Secure and High-Speed Communication

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Co-founder & Director

Eindhoven, 9 April 2025

POWERED BY

//// Aircision: what, how and why

Based in the Netherlands, Europe

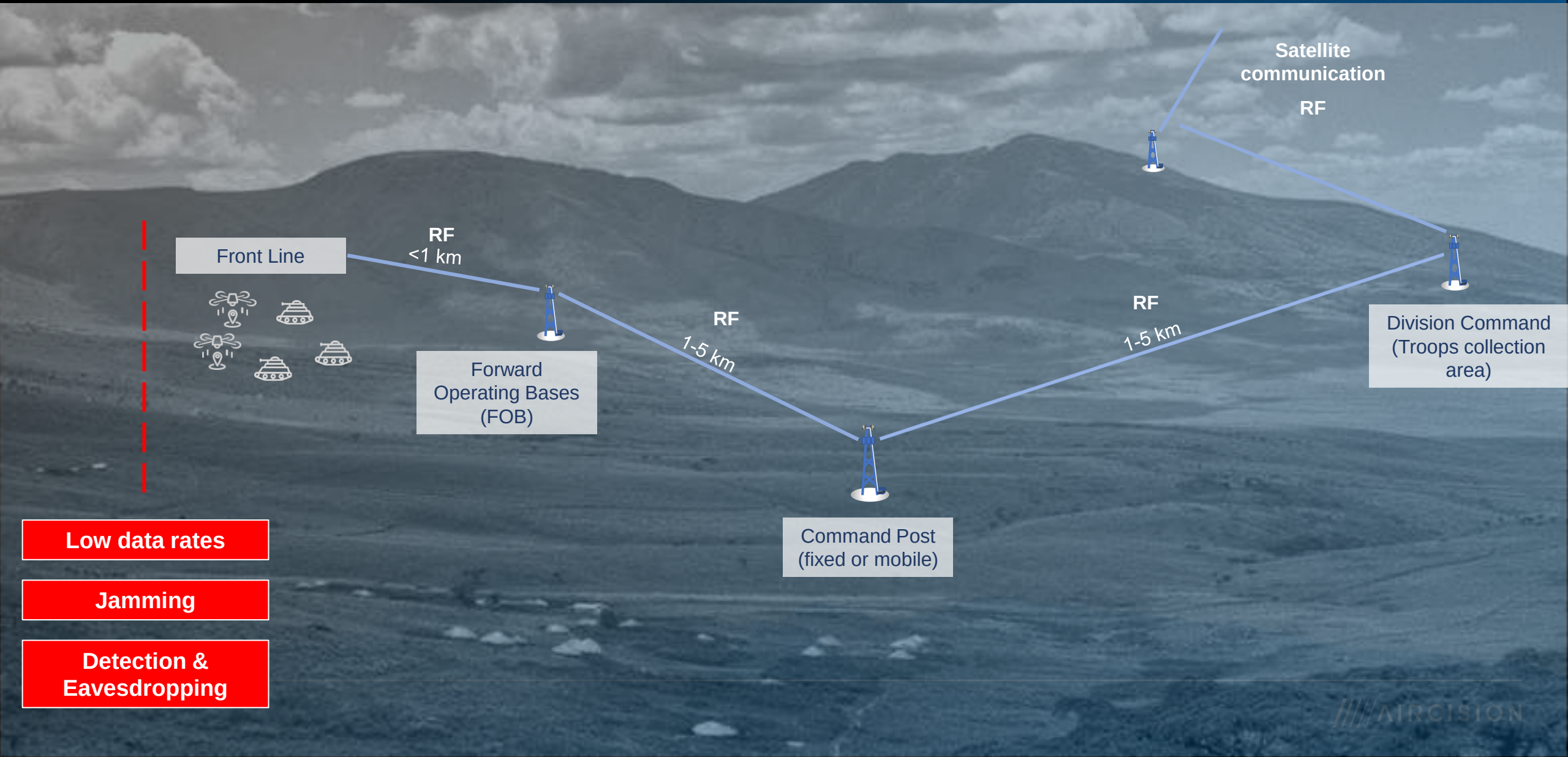
- TNO spin off (leading research institute in the Netherlands)
- HighTechXL Deep-Tech accelerator programme

What we do: most advanced Free-Space optics systems for terrestrial applications

How we do it: R&D team based in Eindhoven, and collaboration projects with European Research and Industry organizations such as TNO, TU/e, European Defence Agency, Portuguese Institute of Telecommunications, Signify

Why we do it: help Defence and Telecom organizations to deploy secure and high data rate communication channels that can be deployed very quickly

Military forces use wireless communication systems based on radio (RF)



- **Low data rates**
- **Jamming**
- **Detection & Eavesdropping**

The use of RF creates capacity and security challenges

Low Data Rates

Large operations can require aggregate network capacities > 10 Gbps

with large deployments of cameras, sensors, drones, autonomous vehicles, etc.

RF (E-Band) transmits < 10 Gbps for distances of 5km.

Jamming

The New York Times

Russia-Ukraine War › | The Latest | Photos | Trump Criticizes Putin | Last Stand at a Coal Mine | Battles Inside Russia

'Jamming': How Electronic Warfare Is Reshaping Ukraine's Battlefields

Drones have become a critical weapon for both sides, but a lack of coordination among troops has put Ukraine at a disadvantage.

Detection & Eavesdropping

sky news

23 Jan 8° 5°

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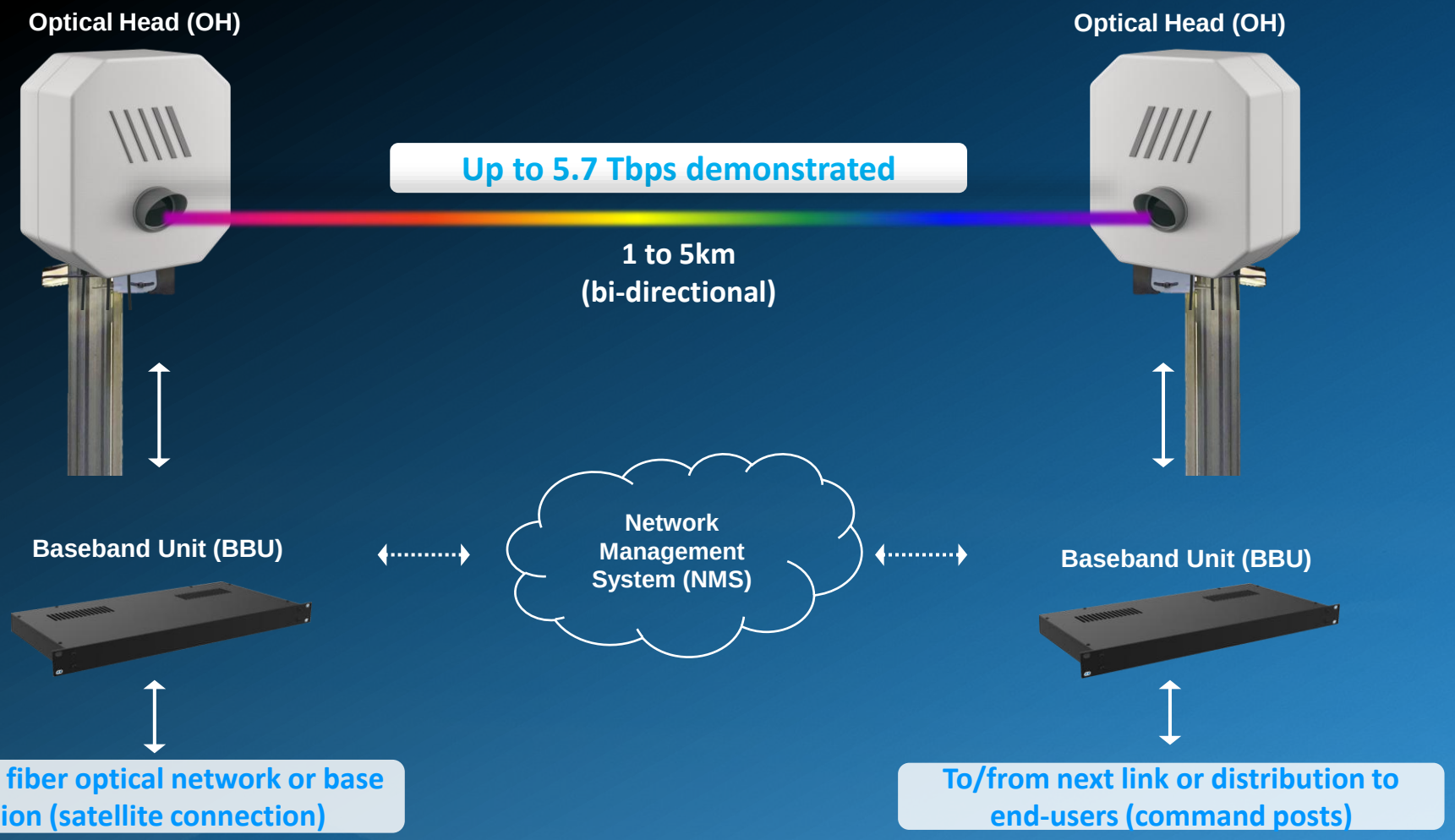
Ukraine war: Mobile networks being weaponised to target troops on both sides of conflict

In the first days of 2023, a Ukrainian missile strike in Makiivka killed perhaps hundreds of servicemen - and Russia is blaming it on mobile phone use by its soldiers.

Kieran Devine
Digital investigations reporter @kierand99

Wednesday 4 January 2023 15:15, UK

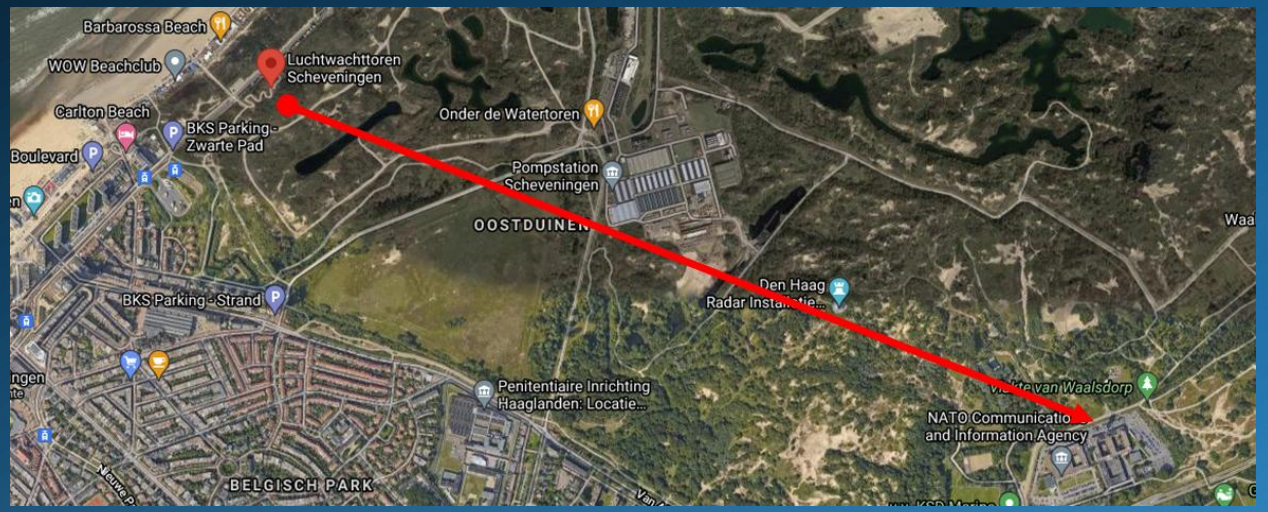
AIRCISION: Modular optical wireless solution



High Bandwidth	Rapid deployment	Secure	Long Range
10 Gbps or higher	(<6 hrs)	(undetectable)	5km span links

Proof-of-concept conducted by Aircision and TNO (2021): 2,5 km @ 10 Gbps unidirectional

Luchtwachttoren Scheveningen



NATO Communication and Information Agency, the Hague

Video available on Youtube: Aircision page

AIRCISION

Full duplex communication at Military base Kazerne, Oirschot (Dec 2021)

Remote control from our office in Eindhoven

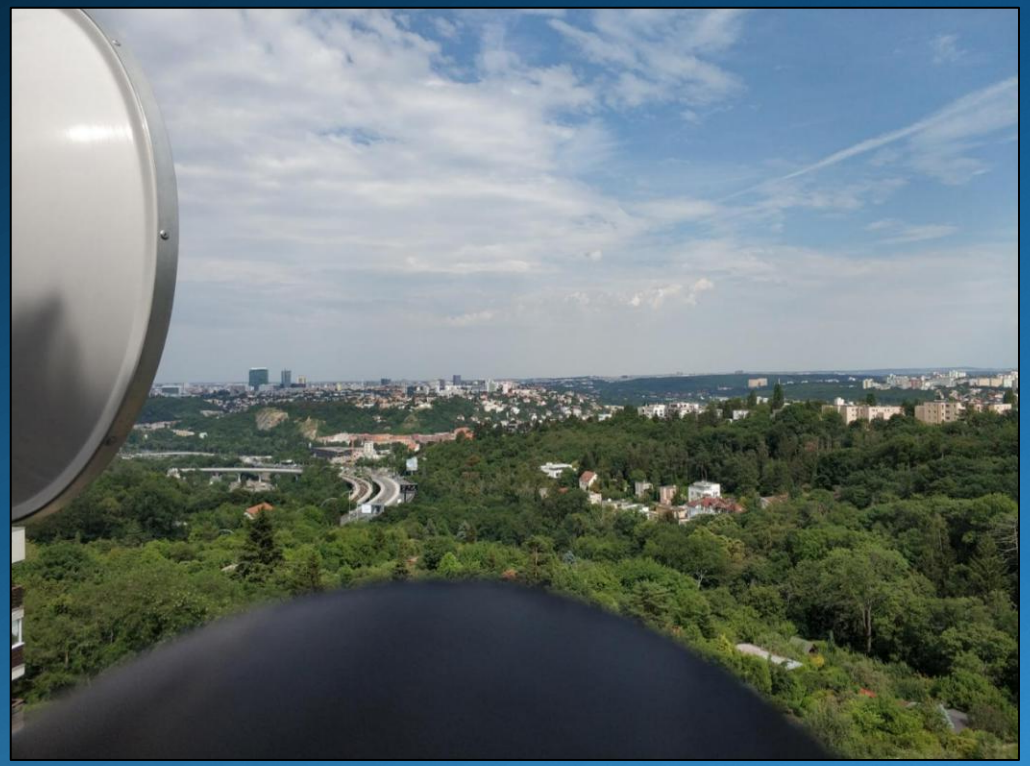
Video available on Youtube: Aircision page

AIRCISION

Full duplex communication in Prague, Czech Republic (2022-2023)

Alice's view

Bob's view



Data communication of 10 Gbps over 6.1km

Up to 4 Tbps over 1.8 km in Portugal (2023)

Achieving Multi-Terabit FSO Capacity with Coherent WDM Transmission Over a 1.8 km Field Trial

Marco A. Fernandes[1], Gil M. Fernandes[1], Bruno T. Brandão[1], Manuel M. Freitas[1], Nourdin Kaai[2], Alina Tomeeva[2], Bas van Der Wielen[2], John Reid[2], Daniele Raiteri[2], Paulo P. Monteiro[1], Fernando P. Guiomar[1]

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Abstract *Using terrestrial optical head prototypes, we experimentally demonstrate 4 Tbps transmission over a field-deployed 1.8 km FSO-link resorting to coherent optics, wavelength multiplexing, optimized coding, and atmospheric turbulence mitigation through optical pre-amplification.*

Introduction

Free-space optics (FSO) have been emerging as a popular solution for next-generation wireless networks, providing advantages over its radio-frequency (RF) counterpart such as unlicensed spectrum, immunity to electromagnetic interfer-

ing a net bit-rate of 400 Gbps. The signal is then pulse-shaped by a root-raised cosine (RRC) filter with 0.1 roll-off, and uploaded to an arbitrary waveform generator (AWG) with 45 GHz bandwidth and 120 Gsps sampling-rate (Keysight M8194A). Afterwards, optical modulation is per-

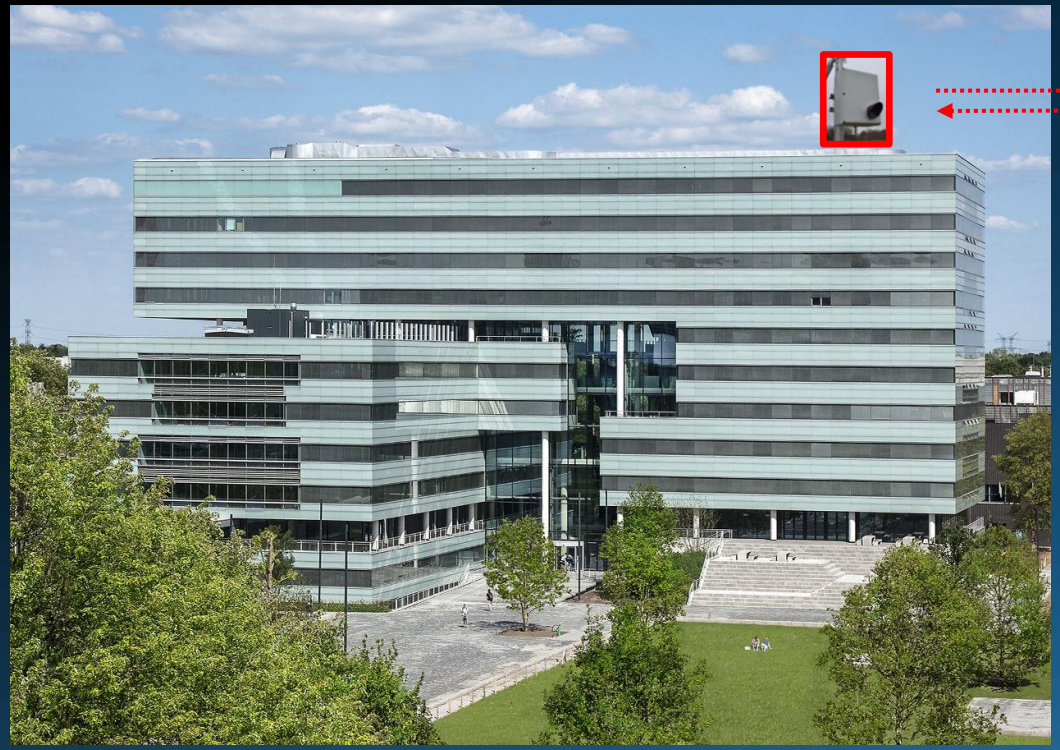
Collaboration with the Portuguese Institute of Telecommunications.

Optical Heads proved suitable for Tbps data rate.

Multiple modulation schemes have been tested in real environment conditions.

Demonstrator available in Eindhoven, the Netherlands (2024-2025)

Flux Building at TU/e



Aircision FSO link
(4.6km)

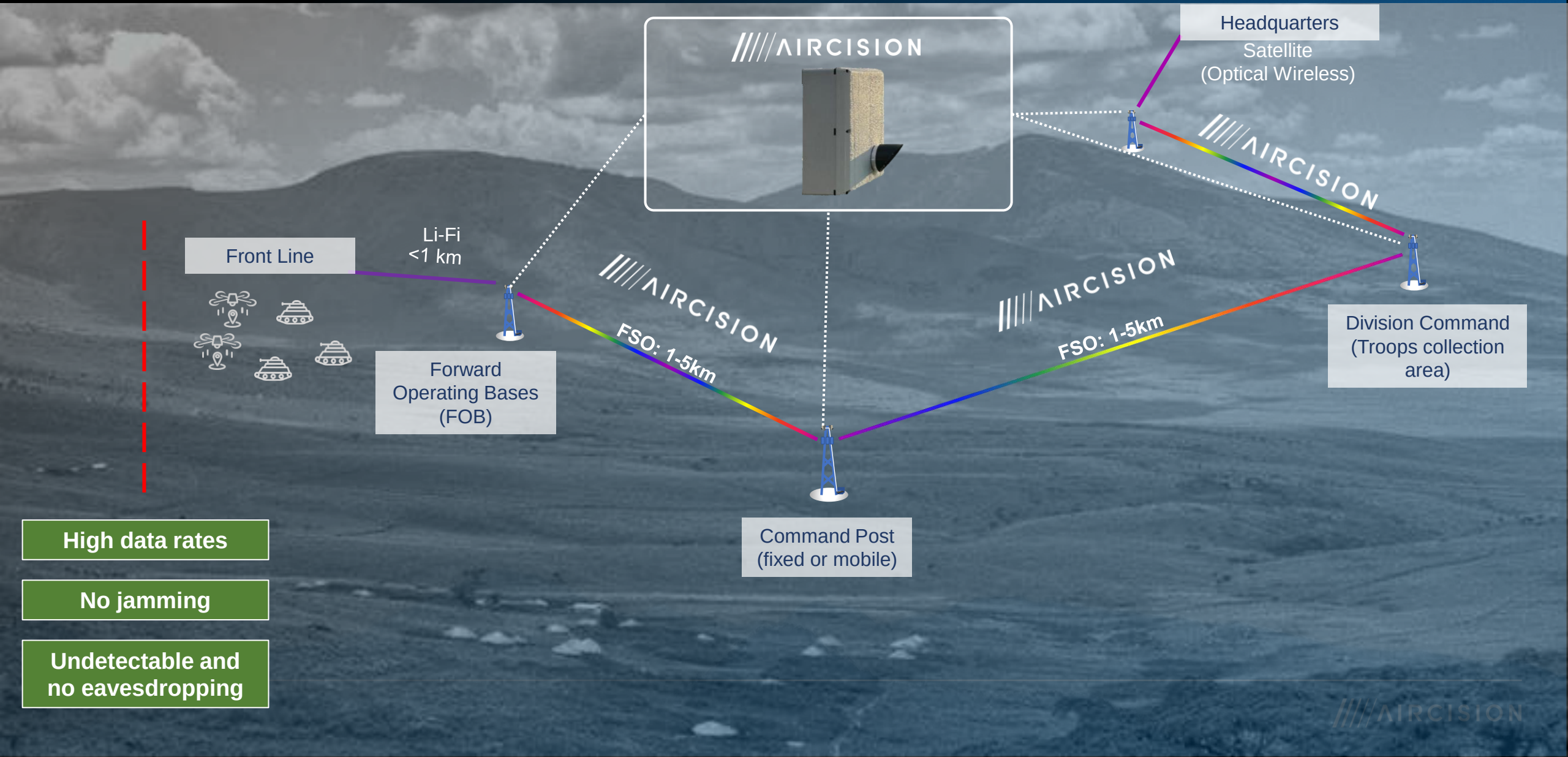
High Tech Campus 37

Data communication of 10 Gbps over 4.6km,
collaboration with Technology University of Eindhoven (TU/e)

“5.7 Tb/s Transmission Over a 4.6 km Field-Deployed Free-Space Optical Link in Urban Environment”

Top 5 in the Corning Outstanding Student Paper Competition at the OFC Conference 2025

AIRCISION: Point to point Free-Space Optics (FSO)



High data rates

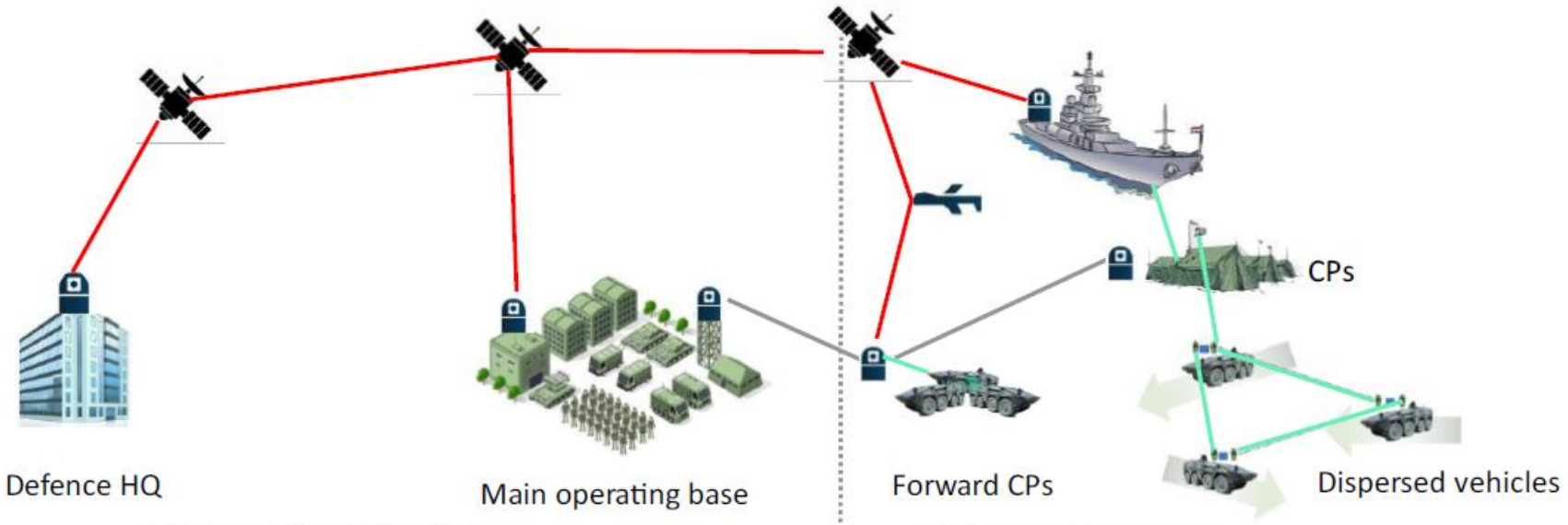
No jamming

Undetectable and no eavesdropping

Optical Wireless Alliance

Netherlands Optical Communications Alliance

Delivers Secure, Untraceable, Jam Resistant and Intercept-Proof Communication Solution for NL Defense and NATO



WHAT DO WE BRING HERE?

- Redundancy
- Bandwidth
- Sovereignty
- Remote sensing
- Low probability to Intercept

WHAT DO WE BRING HERE?

- License free
- Low probability to Detect
- Low probability to Intercept/Jam
- Reduction of Electromagnetic footprint
- Ease of deployment vs wired

Materiel and IT Command
Ministry of Defence

trulifi
by signify

AIRCISION
empowering connectivity

FSO INSTRUMENTS

TNO innovation for life

Secura
A BUREAU VERITAS COMPANY

SMART PHOTONICS
Independent InP Foundry

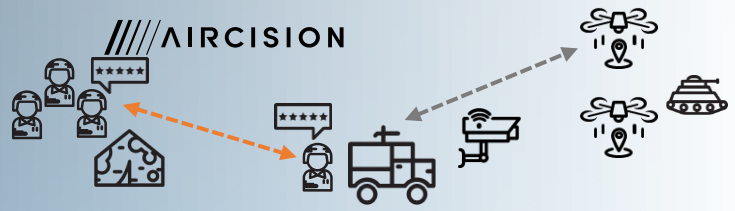
BRAINPORT EINDHOVEN

Brainport Innovation and Technology for Security
Dual-use solutions in Brabant

Adding value in multiple markets (dual-use)

Defence network and tactical comms

- Ultra-secure high-capacity mobile connectivity (harder to detect and jam)
- Rapid deployment for tactical teams



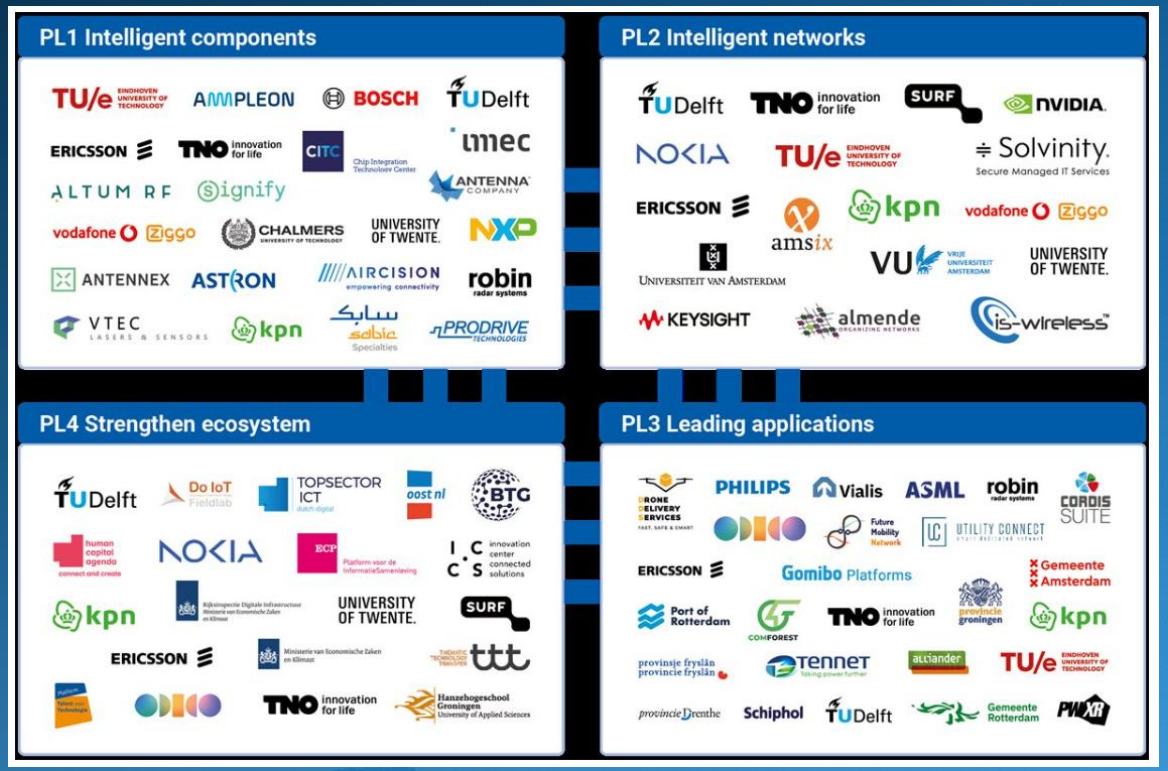
Private Networks (Enterprise 5G)

- Ultra-secure high-capacity dedicated networks

Broadband and Mobile Backhaul (5/6G+)

- Free of spectrum license (cost effective)
- High Backhaul capacity to support 20k homes/offices

Leveraging the strong telecom, optics and photonics ecosystem in the Netherlands and Europe



https://futurenetworkservices.nl/

Quantum Keys Distribution

Photonics Chips

Adaptive Optics

Machine Learning (Link Budget)

Hybrid Systems (RF / Fiber Optics)

AIRCISION

AIRCISION

empowering connectivity

Expanding team

Telecom, Software and Optics Engineers

Partnerships

Research Institutes and Industrialization / Manufacturing

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empowering connectivity

Luís Oliveira

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