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Perspective

AIOps: the key to unlocking superior in-home quality of experience

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1. Executive summary

Communications service providers (CSPs) face the intricate task of managing home networks that accommodate an escalating number of IP-connected devices. These networks, often a complex subnet of Wi-Fi extenders, mesh hardware, and personal area networks, will come under pressure to support the growing demand for new applications such as AR/VR and cloud gaming.

CSPs are struggling to meet these demands. Consumer behaviour is creating bottlenecks in home network performance, particularly among gamers who have a heightened awareness of quality-of-service (QoS) metrics. This presents an opportunity for monetisation, but also a challenge in improving customer perception of the speed and reliability of a service – both factors that have a direct impact on customers' overall satisfaction with their service and intention to churn, as highlighted by our primary research.

Data from Analysys Mason's 3Q 2023 survey of 18 000 consumers worldwide reveals that engagement with cloud gaming and interest in XR technologies are growing. Both of these services are exerting additional demands on in-home connectivity. AI for operations (AIOps) can potentially help. It represents a consolidated data-driven approach to automating operations using analytics and machine learning (ML) techniques applied to real-time and historical data.

The key findings from the research are as follows.

- **CSPs' customers are not all happy with their broadband connectivity.** However, there are clear levers that CSPs can pull to improve customer experience (CX) and reduce churn: small improvements to how happy customers are with the speed or reliability of their service can have a positive effect on Net Promotor Scores (NPSs) and can reduce customers' intention to churn.

- **Implementing AIOps can enhance CX, operational efficiency and cost optimisation.** It can improve KPIs such as first contact resolution (FCR) and mean time to repair (MTTR), leading to fewer site visits and truck rolls, opex reduction and happier customers.

- **AIOps can provide relevant insights from highly complicated models that represent the relationships between different and varying data sets.** These insights can be fed to operations support systems (OSS) such as service management systems or self-care management systems to provide just-in-time information to CSP operations and customer care agents and customers.

- **AIOps can be combined with GenAI capabilities** to augment existing operations' team functions, improving productivity and efficiency, enabling CSPs to deliver better experiences to customers.

- **The implementation of AIOps can deliver commercial benefits.** CSP marketing and sales teams can leverage insights and recommendations gleaned from AI models to target and upsell new services and devices to customers, while network operations teams can reduce costs.

- **CSPs such as Fujian Mobile (FJMCC) are using AIOps to transform fixed broadband operations and have recorded tangible results from these implementations.** FJMCC has achieved a 53.5% improvement in customer satisfaction score and a significant reduction in MTTR, while another CSPs based in Asia–Pacific saved EUR6.5 million in network operations-related opex.

These findings suggest that AIOps can enable CSPs to transition from reactive and siloed operations to a more proactive, preventive and informed mode of operations. This transition could be the key to enhancing CX and retention.

2. Recommendations

- **Embrace AIOps**. Some CSPs have already started their journey with AIOps. However, they are only just scratching the surface. AIOps enables a consolidated data-driven approach to automating operations using analytics and ML techniques and can therefore help CSPs to transition from reactive and siloed operations to more proactive, preventive and informed mode of operations.

- **Focus on customer experience.** Enhancing CX has a direct correlation with end-user satisfaction and retention. Key priorities are improving the speed and reliability of broadband services, and delivering a service that pre-empts the need for customer service intervention.

- **Leverage data more effectively.** CSPs are already collecting data from various sources and they can leverage this data more effectively to gain insights and make informed decisions. They must, however, ensure they use the data sources that will support their fixed broadband CX initiatives.

- **Continue to keep QoS at the forefront.** QoS metrics are already a key focus for many CSPs. We recommend that CSPs continue to prioritise these metrics, especially among gamers and users of new applications such as AR/VR and cloud gaming. Improving these metrics not only enhances customer satisfaction but also presents an opportunity for monetisation.

- **Learn from success stories**. CSPs should look at the success stories of CSPs such as Fujian Mobile (FJMCC – part of the China Mobile Group) which have recorded tangible results from implementing AIOps. The case studies in this paper provide valuable insights and lessons that can guide CSPs in their own AIOps journey.

3. The gap between consumer expectations and CSP performance

3.1 The rising demand for new applications and the struggle of home networks

Today's homes typically host between ten and fifteen IP-connected devices. These devices, depending on the household's size and layout, may be connected via a single Wi-Fi access point or an increasingly complex home subnet. This subnet is an amalgamation of Wi-Fi extenders and mesh hardware, further complicated by personal area networks using protocols like Zigbee or Bluetooth to control and connect other smart devices, sensors, or speakers. The complexity of this ecosystem is set to escalate with the growing prevalence of connected home devices, propelled by increased IP addressability through the Thread network protocol and the Matter connectivity standard.

CSPs are preparing to meet the growing demand on home networks, driven not only by the increasing number of connected devices but also by the expanding network requirements of these applications. The burgeoning consumer interest in applications such as AR/VR and cloud gaming necessitates support for high speeds and low latency, along with the ability to accommodate multiple users demanding reliable throughput simultaneously on the same home network. This concurrent use of the network by multiple people within the same home is a potential pain point. Wi-Fi 5 or 6-based services may be able to comfortably maintain the 25–100Mbit/s throughput under which these services work well, as well as maintaining 10–25ms latency for a single device, but as soon as more than one person in a home wishes to engage in such applications, the home WAN is likely to struggle.

Analysys Mason's 3Q 2023 survey of 18 000 consumers worldwide indicates a rising level of engagement with cloud gaming and a growing interest in XR technologies, both of which will exert additional demands on in-home connectivity. Cloud gaming is being adopted by an increasing number of early adopters and we expect the total number of users of cloud gaming services to double between 2022 and 2025 to 200 million worldwide. Our survey revealed that 14% of respondents either used cloud gaming services in 3Q 2023 or planned to do so in the near future, as shown in Figure 3.1. This figure was even higher, at 20%, among consumers aged 18–44. These cloud gamers are an important demographic for CSPs because they are often willing to pay a premium for their connectivity.

Figure 3.1: Consumer interest in emerging technologies

	% of all adults	% of 18–44	Europe	North America	South Africa	Asia–Pacific
AR/VR	15%	21%	13%	17%	27%	15%
Metaverse	11%	14%	10%	13%	11%	7%
Cloud Gaming	14%	20%	15%	13%	15%	12%
Home security	28%	37%	25%	31%	54%	32%
Home automation	24%	34%	22%	23%	47%	25%

Source: Analysys Mason

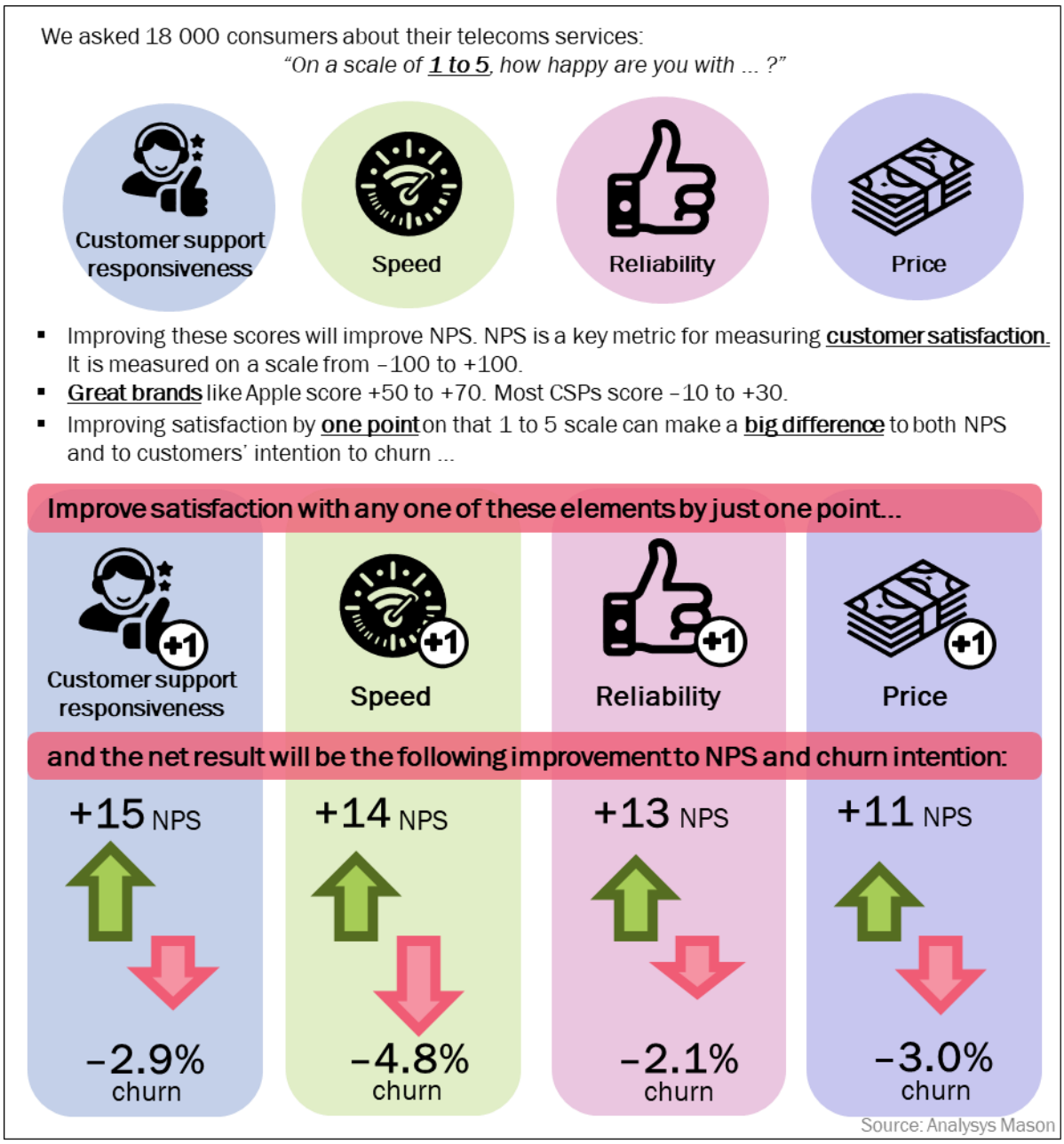
Similarly, the growing availability of XR devices, particularly following the launch of the Apple Vision Pro headset in 2024, is likely to catalyse the development of AR, VR, and metaverse applications, accelerating mass-market adoption. Over the next 2 years, Apple's XR proposition will undergo significant evolution, with

in-home connectivity playing a pivotal role in shaping the user experience. Our survey found that in 2023, 15% of consumers expressed a strong interest in purchasing an XR headset in the next 2 years, a figure that rose to 21% among consumers aged 18–44.

3.2 The ongoing challenge of in-home connectivity issues for CSP customer support teams

In our survey of 18 000 consumers, a regression analysis of NPS against customers' satisfaction scores based on different aspects of their broadband service, clearly shows that improving customer service, speed and reliability all play an important role in maximising customer satisfaction while minimising churn, as shown in Figure 3.2.

Figure 3.2: How improving customer satisfaction based on specific aspects of CX can improve NPS and reduce churn[1]



As shown in Figure 3.2, the service element with the greatest correlation with improved customer satisfaction is a positive perception of responsiveness to customer issues. Accordingly, CSPs should prioritise improvements to customer support agility using data and AI modelling techniques (such as predictive, prescriptive and the more recently launched Generative AI (GenAI)) so as to capture this opportunity to delight customers. But how to approach this improvement? Making this choice is important because customer support is a major opex line for CSPs. Two primary levers can significantly affect the customer experience.

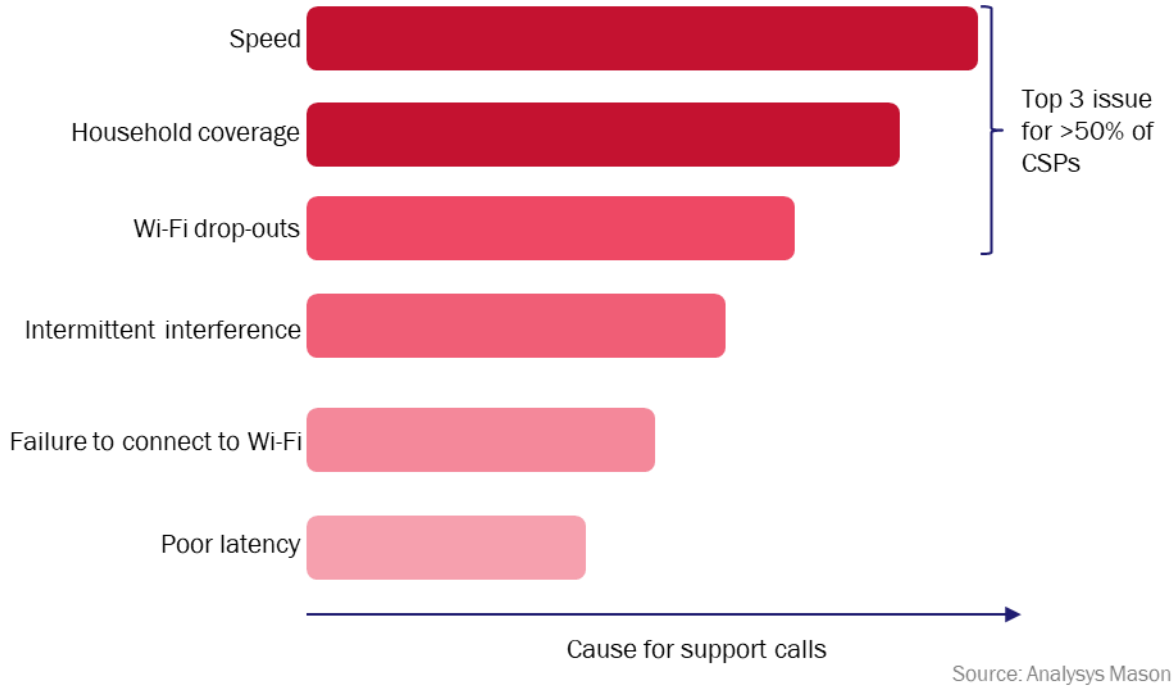
[1] Question: "Please rate your satisfaction with the following aspects of your home broadband service: speed, reliability, price, customer service". Sample size 18 000 online adults from around the world. For more information, see Analysys Mason's consumer surveys.

- **Responsive care** is the provision of a positive experience (and, where needed, engineer visits) when the customer requires assistance. This involves ensuring a high first contact resolution (FCR) rate, providing agents with a clear understanding of the issue at hand, and also empowering customers with various options for resolution through self-care apps.

- **Predictive care** is the delivery of a service that is both reliable and efficient such that it pre-empts the need for customer service intervention in the first place. This can be achieved by using data analysis and AI models to predict and prevent potential issues before they occur.

These two levers work in tandem to create a seamless customer experience. When the service is reliable and issues are few and far between, customers are less likely to require assistance. However, when assistance is needed, a positive experience can significantly enhance customer satisfaction and loyalty. As such, CSPs must address both these aspects to ensure optimal customer satisfaction. It is also likely that there would be a change in balance between the two over time: predictive maintenance solutions will become more sophisticated and promise greater opex savings compared to on-premises visits. At the same time, GenAI solutions will provide augmented decision-making capabilities for many customer call centre staff in the near future. However, what remains relatively constant is the areas where broadband customers say they need the most help: Figure 3.3 highlights the most common reasons why they pursue customer support. These issues can be improved both predictively and through improved agent visibility at the point of contact.

Figure 3.3: Key quality of experience concerns elevated to customer support calls for broadband services



Aside from price and customer support responsiveness, Figure 3.2 also shows the importance of speed and reliability in improving overall customer satisfaction and intention to churn. In fact, after price, the four most-important issues that customers consider when changing broadband plans all relate to in-home connectivity. This is a marked shift compared to our survey results from 2020; consumers are now placing greater value on service components such as reliability and new and better Wi-Fi routers than in previous years. Analysys Mason's analysis of the relative importance of these different factors also identified that the relative importance

of speed and reliability varies, depending on the availability of fibre in a country – in countries with higher fibre penetration, customers cared more about the reliability of their service than the raw throughput.

4. Implementing AI operations for enhanced CX

This section delves into the transformative potential of AIOps across both CSPs' networks and the services that they provide in order to deliver reliable, high-quality home services and enhance customer experience. AIOps will be driven by the combination of pre-existing AI-related technologies and new technologies such as GenAI to achieve these results.

4.1 Introduction to AIOps for fixed broadband network operations

CSPs must transform their current fixed broadband operations to consistently deliver reliable and high-quality services and a positive customer experience. Current CSP operating practices are reactive and highly siloed, as management systems and processes involved in supporting various sub-networks (home network, access network, and service delivery networks) are fragmented. As a result, CSPs have an incomplete view of QoE delivered to customers and cannot fulfil the network requirements for the home services discussed in Chapter 3. In addition, responding to customer calls is challenging as agents move between systems to address issues, leading to increased average call-handling time and operating costs. The cost implications linked to resolving these issues and fulfilling customers' demand for better experience will place significant pressure on CSPs to maintain profitability.

CSPs must adopt a proactive and preventive approach to managing the home network to address these challenges. This approach involves intelligence-driven monitoring of home network experience, predicting and quickly resolving events that are affecting services. By providing quick access to information, regarding the root cause of incidents and potential resolutions to care and operations agents as well as customers (using self-care applications), this preventive maintenance operation can reduce customer calls and truck rolls to resolve network issues. When agents need to address calls, they are equipped with relevant information and can deliver positive experiences to customers.

In order to achieve this new operating paradigm, CSPs will require:

- a holistic view of the health and performance of all the networks and in-home services, to derive full visibility of events that are linked to these services
- real-time monitoring and analysis of these networks and services to identify and predict service-impacting issues before they occur, and identify potential resolutions
- a deterministic approach to monitoring and analysing the health of services to ensure that root causes of impaired QoE can be determined for each service
- automated workflows to take immediate actions to remediate incidents before customers experience service degradation.

CSPs can achieve these new operating principles by leveraging AIOps to manage in-home services. AIOps takes a consolidated data-driven approach to automating operations using analytics and ML techniques applied to real-time and historical data. It creates insights that can drive automated actions using data from multiple sources, including device, service, in-home and out-of-home network, and operations data. When data from

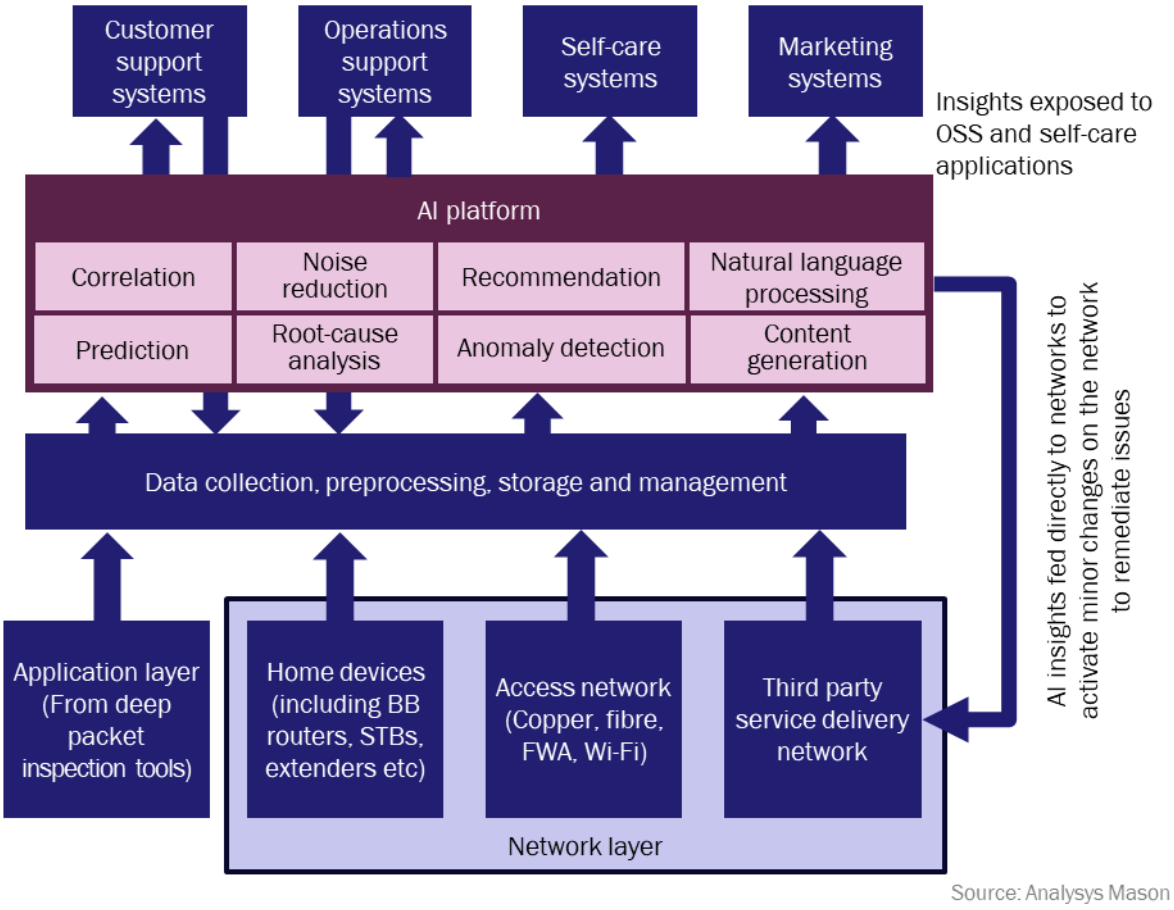
these data sources are analysed using these AI techniques, they reveal relationships or patterns that may not have been deduced by humans. These patterns can reveal the health of services, predict failures, identify causes, and suggest remediation steps.

4.2 Addressing QoE concerns with predictive maintenance and self-management tools

Addressing customers' QoE concerns requires not only a high-quality network but also the ability to correlate network health performance with other data sets linked to the overall customer experience.

AIOps can enable CSPs to achieve this function by providing relevant insights from highly complicated models that represent the correlations between different data sets to proactively detect network and service experience issues, identify the root cause of problems with high accuracy and to generate prescriptive recommendations for rapid resolution. These insights, which could be real-time, predictive or prescriptive insights can be fed to OSS such as those for service management or self-care management to provide just-in-time information to CSP operations and customer care agents and customers. Alternatively, these insights can be used to activate automated workflows to address QoE concerns. As a result, AIOps augments existing operations' team functions, improving their productivity and efficiency and enabling CSPs to deliver better customer experiences. Technology-savvy customers can also be empowered to address issues when they cannot be resolved automatically. Figure 4.1 provides an overview of AIOps when applied within the context of the home service management.

Figure 4.1: Schematic representation of AIOps for fixed broadband service management



The implementation of AIOps involves several stages and these include data collection, preprocessing, storage and management, analysis using AI and insights exposure. Historical and real time data sets will be obtained from several sources covering the application, device, network access and operations layers as shown in Figure 4.1. Data sets can also include derived data obtained from the aggregated raw data sets, including network quality scores or other network or service performance data. With the introduction of GenAI-related technologies, other data sets that can be collected for AIOps include product or operations related manuals which can be analysed when trouble-shooting customer issues. Once collected, these data sets are preprocessed and aggregated to provide a single consolidated view of the data. They are then stored and managed within a common big data environment and exposed to an AI platform.

The AI platform hosts the AI models (including foundation models and large language models) and provides capabilities to train or retrain models based on data stored within the platform. Models can then be applied to perform several analytical workflows including the following.

- **Noise reduction:** using algorithms such as adaptive thresholding and alert deduplication to remove irrelevant alerts thus enabling operations teams to focus on resolving the most critical incidents.
- **Anomaly detection:** based on AI/ML algorithms that detect incidents such as degrading network or device performance as they occur and flag them for resolution before they affect customer experience.
- **Prediction:** based on historical data to inform CSPs of possible service-impacting issues in the home, and when and where they are likely to occur.
- **Root-cause analysis:** the correlation of data from multiple sources can drive causality algorithms to detect the root cause of incidents identified.
- **Recommendation:** based on lessons from OSS regarding the resolution of past incidents, AIOps systems can recommend solutions to detected incidents.

After the analysis stage of the AIOps workflow, the automation workflow follows. Recommendations can be automatically activated, where possible, to implement changes in the network to resolve issues, to maintain high-quality service delivery and improve customer experience. Automated workflows must be assessed first to confirm that they will have no negative impact on the broader customer domain. These automated workflows include autoconfiguration, device reset or restart, or software upgrades to mitigate any problems immediately.

By applying the capabilities of AIOps to fixed broadband operations, CSPs can transition from reactive and siloed operations to more proactive, preventive and informed mode of operations. These changes will have a positive impact on QoE and drive improved customer satisfaction ratings for CSPs.

4.3 The impact of AIOps on CSPs' fixed broadband operations

AIOps solutions offer benefits such as enhanced customer experience, operational efficiency, and cost optimisation. For example, with the insights derived from AI models, CSPs' operations and customer support teams can work with timely and accurate insights on customer issues and recommendations to resolve prevailing service issues. These insights can drive up CSPs' FCRs and potentially increase customer satisfaction as agents have the right information to support customer calls.

AIOps solutions can also affect other KPIs such as MTTR by accelerating the detection of incidents and relevant information (using GenAI to improve information to resolve them and triggering automated remedial actions).

The outcomes of these results will also be reflected in the reduced number of site visits and truck rolls, leading to opex reduction. The reduction in truck rolls, driven by the implementation of automated workflows, will make a positive impact on customers as time spent troubleshooting and resolving issues is reduced.

The implementation of AIOps can deliver commercial benefits. CSP marketing and sales teams can leverage insights and recommendations gleaned from AI models to target and upsell new services and devices to customers. CSPs can also offer their customers differentiated services as AIOps enables them to fulfil the unique requirements of the new network sensitive services they bring to market. This benefit is critical to enabling the CSP to derive new revenue while maintaining a competitive edge in the market.

These benefits of AIOps are applicable to CSPs' in-home services but also other services that CSPs offer to customers.

4.4 Real-world implementations of AIOps

Some CSPs have commenced their journeys with AIOps and have recorded tangible results.

An Asia-Pacific-based CSP that manages about 190 million subscribers recently used a GenAI-based AIOps solutions to tackle multiple challenges within its network and service operations. The CSP suffered from an inefficient approach to accessing information when responding to customer enquiries and analysing operational data to resolve network issues. This led to a high MTTR, poor QoE, and high opex. To improve the speed at which information could be accessed during customer support enquiries, the CSP integrated its service operations system with a large language model (LLM), giving them a natural language search interface to query data from manuals, case libraries and reports. This yielded **an 80% saving in the time required to locate required information to resolve enquiries.** The CSP also applied the LLM to automate its data analysis workflows by passing natural language prompts to the LLMs, which generated and executed SQL queries to retrieve the data required to develop reports. **The CSP achieved a 200% increase in efficiency** (reducing the number of days to generate reports from 3 days to 1 day) **due to the LLM-backed automated data analysis workflows**.

Fujian Mobile (FJMCC, a part of the China Mobile Group) on the other hand had a customer satisfaction rating that was less than that of its competitors and was below the Group's average score. Several factors accounted for this, including taking a non-customer-centric approach to monitoring customer experience, complex operations environments and FJMCC's inability to unify information from OSS. FJMCC decided to adopt an AIOps solution to manage its fixed broadband services. The solution implements a unified operations platform with decoupled and open architecture, and applies AI models to predict customer experience deterioration and proactively take action to protect affected customers from negative service experiences. Results derived from the implementation of the solution, according to the CSP, includes a **53.5% improvement in customer satisfaction score** and **MTTR reduced from 2 hours to 10 minutes**. The **need for repeat site visits fell by 95%**, yielding opex reduction.

5. Conclusion

CSPs are grappling with the complexities of managing home networks that host an increasing number of IP-connected devices. These networks are under pressure to support the growing demand for new applications. However, our research suggests that the implementation of AIOps can help.

AIOps can enhance customer experience, operational efficiency and cost optimisation, which can have a positive impact on key performance indicators such as FCR and MTTR, which can improve NPS and reduce churn. Deploying AIOps leads to a reduction in the number of site visits and truck rolls, and ultimately, opex reduction. Moreover, it can provide relevant insights from highly complicated models that represent the relationships between different and varying data sets. These insights can be fed to OSS to provide just-in-time information to CSP operations and customer care agents, enhancing CX.

The adoption of AIOps represents a significant shift in the operations of CSPs, transitioning from reactive and siloed operations to a more proactive, preventive and informed mode of operations. This shift has far-reaching implications for the future of CSPs and the telecoms industry, promising to enhance customer satisfaction and retention. Therefore, we strongly encourage CSPs to embrace AIOps and take advantage of the wealth of data available to them.

6. About the authors

Martin Scott (Research Director) heads Analysys Mason's research initiatives related to fixed broadband, media and future entertainment applications such as AR/VR. Martin has held numerous positions within Analysys Mason during the last 18 years, including heading the company's *Consumer Services, Data and Regional Markets* practices. He also launched Analysys Mason's *Connected Consumer Survey* series of research. His primary areas of specialisation include telecoms TV strategy, OTT video and media, consumer behaviour, customer satisfaction and consumer-facing marketing strategy. He also specialises in statistics, surveys and the analysis of primary research. specialises in statistics, surveys and the analysis of primary research.

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