



# THE OSS CLOUD OPPORTUNITY

Exploring the challenges and benefits of cloud-based operational support systems



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The business landscape for Communication Service Providers (CSPs) is rapidly changing. Declining margins and rising CAPEX requirements for network upgrades have forced CSPs to seek new sources of operational efficiency. While cost reduction remains critical, business agility and new revenue sources are even more important. This industry dynamic necessitates smart partnerships with over-the-top (OTT) players and rapid deployment of new services and features. The days of service rollouts that progress over a 12 to 18 month period are history.

In this paper we discuss various OSS on the cloud models and the challenges and benefits associated with each. We also recommend appropriate OSS cloud migration strategies for industry participants.

## I. Introduction

OSS plays a critical role in shaping the service portfolios of CSPs. OSS not only impacts a CSP's ability to rollout new services; it also impacts their ability to measure the quality of services (QoS). However, due to exponential growth in data consumption in recent years, CSPs have prioritized investments in network upgrades over OSS/BSS transformations. Legacy OSS systems pose many challenges to CSPs, including:

1. **Management Complexity.** Numerous OSS products to maintain, all with varying infrastructure requirements.
2. **Delayed Time-to-Market.** Delays in launching new products due to changes or upgrades required in legacy OSS.

3. **Lack of Business Flexibility.** On demand scaling of systems is not feasible with existing OSS.

4. **High Costs.** High CAPEX and OPEX for specialized OSS software.

In addition, large carriers and wireless operators have a vast array of products in their OSS landscape consisting primarily of silos of OSS stacks to manage different network technology domains. This approach is inefficient and costly from an OPEX perspective. Although CSP revenues are growing, growth in margins is not keeping pace. In fact, for some CSPs, OPEX constitute ~60% of revenues (see figure 1), pushing margins to unsustainable levels.

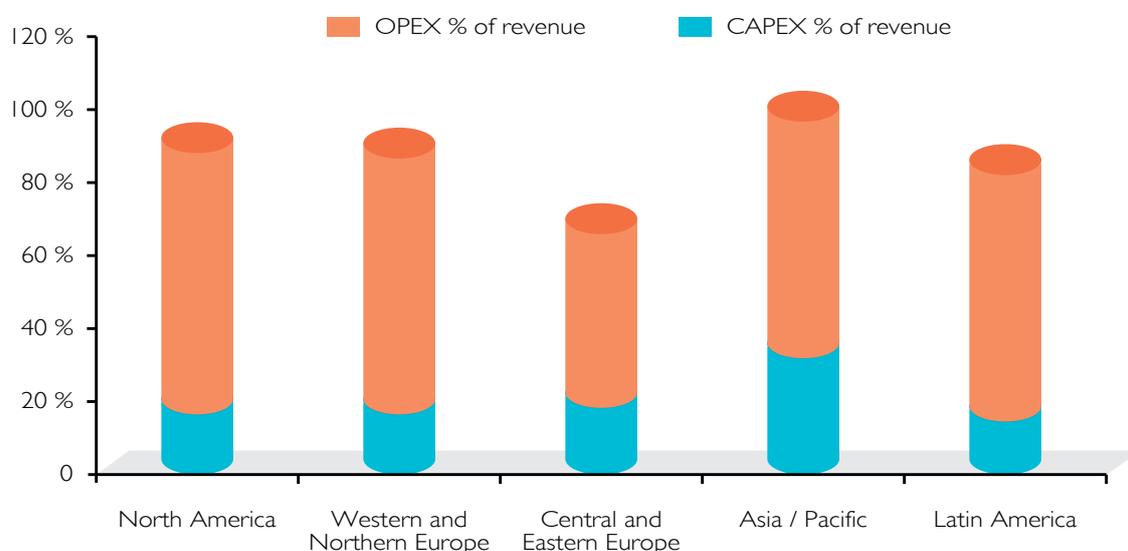


Figure 1: CSP's expenditure by geography, Source: Wipro estimates based on Infonetics Research, 2011

Network & OSS Managed Services Providers (MSPs) have gained significant popularity in recent years as CSPs outsource their network operations for cost savings. However, MSPs are also facing similar OSS challenges and are under cost pressure due to the network and OSS diversity of their clients. These OSS challenges are equally relevant for Tier 2 and mid-market operators and OSS on the cloud presents an interesting value proposition potentially addressing these challenges.

## 2. The OSS Cloud Opportunity

OSS solutions deployed over cloud platforms can address many of the business and technical challenges faced by the communications industry today. In this section, we explore the business potential for OSS on the cloud and consider how industry participants can deploy this opportunity.

## 2. 1. OSS Cloud for Tier I CSPs

Tier I CSPs have multiple OSS applications. This is because of their heterogeneous technology and vendor landscape. One of the key challenges CSPs face is the management of software patches and upgrades. Due to the abundance of legacy systems, scaling up operations on an on-demand basis is another big issue.

Cloud-based infrastructure offers an efficient and easy way to enable resource sharing, automation and monitoring. We propose a cloud hosted OSS solution for Tier I CSPs. In this model, CSPs host the OSS solutions within their private cloud (see figure 2). It provides the flexibility to scale operations on-demand and simplifies software upgrade procedures, reducing costs considerably.

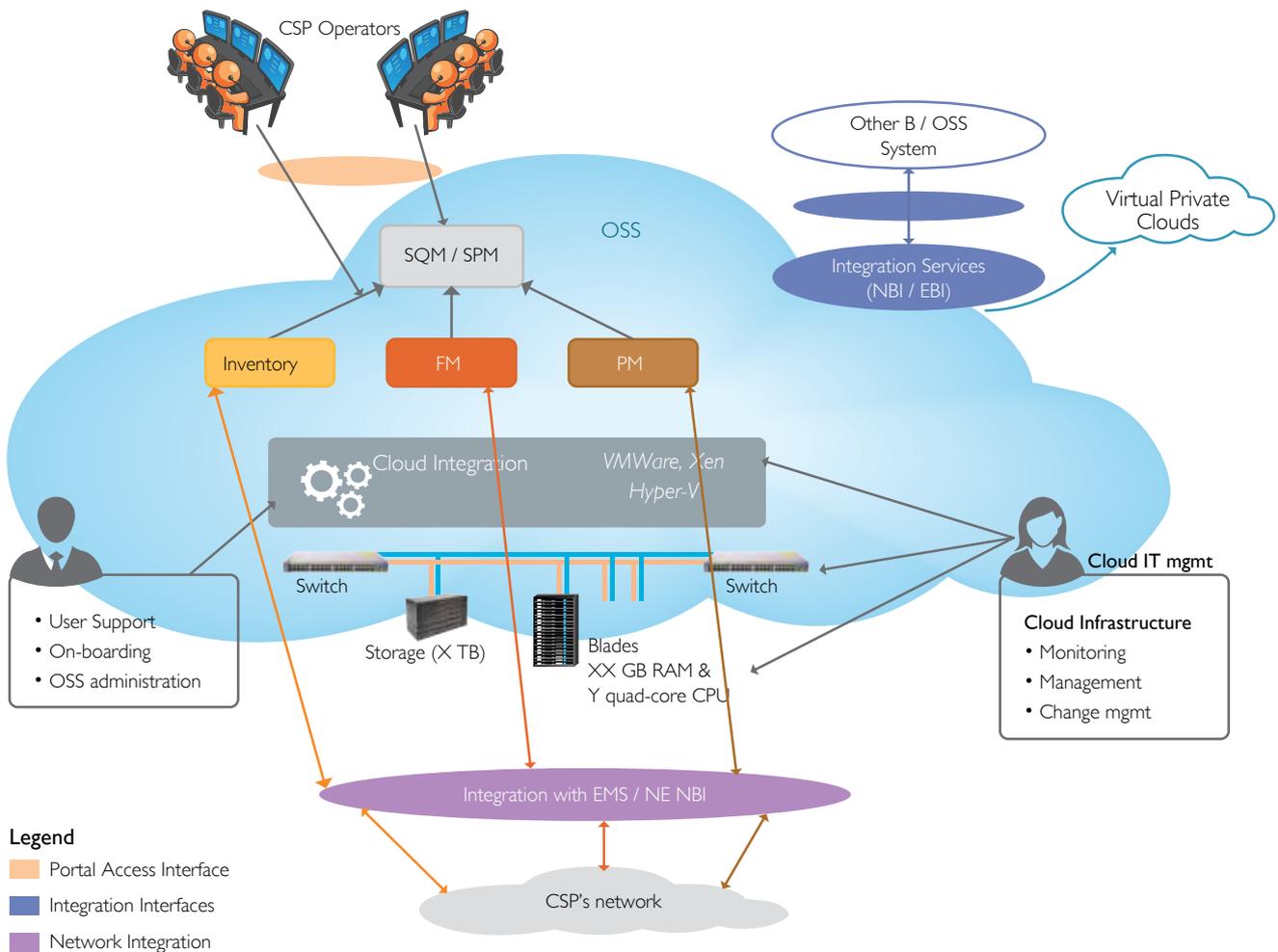


Figure 2: Reference Architecture: OSS Cloud for Tier I CSPs, Source: Wipro Technologies.

However, this model presents maintenance, integration and platform adoption challenges which are described in more detail below, along with potential solutions:

CHALLENGE	DESCRIPTION	SOLUTION
<b>Maintaining High-Availability of Solutions</b>	Most OSS products implement proprietary high-availability solutions that cannot be leveraged over cloud platforms.	Solutions need to be tailored and aligned for cloud environments before they can fully leverage the benefits of a cloud hosted OSS. For instance, if VMware is used as the virtualization platform, vSphere and vMotion solutions can be leveraged to improve the availability of OSS applications.
<b>Integration Challenges</b>	Legacy OSS applications use proprietary interfaces to integrate with other systems or networks which may restrict scalability when deployed over a cloud infrastructure.	Adopt standards based interfaces which use SOA technologies or scalable messaging platforms.
<b>Platform Affinity</b>	Legacy OSS applications leverage platform specific features for various capabilities such as clustering, which implies that these applications cannot be ported to cloud platforms easily.	Such applications will have to be tailored to use the inherent scalability available in cloud platforms.

## Business Benefits for CSPs

Although, the OSS on the cloud model presents some challenges, it can provide significant business benefits to Tier 1 CSPs, including:

### 1. Reduced Costs

- Elasticity to handle burst traffic scenarios without up-front investment.
- Ability to automate server configurations and monitor their usage for improved efficiency.

### 2. Improved Operational Agility

- Near zero downtime during upgrades. New versions can be deployed on virtual machines (VM), keeping the same physical

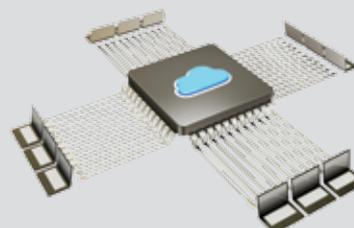
hardware. After the software is tested, the network load can be easily re-directed to the new VMs.

- Faster-time-to market for new services as new capabilities can be easily provisioned and scaled up or down on-demand.
- No single-point failures as the software can be configured on multiple VMs.

### 3. Analytics Capabilities

- Big Data solutions and analytics are easily complemented by cloud and the scalability it offers.

Solutions need to be tailored and aligned for cloud environments before they can fully leverage the benefits of a cloud hosted OSS.



## 2.2. OSS Cloud for Managed Services Providers

Today, CSPs rely upon MSPs to improve their operations and reduce costs. One of the key challenges for MSPs is that CSPs have an array of OSS products from multiple vendors. These systems use different hardware and middleware and also have different upgrade cycles and change management processes. The overheads of managing the OSS applications prevent service providers from achieving economies of scale, significantly limiting their value proposition.

We propose a cloud hosted OSS model specifically tailored for MSPs. Moving to a cloud model (see figure 3) reduces both the CAPEX and OPEX for MSPs and provides much needed business and operational agility.

The overheads of managing the OSS applications prevent service providers from achieving economies of scale, significantly limiting their value proposition.

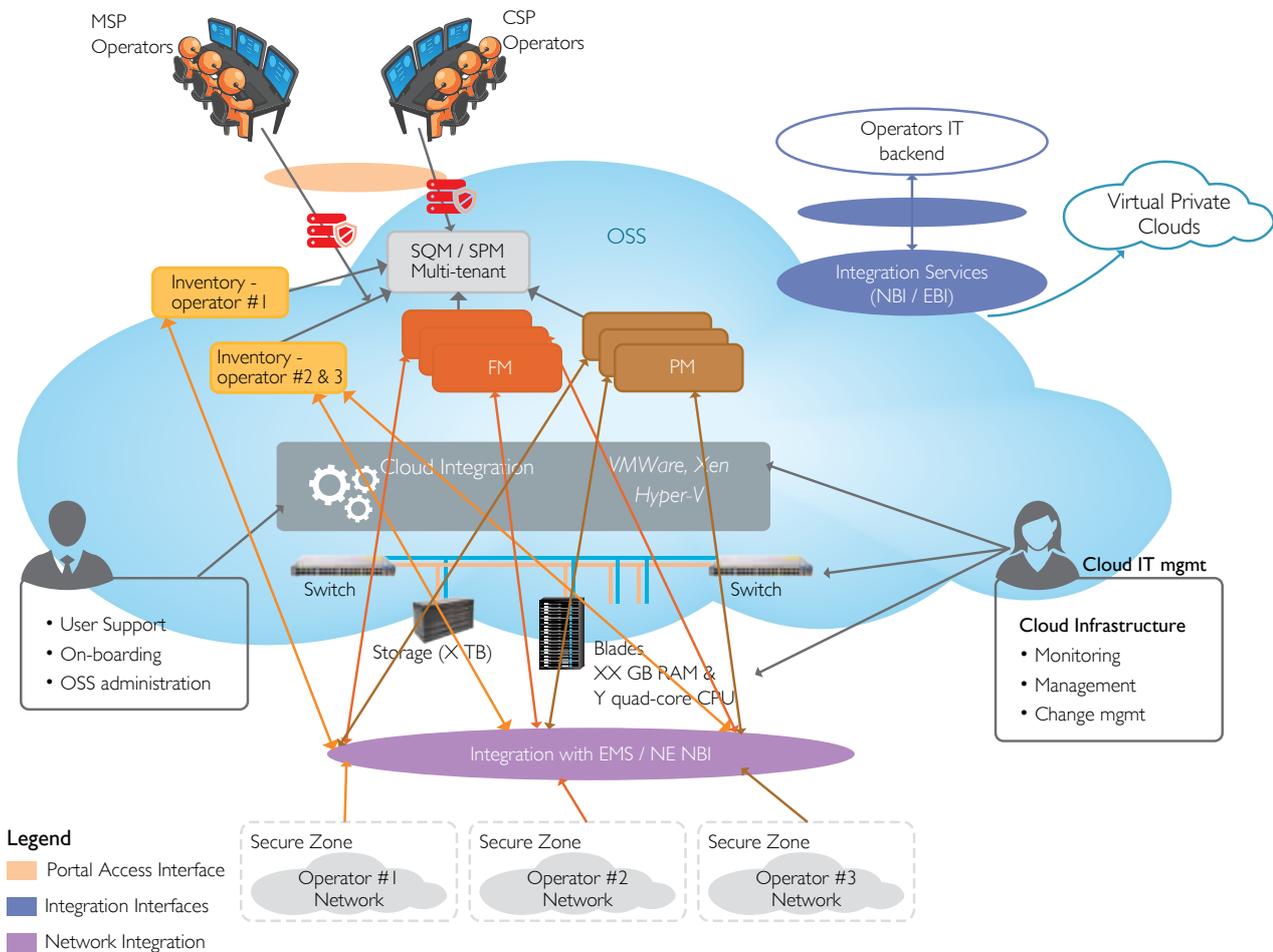


Figure 3: Reference Architecture: OSS cloud for a MSP, Source: Wipro Technologies

The model presented in Figure 3 includes some adoption challenges that are described below with possible solutions.

CHALLENGE	DESCRIPTION	SOLUTION
<b>Monolithic Systems</b>	Legacy OSS product stacks are often used in silos which will need transformation and unification before they are moved to the cloud.	It is good to consider alternatives for such applications, choose a solution that supports multi-vendor, multi-domain network management. In most cases a hybrid solution can be employed from the start and applications can be consolidated in a phased manner.
<b>Hybrid Solutions</b>	It may not be feasible to have the complete OSS application stack on the cloud posing a new integration challenge for applications that reside outside the cloud. Therefore hybrid solutions will be required, which will increase complexity.	Having standards based interfaces such as 3GPP or TMF and good policy control can help mitigate this problem. Wrap proprietary interfaces with standards compliant adaptors to integrate with other applications.
<b>Data Integrity &amp; Isolation</b>	MSPs will have to ensure the data integrity and isolation between their customers as most of the existing OSS applications are not multi-tenant.	Moving to multi-tenant applications is the preferred approach in most cases, but this may not always be feasible. MSPs should select applications that need to be multi-tenant and deploy multiple instances of other applications per operator or geography. Techniques like leveraging the access scope restrictions provided by identity management solutions can be employed.
<b>Network Integration</b>	Integrating the networks of multiple operators to a common OSS cloud will be a challenge. The architecture of such Data Connectivity Networks can be complicated.	The Element Management Systems (EMS) should reside in the operator network and these EMS should be integrated with the OSS cloud. This simplifies the network architecture and allows for data filtering at the EMS layer limiting traffic flow to the OSS cloud. If there are network probes deployed in the operator's network, it's good to aggregate the feed from all the network probes within the operator's premise and send the consolidated and rationalized feed to the OSS cloud.

# Business Benefits for MSPs

The key benefits of an OSS cloud model for MSPs are described below.

## 1. Reduced Costs

- Single deployment of an OSS application caters to the network management requirements for multiple MSPs.
- OSS upgrades can be conducted once to be effective for all customers.
- Resource sharing results in economies of scale.

## 2. Operational Agility

- Improved speed and execution when taking over operations of new CSPs or new network domains of existing customers.
- Customer additions do not result in new OSS application overhead costs; the existing solution can be scaled seamlessly by adding new hardware to the compute cloud.

- Some applications can be auto-scaled to handle burst traffic scenarios, reducing spend.

## 3. Simplified Vendor Management

- The OSS application environment can be rationalized by leveraging the same application for multiple customers. This reduces the vendor management overhead significantly and reduces employee training requirements, thus increasing their efficiency.

## 2.3. OSS as a Service

OSS services delivered over the cloud in a SaaS model (see figure 4) offers small-to-medium sized CSPs a unique combination of technology and business flexibility – at a fraction of the cost of traditional licensed software. This model is more relevant for Tier 2 or 3 operators in emerging markets with limited budgets. On-demand cloud services can provide the same level of business maturity to Tier 2 and 3 operators that large CSPs enjoy while also reducing OPEX.

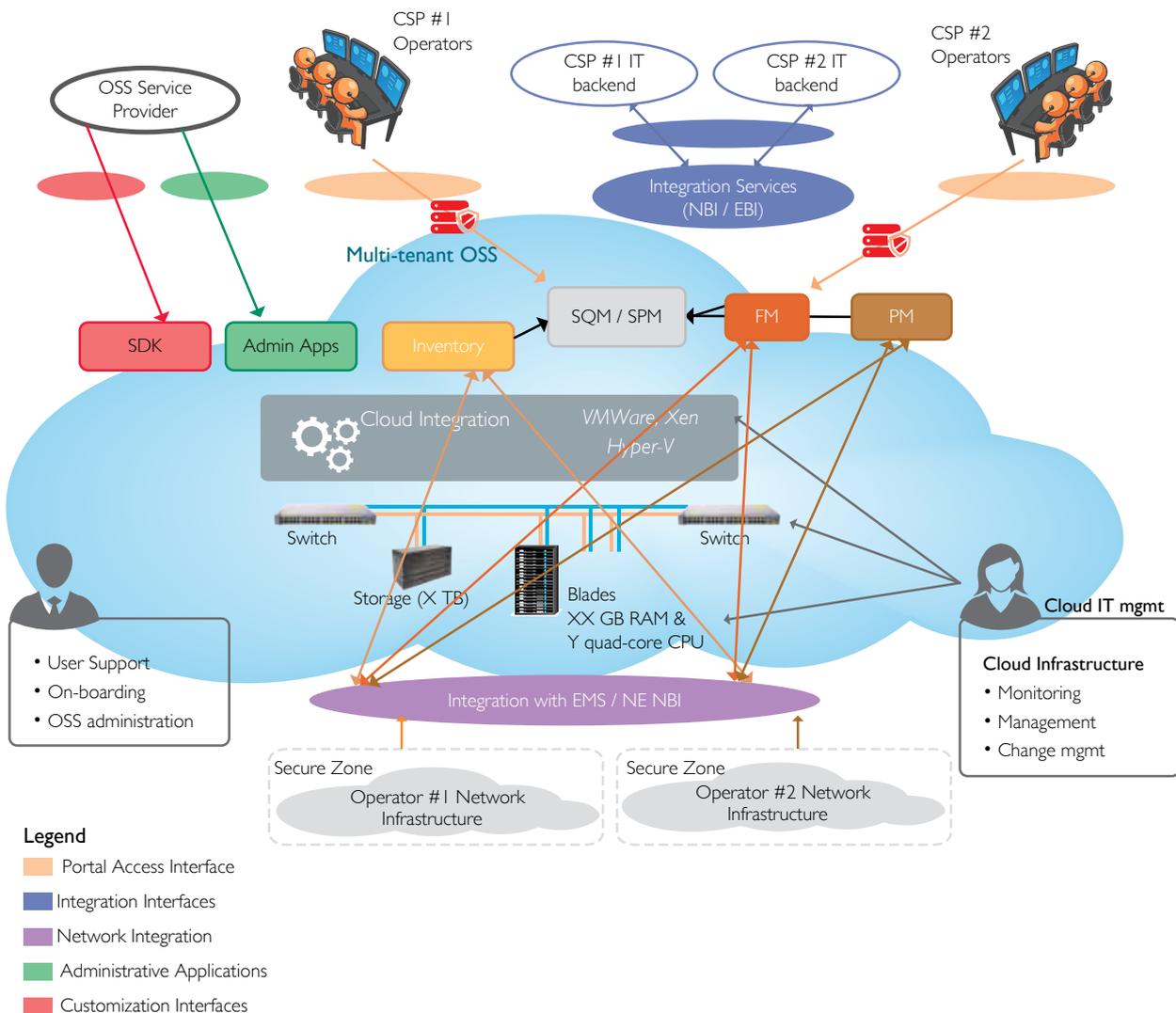


Figure 4: Reference Architecture: OSS hosted as a service, Source: Wipro Technologies

The model presented in Figure 4 includes some adoption challenges which are discussed below, along with a recommended remediation strategy:

CHALLENGE	DESCRIPTION	ALTERNATIVES
<b>Security</b>	Third-party provided and hosted OSS implies that the network data of the operator moves outside their premises. This raises security concerns as it is critical and confidential information.	Cloud OSS service providers will have to establish the right level of trust by guaranteeing security and integrity of operator data. One option could be that all historical data can be made available off the cloud. Critical network information should be transmitted over secure communication protocols. Encryption mechanisms can also be employed for storing and transmitting sensitive information.
<b>Integration with In-house Applications</b>	CSPs might want to host some of the OSS applications in their own premises and in parallel, use specialized applications in a SaaS model. So OSS providers will have to allow integration between OSS applications hosted within operator premises and those offered in SaaS model.	Allowing workflow integration with external applications is very important to make OSS applications attractive for operators. SOA and business process automation needs to be factored in while designing OSS applications.
<b>Customization</b>	Operators will want custom features in the OSS applications. Customizations can make software upgrades a daunting task for OSS cloud service providers.	OSS providers need to identify the features that are candidates for customization and ensure that concepts like model driven architecture are leveraged while designing the OSS applications. Software Development Kits (SDKs) to support easy customization should be made available along with the OSS application. The multi-tenant solution employed in the design of the OSS software needs alignment with the customization capabilities. Some solutions handle multi-tenancy by just adding a tenant specific column in the database tables. This may not be the best option, multi-tenancy is a broader topic and needs to be built-in the architecture of the OSS software considering the tenant specific customizability required.
<b>Provisioning, Rating and Billing</b>	Provisioning tenants, managing access privileges and monitoring the health and performance of OSS applications are vital for OSS offered in a SaaS model. OSS providers also need a transparent mechanism to rate the usage of the OSS service and accordingly bill operators.	OSS providers need a comprehensive vendor-independent cloud management framework. It should provide easy onboarding of new operators or users, administration of the OSS applications and also capture the required information to rate the usage of the operator. There are frameworks available but OSS providers need to evaluate a best-fit for their requirements.

# Business Benefits of OSS as a Service

OSS cloud in a SaaS model provides numerous business benefits to CSPs, discussed in more detail below.

## 1. Best of Breed Solutions

- CSPs can choose the right combination of OSS application features for their network instead of being forced to license products.
- The OSS service provider takes care of upgrading OSS applications and the CSP can be assured that they have the latest upgrades.

## 2. Reduced CAPEX and OPEX

- No upfront CAPEX and SMBs can scale up their OSS system as their network grows.
- Tier 2 and 3 CSPs can get the right mix of technology and flexibility at much lower license costs.
- Reduced OPEX for CSPs as they only need to focus on the network operations and not worry about the IT infrastructure for the OSS.

## 3. Flexibility

- OSS service providers will have better flexibility to package and price value-added features of their OSS applications.
- New features can be added without any deployment overheads as and when required. For example if an operator starts offering new services, the related OSS capabilities can be provisioned on the fly.
- OSS service providers can target a much larger set of CSPs and be more competitive.

# 3. Recommendations

There are different options for delivering OSS through the cloud. Identification of systems that can be migrated to the cloud requires an examination of architectural readiness, maturity and priority of the OSS product, in conjunction with an evaluation of the OSS landscape of the CSP. The deployment approach will also depend upon the scale

of operations of the CSP. We propose a step-by-step approach for migrating to OSS on the cloud for the following three stakeholders:

## 3.1. Tier I Communication Service Providers:

Tier I CSPs typically have a large legacy system footprint and large network and IT operations. They must consider a phased approach towards cloud.

### » IT Roadmap and Strategy

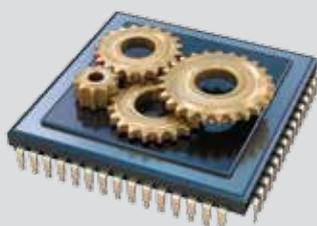
1. Prioritize OSS cloud enablement. Consider complete OSS/BSS landscape.
2. Define the cloud solution and identify the vendors or partners required.
3. Define clear roles and SLAs if multiple parties are involved.
4. Factor the possibility of outsourcing parts of OSS/BSS to MSPs.

### » IT-OSS Planning

1. Capture the OPEX current state for IT infrastructure maintenance and application support.
2. Identify the OSS applications that will provide the greatest benefit when moved to cloud.
3. Check with vendors on their development roadmap for any legacy applications.
4. Identify applications to replace with new vendor solutions or upgrades.
5. Take vendor inputs on existing applications for their suitability to cloud migration.
6. Identify dependencies on other OSS applications. Check if they impose any restrictions or challenges in having a hybrid solution.

### » Procurement Strategy

1. For new OSS applications, clearly understand the vendor's product roadmap, architecture and support for cloud.



Identification of systems that can be migrated to the cloud requires an examination of architectural readiness, maturity and priority of the OSS product, in conjunction with an evaluation of the OSS landscape of the CSP.

2. In all RFX's for OSS products include a mandatory requirement on support for the targeted cloud platform.

## 3.2. Tier 2, 3 Communication Service Providers:

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Tier 2 and Tier 3 CSPs have more limited network and IT operations budgets than Tier 1's. Greenfield operators can also be considered part of this category.

### » IT Roadmap and Strategy

1. Classify existing OSS applications and features into must have and nice-to-have.
2. Retain the must have applications or outsource to MSP and scout for SaaS offerings for the nice-to-have applications.
3. Factor the use of applications hosted outside your premises i.e. define clear security mechanisms, touch-points with in-house applications, overall governance and policy control.

### » IT-OSS Planning

1. Classify the must have OSS applications and identify those that will provide the greatest benefit when moved to the cloud.
2. Take vendor inputs on their suitability to cloud solutions.
3. Identify dependencies for identified applications.

### » Procurement Strategy

1. While procuring new OSS applications, check if there are SaaS offerings.
2. Check the applicability to your needs and understand the customization capabilities of such products.
3. In all RFX's for OSS products (for the nice-to-have applications) include a mandatory requirement to offer the application in a SaaS model and support for target cloud platform for the must-have products.

## 3.3. OSS Software Vendors

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Recommendations for OSS vendors are discussed below.

### » Product Roadmap and Strategy

1. Prioritize cloud or SaaS enablement as part of the OSS product roadmap.
2. Define the cloud solution and identify the vendors or partners required to implement it.
3. Define common guidelines related to cloud enablement for all products to avoid using different third party solutions in each of the OSS products.

### » Product Architecture

1. Do not add multi-tenancy as an afterthought, rather design it ground-up.
2. Reconsider solutions with high availability that are based on platform system specific features or solutions.
3. Choose mature virtualization solutions - some available in the open source domain have limitations.
4. Factor portability among virtualization solutions.
5. Consider scalable storage solutions like Big Data when offering products in a SaaS model.

## 4. Conclusion

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With OSS becoming a complicated and critical function for CSPs, the benefits that can be realized by migrating OSS on the cloud has also significantly amplified.

To keep pace with market demand, CSPs will have to continue to make significant network investments. But the network is only as powerful as the operational systems that support it – OSS helps CSPs better leverage their networks and enables them to develop a portfolio of automated, high quality, secure services and applications. CSPs should carefully consider the benefits of OSS on the cloud which offers much needed scalability and flexibility that will help them keep pace with rapidly evolving market requirements.

The benefits for OSS vendors and MSPs are equally important as a SaaS-based model can provide recurring cash-flows and improved operational efficiency. This decouples OSS software sales with network upgrades or rollouts. It will enable OSS vendors to quickly rollout new features in OSS solutions to a larger segment of customers.

OSS Software Vendors need to prioritize cloud or SaaS enablement as part of the OSS product roadmap.

## About the Authors

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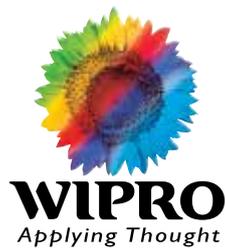
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