HUAWEI

Huawei AirEngine 8776-X7F-T Access Point Datasheet

Product Overview

Huawei AirEngine 8776-X7F-T is an indoor access point (AP) in compliance with Wi-Fi 7 (802.11be). It can simultaneously provide services on 2.4 GHz, 5 GHz, and 6 GHz frequency bands, achieving a device rate of up to 26.56 Gbit/s. The AP is empowered by brand-new Wi-Fi 7 technologies and is equipped with built-in smart antennas to enable always-on Wi-Fi signals for users, significantly enhancing users' wireless network experience. These strengths make the AirEngine 8776-X7F-T ideal for indoor coverage scenarios such as enterprise office, education, and healthcare.

AirEngine 8776-X7F-T

- Provides services simultaneously on the 2.4 GHz (2x2 MIMO), 5 GHz (2x2 MIMO), 5 GHz (4x4 MIMO), 6 GHz (4x4 MIMO) and 6 GHz* (4x4 MIMO) frequency bands achieving rates of up to 0.688 Gbit/s, 1.441 Gbit/s, 1.376 Gbit/s, 11.53 Gbit/s, and 11.53 Gbit/s, respectively, and a maximum rate of 26.56 Gbit/s for the device.
- Built-in smart antennas that automatically adjust the coverage direction and signal strength based on the intelligent switchover algorithm. Such capability enables the AP to flexibly adapt to the application environment changes, providing accurate and stable coverage as STAs move.
- USB port can be used for external IoT expansion (supporting protocols such as ZigBee, and RFID).
- Supports Bluetooth serial interface-based O&M through built-in Bluetooth and CloudCampus APP.
- Supports Fit, Fat and cloud management working modes, and enables Huawei cloud management platform to manage and operate APs and services on the APs, reducing network O&M costs.

NOTE

It supports flexible switching of frequency bands as the following：

- 2.4G 2x2 MIMO +5G 4x4 MIMO +5G 2x2 MIMO+ 6G 4x4 MIMO+ 6G 4x4 MIMO
- 2.4G 4x4 MIMO +5G 4x4 MIMO +5G 4x4 MIMO+ 6G 4x4 MIMO
- 2.4G 4x4 MIMO +5G 4x4 MIMO +6G 4x4 MIMO+ 6G 4x4 MIMO
- 2.4G 2x2 MIMO +5G 4x4 MIMO +5G 2x2 MIMO+ 6G 4x4 MIMO+ scan radio

Feature Descriptions

Wi-Fi 7 (802.11be) standard

Wi-Fi 7 (802.11be) is the Wi-Fi standard, also known as IEEE 802.11be or extremely high throughput (EHT). Based on Wi-Fi 6, Wi-Fi 7 introduces technologies such as 4096-quadrature amplitude modulation (QAM), multi-resource unit (MRU), multi-link operation (MLO), enhanced multi-user multiple-input multiple-output (MU-MIMO). Drawing on these cutting-edge technologies, Wi-Fi 7 delivers a higher data transmission rate and lower latency than Wi-Fi 6.

New Features in Wi-Fi 7

Up to 320 MHz Bandwidth

The 2.4 GHz and 5 GHz frequency bands are unlicensed spectrums that limited and congested. When running emerging applications (such as VR/AR), existing Wi-Fi networks inevitably encounter low quality of service (QoS). To achieve a maximum of 30 Gbit/s throughput, Wi-Fi 7 will support the 6 GHz of frequency band and extend new bandwidth modes, including contiguous 240 MHz, non-contiguous 160+80 MHz, contiguous 320 MHz, and non-contiguous 160+160 MHz.

Multi-RU

In Wi-Fi 6, each user can send or receive frames only on the RUs allocated to them, which greatly limits the flexibility of spectrum resource scheduling. To resolve this problem and further improve spectrum efficiency, Wi-Fi 7 defines a mechanism for allocating multiple RUs to a single user. To balance the implementation complexity and spectrum utilization, the standard specifications impose certain restrictions on RU combination. That is, small RUs (containing fewer than 242 tones) can be combined only with small RUs, and large RUs (containing greater than or equal to 242 tones) can be combined only with large RUs. Small RUs and large RUs can be combined together.

Higher-Order 4096-QAM

The highest order modulation supported by Wi-Fi 6 is 1024-QAM, which allows each modulation symbol to carry up to 10 bits. To further improve the rate, Wi-Fi 7 introduces 4096-QAM so that each modulation symbol can carry 12 bits. With the same coding, 4096-QAM in Wi-Fi 7 can achieve a 20% rate increase compared with 1024-QAM in Wi-Fi 6.

Multi-Link Mechanism

To efficiently utilize all available spectrum resources, the industry is in urgent need to introduce new spectrum management, coordination, and transmission mechanisms on the 2.4 GHz, 5 GHz, and 6 GHz frequency bands. The TGbe defines multi-link aggregation technologies, including the MAC architecture of enhanced multi-link aggregation, multi-link channel access, and multi-link transmission.

There are two modes as for MLO:

- High-concurrency mode, multiple links send different data to improve bandwidth.
- High-reliability mode, multiple links send the same data, improving reliability.

Wi-Fi Shield

Wi-Fi Shield is an innovative wireless security technology developed by Huawei. It transmits extra interference signals to ensure that only the target terminal can accurately receive data packets and signals, preventing malicious users from listening. The Wi-Fi shield function is supported. Eavesdropping terminals cannot capture packets over the air interface.

Wi-Fi CSI Sensing

Wi-Fi CSI sensing is a cutting-edge technology for implementing sensing by using channel state information (Channel State Information, CSI) generated during radio signal propagation. Based on the Wi-Fi 7 standard, Huawei innovatively introduces Wi-Fi CSI to sense the presence of personnel, so that Wi-Fi signals can be sensed wherever they are. Compared with cameras, it protects user privacy and applies to scenarios such as energy saving, health care, and smart security.

Leader AP

The leader AP integrates some WLAN AC functions and can be used to manage Fit APs in small- and medium-sized enterprises and stores, implementing WLAN AC-free access not requiring licenses and saving customer investment.

Basic Specifications

Fit AP mode

Item	Description
WLAN features	Compliance with IEEE 802.11be and compatibility with IEEE 802.11a/b/g/n/ac/ax Maximum ratio combining (MRC) Space time block code (STBC) Cyclic Delay Diversity (CDD)/Cyclic Shift Diversity (CSD) Beamforming Multi-user multiple-input multiple-output (MU-MIMO) Orthogonal frequency division multiple access (OFDMA) Preamble puncturing

Item	Description
	BSS Color TxBF TWT DPD Compliance with 4096-quadrature amplitude modulation (QAM) and compatibility with 1024-QAM, 256-QAM, 64-QAM, 16-QAM, 8-QAM, quadrature phase shift keying (QPSK), and binary phase shift keying (BPSK) Low-density parity-check (LDPC) Frame aggregation, including A-MPDU (Tx/Rx) and A-MSDU (Tx/Rx) 802.11 dynamic frequency selection (DFS) Short guard interval (GI) in 20 MHz, 40 MHz, 80 MHz, 160 MHz and 320 MHz modes Wi-Fi multimedia (WMM) for priority-based data processing and forwarding WLAN channel management and channel rate adjustment **NOTE** For detailed management channels, see the Country Codes & Channels Compliance. Automatic channel scanning and interference avoidance Service set identifier (SSID) hiding configuration for each AP, supporting Chinese SSIDs Signal sustain technology (SST) Unscheduled automatic power save delivery (U-APSD) Multi-user call admission control (CAC) Advanced cellular coexistence (ACC), minimizing the impact of interference from cellular networks 802.11k and 802.11v smart roaming 802.11r fast roaming (≤ 50 ms) Spectrum analysis Terminal location FTM (Fine Timing Measurement) location ASFN (Advanced Same Frequency Network)
Network features	Compliance with IEEE 802.3ab Auto-negotiation of the rate and duplex mode, and automatic switchover between Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDI-X) Compatibility with IEEE 802.1Q SSID-based VLAN assignment Eth-Trunk function Management channel of the AP's uplink port in tagged and untagged modes DHCP client, obtaining IP addresses through DHCP Tunnel data forwarding and direct data forwarding STA isolation in the same VLAN IPv4/IPv6 access control list (ACL) Link Layer Discovery Protocol (LLDP) Service holding when CAPWAP link disconnection in direct data forwarding mode Unified authentication on the AC AC dual-link backup Telemetry, quickly collecting AP status and application experience parameters MESH HotSpot2.0

Item	Description
	IPv6 SAVI
QoS features	WMM power save Priority mapping for upstream packets and flow-based mapping for downstream packets Queue mapping and scheduling User-based bandwidth limiting Adaptive bandwidth management (automatic bandwidth adjustment based on the user quantity and radio environment) to improve user experience Application identification and QoS classification to improve voice quality for popular applications, such as Zoom, QQ, and WeChat Airtime scheduling Air interface HQoS scheduling Intelligent multimedia scheduling VIP bandwidth reservation VIP FastPass, per-packet power control Native-IP IFIT iFlow User-defined application
Security features	Open system authentication WPA2-PSK authentication and encryption (WPA2-Personal) WPA2-802.1X authentication and encryption (WPA2-Enterprise) WPA3-SAE authentication and encryption (WPA3-Personal) WPA3-802.1X authentication and encryption (WPA3-Enterprise) WPA-WPA2 hybrid authentication WPA2-WPA3 hybrid authentication WPA/WPA2/WPA2-PPSK authentication and encryption WPA/WPA2/WPA2-DPSK authentication and encryption Wireless intrusion detection system (WIDS) and wireless intrusion prevention system (WIPS), including rogue device detection and containment, attack detection and dynamic blacklist, and STA/AP blacklist and whitelist 802.1X authentication, MAC address authentication, and Portal authentication DHCP snooping 802.11w Protected Management Frames (PMF) CAPWAP DTLS data encryption and decryption URL filtering MACsec@ Uplink Ethernet port Wi-Fi Shield Secure boot Build-in TPM module Dot1x client
EAP types	EAP-TLS, EAP-TTLS, EAP-PEAP, EAP-CHAP, EAP-SIM, EAP-AKA, EAP-GTC, EAP-FAST, EAP-PEAP, EAP-MD5, EAP-MSCHAPv2, PEAPv0, PEAPv1
Maintenance features	Unified AP management and maintenance on the AC Automatic AP onboarding, automatic configuration loading, and plug-and-play (PnP) Automatic batch upgrade STelnet using SSHv2

Item	Description
	SFTP using SSHv2 Remote wireless O&M through the Bluetooth serial port System status alarm Unified AP management on WebMaster
Sensing	Wi-Fi CSI Sensing

Fat AP mode

Item	Description
WLAN features	Compliance with IEEE 802.11be and compatibility with IEEE 802.11a/b/g/n/ac/ax Maximum ratio combining (MRC) Space time block code (STBC) Cyclic Delay Diversity (CDD)/Cyclic Shift Diversity (CSD) Beamforming Multi-user multiple-input multiple-output (MU-MIMO) Orthogonal frequency division multiple access (OFDMA) Preamble puncturing BSS Color TxBF TWT Compliance with 4096-quadrature amplitude modulation (QAM) and compatibility with 1024-QAM, 256-QAM, 64-QAM, 16-QAM, 8-QAM, quadrature phase shift keying (QPSK), and binary phase shift keying (BPSK) Low-density parity-check (LDPC) Frame aggregation, including A-MPDU (Tx/Rx) and A-MSDU (Tx/Rx) 802.11 dynamic frequency selection (DFS) Short guard interval (GI) in 20 MHz, 40 MHz, 80 MHz, 160 MHz and 320 MHz modes Wi-Fi multimedia (WMM) for priority-based data processing and forwarding WLAN channel management and channel rate adjustment **NOTE** For detailed management channels, see the Country Codes & Channels Compliance. Automatic channel scanning and interference avoidance Service set identifier (SSID) hiding configuration for each AP, supporting Chinese SSIDs Signal sustain technology (SST) Unscheduled automatic power save delivery (U-APSD) Advanced cellular coexistence (ACC), minimizing the impact of interference from cellular networks 802.11k and 802.11v smart roaming 802.11r fast roaming (≤ 50 ms)
Network features	Compliance with IEEE 802.3ab Auto-negotiation of the rate and duplex mode, and automatic switchover between Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDI-X) Compatibility with IEEE 802.1Q SSID-based VLAN assignment DHCP client, obtaining IP addresses through DHCP Tunnel data forwarding and direct data forwarding

Item	Description
	STA isolation in the same VLAN IPv4 access control list (ACL) Link Layer Discovery Protocol (LLDP) Leader AP NAT
QoS features	WMM power save Priority mapping for upstream packets and flow-based mapping for downstream packets Queue mapping and scheduling User-based bandwidth limiting Airtime scheduling Intelligent multimedia scheduling VIP FastPass
Security features	Open system authentication WPA2-PSK authentication and encryption (WPA2-Personal) WPA3-SAE authentication and encryption (WPA3-Personal) WPA-WPA2 hybrid authentication WPA2-WPA3 hybrid authentication MAC address authentication, and Portal authentication DHCP snooping 802.11w Protected Management Frames (PMF) Secure boot
EAP types	EAP-TLS, EAP-TTLS, EAP-PEAP, EAP-CHAP, EAP-SIM, EAP-AKA, EAP-GTC, EAP-FAST, EAP-PEAP, EAP-MD5, EAP-MSCHAPv2, PEAPv0, PEAPv1
Maintenance features	STelnet using SSHv2 SFTP using SSHv2 Remote wireless O&M through the Bluetooth serial port System status alarm

Cloud-Managed AP mode

Item	Description
WLAN features	Compliance with IEEE 802.11be and compatibility with IEEE 802.11a/b/g/n/ac/ax Maximum ratio combining (MRC) Space time block code (STBC) Cyclic Delay Diversity (CDD)/Cyclic Shift Diversity (CSD) Beamforming Multi-user multiple-input multiple-output (MU-MIMO) Orthogonal frequency division multiple access (OFDMA) Preamble puncturing BSS Color TxBF TWT Compliance with 4096-quadrature amplitude modulation (QAM) and compatibility with 1024-QAM, 256-QAM, 64-QAM, 16-QAM, 8-QAM, quadrature phase shift keying (QPSK), and binary phase

Item	Description
	shift keying (BPSK) Low-density parity-check (LDPC) Frame aggregation, including A-MPDU (Tx/Rx) and A-MSDU (Tx/Rx) 802.11 dynamic frequency selection (DFS) Short guard interval (GI) in 20 MHz, 40 MHz, 80 MHz, 160 MHz and 320 MHz modes Wi-Fi multimedia (WMM) for priority-based data processing and forwarding WLAN channel management and channel rate adjustment **NOTE** For detailed management channels, see the Country Codes & Channels Compliance. Automatic channel scanning and interference avoidance Service set identifier (SSID) hiding configuration for each AP, supporting Chinese SSIDs Signal sustain technology (SST) Unscheduled automatic power save delivery (U-APSD) Automatic AP Online by NCE-Campus Multi-user call admission control (CAC) Advanced cellular coexistence (ACC), minimizing the impact of interference from cellular networks 802.11k and 802.11v smart roaming 802.11r fast roaming (≤ 50 ms) Spectrum analysis Terminal location FTM (Fine Timing Measurement) location
Network features	Compliance with IEEE 802.3ab Auto-negotiation of the rate and duplex mode, and automatic switchover between Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDI-X) Compatibility with IEEE 802.1Q SSID-based VLAN assignment DHCP client, obtaining IP addresses through DHCP STA isolation in the same VLAN IPv4/IPv6 access control list (ACL) Link Layer Discovery Protocol (LLDP) Service holdover when the link to NCE-Campus is disconnected Unified authentication on the cloud management platform Network address translation (NAT) Telemetry, quickly collecting AP status and application experience parameters MESH Tunnel-AC IPv6 SAVI HotSpot2.0
QoS features	WMM power save Priority mapping for upstream packets and flow-based mapping for downstream packets Queue mapping and scheduling User-based bandwidth limiting Adaptive bandwidth management (automatic bandwidth adjustment based on the user quantity and radio environment) to improve user experience Application identification and QoS classification to improve voice quality for popular applications,

Item	Description
	such as Zoom, QQ, and WeChat Airtime scheduling Air interface HQoS scheduling Intelligent multimedia scheduling VIP bandwidth reservation VIP FastPass, per-packet power control Native-IP IFIT iFlow User-defined application
Security features	Open system authentication WPA2-PSK authentication and encryption (WPA2-Personal) WPA2-802.1X authentication and encryption (WPA2-Enterprise) WPA3-SAE authentication and encryption (WPA3-Personal) WPA3-802.1X authentication and encryption (WPA3-Enterprise) WPA-WPA2 hybrid authentication WPA2-WPA3 hybrid authentication WPA/WPA2/WPA2-PPSK authentication and encryption WPA/WPA2/WPA2-DPSK authentication and encryption 802.1X authentication, MAC address authentication, and Portal authentication Wireless intrusion detection system (WIDS) and wireless intrusion prevention system (WIPS), including rogue device detection and containment, attack detection and dynamic blacklist, and STA/AP blacklist and whitelist DHCP snooping 802.11w Protected Management Frames (PMF) CAPWAP DTLS data encryption and decryption URL filtering MACsec@ Uplink Ethernet port Wi-Fi Shield Secure boot Build-in TPM module Dot1x client
EAP types	EAP-TLS, EAP-TTLS, EAP-PEAP, EAP-CHAP, EAP-SIM, EAP-AKA, EAP-GTC, EAP-FAST, EAP-PEAP, EAP-MD5, EAP-MSCHAPv2, PEAPv0, PEAPv1
Maintenance features	Unified AP management and maintenance on the cloud management platform Automatic AP onboarding, automatic configuration loading, and PnP Batch upgrade STelnet using SSHv2 SFTP using SSHv2 Remote wireless O&M through the Bluetooth serial port Real-time user configuration monitoring and fast fault locating using the NMS System status alarm Network Time Protocol (NTP)
Sensing	Wi-Fi CSI Sensing

Technical Specifications

Item		Description
Technical specifications	Dimensions (H x W x D)	54 mm x 265 mm x 265 mm
	Weight	2.29 kg
	Interface type	2 x 100M/1GE/2.5GE/5GE/10GE(RJ-45) 1 x USB **NOTE** 2 x 10GE(RJ-45) support PoE input.
	Bluetooth	Bluetooth 6.0
	IoT	• Built-in multi-protocol IoT interfaces, flexibly supporting BLE, ZigBee, HomeKit, and Thread* • USB port extension external IoT (Supports protocols such as ZigBee, RFID) **NOTE** Features marked with asterisks (*) can be implemented through software upgrade.
	LED indicator	Indicates the power-on, startup, running, alarm, and fault states of the system.
Power specifications	Power input	• 43.2V~57.6V • PoE power supply: In compliance with 802.3bt/at **NOTE** When 802.3at power is supplied, the AP will operate with restrictions, and the details refer to the Info-Finder.
	Maximum power consumption	• 42.1 W (excluding USB) **NOTE** The actual maximum power consumption depends on local laws and regulations.
Environmental specifications	Operating temperature	-10°C to +50°C **NOTE** The value may vary depending on the installation environment.
	Storage temperature	-40°C to +70°C
	Operating humidity	5% to 95%
	Altitude	-60 m to +5000 m
	Atmospheric pressure	53 kPa to 106 kPa
Radio specifications	Antenna type	Built-in smart antennas
	Antenna gain	2.4 GHz: 4 dBi 5 GHz: 5 dBi 6 GHz: 5 dBi **NOTE** The gains above are the single-antenna peak gains.
	Maximum number of SSIDs	16

Item		Description
	for each radio	
	Maximum number of users	3000 (600 per radio) **NOTE** The actual number of users varies according to the application environment.
	Maximum transmit power	2.4 GHz: 20 dBm/chain 5 GHz: 20 dBm/chain 6 GHz: 20 dBm/chain **NOTE** The actual transmit power depends on local laws and regulations.
	Frequency bands	2.400 to 2.4835 GHz ISM 5.150 to 5.250 GHz U-NII-1 5.250 to 5.350 GHz U-NII-2A 5.470 to 5.725 GHz U-NII-2C 5.725 to 5.850 GHz U-NII-3/ISM 5.925 to 6.425 GHz U-NII-5 6.425 to 6.525 GHz U-NII-6 6.525 to 6.875 GHz U-NII-7 6.875 to 7.125 GHz U-NII-8 **NOTE** The available bands and channels are dependent on the configured regulatory domain (country).

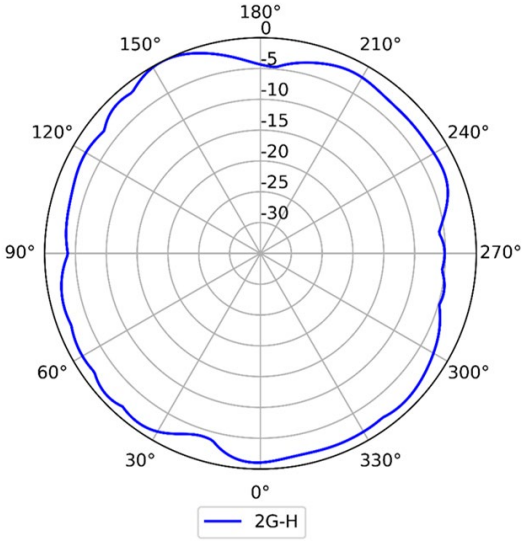
Standards Compliance

Item	Description		
Safety standards	• EN 62368-1	• IEC 62368-1	
Radio standards	• ETSI EN 300 328 • ETSI EN 303 687	• ETSI EN 301 893	• AN/NZS 4268
EMC standards	• EN 301 489-1 • EN 301 489-17 • EN 60601-1-2 • EN 55032 • EN 55035	• GB 9254 • GB 17625.2 • AS/NZS CISPR32 • CISPR 32 • CISPR 35	• IEC/EN61000-4-2 • IEC/EN 61000-4-3 • IEC/EN 61000-4-4 • IEC/EN 61000-4-5 • IEC/EN 61000-4-6 • ICES-003
IEEE standards	• IEEE 802.11a/b/g • IEEE 802.11n • IEEE 802.11ac • IEEE 802.11ax • IEEE 802.11be	• IEEE 802.11h • IEEE 802.11d • IEEE 802.11e • IEEE 802.11k	• IEEE 802.11v • IEEE 802.11w • IEEE 802.11r
Security standards	• 802.11i, Wi-Fi Protected Access (WPA), WPA2, WPA2-Enterprise, WPA2-PSK, WPA3, WAPI		

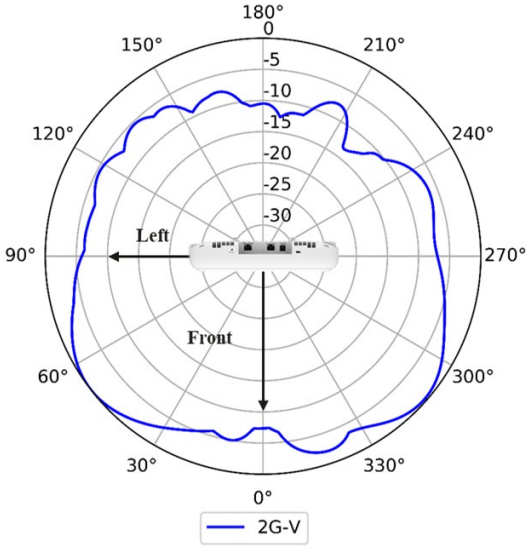
Item	Description	
	• 802.1X • Advanced Encryption Standards(AES), Temporal Key Integrity Protocol(TKIP), WEP, Open • EAP Type(s)	
EMF	• EN 62311	• EN 50385
RoHS	• Directive 2002/95/EC & 2011/65/EU • (EU)2015/863	
Reach	• Regulation 1907/2006/EC	
WEEE	• Directive 2002/96/EC & 2012/19/EU	

Antennas Pattern

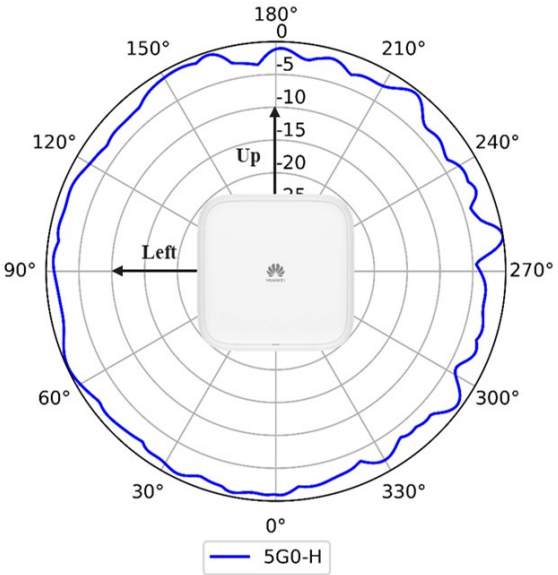
- 2.4G 4x4 MIMO +5G 4x4 MIMO +5G 4x4 MIMO+ 6G 4x4 MIMO mode:



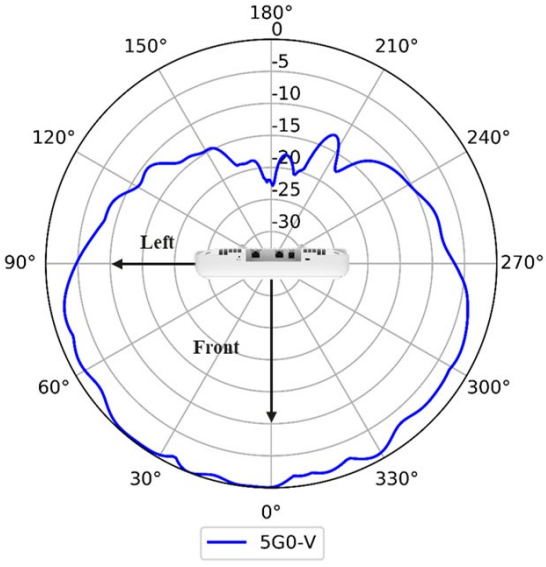
2.4GHz (Horizontal)



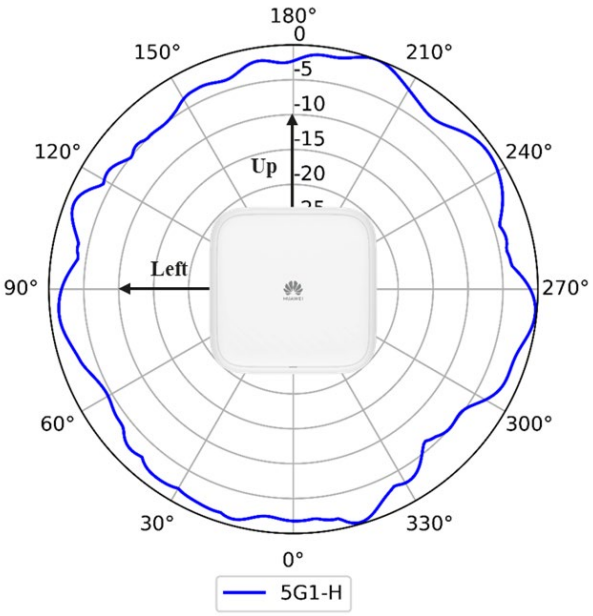
2.4GHz (Vertical)



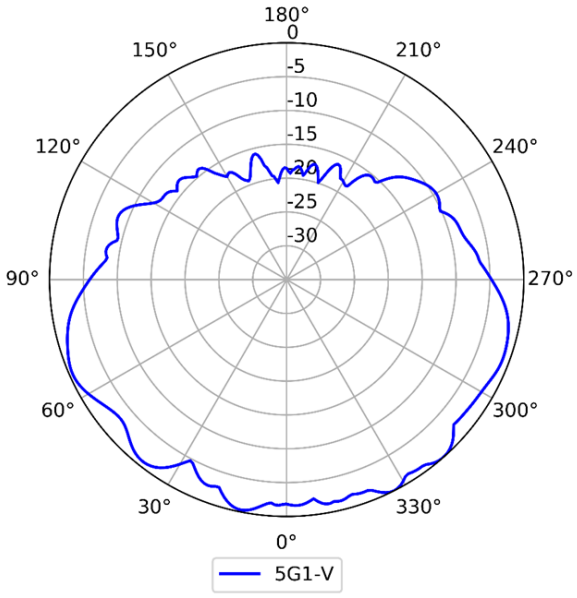
5GHz_0 (Horizontal)



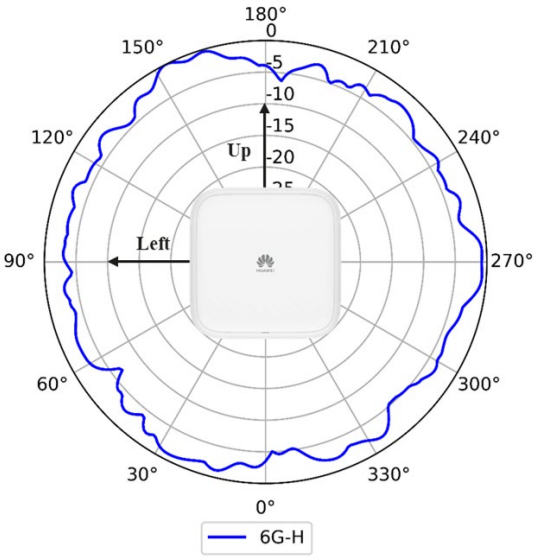
5GHz_0 (Vertical)



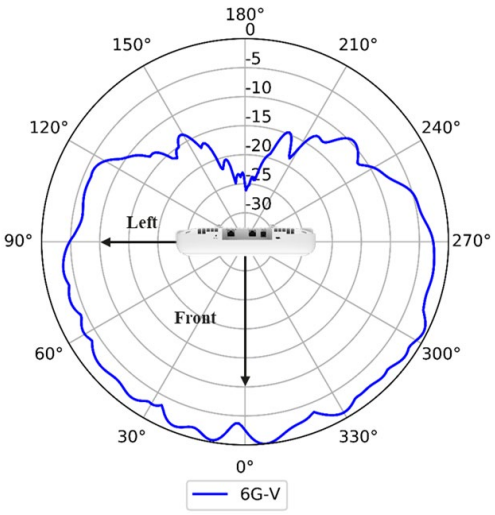
5GHz_1 (Horizontal)



5GHz_1 (Vertical)

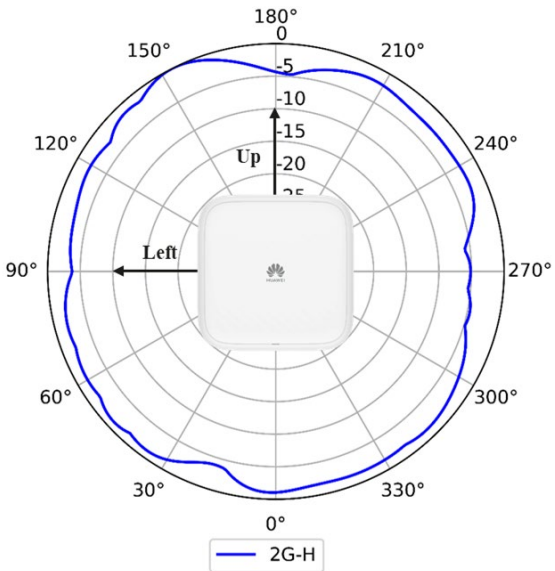


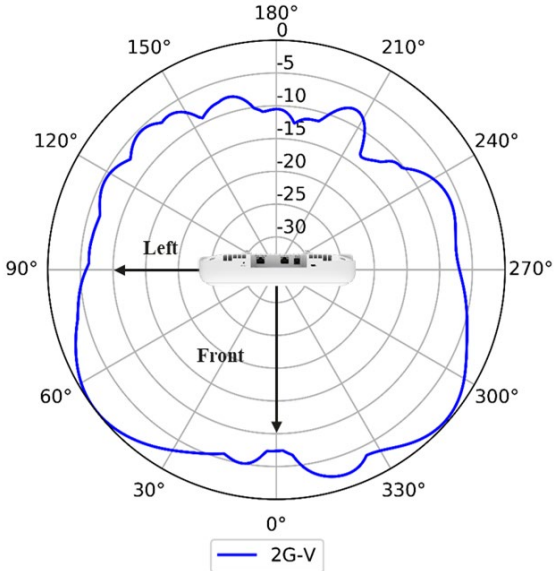
6GHz (Horizontal)



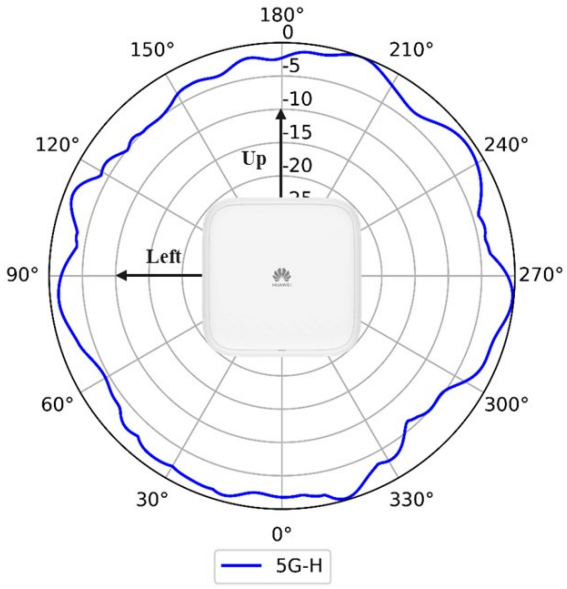
6GHz (Vertical)

- 2.4G 4x4 MIMO +5G 4x4 MIMO +6G 4x4 MIMO+ 6G 4x4 MIMO mode:

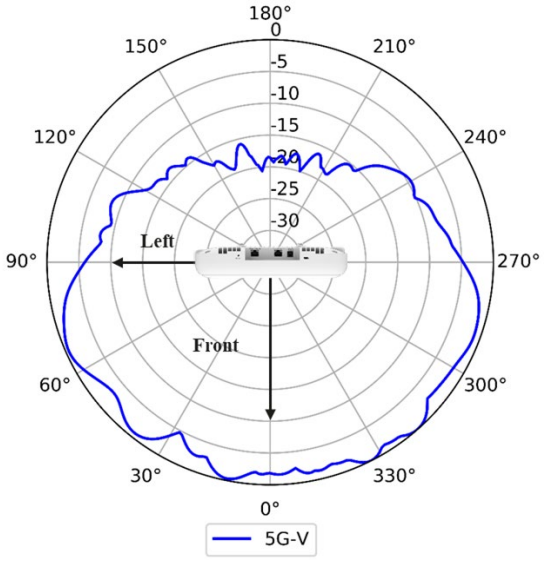




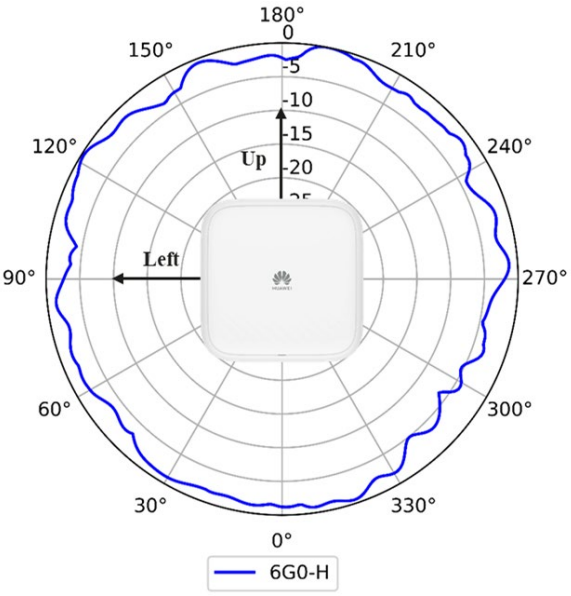
2.4GHz (Horizontal)



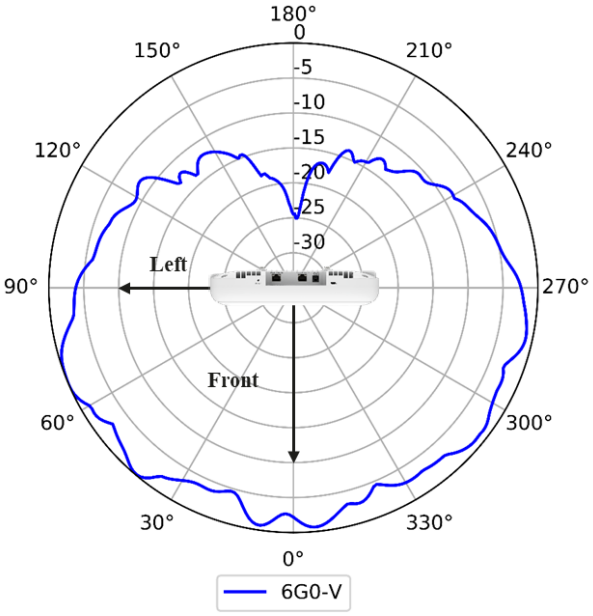
2.4GHz (Vertical)



5GHz (Horizontal)

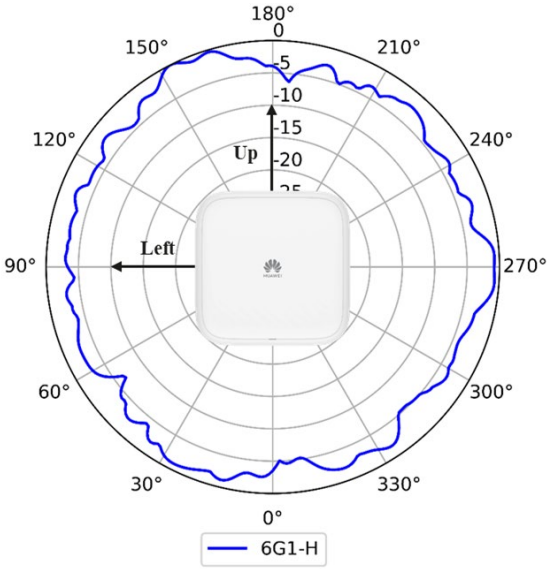


5GHz (Vertical)

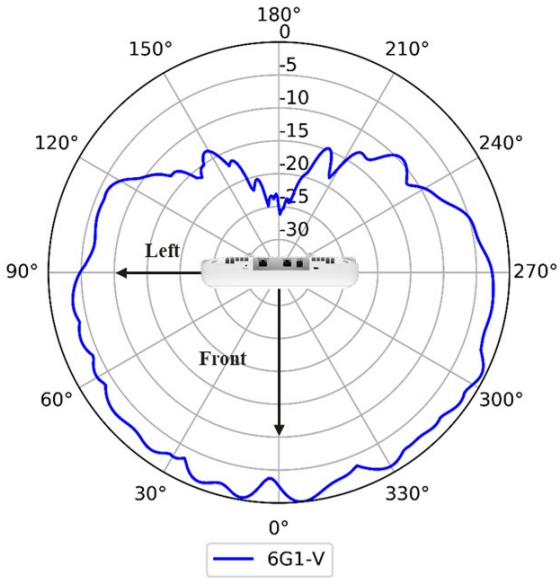


6GHz_0 (Horizontal)

6GHz_0 (Vertical)

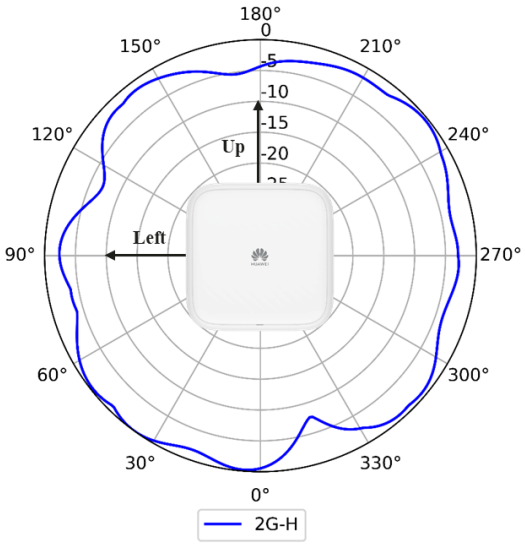


6GHz_1 (Horizontal)

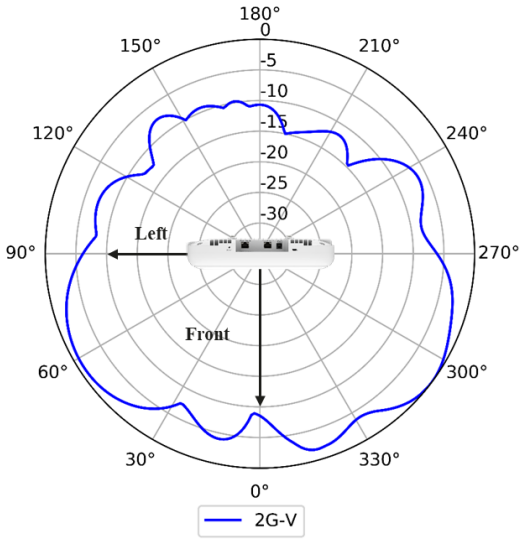


6GHz_1 (Vertical)

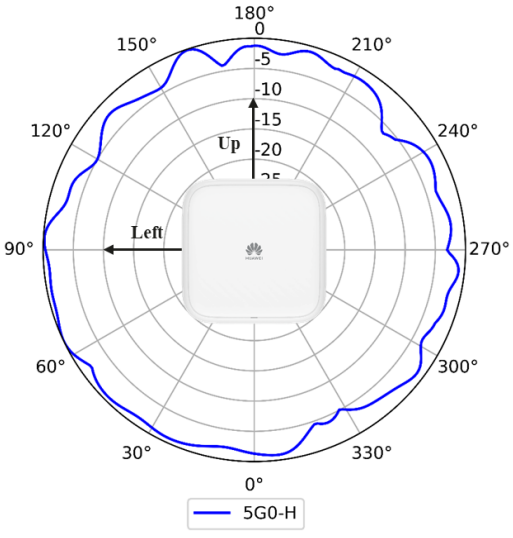
- 2.4G 2x2 MIMO +5G 4x4 MIMO +5G 2x2 MIMO+ 6G 4x4 MIMO+ 6G 4x4 MIMO



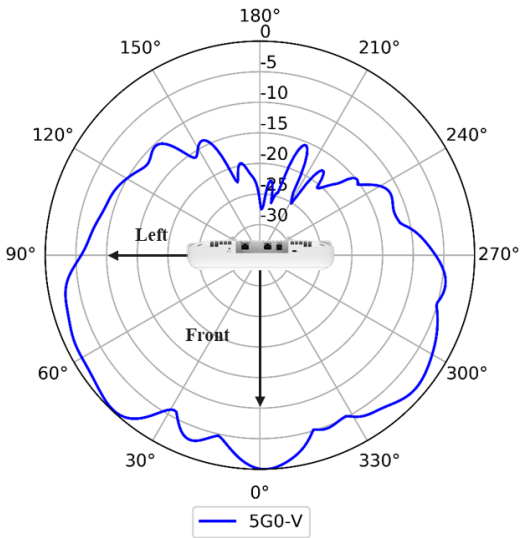
2.4GHz (Horizontal)



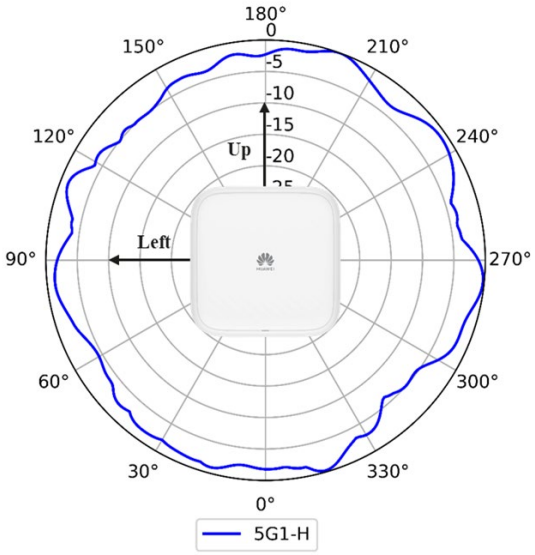
2.4GHz (Vertical)



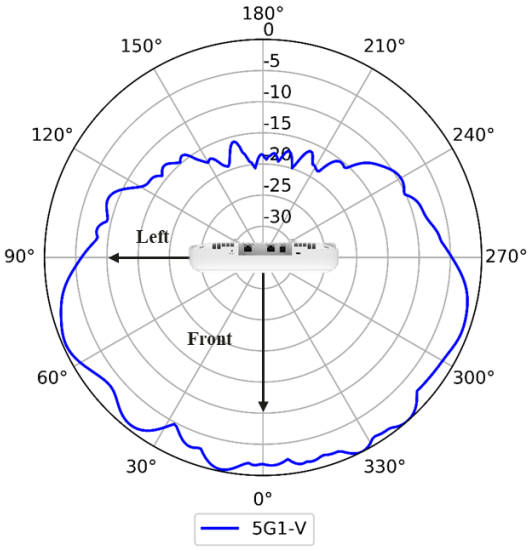
5GHz_0 (Horizontal)



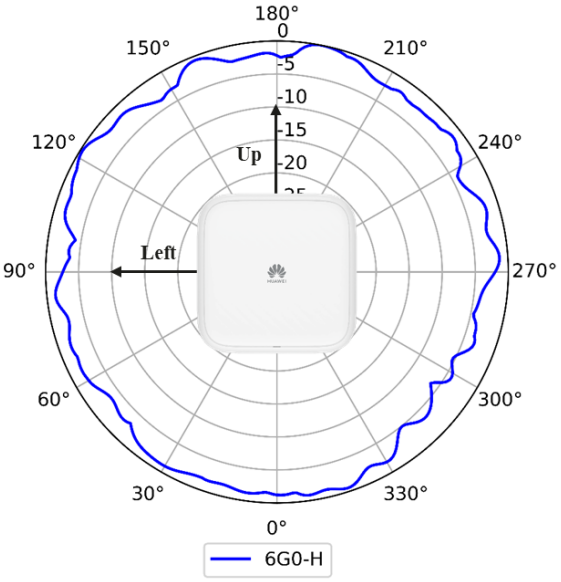
5GHz_0 (Vertical)



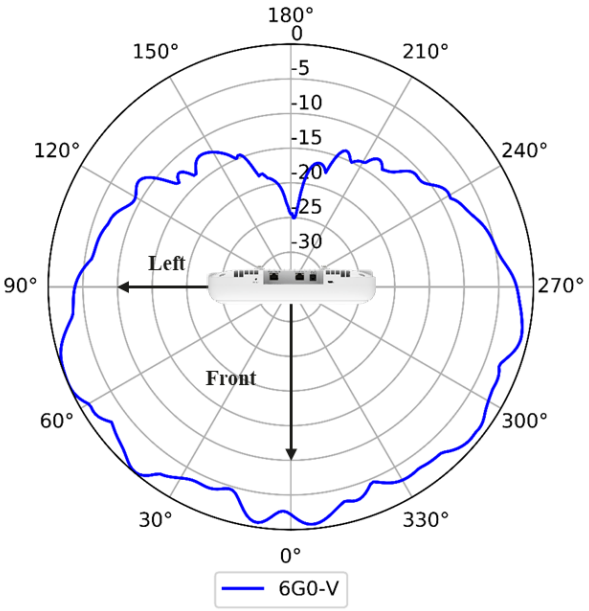
5GHz_1 (Horizontal)



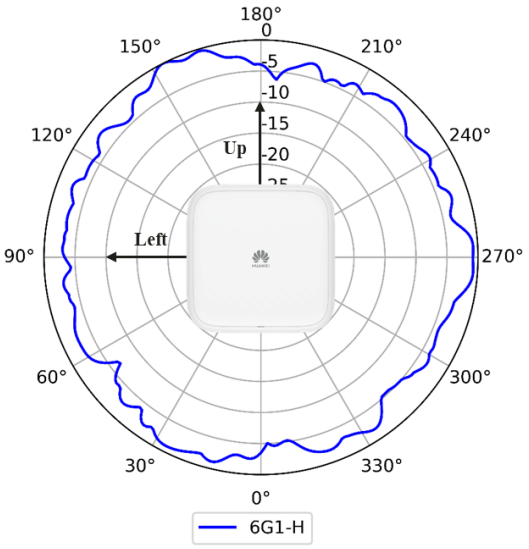
5GHz_1 (Vertical)



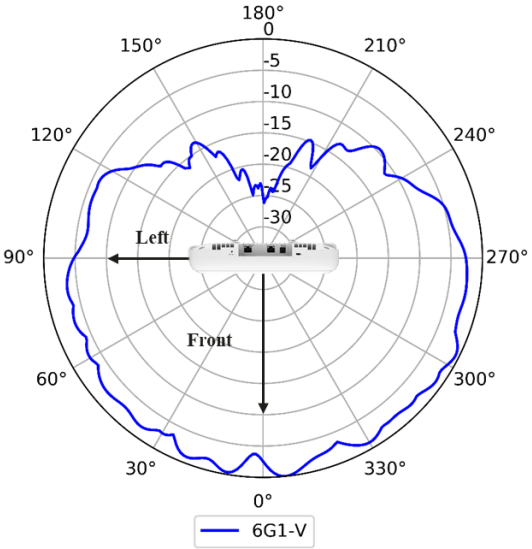
6GHz_0 (Horizontal)



6GHz_0 (Vertical)



6GHz_1 (Horizontal)



6GHz_1 (Vertical)

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