



IO-POWER APM-101RH/102RH/103RH Series

802.11a/g/n Multiple Hops Bridge

Outdoor WiFi MIMO Wireless Access Point



The APM-100RH series are enterprise and carrier-grade 802.11a/g/n Outdoor Wireless Access Point, which offers customer a robust and high performing solution for PTP / PTMP / Hotline / Hotzone applications in both license-free 2.4GHz and 5GHz bands. The APM-100RH series are suitable for campuses, hospitality, healthcare, warehousing and wider metropolitan area deployments.

IOP-APM-100R H Category

Model	Radio Spec.	Radio Amount
APM-101RH	2.4GHz & 5GHz Dual-Band 2x2 MIMO High Power 23dBm (200mW)	1
APM-102RH	2.4GHz & 5GHz Dual-Band 2x2 MIMO High Power 23dBm (200mW)	2
APM-103RH	2.4GHz & 5GHz Dual-Band 2x2 MIMO High Power 23dBm (200mW)	3

The APM-100RH series offer three major features.

- **Multi-Hops feature with low loss of backbone throughput:**
 The throughput reduces about 5~8Mbps/each Hop. From the 5th Hop on, the Throughput will not reduce anymore. The throughput can be remained more than 120Mbps. Even after 10 Hops, the latency is still within 10ms.
 103RH has 3 RF modules, so it can support 3 backbones for the gathering of wider bandwidth from different directions.
- **Multi-Hops + Mesh Networking System:** This solution is for carrier-grade project that needs to provide wireless internet service or large-scale wireless surveillance image transmission.
 To solve the problem that the normal internet system breakdown, Mesh Network features such as auto route selection and self-healing is adopted here.
- **Multi-Hops + Mesh Networking System + High-Mobility:** This is for carrier-grade project that provide high-mobility transmission service in a large area. EX: wireless high-mobility surveillance transmission in city roads or highway, railway high-mobility data transmission, rapid transit (subway) high-mobility data transmission, and even high-speed train high-mobility data transmission.
 Mesh Networking System, collocating with the wide-bandwidth of Multi-Hops and the specially designed Mesh Client, high-mobility data can be transmitted fast and automatically via Mesh Networking System.



APM-100RH series have the advantages as below:

Flexible wireless backbone deployment options

Multiple radio interfaces were integrated by IO-Power's core data switching technology inside the APM-100RH series. Each radio interface can be configured independently to meet different wireless connectivity purposes. With the fast data switching between multiple radio interfaces, the backbone throughput will remain in a high level even after several relays between APs.

High-performance wireless backbone

With the new generation 802.11N MIMO technology, the APM-100RH, offer data link rate up to 300Mbps in each single radio interface, 160Mbps bandwidth. Short Guard Interval and Frames Aggregation methodology configurations improve the efficient of backbone usage, with total data link rate 300Mbps and 320Mbps bandwidth.

Security and efficient client connectivity

The nimble QoS (Quality of Service) configuration provides flexible management of user's access bandwidth of wireless connectivity. Perfect integrated with central RADIUS server and data encryption technique, the APM-100RH series provide a secure wireless connectivity for each client device.

Support CPE mode link functionality (ability to interconnect with other manufacturers products)

Focus on WISP Last Mile application demand and on-line integration of other brands of wireless devices need special features designed with the wireless station CPE mode, this features will let wireless system operators and SI able to design more secure wireless transmission systems, reduce the risk of integrating wireless transmission systems are compatible.

Support low speed mobility wireless roaming handover function of 50-100 km (actual support speed and transmission distance, depend on wireless signal strength)

The low speed moving wireless transmission requirements for general needs, specifically designed to support wireless roaming handover function at low speed of 50-100 km, through the advanced features of the roaming setting function at low speed, in wireless station setting 3 set of roaming wireless devices frequency, handover for low speed mobility wireless roaming.

Support multiple hops backhaul transmit system in interruption situation and after backhaul system backup failover link features

Multiple hops backhaul transmission system, faced hops transmission interrupt issues, through the secondary AP backup setting of the advanced features, to prepare set 3 AP SSID and Frequency for



backup link by wireless station mode, it will automatically fix the link mechanisms, and will reduce the risks of backhaul transmission line.

System construction of the antenna set-up and environment detection and signal strength display online reaction functions

- A. detection scan feature with a wireless set up environment to facilitate wireless engineers determine the channel selection use reference
- B. after the deployments of the antenna, wireless antenna proofreading mechanism through the built-in software, RSSI, signal strength, wireless information made to facilitate judgment antenna alignment or not, benefit builders antenna tuning jobs
- C. wireless link and transmission mechanism of software testing to confirm the transmission bandwidth wireless system exceeding above 50Mbps
- D. dynamic wireless signals and transmission rate and display icons, in order to facilitate wireless engineers determine the wireless system operation stability
- E. by the AP side (your base) and AC side (client or monitoring) detects each other link signals and transmission rates and information display mechanisms such as encryption or not, in order to facilitate wireless engineers and technicians for the future maintenance, judge signals at both ends of the wireless system operation



Mesh Networking Function (Optional software)

When installing backbones in a large-scale area, Mesh Networking function can be selected to offer special features as below:

- A. Mesh data transmission with OSI (Open System Interconnection Reference Model) Layer 2, Data Link Layer, can fasten the data handover and self-healing for connection, and lower the bandwidth loss because of Hopping. It can offer 100Mbps bandwidth after 10 Hops.
- B. Automatically searching for the best route
- C. Automatically disconnecting and searching available connections
- D. Automatically balancing data rate
- E. Automatically refreshing the node information of Mesh Networking System
- F. Automatically scanning and choosing channels
- G. Automatically update the system via Server or Gateway
- H. Automatically forming internet cloud
- I. Support fast transmission via automatic route searching
- J. Support fast roaming calculation of signals and data rate
- K. Support wide-bandwidth Mesh Networking transmission
- L. Support Multi-Gateway for backup use

Hi-mobile with Mesh Networking System (selectable software)

Mesh Networking System, collocating with the wide-bandwidth of Multi-Hops and the specially designed Mesh Client, can build Mesh high-mobility Networking, offering 100Mbps high-mobility throughput at 200KM/h.



Product Images



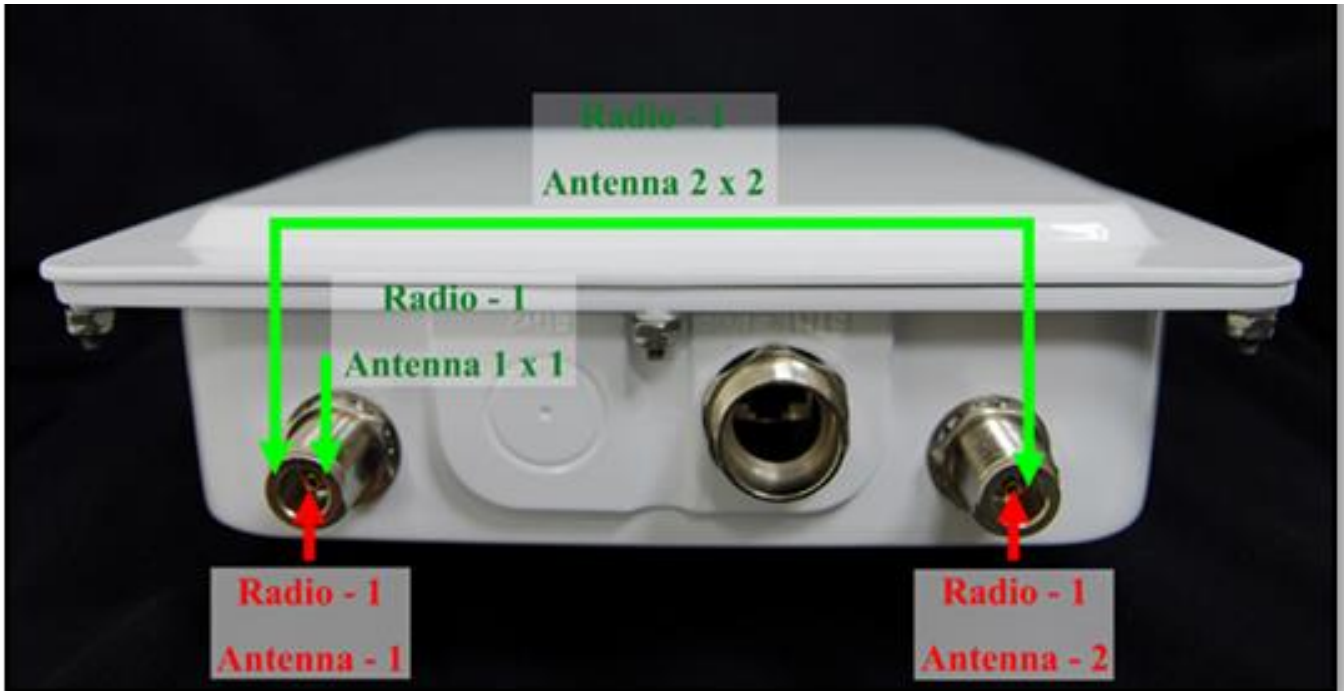
Model Name	APM-101RH	APM-102RH	APM-103RH
Rear Side			
Top of Antenna Connector			
Below of Antenna Connector			
Front Side			



Installation

The APM-100RH series product has up to 3 dual-band 2X2 MIMO radio interfaces. Each 2X2 MIMO radio interface will have 2 N-type connectors come out on the waterproof housing. We strongly recommend that check antenna attachment to match your configuration before the installation.

■ Antenna Connector Number Define by RF modules





■ Power Supply from PoE Install

A. PoE Power Supply Install :

110VAC Adapter transformer to 19VDC power and power through DC connector plugged into DC port and output PoE-48VDC power through PoE's RJ-45 network for wireless devices (Power + Data Out) and plug the other end of the network cable from your computer to a wired network RJ-45 Port (Data In), to build wireless devices and computer cable online.

B. Adapter Install:



C. PoE (Power over Ethernet) Power Supply for Device:



The bottom of the wireless device POE Ethernet waterproof port

Insert the DC connector of the transformer and power supply input is over more than **12VDC/4A ~ 24VDC/3A**; full load power consumption: **APM-101RH needs 10W/H, 102RH 14W/H, 103RH you want to 22W/H.**

PoE (Power over Ethernet) Passive type 48V-72W
 RJ-45 Ethernet jacks, power and data contained in the network cable and power supply to the wireless device and for data transmission.
 --PoE (Power over Ethernet) Passive type power supply maximum 72W/H
 --Network bandwidth is 1Gbps
 --Power supply distance 300 m
 --Network transmission distance of 150 meters
 --Use Cate 5e network cables to cope with 1Gbps transmission.



RJ-45 Ethernet jacks, data contained in the network cable, connect to the computer (or LAN, or camera, or ADSL, or other wireless device ...)

Special note 1: APM-101RH/APM-102RH/APM-103RH with high power RF module, power consumption is relatively large; it is recommend that PoE-48VDC use 72W Passive power pattern.

Special note 2: PoE Power supply Injector, LED lights display:

- PoE (Power over Ethernet) Passive type (48V-72W): after you plugged into power, red LED lit up, after you plug the network cable, **the green light does not light.**
- PoE (Power over Ethernet) Standard type (48V-32W): after you plugged into power, red LED lit up, after you plug the network cable, **the green light lit up.**



Specifications

Hardware Specification

Key Components	
Main Processor	Atheros AR7161(680Mhz)
Wireless Chipset	Atheros AR9220 based mini PCI module, Up to three modules
Switch Controller	Atheros AR8035 / Atheros AR8021
Flash Memory	16MBytes
SDRAM	128MBytes
Console	UART x 1(PCBA onboard)

Interfaces	
Wireless	<p>Up to three 2x2 MIMO radios, mini-PCI version 1.0 type 3A</p> <p>Frequency ranges :</p> <ul style="list-style-type: none"> a. USA : 2.400 ~ 2.483 GHz, 5.15 ~ 5.35 GHz, 5.5 ~ 5.7 GHz, 5.725 ~ 5.825 GHz b. Europe: 2.400 ~ 2.483 GHz, 5.15 ~ 5.35 GHz, 5.47 ~ 5.725 GHz c. Japan: 2.400 ~ 2.497 GHz, 5.15 ~ 5.35 GHz, 5.47 ~ 5.725 GHz d. China: 2.400 ~ 2.483 GHz, 5.725 ~5.85 GHz <p>RF output power of DNMA-H92 :</p> <ul style="list-style-type: none"> a. IEEE802.11a <ul style="list-style-type: none"> 1. 24dBm@6M(all) 2. 21dBm@54M(all) b. IEEE802.11g <ul style="list-style-type: none"> 1. 25dBm@6M(all) 2. 22dBm@54M(all) c. IEEE802.11a/n HT20 <ul style="list-style-type: none"> 1. 24dBm@MCS0/8(all) 2. 18dBm@MCS7/15(5180MHz) 17dBm@MCS7/15(5825MHz)



d. IEEE802.11a/n HT40

1. 22dBm@MCS0/8(all)
2. 17dBm@MCS7/15(5190MHz) 16dBm@MCS7/15(5795MHz)

e. IEEE802.11g/n HT20

1. 25dBm@MCS0/8(all)
2. 21dBm@MCS7/15(all)

f. IEEE802.11g/n HT40

1. 24dBm@MCS0/8(all)
2. 20dBm@MCS7/15(all)

Receive Sensitivity of DNMA-H92 :

a. IEEE802.11a

1. -82dBm@6M, 1Rx -95/-91dBm@6M, 2Rx
2. -65dBm@54M, 1Rx -79/-75dBm@54M, 2Rx

b. IEEE802.11g

1. -82dBm@6M, 1Rx -95/-91dBm@6M, 2Rx
2. -65dBm@54M, 1Rx -80/-76dBm@54M, 2Rx

c. IEEE802.11a/n HT20

1. -82dBm@MCS0, 1Rx -95/-91dBm@MCS0, 2Rx
2. -64dBm@MCS7, 1Rx -77/-73dBm@MCS7, 2Rx

d. IEEE802.11a/n HT40

1. -79dBm@MCS0, 1Rx -91/-87dBm@MCS0, 2Rx
2. -61dBm@MCS7, 1Rx -73/-69dBm@MCS7, 2Rx

e. IEEE802.11g/n HT20

1. -82dBm@MCS0, 1Rx -95/-91dBm@MCS0, 2Rx
2. -64dBm@MCS7, 1Rx -77/-73dBm@MCS7, 2Rx

f. IEEE802.11g/n HT40

1. -79dBm@MCS0, 1Rx -92/-88dBm@MCS0, 2Rx



	2. -61dBm@MCS7, 1Rx -74/-70dBm@MCS7, 2Rx
Ethernet	10/100/1000 Base-TX MDI/MDIX RJ-45 x 1 Compliant with : IEEE802.3 / 802.3u / 802.3at Hardware based 10/100/1000, full/half, flow control auto negotiation RJ-45 wired network Port, designed with Ethernet network surge and lightning surge protection circuits and components
Connector	2 x N-type(1 radio) 4 x N-type(2 radios) 6 x N-type(3 radios)
Power Requirement	48V 1A PoE Passive Mode Support 1 Gigabit Ethernet Bandwidth
Watch Dog	Hardware Watch Dog

Physical	
Dimensions	220 x 220 x 77 mm
Weight	101R/101RH—1.8Kg 102R/102RH—1.9Kg 103R/103RH—2.0Kg (3.7kg mount kit included)

Environmental	
Temperature Range	-30°C~70°C
Humidity	0% ~ 95% Non-condensing
Storage	-40~ 85°C
Dusty & Waterproof	Outdoor IP67 rated

Regulatory	
Certification	FCC:FCC 47 CFR Part 15 Subpart B (Class B) ANSI C63.4-2009 CE:EN 55022&24 + EN 301 489-1-17 EN 300 328 v1 7 1 (EnMA-92) EN 300 328 v1 7 1 (EnMA-H92) EN 301 893 V1.5.1 2008 (MIMO HT 40MHz) 5150 ~ 5250(EnMA-92) EN 301 893 V1.5.1 2008 (MIMO HT 40MHz) 5150 ~ 5250(EnMA-H92)



Software Specification

System Operation	
Bridge Mode	Layer 2 Switching Learning Technology
	Store-and-Forward
	Spanning Tree Protocol - IEEE 802.1d STP / IEEE 802.1w RSTP / IEEE 802.1s MSTP
	Static IP / Dynamic IP
	DHCP server / client
	Multicast / Broadcast Storm Limitation
	IEEE 802.1q Tag VLAN
	IEEE 802.1p VLAN Priority Based QoS

Network Interface	
Wireless	IEEE 802.11 a/g/n 2.4GHz / 5GHz Dual Band Radio
	2 x 2 MIMO Technology
	Single Radio / Dual Radios / Triple Radios
	AP mode / Wireless Station mode / WDS mode / CPE mode
	IEEE 802.11h DFS
	WMM QoS
	Channel / Tx Power / Data Rate / Max Distance Adjustable
	Advanced Wireless Parameters Adjustable
	Multi-SSIDs / VLAN tags mapping(Up to 16 x ESSIDs for each radio)
	Wireless Site Survey
	Node Information
	Concurrent Connected Node Limitation
Wire	Client User Isolation
	48V 1A PoE Support Gigabit Ethernet Speed
	Ethernet Link Speed Configurable
	10/100/1000 Base-TX MDI/MDIX RJ-45

Performance		
Wireless To	TCP	Up to 180Mbps for one radio to Ethernet
		Up to 320Mbps for two radios to Ethernet



Wire		Up to 320Mbps for three radios to Ethernet
	UDP	Up to 240Mbps for one radio to Ethernet
		Up to 350Mbps for two radios to Ethernet
		Up to 350Mbps for three radios to Ethernet
	PPS	>= 20,000 @ short packet for one radio to Ethernet
		>= 28,000 @ short packet for two radios to Ethernet
		>= 28,000 @ short packet for three radios to Ethernet
Latency	< 5ms	
Multiple Hops	2 hops	Up to 160Mbps
	3 hops	Up to 150Mbps
	>= 4hops	Up to 140Mbps
	PPS	>= 20,000 @ short packet at multiple hops
	Latency	< 10ms

Security
Hide SSID (turn off ESSID broadcasting)
MAC Address ACL
WEP 64/128/152 bits
IEEE 802.1x EAP-MD5 / EAP-TLS / EAP-TTLS
WPA / WPA2 PSK / EAP with TKIP / CCMP AES based Encryption

Management
HTTP(s) WEB GUI
Telnet
SSH
Console(optional interface)
CLI commands
SNMP v2c/v3, standard / private MIBs
Syslog



Management VLAN Tag
NTP Client
Firmware upgrade / downgrade
Dual Images
Dual Configuration files / Factory Default
Multiple Level Management

Advanced Technology	
Multiple Hopping	Multiple Hops after 10 times, max Throughput can be up to 120Mbps
	Multiple Hops after 10 times, Ping latency is 10ms below
	Multiple Hops transmission 3 backhauls, can provide the max Throughput up to 350Mbps
	Based on the Secondary AP link features, the Multiple Hops backhaul will have backup structure and function
Global Secondary AP Link	Auto detect Wireless link status, default detect time is every 10 minutes
	Automatic fixing on-line detection mechanism
RADIO- Secondary AP Link	Setup 3 default Aps for back up link, based on pre-determined priorities AP-SSID and Channel to do the search AP, communication, with AP and line to AP
	Each Wireless Station module can be independently functioning
	It is special design for Multiple Hops Backhaul System
Bandwidth Control	Based on Both setting, UL+DL the transmission will be management and limitation of bandwidth traffic
	Based on UL/DL independent bandwidth setting, transmission will be management and limitation of bandwidth traffic
CPE	Enable CPE function of Wireless Station mode, can link to another company's AP and have full bandwidth application



Roam	Based on Wireless Station Mode, enable Roam features can low speed switch different Aps roaming mobile transmission (50-100 km/h) (50-100ms handover speed)
Optional Advanced Technology	
Mesh + Hi-mobility	Based on Mesh Network features, can support high speed mobile functions and run large bandwidth in mobility
	Up to 200km/hr seamless handover speed
	Up to 100Mbps throughput maximum
	Support 20-Vehicle at the same time to transmit Hi-mobile surveillance images
Mesh network	OSI Layer 2 of bridge Mesh network structure system
	Support Mesh Network features – Best path, Auto repair, Auto network and so on
	Multiple Gateways Supporting
	Up to 120Mbps Wireless Mesh one Backbone throughput
	Support mixed Fiber optic backbone networks and wireless backhaul networks for export settings

Package Contents

1. IO-Power APM-101RH/102RH/103RH 802.11A/G/N Outdoor Bridge Wireless MIMO AP
2. PoE Power Injector
3. AC 90-240V to DC 19V 4.74A Power Adapter
4. Mounting Kit & Screw
5. Download User Manual from website:

<http://www.io-power.com.tw/Product%20User%20Manual.htm>

If any of the above items are missing, please contact your reseller.