**Module 5**

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#### **1) Describe the three phases of evolving to an intelligent information network**. Integrating intelligence into the network involves aligning network and business requirements. To accommodate today’s and tomorrow’s network requirements, the Cisco vision of the future includes the Intelligent Information Network (IIN), a strategy that addresses how the network is integrated with businesses and business priorities. This vision encompasses the following features:

* Integration of networked resources and information assets that have been largely unlinked:  
  The modern converged networks with integrated voice, video, and data require that IT departments (and other departments traditionally responsible for other technologies) more closely link the IT infrastructure with the network.
* Intelligence across multiple products and infrastructure layers:  
  The intelligence built into each component of the network is extended network wide and applies end-to-end.
* Active participation of the network in the delivery of services and applications:  
  With added intelligence, it is possible for the network to actively manage, monitor, and optimize service and application delivery across the entire IT environment.
* **Phase 1: Integrated transport:** Everything (data, voice, and video) consolidates onto an IP network for secure network convergence. By integrating data, voice, and video transport into a single standards-based modular network, organizations can simplify network management and generate enterprise wide efficiencies. Network convergence also lays the foundation for a new class of IP-enabled applications, now known as Cisco Unified Communications solutions.
* **Phase 2: Integrated services:** When the network infrastructure is converged, IT resources can be pooled and shared, or virtualized, to flexibly address the changing needs of the organization. By extending this virtualization concept to encompass server, storage, and network elements, an organization can transparently use all its resources more efficiently. Business continuity is also enhanced because in the event of a local systems failure, shared resources across the intelligent network can provide needed services.
* **Phase 3: Integrated applications:** This phase focuses on making the network application ware so that it can optimize application performance and more efficiently deliver networked applications to users. In addition to capabilities such as content caching, load balancing, and application-level security, application network services make it possible for the network to simplify the application infrastructure by integrating intelligent application message handling, optimization, and security into the existing network.

#### 2) **Describe the three layers of the SONA framework.**

* **Networked Infrastructure layer:**   
  Where all the IT resources are interconnected across a converged network foundation. The IT resources include servers, storage, and clients. The Networked Infrastructure layer represents how these resources exist in different places in the network, including the campus, branch, data center, enterprise edge, WAN, metropolitan-area network (MAN), and with the teleworker. The objective of this layer is to provide connectivity, anywhere and anytime. The Networked Infrastructure layer includes the network device’s and links to connect servers, storage, and clients in different places in the network.
* **Interactive Services layer:**   
  Includes both application networking services and infrastructure services. This layer enables efficient allocation of resources to applications and business processes delivered through the networked infrastructure. This layer includes the following services:

— Voice and collaboration services

— Mobility services

— Wireless services

— Security and identity services

— Storage services

— Compute services

— Application networking services (content networking services)

— Network infrastructure virtualization

— Adaptive network management services

— Quality of service (QoS)

— High availability

— IP multicast

* **Application layer:**   
  This layer includes business applications and collaboration applications. The objective of this layer is to meet business requirements and achieve efficiencies by leveraging the interactive services layer. This layer includes the following collaborative applications:

— Instant messaging

— Cisco Unified Contact Center

— Cisco Unity (unified messaging)

— Cisco IP Communicator and Cisco Unified IP Phones

— Cisco Unified MeetingPlace

— Video delivery using Cisco Digital Media System

— IP telephony

#### 3) **Name some of the benefits of using the SONA framework.**

1. **Functionality**: Supports the organizational requirements.
2. **Scalability**: Supports growth and expansion of organizational tasks by separating functions and products into layers; this separation makes it easier to grow the network.
3. **Availability**: Provides the necessary services, reliably, anywhere, anytime.
4. **Performance**: Provides the desired responsiveness, throughput, and utilization on a per application basis through the network infrastructure and services.
5. **Manageability**: Provides control, performance monitoring, and fault detection.
6. **Efficiency**: Provides the required network services and infrastructure with

reasonable operational costs and appropriate capital investment on a migration path to a more intelligent network, through step-by-step network services growth.

1. **Security**: Provides for an effective balance between usability and security while

protecting information assets and infrastructure from inside and outside threats.

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#### **4) Match the PPDIOO network lifecycle phases with their correct descriptions.**

**Phases:**

| **a.** Prepare phase | **1.** The network is built |
| --- | --- |
| **b.** Plan phase | **2.** A network design specification is produced |
| **c.** Design phase | **3.** Includes fault detection and correction and performance monitoring |
| **d.** Implement phase | **4.** Network requirements are identified |
| **e.** Operate phase | **5.** Business requirements and strategy related to the network are established |
| **f.** Optimize phase | **6.** Based on proactive management of the network |

**a- 5, b- 4, c- 2, d- 1, e- 3, f- 6**

#### **5) What are the three basic steps of the design methodology?**

**Prepare phase:** The Prepare phase involves establishing the organizational (business) requirements, developing a network strategy, and proposing a high-level conceptual architecture, identifying technologies that can best support the architecture.

**Plan phase:** This phase involves identifying the network requirements, which are

based on the goals for the network, where the network will be installed, who will

require which network services, and so forth.

**Design phase:** The initial requirements determined in the Plan phase drive the

network design specialists’ activities. These specialists design the network

according to those initial requirements, incorporating any additional data gathered

during network analysis and network audit (when upgrading an existing network)

and through discussion with managers and network users.

**Implement phase:** Implementation and verification begins after the design has been approved.

**Operate phase:** Operation is the final test of the design’s appropriateness. The

Operate phase involves maintaining network health through day-to-day operations,

which might include maintaining high availability and reducing expenses.

**Optimize phase:** The Optimize phase is based on proactive network management,

the goal of which is to identify and resolve issues before real problems arise and

the organization is affected.

#### **6) Describe the role of each layer in the hierarchical network model.**

The Role of the Access Layer

The access layer is the concentration point at which clients access the network.

Access layer devices control traffic by localizing service requests to the access media.

The purpose of the access layer is to grant user access to network resources. Following are the access layer’s characteristics:

* In the campus environment, the access layer typically incorporates switched LAN devices with ports that provide connectivity for workstations and servers.
* In the WAN environment, the access layer for teleworkers or remote sites provides access to the corporate network across some wide-area technology, such as Frame Relay, Multiprotocol Label Switching (MPLS), Integrated Services Digital Network, leased lines, Digital Subscriber Line (DSL) over traditional telephone copper lines, or coaxial cable.

The distribution layer

The distribution layer represents both a separation between the access and core

layers and a connection point between the diverse access sites and the core layer.

The distribution layer determines department or workgroup access and provides

policy-based connectivity.

*Following are the characteristics of the distribution layer:*

■ Distribution layer devices control access to resources that are available at the core

layer and must therefore use bandwidth efficiently

■ In a campus environment, the distribution layer aggregates wiring closet

bandwidth by concentrating multiple low-speed access links into a high-speed core

link and using switches to segment workgroups and isolate network problems to

prevent them from affecting the core layer.

Core layer

The function of the core layer is to provide fast and efficient data transport. *Characteristics of the core layer include the following:*

■ The core layer is a high-speed backbone that should be designed to switch packets as quickly as possible to optimize communication transport within the network.

■ Because the core is critical for connectivity, core layer devices are expected to provide a high level of availability and reliability. A fault-tolerant network design ensures that failures do not have a major impact on network connectivity. The core must be able to accommodate failures by rerouting traffic and responding quickly to changes in network topology. The core must provide a high level of redundancy. A full mesh is strongly suggested, and at least a well connected partial mesh with multiple paths from each device is required.

■ The core layer should not perform any packet manipulation, such as checking access lists or filtering, which would slow down the switching of packets.

■ The core layer must be manageable.

■ The core devices must be able to implement

#### **7) Why might the distribution layer need to redistribute between routing protocols?**

The distribution layer represents a routing boundary between the access and core layers and is where routing and packet manipulation are performed.

■ The distribution layer allows the core layer to connect diverse sites while maintaining high performance. To maintain good performance in the core, the distribution layer can redistribute between bandwidth-intensive access-layer routing protocols and optimized core routing protocols. Route filtering is also implemented at the distribution layer.

■ The distribution layer can summarize routes from the access layer to improve routing protocol performance. For some networks, the distribution layer offers a default route to access-layer routers and runs dynamic routing protocols only when communicating with core routers.

#### **8)** [**What are three roles of the hierarchical model’s core layer?**](#_mvb87gdwnlsl)

[Question 6](#_mvb87gdwnlsl)

#### **9) What is the role of the Service Provider functional area?**

The service provider functional area is responsible for connectivity into Service Provider networks. This includes a number of different connectivity options, from Internet access through Public Switched Telephone Network (PSTN) access.

The second level of division within the service provider functional area includes different modes that are used to connect these different service options:

* ISP—The ISP module is responsible for connecting the networking to the Internet; this includes access for Enterprise remote locations.
* Public Switched Telephone Network (PSTN) —The PSTN module is responsible for connecting network elements using analog, ISDN, and wireless technologies (cellular). Often this connectivity is used for Out-of-Band (OOB) management and backup purposes.
* Frame Relay and ATM Module—The Frame Relay and ATM module is used to connect remote locations via a number of different permanent technologies, including Frame Relay and ATM. This module also includes connectivity using a number of different technologies that are more modern, including Digital Subscriber Lines (DSL), Cable, Wireless (bridging), and Multiprotocol Label Switching (MPLS).