



Aurelis Optical LAN for Airports

Enlighten your LAN with a high-performance network infrastructure that delivers sustainable and scalable connectivity for advanced digital operations

NOKIA

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Powering the digital airport

Airports have always been at the forefront of advances in technology driven by their commitment to provide an efficient, enjoyable and safe travel experience for passengers. Today they are embracing Industry 4.0 digital technologies such as industrial IoT, artificial intelligence and machine learning to expand their operational awareness, automate processes and improve their end-to-end efficiency.

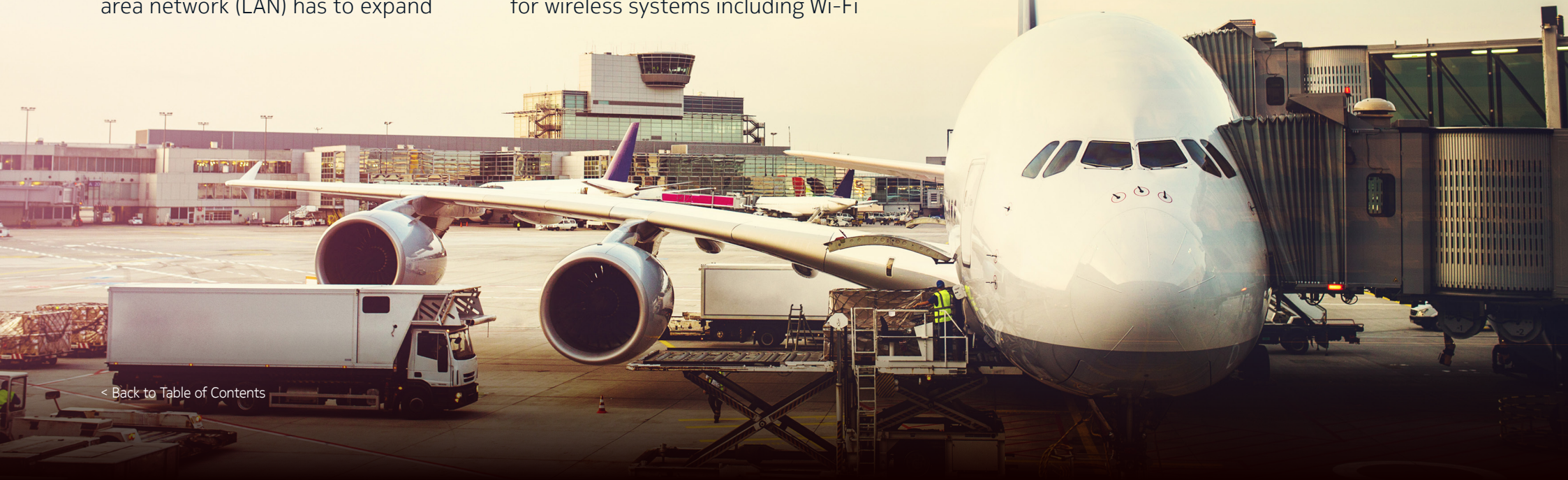
As the digital sophistication of the airport increases, the airport local area network (LAN) has to expand

to provide secure, high-bandwidth and reliable connectivity for gate operations, baggage systems, ticketing, security systems, biometrics, surveillance cameras, paging, digital signage and phone and video sub-systems.

The network must also provide connectivity to stakeholders providing services from restaurants and shops, to travel agencies and ground transportation support. It should deliver robust support for wireless systems including Wi-Fi

for passengers and private wireless for airport operations, as well as critical communications for police and first responders.

Light on infrastructure, light on energy consumption, and light on total cost of ownership, Aurelis Optical LAN provides a cost-effective, scalable and flexible LAN that can support all of your airport sub-systems and grow with you as you adopt new digital applications and services in the future.



Evolving the Airport LAN

The rapid growth in bandwidth requirements over the years has likely led you to make multiple upgrades to your airport LAN. This may take the form of running new copper cabling or adding new generations of switches and routers. Whether contemplating new builds or upgrades, you need a more scalable and sustainable approach to the airport LAN.

Passive optical LANs (POL) leverage the tremendous bandwidth capacity of optical fiber, as well as its ability to cover large distances without the need for intermediate electronics — up to 20 km of distance between the central optical switch and modems. The reduced need for intermediate electronics, enables you to gain space that can be used for concessions or retail.

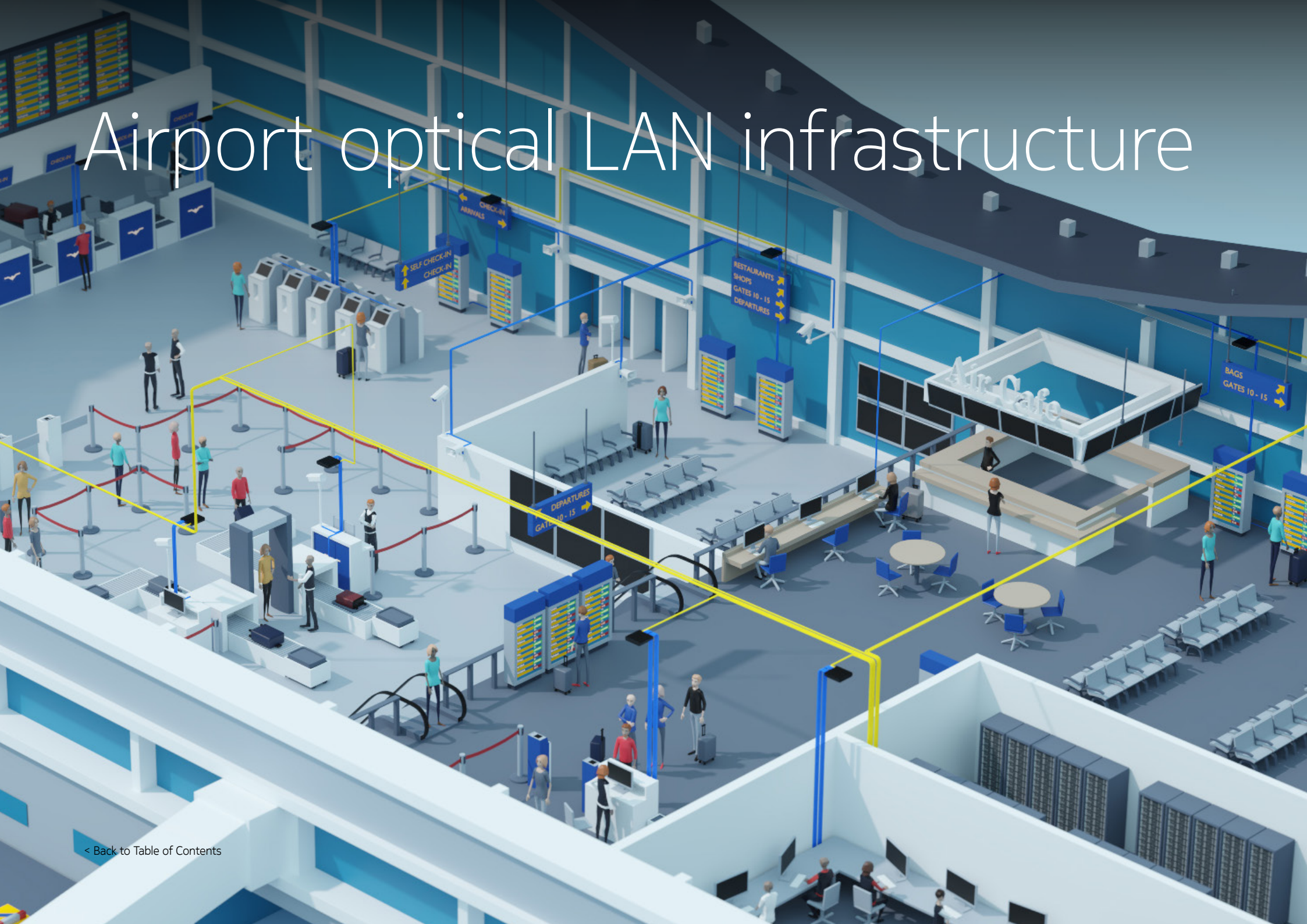
Most airports today have deployed CATx-based LAN networks. These networks are distance restricted and require a closet or equipment room

no more than 90 meters away from the end device. These wiring closets and rooms take up space that cannot be monetized, as well as introducing additional costs such as HVAC and fire suppression. The space gained with POL can be used for concessions or retail — valuable non-aeronautical revenue generation for the airport.

Fiber's ability to support terabits of bandwidth also provides investment protection for the airport. Copper-based CATx cabling has bandwidth limits that will make it unable to meet the ever-growing bandwidth hunger of passengers and digital operational processes in the future. The costs associated with upgrading a passive CATx cable infrastructure are significant. With its much larger capacities, a POL solution avoids these costs and provides you with the wireline LAN foundation to fully support your digitalization journey.

Aurelis Optical LAN offers high reliability with no single point of failure, enabling always-on performance. It is designed to support service availability up to 99.9999% of the time (six nines). Airports have many sub-systems with a range of service availability requirements. Aurelis Optical LAN fully supports this mix of service requirements for all of your airport sub-systems and is able to scale as your needs expand. The Aurelis Optical LAN is very flexible, supporting from tens to tens of thousands of end devices.

Airport optical LAN infrastructure



Aurelis Optical LAN

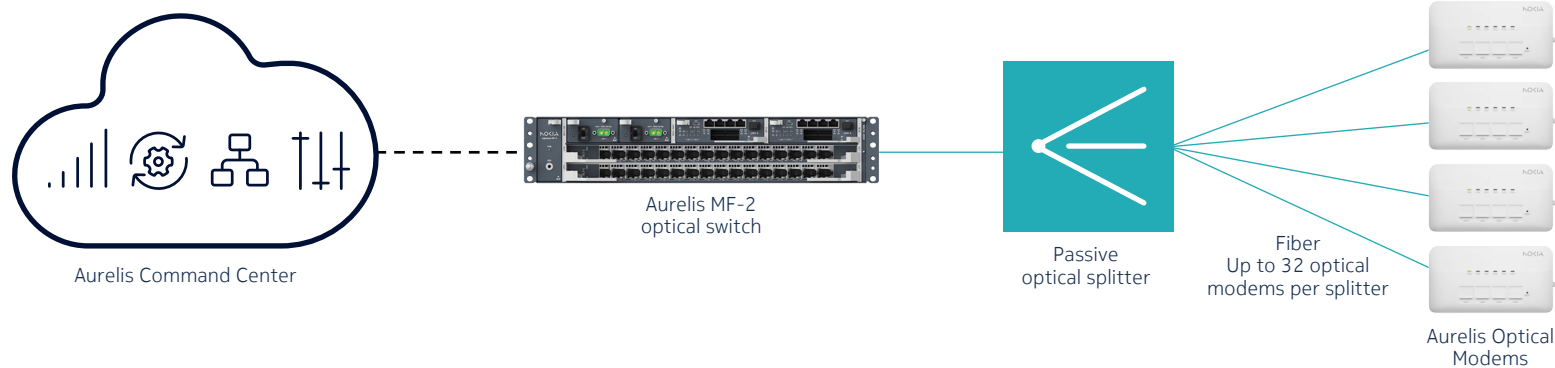
Aurelis Optical LAN for airports uses a fiber-based LAN technology to address the shortcomings of today's copper-based LANs and meet the requirements of Airport 4.0. The lightweight and space-saving LAN solution uses fiber optic cabling and splitters, thus avoiding the power and cooling costs associated with traditional CATx LAN infrastructure.

Aurelis Optical LAN has a simple, flat architecture. The central optical switch is typically installed in the main

IT room of the airport. Optical modems terminate the fiber and provide Ethernet connections to the airport subsystems or end devices, with the option to support Power over Ethernet (PoE).

The connection between the optical switch and optical modems is based on single mode fiber. A passive optical splitter in between the optical switch and the optical modems allows the optical switch to support up to 128 optical modems per optical

switch port. There are different optical splitter variants, such as 1 to 32 split (1:32), which would provide 32 fiber connections from a single optical switch port. The optical switch also provides the connection to the airport campus core network. The Aurelis Optical LAN network is managed by the Aurelis Command Center.



Take control of your operations

The Aurelis Optical LAN network is managed by the Aurelis Command Center. It is an advanced management solution optimized for performance and usability in enterprise environments such as an airport. As part of the Aurelis Optical LAN solution, Aurelis Command Center provides a highly intuitive, simplified environment for configuration, automatic service activation, fault reporting, troubleshooting and maintenance.

Despite the growing scale and number of connections within your airport LAN, Aurelis Command Center removes the complexity from airport IT operations, helping you to better serve your clients' and partners' connectivity needs and increasing your non-aeronautical revenue.

A few highlights of Aurelis Command Center management system are:

Service offering

The Aurelis Command Center simplifies management of the network, with quick and easy rollout of new services. Activation of new services is facilitated with pre-defined service definitions tailored for specific uses. In addition, the Aurelis Command Center verifies your service level agreements (SLAs) using graphed metrics.

Maintenance

The Aurelis Command Center provides easy navigation to network elements and their physical locations in the terminal using a realistic network view based on your specific floorplan.

Automation

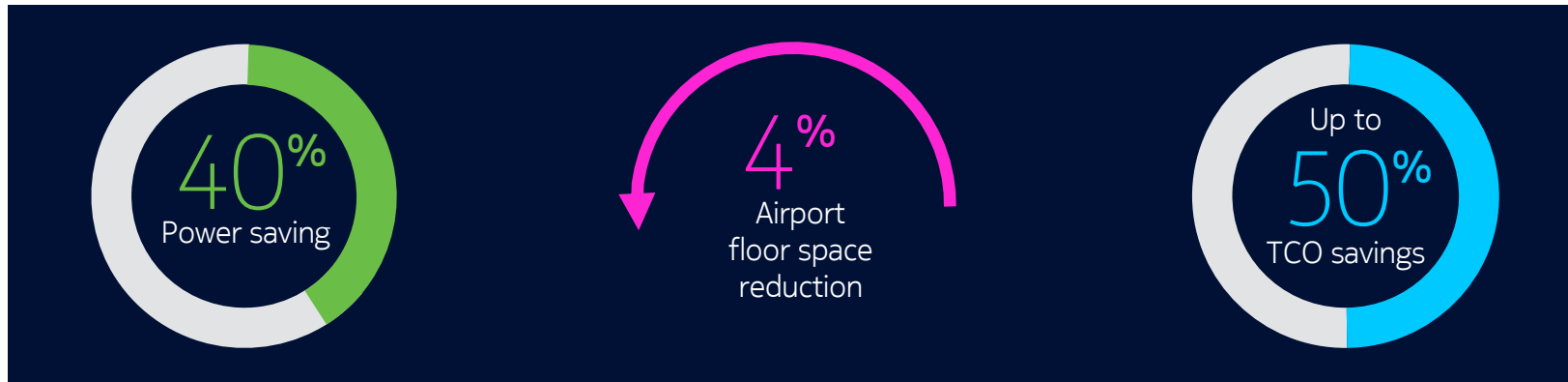
The Aurelis Command Center supports many automated capabilities such as the use of predefined services. In addition, it simplifies network growth with automated optical modem discovery and activation.

Security

The Aurelis Command Center supports role- and resource-based access control. This ensures that IT staff can only access those parts of the network to which they're allowed based on pre-defined roles such as admin, designer, observer, etc. The Aurelis Optical LAN also comes with data encryption.

The benefits of going optical

The Aurelis Optical LAN introduces several benefits to your airport. The three main ones are described below.



Saving space

Nokia's solution removes the need to use airport closets or equipment rooms that hold racks for switches, MDF and HVAC. The space gained can be used for retail, concessions or other use cases, thus improving the passenger experience as well as the ability for the airport to generate more non-aeronautical revenue.

Cost efficiencies

The costs associated with the Aurelis Optical LAN are significantly lower than CATx solutions. In addition to

lower CAPEX and OPEX, additional cost benefits include reduced power consumption, reduced HVAC investment and reduced footprint (for new builds). By combining savings in capital expenditure with reduced maintenance, cooling, power, and space requirements, an optical LAN can lower total cost of ownership by up to 50% compared to CATx solutions.

Fiber is an investment protection for the airport that anticipates the ever-growing data needs of passengers, partners and airport

operations and avoids the costly replacement cycles that passive CATx cable infrastructure imposes.

CO₂ reduction

The Aurelis Optical LAN is a proven "green" solution and the power consumption of Aurelis Optical LAN is much lower compared to a CATx solution. CATx solutions use a lot of intermediate switches, which consume a significant amount of power. Optical LAN power savings vary a lot depending on network configuration and size and can be as much as 40%.



Nokia and aviation

Nokia has extensive experience serving the Aviation Transport Industry (ATI) with a client base including ANSPs, airports, airlines, aircraft manufacturing and MRO companies. Nokia has been engaged in a number of optical LAN projects within the aviation industry. With respect to airports, Nokia has been involved with greenfield and brownfield projects connecting various airport subsystems to the POL network.

In addition, Nokia's optical LAN solution has been deployed at airport admin buildings and airport hotels.

Nokia has also been involved with aircraft maintenance, repair and overhaul (MRO) companies connecting their hangars and providing surveillance networks. Globally, Nokia has deployed more than 700 Optical LAN networks with enterprises in all industries.

Nokia is well placed to build the essential fabric of the digital airport, providing the reliable connectivity infrastructure to connect all people, processes and systems and create benefits for passengers, airlines and partners.

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At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering the future where networks meet cloud to realize the full potential of digital in every industry.

Through networks that sense, think and act, we work with our customers and partners to create the digital services and applications of the future.

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