AP-LMR1000
LMR(Land-to-Mobile Radio) Gateway Radio Interface

Radio Port CLI (Command Line Interface) Configuration

AddPac Technology

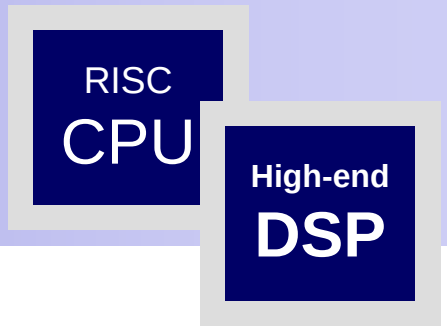
Sales and Marketing

Contents

Product Overview

- 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
- One(1) Module Slots for Radio Interface (E&M, Radio, 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
- Firmware Upgradeable Architecture
- Advanced Voice QoS Mechanism
- Powerful Web based Management
- RS232C Port Support for Command Line Interface

Hardware Specification



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

Hardware Specification

AP-LMR1000 Front Side

LAN0(10/100Mbps)

LAN1 (10/100Mbps)

RS232C
Console Port

Hardware Specification

AP-LMR1000 Land to Mobile Radio Gateway

AP-LMR1000 Back Side

Power Inlet

Power Switch

Radio Interface Module

Hardware Specification

	AP-RADIO2	AP-RADIO4	AP-E&M4
Radio Interface Module			
Port Number	2- Port Radio Interface Module (2xRJ45)	4- Port Radio Interface Module(4xRJ45)	4- Port E&M Interface Module(4xRJ45)

Hardware Specification

Example (AP-E&M4 Card) : 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

Hardware Specification

Example (AP-RADIO4 Card):TTL Level Custom Board for Radio Interface(RJ45)

Lead Name	Pin	Description
PTT Rx	Pin 2	TTL Level : 0V~5V , PTT In Signal
PTT Tx	Pin 7	TTL Level : 0V~5V , PTT Out Signal
Audio IN	Pin 4	Analog Voice Signal, Rx Voice Signal Vp-p : (-2v ~ 2v), Vrms : Max 700mV
Audio Out	Pin 5	Analog Voice Signal, Tx Voice Signal Vp-p : (-2v ~ 2v), Vrms : Max 700mV

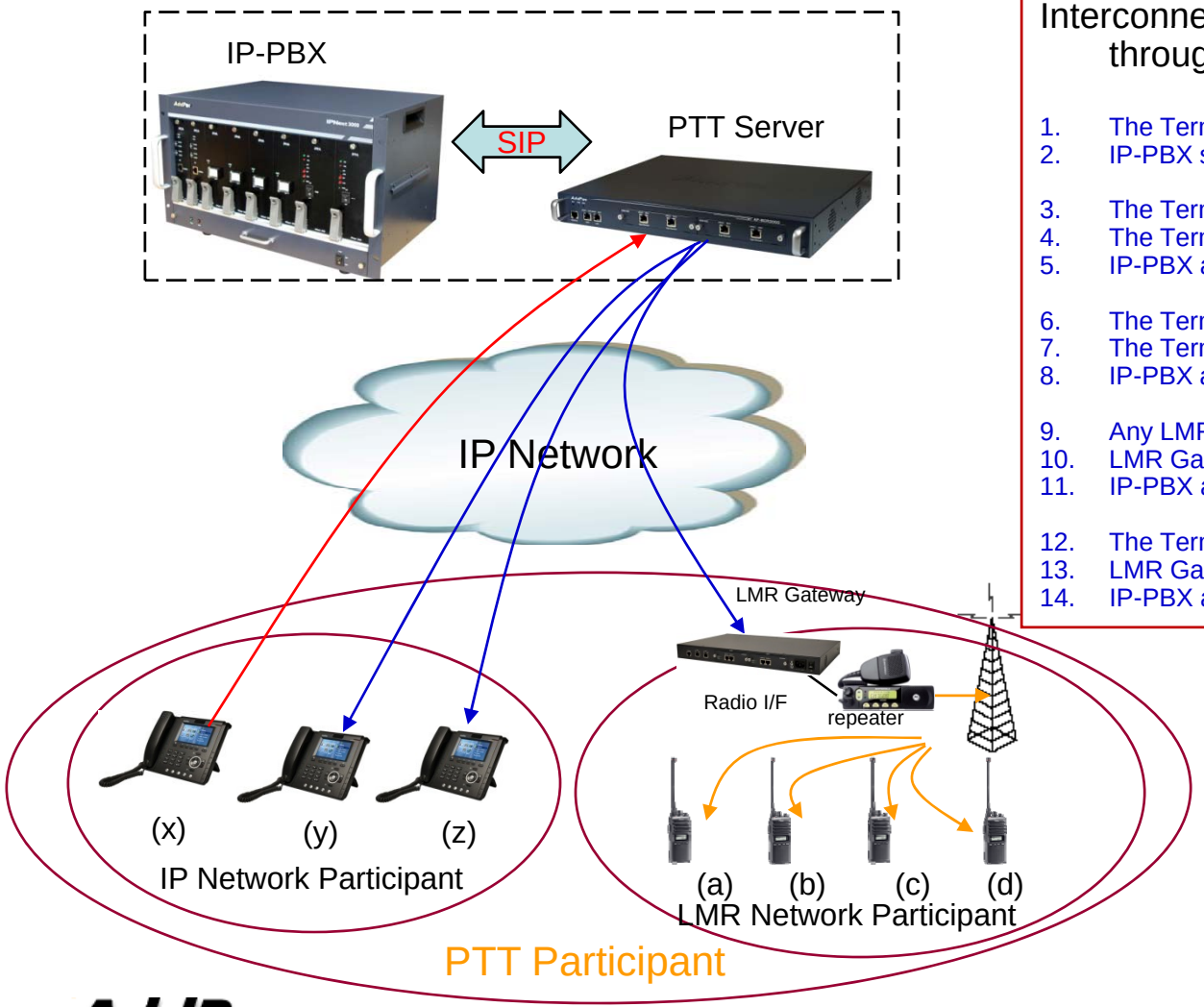
LMR Service

- 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

- AddPac RoIP Solution Features
  - LMR Gateway(Ex : AP-LMR1000) 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(Ex : AP-PTS3000) support powerful media data relay, broadcasting, multicasting and PTT group management.
  - RoIP Solution supports emergency and group PTT service.

LMR Service Examples



Interconnection LMR systems to IP network through AddPac RoIP solution.

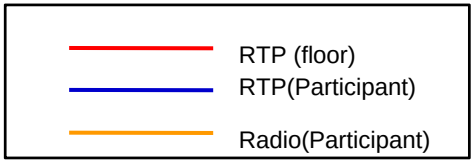
1. The Terminal(x) originate a PTT conference.
2. IP-PBX send invitation message to all participant.

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.

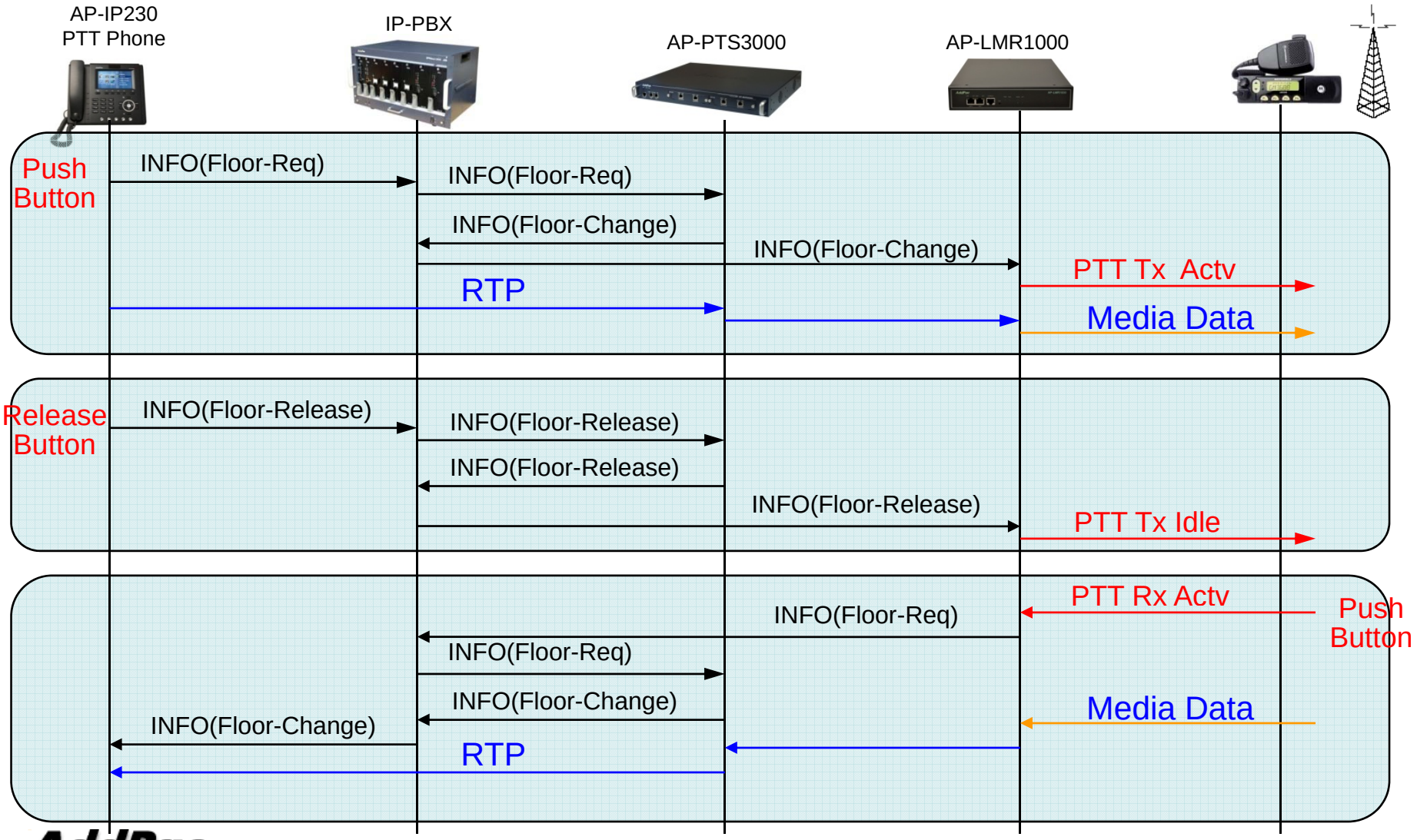
6. The Terminal(x) releases the 'floor button'.
7. The Terminal(x) send a 'release-request' message.
8. IP-PBX and PTT servers control media-relay.

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.

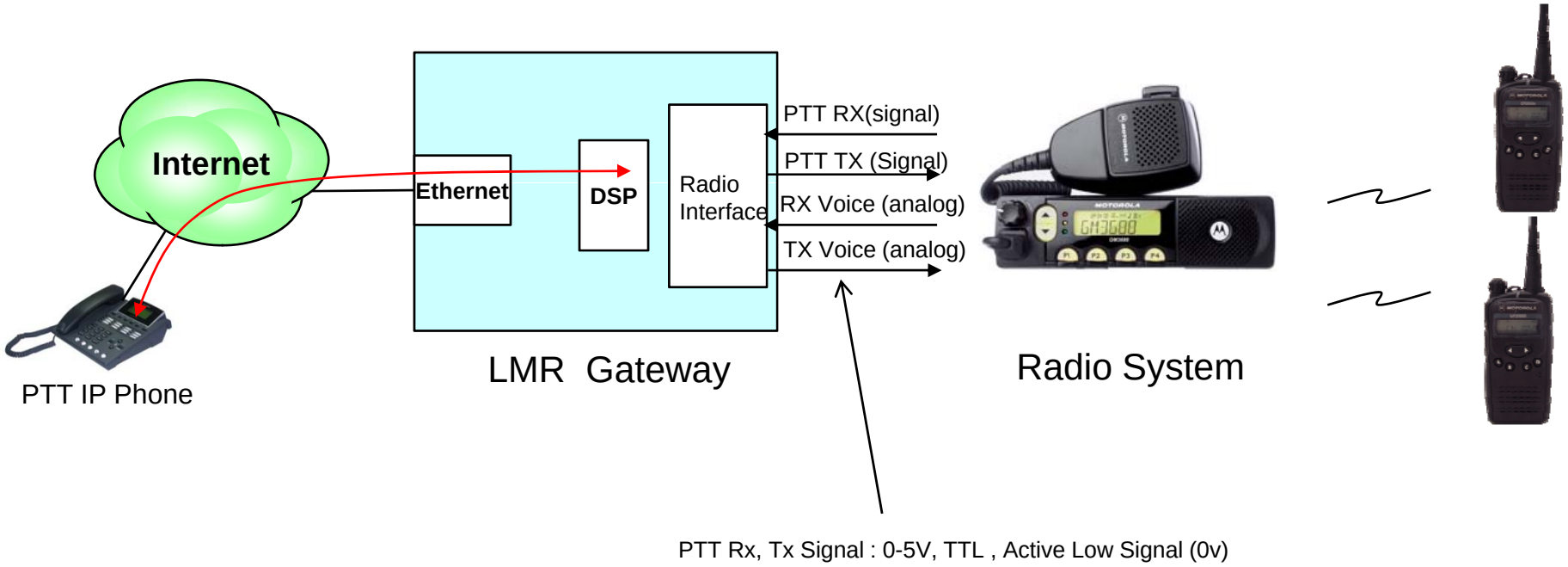
12. The Terminal(a) releases the 'floor button'.
13. LMR Gateway send a 'release-request' message.
14. IP-PBX and PTT servers control media-relay.



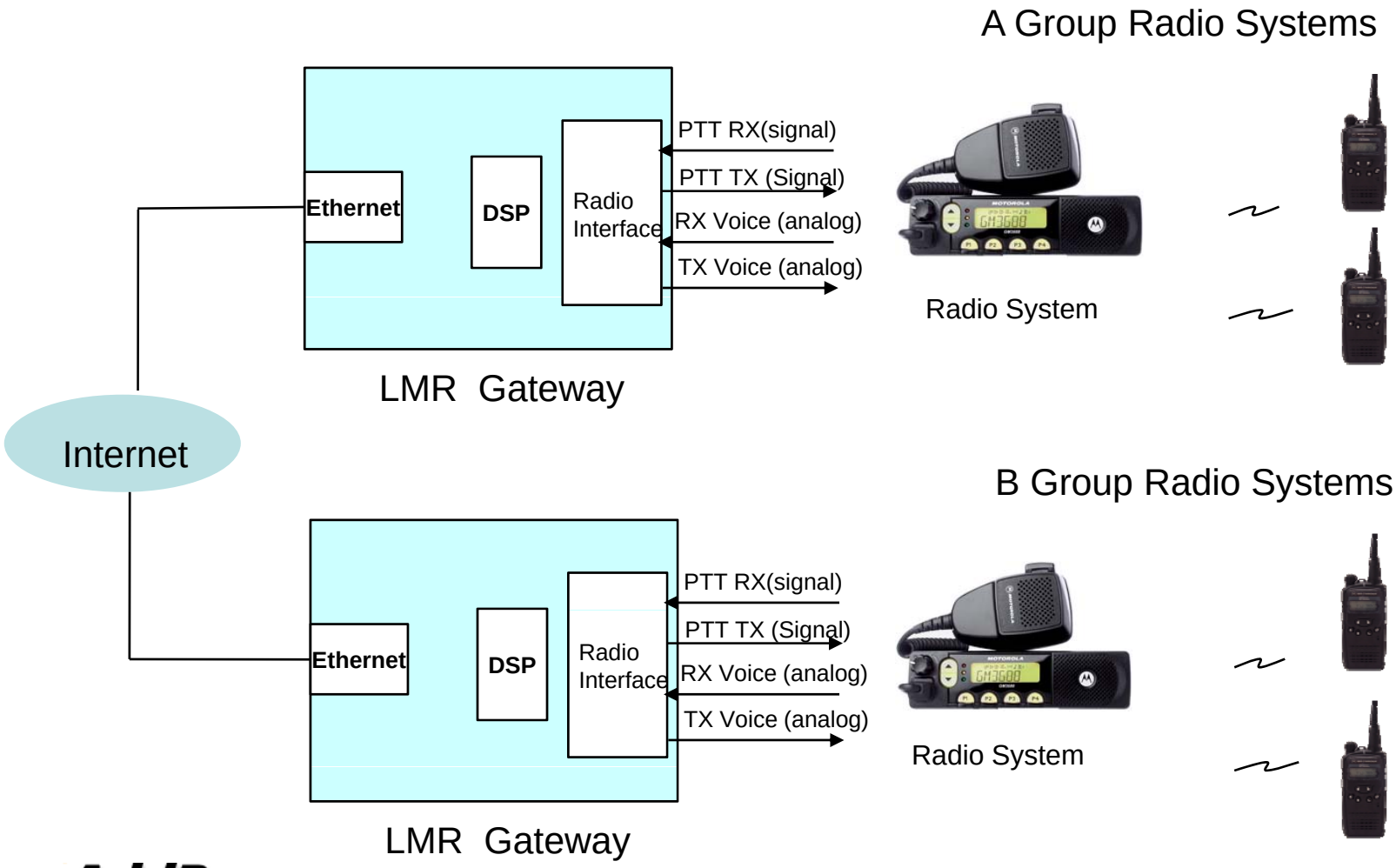
RoIP System Message Flow



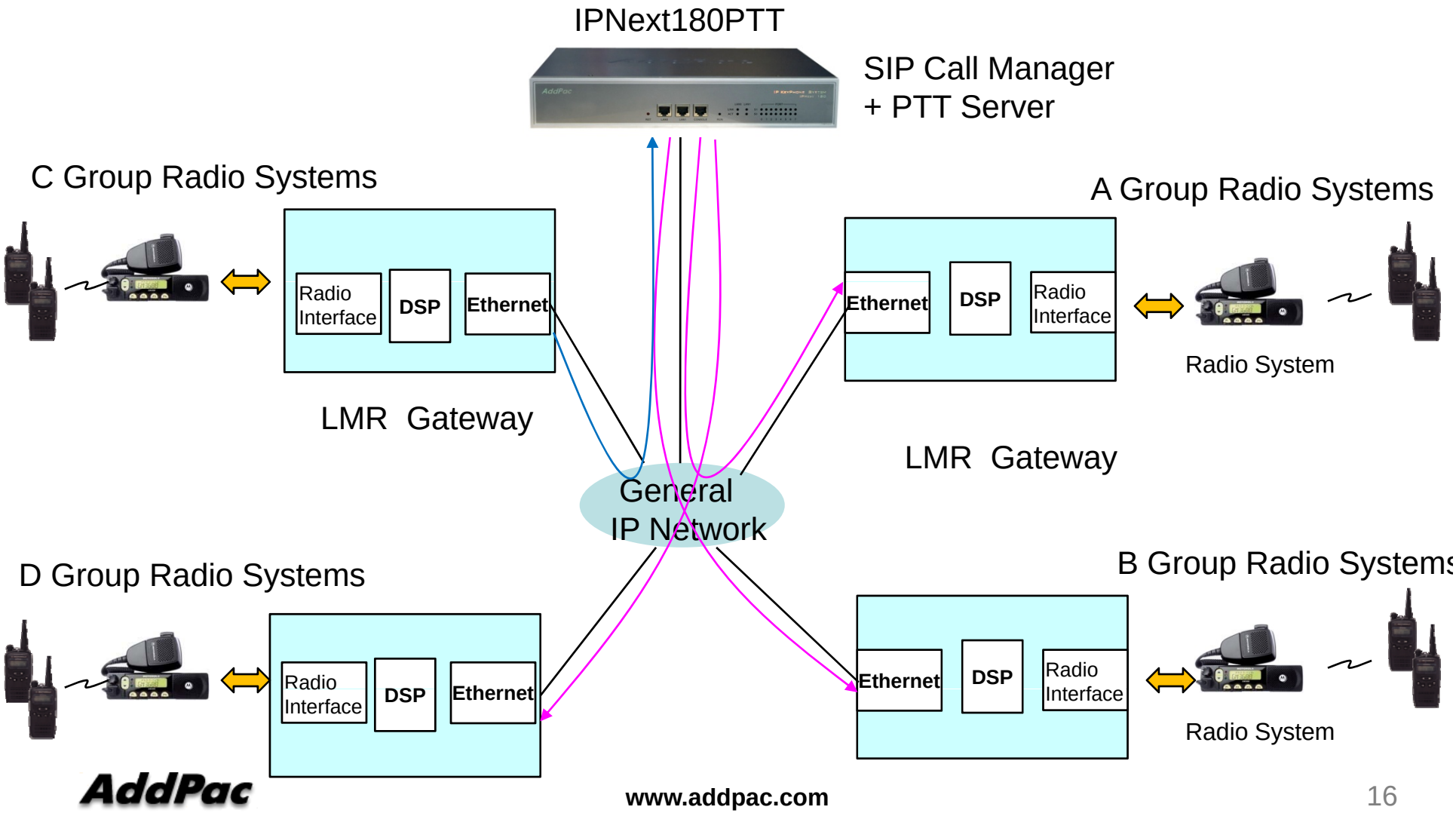
System Interface between LMR Gateway and Radio



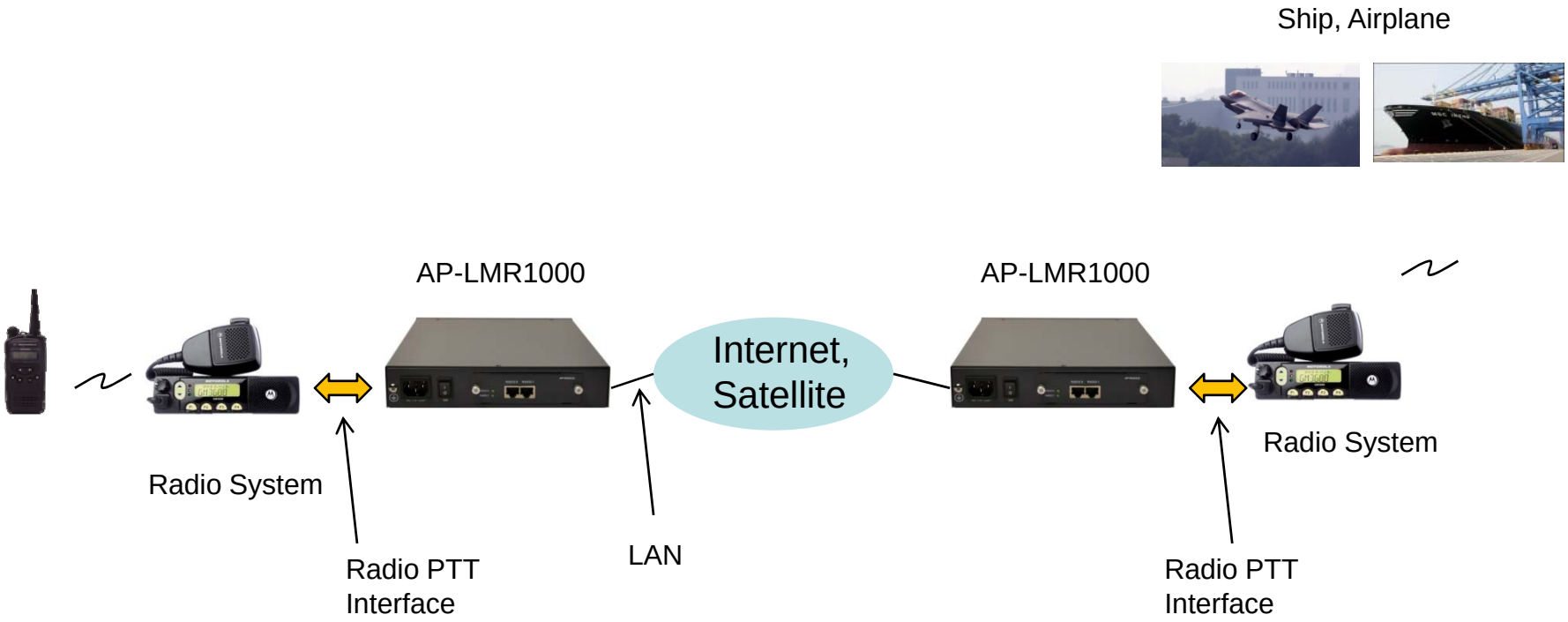
Peer-to-Peer LMR Gateway Service (Remote)



General Radio LMR Interwork Solution



Peer-to-Peer LMR Gateway Service



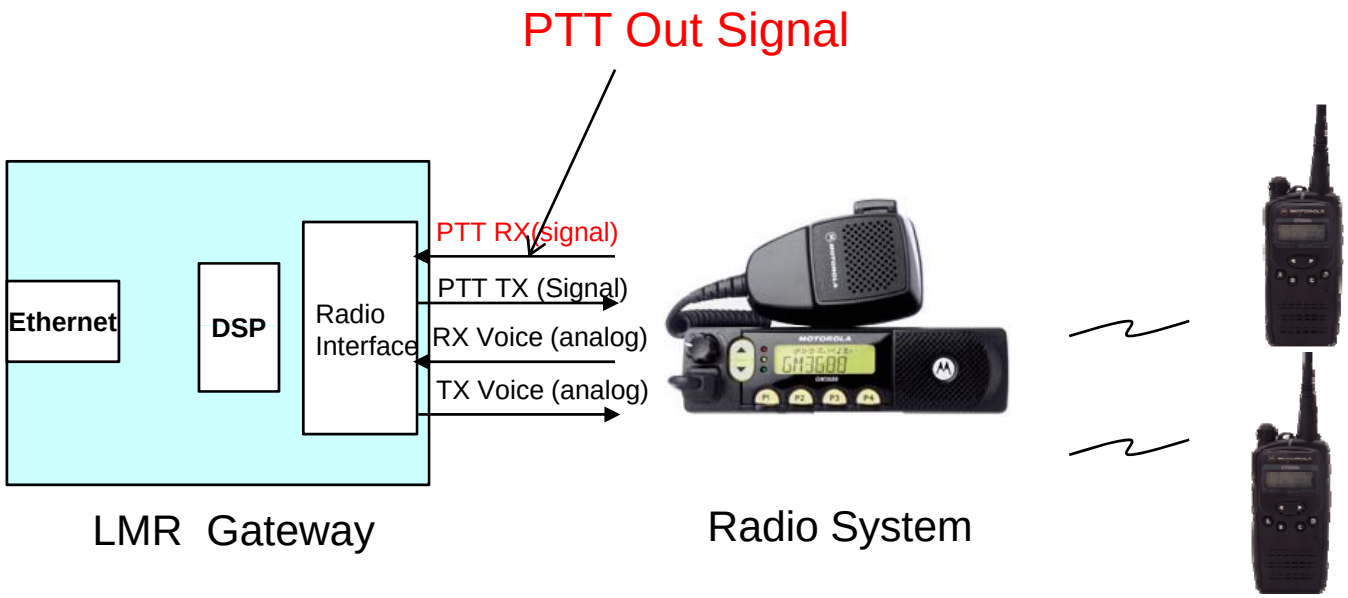
E&M Radio Port CLI (Command Line Interface) Configuration via RS232C Console or Telnet

Contents

- CASE 1 : Radio System provide PTT Out Signal
  - ✓Multi-Party Radio PTT Service
  - ✓Peer to Peer Radio PTT Service

- CASE 2 : Radio System doesn't provide PTT Out Signal
  (Voice Activity Detection Mode)
  - ✓Multi-Party PTT Service
  - ✓Peer to Peer PTT Service

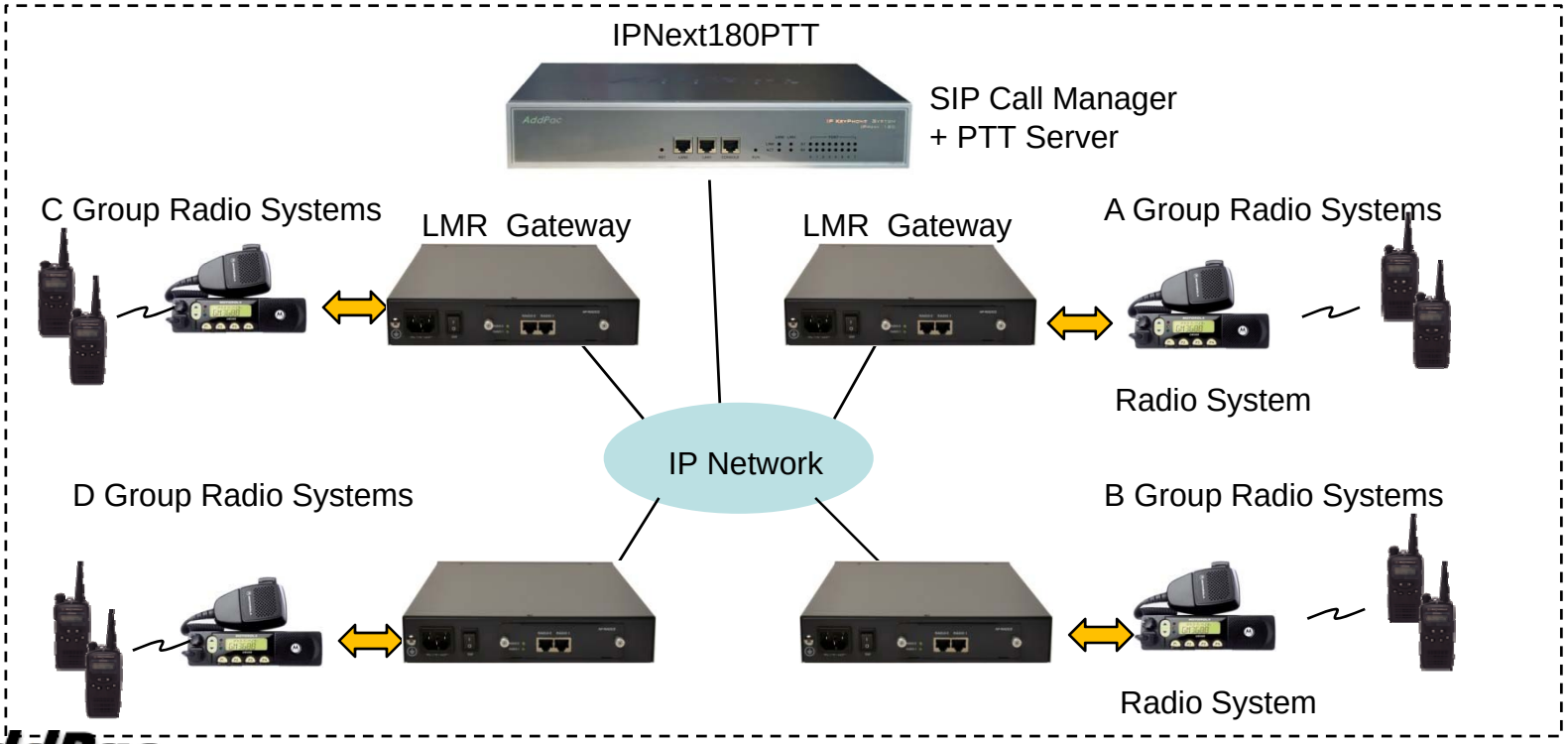
CASE 1 : Radio System Provides PTT Out Signal



CASE 1 : Radio System Provides PTT Out Signal
Multi-Party Radio PTT Service

LMR Gateway CLI
voice-port 0/0
    signal lmr
    lmr m-lead dialin

Network Diagram



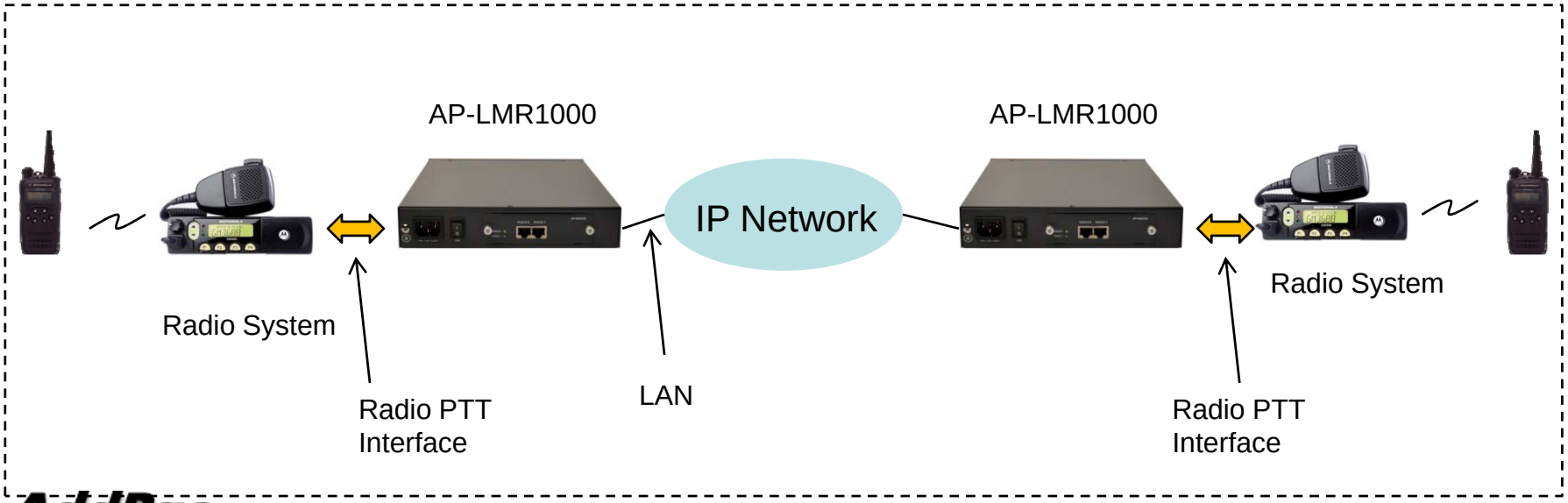
CASE 1 : Radio System Provides PTT Out Signal

Peer-to-Peer Radio PTT Service

LMR Gateway CLI

```
voice-port 0/0
    signal lmr
    lmr m-lead peer-to-peer
```

Network Diagram



CASE 2 : Radio System doesn't provides PTT Out Signal
Voice Activity Detection Mode

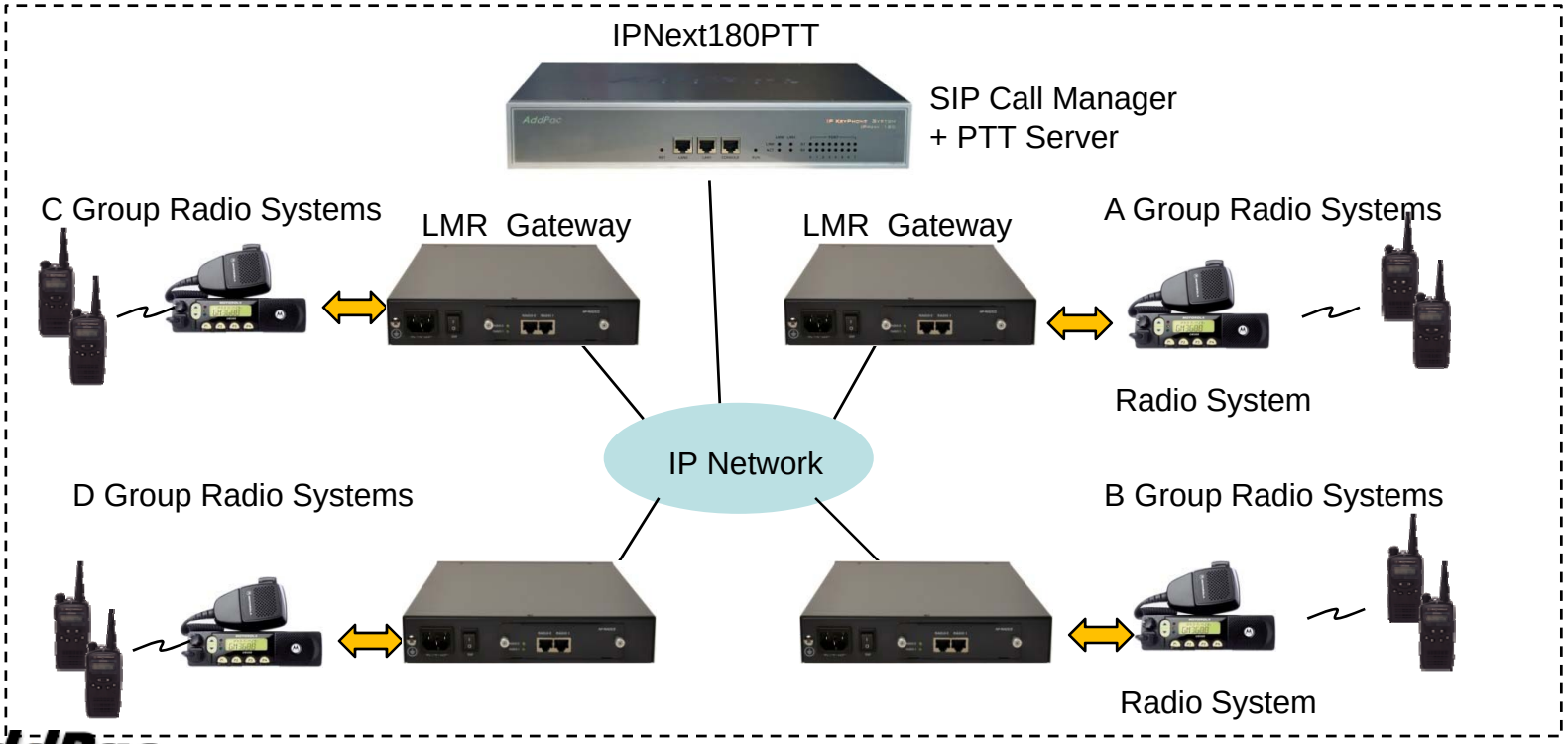
LMR Gateway CLI
Voice Activity Detection
  voice-port 0/0
    lmr voice-detect ActiveLevel IdleLevel ActiveCount IdleCount
      * ActiveLevel : 2 ~ 55 (-dBm) (default : 35)
      * IdleLevel   : 10 ~ 60 (-dBm) (default : 55)
      * ActiveCount : 0 ~ 1024 (count of 10 msec) (default : 5)
      * IdleCount   : 3 ~ 2048 (count of 10 msec) (default : 10)
    (ex) lmr voice-detect 35 55 5 10

CASE 2 : Radio System doesn't provides PTT Out Signal
Multi-Party Radio PTT Service

LMR Gateway CLI

```
voice-port 0/0
    signal lmr
    lmr m-lead inactive
```

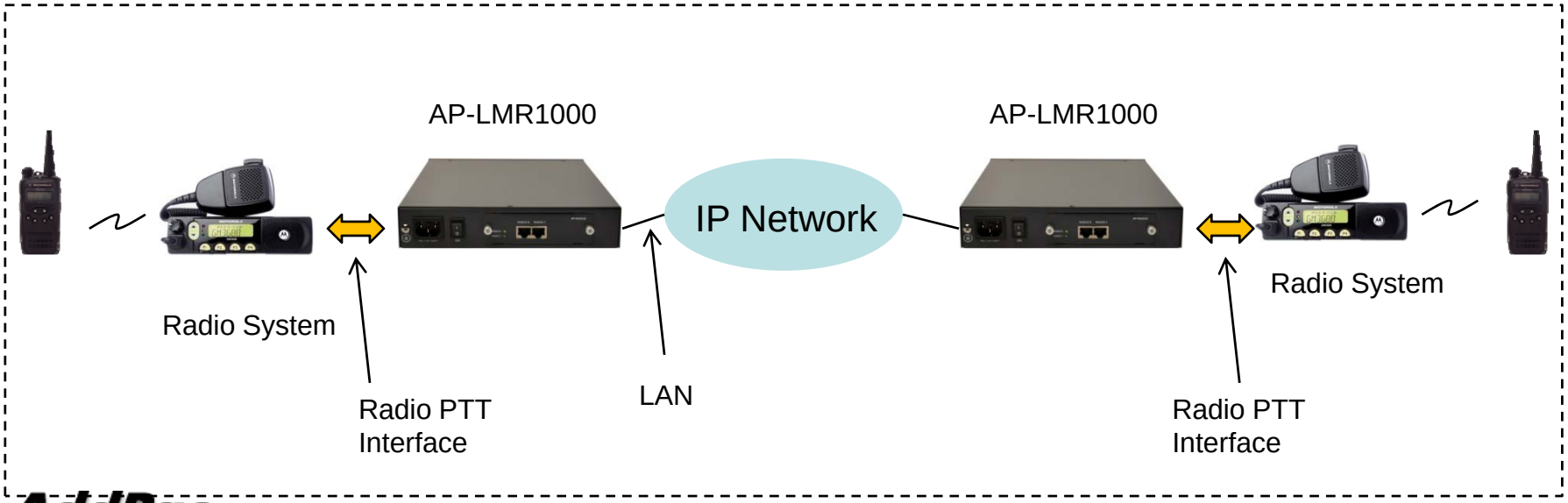
Network Diagram



CASE 2 : Radio System doesn't provides PTT Out Signal
Peer-to-Peer Radio PTT Service

LMR Gateway CLI
voice-port 0/0
signal lmr
lmr m-lead inactive peer-to-peer

Network Diagram



Thank you!

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