Cisco ME 3400 Series Ethernet Access Switches

Summary

Market analysts believe that Carrier Ethernet—a new, carrier-class evolution of Metro Ethernet—is the ideal technology to underpin IP next-generation networks (IP NGNs). With new carrier-class attributes, Ethernet not only can provide high levels of bandwidth at low cost, it is also ubiquitous throughout the network and is easy to implement and deploy.

The Cisco® ME 3400 Series Ethernet Access Switches represent a next generation of metropolitan (metro) access switches designed for service providers. As an integral part of the wider Cisco Metro Ethernet portfolio, they advance the evolution to an Ethernet-based next-generation network. The Cisco ME 3400 Series Ethernet Access Switches help enable secure Metro Ethernet access for residential voice, video, and data ("triple-play") and business VPN services.

Challenge

Service providers are turning to Ethernet technology for metropolitan-area networks (MANs) and WANs to support new service offerings. Ethernet is familiar to enterprise customers and their IT staffs; it can scale to deliver bandwidth up to 10 Gbps to support demanding applications such as triple play, and its bandwidth can be customized to deliver performance that meets the needs of specific business applications. Intelligent Ethernet equipment delivers advanced network security and rich quality-of-service (QoS) capabilities, allowing providers to offer a customized mix of services and data rates for both point-to-point and multipoint connections.

Ethernet can help service providers reduce operating expenses (OpEx); make more efficient capital expenditures; and introduce profitable, high-margin services. The cost of introducing new Ethernet services is relatively low because the technology is easily integrated into the service provider's existing transport infrastructure (Ethernet over SONET/SDH, for example). By offering Ethernet-based services that can support more advanced applications, service providers can differentiate their offerings from competitors', improve their profit margins, and improve their revenue potential over the long term.

Heavy Reading, in its "Carrier Ethernet Equipment Market Outlook" of August 2005, states: "Of all the hot sectors driving telecom investment in 2005, Ethernet is certainly the hottest. This is true from both a service perspective and a network infrastructure perspective, due to the emergence of new carrier-grade products that support more robust and reliable services and networks." Furthermore, "More and more service providers are embracing carrier Ethernet as a critical service and network convergence technology useful for addressing a range of enterprise, residential and mobile applications."

For the first time Infonetics Research measures a dedicated "Carrier Ethernet Switching and Router" segment. Infonetics lists worldwide Carrier Ethernet switching and router equipment spending of US$61 million in 2004, rising to US$403 million in 2005 (558-percent growth), increasing to US$2.7 billion in 2008. This scenario results in a 5-year compound annual growth rate (CAGR) to 2008 of 157 percent. Carrier Ethernet switching and routing in 2008 are forecast to

compose close to 40 percent of all Metro Ethernet equipment spending ("Metro Ethernet Equipment, Biannual Worldwide Market Size & Forecasts," March 2005).

However, implementing a new technology—even one as well understood as Ethernet—and integrating that with traditional technologies introduce many complexities. "Due to the range of approaches to deploying Ethernet in the last mile and metro and service edge, carriers must rely on vendors for flexible and cost-effective solutions supporting multiple services and multiple protocols. Carriers look to vendors to help find the optimal inflection point where it makes economic sense to deploy Ethernet, whether it's natively or over MPLS, WDM, RPR, or SONET/SDH…Consequently, the market needs education about successful application of next-generation Ethernet products and technologies" (The Yankee Group, "Ethernet Infrastructure Is the Key Component to Carrier Service and Network Evolution," Decision Note, July 2005).

In other words, providers need to know more and to understand better how to deploy an end-to-end Metro Ethernet solution and what equipment is most appropriate for the overall solution implementation. For Metro Ethernet access in particular, providers are looking for an easily deployed carrier-class solution with the intelligence to meet their needs for residential Ethernet-to-the-home (ETTH) applications, such as video or IPTV to the home, as well as Ethernet-to-the-business (ETTB) applications, such as Layer 2 and Layer 3 VPN. Furthermore, the solution needs to be highly available and resilient, and security needs to be built in. Because it is the access point to the entire network, strong security is critical, whether from a residential or a business usage perspective, to protect the network and other users from malicious attacks.

In summary:

- Providers need support from vendors for flexible and cost-effective solutions that support multiple services and multiple protocols.
- Providers are looking for an easily deployed, secure, carrier-class solution with the intelligence to meet their needs for ETTH and ETTB applications.

Solution

The Cisco ME 3400 Series Ethernet Access Switch is a Layer 2 and Layer 3 customer-located switch built for service providers. It provides a complete security solution for Metro Ethernet access, and with "pay-as-you-grow" feature images, it is optimized for both the ETTH residential triple-play and ETTB business VPN services markets. This is enabled through feature set bundles, with pricing customized to the deployment model. With a service breadth spanning triple play and Layer 2 and 3 VPN services, reduced total cost of ownership (TCO) and operating expenses can be derived from a single ETTH plus ETTB access solution, as well as ease of management, ease of training, and sparing cost-reduction benefits.

Business Benefits

Single ETTH + ETTB Access Switch Solution

As the opportunity for residential applications such as video and IPTV to the home increases, service providers can deploy a single-box solution for Metro Ethernet access that helps enable both technologies and their business-based applications. The Cisco ME 3400 Series is available with different software images customized to the deployment: METROBASE, METROACCESS, and METROIPACCESS. The METROBASE feature image includes features for triple-play services such as advanced QoS, robust multicast, and the complete security solution. The METROACCESS image includes features for premium triple-play services or Layer 2 VPN services

such as 802.1q Tunneling and Layer 2 Protocol Tunneling (L2PT), configurable per-VLAN MAC Learning and Flex Link, as well as the METROBASE features. The METROIPACCESS image contains features for Layer 3 VPN services such as a range of routing protocols, Multi-VRF CE, and policy-based routing (PBR) (incremental to the METROACCESS feature set).

The provider can customize the features required to the deployment and the pricing level required. Simple software upgrades to a more feature-rich image provide a "pay-as-you-grow" capability, so service providers can upgrade when necessary.

With these image options, service providers can set their service-level offerings based on what they need to achieve with the deployment, at a price that works best in their marketplace. The flexibility enabled on the single device has the additional benefit that providers can standardize on a single platform for deployments across ETTH and ETTB markets, thereby reducing costs for sparing, easing management and training requirements, and reducing overall operational costs in the process.

Next-Generation Metro Access Switch Built for Service Providers

The Cisco ME 3400 represents the next generation of metro access switches built for service providers. Cisco has taken advantage of its experience with today's most widely deployed access switches—the Cisco Catalyst® 2950 and Catalyst 3550—to develop the Cisco ME 3400. Almost half a million of these devices are deployed by service providers worldwide today. The new access switch has features and a form factor built for service providers, such as a telco-friendly user-network interface/network node interface (UNI/NNI) for simpler deployment, management, and troubleshooting, and a service provider-friendly form factor: a single rack unit (1RU) with reduced depth to save space, a higher temperature range for convenience, AC/DC power, ports and cables in front for ease of access, and Network Equipment Business Standards 3 (NEBS3) and ETSI standards compliance. These attributes simplify life for the service provider and increase ease of use in deployment, ultimately reducing operating expenses and TCO.

Increased Service Uptime

Increased service uptime is a critical requirement for service provider networks. The Cisco ME 3400 supports Flex Link for sub-50-ms failover, IEEE 802.1w Rapid Spanning Tree Protocol (RSTP), per-VLAN Rapid Spanning Tree (PVRST+), and the Cisco Hot Standby Router Protocol (HSRP) to create redundant, failsafe routing topologies. Strong, built-in security in three tiers—network, switch, and subscriber based—helps prevent the device and the network from succumbing to malicious attacks, thereby enhancing network uptime.

Complete Security Solution for Metro Ethernet Access

Multitier security capabilities provide comprehensive security. Network-based security protects the network from unauthorized traffic, switch security maintains continued operation of the switch, and subscriber security shields users from other malicious subscribers.

Network-based security protects the network from unauthorized traffic. Access control lists (ACLs) and 802.1x features identify the users that are allowed to transmit traffic through the switch and filter all incoming traffic to help ensure that only valid traffic is allowed.

Switch security maintains continued operation of the switch by protecting the switch itself from attacks. Built into these devices is the ability, for example, to prevent access of the device in its residential basement home because local ports are disabled by default. The Cisco ME 3400 Series offers features to protect the CPU and the configuration file from attacks. The CPU is a critical

component of an Ethernet switch, responsible for process control protocols such as Spanning Tree Protocol and routing updates. If the CPU is under denial-of-service (DoS) attack, those control packets could be dropped, resulting in network outage. Features such as Control Plane Protection and Storm Control protect the CPU against malicious attacks. Port Security allows service providers to control how many MAC addresses are allowed from each subscriber, thereby protecting the memory from being overwhelmed.

Subscriber security shields users from other malicious subscribers by creating protection between users. The UNI/NNI feature creates a circuitlike behavior to separate each customer's traffic from other customers' traffic. DHCP Snooping, Dynamic ARP Inspection (DAI), and IP Source Guard help service providers identify each customer's MAC address, IP address, and port information, thereby preventing malicious users from spoofing attacks.

Protection of the network at the access point is critical. These devices are a front-line defense against attack and potential costly and debilitating problems that may result, caused maliciously or otherwise.

IP Next-Generation Networks

Almost every major service provider worldwide is pursuing IP NGNs. These networks are critical for service providers to provide current and future services, increase infrastructure efficiencies, and enable the value-added network and service control that carriers need to support competitive differentiation and the profitability for long-term success.

With its global commitment to service providers, massive investment in innovation, superior IP expertise, and a comprehensive approach to both the network and business needs of its customers, Cisco focuses on helping service providers make this journey to the IP NGN as quickly, smoothly, and profitably as their goals dictate.

The Cisco IP NGN architecture focuses around three primary areas of convergence that are already well established in service provider networks today:

- Application convergence: Where a profusion of new capabilities and end-user devices can provide a multitude of new service opportunities for carriers.
- Service convergence or "triple play on the move": Where far more application- and subscriber-level service control intelligence is needed to facilitate the efficient and profitable delivery of mobile triple-play services for wireline and wireless convergence.
- Network convergence: Where disparate networks need to be brought together over a more efficient and cost-effective common infrastructure.

From the perspective of the network and network convergence, providers are migrating from deploying, managing, and maintaining many services-specific networks to delivering all services on a single IP/MPLS-based network. Cisco is delivering innovative technology to accelerate network convergence and help customers significantly reduce infrastructure costs. Comprising customer element, access and aggregation, intelligent IP/MPLS edge, and multiservice core components with transport and interconnect elements layered below and above, the secure network layer is also undergoing dramatic and fundamental change compared to only a few years ago. IP/MPLS is being integrated throughout each section of the network. Edge and core areas are converging, with each adopting capabilities of the other and providing greater efficiencies to the provider. Customer elements, whether they are end-user devices or routers at the network

gateway of a business, are converging as well. Service providers can take advantage of this convergence to offer new, more, and better services.

Conversely, one area in the network that is not converging is access and aggregation. In fact, this area of the network is evolving. More and more types of technologies are being offered in the access realm, from third-generation (3G) and WiFi, and Ethernet and cable, to DSL and fiber, in addition to traditional technologies that remain in place such as ATM, Frame Relay, and TDM. The list continues to grow, and these new technologies introduce new challenges to the network because it now has to adapt to whatever access means—even multiple ones—customers choose to receive their services.

A significant part of the marketplace believes that Ethernet, a new, carrier-class evolution of Metro Ethernet, is the ideal technology to underpin IP NGNs. With new carrier-class attributes such as high levels of availability, integrated and security and QoS features, and ATM/Frame Relay and TDM interoperability, Ethernet not only can provide high levels of bandwidth at low cost, it is also ubiquitous throughout the network, and it is easy to implement and deploy.

Cisco Metro Ethernet Advantages

As a leader in metro networking solutions, Cisco offers service providers important advantages:

- A service-rich solution: The Cisco solution helps service providers build a broad portfolio of Metro Ethernet services. Advanced QoS capabilities allow service providers to differentiate their offerings through SLAs. Additional bundled offerings can be delivered over Metro Ethernet, taking advantage of Cisco extensive customer-premises-equipment (CPE) offerings and partner programs.

- Architectural flexibility: In the diverse metro market, Cisco solutions can be implemented using Ethernet, optical, and IP/MPLS technologies. When combined with capabilities such as Frame Relay and ATM interworking, these technologies give service providers the ability to extend their service footprints.

- Proven carrier-class solutions: Cisco Metro Ethernet solutions have been deployed by service providers in different regions for delivering business and residential services. Validated through large-scale deployment, Cisco carrier-class Metro Ethernet solutions address providers' requirements for reliability, scalability, and manageability.

- Service provider market leadership: Cisco has an extensive product portfolio to deliver end-to-end solutions to its customers. The company offers superior deployment experience, with more than 250 MPLS customers, 1000 optical customers, and numerous IP and Ethernet switching customers. Cisco will invest billions of dollars during the next 5 years to continue bringing innovation to the service provider market.

- Market leadership in enterprise networking: More enterprises have built their IP infrastructures with Cisco equipment than with any other vendor's. Service providers that work with Cisco can quickly and smoothly connect with their customers, gaining the benefit of accelerated demand for services that increase overall network usage, reduce cost per user, and generate a faster return on investment (ROI).

- Standards leadership: For more than a decade, Cisco has been a major force in the development of innovative Ethernet, Layer 2, and IP/MPLS features. The company continues to lead support for Metro Ethernet standardization in the IEEE, ITU, IETF, and Metro Ethernet Forum (MEF), as well as in the MPLS and Frame Relay Alliance, Ethernet in the First Mile Alliance (EFMA), and ATM Forum.

- Comprehensive support programs: Cisco helps service providers' transition to a multiservice packet network with support services addressing device-, network-, and application-level challenges. Service providers that choose Cisco gain access to one of the industry's largest pool of networking experts, who collaborate in the planning, design, and implementation stages of a project, as well as with ongoing operational support and network optimization.

For More Information

For more information about the Cisco ME 3400 Metro Ethernet Access Switches, visit: http://www.cisco.com/en/US/products/ps6580/index.html or contact your local Cisco account representative.

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