

Deploying Unified Communications in the Enterprise

Patrick Rodrigues

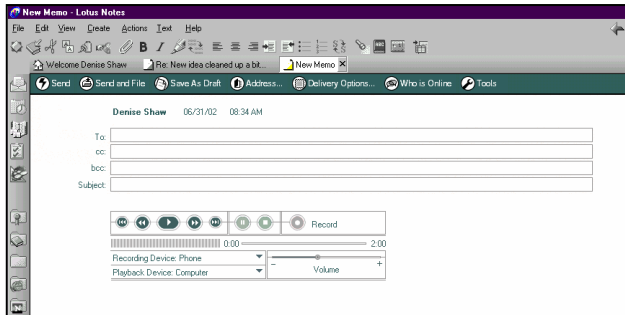
- **The Messaging Challenge**
- **Cisco Unity with Microsoft Exchange**
- **Cisco Unity with IBM/Lotus Domino**
- **Design and Deployment Considerations**
- **Deployment Models**
- **Q&A**

Corporate Messaging Challenges

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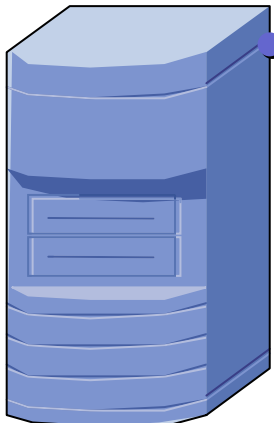
- **Reduce voice cost**
- **Improve employee productivity**
- **Maintain and improve end user satisfaction**
- **Ensure a secure environment**
- **Base solutions on open standards (IETF, ITU, APIs)**
- **Centralize infrastructure while providing resiliency**
- **Accommodate mobility requirements**
- **Accommodate application integration**
- **Provide flexibility and migration options**

Unified Architecture Solution



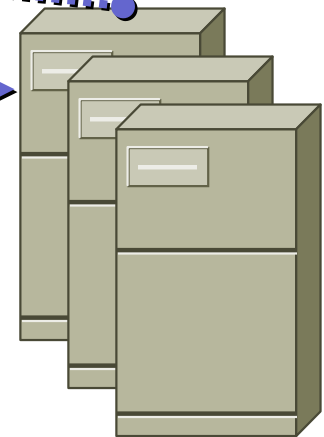
Can Be Domino or Exchange

Voice Messages Are Put in the E-Mail Server



Unity UM

- **One** e-mail/voice message store
- **One** e-mail/voice directory
- MWI relies on synch schedule between stores
- Native Exchange or Domino Client



E-Mail Server(s)
w/ E-Mail, Fax, and **Voice**
Message Store
on Box

Agenda

- **The Messaging Challenge**
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- **Deployment Models**
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Cisco Unity Architecture

Component View—Exchange Message Store

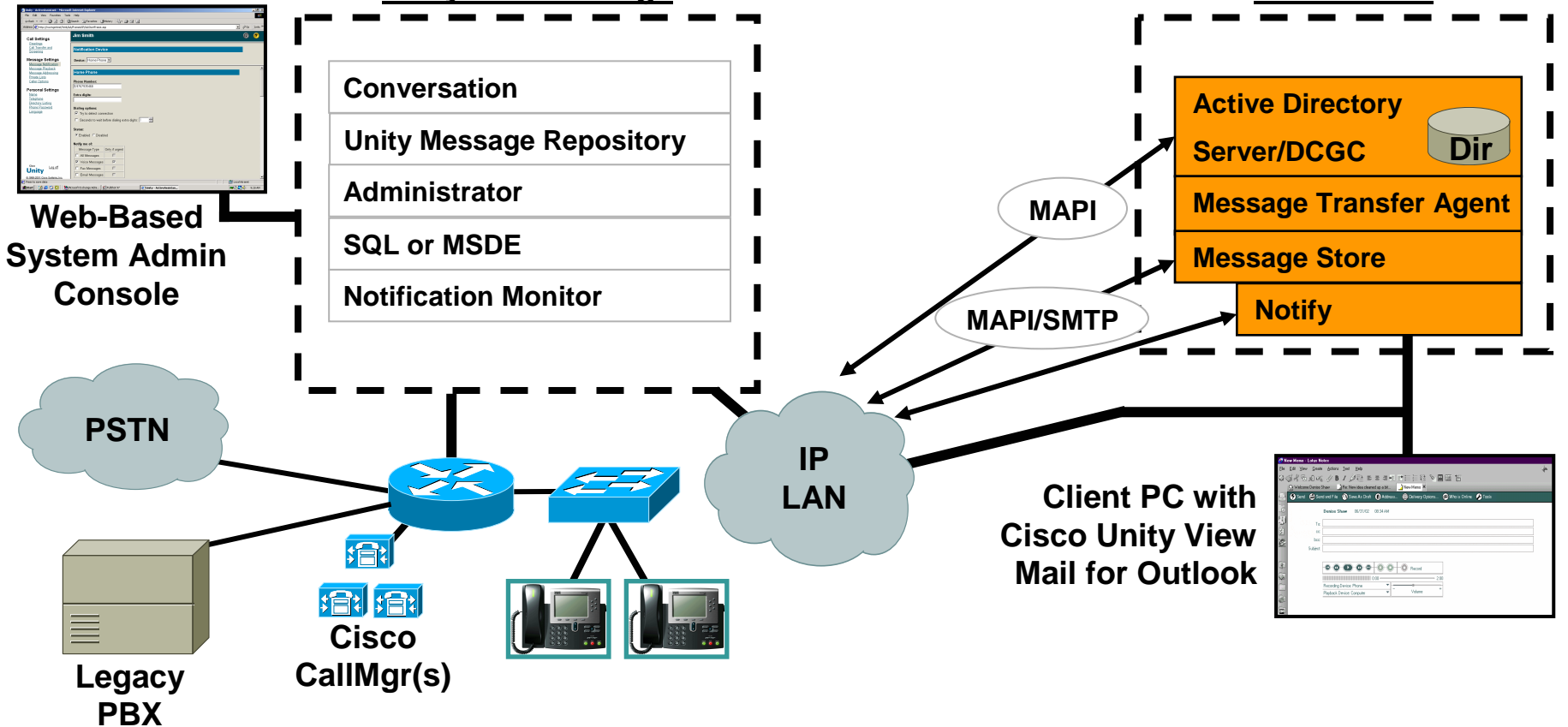
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Cisco Unity

Microsoft

Microsoft Exchange/Windows 2000 Server

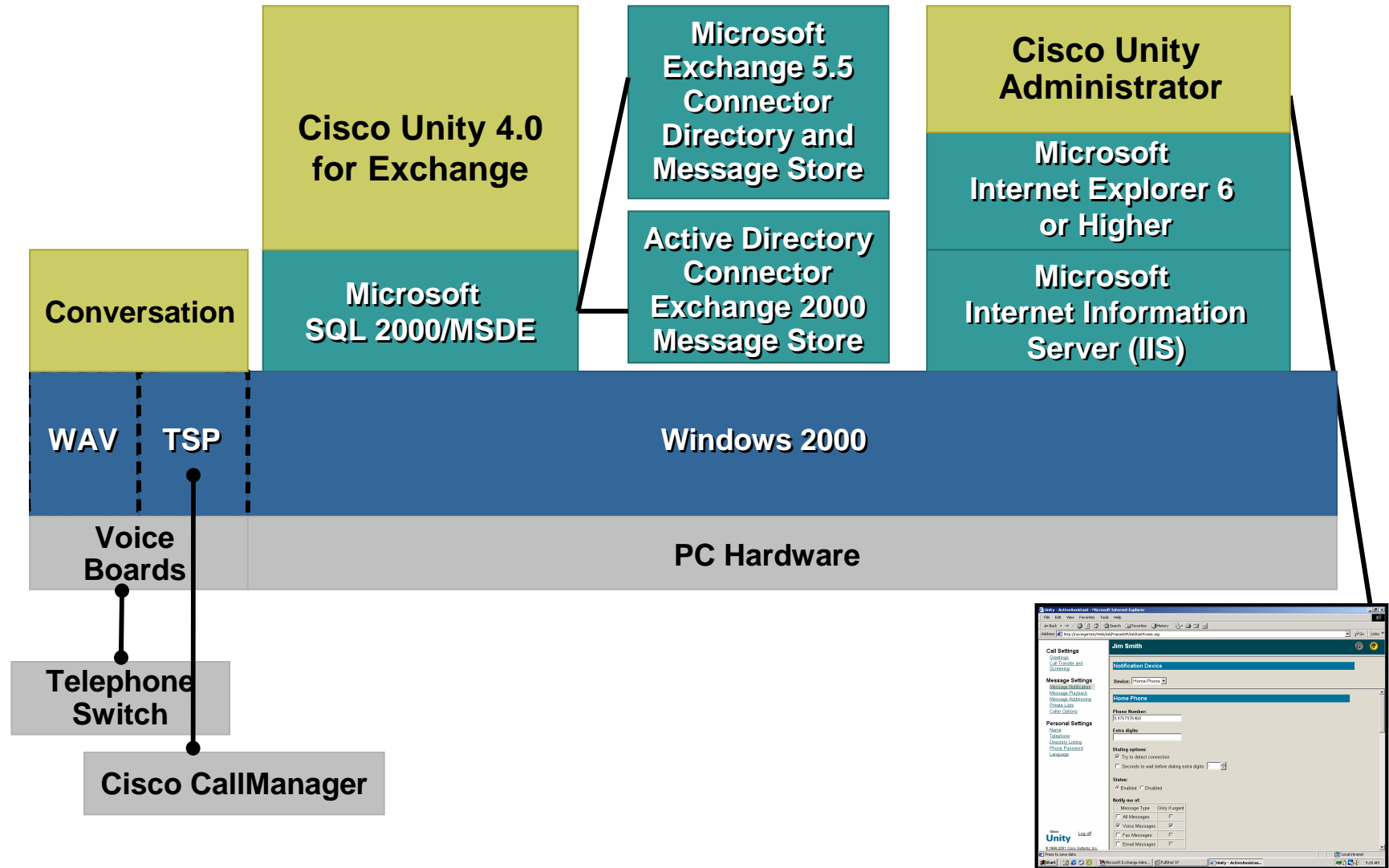
Unity for Exchange



Cisco Unity Architecture

Server View—Exchange Message Store

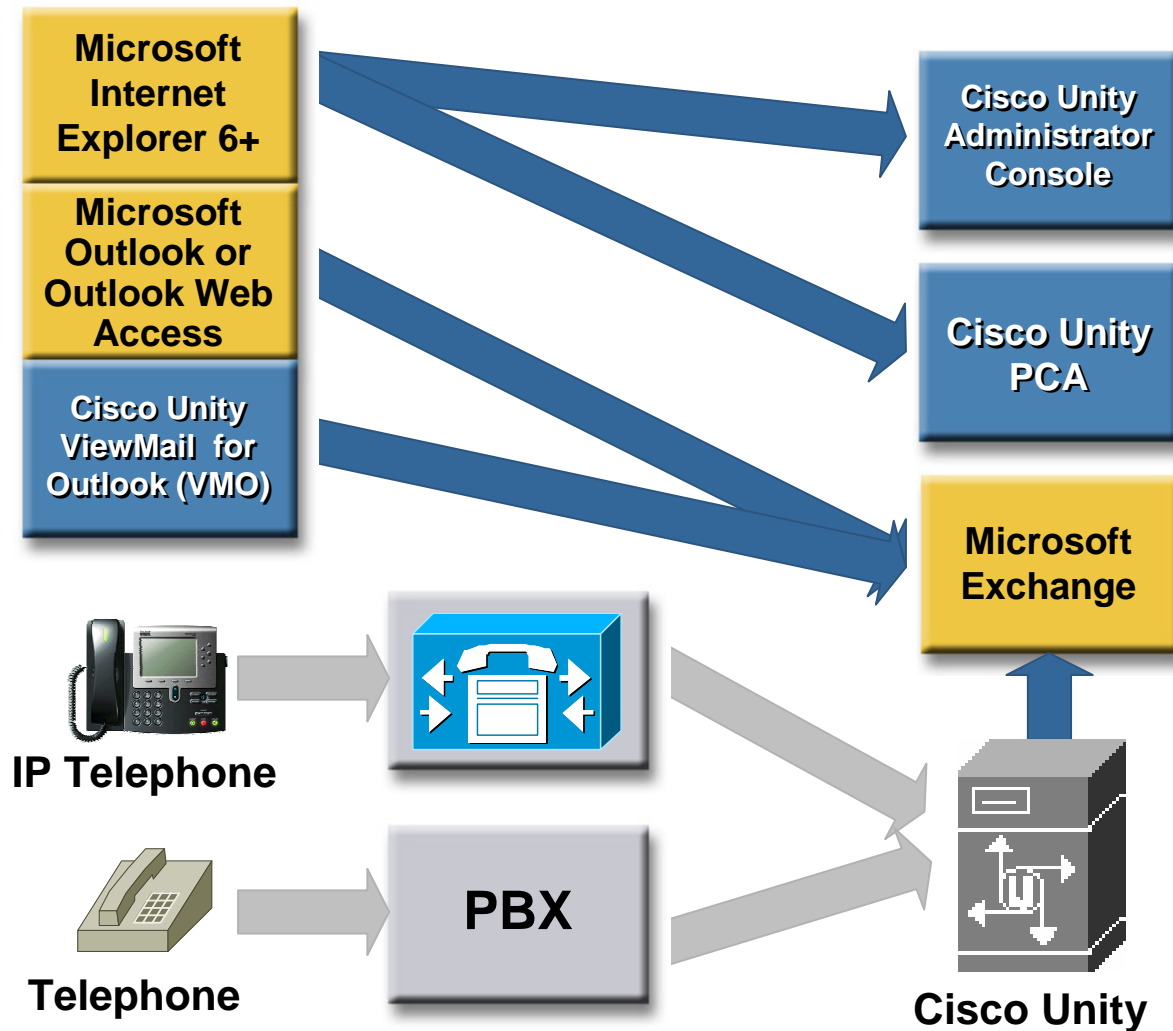
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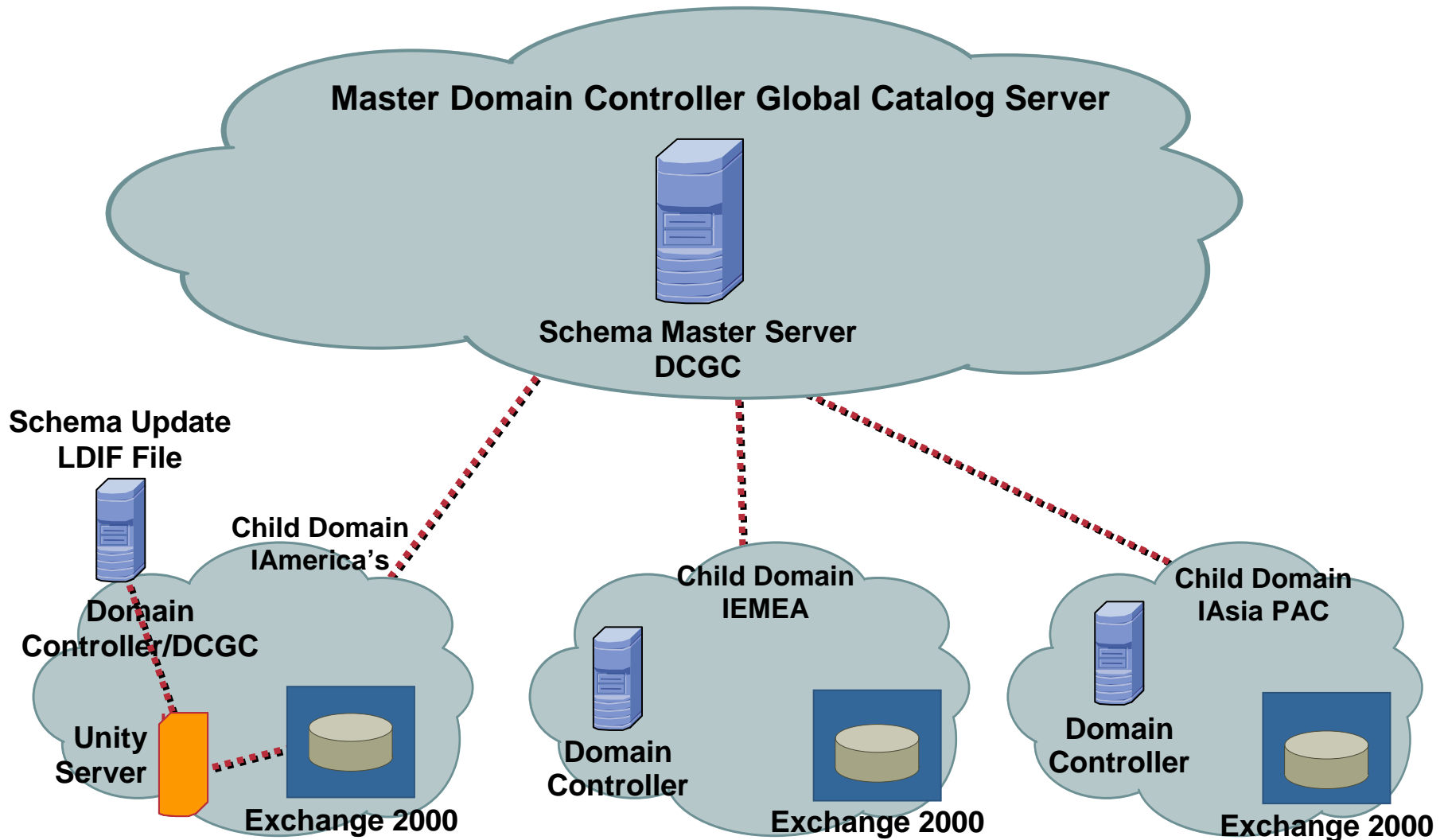
Cisco Unity Architecture

Client View—Exchange Message Store

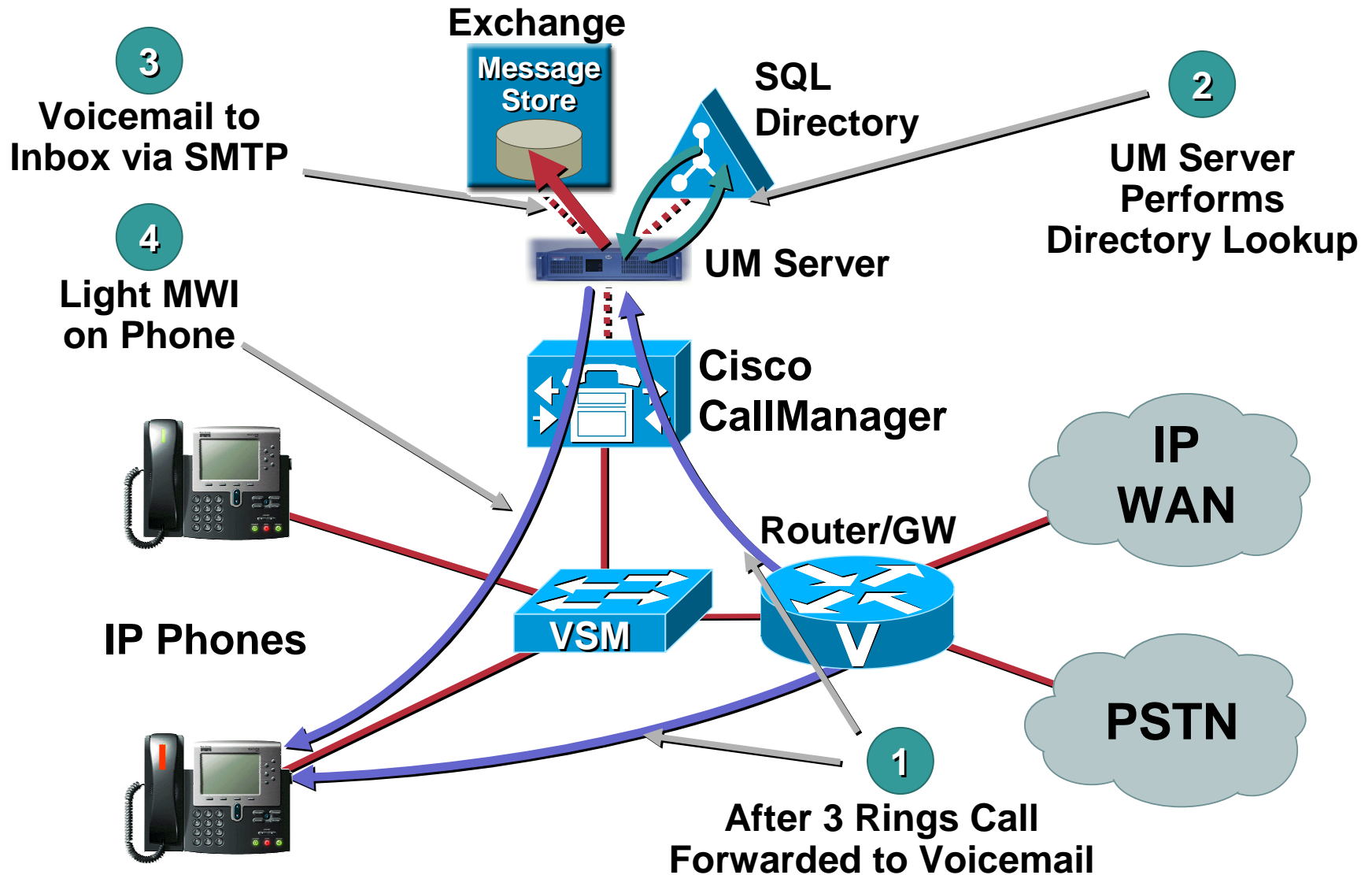
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Active Directory Exchange 2000 Topology



Unity Call Flow with Microsoft Exchange



Microsoft Domain/Exchange Caveats

- In a pure Exchange 5.5 deployment you need one Unity server per Exchange site
- No new Exchange 5.5 VM designs, only support for upgrades
- Exchange 2000 is the only shipping message store for VM
- Unity can support Exchange 2000 clusters in either Active/Active or Active/Passive configurations
- Unity **cannot** be installed into an Exchange 2000 cluster
- Each Unity should only service a single Exchange 2000 administrative group

Agenda

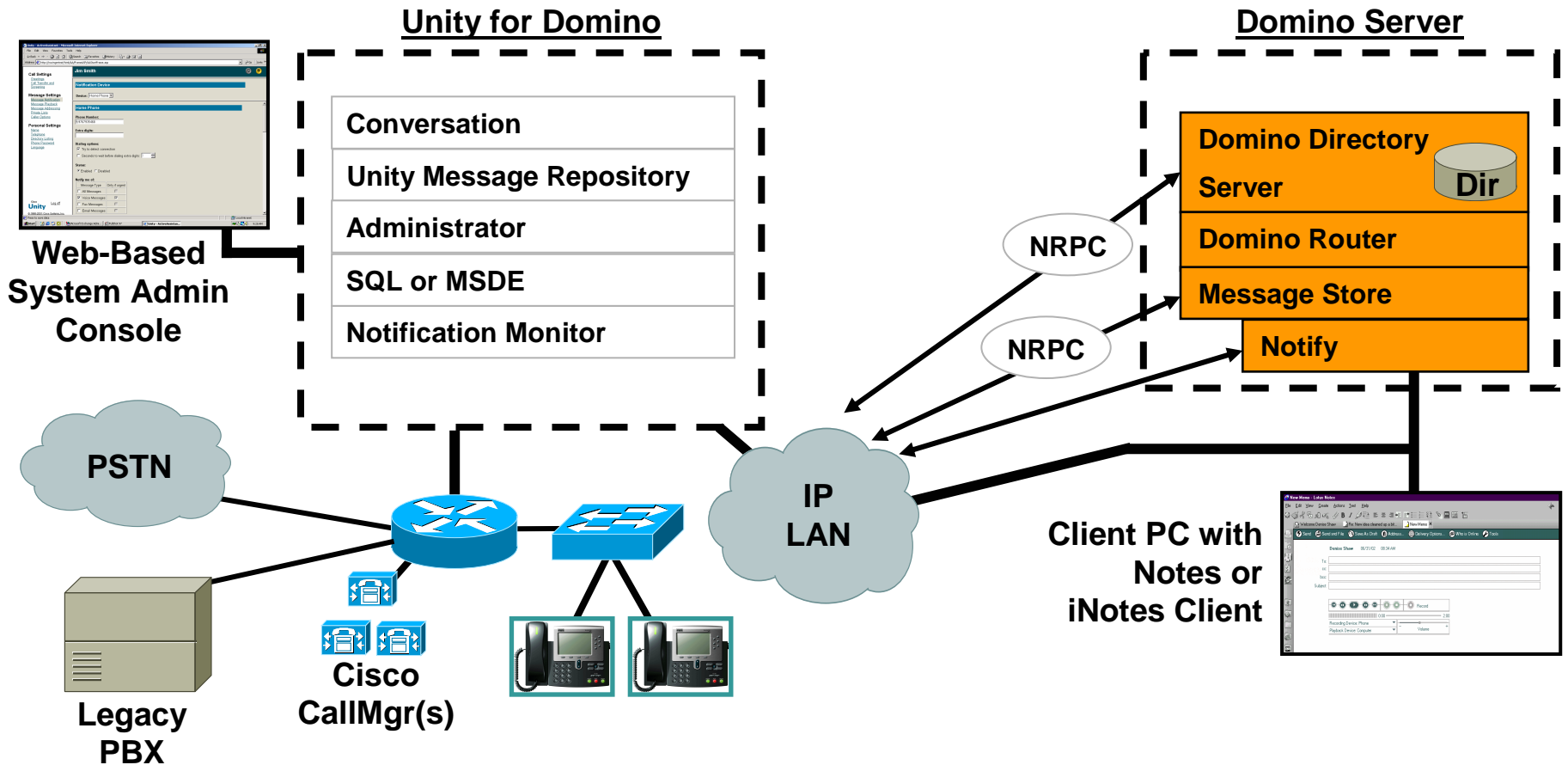
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Cisco Unity Architecture Component View—Domino Message Store

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Cisco Unity

IBM/Lotus Domino

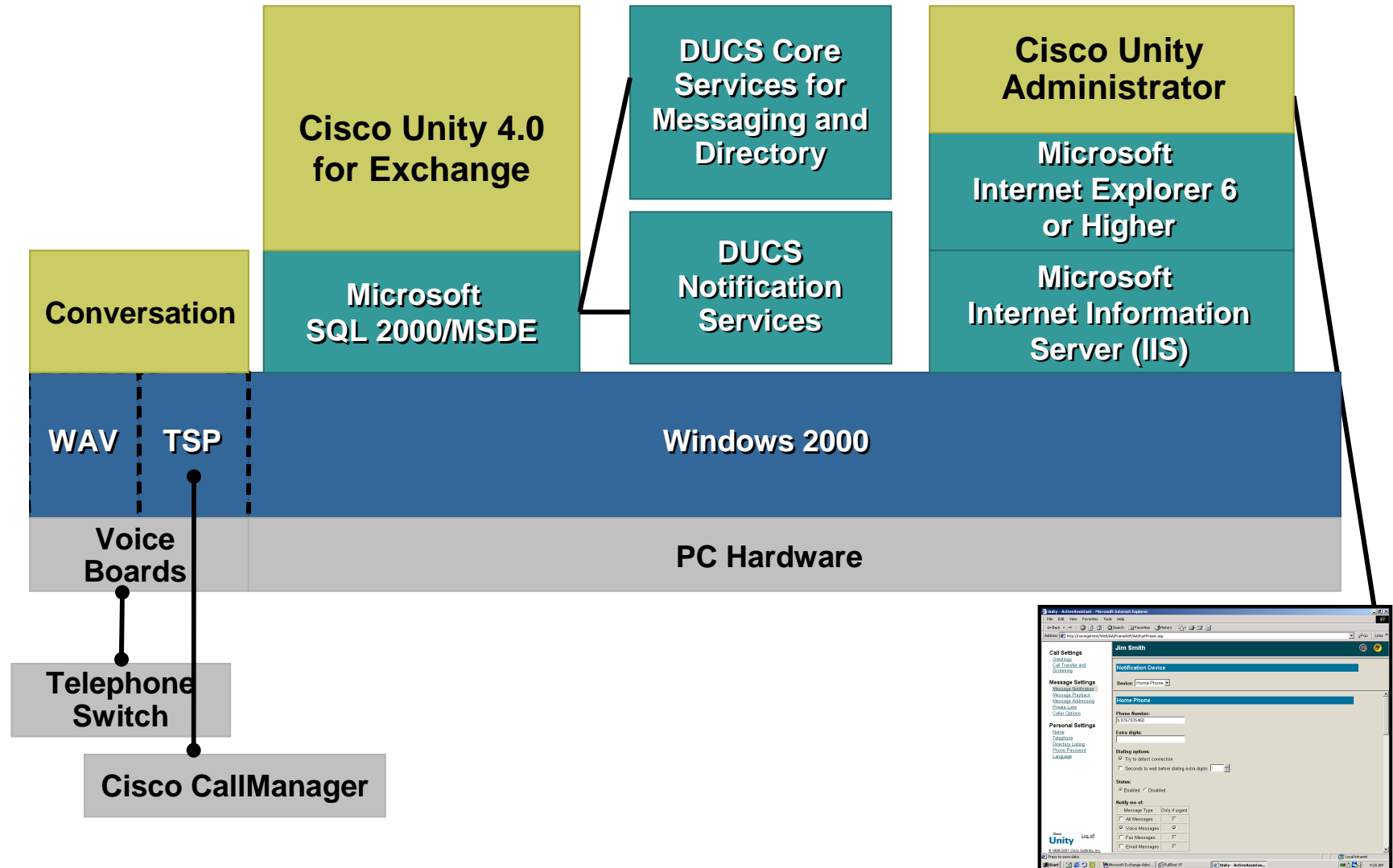


Domino Unified Communication Services

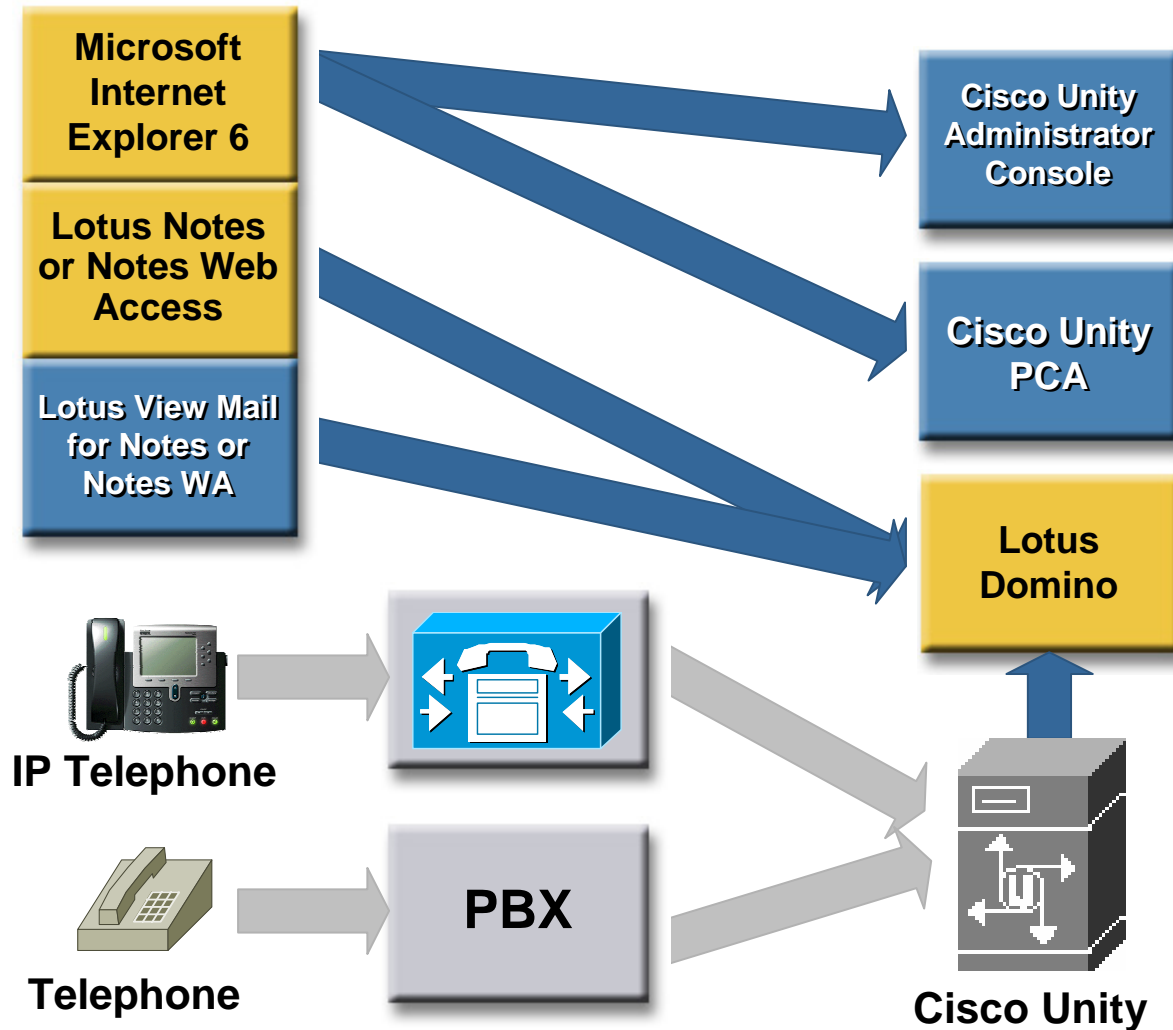
- DUCS is the API glue in the Unity Domino product
- DUCS components include:
 - **CS Admin** (installed on administration server)
 - **CS Server** (installed on message store servers)
 - **CS Client** (installed on each Notes/iNotes client)
- Unity leverages Address Book changes and populates the fields with Unity and subscriber data
- Unity's **Domino monitor** periodically looks for changes to the Domino Address Book on its Domino Partner server

Cisco Unity Architecture Server View—Domino Message Store

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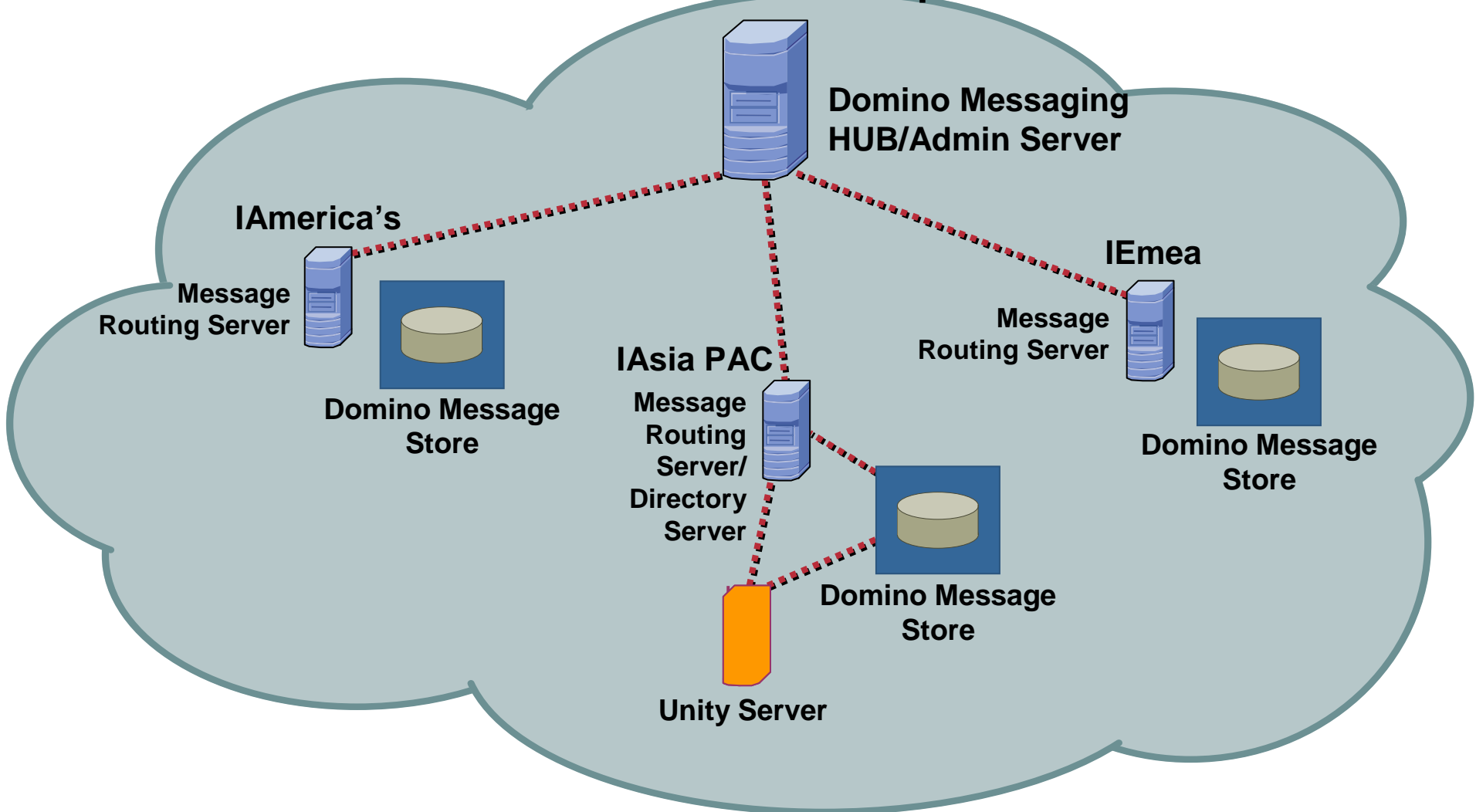


Cisco Unity Architecture Client View—Domino Message Store

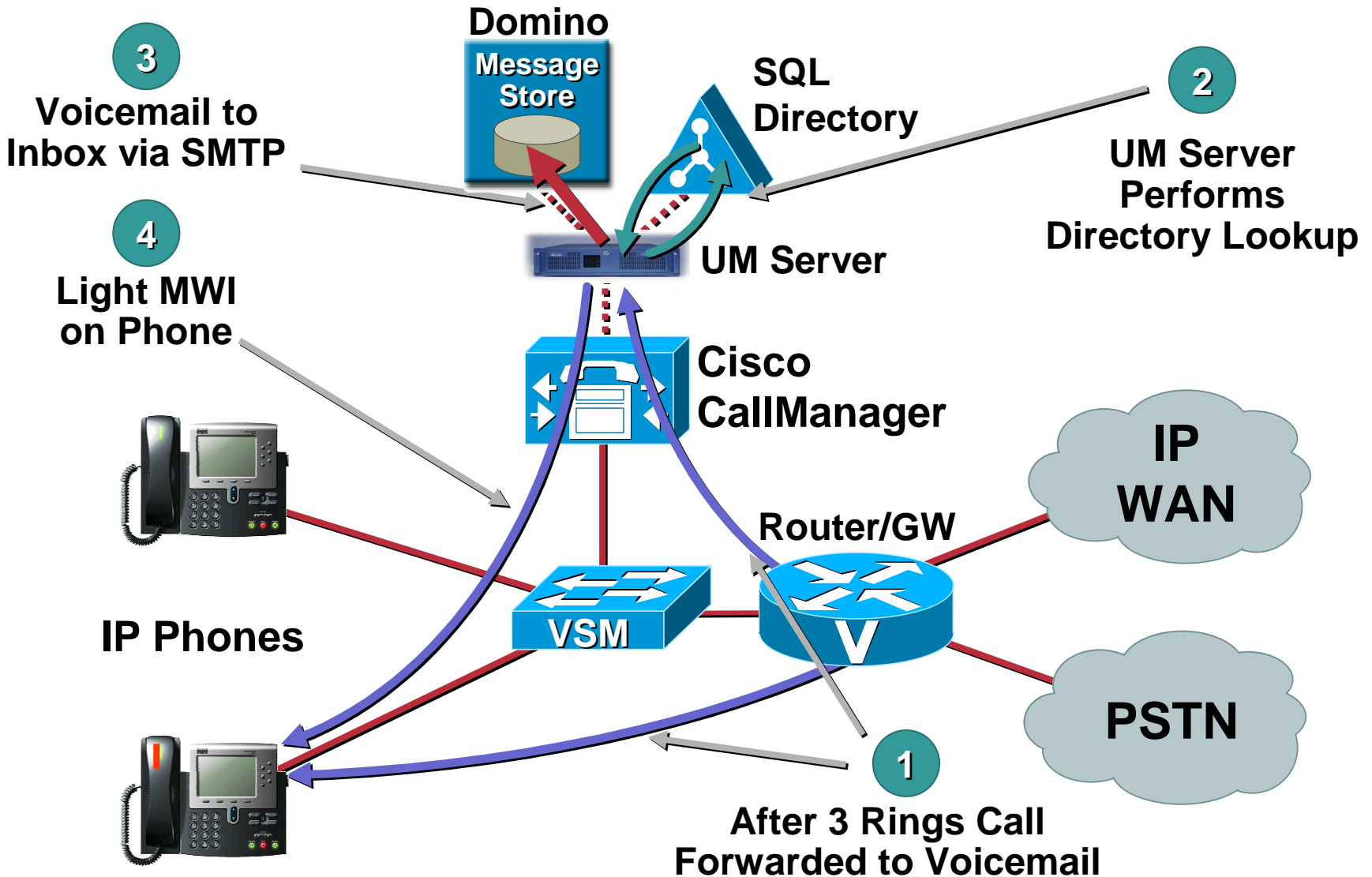


Domino Domain and Messaging Topology

Domino Domain Alpha



Unity Call Flow with Lotus Domino



Domino Messaging Caveats

- **A single Cisco Unity server is fully functional for:**
 - A single physical site with up to 5 Domino servers or clusters (with DUCS installed)**
 - A single Domino Directory or Names.NSF file**
 - A secondary address book for contacts with the same views as normal address book**
- **Digitally networked Cisco Unity servers are fully functional in a single Domino Domain/Directory**
- **More tested configurations in follow on releases**

Agenda

- **The Messaging Challenge**
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Designing a Cisco Unity Solution

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Applications

Telephony Infrastructure

Network Infrastructure

- **Standards-based**
- **Leverages existing customer expertise**
- **Fits into existing messaging topology**

- **Flexible w/caveats**
- **CM, legacy PBX, SIP**

- **QoS-enabled**
- **Highly available**

Where Do You Start?

- **What is the size of your voice messaging solution today?**
- **Do you use Automated Attendant?**
- **What Messaging Groupware do you use?**
- **What is the size of the messaging infrastructure today?**
- **Who will you partner with? Unified Messaging touches everything**

Telephony/IP Telephony/Groupware/Cisco infrastructure

Deployment Considerations

Factors to Consider Include:

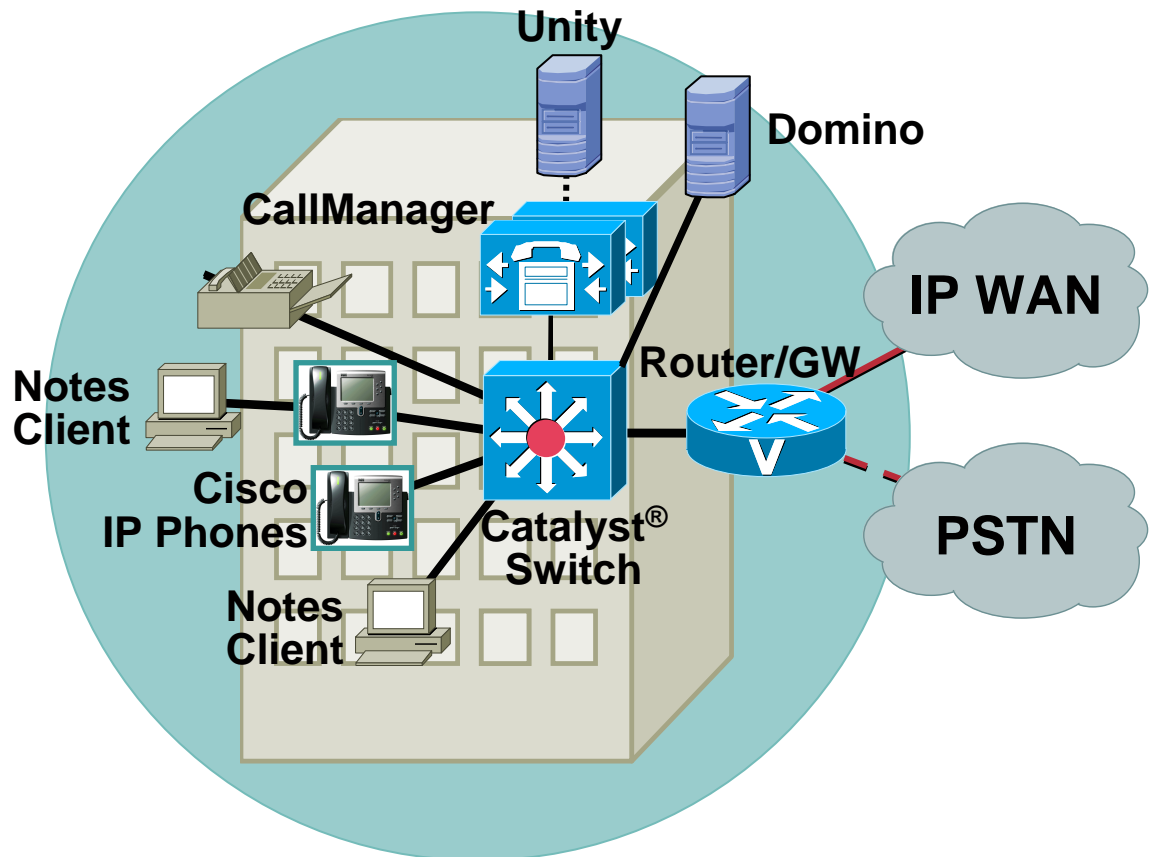
- **Total subscriber count**
- **Total server count**
- **Hardware selection**
- **Voice mail storage**
- **Deployment tasks**
- **Survivability
(Unity Failover/Unity Message Repository)**
- **Voice mail interoperability**

Unity Subscriber Provisioning

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How Many Unity Servers Do I Need?

- Number of subscribers
- Number of sites
- Domino domains
- Number of message stores
- PBX layout
- WAN connections



MCS Software Matrix

Application	7815I	7825H	7835H	7835I	7845H	7845I	7855I	7865I
CallManager	Yes	Yes	Yes	Yes	Yes	No	No	No
CCC	No	Yes	Yes	Yes	No	No	No	No
CER	No	Yes	Yes	No	Yes	No	No	No
IPCC Express	No	Yes	Yes	Yes	Yes	No	No	No
IP IVR	No	Yes	Yes	Yes	Yes	No	No	No
IP PM	No	Yes	Yes	Yes	No	No	No	No
PA	No	Yes	Yes	Yes	Yes	No	No	No
Queue Mgr.	No	Yes	Yes	Yes	Yes	No	No	No
Unity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unity Bridge	Yes	No	No	No	No	No	No	No

Yes = Server supports the Application

No = Server does not support the application

Cisco Unity MCS Hardware Matrix

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Model	MCS-7815I-2.0-ECS1	MCS-7825H-2.2-ECS1	MCS-7835H-2.4-ECS1	MCS-7835I-2.4-ECS1
Processor	Pentium 4 2000MHz	Pentium 4 2266MHz	Pentium Xeon 2400MHz	Pentium Xeon 2400MHz
Memory	512MB	512MB	512MB	512MB
Hard Disk	40GB ATA	2-36GB SCSI	2-36GB SCSI	2-36GB SCSI
Hot Plug HD	No	Yes	Yes	Yes
RAID Config	None	RAID 1	RAID 1	RAID 1
DAT Drive	No	No	Yes	No
Redundant Power	No	No	Yes	Yes
Redundant Fans	No	No	No	No
MAX VM Users	499	499	1100	1100
Max UM Users	499	499	1599	1599

Cisco Unity MCS Hardware Matrix (Cont.)

Model	MCS-7845H-2.4-ECS1	MCS-7845H-2.4-ECS2	MCS-7845I-2.4-ECS1	MCS-7845H-2.4-ECS2
Processor	Dual Prestonia Xeon 2400MHz	Dual Prestonia Xeon 2400MHz	Dual Prestonia Xeon 2400MHz	Dual Prestonia Xeon 2400MHz
Memory	1GB	1GB	4GB	1GB
Hard Disk	4-18GB SCSI 2-72GB SCSI	2-18GB SCSI 2-36GB SCSI	4-18GB SCSI 2-72GB SCSI	2-18GB SCSI 2-36GB SCSI
Hot Plug HD	Yes	Yes	Yes	Yes
RAID Config	3 x RAID 1	2 x RAID 1	3 x RAID 1	2 x RAID 1
DAT Drive	Hot-Plug	Hot-Plug	No	Hot-Plug
Redundant Power	Yes	Yes	Yes	Yes
Redundant Fans	Yes	Yes	Yes	Yes
MAX VM Users	2200	2200	2200	2200
Max UM Users	2500	2500	2500	2500

- **ECS1** server configurations are targeted for voice messaging only deployments
- **ECS2** server configurations are targeted for unified messaging deployments or voice messaging deployments where messages will be stored off box

Cisco Unity MCS Hardware Matrix (Cont.)

Model	MCS-7845I-2.4-ECS1	MCS-7855I-2.4-ECS2	MCS-7865I-2.4-ECS1	MCS-7865I-2.4-ECS2
Processor	Dual Gallatin Xeon 1500MHz	Dual Gallatin Xeon 1500MHz	Dual Gallatin Xeon 1500MHz	Dual Gallatin Xeon 1500MHz
Memory	2GB	2GB	4GB	4GB
Hard Disk	4-18GB SCSI 4-72GB SCSI	4-36GB SCSI	4-18GB SCSI 4-72GB SCSI	4-36GB SCSI
Hot Plug HD	Yes	Yes	Yes	Yes
RAID Config	2 x RAID 1 + RAID 10	2 x RAID 1	2 x RAID 1 + RAID 10	2 x RAID 1
DAT Drive	Non-Hot-Plug	Non-Hot-Plug	Non-Hot-Plug	Non-Hot-Plug
Redundant Power	Yes	Yes	Yes	Yes
Redundant Fans	Yes	Yes	Yes	Yes
MAX VM Users	3000	3000	3000	3000
Max UM Users	7500	7500	7500	7500

- **ECS1** server configurations are targeted for voice messaging only deployments
- **ECS2** server configurations are targeted for unified messaging deployments or voice messaging deployments where messages will be stored off box

What Is the Storage Requirement?

Users	Messages		Ave. Msg. Size in Sec.	Storage Size G.711
1	15	G.711 @ 8k per Sec	40	4,800,000
10	15		40	48,000,000
100	15		40	480,000,000
500	15		40	2,400,000,000
1,000	15		40	4,800,000,000
1,500	15		40	7,200,000,000
2,000	15		40	9,600,000,000
5,000	15		40	24,000,000,000
7,500	15		40	36,000,000,000
10,000	15		40	48,000,000,000
Users	Messages		Ave. Msg. Size in Sec.	Storage Size G.729a
1	15	G.729a @ 1k per Sec	40	600,000
10	15		40	6,000,000
100	15		40	60,000,000
500	15		40	300,000,000
1,000	15		40	600,000,000
1,500	15		40	900,000,000
2,000	15		40	1,500,000,000
5,000	15		40	3,000,000,000
7,500	15		40	4,500,000,000
10,000	15		40	6,000,000,000

Deployment Tasks

- Define and create the accounts to be used in running the **Cisco Unity services** (Windows-based)
- Define and create the accounts to be used to administer Cisco Unity (Windows-based)
- Install **DUCS** on all **mail store servers** which will home Unity subscribers
- Install **DUCS** on the **Domino Admin server** (Unity Partner) for the Domino domain
- Install **DUCS** on the **Notes/iNotes clients**
- Install Notes 5.0.10 on the Unity server (Unity leverages the Notes .dll's for access to DUCS)
- Define and create the Unity **Lotus Notes ID** and assign appropriate permissions to **names.nsf** and **admin4.nsf** databases
- Define the level of access necessary to Unity
- Define COS policy
- Define subscriber templates

Deployment Tasks (Cont.)

- Determine and define distribution lists
- Determine audio-text requirements
- Determine dialing restrictions
- Verify the **number of subscribers** to be serviced by each server (7500 max)
- Verify **server sizing** based on subscriber count
- Determine disaster recovery plan
- Verify PBX/IPT integration
- Determine message notification ports required
- Verify hardware and supporting components
- Determine **acceptance test plan**
- Determine **fallback procedure**
- Determine **performance benchmarks**

Cisco Unity 4.0 Key Features

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- **Unified Messaging (UM) solution for Lotus Domino/Notes**
- **Cisco Unity Domino and Cisco Unity Exchange supporting up to 72 ports, 7,500 UM users/server**
- **SIP Integration**

Enables Unity to integrate with SIP v2.0-compliant SIP proxy servers, designated SIP phones and clients, and SIP-enabled access gateways
- **UTIM (Unity Telephony Integration Manager)**

A single standard Unity UI for installing and configuring Cisco Unity integrations with Cisco CallManager, SIP and circuit-switched PBXs

Cisco Unity 4.0 Key Features (Cont.)

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- **Improve setup experience with Server Preparation Assistant**

Applies to Voice Messaging (VM), Unified Messaging (UM), Cisco provided servers, customer provided servers

Brings all installs up to Unity install

- **FlexLM software security** — no more h/w dongles
- **Live Reply** — Reply to subscribers at their extension
- **Flex Stack** — Flexibility in how to access messages over the phone (e.g. LIFO/FIFO, message class)

- **VPIM**

Cisco Unity VM and Cisco Unity UM for **Exchange** will support VPIM qualified with the **Meridian Net Gateway for Meridian Mail, Mitel NuPoint Messenger, and Nortel CallPilot**

Cisco Unity Survivability

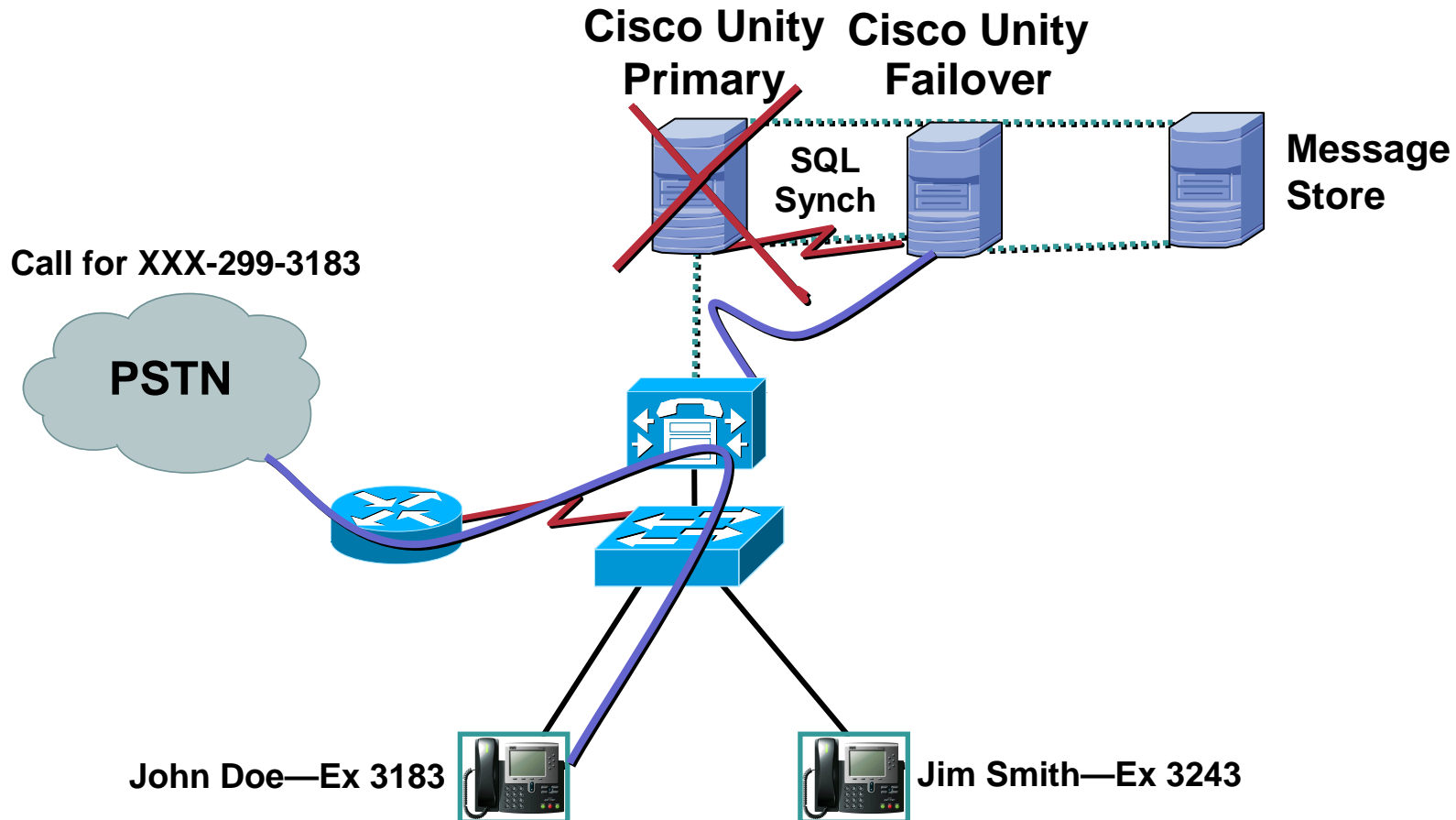
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- **Unity failover**
- **Unity messaging repository**

Unity Failover

- **Failover**—if the primary Unity server goes down, the failover server will automatically fail-over
- **“Port failover”**—
 - A port on the primary has ring-no answer—the failover server will take the call
 - The failover server will send message to the primary to failover
 - System admin is notified
- **Failover server needs to match the configuration of the primary**
- **60 day limit**—the failover server will periodically monitor the primary server to see if it has come back up; if this has not happened in 60 days—the failover server will shutdown

Call Forwarding— Primary Unity Is Off-Line

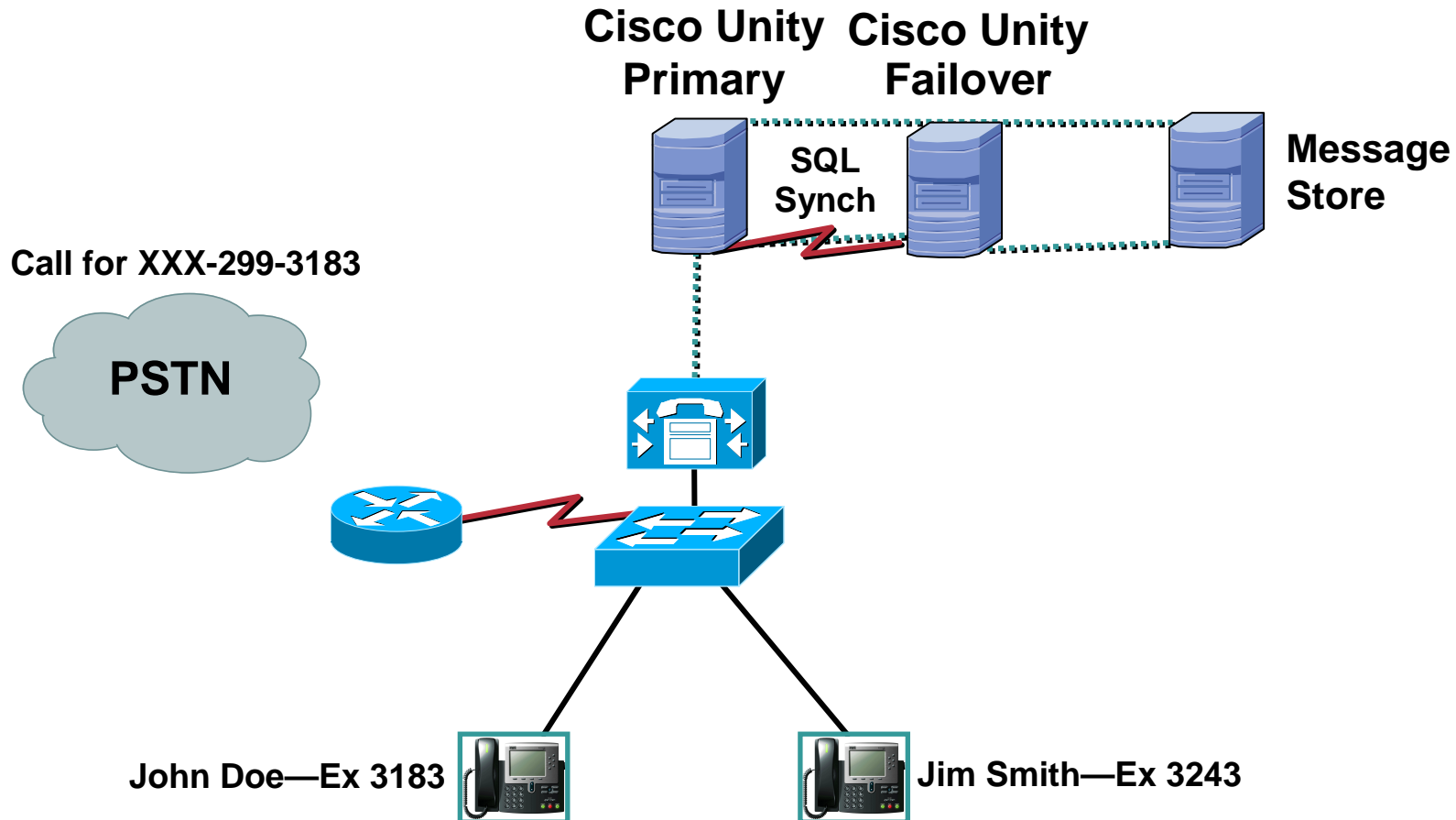


Failover with Cisco CallManager

- **Cisco CallManager setup up to automatically route calls to failover when primary off-line**

Forward each UM port, No Answer to first failover UM port

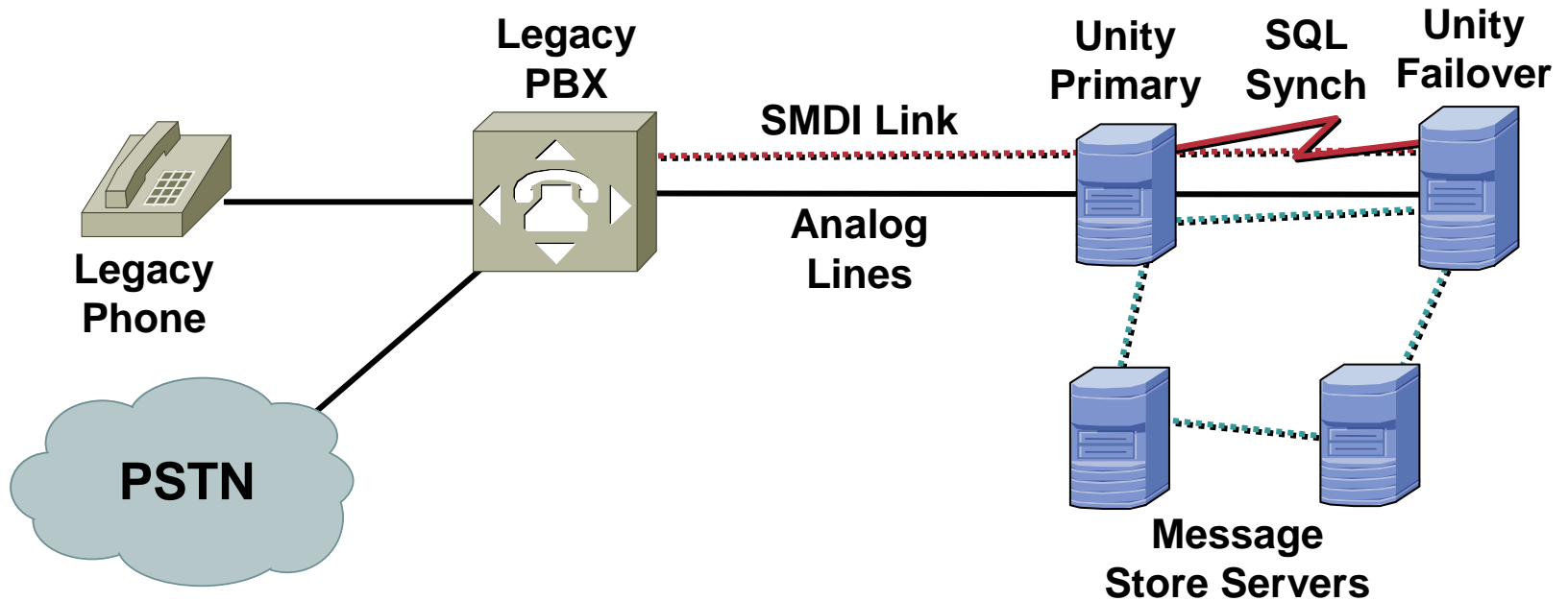
Failover with Cisco CallManager



Failover with Traditional PBX


- **Failover Unity set to answer on 3 rings**
- **PBXLink bridged to failover Unity**
Serial “Y” connector
- **Analog telephone lines bridged to failover Unity**
Line splitter for analog telephone lines

Failover with Traditional PBX



Failover Caveats

- **Failover server should be at the same location as the Unity server**
- **External message store required for voicemail**
- **Failover is not recommended in a dual PBX environment**
- **Failover is not disaster recovery**

- **“UMR”**  **Unity Messaging Repository**

The creation of a pre-MTA message queue reduces the level of volatility within Unity when the Exchange/Domino network is not available
- **Benefit: Allows Unity to continue to take voicemail messages and retrieve voice mail messages while the email system or network is off-line**

Unity Messaging Repository Functionality

1. Outside caller

Leaves message while recipient's message store is down

2. Subscriber to subscriber call fwd off RNA

Senders message store server is down

Recipient's message store server is down

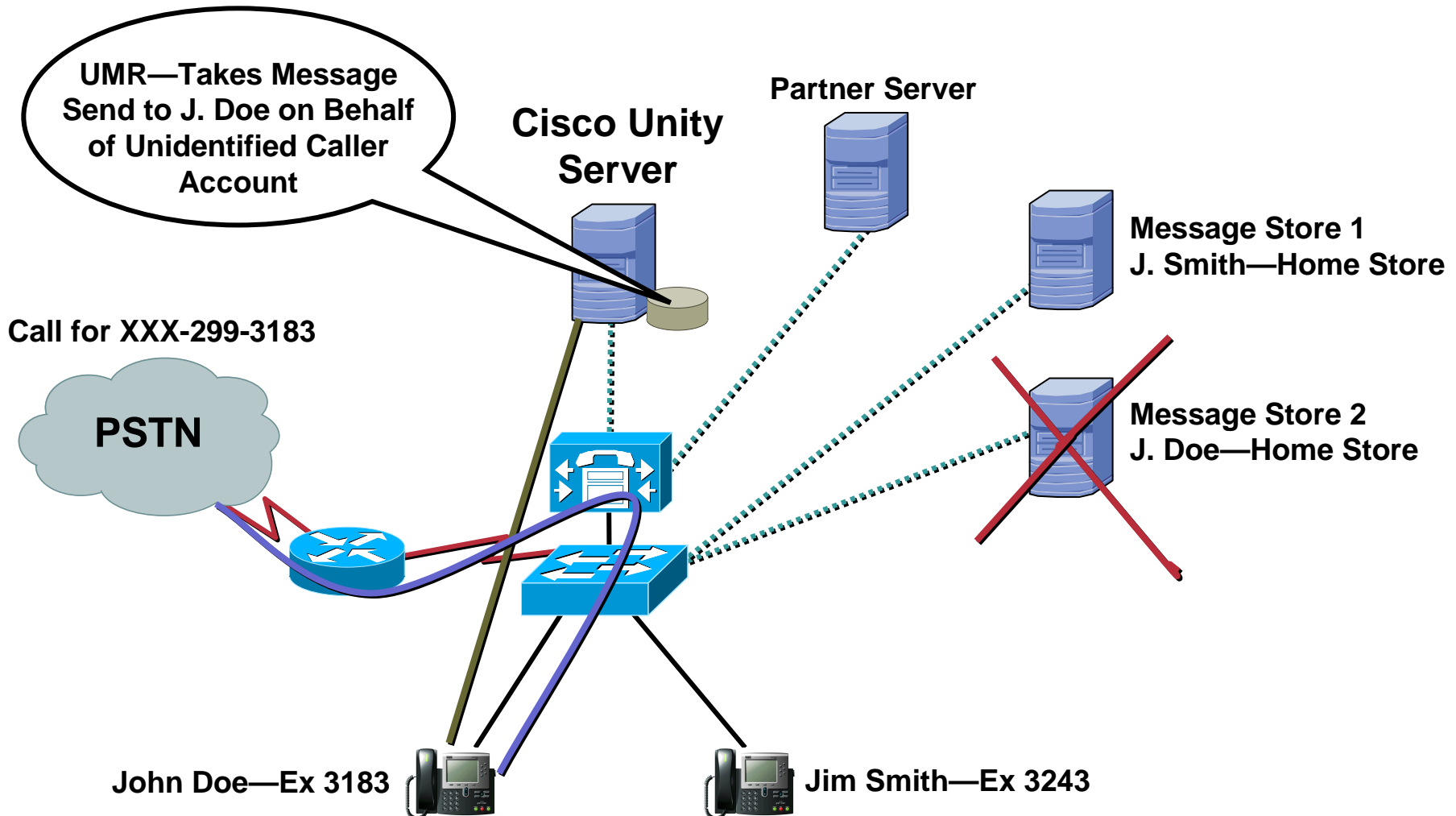
3. Subscriber logon to send message

Senders message store server is down

Recipient's message store server is down

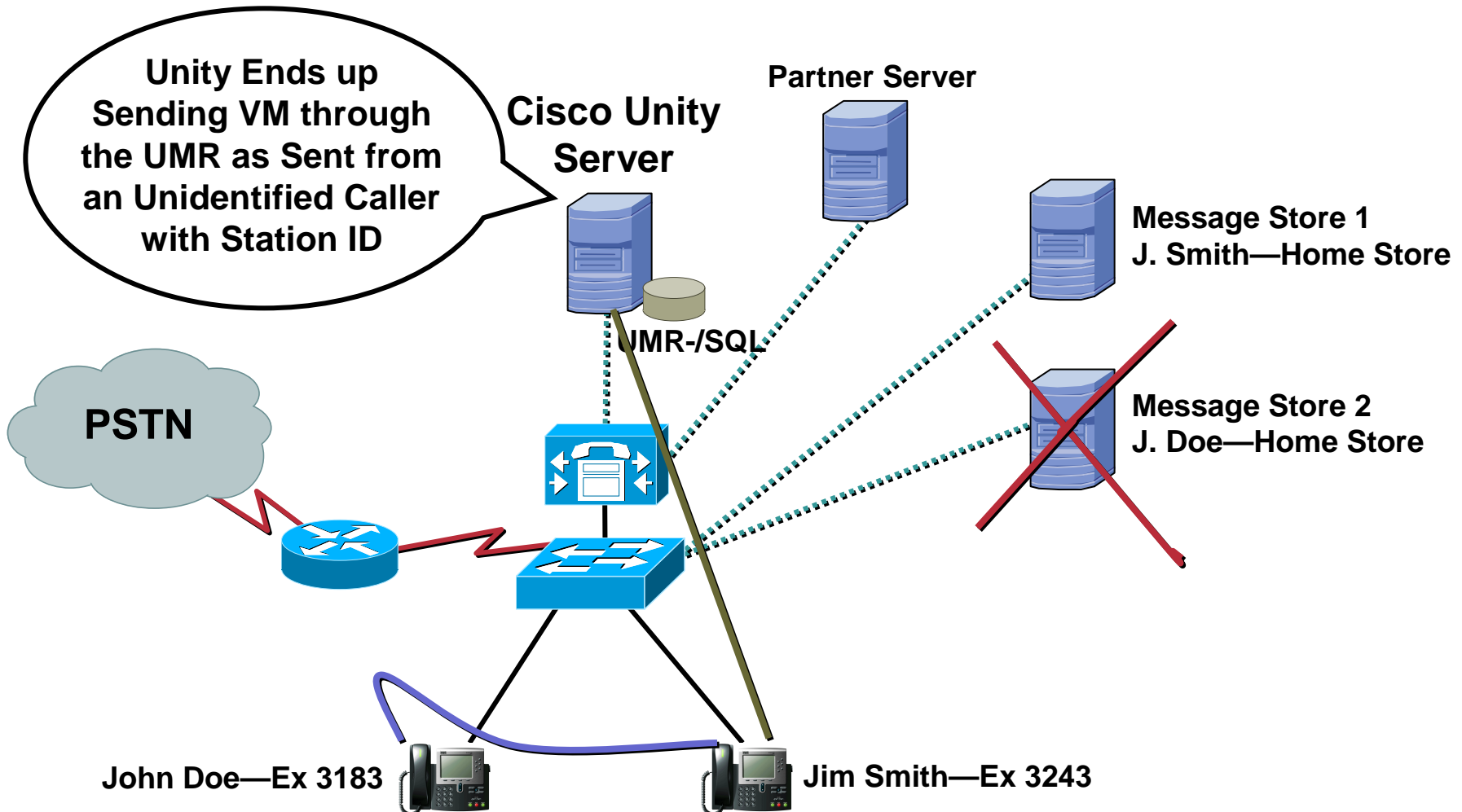
4. Unity partner server goes down

Outside Caller (Call Forward Ring No Answer)— Leaves Message while Recipient's Message Store Is Down



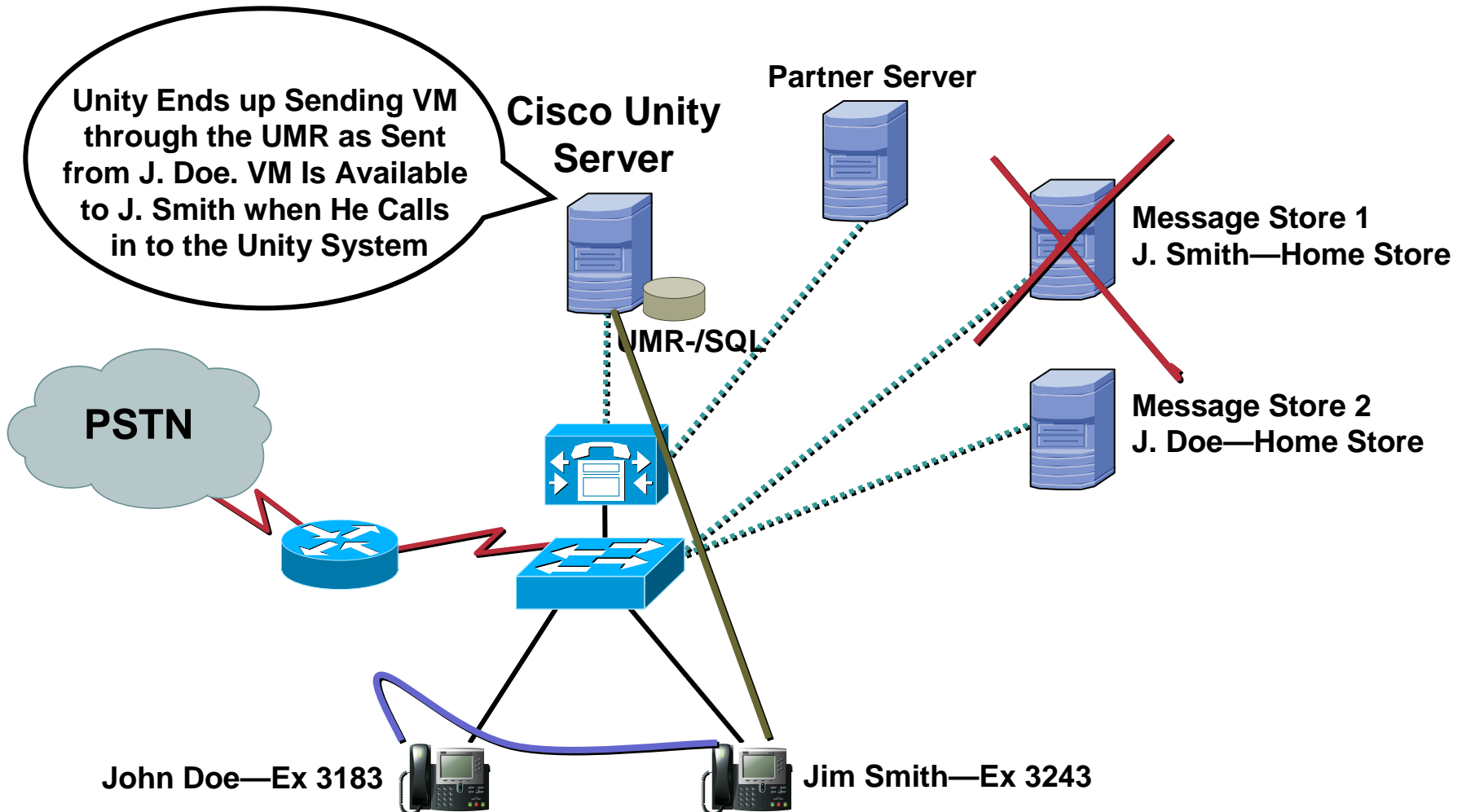
Call Forward RNA— Voice Mail Senders Message Store Server Is Down

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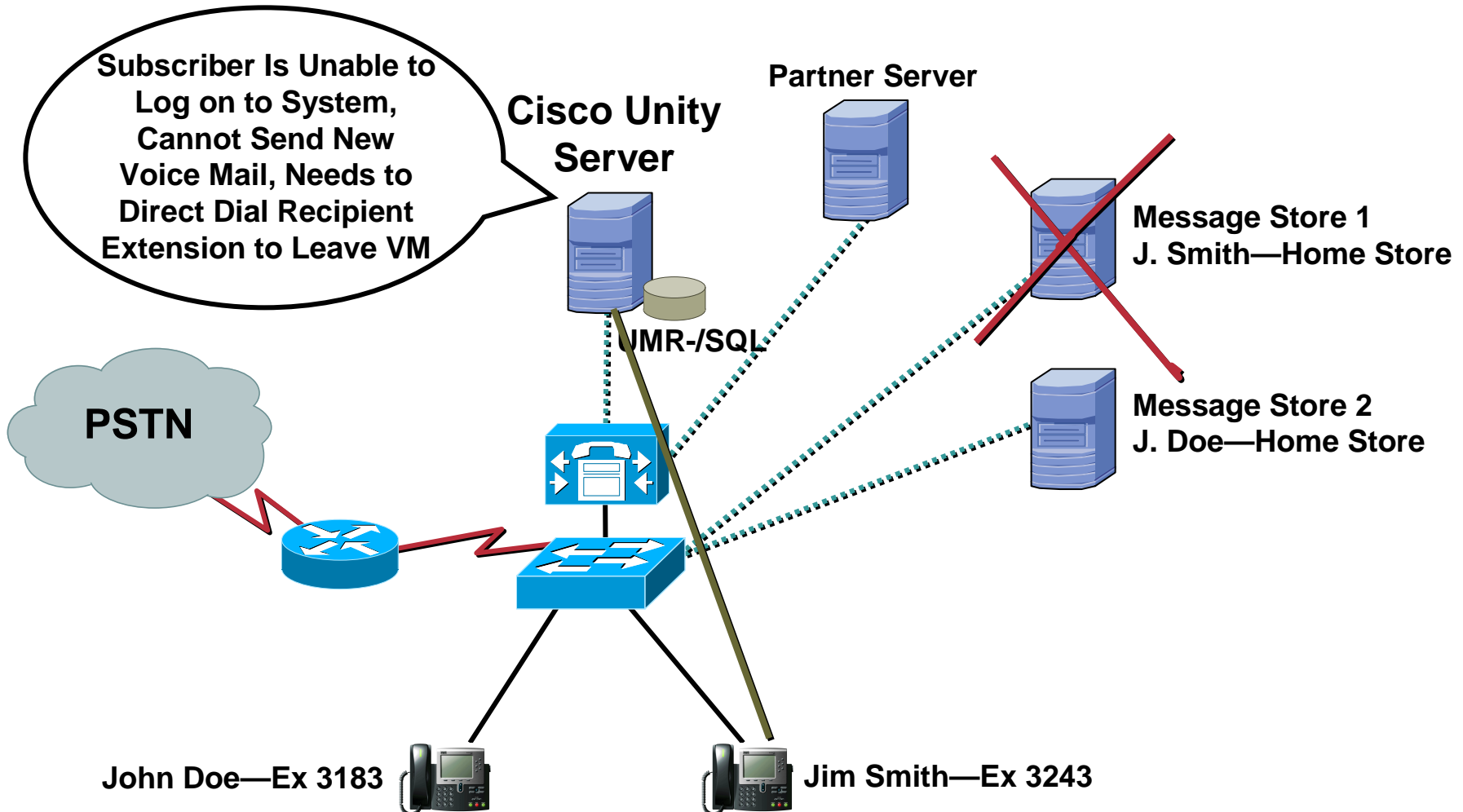
Call Forward RNA— Recipient's Message Store Server Is Down

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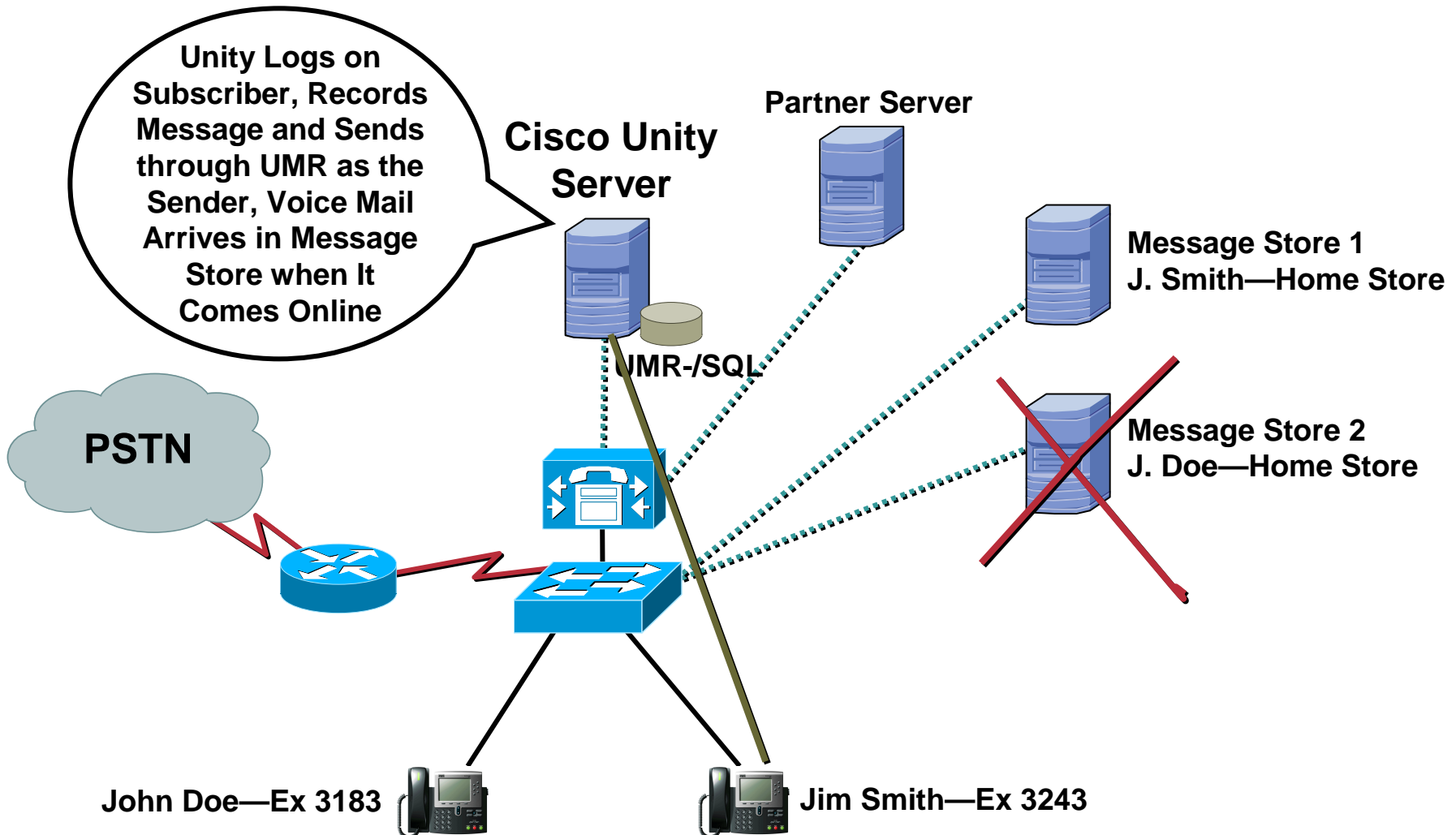
Subscriber Logon to Send Message— Senders Message Store Server Is Down

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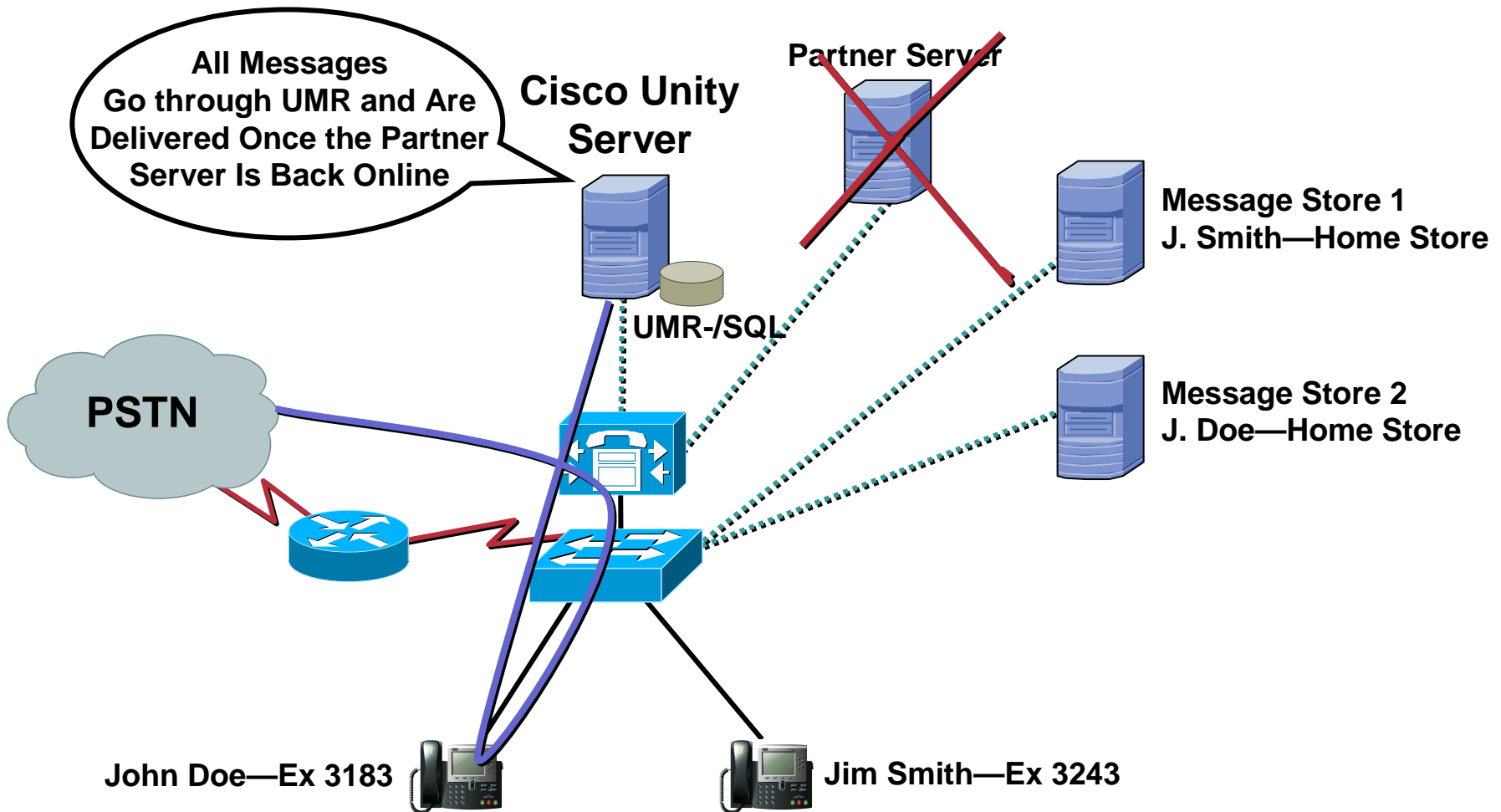


Subscriber Logon to Send Message— Recipient's Message Store Server Is Down

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Unity Partner Server Goes Offline



Unity Messaging Repository UMR— Summary

- **UMR sits in SQL, partition enough room on Unity server for SQL database (recording format G711—compare how many user/messages to how long UMR would be up)**
- **Once Connectivity is up, all Messages are delivered to the message store server**
- **UMR—NO MWIs, no notification-only takes messages/and allows access for messages**

Voice Mail Interoperability

- **AMIS**
- **Unity Bridge**
- **VPIM**

- **AMIS**

- Required for most legacy voicemail**

- Short term migration for Octel**

- Not very efficient**

- **AMIS Bridgehead Model**

- Digital networking multiple Cisco Unity systems**

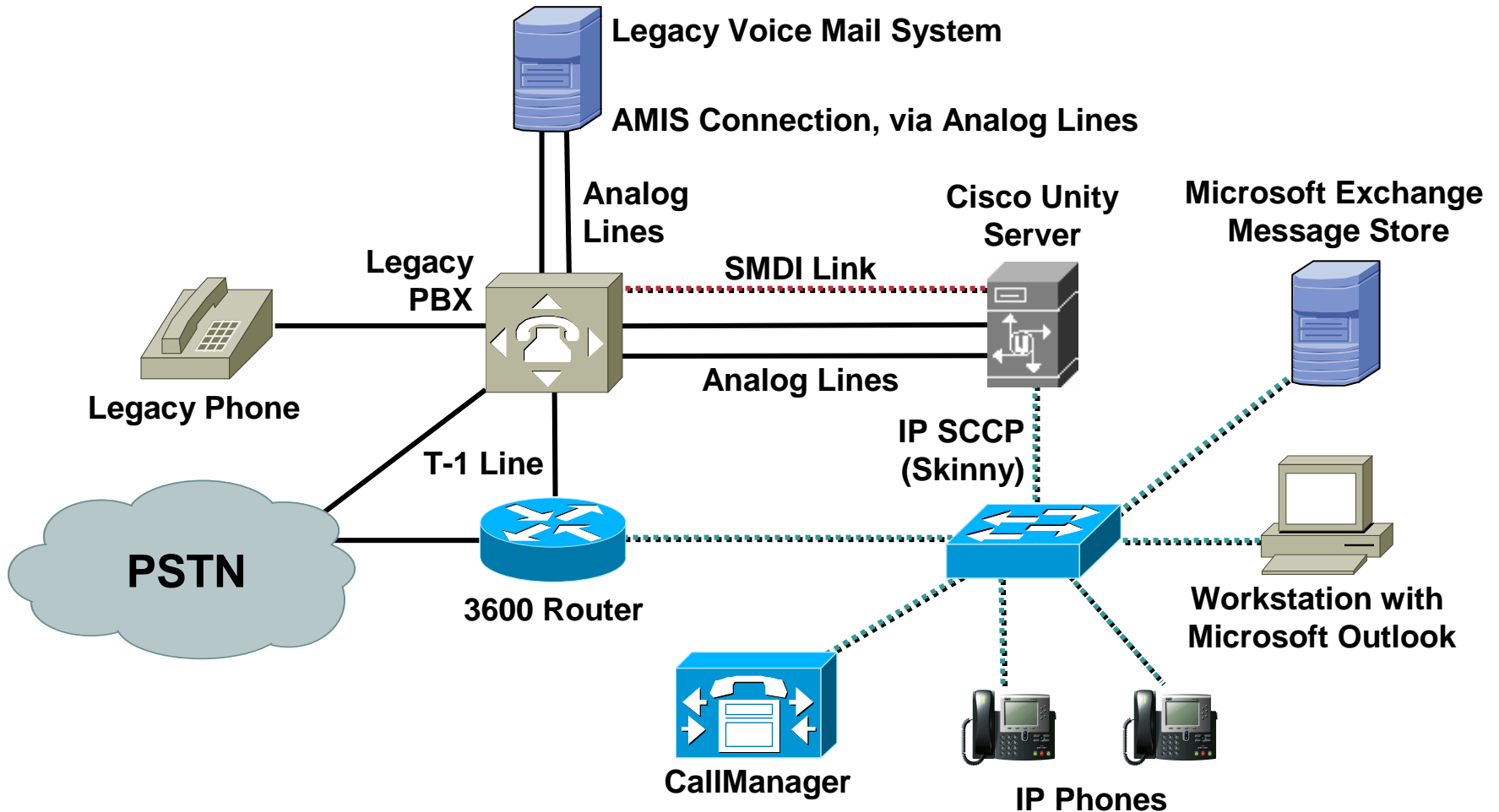
- Dedicated Cisco Unity for AMIS traffic**

- Used for high traffic environments**

- Blind addressing or name confirmation**

- Simultaneous transfer of messages between Cisco Unity and other messaging systems supporting AMIS**

Cisco Unity: AMIS-A



AMIS Integrations Validated

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- **Active Voice—Repartee**
- **Avaya—Interchange**
- **Avaya—Intuity**
- **Avaya—Octel**
- **Baypoint—Centigram**
- **Nortel—Meridian Mail**
- **Siemens—Phonemail**

- **Supports analog OctelNet**

Requires Exchange 2000 and Active Directory

Direct to a node(s)

Avaya Interchange

Used for analog OctelNet environments

Directory synch

NameNet Dialing

No Aria Domain (digital)

Short to long term migration

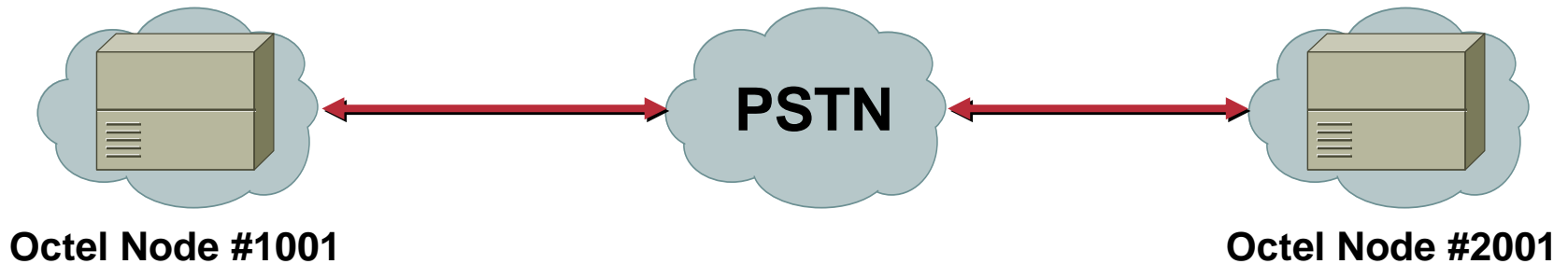
Design Scenarios

- **Basic Octel Networking**
- **Multi-Node Octel Networking**

Design Considerations:

- **Maximum ports per Unity Bridge**
 - Multiple sessions per node
- **Selecting physical location of Unity Bridge server**
- **Possible Octel re-programming**
- **Networked Unity Servers must have a uniform dial plan**

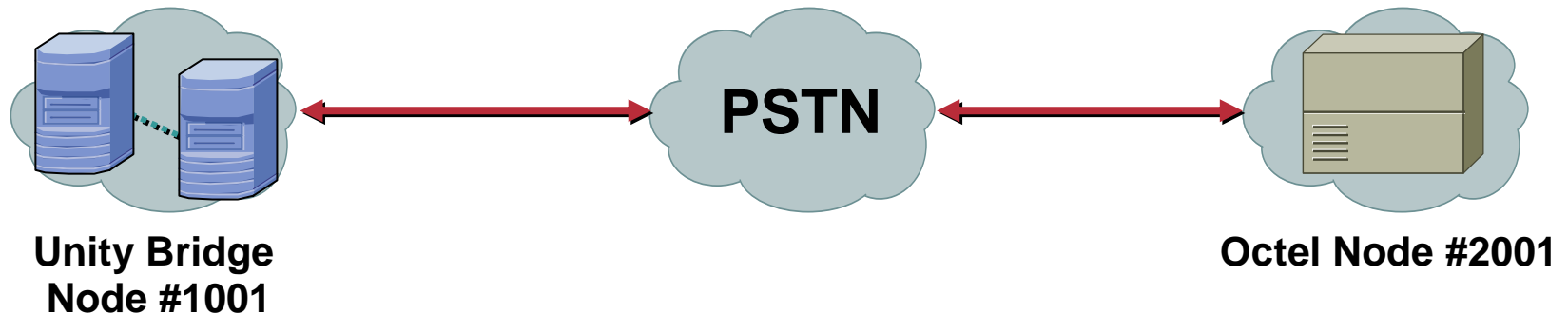
Basic Octel Networking



- **Digital or analog networking**
- **Peer-to-peer topology**
- **Each node is assigned a serial number below 65535**
- **Directory sync when messages are sent between users**

Basic Unity Bridge Networking

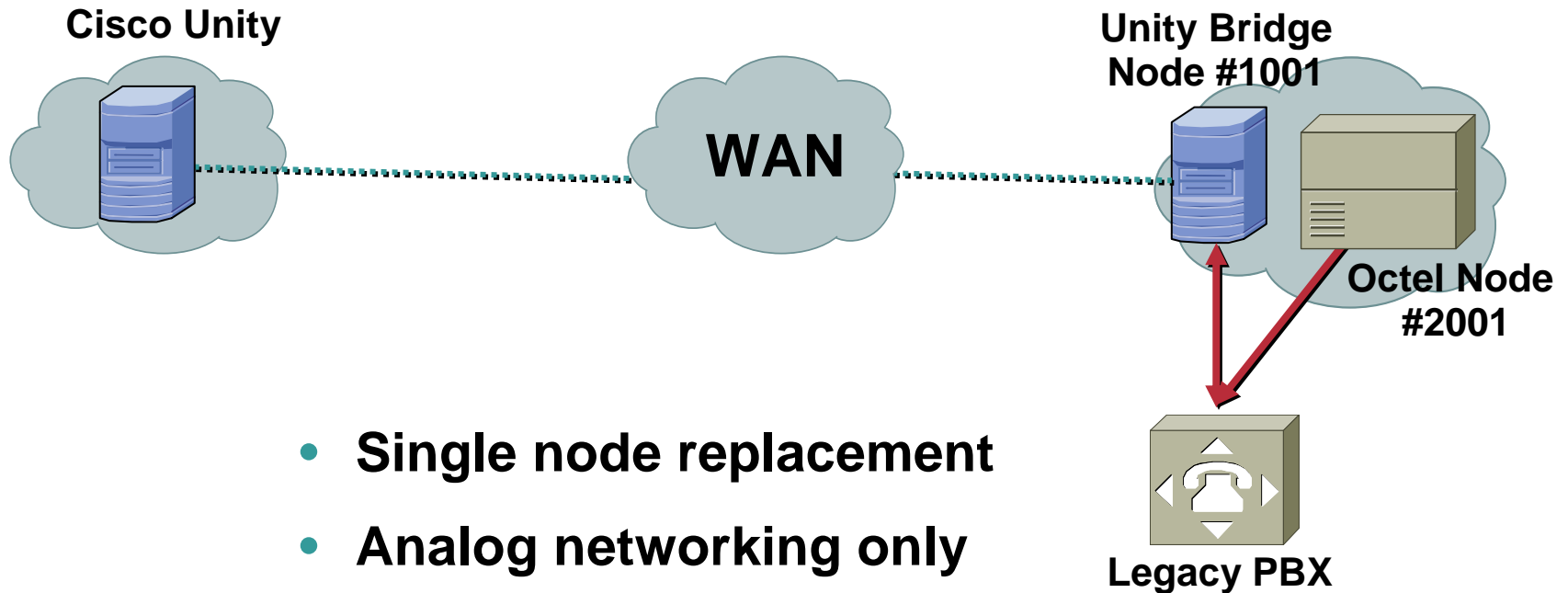
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- **Single node replacement**
- **Analog networking only**
- **Peer-to-peer topology**
- **Each node is assigned a serial number below 65535**
- **Directory sync when messages are sent between users**

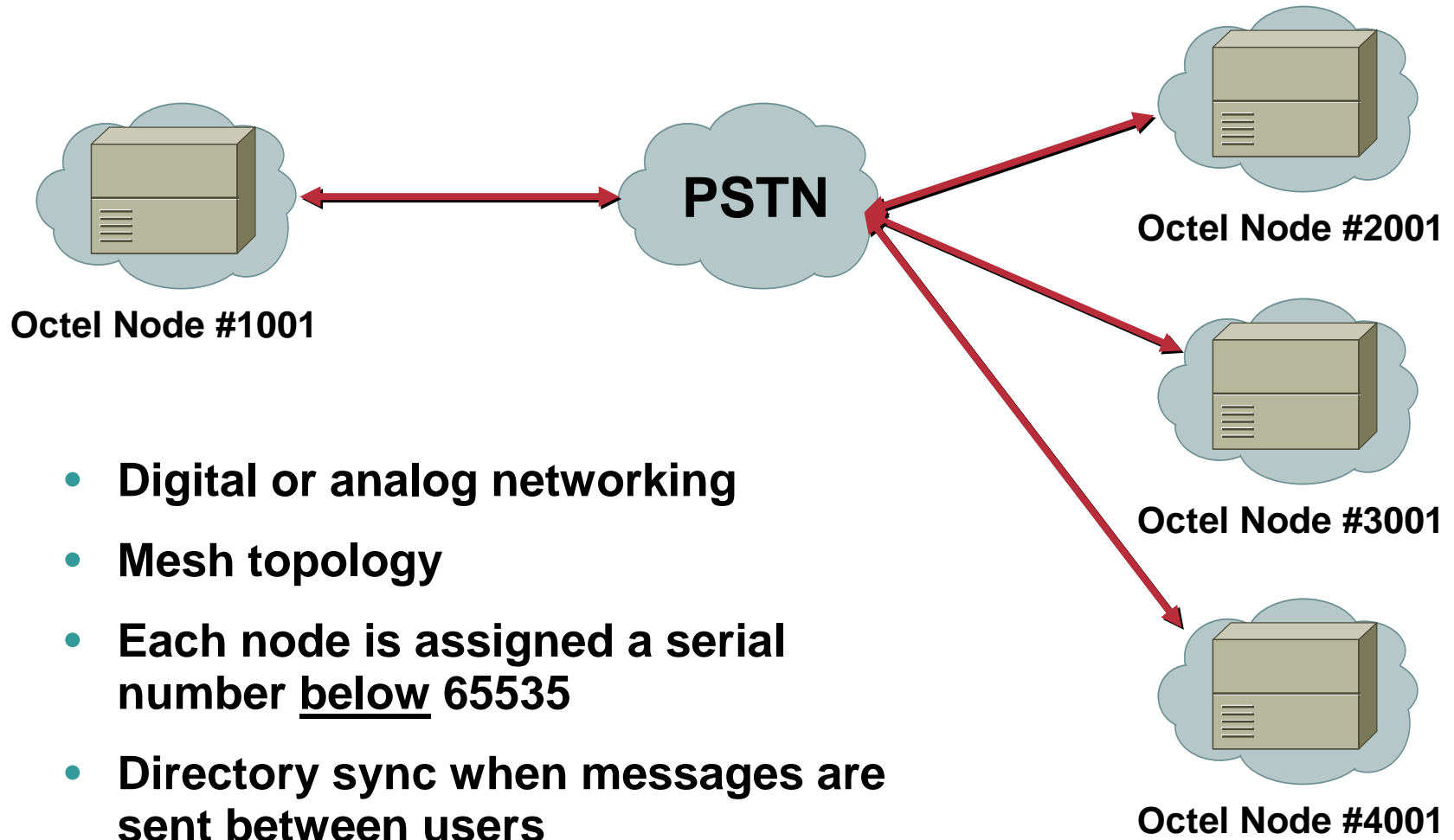
Basic Unity Bridge Networking with a Remote Bridge

Cisco.com

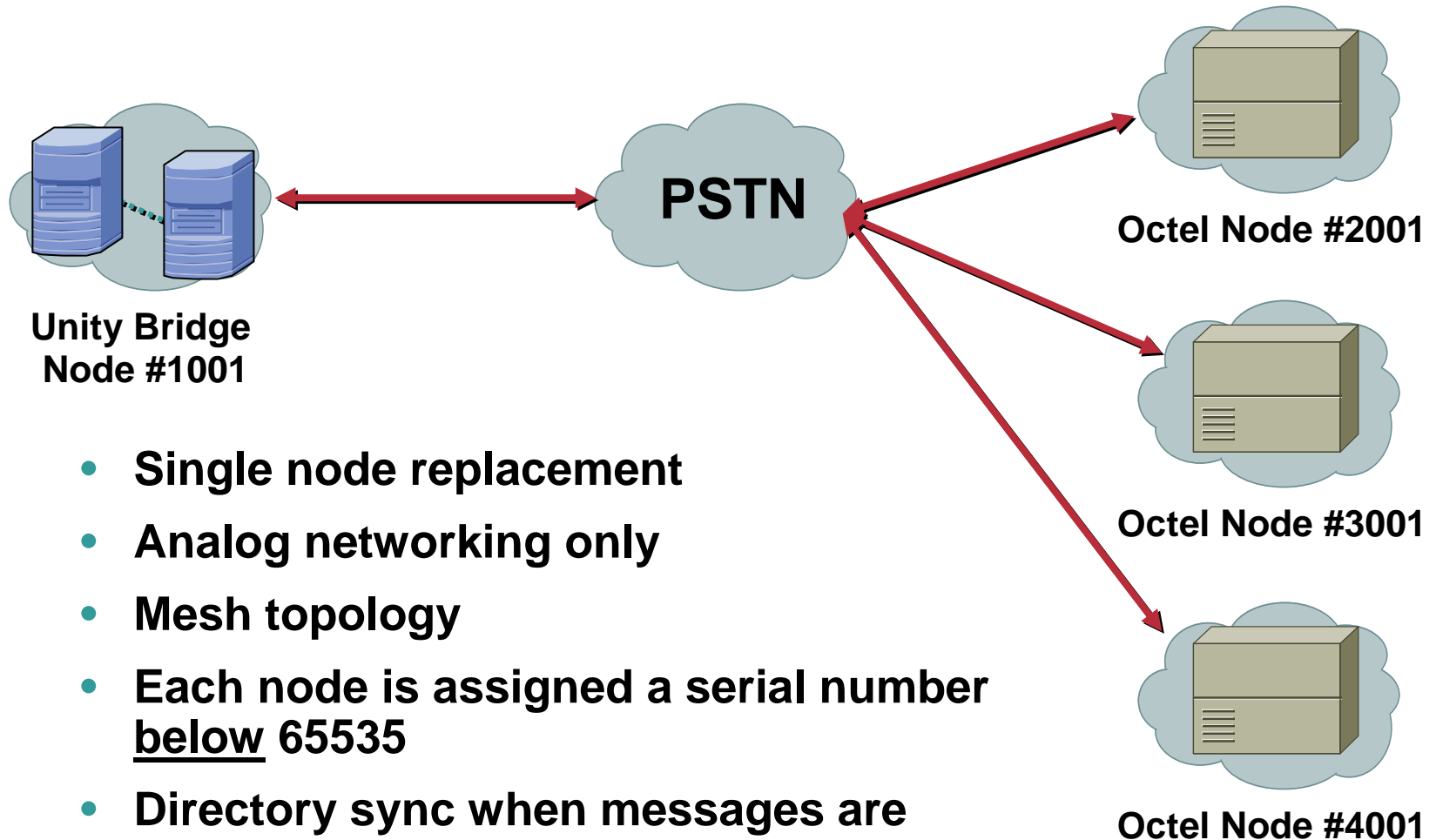


- **Single node replacement**
- **Analog networking only**
- **Peer-to-peer topology**
- **Uses WAN to bypass PSTN**
- **Unity Bridge co-located with PBX**

Multi-Node Octel Networking

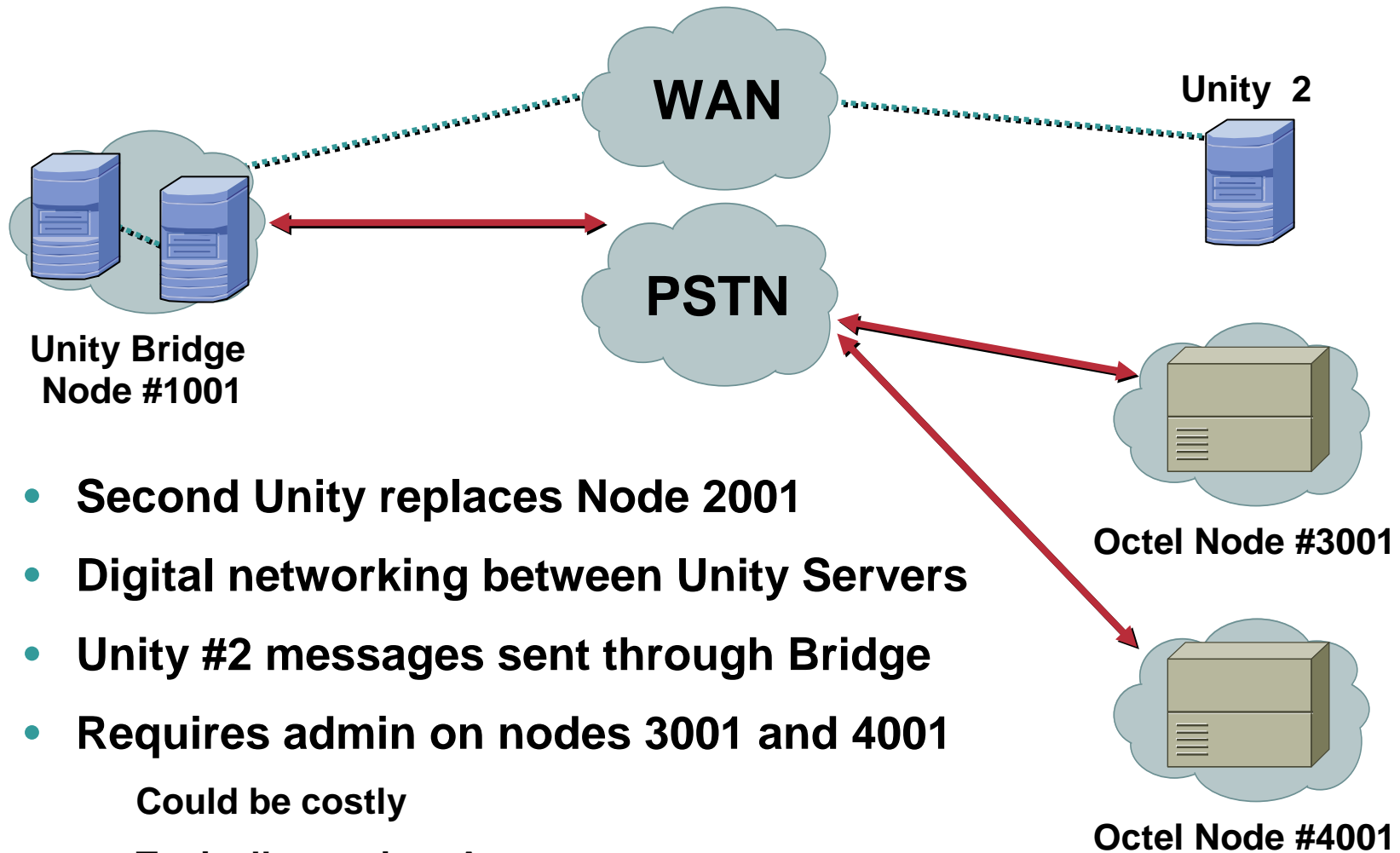


Unity Bridge in Multi-Node Octel Networking (1)



- **Single node replacement**
- **Analog networking only**
- **Mesh topology**
- **Each node is assigned a serial number below 65535**
- **Directory sync when messages are sent between users**

Collapsing a Node

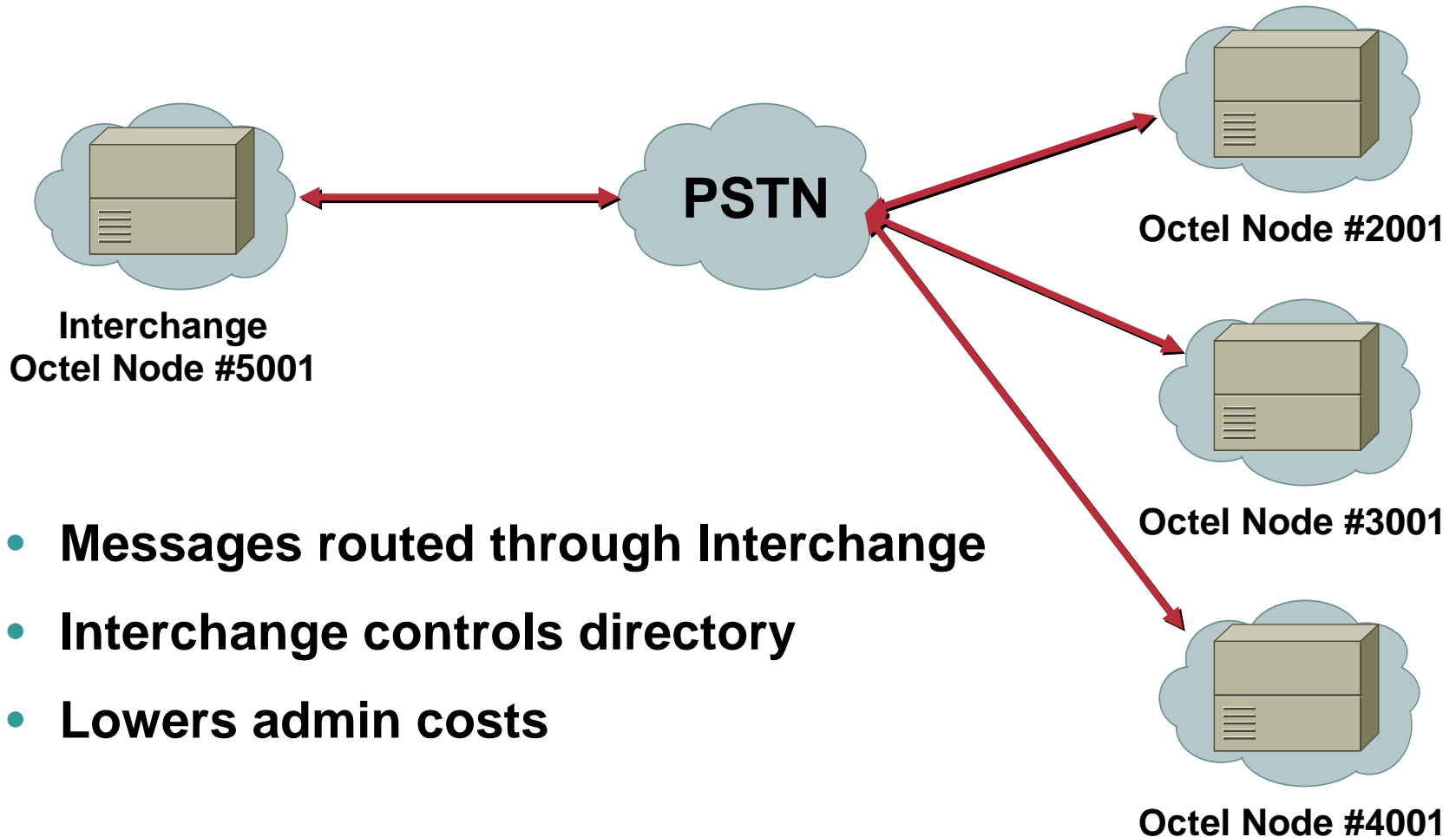


- **Second Unity replaces Node 2001**
- **Digital networking between Unity Servers**
- **Unity #2 messages sent through Bridge**
- **Requires admin on nodes 3001 and 4001**

Could be costly

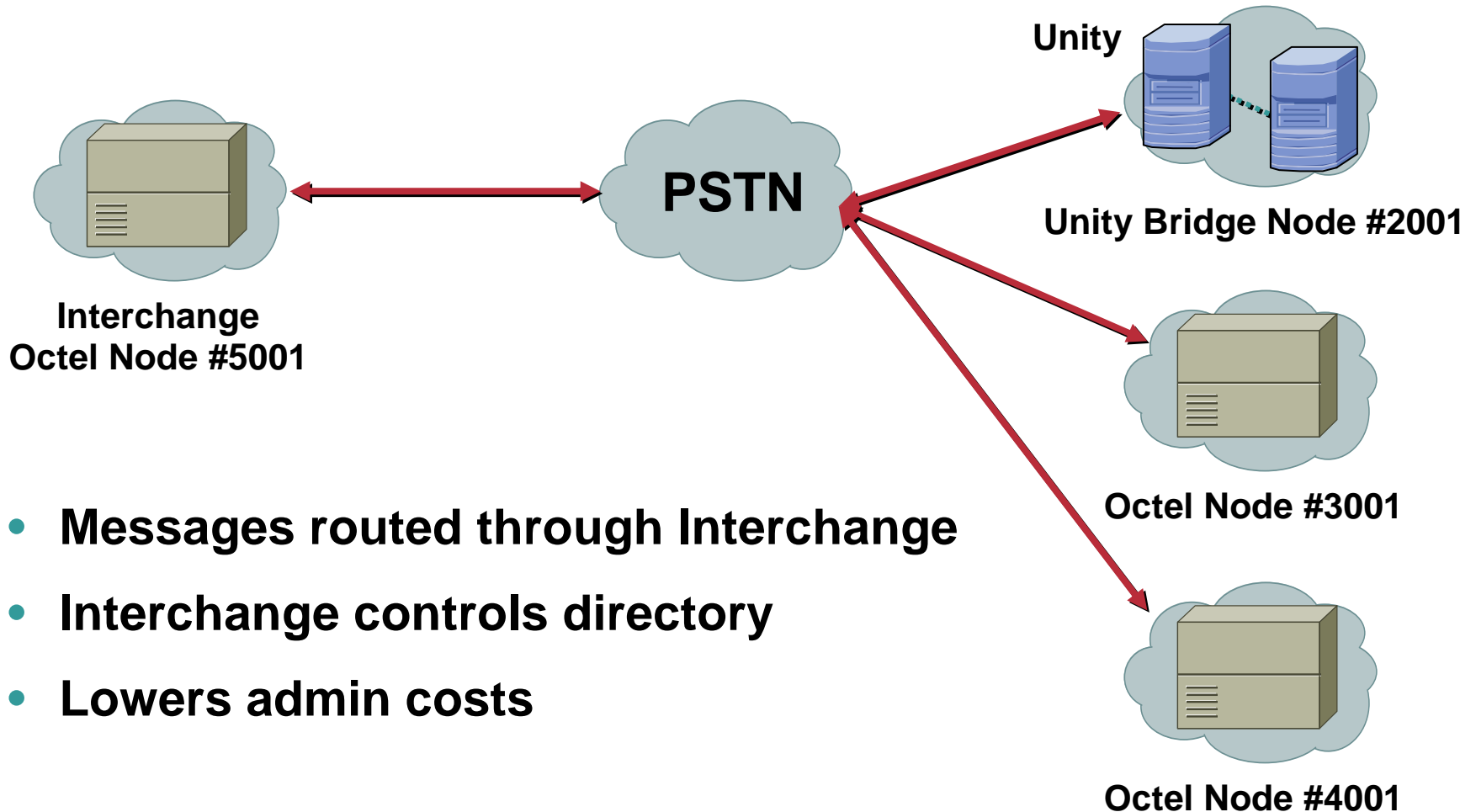
Typically requires Avaya

Multi-Node Octel Networking with Interchange



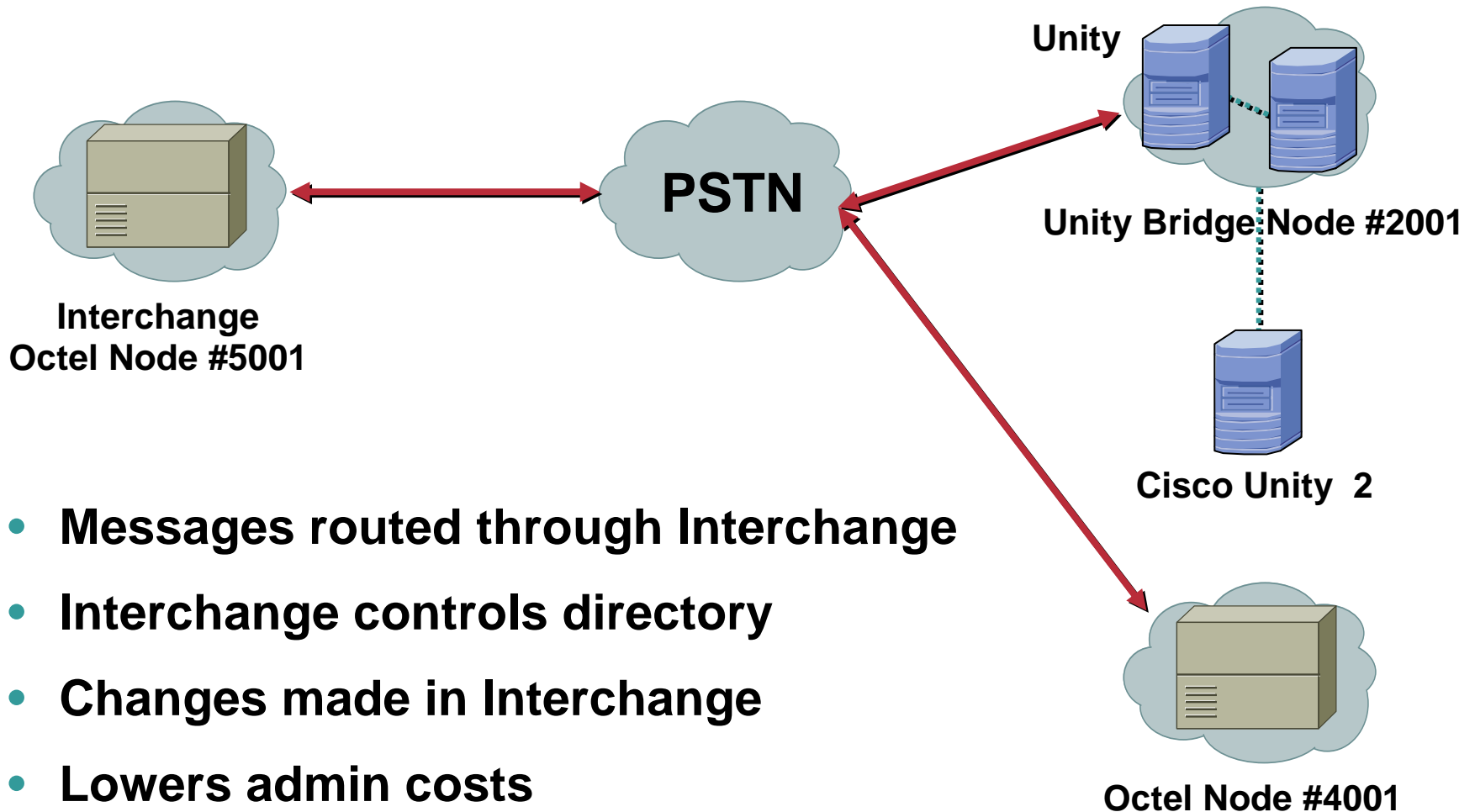
- **Messages routed through Interchange**
- **Interchange controls directory**
- **Lowers admin costs**

Multi-Node Octel Networking with Interchange and Unity Bridge



- Messages routed through Interchange
- Interchange controls directory
- Lowers admin costs

Collapse a Node with Interchange



- Messages routed through Interchange
- Interchange controls directory
- Changes made in Interchange
- Lowers admin costs

VPIM—Defined

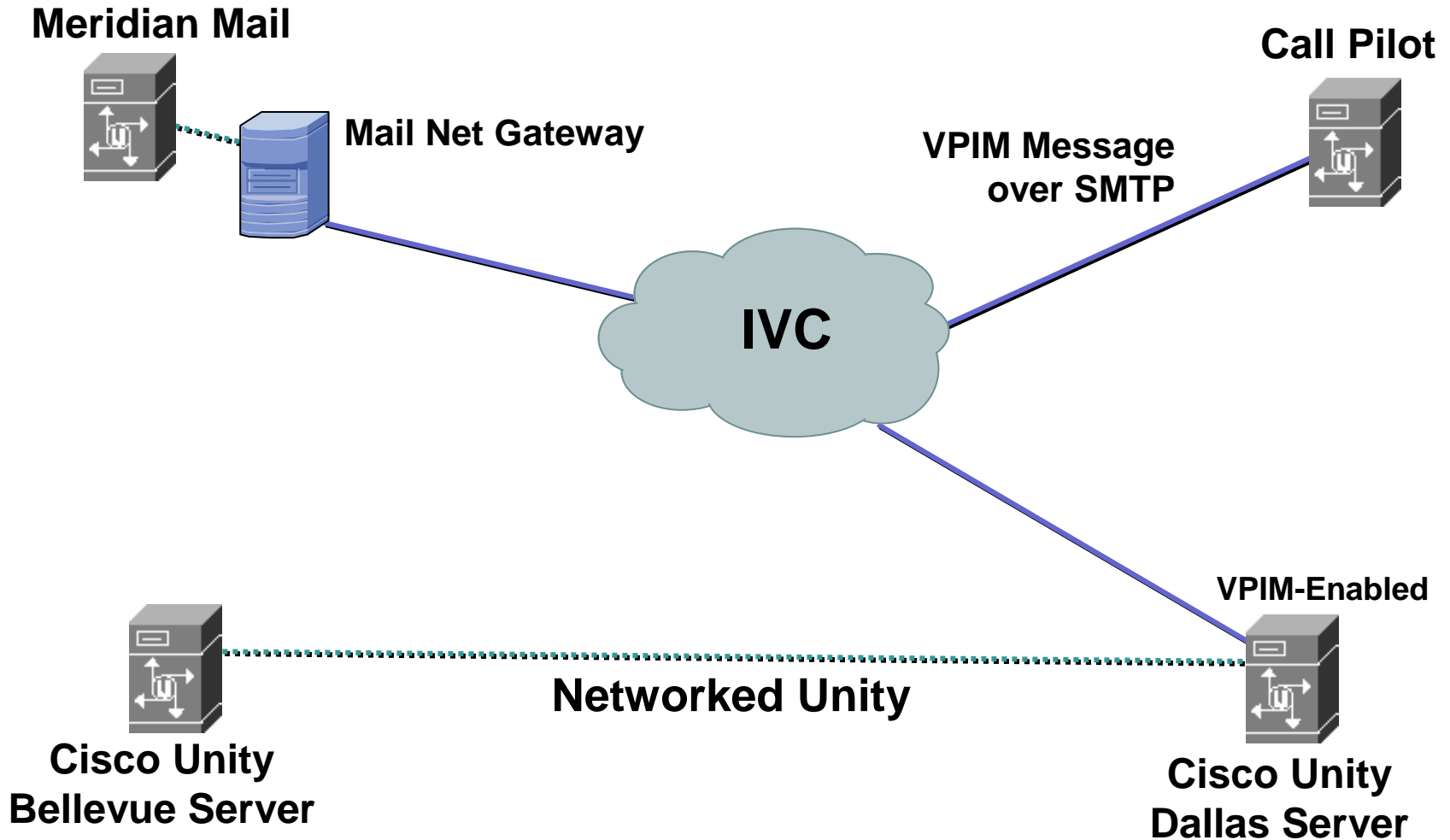
- **Voice Profile for Internet Mail**
 - Available with Unity 4.01**
 - Voice-enabled SMTP message**
 - Sent as an e-mail**
- **Enables interoperability with disparate systems**
- **Efficient use of resources**
- **Immediate message delivery**
- **Easy to administer**

VPIM Integrations Validated by Cisco

Cisco.com

- **Nortel Meridian Mail**
Requires Meridian Mail Net Gateway
- **Nortel CallPilot**
- **Mitel/Baypoint NuPoint Messenger**
Formerly Centigram Series 6
- **Avaya Interchange**

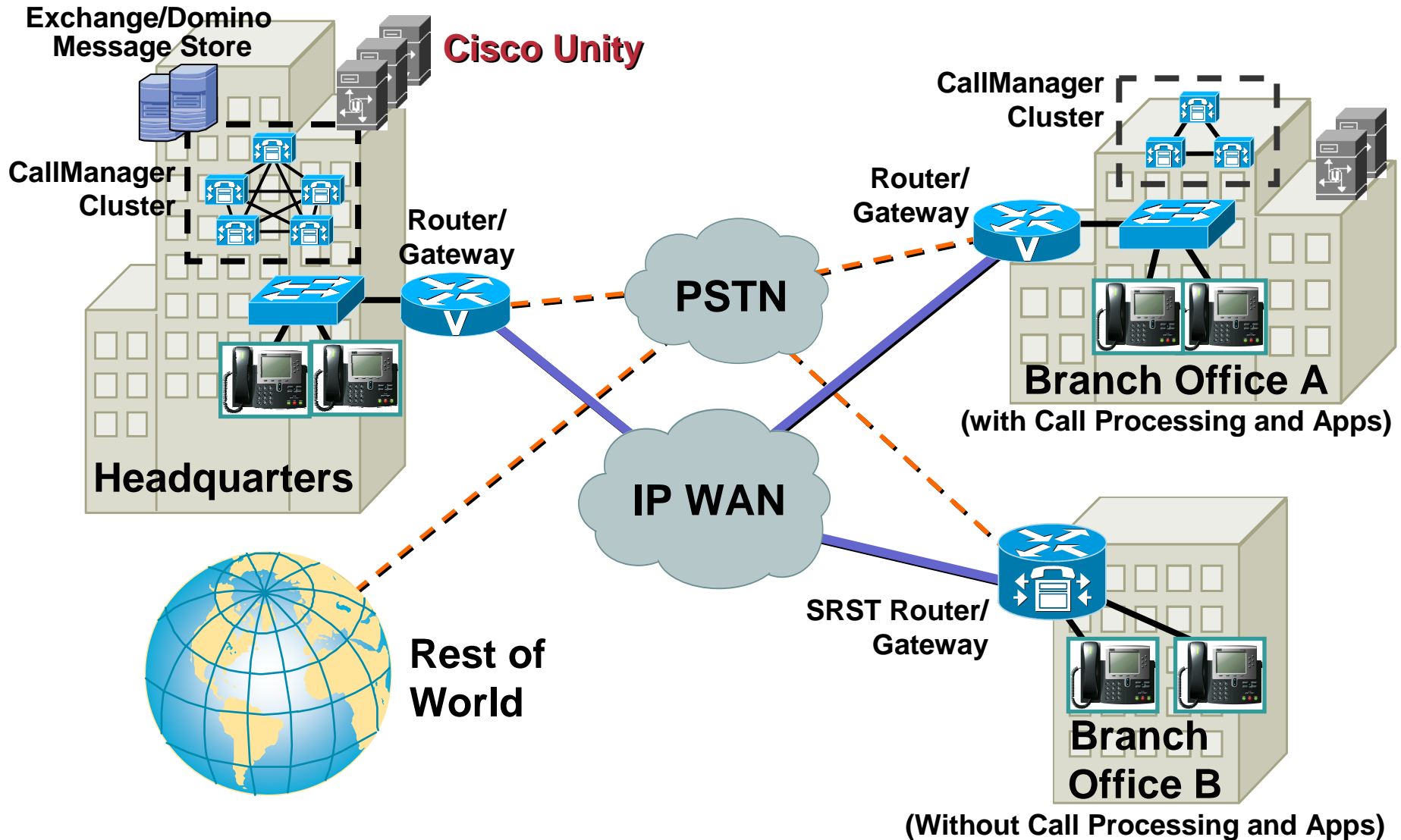
VPIM Message Flow



Agenda

- **The Messaging Challenge**
- **Cisco Unity with Microsoft Exchange**
- **Cisco Unity with IBM/Lotus Domino**
- **Design and Deployment Considerations**
- **Deployment Models**
- **Q&A**

The Goal: End-to-End IP Telephony

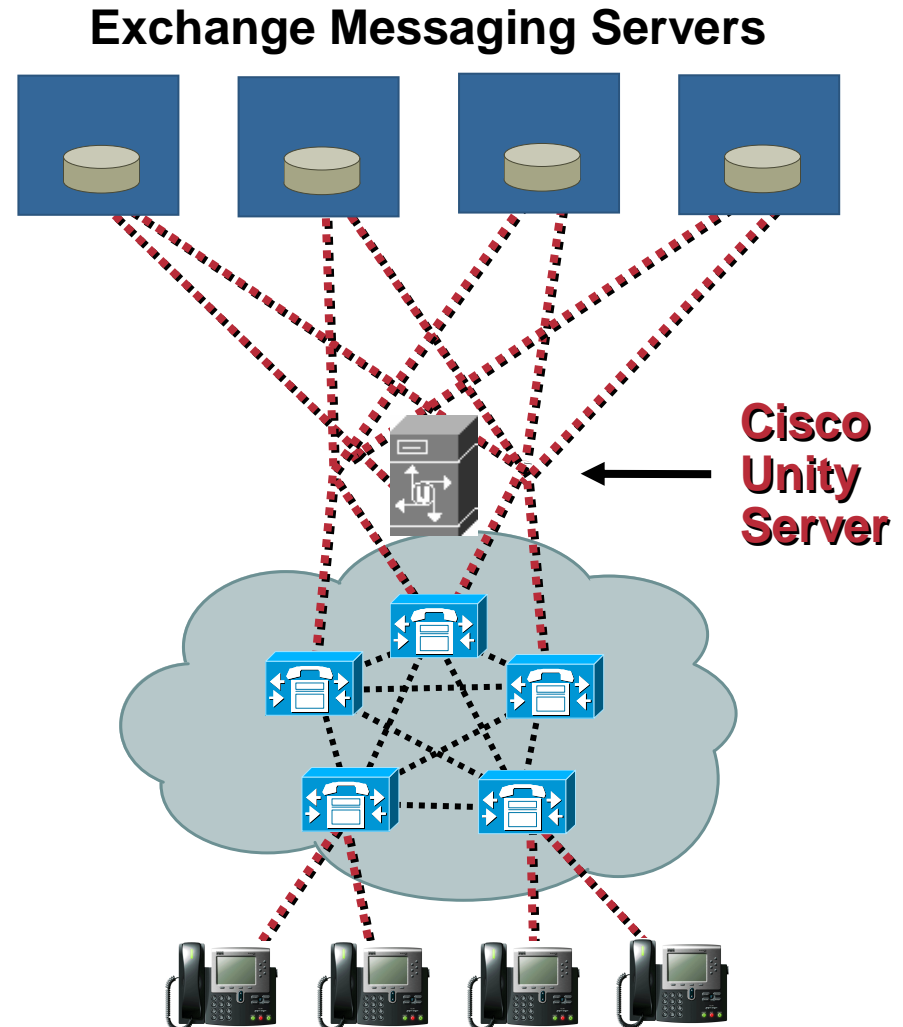


Single Site Deployments

Voice Messaging Only with Exchange Only

Cisco.com

- 72 sessions maximum
- 7500 maximum supported users
- Exchange 2000 is the **ONLY** supported message store for voice mail only
- Microsoft Exchange 2000 on the Cisco Unity server (up to 3000 mailboxes on PO #3 hardware)
- Microsoft Exchange 2000 off box when scaling above 3000 users
- Up to 3000 users supported on a single store (regardless of where the store resides)
- Up to 7500 users supported on off-the-box message stores (no users homed on the Cisco Unity server once you scale above 3000)
- Multiple CM clusters supported

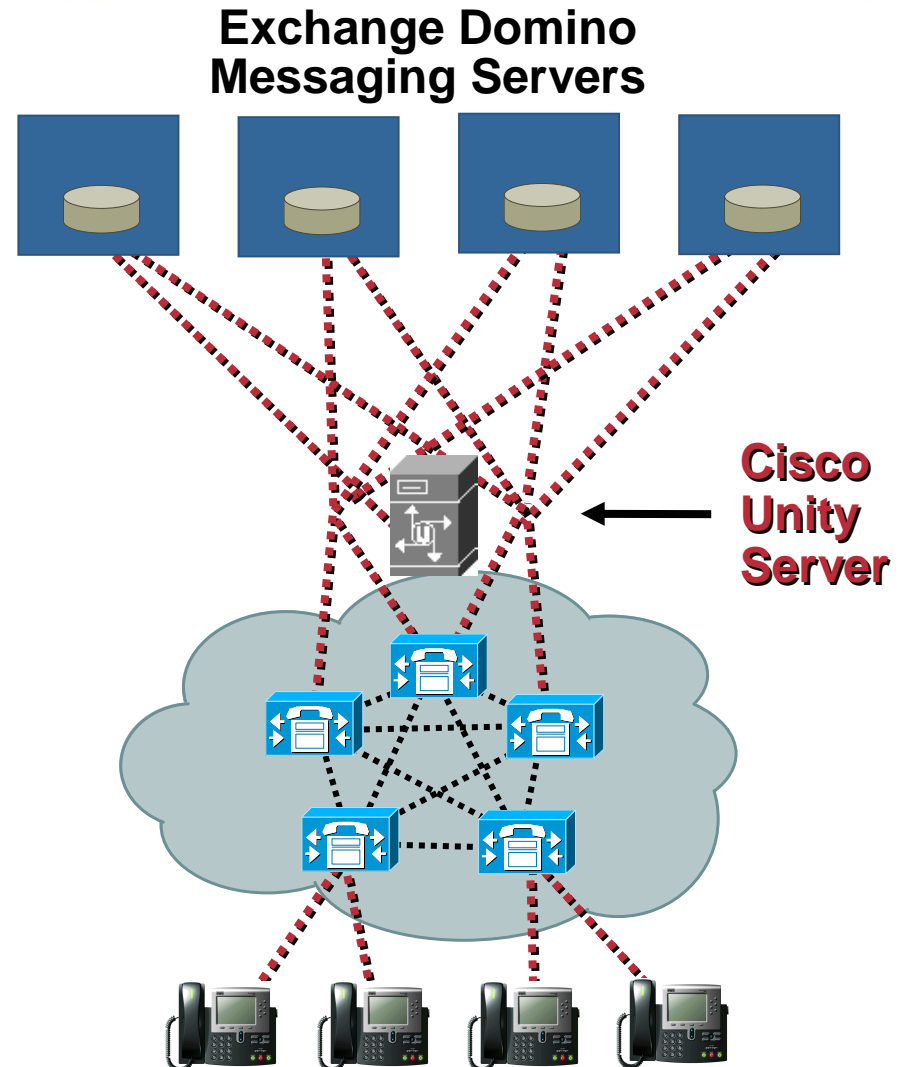


Single Site Deployments

Unified Messaging with Exchange or Domino

Cisco.com

- Microsoft Exchange or Lotus Domino must be installed off box (no more on box UM)
- Microsoft Exchange 5.5/2000 supported for upgrades and new installs
- 72 sessions
- 7500 users supported on Exchange or Domino message store per Cisco Unity server, up to 250,000 (Exchange) 100,000 (Domino) users supported with multi-Unity servers networked

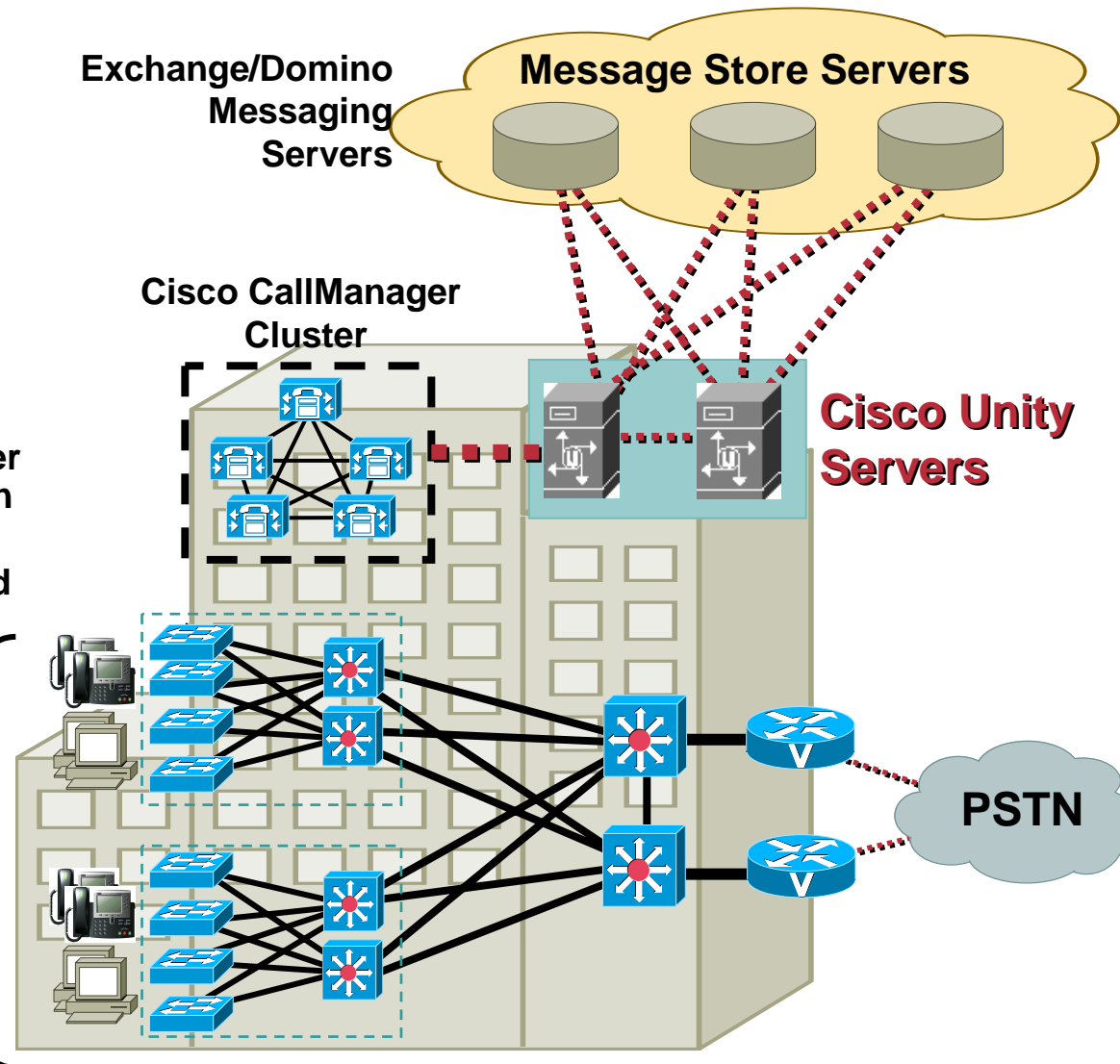


Voice Messaging/Unified Messaging— Two or More Unity Servers

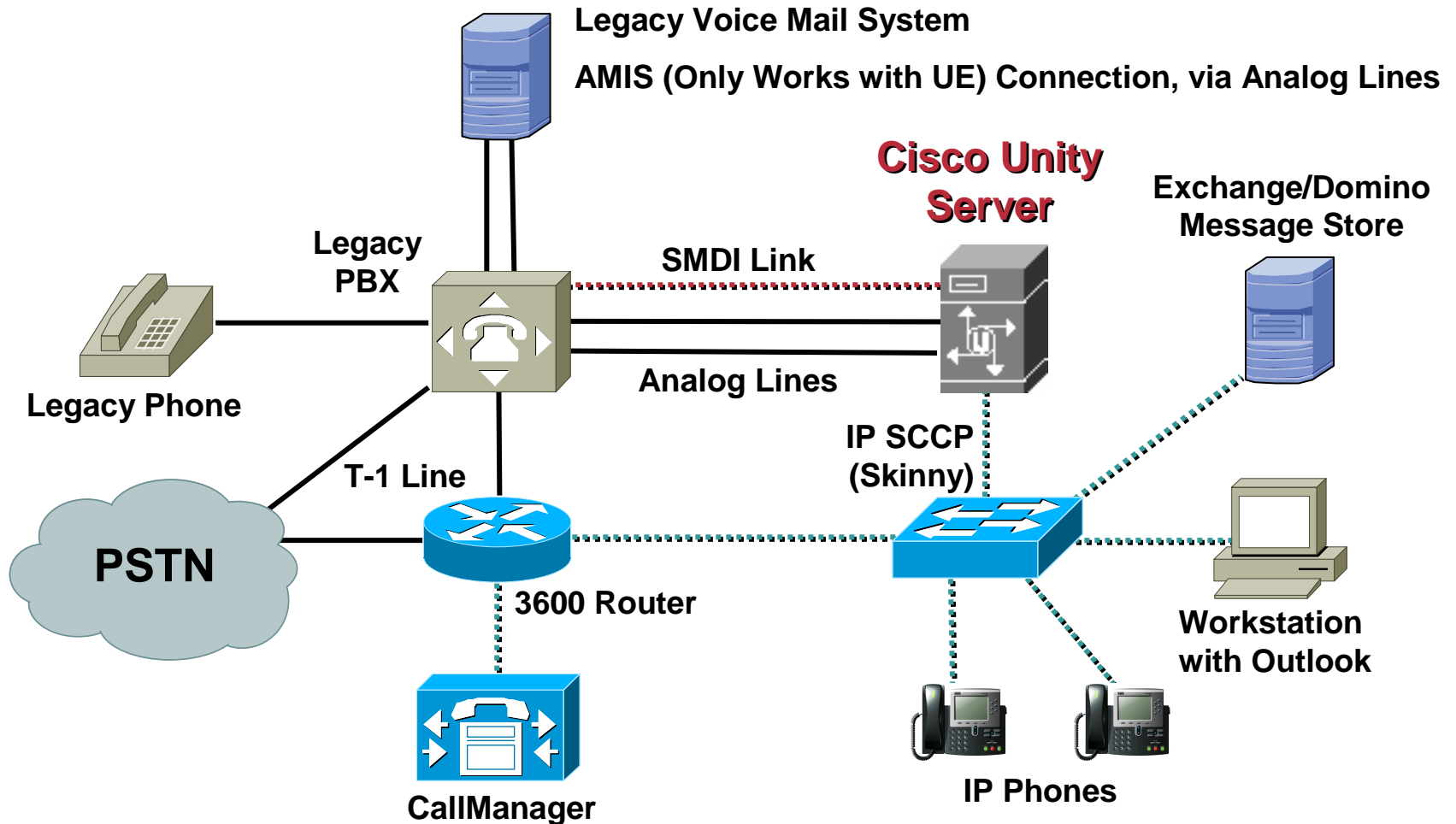
Cisco.com

- Customer needs more than 72 sessions—use one as automated attendant and one for voice messaging
- Shares directory and message store with Microsoft Exchange 2000 system or Lotus Domino
- Each Cisco Unity 4.0 server supports up to 7500 users (72 ports)
- Integrates with Cisco CallManager and legacy PBX to ease migration
- **Cannot** network an Exchange-based Unity with a Domino-based Unity today
- Support for up to 250,000

Up to 10,000
IP Phones

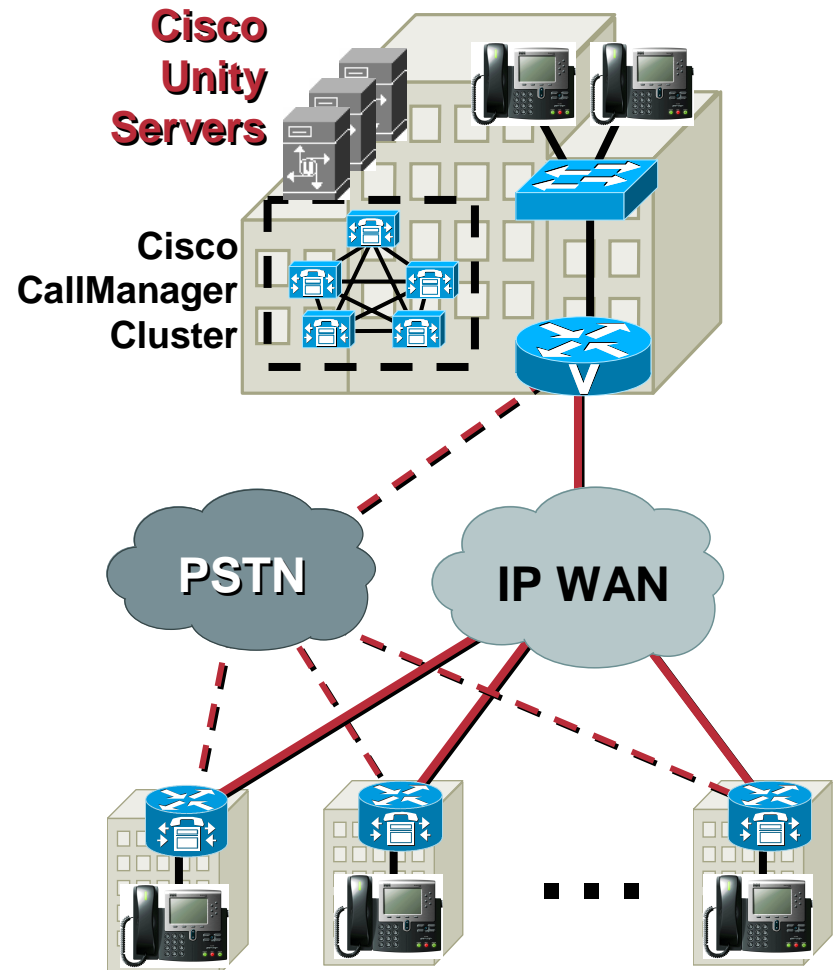


Cisco Unity Dual Switch Integration

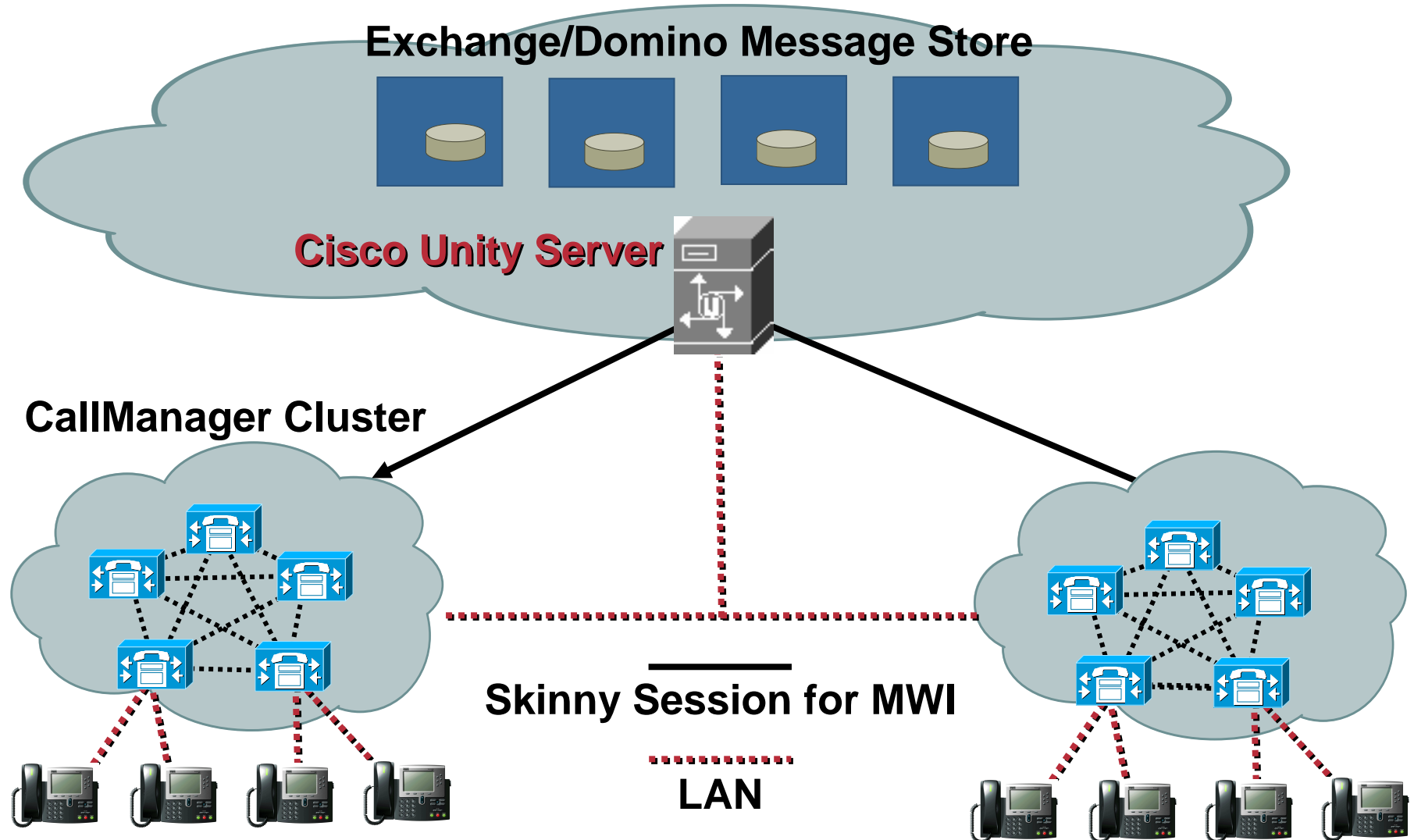


Centralized Call Processing

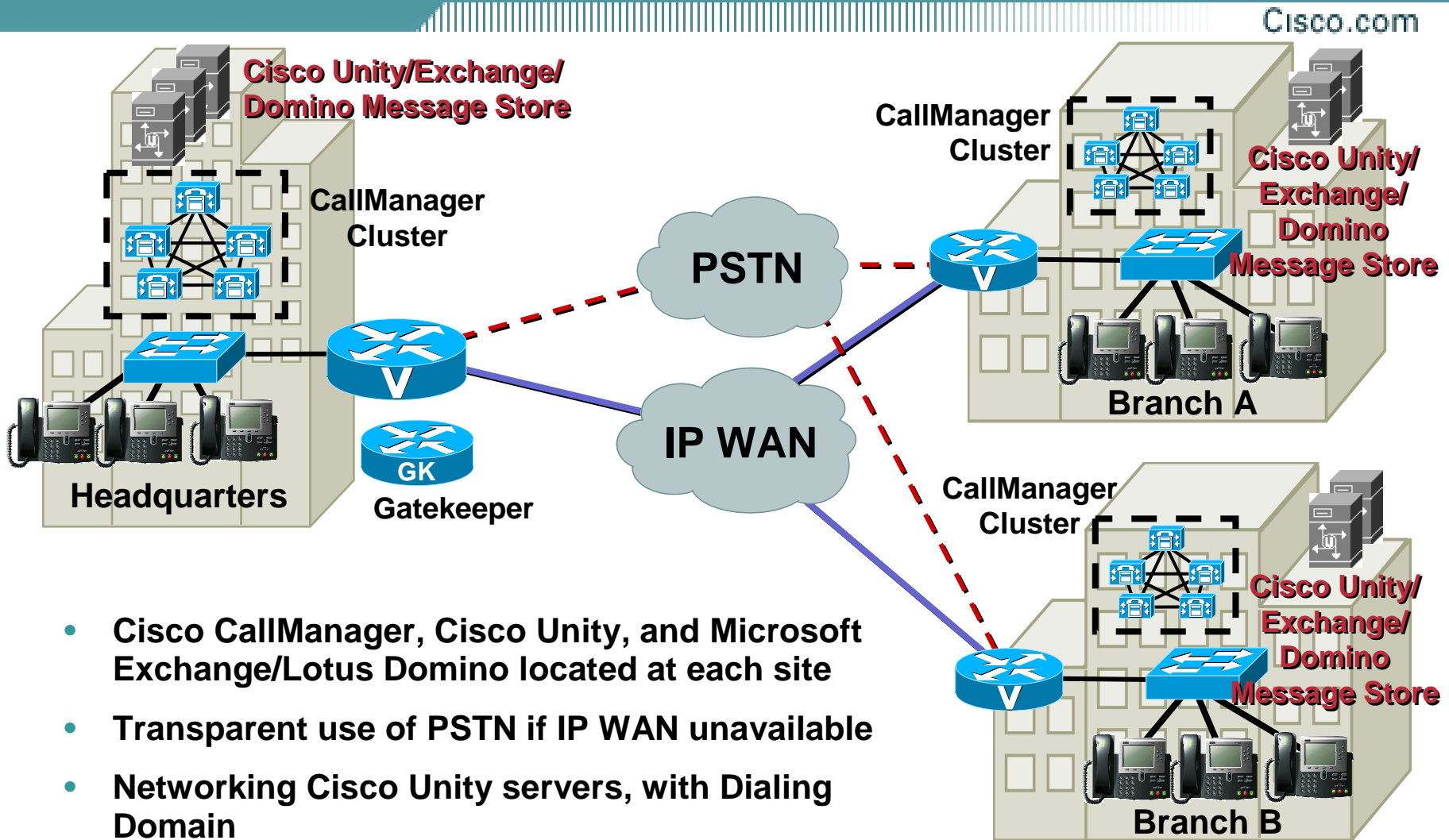
- One Cisco Unity supports multiple CallManager cluster
- Cisco Unity should be deployed within the same LAN as Microsoft Exchange/Lotus Domino
- Cisco Unity supports Transcoding of G711 and G729a
- QoS and WAN Design



Centralized Cisco Unity

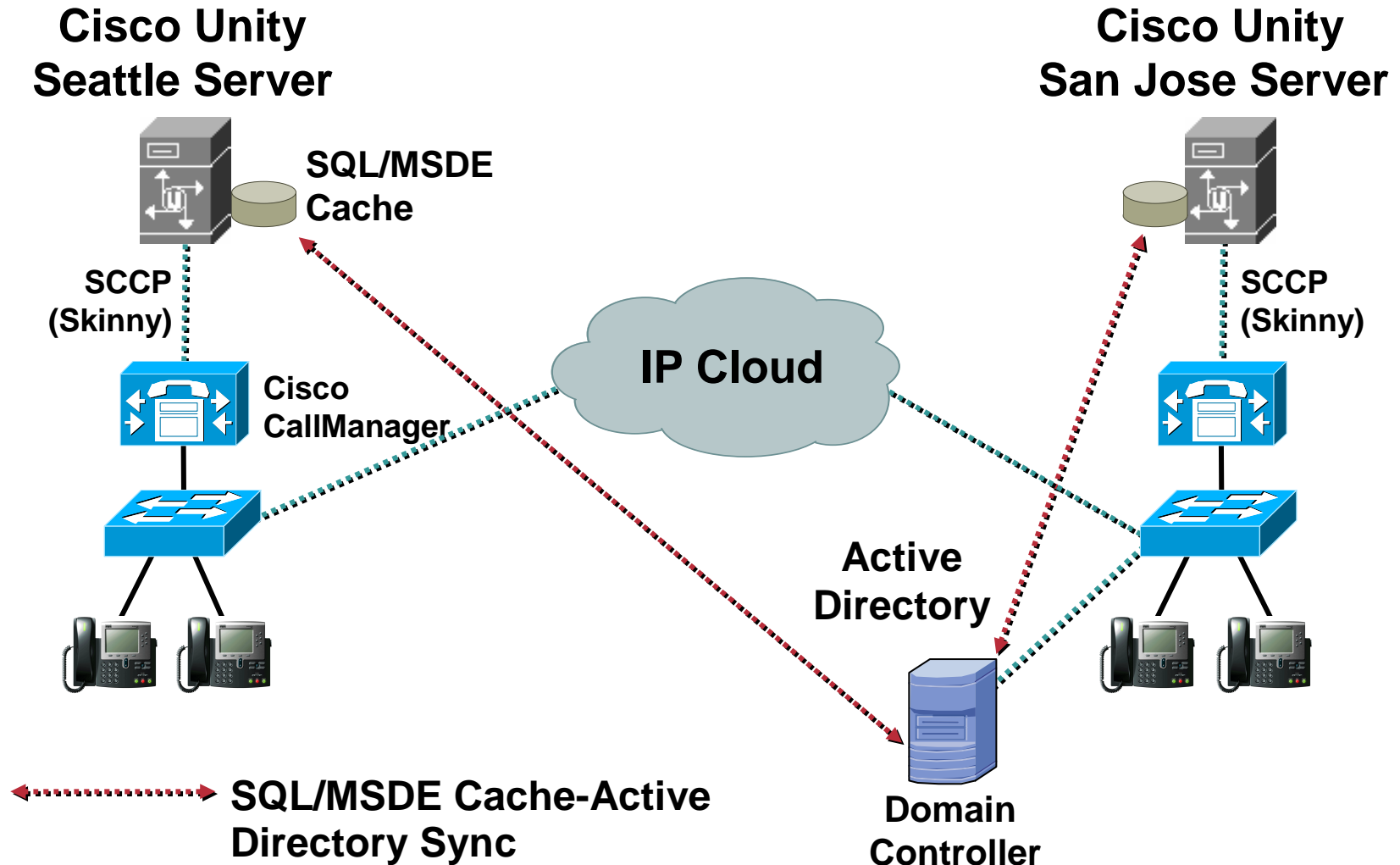


Distributed Call Processing Deployments



- Cisco CallManager, Cisco Unity, and Microsoft Exchange/Lotus Domino located at each site
- Transparent use of PSTN if IP WAN unavailable
- Networking Cisco Unity servers, with Dialing Domain

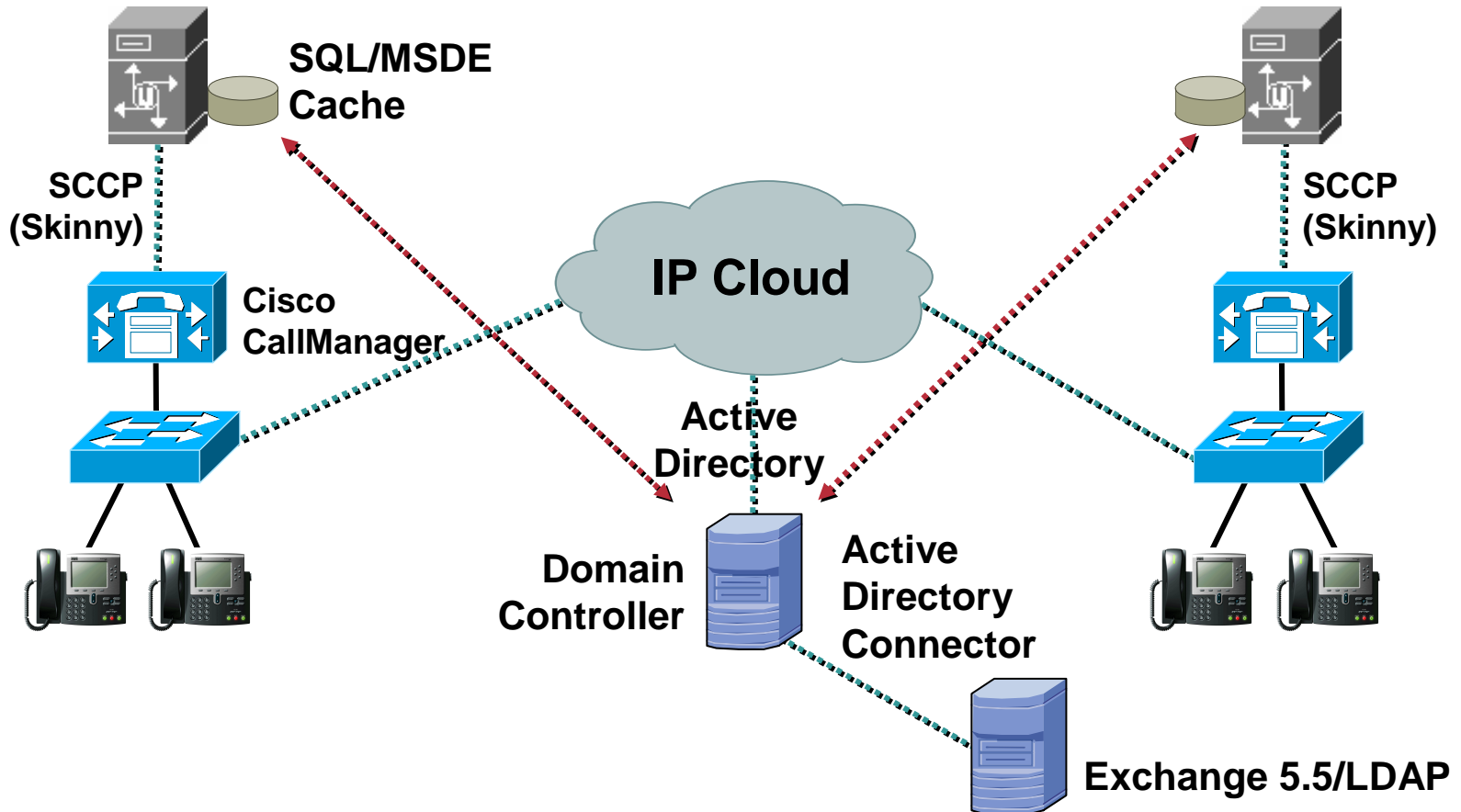
Cisco Unity Networking Native Mode Exchange 2000



Cisco Unity Networking Mixed Mode Exchange 5.5

Cisco Unity Seattle Server

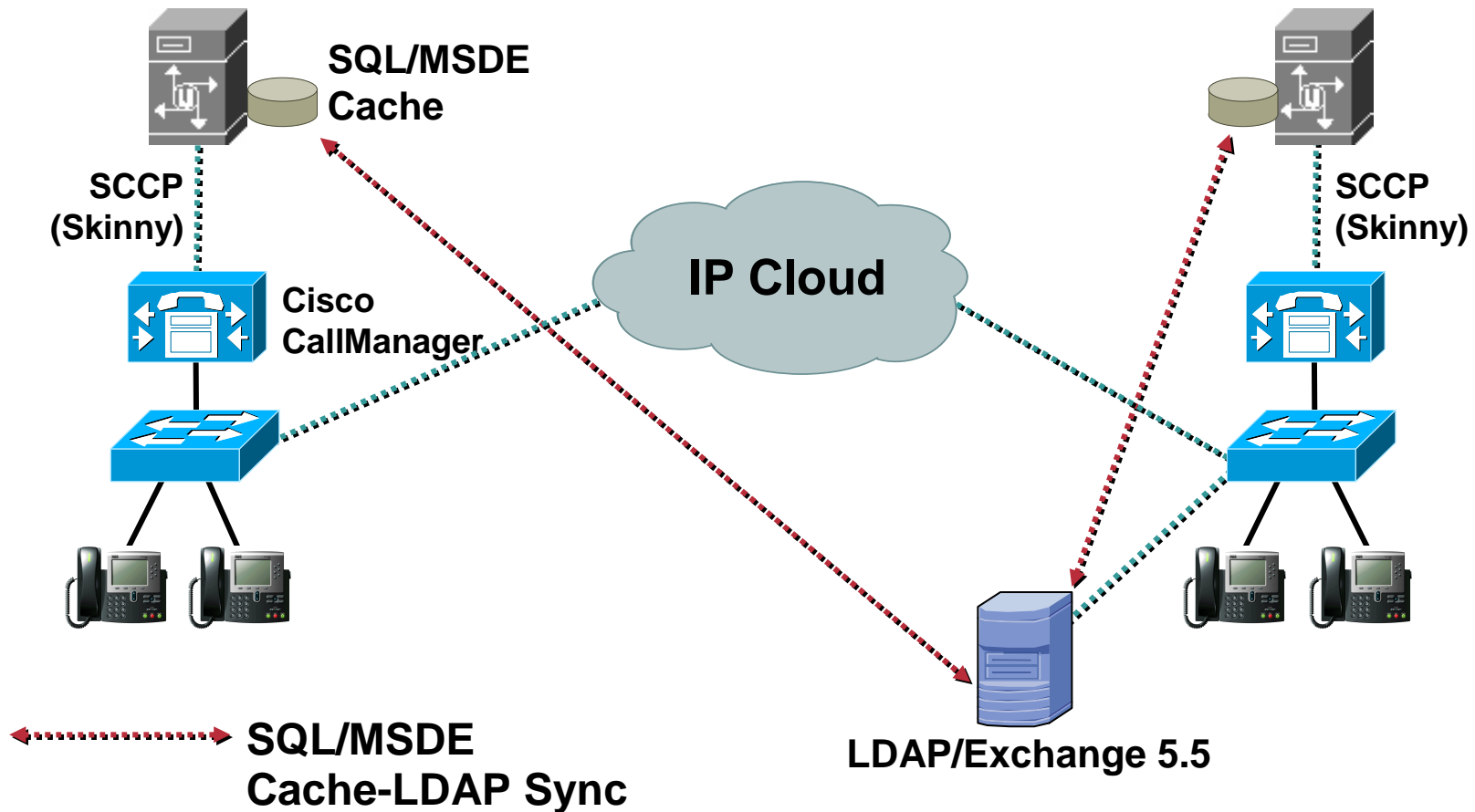
Cisco Unity San Jose Server



Cisco Unity Networking Native Mode Exchange 5.5

Cisco Unity Seattle Server

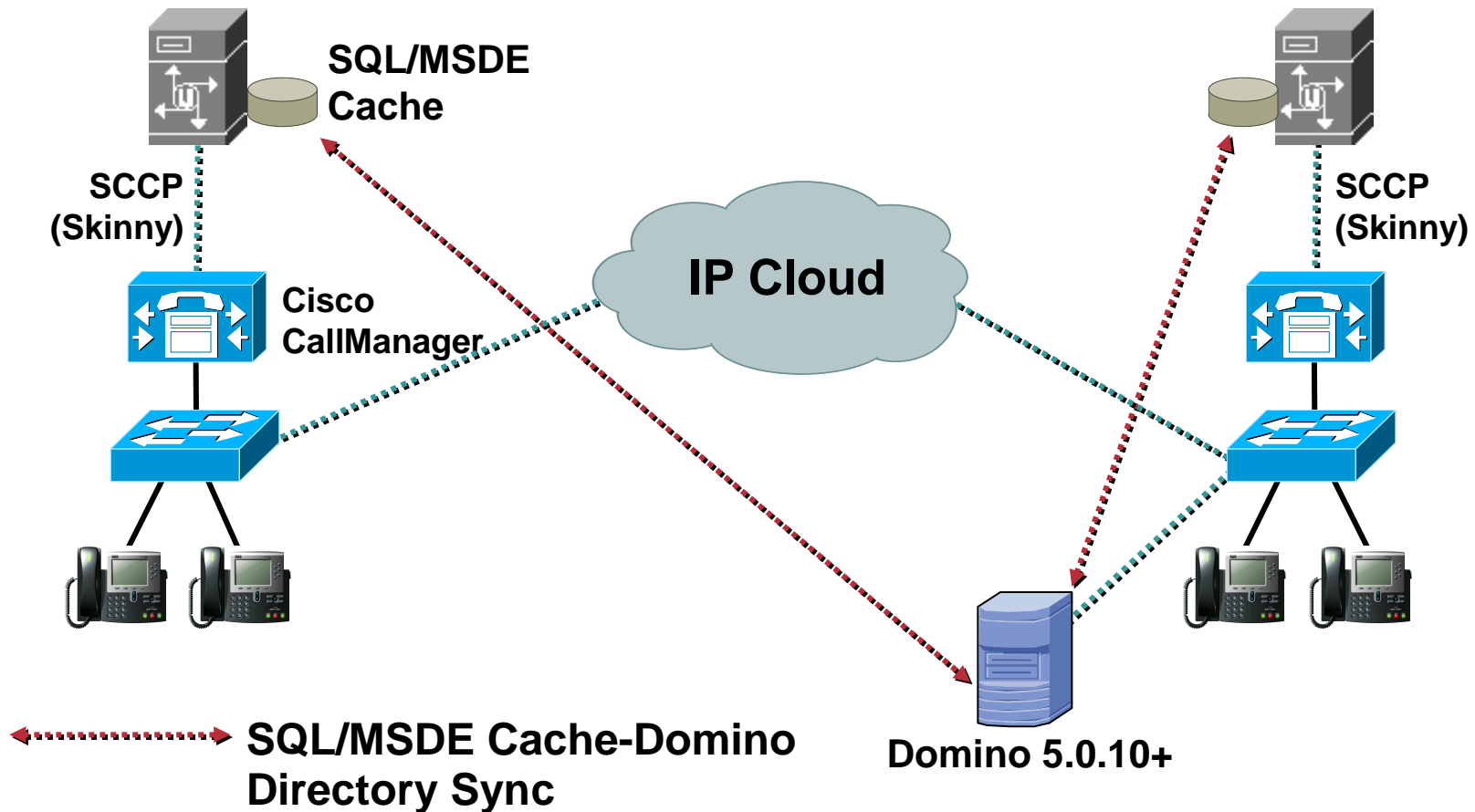
Cisco Unity San Jose Server



Cisco Unity Networking Lotus Domino

Cisco Unity Seattle Server

Cisco Unity San Jose Server



Agenda

- **The Messaging Challenge**
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- **Design and Deployment Considerations**
- **Deployment Models**
- **Final Recommendations and Q&A**

Recommendations and Q&A

- **Follow design guidelines closely**
- **Leverage the Unity Design Guide:**
http://www.cisco.com/en/US/products/sw/voicesw/ps2237/products_implementation_design_guide_book09186a00801187ba.html
- **Understand how the Cisco Unity UMR and failover fit into your environment**
- **Plan for future growth**
- **Leverage existing messaging infrastructure**
- **Leverage interoperability for migration pathway**

Useful Links

- **Cisco Voice Forums**

http://forums.cisco.com/eforum/servlet/NetProf?page=Voice_and_Video_discussion

- **ECSBU Unity Application Team**

<http://www.ciscounitytools.com>

- **Unity Software Download**

<http://www.cisco.com/kobayashi/sw-center/sw-voice.shtml>

- **Product Upgrade Tool (SASU)**

<http://tools.cisco.com/gct/Upgrade/jsp/index.jsp>

- **Unity Support Page**

http://www.cisco.com/pcqi-bin/Support/PSP/psp_view.pl?p=Software:Unity

Useful Links

- **ECSBU (Unity's web site)**

<http://www.cisco.com/en/US/products/sw/voicesw/ps2237/index.html>

- **Unity Documentation homepage**

http://www.cisco.com/univercd/cc/td/doc/product/voice/c_unity

- **IP Telephony Steps to Success**

<http://www.cisco.com/partner/WWChannels/technologies/IPT/index.html>

CISCO SYSTEMS



EMPOWERING THE
INTERNET GENERATION