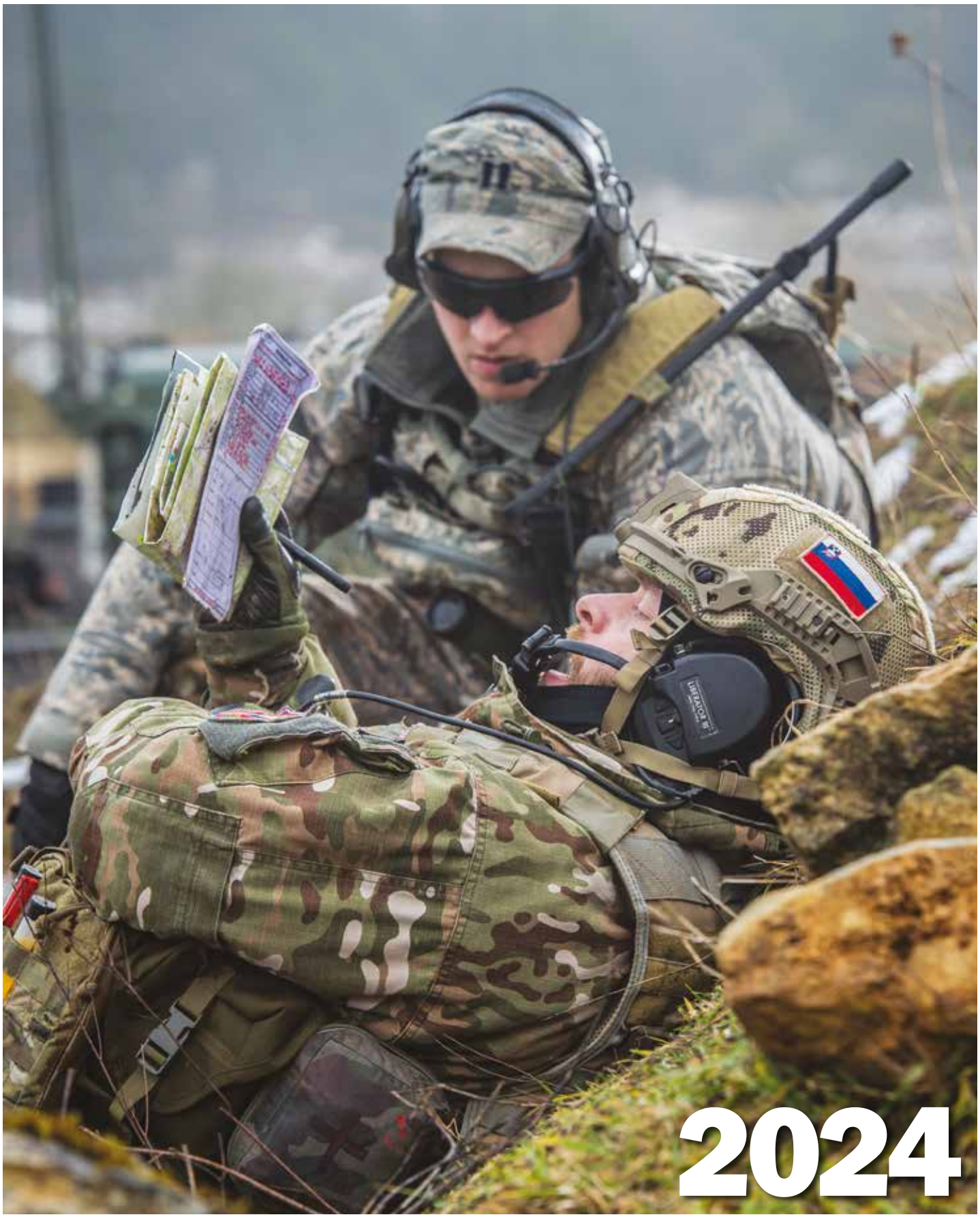
TACTICAL RADIOS



2024

ARMADA INTERNATIONAL : THE TRUSTED SOURCE FOR DEFENCE TECHNOLOGY ANALYSIS

US Army

The Ukrainian Army has received a raft of systems to enhance military communications, including civilian handheld transceivers and military-grade tactical radios. The disparate nature of this equipment has created some serious interoperability challenges.

NETWORKING THE INSTRUMENTS OF POWER

In the first of two articles accompanying the 2024 Tactical Radios Compendium, *Armada* looks at NATO's embrace of the Multi Domain Operations approach and what this means for alliance connectivity.

by Thomas Withington

North Atlantic Treaty Organisation (NATO) sources who have seen the fighting close-up on the ground in Ukraine do not mince their words regarding the connectivity challenges this war brings. A persistent observation is that secure connectivity between Ukrainian forces at the operational and tactical levels is difficult. Land, sea and air forces fighting Russia must easily share Command and Control (C2) and Situational Awareness (SA) information. Voice and data traffic needs to be shared securely and rapidly unimpeded by Russian Communications Jamming (COMJAM) efforts. This is easier said than done. As *Armada* has chronicled extensively in the past, Russian COMJAM capabilities remain effective at tactical and operational levels. Russian forces are fighting to win Electromagnetic Superiority and Supremacy (E2S) as hard as their Ukrainian adversaries. Electromagnetic superiority is the condition where red forces can only perform sporadic and disjointed efforts to contest blue force control of the electromagnetic spectrum across a specific locate. Electromagnetic supremacy is


Russian MOD

Digitisation remains a key priority for Russia's armed forces. Like NATO and allied nations, the Russian military realises the importance of rapid, high-quality decision-making, and is introducing systems and capabilities to this end.

the condition where red forces can perform no meaningful efforts to contest blue force spectrum ownership. Both the Ukrainian and Russian militaries realise they cannot dominate the battlefield, let alone emerge victorious, without winning and sustaining E2S.

An additional complication for Ukraine is caused by the materiel the country has received from its international allies. Assistance has included supplies of military communications. Nonetheless, these disparate systems do not always easily interoperate with one another, *Armada* has been told by Ukrainian sources. The upshot of this is that C2 and SA traffic is sometimes moved across unsecured links from one network to another. This greatly increases the risk that such traffic may either be halted or destroyed through jamming. An additional risk is that traffic en clair may be be compromised by Russian Communications Intelligence (COMINT) cadres.

THE MDO EMBRACE

Consider the challenges the Ukrainian military faces regarding communications interoperability, and then scale these up to the 32 nations that comprise NATO. All these nations have militaries that may need to fight shoulder-to-shoulder on European battlefields should a wider conflict with Russia erupt. Like the United States Department of Defence, NATO has embraced the Multi-Domain Operations (MDO) mindset. In the alliance's own words "(MDO) represents a pivotal shift in NATO's approach. This transformative concept empowers the Alliance to strategically influence events, synchronise efforts with external stakeholders, and present formidable challenges to adversaries." In essence, NATO is working to develop structures and architectures to facilitate synchronous operations across sea, land, air, space and cyberspace domains. Unsurprisingly, given US membership of NATO, the alliance's MDO vision dovetails closely with that of the former. At the heart of NATO's vision is establishing the international, intra- and interforce connectivity needed to share data at the speed of relevance across all domains at all levels of warfare. The central point of MDO is to enable blue force commanders to take better quality and faster decisions than their adversaries.

At first blush, MDO appears to be a new concept embracing the information and communications revolution the world has witnessed over the past three decades since mass internet usage emerged in the 1990s. However, multi-domain operations have their foundations planted firmly in history. The emphasis on faster and better-quality decision-making owes much to the military theorist John Boyd. Boyd pioneered the famous OODA (Observe, Orient, Decide and Act) loop. His thesis was simple: The person or force which

NATO and US multi-domain operations visions share many common features however NATO is taking an all-of-society approach which incorporates instruments of national power alongside militaries.

navigates the OODA loop faster than their adversary will prevail. In navigating the loop at a faster clip, one is always setting the initiative, and adversaries are forced to be continually reactive. Previous approaches to joint warfighting such as the U.S. military's AirLand Battle concept in the 1980s and the drive towards Network Centric Warfare in the 1990s were influenced by Boyd's dictum and represented MDO's foundations.

NATO's MDO vision perceives the depth and breadth of connectivity that the concept requires as effectively coalescing the disparate forces mentioned above into a single, cohesive unit. The speed of technological development, particularly in the tightly-integrated digital and communications domains is forcing the alliance's hand, particularly the actions of potential enemies. Russia, alongside the People's Republic of China and the Islamic Republic of Iran are likewise cognisant of these technology trends. For example, the Russian military is embracing digitisation for similar reasons to those of NATO and allied nations. The Russian Army's operational and tactical level YESU-TZ and tactical level Strelets command and control systems are cases in point: "The speed of information, data flows and adversarial capabilities, the necessity of orchestrating military activities across all domains as a single force is crucial for long-term defence and deterrence initiatives within NATO," the alliance assets.

ESSOR, CESMO AND SATURN

Work is ongoing to foster greater levels of secure interoperability between militaries. The European Secure Software Defined Radio, or ESSOR, initiative is indicative of this. The ESSOR effort involves Finland, France, Germany, Italy, Spain and Portugal. The ESSOR consortium includes Bittium, Indra, Leonardo, Radmor, Rohde and Schwarz, and Thales. These companies have developed a wideband networking waveform that can be installed on a panoply of tactical radios used by NATO land forces. ESSOR's introduction will greatly ease the sharing of C2 and SA information between coalition forces using a secure, jam-resistant waveform. In fact, ESSOR's specifications are likely to be enshrined in a new NATO Standardisation, or STANAG, agreement. Military communications manufacturers will be able to use the STANAG to ensure wideband waveforms used by their radios meet these specifications. Earlier this year ESSOR officials shared with the author that the consortium is working on additional waveforms. Narrowband, satellite communications and air-to-ground/ground-to-air waveforms are in the offing which may also become STANAGs.

Meanwhile, work continues on the Second Generation Antijam Tactical Ultra High Frequency Radio for NATO (SATURN) tactical communications waveform. SATURN has been conceived to replace the SINCGARS (Single Channel Ground and Airborne Radio System) and HAVEQUICK-I/II waveforms used across the alliance. SINCGARS primarily supports ground-to-ground and some ground-to-air/air-to-ground tactical communications. HAVEQUICK-I/II is predominantly used for ground-to-air/air-to-ground traffic. To be fair, both waveforms still have some life left in them. In fact, the U.S. Army's Tactical Command, Control and Communications Programme Executive Office upgrading SINCGARS to improve its resiliency and performance. An important lesson learned from the battlefields of Ukraine has been the robustness of the SINCGARS waveform to Russian COMJAM. SINCGARS was designed in the 1980s and first fielded by U.S. land forces during Operation Desert Storm in 1991. Ukraine has shown that SINCGARS can withstand the nastiest electrons Russian EW cadres can throw at the waveform.

In the electronic warfare community NATO has adopted the Cooperative Electronic Support Measure Operations (CESMO) capability which is enshrined in STANAG 4658. The CESMO architecture uses existing Electronic Support Measures (ESMs) equipping NATO military aircraft. During air operations, these ESMs collect Electronic Intelligence (ELINT) on hostile ground-based air surveillance and fire control/ground controlled interception radars such as the bearing of these threats relative to the aircraft. This ELINT is shared across standard air-to-air and air-to-ground/ground-to-air tactical datalinks to a computer hosting the CESMO software. The software will use this bearing information to triangulate the location of these hostile emitters. With the location of the

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The advent of the ESSOR wideband networking waveform represents a major enhancement of NATO and European land forces intra- and interforce connectivity. This effort is likely to yield additional waveforms aimed at enhancing interoperability in the future.

emitters determined, NATO aircraft can alter their routes to avoid them. Alternatively, these radars can be engaged using kinetic, electronic or cyber threats.

THE HOLISTIC APPROACH

Arguably a key difference between the U.S. and NATO approaches to multi-domain operations is the latter's extension of the concept to what the alliance terms 'Instruments of National Power'. These instruments comprise foreign and economic ministries, national intelligence agencies, law enforcement bodies and critical national infrastructure stakeholders. In fact, just about any organisation or individual tasked in any shape or form with protecting a NATO member nation can be considered an instrument of national power.

The alliance is a defensive organisation. Any incursion into NATO territory is likely to be fought and repelled there. It is not sufficient for MDO to be confined to the military. Information flows will need to be established and protected between forces in battle and local, national and international instruments of national power supporting the fight. This reality creates additional challenges for the alliance. All the organisations cited above will use digital information and communications systems in some shape or form. Data handled by these systems may need to be shared with militaries should war occur. How can these data be shared securely with NATO forces? Are data protocols used by these civilian networks and digital systems compatible with NATO members' military communications? How are differing levels of classifications between military and civilian communications networks administered? These are just a small selection of the vexing challenges NATO faces as the alliance widens the MDO vision to embrace this whole-of-society approach.

The good news is that efforts like ESSOR, CESMO and SATURN show that NATO does communications interoperability well. To be fair, efforts like SINCGARS and HAVEQUICK-I/II laid the groundwork, but time is not on NATO's side. War continues to rage in Ukraine. Europe has arguably not faced this great a risk of continent-wide conflict since the Cuban Missile Crisis of 1962. Short of Russia being defeated in Ukraine, a clear and present danger of a Moscow-driven incursion into NATO's eastern flank remains. The alliance must look at what has worked from a communications interoperability perspective. It must ask how these successes could be adopted for the holistic approach to warfare that NATO's embrace of MDO promotes. A

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The success of the AirLand Battle concept exhibited during Operation Desert Storm paved the way for the wider Revolution in Military Affairs which emphasised precision and connectivity in warfighting. The RMA in turn morphed into the Network Centric Warfare concept.

IAI

JADC2 - BREAKING THE STOVEPIPES

In the second of two articles accompanying Armada's 2024 Tactical Radios Supplement, we look at the ongoing roll-out of the JADC2 architecture across the United States military.

by Thomas Withington

Multi-Domain Operations (MDO) have emerged as the overriding military philosophy for North Atlantic Treaty Organisation (NATO) and allied nations. Definitions vary, but MDO envisages the inter- and intra-force connectivity of all military assets (personnel, platforms, weapons, sensors, bases and capabilities). MDO's goal is to enable synchronous operations at all levels of war facilitated by faster and better-quality decision-making. As our first article noted, MDO is built on the foundations of Network Centric Warfare (NCW) that emerged as a concept in the 2000s. NCW traced its lineage to the Revolution in Military Affairs (RMA) observed during and after the 1991 Persian Gulf War. The RMA was a direct heir to the AirLand Battle concept adopted by the United States military which spread throughout NATO in the 1980s. AirLand Battle, RMA and NCW were all essentially manoeuvrist in their outlook, harking back to the famed OODA (Observe, Orient, Decide, Act) loop. The OODA loop was the brainchild of US military theorist John Boyd which he developed in the 1950s and 1960s. As with the OODA loop a core principle of MDO is to take faster, better-quality decisions than one's adversary. The intention is to force the red team to always be reactive to the blue force's decisions. Ideally, the result is that the blue force continually retains and shapes the initiative.

MDO as a concept was a reaction to the U.S.' 2018 National Defence Strategy. The strategy observed that US strategic rivals were adopting Anti-Access/Area Denial (A2AD) postures as a riposte to what those actors considered to be a hegemonic United States. "Every domain is contested – air, land, sea, space and cyber space" via these A2AD postures, the strategy articulated: "We face an ever more lethal and disruptive battlefield, combined across domains, and conducted at increasing speed and reach," the publication continued. "Some competitors and adversaries seek to optimise their targeting of our battle networks and operational concepts, while also using other areas of competition short of open warfare to achieve their ends." These other areas of competition include "information warfare, ambiguous or denied proxy operations, and subversion." The political intents of actors relying on A2AD postures are underpinned by "rapid technological advancements and the changing character of war." Technology is making its presence felt on the battlefield: "(A)dvanced computing, 'big data' analytics, artificial intelligence, autonomy, robotics, directed energy, hypersonics, and biotechnology" are making their presence felt. The strategy concluded with a stark message: "These trends, if unaddressed, will challenge our ability to deter aggression."

FROM MDO TO JADC2

The challenge for the US Department of Defence (DOD) has been to conceive, develop and adopt the capabilities needed to support MDO resulting in the Joint All-Domain Command and Control (JADC2) architecture. Confusingly, JADC2 is not a programme per se. Instead, it is a serious of efforts that will cumulatively realise the capabilities needed to support multi-domain operations. In a nutshell, JADC2 includes two dominant parts: Firstly, the networking needed to provide the

The US Army's AirLand Battle concept was a precursor to the embrace of Multi-Domain Operations, constituting both a reset of US Army doctrine in the wake of the Vietnam War, and a response to Soviet and Warsaw Pact military strength on the eastern side of the Iron Curtain.

US DOD

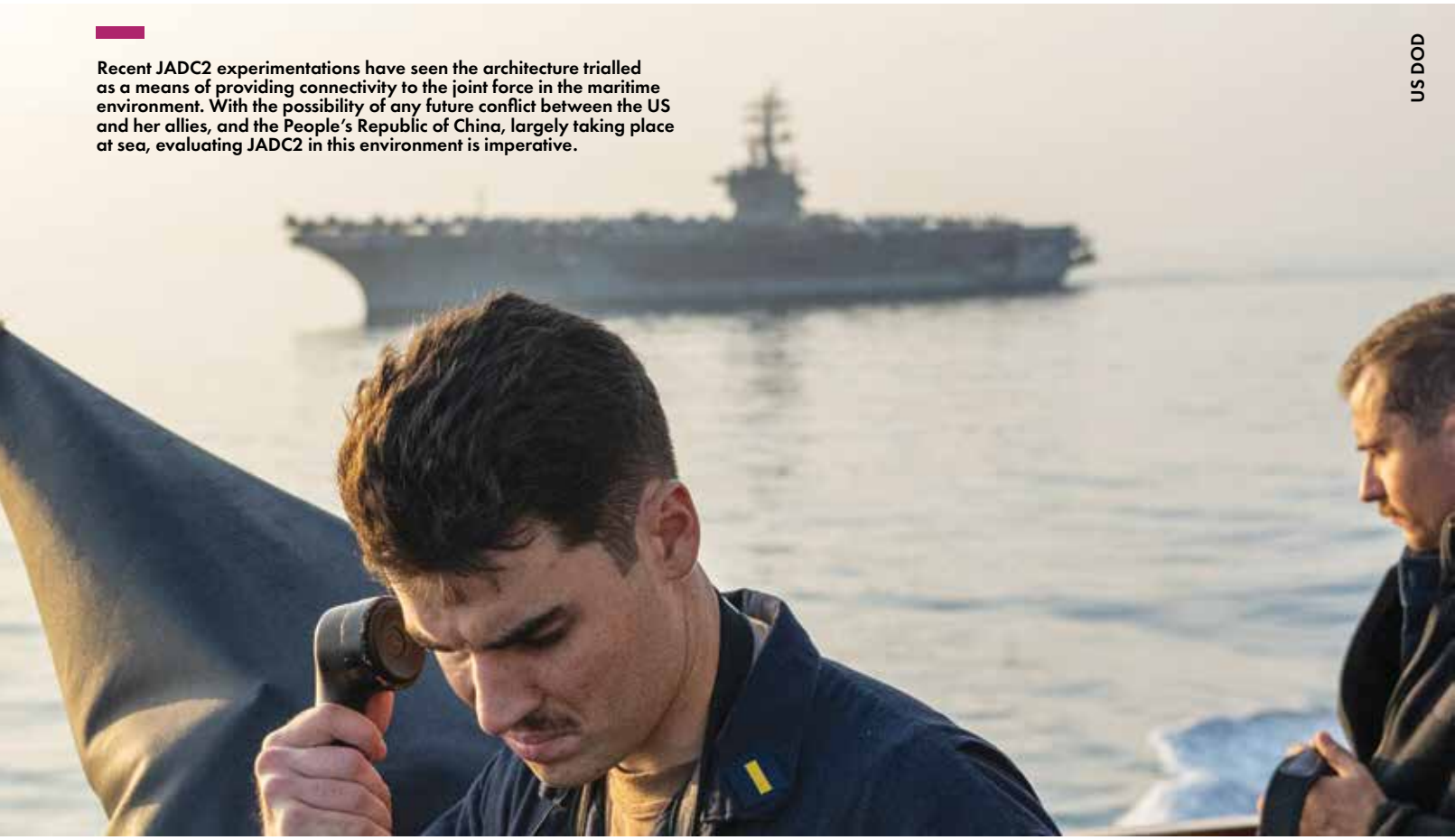
interconnectivity envisaged above. Secondly, cloud computing technology, known as combat clouds. Combat clouds will receive, marshal, analyse and redistribute data across the battlefield. It could be argued that MDO represents the US military's prevailing strategy; JADC2 comprises the operational and tactical structures supporting it.

The key aim of the JADC2 effort is to break the 'stovepipes' existing within, and between, service communications networks. Navies, armies, air, cyber and space forces tend to be good at communicating within themselves, but less good at communicating between each other. JADC2 will deepen levels of interforce connectivity to this end. To give an idea of how JADC2 and its accompanying architectures may work in practice, consider this example: A U.S. Navy Uninhabited Aerial Vehicle (UAV) is loitering above a village and has spotted commandoes believed to be preparing to destroy a key bridge over a river. The UAV streams the imagery it collects to the combat cloud. There, artificial intelligence algorithms scan the incoming imagery determining that the behaviour of the individuals spotted by the UAV are constituent with that of special forces on a mission. The cloud transmits an alert, and the imagery, to the commanders responsible for the locale below the UAV's orbit. At the headquarters, experts confirm the video does suggests that commandoes are planning to destroy the bridge. The HQ transmits a call for fires to the cloud. The call is relayed to assets in the locale that could engage the commandoes. Surface ships, artillery units and close air support/battlefield interdiction assets all decline the call citing concerns over collateral damage. Nonetheless, a platoon of airborne soldiers is a few minutes' helicopter flight away from the target. The airborne forces commander sends a message to the HQ that they will perform the mission which is a success. This whole process, from target detection to effects, may have taken just minutes. The rationale of JADC2 is to ensure that the most appropriate effects are timely matched to specific targets. This will be done in a service and effect agnostic fashion.

Into service

JADC2 architectures are being rolled out across the DOD and the US armed forces. In February, the department announced it had implemented the baseline JADC2 iteration. Each service is pursuing its own efforts to acquire, develop, test and introduce technologies supporting JADC2's cloud computing and networking demands: The U.S. Army is moving forward with Project Convergence, the US Navy with Project Overmatch, the air force with the Advanced Battle Management System and the US Space Force with the National Defence Space Architecture. The services are performing continual experiments regarding the JADC2 capabilities they are acquiring, and implementing appropriate technologies as a result.

Reflecting the reality that US forces will almost certainly fight their future wars as part of a larger coalition, the acronym expanded to include Combined (CJADC2) this year. Coalition partners will have the means of plugging into JADC2 networks to share data. One of the Lines of Effort accompanying JADC2 is creating standards which allies can use to easily send and receive data across JADC2 networks. Standardisation forms a key



Recent JADC2 experimentations have seen the architecture trialled as a means of providing connectivity to the joint force in the maritime environment. With the possibility of any future conflict between the US and her allies, and the People's Republic of China, largely taking place at sea, evaluating JADC2 in this environment is imperative.

US DOD

part of the JADC2 effort within US forces as an imperative to ensure services can easily share data between themselves. Mirroring NATO's MDO philosophies, JADC2 standardisation efforts are widening to ensure non-military government agencies can easily share relevant data with the military. It is entirely possible that other U.S. government organisation like the intelligence agencies and federal authorities may need to exchange data with the US DOD and armed forces during future contingencies. Homeland security operations are one clear example. The Open DAGIR (Data and Applications Government-owned Interoperable Repositories) is front and centre of this effort.

Over the next year, the U.S. DOD will perform its Global Information Dominance Experiment (GIDE) series which will occur every three months to test and field JADC2 connectivity capabilities, according to reports. These reports added that GIDE experiments will evaluate Carrier Battle Group (CBG) and allied networking. Inter-US combatant command and inter-allied connectivity with Australian and UK forces will also be evaluated. GIDE efforts are expected to conclude at the end of 2025 and will inform the continued evolution of JADC2. The CBG experiment is not the first time JADC2 has been put through its paces. In mid-June 2024, Exercise Valliant Shield took place in the Pacific and involved US and foreign militaries working with JADC2 capabilities. Few details were provided to the public domain regarding which JADC2 aspects were used.

JADC2 is not a single programme or capability as such, instead, it is a catch-all term for a raft of technologies which will enable the networking and cloud computing resources demanded by MDO. Nor is there a final 'destination' vis-à-vis Joint All Domain Command and Control. Instead, capabilities will be added incrementally as technologies are developed and proven. There is no doubt that JADC2 is ambitious and expensive. Reports have noted that $2.6 billion has been spent by the DOD on the initiative to date, a further $9 billion could be spent before the end of the decade. Moreover, money will need to be continually spent on capabilities for JADC2 as these become available, due to the initiative's characteristics discussed in more detail below. In June, some US lawmakers expressed disquiet over the programme's direction and cost. Representative Rob Wittman has cited concerns regarding the U.S. DOD's JADC2 ambitions and what the effort has delivered to date. A danger for JADC2 is that any escalating costs and capability shortcomings could risk elements of the overall undertaking. There is always a chance that cuts could leave the US military with substandard JADC2 capabilities if key elements of the programme fail to deliver.

JADC2 will continue to grow, change and develop and is arguably the latest step on a journey to continually improve ways of enacting Mr. Boyd's manoeuvrist mantra. AirLand Battle, the RMA and NCW did not really begin and end, one simply metamorphosed into another, JADC2 being the latest iteration. In is entirely possible that JADC2 may be called something completely different in two decades time, but this will not matter. It is the military philosophy at its heart that make Joint All Domain Command and Control so vital. A

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Frequencies/waveforms: 30MHz to 87.975MHz. Combat Net Radio (CNR), Voice Relay Network (VRN) and Packet Radio Network (PRN) waveforms
Security: AES 256/Customised COMSEC and ECCM
Weight: ≤ 0.6kg (with 3800mAh battery)
Notes: PR9560 is intended for land forces such as infantry, forward observers, snipers, special forces and anti-terrorist units, and can be deployed at the platoon or company level. CNR's primary role is voice or data transmission on battlefield via point to point/ point to multi-points communication. VRN extends voice communication distance by chaining. PRN mainly serves as data transmission for man to machine and machine to machine on the battlefield.

PRR 1M — AT Electronic and Communication International

Power: 100mW EIRP max
Frequencies/waveforms: 2.4GHz, spread spectrum, 240 operating channels, eight selectable nets
Security: Time hopping, frequency hopping and OFDM resists interception, jamming.
Weight: 1kg
Notes: PRR designed for operation within groups of up to 30 users allows for full duplex communication in ad-hoc digital networks, needs no additional infrastructure. Can link to another network through transceiver connected via USB.

PRC-4080 VHF SDR Tactical Transceiver — Barrett Communications

Power: 5W hand portable, 20W manpack, 50W mobile, base station
Frequencies/waveforms: 30MHz to 175MHz, FM (12.5kHz, 25kHz) AM (8.33kHz, 25kHz) Digital modulation (6.25kHz, 12.5kHz, 25kHz)
Security: DES 56 & AES 256 data and voice encryption, Frequency Hopping
Weight: 1.0kg (Including Battery)
Notes: Military grade portable SDR radio transceiver specifically designed for tactical applications. MIL-STD 810H, IP67 - Fully immersible to 1m. Available in handheld, manpack, vehicle mobile and base station configurations. High speed data capability. GPS position sharing and Blue force tracking

PRC-4090 HF SDR Tactical Transceiver — Barrett Communications

Power: 30W/10W PEP (Selectable), Manpack 25W, Mobile/Base Sation 150W
Frequencies/waveforms: 1.5MHz to 30MHz/ Modes: J3E (USB, LSB), H2B (AM), J2A (CW), CF (Custom Filter) ISB (Data) modes. Digital Voice: 600/700, 1200, 2400 Bps (MELP/TWELP)
Security: Security Encryption Standards: AES256 & DES56. Frequency Hopping: 5 or 25 hops per-second
Weight: 3.15kg (4.50kg with BB2590 Battery / 5.65kg with Barrett high performance Li-ion Battery with built in charge controller)
Notes: 2G and 3G ALE options, MIL110, 3G (STANAG) & CLOVER data options. Vehicle mobile (9.35kg) version with 150W power and a docking station with anti-vibration mounting. Base station (11.15kg) with 150W power and a docking station with AC mains power supply.

PRC-4075 Tactical 500 Watt HF transmitter — Barrett Communications

Power: 500W
Frequencies/waveforms: 1.5MHz to 30MHz/ Modes: J3E (USB, LSB), H2B (AM), J2A (CW), CF (Custom Filter) ISB (Data) modes. Digital Voice: 600/700, 1200, 2400 Bps (MELP/TWELP)
Security: Encryption Standards: AES256 & DES56. Frequency Hopping: 5 or 25 hops per second
Weight: 35kg
Notes: 2G and 3G ALE options, MIL110, 3G (STANAG) & CLOVER data options. Configured in 2 x 5RU rugged rack mount cases 900 x 570 x H 374mm including lids.

BLD100 Tactical Radio — Benelec

Power: 1W to 3W
Frequencies/waveforms: VHF 30MHz to 88MHz, full civilian CTSS squelch, standard military 150Hz sub-audio tone
Security: external encryption modules
Weight: 0.295kg including battery & antenna
Notes: Designed for platoon communications, BLD100 is a fixed frequency handheld radio family in IP67 housing, complies with Mil Std 810C, D, E & F. Features built-in data modem.

BL350U UHF FM tactical radio — Benelec

Power: 2W to 4W selectable
Frequencies/waveforms: 380MHz to 420 MHz, up to 128 channels with 12.5Hz or 25Hz spacing
Security: AES 256bit encryption optional
Weight: 0.285kg including 1700mAH Li-ion battery
Notes: Up to 14 hour battery life, IP54 water & dust protection, priority channel & talkback scanning, 1,200/2,400 baud modem, programming via USB, voice operated transmission (VOX).

Tough SDR Handheld — Bittium

Power: 5W (PEP)
Frequencies/waveforms: 30MHz to 2500MHz/ Bittium Narrowband Waveform, Bittium TAC WIN Waveform with data throughput up to 25mbps, ESSOR High Data Rate Waveform, supports porting of legacy and national waveforms
Security: Red/black separation, secured boot, tampering detection & response, emergency erase, COMSEC and TRANSEC allowing implementation of national algorithms, Application Sandbox for customer applications
Weight: 950g with battery
Notes: SDR-based tactical handheld radio for individual soldiers, such as squad or platoon leader, providing a uniquely wide frequency range. With flexible configuration options and routing networks, supporting 'thousands' of radios in one network. Built-in GNSS, camera, transflective TFT LCD (320 x 426) display

Tough SDR Vehicular — Bittium

Power: 12V DC to 32V DC according to MIL-STD-1275E
Frequencies/waveforms: 30MHz to 2.5GHz. Bittium Narrowband Waveform, Bittium TAC WIN Waveform, ESSOR High Data Rate Waveform. Supports porting of legacy and national proprietary waveforms.
Security: Red/Black separation, secured boot, tampering detection and response, emergency erase, COMSEC and TRANSEC allowing implementation of national algorithms, application sandbox for customer applications.
Weight: 15kg
Notes: The Tough SDR Vehicular forms part of Bittium's Tough SDR product line which also includes the Tough SDR Handheld radio; both of which are being supplied to the Finnish armed forces.

PRQ-7 Combat Survivor Evader Locator (CSEL) — Boeing

Power: 5W (PEP)
Frequencies/waveforms: VHF, UHF, satcom
Security: TNSA certified encryption and decryption of OTH and LOS messages
Weight: 0.9kg
Notes: When activated by the Isolated Person (IP), 6-channel CSEL handheld automatically transmits the IP's GPS location and identification and enables the IP and rescue centres to exchange messages.

Sentry 6161 — Codan Communications

Frequencies/waveforms: MeshUltra (up to 144 nodes, 0.25 to 10MHBW)
Security: AES 256 Encryption that is National Institute of Standards and Technology (NIST) Certified to FIPS-140-2
Weight: 445g, excluding cables
Notes: The Sentry Mesh 6161 is a Software Defined Radio based on our highly robust MANET waveforms that have been proven in applications from Public Safety to Unmanned Systems and Covert Operations.

Sentry-H 6120-BM — Codan Communications

Frequencies/waveforms: 1.6 to 30MHz (optional: 1.5 to 30MHz)
Security: AES-256/DES-56/CES-128 COMSEC
Weight: RFU: 2.82kg 2320, handset: 280g (no cable) 2330, console: 1.1kg 2340, control head: 0.77kg
Notes: Codan's Sentry-H 6120-BM delivers a rugged Software Defined Radio (SDR) solution for military organizations that demand uncompromised, secure long range voice and data communications

TACTICAL RADIOS LISTINGS

SENTRY-M 6170 — Codan Communications

Power: Handheld: 0.1W, 1W, 5W, Base/Mobile: 5W, 20W, 50W
Frequencies/waveforms: Handheld: 20 to 520MHz, Base/Mobile: 30 to 520MHz
Security: AES256 (COMSEC), Frequency Hopping (TRANSEC) and NETSEC.
Weight: Handheld: <1 kg (with Battery and Antenna), Vehicle dock: 2 kg, Power amplifier: 9.5 kg
Notes: Codan's Sentry-M 6170-HH is an advanced, secure and easy to operate handheld multiband military Software-Defined Radio (SDR) designed for use in the harshest environments worldwide. With continuous spectrum coverage from 20MHz through to 520MHz, the 6170 provides simultaneous voice, data and situational awareness (APP-6 NATO standard for tactical BMS).

PRC7700H manpack — Datron

Power: 100W
Frequencies/waveforms: TX: 1.5MHz to 30MHz (10Hz steps), RX: 100kHz to 30MHz/ waveforms, modulation types, wide & narrow bands, and communications security can be updated via software
Security: Integrated high-level encryption option with front panel quick-connect key fill port and zeroize button
Notes: IP-addressable, digital, ALE-capable HF manpack SDR combining DSP-IF circuitry and powerful microprocessors, also suitable for mobile, rack-mounting or desktop use. Can be used as a man-pack or vehicle-mounted set. Features an internal GPS receiver with external TNC antenna connector mounted on the front panel.

HH2100V Spectre-V tactical VHF handheld — Datron

Power: Up to 5W output power in three programmable steps
Frequencies/waveforms: 30MHz to 87.975MHz, 100 programmable channels
Security: Full- or partial-band frequency hopping and digital encryption, 2 COMSEC modes (40bit and 64bit)
Weight: 1.2kg with battery
Notes: Meets MIL-STD-810 for reliable operation in harsh environments, accurate position and time-of-day capability is afforded by the embedded GPS receiver, offers short messaging

HH3100 Spectre M multiband tactical transceiver — Datron

Power: up to 7W in three programmable settings
Frequencies/waveforms: 30MHz to 512MHz (depending on model), 100 programmable channels
Security: Embedded ECCM & COMSEC with Spectre 40, 64, and new AES-256, frequency hopping and digital encryption. Fully compatible with PRC2100V and HH2100V SpectreV ECCM
Weight: 1.2kg inc battery
Notes: Spectre M family offer secure communications in ruggedised form-factors, provide a sophisticated feature-set, and utilise a simplified user interface, includes three versions: HH3100V, HH3100A, and HH3100M. Ground-to Air AM operation in some models.

BLU SDR-6 — Domo Tactical Communications (DTC)

Frequencies/waveforms: MeshUltra MANET waveforms included to support up to 144 nodes in a self forming self-healing Mesh network
Security: AES 256 encryption that is National Institute of Standards and Technology (NIST) Certified to FIPS-140-2
Weight: 62g approx.
Notes: Blu SDR-6 is designed specifically for size and weight critical UxV applications, and is particularly suitable for small drone platforms operating in short range applications up to 6km.

Blu SDR-30 — Domo Tactical Communications (DTC)

Frequencies/waveforms: MeshUltra MANET waveforms included to support up to 144 nodes in a self-forming self-healing Mesh network
Security: AES 256 encryption that is National Institute of Standards and Technology (NIST) Certified to FIPS-140-2
Weight: 430g approx.
Notes: Blu SDR-30 is designed for a wide range of UAV applications, and is particularly suitable for small drone platforms operating in medium range applications up to 30km in range.

Blu SDR-90 — Domo Tactical Communications (DTC)

Frequencies/waveforms: MeshUltra MANET waveforms included to support up to 144 nodes in a self-forming self-healing Mesh network
Security: AES 256 encryption that is National Institute of Standards and Technology (NIST) Certified to FIPS-140-2
Weight: 2.5kg approx.
Notes: Blu SDR-90 is designed for either mobile or fixed site applications, particularly suitable for drone platforms operating in long range applications up to 90km.

TWH-101 and TWH-104 Personal Radios — EID Tactical Radio Systems

Power: 100mW for TWH-101R
Frequencies/waveforms: Operates in the 2.4GHz ISM band with low-probability-of-detection TDMA waveform.
Security: AES encryption, user downloadable keys
Weight: 300g to 680g including batteries.
Notes: Provides full-duplex audio conference, simultaneous data, dual PTT, stereo operation, VOX, whisper mode, voice prompt menus, automatic network management, embedded GNSS

TWH-104G1 and TWH-104G3 Portable Gateways — EID Tactical Radio Systems

Power: 400mW
Frequencies/waveforms: AES encryption
Range: 2km line of sight
Maximum data rate: 115.2kbps
Weight: 0.225kg inc batteries: 9VDC to 33VDC in TWH-104G1, 3VDC from 2x LR6 cells or 2x NiMH LR6 rechargeable batteries.
Notes: Creates a gateway between a TWH network and external equipment such as CNR, legacy radios etc.

Micom 3 Pathfinder manpack — Elbit Systems of America

Power: 25W
Frequencies/waveforms: 1.6MHz to 30MHz HF-SSB, 200 preset channels
Security: Digital AES vocoder encryption, internal modem with optional AES encryption
Weight: 3.6kg without battery
Notes: Provides long-range communications in demanding dismounted operations. Automatic Link Establishment per MIL-STD-188-141B standard.

PNR-500 Personal Network Radio — Elbit Systems

Power: up to 800mW
Frequencies/waveforms: 380MHz to 430MHz or 400MHz to 450MHz UHF, 100kHz channel spacing, 15 presets
Security: AES encryption
Weight: Less than 450g including battery
Notes: Offers SOF, snipers & CT units simultaneous voice and data communication at ranges to 1,500m, long-range links via VIC-500 vehicle intercom or tactical VHF/HF radio.

PNR-1000A Personal Network Radio — Elbit Systems

Power: 0.5W, 1W, 2W adjustable
Frequencies/waveforms: 225MHz to 512MHz,
Security: AES 256 encryption based on FIPS 197 standards
Weight: < 0.36kg
Notes: E-Lynx family SDR for dismounts providing full-duplex voice, data and video, ad hoc networking for 64 members. Self-synchronises without master station or GPS, features embedded GPS position reporting.

CNR-710 Handheld — Elbit Systems

Power: 5W, 20W with amplifier
Frequencies/waveforms: 30MHz to 88MHz VHF/FM, 25kHz channel spacing, 20 presets, software controls programming, network management, data comms etc voice and data encryption, advanced frequency-hopping synchronisation.
Security: Digital encryption with very long non-linear "white" sequences, clear override and COMSEC alarm handheld member of CNR family. Features synchronous/asynchronous data transmission, error correction coding, automatic data rate adaptation.
Notes: More powerful manpack, airborne & vehicle configurations available.

CNR-710MB multiband radio — Elbit Systems

Power: 5W handheld & man-pack, 20W high-power man-pack, vehicular & airborne
Frequencies/waveforms: 30MHz to 512MHz, 25kHz channel spacing, 20 preset channels
Security: Digital COMSEC, orthogonal frequency hopping ECCM
Notes: Multi-band radio providing ground, sea, and air units with wide frequency coverage and waveforms. Dynamic network synchronisation eliminates the need for a central control station. Uses Tadiran's synchronous-orthogonal frequency hopping technology, and is fully compatible with legacy Tadiran frequency hopping systems like the CNR-710, CNR-900, CNR-9000 and CNR-9000HDR.

MTCR-7200 V/UHF man-pack — Elbit Systems

Power: 10W
Frequencies/waveforms: 30MHz to 512MHz narrowband waveform, 225MHz to 512MHz wideband waveform, multiple waveforms covering the aforementioned NATO mobile frequency bands, 100 channels per waveform.
Security: AES-256 encryption and Elbit/Tadiran algorithm, synchronous orthogonal frequency hopping, autonomous, GPS-independent synchronisation with master station, no single point of failure.
Weight: <3kg manpack
Notes: Extended networking coverage using robust and unique multi-hop concurrent flooding techniques. Provides simultaneous multiple voice sessions along with data and video services. Embedded IP router supports standard IP routing protocols. Embedded GPS supporting continuous high resolution Blue Force Tracking.

PRC-434G/CS survival radio — Elbit Systems

Power: 1W UHF & 121.5MHz
Frequencies/waveforms: 225MHz to 299.975MHz + 121.5MHz, 3,000 channels in 25kHz steps
Security: Encrypted individual identification code assigned to each user; LPI/LPD
Weight: less than 0.85kg
Notes: ASARS- and NATO-compatible radio featuring automatic activation, transmission of GPS location data and digital emergency messages, can be activated by another PRC-434. Endurance of 30 hours at 1:10 Tx/Rx ratio.

Hook 3 combat survival radio — General Dynamics Mission Systems

Power: 1W – UHF; capable of 5W (FM), 200mW – VHF; capable of 2W (FM), 406 SARSAT 5.0W min, UHF SATCOM 5.0W ±2dB
Frequencies/waveforms: 121.5MHz, 123.1MHz; 225MHz to 320MHz; capable of 100MHz to 512MHz; 406 SARSAT, Hook 2 & SATCOM
Security: Hook 2 waveform is secure, AES-256 encryption for SATCOM
Weight: 0.680kg
Notes: New Hook family CSAR radio that is smaller, lighter and more power-efficient than its predecessors. Fully compatible with existing Hook 2 radios, Quickdraw2 interrogator, SATCOM base station.

AN/PRC-112G Transceiver — General Dynamics Mission Systems

Power: Selectable up to 5W
Frequencies/waveforms: 225MHz to 450MHz, 1250MHz to 1390MHz, 1755MHz to 1850MHz, SRW and future waveforms
Security: Programmable COMSEC and TRANSEC, Type 1, Type 2, not a Controlled Cryptogrphic Item (non-CCI)
Weight: 0.767kg with battery, 0.43kg without
Notes: Small handheld networking radio providing secret or sensitive-but-unclassified communication for leaders or squad members in a single non-CCI device, designed to operate with AN/PRC-155. Compatible with Sidewinder vehicle mount.

AN/PRC-154A Rifleman Radio — General Dynamics Mission Systems

Power: Selectable up to 5W
Frequencies/waveforms: 225MHz to 450MHz, 1250MHz to 1390MHz, 1755MHz to 1850MHz, SRW and future waveforms
Security: Programmable COMSEC and TRANSEC, Type 1, Type 2, not a Controlled Cryptogrphic Item (non-CCI)
Weight: 0.767kg with battery, 0.43kg without
Notes: Small handheld networking radio providing secret or sensitive-but-unclassified communication for leaders or squad members in a single non-CCI device, designed to operate with AN/PRC-155. Compatible with Sidewinder vehicle mount.

Pro & Pro X goTenna — goTenna

Power: up to 5W
Frequencies/waveforms: 142MHz to 175MHz VHF, 445MHz to 480 MHz UHF channel spacing 6.25kHz, 12.5kHz, 25kHz (user selectable), 4GFSK modulation
Security: end-to-end PKI encryption AES-256
Weight: 78g
Notes: Small, light digital mesh-networking tactical radio designed to work with an iOS and Android smartphone apps. Designed to enable 100 percent off-grid comms using Android Team Awareness Kit, also supports custom apps. Offers text messaging, GPS team tracking, collaborative mapping, point sharing of targets, friendlies, rally points, medevac locations etc, emergency beacon.
Pro X radios transmit critical data up to four miles point-to-point, and securely hop messages across six devices. Both offered with multi-device deployment kits.

SR600 UHF Soldier Radio — Kongsberg Defence Systems

Power: 10mW to 1W
Frequencies/waveforms: 225MHz to 400MHz, to 5MHz bandwidth
Security: Embedded AES-256 encryption
Weight: 0.7kg
Notes: Software-defined, IP-based SR600 connects all soldiers within a squad while offering full integration into the platoon/company network.
Allows the squad leader full intra- and inter squad radio communication with a single radio. Also features high data capacity to share video over realistic combat distances.

MH300 Handheld Multi-Role Radio (MRR) — Kongsberg Defence Systems

Power: 15mW, 1W
Frequencies/waveforms: 30MHz to 87975MHz, 2,320 channels
Security: Built in encryption, up to level secret, comprehensive crypto and key management provided
Weight: 1.055kg
Notes: Software configurable handheld MRR suited to CNR voice and advanced data networks. Features include tactical SMS with free-text or predefined messages (individual or group), "grab and run" from vehicle installation.

V60 II ADP – Advanced PTT for audio, data and power — INVISIO

Power: Powered by the radio/comms device. Audio and USB hub working range: 5 V – 36 V DC. USB power delivery working range: 7.2 V – 20 V DC.
Com ports: 3 COM ports
Immersion: 20 meters for 2 hours (MIL-STD-810G)
Weight: 147 grams
Notes: The INVISIO V60 II ADP is an advanced PTT and hub bridging audio, data and power. It routes power and USB data between COM ports, thus acting as a simple USB 2.0 hub. Notifications from end user devices (EUDs), and live audio streaming can be transmitted directly to the headset.
It is powered from connected comms devices, features 3 COM ports and 4 PTT buttons and is capable of connecting into any type of communication device.

T7 Over-the-Ear Headset — INVISIO

Power: Powered by an INVISIO control unit
Hearing Protection: SNR 28 dB (EN351-2002), NNR 22 nB (ANSI S3.19)
Immersion: 10 meters for 1 hour (MIL-STD-810G)
Weight: 347 grams
Notes: The INVISIO T7 is a submersible and lightweight hearing protection headset available in three interchangeable variants. The T7 is submersible to 10 meters and extremely rugged making it ideal for use in demanding environments. It is powered and controlled by an INVISIO control unit, making it easy to use and lightweight while featuring industry leading situational awareness.

X7 In-the-Ear Headset — INVISIO

Power: Powered by an INVISIO control unit
Hearing Protection: SNR 39 dB (EN352-2:2020), NNR 32 dB (ANSI S3.19)
Immersion: 2 meters for 2 hours (MIL-STD-810H)
Weight: 47 grams
Notes: The INVISIO X7 in-ear headset provides best-in-class hearing protection, clear communication, and auditory situational awareness in extreme environments. Designed for comfort and ease of use, it is powered and operated by an INVISIO Gen II control unit.
The ergonomic design is perfected to fit the ear and soft, yet durable, materials ensure comfort for prolonged usage. The X7 fits under helmets, eyewear and breathing apparatus and is available with either foam- or tri-flanged tips.

CNHF Manpack — KNL

Power: 25 W (PEP)
Frequencies: HF: 1.5 - 30 MHz, VHF 30 - 56 MHz. GNSS independent cognitive ALE with 4000 calling channels listened simultaneously
Security: AES256 encryption, static & changing keys. Radio platform: Secure boot, signed software, zeroize function
Weight: Under 5kg without battery. Battery type: BB-2590/U
Notes: CNHF Manpack is software defined radio that has multiple game-changing features not currently found elsewhere: cognitive spectrum usage, wideband HF data up to 300 kbit/s, extremely robust modes can operate with less than -10 dB SNR. The innovative multihop functionality ensures that a route from source to destination is always found. CNHF Manpack also covers VHF up to 56 MHz, interoperability with legacy VHF FM radios can be achieved when required. User can establish their own independent communication network ranging from a few kilometres to thousands of kilometres. This fully autonomous HF radio has intuitive web UI, email and instant messaging clients and standard interfaces (SMTP, XMPP) with military grade encryption. Antenna tuner and battery charger are built-in – CNHF Manpack is compact product in one box.

MP300 — Kongsberg Defence Systems

Power: 10mW, 0.5W, 5W, 50W/ MRR special waveform
Frequencies/waveforms: 30MHz to 87.975MHz, 2,320 channels
Security: Built-in COMSEC; electronic protective measures including Narrow Band Direct Sequence Spread Spectrum (NBDS) in fixed-frequency operation, frequency hopping, multi-hop packet radio service with automatic routing, multipath integration.
Notes: Software upgradable man-pack for CNR and advanced data network services. Features: up to 19.2kbps data with forward error correction, voice, transparent and packet data, interference cancelling.

AN/PRC-150(C) HF Manpack Radio — L3Harris

Power: 1W, 5W, 20W PEP, -1/+2dB (1W, 5W, 10W FM)
Frequencies/ waveforms: 1.6MHz to 60MHz/HF features: encrypted data, ALE, frequency hopping, vocoder, data link layer protocol, VHF features: vocoder, encrypted data
Security: US Type-1 and coalition encryption, enhanced frequency hopping
Weight: 4.7kg without batteries
Notes: Falcon II family advanced HF-SSB/VHF-FM secure voice and data manpack radio. Provides up to 9,600bps (HF), and selectable ARQ modes reduce on-the-air transmission time and enhance secure data transmission. In addition to MIL-STD-188-141B ALE, the AN/PRC-150(C) includes STANAG 4538 third generation HF Link Automation.

AN/PRC-152A Wideband Networking Radio — L3Harris

Power: HF: 1, 5, 20 watts PEP, -1/+1 dB VHF: 1, 5, 10 watts FM
Frequencies/ waveforms: J3E (single sideband, upper or lower, suppressed carrier telephony) H3E (compatible AM single sideband plus full carrier) A1A, J2A (compatible CW), selectable.
Security: World's first and only Type 1 HF manpack meeting the new NSA crypto modernization requirements
Weight:
Notes: Notes - LDD, LPI/LPD and ECCM anti-jamming, anti-spoofing GPS prevents false Friendly Force and target reporting

AN/PRC-152A Wideband Networking Radio — L3Harris

Power: user selectable 250mW to 5W, 10W satcom mode
Frequencies/ waveforms: 30MHz to 520MHz and 762MHz to 870MHz. NB: AM/FM, VULOS, SINCGARS & HAVEQUICK I/II (standard), HPW, HPW IP, APCO P25 Phase 1 trunking, conventional and OTAR (optional). WB: ANW2C (standard), SRW (optional). UHF SATCOM : MIL-STD-188-181B dedicated channel is standard, Mil-Std-188-182A, 183A DAMA, Mil-Std-188-181C, 183B IW Phase 1, High Performance Waveform (HPW) & HPW IP, SATCOM TDMA capability waveform, all optional.
Security: Sierra II programmable crypto, secret or sensitive but unclassified
Weight: 1.2kg max with GPS, battery and antenna
Notes: Handheld networking SDR for simultaneous voice and data, including video.

AN/PRC-117G Wideband Multi-band Multi-mission Radio — L3Harris

Power: NB 10W, SATCOM 20W; WB 20W peak, 5W average
Frequencies/ waveforms: 30 MHz to 2GHz. NB: AM/FM, VHF/UHF LOS, SINCGARS, Havequick I/II standard, SATURN, APCO P25 & P25 OTAR optional; WB: SRW, ANW2 C, ROVER III L-Band receive (optional)
Security: Sierra II-based, Type 1 encryption for WB/NB NSA-certified top secret and below
Weight: 3.7kg without battery, 5.44kg with
Notes: Software defined tactical radio focused on wideband data, interoperability with fielded waveforms.

Falcon III AN/PRC-158 Multi-Channel Manpack — L3Harris

Power: Narrowband: 10W, SATCOM: 20W; Wideband: 20W peak, 10W average (max)
Frequencies/waveforms: 30MHz to 2.5GHz NB: VHF 30MHz to 225MHz, UHF 225MHz to 520MHz & 762MHz to 874 MHz. NB waveforms: AM/FM, VHF/UHF LOS, SINCGARS, Havequick, (SATURN, APCO P25 capable). SATCOM: Rx 243MHz to 270MHz, Tx 292MHz to 318MHz. MUOS: Rx 360MHz to 380MHz, Tx 300MHz to 320MHz. WB: 225MHz to 520MHz UHF, 762MHz to 2.5GHz L-band. WB waveforms: SRW, ANW2C.
Security: Sierra II-based, Type 1 (Suite A/B) NSA certified Top Secret and below.
Weight: 5.76kg inc battery.
Notes: Multi-channel man-pack includes MUOS-ready hardware for SATCOM connectivity while on the move. NSA-certified for voice and data up to U.S. TOP SECRET with L3Harris Sierra II encryption, the man-pack is fully JTRS COMSEC and TRANSEC compliant.

RF-330-E-HH wideband networking handheld — L3Harris

Power: 3.2W max, user selectable
Frequencies/waveforms: UHF: 225MHz to 450MHz, 99 channel presets (L-Band: 1250MHz to 1390MHz and 1755MHz to1850MHz, extension to 2.5GHz optional)/ ANW2C, others available.
Security: Type 3 AES-256 for voice, video & data.
Weight: 0.780kg with battery
Notes: Lightweight radio designed for operations in geographically challenging environments. Can serve as a 'black' relay for secure, encrypted video and data between multiple Type 1 tactical sets. Can be deployed a leave-behind device.

Personal Role Radio (PRR) — Leonardo

Power: 50mW
Frequencies/waveforms: 2.4GHz direct sequence spread spectrum modulation
Security: Encryption optional
Notes: Compact and lightweight PRR with a typical operating range of 500m in open terrain, and through three floors of a building, features wireless press to talk with up to 2m range, operates independently of any infrastructure, interfaces with combat net radios.

Enhanced Personal Role Radio (EZPRR) — Leonardo

Power: 100mW
Frequencies/waveforms: 2.4GHz direct sequence spread spectrum modulation
Security: Encrypted
Notes: Typical operating range is 800m in open terrain, and through three floors of a building; wireless Press To Talk (PTT) with 2m range; features interchangeable switch pack, tailorable audio ancillaries; independent of infrastructure. Enhancements include extended range, more capable antenna, gooseneck antenna, data capabilities, rebroadcast, C2 base station, special purpose ancillaries.

SWave Enhanced Handheld (HH-E) — Leonardo

Power: 5W (50W in vehicles)
Frequencies/waveforms: 30MHz to 512MHz V-UHF/ NB VuLOS V/U AM/FM (STANAG 4204/4205), IP MIL-STD-188-220C (datalink), SelfNET EASY II (EPM/ECCM), SelfNET Networking Soldier Broad band Waveform (WB MANET), SelfNET Narrowband Adaptive Waveform (NB MANET)
Security: Embedded programmable COMSEC up to national restricted and TRANSEC, embedded AES-256 crypto engine, support for custom crypto algorithms.
Weight: 0.63kg with standard battery
Notes: Handheld or body-worn radio for soldier and commander use at platoon or section level, offering simultaneous voice and data communications at the tactical edge, configurable for vehicle use.

Swave MB1 manpack/vehicle radio — Leonardo

Power: Up to 20W, or 50W with vehicle amplifier
Frequencies/waveforms: VuLOS V/UHF AM/FM (NB), MIL-STD-188-220C (data link IP), SINCGARS, HQ I/II , SelfNET EASY II (EPM), DAMA (MIL-STD-181A, MIL-STD-182A, MIL-STD-183, MIL-STD-184 (TACSAT), SelfNET Networking Soldier Broadband Waveform (WB MANET), SelfNET Narrow Band Adaptive WF (NB MANET)
Security: Embedded customisable COMSEC, TRANSEC
Weight: under 8kg inc battery
Notes: Family of reconfigurable man-pack radios for dismounted and vehicular use, supporting wide-band IP voice and data, secure CNR voice and video.

RF-7850M-HH Multiband Networking Handheld — L3Harris

Power: Selectable 0.25W, 1W, 2W, 5W and up to 10W
Frequencies/waveforms: Narrowband: 30MHz to 512 MHz, Wideband: 225MHz to 512 MHz, AM: 108MHz to 512MHz/ NB: TDMA Networking Waveform (TNW) 25K and 75K; WB: M-TNW, ANW2 C (optional)
Security: Quicklook 1A, 2, 3 and Quicklook-Wide ECCM, 1128bit & 256bit Harris proprietary Citadel AES-128 & AES-256 Customer Algorithm Modification encryption
Weight: less than 1kg with battery
Notes: Intended for traditional CNR missions, ground-to-air and company and below voice and data comms. Optional 50W amplifier enables use in mid-tier tactical networks. Provides manpack performance in a handheld, interoperable with Falcon II and III sets.

RO Tactical Radio — L3Harris

Frequencies/waveforms: Defence Information Systems Agency Enhanced Mobile Satellite Services.
Security: NIST certified AES 256 voice and data encryption (can be used by coalition troops).
Weight: 0.510kg without antenna.
Notes: Using Distributed Tactical Communications System satcom service, operator can reach thousands of other RO tactical radios within a 100-250 mile range anywhere with sight of sky. Described as a global push-to-talk satcom tactical handheld radio.

SINCGARS RT-1523 VHF Radio — L3Harris

Power: 1mW, 100mW, 5W, 50W (with power amplifier)
Frequencies/waveforms: 30MHz to 87.975MHz/ SINCGARS
Security: internal encryption module, CT/PT, frequency hopping
Weight: 3.5kg with battery
Notes: Offered in vehicle and man-pack configurations. In the mobile role, the radio works with an embedded tactical data router, and as a man-pack it features a standard point-to-point-protocol interface. Both allow a C2 application to access the tactical internet.

SINCGARS RT-1702 VHF Combat Net Radio — L3Harris

Power: 1mW (LO), 100mW (MED), 5W (HI), 50W (PA with RFPA power amplifier)
Frequencies/waveforms: NB: STANAG 4204 compliant (SC); WB: SINCGARS (FH)
Security: Country unique Pavilion SINCGARS
Weight: 3.5kg including BB-2590 battery
Notes: Man-pack or vehicle-mount radio that provides situational awareness through real-time maps, location and IP data with an optional, embedded 12-channel GPS.

Tactical Network Rover (TNR) — L3 Harris

Notes: Handheld transceiver that provides a multi-megabit, bidirectional data link capability to dismounted combat troops. Combines video downlink receiver functionality with broadband IP networking capability. TNR uses the existing ROVER communications infrastructure for air-to-ground interoperability and ground-to-air networking within a Net-T network, supporting digitally aided close air support, ground force position sharing, chat and large file transfers.

Tactical Network Rover e (TNRe) video receiver — L3 Harris

Frequencies/waveforms: Supports UHF, L-, S-, C- and Ku-Band operations/ capabilities include DDL, DVB-T, Tactical, BE-CDL, CDL, Legacy digital, 466ER, VNW and FM analog
Security: NSA-approved Type 1 and AES encryption
Notes: Small-form-factor hand-held radio provides full bidirectional connectivity to vehicles or the dismounted user. Receives full-motion video and sensor data, enables secure digital video, chat, VoIP and other network-enabled applications. Fully interoperable with ROVER. Antenna can be connected directly to radio or remotely through cables.

BATS-D AN/PRC-161 Handheld Link 16 Radio — L3Harris

Power: 8W or 8mW transmit power
Frequencies/waveforms: Link 16 Voice/Data waveform enables 26.8kbps through 1102kbps TADIL J coded, free text variable format for enhanced throughput
Weight: 1kg including battery
Notes: Radio fuses air and ground Situational Awareness (SA) in a handheld package designed for use at the tactical edge. Designed to be used vest-worn, handheld, or mounted by special operations and expeditionary forces, including Joint Terminal Attack Controllers (JTACs), Forward Air Controllers (FACs), Tactical Air Control Party (TACPs), as well as size, weight, and power constrained platforms.

NoizeBarrier TAC — OTTO Engineering

Power: Two AAA Batteries (72 hours)
Hearing Protection: SNR 29 dB, NNR 23 dB
Immersion: IP68, 1 meter, 31 mins
Weight: 465g
Notes: The NoizeBarrier TAC is the industry's first fully modular tactical communications headset featuring industry-leading hearing protection and 360˚ advanced situational awareness to enhance decision making in a tactical environment. OTTO has collaborated with tactical operators to design and engineer a headset that delivers an unparalleled soundscape experience by producing crystal clear radio communications and has an external microphone that allows for a state-of-the-art talk-through experience.

ESP (Enhanced Spatial Positioning) PTT — OTTO Engineering

Power: Powered by the radio/comms device (4.5 to 36 V DC)
Radio Comm: 2 com ports, 4-Channel PTT
Immersion: IP68, 20 meters for 2 hours (MIL-STD-810H)
Weight: 204g
Notes: ESP PTT was developed to allow users to mentally focus on an individual directional audio source, even if other channels are active simultaneously. Utilizing spatial audio technology, four distinct audio channels are heard around the user's head. Operators hear each channel distinctly from Left, Left-Front, Right-Front, and Right. Compatible with major radio platforms using detachable cables for each radio type, the ESP PTT offers modular compatibility with vehicular and air-based intercoms (ICS). Software and firmware upgrades allow for future channel position options, ATAK PTT functionality.

Lynq PRO — OTTO Engineering

Power: Internal Rechargeable 2000 mAh LiPo Battery, 1 - watt max output
Frequencies/waveforms: Operates in 902-928MHz, Spread Spectrum Frequency Hopping Technology
Security: LPI/LPD Safe, AES-256 encrypted, RF Quiet Peer-to- Peer LAN
Weight: 160g
Notes: Lynq PRO enables teams to share positional data and maximize situational awareness with covert on-demand ad-hoc data networks. Using Lynq PRO's long-range, low power, RF quiet network improves survivability and connectivity, even when comms are denied, with rapidly deployable peer-to-peer location, data, and information sharing. Creates difficult to intercept and detect self-forming networks. Extends the edge of connectivity for tactical communications and data, creating mobility, security, and network independence without the need for infrastructure or subscription networks.

MPU5 — Persistent Systems LLC

Frequencies/waveforms: 10W L-Band Freq. Range: 1350 - 1390 MHz
10W S-Band Freq. Range: 2200 - 2507 MHz
BAS Band Freq. Range: 2025 - 2150 MHz
Lower C-Band Freq. Range: 4400 - 5000 MHz
Upper C-Band Freq. Range: 5100 - 6000 MHz
Security: Wave Relay® MANET
Crypto Modes CTR-AES-256 Encryption SHA-256 HMAC
Hardware Cryptographic Acceleration CNSA Algorithms
2-Handed Key Zero Key zero with no power
Weight: 13.8 Oz or 391 grams (chassis only)
Notes: The MPU5 utilizes the power of the self-forming, self-healing Wave Relay® MANET and 3x3 MIMO technology to deliver optimal throughput, mobility, and scalability, uniting all critical data sources—video, voice, text, and GPS location. As the world's first Smart Tactical Networking Device, the MPU5 features a fully integrated computer, is highly reliable in complex and congested environments, and operates in a true peer-to-peer form with no master node, providing limitless hops. The MPU5 also includes intelligent Radio Over IP (RoIP) functionality, is IP-68 rated, and allows users to monitor up to 16 voice channels simultaneously.

Embedded Module — Persistent Systems LLC

Frequencies/waveforms: 10W L-Band Freq. Range: 1350 - 1390 MHz
10W S-Band Freq. Range: 2200 - 2507 MHz
Lower C-Band Freq. Range: 4400 - 5000 MHz
Upper C-Band Freq. Range: 5100 - 6000 MHz
Security: Wave Relay® MANET
Crypto Modes CTR-AES-256 Encryption
SHA-256 HMACHardware Cryptographic Acceleration Suite-B Algorithms
Weight: 3.2 oz.
Notes: The Embedded Module is the most advanced, scalable, and efficient Mobile Ad Hoc Networking (MANET) device in the world, available in an integration-ready, SWaP-optimized form factor. Integrate the Embedded Module into your products to unite UAVs, UGVs, and sensors on a single network. The Embedded Module features an HD video encoder and onboard computer, eliminating redundant equipment from your platform.

GVR5 — Persistent Systems LLC

Frequencies/waveforms: Supports two frequencies simultaneously:
Lower C-Band (4420MHz to 5000MHZ) & 10W L-Band (1350MHZ to 1390MHZ)
Lower C-Band (4420MHz to 5000MHZ) & 10W S-Band (2200 MHZ to 2507MHz)
10W L-Band (1350MHZ to 1390MHZ) & 10W S- Band (2200 MHZ to 2507MHz)
Waveform: Wave Relay® MANET

Security: FIPS 140-2 Certification
Integrated Hardware Cryptographic Acceleration
CTR-AES-256 Encryption
HMAC-SHA-256 Authentication & Integrity
NSA Suite-B Algorithms
Cryptographically authenticated Over-the- Air Rekey and Key Zero
Front Panel Single Switch Zero

Weight: 9.5 Lbs.

Notes: The GVR5 is a Dual Band Wave Relay® MANET solution, engineered in collaboration with General Dynamics Mission Systems, for tracked and wheeled ground vehicles as well as aircraft. Designed to seamlessly integrate with your existing vehicle LAN, intercom system, and SATCOM / LTE networks. Hardened against electronic warfare. Combat ready.

CRE2-189, GCS RADIO TRANCEIVER AND ANTENNA — Radionor

Power: 19-55 VDC/250W

Frequencies/waveforms: 4.900 -5.900GHz

Security: TRANSEC provided by digital beam-forming and AES-256 encryption embedded in hardware

Weight: 12,5 kg

Notes: Phased array wireless data-link. Maximum data capacity 15mbps. IP based. Long range, exceeding 200 km. Vertically mounted panel with radio transceiver and antennas ideal for vessels and semi-mobile installations. The unit is fully compliant to electromagnetic and immunity compatibility according to MIL-STD-461F. Water ingress protection is IP67 (Submergible).

CRE2-179-UAV, UAV RADIO TRANSCEIVER AND ANTENNA — Radionor

Power: 19-55 VDC/250W

Frequencies/waveforms: 4.900 -5.900GHz

Security: TRANSEC provided by digital beam-forming and AES-256 encryption embedded in hardware

Weight: 2 kg

Notes: Phased array wireless data-link. Maximum data capacity 15Mbps. IP based. Long range. Horizontally mounted panel with radio transceiver and antennas ideal for UAV applications.The antenna panel has the same properties as CRE2-179, but with significantly lower weight adapted for UAV applications. The unit is fully compliant to electromagnetic and immunity compatibility according to MIL-STD-461F. The product has also been tested to all relevant parts of environmental requirements according to DO-160G. Water ingress protection is IP67 (Submergible).

CRE2-144-LW-NAV — Radionor

Power: 9-36 VDC

Frequencies/waveforms: 4.900-5.900GHz

Security: TRANSEC provided by digital beam-forming and AES-256 encryption embedded in hardware

Weight: 130g

Notes: CRE2-144-LW-NAV is extended with a module that gives high precision geolocation navigation in addition to the tactical long range wireless communication system. It extracts angular and distance information from all the phased array antennas within communication range, and performs a massive signal processing operation including internal sensors, such as accelerometer, gyros and other sensors to determine the geolocation with high performance and reliability.

COMP@N H07 VHF/UHF handheld — Radmor

Power: Max 5W (FM, programmable), max 6W (PEP)

Frequencies/waveforms: 20MHz to 520MHz and 30MHz to 137MHz/
DV Reutech narrowband waveform providing secure voice transmission, 25kHz channels, digital voice transmission, 100 hops per second in frequency hopping mode, fixed frequency. Analog voice transmission at a fixed frequency in FM and AM, Radmor Serial Data (RSD) data transmission.

Security: TRANSEC & COMSEC cryptographic protection, AES-256 voice protection

Weight: <1kg

Notes: Handheld SDR radio, developed using a common hardware platform for all COMP@N family radios, on which there are a number of waveforms implemented. HO7 is designed for voice communication, including: tactical short-range VHF and UHF communication for land forces; tactical short-range communication VHF for air force; communication with civilian services.

COMP@N H08 — Radmor

Power: Programmable FM max 5W, programmable AM max 4 W-PEP, CPM (W2FH): 0.1W, 1W, 5W
Frequencies/waveforms: 20MHz to 520MHz and 30MHz to 13MHz 7W2FH (Waveform with Frequency Hopping) – narrowband EPM (Electronic Protective Measures) waveform that can operate in the frequency hopping mode or at fixed frequency, STANAG 4204 - fixed frequency VHF FM, STANAG 4205 - fixed frequency UHF FM/AM
Security: TRANSEC & COMSEC cryptographic protection
Weight: <1kg
Notes: Handheld SDR developed using a common hardware platform for all COMP@N family radios. W2FH waveform allows simultaneous transmission of voice and data, while the synchronization mechanism does not require GNSS.

EPLRS-XF-I — Raytheon

Power: 50W max
Frequencies/waveforms: 225MHz to 450MHz/ enhanced positioning, TCP/IP MANET
Security: AES encryption
Weight: 8kg
Notes: Man-pack vehicle and airborne EPLRS radio providing robust, on-the-move, high-speed, automated data exchange using a contention-free networking architecture.

EPLRS-XF-I (lightweight) — Raytheon

Power: 10W to 20W
Frequencies/waveforms: 30MHz to 512MHz, 142 channel pre-sets/ SINCGARS, SATCOM, DAMA, HAVEQUICK I/II, AM, FM, FSK, B/SB/DESB/SOQ PSK
Security: Embedded encryption engine, embedded COMSEC for voice and data
Weight: 5.2kg
Notes: Provides lightweight, secure, network-capable, multi-band/multi-mission, anti-jam, voice/ imagery/ data communications capability in a single package.

TR3000 — Reutech

Power: 150W
Frequencies/waveforms: 1.5MHz to 32MHz Secure Digital Voice 3G STANAG 4538 Packet Data WBHF MIL-STD-188-110D (up to 240kbps) Frequency Hopping
Security: AES-256, optional fit user definable tamper proof INFOSEC, TRANSEC module
Weight: <10kg
Notes: Direct RF sampling digital architecture

MTR1025 Manpack — Reutech

Power: 30W
Frequencies/waveforms: 1.6MHz to 30MHz, HF
Security: User definable tamper proof INFOSEC, TRANSEC module
Notes: Features integrated texting from front panel, CNIS Link-ZA compliant data link, Bluetooth for peripherals, auto GPS position reporting, ALE to MIL-STD-188-141A, APP A, data to MIL-STD-188-110A and STANAG 4285 local/ networked RC, built-in antenna tuning, Li-ion battery with gauge.

SOVERON-D — Rohde & Schwarz

Power: Modular

Frequencies/waveforms: Certified for SCA 2.2.2, the SOVERON-D radio platform is prepared for porting future and legacy waveforms. It is accompanied by a high-performance waveform family, such as SOVERON WAVE. SOVERON-D will also use the ESSOR high data rate waveform that was developed within the framework of the trans-European interoperability initiative for armed forces at the tactical level, an initiative the Federal Republic of Germany has joined. In addition, the NTN (National Tactical Network waveform)-family is fielded with SVFuA in the German Armed Forces.

Security: The SOVERON-D 'software-defined-crypto' platform allows a flexible lifecycle of encryption methods. Robustness against jamming attacks with TRANSEC fast frequency hopping measures. Support for 'multi-level security' MLS. Transmission of voice and data with confidentiality up to Ievel SECRET. SOVERON-D, known from the SVFuA development project of the German MoD features scalable security layer up to national and NATO SECRET.

Notes: SOVERON-D is a highly modular SDR developed for the sovereign needs for tactical communication of the German Armed Forces. SOVERON-D manages communication networks through all echelons, with a special focus on joint and combined missions with multi-level security needs, supporting operations conducted by coalition forces. The system connects the vehicle IT infrastructure with the tactical command and control system.

SOVERON-VR — Rohde & Schwarz

Power: All modes: 50 W; A3E carrier: 12.5 W.

Frequencies/waveforms: The core of the SOVERON-VR vehicular radio is an SCA 2.2.2 radio platform that supports standardized, legacy and Rohde & Schwarz proprietary waveforms and makes it easy to port waveforms. In addition, it allows customized waveforms and cryptology to be implemented. Frequency range from 30 MHz to 512 MHz without gaps.

Security: Strict red/black separation. Crypto ignition key support. Ad-hoc networking (MANET) capability. Frequency hopping (TRANSEC). AES encryption (COMSEC)

Notes: SOVERON- VR has been designed for use in vehicles and for integration into semi-stationary and stationary applications. Its ruggedized hardware meets applicable MIL-STD environmental and EMC requirements, enabling the radio's use under extreme conditions such as in armored wheeled vehicles and tracked vehicles. Together with the SOVERON-HR handheld tactical radio, SOVERON-VR forms a seamless connection to peers and the higher echelons on the battlefield to provide a common operational picture.

SOVERON-HR — Rohde & Schwarz

Power: High: 5 W; Medium: 2 W; Low: 0.2 W

Frequencies/waveforms: Frequency range from 30MHz to 512MHz without gaps

Security: Ad-hoc networking (MANET) capability. Frequency hopping (TRANSEC). AES encryption (COMSEC)

Weight ≤1.2 kg (2.65 lb)

Notes: The SOVERON-HR is a multiband handheld radio system that supports up to two voice channels and IP data transmission in parallel. It has been designed for use by dismounted soldiers, leaders and specialists under harsh field conditions in an electromagnetically contested environment. Its ruggedized hardware surpasses MIL-STD environmental and EMC requirements. Together with the SOVERON-VR vehicular radio, the SOVERON-HR handheld tactical radio forms a seamless connection to peers and the higher echelons on the battlefield to provide a common operational picture.

StreamCaster 4400E AN/PRC-169(v)1 — Silvus Technologies

Power: User Adjustable: 1mW-1W; 1mW-8W; 1mW-20W
Up to 80W Effective TX Power with Beamforming

Frequencies/waveforms: 300MHz to 6GHz available
Single/Dual Band: 30 Configuration Options (L,S,C)
Channel Bandwidth (MHz): 20/10/5 (2.5/1.25 Optional)
MN-MIMO waveform: 550+ Node Scalability

Security: FIPS 140-3 Level 2; AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight 861g

Notes: The StreamCaster 4400 (SC4400E) delivers the power of 4x4 MIMO in a ruggedized software-defined MANET radio. Purpose-built for maximum performance in fixed infrastructure, vehicular, long range and airborne applications. Optimized Output Power (up to 20W; 80W Effective) and High-Bandwidth Data Throughput (up to 100 Mbps) with flexible configuration options including Externally Powered (IP68) and OEM module. Available interfaces: Ethernet, USB, RS232, PTT

StreamCaster 4200EP AN/PRC-169(v)2 — Silvus Technologies

Power: User Adjustable: 1mW-1W; 1mW-4W; 1mW-10W
Up to 20W Effective TX Power with Beamforming

Frequencies/waveforms: 300MHz to 6GHz available
Single/Dual Band: 30 Configuration Options (L,S,C)
Channel Bandwidth (MHz): 20/10/5 (2.5/1.25 Optional)
MN-MIMO waveform: 550+ Node Scalability

Security: FIPS 140-3 Level 2; AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight 425g

Notes: The StreamCaster 4200 (SC4200EP) is a 2x2 MIMO radio, delivering best-in-class MANET radio performance and connectivity at the tactical edge. Low SWaP profile makes it ideal for use in portable and embedded applications. Optimized Output Power (Up to 10W; 20W Effective) and High-Bandwidth Data Throughput (up to 100 Mbps) with flexible configuration options including Battery Powered Handheld, Externally Powered (IP68) and OEM module. Available interfaces: Ethernet, USB, RS232, PTT; Blue UAS Framework Certified – NDAA Compliant

StreamCaster 4200+ Drop-In Module — Silvus Technologies

Power: User Adjustable: 1mW-1W; 1mW-4W; 1mW-10W
Up to 20W Effective TX Power with Beamforming

Frequencies/waveforms: 300MHz to 6GHz available
Single/Dual Band: 30 Configuration Options (L,S,C)
Channel Bandwidth (MHz): 20/10/5 (2.5/1.25 Optional)
MN-MIMO waveform: 550+ Node Scalability

Security: FIPS 140-3 Level 2; AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight 260g

Notes: Purpose-built for UAS integration, the SC4200+ Drop-In Module provides all of the power and performance of the SC4200EP MANET radio in a plug-and-play compatible form-factor. With up to 10 Watts of Output Power (20W Effective), up to 100 Mbps data throughput, and Single/Dual Band Frequency Options, the SC4200+ Drop-In Module delivers bi-directional C2, video, voice and IP data communications with class-leading range, mobility and scalability. Familiar mechanical footprint, hole pattern, and JST connectors provide seamless compatibility with unmanned subsystems on the market today.
Blue UAS Framework Certified – NDAA Compliant (IP68 Rated)

StreamCaster Lite 4200 — Silvus Technologies

Power: User Adjustable: 1mW-1W
Up to 2W Effective TX Power with Beamforming

Frequencies/waveforms: L,S,C Single Band
Channel Bandwidth (MHz): 5/2.5/1.25
MN-MIMO waveform

Security: AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight 295g

Notes: SL4200 bends the cost curve without sacrificing performance. This 2×2 MIMO radio is powered by the same MN-MIMO waveform as our flagship StreamCaster MANET radio counterparts. Its ultra-low SWaP profile, flexible form factor (Rugged handheld or OEM module) provides up to 2 Watts of Output Power and High-Bandwidth Data Throughput (up to 20 Mbps) - making it ideal for body-worn, concealment or embedded applications - delivering video, voice and IP data communications with class-leading mobility and scalability. Available interfaces: Ethernet, USB, RS232. Blue UAS Framework Certified – NDAA Compliant; Green UAS Certified (IP67 Rated)

StreamCaster Lite 5200 — Silvus Technologies

Power: User Adjustable: 1mW-2W
Up to 4W Effective TX Power with Beamforming

Frequencies/waveforms: Single/Dual Band: L,S, L&S
Channel Bandwidth (MHz): 20/10/5 (2.5/1.25 Optional)
MN-MIMO waveform: 550+ Node Scalability

Security: FIPS 140-3; AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight: 52g

Notes: Compact, lightweight and powerfully versatile, the SL5200 unifies C2, data and communications relay capabilities in one streamlined MANET radio solution. Featuring an ultra-low SWaP OEM module form factor, SL5200 is purpose-built for integration into tactical unmanned systems, with the flexibility for body worn and manned vehicle applications. Delivering class-leading power, range and mobility with up to 2W Output Power (4W Effective) and up to 100 Mbps Data Rate, SL5200 provides bi-directional C2, video, sensor and telemetry data communications. Natively compatible with StreamCaster 4000-series MANET radios, SL5200 allows users to connect multiple UAVs, UGVs, sensors and personnel to actualize a common operating picture through massively scalable mesh networks. Available interfaces: Ethernet, USB, RS232

DOCK StreamCaster - DOCK SC4240P — Silvus Technologies

Power: User Adjustable: 1mW-4W
Up to 8W Effective TX Power with Beamforming

Frequencies/waveforms: Single/Dual Band: L,S,C; L&S; S&C
Channel Bandwidth (MHz): 20/10/5 (2.5/1.25 Optional)
MN-MIMO waveform: 550+ Node Scalability

Security: FIPS 140-3 Level 2; AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight; 44oz

Notes: Silvus Technologies and Kagwerks joined forces to create DOCK StreamCaster – The Next Generation of Tactical Networking Systems – combining advanced StreamCaster MANET radios with Samsung's mission-ready EUDs in one fully-integrated chest-mountable DOCK system. Each DOCK StreamCaster features a low SWaP profile and modular design, with streamlined cabling and unified power that reduces operator load-out while increasing mobility and mission effectiveness.
The most powerful DOCK Tactical Networking System available, DOCK SC4240P seamlessly scales from tactical Personal Area Network to wide-area mesh networks in any environment. Integrated StreamCaster MANET radio provides up to 4 Watts output power (8 Watts Effective) and up to 100 Mbps data throughput to support high-bandwidth video, voice and data communications.
Direct connection to Samsung's S23TE (sold separately) provides powerful on-board processing, advanced security and exclusive MilSpec features. Built-in ATAK and Nett Warrior connectivity empowers operators with increased situational awareness and mission planning, with instant access to networked devices. Available access to Spectrum Dominance expansive suite of LPI/LPD and Anti-Jamming resiliency capabilities provides secure and protected comms without sacrificing performance. (IP67 Rated)

DOCK StreamCaster - DOCK ULTRA SL4210P — Silvus Technologies

Power: User Adjustable: 1mW-1W
Up to 2W Effective TX Power with Beamforming

Frequencies/waveforms: Single/Dual Band: L,S; L&S
Channel Bandwidth (MHz): 20/10/5 (2.5/1.25 Optional)
MN-MIMO waveform: 550+ Node Scalability

Security: FIPS 140-3 Level 2; AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight: 48oz

Notes: Silvus Technologies and Kagwerks joined forces to create DOCK StreamCaster – The Next Generation of Tactical Networking Systems – combining advanced StreamCaster MANET radios with Samsung's mission-ready EUDs in one fully-integrated chest-mountable DOCK system. Each DOCK StreamCaster features a low SWaP profile and modular design, with streamlined cabling and unified power that reduces operator load-out while increasing mobility and mission effectiveness.
Designed for the Universally Connected Warfighter, DOCK ULTRA SL4210P combines advance mesh networking capabilities with powerful on-board AI computing and edge processing. Integrated StreamCaster MANET radio provides up to 1 Watt output power (2 Watts Effective), and up to 100 Mbps data throughput to support high-bandwidth video, voice and data communications. Direct connection to Samsung's S23TE (sold separately) provides on-board processing, advanced security and exclusive MilSpec features. Built-in Intra-Soldier Wireless, ATAK and Nett Warrior connectivity empowers operators with increased situational awareness and mission planning, with instant access to networked devices. Powerful on-board NVIDIA Jetson NANO AI module enables DOCK ULTRA SL4210P to create a common operational picture, delivering decision dominance at the tactical edge. Available access to Spectrum Dominance expansive suite of LPI/LPD and Anti-Jamming resiliency capabilities provides secure and protected comms without sacrificing performance. (IP67 Rated)

DOCK StreamCaster – DOCK SL4210P — Silvus Technologies

Power: User Adjustable: 1mW-1W
Up to 2W Effective TX Power with Beamforming

Frequencies/waveforms: Single/Dual Band: L,S; L&S
Channel Bandwidth (MHz): 20/10/5 (2.5/1.25 Optional)
MN-MIMO waveform: 550+ Node Scalability

Security: FIPS 140-3 Level 2; AES256
Spectrum Dominance (LPI/LPD & AJ Resiliency Capabilities):
MANET Spectrum Analyzer (MAN-SA); MANET Power Control (MAN-PC)*; MANET Protected Waveform (MAN-PW)*; MANET Interference Cancellation (MAN-IC)*; MANET Interference Avoidance (MAN-IA) *ITAR Controlled

Weight: 44oz

Notes: Silvus Technologies and Kagwerks joined forces to create DOCK StreamCaster – The Next Generation of Tactical Networking Systems – combining advanced StreamCaster MANET radios with Samsung's mission-ready EUDs in one fully-integrated chest-mountable DOCK system. Each DOCK StreamCaster features a low SWaP profile and modular design, with streamlined cabling and unified power that reduces operator load-out while increasing mobility and mission effectiveness.
Compact, lightweight and powerfully connected, DOCK SL4210P is purpose built for multi-domain operations. Integrated StreamCaster MANET radio provides up to 1 Watt output power (2 Watts Effective), and up to 100 Mbps data throughput to support high-bandwidth video, voice and data communications. Direct connection to Samsung's S23TE (sold separately) provides on-board processing, advanced security and exclusive MilSpec features. Built-in Intra-Soldier Wireless, ATAK and Nett Warrior connectivity empowers operators with increased situational awareness and mission planning, with instant access to networked devices. Available access to Spectrum Dominance expansive suite of LPI/LPD and Anti-Jamming resiliency capabilities provides secure and protected comms without sacrificing performance. (IP67 Rated)

Cheetah 3 VU Combat Net Multiband (VHF/UHF) — Sat-Com Secure and Tactical Communications

Power:	10W
Frequencies/waveforms:	30-512MHz
Modulation:	USB/LSB, AM, FM, FSK, MSK,
Advanced Modem:	BPSK, QPSK, PSK, QAM, DSSS
Security:	Encrypted AES256 Digital Voice
Transec:	OTP / AES128, 1-600 hops per seco
Nets:	8-digit decimal Mission Key.
Linking:	Ad hoc channel scan / ALE
Enhanced Features:	TacTalk - Messaging, Chat, E-mail, File Transfer.TacTalk-plus - Messaging, Chat, E-mail, File Transfer plus Frontline Battlefield awareness
Weight:	2.98kg (including Battery)
Note:	COMSEC (SDV) and TRANSEC(FFH) Modes on Scanning or ALE . All VHF/UHF Features are interoperable with the Satcom suite of radios.

Leopard HU Combat Net Multiband (HF/VHF/UHF) — Sat-Com Secure and Tactical Communications

Power:	30W@(1.6-30MHz),18W@(30-88MHz),10W@(88-512MHz)
Frequencies/waveforms:	1.6-512MHz
Modulation:	FM, USB/LSB, AM, FSK, MSK.
Advanced Modem:	BPSK, QPSK, PSK, QAM, DSSS*
Security:	COMSEC: Encrypted AES256 Digital Voice
Transec:	OTP / AES128, 1-600 hops per second.
Nets:	8-digit decimal Mission Key.
Linking:	Ad hoc channel scan / ALE
Enhanced Features:	TacTalk - Messaging, Chat, E-mail, File Transfer.
Mounting:	TacTalk-plus - Messaging, Chat, E-mail, File Transfer plus Frontline Battlefield awareness. Backpack, Mobile Racks, Base Racks, Custom Solutions
Weight:	4.5kg (including Battery)
Note:	COMSEC (SDV) and TRANSEC(FFH) Modes on Scanning or ALE . All HF/VHF/UHF Features are interoperable with the Satcom suite of radios.

AN/PRC-148 MBITR/JEM — Thales

Power:	0.1, 0.5, 1.0, 3.0 and 5.0W user selectable (waveform dependent)
Frequencies/waveforms:	30MHz to 512MHz contiguous . Implemented and planned waveforms and modes include: AM/FM, Havequick I/II, MIL-STD-188-241-1/-2 (SINCGARS), MIL-STD-188-181B (56kbps), MIL-STD-188-181C, -182B, -183B (SATCOM IW), ANDVT, Project 25, Over The Air Cloning (OTAC), retransmission
Security:	Programmable encryption engine supports NSA crypto modernisation requirements, certified by NSA.
Weight:	0.867kg with battery
Notes:	An evolution of the combat- proven AN/PRC-148 MBITR, the JEM is a JTRS-approved production radio, is part of a complete communications system for mounted and dismounted operations.

AN/PRC-148B MBITR2 — Thales

Power:	5 W in all frequencies
Frequencies/waveforms:	30MHz to 512MHz , Soldier Radio Waveform (SRW) , MIL-STD-188-241-1/-2 (SINCGARS - Standard/ FH2 EOM), MIL-STD-188-181C, -182B, -183B (SATCOM IW) , HAVEQUICK I and II, ANDVT (LPC-10, MELP), AM/FM, Project 25.
Security:	Programmable encryption engine supports NSA crypto modernisation requirements, certified by NSA.
Weight:	1.225kg
Notes:	Combines AN/PRC-148 and AN/PRC-154 wideband tactical handheld radio capabilities to integrate dismounts into the wideband tactical IP and voice network via the SRW, simultaneously connecting with older nets via narrowband.

AN/PRC-6809 Multi-Band Inter/intra Team Radio — Thales

Power:	0.1W to 5.0W
Frequencies/waveforms:	30MHz to 512MHz contiguous , Havequick II frequency hopping ECCM waveform, country-specific ECCM waveforms
Security:	Type 3 DES (optional), AES-256 (optional)
Weight:	0.867kg
Notes:	Non-Type 1 version (without NSA approved cryptographic algorithms) of the AN/PRC-148 compatible with all MBITR family products and available to US, allied and coalition forces.

AN/PRC-154A Rifleman Radio — Thales

Power: User selectable up to 5W
Frequencies/waveforms: 225MHz to 450MHz (UHF band), 1,250MHz to 1,390MHz and 1,750MHz to 1,850MHz (L-band); supports SRW
Security: Programmable COMSEC and TRANSEC NSA certified for Type 1 secret and below, non-CCI.
Weight: 0.771kg with battery
Notes: Low-cost, body-worn radio that transmits voice and data simultaneously using the SRW, bringing secure secret and below squad-level communications to the soldier at the tactical edge, enables situational awareness and blue force tracking.

AN/PRC-154B Rifleman Radio — Thales

Power: User selectable up to 5W
Frequencies/waveforms: UHF band 225MHz to 450MHz, L-Band 1250MHz to 1390 MHz, 1750MHz to 1850MHz/ Soldier Radio Waveform (SRW)
Security: Embedded encryption, COMSEC, TRANSEC
Weight: 0.771kg with battery
Notes: Increased RF range, battery life, and added visual HMI display built on the successful and field proven AN/PRC-154A Program of Record Rifleman Radio

BCC 67 Panther VHF Manpack Radio — Thales

Power: Selectable up to 5W or 20W boosted mode in vehicle configuration
Frequencies/waveforms: 30MHz to 108MHz
Security: Secured voice and data 16kbps digital encryption, high EPM protection including frequency hopping, free channel search and mixed mode
Weight: 5.9kg with battery
Notes: Interoperable with Jaguar radios. Battery life: 32 hours with rechargeable Li-Ion battery pack. Advanced CNR services including group selective call, alert, authentication, passive late entry, over-the-air rekeying

F@stnet Twin — Thales

Frequencies/waveforms: VHF and UHF
Notes: F@stnet Twin keeps infantry leader in touch with soldiers through the embedded UHF soldier channel while being continuously in touch with the commanding level thanks to the embedded VHF channel. Designed for interoperability with legacy waveforms; handles simultaneous voice and data.

SquadNet soldier radio — Thales

Frequencies/waveforms: 865MHz to 880MHz, 100 talk groups over 50 channels with up to 50 users per channel/
Security: Programmable encryption with red/black architecture
Weight: 250g including battery
Notes: "Unique" waveform ensures communication is maintained across urban, wooded and mountainous terrain. In open terrain SquadNet gives a 2.5km range point-to-point, extending to 6km with automatic network relaying, maintaining secure comms over IP networks with an Android app

TW-950 TSM Shadow Radio — TrellisWare Technologies

Frequencies/waveforms: L-UHF: 225-450MHz, U-UHF: 698-970MHz, L/S Bands: 1250-2600MHz, TSM 6, (Katana optional)
Security: AES-256
Weight: (R/T only) 11.3oz (320g)
Notes: The TW-950 TSM Shadow Radio features unparalleled performance powered by the TSM and Katana waveforms. TrellisWare's signature radio provides an expanded frequency range, high throughputs for streaming multiple high definition videos and offers the most flexible data interface options in its class.

TW-135 TSM Shadow HPR Radio — TrellisWare Technologies

Frequencies/waveforms: L-UHF: 225-450MHz, U-UHF: 698-970MHz, L/S Bands: 1250-2600MHz, TSM-6
Security: AES-256
Weight: 6.40lbs (181.44g)
Notes: TrellisWare's TW-135 TSM Shadow HPR Radio complements the TW-950 TSM Shadow by providing greater transmission power and supports a wide range of configurations. The radio contains all of the features of the TW-950 radio and delivers 20 Watts of transmit power in UHF, L-band, and S-band to extend and strengthen MANET networks. Versatile form factor that supports vehicular, airborne, fixed-site, or manpack configurations.

TW-860 TSM Spirit Radio — TrellisWare Technologies

Frequencies/waveforms: L-UHF: 225-450MHz, U-UHF: 698-970MHz, L/S Bands: 1250-2600MHz, TSM 6
Security: AES-256
Weight: 8.81oz (249g)
Notes: The TW-860 TSM Spirit radio represents the most cost-effective TrellisWare radio available, making it easier to expand tactical networks to everyone who needs to be connected. It was designed for next generation soldier systems, public safety, and first responder requirements. Interoperable with all TrellisWare radios, the TW-860 TSM Spirit radio supports a true flat network with massive scalability in a single radio frequency channel, while still delivering rapid position location information updates for every radio.

CNHF Manpack — KNL

Power: 25 W (PEP)
Frequencies/waveforms: HF: 1.5 - 30 MHz, VHF 30 - 56 MHz. GNSS independent cognitive ALE with 4000 calling channels listened simultaneously
Security: AES256 encryption, static & changing keys. Radio platform: Secure boot, signed software, zeroize function
Weight: Under 5kg without battery. Battery type: BB-2590/U
Note: CNHF Manpack is software defined radio that has multiple game-changing features not currently found elsewhere. The CNHF Manpack receives over 4000 calling channels (HF and VHF) automatically at the same time, selects the best channel independently and establishes link in less than a second – all of this without intervention of the radio operator. Operational in SATCOM-denied environments, the CNHF Manpack excels with wideband HF communications capabilities up to 300 kbps, supporting a variety of media formats. Encrypted voice and data ensure no transmission is compromised, while the user-friendly design allows for full operational fluency with just one day of training. With standard interfaces the system integrates seamlessly with existing tactical communications and C2 systems and automatic multihop provides the best network coverage by avoiding skip zones. Antenna tuner and battery charger are built-in – CNHF Manpack is compact product in one box.

CNHF1 — KNL

Power: 250 W (PEP)
Frequencies/waveforms: 1.5 - 30 MHz
Security: AES256 encryption
Weight: 30kg
Note: The original CNHF system is an example of resilience and reliability in beyond-line-of-sight communications. It's designed to receive the full HF spectrum all at once, listening to over 2500 calling channels at the same time. The cognitive features of the radio allows it to select the best channel independently and establish a link in less than a second – all without any input from the radio operator! The CNHF1 excels in maintaining robust connections in the most challenging environments, ensuring consistent transmission of various media types with wideband data rate up to 153 kbps. It's a standalone solution for SATCOM-denied environments, but with standard interfaces it can be easily integrated with other systems and networks. Automatic multihop functionality eliminates skip zones and ensure continuous connectivity.