

The Siemens logo is displayed in a bold, teal, sans-serif font within a white rectangular box in the top left corner of the page. The background of the entire page is a photograph of a tall, white, lattice-structured water tower with a spherical tank at the top, set against a backdrop of blue mountains and a clear sky with some light clouds.

SIEMENS

usa.siemens.com/water-wastewater

Leveraging the 4.9 GHz wireless spectrum to give your municipal water/wastewater network a makeover.

Abstract:

As the demands on network infrastructure for water/wastewater (W/WW) operations continue to escalate, it is clear that new solutions must be explored which are scalable, secure, and reliable. This educational brief takes a look at an alternative wireless technology standard that solves many current challenges and may be uniquely available to this market.

W/WW Communication Challenges

Establishing reliable communication links to lift stations, booster pumps, water tanks, master meters, and other remote locations is a must-have requirement for IT and communication engineers in the W/WW market. The typical distances, sometimes multi-mile, between these operations and the control centers makes the consideration of fiber networks cost prohibitive, shifting the focus to wireless connectivity as the primary network technology.

Historically, wireless options have focused on low bandwidth and easy to deploy product solutions that require minimal RF engineering. But recently, several trends and additional requirements related to wireless connectivity are entering the discussion:

- The need for higher bandwidth solutions to support more than just basic SCADA applications
- Low lying lift sites – difficulty with Line of Sight (LOS) in some situations
- The need for increased security
- Alternatives to the crowded unlicensed 900 MHz frequency bands
- Avoidance of recurring OpEx outlays associated with carrier networks
- Interest in the possibility for mobility solutions over private wireless networks

New Communication Possibilities Using WiMAX™ in a Licensed Frequency Band

Many users in this vertical market are unaware of the potential to leverage the licensed 4.9 GHz frequency band for W/WW communication networks. While established primarily as a spectrum range for public safety users, the FCC rules also state that municipalities and critical infrastructure companies can gain access to this frequency band through proper coordination and spectrum sharing arrangements with the primary users: (<http://transition.fcc.gov/pshs/public-safety-spectrum/4-9GHz-Public-Safety-Band.html>)

In the case of a municipality, which may also be the owner/operator of the police, fire, electrical, and W/WW departments, this coordination can many times be very easily facilitated. Nationwide, the 4.9 GHz band has been vastly underutilized by the primary users to date, and where currently deployed consists mainly of point to point microwave links only. This situation poses an appealing opportunity for the W/WW entity to update a communications network through the use of (the required) frequency coordination with other users and via proper and documented radio frequency (RF) engineering.



WiMAX technology is based upon the IEEE 802.16e standard enabling the delivery of wireless broadband services anytime, anywhere.

In a W/WW application using 4.9 GHz, WiMAX can provide an attractive solution. There are many benefits to this standards-based approach:

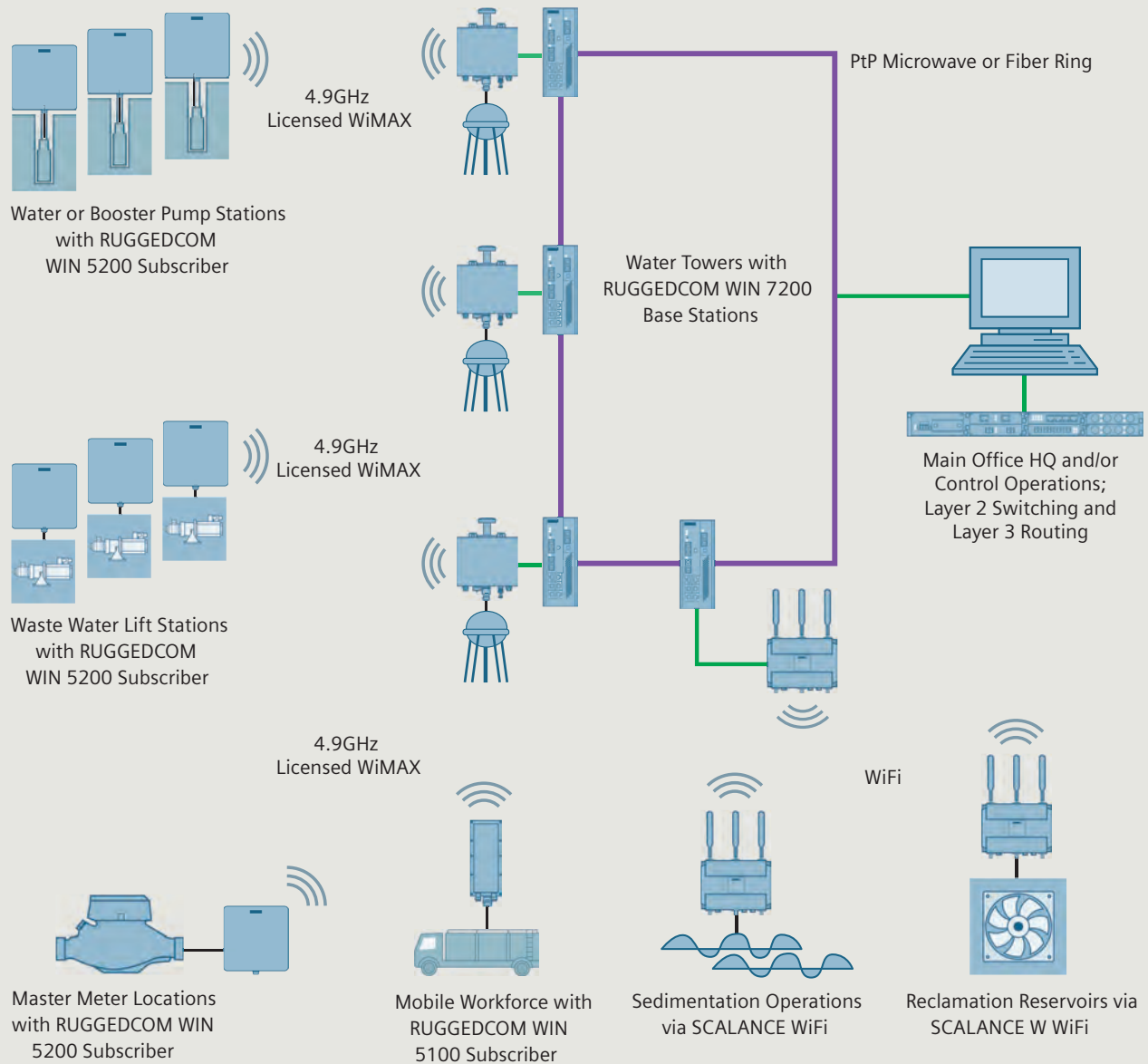
- 1) Higher aggregate bandwidth than 900 MHz solutions
- 2) Protection from RF interference vs. unlicensed solutions in 900 MHz, 2.4 GHz, 5.8 GHz band
- 3) Quality of Service (QoS) capabilities to prioritize multiple applications or user types over the link
- 4) NLOS potential with MIMO features that maximize throughput in semi-LOS situations
- 5) Layer 2 connectivity with AAA security, supporting both Ethernet and legacy serial interfaces
- 6) Ranges of up to 10 miles, and repeater capabilities to extend further

Siemens Secure Wireless Communications for Water/Wastewater Networks

Siemens' RUGGEDCOM WIN is a high-performance, long range, and secure family of wireless products, fully compliant with the WiMAX 802.16e Wave2 (MIMO) mobile broadband wireless standard. Among other frequencies, RUGGEDCOM WIN offers a solution in the aforementioned 4.9GHz spectrum.

RUGGEDCOM WIN is designed to extend IP networks over long distances to fixed and mobile users in a point-multipoint topology. RUGGEDCOM WIN scales easily to add applications as the network grows. The WiMAX IEEE 802.16e wireless communications standard ensures a long product lifecycle and 3rd party interoperability. With its all-outdoor and compact form factor and flexible configuration support, RUGGEDCOM WIN is a cost effective system ideally suited to building mission-critical private networks for the most challenging applications and environments.

Example Water/Wastewater Network Topology using WiMAX and WiFi



Network Topology Summary

- Corporate Network extended via Microwave or Fiber backbone
- Water Tower locations accommodated via backbone
- Multi-Mile end point locations via RUGGEDCOM WIN WiMAX 4.9GHz Point to Multipoint
- Local end point locations via SCALANCE W WiFi
- Backbone constructed in ring topology for redundancy/availability



Siemens wireless solutions for WiMAX (RUGGEDCOM WIN) and WiFi (SCALANCE), as well as PoE injectors.

Siemens Can Help

Siemens has already deployed several communication infrastructure retrofits for municipality water/wastewater operations resulting in increased performance, enhanced security, and significant cost savings for our customers.

In addition to our comprehensive RUGGEDCOM WIN portfolio for “next to last mile” applications, Siemens also offers a just as impressive industrial WiFi solution set (SCALANCE) for local wireless applications. Both technologies can be combined to provide a complete end to end wireless solution. We can also provide design assistance, spectrum coordination, license application consulting, and installation services for your 4G WiMAX and/or WiFi network.

Be sure to check out our case study on the City of Georgetown for a great testimonial on the benefits of a Siemens based 4.9GHz WiMAX wireless network using RUGGEDCOM WIN.

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