EFM Data Communications
Problems and Solutions

Jackson Kyle Bates
Measurement Supervisor
Williams Midstream, L.P
525 Central Park Drive Ste. 1005
Oklahoma City, OK 73105

Introduction

The purpose of this paper is discuss various methods to mitigate experienced problems when it comes to measurement data collection and discuss possible solutions. I think there is great benefit in providing a current state summary of measurement data collection as we sit today and discuss how technology and metrics are continuously being utilized to help shape the future of remote measurement data collection in the Natural Gas industry.

Current State

When it comes to troubleshooting EFM Data Communications problems, many companies undoubtedly start with the end device or RTU often requesting a technician drive immediately out to diagnose the issue. Once the technician visits the site and preforms all the checks he or she knows to do, the task and its status is communicated to a corporate SCADA or IT group for further review and signoff. This process of troubleshooting is often duplicated multiple times before a root cause is identified and corrected. The identified root cause may or may not be attributed to the end device. This reactive approach may be necessary for some occasions but I have found continuous monitoring with metrics and application tools may enhance any company's ability to identify problems earlier than originally acted upon. This continuous, automated review will allow any company the ability to more quickly identify a root cause of the issue, mobilize resources and request the correct team address the issue leading to a more timely solution.

Metrics for Measurement Data Collection

It is my opinion that metrics should be an essential part of any company's strategic business plans and continuous improvement processes. In gathering and analyzing strategic and specific metrics, a company can better position themselves to make the best decision possible. I feel there are quite a few metrics that may be gathered and analyzed from any existing Data Acquisition system to ensure the system is functioning at top performance. Any company may also use any gathered metrics to further define requirements for data usage to formulate further improvements or suggested enhancements.

Suggested Data Acquisition Metrics:

Communication Percentages

- Real Time Data Polls
  - Percentage successful polls
  - Percentage of unsuccessful polls
- Measurement Data Polls
  - Percentage of successful polls
  - Percentage of unsuccessful polls
- Communication Stats by area
  - Evaluate communication stats to determine dead zones
  - Review data to ensure all end device communication requirements are met

Asset Review and Modeling

- Issue Tracking
  - Talley of most common issues by Device, User and Area
  - Evaluating trends and reviewing on a scheduled frequency
- Meter Status Review
  - Establish a consistent review of meter status to ensure polling is set accordingly
  - Develop process to review status updates on a regular basis

- Data and Metric Modeling
    - Regression Analysis for estimating relationships among key variables
    - Formal Metric reporting and review using compatible tools
- Asset Management
    - Locating and tracking assets based on Serial #'s and IP addresses
    - Ensuring assets are commissioned and de-commissioned properly

Modem Lifecycle Considerations

When the shale gas revolution began around 10 years ago, there was a demand to set new EFM equipment at a pace not seen before in our industry. In order to meet this demand, measurement and SCADA groups were scrambling to come up with a way to collect measurement data in areas that were just starting to be developed and didn't have any established communication infrastructure in place. Many companies began deploying cellular modems in mass to keep up with the demand. Cellular modems were relatively inexpensive to purchase and could easily be configured and deployed. This also gave companies a way to establish a fairly reliable means of communication without having to spend the upfront capital to build out a costly and time consuming data communication infrastructure. Ten years later, many companies have opted to leave the cellular modems in place causing some unforeseen issues to arise. The first issue to discuss is continued cellular service charges. When the cellular modems were originally set, capital budgets were bountiful and money wasn't as much of a consideration. Now that drilling has slowed down quite significantly, companies are realizing the benefit of changing the modems over to a private radio network for cost savings. Second, many companies' utilized large national carriers for cellular service such as AT&T or Verizon. The industry quickly realized that modems commissioned through the large carriers were not considered priority and were often subject to prolonged outages. This was a huge issue when monitoring safety sensitive measurements. Third, the industry identified issues with security when mapping modems with public IP addresses onto a private company network. There has been a push by both the industry and cellular carriers to generate cellular modem IP addresses used in oil and gas applications on a semi private network to protect the company's assets and servers. There has also been quite a bit of movement toward creating private 4G/LTE networks for the industry to ensure their measurement data is treated as priority and to also ensure security. Fourth, as the configurable functionality in cellular modems have evolved over the years, many companies are experiencing issues with inexperienced technicians altering configurable settings which enhance functionality. This essentially creates more risk in the IT software environment. An example of this would be the improved layering capabilities in modems in setting tiers of communication.

System Design

When discussing problems and solutions around EFM data communications, we must discuss the current system design so to ensure an inefficient or complicated structure isn't causing all the problems. Often a system that is pieced together through acquisitions or multiple stages of implementation will cause numerous problems due to incompatibility leading to patch fix scenarios. In regards to new build outs, companies must consider their data acquisition requirements so to ensure a system isn't over or under engineered. There is often an effort by IT or wireless groups to deploy the latest and greatest technology with an attempt to justify the cost by touting enhanced functionality. There is also a demand to ensure site security is on the forefront of any project but this usually comes at a cost and is an added functionality requirement. I have populated a few things to consider when evaluating a current or new communication system below.

- Will any new or existing communication network require an engineering team to install and support the asset?
- Will any newly acquired software and end devices work in conjunction with existing software in its current state
- Are the technicians responsible for maintaining the assets adequately trained?
    - If not, do you have a training program in place?
    - Has this been allotted for when evaluating the build out of communication infrastructure
- Have you gathered all requirements from key stakeholders during planning of any communication infrastructure buildout?
    - Ex. Site Security, Measurement, SCADA, IT, etc.

Conclusion

I would like to say that due to the ever changing technological advancements in today's environment, it is important to realize where our industry has been in order to understand where we are headed by way of EFM data communications. Due to the downturn in our industry, it is even more important to leverage new technologies to ensure all remote measurement data collection is done as efficient and cost effective as possible. Your company should leverage the knowledge and skill of an advanced IT/Wireless communications group coupled with network engineers working alongside SCADA and Measurement to ensure the most accurate and cost effective equipment is placed onsite for data collection. With all groups working together, a system and process may be realized that ensures remote communication and data collection will be achieved and monitored so that costs are kept at a minimum without jeopardizing performance.