Cisco ANA Carrier Ethernet for Service Activation

Introduction

In today's competitive environment, one thing is clear: service providers must be able to offer a range of services to different types of customers in a cost-effective manner. The IP NGN Carrier Ethernet network has been designed to offer a scalable and flexible fulfillment process for business and residential services. Service fulfillment includes three primary components:

- Order management system
- Provisioning/activation system
- Inventory

This white paper focuses on dividing the provisioning and activation system into two layers, which include the service creation layer and the resource management layer. The Cisco ANA product provides an abstraction layer for the resource management layer and facilitates a powerful, yet flexible service activation capability that allows control and alignment with service provider business processes and business policies.

As converged networks become more complex, fulfillment requirements become more complex, resulting in networks that can have hundreds of routers supporting many customers with unique configurations, growing, with customer identities that are constantly changing. Service providers cannot build a silo infrastructure dedicated just to mobile, VPN, or business customers. Next-generation networks must support a converged and multiservice infrastructure with a service fulfillment system that can support business VPN, data services, video, mobile backhaul, and messaging services. The Cisco Carrier Ethernet management solution includes a framework that allows separating key layers such as resource management and service creation with an eye to optimizing service provider business processes, enabling flexibility to support the acceleration of new services, and reducing costs when performing network changes or upgrades. Figure 1 below shows the business challenges and how they will be addressed by the Carrier Ethernet Activation Solution.

Figure 1.   Carrier Ethernet Activation Solution Summary

What You Will Learn

The Business Challenge	The Solution	Cisco Active Network Abstraction (ANA)	The Results
▪ Service providers must rapidly bring new services to market. ▪ Service providers must provide on-demand services and support to their customers. ▪ Service providers must take the cost out of the business process from order placement to fulfillment through automation.	▪ Service providers should deploy Cisco Active Network Abstraction as their resource management system to facilitate flexible and controlled activation of Carrier Ethernet services on network devices.	▪ Element management system with root-cause analysis. ▪ Abstraction layer for resource management. ▪ Service activation through ANA Command Builder including Carrier Ethernet activation methods.	▪ Real-time activation of customer services through automation and flexibility. ▪ As part of an OSS transformation, ANA can be integrated into a complete service fulfillment system that includes integration of federated inventories and automated business processes. ▪ Enable a consistent, automated, and controlled fulfillment process for multivendor and multiservice fulfillment.

## The eTOM Service Fulfillment Framework

The TeleManagement Forum (TMF) illustrates a structured and standard method for describing the service provisioning process in its enhanced Telecom Operations Map (eTOM) operations model (Figure 2).

Figure 2.   Elements of the eTOM Operations Model
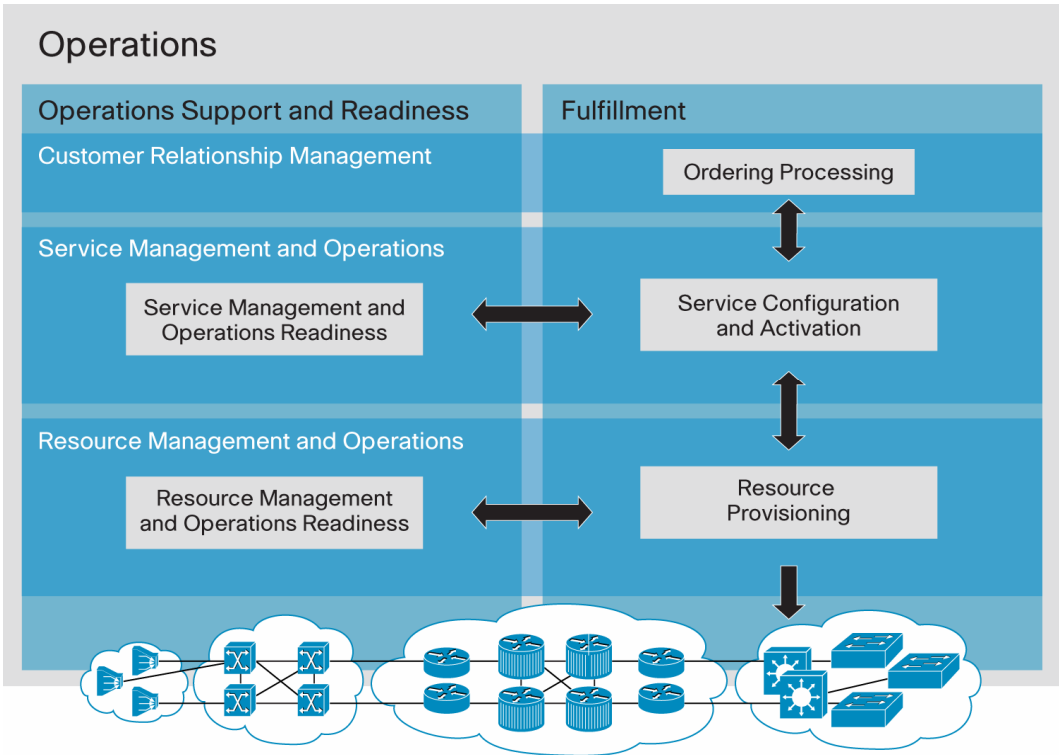
There is an architectural advantage to separating the service management operational functions from the resource management operational functions. For service fulfillment systems that support a multivendor environment, the vendor-specific management functions are captured in the resource management layer (typically referred to as the element management system or EMS). The service management layer can be designed to be vendor-independent, including a service catalog, service inventory, and service creation workflows. These workflows call vendor-specific activation methods in the resource management layer. The benefit is realized when the service provider can upgrade a router (network element) with a new device driver in the resource management layer and never have to upgrade any of its service management applications. This savings in change management alone can justify the cost to upgrade to Cisco NGN fulfillment architecture (Figure 3).

Figure 3. Fulfillment of the NGN Architecture
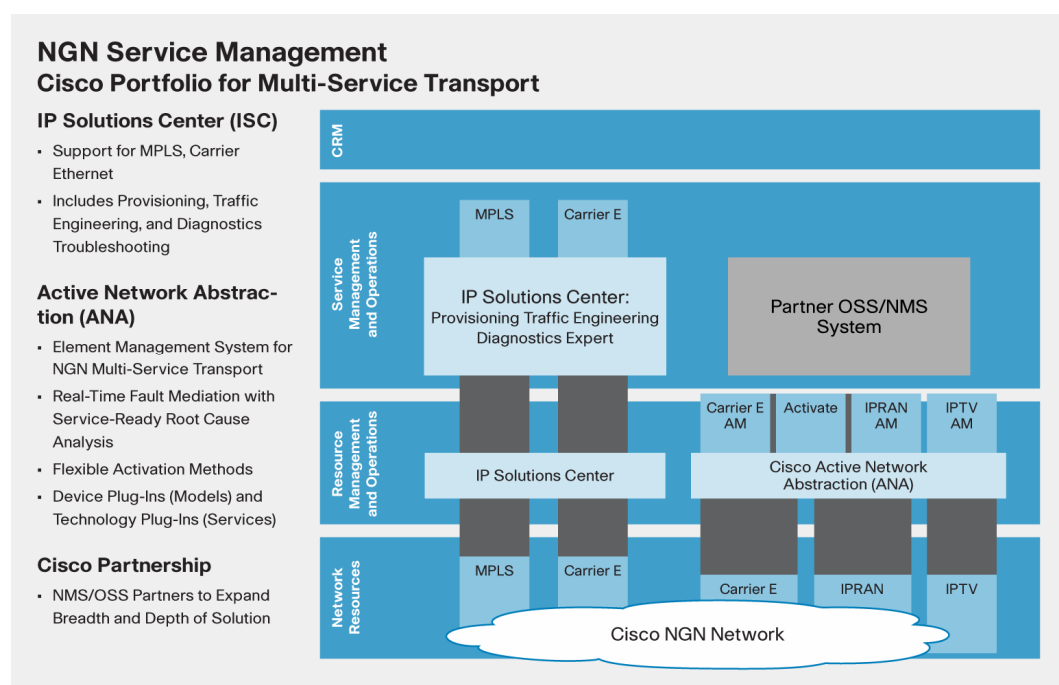
The Service Creation Lifecycle

This flexible network must be matched by an equally flexible and robust management system that addresses the full lifecycle of services from conception through to activation and ongoing monitoring. The service lifecycle is shown in Figure 4.

Figure 4. The Service Lifecycle
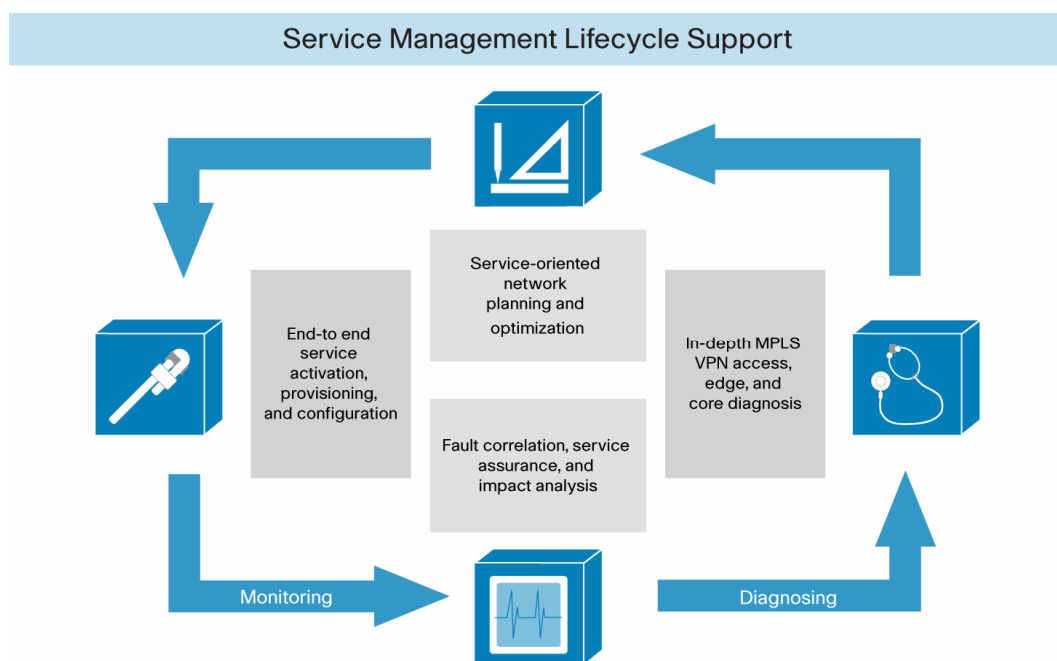
The successful implementation of these various steps relies on a common services model and view of the service as it is implemented and the infrastructure upon which the service is deployed. For example, the service assurance component must be updated about new services as they are deployed; this can be accomplished either through a database update or an automatic service discovery process.

This business overview paper focuses specifically on the service activation step of the lifecycle, that is, deploying multiple service types onto the NGN Carrier Ethernet network.

Challenges

Historically, services offered to end customers have tended to basic "pipe only" services with only a few variations in service attributes, for example, bandwidth, resiliency level, and so on. In the last few years this has been changing to a model in which not only are there many different types of services for both business and residential customers but customers also are expecting bespoke offerings. As an example, a residential triple-play customer may need voice and Internet access along with video with each part of the overall bundle, requiring different supporting services.

Working hand in hand with the network infrastructure are the service fulfillment system and processes. The cost of these systems and processes as reflected in the cost of deployment is crucial in maintaining the profitability of the service. According to Light Reading[1], "…at least 60 percent of the cost of a new telco product stems from the time and effort needed to plug into the operations/billing support system (OSS/BSS) so that it can be marketed, sold, fulfilled, billed for, and assured."

As services have evolved, so has the way they are defined and implemented within the service delivery platform. Specifically, service definitions are being decoupled from the network activation components. This offers several advantages including:

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[1] Light Reading's Services Software Insider/Vol. 3, No. 5, December 2007.

- Focus on definition of services as desired by customers rather than what the network can support
- Reuse of the network activation components across various service types
- Allowing the abstraction and decomposition of services, which in turn makes service definitions and implementations more flexible and efficient

Any fulfillment system must be able to support this decoupling of network and service layers (or resource and service layers in eTOM terminology) and allow the decomposition of services into base components.

This demarcation between service and resource management layers drives requirements for the resource management system. It must be able to provide an abstracted view of the network and hide implementation details for different device types and versions from the service management system. Also, the resource layer must be able to integrate into the existing OSS infrastructure and support existing fulfillment business processes. Primarily this involves making sure there is an open API to facilitate integration into existing systems.

In summary the challenges facing providers in terms of fulfillment are:

- Reducing the time and cost, while increasing the efficiency of activation: This includes making sure of deployment consistency and compliance to configuration policies
- Flexible service definition including being able to decouple service information from network element activation details
- Architectural flexibility: Being able to integrate into the existing OSS architecture
- Supporting existing business processes for service deployment

The Carrier Ethernet Activation Solution

To meet these challenges, a resource management layer that can be easily integrated and provides a set of common, device independent activation routines is required.

Solution Framework

Cisco ANA is a flexible, vendor-neutral network resource management solution for a multitechnology, multiservice network environment. Operating between the network and the operations support system layer, Cisco ANA aggregates device models called virtual network elements (VNEs) into a software-based virtual network, much as real network elements create the real-world network (Figure 5). Cisco ANA dynamically discovers network components and tracks the status of network elements in near real time. Cisco ANA also provides platform and network mediation services for both Cisco applications and value-added applications from Cisco partners. Cisco ANA offers service providers:

- Simplified integration of OSS applications with near real time resource information
- A flexible common infrastructure for managing network resources in alignment with business process
- Consistent procedures and interfaces for all network elements
- Abstracting a service-aware resource layer from the service creation layer to lower integration costs (change management costs) when upgrading or changing the network layer

- Adding a powerful resource management layer that can quickly add value to your northbound fault system through discovery and rapid correlation of device problems to service paths through the network

Figure 5. Cisco ANA Operates between the Network and the OSS Layers
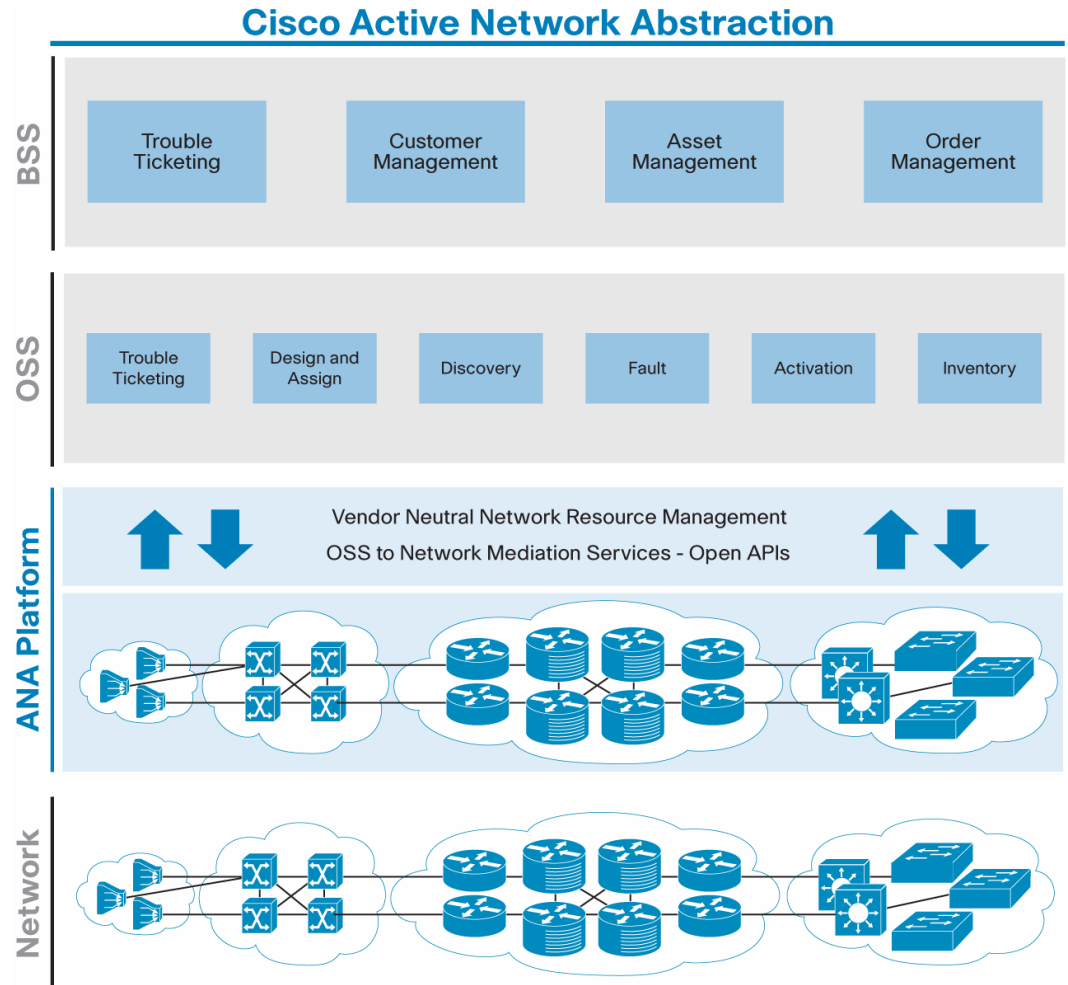
Features and Benefits

The key capabilities of Cisco ANA are divided into three separate categories:

- Vendor-neutral network resource management
- Activation platform for value-added network and service management applications
- Standards-based access to near real time network element and network information

ANA provides the foundation for a flexible resource management solution through its Command Builder configuration capabilities. This allows device-specific activation scripts to be developed for each type of device and/or version. These details are then hidden from the higher-level system, which needs only call the activation script by name along with any required arguments.

As part of its Carrier Ethernet Management Solution, Cisco offers a set of activation modules that can be integrated into ANA for Carrier Ethernet service deployment. These modules provide a set of known service components that can be used to develop and deploy complex end-to-end services as required by the customer. These modules have been developed and tested by Cisco to help ensure that they perform the correct configuration of devices to support end-to-end services.

By supplying a provider with this set of flexible activation modules, Cisco provides the flexibility required in this fast moving environment along with the guarantee of Cisco development and testing. The provider has flexibility in terms of how to link these modules together—within ANA or through their existing provisioning.

Finally, this layered approach with activation modules in the ANA resource management layer frees the service designer to concentrate on end-to-end customer service and the decomposition and definition of this service in the system without worrying about the specifics of device activation commands. Figure 6 shows how the layered approach allows services to be abstracted from network specifics to service level definitions:

**Figure 6.**   Layered Service Abstraction
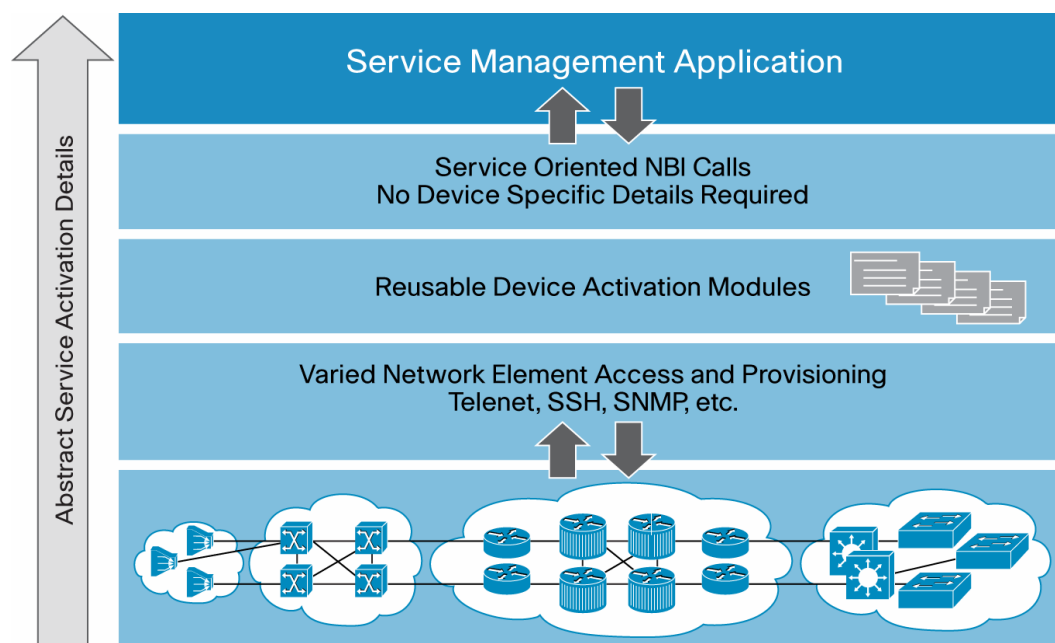
The scripts that are supplied by Cisco implement the service elements required to support:

- Triple-play residential services
- Business Layer 2 service – E-LAN and E-LINE
- IPRAN TDM over Multiprotocol Label Switching (MPLS) Backhaul

As an example of how service elements can be reused across different services, an element related to User Network Interface (UNI) configuration could be used for triple-play or Layer 2 business point-to-point services. When defining the service, the designer does not have to worry about the UNI configuration details, regardless of the devices.

Figure 7 shows how various service elements can be combined into an end-to-end service used by a customer.

Figure 7. Combining Service Elements into an End-to-End Service
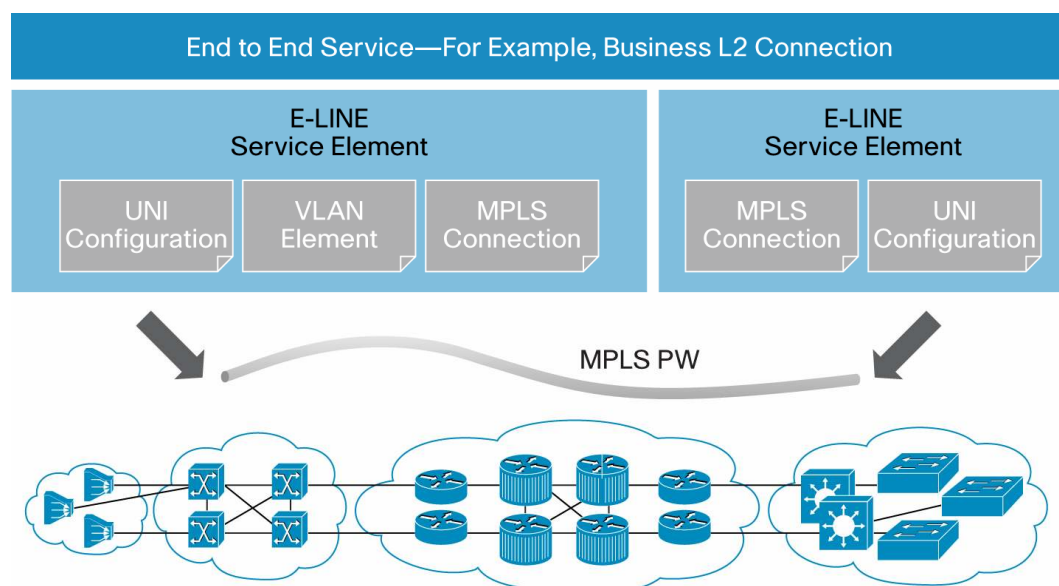
In this example, the components for different UNI types (for example, UNIs on different device types) and for MPLS connectivity are combined to create a full end-to-end business Layer 2 VPN service.

The modules are designed to be modified or extended by either a system integrator or provider through the use of a thorough "cookbook." This document is the key to extending services, and it details how the existing modules can be modified or new ones added. Regardless of which modules are used, through ANA's role-based access control, scripts can be "locked," helping ensure that they can be modified only by authorized personal. This helps ensure that services are activated on the network elements in a consistent way and that network configuration policies are adhered to.

Conclusion

Cost-effective and flexible service activation is becoming a crucial part of the overall service lifecycle and fulfills critical requirements on the overall service fulfillment system, in particular, the ability to decouple service definitions from the network elements along with a resource management layer that includes open APIs. The open APIs can be used to integrate Cisco ANA with other partner provisioning systems to create an automated and flow-through provisioning system that maps to the service providers business processes. The Cisco layered approach to service fulfillment and in particular the ANA-based activation scripts meet the overall service provisioning requirements and allow service providers to:

- Separate network activation from service provisioning
- Reuse service activation components across different end-to-end services
- Support existing business processes through open APIs for integration into the OSS and create a complete order-to-fulfillment automated provisioning system
- Provide service providers both control and flexibility while helping ensure that network configuration policies are adhered to by enforcing access control when modifying and creating scripts that configure complex network devices

For More Information

Visit http://www.cisco.com/go/ceactivation to learn more about the complete Cisco Carrier Ethernet solution architecture including the Cisco Active Network Abstraction (ANA) element management system, contact your local Cisco account representative, or send email to ask-cems@cisco.com.

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