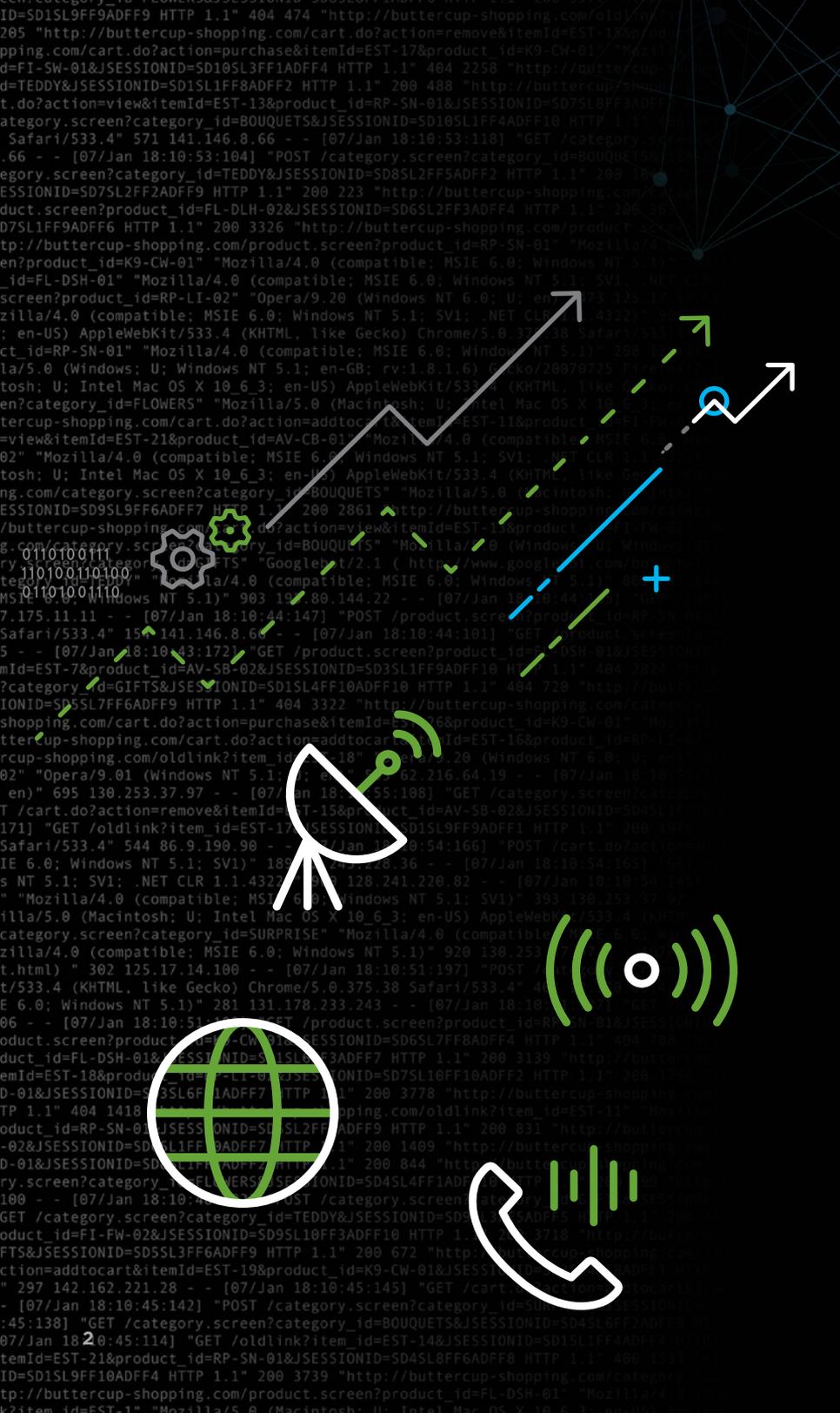


HOW CSPS CAN PREPARE FOR 5G AND EXCEED CUSTOMER EXPECTATIONS



Communication service providers (CSPs) and media companies are currently in the throes of a massive disruption to traditional business models. Customer loyalty is increasingly difficult to predict and manage in an era where consumers have infinite choice across devices and service providers, as well as plenty of incentive to shop around. At the same time, companies are in the process of investing heavily in next-generation infrastructure that consumers demand — such as 5G and the cloud — while still trying to drive greater operational efficiencies from existing assets and developing new revenue streams.

As the array of offerings and associated platforms and touchpoints grow, security breaches or performance-based service disruptions can quickly turn into regulatory sanctions, a reputational crisis or financial penalties.

As a result, many of the long-standing KPIs that CSPs use to manage their businesses are no longer enough to identify potential issues or opportunities. They need insights from their realms of structured and unstructured data to stay competitive. This is where Splunk comes in: by delivering perspectives on customer behavior, network performance and other operating dynamics.



Before discussing how Splunk helps companies navigate these changes, it's worth exploring some of the key trends in the communications and media industries:

SECURITY AND FRAUD

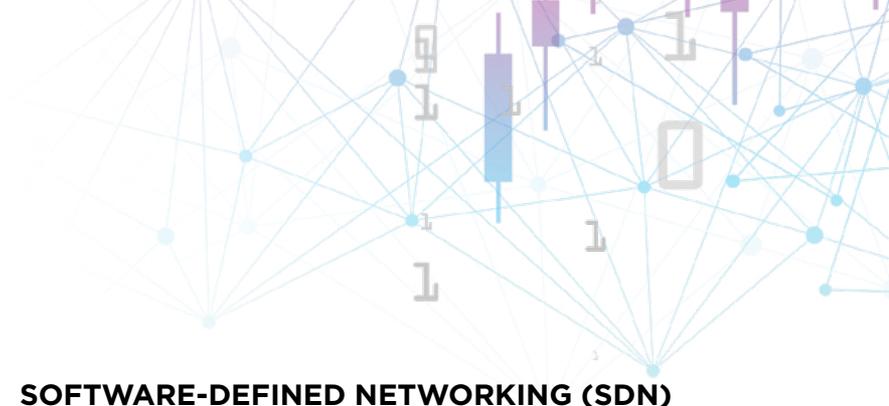
CSPs face the extraordinary challenge of protecting themselves as well as their subscribers against malicious actors looking to exploit network and consumer vulnerabilities, and massive service disruptions through a distributed denial of service (DDoS) attack. Cyberattacks often cause irreparable damage to the reputation of the CSP, loss of subscribers and billions of dollars in lost revenue. According to the Communications Fraud Control Association, CSPs leak an estimated **\$30 billion in revenue** annually on fraud.

Telcos can combat and identify suspected fraudulent activity with the copious amounts of information-rich data at their disposal. For example, by analyzing historical records such as call detail records (CDRs) they can identify patterns of high call volume to suspicious destinations, suggesting account takeover or IP-PBX hacking, potentially as part of an International Revenue Sharing Fraud (IRSF) scheme. Once detected, the telco can proactively block subsequent calls.

NETWORK FUNCTION VIRTUALIZATION

Network function virtualization (NFV) has been around for years. The vision was first crafted by 13 of the world's largest telcos in 2012 to realize cost savings and to reduce time to market for services. Historically, telcos have leveraged purpose-built hardware and appliances such as firewalls, edge routers and broadband remote access servers to deliver solutions to enterprise customers on top of the end-to-end network connectivity they provide. Additionally, services like DNS, encryption and even deep packet inspection are offered over the same path. However, as the appliances and systems (sometimes called customer premise equipment) grow, so does the CSP's operational expenditure to support installation and maintenance.

Mobile network operators (MNOs) are seeing demand for more bandwidth driven by applications on mobile devices and have to continue to scale at capacity to accommodate the increase in traffic. And this will only get worse with 5G on the horizon. All the while, they're finding it increasingly difficult to continue to raise the key metrics they leverage to measure revenue, including average revenue per user. MNOs need to find creative ways to reduce the total cost of ownership and the energy footprint of radio access network (RAN) nodes.



CSPs have embraced virtualizing these network functions to save on the massive costs associated with hardware that offers single-point solutions. NFV allows CSPs to decouple the software that offers the network function from the hardware that supports it, creating a highly flexible, scalable, secure, high-performance and cost-effective solution to enable rapid service delivery. NFV is a transformational technology that enables CSPs to offer virtual customer premise equipment, leveraging virtualization platform technologies like OpenStack or VMware vCloud. With NFV, CSPs also have the flexibility to deploy network functions at a variety of locations within their network or at the customer premise, if that's best suited for a specific function. Additionally, MNOs can leverage NFV to virtualize some inefficient RAN components to save on energy costs and benefit from features like dynamic resource allocation and load balancing. Another attractive option is that it allows for telcos to move towards a vendor agnostic model for delivery of Virtualized Network Functions (VNFs).

SOFTWARE-DEFINED NETWORKING (SDN)

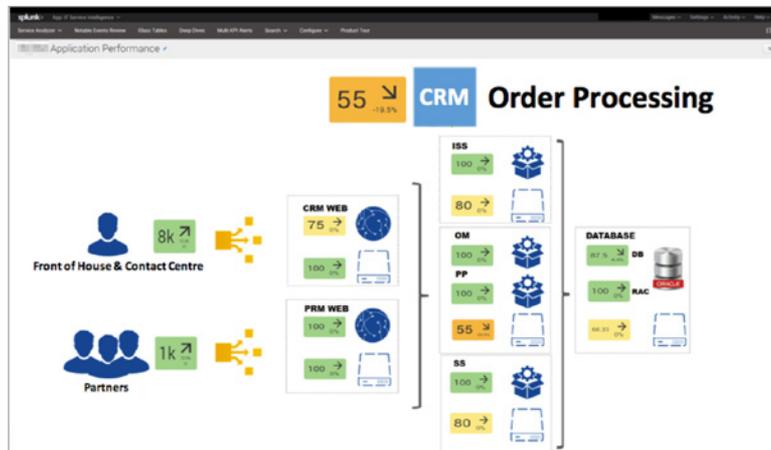
Simply providing a highly customizable and elastic approach like NFV to address computational and storage challenges to supply network functions is not enough. If the network functions can be dynamically configured in a matter of seconds, yet do not have corresponding dynamic paths configured on the network to deliver the traffic, the value is extremely limited.

That's where software-defined networking (SDN) comes into play. SDN technology takes a centralized approach to managing a complex routing environment, whereas a traditional network or individual routers make decisions on how and where to route packets. SDN is cost-effective and highly-programmable, so things like provisioning additional bandwidth to carry a sudden increase in traffic from newly configured virtualized network functions can happen in a matter of seconds.

5G

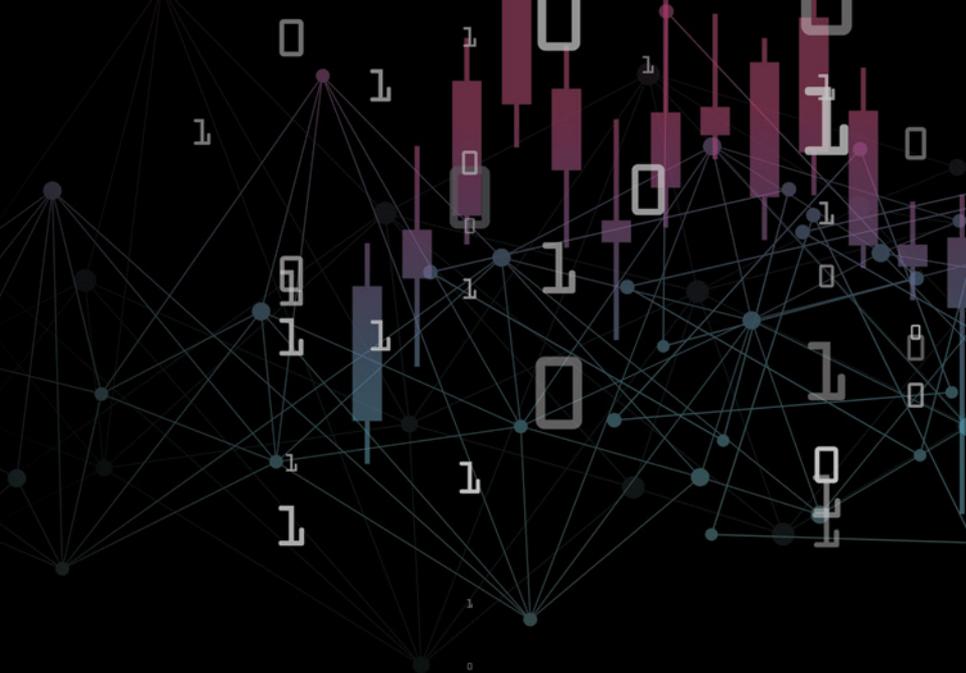
Over the past few years, the need for instantaneous response in communications has gone from nice-to-have to required. CSPs must continue to keep pace by enhancing customer experience for delivery of products and services, and by offering excellent customer service. With connected devices **predicted to exceed 125 billion by 2030**, CSPs also need to transform existing business models to ones driven by the massive explosion of data at their fingertips.

Proactively Resolve Customer Issues: Correlate structured, unstructured and semi-structured data to gain new insights and proactively monitor and resolve customer issues across Internet, voice and data services.



5G represents a massive upgrade over existing 4G networks with speeds as high as 100 times 4G, and with latency approaching one millisecond. That means downloading a feature-length movie that takes eight minutes over 4G could take just five seconds on 5G, and that's without buffering.

With 5G speeds that could exceed even wireline performance, it's easy to see how 5G will be the connective tissue for the IoT explosion, autonomous and connected vehicles, connected home monitoring, remote surgical procedures, manufacturing safety for incorporating connected robots, and definitely for more immersive experiences like augmented reality and virtual reality. CSPs can offer 5G home Wi-Fi routers to support existing devices as well as the billions of IoT devices soon to connect, and produce a brand new revenue stream by charging a fee per connection for faster speeds. They may also bundle devices to view subscriber-based video content delivered with AppleTV, Roku, Chromecast, Amazon Fire TV or watch programming via YouTubeTV. This will kick off an era where set-top boxes don't exist, meaning CSPs would no longer accrue costs associated with setup, installation or maintenance for that legacy hardware.



HOW **SPLUNK HELPS**

IT OPERATIONS ANALYTICS FOR ACTIVATIONS, CHURN MANAGEMENT AND OTHER KEY PROCESSES

As CSPs look to implement future transformative technologies, they'll also be keeping an eye on what's most important to them: consumers. After all, what good is providing the next generation of services if consumers are leaving because they're not happy with the service levels being provided? CSPs understand this and are constantly striving to provide a frictionless experience for customers to ensure they continue to consume their products and services. They have to manage what they can control around service performance and quality, all while keeping costs low enough so customers have no predictable reasons to look for an alternative. Happy customers are loyal customers.

The cost to retain and cultivate the experience for an existing customer is far less than acquiring a new one and building a relationship from the start. However, one customer is not like the other, and it may make sense to retain loyal customers consuming many services over others. In order to gain this insight, CSPs must use data to piece together customer journeys, including requests for the activation of new products and services, support experiences, billing and offering new products or rate plans.

Splunk can help CSPs collect and correlate transactional data from databases, customer reference information, and machine data from network switches, IVRs and ACDs, call recording infrastructure, and backend order processing systems, to create powerful insights based on individual customer journeys. Analytics based on customer journeys are more meaningful when they're individualized. CSPs can also leverage Splunk's machine learning capabilities with logistic regression to predict when customers may churn based on one or more indicators from disparate systems.

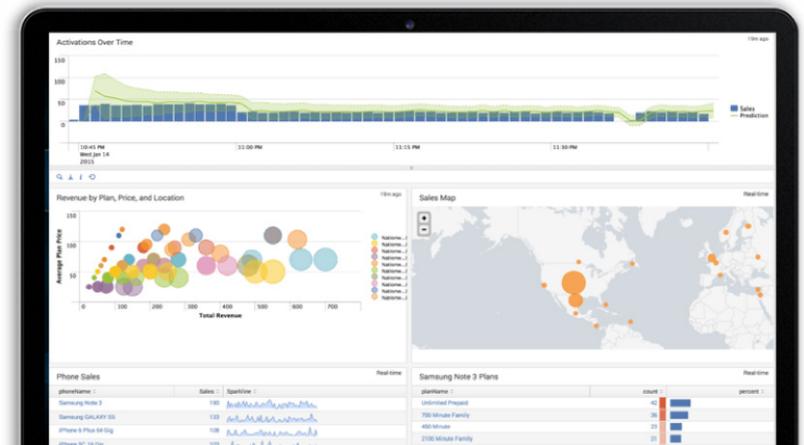
Communications service providers manage some of the largest IT operations in the world, delivering key processes such as customer activations. Deploying Splunk can provide a real-time view of the health of the applications involved in the business transactions flowing across the order to activation process.

“CenturyLink puts a heavy focus on customer experience, and Splunk helps ensure our end users are always satisfied with their service team interactions. Splunk Enterprise and Splunk IT Service Intelligence give us real-time, executive-level visibility into the health of our IT applications. This ensures that our representatives can get the information that matters most to each customer at all times. Splunk has helped us raise the bar in customer service by improving time to resolution, resource optimization and executive-level communication.”

Tim Kerrigan, Manager, Systems Engineering Group



Read more about Splunk at [CenturyLink](#).



CSPs can track and predict sales and activations, can track revenue by plan, price and location, or nearly any other performance metric to help drive better customer experience.

SECURITY

Splunk can help communications providers recover leaking revenue due to fraudulent schemes by identifying suspicious patterns using real-time analytics of CDRs or session initiation protocol (SIP) signaling messages. Unlock the power of machine learning in Splunk, and leverage machine learning (ML) algorithms to proactively detect outliers and anomalies to catch and prevent fraud. Leverage other advanced features like adaptive thresholding to create intelligent alerts. Use [Splunk Phantom](#) to execute a security orchestration automation response (SOAR) playbook to automatically take a defensive action based on predictive patterns and historical behavior.

Additionally, Splunk can detect security threats and malicious events such as DDoS, SIM swapping and other events that contribute to revenue leakage.

“Security of the network is critically important to our customers. For many of them, security is the primary reason why they choose to work with Integra. They want their data and communications services delivered on a network that has a level of security that goes beyond what other providers and the public Internet can provide,” said Steve Fisher, vice president of network planning and security, Integra. “Splunk software is playing a central role in helping Integra’s SOC and our suite of services set the highest standards for protection against threats, thanks to Splunk software’s ability to perform real-time and historical analysis for massive volumes of data. That helps enable Integra to ensure an exceptional level of threat neutralization and incident response rate.”



Read more about Splunk at [Integra](#).

PHYSICAL (TELCO) NETWORK ANALYTICS

RAN Monitoring

A successfully managed network leads to high rates of customer calls connecting, cell availability and low failure rates, which drive overall customer satisfaction and revenue. An organization can use Splunk to monitor the infrastructure across cellular sites, watching availability, uplink/downlink performance and connection volumes over time. This information can help to deliver targeted field maintenance and accurate capacity planning.

Monitoring the RAN performance is a vital task for operations personnel, network engineers and management in all communications companies. Splunk-driven insights can deliver KPIs for the following:

- Monitoring and optimizing the radio network performance to provide better subscriber perceived quality or better use of installed resources.
- Rapidly detecting unacceptable performance in the network, enabling the operator to take immediate actions to preserve the quality of the network.
- Providing radio network planners with the detailed information required for dimensioning and configuring the network for optimal use.
- Troubleshooting on cell clusters of interest.

“Traditional monitoring tools just tell you when something isn’t working. With Splunk, we can now proactively manage operations and respond before an outage occurs or service erodes. The Operational Intelligence we have with Splunk software makes it much quicker and easier to investigate and resolve any incidents that occur in our infrastructure.”

Security Architect

Telenor



CELL TOWER CAPACITY PLANNING AND OPTIMIZATION

Splunk is able to play a critical role in the management of the mobile cellular network for communications providers. Splunk can be used in the planning process, ingesting many datasets including existing network information and demographic data, to identify where future capacity will be required. This use case will become especially prescient in the context of 5G, with the expected higher number of cell site requirements.

“Splunk IT Service Intelligence gives us a real-time understanding of how our services are performing. The glass table visualizations make it quick and easy to identify and resolve any issues, preventing any impact on our users. Now we’re able to be a lot more proactive about our services.”

Andre Casper, Solution Owner, Operational Analytics



Read more about Splunk at [Vodafone](#).

SOFTWARE DEFINED NETWORKING (SDN) AND NETWORK VIRTUALIZATION FUNCTION (NFV)

Splunk plays well in both the traditional telco space to accommodate data feeds from purpose-built appliances by ingesting traditional data feeds like syslog, but it really excels in the world of NFV where datasets among components leveraged at the compute, network and storage tiers must be carefully correlated to present the overall health of a given network function. In addition to health monitoring and predictive analytics, ML and AI operations can also be leveraged in Splunk to determine when traffic patterns may require additional computing resources to dynamically accommodate an impending increase in traffic, or conversely, identify when traffic patterns suggest a reduction in resources is warranted.

Similarly, Splunk is leveraged by SDN technologies like Cisco ACI, where it's used to gain real-time visibility centrally across the deployment, track inventory and health of physical and logical constructs, threshold settings for KPIs, state transition faults and tenant-based bandwidth utilization reporting. Learn more about the [Cisco ACI App for Splunk Enterprise](#).



FIELD ORGANIZATION ANALYTICS

When customers report problems via web forms, chatbots, or via call center agent, complaints are logged and then some form of action is taken if the trouble wasn't resolved in real time. The inherent problem in diagnosing those complaints during this triage process is that neither the customer reporting the problems, nor the entity responding, is an expert with the product or service in question. If enough information can be gathered up front to accurately assess the problem, a truck is then dispatched to address it. However, in many circumstances, CSPs are left guessing as to which engineer is best suited for the job, which truck to dispatch, whether the issues are contained or wide-spread, local or network, and the list goes on. With each truck roll costing CSPs \$100 or more, the total annual operating cost is in the millions. Furthermore, it's estimated that 20 percent of these result in no trouble found, translating to dollars wasted on technician labor costs, along with fuel and maintenance expenses for trucks.

CSPs are becoming more reliant on machine data to assist with diagnostics. Customer-premise equipment (CPE) like cable modems and optical network terminals produce data that can be used in the diagnostics process to determine things like services impacted (e.g., whether it's the internet, TV, phone, or perhaps all of the above). Those insights can be captured in Splunk, then queried by agents during the triage process to better diagnose issues in real-time and prevent truck rolls altogether.

Additionally, correlating individual CPE data with that of other customers, along with network information, provides a great deal of insight on its own. Layering in machine learning with [Splunk's Machine Learning Toolkit](#) (MLTK) to analyze symptoms, suggest likely cause and recommend actions to agents can be a powerful tool to mitigate truck rolls resulting in immediate cost savings. Tools like [Splunk IT Service Intelligence](#) (ITSI) can be used to map and stitch together KPIs across a complicated infrastructure and down to CPE to help determine the exact level of impact, whether to a single home, street, neighborhood or community. By leveraging Splunk for business critical insights based on machine data, CSPs can save and reinvest a significant amount of money annually.

BLOCKCHAIN

Blockchain, while an emerging technology, introduces a number of important potential benefits for communications providers. Early adopters are exploring use cases that include mobile payments, contract fraud management, identity management or IDaaS, and settlement between carriers for roaming charges. The benefits, though not yet realized in most cases, are expected to be measured in billions of dollars annually.

Splunk is at the forefront of this new technology, delivering the ability to manage the health of the servers and surrounding infrastructure in the blockchain/distributed ledger technology (DLT) network, as well as employing blockchain to support the integrity of the data in Splunk itself.

NEW REVENUE GENERATING MODELS

As communications companies transform into digital businesses, new opportunities are created to leverage the existing infrastructure and data assets to develop new sources of revenue. Most are largely dependent on the successful interpretation of patterns and events found in machine data, so Splunk is uniquely positioned to underpin these new offerings. The most prominent include smart homes, smart vehicles, healthcare, wearables and other connected devices within the realm of IoT. Using the Splunk platform, plus ITSI and the Splunk Machine Learning Toolkit, communications companies are able to process high volumes of data generated by these platforms to determine patterns and key events. Splunk is already engaged with several key communications providers in its smart car initiatives among other IoT programs.

Additionally, as the capabilities of handheld devices and smartphones increase to include mobile payments, identity management and video content consumption, the Splunk MLTK and ITSI help monitor the health of these critical new platforms and the security of the transactions executed across them, analyzing the performance and identifying issues to help deliver a positive customer experience.

Today SaskTel teams report that Splunk Enterprise is helping them to speed time to market. “With Splunk Enterprise, we can rapidly prototype new products,” Pasnak says. “The ability to rapidly prototype and bring new, innovative products to market quickly benefits SaskTel customers. For example, one useful new feature of the mySASKTEL app enables customers to learn how much money they save by using the free Wi-Fi network made possible by SaskTel’s partnership with businesses throughout the province.”

Jeff Pasnak, Technical Analyst, IS Division

SaskTel 

Read more about Splunk at [SaskTel](#).

SUMMARY

Communications service providers are enabling the connected world. Daily digital interactions at work, home and on-the-go rely on complex provider networks, interconnections and cross-collaboration behind the scenes. Business and personal decisions are dependent on the flow of data to be fast and reliable, and CSPs are under constant pressure to not only keep up with technology but are continually striving to stay ahead.

Our data universe is on track to grow to 175 zettabytes by 2025, with more than a quarter of that data being real-time from mobile and IOT devices, according to an International Data Corporation report. To support that growth, CSPs must uncover opportunities to reduce costs by continuing to pivot away from legacy-fixed infrastructure and towards flexible and scalable solutions to help deliver the products and services of tomorrow. Simultaneously, they'll need to expand their current footprint to include innovative solutions that will enable secure transmission of the billions of terabytes of machine data that will traverse their networks.

With all the vastly disparate data CSPs are generating and the seemingly endless use cases built around preventing customer churn, enhancing the customer experience, predicting product purchases or upselling services, it's becoming increasingly difficult for humans to make decisive, data-driven actions. CSPs will need a platform which not only processes, cross-correlates and enriches the vast quantity of machine data available, but also leverages predictive analytics using machine learning and artificial intelligence to help navigate and determine which actions will bear the most fruit.

Monitor Activations in Real Time: CSPs can effectively monitor their network infrastructures to proactively resolve problems, ensure consistent delivery of services and accelerate the introduction of new products.



With industry-leading trusted analytics for machine data, CSPs can rely on Splunk to help them drive critical business insights as they look to stay ahead of emerging and demanding technologies reliant on their networks, while creating the highly functional and scalable supporting infrastructure of the future. In addition to the already secure and reliable data on transmission between systems that Splunk provides via transport layer security, Splunk is introducing new capabilities, leveraging DLT technology like blockchain to securely store data and mitigate data manipulation — that way, CSPs can rest assured the data they rely on to stitch together the customer journey or leverage critical business decisions is safe and dependable.



For more information on how Splunk can help
your CSP meet changing customer, technological
and environmental demands, please visit:

www.splunk.com/telcomedia.



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