



# Reducing Operation Costs With Better Monitoring & Control of Transmitter Facilities

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# How it was

- FCC Requirements

- Live operators at transmitter facilities
- Meter readings on a regular schedule
- Ensure compliance with FCC rules

- Equipment Checks

- Monitor the equipment visually
- Equipment was less reliable and required more maintenance than the solid state boxes of today

- Engineers were responsible for fewer transmitters



# How it was

- As transmitters became more reliable
  - Remote control was permitted
    - At first wired to the studio
    - Typically via a dedicated telephone line
    - Later dial-up telephone remotes were allowed
- Cell phones allowed for even more freedom
  - An engineer could monitor and control with limited functionality



# Tone operated remote control

circa 1984



Making Digital Radio **Work.**



# How it was

- Did not address the need for
  - Remote maintenance
- Had limited remote diagnostics
  - Tell us if the power has moved outside limits or if the building is too hot, etc.
  - But would not provide any significant detail



# How it was

- Trip to the site (empty handed)
  - Sometimes extremely inconvenient
    - Very long drive
    - Perhaps a helicopter or snow cat is required
  - Discover that a module has failed
  - Or a component needs to be replaced
  - Costly and time consuming “process of elimination” was often used as diagnostic approach
  - Or something else requires our attention that we are not prepared for



# How it was

- After leaving site on initial visit
  - Order the required parts / assembly
  - Or gather the additional tools or test gear
- Travel back to the site to deal with the actual repair

This has been the conventional methodology  
since sites became unmanned

Until the transmitter of today.



# In comes the new

- Internet protocol (IP)
  - Becoming widely available at our transmitter sites
  - Allowing for much more information
- FCC
  - No longer requires that we constantly measure our critical parameters as long as we remain in compliance.



# In comes the new

- Smart transmitters

- The amount of information available on the control panel (remote or local) of a modern transmitter was inconceivable a few years ago.
- Learn much more about what is occurring inside the transmitter with the in-depth monitoring .
  - We now know the exact power level of the transmitter
  - Not only the output air temperature of the transmitter
  - but the heatsink temperature of critical components
  - fan speed of every fan.



# Advanced User Interface (AUI) in today's transmitter

- Sophisticated tool available via TCP/IP
- Alarm via email
- Ability to diagnose problems
- Reset alarms
- Can determine what module, power supply, fan or what part of the transmitter is having an issue.



# Advanced user interface (AUI)

- Can go to the site prepared to actually deal with the problem – on the first visit!



# A real world example

- July 4<sup>th</sup> holiday, 2009

Nautel CS were performing a maintenance check using the AUI on the tx at KCBC, a Crawford Broadcasting station and noticed a PA alarm.

Emailed Cris Alexander, Director of Engineering at Crawford advising we discovered the problem, diagnosed it as a PA module needed to be swapped out and that we were sending a replacement under warranty.



# A real world example

*“It's amazing! I had a problem with the NX-50s VSWR protection system. I arranged for Nautel tech support to get VPN access to the transmitter while it was on the air and they found the problem quickly. Then they told me what to adjust and the problem went away. This is a paradigm shift if ever there was one!”*

*KRLD - Erik Disen*



# AUI showing built in test equipment





# Prevention is the keystone

- Diagnosing a problem early can prevent more severe failures later.
- Knowing exactly what went wrong allows the engineer to go to the site fully prepared to affect the repairs.
- Can inform him by deduction, what tools, equipment or even if assistance will be required.



# Prevention is the keystone

- The AUI allows us to know that the transmitter is in compliance with regulatory rules.
- For HD radio, a built-in spectrum analyzer instantly monitors and demonstrates mask compliance and HD Radio injection levels.
- Constellation views show the integrity of the HD Radio Broadcast signal.



# Prevention is the keystone

- We can monitor the adaptive pre-correction and see what equalization is taking place, graphically.
- We can monitor analog modulation.
- On an AM transmitter we have a real time “Smith Chart” and can know if our antenna load has shifted.



# KSPN – Mike Tosch





# AUI – can save your station \$

- Eliminated the need for many thousands of dollars of test equipment.
- All available on the front of the transmitter or from any web browser, anywhere.
- Being able to check if you are in compliance can eliminate the possibility of costly fines for out-of-tolerance operation.



# Factory Support

- With proper password authorization, factory support people can diagnose a problem, recommend a solution and if needed, ship parts or modules.
- Further, we can assist the customer with special configurations and optimization.



# The reduction in operating costs comes from answering these questions

- How much money could be saved with contract engineers using this tool?
- How many staff hours can be saved?
- How many trips and dollars can be saved over the life of this equipment by cutting the number of trips to the site perhaps in half to solve problems when they do occur?



# Thank You

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