**Introduction**

**Intelligent Information Network**

The Intelligent Information Network (IIN) offers companies an understanding of how the role of the network is evolving to meet business needs. The IIN vision is essentially the concept of network simplification through the alignment of technology and business priorities. Beyond evolution, the role of the network is expanding as more and more services become available network offerings. Cisco has established four technological roadmaps specific to the individual business needs of its customers. Each of the four roadmaps defines the IIN vision for a particular market segment or business type. These architectures are meant to show businesses how to look forward three to five years in planning network expansion. These four technological roadmaps are as follows:

■ Service-Oriented Network Architecture (SONA)

■ Service Provider Architecture (IP Next-Generation-Networks or IP-NGN)

■ Commercial Architecture

■ Consumer Architecture

Together these comprise the foundation of the IIN. The goal of the IIN is to build intelligence across multiple protocols and infrastructure layers to allow the network to be more aware of the needs of its users and respond efficiently to those needs by allocating needed resources and/or applications regardless of the nature of the connected device. The network aligns itself with the business priorities of an organization through services, availability, adaptivity, and resilience. The Cisco vision of the IIN composition includes these features:

■ Network resource and information asset integration into the network—Includes video, voice, and data integration into the network infrastructure

■ Cross-platform/cross-product intelligence spanning all layers of infrastructure—

Network-wide extension of that intelligence to permit end-to-end connectivity and a common user experience regardless of access device or method

■ A network that actively participates in the delivery of services and applications—

Proactive allocation of network resources as needs demand for a particular application, service, or user

IIN is beyond the traditional concept of basic network connectivity, bandwidth allocation, and access to applications. A true IIN offers end-to-end functionality that adaptively shapes the user experience on-the-fly and promotes true business transparency and agility.

The evolutionary approach of the IIN technology model consists of the following three essential phases. In each phase, the opportunity exists to further augment the applications and services available to meet the business need.

■ Integrated transport phase—The network is a common pathway for all traffic types. Each traffic type is classified according to the identified business priorities and/or the nature and sensitivity of the traffic to latency, jitter, and other assorted network conditions. This permits the network architect to present a modular functionality that can be customized by organizations or individual departments according to their individual needs. Network convergence also lays the foundation for a new class of IP-enabled applications delivered through Cisco IP Communications solutions.

■ Integrated services phase—With full network convergence, IT resources can be pooled and personnel can be cross-trained and utilized more efficiently. This remedies the age-old issue of having only one "go-to" person in IT. Each IT staff member becomes a "go-to" person. Diverse resources required by individual organizations and personnel can be virtualized and moved into the network so that a new degree of flexibility can become reality. This flexibility comes into reality by using the network as the platform—a single resource capable of providing common services to all applications. Rather than having hundreds or thousands of mission-specific servers, the network becomes the platform. The servers are moved into the network as virtual services, thereby providing immense savings in hardware, power consumption, and real estate usage in the data center. Business continuity is also enhanced because shared resources across the IIN provide services in the event of a local systems failure.

■ Integrated applications phase—The third phase of the IIN evolution is known as

Application-Oriented Networking (AON). This is where the plans come to fruition. The network reaches an "application-aware" state that allows it to optimize application performance and more efficiently deliver networked applications to the end-user community. Additional capabilities, such as content caching, load balancing, and application-level security, allow the infrastructure to add intelligence through simplification of the overall network infrastructure.

Of particular interest in this book is the technical roadmap focused on enterprise networks known as SONA. SONA is the framework that provides the evolutionary path for an enterprise network to become an IIN. While the remaining three architectures are critical for their respective market segments, they are beyond the scope of this book. They are mentioned here to illustrate that concepts similar to those discussed here are laid out for service provider (SP), small/medium business (SMB), and small office/home office (SOHO) networks.

SONA

The path of evolution for business services and applications is emerging into a more efficient, flexible, and dynamic model. This is the IIN. The network is the platform. Individual resources can be allocated dynamically, as needed by resource-hungry applications or services. Resources such as CPU, memory, and storage can be added and/or removed on-the-fly and without impact on other processes. Even better, the cost of such a model is reduced through shared resource utilization. No longer are dedicated resources needed for mission-specific applications. Instead, the network maintains resource pools that provide dynamic allocation of resources on demand.

For enterprise networks, SONA provides the architectural framework necessary to build an IIN. SONA leverages the network to allow interactive services to be added to it. This provides the additional benefit of allowing loosely connected services and/or applications to communicate, yet remain independent of each other. This collaborative capability permits provisioning of a new level of service, allowing an enterprise to offer its user community the same network experience, including applications, services, and capabilities, regardless of their location or choice of network endpoint device.

As previously mentioned, the SONA vision is built around the enterprise network. The architecture itself is further subdivided into layers so that each can be implemented properly to support the next. SONA is the architectural framework that leads enterprise network evolutionary processes, allowing a network to reach the IIN state in order to accelerate applications, business processes, and, most importantly, profitability. Figure 1-1 illustrates the breakdown of the SONA layers.

Figure 1-1 Cisco SONA



SONA makes extensive use of Cisco product lines and business partners to accomplish its goal of providing secure, flexible, adaptive, and converged network infrastructures. To aid the comprehension and to promote understanding of individual technology roles in the architecture, a layered model was created. Unlike the OSI Model, the SONA layered model consists only of three layers. As shown in Figure 1-1, these are as follows (from the bottom up):

■ Networked Infrastructure Layer

■ Interactive Services Layer

■ Application Layer

Service integration is a key concept in the overall SONA picture. This allows common services to be provided from a single point within the infrastructure. Keeping these services in loosely coupled relationships with other services (for example, web services, XML, and so on) allows a single service or resource to be shared among multiple applications. This simplifies support, reduces maintenance costs, and potentially provides licensing savings on some applications.

Each layer has its form and function in the construction of an IIN. The sections that follow provide a brief discussion of that form and function at each layer.

The Service-Oriented Network Architecture (SONA) is one of the central models of Cisco network design and management. The SONA network architecture contains three basic layers:

* **Network infrastructure layer:**Contains the enterprise network architecture, which includes switches, routers, communication links, and so on. This layer has redundancy built into it and contains network layer security to enforce business policies as needed.
* **Integrated service layer:** *Virtualizes* services (or unties them from specific pieces of hardware) to allow them to be provided over a dispersed or centralized network environment. The following services are provided at this layer:
	+ *Identity:*Authentication services for user or device credentials, which can play a role for network or application access.
	+ *Mobility:* Allowing access to network resources from any location. This may rely on wireless technologies or a Virtual Private Network (VPN).
	+ *Storage:* Storage of important network data and replication or duplication of that data, over the network, to remote locations for disaster recovery.
	+ *Computing or processing:* Servers represent the main element of this component, while virtual servers allow for scaling and betting utilization of server processing power.
	+ *Security:* Security for your business is crucial, and the security level makes use of security features at the network level, such as intrusion detection and prevention systems (IDS and IPS).
	+ *Voice and collaboration:* Voice services now run over the main corporate data network, and have allowed for more options for users to communicate. These communication methods include the traditional telephone, but also include instant messaging and collaboration through websites, such as Microsoft’s SharePoint.
* **Application layer:** Carries the responsibility for providing the applications that users rely on. These applications include the following product areas:
	+ *Customer relationship management (CRM):* Communication with clients, as well as all of their pertinent data, can be found in CRM applications.
	+ *Enterprise resource planning (ERP):* Business data for your organization is found in your ERP system. This is everything that would have been in a traditional accounting system, plus information on business processes and business logic, thereby allowing you to derive more planning and statistical information from the accounting system.
	+ *Procurement:* Purchasing can sometimes be tracked as part of the overall corporate ERP system, or can be a standalone system to manage purchasing from the request for a quote through to the deployment of the purchased product to the end user.
	+ *Supply chain management (SCM):* Procurement systems can purchase items, but SCM systems tell procurement what parts need to be purchased and when. In manufacturing and service organizations, good SCM systems will provide you with “just in time” inventory items right before you need those items.
	+ *Instant messaging (IM):* Instant messaging has come into businesses who now expect to be able to instantly communicate within their network infrastructure. This assists in users on your network in their collaboration goals.
	+ *Unified messaging (UM):* Unified messaging talks all of the forms in which users can communicate and ties them together, allowing for unique situations, such as where an e-mail can be relayed to office voicemail, and then forwarded to a cell phone as a text message. Unified messaging takes control and integrates all communication and messaging formats within an organization, either partially or completely.

*Assignment:*

* + 1. List the four technological roadmaps designed by Cisco.
		2. Expand & Explain IIN by discussing its importance.
		3. How Cisco achieve IIN?
		4. Expand SONA & diagrammatically explain its components.
		5. Discuss Integrated Service layer of SONA briefly.
		6. Explain Application layer & its components in detail with respect tp SONA.