Extreme™
Customer-Driven Networking

Highlights

Radio Technology

- 5 GHz 4x4:4
- 2.4 GHz 4x4:4

Radio Modes – SSR

- 5 GHz/2.4 GHz – Fixed
- 5 GHz/5 GHz – Dual 5 GHz
- 5 GHz/Sensor both bands

High Density Environments

- Delivers exceptional end-user experience even in the densest user environments

WPA3 Support

- Includes the latest WPA3 Wi-Fi security standard delivering robust protections for users and IoT devices

Fully Functional over 802.3at

- Reduced functionality with 802.3af

Smart Management Choices

- ExtremeCloud™ IQ™ delivers powerful, simple, and secure public or private cloud management capabilities

ExtremeWireless™ AP650/650X

Wi-Fi 6 (802.11ax) Indoor Access Point with Integrated or External Antenna Options

The AP650/X is a high performance, enterprise class Wi-Fi 6 access point that is ideal for many verticals, including; retail, education, hospitality and healthcare. These enterprises need to support a high density of users and IoT devices, while delivering an exceptional user experience.

The AP650/X provides high-efficiency 802.11ax aggregate data rates up to 4.8 Gbps currently in both the 5 GHz band and 2.4 GHz band. It also supports a Software Selectable Radio (SSR), providing the flexibility to simultaneously operate both radios in the 5 GHz band.

Despite the exponential growth of users, BYOD devices, IoT, high-bandwidth applications and security threats straining the infrastructure, the AP650 combines performance, security services and insightful ML/AI management capabilities to deliver an enterprise class solution at a value price.

BUILT ON BROADCOM®

Ex Extreme Elements™
ExtremeWireless™ AP650/X

| Hu Human | IQ Extreme Cloud iQ | Wi Wireless Indoor APs |

Built to Suit Your Business Needs

Extreme Elements are the building blocks that allow you to tailor your network to your specific business environment, goals, and objectives. They enable the creation of an Autonomous Network that delivers the positive experiences and business outcomes most important to your organization.

Combining architecture, automation, and artificial intelligence, Extreme Elements enable you to ensure that your uses get what they need — when and where they need it. Providing these superior user experiences is as simple as mixing and matching the right elements.

Learn more at extremenetworks.com/elements.

Security

The AP650/X delivers the highest level of security services, beginning with support for the latest Wi-Fi Alliance WPA3 security certifications. Additionally, supporting a stateful L2-L7 DPI firewall for context-based access security, Private Pre-Shared Key (PPSK) and much more.

Management Analytics

In conjunction with ExtremeCLoud IQ, the AP650/X provides a very rich set of data displayed via real-time analytics as well as a historial timeline.. The Network 360 and Client 360 views powered by machine learning provide context-specific granularity with perspective views for locations, network, APs, individual client devices as well as policy roles.

Wi-Fi 6 Technology

The AP650/X delivers the highest level of security services, beginning with support for the latest Wi-Fi Alliance WPA3 security certifications. Additionally, supporting a stateful L2-L7 DPI firewall for context-based access security, Private Pre-Shared Key (PPSK) and much more.

RF Monitoring

Network administrators will appreciate a powerful choice of RF management for their Wi-Fi networks, with Adaptive RF management with AI/ ML like functionality. Adaptive RF algorithms provide intelligent selection of the best channels and transmit power for unimpaired dual 5 GHz operation. Load balancing, band steering and many other attributes of the RF can all be automated.

Programable Radios

Extreme launched the industry's first software defined 802.11ax access point supporting not only a dual 5 GHz capability but also three software programmable modes to optimally manage radios to provide the highest level of client performance. The AP650 intelligent monitoring of the software configurable radios enables network administrators to configure network RF topology based on user environment and configure the access points in different modes as required.

Integrated BLE and Zigbee

To support both IoT and Guest Engagement services the AP510C/CX integrates Bluetooth to connect with IoT devices with Thread wireless to engage loyalty customers with Apple iBeacon. Enterprises can use Google Eddystone to send advertisements directly to shoppers, guests, and conference attendees. This makes it ideal for businesses to advertise their app-download pages, captive portals, or site-specific information.

Product Specifications

Radio Specifications

Wireless Frequency Range
- USA: 2.400 ~ 2.483 GHz, 5.15 ~ 5.35 GHz, 5.47 ~ 5.725 GHz, 5.725 ~ 5.85 GHz
- Europe: 2.400 ~ 2.483 GHz, 5.15 ~ 5.35 GHz, 5.47 ~ 5.725 GHz
- Japan: 2.400 ~ 2.497 GHz, 5.15 ~ 5.35 GHz, 5.47 ~ 5.725 GHz
- China: 2.400 ~ 2.483 GHz, 5.725 ~5.85 GHz

Modes
- IEEE802.11a 5 GHz OFDM
- IEEE802.11b 2.4 GHz DSSS/CCK
- IEEE802.11g 2.4 GHz OFDM
- IEEE802.11n 2.4 GHz/5 GHz OFDM
- IEEE802.11ac OFDM
- IEEE802.11ax OFDMA

Channel Support

802.11 b/g/n/ax
- US/Canada: 11 (1 ~ 11)
- Europe: 13 (1 ~ 13)
- Japan: 11b: 14 (1-13 or 14th), 11g: 13 (1 ~ 13)
- China: 13 (1 ~ 13)

802.11 a/n/ac/ax
- US/Canada: 24 non-overlapping channels (36,40,44,48,52,56,60,64;100,104,108, 112,116,120,124,128,132,136,140; 149,153,157,161,165)
- Europe: 19 non-overlapping channel (36,40,44,48,52,56,60,64;100,104,108,112, 116,120,124,128,132,136,140)
- Japan: 19 non-overlapping channels (36,40,44,48,52,56,60,64;100,104,108,112, 116,120,124,128,132,136,140)
- China: 5 non-overlapping channels (149,153,157,161,165)

Modulation Technology

802.11 Legacy a/b/g
- DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
- DSSS (Direct Sequence Spread Spectrum) with DBPSK (Differential Binary Phase Shift Keying 1 Mbps), DQPSK (Differential Quaternary Phase Shift Keying 2 Mbps), and CCK (Complementary Code Keying 5.5 & 11 Mbps), and OFDM (Orthogonal Frequency Division Multiplexing with BPSK for 6, 9 Mbps. QPSK for 12, 18 Mbps,16QAM for 24, 36 Mbps, 64QAM for 48, 54 Mbps)

802.11n
- OFDM (BPSK, QPSK, 16-QAM, 64-QAM)

802.11ac
- OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)

802.11ax
- OFDMA (1024-QAM)

Interfaces
- 1x 10/100/1000 Gigabit Ethernet
- 1x 2.5 mGig
- RJ-45 Console Port
  - USB Interface
- 802.3az supported
- Redundant PoE Capable

Radios
- Dual Radio AP, 2.4 GHz/5GHz and 5GHz radios supporting dual band or dual 5GHz operation
- 2.4 GHz/5 GHz, 802.11b/g/n/ax, 4x4
- 5 GHz, 802.11 a/n/ac/ax, 4x4 • 160 MHz, 1024-QAM supported • 1x Bluetooth/Zigbee radio

Power Consumption
- DC Power: Typical 18.78 W; Max 20.65 W
- 802.3at PoE Power: Typical 15.72 W; Max 19.92 W

Environmental
- Operating Temperature: 0 to 40 °C
- Storage Temperature: -40 to 70 °C
- Humidity: 10 to 95%

Physical
- Dimensions: 225mm x 225mm x 37.5mm • Weight: 2.6lb (1.18kg)
- Wall or ceiling mountable
- MTBF: 363,162 Hours @ 25 °C (estimate)
- RoHS: -2 Compliant
- TPM chip for added security

Antenna
- 4x integrated dual band 2.4-2.5 GHz/5.1-5.8 GHz omnidirectional antennas
- 4x integrated single band, 5.1-5.8 GHz omnidirectional antennas
- 1x internal Bluetooth/ZigBee antenna

Peak Antenna Gain
- 2.4 GHz omnidirectional, gain 5.0 dBi
- 5 GHz omnidirectional, gain 6.0 dBi
- Bluetooth/ZigBee omnidirectional, gain 4.2 dBi

AP650 – Sensitivity and Power Tables

Receive Sensitivity – 2.4GHz

Channel	Data Rate	Power (dBm)
11b	1 Mbps	-98
	11 Mbps	-90
11g	6 Mbps	-96
	54 Mbps	-78
HE20	MCS0	-95
	MCS11	-64
HE40	MCS0	-92
	MCS11	-62

Receive Sensitivity – 5GHz

Channel	Data Rate	Power (dBm)
11g	6 Mbps	-86
	54 Mbps	-73
HE20	MCS0	-87
	MCS11	-58
HE40	MCS0	-88
	MCS11	-56
HE80	MCS0	-83
	MCS11	-53
HE160	MCS0	-82
	MCS11	-51

Power – 2.4GHz

Channel	Data Rate	Power (dBm)
11b	1, 2, 5, 5, 11 Mbps	18
11g	54 Mbps	15
	48 Mbps	16
	36 Mbps	17
	6 Mbps	18
HE20	MCS0, 1, 2	18
	MCS3	17
	MCS4, 5	16
	MCS6, 7	15
	MCS8, 9	14
	MCS10, 11	12
HE40	MCS0, 1, 2	18
	MCS3	17
	MCS4, 5	16
	MCS6, 7	15
	MCS8, 9	14
	MCS10, 11	**12**

Power – 5GHz

Channel	Data Rate	Power (dBm)
11a	54 Mbps	17
	48 Mbps	17
	36 Mbps	18
	6 Mbps	19
HE20	MCS0, 1, 2	19
	MCS3, 4	17
	MCS5, 6	16
	MCS7, 8	15
	MCS9	14
	MCS10	13
	MCS11	12
HE40	MCS0, 1, 2	17
	MCS3, 4, 5	16
	MCS6, 7, 8	15
	MCS9	14
	MCS10	13
	MCS11	12
HE80	MCS0, 1, 2	17
	MCS3, 4, 5	16
	MCS6, 7, 8	15
	MCS9	14
	MCS10	13
	MCS11	12
HE160	MCS0, 1, 2	17
	MCS3, 4, 5	16
	MCS6, 7, 8	15
	MCS9	14
	MCS10	13
	MCS11	12

AP650X – Sensitivity and Power Tables

Power – 2.4GHz

Channel	Data Rate	Power (dBm)
11b	1, 2, 5.5, 11 Mbps	21
11g	6 Mbps	15
	36 Mbps	16
	48 Mbps	17
	54 Mbps	18
11n HT20	MCS0, 1, 2, 3, 4	20
	MCS5, 13, 21	18
	MCS6, 14, 22	17
	MCS7, 15, 23	16
	MCS8, 9, 10, 11, 12	20
	MCS16, 17, 18, 19, 20	20
11n HT40	MCS0,1, 2, 3, 4, 8	20
	MCS5, 13, 21	18
	MCS6, 14, 22	17
	MCS7, 15, 23	16
	MCS9, 10, 11, 12, 16	20
	MCS17, 18, 19, 20	20

Power – 5GHz

Channel	Data Rate	Power (dBm)
11a	6 Mbps	19
	36 Mbps	18
	48 Mbps	16
	54 Mbps	15
11n HT20	MSC0, 1 - 4, 8 - 11	19
	MCS5, 13, 21	18
	MCS6, 14, 22	16
	MCS7, 15, 23	15
	MCS12, 16 - 20	19
11n HT40	MCS0, 1, 2, 3, 4, 8	19
	MCS5, 13, 21	18
	MCS6, 14, 22	16
	MCS7, 15, 23	14
	MCS9, 10, 11, 12, 16	19
	MCS17, 18, 19, 20	19
11ac HT	256QAM @ 3/4 Code Rate	12
	256QAM @ 5/6 Code Rate	11

Receive Sensitivity – 2.4GHz

Channel	Data Rate	Sensitivity
11b	1 Mbps	-100
	11 Mbps	-93
11g	6 Mbps	-95
	36 Mbps	-86
	48 Mbps	-82
	54 Mbps	-80
11n HT20	MCS0, 8, 16	-95
	MCS5, 13, 21	-81
	MCS6, 14, 22	-79
	MCS7, 15, 23	-77
11n HT40	MCS0, 8, 16	-92
	MCS5, 13, 21	-78
	MCS6, 14, 22	-76
	MCS7, 15, 23	-74

Receive Sensitivity – 5GHz

Channel	Data Rate	Sensitivity
11a	6 Mbps	-95
	36 Mbps	-86
	48 Mbps	-81
	54 Mbps	-80
11n HT20	MCS0, 8, 16	-91
	MCS5, 13, 21	-78
	MCS6, 14, 22	-76
	MCS7, 15, 23	-74
11n HT40	MCS0, 8, 16	-88
	MCS5, 13, 21	-75
	MCS6, 14, 22	-73
	MCS7, 15, 23	-71
11ac HT20	3/4	-65
	5/6	-63
11ac HT40	3/4	-62
	5/6	-60
11ac HT80	3/4	-59
	5/6	-57
11ac HT160	3/4	-56
	5/6	-54

AP650 – Radiation Patterns: Azimuth and Elevation
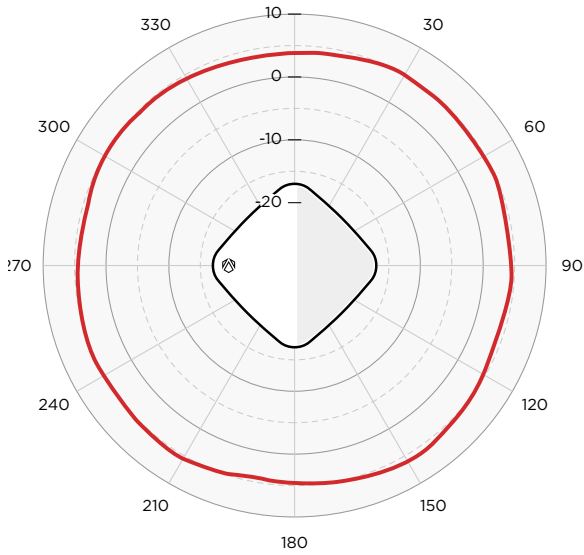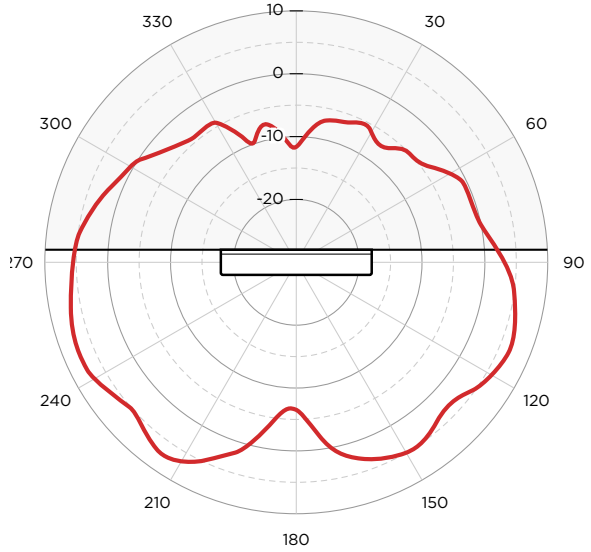
Azimuth – 2.4 GHz
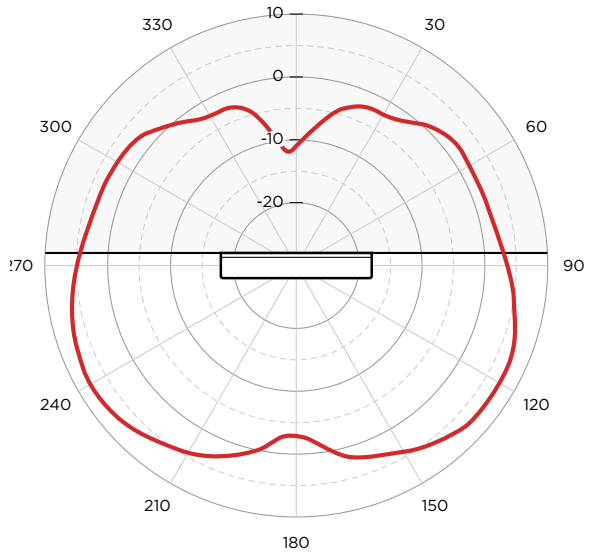
Elevation – 2.4 GHz
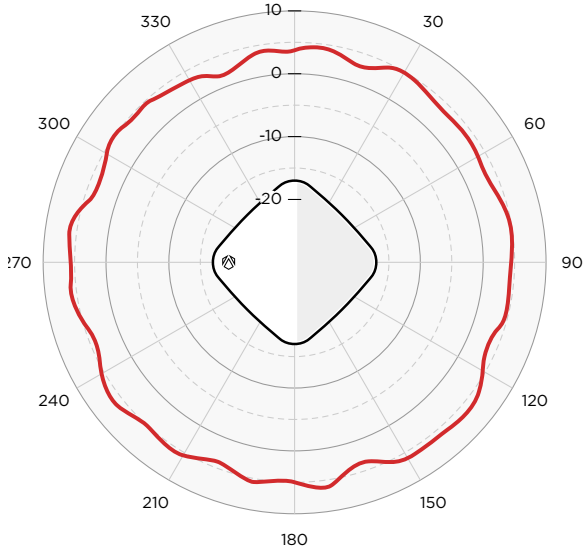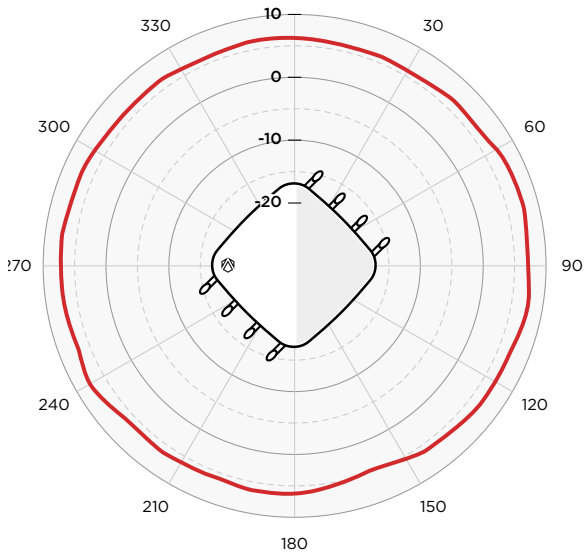
Azimuth – 5 GHz

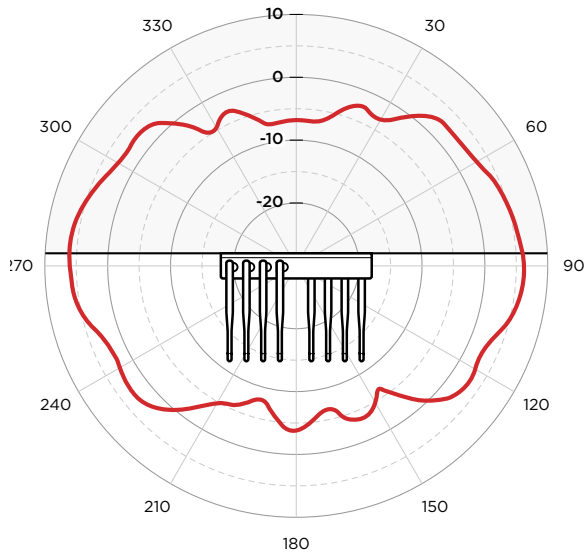## Elevation – 5 GHz

AP650X – Radiation Patterns: Azimuth and Elevation

Azimuth – 2.4 GHz

Elevation – 2.4 GHz

Azimuth – 5 GHz
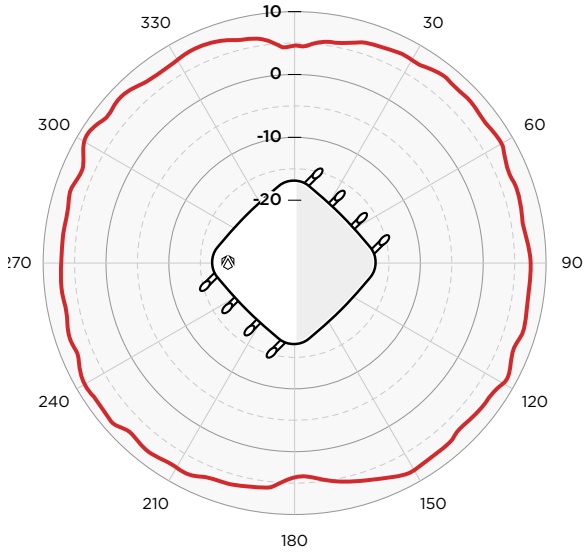
Elevation – 5 GHz
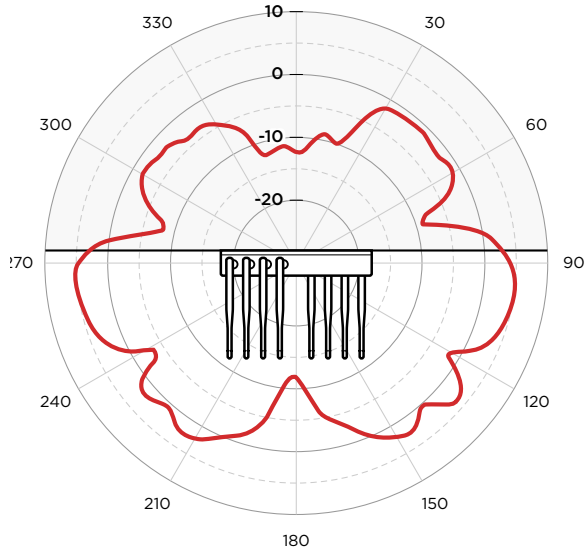
Ordering Information

SKU	Description
AH-AP-650-AX-XX	AP650 Indoor plenum rated AP, dual 5 GHz radio 4x4:4 802.11ac/ax AP, 1x NBASE-TTM Ethernet port and 1x GE Ethernet port, with internal antennas. Includes HiveManager Connect and HiveCare Community. (Regulatory Domains available: FCC, CE, W (World), CAN (Canada))
AH-AP-650X-AX-XX	AP650X Indoor plenum rated AP, dual 5 GHz 4x4:4 802.11ac/ax, 1x NBASE-T™ Ethernet and 1x GE, supports external antennas and extended temp range. Antennas sold separately. Includes HiveManager Connect and HiveCare Community. (Regulatory Domains available: FCC, CE, W (World), CAN (Canada))
AH-ACC-INJ-30W-UK	30W POE power injector with UK power cord for AP122, AP122X, AP130, AP200 series, AP550, AP630, AP650 and AP650X
AH-ACC-INJ-30W-US	30W POE power injector with US power cord for AP122, AP122X, AP130, AP200 series, AP550, AP630, AP650 and AP650X
AH-ACC-INJ-30W-AU	30W POE power injector with Australia/New Zealand power cord for AP122, AP122X, AP130, AP200 series, AP550, AP630, AP650, and AP650X
AH-ACC-INJ-30W-EU	30W POE power injector with EU power cord for AP122, AP122X, AP130, AP200 series, AP550, AP630, AP650, and AP650X
AH-ACC-BKT-AX-IL	Armstrong mounting bracket for Interlude ceiling for the AP650, AP650X, or AP630
AH-ACC-BKT-AX-SL	Replacement Prelude Bracket, T-Bar, Supported on AP630, AP650, and AP650X. Same as in-box accessory
AH-ACC-BKT-AX-WL	Bracket, Wall Mount, Supported on AP630, AP650, and AP650X
AH-ACC-PW-30W-US	30W Power Supply for AP650/AP650X with US Power Plug
AH-ACC-PW-30W-UK	30W Power Supply for AP650/AP650X with UK Power Plug
AH-ACC-PW-30W-EU	30W Power Supply for AP650/AP650X with EU Power Plug
AH-ACC-PW-30W-AU	30W Power Supply for AP650/AP650X with Australia Power Plug
AH-ACC-PW-30W-JP	30W Power Supply for AP650/AP650X with Japan Power Plug
AH-ACC-PW-30W-KR	30W Power Supply for AP650/AP650X with Korea Power Plug

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