



Huawei AirEngine 9503-S Wireless Access Controller Datasheet

Product Overview

The AirEngine 9503-S is a high-specification wireless access controller (AC) for midsize and large enterprise campuses, enterprise branches, and school campuses. The AirEngine 9503-S can manage up to 4096 access points (APs) and provide up to 120 Gbps forwarding performance. It features high scalability and offers users considerable flexibility in configuring the number of managed APs. When used with Huawei's full series 802.11be, 802.11ax, 802.11ac, and 802.11n APs, the AirEngine 9503-S delivers an adaptable solution for midsize and large campus networks, enterprise office networks, wireless Metropolitan Area Networks (MANs), and hotspot coverage.

Huawei AirEngine 9503-S wireless access controller



Product Features

Large-capacity and high-performance design

- The AirEngine 9503-S is capable of supporting midsize and large campuses with up to 4096 APs.
- Provides various high-rate interfaces such as 100G/40G/25G/10G optical ports and GE Combo ports, supporting up to 120 Gbps forwarding performance.

SmartRadio for air interface optimization

- Load balancing during smart roaming: The load balancing algorithm is used to perform load balancing detection on APs after STAs roam, and adjust the STA load on each AP accordingly to improve network stability.
- Intelligent conflict optimization technology: The dynamic enhanced distributed channel access (EDCA) and airtime scheduling algorithms are used to schedule the channel occupation time and service priority of each user. This ensures that each user is assigned relatively equal time for using channel resources and user services are scheduled in an orderly manner, improving service processing efficiency and user experience.

Flexible networking

- The WLAN AC can be deployed in in-path, off-path, bridge, and Mesh networking modes, and supports both centralized and local forwarding.
- The WLAN AC and APs can be connected across a Layer 2 or Layer 3 network. In addition, NAT traversal can be deployed when APs are deployed on the private network and the WLAN AC is deployed on the public network.
- The WLAN AC is compatible with Huawei full-series 802.11n, 802.11ac, 802.11ax, and 802.11be APs and supports hybrid networking of 802.11n, 802.11ac, 802.11ax, and 802.11be APs for simple scalability.

Built-in application identification server

- Supports application-based policy control technologies, including traffic blocking, traffic limit, and priority adjustment policies.
- Supports automatic application upgrade in the application signature database, without the need of a software version upgrade.

Comprehensive reliability design

- Supports WLAN AC 1+1 hot standby (HSB), ensuring uninterrupted services.
- Supports port backup based on the Link Aggregation Control Protocol (LACP) or Multiple Spanning Tree Protocol (MSTP).

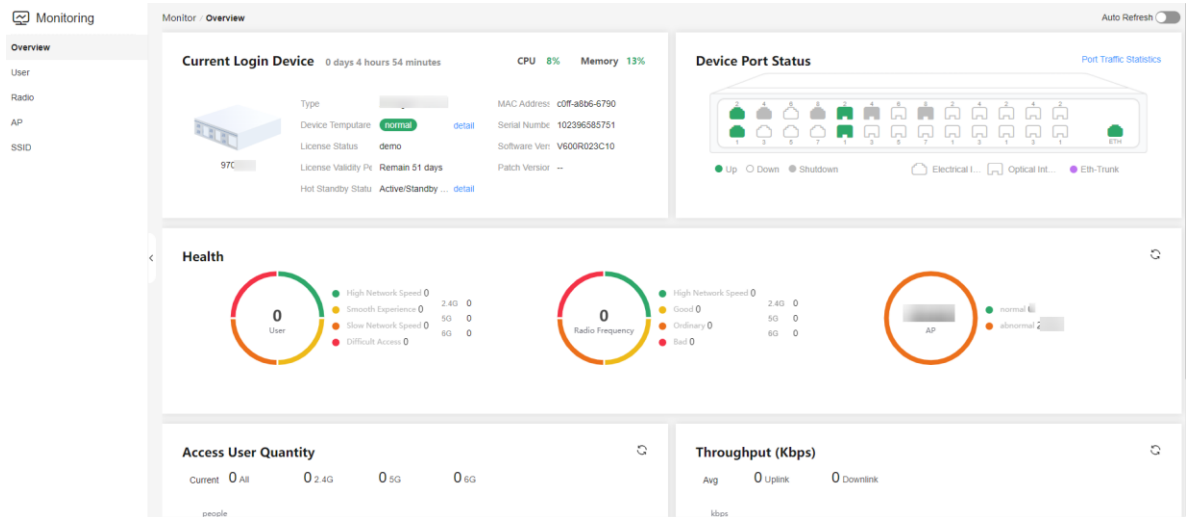
Built-in visualized network management platform

- The AirEngine 9503-S has a built-in web system that is easy to configure and provides comprehensive monitoring and intelligent diagnosis.

Health-centric one-page monitoring with visualized KPIs

- One page integrates the summary and real-time statistics. KPIs are displayed in graphs, including user performance, radio performance, and AP performance, enabling users to extract useful information from the massive amounts of monitored data, while also knowing the device and network status instantly.

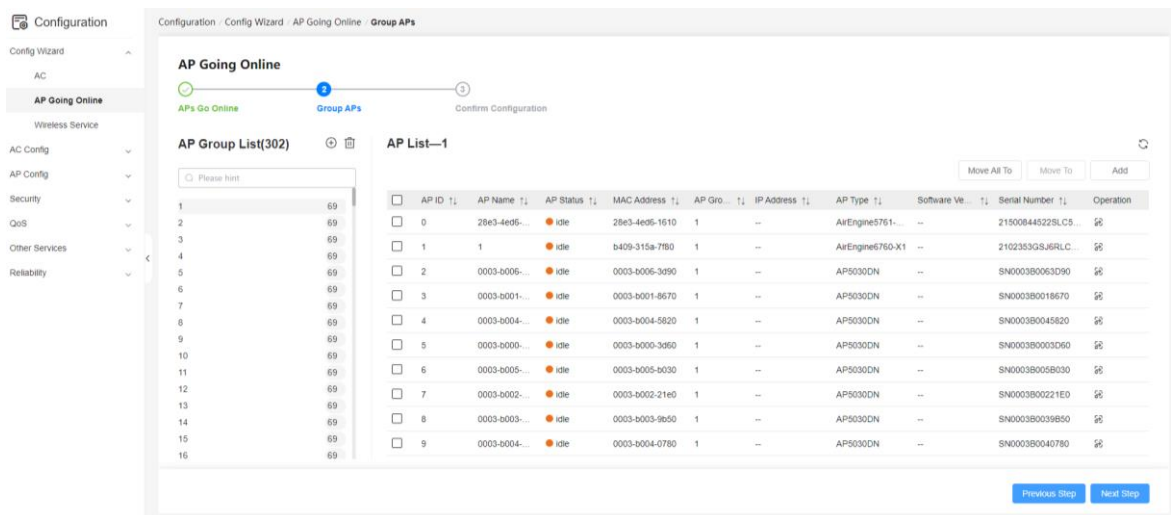
Monitoring interface



Profile-based configuration by AP group, simplifying configuration procedure and improving efficiency

- The web system supports AP group-centric configuration and automatically selects the common parameters for users without pre-configuration, simplifying the configuration procedure.
- If two AP groups have small configuration differences, users can copy the configurations of one AP group to the other and modify the configuration differences only, improving configuration efficiency.

Configuration interface



One-click diagnosis, resolving 80% of common network issues

- The web system supports real-time and periodic one-click intelligent diagnosis from the dimensions of users, APs, and WLAN ACs, and provides feasible suggestions for troubleshooting.

Feature		Description
IPv4 forwarding	IPv4 features	Partitioned STP ARP and RARP ARP proxy Auto-detection Bonjour protocol
	Unicast routing features	Static route RIP-1 and RIP-2 OSPF BGP IS-IS Routing policies and policy-based routing URPF check DHCP server and relay DHCP snooping
	Multicast routing features	IGMPv1, IGMPv2, and IGMPv3 PIM-SM Multicast routing policies RPF
IPv6 forwarding	IPv6 features	ND protocol
	Unicast routing features	Static route RIPng OSPFv3 BGP4+ IS-IS IPv6 DHCPv6 DHCPv6 snooping
	Multicast routing features	MLD MLD snooping
Device reliability	BFD	BFD
Layer 2 multicast features	Layer 2 multicast	IGMP snooping Prompt leave Multicast traffic control Inter-VLAN multicast replication
Ethernet OAM	EFM OAM	Peer discovery Link monitoring Fault notification Remote loopback
QoS features	Traffic classification	Traffic classification based on the combination of the L2 protocol header, IP 5-tuple, and 802.1p priority
	Action	Access control after traffic classification Traffic policing based on traffic classification

Feature		Description
		Re-marking packets based on traffic classifiers Class-based packet queuing Associating traffic classifiers with traffic behaviors
	Queue scheduling	PQ scheduling DRR scheduling PQ+DRR scheduling WRR scheduling PQ+WRR scheduling
	Congestion avoidance	SRED WRED
Configuration and maintenance	Terminal service	Configurations using command lines Error message and help information in English Login through console and Telnet terminals Send function and data communications between terminal users
	File system	File systems Directory and file management File uploading and downloading using FTP and TFTP
	Debugging and maintenance	Unified management over logs, alarms, and debugging information Electronic labels User operation logs Detailed debugging information for network fault diagnosis Network test tools such as traceroute and ping commands Intelligent diagnosis Interface mirroring and flow mirroring
	Version upgrade	Device software loading and online software loading BIOS online upgrade In-service patching
Security and management	System security	Different user levels for commands, preventing unauthorized users from accessing device SSHv2.0 RADIUS and HWTACACS authentication for login users ACL filtering DHCP packet filtering (with the Option 82 field) Local attack defense function that can protect

Feature	Description
	<p>the CPU and ensure that the CPU can properly process and respond to normal services</p> <p>Defense against control packet attacks</p> <p>Defenses against attacks such as source address spoofing, Land, SYN flood (TCP SYN), Smurf, ping flood (ICMP echo), Teardrop, broadcast flood, and Ping of Death attacks</p>
Network management	<p>ICMP-based ping and traceroute</p> <p>SNMPv1, SNMPv2c, and SNMPv3</p> <p>RMON</p>

Wireless networking capabilities

Feature	Description
Networking between APs and WLAN ACs	<p>APs and WLAN ACs can be connected through a Layer 2 or Layer 3 network. APs can be directly connected to a WLAN AC.</p> <p>NAT traversal can be deployed when APs are deployed on a private network and the WLAN AC is deployed on the public network.</p> <p>WLAN ACs can be used for Layer 2 bridge forwarding or Layer 3 routing.</p> <p>WAN authentication escape is supported between APs and WLAN ACs. In local forwarding mode, this feature retains the online state of existing STAs and allows access of new STAs when APs are disconnected from WLAN ACs, ensuring service continuity.</p>
Forwarding mode	<p>Direct forwarding (distributed forwarding or local forwarding)</p> <p>Tunnel forwarding (centralized forwarding)</p> <p>Centralized authentication and distributed forwarding</p> <p>In direct forwarding mode, user authentication packets support tunnel forwarding.</p> <p>Soft GRE forwarding</p> <p>Tunnel forwarding + EoGRE tunnel</p>
WLAN AC discovery	<p>An AP can obtain the device's IP address in any of the following ways:</p> <ul style="list-style-type: none"> • Static configuration • DHCP • DNS <p>The WLAN AC uses DHCP or DHCPv6 to allocate IP addresses to APs. DHCP or DHCPv6 relay is supported.</p> <p>On a Layer 2 network, APs can discover the WLAN AC by sending broadcast CAPWAP packets.</p>
CAPWAP tunnel	<p>Centralized CAPWAP</p> <p>CAPWAP control tunnel and data tunnel (optional)</p> <p>CAPWAP tunnel forwarding and direct forwarding in an extended service set (ESS)</p> <p>Datagram Transport Layer Security (DTLS) encryption for control tunnels, which are not encrypted by default</p> <p>Heartbeat detection and tunnel reconnection</p>

Feature	Description
Active and standby WLAN ACs	<p>Enables and disables the switchback function.</p> <p>Supports load balancing.</p> <p>Supports 1+1 HSB.</p> <p>NOTE</p> <p><i>In 1+1 VRRP HSB mode, WLAN ACs share one virtual IP address, simplifying the network topology.</i></p> <p>Supports wireless configuration synchronization between WLAN ACs.</p> <p>Supports license sharing between active and standby WLAN ACs.</p>

AP management

Feature	Description
AP access control	<p>Displays MAC addresses or SNs of APs in the whitelist.</p> <p>Adds a single AP or multiple APs (by specifying a range of MAC addresses or SNs) to the whitelist.</p> <p>Automatically discovers and manually confirms APs.</p> <p>Automatically discovers APs without manual confirmation.</p>
AP profile management	Specifies the default AP profile that is applied to automatically discovered APs.
AP region management	<p>Supports three AP region deployment modes:</p> <ul style="list-style-type: none"> • Distributed deployment: APs are deployed independently. An AP is equivalent to a region and does not interfere with other APs. APs work at the maximum power and do not perform radio calibration. • Common deployment: APs are loosely deployed. The transmit power of each radio is less than 50% of the maximum transmit power. • Centralized deployment: APs are densely deployed. The transmit power of each radio is less than 25% of the maximum transmit power. <p>Specifies the default region to which automatically discovered APs are added.</p>
AP type management	<p>Manages AP attributes including the number of interfaces, AP types, number of radios, radio types, maximum number of virtual access points (VAPs), maximum number of associated users, and radio gain (for APs deployed indoors).</p> <p>Provides default AP types.</p>
Network topology management	Supports LLDP topology detection.
AP working mode management	Supports AP working mode switchover. The AP working mode can be switched to the Fat or cloud mode on the WLAN AC.

Radio management

Feature	Description
Radio profile management	<p>The following parameters can be configured in a radio profile:</p> <ul style="list-style-type: none"> • Radio working mode and rate • Automatic or manual channel and power adjustment mode • Radio calibration interval

Feature	Description
	<ul style="list-style-type: none"> The radio type can be set to 802.11b, 802.11b/g, 802.11b/g/n, 802.11g, 802.11n, 802.11g/n, 802.11a, 802.11a/n, 802.11ac, 802.11ax, or 802.11be. <p>You can bind a radio to a specified radio profile.</p> <p>Supports MU-MIMO.</p>
Unified static configuration of parameters	Radio parameters such as the channel and power of each radio are configured on the WLAN AC and then delivered to APs.
Dynamic management	<p>APs can automatically select working channels and power when they go online.</p> <p>In an AP region, APs automatically adjust working channels and power in the event of signal interference:</p> <ul style="list-style-type: none"> Partial calibration: The optimal working channel and power of a specified AP can be adjusted. Global calibration: The optimal working channels and power of all the APs in a specified region can be adjusted. Dynamic frequency assignment (DFA) can automatically identify, switch, or disable redundant 2.4 GHz radios, reducing co-channel interference on the 2.4 GHz frequency band and increasing system capacity. <p>When an AP is removed or goes offline, the WLAN AC increases the power of neighboring APs to compensate for the coverage hole.</p> <p>Automatic selection and calibration of radio parameters in AP regions are supported.</p>
Enhanced service capabilities	<p>Band steering: Enables terminals to preferentially access the 5 GHz frequency band, achieving load balancing between the 2.4 GHz and 5 GHz frequency bands.</p> <p>Smart roaming: Enables sticky terminals to roam to APs with better signals.</p> <ul style="list-style-type: none"> 802.11k and 802.11v smart roaming 802.11r fast roaming (≤ 50 ms)

WLAN service management

Feature	Description
ESS management	<p>Allows you to enable SSID broadcast, set the maximum number of access users, and set the association aging time in an ESS.</p> <p>Isolates APs at Layer 2 in an ESS.</p> <p>Maps an ESS to a service VLAN.</p> <p>Associates an ESS with a security profile or a QoS profile.</p> <p>Enables IGMP for APs in an ESS.</p> <p>Supports Chinese SSIDs.</p>
VAP-based service management	<p>Adds multiple VAPs at a time by binding radios to ESSs.</p> <p>Displays information about a single VAP, VAPs with a specified ESS, or multiple VAPs.</p> <p>Supports configuration of offline APs.</p> <p>Creates VAPs according to batch delivered service provisioning rules in automatic AP discovery mode.</p>
Service provisioning management	<p>Supports service provisioning rules configured for a specified radio of a specified AP type.</p> <p>Adds automatically discovered APs to the default AP region. The default AP region is configurable.</p> <p>Applies a service provisioning rule to a region to enable APs in the region to go online.</p>

Feature	Description
Multicast service management	Supports IGMP snooping. Supports IGMP proxy.
Load balancing	Performs load balancing among radios in a load balancing group. <ul style="list-style-type: none"> Supports two load balancing modes: <ul style="list-style-type: none"> Based on the number of STAs connected to each radio Based on the traffic volume on each radio
Bring Your Own Device (BYOD)	Identifies device types according to the OUI in the MAC address. Identifies device types according to the user agent (UA) field in an HTTP packet. Identifies device types according to DHCP Option information. Carries device type information in RADIUS authentication and accounting packets.
Location services	Locates Wi-Fi terminals. Locates Bluetooth terminals. Locates Bluetooth tags.

WLAN user management

Feature	Description
Address allocation of wireless users	Functions as a DHCP server to assign IP addresses to wireless users.
WLAN user management	Supports user blacklist and whitelist. Controls the number of access users: <ul style="list-style-type: none"> Based on APs Based on SSIDs Logs out users in any of the following ways: <ul style="list-style-type: none"> Using RADIUS DM messages Using commands Supports various methods to view information: <ul style="list-style-type: none"> Allows you to view the user status by specifying the user MAC address, AP ID, radio ID, or WLAN ID. Displays the number of online users in an ESS, AP, or radio. Collects packet statistics on air interface based on user.
WLAN user roaming	Supports intra-AC Layer 2 roaming. NOTE <i>Users can roam between APs connected to different physical ports on a WLAN AC.</i> Supports inter-VLAN Layer 3 roaming on a WLAN AC. Supports fast key negotiation in 802.1X authentication. Authenticates users who request to reassociate with the WLAN AC and rejects the requests of unauthorized users. Delays clearing user information after a user goes offline so that the user can rapidly go online again.
User group management	Supports ACLs. Supports user isolation: <ul style="list-style-type: none"> Inter-group isolation

Feature	Description
	<ul style="list-style-type: none"> Intra-group isolation

WLAN security

Feature	Description
WLAN security profile management	<p>Manages authentication and encryption modes using WLAN security profiles.</p> <p>Binds a security profile to an ESS profile.</p>
Authentication modes	<p>Open system authentication with no encryption</p> <p>WEP authentication/encryption</p> <p>WPA/WPA2/WPA3 authentication and encryption:</p> <ul style="list-style-type: none"> WPA/WPA2-PSK+TKIP WPA/WPA2-PSK+CCMP WPA/WPA2-802.1X+TKIP WPA/WPA2-802.1X+CCMP WPA3-802.1X+GCMP256 WPA/WPA2-PSK+TKIP-CCMP WPA/WPA2-802.1X+TKIP-CCMP <p>WPA/WPA2-PPSK authentication and encryption</p> <p>WPA3-SAE+CCMP authentication and encryption</p> <p>WAPI authentication and encryption:</p> <ul style="list-style-type: none"> Supports centralized WAPI authentication. Supports three-certificate WAPI authentication, which is compatible with traditional two-certificate authentication. Issues a certificate file together with a private key. <p>Allows users to use MAC addresses as accounts for authentication by the RADIUS server.</p> <p>Portal authentication:</p> <ul style="list-style-type: none"> Authentication through an external Portal server. Built-in Portal authentication and authentication page customization. <p>802.1X authentication:</p> <ul style="list-style-type: none"> Authentication through an external 802.1X server. Built-in 802.1X authentication.
Combined authentication	<p>Combined MAC authentication:</p> <ul style="list-style-type: none"> PSK+MAC authentication <p>MAC+Portal authentication:</p> <ul style="list-style-type: none"> MAC authentication is used first. When MAC authentication fails, portal authentication is used.
AAA	<p>Local authentication/local accounts (MAC addresses and accounts)</p> <p>RADIUS authentication</p> <p>Multiple authentication servers:</p> <ul style="list-style-type: none"> Supports backup authentication servers. Specifies authentication servers based on the WLAN AC account. Configures authentication servers based on the WLAN AC account. Binds user accounts to SSIDs.

Feature	Description
Security isolation	Port-based isolation User group-based isolation
WIDS	<ul style="list-style-type: none"> Rogue device scan, identification, defense, and countermeasures, which includes dynamic blacklist configuration and detection of rogue APs, STAs, and network attacks.
Authority control	ACL limit based on the following: <ul style="list-style-type: none"> Port User group User
Other security features	<ul style="list-style-type: none"> SSID hiding IP source guard Configures IP and MAC binding entries statically. Generates IP and MAC binding entries dynamically.

WLAN QoS

Feature	Description
WMM profile management	Enables or disables Wi-Fi Multimedia (WMM). Allows a WMM profile to be applied to radios of multiple APs.
Traffic profile management	Manages traffic from APs and maps packet priorities according to traffic profiles. Applies a QoS policy to each ESS by binding a traffic profile to each ESS.
WLAN AC traffic control	Manages QoS profiles. Uses ACLs to perform traffic classification. Limits incoming and outgoing traffic rates for each user based on inbound and outbound CAR parameters. Limits the traffic rate based on ESSs or VAPs.
AP traffic control	Controls traffic of multiple users and allows users to share bandwidth. Limits the rate of a specified VAP.
Packet priority configuration	Sets the QoS priority (IP precedence or DSCP priority) for CAPWAP control channels. Sets the QoS priority for CAPWAP data channels: <ul style="list-style-type: none"> Allows you to specify the CAPWAP header priority. Maps 802.1p priorities of user packets to ToS priorities of tunnel packets.
Airtime fair scheduling	Allocates equal time to users for occupying the channel, which improves users' Internet access experience.

Physical specifications

Feature	Description
Dimensions (H x W x D)	43.6 mm x 442 mm x 420 mm
Port type	2 x 100G QSFP28/(2 x QSFP+ + 4 x 25GE SFP28)/(2 x QSFP+ + 8 x 10GE SFP+)/8 x 25GE SFP28

Feature	Description
	4 x 25GE SFP28 4 x 10GE SFP+ 8 x GE Combo 1 x ETH Management port 1 x Management console port (RJ45) 1 x USB interface NOTE <i>Slashes (/) indicate that the port combinations are mutually exclusive.</i>
Maximum power consumption	240 W
Weight	7.2 kg
Operating temperature and altitude	0°C to 45°C (From 1800 m to 5000 m, the maximum temperature of the device decreases by 1°C for every 300 m increase in altitude.)
Relative humidity	5% RH to 95% RH, noncondensing
Power module	AC and DC power modules

Performance Specifications

Feature	Description
Number of managed APs	Common APs and RUs: 4096 NOTE <i>The RUs managed by the WLAN AC do not occupy the WLAN AC's license resources. However, the total number of managed common APs and RUs cannot exceed the upper limit allowed by the WLAN AC.</i>
Number of access users	50K NOTE <i>The maximum number of access users varies depending on the authentication mode.</i>
Number of MAC address entries	76K
Forwarding capability	120 Gbps
Number of VLANs	4096
Number of routing entries	<ul style="list-style-type: none"> IPv4: 8192 IPv6: 2048
Number of ARP entries	76K
Number of multicast forwarding entries	2048
Number of DHCP address pools	64 (up to 8192 IP addresses assigned in each pool)
Number of local accounts	4096
Number of ACLs	4096

More Information

For more information about Huawei WLAN products, visit <http://www.huawei.com> or contact Huawei's local sales office.

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