ESSOR

European **S**ecure **SO**ftware defined **R**adio

Waveform Portability Panel

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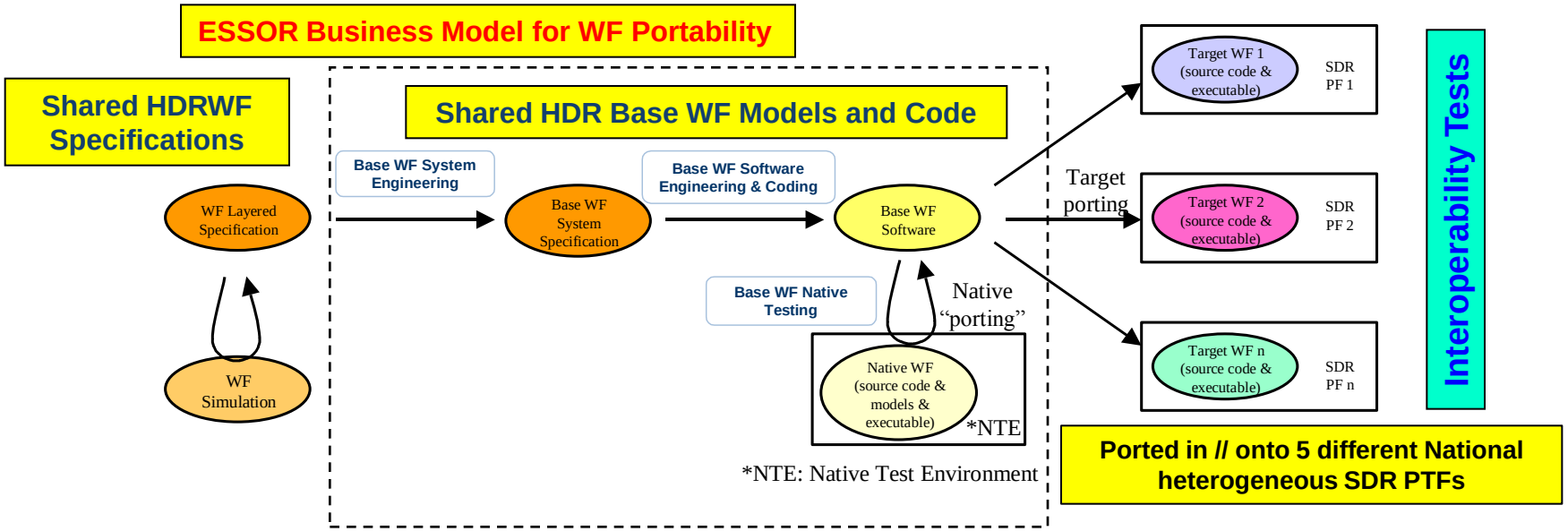
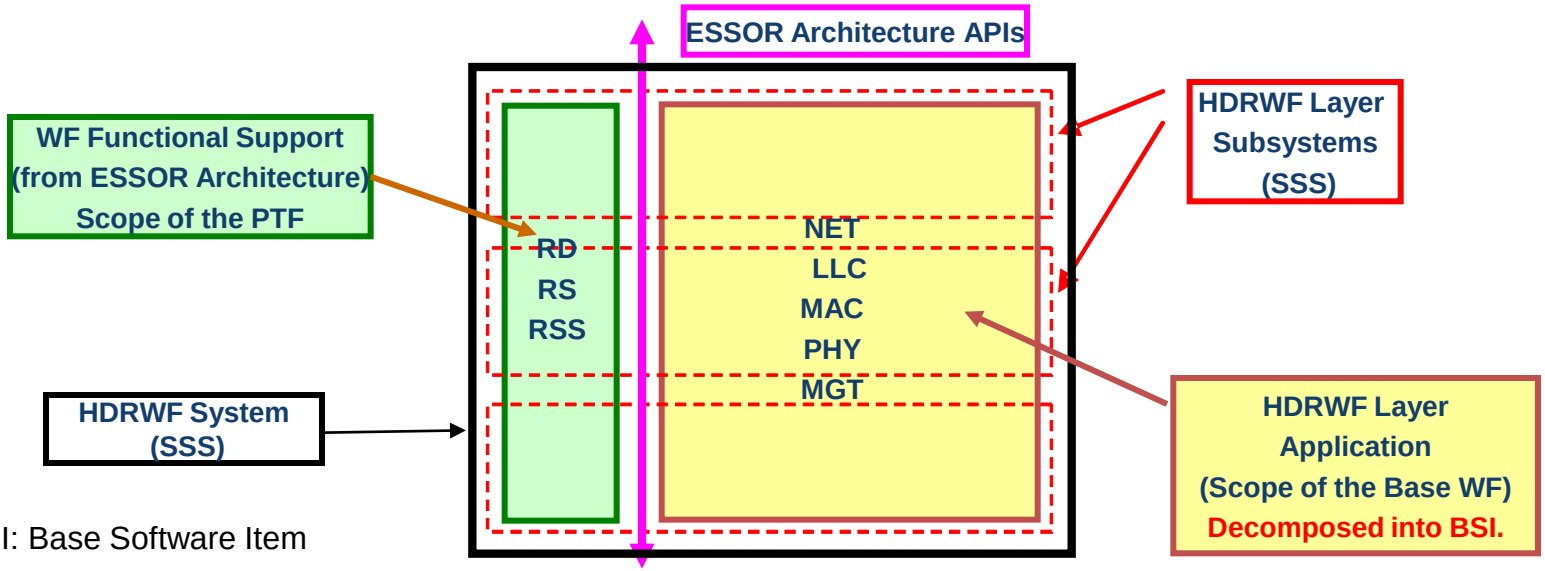
ESSOR WF Portability Model (HDRWF)

- Documented into the **ESSOR Base WF Methodology for Portability**
  - Differentiate **Portable HDR Base WF** from **Optimized Ported HDR Target WF**
- HDR Base WF is the **Portable Software** for **Heterogeneous SDR Platforms**
  - HDR Base WF is developed using the ESSOR Architecture APIs
  - HDR Base WF is jointly developed by the 6 ESSOR National Champions
  - HDR Base WF is specifically validated on Native Test Environment (NTE)
- Key point: **Which level of Heterogeneity is targeted** ?
  - More the Heterogeneity will be, more the Portable Software shall be modular and abstracted



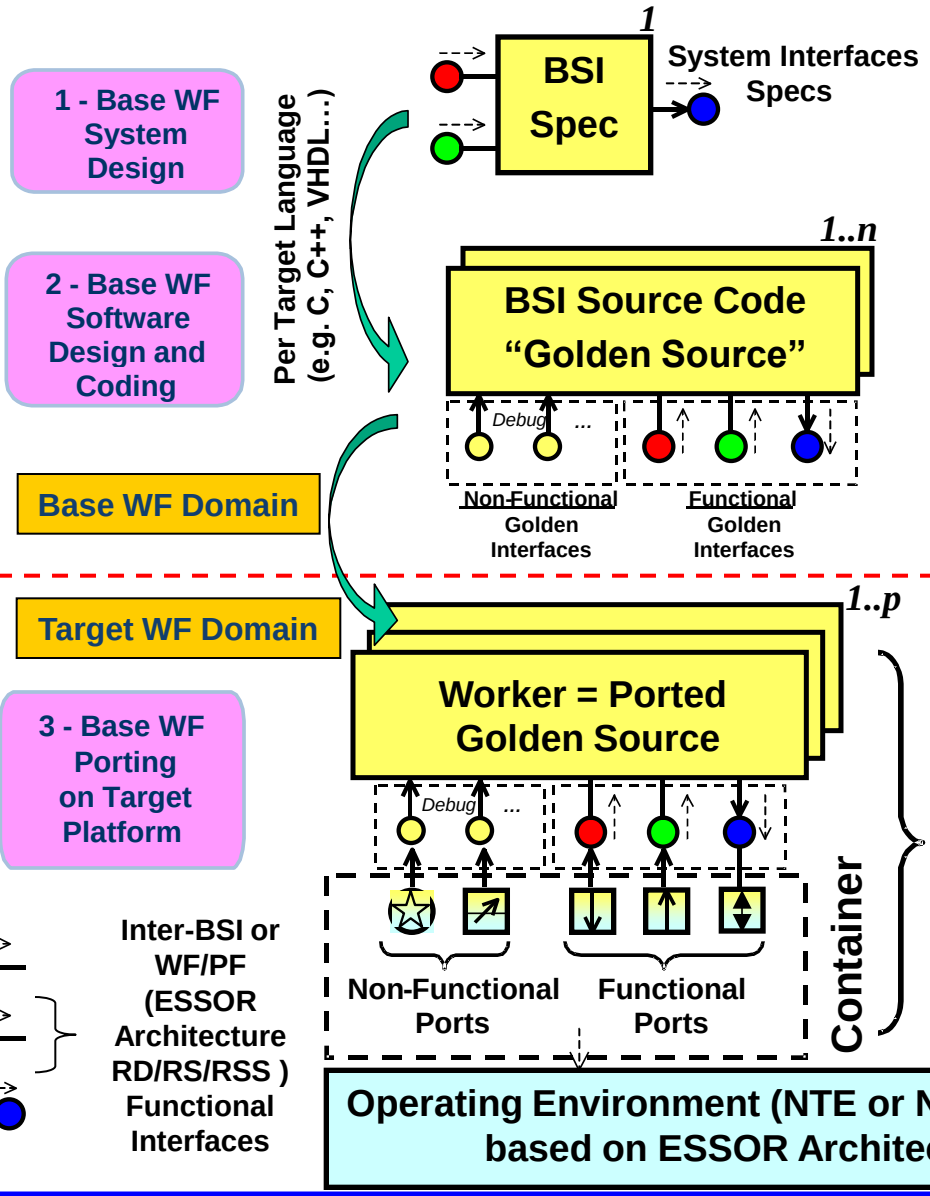
ESSOR WF Portability Model (HDRWF)

- ESSOR HDR Base WF / PTF Partitioning based on ESSOR Architecture
- The HDRWF system functionalities are partitioned between
  - WF Functional Support – Scope of the PTF
    - Implements the selected features of the ESSOR Architecture (according to RD, RS, RSS)
  - WF Layer Application – Scope of the Base WF (decomposition into BSI)
    - BSI(*) granularity is driven by the heterogeneity of the targeted PTFs (DSP, FPGA, GPP)
    - Impact of Security Architecture (Red / Black separation)
    - Impact of Abstraction of RF Front-End features
    - Test Environment/ Test Scenarios for validating the Base WF



(*) BSI: Base Software Item

ESSOR Base WF Methodology for Portability



- Portability-focused
  - Separates the stable functional software (the Worker / Golden Source) from platform-dependent software (the Container)
- Key methodological principles
  - System / Software Definitions isolation
  - Separation of Concerns
  - Model Driven Architecture (CIM/PIM/PSM)
- Covers the complete Base WF dvlp. cycle
  - System Design, Software Design and Coding, Native Verification
  - Coding Rules derived from "*Joint Strike Fighter Air Vehicle C++ Coding Standards*"
  - Assessment of required processing power and memory footprint.

- HDR Base WF split in Base Software Item (BSI)
- BSI Language (C++, C, VHDL) depends of targeted PE (GPP, DSP, FPGA)
- Target Component groups Workers and Container
  - Worker (Ported Golden Source) can use specific libraries or accelerators
  - Container includes the code specific to each Target Platform (OE functionalities: connectivity, RTOS, timers, … RD, RS, RSS)

ESSOR HDR Base WF Key Figures

- HDR Base WF split in Base Software Item (BSI)
- BSI Language (C++, C, VHDL) depends of targeted PE (GPP, DSP, FPGA)

- PHY Layer BSI Q=16
  - BSI for DSP only: Q=4
  - BSI for FPGA only: Q=2
  - "Dual" BSI: Q=10
    - Developed for both DSP and FPGA
  - Total: 26 specific Golden Sources

- Medium-grain granularity
  - driven by need for Signal Processing SW (C) / FW (VHDL) (***) portability on heterogeneous SDR Platforms made of DSP and FPGA PE (**)

- PROT Layers BSI Q=17
  - MAC, LLC, NET, MGT layers
  - Golden Source: 230K SLoC(*)
  - Containers: 140K SLoC(*)

- Medium-grain granularity
  - driven by need for functional modularity, considering Software portability on multiple GPP PE (**)

(*) SLoC: Source Line of Code; (**) PE: Processing Elements (***) SW/FW: Software / Firmware