CCNP ONT Quick Reference Sheets

Exam 642-845

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Network Architecture

Cisco VoIP

QoS Overview

QoS Details

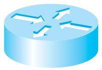
AutoQoS

Wireless Scalability

shortcut

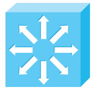
Your Short Cut to Knowledge

Icons Used in This Book


Router


7507 Router

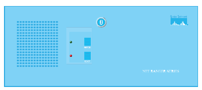

Multilayer Switch with Text


Multilayer Switch

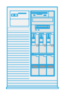

Communication Server

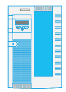

Switch


Internal Firewall


IDS


Web Browser


Database


App Server

Network Architecture

Modern converged networks include different traffic types, each with unique requirements for security, Quality of Service (QoS), transmission capacity, and delay. Some examples include:

- Voice signaling and bearer
- Core application traffic, such as Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM)
- Database transactions
- Multicast multimedia
- Network management
- "Other" traffic, such as web pages, e-mail, and file transfer

Cisco routers are able to implement filtering, compression, prioritization, and policing (dedicating network capacity). Except for filtering, these capabilities are referred to collectively as QoS.

Although QoS is wonderful, it is not the only way to address bandwidth shortage. Cisco espouses an idea called the Intelligent Information Network (IIN). IIN builds on standard network design models to enable these new services to be reliable and layered on top of traditional data delivery.

SONA and IIN

IIN describes an evolutionary vision of a network that integrates network and application functionality cooperatively and allows the network to be smart about how it handles traffic to minimize the footprint of applications. IIN is built on top of the Enterprise Composite Model and describes structures overlaid on to the Composite design as needed in three phases.

Phase 1, "Integrated Transport," describes a converged network, which is built along the lines of the Composite model and based on open standards. This is the phase that the industry has been transitioning. The Cisco Integrated Services Routers (ISR) are an example of this trend.

Phase 2, "Integrated Services," attempts to virtualize resources, such as servers, storage, and network access. It is a move to an "on-demand" model.

By "virtualize," Cisco means that the services are not associated with a particular device or location. Instead, many services can reside in one device to ease management, or many devices can provide one service that is more reliable.

An ISR brings together routing, switching, voice, security, and wireless It is an example of many services existing on one device. A load balancer, which makes many servers look like one, is an example of one service residing on many devices.

VRFs are an example of taking one resource and making it look like many. Some versions of IOS are capable of having a router present itself as many virtual router (VRF) instances, allowing your company to deliver different logical topologies on the same physical infrastructure.

Server virtualization is another example. The classic example of taking one resource and making it appear to be many resources is the use of a virtual LAN (VLAN) and a virtual storage area network (VSAN).

Virtualization provides flexibility in configuration and management.

Phase 3, "Integrated Applications," uses application-oriented networking (AON) to make the network application-aware and to allow the network to actively participate in service delivery.

An example of this Phase 3 IIN systems approach to service delivery is Network Admission Control (NAC). Before NAC, authentication, VLAN assignment, and anti-virus updates were separately managed. With NAC in place, the network is able to check the policy stance of a client and admit, deny, or remediate based on policies.

IIN allows the network to deconstruct packets, parse fields, and take actions based on the values it finds. An ISR equipped with an AON blade might be set up to route traffic from a business partner. The AON blade can examine traffic, recognize the application, and rebuild XML files in memory. Corrupted XML fields might represent an attack (called *schema poisoning*), so the AON blade can react by blocking that source from further communication. In this example, routing, an awareness of the application data flow, and security are combined to allow the network to contribute to the success of the application.

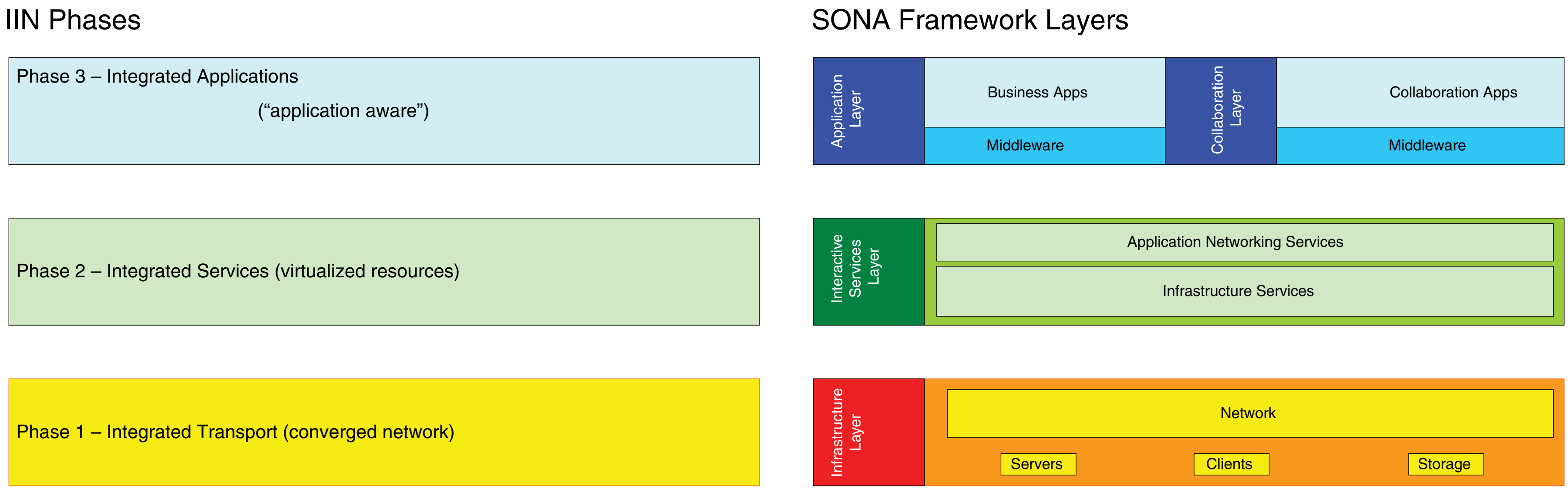
Services-Oriented Network Architecture (SONA) applies the IIN ideal to Enterprise networks. SONA breaks down the IIN functions into three layers:

- Network Infrastructure—Hierarchical converged network and attached end systems.
- Interactive Services—Resources allocated to applications.
- Applications—Includes business policy and logic

IOS features, such as Survivable Remote Site Telephony (SRST) and AutoQoS, cooperate with centralized services to increase the resiliency of the network by easily distributing network application logic to the edges of the enterprise, so that the entire network participates in operations instead of just the core.

Figure 1-1 shows how IIN and SONA more specifically compare.

FIGURE 1-1 IIN and SONA



Network Models

Cisco has developed specific architecture recommendations for Campus, Data Center, WAN, branches, and telecommuting. These recommendations add specific ideas about how current technologies and capabilities match the network roles within an enterprise.

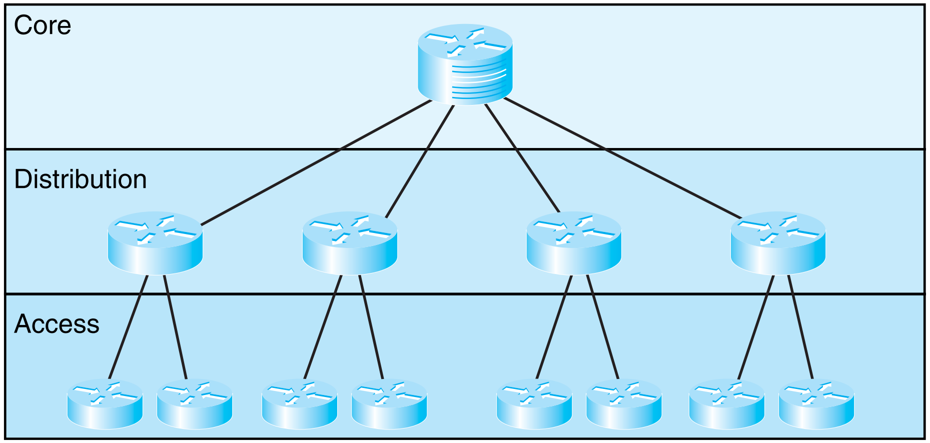
Each of these designs builds on a traditional hierarchical design and adds features such as security, QoS, caching, and convergence.

Hierarchical Design Model

The traditional model provided a high-level idea of how a reliable network could be conceived, but it was short on specific guidance.

Figure 1-2 is a simple drawing of how the three-layer model might have been built. A distribution layer-3 switch is used for each building on campus, tying together the access switches on the floors. The core switches link the various buildings together.

FIGURE 1-2 Three-Layer Hierarchical Design



The layers break a network in the following way:

- Access layer—End stations attach to the network using low-cost devices.
- Distribution layer—Intermediate devices apply policies.
  - — Route summarization
  - — Policies applied, such as:
    - Route selection
    - Access lists
    - Quality of Service (QoS)
- Core layer—The backbone that provides a high-speed path between distribution elements.
  - — Distribution devices are interconnected.
  - — High speed (there is a lot of traffic).
  - — No policies (it is tough enough to keep up).

Enterprise Composite Network Model

The newer Cisco model—the Enterprise Composite Model—is significantly more complex and attempts to address the shortcomings of the Hierarchical Design Model by expanding the older version and making specific recommendations about how and where certain network functions should be implemented. This model is based on the principles described in the Cisco Architecture for Voice, Video, and Integrated Data (AVVID).

The Enterprise Composite Model is broken into three large sections:

- Enterprise Campus
- Enterprise Edge
- Service Provider Edge