

# Generic Transformational Scalable Modular Adaptive RF Transceiver (Get SMART)

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MITRE Sponsored Research



# Problem

DoD and intelligence communities need low-cost, flexible systems for secure wireless data transmission to support critical operations. These systems require performance characteristics beyond those offered by commercially available hardware.

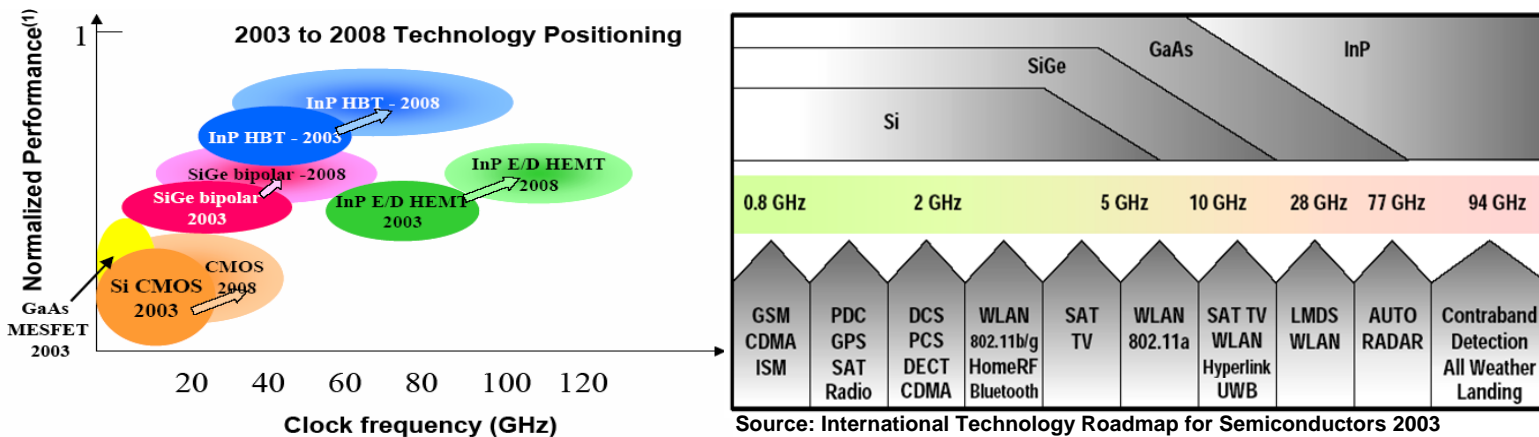
Military and intelligence performance characteristics include:

- Platform interoperability
  - Configurable waveforms and messaging
- Wide frequency coverage and agility
- Large (>100 MHz) instantaneous bandwidth
- Ability to work independent of commercial infrastructure

# Background

- Commercial Industry Not Focused on the Military Market
  - Radio on a Chip Focused on Cellular, 802.XX, Bluetooth Systems, ...
    - High Quantities : 100,000s+
    - Fixed Modulation characteristics (BPSK, QPSK, FSK, etc.)
    - Not: LPI/LPD, Interoperable, Reconfigurable
- “Special” Application Quantities Do Not Attract Commercial Investment
 

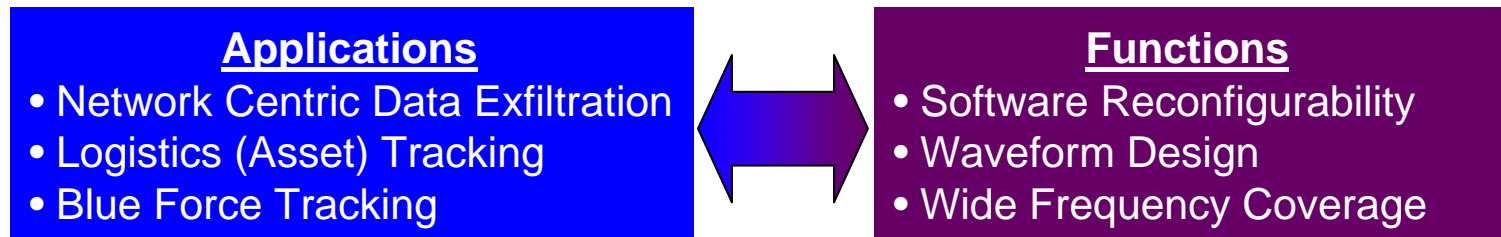
Risky Development + Low Production Quantities = Bad Investment



# Objective

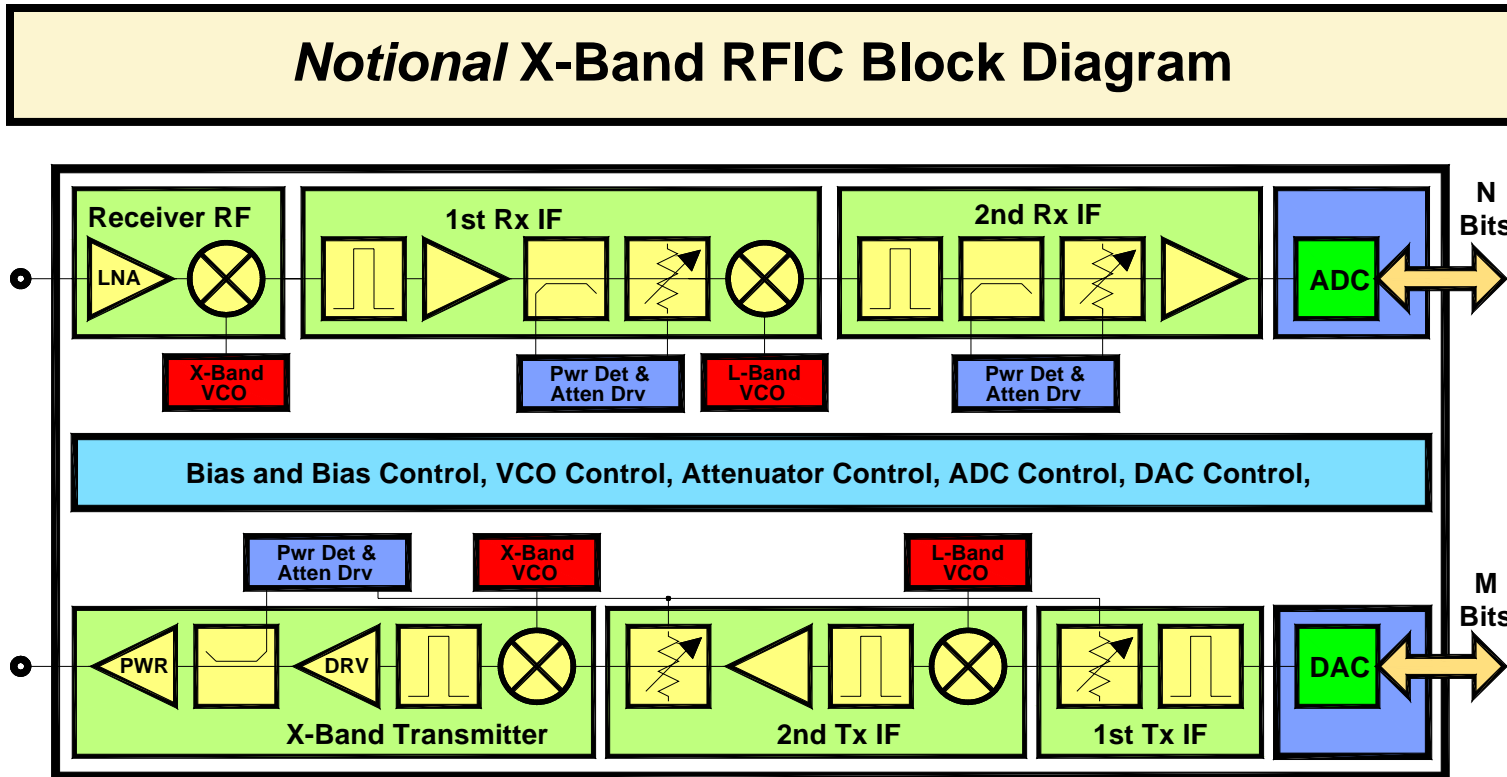
- **Develop and demonstrate a generic, scalable modular, reconfigurable RF transceiver using system-in-a-package microelectronics technology which will be a foundation for low-cost, adaptive communication modules**
- **Integrate SiGe into MITRE digital, mixed signal, and microwave design processes and tools to extend SoC integration capability**
- **Develop lab and industry partnerships to promote government interests**

# Activities

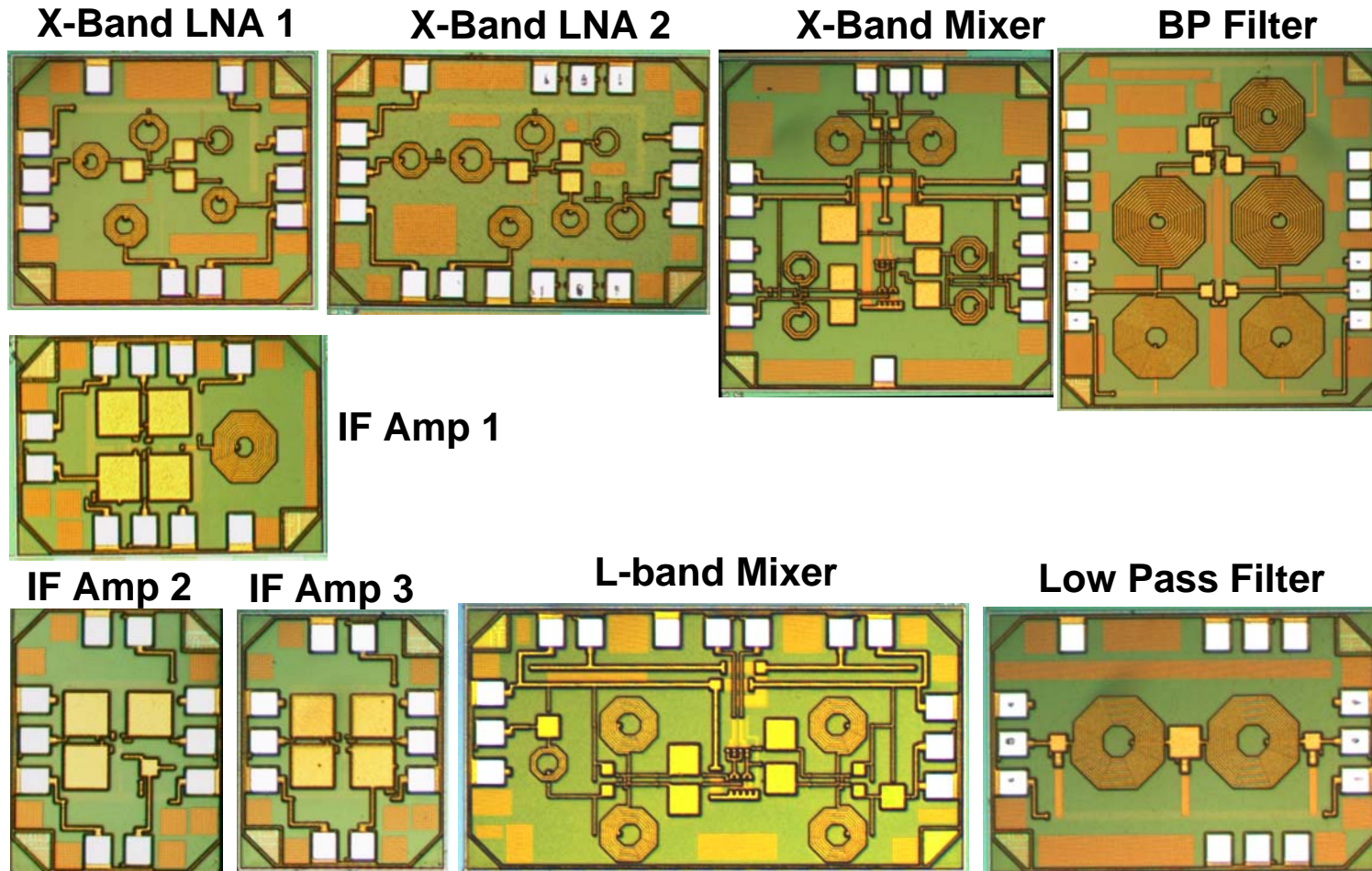


- **Employ Systems-Level Methodology to Design, Analyze, and Implement a Generic Transceiver**
- **Design State-of-the Art Circuits**
  - Ultra Low Power (System Architecture, Adaptive sampling, Power Control Circuits)
- **Expand Domain Knowledge in SoC. In particular:**
  - SiGe layout for both RF and digital integration
  - RFIC mixed signal design
- **Develop System Expertise in Application Areas**

# Highlight



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# Impacts

- Fills the performance/cost void for high-performance transceivers
- Surpasses all known commercial SoC transceiver efforts for data bandwidth and reconfigurability
- Reduces industry risk by demonstrating low-cost, portable, wireless data transmission
- Supports the MITRE vision of network-centric connectivity, providing real-time, reliable data
- Expands technical capabilities in challenging applications such as Blue Force Tracking and data communications
- Makes progress toward our MTC strategic goal of SoC through RFIC and SiGe technologies

# Future Plans

Get SMART Development Plan	FY 2005				FY 2006				FY 2007			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Develop Specification	▼	▲										
Model		▼	▲									
Chip Layout			▼	▲								
Fab Chip				▼	▲							
Test Chips					▼	▲						
Develop RFIC (Rev. 2)						▼	▲					
Fab Chip								▼	▲			
Develop Packaging								▼	▲			
Test Chips										▼	▲	



The ultimate goal is to integrate the SiGe RF and digital functionality on to a single chip, providing the maximum advantages of SoC integration.

