

US Army's Warfighter Information Network-Tactical (WIN-T) enables mission command and secure reliable voice, video and data communications anytime, anywhere without the need for fixed infrastructure.

Today's soldiers expect to have network access anywhere, anytime. With the Warfighter Information Network-Tactical (WIN-T), commanders can communicate on-the-move and soldiers can have their voices heard, their texts received, and their location displayed on a map.

The WIN-T network allow all Army commanders, and other communications network users, at all echelons, to exchange information internal and external to the theater, from wired or wireless telephones, computers (internet-like capability) or from video terminals. WIN-T is the Army's tactical communications network backbone that enables mission command and secure reliable voice, video and data communications anytime, anywhere without the need for fixed infrastructure.

By connecting soldiers with their commanders, WIN-T is changing the way the U.S. Army fights by providing life-saving information on-the-move, anywhere in the world. WIN-T enables soldiers to: stream real-time video over the network, view a topographical map of friendly forces, send texts requesting medical assistance, digitally call for artillery support, and access mission command apps like CPOF and TIGR.

Command Post of the Future (CPOF) enables warfighters to visualize the battlefield and plan the mission through a dynamic view of critical resources and events. Collaborators across echelons and distances can maintain situational awareness while automating many of their daily tasks. TIGR – Tactical Ground Reporting System – provides updated intelligence such as maps showing insurgent or roadside bomb locations and incident reports from certain high-risk locations.

With WIN-T, Commanders and Soldiers can leverage mission command applications at any location, from traditional command posts, to network-equipped vehicles crossing the battlefield, even from the belly of C17 aircraft en route to an objective.

It is the Army's 21st Century C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance) infrastructure that provides capabilities that are mobile, secure, survivable, seamless, and capable of supporting multimedia tactical information systems.

WIN-T employs a combination of terrestrial, airborne, and satellite-based transport options, to provide robust, redundant connectivity. Leveraging satellite and line-of-sight capabilities for optimum efficiency, effectiveness and operational flexibility, the WIN-T network provides the data "pipe" that other communication and mission command systems need to connect into in order to operate.

The Army is conducting a wide-ranging review of "a whole series of vulnerabilities" in its communications systems that extends far beyond the troubled WIN-T program, Gen. Mark Milley and Acting Army Secretary Robert Speer told reporters after a Senate appropriations hearing .

What's the motivation? "In the electromagnetic spectrum...there's a whole series of vulnerabilities," Milley said, who's criticized Army electronics being too easy for

enemies to hack, jam, or triangulate for artillery bombardments. "What we want to make sure is that the Army, as part of a joint force, has the ability to effectively conduct mission command," he went on, using the Army's more initiative-friendly concept for what used to be called command and control. "A key component of that is to be able to communicate – voice, digital, video, and so on – in any environment, globally...and against any foe."

The location tracking services depend on GPS which is vulnerable to jamming attacks. Typical military jammers are able to affect GPS receiver for many tens of kilometers by line of sight. It's a problem because best accuracy, availability and global coverage of PNT data is through GPS/GNSS.

Engineers and WIN-T developers at GD are currently working on a range of "hardening" strategies, tactics and technological adjustments to address changing threats, Bill Weiss, Vice President and General Manager, Ground Systems, General Dynamics Mission Systems, told Scout Warrior.

Also, WIN-T developers are making progress with an emerging strategy described as "keep-out-zones," a method of deliberately emanating electromagnetic signals in the direction of friendly forces and, by design, away from an enemy. "Some radios broadcast in an omni-directional fashion. The antenna in WIN-T is sophisticated. It has the option to stream a beam and only radiate in a certain direction," Paul Bristow, Chief Network Architecture for General Dynamics Mission Systems, told Scout Warrior.

WIN-T developers also say technical progress is being made with efforts to refine and operationalize emerging "precision, navigation and timing" technologies able to facilitate relevant connectivity in the event that GPS is compromised. Militaries are taking two approaches one is

integration of GPS with complementary technologies such as chip-scale atomic clocks and small inertial measurement units of the Micro-Electro Mechanical Systems (MEMS). Other approach is developing entirely new PNT technologies. The latest PNT technology, being developed through DARPA and the Army Emerging Technologies Office, will no longer depend on GPS technology, which requires sending and receiving signals to satellites and therefore can be disabled by electromagnetic and cyber space interference.

WIN-T is used by every echelon on the battlefield (Theater through Unit of Action) and consists of infrastructure and network components from the maneuver battalion to the theater rear boundary. Major components of the WIN-T network infrastructure include switching, routing, transmission media, network management, information assurance (IA), subscriber services and user interfaces to support user multimedia (voice, data, messaging, and video) requirements.

WIN-T Increment 1: Communications At The Halt

Joint Network NodeOriginally known as the Joint Network Node Network (JNN-N) program, WIN-T Increment 1 began fielding in 2004 to support combat missions during Operation Enduring Freedom and Operation Iraqi Freedom. With WIN-T Inc. 1, for the first time in history, the soldiers in the battlefield had a high-speed, interoperable voice and data communications network down to the battalion level. Fielding of WIN-T Inc. 1 was completed to the U.S. Army, National Guard and Reserves in June 2012.

Similar to most Americans' Internet connections at home, but with added security and the ability to network in the most

remote environments, WIN-T Inc. 1 provides the U.S. Army's tactical force with secure high speed, high capacity voice, data and video communications "at-the-halt" granting soldiers the ability to quickly communicate with their operations center.

It has three types of transportable network nodes: the Tactical Hub Node (THN) that supports division headquarters, the Joint Network Node (JNN) that supports brigade level headquarters and the Battalion Command Post Node (BnCPN) that supports battalion level headquarters.

A communications network management software solution (PacStar's IQ-Core Software) deployed in 2016 across the U.S. Army has proven to drastically reduce network downtime as soldiers operate in an increasingly complex command post environment. An estimated 80 percent of network downtime in combat zones is caused by equipment misconfiguration, not equipment failure, says PacStar's Chief Technical Officer Charlie Kawasaki. "By eliminating those misconfigurations, we're keeping the critical network services available," Kawasaki says. "That's what we're talking about—the ability to potentially reduce downtime by hours."

WIN-T Inc. 1 is currently in use by soldiers in the Army, National Guard and Army Reserves. WIN-T Increments 2 and 3 build on the capabilities of Inc. 1 with on-the-move networking and further security, bandwidth and connectivity.

WIN-T Increment 2: Communications On-The-Move

Combat vehicles integrated with WIN-T Increment 2 provide the on-the-move communications, mission command and situational awareness that commanders need to lead from anywhere on the battlefield. WIN-T Increment 2 enables deployed Soldiers down to the company level operating in remote and challenging terrain to maintain voice, video and data communications while on patrol, with connectivity rivaling that found in a stationary command post.

Increment 2 enables mission command from brigade to division to company through a completely ad-hoc, self-forming, self-healing networks. Commanders and select staff now have the ability to maneuver anywhere on the battlefield and maintain connectivity to the network, without the need to stop and set up communications, making them vulnerable to attack. Army Chief of Staff Gen. Mark Milley has repeatedly stated that nothing stationary will survive long in the high-intensity conflicts of the future.

The Army's mobile Satcom and high-bandwidth communications network, Warfighter Information Network Inc. 2, has been fielded to at least 16 Brigade Combat Teams and has performed well in combat during ongoing ground wars.

WIN-T Increment 2 enables high-capacity voice, video and data transmission in an electronically-contested environment. It is resistant to jamming and cyber attacks. Its transmissions are double-encrypted, so they can't be intercepted and understood by the enemy. It can be modified to minimize signatures that

adversaries might exploit for targeting. And most important, it is fully functional from tactical vehicles on the move.

The system provides on-the-move network capability and a mobile infrastructure by employing military and commercial satellite connectivity and line-of-sight (terrestrial) radios and antennas to achieve end-to-end connectivity and dynamic networking operations. The 10th Mountain Division was the first to have this new capability when it deployed for Afghanistan in July 2013. WIN-T Inc. 2's unique value was immediately recognized, as it provided soldiers with communications even as fixed infrastructure was removed.

On-The-Move: The tactical communication nodes in Inc. 2 are the first step to providing a mobile infrastructure on the battlefield. Consisting of mobile points of presence systems (installed on select vehicles at battalion levels and above, which include four companies of up to 200 soldiers and about 10 to 30 vehicles each), vehicle wireless packages, and the soldier network extension (for Company-level connectivity).

WIN-T Increment 3: Simplifying, Securing and Expanding the Network

WIN-T Inc. 3 advancements simplify WIN-T "network operations" for greater soldier utility and ease of use. And as threats within cyber space continue to evolve and grow, Inc. 3 ensures the entire WIN-T portfolio remains cyber secure with ongoing upgrades and development of Type 1 encryption for the network.

WIN-T Inc. 3 will also expand the reach of the network to

provide a fully mobile and flexible tactical networking capability needed to support a highly dispersed force over isolated areas. This is especially important as the Army transitions to a faster, leaner force to handle future threats and missions across the globe.

With continued network enhancements, Inc. 3 provides a leap forward in network capacity, as well as improvements to the overall reliability and robustness of the network.

WIN-T Inc 3 develops the Network Operations (NetOps) software to meet the Army's Network Convergence goals. NetOps provides the monitoring, control and planning tools to ensure management of the voice, data and internet transport networks. The NetOps software will also provide Information Assurance and Network Centric Enterprise Services.

Inc 3 also develops the enhanced Net Centric Waveform (NCW) version 10.x for increased throughput capability beyond line of sight (BLLOS) satellite communication and the Highband Networking Waveform (HNW) version 3.0 for line of sight (LOS) communications. NCW version 10.x testing will support Army Strategic Command certification of the waveform for use on Wideband Global Satellites and subsequent insertion into WIN-T Inc 1 and Inc 2. HNW version 3.0 will be delivered to the Joint Tactical Networking Center (JTNC) Information Repository for commercial development application. Both NCW and HNW provide improved network capacity and robustness

Cyber: Protecting and Defending the Network

Cybersecurity and anti-jam capabilities are a critical part of WIN-T. With the amount of voice and data information that can now flow between soldiers on the ground and back up to commanders at higher echelons, protecting and defending the integrity of the network is a paramount concern.

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