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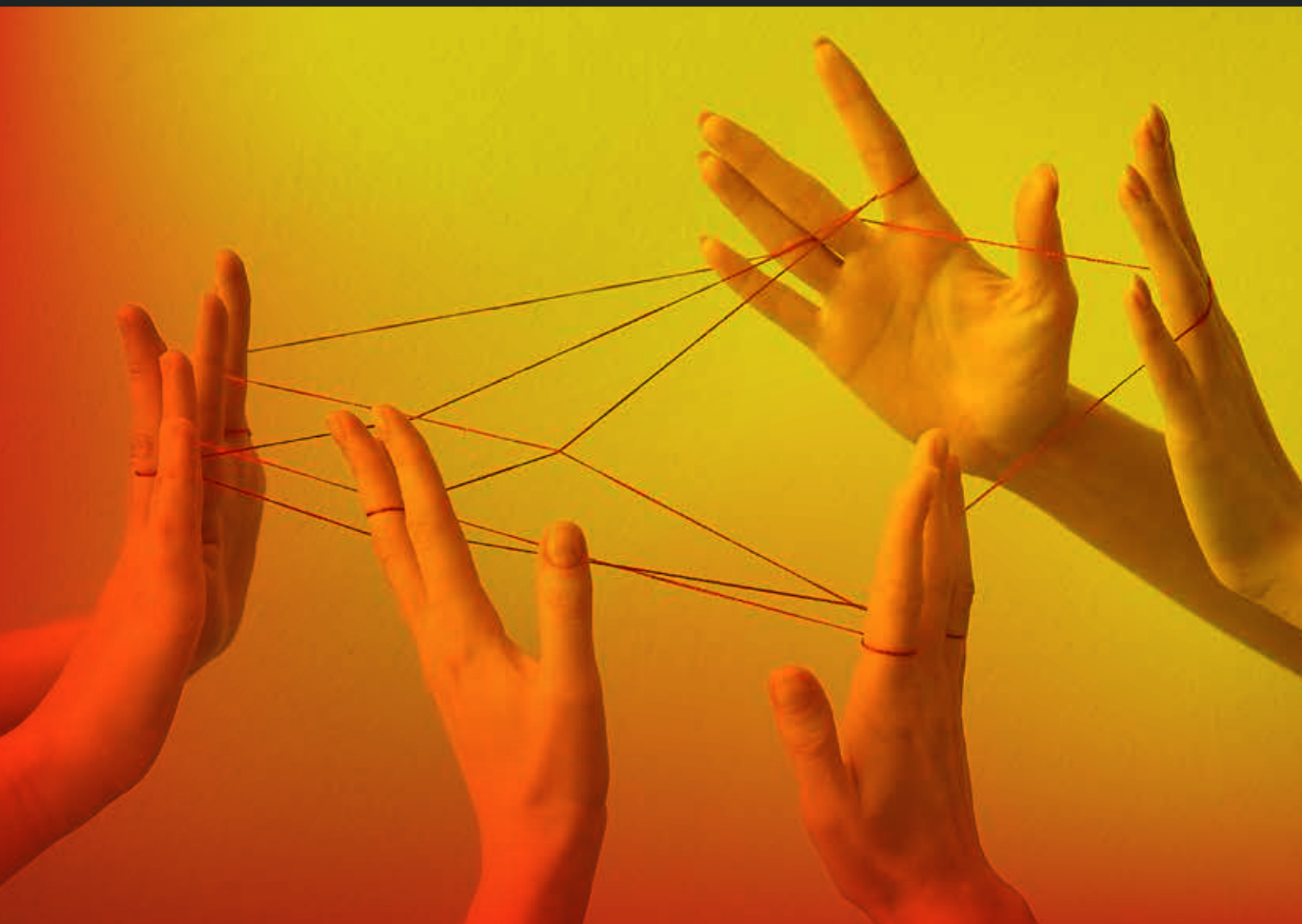
Building on belief

Toward zero touch operations:

Evolving hybrid network operations in a digital-first world



Abstract

The new era of smart cities, connected factories, self-driven cars and drone-based deliveries is putting relentless pressure on communications service providers (CSPs) to deliver seamless and reliable network connectivity. It has compelled CSPs to reposition themselves as digital service providers (DSPs). A major step in this transformation requires effective management of hybrid networks, comprising both physical and virtual networks. Automating operations and taking a machine-first approach is crucial to detecting and resolving operational issues at scale in such a complex network. This means seamlessly migrating to telco cloud networks, embracing technologies such as network function virtualization (NFV) and software-defined networking (SDN), and deploying big data-based analytics and IoT systems – a process that spans multiple phases.

This paper outlines an evolutionary approach that enables CSPs to transform their reactive legacy physical network operations to support the requirements of real-time automated actions and cognitive orchestration, leading to zero touch operations.

Combining the traditional with the modern: The need for a holistic approach

Traditionally, CSPs have been managing their network operations on a piecemeal basis. With telecommunications networks evolving at a rapid clip, emerging architectures such as SDN and NFV seek to abstract network functions from their hardware. As a result, most CSPs are faced with the burden of managing both their legacy networks and virtual networks, which in turn increases the complexity, security and reskilling challenges.

In addition to technological advancements, CSPs confront a slew of challenges. It is expected that by 2026, there will be 3.5 billion 5G subscriptions[1] and virtualization is key to meeting 5G connectivity requirements. At the same time, consolidating data from varied systems, tools and products for an end-to-end analysis and view of the network and its operations is a must. Employing machines to supplement network teams, operation support system (OSS) tools and day-to-day processes is crucial to accelerating service delivery, proactively resolving operational issues, and optimizing costs. In addition, flourishing IoT and cloud services require on-demand real-time service provisioning via automatic spawning of network circuits with the ability to terminate services when no longer needed. As if that weren't enough, today's tech savvy and highly aware consumers demand transparency and instantaneous responses. The answer to these multi-pronged challenges is to take a holistic approach to managing today's hybrid networks and evolving legacy networks over time to attain zero touch operations.

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[1] Ericsson, Ericsson Mobility Report 2020, November 2020, https://www.ericsson.com/4adc87/assets/local/mobility-report/documents/2020/november-2020-ericsson-mobility-report.pdf accessed on 29 January 2021

Making the case for zero touch operations

Zero touch operations (ZTO) is the foundational pillar to creating networks that can effectively self-manage, rectify, scale and administer, without any human intervention. It is vital to seamless provisioning and de-provisioning through mechanized network orchestrators and monitoring of physical as well as virtual networks. ZTO helps CSPs monitor intrusion prevention systems (IPS) and enable security tool deployments for robust operations as well as automatically raise alerts for incidents and assign them to respective systems. One of the key benefits of ZTO is the ability to handle all communications management intuitively, maintain a record of all network events to co-relate and predict any downtime, and optimize performance, quality, and reporting for the entire network. Furthermore, ZTO enables auto software and firmware installation and troubleshooting of network elements, while allowing intelligent patch management, and scheduled and on-demand backup and storage for contingency.

The four-stage journey toward successful zero touch operations

Achieving ZTO, however, is a phased journey that spans four stages. It requires end-to-end virtualization of multiple networks spanning legacy and next-generation technologies. Before embarking on the evolutionary journey, organizations must first clearly segregate their networks and identify the maturity of the entities within the networks to establish their starting point.

CSPs can map the degree of virtualization with the degree of automation to identify their state of network maturity. The focus of our approach is based on the level of virtualization in the network, as this is one of the core parameters to enable delivery of on-demand digital services in real time. Other parameters such as orchestration and AI/ML can also impact the level of automation, but we acknowledge that virtualization is the foundational parameter to understand the level of automation a CSP can achieve.

- Stage 1 – Traditional: These networks are extensively physical, with no near-term plan to virtualize them. CSPs with traditional networks can begin by automating manual processes such as fulfillment and assurance through tool sets such as command line interface (CLI) automation

and robotic process automation (RPA) scripting to move to the next stage. This automation will bring down the operate costs for these networks and make them financially viable for delivering services. Most CSPs, who are government-owned and manage and deliver traditional voice services wear this label comfortably.

- Stage 2 – Reactive: Reactive networks combine extensive physical networks with a high degree of automated processes across fulfillment and assurance. This approach is designed to maximize the benefit of network investments made years earlier. This type of network lacks the elasticity and versatility to scale operations up or down based on the demand. In addition, these networks cannot be run through orchestrators for delivering multiple layered services. As a next step in the evolutionary process, CSPs must proactively identify which parts of their network can be virtualized to take network operations to the next level. AI and machine learning-based insights can be generated for such networks and automated actions can be triggered based on these insights. A few multinational telecom companies have been trying to navigate their way through stage two of the ZTO steeplechase.
- Stage 3 – Progressive: While a major portion of this type of network is virtualized, these networks either lack a good orchestrator or fail to function effectively due to the dependency on certain physical networks. In such a scenario, where the access network is completely virtualized and the backhaul network is still physical, end-to-end service deployment may not be completely automated and orchestrated, limiting the impact of virtualization. For CSPs with progressive networks, transitioning to completely virtual networks and deploying automation and orchestration is the next step in the evolutionary process. These networks will eventually have to be automated end-to-end to fully realize the agility and automation benefits. Machine learning and analytics can only be employed for part of the network, which is not going to deliver the full value of any such system. Many of the telecom behemoths need to take either a 'giant leap' or 'one small step' depending on how they are placed on the change curve.
- Stage 4 – Reformist: These networks are the most evolved – they are characterized by a high level of virtualization and automation. Most standards and products are working for this category of CSPs and they have a huge advantage given the new open technologies that are available to integrate with Open APIs, orchestration ecosystems like ONAP, OPNFV, and so on. The powerful combination of virtualization and automation helps CSPs seamlessly orchestrate services and scale up or down as needed, based on demand. This type of network is the most amenable to the implementation of ZTO as it's easy to collect and analyze data in this type of a network, generating insights for proactive network management. This category of the CSPs must make huge investments in new technologies to figure out how customer and/or service layers will merge with the network. These CSPs have intelligent operations driven by prescriptive analytics and machine intelligence algorithms. Network components are created and shut down dynamically based on the need. It's no surprise then that the numero unos in telecom have already turned reformists.

Re-energizing network operations for the 5G era

Most of the strategies being discussed in the industry are around reformists, however only 15-20% of CSPs fall in that category. The aforementioned approach includes all the categories of CSPs regardless of whether they have complete physical networks or partial virtual networks. CSPs should evaluate their networks on the basis of these categories and draw a clear strategy for ZTO. However, the reality is that many CSPs are still dependent on legacy physical networks, making the transition to ZTO challenging. With 5G poised to disrupt the telecommunications industry, evolving to ZTO quickly but in a phased manner will be key to surviving and thriving. This will mean identifying the next steps based on the current network maturity and iterating through the subsequent stages, until the network attains the reformist stage.

About the authors

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