

AP-LMR2000

LMR(Land-to-Mobile Radio) Gateway

High Performance LMR Gateway Solution

Peer-to-Peer Service Mode
(PTT Talk Listening Service)



AddPac

AddPac Technology

Sales and Marketing

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- PTT IP Phone Solution for Listening
 - AP-IP300
 - AP-IP230
 - AP-IP120
- IP Voice Recording Server Solution for PTT Talk Recording

Product Overview

AP-LMR2000 LMR Gateway

- Radio over IP Service Support
- Radio Systems(Motorola, etc) are Extended to IP Network
- High Performance RISC & Programmable DSP Architecture
- Two(2) 10/100Mbps Fast Ethernet (IP Share ,etc)
- High Performance LAN-to-LAN Routing Capability
- Two(2) Module Slots for Radio Interface (E&M, etc)
- VoIP Codec : G.711/G.726/G.723/G.729, VAD, etc
- Powerful Network Protocols (PPPoE, DHCP, Static Routing, etc)
- IPv4/IPv6 Dual Stack Support
- SIP/H.323 Dual Concurrent Signaling Protocols
- TLS/SRTP VoIP Secure Protocol Support (AES, 3DES, etc)
- Firmware Upgradeable Architecture
- Advanced Voice QoS Mechanism
- Powerful Web based Management
- RS232C Port Support for Command Line Interface

Hardware Specification

AP-LMR2000 LMR Gateway

RISC
CPU

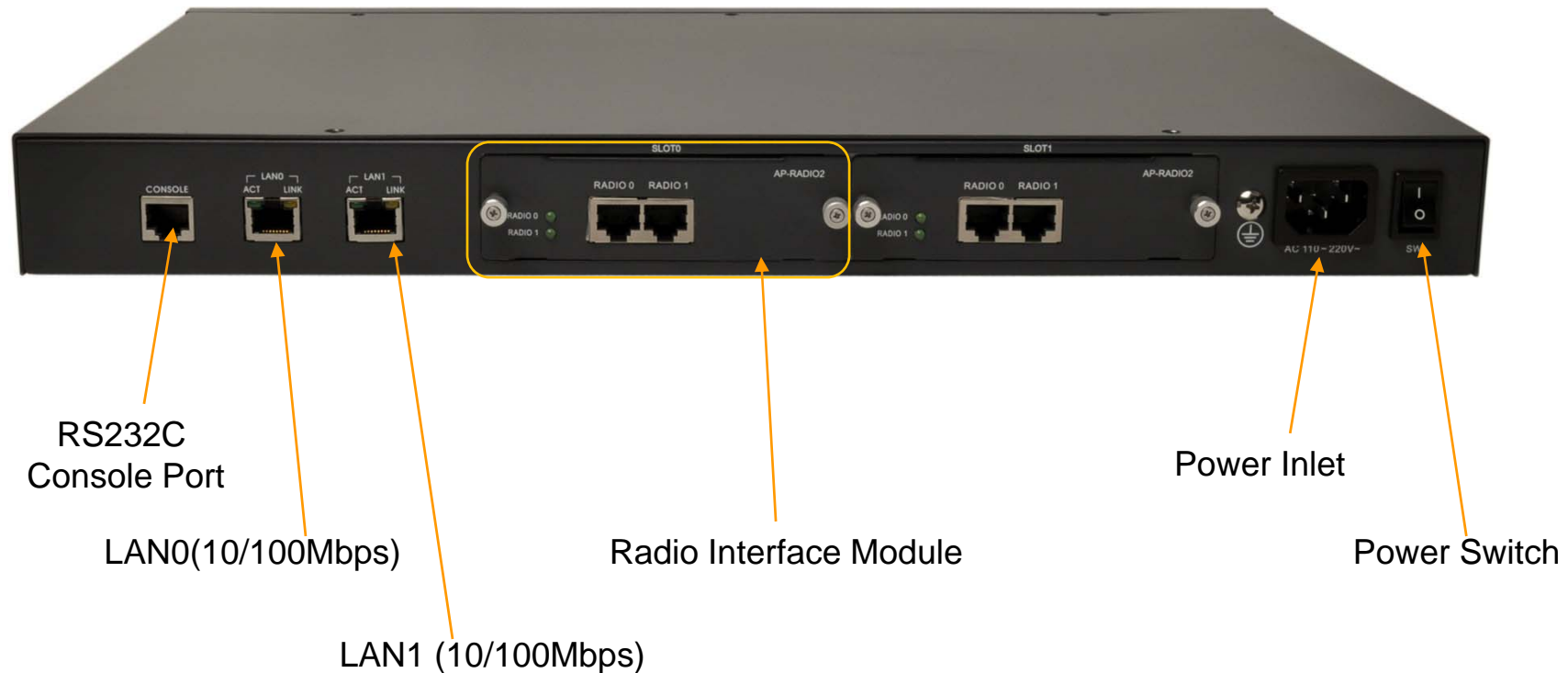
High-end
DSP

- RISC Microprocessor Computing Power
- Main Chassis
 - Network Interface
 - Two(2) 10/100Mbps Fast Ethernet
 - One(1) RS-232C Console (RJ45)
 - Two(2) Radio Module Slots for E&M, etc
 - Internal Power Supply

Hardware Specification

AP-LMR2000 LMR Gateway

AP-LMR2000 Back Side



Hardware Specification

AP-LMR2000 LMR Gateway

Example : AP-RADIO2 Interface Module for Radio Interworking



Hardware Specification

AP-LMR2000 LMR Gateway

Example : E&M Interface for Radio Interworking

| Lead Name | Pin | Description |
|-----------------------|---------|---|
| E (Ear or Earth) | Pin 7 | Signal wire asserted by the router toward the connected device. Typically mapped to the push-to-talk (PTT) lead on the radio. |
| M (Mouth or Magnet) | Pin 2 | Signal wire asserted by the router toward the connected device. Typically mapped to the push-to-talk (PTT) lead on the radio. |
| SG (Signal Ground) | Pin 8 | Used on E&M signaling Types II, III, and IV. |
| SB (Signal Battery) | Pin 1 | Used on E&M signaling Types II, III, and IV. |
| Two-Wire Mode | | |
| T1/R1 (Tip-1/Ring-1) | Pin 4,5 | In two-wire operation, the T1/R1 leads carry the full-duplex audio path. |
| Four-Wire Mode | | |
| T/R (Tip/Ring) | Pin6,3 | In a four-wire operation configuration, this pair of leads carries the audio in from the radio to the router and would typically be connected to the line out or speaker of the radio. |
| T1/R1 (Tip-1/Ring-1) | Pin5,4 | In a four-wire operation configuration, this pair of leads carries the audio out from the router to the radio and would normally be connected to the line in or microphone on the radio |

LMR Service

AP-LMR2000 LMR Gateway

- LMR system overview
 - A LMR(Land Mobile Radio) system is a collection of portable and stationary radio units designed to communicate with each other.
 - LMR is deployed wherever organizations need to have instant communication between geographically dispersed and mobile personnel.
 - Typical LMR system users are public safety organizations (ex: police departments, fire departments, etc).
 - The systems are extended the range of communications by repeaters.
 - The systems are required interoperability with IP network.

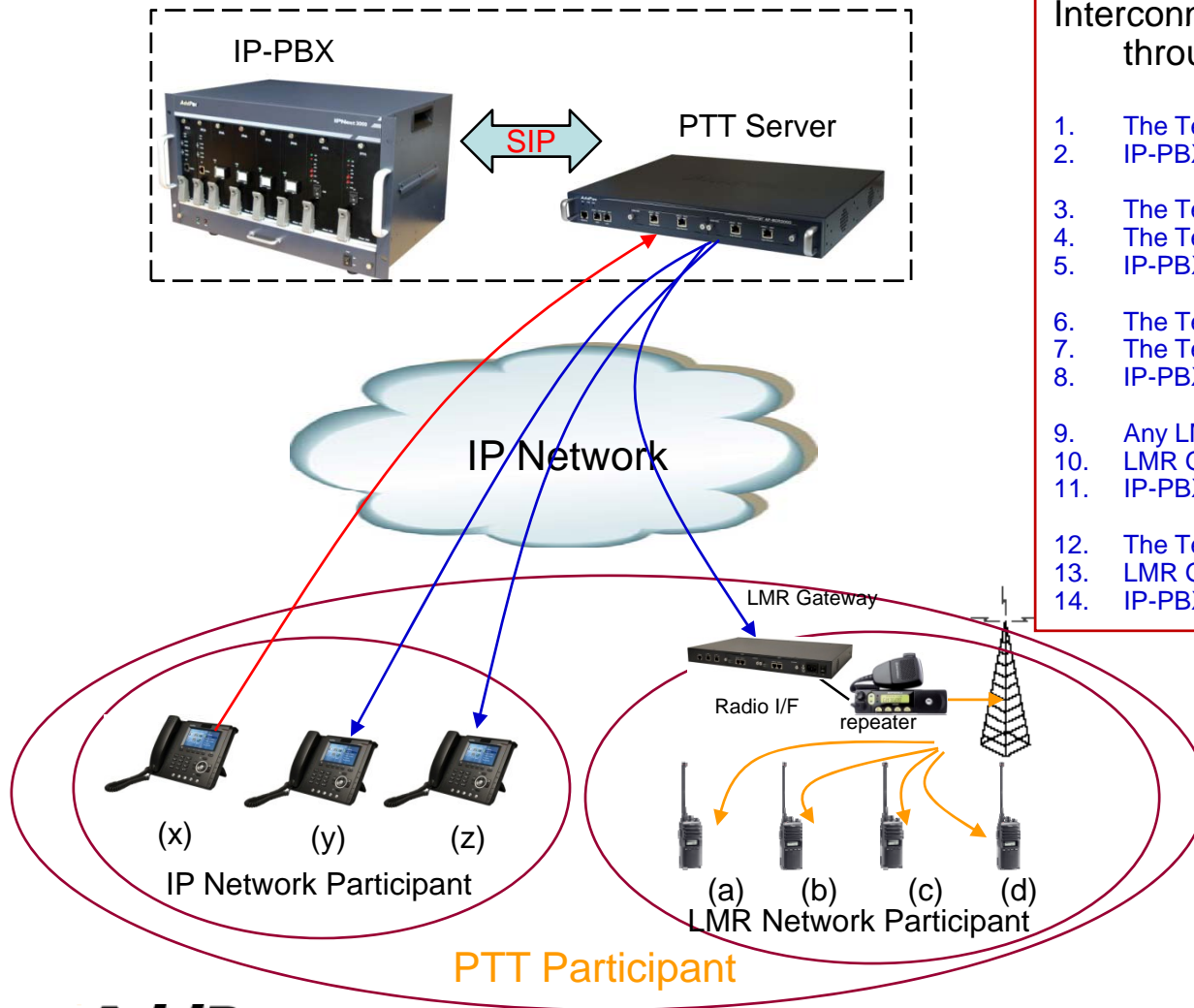
LMR Service

AP-LMR2000 LMR Gateway

- **AddPac RoIP Solution Features**
 - LMR Gateway(AP-LMR2000) joins the LMR systems to the IP network through open SIP standard and RTP.
 - The radios are connected to LMR gateway through AddPac radio interface (reference LMR signal).
 - AddPac IP PTT terminals (AP-IP230, AP-IP300 IP Phones, AP-WP100 WiFi-Phone, etc) support the traditional radio user interface(PTT).
 - AddPac IP PTT terminals easy PTT group management user interface.
 - IP-PBX support call management, PTT group management, PTT control and various additional service.
 - PTT Server(AP-PTS3000) support powerful media data relay, broadcasting, multicasting and PTT group management.
 - RoIP Solution supports emergency and group PTT service.

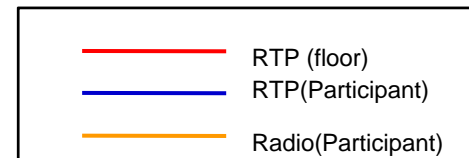
LMR Service Examples

AP-LMR2000 LMR Gateway



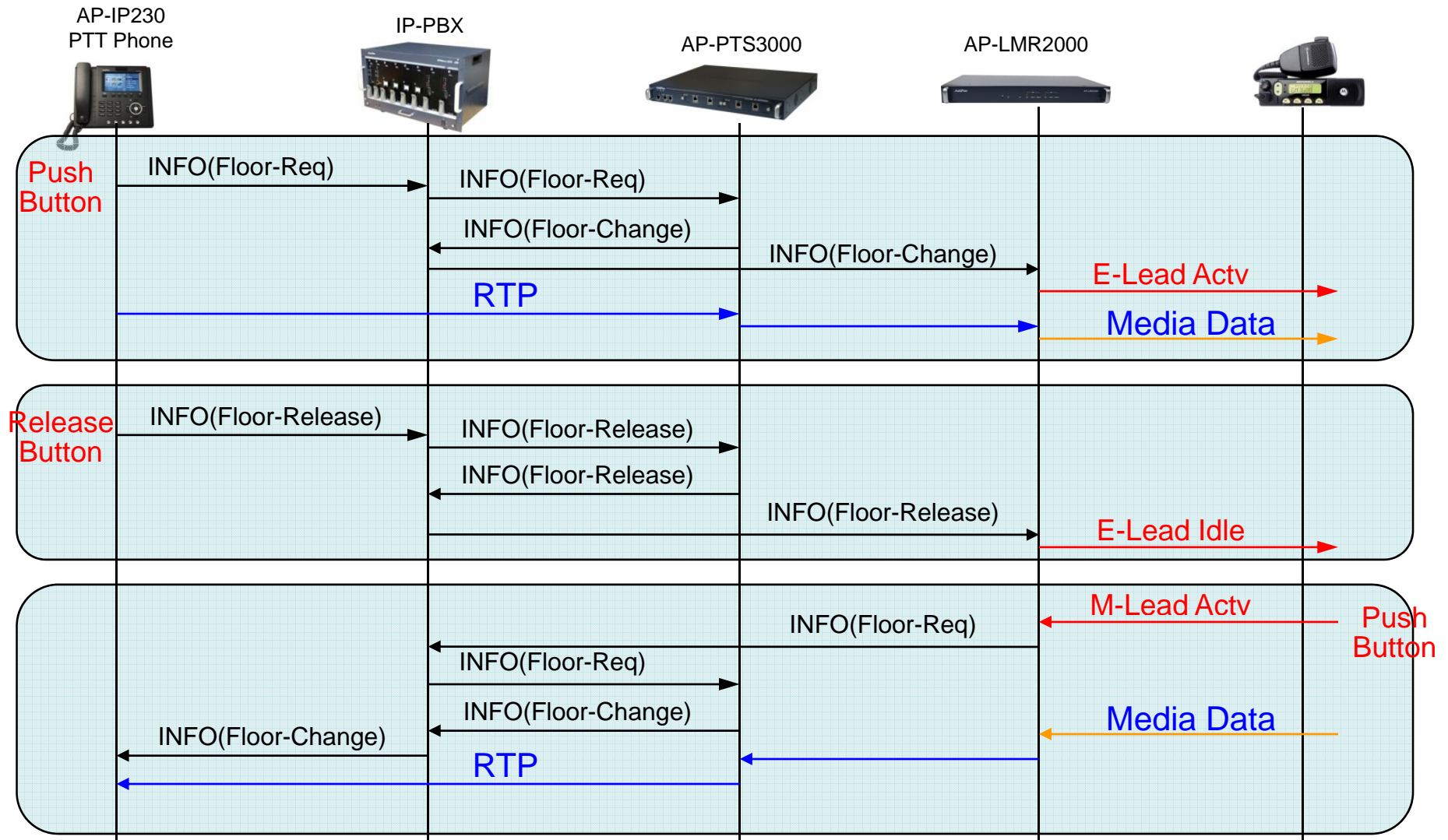
Interconnection LMR systems to IP network through AddPac RoIP solution.

1. The Terminal(x) originate a PTT conference.
2. IP-PBX send invitation message to all participant.
3. The Terminal(x) presses the 'floor button' to talk.
4. The Terminal(x) send a 'floor-request' message.
5. IP-PBX and PTT servers control media-relay.
6. The Terminal(x) releases the 'floor button'.
7. The Terminal(x) send a 'release-request' message.
8. IP-PBX and PTT servers control media-relay.
9. Any LMR Terminal(a~d) presses the 'floor button' to talk.
10. LMR Gateway send a 'floor-request' message.
11. IP-PBX and PTT servers control media-relay.
12. The Terminal(a) releases the 'floor button'.
13. LMR Gateway send a 'release-request' message.
14. IP-PBX and PTT servers control media-relay.



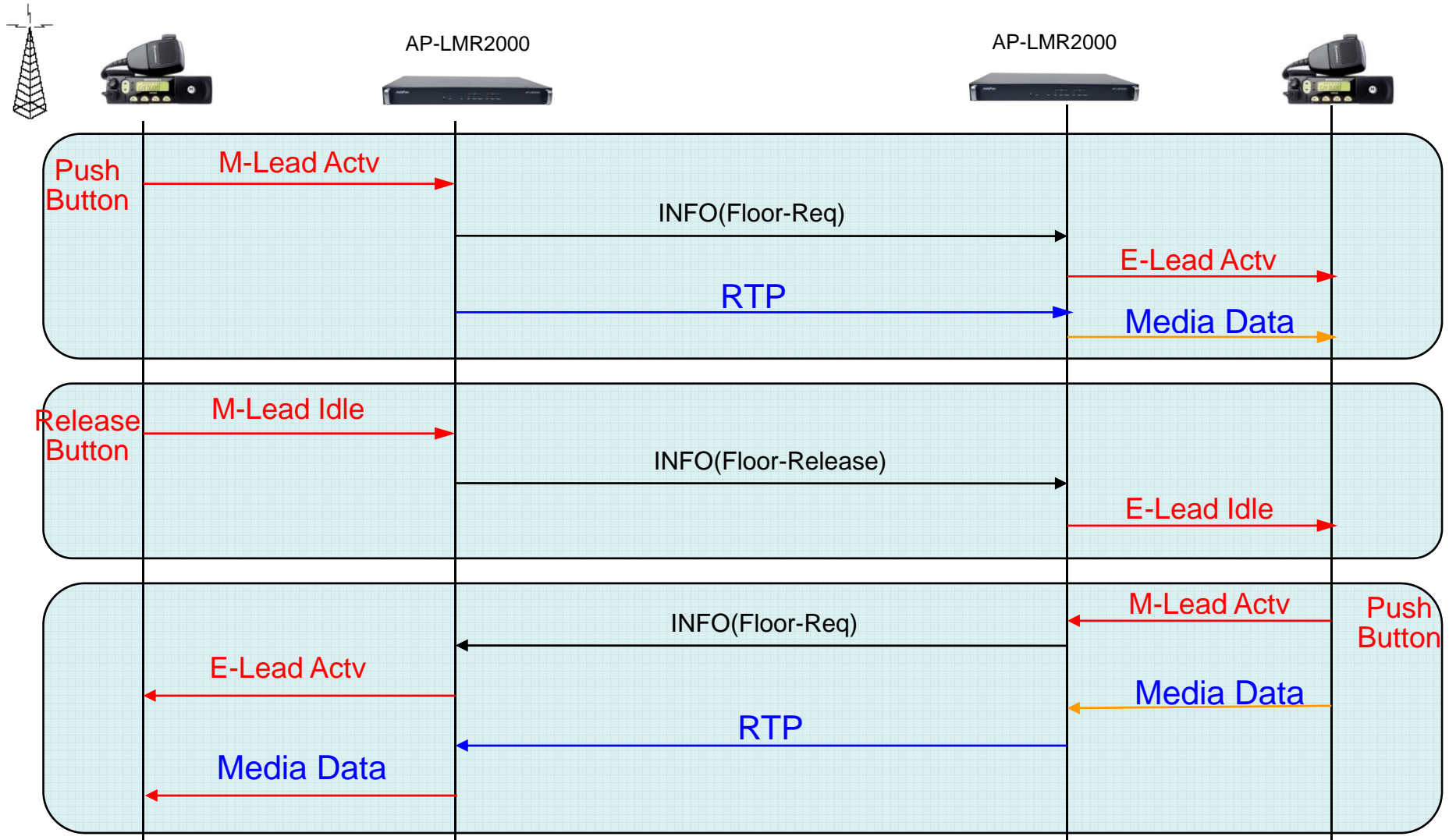
RoIP System Message Flow

AP-LMR2000 LMR Gateway



LMR Gateway Peer-to-Peer Message Flow

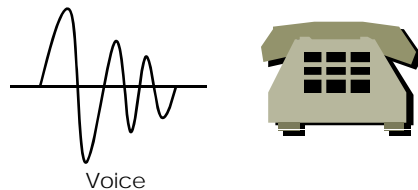
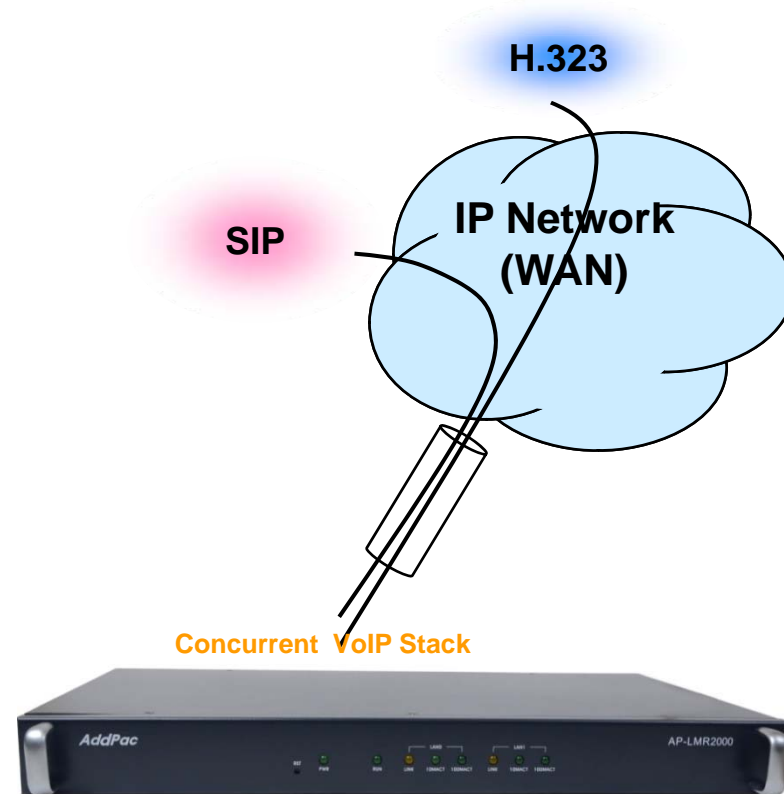
AP-LMR2000 LMR Gateway



VoIP (Voice over IP) Service

AP-LMR2000 LMR Gateway

- **H.323, SIP Dual Stack**
- **H.323**
 - ITU-T Standard H.323 v3 Support
 - Support H.245 Tunneling
 - Including H.235 Security Features
- **SIP**
 - IETF RFC3261 or RFC2543 SIP Standard



VoIP (Voice over IP) Service

AP-LMR2000 LMR Gateway

- **H.323**

- Fast connect, normal connect support
- H.245 tunneling support
- Q.931 response message setting for inbound VoIP calls
- H.245 logical channel open timing selection function
- Start H.245 procedure support
- DTMF / Hook flash relay with H.245 alphanumeric / signal
- Secondary gatekeeper support
- Gatekeeper assignment according to the domain name
- Gatekeeper discovery with multicast
- Lightweight RRQ support
- Signaling TCP port assignment
- Resource threshold setting with RAI
- H.235 clear-token, crypto-token support
- canMapAlias support
- Technical prefix (supported prefix) support
- Public IP assignment in NAT environment

- **SIP**

- Gateway-based / Endpoint-based registration support
- Secondary proxy-server assignment function
- SIP signaling port change function
- SIP proxy server assignment according to the domain name
- T.38 real-time fax relay support
- DTMF relay support with RFC2833 / OPTION message
- Re-INVITE support

VoIP (Voice over IP) Service

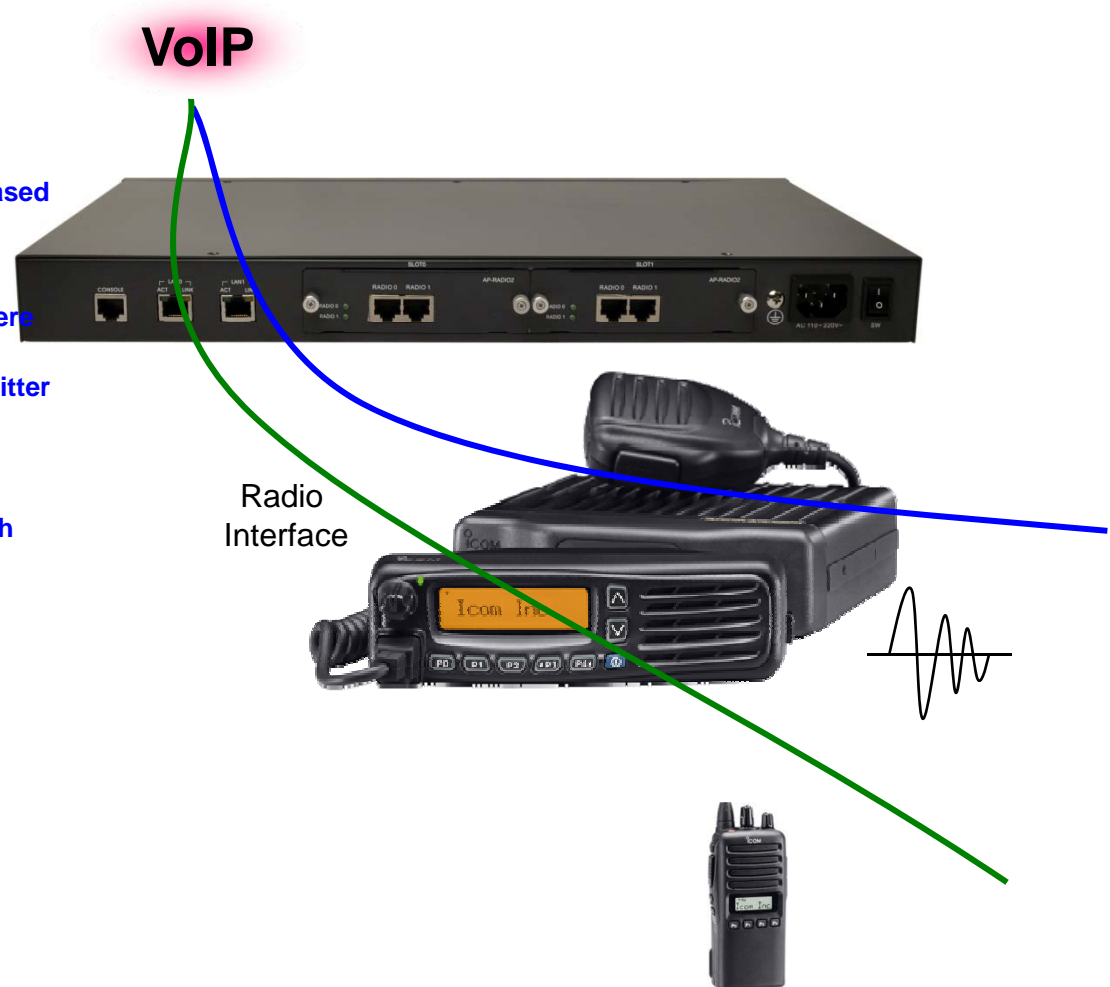
AP-LMR2000 LMR Gateway

- **Voice Codec**

- G.711 A-Law, G.711 U-Law
- G.726 r16, G.726 r32
- G.729A
- G.723.1 r63, G.723.1 r53
- VAD (Voice Activity Detection) function support
- DTMF relay support (H.323, SIP, MGCP common) based on RFC2833

- **RTP**

- Redundant RTP packet transmission in case of severe packet loss
- Dynamic jitter buffer management and RPT packet jitter and loss compensation with heuristic & DSP error concealment
- Static jitter buffer setting support
- Voice frame per RTP packet number control for each codec
- In-band ring-back tone support
- Virtual ring-back tone support
- Tone parameter change support



VoIP (Voice over IP) Service

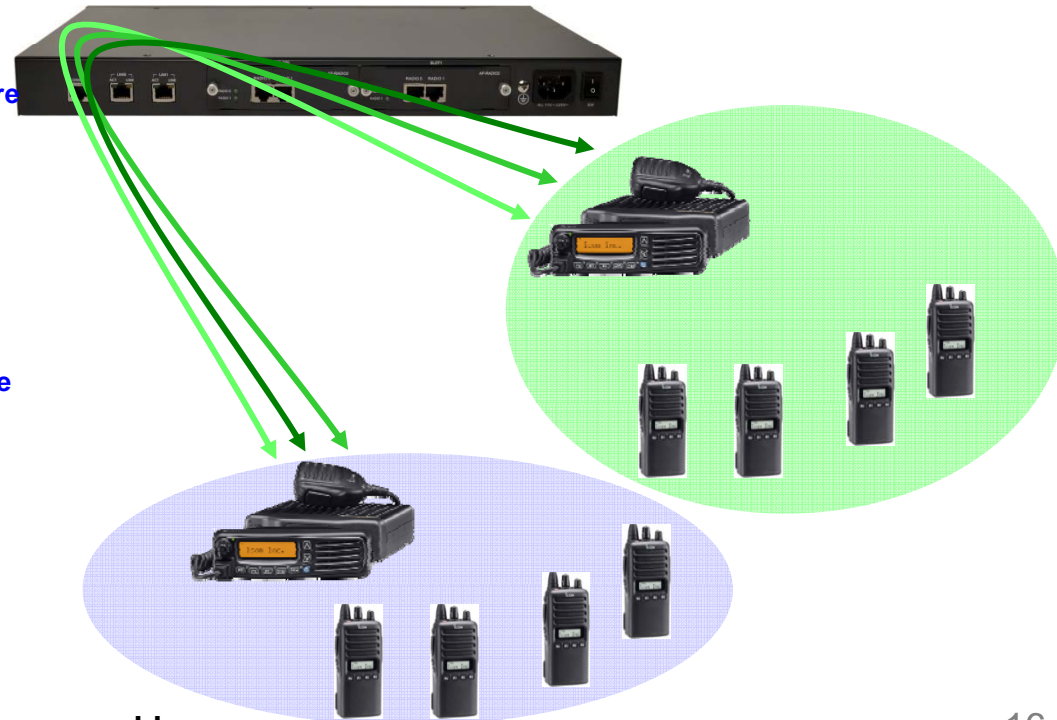
AP-LMR2000 LMR Gateway

• VoIP Call Controls

- Hot line connection function with PLAR (Private Line Auto Ring Down)
- Leased line emulation function
- Connection monitoring function
- Fault tolerant with Redundancy and Call Distribution among Gateways for load balancing
- Call attempt with IP address
- H.323, SIP, MGCP inbound call connection for each voice port
- Multiple E.164 setting for one voice port
- One E.164 or digit pattern can be assigned to more than one voice port
- Hunting with Longest match/ priority/ sequence/ random
- One stage call setup by Digit forwarding
- Call barring with specific digit patterns
- Calling and called number conversion for PSTN outbound calls
- PSTN rerouting in case of VoIP call attempt failure

• VoIP Call Controls (cont.)

- Call transfer for internal calls
- Call pickup for internal calls
- Calling and called number conversion for VoIP outbound calls
- Calling and called number conversion for VoIP inbound calls
- Fax broadcasting call control



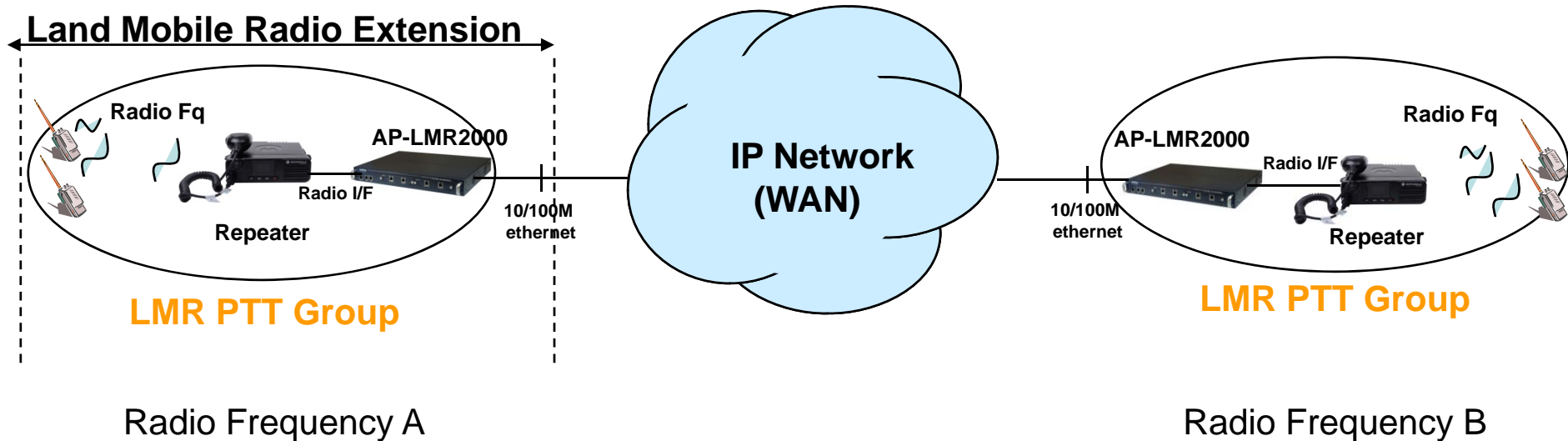


Peer to Peer Service Mode

RoIP Peer to Peer Service Mode

AP-LMR2000 LMR Gateway

LMR Gateway to LMR Gateway Service Mode



RoIP Peer to Peer Service Mode

AP-LMR2000 LMR Gateway

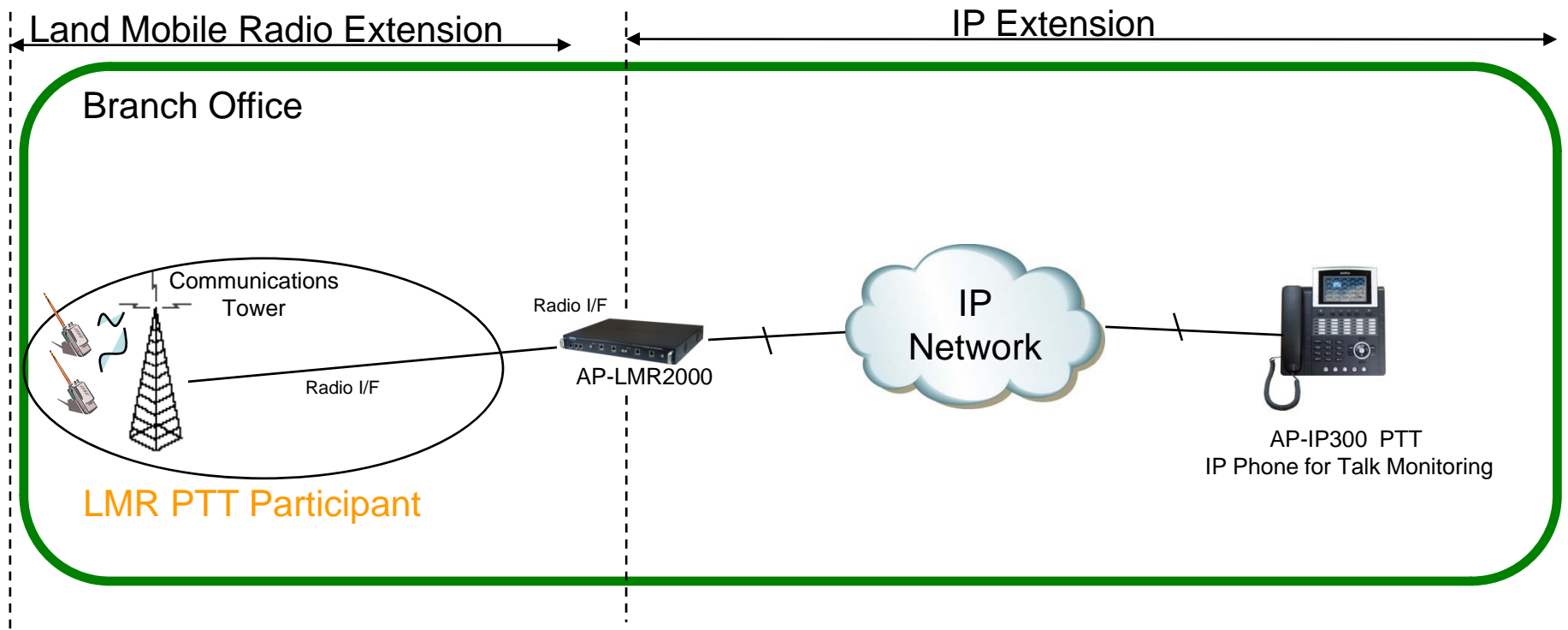
LMR Gateway to IP Phone Service Mode for Radio Talk Listening

- Peer To Peer Service Features (Radio & IP Network)
 - AddPac PTT terminals (AP-IP120, AP-IP230, AP-IP300, etc) join the LMR systems through open SIP standard and RTP.
 - The radios are connected to LMR gateway through AddPac radio interface.
 - AddPac PTT terminals (AP-IP120, AP-IP230, AP-IP300) support the traditional radio user interface(PTT) - SIP terminal can be a participant.
 - Support monitoring service with Gateway and SIP terminal (without additional servers – PTT server, IP-PBX, etc)

Radio Talk Monitoring in IP Network

AP-LMR2000 LMR Gateway

- LMR Gateway to IP Phone Service Diagram





PTT IP Phone Solution for Listening

AP-IP300 IP Phone for PTT Service



Main Features

AP-IP300 IP Phone

- 4.3 Inch Color LCD Display
- External I/O Interface
 - Audio In/Out
 - Two(2) Fast Ethernet Interface
 - PSTN FXO Interface (optional)
- PoE (Power over Ethernet) Support
- 25 Speed Dial button with Presence Indication Lamp
- Audio Broadcasting Controller & Terminal
- Providing Powerful Push-to-Talk Service
- Powerful Color GUI
- IPv4/IPv6 Address Support
- SIP, H.323 Signaling Support
- High-end Error Resilient Against Various Packet Error

Hardware Specification

AP-IP300 IP Phone

- RISC+DSP Microprocessor Computing Power (Dual Processor Architecture)
- High Quality 4.3 Inch Color LCD Panel
- 25 Speed Dial Key & User Presence Indication LED
- Optional PSTN Backup Interface
 - FXO Interface
- High quality Audio and Voice Interface
 - Stereo Audio Input Connector
 - Stereo Audio Output Connector
- Network Interface
 - Two(2) 10/100Mbps Fast Ethernet
- USB Host Mode Interface
 - USB Memory(Flash, HDD), etc
- Power Supply
 - Power over Ethernet
 - External Power Adaptor (5V, 3A)



Hardware Specification

AP-IP300 IP Phone



AP-IP230 IP Phone for PTT Service



Main Features

AP-IP230 IP Phone

- 5 Inch Color LCD Display with Touch Screen
- External I/O Interface
 - Audio In/Out
 - Two(2) Fast Ethernet Interface
 - PSTN FXO Interface (optional)
- PoE (Power over Ethernet) Support
- Touch Screen based 25 Speed Dial button with User Presence Indication
- Audio Broadcasting Controller & Terminal
- Providing Powerful Push-to-Talk Service
- Powerful Color GUI
- IPv4/IPv6 Address Support
- SIP, H.323 Signaling Support
- High-end Error Resilient Against Various Packet Error

Hardware Specification

AP-IP230 IP Phone

- RISC+DSP Microprocessor Computing Power
(Dual Processor Architecture)
- High Quality 5 Inch Color LCD Panel with Touch Screen
- Touch Screen based 25 Speed Dial Key & User Presence Indication Info.
- Optional PSTN Backup Interface
 - FXO Interface
- Optional PoE Interface
- High quality Audio and Voice Interface
 - Stereo Audio Input Connector
 - Stereo Audio Output Connector
- Network Interface
 - Two(2) 10/100Mbps Fast Ethernet
- USB Host Mode Interface
 - USB Memory(Flash, HDD), etc
- Power Supply
 - Power over Ethernet
 - External Power Adaptor (5V, 3A)



Hardware Specification

AP-IP230 IP Phone



PTT Button

AP-IP120 IP Phone for PTT Service



Product Overview

AP-IP120 IP Phone

- IP Phone Solution
- 12 Speed-Dial Key with Presence Indication Lamp
- Audio Broadcasting Solution
- PTT Service Features
- High-performance Audio, and Voice Service
- Firmware Upgradeable Architecture
- VoIP Solution with Outstanding Network Service Capability
- Audio Privacy Protection

Hardware Specification

AP-IP120 IP Phone

- RISC+DSP Microprocessor Computing Power (Dual Processor Architecture)
- Optional PSTN Backup (FXO) Interface
- Optional PoE (Power over Ethernet)
- High quality Audio and Voice Interface
 - Stereo Audio Input Connector
 - Stereo Audio Output Connector
- Network Interface
 - Two(2) 10/100Mbps Fast Ethernet
- LCD Window : Graphic LCD (4 Line Text)
- 12 Speed-Dial Key with Presence Indication LAMP
- Power Supply
 - External Power Adaptor (5V, 2A)

PTT Service Features

- **Various VoIP & PTT Call Mode Support**
 - VoIP Call & PTT Call Support
 - Call Waiting Support and Incoming Call Indication
 - VoIP Call and PTT Call Mode Change
 - Various PTT Call Mode Support
 - Point-to-Point PTT Call, Group PTT Call, Emergency PTT Call
 - PTT Call Connection using Send/PTT Button
- **Status Display & Indication Function**
 - Various Call Status Display using ICON
 - Call, SMS, Wi-Fi Antenna, PTT Call Status
 - Status Indication using LED
 - Absent Call, Emergency Call
 - Status Indication using Sound
 - PTT Call Start/Incoming Call, Wi-Fi connection and release

PTT Service Features

- PTT Group List Display Function
 - PTT Member List Display
 - Overall, Personal, Group, Emergency List Display
 - Group Presence Status Display
 - PTT Group Presence Status Display (Option : Presence Server Required)
 - Automatic Presence Status Display
 - Manual Presence Status Display
- VoIP Call List Display
 - Outbound/Incoming/Absent Call List
 - VoIP Call Phone Book
 - VoIP Call List Delete and Redialing Support



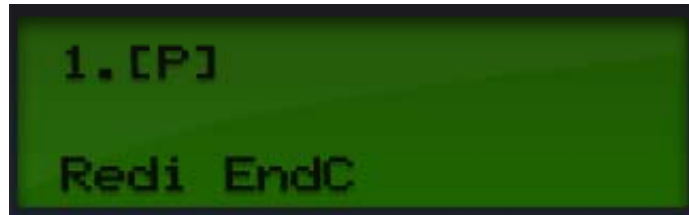
AP-IP120 PTT(Push-to-Talk) Service UI

PTT Idle Mode



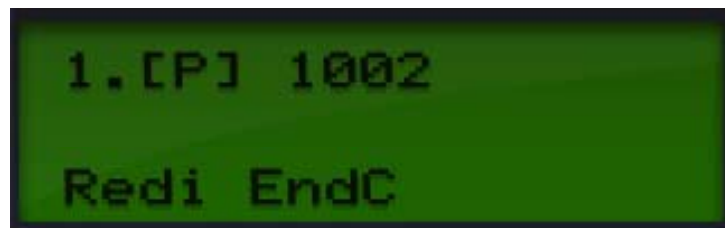
PTT Call Mode Entering by
F3 Softkey Press

PTT Call Mode



PTT Call Mode (Dialing)

PTT Dialing Number : 1002



PTT Waiting Mode

PTT Waiting Mode after PTT Dialing



1.[P] Talk 1002
Talk EndC



Push-to-Talk Mode



1.[P] Talk 1002
Speaking
Talk EndC



Push-to-Talk : Speaking Mode
(F1 Softkey Press)

PTT Close Mode

1.[P] Talk 1002
Listen [1002]
Talk EndC



Push-to-Talk : Listening Mode

AP-NR1500

IP Voice Call Recording Server



Product Overview

AP-NR1500 IP Voice Call Recording Server

- IP based Network Voice Call Recording Server
- Linux Operating System
- Powerful Management and User Friendly Features
- High-performance Voice Recording Service
- External AddPac IP Terminal (Ex: IP Phone, IP Intercom, IP Emergency Phone) Interworking Support
- Firmware Upgradeable Architecture
- One(1) 10/100/1000Mbps Gigabit Ethernet Interface
- Up to Two(2) 3.5Inch SATA Hard Disk Interface Support
- Two(2) USB Interface Support
- One(1) RS232C Console Interface

Hardware Specification

AP-N1500 IP Voice Call Recording Server

- High Performance Computing Power
- Network Interface
 - One(1) 10/100/1000Mbps Gigabit Ethernet Port
- Two(2) USB 2.0 Interfaces for Mouse, Secondary Storage, etc
- One(1) RS232C Console Interface (RJ45)
- Up Two(2) SATA type Hard Disk (4~8 Tera HDD Capacity)
- Power On/Off Soft Switch with LED Indication Lamp (Front Side)

Hardware Specification

AP-NR1500 IP Voice Call Recording Server

AP-NR1500 Front Side

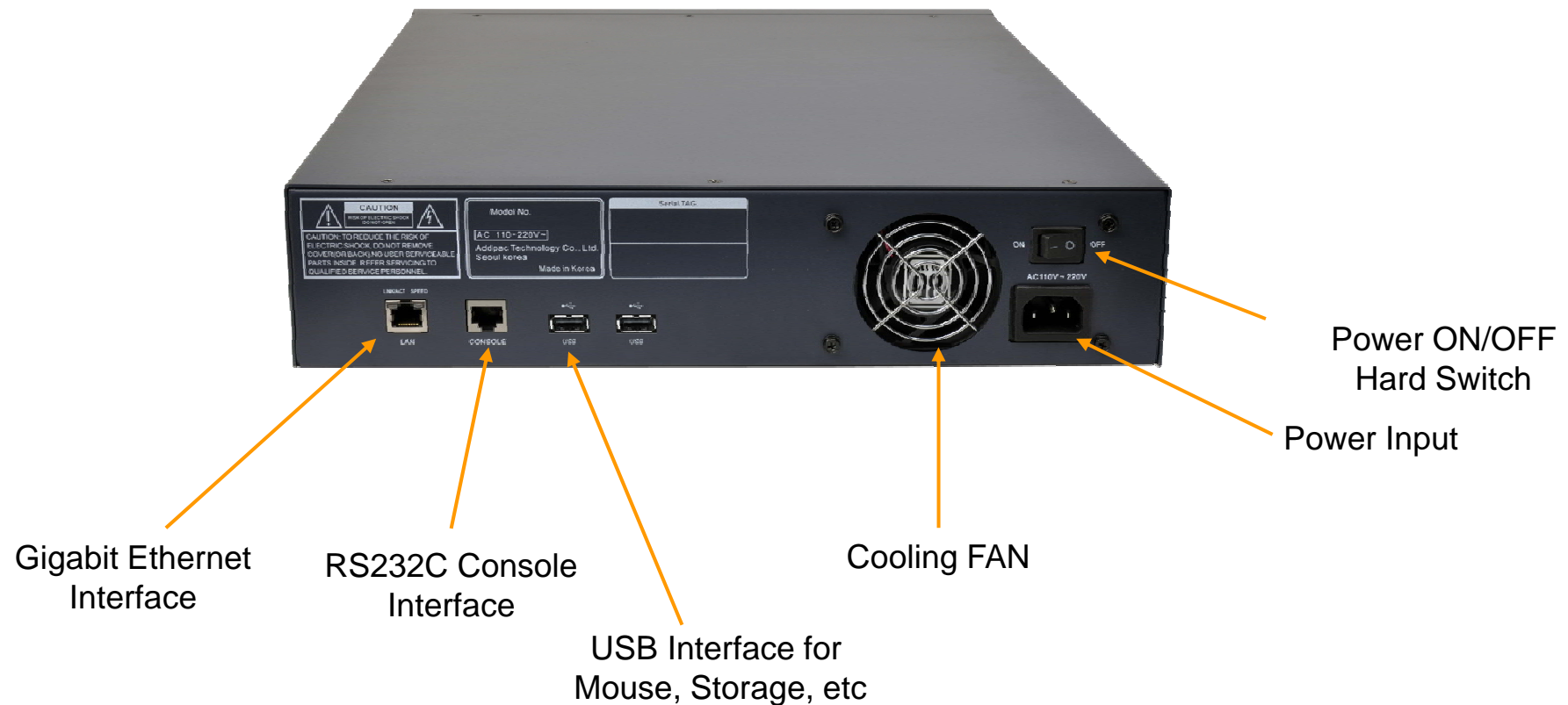


Power On/Off Switch with LED Indication LAMP

Hardware Specification

AP-NR1500 IP Voice Call Recording Server

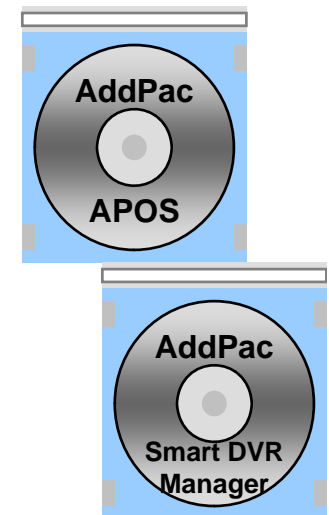
AP-NR1500 Back Side



Software Service

AP-NR1500 IP Voice Call Recording Server

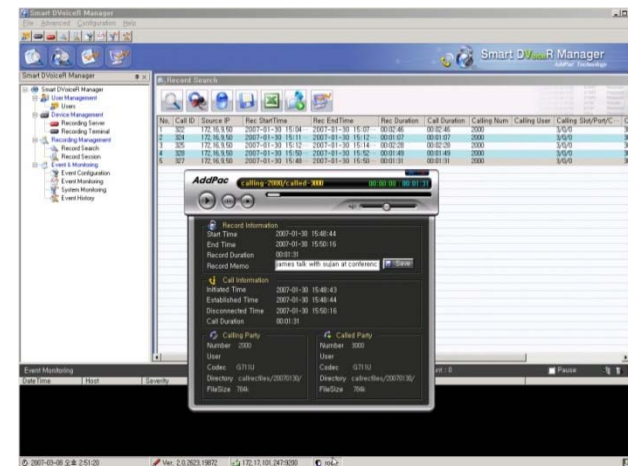
- **Built-in AddPac Internetworking Software**
 - Scalability, Functionality, and Stability Features
 - Advanced Network DV_{oice}R Recording & Live Streaming Features
 - QoS Control Features
- **Firmware Upgradeable Architecture**
- **Industry Standard Network Protocol Features**
- **Highly User Friendly Management Features**
 - PC based Window Program
 - Smart DV_{oice}R Manager



Smart DVoiceR Management Program

AP-NR1500 IP Voice Call Recording Server

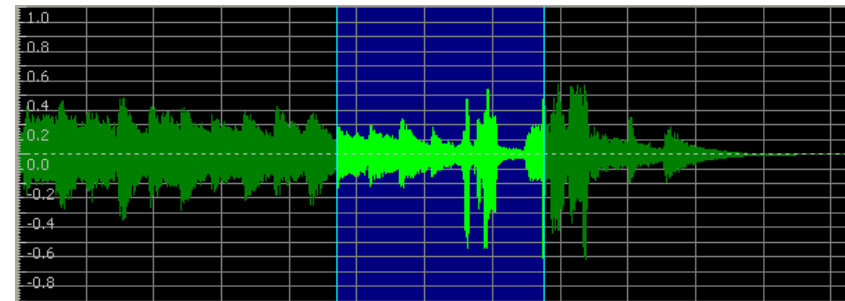
- Call History Management (search/modify/delete/save)
- Media Play Management (Play/Stop/Seek/Pause)
- Live Call List Management, Live Call Monitoring
- Local Backup (File Manager Support, PC HDD, DVD) and Local Play
- User Management (registration/modify/delete/search)
- Server Status (CPU/Memory/HDD) & Event Monitoring
- Waveform Analyzing Function
- Recording Source Management (VoIP Gateway, IP Phone, etc)
- Live Recording Board



Application Service

AP-NR1500 IP Voice Call Recording Server

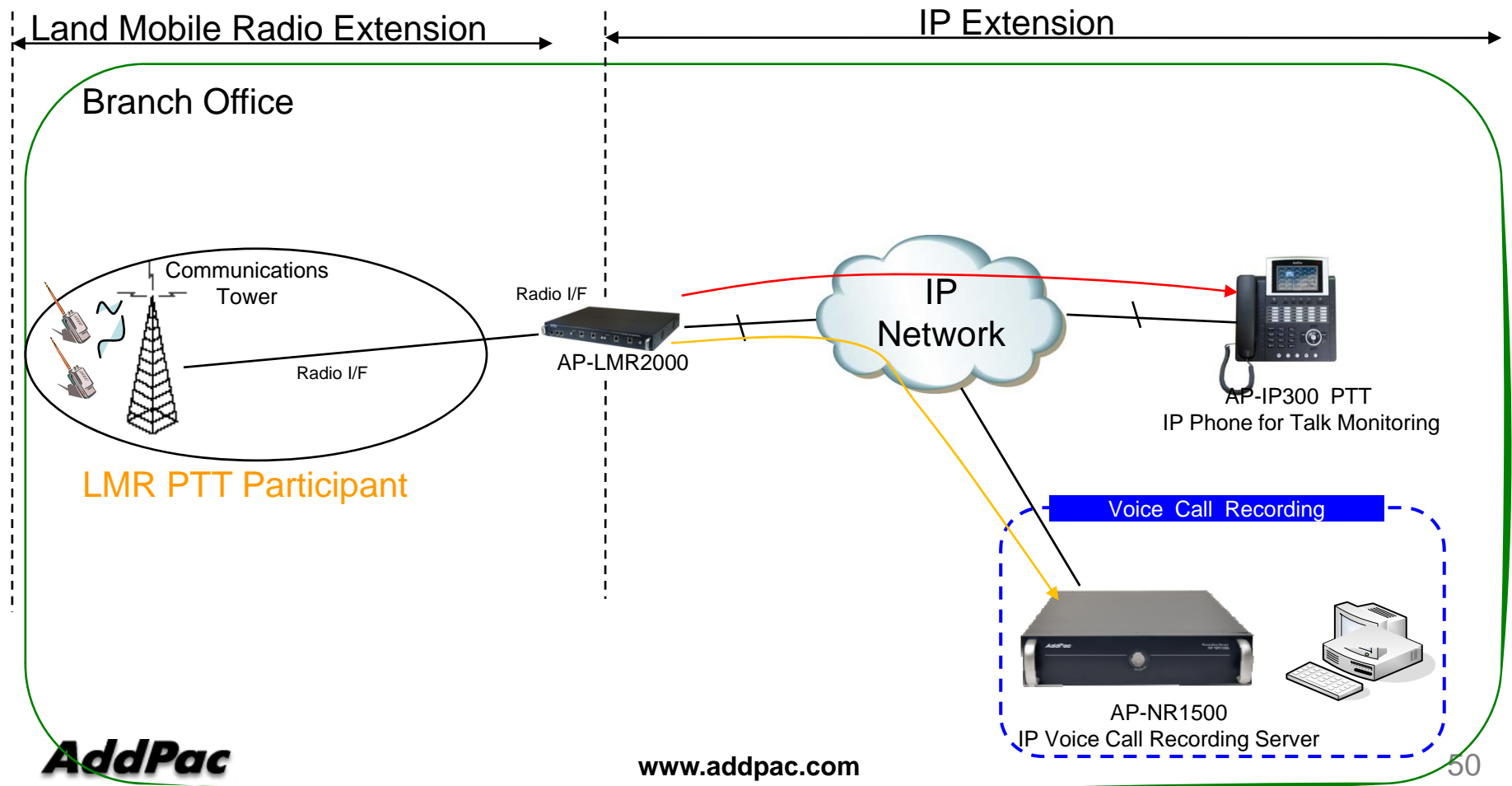
- Call Center Application
- Enterprise Application
- All IP Network Application



Radio Talk Monitoring in IP Network

AP-LMR2000 LMR Gateway

- LMR Gateway to IP Phone Service Diagram





Thank you!

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