Architecture Voice Video Integrated Data

"AVVID"

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Cisco AVVID
CISCO
AVVID
Architecture for
Voice, Video and
Integrated Data
Network Design

Agenda

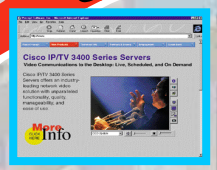
- Overview
- Announcing AVVID products
- Design models
- Design consideration
- Case studies

Overview

Cisco AVVID—An End-to-End Architecture

Clients

Soft Phone



IP Phones

Video

PCs

Infrastructure

Support

Service

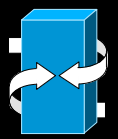
Cisco IP Fabric

Internet Application Technologies

QoS | Security | Voice | Video | Multicast | VPN | ... | Management | Policy | Directory

Intelligent Network Services

Platforms



Gateways

Routers

Switches

Scalable Open

Applications

Call Mgr Servers

Message Servers

Telephony Apps Servers

Directory Servers

Content Servers

Management

END TO END MANAGEMENT

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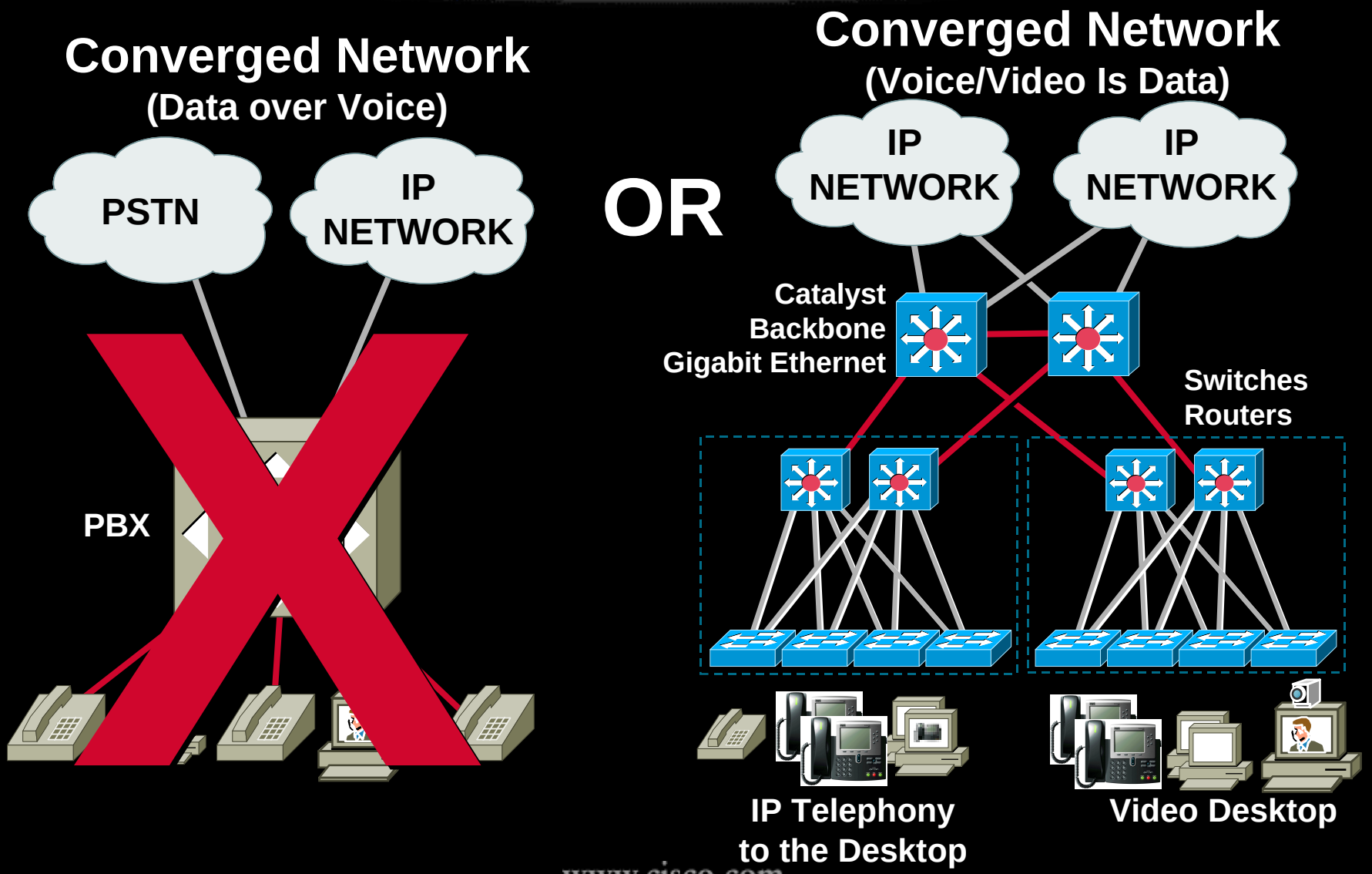
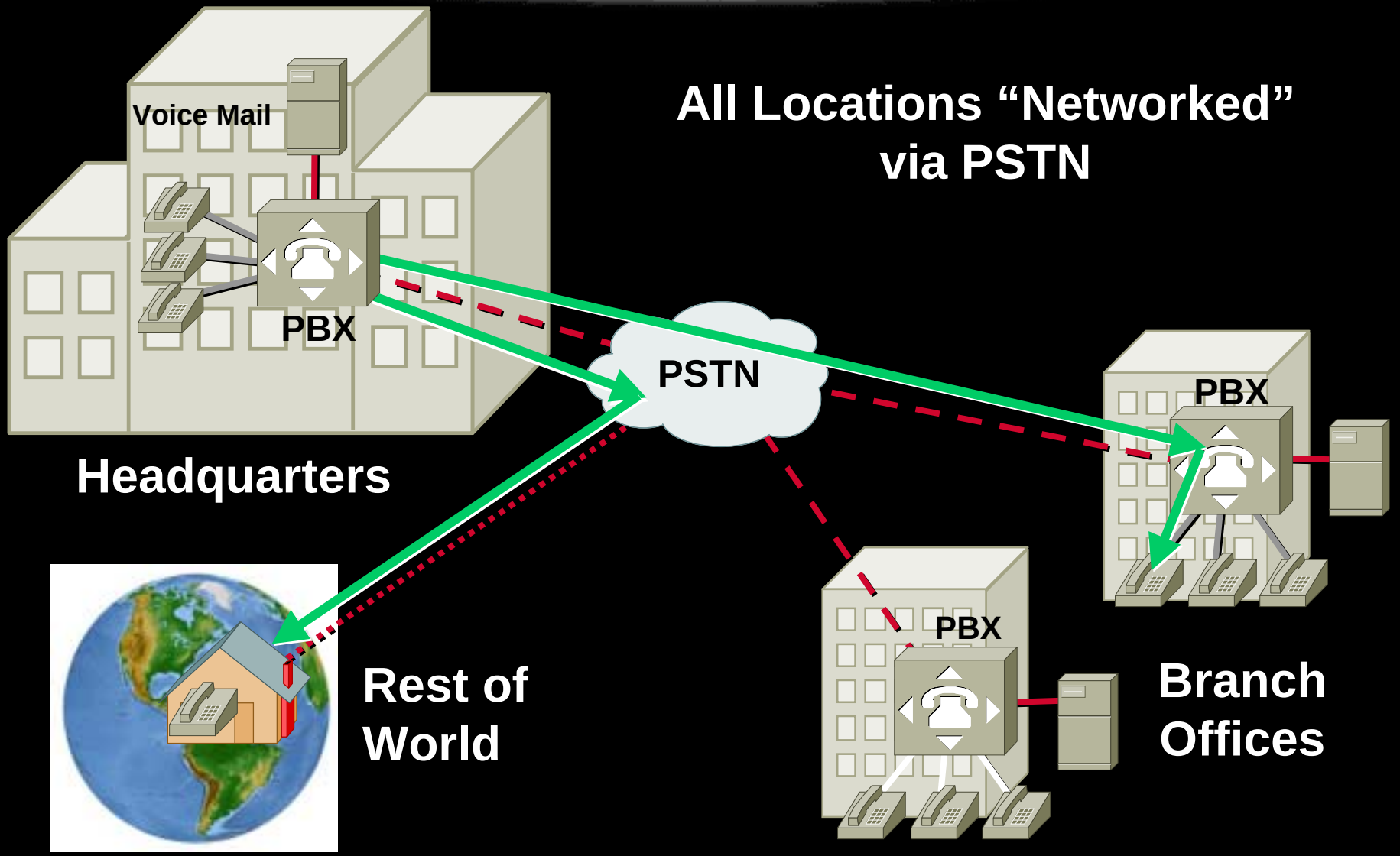
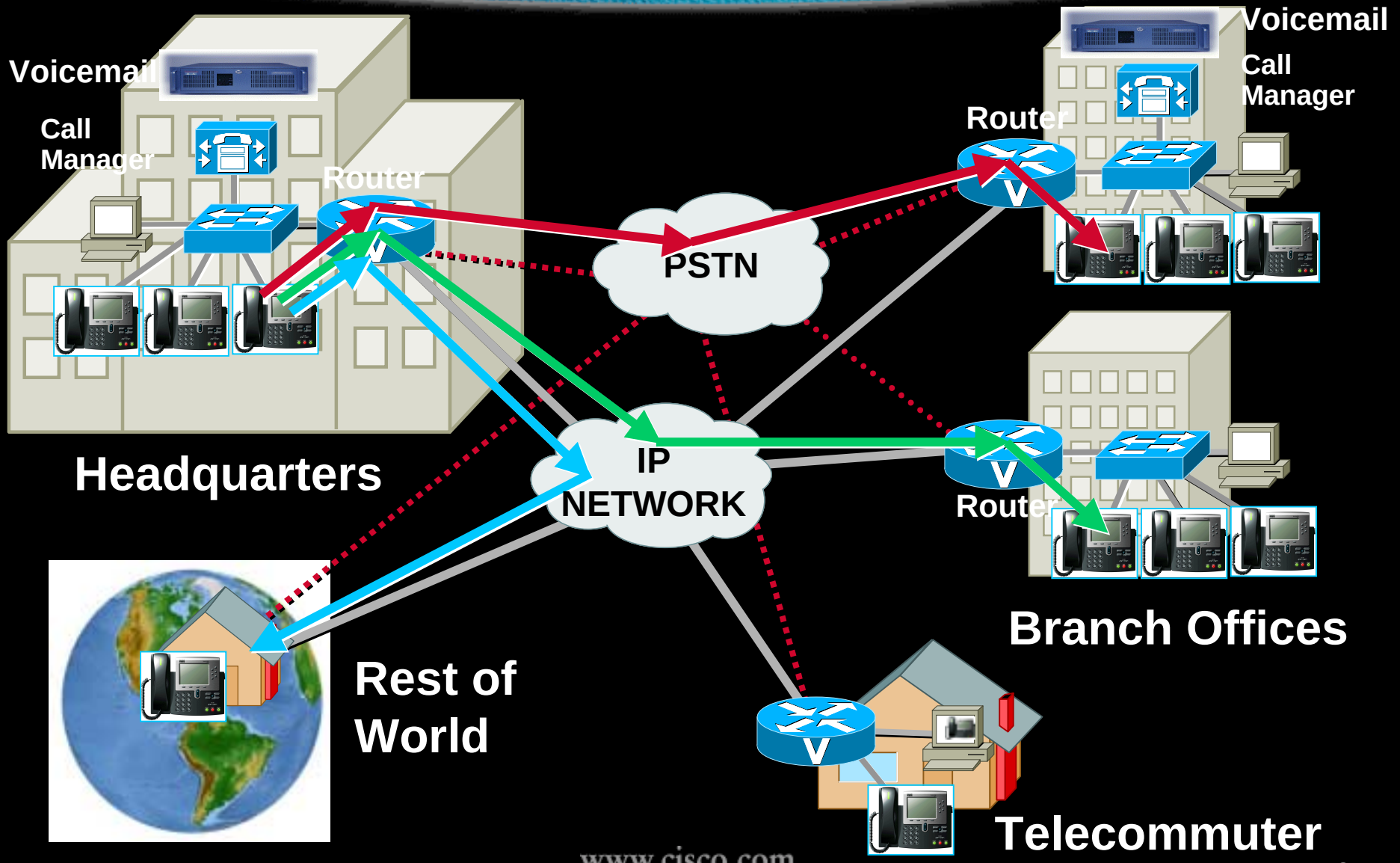
Infrastructure Choices



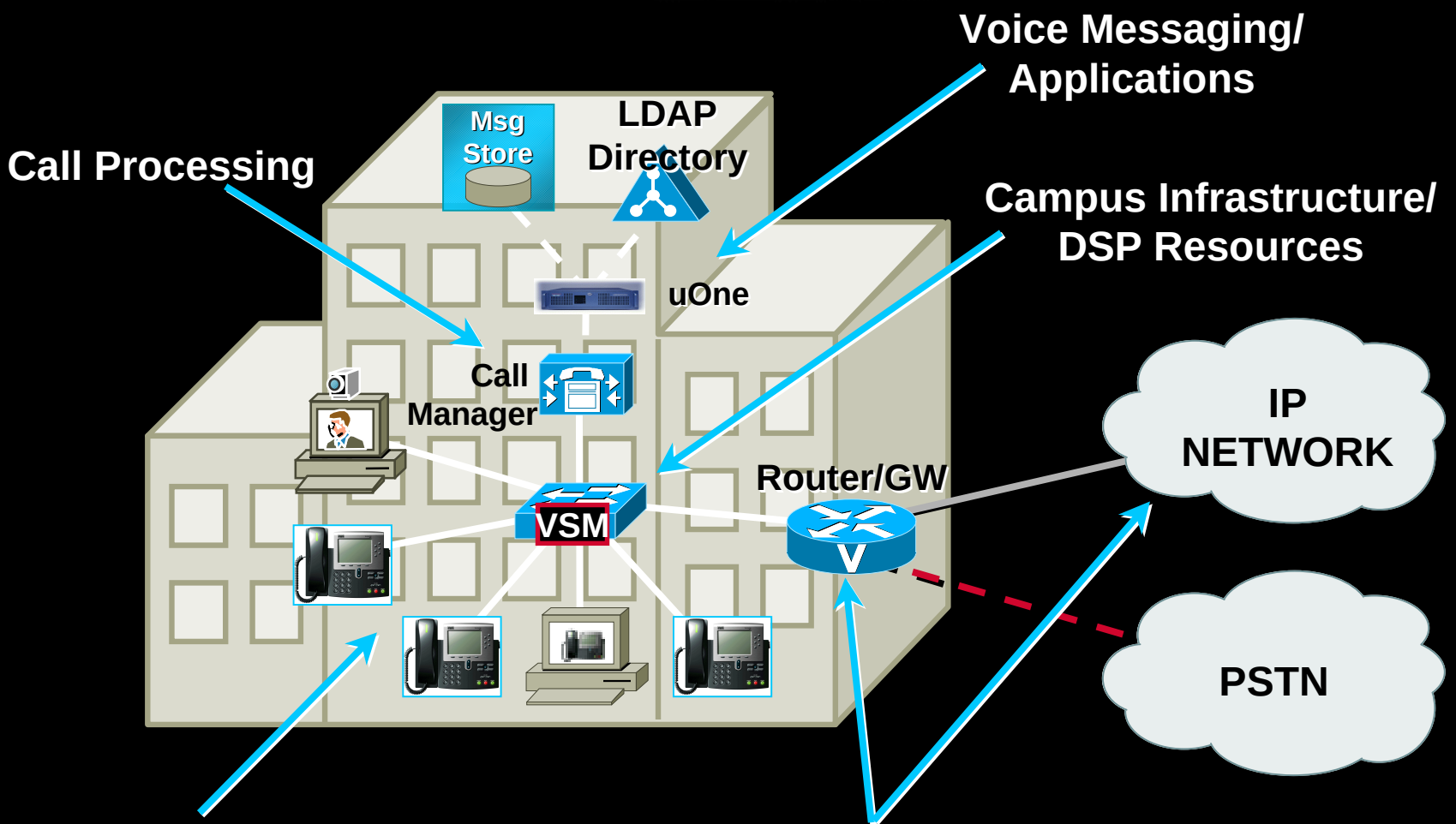
Today's Enterprise Voice Topology



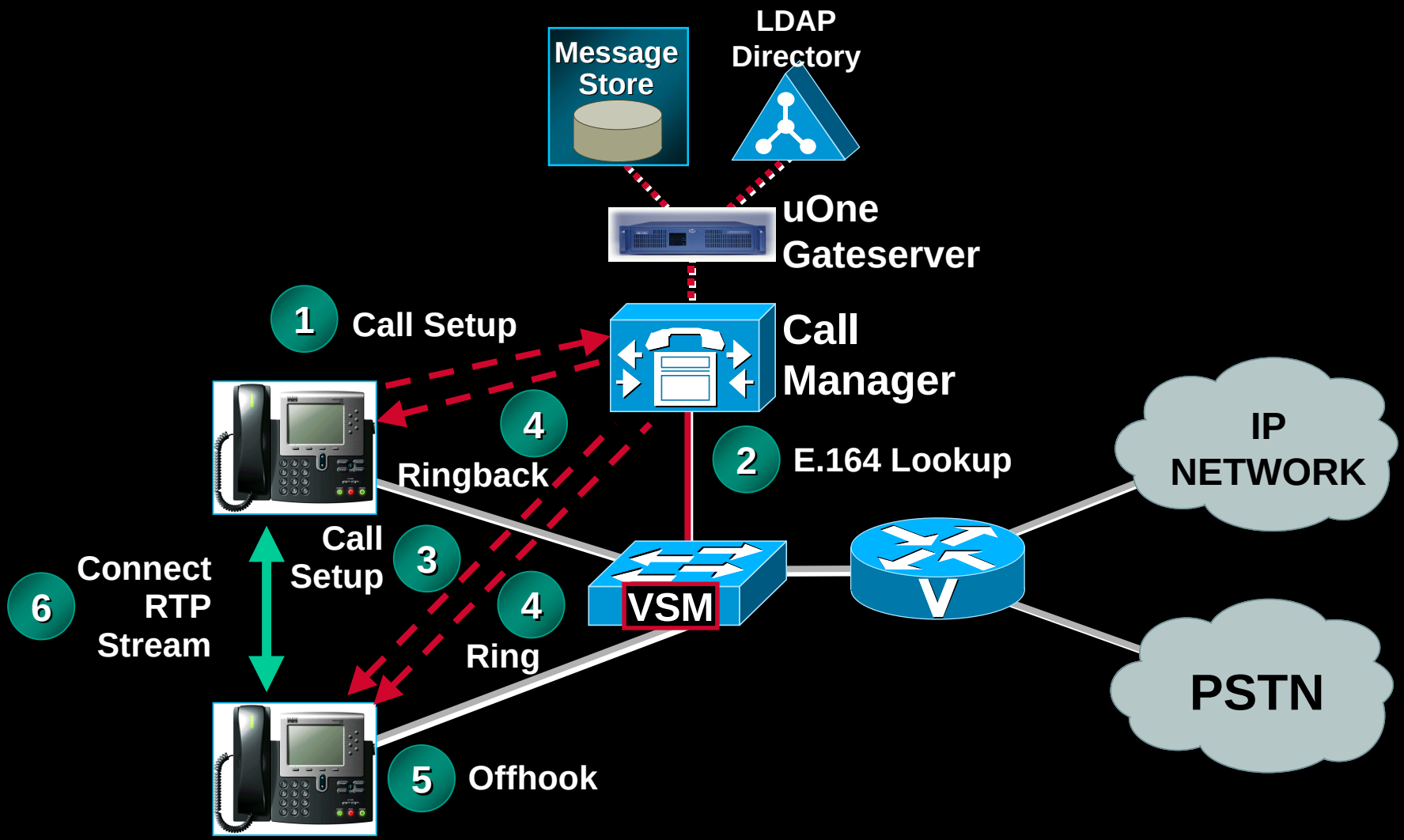
Tomorrow's Enterprise



Examining IP Telephony Components



Call Processing



IP PBX: MCS 7835

NEW

- Call control and processing
- Support 2500 IP phones
- 10,000 IP phones per cluster
- Dual 18.2 Gig hot plug drives
- Dual hot swappable power supply
- 50,000 Busy Hours

IP PBX: MCS 7822

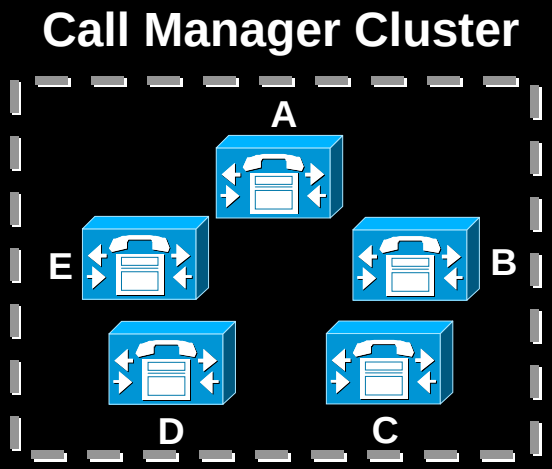
NEW

- Call control and processing
- Single 9.1 Gig hard drive
- Single power supply
- Lower cost platform

Call Manager 3.0

- Standard HTML which minimizes training
- Pre-installed on Cisco platforms
- Comprehensive telephony features
- Remote administration simplified
- Extensive on-line help
- 50,000 Busy Hour Call Completion Setup per MCS server
- 125,000 Busy Hour Call Completion Setup per cluster
- Scalability, availability and redundancy

Call Manager Cluster Scalability



Call Manager Cluster Sizing

1. Five Call Managers max in a cluster—cluster is confined to a campus
2. 2500 users max per Call Manager (even under failure conditions)
3. Maximum of 10,000 users in a cluster
4. Provision for Call Manager failure

Call Manager Cluster IP Phone Provisioning

CM's in Cluster	Max users per cluster	Max users with N+1 Redundancy
1	2500	0
2	5000	2500
3	7500	5000
4	10,000	7500
5	10,000	10,000

Cisco IP Phone

Cisco 7960

- Professional, manager
- Six lines—Mix directory numbers or features
- Display area: Calling information, feature access via “soft keys,” full-duplex handsfree
- 10/100BaseT switch

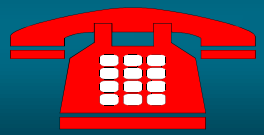
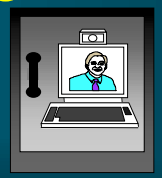
NEW

Cisco 7910

- Common areas—hallway, break room, reception etc
- Single line
- Two models—Single 10Base T or 10/100Base T Ethernet
- FCS Q3 2000

Unified Messaging System

Many Users Interfaces to Common Services

Common Infrastructure
(TCP/IP Network and Access)

Common Mailbox
(IMAP, SMTP, VPIM)

Common Infrastructure

Common Subscriber Directory
(LDAP)

Common Operations
(SNMP, Web)

Personal Customization

Many Ways to Put Messages In & Take Messages Out in right Media Format




uOne Voice Mail
uOne 4.1E Corporate Edition

MCS-7835

" uOne GateServer 4.1E

" Embedded Message Server

" Embedded Directory Server

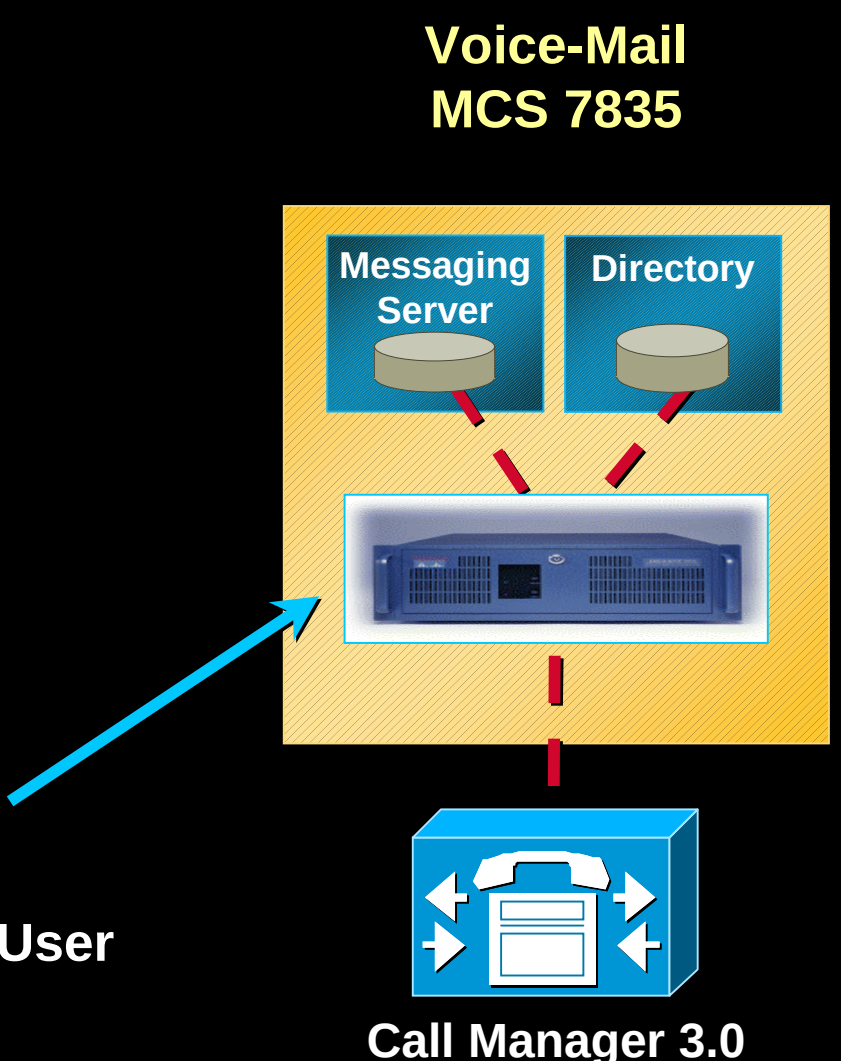
" 2 x 18GB Drives

uOne 4.1E—Corp

" 500 users Voice Mail Only

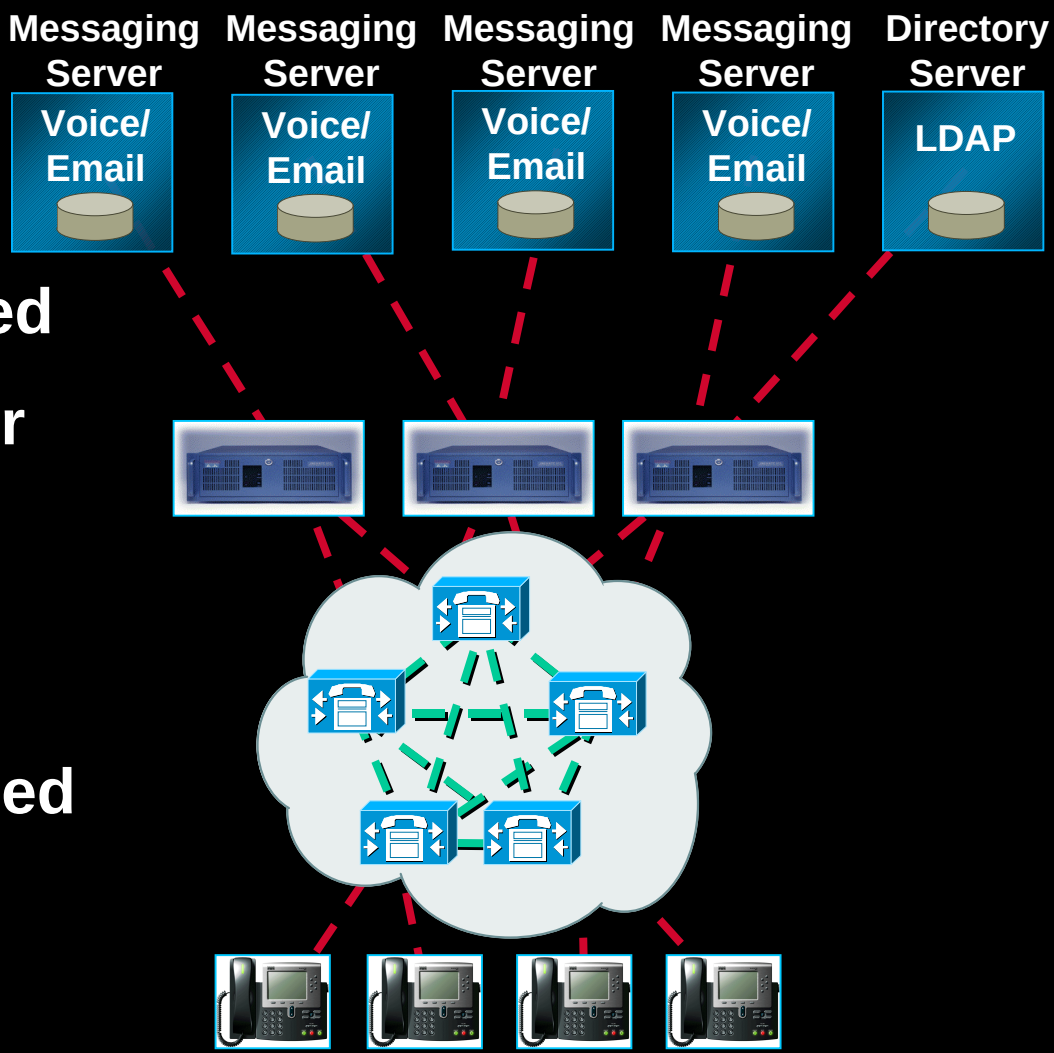
" 20 Simultaneous VM Ports

" 30 Min of Voice Mail Storage per User

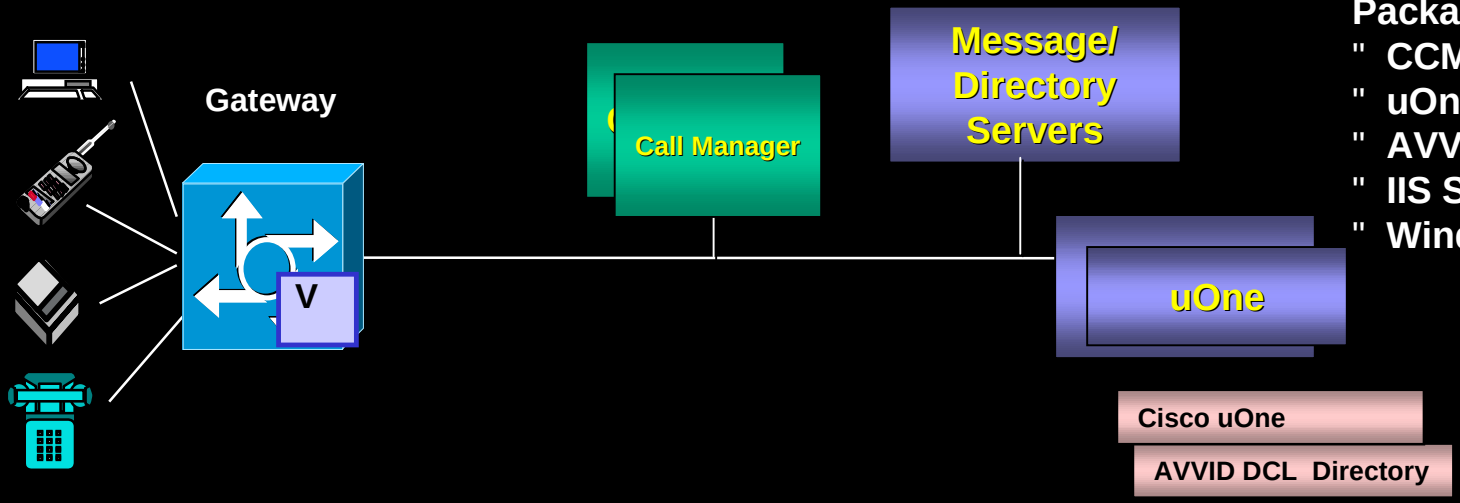


uOne 5.0E—Corporate: 500 to 10,000 User Campus

- Voice mail networking supported
- Call Manager failover supported
- G.711 OR G.729
- Single, central directory or embedded AVVID directory
- Scalable growth



uOne Unified Messaging



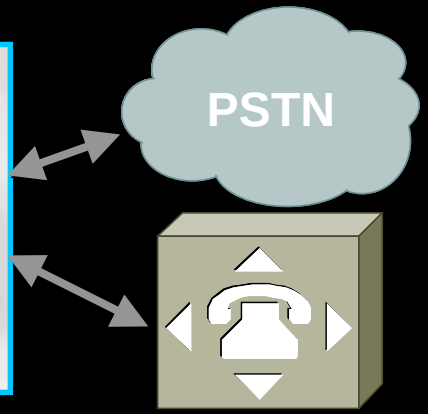
Packaging (UM)
- CCM 3.x
- uOne 5.x
- AVVID (DCL) Directory
- IIS Server
- Windows 2000

Features
- FAX mail, Email, Voice Mail unified
- Scheduled Delivery, Cancelled Delivery
- Media Conversion: Text-to-FAX, Text-to-Speech
- VPIM/AMIS-A Message Interchange
- N+1 redundancy/recovery
- XML Customizable TUI & Web Client
- Internationalization
- Single Number Reach Services
- Notification via MWI, Paging, SMS or PDA

Deployment Options
- Separate CM, uOne, Message Servers
  or
- Co-Resident uOne, CM and Message Server
  or
- Co-Resident uOne and Message Server separate Call Manager

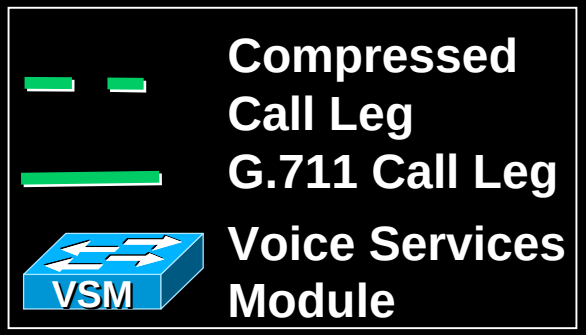
Catalyst 6000 8-Port Voice Services Module (VSM)

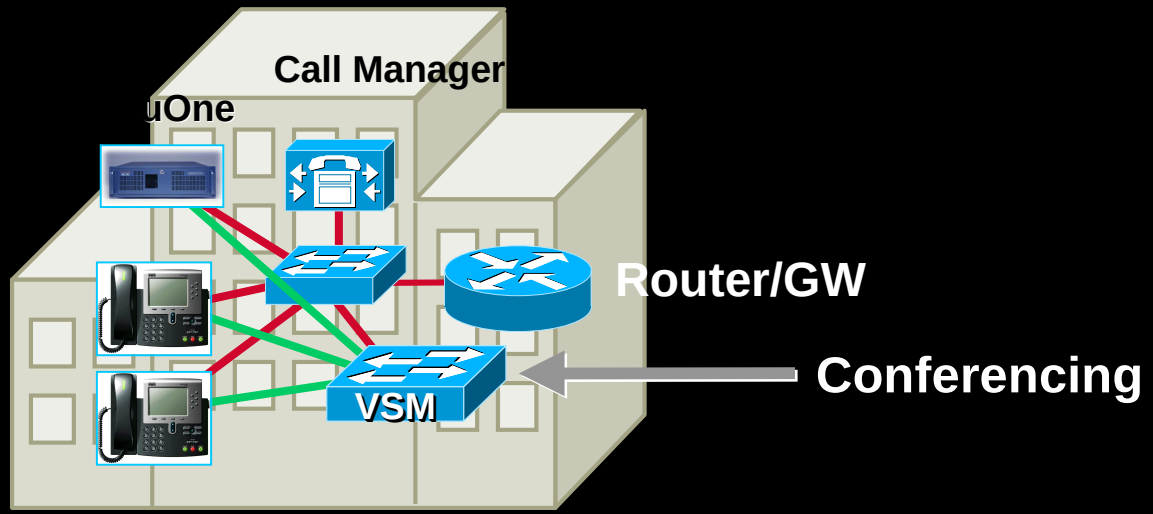
Catalyst 6000

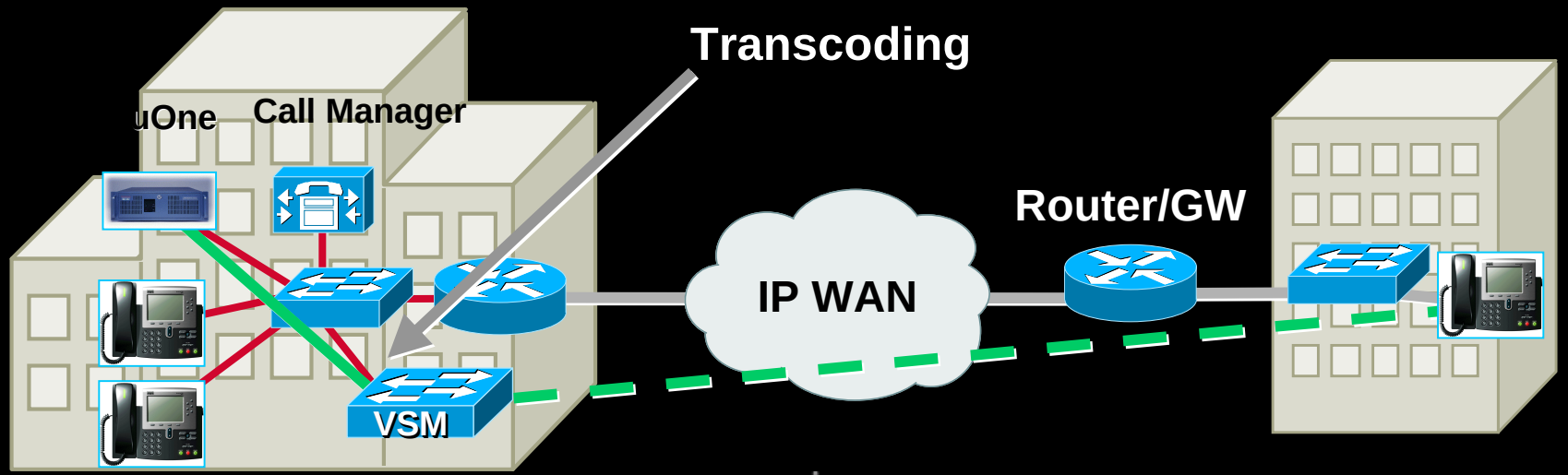


- Catalyst 6000 8-port voice T1 and services module:
  - Provides eight physical or logical ports (configured on a port by port basis)
  - When configured as a physical port:
    - T1 or E1 gateway for connections to the PSTN or PBX (built in CSU)
    - Supports ISDN PRI at FCS
  - When configured as a logical port:
    - Provides voice services such as conferencing or transcoding

Conferencing and Transcoding Resources

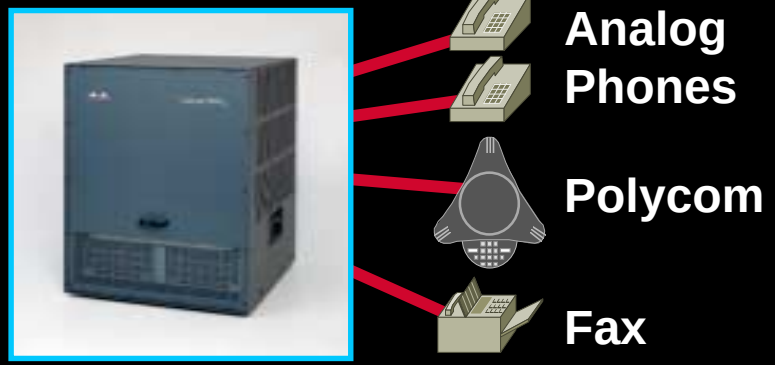






Catalyst 6000 FXS ports

- Deployable in any Catalyst 6000/6500 chassis
- Provides analog connectivity for fax machines, speaker phones, analog telephone sets
- 24 FXS ports (one RJ21 connector)
- Uses one IP address
- Supports fax relay
- Supports hook-flash blind transfer



Catalyst 6000 Inline Power

- 48-port 10/100 Ethernet switch line card, with optional Inline Power daughtercard
- Provides Inline Power to IP phones
- Intelligent auto-detection of IP phones
- Manageable via SNMP

Catalyst 3524-PWR-XL

Enhanced Functionality:

- **QoS - ensure timely delivery of voice packets**
  - Reclassification of 802.1p priority settings on a port-by-port basis
- **High Availability - increase reliability of network**
  - Phone power - integrated Inline Power for Cisco IP phones over the same pairs as Ethernet (pins 1,2,3,6)
  - New low-cost RPS using new power architecture
- **Integrated Management - manage network as one system**
  - IP phone configuration
  - Auxiliary VLAN

Catalyst Inline Power Patch Panel

NEW

- For use in any switched Ethernet environment
- Provides Inline Power to any Cisco IP phone
- Auto-discovery algorithm to provide power on demand to IP phones
- Increases availability of IP telephony network via centralized power distribution

VG200 Standalone Gateway

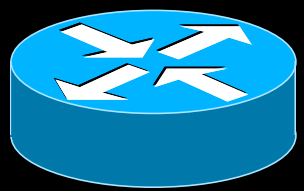
NEW

- Second-generation standalone analog gateway
- Supports up to four FXS/FXO interfaces
- Support E1/T1 in CQ3
- Uses standard Voice Interface Cards (VIC) from router platforms
- Voice gateway only; no routing capability

Video Integration with the IP/VC Family

- **Cisco IP/VC 3510**
  - Multipoint control unit
- **Cisco IP/VC 3520, 3525**
  - H.320 to H.323 gateways
- **Cisco IP/VC 3530**
  - Video terminal adapter
- **Cisco Multimedia Conference Manager**
  - H.323 Gatekeeper/proxy

Cisco 3500 Series

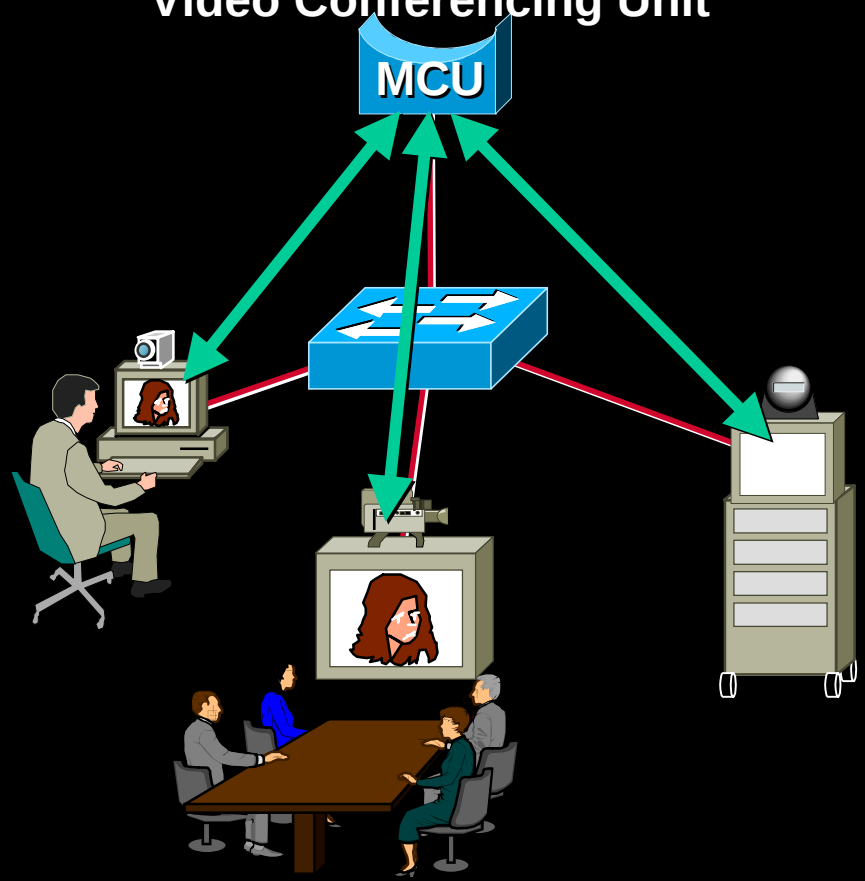


MCM—Multimedia Conference Manager

Cisco IP/VC 3510 Multipoint Control Unit

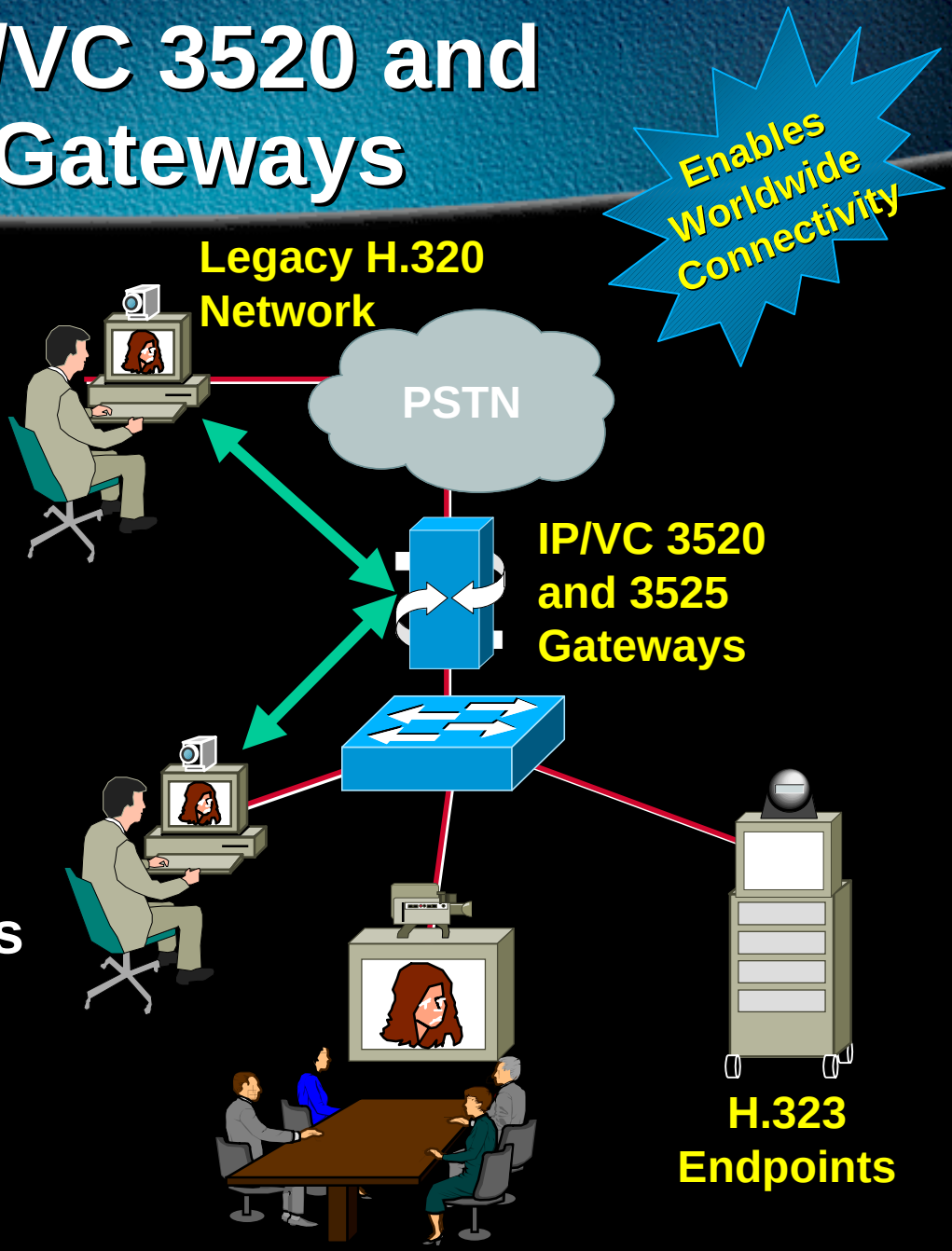
Multipoint Multimedia Conferencing

- Enables multi-participant videoconferences
- Video, audio and T.120 data bridging – from 128 kbps to 1.5 Mbps
- Up to 15 sessions per unit
- Scales easily by combining multiple units
- Supports ad hoc call-in or planned call-out conferences



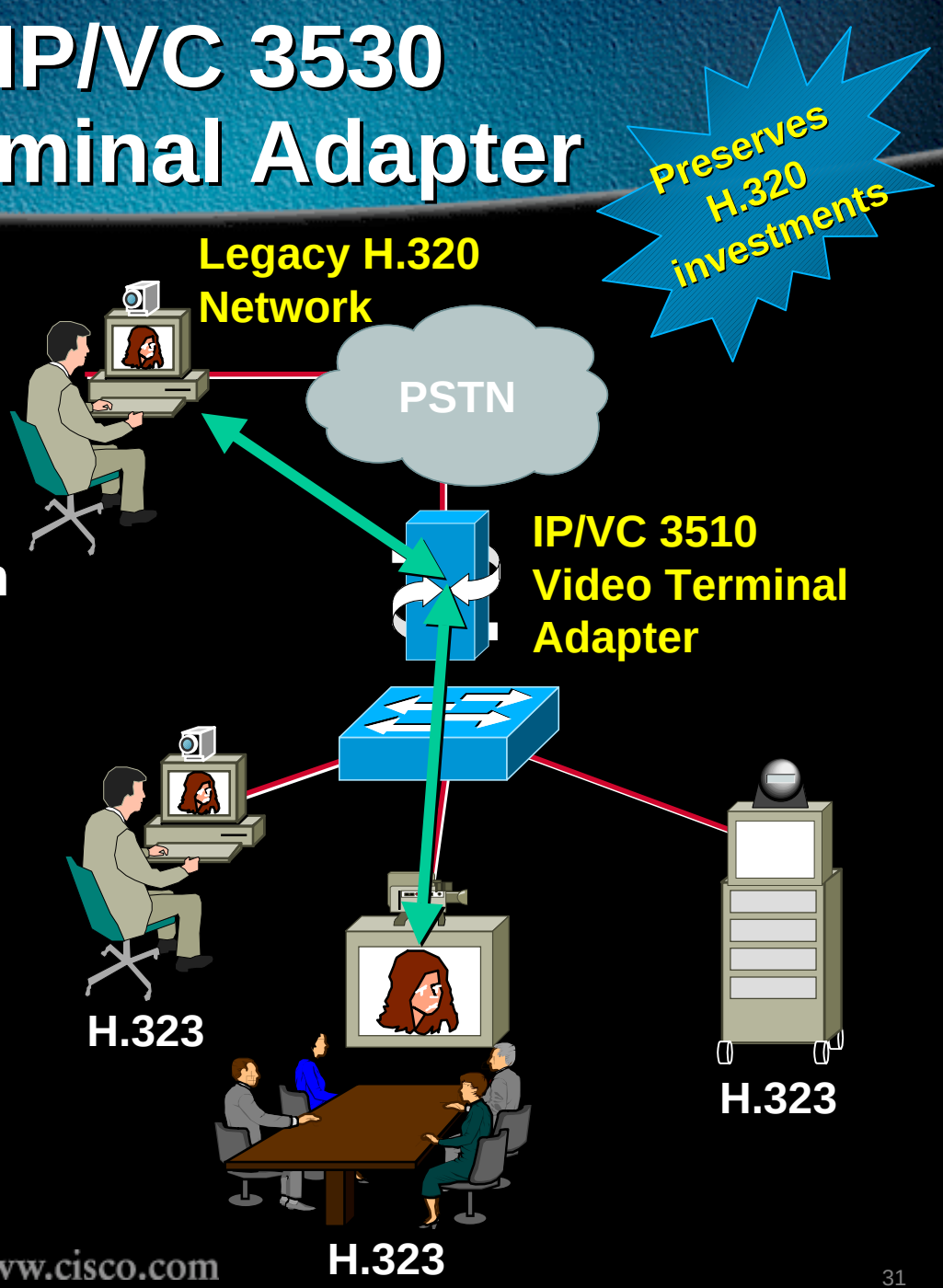
Cisco IP/VC 3520 and 3525 Gateways

- Connects H.320 circuit-switched networks to H.323 IP networks
- Ties into existing H.320 conferencing networks
- Video, audio, and T.120 data calls up to 384 kbps
- Supports PRI, BRI and V.35 interfaces



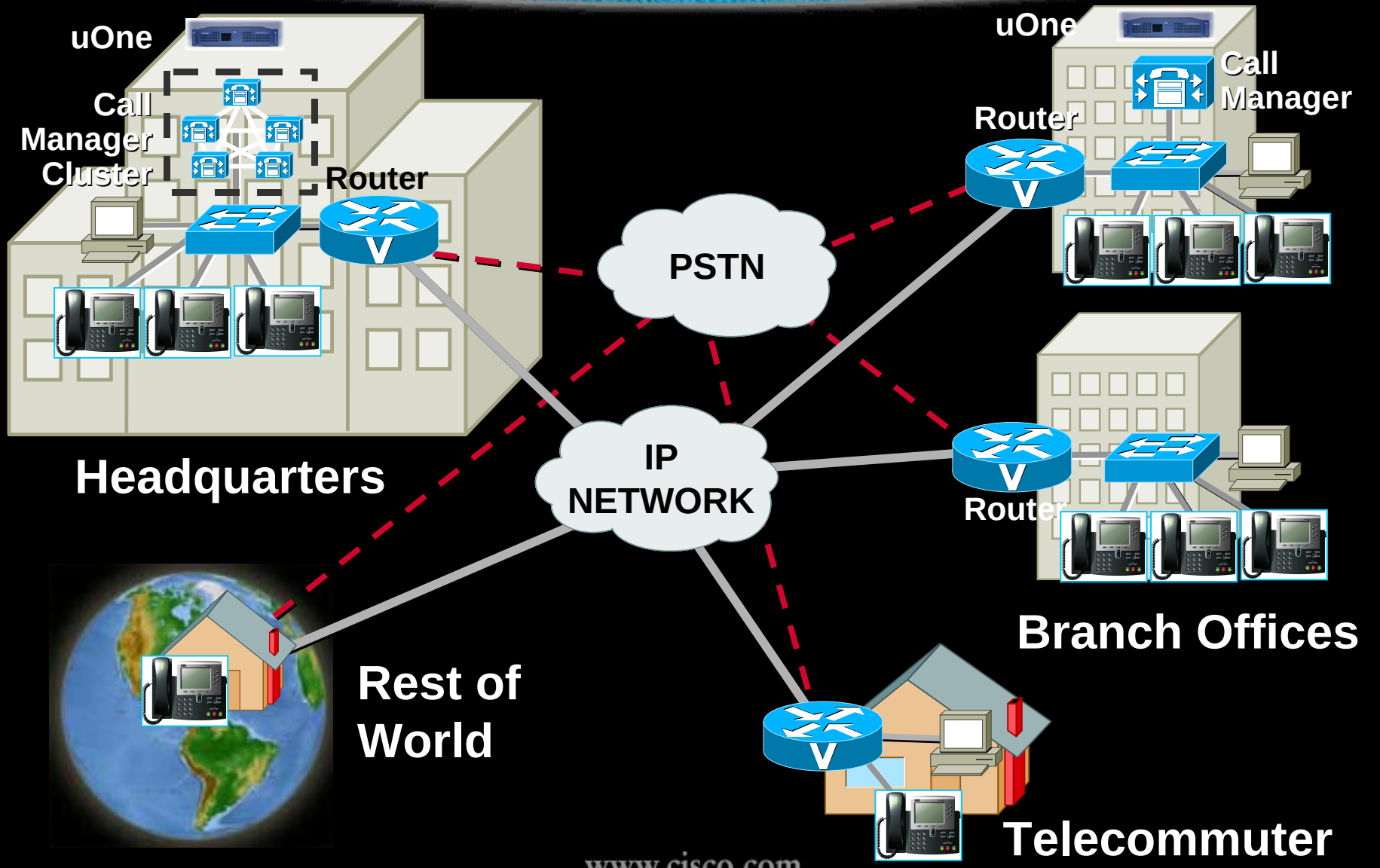
Cisco IP/VC 3530 Video Terminal Adapter

- Connects an H.320 system to an H.323 IP network
- Video, audio, and T.120 data calls up to 384 kbps
- Provides migration path to IP networks



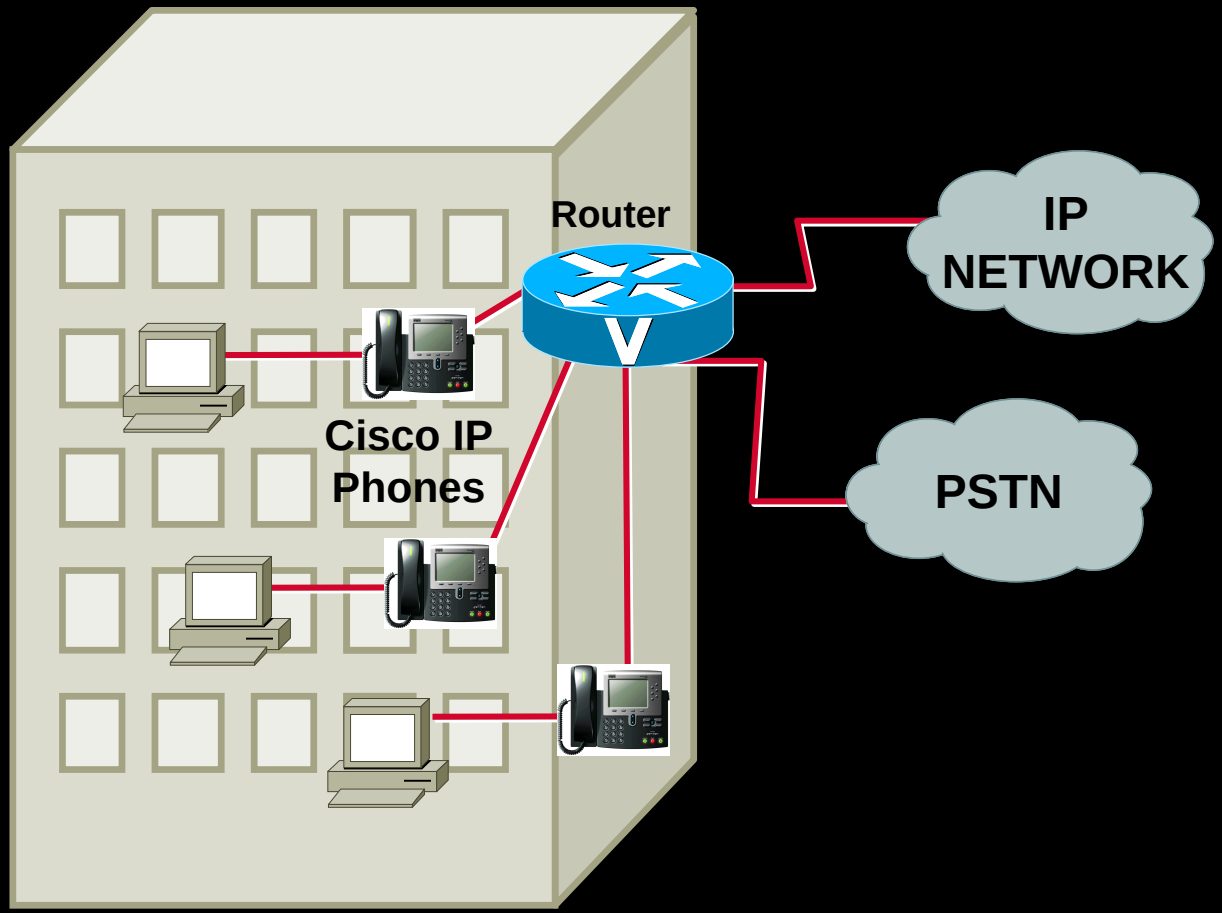
Design models

What We Are Going to Build?

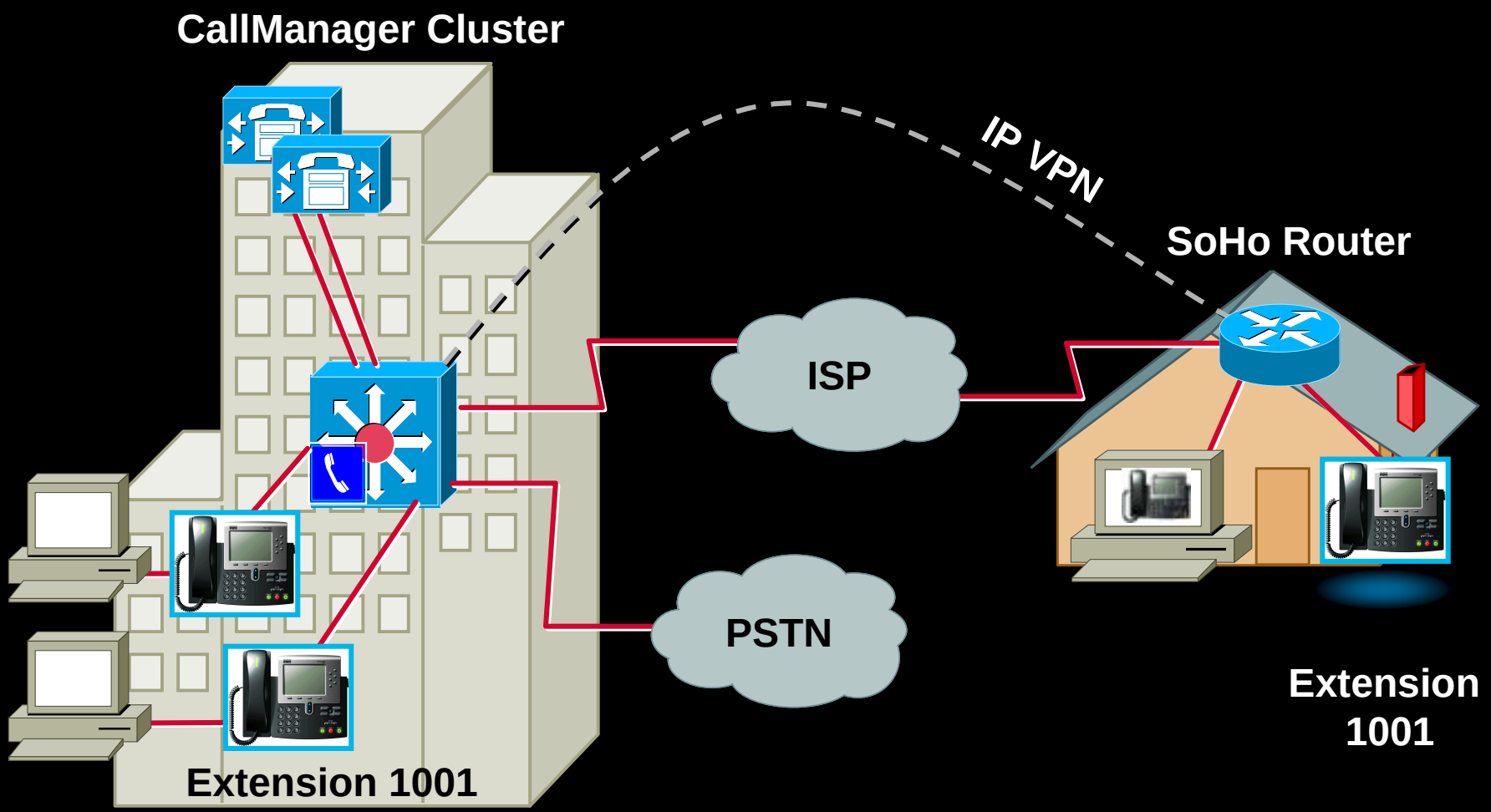


Small/Branch Office

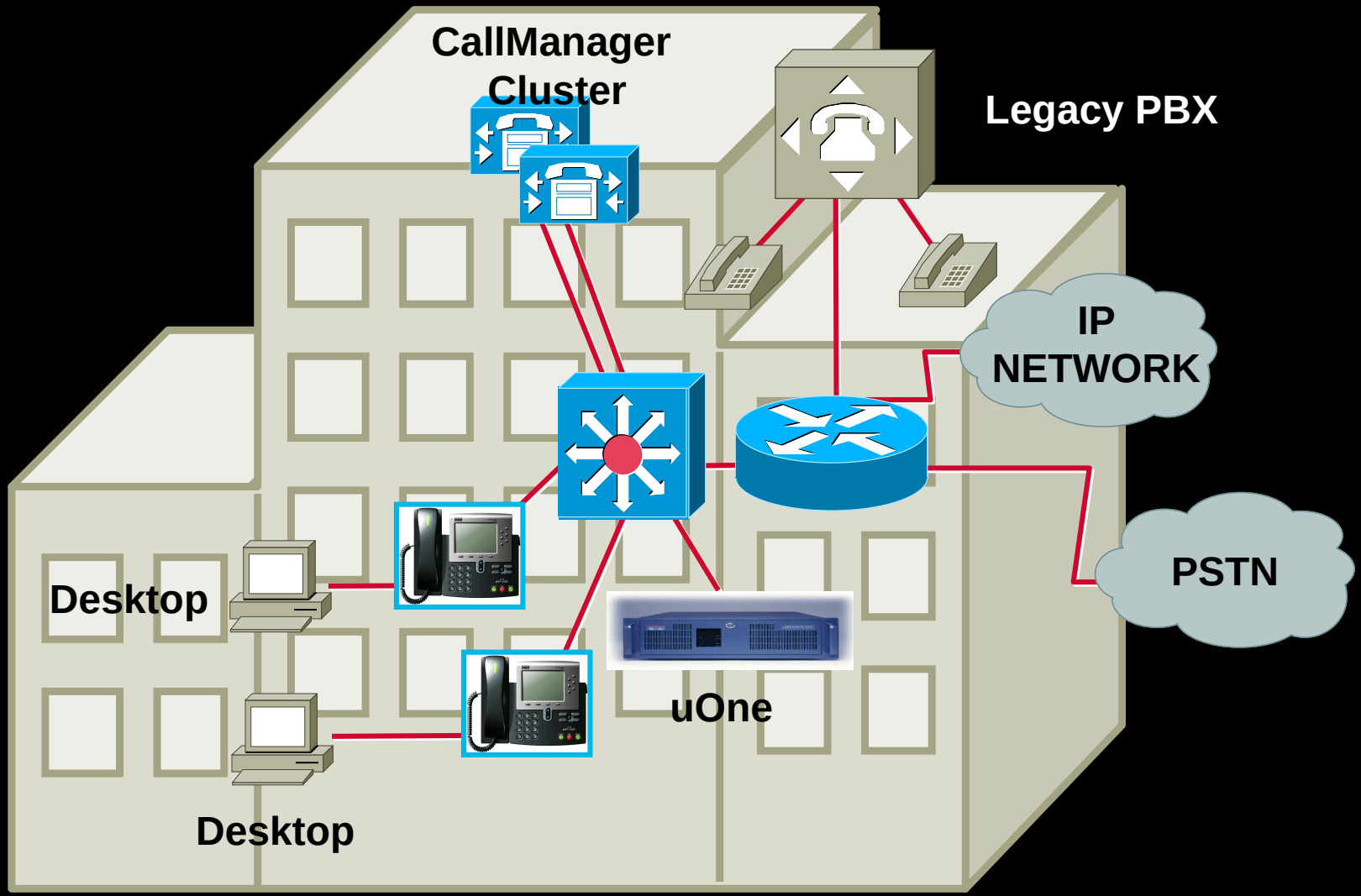
Single Infrastructure for Data, Voice, and Video



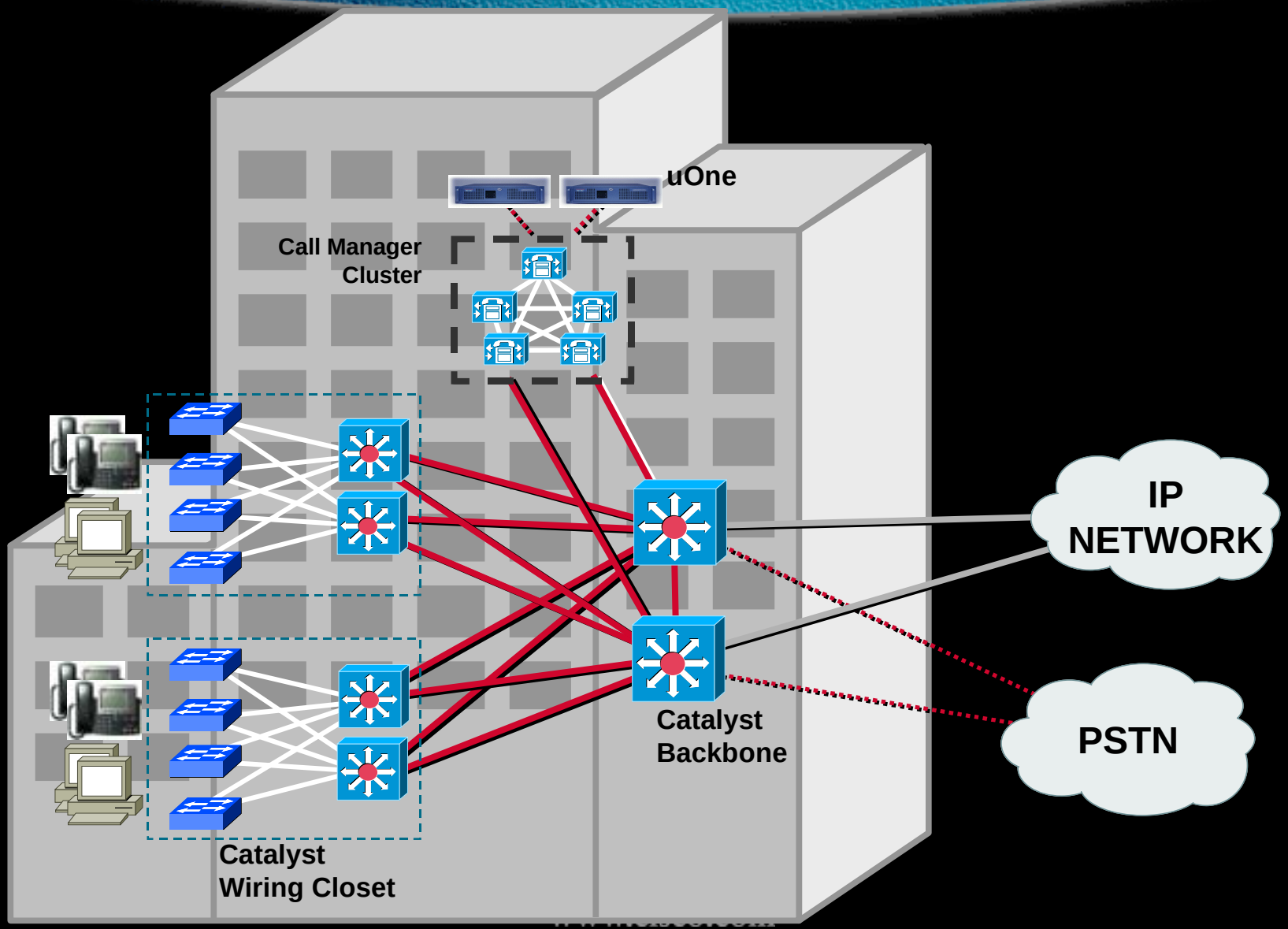
Telecommuter



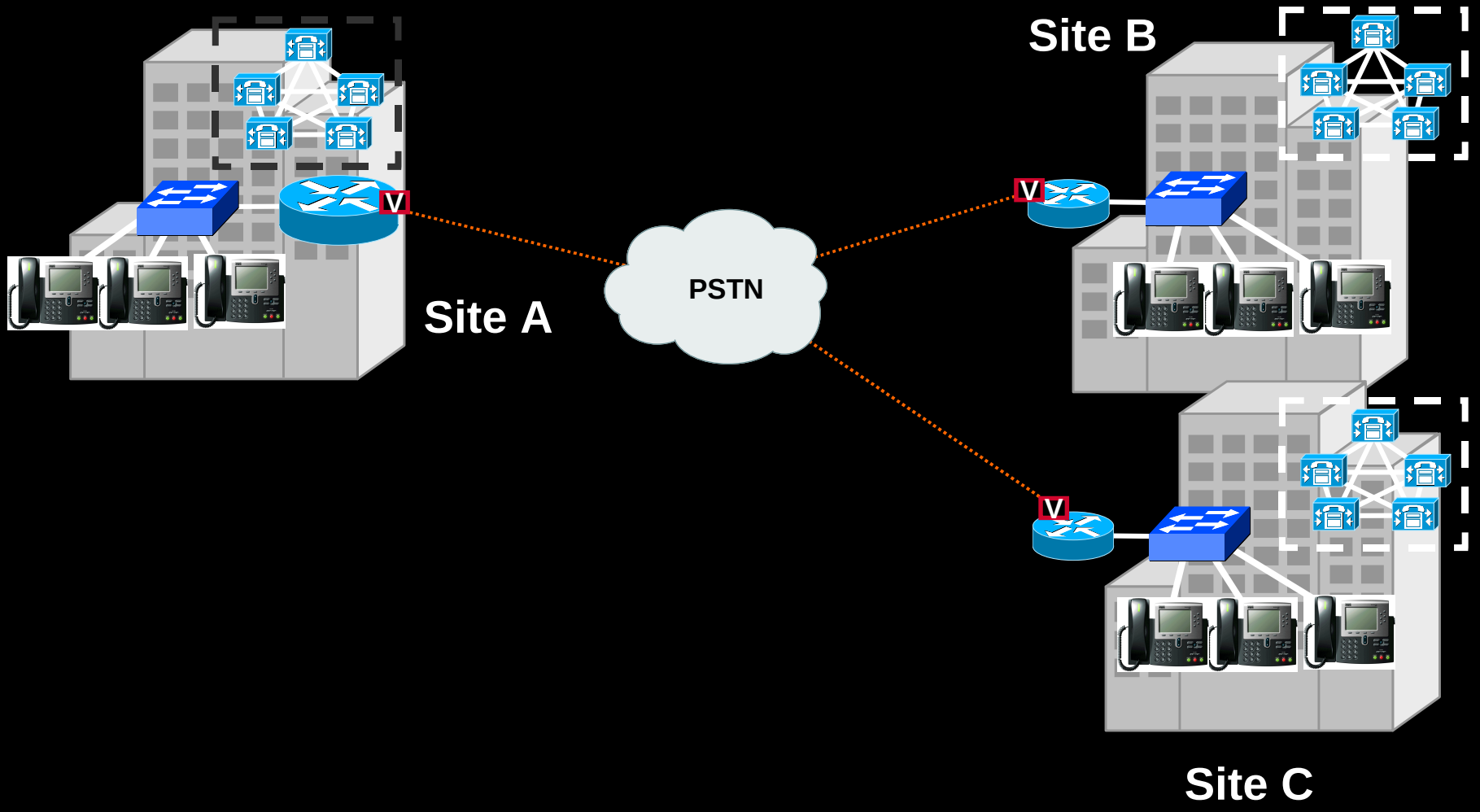
Converged Campus



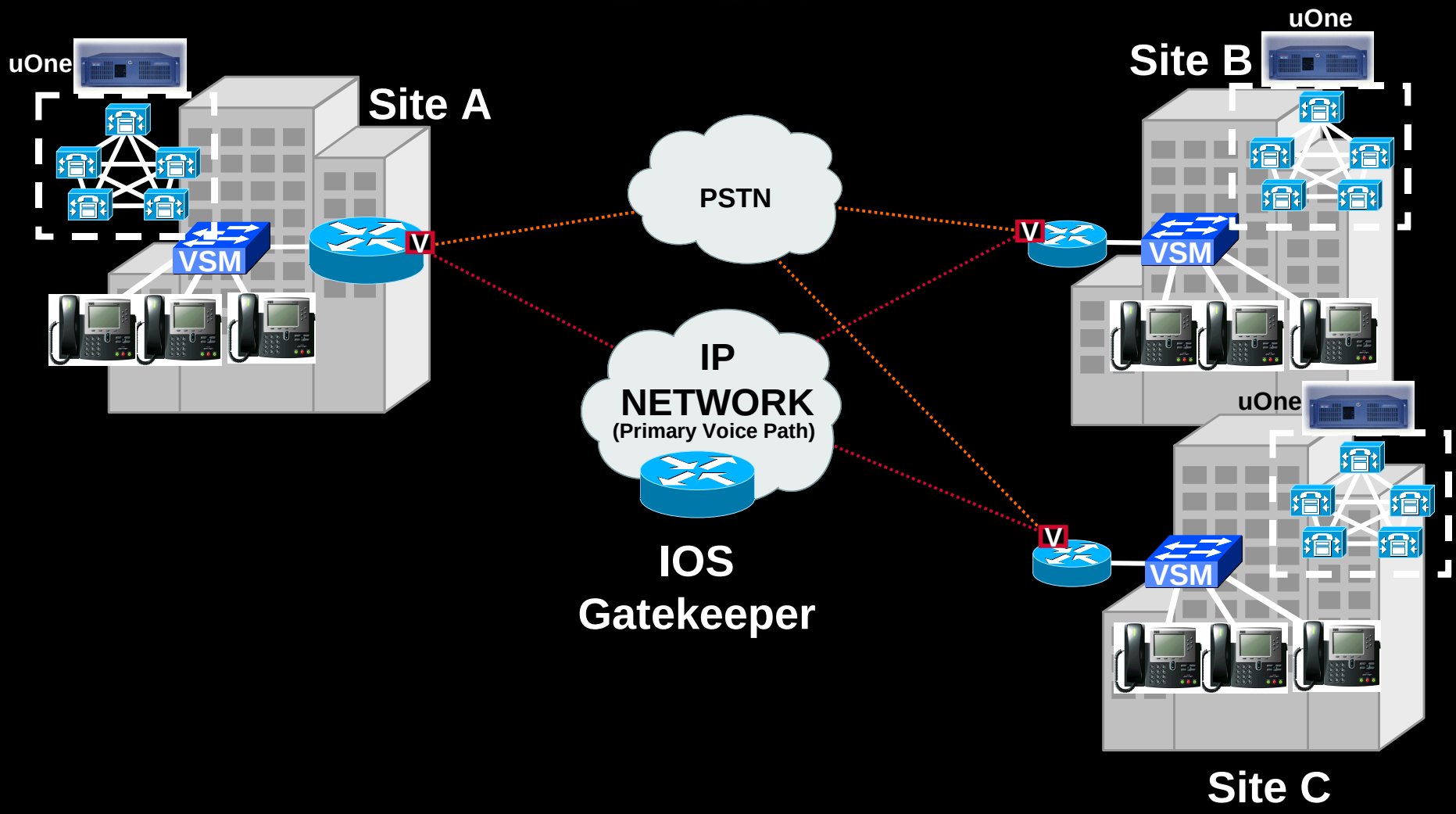
Headquarter Deployments



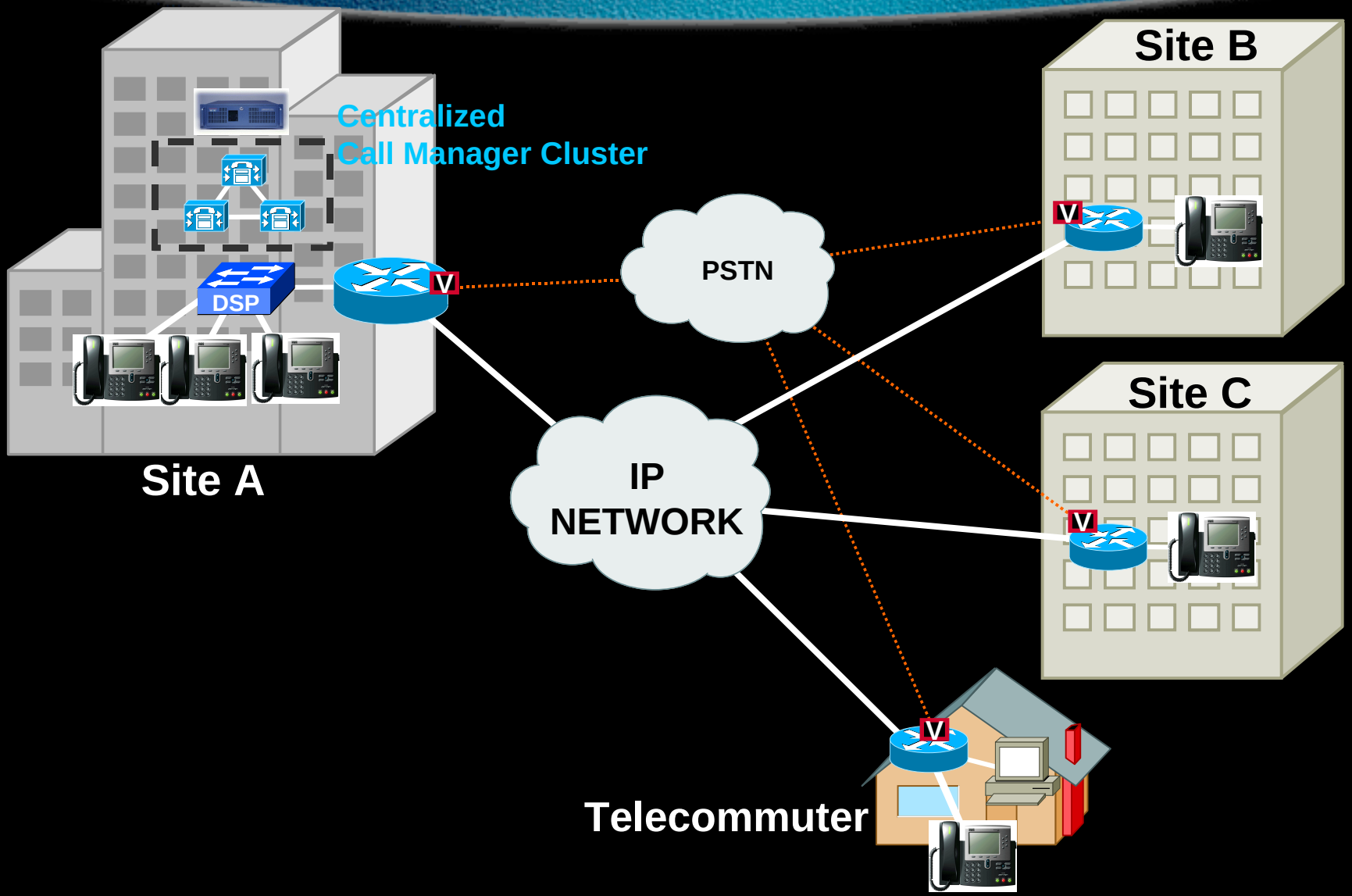
WAN - Isolated Deployments



WAN - Distributed Call Processing



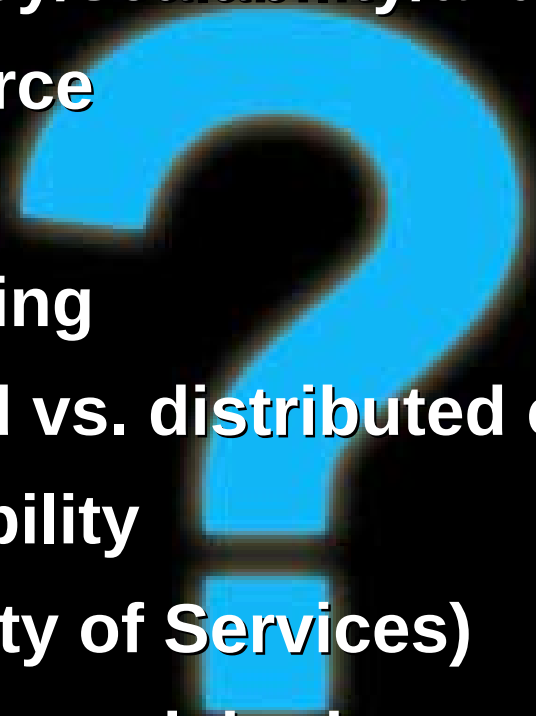
WAN - Centralized Call Processing



Design considerations

Deployment Questions: Where Do I Start?

- Redundancy/scalability/availability
- Power source
- Cabling
- IP addressing
- Centralized vs. distributed call processing
- Interoperability
- QoS (Quality of Services)
- Bandwidth provisioning



Call Manager Cluster design

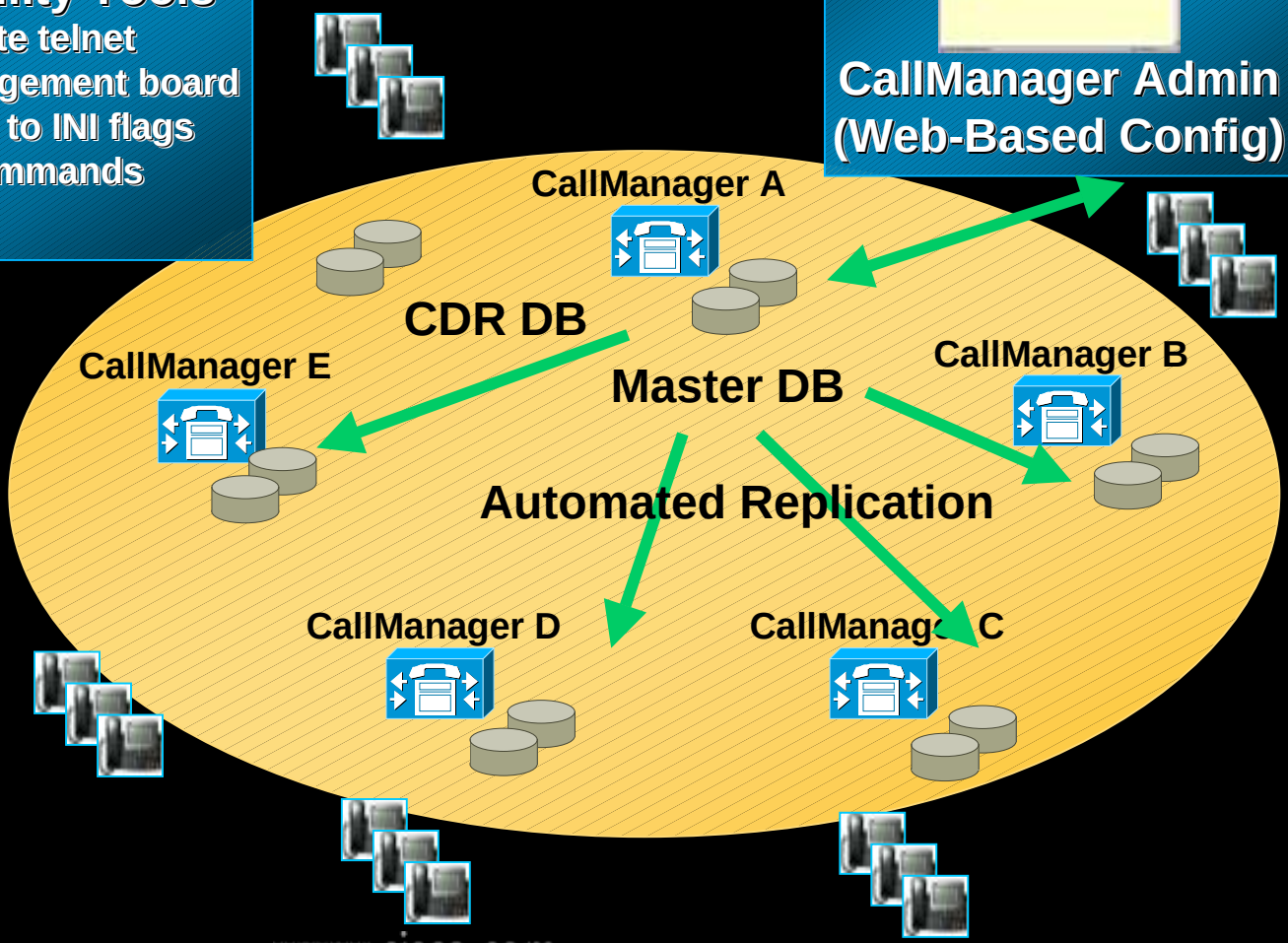
Integrated Serviceability Tools

- Bridged remote telnet
- Remote management board
- Web interface to INI flags
- Show tech commands
- Carbon copy

Web-Based Management

- Syslog
- Device statistics
- Signaling/control debug trace
- CDR reporting
- Event monitoring
- Performance Monitoring

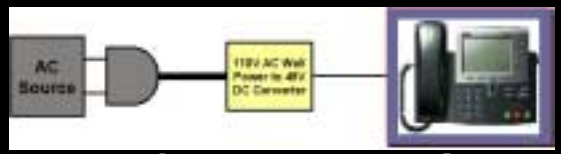
CallManager Admin (Web-Based Config)



Power

- **Inline Power**
  - *Needs Powered Linecards for Catalyst Switches*
  - *Uses Pairs 2 & 3 (same as Ethernet) for delivering power*

- **External Power**
  - *Needs External Power Patch Panel*
  - *Patch Panel delivers power over Pairs 1 & 4*



- **Wall Power**
  - *Needs DC Converter for connecting IP Phone to Wall Outlet*

Inline power: Catalyst 6000, 6500, 4006, 3500-PWR

Single Wire and Power Options

New Inline Power on Catalyst Switches

4 Wires

48V DC Power

10/100 Ethernet

4 Wires

10/100 Ethernet

Catalyst Switch with Regular 10/100 Ethernet Line Cards

Catalyst Power Patch Panel

8 Wires

<- Injects DC Power

10/100 Ethernet

4 Wires

10/100 Ethernet

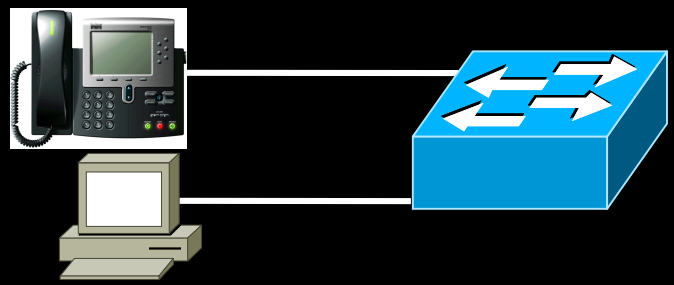
Cabling

1

Single Cable

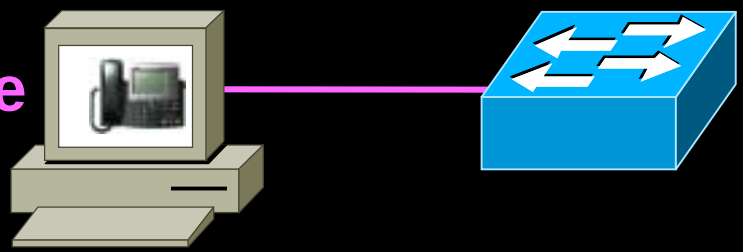
2

Multiple Cables



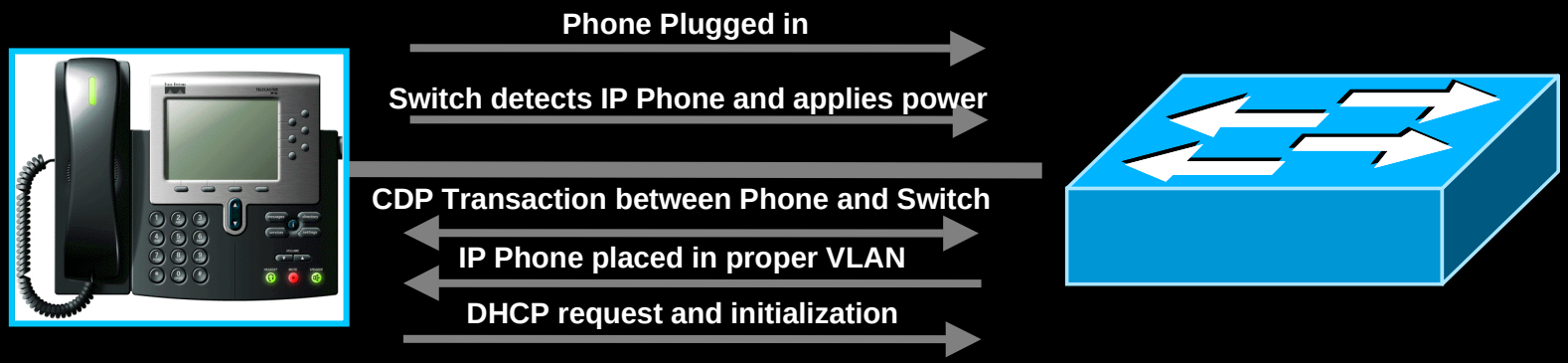
3

Soft Phone



Discovering Cisco IP phones

Endpoint/Infrastructure Integration



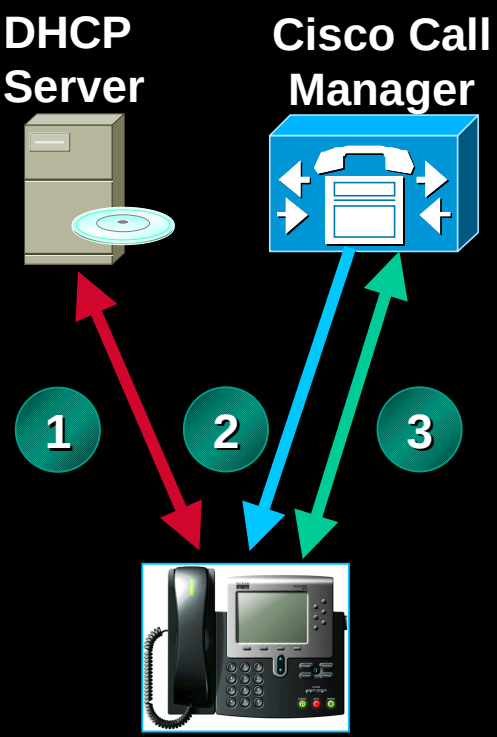
10/100 switch port
LDAP enabled
IP Prec = 5
802.1Q VLAN Support

24 Port Ethernet Line Card
Uses Pins 1,2,3,6

Catalyst 6K, 4K + 3500

Flexible Mobility

1. Phones make DHCP request to get an IP address, gateway, boot server, etc.
2. Phones make TFTP boot file request to get CM IP addresses
3. Phones register with CM and get Display Templates and ready to receive/place calls

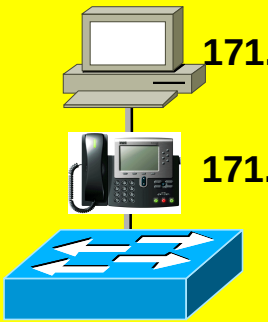


Ease of Moves, Adds, and Changes

- Add a new device
  - Plug it in out of the box
- Move a device
  - Unplug and plug in new location
- Changes
  - Simple web-based interface

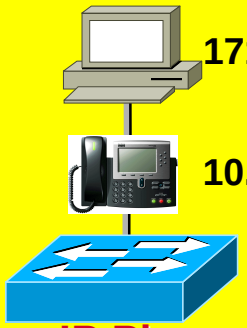
IP address

IP Phone + PC on Same Switch Ports



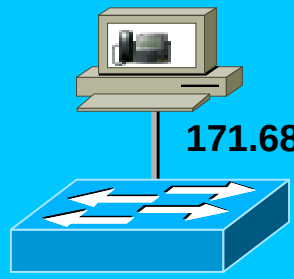
Real IP Addresses

IP Phone + PC on Same Switch Ports



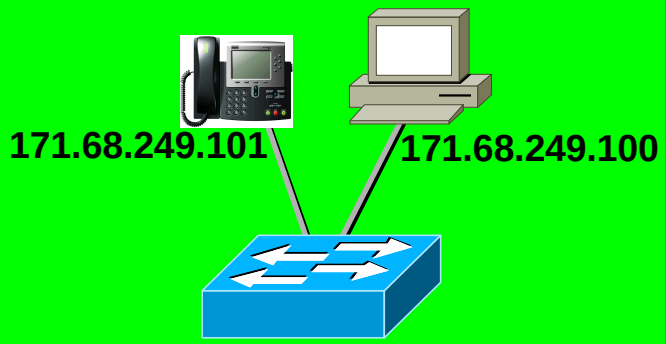
IP Phone uses "10.0.0.0" Network

IP Phone + PC share the same device (Soft Phone)



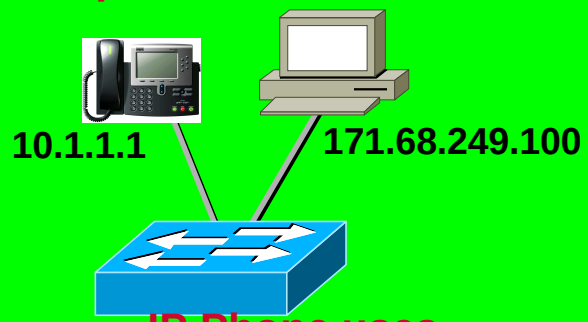
Real IP Addresses

IP Phone + PC on Separate Switch Ports



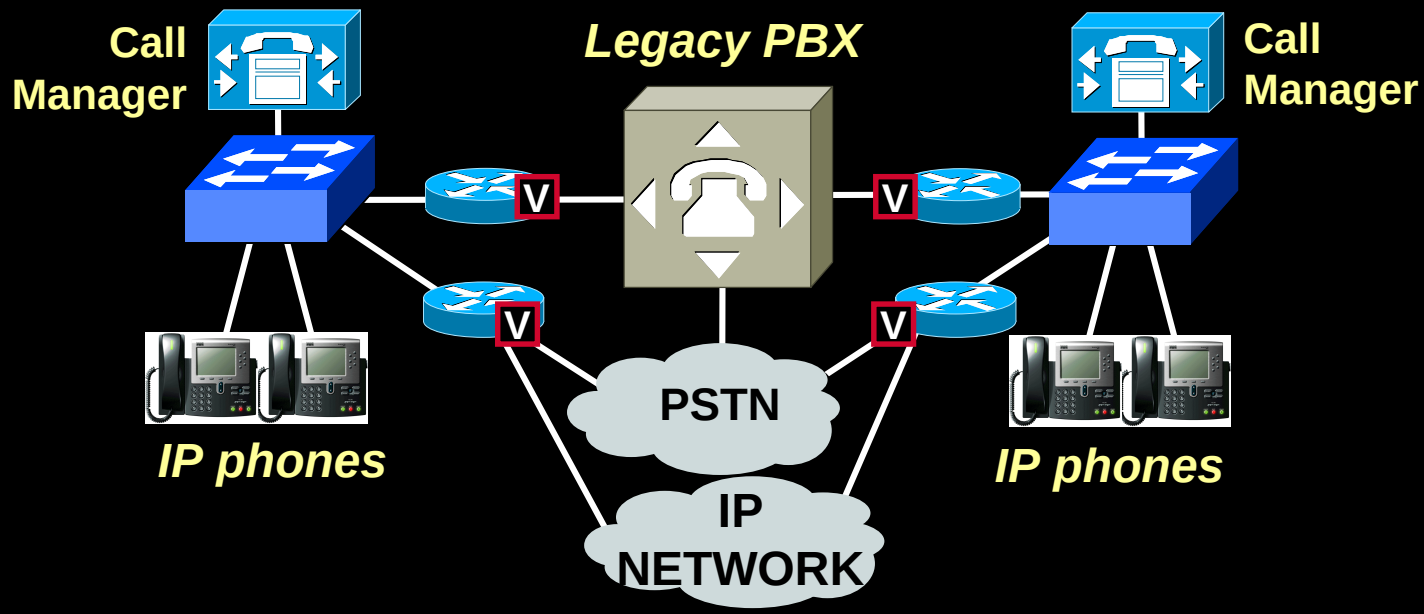
Real IP Addresses

IP Phone + PC on Separate Switch Ports



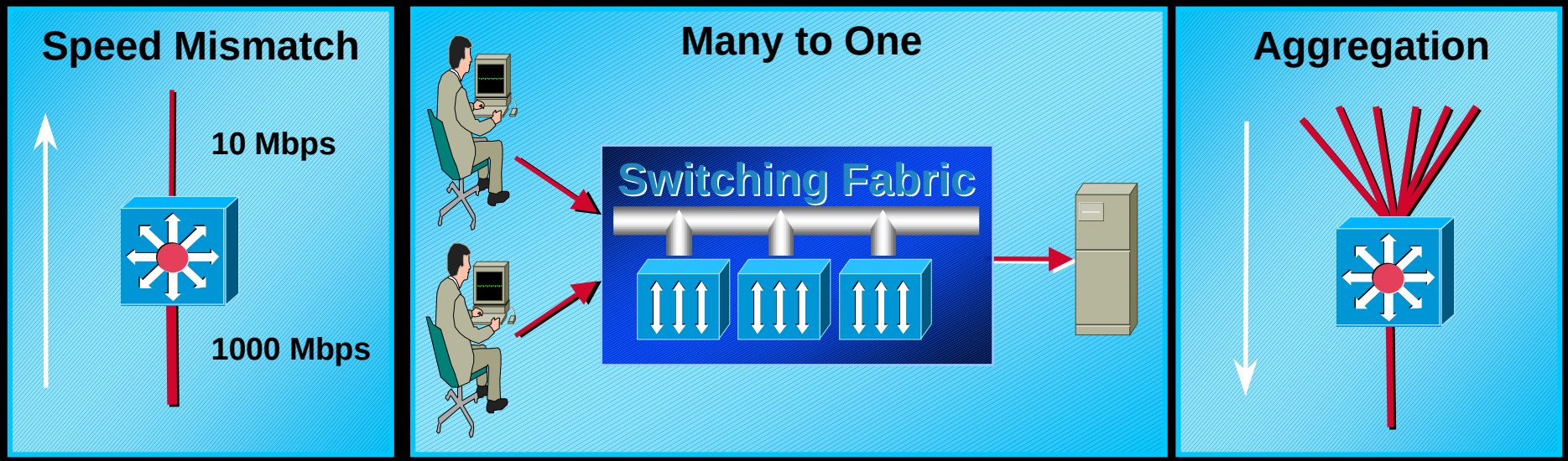
IP Phone uses "10.0.0.0" Network

Interoperability

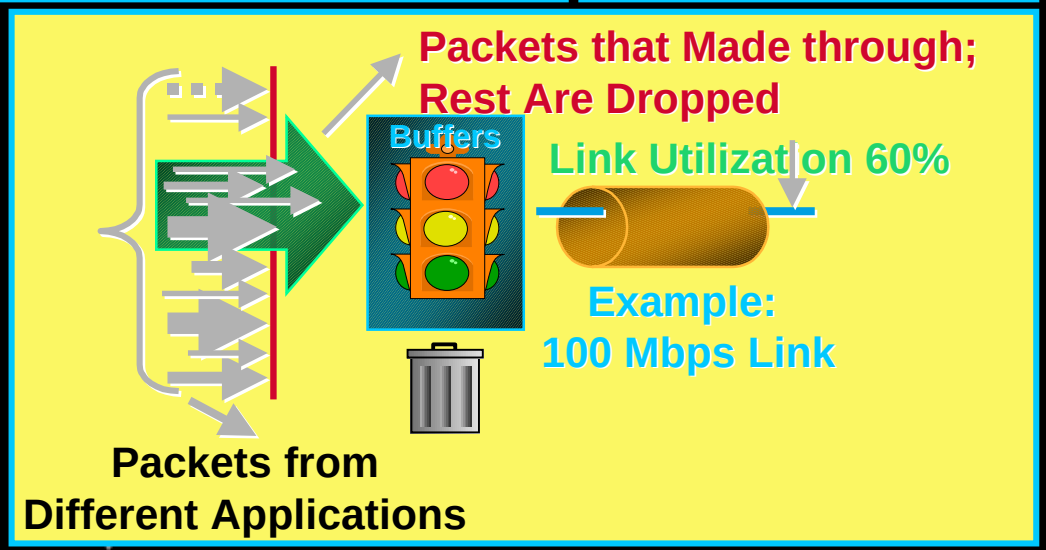


" Signaling: E1/T1 CAS, CCS, QSIG, PRI, BRI
" FXO, FXS, E&M
" H323, MGCP
" Standards based

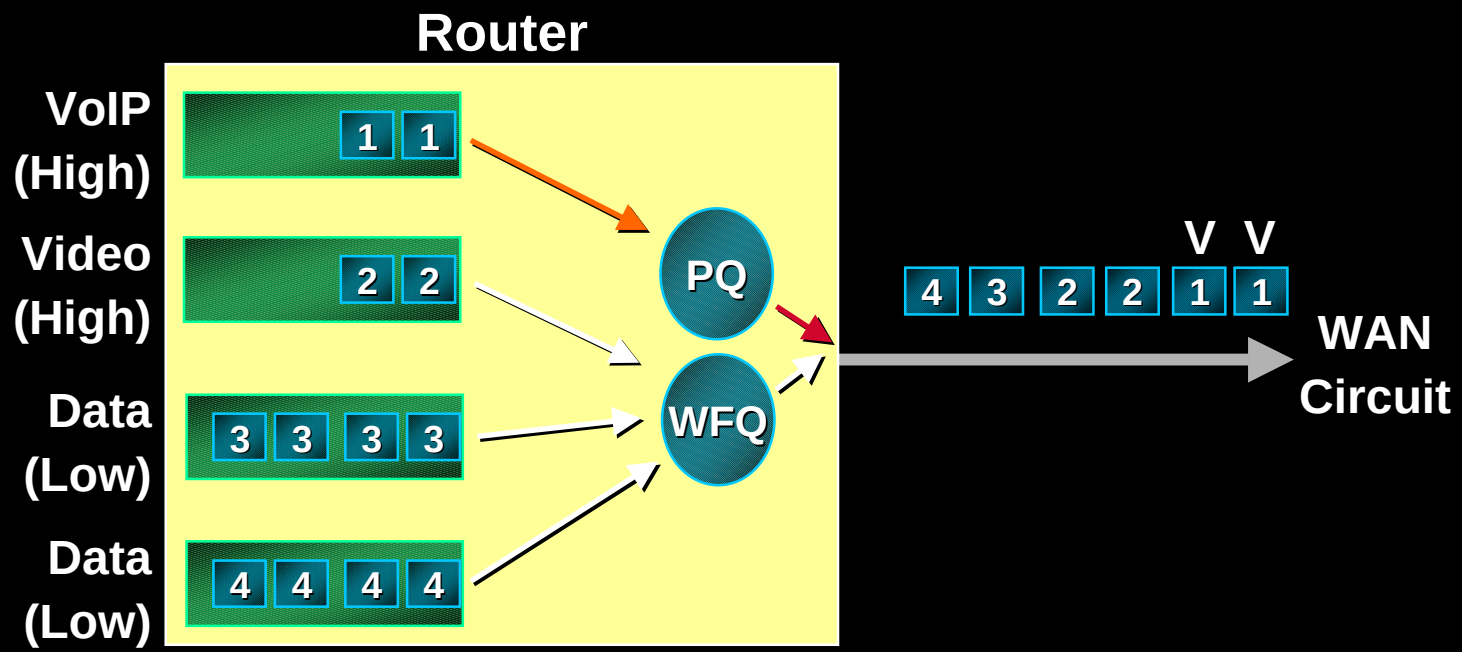
Campus QoS



TAG voice packet
Voice VLAN
Separate queue for voice
Trusted boundary



QOS in WAN
Protecting Voice from Data



Classification Mechanisms

IP Precedence

DiffServ Code Point

RSVP

"Identifying" Voice as Important

QoS Queuing Features

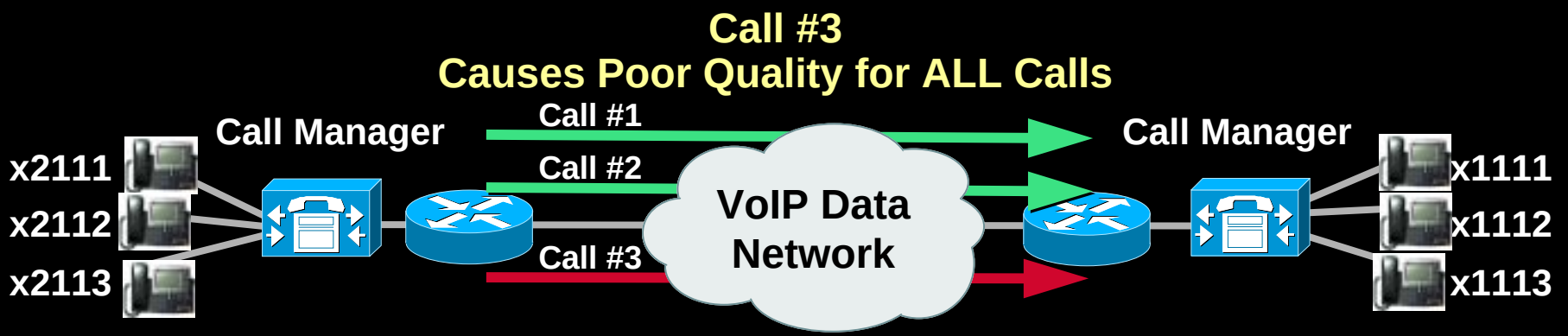
IP RTP Priority

Low Latency Queuing

"Giving Priority" to Voice

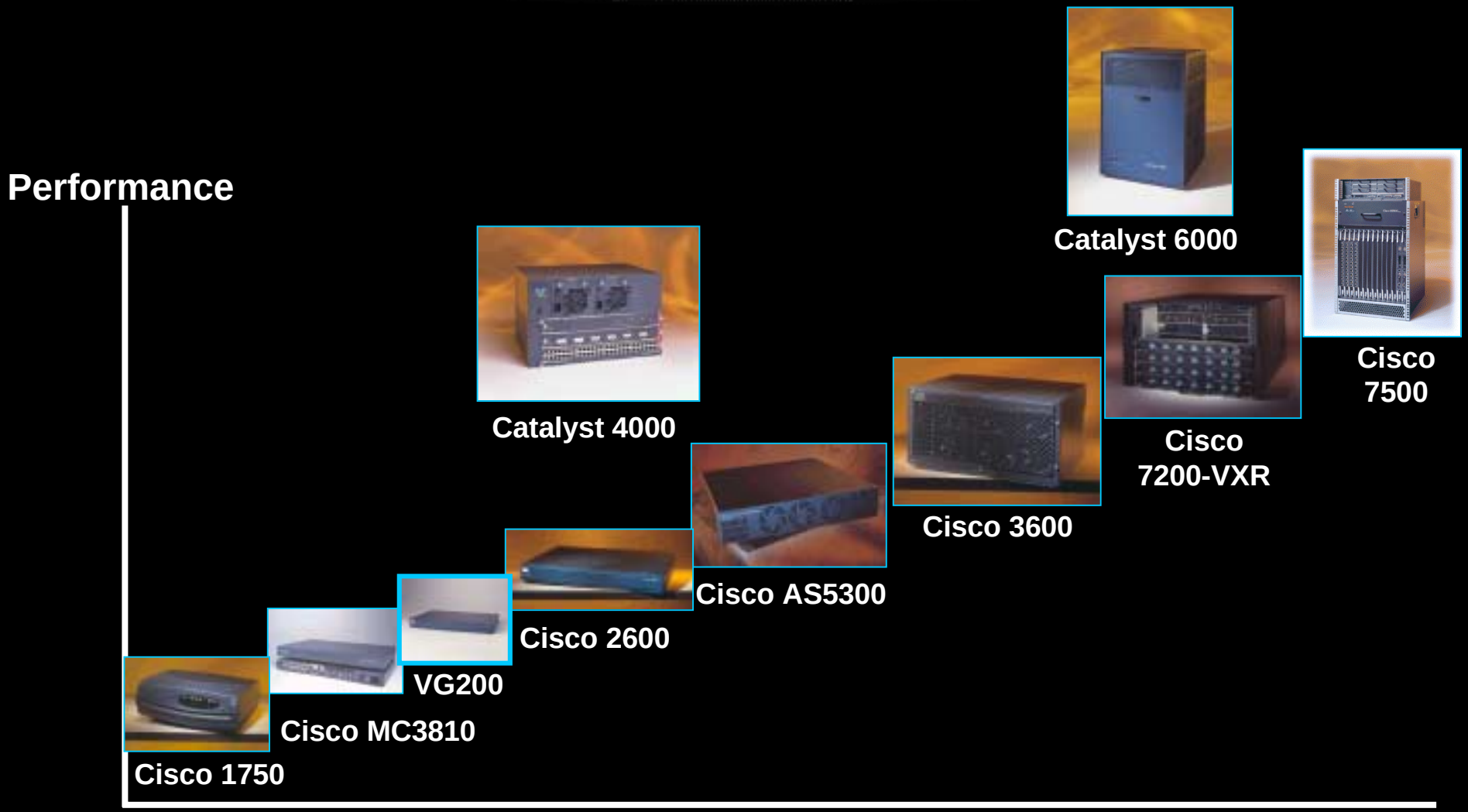
QOS in WAN: Protecting voice from voice

Example:
WAN Bandwidth Can Only Support 2 Calls
What Happens when 3rd Call Attempted?



Use gatekeeper between Call Manager
Use Call Manager Location within Call Manager

Cisco Integrated Voice Gateways

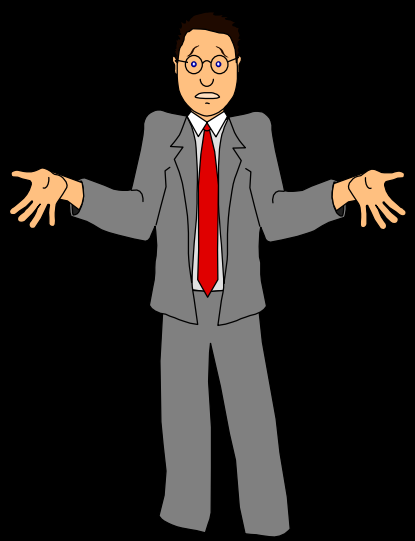


Design considerations: WAN bandwidth requirement

How much bandwidth do I need for one voice call?

Link Header	IP Header	UDP Header	RTP Header	Voice Payload
X Bytes	20 Bytes	8 Bytes	12 Bytes	X Bytes

- G711 64K
- G729a 8K
- RTP/UDP/IP 16K
- CRTP 2K
- VAD uses less

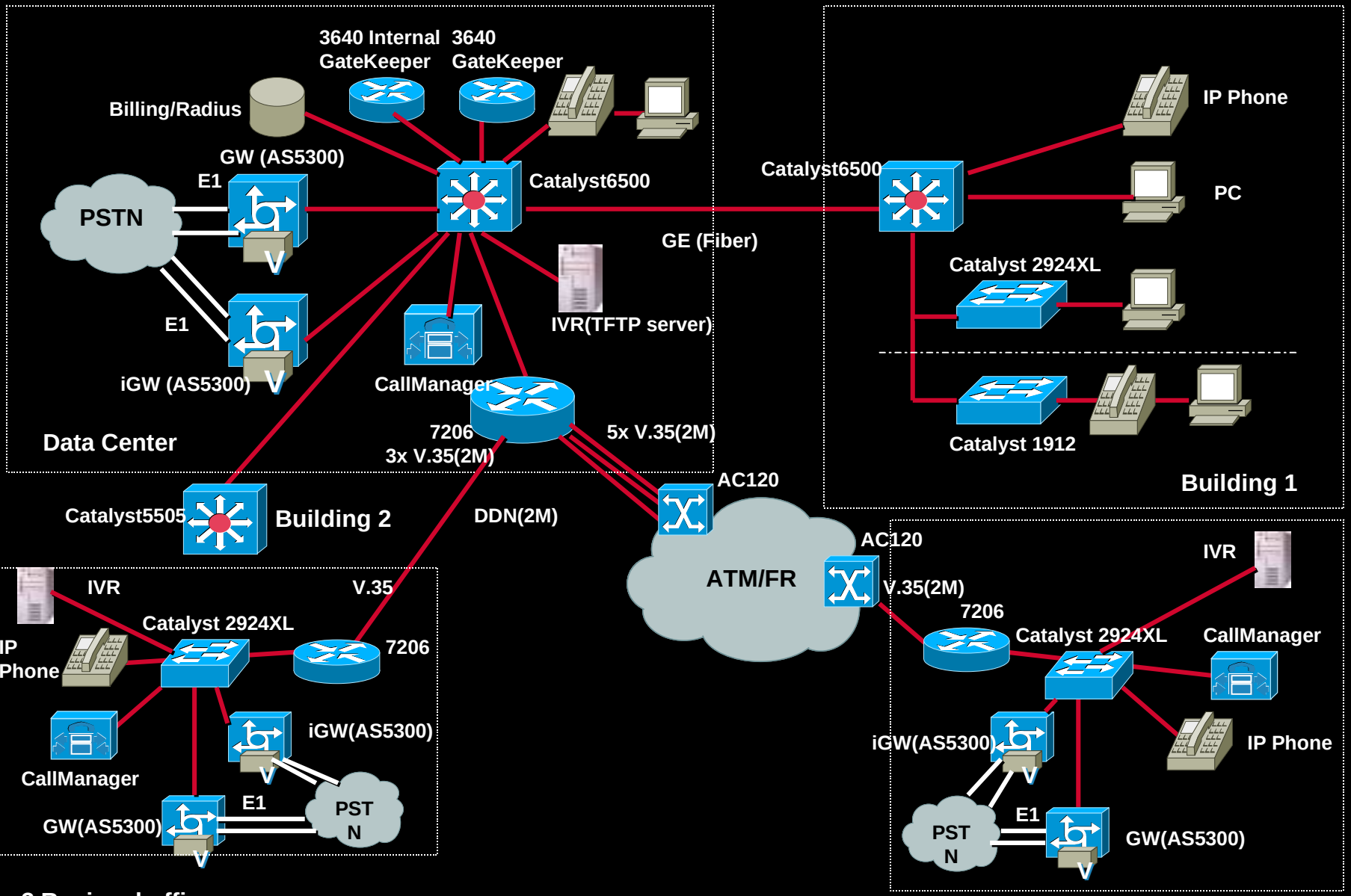


- Use G711 in LAN
- Use G729a in WAN
- Consider transcoding from G711 to G729a
- With CRTP and G729a use 10K

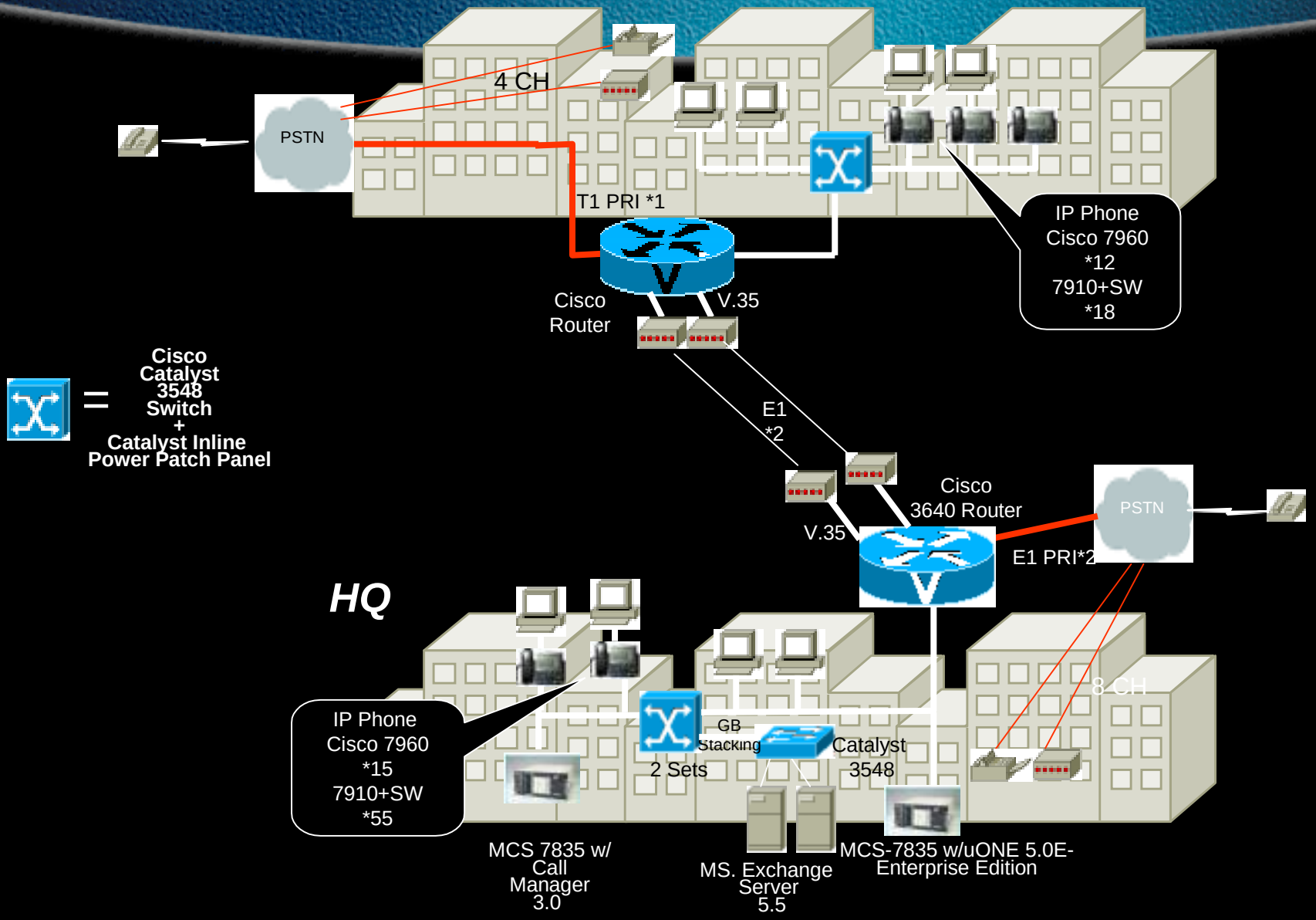
10K

10K

China - Branch office



Taiwan: Campus



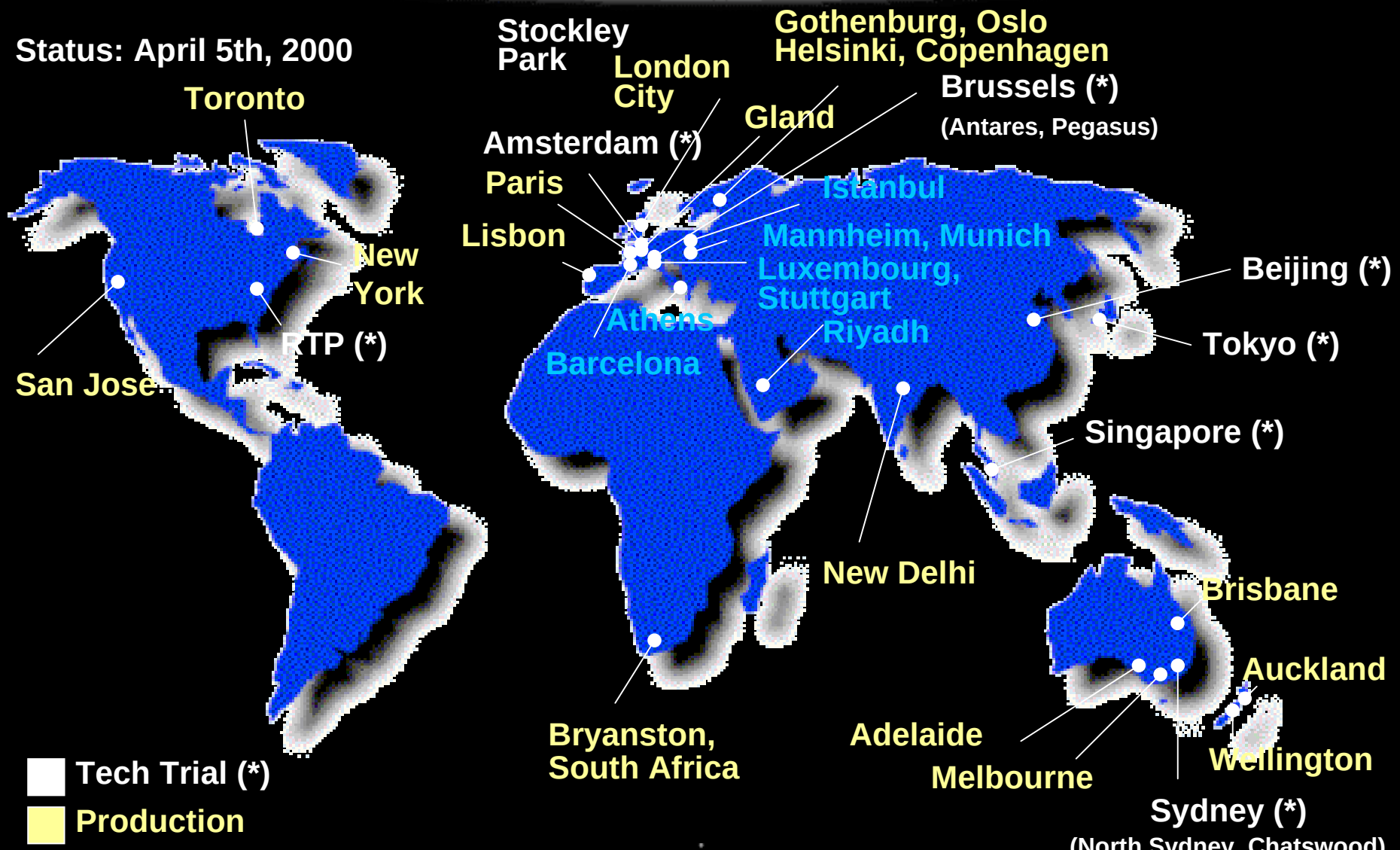
Cisco Systems: Worldwide deployment

- Worldwide deployment is 5,000 IP Phones at 42 locations.
- 32 sites are in production with 4,700 IP Phones (1)
- 10 sites are participating in technology trials with 200 IP Phones
- The San Jose Call Manager is supporting 3,000 IP Phones in Production (2)

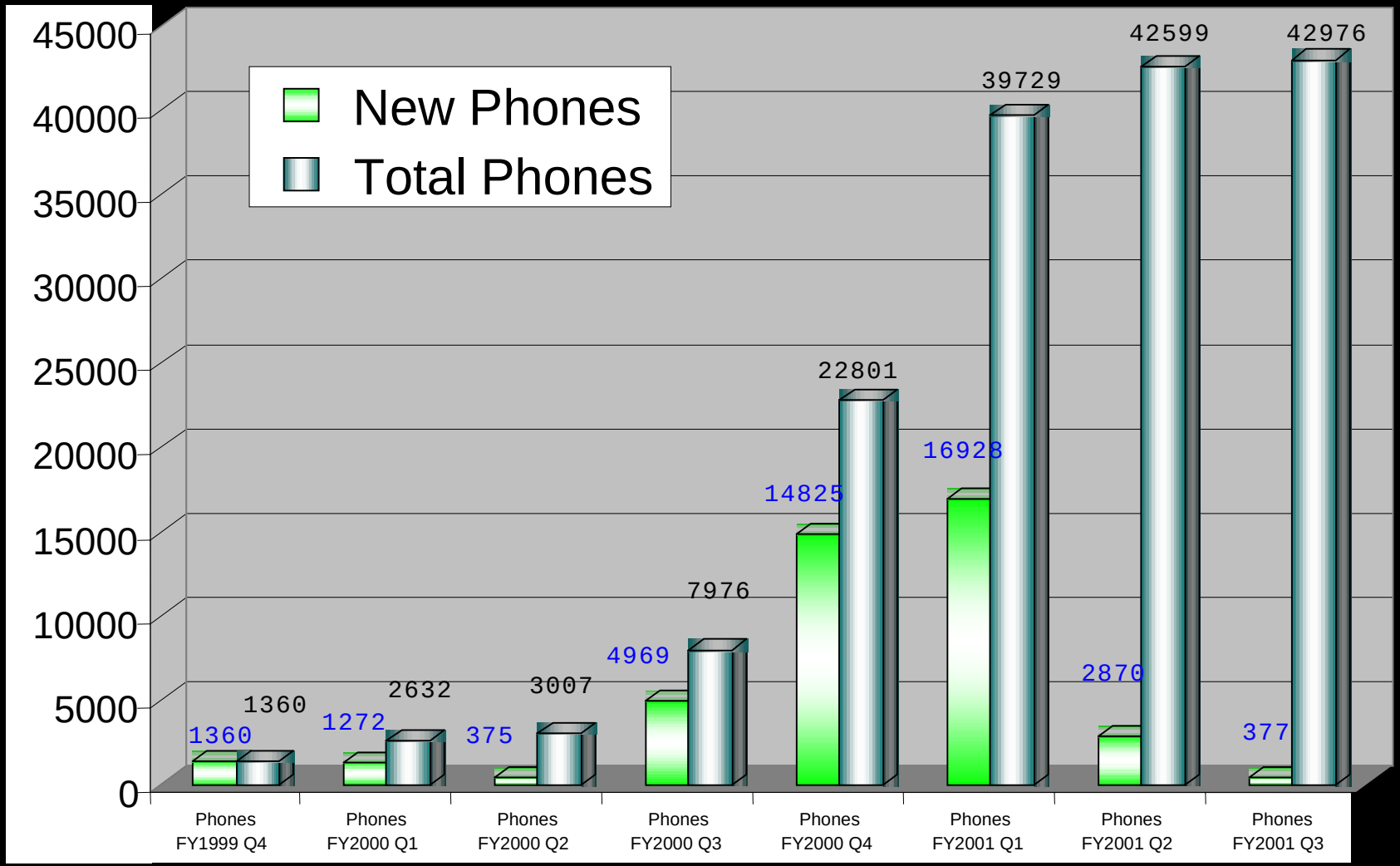
(1) The TDM PBX has been removed

(2) The IP Phone is the sole means of communication

Cisco worldwide



IP Phones Deployed in Cisco by Quarter



IP Telephony Deployment

Theater	FY1999 Q4	FY2000 Q1	FY2000 Q2	FY2000 Q3	FY2000 Q4	FY2001 Q1	FY2001 Q2	FY2001 Q3	FY2001 Q4	FY2002 Q1-Q3
Asia Pacific	3	8	3	2	4	2	3	3	5	5
America's	0	0	2	0	8	20	20	21	21	20
Corporate	1	0	1	0	5	2	1	3	0	0
EMEA	8	10	4	0	11	6	9	0	0	0
New (Incremental) Sites	12	18	10	2	28	30	33	27	26	25
Total	12	30	40	42	70	100	133	160	186	211

NZ Government Department

- Legacy PBX lease expiring
- Phase 1: 500 7960
- Phase 2: 7000 7910
- uOne voice mail
- 210 sites

Texas Instruments

- 5 sites in USA linked with ATM OC3
- Philippines and India with 512K and 256K links
- 1000 users registering with one Call Manager cluster
- On-going deployment of AVVID

Why AVVID?

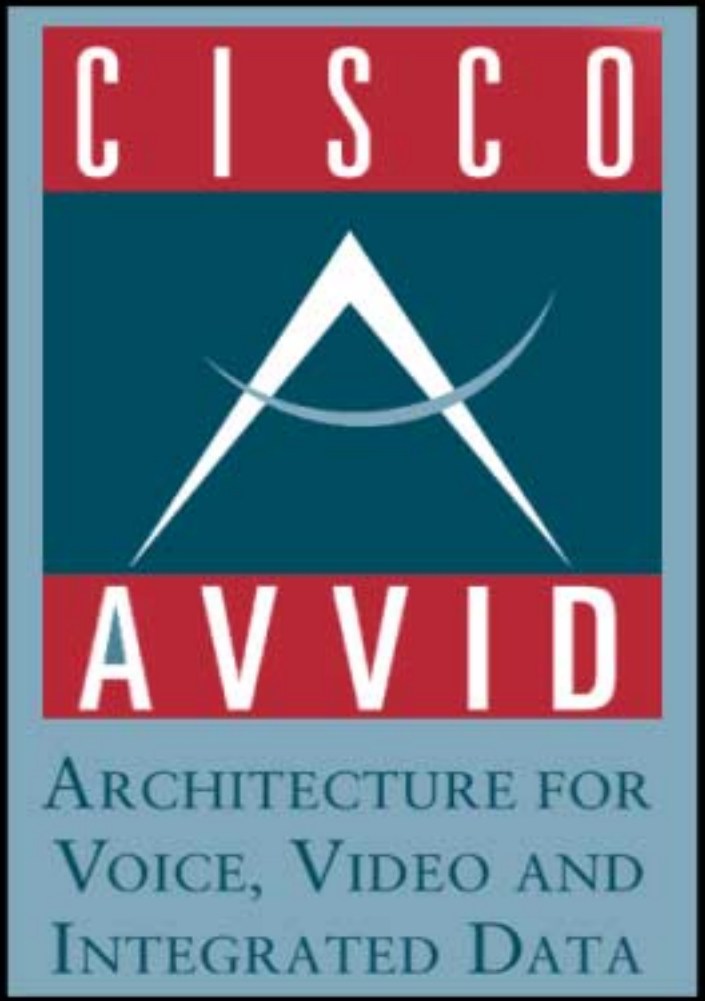
- Data, voice and video are converging rapidly
- Customers are adopting today
- Convergence in infrastructure, applications and clients

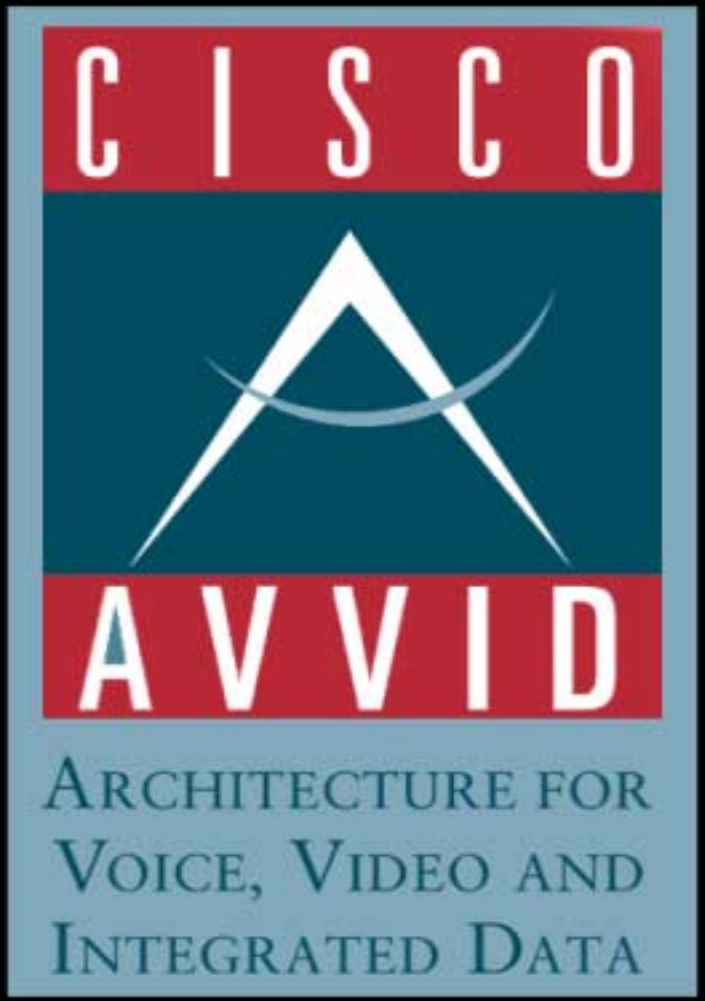
Reasons for convergence

- Lower cost
  - Infrastructure consolidation
  - Toll bypass
  - Lower cost of ownership
- Increased productivity
  - Rapid application enablement
  - Flexibility/mobility
  - Open standards based
- Competitive advantage

Key Messages

- AVVID is a total Architecture
- Cisco has the leading deliverable solutions
- AVVID is available today!


CISCO
AVVID
ARCHITECTURE FOR
VOICE, VIDEO AND
INTEGRATED DATA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