Hybrid SCADA Communication

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Presentation Overview

Topics Discussed:

• Network Types
• Communication Devices/Types
• Typical O & G Installations
• Market Trends
• Questions and Answers
Network Types and Topologies

There are different types of network:

- LAN (Local Area Networking)
- WLAN (Wireless Local Area Networks)
- WAN (Wide Area Networks)
- MAN (Metropolitan Area Networks)
- CAN (Campus Area Networks)

And many more – PAN (personal area network), FAN – Field Area Network (Electric Utilities use this one)...
Network Topologies

Bus or Serial with hubs off the line

Rings are used a lot for Microwave links with FDDI

Star or Wagon Wheel – Master or Access point in middle of Network

The most common network protocols are:
- Ethernet
- Local Area Network
- Token Ring
- FDDI
- ATM
- Modbus
- ProfiBus

The following is some common-used network symbols to draw different kinds of network protocols.
Microwave Ring with SCADA Master
Old pad or RTU site

Old Pad Site
- 1200-9600 bps
- MAS or ISM
- Single Company or asset
- Vertical well

One well per pad
One radio and RTU/EFM/PLC per pad
One set of production facilities per pad
One plunger lift system per pad
One gas meter per pad
One or two tanks per pad
Old 1200 To 9600 Analog Radios

- Analog radios
- Licensed UHF frequency
- 1st gen. Bell 202 modems
- High power consumption
- Slow transmission 1200 to 9600 Kbps
- One repeater per network
Legacy Hybrid Network

Mixed Use

- 450Mhz UHF, ISM and MAS 900MHz
- 450MHz Voice
- Several mfg. and technologies
- Phone/Fax
Today’s new pad or RTU site

New Pad Sites
- Multiple wells
- 4 to several with horz. drilling
- Multiple company’s have assets
- IP, WiFi and Video

Higher data volumes
Faster polling for real time information
Greater demand for well optimization
IO, WiFi and Video may be used with SCADA
Greater need for minimizing downtime
Greater need to maximize manpower
Today’s new pad or RTU site

IP/IT Driven

- Ethernet based
- Speed
- Serial and IO over IP
- High Speed backhaul and cell bridge in remote areas

Ethernet data with VLAN, Routing, etc.
MAS and Non-licensed ISM band frequencies
Ethernet and Serial ports – terminal server
57kbps to 8 + Meg throughput
Faster polling/ping times
Low power consumption still needed - Solar
Unlimited repeaters in a network
Wireless I/O (Modbus TCP or Modbus RTU)
Typical Pad Radio Communications

Diagram showing the setup of radio communications at a pad site, with components such as a Coget IP polling host, enterprise router, and various radio modules and antennas.
Other communication devices used

- IP Video Cameras and DVR’s
- Cellular Bridge
- High Speed Backhaul
- WiFi
Network Examples

LANs, MANs, and WANs Illustrated

- **LANs**: Within the confines of a room or single building.
- **MANs**: Connecting LANs from multiple buildings.
- **WANs**: Commonly connects separate offices from the same organization, whether they are across town or across the world.
Short range and Cellular networks

Bluetooth and WiFi used on pad and tower sites
Communication protocols

Layer 2 communication from RTU/PLC to backbone

Can be Serial and/or Ethernet – RS485

Should be faster throughput than the port speed of EFM, pump off controller or RTU/PLC

Low power consumption CRITICAL for solar sites

Full duplex or simulated

Full Duplex may be needed
Communication protocols

Layer 3 communication backbone end point to SCADA gateway to the field or Network

Consolidates multiple layer 2 applications

High speed Ethernet or microwave

Must be higher speed than layer two

SCADA bandwidth at least 1-3Mbps

Long range (30 + miles) with 1Mbps
Software Defined Communications

Truly software defined – Network, Radio, Serial and IO

Ability to have 900MHz ISM and MAS in one Radio

IO and expansion IO with each channel software defined and user selectable

Open Linux based operating system

OTA and Access Point to Remote updates

Mix use of freq. and modular components
User selectable Freq. use

Communication systems today consist of many different technologies and types –
Mix use of RF – VHF, UHF and Microwave
Almost every company has cell systems somewhere
Video and WiFi deployed and even expected
Oil prices causing consolidation – one cell bridge with several ISM radios, short range wireless IO, mix use of licensed and ISM bands and need for Network Management Software to view remotely
Summary

”Lot’s of legacy hardware that is still in use”

Move to Ethernet – terminal servers and routers

Pico networks: 40-50 remotes per A/P instead of several hundred remote sites

Network design is critical – better planning

Onsite assistance often needed and IT support

Must be expandable and scalable from day one and ability to interface and communicate with several types of communication gear.
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