



DEFENCE AND SPACE

Context & Objectives

DAHLIA is an answer to the H2020 topic

“COMPET-1-2016: Critical Space Technologies for European Strategic Non-Dependence”

DAHLIA is an **ARM-based System on Chip** implemented in 28nm FDSOI technology designed to boost competitiveness and ensure strategic non dependence of future European Space equipment.

DAHLIA brings to reality what was still a dream few years ago, addressing the new expectations and new mindset of Space industry in a single chip.





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Organization

7 partners from 4 countries involving the main actors of European Space industry

- ST *France*, coordinator
- Airbus D&S *Germany & France*
- Thales Alenia Space *Italy & France*
- ISD *Greece & NanoXplore France*

ESA and CNES are also part of an Advisory Group



AIRBUS

ThalesAlenia
Space
A Thales / Finmeccanica Company

ST
life.augmented

ISD S.A.
Integrated Systems Development

NX
NanoXplore

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DAHLIA

Development Plan

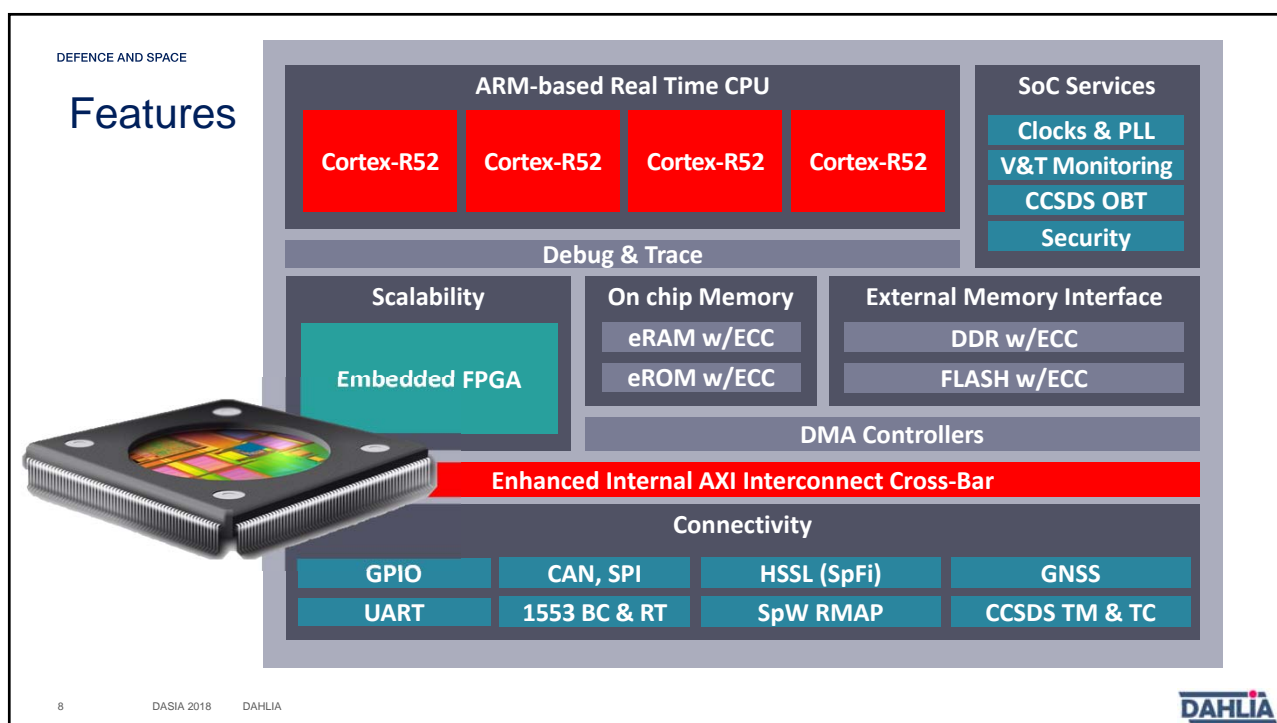
- Kick-Off in 2017
- Development in 2017-2018-2019
- SoC FPGA prototyping end 2018
- DAHLIA prototypes available end 2019



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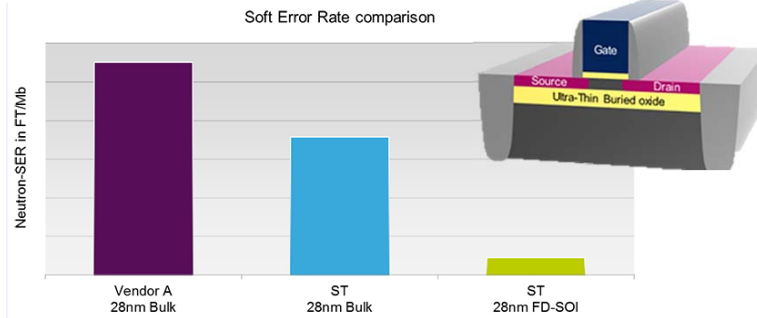
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STM 28nm FDSOI Technology

- Intrinsically immune to Latch-up
- Reduced pitch size providing good dose tolerance
- Very good immunity to SEU

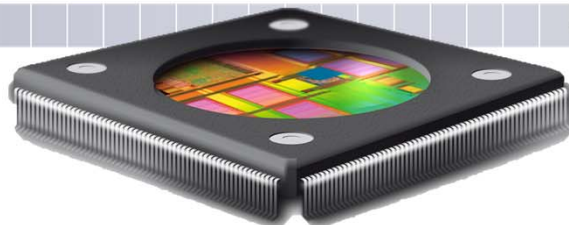


- 28nm FDSOI is combined with RHBD solutions such as Hardened DFF, EDAC on memories or Embedded Configuration Memory Integrity Check (CMIC) for the embedded FPGA

Designed for ultimate performances

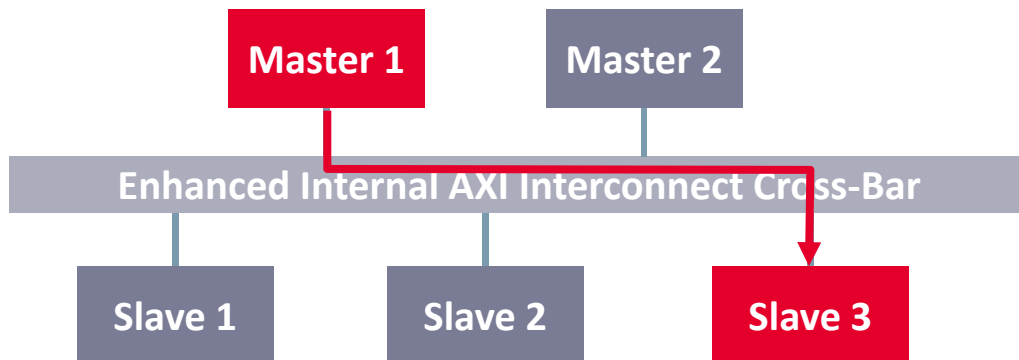


Up to 600 MHz per core with 2.2 DMIPS/MHz → more than 1000 DMIPS per core



Designed for ultimate performances

Optimized Network Interconnect Architecture based on AXI with QoS



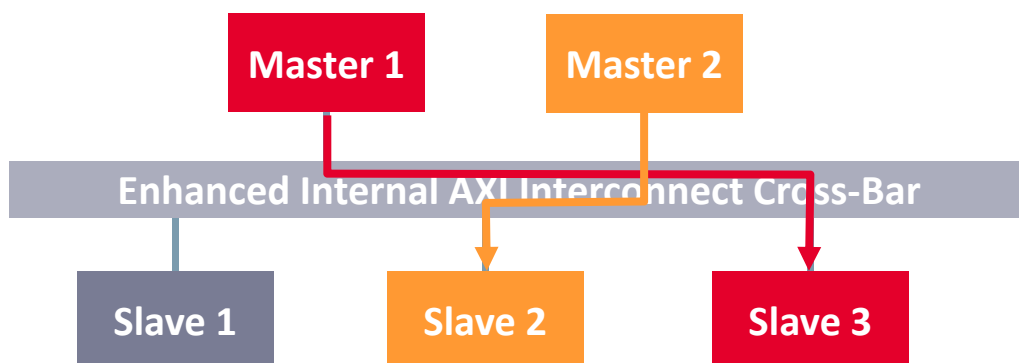
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Designed for ultimate performances

Optimized Network Interconnect Architecture based on AXI with QoS



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DAHLIA Key Features
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Why looking at ARM ?

100 BILLIONS OF CHIPS



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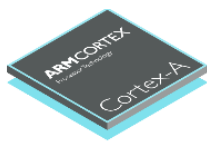
Why looking at ARM ?

- Wide dissemination of ARM CPUs in embedded systems
- Available as an RTL IP Core with full access to source code
- ARM ecosystem
- Code density better than its competitors
- Many development languages
- European technology (UK & FR)
- Low power
- Now focused on safety critical applications with the highest level of certification
- New SW development & environment
- ARM market business plan
- Radiation assessment

ARM®



ARM technology selection



Cortex-A

Highest performance
Optimized for rich
operating systems



Cortex-R

Fast response
Optimized for high-
performance, hard real-
time applications

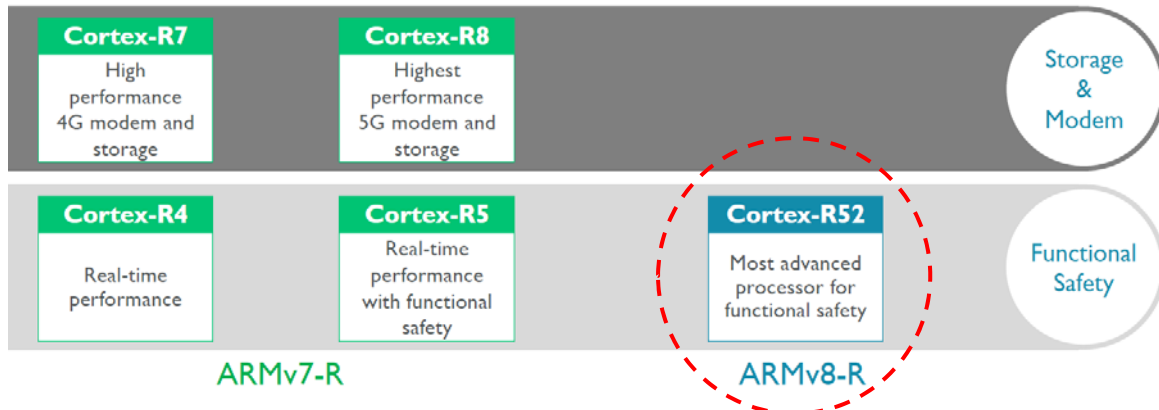


Cortex-M

Smallest/lowest power
Optimized for discrete
processing and
microcontroller



ARM Cortex-R family



Cortex-R52

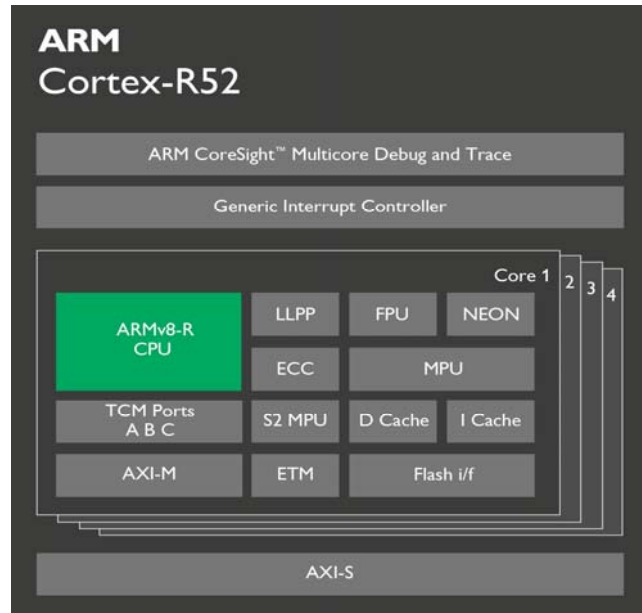
- ARM's most advanced processor for safety
- Dedicated for safety applications including automotive, industrial and healthcare
- Simplifies integration of software in complex safety systems



Cortex-R52

Safety features dedicated to random errors

- ECC protected memory
- Software BIST libraries
- Error management
- Level 2 MPU
- New privilege level
- ...

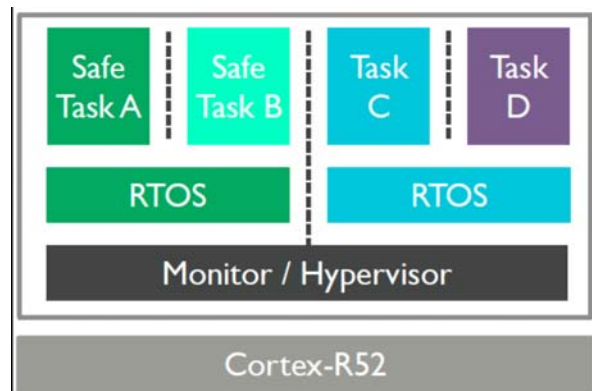


Cortex-R52 simplifies real-time SW isolation



- ARMv8-R introduces new privilege level
- Create 'sandboxes' protected from other SW
- Monitor / Hypervisor manages SW separation and simplifies isolation of tasks
- Real time switch rapidly between tasks and 'sandboxes'
- Simplified integration of complex SW from multiple sources

→ Optimized for TSP

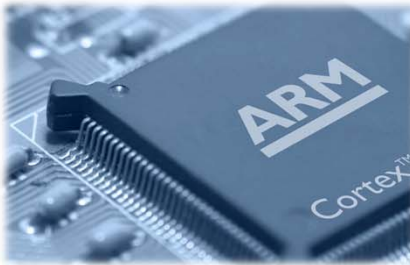




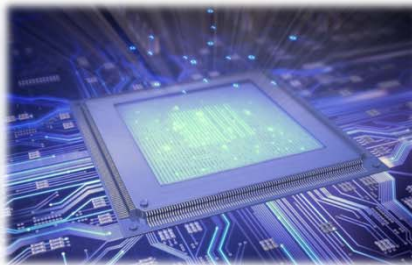
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DAHLIA Keypoints



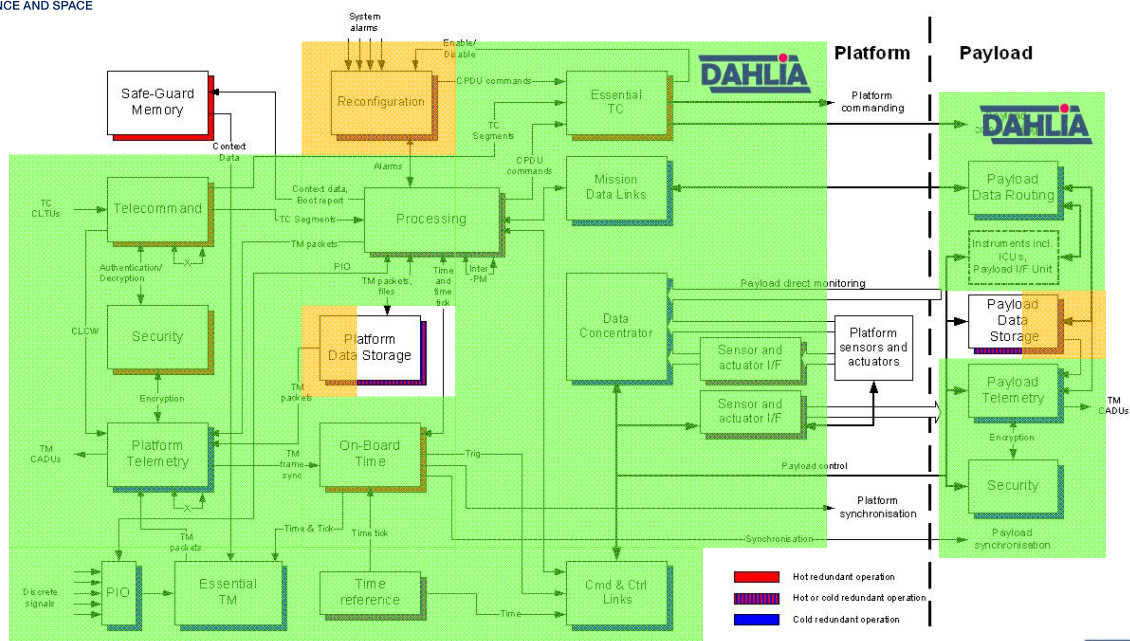
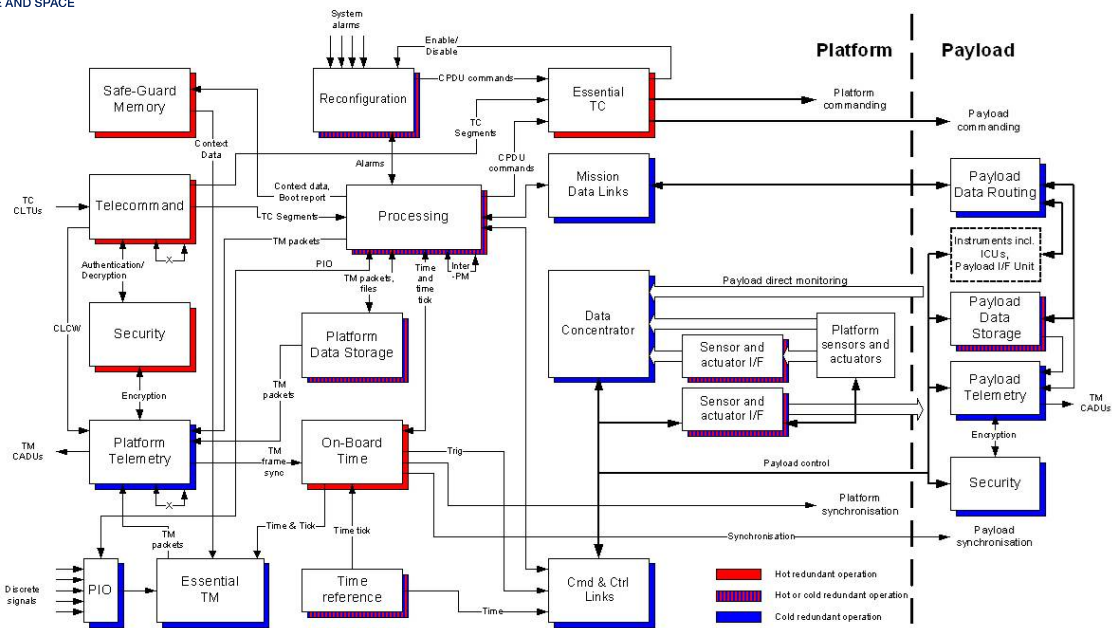
Powerful combination of innovative technology adapted for Space



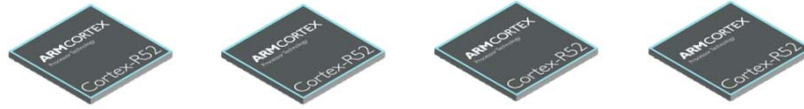
Optimized to support time and space partitioning for centralized avionics



Designed to face the new challenges of Space such as mega-constellations



Conclusion



The DAHLIA H2020 project covers the development of a rad-hard high performance quad-core ARM R52 SoC in 28nm FDSOI technology, with eFPGA for flexibility and key IPs.

It will enable faster and cost-efficient development of products for multiple platform and payload Space applications.

Beyond Space applications, DAHLIA will enable the convergence with terrestrial applications benefiting from the strong ARM ecosystem.

DAHLIA brings to reality what was still a dream few years ago, addressing the new expectations and new mindset of Space industry in a single chip.

dahlia-h2020.eu

More details on DAHLIA are available the project website