Methods of Gathering Electronic Gas Measurement Data

Russell M (Rusty) Fields

Weatherford, Int'l
1040 Schilipf Road
Katy, TX 77493

INTRODUCTION

To understand and improve success in the collection of SCADA and EFM data you must first understand what's in the field, their frequencies and communication methods.

Frequency ranges typically utilized in the field are 900 MHz and 2.4 GHz. These frequency ranges were released as "junk band" or public use by the FCC in the 1980's and 1990's. These frequencies were adopted by everything from cell phone manufacturers, wireless home phones, two way handheld radios and many more.

Statistics indicate that there are currently between 750,000 and 1,200,000 radios deployed in the oil and gas fields across the U.S. and sales expectations for 2013 are upwards of 100,000. Compound this into 2015 and we near ½ Million new devices in the last 3 years.

As the frequency increases the signal become easier to deflect so as you move from 900 mhz radios to 2.4ghz or even up to the 5.2 ghz range you can expect to deal with more signal deflection and interference from towers, tree's, rain buildings etc. Simply put, the signal is easier to block and redirect than the older 900 mhz range. Note the loss of Satellite during a heavy rain!

Radio technology is now making it easier to select a frequency and port, and maintain it. However, many installing radios continue to use the default RF network and ports. This causes adjacent properties to conflict with each other because they constantly try to negotiate and establish connections with sites that are not within your companies operation. A radio "traffic jam"!

Our world is never perfect!

In a perfect world, each company in each field would have their own assigned IP's, TCP port range and RF network frequency range.

But since we don't live in that world, one company will pick ranges that work for them, and place towers and repeaters as they require them. Many times this increases the failure rate for another company so they make changes or add repeaters etc.. and the fight continues perpetually. Signal to noise ratios decrease shortening RF range and increasing failures.

So what can you do to mitigate the problem?

- Review templates for data being requested that is unused in the point schema and remove.
- Count those bytes…know what is going out and coming in! LOAD BALANCE
- Monitor request response times, transaction sizes, retries and trend for degradation and predictive failure monitoring.
- Understand the environment you are working in and streamline your RF network to avoid conflicts with neighboring properties.
- Think creatively about statistical data reporting and monitoring.
- Monitor and track scheduled tasks and reduce overlapping requests.

Non-SCADA Measurement Collection Methods to consider as backup alternatives.

Manual laptop or Flat file collection and import to SCADA or Measurement.

OPC collection engines like Kepware, AutoSol AES, CygNet OPC. Totalflow TDS etc…

Company specific standalone software like WinCCU than can create SCADA import files.,

ISM band Statistics

- 1.5 Million radios currently in the field with per year sales of 100,000+ (900 and 2.4ghz frequency range)
- Add to this all cell phones, wireless wifi, bluetooth and other devices on the public bands still in use since 1985.
- The number of RF devices now climbs into the billions and continues to climb by millions every year!

Why Everything Wireless Is 2.4 GHz From WIRED Magazine By Gizmodo

"A glance at FCC regulations confirms any suspicions. A band of frequencies clustered around 2.4 GHz and recently added higher frequencies, have been designated no license required or ISM bands.

This band is used not only in O&G but also in the Industrial, Scientific, and Medical radio bands. "A lot of the unlicensed stuff — for example, Wi-Fi — is on the ISM frequencies, with the ISM bands you don't need a license to operate on them.

Ira Kelpz, Deputy Chief, Office of Engineering and Technology at the FCC, explaining precisely why these ISM bands are attractive to gadget makers: They're free to use. If routers and cordless phones and whatever else are relegated to a small band 2.4 GHz, then their radio waves won't interfere with, say, cellphones operating at 1.9 GHz, or AM radio, which broadcasts between 535 kHz and 1.7 MHz.

Wired magazine quote

"The ISM is, in effect, a ghetto for unlicensed wireless transmission"

This is our most common communication frequency range in use today!

The question is what can be done about it?

Is a digital oilfield the answer?

What you should be doing today!
➢ **Know your data priority and timing in your configuration to improve efficiency.**

➢ **Track communication statistics that allow you to visualize the outside world. This will determine and measure the success of your changes or implementations.**

➢ **Monitor and alarm for predictive failures before they become down time!**

➢ **Learn about digital oil field specifically Bluetooth and WIFI technologies**

The answer to one of the most common questions!

What do is meant by digital oilfield?

I think the simplest answer is that the field devices become a part of the corporate network as opposed to it being external like it is today. So you would have ethernet connectivity from the SCADA host server all the way to the field device.

By doing this you are provided a higher level of security and performance monitoring.

It is much like AT&T managing your home router, firewall or Television control box from their offfice. Your Home Television is a device now on their U-Verse network!

Today our industry is rapidly transitioning from the dustributed radio style network being polled over master radios and IP / Cell modems to getting TCP/IP and Ethernet to the field device level.

Having this connectivity in the field opens the door for not only SCADA and measurement data but also security cameras, field side network security, file pushes to and from the field such as flash software to devices, email to the field tech. The field tech could have access to the intranet, internet, ftp sites etc… from the field site. And last but not least voice over IP for field services.