

# Tropos 7329-XA

## Outdoor mesh router for extreme public safety applications



### Features and benefits

#### Software

- Decentralized architecture optimizes throughput in realtime and ensures scalability
- Dynamic selection of optimal end-to-end path delivers the highest performance
- Network performance and capacity maximized by automatic optimization of power and rate on per-connection and per-packet basis

#### Platform

- Support for 802.11n features deliver significant performance enhancements
- Flexible, modular form factor can be customized with user-selected antennas
- Supports the industry's widest array of power input options
- Ideal for providing source PoE to co-located devices
- AA360 aluminum alloy casting with SAE AMS-C-26074 nickel plating for exceptional salt fog resistance
- Extended operating temperature range
- >200 mph wind survivability

The Tropos 7329-XA outdoor public safety and critical infrastructure mesh router is a full-feature wireless networking platform that delivers high performance in extreme application environments. Architected to provide maximum flexibility and configurability, the router delivers significant performance increases through support for the 802.11n standard, a next-generation high-sensitivity radio design, and the incorporation of patented new features into the industry-leading Tropos Mesh OS.

A high-capacity solution capable of simultaneous support for multiple network applications, the Tropos 7329-XA router is designed to meet the demanding needs of municipalities and utilities, as well as enterprise, industrial, and military entities. The platform provides a reliable communications foundation for deploying public safety, intelligent transportation, video surveillance, and utility smart grid systems. The Tropos 7329-XA router can either serve as a gateway interface for capacity injection into the network, or as a node to extend or reinforce network connectivity.

Designed for creating or expanding higher-capacity networks, the Tropos 7329-XA router is a dual-band unit with one 2.4 GHz and one 4.9 GHz radio. It supports meshing and client connectivity at both frequency bands. The platform provides superior performance and resiliency, and enables the network to be scaled to the highest-capacity configurations through deployment of additional Tropos routers.

In the United States, the 4.9 GHz spectrum is allocated for licensed use by public safety agencies and certain critical infrastructure operators. See applicable FCC regulation for specific rules governing the use of this spectrum.

The Tropos 7329-XA is specifically packaged for installation in extreme application environments. Its case is cast from an aluminum alloy designed specifically for use in marine environments and is coated with high-phosphorus nickel plating. The combination provides exceptional resistance to salt fog corrosion.

The Tropos 7329-XA also provides an enhanced temperature range and, with the optional XA mounting kit, >200 mph wind survivability.

The high-capacity unit has two Ethernet ports that can be used for a variety of purposes:

- Gateway configurations where device connectivity is needed for capacity injection into the network
- Attachment of client devices requiring power over Ethernet (PoE), such as cellular point-to-point wireless products used for capacity injection; video cameras; or advanced meter reading/advanced metering infrastructure (AMR/AMI) collectors

### 802.11n features deliver network-wide performance enhancements

The Tropos 7329-XA mesh router is designed to utilize the powerful capabilities of the 802.11n standard, which delivers performance increases in coverage, capacity, and reliability. This breakthrough technology improves receive link signal strength and client connectivity not just for 802.11n clients, but for 802.11b/g clients as well. Client connection reliability is enhanced by combining multiple signals from multiple antennas, instead of relying on signals received from a single antenna. The result is increased throughput, higher network capacity, and reduced latency across the network.

### Tropos Mesh OS

The Tropos Mesh OS is the foundation of the decentralized Tropos system 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 performance. Unlike controller-based architectures that suffer bandwidth losses as control traffic is passed back

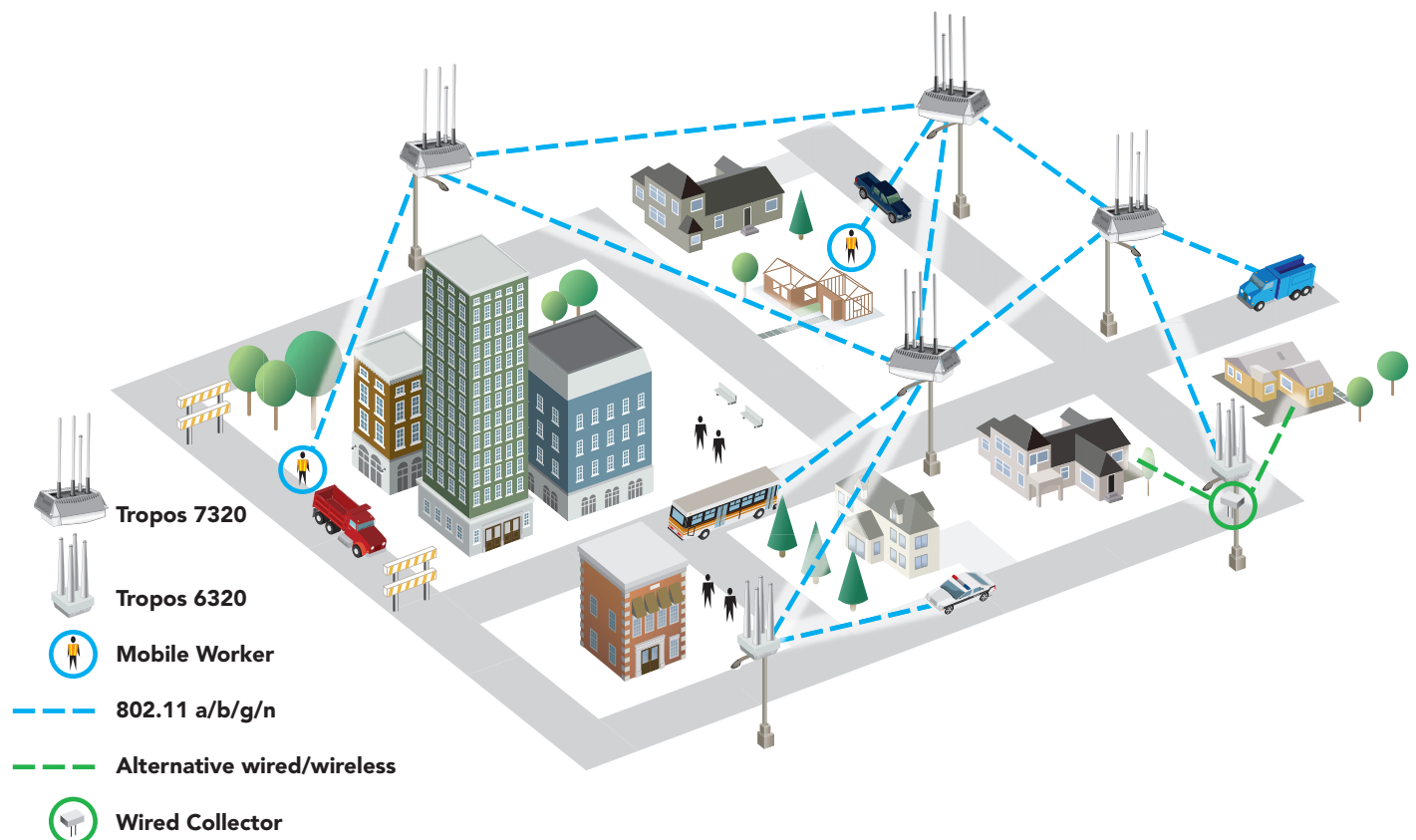
and forth between network nodes and the central site, the distributed Tropos system architecture uses efficient on-board processing at the device level to minimize network congestion and adapt on a real-time, packet-by-packet scale. This distributed approach optimizes performance and throughput by minimizing 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 performance. Upon deployment, the routers automatically discover one another, and quickly determine the optimal route to the gateways 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 throughput by selecting optimal routing paths



Tropos fixed and mobile routers can be used for securely operating a wide range of services

- Enhances network resiliency by providing graceful rerouting of traffic in the event of RF interference, backhaul failures, or other disruptions in the wireless mesh
- Supports client mobility without the need for special client hardware, software, or network reconfigurations
- Enables the network to be scaled to thousands of nodes covering the largest geographical areas in the industry
- Provides continuous monitoring of all channels to detect intermittent noise sources
- Non-disruptive to user traffic and sessions
- Avoids interference and enhances network capacity and reliability

### PowerCurve

A distributed algorithm that leverages the Tropos PWRP communication protocol, PowerCurve maximizes network performance and capacity by automatically optimizing power and rate parameters on a per-connection and per-packet basis. This advanced, distributed algorithm continually adjusts transmit power to maximize the number of wireless links that can operate concurrently. Unlike alternative approaches where transmit power is configured as a static setting, PowerCurve tightly couples power and bit rate control. This enables the router to make continuous and dynamic adjustments that can enhance throughput and provide a better user experience.

PowerCurve delivers the following key benefits:

- Dynamically monitors and adjusts power and rate per-packet, per-link, to deliver maximum capacity
- Enhances network reliability, capacity and scalability beyond the capabilities of controller-based architectures
- Streamlines network planning, deployment and optimization

### Airtime Congestion Control

Airtime Congestion Control (ACC) technology enables networks to be operated closer to their capacity limits by detecting signs of congestion and dynamically adjusting airtime resource allocation to clients. ACC is unlike traditional rate limiting in two important ways. First, instead of limiting traffic during congestion-free periods, ACC activates only when performance-impacting congestion is detected and returns to a monitoring state afterward. Second, it is mesh- and wireless-aware, distributing air time resources equally among clients during a congestion event rather than applying fixed throughput caps. By allowing networks to carry heavy traffic loads without crossing over into a saturated state, ACC actually increases usable capacity.

- Deterministic allocation of airtime resources enables networks to run at higher capacity without congestion
- Monitors airtime availability to deliver more efficient network utilization than systems relying on limiting traffic levels
- Provides fair network access to all users, enabling Tropos to surpass traditional broadband wireless network capacity

### SmartChannel

Designed to optimize performance in both single- and dual-radio networks, this distributed algorithm continually samples all available channels to analyze link performance and interference trends. The channel decision logic is integrated into the PWRP routing algorithms so that end-to-end path qualities are assessed on alternate channels. In dual-radio systems, fine-grained channel plans are implemented within individual clusters to optimize each cell for client coverage and spectral reuse.

### 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 expansion and optimization strategies based on analysis of network trends and detailed historical information

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

As the leader in wireless IP broadband mesh networking solutions, 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. As the industry continues to evolve, Tropos is poised to extend its market leadership through the introduction of innovative products, and functionality.

For further information, visit us on the web at [abb.tropos.com](http://abb.tropos.com).

## Wireless

- IEEE 802.11b/g/n radio
  - Frequency band: 2.4-2.483 GHz
  - Modulation: 802.11g/n - OFDM, 802.11b - DSSS
  - TX Power: ETSI/EU 5-20 dBm (EIRP) set in 1 dB units; FCC/IC 21-36 dBm (EIRP) set in 1 dB units
  - 7.4 dBi omnidirectional antennas
  - RX sensitivity: -97 dBm @ 1 Mbps, -96 dBm @ 6 Mbps, -84 dBm @ 54 Mbps
  - Multi-antenna system: 1-TX x 3-RX
  - Support for 802.11n MRC
- IEEE 802.11a radio
  - Frequency band: 4.940 - 4.990 GHz (FCC Part 90)
  - Modulation: 802.11a - OFDM (64-QAM, 16-QAM)
  - TX Power: 29 dBm EIRP
  - 9.1dBi omnidirectional antenna
  - Optional 12.0 dBi sector or 19 dBi panel antenna
  - RX sensitivity:-94 dBm @ 6 Mbps, -76 dBm @ 54 Mbps

## Networking

- Full 802.11b/g, 802.11a, 802.11n client compatibility
- IEEE 802.3u autosensing 10/100BASE-T Ethernet ports
- IPv4; IPv6-ready
- BGP
- 802.1q VLAN support (ESSID and IP based tagging)
- Static & dynamic addressing for wireless & wired clients
- Onboard DHCP server and relay
- Session-persistent mobility across subnets
- Network address translation (NAT)
- IP multicast forwarding, IGMPv3; IGMP proxy
- Automatic rate, power, channel and band control
- 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)

## Management

- RADIUS accounting
- Local and remote management via HTTPS
- Identity-based authentication (4 levels)
- Configuration save and restore
- Over the air software updates with rollback
- Command line interface (CLI) via SSH
- SNMP (standard MIBs)
- Wireless network and client monitoring and statistics
- Infrared (IR) port
- Wireless rescue
- Dual image
- Auto recovery

## Security

- IPsec VPNs, tunnels to wired client interfaces using AES
- Authentication: WPA, WPA2, 802.11i, RADIUS, 802.1x (includes EAP-TLS, EAP-TTLS, EAP-SIM, PEAP)
- Encryption: open, WEP, TKIP, AES-CCM

- AES encryption of mesh and control traffic
- FIPS 140-2 Level 2 compliant
- NERC CIP 002-009 compliant
- Multiple BSSIDs & ESSIDs (ESSID suppression)
- Integrated firewall
  - Packet filtering on TCP/UDP port, protocol, SA, DA
  - Peer-to-peer blocking
  - Client access control lists
  - VPN filtering
  - Router access control
- Evil twin and DoS attack detection and reporting

## Environmental specifications

- Operating temp range
  - -40°C to +70°C (units without internal battery backup)
  - -40°C to +55°C (units with internal battery backup),
- Storage temperature range: -40°C to 85°C
- Weather rating: IP67 - UL 579/IEC 60529 IP67
- Wind survivability: >200 mph
- Wind loading (200 mph): <365 Newtons
- Salt fog corrosion resistance: Aluminum Association 360 alloy (UNS A03600) casting for use in marine environments plus SAE AMS-C-26074 high-phosphorus electroless nickel plating for salt fog resistance
- Shock & vibration: ETSI 300-19-2-4 spec T41.E class 4M3
- Transportation: ISTA 2A

## Power

- 100-480VAC 50/60Hz single and split-phase ANSI/IEEE C62.41 category C3 integrated branch circuit protection
- Power consumption: 18 W typical
- Power over Ethernet power sourcing capability: 12VDC, 24VDC, 48VDC @ 30 W output
- Factory installed Li-Ion battery - optional
  - Back-up power 2 - 6 hours typical
- Power-on and network status LEDs
- Power cables
  - Street light NEMA photo-electric control power tap 100-480 VAC, 2 wire 4 ft. or 20 ft. power cable
  - Electrical power cord, US/Canada 120 VAC, 15 A, 3 prong 6 ft. or 30 ft.

## Physical

- Dimensions (w/o mounting brackets or antennas): 13 in (33 cm) wide x 8 in (20 cm) deep x 5.3 in (13 cm) high
- Weight: 16 lbs (7 kg) max., with mounting brackets

## Wireless approvals

- FCC CFR 47 Part 15
- FCC CFR 47, Part 90

## Safety approvals

- IEEE 1613
- UL 60950-1, CSA 22.2 No. 60950-1, IEC 950, EN 60950
- UL 1449/IEC 60664-1
- CE

## Protection

- Antenna protection:  $\leq 0.5\mu\text{J}$  for 6kV/3kA @ 8/20 $\mu\text{S}$  waveform
- Electrical protection:
  - ANSI/IEEE C62.41, UL 1449-2nd ed., 10kA @ 8/20  $\mu\text{S}$  wave form, 36kA per phase, L-L, L-N, L-PE
  - EN61000-4-5 level 1 & 2 AC surge
  - EN61000-4-4 level 2 electrical fast transient burst
  - EN61000-4-3 level 2 EMC field
  - EN61000-4-2 level 2 (contact), level 3 (air) ESD

## Warranty

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

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