



# Product and Applications update

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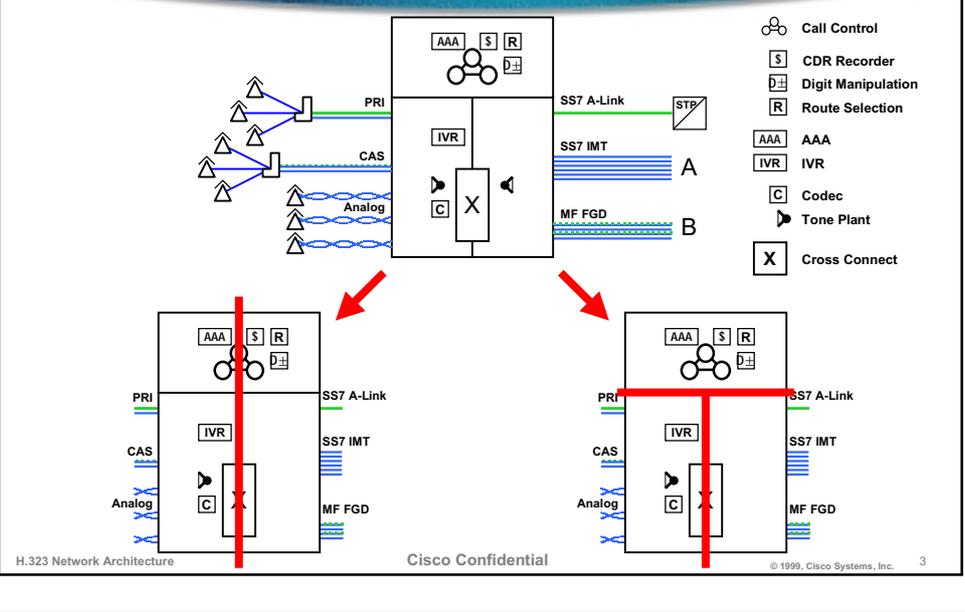
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## Agenda

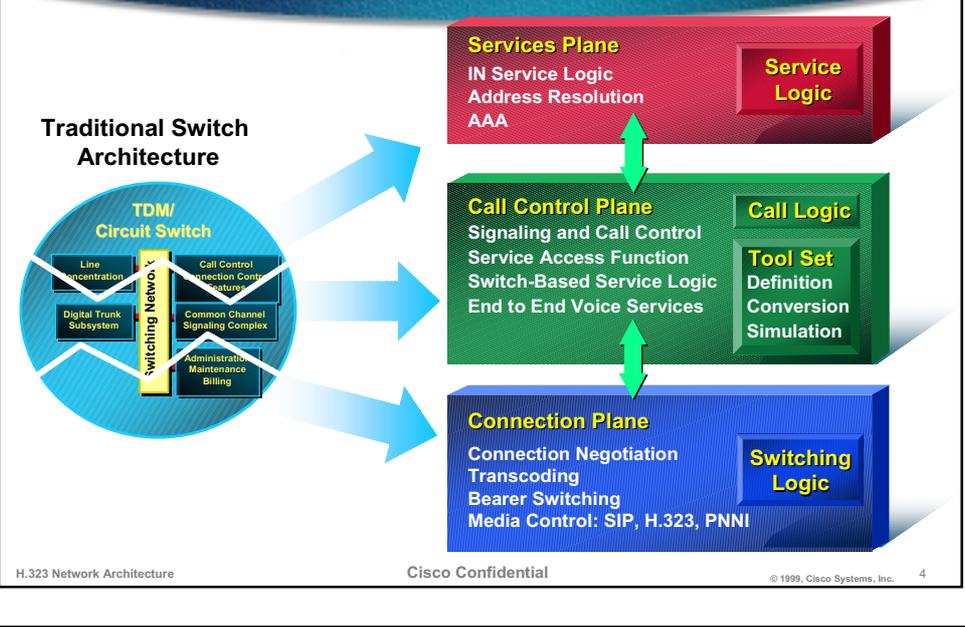
- **VoIP Architecture**
- **Voice Gateways**
- **H.323 Gatekeeper**
- **Signalling Controller (SS7)**
- **Virtual Switch Controller (Call agent/Softswitch/MGC)**
- **Large Gateways**

H.323 Network Architecture Cisco Confidential © 1999, Cisco Systems, Inc. 2

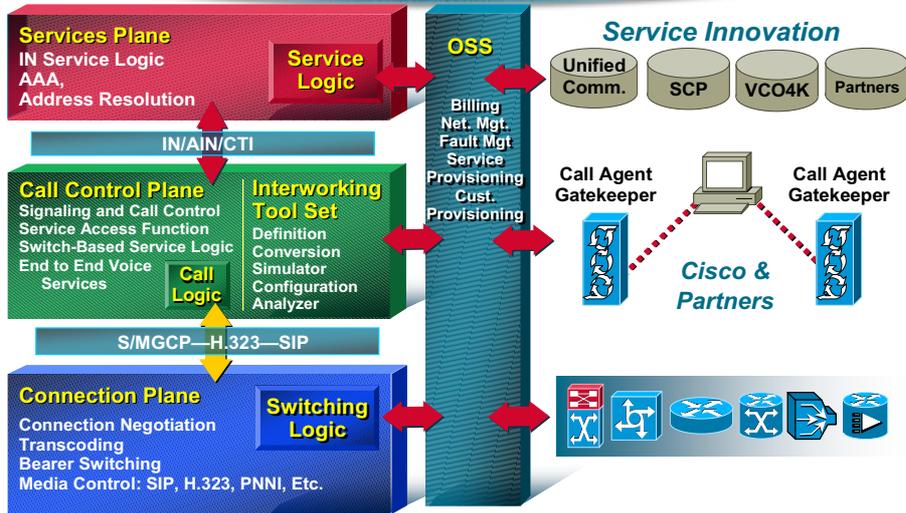
# “Distribution Models” of a Basic Switch



# Cisco's Open Packet Telephony Architecture



# Cisco's Open Packet Telephony Architecture

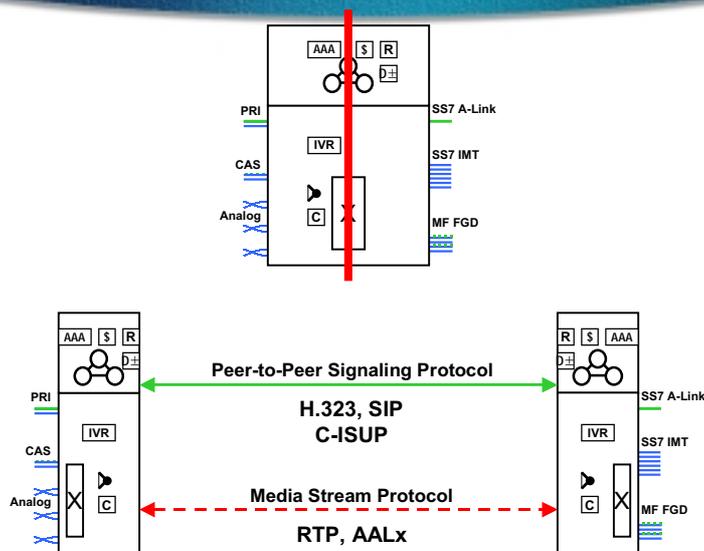


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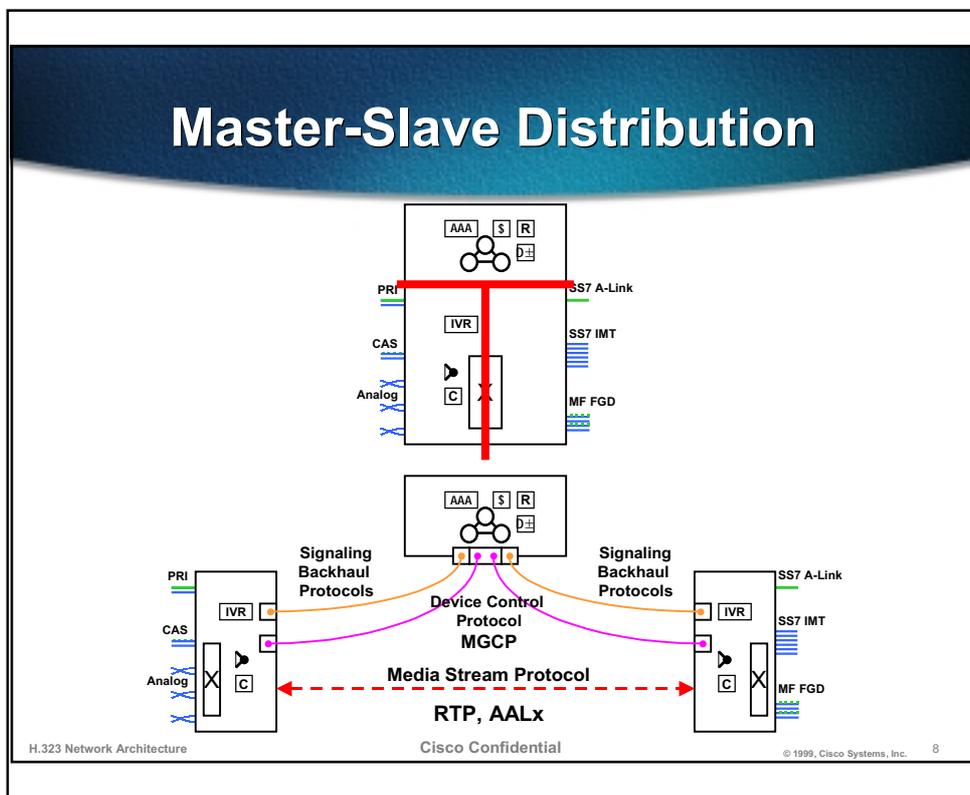
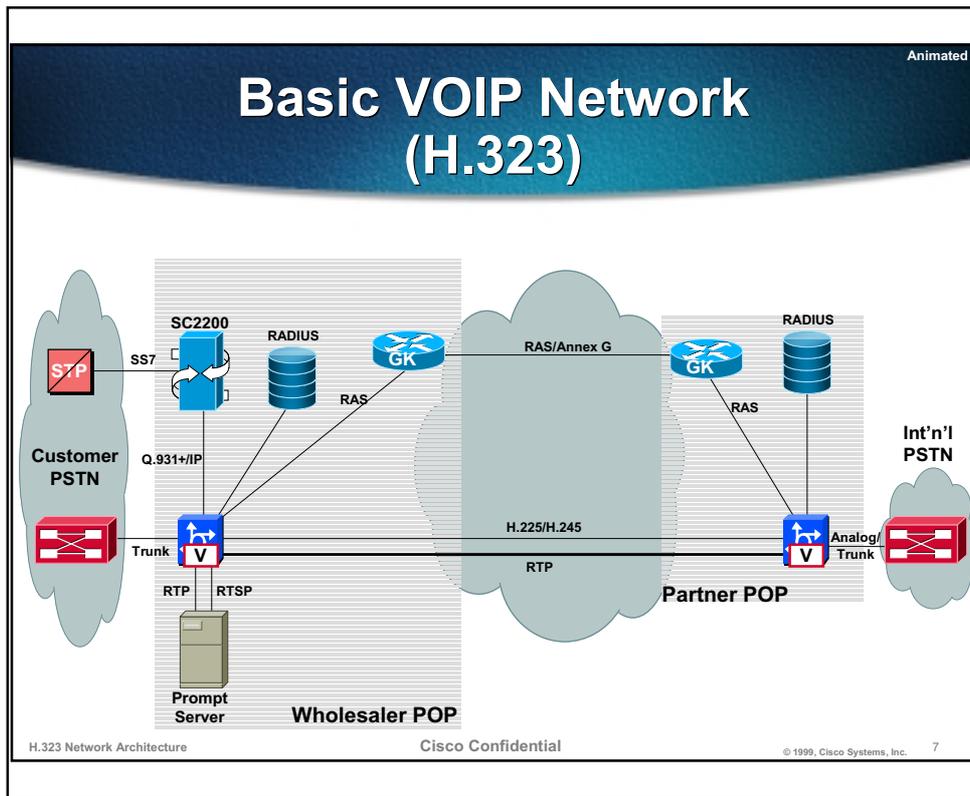
# Peer-to-Peer Distribution



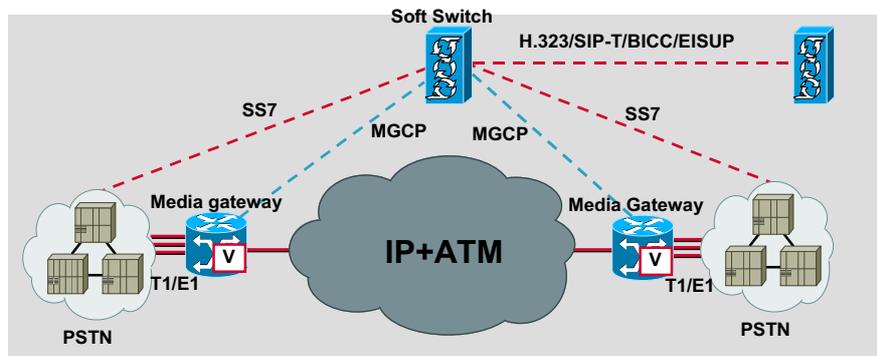
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# Basic MGCP Device Control Network



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## Agenda

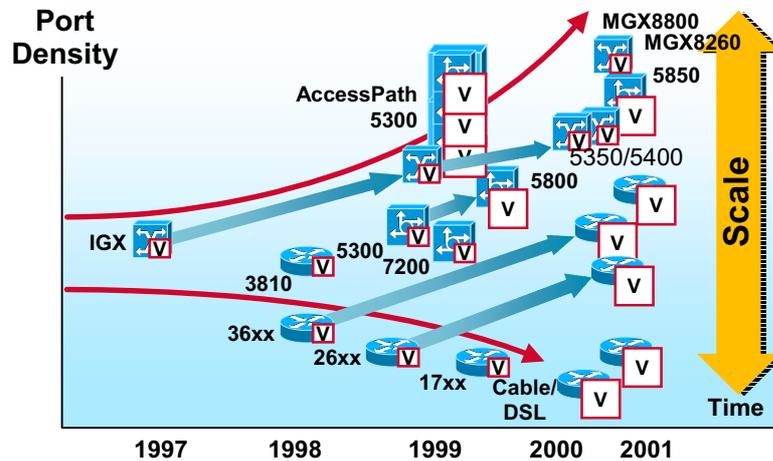
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# Packet Telephony Gateway Breadth



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# Cisco AS5300 VoIP Gateway

- **Independent test rated Cisco No. 1 in VoIP Quality**
- **Performance**
  - 150-MHz R4700 RISC CPU
  - High-performance, low-latency architecture
- **Carrier class**
  - Voice quality
  - AccessPath/DASA
  - NEBS
  - SS7
- **Connectivity**
  - Four CT1/CE1/PRI
  - One 10-MB and one 10/100-MB Ethernet interface
- **Voice and data on same platform**



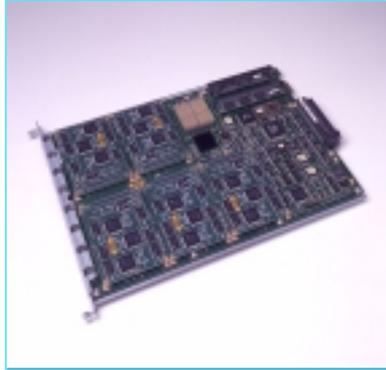
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## AS5300 — High Density Voice/Fax Feature Card

- Voice/Dial DSP
  - H323v2, SIP, MGCP
  - Fax: T.37 / T.38
  - TCL IVR 2a.0
  - PSTN Fallback
  - TDM Switching
  - ISDN, CAS, R2,
  - QSIG
  - Voice SS7
  - MGCP SS7
- Modem Passthrough
  - OSP
  - G.7xx Codecs
  - GSM-FR/EFR
  - V.90, V.xx legacy
  - V.110, V.120
  - Async/Sync PPP,



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## AS5400 Universal Gateway

- Highest density 2RU universal port gateway
  - 384 universal ports—data, voice, fax
  - Any service on any port
- Low power and high availability design
  - Hot-swappable cards
  - Internal redundant power supply
- 16 individual T1/E1s or CT3 ingress
- Compact form factor allows you to add capacity as the network grows
- Cisco SS7/C7 signaling gateway interoperability
- Ideal for co-location and mega-POP network architectures



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## AS5350 Universal Gateway

- Up to 8T1/E1 calls in 1 rack unit (1.75-inches)
- **Hardware Highlights:**
  - 2/4/8 CT1/CE1/PRI interfaces
  - Universal DSPs
  - Dual 10/100 autosensing FE ports
  - Dual 8MB serial WAN backhauls (Frame Relay, PPP, and HDLC supported)
  - Hot swappable cards
  - Internal AC power supply or DC power supply with dual inputs
  - SS7/C7 signaling gateway interoperability
- Ideal for Tier 2/3 ISPs, small POPs and enterprises



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## AS5850 Universal Gateway

- **Highest density access gateway on the market**
  - Supports up to 2688 concurrent users
- **Designed to meet the demands of large service providers, PTTs and RBOCs**
  - 14 RU chassis – three AS5850s per rack
  - High availability through redundant components and resilient architecture
  - SS7/C7 interoperability
  - Universal Port ready
  - Manageable through the CLI, SNMP, Universal Gateway Manager or CiscoView



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# Agenda

- VoIP Architecture
- Voice Gateways
- **H.323 Gatekeeper**
- Signalling Controller (SS7)
- Virtual Switch Controller (Call agent/Softswitch/MGC)
- Large Gateways

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## Cisco 2600/3600/7200 Family Gatekeepers

- Gateway Registration and Authorization
- User Registration and Authorization
- Destination Translation and Routing
- 100 calls/second Direct Mode
- Multi-Zone and Directory Configurations for Large Networks
- Open Protocol and Unix/Linux API for third-party application development

**Highest Price/Performance in the Industry**



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# Cisco 3600 Gatekeeper

- Scalable distributed control of endpoints
- Scalable IP/E.164 Address Resolution
- H.323 traffic segregation
- Bandwidth Management
- Zone Management – RAS message
- Proxy for secure enterprise access
- Ability to see active calls
- Carrier Level Redundancy via HSRP
- Gatekeeper failover in less than 5s
- Redundant AC/DC Power Supply



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## H.323 Based Application Development (GKTMP)



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## Application Development Environment on top of Gatekeeper

- Integrated into a wide range of Cisco IOS® platforms (26xx, 36xx, 7200)
- Performs basic gateway/user registration and authorization
- Basic translation and routing
- 100 calls/second direct mode
- Cluster support to 500 calls/second
- Multizone and directory configurations for large networks
- Open Protocol and Unix/Linux API for third-party application development

## Gatekeeper Transaction Message Protocol GKTMP/GKAPI

- GKTMP provides a transaction-oriented application protocol that allows an external application to modify gatekeeper behavior by processing specified RAS messages.
- GKAPI Provides GKTMP encoding/decoding and socket handling library to GK for quick application development
- GKAPI is public and currently runs on Solaris and Linux

# Third Parties Add the Enhanced Services

- **Carrier scale routing engine**
  - Least cost routing
  - Time of day routing
  - Percent allocation
  - 800-number routing
  - Local number portability
  - Carrier sensitive routing
- **Single point of management**
- **Security/authorization**
- **Load balancing during registration**
- **Network-wide DNS-type knowledge**
- **Gatekeeper recovery**
- **Billing**

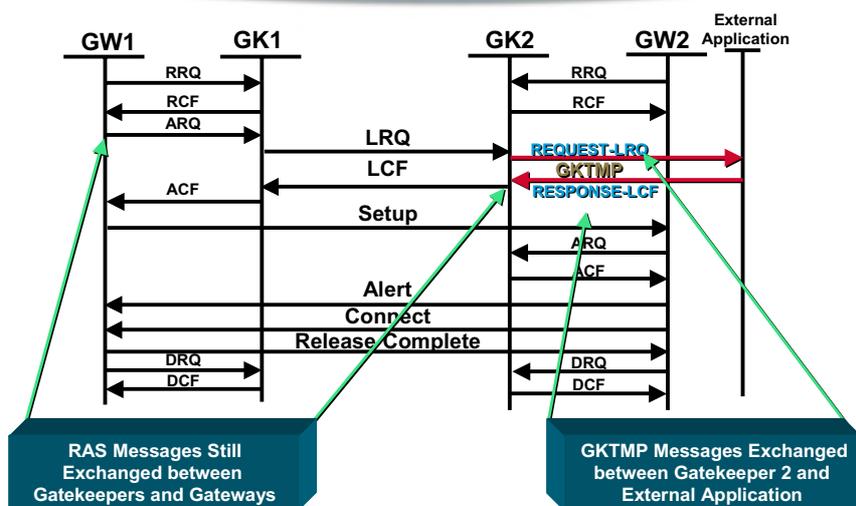
**GKTMP specification is public and open to partners**

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# GKTMP - The principle

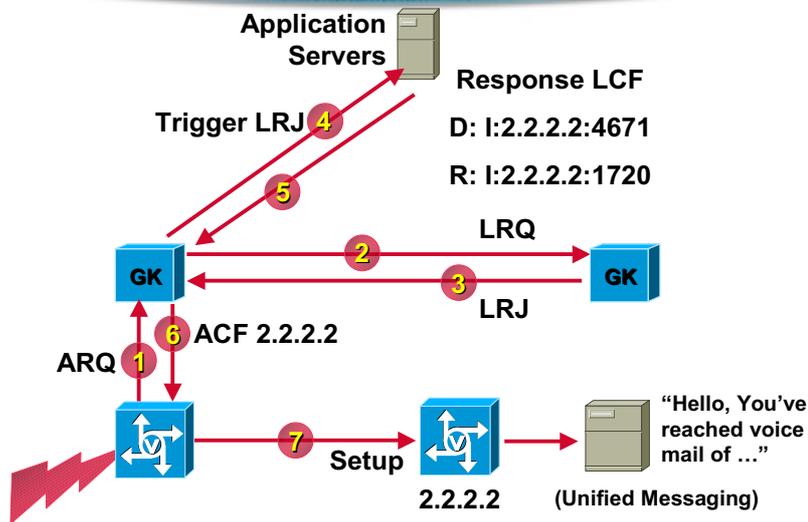


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# GKTMP Application (Call Diversion)

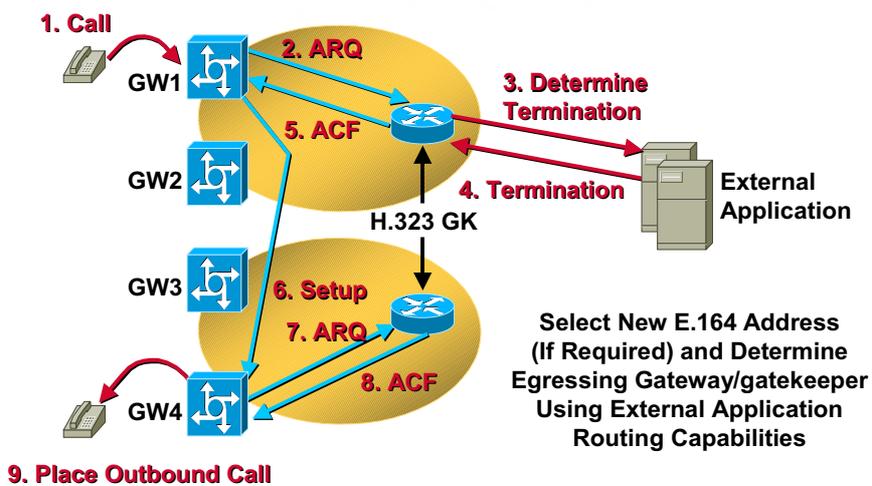


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# Routing Example with H.323



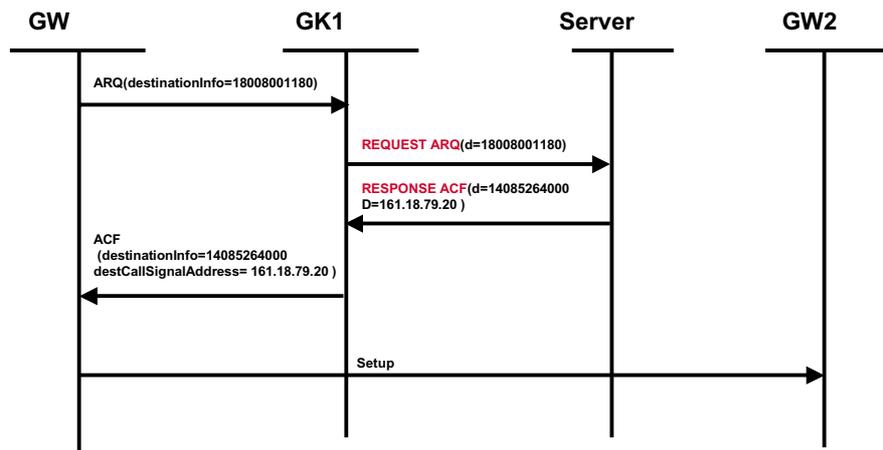
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# Applications (Example) 800 Number resolution

## Example: 800 Number Translation Using GKTMP Server



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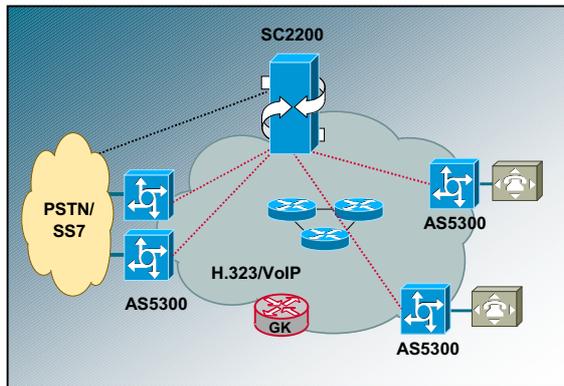
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## SC2200 H.323 VOIP Architecture



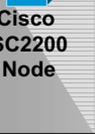
- ⇒ Introduces SS7 to H.323 Voice Architecture
- ⇒ AS5300 used as trunking gateways to PSTN
- ⇒ SLT terminates SS7 signaling, backhauls upper layer protocols to SC2200
- ⇒ Cisco 3600/7200 used as H.323 gatekeeper (optional)

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## Solution Components

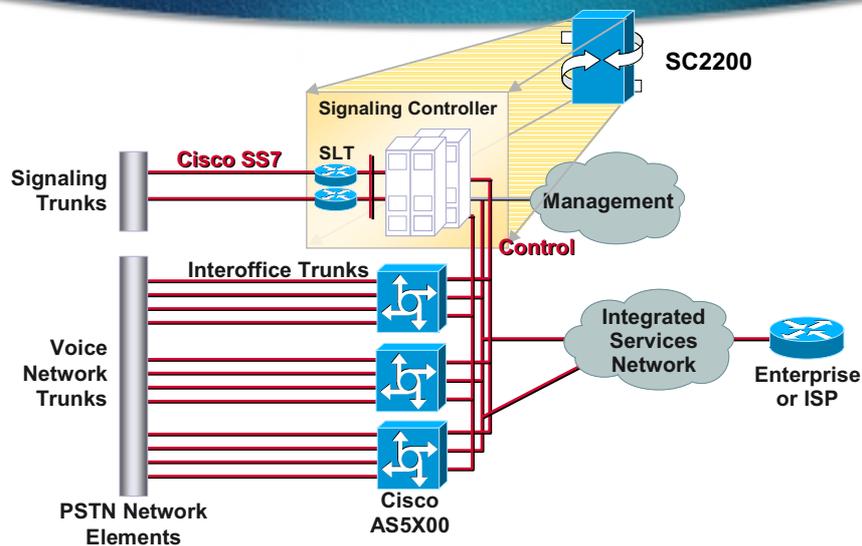
Diagram	Description	Details	Purpose
 Cisco SC2200 Host	<b>Signaling Controller</b> AKA: Cisco SC2200 Host	Based on Sun Netra 1120s, 1400s and 1800s	Supports over 60 Different ISUP Variants into Q.931+ over IP
 Cisco SC2200 Node SLT	<b>Signaling Link Terminal</b> AKA: SLT	Based on 2611 w/ Special Cisco IOS Image for the SLT  Cisco IOS = 12.1(3)T	Supports Terminating A or F Links and Encapsulating MTP 3 Layers and above over IP; Provides Muxing F Links off E1s
 AS5x00	<b>Cisco Voice Gateway</b>	Based on AS5300 w/ 12.1(2a)T2 or Later	H.323 Voice-over-IP Media Gateway Responsible for Voice Packetization, H.323 Signaling

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# Cisco SS7 Architecture

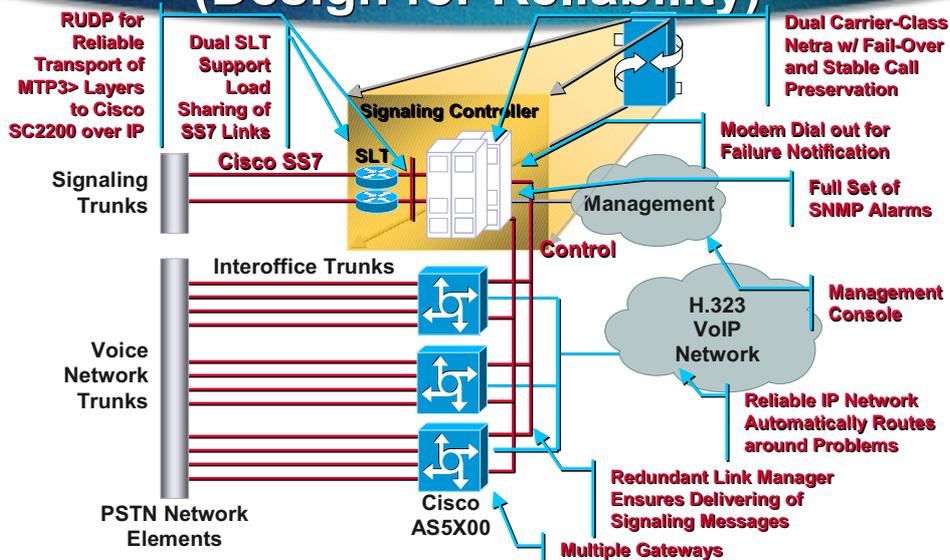


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# Redundant Components (Design for Reliability)

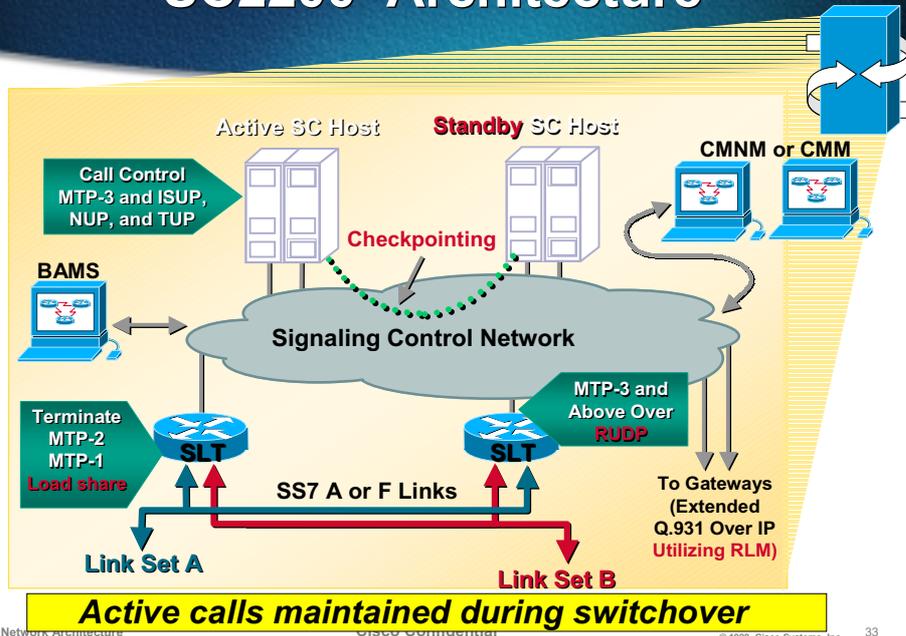


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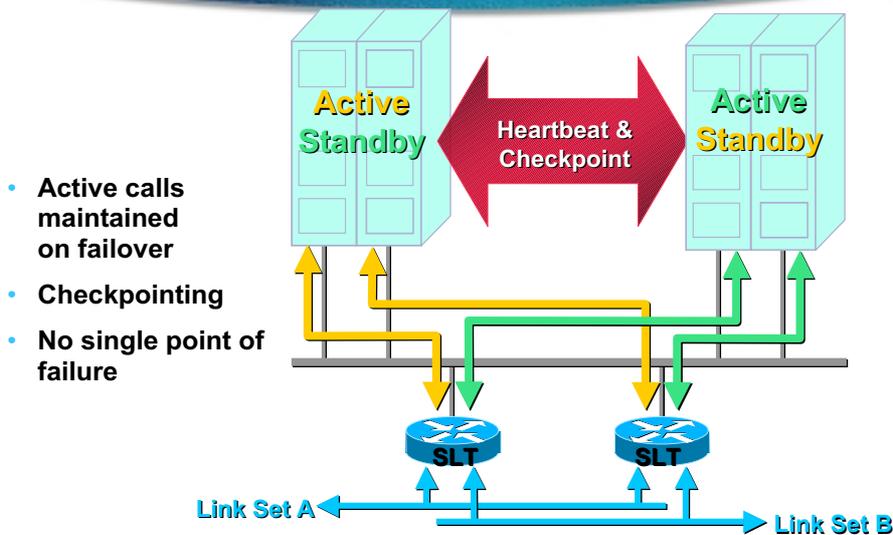
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# SC2200 Architecture



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# Node Redundancy



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## Hardware Platforms

- Telco-certified Sun Netra t servers: t1xx, t1120/1125, t1400/1405, ft1800
- NEBS Level 3 compliant
- Rack mountable
- Solaris 2.6
- DAT and CD drives
- AC or DC power (DC only for ft1800)
- Hardware fault-tolerant option (ft1800) with fully hot-swappable I/O

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## Hardware Configurations

T100 has been added to the H/W Platforms



Sun Netra t 1xx



Sun Netra t 1120/1125  
2 CPU, 2-GB RAM



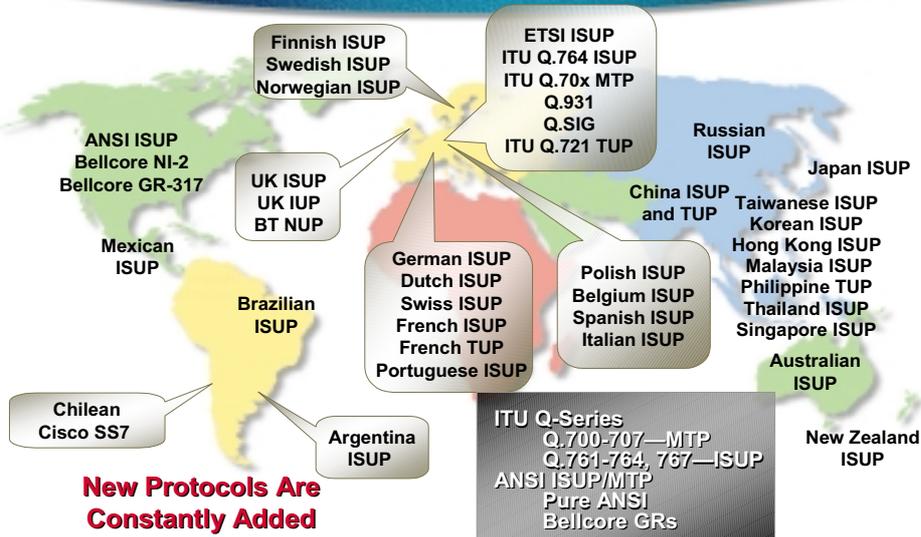
Sun Netra t 1400/1405  
4 CPU, 4-GB Ram

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## Worldwide Signaling Support



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## Proven SS7 Results With SC2200

- **Faster time to market compared to TDM switch**
- **Continuous service design for redundant operation -- no active calls are lost**
- **Worldwide protocol support (60+ variants available)**
- **Carrier class -- NEBs compliant, redundant & reliable components**
- **Fully manageable -- SNMP, CLI, CDRs, GUIs, COT**
- **Single SC2200 can appear as multiple point codes**
- **Supports Dial and H323 applications**

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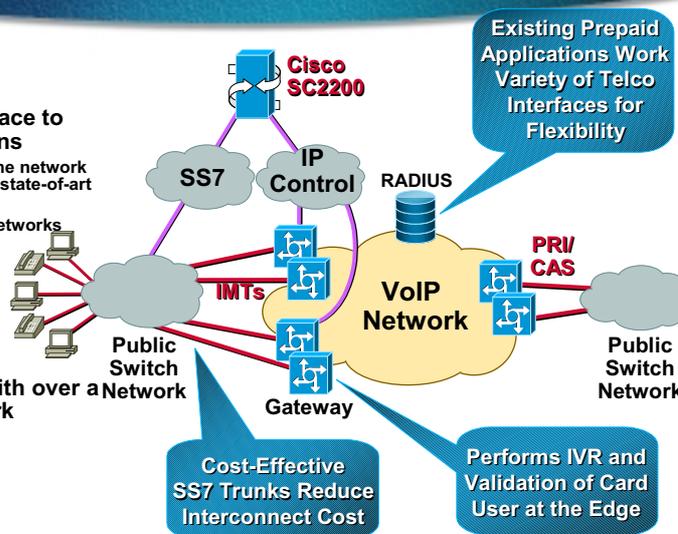
# Proven SS7 Results with Cisco



- Third generation of Cisco SS7 development
- Deployed since 1997 in 32 countries, 200+ nodes
- Continuous service design for redundant operation—no lost calls
- Worldwide protocols
- Fully manageable—SNMP, CLI, and CDRs and GUIs

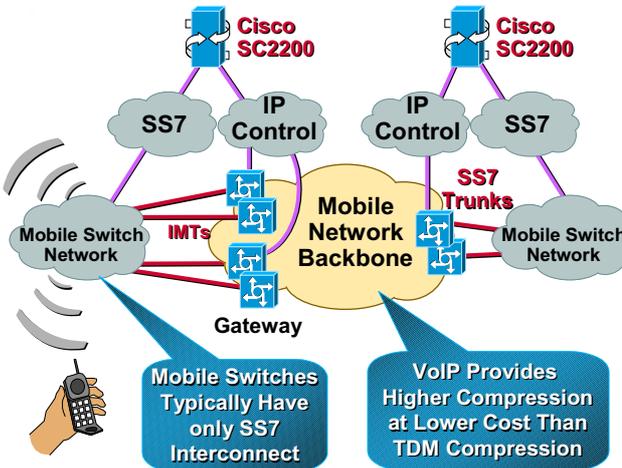
# Prepaid

- Provide SS7 interface to prepaid applications
  - IVR at the edge of the network providing low-cost, state-of-art solution
  - Works with H.323 networks
- Can enter new markets with lower interconnect cost over PRI
- Proven solution with over a year of live network deployments



# Inter-MSC Trunking

- Interconnect to MSC that typically have only SS7-controlled ports
- VoIP provides carriers higher compression at a lower cost than TDM equipment
- ISUP transparency on key information elements needed by the MSC; (called and calling number are fully mapped end-to-end)



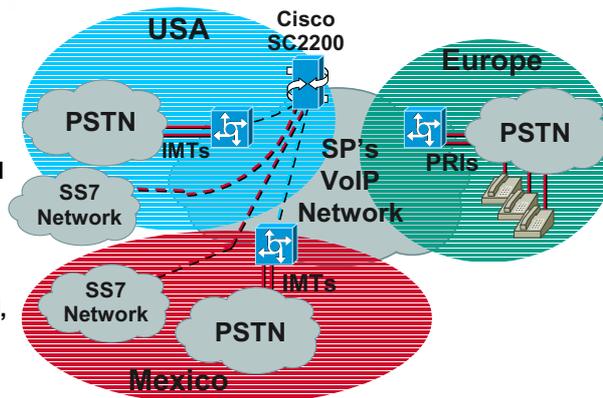
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# International Wholesale

- Interconnect at either national or international level
- Support for over 70 ISUP variants
- Full interworking of PRI, CAS, R2, and SS7 trunk groups



SLT— Signaling Link Terminal  
 - - - SS7 Signaling Paths  
 - . - . Q.931+ Signaling Paths

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# Agenda

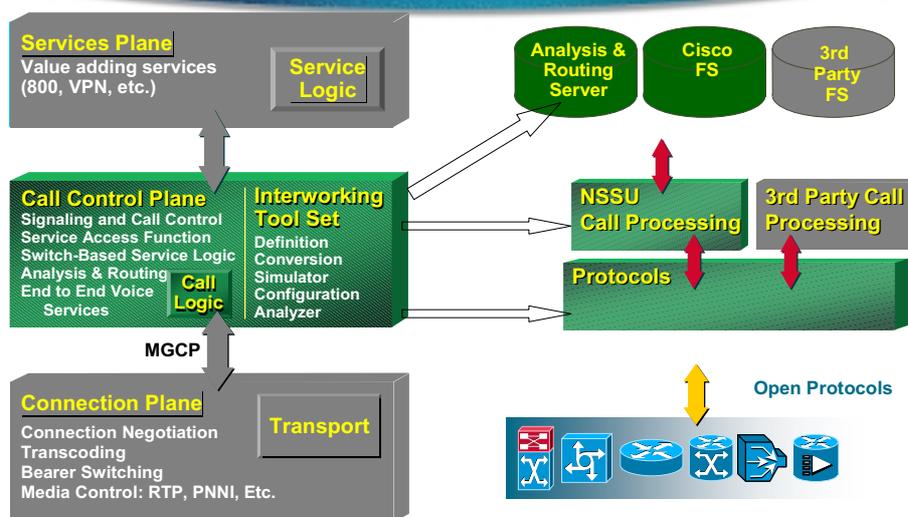
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# Open Softswitch Architecture



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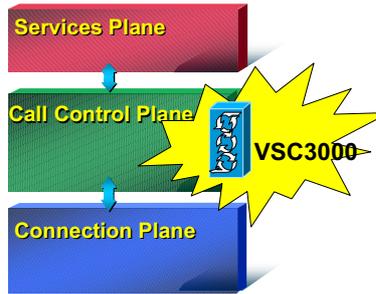
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# VSC3000 Softswitch

- Key element in Cisco's Open Packet Telephony Architecture
- VSC3000 functionality
  - Intelligent call routing
  - Services access
  - Signaling mediation
  - Flexible gateway control via MGCP
  - Accounting
  - Centralized management

## Cisco Open Packet Telephony Architecture

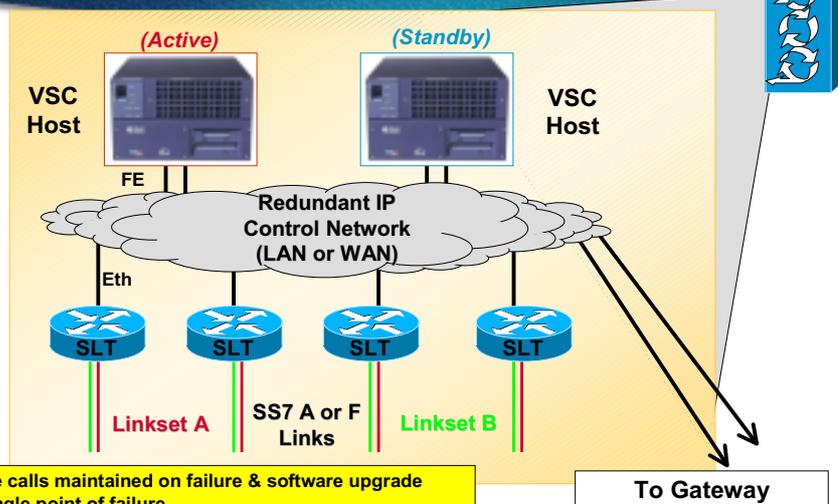


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# VSC Node Architecture



- Active calls maintained on failure & software upgrade
- No single point of failure
- Heartbeats between all node components
- 99.999% availability has been mathematically modeled
- Separate IP control networks for signaling & management

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## VSC3000 Call Routing Features

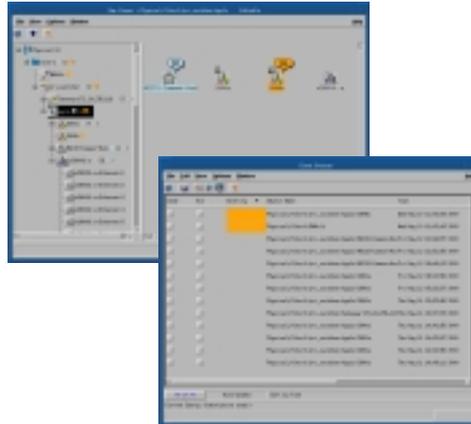
- **Intelligent Network Database Access (US specific)**
  - AIN 0.1/INAP CS-1 subsets
  - Toll Free, LNP & Number Translation Services
- **National & International Dialing Plan Support**
  - North America (0+, 0-, 101XXX, 011+, 411, etc.)
  - E.164 (Fixed and Variable Length)
- **Digit Manipulation**
  - A-number, B-number, Nature of Address
  - Insert/Deletion
- **Screening**
  - A-number, B-number
  - White-list, Black-list
- **Routing**
  - Least Cost
  - Load Sharing
  - %-based
  - Route advance on route busy/congestion
  - Default route to network announcement
- **Circuit Selection**
  - Industry-standard hunting types

## Accounting

- **Configurable Cisco Call Detail Record (CDR) Format**
- **Bellcore AMA Format (BAF)**
- **Near Real-time Generation**
- **FTP transfer from VSC Node**
- **Conversion to other formats using Partners**

# VSC3000 Element Management

- **VSC3000 Element Manager**
  - Integrates management of VSC node network elements (Sun, CAT5500, 2600 SLT)
  - Build using Cisco Element Management Framework (CEMF)
- **CEMF (Acquired from Atlante)**
  - Consistent "look-and-feel" across all network elements (GWs, Routers, etc.)
  - Seamless integration with Gateway EMS
  - Corba north-bound interfaces
- **Features/Functions**
  - Fault Management
  - Performance Management
  - Extensive System Diagnostic Tools
  - Integrated VSC/Gateway Provisioning

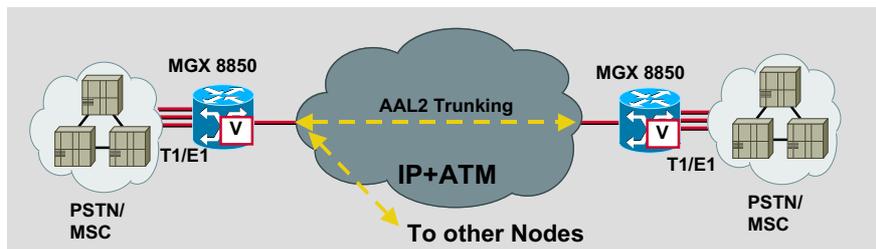


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# Integrated Transport Solution (AAL2 Trunking)



## Advantages

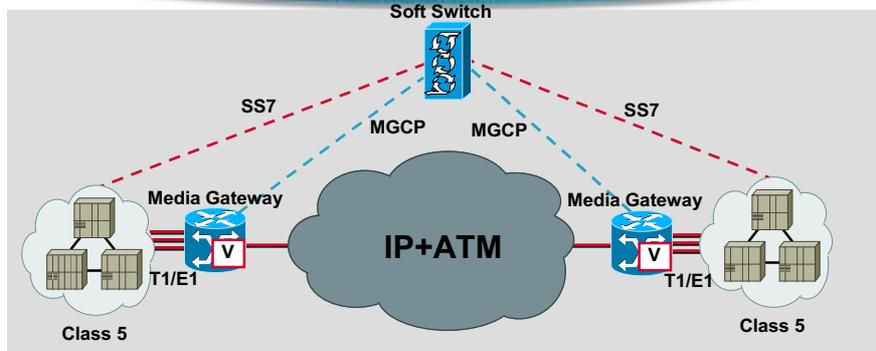
- Single network for Voice and Data. Cap investment in TDM
- Full sub-cell multiplexing, compression (G.726, G.729a) and VAD
- 128 msec Echo Cancellation
- Ease of provisioning (one VC for 248 DS0s)

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# VoIP Transit



- Application: Offload of transit voice traffic from TDM to Packet Network
- Call Agents: VSC 3000, Partner Call Agent

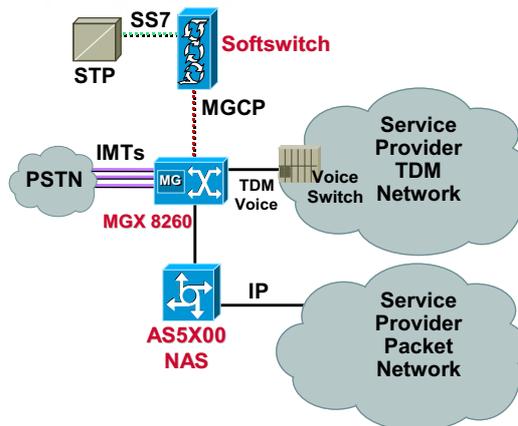
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# SS7- PRI Gateway Solution

- Reassigns TDM switch to its original purpose, removing "poor fit" data application
  - Removes long hold time data calls from TDM network
- Efficiently separates the voice and dial traffic from IMTs
- Works with Cisco or 3rd party NASs
- Both voice & dial controlled through open media gateway control protocol
- Optimizes total cost of POP



**Now available: E1 & Multi-chassis support**

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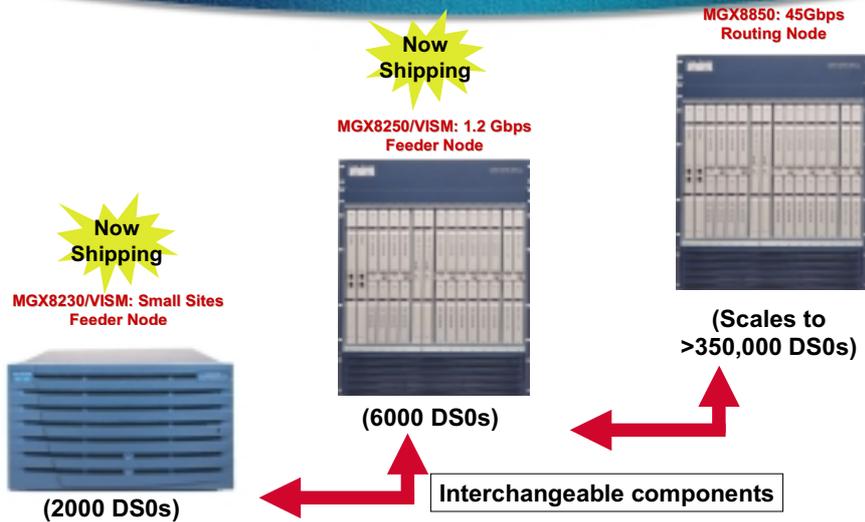
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- **VoIP Architecture**
- **Voice Gateways**
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- **Large Gateways**



# Product Update MGX 88xx/VISM

## MGX 8800 Product Portfolio



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## MGX 8850 VoIP Features

VoIP (RTP, RTCP)

Compressed RTP (CRTP) using RPM

Codecs

G.711 PCM (A-law, Mu-law)

G.726-32K ADPCM

G.729a-8K CS-ACELP

64 Kbps Clear Channel

Configurable Packetization Interval

Interfaces (TDM)

T1 interfaces

E1 interfaces

T3 interfaces (via SRM)

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## MGX 8850 VoIP Features – Cont.

- **Interfaces (Packet)**
  - 100 Base-T (RPM)**
  - ATM - T3/E3, OC3/STM1, OC12/STM4**
- **Carrier-Class VoIP Features**
  - QoS (IP Precedence Bit Setting)**
  - MPLS (using RPM)**
  - Separate routes for bearer/control**
- **Signaling**
  - SS7 (via Call Agent)**
  - PRI backhaul (Corsair RUDP)**
  - CAS MGCP**

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## MGX 8850 VoIP Features – Cont.

### DSP Features

- Echo Cancellation (128 msec)**
- DTMF/MF Detection**
- DTMF Relay**
- Continuity Test (COT)**
- Fax/Modem Detect & Upspeed**
- VAD & CNG**

### Performance

- Lowest end-to-end latency (<30 ms with G.711-10ms)**
- VoIP: 250 Calls/Sec (MGX 8800)**

### Density

- 6000 DS0 (MGX 8800)**
- 2000 DS0 (MGX 8230)**

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# Product Update

## MGX 8260

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## MGX 8260: Carrier-class Media Gateway

- **Highest density TDM and VoIP switching**
  - Over 72,000 TDM DS0s in a 7' rack
  - Over 16,000 VoIP DS0s in a 7' rack
- **Open standard interfaces**
  - Industry-standard call control: MGCP
  - SS7/PRI/IP support
- **High availability gateway**
  - No single point of failure—calls in progress maintained
  - Redundancy across all hardware, including software



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## MGX 8260 VoIP Features

### VoIP (RTP, RTCP)

#### Codecs

- G.711 PCM (A-law, Mu-law)
- G.726-32K ADPCM
- G.729a-8K CS-ACELP
- 64 Kbps Clear Channel
- Configurable Packetization Interval

#### Interfaces (TDM)

- T1 interfaces
- E1 interfaces
- T3 interfaces

## MGX 8260 VoIP Features – Cont.

### ➤ Interfaces (Packet)

- 100 Base-T

### ➤ Carrier-Class VoIP Features

- No loss of active calls on switchover

### ➤ Signaling

- SS7 (via Call Agent)
- PRI backhaul (Corsair RUDP)

## MGX 8260 VoIP Features – Cont.

### DSP Features

Echo Cancellation (128 msec)

DTMF/MF Detection

DTMF Relay

Continuity Test (COT)

Fax/Modem Detect & Upspeed

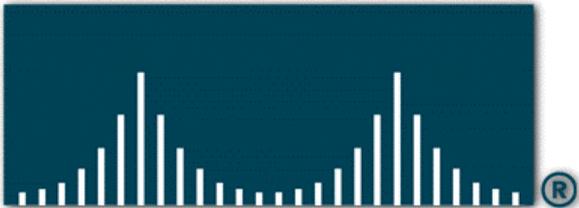
VAD & CNG

Questions ??

**THANK  
YOU!**

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