



Large Scale Connectivity for Grid Modernization

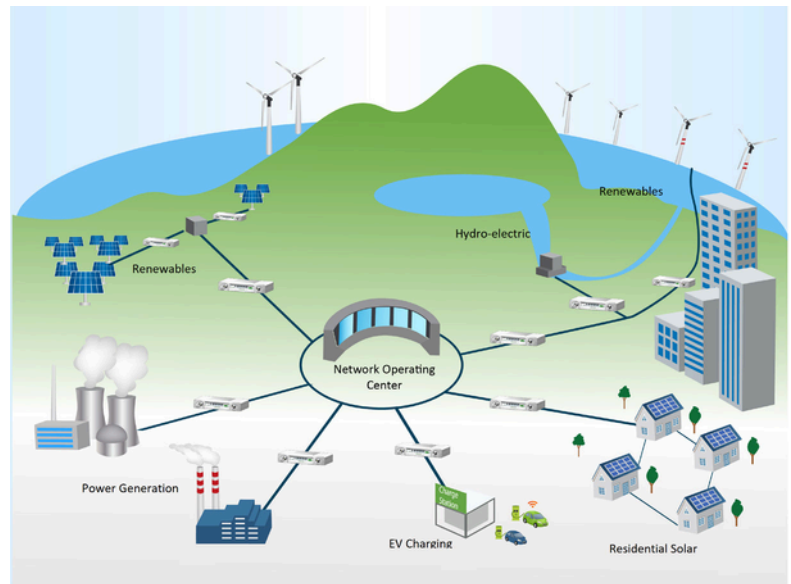


Connectivity for Grid Modernization

Utilities currently face several challenges in the form of modernizing an aging grid, integrating sustainable generation into the grid and meeting ever-increasing customer demands for a stable electricity supply to suit modern lifestyles.

The smooth operation of the grid in the face of variable demands and flows is only made possible through reliable connectivity.

Utility Field Area Networks (FAN) are designed to ensure near real time visibility to the edge of the grid to allow for the better management of electricity supply and an improvement in outage response times. Offering wireless communications between grid devices such as capacitor banks, substations, reclosers, intellirupter switches, DFA switches, solar inverters and AMI aggregators, the FAN enables centralized monitoring and control of power flows into and out of the grid.



Key Benefits of Our Wireless Solutions

Mission Critical Focus - Designed to meet the most stringent communications requirements for our mission critical customers.

High Spectral Efficiency - Highest spectral efficiency (16b/Hz/s) in narrowband channels, allowing customers to fully optimize their investment in spectrum.

Better Coverage - Where microwave and satellite can struggle with terrain and weather events, our narrowband radios can perform even in near or non-line of sight and poor weather conditions.

Easy to Deploy - Engineered for plug'n'play to save time and cost during deployment.

Scalable - Designed to support future expansions of grid assets.

Multiple Applications - Support multiple utility applications in one network.

Utility Communication Challenges We Solve

- Consolidating multiple separate utility communications networks into one high-capacity Field Area Network
- Fast, reliable, secure network to support ADMS, DERMS & Distribution Automation
- Integration of Distributed Energy Resources and Smart City devices
- Near real-time monitoring to the edge of the grid via a high-capacity SCADA network
- Ultra-low latency, low jitter, and low asymmetry links for substation Teleprotection circuits
- Terrain challenges for isolated or non-line of sight communication links to remote sites
- Redundant communications networks with hot or warm standby system operations for mission critical assets

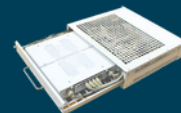
RF Spectrum

Operates in licensed spectrum to ensure customers' communications links offer the dedicated availability required.

| | |
|----------------|--------------------------------|
| Frequency Band | 400MHz, 700MHz, 800MHz, 900MHz |
| Bandwidth | 12.5kHz, 25kHz, 50kHz, 75kHz |

Tornado | Tornado OPV | Tornado 1+1

Our award-winning Tornado radio utilizes MIMO technology, full duplex communications and high order modulation to provide the highest spectral efficiency in narrowband channels. Ubiik also offers an ultra-low latency Optimized Protection Variant providing the criticality required for teleprotection circuits and a 1+1 variant to ensure no-fail communications for mission critical applications.



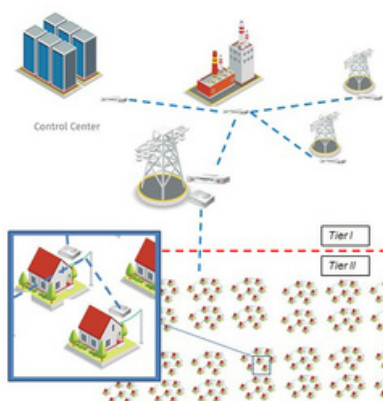
Tornado X, Tornado XR & Tornado X 1+1

Tornado X is a high transmit power addition to our full duplex, MIMO range with a transmit power which remains stable across all modulations. Tornado XR is a high output power remote radio for multipoint networks. Full compatibility across the Tornado family allows for a mix of radios in the network to suit terrain or data throughput challenges. A 1+1 redundant version of Tornado X is also available.

Multi-tier Communications Networks

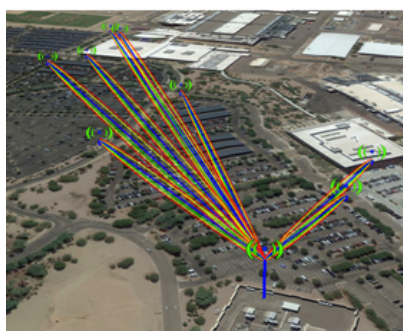
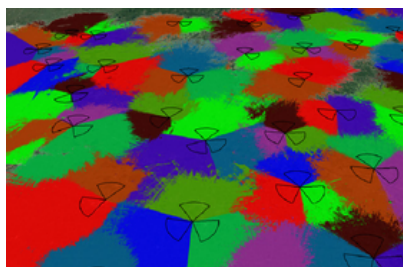
The conflicting demands of high system performance versus the efficient use of spectrum is a challenge faced by any network designer. Ubiik Field Area Networks are designed with multiple tiers to provide cost-effectiveness and an appropriate level of capacity and coverage at each level. Re-using channels in a FAN is key to optimizing use of spectrum. Designing a second tier into the network allows for the reduction of the signal level.

Utility to Customer Premise SCADA Application



Network Management System

Ubiik can partner with third party NMS providers or offer our own web interface for centralized control over a large network of our radios. These solutions scale up from a simple web-hosted configuration tool through to Ubiik Mimomax's cNMS network manager and, for large network deployments, to industry-standard SNMP network managers.



Our Valuable Experience

With the largest referenceable utility Field Area Network in North America at Salt River Project, Ubiik brings extensive expertise to large-scale utility communications projects.

- **Project Management** – Every Ubiik FAN project has a dedicated Project Manager capable of performing all of the required engineering, logistical, and technical aspects required to successfully implement the Engineering, Deployment, and Installation requirements of the project.
- **Coverage Design** - Our in-house RF network designers have developed a deep knowledge of the challenges faced during these type of utility deployments and have the experience to design networks which balance the competing needs of capacity, coverage and cost.
- **24/7/365 Support** – In addition to offering remote support at any time of day or night, for large deployments we can bring support locally to the customer. Furthermore, in past deployments we have embedded Ubiik engineering staff within customer engineering teams as a way of fast-tracking the sharing of information and assisting with a more rapid commissioning of the network.

RAW AGGREGATE DATA THROUGHPUT

| Modulations | 12.5 kHz | 25 kHz | 50 kHz | 75kHz |
|-------------|----------|----------|-----------|-----------|
| QPSK | 80 kbps | 160 kbps | 320 kbps | 480 kbps |
| QAM16 | 160 kbps | 320 kbps | 640 kbps | 960 kbps |
| QAM64 | 240 kbps | 480 kbps | 960 kbps | 1440 kbps |
| QAM256 | 320 kbps | 640 kbps | 1280 kbps | 1920 kbps |

ONE WAY LATENCY RATES (at QAM256)

| Applications | 12.5 kHz | 25 kHz | 50 kHz | 75kHz |
|------------------------|----------|---------|---------|---------|
| Teleprotection | 8 ms | 4.3 ms | 2.7 ms | 1.6 ms |
| IP Point-to-Point | 13 ms | 6.5 ms | 3.7 ms | 2.95 ms |
| IP Point-to-Multipoint | 53 ms | 26.5 ms | 13.5 ms | N/A |

OUR VALUABLE EXPERIENCE

Ubiik's narrowband radios are engineered to meet the mission critical requirements of utility connectivity as well as the exacting standards and high availability requirements of public safety. Our gear is renowned for its resilience in the face of snowstorms, desert heat and even earthquakes.

We have several large-scale networks currently in deployment to support utility grid modernization goals. From state-wide SCADA networks, voice or AMI backhaul through to multi-tier urban utility networks, our wireless communications solutions are busting the myths of what can be achieved in narrowband channels.



FAN SUPPORTS POWER & WATER DELIVERY TO 1 MILLION END USERS FOR SALT RIVER PROJECT

Servicing over a million end-users in an approximately 2900 square mile area, Salt River Project is one of the USA's largest public power utilities.

With spectrum being both scarce and valuable, the biggest challenge was to find a solutions provider who could optimize data throughput in the narrowband channel SRP had available.

SOLUTION:

Encompassing three Arizona counties, including the metropolitan Phoenix area, Ubiik designed a Field Area Network which would enable centralized monitoring and control of SRP's distributed power and water systems. SRP's new FAN will also be used to monitor and control power flows into and out of the grid from numerous advanced solar installations.

HIGH CAPACITY, STATEWIDE SCADA NETWORK FOR GREAT RIVER ENERGY

With a 56,000 square mile service area to cover, Great River Energy (GRE) in Minnesota was in need of a robust, cost-effective and stable communications solution to support their critical infrastructure. Tree cover and extreme weather added challenges to the coverage design of the project and the solution needed to be scalable to add an element of future-proofing for network expansion.

SOLUTION:

Ubiik engineered an extensive wireless Point-to-Multipoint high capacity communications network which effectively doubled the data capacity achieved within the two 1MHz channels Great River Energy had leased. The two by two MIMO technology offers the flexibility for GRE to carry out activities such as software updates while continuing to run their SCADA monitoring.



About

Founded: 2007

Design & Manufacturing: Christchurch, New Zealand

US Sales & Support Office: Phoenix, Arizona

Combining a deep understanding of RF engineering with expertise gained from numerous deployments across the globe, Ubiik provides utility customers with cost-effective, wireless communications solutions to support grid modernization.

Advanced communications technology coupled with sophisticated RF network design ensures our customers not only gain visibility right to the edge of the grid but also optimize their investment in spectrum.

Contact Us Today

US Office

4630 East Elwood St, Suite 7
Phoenix, AZ 85040

Phone: 602 441 2448

Email: sales@ubiik.com

www.ubiikmimomax.com

www.ubiik.com