Tropos 4310-XA
Mobile mesh router for extreme applications

Tropos 4310-XA mobile mesh routers interoperate seamlessly with Tropos fixed routers to deliver a robust, high-performance wireless connectivity solution for mobile workers and equipment. At vehicular speeds, the mobile routers support voice, video and data connectivity and extends the Tropos fixed network to provide access for handhelds, laptops and other endpoint devices.

The Tropos 4310-XA uses a standard, unlicensed 2.4 GHz radio to connect with clients and other Tropos mesh routers. It is packaged in a rugged, weatherproof enclosure especially suited to extreme applications such as rail transport, mining and other applications subject to harsh operating temperatures, vibration and weather.

An easily deployed solution for increasing the productivity of mobile workforces and enabling mobile machine-to-machine (M2M) communications, Tropos 4310-XA mobile mesh routers can turn any vehicle into a mobile node. When deployed in rail cars, military vehicles or heavy equipment, the mobile router improves operational efficiency and enhances communications.

Tropos 4310-XA mobile routers can transport video streams from vehicle mounted cameras to an operations center. Real-time of the area around vehicles increases supervisors’ situational awareness to ensure efficient equipment operation while avoiding accidents, injury and property damage. Cameras providing video from vehicle interiors can be used to monitor the well-being of the vehicle operator as well as any passengers that are on board.

When used for mobile M2M communications, Tropos 4310-XA mobile mesh routers can, via a fixed Tropos mesh network, relay telemetry data from moving vehicles to a centralized operations center. Telemetry data enables supervisors to verify that vehicles are being operated with specified parameters, optimally schedule routine maintenance and determine if preventative maintenance is required. Benefits of analyzing telemetry data include minimizing unscheduled maintenance and equipment downtime while increasing efficiency and productivity.

The routers provide a connector suitable for use with a GPS puck. GPS data transmitted using Tropos 4310-XA mobile routers can be used by automated vehicle location (AVL) and positioning systems. AVL systems can be used to monitor the safety of employees in the field while positioning systems can increase efficiency and productivity, as well as enhance safety, in applications such as open pit mines.

Features and benefits
Software
- Routing algorithms optimized for mobility provide connectivity at vehicular speeds
- Maximizes performance to automatically find optimum end-to-end paths across the network
- Session persistent cross-subnet roaming at vehicular speeds
- Creation of stand alone mobile networks in areas where coverage is unavailable

Platform
- Intelligent 2.4 GHz mobile node supports 802.11b/g or 802.11a mesh and client connectivity
- IP67 rated packaging
- Vibration-resistant Ethernet and power connectors
- Best-in-class link budget for superior RF propagation
- Vehicle-mounted with integrated high-power radio
- FIPS 140-2 compliant
Tropos mobile routers also support the creation of tactical mesh
zones, an empowering solution for emergency response teams.
Multiple vehicles equipped with mobile routers can mesh with one
another to create a wireless network capable of increasing tactical
effectiveness through enhanced communication. Even if the
response team is operating in a rural region that does not have
access to the fixed Tropos network, the team member vehicles still
benefit from enhanced communication capabilities to coordinate
their efforts. When parked in a tactical situation, mobile-node
equipped vehicles use their high-power and high-sensitivity 2.4
GHz radio to provide connectivity to authorized handheld and lap-
top users nearby.

**Tropos Mesh OS**
The Tropos Mesh OS is the foundation of the decentralized
Tropos mesh architecture. A common software platform that runs
on each router across the network, the Tropos Mesh OS leverages
the router's on-board intelligence to monitor and maximize perfor-
mance. Unlike controller-based architectures that suffer bandwidth
losses as control traffic is passed back and forth between network
nodes and the central site, the distributed Tropos mesh architec-
ture uses efficient on-board processing at the device level to
minimize network congestion and adapt on a real-time, packet-
by-packet scale. This distributed approach optimizes performance
and throughput by minimizing control traffic, delivers a highly
scalable solution, and helps provide a quality user experience for
network clients.

**PWRP**
The cornerstone of the Tropos Mesh OS is the patented Predictive
Wireless Routing Protocol (PWRP™), which continually analyzes
the quality of active and inactive mesh links to dynamically
configure the ideal combination of paths to optimize network per-
fomance. Upon deployment, the routers automatically discover
one another, and quickly determine the optimal route to the gate-
ways that inject capacity into the network. Optimal links are
chosen on the basis of throughput, packet success, signal-to-
noise ratios and other key criteria.

PWRP performs a range of key tasks across the wireless network:

- Streamlines deployments and preserves performance by
dynamically configuring and optimizing mesh connections
- Improves overall throughput by selecting optimal routing paths
- Enhances network resiliency by providing graceful rerouting of
traffic in the event of RF interference, backhaul failures, or other
disruptions in the wireless mesh
- Enables the network to be scaled to thousands of nodes cov-
ering the largest geographical areas in the industry

**Seamless mobility and cross-subnet roaming**
Tropos Mesh OS provides seamless, session-persistent roaming
within the mesh coverage area at vehicular speeds. Tropos net-
works employ make-before-break connections when Tropos 4000
series mobile mesh routers transition from being connected to one
Tropos fixed mesh router to being connected to another Tropos
fixed mesh router. Make-before-break connections contribute zero
delay to application session handoffs. This handoff timing permits
Tropos mobile routers to support seamless voice, video and data
connectivity at vehicular speeds.

Clients, including those with established IPsec VPN connections,
can maintain connections when the Tropos mobile mesh routers
providing their connections move between Tropos mesh nodes
and gateways as well as between IP subnets. When the Tropos
mesh router providing a client’s connection moves from a Tropos
mesh router in one subnet to a Tropos router in another subnet,
Tropos Mesh OS uses tunneling and other techniques to enable
the client to maintain its connectivity without changing its IP
address.
Advanced network management platform delivers optimized edge-to-edge visibility

Tropos Control is a standards-based network management system designed to achieve peak performance and reliability. Designed around an intuitive web-based interface, the software facilitates the remote management of Tropos mesh networks, and is ideal for dynamically deploying and configuring networks ranging in size from tens to thousands of Tropos mesh routers. Tropos Control minimizes planning, deployment, and operating costs, and increases the efficiency of management personnel by performing complex tasks such as global provisioning and software updates across the network in a single session.

- Streamlines tasks such as monitoring network health, statistical network performance analysis and performance optimization
- Provides macro-level visibility as well as granular real-time and historical detail on usage, link quality, capacity and network reliability
- Network health dashboard provides at-a-glance views of network traffic, performance and alarms with links to instantly drill down to relevant statistical information
- Wireless-aware provisioning for guaranteed configuration changes and software updates over dynamically changing links
- Detailed historical database of RF environmental data, network performance and client connectivity enables fast root-cause diagnosis
- Assists network managers to plan future expansions and optimization strategies based on analysis of network trends and detailed historical information

Resilient, high-performance networks from ABB Tropos – the wireless IP broadband market leader

As the leader in wireless IP broadband mesh networking solutions, ABB Tropos is the right choice for organizations interested in deploying a robust infrastructure capable of withstanding the harshest outdoor environments. Designed to contain costs and enhance productivity, Tropos technology provides the backbone for top-performing outdoor wireless IP networks across the globe.

For further information, visit us on the web at abb.tropos.com.

Networking
- TCP and VPN session persistent roaming across subnets
- Mobile tactical mesh operating mode
- Full 802.11b/g client compatibility
- IPv4; IPv6-ready
- 802.1q VLAN support
- Support for static and dynamic addressing for wireless and wired clients
- Layer 2 and layer 3 support
- DHCP server and relay
- NAT support
- Plug & play wired client support
- Autosensing 10/100BASE-T Ethernet ports (management and client connection)

Quality of service
- 802.11e WMM
- 802.1p/q with 4 queues per VLAN and ESSID
- 802.1p and DSCP
- VoIP and VoWiFi support
- Heuristics-based voice classification
- Call admission control
- TSpec classification
- Seamless mobility
- Call reporting
- Rate limiting (airtime and throughput based)
- ACC - Airtime Congestion Control

Management
- RADIUS accounting
- Secure local and remote management tools via HTTPS
- Configuration save and restore
- Software upgrades with rollback
- Command line Interface (CLI) via SSH
- SNMP (standard MIBs)
- Wireless network and client monitoring, statistics and wireless capture capabilities
- GPS location tracking in Tropos Control

Security
- Authentication: WPA, WPA2, 802.11i, RADIUS, 802.1x (includes EAP-TLS, EAP-TLS, EAP-SIM, PEAP)
- Encryption: Open, WEP, TKIP, AES-CCM
- AES encryption of mesh and control traffic
- Multiple BSSIDs & ESSIDs (ESSID suppression)
- Full VPN compatibility (VPN filtering)
- Password and certificate-based HTTPS and SSH remote access
- Packet filtering & forwarding
- Client access control lists
- Router access control
- Evil twin detection and reporting
- Denial of Service (DoS) attack detection and reporting
- FIPS 140-2 compliant

Wireless
- IEEE 802.11b/g/n
  - Frequency band: 2.4-2.483 GHz
  - Modulation: 802.11g - OFDM, 802.11b - DSSS
  - TX power FCC: 21-36 dBm (EIRP) set in 1 dB units; ETSI 5-20 dBu (EIRP) set in 1 dB units
  - Media access protocol: CSMA/CA with ACK
  - RX sensitivity: -100 dBm @ 1 Mbps, -94 dBm @ 6 Mbps, -76 dBm @ 54 Mbps
  - Multi-antenna system: 1-TX x 2-RX
  - Support for 802.11n MRC
Environmental specifications
- Operating temperature range: -40°C to 70°C
- Storage temperature range: -40°C to 85°C
- Humidity range: 0-100% condensing
- Water and dust resistance: UL579/IEC60529 IP67
- Transportation: ISTA 2A

Power
- Power input: 11-55VDC
- Power consumption: 8W typical
- Polarity protection
- Low voltage disconnect protection
- Network status LED

Physical
- Dimensions: 7.25 in (18.4 cm) height x 10.0 in (25.4 cm) width x 3.25 in (8.25 cm) depth
- Weight: 3 lbs (1.3 kg)
- Connectors
  - Ethernet: 4-pole, circular, Industrial Ethernet M-12 D-coded female (Two: one client device & one management)
  - Power: Industrial-type locking connector, 2-pin, male
  - Aux: Industrial-type locking connector, 7-pin, female
  - RF: 2 N-female
- Auxiliary port
- Remote network status indicator
- Serial GPS input

Wireless approvals
- FCC CFR 47 Part 15, Class B
- Industry Canada RSS 210 (Tropos 4310-XA only)

Safety approvals
- UL 60950-1
- CSA 22.1 No. 950
- EN 60950
- IEC 950

Warranty
- One (1) year on parts and labor; return to point of purchase
- Optional standard and premium support packages available

Protection
- Antenna protection: ≤ 0.5μJ for 3kA @ 8/20μS waveform
- Electrical protection:
  - EN61000-4-5 level 4 AC surge immunity
  - Data protection:
  - EN61000-4-2 level 4 ESD immunity

For more information please contact:

ABB Inc.
Tropos Wireless Communication Systems
555 Del Rey Avenue
Sunnyvale, CA 94085, USA
Phone: +1 408 331 6800
E-Mail: tropos.sales@nam.abb.com

abb.tropos.com