ARINC653, AADL annex

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Context and Rationale

- **ARINC653**
  - Avionics standard
  - Standardized API (called APEX – APplication Executive)
  - Central part of the IMA philosophy
  - Time & space partitioning

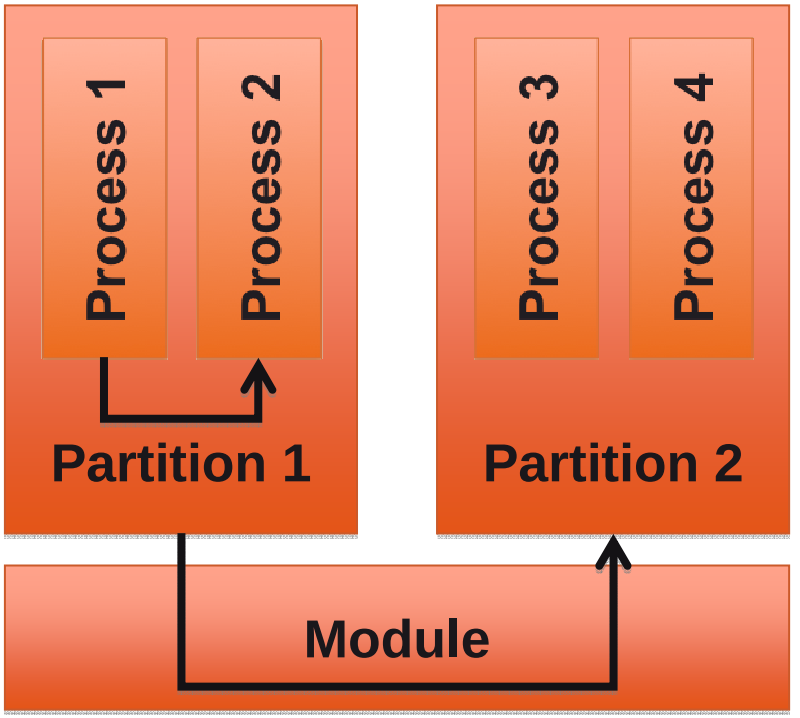
- **Rationale of ARINC653 annex for AADLv2**
  - Standardized modeling patterns
  - Better modeling & analysis support
  - Code generation from AADL to ARINC653 O/S

ARINC653 standard overview

- **Partitioning support**
  - Software isolated in partitions
  - Partitions run as if they were on a single processor
- **Time isolation**
  - Execution during a fixed & predefined time slice
  - Tasks scheduled with a dedicated scheduling policy
- **Space isolation**
  - Code & data stored in a separated address space
- **Fault containment**
  - Faults are propagated from processor to partitions
  - Partition-dependent recovery strategy

ARINC653 services

- **Time and space isolation**
  - Time slices allocation
  - Address spaces allocation
- **Tasking (process) services**
  - Similar to the thread concept
- **Communication services**
  - Intra-partition
  - Inter-partitions (module enforced)
- **Health Monitoring**
  - Recover faults at module, partition or process levels



Map ARINC653 services to AADL models

- **Partitioning support**
  - Partition execution context : virtual processor
  - Partition content : process
- **Partitions control (with time & space specification)**
  - Support for partitions execution : processor
- **Tasking/process service**
  - Thread component
- **Communication services**
  - Rely on ports connections
- **Health Monitoring**
  - Dedicated properties (ARINC653 property set)

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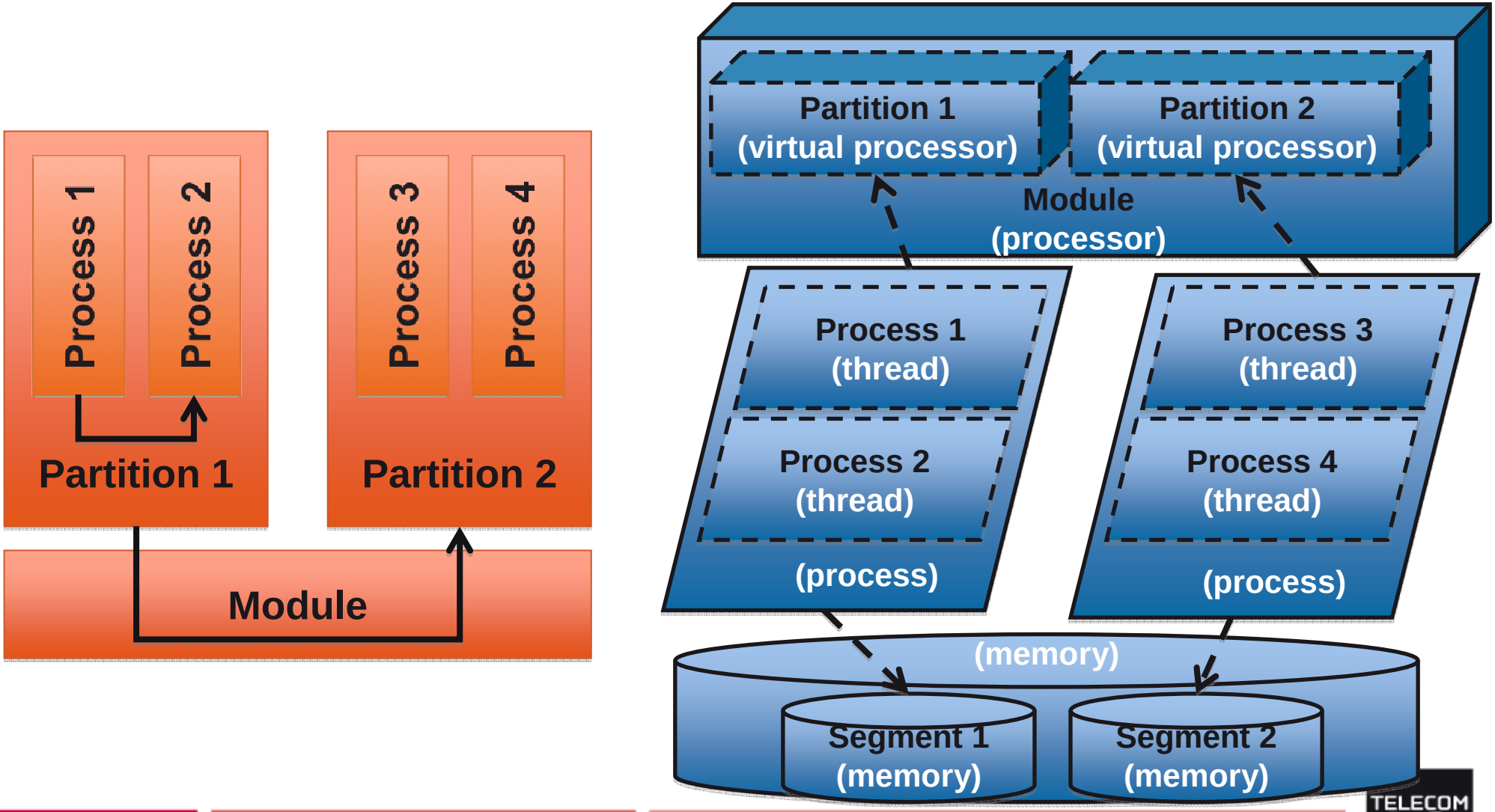
From ARINC 653 architecture to AADL models



Current standardization state

- **Joint effort from academic and industrial partners**
  - Show the relevance of the annex for the industry
  - Support from academic tools
    (e.g. Ocarina with ARINC653 code generation)
- **Presented for ballot at the next meeting (May 2010)**
- **Publication as a standardized annex for end-2010**
  - White paper to illustrate modeling patterns usage
  - Examples and case studies coming with the annex

Conclusion

- **Standardized modeling patterns**
  - Mapping ARINC653 services
  - Enforce AADL semantics
- **Ease design, analysis and implementation**
  - Benefits from AADL validation tools
  - Code generators already available
- **Publication in late 2010**
  - Ready for the ballot process
  - Standardization as an annex document
- **First implementation in Ocarina (compiler) + POK (run-time)**
  - http://aadl.telecom-paristech.fr/
  - http://pok.gunnm.org