

# Migration Made Simple

## How KCMO Water Upgraded their Radio Network without Compromising Operations

Producing up to 240 million gallons of water each day and delivering it to 170,000 customers requires the Water Services Department in Kansas City, Missouri to monitor equipment to ensure it is working properly in remote locations, like water supply pump stations and pressure points. Terri Mansfield, Supervisor of the Electronics Technician Work Group, and her team rely on their radio network for continuous communication, giving them the opportunity to detect and resolve problems before they jeopardize their mission of delivering safe and reliable drinking water to the community.



To monitor and maintain communication, KCMO Water Services had relied on GE MDS 9710 radios and 9790 repeaters for many years. They utilized Modbus communications from each site in order to relay all information, through seven separate channels, back to their main hub, which hosted the master site within their SCADA system. When informed that the GE MDS 9710 radios were reaching their end-of-life, KCMO Water Services opted to replace them with the GE SD9 radio.

Backward-compatible with the GE MDS 9710 radios, the SD9 radios could continue to communicate with 9790 repeaters and were an affordable solution to replacing the obsolete 9710 radios. Alas, in the fall of 2016, Mansfield was informed that the SD9 radios would no longer be available, and KCMO Water Services would need to upgrade their entire radio network.

### THE CHALLENGE

Upgrading the entire system at once, changing out seven channels of radios, and training staff would be costly and time-consuming for KCMO Water Services. Mansfield began to research other options, and in a timely meeting with their systems integrator, Black and Veatch, 4RF Aprisa radios were suggested as a better-performing, secure, and reliable radio with a solution to upgrade their network gradually. Tom Mundell, with Logic, Inc., described the challenges Mansfield's team faced. "Terri and her team work long days ensuring that pump stations and pressure points are operational with no downtime. To expect them to change their entire communication system overnight was unrealistic. We needed to offer a solution that provided an incremental path forward." Mundell arranged a migration solutions demonstration with 4RF's Midwest Sales Manager, Joe McFadden.

## THE SOLUTION

4RF offers utilities mission-critical wireless communications between their control center and utility assets such as pump stations and pressure points. The Aprisa SR+ radios are smart, secure, narrow band point-to-multipoint radios that are optimized for SCADA and telemetry applications. This smart radio, with its compact form factor, does not require manual component tuning (no moving parts) and maintains its high-power output over a wide temperature range, thus providing reliable and robust performance.

### The Aprisa SR+ provides smart, secure point-to-multipoint communications for utility monitoring and control:

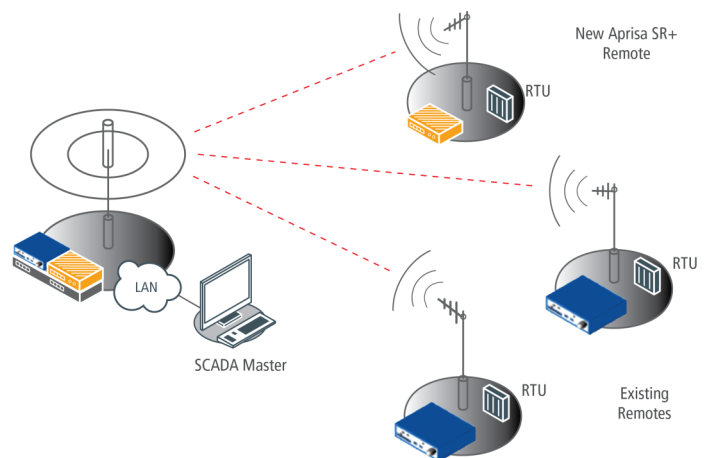
- 220 MHz, UHF, VHF, 700 MHz and 900 MHz licensed bands
- RS-232 and IEEE 802.3 protocols with multiple port options
- Software selectable: 12.5 kHz, 25 kHz, and 50 kHz channel sizes
- Software selectable single / dual frequency selection
- Software selectable dual / single antenna port operation
- Gross data rates up to 240 kbps
- 256, 192, or 128 bit AES encryption
- AES-CCM to NIST SP 800-38C
- Adaptive Coding and Modulation: QPSK, 16, and 64 QAM
- Advanced forward error correction
- Dedicated alarm port per radio
- Layer 2 bridge (VLAN aware) and layer 3 router modes
- VLAN add/remove, single or double VLAN (QinQ)
- QoS priority enforcement
- L3/L4 filtering and ICMP-ping, Telnet, HTTPS, SNMP, SNMP proxy protocol filtering
- Power supply options of 12 VDC and 48 VDC
- -40 to +70°C operating temperature without fans
- Class I, Div 2 for hazardous locations
- 432.6 mm (W) x 372 mm (D) x 83 mm (H)
- ETSI, FCC, and IC standards compliant

The Aprisa SR+ radio is an ideal radio for the water industry, with its unmatched security and easy testing, configuration and management.

The 4RF Migration Master Station (MMS) would provide a smooth migration from KCMO Water Services' legacy radios. As McFadden explained, "Our Aprisa SR+ Migration Master Station (MMS) works alongside the legacy master station, utilizing the existing infrastructure and frequency assets, thus enabling KCMO to set up a high-speed radio network with the Aprisa SR+ radio in parallel with their legacy network and reduce the stress and cost of upgrading to their operations. Ultimately, we could provide them with a better performing radio incrementally."

## HOW IT WORKS

The MMS system is comprised of two main components: the standard Aprisa SR+ protected or non-protected master station and the migration switch, a fully redundant RF switch. The MMS is installed side-by-side with the legacy master station. The Aprisa SR+ network uses the same frequencies and antenna as the existing radio network. The migration switch connects to the 4RF antenna and shares this with the legacy master or the Aprisa SR+ master station, as required by the remotes. The migration switch is managed by the advanced logic in the Aprisa SR+ protected master station. All SCADA traffic is directed through the Aprisa SR+ master, which passes traffic destined for the legacy network to the legacy base station, in addition to setting the migration switch for the antenna.



KCMO Water Services has a history and reputation for making smart investments in their infrastructure. The work and money they put in today should also benefit their water customers for years to come. Logic, Inc. and 4RF were confident that the Aprisa SR+ MMS solution would not only ease KCMO Water Services' challenge of upgrading their communications, but would also address future communications needs. To prove it, the team set up a pilot program to demonstrate the solution on one channel for 30 days. After the 30 days concluded, Mansfield agreed that 4RF SR+ MMS solution could achieve their goal of upgrading the system without disrupting operations or incurring high costs as well as upgrading the radio platform to deliver maximum user traffic with maximum range, reliability, robustness, and efficiency across the network. Not only could KCMO Water Services avoid the huge undertaking and cost of upgrading a new radio system all at once, but they also found installation and testing was seamless with the Aprisa SR+ radios.



## MIGRATION MADE SIMPLE

Mansfield described how the team tested during installation. “The test mode allows one to perform a visual test of the signal strength of each radio without being connected to the radio via a computer. The LEDs on each radio gives an indication for good signal strength and antenna connectivity. These tests can be performed at each radio individually or through the master site radio. It is a valuable tool that saves time when assessing any communication problems or when verifying that each site is communicating.”

Ease of use extends past testing each radio and into management of the entire system with 4RF's SuperVisor web-based browser application.

Users have a comprehensive graphical interface to enhance network configuration and set up as well as increase asset visibility and improve fault identification and isolation. Continuous communication is a critical component of effective utility management. Interruptions or downtime in the radio network could leave KCMO Water Services without the tools to communicate asset performance, leaving their team stranded in identifying and preventing potential equipment issues.

*“Each time we have needed help or have questions, 4RF and Logic, Inc. are just a phone call away”.*

**Terri Mansfield**

**Supervisor of the Electronics Technician Group  
KCMO Water Services**

Taking the step-wise approach of replacing legacy radios with Aprisa SR+ radios through the Migration Master Station Solution supported the mission of KCMO Water Services; cost-conscious while investing in smart, sustainable infrastructure to continuously deliver vital water services to the community. For Mansfield and her team, good communication is not just how they operate, but what they appreciate most about their solution providers. She explained, “The representatives at Logic and 4RF truly stand behind their product. When we need help or have questions, they are just a phone call away. We appreciate reaching a person and not having to be placed on hold or leave a message.” KCMO Water Services are preparing to extend this migration service to their waste water department in the near future.

Jane Mohr is Marketing Director at Logic/WWGP. She coordinates and organizes material to provide customers with worthwhile info about industrial solutions.