GREENER, SAFER, SMARTER

The 6320 Outdoor Mesh Router is designed to provide a cost-effective, easy to deploy, high-performance networking solution for outdoor environments. Light-weight and compact, the 6320 router delivers significant performance increases through support for the 802.11n standard, a next-generation high-sensitivity radio design, and the incorporation of new patented features into the industry-leading Tropos Mesh Operating System.

FEATURES AND BENEFITS

Software

❖ Decentralized architecture optimizes throughput in real-time 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 delivers significant performance enhancements

❖ Cost-effective, compact, lightweight design streamlines site sourcing and deployment

❖ Available in single (2.4 GHz) or dual-radio (2.4/5 GHz) configurations

A cost-effective solution for a wide variety of applications, the Tropos 6320 router is well-suited for municipalities, utilities, enterprise, industrial, and military entities. The 6320 router provides a reliable communications foundation for utility meter reading, intelligent transportation systems, public safety, and video surveillance, and is designed to support multiple applications simultaneously. Each router can either serve as a gateway interface for capacity injection into the network, or as a node to extend or reinforce network connectivity.

The small, lightweight form factor is ideal for deployments where aesthetics and weight are part of the mounting asset equation. Configured with multiple antennas, the 6320 router is fitted with two Ethernet ports. These ports can be used for a variety of purposes, including capacity injection from a wired or point-to-point wireless broadband link; for attachment of client devices such as a video camera or Advanced Meter Reading/Advanced Metering Infrastructure (AMR/AMI) collector; or to receive power over Ethernet. The router is available in two versions:

❖ **6320 Outdoor Mesh Router** - Dual-band unit with one 2.4 GHz and one 5 GHz radio. Designed for creating or expanding higher-capacity multi-use networks, the 6320 supports meshing and client connectivity on both bands for superior performance, resiliency, and capacity. A scalable solution that protects hardware investments, the 6320 enables the network to be expanded to support the highest-capacity configurations through deployment of additional Tropos routers.

❖ **6310 Outdoor Mesh Router** - Single-band unit with one 2.4 GHz radio. Designed for networks with lighter traffic loads, such as collector monitoring for utilities, or for fill-in connectivity in larger systems. A scalable solution that protects hardware investments, 6310-based networks are fully interoperable with dual-band routers - and can be easily expanded to the highest-capacity configurations through deployment of additional of Tropos routers.

802.11n Features Deliver Network-Wide Performance Enhancements

Both models are 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 cornerstone 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 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

❖ 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

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 airtime 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

Smart Channel

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.

❖ 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

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 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 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 www.tropos.com.

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

Tropos 6320
Mobile Worker
— — — 802.11 a/b/g/n
— — — Alternative wired/wireless
Wired Collector
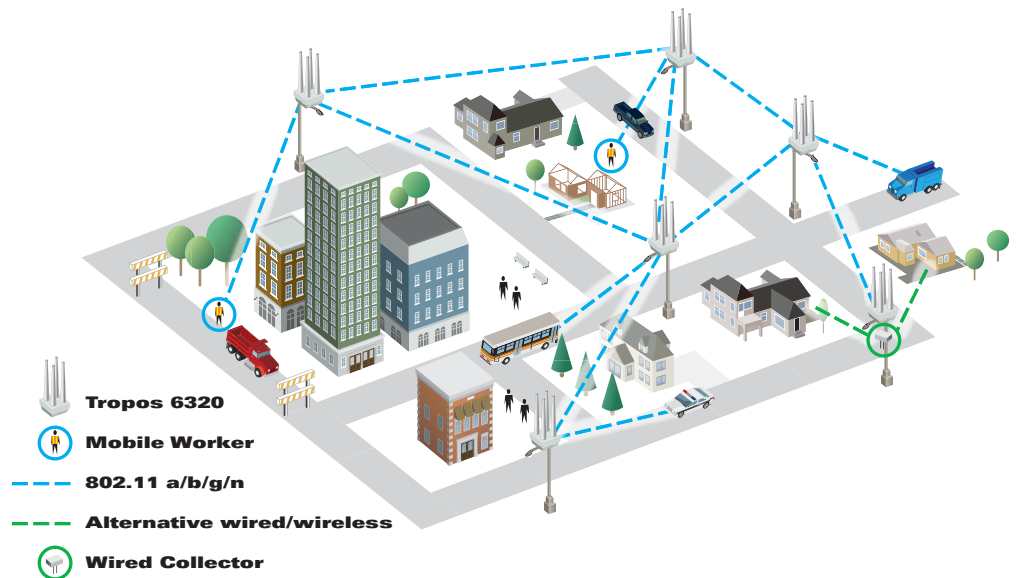
Wireless

- IEEE 802.11b/g/n radio
  - Frequency band: 2.4-2.483 GHz
  - Modulation: 802.11g/n - OFDM (64-QAM, 16-QAM, QPSK, BPSK); 802.11b - DSSS (DBPSK, DQPSK, CCK)
  - Media Access Protocol: CSMA/CA with ACK
  - X Power: ETSI/EU 5-20 dBm (EIRP) set in 1 dB units; FCC/IC 20-35 dBm (EIRP) set in 1 dB units
  - Multi-Antenna System: 1-TX x 3-RX
  - Support for 802.11n MRC
  - 6 dBi Integrated omnidirectional antennas
  - RX Sensitivity:
    - -97 dBm @ 1 Mbps   -95 dBm @ 18 Mbps
    - -94 dBm @ 5.5 Mbps   -92 dBm @ 24 Mbps
    - -92 dBm @ 11 Mbps   -89 dBm @ 36 Mbps
    - -96 dBm @ 6 Mbps   -85 dBm @ 48 Mbps
    - -96 dBm @ 12 Mbps   -84 dBm @ 54 Mbps
- IEEE 802.11a radio
  - Frequency band: 5.725 - 5.850 GHz (FCC/IC) 5.470 - 5.725 GHz with DFS (ETSI/EU)
  - Modulation: 802.11a/n - OFDM (64-QAM, 16-QAM, QPSK, BPSK)
  - Media Access Protocol: CSMA/CA with ACK
  - TX Power: ETSI/EU 15-30 dBm (EIRP) set in 1 dB units; FCC/IC 19-34 dBm (EIRP) set in 1 dB units
  - 8 dBi Omnidirectional antenna
  - RX Sensitivity:
    - -94 dBm @ 6 Mbps   -86 dBm @ 24 Mbps
    - -93 dBm @ 9 Mbps   -83 dBm @ 36 Mbps
    - -92 dBm @ 12 Mbps   -78 dBm @ 48 Mbps
    - -89 dBm @ 18 Mbps   -76 dBm @ 54 Mbps

Networking

- Full 802.11b/g, 802.11a, 802.11n Client Compatibility
- IEEE 802.3u 10/100BaseT Ethernet Ports
- BGP
- 802.1q VLAN Support (ESSID and IP based tagging)
- Support for static and dynamic addressing for wireless and wired clients
- Onboard DHCP Server and Relay
- Plug and Play Wired Client Interface
- Session-Persistent Mobility across Subnets
- Location Based Services
- Layer 2 Emulation (L2E)
- NAT

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)

Management

- RADIUS Accounting
- Local and Remote Management Tools via HTTPS
- Router Access Control
- Identity-Based Authentication (4 levels)
- Configuration Save and Restore
- Software Upgrades with Rollback
- Command Line Interface (CLI) via SSH
- SNMP (standard MIBs and Tropos MIB)
- Wireless, Network and Client Monitoring and Statistics

Security

- Authentication: WPA, WPA2, 802.11i, RADIUS, 802.1x (includes EAP-TLS, EAP-TTLS, EAP-SIM, PEAP)
- Encryption: Open, WEP, AES-CCM, TKIP
- Hardware assisted encryption
- 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
- Peer-to-Peer Blocking
- Client Access Control Lists
- Router Access Control
- Evil Twin Detection and Reporting
- Denial of Service Attack Detection
- Tamper-Evident Seal
- FIPS 140-2 Level 2 certified

Environmental Specifications

- Operating temperature range: -40°C to 55°C
- Storage temperature range: -40°C to 85°C
- Weather rating: IP67
- Wind survivability: >165 mph
- Wind loading (165 mph): <210 Newtons
- ASTM B117 Salt Fog rust resistance compliant
- Shock & vibration: ETSI 300-19-2-4 spec T41.E class 4M3
- Transportation: ISTA 2A

Package Contents

- Tropos 6320 Outdoor Mesh Router
- Mounting bracket and accessories
- Quick Start Guide
- Weatherized data cable housing

Warranty

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

Optional Accessories

- Data & POE Outdoor CAT5 STP Cables: 4 or 8 ft
- Street light NEMA photo-electric control power tap 100-277 VAC
- CAT5 data cable building entrance protection; network protection unit

Approvals

- FCC CFR 47 Part 15, Class B Subpart C
- Industry Canada RSS 210
- EN 301 489-17
- EN 300 328
- EN 301 893
- EN 60950
- IEC 950
- UL 60950-1
- CSA 22.2 No. 60950-1
- UL 579/IEC 60529 IP67 rated for outdoor use
- UL 1449/IEC 60664-1
- CE!

Hardware Specifications

- Auto-sensing 802.3u 10/100BASE-T Ethernet
- Power input: PoE (20-60 VDC); 100-277 VAC with external accessory
- Power consumption: 10 W typical
- Power-on and network status lamp: Green/Red/Blue
- Dimensions (w/o mounting brackets or antennas): 8.75" (22.2 cm) x 7.25" (18.4 cm) x 2.5" (6.4 cm); with antennas 14" (35.6 cm)
- Weight: 5 lbs (2.3 kg) max., with mounting brackets

Protection Circuits
- Antenna Protection Integrated
- Electrical Protection:
  - EN61000-4-4 Level 2 Electrical Fast Transient Burst Immunity
  - EN61000-4-3 Level 2 EMC Field Immunity
  - EN61000-4-2 Level 2 (contact), Level 3 (air) ESD immunity

Ordering Information

Part Number: 63203030 for FCC and Canada
Tropos 6320 Outdoor Mesh router, FCC TX; 2.4 & 5.8 GHz; three 6 dBi & one 8 dBi omni antennas, bracketry

Part Number: 63202531 for ETSI markets
Tropos 6320 Outdoor Mesh router, ETSI TX; 2.4 & 5.4 GHz; three 6 dBi & one 8 dBi omni antennas, bracketry

Part Number: 63103030 for FCC and Canada
Tropos 6310 Outdoor Mesh router, FCC TX; 2.4 GHz; three 6 dBi omni antennas, bracketry

Part Number: 63102531 for ETSI markets
Tropos 6310 Outdoor Mesh router, ETSI TX; 2.4 GHz; three 6 dBi omni antennas, bracketry

Part Number: FIPS 1402-6310
Software license, hardware labels for FIPS 140-2

Part Number: FIPS 1402-6320
Software license, hardware labels for FIPS 140-2