Altitude™ 450 and Altitude 451 Access Points

Altitude 450 and 451 Access Points enable high performance wireless service using the emerging 802.11n WLAN technology.

Enhanced Wireless Performance

- Up to 300 Mbps over the air throughput per radio using 3x3 MIMO and 40 MHz wide channel
- Gigabit Ethernet connectivity to the wired network
- Distributed architecture with intelligent traffic management optimizes performance of existing wired network.

Superior Return on Investment

- Fully compliant with existing 802.3af Power over Ethernet (PoE) infrastructure
- Interoperate with legacy WLAN clients (11a/b/g)
- "Green" design with efficient power usage

Enterprise-Grade Wireless Services

- Supports high speed multimedia applications
- Support for real-time voice services
- Centrally-deployed Configuration and Upgrades

Comprehensive Security

- Utilizes 802.11i industry standards for wireless security
- Hardware-based encryption
- Tamper-proof housing and mounting plate

Altitude 450 and Altitude 451 are dual-radio Access Points (APs) that support simultaneous operation of 802.11a/n and 802.11b/g/n wireless networks. Used with the Summit® WM controllers for centralized management and control, the Altitude 450/451 provide 3x3 Multiple-Input and Multiple-Output (MIMO) functionality for dramatically increased bandwidth over legacy 802.11a/b/g APs.

Altitude 450 is a wall-mount AP with internal omni-directional antennas. The Altitude 451 detachable model includes three external dual-band omni-directional antennas and is suitable for wall, ceiling or out-of-sight plenum installation.

Altitude 450/451 AP delivers an easy-to-use, secure and high-performance solution that is ideal for demanding enterprises. With the versatility to simultaneously support a wide variety of wireless needs—including voice access, guest access, secured access and rogue AP detection—Altitude 450/451 dramatically simplifies the installation and operation of enterprise wireless networks.

Altitude 450/451 APs deliver full 802.11n and 3x3 MIMO capabilities using standard 802.3af PoE, enabling faster installation using existing PoE infrastructure and "greener" operation due to lower power consumption.

Target Applications

- High-performance wireless services
- Wireless coverage of temporary or hard-to-wire facilities
- Connectivity in headquarters and remote sites of distributed enterprises

Enhanced Wireless Performance

Altitude 450/451 APs provide up to 300 Mbps which is about a six-fold through-put increase over existing 802.11a/b/g wireless LAN APs. For wireless 802.11n clients, this tremendous increase in wireless performance is comparable to 100Mb Fast Ethernet wired LAN throughput, the current standard for many enterprises.

Dual Concurrent Radios with 3x3 MIMO Capability

Altitude 450/451 APs contain dual, concurrent independently-managed radios, one operating in the 2.4 Ghz band for 802.11b/g/n service and the other operating in the 5 GHz band for 802.11a/n service. Each radio has a set of three transmitters/receivers which enable 3x3 MIMO functionality. With the multiple signal streams, along with Orthogonal Frequency-Division Multiplexing (OFDM) modulation, the AP provides higher bandwidth, greater range, and better overall performance compared to 2x2 MIMO, 2x3 MIMO, or legacy 802.11 a/b/g APs.

In addition to MIMO technology, the 802.11n AP and client can bond two adjacent 20 MHz channels to create a single 40 MHz wide channel. This potentially doubles the throughput from a standard 20 MHz channel, used in legacy wireless networks.

Optimal Use of Existing Network Infrastructure

The increased performance of 11n AP can strain the wired infrastructure and even require that the wired network be upgraded to handle the increased wireless traffic. To avoid such an expensive upgrade, Extreme Networks offers an innovative distributed wireless architecture. Unlike other wireless solutions, Summit WM distributed architecture offers the choice to tunnel user traffic to the controller in the core or be locally bridged at the AP across the edge switch. This traffic distribution can be configured on a per SSID basis. This local bridging approach allows high bandwidth data and video traffic to be bridged locally resulting in distributed traffic management. With local bridging, there is no need to send all traffic back to the core and then turn it around and "hairpin" it back to the Edge.

Reliable Coverage

In addition to enhanced performance, the 11n technology enables faster, cleaner and more reliable signals. With fewer dropped packets and fewer retries, network reliability is greatly enhanced. Improved range and coverage increases user productivity, simplifies network design and operations, and ultimately reduces service calls to the IT helpdesk.

Increased User Productivity

The increased bandwidth of Altitude 450/451 APs enables wireless users to access to high bandwidth applications like multimedia, rich e-learn-ing, video conferencing, collaborative design and so on. Additionally, with 11n it is easy to set up temporary classrooms and facilities without pulling new cables. The end result is better productivity for mobile users and less IT time spent on wired infrastructure setup and teardown.

Superior Return on Investment

Extreme Networks' Altitude 450/451 APs offer a superior return on investment when considering the total costs of upfront capital expenditure, network upgrades, installation, and operation. The AP's unique conformance to the 802.3af Power over Ethernet (PoE) standard and the innovative distributed architecture of Summit WM controllers drive these financial advantages.

Efficient Power Consumption

Altitude 450/451 APs provide full function-ality, including 3x3 MIMO dual concurrent radio operation, while being powered by industry-standard 802.3af PoE. This unique capability reduces the overall cost of implementing an 11n wireless LAN compared to alternative 11n enterprise-grade APs that require one or more of the following upgrades to avoid degraded operation:

1. New higher-power non-standard PoE switches
2. Allocate two standard PoE ports per AP and double the cable run to each AP
3. Restricting PoE cable runs to much less than standard 100m. This limits deployment flexibility for optimum wireless coverage and capacity
4. AC drops near the AP for powering external power adapters for APs

All of these options can significantly increase capital and operational expenses.

The lower power consumption of Altitude 450/451 APs compared to competing APs enables "greener" opera-tion. By consuming at least four watts less per AP than a competitive 11n AP, the total power consumption across several APs can be significant. For example, with a 250 11n AP installation, Extreme Networks wireless solution would save the customer about 1KW of power!

Minimized Network Upgrades

Extreme Networks distributed wireless architecture enables enterprises to transition to 11n technology without costly upgrades to the wireless or wired infra-structure. Summit WM controllers are 11n ready thereby avoiding costly fork lift upgrades. Additionally, with local bridging capability organizations can fully utilize the existing edge network infrastructure for high-bandwidth 11n traffic, rather than tunneling all of the user traffic back to the controller across the wired core. An 11n AP, at peak performance can handle up to 250 Mbps (TCP payload) of user traffic across both radios operating simultaneous-ly. Tunneling all of the user traffic from all the APs connected to a controller can severely strain the wired infrastructure as well the WLAN controller in the core network. Distributing the user traffic across several edge switches optimizes the operation of the wired network.

Based on application, some user traffic would need to be tunneled to the control-ler. This would include voice traffic that requires session mobility. Guest traffic should be tunneled back to the controller for security reasons. Typically high bandwidth employee data traffic can be locally bridged at the edge of the wired network.

Faster, Easier Installation

In addition to the previously mentioned PoE power advantage, Altitude 450/451 APs have a number of features that enable quick deployment. The APs can be mounted on the wall, on drop ceilings, or out of sight in the ceiling plenum space. The power-efficient AP design also minimizes vents in the housing, making the APs particularly resistant to tampering and dust. Altitude 451 operates with external antennas that provide extended coverage and minimal interference in hard to reach areas. If necessary, approved

third-party antennas can be used to provide shaped or directional wireless coverage.

Altitude 450/451 AP also supports Extreme Network Summit WM plug-and-play installation. When connected to the network, the AP automatically and securely registers with the Summit WM controller. The plug-and-play installation of a centrally managed network elimi-nates manual configuration of each AP individually. This is ideal for remote sites where IT staff may be limited or non-existent. Altitude 450/451 has a self-sensing 10/100/1000 Ethernet port for 100+ Mbps transfer rates. The port can fall back to 100 Mbps if it is connect-ed to a 10/100 Ethernet port of an edge switch.

For existing wireless LAN installations, Altitude 450/451 APs can seamlessly operate in conjunction with existing Altitude 350 APs in the same wireless network. This enables legacy and 11n clients be serviced by legacy APs and the 11n APs operating in mixed mode. Additionally, Altitude 450/451 APs use the same mounting brackets as Altitude 350, allowing easy upgrades as organizations transition to 11n AP deployment.

Central Configuration and Monitoring
All Altitude 450/451 APs are centrally managed by the Summit WM controller using graphical management interface. APs can be configured, enabled, disabled, and managed separately or in groups. Different APs can beacon different SSIDs, allowing guest access, for example, to be available in confer-ence rooms only but not in the corporate office area. The management interface also presents and reports on alarms, traps, statistics and events across the wireless network managed by the controller.

Enterprise Grade Wireless Services

Extreme Networks wireless solutions optimize performance and availability to provide robust Enterprise-grade wireless services. All 802.11 time-critical functions, such as hardware-accelerated encryption, over-the-air standards based (WMM) QoS and RF management is implemented in Altitude 450/451. This

delivers higher performance, more scalability and high availability.

Enterprise-Grade Voice Performance
Altitude 450/451 APs enable low latency support for the industry leading VoWLAN devices. The APs support over-the-air QoS protocols such as SpectraLink Voice Priority (SVP) and 802.11e based WMM specifications. Priorities can be set according to SSID, allowing critical real-time voice traffic to be assigned to a distinct high-priority queue. Interoperability with wired network traffic prioritization ensures end-to-end QoS as the traffic traverses the network.

Comprehensive Security

Altitude 450/451 AP can support several security profiles based on application. On-board hardware accelerated encryption engine supports WEP, TKIP and AES standards. The AP can participate in several client/user authentication schemes including 802.1X or PSK authentication. Enterprises can utilize their existing AAA infrastructure to deliver comprehensive link security and configure different encryption options ranging from no encryption for guests, shared key for phones and PDAs, to WEP, WPA, and WPA2. Unique security profiles are configured on a per SSID basis. The Altitude 450/451 AP is transparent to end-to-end VPN tunnels like IPSec, PPTP, L2TP.

Product Specifications

Physical Specifications

Unit Dimensions
- 8.5 in. (21.5 cm) wide; 7.1 in. (18.1 cm) deep; 2.2 in. (5.5 cm) high

Unit Weight
- Altitude 450: 1.38 lbs (628g)
- Altitude 451: 1.43 lbs (649g)

Packaging Dimensions
- 10.8 in. (27.4 cm) wide; 8.9 in. (22.8 cm) deep; 3.5 in. (8.9 cm) high)

Packaging Weight
- Approx. 2.3 lbs (1.03 Kg)

General Specifications

Power
- 802.3af Power over Ethernet, Class 0 (12.95 Watts Max, 11W typical)
- Optional DC Power Module: Input 100 – 240VAC, Output: 48VDC, 0.38A max

Interface Ports
Data/PoE Port: 10/100/1000BT (RJ-45) with auto-sensing and auto negotiation. PoE as per IEEE 802.3af.
Console Port: RJ-45

LEDs
LEDs provide AP status, (i.e. self-test, image load, normal operation) as well as RF/Ethernet activity

Antennas
- Altitude 450: Integrated Antenna; 2.4/5.0 GHz – 3/6 dBi Gain,
- Altitude 451:External Antenna; 2.4 GHz/ 5.0 GHz - 4/5 dBi Gain. May work with other 3rd party external antennas

Frequency Bands
802.11a/n:
- 5.15 to 5.25 GHz (FCC/IC/ETSI)
- 5.25 to 5.35 GHz (IC/ETSI)
- 5.47 to 5.725 GHz (IC/ETSI)
- 5.725 to 5.850 GHz (FCC/IC)

802.11b/g/n:
- 2.400 to 2.4835 GHz (FCC/IC/ETSI)

Wireless Modulation
- 802.11a: OFDM
- 802.11b: DSSS/CCK
- 802.11g: DSSS/CCK/OFDM
- 802.11n: 3x3 MIMO plus 2 spatial streams, OFDM

Dynamic Channel Control
- DFS & TPC support (ETSI)

Available Transmit Power
802.11a/n (FCC/IC) (OFDM\HT20\HT40):
- 5.15 to 5.25 GHz: 15dBm\15dBm\15dBm
- 5.25 to 5.35 GHz: 18dBm\18dBm\15dBm
- 5.47 to 5.725 GHz: 18dBm\18dBm\16dBm
- 5.725 to 5.825 GHz: 22dBm\22dBm\22dBm

802.11a/n (ETSI) (OFDM\HT20\HT40):
- 5.15 to 5.35 GHz: 17dBm\17dBm\17dBm
- 5.500 to 5.700 GHz: 22dBm\22dBm\20dBm

802.11b/g/n: (FCC/IC) (CCK\DSSS\OFDM\ HT20\HT40):
- 2.400 to 2.4835 GHz: 23dBm\19dBm\ 21dBm\18dBm

802.11b/g/n: (ETSI) (CCK\DSSS\OFDM\ HT20\HT40):
- 2.400 to 2.4835 GHz: 15dBm\15dBm\ 15dBm\15dBm

Typical Receive Sensitivity
- 802.11a: 6 Mbps/-93dBm, 54 Mbps/-80dBm
- 802.11n 5GHz HT20 Mode: 6.5Mbps(MCS0)/-94dBm, 130Mbps(MCS15)/-72dBm
- 802.11n 5GHz HT40 Mode: 15Mbps(MCS0)/-89dBm,300Mbps(MCS15)/-68dBm
- 802.11b: 1 Mbps/-93dBm, 11 Mbps/-90dBm
- 802.11g: 6 Mbps/-92 dBm, 54 Mbps/-81dBm
- 802.11n 2.4GHz HT20 Mode: 6.5Mbps(MCS0)/-94dBm, 130Mbps(MCS15)/-74dBm
- 802.11n 2.4GHz HT40 Mode: 15Mbps(MCS0)/-88dBm, 300Mbps(MCS15)/-69dBm

Standards/Compliance

IEEE
- 802.3/802.3u/802.3af

Wi-Fi Alliance
- 802.11a/b/g/n (Draft 2.0)
- WPA, WPA2, WMM

Data Rates
- 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- 802.11b: 1, 2, 5.5, 11 Mbps
- 802.11g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54 Mbps
- MIMO Mode HT20 (1 data stream): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps
- MIMO Mode HT20 (2 data streams): 13, 26, 39, 52, 78, 104, 117, 130 Mbps
- MIMO Mode HT40 Normal GI (1 data stream): 13.5, 27, 40.5, 54, 81, 108, 121.5, 135 Mbps
- MIMO Mode HT40 Normal GI (2 data streams): 27, 54, 81, 108, 162, 216, 243, 270 Mbps
- MIMO Mode HT40 Short GI (1 data stream): 15, 30, 45, 60, 90, 120, 135, 150 Mbps
- MIMO Mode HT40 Short GI (2 data streams): 30, 60, 90, 120, 150, 180, 240, 270, 300 Mbps

Environmental

Operating
- Operating Temperature: 0° C to 50° C (32° F to 113° F)
- Relative Humidity: 5 – 95% (Non-Condensing)
- Altitude: 0 – 3000 meters (9,850 ft) @ 40° C
- Shock: 30 m/s^2 (3g), 11ms

Storage
- Temperature: -40° C to 70° C (-40° F to 158° F)
- Relative Humidity: 5 – 95% (Non-Condensing)
- Shock*: 40 m/s^2, 22ms
- Sinusoidal Vibration:* 2 – 9 Hz @ 1.55m^2/s^3 ; 9 – 200 Hz @0.3 m^2/s^3
- Random Vibration:* 10 – 200 Hz @ 1.m^2/s^3 ; 200 – 2000 Hz @0.3 m^2/s^3

Transportation
- Temperature: -40° C to 70° C (-40° F to 158° F)
- Relative Humidity: 5 – 95% (Non-Condensing)
- Shock (Half Sine) 300 m/s^2 (3g), 6ms
- Random Vibration 10 – 200 Hz @ 1m^2/s^3
- Random Vibration 200 – 2000 Hz @ 0.3m^2/s^3
- Drop at 39.3" (1.0 m); packaged
  * = Short term test condition

Regulatory Compliance

Safety
- UL 60950-1:2003 1st Ed., Listed Device (U.S.)
- cUL to CSA 22.2#60950-1-03 1st Ed. (Canada)
- UL2043 Plenum Rated
- 2006/95/EC Low Voltage Directive
- CB scheme, IEC 60950-1:2001+ National Differences
- ANATEL, Resolution 238 (Brazil)
- NOM/NYCE (Mexico)

North America EMC Standards
- FCC CFR 47 part 15.107 & 15.109, Class B (USA)
- ICES-003 Class B (Canada)

European EMC Standards
- 89/336/EEC EMC Directive
- EN 55022 2006 Class B
- EN55011: 2003 Class B, ISM
- EN 55024 A2:1998 Includes IEC 61000-4-2, 3, 4, 5, 6, 11
- ETSI EN 300 386: v1.3.3, 2005-04 (EMC Telecom)
- ETSI/EN 301 489-1 v1.6.1 (2004-08)
- ETSI/EN 301 489-17 v1.2.1 (2002-08)
- EN60601-1-2:2001 2nd Edition (Medical Electrical Equipment)

International EMC Standards
- CISPR22:1998 with A1 & A2 (Emissions)
- CSPR 11:2004 Class B, ISM
- CISPR24:1998 (Immunity)
- IEC/EN 61000-4-2, 4-3, 4-4, 4-5, 4-6, 4-11

Country Specific
- ACMA, CISPR 22:2006

Environmental Standards
- EN 300 019-2-3 v2.1.2 (2003-04), Stationary Use, Class 3.1
- EN 300 019-2-2 v2.1.2 (1999-09), Public Transportation, Class 2.3
- EN 300 019-2-1 v2.1.2 (2000-09), Storage, Class 1.2
- RoHS
  – RoHS 6 compliant
  – China RoHS compliant
- WEEE Compliant

Radio Transceiver Compliance

USA
- FCC 47 CFR, Part 15.247, Class C (2.4GHz)
- FCC 47 CFR, Part 15.407, Class C (5GHz)
- FCC 47 CFR, Part 15.205, 15.207, 15.209
- FCC 47 CFR, Part 2.109, 2.1093
- FCC OET No. 65:1997 & MPA
- FCC ID: AY3-AP36V1A

Canada
- RSS-210 Issue 6, Annex 8&9 (2.4/5GHz)
- RSS-102 (RF Exposure)
- IC ID: 4141A-AP36V1A

European Union
- ETSI/EN 300 328 v1.6.1, 2004-07 (2.4GHz)
- ETSI/EN 301 893 v1.4.1, 2003-8 (5.0GHz)
- EN50385 – Human Exposure
- 1999/5/EC R&TTE Radio Directive:

Note: For latest compliance standards, Declarations of Conformity (DoC) and country specific certifications visit http://www.extremenetworks.com/go/rfcertification.htm

Ordering Information

Part Number	Description
15800	Altitude 450 Indoor Access Point capable of supporting concurrent dual radios (11a/n, 11b/g/n) with integrated internal antennas. Delivers 3x3 MIMO spatial and antenna diversity. Use 802.3af PoE, or optional AC power module. Recommended for wall mount due to antenna radiation pattern.
15801	Altitude 451 Indoor Access Point capable of supporting concurrent dual radios (11a/n, 11b/g/n) with three RP-SMA connectors for external antennas. Comes with three detachable dual band external paddle antennas. Delivers 3x3 MIMO spatial and antenna diversity. Use 802.3af PoE, or optional AC adapter. For wall or ceiling mount.
15802	Altitude 450/451 AC Power module for universal use. Optional accessory. Output is 48VDC for the AP. Need to separately procure region specific AC power cord that plugs into the standard IEC C14 socket in the power module.
15803	Altitude 450/451 Security Mounting Plate for wall or ceiling mount including cable management and securing access to connectors. Optional accessory. For physical security use Kensington lock which can be procured separately.
15920	Optional pack of 5 ceiling mount bracket kits for Altitude 350-2d and A451 Access Points. Each mounting bracket is used to mount one Altitude 350d/A451 – upside down on the T-Rail of a drop ceiling.

www.extremenetworks.com **email: info@extremenetworks.com**

**Corporate
and North America**
Extreme Networks, Inc.
3585 Monroe Street
Santa Clara, CA 95051 USA
Phone +1 408 579 2800

**Europe, Middle East, Africa
and South America**
Phone +31 30 800 5100

Asia Pacific
Phone +852 2517 1123

Japan
Phone +81 3 5842 4011