

BIOGRAPHICAL INFORMATION

**Pat W. Drinnan
Supervisor, Mapping & Facility Records
Aquila Networks Canada**

Specific Responsibilities

Pat is the Business Unit owner of the AM/FM System. He is responsible to all end users of the AM/FM system to ensure they can utilize AM/FM to meet their business needs. In this capacity he is the major customer to the IS Department, identifying and supporting changes, new enhancements, applications or functionality's that are required. Pat is Project Manager for the delivery of Aquilas' AM/FM application. He also, acts as owner for Field View and WebMap, responsible for leveraging these technologies throughout Aquilas' T&D field organization.

Past Experiences

Pat has been with Aquila Networks Canada (formerly TransAlta Utilities & Utilicorp) for 34 years in various positions from Engineering Technician to Area Business Supervisor. He spent 20 years in the engineering design sections of UtiliCorp, was involved with the first Automated Mapping system which was started in 1978, as user representative helping with the original specifications. He also, served as user representative to develop the specifications of the AM/FM system from 1986 through to 1988. He then supervised the conversion and migration effort from the AM system to AM/FM from 1988 to 1992. He took over his current role as Supervisor of Aquilas' AM/FM production system at the end of conversion in January of 1995.

Professional Memberships

GeoSpatial Information Technology Association

Asset Management 101 Field Driven....Field Enabled!

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ABSTRACT

This presentation will provide an overview of Aquilas' mobile solutions. The paper will explain how our Maintenance Planners and PLT are using our mobile mapping solution to provide the necessary digital data to drive our yearly Maintenance Programs. How our two Maintenance Planners can cope with all this information, the criteria they use in analyzing and prioritizing the work and finally the development of the yearly maintenance plan for our entire service area. Then how the Linemen are enabled to utilize this same data and manage their work, completing the actual work cycle. I will demonstrate how simple it is for both our field and Maintenance staff to enter data, produce useful reports, analysis this data and complete the work cycle. How outage reports and information drive our Maintenance Program of 'Worst Performing Feeders' each year. These procedures have allowed us to increase our Maintenance budget for Operations and Maintenance from \$19M to \$29M with our existing staff. Having accurate, consistent data available immediately and using consistent standards allows us to produce a very effectively Maintenance Program. Ensuring the limited Maintenance \$'s are spent where they are required the most and ensuring continuous improvement in Reliability and Customer Service.

INTRODUCTION

Aquila Networks Canada is an investor-owned electric utility in Canada with over 100,000 kilometers of transmission and distribution lines in two different service areas. An Alberta service area of 220,000 square kilometer with Distribution facilities only and a BC service area of 25,000 square kilometer with Transmission and Distribution facilities. The AM/FM System models Aquilas' entire electrical network, in both graphical and pure data representations, with true connectivity. It links installed distribution and transmission facilities (185,000 transformers, 900,000 conductor segments and over 1 million poles, among others), to actual geographical and customer information, within this integrated model. Our AM/FM model contains over 30Gb of electronic corporate information.

The key to any successful software / hardware implementation is having end-user acceptance. This means field staff willingly use the system and actually look for ways to use these tools even more extensively. Aquila Networks Canada has not only succeeded in meeting our intended outcome but has gone beyond our expectations. The Field Staff have developed a sense of ownership in both the software tools and more importantly the data.

With the implementation of Aquilas' mobile technology the paybacks promised in the original business case are now finally starting to be realized. This has drastically improved the image of our AMFM system. Everyone from Senior Management down now speak in glowing terms of its value and accomplishments. Overnight it has gone from a system that was a deep dark money pit to one of three mission critical enterprise systems that the corporation cannot operate without. The field staff now, utilize this mobile technology as their only source of facility information and have come to trust it completely. If the field staff come across errors they willingly send in corrections and these corrections are completed immediately for them to see and use. This has created a great deal of faith and ownership in the data by the field staff.

Aquilas' mobile technology is now being used as a full Distribution Asset Management System. This is a fully integrated electronic solution that has had a tremendous positive impact, in terms of reductions, such as cycle times, printing, plotting, data translation, and facility checking. The field staff can record all information required against the actual Distribution facilities right at the source in the field to manage each piece of plant through its' entire life cycle including the retirement of the facility.

We chose a commercially available Viewer / Red-liner application from Intergraph called FRAMME Field View. This product was enhanced and customized to support a set of specific business workflow requirements for Aquilas' Network Operations field staff. To leverage Aquilas' investment in technology even further we interfaced a GPS unit to not only our Field View map but to the Dispatch department near real time via CDPD through a Sierra Wireless modem.

The Mobile technology now provides easy to use functionality, directly into the hands of field staff at job sites remote from the master model. Our delivery includes powerful search tools, display controls, intelligent redline features and specific customized work tasks. Allowing the field staff and contractors to directly input data for Pole inspections, new service layouts, ground testing, line patrol, outage statistics, and capital retirements directly into other corporate system. Our approach results in all users working directly within the same master model, with identical views and comprehension of the represented facilities.

ASSET MANAGEMENT SHIFT

Aquila has undertaken a major shift in the way we handle the Maintenance functions for all our Distribution facilities. This Maintenance work has been centralized into an Asset Management department within the head office. This has given the Maintenance Planners an overall view of all maintenance activities within the corporation and allows for consistent standards to be applied throughout our service area. In the past Aquila would have the District Managers from each of the 58 service points, all put together their requests for maintenance dollars for the next year. These would seldom have any concrete facts or evidence supporting the need for these maintenance dollars other than the word of the District Managers submitting the request. These maintenance requests would be sent in to the five regional Senior Engineers. These five regional Senior Engineers were given a budget of maintenance dollars for the next year. Based on these budget dollars the regional Senior Engineer would evaluate the requests and make a decision on each request to approve or not. This method would evenly split the budgeted dollars not only between the 5 regions but generally between the 58 service Points as well. However, the philosophy of the 'squeaky wheel gets the crease' usually prevailed and the more vocal District Managers would have more than their fair share of the next year Maintenance dollars approved. This method was certainly flawed, as there was no tie to system performance or to any detailed analysis of the maintenance work being undertaken. It could not possibly ensure that the limited maintenance budget dollars each year are spent in the areas that required them the most or where the distribution facilities are in the worst condition.

The new Asset Management process has changed significantly with the use of digital data readily and easily available. There are now only three Maintenance Planners that basically prepare the entire Maintenance Plan for the entire service area for the following year. They receive information from all of our 200 Power Line Technicians in the field, which gives them visibility to the entire service territory, not just a region. This ties the Maintenance Program directly to feeder performance using outage reports and detailed line patrol information to determine the '15 Worst Performing Feeders' each year. Using these new procedures since 1999 has allowed us to increase our Maintenance budget for Operations and Maintenance from \$19M to \$29M without increasing our existing staff. Having accurate, consistent data available immediately and using consistent standards allows us to produce a very effectively Maintenance Program. Ensuring the limited Maintenance \$'s are spent where they are required the most and ensuring continuous improvement in Reliability and Customer Service.

WORST PRREFORMING FEEDERS PROCESS

The selection of the worst performing is not strictly a quantitative calculation and result. A cross-functional team meets to evaluate all aspects of feeder performance and identify the worst performing feeders, the problems and the solutions. Representatives from Planning, Maintenance, Reliability, and Networks Services review the following statistics.

1. Customer- hours of interruptions
2. Number of outages
3. Feeder criticality
4. Number of customers fed on the feeder
5. Momentary Trips on protecting devices (Breaker, OCR, ect)

The first step is to run a report out of our corporate DOSS (Distribution Outage Statistics System), which is a simple VB application. They choose a report for the entire service area, then specify a time period (Jan 1 to Dec31) for the report and run. Within seconds they have an Excel spreadsheet report with all the information that they selected. The report identifies Customer-hours of interruption, number of outages and the total number of customers on each of our 450 feeders. The team then starts to review the worst 25 feeders. If there are any large outages that are over 1000 customer hours of interruption, they look at the actual outage to determine outage cause and component failed. If this was a 'major weather occurrence or public interference event' it will be excluded from the statistics, as maintenance will not remedy these types of outages. After reviewing all of the above statistics on the 25 feeders, the team uses its collective experience as well as the statistics to identify, which 15 of the worst 25 are in the greatest need and would provide the largest improvement to Reliability and Customer Service.

CAPTURING DATA DIGITALLY

The key to our Asset Management planning is easy access to accurate, detailed digital data. Our Power Line Technicians or PLT's are responsible for entering every power outage on our electric distribution system both planned and unplanned. As well as all repairs required to every distribution facility.

1. Distribution Outages

First the PLT brings all of the facilities on the map for his current location by using one simple keystroke he presses Shift F4. This "Locate GPS" function uses the GPS unit in his vehicle, recording his GPS location and centering the map around the actual location of his truck in our mobile mapping system called Field View. He then captures Aquilas' DOSS (Distribution Outage Statistics) using a function called "DOSS". The PLT presses the F6 key and the dialogue box appears it lets him record the 'Time Off' and 'Time On' by simply editing the present time, which is displayed in both of those fields. He then chooses the 'Cause ' and 'Component

Failed' from pull down menus. Finally, he traces the circuit starting from the failed feature or device. This ensures very complete and accurate information on kilometers of line affected, the number of customers affected and the RCM circuit the outage is a part of.

2. Detailed Repairs

Again, with the simple "Locate GPS" function the PLT presses the Shift F4 keys and centers the map on the location of his truck. Then the PLT identifies any and all work required along a feeder utilizing the detailed "Line Patrol" function in Field View. The "Line Patrol" function is a very simple and easy to use function for the PLT. It has pull down menus and virtual all input is point and click. The PLT not only records the action required to maintain this feature, he gives us a priority using an established criteria and the resources required (equipment, man hours and access) to do this maintenance work. We have also provided a comment field for any information that is not conveyed but the pull down menu selections or the point and click choices.

At any time throughout the workday the PLT can then send this information into the corporate system. He does this by logging onto the network either in the Service Point office or at his home via modem. Once logged onto our Wide Area Network he simply pushes a button in Field View called "Send Packet to Sever". The packet is sent to the server into a folder called Incoming and then there is an automated routine that runs every two hours that updates the database with no other human involvement or intervention. Thus, within two hours the data that the PLT has recorded will be entered into our corporate oracle database and available for everyone in the enterprise to review or use.

The PLT now records this information for three basic reasons. First his admin help is gone so there is no one else to do this task and it is very simple and easy to record. Second it is very useful information when a customer is complaining about their service reliability or wants information about reliability for a specific area. Finally and probably most important is that our limited budget dollars each year are primarily being spent on our '15 Worst Performing Feeders'. These outage statistics are used to determine the '15 Worst Performing Feeders'. Thus, if he has no statistics, his area will not qualify for the budget dollars even if his feeder was actually one of the '15 Worst Performing Feeders'.

DEVELOPING THE MAINTENANCE PLAN

Once the '15 Worst Performing' feeders are established the next step is to gather detailed information on each of these feeders. First they run a detailed outage report for each feeder that gives them location of each outage, outage cause and the component that failed in the form of an Excel spreadsheet. They also produce a thematic map that shows exactly where each outage is along the feeder and finally they produce a Detailed Line Patrol report that gives them all of the detailed work required on each of the 15 feeders. These reports and maps are the same ones available to anyone in the corporation and are easy to create by using a simple VB application from anywhere on our corporate WAN. The next step is to involve the

Field Staff for input. A meeting with the Service Supervisor and Power Line technicians from the Service Point responsible for the feeder is held. This allows the Field Staff to see the data that has been gathered and help to identify specific problems areas and solutions that they would recommend. Involving the field staff this way serves two main purposes they see how important the data they capture is and how it is used. As well as giving them a sense of value by being involved in both the final analysis and development of the solutions or Maintenance Plan fro their area. The next step for the Maintenance Planner is to estimate the costs of the solutions and get approval to proceed with this work. They then manage the project to implement the corrective actions or solutions. The final step is to monitor the feeder the following year to ensure that Reliability and Customer Service have improved and that the Maintenance Plan and proposed solutions are fact working and effective.

COMPLETING THE WORK CYCLE

Aquila built a function in Field View to help either the PLT or contractor manage the work being sent out via Dispatch. Whenever possible the work is sent out on Excel spreadsheets. These have an IPID or unique identifier on each piece of plant or equipment that needs work. Once the Excel spreadsheet is on the PLT's or contractors hard drive they use a function in Field View called "Hi-light Repairs". This asks the PLT to select a spreadsheet anywhere on his hard drive. He must also specify a column and row to start the search from and a hi-light option. The Field View will compare the feature IPID (unique identifier) on the spreadsheet with features in his area once it finds a match it goes to the next feature. Once it has found all the features that require work it will hi-light these features in his current view. At a glance the PLT can now plan all his work in the area saving a great deal of time and effort. Previously he would have had to locate these problems one at a time not really seeing the overall work required for his area, unless he plotted these one at a time by hand. He can then either refer to the spreadsheet or query the feature in Field View for the repair details. Once he has completed the work he indicates this in Field View against the actual feature. This then tells the Maintenance group, electronically, that the work is completed. As well as updating our corporate record in a timely and accurate manner.