Cisco IP Next-Generation Network Carrier Ethernet Design: Powering the Zettabyte Era

Connecting Customers with Multiple Services Anytime, Anywhere, on Any Device

Exponential growth of IP traffic for voice, video, data and mobile services has led us to the zettabyte era. The Cisco® IP Next-Generation Network (IP NGN) Carrier Ethernet Design provides a foundation to optimize the transport of any service over a converged infrastructure in a consistent manner with a high quality of experience - it is the Human Network. This supports the evolution of service providers from access providers to "experience providers" offering compelling "any play" services that are available anytime, anywhere, on any device.

Figure 1. Carrier Ethernet Powers the Connected Life

The Connected Life in the Zettabyte Era

The Internet is not simply a network of computers; it is a network of people who connect with each other when, where, and how they want. Networking is the foundation for all of the collaboration and co-creation that is happening online and is the basis of a Connected Life where empowered consumers access many services from many screens. According to the Cisco Visual Networking Index Forecast (Figure 2), IP traffic will increase six times between 2007–2012. By 2012, half a zettabyte of traffic will traverse the global network.

Figure 2. The Growth of Packet Services 2007–2012
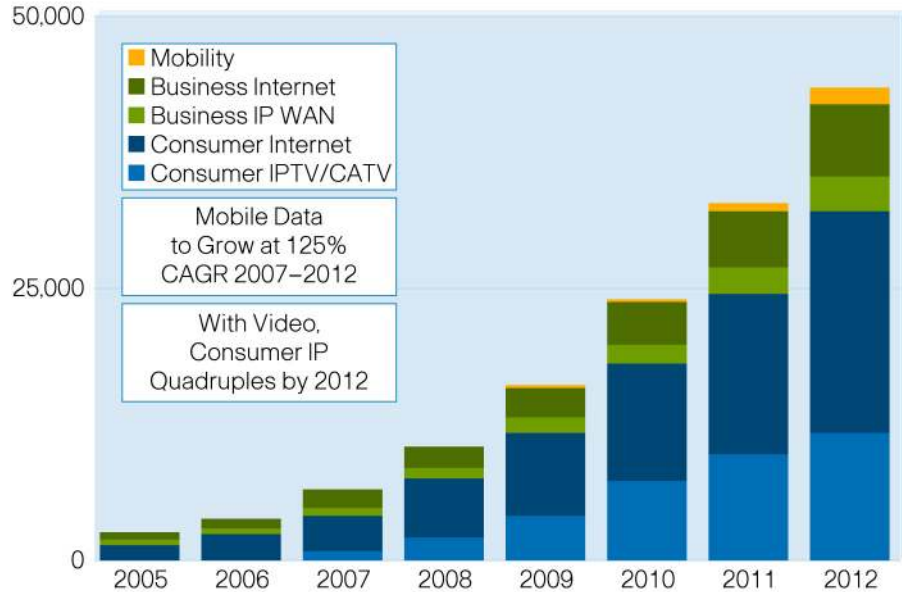
Consolidating Business and Residential Networks

Service providers that implement converged multiservice networks can anticipate cost savings from integrated network operations. The IP NGN Carrier Ethernet Design supports a smooth integration of business, residential, wholesale and managed services over a converged infrastructure by leveraging IP/Multiprotocol Label Switching (MPLS) technology. This design has evolved to support converged, resilient, intelligent and scalable services.

Service providers gain a competitive advantage by offering consistent and highly reliable transport of any play services. Using the Carrier Ethernet Design, providers can create a purpose-built and cost-effective Ethernet FTTx access solution complemented by validated support for many broadband access technologies such as Ethernet, DOCSIS, DSL, PON, WiMAX, and Wi-Fi.

IP NGN services include:

- Residential and business
- Video
- Music
- Games
- Content streaming
- Hosting
- Unified communications
- Wholesale

IP NGN Architecture

The IP NGN Carrier Ethernet Design represents key elements of the Cisco IP NGN architecture (Figure 3) that enable a best-in-class implementation for consistent service delivery optimized to meet the specific demands of each service. It is the end-to-end service transport foundation from the network access to the IP/MPLS core. This design provides integrated linkages with the service and application layer components to offer a converged, intelligent, reliable, and scalable network model to meet current and future network service requirements.

Figure 3. IP NGN Architecture
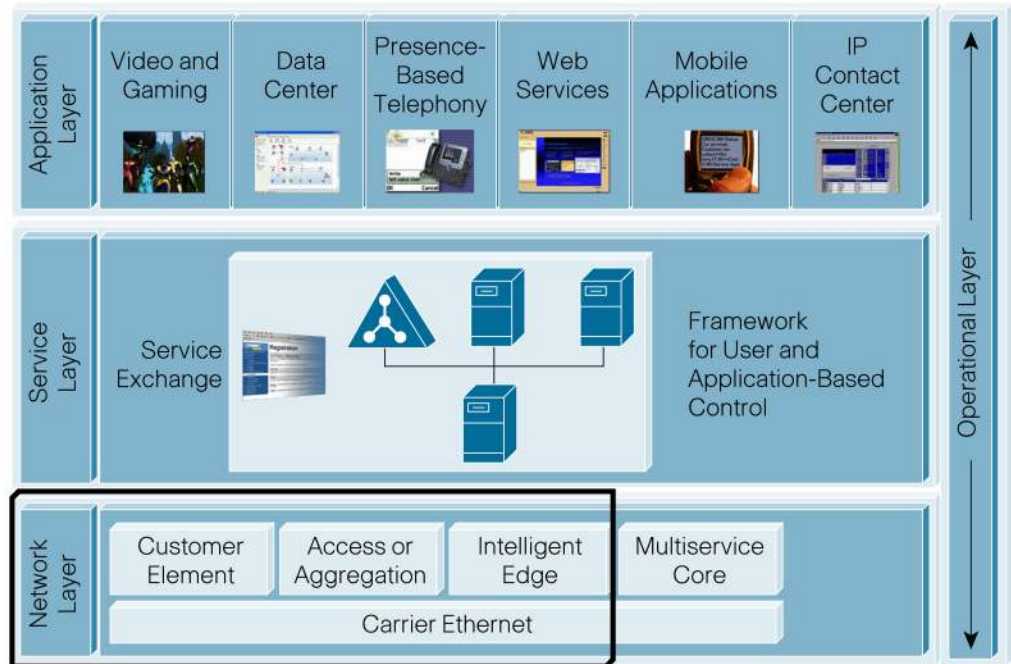
Personalized Subscriber and Application Awareness

Deploying new services often requires significant initial investments in overlay network architectures and service delivery platforms. Cisco Intelligent Services Gateway (ISG) can help transform today's broadband infrastructure into an agile and highly scalable service delivery architecture based on the "pay-as-you-grow" principle. It also protects the investments service providers have already made in their current broadband infrastructures. An integral, highly modular component of Cisco IOS® Software, Cisco ISG dramatically accelerates the delivery of new services while minimizing initial investment. It can act as a network-based, self-contained policy management and enforcement system or interoperate with external service control systems using an array of open protocols.

Enabling High-Quality Visual Networking

Cisco Visual Quality of Experience (VQE) technology is a combination of innovations that resolve many perplexing challenges to successful IPTV and video services delivery. It uses Layer 3 intelligence in the aggregation network and is supported on the Cisco 7600 Series Router.

Cisco VQE allows wireline providers to meet baseline performance expectations for picture quality and channel-change times that are inherently difficult to achieve on copper-based transport while maintaining the overall viewing experience. Specific features include Video Error Repair, Rapid Channel Change, Video Connection Admission Control (CAC) to balance requests with available bandwidth, and the Video Assurance Management Solution (VAMS), which provides real-time centralized monitoring of broadcast video.

### Carrier Ethernet Powers Fixed-Mobile Convergence

Mobile wireless networks are poised to become a primary vehicle for a wide variety of communications. Mobile operators are building networks capable of delivering a host of real-time multimedia applications and supporting business-class data applications and services. Mobile IP is the glue that can bind the applications and services evolving from 2G/3G and 4G wireless technologies into a transparent service offering.

Mobile operators must build robust yet flexible IP transport networks that take advantage of packet economics. One emerging best practice is to transition Radio Access Network (RAN) backhaul transport from traditional circuit-based technology to packet-based solutions.

The Cisco Mobile Transport over Packet (MToP) solution uses industry-standard Pseudowire technology to extend the features and benefits of the packet-based core into the RAN. It effectively flattens the multiple layers of the RAN onto a single Carrier Ethernet network by encapsulating and transporting mobile TDM, ATM, Pseudowire, and Native IP traffic.

The IP NGN Carrier Ethernet Design (Figure 4) provides a platform-independent architecture and Ethernet-based services model across all Carrier Ethernet platforms. This allows service providers to optimize service transport with the intelligence of appropriate networking technologies (such as Ethernet, IP, MPLS, Multicast, Pseudowire, or Hierarchical Private Virtual LAN Services) to meet their business and quality-of-experience goals. This network design is recognized as the industry's most scalable and optimized video, business, and mobile services transport solution with enhanced queuing and high-availability features.

Figure 4. IP NGN Carrier Ethernet Design
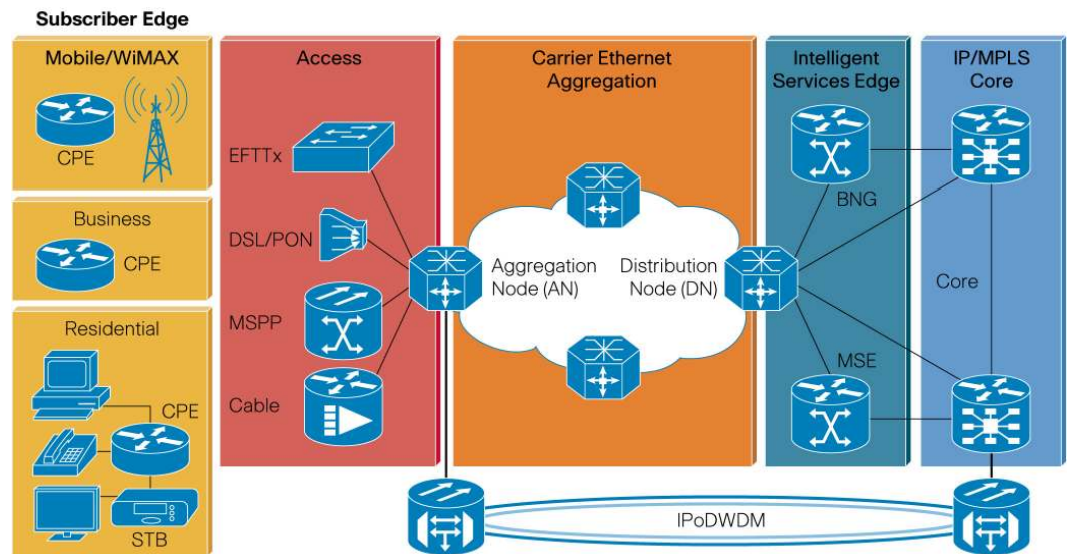
Carrier Ethernet Innovations

Key advantages of the IP NGN Carrier Ethernet Design include extending IP over DWDM (IPoDWDM) from the core to the network aggregation to reduce network complexity and support the increased capacity being driven by video traffic growth. This design delivers carrier-class reliability with 50ms recovery from core to premises and is backed by network availability SLAs in a services-led model. A consistent approach to applying intelligence throughout the network using purpose-built Carrier Ethernet platforms optimizes service transport and operations to accelerate

time to revenue with zero touch deployments. A unique design attribute includes integration of evolving broadband mobility services that can be adapted to future high-bandwidth mobile applications (such as LTE) while providing easy, secure and seamless roaming with integrated quality-of-service (QoS) capabilities to optimize the mobile user experience.

Cisco Carrier Ethernet – Leading the Evolution to IP

With the Cisco IP NGN Carrier Ethernet Design, residential and business consumers are able to personalize and define their connected lives using the next-generation services that experience providers deliver. With ubiquitous mobility for home- and office-based services, consumers are never out of touch with friends, family, or business associates; nor are they ever disconnected from their business networks and tools or unable to view and listen to their preferred entertainment.

Integrated service delivery requires a network infrastructure that can converge functions and decrease costs so that providers can successfully and profitably deliver on the promise of any play services. The Cisco IP NGN Carrier Ethernet Design offers service providers a remarkably extensive set of configurable options to meet evolving needs while enabling tremendous cost savings.

Cisco's Award-Winning Technology

InfoVision Award Winner—2006: Integrated Video Admission Control, 2007: Cisco Intelligent Services Gateway

Frost & Sullivan Award Winner 2007: Global Carrier Ethernet Market Leadership

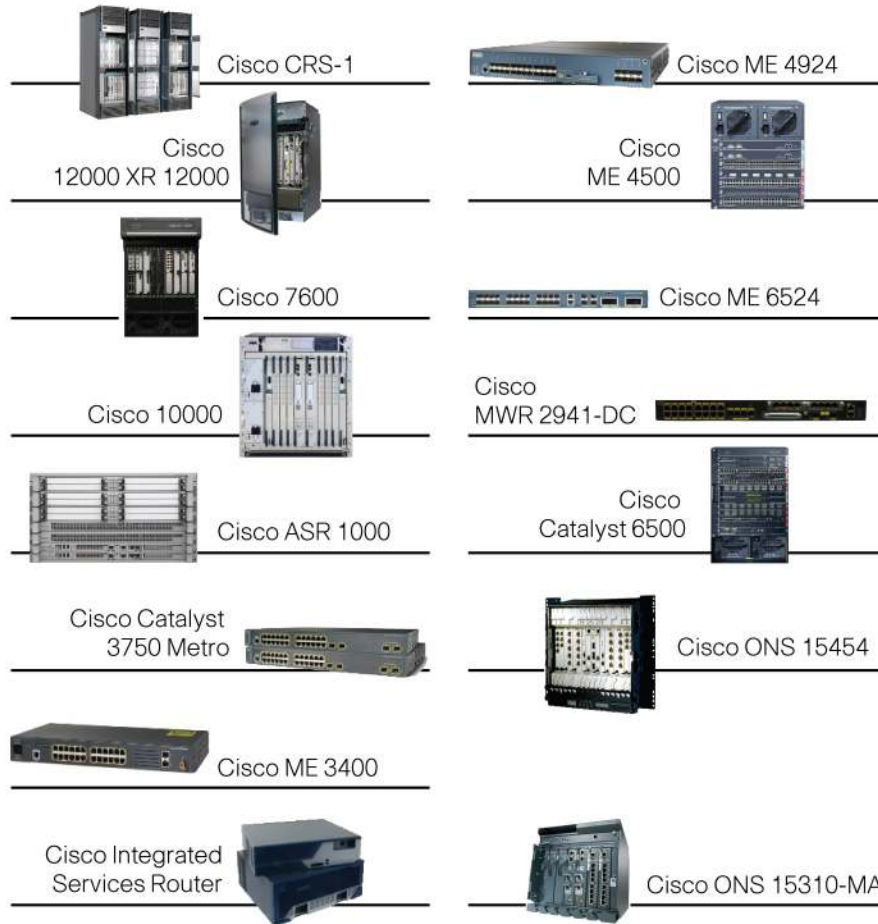Frost & Sullivan Award Winner 2007: Global Product Differentiation

IPTV World Series Award 2008 for IPTV Distribution, Transport, and Delivery

iptvworldseriesawards

To learn more about products and technologies that comprise the Cisco IP NGN Carrier Ethernet Design, please contact your Cisco account representative and visit: www.cisco.com/go/cedesign.

Cisco Carrier Ethernet Portfolio

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Cisco 12000 XR 12000
Cisco 7600
Cisco 10000
Cisco ASR 1000
Cisco Catalyst 3750 Metro
Cisco ME 3400
Cisco Integrated Services Router

Cisco ME 4924
Cisco ME 4500
Cisco ME 6524
Cisco MWR 2941-DC
Cisco Catalyst 6500
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