GE
Digital Energy

MDS™ WiYZ

Intelligent Data Acquisition

Data Acquisition | MDS Mesh, WiFi, Cellular

GE's MDS WiYZ is an intelligent data acquisition and networking platform combining wireless connectivity for sensors, I/O, instruments and meters with comprehensive network infrastructure solutions for IP/Ethernet and serial, machine-to-machine and backhaul communication to host systems and devices. Whether your application requires the collection of data from remote, unpowered sensors or deployment in areas with obstructed communication paths or a bridge for data using the cellular infrastructure to your enterprise network, MDS WiYZ products provide versatile, reliable and cost-effective solutions.

Key Benefits

- Cost effective wireless communication for sensors, instruments and I/O monitoring remote assets
- Improved communication reliability and simplified deployment using standards based, self creating, self healing mesh networking
- Reduce wiring, power and integration costs using battery powered, field hardened components
- Automate data collection using any combination of Cellular, WiFi and MDS backhaul options for seamless IP/Ethernet and serial communication to remote devices
- Global unlicensed use in 2.4 GHz spectrum plus GSM and CDMA cellular technology

Application Specific Wireless Solution

Oil & Gas

- Monitor gas well head tubing and casing pressure
- Collect compressor inlet and discharge pressure values

Heavy Industrial

- Track remote liquid storage inventories and monitor remote assets
- Monitor holding pond levels and discharge flow for regulatory reporting

Water & Wastewater

- Battery powered remotes monitor storage tank levels
- Collect pollution discharge flow rates for regulatory compliance

Energy

- Monitor pole top circuit breakers and report status
- Collect inventory data from gas storage facilities

imagination at work

Versatile

- Battery or line powered Remotes
- Single, sensor or multiple analog & digital I/O
- I/O Extension to regenerate remote signals
- Poll data using Modbus
- Collect, time-stamp and store data
- FTP for transfer data files
- Configurable data sampling & transmission rates
- Bridge communication to RTUs, Meters and Controllers
- Bridge between wired & multiple WiFi, MDS and cellular wireless options

Reliable

- Rugged NEMA 4X, IP 65 housings
- -40 to 70° C temperature ranges
- Class 1, Division 2 and ATEX Zone II environments
- Self-healing mesh networking

Cost Effective

- Battery powered Remotes reduce cost
- Ultra-low power operation reduces solar power infrastructure cost
- Outdoor, hardened components eliminate extra enclosure, accessory and integration costs
- Self-creating mesh networking reduces path analysis and deployment costs
- Multiple sensor and I/O capacity

Secure

- 128-bit encryption and authentication
- Password protected access and lockdown
- Frequency hopping 2.4 GHz mesh network

Versatile Data Acquisition

Process optimization, quality control, regulatory compliance, improved productivity, preventive maintenance, safety and security are just a few of the requirements that drive the need for data acquisition and monitoring solutions.

Delivering remotely collected data cost effectively to local devices and systems or to Enterprise networks on a regional, national, even international scale requires new solutions that bridge multiple communication methods and technologies. MDS WiYZ products deliver these solutions for both data acquisition and networking.

The MDS WiYZ platform contains two components. Field hardened WiYZ Remotes that implement standards-based mesh communication and optionally operate on battery power connect sensors, transducers and I/O. Outdoor WiYZ Gateways that provide Cellular, WiFi and MDS private wireless options for connectivity to remote host systems and devices plus wired IP/Ethernet and serial connections for local RTUs controllers and systems.

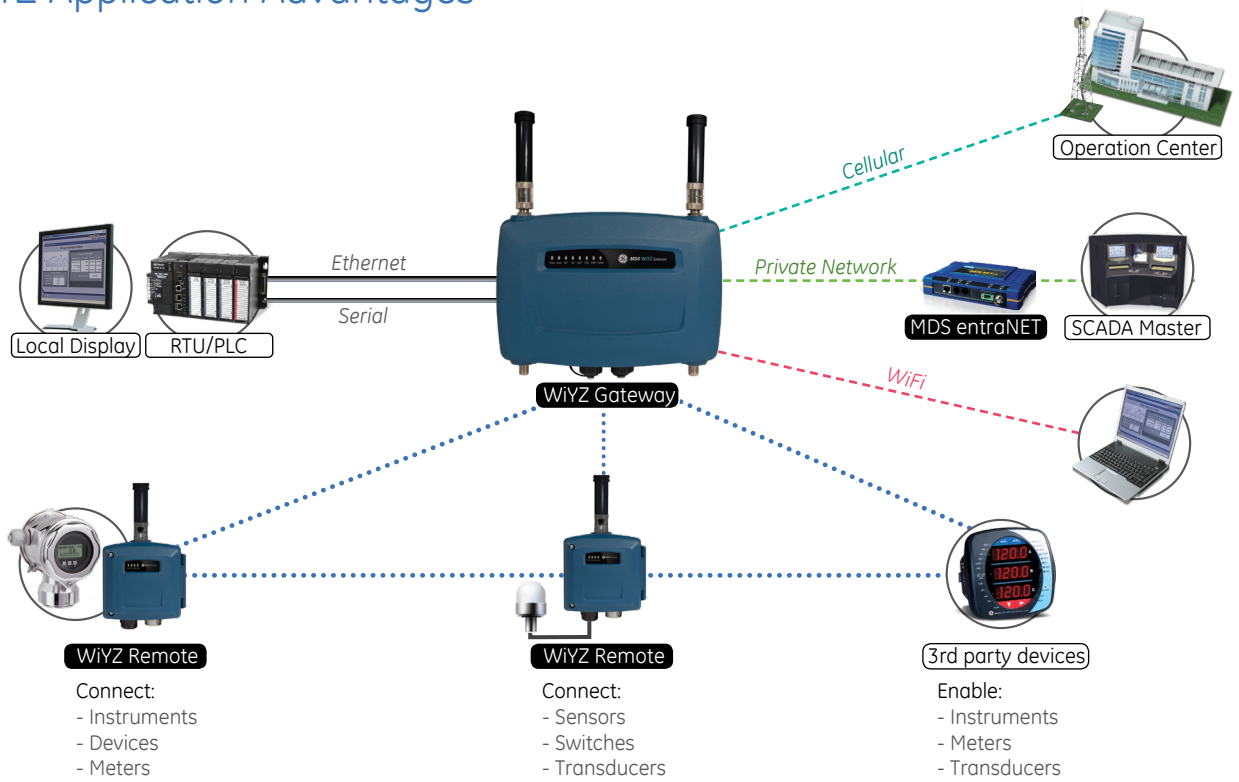
Connect Sensors and I/O - Battery or Line Powered

WiYZ Remotes provide true connection flexibility supporting the direct connection of a single sensor, or multiple I/O signals from external devices. WiYZ's battery power option allows you to install it even when local power is unavailable and lasts up to 5 years depending upon the number and type of devices connected as well as the required sampling rate. WiYZ constantly monitors and reports battery power levels so depletion is predictable.

Enterprise, System and Device Connectivity

The WiYZ Gateway provides unparalleled performance and versatility. Interface to local controllers, systems or networks using IP/Ethernet or serial connections. Select additional options for wireless connectivity to far-away Enterprise networks using CDMA or GSM cellular networks, local plant infrastructure using WiFi and long range MDS wireless for private SCADA networks. Use Modbus to interface with sensor and I/O data collected from WiYZ Remotes or move time stamped data files to Operations centers via FTP.

WiYZ Application Advantages



Connect:
- Instruments
- Devices
- Meters

Connect:
- Sensors
- Switches
- Transducers

Enable:
- Instruments
- Meters
- Transducers

Sensors and I/O Signals

- Use WiYZ Remotes with level, pressure, flow and temperature sensors to remotely monitor important parameters
- Connect digital signals for status monitoring and control
- Regenerate signals from sensors and I/O to RTUs and controllers

System Communication

- Interface data to host systems using Modbus
- Transfer data files to Enterprise systems using FTP or SFTP
- Bridge IP/Ethernet and serial communication to remote controllers and multi-variable transmitters

Gateway Connectivity

- Enterprise connectivity using public cellular communication
- Connect multiple WiYZ networks to SCADA systems using MDS point-to-multipoint wireless
- Connect to your plant's WiFi infrastructure

MDS WiYZ Remote

MDS WiYZ Remotes are packed with features and functionality to match up with a diverse range of remote monitoring and control requirements. Each Remote accommodates 2 Analog Inputs, 2 Analog Outputs, 2 Digital Inputs and 2 Digital Outputs. One RS232 port is used for configuration. A second RS232/RS485 port is available for connection to an external device.

- Configurable sample periods allow remotes to periodically sample sensor and I/O data, and transmit back to the gateway at specified intervals, conserving battery power and reducing network traffic.
- Condition-based data transmission allows remote to transmit data only when there is a change of state for a Digital Input
- I/O extension can be implemented to regenerate sensor and I/O signals between devices

The WiYZ Remote is housed in a NEMA 4X. IP 65 enclosure for harsh outdoor environments and includes convenient mechanical and electrical connection options. The WiYZ Remote also includes an omnidirectional antenna plus options for a remote mounted antenna. Surface mount, pole mount and conduit mount options simplify installation. The WiYZ Remote is optionally Class 1 Division 2 and ATEX Zone II approved for use in hazardous locations.

No power? No problem. The WiYZ Remote can be battery powered so users can implement monitoring solutions at important locations that have been impractical before. The ultra low power WiYZ Remote drives lower cost options for solar power equipment when the application exceeds the capacity of the internal battery pack. The battery pack can still be used as emergency backup for both solar and line powered applications.

MDS WiYZ Gateway

The WiYZ Gateway is a powerful and flexible device facilitating wired and wireless connectivity to host systems and Enterprise networks. The WiYZ Gateway supports up to 4 wireless connectivity options for bridging communication between Mesh, Cellular, WiFi and MDS wireless.

The WiYZ Gateway establishes and maintains the ISA100 mesh network. It also collects data from WiYZ Remotes. Data can be locally stored on the gateway in between transmissions to Enterprise networks resulting in significant savings in cellular communication costs. Alternatively, the gateway supports Modbus for direct polling of sensor and I/O data in real time.

The WiYZ Gateway operates as a multi-device hub and bridges IP/Ethernet and serial communication (either wired or wireless) anywhere, between remotes, controllers and PLCs and host systems.

- Configurable data transmission periods
- Storage of time stamped data in between data transmissions
- Security implementation including encryption and password access

The WiYZ Gateway manages the ISA100 mesh network and implements the local user interface. It has a capacity for up to 50 WiYZ remotes. It also implements the cyber security layer for the entire network.

The WiYZ Gateway is housed in a NEMA 4X, IP65 enclosure for installation in harsh outdoor environments and general safety or either Class I Division 2 or ATEX Zone II approval for hazardous locations.

Industrially Hardened

Class 1 Div. 2 for hazardous locations

Nema 4X, IP 65 housings

−40°C to 70°C

Data Acquisition

MDS Mesh

Wi Fi

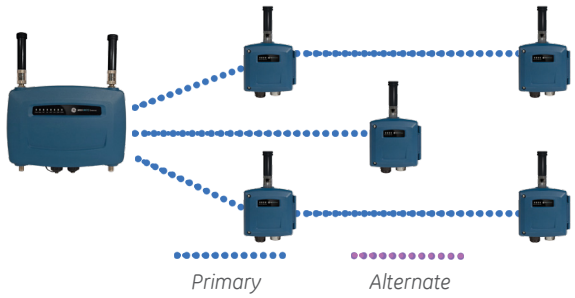
Cellular

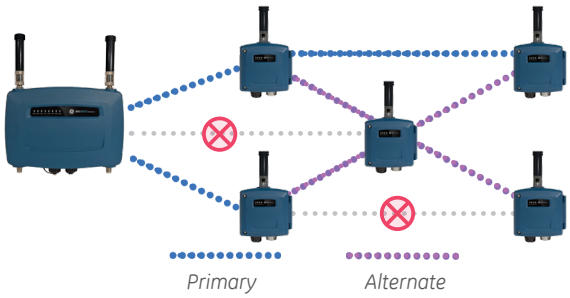
MDS Mesh Networking

The MDS WiYZ implements the ISA100.11a standard for mesh network communication between Remotes and the Gateway. ISA100.11a is an open mesh network standard developed by the International Society of Automation (ISA).

Mesh networks provide significant benefits in network design, deployment and reliability versus traditional point to multipoint networks. In conventional multipoint networks each remote device must establish a direct, unobstructed wireless path to the network's Access Point or Master. This requires careful upfront planning, path analysis and design.

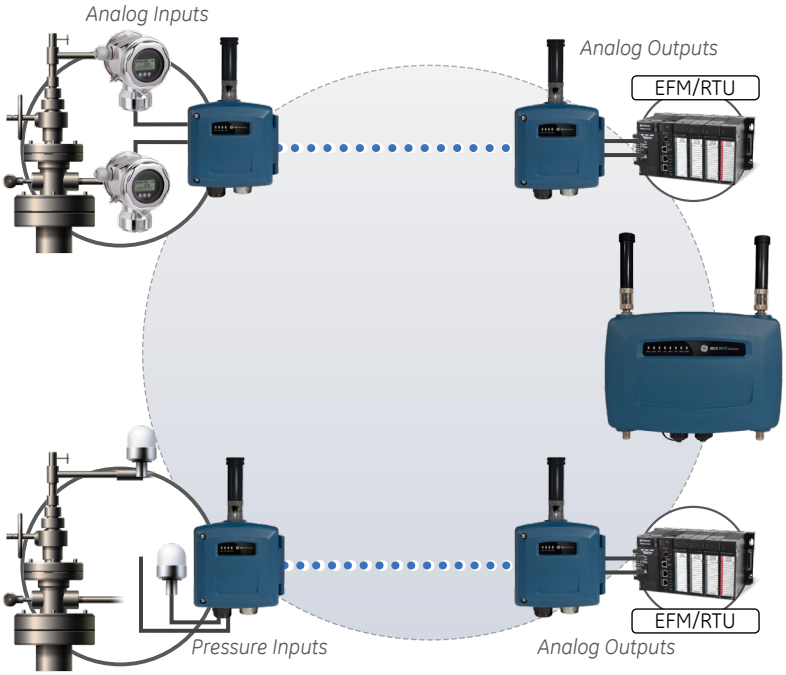
In the MDS mesh network, all devices can be peers that allow wireless communication to be routed automatically to the desired destination even when a direct line of sight path to the Gateway is unavailable. The mesh network self-forms upon power up, automatically creating the wireless network and eliminating the cost and effort associated with path planning and analysis. Moreover, the mesh network automatically establishes alternate communication paths to the Gateway and between remotes re-routing communication around obstructions or device failures. The ISA100.11a standard is extremely robust and deterministic. It was designed specifically for the rigors and demands for process automation as well as to coexist with other wireless solutions that may be in use. It operates in the unlicensed 2.4 GHz spectrum for global use.





Oil & Gas Application - Wireless I/O Extension

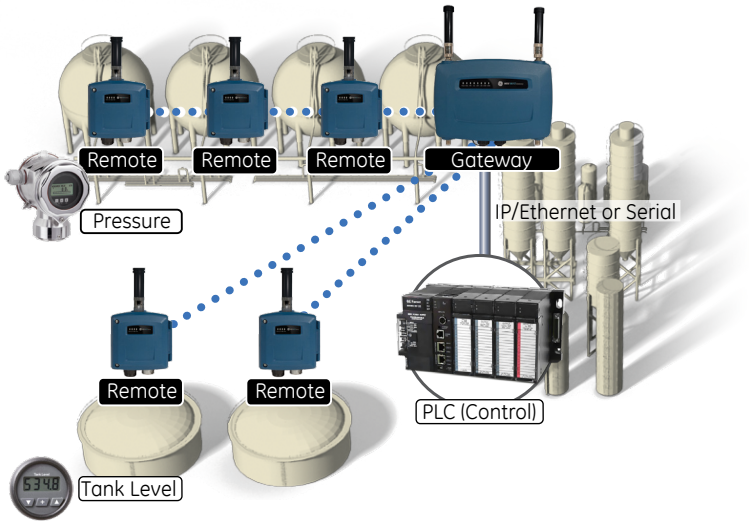
Use the MDS WiYZ I/O Extension feature to regenerate I/O signals at meters, RTUs and controllers when direct wiring is too expensive or impractical. Gas wellhead pressure values can be monitored by a WiYZ remote located at the wellhead and regenerated by another WiYZ remote into an RTU or Flow meter.



- Use WiYZ to measure pressures at a gas wellhead
- Connect pressure instruments or transducers directly to a WiYZ Remote
- Transmit pressure values to a WiYZ remote at RTU or Flow meter
- Regenerate the pressure values as 0-5 V or 0-20 mA signals to RTU
- Connect 1-2 Analog and 1-2 Digital signals per remote
- Use WiYZ Remote's internal battery power at locations without power
- Eliminate need to run signal wire between wellhead and meter site

Heavy Industrial Application - Remote Data Collection & Networking

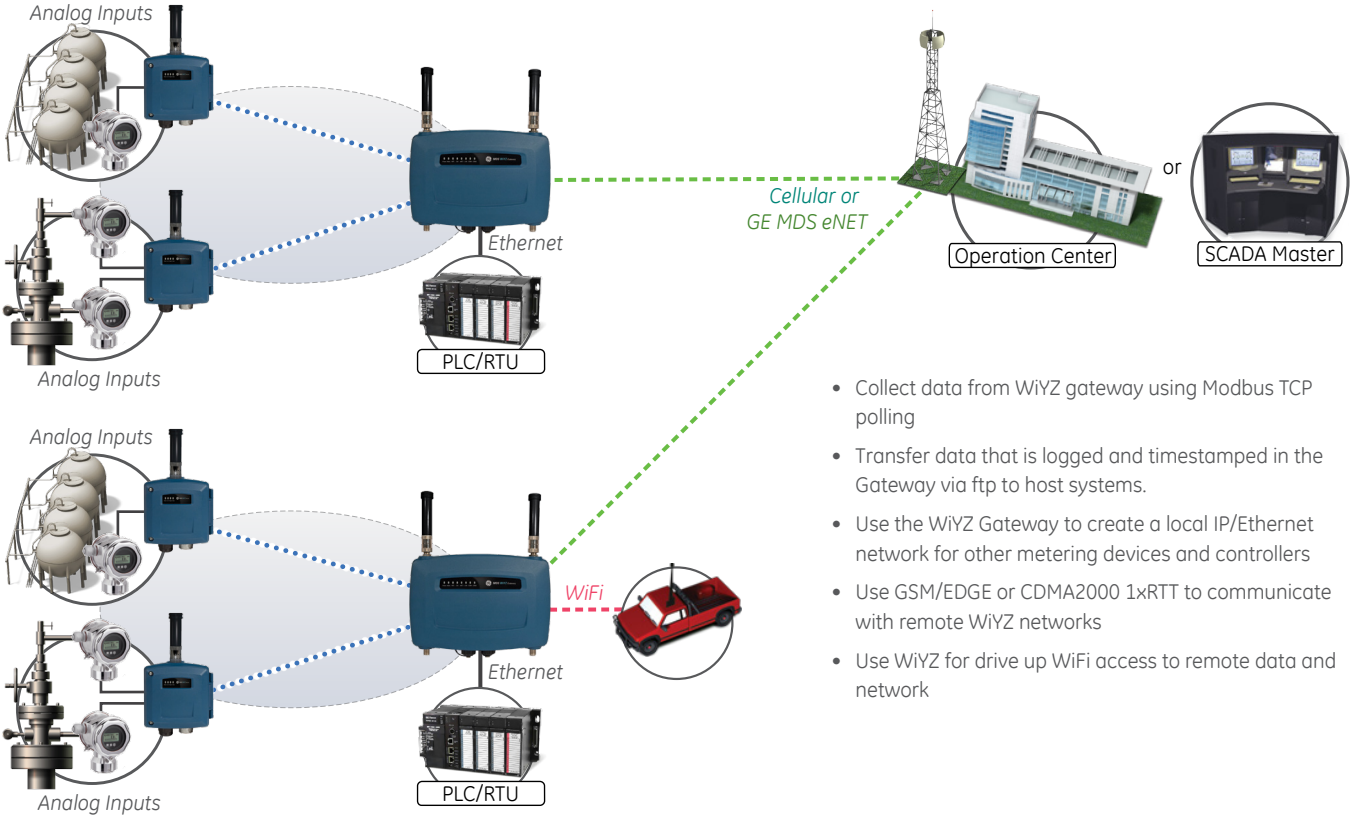
Collect process data from remote assets using IP/Ethernet to local PLC or controller for monitoring and control applications where it is cost prohibitive to run signal wire or when power is unavailable. Use WiYZ to directly connect sensors, transducers or I/O from instruments and meters. WiYZ Remotes automatically form a mesh network around obstructions to the WiYZ Gateway.



- Use WiYZ to automatically create a mesh data acquisition network for remote assets
- Collect level, pressure and status data from remote devices and send to Gateway
- Connect PLC or Controller to WiYZ serial or IP/Ethernet port
- Use Modbus to poll data collected at WiYZ Gateway
- Use WiYZ Remote battery power at locations without power or DC power at both Remote and Gateway
- Use WiYZ to power transducers and instruments

Heavy Industrial Application - Cellular or MDS eNET Backhaul

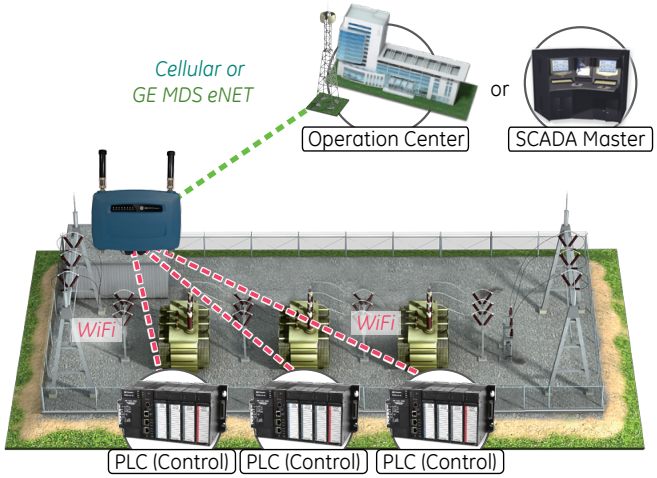
When Operations centers and Enterprise networks need long range access to remote sites, use the Cellular infrastructure or MDS eNET option. The WiYZ Gateway operates not only as the access point to the MDS Mesh network, but also supports WiFi for local drive-up data access.



- Collect data from WiYZ gateway using Modbus TCP polling
- Transfer data that is logged and timestamped in the Gateway via ftp to host systems.
- Use the WiYZ Gateway to create a local IP/Ethernet network for other metering devices and controllers
- Use GSM/EDGE or CDMA2000 1xRTT to communicate with remote WiYZ networks
- Use WiYZ for drive up WiFi access to remote data and network

Utility Application – Substation Network Infrastructure

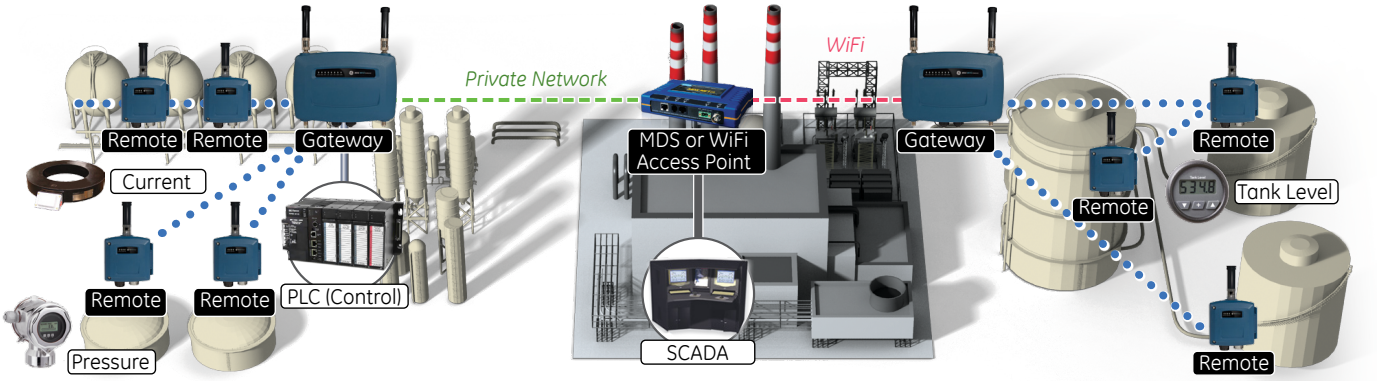
When a utility uses WiFi at a substation to collect data from IEDs or RTUs and monitor status/condition information the WiYZ Gateway can operate as the WiFi access point to bridge wireless Ethernet and serial data onto the Cellular network or private MDS eNET network. The WiYZ Gateway also supports wired Ethernet and serial connectivity to interface other devices and systems.



- Use the WiYZ Gateway to bridge WiFi enabled IEDs or controllers onto cellular infrastructure or IP/Ethernet hub
- Optionally connect Ethernet and serial devices to the WiYZ Gateway
- Use WiYZ Remotes to monitor other substation status points
- Use GE MDS eNET to monitor other devices remote from the substation

Heavy Industrial Application – Facility Data Acquisition and Networking

When process facilities need to automate data collection from remote assets, metering devices and controllers WiYZ has the versatility not only to form a mesh network around obstructions and interference but also to provide wireless serial and IP/Ethernet connectivity. The WiYZ Gateway can operate as a WiFi station for connection to an existing WiFi network or create a MDS eNET network for a comprehensive network infrastructure.

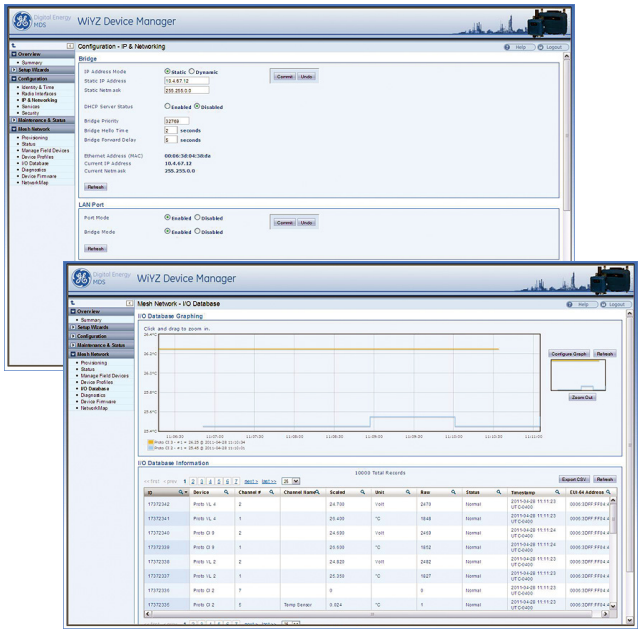


- Collect data from multiple WiYZ Gateways and Remote clusters monitoring status, pressure level and temperature parameters
- Provide IP/Ethernet and serial communication to remote controllers
- Bridge remote data onto facility WiFi networks
- Use GE MDS eNET to for license free communication to plant control and monitoring systems

MDS WiYZ Device Manager

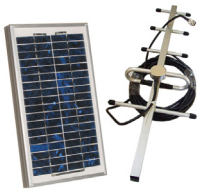
Use the web based WiYZ Device Manager for convenient, intuitive configuration and maintenance of WiYZ devices. Device Manager is resident in the WiYZ Gateway and can be accessed via the Ethernet port or over the air via any of the backhaul options. The WiYZ Device Manager provides a comprehensive set of tools and utilities such as configuration wizards, device profiles for repetitive configuration tasks and utilities for saving device configurations and upgrading firmware.

- Access over-the-air or using Gateway Ethernet port
- Device profiles simplify repetitive setup tasks
- Built-In Wizards guide users through multi-step configuration processes
- View I/O Data and Status information from WiYZ Remotes or other devices on the WiYZ network
- View data logged on Gateway in trend graph formats
- View device status and performance information
- Simple Maintenance Menus for firmware upgrade and saving radio configuration
- Menus for broadcasting firmware upgrades to all Remotes
- Network Configuration Features
- Setup bridging over multiple wireless option
- Monitor network status and health



Sensor Kits and Accessories

WiYZ Sensor kits are available for typical monitoring applications involving pressure, level and temperature. They are optimized whenever practical to take advantage of WiYZ low power battery operation. A full array of important accessories such as antennas, lightning protection and cabling are available for convenient ordering for any WiYZ installation.



MDS WiYZ Starter Kits

MDS WiYZ Starter Kits simplify ordering for the Gateway and up to 5 Remotes. Each contains a Gateway and the necessary antennas and accessories for installation. Kits are available for 2, 3 and 5 remotes.

Comprehensive Network Management

Manage WiYZ using PulseNET™ NMS. PulseNET is purpose-built for industrial communications and includes sophisticated and meaningful pre-built workflows along with intuitive graphical representations of the network at your fingertips.

Power Consumption

WiYZ Gateway Power Consumption

	12 VDC Power		24 VDC Power	
	Rx	Tx	Rx	Tx
Base Gateway	211 mA	212 mA	106 mA	106 mA
Cellular Modem	32 mA	168 mA	16 mA	84 mA
eNET	117 mA	562 mA	58 mA	281 mA
WiFi	138 mA	298 mA	69 mA	149 mA

WiYZ Remote Power Consumption

12 VDC Power			24 VDC Power		
Sleep	Rx	Tx	Sleep	Rx	Tx
111 µA	12 mA	110 mA	55 µA	6 mA	53 mA

Specifications

GENERAL	
Gateway Power	10-30 vDC
Remote Power	7-30 vDC
Temperature	-40°C to 70°C -30°C to +60°C w/ cellular
Housing	Die-cast Aluminum
Area Approval	General Purpose, Class 1, Division 2 or ATEX Zone II area approval
WIYZ GATEWAY	
Size	8.0 H x 11.75 W x 3.0 D in. 20.3 H x 29.8 W x 7.6 D cm.
Weight	5 Lbs (2.9 kg)
Antenna(s)	N-female
Ethernet Port	One RJ45 10/100BaseT
Serial Port	Two DB9, RS232, 1.2 to 115.2 kbps
LAN Protocols	802.3 (Ethernet), 802.1D(Spanning Tree), TCP/IP, DHCP, ICMP, SFTP, FTP, UDP, SNMP v1,/v2/v3, NTP, HTTPS
Security	Encryption, Password Access, MAC Address block list
VPN	IPSEC, Open VPN
MESH SPECIFICATIONS	
Frequency	2.4 to 2.4835 GHz
Range	1500 ft.
Carrier Power	13 dBm
Carrier Power - ETSI	0.01 to 0.1 watts (10 to 20 dBm)
Receiver Sensitivity	-95 dBm (1 x 10^{-6} BER)

CELLULAR OPTIONS	
CDMA 1xRTT (Verizon) GSM/GPRS EDGE (AT&T)	
WIFI OPTION	
802.11b/g	Access Point, Station, Ad Hoc
Carrier Power	0.1 watts (20 dBm)
900 MHZ OPTION	
Data Rate	106 kbps
Frequency	902-928 MHz ISM band
Mode	Frequency Hopping
Range	Up to 25 miles
System Gain	136 dB
Carrier Power	0.1 To 1.0 watts (20 to 30 dBm)
Receiver Sensitivity	-106 dBm (1 x 10^{-6} BER)
2.4 GHZ OPTION	
Data Rate	106 kbps
Frequency	2.4016 – 2.4778 GHz ISM
Mode	Frequency Hopping
Channels	Selectable 80 to 128
Range FCC/IC	Up to 15 miles
Range ETSI	Up to 1200 meters / 3900 feet
System Gain	131 dB
Carrier Power	0.1 To 0.5 watts (20 to 27 dBm)
Carrier Power-ETSI	0.01 to 0.1 watts (10 to 20 dBm)
Receiver Sensitivity	-104 dBm (1 x 10^{-6} BER)
WIYZ REMOTE	
I/O Capacity	2 AI, 2 AO, 2 DI, 2 DO
Size	5.5 H x 6.0 W x 3.5 D in. 14 H x 15.2 W x 8.9 D cm.
Weight	3.7 lbs (1.7 kg)
Housing	Die-cast Aluminum

I/O SPECIFICATIONS	
ANALOG INPUTS	
Types	0-100 mV, 0-22 mA, 0-5 V
Accuracy	.1% of Span
A/D Resolution	12 bit
ANALOG OUTPUTS	
Types	0-22 mA, 0-5 VDC
Accuracy	.1% of Span
Isolation	1400 V output to power
D/A resolution	12 bits
DIGITAL INPUTS	
Type	5-36 vDC
Isolation	1,500 V to chassis ground
DIGITAL OUTPUTS	
Type	FET relay
Capacity	36 vDC
Load	2A continuous (per output)
Isolation	1,500 V to chassis ground
APPROVALS	
FCC	Part 15, SubpartC
IC – Industry Canada	RSS-Gen Issue 2/RSS 210 Issue 7
ETSI /CE	EN 60079, EN 60950, EN 61326, EN 300 328, EN 301 489
UL	General ITE, Class 1, Div. 2 Groups A,B,C,D
ATEX	Ex II 3 G Ex nA IIC Gc
PROTOCOLS	
Modbus TCP	
Modbus RTU	
FTP/SFTP	

Remote Ordering

WiYZR- M	*	4	*	A	*	*	N	*	*	*	*	WiYZ Remote Nema 4X, IP 65, MDS Mesh
	N											General UL
	2											Class I Division 2
			F									FCC/IC
			E									ETSI/CE
					E							7-30 VDC
					F							Internal 14 AH, 10 V Battery Bracket
						1						2 AI (0-5 VDC), 2 AO (0-5 VDC), 2 DI, 2 DO
						2						2 AI (0-100 mV), 2 AO (0-5 VDC), 2 DI, 2 DO
						3						2 AI (0-20 mA), 2 DI, 2 DO
						4						2 AO (0-20 mA), 2 DI, 2 DO
								G				Cable Gland - Left Connector
								N				¾ Inch NPT – Left Connector
								M				NPT-Metric - Left Connector
								P				Blank Plug – Left Connector
								X				None
									G			Cable Gland – Right Connector
									N			¾ Inch NPT – Right Connector
									M			NPT-Metric - Right Connector
									P			Blank Plug – Right Connector
									X			None
										1		Omni Antenna
										N		N Connector
											F	Surface Mounting
											P	Pole Mounting

Order Code Example

WiYZR-**M24FAF1NNP1FN**

- Class 1 Division 2
- NEMA 4X Housing
- FCC/IC Approval
- ISA100.11a Mesh
- Battery Powered
- 0-5 VDC AI, 0-5 VDC AO, DI, DO
- No prewiring
- ¾ Inch NPT Left Connector
- Blank Plug Right Connector
- Omni Antenna
- Surface Mounting Bracket

Gateway Ordering

WiYZG- M	N	*	*	*	*	*	D	0	*	N	*	N	WiYZ Gateway
		F											FCC/IC
		C											Australia
		E											ETSI/CE
			A										ISA100 Mesh Radio
			N										No Mesh Radio
				A									GSM/GPRS EDGE (AT&T)
				Z									CDMA 1xRTT (Verizon)
				N									No Cellular
					1								900 MHz MDS entraNET
					2								2.4 GHz MDS entraNET
					3								900 MHz MDS entraNET - Australia
					N								No MDS Radio
						W							802.11b/g WiFi Radio
						N							No WiFi Radio
									1				Standard Peripheral Connections
									2				Class 1 Division 2 Peripheral Connections
											F		Surface Mounting Brackets
											P		Pole Mounting Brackets

Order Code Example

WiYZG-**MNFAZ1WD01NFN**

- FCC/IC Approval
- ISA100.11a Mesh
- Verizon Cellular
- 900 MHz entraNET
- WiFi
- 10-30 VDC Power
- Modbus Protocol, FTP
- General UL Peripheral Connections
- Surface Mount Brackets

Buy MDS WiYZ online at GEDigitalEnergy.com/onlinestore