



Cisco IP Interoperability and Collaboration System (Cisco IPICS) Overview

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Agenda

- **Interoperability Overview**
- **Solution Overview**
- **Example Deployments**
- **Demo**

Lack of True Communications Interoperability Has Already Taken Its Toll

- **Billions of dollars**
Productivity, effectiveness, efficiency
- **Quality of life**
Security, health, environment
- **Thousands of lives**
From dozens of tragic incidents



Problem: How to Deliver “Right Information, Right Time, Right Format to the Right Person”



Operational Silos
No Interoperability
No Collaboration
Expensive: Radio Only
Proprietary Networks

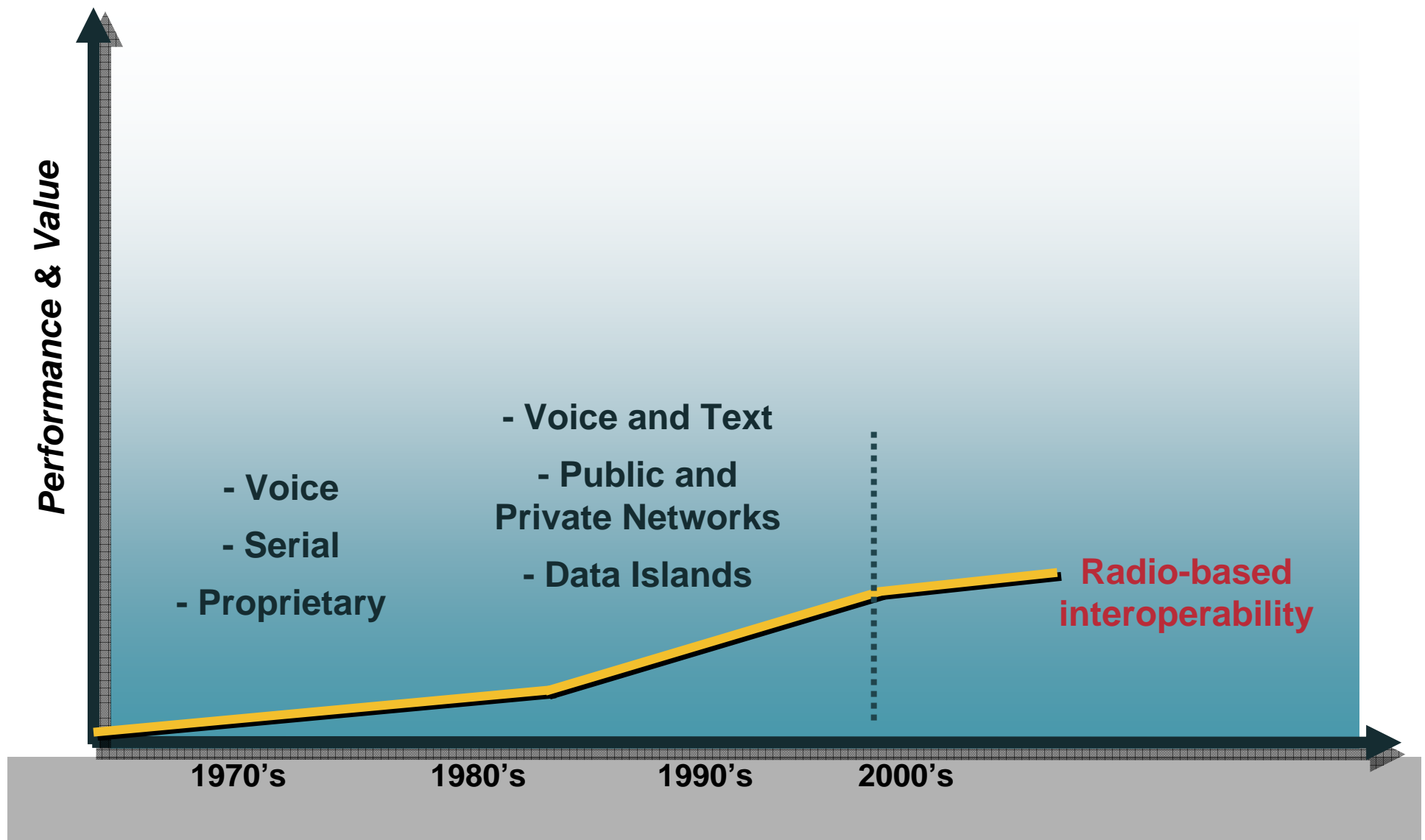


Example: Public Safety

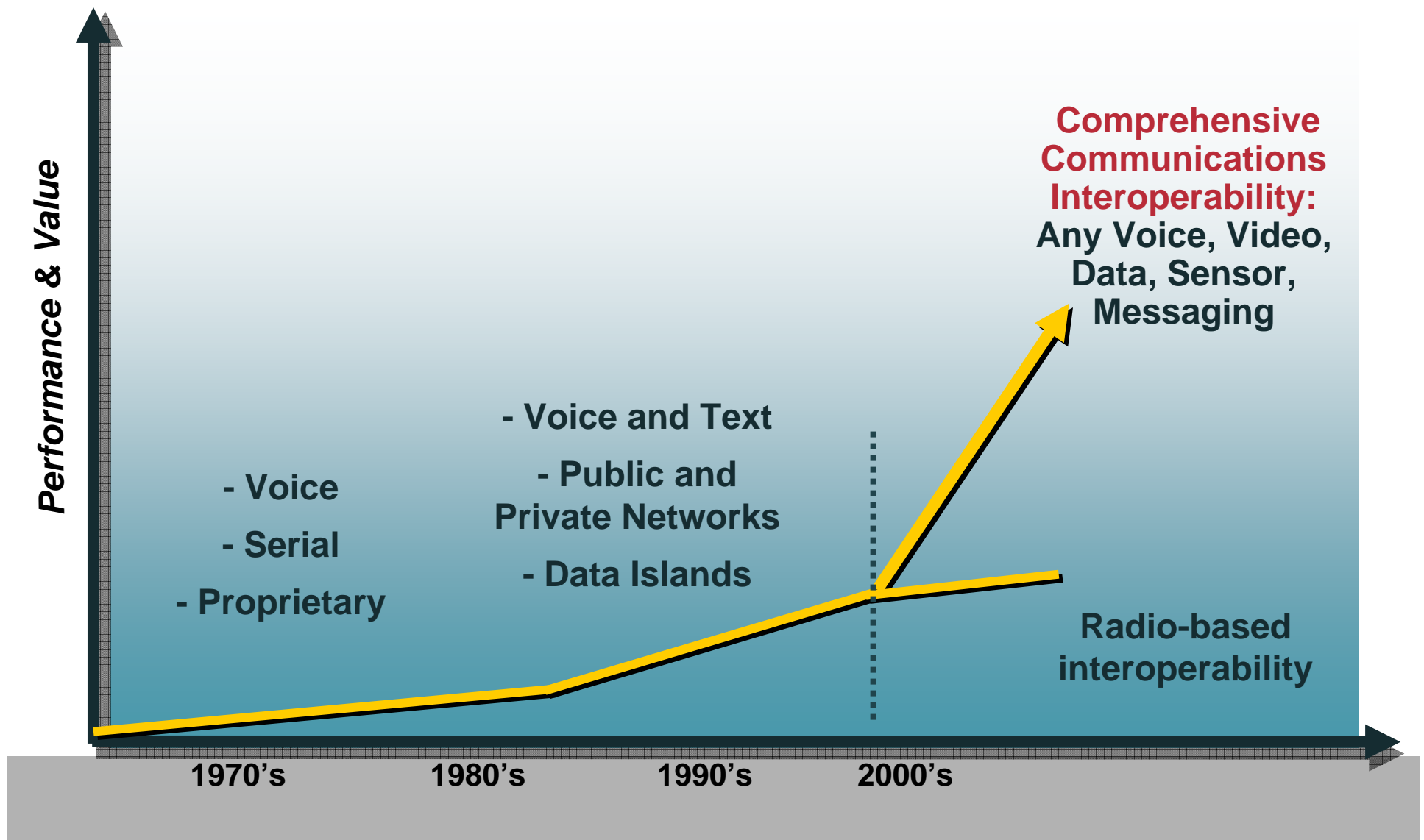
A Broad-Based Problem in Many Verticals



Interoperability Today is Restricted to Proprietary Radio Solutions



There is a Better Way Now



Traditional Radio Vendors Are Aiming Too Low

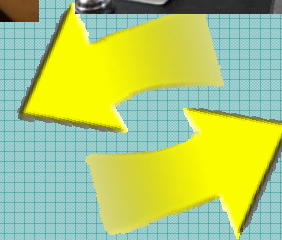
- **Proprietary**
- **Radio only**
- **Point Bridging products don't scale to the true challenge**
- **\$30-40B estimated system replacement cost across state, local, and federal governments**

Source: SAFECOM Interoperability Report



People to People

- **Open Standards**
- **Any to Any**
- **Cost effective investment protection**
- **Set the stage for the strategic evolution in voice, video and data interoperability**
- **Customer driven**



LMR Interoperability - The Problem

“More than 14 months after radio problems contributed to the deaths of New York firefighters in the Sept. 11 terrorist attacks, many of America's 73,000 police, fire and other public-safety agencies still can't talk to each other in major emergencies.”

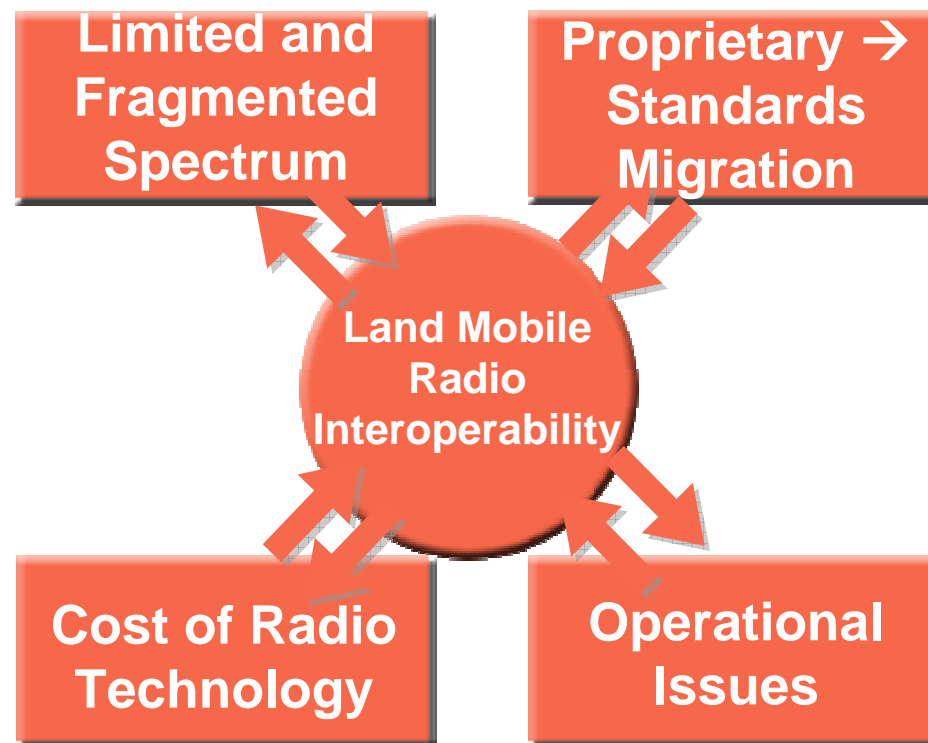
USA TODAY – Page 1

November 20, 2002

Inability to Interconnect disparate LMR systems to coordinate effective response

Land Mobile Radio Interoperability

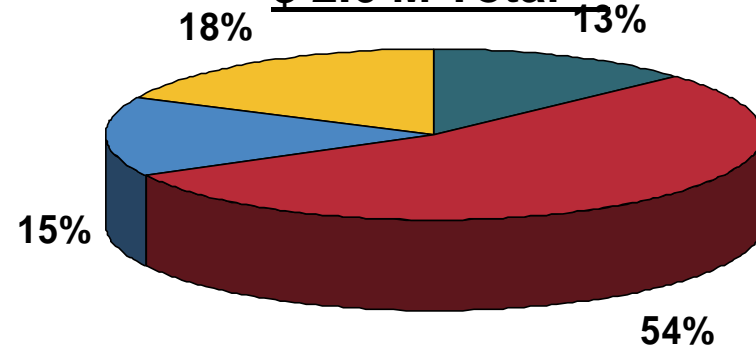
Key Challenges



Cost of Radio Technology

- **\$18* – \$40** Billion for Nationwide LMR System Replacement**
- **Bulk of the Cost is Subscriber Equipment – Local Agencies**
- **Local and state agencies have different acquisition requirements, planning cycles, and technical requirements**
- **68% of Agencies listed Funding as the Primary Barrier to Interoperability**

Est. Total Cost breakdown per Site
\$ 2.6 M Total **



Annual Operations cost 5-10%

■ Network Hardware	■ Subscriber Equipment
■ Towers & Antennas	■ Eng. & Other Services

* Booz Allen Study conducted on behalf of PSWN

** SAFECOM Estimate

Based on Gartner Study on State of North Carolina
Statewide Voice Trunking Network (11/02)



IPICS Solution Overview

Major Elements of IPICS

Voice Interoperability:

- LMR Interoperability
- Push-to-talk everywhere
- Low cost, IP standards-based solution
- Less than 10% -15% of the cost of radio replacement

IPICS Phase I, FCS Dec. 2005

Data Interoperability:

- Rapid information interoperability
- Instant Messaging
- Application sharing via MeetingPlace
- GIS integration

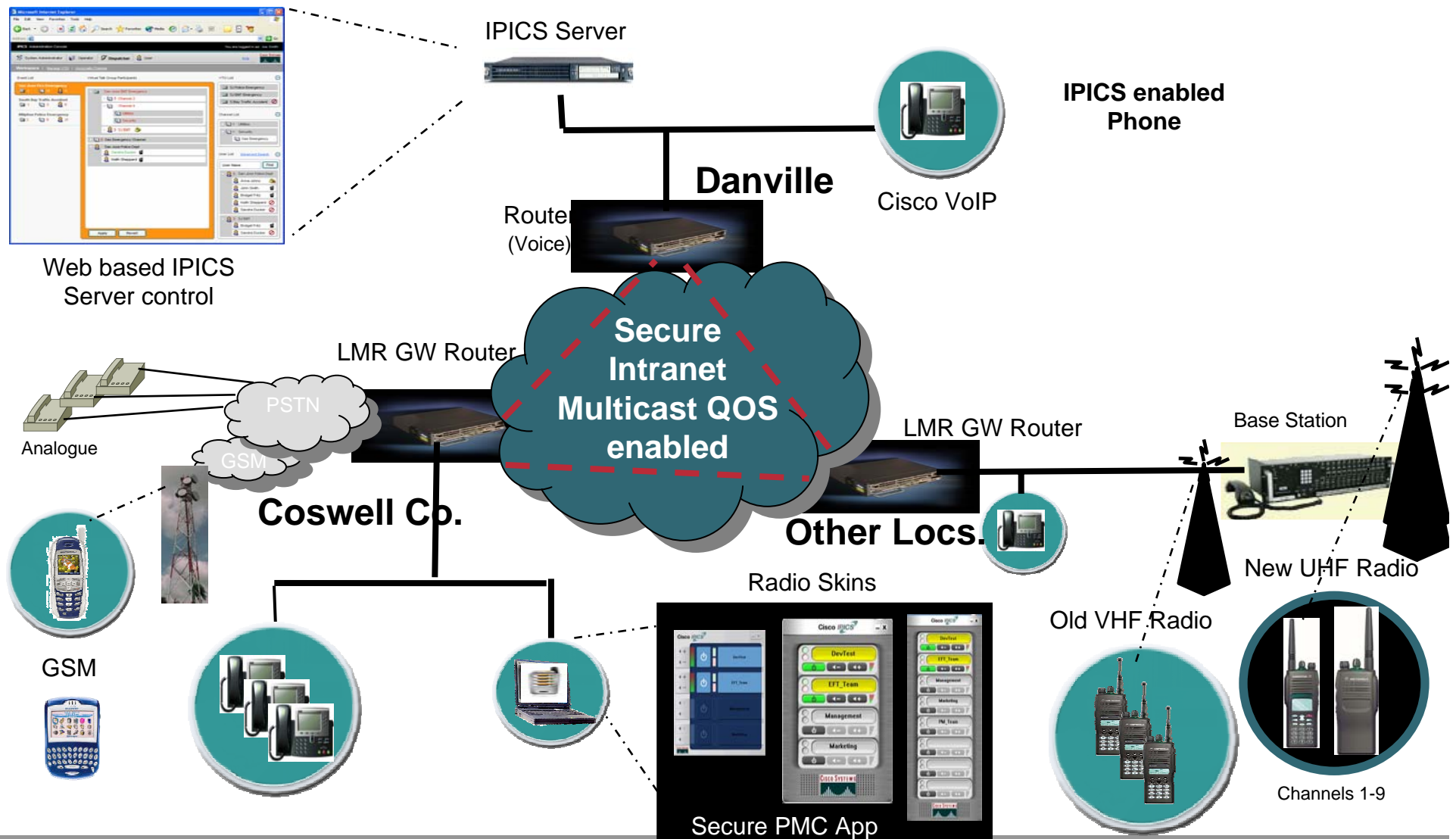
Video Interoperability:

- Video (surveillance) interoperability
- Legacy investment protection

Control Interoperability:

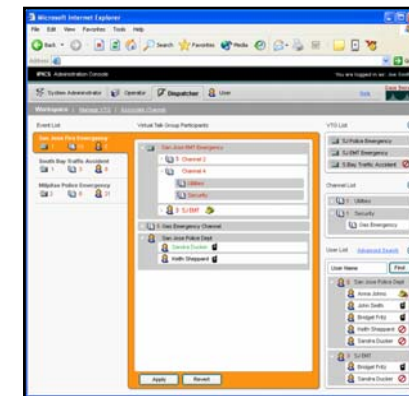
- Sensor integration and telemetry
- Radio network & end point control
- RFID support
- Integration with BMS
- Presence aware networks

High-Level IPICS System Architecture

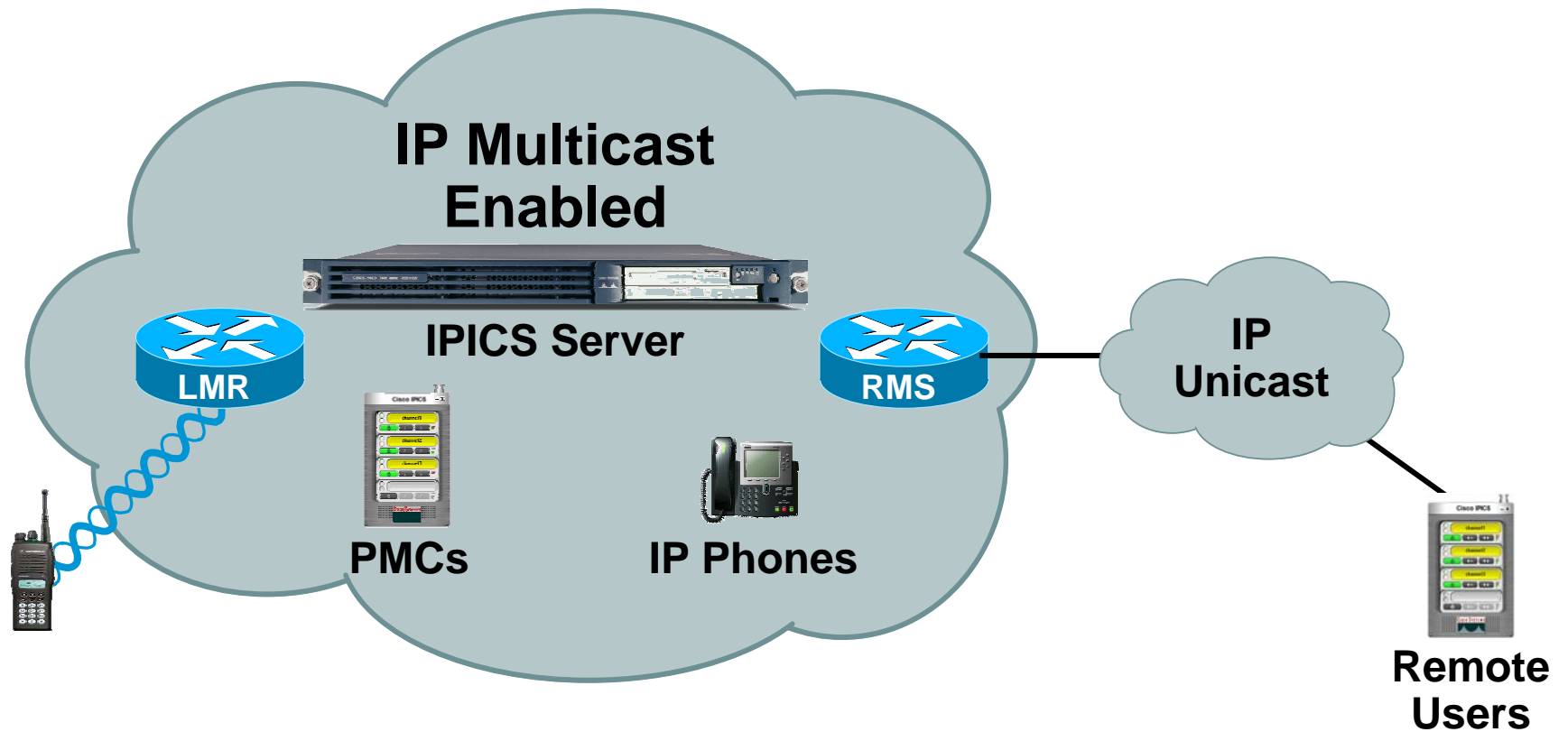


IPICS Components Phase I

- **IPICS Server (Appliance)
MCS Platforms**
- **Media services**
**RMS Router Media Services
(Router DSP Release 1.0)**
- **PMC (Push-to-Talk
Management Center)**
- **IP phone with radio
PTT capability**
- **Customization of PMC
and Incident Management
Console**



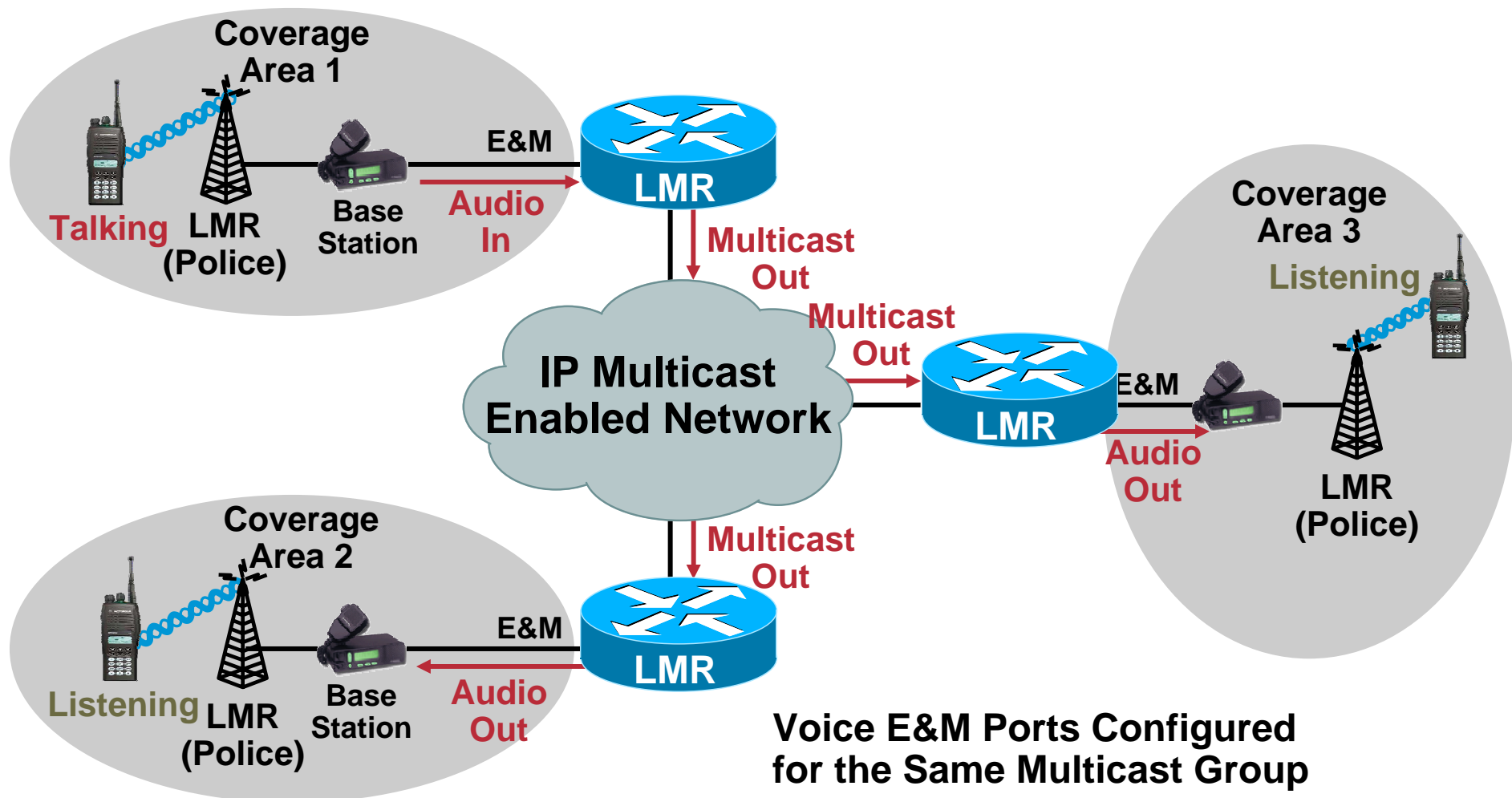
Cisco IPICS Overview



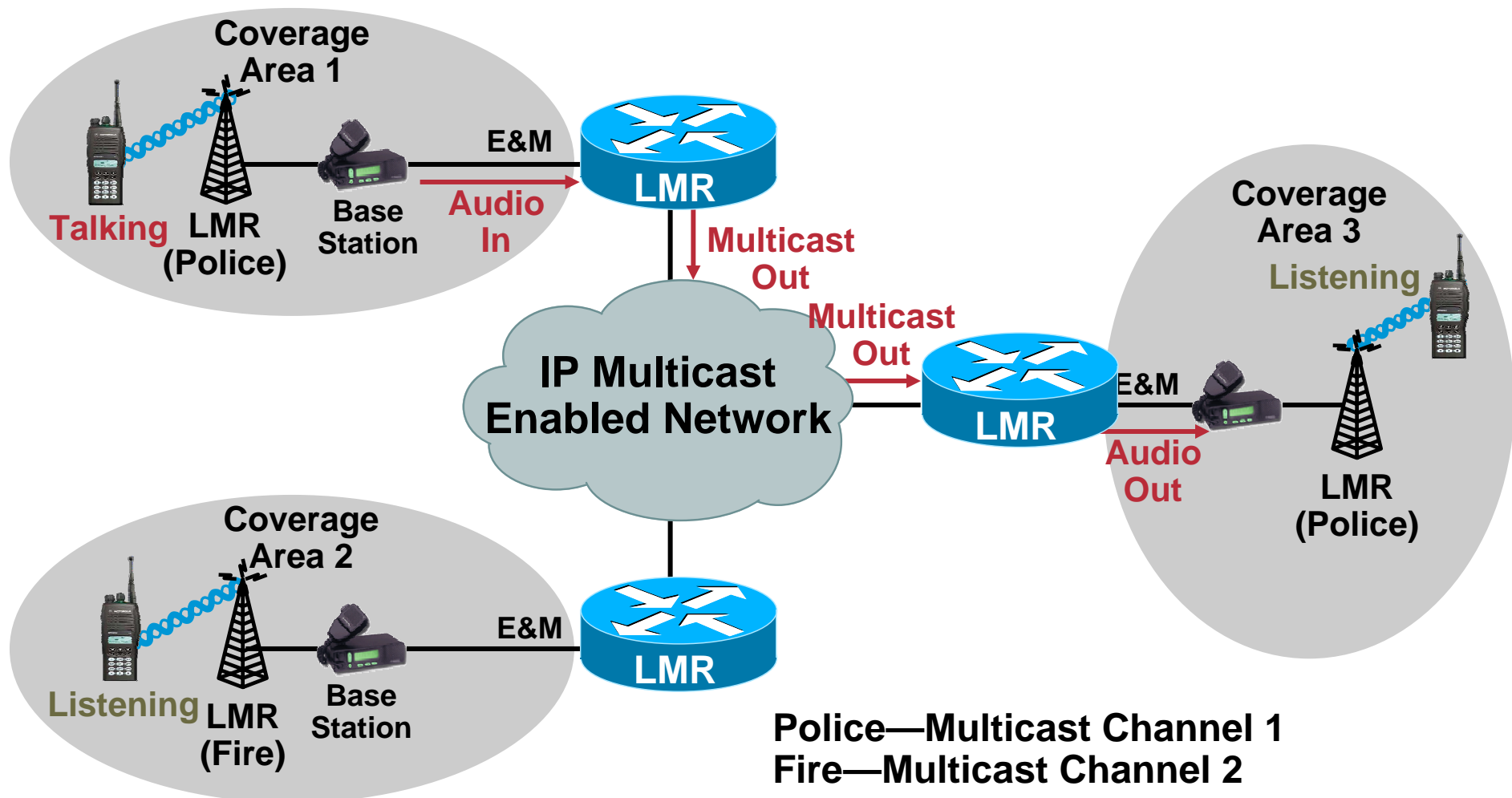
Land Mobile Radio IOS Feature

- **Used to “connect” LMR analog signal to the IP multicast domain**
- **Gateway uses the Cisco IOS® “Hootie” feature (Hoot ‘n’ Holler) and a voice E&M port(s)**

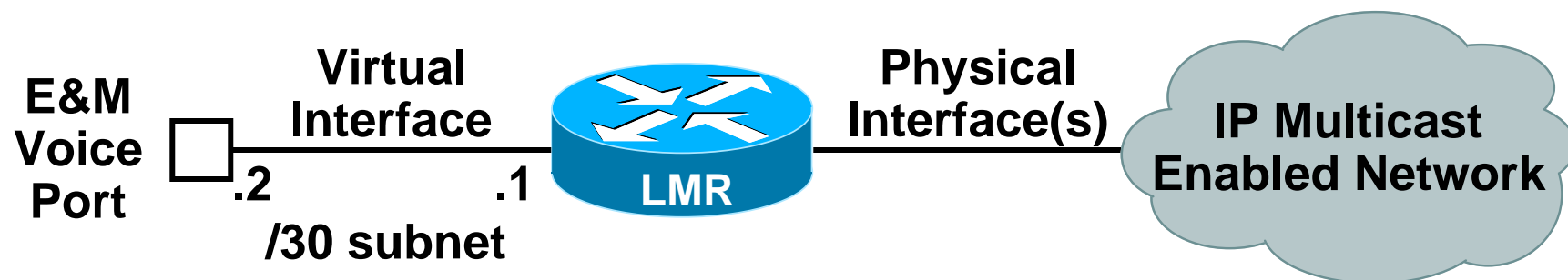
Land Mobile Radio—Single Channel



Land Mobile Radio—Multiple Channels



Land Mobile Radio—Virtual Interface



```
interface Vif1  
  
  ip address 10.1.1.1 255.255.255.252  
  
  ip pim sparse-dense
```

Land Mobile Radio—Virtual Interface

Configured Address + 1	Configured Address
.2	.1
<hr/>	
Vif subnet /30	

```
interface Vif1  
  ip address 10.1.1.1 255.255.255.252  
  ip pim sparse-dense
```

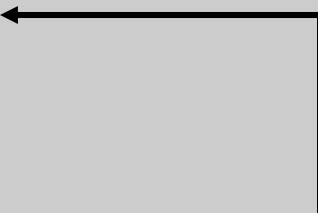
Land Mobile Radio—Virtual Interface

- **Virtual Interface is used to associate an IP address with the voice port(s)**
- **Only one Virtual Interface can be configured**
- **Vif subnet must be routable (reachable by the network)**
- **Configured address + 1 is associated with the voice port(s)**

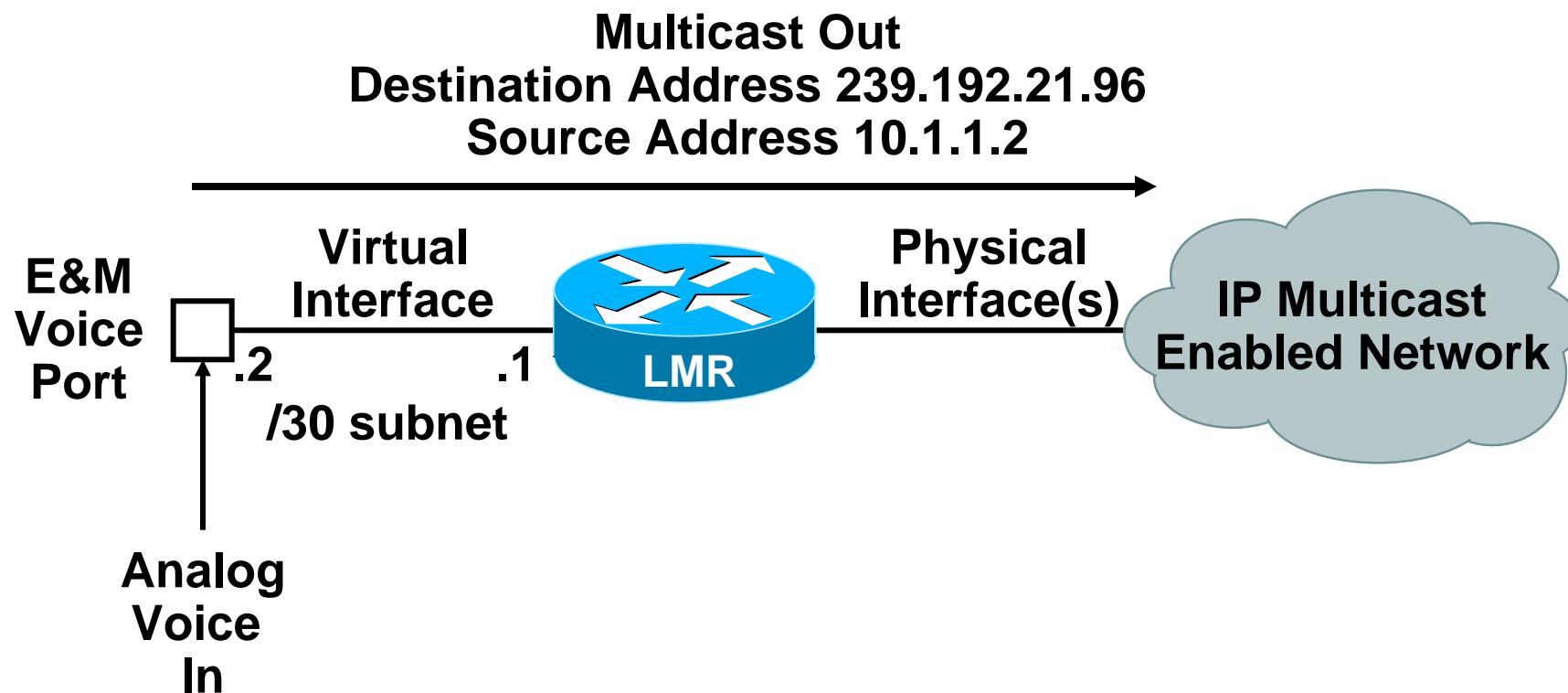
Land Mobile Radio—Dial-Peer

Dial-Peers Are “Hard Wired” to the Multicast Group (Channel)

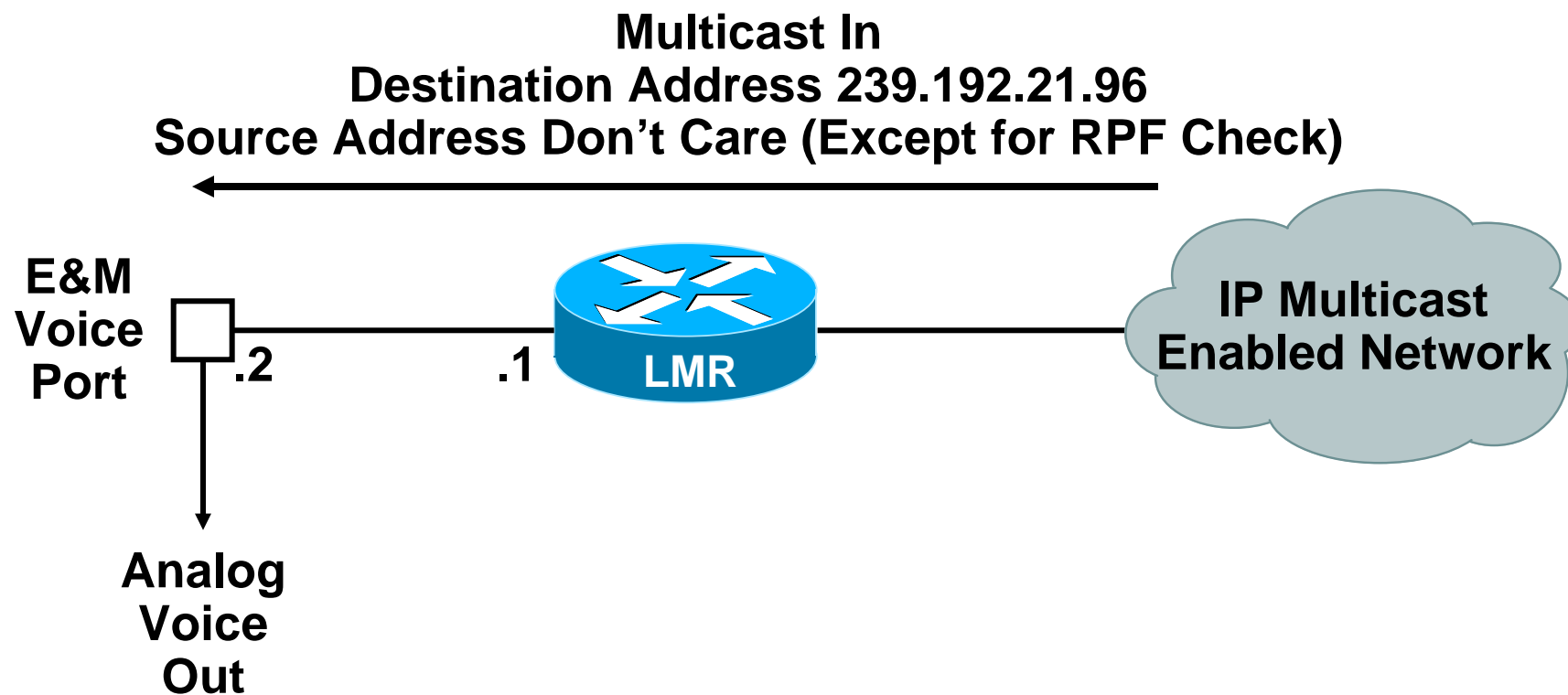
```
voice port 2/0/0
. . .
connection trunk 501 ←
dial-peer voice 1
...
destination-pattern 501 ←
session protocol multicast
session target ipv4:239.192.21.96:21000
```

A diagram consisting of two horizontal arrows pointing to the left. The top arrow originates from the text 'connection trunk 501' and points to the text 'destination-pattern 501'. The bottom arrow originates from the text 'destination-pattern 501' and points to the text 'destination-pattern 501'. The two arrows are connected by a vertical line on the right side, forming a U-shape that highlights the connection between the two lines of configuration.

Land Mobile Radio—Sending



Land Mobile Radio—Receiving



Land Mobile Radio—Configuration

```
voice-port 2/0/0
voice-class permanent 1
auto-cut-through
operation 4-wire
type 2/3/5
signal lmr
lmr m-lead audio-gate-in
lmr e-lead voice
lmr duplex half
lmr led-on
output attenuation 10
no echo-cancel enable
no comfort-noise
timing hookflash-in 0
timing hangover 30
timing hangover 500
timing delay-voice tdm 500
timing ignore m-lead 300
connection trunk 20501
description POLICE
threshold noise -50
```

```
voice class permanent 1
signal timing oos timeout disabled
signal keepalive disabled
signal sequence oos no-action
```

```
dial-peer voice 1 voip
description San Jose Police
destination-pattern 20501
session protocol multicast
session target ipv4:239.192.21.96:21000
codec g711ulaw
ip qos dscp 5 media
vad aggressive
```

IPICS Support Platform

- **IPICS Server**

Cisco MCS7825-PS3/MCS7845-PS3

Linux (Redhat AS3)

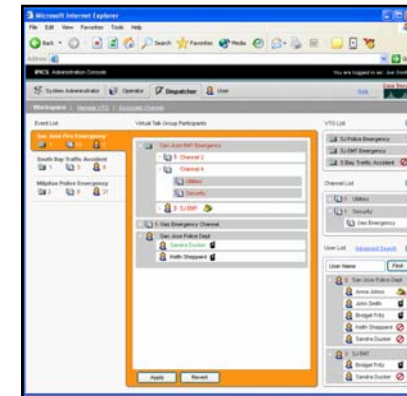
Tomcat Java App Server 5



- **PMC**

W2k 2000 SP4

XP Profession SP2



- **Administrator Console**

IE 6.0.2

- **Router/Gateway**

2811, 3725 and 3845

12.4T



Definition—Channel

- **Multicast RTP stream to/from a predefined/ configured multicast group address
224.0.0.0 -> 239.255.255.255**
- **An LMR channel multicast address is statically configured on the LMR gateway**
- **Cisco IPICS channels are configured on the IPICS server (name and multicast address)**
- **IPICS users (PMC and/or IP phone) are usually associated with one or more channels**

Definition—Virtual Talk Group (VTG)

- A “mixed” or combined channel consisting of two or more “regular” channels
- VTGs are managed (create, delete, modify, enable, disable) from the Cisco IPICS server
- The VTG multicast channel address is dynamically selected from a multicast address pool configured on the server

Definition—Router Media Service (RMS)

A Router with DSP Resources Used To

- **Combine two or more regular channels into a VTG**
- **Bridge unicast (remote) users to a multicast channel**
- **RMS is managed from the IPICS server**

Definition—Remote User

- **A PMC user who is not attached to the Cisco IPICS multicast domain**
- **Remote users use a SIP initiated/controlled unicast call to the RMS**
- **The RMS bridges the unicast call to the multicast channel selected by the user**
- **IP phone users cannot connect via unicast, only multicast**

Roles Within IPICS

- **System administrator**
Many functions
- **Operator**
Creates and assigns roles to users
Associates users with one or more channels
- **Dispatcher**
Manages and monitors Virtual Talk Groups (VTGs)
Manages policies
- **User**
Accesses channels and VTGs via PMC or IP phone

Dispatcher - VTG Workspace Tab

VTG Workspace

https://10.32.101.59/ipics_server/DispatcherTab.do

Cisco IPICS Administration Console - 1.0(1.1)

You are logged in as: ipics Logout Help

System Administrator | Operator | **Dispatcher** | User

VTG Workspace | Manage Policies

Active VTGs

There are currently no active virtual talk groups.

VTG Template Details

VTG Name:* Combined

Drag and drop users and/or channels

Channels Search

- Fire
- Police

Users Search

- Adama, Bill
- Admin, IPICS
- Jackson, Daniel
- Kirk, James
- O'Neill, Jack

VTGs Search

There are currently no virtual talk groups.

Add Save Revert

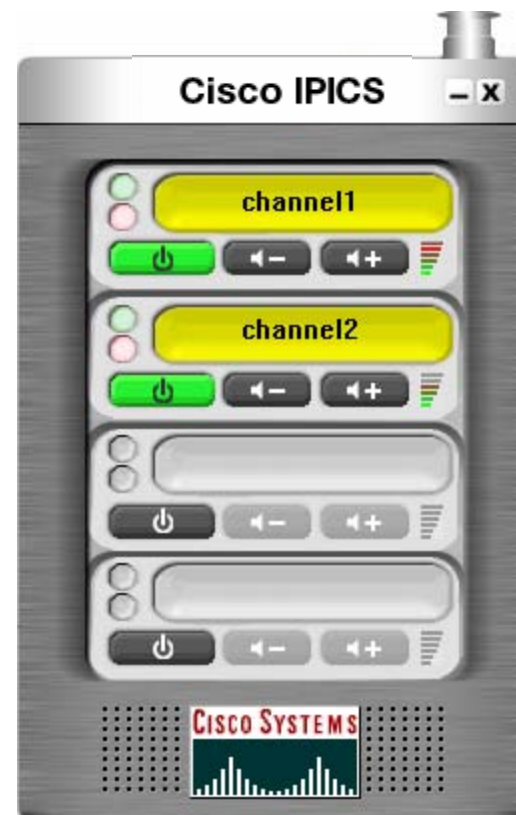
Done 10.32.101.59

System Administrator—System Status Tab

The screenshot displays the 'System Status' tab within the Cisco IPICS Administration Console. The browser address bar shows the URL https://10.32.101.59/ipics_server/MonitorStatus.do. The console header includes the Cisco Systems logo and the text 'Cisco IPICS Administration Console - 1.0(1.1)'. A navigation bar at the top lists various tabs: RMS, Channels, Multicast Pool, Locations, Activity Logs, System Status (selected), License, PMC Auto Update, PMC Installer, Ops Views, Database, and Options. Below the navigation bar, there is a section for 'Auto Update this page every:' with a dropdown set to 'None' and buttons for 'Apply' and 'Refresh Now'. The 'Manage System' section shows the 'System Status' as 'Running' and 'Database % Full' as '0%' (7,878 bytes; max=50MB of Activity Logs). Below this, there is a 'Purge Activity Logs from Database:' section with dropdowns for 'From' (January 1, 2005) and 'To' (February 8, 2006), and buttons for 'Purge' and 'Download Activity Logs'. The 'Recent System Log Entries' section displays a list of log messages, including information about PMCActivityLogUpdateTask and RMSSetModule\$CacheCleanUpRunnable. At the bottom, it shows 'Errors detected=0', 'Lines=693', and a 'Done' button. The status bar at the very bottom indicates the IP address '10.32.101.59'.

PMC Introduction

- **PC-based application**
 - Windows 2000 SP4
 - Windows XP SP2
- **Minimum hardware requirements**
 - 300MHZ Pentium III
 - 256MB RAM
- **User account required on the Cisco IPICS Server**
- **RMS required for remote users**



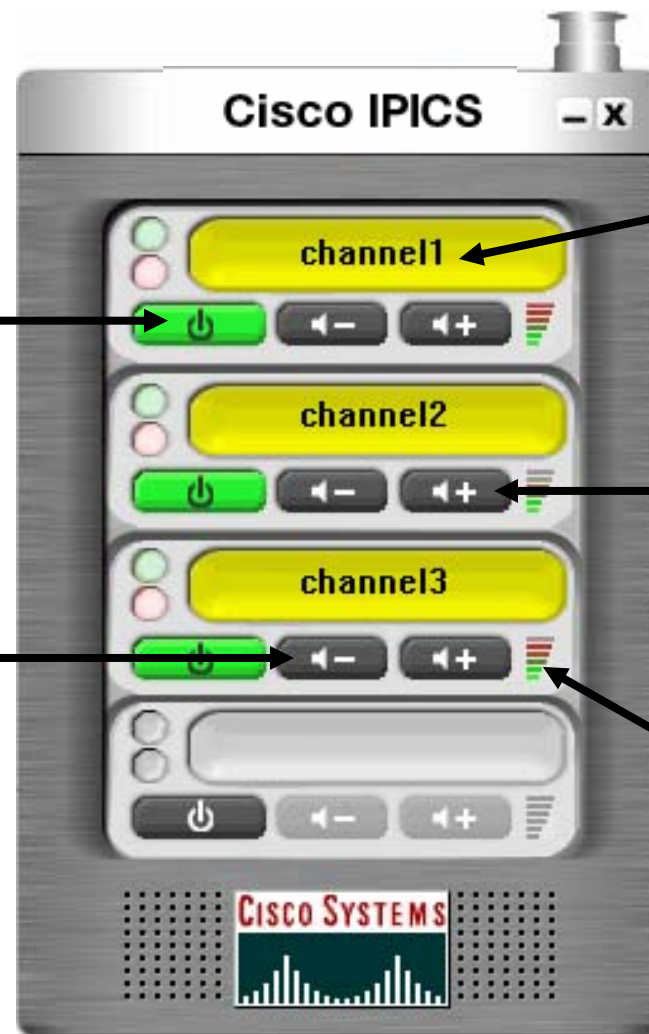
PMC Operation—Controls

Activation

Push This Button to Join or Leave a Channel

Volume Down

Push This Button to Turn down the Volume



PTT

Push This Button to Talk

Volume Up

Push This Button to Turn up the Volume

Volume Level Indicator

Indicates the Volume Level

IP Phones—Services



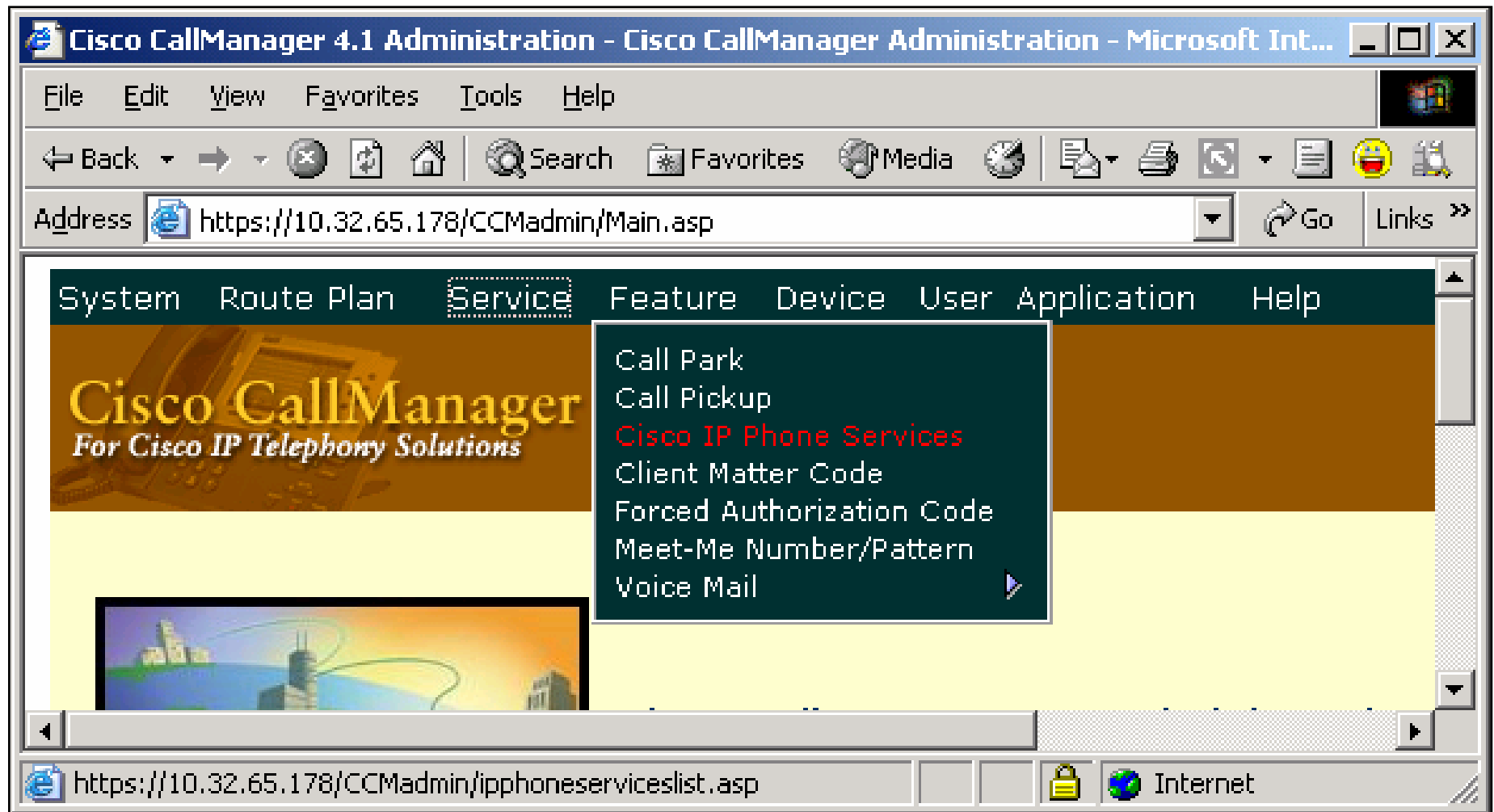
Push-To-Talk Services on Cisco Unified IP Phones Through Cisco IPICS

IP Phones—Cisco CallManager Express

```
tftp-server flash:filename1  
tftp-server flash:filename2
```

```
telephony-service  
load 7960-7940 filename1  
load 7970 filename2  
max-ephones 2  
max-dn 2  
ip source-address 10.1.1.1 port 2000  
url services http://server address/ipics_server/servlet/IPPhoneManager  
create cnf-files version-stamp Jan 01 2002 00:00:00  
max-conferences 8 gain -6ephone-dn 1 dual-line  
number abcd  
!  
ephone-dn 2 dual-line  
number efgh
```

IP Phones—Cisco CallManager



IP Phones—Cisco CallManager

Cisco CallManager 4.1 Administration - Cisco IP Phone Services Configuration - Microsoft Internet Explorer provided by Cisc...

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail News RSS Feeds

Address <https://10.32.65.178/CCMadmin/phoneservicesconfig.asp?iService={4A5F9852-0812-49D2-BA9A-E5FD8D7164EF}> Go Links >>

System Route Plan Service Feature Device User Application Help

Cisco CallManager Administration
For Cisco IP Telephony Solutions

Cisco IP Phone Services Configuration

[Add a New IP Phone Service](#)
[Back to Find/List IP Phone Services](#)
[Dependency Records](#)

IP Phone Service: IPPhone
Status: Ready

Update Delete Update Subscriptions

Service Information

Service Name*	Service Description
IPPhone	

Service URL*

http://rbaswa-lnx:8080/ipics_server/servlet/IPPhoneManager

Service Parameter Information

Parameters

	New
	Edit

Applet RSAsProxyApplet started

Internet



Example Deployments

NY State Emergency Management Office

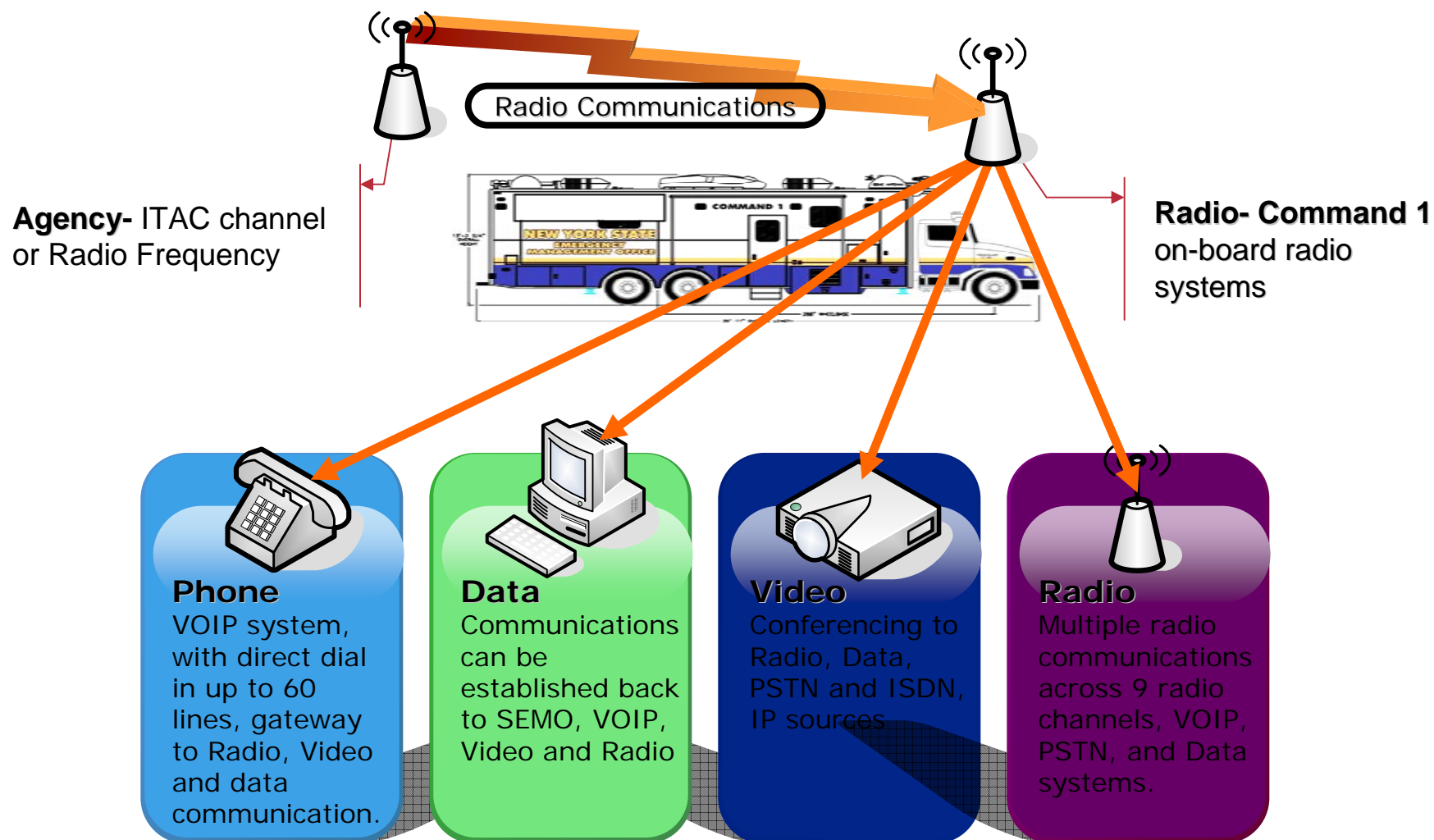


- **Responsible for coordinating all activities necessary to protect New York's communities from natural, technological and manmade disasters and other emergencies that threaten the State.**

IPICS Deployment

- **Currently in deployed within the SEMO Emergency Response Vehicle and Albany Command Bunker.**
- **Emergency Response vehicle interfaces to 16 separate radios for “on-scene” interoperability.**
- **Command Bunker has ip phones interfacing to vehicle and local radios.**

Bridging the Communications Gap



Command 1 and Support Vehicle



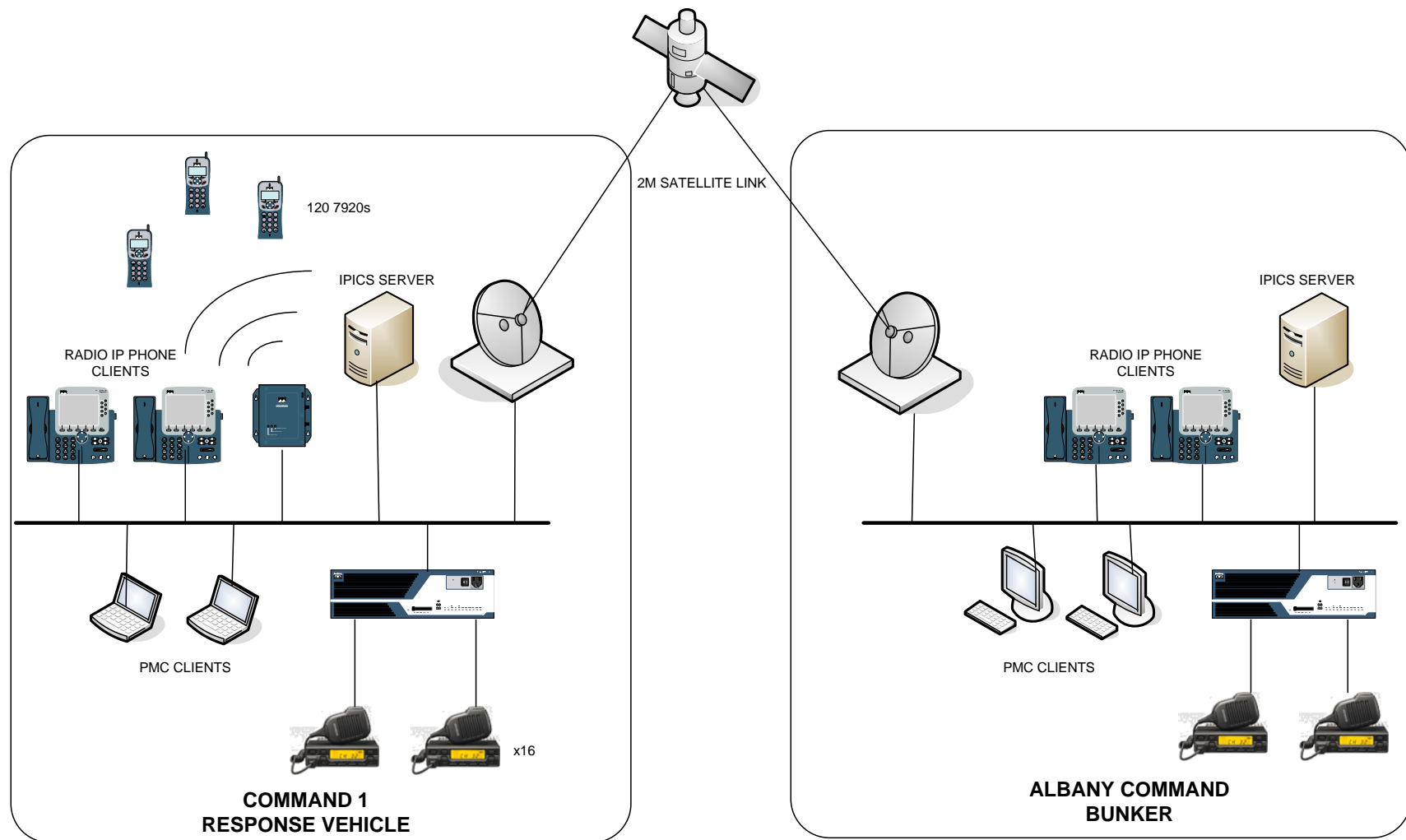
Command 1 Com Room



Command 1 Conference Room



SEMO IPICS (current)

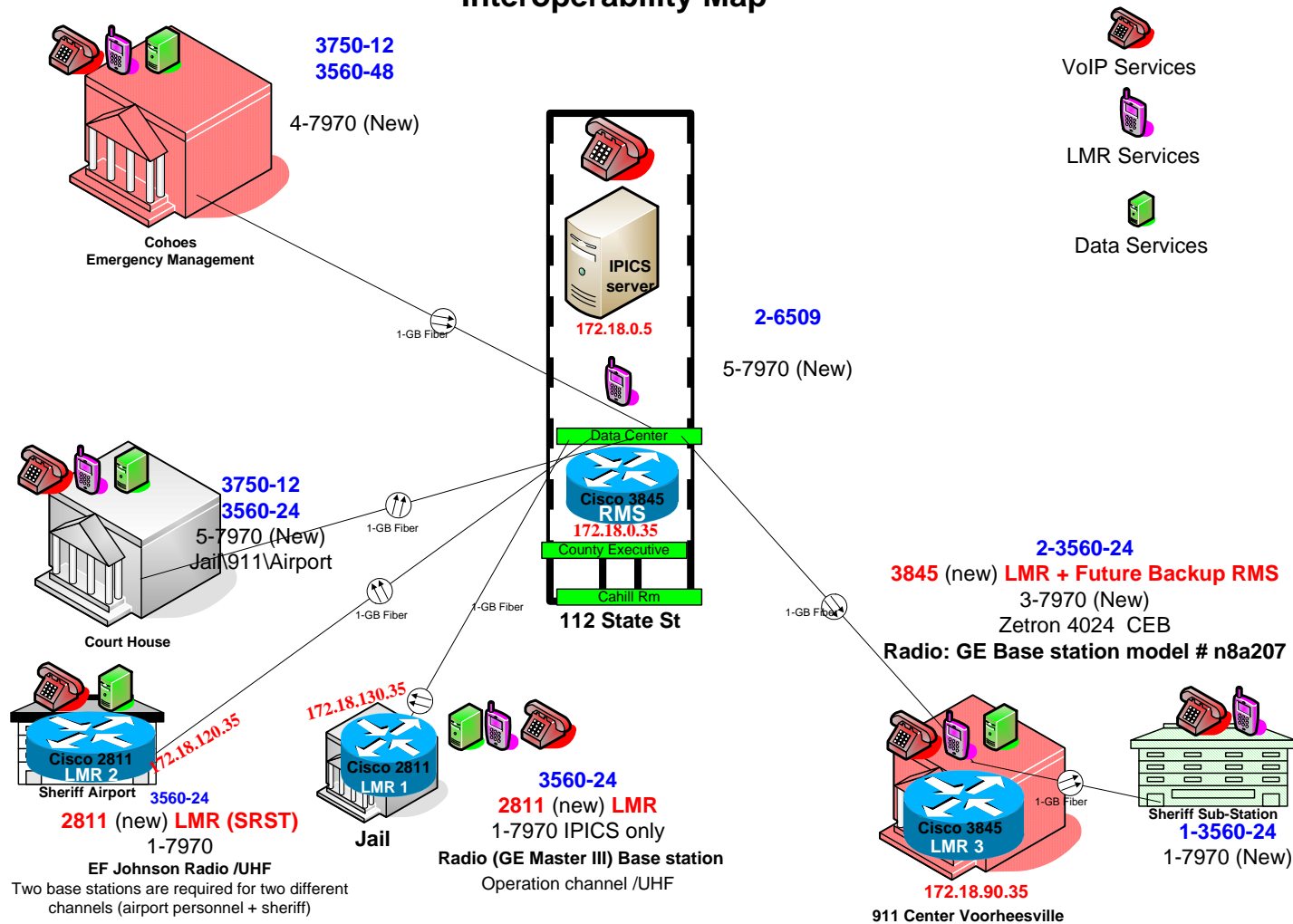


Albany County, NY

- **Currently in production with IPICS at 7 locations including their 911 dispatch center**
- **Providing for radio interoperability, ip phone access, soft client access, and access via VPN**

Albany County, NY

Albany County Public Safety Fiber Network Interoperability Map





Demo

Demo Topology

