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

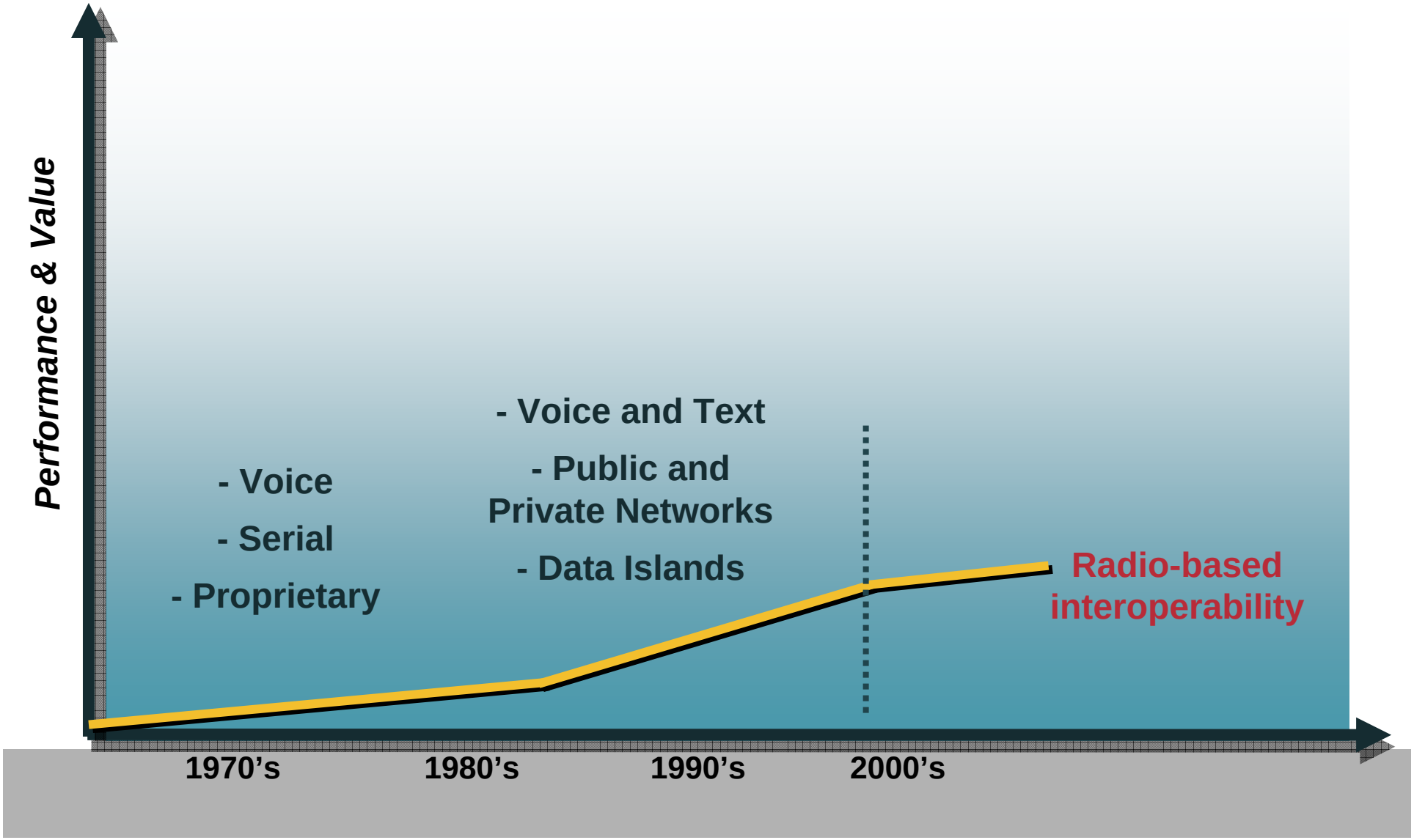
Problem: How to Deliver "Right Information, Right Time, Right Format to the Right Person"

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

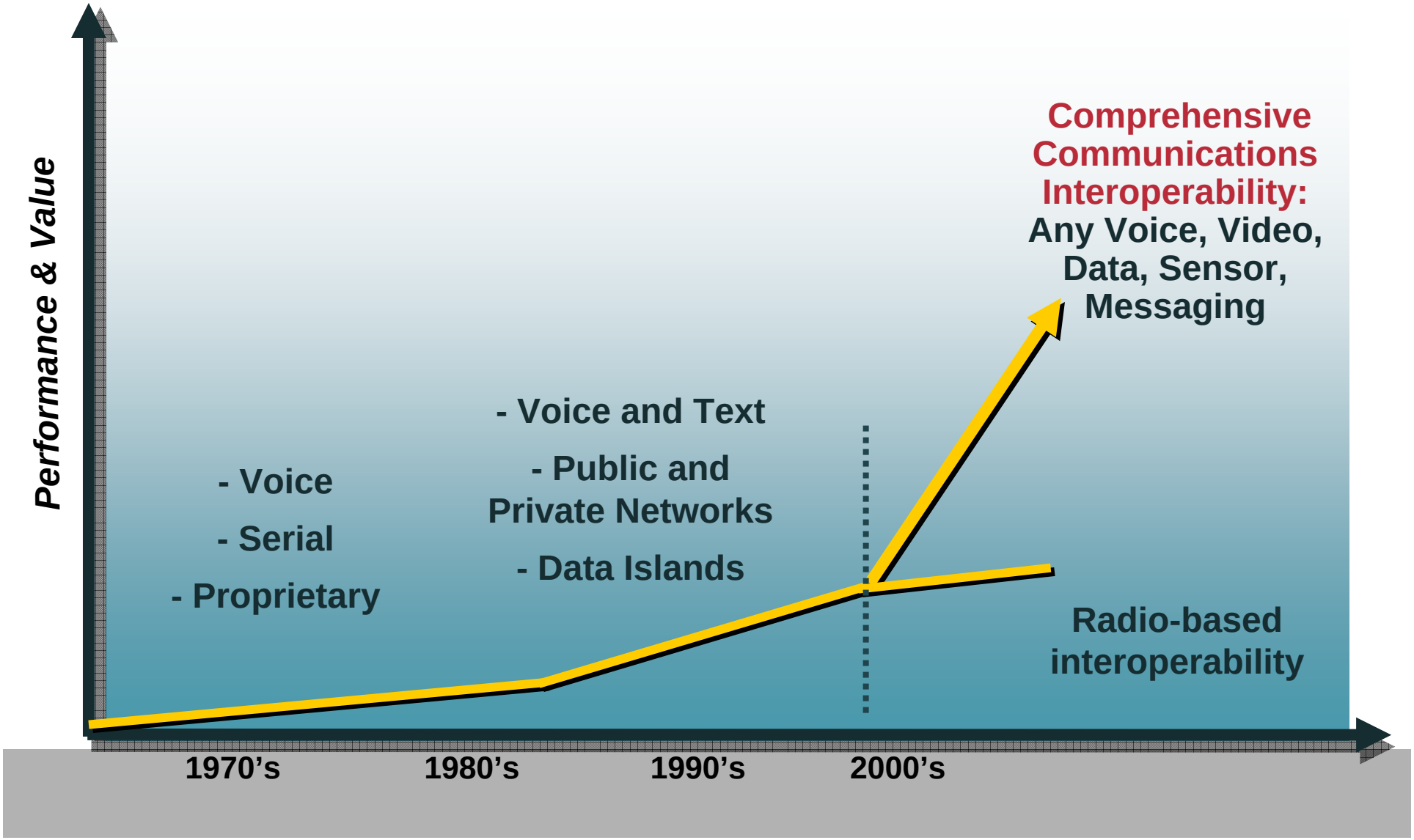
Example: Public Safety

A Broad-Based Problem in Many Verticals

Interoperability Today is Restricted to Proprietary Radio Solutions



There is a Better Way *Now*



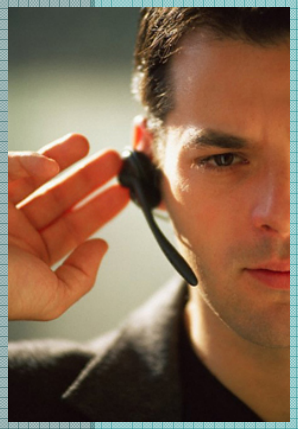
Traditional Radio Vendors Are Aiming Too Low

- **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

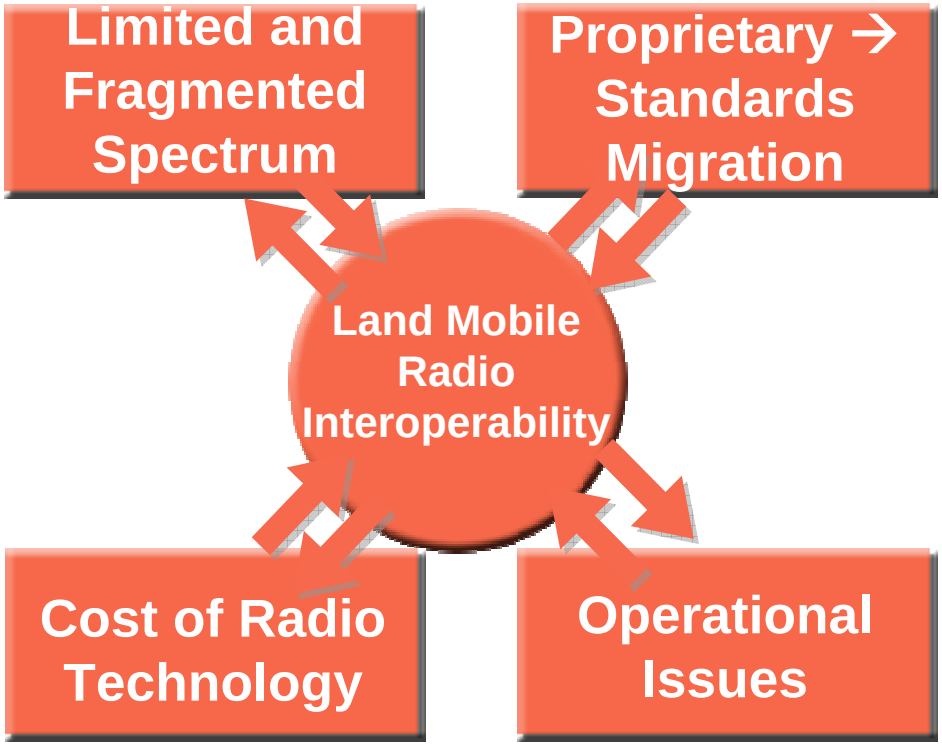
"More than 14 months after radio problems contributed to the deaths of New York firefighters in the Sept. 11 terrorist attacks, many of America's 73,000 police, fire and other public-safety agencies still can't talk to each other in major emergencies."

USA TODAY – Page 1

November 20, 2002

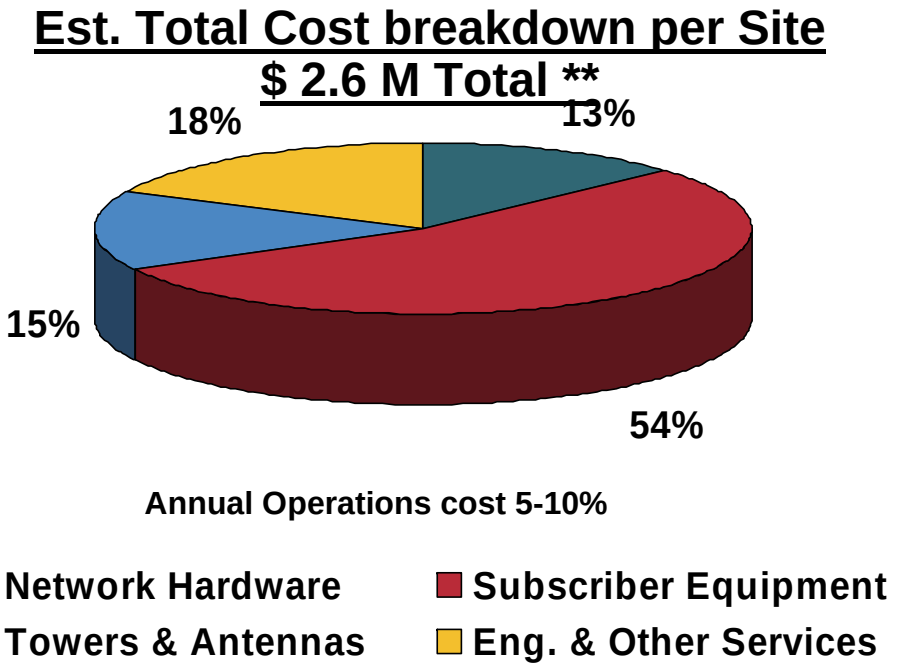
Inability to Interconnect disparate LMR systems to coordinate effective response

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***



*** 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

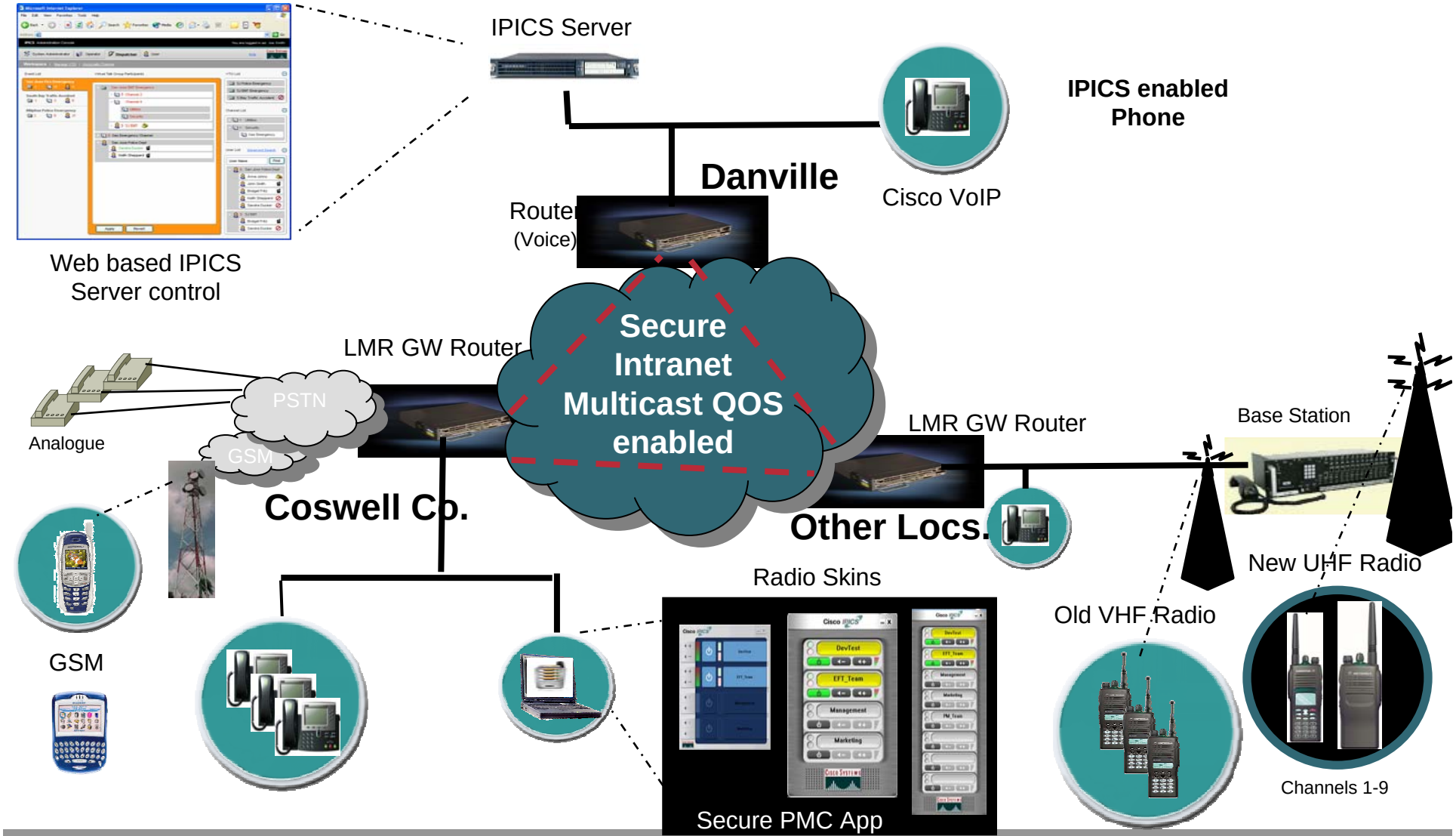
Video Interoperability:

- Video (surveillance) interoperability
- Legacy investment protection

Control Interoperability:

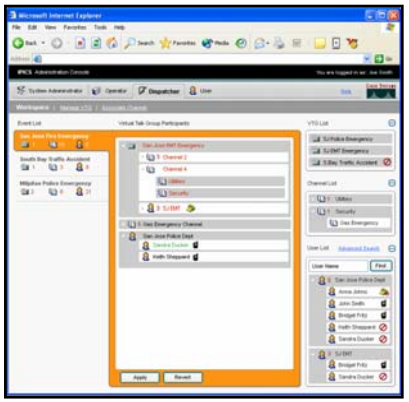
- Sensor integration and telemetry
- Radio network & end point control
- RFID support
- Integration with BMS
- Presence aware networks

High-Level IPICS System Architecture

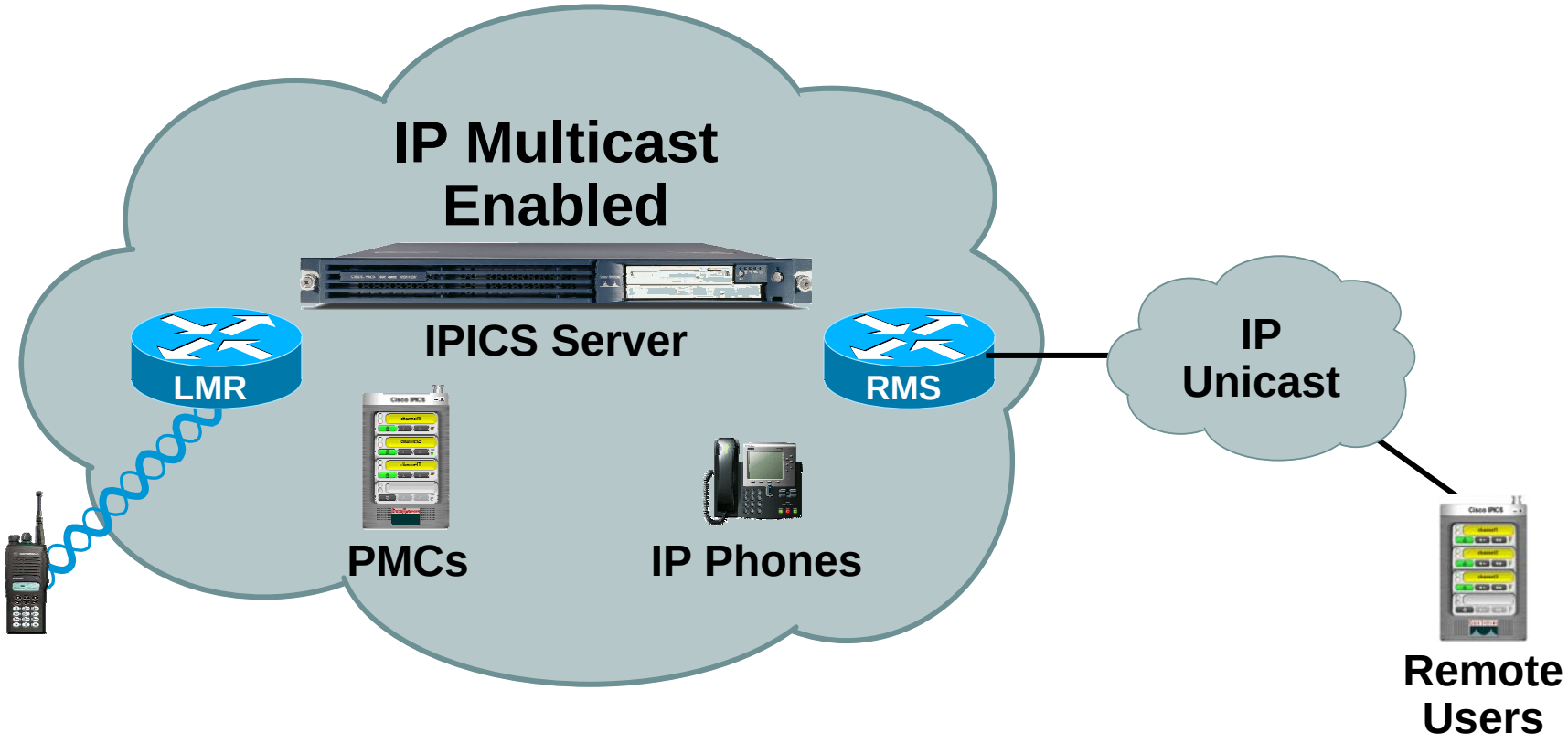


IPICS Components Phase I

- **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**



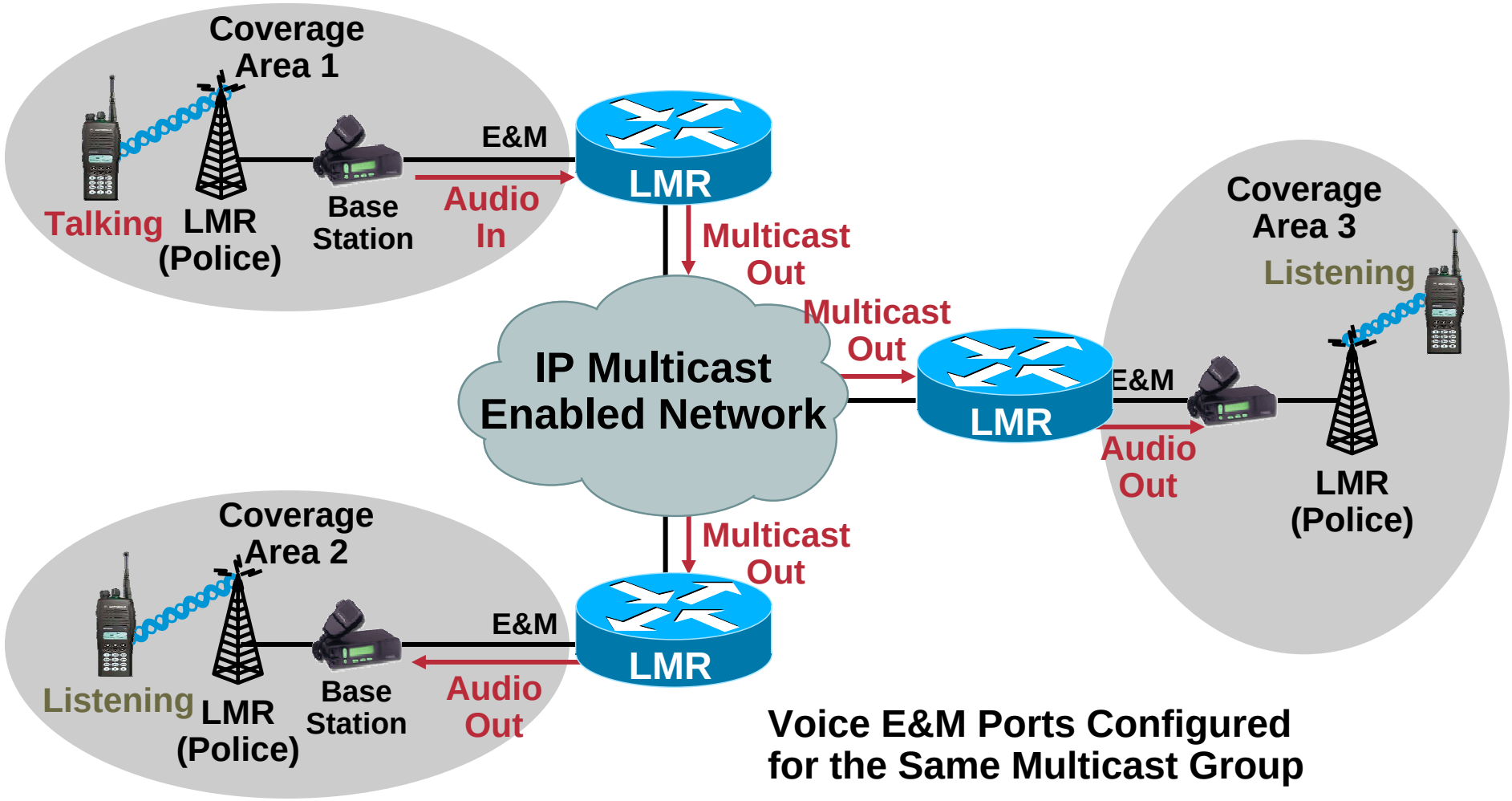
Cisco IPICS Overview



Land Mobile Radio IOS Feature

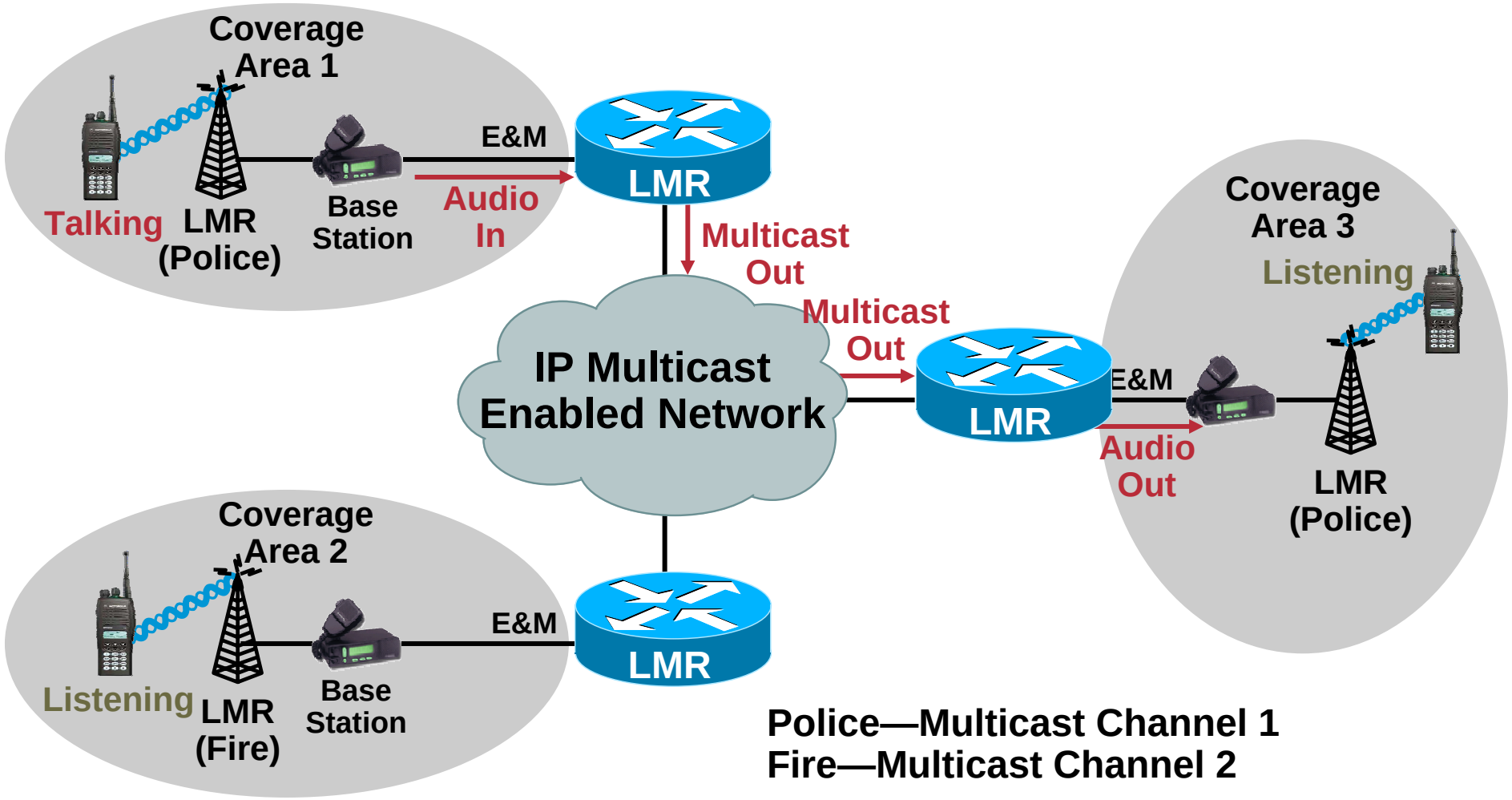
- **Used to “connect” LMR analog signal to the IP multicast domain**
- **Gateway uses the Cisco IOS® “Hootie” feature (Hoot ‘n’ Holler) and a voice E&M port(s)**

Land Mobile Radio—Single Channel

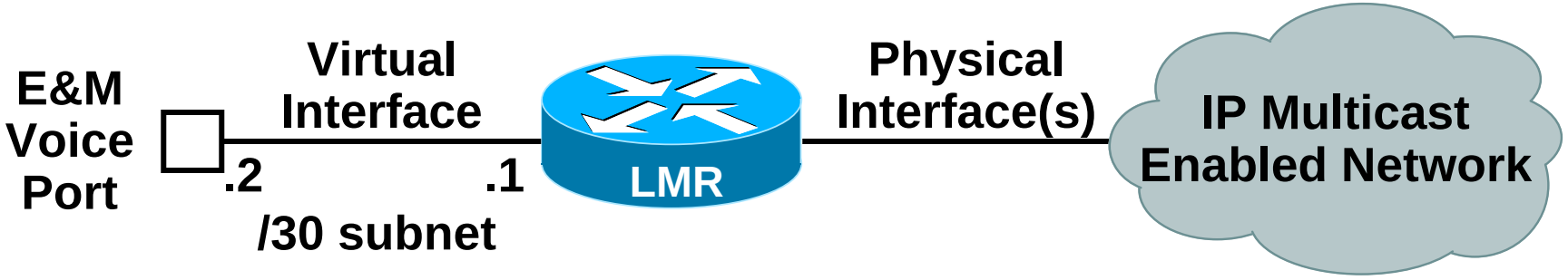


Voice E&M Ports Configured for the Same Multicast Group

Land Mobile Radio—Multiple Channels

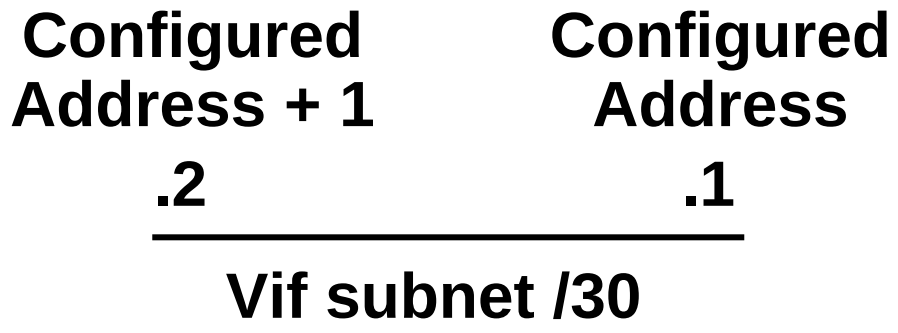


Land Mobile Radio—Virtual Interface




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

Land Mobile Radio—Virtual Interface




```
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)**

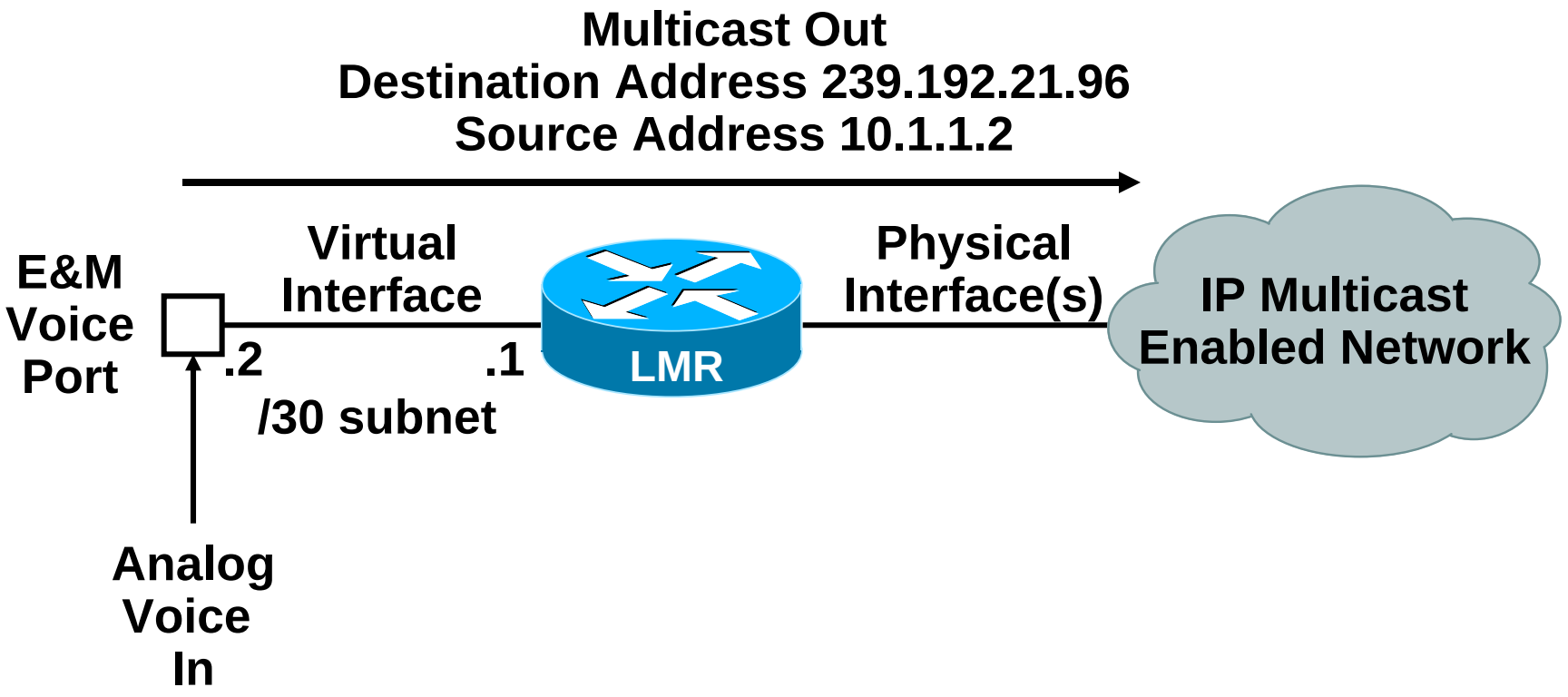
Land Mobile Radio—Dial-Peer

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

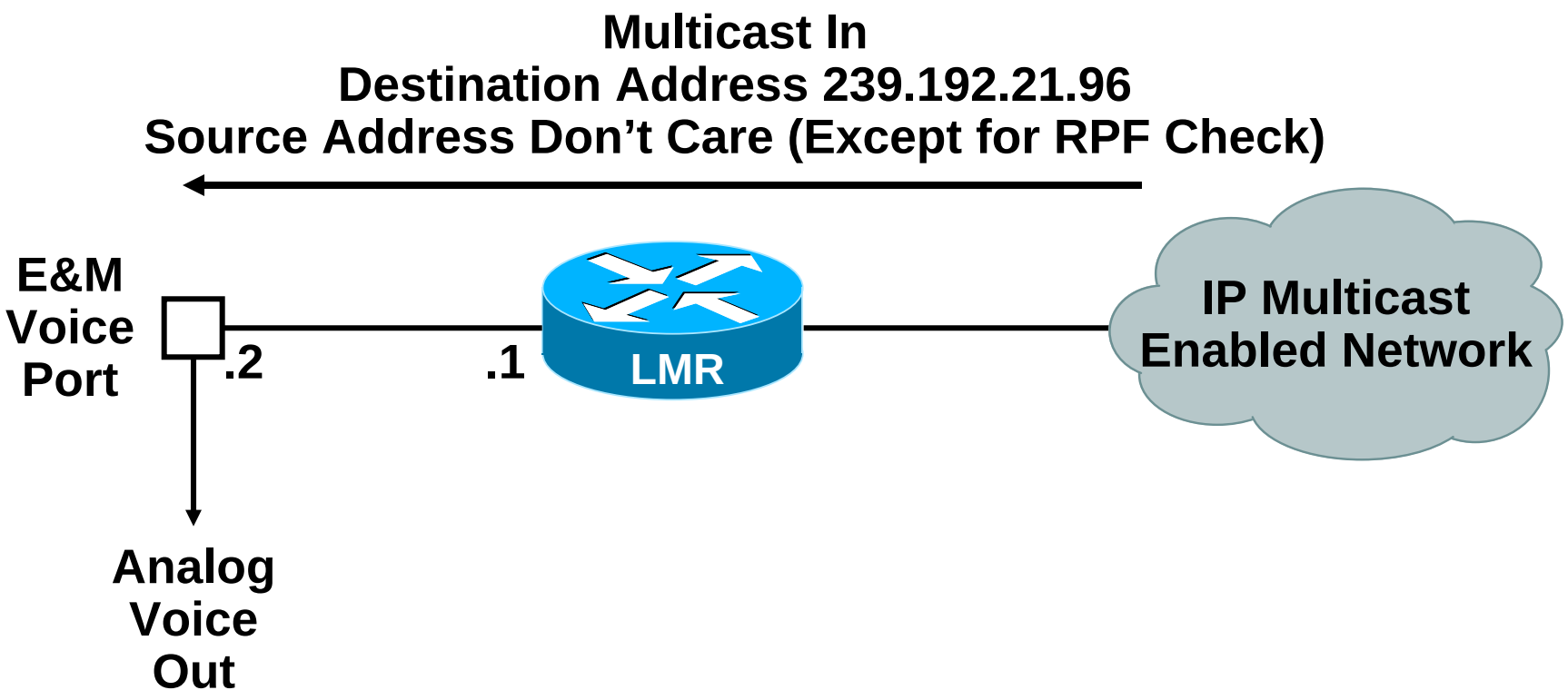
```
voice port 2/0/0
 . . .
 connection trunk 501

dial-peer voice 1
  …
 destination-pattern 501
 session protocol multicast
 session target ipv4:239.192.21.96:21000
```

Land Mobile Radio—Sending



Land Mobile Radio—Receiving



Land Mobile Radio—Configuration

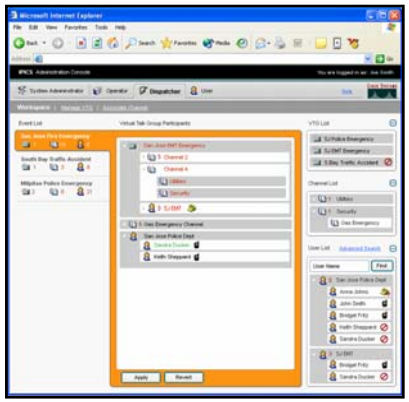
```
voice-port 2/0/0
 voice-class permanent 1
 auto-cut-through
 operation 4-wire
 type 2/3/5
 signal lmr
 lmr m-lead audio-gate-in
 lmr e-lead voice
 lmr duplex half
 lmr led-on
 output attenuation 10
 no echo-cancel enable
 no comfort-noise
 timing hookflash-in 0
 timing hangover 30
 timing hangover 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**

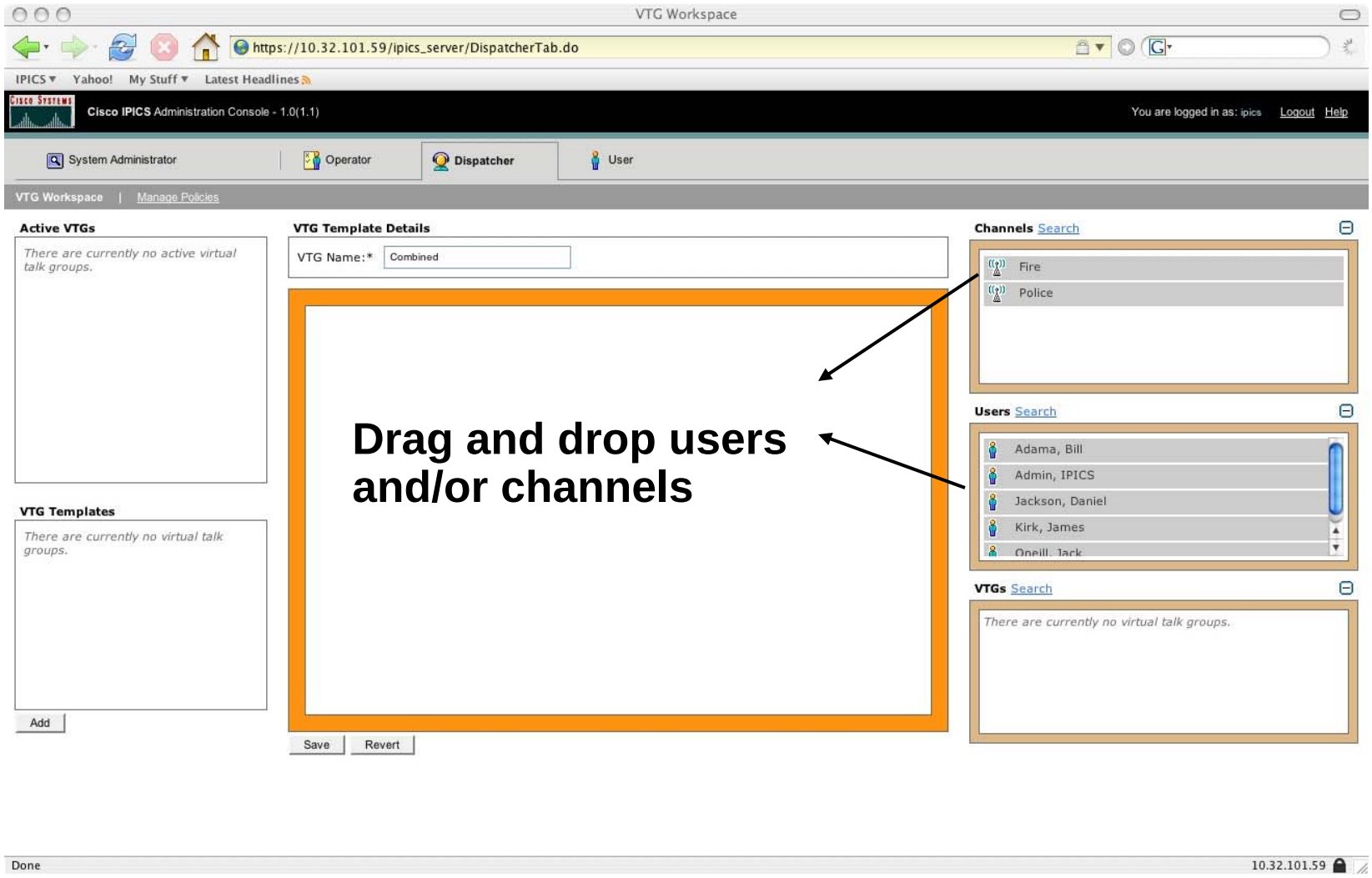
Definition—Remote User

- **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**

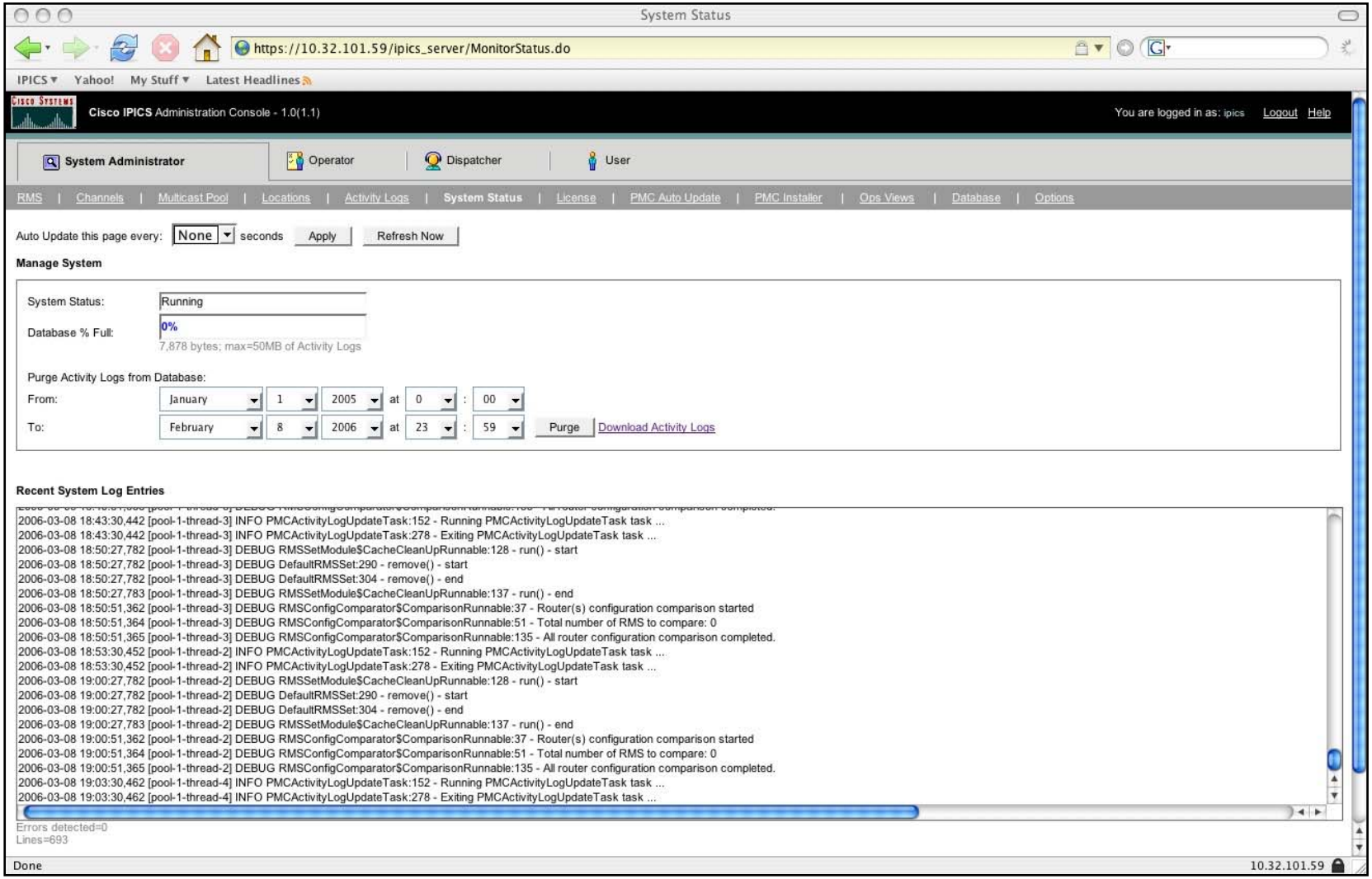
Roles Within IPICS

- **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



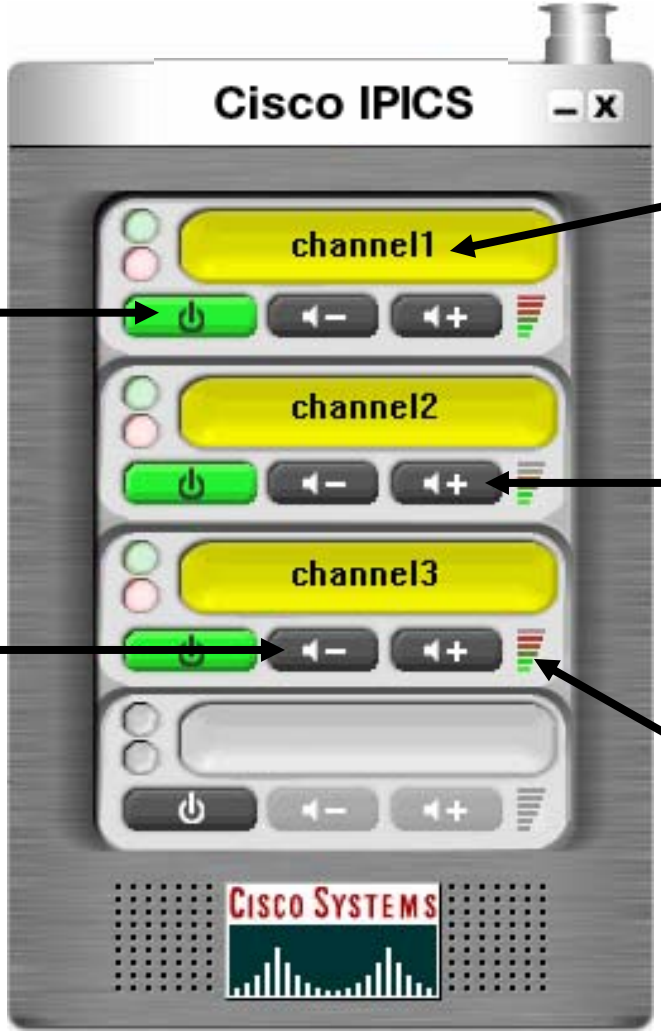
System Administrator—System Status Tab



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

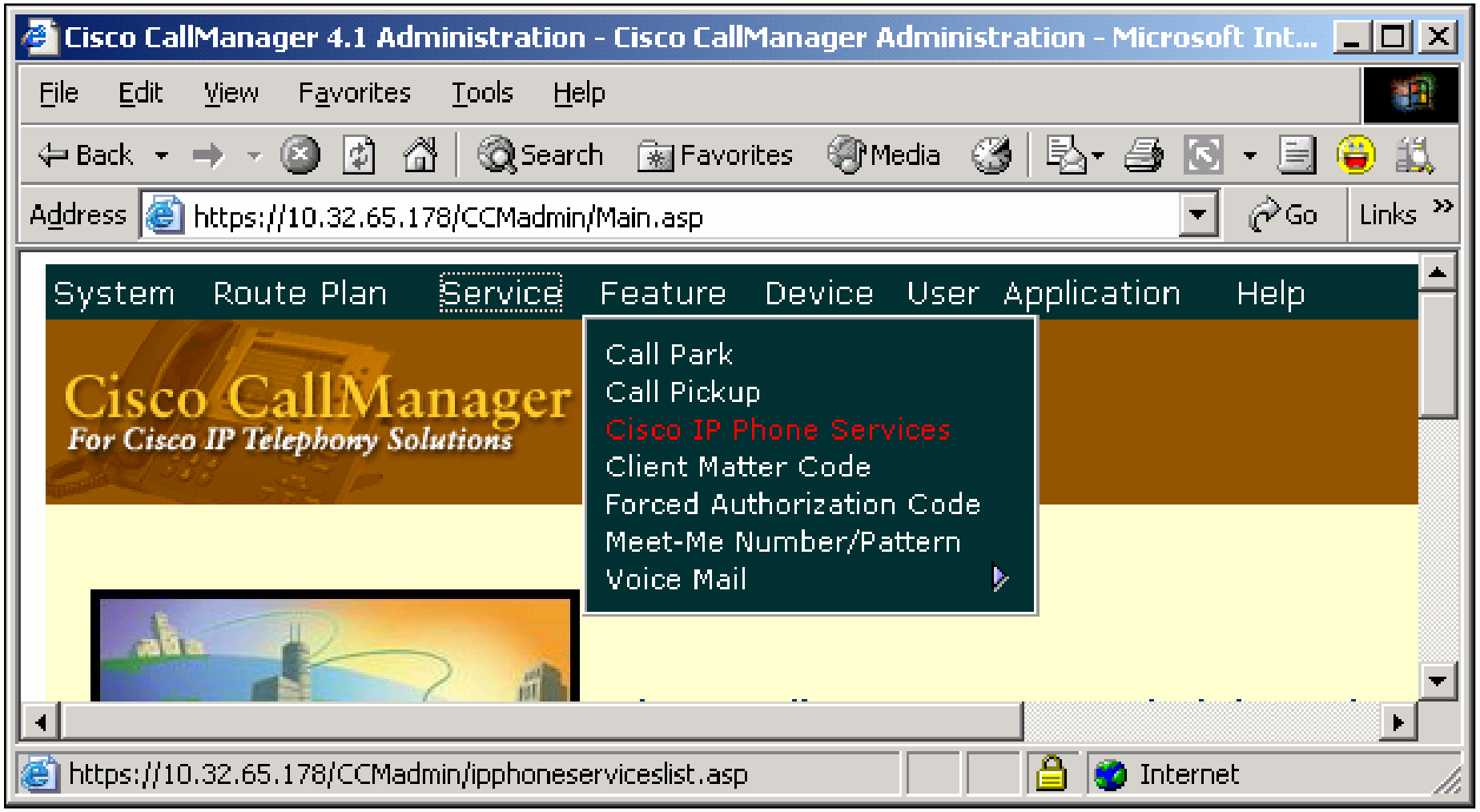
Push-To-Talk Services on Cisco Unified IP Phones Through Cisco IPICS

IP Phones—Cisco CallManager Express

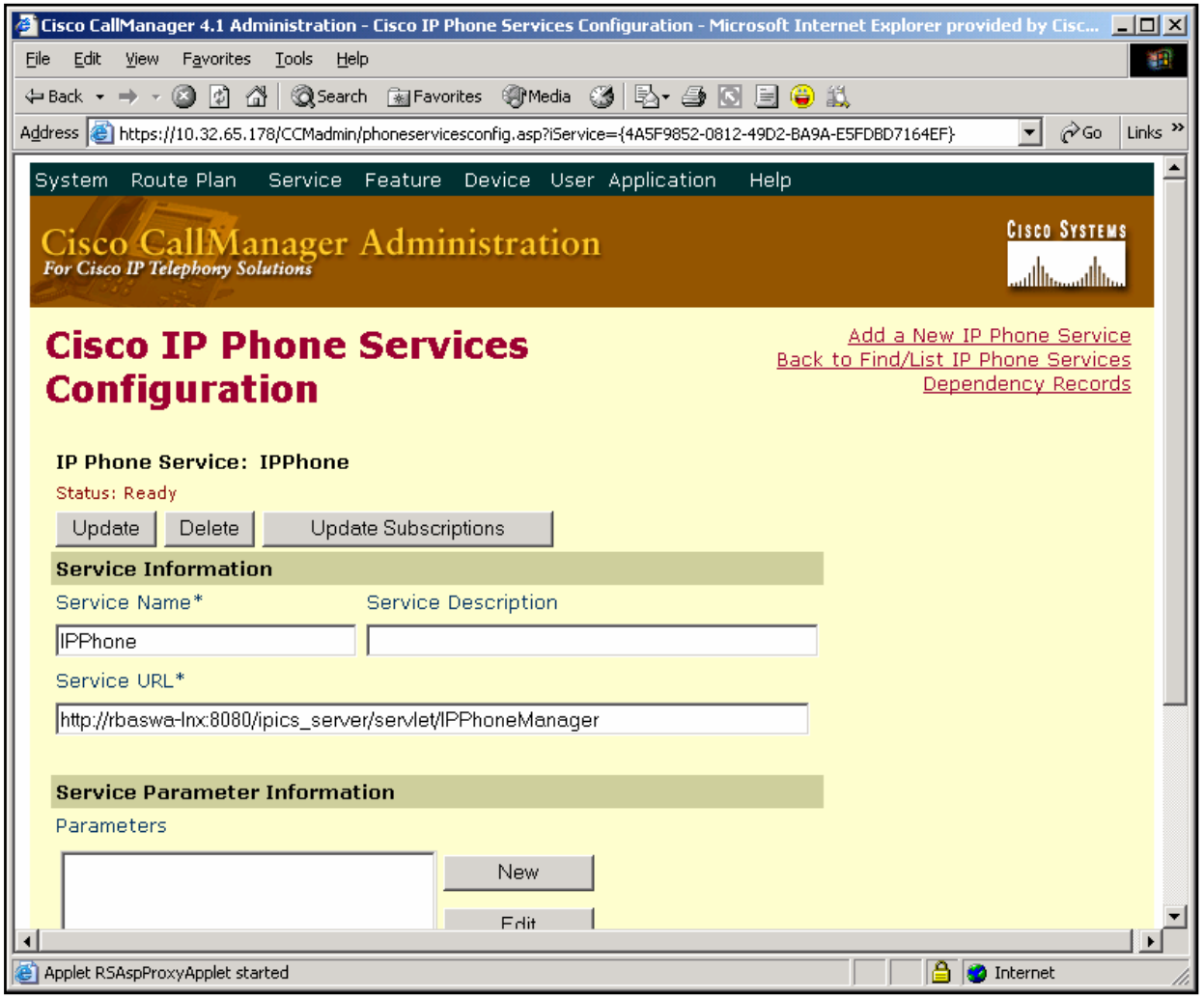
```
tftp-server flash:filename1
tftp-server flash:filename2

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



Example Deployments

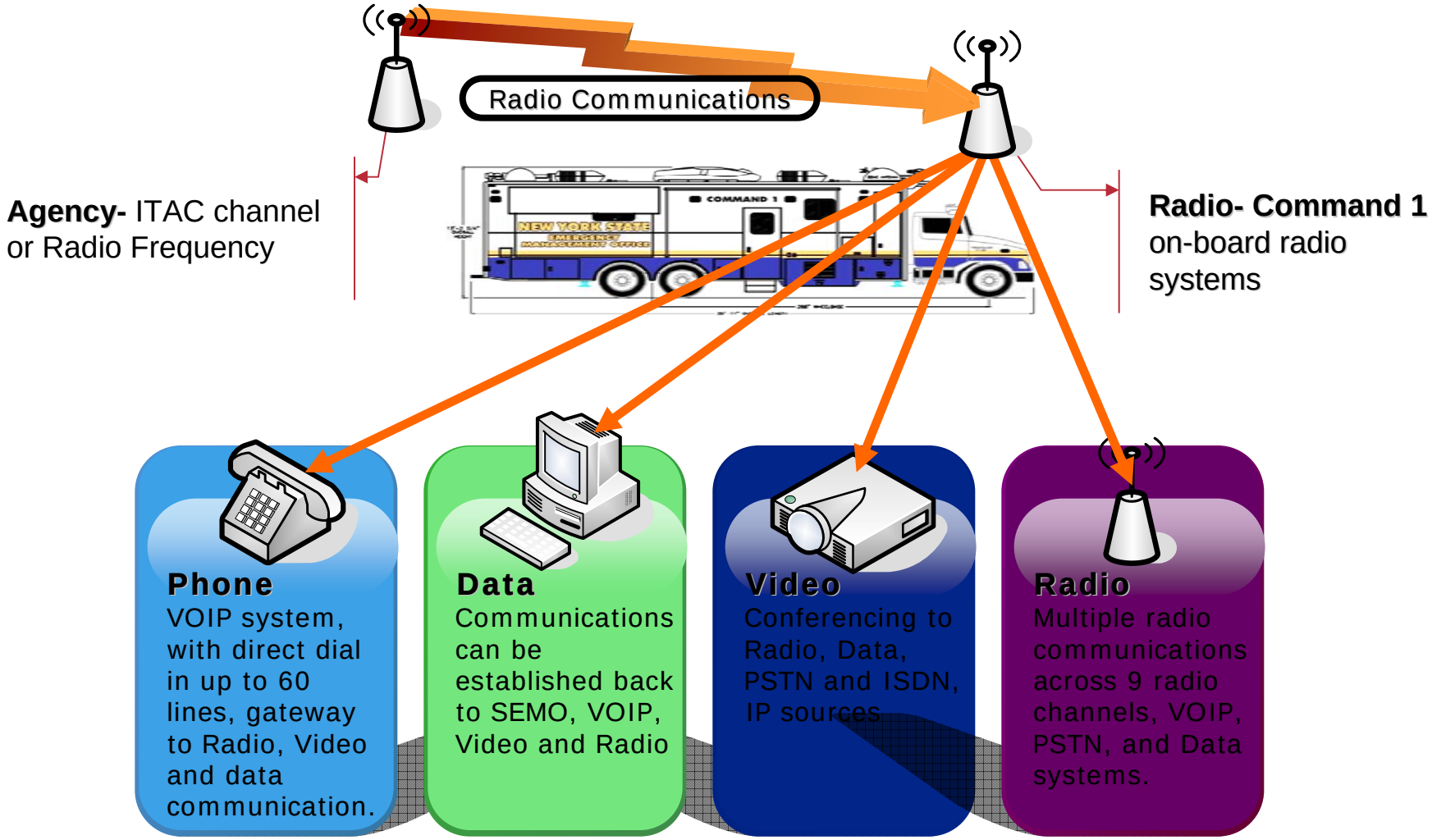
NY State Emergency Management Office

- **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

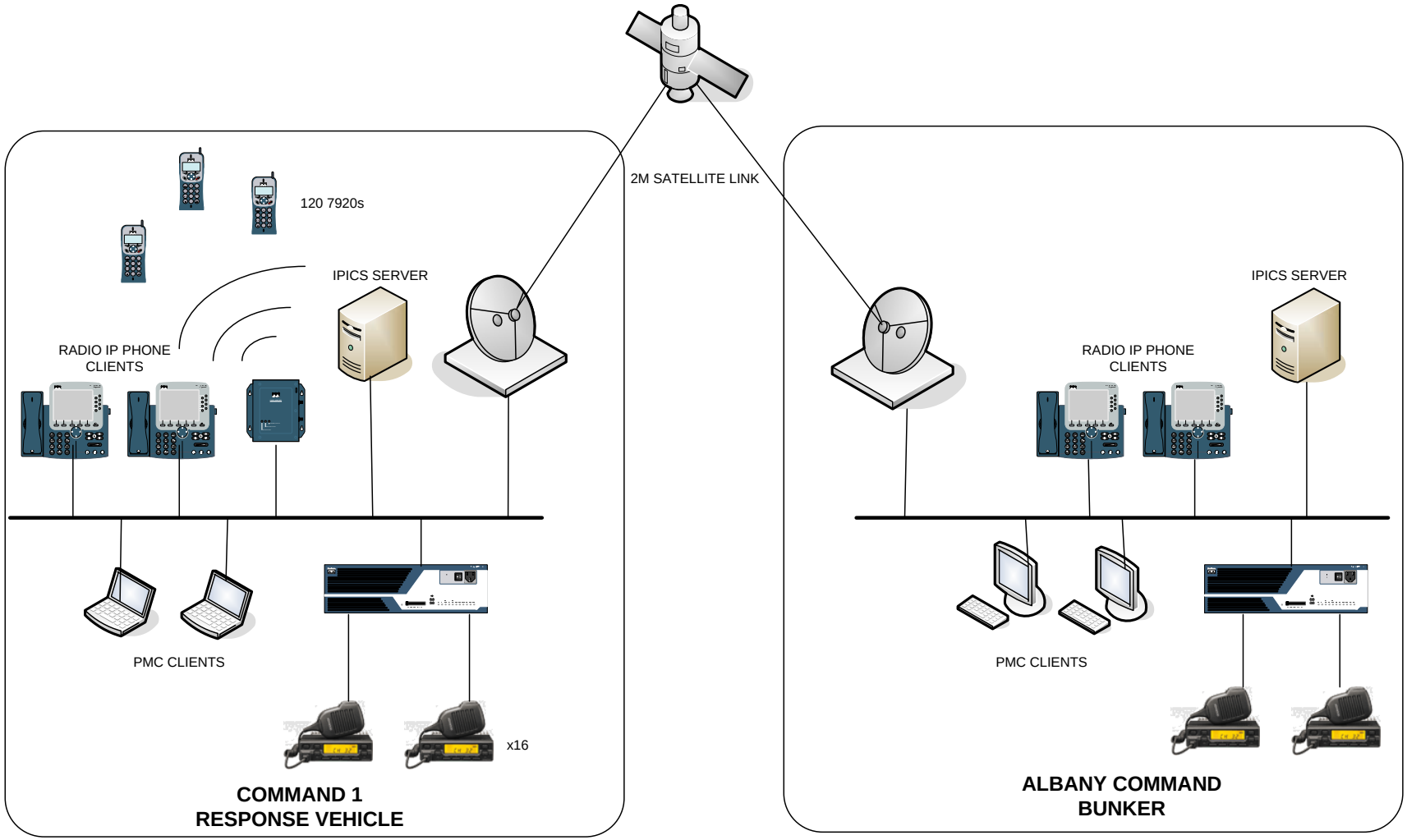


Command 1 and Support Vehicle

Command 1 Com Room

Command 1 Conference Room

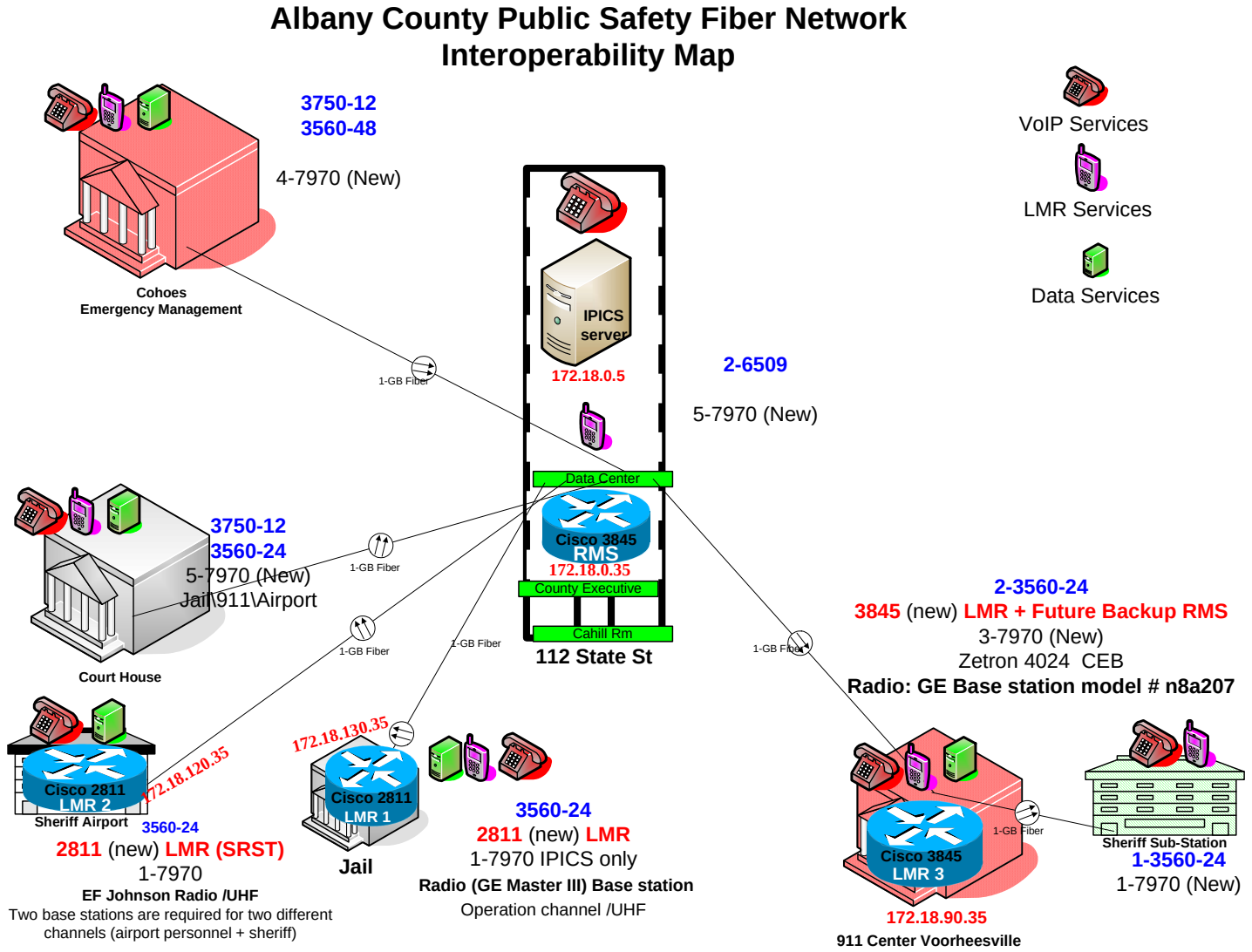
SEMO IPICS (current)



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



Demo

Demo Topology