AP322
Datasheet

Aiming to create better and safer working environments and life experiences through the products we deliver.

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Dual Core and Dual WLAN Secured and Rugged LTE Router for IIoT

AP322

Industrial Secure LTE Router

AVCOMM industrial secure LTE router AP322 enhances routing performance with dual-core 880MHz CPU and support concurrent 2.4G+5GHz WLAN networks. The RS232/422/485 DB9 ports with Modbus and digital input and digital output interface can connect sensor and meter data to cloud wirelessly. The AP322 router supports LTE to Ethernet WAN redundancy to guarantee continuous connections. To safeguard cybersecurity, security features such as Firewall, OpenVPN, GRE tunnel are supported. The embedded MQTTS, CoAP and RESTful API enables instant public cloud integration such as AWS or Azure. The ATMS OTA can also be set up for an instant and secured access to receive data or manage devices remotely.

High speed 4G LTE & Wi-Fi Network

- Dual Core High Speed Processor
- LTE Cat.4, 2x2 MIMO, 150M downlink and 50M uplink
- 4G/3G/2G full cellular network compatibility
- Support GPS for location services
- IEEE 802.11ac Wave 2 compliant & backward compatible with 802.11a/b/g/n
- Dual Radio 5GHz + 2.4GHz Wi-Fi for local coverage, up to 1166(866Mbps + 300Mbps) bandwidth

Serial Communication & High Throughput Data Switching

- Serial ports with RS232/422/485 full functions for serial over LTE/Wi-Fi/Ethernet data switching
- 2-port Gigabit Ethernet supports routing and bridging mode
- Close to wire-speed NAT routing performance
- Hardware NAT for CPU utilization saving

Dynamic Routing with Redundancy Protection

- RIPv1&v2, OSPFv1&v2 for intra-domain routing within an autonomous system
- Efficient unicast/multicast* static routing
- VRRP guarantees sustainable routing in a single point of failure

Enhanced Cyber Security & Redundancy

- Firewall for inbound/outbound traffic
- OpenVPN (server/client), and IPSec support AES256 for secure remote connection
- L2TP with PPP, PAP, CHAP(LCP, IPCP)
- GRE tunnel
- HTTPs/SSH secure login
- TACACS+ multi-user authentication for privileged user management
- Cellular to WAN redundancy, dual SIM backup
- RSTP spanning tree protocol*

Rugged Design for Wayside Surveillance, ITS Application

- EN50121-4 railway trackside EMC compliant design for Industrial IoT, ITS applications
- Effective heat dissipation design for operating in -40~70°C environments
- CE Marking
- IEC61000-6-2/IEC61000-6-4 heavy industrial EMC compliance

Industrial IoT LAN & Cloud Management

- Embedded Amazon AWS & Microsoft Azure cloud service
- Various configuration paths, including CGI WebGUI, CLI, SNMP and RMON*
- 1:1 NAT, port forwarding and NAPT for local traffic protection
- Support SNMPv3 and entity-MIB (RFC4133), MIB II (RFC1213)
- NTP v3 time management
  AVCOMM Software Utilities:
  ANMS: Network Management System with VLAN visualization* and ERPS* Ring
  AIAS: Configuration Management
  ATMS: Interactive monitoring dashboard to collect data from field devices
  ATMS OTA: Realtime map showing the status, signal strength, location of the remote devices, over-the-air batch device registration, configuration and firmware upgrade*, alerts on critical events to prevent downtime
- Support MQTTS/CoAP protocol, ready to use AWS/Azure and Private Cloud Agent for cloud management
- LLDP* for topology control, auto-topology drawing
- USB for easy field configuration and firmware update
- Diagnostic tool includes Ping, TFTP, SNMP Trap, E-mail Alert and System Log

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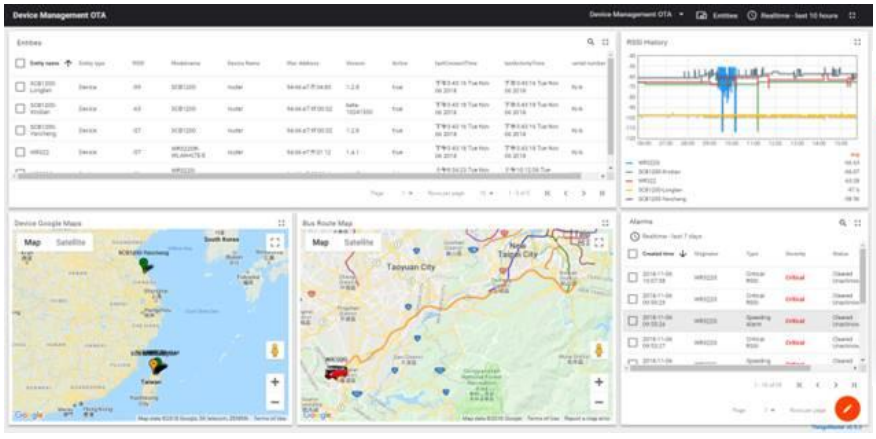
Ordering Information

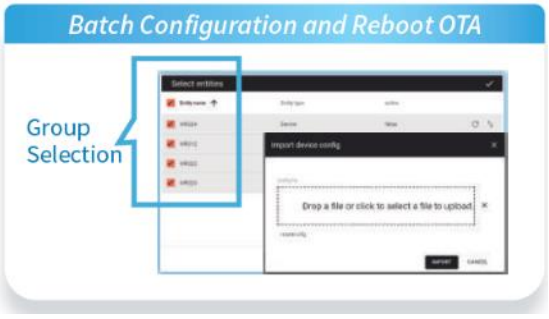
Model Name	Description
AP322-LTE	Industrial Secure LTE Router, Dual Core, 2GbE+2COM, 1USB,1SD, 2SIM, LTE-E, 2 LTE Antennas
AP322-WLAN	Industrial Secure LTE Router, Dual Core, 2GbE+2COM, 1USB, 1SD, 1 Relay 802.11ac + 11n Dual WLAN , 4 WLAN Antennas
AP322-WLAN-LTE	Industrial Secure LTE Router, Dual Core, 2GbE+2COM, 1USB, 1SD, 1 Relay 802.11ac + 11n Dual WLAN, 2SIM, LTE-E, 2 LTE Antennas, 4 WLAN Antennas
AP322-WLAN-LTE-GPS	Industrial Secure LTE Router, Dual Core, 2GbE+2COM, LTE-E, 1USB,1SD, 1SIM+ Wi-Fi + GPS (with LTE and WiFi antennas), MQTT, Cloud Agent

Product Features

✓ ATMS OTA (Device management over the air)

The OTA agent embedded in AP322 upgrades device management over the air, anywhere you are and any time you want over your mobile devices. ATMS OTA is a secured local OTA software that can be installed in a private or public server or even QNAP NAS (network attached storage). With OTA, all device information such as location, warning event can be shown in real time. The maintenance such as configuration reload, or device reboot can also be run by group.

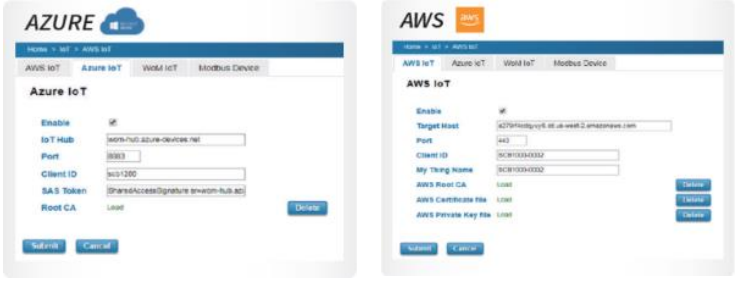




✓ Secured Remote Access by VPN

AP322 can act as a VPN server for data encryption and dynamic remote access. Multiple VPN protocols are supported such as OpenVPN, DMVPN, and L2TP. The channels between multiple networks, ex. private/public/hybrid networks are fully secured and with authentication features.

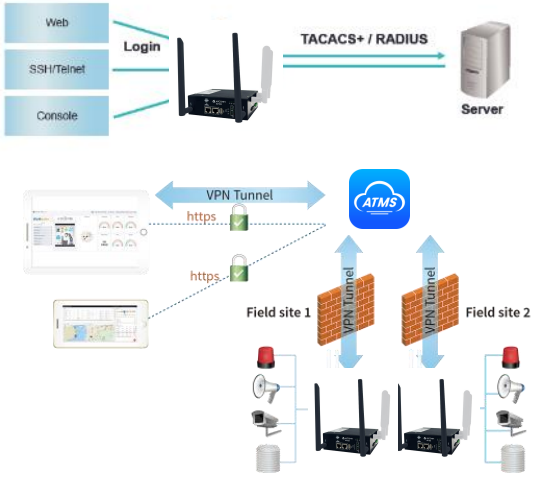
✓ Built-in Microsoft Azure and Amazon AWS agent



✓ Multi-Level User Passwords

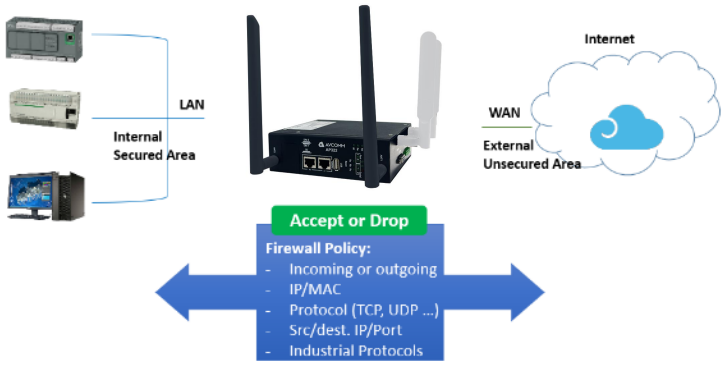
Different centralized authentication servers are supported such as RADIUS and TACACS+. Using a central authentication server simplifies account administration, when you have more than one switches in the network.

Authentication Chain is also supported. An authentication chain is an ordered list of authentication methods to handle more advanced authentication scenarios. For example, you can create an authentication chain which first contacts a RADIUS server, and then looks in a local database if the RADIUS server does not respond.

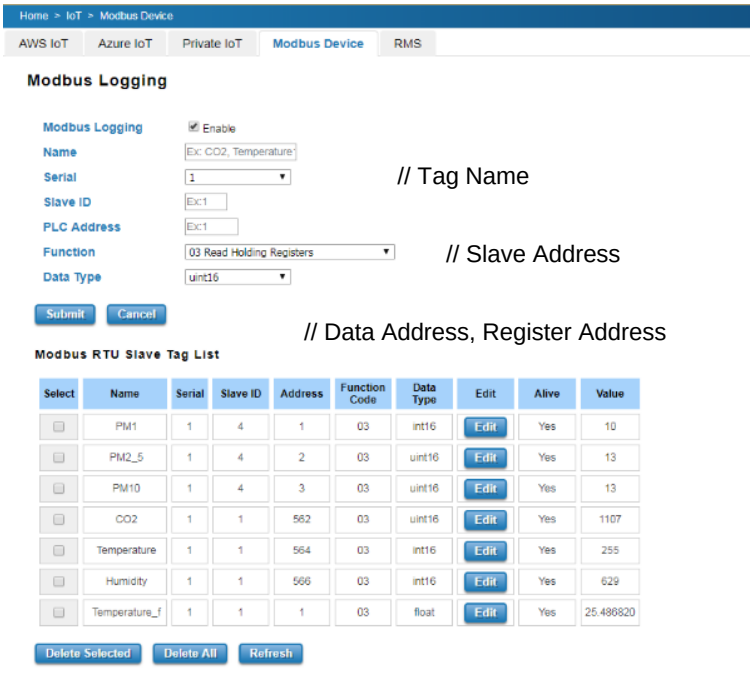


✓ Cyber Security Guard

The stateful firewall can monitor the status of connection at all time. Multiple industrial fieldbus protocols, ex. Modbus TCP*, EtherNet/IP* are also supported for factory automation applications.



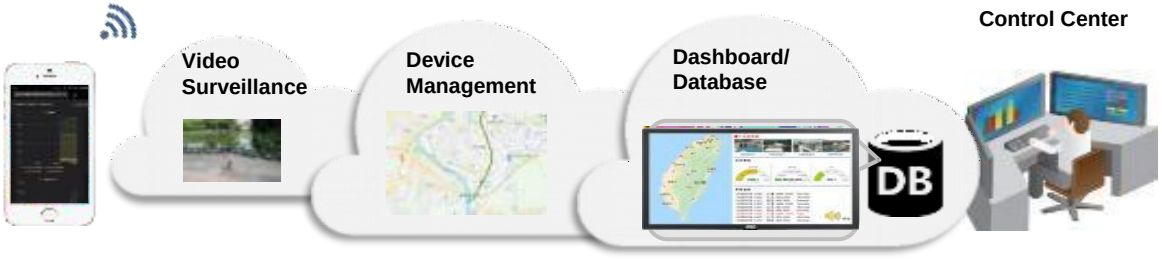
Secure IoT Modbus Tags
Tag-based data acquisition with MQTTS/CoAP support
MQTT client acting as publisher and subscriber
The latest TLS encryption and X.509 authentication
Selectable serial port and data type. Sensor alive check and display sensor value.

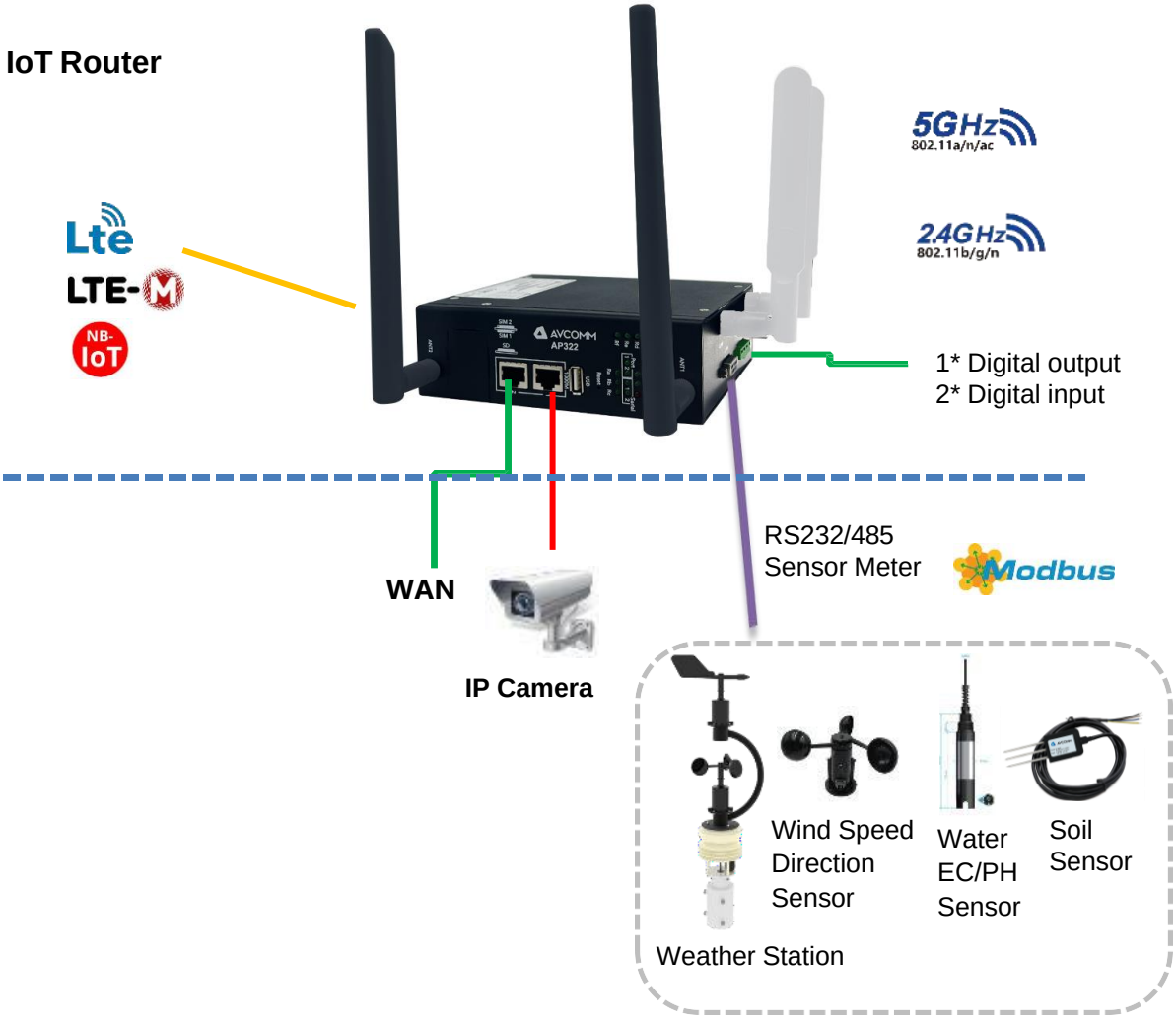


Secured Multi-sites Management
N to N VPN
Latest TLS encryption and X.509 authentication

✓ Ready Total Solution for IoT

Cloud Service





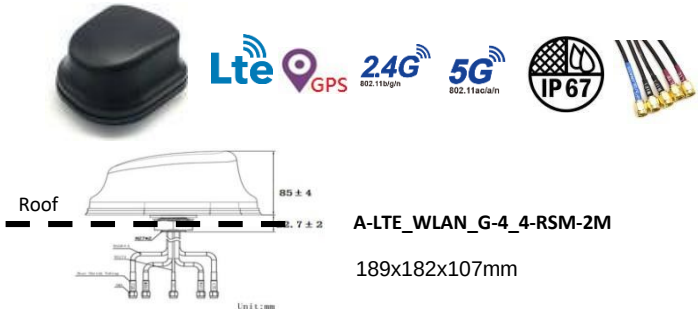
Optional Accessory

Model Name	Description
A-LTE_WLAN_G-4_4-RSM-2M	Combo IP67 Antenna, LTE WW 4dBi, Wi-Fi 2.4/5GHz dual band Omni-directional 4/4dBi, GPS 1561- 1670MHz 28dBi, RP-SMA male, 2M
A-LTE_WLAN_G-3_2-RSM-2M	Combo IP67 Antenna, LTE WW 3dBi, Wi-Fi 2.4/5GHz dual band Omni-directional 2/2dBi, GPS 1575- 1610MHz 28dBi, RP-SMA male, 2M
A-LTE-3-NM	LTE Antenna, LTE WW 3dBi, N-type male
A-WLAN-6-NM	Wi-Fi Antenna, Wi-Fi 2.4/5GHz dual band Omni-directional 4/6dBi, N-type male
A-GPS-27-RSM-3M	GPS Antenna, GPS 1575MHz 27dBi, RP-SMA male, 3M
A-GPS-2-NM	GPS Antenna, GPS 1575MHz 2dBi, N-Type male
C-RF-R-RSF_RSM-1M	RF cable, RP-SMA female to RP-SMA male, 1M
C-RF-C2-NF_RSM-2M	RF cable, N-type female to RP-SMA male, CFD200, 2M

Outdoor Vehicle Combo Antenna

A-LTE_WLAN_G-4_4-RSM-2M

- 5 RF cables, LTE MIMO, Wi-Fi MIMO, GPS/GLONASS/GALILEO/BEIDOU
- 4dBi gain for LTE and 4dBi gain for 2.4G/5G WIFI RF
- High WLAN gain is perfect for train to ground vehicle application
- 5 x 2-meter cables in RP SMA male connector
- Outdoor high gain, IP67 waterproof and -40˚~85˚C wide temperature design
- 189x182x107mm



A-LTE_WLAN_G-4_4-RSM-2M

189x182x107mm

A-LTE_WLAN_G-3_2-RSM-2M

- 5 RF cables, LTE MIMO, Wi-Fi MIMO, GPS&GLONASS
- 3dBi gain for LTE and 2dBi gain for 2.4G/5G WIFI
- Suitable for in-vehicle, roadside box and short-range coverage WLAN to LTE communication environment
- 5 x 2-meter cables in RP SMA male connector
- Outdoor IP67 waterproof and -40˚~85˚C wide temperature
- 110x110x80mm slim size

110x110x80mm

A-LTE_WLAN_G-3_2-RSM-2M

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-LTE_WLAN_G-4_4-RSM-2M (optional)	Omni	LTE: 698~960/1710~2690/2900~3600 WLAN: 2400~2483.5/4900~5825 GNSS: 1561.1~1610 (GPS/GLONASS/GALILEO/BEIDOU)	4 4 28	5x RP SMA Male	189x182x107	2	-40˚C~85˚C	Outdoor
	A-LTE_WLAN_G-3_2-RSM-2M (optional)	Omni	LTE: 698~960/1710~2690 WLAN: 2400~2483.5/4900~5825 GNSS: 1575.42~1610 (GPS/GLONASS)	3 2 28	5x RP SMA Male	110x110x80	2	-40˚C~85˚C	Outdoor

LTE Antenna

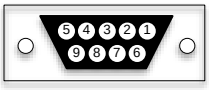
	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-LTE-2-RSM (Default)	Omni	704~960/1710~2690	2	RP SMA Male	161xΦ13	-	-20˚C~ 65˚C	Indoor
	A-LTE-3-NM (optional) (require RF cable)	Omni	704~960 1710~2700	2 3	N-Type Male	187xΦ20	-	-20˚C~ 65˚C	Outdoor

Wi-Fi Antenna

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-WLAN-3-RSM (Default)	Omni	2400~2500 4900~5900	2.5 3	RP SMA Male	196xΦ13	-	-40˚C~ 65˚C	Indoor
	A-WLAN-6-NM (optional) (require RF cable)	Omni	2400~2500 5150~5850	4 6	N-Type Male	187xΦ20	-	-20˚C~ 65˚C	Outdoor

GPS Antenna

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-GPS-27-RSM-3M (optional)	Omni	1575.42	27	RP SMA Male	36x36x13.9	3	-20˚C~ 65˚C	Indoor
	A-GPS-2-NM (optional) (require RF cable)	Omni	1575.42	2	N-Type Male	187xΦ20	-	-20˚C~ 65˚C	Outdoor

Technology	
Standard	3GPP Release 11/12 Long Term Evolution (LTE), fallback 3GPP Release 7,8,9 for HSPA/UMTS
	IEEE 802.11ac wireless local area network (WLAN), Backward support 802.11n/g/a/b Wireless LAN
	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet Copper
Interface	
Ethernet Port	2 x 10/100/1000MBase-T RJ45, Auto Negotiation, Auto-MDI/MDIX
System LED	1 x PWR: Green On 1 x SYS: Ready: Green On, Firmware Updating: Green Blinking 1 x DO(Relay): Red On 2 x Ethernet Ports: Link: Green On, Activity: Green Blinking 2 x Serial Ports (Serial 1/2, by model): Activity: Green Blinking **AP322-LTE:** 3 x Radio (Ra, Rb, Rc): Radio status Ra: SIM detected: Green On, SIM not inserted: Off Rb: 2G/3G/4G Signal Strength: Signal Good: Green On, Medium: Green Blinking, Low: Off Rc: 2G/3G/4G connection: Connected: Green On, Not Connected: Off **AP322-WLAN-LTE:** 3 x Radio (Ra, Rb, Rc): Radio status Ra: Cellular Connected: Green On, Poor Coverage: Green Blinking, Not Connected/Disabled: Off Rb: 802.11ac AP mode: Green ON, Client Mode: Green Blinking, Not Enabled: OFF Rc: 802.11n AP mode: Green ON, Client Mode: Green Blinking, Not Enabled: OFF
USB	1 x USB for Configuration/Firmware Update
Reset	System Reset(2~6 Seconds) / Default Settings Reset(over 7 Seconds)
SMA Socket	**AP322-LTE:** Up to 2 x SMA-Female LTE 2T2R: ANT1 for LTE Main, ANT2 for LTE Aux. **AP322-WLAN-LTE:** Up to 6 x SMA LTE 2T2R: ANT1 for LTE Main, ANT2 for LTE Aux or GPS(By Request) Wi-Fi 5 802.11ac 2T2R: ANT3 for Wi-Fi 5 Main, ANT5 for Wi-Fi 5 Div. Wi-Fi 4 802.11n 2T2R: ANT4 for Wi-Fi 4 Main, ANT6 for Wi-Fi 4 Div.
SIM Socket	2 x Nano SIM with redundancy
MicroSD	Internal mSD socket can be pre-installed with SD card for field diagnostic data logging.
Serial	1 x RS232/422/485, DB9 *2 x RS232/422/485 is optional upon request. Baud Rate: 110 to 460800bps (110,300,600,1200,2400,4800,9600, 19200,38400,57600,15200,230400,460800 bps) Parity: Odd, Even, Mark, Space, None Flow Control: Yes/No DB9 Female 

Pin	RS232	RS485-4w/422	RS485-2w
1	DCD	TX-	Data-
2	TXD	RX+	-
3	RXD	TX+	Data+
4	DSR	-	-
5	GND	GND	GND
6	DTR	RX-	-
7	CTS	-	-
8	RTS	-	-
9	RI	-	-

Digital Input/ Digital Output	6-Pin Removable Terminal Block Connector: 4 Pins for 2x DI with isolation High: DC 2~30V, Low: DC 0~1V 2 Pins for 1x DO: 0.1A/24V with isolation *The model with 2xSerial ports doesn't support this feature.
Power Input, Digital Output	6-Pin Removable Terminal Block Connector 4 Pin for Redundant Power, 24VDC 2 Pin for DO (Relay Alarm) DO: Dry Relay Output with 1A/24V DC

Power Requirement	
Input Voltage	24VDC (9~48VDC)
Reverse Polarity Protect	Yes
Input Current	**AP322-LTE:** 0.34A@24V **AP322-WLAN-LTE:** 0.4A@24V
Power Consumption	**AP322-LTE:** Max. 8.16W@24VDC full traffic, suggest to reserve 15% tolerance **AP322-WLAN-LTE:** Max. 9.6W@24VDC full traffic, suggest to reserve 15% tolerance
Cellular Properties	**(LTE Cat. 4)**
Standard	GSM/GPRS/EDGE 3GPP Release 6 UMTS/HSPA 3GPP Release 8 LTE 3GPP Release 11
Data Rate	GPRS: DL: max. 85.6 kbps, UL: max. 85.6 kbps EDGE: DL: max. 236.8 kbps, UL: max. 236.8 kbps HSPA: DL: max. 42 Mbps, UL: max. 5.76 Mbps LTE-FDD Cat.4: DL: max. 150 Mbps, UL: max. 50 Mbps, 2x2 DL MIMO LTE-TDD Cat.4: DL: max. 130 Mbps, UL: max. 35 Mbps, 2x2 DL MIMO
Band Information: LTE-EUX	LTE: FDD B1/B3/B7/B8/B20/B28A LTE: TDD B38/B40/B41 WCDMA: FDD B1/B8, GSM: B3/B8
Band Information: LTE-ECGA	LTE: FDD B1/B3/B7/B8/B20/B28A WCDMA: FDD B1/B8, GSM: B3/B8
Band Information: LTE-AU	LTE: FDD B1/B2*/B3/B4/B5/B7/B8/B28 LTE: TDD B40 WCDMA: FDD B1/B2/B5/B8, GSM: B2/B3/B5/B8
Band Information: LTE-G (By MoQ Request)	LTE: FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE: TDD B38/B39/B40/B41 WCDMA: FDD B1/B2/B4/B5/B6/B8/B19, GSM: B2/B3/B5/B8
GPS Properties*	
GNSS	GPS/GLONASS/BeiDou/Galileo
Performance	Cold start: 18s, Warm start: 2.2s, Hot start: 1.8s
Sensitivity	Cold start: -146dBm, Reacquisition: -157dBm, Tracking: -157dBm
Accuracy	<1.5M
GNSS Frequency	GPS/Galileo: 1575.42±1.023 MHz GLONASS: 1597.5~1605.8 MHz BeiDou: 1561.098±2.046 MHz
Antenna (Optional Accessory-A-GPS-27-RSM-3M)	Frequency range: 1561~1615MHz Polarization: RHCP or linear VSWR: <2 (Typ.) Passive antenna gain: >0dBi
Wi-Fi Properties	
Standard	IEEE 802.11ac/a/b/g/n, 2T2R MIMO 802.11ac Wave 2: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
Data Rate	802.11ac: MCS0 ~ 9, max. 866Mbps 802.11b: 11Mbps / 802.11a/g: 54Mbps / 802.11n: MCS0 ~ 15, max. 300Mbps
Frequency	ISM Band, 2.412GHz ~ 2.472GHz, 5.150GHz ~ 5.250GHz
RSSI	≦20db/≦23db, compliant with CE 2.4G/5G request

Antenna	
LTE Default Antenna	**Frequency:** 690~960/1710~2700 MHz
	Peak Gain: 3.15dBi 690MHz: 1.36dBi, 960MHz: 1.37dBi, 1710MHz: 3.12dBi, 1800MHz: 1.29dBi 1900MHz: 2.63dBi, 2100MHz: 1.47dBi, 2170MHz: 1.14dBi, 2500MHz: 3.15dBi 2600MHz: 2.46dBi, 2700MHz: 1.89dBi
	Direction: Omni
	Connector: SMA Male
	Dimension: 158x17.6xΦ13 mm
Wi-Fi Default Antenna	**Frequency:** 2400~2500/5150~5850MHz
	Peak Gain: 2.4G: 3.55dBi, 5GHz: 5.28dBi 2400~2500MHz: 2.4~3.55dBi 5150~5850MHz: 3.41~5.28dBi
	Direction: Omni-directional
	Connector: SMA Male Reverse
	Dimension: 200xΦ13 mm
Software	
Management	CGI WebGUI, Command Line Interface (CLI), IPv4/IPv6*, Telnet, SNMP v1/v2c/v3, DDNS, DHCP server/client, DHCP Relay, Fixed IP, TFTP, FTP(active/passive), System Log, SMTP, Proxy ARP, DNS (client/proxy), PPPOE*
Traffic Management	Flow Control*, Traffic shaping
Filter	IEEE802.1Q VLAN
Security	IEEE 802.1X/RADIUS, TLS v1.2, HTTPs/SSH, First login password management WLAN AP Security: Share Key, WPA/WPA2-PSK(Pre-Shared Key), WPA/WPA2 Enterprise Encryption: 64/128-bit WEP(Wired Equivalent Privacy), TKIP(WPA-PSK), AES(WPA2-PSK), MAC Filter
Advanced Security	TACACS+, Mutli-user authentication
Time Management	NTP, SNTP, Cellular Time
Redundancy Protocol	WAN/LTE Redundancy, Rapid Spanning Tree Protocol (RSTP)
WAN / Routing / NAT/ Firewall / VPN	Routing: RIPv2, OSPFv2, VRRPv2 NAT: 1-1 NAT, NAPT(SNAT/DNAT), Port Forwarding, DMZ Firewall: Stateful Inspection firewall(SIP), IP/Port Filter, MAC ACL VPN: IPSec, OpenVPN (Multipoint VPN), L2TP, GRE, PPTP*, DMVPN*, mGRE*
Watchdog	Hardware watchdog for system status monitoring Software cellular watchdog/ ping watchdog for connection monitoring
IIoT Industrial Protocol	Modbus RTU, MQTTS, CoAP, RESTful API*
Private Cloud	ATMS,ATMS OTA
Public Cloud	AWS Agent, Azure Agent
Location	Google map, Baidu map
MIB	MIB-II, Entity MIB, AVCOMM Private MIB for monitoring
Utility	AIAS, ANMS, Ping, Traceroute
Serial communication	TCP Server/TCP Client/UDP mode, TCP Alive check, Force TX Delimiter/Timeout/interval/length, Long Distance Termination, DLMS*
Cellular Configuration	Radio on/off, 2G, 3G and 4G modes configurable, SIM Security, Connection Status, Cellular to Eth-WAN Redundancy, GPS positioning (by model), Backup SIM Retry (1-10 times)
WLAN Configuration	WLAN Basic Settings: Radio on/off, AP/client mode, 2.4G 11n and 5G 11ac Band and Frequency selection, SSID/Multi-SSID configuration, SSID broadcast, VLAN ID, advanced WLAN settings, WLAN Access Control, 802.1X Radius

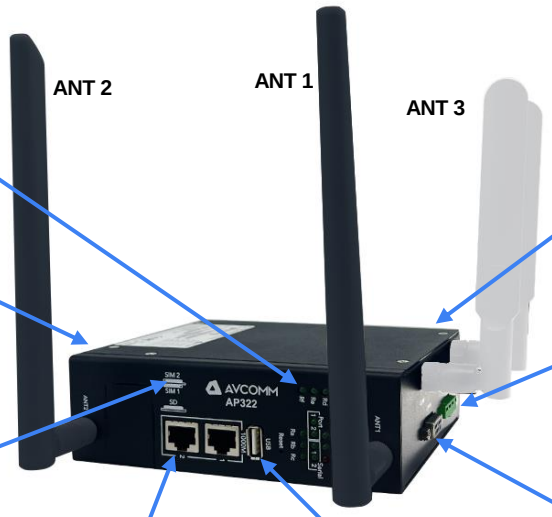
Mechanical	
Installation	DIN Rail
Enclosure Material	Steel Metal
Dimension	50 x 151 x 120 mm(W x H x D) / without DIN Rail Clip
Ingress Protection	IP30
Weight	600g~660g without package
Environmental	
Operating Temperature & Humidity	-40°C~70°C , 5%~95% Non- Condensing
Storage Temperature	-40°C~85°C
MTBF	>200,000 hours at 40º full cycle
Warranty	5 years
Approval	
CE	CE RED Compliance Safety: EN 62368-1:2014/AC:2017 EN 62311 MPE assessment EN 301 489-1/17/19/52, EN 55032/55024 EN 300 328/EN 301 893*, EN 301 908-1*
FCC	FCC part 15B Class A Compliance, FCC Approved LTE/WLAN Module
EMC	Railway Roadside EN 50121-1/4, EN61000-6-4 EN61000-4-2 ESD, EN61000-4-3 RS, EN61000-4-4 EFT, EN61000-4-5, EN61000-4-6 CS, EN61000-4-8 Magnetic Field EN61000-4-12/16/17/18/29 for power application
Environmental	EN 60870-2-2:1998 Compliance IEC 60068-2-21:2006 Compliance Shock/Vibration: EN 50155:2017/EN 61373:2010 Railway Shock/Vibration Shock: IEC60068-2-27 Compliance Free fall: IEC60068-2-31 Compliance Vibration: IEC 60068-2-6 Compliance

Function interface

	AP322-LTE	AP322-WLAN-LTE
Ant 1	LTE-Main	LTE-Main
Ant 2	LTE- Diversity/ GPS (by model)	LTE- Diversity/ GPS (by model)
Ant 3	-	Wi-Fi 5 Main
Ant 4	-	Wi-Fi 4 Main
Ant 5	-	Wi-Fi 5 Div.
Ant 6	-	Wi-Fi 4 Div.

*Antenna: Wi-Fi in White; LTE in Black

System LED
- 1 x Power
- 1 x System Status
- 1 x DO(Relay)
- 2 x Ethernet Port
- 1 Serial Port
- 3 x Radio LED (Ra~Rc)



Integrated Power Connector
- 4 pin for redundant power
- 2 pin Relay Output

DIN Clip

2xDigital Input
1xDIgital Output
*Optional Serial 2 by request

Serial Communication
- RS232/422/485 Full functions
- DB9 female

SIM Card
- 1x SIM or 2 x SIM
- 1xSD

Gigabit Ethernet
- 2-port 10/100/1000M RJ45
- 1WAN +1 LAN

USB Extension Port
- USB for Configuration/ Firmware update
- External Storage

Installation dimensions

Unit: inch ±0.040 / [mm] ±1.00