

# From data-driven to intent-based network operations

**Digital Nasional Berhad's stunning  
success with intent-based operations**



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In partnership with



# The fast track to data-driven network transformation

Digital Nasional Berhad (DNB) created the world's first multi-operator core network (MOCN), just six months after its founding, thanks to Ericsson Operations Engine (EOE) and other tools provided by Ericsson.

## Executive summary

In 2021, against the backdrop of the COVID-19 pandemic, the Malaysian Ministry of Finance began an initiative to transform the economic potential of the region and bridge the digital divide, by driving the adoption of 5G services nationwide. This led to the creation of DNB, a special-purpose vehicle company and wholesale mobile operator intended to meet the needs of six different, but firmly established, telecom service providers and to ensure that 5G connectivity was affordable for the people of Malaysia.

The tender was granted in July 2021, and DNB's goal was to provide 5G infrastructure less than one year later. Initially, DNB had no staff, no processes and no offices, a position from which they had to develop rapidly to run the networks of the six service providers, all of which had different requirements and processes. Such a task had not been done before anywhere in the world, meaning there was no roadmap to follow.

Twelve weeks after its launch date, a fully functional network operations center (NOC) was set up, and in collaboration with the Ericsson Managed Services team, DNB successfully launched Malaysia's 5G infrastructure in under six months. This is shared between the six Malaysian service providers (now five, after two of them, Celcom and Digi, merged) and DNB has firmly established itself as the builder of the world's first 5G MOCN.

The results have been nothing short of spectacular and were made possible by Ericsson Operations Engine (EOE), the data-driven operating model that manages the complexity of 5G networks in an automated way, while also providing significant increases to network uptime and reductions to operating costs and alarm rates.

## The business challenge

It is well understood that requirements on networks are increasing all the time, due to growth in demand, the increasing complexity of offered services and the introduction of multiple new technologies. Networks need to operate faster and more efficiently while ensuring they are free from faults and human errors.

In DNB's case, six separate service providers each brought their own sets of requirements, and six separate sets of systems and processes, meaning DNB's task of onboarding and providing a framework of NOC to NOC communication was one of great complexity. Added to this was the difficulty of scheduling major and minor software upgrades, and the rollout of new capabilities and features while ensuring total network availability and integrity. These upgrades had to be carried out in a way that avoided any negative effect on the other service providers' networks, either through the demands leveraged upon the network, or through an individual core network issue that had the potential to affect the wider users of the network. To manage all this complexity, an automated solution proved a necessity, and so the data-driven, machine-learning-capable EOE became a crucial solution to explore.



Digital Nasional Berhad (DNB) was established in 2021 to deliver key outcomes in line with the goals of the Malaysia Digital Economy Blueprint (MyDIGITAL), namely: To accelerate the availability and adoption of 5G to support the transformation of Malaysia to become a regional leader in the digital economy and to promote a more inclusive society.

"When DNB started off in 2021, it was a startup. Literally from the ground up, we had to build the people, we had to build the process. We didn't even have an office."

Ken Tan – Chief Technology Officer of Digital Nasional Berhad

**Additional challenges**

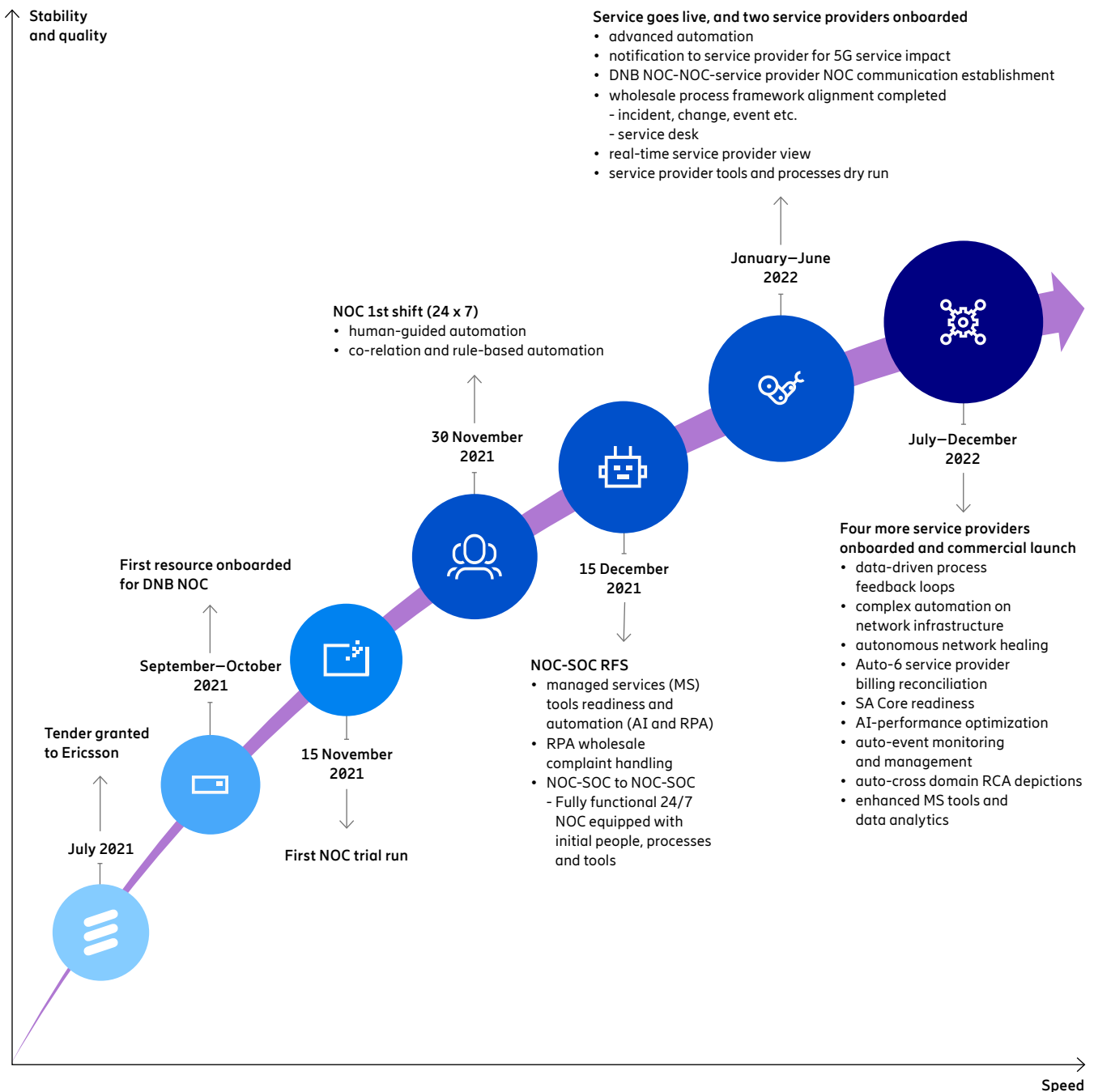
DNB also had to manage each service provider’s Radio Access Network (RAN) partition per site, their billing operations, customer complaint handling and network KPI optimization, all of which added up to a huge challenge for DNB to find the “right path” to an effective solution that could meet all of these requirements.

There were also ethical and security considerations. Each service provider’s business-sensitive information, such as

real-time network performance data and reported faults, needed to be shielded from the others. This was a variable-heavy environment DNB was required to navigate, with each consideration being of equal importance to the others. Additionally, the fact that DNB was overseeing the creation of the world’s first MOCN only added to the challenge, as there were no roadmaps to follow from anyone who had successfully attempted this task before.

DNB’s solution needed to address a level of great complexity, that was only set to increase, taking it far beyond the capabilities of a human team of engineers. So, it followed that for Ericsson to help DNB succeed, a solution that could rapidly handle this complexity and lay the groundwork for further growth was required. Ericsson Operations Engine proved to be that solution.

**Figure 1: DNB and Ericsson’s six-month, six-service-provider 5G journey**



# Digital Nasional Berhad's key transformation tools

The combination of automation and data-driven processes used by EOE significantly increased network performance while reducing network complexity in a period of dramatic growth.

## Ericsson Operations Engine (EOE)

To manage the complexity of the various challenges it faced during the rollout of the network, DNB turned to EOE. This operating model is used to run multi-vendor, multi-technology network operations and facilitate the transformation to autonomy while ensuring high customer experience. The centralized platform applies processes to data applications and manages how they run the network. EOE makes use of closed-loop AI-based automation capabilities and data-driven processes that utilize machine learning to automate a network's management. This replicates and improves upon the reasoning of skilled engineers, as well as cognitive core-based, intent-based automation and API-based connectivity solutions while remaining capable of resolving conflicting requirements without compromising on service quality or profitability. The technology is agnostic, from a vendor and technological perspective, which when combined with automation, facilitated the introduction of standardization, generating increases in speed and accuracy.

EOE proved an effective solution owing to a number of key principles. It is AI and automation-driven, with qualified personnel still able to provide important oversight. Actionable insights are obtained from advanced analytics, which help operations move from a reactive stance to a predictive one over time, thanks to the intelligence gleaned from machine learning. Additionally, standardized global processes reduce complexity and increase scalability, while the combination of network engineering and data science allows for the introduction of new processes that help networks run more efficiently. EOE works on an end-to-end basis, which ensures that planning and optimization, dynamic deployment, applications development, collaborative innovation and data-driven

operations are covered and that network capabilities are enhanced, optimized and geared toward improving the customer experience. Going from zero networks to managing six separate and independently complex ones in under six months is an impressive achievement in and of itself, but the results obtained were even more remarkable.

## Significant efficiency-enhancing results

During a period of time that saw the total size of DNB's network grow by seven times, rule-based Autonomous Network Automation saw the overall 5G RAN alarm rate reduce by 90 percent in the first three months, dramatically lowering the requirement for human involvement. Within the first six months, machine learning led to effective auto analysis and correlation of alarms, and the subsequent network corrections resulted in the alarm rate reducing by 500 percent. In November 2021, DNB had 500 sites and the operation centers registered 320,000 alarms a day. In August 2022, the alarms had reduced to 1,200 per day, but the number of live sites had risen to 2,000.

In the same period, DNB's NOC response time shrank from 33 minutes to 3 minutes, a reduction of 90 percent, which was achieved by automating the first response on every fault received in the network. The number of incident hours that impacted service dropped from 5.38 hours per incident to 2.18 hours per incident, cutting the time taken in half. The service level agreement (SLA) of service desk responses rose from 48 percent to 100 percent for customer complaints reported via service providers to DNB. Complaint reception, service request (SR) creation in IT service management, SR assignment, problem type and location deduction, analysis of impacted network nodes and responses to service providers were all automated, which led to this incredible improvement.

AI and machine learning processes reduced the customer complaint resolution time by 90 percent. The automated feedback loop, which allows processes to be adjusted to meet business outcomes through service provider feedback and data obtained from the 5G network, saw 13 new processes implemented in phase 1, and an additional 7 processes in phase 2 based on Business Process Framework (eTOM) guidelines.

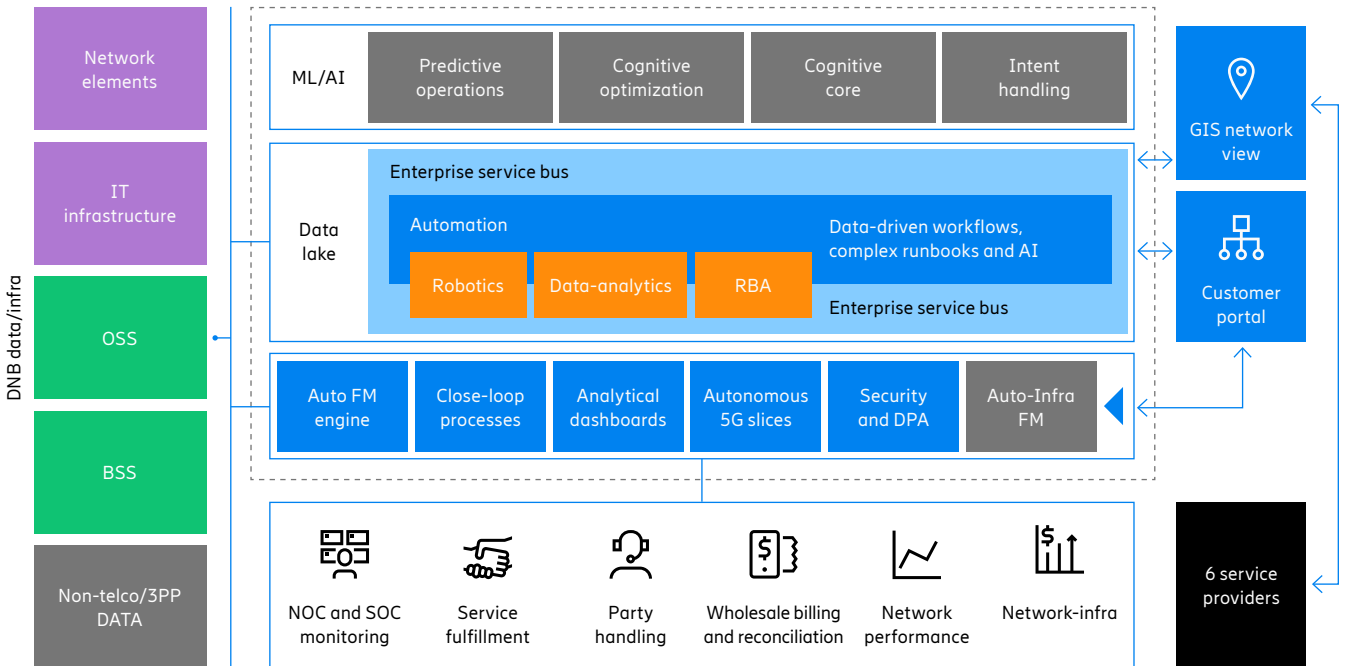
Network uptime rose from 97.5 percent to 99.8 percent with an average network throughput of more than 500 Mbps. This meant DNB secured one of the world's best network throughput experiences for end users, thanks to effective automation, feedback loops and analytical models which made use of the DNB network and other variables, such as weather conditions.

There was an increase in efficiency with a reduction in downtime and alarm rate, while there was a significant network performance improvement. Customer experience improved overall, as did the service desk response time, as auto-actuation of corrective measures meant that customer complaint resolution time fell by 90 percent and the proportion of automatically created trouble tickets increased to 95 percent.

"On day one, what DNB did with Ericsson was to deploy the Ericsson Operations Engine. This allowed DNB and Ericsson to utilize closed-loop automation and data-driven processes to manage the network seamlessly with all the existing operators in the market."

Ken Tan, Chief Technology Officer,  
Digital Nasional Berhad

Figure 2: Ericsson Operations Engine



**Augmenting human capabilities with AI, automation and analytics**

The benefits of EOE are not solely automated. In emergencies, and cases where the rules don't apply, expert human oversight is required to ensure an appropriate solution is chosen. To aid the experts in this task, real-time network visualization capabilities are provided through autonomous analytical dashboards. Operation service desk teams can see real-time geographic information systems (GIS) views of network coverage outage areas, along with information on trouble tickets, change requests and progress updates. Each service provider's network slice can also be visualized with a real-time view, and such oversight of the network allows for better management of the customer experience. To complete the circle of benefits, these interventions by engineers facilitate greater machine

**Ericsson Operations Engine**

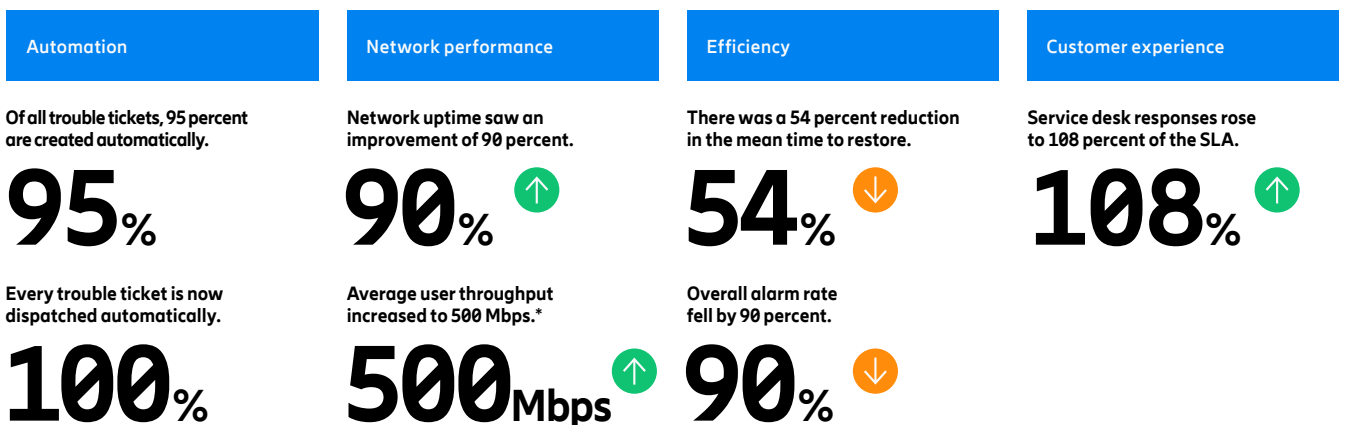
- Autonomous network automation: Auto-analysis and correlation of alarms and actuation in the network led to a 500 percent reduction in alarm count 6 months after its introduction.
- AI-based predictive 5G network management: Feedback loops from DNB's network data combined with analytical models brought about a network uptime greater than 99.8 percent.
- Data-driven processes: The management of DNB's wholesale

- operation was set up with an inbuilt data-driven process that led to the achievement of measurable business outcomes.
- 5G customer experience: real-time network visualization capabilities provided by autonomous analytical dashboards granted superior network visibility for customer experience management, while automated corrective actions reduced the customer complaint resolution time by 90 percent.

learning in cases where automation will be able to learn from and autonomously adapt to similar situations in the future. Traditionally, basic automation for a network could be described as human driven with

some assistance from automated systems. The key to DNB's success was the inversion of this principle, introduced by EOE: The network was system driven with some assistance from humans.

Figure 3: Measurable impact of EOE



\*Source: Ookla

# The future unlocked by intent-based operations

Following a successful proof of concept of intent-based operations (IBOs), DNB has blazed a trail for introducing profitability and additional 5G capabilities for service providers effectively and affordably, and in a way that scales with future growth.

## The master key for unlocking automation

To build on the success of this project, DNB was chosen to trial the use of IBOs on their network, which proved a triumph. Four premium SLAs were measured, and 100 percent slice user throughput was achieved, when compared to the 70 percent managed without the use of IBOs.

By implementing a new cognitive intent-based model to handle RAN partitions for each RAN cell site, while also managing the network's resources, the trial saw 8–10 percent better throughput of premium services with no intent violations, the avoidance of 12 SLA breaches per cell per day and 15–17 hours partition overuse prediction shared with the customer per week. So, it proved possible to introduce monetization, expand business outcomes and open the route to differentiated services that can provide separate, distinct slices that also have individual guaranteed SLAs.

In the words of Ken Tan, "This successful proof of concept with Ericsson has shown a way to manage the complexities involved in delivering tailored 5G differentiated connectivity to multiple parties while adhering to strict SLAs with our customers. With intent-based operations, we can further strengthen this network to accelerate Malaysia's digital transformation."

However, this proof of concept has implications far beyond Malaysia itself. Sustainable growth and scaling will not come from additional investment in manual ways of working, so not only can the automation of IBOs help with both growth and scaling, there are also a number of future benefits and avenues this technology opens for exploration for service providers worldwide.

The first, which is the ability of IBOs to manage and simplify complex network operations, allows for divergence from the traditional "more complexity equals more cost" curve. Once the increased automation and streamlined simplicity that IBOs unlock are applied to a network, greater complexity can be handled and introduced without the need for additional costs or resources. Intent-based operations will make it easier for customers to define their business goals in their way, confident in the knowledge that these goals can be effectively and automatically translated into the correct technical language that will allow for them to be applied to their network. Intent-based operations will also automate the decision-making process that engineers typically handle, such as resolving conflicts. Not only does this mean that skilled engineers will be freed up for other work, such as real-time monitoring of network performance for the

identification of additional revenue granting opportunities, but it is also the only way that service diversification can be managed at scale. By introducing an intent-based model that can handle RAN partitions for each RAN cell site, future differentiated services – each with guaranteed SLAs and the simultaneous handling of conflicts and intelligent prioritization of resources – can be created within new slices nationwide, which of course represent significant business opportunities for service providers.

"The successful trial demonstrates that operators using Digital Nasional Berhad's MOCN will be able to set up a multitude of network slices with varying characteristics to suit specific uses for consumer and business customers such as mobile gaming, video applications or industrial uses in Internet of Things (IoT), and be assured of reliable delivery of that specified connectivity to the customers."

David Hägerbro, President and CEO of Ericsson Malaysia, Sri Lanka and Bangladesh

# An important step toward autonomous networks

Ericsson was proud to partner with Digital Nasional Berhad on its way to becoming the world's first MOCN. The strategic partnership yielded a number of learnings and insights about the capabilities of EOE and the future use of IBOs.

## Unleashing profitability

In the words of Sam Keys-Toyer, Global Head of Portfolio for Network Managed Services at Ericsson, "Intent-based networking needs to automate the reasoned decision-making that engineers do on a daily basis, for example conflict and compromise decisions. This will unlock the ability to manage service diversification and variability at scale, therefore guaranteeing SLAs at a cost level which will increase profitability, rather than be a drag upon it." This lesson, and others like it, were learned because DNB's journey has been deeply rewarding and insightful for both itself and Ericsson. DNB required a solution and a partner that could manage complexity on many levels, while simplifying processes and introducing scale and efficiency, as well as the capacity for future monetization. Ericsson was able to integrate all these needs with their intent management and other tools found within the EOE as well as their experience and expertise in this area.

## Learnings about automation

The advantages that automation bring to the table include boosts to speed and performance that cannot be replicated by humans, as well as data-driven adaptations that prevent faults from occurring in the first place. As 5G advances and more services are offered to a greater number of subscribers, human involvement will increasingly fall behind the demands of the network, making it necessary for automation to step into the breach and meet the requirements of the expanding industry. Increased demand for performance won't just come from new services, but from the changing role of the industry. Increasingly classified as "critical national infrastructure," advanced automation will be needed to improve resilience and reduce the tendency for human error, which remains one of the primary weaknesses of a network.

## Proud accomplishments

There is a lot to look back on with pride from this project, and lessons to take that can be applied to the future. Having 5G delivered to six national service providers in the space of six months is a phenomenal achievement, which may be the fastest rollout of a brand-new network in history. The improvements to performance for the network, in service availability, network uptime and reduction in alarms proved instrumental in DNB becoming a finalist at the 2023 TM Forum Excellence Awards in the Autonomous Operations category, proving the importance of IBO capabilities. The successful proof of concept was also recognized by the Glotel Awards, and Ericsson and DNB's submission won the "Managed Service Mastery" category, which is dedicated to innovation in managed service provision that significantly benefits consumers. These successes prove that IBOs can support multiple service providers with connectivity through network slicing, and by automating network processes that allow for the future of the industry to continue to develop.

"Ericsson Managed Services met with multifaceted challenges during the establishment of DNB's network. We had to manage the complexity of a MOCN network, set up operations in a few weeks and lay a foundation for future-proof 5G operations. All this became possible with the robust managed services environment framework under EOE, and data-driven, AI-based automations which converted challenges into opportunities and first-time right results. Our recent introduction of IBO in DNB shows Ericsson's commitment to keep DNB at the forefront of technology innovation, while helping to solve the most complex problems of network operations and generate new avenues for monetization."

Anchit Kakroo, Managed Services Chief Operating Officer, Ericsson Malaysia

## About Ericsson

Ericsson enables communications service providers and enterprises to capture the full value of connectivity. The company's portfolio spans the following business areas: Networks, Cloud Software and Services, Enterprise Wireless Solutions, Global Communications Platform, and Technologies and New Businesses. It is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's innovation investments have delivered the benefits of mobility and mobile broadband to billions of people globally. Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

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