



## Selected Articles

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### Service your system

The global operations support system (OSS) market is worth US\$13bn (€10bn), but as Martine Parsons, marketing director for OSS provider Axiom Systems says, "The area is hugely overlooked because it is technical and not particularly exciting - it's not a sexy part of technology."

However, these systems are the heart of communications networks, and have been evolving as dramatically as the networks they support. OSS is in a period of flux.

An OSS system traditionally sits on top of other layered network systems - the first might be a business support system (BSS), the second a network management system (NMS), the third an element management system (EMS) - each subsequent layer dealing with parts of the network residing a bit closer to the customer. The vertical functions of a network such as order capture and management, product management and service activation (or in the service assurance arena, fault management and performance management) cut through the horizontal layers that knit everything together. OSS has expanded in recent years to cover service management and creation as a result of increasingly complex service offerings.

Service providers' OSS needs have changed in recent years. The telco and increasingly the cable operators are migrating to IP and the world in which telcos are providing just voice and cable is simply a TV provider belongs with one that uses roller lawn mowers and betamax video players. The OSS challenges in this bright new world are threefold: they must help operators manage the evolution from legacy to next-generation OSS, create a flexible provisioning process, and understand and manage the service experience.

### Cable operators and telcos

Although the OSS requirements of cable operators and telcos are similar and becoming more so as they develop their IP backbones, the legacy systems they deal with are different. The original billing and back-office systems that telcos are trying to replace were made to cope with voice; those of cable made to deliver TV. Over the years, network operators (and particularly telcos) will have upgraded pieces of their OSS systems but any new provisioning system or service management software must be designed to interact with the underlying legacy infrastructure. Incumbent telcos have additional problems because, as the grand old ladies of communications, many simply don't know where parts of their network lie. As Parsons says: "They have a long history and parts of their network go back decades." Cable operators and ISPs, which were created more recently, have more coherent inventory management systems.

As service offerings get increasingly complicated the larger telcos and cable operators are likely to overhaul their back-office systems completely. UK incumbent BT switched from its own Excel spreadsheet inventory system to one created by Axiom systems approximately six years ago but the company is currently working with Metasolve (a US-based company) on a project that will develop a comprehensive IP OSS suite as part of BT's 21CN project. This will pave the way for its IPTV launch later this year.

Cable operator NTL also dealt with Axiom Systems when four years ago it replaced several inventory management systems with one. But now it has merged with Telewest it will have a different set of OSS requirements. "It would make sense for the company to buy a single OSS platform comprising all the services fulfilment elements and some service creation," says Parsons.

NTL's move into quadruple-play with its acquisition of Virgin Mobile will further increase complexity and the need for flexibility. Virgin's business model (that of a mobile virtual network operator or MVNO) will require a fulfilment and assurance OSS system that differs from the traditional network-based system. This model is without a network (Virgin uses T-Mobile's) and does not require an inventory. Some OSS systems run networks using the inventory section of fulfilment such as Cramer's recently launched Cramer 6 OSS suite (an integrated suite of service fulfilment products). This means that information regarding the physical network forms the basis of the inventory; and the elements within the system (modems and STBs for example) as well as each customer's location and requirements are recorded within the inventory in terms of their place on the network. This information can then be pulled out for the purposes of service creation and management. Some people within the industry criticise this approach because it cannot work with an MVNO, for example, which does not have a physical network.

The way content is transported differs between cable operators and IP-technology-based telcos. A telco's last-mile optical fibre/DSL technology means it will deliver television as IPTV, while cable's hybrid fibre coaxial network means television will be delivered in an analogue or digital DVB format. "Telcos are delivering multiple services over one IP network where as cable can single out channels," says Sanjay Castelino, vice-president of industry marketing for OSS provider Motive. "They can say, 'I want this channel spectrum for data' and there is no chance that their TV service will interfere with that. Telcos have their packets and their data service riding side by side and have to do much more to manage their IP traffic both within the network and the home." This is the responsibility of the network's OSS system.

One solution is the management of the 'class of service'. This distinguishes one type of IP packet from the next as well as tests and classes it. In practice it means that an operator can prioritise real-time applications (such as VOIP and IPTV) over other less latency-sensitive traffic.

The class of service manager in the Cramer 6 OSS suite will enable a telco to sort its IP data by tagging each packet (with a label stating whether it is VOIP, or IPTV for example) it also tests for degradation, and has the ability to allocate bandwidth capacity based on priority.

Castelino continues: "However, as the cable guys move more content within the home they will have to deal with the same issues." Cable operators are increasingly offering interactive services (such as gaming and red-button facilities), which will require knowledge and management of a customer's IP activity.

### Different sized networks

The size of a communications provider also has implications for the OSS system.

Brian Cappellani, chief technology officer for OSS provider Sigma Systems says: "A larger operator may purchase the same product from several vendors or they may have acquired other operators who used different vendors, each with their own APIs and interfaces - this means the OSS system will have to do more work to bring all these moving parts together."

Preston Gilmer, vice-president of product marketing from Sigma systems adds: "The service complexity is likely to be higher with larger companies, making the number of services or bundled options greater."

Parsons from Axiom agrees: "Tier 2 customers such as Wanadoo are more fleet of foot, a bit more cutting edge and exciting. Incumbents have legacy systems and have to transfer the data from the old systems to the new. There is a lot of data migration work to do."

Another difference between the large and small providers is the type of business they are likely to be running. Castelino from Motive says: "The smaller network operators are more likely to focus on one service, and tend to make OSS decisions that are strategic or longer lasting across multiple services because they don't have as many pieces to account for."

IP has had the paradoxical effect of homogenising (or simplifying) the communications market at the same time as enabling the bundling of packages, which has created increased complexity.

The complexity inherent in a triple or quad-play-providing network is mind-boggling. Burke from Ceon says: "If a network has two million subscribers, it might have five million product offerings [meaning potential variations in each subscriber's consumption of content]." The network might want to offer four services (broadband, VOIP, video channels and mobile telephony) as well as five attributes of interest in each service (these are the characteristics of interest such as upload and download bandwidth and cost). On top of this, a customer might want video-on-demand and pre-paid services, as well as to take up a cross-promotional offers, such as the use of a certain number of minutes of VOIP entitling them to a free video-on-demand.

### Coping with complexity

Similarly there may be geographical complexity to take into account. As Burke says, "In the US particularly, a viewer will require both local and national content."

This requires knowledge of the network where the viewer is located.

One way of delivering bundled services is by purchasing suites comprising every area of service fulfillment in the one package.

A number of companies which had previously specialised in one area of OSS such as Cramer (inventory management) and Ceon (order management and activation software), have begun to offer purpose-built systems. The best of breed products of a few years ago, in which network operators would buy each part of their OSS from a different vendor are slowly being replaced by fulfilment suites that also act as service management and creation systems.

Whether an operator adopts a best-of-breed operating service system, or an OSS fulfilment suite, it must choose a system that is flexible. A customer will have a number of different services, and may want to vary these regularly. Axiom has developed a drag-and-drop customer service system (see sidebar on p27) that the product manager can use to create bundled packages. According to Parsons this is easily operable and is an example of how flexibility can be built into the system.

Similarly Motive's call-centre software enables flexibility and utilises a configuration tool that allows the customer services representative to see the data that is important. Castelino from Motive says: "The sort of important data might be that a certain set of subscribers have voice and high-speed data. If they upgrade to IPTV the priorities of the gateway are different. The operator will need to know this."

Similarly, operators want to get products to market swiftly. One of the ways it is able to do this is by making products that can interact with other elements of the network system and do not require additional software to make them interoperable. There are a number of open standards that OSS operators must abide by to ensure this is the case.

With the growth in variety of services, one component that needs to be flexible is billing. Jennifer Kyriakakis, director of product marketing for broadband and XOIP at billing company Portal says: "Essentially what our system does is manage the types of service - how you're going to price, bundle and charge for changeable services." She continues: "Voice-based systems were originally programmed to understand one service and any time there was a change, the system had to be reprogrammed and recoded. Now there's an object-based model that has flexible configuration for any type of service format. [A product manager] can add new applications through an online graphical-user interface. There's no programming or coding involved. The software is usable and abstracts the complexity from the system so that the user can visually create what they need."

With cross promotions, gaming and other IP bundles (offering ad-hoc videos etc) billing systems must charge in real-time. Old fashioned billing systems involved a two-step, batch-orientated process - all the usage occurred on the network and then got sent to a system that rated and charged at the end of the month. However as Kyriakakis says: "With real-time services, for example if the customer has purchased five video-on-demands within a month, there's a need for the network to check things immediately such as customer status, and whether the customer has subscribed to that service. In addition, real-time is able to tell whether there are errors in the process [whether the customer's details are accurate for example] - which tackles the problem of revenue leakage. Profit is as important to these operators [who are working at very narrow profit margins] as flexibility."

Portal's billing system was designed 11 years ago for an IP system and as Kyriakakis says: "We created this system before people knew what the interactive model would be - we didn't know whether people would be charged on bandwidth or service - with this unknown market we had to be very flexible."

## The future of OSS

So with all the recent changes in the provision of communications, what is the future of OSS? Well Sigma Systems for example is focusing on integrative technologies using the session initiation protocol (SIP). SIP is a communications standard that deals with interactivity in voice, video, instant messaging and online games. It was made a permanent element of the IMS architecture (which enables the provision of fixed and multimedia services) in 2000. Cappellani from Sigma Systems says: "We are currently looking into the communications protocols underneath the technologies such as IMS and media subsystem standards - as they allow operators to open up their network systems and deliver increased mobile and wireline services." Cappellani continues: "We've been doing a lot more integration with multimedia services that deliver this type of thing. An example of one of these is Openwave [which provides software for boundary-free, multi-network communications services]. These are the next range of application servers we need to talk to."

So with service creation and management dealt with, the future for OSS is to provide any service, over any platform, anywhere. Who says OSS isn't sexy?

## Standards for a quad-play world

Standards have been important for the OSS world in a number of ways. Many standards such as Docsis and EuroDocsis in the cable world relate to the network operators' physical network, so the Telemanagement Forum (TMF) has defined what has become a universally recognised OSS architecture. Around five years ago the TMF went back to first principals and created a FAB model (a functional analysis of behaviour of the OSS system). It also covered planning

and strategy, describing everything from the top down in a layered fashion. This model gives OSS providers a common language with which to talk to each other and vendors. Some make greater use of the TMF's work than others. John Wilmes, chief technical officer at Ceon, says: "The TMF standards go very deep and can be used as the basis for very detailed APIs."

It is these APIs or application programming interfaces that knit together a network. They can be created by the service provider's IT department, or come off the shelf from a systems integrator such as Accenture or from the open-source community. Where OSS components adhere to public (or open-source) APIs, it is easier, faster and less expensive for the service provider and systems integrator to connect its components together. In an environment where speed to market is essential, open-source products are widely used.

There have been significant developments in OSS systems as a result of quadruple-play or the addition of mobility to the services provided. Standards have been developed accordingly. The IP multimedia subsystem (IMS) is one of the standards involved in the overarching set of standards known as next generation network (NGN) which are based on SIP. IMS has become increasingly popular amongst network providers because it provides a separation between the application layer and the switching and transport layers. It allows communications providers to put together a variety of services on a variety of applications servers as well as unite mobile and IP services - meaning the service providers can offer quadruple-play, creating sticky services, which benefits the providers.

IMS allows what some might consider to be an open-access network. It allows service providers to unite, expose or link together applications that run on different vendor application servers and it is now possible to open a network and allow third-party application developers access to provide their own applications. Wilmes says: "An example would be France T&eacute;l&eacute;com, which has opened up its network and is allowing third-parties access. Of course they will check and monitor all the software created."

Wilmes cites an example of the sort of software that might be provided: "Let's say I'm a third-party developer sitting in the garage writing software. I come up with an interesting 'mash up' that integrates a cell phone and Google maps. This could mean that, via voice recognition, the user can tell the phone where they want to go and the software created would pull up the relevant map." This type of versatility is enabled by IMS.

### Making the transition to quadruple play

In the move to triple and quadruple-play, the service fulfilment aspect of OSS has expanded to encompass the new areas of service creation and service management. In addition areas that look at class of service are necessary to distinguish one type of IP packet from the next; as well as test and class it.

Service creation is a essential for any network wanting to offer more than a single product. For example, says Martine Parsons, marketing director for Axiom: "MSOs began to panic when the marketing people put together these gold and silver packages. They were worried that they couldn't deliver this level of complexity: to implement a new service used to take six months to a year." To increase speed to market, Axiom developed service creation software on top of its fulfilment suite comprising 'service provider building blocks', which are technology components that take little bits of order management/provisioning, inventory management and service activation and talk to a network box from the likes of Alcatel and Cisco. They also contain code that would refer to services (such as VOIP or IPTV). The product management team can drag and drop the building blocks together on a screen, thereby creating and delivering these services.

Parsons says: "The beauty of this system is its flexibility. With these personal building blocks the product manager can put them in any order without needing databases, orders and codes."

The sort of flexibility required by a communications service provider must be located in the service management layer, the main activity of which is in provisioning. But another area has sprung up within this layer - that of diagnostics of service and self-care. The customers of bundled packages are generally high-spending and therefore demanding. But by its nature the complexity of the bundled offering means it is more likely to go wrong and dealing with problems can be very costly. James Morehead, vice-president of product marketing for Supportsoft says: "[In some research we conducted] cable and satellite operators were still taking one call a month from every one of their digital subscribers. In addition to this there were also trucks called out to subs once or twice a year."

As margins are tighter than ever with the increased competition in the market, OSS providers are developing troubleshooting tools around the subscriber services. Sigma Systems does this via its advanced diagnostics manager (ADM), which leverages service management information. It provides a technical service representative interface with integrated automatic tests to guide the service diagnostic interaction with subscribers. These service diagnostics should not be confused with service assurance, with is a part of OSS that monitors the network and works out when something is faulty. This new type of service management is focused on customer care.

Another way in which OSS providers have attempted to address this issue is by the creation of self-care portals on a computer or TV. But as Morehead from Supportsoft says: "The customer care must be relevant to the customer. People aren't going to get off the couch to look at a web portal and see what's going on with the TV. People normally deal with TV services by picking up the phone - we have therefore created a portal for the TV and we believe customers will use this".

OSS has evolved from a service-centred industry to something that facilitates self-service, and the traditional areas of service fulfilment and assurance must be integrated to this to enable the automation of the customer experience.

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