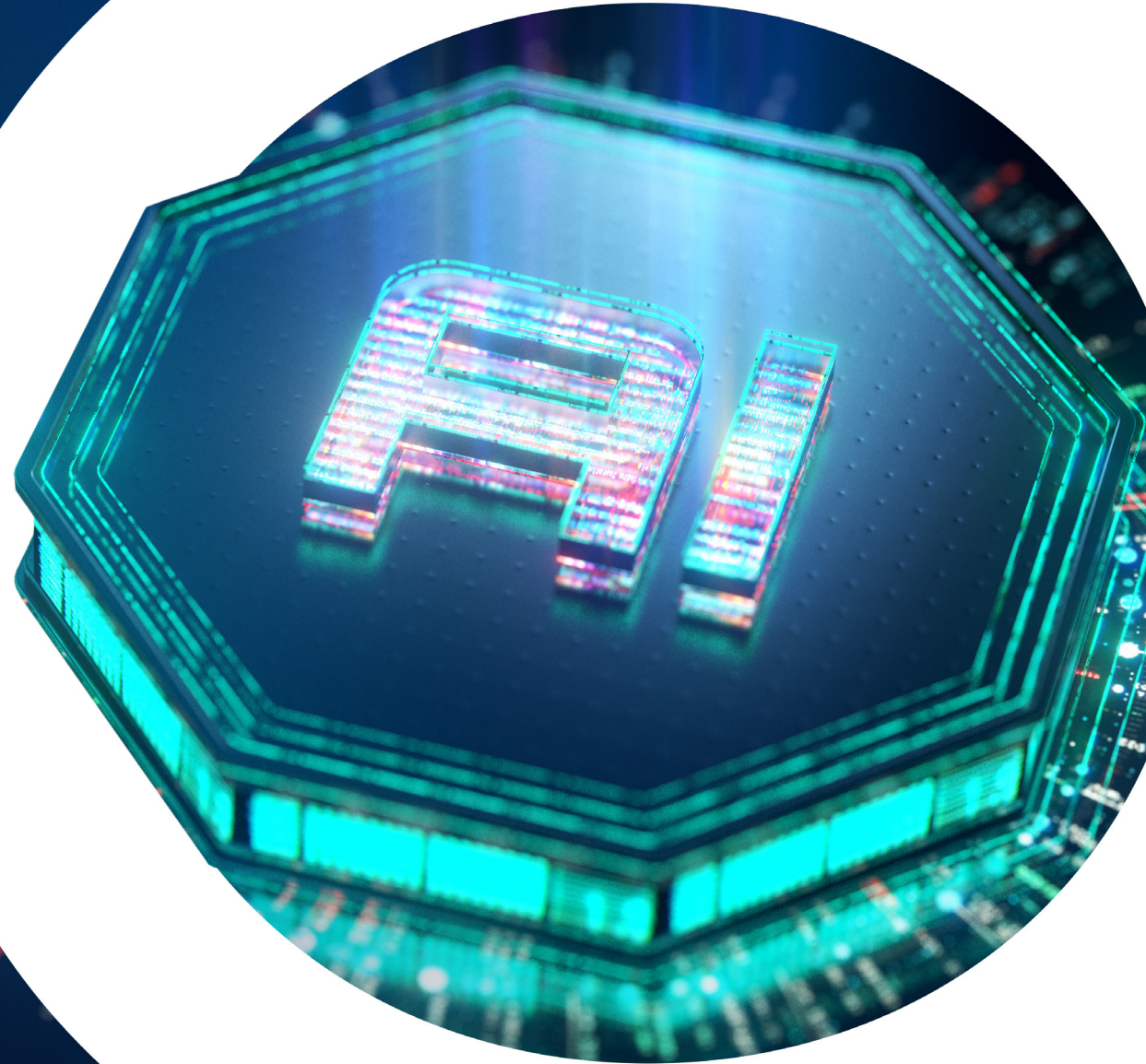


## CASE STUDY

# stc starts autonomous RAN operations journey with AI-powered MantaRay AutoPilot

- 10,000 autonomous corrective actions per hour by AutoPilot
- Unique 15-minute machine learning interval for AI algorithms
- 10 percent average enhancement in downlink throughput

NOKIA | stc



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**“Together with Nokia, stc is pioneering a new era where artificial intelligence revolutionizes the telecom industry.**

When Nokia introduced us to AutoPilot and its advanced AI algorithms, we knew that it would take us to the next level in transforming our network with autonomous operations. This was particularly important for optimizing our 4G network during the Hajj, when close to two million people gathered in the city of Mecca.

AutoPilot allowed our network to operate autonomously and efficiently, resulting in an enhanced throughput at the time of exceptional traffic load. Our engineers concentrated on maximizing the outcomes from machine learning, which Nokia helped us fine-tune to operate in an outstanding 15-minute learning cycle throughout this seasonal event”

**Mohammed M. Albadrani**

Operations VP, stc



**The largest mobile network operator in Saudi Arabia, stc is focused on innovation and the evolution of technologies that enable digital transformation in this fast-growing market, supporting Saudi Vision 2030.**

stc is continuously evolving and growing its mobile network to offer enhanced coverage and capacity for its subscribers.

Since the first deployment of Nokia Self-Organizing Networks (SON) back in 2021, stc has been running Nokia MantaRay SON continuously in closed-loop automation with excellent results for RAN performance and energy efficiency optimization.

In 2024, stc decided to implement the AI-powered MantaRay AutoPilot that enables autonomous RAN operations.

This case study illustrates how the artificial intelligence and machine learning capabilities of AutoPilot helped stc elevate network automation to the next level, resulting in significantly enhanced efficiency and higher throughput without any human interaction.

## OBJECTIVE

# High-quality mobile service during a massive seasonal event with AI-based optimization

The Hajj pilgrimage brings together millions of people who want to share their experiences using phone calls and mobile applications. For stc, a key objective was ensuring an enhanced user experience with a constant level of reliable service for all its subscribers during the entire duration of the Hajj.

This seasonal event brings an exceptional peak in capacity load of voice and data traffic in the city of Mecca. In 2023, stc was able to maintain consistent network performance during the Hajj using Nokia MantaRay SON in a closed-loop mode for automated optimization.

In 2024, stc wanted to take network automation to the next level and set the goal of reaching level 4 of TM Forum's autonomous network framework.

Thanks to built-in artificial intelligence, MantaRay AutoPilot can already reach level 4 today, which means highly autonomous operations.

Based on these extensive AI capabilities, stc chose to implement the AutoPilot solution for boosting the efficiency and performance of its radio network.

### TM Forum's autonomous network framework

TM Forum's autonomous network framework defines six levels of automation, with level 0 being fully manual and level 5 fully autonomous. Each level describes to which extent a solution applies autonomous capabilities in network operations. The participation of humans and machines is an important factor in evaluating the network autonomy level.

Without AI, it is not possible to reach TM Forum's levels 4 and 5

## SOLUTION

# AI-powered autonomous RAN operations with AutoPilot



Based on the positive experience with MantaRay SON for automated network optimization and the target of reaching a higher level of automation, stc.

AutoPilot autonomously optimizes the network. Its AI algorithms manage the SON module orchestrations without human intervention to reach the performance objective that the operator has defined for a set of cells in the radio network.

AutoPilot autonomously detects any performance degradation compared to the objective, identifies radio network incidents, analyzes them, initiates corrective actions and verifies the results. This helps achieve operational efficiency and enhance network quality in environments marked by exponentially growing complexity.

The season of Hajj represents a unique challenge for mobile network operators. Nokia helped stc tailor the AutoPilot solution to manage the exponential growth in traffic volumes and the fluctuation in load during the event.

Typically, AI algorithms are trained with historical data from the network that is measured over weeks; however, historical data is not available for a massive gathering like Hajj. In the implementation Nokia fine-tuned for stc, AutoPilot started with zero data, measured network performance at exceptionally fast 15-minute learning intervals and updated the AI model accordingly.

The two key SON modules in this solution included Component Carrier Load Balancing (CCLB) and Sector Load Balancing (SLB).

# Enhancing downlink throughput with traffic-balancing SON modules

When many people gather in the same area and use mobile services simultaneously, radio network congestion can occur.

AutoPilot autonomously orchestrated the Component Carrier Load Balancing (CCLB) and the Sector Load Balancing (SLB) SON modules to ensure high downlink throughput for all subscribers also during peak traffic hours.

## How does Component Carrier Load Balancing work?

The CCLB module intelligently balances the load between component carriers when the distribution of load is uneven among the frequency layers in a cell sector.

The module transfers idle mode users and connected mode users across frequency layers within the defined sector. It also equalizes the load across frequency layers that have a similar coverage within a sector.

## How does Sector Load Balancing work?

The SLB module intelligently balances the load between neighboring cell sectors that use the same frequency when the distribution of load is not even among those sectors.

The module optimizes the SON Mobility Load Balancing (MLB) algorithm to enable the transfer of connected mode users across the same frequency layer in the neighboring sector, and transfers those users.



## RESULTS

# Enhanced radio network throughput with AI-powered autonomous operations

AutoPilot helped stc unlock the power of artificial intelligence to autonomously optimize its 4G network in Mecca during a time of exceptional traffic load.

Despite traffic increasing by 40 percent during the Hajj, stc's network successfully maintained consistent connectivity. The key results were impressive:

- 10,000 autonomous corrective actions per hour performed autonomously by AutoPilot.

- A unique 15-minute machine learning interval for AI algorithms.
- 10 percent enhancement in average downlink throughput with traffic balancing.
- 30 percent higher cell utilization.

The next step for stc is implementing AutoPilot across its entire 4G network in Saudi Arabia.

Autonomous operations per hour

10,000

Enhancement in downlink throughput

10%

Unique learning interval for AI algorithms

15 min



# AutoPilot brings AI-driven efficiencies to the optimization of complex multi-supplier networks

As operators accelerate their investments in 5G, they typically deploy technology from multiple RAN suppliers. This presents an additional challenge for performance optimization.

Today, manual operations are just not efficient and cost-effective enough: we need artificial intelligence to take the lead.

The AI-powered MantaRay AutoPilot significantly reduces the effort required for manual planning and optimization work. This allows human engineers to focus more on business-relevant operations that require unique competencies.

With its enhanced AI capabilities, AutoPilot can elevate the cost savings and productivity enhancements of autonomous radio network optimization to a completely new level while building on the automation features of the industry-leading MantaRay SON platform.

Together with stc, Nokia has proven the capabilities of AutoPilot to ensure outstanding mobile user experience during a time of exceptional traffic load in a radio network.



Visit MantaRay  
SON webpage to  
learn more.

Nokia OYJ  
Karakaari 7  
02610 Espoo  
Finland

Tel. +358 (0) 10 44 88 000

CID: 214374

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

# 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, which is celebrating 100 years of innovation.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. 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.

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