OSS/BSS Impact with 5G Applications and Services

Dr. Prithwish Kangsabanik, Sr. Member of IEEE, Swisscom, Switzerland
prithwish.kangsabanik@ieee.org

Abstract

Operation Support Systems /Business Support Systems (OSS/BSS) are the heart of the telecom operations and will be heavily impacted with 5G-based application and services. This article will discuss the impacts and key technological requirements in OSS/BSS of the telecom operators for enabling smooth integration of 5G-based applications and services.

Keywords: 5G, OSS/BSS, network services, application services, service orchestration

1. Introduction

In this short position paper, we will sketch the OSS/BSS impact with 5G applications and services. We will start describing the present industry trends with cloud computing and virtualization, together with automation of industrial processes with massive IoT. The need from public/private telecom operators in association with 5G applications and services will be described next. We will then sketch the key drivers of 5G application and. The challenges from network and connectivity associated with 5G applications and services will be explained, and the key technology requirements associated with OSS/BSS of 5G applications and services will be visited at the end.

2. Industry trends

The present industry trend is towards the virtualization of IT- and Network platform. The virtualization of network-platforms is being done using SDN/NFV by putting the network functionality in commodity hardware. The virtualization of IT-platforms is being done in various ways using IaaS, PaaS, or SaaS, by using commodity hardware and storage, and by providing separate virtualized infrastructure, virtualized platform, and virtualized software to a set of tenants using the shared physical hardware and storage. The virtualization is helping to develop new digital ecosystems as different verticals and over-the-top (OTT) service providers are now quickly able to set up a virtualized IT and network infrastructure from a cloud provider without a big investment on a pay-per-use basis. Therefore, the virtualization is enabling the shared economy mindset for the cloud consumers and as well as for cloud providers. 5G technology will bring automation of industrial processes with support of massive/critical machine-type communication (MTC) along with mobile broadband capability. With 5G, the virtualization of network functionality will help the public/private operators to share their spectrum and network functionality, and thereby reducing cost. The sharing of the network functionality will be done at the core

of the network as well as in the aggregation and edge of the network. Here the edge computing and fog computing paradigms will also impact 5G network technology. Presently telco operators are losing their margins due to the continuous price erosion and at the same time hefty infrastructure spending costs. With this kind of shared and cooperative network infrastructure with 5G, the operators will be able to prevent price erosion and enhance their margin.

3. Needs from segment

With 5G, cooperation among different interacting parties (i.e. telecom-operators, ISPs, CSPs, NSPs, ASPs, CIPs, Verticals) will be needed to share the spectrum, network and IT resources and to build a shared and cooperative digital ecosystem. Therefore, automated and standardized process flows across these interacting parties will be needed in control-plane, user-plane, and management-plane (including OSS/BSS). The processing of the network and application services needs to be done near the edge of the network for some critical use cases (e.g. information-centric networking (ICN), Massive/Critical MTC).

4. Key drivers

5G application and services are being defined in different standardization bodies and industry alliances (namely 3GPP, ETSI, ITU, IEEE, NGMN, 5G-PPP). The OSS/BSS upgrades needed with 5G applications and services are being investigated in industry alliances like TMForum. These industry alliances and standardization bodies are becoming the key drivers for achieving digitalization of existing business processes in different industry verticals with 5G applications and services. In addition, emerging trends of usage of automation and business intelligence (BI), artificial intelligence (AI), and machine learning (ML) technologies for building efficient digitized business processes are also serving as the key driver of 5G applications and services.

5. Challenges from network and connectivity

The following challenges from a network and connectivity viewpoint will be need to revisited to achieve the efficient and effective digitized business processes with 5G applications and services:

- Standardized APIs from VNF-/NE-vendors, cloud-vendors, OSS/BSS vendors will be needed to enable smooth integration of different interacting parties (e.g. Operators, NSP, ASP, ISP, CIP). This will then avoid vendor lock-in at the infrastructure layer, virtualization layer, NF layer, SDN layer, and orchestration layer. This will help in providing automated and standardized provisioning of network and connectivity needed for 5G applications and services.

6. Key technology requirements

Based on the above discussion, the key technology requirements for the OSS/BSS for 5G application and services are listed below:

- **Standardized business process and business model**: A shared reference model including the key business roles and information-flows among the business roles need to be defined. Instantiation of the reference model for different business

scenarios will be also important. Standardization of the information-flow over pre-defined APIs will be needed.

- **Capability of trusted transactions among business entities**: Usage of technologies like blockchain and smart-contract among the cooperating business entities will be needed to enable data-integrity, (temporary) trust establishment, micropayments, asset management, identity management, and disintermediation within the overall ecosystem players.
- **Cross-layer and cross-organizational service management:** When doing 5G network slicing in E2E-LSO (based on service-orders, network status, and customer SLA), the service management needs to be optimized for cross-layer and cross-organization network/IT resource allocation. We will also need the establishment of marketplaces and brokering services to provision 5G-based Network Services (NS) and Application Services (AS) across a number of interacting business entities. Proactive Service assurance in a hybrid network scenario over multiple business entities needs to be ensured. Therefore, a capability for hierarchical orchestration (across LSO, NSO, CSO, SDN-controller) and service management across different organizational boundaries will also be needed.
- **Modularization and transformation of operator OSS/BSS-stack**: Modularization and transformation of operator OSS/BSS-stack to accommodate different business scenarios and integration with Marketplace, Brokering services, and E2E-LSOs will be needed.

With these technology requirements in place, the OSS/BSS of 5G application and services will be able to accommodate new product offerings based on mobile broadband (MBB) and massive/critical MTC services coming with 5G.

7. Conclusion

As the 5G-based applications and services are implemented, the telecom operators have the huge challenge to modernize the present legacy OSS/BSS systems to enable cross-business cooperation with different horizontal and vertical business use cases of 5G. This article provides a summary of the challenges and requirements in the OSS/BSS landscape for the telecom operators with 5G applications and services.

Prithwish Kangsabanik (M'-01, SM'-03): Dr. Prithwish Kangsabanik obtained his Bachelor's degree in Computer Science and Technology from Bengal Engineering College, Shibpur, India (now known as Indian Institute of Engineering Science & Technology, Shibpur). He obtained his Masters and PhD in Computer Science and Engineering from the Indian Institute of Technology, Kharagpur. His PhD was in the area of concurrency control in Active OODBMS systems. He is presently working at Swisscom, Switzerland as a Senior Enterprise Architect. He is a Senior Member of IEEE and a professional member of ACM. His present areas of interest are: Wireless & Optical Networking, Secure Distributed systems, Mobile & Active DBMS.

Glossary

- **AI**: Artificial Intelligence
- **AS**: Application Service
- **ASP**: Application Service Provider
- **BI**: Business Intelligence
- **CIP**: Cloud Infrastructure Provider
- **CSO**: Cloud Service Orchestrator
- **IaaS**: Infrastructure as a Service
- **ICN**: Information Centric Network
- **IIoT**: Industrial Internet of Things
- **ISP**: Internet Service Provider
- **LSO**: Life-cycle Service Orchestrator
- **MEC**: Multi-access Edge Computing
- **MBB**: Mobile Broadband
- **ML**: Machine Learning
- **MTC**: Machine Type Communication
- **NaaS**: Network as a Service
- **NGMN**: Next Generation Mobile Network
- **NE**: Network Equipment
- **NS**: Network Service
- **NSO**: Network Service Orchestrator
- **NSP**: Network Service Provider
- **NFV**: Network Function Virtualization
- **OTT**: Over The Top (provider)
- **PaaS**: Platform as a Service
- **SaaS**: Software as a Service
- **SDN**: Software Defined Network