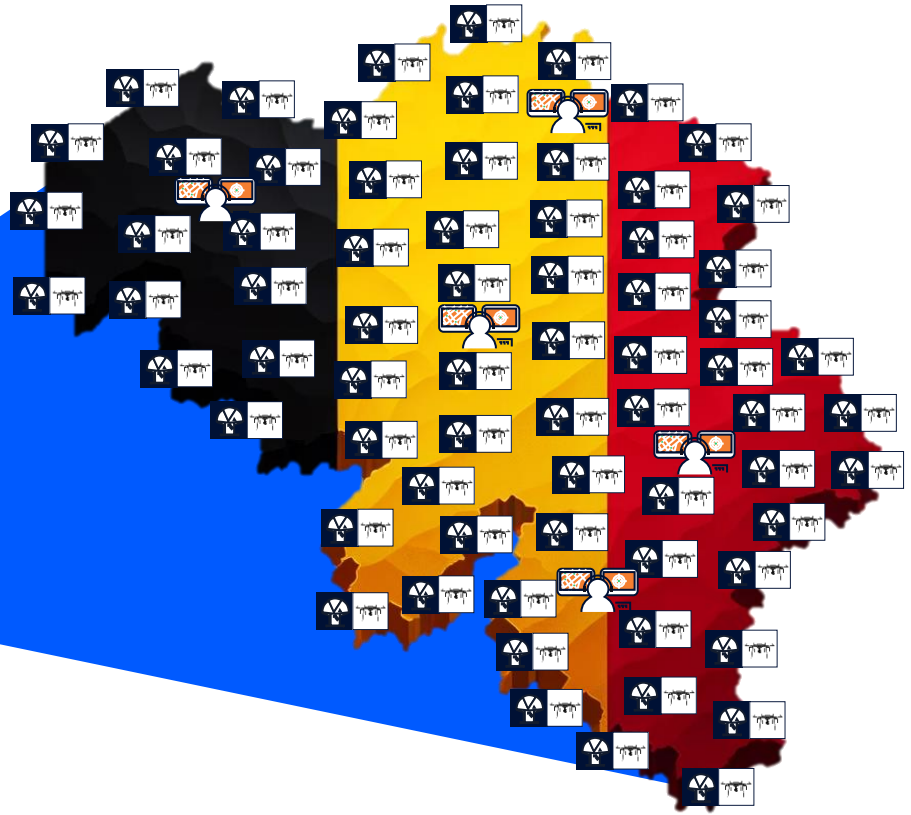
Nokia Drone Networks in Belgium

World’s first nationwide drone network

CITYMESH



- 70 Nokia Drone Networks Systems
- Plug & play deployment Service & SLAs
- 40 pilots in shifts, concurrently 10 in duty
- 5 remote operation centers with 2 seats
- Public, private & hybrid network setups
- Prime customers: firefighters, police, utilities

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How Citymesh utilizes AI in their operations

People counting

How Citymesh utilizes AI in their operations

Searching for a missing person

Drone use cases for public safety

Emergency response support, search and rescue and perimeter security

Emergency response support

- Drones being dispatched to the incident scene before arrival of troops to gain better situational awareness

Search and rescue

- Search for missing person with the help of thermal camera
- Mapping and evacuation route management

Perimeter security

- Border inspection
- Perimeter surveillance

Drone use cases for public safety

Prevention, firefighting and emergency support

Prevention

- Finding hot spots in forests/dry areas to prevent/mitigate larger fire
- Fire monitoring in cities
- Incident warning
- Evacuation route management

Incident and monitoring support

- Video streaming improves the situational awareness and supports resource planning, risk evaluation and decision making
- Sensors and analytics can identify hazardous substances

Inspection

- Verification that a fire is extinguished through HD - or thermal video streaming
- Gas leakage detection
- Damage inspection for insurance

Drone use cases for mining

Security and surveillance & environmental - and volumetric monitoring

Mine security

- 24/7 automated mine area monitoring
- Safety and security

Environmental monitoring

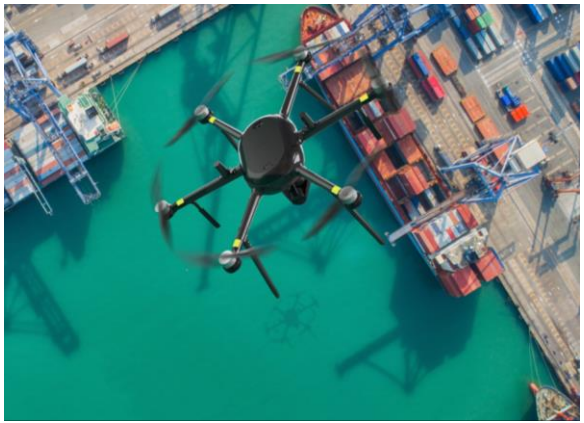
- Surveying and inspection of tailing dams
- Water and air quality monitoring

Volumetric monitoring

- Swap your payload to LiDAR scanner and use it for volumetric monitoring of stockpiles

Ports

Security, area monitoring and water quality



Port security

- 24/7 automated port area monitoring
- Safety and security

Maritime monitoring

- Vessel and traffic monitoring
- Coastguard and port management support

Water quality monitoring

- Detection of oil /chemical leakage
- Monitoring of water quality

Drone use cases for utilities

Inspect your power lines, wind turbines, solar panels and refineries

Power line inspections

- Inspect your power lines and transmission towers from a safe distance with drones. Inspections like this are faster, cheaper, more comprehensive, and more accurate.

Wind turbine inspections

- Wind turbine drone inspection can identify blade delamination, core defects, internal component failure, and other key defects.

Gas refinery inspections

- Gas sensing
- Gas emission monitoring
- Identifying of heat and temperature differences with thermal camera

Drone use cases for oil and gas

Remote inspections, leakage detection and surveillance

Gas refinery inspections

- Inspect hard-to-access areas, such cranes and derricks, after severe weather.
- Security and surveillance

Pipeline inspections

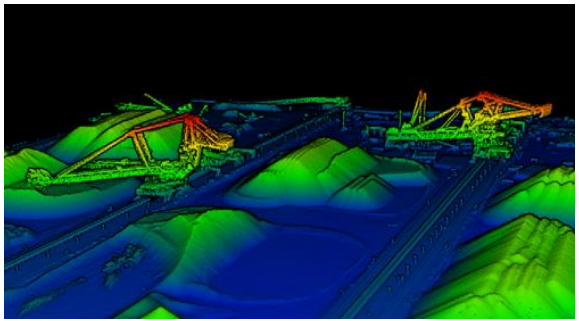
- Leakage detection
- Gas sensing

Offshore oil platform inspections

- Remote analysis of offshore platform
- Oil leakage detection
- Gas emission monitoring
- Security and surveillance

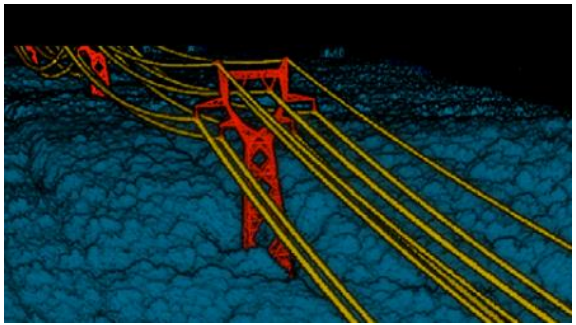
Possibilities of LiDAR scanning for industries

Mining, utilities and rail



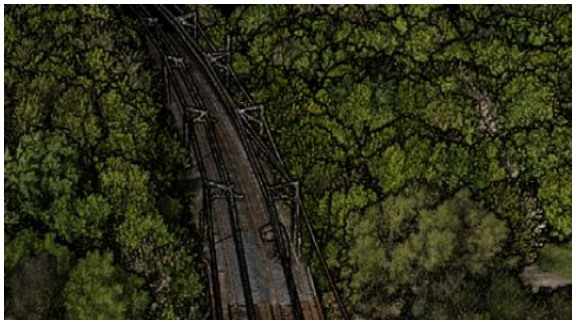
Mining

Swap your payload to LiDAR scanner and use it for volumetric monitoring of stockpiles.



Utilities

Use LiDAR scanner to measure the distance between the foliage, different vegetation and power lines to make well-informed decisions and predict the areas that will become problematic in the near future.



Rail

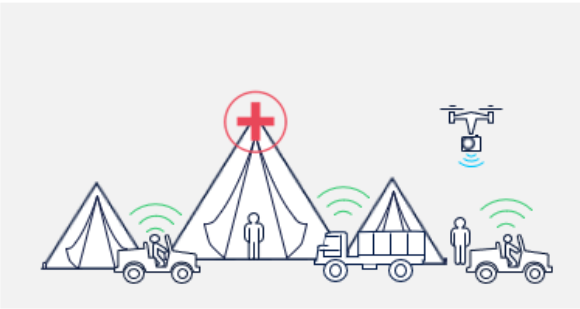
Use drones equipped with LiDAR scanner to identify infrastructure defects, environmental threats and other maintenance issues on your rail tacks.

Drone use cases for defense

From intelligence gathering to search and rescue and surveillance

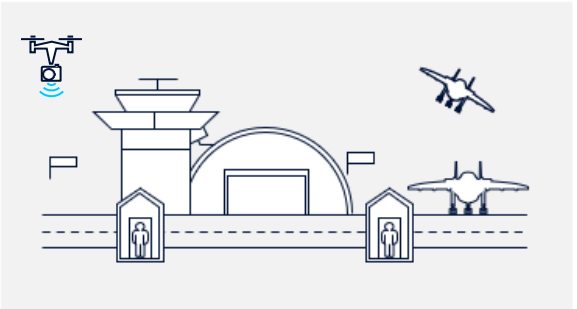
Intelligence gathering

Drones equipped with high-resolution cameras and sensors allow them to collect data and images from a distance.



Search and rescue

Drones are increasingly being used for search and rescue operations. They can be used to locate and rescue personnel in hazardous or inaccessible areas. Drones can also be used to drop supplies to troops in the field.



Surveillance and reconnaissance

Drones can be used for surveillance and reconnaissance purposes. They can be used to track troop movements and assess the terrain. This information is used by military planners to develop strategies and tactics.

Surveyor Ultra - 360° LiDAR system for 3D Mapping

- Scanner: Hesai XT32M2X
- IMU: SBG Quanta Micro

Features

- Brighter LED for clear messaging
- Simpler connectors, simpler set up

Specifications

- Precision: 3 cm
- Accuracy: 2.5 cm
- Weight: 0.983 kg batt. excl.

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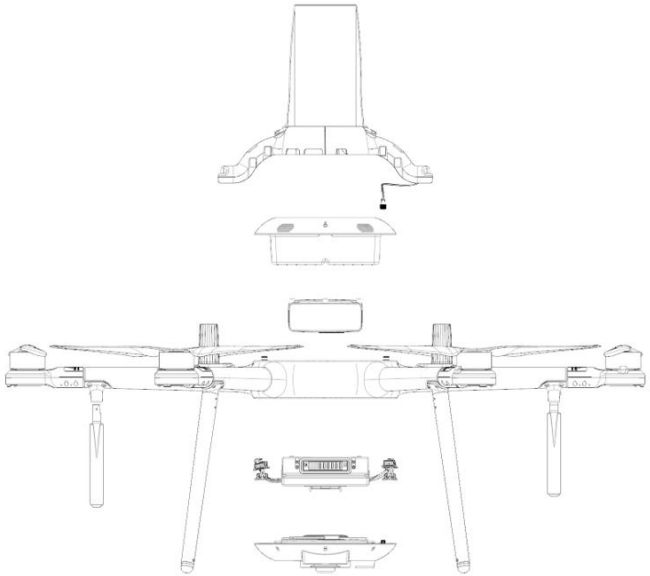
Technology

Nokia Drone Networks – Technology

Nokia Electric Drone – Modularity & Maintenance



- Parachute unit
- Battery
- Navigation unit
- Main frame
- Power unit
- Electronics unit

Nokia Drone Networks – Technology

Nokia Docking Station

Key Features

Remote, fully automated flight operations
Rugged, reliable, and built to operate 24/7
Smart operations with API based automation
Ships integrated and easy to deploy
Fast Charging, fast turnaround
Predictive maintenance
Vehicular integration (Trailer)

Performance

Charging time: 40 min
Integrated security camera
Integrated heating and cooling
Gigabit Ethernet and 4G / 5G connectivity

Dimensions and weight

Weight: 185 kg
Dimensions: 184 x 181 x 184 cm
Input voltage: 110/230 VAC

Operating environment (H2)

Temperature: -20°C to 40°C
Ingress Protection Rating: IP54
Maximum allowable landing wind speed: 15 m/s
Lightning protection according to EN61000

Nokia Drone Networks as a technology enabler

Private and public networks to satisfy the needs of industry

3D LiDAR scanner

HD video thermal video

Network scanner

Enablement of digital twins

Industrial inspections

Saving lives

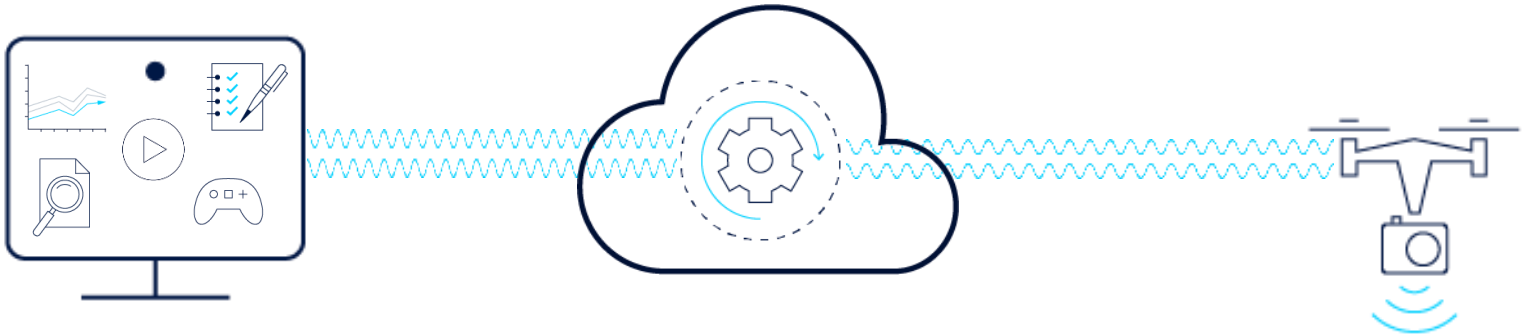
Asset tracking

Perimeter security

Environmental sustainability

Nokia Drone Networks – Technology

3 Software components



NDN Ground Control Station | NDN Edge Controller | NDN Electric Drone

(Monthly) subscription based

License per User/Pilot

- Cockpit
- Manual controls
- Maintenance
- Telemetry

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

License per Drone

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