CHAPTER 2

Prepare and Plan

Introduction to Prepare and Plan

In the Prepare and Plan phase, you evaluate Cisco technologies that address your business needs. Gather information about your business and technical environment that will feed into the high-level design. Then, create a business case for the IP telephony system that provides the best return on your investment.

Before You Begin

Understand the features and functions of IP telephony applications. Start with the IP Telephony Overview and the System Release Notes. Then, review the deployment models to understand your options.

When You Are Done

You have defined and created the following:

- Your business and system requirements
- A list of components and applications that match the requirements
- A project plan based on those requirements including a proposed, high-level design

Major Concepts and Tasks in This Process

- Cisco Unified Communications Features and Benefits Overview
- Planning Concepts
- Planning Tasks

Cisco Unified Communications Features and Benefits Overview

The Cisco Unified Communications 6.1(1) system securely integrates voice, video, and other collaborative data applications into intelligent network communications solutions. This system, which includes IP telephony, unified communications, rich-media conferencing, IP video broadcasting, and customer contact solutions, takes full advantage of the power, resiliency, and flexibility of an IP network. The elements of this system were designed, developed, documented, and tested as part of a comprehensive, end-to-end Unified Communications System.

The Cisco Unified Communications system reduces the cost and complexity associated with managing multiple and remote sites, meets stringent quality of service (QoS) requirements, and provides optimal availability and security when deployed as part of a converged network. In addition, the solution

interoperates with existing time-division multiplexing (TDM)-based systems and enterprise business applications, allowing organizations to migrate to full-featured IP Communications while maintaining existing technology investments.

This topic provides an overview of the key features and benefits of Cisco Unified Communications. It includes these sections:

System Definition

The Cisco Unified Communications system is designed for a single, secure, converged network. Part of an integrated, comprehensive Cisco architecture, the communications applications reside “in” the network, not “on” the network, and can easily incorporate emerging business processes, applications, and new devices. Applications can be deployed in a single instance, rather than in multiple instances, and managed services offerings further increase deployment flexibility. Standards-based Cisco Unified Communications products let organizations migrate based on business needs, not technical limitations, to keep pace with new technology.

This release of the Cisco Unified Communications system introduces the Cisco Unified Communications Manager Business Edition and deployment models for the medium-sized business. The Cisco Unified Communications Manager Business Edition includes the features and capabilities of Cisco Unified Communications Manager, Cisco Unified Mobility, and Cisco Unity Connection co-resident on a single, low-cost Media Convergence Server. The Cisco Unified Communications Manager Business Edition is designed to support 150 to 500 endpoints in one main and up to five remote locations.

The Cisco Unified Communications System also includes a suite of network management applications that allow you to monitor, manage, and troubleshoot your system. It also includes tools that allow you to analyze the readiness of your infrastructure to support the UC system.

System Release Strategy

The Cisco Unified Communications system includes the following types of releases:

- Major release—Marks the beginning of a major new release version. This release type typically is based on a major release of at least one of these components: Cisco Unified Communications Manager, Cisco Unity, Cisco Unified MeetingPlace, or Cisco Customer Response Solutions.

- Minor release—Adds features and fixes to an existing major release. This release type can consist of revisions to existing components and new versions of components.
- Maintenance release—Contains bug fixes for one or more of the components. This release type is based on an existing major or minor release.

For example, in Cisco Unified Communications release 6.1(1), “6” indicates the major release, the first “1” indicates the minor release, and the second “1” indicates the maintenance release.

Service Offerings

Using the Cisco Lifecycle Services approach, Cisco Systems and its partners offer a broad portfolio of end-to-end services. These services are based on proven methodologies for deploying, operating, and optimizing Unified Communications solutions. Planning and design services, for example, can help you meet aggressive deployment schedules and minimize network disruption during implementation. Operate services reduce the risk of communications downtime with expert technical support. Optimize services enhance solution performance for operational excellence. Cisco and its partners offer a system-level service and support approach that can help you create and maintain a resilient, converged network that meets your business needs.

Service offerings include:

- Cisco Unified Communications Software Subscription, which allows you to purchase major software version upgrades of various Cisco Unified Communications products at a reduced cost through a one-, two-, or three-year subscription.
- Cisco Unified Communications Essential Operate Service, which provides 24-hour, 365-day-a-year access to Cisco Systems engineers and certified partners who are highly trained and have a deep understanding of Cisco Unified Communications products and technologies.
- Cisco Unified Communications Select Operate Service, which provides a proactive support solution that combines 24-hour, 365-day-a-year access to technical support representatives plus a simple-to-install monitoring solution designed for Cisco Unified Communications.
- Cisco Unified Communications Cisco SMB Network Operate & Optimize Service, is a partner-led service offering (designed specifically for the medium-sized businesses) that enables the delivery of affordable, ongoing, high-availability network support.

Career Certifications

The Cisco Certified Voice Professional (CCVP) certification and related certifications are designed for IT professionals who are responsible for integrating voice technology into underlying network architectures. Individuals who earn a CCVP certification can help create a telephony solution that is transparent, scalable, and manageable. Earning a CCVP certification validates a robust set of skills in implementing, operating, configuring, and troubleshooting a converged IP network. The certification content focuses on many components of the Cisco Unified Communications system, including Cisco Unified Communications Manager, quality of service (QoS), gateways, gatekeepers, IP phones, voice applications, and utilities on Cisco routers and Cisco Catalyst switches.

Solution Bundling

In addition to providing traditional solution ordering, where you choose the individual components and quantities that you require, the Cisco Unified Communications system provides flexible bundling options. A bundled solution simplifies the way in which you order applications and services and makes it easy to add options.

Cisco Unified Communications systems also offer a bundling option for medium-sized businesses. This option includes the Cisco Unified Communications Manager Business Edition, which is designed specifically to address the call processing and messaging needs of medium-sized businesses, as well as new network management tools.

Intelligent Information Network

The Cisco Intelligent Information Network facilitates the evolution of networking to systems. It allows the network to be used as a strategic asset and provides capabilities that include:

- Cisco Discovery Protocol (CDP)—A simple broadcast protocol that devices use to advertise their presence, it operates in the background and facilitates communication between a Cisco Unified IP Phone plugged into a network and the network switch.
- QoS—Cisco provides an end-to-end solution to ensure quality of service. QoS starts at the phone and LAN distribution layer, where packets are classified and marked as high priority traffic. Traffic markings originating from Cisco Unified IP Phones are automatically trusted by the Cisco switch infrastructure, which typically remarks traffic from nontrusted end user workstations. Configuration is made easier through Cisco AutoQoS, which automatically handles a range of tasks traditionally done manually, including classifying applications, generating policies, configuring the proper QoS configurations, monitoring and reporting to test QoS effectiveness, and enforcing service-level consistency.

  As traffic flows through the access layer, priority queuing and buffer management ensure that real-time traffic is prioritized over less time-critical data. Where bandwidth is most restricted, across the WAN, the Cisco solution provides RSVP for reserving the bandwidth needed for voice. Fragmentation and interleaving of large blocks of data ensure a steady stream of voice traffic, and voice packet header compression minimizes bandwidth consumed.
- VLAN—When a Cisco Unified IP Phone boots up on the IP network, it advertises its presence using CDP, and it requests an IP address lease from a DHCP server. The Cisco LAN switch learns of the new phones via CDP and automatically reconfigures to add that port to the VLAN used for voice.

  With this feature, the LAN infrastructure can distinguish a phone from a PC and does not require manual configuration every time a phone is added, moved, or removed.
- Wireless—Cisco wireless access points allow Cisco wireless phone users to roam a campus without losing voice connectivity. If a user roams to a different site, the system will discover the new physical location for emergency 911 information purposes.
- Power over Ethernet (POE)—Eliminates the need for local power connections for every phone. Cisco switches can be configured with redundant power supplies connected to uninterruptible power supplies in a data center to ensure that the power to the phone is preserved, even when local power for other equipment at the desk is lost. Most Cisco Unified IP Phone models support the industry-standard 802.3af power and the Cisco pre-standard inline power.
- Gigabit Ethernet (GigE)—Allows certain Cisco Unified IP Phone models to take advantage of the emerging Gigabit Ethernet LAN infrastructure.

Business Productivity Applications

The Cisco Unified Communications system provides a wide array of applications that enhance business and organizational productivity and efficiency. These applications offer capabilities that include:

- Rich-media conferencing—Cisco Unified MeetingPlace provides intuitive interfaces for setting up, attending, and managing meetings. Extensive voice, video using Cisco Unified Videoconferencing, and web conferencing capabilities enable a range of meeting applications, including highly-collaborative meetings, training sessions, and presentations.
- Messaging—Cisco Unity provides users with access to voice, e-mail, and fax messages from a Cisco Unified IP Phone or from a PC. These solutions combine unified messaging with personal productivity tools to help manage communications quickly and conveniently. For midsize organizations, Cisco Unified Connection provides voice messaging, speech recognition, call routing rules, and desktop PC message access in a system that is easy to manage and deploy. For small organizations, Cisco Unity Express offers a voice messaging solution that integrates with your router.
- Common interface—Cisco Unified Personal Communicator is a presence-based desktop application that provides a focal point for phone services, directory services, messaging, and conferencing.
- Cisco Unified Presence—The focal point of all status processing, including attributes and capabilities. It links the various knowledge within each application to provide a ubiquitous and broad view of a defined user within the Cisco Unified Communications system.

Customer Interaction Network

The Cisco Customer Interaction Network component provides a single, integrated platform for all contact center locations. It is a distributed, IP-based customer-service infrastructure that easily integrates with legacy contact center platforms and networks, providing multi-channel services and integration with customer relationship management applications.

- Intelligent contact routing and multi-channel automatic call distribution (ACD)—Enables interaction with customers via phone (inbound or outbound), web, e-mail or chat. The application provides call handling tailored to different classes of customers and to individual customers, providing flexible contact center operational profiles based on varying business needs.
- Voice and web self-service—Extracts and parses web content and presents this data to customers through a telephony interface, allowing simple transactional requests to be handled by the interactive voice response (IVR) system instead of by agents. This application provides self-service automation with automatic speech recognition (ASR) and TTS. It also performs *prompt-and-collect* functions to obtain user data such as passwords or account identification that it can then pass to contact center agents, and it delivers proactive notification users through e-mail, fax, pager, and short message service (SMS).
- Agent and supervisor options—Provide full support for agent or supervisor interaction using chat capabilities. Instant messaging offers the capability to communicate with any or all the agents on a supervisor's team. Other options include:
  - Agent status monitoring
  - Silent monitoring
  - Barge-in
  - Intercept
  - Real-time and historical reporting

  - ACD

IP Communications

IP communications provides powerful and efficient voice, data, and video communications, and related capabilities. Key features include:

- Video telephony—Allows video calls to be placed and received over an IP telephony network using the familiar phone interface. Video endpoints support common call features such as forward, transfer, conference, and hold. Use of a single infrastructure also enables a unified dial plan and user directory for voice and video calls. This release of the Cisco Unified Communications system also includes Cisco Unified Conferencing for TelePresence, which is a new technology that combines rich audio, high-definition video, and interactive elements to deliver a unique in-person experience.
- Mobility—Provides for several forms of user mobility, including:
  - Extension Mobility—Allows users to access any phone within a single Cisco Unified Communications cluster as their own, by simply logging in to the phone. After log in, the phone assumes all of the user profile information, including line numbers, speed dials and service links.
  - Site/campus mobility—Allows users to access the Cisco Unified Communications network through the wireless Cisco Unified Wireless IP Phones 7920G and 7921G. In addition, this release includes enhanced mobile IP phone applications that allow users to:

    Dynamically manage how and when mobile calls take place

    Intelligently screen calls based on urgency, subject matter, and caller identity

    Identify which users are available to talk and which users choose not to be disturbed

    Increase accessibility of corporate calendar and contact information from mobile phones.
- Emergency caller response/safety and security—Enables emergency calls in an IP network to be directed to the appropriate Public Safety Answering Point (PSAP). In this way, emergency agencies can identify the location of 911 callers without a system administrator needing to keep location information current.

Security

The Cisco Unified Communications system takes a layered approach to protecting against various attacks, including denial of service (DOS), privacy, and toll fraud. Security features include:

- Encryption of signaling and media—Ensures that the signaling and the actual phone conversations are protected against unintended interception by third parties.
- Catalyst Integrated Security Features (CISF)—Includes private VLANs, port security, DHCP snooping, IPSource Guard, secure Address Resolution Protocol (ARP) detection, and dynamic ARP inspection. These features protect the network against attacks such as man-in-the-middle attacks and other spoofing.
- Integration with firewalls—Ensures that system platforms are accessible only by authorized devices. The firewall acts as a guardian between all IP devices and the Cisco Unified Communications system platforms, ensuring that only specific transactions are allowed.
- Secure platforms—Provides features, such as host-based intrusion detection, optional security scripts, and anti-virus software, that ensure that the platform is hardened against intruders and malicious code.

- Enhanced phone security features—Provides configurable levels of security. Options include configuring the phone to ignore Gratuitous Address Resolution Protocol (GARP) requests, disabling the PC port on the phone, disabling access to network configuration settings on a phone, and configuring a phone to accept only digitally signed firmware images.

Deployment and Migration

The Cisco Unified Communications system is designed to be deployed efficiently and effectively. The solution offers:

- Flexible deployment models—Cisco Unified Communications supports LAN and WAN connectivity and can be configured for single-site or multi-site networks. Headquarters, contact centers, branch offices, and telecommuter configurations can be interconnected without geographic constraints. Call processing and administration can be centralized or distributed.
- Integration with existing equipment and networks—Cisco Unified Communications provides gateway support to enable integration and interoperability with existing call processing equipment, phones, and TDM networks. This capability ensures compatibility with and migration from legacy systems, and supports:
  - Integration with PBXs through QSIG, Digital Private Network Signaling System (DPNSS), and PRI links
  - Integration with ACD platforms via CTI interface
  - Integration with legacy phones through gateways
  - Integration with TDM networks through gateways via T1, E1, and PRI links
- Open IP connectivity through SIP—Cisco Unified Communications provides enhanced support for SIP trunking and to a variety of SIP endpoints. An integrated Cisco Unified Presence provides user information and status and enables interconnection to popular messaging networks.
- High availability—Cisco Unified Communications networks can be built to meet high availability requirements as business needs dictate. Networks can be designed to ensure no single point of failure in either network topology or applications. Cisco Unified Survivable Remote Site Telephony (Unified SRST) allows remote branch offices to remain in service even when the WAN access link is lost.

IP Telephony Overview

The Cisco IP telephony system includes a wide array of hardware and software components, such as call processing products, communications endpoints (Unified IP phones and video devices), and special applications, all deployed over a converged network infrastructure. The network infrastructure for Cisco IP telephony includes PSTN gateways, analog phone support, and digital signal processor (DSP) farms.

The following topics are described:

Market Descriptions

Cisco provides Unified Communications solutions for every market size. The following subsections describe the small, medium, and enterprise markets and the Unified Communications solutions that Cisco offers:

- Small Business
- Medium Business
- Enterprise Business

Note Many of the Cisco Unified Communications products and solutions can be applied in any market. Those products and solutions that apply to a specific market are labeled as such.

Small Business

Small businesses are those with the number of employees between 5 and 100. These businesses require IP telephony systems that are low-cost, easy to deploy, easy to use, and scalable. These businesses must face the challenge of managing the technology around a data and voice communication systems without taking the focus off business.

Many growing businesses do not have the capital to keep up with the latest productivity-enhancing technologies, let alone the staff to maintain the systems. Until Cisco provided Unified Communications for small business, communications options had been limited to products and services that were too complicated, too costly, or not designed to work as a complete system. Now, Cisco delivers cost-effective voice, video, and data integration that is critical to the success of the small business.

The Cisco Unified Communications solution options for small business include:

- Call Control
  - Cisco Unified Communications Manager Express (formerly known as Cisco Unified CallManager Express)
  - Cisco Unified Communications 500 Series for Small Business (designed specifically for business with under 50 users)
  - Cisco Unified Survival Remote Site Telephony
- Conferencing
  - MeetingPlace Express
- Voice Mail and Messaging
  - Cisco Unity Express
- Wireless and Mobility
  - Cisco 500 Series Wireless Express Access Point and Controller
- Network Management
  - Cisco Monitor Manager
  - Cisco Monitor Director
- Infrastructure
  - Cisco Unified Communications 500 Series for Small Business
  - Cisco 800 Series Routers

  - Catalyst Express 500 Series Switches

Medium Business

Medium businesses are those with the number of employees between 100 and 1000 employees. There are over 5,000,000 firms worldwide that are considered medium businesses. These businesses vary greatly when determining the voice, video and data requirements of running their business.

The role of technology is changing for medium businesses. As organizations and competitors become more global, they are turning to network technology to better connect with customers, suppliers, and customers.

Cisco Unified Communications is an integrated set of communications products and services that addresses the needs of medium businesses. It optimizes the resources of a business by transparently integrating voice, video, data, security, and mobility into a single efficient and affordable communications solution. Cisco Unified Communications works with existing business applications and infrastructure to create an accessible yet secure network in which information is always available. All communications are more effective, more mobile, and highly secure.

A Cisco Unified Communications solution resides on a single, converged voice, video and data network that delivers the highest level of security because security is built right into the network. An open platform provides superior investment protection, allows easy integration of critical applications from Cisco and other industry leaders, and includes more support for mobility, network management, and security.

The Cisco Unified Communications options for medium businesses include:

- Call Control
  - Cisco Unified Communications Manager
  - Cisco Unified Communications Manager Business Edition, available with Cisco Unity Connection co-resident on the same server
  - Cisco Unified Communications Manager Assistant
  - Cisco Unified Communications Manager Express
  - Cisco Unified Survivable Remote Site Telephony (SRST)
  - Cisco Unified Presence
  - Cisco Unified Business Attendant Console and Cisco Unified Department Attendant Console
- Applications
  - Cisco Emergency Responder
  - Cisco Unified Application Environment
- Conferencing
  - Cisco Unified MeetingPlace Express
  - Cisco Unified Video Conferencing
- Voice Mail and Messaging
  - Cisco Unity Connection
- Endpoints and Clients
  - Cisco Unified Personal Communicator
  - Cisco Unified Video Advantage

  - Cisco IP Communicator
  - Cisco Unified IP Phone 79XX series
- Wireless and Mobility
  - Aironet Wireless Access Point
- Security
  - Cisco Advanced Security Appliance ASA 5500 Series
  - Firewall Service Modules (FWSM)
  - Cisco Intrusion Prevention System Appliance IPS-4200
  - Cisco Security Agent Management Center
  - Cisco Clean Access
- Network Management
  - Cisco Unified Operations Manager
  - Cisco netManager - Unified Communications
  - Cisco Monitor Manager
  - Cisco Monitor Director
- Infrastructure
  - Routers
  - Gateways and Gatekeepers (H.323/MGCP)
  - Cisco Resource Reservation Protocol (RSVP)
  - Cisco Unified Mobility (formerly known as Cisco Unified MobilityManager) now integrated into the Cisco Unified Communications Manager software

Enterprise Business

Enterprise businesses are those with the number of employees exceeding 1000 employees. The technology demands of large businesses require a system of enterprise-class solutions that facilitate more engaging and efficient interactions among employees, partners, and customers, and provide the foundation for a collaborative workforce. They require applications that enable user-controlled productivity anywhere, anytime with any device and standards-based, secure systems, built into an intelligent, integrated network.

Cisco Unified Communications solutions dramatically improve operational efficiencies, increase organizational productivity, and enhance customer satisfaction to create an empowered, effective work environment. By promoting greater levels of workforce collaboration, Cisco Unified Communications solutions help enterprises exceed customer expectations, outpace the competition, and realize a measurable return on their investments. These solutions and technologies are key to delivering enterprise-class IP Communications.

The Cisco Unified Communications options for enterprise businesses include:

- Call Control
  - Cisco Unified Communications Manager
  - Cisco Unified Communications Manager Assistant
  - Cisco Unified Communications Manager Express
  - Cisco Unified Survivable Remote Site Telephony (SRST)

  - Cisco Unified Contact Center Express/Cisco Customer Response Solution
- Applications
  - Cisco Unified Presence
  - Cisco Emergency Responder
  - Cisco Unified Application Environment
- Conferencing
  - Cisco Unified MeetingPlace
  - Cisco Unified Video Conferencing
- Voice Mail and Messaging
  - Cisco Unity
  - Cisco Unity Express
  - Microsoft Active Directory (integrated with Cisco Unity and Cisco Customer Response Solution)
- Endpoints and Clients
  - Cisco Unified Personal Communicator
  - Cisco Unified Video Advantage
  - Cisco IP Communicator
  - Cisco Unified IP Phone 79XX series
- Wireless and Mobility
  - Aironet Wireless Access Point
  - Cisco Unified Mobility (formerly known as Cisco Unified MobilityManager) now integrated into the Cisco Unified Communications Manager software
- Security
  - Cisco Advanced Security Appliance ASA 5500 Series
  - Firewall Service Modules (FWSM)
  - Cisco Intrusion Prevention System Appliance IPS-4200
  - Cisco Security Agent Management Center
  - Cisco Clean Access
- Network Management
  - Cisco Unified Operations Manager
  - Cisco Monitor Manager
  - Cisco Monitor Director
  - Cisco Unified Service Monitor
  - Cisco Unified Provisioning Manager
  - Cisco Unified Service Statistics Monitor
- Infrastructure
  - Routers
  - Gateways and Gatekeepers (H.323/MGCP)

  - Cisco Resource Reservation Protocol (RSVP)

Product Categories

The primary types of IP telephony system components are grouped in the following categories:

- Call control—Cisco Unified Communications Manager is the core call processing software for the Cisco IP telephony system. It builds call processing capabilities on top of the Cisco IP network infrastructure. It extends enterprise telephony features and capabilities to packet telephony network devices such as Unified IP phones, media processing devices, Voice over IP (VoIP) gateways, and multimedia applications.Applications—Cisco Unified Application Environment is the core software component that enables the development of customized applications that streamline business processes and drive productivity through IP-based Unified Communications.
- Conferencing—Cisco Unified MeetingPlace is the core conferencing software that provides integrated voice, video, and Web conferencing capabilities to enable remote meetings that are natural and effective with face-to-face quality, such as meetings, training sessions, and presentations.
- Voice mail and messaging—Cisco Unity is the core messaging software that delivers powerful voice, integrated, and unified messaging options that transparently integrate with Microsoft Exchange, Lotus Domino, and Novell GroupWise.
- Endpoints and clients—Cisco IP Communicator is the core software that integrates the management capabilities of IP-based networks with phones, pagers, and computers and use these for signaling, voice communications, and data communications.
- Wireless and Mobility—Cisco Unified Mobility Advantage, Cisco Unified Mobile Communicator, and Aironet Wireless Access Points are the core software and hardware components that enable secure and scalable methods to real-time access to instant messaging, e-mail, and network resources.
- Security—Cisco Advanced Services Appliance ASA 5500 Series, Firewall Services Modules, and Cisco Intrusion Prevention System Appliance IPS-4200 are the core hardware and software components that process new threats to the network by using proactive, automated, real-time threat management.
- Network management—Cisco Unified Operations Manager is the core software component that provides an integrated view of the entire Cisco Unified Communications system and presents the current operational status of each component of the IP communications network.
- Infrastructure—Cisco routers, voice gateways, and Cisco Unified Telepresence Multipoint Switches are the core hardware components that provide reliable connectivity that is more resilient and enables all the latest network services.

IP Telephony Deployment Models

A Cisco Unified Communications IP telephony system supports the deployment models in Table 2-1.

Table 2-1 Deployment Models

Deployment Model	Description
Single-Site Model	This model is designed for autonomous offices in which most or all employees are IPC users. This model can support up to 30,000 users.
Multisite Centralized Call Processing Model	This model is designed for distributed operations with a large central or headquarters site and multiple remote or branch sites. This model can support up to a total of 30,000 phones distributed among up to a maximum of 1000 sites. Based upon the bandwidth available, each site can support any number of users up to the overall total of 30,000 phones.
Multisite Distributed Call Processing Model	This model is designed for organizations with large user populations or large numbers of geographically distributed sites resulting in the need for more than a single call processing entity. This model is suited for deployments that require multiple Cisco Unified Communications Manager clusters or Cisco Unified Communications Manager Express platforms. Each call processing entity in this model is configured as a Single-Site Model or Multisite Centralized Call Processing Model and each has a common dial plan and feature set.
Clustering Over IP WAN Call Processing Model	This model is designed for organizations with large user populations across multiple sites that are connected by an IP WAN with the QoS features enabled. It supports the Local Failover Deployment Model and the Remote Failover Deployment Model.

See also Deployment Methodology in the Cisco Unified Communications System Description.

System Features in This Release

The Cisco IP telephony system is part of the end-to-end system release for Cisco Unified Communications that integrates telephony, conferencing, messaging, and security products for IP customers who have a variety of deployment models. For detailed Cisco IP telephony feature information, see the System Release Notes for IP Telephony: Cisco Unified Communications System, Release 6.1(1).

Additional Product Information

CiscoIP Telephony

Planning Concepts

This topic presents planning concepts. It is assumed that your network will be a converged network that combines voice, data, and video and that you have decided on one of network types discussed in the Internetwork Design Guide. You should also review the information contained in the Market Descriptions topic.

The primary planning considerations that drive the planning stage are:

- Type of deployment, whether it involves installing new equipment or migrating existing equipment
- Application availability based on your networking needs for multimedia and voice, security, redundancy, and fault tolerance
- Costs associated with your needs

Your goal is to minimize costs while delivering service that does not compromise established availability and performance requirements. These issues are essentially at odds. Any increase in availability and performance must generally be reflected as an increase in cost. As a result, you must carefully weigh the relative importance of resource availability, performance constraints, variables, and overall cost.

Note The concepts discussed in this topic are meant to be a high-level overview of considerations and not meant to be a definitive set of rules.

The concepts that you should review are as follows:

- Deployment Types
- Cost of Ownership
- Redundancy
- Capacity and QoS
- Security

Deployment Types

The deployment types to consider are as follows:

- New Installation
  - Greenfield—Completely new installation of the Cisco Unified Communications system, using no existing equipment.
  - Legacy—New installation of the Cisco Unified Communications system combined with existing legacy equipment, such as TDM PBXs and third-party adjuncts, which may require long-term co-existence and integration or eventual migration to the new installation.
  - Brownfield—Existing Cisco Unified Communications system, which requires an upgrade and migration from a previous system release to the current system release.
- Single-Stage Upgrade
  - Using existing hardware—All components in the network start at the base release set and all components can be upgraded to the target release set within a single maintenance window.
  - Using new hardware (flash-cut or shrink-and-grow)—A parallel network should be built using new hardware and pre-staged with configuration to support the existing production network.
- Multistage System Upgrade

  - Using existing hardware (hybrid system)—The components in individual sites can be upgraded from the base release set to the target release set in stages, during separate maintenance windows.
- Multisite Migration with Independent Site Upgrade
  - Using an hybrid network with interworking release sets—Components are upgraded on a site-by-site basis during separate maintenance windows. At the completion of each maintenance window, a hybrid network exists within the multiple sites that have components operating on the base release set; or components that are operating on the target release set; or components that are a hybrid system as described in Multistage System Upgrade.

For more information about deployment types, see the System Installation and Upgrade for IP Telephony: Cisco Unified Communications System.

Cost of Ownership

Information system budgets can run into millions of dollars. As large organizations increasingly rely on electronic data for managing business activities, the associated costs of computing resources continue to rise. With this in mind, your basic network plan should include the following:

- Environmental consideration—Include the location of hosts, servers, terminals, and other end nodes; the projected traffic for the environment; and the projected costs for delivering different service levels.
- Performance constraints—Consider network reliability, traffic throughput, and host and client computer speeds. For example, network interface cards and hard drive access speeds.
- Internetworking variables—Include the network topology, line capacities, packet flow assignments, redundancy and fault tolerance factors, backward compatibility (co-existence and interoperability), and security.

Redundancy

Redundancy is critical considering the number of vital business applications running on the network. If you have a distributed network with several access layers to remote offices, and you have a failure from the distribution layer to the core without redundancy, you have loss of network service for a large number of people. If you have redundancy in the distribution layer and the core, you can potentially lose one or more circuits without disturbing service to any particular group of users. Depending on the application, you may also need some redundancy from the access layer to the distribution layer.

Because of redundancy, if you drop a link at any one point in the network, every remote group or user still has a path to get back to the core. Even if you cut off the connection from one of the distribution switches back to the core, you still have access to the core for every user.

For more information on redundancy planning, see the Redundancy and Load Sharing Design Guide.

Capacity and QoS

Capacity and QoS are major considerations in a converged network and effect one another. QoS is needed to prevent applications from using more than a fair share of bandwidth and degrading the performance of other applications. At the WAN interface, QoS is needed to allocate expensive wide area capacity among applications.

Bandwidth and QoS requirements are easy to figure in a multilayered design because the traffic flow is fairly predictable. You can also have end-to-end QoS in a multilayered design. End-to-end QoS is critical when you have real-time applications, such as a voice conversation or video presentation, and you have non-real time applications that can interfere with the real-time applications. For example, if the real-time and non-real time applications arrive at the same layer at the same time, the network must pass the real-time packets first, as well as keep latency and jitter low. QoS end-to-end is the answer.

Consider Call Admission Control (CAC) as an alternative to QoS. CAC limits the amount of traffic allowed onto the network at the ingress point. Because you know that the network will be congested at various times during the day, you can disallow additional traffic by using CAC. Also consider using traffic shaping techniques using a traffic shaping devices. A combination of QoS, CAC and traffic shaping will provide optimal performance for applications on a converged network.

Managing link speed mismatches is the last element of traffic management. The mismatches, called chokepoints or bottlenecks, are a basic design issue whenever a large capacity link generates traffic destined for a low capacity link.To avoid the mismatches, carefully analyze the traffic and the device capabilities, then upgrade the interface (if needed) and apply a combination of CAC and QoS.

For more information on QoS, see the Enterprise QoS Solution Reference Network Design Guide.

Security

Cisco recommends multiple layers of security technologies to prevent a single configuration error from jeopardizing the security of the network. Cisco also recommends operational processes that ensure prompt application of software patches, timely installation of new security technologies, and performance of regular security audits and assessments.

As you begin to design your network, rank the importance of your network assets and services by considering these factors:

- What keeps you in business?
- How do you make money?
- Does loss of data or privacy equal lost money?
- What about regulatory compliance?
- How do you protect your critical data?
- Where does voice fit?

Then consider the potential threats to your business, which may include:

- Toll fraud
- Eavesdropping
- Address spoofing
- Fake caller identity
- Media tampering
- Denial of service
- SPAM, SPIT (SPAM over IP telephony), and SPIM (SPAM over Instant Messaging)

In addition to the operational processes, advanced security technologies should be reviewed and considered. Security technologies can be categorized as follows:

- Network security
  - Virtual LANs (VLANs)

  - Access control lists (ACLs),
  - Stateful firewalls with protocol aware inspection
  - Virtual Private Networks (VPNs)
  - QoS
  - Dynamic Address Resolution Protocol (ARP) inspection
  - Dynamic Host Configuration Protocol (DHCP) snooping
  - Port security
  - Network intrusion prevention
- Host security
  - Cisco Security Agent
  - Third-party anti-virus software
  - Host-based firewalls
  - Hardened operating systems
- User authentication, authorization, and accounting security
  - Phone image authentication
  - Multilevel administration privileges
  - Call detail reporting

For more information about Cisco end-to-end security designs, see the SAFE Blueprint. For more details about Cisco integrated network security solutions, see the following resources:

- Security Solutions and Products
- Enhanced Security for Unified Communications
- Networking Professionals Connection

Planning Tasks

The following overview shows the high-level tasks of the planning process:

- Determine Your Business Requirements
- Use Planning Tools and Templates
- Understand Your Deployment Options
- Identify System Components
- Review Release Matrix
- Collect and Analyze Data
- Create High-Level Design
- Plan and Prepare for Your System Installation
- Plan and Prepare for Your System Upgrade

Determine Your Business Requirements

Two important factors that drive your business requirements are:

- Size of your business, see Market Descriptions
- Requirements for installation and upgrade, see:
  - Plan and Prepare for Your System Installation
  - Plan and Prepare for Your System Upgrade
  - Install and Configure System Components
  - Performing Your System Upgrade
  - Additional Sites and Services

Review Step 1: Determine Your Requirements of the Deployment Methodology chapter in the Cisco Unified Communications System Description.

Collecting Requirements

The following are suggested methods to use in gathering information to plan your network:

- Assess User Requirements—Users want applications to be available on demand in the network. The chief components of application availability are response time, throughput, and reliability. You can assess user requirements as follows:
  - Develop community profiles of what different user groups require. Although many users have roughly the same requirements of an electronic mail system, engineering groups using Windows terminals and Sun workstations in an NFS environment have different needs from PC users sharing print servers in a finance department.
  - Build a baseline for implementing an internetwork by interviewing groups, forming focus groups, or using surveys. Some groups might require access to common servers, while others might want to allow external access to specific internal computing resources. Formal surveys can be used to get a statistically valid reading of user sentiment regarding a particular service level or proposed internetworking architecture.
  - Conduct a test involving representative users in a lab environment. This is most applicable when evaluating response time requirements. As an example, you might set up working systems and have users perform normal remote host activities from the lab network. By evaluating user reactions to variations in host responsiveness, you can create benchmark thresholds for acceptable performance.
- Identify Functionality Requirements—After you understand your internetworking requirements, you can select the specific functionality that fits your environment, such as the level of application availability and the implementation costs for that availability. Fault tolerance and redundancy should be considered also.

Use Planning Tools and Templates

This topic includes planning tools and links to documents that provide guidelines for designing and configuring your IPT system. It also includes information on quoting and ordering Cisco Unified Communications products.

Solution Reference Network Design Documents

Solution Reference Network Design (SRND) documents provide guidelines, recommendations, and best practices for implementing enterprise network solutions. The following SRNDs are recommended for designing Cisco Unified Communications systems:

- Cisco Unified Communications SRND Based on Cisco Unified Communications Manager 6.x
- Cisco Unified Communications SRND Based on Cisco Unified Communications Manager 5.x
- Cisco Unified Communications SRND Based on Cisco Unified CallManager 4.x
- Cisco Unified Communications Manager Express Solution Reference Network Design
- Cisco Unified Contact Center Express Solution Reference Network Design Release 5.0
- Enterprise QOS System Solution Reference Network Design Guide

Note Additional SRND resources are available at http://www.cisco.com/go/srnd.

Solution Expert Tool

Solution Expert is a web-based tool that assists in the design, configuration, quoting, and ordering of Unified Communications products. Solution Expert is available for Cisco sales and partner systems engineers who have Unified Communications specializations.

With the Solution Expert tool, users can generate a recommended solution based on their requirements. Users can modify the recommended configuration if desired. Solution Expert validates any changes when it presents the new solution. Solution Expert also generates a bill of materials with list pricing, a Visio diagram, and other design documentation. To access Solution Expert, go to the following URL. For an overview of how to use the tool, see the introductory PDF on the home page.

Quote Builder Tool

The Quote Builder tool is a solutions quoting application for Cisco Unified Communications products. Quote Builder is available to specialized partners and Cisco employees. With Quote Builder, users can build a system quote with design documents to aid in the implementation of the solution. Quote Builder also validates designs for common deployments. Quote Builder generates a bill of materials, a network diagram, and design guides for deployment.

Ordering Guides

Ordering guides for most Cisco Unified Communications products are available for partners and Cisco employees. For information on ordering guides, go to the following URL:

http://www.cisco.com/web/partners/sell/technology/ipc/announcements/unified_communications_system_6_launch.html

Click the “What is available for Partners” tab to view a list of the ordering guides and other marketing collaterals.

Understand Your Deployment Options

Review the Deployment Models chapter in the Cisco Unified Communications System Description for a guide to site models and see Table 2-1 for a brief overview of each model.

Identify System Components

For a brief description of all the components that are available with Cisco Unified Communications System Test Release 6.1(1), refer to the Component Overviews chapter in the Cisco Unified Communications System Description.

See the Install and Configure System Components topics in the Implement tab for links to information that describe components that are specific to the IPT system.

Review Release Matrix

The Release Matrix (which includes the Software Version Matrix and the Firmware Version Matrix) lists all the components and their versions for a particular release. This is the recommended set of components and specific software versions that have been tested and verified for interoperability within a specific system release.

Collect and Analyze Data

Using available tools, system designers collect data on the network to assess network readiness.

Tasks for data collection and analysis include:

- Perform an infrastructure analysis—By obtaining floor plans and campus maps, including utilities and conduit systems, deficiencies in infrastructure can be identified.
- Perform a software gap analysis—Do a software gap analysis to address network management tools for the IP network.
- Perform initial traffic analysis—Collect data on all potential converged infrastructure traffic flows. Use station message detail recording (SMDR) and billing records to determine legacy call volumes and use network management tools to collect key statistics on your IP data network.

Create High-Level Design

Once data is collected and analyzed, record the results in the site survey and high-level design documents.

Plan and Prepare for Your System Installation

This topic provides the system-level information required to install IPT components in Cisco Unified Communications System Release 6.1(1).

- Planning Your System Installation
- Preparing for Your System Installation

Planning Your System Installation

This topic provides links to documentation for you to review before installation and includes types of installations and components that are included in the release sets, and describes installation strategies. See the following sections:

- Scope of this Installation Documentation
- System Installation Overview
- Component Installation Overview
- System Installation Strategies
- Interoperability and Compatibility Portals

When you have reviewed preinstallation planning, installation approach, and dependencies, go to Preparing for Your System Installation. For information about the installation order and process, see Performing Your System Installation on the Implement tab.

Preparing for Your System Installation

This topic provides links to documentation for you to review before you install the Cisco Unified Communications System. It describes preinstallation tasks and the initial installation sequence. It also lists the components in the release set and provides information regarding the deployment of various components. See the following sections:

- Before You Begin
- System Installation Approach
- Release Set Versions
- System Installation Dependencies

When your installation plans are complete and you are ready to install components, go to Performing Your Installation.

Plan and Prepare for Your System Upgrade

This topic provides links to documentation for you to review the system-level information required to upgrade IPT components from previous Unified Communications releases to Release 6.1(1).

- Planning Your System Upgrade
- Preparing for Your System Upgrade

Planning Your System Upgrade

This topic provides an overview of the upgrade process for IPT components, the software releases that are involved in the upgrade process, and the different upgrade strategies that can be used based on the size of the customer network.

Note There may be more than one upgrade path available based on the software deployed in your specific environment. For more information, see System Upgrade Paths.

This topic contains the following sections:

- Release Sets
- Upgrade Roadmap
- Upgrade Overview
- System Upgrade Paths
- System Upgrade Strategies

When your upgrade plan is in place and you are ready to upgrade, go on to Performing Your System Upgrade on the Optimize tab.

Preparing for Your System Upgrade

This topic discusses information to review before the actual upgrade process, such as the general upgrade approach for the different IPT components, upgrade release versions of components involved in the upgrade, and release version compatibility. This topic contains the following sections:

- System Upgrade Approach
- System Upgrade Dependencies
- Upgrade Release Versions

When your upgrade plan is in place and you are ready to upgrade, go to Performing Your System Upgrade on the Optimize tab.

Additional Sites and Services

Steps to Success is a Cisco methodology that outlines the tasks required to complete a successful customer engagement. Registered users can visit the Steps to Success resource site for Cisco Unified Communications process flows.

Cisco Unified Communications Services is a Cisco service offering that provides engineering expertise and best practices.

- Registered users can visit the Cisco Unified Communications Services partner site.
- Nonregistered users can visit the Cisco Unified Communications Services site.

Cisco Unified Communications System Demos

The Cisco Unified Communications system demonstration describes the various methods available for use by Cisco sales teams to demonstrate the Cisco Unified Communications system.

Cisco Unified Communications System Demonstration Programs [**Internal**]