Cisco News for Broadband Service Providers

Broadband

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Open! Open! Open!

Opportunities Abound When Open Networks and Open Standards Converge

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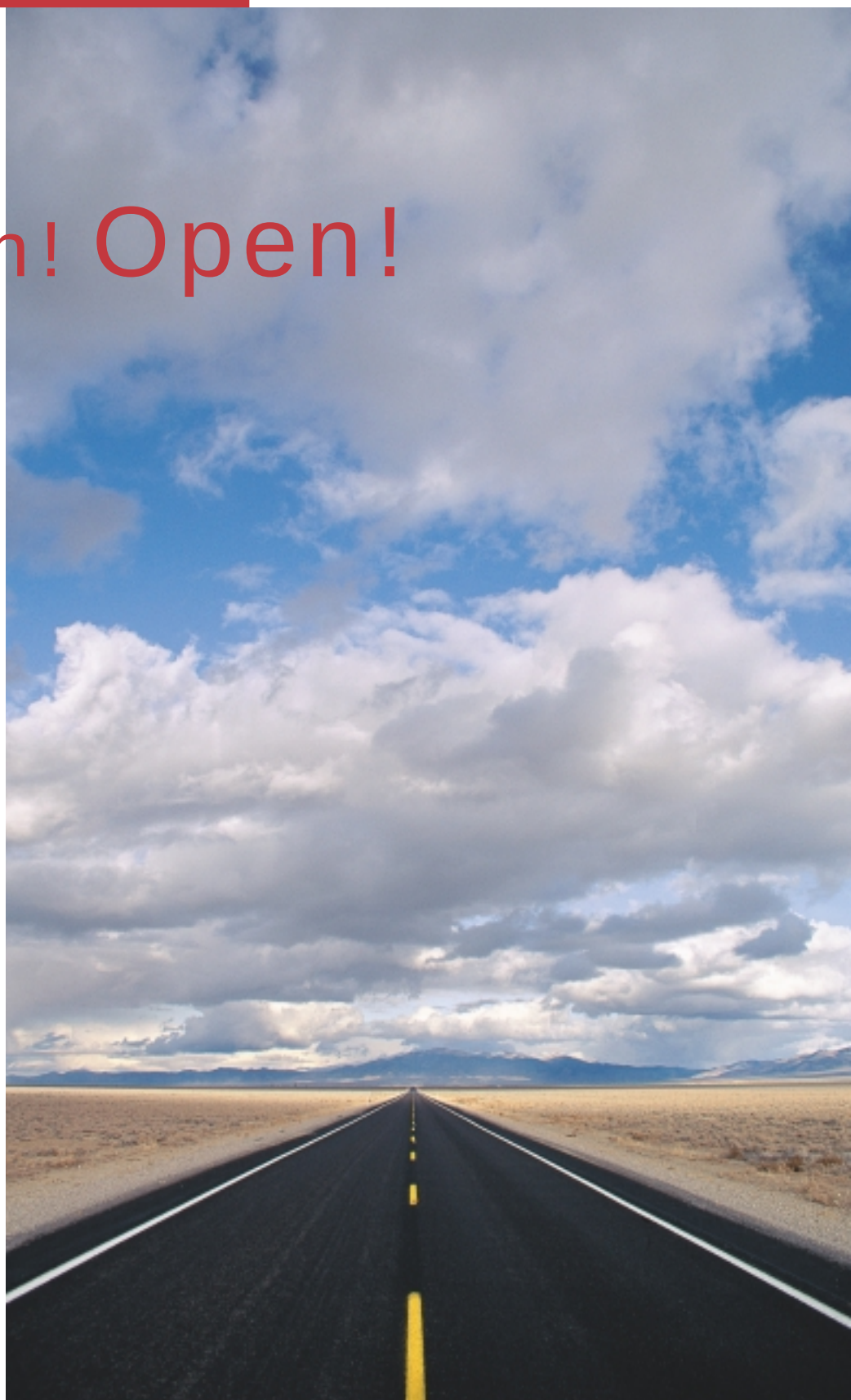

Cisco Systems

Empowering the Internet Generation℠

OPEN! OPEN! OPEN!

Opportunities Abound When Open Networks and Open Standards Converge

In 1983, the telephone monopoly in the United States was broken up by court order. After that, the Federal Trade Commission (FTC) and Federal Communications Commission (FCC) ordered incumbent local exchange carriers (ILECs) and regional bell operating companies (RBOCs) to provide network infrastructure access to competitive local exchange carriers (CLECs) and other service providers.

As the cable industry consolidates, and communications industries converge, regulators are being pressed to open up cable networks to competing Internet service providers (ISPs). Recent cable buyouts are creating national cable networks or multiple system operators (MSOs). ISPs and other competitive service providers now want open access to these cable networks to compete as the MSOs develop their own ISP services.

In addition, the FTC, FCC, and European Commission are all looking at open access issues for the cable industry. Andrew Schwartzman, president of the Media Access Project, says, “There are indications that the FTC is really taking a hard line and that, in turn, influences the FCC.” While various government bodies may eventually mandate open access for all types of networks, there are also new business and technology opportunities arising as markets begin to anticipate some sort of open access solution.

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VALUE-ADDED SERVICES—WHERE THE MONEY IS

With less-expensive options available, wireline access charges are under tremendous price pressure, eroding profit margins on that part of the business. However, charges for value-added services not only give service providers an opportunity to differentiate themselves on service packages, but offer an increasing revenue opportunity. This trend is already under way in the cable market where MSOs have started building cable offerings with voice, new video on demand, high-speed Internet access, and virtual private network (VPN) service on the same coaxial cable.

In the phone industry, customers get a dial-up connection from their ILEC and can then select almost any service provider. To a limited extent, this has enabled competitive service providers to offer value-added services to meet the exploding demand—with each service provider adding their own value across a common network, whether or not they own the infrastructure.

But, while ILECs are required to open up their network so CLECs can compete, most ILECs have only opened up copper pair access. ILECs have been understandably reluctant to spend money making network changes to rapidly provision services for CLECs. This has slowed the ability of CLECs to bring in additional services that require changes to the incumbent network.

In addition, ILECs have traditionally implemented technology and a complete set of voice services to ensure customer loyalty and market share. Opening up their networks to partners, leveraging services from third-party providers, and providing the open access to enable quick turn-up of new services represents a significant shift in attitude, technology, and business practices for this market. However, open standards can make this shift economically attractive for both ILECs and CLECs, and give the whole market more opportunity to take advantage of the exploding demand for high-speed Internet services.

THE OPEN MARKET—DRIVING OPEN TECHNOLOGY INTERFACES

Open standards such as the emerging OpenDSL initiative, from the DSL Forum, will make it possible for a CLEC to configure a service remotely across an open network. The OpenDSL approach will enable any Internet-enabled consumer device to automatically configure itself by downloading a software image and provisioning information from an intelligent DSL device such as a DSL access

The Virtues of Virtual Truck Rolls

Once the favorites of Wall Street, many broadband service providers have been having financial difficulties lately. Rolling out new broadband service is complicated, time-consuming, and expensive. Service providers are suffering, and Wall Street is getting nervous.

The problem lies in the complexity of deploying high-speed broadband cable and digital subscriber line (DSL) services. Until recently, service providers have been carrying the cost of customer premise equipment (CPE) (a cable or DSL modem), sending out highly skilled truck crews (sometimes several times), and adding costly customer service calls. The final bill for establishing broadband service can run up to US$500 per customer—deployment costs that may not be earned back for several years.

To eliminate these high costs, Cisco developed Cisco Subscriber Registration Center (CSRC), a "plug-and-play" technology that was developed for the cable industry two years ago and is now moving to DSL and wireless. CSRC automates modem and service setup over an Internet-based Cisco network. With CSRC today, a cable customer can purchase a high-speed modem at a consumer electronics store, take it home, and plug it into the set-top box and the computer. Broadband device setup and service activation is three Web clicks away. And the savings are substantial. The cost of the device is shifted from the service provider to the user (up to US$200); cable installation truck rolls are virtually eliminated (US$150 to 200 each), and customer support calls are significantly reduced (US$25 per call).

No equipment cost, no truck roll, and no customer-service call—CSRC eliminates the overhead costs and allows broadband providers to move quickly into the profit column.

To find out more about CSRC, visit: www.cisco.com/warp/public/cc/pd/nemnsw/rgcr/prodlit/index.shtml.

multiplexer (DSLAM), switch, or router, eliminating truck rolls.

Another potential standard that could help open up the access market is vector orthogonal frequency division multiplexing (VOFDM). Under development by the Broadband Wireless Internet Forum (BWIF), this open standard will drive down infrastructure deployment costs, customer premise equipment (CPE) device cost, and installation costs (currently up to US$500 per subscriber)—while decreasing the risks associated with choosing a single-vendor, proprietary solution. In point-to-point and point-to-multipoint deployments, Cisco broadband products based on VOFDM architecture will deliver high-speed, high-reliability Internet and Frame Relay access, packet local and long-distance business telephony services, and VPN service—making broadband wireless another true multiservice access option for businesses and consumers.

MANAGED BROADBAND ACCESS FOR CABLE NETWORKS

Another key to the success of open networks is managed broadband access. Market demand is increasing for less expensive alternatives to costly T1 leased lines. However, enterprise customers still want the same quality of service (QoS) for their business-critical traffic. Less-expensive services such as DSL may offer adequate performance, but service providers have had no way to manage speed or availability as the circuit goes through the Internet.

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As ILECs Open to CLECs, Copper Cross-connects Solve CLEC Infrastructure Challenges

As more and more independent local exchange carriers (ILECs) open up to competitive-local-exchange-carrier (CLEC) line leasing and competition, the local loop is no longer a regulated monopoly. The Telecommunications Act of 1996 made the local loop a competitive marketplace where both ILECs and CLECs participate in deregulated business by taking advantage of unbundled copper loop.

Although deregulation encourages competition, it creates new challenges, from both infrastructure and business perspectives. In the case of ILECs and CLECs, copper cross-connects can solve many critical network challenges.

ILECs own the central office (CO), but CLECs must run their leased segment of the ILEC physical loop remotely—guaranteeing services and performance over infrastructure that they don't control. To address this challenge, copper cross-connects are being installed in ILEC COs, between the main distribution frame (MDF) and the digital subscriber line access multiplexers (DSLAMs) that provide DSL services to CLEC subscribers. The copper cross-connects manage the physical infrastructure from the subscriber line to the equipment in the CO, connecting copper pairs to enable a path for service delivery.

When a cross-connect is in place and wires are hooked together, it's still difficult for CLECs to check connection quality. The solution is to add test heads to cross-connects to test performance on the wire. Test capabilities give CLECs a better remote view of performance and service delivery, plus troubleshooting capabilities. Advanced copper cross-connects enable CLECs to quickly, reliably deploy and troubleshoot the physical connection between ILECs and CLECs. Copper cross-connects in the COs also eliminate scheduling problems, making the technical end of the business easier for both CLECs and ILECs.

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10 Ways to Promote Open System Success

Just as telephone system operators were once required to open their networks to the competition, multiple system operators (MSOs) in the cable world are now receiving scrutiny from regulators. To avoid being forced to comply with unfavorable regulations, MSOs are exploring ways to open their systems, without giving them away.

Cisco Systems is working with many of the United States' largest MSOs to develop open standards for "managed access" and solutions for providing access to service providers. Ideally, these service providers can provide strategic alliances for fast entry into such new markets as high-speed Internet access, digital telephony, content distribution, video on demand (VoD), streaming media, and countless other emerging applications for business as well as residential customers.

To ensure the success of the system and the alliances, a managed broadband access solution must have a solid technology foundation in place. The following 10 items give a basic overview of points Cisco and our customers have found important. The ideal solution will:

1. Integrate with legacy as well as Data-over-Cable Service Interface Specification (DOCSIS) 1.0 and, in the future, DOCSIS 1.1-compliant devices
2. Allow an MSO to continue offering existing service without interruption to customers
3. Enable value-added services on a per service provider basis. System organization must allow an MSO to divide and track resources technically and administratively, in much the same way a local exchange carrier can provision a guaranteed level of service for a competitive long distance carrier
4. Provide traffic-delivery guarantees; consistency and reliability are critical
5. Allow class of service (CoS), quality of service (QoS), and service-level agreements (SLAs), again borrowing from the common practices and regulatory guidelines for the telephone industry, to segment resource allocation and establish appropriate business relationships with service provider business partners
6. Ensure privacy and security; keep private information private, at all times
7. Eliminate expensive truck rolls by automating provisioning and providing network management
8. Be Internet standards-based, interpreting and supporting multiple broadband vendors and technologies
9. Support a variety of access methodologies from the network interface device (such as a cable modem) to the headend, including VPNs, point-to-point over Ethernet (PPPoE), Layer2 Tunneling Protocol (L2TP), and IPSec
10. Provide satisfying and successful broadband experience for subscribers and flexible billing arrangements with service provider partners

Managed broadband access gives cable network operators a way to open up their cable plant to multiple ISPs while building an infrastructure that allows the operator to add value-added services. It allows service providers to track circuits all the way through the network and reroute around failures or bottlenecks, and adds billable value to low-cost services. It also helps them provide the connectivity they need to leverage third-party services such as second-line voice. An offering that includes a range of hardware, software, and engineering consulting services, managed broadband access solutions go all the way through the cable plant and can include systems integrators to achieve a turnkey billable service.

CHANGING INFRASTRUCTURE—PUTTING INTERNET INTELLIGENCE IN OPTICAL NETWORKS

Data traffic continues to explode, and will clearly become dominant both in traffic volume and profit. A new data-optimized service infrastructure with high-speed internetworking devices and optical networking technologies will become the foundation for all communication services in the future. Combining internetworking and optical technologies will enable service providers to deliver data services at dramatically reduced costs.

The transition in optical networks from SONET ring to mesh will enable more efficient use of resources, adding distributed network intelligence through wavelength routing, and provide simplified provisioning. An integrated control plane capability will automatically optimize optical capacity, and the process of wavelength provisioning will be largely automated as well. This automated provisioning will further enable low-cost CLEC configuration and provisioning.

FACT

This month another 18,000,000 people will go on line.

SUPPORT FOR A GROWING MARKET

The convergence of open network access and open standards offers benefits for the whole market. Choice and innovation lowers operating costs. A common platform lets providers focus on service differentiation. And customers get faster, more reliable services and competitive pricing in an open market.

New broadband infrastructure technologies and open standards will reduce truck rolls for all types of service providers. ILECs, CLECs, RBOCs, MSOs, and ISPs benefit from the ability to support growing demand. And, no matter who provides the services now, the ability to support customer needs for more personalized communications services that integrate data, voice, and video will help grow the market to the US$6 trillion industry analysts estimate by 2005.

In this unique environment of standards-based open networks, all types of service providers have the ability to offer incremental services and to create new revenue opportunities from competitive offerings. **BN**

The Optical Access Option

While leveraging existing copper and cable infrastructure is key to bringing broadband communications to households and businesses, new broadband access options based on fiber optics are also gaining momentum. With large-scale fiber deployment in metro areas accelerating, more and more commercial buildings now have fiber access or have it close by. This opens up a range of new service possibilities.

Historically, large enterprises that needed very-high-speed wide area network (WAN) connections depended on their incumbent local exchange carrier (ILEC) to run fiber to their premises. This often involved very long lead times and high recurring SONET circuit charges.

Gradually, competitive access providers (CAPs) began to build their own metropolitan fiber networks, typically targeting large multi-tenant buildings and metro-area campuses with concentrations of high-revenue customers. By installing multiplexing and switching equipment in the building, the CAPs were able to offer services from DS1 and SONET OC-n circuits to switched voice and data, at competitive rates.

With the increasingly ubiquitous availability of metro fiber, new options are emerging. Many enterprises are leasing dark fiber and rolling their own high-speed communications systems. With the latest advances in wave division multiplexing technology and systems, enterprises can lease a single pair of fibers and use them to interconnect SONET equipment, Gigabit Ethernet campus networks, and storage area networks (SANs) based on Fiber Channel or other technologies.

New service providers are also emerging, focused on leveraging abundant fiber and the latest optical networking technologies to offer services with radically new economics. These providers lease fiber to multi-tenant buildings and offer the tenants high-speed data connectivity and other services.

With access to these types of services, enterprises will have an array of high-speed data connectivity options to choose from. Where just a few years ago 56-kbps modems, DS1, and DS3 defined the available wide-area connectivity options; affordable alternatives for the near future will include DSL, cable, 10/100 Ethernet, and Gigabit Ethernet.

Managed BROADBAND Access

Opening Networks to Value-Added Services

High-speed data Internet access in the cable industry is in much the same position that the last-mile telco distribution industry was in before deregulation. The Federal Communications Commission (FCC) has forced the telcos to open their plants, and this scenario has created the competitive local exchange carrier (CLEC) industry. Now, this issue is facing the cable industry as well. In Korea, Brazil, and Canada, regulators have forced cable operators to open their plants.

In addition to regulatory pressures, market demands are pushing open access. Business customers are demanding enhanced services beyond simple bandwidth provisioning, while residential customers want inexpensive bandwidth. In the United States, cable multiple system operators (MSOs) are trying to figure out how to use their infrastructure to take advantage of this demand, with several trials under way to open regional access networks to Internet service providers (ISPs). With managed broadband access, MSOs can offer inexpensive line access, and still make money by offering the differentiated services with enhanced features that appeal to business and residential customers alike. Managed broadband access can help create the infrastructure for open access, and ensure that the structure can support revenue-generating, value-added retail services such as:

- Broadband Internet access services with a range of access speeds and optional security features
- High-speed WAN transport services with high-availability transport options and a broad range of media and interface options
- Integrated data and voice services that take advantage of packet networking technologies to reduce overall recurring voice costs and prepare for advanced telephony applications such as unified messaging and personal telephony

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OpenDSL: Opening Up Mass Markets For DSL

Leading digital subscriber line (DSL) equipment and chip manufacturers, systems integrators, and service providers have formed the OpenDSL initiative to simplify and expedite DSL installation, and to make customer premise equipment (CPE) fully interoperable. OpenDSL will make DSL equipment easy for end users to install themselves, while enabling service providers to start service more quickly and cost-effectively by eliminating truck rolls for DSL CPE configuration.

"The OpenDSL initiative addresses two major challenges in the DSL industry that are limiting service providers' ability to deploy DSL on a mass-market scale—customer self installation of CPE equipment, and vendor interoperability," says Kathie Hackler, principal analyst, remote access, Dataquest, Inc.

A standardized, open software specification will automate the configuration of CPE and network elements and ensure true "plug-and-play" interoperability between multivendor DSL modems and routers. To promote this interoperability in DSL equipment, the OpenDSL consortium will work with the DSL Forum to create a third-party certification program so vendors can test and certify their equipment. OpenDSL testing will cover both physical and system-level interoperability and eliminate the need for costly and time-consuming in-house interoperability testing by equipment manufacturers and service providers.

"By enabling DSL CPE vendors to submit their products to one certification lab for industry-wide interoperability, the OpenDSL initiative has the potential to be a major breakthrough in helping to establish the interoperability needed to further the DSL mass market," says Matthew Davis, senior analyst, the Yankee Group.

OpenDSL will enable service providers to meet mass-market demand for DSL by cutting the time and cost of testing products and turning on service, and by making DSL CPE available through retail channels.

▶ *Continued on Page 34*

Broadband WIRELESS Internet Forum

Opening Wireless Opportunities

Delivering broadband fixed wireless solutions has been a challenge for service providers. System deployment and interoperability have been difficult and costly, due to several proprietary standards from chips to customer premise equipment (CPE) gear and antennas.

To move wireless forward and reach its full potential, vendors must work together across all components to drive a common standard. To accomplish this, several leading companies have formed the Broadband Wireless Internet Forum (BWIF), which is a program of the IEEE Industry Standards and Technology Organization. The forum's goal is to drive a standard based on vector orthogonal frequency division multiplexing (VOFDM) technology for the physical layer and Data-over-Cable Service Interface Specification (DOCSIS) for the medium access layer that will lower product costs, simplify deployment issues, and ensure product interoperability. This will enable service providers to expand their business quickly, easily, and more cost effectively.

The open BWIF consortium will enable low-cost (CPE) with integrated chip suppliers that will, in turn, facilitate the production of an open-standard broadband VOFDM/DOCSIS wireless solution that lowers the cost of provisioning a wireless network, while increasing the overall subscriber coverage. This solution will enable consumers and businesses to receive broadband access in more areas at more affordable costs.

FACT

The key to building network infrastructures for the Internet era is scale.

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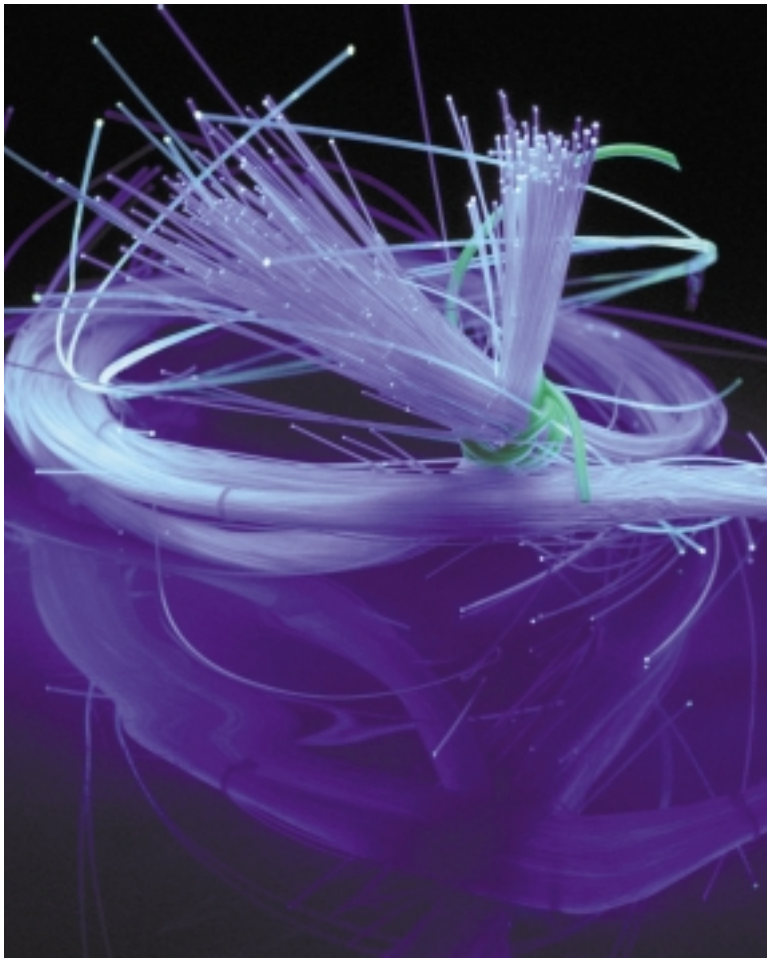
Interconnects Open Optical Cores to METRO Service Providers



In addition to changes in open access and open standards, the infrastructure on which services are provisioned is changing as well. Today's Internet architecture consists of two general network segments—the metro network and the core network—joined together by service points of presence, or service POPs.

Formerly simple interconnects, today's service POPs, connect metro networks, and are quickly becoming the hub of high-value Internet services. The service POP can host a wide array of services such as Web content, Domain-Name-System (DNS) servers, connections to Internet service provider (ISP) networks, virtual private network (VPN) services, and applications. To reduce response time, service POPs act as local repositories, hosting tremendous amounts of local content for application service providers (ASPs) and a variety of e-businesses.

Traditionally, the metropolitan network has been supported largely by legacy Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) transport, with a time-division multiplexing (TDM)-based infrastructure. This structure limits scalability, is built with single-purpose equipment, and is costly to provision because of the centralized multistep processes required. Today, a more flexible optically-enabled IP architecture provides multiservice capabilities and is highly integrated for low cost and high density. It guarantees simplified provisioning and integrated-packet services. A fully integrated IP+Optical infrastructure enables all of these enhancements and more.

The core network has been a TDM ring that supported a voice-oriented infrastructure and was difficult, costly, and time-consuming to provision. Today, the emergence of dense wave division multiplexing (DWDM) is reducing fiber exhaust and regeneration costs, while increasing the capacity of the core.

All core DWDM systems today use proprietary multiplexing and management schemes. Until standards of the system are fully defined, it will be difficult or impossible to have DWDM systems from different vendors at opposite ends of a fiber span. The same restriction applies to integration of parts of the DWDM system into clients such as SONET/SDH terminal equipment, ATM switches, or IP routers. A wavelength-specific interface for an IP router would require a different proprietary module for each unique DWDM system to which it needed to attach.

OPENING THE CORE

Open DWDM systems have standard optical interfaces to which various clients can attach. The client signal is converted into a unique wavelength for DWDM transmission. In contrast, closed systems embed DWDM within an element such as a SONET/SDH multiplexer, preventing other clients from sharing the DWDM capacity unless they implement a proprietary DWDM scheme.

FACT

The worldwide market for DWDM equipment is predicted to more than double over the next five years.

The transition from SONET ring to mesh will enable more efficient use of resources, add distributed network intelligence through wavelength routing, and provide simplified provisioning. An integrated control plane capability will automatically optimize optical capacity, and the process of wavelength provisioning will be largely automated as well. These changes will make it faster, more reliable, and more cost-effective to configure and provision competitive-local-exchange-carrier (CLEC) services throughout the core network. BN

Managed Broadband Access, Continued from Page 18

- Virtual private networking services that enable secure connections to support business-to-business extranets, intranet WANs, and remote access

With managed broadband access solutions, dial and cable network operators can not only provide open access, but they can also use these same technologies to add enhanced services to increase wholesale revenue. For example, now access tunnels are built all the way from the client PC to the service provider, leaving no way for the access provider to enhance the value of the access service. With managed broadband access, MSOs can use Multiprotocol Label Switching virtual private networks (MPLS VPNs) to provide a secure tunnel to each service provider. At the same time, managed broadband access gives operators the ability to add enhanced services, with network characteristics based on the requirements of each service provider and service offering. With policy-based routing, packets are routed through the access provider to the service provider, again allowing dial and cable network operators to add enhanced services that can generate increased revenue.

Analysts project that cable ISPs will capture a substantial portion of the high-speed market for the next several years, winning as much as 77 percent of the US$8.8 billion in consumer broadband spending in 2003. Overall ISP spending is expected to increase by 19 percent annually over the next five years, from US$9.9 billion in 1999 to $19.9 billion in 2003. Managed broadband access can enable MSOs to build a robust, open, flexible broadband infrastructure that can reach these potential customers, and at the same time offer a valuable service to ISPs. BN

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Open DSL, Continued from Page 19

The OpenDSL standard will continue to add value throughout the service life-cycle—from turning up the service through tearing down or changing a service or a technology. It provides long-term value by making it cost-effective to add new services and manage life-cycle issues. For example, say a service provider has a million asymmetric DSL (ADSL) modems in use by customers. A new feature or fix comes out. Does the service provider roll a million trucks? Even downloading new configurations through central distribution could take months. But with OpenDSL, service providers can download configurations through the network using an intelligent distributed network to distribute updates at the network edge.

This life-cycle management of components in the network not only saves money, but it also enables the market to grow faster. It enables DSL to grow fast enough to supply demand, leaving less room for competitive solutions.

Kambiz Hooshmand, vice president and general manager, Cisco DSL Business Unit, says, "By working together to drive standards, the DSL industry can overcome barriers to rapid deployment. The OpenDSL initiative will simplify and expedite DSL installation, and promote the DSL mass market through self-installable equipment, interoperability, and retail availability."

To learn more about OpenDSL, visit www.opendsl.org or contact William Quiles, product manager and OpenDSL contact, Cisco Systems, at wquiles@cisco.com. BN

FACT

Third-generation mobile networks will deliver data, voice, and video.

BWIF, Continued from Page 21

VOFDM technology easily enables high-speed data, voice, and video through congested city, suburban, and rural environments by minimizing the line-of-sight limitations and installation problems faced by other broadband wireless access technologies. This enables service providers to deliver differentiated broadband services to nontraditional wireless markets.

The DOCSIS standard for subscriber management tools, was chosen as the Media Access Control (MAC) protocol for the broadband wireless products being developed under the BWIF consortium. DOCSIS is responsible for the highly successful cable modem infrastructure. The standard was developed to ensure that interface specifications for delivering data services over cable networks are interoperable with other certified modems and headends.

SETTING THE STANDARD

Standardizing on the VOFDM/DOCSIS platform enables faster, less expensive, and more flexible service provisioning. It also offers access to broader markets because service providers can reach any customers who are using standardized products. This gives providers the opportunity to differentiate their services in this larger market by adding services such as private-label Internet, outsource managed services, application service provider (ASP) provisioning, quality-of-service (QoS) levels and guarantees, autoprovisioning, and managed bandwidth.

According to the Strategis Group, fixed wireless will be a US$16 billion market by 2004. Allied Business Intelligence estimates the number of broadband subscribers will grow to 9.4 million in 2005.

Chip manufacturers, CPE developers, radio frequency suppliers, and service providers who want to be part of driving the market requirements for this new wireless standard can join BWIF at www.BWIF.org. BN