Standardizing On A Set Of Radio Set APIs To Ensure Waveform Portability

Glenn Fogarty

Embedded Software Engineer
The Boeing Company, Anaheim, CA
glenn.a.fogarty@boeing.com
(714) 762-0137

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Waveform Application Portability Is The Goal

- Many Implementations Of Software Defined Radio (SDR) Platforms
  - Only One Implementation Of The Waveform Application
- Cost Is The Main Driver
  - Develop The Waveform Application Only Once
  - Minimize or Eliminate The Porting Effort

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The Current Software Communications Architecture (SCA) Standard Focuses On Component Standardization

- Base Application Classes
  - Resource
  - Resource Factory
- Restrictions On ORB And CORBA Services Usage
- Application Environment Profile (AEP)
  - Similar To POSIX PSE 52 Profile

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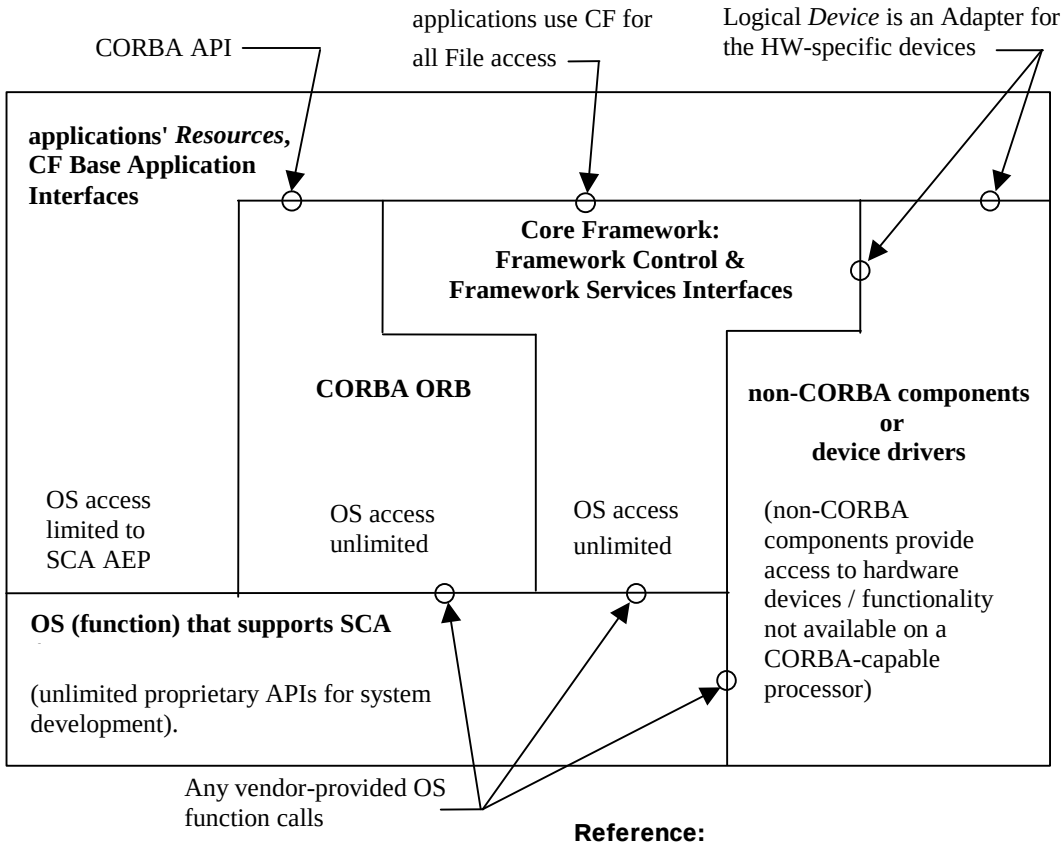
The Notional Relationship Of Operating Environment (OE) And Application To The SCA AEP



Reference:

Software Communications Architecture (SCA) Specification

Document #: MSRC-5000SCA Version 2.2

Dated: November 17, 2001

The Software Defined Radio Platform Presents A New Set Of Dependencies

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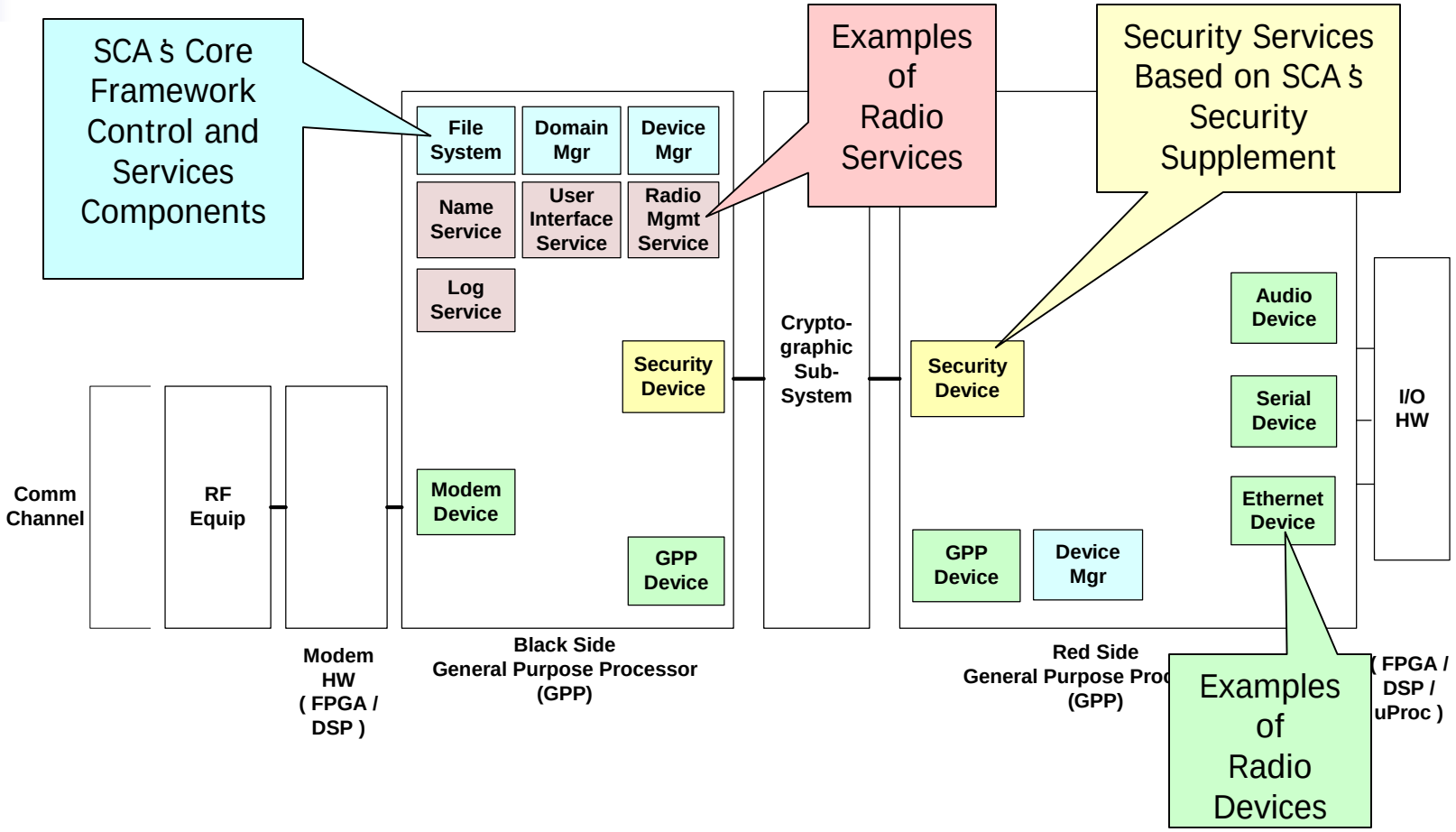
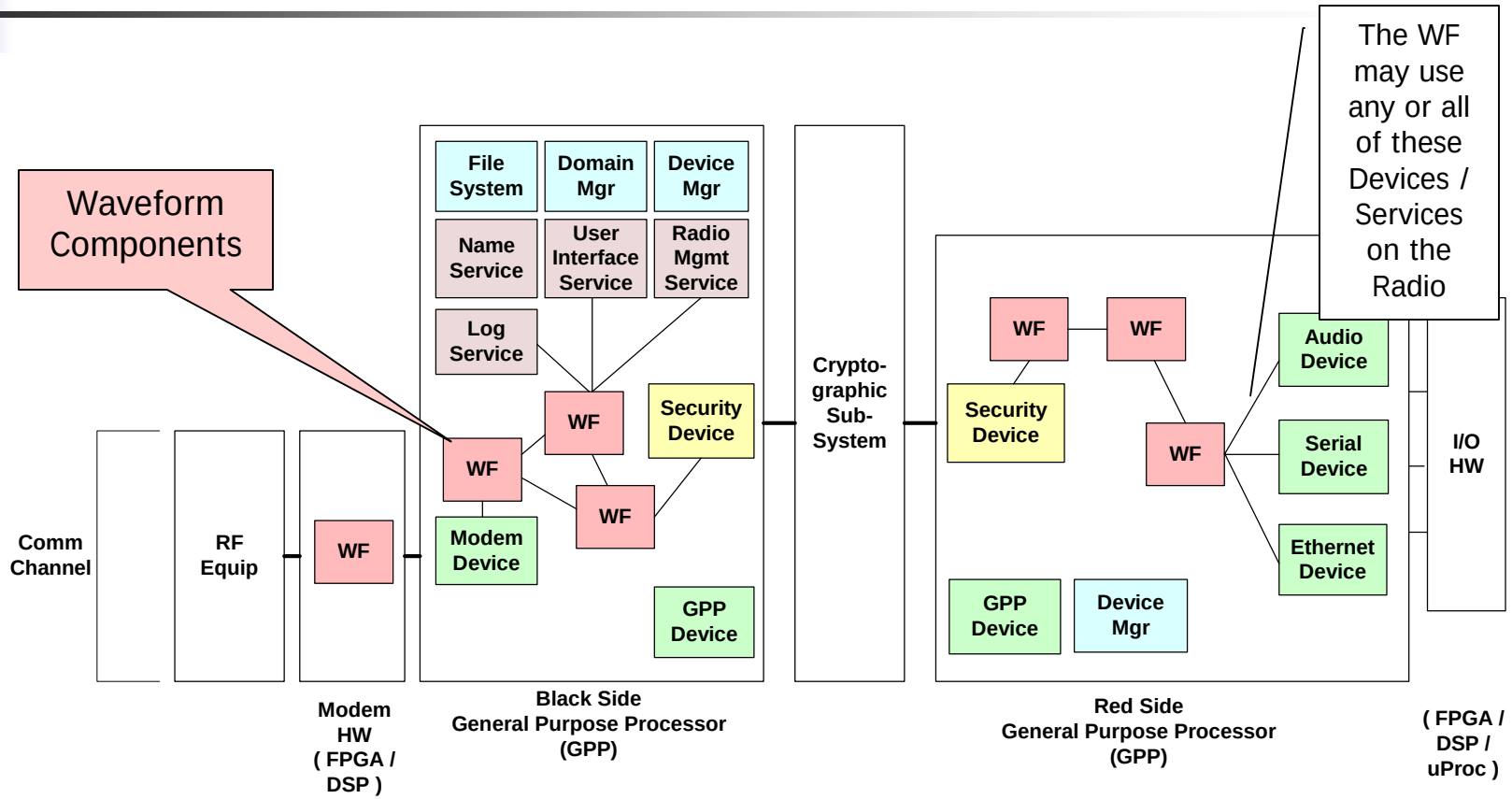
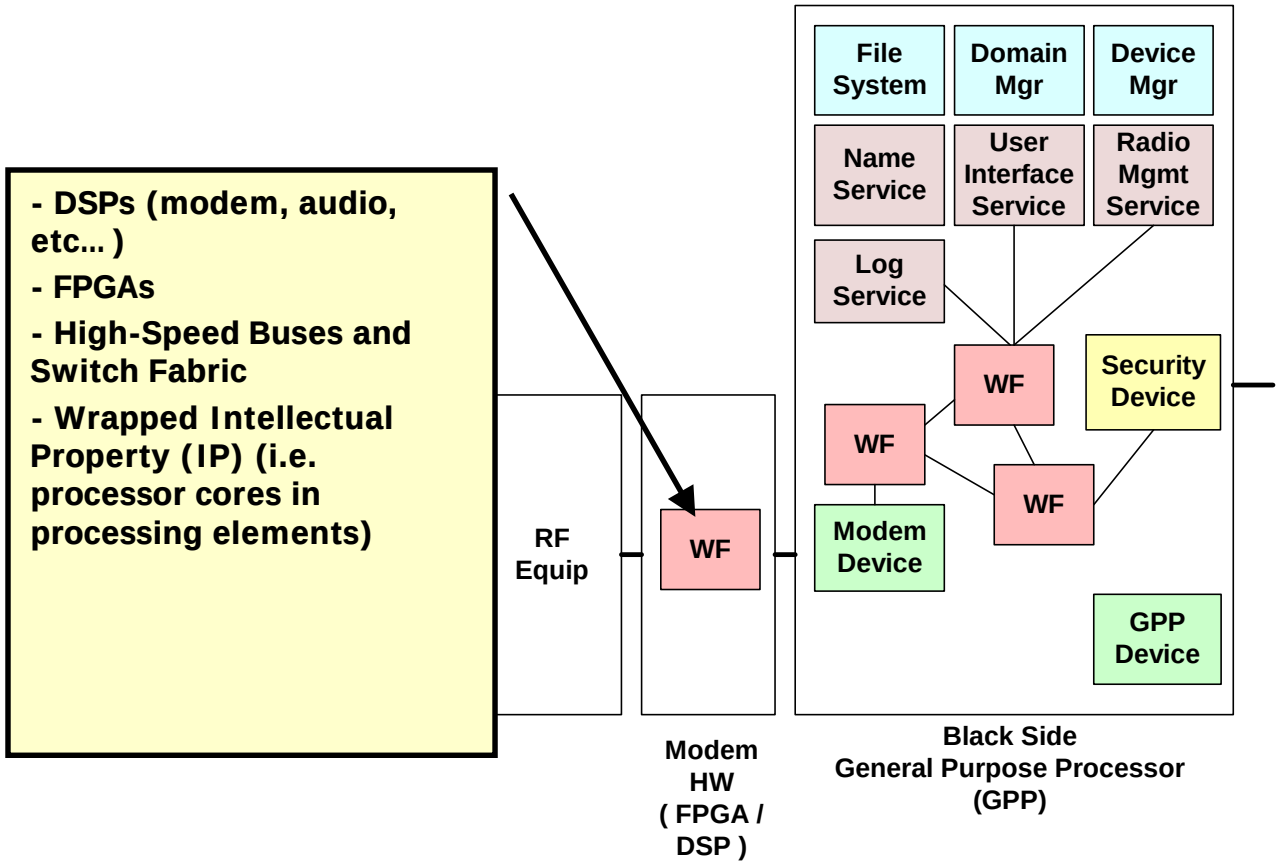
The Operating Environment



Deployment Of The Waveform Application On The Radio Increases The API Exposure



Other Radio Dependencies – Specialized Hardware

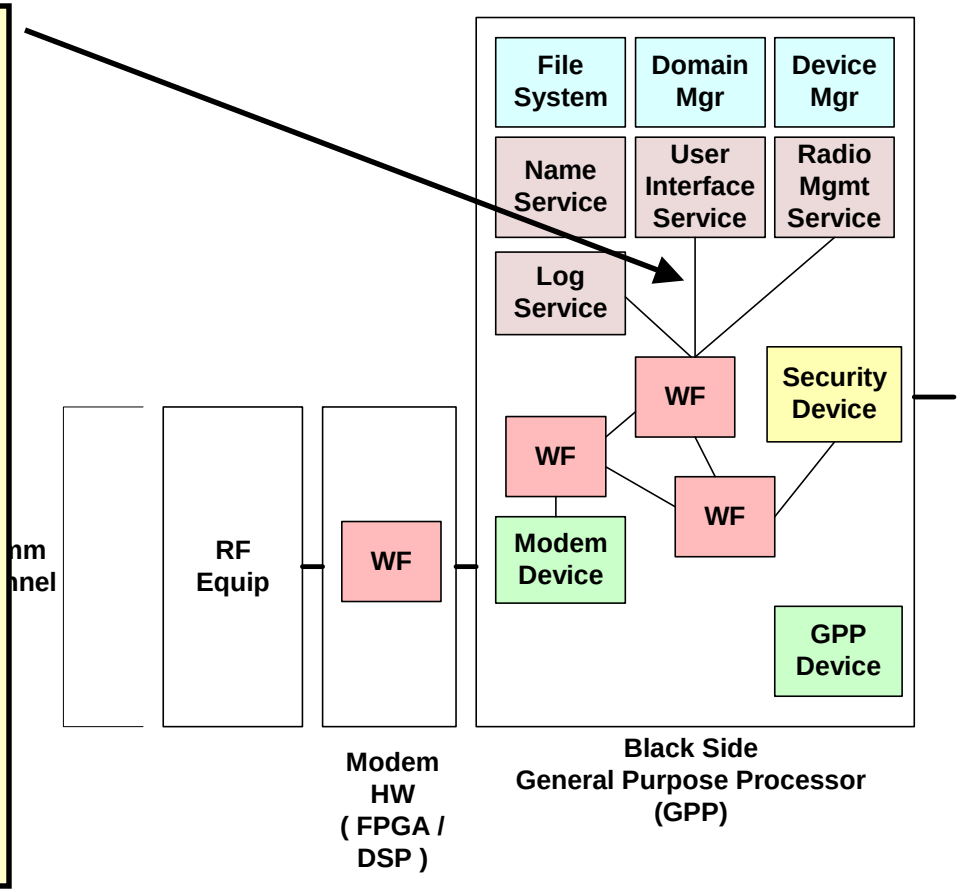


Some Other Radio Dependencies – That Are Not So Obvious

This connection may be perceived as a platform specific dependency.

User Interfaces (UI) like Web Browsers, Multi-Function Displays, etc, … may be considered specific to the platform that is hosting the radio

Even the connection to the Radio Mgmt Service may be considered platform specific



What's Being Done To Promote Waveform Portability?

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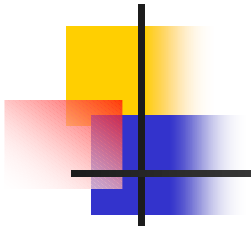

Methods To Achieve Portability

- Limit API Exposure
- API Standardization
- Standardizing On HW Abstraction Layers
- Platform Abstraction Layers
- Personality Control Modules

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Limit API Exposure

- Allowed
  - Modem Device
  - Audio Device
  - Serial Port Device
  - Ethernet Device
  - Log Service
  - …
  - …
- Not Allowed / Restricted Interfaces
  - Security Device
  - Name Service
  - Radio Mgmt Service
  - User Interface Service
  - …
  - …

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API Standardization

- SCA API Supplement
  - API Building Blocks
  - Guidelines For Specifying IO, MAC, LLC And Other Networking Layer APIs
- SCA Security Supplement
  - Security Services APIs
- Reference: http://jtrs.army.mil
  - Look Under Hot Links – SCA And Then SCA 2.2

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API Standardization (cont)

- DOD
  - SCA API Portal
    - API repository for DOD radio programs
    - Approved APIs for use on DOD programs
    - Reference: https://jtel-sca.spawar.navy.mil/
- Industry Wide
  - OMG's Software-Based Communication Domain Task Force
    - "PIM and PSM for Software Radio Components" – document reference: dtc/04-05-04
    - Reference: http://sbc.omg.org/

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Hardware Abstraction Layers (HAL)

- Modem HAL (MHAL)
  - FPGA, DSP, RF Control
- Audio HAL
  - FPGA, DSP, CODECs, Tones, Alerts
- HAL Working Group (SDR Forum)
  - Reference:
    http://www.sdrforum.org/tech_comm/halwg.html

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Hardware Abstraction Layers (HAL) – (cont)

- Specialized Hardware Supplement (SHS)
  - Part Of The Upcoming SCA 3.0 Work
  - HAL-C – Connectivity Infrastructure Between Processing Elements (PE)
  - DSP OS - AEP
  - Standard Waveform Functional Blocks
  - Reference: http://jtrs.army.mil
  - Look Under Hot Links – SCA And Then SCA 3.0 Extensions

Other Approaches To Reducing Platform Dependencies

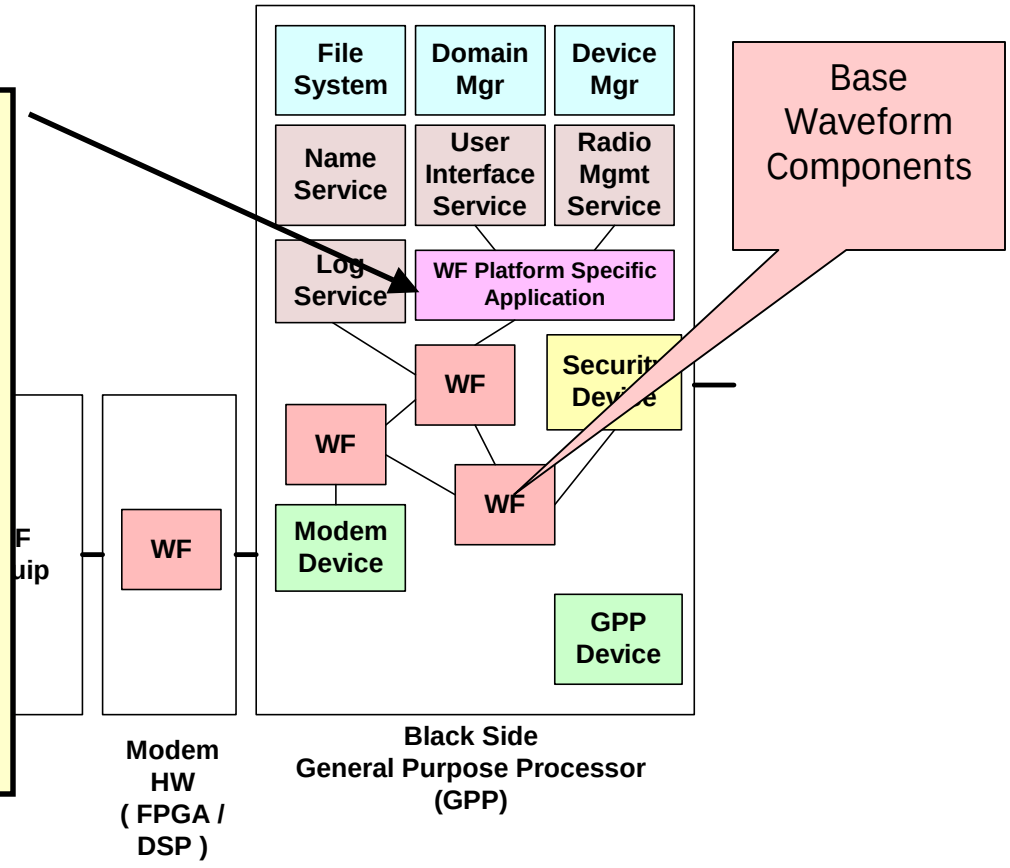
- Platform Abstraction Layers
  - Waveform Platform Specific Application
    - inserts a layer between the waveform proper (sometimes referred to as the base waveform) and the platform/radio services
    - handles unique message processing for interfaces like 1553 and HTML

Platform Abstraction Layer

Insert a Platform Abstraction Layer between the Base Waveform Application and the Platform Services.

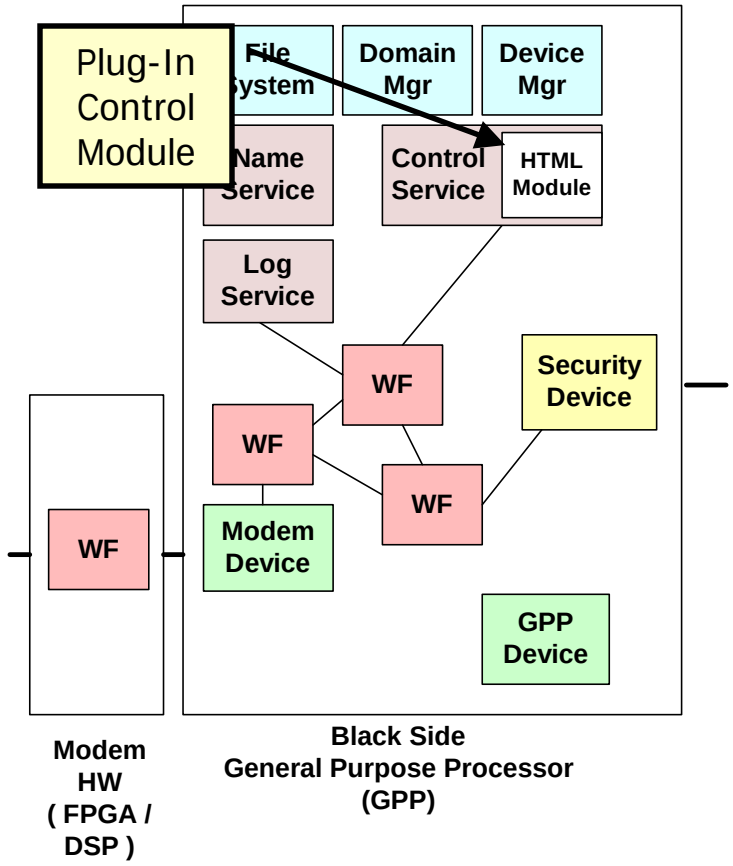
The WF Platform Specific Application is implemented as a separate Application that is launched first and then connected to the Base Waveform Application.

When the Base Waveform Application needs to run on another radio, only the WF Platform Specific Application needs to be ported.



Personality Control Modules

- The Waveform Application Connects To A Standardized Control Service
- The Control Service Acts Like a Loadable/Executable Device That Has Different "Personality" Modules (or Plug-Ins) For Processing Different Types Of Control Messages
  - HTML Module
  - 1553 Module
  - SNMP Module
- Modules Are Loaded Based On The Platform Needs



Conclusion

- FACTS:
  - While The API Standardization Process May Be Slow In Coming, APIs Are Being Created Now And Being Used Now On All Software Radio Programs
  - Standardization Work Is Also Actively Occurring In Other Non-CORBA Areas Of The Radio
- The Standardization Process May Be An Evolution Of APIs That Are Viewed As Best-Of-Breed
- DOD Based Radios May Lead The Way Since The Need For Standard APIs Will Be Schedule Driven

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