Huawei AirEngine 5776I-X7EH Access Point Datasheet

Product Overview

Huawei AirEngine 5776I-X7EH is a wireless access point (AP) designed specifically for rail transport scenarios. It supports the Wi-Fi 7 (802.11be) standard, is backward-compatible with 802.11a/b/g/n/ac/ax, and provides four spatial streams with data rates of up to 11.53 Gbps. With its EN50155-compliant design, the AP is well-suited for train-to-ground backhaul deployments in rail transport environments.



AirEngine 5776I-X7EH

- Supports up to 6 operating modes for flexible adaptation to various regions or scenarios.

Work Mode	MIMO	Peak Data Rate
Mode1	5GHz (4x4)	5.76 Gbit/s
Mode2	6GHz (4x4)	11.53 Gbit/s
Mode3	2.4GHz (2x2) +5GHz (2x2)	2.13 Gbit/s
Mode4	5GHz (2x2) +5GHz (2x2)	4.32 Gbit/s
Mode5	5GHz (2x2) +6GHz (2x2)	4.32 Gbit/s
Mode6	2.4GHz (2x2) +6GHz (2x2)	3.57 Gbit/s

- Supports dual PoE input via 10GE port (M12) + GE port (M12), enabling hot backup for power supply and communication.
- The make-before-break "soft handover" mechanism enables fast link handover for train-to-ground communication and minimizes packet loss during the handover process.

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.

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

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 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, 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)

Item	Description
	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 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

Technical Specifications

Item		Description
Technical	Dimensions (H x W x D)	44 x 442 x 305 mm

Item		Description
specifications	Interface type	1 x 100M/1G/2.5G/5GE/10GE (RJ-45) 1 x 10M/100M/1GE (RJ-45) **NOTE** 10GE (RJ-45) and GE (RJ-45)support PoE input.
	BLE	BLE 5.2
	LED indicator	Indicates the power-on, startup, running, alarm, and fault states of the system
Power specifications	Power input	DC: 110V AC: 220V 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.
Environmental specifications	Operating temperature	-40°C to +45°C
	Storage temperature	-40°C to +85°C
	Operating humidity	5%～95%(non-condensing)
	Altitude	-60m～5000m
	Atmospheric pressure	53kPa～106kPa
Radio specifications	Antenna type	External antennas
	Maximum number of SSIDs per device	32 (16 per radio)
	Maximum number of users per device	1200 (600 per radio) **NOTE** The actual number of users varies according to the environment.
	Maximum transmit power	5GHz (4x4) mode: • 5GHz: 29dBm 6GHz (4x4) mode: • 6GHz: 29dBm 2.4GHz (2x2) +5GHz (2x2) mode: • 2.4GHz: 28dBm • 5GHz: 27dBm 5GHz (2x2) +5GHz (2x2) mode: • 5GHz0: 27dBm • 5GHz1: 26dBm 5GHz (2x2) +6GHz (2x2) mode: • 5GHz: 27dBm • 6GHz: 26dBm 2.4GHz (2x2) +6GHz (2x2) mode: • 2.4GHz: 28dBm • 6GHz: 26dBm **NOTE**

Item		Description
		• The gains above combined power. • 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		
Vehicle-mounted electronic equipment standards	• EN50155		
Safety standards	• EN 62368-1	• IEC62368-1	
Radio standards	• ETSI EN 300 328	• ETSI EN 301 893	• ETSI EN 301 893
EMC standards	• EN 301 489-1 • EN 301 489-17 • EN 55032 • EN 55035 • EN 50121	• 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 2(WPA2)，WPA，WPA2，WPA2-Enterprise，WPA2-PSK，WPA3，WAPI • 802.1X • Advanced Encryption Standards(AES)，Temporal Key Integrity Protocol(TKIP)，WEP，Open • EAP Type(s)		
EMF	• EN 62311	• EN 50385	
RoHS	• (EU)2015/863	• Directive 2002/95/EC & 2011/65/EU	

Item	Description
Reach	• Regulation 1907/2006/EC
WEEE	• Directive 2002/96/EC & 2012/19/EU

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Huawei Technologies Co., Ltd.

Address:Huawei Industrial Base Bantian, Longgang Shenzhen 518129 People's Republic of China

Website:www.huawei.com