

Domain Controllers: Multivendor This Time?



By:

The advent of SD-WAN and SDN controllers has heralded a new era in telecom network management architecture. The old proprietary vendor-supplied element and network management systems (EMS and NMS) are being replaced by a new generation of domain control (DC) and cross-domain orchestration systems built with cloud-born software technologies. Every supplier of these systems touts their multivendor capabilities, although all but a few are difficult to interface with the multiplicity of vendors, equipment, and versions.

Domain Control Systems: a closer look

CSP networks are large and complex with multiple interworked technologies requiring multiple skill sets and tools to manage effectively, including planning, installing, analyzing, assuring and securing them. To manage and evolve their networks to meet their needs today, CSPs typically divide their deployment into domains, often by technology (such as optical transport, IP/MPLS or carrier Ethernet), by service (such as SD-WAN or residential broadband), by geography, or along organizational boundaries. A tiered management structure has evolved that seeks to automate provisioning and assurance within a domain (using domain-oriented controllers and applications) as well as across domains (using cross-domain functionality, also called orchestration software).

The need to refine and evolve these implementations is creating the new DC and cross-domain orchestration systems, progressively replacing EMS, NMS, and many OSS systems and expanding on the work begun in early-stage SDN, NFV and resource orchestration areas. The software is being brought to market in both vendor and open source initiatives. It is generally being implemented as a suite of cloud-native, model-based, API-driven, cloud-hosted modules that support the full lifecycle of operations needed within and across an operator's domains. In addition, it is increasingly linking northbound to higher-level service and business management systems. It is a modular tier of software that streamlines and enhances the operation of multivendor, multilayer and multidomain network infrastructures as shown in the figure.

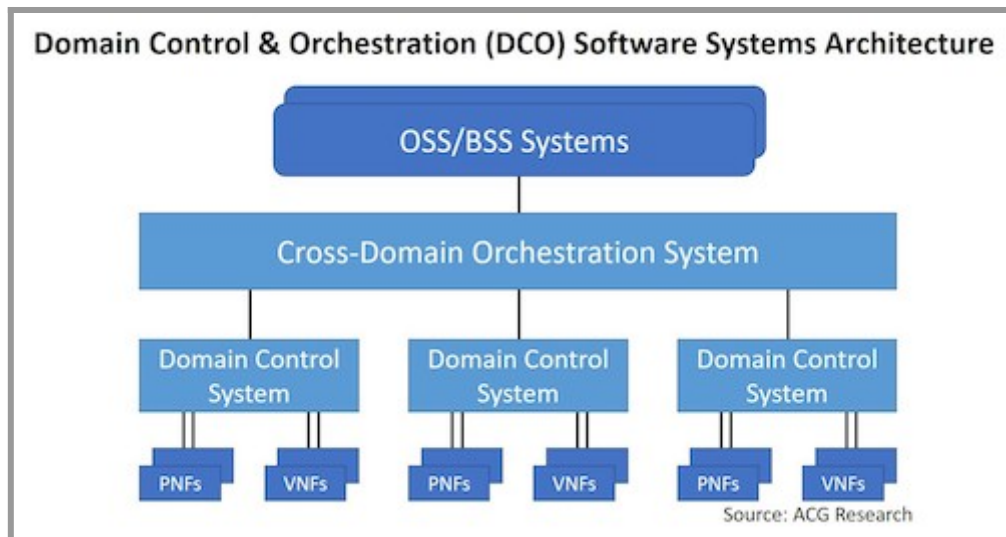


Figure 1: Network Infrastructure

The Domain Control Systems operate on the physical network functions (PNFs) and virtual network functions (VNFs), providing overall management of the elements within their domain. Like today's EMS systems, they provide provisioning of the network functions themselves and of the services utilizing them—but with much more automation. They also serve as telemetry conduits for performance information, like EMSs, but also analyze the information to provide network and service assurance support. Ultimately, they will provide closed-loop automation to add network resources when they detect the need.

Cross-domain orchestration systems are intrinsically vendor-neutral, since they need to control widely varying technologies that usually come from multiple vendors. But DC systems can be either single-vendor or multivendor. Let's look at which will win in the marketplace.

Why might DC systems be vendor-specific?

There are market and technical forces in play that will push the DC systems to be provided by the network equipment vendors themselves. This section outlines those forces.

The market dynamics are the same as they were with the EMSs that became vendor-specific. EMSs were originally envisioned in the 1980s to be multivendor, providing a standardized northbound interface to the Operations Support Systems (OSS) so that CSPs would be free to buy multiple vendors' network elements but enable operation as a single network. They provided both provisioning and performance information in a regularized fashion.

Although several ISVs attempted to build EMSs and EMS platforms that could be used by CSPs themselves, Systems Integrators (SIs) and the network equipment manufacturers (NEMs) to build the EMSs, these failed in the marketplace. Instead, EMSs became almost exclusively from the NEMs, bundled along with their equipment. This is because they needed a way to use the features of their equipment, including proprietary functionality that gave them a competitive advantage, which CSPs wanted. Plus, the NEMs priced their EMS systems low, in order to advantage their equipment. This left little margin for the multivendor EMS players.



Many NEMs moved on to build the layer of network management systems (NMSs) above the EMSs, controlling a larger range of systems. This added to their value proposition, using their incumbency in one area to gain advantage in another. These NMSs were marketed as having multivendor capabilities, but they were limited.

Controlling proprietary differentiating features in the equipment is hard in a multivendor environment. Vendors of DC systems must know the details of the equipment they control. For their own equipment, this is not a problem. But other vendors only provide that information under the direct request of their customers. And even then, they may not be fully forthcoming about the details, nor share their roadmap of anticipated changes so that the DC system provider can update their systems in a timely manner.

And there is additional complexity that will make the problem worse. As equipment vendors move to continuous integration-continuous deployment delivery models (providing multiple system updates every month, week, or even day), the problem of keeping the DC systems current with the network elements will increase many times over.

Why might DC systems be vendor-neutral?

The DC systems may, however, become vendor-neutral in the future, again because of both business and technical forces.

First, CSPs want efficient, automated operations of wide swaths of their network. CSPs cannot afford to keep their current siloed operations structures, with specialists in network and IT doing much of the work. They need to achieve their 10x aspirational goals: 10x times the agility, 10x the speed, at 1/10th the cost. This will require massive automation efforts, requiring that the domain controllers and cross-domain controllers control wide swaths of their networks without human intervention. Proprietary islands speak against that.

Second, standards and dynamic service descriptors are making the problem easier. The challenge of characterizing the capabilities of the network elements is getting easier as dynamic service descriptors and intent-based networking structures move beyond the current YANG and NETCONF models. Vendors are learning how to compile these service descriptors into their systems to

instantiate features to control a multiplicity of vendors' elements.

Main suppliers of DC systems

NEMs, SIs, ISVs and even CSPs themselves (for example, AT&T's ECOMP and the open source version, ONAP) are all playing in the DC and Cross-domain orchestration markets. But which will predominate in the future? It is not yet clear: each has a separate set of problems in effectively providing this function.

Network element vendors face information challenges in providing multi-vendor DCs. The same problem that NEMs had in EMSs is again in play here. Getting detailed information from other vendors in a timely manner has been and continues to be difficult. But standards and technology are making that easier, as described above.

In addition, independent software vendors face margin challenges. NEMs, again, are pricing their DC systems low, bundled with their network elements (whether virtual or physical). This presents a business problem to the ISVs, especially in the DC area, although less so in the cross-domain orchestration area.

And, CSPs face the single-user cost challenge: those that decide to build their own systems have the problem of having to bear the cost of their systems and of the adaptation to the myriad of network elements. Open source initiatives are helping here, making it more cost effective.

Stay tuned

There are not strong market splits among the players, nor is it evident whether the DC systems will be primarily multivendor or single vendor. At the moment, it generally appears that the NEMs are holding the strong cards in the DC system area and the ISVs in the cross-domain orchestration system areas. But the market will decide as this area matures. ACG Research will be following these changes in its research. Stay tuned.