MRW55 / MRW55M

Carrier Grade DUAL BAND WLAN Outdoor Bridge

Overview

MRV's MRW55/MRW55M is an intelligent, fast, reliable, and cost effective outdoor wireless Access-Point/ Bridge. It provides connectivity for wireless clients to a LAN as well as connectivity between remote LANs, up to 28km.

The MRW55/MRW55M provides wireless point-to-point and point-to-multipoint bridging solutions that operate in the unlicensed bands, and provides an efficient and highly secure solution for building-to-building and outdoor connectivity. It provides cost effective alternatives to expensive leased lines enabling instant links to connect detached offices to headquarters, and isolated buildings on campuses and in industrial zones.

The MRW55/MRW55M is a Dual Band Outdoor system that provides access point and/or bridging services through either 5 GHz or 2.4 GHz radio interfaces. The MRW55/MRW55M units can be used just as normal access points connected to a local wired LAN, providing connectivity and roaming services for wireless clients in an outdoor area. Can also be used purely as bridges connecting remote LANs. Alternatively, you can employ both access point and bridging functions simultaneously, offering a flexible and convenient wireless solution for many applications.

ISPs can leverage the MRW55/MRW55M as a cost effective yet powerful wireless link to backhaul point-to-multipoint data into the Internet access network, without a need for leased lines over wire line infrastructure.

License-Exempt Wireless Accelerates Deployment and Lowers Costs

The MRW55/MRW55M Wireless Bridge operates in the 5GHz spectrum, which many countries are opening up for license-free transmission. It also operates in the 2.4GHz license-free band. License-exempt links allow for faster and more affordable deployment, since no frequency coordination and license fee are required.

Compliance with FCC, International, and ETSI Standards

The MRW55/MRW55M is FCC compliant. The frequency bands 5.725GHz - 5.850GHz and 5.15GHz - 5.36GHz are unlicensed bands in several countries, including the U.S., Canada, and parts of Latin America and Southeast Asia. The European market operates at frequency bands between 5.5GHz and 5.7GHz. The MRW55/MRW55M operates at this frequency band conforming to the ETSI standard.

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Product Highlights & Advantages

- Robust outdoor architecture ensures unprecedented range and reliability.
- Non compromising security using, selectable, AES or 64 / 128 / 152 bit WEP key encryption, and 801. x Authentification.
- Supports 802.1D Spanning Tree protocol.
- Supports packet filtering and VLANs
- MRW55 Units support a 5 GHz point-to-point wireless link up to 28 km (at 36 Mbps data rate) using integrated high-gain 17 dBi antennas.
- MRW55M units support 5 GHZ point-to-multipoint links using various external antenna options.
- Multi-Band, Dual Radio works as access point or bridge in the 2.4 - 2.5GHz bands.
- Works as Bridge and Access Point simultaneously
- Data rate up to 100Mbps on the 5GHz radio.
- Scans all available channels and selects the best channel and data rate based on the signal-to-noise ratio.
- Manageable through an easy-to-use web browser interface, command line (via Telnet) or SNMP network management tools.
- Firmware upgradeable by TFTP file transfer protocol through the Ethernet network.
- Dual firmware image allows firmware upgrade without interference with existing firmware.
- Supports TELNET console interface, password protected with Cisco like CLI.

The Dual-band Outdoor Access Point/Bridge system of two models provide point-to-point or point-to-multipoint bridge links between remote Ethernet LANs and wireless access point services for clients in the local LAN area:

- MRW55– Includes an integrated high-gain antenna for the 802.11a radio and is designed to operate as a "Slave" bridge in point-to-multipoint configurations, or provide a high-speed point-to-point wireless link between two sites that can be up to 28 km (17 miles) apart. The 802.11b/g radio requires an external antenna option.
- MRW55M – Provides only external antenna options and is designed to operate as the "Master" Bridge in point-to-multipoint configurations, supporting wireless bridge connections as many as 16 MRW55 Slave units.

Each model is housed in a waterproof enclosure for mounting outdoors and includes its own brackets for attaching to the wall, pole, radio mast, or tower structure. The unit is powered through its Ethernet cable connection from a power injector module that is installed indoors.

The wireless bridge system offers a fast, reliable, and cost-effective solution for connectivity between remote Ethernet wired LANs or to provide Internet access to an isolated site. The system is also easy to install and operate, ideal for situations where a wired link may be difficult or expensive to deploy. The wireless bridge connection provides data ranges of up to 100MBps.

In addition, both wireless bridge models offer full network management capabilities through an easy-to-use web interface, a command-line interface, and support for Simple Network Management Protocol (SNMP) tools.

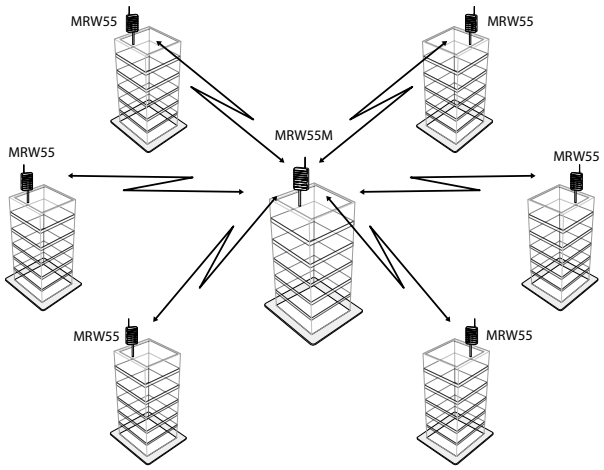
Ease of Use

Based on IEEE 802.11a technology, and utilizing the same industry-standard CLI as in "wired" networks. The MRW55/ MRW55M provides the user with the familiar "out of box" deployment. Convenient and easily accessible Received Signal Strength Indicator (RSSI) for alignment and diagnostics allows for easy installation process

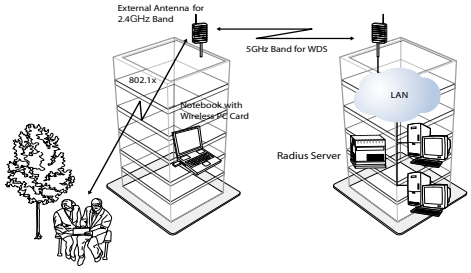
To simplify ordering and installation, the MRW55/MRW55M Wireless Bridge provides the professional or IT installer with all of the components and accessories necessary to complete most deployments, including:

- One Dual-band Outdoor Access Point / Bridge (MRW55 or MRW55M)
- One Category 5 network cable, length 100 ft (30 m)
- One power injector module and power cord
- One N-type RF coaxial cable (two for MRW55M)
- Outdoor pole-mounting bracket kit

For remote LAN connectivity, both Point-to-Point and Point-to-Multipoint configurations are supported allowing multiple buildings to be connected using the same wireless network.



The MRW55 / MRV55M includes two antennas and operates in two bands, 2.4Ghz and 5 Ghz, making it ideal for configurations that need simultaneous Access-Point and Wireless Bridge connectivity.

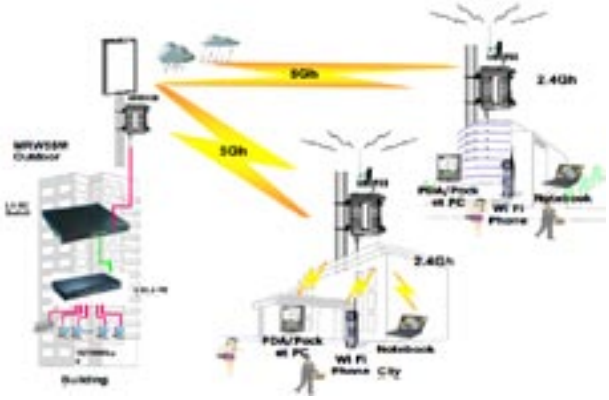


Data Rates:

Two IEEE standard interfaces are supported, 802.11a and 802.11b/g, each providing data rates up to 54 Mbps half-duplex. The 802.11a interface also supports Turbo Mode, which allows the data rate to be doubled to 100Mbps.

Seamless Mobility:

When multiple Access-Points are needed to cover a large area, the MRW55 / MRRW55M is the perfect solution. Seamless L2 roaming between Access-Points is achieved using IAPP (Inter-Access Point Protocol / IEEE 802.11f standard).



Power Injector Module:

The wireless bridge receives power through its network cable connection using power-injection-over-Ethernet technology eliminating the need for an outdoor power source. A power injector module which is located indoor and connects to an indoor AC power source provides two RJ-45 Ethernet ports, one for connecting to the wireless bridge (Output), and the other for connecting to a local LAN switch (Input).

Security:

To protect important company data from eavesdropping, extensive security features are supported to encrypt packets using 64, 128 and152-bit keys. WEP (Wired Equivalent Privacy) and WPA (Wi-Fi Protected Access), TKIP (Temporal Key Integrity Protocol) and AES (Advanced Encryption Standard) are all supported for enhanced, interoperable, forward-compatible WiFi security. AES is used by the US government for encrypting all sensitive, non-classified information and has been designated by the National Institute of Standards and Technology as the successor

to the Data Encryption Standard (DES) encryption algorithm.

802.1x (Port Based Network Access Control) in conjunction with a remote RADIUS server authenticates wireless clients in order to keep out unauthorized users. 802.1x port-based authentication supports Extensible Authentication Protocol (EAP), EAP-MD5, Protected EAP (PEAP) and EAP-Tunneled TLS (TTLS). For WLAN authentication, a mutual authentication between any two bridges is supported through EAP-MD5 protocol.

Other security features are also supported to enhance security, such as MAC-based authentication. MAC-based authentication enables the access point to authenticate each client by its wireless NIC card address. MAC authentication databases can be either stored locally or remotely using RADIUS.

Packet filtering and VLANs can be used to prevent client-to-client communication. AP filtering prevents management by wireless clients. For secure management from the wired network, SNMPv3 is available with a future firmware upgrade.

Dynamic 802.1x VLANs

To secure wireless clients from particular servers and from other wireless clients, VLANs can be used. On the MRW55 / MRW55M, VLANs are dynamically assigned using 802.1x/Radius authentication. Based on the client's login, the MRW55 Access Point places each client session into a specific VLAN. Up to 64 different VLANs are supported. By using a central Radius server for VLAN assignment, this greatly eases the deployment of multiple MRV55 / MRV55M Access Points. 802.1Q VLAN tags are used on the MRW55 / MRW55M's wired ethernet port which allows interoperability with any 802.1Q VLAN tagging switch.

Radio Interface:

The IEEE 802.11a and 802.11g interfaces include configuration options for radio signal characteristics and wireless security features. The configuration options are nearly identical, but depend on which interface is operating as the bridge band. The access point can operate in the following modes:

- 802.11a in bridge mode and 802.11g in access point mode
- 802.11a in access point mode and 802.11g in bridge mode
- 802.11a and 802.11g both in access point mode (no bridging)
- 802.11a only in bridge or access point mode
- 802.11g only in bridge or access point mode

Note that 802.11g is backward compatible with 802.11b and can be configured to support both client types or restricted to 802.11g clients only. Both wireless interfaces are configured independently:

- Radio Interface A: 802.11a
- Radio Interface G: 802.11b/g

Note: The radio channel settings for the wireless bridge are limited by local regulations, which determine the number of channels that are available.

Integrated High-Gain Antenna:

The MRW55 wireless bridge includes an integrated high-gain (17 dBi) flat-panel Antenna for 5 GHz operations. The antenna can provide a direct line-of-sight link up to 28 km (17 miles) with a 36 Mbps data rate.

External Antenna Options:

The MRW55M Master bridge unit does not include an integrated antenna, but provides various external antenna options for both 5 GHz and 2.4 GHz operation. In a point-to-multipoint configuration an external high-gain omni directional, sector, or high-gain panel antenna can be attached to communicate with bridges spread over a wide area. The MRW55 and MRW55M units both require the 2.4 GHz 8 dBi omni directional external antenna for 2.4 GHz operation. The following table summarizes the external antenna options:

Antenna Type	Gain (dBi)	HPBW* Horizontal	HPBW* Vertical	Polarization
5 GHz Omni Directional	8	360	12	Linear, vertical
5 GHz 120-Degree Sector	13.5	120	6	Linear, vertical
5 GHz 60-Degree Sector	16.5	60	6	Linear, vertical
5 GHz High-Gain Panel	23	9	9	Linear
2.4 GHz Omni Directional	8	360	15	Linear, vertical

* Half-power beam width in degrees

External antennas connect to the N-type RF connectors on the wireless bridge using the provided coaxial cables.

Operation Using 5 GHz Channels in the European Community

The user/installer must use the provided configuration utility to check the current channel of operation and make necessary configuration changes to ensure operation occurs in conformance with European National spectrum usage laws as described below and elsewhere in this document.

Allowed 5GHz Channels in Each European Community Country:

Allowed Frequency Bands	Allowed Channel Numbers	Countries
5.15 - 5.25 GHz*	36, 40, 44, 48	Austria, Belgium
5.15 - 5.35 GHz*	36, 40, 44, 48, 52, 56, 60, 64	France, Switzerland, Liechtenstein
5.15 - 5.35* & 5.470 - 5.725 GHz	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140	Denmark, Finland, Germany, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, U.K.
5 GHz Operation Not Allowed	None	Greece
* Outdoor operation is not allowed using 5.15 - 5.35 GHz bands (Channels 36 - 64).		

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Feature Summaries

L2 Features

- Supports 1 10/100BASE-T/TX compatible with IEEE802.3
- Provides PIOE (Power Injection Over Ethernet) power supply
- Supports half and full duplex mode 10/100M bps speed for Ethernet port
- Provides flow control mechanism: backpressure for half duplex;
- DHCP Client (for both AP and Bridge)

Wireless

- Interoperable with IEEE 802.11a, 802.11b/g compliant equipments (for bridge application may not need interoperability)
- Auto data rate switching with 6,9,12,18,24,36,48,54 and turbo mode for 11a allows auto fallback data rate for optimized reliability, throughput and transmission range. Auto data rate switching with 1, 2, 5.5, 6,9,11,12,18,24,36,48,54 for 11b/g; turbo mode for 11g is a future firmware upgradeable function.
- Fixed data rate is set through management interface 17dBi directional flat panel antenna that offers up to 28 kilometers of transmission range.
- Auto-Channel Selection
- Advanced Setting:
  - Transmitting power
    - Five Levels: Full, -3dB(50%), -6dB(25%), -9dB(12.5%), MIN.
  - Threshold
    - RTS/ CTS, Fragmentation
- WDS Bridge (AP to AP)
- Selectable WDS Bridge band
- Selectable long or short preamble
  - Selectable Beacon Interval
    - 10ms to 1000 ms, resolution 1ms
- Selectable DTIM Interval
- 802.1D transparent Bridging
  - Support Ethernet II, IEEE802.3, IEEE802.2

Security

- 802.1x Authentication Access Control with Key Rotation for wireless clients
  - Configuration
    - MAC address authentication (Enable/Disable)
    - Radius or Local authentication
  - MD5
  - EAP-TLS per user per session key
  - TTLS per user per session key
  - PEAP
- 802.1x mutual Authentication Access Control between two bridged Aps (Future firmware upgrade)
  - MD5
- WEP security - 64/128/152 bit
  - A different WEP key settable for each client
    - Statically Configurable (4 Set)
    - Assigned by Radius Server (for wireless client only)
- The wireless LAN client is disabled for any system setting of the wireless LAN access point
- Radius Client support
  - Radius MAC address authentication
  - Client re-authentication timer
    - Enable/Disable
    - Session-Time out can be user-configurable (per system) or Radius Server assign (per

client), if Radius Server is not available, session-time out is a user-configurable value

- ACL (Access Control List - Needs 32MB SDRAM upgrade)
  - Wireless clients (802.11a) to wired clients (802.3) protocol frame filtering
    - SA, DA, Ether Type
- WPA
  - TKIP and AES for wireless client packet encryption
  - Static AES for bridge packet transmission
- SSL (Needs 32MB SDRAM upgrade)
- SSH (Needs 32MB SDRAM upgrade)

Management

- SNMP Management- Management via SNMP v1 (v3 needs 32MB SDRAM upgrade)
- Supports Web-based management.
  - Netscape v6.0 or higher and Internet Explorer v5.0 or higher
  - 3 Web Sessions
  - Optional session timeout after a user settable time out period
  - A password is required to reconnect the management session
- Supports TELNET console interface
  - Four sessions, password protected
  - Cisco like CLI
  - VT 100 Terminal
- Supports DHCP client for IP address assignment.
- Firmware upgraded by FTP, TFTP or WEB through the Ethernet network.
- Dual firmware images- the redundant image allows recovery if there was an error during the Firmware upgrade process. The current image is retained until the new image has been completely downloaded, verified and written into flash memory
- Configuration file upload/download
- System Watchdog
- The MRW55 is compatible with Syslog
- For Syslog, the following information shall be collectable: Wireless LAN access point status, Success/failure in authentication for each wireless LAN client
- Event Log
- Supports 802.1D Spanning Tree Protocol

MIB Support

MRW55/MRW55M Supports MIBs

- FFC1213 MIB-2
  - System group
  - Interfaces group
  - Ip goup
  - Icmp group
  - Tcp group
  - Udp group
  - Snmp group
- RFC 1493 Bridge MIB (future firmware upgrade)
  - Dot1dbase group
  - Dot1dStp group
  - Dot1dTp group
  - Dot1d Static group
- RFC2618 RADIUS MIB (future firmware upgrade)
  - RadiusAuthClientMIB group

- IEEE 802.11 MIB
- MRV Private MIB

SPECIFICATIONS AND STANDARDS

Reliability

- MTBF: 43800 hours

Mechanical

- The MRW55 has the following size:
  - 198mm x 198mm x 63.3mm

Electrical

Power Requirements

- Nominal Input Voltages: 48V
- Nominal AC input to POE: 100~240 Vac, 50~60Hz

Heat & Power Dissipation

- Power: 30W max

Safety

The MRW55 is certified with:

- CSA/NRTL (UL1950, CSA 22.2.950)
- TUV/GS (EN60950)

Electromagnetic Compatibility

The MRW55 is certified with the following standards:

- CE mark
  - EN55022 (1997) Class A.
  - EN55024 (1998)
  - EN61000-4-2/3/4/5/6/11
  - EN61000-2-2 Class A.
  - EN61000-2-3
- FCC Class A
- VCCI Class A
- CISPR Class A

Environmental

The MRW55 complies with the following standards:

• Operating Temperature:	ETS 300 019-2-4 Class 4.1E modified -33°C to 55°. Vibration class 4M3
• Transportation Environment:	ETS 300 019-2-2 Class 2.3 Public Transportation
• Storage Environment Shock:	IEC 68-2-29
• Drop:	IEC 68-2-32
• Wind (Operational):	90 MPH
• Wind (Survival):	125 MPH
• Lightning:	The unit withstands a +4KV of Input, surge, 1.2usec rise/fall time, 50 µsec duration every 10 seconds, for both RF and IF

Wireless Specification

802.11A WIRELESS RADIO

• Radio:	Complies with IEEE 802.11a

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• Frequency Band:	5.15 ~ 5.25GHz (lower band) for US/Canada, Japan. 5.25 ~ 5.35GHz (middle band) for US/Canada 5.725~ 5.825GHz (upper band) for US/Canada 5.50~ 5.70GHz for Europe
• Modulation Type:	BPSK, QPSK, 16-QAM, 64-QAM
• Operating Channels:	IEEE 802.11a compliant 12 channels in base mode (US, Canada) 5 channels in turbo mode (US, Canada) 4 channels (Japan) 11 channels in base mode (Europe) 4 channels in turbo mode (Europe)
• Radio Technology:	OFDM
• Date Rate:	6/9/12/18/24/36/48/54 Mbps Up to 108Mbps (turbo mode)
• Media Access Protocol:	CSMA/CA with ACK
• Antenna type:	Fixed Antenna
• Antenna gain:	17 dBi
• Radio On/OFF:	Radio on/off control by utility

802.11B/G WIRELESS RADIO

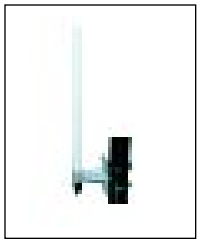
• Radio:	Complies with IEEE 802.11b/g 2400 ~ 2483.5 MHz (for US, Canada, and ETSI) 2400 ~ 2497MHz (for Japan)
• Modulation Type:	CCK, BPSK, QPSK, OFDM
• Operating Channels:	11 channels in base mode (US, Canada) 13 channels (ETSI) 14 channels (Japan)
• Radio Technology:	Direct Sequence Spread Spectrum (DSSS)
• Date Rate:	1/2/5.5/11 (11b) Mbps 6/9/12/18/24/36/48/54 Mbps (11g)
• Media Access Protocol:	CSMA/CA with ACK
• Antenna type:	Detachable Antenna
• Radio On/Off:	Radio on/off control by utility

EXTERNAL ANTENNA SPECIFICATION

Provided the flexible high gain external antenna deployment for outdoor wireless bridge/AP. The outdoor wireless bridge/AP provides many kinds of 2.4Ghz & 5.8Ghz external antenna for user selection.

5.8Ghz External Antenna

5.8Ghz Omni-Directional Antenna – 8dBi



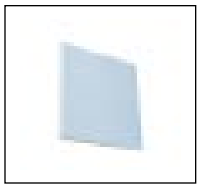
Omni-Directional Antenna for 5.8 GHz
MRW55/MRW55M
Electrical Specification
Frequency range 5725MHz - 5875 MHz
Gain 8dBi
VSWR 2.0 20: 1 Max.
Polarization Linear, vertical
HPBW / horizontal 360º
HPBW / vertical 12º
Downtilt 0º
Power handling 5 W (cw)
Impedance 50 Ohms
Connector N- female

Environmental & Mechanical Characteristics

Survival wind speed 216 km/hr
Temperature -40º to +80ºC
Humidity 95% @ 25ºC
Lightning protection DC ground
Radome color Gray-white
Radome material Fiber glass
Weight 245 gw
Dimension 78 x 80 x 373 mm

5.8Ghz Directional Panel Antenna –23dBi

High Gain Directional Panel Antenna for 5.8GHz
MRW55/MRW55M Electrical Specification



Frequency range 5725 MHz - 5875 MHz
Gain 23 dBi
VSWR 1.5 1.5: 1 Max.
Polarization Linear vertical / horizontal
HPBW / horizontal 9º
HPBW / vertical 9º
Front to back ratio 40 dB
Cross Polarization 25 dB
Power handling 20 W (cw)
Impedance 50 ohms

Electrical Specification

Frequency range 5725 MHz - 5875 MHz
Gain 23 dBi
VSWR 1.5 1.5: 1 Max.
Polarization Linear vertical / horizontal
HPBW / horizontal 9º

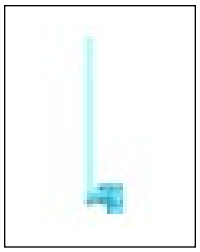
HPBW / vertical 9º
Front to back ratio 40 dB
Cross Polarization 25 dB
Power handling 20 W (cw)
Impedance 50 ohms

MRW55/MRW55M
Connector N type female

Environmental & Mechanical Characteristics
Survival wind speed 216 km/hr
Temperature -40º to +80ºC
Humidity 95% @ 25ºC
Lightning protection DC ground
Radome color White
Radome material ABS, UV resistant
Back plate material Powder-coating iron
Weight 1.6 kgw
Dimensions 360 x 360 x 16 mm

2.4Ghz External Antenna
2.4Ghz Omni Directional Antenna – 8dBi

Omni-Directional Antenna for 2.4 GHz
R0205-135
Electrical Specification
Fequency range 2400MHz - 2500MHz
Gain 8dBi
VSWR 2.0 20 : 1 Max.
Polarization Linear, vertical
HPBW / horizontal 360º
HPBW / vertical 15º
Downtilt 0º
Power handling 50 W (cw)
Impedance 50 Ohms
Connector N- female



Environmental & Mechanical Characteristics
Survival wind speed 216 km/hr
Temperature -40º to +80ºC
Humidity 95% @ 25ºC
Lightning protection DC ground
Radome color Gray-white
Radome material Fiber glass
Weight 337 gw
Dimension 520x 019 mm

MRV has more than 50 offices throughout the world. Addresses, phone numbers and fax numbers are listed at **www.mrv.com**.
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