Managed Evolution: Scaling, Operating and Supporting New Technologies

As Communications Service Providers (CSPs) scale up their deployment of new technologies in support of converged services, pressures increase on business processes and Operations Support Systems (OSSs), resulting in escalating operations expenses. Next Gen OSSs present part of the answer, especially for managing Layer 2 and 3 functions. However, the investment in core OSSs can continue to be leveraged, particularly in support of Layer 1 functionality, by making critical inventory data available to Next Gen OSSs through techniques such as data federation. This approach, called managed evolution, leads to reduced risk, lower operations expense, improved time-to-market, and an enhanced customer experience. In fact, by employing the principles of managed evolution, Tier 1 CSP operations expenses can be cut by $110 per subscriber per year, or $110 million annually for a CSP with 1 million subscribers.

Technology Convergence Drives Operations Imperatives

As cable operators and emerging VoIP players compete ever more successfully for the traditional voice-services market, it is crucial that CSPs differentiate themselves by offering convergent services tailored to customer preferences concerning devices, features, and payment options.

Already, network operators around the world are rolling out technology to support such new services for both residential and business customers. New, high-bandwidth access technologies — such as Fiber-to-the-Home (FTTH) and Fiber-to-the-Node (FTTN) — will help to generate new revenue to offset declining voice and DSL revenues. Likewise, the rise in new transport technologies — such as Metro Ethernet — will help meet the demand for greater and more flexible bandwidth on networks that are easier for business customers to interact with and manage.

A key premise of the investment in these new technologies is that the resulting streamlined operations will produce significant savings in operational expense. This savings, in turn, depends on enhancing or deploying the appropriate OSS and accompanying business processes, in order to enable rapid time to market, high levels of flow-through in fulfillment and assurance functions, and ultimately, increased customer satisfaction and confidence in the new services and technologies.

The Promise of Next Gen OSS

Next Gen OSSs hold the promise of driving more efficiency in optical transport by helping CSPs automate provisioning, service assurance and integration. They do so by, among other things, enabling improved inventory management and capacity planning.

CSPs are eager to reap the benefits of Next Gen OSS, but implementation efforts face the conundrum of balancing resources for both Time Division Multiplexing (TDM) network maintenance on the one hand with Next Generation Network (NGN) roll-out on the other.

To get a start, some CSPs have started consolidating Layer-2 and Layer-3 networks into a single Internet Protocol/Multi- Protocol Label Switching (IP/MPLS) infrastructure. The hope is to replace older equipment in core networks with faster, more efficient devices over time. Some CSPs are also integrating burgeoning technologies, such as Dense Wavelength Division Multiplexing (DWDM) and Reconfigurable Optical Add-Drop Multiplexer (ROADM), to realize greater capacity optimization.

As carriers continue to migrate to IP and to drive convergence, they will seek a path that leads from the core OSS used to support TDM networks, to the Next Gen OSS principles that support IP-based multi-service offerings.

Even so, converged networks remain — and will remain for sometime to come — a combination of next generation and legacy technologies and equipment. Most convergent services involve use of technology from both of these domains, and the supporting OSS must seamlessly integrate the two in order to scale successfully.

Choosing the Right Path

Replacement may be a viable strategy for alternative CSPs or developing market CSPs that have less investment in TDM networks and less capable core OSSs. However, despite viable alternatives to preserve existing investments, some Tier 1 CSPs may be pushed by their vendors and industry hype to either upgrade core OSS to support a breadth of Ethernet as well as IP-based services, or to rip out legacy systems altogether in exchange for Next Gen OSS.

Either strategy invites unnecessary risk, considerable expense, and compromised speed to market. CSPs need to look at the problems that can ensue with potentially myopic initiatives.

For instance, “replacement” is a strategy being touted by some vendors. However, replicating everything being done in a core OSS to an off-the-shelf Next Gen OSS would not only be extremely arduous and costly it is also completely unnecessary. The Total Cost of Ownership (TCO) for replacement would be cost-prohibitive and impractical enough that those waiting for the ideal time to “rip out” systems will discover there is no ideal time for something so disruptive. As they wait, they would likely have a growing reliance on spreadsheets and manual processes used to track inventory and activity.

On the other hand, if not carefully designed and implemented, the parallel use of existing systems for Layer 1, along with new systems for Layers 2 and 3 could lead to redundant and incongruous data. Additionally, the management of side-by-side systems would precipitate “swivel-chair management” as opposed to eliminating it. It would also give rise to more, not less, manually intensive processes. These consequences would, in short order, compromise data integrity, and the resulting data corruption would offset any initial time and cost savings, as CSPs would most likely add more people to solve the problem.

A Better Balance: "Managed Evolution"

Whether FTTH with flow-through, deployment of Metro Ethernet, or enabling converged services including IPTV, next-generation services will require both legacy enhancements and next-generation OSS deployments — *not* one or the other.

For that reason, a "Managed Evolution" approach is the best way to integrate existing provisioning processes into next-generation OSS domains. Managed Evolution essentially begins as an integrated side-by-side approach that is economically managed over time to migrate to the aforementioned "replacement approach." But *rather than pursue costly conversions of data and system functionality*, the Managed Evolution concept handles data migration, replication and management from a Service-Oriented Architecture (SOA) point of view.

The underlying purpose of Managed Evolution usually is TCO reduction at Layer 1, while laying the foundation for comprehensive resource management and provisioning at layers 2 and 3.

Consider the example of residential FTTx access technology, which is fundamental to the triple-play converged services strategy of many CSPs. In most FTTx scenarios, Layer 1 of the core and aggregation networks will continue to be managed by core OSS. Next Gen OSS must integrate with core OSS to manage the access network, but the manner of this integration will vary depending on the technologies chosen and the capabilities of the OSS.

In the case of optical access technologies, there are typically two choices. For FTTH via a Passive Optical Network (PON), the Next Gen OSS may manage all inventory data, including Layer 1 because each PON is essentially a pure next-generation island. However, in the case of FTTN, a core OSS may be best suited for managing the legacy copper loops that still run from a remote terminal to the customer premises, while a Next Gen OSS manages the optical link back to the central office. These cases involve a vertical demarcation of OSS responsibility based on network technology.

However, in some cases, the more elegant solution is a horizontal demarcation of responsibility, where the core OSS manages all Layer 1 physical inventory data (with its attendant detail and complexity), while the Next Gen OSS manages Layer 2 and 3 inventory functions. This blending can be achieved by a combination of data federation and good process design. A good example of this scenario is Metro Ethernet that may support many old and new technologies (as diverse as DS3 versus transparent Local Area Network [LAN] services) on the same network and devices.

The Data Federation Approach

At the core of Managed Evolution is data federation, which provides OSS with visibility to data across all data sources. This approach is the main vehicle for storing all physical, logical, and services inventory within one comprehensive single view of the network. With that one view, elements can be configured and maintained automatically from multiple sources. A key principle of data federation is that a single system plays the role of steward of a given type of data, but this data is made available to other systems for fulfillment and assurance purposes.

The burgeoning Multi-Technology Operations System Interface (MTOSI) can be used to summarize the detailed physical layer data in Layer 1 as simplified but actionable logical data in Layer 2 or 3. That means Layer 2 can get information about the network transport, which traditionally was only available to the Layer 1 inventory system.

This movement of data can and should be done in a seamless fashion, based on triggers and filters implemented in the Layer 1 system. That level of visibility greatly augments the ability for CSPs to manage OSS transformation.

The Bottom Line: Experience Is Essential

When adopting a Managed Evolution strategy to clear a path to Next Gen OSS from TDM-based networks and OSS, there are substantial challenges to overcome. Systems for ordering, inventory, provisioning, and other OSS will vary stack to stack. Interfaces will differ, as will the partitioning of functionality, data flows, and processes. These differences ultimately affect data projections and data processing, which throws the synchronization of functions across systems off track.

Therefore, OSS design must support Managed Evolution. For example, incorporating transparent User Defined Classes (UDCs) in a Next Gen OSS inventory system can improve stewardship and control of data and also reduced duplication of data. This approach can allow Next Gen OSS, users to look at objects on their screens that actually reside in core OSS.

Similarly, OSSs should be designed and integrated to enable management of service or trouble orders from inception to completion, including order decomposition, routing, status, tracking, business rule validation, message mapping, provisioning/activation, and billing.

By developing and incorporating standards-driven principles in an OSS, CSPs can reduce the need for extensive Java scripting, hard coding, or intense pre-integration work. These solutions should incorporate open APIs and table-driven, metadata approaches that readily integrate legacy and next-generation components of architecture.

However, this approach is not simply an OSS configuration or systems architecture exercise, but a business process and data driven analysis and design effort. Therefore, a strong understanding of transport, access, and service creation is necessary, as is intimate knowledge of different network elements, Element Management Systems (EMS), and Network Management Systems (NMS).

By employing these principles of Managed Evolution, Tier 1 CSPs have uncovered unused capacity and increase data accuracy. Independent assessments of this type of approach estimate that operations expenses can be cut by $110 per subscriber per year, or $110 million annually for a CSP with 1 million subscribers.

Managed Evolution requires methodologies, expertise, and tools that focus on building a federated view of data across all network layers and all services. The most effective strategy includes a three-pronged approach of data federation, OSS integration, and process design. The three come together to foster a consolidated view of inventory data that spans both new and legacy provisioning systems. This approach enables CSPs to deploy new technologies and new convergent services with less risk, less cost, and more rapid time-to-market.

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