Capgemini engineering

NEXT-GEN BSS EVOLUTION

For 5G networks and IoT

Table of contents

Executive Summary

Business Support Systems (BSS) software has traditionally been designed as a monolithic package to support a specific service or set of use cases. But as 5G and IoT evolve, the services they enable will be more granular. These dynamic environments will therefore require access to granular support system functionality. Customers may only need part of an overall package, or require a billing or charging function for a very short time, such as an offer of content from an OTT partner designed around a localized, live event like a world cup cricket match. The vision of Telecom Service Provider, Internet Service Provider, Communication Service Provider (TSP, ISP, CSP)-as-a-platform is that partners will be able to self-design and order services such as these on a telco platform, with network fulfilment, security, policy, charging, billing, and customer interaction being provided as required. Only fully automated processes, scaled to demand, could meet this vision economically and practically. Now, microservices-based architecture has come to fulfil such expectations for 5G and IOT services. In this paper, Capgemini Engineering highlights how microservices-based architecture is required for TSPs, ISPs, and CSPs to transform from existing BSS to new next-generation BSS to monetize 5G and IoT services.

Introduction

BSS is the heart of telecom operations and will be heavily impacted by 5G and IOT-based applications and services.

Next-generation BSS and network markets provide capabilities that have become vital requirements for all types of TSP, ISP, and CSPs, including integrated legacy carriers - fixed, wireless, and cable, internet, Multiple System Operators (MSOs), and Over-the-Top (OTT) providers. Previously, the BSS market was driven largely by a need to consolidate operational support and billing, as well as to prepare next-generation, IP-based networks and services.

To monetize 5G and IoT services, different parties need to interact with each other more tightly. Therefore, TSPs, Mobile Network Operators (MNOs), CSPs, ISPs, Network Service Providers (NSPs), and verticals will have to share spectrum, network, and IT resources to build a cooperative digital ecosystem. Automated and standardized process flows across these parties will be needed in the control plane, user plane, and management plane as well as in the BSS system. Additionally, 5G will require BSS support for network slicing, both in terms of administration of slice allocations, including Service Level Agreements (SLAs), and billing for slices and usage. TSPs will also require BSS to support Massive Internet of Things (MIoT) systems enabled by 5G.

IoT billing and settlement will become significant in the near term while, in the longer-term, IoT authentication and authorization will be a key market for the next generation BSS ecosystem.

As 5G matures, service providers will introduce many new services and business models, such as Virtual Reality (VR), new forms of partnership, different apps, and gaming, all of which will require next generation BSS support.

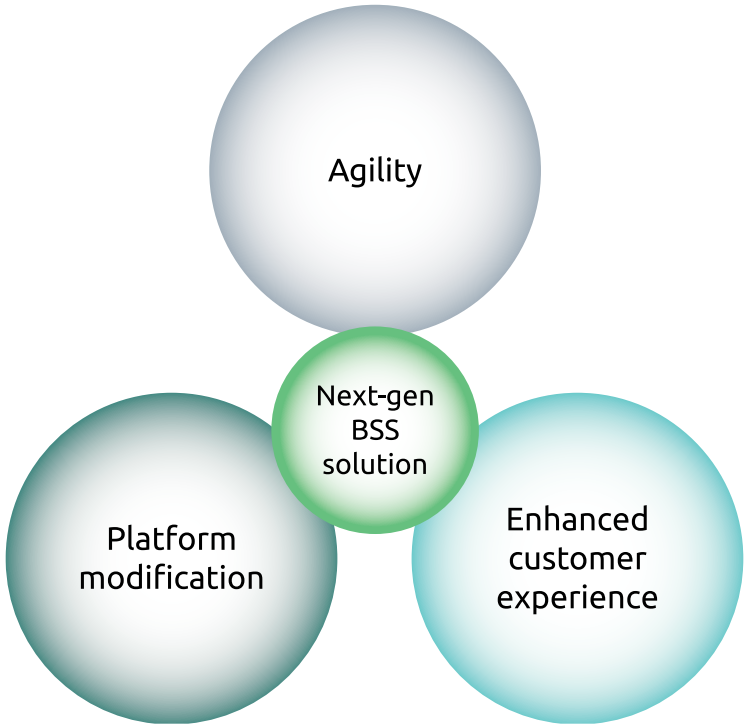
In the future, 5G and IoT will allow us to offer many critical use cases, and will require full BSS infrastructure automation from both the front-end and the back-end. This is essential, given that service providers will be working with several different industry verticals and seamlessly onboarding a high number of partners to monetize their 5G investments. The BSS system needs to be flexible, agile and must simplify management. It's here that cloud native, microservices, and DevOps-based approaches will play a vital role. A microservices architecture, for example, decomposes a monolithic application as a set of small autonomous services that are independently deployable. Each microservice executes on its own process and is designed to achieve a single business capability.

Further, the modernization of BSS systems will enable service providers to become Digital Service Providers (DSPs) that need to respond quickly to meet the evolving needs of their subscribers. From service ordering to orchestration, billing, device management, and customer experience, legacy BSS systems are not geared to meet the needs of a DSP.

Expectations for a next-gen BSS Solution

The evolution of 5G, IoT, high-speed internet, and a smarter subscriber base have given rise to an increase in demand for next-generation, value-added services, making it crucial for service providers to offer multiple services over multiple networks while staying profitable. Service providers are facing a critical time in driving their investments in areas that afford them a winning edge over their competitors. Rapidly changing markets and competition have led service providers to focus on two key areas – the monetization of data services and an enhanced customer experience to reduce customer churn.

With next-gen BSS systems, operators can expect the following attributes:



Agility: to compete and stay ahead

- Service providers are looking for solutions that will allow them to move away from legacy systems and monolithic applications and adopt agile, flexible, cloud-based microservices architecture. BSS systems must become faster, more effective, more reliable, and more resilient, and enable them to rapidly introduce new and innovative offerings
- Simple processes to add increasingly more partners
- Support for operation staff to customize their own dashboards as per their own requirements
- Dynamic framework support in product lifecycle management, payment, product catalog, other modules, and for customization and plug-in support

Enhanced Customer Experience: for increased transparency

- Service providers need a next-gen engagement platform that addresses the needs of both retail and enterprise customers, from discovery, acquisition and onboarding, to gaining actionable insights, and self-care
- The ability to provide a consistent user experience across multiple channels for customer engagement such as call centers, web portals, PoS, mobile apps, and SMS

Platform Modification: 5G and IoT services allow service providers to offer different use cases, and this demands that the BSS infrastructure is automated from both the front-end and back-end. This is essential considering service providers will be working with several different industry verticals and seamlessly onboarding a higher number of partners to monetize their 5G investments. The BSS system needs to be both flexible and agile.

Challenges

Service providers face several challenges in customer engagement at different levels. Customers expect service providers to keep pace with the digital experience provided by web-scale/OTT players, for instance. The problem is that legacy BSS is not designed for digital experiences.

Service providers can ensure an uninterrupted and positive customer experience only by being able to innovate quickly, add new services and features, and seamlessly integrate these with their existing range of offers. The modernization of BSS systems is also imperative in service providers' own journey to becoming DSPs that need to react quickly to meet the evolving needs of their subscribers. From service ordering to orchestration, billing, device management, and customer experience, legacy BSS systems are not geared to meet the needs of a DSP.

To achieve this, service providers must digitize their existing BSS systems. Applying a microservices and webscale-enabled approach to operation and business support systems, and combining this with DevOps practices, is the best way to achieve BSS transformation.

One of the biggest shortcomings of existing telecom mainframes is their rigidity. Telecom software development is painstakingly slow, as vendors have to ensure their systems' integration and interoperability with all components available on the market — or with a significant portion of them, at the very least. For this reason, service providers are used to overhauling their BSS systems every couple of years or so when newer equipment becomes available — and this can be costly. Legacy systems consist of multiple hardware and software components that cannot be easily reconfigured. Any update, upgrade, or adjustment entails significant expense and leads to a high Total Cost of Ownership (TCO). What's more, scaling legacy systems is complicated, as adding more capacity does not remove bottlenecks that are structural, not operational.

Service providers should consider transitioning to microservice and cloud-native BSS through virtualization. They can now replace hardcoded network functions delivered through a piece of equipment with Virtualized Network Functions (VNFs), enabled via a virtual environment. The result of this is that scaling the system up and down or reconfiguring it entails no significant capital expenditure and the system itself has minimal operating expenses, leading to a substantially reduced TCO.

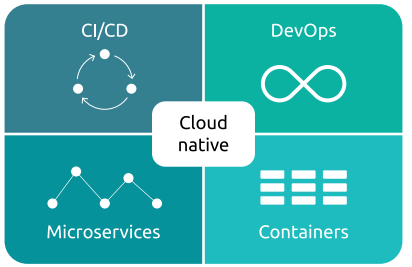


Figure 1: BSS Transition pillars

Benefits of a microservices-based approach in the Next-Gen BSS evolution

Microservices for telco BSS are the next step, as they allow you to split any application or function into a bundle of independent functions running in separate Docker containers.

The key benefit of running various BSS components in telecom domains and networks as microservices is that you can launch, stop, and restart them independently. This means you can manage, update, and scale each virtual network function seamlessly, without stopping the whole system. Docker containers run atop a Kubernetes cluster, while Prometheus and Grafana solutions, available from the Cloud Native Computing Foundation, can help you monitor such clusters.

Microservices can interact with each other and any number of external tools using RESTful APIs. This allows you to quickly add them to an existing system without the need for major investments and reorganization. You can monitor complex microservice systems with the help of message brokers like Kafka or RabbitMQ, which help you track the performance of BSS in real time and ensure the transparency of logging.

Importantly, as microservices run in separate containers, a security breach in one container doesn't affect the entire system. This reduces security risks, which are always a concern when handling complex software and hardware platforms with a multitude of customer-facing endpoints.

Microservices-based architecture offers increased agility, which makes for easy adoption of DevOps culture. The final step before the complete development of microservices is to set up a Continuous Integration and Continuous Deployment (CI/CD) pipeline, which enables easy auto-scaling, the seamless upgrade of various microservice versions, and the dynamic deployment of individual services without impacting any existing service component.

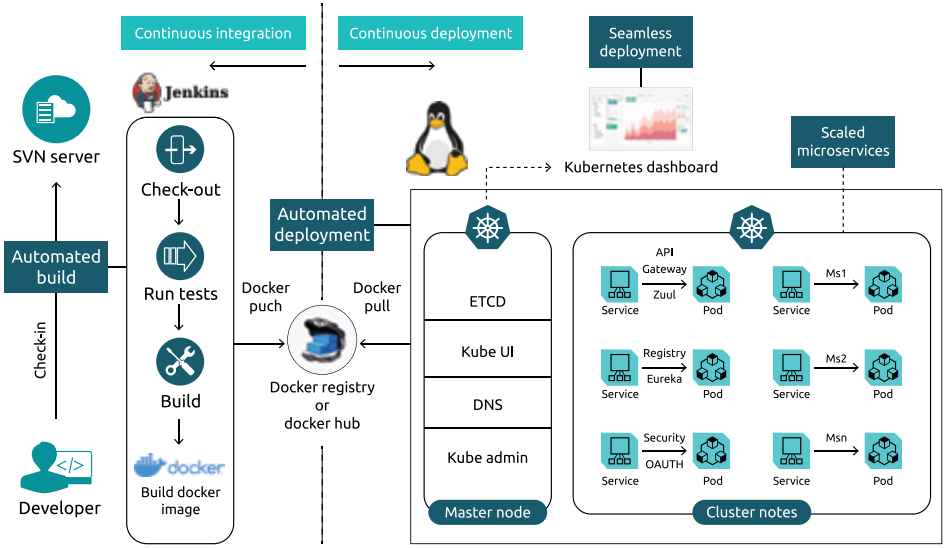


Figure 2: Microservice – Reference architecture

DevOps is a more inclusive approach to the software development process, where the development and operations teams work collaboratively on a project. As a result, the Software Development Life Cycle (SDLC) is shortened with the help of faster feedback loops for more frequent delivery of updates and features. This enables service providers to launch services faster than a traditional SDLC. DevOps has greater benefits when compared to the traditional model as it helps in detecting and correcting problems quickly and efficiently. As the flaws are repeatedly tested through automation, the team gets more time in framing new ideas.

The final, important factor is that multiple vendors already use microservices and DevOps in developing IoT products, big data analytics, machine learning solutions, and AR/VR platforms. Using microservices for back-office modernization ensures interoperability, and easier integration of new functions, and significantly reduces potential expenses. That is why a microservices-based approach to OSS/BSS is now being seen as the preferred foundation for next generation OSS/BSS for digital and 5G services.

Opportunities in the Market

New verticals will need to be charged differently than in the traditional subscriber-based consumption models of previous releases. For example, in IoT type scenarios, the value may be based on the number of connected devices, the location from where the devices connect to the network, or even the mobility profile associated with a particular device. The rapidly expanding IoT and the new capabilities available in 5G have opened up a wealth of opportunities for service providers beyond their traditional markets, particularly in verticals such as automotive, healthcare, agriculture, energy, and manufacturing. To monetize these, service providers will need to meet the expectations of a broader range of stakeholders and be able to handle complex ecosystems.

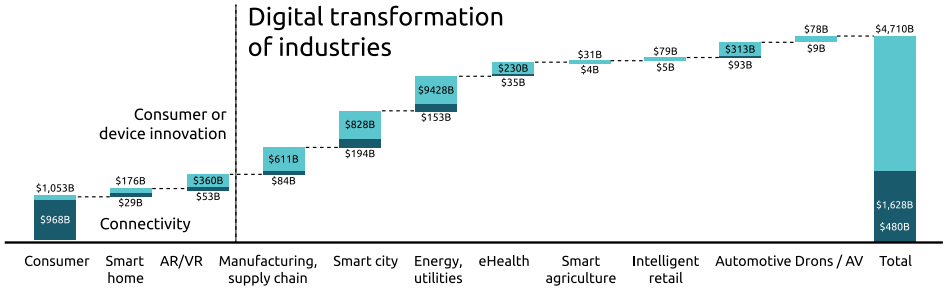
Service providers are focusing on establishing creative new partnerships which enable IoT and other new services. As a result, one of the primary roles of BSS will also be to manage these business relationships by keeping track of agreements, handling orders, generating reports, sending invoices, managing debt handling, and so on.

Network slicing is widely considered to be an important enabler for monetizing 5G, as it allows service providers to deliver unique and efficient service customization and flexible, on-demand service catalogs. Enterprise customers will self-manage network allocation and capabilities through policies, dashboards, or other BSS services, while the carrier will manage the overall experience across the network.

5G-enabled remote healthcare services like remote patient monitoring, connected ambulances, HD virtual consultations, video-enabled prescription management, and medicine delivery will consume a large amount of data. These use cases can't be implemented without 5G technology as it offers capabilities like lower latency, high bandwidth, increased reliability and security, network slicing, and an increased capacity for the number of connected devices. To support this, applying containerization and microservices will assure the scalability of the BSS solution to meet the increased throughput demands of the network.

The enterprise business opportunity for 5G : from Telco to Techco

2025 market size projection, $B



<30% will be related to connectivity
The revenue opportunity is in value creation to transform industries

Figure 3: Business opportunity for 5G

Conclusion

The evolution of the 5G network and IoT presents service providers with the opportunity to transform themselves from traditional network developers to digital service enablers. 5G, evolved BSS enhancements, and new capabilities provide the opportunity for operators to develop new business models and services for 5G and IoT. Along the way, this journey opens up substantial new revenue streams in verticals such as industrial automation, security, health care, and automotive.

In summary, service providers are required to enhance existing BSS with cloud native and microservices-based architecture, along with an IT-based, 5G core network.

This transformation will not only help operators achieve agility, flexibility, and scalability, but also derive granular insights, which can be leveraged to deliver a superior customer experience and enable new business streams.

Author

Ashutosh Shukla
Manager BSS/OSS Solutioning Team

A seasoned professional with over 13 years in the Telecom, IT, and Enterprise domain, Ashutosh has the experience to provide BSS/OSS consultancy, solutions, customer engagement, and business development.

Capgemini engineering

About Capgemini Engineering

Capgemini Engineering combines, under one brand, a unique set of strengths from across the Capgemini Group: the world leading engineering and R&D services of Altran – acquired by Capgemini in 2020 – and Capgemini's digital manufacturing expertise. With broad industry knowledge and cutting-edge technologies in digital and software, Capgemini Engineering supports the convergence of the physical and digital worlds. Combined with the capabilities of the rest of the Group, it helps clients to accelerate their journey towards Intelligent Industry. Capgemini Engineering has more than 52,000 engineer and scientist team members in over 30 countries across sectors including aeronautics, automotive, railways, communications, energy, life sciences, semiconductors, software & internet, space & defence, and consumer products.

For more information please visit:
www.capgemini-engineering.com

Contact us at:
engineering@capgemini.com