# Huawei AirEngine 5576I-X6EH Access Point Datasheet

# Product Overview

AirEngine 5776I-X6EH are outdoor access points (APs) in compliance with Wi-Fi 7 (802.11be).It is empowered by brand-new Wi-Fi 7 technologies, significantly enhancing users' wireless network experience. These outdoor APs stand out with excellent outdoor coverage performance, IP68 waterproof and dustproof design, and strong urge protection capability. These strengths make Huawei's Wi-Fi 7 outdoor APs ideal for scenarios such as stadiums and amusement parks.

AirEngine 5576I-X6EH

- The AirEngine 5776I-X6EH uses external antennas and works simultaneously on the 2.4 GHz (2x2 MIMO) and 5 GHz (4x4 MIMO) frequency bands, or the 5 GHz (2x2 MIMO) and 5 GHz (4x4 MIMO) frequency bands, achieving a maximum rate of 7.20 Gbps for the device.

| Mode | MIMO | Peak Data Rate |
|---|---|---|
| Mode1 | 2.4GHz(2x2) + 5GHz(4x4) | 6.45 Gbps |
| Mode2 | 5GHz(2x2) + 5GHz(4x4) | 7.20 Gbps |

- 6 KA surge protection for Ethernet ports, IP68 waterproof and dustproof design, and -40°C to + 70°C wide temperature, fully meeting industrial-grade requirements.
- 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.

# Feature Descriptions

## Wi-Fi 7 (802.11be) standard

Wi-Fi 7 (Wi-Fi 7) is the next-generation Wi-Fi standard to be launched, also known as IEEE 802.11be or extremely high throughput (EHT). Based on Wi-Fi 6, Wi-Fi 7 introduces technologies such as 320 MHz bandwidth, 4096-quadrature amplitude modulation (QAM), multi-resource unit (RU), multi-link operation (MLO), enhanced multi-user multiple-input multiple-output (MU-MIMO), and multi-access point coordination. Drawing on these cutting-edge technologies, Wi-Fi 7 delivers a higher data transmission rate and lower latency than Wi-Fi 6.

## Wi-Fi 7 vs. Wi-Fi 6

Based on the Wi-Fi 6 standard, Wi-Fi 7 introduces a plurality of new technologies. The following compares Wi-Fi 6 and Wi-Fi 7.

| | Wi-Fi 6 | Wi-Fi 7 |
|---|---|---|
| IEEE standard | 802.11ax | 802.11be |
| Maximum transmission rate | 9.6 Gbps | 23 Gbps |
| Frequency band | 2.4 GHz, 5 GHz, 6 GHz (Wi-Fi 6E) | 2.4 GHz, 5 GHz, and 6 GHz |
| Security protocol | WPA3 | WPA3 |
| Channel bandwidth | 20 MHz, 40 MHz, 80 MHz, 160 MHz, 80+80 MHz | Up to 320 MHz |
| Modulation mode | 1024-QAM OFDMA | 4096-QAM OFDMA |

NOTE

- The maximum transmission rate of the picture is the maximum rate of a single radio. It is 5 GHz radio for Wi-Fi 6, while it is 6 GHz radio for Wi-Fi 7.

## New Features in Wi-Fi 7

Wi-Fi 7 aims to increase the WLAN throughput and provide low-latency access assurance. To achieve this goal, the standard defines modifications to both the physical layer (PHY) and MAC layer. Compared with Wi-Fi 6, Wi-Fi 7 brings the following technical innovations:

### 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 7 Application Scenarios

New functions introduced by Wi-Fi 7 will significantly improve the data transmission rate and deliver lower latency. These highlights will contribute to the development of emerging applications:

- Video stream

- Video/Voice conference
- Online gaming
- Real-time collaboration
- Cloud/Edge computing
- Industrial IoT
- Immersive AR/VR
- Interactive telemedicine

# 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<br>Maximum ratio combining (MRC)<br>Space time block code (STBC)<br>Cyclic Delay Diversity (CDD)/Cyclic Shift Diversity (CSD)<br>Beamforming<br>Multi-user multiple-input multiple-output (MU-MIMO)<br>Orthogonal frequency division multiple access (OFDMA)<br>Preamble puncturing<br>BSS Color<br>TxBF<br>TWT<br>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)<br>Low-density parity-check (LDPC)<br>Frame aggregation, including A-MPDU (Tx/Rx) and A-MSDU (Tx/Rx)<br>802.11 dynamic frequency selection (DFS)<br>Short guard interval (GI) in 20 MHz, 40 MHz, 80 MHz, and 160 MHz modes<br>Wi-Fi multimedia (WMM) for priority-based data processing and forwarding<br>WLAN channel management and channel rate adjustment<br>Automatic channel scanning and interference avoidance<br>Service set identifier (SSID) hiding configuration for each AP, supporting Chinese SSIDs<br>Signal sustain technology (SST)<br>Unscheduled automatic power save delivery (U-APSD)<br>Multi-user call admission control (CAC)<br>Advanced cellular coexistence (ACC), minimizing the impact of interference from cellular networks<br>802.11k and 802.11v smart roaming<br>802.11r fast roaming (≤ 50 ms)<br>Spectrum analysis<br>Terminal location |
| Network features | Compliance with IEEE 802.3ab |

| Item | Description |
| --- | --- |
| | Auto-negotiation of the rate and duplex mode, and automatic switchover between Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDI-X)<br>Compatibility with IEEE 802.1Q<br>SSID-based VLAN assignment<br>Eth-Trunk function<br>Management channel of the AP's uplink port in tagged and untagged modes<br>DHCP client, obtaining IP addresses through DHCP<br>Tunnel data forwarding and direct data forwarding<br>STA isolation in the same VLAN<br>IPv4/IPv6 access control list (ACL)<br>Link Layer Discovery Protocol (LLDP)<br>Service holding upon CAPWAP link disconnection when direct data forwarding<br>Unified authentication on the AC<br>AC dual-link backup<br>Telemetry, quickly collecting AP status and application experience parameters<br>MESH<br>HotSpot2.0<br>IPv6 SAVI |
| QoS features | WMM power save<br>Priority mapping for upstream packets and flow-based mapping for downstream packets<br>Queue mapping and scheduling<br>User-based bandwidth limiting<br>Adaptive bandwidth management (automatic bandwidth adjustment based on the user quantity and radio environment) to improve user experience<br>Application identification and QoS classification to improve voice quality for popular applications, such as Zoom, QQ, and WeChat<br>Airtime scheduling<br>Air interface HQoS scheduling<br>Intelligent multimedia scheduling<br>VIP bandwidth reservation<br>VIP FastPass, per-packet power control |
| Security features | Open system authentication<br>WPA2-PSK authentication and encryption (WPA2-Personal)<br>WPA2-802.1X authentication and encryption (WPA2-Enterprise)<br>WPA3-SAE authentication and encryption (WPA3-Personal)<br>WPA3-802.1X authentication and encryption (WPA3-Enterprise)<br>WPA-WPA2 hybrid authentication<br>WPA2-WPA3 hybrid authentication<br>WPA/WPA2/WPA2-PPSK authentication and encryption<br>WPA/WPA2/WPA2-DPSK authentication and encryption<br>WAPI authentication and encryption<br>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 |

| Item | Description |
| --- | --- |
| | 802.1X authentication, MAC address authentication, and Portal authentication<br>DHCP snooping<br>802.11w Protected Management Frames (PMF)<br>WAPI GCM-SM4 encryption algorithm<br>CAPWAP DTLS data encryption and decryption<br>URL filtering<br>MACsec@ Uplink Ethernet port<br>Wi-Fi Shield<br>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 | Unified AP management and maintenance on the AC<br>Automatic AP onboarding, automatic configuration loading, and plug-and-play (PnP)<br>Automatic batch upgrade<br>STelnet using SSHv2<br>SFTP using SSHv2<br>Remote wireless O&M through the Bluetooth serial port<br>System status alarm |

## Fat AP Mode

| Item | Description |
| --- | --- |
| WLAN features | Compliance with IEEE 802.11be and compatibility with IEEE 802.11a/b/g/n/ac/ax<br>Maximum ratio combining (MRC)<br>Space time block code (STBC)<br>Cyclic Delay Diversity (CDD)/Cyclic Shift Diversity (CSD)<br>Beamforming<br>Multi-user multiple-input multiple-output (MU-MIMO)<br>Orthogonal frequency division multiple access (OFDMA)<br>Preamble puncturing<br>BSS Color<br>TxBF<br>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)<br>Low-density parity-check (LDPC)<br>Frame aggregation, including A-MPDU (Tx/Rx) and A-MSDU (Tx/Rx)<br>802.11 dynamic frequency selection (DFS)<br>Short guard interval (GI) in 20 MHz, 40 MHz, 80 MHz, and 160 MHz modes<br>Wi-Fi multimedia (WMM) for priority-based data processing and forwarding<br>WLAN channel management and channel rate adjustment<br>Automatic channel scanning and interference avoidance<br>Service set identifier (SSID) hiding configuration for each AP, supporting Chinese SSIDs |

| Item | Description |
| --- | --- |
| | Signal sustain technology (SST)<br>Unscheduled automatic power save delivery (U-APSD)<br>Advanced cellular coexistence (ACC), minimizing the impact of interference from cellular networks<br>802.11k and 802.11v smart roaming<br>802.11r fast roaming (≤ 50 ms) |
| Network features | Compliance with IEEE 802.3ab<br>Auto-negotiation of the rate and duplex mode, and automatic switchover between Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDI-X)<br>Compatibility with IEEE 802.1Q<br>SSID-based VLAN assignment<br>DHCP client, obtaining IP addresses through DHCP<br>Tunnel data forwarding and direct data forwarding<br>STA isolation in the same VLAN<br>IPv4 access control list (ACL)<br>Link Layer Discovery Protocol (LLDP)<br>Leader AP<br>Unified authentication of leader Aps<br>NAT |
| QoS features | WMM power save<br>Priority mapping for upstream packets and flow-based mapping for downstream packets<br>Queue mapping and scheduling<br>User-based bandwidth limiting<br>Airtime scheduling<br>Intelligent multimedia scheduling |
| Security features | Open system authentication<br>WPA2-PSK authentication and encryption (WPA2-Personal)<br>WPA2-802.1X authentication and encryption (WPA2-Enterprise)<br>WPA3-SAE authentication and encryption (WPA3-Personal)<br>WPA3-802.1X authentication and encryption (WPA3-Enterprise)<br>WPA-WPA2 hybrid authentication<br>WPA2-WPA3 hybrid authentication<br>MAC address authentication and Portal authentication<br>DHCP snooping<br>802.11w Protected Management Frames (PMF)<br>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<br>SFTP using SSHv2<br>Remote wireless O&M through the Bluetooth serial port<br>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<br>Maximum ratio combining (MRC)<br>Space time block code (STBC)<br>Cyclic Delay Diversity (CDD)/Cyclic Shift Diversity (CSD)<br>Beamforming<br>Multi-user multiple-input multiple-output (MU-MIMO)<br>Orthogonal frequency division multiple access (OFDMA)<br>Preamble puncturing<br>BSS Color<br>TxBF<br>TWT<br>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)<br>Low-density parity-check (LDPC)<br>Frame aggregation, including A-MPDU (Tx/Rx) and A-MSDU (Tx/Rx)<br>802.11 dynamic frequency selection (DFS)<br>Short guard interval (GI) in 20 MHz, 40 MHz, 80 MHz, and 160 MHz modes<br>Wi-Fi multimedia (WMM) for priority-based data processing and forwarding<br>WLAN channel management and channel rate adjustment<br>Automatic channel scanning and interference avoidance<br>Service set identifier (SSID) hiding configuration for each AP, supporting Chinese SSIDs<br>Signal sustain technology (SST)<br>Unscheduled automatic power save delivery (U-APSD)<br>Automatic AP Online by NCE (Campus)<br>Multi-user call admission control (CAC)<br>Advanced cellular coexistence (ACC), minimizing the impact of interference from cellular networks<br>802.11k and 802.11v smart roaming<br>802.11r fast roaming (≤ 50 ms)<br>Spectrum analysis<br>Terminal location |
| Network features | Compliance with IEEE 802.3ab<br>Auto-negotiation of the rate and duplex mode, and automatic switchover between Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDI-X)<br>Compatibility with IEEE 802.1Q<br>SSID-based VLAN assignment<br>DHCP client, obtaining IP addresses through DHCP<br>STA isolation in the same VLAN<br>IPv4/IPv6 access control list (ACL)<br>Link Layer Discovery Protocol (LLDP)<br>Service holdover when the link to NCE (Controller) is disconnected<br>Unified authentication on the cloud management platform |

| Item | Description |
| --- | --- |
| | Network address translation (NAT)<br>Telemetry, quickly collecting AP status and application experience parameters<br>MESH<br>Tunnel-AC<br>HotSpot2.0 |
| QoS features | WMM power save<br>Priority mapping for upstream packets and flow-based mapping for downstream packets<br>Queue mapping and scheduling<br>User-based bandwidth limiting<br>Adaptive bandwidth management (automatic bandwidth adjustment based on the user quantity and radio environment) to improve user experience<br>Application identification and QoS classification to improve voice quality for popular applications, such as Zoom, QQ, and WeChat<br>Airtime scheduling<br>Air interface HQoS scheduling<br>Intelligent multimedia scheduling<br>VIP bandwidth reservation<br>VIP FastPass, per-packet power control |
| Security features | Open system authentication<br>WPA2-PSK authentication and encryption (WPA2-Personal)<br>WPA2-802.1X authentication and encryption (WPA2-Enterprise)<br>WPA3-SAE authentication and encryption (WPA3-Personal)<br>WPA3-802.1X authentication and encryption (WPA3-Enterprise)<br>WPA-WPA2 hybrid authentication<br>WPA2-WPA3 hybrid authentication<br>WPA/WPA2/WPA2-PPSK authentication and encryption<br>WPA/WPA2/WPA2-DPSK authentication and encryption<br>802.1X authentication, MAC address authentication, and Portal authentication<br>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<br>DHCP snooping<br>802.11w Protected Management Frames (PMF)<br>CAPWAP DTLS data encryption and decryption<br>URL filtering<br>Wi-Fi Shield<br>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 | Unified AP management and maintenance on the cloud management platform<br>Automatic AP onboarding, automatic configuration loading, and PnP<br>Batch upgrade<br>STelnet using SSHv2<br>SFTP using SSHv2 |

| Item | Description |
| --- | --- |
| | Remote wireless O&M through the Bluetooth serial port<br>Real-time user configuration monitoring and fast fault locating using the NMS<br>System status alarm<br>Network Time Protocol (NTP) |

# Technical Specifications

| Item | | AirEngine 5776I-X6EH |
| --- | --- | --- |
| Technical specifications | Dimensions (H x W x D) | 77 mm x 250 mm x 220 mm |
| | Weight | 2.97 kg |
| | Interface type | 1 x 1G/2.5G/10GE SFP+<br>1 x 100M/1GE/2.5GE electrical<br>1 x USB<br>NOTE<br>• 2.5GE electrical port supports PoE input.<br>• 10G optical ports support optical-electrical separation solution by working with the waterproof connection kit for an AP hybrid cable to achieve data transmission on the optical port and power supply on the electrical (RJ45) port.<br>• The third-party device connected to AP via the USB port must be insulated. the USB cable length must be less than 2 m.<br>• The USB module must meet the specifications of Huawei outdoor APs. For details, see Huawei WLAN AP IoT Card (USB) Hardware Specifications. |
| | Bluetooth | Bluetooth 5.2 |
| | IoT | • Built-in multi-protocol IoT interfaces, flexibly supporting BLE, ZigBee, HomeKit, and Thread*<br>• USB port extension external IoT (Supports protocols such as ZigBee, RFID, and UWB)<br>NOTE<br>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 | • PoE power supply: In compliance with 802.3at/af<br>• DC: 43.2V～57.6V<br>NOTE<br>When 802.3at/af power is supplied, the restriction details refer to the Info-Finder. |
| | Maximum power consumption | 18.7 W (excluding USB) |
| | | NOTE<br>The actual maximum power consumption depends on local laws and regulations. |
| Environmental specifications | Operating temperature | -40°C to +70°C |

| Item | | AirEngine 5776I-X6EH |
|---|---|---|
| | | **NOTE**<br>The value may vary depending on the installation environment. |
| | Storage temperature | -40°C to +85°C |
| | Operating humidity | 0% to 100% |
| | Dustproof and waterproof grade | IP68 |
| | Altitude | -60 m to +5000 m |
| | Atmospheric pressure | 53 kPa to 106 kPa |
| Radio specifications | Antenna type | External antenna |
| | Antenna gain | **NOTE**<br>The gain varies with external antennas. For details, see the specifications of each antenna. |
| | Maximum number of SSIDs for each radio | 16 |
| | Maximum number of users | 1200 (600 per radio)<br>**NOTE**<br>The actual number of users varies according to the environment. |
| | Maximum transmit power | Mode1:<br>• 2.4GHz: 28dBm<br>• 5GHz: 30dBm<br>Mode2:<br>• 5GHz0: 27dBm<br>• 5GHz1: 30dBm |
| | | **NOTE**<br>Above are the combined power powers. The actual transmit power depends on local laws and regulations. |
| | Frequency bands | 2.400 to 2.4835 GHz ISM<br>5.150 to 5.250 GHz U-NII-1<br>5.250 to 5.350 GHz U-NII-2A<br>5.470 to 5.725 GHz U-NII-2C<br>5.725 to 5.850 GHz U-NII-3/ISM<br>**NOTE**<br>The available bands and channels are dependent on the configured regulatory domain (country). |

# Standards Compliance

| Item | Description |
| --- | --- |
| Safety standards | • EN 60950-22<br>• IEC 60950-22 |
| Radio standards | • AS/NZS 4268 |
| EMC standards | • IEC/EN61000-4-2<br>• IEC/EN 61000-4-3<br>• IEC/EN 61000-4-4<br>• IEC/EN 61000-4-5<br>• IEC/EN61000-4-6<br>• ICES-003 |
| IEEE standards | • IEEE 802.11v<br>• IEEE 802.11w<br>• IEEE 802.11r |
| Security standards | • 802.11i, Wi-Fi Protected Access (WPA), WPA2, WPA2-Enterprise, WPA2-PSK, WPA3, WAPI<br>• 802.1X<br>• Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TKIP), WEP, Open<br>• EAP Type(s) |
| EMF | • EN 50385 |
| RoHS | • Directive 2002/95/EC & 2011/65/EU<br>• (EU)2015/863 |
| Reach | • Regulation 1907/2006/EC |
| WEEE | • Directive 2002/96/EC & 2012/19/EU |

# More Information

For more information about Huawei WLAN products, visit http://e.huawei.com or contact us in the following ways:

Global service hotline: http://e.huawei.com/en/service-hotline

Logging in to the Huawei Enterprise Technical Support Website: http://support.huawei.com/enterprise/

Sending an email to the customer service mailbox: support_e@huawei.com

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