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## *Modular Radio Architecture*

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# Looking in the Rear Mirror at Tactical Radios



*Some things we would change with today's light on yesterday's picture*

Would recommend more cautious and judicious use of component-level software communication

- The hoped-for collection of small reusable software components was never realized

Would consider larger-module components and waveforms

- Fine-granularity of software is not the commercial model

Would define hardware waveform interfaces

- Application-Specific Integrated Circuits (ASICs) versions of WiFi and Bluetooth make software versions a difficult cost and schedule justification
- Imperative to leverage consumer products and technology
- Emerging tactical radio model today is a hybrid of software-defined and hardware implementation





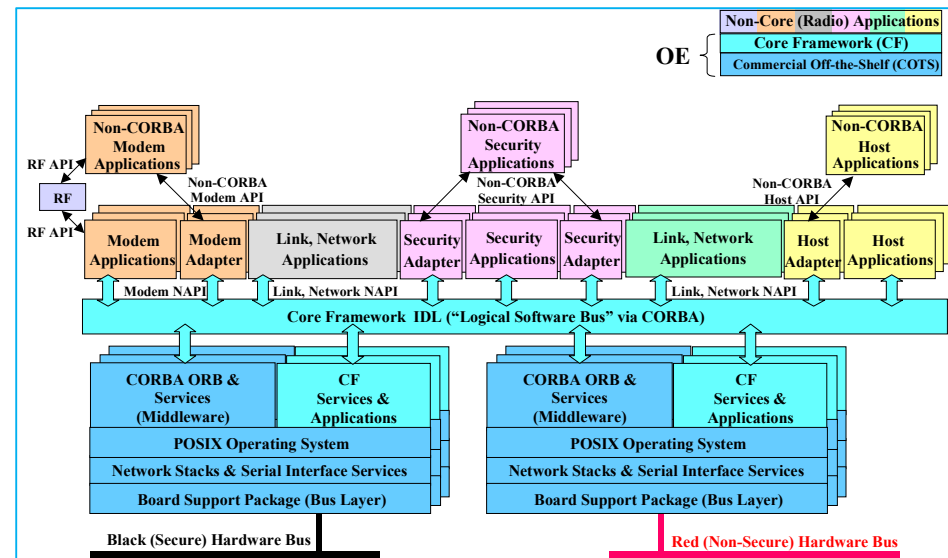
# Something Missing



The Software Communications Architecture (SCA) was an early product of the Joint Tactical Radio System (JTRS) program, with SCA 0.1 released December 1, 1999.

It was a software-centric vision, with the idea that hundreds of reusable components could be dynamically linked together to form applications and waveforms.

## Original SCA



This radio architecture is missing three emerging features:

- Support for commercial hardware modules/Application-Specific Integrated Circuits (ASICs)
- Support for commercial waveforms
- Support for software defined networking

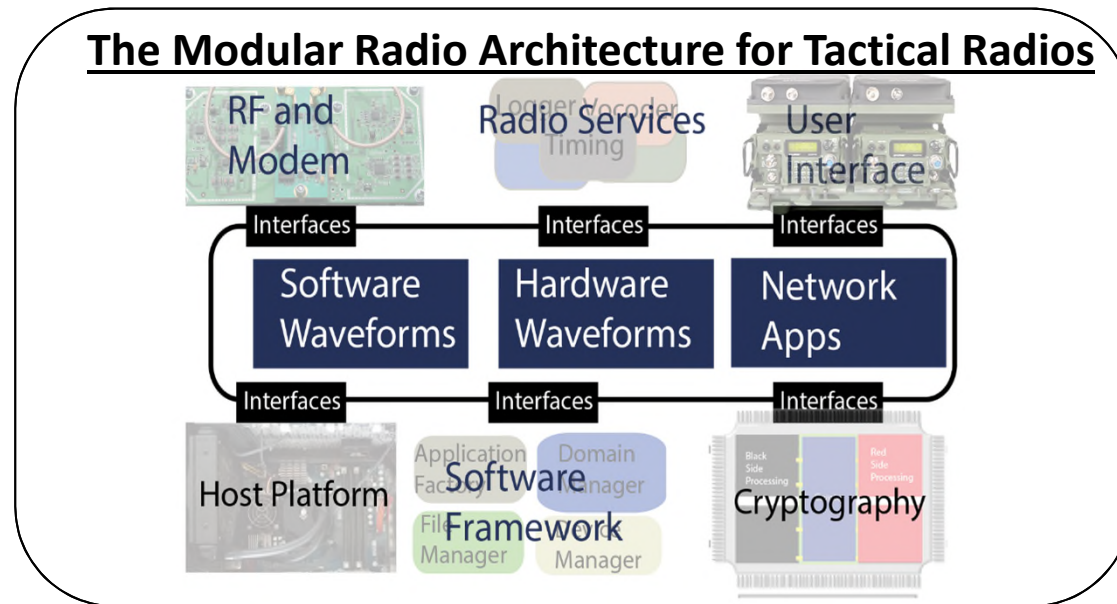


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# Extending Radio Capabilities

## The Modular Radio Architecture for Tactical Radios

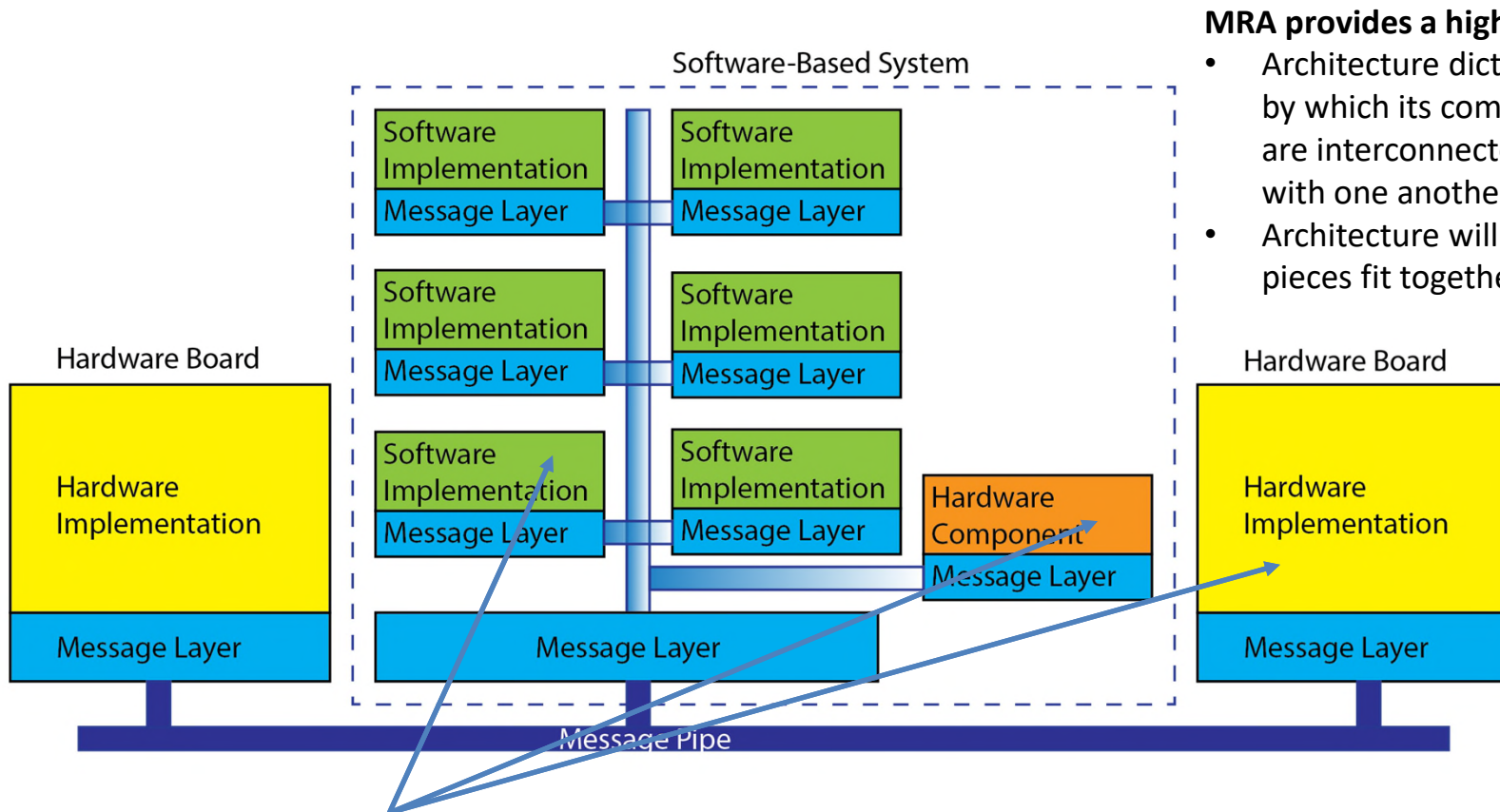


Modular Radio Architecture (MRA) expands radio capabilities

- Provides architectural freedom for multiple approaches to interoperability
- Addresses tactical radio emerging scenarios (e.g. HW waveforms)
- Establishes Open Systems Architecture bounds for the integration of commercial technology (e.g. NDI WFs)
- Aligns with multiple acquisition strategies
- Amorphous radio
- Allows for extensions
- Partner and coalition interoperability



# Message View of MRA



## MRA provides a high level architecture

- Architecture dictates the manner by which its component elements are interconnected and interface with one another
- Architecture will articulate how the pieces fit together

## Individual implementations

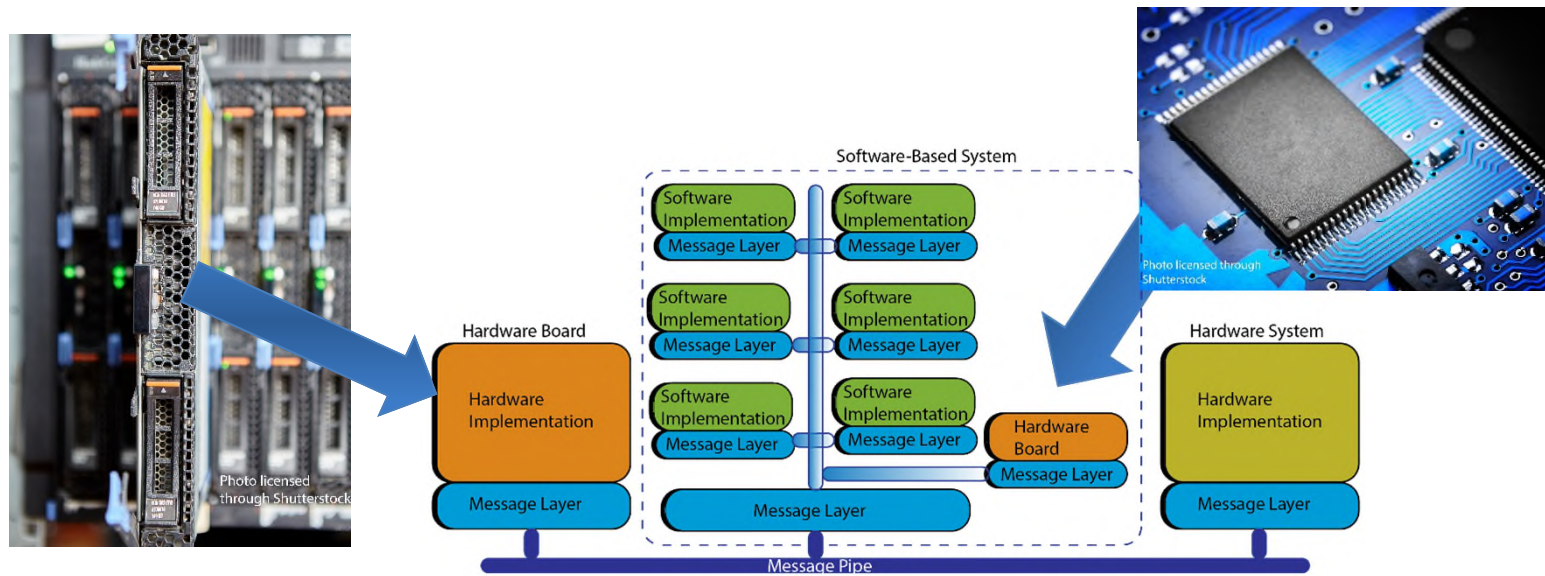
- May be governed by architectures that exist in concrete solutions (e.g. HW waveform on a card or NDI waveform)
- May be developed in accordance with standardized frameworks or de-facto standards
- Multiple approaches may exist within the same platform



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# Two Flavors of Hardware Waveforms



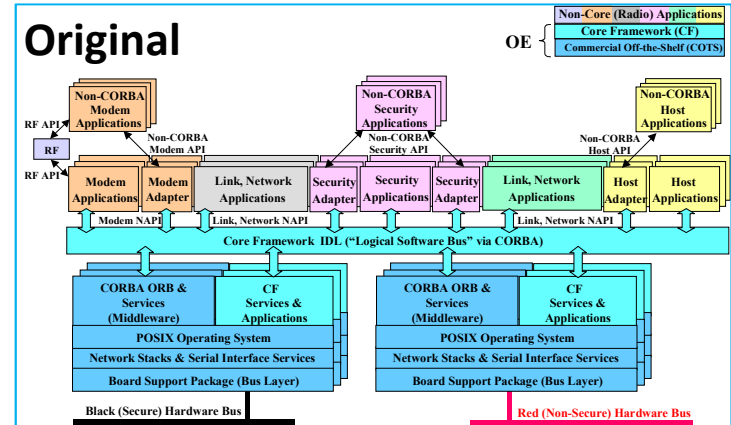
- MRA supports waveform cards
- MRA supports ASIC waveforms



# Modular Radio Architecture vs Current Deployment

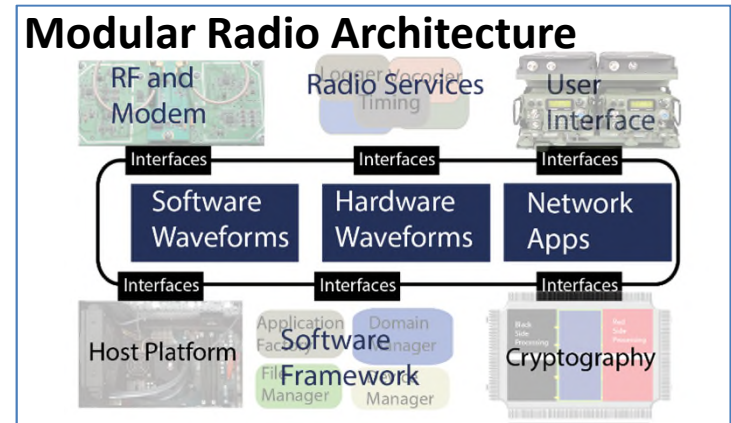
## Original Architecture:

- Focused on lower-level individual software component reuse
- Never achieved reuse of waveform components



## Modular Radio Architecture:

- Software Defined Radio (SDR) is no longer the focus
- Radio has become an edge network device
- A hybrid hardware/software mix of waveforms is supported
- Better utilization of commercial technology
- Allows commercial modules such as LTE and Iridium
- Elevates focus and concern to waveforms and network applications
- Interfaces at a higher, waveform, and module level
- Incorporation of software networking allows endpoint protection and pushes cyber protection to the tactical edge

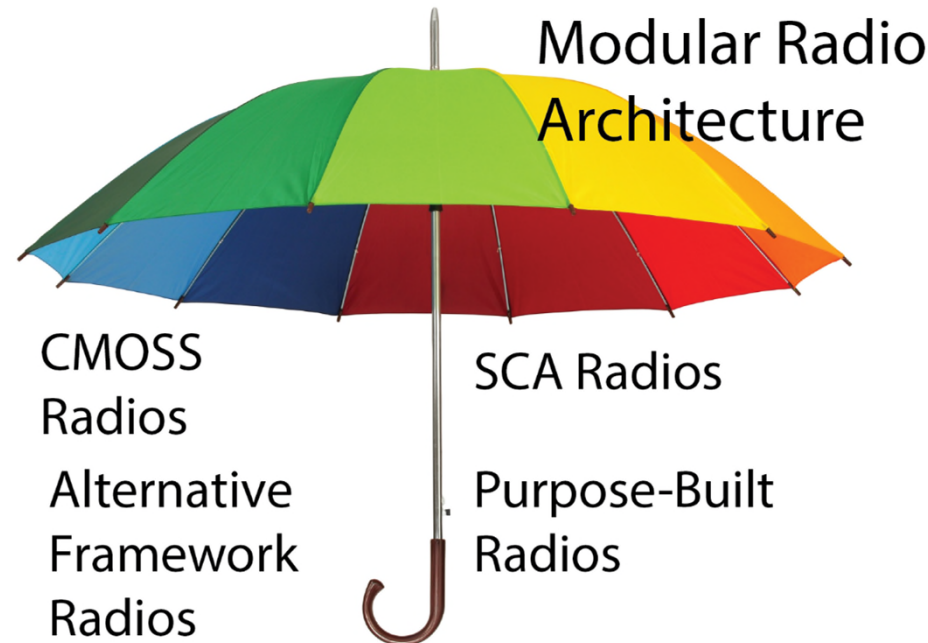




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# Modular Radio Architecture Provides Additional Implementation Options



- Modular Radio is a reference architecture that provides additional options for implementing a radio
- Intent is to define a template for radios rather than a solution such as the SCA





## Current Status

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- DoD stakeholders briefed and onboard
- WINNF MRA project established and running