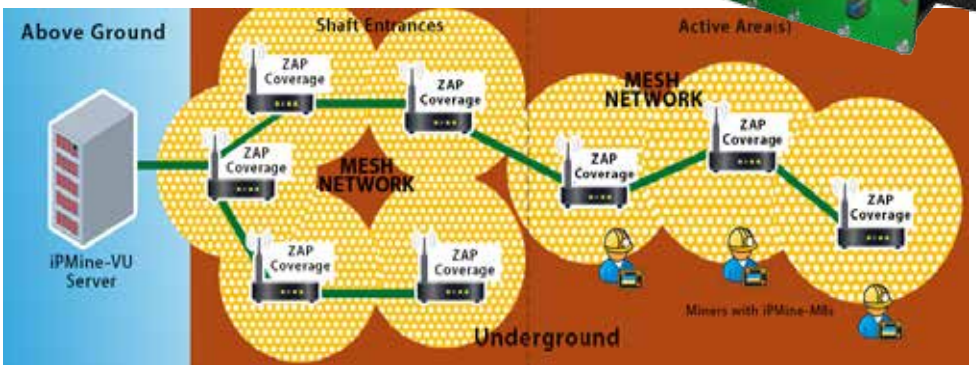
iPMine

Communications and Mine-Safety Solution

iPMine-ZAP
Zone Access Point
Model IM6-XP72

MSHA Approval Number 23-A120006-0

iPMine-ZAPs (Zone Access Points) are IEEE 802.11 wireless/wireline (fiber) access points, based on true wireless mesh network technologies. Placed in and around a mine, the iPMine-ZAP Model IM6-XP72's explosion proof design withstands the harsh underground mining operations, and collectively defines a resilient, highly reliable and available wireless/ wireline in-mine voice and data communication backbone with redundant multi-paths and multi-hops. A multi-path network provides redundant communications paths from source to destination. If a path stops working due to hardware failure or interference, a mesh network automatically re-routes communications through an alternative path. Redundant data paths not only improve reliability, but also provide higher data rates than single-hop networks. iPMine-ZAP's mesh networks are self-configurable, self-healing, and do not require a central server, and are expandable with minimal degradation in signal.



As miners carrying the iPMine-M8 tracking and communication devices through the mine:

- iPMine-ZAPs sends signals to the iPMine-M8 devices.
- iPMine-M8 devices collect these signals and transmit their information to iPMine`s tracking and monitoring enterprise software, iPMine-VU, via iPMine-ZAPs.
- iPMine-VU calculates the location of the miners based on the information received.

iPMine-ZAP Model IM6-XP72 can be configured with one or two radio boards, each board provides three 802.11a/g/n radios. Therefore, the iPMine-ZAP Model IM6-XP72 can be configured with three or six 802.11 a/g/n wireless radios. Each iPMine-ZAP Model IM6-XP72 has a gigaport wireline option for connecting to any CAT-5 LAN infrastructure through an RJ45 connection or to a fiber optic backbone with an optional fiber-to-Ethernet media converter. The 802.11a/g/n radios are fully backward compatible with 802.11b standards. The iPMine-ZAP Model IM6-XP72 runs on AC power with a built-in 72-hour battery back-up.

A group of iPMine-ZAPs can also be power daisy-chained for those situations where AC power outlets are not available. This will reduce the battery back-up life.

The iPMine-ZAP Model IM6-XP72 is designed and sized for convenience and durability. They are enclosed in an explosion-proof and flame-proof casing to meet government mine-safety standards and harsh terrain. The explosion proof enclosure has a window with access to the magnetic overload reset switch. The LED lights can also be seen to indicate the health and status of the iPMine-ZAP. The iPMine-ZAP Model IM6-XP72 has protection against incidental contact with dirt, dust, water, and the external formation of ice. The iPMine-ZAP Model IM6-XP72 is bundled with an intelligent Network Management Software (NMS), incorporating continuous network monitoring with selectable alarm levels, user management options, network history logging, and security filtering. The iPMine-ZAPs are also configured with standard encryption, bridging, multiplexing, and bandwidth management. The iPMine-ZAP Model IM6-XP72 is antenna agnostic and can be configured with any external antennas including omnidirectional, sectional, or directional antennas of up to but not to exceed FCC rule part 15.

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FEATURES & BENEFITS

Explosion Proof Enclosure
Withstand the harsh underground mining operation and meet governmental mine-safety standards.

802.11 Wireless LAN / 802.3 for Ethernet LAN
Widely accepted, cost-effective standards utilizing the latest technology.

Based on True Wireless Mesh Networking
Highly reliable and available wireless network with redundant multi-paths and multi-hops.

True Wireless Backhaul with a Redundant Fiber to LAN Backhaul
Providing non-interrupted communications even up to both sides of a cave in.

Multi-Path and Multi-Hop Features Up to 5 Hops Between Portals
Providing a self healing network to and from each portal then fiber going to the surface.

IP-Communication
Efficient packet transmission that minimizes the risk of disconnection or packet loss.

Standarized Components
Easy and affordable maintenance and upgrades.

Max 600 Watts of Running Power @ 120VAC
Lower power requirements for better power management efficiency.

Charging Conditions-Max 60 Watts Constant Current @ 12VDC
Lower power requirements for better power management efficiency.

Flexible Configurations
Customize deployment of iPMine-ZAPs by utlizing options for combinational set-ups of wireless and wireline models as well as utilization of multiple radios to cover more entries using antenna stations.

Online Help and Product Support
Improve usability and effectiveness with product enhancements and guided instruction for troubleshooting.

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PHYSICAL SPECIFICATIONS

Size/Dimensions	8" (H) x 18" (W) x 14" (D) / 203mm (H) x 457mm (W) x 355mm (D)
Weight	65lbs / 29 kg with a 72-hour Lithium-Ion Phosphate technology battery
Enclosure	Explosion-proof, flame-proof machined aluminum casting and lid
Operating Temperature	-58 to 140°F / -50 to 60°C
Storage Temperature	-58 to 140°F / -50 to 60°C
Humidity (Non-Condensing)	10% to 90% operating

BOARD SPECIFICATIONS

Wireless Standards	IEEE 802.11g (backward compatible with 802.11b)
Radios (Wi-Fi Modules)	Each board has 3 radios 2nd board for remote antenna locations
Transmit Power (802.11a/g)	26 dBm with high powered radios

Receiver Sensitivity

802.11b		802.11g	
dBm	**Mbps**	**dBm**	**Mbps**
-97	1	-94	6
-96	2	-93	9
-95	5.5	-91	12
-92	11	-90	18
-91	12	-86	24
-85	24	-83	36
-82	36	77	48
-77	48	54	74
-75	54/10		

LO (Crystal) Frequency Stability	+/-20PPM
Operating Voltage	Auto-sensing 120/240VAC, 50/60Hz, single phase
AC Power Consumption	120VAC @ 12A typical
Frequency Band	802.11a 5.15 - 5.25 GHz, 5.25 - 5.35 GHz 5.470 - 5.725 GHz (capable), 5.725 - 5.850 GHz 802.11b/g 2.4 - 2.462 GHz (Americas, FCC) 2.4 - 2.472 GHz (Europe, ETSI) 2.4 - 2.497 GHZ (Japan, MKK)
Data Rates (Mbps)	802.11b - 11Mbps; 5.5Mbps; 2Mbps; 1Mbps 802.11g - 54Mbps; 48Mbps; 36Mbps; 24Mbps; 18Mbps; 12Mbps
Wireless Medium	802.11a/n - OFDM; 802.11b/g - DSSS
Modulation	OFDM: BPSK, QPSK, 16 QAM, 64 QAM DSSS: DBPSK, DQPSK, CCK
Electrical Protection	ANSI/IEEE C62.41, UL 1449 2nd edition; 10kA @ 8/20 µs waveform, 36kA per phase; LL, L-N, L-PE
Data Protection	EN61000-4-2 Level 4 ESD Immunity
Other Data Protection	Triplicated reverse polarity protection. Full programmable over/ under and delay on. Overload is not auto reset but manual by the magnetic switch located behind the glass window.
Antenna	External support for any standard antenna

About iPTerra Technologies, Inc.

iPTerra develops and markets a real-time, 2-way wireless/wireline communications and mine-safety solution for the global mining industry. iPMine, iPTerra's flagship product, tracks, monitors and communicates with miners and equipment underground and above ground.

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