VoIP

AP-MG5000 Next Generation Media Gateway

Jan. 2005
Technical Sales and Marketing
AddPac Technology
www.addpac.com
**AP-MG5000 Next Generation Media Gateway**

<table>
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<th>No.</th>
<th>Interface</th>
<th>Explanation</th>
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<td>Module Slot 0-3</td>
<td>Four(4) Digital E1/T1 Interface, One(1) 10/100Mbps Fast Ethernet</td>
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**Explanation**

1. **Asynchronous Serial**
   - One(1) RS-232C serial ports for Local system management
2. **Gigabit Ethernet**
   - Two(2) 10/100/1000Mbps Gigabit Ethernet Ports for LAN interface
3. **Fast Ethernet Switch**
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   - Four(4) Digital E1/T1 Interface, One(1) 10/100Mbps Fast Ethernet

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[www.addpac.com](http://www.addpac.com)
**AP-MG5000 Media Gateway Product Overview**

**APOS Internetworking Protocol Stack**

AddPac Network Hardware Platforms for Data, Voice, Multimedia, and Security
AP-MG5000 Media Gateway Product Overview

APOS Internetworking S/W World

- APOS Internetworking Software World
  - AddPac Operating System (APOS)
  - Support Industry Standard
  - Integrated Networking Protocols
  - Optimized Performance & Functionality
  - Easy to use, Installation, and Maintenance

Features
- IP Routing
- VPMS (Plug & Play)
- SIP
- H.323
- MGCP
- SIP
- FoIP
- PSTN
- Core Network
- Edge Network
- Interoperability

Protocols
- H.323
- MGCP
- SIP
- VoIP
- PSTN
- FoIP

Remote Management
- Web based Management
- SNMP
- CLI
- FTP/TFTP
- VLAN Routing
- DHCP

Services
- FAX
- Voice Codec
- Analog Phone
- MFC-R2, ISDN-PRI, SS7
- NAT/PAT
- PPPoE
- VPMS (Plug & Play)

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AP-MG5000 Media Gateway Product Overview

APOS Internetworking S/W World (cont.)

1. ATM Connectivity
2. VoIP Connectivity
3. Voice over IP Services
4. VoIP Call Managements
5. Enhanced QoS Managements
6. IP and WAN Protocols
7. Operations & Managements
8. Other Scalability
9. Security Managements
10. Other Scalability

AddPac Network Hardware Platforms for Data, Voice, Multimedia and Security

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Digital E1/T1 Interface Connectivity

- E1/T1
  - ISDN PRI signaling support (network mode, user mode)
  - R2 signaling support (calling number receive support)
  - DTMF signaling support
  - Clock source master mode, slave mode support
  - In case of channel allocation, ascending / descending random support
  - One physical E1/T1 interface can be divided into several logical channel groups
  - Super frame, extended super frame T1 framing support
  - AMI, AMI-BELL, AMI-GTE, AMI-DDS, B8ZS T1 line code support
  - Immediate, Wink-start T1 CAS type support
  - SS7*
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Voice over IP Service

- H.323, SIP, and MGCP Triple Stack
  - Concurrent Triple VoIP Stack Software
  - Single Hardware with Three VoIP Service
  - New APOS-NX Version
- 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
- MGCP
  - IETF RFC2705bis-02 Standard MGCP 1.0
AP-MG5000 Media Gateway Product Overview

Voice over IP Service (cont.)

• 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

• MGCP
  – Secondary call agent assignment function
  – Default package assignment
  – Announcement Server Package, Generic Media Package, Handset Package, Line Package, Trunk Package support
  – MGCP call agent assignment according to the domain name
  – T.38 real-time fax relay support
  – DTMF relay support based on RFC2833
### AP-MG5000 Media Gateway Product Overview

#### Voice over IP Service (cont.)

**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 RTP 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

**FAX**
- Fax relay mode supporting T.38, inband-T.38, bypass mode
- Lost packet compensation with redundant setting in case of T.38 fax relay
- Fax relay mode, rate setting for remote end

VoIP

![AddPac Appliance](image)
VoIP Call Managements

- 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
AP-MG5000 Media Gateway Product Overview

Enhances QoS Managements

- **Enhances Transmit Voice QoS Features**
  - Voice Traffic Priority Queuing
  - QoS Service Profiling
  - Providing Virtual Network Transmit Algorithm
  - Real-time Voice Traffic QoS Support
  - RTP Packet Transmit Interval Control
  - Supporting RTP Packet Redundancy Scheme
  - IP Header Control such as ToS, Diffserv

- **Enhances Receive Voice QoS Features**
  - Dynamic Jitter Buffer Management
  - Error Concealment
  - Support T.38 FAX Data Error Recovery Scheme

Best and Optimal Voice Quality

![Diagram of voice communication between PSTN and internet](image)
IP and WAN Protocols

- **IP Routing Protocols**
  - Multi-protocol Internetworking Services
  - Static IP routing
  - RIP v1/v2 (opt.)
  - OSPF v2 routing protocols support (opt.)
  - Transparent Bridging (IEEE Spanning Tree Protocol)

- **WAN Protocols**
  - Point-to-Point over Ethernet Protocol (PPPoE)
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Network Managements

- **SNMP**
  - Standard Simple Network Management Protocol (SNMP) Agent support
  - MIB v1 and v2 Support

- **Web-based Management**
  - Standard Digital E1/T1 Voice Interface

- **Watch-dog Function**
  - Hardware, Software watch-dog services

- **Remote Management**
  - Telnet
  - Rlogin
  - Console

- **Auto Upgrade Service**
  - HTTP server based APOS image and configuration file auto-upgrade support

- **Batch Job Function**
  - Text based script downloading
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Security Managements

- IP packet filtering
- IP access list
- User authentication function
  - Password Authentication Protocol (PAP)
  - Challenge Handshake Authentication Protocol (CHAP)
- Enable/Disable specific protocols
- Auto-square connect of console and Telnet session
- Account Management function for multi-level user
- SNMP/TELNET/FTP/HTTP/TFTP port assignment function
- SNMP/TELNET/FTP access list management
- Boot mode security checking function
**AP-MG5000 Media Gateway Product Overview**

**Network Scalability**

- **Bridging Service**
  - Spanning Tree Bridging protocol (IEEE) support
- **DHCP**
  - Server and Relay
- **IP Accounting**
- **PAT (Port Address Translation)**
- **NAT (Network Address Translation)**
- **Cisco Style CLI (Command Line Interface)**
- **PPTP (Point-to-Point Tunneling Protocol)**
- **NTP (Network Time Protocol)**
- **FTP/TFTP**
  - Server and Client support
- **DNS**
  - Dynamic DNS Client support
## AP-MG5000 Next Generation Media Gateway

### AP-MG5000 Hardware Specification

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AP-MG5000 4E1 DSP Module

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<th>Processor</th>
<th>64bit Communication Microprocessor</th>
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<tr>
<td>Memory</td>
<td>SDRAM</td>
<td>64Mbyte High Speed SDRAM</td>
</tr>
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<td></td>
<td>Boot Memory</td>
<td>512Kbyte Flash Memory</td>
</tr>
<tr>
<td>Network Interface</td>
<td>Six(6) 10/100 Fast Ethernet Ports for LAN interface</td>
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<td></td>
<td>1-Port 10/100Mbps Fast Ethernet Interface (1 x RJ45)</td>
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### AP-MG5000 Next Generation Media Gateway

#### AP-MG5000 System CPU board

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<td>Memory</td>
<td>Flash Memory</td>
<td>16Mbyte</td>
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<td></td>
<td>SDRAM</td>
<td>128Mbyte High Speed SDRAM</td>
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AP-MG5000 Next Generation Media Gateway

AP-MG5000 Dual Power Supply

Power Supply Module
Power Switch
110~220VAC
AP-MG5000 Media Gateway Product Overview

AP-MG5000 4E1/T1 Digital Voice Module

- Fast Ethernet Port
- Hot-Swap Indication LED
- E1/T1 Digital Voice Interface
## AP-MG5000 Media Gateway Product Overview

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### Power Input
- VAC 110~220V Free Voltage, 50/60Hz, Dual Power Supply Unit

### Operating Temperature
- 0°C ~ 50°C

### Storage Temperature
- -40°C ~ 85°C

### Dimension
- Width x Depth x Height: 132 mm x 445 mm x 435 mm, 3U x 19” Rack Mountable Chassis
- Weight: 12kg
**AP-MG5000 Voice Networking Configuration**

VoIP Gateway Appl. (Inter-office calls)

- **PSTN**: Public Switched Telephone Network
- **PBX**: Private Branch Exchange
- **Digital E1/T1**: Digital Trunk Lines
- **AP-MG5000**: AddPac Media Gateway
- **AP-VPMS Server**: AddPac Voice and Video Management System
- **EMS**: Elementary Management System
- **Leased Line/ATM/Frame-Relay/IP Router, xDSL/Cable Modem, etc.**
- **AddPac AP-MG5000 Media Gateway**
- **Analog Phone**

**Voice Call Flow**

- Green: Voice Call Flow
- Blue: PSTN Interface
- Red: Voice+Data, Ethernet or WAN Interface
- TRUNK n x E1 Voice Interface for PSTN Interworking

**New York**

- **PSTN**
- **PBX**
- **Digital E1/T1**

**Seoul**

- **PSTN**
- **AP-MG5000**
- **PBX**
- **Digital E1/T1**
AP-MG5000 Networking Configuration

VoIP Gateway Appl. (VoIP to PSTN Inter-working Call Flow)

Voice Call Flow

FXS Analog Voice Interface

Voice+Data, Ethernet or WAN Interface

TRUNK n x E1 Voice Interface for PSTN Interworking

AddPac AP-MG5000 Media Gateway

AddPac AP-MG5000 Media Gateway

Voice Interface

Leased Line/ATM/Frame-Relay/IP Router, xDSL/Cable Modem, etc.

Analog Phone

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AP-MG5000 Media Gateway Product Overview

AP-MG5000 Ordering and Pricing

• AP-MG5000 Media Gateway
  AP-MG5000-01 : AP-MG5000 Standard Configuration
    - Two(2) Gigabit Ethernet Interface
    - Six(6) Fast Ethernet Interface
    - One(1) RJ45 Console Port
    - 64bit RISC CPU, 16MB Flash, 128MB SDRAM
    - APOS v5.xx with Operation Manual
    - Including CAB-LAN, CAB-CON

MG5000-4E1 : 4 Port Digital E1 Interface Module
MG5000-4T1 : 4 Port Digital T1 Interface Module
CAB-LAN : RJ45 Ethernet Cable
CAB-CON : RJ45 RS-232C Console Cable
## AP-MG5000 Media Gateway Product Overview

### AP-MG5000 Comparison Table

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<th>Specification</th>
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<td>Digital 4E1/T1 VoIP Module</td>
<td>Up to 4</td>
</tr>
<tr>
<td>10/100/1000 Mbps Ethernet Ports</td>
<td>2</td>
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<td>10/100 Mbps Ethernet Ports</td>
<td>6</td>
</tr>
<tr>
<td>Console Port</td>
<td>1</td>
</tr>
<tr>
<td>Main CPU</td>
<td>High-End Power PC 64Bit RISC</td>
</tr>
<tr>
<td>Main Flash Memory</td>
<td>16Mbyte</td>
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<td>Main Memory</td>
<td>128Mbyte</td>
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<td>Internetworking OS</td>
<td>APOS</td>
</tr>
<tr>
<td>H.323, SIP, MGCP VoIP Protocol, T38 FAX</td>
<td>YES</td>
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<td>PPPoE, PPTP Network Protocols</td>
<td>YES</td>
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<td>Enhanced QoS Management Feature</td>
<td>YES</td>
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<td>IP Routing Protocols Including NAT</td>
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