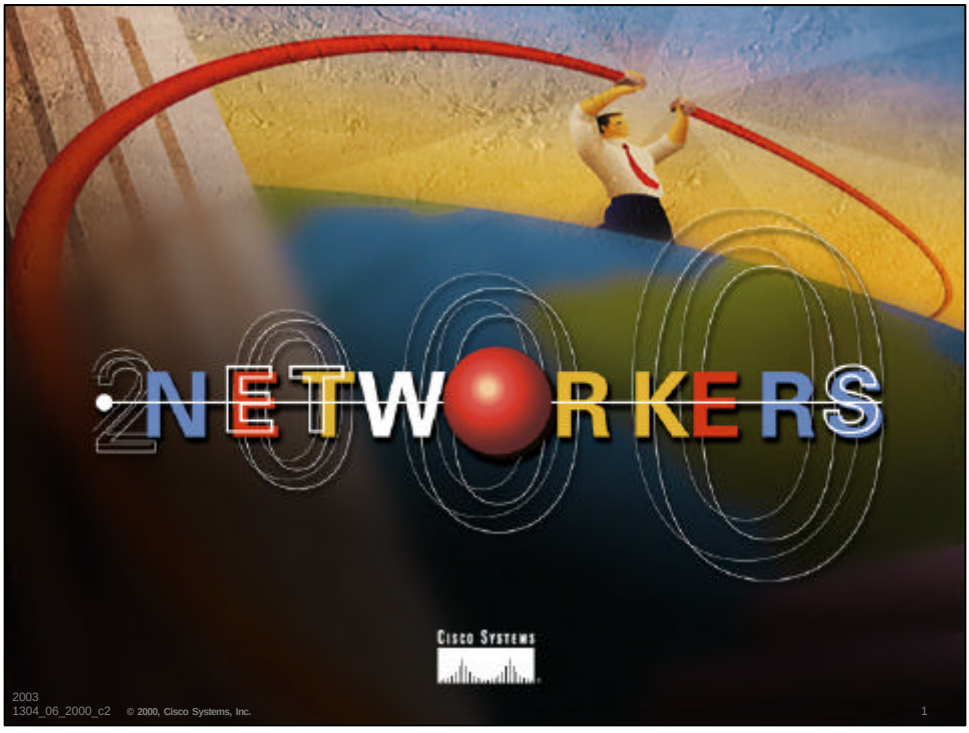


Agenda

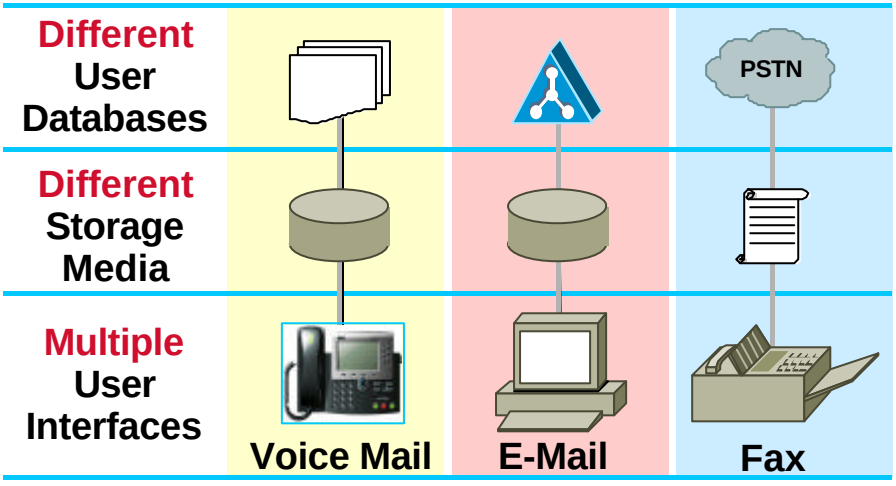
- Why Consider Unified Messaging?
- Unified Messaging Technologies
- Unified Messaging Infrastructure
- Sample Call Flow
- Deployment Examples

Modern Communications Challenges

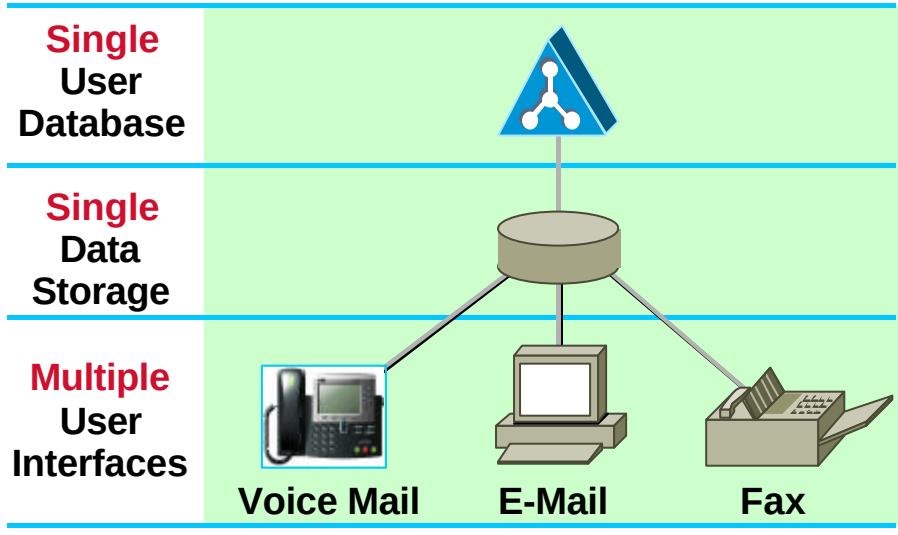
- 900 million voice mails a day!
- 5 million e-mails a minute!
- 30% of your long distance is fax!
- 200 million voice, 100 million e-mail, and 150 million fax users
- Mobile workforce/cell phones
- The Internet revolution
- All of the above are separate islands

Messaging Today

Parallel Infrastructures to Maintain



Converging the Messaging Infrastructure



What Are the Benefits of Unified Messaging?

Employee productivity

- Message access anywhere, any way, anytime
- One-stop message management
- Prioritization of messages by user

Customer satisfaction

- Increases speed of communication
- Allows for flexible communication flow

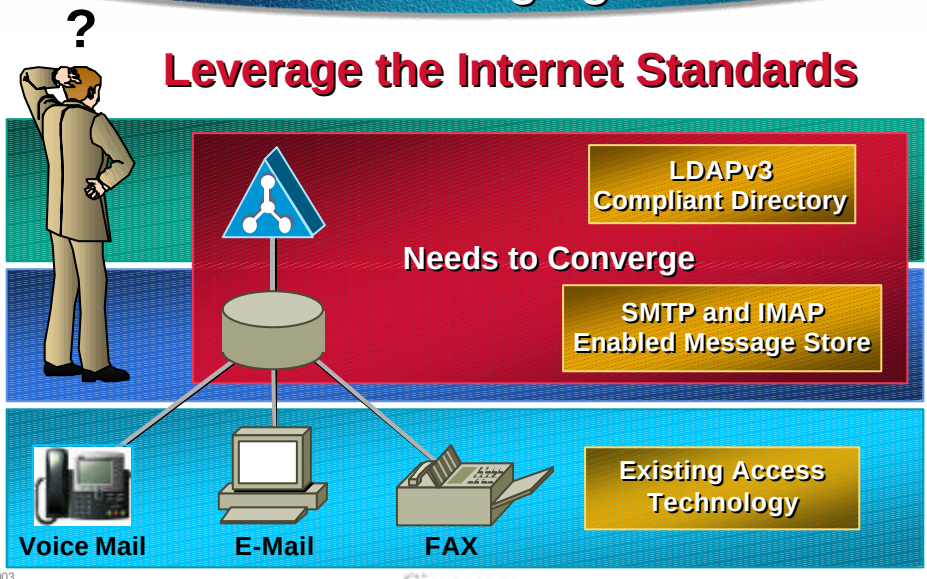
Cost reductions

- Moves/adds/changes are faster
- Single infrastructure to manage
- Single transport infrastructure for all media: Data/voice/video

Agenda

- Why Consider Unified Messaging?
- Unified Messaging Technologies
  - Single, Integrated Directory—LDAPv3
  - Unified Message Storage—IMAP/SMTP
- Unified Messaging Infrastructure
- Sample Call Flow
- Deployment Examples

What Technologies Does Unified Messaging Use?



What Is a Directory

A Directory Can Be Thought of As a Specialized Database

- **Strengths**
  - Highly distributed, replicable, scalable
  - Optimized for read access and searches
  - Extensible
  - Open, standard API (LDAP)
- **Weaknesses**
  - Not optimized for writes
  - No support for transactions
  - No support for change notification

Multiple Enterprise Directory Support

- **Problem: different directory implementations from vendors**
  - **Different schemas**
  - **User models**
  - **Security models**
- **Solution: write to least common denominator…LDAPv3 compliance**
  - **Use core LDAPv3 user attributes**
- **Extend these attributes using standard classes**

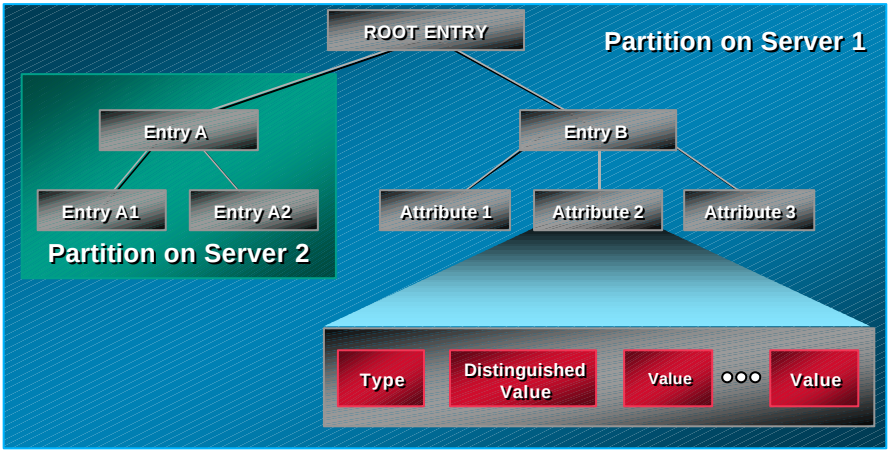
Supporting Multiple Enterprise Directories (Cont.)

Netscape inetOrgPerson
obejctclass inetOrgPerson
oid 2.16.840.1.113730.3.2.2
superior organizationalPerson
allows
cn,
sn,
givenName,
mail,
uid,
userPassword

AD User
objectclass User
oid 1.2.840.113556.1.5.9
superior organizationalPerson
auxiliary mailRecipient
auxiliary securityPrincipal
allows
cn,
sn,
givenName,
mail,
sAMAccountName
userPassword

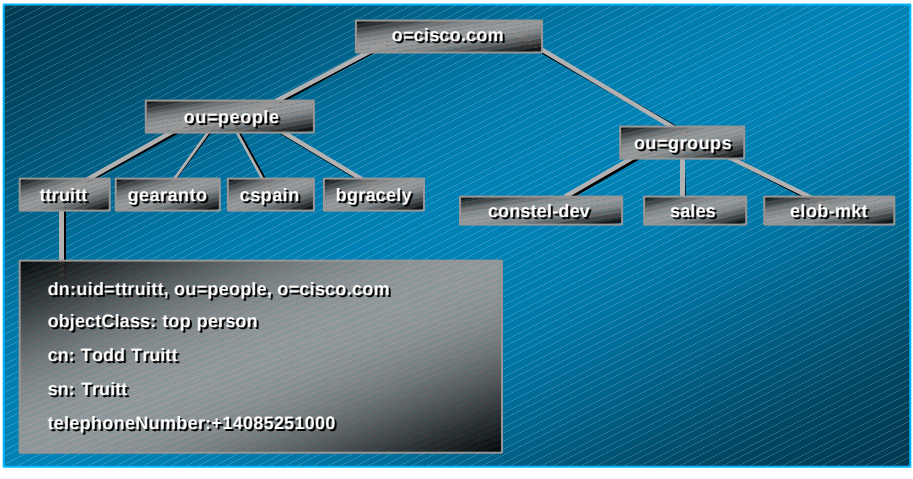
Different User Models!

Directory Structure of Information

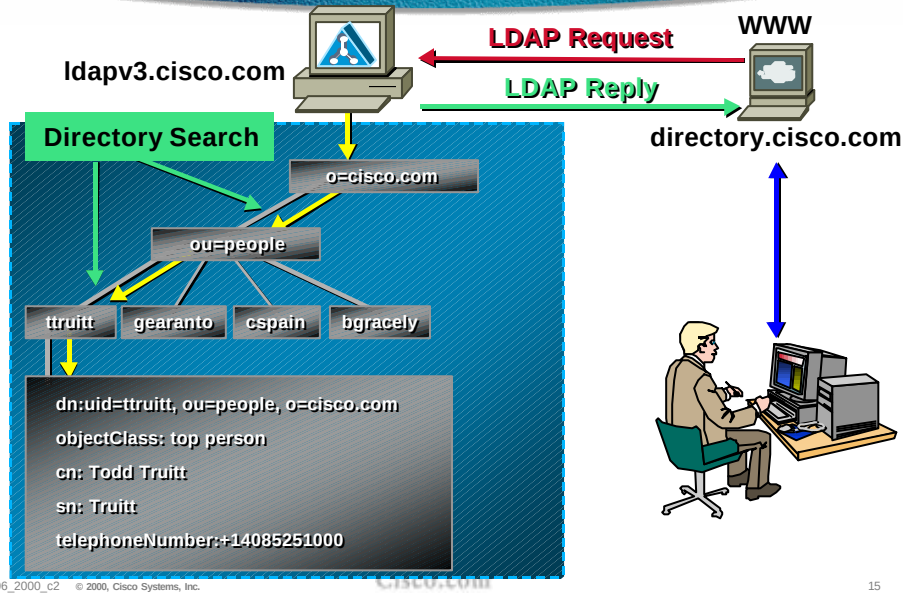


DITs May Be Subdivided between Many Directory Servers, Each With a Piece of the Namespace (Referrals Point to Information a Server Does Not Have)

Typical LDAPv3 Directory Information Tree (DIT)



Example: Cisco Directory



Cisco Directory

Cisco Application Model

- Applications require a few basic attributes about a person which are basic attributes already defined in LDAPv3

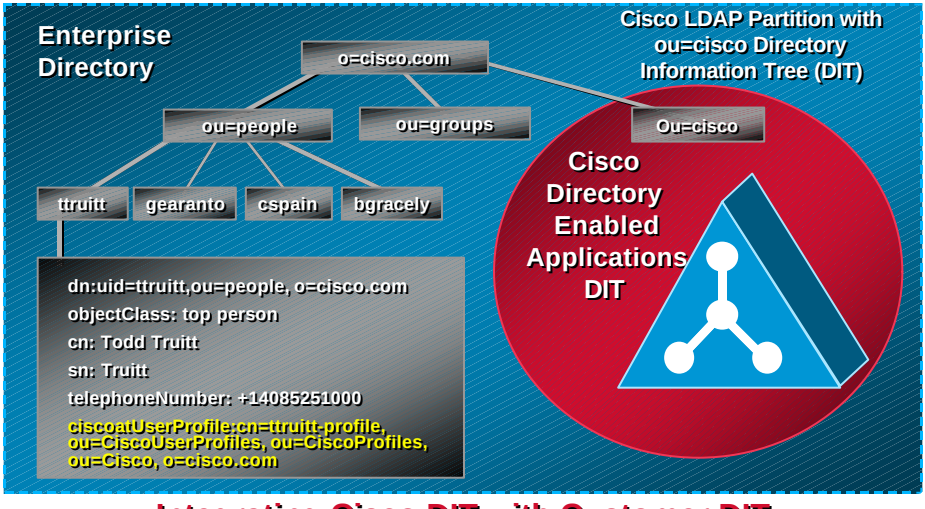
  Name, user ID, password, telephone number, etc.

- Directory-enabled applications require additional attributes that are application specific

  E-mail server, v-mail disk quota, etc.

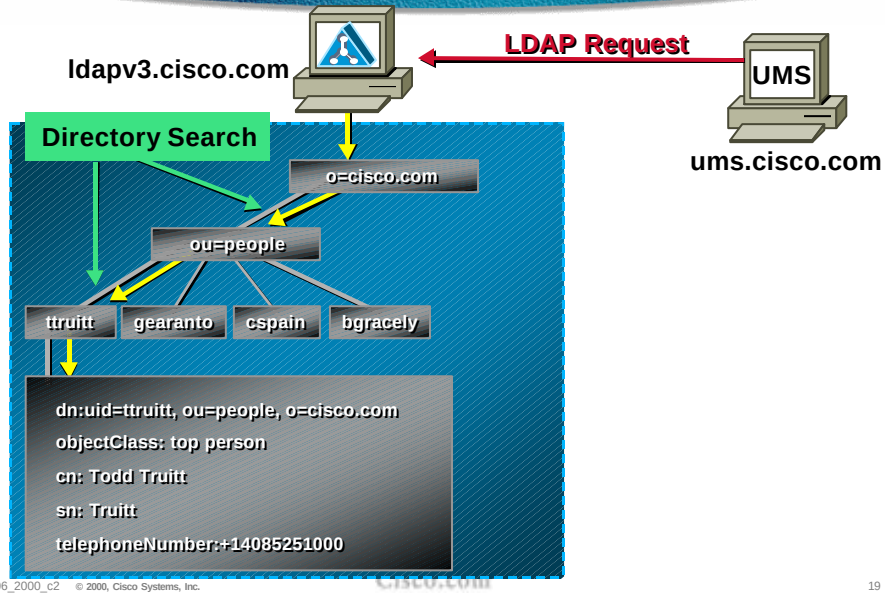
- Define application-specific attributes in an application profile
- Extend native user schema using auxiliary classes to support user and application profiles

Cisco Directory Deployment Model

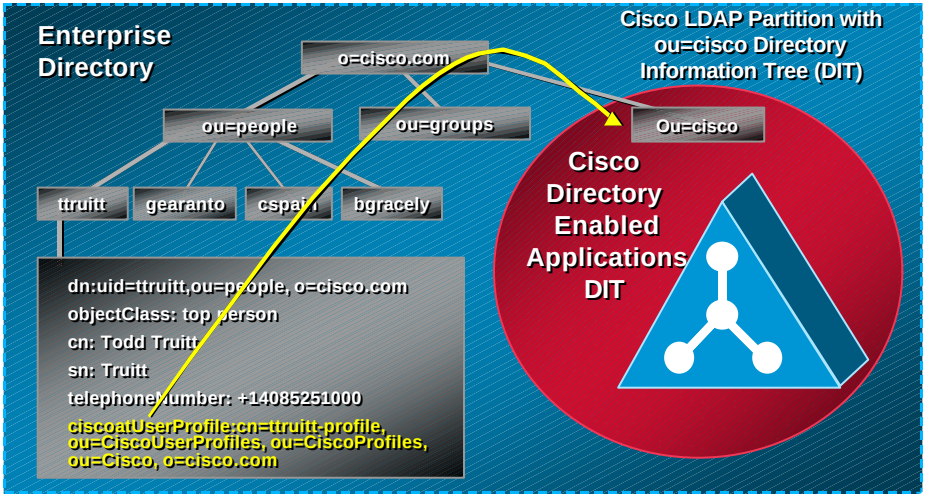


Integrating Cisco DIT with Customer DIT

Example: Unified Messaging

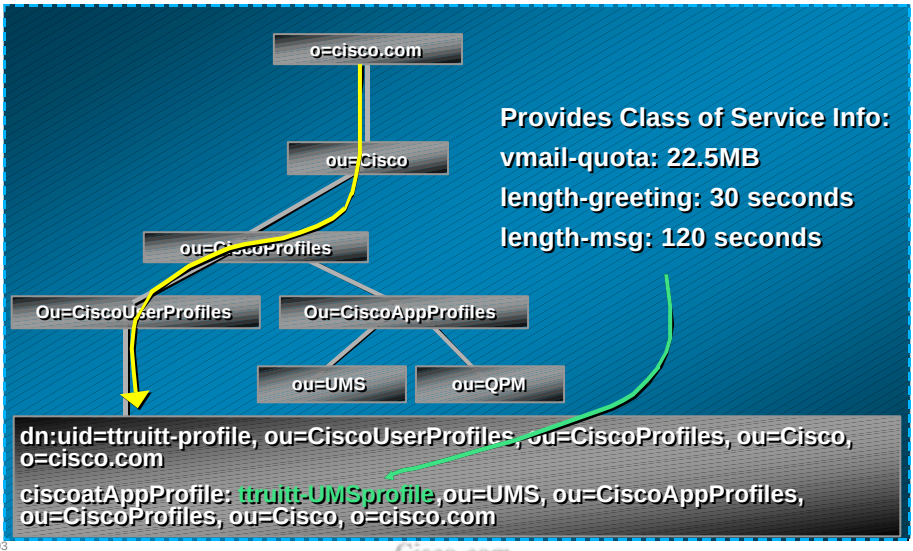


Cisco Directory Deployment Example



Integrating Cisco DIT with Customer DIT

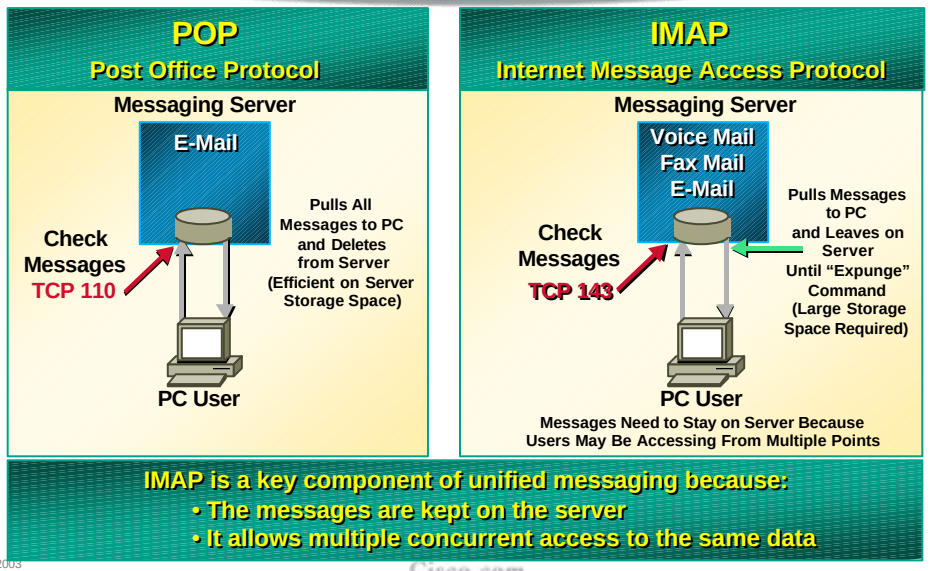
Cisco Directory Information Tree



Agenda

- Why Consider Unified Messaging?
- Unified Messaging Technologies
  - Single, Integrated Directory—LDAPv3
  - Unified Message Storage—IMAP/SMTP
- Unified Messaging Infrastructure
- Sample Call Flow
- Deployment Examples

POP vs. IMAP



IMAP is a key component of unified messaging because:

- **The messages are kept on the server**
- **It allows multiple concurrent access to the same data**

IMAP Impact: Unified Messaging Deployments

- **Used by clients to access messages**
- **All messages are left on the server**
- **Cisco IT plans for 200 MB per user**
  - **30 minutes of voice-mail messages (750 KB per minute of voice message)**
  - **177.5 MB leftover for e-mail**
- **Two TB of disk space for a 10,000 user deployment**
- **Significant user education needed**

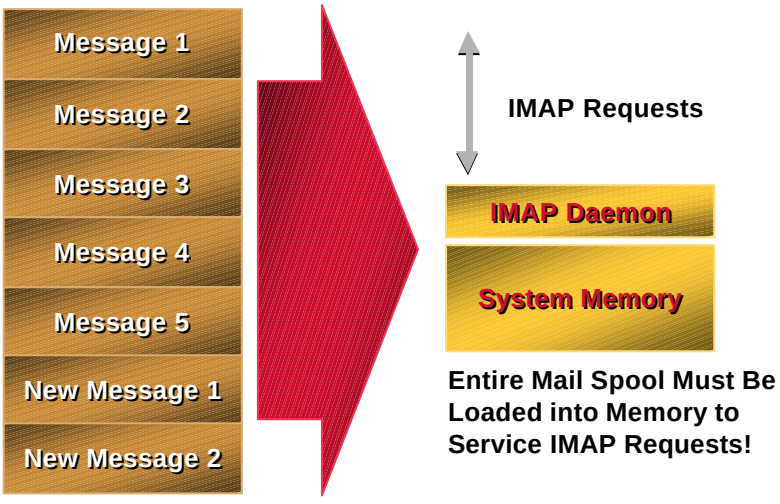
IMAP—I/O Bottleneck

- Typically sendmail uses a storage format called /var/mail or berkeley format
  - Also known as the bezerkley format because it's so inefficient
- User e-mail is stored in a flat file; new messages are appended to the end of the file
- Many corporations still use Sendmail

Berkley Mail and POP

- System starts at the top of the file and reads through the entire file to see if there are new messages
- It must do this every time a check is done for new messages
- Most Cisco employees check for new messages every two minutes!
- This storage format causes I/O bottlenecks on the server

Berkley Mail and IMAP

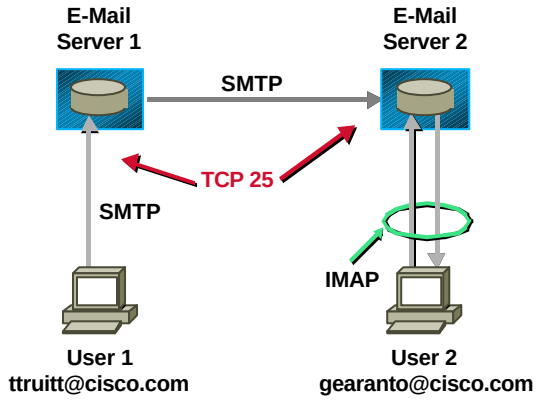


Solution: Modern E-Mail Servers

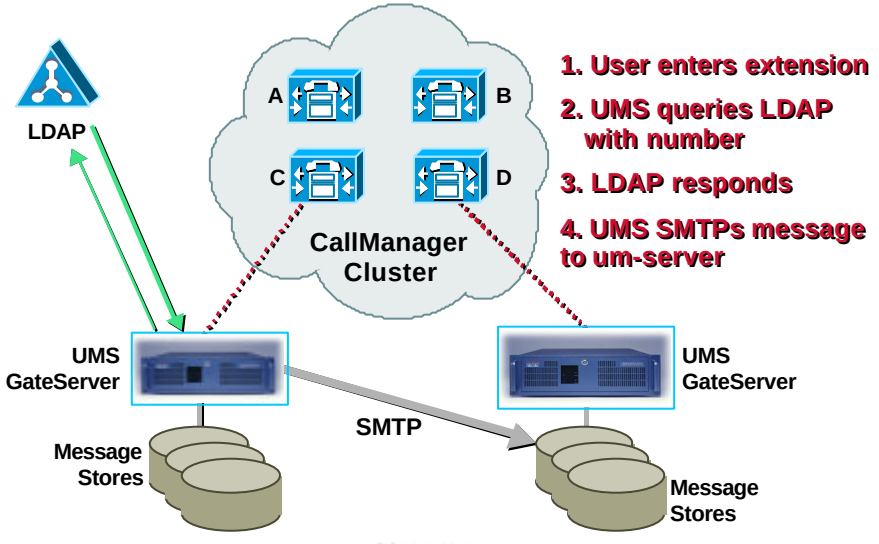
- **Use a modern mail system**
  - **Netscape, SIMS, Mirapoint, Exchange, etc.**
  - **Database storage format avoids the I/O bottlenecks**

Simple Mail Transfer Protocol

- Standard method of transferring e-mail between hosts
- Used by clients to send messages across the Internet
- Also used by UMS systems to exchange all message types



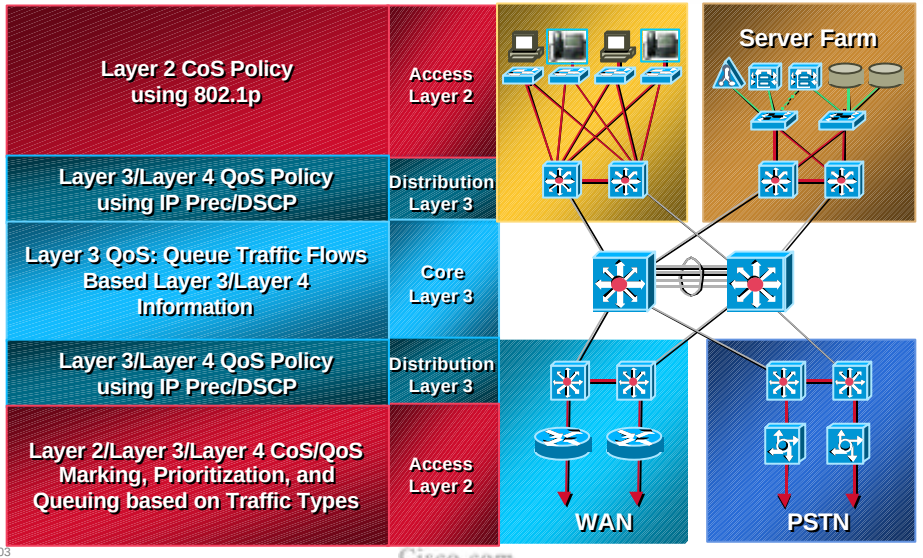
UMS Networking: Forwarding a Voice Message



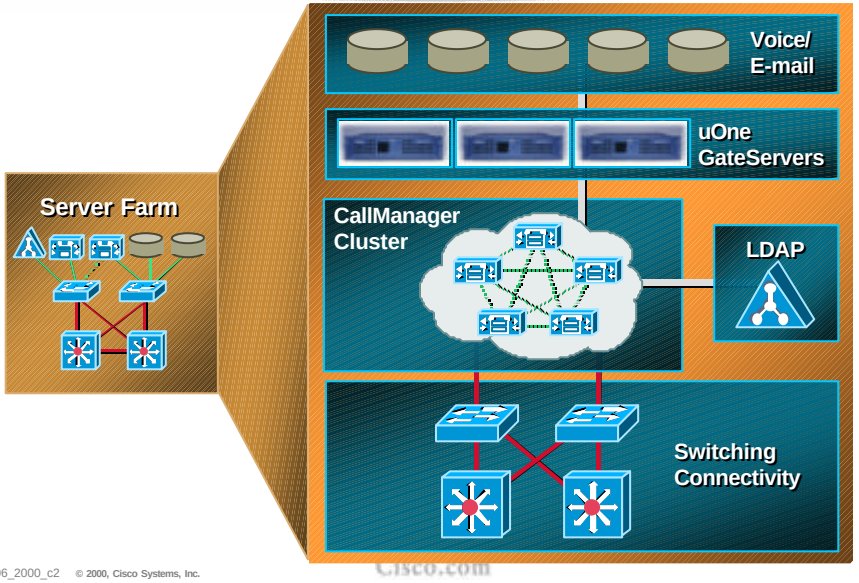
Agenda

- Why Consider Unified Messaging?
- Unified Messaging Technologies
- Unified Messaging Infrastructure
- Sample Call Flow
- Deployment Examples

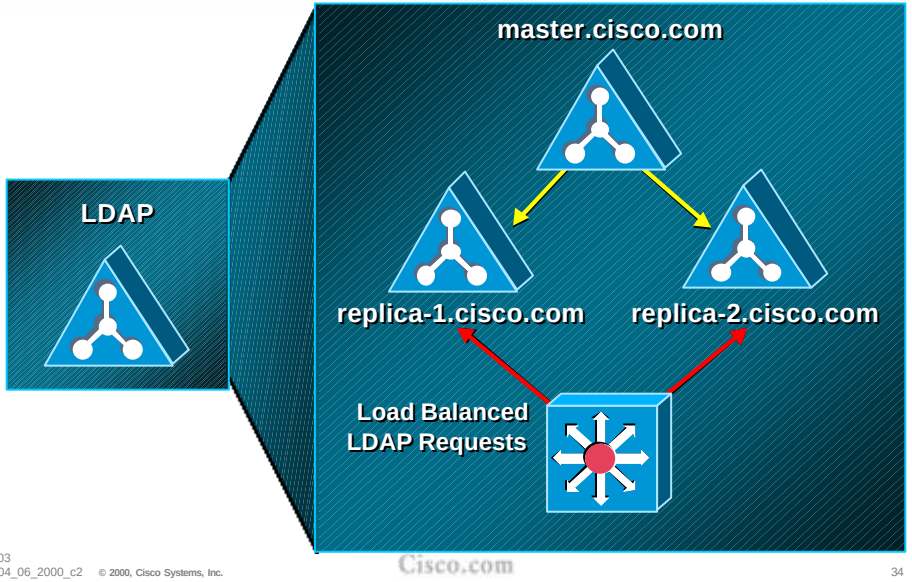
IP Telephony Infrastructure



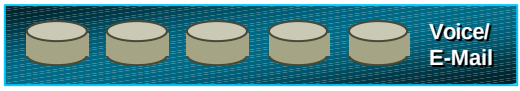
Unified Messaging Infrastructure



Redundant LDAP Infrastructure



Message Store Infrastructure



- Message store servers should be connected to UMS GateServers via high-speed media

  One-minute voice mail (750 KB) takes ~ four seconds to serialize on a T1 link

- A modern e-mail application should be utilized
- Evaluate needed disk space
- A regimented backup plan should be implemented for the message stores

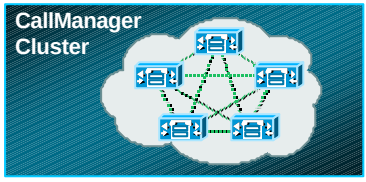
UMS GateServer Infrastructure

- uOne GateServers must use a single LDAP directory in order to network
- uOne GateServer and QoS

  Voice VLAN, IP Prec = 5, DSCP = EF and UDP ports within 16384-32767 range

CallManager Connectivity

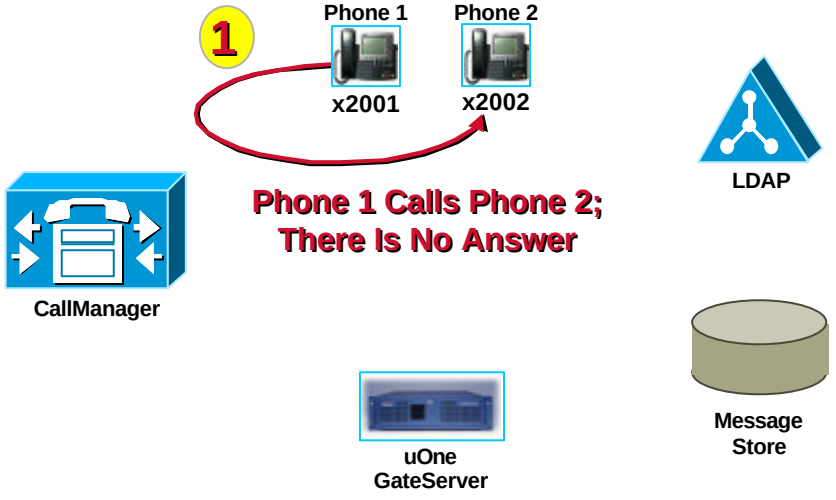
- uOne GateServer registers with CCM using the Skinny Station Protocol
- uOne GateServer should be configured to failover to a redundant CCM in a 3.0 cluster
- IP phones configured to forward to voice mail pilot number via CFNA/CFB



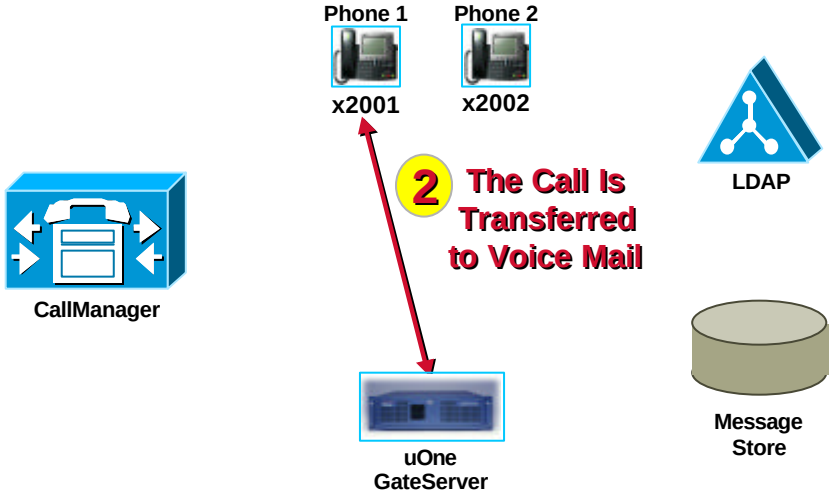
Agenda

- Why Consider Unified Messaging?
- Unified Messaging Technologies
- Unified Messaging Infrastructure
- Sample Call Flow
- Deployment Examples

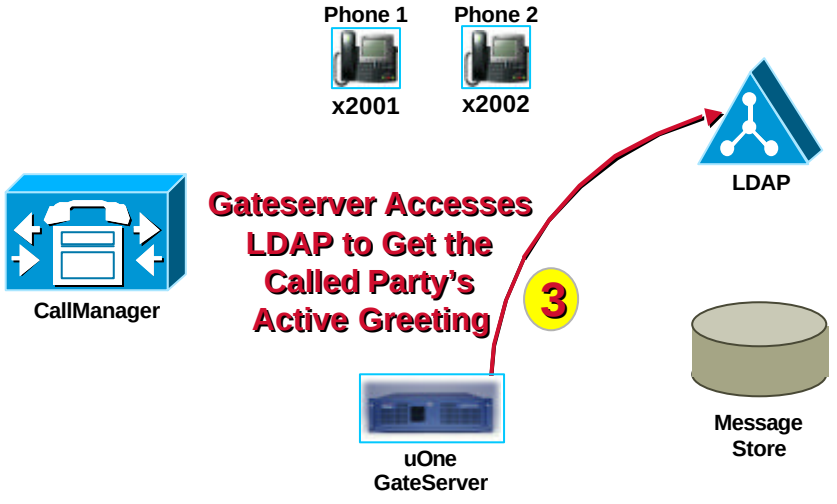
Leave a Message Call Flow



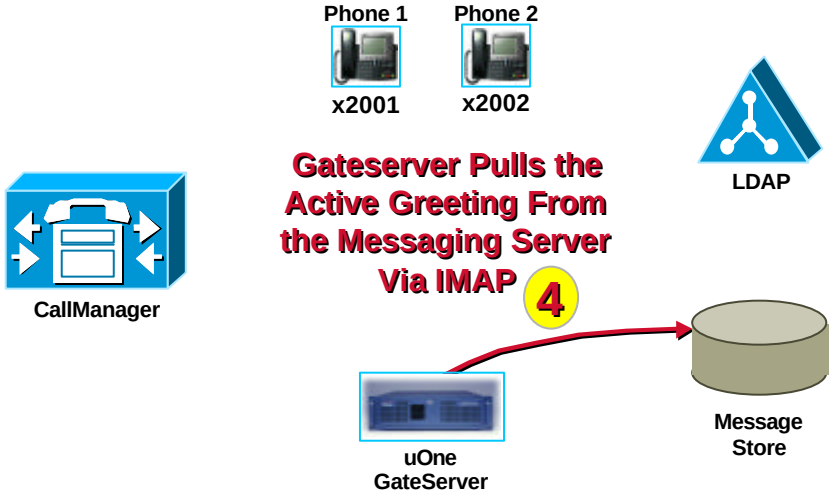
Leave a Message Call Flow



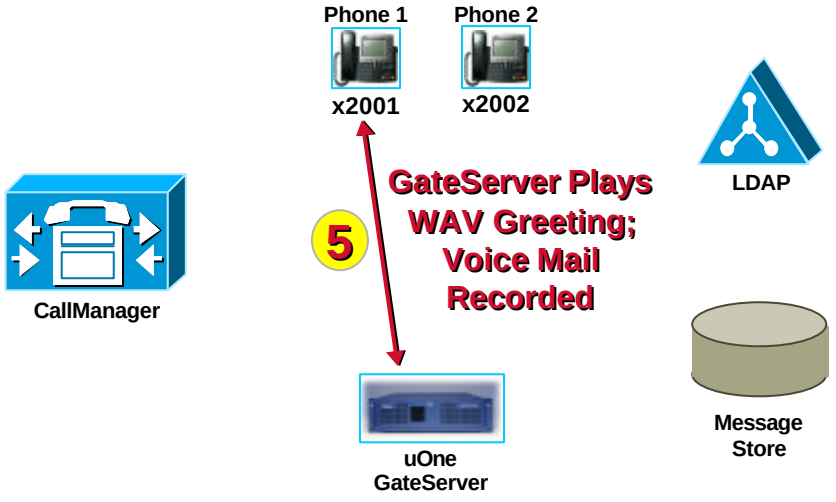
Leave a Message Call Flow



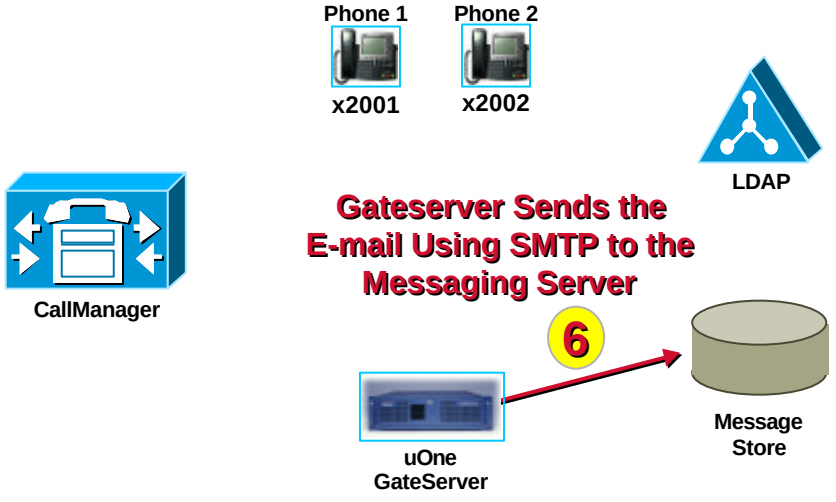
Leave a Message Call Flow



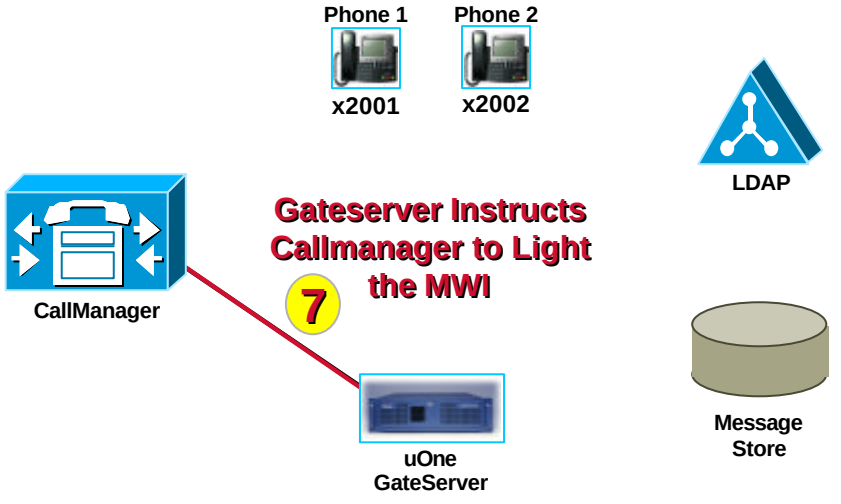
Leave a Message Call Flow



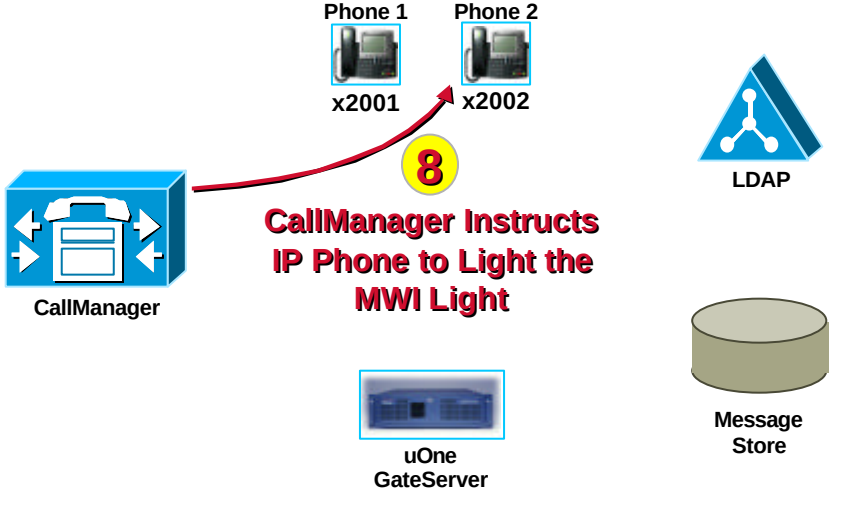
Leave a Message Call Flow



Leave a Message Call Flow



Leave a Message Call Flow

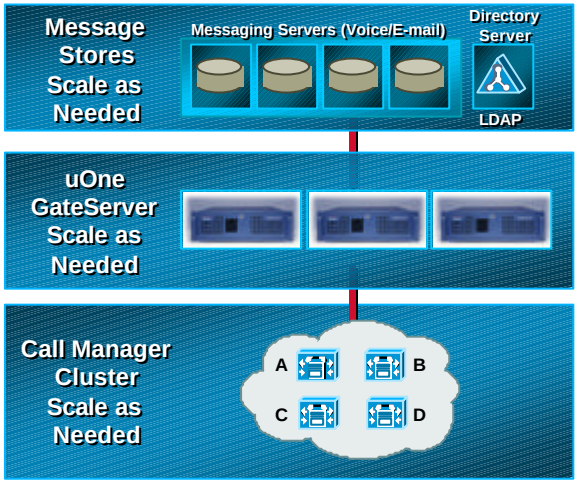


Agenda

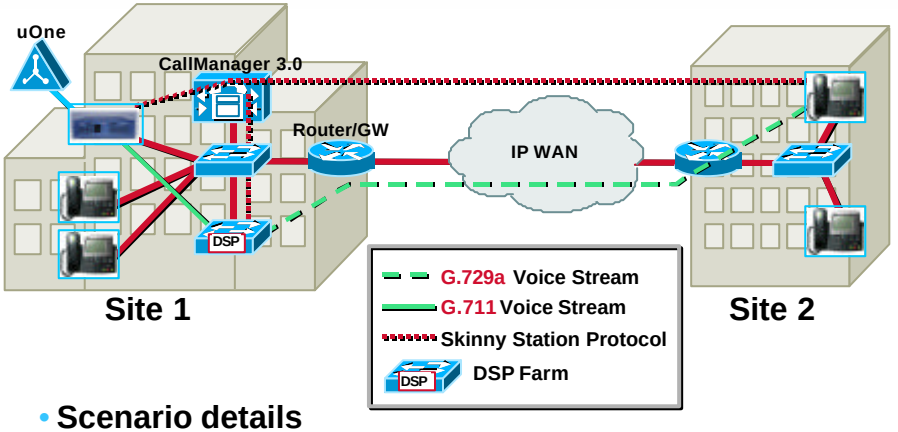
- Why Consider Unified Messaging?
- Unified Messaging Technologies
- Unified Messaging Infrastructure
- Sample Call Flow
- Deployment Examples

Design Scenario: Campus

- uOne GateServers can connect to all of the CCMs and message stores
- SSP for uOne CCM failover
- G.711 voice everywhere
- All users have a single Voice mail pilot number
- Customer's enterprise directory with the Cisco subtree as a partition

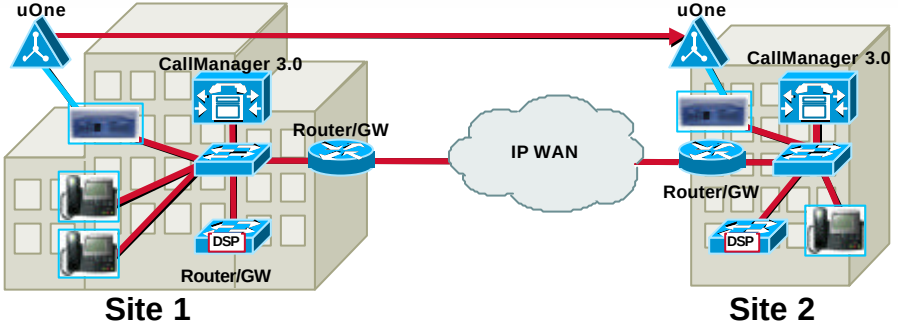


Design Scenario: Multisite with Centralized Voice Mail



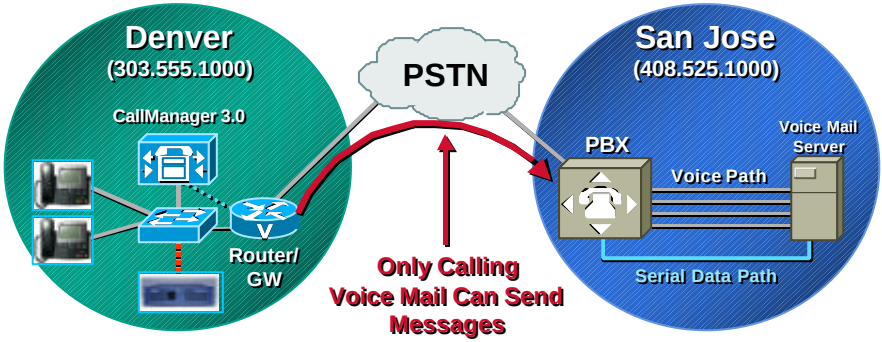
- **Scenario details**
  - DSP resources for compressed voice across the WAN or use G.729 only or G.711only everywhere
  - Centralized directory model: all LDAP look-ups traverse WAN

Design Scenario: Multisite with Distributed Voice Mail



- **Scenario details**
  - Synchronized directory which contains entire enterprise user data
  - Distributed directory model: Only LDAP replications and limited referrals traverse the WAN
  - DSP Resources for compressed voice across the WAN or use G.729 everywhere

Legacy Voice Mail System Integration: AMIS-A Call Flow

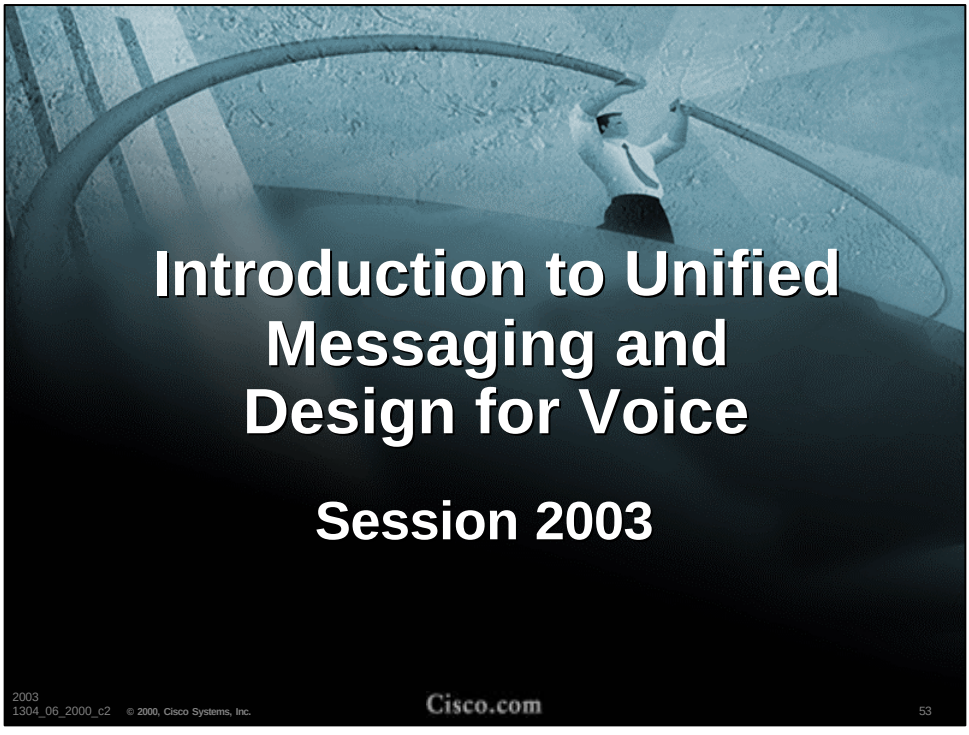


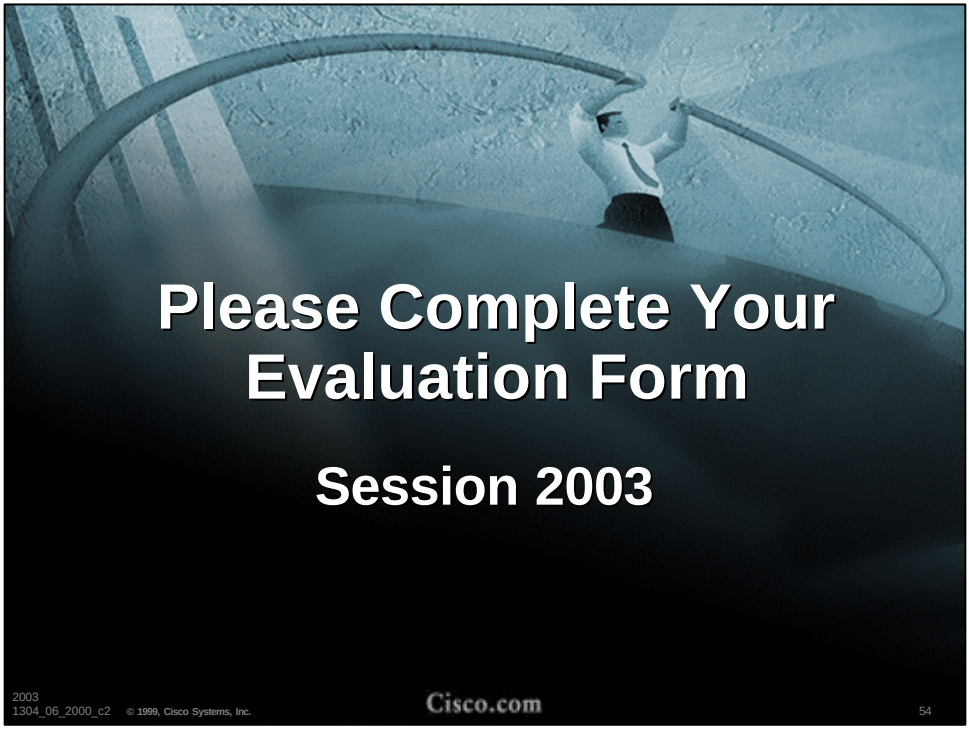
1. Denver uOne 5.0E signals CCM to call the San Jose Octel System
2. CCM signals H.323 GW to call SJ PBX; Uses DTMF to send a "C"denoting an AMIS-A connection
3. San Jose responds with a "D"
4. Denver sends a START SESSION, SYSTEM NUMBER, MESSAGE and END of MESSAGE
5. Each transmission from Denver is acknowledged (RESPONSE frame) by San Jose

Summary

So What Did We Cover?

- Key ingredients and requirements of unified messaging
- How to build it…
  - Leverage existing Internet technologies and standards
  - Synchronized enterprise LDAP directory
  - Integrated or unified message storage
- IP services enabled infrastructure must exist





Empowering the Internet Generation℠

