

Accelerate and Simplify Service Design, Creation, and Delivery

What You Will Learn

Most service providers and many enterprises today have multivendor network environments. Administrators manage these platforms with separate vendor element management systems (EMSs) supporting service fulfillment, assurance, and billing. However, using an array of point solutions adds time, redundant processes, complexity, and cost to network operations. Cisco Prime™ Fulfillment Multivendor Service Orchestration (MVSO) provides a compelling alternative for service fulfillment in these environments by allowing service orchestration across multiple element management systems from different vendors.

This approach preserves existing investments in infrastructure, element management systems, and management processes, while allowing end-to-end service delivery across multivendor environments. Service providers can save time, reduce complexity and operational costs, and promote greater efficiencies. Cisco Prime Fulfillment MVSO is part of the Cisco Prime portfolio of IT and service provider management products. It automates service orchestration across Cisco and other vendors' equipment, starting with Alcatel-Lucent, and offers easy extension to other vendor devices. The solution includes reusable service fulfillment building blocks to automate the fast provisioning of popular services, such as those defined by the Metro Ethernet Forum (MEF).

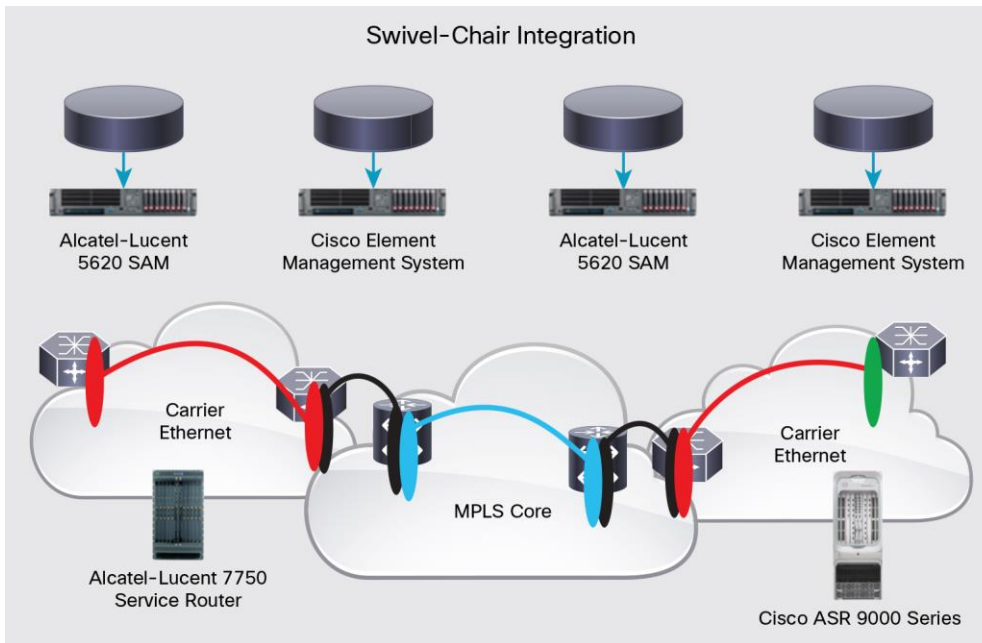
This white paper presents the need for and benefits of multivendor service orchestration. The features and functional architecture of Cisco Prime Fulfillment MVSO are described, and a sample case study is included.

Challenges of the Multivendor Environment

Service providers deploy best-of-class equipment in their networks to reap competitive and cost-efficiency benefits. Mergers and acquisitions add to this equipment inventory. These factors eventually result in a broad array of different vendor platforms and technologies, from the customer premises to the data center. In addition, each vendor platform typically has its own, proprietary management systems. These systems are integrated with a provider's operational support systems (OSSs) and business support systems (BSSs), resulting in separate silos of network management functionality.

Used together, these diverse systems rely on many redundant and inefficient processes that are often manual, complex, and error-prone. With many separate management systems for the varied equipment brands, administrators rely on "swivel-chair integration" to ensure that a service is properly provisioned and running efficiently across the network topology. That means they must move back and forth from one management system to another and sometimes write updates to custom program scripts to correct order failures (Figure 1).

Figure 1. Separate Management Systems Require “Swivel-Chair Integration”



These methods result in high order fallout rates. They slow time to market for new services and limit a service provider’s ability to monetize diverse network equipment. Changes or upgrades to services often require manual intervention by highly skilled resources. Service assurance is put at risk.

In summary, while multivendor architectures offer the promise of flexibility, they introduce significant complexity. Order fulfillment processes can become siloed and increase the need for manual intervention. This leads to a reduction in business agility and an increase in operating costs and compromises the end-user experience.

Cisco Prime Fulfillment MVSO

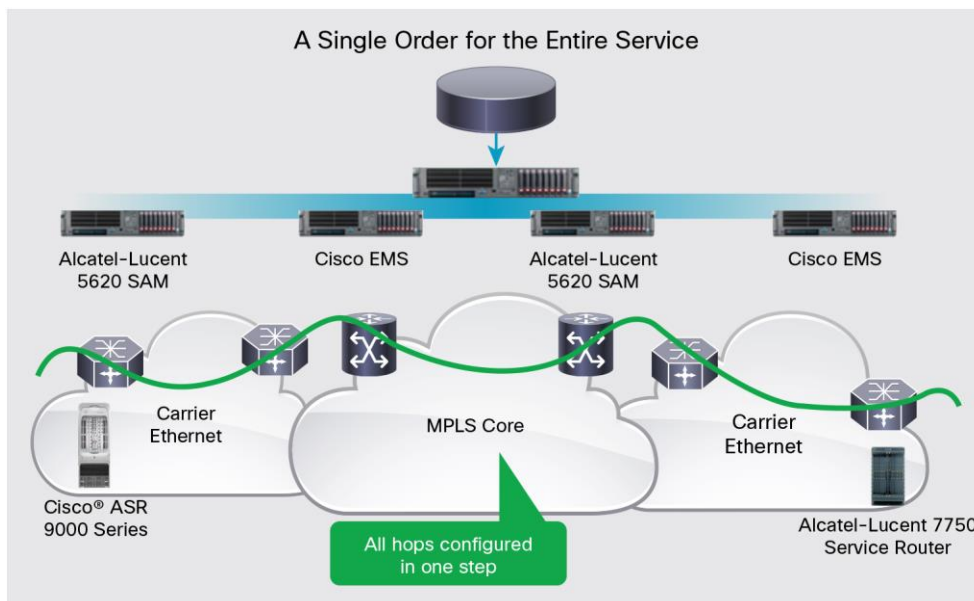
Now there’s a viable alternative. In this era of programmable networking and high-level service orchestration, Cisco has developed a compelling solution for the fulfillment of multivendor services. Cisco Prime Fulfillment MVSO is designed to preserve the existing investments providers have made in management systems and processes, beginning with Cisco and Alcatel-Lucent management platforms and their management processes. This solution is a new addition to the Cisco Prime portfolio of management products, which provides orchestration of Metro Ethernet services across these multivendor network environments. MVSO introduces predefined and pretested service components for faster construction of service variations and new product offerings. With minimal disruption to service provider environments, it eases insertion of Cisco equipment into existing Alcatel-Lucent networks. Service providers can reduce time to market and decrease total cost of ownership through its powerful automation of service delivery business process logic and easy integration with existing OSS architectures and platform components.

Service Orchestration

Here's how Cisco Prime Fulfillment MVSO works: Service providers with Alcatel-Lucent equipment that want to add Cisco® equipment cannot easily use Alcatel-Lucent Service Aware Manager (SAM) to manage their Cisco equipment. Likewise, Cisco Prime Carrier Management cannot be adapted easily to manage Alcatel-Lucent platforms. But now Cisco Prime Fulfillment MVSO can orchestrate services across both vendor management systems, while maintaining the existing processes and operations of those vendor management products. It is designed to fit easily into an existing OSS architecture and to integrate with platform components with minimal disruption.

By integrating smoothly with the provisioning mechanisms of Cisco and Alcatel-Lucent, Cisco Prime Fulfillment MVSO orchestrates service delivery end to end across both vendors' equipment and across network regions (Figure 2). It ends the inefficiencies of "swivel-chair integration." Service providers become more agile, with the ability to quickly and easily introduce new and innovative services.

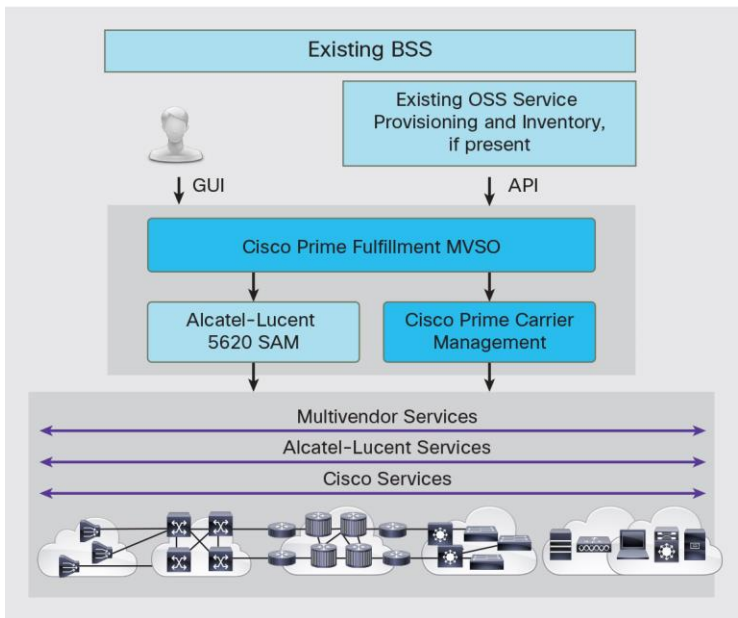
Figure 2. Streamlining Service Delivery across a Network with Cisco and Alcatel-Lucent Equipment



Cisco Prime Fulfillment MVSO also makes service provisioning, from concept to deployment, easier and faster. The combination of high-level orchestration and easier, accelerated provisioning shortens the time between a new service order, its deployment, and the first billing cycle.

With Cisco Prime Fulfillment MVSO working as a service orchestrator across the Alcatel-Lucent SAM and Cisco element management systems, the introduction of Cisco equipment into Alcatel-Lucent networks is greatly simplified. Integration efforts, operational expenditures (OpEx), and changes to existing operational processes are reduced because Cisco Prime Fulfillment MVSO uses the provisioning mechanisms provided by each vendor's network management systems (Figure 3). By integrating smoothly with these systems, the solution provides orchestration of end-to-end service delivery across network regions and across Cisco and Alcatel equipment.

Figure 3. Flow through from the Existing OSS or BSS - or Manual Provisioning through the GUI



Reusable Building Blocks for IP VPN and Metro Ethernet Services

Cisco Prime Fulfillment MVSO comes with predefined and pretested service components for creating and modifying Metro Ethernet services. Cisco recognizes that no two service providers deploy services in exactly the same way, despite using the same underlying technologies, such as Virtual Private Wire Service (VPWS) or Ethernet VLANs. Hence, based on standards that incorporate best-of-class approaches to service creation, Cisco Prime Fulfillment MVSO allows providers to quickly create services like IP VPN, E-line, and E-LAN, using reusable technology building blocks, and tailor them to match their unique business rules.

With the ability to quickly spin up a working service, administrators have easier ways to define service requirements. They can see how the prebuilt service is designed and how it runs, then modify it to best fit into their network. Version 1.1 of the solution includes preassembled example E-line service workflows. Future versions will include additional preassembled service workflows.

Cisco Prime Fulfillment MVSO also includes prebuilt adaptors for Cisco devices and Alcatel-Lucent 5620 SAM to make provisioning the newly created Metro Ethernet services easy and consistent. These adaptors allow repeatable, automated integration with Cisco and Alcatel-Lucent equipment.

Unique Features for Orchestration

Cisco Prime Fulfillment MVSO was designed to be vendor agnostic. It can translate service representations between its internal standards-based model and the unique ways that element management systems from Cisco, Alcatel-Lucent, and other vendors represent those services. The solution serves as an end-to-end orchestrator for any combination of single-vendor or multivendor equipment.

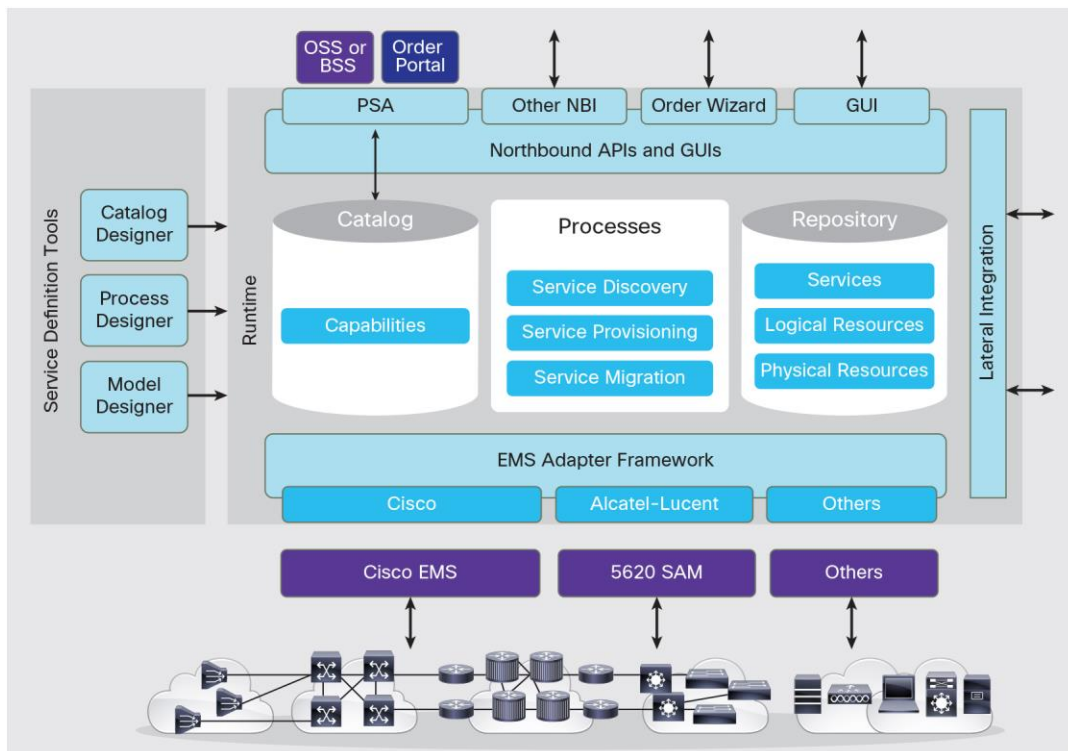
Cisco Prime Fulfillment MVSO first performs a discovery of the existing network, including the physical equipment and its logical configuration. The configuration information is then uploaded and converted into a vendor-neutral model that depicts existing services. Often, provisioning systems are based on offline inventory systems that can get out of sync with the real network, and this can lead to order fallout based on incorrect topology information. But with Cisco Prime Fulfillment MVSO, the real-time discovery of services and of physical and logical resources, along with built-in discrepancy detection, helps reduce errors in the provisioning process by maintaining an accurate view of what is deployed in the network.

A comprehensive, standards-based, northbound API simplifies integration with existing order entry and other OSS components. The vendor-agnostic models for services and resources are based on industry standards from the International Telecommunication Union (ITU), Internet Engineering Taskforce (IETF), TeleManagement Forum, and other industry organizations, as described later in this paper.

Functional Architecture

The functional architecture behind Cisco Prime Fulfillment MVSO has three key components: a catalog of service capabilities, service fulfillment processes (such as create new service, modify existing service, verify service), and a repository of services and physical and logical resources running in the network (Figure 4).

Figure 4. Cisco Prime Fulfillment MVSO Functional Architecture



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- **The catalog** publishes the capabilities that Cisco Prime Fulfillment MVSO provides. It is a technical service catalog: For every service that Cisco Prime Fulfillment MVSO handles, a set of capabilities is published in the catalog. The catalog interfaces through a northbound Product and Service Assembly (PSA) API with a provider's OSS, BSS, and/or ordering portal.
 - **The processes** are the services workflows that provide, modify, cease, migrate, or discover services. They include comprehensive service order management functions with both automated and manual steps and fallout management. Services processes follow a standard design, activate, and test model that helps ensure consistency across service types.
 - **The repository** stores an accurate image of the resources being managed and the services that use them. It can also contain services provisioned by tools other than Cisco Prime Fulfillment MVSO, through the service discovery function, which identifies services that already exist on the network and adds them to the repository. Repository information is kept in sync with regular discovery and upload functions from the live network.

Another facet of the functional architecture is lateral integration. Cisco Prime Fulfillment MVSO may need to interconnect with other systems, - for example, a separate IP address management system that is responsible for handing out IP addresses, or a workforce management system that manages the dispatch of technicians to sites to install equipment. The lateral integration capability allows a Cisco Prime Fulfillment MVSO process to communicate with these other systems.

Figure 4 also shows the service definition tools used to reassemble service building blocks, such as pseudowires or Layer 3 VPNs, allowing services to be customized to the associated business processes of each service provider. The service definition tools are used to assemble building blocks into new processes for new services, to create new building blocks when needed, and to build new adapters for new EMSs.

Design Principles

Fast service creation is central to Cisco Prime Fulfillment MVSO. This objective is realized with the use of service design patterns, which contain the solution's reusable building blocks. The building blocks can be assembled into services and use best-of-class design approaches for different services. A consistent set of functions is provided for all services, including import, verify, provide, amend, and cease (IVPAC). Furthermore, each function follows a standard model that contains four steps: order capture, design, activate, and test. Cisco Prime Fulfillment MVSO includes a set of resource-facing services (RFSs) that are prebuilt, reusable components, designed to be assembled into customer-facing services (CFSs) to suit the particular service provider. The RFSs are based on industry standards, and the CFSs contain the provider's specific business rules. This separation of CFS and RFS optimizes reuse and reduces the time required to create a new service offering.

The ability to coexist with other systems and to support migration from other element management systems - including those that may have been built in-house and from other vendors - is also central to Cisco Prime Fulfillment MVSO. One use case, described later in this paper, shows how a service provider can take an existing order portal and migrate those services to the Cisco Prime Fulfillment MVSO solution for orchestration and management.

Carrier class maturity is another design tenet. Cisco Prime Fulfillment MVSO is a component of Cisco Prime Fulfillment, which is a mature and highly scalable end-to-end service fulfillment solution used by service providers globally. The product includes order management, inventory management, and activation systems, and it is designed for high availability and resiliency in the most demanding and complex carrier-class environments.

MVSO includes interfaces for integration with management systems that are already in place in the service provider's environment. This makes for an easier, smoother transition to using Cisco Prime Fulfillment MVSO as a high-level service orchestrator. The northbound interface (NBI) is based on the PSA API, which was originally developed under guidance of the TeleManagement Forum (TMForum) and is now an open standard. Incorporating the PSA API provides Cisco Prime Fulfillment MVSO with preintegration into the Cisco Agile Business Architecture (ABA).

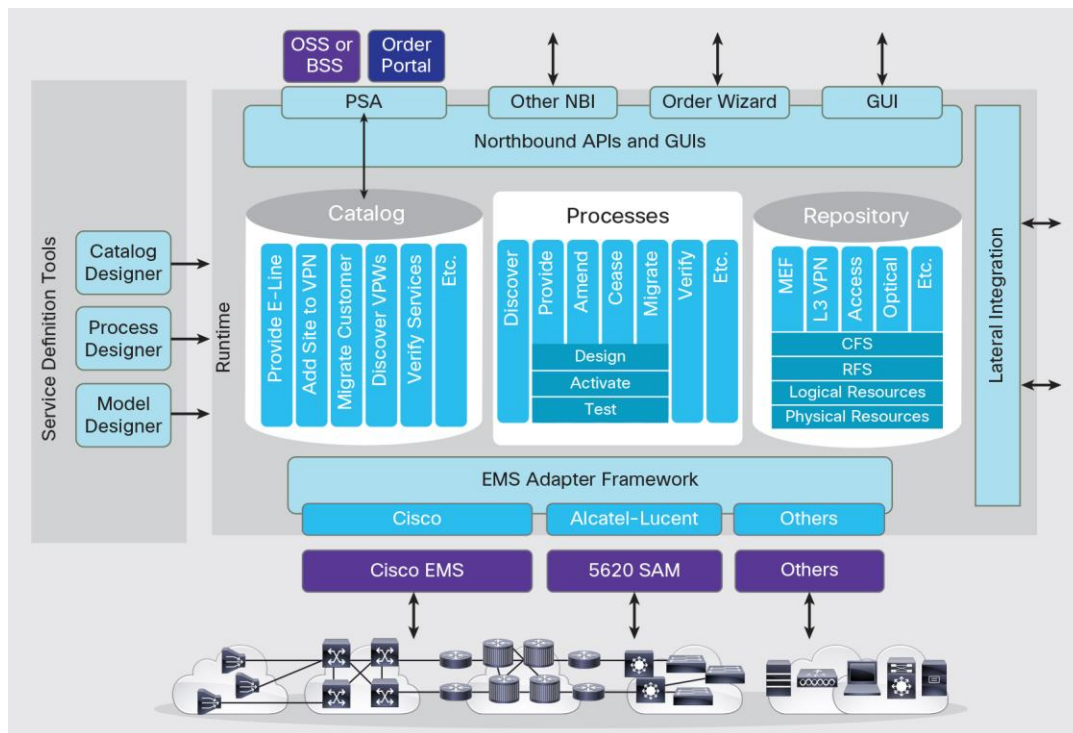
The Cisco ABA follows the logical architecture of network and IT assets, independent of access technology such as fixed or mobile networks and associated IT operations management. By defining clusters of independent business activity (people, processes, and technology) as modules and providing end-to-end service control of those modules, service providers can greatly reduce the complexity of their operations. With end-to-end control, they can create new and differentiated services on demand.

The northbound interface encompasses the TMForum Shared Information/Data Model (SID), the ITU G.809 model for connectionless technologies, and the ITU G.805 model for connection-oriented technologies. Incorporating these nonproprietary standards contributes to easier integration with other products.

Cisco Prime Fulfillment MVSO also contributes to the service assurance process by providing an accurate view of network resources and services. When the upload function detects that a service component has been modified or removed, Cisco Prime Fulfillment MVSO will automatically flag the discrepancy based on a comparison with the service repository. At any time, an administrator performing troubleshooting can use the verify function to see whether a service is still correctly provisioned. Cisco Prime Fulfillment MVSO can also provide the link between customers, services, and resources. This is useful if a link fails, because information about which services are operating over that link and which customers are affected by the failure becomes instantly available. It is also useful for planned maintenance. For example, if a line card in a router is to be swapped out, Cisco Prime Fulfillment MVSO contains information on which customers will be affected, so they can be notified in advance of any service disruption.

As shown in Figure 5, the catalog has an entry for each function that Cisco Prime Fulfillment MVSO is capable of providing. Processes for external use are published by the catalog, which shows other systems which operations are available. Service providers can control which functions are integrated northbound through the PSA NBI simply by configuring the catalog. For example, a new version of a process can be added and an older one removed, so that the older version can no longer be requested. Using the publish and subscribe functions of PSA, northbound systems can learn the capabilities of Cisco Prime Fulfillment MVSO. These systems can request the operations and the catalog then launches the appropriate process to accomplish each request.

Figure 5. Cisco Prime Fulfillment MVSO Functional Architecture Deep Dive



Processes for each service-related function that modifies the network (for example, provide, amend, migrate, and so on) are based on a standard pattern containing design, activate and test steps.

The design step updates the repository with all the changes that will be required in the equipment. It creates a set of pending changes in the repository that can then be used in the next step, activate. When Cisco Prime Fulfillment MVSO receives a request to provide or amend a service, it is possible that some of the design and assign steps have already been performed by an upstream application (for example, an inventory system) or manually entered (for example, into a customer relationship management system or a spreadsheet). In this case, Cisco Prime Fulfillment MVSO takes this partial design and completes it by making any remaining design decisions and assignments. The solution can handle services where the design is fully specified, not specified, or partially specified.

The activate step takes the set of pending changes and converts them into instructions for each underlying element management system. Then it sends the instructions to the EMSs and handles any error conditions.

The test step allows an optional end-to-end service test function to be added. This can be anything from a simple ping test to integration of a full test platform.

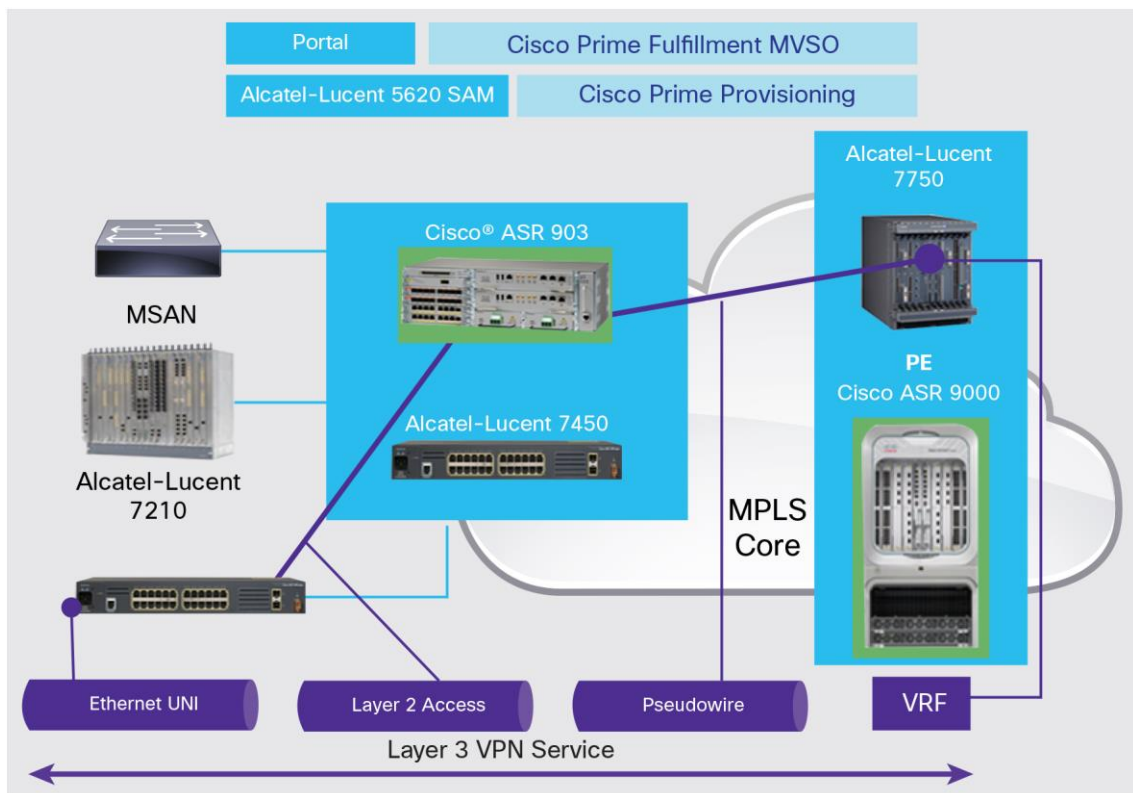
As mentioned earlier, the repository has models for services and resources, based on industry standards. The models are vendor-agnostic so that any vendor's equipment can be managed. Resources and services are separated, so that any combination is possible. Different services can use the same set of resources, and IDs can be allocated consistently. Figure 5 also shows the reusable service building blocks, the RFSs, which can be assembled into different CFSs.

Cisco Prime Fulfillment MVSO Case Study: Tier 1 Service Provider

A Tier 1 service provider has Alcatel-Lucent 7750, 7450, and 7210 Service Routers running IP VPN services with Layer 2 access networks over a Multiprotocol Label Switching (MPLS) network core. The provider wants to introduce a Cisco ASR 9000 Series Aggregation Services Router as an alternative to the Alcatel-Lucent 7750 and a Cisco ASR 903 Router as an alternative to the Alcatel-Lucent 7450. It plans to offer the same IP VPN services but use all these different platforms without restriction for greater flexibility.

Using Cisco Prime Fulfillment MVSO to orchestrate both the Alcatel-Lucent SAM and Cisco Prime Provisioning systems reduces the complexity, cost, and time required for “swivel-chair integration” management.

Figure 6. Tier 1 Service Provider Service Fulfillment Topology



The provider also has a service ordering portal, which handles orders for services on the Alcatel-Lucent equipment. Using the Cisco Prime Fulfillment MVSO, the provider has the flexibility to continue using the portal for older Alcatel-Lucent SAM-based services. For the new services that ride over both Cisco and Alcatel-Lucent equipment (for example, Layer 3 VPNs), Cisco Prime Fulfillment MVSO can be used to quickly and efficiently orchestrate these services and management systems.

Summary

Network service fulfillment environments have become very complicated due to highly varied proprietary hardware, along with their associated element and network management systems and fulfillment systems. This complexity is heightened as the systems are integrated with commercial and home-grown OSSs and BSSs. The resulting time-consuming management has affected the time to market required for creating new services, as well as managing existing ones. That has, in turn, affected OpEx, the bottom line, and the service provider's competitiveness.

Now Cisco Prime Fulfillment MVSO greatly simplifies service delivery on combined multivendor networks, beginning with Alcatel-Lucent and Cisco environments. It provides high-level service orchestration across those proprietary platforms and their associated management systems, significantly accelerating time to market for new services. By automating end-to-end processes related to service creation, modification, management, and troubleshooting, the solution reduces order-to-cash times. It also provides predefined and pretested service components for Metro Ethernet services to promote quick construction of service variations and new product offerings. Cisco Prime Fulfillment MVSO preserves the existing infrastructure and network management systems investment and service delivery processes of service providers, while helping to enable more agile service delivery. It greatly eases insertion of Cisco equipment into existing Alcatel-Lucent networks by simplifying integration. Future releases will include integration with other popular network equipment and their associated element management systems.

For More Information

For more information on Cisco Prime Fulfillment MVSO, visit <http://www.cisco.com/go/mvso>, contact your local account representative, or send an email to prime-fulfillment@cisco.com.



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