



RTEMS QDP for GR740



Improvements of the RTEMS SMP Qualification Data Package





RTEMS QDP for GR740



Agenda

- QDP: Goals, Scope & Status
- Ongoing Activities
- Three Ways to Qualification
- eb Qualification Efforts
- RTEMS Community Aspects





QDP2021 for GR740: Goals, Scope & Status



Goals

- provide an ECSS Cat.C prequalified **RTEMS** as Open Source RTOS
- allow re-qualification of patches and future RTOS versions
- automated testing approach

Scope

- Hardware:
 - GR712 (LEON3 dual core)
 - **GR740 (LEON4 quad core)**
- **RTEMS** Space Profile

Status

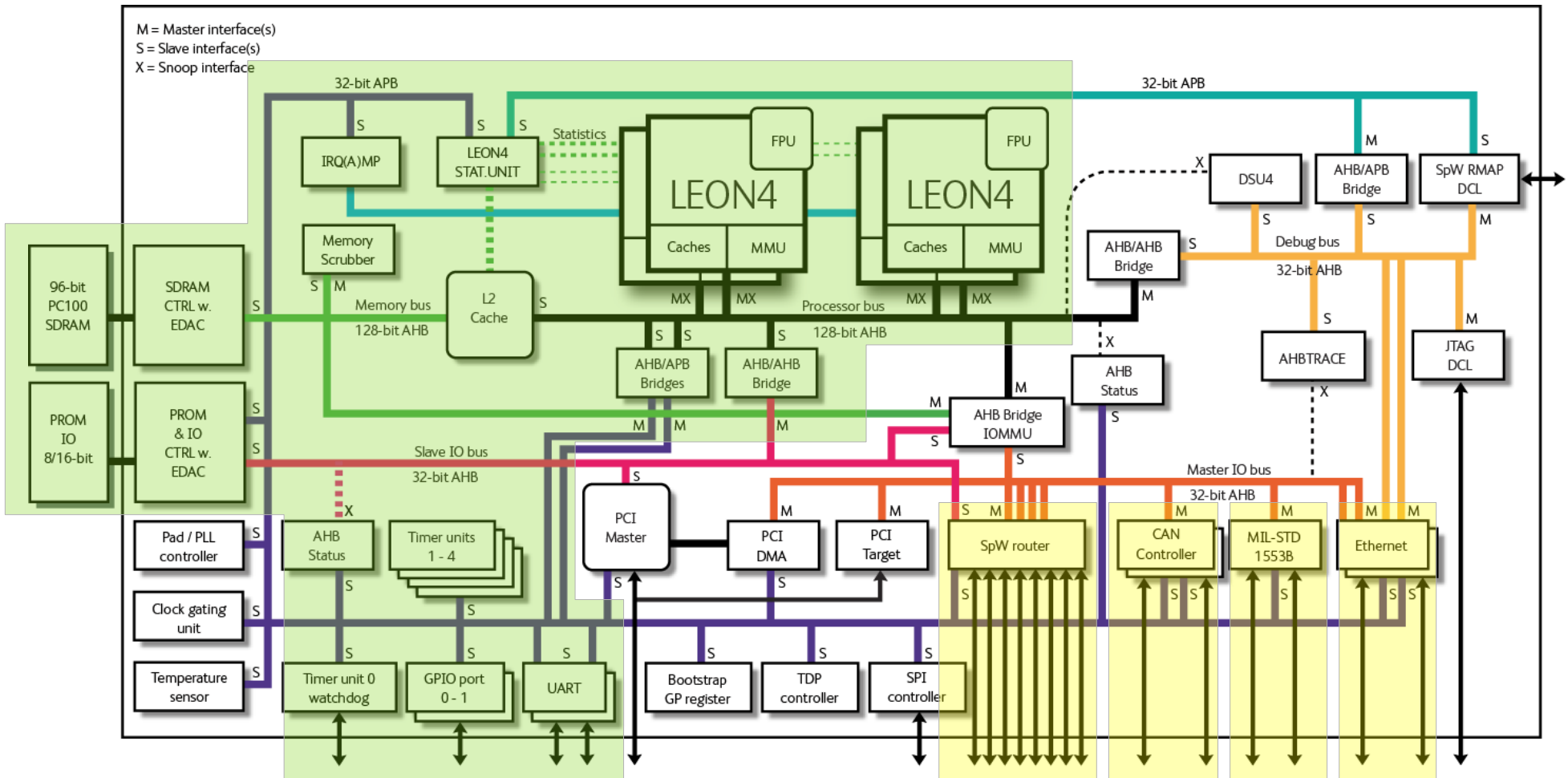
- **Done:** ECSS Cat.C prequalification available since 2021
 - results available at <https://rtems-qual.io.esa.int>





QDP2021 for GR740: hardware scope

...and it works!

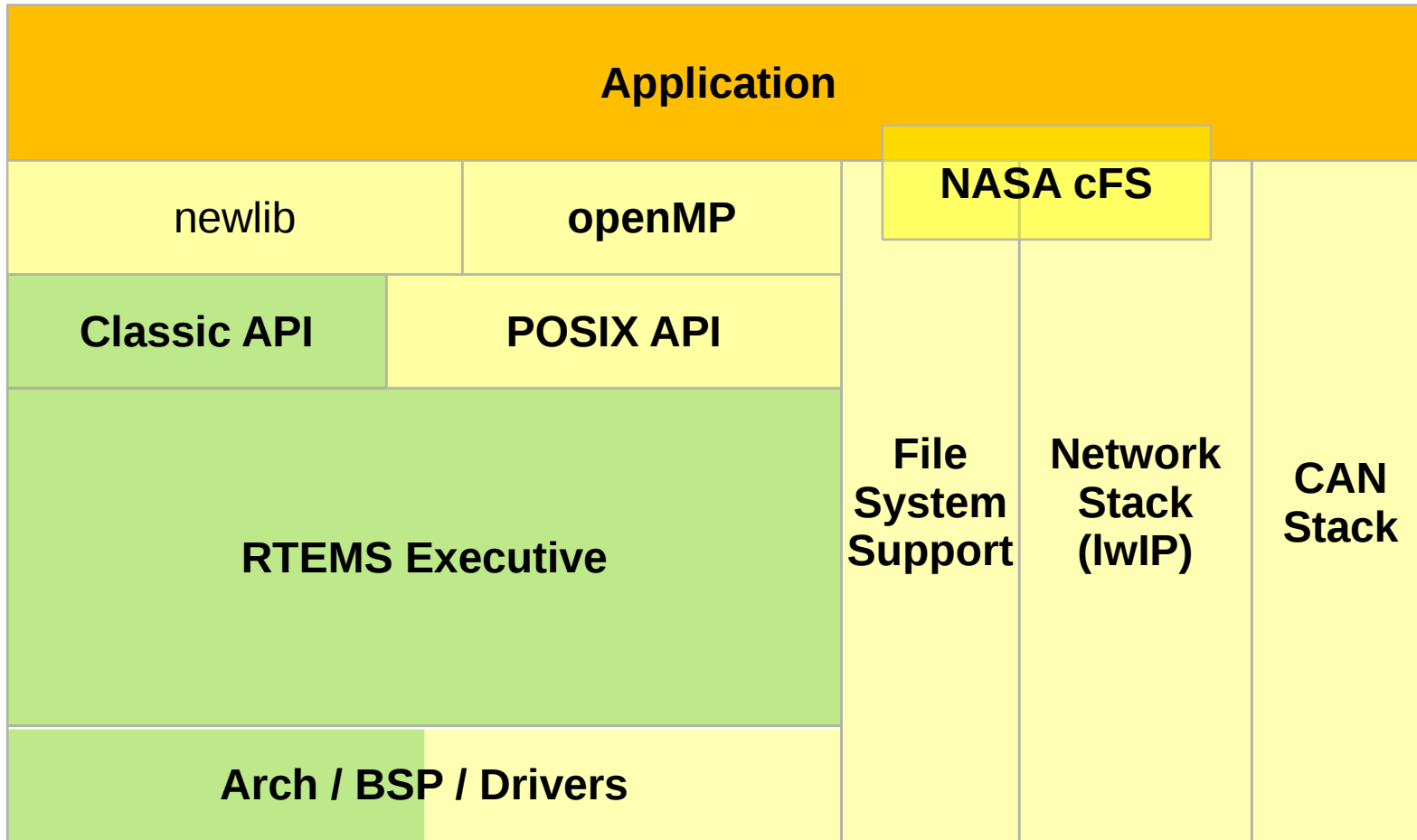


supported by existing QDP

possible QDP extension



QDP2021 for GR740: RTEMS scope



supported by existing QDP

possible QDP extension



QDP & RTEMS: Ongoing Activities



- **active**
 - ISVV for ECSS Cat.B (by Critical Software)
- **near future (planned ESA activity)**
 - uniprocessor full code coverage
 - update to latest RTEMS mainline and GCC bug fixing
- **future (open)**
 - improved document handling and generation
 - support for
 - further architectures (e.g. RISC-V)
 - further SoCs, (e.g. NOEL-V, GR765, GR716, UT700)
 - extended functionality (e.g. CAN, lwIP)





RTEMS QDP: Three Ways to Qualification



	<i>ESA initiated QDP</i>	<i>DIY: private QDP</i>	<i>eb commercial QDP</i>
Scope/Definition	according to general needs, defined in SoW	according to project requirements	according to project requirements
QDP License	open source license	(Not applicable)	commercial/restricted license
QDP cost of usage	None, free	High, incl. learning curve	see license agreement
synchronization with RTEMS community	depends on SoW, budget, awareness	depends on budget, skill, awareness	✓
RTEMS Source location	rtems.org repo	rtems.org repo + private patches	rtems.org repo
Qual. Toolchain location	ESA repo (for member states)	private copy of ESA repo	rtems.org repo + eb repo (closed)
Bug tracking: RTEMS&GCC	✗	✗	✓
Long term maintenance	✗	✗	✓
Time to availability	Long (definition – tender – contract - delivery)	individual (depends on skill, acceptance)	Short (many features off the shelf)





eb Qualification Efforts



customized qualification services

- QDPs for various architectures, SoCs, Modules and OBCs
- POSIX API
- OpenMP
- Comm Support (e.g. CAN, SpaceWire, MIL-STD-1553, lwIP)
- NASA cFS
- Qualification Support for application software
- Others





RTEMS Community: behind the curtains



who's part of it?

- company staff
 - service (e.g. from OAR, embedded brains, Contemporary Software)
 - others (e.g. from Gaisler)
- university staff
- freelancers
- interested individuals
- core team: approx. 10-20 people

community responsibility

- RTEMS porting, enhancements
- code steering & maintenance
 - keep functional after (tool) updates
 - keep ready for future
- testing (coverity, CI, xxx)
- patch review, steering & integration
- infrastructure operation
 - web/file/git/trac/build servers
 - test targets





RTEMS Community: contributing



why contribute your code?

- code matures faster:
 - used, tested, improved by other users
- code is maintained and (res-)usable with future RTEMS releases → *avoid bit rot*
- and: it's the "give" in give&take

successful contributions

- discuss your plans with the community
- read/observe RTEMS coding style before creating your code
- start slowly:
 - commit small initial patches
 - learn
 - build up your reputation

hot tips **not** to contribute

- "donate" 10,000 lines of code without preparation
- schedule code contribution at the end of your project
- ignore any feedback





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Questions?

