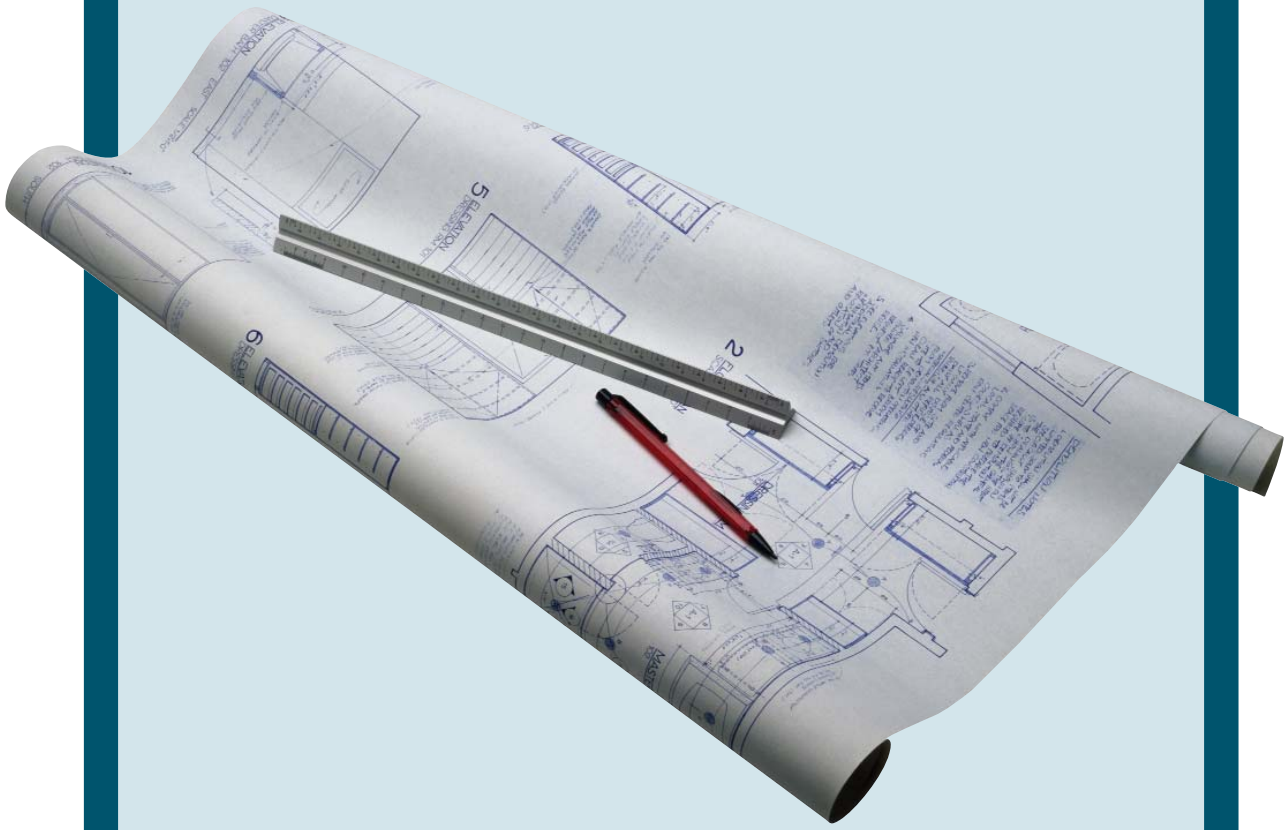
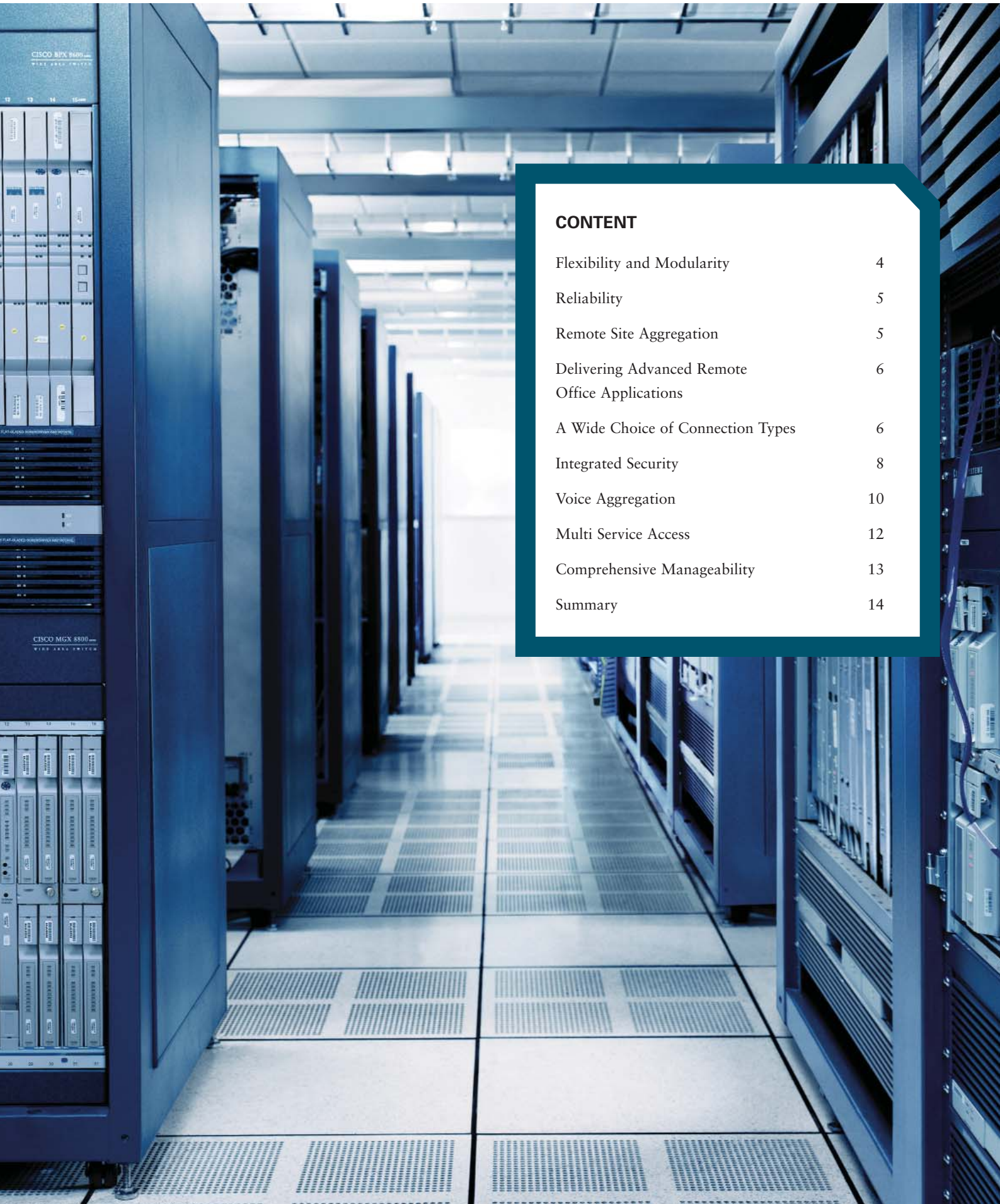
Cisco Systems

CISCO 7200VXR SERIES ROUTER



Scalable and Secure Remote-Site Aggregation



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CISCO 7200VXR SERIES ROUTER
SCALABLE AND SECURE REMOTE-SITE AGGREGATION

Providing simple connectivity to remote sites is no longer sufficient as business requirements shift from discrete voice and data communication solutions to a more sophisticated model that requires an integrated approach.

The need for closer integration of network-based applications means that the solutions for medium and large enterprises have become both complex and extensive. Increasingly, the entire spectrum of communications, from data (e-mail and Internet) to voice (traditional private branch exchange [PBX] and IP telephony-based) and video (conferencing, e-learning, surveillance, etc.) run over a common network.

Add to this the need to link branch offices and partner companies to allow simultaneous site-to-site and headquarters communications in a secure and scalable manner, and the integration tasks become even more significant. Thus, large organizations with geographically dispersed workforces face a significant challenge in aggregating data, voice, and video connections from remote offices in a secure, resilient, efficient, and cost-effective manner.

The Cisco® 7200VXR Series Router is the ideal system to deploy at central locations to facilitate the aggregation of data and voice traffic from remote sites. It combines flexibility and reliability with an unrivaled feature set that complements the extensive capabilities of the latest generation of integrated services routers.

Figure 1.
Cisco 7206VXR and NPE-G1 processor

Primary benefits of the Cisco 7200VXR include:

- Comprehensive connectivity options for deployment flexibility
- Extensive feature support with regular software-based enhancements
- A compact and modular form factor which enables "build-as-you-grow" deployment
- Optional high-performance hardware-assisted encryption
- Unparalleled investment protection delivered through a range of scalable system processors and software-based feature enhancements
- A huge range of connectivity options delivered through port adaptors that are common to all Cisco 7000 Series platforms

SCALABLE AND SECURE REMOTE-SITE AGGREGATION

Flexibility and Modularity

A rapidly developing global commercial environment means that enterprises and organizations need solutions that can both fit their present needs and help them build toward the emerging demands of the future. To meet these challenging requirements, the Cisco 7200VXR offers a tremendous variety of feature and connectivity options that provide exceptional deployment flexibility.

Connectivity options available for the Cisco 7200VXR include:

- Ethernet at 10Mbps, 100Mbps and 1Gbps rates
- Token Ring
- High-Speed Serial Interface (HSSI)
- Enterprise Systems Connection (ESCON)
- ISDN Primary Rate Interface (PRI) and Basic Rate Interface (BRI)
- Digital voice
- Serial lines X.21, V.35, RS-232, or E1/T1
- Channelized and unchannelized E1/T1, E3/T3, and STM-1/OC-3
- ATM from E1/T1 to STM-1/OC-3
- Packet over SONET (POS) STM-1/OC-3
- Dynamic Packet Transport (DPT)

Connectivity with the Cisco 7200VXR is provided by port adaptors that are inserted into dedicated slots within the system chassis. Different port adaptors can be combined to match precisely any connection requirements based on the cost and availability of carrier services.

This breadth of connectivity options combines with flexibility and scalability to meet changing needs without requiring chassis replacement. With 100-percent modularity—processor, I/O controller, port adapter, power supply, and memory are all modular components—the Cisco 7200VXR can be continuously upgraded. This ensures that the Cisco 7200VXR consistently delivers the highest levels of performance and functions while preserving the original investment.

Application capabilities of the Cisco 7200VXR include:

- Multiprotocol routing—IPv4, IPv6, Internetwork Packet Exchange (IPX), DECnet, Systems Network Architecture (SNA), etc.
- IBM/SNA integration with IP networks
- Security—Stateful firewall; intrusion prevention system (IPS); hardware encryption for IP Security (IPSec); Network Address Translation (NAT); access control list (ACL); and authentication, authorization, and accounting (AAA)
- Network-based application recognition (NBAR)
- Data, voice, and video integration
- Quality of service (QoS)
- Broadband aggregation (L2TP network server [LNS] and L2TP access concentrator [LAC])
- Route reflector
- Multiprotocol Label Switching (MPLS)—provider and provider edge] functions, MPLS virtual private networking (MPLS VPN, Layer 2 and Layer 3); MPLS QoS; and MPLS Traffic Engineering (MPLS-TE)
- Multicast
- Dynamic Multipoint VPNs (DMVPNs)

The Cisco 7200VXR draws on the extensive array of features available within Cisco IOS® Software to deliver an unrivalled range of capabilities without compromising flexibility. The latest capabilities can be applied through simple software upgrades. This helps ensure maximum investment protection while allowing the system to adapt dynamically to ever-changing business demands.

As the number of connections or the sophistication of applications increases, the modular architecture of the Cisco 7200VXR allows the system to be upgraded. This flexible approach enhances system performance by tailoring investments precisely to meet technical and business requirements. Capacity can also be added as necessary at any time as new, higher-performance processors become available. Indeed, the network processing engine (NPE) can be upgraded by simply replacing the main processor card within the Cisco 7200VXR chassis. This has the added benefit of minimizing risk and disruption to existing services.

All Cisco 7200VXR capabilities are housed in a space-efficient, cost-effective, three-rack-unit (3RU) form factor with either four or six expansion slots. This compact and flexible form factor helps enable a full range of solution requirements to be met within the smallest possible system footprint.

Reliability

In today's business world the communications infrastructure is a critical component and any outage, no matter how brief, can have a huge impact on profitability. Recognizing this, Cisco Systems® offers the Cisco 7200VXR, which provides the reliability necessary to handle mission-critical applications. It supports dual power supplies (AC or DC) and the online insertion and removal (OIR) of port adapters to allow interfaces to be added, removed, or replaced with minimal service interruption. A PC Flash memory card allows nonvolatile storage of backup software images and configuration files that can be transferred between systems. The Cisco 7200VXR also supports Cisco Gateway Load Balancing Protocol (GLBP) and IETF-compliant Virtual Router Redundancy Protocol (VRRP) to provide load balancing and fast cutover to a backup router if a system or link fails.

Remote-Site Aggregation

The modern enterprise has many different remote sites and connections, all operating at different speeds but all of which must operate securely and be available and accessible at all times. Remote-site aggregation is the consolidation of connections from remote sites into trunk lines or a backbone LAN to enable branch and regional offices to connect to corporate voice and data systems. An effective aggregation router provides high-throughput performance on many relatively low-speed serial interfaces while simultaneously providing secure and efficient transport for business-critical applications. Through the Cisco 7200VXR, network managers can efficiently support many remote users who require secure low- to medium-speed WAN connections.

SCALABLE AND SECURE REMOTE-SITE AGGREGATION

Delivering Advanced Remote-Office Applications

Global businesses increasingly need to make sure that the services and communications available at the corporate center are available to everyone, even to offices with only a handful of people. The latest generation of integrated services routers such as the Cisco 1800, 2800, and 3800 series platforms allows deployment of sophisticated communications services and applications in even the smallest of remote offices. However, the ultimate success of such deployments and their operation depends on the installation of an efficient and scalable system at the aggregation points. The Cisco 7200VXR is ideally suited to meet this challenge and deliver these applications transparently.

A Wide Choice of Connection Types

Global operations mean diversity of connections and devices. The Cisco 7200VXR can accommodate a huge range of connection types so network managers can select the most cost-effective solution based on the application support required and the services available. Its flexibility also allows combination of different connection types to deliver optimal solutions in all situations (Figure 2).

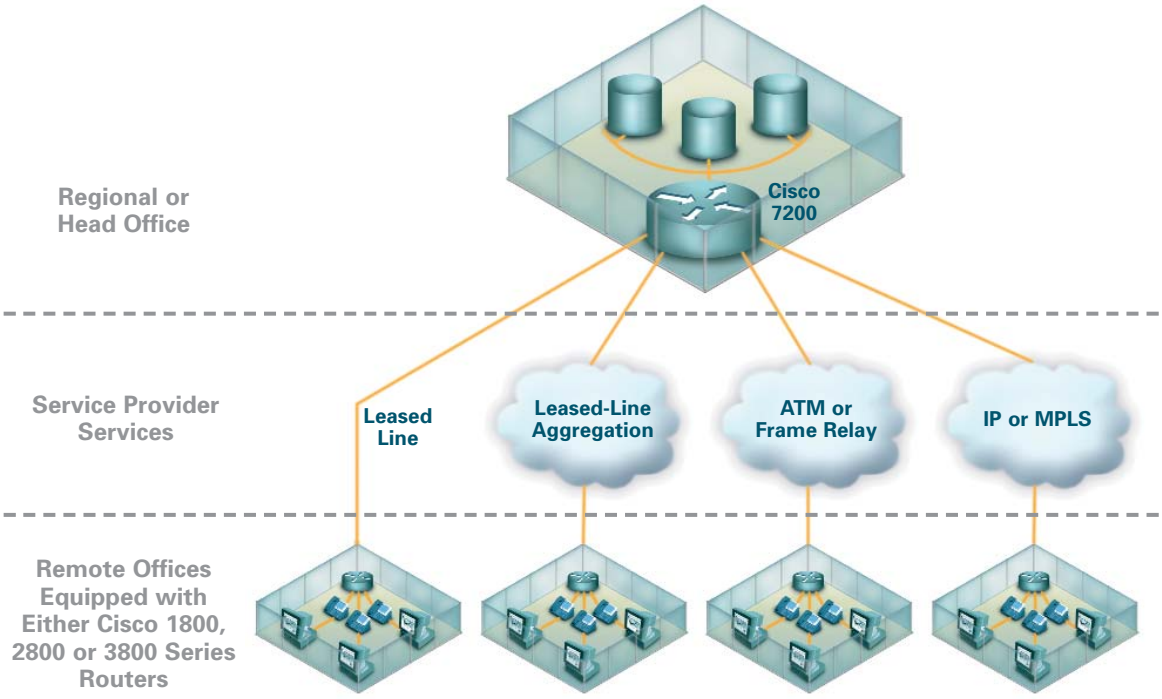


Figure 2.
The Cisco 7200VXR Offers a Huge Range of Connection Options

Leased Line Services

Leased lines offer the simplest type of remote-site connectivity. The Cisco 7200VXR can accommodate RS-232, X.21, V.35, or T1/E1 serial connections carrying either Frame Relay or IP (Point-to-Point Protocol [PPP]) traffic.

For locations where a single serial line is not sufficient but the cost of high-speed circuits is prohibitive, Multilink PPP (MLPPP) can be used to bond together two or more T1/E1 circuits to create a logical circuit that provides greater bandwidth than a single T1/E1. MLPPP is an industry-standard protocol (RFC 1990) that describes the

protocol and procedures necessary to distribute a single stream of packets to several parallel links and reassemble the stream at the receiving end. Using MLPPP on the Cisco 7200VXR allows the combination of as many as 10 T1 or E1 links into a parallel path to a single remote site.

When a large number of leased-line connected remote sites are being aggregated into a single central location, it may be more attractive to exploit a Channelized high-speed service to simplify connection management. A Channelized DS-3/E3 or OC-3/STM-1 connection can be used to carry the traffic from the many remote sites linked to the service provider network through lower-speed leased lines, thereby simplifying the aggregation process and reducing costs.

ATM and Frame Relay Connectivity

The ability to accommodate different wide area networking protocols within one corporate network is vital because many large enterprises and service providers continue to employ ATM and Frame Relay within their networks. The Cisco 7200VXR is well-equipped to deliver IP integration with these Layer 2 transport protocols. It can deliver the connectivity and feature integration needed to help ensure deployment of an optimal solution.

The Cisco 7200VXR supports the full suite of standards-based interworking functions between ATM, Frame Relay, and IP. The WAN feature suite is matched to a complete range of physical interfaces to ensure that the most efficient and cost-effective solution is always implemented.

IP and MPLS

MPLS is quickly becoming the aggregation technology of choice for enterprises and service providers alike, because it can increase the scalability of IP networks and also transport native Frame Relay and ATM traffic. The Cisco 7200VXR provides a multitude of sophisticated MPLS features—it is therefore ideal for applications at the edge of an MPLS network where remote sites are connected. Links from the remote offices can be based on ATM, Frame Relay, or native IP. This flexibility helps enable the Cisco 7200VXR to perform the primary role at the edge of an MPLS network, applying and removing the necessary labels to traffic as it enters the backbone network. The Cisco 7200VXR can be used to create secure MPLS VPN connections from the branch office across the core network and enable application of QoS both to and from each end of a connection, thus allowing voice and data to be combined on a single, secure infrastructure.

The MPLS capabilities of the Cisco 7200VXR include support for IPv6 to help ensure that any solution deployed today is also well-positioned to address future needs. By using IPv6 MPLS provider edge functions, the Cisco 7200VXR can carry both IPv4 and IPv6 simultaneously across a common MPLS core network, thus greatly simplifying the coexistence of the two IP versions.

SCALABLE AND SECURE REMOTE-SITE AGGREGATION

Integrated Security

Creating a network that can deliver the breadth of communications and applications essential for business today also must be achieved without compromising the safety of the information traveling faster and further than it ever has before. Because businesses depend on their networks for all forms of internal and external communication, it is essential that the network infrastructure be able to detect and deal with any attack from any source. The Cisco 7200VXR employs the full range of security functions available within Cisco IOS Software to provide unmatched security throughout the network, protecting network devices, corporate data, and user systems. Cisco IOS Software shields network devices, allowing them to remain operative and, therefore, controllable even during an attack.

The Cisco 7200VXR security capabilities include support for a fully featured stateful firewall that can track each connection traversing the router and confirm its validity. In addition to examining the header of every packet, the stateful-firewall capability within the Cisco 7200VXR inspects the contents and monitors the state of the connection to determine more about the nature of the network traffic. Therefore, filtering decisions within the Cisco 7200VXR are based not only on administrator-defined rules (as in static packet filtering), but also on factors in the context of the connection. This allows for a dynamic real-time decision-making process that can react to unexpected events as they occur.

In today's environment, Internet worms and viruses spread across the world in mere minutes. Without the luxury of time to react, the network itself must possess the intelligence to recognize and mitigate these threats instantaneously. By providing a complete suite of inline intrusion detection and mitigation capabilities, the Cisco IOS Intrusion Protection System (IPS) delivers a comprehensive, pervasive security solution for combating unauthorized intrusions. Sensors analyze traffic in real time and detect unauthorized activity, enabling either a manual or automated response to security breaches.

Deploying the Cisco IOS IPS to complement the embedded firewall capability significantly enhances the security of a network. The Cisco 7200VXR incorporates both Cisco IOS Firewall and IPS functions that serve a complementary role as they address different types of attacks and risks. Although the primary function of a firewall is to control access to services and hosts based on a defined security policy, Cisco IOS IPS protects against data- and content-driven attacks and can even address certain types of attacks that have never occurred before. Possessing the intelligence and performance to accurately identify, classify, and stop malicious or damaging traffic in real time, Cisco IOS IPS is a critical function that helps enable the network to proactively defend itself.

Secure Connections

The VPN Acceleration Module 2+ (VAM2+) for Cisco 7200VXR routers provides high-performance, hardware-assisted encryption, key generation, and compression services suitable for site-to-site VPN applications. As an integral component of the SAFE Blueprint from Cisco for security, the VAM2+ provides encryption scalability while working transparently with critical site-to-site VPN software services, such as support for routing, QoS, multicast, and multiprotocol traffic across the VPN. It also integrates firewalls, intrusion detection, and service-level validation. This combination of features delivers a best-in-class solution that accommodates the most diverse site-to-site VPN environments. Furthermore, the VAM2+ provides hardware-assisted compression services where bandwidth conservation may lower network connection costs. Together with the Cisco 7200VXR support for a broad set of LAN and WAN media and full multiservice routing, the VAM2+ helps ensure the smooth integration of encryption technology into virtually any enterprise or service provider network environment.

The VAM2+ supports Data Encryption Standard (DES) and Triple DES (3DES), and provides hardware acceleration for Advanced Encryption Standard (AES). AES is a cryptographic algorithm often used by U.S. government organizations to replace DES and 3DES. The Cisco 7200VXR Series, combined with the Cisco VAM2+, can support up to 280 Mbps of IPSec encryption traffic distributed across up to 5000 remote-access or site-to-site tunnels, thus ensuring that solutions can be scaled to meet the demands of even the largest organizations.

Dynamic Multipoint VPN

When using public networks to interconnect offices, there is often a strong desire, sometimes by industry regulators, to encrypt the data to protect its integrity. The resulting amalgamation of point-to-point encrypted tunnels and a full- or partial-mesh network presents significant management issues for network administrators. With large hub-and-spoke networks, the size of the configuration on the hub router can become significant—to the extent that it is unmanageable. For example, a hub router would need up to 3900 lines of configuration to support 300 spoke routers. These numbers make it difficult to make changes or troubleshoot network problems. Furthermore, such a large and complex configuration leaves more room for administration errors, in turn causing unnecessary network outages.

Cisco 7200VXR routers with Dynamic Multipoint VPN (DMVPN) greatly simplify the deployment of point-to-point encrypted tunnels by providing automated dynamic configuration of the endpoint routers in IPSec-based VPN networks. Network managers need only to configure a single multipoint tunnel interface and a single IPSec profile, without dealing with cryptographic access lists on the hub router, to be able to handle all spoke routers. Thus, the size of the configuration on the hub router remains constant even if spoke routers are added to the network. Furthermore, if IPSec encryption is required, DMVPN allows IPSec to be immediately triggered for the connection that is to be secured, thus further simplifying configuration tasks (Figure 3).

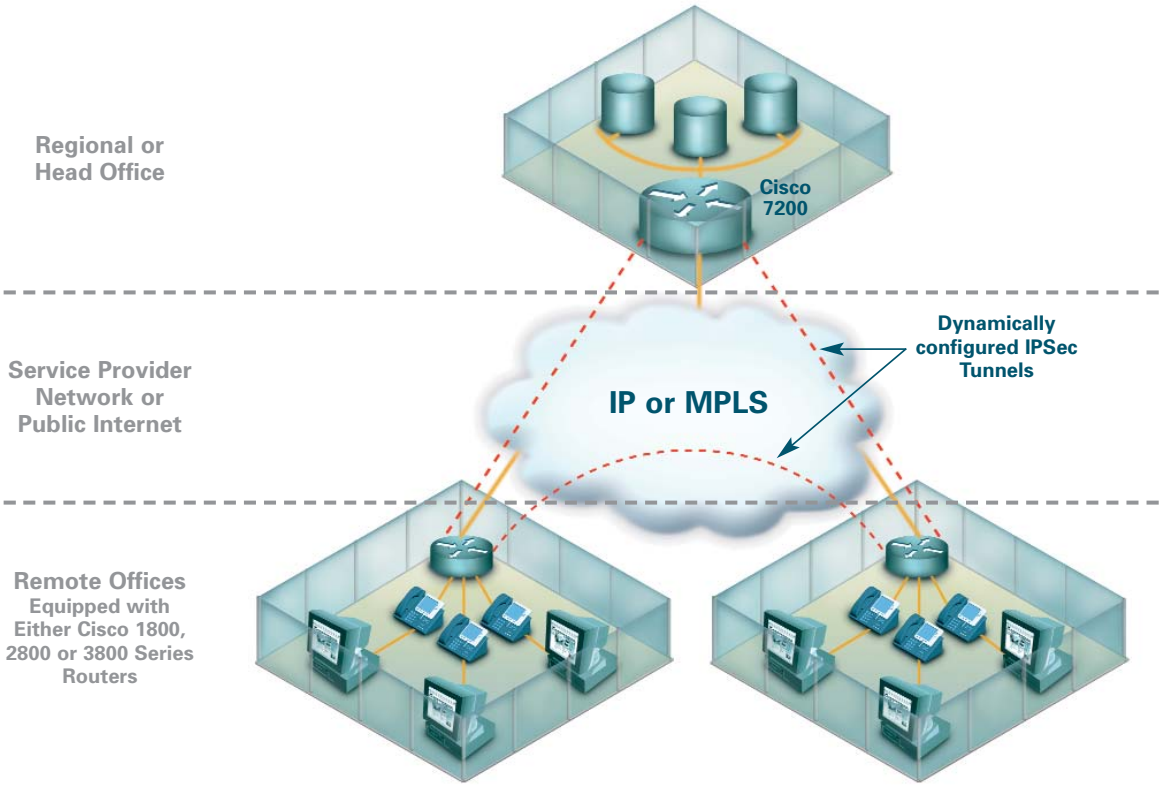


Figure 3.
Dynamic Multipoint VPNs Greatly Simplify the Creation and Management of Site-to-Site Encrypted Tunnels

DMVPN supports environments where the remote sites receive their IP addresses dynamically. This is often the case for small locations or where the site-to-site connection is through the Internet or a service provider's IP network. Thus, remote routers can have reactive physical interface IP addresses, which are common for cable and DSL connections. When the spoke router goes online, it sends registration packets to the hub router and triggers the automatic creation of a secure tunnel.

If a full-mesh network is required to allow remote sites to communicate directly with one another, then the DMVPN solution also can facilitate direct site-to-site communication. Before a remote router transmits a packet to another spoke router, it determines the destination address of the target spoke router by using the hub router. The two spoke routers then create an IPSec tunnel between them so that data can be transferred directly.

The intuitive nature of DMVPN means that it is inherently more resilient than manually configured solutions. DMVPN automatically reestablishes secure, site-to-site communication tunnels and the routers can thus respond to any changes in connectivity caused by link failures or topology changes.

Voice Aggregation

Using the same network to carry voice and data offers large enterprises and organizations substantial rewards, in terms of both cost reduction and productivity increases. Voice communication across packet networks (IP, Frame Relay, or ATM) has established itself as a reliable and cost-effective solution that allows the integration of voice and data traffic onto a single network infrastructure. The successful creation of a homogenous voice and data infrastructure that can address the need for internal

and external communication depends upon the ability to integrate the latest packet voice technologies with the traditional systems employed in the public switched telephone network (PSTN) and many PBX systems.

As a multiservice router, the Cisco 7200VXR can aggregate voice as well as data at the edge of enterprise or service provider networks. When equipped with time-division multiplexing (TDM)-enabled voice port adapters, the Cisco 7200VXR can terminate voice over IP (VoIP), voice over Frame Relay (VoFR), or voice over ATM (VoATM) and pass calls to either the PSTN or a PBX system (Figure 4).

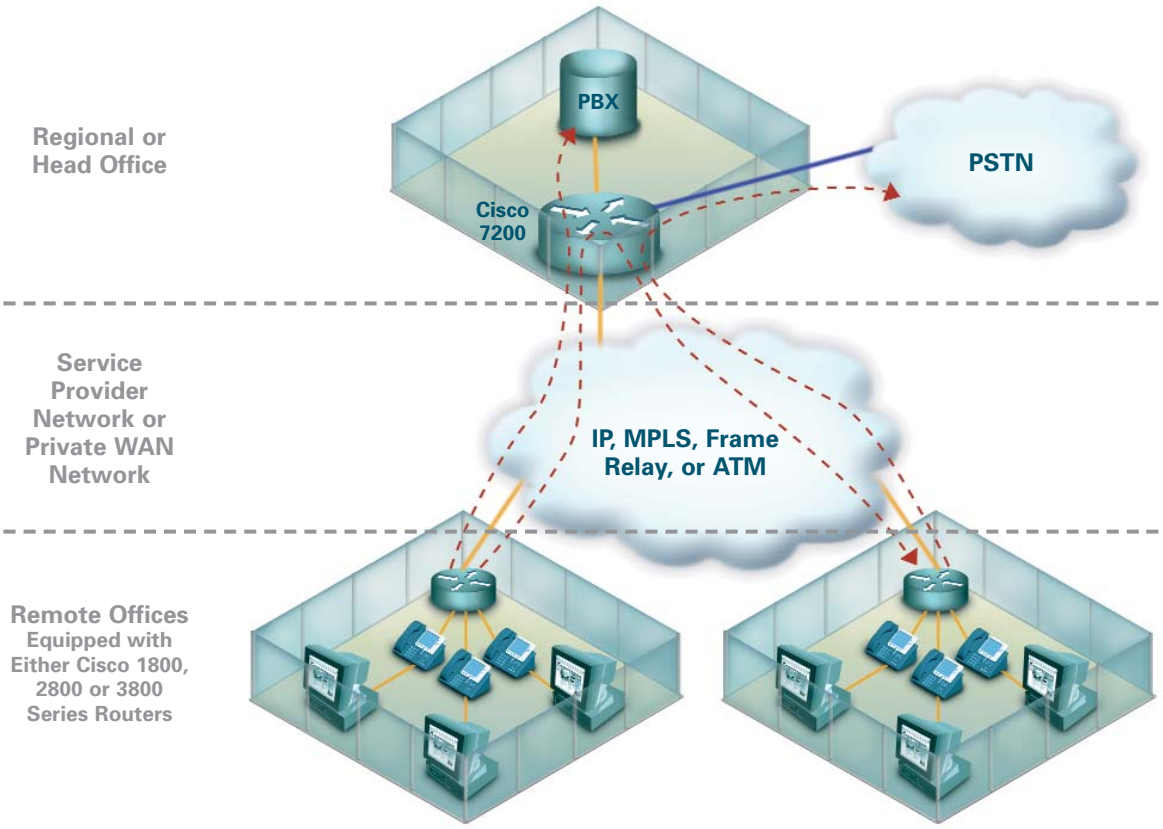


Figure 4. The Cisco 7200VXR Enables the Deployment of Efficient and Cost-Effective Voice-over-Packet Solutions for Site-to-Site and PSTN Break-Out Solutions

Using a mixture of high-density and high-bandwidth interface cards on the Cisco 7200VXR, only one device is required to aggregate all voice traffic and perform the necessary gateway functions between the different signaling and transmission environments. All call origin and termination combinations are supported, whether site-to-site, remote site-to-headquarters, or internal-to-public network connectivity.

The Cisco 7200VXR delivers the highest-density Cisco voice gateway solution, with up to 20 T1 or 18 E1 trunk-line terminations within 3RU (14 cm) of rack space. With its advanced QoS capabilities, the Cisco 7200VXR provides the perfect foundation for any integrated voice and data network.

SCALABLE AND SECURE REMOTE-SITE AGGREGATION

Multi Service Access

Businesses are constantly seeking intelligent ways to manage data, voice, and video on a single platform. The Cisco 7200VXR offers a powerful suite of tools that allow voice, video, and business-critical data applications to co-exist on a common network. High-quality voice capabilities are matched with the ability to handle large volumes of data traffic. This combination makes the Cisco 7200VXR the intelligent solution for service providers and enterprises that need to consolidate traffic onto a single platform while preserving the integrity of the end-user services. The successful mixing of delay- and loss-sensitive applications such as voice and video with more resilient data services on a common packet network can be achieved only if powerful traffic-management functions are available.

QoS Enforcement

Next-generation networks must be able to apply QoS criteria to network traffic. As enterprises and service providers continue to shift to using a single, converged network to carry mission-critical applications over unified multiservice (data, voice, and video) architecture, the ability to manage traffic flows and delivery terms becomes increasingly critical. Enterprises will increasingly outsource their network services to service providers that can supply QoS features and provide the necessary bandwidth to maintain performance of on-demand, bandwidth-intensive applications as well as time-sensitive information-delivery applications. This ability to apply QoS to customer traffic will become vital to meeting service-level agreements (SLAs) and maintaining network performance. Moreover, support for advanced QoS features will allow service providers to create premium products and service bundles while the efficient application of QoS techniques and use of network links will reduce overall WAN costs. The Cisco 7200VXR is rich in QoS management functions that can be deployed individually or together to help ensure that all applications can perform optimally at all times and that SLAs can be met without compromising network efficiency.

Network Based Application Recognition (NBAR)

NBAR is a classification engine that recognizes a wide variety of applications, including Web-based applications and client-server applications that assign tailored TCP or User Datagram Protocol (UDP) port numbers. Using NBAR, the Cisco 7200VXR can intelligently recognize the type of data passing through the network. When the application is recognized, the network can invoke specific QoS services for that particular application.

Comprehensive Manageability

The success of an integrated access network depends on its ability to deliver high performance at optimum cost. It must offer the network manager the ability to track network traffic and quickly identify areas of immediate concern while also mapping a clear picture of the changing trends in data volumes and distribution. Cisco recognizes this requirement and offers a suite of integrated products and system capabilities that can be combined to create optimized solutions for any situation.

The Cisco Element Manager Framework (Cisco EMF) provides management and monitoring functions for the Cisco 7200VXR platforms. Through an intuitive user interface, the Cisco EMF eases and accelerates deployment, helps enable efficient operation of large network environments, and streamlines the provisioning process. The element manager provides a variety of management capabilities without requiring detailed knowledge of Cisco IOS Software or Simple Network Management Protocol (SNMP).

For self-managed enterprise networks, the CiscoWorks Routed WAN Management Solution provides a collection of powerful enterprise management applications to configure, administer, and troubleshoot routed WANs, thereby dramatically reducing their complexity. This suite of solution applications makes network behavior more visible and quickly identifies network bottlenecks that can impact short- and long-term performance trends. It also provides sophisticated configuration tools to optimize bandwidth use across critical WAN links in the network.

The broad management and monitoring capabilities of the Cisco 7200VXR include comprehensive support for NetFlow and IP SLA functions. Both of these are integral parts of the Cisco IOS Software that powers all Cisco routers.

NetFlow technology provides an efficient metering base for an essential set of applications, including network traffic accounting, usage-based network billing, network planning, denial-of-service attack-monitoring capabilities, network monitoring, and data-mining capabilities for both service provider and enterprise customers. Cisco offers a suite of applications to collate NetFlow export data, perform data volume reduction and postprocessing, and provide end-user reporting.

Cisco IOS IP SLA helps enable customers to install new business-critical IP applications and services that use data, voice, and video within an IP network confident in the knowledge that they will be able to precisely measure performance and quickly address issues that may negatively impact the customer's experience. Cisco has augmented traditional service-level monitoring and advanced IP infrastructure such that the infrastructure can now intelligently identify applications by measuring them at both the end-to-end and IP layers.

By employing Cisco IOS IP SLA and NetFlow, network managers can verify service guarantees, increase network reliability by validating network performance, proactively identify network issues, and increase return on investment (ROI) by easing the deployment of new IP services. Cisco IOS IP SLAs use active monitoring to generate traffic in a continuous, reliable, and predictable manner, thus enabling the accurate measurement of network performance and health.

SCALABLE AND SECURE REMOTE-SITE AGGREGATION

Summary

Integrating a business across many distributed locations while providing reliable and secure access to a rapidly developing array of mission-critical applications and data sources is a significant challenge. However, it also is one that businesses everywhere must increasingly meet.

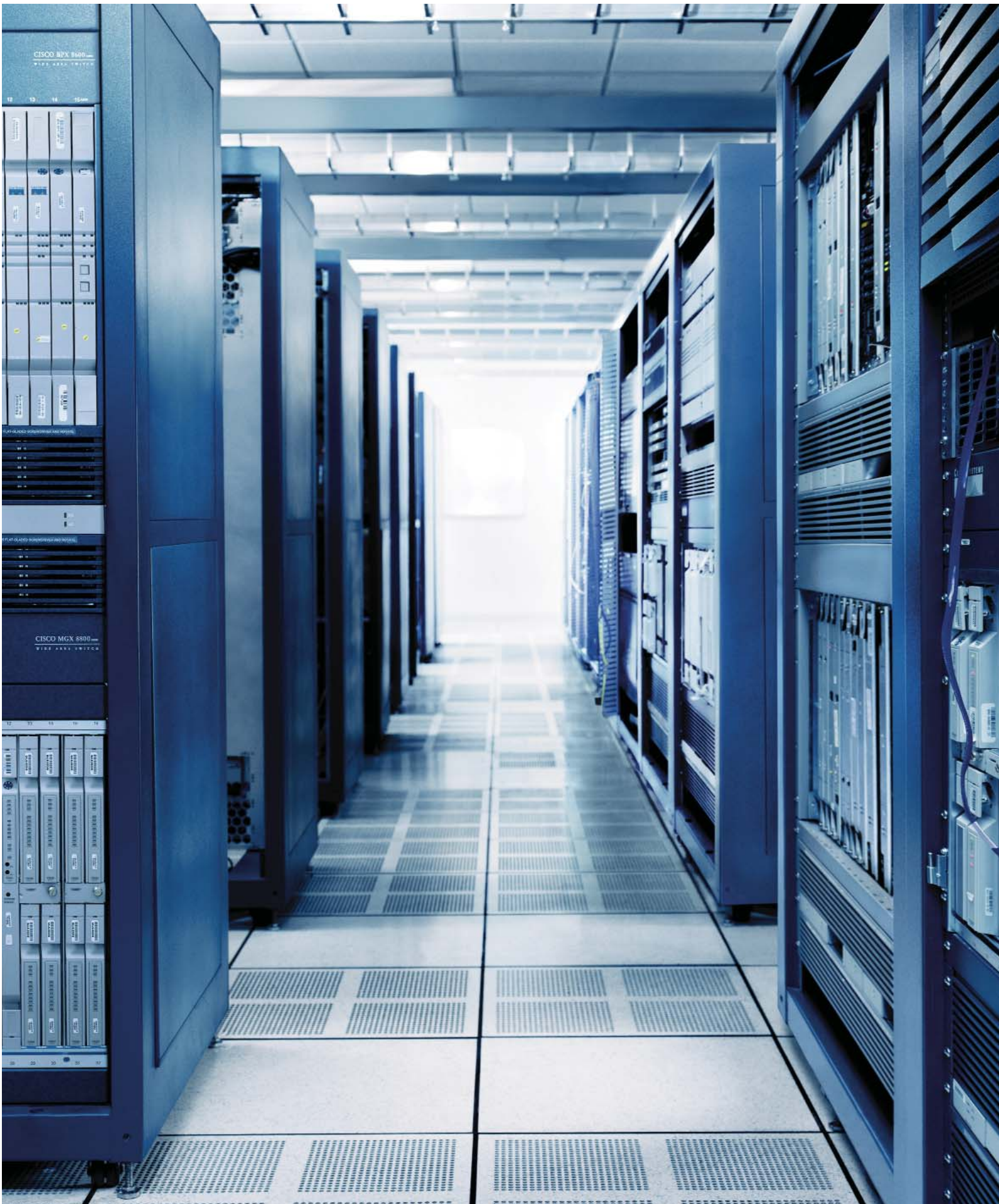
The Cisco 7200VXR responds to and anticipates the needs of large and medium-sized enterprises through its unique combination of features that provide the flexibility and scalability to meet the challenges of today and tomorrow. The Cisco 7200VXR allows a multitude of connections, protocols, and applications to coexist transparently on the same network, overcoming many of the challenges that businesses face when integrating their remote sites.

It offers the ability to extend widely the benefits of converged networks, carrying data, voice, and video on a single platform and doing so cost-effectively. The Cisco 7200VXR solution provides the vital management control and oversight that allows both optimal performance and cost of operation.

The modularity of the Cisco 7200VXR protects investment by allowing continuous upgrades that meet changing circumstances without the need to make significant new hardware investments. It offers embedded world-class security so that extending access to more users across more locations can be achieved without compromising the protection of the data and applications that the network carries.

Designed with the needs of a rapidly developing and dynamic marketplace in mind, the Cisco 7200VXR is the ideal solution for the aggregation of the latest generation of integrated services routers and the sophisticated applications that they deliver.

To obtain further information about the Cisco 7200VXR, go to www.cisco.com/go/7200.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