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The future of operations

Why and how service providers need to evolve to enable 5G operations

White paper

The 5G telecommunications services market has an estimated value of $2 trillion worldwide. To claim their share, service providers need to adopt new ways of working that support novel business models built around the network as a platform for value creation. That requires solving the present-day problem of overwhelming operational complexity – and looking beyond technology at the roles people, processes and tools have to play in realizing the potential of the 5G era.

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A new way of doing business

Conservative estimates put the 5G telecommunications services market opportunity somewhere in the range of $2 trillion – with some analysts expecting the potential value of 5G network slicing alone to reach $66 billion. For service providers worldwide, seizing that opportunity isn't just about deploying new technology: it's about adopting new ways of working that support novel business models that are built around the network as a platform for value creation. This is because 5G isn't simply the fifth generation of existing radio technology. It's the first generation of something entirely new.

As a platform, the network will have any number of uses – from Internet of Things (IoT) and Industry 4.0 applications to new kinds of consumer and enterprise services.

The enterprise piece will be especially significant. Traditionally, service providers have focused on winning subscribers for well-defined services. In the 5G era, the network-as-platform will have particular value as an enabler of enterprise innovation – for use by enterprises to develop and deliver solutions to their own markets. Today's B2B and B2C (business-to-business and business-to-consumer) models will take on an extra enterprise dimension: B2B2B or B2B2C.

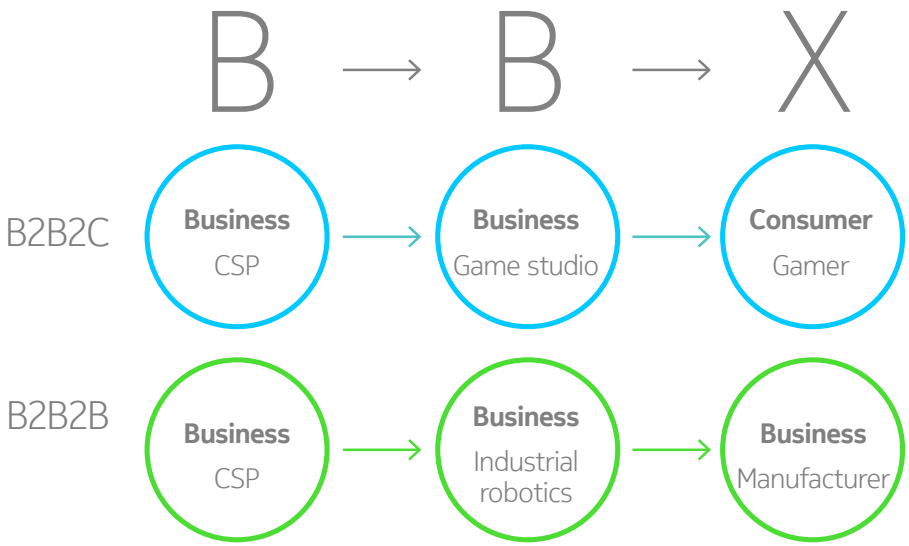
To get from here to there – from today to that fully realized 5G future – service providers have a few challenges to overcome, including the complexity of their current operations. Years of building technologies on top of technologies and silos beside silos have severely constrained service providers' agility. To be truly ready for 5G, they need to look beyond technology and evolve their approaches to people, processes and tools as well.

1. Source: ABI Research, 2018. https://www.abiresearch.com/press/network-slicing-potential-us66-billion-opportunity-msps/

The B2B2X evolution

One effect of shifting the network from a pure connectivity mechanism to a digital value-creation platform is that service providers will be able to connect with – and cultivate – vast and varied ecosystems of third-party service creators. By leveraging the software-based capabilities of the 5G network, they will create virtualized portions of the network ("slices") that they can sell to third parties who can then build 5G capabilities into their own enterprise and consumer offerings.

Figure 1. 5G enables new B2B2X business models



In the **B2B2C** case, a service provider might assign a slice of its 5G network to a gaming company to host online games for subscribers with guaranteed performance and availability. In this arrangement, the gaming company provides the cloud-based graphics processing and computing capabilities, while the service provider delivers connectivity at specified latency levels and bandwidth allocations.

As a **B2B2B** example, a service provider could apportion some of its 5G network to an advanced robotics company that then sells ultra-reliable, low-latency connected robotics solutions to manufacturers looking for ways to automate their industrial processes.

Importantly, the "Bs" in these scenarios are interchangeable. In some situations, the service provider will be the first "B" and in some it will be the second "B" – it all depends on which company will have direct contact with the end customer.

For instance, a third-party enterprise could develop a network-dependent offering delivered directly by the service provider to its end customers. In that case, the first "B" would be the third-party enterprise and the second would be the service provider.

Whether B2B2C or B2B2B, the network slices are personalized to meet specific service requirements for latency, reliability, mobility, throughput and other factors. That means slices need to be orchestrated, operated and assured in closed-loop cycles so agreed-upon service-level agreements (SLAs) are upheld.

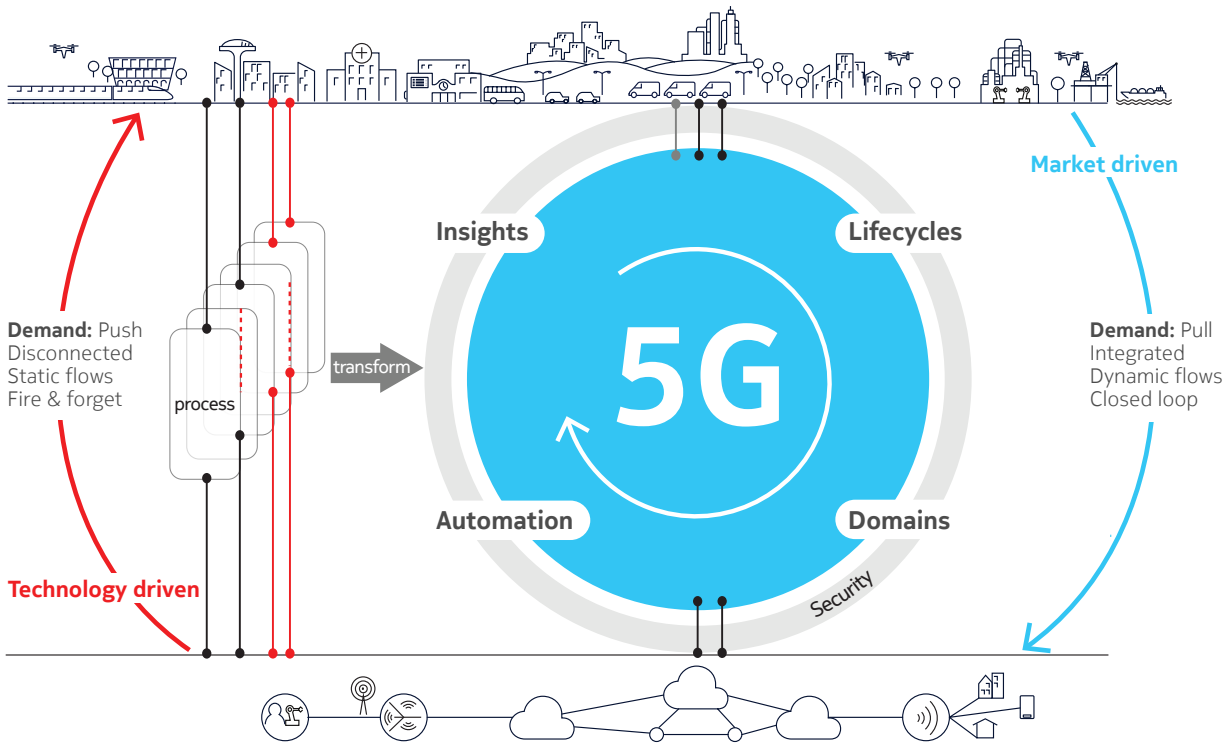
2. The game can be running in virtually any location, though for low latency the service provider's edge cloud would likely be ideal.

From push to pull

The traditional telco innovation model has been "inside–out", with products and services designed to deliver the quickest return on investment based on the network instead of being driven by customer demand. B2B2X models require the opposite, away from "define-and-push" services and toward "design-and-pull" offerings.

The best (and possibly only) way to do this effectively is to adopt a closed-loop approach to operations. This contrasts with the classic siloed, open-loop model characterized by "fire-and-forget" processes across static networks, which results in a one-dimensional view of functions like fulfilment, assurance and billing. The integrated nature of closed-loop operations means activities can be much more easily aligned. All parts serve a single, common goal: a "business intent" based on what customers want and need.

Figure 2. From technology-driven to intent/market-driven innovation



How does this "intent-driven" approach work in practical terms? Let's take our earlier B2B2B example. In that case, the business intent is to create a smart, machine-based manufacturing environment. That spawns a service intent to allocate a slice of the 5G network with certain performance characteristics. That service intent creates a network intent to guarantee specific levels of capacity, reliability and latency.

This makes it clear that there can be any number of business intents driving network services. A robotics company would produce a very different business intent than the gaming company in our B2B2C example. A mining operation with self-driving vehicles would have very different business intents than a smart stadium delivering immersive media experiences. 5G network slicing makes it possible to support all these different intents because every slice can be configured to different parameters for latency, reliability, performance, number of connections, and more.

A key consequence of the intent-driven approach (or a prerequisite for it, depending on your perspective) is the convergence of the operations and customer journeys, which have traditionally been entirely separate. The classic customer journey moves from marketing and sales to monetization and care. What's marketed and monetized are services designed and deployed independently by operations – often with a fairly long time to market.

The intent-driven approach of 5G demands a single, real-time flow from customer need to business intent to live delivery and monetization – bringing the two "journeys" together and automating actions wherever possible for the fastest, most seamless and responsive experience.

Figure 3a. Merging the experience and operations journeys

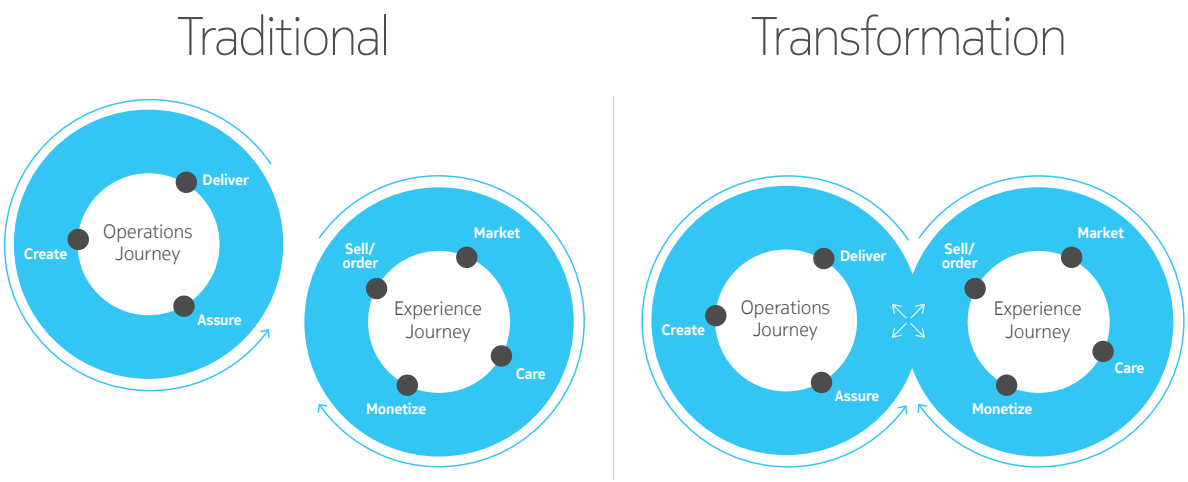
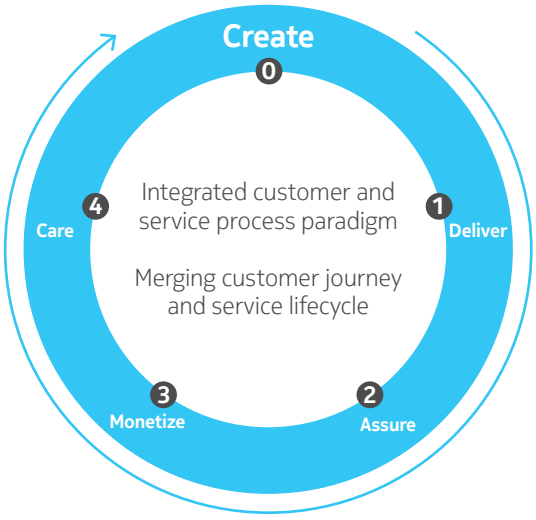


Figure 3b. A fully integrated customer and service process framework



In one continuous–loop "forever process", the service provider discovers the business demands of a customer or vertical; designs, deploys, markets, orders and monetizes a network slice; onboards the customer; and assures, cares for and optimizes both the service and customer experience.

An incremental approach to evolution

Merging the customer experience and operations processes would be difficult even if the network was not changing. Pursuing this kind of integration at the same time as undertaking a 4G to 5G transformation – and operating a hybrid network for years in the interim – makes the prospect that much more complex. For that reason, taking a staged, gradual approach is essential to success (as we at Nokia have seen with our own customers).

Figure 4 shows the key stages involved in an incremental approach toward end-to-end, automated service operations. The top line indicates fulfillment operations; the bottom line service assurance operations. Successful initiatives that we've seen bring tactical business benefits to our customers along the way include:

Fulfillment operations

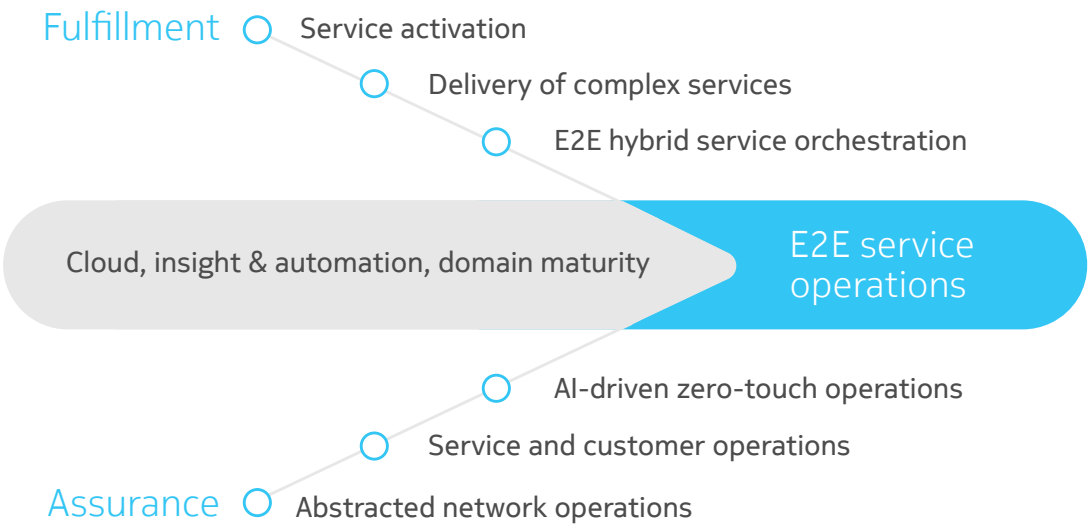
1. Catalog-driven service activation
2. Gradual delivery of more complex services
3. Implementation of end-to-end hybrid service orchestration

Service assurance operations

1. Abstraction of network operations
2. Simplification of service and customer operations
3. Implementation of AI-driven zero-touch operations

This is a step-by-step evolution toward end-to-end service operations and automation, where service fulfilment and service assurance will ultimately merge into one integrated process framework.

Figure 4. The path to end-to-end service automation



At each of these steps, two things will be absolutely indispensable: automation and artificial intelligence (AI).

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The critical role of automation and AI

Per the diagram above, as we move left to right, automation and AI become more important. 5G network-based services with multiple slices and diverse SLAs to uphold will be too dynamic for static, open-loop operational systems and processes to keep up. Automation and AI need to be "designed-in" to 5G service and network operations from the start. This will help service providers with four concerns in particular:

- **Cost:** The transition to 5G is ultimately about leaving the past behind. Yesterday's tools can't meet the needs of the future. That can be daunting given the decades of building up and fine-tuning layers of legacy systems and procedures. To keep costs under control and maximize profits while evolving to 5G, any path forward has to be both sustainable and profitable.
- **Quality:** Different network slices will have to maintain different performance characteristics. These will be codified in service-level agreements (SLAs), which will be especially important for customers in the enterprise segment. Maintaining service quality will require AI, machine learning and automated actions, as well as a shift away from managing systems and toward managing services from end to end over their lifecycles.
- **Agility:** Webscale companies have set the pace of the market when it comes to how quickly new services can be designed and delivered. Months-long processes are no longer acceptable – especially not in the dynamic 5G environment. Service providers need to improve both their business agility and their infrastructure/operational agility if they want to rapidly capture and manage digital service opportunities as they arise.
- **Security:** In the open, diverse 5G environment, the volume of threats and data to manage will be too great for traditional security approaches to manage – and the very boundaries of the network will continue to disappear. Security teams will need automation and AI will to deal with the massively expanded number of functions, endpoints and elements, and to break down today's point-solution silos for an overall stronger security posture.

To address the challenges and automate successfully, however, service providers will need to put in place an automation-native architecture.

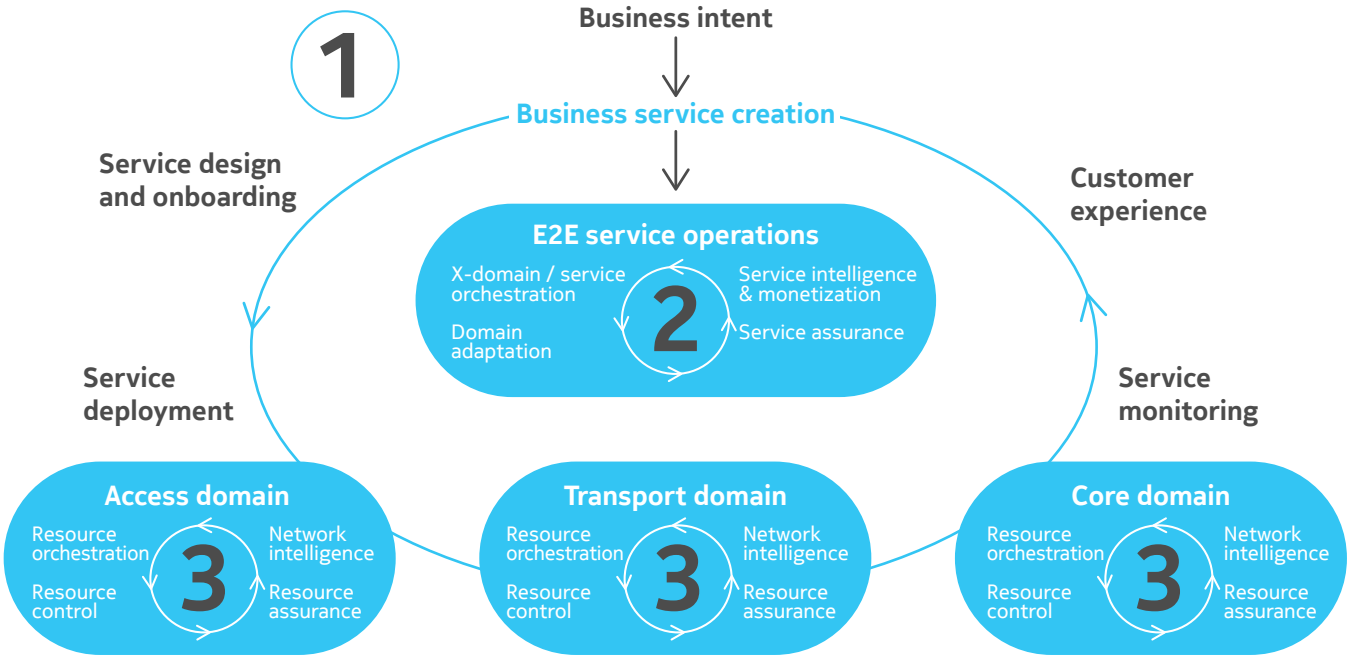
The hyperconnected, dynamic 5G environment

In the typical federated model for service provider operations, every network action has to pass through and get permission from the service layer. The more complex and dynamic network activity and services become with 5G, the less and less sustainable this model will be. The layers will need to become more autonomous – each one an (almost) closed loop unto itself.

At the same time, network assets and infrastructure are becoming more fluid: used when needed, released when not, all in service to the business intent. The service layer will have the end-to-end understanding of the service and orchestrate the underlying network domains. The "art" of operations will lie in determining what gets shared between the layers and what doesn't.

To provide dynamic, "in the moment" domain management and innovation capabilities, service providers will need to bring orchestration and assurance together and break the current boundaries of service design, data structure and topology. This will require a multi-tiered, domain-based approach that uses intelligent, coherent and interconnected closed loops throughout the service and network layers, with a "single pane of glass" for creation, deployment, intelligence-gathering, monetization and assurance.

Figure 5. The Future of Network and Service Automation architecture



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Conclusion

For telecommunication service providers, the 5G opportunity is enormous. Being able to capitalize on it will require a complete rethinking of the traditional approaches to both network and service operations, including the people and processes that power them. Success will depend on embracing new ways of working and new business models that will turn the network into a platform for value creation. But that evolution should happen incrementally, with automation and AI essential to getting service providers from where they are today to where they want to be: a fully integrated, outside-in, market-driven approach to operations.

Your partner for digital operations

Nokia has the network expertise, software solutions and global services to help telecommunications companies plan for and carry out their 5G evolution. Our deep understanding of 5G operations and our end-to-end 5G portfolio provide a clear path forward to connect the network to the business, adopt closed-loop processes and establish a truly outside-in approach to innovation.

Because embedding automation into service provider operations and unleashing dynamic innovation requires a reimagining of the network architecture and digital platforms, Nokia Bell Labs has developed Future X: the first end-to-end portfolio of solutions, software and services to enable breakthrough performance while controlling costs in 5G networks. Providing a zero-touch network with end-to-end service automation and autonomous programmable networking, it represents our vision of the future framework for dynamic operations.

For more insights into the key trends affecting operations today and the implications of a 5G future, visit Nokia's Future of Operations microsite.

To find out how telcos can best leverage AI in their networks and business read Ovum's Decision Matrix report.

About Nokia

We create the technology to connect the world. Powered by the research and innovation of Nokia Bell Labs, we serve communications service providers, governments, large enterprises and consumers, with the industry's most complete, end-to-end portfolio of products, services and licensing. From the enabling infrastructure for 5G and the Internet of Things, to emerging applications in virtual reality and digital health, we are shaping the future of technology to transform the human experience.

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