TDGAP-830D+-M12X-WV

TDGAP-8830D+-M12X-WV

Industrial EN50155 802.11 AC/G/N Access Point

with 3x10/100/1000Base-T(X)

User Manual

Version 1.0

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www.oringnet.com

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Getting Started

1.1 About the TDGAP-830D/8830D+-M12X-WV

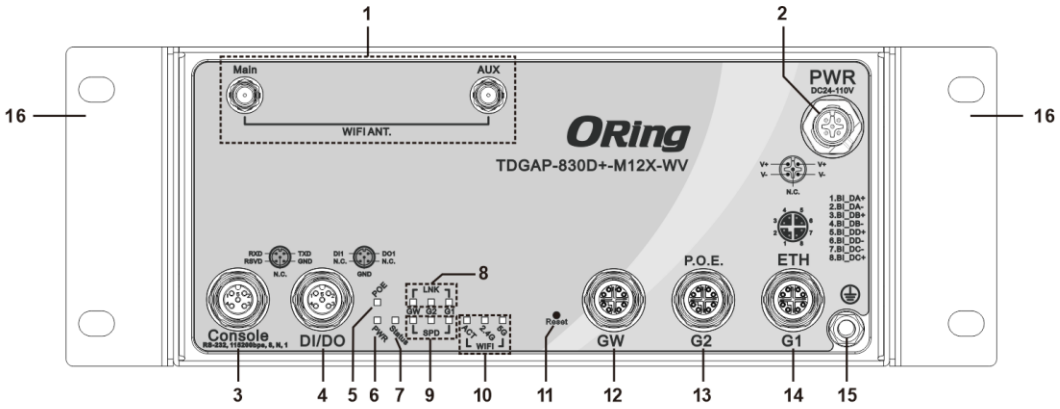
TDGAP-830D/8830D+-M12X-WV is reliable WiFi5 Access Point with 3 ports Gigabit Ethernet which is fully compliant with EN50155 certification. TDGAP-830D/8830D+-M12X-WV EN50155 WiFi5 Access Point uses M-series connectors to ensure tight, robust connections, and guarantee reliable operation against environmental disturbances, such as vibration and shock. In addition, TDGAP-830D/8830D+-M12X-WV also provides P.D. feature which is fully compliant with IEEE802.3at PoE P.D.

1.2 Features

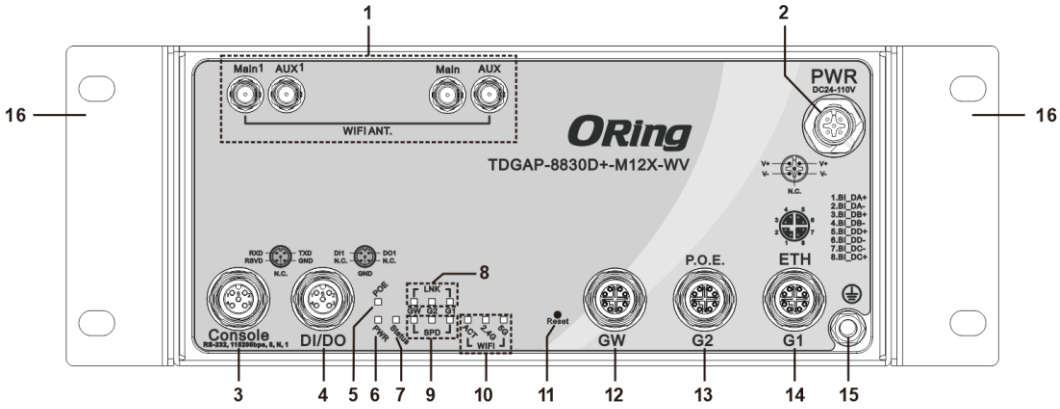
- Leading EN50155-compliant device for rolling stock application
- Provide 3x10/100/1000Base-T(X) Ethernet with M12 x-coding
- Highly Security Capability: WPA/WPA-PSK (TKIP, AES)/ WPA2/WPA2-PSK (TKIP, AES)/802.1X Authentication supported
- Support wireless AP/Client/Repeater mode
- Secured Management by HTTPs
- DHCP / Static IP address assignment
- 1KV isolation for PoE P.D. port
- Event warning by Syslog, e-mail, SNMP trap
- Wall mounting enabled

Hardware Overview

2.1 Panel Layouts



1. Wi-Fi antenna connector
2. Power connector
3. Console connector
4. DI/DO connector
5. POE power LED
6. Power LED
7. Status LED
8. LNK/ACT indicator
9. Speed indicator
10. Wi-Fi status LED
11. Reset button
12. Gigabit Ethernet port
13. Gigabit POE Ethernet port
14. Gigabit Ethernet port
15. Ground wire
16. Rack-mount kit



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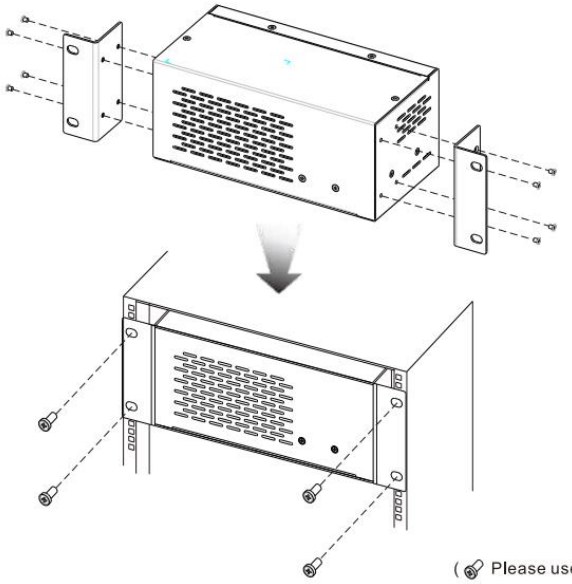
2.2 Front Panel LEDs

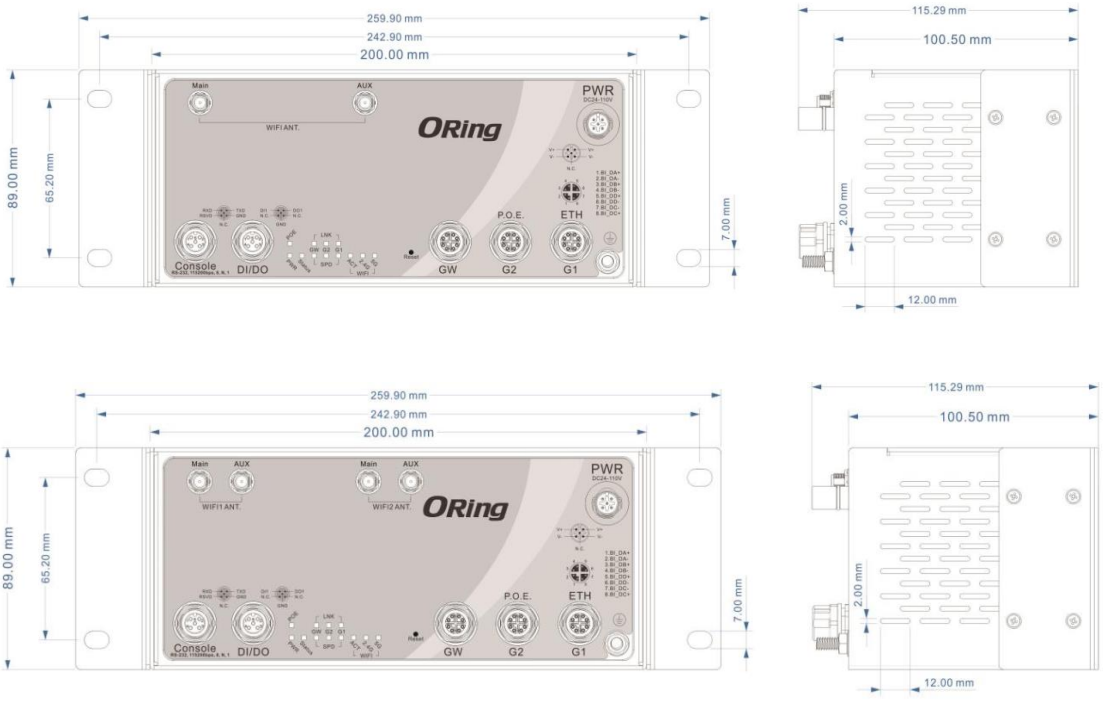
LED Indicators	
PWR	1 x LED, Green for DC Power in
POE	1 x LED, Green for POE Power in
Ethernet Port Indicator	6 x LEDs, LNK: Green for port Link/AcT SPD: Green ON : for 1000/100Base-T(X); Green OFF : for 10Base link
WLAN(Wifi) LED	3 x LEDs, 1 x LED, Green ON: RF ON; Blink: data transmitting 1 x LED, Green for WLAN work on 2.4GHz 1 x LED, Green for WLAN work on 5GHz
Status Indicator	1 x LED, Green slow blink for normal, OFF for system halt

Hardware Installation

3.1 Rack Mounting

With the brackets orientated in front of the rack, fasten the brackets to the rack using two more screws.





Rack-Mount Kit Measurement (Unit = mm)

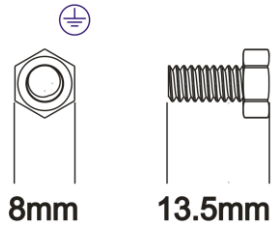
3.3 Wiring

WARNING

Be sure to switch off the power and make sure the area is not hazardous before disconnecting modules or wires. The devices may only be connected to the supply voltage shown on the type plate.

3.3.1 Grounding

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

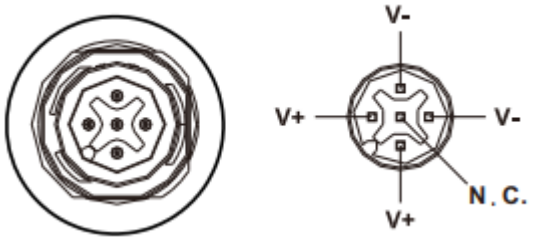


3.3.2 Power Inputs

TDGAP-830D/8830D+-M12X-WV supports one set of power supplies and uses the 5-pin M12 male A-coding connector on the front panel for the power input.

Step 1: Insert a power cable to the power connector on the device.

Step 2: Rotate the outer ring of the cable connector until a snug fit is achieved. Make sure the connection is tight.



ATTENTION

1. Be sure to disconnect the power cord before installing and/or wiring your devices.
2. Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.
3. If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.
4. Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
5. Do not run signal or communications wiring and power wiring through the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
6. You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring sharing similar electrical characteristics can be bundled together
7. You should separate input wiring from output wiring
8. It is advised to label the wiring to all devices in the system

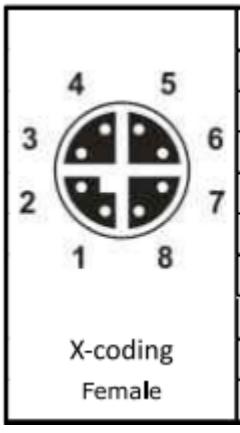
Cables and Antenna

4.1 Ethernet Cables

TDGAP-830D/8830D+-M12X-WV has 10/100/1000Base-T(X) Ethernet port of M12 connector. Depending on the link type, the switch uses CAT 3, 4, 5, 5e UTP cables to connect to network devices (PCs, servers, switches, routers, or hubs). Please refer to the following table for cable specifications.

Cable	Type	Max. Length	Connector
10BASE-T	Cat. 3, 4, 5 100-ohm	UTP 100 m (328 ft.)	8-pin female M12 X-coding connector
100BASE-T(X)	Cat. 5 100-ohm UTP	UTP 100 m (328 ft.)	8-pin female M12 X-coding connector
1000BASE-T(X)	Cat. 5e 100-ohm UTP	UTP 100 m (328 ft.)	8-pin female M12 X-coding connector

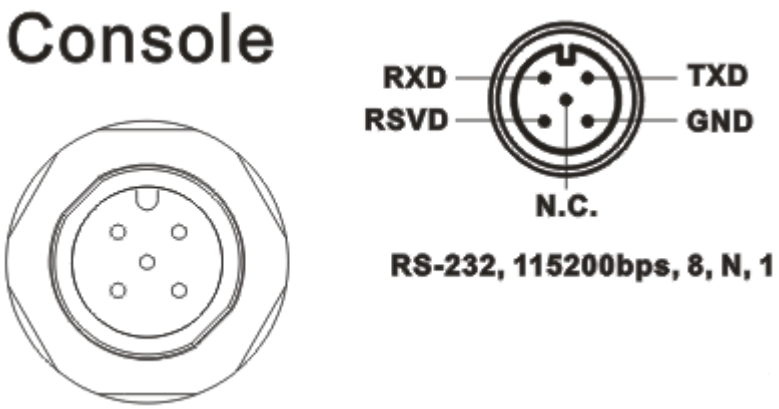
4.2 M12 8-Pin X-coding Definition



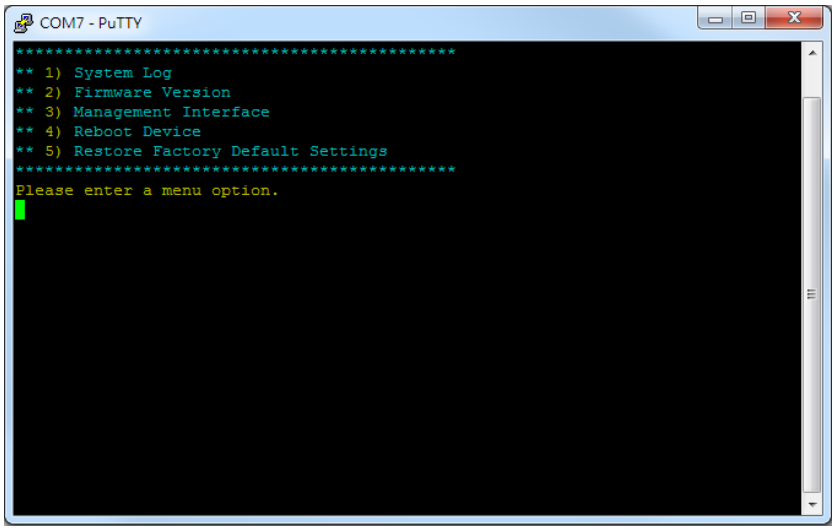
10/100/1000Base-T(X) M12 port	
Pin No.	Description
#1	BI_DA+
#2	BI_DA-
#3	BI_DB+
#4	BI_DB-
#5	BI_DD+
#6	BI_DD-
#7	BI_DC-
#8	BI_DC+

4.3 Console Port

TDGAP-830D/8830D+-M12X-WV can be managed via the console port using a M12-to-DB-9(RS-232) cable. You can connect the port to a PC via the M12-to-DB-9(RS-232) cable with a DB-9 female connector. The DB-9 female connector of the M12-to-DB-9(RS-232) cable should be connected the PC. After connecting the console cable from the device to the PC, you must set the baud rate on the PC to the same value used by the device. The baud rate is the communication speed that measures the number of bit transfers per second. Use the Hyper Terminal utility or other RS-232 communications software to set the baud rate to **115200**.



TDGAP-830D/8830D+-M12X-WV provides basic management function through console port: **System Log**, **Firmware version**, **Management Interface**, **Reboot Device** and **Restore Factory Default Settings**, enter a menu option for process.



4.4 Antenna

TDGAP-830D/8830D+-M12X-WV total provide, RP-SMA connectors for WIFI. External RF cables and antennas can also be used with the connector.

Management Interface

5.1 Installation

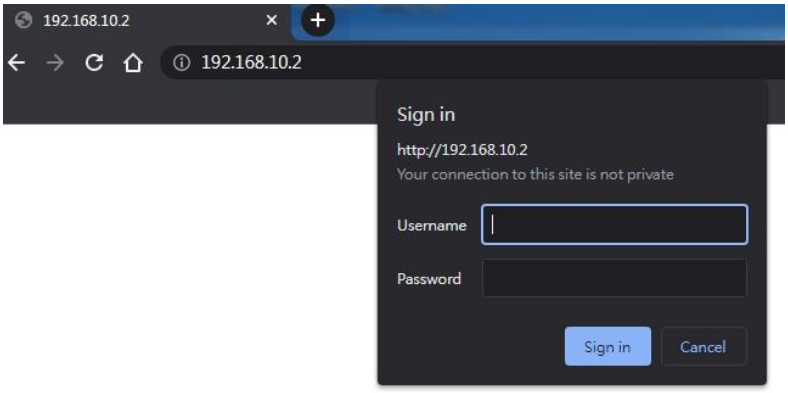
Before installing the TDGAP-830D/8830D+-M12X-WV, you need to be able to access the device via a computer equipped with an Ethernet card interface.

Follow the steps below to install and connect the device to PCs:

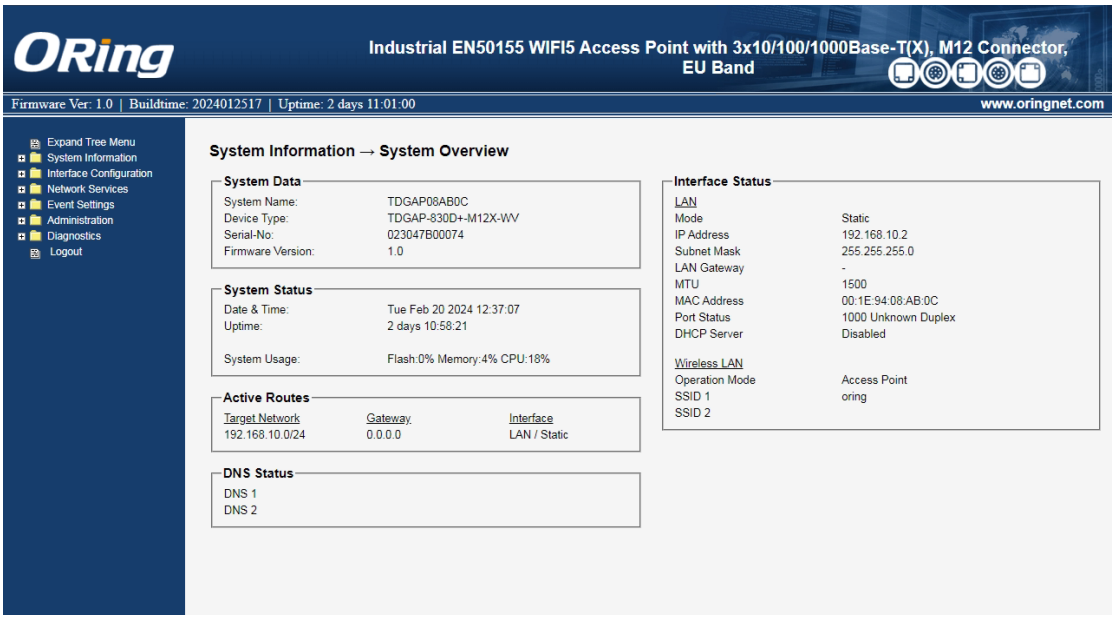
Step 1: Select power source. The device can be powered by +24 ~ 110V DC power input.

Step 2: Connect a computer to the device. Use either a straight-through Ethernet cable or cross-over cable to connect ethernet port of the device to a computer. Once the LED of the port lights up, which indicates the connection is established, the computer will initiate a DHCP request to retrieve an IP address from the device.

Step 3: Configure the device on a web-based management utility. Open a web browser on your computer and type http://192.168.10.2 in the address box to access the webpage. A login window will pop up where you can enter the default login name admin and password admin. For security reasons, we strongly recommend you going to change the password. Click on **Administration** > **System Settings** after logging in to change the password.

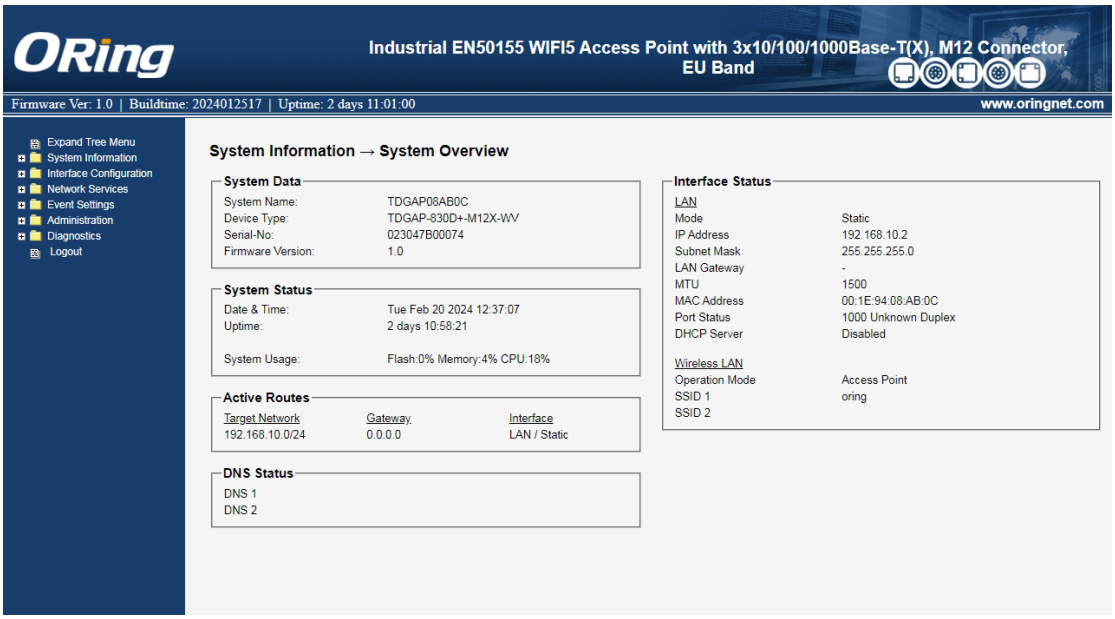


After you log in successfully, a Web interface will appear, as shown below. On the left-hand side of the interface is a list of functions where you can configure the settings. The details of the configurations will be shown on the right screen.



5.2 Configuration

On top of the screen shows information about the firmware version, uptime.



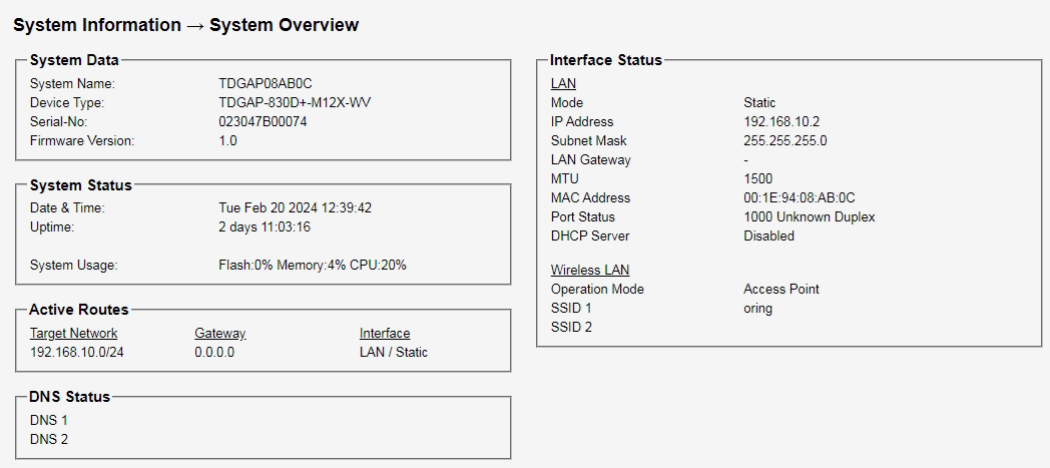
Label	Description
Firmware	Shows the current firmware version
Uptime	Shows the elapsed time since the AP device is started

5.2.1 System Information

System information shows up all system information, and Wired LAN/WAN traffic statistics.

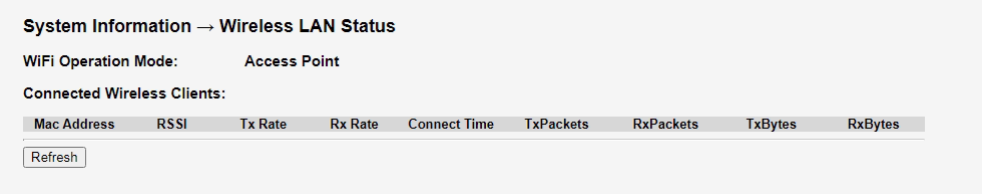
System Overview

System basic information



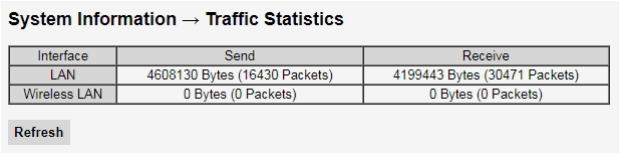
Wireless LAN Statistics

Include wireless operation mode and all connected wireless client information.



Traffic Statistics

Cellular, Wire/Wireless, LAN/WAN traffic statistics.

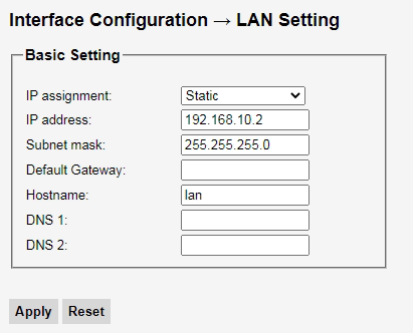


5.2.2 Interface Configuration

This section will guide you through the general settings for the device.

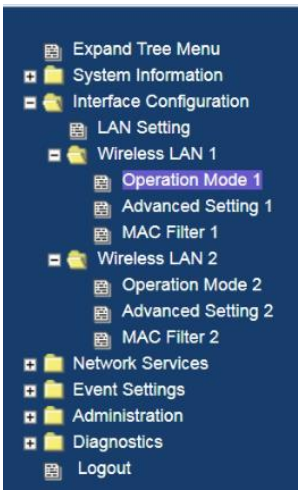
LAN Setting

This page allows you to configure the IP settings of the LAN for the device. The LAN IP address is private access device's Web page.



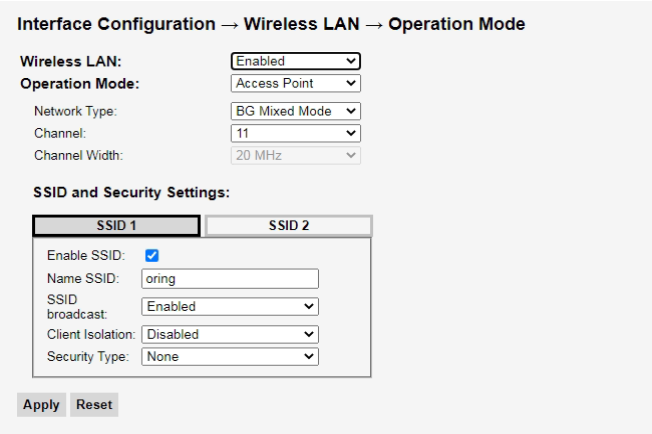
Label	Description
IP assignment	Assign IP address by static or DHCP
IP Address	The IP address of the LAN. The default value is **192.168.10.2**
Subnet Mask	The subnet mask of the LAN. The default value is **255.255.255.0**
Default Gateway	Assign default gateway address for device
Hostname	Assign hostname for device
Static DNS 1/2	Assign DNS address for device

Wireless LAN Setting



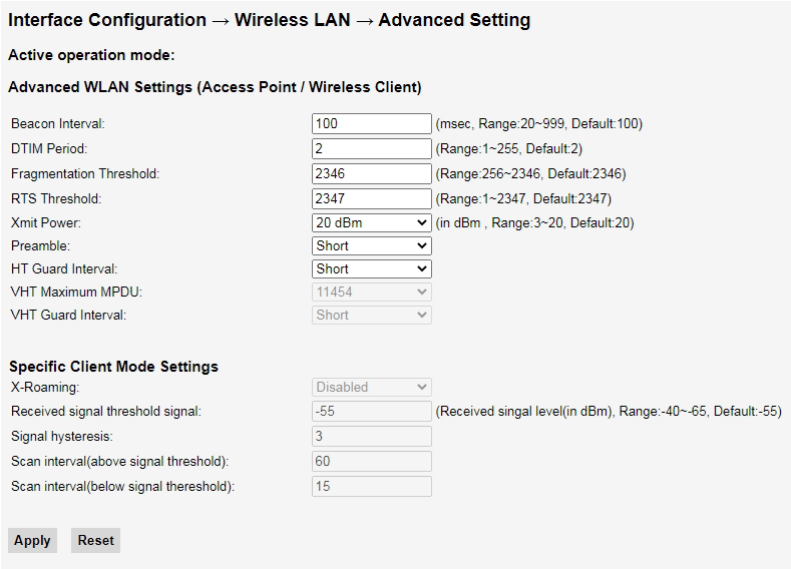
Notice: Wireless LAN 2 is only available with TDGAP-8830D+-M12XWV model.

Operation mode



Label	Description
Wireless LAN	Enable/Disable interface
Operation Mode	Device provide 3 Wi-Fi connection mode and support Access Point/Client/Repeater mode
Network Type	Support WIFI 2.4G BG/BGN mode, WIFI 5G A/AN/AC mode
Channel	WIFI Channel setting
Channel Width	2.4G support 20/40Mhz, 5G support 20/40/80MHz
SSID & Security Setting	Wireless interface support 2 individual SSID and Security setting

Advanced Settings



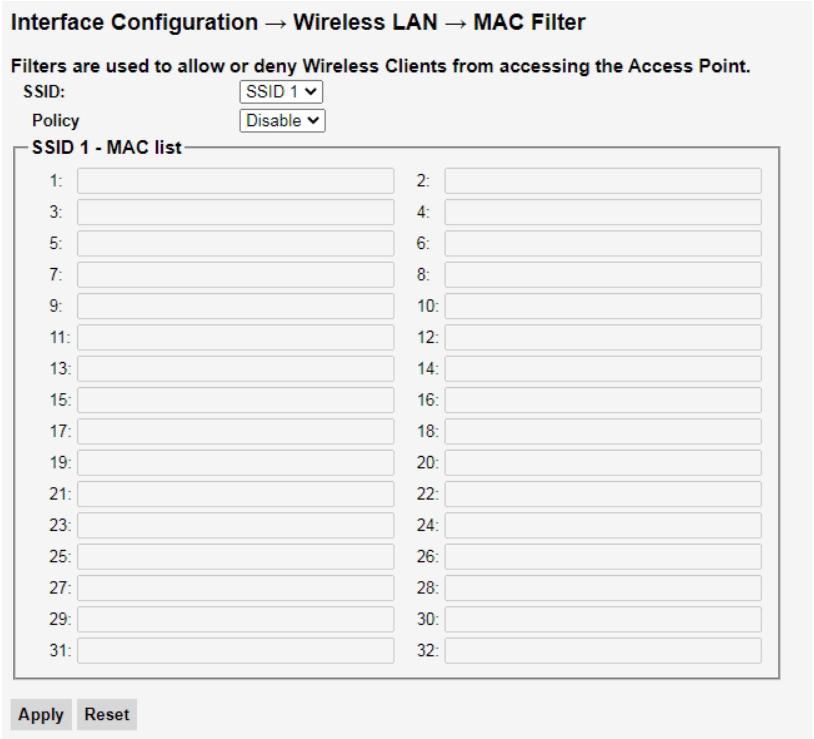
Label	Description

Beacon Interval	A beacon is a packet sent by a wireless access point to synchronize wireless devices. The beacon interval value indicates the frequency interval of the beacon. Increasing the beacon interval reduces the number of beacons and the overhead associated with them. The default value is 100, but 50 is recommended when reception is poor
DTIM Period	The value is an integer that ranges from 1 to 255, in Beacons. The DTIM interval specifies how many Beacon frames are sent before the Beacon frame that contains the DITM. A long DTIM interval lengthens the dormancy time of the STA and saves power, but degrades the transmission capability of the STA. A short interval helps transmitting data in a timely manner, but the STA is wakened up frequently, causing high power consumption
Fragmentation Threshold	Specifies the maximum size for a packet before data is fragmented into multiple packets. The range is 256-2346 bytes, or “off”. Setting the Fragmentation Threshold too low may result in poor network performance. The use of fragmentation can increase the reliability of frame transmissions. Because smaller frames are sent, collisions are much less likely to occur. However lower values of the Fragmentation Threshold will result lower throughput as well. Little or no modification of the Fragmentation Threshold value is recommended as the default setting of 2346 is optimum for most wireless networks.
RTS Threshold	Determines the packet size of a transmission and, through the use of an access point, helps control traffic flow. The range is 0-2347bytes, or "off". The default value is 2347, which means that RTS is disabled. RTS/CTS (Request to Send / Clear to Send) is the mechanism used by the 802.11 wireless networking protocol to reduce frame collisions introduced by the hidden AP25N01 User Manual 85terminal problem. RTS/CTS packet size threshold is 0-2347 bytes. If the packet size the node wants to transmit is larger than the threshold, the RTS/CTS handshake gets triggered. If the packet size is equal to or less than threshold the data frame gets sent immediately. System uses Request to Send/Clear to Send frames for the handshake which provide collision reduction for access point with hidden stations. The stations are sending an RTS frame first while data is sent only after handshake with an AP

	is completed. Stations respond with the CTS frame to the RTS, which provides clear media for the requesting station to send the data. CTS collision control management has time interval defined during which all the other stations hold off the transmission and wait until the requesting station will finish transmission.
Xmit Power	Transmit power of the radio. This is the total power supplied to the antennas of the radio
Preamble	Available values include **Long** and **Short**, with **Long** as the default value. If all clients and access points in your wireless network support short preamble, then enabling it can boost overall throughput. However, if any wireless device does not support short preamble, then it will not be able to communicate with your network. If you are not sure whether your radio supports the short RF preamble, you must disable this feature
HT Guard Interval	Select HT (High Throughput) Guard Interval, short or long.
VHT Maximum MPDU	Select VHT Maximum MPDU (Very High Throughput Maximum MAC Protocol Data Unit), 3895, 7991 or 11454.
VHT Guard Interval	Select VHT (Very High Throughput) Guard Interval, short or long.
X-Roaming	Enable/Disable X-Roaming protocol. Roaming group does not require the same wireless channel, but the speed is slower than using the “fixed channel”.
Received Signal Threshold	When signal is lower than the designated value, the client will roam to another AP target with the same SSID, security option and signal strongest within the environment. (This value is only effective on **client-mode** equipment)
Signal hysteresis	Configure the signal strength differences of roaming threshold for choosing roaming candidates (AP).
Scan interval (above signal threshold)	Configure the frequency for detecting roaming candidates (background scan) when connected AP’s signal strength is above signal threshold.
Scan interval (below signal threshold)	Configure the frequency for detecting roaming candidates (background scan) when connected AP’s signal strength is below signal threshold.

MAC Filter

Filters are used to allow or deny Wireless Clients from accessing the Access Point.



Label	Description
SSID	Choose to apply SSID
Policy	Deny/Allow Policy
MAC list	Add Client MAC address to list table

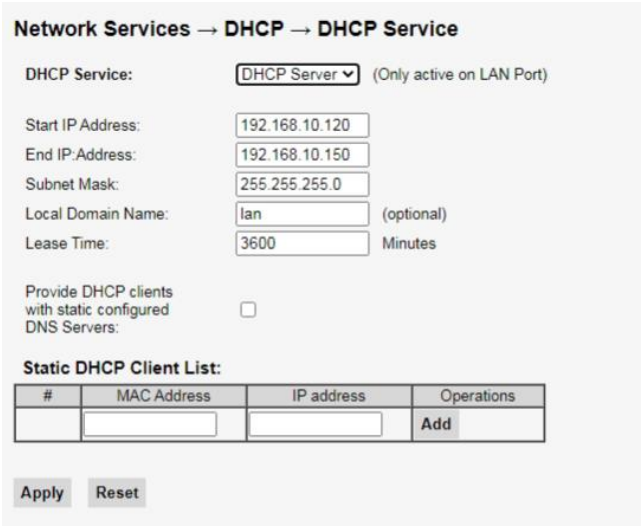
5.2.3 Networking Services

DHCP

DHCP is a network protocol designed to allow devices connected to a network to communicate with each other using an IP address. The connection works in a client-server model, in which DHCP clients request an IP address from a DHCP server. The device comes with a built-in DHCP (Dynamic Host Control Protocol) server which assigns an IP address to a computer (DHCP client) on the LAN automatically. The device can also serve as a relay agent which will forward DHCP requests from DHCP clients to a DHCP server on the Internet.

The IP allocation provides one-to-one mapping of MAC address to IP address. When a computer with a MAC address requesting an IP address from the device, it will be assigned with the IP address according to the mapping. You can choose one from the client list and add it to the mapping list.

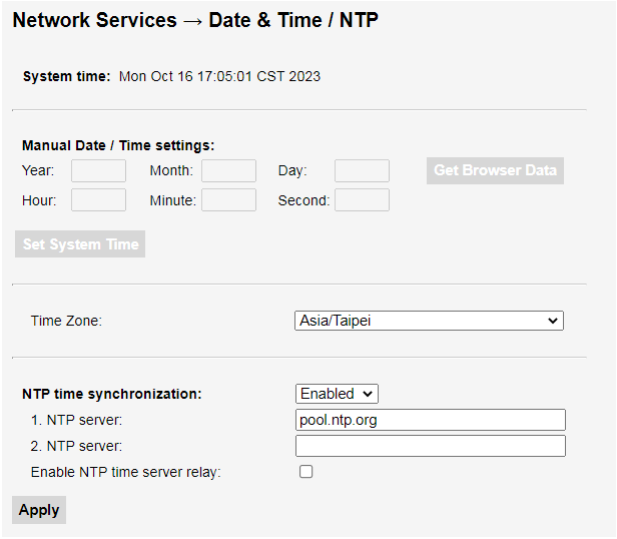
DHCP Service



Label	Description
DHCP Server	Enable or disable the DHCP server function. The default setting is **Enabled**.
Starting IP	The starting IP address of the IP range assigned by the DHCP server
Ending IP	The ending IP address of the IP range assigned by the DHCP server
Lease Time	The period of time for the IP address to be leased. During the lease time, the DHCP server cannot assign that IP address to any other clients. Enter a number in the field. The default setting is 48 hours.
Local Domain Name	Enter the local domain name of a private network (optional)
Provide DHCP clients with static configured DNS Servers	Provide static configured DNS server address (LAN Setting) to DHCP clients.
Static DHCP Client List	Add the one-to-one relationship of the MAC address and IP address.

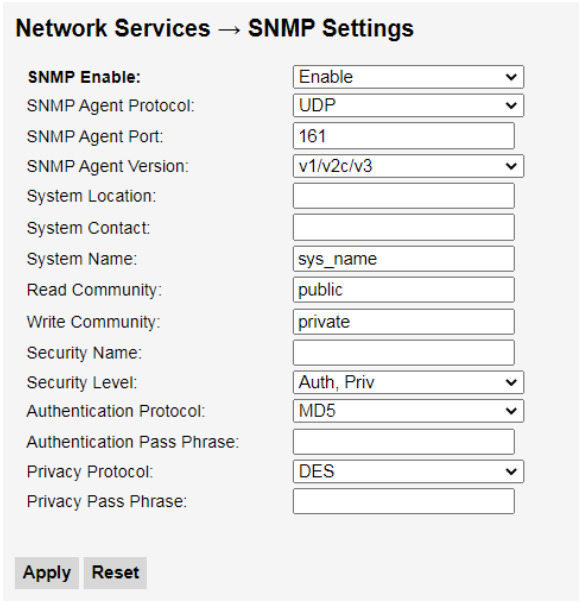
Date & Time / NTP

In this page, you can set the date & time of the device. A correct date and time will help the system log events. You can set up a NTP (Network Time Protocol) client to synchronize date & time with a NTP server on the Internet.



Label	Description
Get Browser Date	Get Date and Time from Browser
Set System Time	Set the setting value to system
Time Zone	Assign Time Zone for system
NTP time synchronization	Enable or disable NTP function
Time Zone	Select the time zone you are located in
NTP Server	Set NTP server address for synchronization
Enable NTP time server relay	Check for NTP time server relay

SNMP Setting



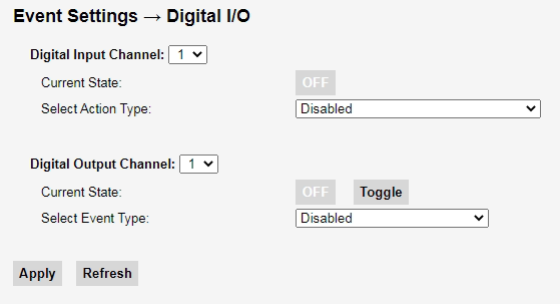
Label	Description
SNMP Enable	SNMP (Simple Network Management Protocol) Agent is a service program that runs on the device. The agent provides management information to the NMS by keeping track of various operational aspects of the system. Turn on to open this service and off to shutdown it.
SNMP Agent Protocol	Select packet type for SNMP protocol
SNMP Agent Port	Specify SNMP listening port
SNMP Agent Version	Specify SNMP protocol version
System Location	Specify System Location of SNMP Agent
System Contact	Specify System Contact of SNMP Agent
System Name	Specify System Name of SNMP Agent
Read Community	Community is essentially password to establish trust between managers and agents. Normally "public" is used for read-only community.
Write Community	Community is essentially password to establish trust between managers and agents. Normally "public" is used for read-write community.
Security Name:	Specify Security Name of SNMP Agent
Security Level	Specify Security Level (Authentication or Privacy) of SNMP Agent
Authentication Protocol	Select MD5 to authenticate using HMAC-MD5 algorithms Select SHA to authenticate using HMAC-SHA algorithms

Authentication Pass Phrase	Specify Authentication Pass Phrase of SNMP Agent
Privacy Protocol	Select DES to use DES-based data encryption Select AES to use AES-based data encryption
Privacy Pass Phrase	Specify Privacy Pass Phrase of SNMP Agent

5.2.4 Event Setting

When an error occurs, the device will notify you through system log, and SNMP messages. You can configure the system to issue a notification when specific events occur by checking the box next to the event.

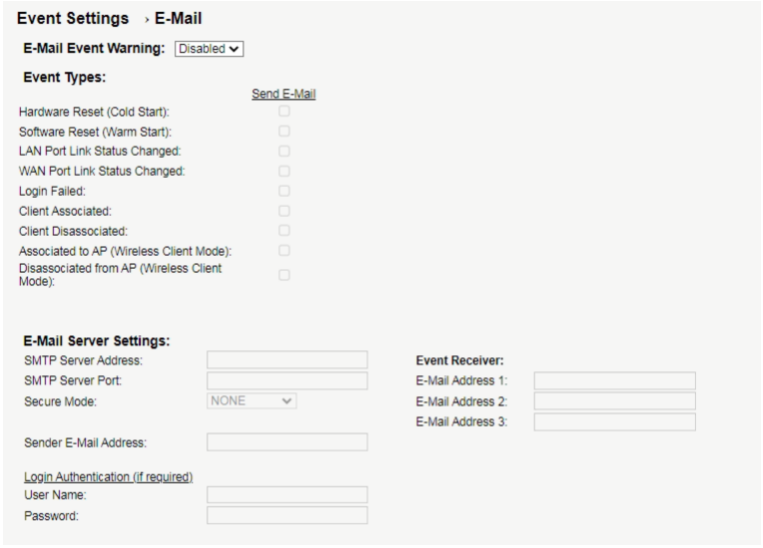
Digital I/O



Label	Description
Digital Input	When Channel 1 and 2 State changed will action one of below **Start/Stop OpenVPN Server or Connect/Disconnect OpenVPN Client or Block/Unblock Wireless Lan.**
Digital Output	manually or one of events below occur **OpenVPN Server status or OpenVPN Client status or Block/Unblock Wireless Lan** will toggle channel 1 and 2 state

E-Mail

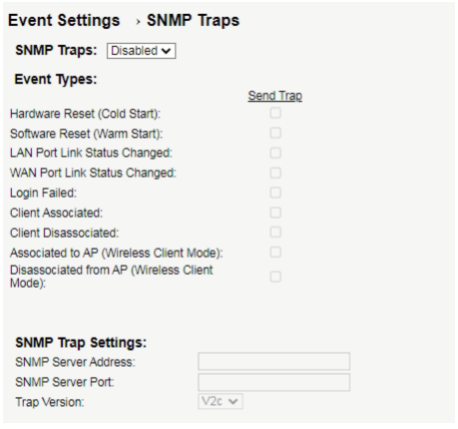
Send the event alert via Email.



Label	Description
SMTP Server	Enter a backup host to be used when the primary host is unavailable.
Server Port	Specifies the port where MTA can be contacted via SMTP server
E-mail Address 1-3	Enter the mail address that will receive notifications

SNMP Traps

Send event alert via SNMP trap protocol.



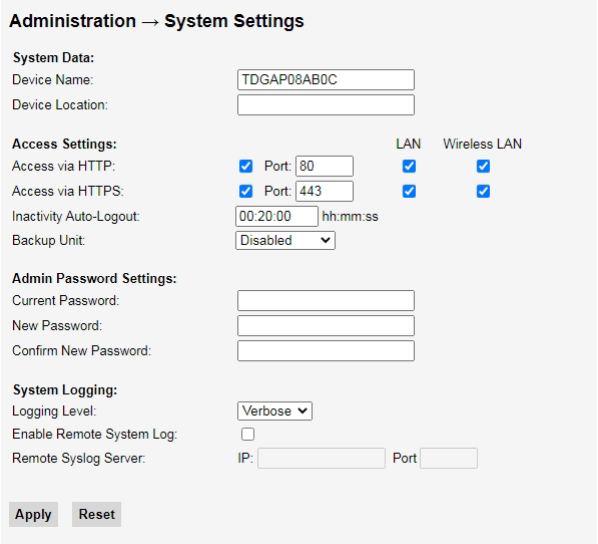
Label	Description
SNMP Server Address	Enter the IP address of the SNMP server which will send out traps generated by the AP.

SNMP Server Port	Enter Trap server using port
Trap Version	Support V2c

5.2.5 Administration

System Setting

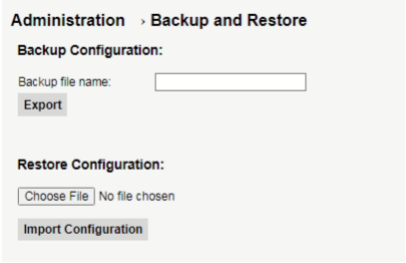
System setting include web access setting, Web login name and password in page; default login name and password are both **admin** and system log server setting.



Label	Description
Device Name	Assign name for device
Device Location	Type in device location
Confirm New Password	Retype the new password to confirm it.
Access setting	Choose a web management page protocol from **HTTP** and **HTTPS**. HTTPS (HTTP over SSL) encrypts data sent and received over the Web. Choose HTTPS if you want a secure connection.
Port	Choose a web management page port number. For HTTP, default port is 80. For HTTPS, default port is 443.
Response on WAN Ping	Click Enable to allow system administrator to ping the device from WAN interface
Remote Syslog IP	Enter the IP address of a remote server if you want the logs to be stored remotely. Leave it blank will disable remote syslog.
Remote Syslog Port	Specifies the port to be logged remotely. Default port is 514.

Backup and Restore Configurations

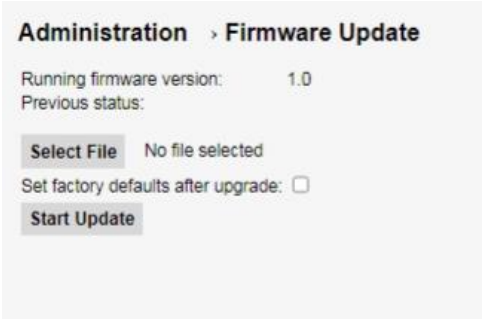
This page allows you to save configurations or return settings to previous status. You can download the configuration file from the Web. Note: users using old versions of Internet Explorer may have to click on the warning on top of the browser and choose Download File.



Label	Description
Export	Click to Save existing configurations as a file for future usage.
Import	You can restore configurations to previous status by installing a previous configuration file.
Restore Factory Default Setting	Click to reset the device to the factory settings. The device will reboot to validate the default settings.

Firmware Upgrade

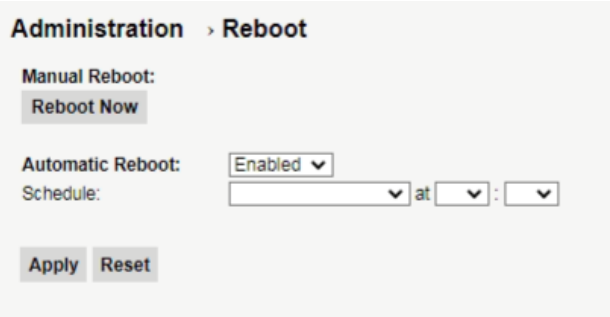
ORing launches new firmware constantly to enhance device performance and functions. To upgrade firmware, download new firmware from ORing's website to your PC and install it via Web upgrade. Make sure the firmware file matches the model of your device. It will take several minutes to upload and update the firmware. After upgrade completes successfully, reboot the device.



During firmware upgrading, do not turn off the power of the device or press the reset button.

Reboot

This page allows you to configure restart settings for the device.



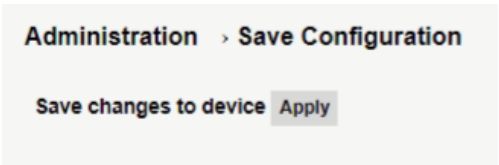
Label	Description
Reboot Now	Click to restart the device via warm reset
Automatic Reboot	**Enable**: check to activate the setting Reboot at: specify the time for resetting the device. You can configure the action to be performed periodically.

Factory Default

Click to reset the device to the factory settings. The device will reboot to validate the default settings.

Save device configuration.

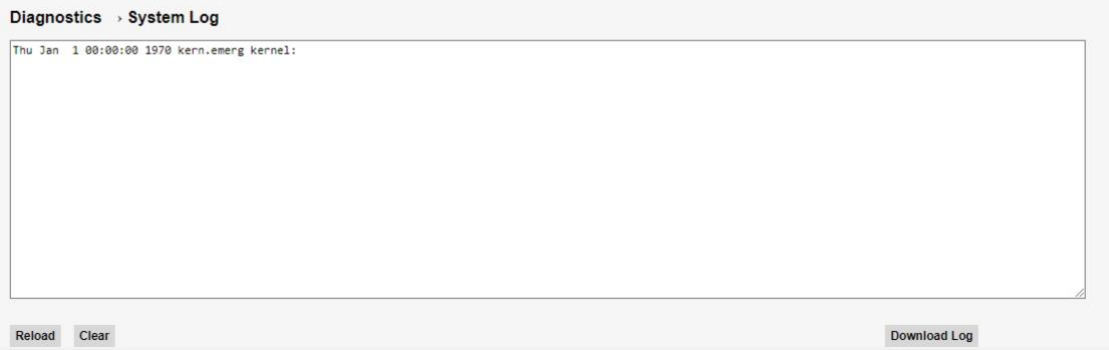
Click Apply to save all Changes to device.



5.2.6 Diagnostics

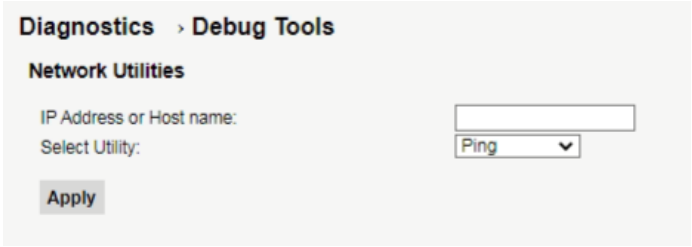
System Log

The device will constantly log the events and provide the files for you to review. You can click **Reload** to renew the page, **Clear** to clear all or certain log entries and **Download** to save all logs to file.



Debug Tools

Use utility Tool Ping, Trace device and NSLookup to check any IP or Host.



Technical Specifications

ORing EN50155 Access Point Model	TDGAP-830D+-M12X-WV	TDGAP-8830D+-M12X-WV
Physical Ports		
10/100/1000Base-T(X) Ports in M12 (8-pin X-coding female)	**3(LAN), Auto MDI/MDIX**	
Console Ports in M12 (5-pin A-coding female)	**1**	
DI/DO Port in M12 (5-pin A-coding female)	**DI x 1, DO x 1** **(DI :Logic level 1: 5V~30V, Logic level 0: 0V~2V** **DO :Maximum Voltage is 30V, Maximum Current is 20mA)**	
Input Power Port in M12 (5-pin A-coding male)	**1**	
PoE P.D Port	**Present at Ethernet (G2)** **Fully compliant with IEEE 802.3at Power Device specification** **Over load & short circuit protection** **Isolation Voltage: 1000 VDC min.** **Isolation Resistance : 10^8 ohms min**	
Antenna connector		
WIFI	**2 x RP-SMA female**	**4 x RP-SMA female**
WLAN interface		
Modulation	IEEE 802.11a: OFDM IEEE 802.11b: CCK, DQPSK, DBPSK IEEE 802.11g: OFDM IEEE 802.11n: BPSK, QPSK, 16-QAM, 64-QAM IEEE 802.11ac: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM	
Frequency Band	America / FCC: 2.412~2.462 GHz 5.180~5.240 GHz & 5.745~5.825 GHz Europe CE / ETSI: 2.412~2.472 GHz 5.180~5.240 GHz	
Transmission Rate	IEEE 802.11b: 1/2/5.5/11 Mbps IEEE 802.11a/g: 6/9/12/18/24/36/48/54 Mbps IEEE 802.11n: UP to 300 Mbps IEEE 802.11ac: up to 867Mbps	
Transmit Power	IEEE 802.11a: 12dBm ± 2dBm@54Mbps IEEE 802.11b: 18dBm ± 2dBm@11Mbps IEEE 802.11g: 15dBm ± 2dBm@54Mbps IEEE 802.11gn HT20: 14dBm ± 2dBm @MCS7 IEEE 802.11gn HT40: 14dBm ± 2dBm @MCS7 IEEE 802.11an HT20: 11dBm ± 2dBm @MCS7 IEEE 802.11an HT40: 10dBm ± 2dBm @MCS7	

	IEEE 802.11ac VHT80: 7dBm ± 2dBm @MCS9	
Receiver Sensitivity	IEEE 802.11a : -71dBm ± 2dBm@54Mbps IEEE 802.11b : -86dBm ± 2dBm@11Mbps IEEE 802.11g : -72dBm ± 2dBm@54Mbps IEEE 802.11gn HT20:-68dBm ± 2dBm@MCS7 IEEE 802.11gn HT40:-66dBm ± 2dBm@MCS7 IEEE 802.11an HT20:-68dBm ± 2dBm@MCS7 IEEE 802.11an HT40:-67dBm ± 2dBm@MCS7 IEEE 802.11ac VHT80:-57dBm ± 2dBm@MCS9	
Encryption Security	WEP: (64-bit ,128-bit key supported) WPA/WPA2 :802.11i(WEP and AES encryption) WPA-PSK (256-bit key pre-shared key supported) 802.1X Authentication supported TKIP encryption	
Wireless Security	SSID broadcast disable	
Protocol Support		
General Protocol	ARP, BOOTP, DHCP, DNS, HTTP, IP, ICMP, SNTP, TCP, UDP, RADIUS, SNMP, STP (IEEE 802.1D), RSTP	
LED Indicators		
PWR	1 x LED, Green for DC Power in	
POE	1 x LED, Green for POE Power in	
Ethernet Port Indicator	6 x LEDs, LNK: Green for port Link/AcT. SPD: Green On for 1000/100Base-T(X) link; Green Off for 10Base link	
WLAN(Wifi) LED	3 x LEDs, 1 x LED, Green On: RF on; Off: RF off 1 x LED, Green for WLAN work on 2.4GHz 1 x LED, Green for WLAN work on 5GHz	6 x LEDs, 2 x LED, Green On: RF on; Off: RF off 2 x LED, Green for WLAN work on 2.4GHz 2 x LED, Green for WLAN work on 5GHz
Status Indicator	1 x LED, Amber slow blink: booting, Green On:for normal	
Power		
Input Power	24 ~110v DC	
Isolation	DC 2KV/ AC 1.5KV	
Power Consumption (Typ.)	25 watts Max.	
Overload Current Protection	Present	
Reverse Polarity Protection	Present	
Physical Characteristic		
Enclosure	IP-30	
Dimension (W x D x H)	200(W) x 100.5(D) x 89(H) mm	
Weight (g)	<2Kg	
Environmental		
Storage Temperature	-40 to 85 °C (-40 to 185°F)	

Operating Temperature	-25 to 70°C (13 to 158°F)
Operating Humidity	5% to 95% Non-condensing
Regulatory Approvals	
EMI	FCC Part 15, CISPR (EN55022) class A, EN50155 (EN50121-3-2, EN55011, EN50121-4)
EMS	EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5 (Surge), EN61000-4-6 (CS), EN61000-4-8, EN61000-4-11
Shock	IEC60068-2-27, EN61373
Free Fall	IEC60068-2-31
Vibration	IEC60068-2-6, EN61373
Rail Traffic	EN50155
Cooling	EN60068-2-1
Dry Heat	EN60068-2-2
Safety	EN60950-1
Warranty	5 years