



Pan-African backbone  
network uses advanced  
optical transport  
technologies to  
provide scalable,  
reliable service coverage  
to a burgeoning region

Case study







# Reducing the digital divide

A young, growing population and expanding urbanization are driving increased demand for data, mobile voice and mobile money services in many parts of Africa. With limited infrastructure and low telecom penetration, there is an opportunity to connect consumers, enterprises and economies and reduce the digital divide.

The continent's second-largest communications service provider (CSP) and leader in telecom and mobile money services wants to capitalize on this opportunity by sustainably delivering affordable and reliable services across 14 African countries.

The CSP's mission is to help transform lives across sub-Saharan Africa by fostering financial inclusion, driving digitalization, supporting education and empowering over 150 million customers.



# Winning with technology

To achieve its mission, the CSP is using advanced technologies to create a leading, modernized network. The new network will provide the data capacity to meet rapidly growing demand and enhance connectivity and digitalization in the CSP's markets.

This means expanding the network's footprint while maximizing its capacity, agility and uptime. The new backbone network is extensive, resilient and reliable.

## Key network design criteria:

- Expanded urban and rural coverage
- Seamless, scalable, future-proof capacity
- Agile and efficient network and service operations
- Resilient networking for service continuity





# Solution

- The CSP partnered with Nokia to build an OTN/WDM east-west-south backbone network. This approach was guided by a five-year traffic demand forecast driven by in-region customers and large traffic demand generated by webscale companies linked to the arrival of new subsea cables such as 2Africa and Equiano. The network comprises 139 sites, including over 50 reconfigurable optical add/drop multiplexer (ROADM), 70 inline amplifier (ILA) and 18 data center locations.
- Nokia 1830 Photonic Service Switch (PSS) optical transport platforms provide the network's foundation. These platforms use Nokia Photonic Service Engine Super Coherent (PSE-s) optics to boost total capacity to multiple terabytes.
- To meet its main challenges, the CSP used the Nokia application-optimized optical line system solution to maximize critical network scalability, flexibility and resilience.
- Key enabling components:
  - 1830 PSS-8 (access/metro), 1830 PSS-16II (metro/regional/long-haul) and 1830-24x OTN/WDM (core) platforms supported by common hardware and a common management system
  - PSE-Vs Super Coherent optics with 600G muxponders and 1Tb uplinks to optimize capacity, reach and networking efficiency
  - Integrated ROADMs (iROADMs) with modular C+L-band and CDC-F configurations to double fiber capacity and provide dynamic, reconfigurable networking
  - Layer 0 GMPLS intelligent control plane with protection and restoration capabilities to maximize network uptime
  - Nokia commissioning, integration and consulting services to ensure seamless and timely deployment

# Application-optimized optical line system solution

**Seamless scalability:** Modular and integrated C+L-band DWDM options enable the solution to double fiber capacity. The modular optical line system solutions scale network capacity with selective C+L upgrades—link by link, node by node or degree by degree. When the CSP needs more capacity, it can simply upgrade ROADM and ILA sites with additional L-band modules.

The modular C+L solution also offers an option to install combined C+L nodes at ILA sites during the initial deployment stage without needing to revisit them for future upgrades. When the CSP expands capacity, it only needs to upgrade ROADM sites with additional L-band equipment. This saves time and money and reduces truck rolls to multiple sites.

Both modular options allow the CSP to avoid the cost of leasing additional fiber pairs, reduce operating costs and minimize future network disruptions.

The Nokia 1830 Integrated C+L line system can maximize fiber capacity in a single deployment to ensure maximum density and operational simplicity. It integrates the

C- and L-band components into a single, managed continuous solution for ROADM and ILA functions.

- Benefit: Cost-effectively and seamlessly install and expand network capacity to optimize CAPEX and reduce OPEX

**No-compromise flexibility:** Nokia offers a range of optical line system solutions to provide the capacity, reach and flexibility required for access, metro, regional, long-haul and subsea applications. The Nokia 1830 family supports WDM optical line system functions in telco-optimized chassis and compact modular data center-optimized chassis.

These application-optimized, no-compromise solutions provide a full suite of iROADMs to support small, low-degree, low add/drop nodes and large, high-degree, high add/drop nodes. The CSP can choose the ROADM configurations that best address its needs—from classic fixed-port, static-wavelength ROADMs to dynamic CDC-F ROADMs. FlexGrid ROADMs and multiple

configuration options use evolving coherent DSP modulation schemes. This makes them key building blocks for using network automation to meet dynamic traffic needs. Advanced C-F and CDC-F FlexGrid ROADMs with flexible add/drop options enable dynamically reconfigurable networking that can autonomously deploy, optimize and restore wavelengths.

By taking advantage of common, interoperable hardware and management across data center- and telco-optimized platforms, the CSP will be able to maximize deployment flexibility and simplify its operations and sparing plans.

- Benefit: Maximize network bandwidth agility and simplify architectures and operations to reduce OPEX and maximize revenue generation

**Ultra-resilience:** Nokia application-optimized line system solutions will help the CSP maximize network uptime to increase reliability. Optical

layer restoration and protection options help ensure high network reliability for mission-critical services.

The solution offers application-driven network resilience options. One option is to implement Layer 0 1+1 protection switching that provides ultrafast <50 ms wavelength switching on reserved dual paths. A second option is to implement optical layer restoration with the ability to automatically reroute and restore traffic around network faults using CDC-F and GMPLS—thus avoiding a 50 percent capacity penalty. A third option combines protection switching with optical layer restoration for the ultimate mission-critical service assurance capability.

- Benefit: Maximize network availability and service uptime and optimize network utilization to adhere to service-level agreements (SLAs) and maximize revenue generation



# Why this CSP chose Nokia

## A scalable, flexible, resilient solution

- Application-optimized optical line systems based on industry-leading C+L-band solutions, iROADMs and proven critical-network protection options
- 1830 PSS platforms supported by common hardware and management systems versus inflexible one-off, one-size-fits-all line systems
- PSE-Vs Super Coherent optics that enable future-proof evolution to PSE-6s when needed

## Professional integration and consulting services

- Experienced in planning and deploying the world's largest networks

## A proven and reliable partner

- The preferred and leading optical networking partner to the top CSPs, carrier-neutral providers (CNPs), and webscale companies in the region and globally
- An unmatched performance record as the leading supplier for metro, regional and national long-distance networks based on WDM, OTN, C+L and layer 0/1 protection

Learn more about Nokia optical solutions at

<https://www.nokia.com/networks/optical-networks/>





Nokia OYJ  
Karakaari 7  
02610 Espoo  
Finland

Tel. +358 (0) 10 44 88 000

CID214125

[nokia.com](https://nokia.com)

# NOKIA

## About Nokia

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

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

Nokia is a registered trademark of Nokia Corporation. Other product and company names mentioned herein may be trademarks or trade names of their respective owners.

© 2024 Nokia