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tmforum knowledge

A regional guide to

autonomous networks progress

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NOKIA

Author: Richard Webb, Senior Analyst
Editor: Ian Kemp, Managing Editor

contents

We hope you enjoy the report and, most importantly, find ways to use the ideas, concepts and recommendations detailed within. You can send your feedback to the editorial team at TM Forum via editor@tmforum.org


the big picture

Communications service providers (CSPs) have made strong progress in implementing autonomous networks (AN) in recent years as we regularly demonstrate in reports, case studies and whitepapers. But often these examples are seen in isolation rather than a global context. For this research we set out with a simple question: what are the drivers for AN implementation in different regions of the world and (how) do they differ?

The research builds on our autonomous networks Benchmark report, published in December 2024, for which we conducted a survey that drew responses from 111 individuals in 82 companies globally. The aim of the report was to provide a picture of where CSPs are now with AN implementation and what the future holds with regard to:

- The business goals and visions driving AN adoption
- Which areas CSPs are prioritizing for AN implementation
- The relationship between AI and intent-based automation
- The blueprint for achieving AN Level 4
- How AN best practice is being defined in real-world network deployments.

For this new report, we extended that survey, for the period February to April 2025, with a view to analyzing data gathered on a region-by-region basis, to deliver insights into how CSPs in different parts of the world are building roadmaps for AN implementation. In total we received responses from 141 individuals from CSPs worldwide.

While the samples for North America and Central & Latin America (CALA) were small compared to other regions, we are confident that the quality of the responses – size of company and competitive position in the market – validates their inclusion. China, which is often seen as a leader in AN advancement, was not represented in the survey.

What are the AN levels?

Autonomous networks represent a transformative shift for CSPs, enabling them to operate more efficiently, deliver better customer experience and innovate rapidly. A key element of TM Forum's Autonomous Networks Project is a six-step taxonomy that CSPs can use to measure their AN progress. Each AN level has a set of characteristics describing the evolutionary stage of the CSP's journey from fully manual to fully autonomous operations (see graphic on the next page).

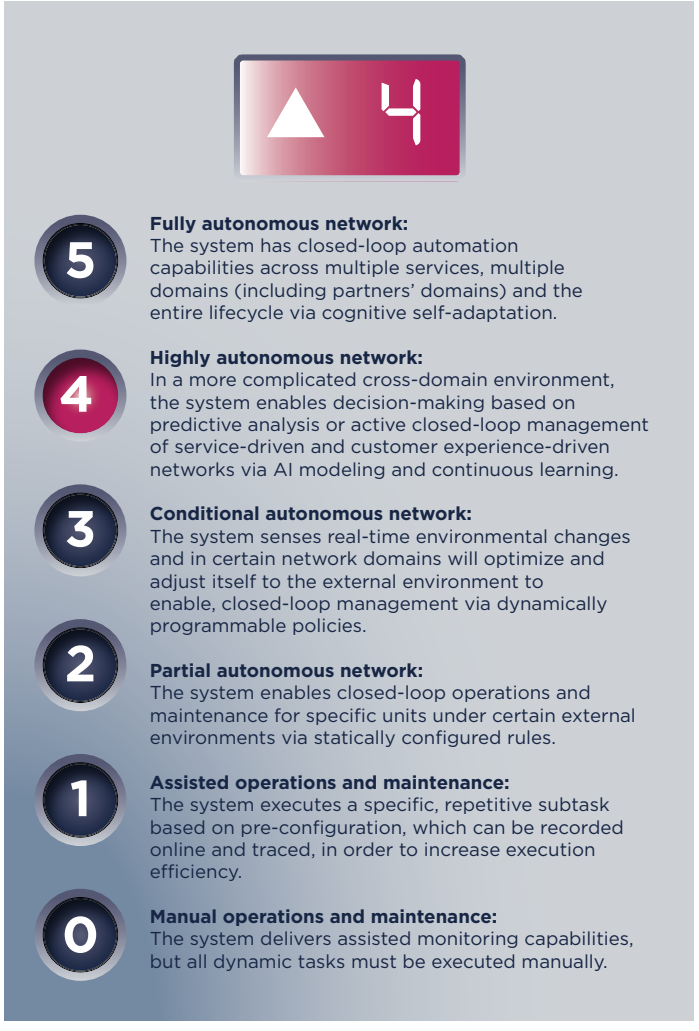
Read the AN Benchmark report in full:

Unlike network automation, which relies on predefined rules, autonomous networks comprise intelligent systems making independent decisions. Transitioning from automation to autonomy is a significant business and technology challenge, requiring multi-domain integration.

According to TM Forum's definition, Level 4 ANs represent a major shift from traditional human-defined automation processes to true autonomous decision-making. This is a significant leap from Level 3, where machines assist humans in decision-making but still rely on human oversight. At Level 4, the network can self-manage, self-optimize and handle complex tasks.

In the first section we reveal some of the new survey findings, including CSPs' visions for autonomous networks in different regions, current AN levels and timeframes for reaching Level 4. The graphic on the next page provides an overview of the survey respondents, their roles and their companies.

Autonomous network levels



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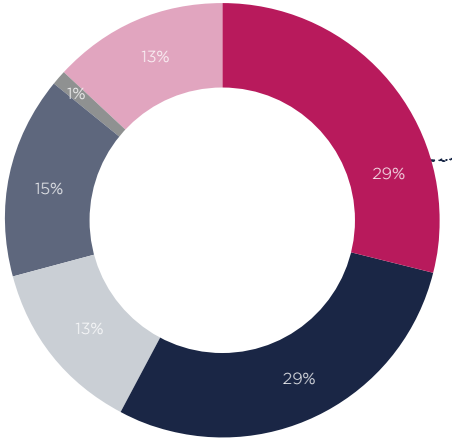
Size of CSP



- Fewer than 5 million 29%
- 5 million to 25 million 29%
- 25 million to 50 million 13%
- 50 million to 100 million 15%
- 100 million to 150 million 1%
- More than 150 million 13%

Where were the participants from?

141 respondents from **91** companies

Respondents' roles

Note: some totals/graphics in the report may not add to 100% because of rounding

TM Forum, 2025

section 1

CSPs' AN visions and progress

As we have seen, TM Forum has a clear vision for AN implementation and outcomes, but individual CSPs will interpret this within their own strategies, dependent on their current market and technology situation, leveraging AN to support their specific operational and business transformation. In our new survey approximately two-thirds of respondents globally said their companies are adhering to a gradual, continuous strategy of AN-driven improvement, while one third are pursuing a more ambitious implementation of AN to drive operational change.

When we examined these visions by region, operators in Africa and the Middle East were more likely to say they have an ambitious strategy in place (see bar chart on the next page). In the case of the former, this is likely driven by mounting challenges as those operators scale up networks and users, whilst for the latter rising service complexity and quality-led service competition is a likely driver of greater urgency. By contrast, operators in North America and CALA overwhelmingly said they are taking a more cautious approach. That could be because of uncertainty around AN maturity, or prioritization of certain use cases for automation which they are aligning with other AI-driven development programs.

We also asked survey respondents to indicate their current level of AN implementation, benchmarked against TM Forum's maturity model, and their future goals (see table right). While most CSPs are underway in their AN journey, few have achieved AN Level 4 for any part of their network operations – Level 4 represents a much more ambitious, AI-driven phase of AN – but a healthy proportion (23%) are on a roadmap to do so by 2026.

Based on TM Forum's definition, which AN level has your company achieved and what are your goals (all respondents)?

Now				
L0	L1	L2	L3	L4
12%	36%	31%	17%	4%
2026				
L0	L1	L2	L3	L4
0%	6%	25%	46%	23%
2030				
L0	L1	L2	L3	L4
0%	0%	5%	10%	85%

TM Forum, 2025

However, a larger proportion (85%) is taking a longer-term trajectory, working towards a 2030 timeframe for AN Level 4, with AN Level 3 the target for 2026.

The table below shows the proportion of respondents in each region by current AN level. Few said they have reached AN L4 (and a few respondents did not specify).

Current AN level by region

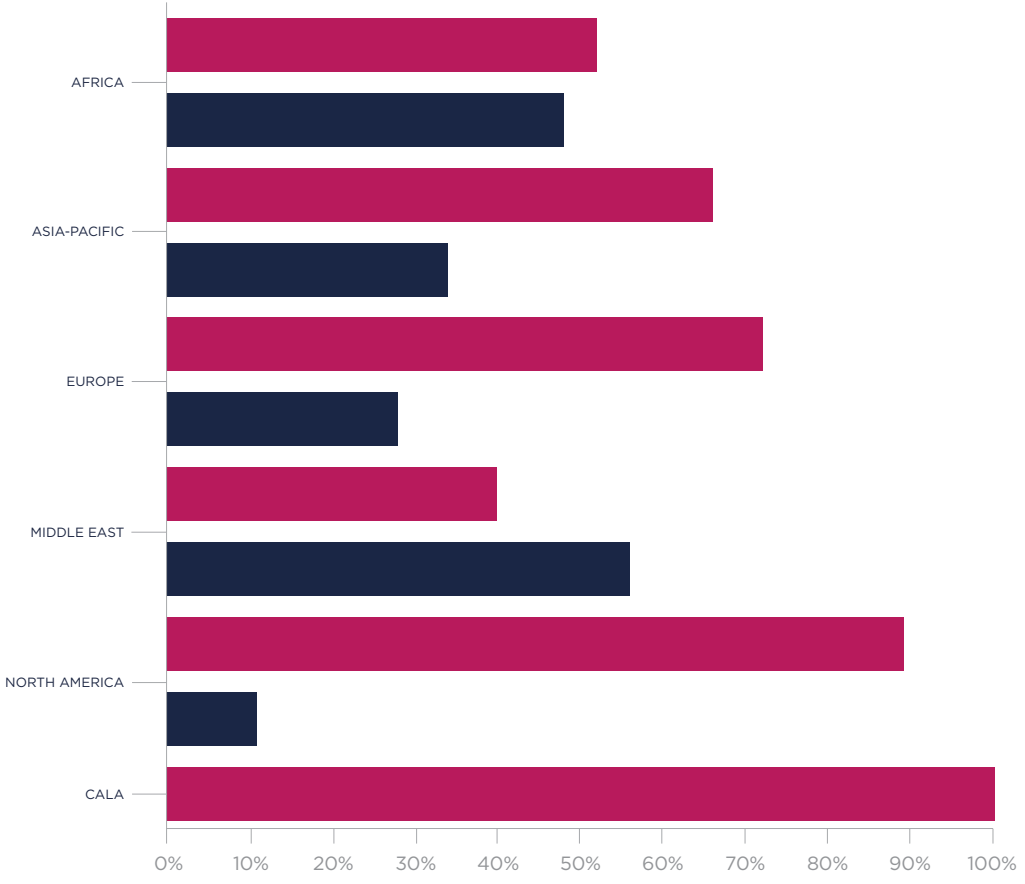
	Level 0	Level 1	Level 2	Level 3
Africa	14%	43%	29%	10%
Asia-Pacific	15%	37%	22%	26%
Europe	15%	39%	39%	8%
Middle East	4%	13%	44%	35%
North America	11%	22%	34%	22%
CALA	0%	63%	25%	0%

TM Forum, 2025

Typically, different functions within network operations are at different levels of AN implementation within each CSP; some functions may be advancing to AN Level 3.5, whilst other uses cases are at 2.5, for example. CSPs must prioritize which areas of their operations to focus on for AN enhancement, based on their individual operational challenges and business strategy.

Within TM Forum's Autonomous Networks Project many CSPs have outlined their AN visions and strategies, and 24 have carried out internal AN level assessments.

CSPs' AN vision over the next 3-5 years



TM Forum, 2025

A handful of CSPs have publicly stated they are adopting AN Level 4 "high-value scenarios", aiming to reach Level 4 for operational flows in some domains from 2025 to 2027.

More detail defining AN Level 4 high-value scenarios, and examples of CSP implementation, can be found in TM Forum's AN Level 4 blueprint, published in November 2024.

Regional timeframe for achieving AN Level 4

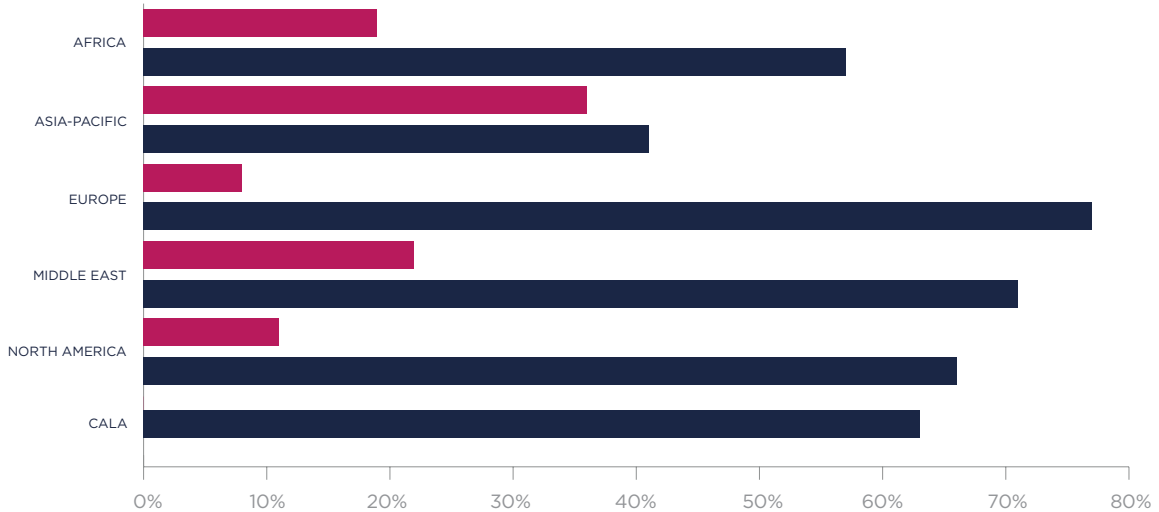
Across the regions, Asia-Pacific (36%) and Middle East (22%) have higher proportions of respondents aiming to achieve AN Level 4 by 2026. European respondents (8%) say they are less likely to do so in that timeframe (see graphic).

A few respondents across several regions said they have already achieved AN Level 4, at least for some part(s) of their network operations. (Because the sample size varied across regions, this was just a single CSP in each of Africa, the Middle East, North America and CALA).

But our analysis is that it is likely these respondents were referring to a single domain or process where they have achieved Level 4, rather than giving an average across their whole network operations. Later questions in our survey ask respondents to indicate the specific parts of their operations they are focusing on as AN Level 4 priorities (see pages 18 and 20).

In the next section we look at the challenges and drivers for implementing AN in the different regions.

When do CSPs think they will reach Level 4 AN?



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The role of AN in network monetization

In this video, Jean Lawrence, CMO for Nokia's Cloud & Network Services, looks back on Mobile World Congress and shares her thoughts with TM Forum Senior Analyst Richard Webb on autonomous networks and the role they play in network monetization for CSPs. Hear her views on how CSPs can leverage automation to create value from new services such as network slicing and network APIs.

section 2

AN drivers and challenges

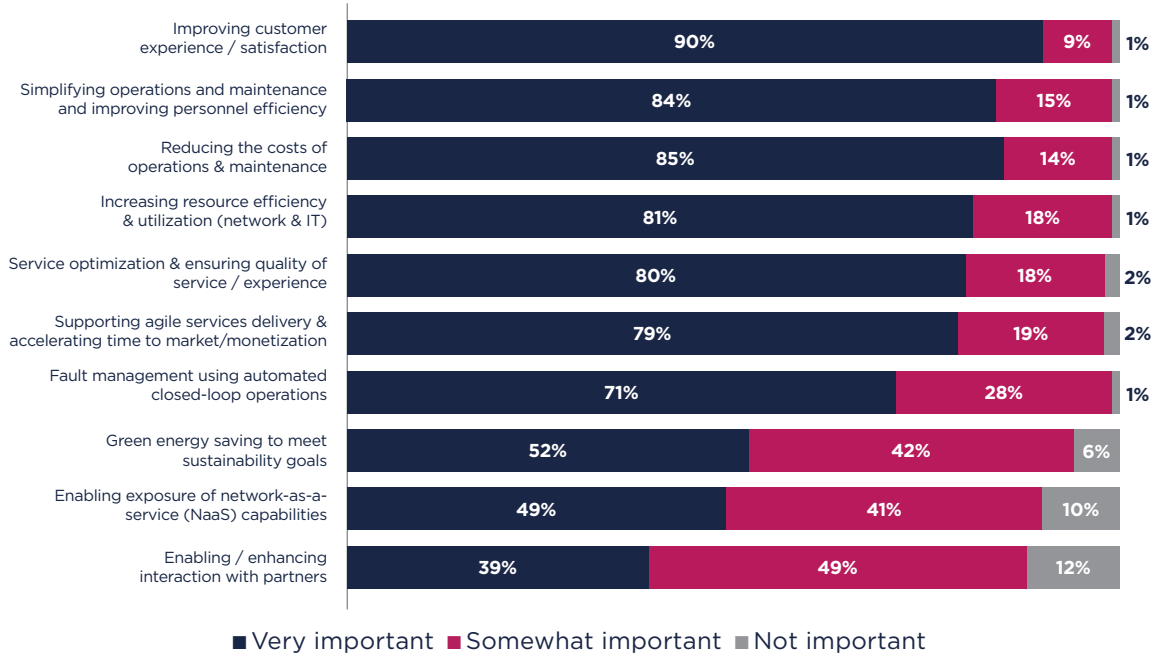
In our survey we asked respondents to indicate the most important drivers for their implementation of autonomous networks. The overall results are shown in the graphic below.

Perhaps unsurprisingly, the top-rated AN driver across all our survey respondents relates to enhancing customer experience. ANs can help CSPs understand subscriber behavior and take proactive measures to improve customer satisfaction. For instance, AI-powered analysis enables CSPs to assess network performance, such as latency at the customer level, predict failures and improve network reliability.

Reducing O&M costs was also highly rated in our survey, in four regions (see graphic on p.15), an obvious concern for CSPs given that costs rise as complexity and scale of network operations increases. Related to these factors is simplifying O&M and improving personnel efficiency, also a highly rated AN driver and most notably in Africa and Europe. With simplification of processes and people comes reduced labor and the potential for cost reduction (or at least, greater cost control). With AN, CSPs do not have to use human resources to conduct routine tasks such as provisioning and fault detection, lowering costs and time to rectify problems.

In these regions, it is possible that respondents are still in a more 'network-centric' phase of network operations and are experiencing increased demands on O&M to manage increasingly complex networks. Asia-Pacific rated agile service delivery and accelerating time to market as a high

AN drivers (all respondents)



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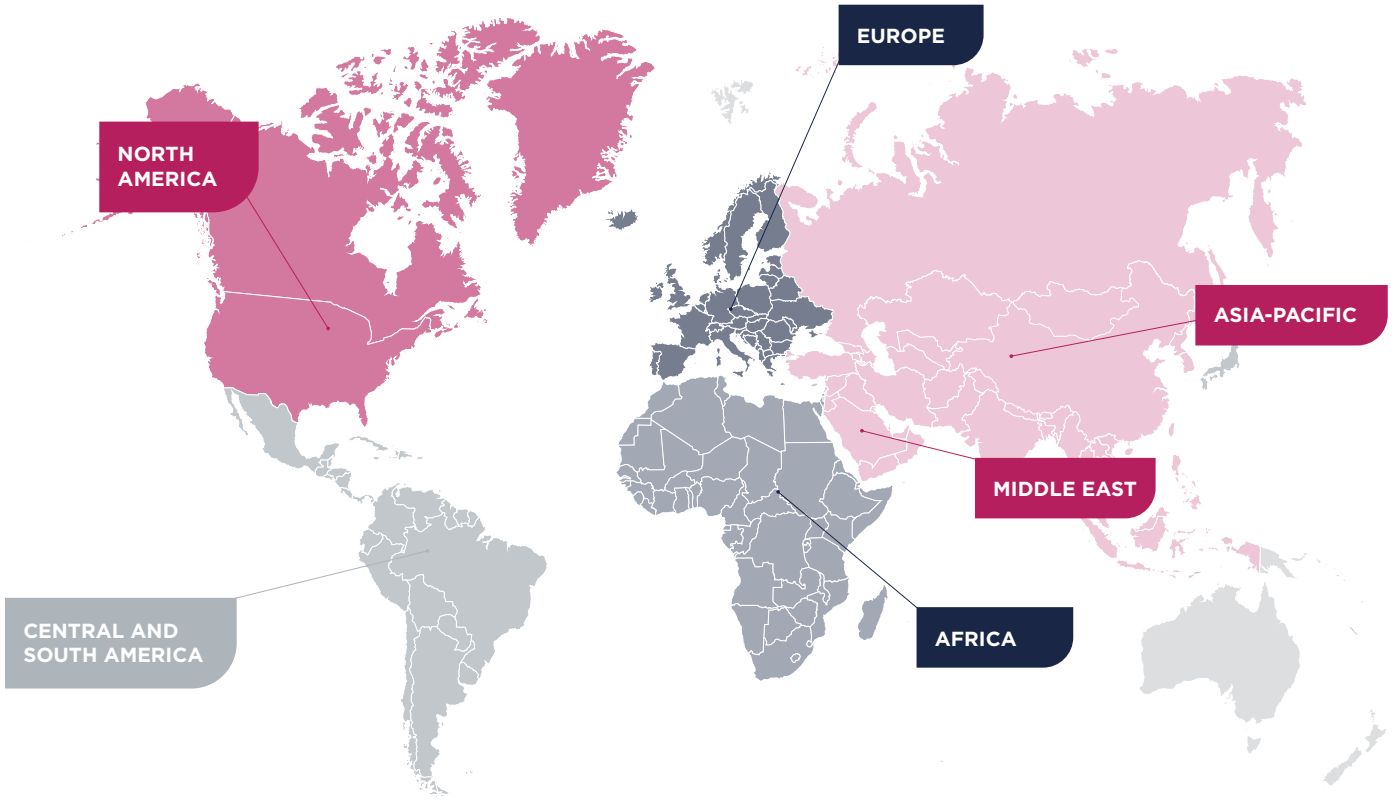
CSPs' top 3 AN drivers by region



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AFRICA:
- Improving customer experience/ satisfaction
- Simplifying operations and maintenance and improving personnel efficiency
- Service optimization and ensuring quality of service/quality of experience

ASIA-PACIFIC:
- Improving customer experience/ satisfaction
- Reducing the costs of operations and maintenance
- Supporting agile services delivery and accelerating time to market/monetization

EUROPE:
- Improving customer experience/ satisfaction
- Simplifying operations and maintenance and improving personnel efficiency
- Reducing the costs of operations and maintenance

MIDDLE EAST:
- Supporting agile services delivery and accelerating time to market/monetization
- Improving customer experience/ satisfaction
- Fault management using automated closed-loop operations

NORTH AMERICA:
- Improving customer experience/ satisfaction
- Reducing the costs of operations and maintenance
- Fault management using automated closed-loop operations

CALA:
- Supporting agile services delivery and accelerating time to market/monetization
- Simplifying operations and maintenance and improving personnel efficiency
- Reducing the costs of operations and maintenance

AN driver, so it is likely that more respondents in this region are orientated to 'service-centric' operations, and therefore value agility as a means of effectively delivering dynamic, flexible service offerings.

Respondents were also asked about the primary challenges they are experiencing when deploying or upgrading levels of autonomy in their networks.

The graphic opposite shows the top three answers indicated as 'very challenging' in each region. Integration was rated as the most serious challenge by respondents overall, but this is a particularly significant barrier in Africa, Asia-Pacific and CALA. CSPs need to be able to scale orchestration of zero-touch, zero-wait and zero-trouble services, end to end across network domains, and this complex multi-domain integration can be challenging in countries where network transformation and consolidation is perhaps less advanced.

Lack of budget was also indicated as a challenge in four regions (Africa, Asia-Pacific, Europe and CALA). Implementation of AN is an investment commitment in technology change – and likely people/skills upgrades – which, whilst it should ultimately yield positive cost reduction/control outcomes, can initially prove costly.

It is therefore critical that AN use cases prove they can deliver return on investment to build confidence in AN implementation and so retain budget commitment for further deployments.

In the next section we look at CSPs' domain and process priorities for reaching Level 4 AN.

CSPs' top 3 AN challenges by region

AFRICA
Lack of budget
Complex integration challenges across domains
AN standards are not mature enough for implementation
ASIA-PACIFIC
Lack of clear business objectives and value indicators
Lack of budget
Complex integration challenges across domains
EUROPE
Lack of budget
The end-to-end architecture is not defined, and there is no clear path to Level 4
We do not have the right skills
MIDDLE EAST
The end-to-end architecture is not defined, and there is no clear path to Level 4
Key technologies required (such as AI) are not mature
AN standards are not mature enough for implementation
NORTH AMERICA
Key technologies required (such as AI) are not mature
Complex integration challenges across domains
The end-to-end architecture is not defined, and there is no clear path to Level 4
CALA
Complex integration challenges across domains
The end-to-end architecture is not defined, and there is no clear path to Level 4
Lack of budget

section 3

domain and process priorities

In addition to asking about their overall drivers for AN, we drilled deeper to ask respondents what their network priorities are for AN deployment, giving them options of specific network domains.

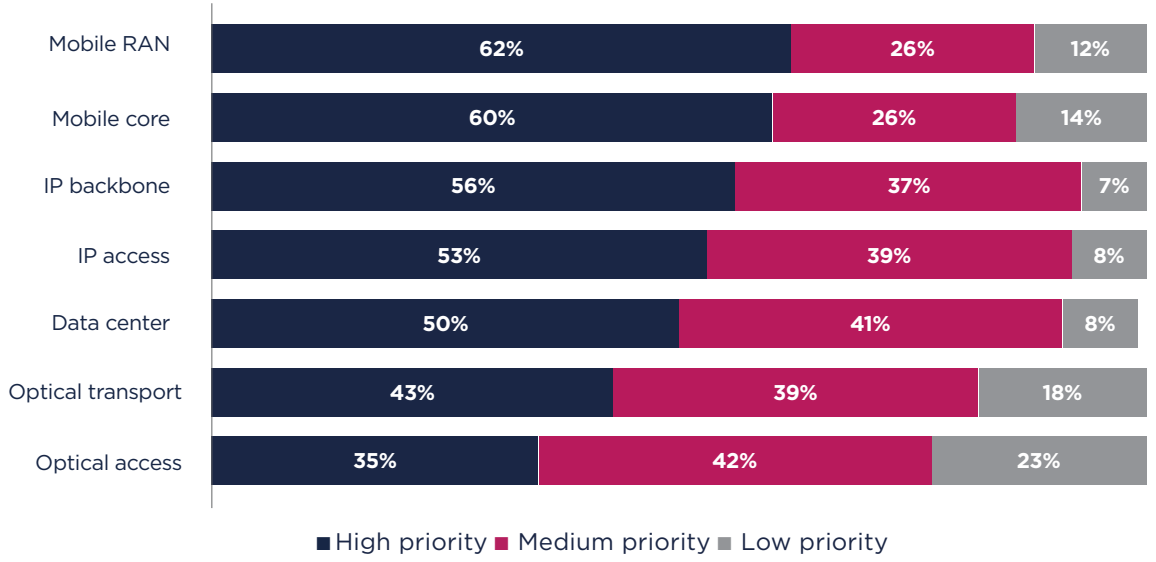
At the top of the list, 62% of respondents said that Mobile RAN (radio access network) was a high priority for AN implementation. Given that the RAN has high O&M costs associated with it, this is not surprising and was consistent across multiple regions. RAN is often a high priority domain for greater automation due to the scale of network elements (number of radios, cell sites and so on) and frequency of network performance incidents, so there's a significant opportunity for workload reduction if they are automated. Several AN use cases center around fault monitoring and resolution, as well as energy savings, for example, all of which can benefit RAN operations, potentially resulting in significant savings.

Related to that is the mobile core, indicated as a high priority by 60% of respondents overall. This prioritizing of greater autonomy could be aligned with plans and aspirations to upgrade to a 5G core network to support 5G Standalone capabilities such as network slicing to target dedicated and differentiated services for customers.

Among our respondents, 56% indicated IP backbone and 53% IP access as high priorities for AN domains. In part this may be because they are easier to automate than other domains because they have been designed with inherent routing protocols.

The IP network "by design has been implemented like an autonomous network with the routing protocols", explained Telenor's Terje Jensen, SVP, Global Business Security Officer, during a recent webinar about AN.

Which network domains are CSPs are addressing first?



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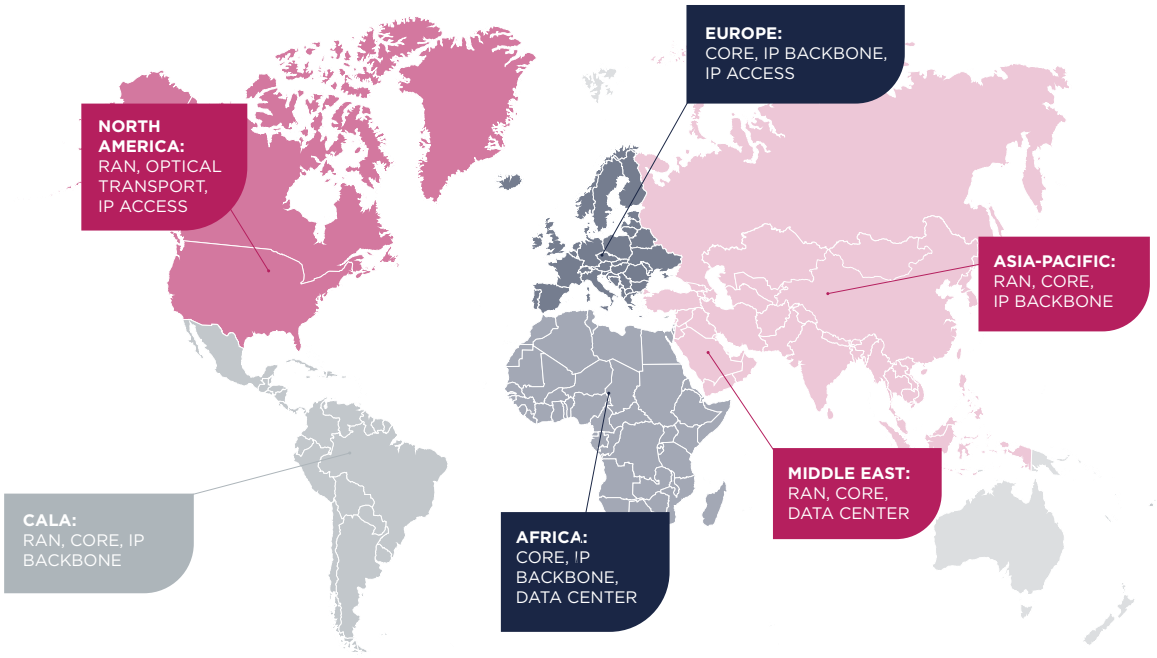
The graphic opposite shows the top three answers indicated as being 'high priority', by region.

Operators in Asia-Pacific and the Middle East both singled out mobile RAN and core as high priorities for AN implementation. Both regions have a number of strongly progressive mobile operators pushing innovative 5G service portfolios. These domains were also top ranked in CALA, likely due to the increasing scale of mobile network complexity in the region.

As previously noted, focusing on RAN and core for AN may indicate an intent by CSPs to deliver new 5G Standalone services, such as network slicing, which require high levels of network automation. A mobile-centric AN focus could also signify that CSPs are trying to deal with the growing scale and complexity of mobile services and meet burgeoning traffic and bandwidth demand.

Africa and the Middle East called out data center as a priority domain for AN, possibly due to less hyperscaler presence in these regions, requiring CSPs to be more proactive in supporting their own data center operations.

Top 3 high priority domains by region



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Process priorities for AN

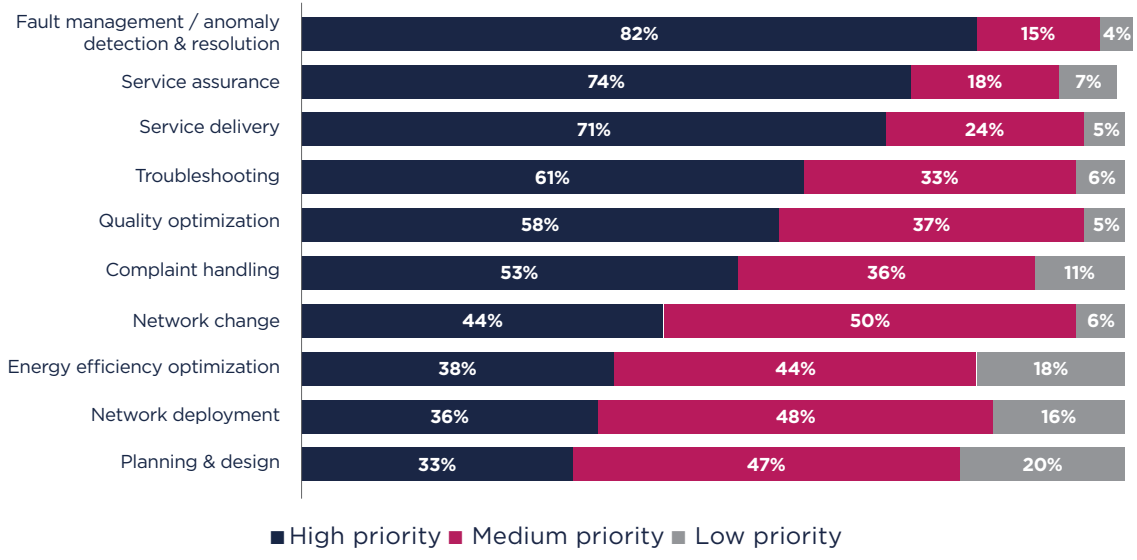
We also asked about which processes CSPs are addressing first (see graphic on the next page). Fault management is indicated across the board in all regions as a primary priority for AN implementation. This is particularly pertinent to the RAN, which as we have seen was indicated as a high priority domain for AN in the previous question. Due to scale and the potentially hard-to-reach locations of cell sites, as well as sensitivity to environmental fluctuations (weather, temperature and so on), the RAN is a challenging and costly domain to operate and maintain. For example, in a recent research call with TM Forum, one CSP stated that at any given time its mobile network could have at least 100 cell sites with faults or sub-optimal performance conditions. It is simply not possible to have field repair operatives close to all these sites simultaneously, so automating fault management is critical.

CSPs have traditionally managed their networks using network operations centers (NOCs). These focused on monitoring network-centric alarms, faults and performance, and typically did not correlate with service performance and customer experience. However, as CSPs needed more visibility of customers' end-to-end service experience, many implemented a separate operations organization, the service operations center (SOC). The SOC has access to tools for service quality measurement and customer experience management and can monitor the quality of overall services, communicate with the customer about service status, and take rapid actions to rectify service degradation and outages that negatively affect service quality and experience.

Organizationally, the NOC and SOC may be separate or combined into one entity, an NSOC, but that requires collaboration between the NOC and SOC teams which can result in the reliance on manual flows and handoffs between the two organizations. Manual handoffs often create disconnected silos of activity within and between network resource and service operations levels and do not help resolve incidents or improve customer experience.

When it comes to the NOC-to-SOC journey, some regions are more advanced in terms of being service-centric, whilst others focus on network-centric actions. To some extent this correlates with regional differences in AN process priority. For example, CALA and Africa both rated quality optimization as high priority processes for AN (with Africa also indicating complaint handling as a high priority), suggesting there are CSPs in these regions still with challenges around delivering network quality

Which processes are CSPs addressing first?



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for customers. By contrast, service assurance was rated as a high priority in Asia-Pacific, Europe, Middle East and North America, suggesting CSPs in these regions are becoming more service-centric in their operations.

The graphic opposite shows the top three processes indicated as being 'high priority', by region.

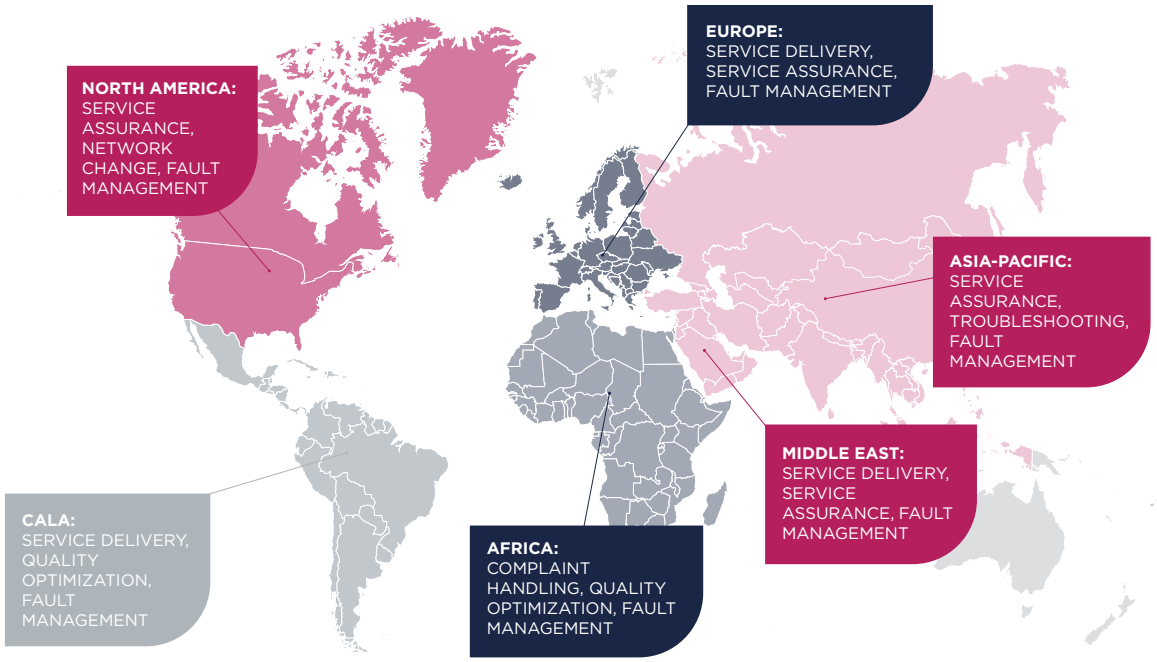
Measuring AN effectiveness: CX

Understanding the effectiveness of AN implementation is fundamental to proving return on investment, so measuring impact is critical. We asked respondents how they measure AN impact in terms of customer experience and operational effectiveness, asking them to rate each option as very important, somewhat important or not important. The very important percentages are shown in the graphics on p.22.

On a regional level, when it comes to assessing where AN has the potential to have the most impact on customer experience, service delivery satisfaction was the top response almost across the board, indicating complaint handling is a high priority process to be addressed with AN (see graphic on p.23). Service fault recovery duration and timeliness were both top-rated measures of AN effectiveness in Asia-Pacific, where due to often large-scale networks – and thus, number of network faults to address – recovery from network faults is a challenge.

Network quality satisfaction is a top-rated measure of AN effectiveness from a CX perspective in Asia-Pacific, Europe, North America and CALA in particular – markets where CSPs often must compete on the quality of their networks rather than price of services. Automatic service

Top 3 high priority processes by region



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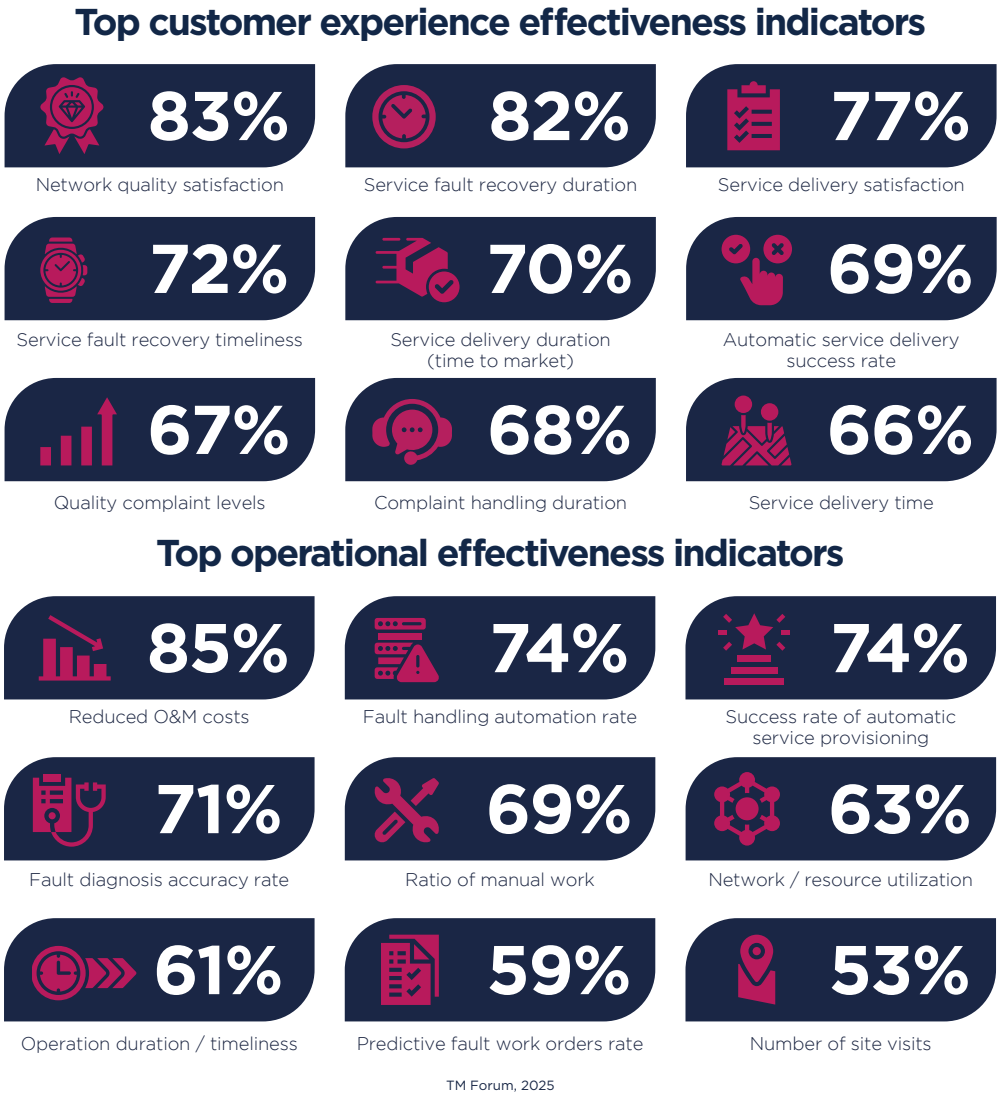
delivery success is a highly-rated measurement in Africa, Europe and the Middle East, suggesting CSPs want to improve the extent to which AN can help them automate orchestration and assurance of services without human intervention – from customer interaction via chatbots through to ultimate service delivery.

Measuring AN effectiveness: operations

Measuring the effectiveness of AN is also seen in the context of operations improvements – indicators that are important to the CSP but are not necessarily directly visible to the customer. Some of these metrics are inter-related, such as energy savings and overall operations and maintenance (O&M) cost reduction.

Unsurprisingly, reducing O&M costs is a top-rated response across all regions, as it represents the most obvious bottom-line benchmark for AN return on investment (see graphic on p.24). Related to this is automating the rate of fault handling, an important AN metric in Africa, Asia-Pacific and the Middle East, though reasons for this likely differ.

For example, this could be due to current low levels of automation of these processes in Africa, where many CSPs are still at the comparatively early stages of AN implementation. In contrast, as previously noted, network scale in Asia-Pacific makes efficiency a particularly important focus. This also explains why fault diagnosis accuracy is highly rated by Asia-Pacific CSPs, which need to identify where (and why) a fault has occurred, something that is typically more challenging in bigger, more complex networks.



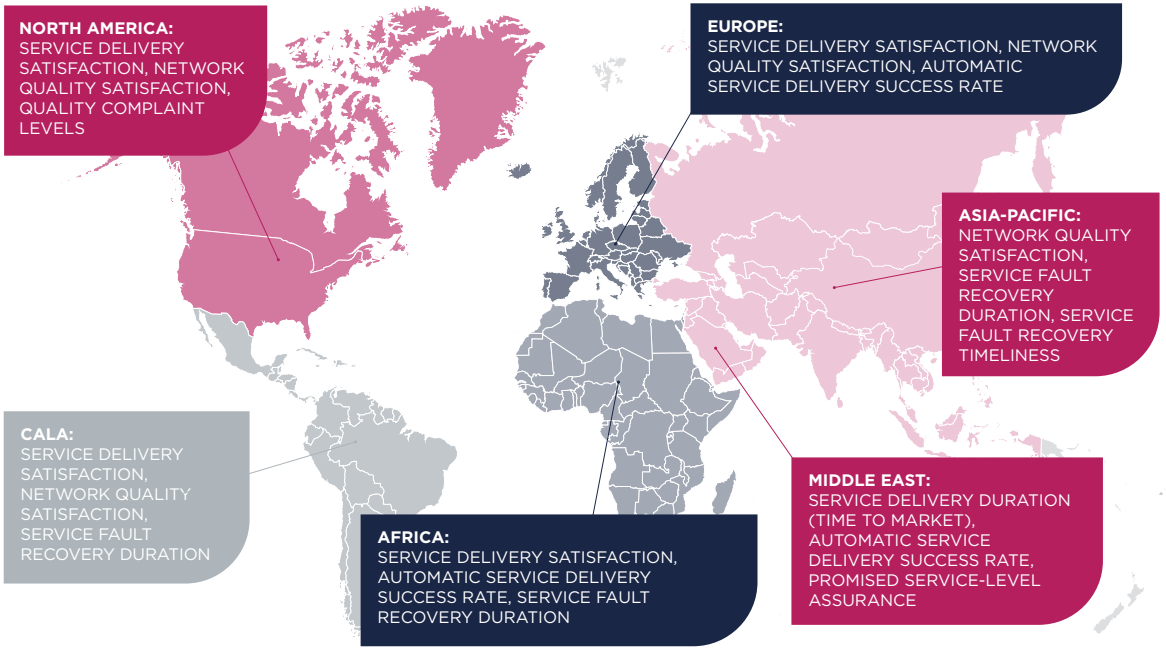
Fault handling is a costly and time-consuming operation, particularly if human intervention is required. Reducing manual work is a particularly key AN metric in North America and Europe, where labor costs typically are higher.

Success rate of automatic service provisioning is a highly rated measure of AN operational improvement effectiveness in Africa, Europe, the Middle East and CALA. This may be due to low levels of service automation and high reliance on human activation of services (which is typically slower). Or it could be driven by high levels of market competition, meaning that getting services delivered to customers (particularly new services/customers) in a timely and accurate manner, is a particular imperative in competitive markets.

The graphic on the next page shows the top 3 operational improvement indicators by region.

And in the final three pages we round off the report by providing a snapshot of the regional data, showing CSPs' AN progress in each region as well as the leading drivers and challenges for implementation.

Top 3 CX improvement indicators, by region



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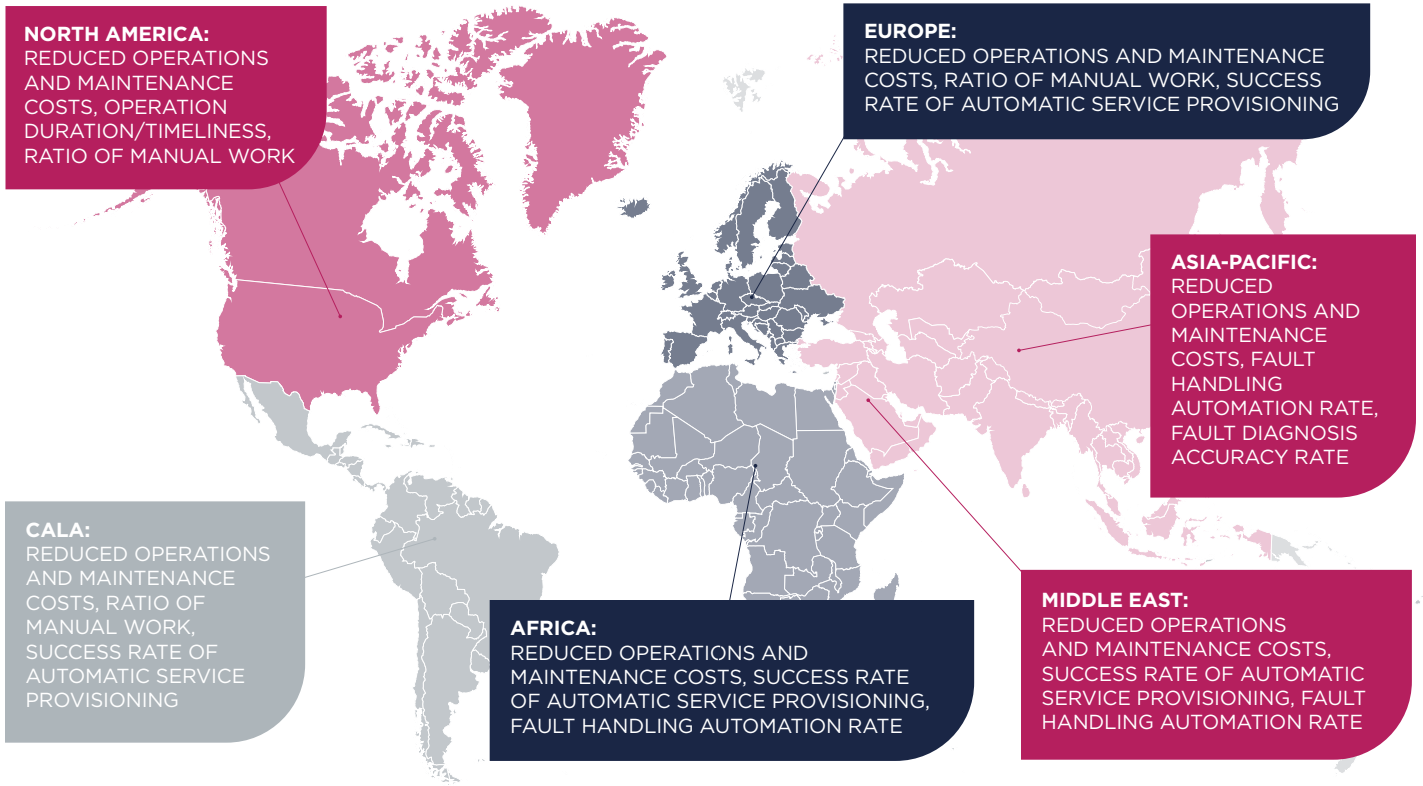
Top 3 operational improvement indicators, by region



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Regional summary

Africa

Current AN level (% of respondents)			
Level 0	**Level 1**	**Level 2**	**Level 3**
14%	43%	29%	10%

Top AN drivers
General: Improving CX
Specific: Simplifying O&M

Top AN challenges
General: Integration complexity
Specific: Lack of budget

Top AN processes
General: Fault management
Specific: Complaint handling

Top GenAI NetOps uses
General: Intelligent CX
Specific: Network maintenance

Asia-Pacific

Current AN level (% of respondents)			
Level 0	**Level 1**	**Level 2**	**Level 3**
15%	37%	22%	26%

Top AN drivers
General: Improving CX
Specific: Supporting agile services

Top AN challenges
General: Integration complexity
Specific: Lack of budget

Top AN processes
General: Fault management
Specific: Service assurance

Top GenAI NetOps uses
General: Intelligent CX
Specific: Network optimization

Europe

Current AN level (% of respondents)			
Level 0	**Level 1**	**Level 2**	**Level 3**
15%	39%	39%	8%

Top AN drivers
General: Improving CX
Specific: Reducing O&M costs

Top AN challenges
General: Integration complexity
Specific: Lack of budget

Top AN processes
General: Fault management
Specific: Service delivery

Top GenAI NetOps uses
General: Intelligent CX
Specific: Network optimization

Middle East

Current AN level (% of respondents)			
Level 0	**Level 1**	**Level 2**	**Level 3**
1%	13%	44%	35%

Top AN drivers
General: Improving CX
Specific: Closed-loop fault management

Top AN challenges
General: Integration complexity
Specific: end-to-end architecture not defined

Top AN processes
General: Fault management
Specific: Service delivery

Top GenAI NetOps uses
General: Intelligent CX
Specific: Network maintenance

North America

Current AN level (% of respondents)			
Level 0	**Level 1**	**Level 2**	**Level 3**
11%	22%	34%	22%

Top AN drivers
General: Improving CX
Specific: Closed-loop fault management

Top AN challenges
General: Integration complexity
Specific: end-to-end architecture not defined

Top AN processes
General: Fault management
Specific: Service assurance

Top GenAI NetOps uses
General: Intelligent CX
Specific: Network planning

CALA

Current AN level (% of respondents)			
Level 0	**Level 1**	**Level 2**	**Level 3**
0%	63%	25%	0%

Top AN drivers
General: Improving CX
Specific: Reducing O&M

Top AN challenges
General: Integration complexity
Specific: Lack of budget

Top AN processes
General: Fault management
Specific: Quality optimization

Top GenAI NetOps uses
General: Intelligent CX
Specific: Network energy saving

Different Roads Lead to Autonomous Networks

Fully autonomous networks are the destination that communications service providers (CSPs) are driving toward. However, the road takes a different route, depending on the region in which a CSP operates. Each part of the world brings its own challenges and realities that will influence how CSPs invest in automation and AI, and which partners they work with along the way.

Nokia aims to help our customers on this journey by powering networks that sense, think, and act, regardless of where they are on the map. Building on TM Forum's Autonomous Network Framework, we deliver AI-driven automation across radio, transport, cloud, and core, with security woven in from the ground up. This year, we're taking the next step with the launch of Nokia's Autonomous Network Fabric to help CSPs better secure, automate, and monetize their networks.

Before we get into those details, let's look at autonomous network progress across the different regions and how we're helping customers bridge the gap between where they are and where they want to be.

Every region's road to autonomy

CSPs are advancing network automation at different speeds because each network environment faces unique roadblocks. In TM Forum's regional analysis of autonomous network adoption (n = 148), Asia-Pacific is charging ahead of the pack. With national policy backing, significant government R&D funding, and massive mobile-first populations, CSPs like China Mobile and NTT DOCOMO are deep into closed-loop automation and AI/ML deployments. 66% of CSPs are taking a measured step-by-step approach, while 34% are pursuing transformative strategies head-on. This dual-speed dynamic reflects the region's diversity, where advanced digital economies coexist with markets still laying down infrastructure.

Nokia is engaged in this region, helping China Mobile reach its autonomous networking goals by saving $7 million in opex. We're also helping Australian CSP, Telstra, tackle the complexity of cross-domain orchestration. With our orchestration center and unified inventory solutions, Telstra can now set up new orchestration domains in under 48 hours, leading to faster time-to-market for new services.

In Europe, ambition meets complexity. This region's multi-vendor ecosystems and strict regulatory frameworks, especially around data privacy and net neutrality, slow progress, but not innovation. According to TM Forum's regional survey data, CSPs like Orange and Deutsche Telekom are pushing forward with cloud-native strategies and sustainability initiatives. We also take our customers' sustainability priorities seriously; our Energy Efficiency solution, which is deployed in only weeks, helps CSPs reduce energy consumption and carbon emissions by up to 30%, without compromising network performance or customer experience. This region also shows the highest rate of incremental strategy: 72% of CSPs are focused on gradual automation, while just 28% are in transformation mode. That caution is understandable in a landscape built on existing infrastructure, and it underscores the importance of multi-vendor orchestration and assurance, areas where Nokia brings strength, most recently with Telenor.

Different Roads Lead to Autonomous Networks

The Middle East and Africa present a study in contrast. Countries like the UAE and Saudi Arabia are rapidly advancing, leveraging top-down mandates to fast-track 5G and autonomous capabilities. Here, 56% of CSPs are already executing bold automation strategies, while 40% are taking a more gradual route. Meanwhile, in Africa, infrastructure and investment gaps remain, but interest is rising fast. Energy optimization and rural connectivity are key drivers. CSPs are nearly split: 48% are moving ahead with transformative strategies, while 52% are focusing on steady progress. Nokia is engaged with stc in this region to help the CSP strengthen its monetization potential.

In North America, leaders like Verizon and AT&T are betting on closed-loop assurance and AI to bring more value from large, complex networks. Yet, despite the innovation, 89% of CSPs are prioritizing incremental automation, and only 11% report transformative strategies in motion. That slow-and-steady approach likely stems from the scale of operations; this signals an opportunity for frameworks that simplify automation.

In CALA (Caribbean and Latin America), caution is even more pronounced. 100% of CSPs surveyed in this region are focused on gradual automation. While the pace may be slower, the focus is clear: build observability, unify data, and set the foundation for fully autonomous networks in the long-term.

Despite the differences across the globe, there's an undeniable through-line: CSPs in every region recognize that automation is inevitable, and they share the same end goals: Save costs, improve CX, and increase revenues. And they need the flexibility to get there in a way that suits their individually complex environment.

Nokia's Autonomous Network Fabric: Intelligence that Scales

At Nokia, we've boiled a complex concept down to three powerful verbs:

- **Sense** with 360° observability
- **Think** with explainable AI
- **Act** with closed-loop automation driven by business intent

We've earned our position as a thought leader by doing something many shy away from, making the complex reality of autonomous networks easier to understand and trust. Now, we're taking the next step forward.

We're evolving our Cloud and Network Services (CNS) portfolio to include the Autonomous Network Fabric. It's a common intelligence layer that connects and powers our entire application portfolio with secure automation, trusted data, and AI at scale. It's what transforms a fragmented network into a single, smart, adaptive system.

We aim to differentiate in five critical ways:

- **Data-native by design:** Our Autonomous Network Fabric leverages modern data mesh and management architectures that minimize duplication, integrate with existing customer data lakes, and ensure quality, privacy, and trust to scale AI confidently.

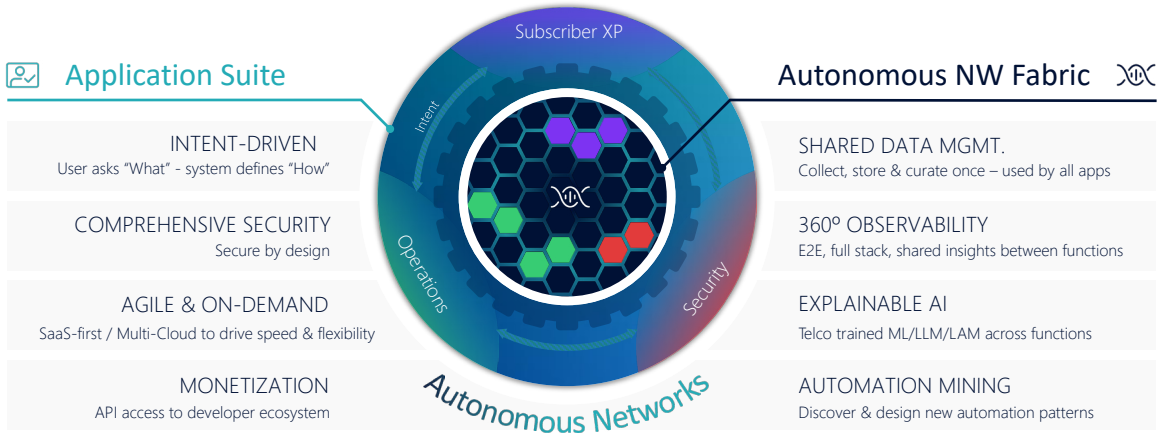
Different Roads Lead to Autonomous Networks

- **Built for every deployment:** With a SaaS-first approach, our Autonomous Network Fabric works seamlessly across hybrid, on-prem, and cloud environments.
- **Unified intent management:** Our single application suite can translate business and operational intents into real action, unlocking the value in areas like customer satisfaction, profitability, churn reduction, sustainability, and threat response.
- **Cybersecurity leadership in telco AI:** Nokia's expertise in telco-grade AI governance and GenAI-enabled cybersecurity solutions ensures that trust is built in, not bolted on.
- **Cross-domain experience:** We're unifying data and user experience across assurance, analytics, and security, delivering something few OSS players in telecom can.

Our Autonomous Network Fabric gives CSPs the tools to scale value, fast. Whether it's shared data management, explainable AI, or automation mining, every capability is built as a reusable building block. This means faster app development, easier customization, and the ability to monetize your investments through new offerings like NaaS and Nokia's Network as Code.

Sense, Think, Act: From roadblocks to breakthroughs

The road to autonomous networks varies significantly across regions, shaped by each market's unique challenges, regulations, and infrastructure realities. We meet CSPs where they're at, providing tailored services and solutions to secure, automate, and monetize networks.



With Nokia's Sense, Think, Act framework and our Autonomous Network Fabric, CSPs around the world can move beyond fragmented operations and start building unified, scalable autonomous networks. From the rapid advancements in Asia-Pacific, to the regulatory complexities in Europe, to the diverse conditions in the Middle East, Africa, North America, and CALA, we will help our customers progress confidently toward fully autonomous networks at a pace and scale they choose.

Visit Nokia's Autonomous Networks web experience to learn more about our Sense, Think, Act framework. Read our stories and take the quiz to test your Autonomous Network knowledge today.

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.

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.

AN case studies

Telstra, Australia

Dynamic, composite service orchestration

<48 hours

Set-up of new orchestration domains or entities

$ ↓

Significantly reduced cost of maintaining siloed, customized orchestrators

API-first

Leverages intent-based APIs and ODA for simplified integration

Case study: Telstra Australia - dynamic composite service orchestration

Challenge

- Siloed creation and orchestration of the services for different domains and networks
- Lacking the ability to offer aligned, adaptable and cross-domain services
- Complexity in service creation due to many tools and domain-specific GUIs

How Nokia Helps

Autonomous closed-loop dynamic orchestration based on intent-driven Orchestration Center, underpinned by Unified Inventory. Deployed in public cloud and multi-vendor network environment

Single pane of glass for the creation of composite and adaptive services, based on business policies, for mobile, fixed and transport networks

Flexible, open, and adaptive solution supporting use cases such as Adaptive SDWAN, 5G Slicing, and Edge in multi-domain network across fixed and mobile access

The solution is compliant to standards like 3GPP, ETSI, and TM Forum's ODA (Open Digital Architecture) e.g. TMF's APIs

Outcome

- Composite, horizontal solution, covering multi-tenancy and the entire life-cycle of the service
- Adaptive and dynamic orchestration of services based on policy-driven conditions and options
- Ability to offer more use cases while reducing the number of orchestrators in the networks
- Making the life of a service designer easier with a single pane of glass

AN case studies

stc, Saudi Arabia

Improving 5G monetization by enabling tailored services for enterprises and consumers

Through intent-driven autonomous operations, the creation of end-to-end slices at scale will be accelerated from days to minutes and becomes highly reliable and programmable.

"Providing new 5G slicing services and technology openness go hand in hand for stc, so we're pleased that Nokia has these capabilities that will provide our customers with specific network experiences, while giving us fresh automation and operational efficiency benefits."

Anwar Al-Subhi
GM, Cloud Infrastructure, stc, Saudi Arabia

stc selects Nokia Orchestration software to deliver 5G slicing and strengthen monetization efforts | Nokia.com

Challenge

- How to monetize 5G and offer new and tailored services to enterprises and consumers
- Need for automation to allow end-to-end, service lifecycle orchestration for 5G slicing
- How to be able to launch new and differentiating digital services and slices to the market quickly
- Ability to offer new type of digital services such as SDWAN, and IPVPN to the end customers

How Nokia Helps

Orchestration Center provides a single, multi-tenanted platform; orchestrating the design and deployment in multi-vendor environment; and delivering against business-specific SLAs

As a trusted partner, fully aligned with stc's strategy for automation, to enable 5G monetization through slicing orchestration, openness, and flexibility in service creation

Nokia's Orchestration Center software will be used for various market-driven use cases, including slice-based services such as gaming, and supporting complex IP services for the end customers.

The solution is future-proof, and compliant to standards like 3GPP, ETSI, and TM Forum's ODA (Open Digital Architecture) such as TMF's APIs.

Outcome

- Strengthening stc's position as a leading service provider and digital partner in the region
- 5G monetization of versatile and tailored slice-based services for B2B and B2C customers
- Deploys end-to-end 5G slicing automation across multi-vendor radio, transport, and core
- Accelerates new service launches by automating slice deployments from days to minutes
- Allows the end-to-end orchestration for new IP services such as IP-VPN and SDWAN

Meet the Research & Media team

Report Author:
Richard Webb
Senior Analyst
rwebb@tmforum.org

Chief Analyst:
Mark Newman
mnewman@tmforum.org

Practice Lead:
Dean Ramsay
dramsay@tmforum.org

Head of Operations:
Ali Groves
agroves@tmforum.org

Commercial Manager:
Tim Edwards
tedwards@tmforum.org

Report Editor:
Ian Kemp
Managing Editor
ikemp@tmforum.org

Editor in Chief, Inform:
Joanne Taaffe
jtaaffe@tmforum.org

Global Account Director:
Carine Vandevelde
cvandevelde@tmforum.org

Customer Success Project Manager:
Maureen Adong
madong@tmforum.org

Customer Success Project Manager:
Amanda Alexander
aalexander@tmforum.org

Published by: TM Forum

European Office
25 Worship St,
London EC2A 2DX
United Kingdom

US Office
181 New Road, Suite 304,
Parsippany, NJ 07054 USA
Phone: +1 862-227-1648

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Paul Martin

tmforum knowledge

Find out more about TM Forum's
Autonomous Networks
work and assets