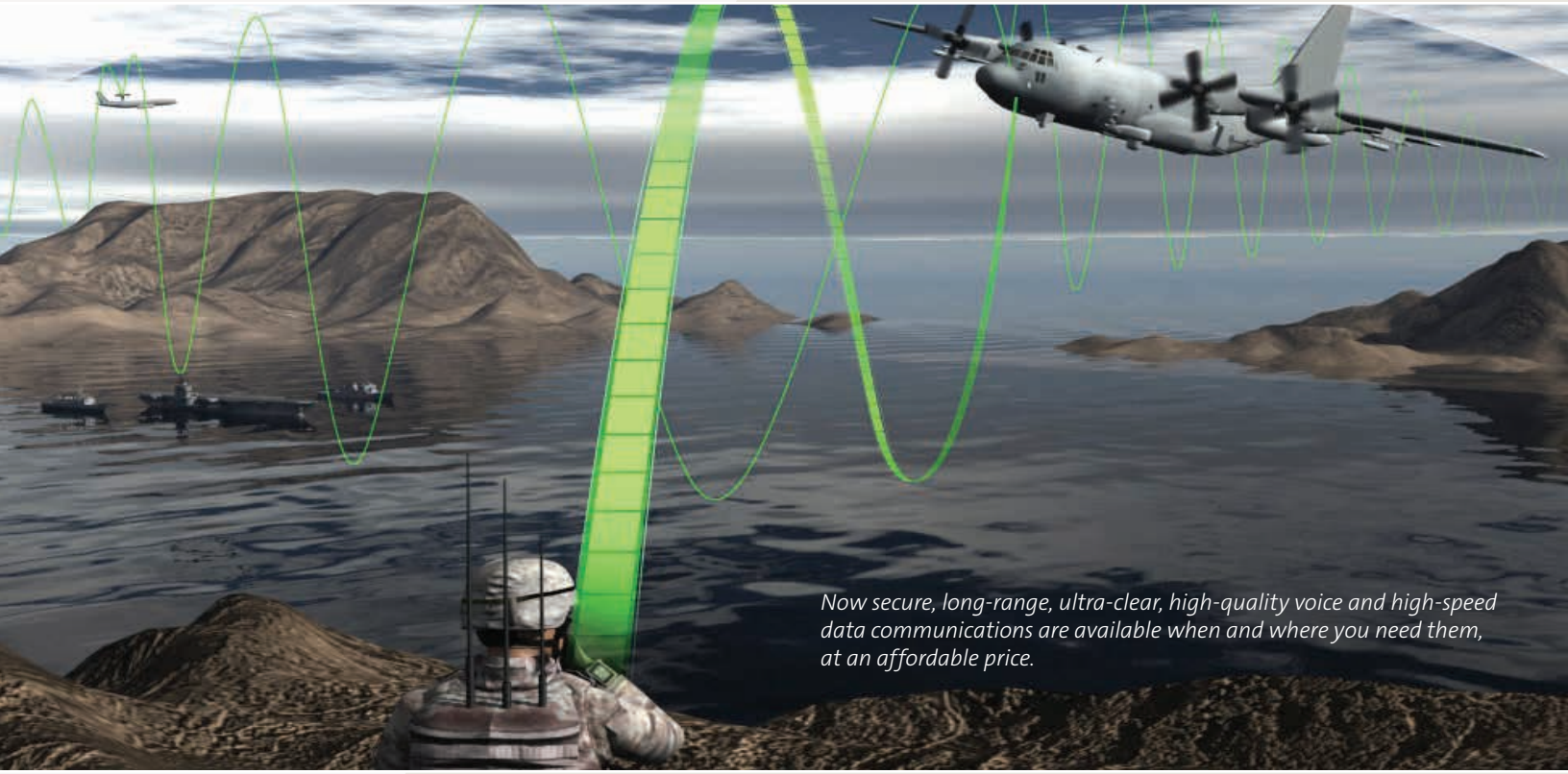
MODERNIZED, HIGH-FREQUENCY COMMUNICATIONS

HF like you've never seen it before.

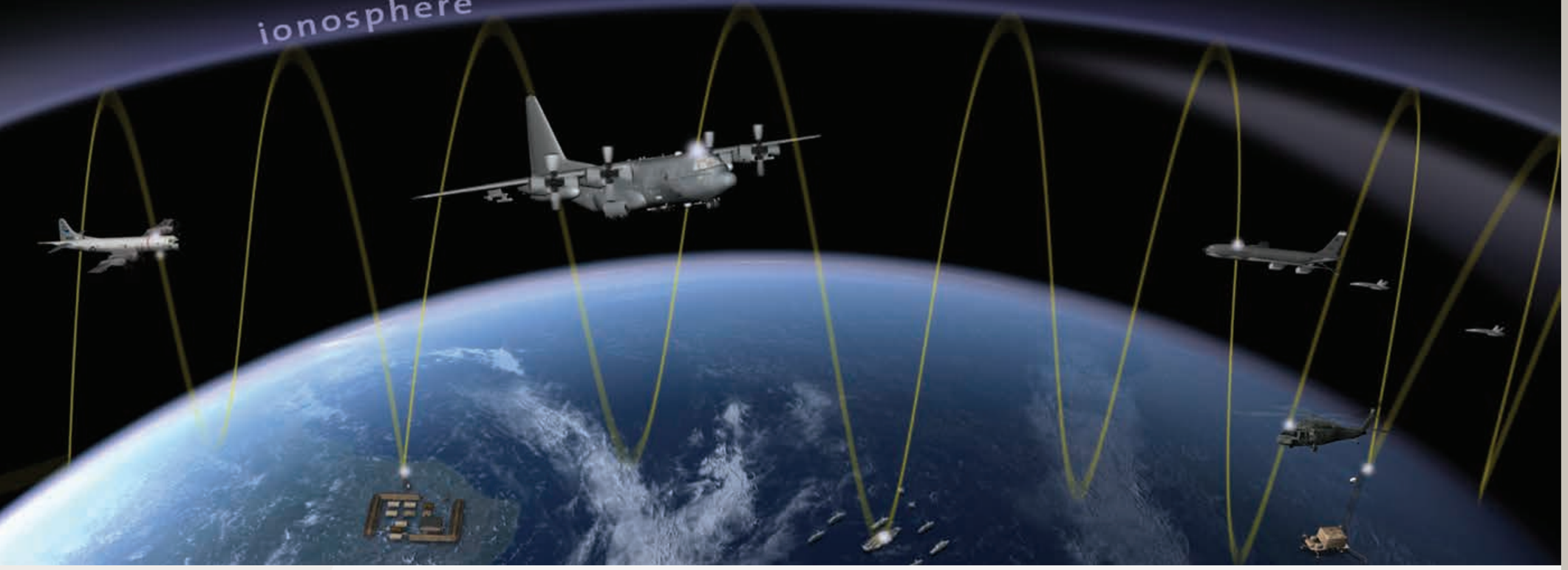


Now secure, long-range, ultra-clear, high-quality voice and high-speed data communications are available when and where you need them, at an affordable price.

Rockwell Collins' modernized, high-frequency (HF) communications systems give military operators advanced, secure, Beyond Line of Sight (BLoS) communications capabilities with very low day-to-day operating costs and effectiveness in both satellite-limited and contested battlefield environments.

Rockwell Collins

Building trust every day



New-generation HF – fast, robust, secure and cost effective.

Recent advances in HF radio and Digital Signal Processing (DSP) technology, along with new U.S. and international regulatory flexibility in spectrum allocation policies, have ushered in a new era for terrestrial-based, long-range communications capabilities. As a result, HF radio is now no longer limited to agonizingly slow 9,600 bps data transfer rates – slower than dial-up modems of the early 1990s.

Today, modernized Wideband HF (WBHF) can deliver rates up to 240 kpbs on a 48 kHz wide channel. The door is open for HF to provide the same levels of data transmission speeds, quality and security of a narrow-band SATCOM system.

Rockwell Collins' modernized HF capabilities, coupled with the inherent anti-jam nature of the widely dispersed nodes in Automatic Link Establishment (ALE) based HF networks, create an ideal alternative to narrow-band SATCOM in Anti-Access/Area Denial (A2/AD) battlefield environments.

Our modernized HF is primed to become the global BLoS communications backbone for almost any military BLoS communications requirement, including:

Mission communications

- Global command and control of combat forces
- Real-time, in-transit visibility for mobility forces
- Dynamic re-tasking of assets by providing crews with updated tasking orders, medical information, maps, country clearances, etc.
- Transmission of Intelligence, Surveillance and Reconnaissance (ISR) information to and from aircraft

Remote network connectivity

- Access to secure and nonsecure Internet Protocol (IP) router networks (SIPR and NIPR) to include email, chat, video and other applications
- Air-ground and ship-shore phone patching, email access, all-frequency broadcasts, Emergency Action Messages, and Link 11/22
- Battle force reach-back air-ground and ship-shore in an A2/AD environment
- Integrated with Rockwell Collins' SubNet Relay technology to provide ad hoc, dynamically reconfigurable, masterless data return

Air Traffic Control (ATC) communications

- ATC voice communications for operations in commercial air routes, necessary for worldwide deployment capability and fuel efficiency
- Logistics and Command/Control HF Data Link messaging through Rockwell Collins' ARINC Aircraft Communications Addressing and Reporting System (ACARS®)

New HF solutions. One trusted source.

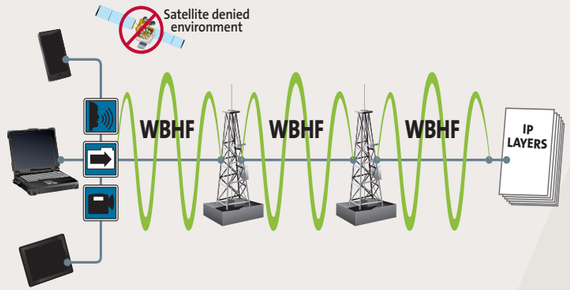
Rockwell Collins has been a leader in HF technology since 1933. Today, we are a major supplier of HF communications equipment to U.S. and allied military forces. In fact, over 88 percent of U.S. Army aircraft are equipped with our current-generation HF radios.

While many other companies have abandoned HF, we have built upon our 80-plus-year history to introduce our next generation of HF. The only modernized HF solution that delivers net-centric, high-speed BLoS communications capabilities at costs that are in line with today's tighter military budgets.

Our leadership in HF technologies extends beyond capabilities and into providing our global military customers with the full range of planning, installation, training and support services you need to maximize your investment.

A quick look at all the benefits of Rockwell Collins' new-generation HF:

- Rockwell Collins is the leader in multi-domain, next-generation HF solutions covering air, land and sea
- Data transmissions up to 24 times faster than legacy HF
- High-speed BLoS communications without the high cost, vulnerability and availability issues of SATCOM
- Technology compatible with current global HF communications network infrastructures
- Single drop-in sub-component replacement adds capability without replacing complete HF system
- Digital voice for cellular-quality communications
- Eliminates problems with legacy HF:
  - "Cell phone" easy to use
  - Mitigation of atmospheric interference
  - High data transfer rates
  - Clear, understandable and recognizable voice sound quality
- High-speed, net-centric connectivity enables BLoS:
  - Web access
  - Email
  - Collaborative white boarding
  - Real-time chat
  - Streaming video
  - Rapid, large file transfers
- Software Defined Radio (SDR) architecture allows for future capabilities upgrades through quick and economical software updates

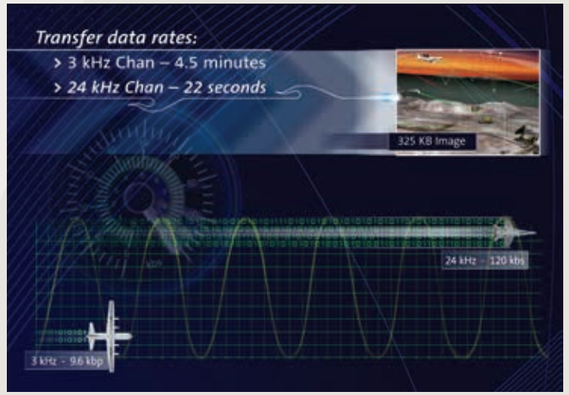


Communicate BLoS when others can't.

Our modernized HF eliminates the performance and signal clarity issues that became synonymous with legacy HF communications. Now, HF can deliver high-speed, BLoS digital communications in situations where SATCOM is not available.

And it's all done at a much lower cost and with greater reliability – especially in areas of the world where satellite connections are inconsistent.

In fact, the digital voice quality and accuracy found in our newest generation of HF is equal to your cellular phone. No other company can match it.



There's fast. Then there's WBHF fast.

Rockwell Collins has taken HF a step further, introducing WBHF with waveforms out to 48 kHz. With the ongoing development of WBHF, data rates have increased twentyfold over those of legacy HF capabilities. This groundbreaking technology has created a major paradigm shift in the area of low-cost, BLoS net-centric communications.

Radios equipped with new WBHF technology are fast enough to deliver streaming video, interactive white boarding, high-speed transfer of large files, and other IP-based applications. Whenever you need it.

In addition, brand new ALE capability, known as 4G ALE, makes HF linking easier, faster and more reliable than ever before, while taking full advantage of wider channels. Its 4G ALE adds the spectral sensing parameter, as well as other signal enhancing characteristics, to create a new protocol that not only automatically determines the optimal bandwidth but also links much faster than legacy 2G or 3G ALE.

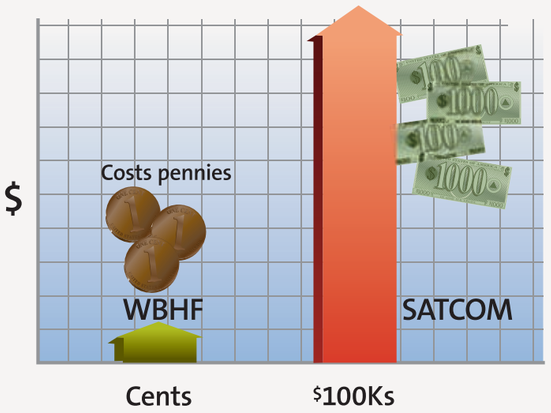
Spectral sensing ensures that the established link not only has the best signal, but also the maximum available bandwidth. And it does it all without any operator intervention.

The easy-to-use network pipeline.

Our new approach to HF differs greatly from legacy systems in its ease of use.

Gone are the days of needing highly trained HF operators.

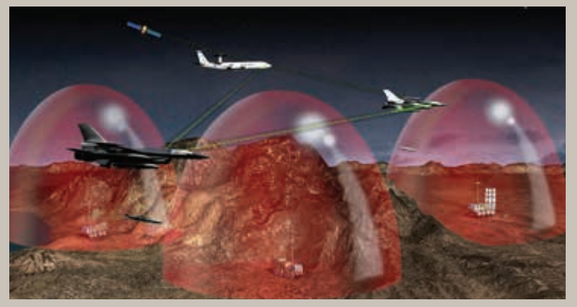
With minimal human interaction, single connections to entire high-speed data networks are easily established anywhere in the world, making it ideal for airborne, ground-based, transportable and maritime applications.



Satellite speeds at down-to-earth costs.

Without the increasing subscriber and per-minute rates associated with today's SATCOM connections, modernized HF delivers narrow-band, satellite-like data capabilities with exceptional cost effectiveness.

Also, because the majority of U.S., allied and coalition forces already employ some form of HF communications, upgrades to their currently installed infrastructure can be accomplished in stages – again, tipping the cost scale further in favor of modernizing existing HF systems rather than buying something completely new.



Jam-resistant assured communications

Jam resistance. Communication assured.

Whether in the field of battle, search-and-rescue or humanitarian aid efforts, the ability to share real-time, networked information between ground, sea and airborne forces is rapidly becoming the defining factor in a mission's success.

Although HF radio has carried the bulk of BLoS communications for militaries worldwide since the early 1930s, various regulatory and technological limitations, along with the growing need to move greater amounts of data at higher rates, have pushed legacy HF aside.

Today, the bulk of military net-centric, BLoS voice, video and data communications is being carried by narrow-band satellite (SATCOM) links.

SATCOM works well, but it has limitations. A number of countries have already demonstrated the capability to deploy space-based weapons to destroy critical communications satellites. And even in peacetime, many allied/coalition forces do not have access to SATCOM systems, so HF becomes the default method of BLoS communications.

Because of these various satellite-denied scenarios, there is a growing need for a new-generation communications capability that blends the high data throughput of satellite with the commonality and cost effectiveness of HF.

New-generation HF – ready when you are.

Airborne. Land based. Shipboard.

As the only company with a new-generation HF solution, Rockwell Collins is the leading provider of modernized HF components. We continue to work closely with U.S., allied and coalition military leaders to develop new-generation HF capabilities through ongoing improvements to all available HF products and systems.

Our goal is to provide an array of solutions that offer highly capable, highly secure alternatives to SATCOM BLoS communications.

Trusted planning, installation and support.

As a global leader in the design, development and deployment of military communications systems, we understand that you are looking for more than just a hardware or software solution to your needs.

That is why Rockwell Collins offers a full range of services, including procurement and implementation planning, system installation, training and ongoing support.

GROUND		**URG-III HF communications system** – Latest in digital signal processing techniques and software-intensive, high-level control implementation to provide flexible, powerful and highly reliable data and voice operation in the HF band. The heart of URG-III is the RT-2200 receiver-exciter. ***Features:*** 19" rack, fixed site or transportable configuration, single-site or split-site, MIL-STD-188-141B ALE, MIL-STD-188-110B data modem, 1 kW or 4 kW power options ***Future:*** WBHF high-speed data, 4G ALE, IP remote radio control
		**AN/VRC-100** – HF ground/transportable communications system that offers aviation commanders reliable voice and data communications as well as enhanced situational awareness for ground support of AN/ARC-220 equipped aircraft. Receives and translates aircraft position reports automatically and interfaces with military Common Operating Picture networks for complete battlefield situational awareness. ***Features:*** Heavy-duty transportable case with available vehicle mount, single side-band, analog voice, MIL-STD-188-141B ALE, ALE Linking Protection, MIL-STD-188-110B data modem, compatible with KY-100 crypto, automatic position report messaging, max power output 175 W pep (100 W avg) ***Future:*** Based on modernization plans for the AN/ARC-220, the next generation of the VRC-100 will include WBHF high-speed data and 4G ALE, with options for embedded crypto and digital voice
AIRBORNE		**AN/ARC-190(V)** – Highly reliable, standard HF BLoS system for most U.S. Department of Defense and international wide-body aircraft, such as the KC-135, C-17, C-130, B-1B, B-52 and E-6B. Primarily designed for military airborne applications that employ probe/cap, shunt or wire antennas. ***Features:*** Single side-band, analog voice, max power output 400 W pep (400 W avg) ***Future:*** The ARC-190(V)9 reduces size, weight and power by embedding all features of the obsolete CP-2024 (SELCAL, ALE and HF Data Link) into the receiver/transmitter, plus adds WBHF high-speed data, 4G ALE and options for embedded crypto and digital voice
		**HF-121C (AN/ARC-243)** – The high-performance HF BLoS system is primarily designed for special mission military aircraft with requirements for custom interfaces with aircraft mission systems and Simultaneous Operations (SIMOP) of multiple HF systems. ***Features:*** Single side-band or independent side-band, analog voice, max power output 400 W pep (400 W avg), MIL-STD-188-141B ALE, ALE Linking Protection, MIL-STD-188-110B data modem, SELCAL, compatibility with common crypto, filtering for Simultaneous Operations (SIMOP) ***Future:*** The next generation of the HF-121C will include WBHF high-speed data and 4G ALE, plus options for embedded crypto, digital voice and HF Data Link
		**HF-9500** – The high-power, solid-state HF system for international wide-body aircraft such as the A400 and the C-27J ***Features:*** Single side-band or independent side-band, analog voice, max power output 400 W pep (400 W avg), MIL-STD-188-141B ALE, ALE Linking Protection, MIL-STD-188-110B data modem, SELCAL, compatibility with common crypto, filtering for Simultaneous Operations (SIMOP) ***Future:*** The next generation of the HF-121C will include WBHF high-speed data and 4G ALE, plus options for embedded crypto, digital voice and HF Data Link

Upgrade today and be ready for tomorrow's needs.

When compared with other BLoS options, Rockwell Collins' modernized HF brings significant capabilities and delivers on all requirements at both reasonable implementation and ongoing operational costs.

New-generation subcomponents easily integrate into current fixed, mobile and airborne HF systems, enabling operators to develop an upgrade path that best fits their needs and budget.

And because new-generation HF is largely software-based, the systems will be more easily upgradable with new capabilities as they become available. This solves long-term obsolescence problems and provides outstanding growth potential.

AIRBORNE		**AN/ARC-220** – The standard HF BLoS system for most U.S. Department of Defense and rotary-wing platforms, such as the CH-47, CH-53, UH-60 and AH-64, plus various fixed-wing and maritime applications. The system offers reliable voice and data communications as well as enhanced situational awareness through automatic transmission of aircraft position reports that can be provided to military Common Operating Picture networks through the VRC-100 system for complete battlefield situational awareness. ***Features:*** Single side-band, analog voice, MIL-STD-188-141B ALE, ALE Linking Protection, MIL-STD-188-110B data modem, compatible with KY-100 crypto, automatic position report messaging, max power output 175 W pep (100 W avg) ***Future:*** Updates to the AN/ARC-220 will include WBHF high-speed data, 4G ALE, with options for embedded crypto and digital voice
		**HF-9000D/F** – A highly reliable, compact, lightweight and versatile HF BLoS system used in a variety of fixed- and rotary-wing applications across the world. The HF-9000D offers the flexibility of multiple antenna options that allow the use of various antenna configurations at both low and high altitudes. The HF-9000F offers all the features of the HF-9000D in a ruggedized package for the operational stresses of fighter aircraft. ***Features:*** Independent side-band, analog voice, MIL-STD-188-141B ALE, MIL-STD-188-110B data modem, compatible with common crypto, max power output 200 W pep (100 W avg), automatic position report messaging option ***Future:*** The next generation of the HF-9000D system will include WBHF high-speed data, 4G ALE, with options for embedded crypto and digital voice
ANCILLIARIES		**DVP-200 digital voice privacy processor** – Compact and simple to operate, the DVP-200 provides a combination of data and voice privacy with crystal-clear audio quality. It utilizes the latest MELPe digital voice technology to provide clear and recognizable, noise-free voice communication, secured with AES 256 encryption. Meets Federal Information Processing Standards 140-2 level 1 certification and is fully compatible with HF, VHF, UHF and other communications channels.
NETWORKING		**HF Cellular** – A state-of-the-art, global, advanced HF ALE network designed to pool HF ALE ground assets for umbrella-like coverage over an extended area. The network is impervious to traditional point-to-point propagation limitations, providing exceptional reliability and connectivity performance over traditional ALE networks. Similar to a cell phone system, which seeks the best tower relative to the location of the user's device, the HF Cellular Network provides the best ALE ground station to the mobile user.

Building trust every day.

Rockwell Collins delivers smart communication and aviation electronic solutions to customers worldwide. Backed by a global network of service and support, we stand committed to putting technology and practical innovation to work for you whenever and wherever you need us. In this way, working together, we build trust. Every day.

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