Product Specification Sheet
TSM WAVEFORM

TrellisWare TECHNOLOGIES

THE TRELLISWARE TSM WAVEFORM

TrellisWare Technologies, Inc. is the industry leader in the development and deployment of Mobile Ad Hoc Networks (MANET). TrellisWare's TSM waveform is a highly scalable and robust MANET waveform that was designed from the ground up to support over 800 nodes with simultaneous voice, data, video, and Position Location Information (PLI) operating in a single radio frequency channel. As a Technology Readiness Level (TRL) 9 technology, the TSM waveform is used worldwide in highly challenging tactical environments, supporting military, commercial, and public safety missions.

Unlike many competing commercial MANET solutions that overlay Internet-driven routing protocols over commercial technologies such as Wi-Fi (802.11n), TSM is a true Software Defined Radio (SDR) waveform that includes all network layers, and is offered in different variants to support various mission profiles. It has been ported to many partners' SDR products, including eight program of record tactical radios for the US military.

The TSM waveform offers robust, reliable communications with simplified network management, and has been validated in real, critical missions with diverse use cases ranging from Intelligence, Surveillance & Reconnaissance (ISR) to Command & Control (C2) applications in some of the most challenging environments.

TRELLISWARE'S TSM WAVEFORM IS THE INDUSTRY STANDARD FOR RESILIENT COMMUNICATIONS

- **Network Resilience:** The TSM waveform's non-routing-based Barrage Relay networking solution supports extremely fast network adaptability that is required by highly dynamic and rapidly evolving tactical situations. TSM eliminates the need for complex network management while ensuring reliable communications with steady throughput across multiple hops.
- **Scalability and Spectrum Efficiency:** Supports over 800 nodes without any gateways in a single 1.2 MHz Radio Frequency (RF) network. This scalability leads to significant spectrum planning efficiency because a larger network can share a single 1.2MHz channel.
- **Global Mobility –** Access to a broad spectrum range that includes the UHF band, L-band, and S-band frequencies on a single radio.
- **Multi-vendor Ecosystem –** As a true Software Defined Radio (SDR) waveform, the TSM waveform can be implemented on many different SDRs.
- **Efficient Position Location Information (PLI) distribution:** Since PLI is a high priority in almost all tactical networks, the TSM waveform is optimized for efficient and fast PLI distribution.
- **Voice:** Dedicated resources for voice traffic and does not use voice over IP (VoIP). This enables the TSM waveform to ensure voice quality and latency. Up to 32 voice talk groups can be supported on a single TSM network.
- **Data:** Supports IP data and is commonly used for ISR missions that require video streaming. Throughputs of up to 32 Mbps are supported.
- **Security –** Supports mixed classified / unclassified network (Type 1 / SBU).
- **Ease of Use:** Web App tool set, open API suite, and Android™ Apps integration all lead to ease of use for both network managers and end users.

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TECHNICAL FEATURES OF THE TSM WAVEFORM

Features	Capability
Supported Software Defined Radio (SDR) Platforms	**TrellisWare radio products that operate TSM:** • TW-950/TW-900 TSM Shadow Radio • TW-135 TSM Shadow High Power Radio (HPR) • TW-860 TSM Spirit Radio • TW-870 TSM Ghost Radio • TW-875 TSM Ghost Radio • TW-650 TSM Shadow Core Board Module • TW-880 TSM Ghost Embedded Module **Partner radio products that operate TSM and/or TSM-X*:** • Collins Aerospace – AN/PRC-162 • L3Harris – AN/PRC-158, AN/PRC-163, AN/PRC-167, AN/PRC-171 • Thales Defense & Security – AN/PRC-148C, AN/PRC-148D, AN/PRC-170 • Ultra – ORION X510
Spatial Hops	Supports up to 8 spatial MANET hops with up to 26 miles (41.8 km) per hop and over 200 miles (321.9 km) per hop in Long Range Mode
Frequencies	• L-UHF: 225–450 MHz • U-UHF: 698–970 MHz • L/S Bands: 1250–2600 MHz
Bandwidths	• 1.2 MHz, 3.6 MHz, 10 MHz, 20 MHz, 40 MHz • Spectrum pipelining feature available with 10 and 20 MHz bandwidths that combines two non-contiguous bands together doubling multi-hop throughput
Scalability	• Over 800 nodes in a radio frequency channel using 1.2 MHz • Fast join and merge (1 second to join, < 5 seconds for network formation/merge time)
Voice	• Up to 32 talk groups of either Adaptive Multi-Rate (AMR) 5.9 or Mixed-Excitation Linear Prediction enhanced (MELPe)
PLI	• Cursor-on-target (CoT), Extensible Markup Language (XML), and Protobuf) formats supported • 1 to 5 second PLI update rate (based on configuration)
Data	Up to 32 Mbps of user throughput for a single hop: • SD and HD video • Chat • File transfer
Security	AES-256 Commercial Security
Black Relay	TrellisWare radios can be left unattended as non-Controlled Cryptographic Item (CCI) radios when they act as a black relay for a network running TSM-X* with Warrior Robust Enhanced Networking (WREN) Security network, or TSM-X with SOCOM Tactical Communications (STC) Security
Modulation	• Continuous Phase Modulation (CPM) for standard TSM modes • Orthogonal Frequency Division Multiplexing (OFDM) for High Data Rate (HDR) TSM
End User Device (EUD) Support	• Android™ Tactical Assault Kit (ATAK) • Windows™ Tactical Assault Kit (WinTAK)

* TSM-X is a version of TSM that runs on certain partner radio products, which includes specially designed software functions to support and interface to National Security Agency (NSA) -certified (Type 1) security architecture(s). TSM-X with WREN Security is TSM-X with the addition of encryption that complies with TrellisWare's WREN Information Security (INFOSEC) Design Document.

Specifications subject to change without notice.

When Nothing Else Works

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For more information, email sales@trellisware.com

Please access the most recent digital version of this datasheet on the TrellisWare Customer Support Site (site registration required).

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