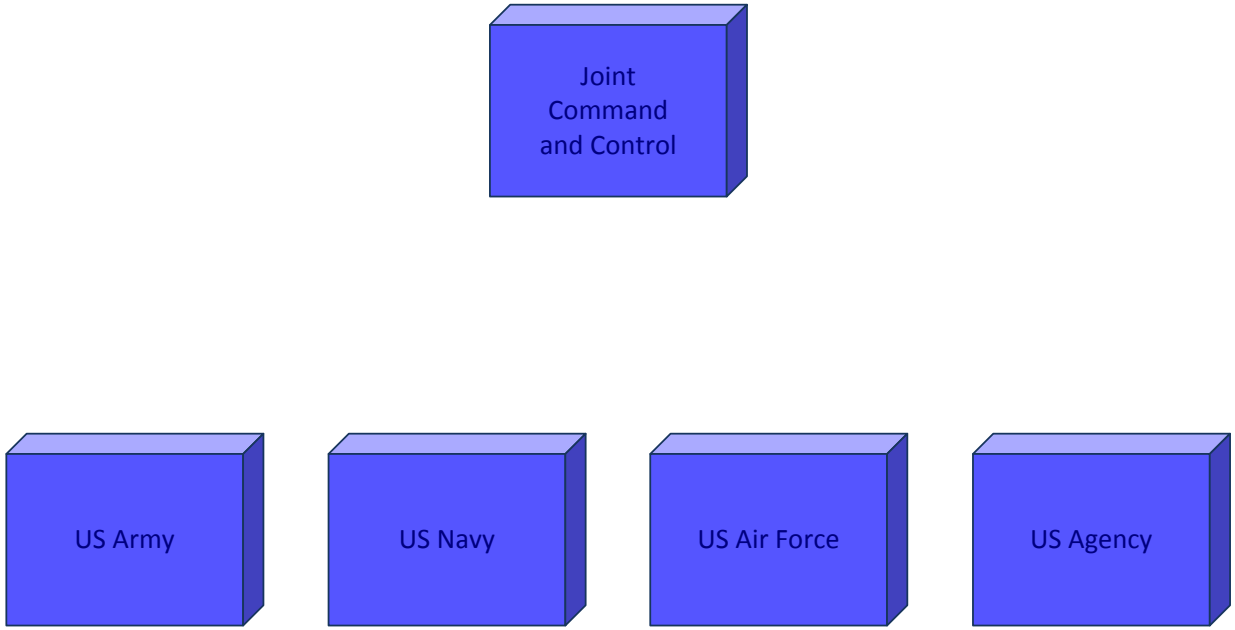
Architectural Approach to Achieve Interoperability in Heterogeneous Wireless Hardware Systems

Howen Fernando
DoD Waveform Standards
02 December 2017

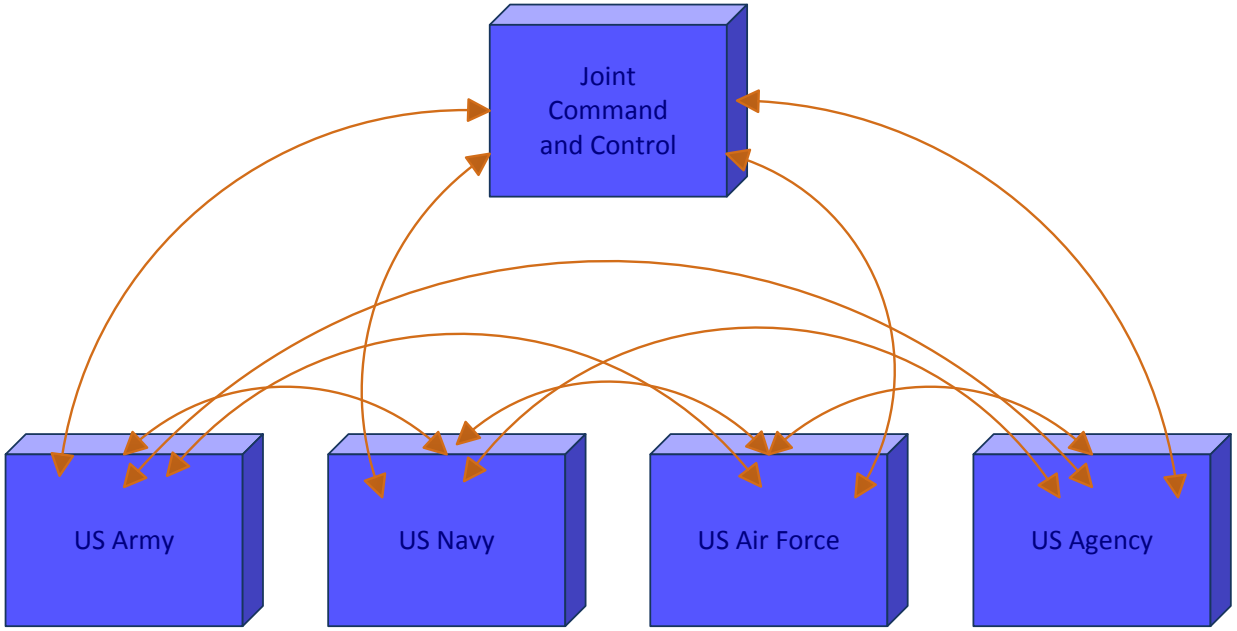
Outline

- Military Scenarios
- Open Systems Architecture (OSA)
  - Examples
- Software Architecture
- Hardware Architecture
- Beyond Interoperability
- Q&A

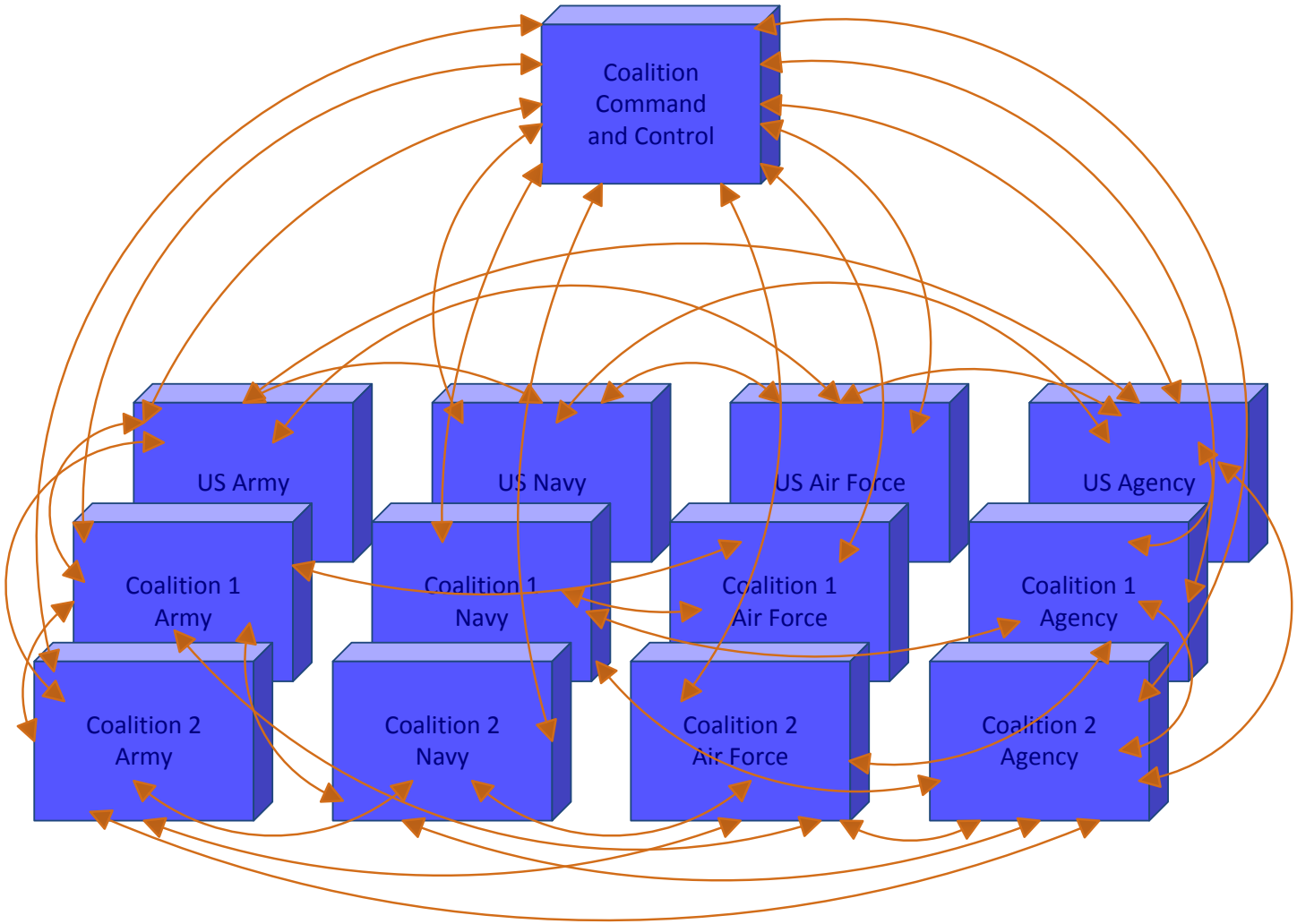
US Military Scenario



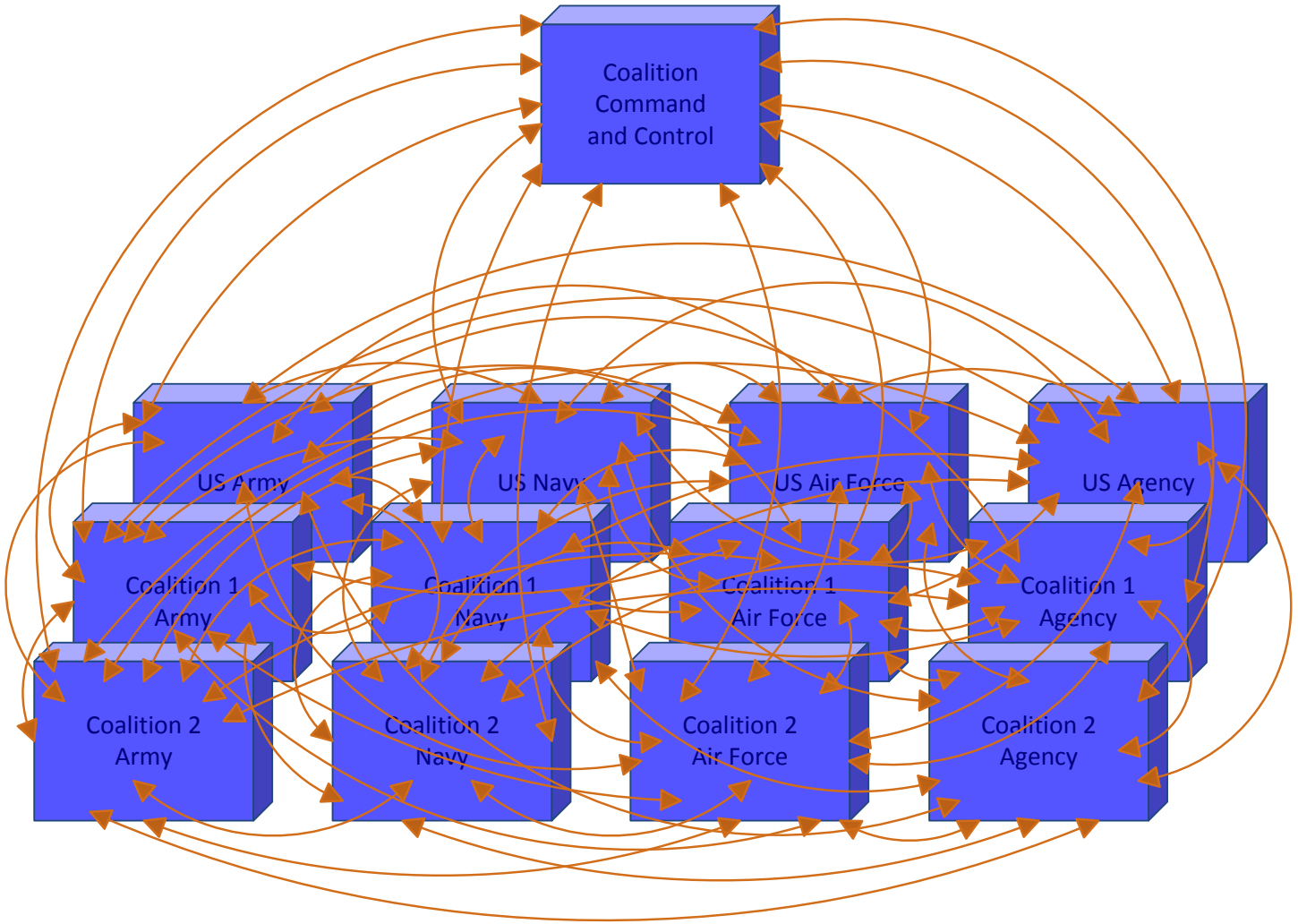
US Military Scenario



Coalition Military Scenario



Coalition Military Scenario



Open Systems Architecture (OSA)

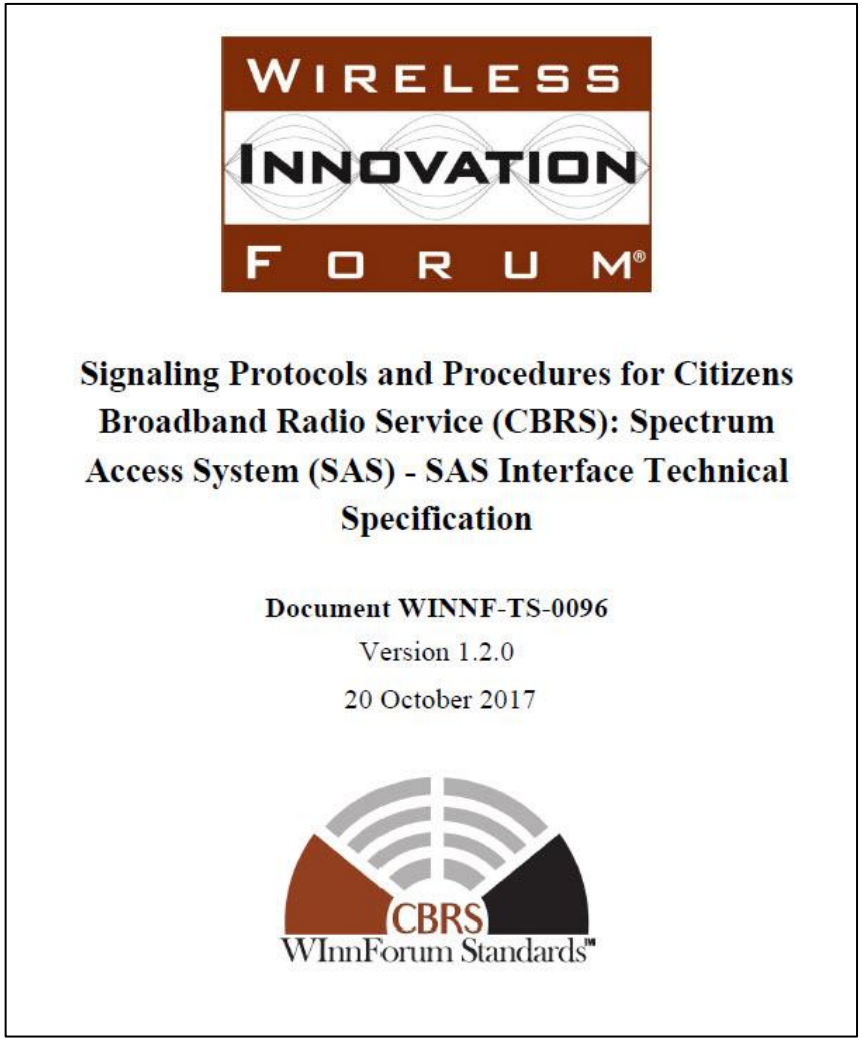
- Open Systems Architecture (OSA) is consensus-based integrated business and technical approach to acquire and assemble interoperable components using modular systems design.

- OSA considers interoperability through the entire life cycle of a system. Systems must be interoperable from the time they acquire and define their components, interfaces, and standards through the end of life and decommissioning.

- Controlled and consistent interfaces enhance the interoperability of components. Interfaces should be controlled, monitored, and published to clearly and fully define all inputs and outputs of a component.

https://www.dau.mil/cop/mosa/Pages/Topics/Terms-and-Definitions.aspx

Spectrum Sharing and Dynamic Spectrum Allocation



WIRELESS INNOVATION FORUM®

Signaling Protocols and Procedures for Citizens Broadband Radio Service (CBRS): Spectrum Access System (SAS) - SAS Interface Technical Specification

Document WINNF-TS-0096

Version 1.2.0

20 October 2017

CBRS
WInnForum Standards℠

Software Communications Architecture

SOFTWARE COMMUNICATIONS ARCHITECTURE
SPECIFICATION

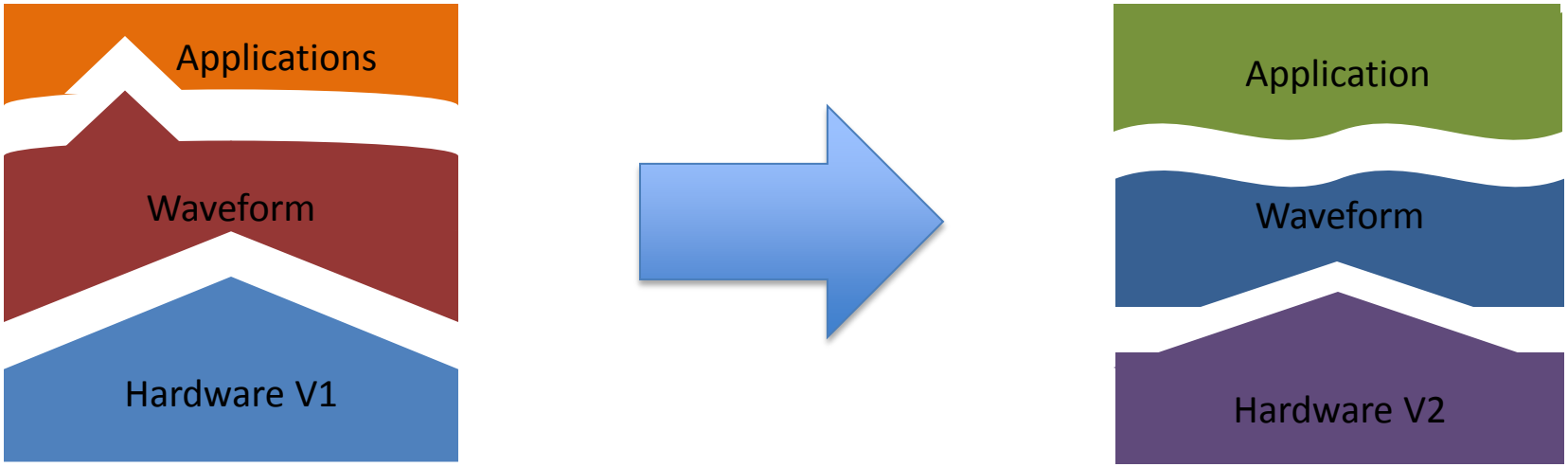
20 August 2015
Version: 4.1

Prepared by:

Joint Tactical Networking Center (JTNC)
33000 Nixie Way
San Diego, CA 92147-5110

Distribution Statement A - Approved for public release; distribution is unlimited (27 August 2015)

Interoperability without OSA

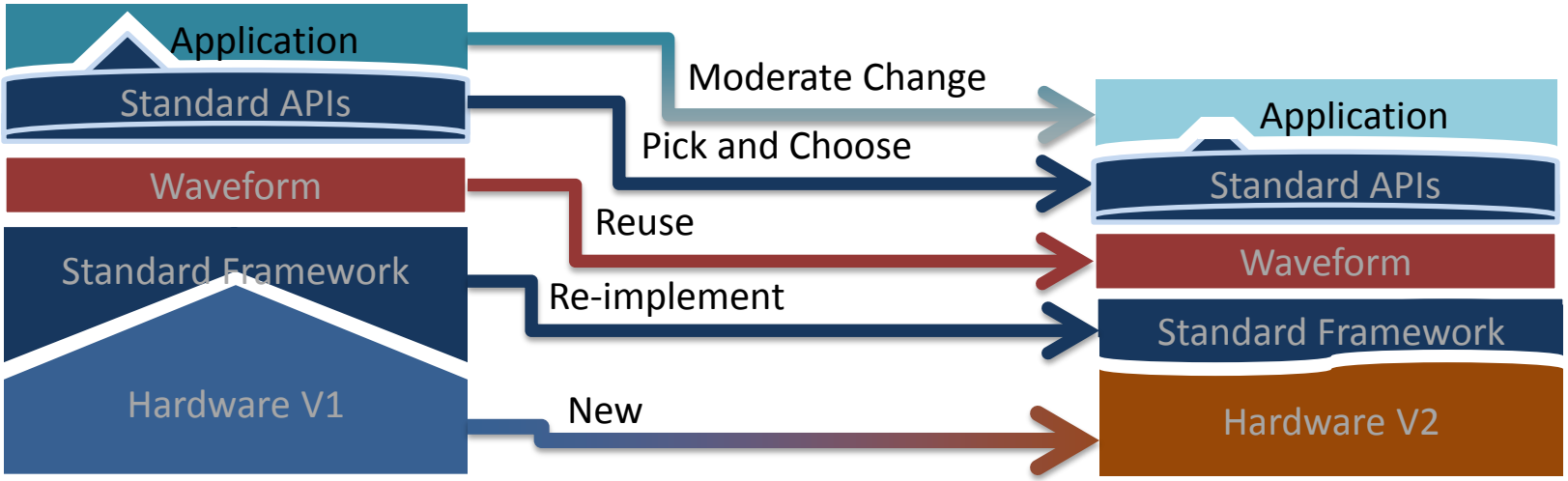


Hardware Versions – **Unique** physical system

Waveform – **Unique** Implementation communications sub-system software

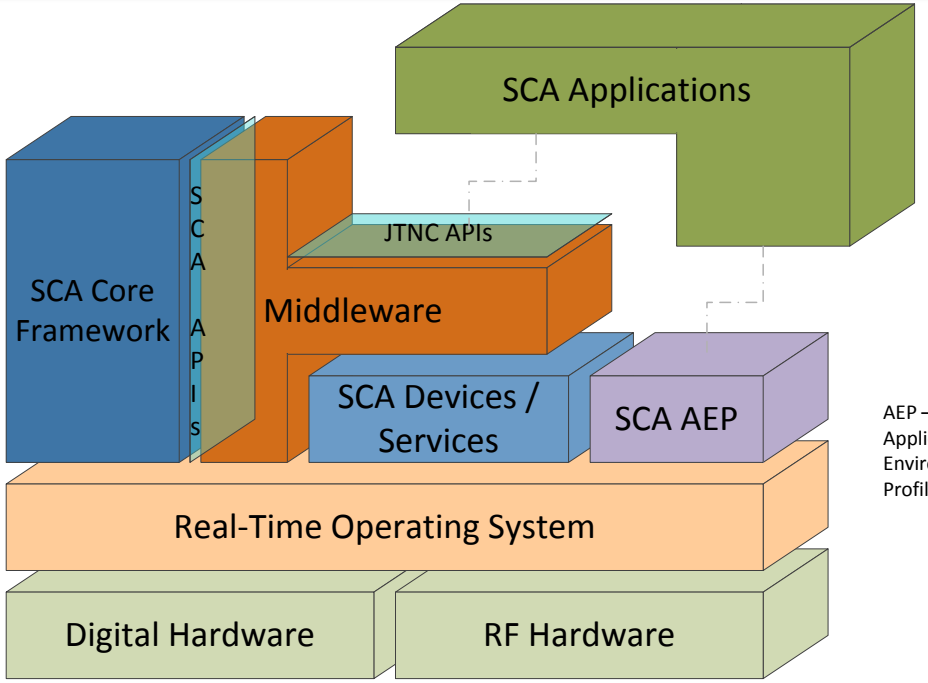
Applications – **Unique** system software (Display, map, plots, sensor interface, processing algorithms)

Software Interoperability through Open Standards



Software Communications Architecture (SCA) 4.1

- The SCA is an open architecture framework that defines a standard way to deploy, instantiate, configure, and manage components running on a platform
- The SCA separates waveform software from the underlying hardware platform, facilitating waveform software portability and re-use
  - Avoids costs of redeveloping waveforms



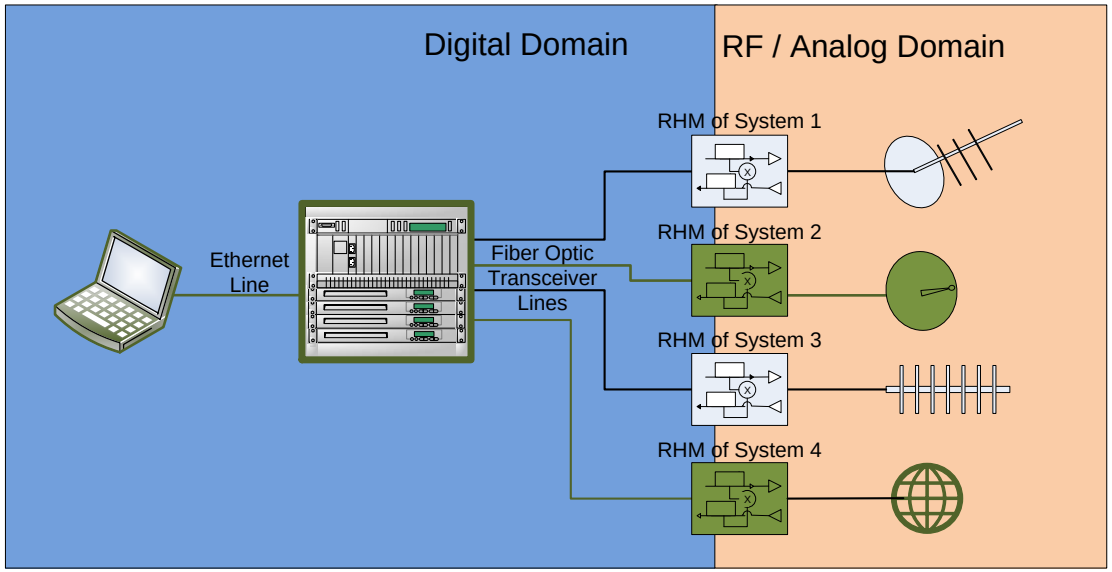
AEP – Application Environment Profile

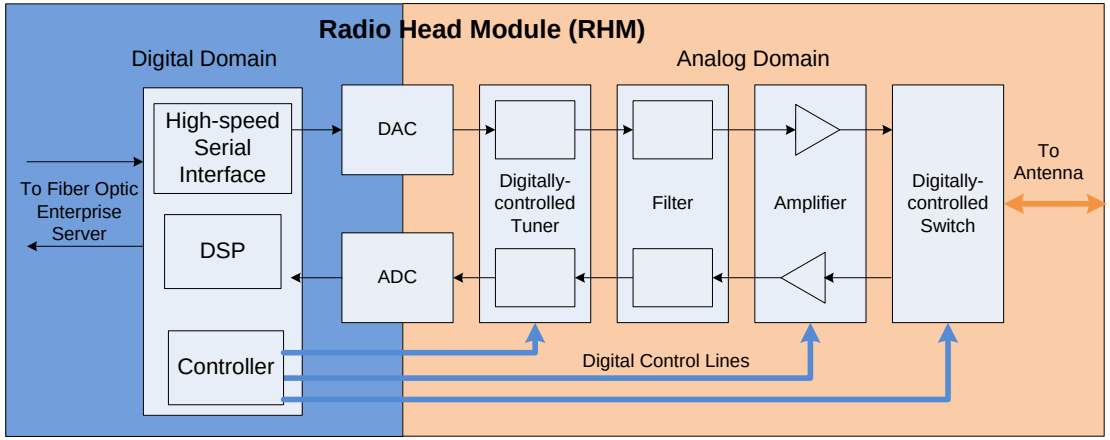
- The SCA is to Software Definable Radios (SDRs) what a “Windows” operating system is to a personal computer
  - Microsoft Outlook can be installed on HP, Dell, Lenovo, etc., computers with the Windows operating system
  - Similarly an SCA waveform can be installed on SCA radios from many different vendors
  - Like new versions of “Windows” the SCA has evolved to incorporate technological advancements and address emerging cyber threats for SDRs

Other Benefits of SCA

- Affordability
- Cyber Hardening
- Smaller Radios
- Longer Battery Life
- Faster Boot up
- Future-proofing
- Better Connections with External Devices such as Android

Hardware Architecture - Enterprise Architecture





- Enabled by SCA
- Interoperability from SCA perspective
- Brute Force Interoperability
- Examples
  - InTop (Navy)
  - MORA (Army)
  - SOSA (Open Group)
- Other Benefits
  - Network Management
  - Spectrum Management

Questions?

Joint Tactical Networking Center
33000 Nixie Way
Building 50, Suite 339
San Diego, CA 92147
JTNC_Public_Affairs@navy.mil
http://www.public.navy.mil/jtnc/