

An aerial night photograph of a power line stretching through a forested landscape. The power line is illuminated with a bright, glowing light, creating a strong contrast against the dark trees. In the background, a city or town is visible, with its lights glowing against the dark sky. The overall scene is a mix of natural and man-made elements, suggesting a focus on infrastructure in a rural or semi-rural setting.

# **THE INTELLIGENT CHOICE FOR DISTRIBUTION AUTOMATION**



# GRID VISIBILITY AND CONTROL

**Improving distribution grid operations with real time remote monitoring and control of grid assets has become simple and affordable with wide area digital land mobile radio.**

**Our Mission Critical Communications Infrastructure provides full feature voice services and wide area data transport services based on the Digital Mobile Radio standard.**

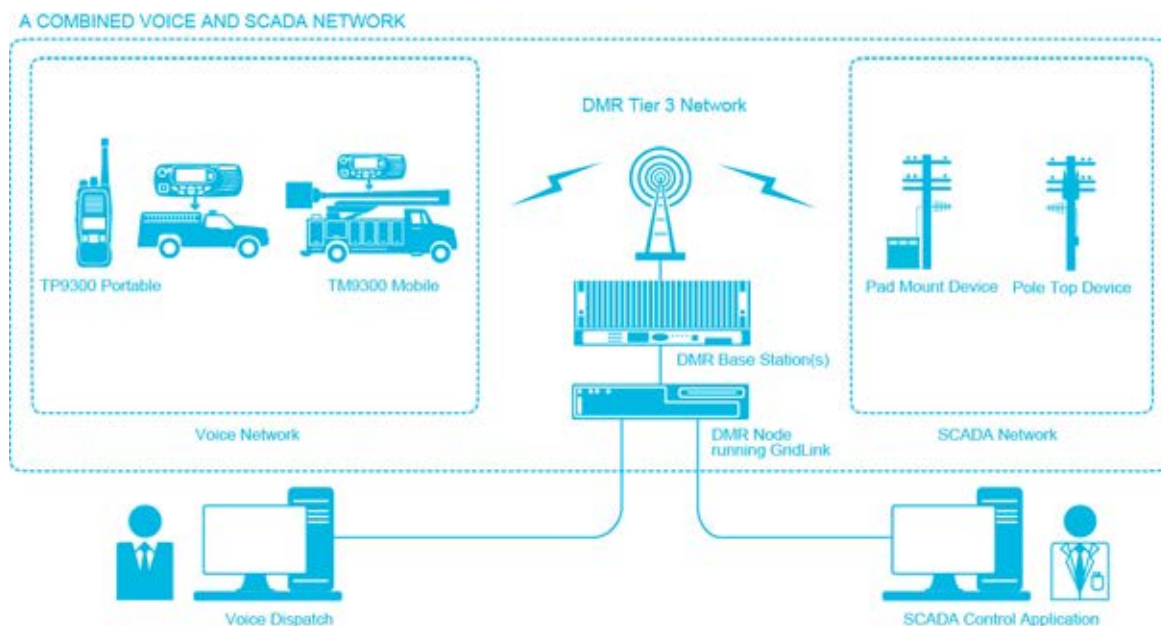
Delivering power reliably and safely is a constant challenge for electrical distribution utility companies. The diverse environments that many utilities operate across pose reliability and resilience challenges for their distribution network. Improving their grid visibility and control over their distribution network is a key priority.

Grid managers around the world have leveraged various types of communications to connect distribution line infrastructure and substations to their Supervisory Control and Data Acquisition (SCADA) systems. However, large parts of distribution grids remain off limits and are not visible or manageable due to the cost of connecting them.

Providing data communication for Distribution Automation (DA) in remote areas with a low density of pole top and pad mount transformers, reclosers, and capacitor banks is commercially challenging, and in rural areas cellular coverage can be too inconsistent, unreliable and a security risk for mission critical communications.

Improving distribution grid operations with real time remote monitoring and control of grid assets has become simple and affordable with wide area digital land mobile radio. Tait Communications' DMR Tier III based Mission Critical Communications Infrastructure provides full feature voice services and wide area data transport services through our GridLink Solution.

Tait GridLink employs wide area, trunked digital radio coverage to deliver a DA solution that is highly economic, reliable and secure, providing visibility and control of your entire grid.



# GRIDLINK BUSINESS BENEFITS

Tait GridLink provides utility managers with a layer of network intelligence that delivers both visibility and control over their grid, ensuring operational cost reductions, optimized energy usage, and improved grid reliability and resilience.

## Operational cost reductions

With better grid visibility, utilities are able to more quickly isolate and resolve faults, as well as limit the number and scale of any outage in less time and with fewer people resulting in operational cost reductions.

## Optimized energy usage

Electricity grid control enables utilities to optimize Volt/VAR, which in turn improves power delivery effectiveness and management. With better usage management, it is easier to ensure that your budgeted asset life cycles are realized and avoid premature equipment failure or replacement.

## Improved grid reliability and resilience

GridLink gives managers improved visibility and control of their electricity distribution networks helping them to predict potential weaknesses and improve their grid reliability and resilience. Improved grid reliability and resilience will ensure better SAIDI and CAIDI metrics, which in turn means improved levels of customer service and increased utility profits.

**The diagram above shows a combined Voice and SCADA Network delivering two independent network services over common infrastructure.**

This network topology ensures that utilities realize the benefits of a single communications vendor and only one network to design, deploy, maintain, harden, and secure.

**LEFT:** Mobile field workers rely on voice based, work-group centric dispatch services for a safe and efficient work environment under all conditions—from BAU to black start.

**RIGHT:** Remote devices on the distribution lines monitor and control the distribution grid. A SCADA control room application polls for and responds to remote event notifications from the remote devices using SCADA protocols such as DNP3 or IEC 60870-5-10x, which provide robust communication over narrow band PMR networks.



# THE HIGHLIGHTS OF THE GRIDLINK SOLUTION

**Tait GridLink builds on the Tait DMR Tier 3 radio platform to provide extremely reliable and robust voice and data communications.**

## **Improved coverage**

DMR Tier 3 delivers affordable wide area coverage for suburban and rural networks - equivalent to analog radio systems. Combined, Tait DMR Tier 3 and GridLink provide significantly wider area coverage for both voice and data than other digital radio technologies, such as Tetra. Depending on terrain, DMR coverage allows outstations to be located up to 43 miles (70km) from the base station sites. This minimizes the requirement for multiple base station sites and therefore reduces the capital costs of creating a wide area DA network/

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## **Reliability and resilience**

Tait GridLink and the Tait DMR Tier 3 radio network are designed to deliver highly reliable network services. All infrastructure equipment is offered in redundant configurations to ensure business critical SCADA communications can continue to operate in the rare event of an equipment failure. GridLink employs DMR Tier 3 trunking capability to dynamically reassign traffic to radio channels, so even if channels are lost, data will continue to pass through the network to its destination

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## **Scalability**

GridLink is a highly scalable solution, making it easy for a utility to deploy a small number of GridLink data terminals and then gradually scale-up the solution, pole by pole, to a grid-wide system when required.

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### Ease of integration

The integration of Tait GridLink with SCADA control systems and outstation equipment is seamless. GridLink supports global SCADA communication standards and Tait has extensive experience integrating equipment from multiple vendors.

Tait provides comprehensive support during system integration and roll out including tailored acceptance testing, deployment planning and project management to guarantee the successful operation of your SCADA system once deployed

### Securing Tait GridLink

All SCADA communications are encrypted to prevent unauthorized access to your electricity network. In addition, access to the DMR radio network is restricted to authorized terminals using DMR standard security authentication protocols.

### Remote management and control

GridLink provides remote management and diagnostics facilities allowing console access to RTU / IED equipment, which removes the need to physically visit outstations for routine maintenance activities. The status of all the GridLink equipment is made accessible via SNMP / MIB interfaces for display through industry standard Network Management Systems.

### Detailed communication system reporting

Tait GridLink systems monitor and provide detailed reports of system performance for both individual outstation and base station sites, including:

- Transaction latency and volumes to identify overloaded communication paths
- Transaction failure and retry metrics to identify failing equipment
- Received signal-strength and bit-error counters to identify interference or faulty antennas
- Supply voltage readings to confirm performance of outstation power supplies

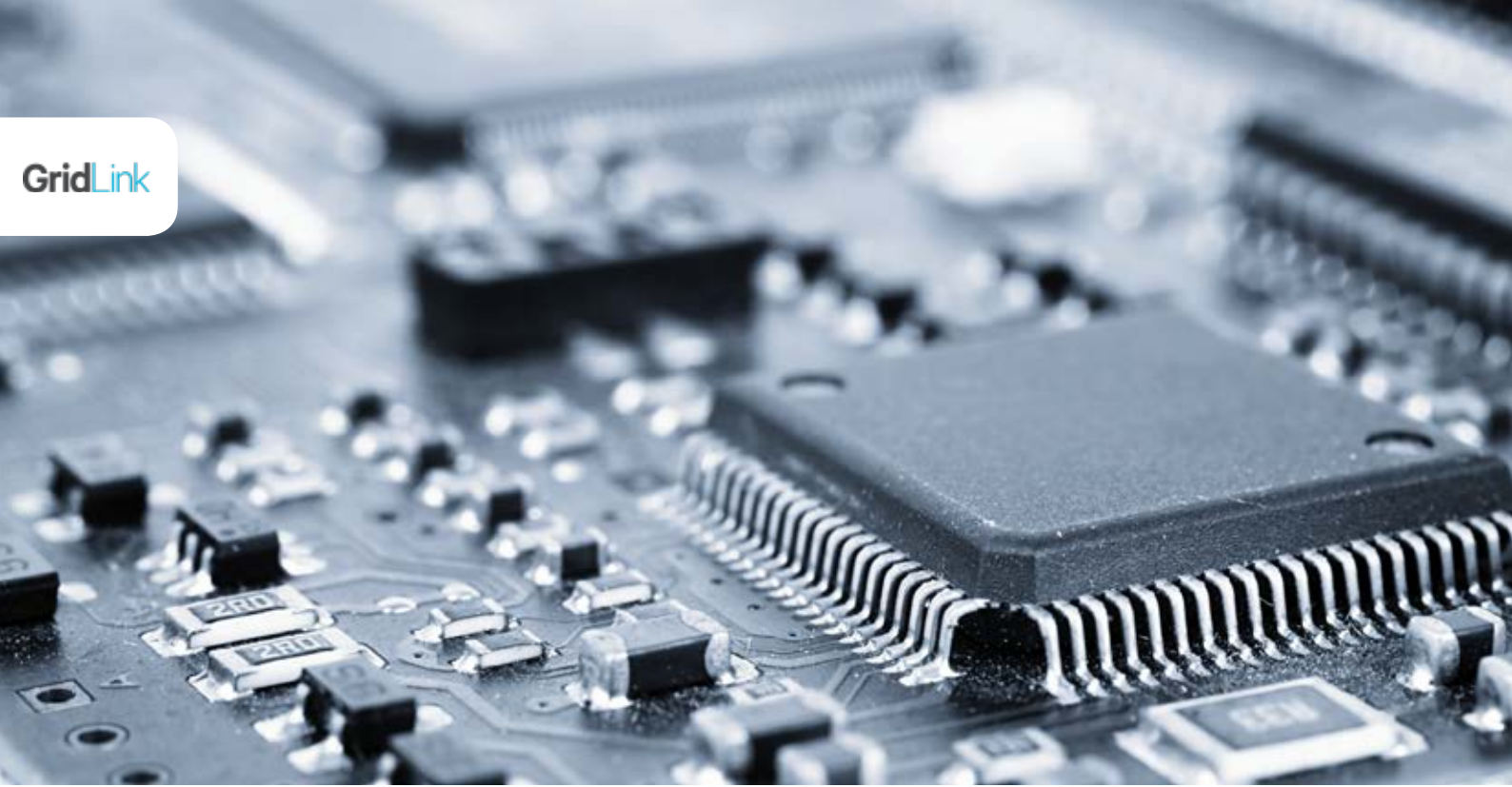
### Industry standards

DMR Tier 3 is a proven, open standard based radio protocol and Tait GridLink supports major SCADA communications standards, including:

- DNP3 over both TCP/IP and serial
- IEC60870-5-101 and 104

Other communications protocols can be made available on request.





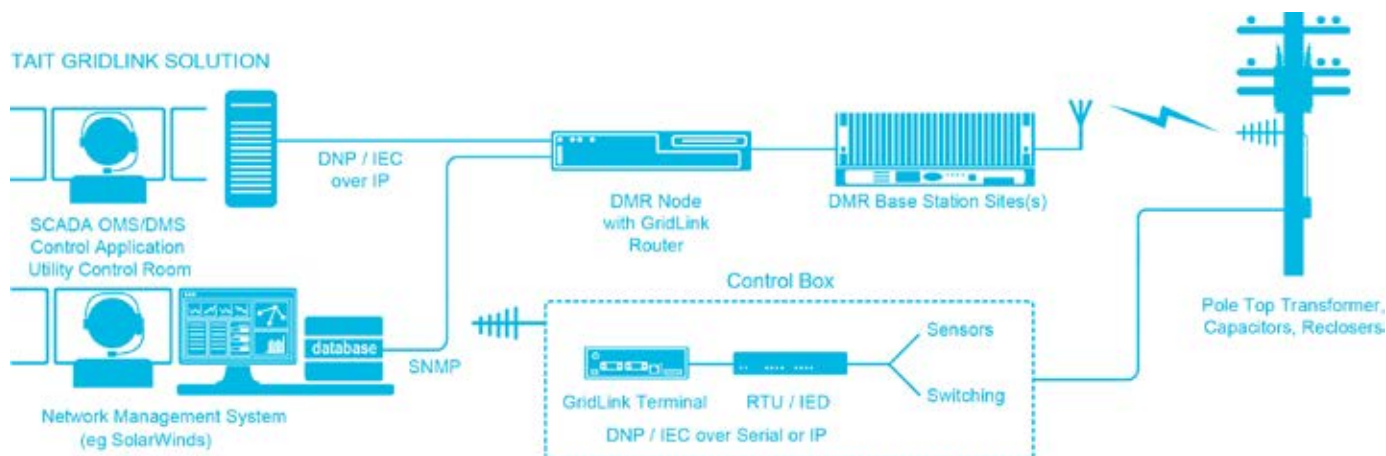
# INTELLIGENT VOICE AND DATA NETWORKS

**GridLink builds on the proven value of DMR based mission critical voice by adding SCADA monitoring and control.**

Traditionally, wide area networks have delivered voice and data communications on separate networks. Network managers have accepted this duplication and the associated costs as necessary in order to avoid the difficult balancing act of combining voice and data interactions within their required Quality of Service metrics. The effectiveness of any DA solution depends on the reliability of the communications link between each device and the SCADA system. The intelligence of modern, all digital TDMA-based trunking standards that reliably manage system resources is the key to delivering mission critical combined voice and SCADA networking. At its core, Tait GridLink relies on the Tait DMR Tier 3 radio platform to provide an extremely reliable and robust communications link with market leading security, reliable LMR voice communications, and digital data functionality.

The capacity doubling effect of 2-slot TDMA combined with trunking resource management gives network operators new opportunities to:

- Prioritize network resources for voice or SCADA traffic
- Reserve channel resources for voice or SCADA, so that dynamic network loading does not impact the quality of essential services
- Pre-empt call queues based on call priority and network loading



**GridLink builds on Tait Communication's proven experience in providing mission critical voice communications solutions for electrical utilities companies with the addition of data enabled grid device monitoring and control.**

## How does GridLink work?

SCADA communications are passed from the control application to the GridLink communications server, which is located on the DMR Node, and transmitted via the DMR Base Station sites to GridLink terminals at outstation sites.

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- The Tait GridLink solution passes SCADA messages using the packet data service on DMR traffic channels.
- In the event of RF interference, the GridLink terminal and communications server automatically resend communications to ensure messages are reliably passed between the SCADA equipment.
- More than 50,000 GridLink data terminals may be provisioned on a single network, subject to channel capacity constraints. The number of outstation RTUs and associated GridLink SCADA terminals supported by a logical<sup>1</sup> DMR channel is dependent on a number of factors including the number outstations and the frequency of status checks being conducted.

1. A single physical DMR channel provides 2 logical channels or timeslots



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