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White Paper

Automating Experience-centric Assurance in 5G Networks

The complexity of the Digital Economy has accelerated beyond the manageability of human intervention. Automation is no longer a luxury, but a necessity, to maintain exceptional customer experience.

Closed-loop operations, network automation, and automated assurance are finally gaining traction. Why?

5G standalone networks make it more urgent for communications service providers (CSPs) to trust network systems to make the right decisions to avoid any impact on the quality of customer experience. Everything is more complex with higher volumes of data, more connected machines, new service-based architectures, and cloud networks. In addition, customers expect digital services to work flawlessly, yet services are more complex to deliver, especially critical 5G services for enterprises. The challenge is delivering the expected service levels and managing SLAs for all services, end users, and devices.

This places new business demands on service assurance, where real-time visibility and control of network and service quality is needed to maximize performance. Service assurance has become strategic to elevating customer experience, and driving new service revenue. No longer an afterthought, service assurance needs to be considered up-front in planning new 5G service launches and automating end-to-end service quality across multiple network domains.

This paper will discuss:

- Business drivers and new demands on service assurance
- Requirements for automating assurance in the 5G service lifecycle
- CSP recommendations for successful customer experience outcomes

Service assurance automation meets CSP strategic goals

Many CSPs are undergoing digital transformation to defend their existing revenue streams and to generate new revenue by offering innovative digital services, increasing business and service agility, and delivering superior customer experience. 5G network investments are a key driver of change as the service-based architecture demands a re-think of business processes, commercial go-to-market models, and a shift to cloud, network and IT operations.

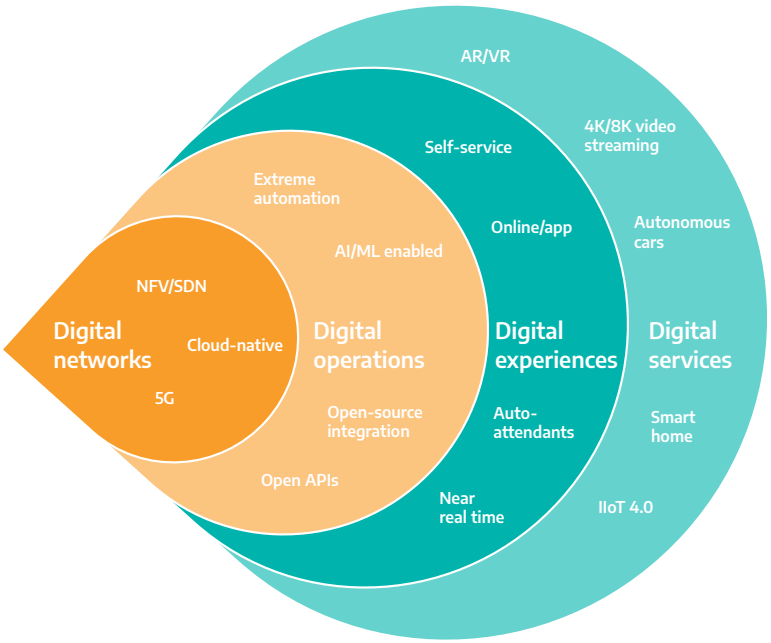

Figure 1: Digital transformation

Source: Analysys Mason

Monetization and new services revenue

With the GSMA expecting 5G network investments to top $1 trillion by 2025, gaining a return on that investment is now a priority for operators. New domains such as edge computing and private 5G networks become critical in improving the end user experience and application performance. Whereas in the past most mobile operators sold to consumers, 5G is the age of B2B and B2B2x services where operators may have agreements with, for example, gaming companies to deliver a level of experience and quality to each gamer or for critical service delivery for an automotive manufacturer or a healthcare provider. For this reason, service providers need real-time visibility on service health and increasingly need to give customers access to this data backed by a service level agreement (SLA).

Efficiency and simplification

Global mobile data usage will grow by 400%, and twice as many machines (IoT) will be connected to the network, reaching 24 billion by 2025, according to the GSMA. The only way to proactively deliver service quality and maximize network performance is to have visibility into every layer of infrastructure and to enable orchestration and service assurance to become dynamic, intelligent, real-time and automated.

Communications Service Providers (CSPs) are looking at a journey towards an end state of zero-touch network operations to meet strategic goals. Complexity is the enemy of speed, so a key benefit of automation is to simplify, make legacy systems end-of-life and eliminate silos, driving the business towards user-experience-aware multi-layer, multi-vendor, multi-domain “service quality monitoring”.

A re-think of service assurance is critical to driving new service revenue

- Real-time visibility and service insight are critical
- End-to-end visibility on critical services
- Speed and agility: new service launches and innovation
- Customer experience: active monitoring and early detection and fixing issues before customers are impacted or notice
- Service and SLA differentiation

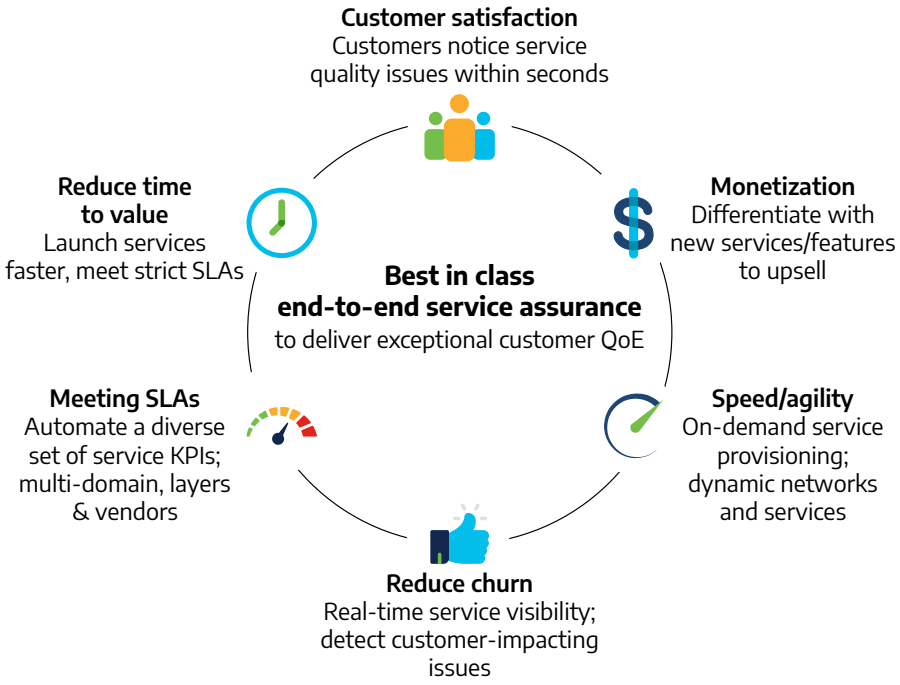

Figure 2: New demands on service delivery & assurance

CSPs are committed to the edge

According to a recent Heavy Reading report titled Harnessing Edge computing for 2022, 39% of CSP respondents have already deployed edge computing, a third plan to do so in the next 12 months, and the remaining 29% plan to do so within the next 24 months*.

The most significant benefit of edge computing is its ability to maintain or improve customer quality of experience (QoE). In early implementations, this often pertains to support for applications and services that require ultra-low latency.

> It's clear that the shift to cloud- and edge-based services is really driving service providers to review their assurance strategies. Automated assurance is a key part of this because of all the opportunities.*
>
> **Jim Hodges,** Research Director for Cloud and Security, Heavy Reading

*https://go.accedian.com/sp/analyst-report/a/edge/heavy-reading-harnessing-edge-computing

Emerging SP revenue streams that require assurance

Telco edge cloud creates the foundation for a new generation of use case applications, placing new demands on network and application performance.

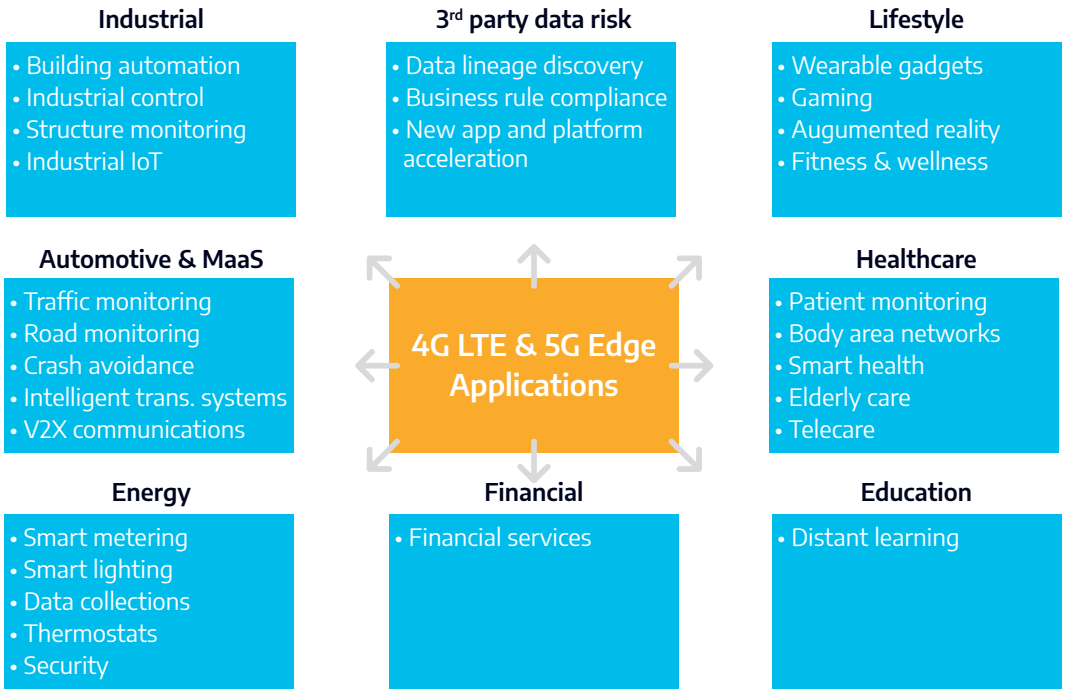

Figure 3: Emerging SP revenue that require assurance

Assuring performance at the edge is complex

A perpetual priority among service providers is ensuring generational interoperability between networks. It is, therefore, not surprising that in the Heavy Reading Harnessing the Edge CSP survey, 4G/5G network interoperability ranks as the key challenge. CSP concerns about edge computing security make "security at the edge" an obvious choice for second in importance.

Although many CSPs planning to deploy edge services agreed that automated service assurance is important, that perception skyrockets once they've deployed edge services (see Figure 4).

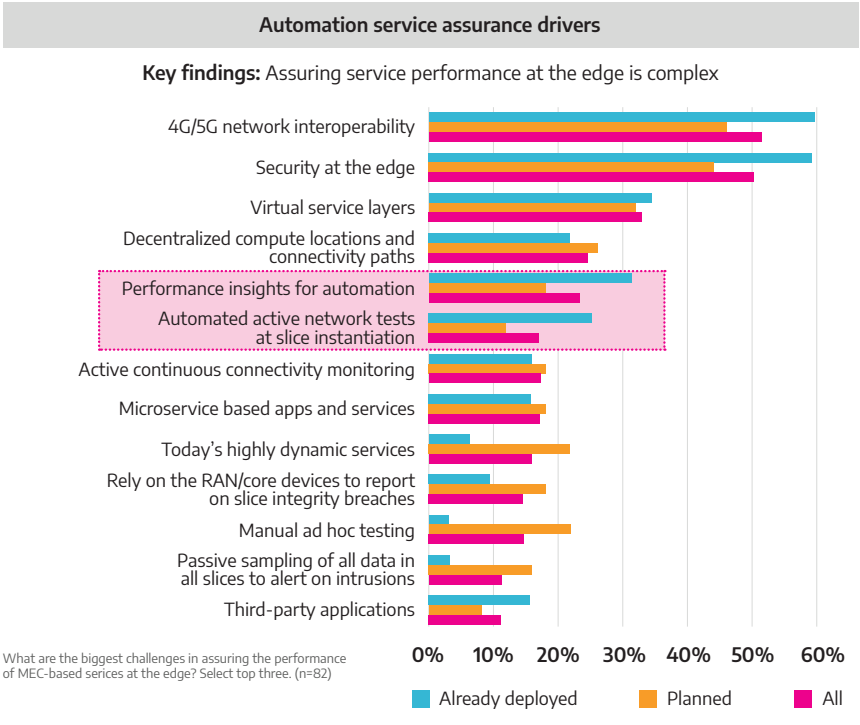

Figure 4: Automation service assurance drivers

Source: Heavy Reading

What's needed to automate assurance

Automation is about enabling network teams to execute at machine speed with repeatable quality. It's not just about executing a script or writing some robotic process automation (RPA) scripts for repetitive tasks. In order to understand the changes you are making and why, you need better information from the network. This gives you the ability to run your business better when integrated into IT and business processes.

Three critical components of successful automation

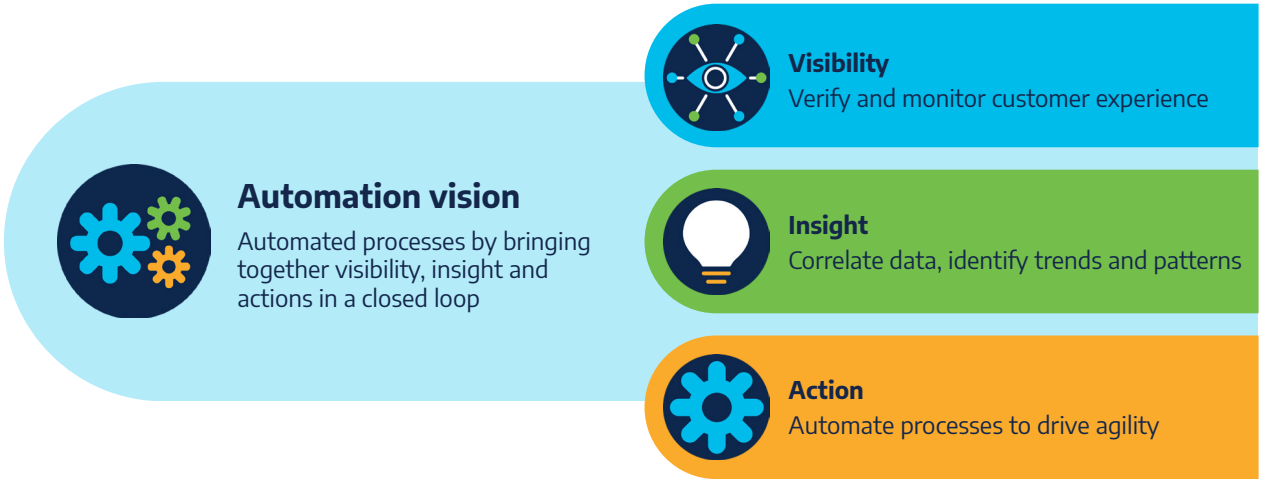

Figure 5: Automation vision Source: Cisco

1. Visibility

"If you can't measure it, you can't automate it.* **Kervin Pillay,** CTO, Cisco

Automating blindly will get you to a place where you are making changes to the network but you have no idea of the impact of that. Being able to get performance data at the right time and at the right level of precision is critical to be able to automate network actions to make it more efficient.

You can't detect performance degradations that impact service quality and customers' critical networks and applications without real-time visibility into what is happening every second in the network. Customers notice issues right away and precise detection is needed to see the seemingly small, but annoying, issues that impact customer experience; these microbursts in latency are only visible with precise per-second proactive monitoring capabilities.

2. Insight

"Data by itself is not going to tell you why you need to make a change.* **Kervin Pillay,** CTO, Cisco

Getting independent insight from multiple sources and vendors, equipment, devices, and even third-party data, allows you to verify and monitor end-to-end user experience. Network analytics and correlation of relevant data generates valuable insight and helps to detect recurring anomalies or experience-impacting microbursts. It's beneficial to correlate multiple sources of data so you can look at what the network is doing over time, understanding service health and quality, patterns, and anomalies.

3. Action

"This is about taking the data insights on "what you need to change", how you make that change and then 'close the loop' so you know that the change made has had the right effect.*

Kervin Pillay, CTO, Cisco

The foundation is to make sure you have assurance, and the next step is machine learning which can tell you what the network is trying to achieve. Then, you can transition to fully closed-loop automation. This is a journey that can happen once you've monitored a domain for long enough with the right orchestration and assurance partners to trust it can run itself with minimal intervention.

*https://go.accedian.com/sp/analyst-report/a/edge/heavy-reading-harnessing-edge-computing

High-quality data and metrics to feed automation

The continued growth of the network measured by any metric, be that traffic, devices, or cell sites, has encouraged service providers to step away from their multi-monitor network displays and start to rely more on automation. As a result, CSPs that have been reluctant to relinquish ongoing network control to automated tools are now starting to embrace them (see Figure 6).

When Heavy Reading asked survey respondents who would be consuming their metrics data, "internal closed-loop automation or ML/AI tools" was the emphatic number one response. This response is even more pronounced among very large carriers (with annual revenue >$5bn), with 48% choosing automation tools as the primary consumer of the data*. The need for high quality network performance data and KPIs are essential for success and include accuracy, granularity, and timeliness of KPI data—all analytics that generate actionable insight—when being used directly for closed-loop automation or machine learning and artificial intelligence tools.

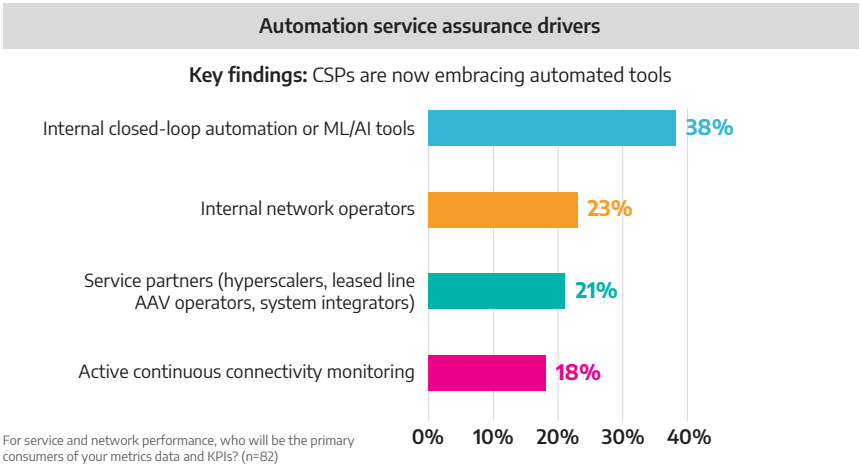

Figure 6: Automation service assurance drivers Source: Heavy Reading

Closed-loop operations: steps in the full lifecycle

Once CSPs decide to implement closed-loop automation, the first question is where? For example, a single change in the core network can impact millions of customers; however, an access network has millions of endpoints, so an automated change to one is unlikely to disrupt the rest. That would be a great place to begin the journey and deploy closed-loop operations.

Figure 7 illustrates the full lifecycle of closed-loop automation and the key role of service assurance at each stage.

Visibility

1. Observe what's happening in the network and get as much data as you can from as many sources as possible, across multiple different dimensions.
2. How do you design services with assurance built-in up front to make sure that how the customer experiences service quality is what you intended to happen?
3. Using an intent-based approach, that service intent can be pushed to the network with Cisco tools and mapped to configuration– here's what we want out of the service and the network. Map intent to configuration. One of the biggest benefits of automation is to abstract away complexities of how a network works to an intent-based API so that you can expose the network to far more users than ever before. The teams don't have to understand how the network protocols work to deploy a service, which can speed up time to market with new services. That's one of the underlying benefits of automation that is often overlooked.
4. Once we have intent and have mapped to configuration, you can ask the network "what do you look like right now?" and "how have you affected every other service?" Without visibility you would not know how it's affecting other services. And this is the biggest balancing act – how do you make sure all services are operating together and not interfering with each other?

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In action: full lifecycle, closed-loop operations

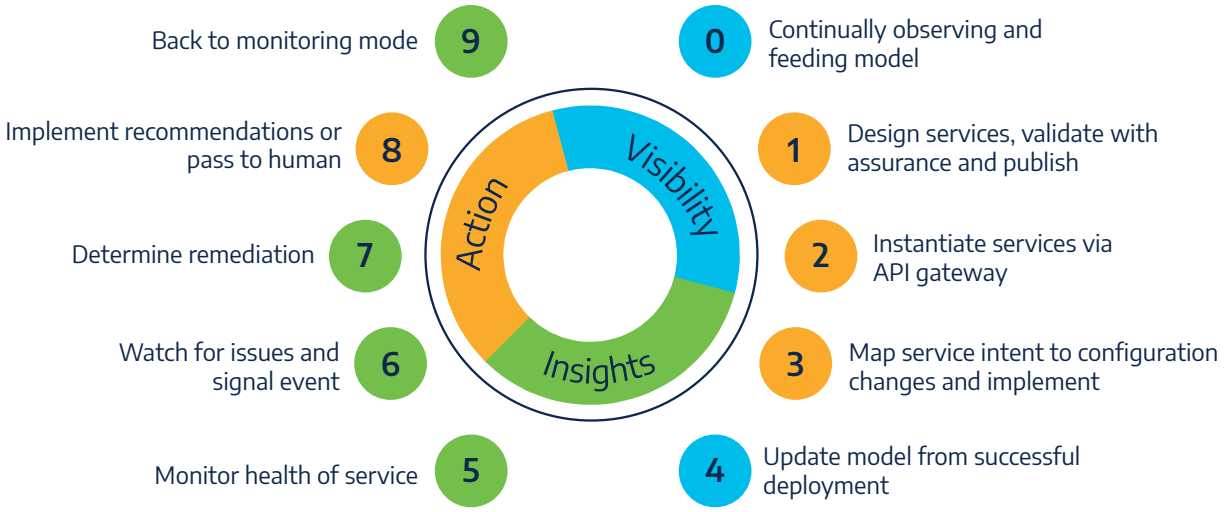

Figure 7: Full lifecycle, closed-loop operations

Source: Cisco

Insight

5/6. What service health insights can we get? How is the service performing? How is the customer experience? Another advantage of automation is that you don't need humans to constantly look at screens, and then spend hours analyzing data before making a decision. It is possible to set thresholds so the network tells you when something is wrong and can then suggest actions to improve service delivery and the resulting customer experience.

7. One could be presented with several remediations and be able to understand the potential and risk of each, then selecting the best impact based on risk level you are willing to accept for the service.

8. To close the loop, we go back to monitoring mode. We designed service with assurance, we understand how it's going to be implemented, and the impact of multiple services on each other. The network tells us what's happening and recommends the best course of action – and you can also decide when to bring a human into the loop to determine what is the next best step.

Action

9. Back to monitoring and continuing to observe and feed the model. Without assurance, it would be impossible to achieve a state where the network tells one what could be improved or provide the customers' input into how to improve service.

Automated Assurance Checklist

Summary: What is needed for assured automation?

- Active underlay with millisecond awareness and microsecond precision
- Passive full stack overlay for end user experience (QoE) visibility
- Analytics ingesting ecosystem data sources for correlation and insight
- Support for legacy, virtual, and cloud architectures
- Based on cloud native technology and methods: CI/CD at network level
- Tight Open REST-API integration with automation/orchestration
- Feeding closed-loop automation in real-time based on QoE

Colt's automation journey

For service providers, one way to understand the business benefits and implementation options is to learn from peers that have already begun executing their next-gen service assurance strategies. One example is Colt, which is now halfway through a three-year process of updating all existing performance- and fault-monitoring systems.

> "You get unparalleled visibility over your entire ecosystem. You get untapped data access. Whereas systems before might have had a very proprietary data architecture, all of the vendors we've gone with are very open, often using REST APIs. We can grab and source that data. It becomes a real powerhouse in the future we want to get to."*
>
> **Shane Sura,** Vice President of Network Operations, Colt

Recommendations for getting started with automated assurance

- **First determine your strategy and the automation future state** you are trying to achieve, and start thinking about how your network, people and processes can evolve to closed loop automation. For example, is your goal to enable a fully automated customer journey from service order start to end service deployment without any human interaction?
- **If AI and machine learning are the end state,** determine everything those tools need to be a success, including massive data sets and unlimited access to your network.
- **Consider where your employees sit in the journey.** It's easy to get caught up in the system and technology without considering the work culture, employee satisfaction, and what your peoples' lives will be like and where they fit in your automation journey.
- **Getting automation to work across legacy, virtual and cloud** can be challenging since legacy systems don't have modern REST APIs. An adaptable platform that can talk to all these layers is essential, along with visibility and instrumentation of all network layers to continuously verify it's always working.
- **Avoid multiple systems from multiple vendors, opt for a single platform** that gives you unified visibility and insight from multiple sources of data on the end-to-end service health and customer experience. Once you have that, you can decide what to do with that data and what actions to take. Ask the question: do I get humans to look at it or put it into machine learning?
- **Picking the right partner is key and can make or break the experience.** Implementation can be lengthy to build all the automation workflows on top of platforms. Colt went through rounds of RFPs and decided to rip and replace all performance and fault monitoring platforms. Colt decided to go with completely new tools and chose Cisco and Accedian as key partners.

*https://go.accedian.com/sp/analyst-report/a/edge/heavy-reading-harnessing-edge-computing

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Accedian Skylight and the Cisco Crosswork™ Automation platform

Together, Accedian Skylight and the Cisco Crosswork™ Automation platform show what's happening in the network every millisecond, enabling service providers to identify issues quickly and automate intervention to assure customer experience in real time. These capabilities are highly relevant to 5G standalone operations and delivering innovative new services.

The integration of Accedian Skylight with Cisco Crosswork™ helps CSPs to:

- Deliver services faster and "right the first time" with on-demand service activation testing
- Unlock revenue from advanced services with orchestrated continuous assurance and automated service lifecycle management
- Actively verify end-user Quality of Experience (QoE) through real-time performance KPI measurements
- Automate multiple complex tasks: reroute paths or adjust bandwidth to maintain service quality
- Reduce costs of manual and field-testing efforts across multi-vendor networks, services, and domains

Click here to read more about Accedian Skylight and the Cisco Crosswork™ Automation platform

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