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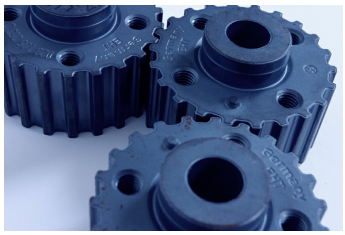
The Future of OSS and Orchestration



By: Mark Cummings, Ph.D.

There has been a lot attention directed to future OSS (Operation Support Systems) and Network and Service Orchestration Systems. Some argue that OSS will evolve to encompass the orchestration function, while others argue that orchestration will take over the functions now performed by OSS. We will examine the current situation with OSS in Telcos and how orchestration interacts with them. The analysis will show that, most likely, neither of these extreme positions is correct. The way the human body works is a good model that shows the synergistic relationship between them.

OSS

The first problem is what is an OSS. For this discussion we will use the classical definition of an OSS. That is, a computer system in a data center that attaches to the north bound interface of one or more EMS (Element Management Systems). Generally, there are separate OSS for separate functions such as Inventory Management, Configuration Management, Alarm Management, etc. These systems have operator consoles in the NOC (Network Operations Center) where operation staff interact with the OSS. These consoles are the primary (but not only) way that operations staff and others interact with Network Elements (NEs). It is the intent of the OSS to be to be the authoritative source of information about the current state of the NE's that compose the network. OSS tend to be based on the assumption that they are also the only way that NEs are provisioned, monitored, and changed. When OSS evolved, this was a powerful vision. Over time, the vision and reality have diverged.

Today, there are many ways other than through OSS that people interact with the operation of NEs. This results in changes that may not be visible to the OSS. These include Local Maintenance Terminal (LMT) interactions by Telco operations staff members, third party service providers, and vendor staff members. In many cases, vendors also have special vendor only accessible interfaces that they use to make configuration changes, software updates, etc. Also, Telco operations staff members, third party service providers, and vendor staff members may make hardware changes such as replacing boards, or even whole systems. These kinds of changes are often not visible to the OSS. Thus, some Telcos have a standard process of periodically interrogating all NE's to update themselves. This resembles a common practice in the financial industry.

Many banks, etc. use a "system of record" / "memo post" system. In this approach, each night an updated version of the system of record is loaded into a separate memo post system. During the day, transactions are made based on the information in the memo post system and it is updated accordingly. At the end of the transaction day, the system of record is updated from that day's memo post system and a new system of record is created. In one European Telco, the status of all base stations is interrogated each night and the OSS are updated accordingly. In another European Telco this is done once per week. As networks become bigger and more complex (2G base stations had 50 software settable parameters; 3G had 500; 4G 6,000; and 5G?) it is becoming more and more difficult to complete an interrogation run in the quiet period between 2:00 and 6:00 a.m.

In addition to multiple uncoordinated entry points for data, there is a process of summary and delay that affects the data in OSS. To understand this, it is helpful to think in terms of layers. The layering of data plane and control plane has been discussed for some time. However, it is more useful to think of several planes above the data plane. There is the control plane that is involved in packet

routing, etc. Above that is the orchestration layer that we will discuss later in this article. Then comes a relatively fast management plane with functions performed by EMS. Then, a slow management plane with functions performed by OSS. Then, finally, there is the Big Data plane. As information moves up the layers, it is summarized and since the movement takes time, somewhat "stale". As a result of all of these affects, OSS do not have complete and timely information.

From the outside, there is a tendency to talk about OSS as if there is a single OSS system for each function. Unfortunately, this appears not to be the situation. One of the U.S. majors tells me that they have over 200 Inventory Management Systems. It is interesting to note that they didn't say 242 Inventory Management Systems. This suggests two things: first, they are not sure how many they actually have; and second, there is some volatility with Inventory Management Systems coming and going. Also, it appears that a similar situation exists for the other OSS functions. That is, that there are approximately 200 Configuration Management Systems, Alarm Management Systems, etc. Operators in Europe tell me that the situation with numbers of support systems is the same in Europe. In some countries that have gone through recent development or with highly-centralized government-owned Telcos, the situation may be a little different, but the general Telco situation is large numbers of OSS.

Based on this background, one way to model OSS is as similar to the human brain. That is, they have a centralized, but somewhat incomplete and out-of-date view of the situation handled by multiple independent systems, some overlapping and some totally separate. Just as the human brain provides valuable capabilities with its model, so too do OSS.

Orchestration

The concept of orchestration came into use in the era of server farms, and then grew into Cloud Computing. It started by focusing on how applications would be distributed over servers and then grew into how many VMs (and later Containers) would be created and deployed where and when; plus how the applications would be distributed over the result. With Cloud Computing's focus on matching capacity to demand, the number of VMs was constantly changing. In order to meet the demands of this environment, it was necessary to react in very small fractions of a second. These response times were slower than those required for packet routing, etc., but much faster than the previously existing management and provisioning systems operated.

As Telco equipment became more and more software based, orchestration became a need. With the advent of SDN and NFV, it became even more serious. Telcos and their supply chains began to look to the cloud computing leaders for inspiration. So, the concept of a layer responding faster than the OSS began to be recognized and valued. In order to meet the faster response time requirements, orchestration systems began to be distributed – out into the network and in some case at the very edge.

In the human body, we have ganglions in our toes. In order to stand up, and not fall down, our toes have to make small adjustments all the time, very quickly. If the sensors in our toes had to send signals to our brains and then our brains send commands back to our toes, we would fall over before they got there. In our bodies, we have distributed control systems called ganglions. The ganglions in our toes get information from the sensors in our toes and tell our muscles to make the constant small changes that keep us standing up. This is all done locally at the edge because of the response time requirements. In general parlance, this is called "muscle memory". Thus, orchestration systems began to take on the characteristics of that portion of our distributed nervous system with its ganglions.

Synergy or Competition

While these small rapid changes are going on, our brain keeps track of larger scale phenomenon. For example, if our shoes are too tight and starting to cause a blister. Then deciding to change shoes. These two portions of our nervous system are called the conscious and the autonomic. They work together very successfully. Using this model, the OSS can be thought of as the

conscious and the orchestration as the autonomic.

OSS vendors saw the appearance of orchestration as both a threat and an opportunity. The threat is that new entrants with new technology focused on Telco orchestration would displace them. The opportunity was that they could expand their footprint and maybe displace other traditional competitors. At the same time, some of the new entrants with orchestration technology, thought that they had to enhance their value proposition by trying to combine traditional OSS functionality with their new orchestration capability.

Right Tool for Right Job

Just as it is possible to use a screwdriver as a hammer, it is better to use a hammer as a hammer. Both OSS and orchestration tools are well suited to their respective jobs. Furthermore, Telcos are not going to abandon their undepreciated investments in OSS, let alone their well-established procedures and staff skill sets in using them.

What emerges, then, is a system of systems composed of synergistic OSS and orchestration systems modeled on the way the human body works. That is OSS functioning as the conscious portion and orchestration systems functioning as the autonomic portion.