

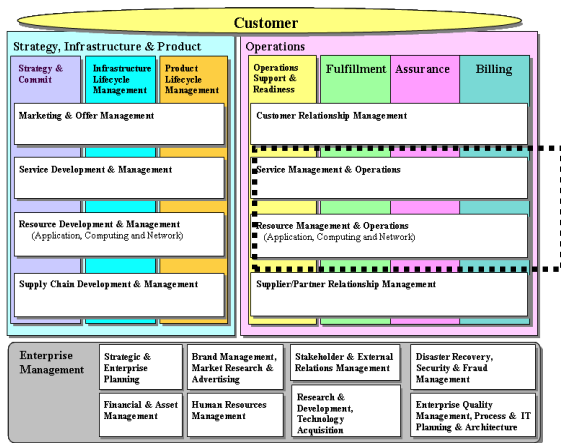


Operations Support Systems (OSS)

What is OSS?

'Operations Support Systems' support the e-TOM Fulfillment, Assurance and Billing processes and provide the following basic functions:

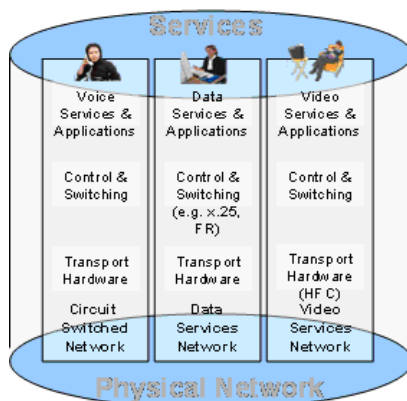
- Network Inventory Management
- Service delivery (order management & end-to-end provisioning)
- Proactive monitoring of the different network layers and message correlation (Fault, Performance and Service Quality Management)
- Collection and distribution of user data (Mediation)
- Coordination of technical service personnel for installation and repair activities (Workforce Management)



Scope of OSS superimposed on e-TOM

Legacy OSS

Many operators are dealing with legacy OSS systems that consist of multiple 'stovepipes'. Such a stovepipe often consists of a network infrastructure cluster from a single or a limited number of telecom suppliers combined with a network management system and specific IT tooling designed to deliver the service.

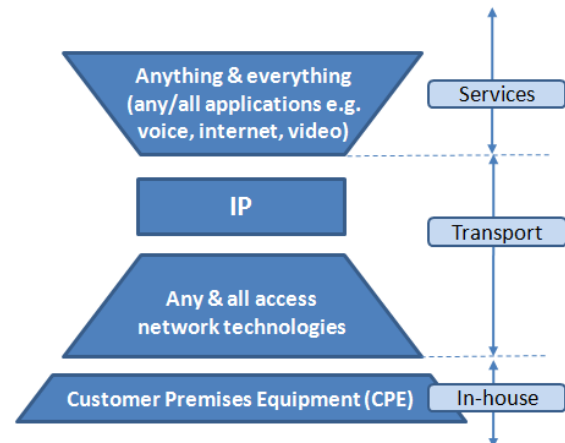


Stovepipe Architecture

These stovepipes enabled the operator to supply traditional services, such as voice, data or video across a specific form of access (copper, coax, fiber optic/SDH, SDSL). These stovepipes are characterized by the tight integration of the technical infrastructure (TI) and IT.

The introduction of a new service or service variant requires modifications and expansion of the existing delivery processes. This approach resulted in an organically grown, compartmentalized and fragmented OSS infrastructure characterized by:

- high management costs;
- long lead-times for the introduction of new services;
- prolonged supply times within the supply chain;
- reduced quality of the service assurance processes due to the dispersed or inconsistent customer information;
- lack of standard procedures, limited support for the more sporadic processes.



ALL IP Architecture

Trends in the telecom industry

The following telecom industry trends are relevant to OSS:

- Transformation into ALL IP as the dominant access technology (IP over all) and services (all over IP)
- Operator services will be increasingly composed of IT services next to the traditional network services (Hosted Voice, SaaS, IPTV middleware, VAS applications, etc)
- Disentanglement of the Service Provider (BSS) and Network Operator (OSS), with, for example, wholesale access to the Network Services as delivered by the Network Operator
- Modular construction of service and process building blocks to enable the service provider to rapidly bundle services



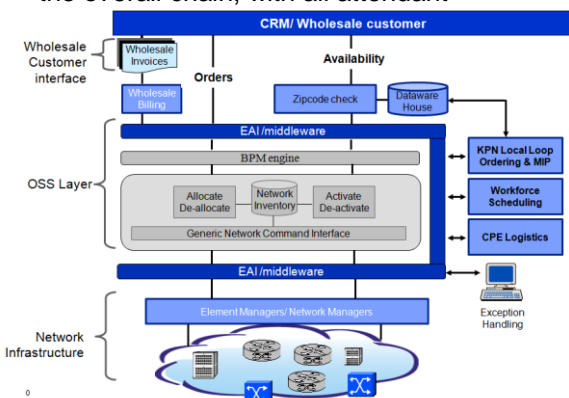
- Differentiation from over-the-top internet players by offering supplementary services such as identity management, location-based services, payments, etc.
- Reduction in cost levels in order to remain competitive

Guiding OSS implementation principles

I. OSS implementation on the basis of generic, and consequently reusable, building blocks.

A building block approach is not restricted to the initial delivery alone, but can also be specifically applied to processes such as customer self-care and service assurance. Essential elements in this regard are:

- Well-considered product model, whereby a distinction is generally made between the commercial product (often established in the BSS domain), the functional product (e.g., placing/receiving telephone calls) and the technical product (e.g., VoIP account or Ethernet access). As such the final commercial product is an accumulation of different semi-finished products.
- Uncoupling between Access and Services achieved through a consistently implemented domain separation within the OSS in relation to the service platforms and CPE management on the one hand and network access on the other.
- Stratification of the supply chain, consistent with the stratification within the product model. Each layer contains an orchestration component of the workflow, transaction registration and interaction via northbound and southbound interfaces. A well-considered choice of the granularity (number of layers) is therefore of major importance. Having fewer layers limits flexibility and consequently the reusability of the chain for the development of new services. By contrast, a larger number of layers drastically increases the complexity of the overall chain, with all attendant



implications in terms of the development elapsed time, particularly the testing process.
Sample OSS architecture for DSL Wholesaler

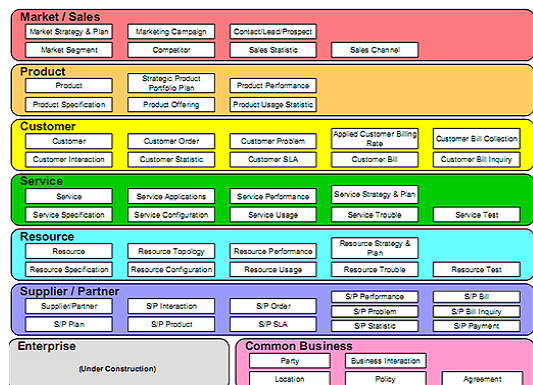
II. OSS delivery: top-down vs. bottom-up processes.

The primary supply processes such as installation and service changes are triggered top-down from the BSS domain. A number of processes is initiated bottom-up, however. For example, a request to port a telephone number to a third operator, or a status update, e.g., the service has become operational. The support of such processes must be included in the design of the OSS architecture.

III. Network Administration (NWA)

The following aspects are important in this respect:

- The network administration must reflect the stratification of the technical solution. The following levels may be defined: customer (BSS domain), service, logical connectivity, physical connectivity and equipment, locations, and finally geographic information.
- Quality of the network administration is crucial to ensure the smooth progress of the automated delivery and for high volume service processes. An effective way to keep the technical infrastructure in the field synchronized with the NWA, is the use of so-called Network Discovery Engines.
- Application of standardized information models (TeleManagement Forum SID).



TM Forum - Information Framework (SID)

IV. The realization of customer portals (customer self-care)

These provide real-time access to the network services external to the BSS and OSS layers and are also increasingly constructed using IT server applications. The relevant service changes must be recorded administratively in this respect so that the proper service and service changes can be billed, for example.



V. Workforce Management

Operators try to limit the cost of technical service activities by deploying resources efficiently. Technical service activities are diverse and vary from in-house installations, patch activities at a Point of Presence (POP), repairs due to a cable break for example, replacement of defective hardware, and the resolution of complaints at the customer's home. To carry out this variety in activities as smartly as possible within the specified SLAs requires an intelligent workforce management system capable of scheduling the relevant activities and required materials on the basis of work orders, a skills matrix, resources, location and calendar/requirements data. The configuration of such a tool requires an integral view of the identified processes and involved business units.

VI. Organization of the OSS configuration

- Integral management of the process chains, i.e., the need for the end-to-end design of an OSS and BSS architecture, decoupled however of project execution and releases.
- Proper balance between pre-provisioned services and services that need to be modified real-time.
For example, do you switch a VLAN as soon as the application is known and fixed, or do you do this already for the basic Internet, Voice and/or Video applications?
- Integral focus on non-functional requirements, such as the performance, availability, robustness and reliability of the chain.
- Finally, the exception processes must as much as possible be implemented in a standard way throughout the entire chain, whereby it is possible to make a distinction on the basis of the exception's priority (relevant for real-time supply processes), the impact, etc.

How can VDVL help you?

Aside from the required strategic and process knowledge, VDVL also has the technical knowledge and experience to help organizations with the planning, design and management of their OSS projects. Our in-depth telecommunications knowledge linked to experience with specific OSS (sub)solutions acquired working for various telecom organizations can be of great added value for our customers.

Our consultants have years of experience with OSS programs in which they fulfilled roles ranging from program manager to business analyst, designer and technical architect.

Before an OSS can be successfully configured, it is very important to model the products and services in the various layers, at the appropriate level of granularity. In addition, it is sometimes necessary to clearly standardize products and services before proceeding with the modeling process.

VDVL references

We are proud of the results we have achieved, such as:

- ❑ The implementation of the OSS for KPN Wholesale xDSL using WebLogic Integration and the TTI Netrac product suite for Provisioning and Assurance.
- ❑ The implementation of OSS for KPN Glas using Cramer and Tibco.
- ❑ The implementation of an OSS fulfillment solution for Tele2 using WebMethods and Frontix.
- ❑ The implementation of OSS for Online Breedband using AxiOSS.
- ❑ The implementation of Number Portability for various operators and the COIN (*Communications Infrastructure*) Association.
- ❑ The selection of IPTV middleware for Tele2.

Furthermore we have experience with the following standard OSS (sub)solutions:

- BPM and the WebSphere Fabric and Cordys integration solutions.
- Network Inventory solutions, such as Netcracker and NetAdmin.
- Specific activation solutions from Nakina and Kabira for example.
- OSS comprising solutions, such as Comptel, Cramer, AxiOSS and MetaSolv.
- Number portability solutions from PortingXS and Logica.

Call us for a further introduction and for more detailed information about our experience and references.

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