



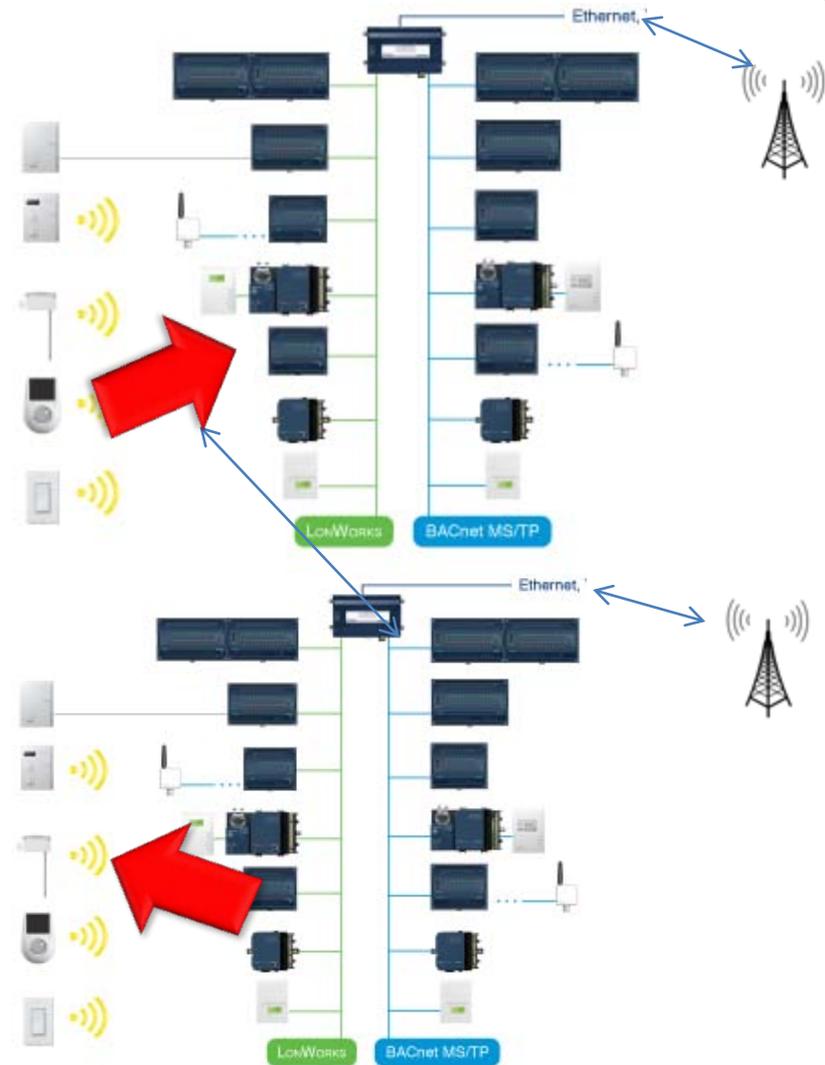
• August 15-18, 2010 • Dallas, Texas •
• Dallas Convention Center •

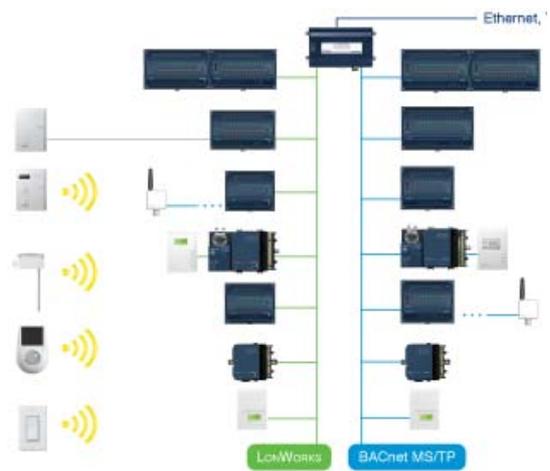
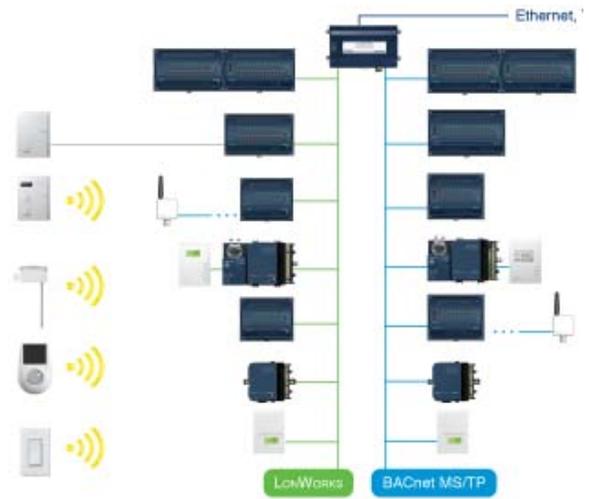


New Technologies In Building
Automation Systems
Wireless

New Technologies In Building Automation Systems

- Wireless Topics
 - Sensing/Measurement
 - Sensors and switches wirelessly into a controller
 - Control – Start/stop
 - Controller wireless outputs for start/stop functions
 - Networks – Building to building
 - The Network communication wirelessly between Building level controllers



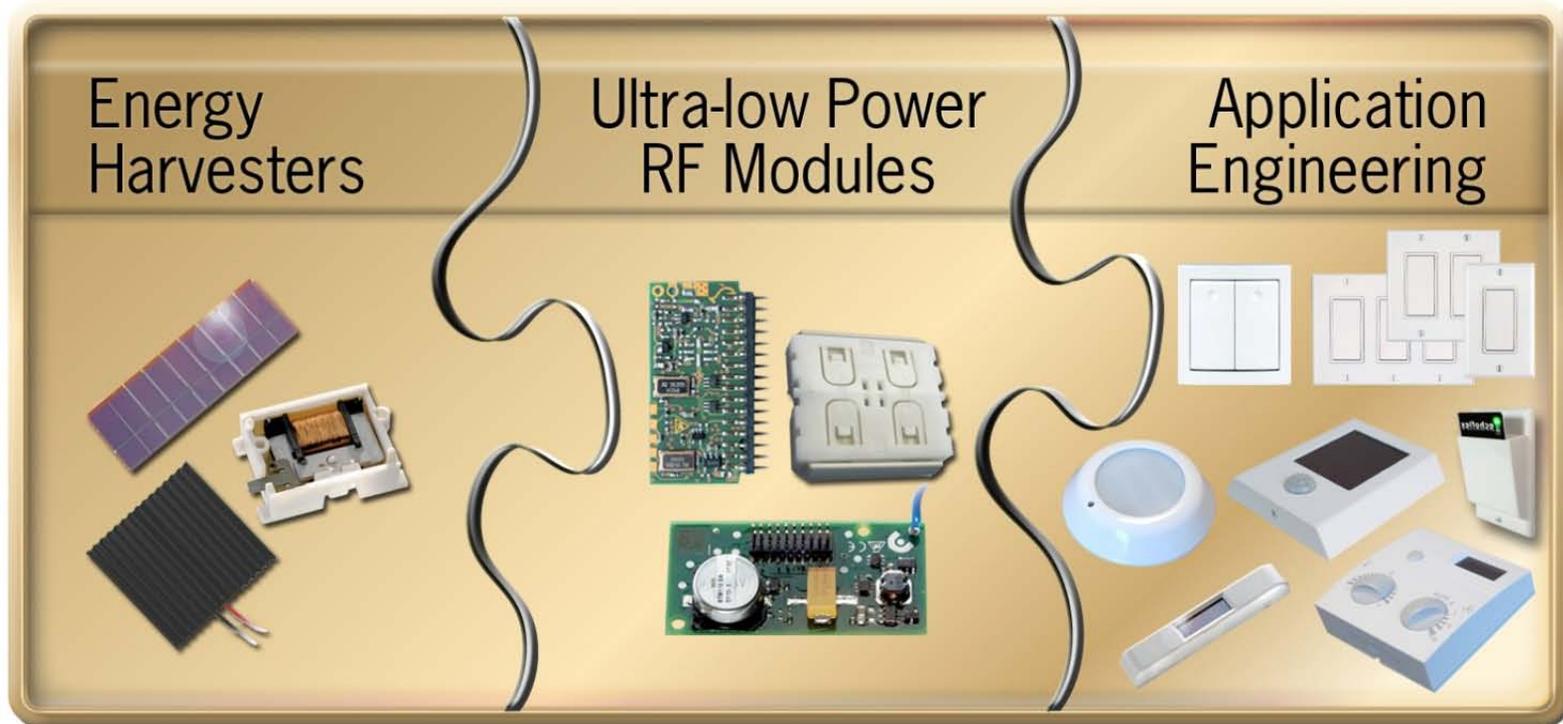


Wireless Sensing: Cost-effective & Flexible

- Application Wireless sensing of values, status and switches
- The widest and most practical application of wireless in commercial buildings



Self-Powered Wireless Sensing

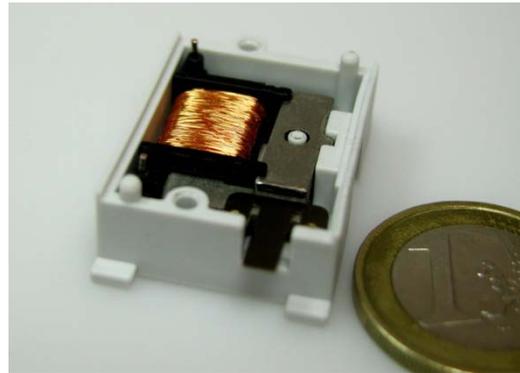


- **Sensors powered by tiny environmental changes**
Light, Temperature & Mechanical Energy

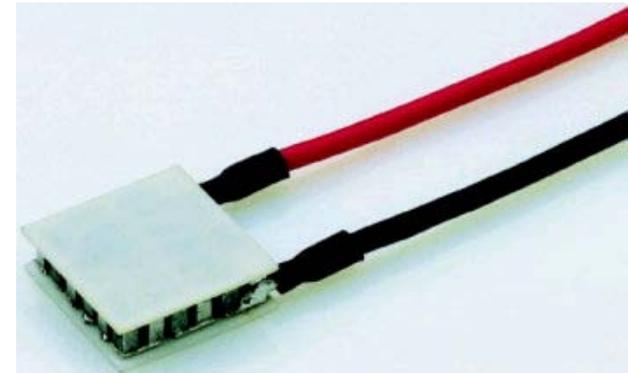
Wireless Sensing Energy Harvesting

Sources of Energy

- linear motion
- light
- vibration
- temperature gradient
- rotation
- pneumatic pressure
- electromagnetic noise
- muscle contraction
- etc.



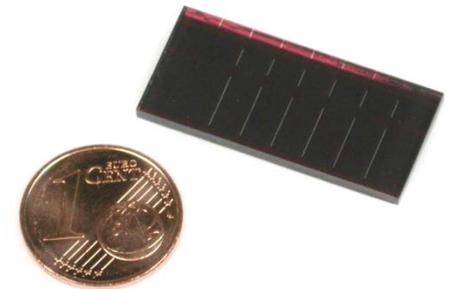
coil & magnet:
linear motion



peltier element:
temperature difference 4K



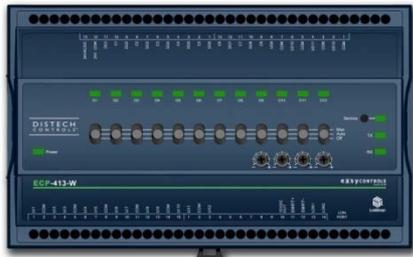
piezo element:
vibration



mini solar cell:
light

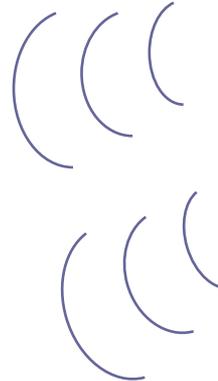
The Wireless Battery-less Solution

Network: LONWORKS or BACnet



Wireless Communication to Controller

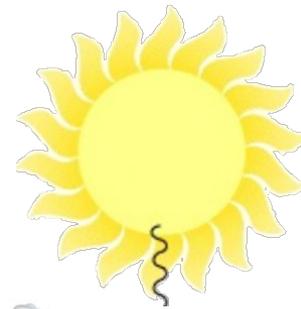
100 ft



Battery-less: Energy Harvesting



Piezo element:
Vibration

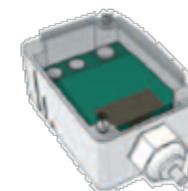
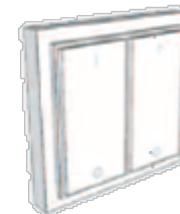


Solar cell:
Light

- Sensors - Solar cell /capacitor for 2-3 day energy storage
- Illumination of 200 lx for at least 3-4 hrs/day
- Switches- Piezo power generator
- Practical Range 30 meters indoors
- Secure transmissions with 32-bit sender ID using 868 or 315 MHz band

Available Wireless Battery-less Devices

- Room temperature
- Fan speed
- Humidity
- Light level – lux
- Occupancy detection
- Light switches
- Outside air temperature
- Duct temperature
- Cable temperature
- Contact temperature
- Window/door contact
- Manual override



Wireless Sensing - Easy Configuration and Commissioning

The screenshot displays the Distech Controls, Inc. software interface. The main window is titled "VavObject [My Office\Subsystem 1\ECC-VAVS-W] - Distech Controls ECC-VAVS Configu...". It features a sidebar with navigation options like "Sensor Input", "Equipment Control", and "General Settings". The main area shows "Hardware Input" and "Smart Sensor" tabs. A "Warning: Smart Sensor and Wireless can simultaneously on this device" is visible. The "Smart Sensor" tab is active, showing a list of sensor types for input 1, with "SPACE_TEMP" selected. Below this, the "Module Configuration" window is open, showing "ID" as "0000544d" and "Type" as "RF_TP_SP_OV_SENSOR". A "Module Manager..." button is present. The "Module Manager" window is also open, showing "Enter Module ID" and "Registered Modules" sections. The "Registered Modules" section contains a table with columns "Index", "ID", and "Type".

Index	ID	Type
1	0000544d	RF_TP_SP_OV_SENSOR
		RF_TP_SP_OV_SENSOR
		RF_TP_SP_SLDSW_SENSOR
		RF_TP_SP_OV_FANSPD_SENSOR
		RF_TP_RH_SENSOR
		RF_TP_RH_SP_SENSOR
		RF_TP_RH_SP_OV_SENSOR
		RF_TP_RH_SP_SLDSW_SENSOR
		RF_OUTDOOR_TP_SENSOR
		RF_CABLE_TP_SENSOR
		RF_AIRDUCT_TP_SENSOR

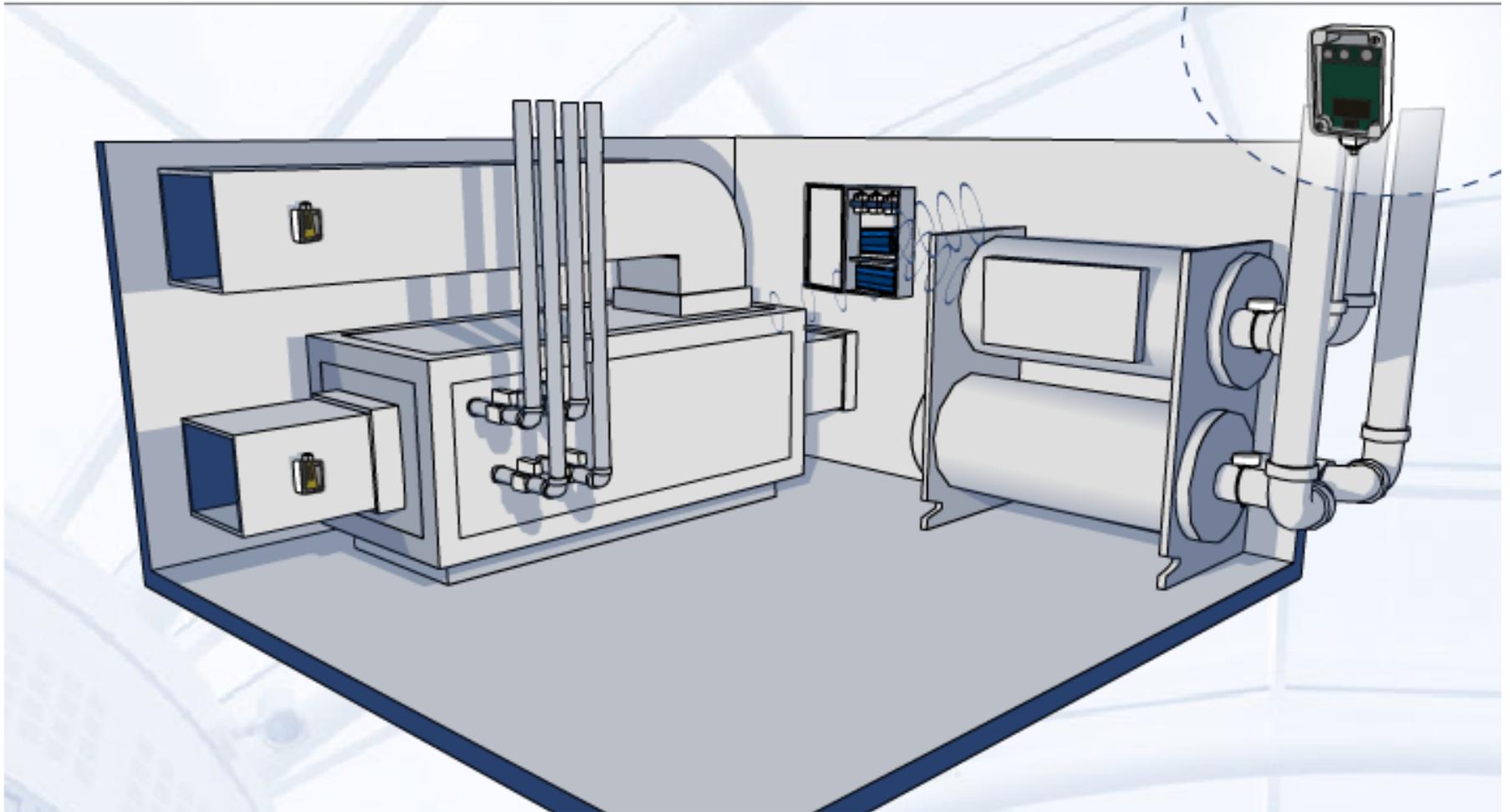
Additional options in the Module Manager include "Clear list before learning" and "Accept learn button only", both checked. A "Stop Learning Modules" button and a "Status" field showing "Learning modules ..." are also visible.

- Easy & quick setup
- Same application as the standard sensors
- No mesh networks to set up

Applications : Office



Applications : Mechanical Room



Wireless Control



- Start Stop Control
 - Fans, Lights, Pumps, Small HVAC loads
- Makes Use of the EnOcean Technology
- Connects to the DO of the Controller
 - Transmits signal to the Relay receiver
 - Can have Wireless status inputs

Wireless Solutions

Wireless Transmission from Controller

One-Way Transmitter

- Use with BAS or Lighting Controller's Output
 - 24 Vac/dc
 - Analog (5-25 Vac/dc)
 - Dry Contact
- EnOcean® enabled for 315 MHz transmissions
- Talks to an infinite number of Relay Receivers (up to approx. 100 ft.)
- Must be powered by 24 Vac/dc

Relay Receiver

- Switches up to a 20 Amp load
- Works with 315 MHz EnOcean® enabled Wireless Wall Switches

No wiring promotes money savings and application flexibility

Transmit through brick, concrete, plasterboard, & electrically-noisy environments up to approximately 100 feet

[View Animation](#)



RIBWE24TDC-EN
One-Way Transmitter
Data Sheet



RIBW01B-EN
RIBW277B-EN
Relay Receivers
Data Sheet



WST-EN
Wall Switches
Data Sheet



Functional Devices, Inc.



enocean®

EnOcean Alliance – Eco-System

Creating an Open Solution

- 110 Member Companies
- 80 OEMs offering end-products
- 400 Interoperable products
- Interoperability
 - Across OEM, Application



Wireless Sensing in Use

- Readily mounted on any wall or surface
- Easy and cost effective relocation
- Use of green technology – no batteries
- Eliminate time and expenses of electrical installs.
- Helps eliminate design errors
- Easy, low-cost relocation
- No disturbance to tenants caused by noise, dust etc.
- Better management of job cost and schedule



Hospitals



Schools, Colleges & Nurseries



Office Tower Buildings & Corporate HQs



Hospitality



Hard to wire locations



Industrial Plants

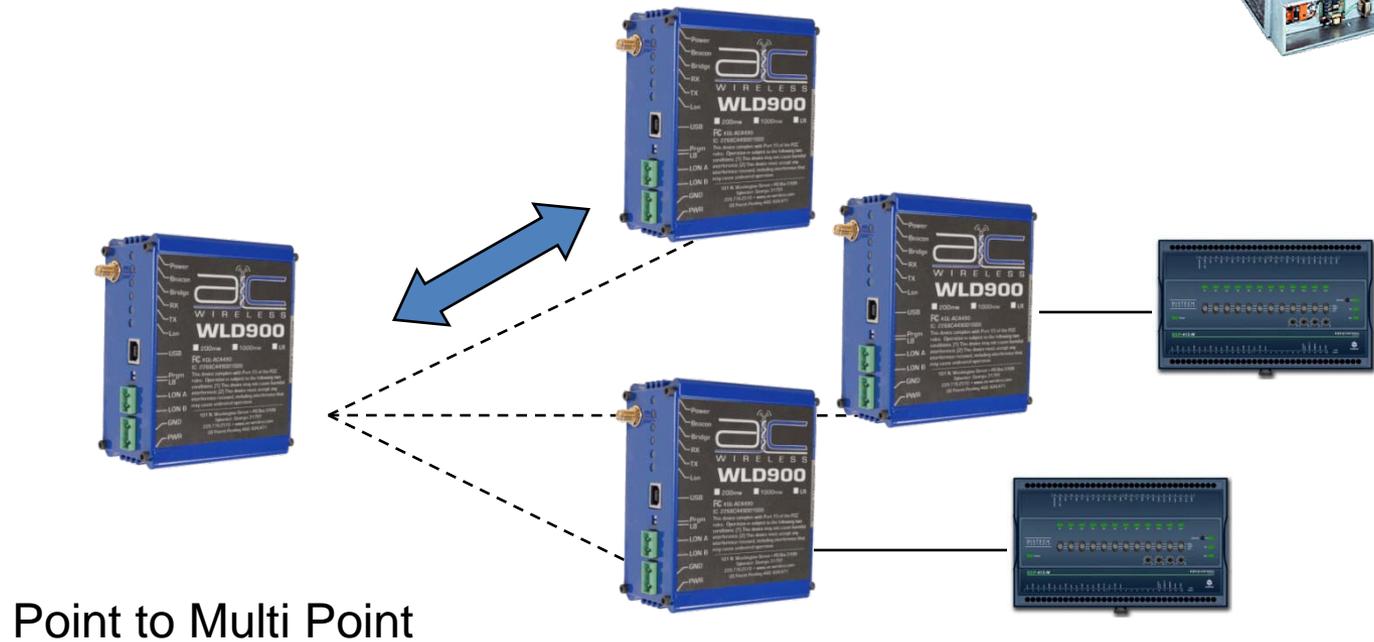
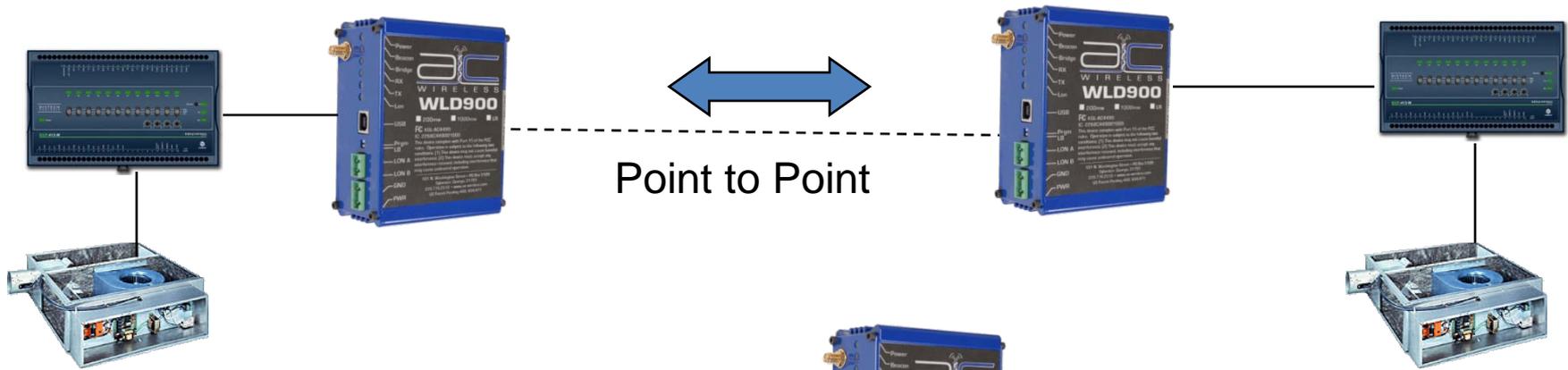
Questions On Wireless Sensing



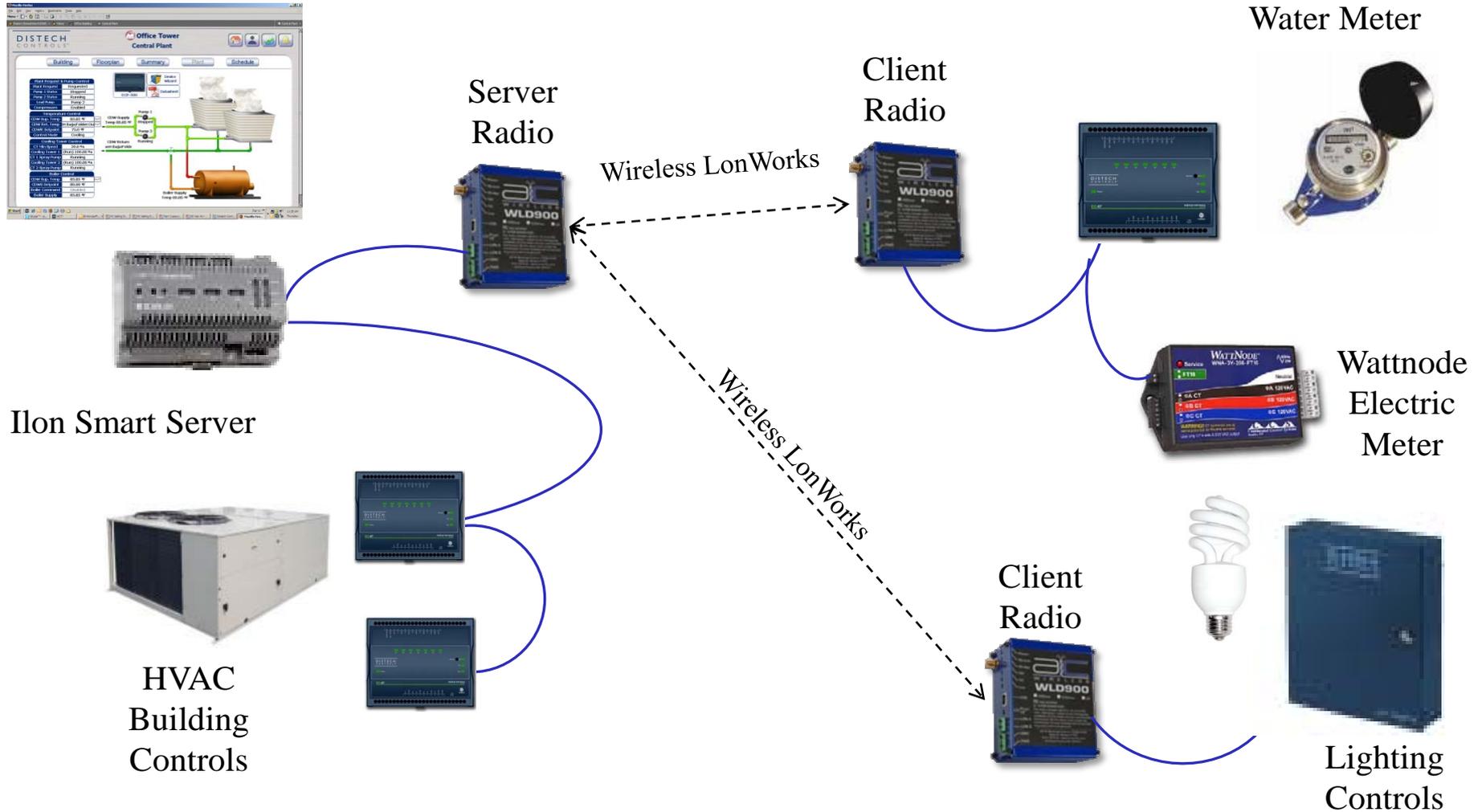
Building Automation System Wireless RF Networks

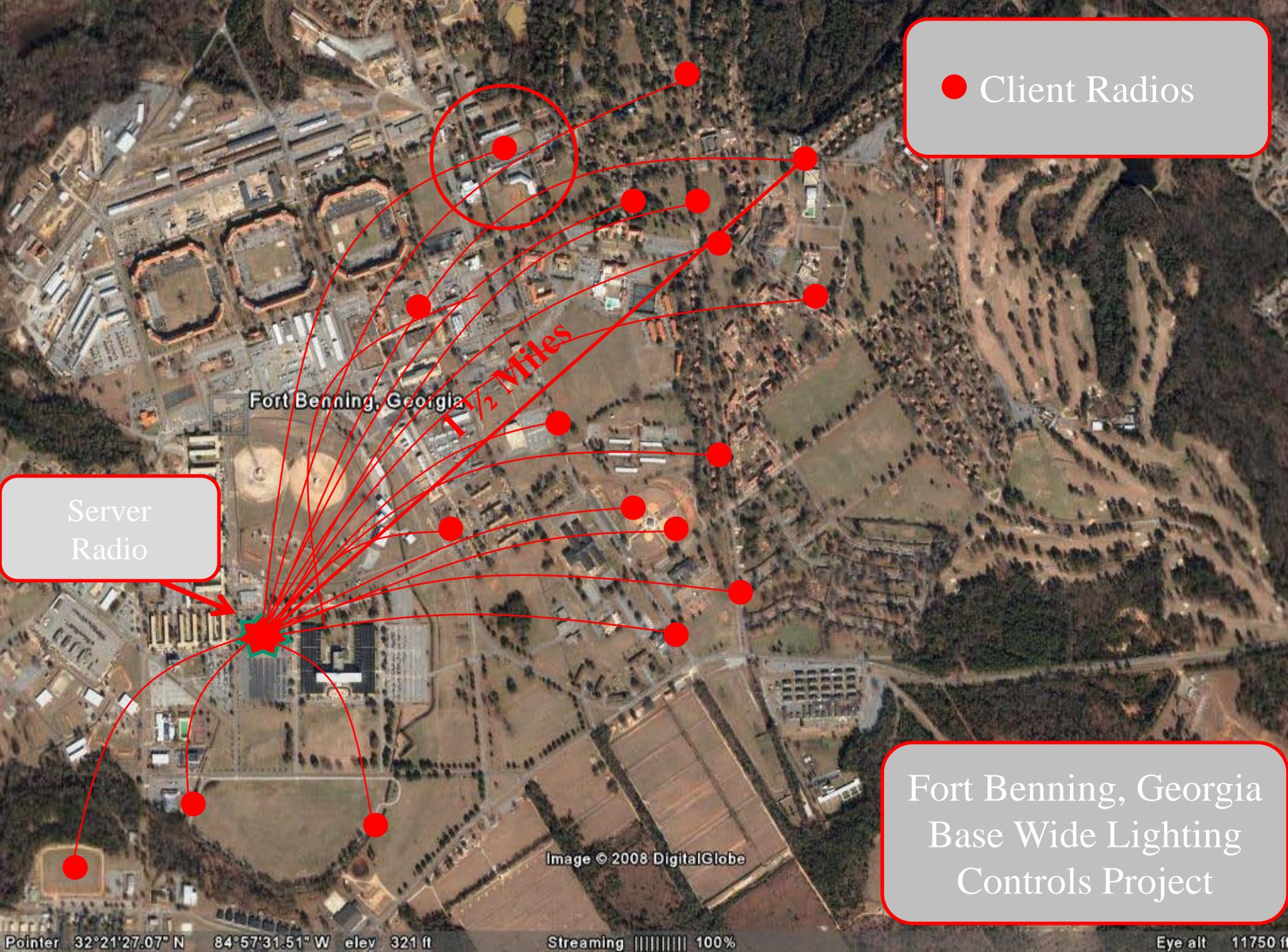
- Short range communication between Buildings Control Networks
- Application – no Ethernet communication
- Range – 6 Miles or less practical range
- 900mhz – 2.4 GHZ frequency hopping
- Extends Networks
 - LonWorks
 - BACnet
 - ModBus
 - Ethernet

Wireless Network Topology Designs



Point to Multipoint Example





● Client Radios

Server
Radio

1 1/2 Miles

Fort Benning, Georgia

Fort Benning, Georgia
Base Wide Lighting
Controls Project

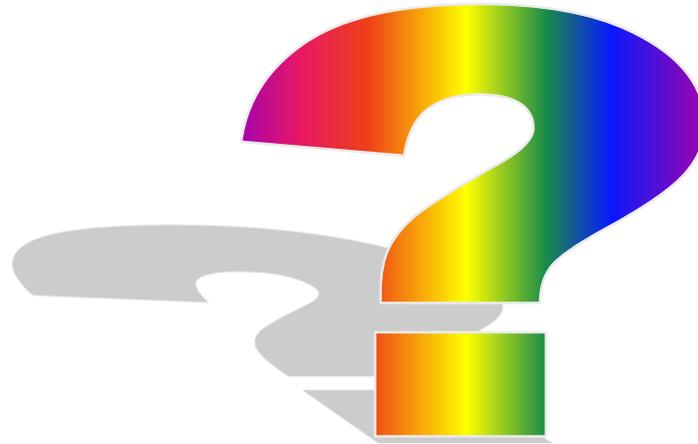
Image © 2008 DigitalGlobe

Pointer 32°21'27.07" N 84°57'31.51" W elev 321 ft

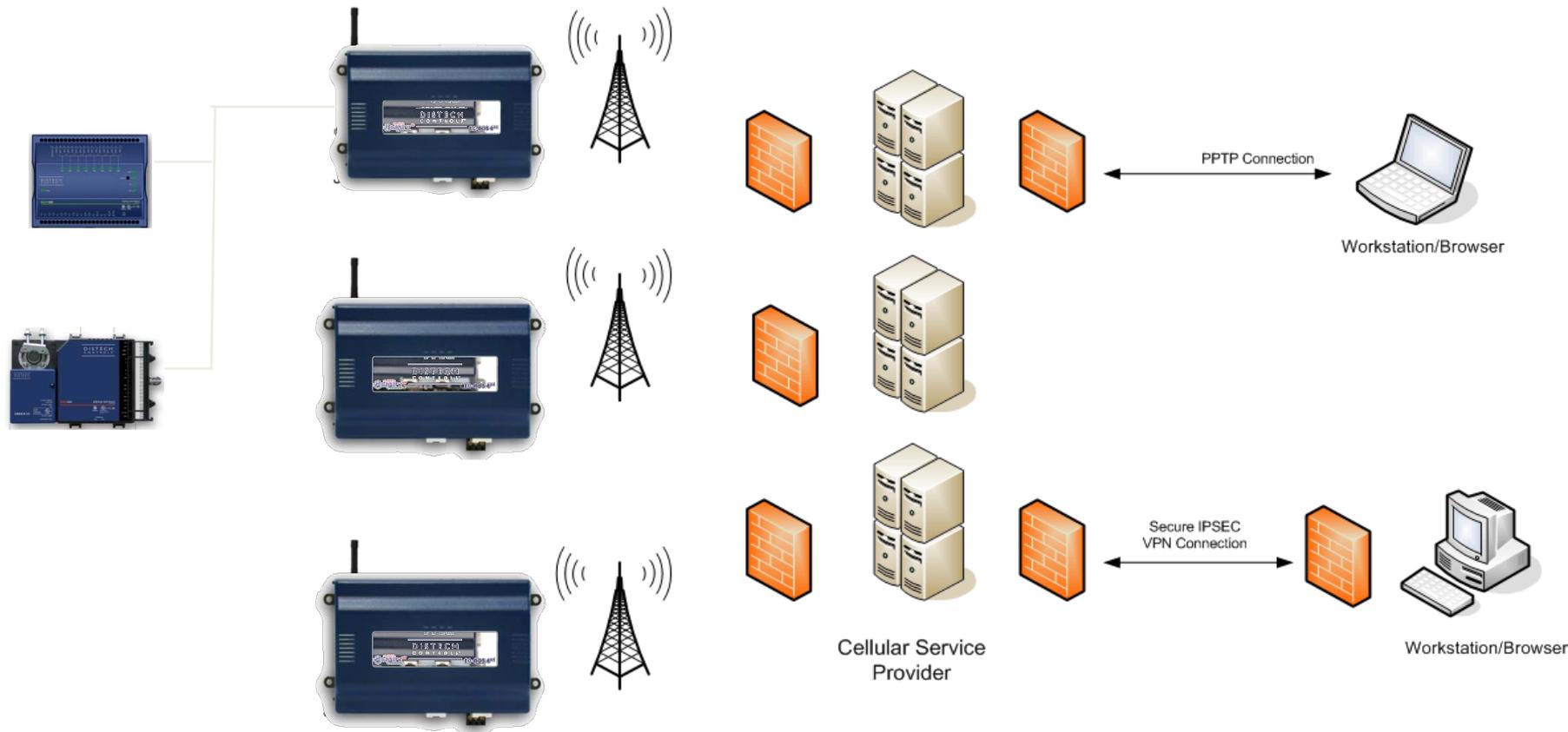
Streaming ||||| 100%

Eye alt 11750 ft

Questions On Wireless RF Networks



Wireless Networks Cellular GPRS Modem

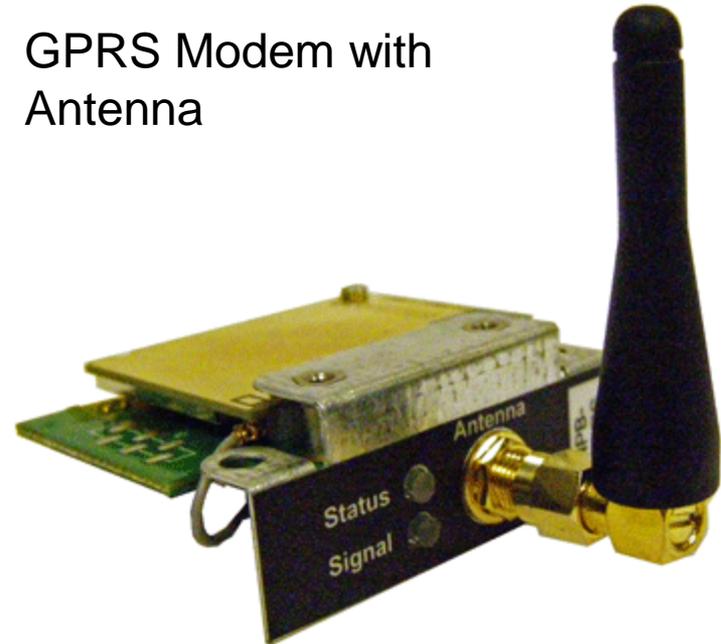


- Application – Long range communication between buildings when Ethernet communication is not available

GPRS Modem *Technical Details*



GPRS Modem with
Antenna



- GPRS Modem with
Optional Antenna Extension
- Contract services with Cell Communication provider
- Live real-time communication

Questions On Wireless GPRS Networks



Information Sources

- Wireless Sensing
 - Enocean.com
 - Enocean-alliance.org
 - Distech-controls.com
- Wireless Networks
 - Distech-controls.com
 - Aic-wireless.com