Smart Wireless Gateway 1552WU

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- Gateway connects wireless self-organizing networks with any host system with integrated Wi-Fi® backhaul
- Easy configuration and management of *Wireless*HART® self-organizing networks
- Easy integration into control systems and data applications through Wireless LAN connections
- Seamless integration into AMS™ Device Manager and DeltaV™ distributed control system
- Greater than 99% reliability of field wireless data integrity with industry proven security
- Smart Wireless capabilities extends the full benefit of PlantWeb™ architecture to previously inaccessible locations
- Secure field wireless communications built into *Wireless*HART
- Secure Wi-Fi communications provided by Cisco's defense-in-depth wireless intrusion prevention solution

Introduction

The Smart Wireless Gateway 1552WU combines *Wireless*HART (IEC62591) and Wi-Fi (IEEE802.11 a/b/g/n) in a single device. WirelessHART is the global standard that enables wireless sensors to securely communicate measurements through a mesh network to the Gateway. Wi-Fi is the global standard that connects wireless devices such as tablets, laptops, cameras and RFID tags. The Smart Wireless Gateway 1552WU makes possible a full-featured wireless solution comprising plant and field networks into a seamless architecture enabling pervasive sensing along with Wi-Fi solutions in a more straightforward and economical manner.

Benefits

Scalable. Emerson can provide a wireless network solution that exactly meets your needs today, while providing flexibility for future wireless mesh infrastructure growth as your needs expand. Emerson's Smart Wireless Plant Solutions can also scale to the types of applications you utilize in your wireless plant. For example, each Smart Wireless Gateway 1552WU is also a Wi-Fi Mesh Access Point that can be used as a "hot spot" for your mobile workers to access live plant data, to wirelessly stream video data, or track personnel with Wi-Fi RFID tags.

Reduced Cost. When compared to the cost of engineering and trenching a fiber optic cable to each of the *Wireless*HART gateways, a wireless backhaul solution can be deployed for less cost when the gateway is separated from the control room by large distances, difficult terrain, or bodies of water.

Safer Deployment. Trenching a fiber optic cable in a live process area puts workers in the process area for long periods of time – exposing them to potential hazards and risking disruptions to process operations.

Secure and Reliable Communications. All communications on the wireless plant network are fully secure using AES 128-bit encryption. The integrity of the wireless communication network is continuously monitored and alerts can be sent to administrators if degradation of the wireless signal is detected. Full Wi-Fi defense in depth solutions are available including wireless intrusion prevention. The *Wireless*HART gateway is Achilles Level 1 certified.

Full Support Service. Emerson Sure Service provides full 24/7 support for customers who have purchased and deployed a wireless backhaul solution from Emerson.

A Smart Wireless solution consists of the measurement devices, the self-organizing network, and easy integration with the host system. Emerson Process Management offers a full portfolio of wireless solutions enabled by self-organizing WirelessHART networks. The 1552WU is capable of communicating via Modbus TCP/IP, Ethernet/IP, OPC and it also includes native integration with the DeltaV and Ovation™ distributed control systems which are chosen during the solution scope phase to address all various available integration methods.

Wireless Field Network Solution

Self-organizing, adaptive mesh routing

- No wireless expertise required, network automatically finds the best communications paths
- The self-organizing, self-healing network manages multiple communication paths for any given device. If an obstruction is introduced into the network, data will continued to flow because the device already has other established paths. The network will then lay in more communication paths as needed for that device.

Reliable wireless architecture

- Standard IEEE 802.15.4 radios
- 2.4GHz ISM band sliced into 15 radio channels
- Time Synchronized Channel Hopping to avoid interference from other radios, Wi-Fi, and EMC sources and increase reliability
- Direct Sequence Spread Spectrum (DSSS) technology delivers high reliability in challenging radio environments

Seamless integration via LAN to all existing host systems

- Native integration into the DeltaV and Ovation distributed control systems is transparent and seamless
- Gateways interface with existing host systems via LAN, using industry standard protocols including OPC, Modbus TCP/IP, and Ethernet/IP

Layered security keeps your network safe

- Ensures that data transmissions are received only by the Smart Wireless Gateway

- Network devices implement industry standard encryption, authentication, verification, anti-jamming, and key management
- Third party security verification including Achilles and FIPS197- User based login and enforced password strength. Password strength monitoring, user based log in, password reset requirements, automatic lockout, password expiration requirements. Based on guidelines from ISA99.03.03 standard approved level two.

Wireless Plant Network Solution

Scalable

Emerson can provide a wireless network solution that exactly meets your needs today, while providing flexibility for future wireless mesh infrastructure growth as your needs expand. Emerson's Smart Wireless Plant Solutions can also scale to the types of applications you utilize in your wireless plant. For example, each Wi-Fi mesh node installed to backhaul *Wireless*HART data can also be used as a "hot spot" for your mobile workers to access live plant data, to wirelessly stream video data, or track personnel with Wi-Fi RFID tags.

Reduced Cost

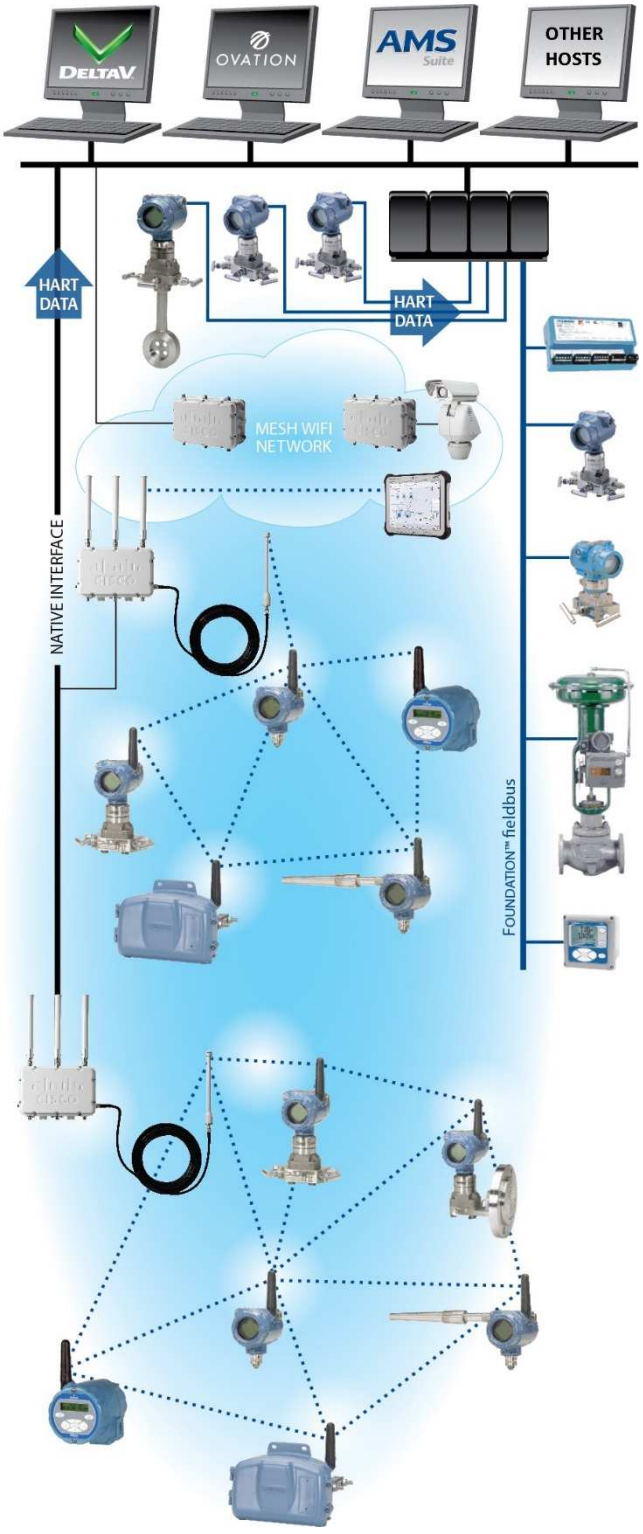
When compared to the cost of engineering and trenching or pulling a fiber optic cable to each of the *Wireless*HART gateways, a fully integrated wireless backhaul solution can be deployed for less cost when the field network is separated from the control room by large distances, difficult terrain, or bodies of water.

Safer deployment

Trenching or pulling a fiber optic cable in a live process area puts workers in the process area for long periods of time – exposing them to potential hazards and risking disruptions to process operations.

Secure and reliable communications

All communications on the wireless plant network are fully secure using AES 128-bit encryption. The integrity of the wireless communication network is continuously monitored and alerts can be sent to administrators if degradation of the wireless signal is detected. Wi-Fi defense-in-depth provided by Cisco's wireless Intrusion Prevention solution secures the Wi-Fi network from hackers, eavesdroppers, and ensures only authorized personnel have access to the resources they need.



System Architecture with the 1552WU Gateway

Wireless engineering services

Wireless engineering services are critical to the success of a wireless plant network deployment. Emerson offers a comprehensive services portfolio to help you design and deploy Wireless solution.

Wireless FEED study (RF site assessment)

A Radio Frequency (RF) site assessment is not needed for the *Wireless*HART field instrumentation network, but a wireless Front End Engineering and Design (FEED) study will be required for the Wi-Fi network communications equipment being installed to provide good Wi-Fi coverage for the desired plant area. For the Wi-Fi wireless FEED, Emerson engineers visit your plant site to conduct an RF study, determine access point locations and collect other on-site information.

Network design and planning

Based on the Wi-Fi FEED results and your control system requirements, Emerson engineers design the overall wireless mesh architecture including the detailed network infrastructure, network monitoring tools, and integrated security.

Physical network installation management

Engineers work with you to install the wireless mesh network equipment based on the detailed network design.

System commissioning

The wireless mesh network is brought online and commissioned onsite. Complete site acceptance testing is performed with your engineers.

Training

Emerson will work with you and deliver to you a training curriculum that meets your specific needs.

Support

Emerson delivers SureService® wireless life-cycle services through our engineering centers and global service organizations. Emerson's wireless life cycle services are designed to help you maintain system uptime, apply wireless technology for better business results and preserve your intellectual and capital investment.

1552WU Specifications

Functional Specifications

Input Power

- 24VDC 3.5 Amp nominal (19 - 30 VDC), 39 watts
- 12VDC nominal (11.4 - 15V DC) non-hazardous installations only
- **No AC or POE input power options**

Environmental

Operating temperature: -40 to 55°C (-40 to 131°F) plus Solar Loading
Storage temperature: -50 to 85°C (-58 to 185°F)
Humidity: 0-100% (condensing)
Wind resistance:

- Up to 100 MPH sustained winds
- Up to 165 MPH wind gusts

Environmental ratings

- IP67
- NEMA Type 4

Compliance

Safety

- UL 60950-1, 2nd Edition
- CAN/CSA-C22.2 No. 60950-1, 2nd Edition
- IEC 60950-1, 2nd Edition
- EN 60950-1, 2nd Edition
- ANSI/ASA 12.12.01
- CSA C22.2 No 213
- IEC/EN 60079-0
- IEC/EN 60079-15
- CSA: Class I, Division 2, Groups A, B, C and D
- ATEX: Class I, Zone 2; Ex nA II, T5

Immunity

- <= 5 mJ for 6kV/3kA @ 8/20 ms waveform
- ANSI/IEEE C62.41
- EN61000-4-5 Level 4 AC Surge Immunity
- EN61000-4-4 Level 4 Electrical Fast Transient Burst Immunity
- EN61000-4-3 Level 4 EMC Field Immunity
- EN61000-4-2 Level 4 ESD Immunity
- EN60950 Overvoltage Category IV

Radio approvals

- FCC Part 15.247, 15.407
- FCC Bulletin OET-65C
- RSS-210
- RSS-102
- AS/NZS 4268.2003
- EN 300 328
- EN 301 893

EMI and susceptibility

- FCC part 15.107, 15.109
- ICES-003
- EN 301 489-1, -17

Communication Specifications

Wiring: Cat5E shielded cable. Wiring distance 328 ft. (100 m).

Ethernet
10/100/1000BASE-T Ethernet, autosensing (RJ-45)

Maximum transmit power for Wi-Fi
2.4 GHz
- 802.11b (Complementary Code Keying [CCK])
  - 28 dBm with 2 antennas
- 802.11g (non HT duplicate mode)
  - 28 dBm with 2 antennas
- 802.11n (HT20)
  - 28 dBm with 2 antennas
- 802.15.4
  - 18 dBm with 1 antenna

5 GHz
- 802.11a
  - 28 dBm with 2 antennas
- 802.11n non-HT duplicate (802.11a duplicate) mode
  - 28 dBm with 2 antennas
- 802.11n (HT20)
  - 27 dBm with 2 antennas
- 802.11n (HT40)
  - 27 dBm with 2 antennas

Maximum transmit Power from *Wireless*HART
Maximum of 10 mW (10 dBm) EIRP

EMC Performance
Complies with EN61326-2-3:2013.

*1552WU with Wi-Fi omni antennas and remote mounted Wireless*HART *omni antenna*

Wi-Fi Antenna Options
The 1552WU has six external Type N connectors for Wi-Fi antennas: Three for 2.4 GHz and three for 5 GHz. These IP66 rated antennas may be connected directly, or via an appropriate cable. The following Cisco antennas are supported for hazardous installations:
- AIR-ANT2480V-N (2.4 GHz, 8 dBi, omni, 19.5" long)
- AIR-ANT5180V-N (5 GHz, 8 dBi, omni, 11" long)
- AIR-ANT5114P2M-N= (5 GHz, 14 dBi, dual polarized patch)

*1552WU with 5 GHz Wi-Fi patch antenna and remote mounted Wireless*HART *omni antenna*

802.11n Capabilities
2 x 3 multiple-input multiple-output (MIMO) with two spatial streams
Legacy beamforming
20- and 40-MHz channels
PHY data rates up to 300 Mbps
Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx)
802.11 dynamic frequency selection (DFS)
Cyclic shift diversity (CSD) support

*Wireless*HART Antenna
Remote mount Omnidirectional Antenna (2.4GHz, 6 dBi) connected with a 50’ low loss cable and lightning arrestor.

Physical Specifications

Dimensions (W x L x H)
12.0 in. x 7.8 in. x 6.4 in. (30.48 cm x 19.81 cm x 16.26 cm) (including antenna mount)

Weight
1552WU: 17.6 lb (8 kg)
Pole mounting bracket: 6.1 lb (2.8 kg)

Material of Construction
Housing: Aluminum, NEMA 4
Paint: Powder coat paint over Alodine finish plating
Cover Gasket: Silicone tube
Remote Antenna: Fiber Glass
For mounting information, see the Cisco Aironet 1552 Series for Hazardous Locations Installation Guide.

Certifications
- CSA: Class I, Division 2, Groups A, B, C and D
- ATEX: Class I, Zone 2; Ex nA II, T5

Self-Organizing Field Network Specifications

Sensor Protocol
IEC 62591 (*Wireless*HART), 2.4 - 2.4835 GHz DSSS.

Maximum Sensor Network Size with specified sensor update rates
100 wireless devices @ 8 sec or higher.
50 wireless devices @ 4 sec.
25 wireless devices @ 2 sec.
12 wireless devices @ 1 sec.

Supported Device Update Rates
1, 2, 4, 8, 16, 32 seconds or 1 - 60 minutes

Sensor Network Size/Latency
100 Devices: less than 10 sec.
50 Devices: less than 5 sec.

***Wireless*HART Data Reliability**
>99%

*Wireless*HART Gateway Protocols:

Modbus
Supports Modbus RTU and Modbus TCP with 32-bit floating point values, integers, and scaled integers. Modbus Registers are user-specified.

OPC
OPC server supports OPC DA v2, v3

EtherNet/IP
Supports EtherNet/IP protocol with 32 bit Floating Point values and Integers.
EtherNet/IP Assembly Input-Output instances are user configurable.
EtherNet/IP specifications are managed and distributed by ODVA.

Wi-Fi Security

Security
- Wireless bridging/mesh
  - X.509 digital certificates
  - MAC address authentication
  - Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TLIP)

- Wireless client access
  - 802.11i, Wi-Fi Protected Access (WPA2), WPA
  - 802.1X authentication, including Extensible Authentication Protocol and Protected EAP (EAP-PEAP), EAP Transport Lauer Security (EAP-TLS), EAP-Tunneled TLS (EAP-TTLS), and Cisco LEAP
  - Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TLIP)
  - VPN pass-through
  - IP Security (IPsec), Layer 2 Tunneling Protocol (L2TP)
  - MAC address filtering

*Wireless*HART Gateway System Security Specifications

Ethernet
Secure Sockets Layer (SSL) - enabled (default) TCP/IP communications

Smart Wireless Gateway Access
Role-based Access Control (RBAC) including Administrator, Maintenance, Operator, and Executive. Administrator has complete control of the gateway and connections to host systems and the self-organizing network.

Self-Organizing Network
AES-128 Encrypted *Wireless*HART, including individual session keys. Drag and Drop device provisioning, including unique join keys and white listing.

Internal Firewall
User Configurable TCP ports for communications protocols, including Enable/Disable and user specified port numbers. Inspects both incoming and outgoing packets.

Third Party Certification
Wurldtech: Achilles Level 1 certified for network resiliency for communication to the *Wireless*HART Gateway.

National Institute of Standards and Technology (NIST): Advanced Encryption Standard (AES) Algorithm conforming to Federal Information Processing Standard Publication 197 (FIPS-197)

1552WU Product Certifications

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson and Cisco are working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions. This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification for CSA

As standard, the 1552WU has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by CSA, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North American Certifications

CSA Division 2, Non-Incendive
Certificate Number: 1945576
Suitable for Class I Division 2, Groups A, B, C, and D
Ambient Temperature: T5 (-40 °C to +55 °C)
CSA Enclosure Type 4

European Union Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Emerson website at www.emerson.com. A hard copy may be obtained by contacting your local sales representative.

European Certification

ATEX Type n
Certificate Number: Sira 11ATEX4253
ATEX Marking:  II 3 G
Ex nA II T5 Gc (Ta = -40°C to +55°C)

Special condition for safe use (X):

The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

Ordering Information

For inquiries and ordering information, please contact your local Emerson sales office. Prior to order acceptance, Emerson will issue a written proposal for your review and approval to ensure that scope, deliverables, timing, and budget meet your needs and expectations.

Professional services from Emerson or its Local Business Partner are required to scope, design and commission the solution.

For more information, please visit our website at http://www.EmersonProcess.com/SmartWireless

To locate a sales office near you, visit our website at:
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