SystemC integration

Integrating gem5 in systemC simulations

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Outline

- Introduction to systemC and TLM2
- Simulation Kernels Synchronization
- Bus requests translation
- Timing requests conversion examples
- Conclusion

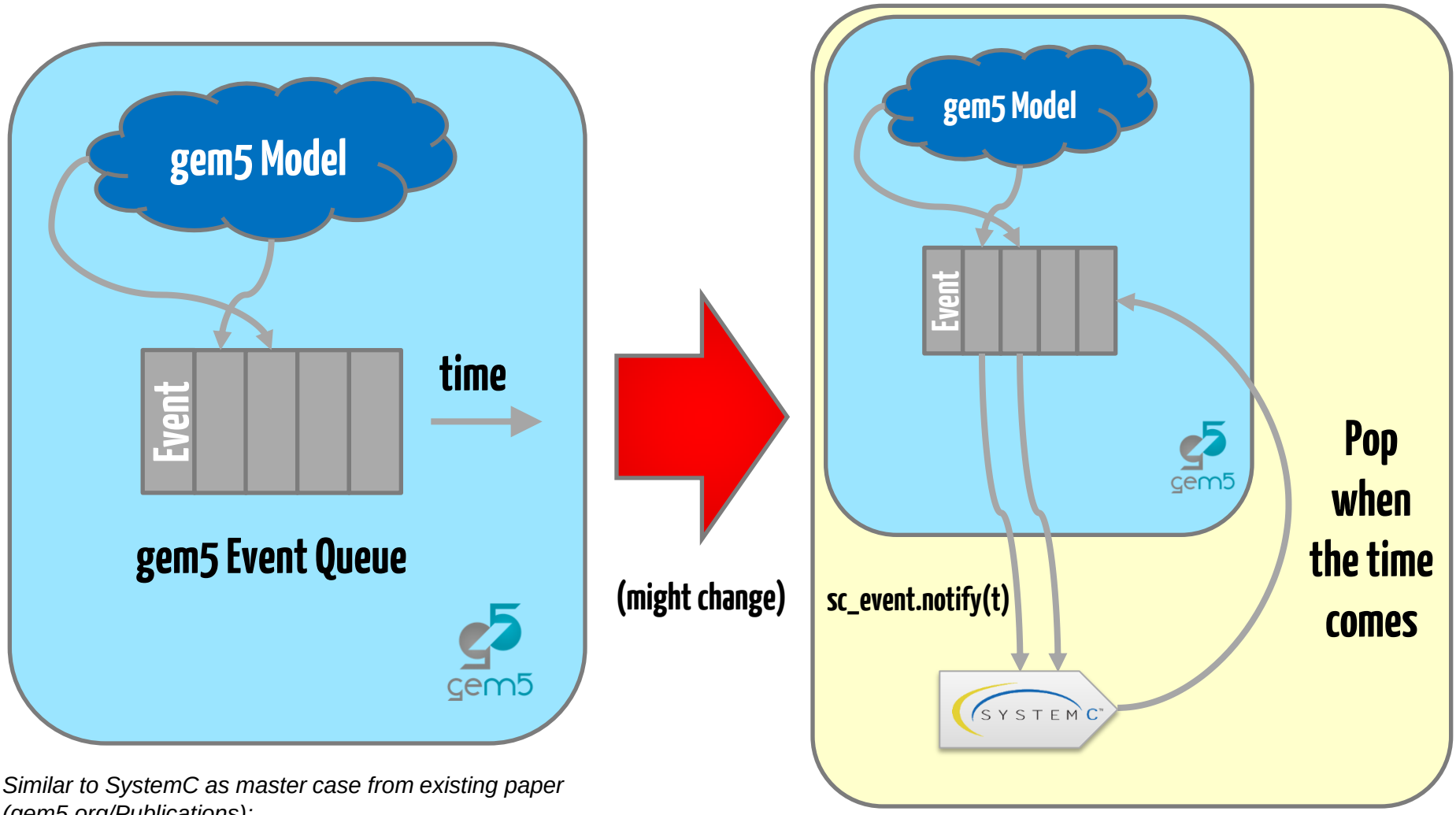
SystemC (IEEE 1666-2011)

- A set of **C++ classes and macros** which provide an event-driven simulation kernel.
- **A standard**
  (approved by the IEEE Standards Association as IEEE 1666)
- Proof of concept available as **open source** on accelera systems initiative website

TLM2

- **A Modeling technique** for **T**ransaction **L**evel **M**odeling
- **Standardizes** coding styles
- **Requirements**:
  - Transaction-level memory-mapped bus modeling
  - Register accurate, functionally complete
  - Fast enough to boot software O/S in seconds
  - Loosely-timed and approximately-timed modeling
  - Interoperable API for memory-mapped bus modeling
  - Generic payload and extension mechanism

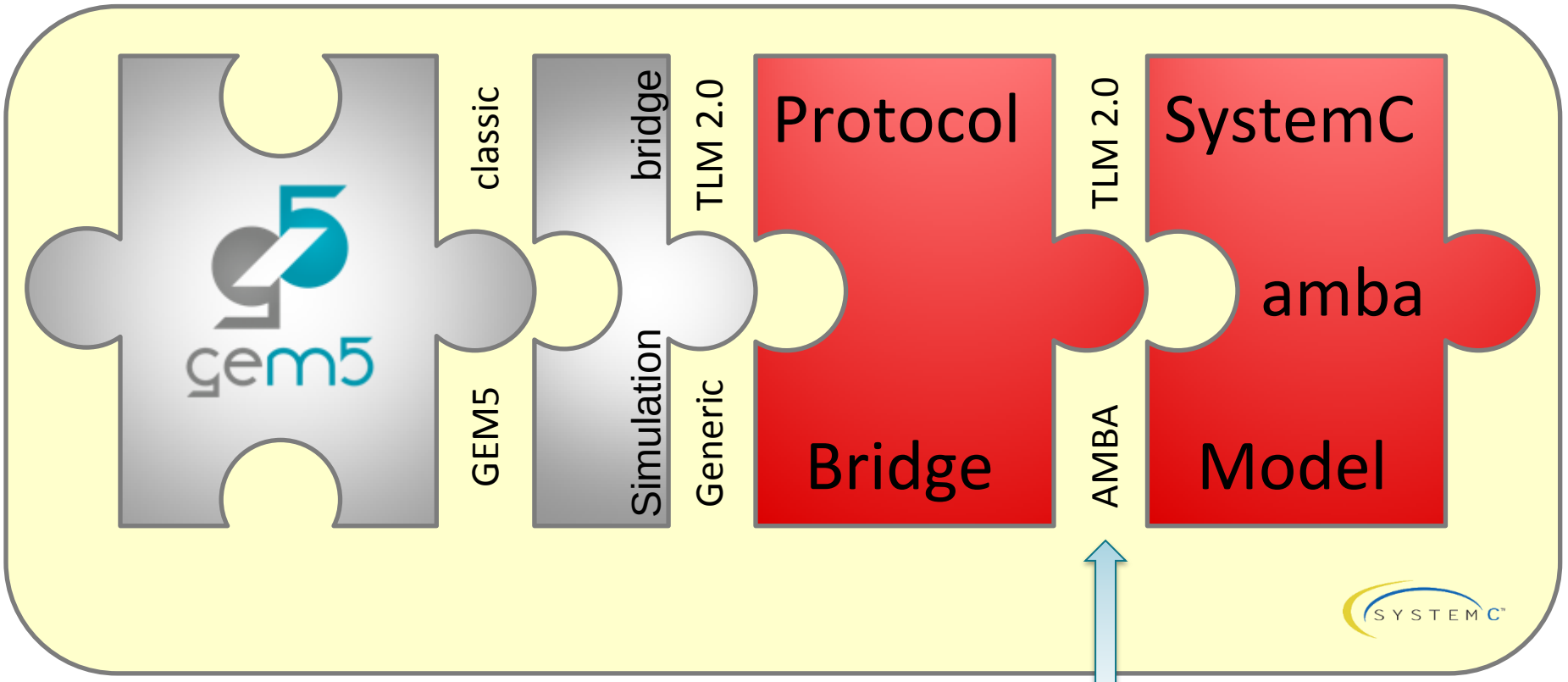
Gem5+systemC co-simulation: kernels



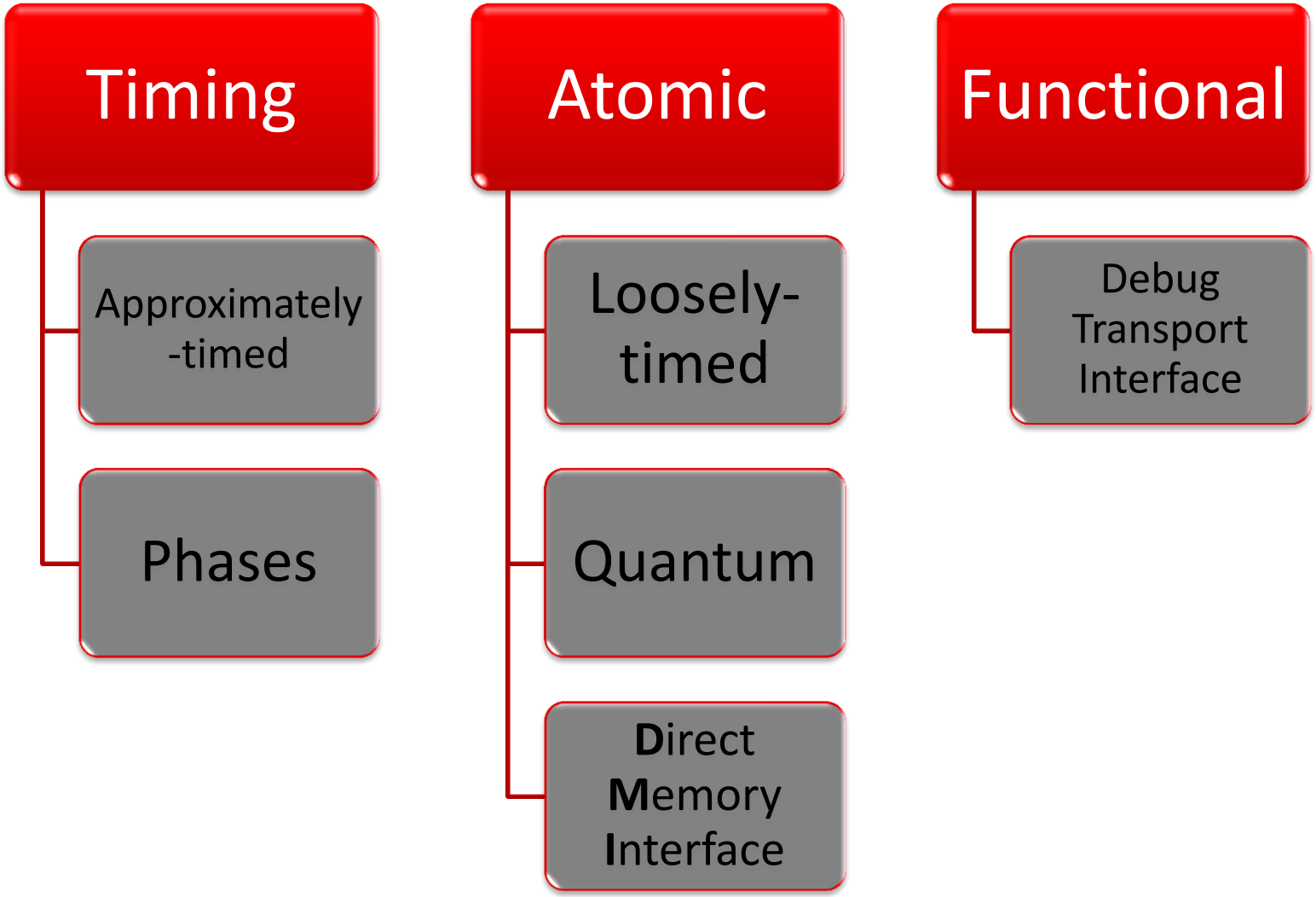
Similar to SystemC as master case from existing paper (gem5.org/Publications):
A Fast Timing-Accurate MPSoC HW/SW Co-Simulation Platform based on a Novel Synchronization Scheme, Mingyan Yu, Junjie Song, Fangfa Fu, Siyue Sun, and Bo Liu

Gem5+systemC co-simulation: bus

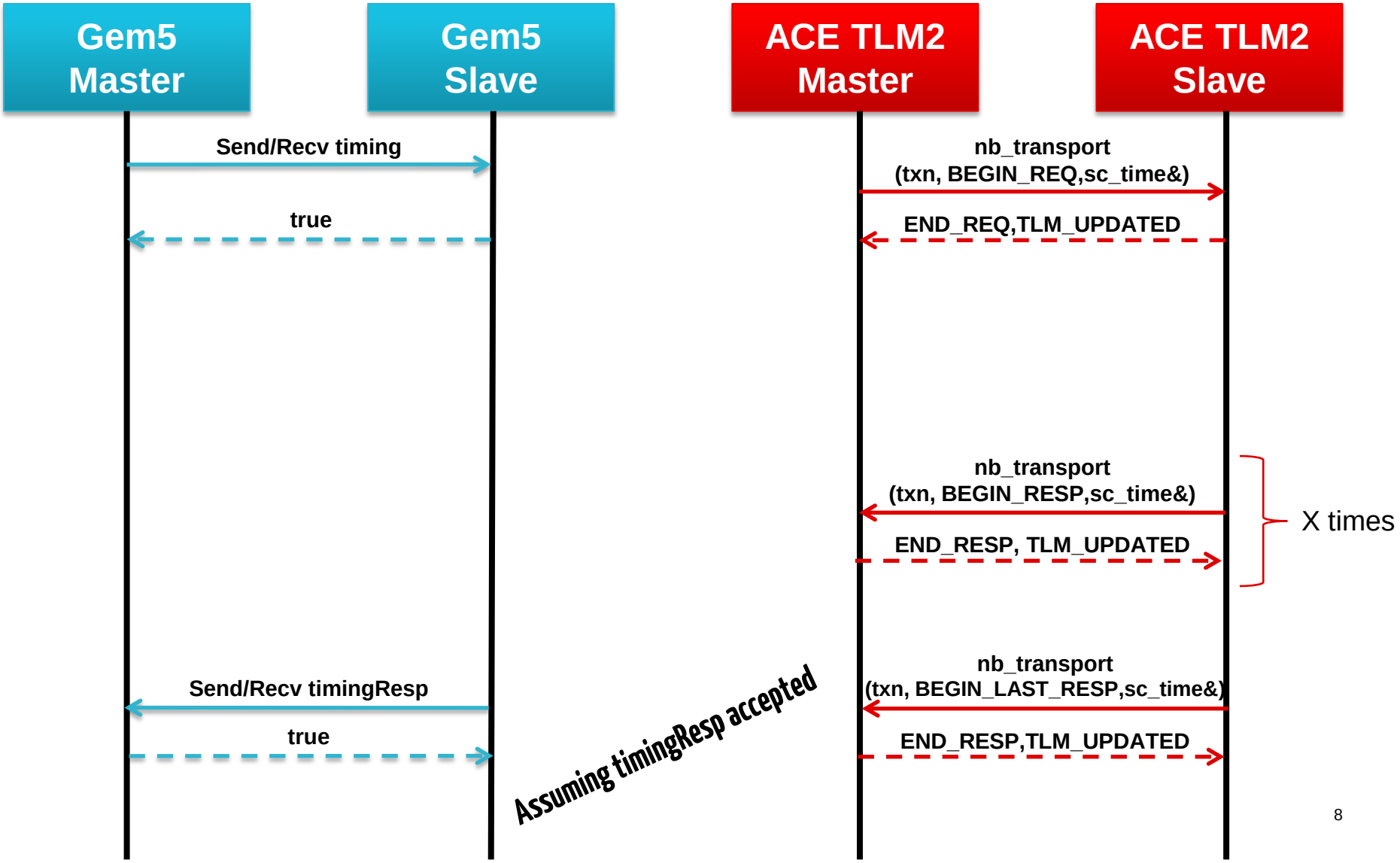
Example:



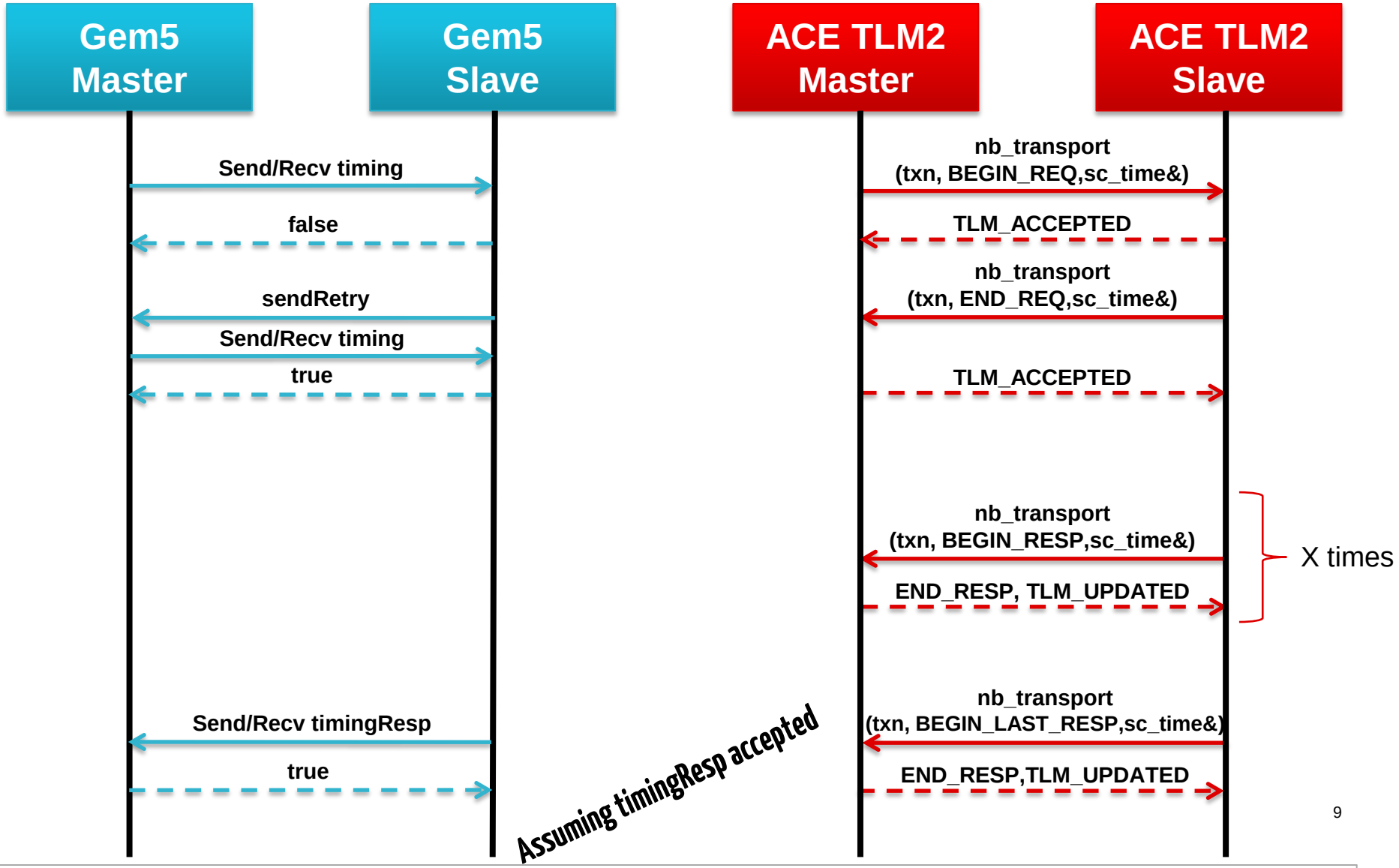
Mapping gem5 accesses



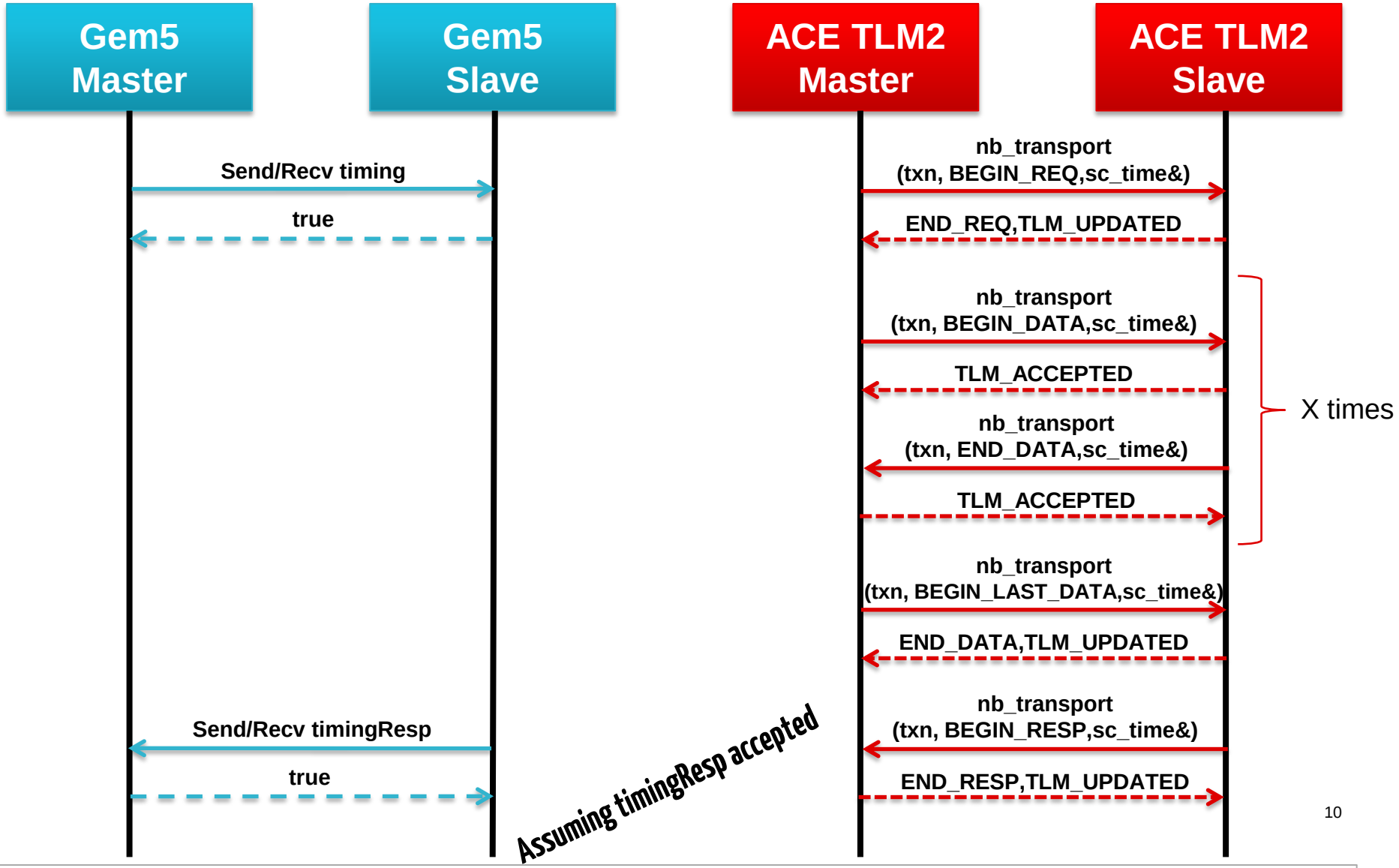
READ Sequence: same cycle REQ handshaking



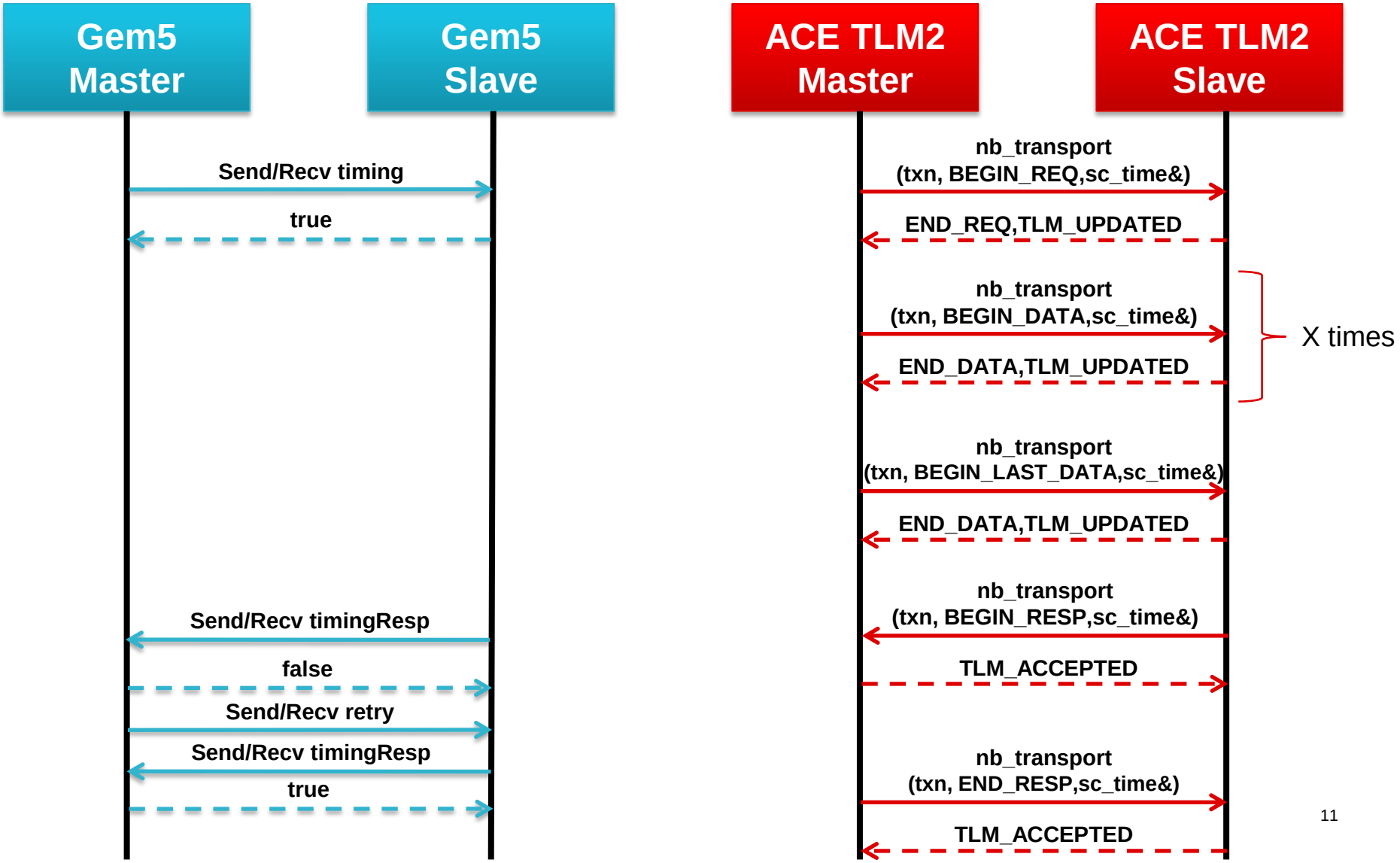
READ Sequence: different cycle REQ handshaking



WRITE Sequence: different cycle DATA handshaking



WRITE Sequence: same cycle DATA handshaking



Next steps

- Introducing **GreenSocs:**
  - Renowned **systemC** and **TLM2** expert (&Qemu…)
  - Created the TLM2 AMBA kit for carbon design systems
  - GreenSocs aims to support and develop the SystemC **Open Source community**, especially in terms of the adoption of the interfaces and infrastructures that GreenSocs makes available
- Texas Instruments and GreenSocs will collaborate to **submit to gem5 community** patches and models for systemC/TLM2 compatibility, mainly for ARM simulation

Thank You!

Questions?