

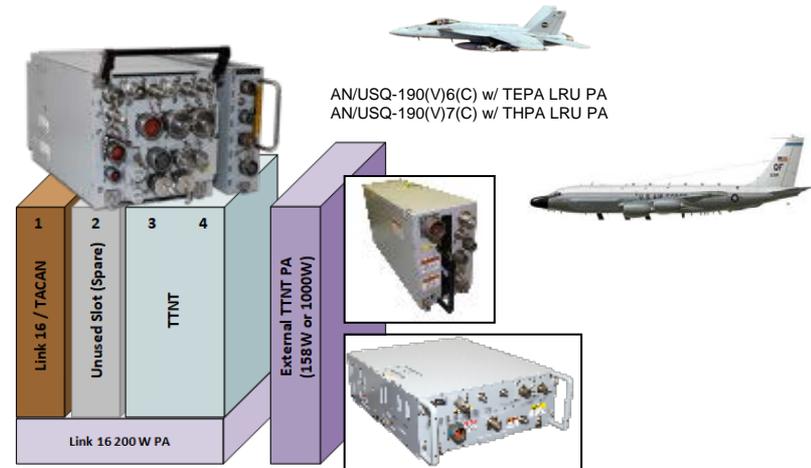
MIDS JTRS TERMINAL – TACTICAL TARGETING NETWORK TECHNOLOGY

Modernized Link 16 assured communications among US, NATO and other approved forces and Tactical Targeting Network Technology advanced ad hoc networking waveform

Tactical Targeting Network Technology (TTNT) is a secure and robust IP-based waveform that delivers the fastest ad hoc mesh network to the tactical edge. TTNT compliments Link 16 increasing the warfighter's networking capability to address the growing threats from peer advisories. TTNT is a proven and mature system that instantly and accurately shares secure voice, video and data across a dynamic battlespace, meeting the rapidly changing networking needs of today's warfighter.

TTNT NETWORKING OVERVIEW

- Robust, high-speed, high-capacity, low latency, Ad Hoc network
 - Greater than 14Mbps instantaneous network bandwidth
 - Up to 2 Mbps single user Tx data rate
 - Up to 8 Mbps single user Rx data rate
 - Multiple Data Rates (250k, 500k, 1M, 2M) & Special Modes
 - Ranges up to 300 NM without relay (dependent on power)
 - Multi-hop Relay (up to 16 hops)
 - Very low latency from sender to receiver
 - Self forming & self-healing with fast join time
 - Aircraft relative velocities up to Mach 8
- Standard Internet Protocol (IP) with autonomous adaptive networking
 - Automatic routing between originating and destination nodes for resilient communications
 - Self Mitigates intentional jamming "Quality of Service" Prioritized Communications
- Transmit on demand – no waiting for time slots
- Nodes receive while transmitting
 - Receive up to four simultaneous streams



MIDS JTRS TTNT KEY FEATURES

- Multi-Waveform operation w/ isolated security
 - TTNT Waveform
 - 3 channel IP-based tactical network capable of running at different security levels
 - Information is transmitted on demand
 - Adaptable power output levels
 - Link 16 Waveform
 - Full access to situational awareness & Command and Control (C2)
 - Increased receive capacity w/ CMN-4/CCR
 - TACAN Waveform
 - Option for additional growth waveform
- NSA Certified Equipment

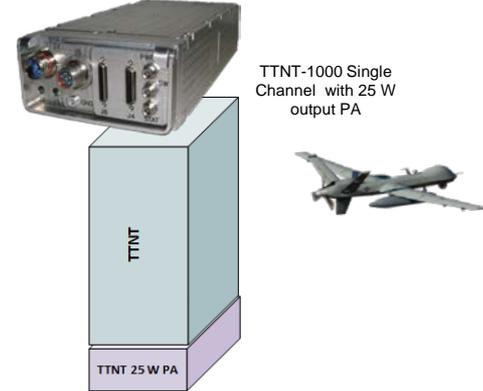
COLLINS TTNT-1000 – SMALL FORM FACTOR TTNT RADIO

The first Small Form Factor TTNT radio fully interoperable with MIDS JTRS TTNT v7

The Collins Aerospace TTNT-1000 allows SWaP-constrained platforms to integrate into the Tactical Targeting Network Technology (TTNT) network. The small form factor of the TTNT-1000 terminal enables smaller disadvantaged platforms to participate in the TTNT network increasing the dissemination of operational relevant, actionable data to the warfighter at the speed of battle. The TTNT-1000 uses Dynamic Spectrum Access (DSA) capability to enable authorization of generally restricted RF spectrum frequencies by allowing the radio to select and deselect frequencies based on geo-spatial and temporal policies, and communicating those adjustments over the TTNT network improving network performance.

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TTNT-1000 KEY FEATURES

- Small form factor software defined radio (8 pounds, 125 in³)
- Single TTNT waveform operation at defined security level
 - (U) IP-based tactical network
 - (U) Information is transmitted on demand
 - (U) Adaptable power output levels
 - (U) fast automatic joining & leaving of network nodes
 - (U) Interoperable with MIDS JTRS TTNT
- Internal Cryptographic Subsystem (CSS) for full COMSEC / TRANSEC operations (NSA Type 1)
- Miniaturized Terminal for disadvantaged SWaP platforms
- “Hooks” to additional capabilities
 - (U) Special Modes (classified)
 - (U) External 80 Watt Dual Power Amplifier (DPA)
 - (U) Precision Navigation Time (PNT)

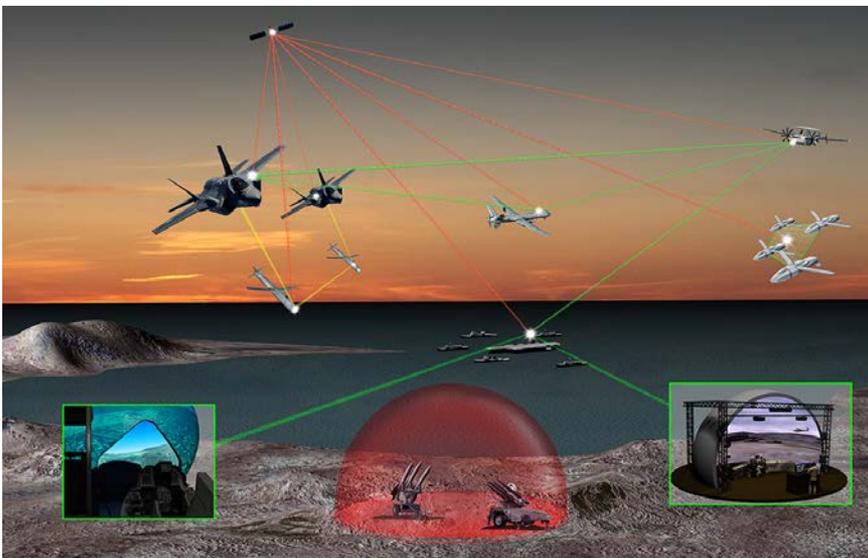
COLLINS TACNET – NETWORK ENABLED WEAPON DATA LINK

Advancing the employment of weapons - Net Enablement and Collaborative Weapons Engagement

When mission success is critical, TacNet WDL enables warfighters to engage stationary and moving targets at greater ranges and in all-weather, high threat environments. TacNet makes any guided weapon a Network Enabled Weapon (NEW) providing the warfighter with joint weapon tracking and fire control, as well as high-confidence situational awareness data.

TACNET KEY FEATURES

- Multi-channel Link 16 and UHF
- NSA Type-1 certified
- Moving target engagement
- In-flight target update
- In-flight retargeting
- In-flight controller hand-off
- In-flight abort
- Bomb Hit Indication (BHI)
- Increased standoff range
- Increased weapon accuracy
- Real-time situational awareness
- Collaborative weapon engagement



Status

L-16 Waveform

L-16 Xmt Power

UHF Waveform

Crypto Mod

ATDL Waveform

BLOS

Rel Nav

	Gen I	Gen II	Gen III (common Hardware)		Gen IV
	TacNet™ 1.0	TacNet™ 1.1	TacNet™ 1.5	TacNet™ 1.7	TacNet™ 2.0
	Fielded JSOW-C1, Harpoon Blk II	Production SDB-II MALD	Development SDB-II	Development SOM-J	IR&D
	✓	✓	✓	✓	✓
	5/50W	40W	40W	5/50W	5/40/50W
		✓	✓	✓	✓
			✓	✓	✓
					✓
					✓
					✓

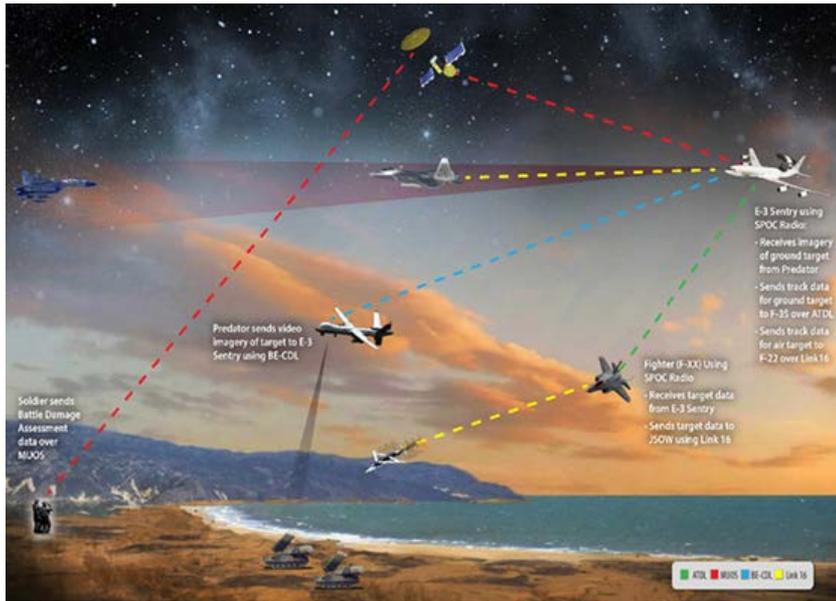
TACNET 2.0 FUTURE CAPABILITY

- Requirements
 - 2-Channel Link-16 and Advanced Tactical Data Link (ATDL)
 - Beyond Line of Sight
 - LPI/LPD/AJ
 - Long Range/High Altitude
- Collins IR&D investment in small form factor Software Defined Radio (SDR) that is waveform agnostic (TRL-6) to host multiple ATDL networking waveforms
- 2 Channel conceptual framework initiated through Advanced Weapon Agnostic Radio Enhancement (AWARE) program

COLLINS SPOC - SOFTWARE PROGRAMMABLE OMS COMPLIANT RADIO

The First USAF validated Open Architecture radio for Real Time Warfighter decision making

Datalink and communication waveform technology is being outpaced by adversary offensive electronic warfare capability, which reduces critical connectivity between warfighters and between platforms. Traditional radios are designed with highly integrated software and hardware which result in cumbersome, expensive and lengthy upgrade cycles to field new capability. To counter adversary capability in an affordable manner, the upgrade cycle must be significantly reduced by deploying radios with open architectures based on government owned open standards using general purpose processors.



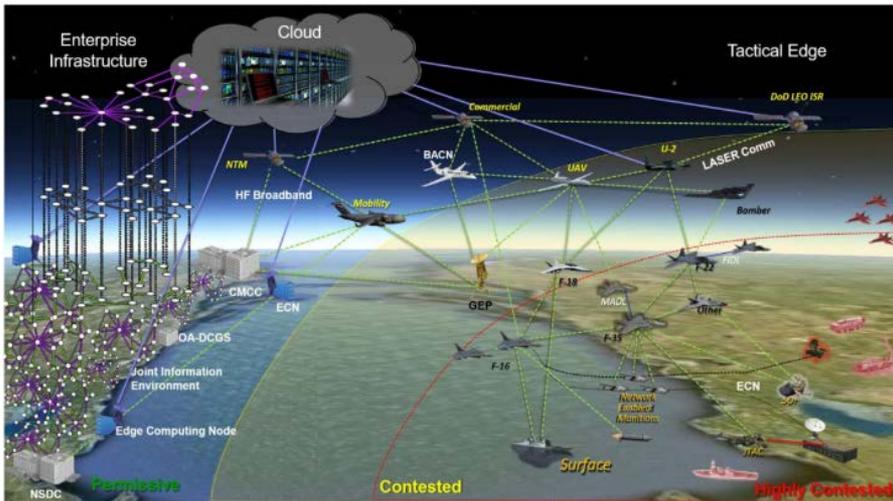
SPOC KEY FEATURES

- SPOC is a 3-channel multi-functional processor radio that is capable of simultaneous operation of 3 disparate waveforms
- SPOC is field programmable so that it can accept additional waveforms or waveform upgrades, increasing versatility and utility
- Launching platform for future waveforms:
 - Mobile ADHOC IP-Based Networks
 - Increased anti-jam performance
 - LPI/LPD signals in space
- SPOC will enable ground and airborne platforms to replace multiple existing legacy systems with a single unit having the added flexibility of reprogram ability

COLLINS ABMS DEMONSTRATION OFFERINGS

Providing Joint Warfighter Solutions NOW...Rapidly Innovating Open Capabilities for TOMORROW

Collins Aerospace system-of-systems view of battlespace awareness and management directly aligns with the ABMS "many as ONE" approach. ABMS is challenged with making sure the right data is transmitted to the right user at the right time to shorten the "kill chain". Collins Aerospace delivers products now and is innovating solutions addressing the six different ABMS Product Categories to connect, safe guard, process, fuse, and apply multi-domain effects in the highly dynamic battlespace.



COLLINS ABMS DEMO OFFERINGS

Collins is part of the ABMS IDIQ Contract in 6 categories

Digital Architecture Standards

- Building on Collins high fidelity Modeling and Simulation (M&S) environment for development, integration, test and training

Sensor Integration

- Building on fielded Collins sensors as ABMS test bed, and evolving to Smart Sensors

Secure Processing

- Using SecureOne™ product family to prototype and maturing ABMS Multi-level Security (MLS) products

Connectivity

- Demonstrating new tactically resilient capabilities with existing communication and Data Links products and emerging Open Architecture Systems

Applications

- Demonstrating existing Machine Learning (ML) framework and functions and evolving capabilities into ABMS Apps

Effects Integration

- Virtually demonstrating multi-domain, multi-platform collaborative effects with robust Modeling and Simulation (M&S) and then demonstrating live capabilities