



# *Joint Tactical Radio System (JTRS)*



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# Agenda

- Overview of the JTRS Program
  - JTRS Mission
  - How JTRS differs from previous radios
  - JTRS Objectives
  - Explain the “waveform” concept
  - Define Cluster concept
  - Outline Step 2C and Cluster 1 effort
- Program Milestones

# Mission / Vision Statement

## Mission

*Acquire a Family of Affordable, High-capacity Tactical Radio Systems to Provide Interoperable LOS/BLOS and Wireless, Mobile Network C4I Capabilities to the Warfighters.*

## JTRS and Joint Vision 2010

- *Network Centric Communications*
- *Interoperability via Common Waveforms*
- *Cross banding of Information across and Between Networks*
- *Cost Saving Standards*
- *Coalition Operations*

# OSD Policies on Radio Acquisitions

- USD(A&T) 10 APR 98: “I am concerned with Service plans to proceed with near term radio and terminal developments that may be unnecessary and in the long term cause the DoD to expend scarce resources, delay the earliest possible fielding of JTRS family of equipment and continue to field legacy systems. Accordingly, **I request the each Service Acquisition Executive aggressively pursue the necessary steps to achieve the goal of minimizing new programs and migrate existing development programs for radio-based communications systems to a target single acquisition program.**”
- ASD(C3I) 28 AUG 98: “... In view of the above (ref. USD(A&T) memo above), and in order to stem the continuing efforts to independently develop and acquire independently service unique radio and terminal programs, **all current Component efforts to initiate any contracting activity to develop and acquire any radio system to include software programmable radio technology are to be held in abeyance.** No BAAs, RFIs, or RFPs will be released unless approval is granted by the ASD(C3I).”

# OSD Policies on Radio Acquisitions (Cont.)

- USD(A&T) 02 AUG 01: “The current moratorium on acquisition of legacy radios is reemphasized. **Any acquisition or modification of radios, terminals or other communications systems which use over-the-air frequency energy in the frequency range specified in the JTRS Operational Requirements Document (ORD) must be JTRS compliant unless a waiver is granted** the the Assistant Secretary of Defense, Command, Control, Communications, and Intelligence (ASD(C3I)). Waiver requests must be made through the appropriate Component Acquisition Executive. The JPO will continue to independently recommend approval/disapproval to the ASD(C3I) on each waiver request.”

# How JTRS Differs From Legacy

**1980s**

**1990s**

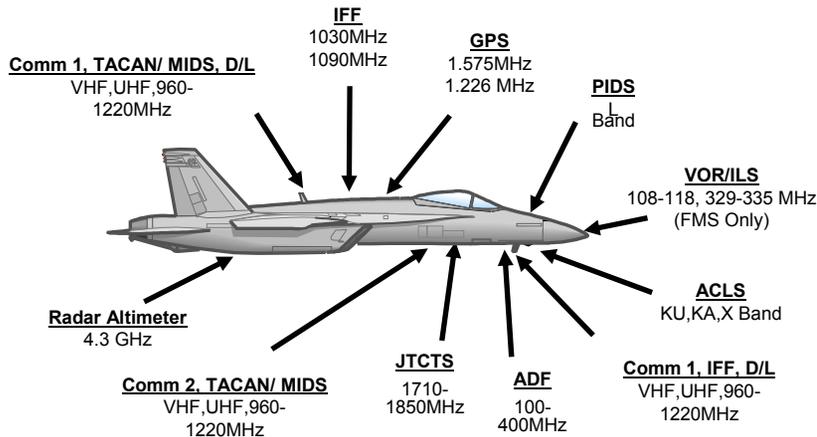
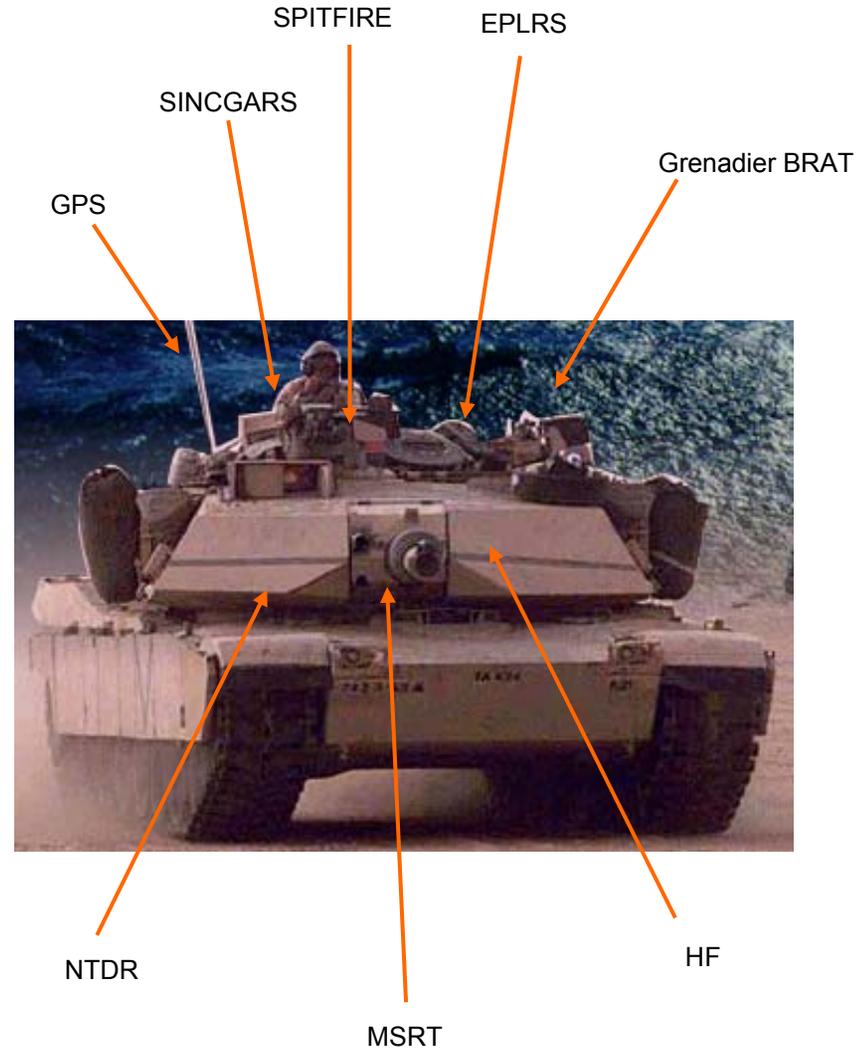
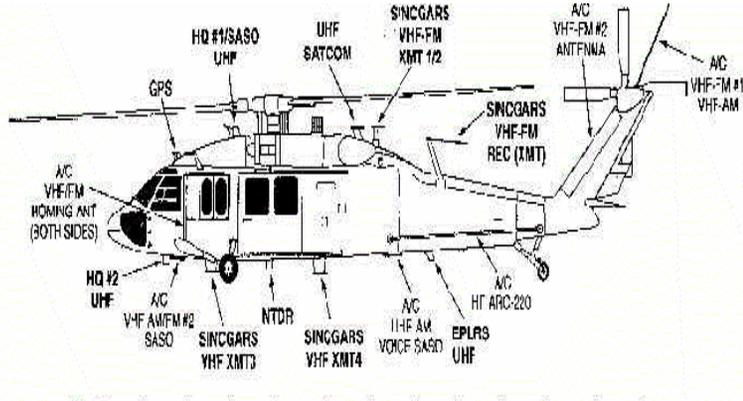
**2000s**

<b>Characteristics</b>			
<b>Radio Architecture</b>	Mostly Hardware	Mostly Software (vendor specific Architecture – not portable)	Software radio based on common Architecture for portability)
<b>Freq Bands / Channels</b>	Single Freq Band Single Channel	Multiple Freq Bands Single Channel	Multiple Freq. Bands Multiple Channels
<b>Services</b>	Voice or Data	Voice or Data	Voice, data, and Video
<b>Interfaces</b>	Limited, MIL-STD	Flexible MIL-STD & Commercial (Serial)	Flexible, MIL-STD, Commercial (Serial, Ethernet)
<b>Upgrades</b>	Hardware Upgrade	Mostly Software upgrade	Hardware and Software upgrade
<b>Crypto / Algorithms</b>	External / HW Based	Embedded / Hardware based	Embedded / Programmable

# The Problem at the Platform Level

These are the types of platforms involved in current operations.

But they only share voice as common communications, and they require multiple antennas.



# A Common Architecture Provides the Solution

**Current Systems**  
(25-30 Families)  
(750, 000 Radios)

**Common Open Standards Architecture & Technology Base**

**Joint Solutions**  
(1 Family)

- Navigation
- Positioning
- Location
- Identification
- Air to Ground
- Air to Air
- Ground to Ground
- SATCOM



AN/PSQ-6A EPLRS



AN/ARC-210



AN/WCS-3 UHF SATCOM/LOS



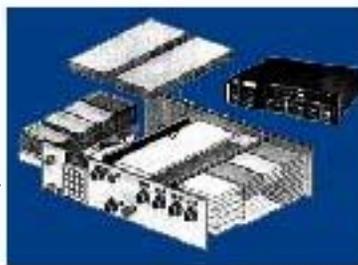
AN/ARC-201A SINCGARS



AN/PRC-119 SINCGARS



AN/PSC-5



**Legacy Waveforms**  
**Commercial Waveforms**  
**New Military Waveforms**

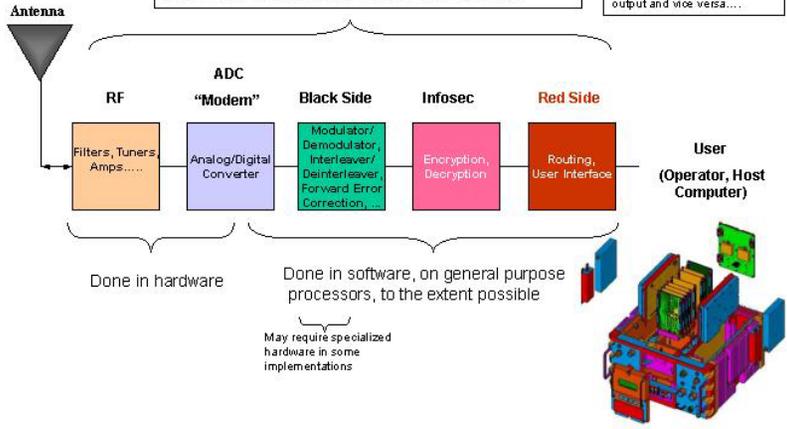


# JTRS Waveforms and SCA

## What is a Waveform?

A waveform is all of the functionality between the antenna and the user

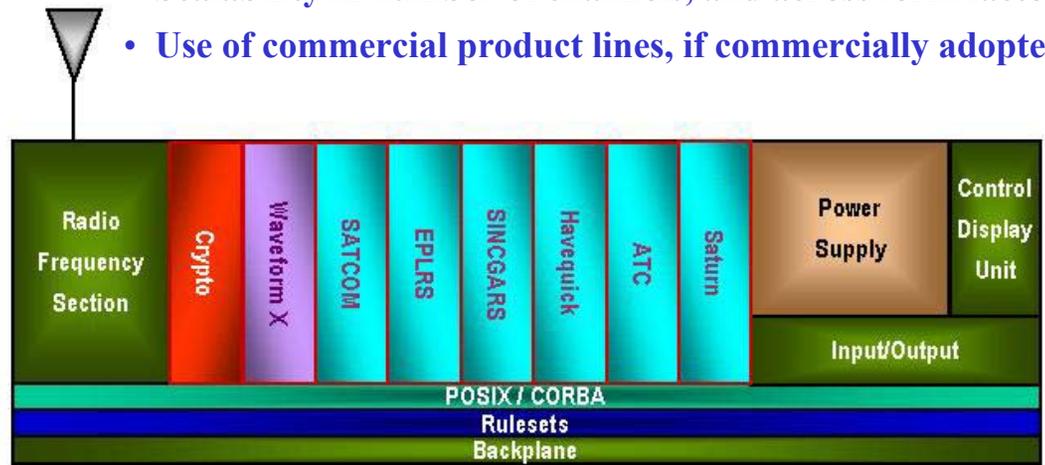
Waveform (ORD Definition)...In JTR System usage, the term waveform is used to describe the entire set of radio functions that occur from the user input to the RF output and vice versa....



Waveform (ORD Definition)...In JTR System usage, the term waveform is used to describe the entire set of radio functions that occur from the user input to the RF output and vice versa.

## JTRS SCA and Waveforms Enable:

- Porting of waveforms across radio platforms
- Interoperability among radios
- Use/reuse of common software across waveforms
- Scalability in number of channels, and across form factors
- Use of commercial product lines, if commercially adopted



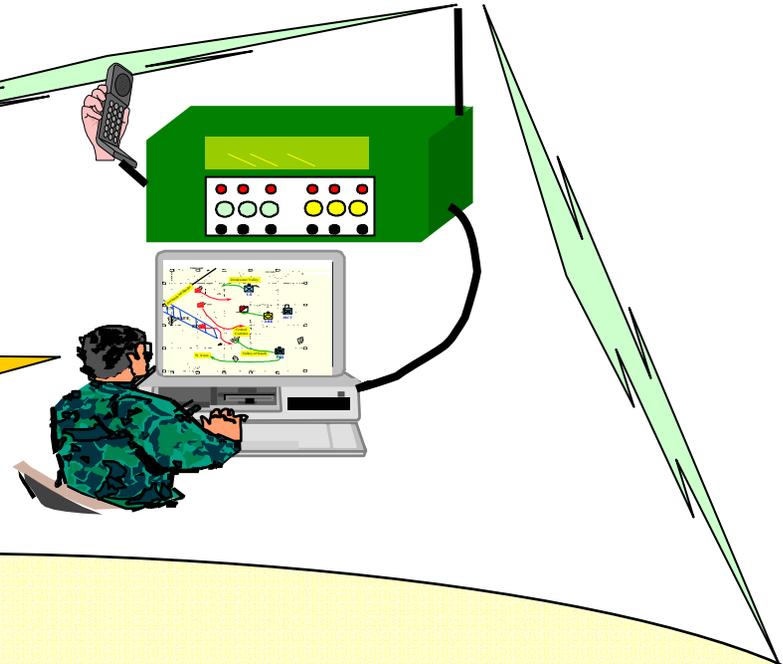
# JTRS Over the Air Networking

Voice, Data, Video –  
Multiple, Simultaneous Channel Operation

**JTRS NETWORK  
(Small)**

**Scaleable to  
User  
Requirements**

**JTRS NETWORK  
(Large)**



# JTRS Step 2C

- **Goals: Provide...**
  - 220 Operational JTRS Prototypes
  - Develop JTRS Tactics, Techniques and Procedures (TTPs)
  - Validate Large Scale Network
- **What Step 2C is...**
  - A developmental ruggedized prototype for exercise support
  - A 2 channel SCA v.2.0 compliant system hosting two-vendor developed wideband waveforms
    - Means to continue validating SCA
- **What Step 2C is not...**
  - Material Released Hardware
  - System to meet all JTRS ORD requirements without hardware changes, e.g. RF range only 225-400 MHz
- **Additional systems required to support near-term TOC to TOC**



2 channels

# JTRS Clusters

- Cluster 1 – Designated Lead: Army
  - Army Rotary Wing Platforms
  - Army Ground Vehicular Platforms
  - USAF Tactical Air Control Party
  - Future USMC Small Unit Operations Center participation
- Potential Clusters
  - Handheld – lead: USSOCOM (official designation pending @ OSD)
  - Maritime/Fixed-site – proposed lead: Navy
- Future Clusters
  - Fixed wing – proposed lead: ?
  - Network Gateway Platforms (e.g., Command&Control Ships, JSTARS, AWACS, E-2C aircraft, UAVs,) – proposed lead ?
  - Space-based platforms – proposed lead ?

# Cluster 1 Overview

## Cluster 1 Joint Tactical Radio System (JTRS)

### Description

Cluster 1 is a software reprogrammable radio providing the warfighter with a multi-band/multi-mode capable, networkable radio system which provides simultaneous voice, data and video communications to increase interoperability, flexibility, and adaptability in support of varied mission requirements

### Benefits/Capabilities

- Voice, Data, Video Communications
  - TOC-to-TOC Data Communications
  - Aviation and Lower TI connectivity
- Supports Commercial IP Routing & BFA Systems
- Automatic Network Reconfiguration
- Supports Multi Independent Levels of Security
- JTA Compliant
- Open System Architecture
- Communicates with routers using commercial protocols
- Cross-banding
- Software reprogrammable

### Legacy Radios



SINCGARS



EPLRS



MIDS/Link 16)



Spit Fire/DAMA



OTHERS...

HQ, VHF, HF, etc.,

### Single Radio Replaces Several

JTRS...Radio and Waveforms



### Waveforms

- SINCGARS
  - EPLRS
  - DAMA
  - HF SSB
  - HAVE QUICK
  - LINK 16
  - VHF ATC
  - WNW
- SCA Compliant
  - Interoperability
  - Cross-banding
  - Networked
  - New functionality in WNW
  - Full functionality of legacy Radios
  - Protocols/Standards
  - Flexibility/Independence
  - Waveform Storage

# Key Performance Parameters (KPPs)

	<b>Operational Requirement</b>	<b>ORD Threshold</b>	<b>ORD Objective</b>	
	Have internal growth capability ORD Para 4a(1)(b)	Open System Architecture IAW JTA; Modular, Scaleable, Flexible form factors	Same as Threshold	
	JTR set modes/capabilities configuration and reconfiguration via software ORD Para 4a(1)(c)	By operators in their operational environment	Same as Threshold	
	Multi-channel routing and retransmission ORD Para 4a(1)(e)& Table 4-2	Supports KPP waveforms that are compatible in mode (voice, video, and data) and use compatible data rates.	Objective waveforms that are compatible in mode (voice, video, and data) and use compatible data rates.	
	Support time-critical waveforms ORD Para 4a(1)(f) & Tables 71 and 7-5	ORD Tables 7-1 and 7-5	ORD Tables 7-1 and 7-5	

# Key Performance Parameters

	<b>Operational Requirement</b>	<b>ORD Threshold</b>	<b>ORD Objective</b>	
	Each set shall be capable of operating on multiple full or half - duplex channels at the same time ORD Para 4a(1)(h)	1) GPS + 6* (Vehicular) 2) GPS + 8* (Airborne)	1) GPS + 8 (Vehicular) 2) GPS + 10* (Airborne)	
	Scaleable networking services ORD Para 4(3)(a)	Provide scaleable networking services for connected RF networks, host networks, and hybrid networks for ground and airborne rotary wing domains	Ground and Airborne rotary wing	
	Networking Extension/Coverage ORD Para 4a(3)(b)	Networked JTR System supports seamless interoperability across organizational boundaries in an operational area	Same as Threshold	
	JTR System Joint network interoperability ORD Para 4a(1)(r)	Interoperate with Army and Joint networks	Interoperate Allied/Coalition and commercial networks	
	Operational Availability ORD Para 4c(1)	0.96**	0.99**	

# JTRS Program Milestones

## DATE

## EVENT

ORD Joint Working Group  
JROC ORD Review

Nov 01  
Jan/Feb 02

Step 2C  
(2-channel engineering prototype)

FY-02 fielding

Cluster 1  
(ORD threshold requirements):

26 Oct 01  
Jan/Feb 02  
Mar 02  
4QFY05  
3QFY06  
4QFY06  
1QFY07

RFP Release  
M/S B Decision Review  
Contract Award Target  
Low Rate Initial Production  
IOT&E  
Full Rate Production  
First Unit Equipped