Poster at the EuroMPI 2011

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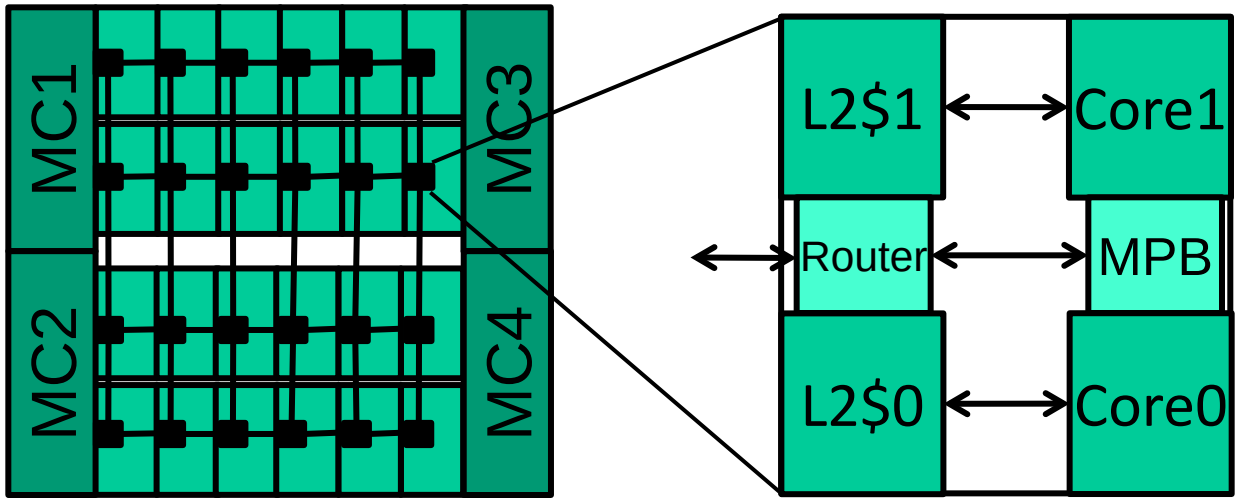
Performance Tuning of SCC-MPICH by means of the Proposed MPI-3.0 Tool Interface

- The Intel *Single-Chip Cloud Computer* (SCC)
  → an 48-cores Research Processor by Intel
- SCC-MPICH
  → yet another MPI Library for the Intel SCC
- The Proposed MPI-3.0 Tool Interface
  → for querying MPI library *internal* information

The Intel SCC Many-core Processor

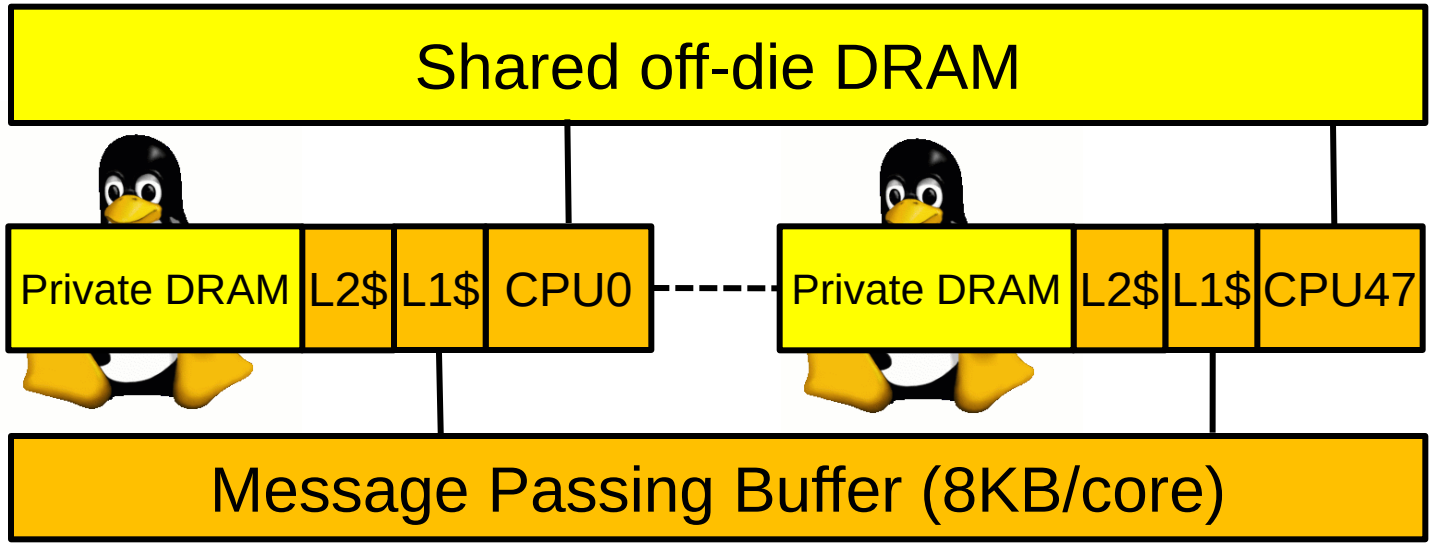
- **Intel Single-Chip Cloud Computer**
  → a *Concept Vehicle* for Many-core Software Research
- **48 Pentium-I Cores arranged in a 6x4 on-die Mesh**
  → 2 Cores and 1 Router per *Tile*



- **On-die *Message-Passing Buffers*** (MBP) / 16kByte per Tile
  → accessible as distributed on-die *Shared-Memory*
- **4 on-die Memory Controllers** (MC1-4)
  → max. 64GByte DDR3 off-die main memory

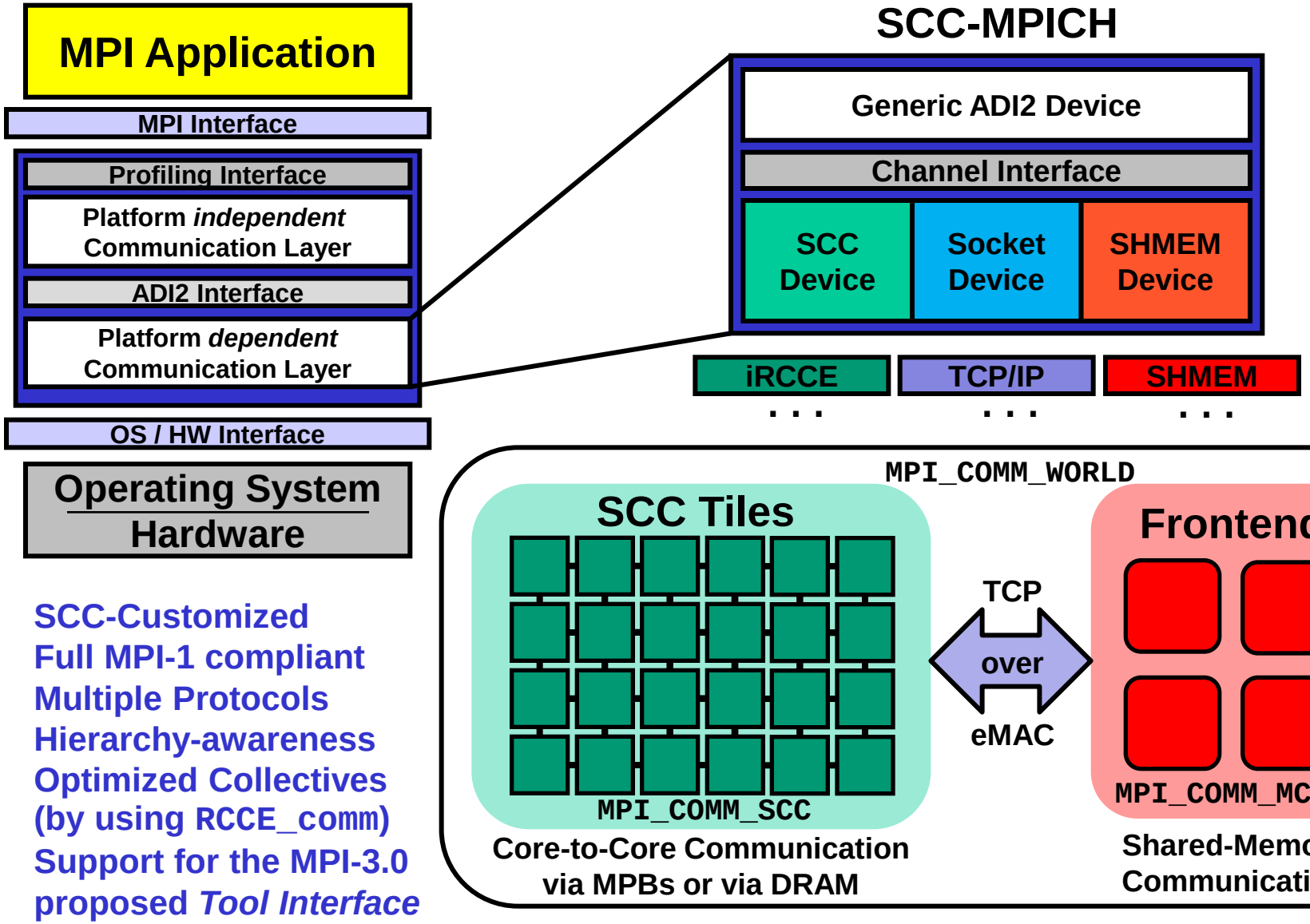
The Intel SCC Many-core Processor

- **Strictly No Cache Coherency**
  → Cluster-on-Chip Architecture
- **Private off-die DRAM Regions (one per Core)**
  → Caches *enabled*! One *Linux* instance per Core!



- **Shared / Global off-die DRAM Region**
  → Caches *disabled* per default! → e.g. for global shared data
- **Shared on-die MPB Regions**
  → Cached in L1, L2 Bypass / Fast L1 Invalidation for MPB-Data

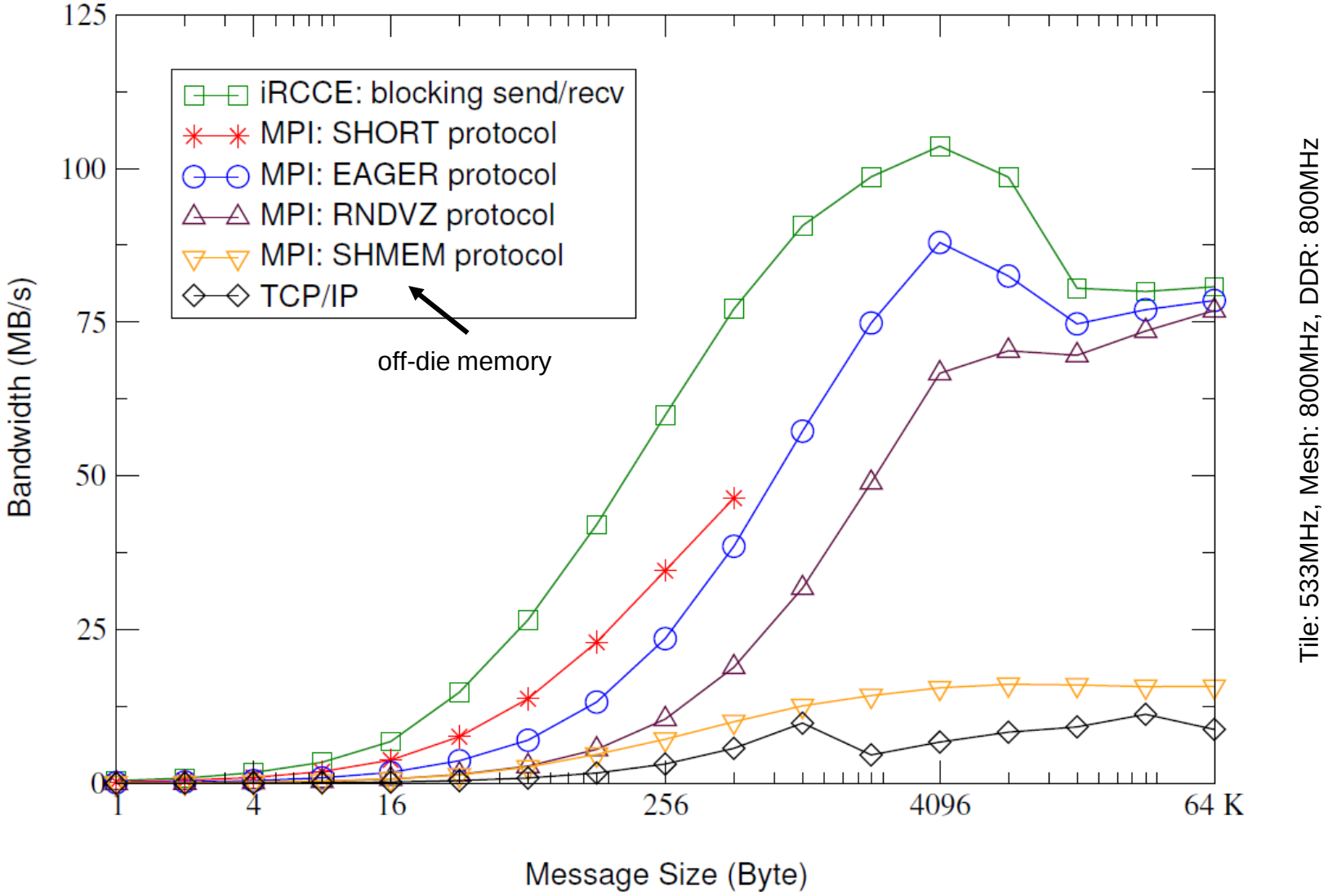
SCC-MPICH: yet another MPI for the SCC



- SCC-Customized
- Full MPI-1 compliant
- Multiple Protocols
- Hierarchy-awareness
- Optimized Collectives (by using `RCCE_comm`)
- Support for the MPI-3.0 proposed *Tool Interface*

SCC-MPICH: yet another MPI for the SCC

Ping-Pong Measurements



The Proposed MPI-3.0 Tool Interface

- **The MPI Tool Interface:**

```
MPI_T_Cvar_get_info()
MPI_T_Cvar_read()
MPI_T_Cvar_write()
...
```

} for *Control* Variables

- **Prototyping the MPI Tool Interface in SCC-MPICH:**

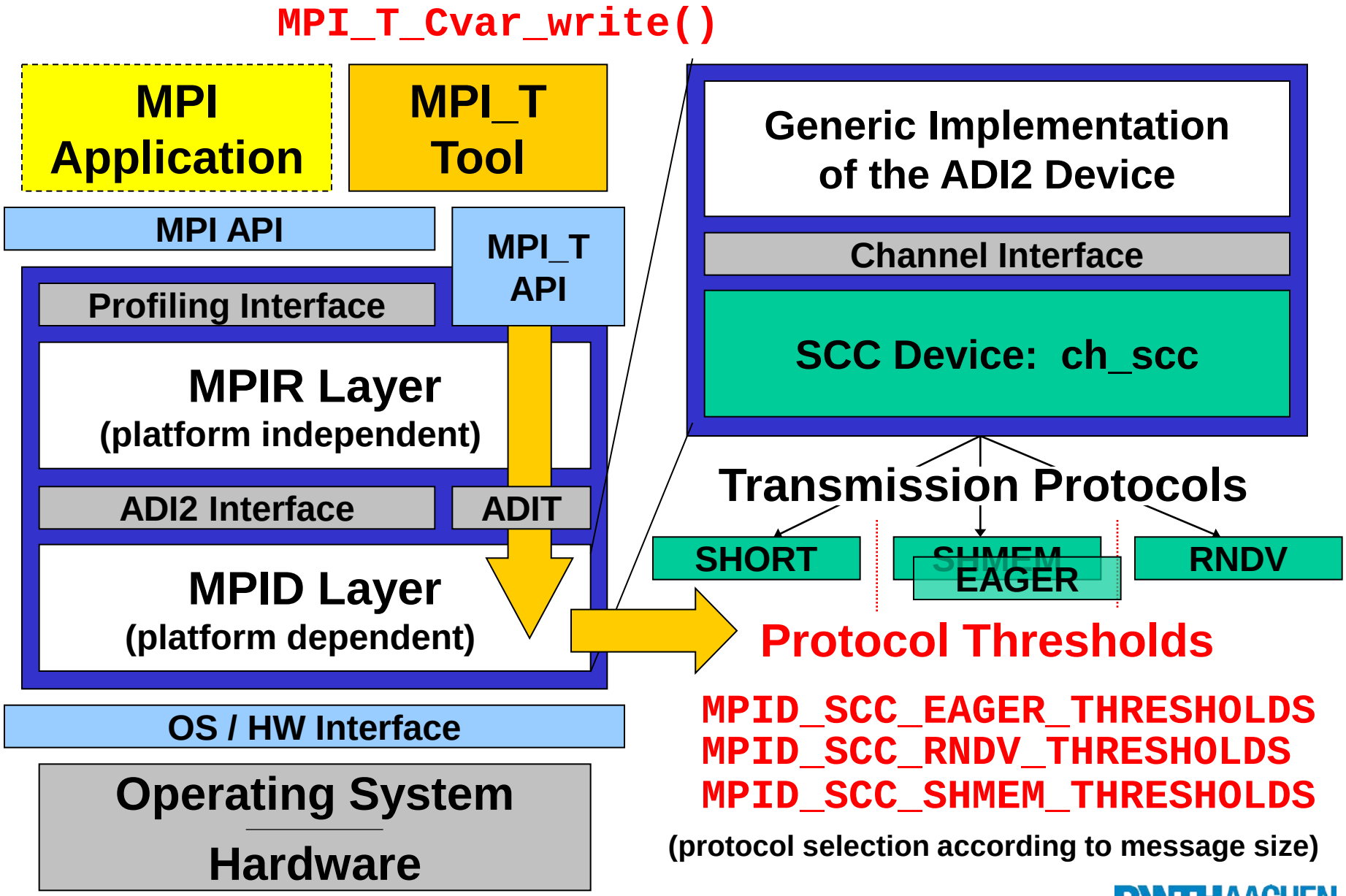
```
MPID_SCC_RNDV_THRESHOLDS
MPID_SCC_EAGER_THRESHOLDS
MPID_SCC_SHMEM_THRESHOLDS
...
```

} Control Variables

```
MPID_SCC_MSGS_SENT
MPID_SCC_MSGS_RECEIVED
MPID_SCC_MSGS_UNEXPECTED
...
```

} Performance Counters

The Proposed MPI-3.0 Tool Interface



Thank you for your attention!

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