



TSAT's highly unique private satellite network solution features an industry leading narrowband VSAT hub and remotes. The solution is specifically engineered to support mission critical narrowband applications such as SCADA, Telemetry, M2M and IoT in industrial sectors such as energy, utility, environment, water, and transportation.

The ruggedized and utility hardened hardware is designed to provide years of reliable operation in remote locations and harsh environments.

TSAT 3500



With TSAT's efficient use of spectrum and bandwidth resources recurring costs are kept at a minimum to achieve the lowest possible total cost of ownership (TCO). This makes TSAT a great choice for primary communications or as out-of-band (OOB) solution for terrestrial communications.

TSAT's satellite solution is designed to comply with IEC 61850, the global standard for utility and industrial communication and automation.

A TSAT solution provides cyber-secure communications to and from your remote locations. Data is 'piped' directly to your control or data center without the need to use public communications infrastructure (PSTN) or the Internet.

TSAT provides the highest levels of network reliability by being able to support geo-redundant, load-sharing and hot-standby hub installations with minor cost impact due to the low hub cost.

TSAT's low capital investment cost makes private satellite network implementations an affordable option even for small single-site installations, and with room to grow the network over time.

The TSAT remote terminal provides the power and flexibility to adapt to all kinds of communication needs, ranging from legacy SCADA protocols to TCP/IP-based communications. IP compression schemes, VLAN and QoS ensure efficient and prioritized channel throughput even when integrating voice or video.

Advanced power saving features makes TSAT the ideal choice when solar panels or batteries are the only available power options. TSAT requires a smaller number of panels and batteries compared to legacy VSAT terminals.

THE TSAT ADVANTAGE

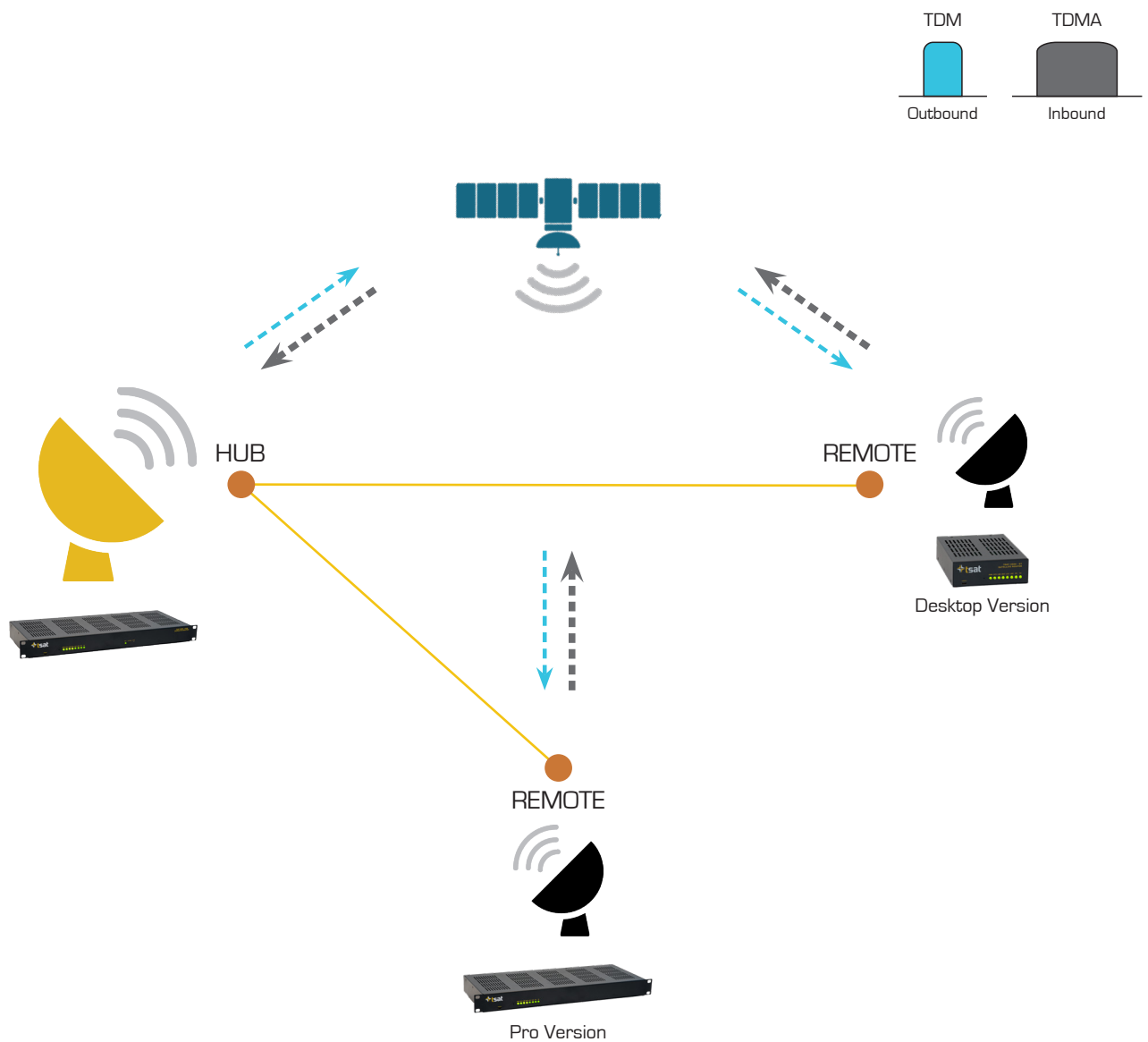
- A private network solution under your full control
- Low capital investment and scalability to meet future needs
- Minimal bandwidth requirements for low operational cost

STAR (FDD) NETWORK TOPOLOGY

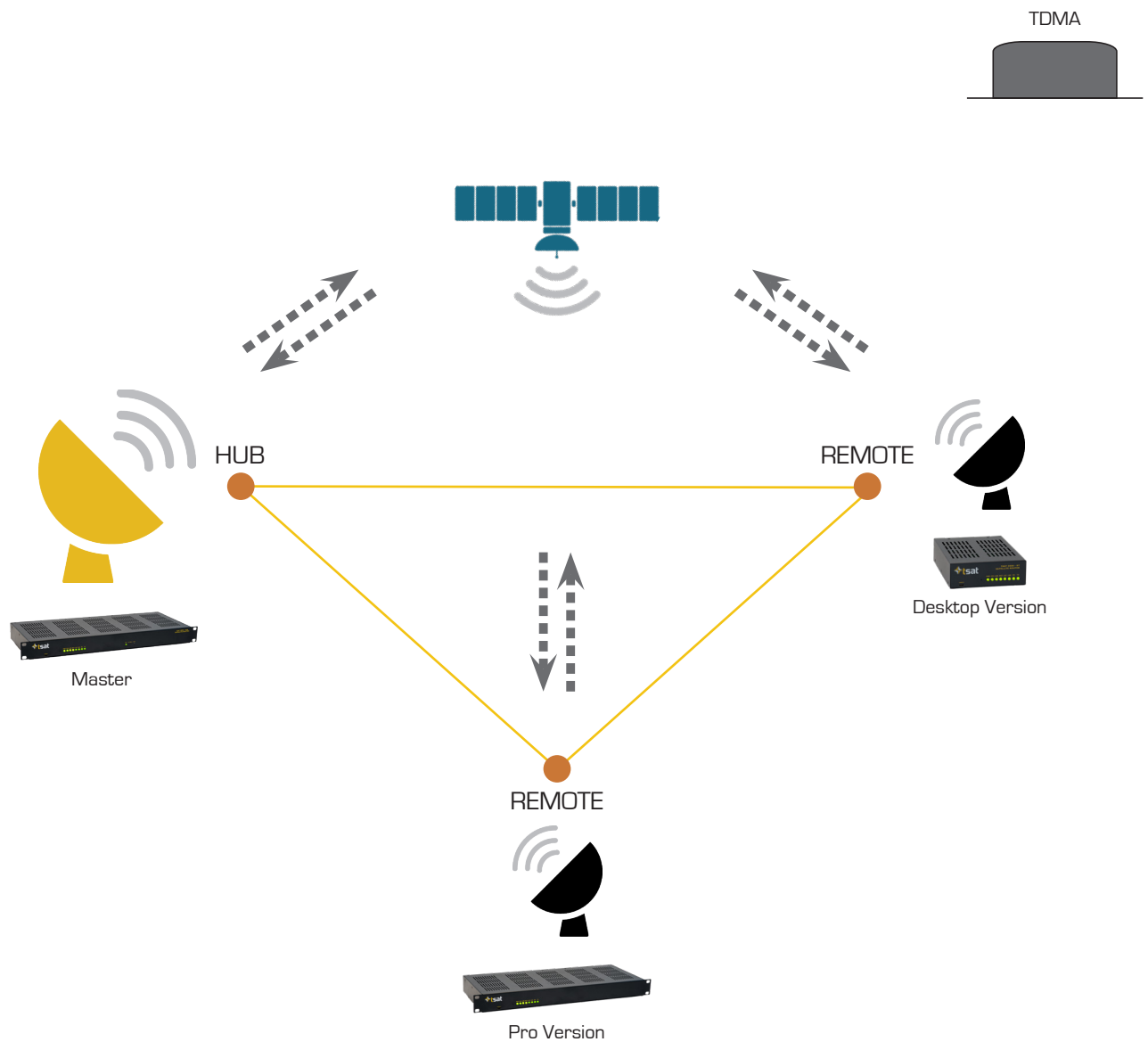
The TSAT 3500 hub provides network signaling and data transmission over the outbound TDM carrier. The transmission is continuously received by all remotes. The remotes will transmit on the inbound TDMA carrier according to a user-configured slot allocation scheme. The outbound and inbound carriers can be sized independently to meet exact throughput requirements.

For most SCADA/Telemetry networks, the inbound traffic is larger than the outbound. When network traffic exceeds the capacity of the single outbound and inbound carrier, additional carriers are easily added.

Geo-redundant/load-sharing and hot stand-by hub options are available for maximum network reliability and availability.



MESH (TDD) NETWORK TOPOLOGY



The TSAT 3500 mesh feature (TDD) is implemented with a single TDMA carrier, where the hub is designated as the master. The master provides timing and bandwidth (slot) allocations to the connected remotes in the network.

Since transmission from any remote is received by all remotes, any network topology is possible (hub and spoke, multilevel tree and full mesh). Network configuration and bandwidth allocations are highly flexible and can be dynamically changed.

Mesh connectivity enables remote-to-remote connectivity via a single "hop". Single hop connectivity is a highly desired capability for several utility distribution use-cases where latency is critical. One example is the signaling of a transfer-trip from a distribution re-closer to the related substation.

The reliability of TSAT's mesh network implementation is further enhanced by an optional "hot" stand-by master. It enables uninterrupted operation in case of a master outage.

Features & Benefits

Private network

With the TSAT hub placed at your data or control center you are in full control over your own private satellite network that connects to any SCADA, Telemetry or IOT site. It supports both TCP/IP and legacy serial (RS 232,422 and 485) devices. The satellite spectrum allocated to your network is not shared with others.

Low Cost and Scalable Solution

The low-cost hub makes TSAT-3500 suitable for even single-site installations, and with room to grow the network over time with respect to numbers of sites, carriers or throughput. Geo-redundant/load-sharing or hot stand-by hub options can be implemented with minor cost impact due to low cost hub.

Cyber Secure

TSAT operates as a closed private network totally isolated from public communications networks and the Internet. Secure boot combined with secure terminal authentication and AES-256 link encryption and VLAN provides the highest levels of cyber security. Security controls also include user permission roles and site-specific access limits (ACL) and in sum provides the highest level of ingress protection.

Powerful NMS

A Windows based graphical user interface with powerful diagnostics simplifies operation and support of a private SCADA/Telemetry satellite network. The NMS provides real-time visibility of actual SCADA/Telemetry data down to the byte level from any site. This greatly simplifies troubleshooting of TCP/IP or serial device connections. Comprehensive logging of signal levels and events combined with power trend analysis enables preventive maintenance for improved network availability.

SCADA Optimized

A Windows based graphical user interface with powerful diagnostics simplifies operation and support of a private SCADA/Telemetry satellite network. The NMS provides real-time visibility of actual SCADA/Telemetry data down to the byte level from any site. This greatly simplifies troubleshooting of TCP/IP or serial device connections. Comprehensive logging of signal levels and events combined with power trend analysis enables preventive maintenance for improved network availability.

Ruggedized Hardware

Designed to comply with relevant parts of IEC 61850-3 and IEEE 1613 to ensure reliable operation in the most demanding environments.

Smart Investment

Future proof technology for next generation utility networks

The TSAT 3500 platform enables private networking at a low operational cost. It requires minimal initial capital outlay for HUB hardware. The platform is ideal for small- to medium-sized networks and integrates easy into existing communications infrastructure.

Capex friendly

Affordable narrowband technology versus broadband satellite systems, **low barrier to adopt.**

Opex friendly

Engineered to provide critical networking with **minimal space segment** requirements.

User friendly

Supports legacy **SCADA protocols**, integrates both IP/ETH and RS232, 422 and 485 serial devices.

Market friendly

Designed for **SCADA/Telemetry** and related utility applications.



Trusted
communication –
anywhere

TSAT AS
Martin Linges vei 25
NO-1364 Fornebu, Norway
mail@tsat.net
www.tsat.net