

# Doing SCADA

# Presented by

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WWOA

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# Doing SCADA

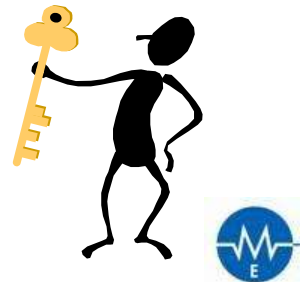


## Overview

- I. Wireless Options and Other Considerations
- II. Productivity Opportunities.
- III. Discussion of Pros and Cons of D-I-Y vs. Engineered System

# PURPOSE

- To provide municipal personnel
  - An overview of the many technological options in the world of SCADA
  - Consideration of factors that may come into play when considering a DIY approach.



# Radios

What types are out there?

- Radio to radio
- Radio to control systems



# Radio to Radio - Licensed

- UHF
- VHF



# Radio to Radio - License Free

- 900 MHz
- 2.4 GHz
- 4.9/5.8 GHz



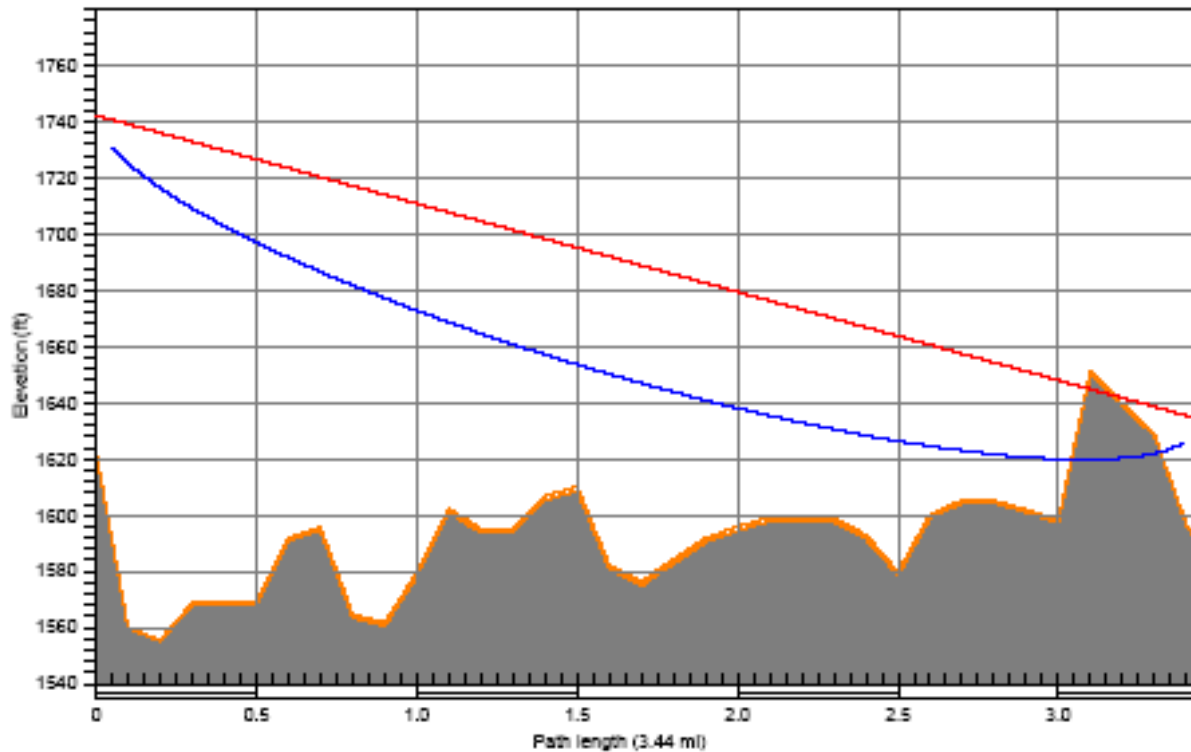
# Radio to control systems

- Serial
- Ethernet
- Cellular Band
- Wi-Fi





# Radio Path



High Street Tower	
Latitude	45 38 42.00 N
Longitude	089 25 07.00 W
Azimuth	248.56°
Elevation	1622 ft ASL
Antenna CL	120.0 ft AGL

Frequency (MHz) = 915.0  
K = 1.33  
%F1 = 60.00

Well 7	
Latitude	45 37 36.37 N
Longitude	089 29 05.00 W
Azimuth	68.52°
Elevation	1589 ft ASL
Antenna CL	45.0 ft AGL



# The Importance of a Radio Path Study

## “Desktop” Study vs. Field Study

- Seasonal Considerations
- Different radios behave differently
  - UHF
  - 900 MHz
  - Ethernet



# Types of Networks

- Public
- Private
- LAN
- WAN



# In-Plant or Local Area Network (LAN)

- A **Local Area Network (LAN)** is a computer network covering a small physical area, like a home, office, or small group of buildings, such as a school, an airport or a water/wastewater treatment facility.



# Wireless Instruments

- Process Monitoring
  - Flow
  - Level
  - Pressure
  - Temperature



# Wireless Instruments

- Weather Station



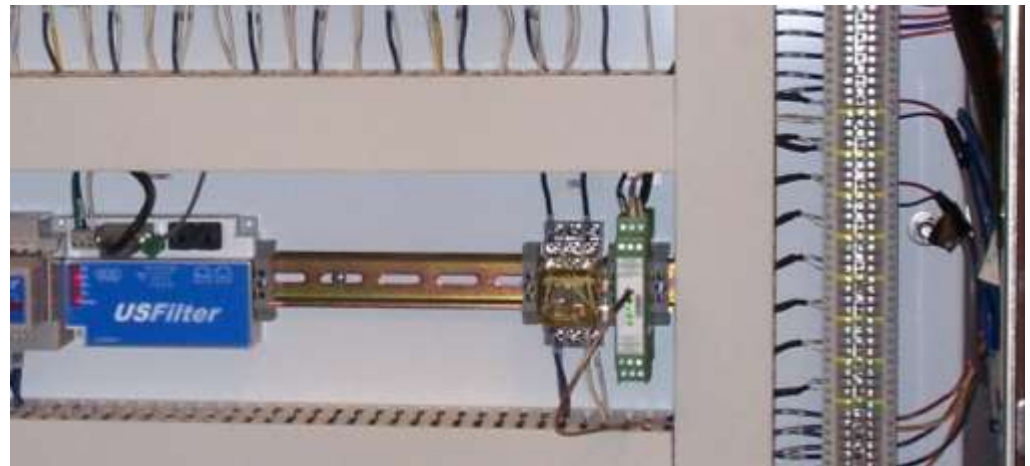
# Wireless Instruments

- Cameras



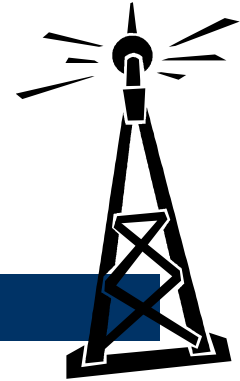
# Wireless In-Plant

- Wireless I/O
- Conventional telemetry radios - for SCADA expansions at existing facilities without cable/fiber
- Wi-Fi





# Wide-Area Network (WAN)



- A **Wide Area Network (WAN)** is a computer network that covers a broad area, that is, any network whose communications links cross metropolitan, regional, or national boundaries.

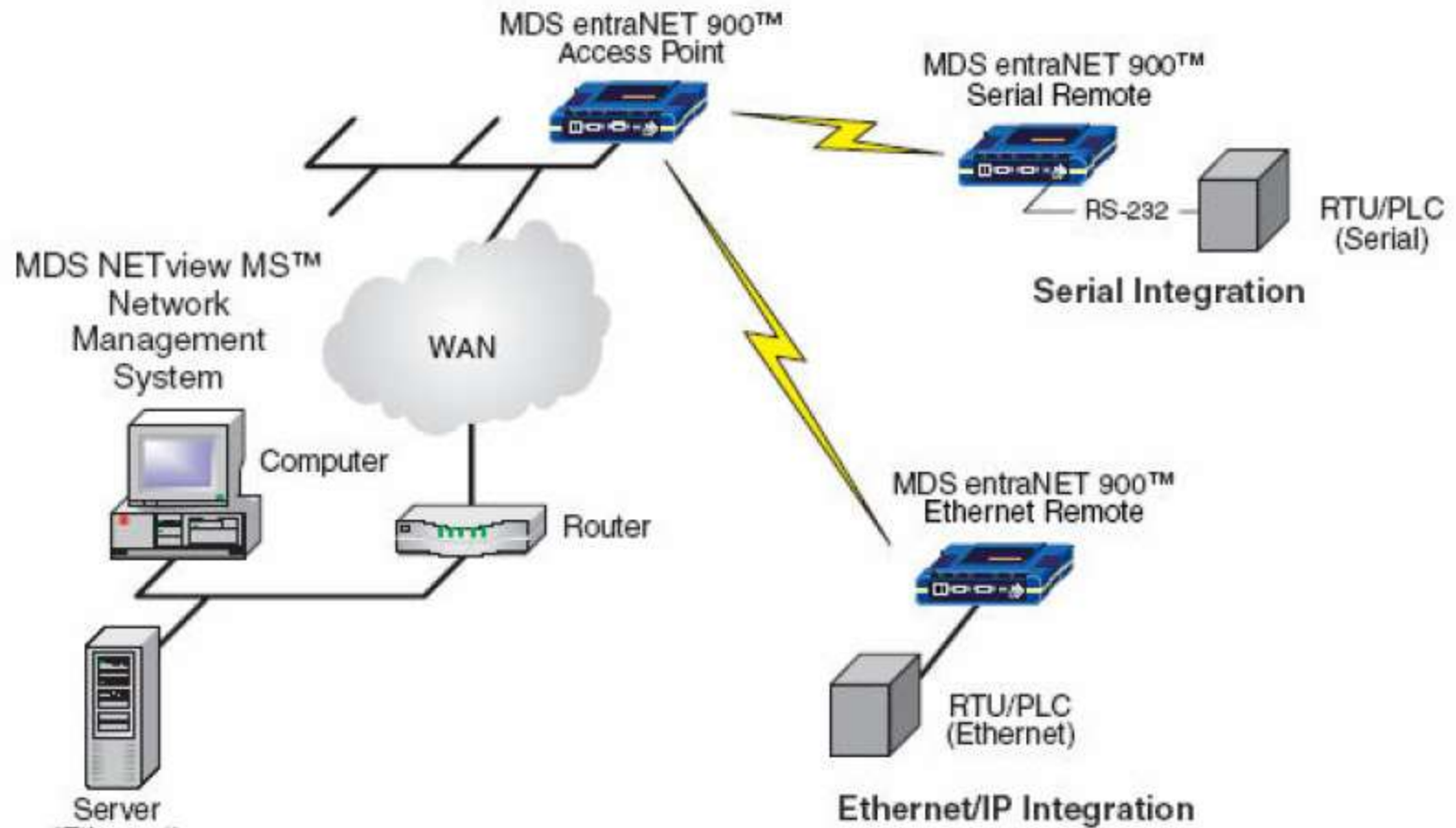
WANs connect towers, well houses, and Master control units.

# Wide-Area Network Radio Types

- Serial
- Ethernet
- Cellular Channel
- Ethernet Mobile



# Typical WAN Utilizing MDS Radios



# Expanded/New Technology



- Wi-Fi Equipped handheld devices
- Ethernet Radios in Mobile applications
- Laptop/Notebook/Netbook access via Cellular Modem
- SmartPhone based Access



# DIY Options

- 900 MHz radio network based
- More like the engineered systems, but components and radios are essentially “pre-engineered” with fixed I/O.
- Can be configured with a Master.
- Can be configured with PC based visualization software and reporting.
- It can't be that hard, can it?



# 900 MHz Radio Based

- SCADATA is an example



# Cellular Based / Cloud Systems

- Pre-engineered units installed with fixed I/O
  - Status of I/O is transmitted via Cellular service to the System central monitoring location.
  - Reporting/Status available via Internet connection to the central monitoring location.
  - Real-time status, Alarm Dialer Functions, Reporting Functions available.
  - Monthly fees per site based on cellular data demands (daily/alarm only, or continuous real-time).



# Cellular Based / Cloud Systems

- OmniSite (Crystal Ball) and Mission Wireless are examples.





# Productivity Improvements

- The greater variety of communication channels, many built on existing technology, provides more options for placing information and real-time access to the SCADA system into the hands of operators and supervisors.



# Performance Improvements

- Well designed systems are not simply exercises in gee-whiz technology.
- Properly designed they are systems which use the technology best suited to the application and provide precisely the right information for operators and supervisors.



# Real-Time remote access to System SCADA

- 



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# Real-Time remote access to System SCADA



# Real-Time Operational Monitoring

- 24/7 remote access to monitor plant/system operation.
- 24/7 remote access for alarm notification and response.





# Real-Time Operational Monitoring

- Immediate access to security status of remote facilities.
- Immediate access to camera images where remote facilities are equipped with surveillance cameras.



# Real-Time Asset Management

**Asset Maintenance**

Asset Class: **HYD - Hydrant**      Description: **Hydrant, 125 Bobola Road**

Work Order History    Custom    Components    Inspection    Child Assets    Asset Level    HMI / SCADA

Inspection History    Inspection Procedure

Date Entered	Step Group	Step Description	Value	UOM	Inspected By	Alarm	
7/15/2009	Appearance	Needs Paint	No		Ed		
7/15/2009	Appearance	Color	White		Ed		
7/15/2009	Flow	Valve Working	No		Ed	*	secor
7/15/2009	Flow	Water Pressure	195.00	GPM	Ed		
7/14/2009	Flow	Water Pressure	195.00	GPM	Ed		
7/14/2009	Flow	Valve Working	No		Ed	*	
7/14/2009	Appearance	Needs Paint	No		Ed		
7/14/2009	Appearance	Color	White		Ed		
6/17/2009	Appearance	Needs Paint	Yes		Ed	*	PAIN
6/17/2009	Flow	Water Pressure	200.00	GPM	Ed		
6/17/2009	Flow	Valve Working	Yes		Ed		
6/17/2009	Appearance	Color	Red		Ed		
6/1/2009	Flow	Water Pressure	200.00	GPM	Ed		

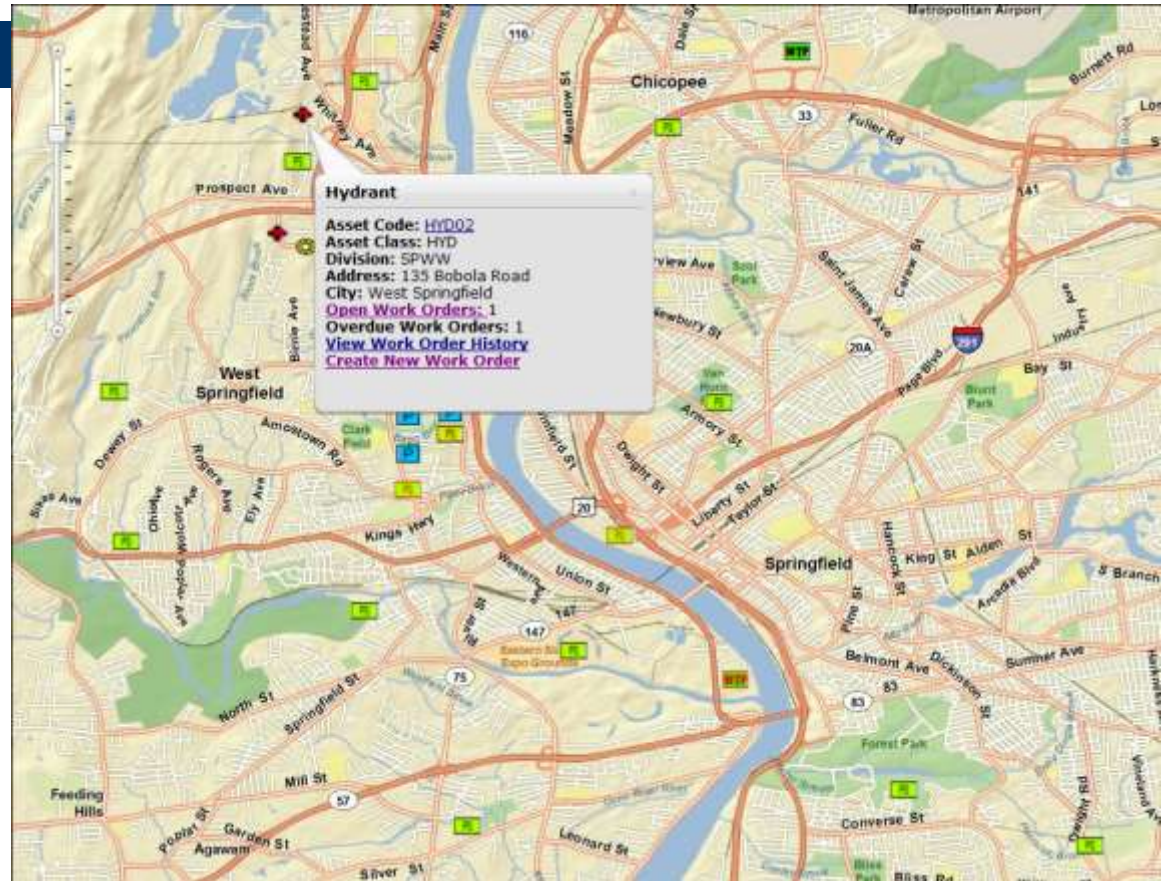
Save    Copy    Delete    Change Link    Delete Link    GIS    Print Inspection Sheet    Enter Inspection Data    Return





# Real-Time Asset Management Linked to GIS

Access to  
Maintenance  
Data from  
the field



# Real-Time Access to GIS Data

- Access to GIS data – linked to asset management database.
- Facilitate CMOM reporting and record keeping.



# DIY or Engineered System

- Simple needs to monitor a limited number of locations and conditions
- More complex monitoring and control needs over a wider area.
- Availability of Staff time an opportunity cost of that time.
- Documentation of the Systems.
- Industry standard components or proprietary.
- Total System Cost, accounting for staff time.
- Staff turnover and impact on long term support.
- Security vulnerability
- Uptime, reliability in adverse weather.
- Thorough analysis of needs and options



# Conclusions

- SCADA systems can be fairly basic, or very complex.
- Some applications may lend themselves to a DIY approach.
- Risk and opportunity must be carefully weighed to decide what is best for your system and community.





- Any questions?

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for a copy of this presentation.



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