

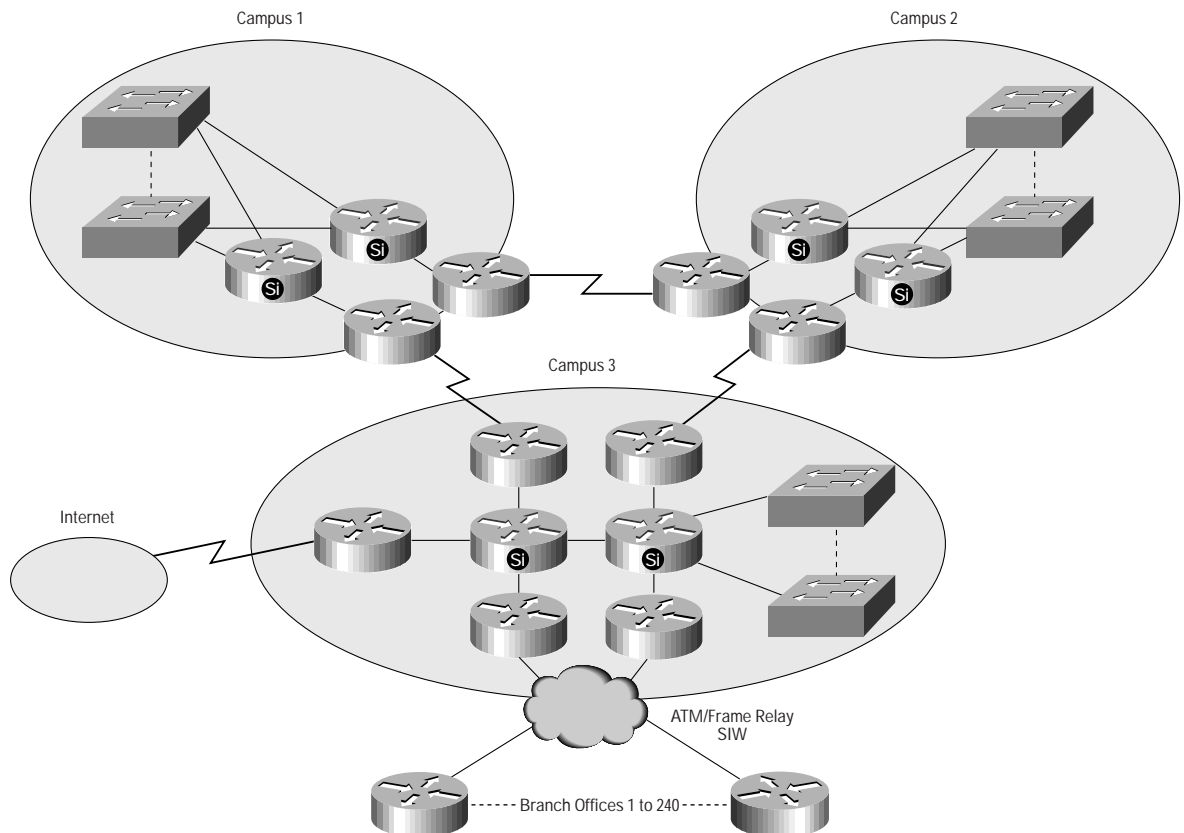
Cisco AVVID Network Infrastructure

Q. What is Cisco AVVID?

A. Cisco AVVID is the Architecture for Voice, Video and Integrated Data from Cisco Systems. Cisco AVVID defines the methodology for building a converged network of voice, video and data. Cisco AVVID is not a single product or application; it is a set of guidelines for building a converged network that is highly available, distributed, and standards-based.

Q. What is the Cisco AVVID Network Infrastructure?

A. The Cisco AVVID Network Infrastructure is a network that has the components necessary to run a converged network. Cisco uses the model below to represent what a typical customer-deployed Cisco AVVID network might look like. It includes a quality-of-service (QoS)-enabled IP network capable of supporting voice, video, and data.





The model consists of three campus networks, a wide-area network (WAN), and branch office components. The WAN connects a headquarters site with potentially hundreds of branch offices over Frame Relay, Asynchronous Transfer Mode (ATM), or leased-line media.

Q. Why migrate to the Cisco AVVID Network Infrastructure?

A. Historically, distinct and separate networks over different media have been implemented for data, voice, and video services within the enterprise. The use of separate networks has meant the duplication of management functions and the greater likelihood of lower utilization. However, using IP as the sole transport in converged networks offers increased bandwidth efficiency through sharing, lower overall bandwidth requirements, ease of management, and the ability to deploy new applications rapidly. It also results in lower costs for facilities, training, staffing, and management of enterprise networks.

Q. How does my company migrate towards Cisco AVVID Network Infrastructure?

A. The multiprotocol routers and multilayer switches upon which Cisco AVVID Network Infrastructure is based are often already present in the nonconverged enterprise network. Cisco AVVID Network Infrastructure-ready switches include the Cisco Catalyst[®] 3500, the Catalyst 4000 Series, and the Catalyst 6500, which are deployed in the campus network components. The Cisco 7200 and Cisco 7500 routers are used for WAN aggregation to branch offices and for high-speed point-to-point connections between the campuses. Cisco 2600 and 3600 Series routers are used in the branch office components.

Q. When is the “right” time to implement a converged network such as Cisco AVVID Network Infrastructure?

A. The Internet has created a world in which competition is growing, margins are shrinking, and the rapid proliferation of technology is rendering traditional business models obsolete. Now, more than ever, successful companies are using Internet infrastructure and applications that provide superior customer service, enable market-share growth, and reduce operating cost. Maintaining a competitive advantage means migrating quickly and safely to the single IP infrastructure of Cisco AVVID. The time to begin your migration to a converged Cisco AVVID network is now.

Q. What QoS features are used on the Cisco AVVID Network Infrastructure?

A. A primary consideration for converged network environments is to guarantee performance levels for all types of traffic over the single transport infrastructure. Data streams tend to be bursty, loss intolerant, and delay-insensitive. In contrast, voice streams tend to be continuous, with a low tolerance to loss, and are delay sensitive.

Traffic shaping is a prerequisite for a data-only Cisco AVVID Network Infrastructure using ATM or Frame Relay in the WAN. A voice-ready Cisco AVVID Network Infrastructure must be configured with additional QoS features. Besides traffic shaping, voice-enabled networks require Low Latency Queuing (LLQ), fragmentation, and Compressed Real-Time Transfer Protocol (CRTP) mechanisms.

LLQ is used in the WAN to ensure that traffic, once classified, is placed into an outbound interface queue that meets its handling requirements in terms of bandwidth and delay characteristics. For example, given the low tolerance to packet loss and delay, voice traffic is placed in a high priority queue and data is placed in a lower priority queue.

Traffic shaping is implemented when a high-speed central site feeds numerous lower-speed remote sites. The central site has the potential to overrun the lower-speed circuit at the remote site. Traffic shaping on the central site router prevents too much traffic from being directed towards any of the remote sites.

On links less than 768 kbps the serialization delay of sending large data packets can cause a problem. Link fragmentation tools break large data packets into smaller sizes that are equivalent to voice packets. This ensures that the delay incurred by the voice frame is lessened. At the other end of the link, the data fragments are reassembled. On Frame Relay networks, the Frame Relay Forum specification FRF.12 is implemented for link fragmentation.



For voice on low-speed links, CRTP is required. CRTP compresses IP headers, thus reducing the size of voice packets. CRTP compression can reduce a G.729a 24-kbps voice stream by 50 percent.

Q. Do I need admission control on a voice-ready Cisco AVVID Network Infrastructure?

A. Yes, voice-ready networks require admission control in the WAN. This is to control the amount of voice, video, or other fixed bandwidth traffic on the network at any one time to prevent the required bandwidth from exceeding the available bandwidth. In the case of voice, for example, suppose there is enough bandwidth on a wide area link to carry five voice calls. If there are five active calls and a sixth call is placed, this last call should not be admitted across the link because the quality of all voice calls might suffer. If the call is not admitted onto the Cisco AVVID network, it can be rerouted transparently to the end user through a gateway and directly out to the public switched telephone network (PSTN).

Q. What about availability concerns relative to the Cisco AVVID Network Infrastructure?

A. Availability is achieved at many levels through the use of advanced network devices and algorithms. At the physical layer (Layer 2), Cisco switches provide a spanning tree per virtual LAN (VLAN) and tunable spanning-tree parameters. These features can be set to provide faster convergence. Advanced Layer 3 redundancy protocols such as Hot Standby Routing Protocol (HSRP) and routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First OSPF ensure quick convergence, and thus availability.

Q. Why EIGRP and HSRP?

A. EIGRP is a routing protocol that is suited for many different topologies and media. It is applied to the WAN component of the Cisco AVVID Network Infrastructure. In a properly designed network, EIGRP scales well and provides extremely quick convergence times with minimal network traffic. Some of the many advantages of EIGRP include:

- Very low usage of network resources during normal operation; only hello packets are transmitted on a stable network.
- Only routing table changes propagated, not the entire routing table. This reduces the load the routing protocol places on the network.
- Rapid convergence times when there are changes in the network topology. In some situations convergence can be almost instantaneous.

IP routing redundancy is a key component of a high-availability strategy for any network; it is a critical component in delivering reliable data, voice, and video integration. Its goal is to protect against first-hop router failure when a source host cannot dynamically learn the IP address of an alternate first-hop router HSRP ensures availability within the Cisco AVVID Network Infrastructure campus component.

Q. How are capacity and performance ensured on the Cisco AVVID Network Infrastructure?

A. Performance is based on good design. Specifically, for converged networks the design process must include:

- Auditing the current network infrastructure
- Setting network performance objectives
- Calculating voice delay budgets for a voice-ready Cisco AVVID Network Infrastructure
- Planning for capacity
- Cost analysis

The white paper, "Designing Your Converged Network," provides "best-practice" capacity planning and traffic engineering guidelines for designing a data-only or voice-ready Cisco AVVID Network Infrastructure. This paper is available on Cisco.com at the following URL: <http://www.cisco.com/univercd/cc/td/doc/product/voice/ics7750/design/ddesign.htm#xtocid167695>.

Q. How is a converged network such as Cisco AVVID Network Infrastructure managed?

A. The CiscoWorks2000 line of products provides three management solutions targeted at the combined LAN and WAN operation of converged networks. The LAN Management Solution (LMS) provides advanced management of Cisco Catalyst multilayer switches. The Routed WAN Management provides monitoring, traffic management, and access control to administer the purely routed WAN component of the Cisco AVVID Network Infrastructure. Finally, the Service Management Solution allows you to manage and monitor service-level agreements.



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