SOFTWARE DEFINED RADIO

Experience across all domains.

DATA LINK
SOLUTIONS

Rockwell Collins

Building trust every day

Leadership

Leading the way developing Software Defined Radio (SDR) solutions

MIDS-JTRS

FlexNet™-One

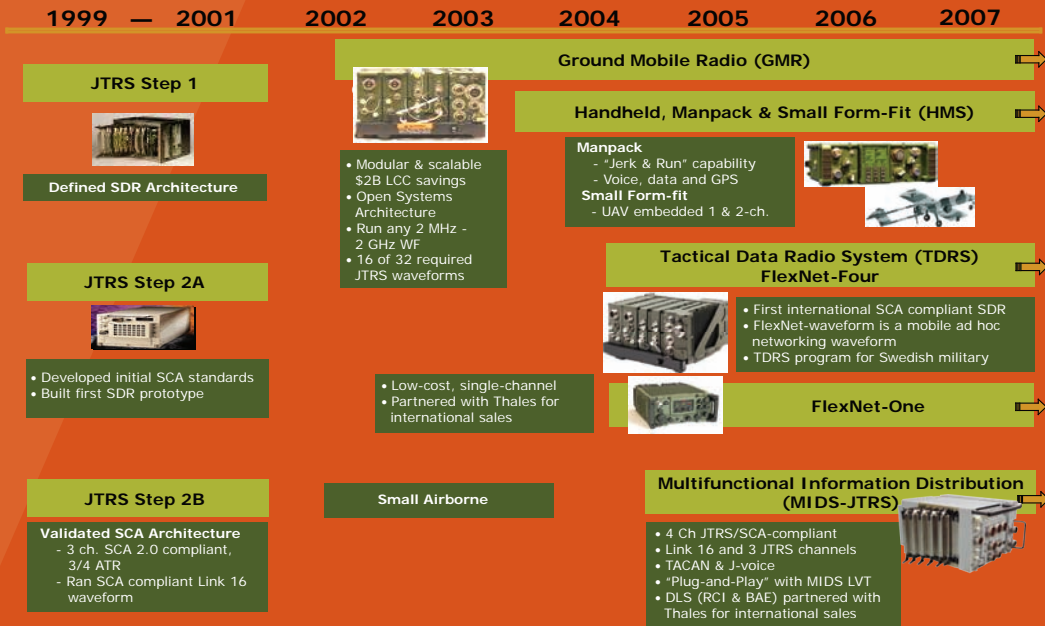Ground Mobile Radio (GMR)

HMS Manpack

FlexNet™-Four

Rockwell Collins is a recognized Joint Tactical Radio System (JTRS) expert and leader in the field. We design, develop and test Joint Tactical Radios (JTR) for U.S. forces fighting in all domains.

> Member on the Boeing JTRS Ground Mobile Radio (GMR) Team
> Member on the General Dynamics Handheld, Manpack and Small Form Fit (HMS) JTRS Team
> Member on the Data Link Solutions (DLS) Multifunctional Information Distribution System-JTRS (MIDS-JTRS) Team

Rockwell Collins is also developing a family of dedicated FlexNet™ SDR products to meet international customer requirements. International Software Defined Radio (ISDR) programs include the Tactical Data Radio System (TDRS) for the Swedish military.

Rockwell Collins' unmatched SDR breadth of experience

1999 — 2001 **2002** **2003** **2004** **2005** **2006** **2007**

Ground Mobile Radio (GMR)

JTRS Step 1

Defined SDR Architecture

- Modular & scalable $2B LCC savings
- Open Systems Architecture
- Run any 2 MHz - 2 GHz WF
- 16 of 32 required JTRS waveforms

Handheld, Manpack & Small Form-Fit (HMS)

Manpack
- "Jerk & Run" capability
- Voice, data and GPS
Small Form-fit
- UAV embedded 1 & 2-ch.

**Tactical Data Radio System (TDRS)
FlexNet-Four**

- First international SCA compliant SDR
- FlexNet-waveform is a mobile ad hoc networking waveform
- TDRS program for Swedish military

JTRS Step 2A

- Developed initial SCA standards
- Built first SDR prototype

- Low-cost, single-channel
- Partnered with Thales for international sales

FlexNet-One

JTRS Step 2B

Validated SCA Architecture
- 3 ch. SCA 2.0 compliant, 3/4 ATR
- Ran SCA compliant Link 16 waveform

Small Airborne

Multifunctional Information Distribution (MIDS-JTRS)

- 4 Ch JTRS/SCA-compliant
- Link 16 and 3 JTRS channels
- TACAN & J-voice
- "Plug-and-Play" with MIDS LVT
- DLS (RCI & BAE) partnered with Thales for international sales

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Ground Mobile Radio (GMR)

Versatile and efficient

Rockwell Collins is a leader in the development of ground vehicular JTRS solutions and we are a principal developer of many Software Communications Architecture (SCA) compliant JTRS Operational Requirement Document (ORD) waveforms.

The JTRS GMR radio system is an open, scalable platform solution with multiple reprogrammable channels. SCA compliant waveforms have been shown to operate in the 2 MHz to 2 GHz spectrum during ongoing operational assessments.

The modular GMR architecture, developed by Rockwell Collins, reduces total life cycle costs for communications hardware on mobile platforms.

GMR Line Replaceable Units (LRU) are defined at the lowest operational level for flexibility and greatly improved logistics support with easy repair or upgrade in the field.

As a member of the GMR Team, Rockwell Collins is delivering JTRS GMR radios for field experiments and to the Army's Future Combat System (FCS) program.

Handheld, Manpack and Small Form Fit (HMS)

Battlefield interoperability

The HMS JTRS Manpack provides embedded communications for Future Combat Systems (FCS) brigade combat teams and associated soldier/ platform applications.

We are currently developing two-channel manpack radio technology capable of communicating voice, data and video signals while simultaneously talking with legacy military radios.

A member of the General Dynamics HMS Team, Rockwell Collins brings extensive hardware and waveform software development expertise to this advanced man-portable JTRS technology.

MIDS-JTRS

Meeting size, weight and power requirements

Multifunction Information Distribution System (MIDS) is a series of high-performance, best-value, third generation Link 16 terminals. Data Link Solutions (DLS), a joint venture between Rockwell Collins and BAE Systems, delivers this affordable open-architecture Link 16 solution to fighter aircraft, command and control centers, and ships.

DLS is currently working to transition the MIDS to be JTRS SCA-compliant so warfighters can more readily and effectively communicate in real time. The improved MIDS-JTRS will utilize software applications for expanded capability and enable enhanced operational effectiveness without consuming additional space, weight or power.

DLS and Thales intend to cooperatively produce and sell MIDS-JTRS terminals. Tanker, transport and rotary wing aircraft, along with maritime and fixed stations, are all potential platforms.

Waveform expertise

Enabling interoperability and high data throughput

Rockwell Collins SDR hardware solutions and SCA-compliant JTRS waveforms are combined with standard IP-based protocols and complementary commercial technologies to provide connectivity for transformational forces communicating in Global Information Grid (GIG) sub-networks around the world.

A key element in the Rockwell Collins ISDR product portfolio is the FlexNet SCA-compliant waveform which provides ad hoc, mobile, broadband wireless networking services at high data rates for our international customers.

Rockwell Collins research programs have led to waveform and technology demonstrators such as Multifunctional On-the-Move Secure Adaptive Integrated Communications (MOSAIC), Tactical Targeting Network Technology (TTNT), and Weapons Data Link (WDL).
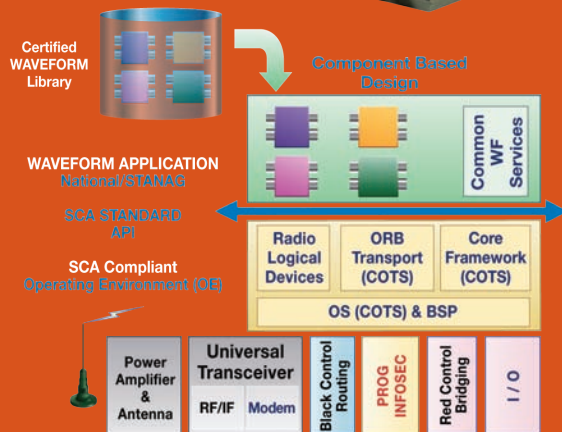
BSP: Board Support Package - ORB: Object Request Broker
OS: Operating System

The FlexNet Solution

Meeting operational requirements

The FlexNet family of SDRs and FlexNet waveform (FNWF) offers these essential features: advanced networking capabilities, operational flexibility and joint/coalition interoperability.

Customers will benefit from the open architecture offered by the SCA compliance and they will be able to port or develop their own waveforms on our FlexNet-One and FlexNet-Four systems.

Rockwell Collins, teamed with Thales Communications, is providing FlexNet SDR communication systems to meet today's operational requirements. Our FlexNet product line leverages today's SCA and SDR technologies.

FlexNet-One (FN-1)

Single-channel, cost-effective SDR

FlexNet-1 is a compact, single-channel, multi-band (30 MHz to 512 MHz) SDR, fully interoperable with the PR4G Combat Net Radio standard and hosts the FlexNet-Waveform.

This radio's form-fit factor is compatible with the PR4G, can be easily integrated in small vehicles and, due to its superb cosite performance, can enhance an existing vehicular installation by increasing the overall communication capacity.

FlexNet-Four (FN-4)

Modular, versatile, multichannel SDR

FlexNet-4 is a versatile and scalable multichannel SDR, configurable from one to four channels and offering frequency coverage from 2 MHz to 2 GHz.

FlexNet-4 is fully compatible with the FlexNet-One services, and will host the FlexNet Waveform, the PR4G waveform and is capable of hosting NATO STANAG and nation specific waveforms.

Keys to effective communication

Meeting SDR requirements around the world

To meet operational requirements, today's SDR communication systems require advanced features:

> *Quality of Service (QoS)* to provide real-time exchange during engagements. Bandwidth on demand for voice (digital or VoIP), data (short messages, formatted messages, file transfer), image and video transmission, or web services and database consultation

> *Reliable connectivity* for unit command and control to the tactical edge

> *Seamless interoperability* for joint and combined operations on the ground, in the air and at sea

> *Flexibility and mobility* to cope with unpredictable deployments/engagements, and keep pace with rapid maneuvers

Improving network performance

Optimized Quality of Service (QoS)

Self forming and self healing, the FlexNet system implements adaptive routing over a distributed architecture, implementing QoS management, to improve the overall performance of the network.

High data throughput and low latency characteristics of the FlexNet-Waveform also meet complex networked systems key requirements such as Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR); and Air Defense Systems.

Relay nodes and Internetworking functions extend user connectivity to higher echelon networks via the vertical C2 chain or across the horizontal command structure of cooperative units.

CONNECTIVITY
Enhanced data thruput;
reliable communications

INTEROPERABILITY
Joint and Combined Operation
Legacy Radios

FLEXIBILITY
Programmable
Multi-Missions
Mobility

HIGH DATA RATE CAPACITY
Situation Awareness
Cooperative Engagement
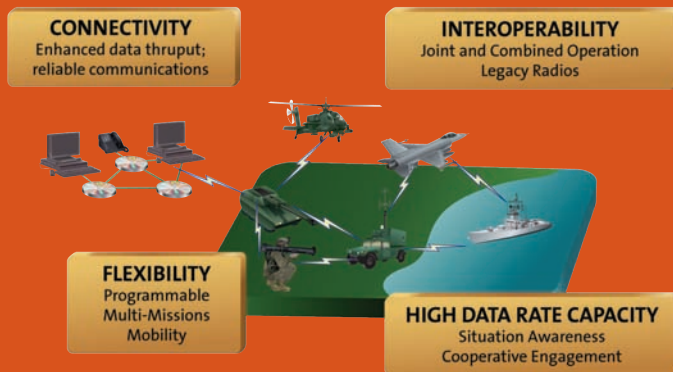
Providing ad hoc mobile networking and multimedia services

Reliable connectivity

Achieving timely information dissemination throughout the operational theatre requires higher data rates, shorter reaction times and greater user connectivity. This challenge is solved by the introduction of a broadband, ad hoc, mobile communications network.

The FlexNet SDR communication system provides communications on the move with high data throughput (up to 6 Mbps and more than 150 fully mobile nodes). These advanced capabilities are a seamless extension to the current transmission system.

A new wideband ad hoc networking waveform, called the FlexNet-Waveform is also implemented along with IP-based networking layers to offer scalable, robust and secure multimedia services (voice, IP data, video, mail and file transfer).

Enabling joint international operations

Seamless interoperability

FlexNet products are designed to host national waveforms with the appropriate security levels.

FlexNet is capable over an extended frequency band and is interoperable with joint and combined forces. FN integrates standardized waveforms (MIL-STD, STANAG), national waveforms, and other widely used waveforms such as PR4G and PR4G F@stnet to ensure interoperability.

By integrating legacy waveforms and node functions, FlexNet allows a smooth transition from legacy transmission systems to full wideband networked over-the-air communications.

FlexNet is based on standard IP technology, which greatly improves the system integration and interfaces with applications such as Information System or Battlefield Management System.

A modular, scalable, open architecture

Flexibility and mobility

FlexNet enables real-time configuration of the radio system with the desired waveform and services: voice (digital or VoIP), data (short messages, formatted messages, file transfer), image and video transmission or web services and database consultation.

By covering the HF, VHF and UHF frequency bands and offering a wide variety of channel configurations from 3 kHz up to 5 MHz bandwidth, FlexNet multimission radios bring a real operational advantage when unpredictable deployment or flexible spectrum management is required.

Open system, SCA compliant and wideband programmable hardware capabilities open up a new dimension in product scalability. With multiband, multimission radios, this communications system can be enhanced progressively to ramp up capability in terms of frequency diversity, data throughput, connectivity and interoperability for all users.

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Swedish Tactical Data Radio System

Wireless, mobile, ad hoc networking capability
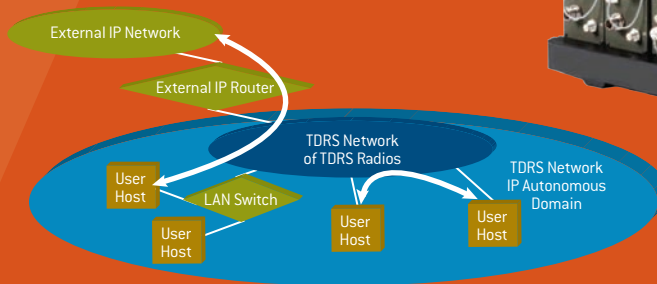
Rockwell Collins' experience in developing software-defined radio (SDR) solutions has uniquely positioned us to provide transformational defense communications around the world.

We are providing the Tactical Data Radio Systems (TDRS) to the Swedish military. TDRS supports the Swedish Armed Forces initiative to develop a Network Based Defense.

TDRS is compliant with SCA standards to ensure waveform portability and interoperability. The SDR system consists of modular, open architecture, hardware and software components.

The TDRS also hosts a customized, high data rate, networking waveform. The new waveform will provide Swedish tactical forces with a wireless, mobile, ad hoc network capable of simultaneous voice, data and video communications.

Providing the power of information

Dynamic interoperability

Information is power.
The power to deploy forces rapidly and decisively.
The power to keep supply lines full.
The power to keep troops safe yet engaged — and commanders in control.
At Rockwell Collins, we provide the power of information to the warfighter.

Building trust every day.

Rockwell Collins delivers smart communication, aviation electronics, simulation and visualization 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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