RV-N55-5 *Remote Autonomous Zone Node*

RV-N55-5 RAZN

Status Recorder and Data Logging

A Remote Autonomous Zone Node for modern SCADA and Telemetry systems. The Remote Autonomous Zone Notes log data and have IOs is listed here with solenoid drivers and 5 digital IOs isolated. Isolated Analog port with 2 analog voltage or current inputs 4-20 mA capability in a compact, cost-effective package. Connect it to your network, PC, or Cloud. Utilizes wired networks (Ethernet, RS485) or long-range wireless communication. Many Long Range Wireless options: narrow UHF or VHF channels, LoRa, or license-free ISM band. Monitor, control, and save all your things with it.

Product Overview

SCADA and Telemetry

RAZN is the new wireless SCADA (Supervisory Control and Data Acquisition) system where a central computer communicates to multiple devices over a network. This Remote Zone Node (RAZN) can be wired into a SCADA system, or wired to Programmable Logic Controllers (PLCs) with the system, and is a PLC and RTU with a myriad of Autonomous operations. The RAZN communicates with MODBUS messages.

High Performance Interfaces

This SCADA product has a number of interface options to connect to controllers or other RAZNs, RTUs, PLCs.

A. **Ethernet**. Connect to a LAN, the Internet, Cloud, or PC/Server. The device can be setup as a TCP client or TCP server and has a Web GUI on it.
B. **Serial Port**. RS-485. RS-232 is also an option.
C. **Website**. HTML website server built in to use a Web Browser to access statistics, settings, and control IOs.

Embedded Wireless Modem Options

The RAZN can have an, M8, M6, or M50 wireless modem module inside. These modules provide proven, rugged, and reliable SCADA communications for Narrowband UHF and VHF systems, and License Free radio bands.

Differential Analog Inputs

Single-ended measurements can be taken of any line compared to ground, or differential measurements can be taken of any line to any other line. The RAZN's 24-bit ADC can calculate 4-20mA current and voltage with highest resolution in the world. Internal AVDD and AVDSS power supplies power the ADC and set the measurement voltage rage. Various ranges are available, or external power can be used if desired.

4-20mA Measurement

The ADC in the RAZN has a 24-bit resolution ADC. Put a resistor on a differential input, and it measure voltage and current. Read the 4-20mA and setup internal registers scaled the way you want to read actual information such as Temperature, Pressure, Brightness… Has the option of customizing the input OFFSET (zero) and SPAN (full scale) adjustments that can be set to a percentage of the full scale.

Real Time Clock (RTC)

The RAZN has a RTC with a battery backed-up timer, so commands can specify timing, duration, and periodic values that are accurately tracked in real time.

Timer Operations Actions & Alerts (TOAA)

TOAA events are setup with three parameters (Timer, Operation, and Action) in any way you would like. Specify time and data events trigger and how long they continue to trigger.

Relay Driver for Alarms and Control

SCADA messages or preset TOAA logic can trigger the MOSFET terminal relay driver output from thresholds and time to autonomously switch a relay as needed.

Secure Data

The data encryption feature may be enabled on wireless communication. When secure data is enabled, the product will encrypt transmissions with AES128.

Port A Isolated Solenoid Drivers

Port A has 4 isolated solenoid driver outputs. ***BSB*** 2-pin solenoid drivers.

Port B 8 Generals Purpose IO pins

Port B has: 2 Isolated analog Input sensors ***IAI***, 2 terminals are ***LI*** Fully Isolated Led Digital Inputs. 3 optically isolated ***OIDI*** pins are Obtically Isolated Digital Inputs. One pin is the ***IGND*** Isolated Ground Input for you.

Meteorological Instrument Functions

External temperature sensors connect to analog inputs. Rain gauge connects to digital input. Wind speed connect to digital inputs, status, frequency, or pulse counting inputs can be read.

Long Range Wireless Operation

RAZN transmits I/O signals or serial data and is therefore very versatile. Many RF options, super long-range communication. 1/2W to 5W UHF, VHF; 50mW-1W ISM LoRa. Communicate in the field from 1 to 50 miles.

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General Specifications

Model Number: **RV-N55-5V-MBB-O**

V: Variations of the X version. A, B, C,
M: Radio Modem version 5,6,8 (M50, M6, M8)
BB: Radio band code.
O: Options, sensors, and Accessories included

DC Voltage to power:	7V - 30V DC.
Power Consumption	1-2.5W plus I/O current.
Maximum Input Voltage: (without damage)	50V DC.
Negative Input Voltage: (without damage)	-50V DC.
Additional Power required.	Wireless Links utilized 1-10W, varies by radio model utilized. Idle, TX, and RX modes vary.
Over-Voltage Protection	31-50V input, no damage.
Operating Temperature:	-30C to +60C
Humidity	5 to 95% (non-condensing)IEC 60068-2-30 (Test Db, Damp Heat)
Environmental Air	No corrosive gases permitted
Weight	0.40lbs + RF Modem weight.

Security

Encryption Method..... *AES128*
Electronic Serial Number..... Silicon ESN

RF Electrical Specifications

See the appropriate RV-M8, RV-M6, RV-D50 or RV-Z50 data sheet for specific details regarding the wireless performance specifications for the optional radio modems.

Input / Output Connection Functions

Terminal A (Analog Input Pins)

2 different analog inputs. **ADS**
1 Relay Driver open-source MOSFET output. **RD**

Terminal B (General Purpose IO Pins)

8 GPIO are Flexible Digital Input / Output pins. **FIO**

IO Terminals Electrical Specifications

ADS Analog Delta Signal Input Specifications

Sample Duration Time	100mS or average rate.
Input Filter	1000Hz default, 10-1000Hz cfg

DSD Solenoid Drivers.

A and B Voltage Outputs to pulse the Solenoid..

IAI Isolated Analog Inputs

Max output impedance ON. measure voltage or 4-20mA.

LI LED

LED optically isolated digital inputs.

OIDO optically isolated digital outputs

Max output 3.3V.

OIDI optically isolated digital Input

Max Input 5V.

Device Electrical Specifications

DC supply Voltage	7.5VDC – 29VDC
Max. power consumption at 24V	
Product less RF modem	110mA
RV modem consumption	See data sheets for modem power
DC Power Cable	2.5mm X 11mm plug. 6M cable
Raveon part number	4C850-1

Interface Option Connections

RS-485 / RS-422 Interface Port

Connector Type	Phoenix 5-pin
IO Voltage Levels	RS-485

Ethernet TCP

Connector Type	RJ45f, 10/100
IP Address	Static, dynamic, port selectable

Mechanical Specifications

Dimensions Width, Height, Depth .....5.25" X 2.75" 1.25"

Accessories: Model Number Code: (x)

(P) AC/DC Power supply 12V. 2A P/N: PS-55-2
(D) DIN Rail Mount

LEDs

8 LEDs show the status of the 8 Outputs
1 LED shows Power status On/Off
1 LED shows communication status

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Remote Autonomous Zone Node (RAZN) Features and Notes

The RAZN makes remote automation and monitoring of your complex processes robust and cohesive by connecting across a variety of communication methods and data protocols.
RAZN IoT features and abundant customization enables the RZV to fit your specific SCADA needs. Raveon is always interested in adding more features to our products, so please contact sales if you have additional desires. You can start small and grow confident that the RAZN's powerful micro processor can handle complex applications. Designed in 2019, it uses some of the most efficient technology in the industry.

Methods to Control the Inputs and Outputs

- Send Commands via Ethernet, Serial port, USB port, Wireless network or connect with Web Browser.
  - Turn on and turn off commands.
  - Read sensor registers, or actual sensor measurements (volts, current, temperature)
  - Reset to defaults if the power is cycled.
- Internal timers and counters setup to manage Outputs
  - Turn off after XX milliseconds.
  - Turn on for XX milliseconds
  - Internal Real Time Clock (battery backed up):
  - Innovative TOAA has a myriad of ways to manage outputs with configurable duration.
- Command protocols (Contact sales to incorporate you protocol).
  - MODBUS RTU
  - HTTP
  - Raveon command mode commands or remote commands using RPR.
  - WMX Wireless Message Exchange commands incorporated into all Raveon data radio modems.
  - To use your custom commands, contact Raveon sales to request new commands added to the RAZN

Things to use RAZN to do

- Control DC powered lights. Up to 30-40watts.
- Security Alarm System applications.
- Meteorological Instrument Functions to measure weather.
- Control low-voltage AC/DC powered lights or switch an external AC power relay on and off.
- For Digital output status information, set the FIO digital outputs to turn on/off based on various analog input thresholds. The stat LEDs will also display the status of the analog inputs.
- Smart Cities can use the RAZN to control the things in the city they need to smartly manage.
- To connect things to internet cloud servers or your private servers, the Ethernet or wireless connections can pass the status of switches and sensor measurements to your servers.
- Control valves, pumps and devices from your commands or autonomous control from inputs.
- Autonomously control things based on sensor levels.
- Sensor data is stored in internal registers based on range settings and calibration.
- Monitor water sensors, and report their status and report emergency information.
- Monitor analog sensors such as temperature, pressure, current, voltage,…

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Hardware Connections to the RAZN N55-7

IO Terminals

The RV-V55-7 interface terminal connector pin-outs are as follows:

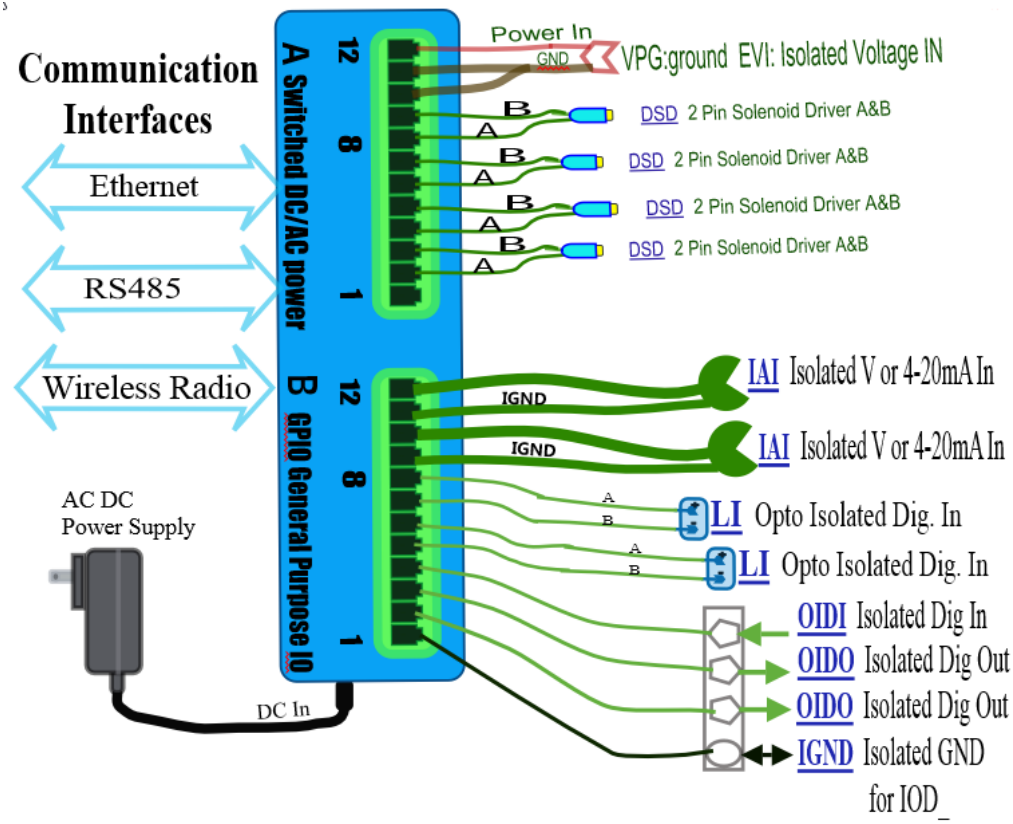
Terminal Port A (Switched Voltage Outputs, Analog inputs, Digital inputs)

Pin #	1	2	3	4	5	6	7	8	9	10	11	12
Function	***NC***	***DSD A***	***DSD B***	***DSD A***	***DSD B***	***DSD A***	***DSD B***	***DSD A***	***DSD B***	***VPG***	***VPG***	***EVI***
IO#		0	1	2	3	4	5	6	7			

Terminal Port B (Isolated Analog and Digital Inputs, Digital output, Digital input)

Pin #	1	2	3	4	5	6	7	8	9	10	11	12
Function	***IGND***	***OIDI***	***OIDO***	***OIDO***	***LI B***	***LI A***	***LI B***	***LI A***	***IGND***	***IAI***	***IGND***	***IAI***
IO#		12	13	14	8	8	9	9	10	10	11	11

Pin # is the Terminal Port Pin Number. IO# is the software reference and register code for this port.



Description of the Terminal Port's Input and Output Features

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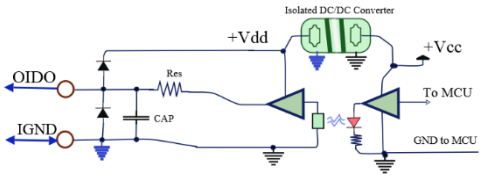
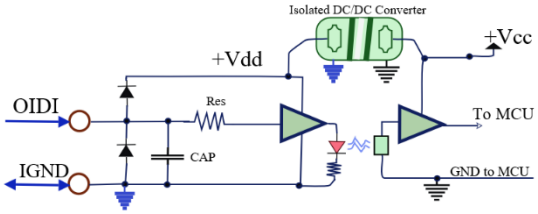
OIDO Optically Isolated Digital Output.



IOPIN: **B** is the character to use to specify this type of GPIO
Output "ON" voltage output: Vdd.
Output "OFF" voltage output:
Output impedance: 1-100 ohms
Maximum voltage driven into output: 3.3V std. 5V, 9V opt.
Max output current: 50mA (Per Pin) 150mA (total)
CAP: 220pF

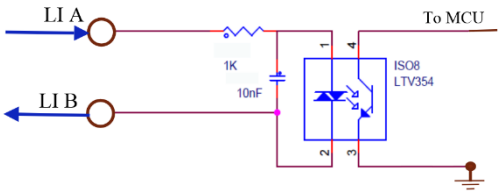
OIDI Optically Isolated Digital Input.

IOPIN: **A** is the character to use to specify this type of GPIO
Max DC input Voltage: Vdd+.1
"ON" DC input voltage Range: (0.9 × Vdd) to Vdd
"OFF" DC input voltage Range: 0 to (0.2 × Vdd)
Input Current: < 10uA
CAP: 220pF Res: 1K Diodes for ESD protection.



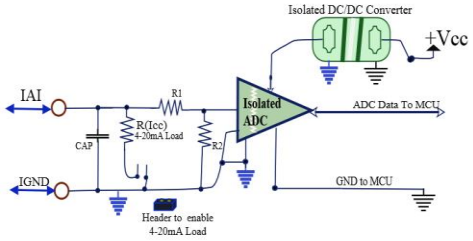
LI LED Optically Isolated Digital Input.

IOPIN: **A** is the character to use to specify this type of GPIO
2 inputs in ***LI*** a and B are digital input that will light up an internal LED to optically isolate the ***LI***s from the microcontroller unit (MCU) that monitors these inputs.
Max input Voltage (A to B): 48V
"ON" DC input voltage Range: >1.5V
"OFF" DC input voltage Range <0.8V
Input Current: (Vin-1.0)/1000



IAI Isolated Analog Input. Voltage Input or 4-20mA current Input

IOPIN: E (Volt) or F (Current) is the character to use to specify this type of IO.
A Header jumper turns on the F (4-20mA mode).
Input Configuration: E: (Voltage read) F: (Current Read)
E: Input impedance: 10K-15K
F: 4-20mA Input Impedance: 120 ohm
A to D resolution: 12 bit
Input Measurement Accuracy: 2%.
Input Sampling Time: 50mS - 2S configurable.
Smoothing: Selectable averaging: 1-8 samples.
Maximum Input voltage: 5V R1 can be changed.
Max isolated differential voltage to GND: 100V TBVD.
Temperature stability: < ±30 PPM/ºC



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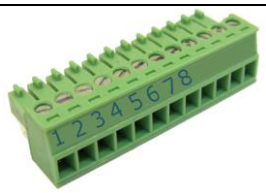
Connectors and Accessories From Raveon to Plug into the Terminal Ports

		
Modtronix TB12P-F350-R4	Phoenix Contact: MC 1,5/12-ST-3,81 – 1803675	Phoenix Contact: MC 1,5/12-STZ4-3,81 - 1768978
Raveon Part # RT-CN-550	Raveon Part # RT-CN-551	Raveon Part # RT-CN-552

FYI these mate to is a Phoenix: MC 1,5/12-G-3,81 – 1803374 used on this RAZN enclosure.

Connecting Communication to the RAZN

The RAZN has Multiple Communication Interfaces comprised of:

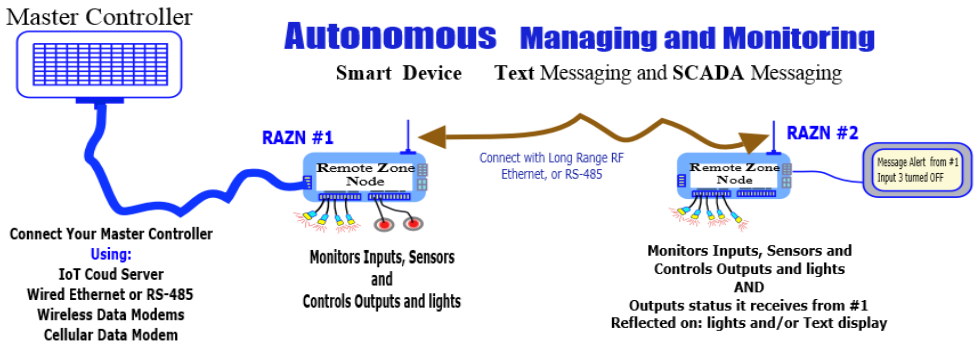
Ethernet TCP/IP Connect an Ethernet Cable, or Wi-Fi adaptor, or Web Browser to the RAZN.

RS-485 Serial Connect an RS-485 serial cable to a RAZN or dozens of RAZNs.

Long Range RF The RAZN can have Raveon's RV-M6, or RV-M7 data radio modem installed inside for ultra long range RF data 5-50 miles.

LoRa RF The RAZN can have Raveon's RV-M50 LoRa data radio modem installed inside for long range license-free RF data 1-10 miles.

The RAZN's Timer, Operation, Actions and Alerts (TOAA) functions are run ***Autonomously***. RTUs require Master controllers and modern RTUs often use IoT Cloud servers. The RAZN can use Master controllers, Cloud IoT servers, and local PCs, and local servers, but the RAZN will also execute these TOAA features even when nothing is connected to it.



SCADA and Telemetry Operations: RTU, PLC, and RAZN

The RAZN performs many basic RTU tasks:

1. RTUs report changes an input/output to the Controller
2. RTUs respond to commands from the Controller.
3. RTUs monitor and record changes to inputs.
4. RTUs change output state as commanded, and when proper time comes to change.
5. Analog and digital inputs may be configured to report changes in text messages as they occur without being polled by the Controller (report by exception).

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Addressing and Accessing RAZNs in many ways:

1. Ethernet: TCP addresses and RTU ID terminal code. (millions)
2. RS485/422: RTU ID terminal code (hundreds)
3. Wireless over the air: 16 bit ID for the radio, and 8 bit RTU terminal ID. (millions)

When a RAZN is connected using wireless, Ethernet, or USB, SCADA or MODBUS messages that come in to it not for the particular RAZN, it can pass them out the RS485/422 port or radio modem to other RAZNs that is wired to its RS485 connection or on the same radio network.

Text Messaging, Sending Status, Sending Alert Messages

The RAXN can be configured to send text messages.

Every RAZN can send out its status to remote areas using: wirelessly/Ethernet/wired.

Lights/Alarms/LEDs/Output pins and can display Text messages or get MODBUS SCADA messages…

The Text is written the way you want it. Text can include registers and parameter numbers into the text, such as voltage, current measurements.

Current and Voltage measured can be scaled the way you want, so the number looks correct in text. For example, a 4-20mS temperature sensor can show up in text as -30C to +60C or -22F to 140F.

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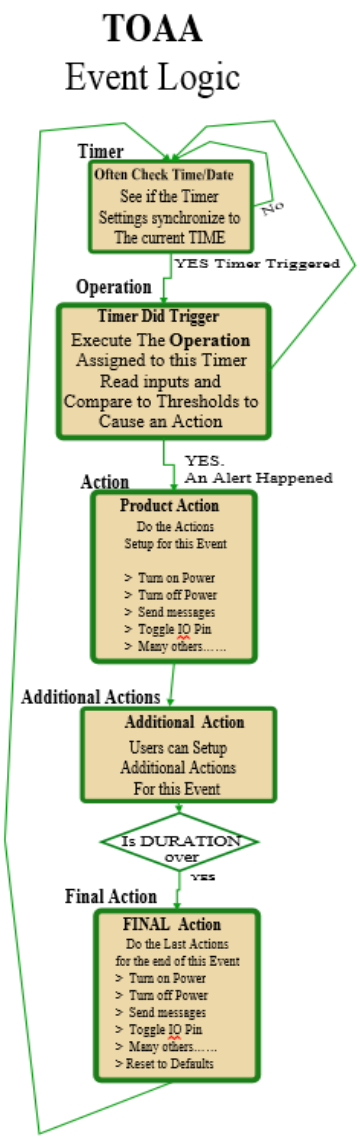
Timer Operations Actions and Alerts (TOAA) System Overview

TOAA Events are setup the way your want with three-four parameters (Timer, Operation, and Actions and Alert messages). The timer is accurate and can precisely specify at a day, hour, minute, and second to activate. A TOAA action can send a text message, text message with data information, and a SCADA message to another RAZN or RTU.

Timer Operations in the RAZN are the most flexible and efficient for any device in this industry. No need to use PCs, APPs, server, protocols, IoT, or whatever. PCs, APPs, server, protocols, IoT can manage the RAZN and its TOAA timer, but the Timer Operations works perfect and reliable without the need for connection to any other device.



The TOAA has 4 events in the Timer Event Logic it handles.

1. A **Real Time Clock Triggers** the event. It can trigger daily, hourly, weekly, monthly ore once per year or once. How it triggers and how often the Event occurs, is how you set it up.
2. The RAZN **Operation** happens with timer triggers. Operation can read voltage, digital inputs, buttons, counters, temperature, pulse rates, or dozens of other things to read.
3. The data read in the Operation causes and **ACTION**. Operation will either cause and Alert or be set aside. If the Alert condition occurs, an **ACTION** will take place. Actions can be assigned to output data, set or clear output pins, turn voltages on or off, or whatever telemetry action you would like to happen. Communication **Alert ACTIONs** can also be outbound text messages, serial data, SCADA messages, or email notifications. 1 to 4 Actions take place per alert.
4. A **FINAL ACTION** may take place, after the amount of time you setup, another Final action can take place. The final action can be to reset the previous action, turn something off or on, or whatever action you want at the end of this event.

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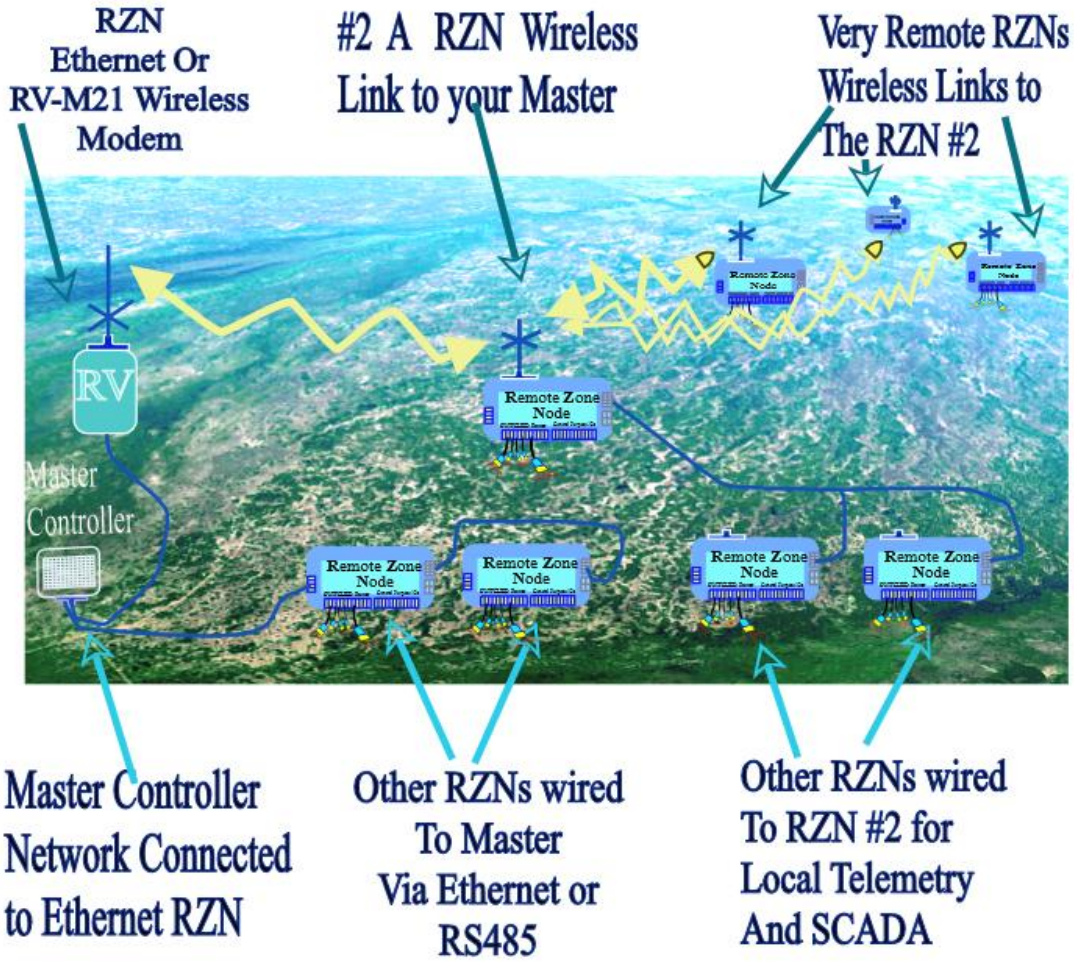
Cover Large Areas with Wireless Modems in the RAZN. They Mesh together if you want.



The Master controller can collect data from all the RAZNs using wireless links, or wired links, or both.

Raveon has 7+ IO options in the RAZN enclosure. All work together, so you can use the versions around your system the way you want it to work. And Raveon is glad to make new custom versions for you.

This device must be operated as supplied by Raveon Technologies. Any changes or modifications made to the device without the written consent of Raveon Technologies may void the user's authority to operate the device.

End user products that utilize this RAZN on licensed RF frequencies, must be installed by experienced radio and antenna personnel. Please contact Raveon for end user antenna recommendations.

And the RAZN can be setup to automatically report input levels based on time and input status. And it can also send text messages instead of SCADA messages if you want text to be displayed.

Get extra features or different parameters.

Raveon provides products to customers, an is a efficient high-tech company in California. If there is any parameter such as terminal voltage limits you would like in a different way, or a feature you would like added, please contact Raveon Tech

Made in America

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Support team. Raveon often customizes a product to meet our customers' needs. Here are examples of things we can easily do for you on this RAZN.

1. Change the differential input voltage range. *The internal positive and negative reference voltages can be configure very large or small in any way.*
2. Add an Internal current resistor. *On the voltage input pins inside is a non-place resistor location for use in 4-20mA, 0-1mA, or any other current measuring mode. Easy drop in a small resistor to even measure many amps.*
3. Store analog inputs digitally, or floating point. *Internal registers get the results from calculated analog inputs. Digital can be stored in 8, 16, 18, or 24 bits signed or unsigned registers and can also be in a floating point register.*
4. Set Digital I/O Voltage level. *The Digital IO DC power can be changed to 1.5, 3.0, 5.0 or whatever you want.*
5. Input Filter. *The analog input has a noise filter on it to get rid of RF and noise greater than 1000Hz. It can be configured to filter out AC 60Hz noise or other frequencies as needed.*
6. Add Operations. *Software is created here at Raveon, and adding new features, protocols, registers… are easy to add.*

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