



TLM 2.0 Approximately Time (AT) System Example – Out Of Order Transactions

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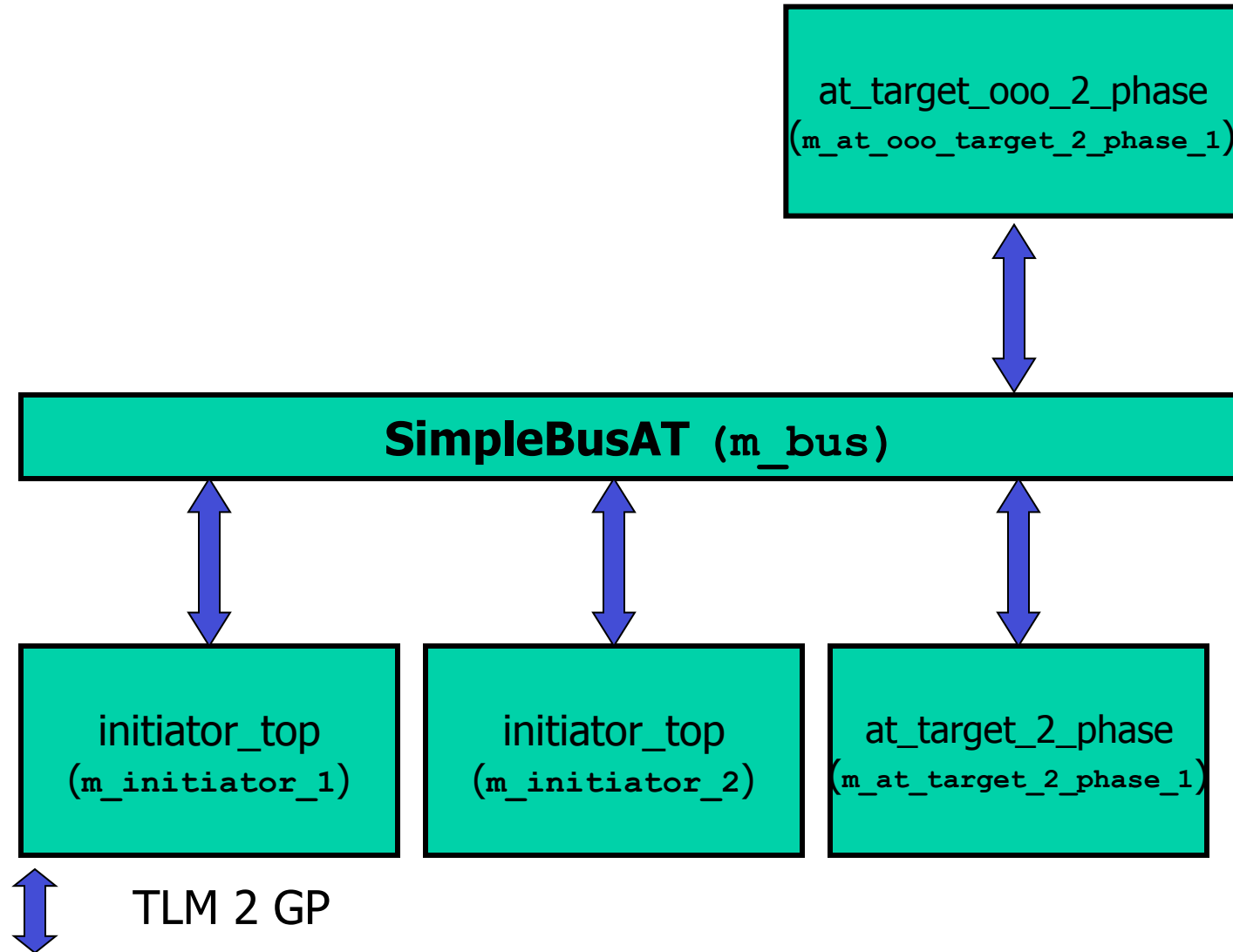
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AT System Example - Annotated Timing

- **The Goal is to Illustrate:**
 - Application of TLM 2.0 in a real system
 - Show out of order REQ and RESP phases
 - ◆ Target
 - ◆ Initiator
- **Possible Applications:**
 - Architectural exploration
 - Early software development



Example Block Diagram



How to run this example (Linux)

- Set `SYSTEMC_HOME` and `TLM_HOME`
- `cd examples/tlm/at_ooo/build-unix`
- `make clean`
- `make`
- `make run`

How to run this example (MSVC)

- Open a explorer window on `examples/tlm/at_ooo/build-windows`
- Launch `at_ooo.sln`
- Select '**Property Manager**' from the '**View**' menu
- Under '`at_ooo > Debug | Win32`' select '**systemc**'
- Select '**Properties**' from the '**View**' menu
- Select '**User Macros**' under '**Common Properties**'
- Update the '**SYSTEMC**' and '**TLM**' entries and apply
- Build and run

Expected Output (1 of 3)

Approximately line #2976 of log file

REQ for first transaction

Approximately line #3023 of log file

REQ for second transaction

Approximately line #3043 of log file

```
Info: select_initiator.cpp: 1824 ns - initiator_thread
Initiator: 101 starting new transaction for Addr:0x10000100
Initiator: 101 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Info: select_initiator.cpp: 1824 ns - initiator_thread
Initiator: 101 ACCEPTED (GP, BEGIN_REQ, 0 s)
Initiator: 101 transaction waiting end-request on backward-path
Info: at_target_ooo_2_phase.cpp: 1824 ns - nb_transport_fw
Target: 202 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Target: 202 out of order transaction moved to response PEQ
Target: 202 with Addr: 0x00000100 and a delay of 780 ns
Target: 202 UPDATED (GP, END_REQ, 20 ns)

...
Info: select_initiator.cpp: 1834 ns - initiator_thread
Initiator: 102 starting new transaction for Addr:0x10000200
Initiator: 102 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Info: select_initiator.cpp: 1834 ns - initiator_thread
Initiator: 102 ACCEPTED (GP, BEGIN_REQ, 0 s)
Initiator: 102 transaction waiting end-request on backward-path
...
Info: at_target_ooo_2_phase.cpp: 1844 ns - nb_transport_fw
Target: 202 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Target: 202 transaction moved to response PEQ
Target: 202 with Addr: 0x00000200 and a delay of 80 ns
Target: 202 UPDATED (GP, END_REQ, 20 ns)
```

Expected Output (2 of 3)

Router has
"modified"
address

RESP for second
Transaction
(out of order)

```
Info: select_initiator.cpp: 1864 ns - nb_transport_bw
Initiator: 102 nb_transport_bw (GP, END_REQ, 0 s) from Addr: 0x00000200
Initiator: 102 transaction waiting begin-response on backward path
Initiator: 102 ACCEPTED (GP, END_REQ, 0 s)
Info: at_target_ooo_2_phase.cpp: 1924 ns - begin_response_method
Target: 202 Starting response method for Addr: 0x00000200
Info: memory.cpp: 1924 ns - print
ID: 202 COMMAND: WRITE Length: 04
Addr: 0x0000000000000200 Data: 0xEFFFFFFDFF
Info: at_target_ooo_2_phase.cpp: 1924 ns - begin_response_method
Target: 202 nb_transport_bw (GP, BEGIN_RESP, SC_ZERO_TIME)
Info: at_target_ooo_2_phase.cpp: 1924 ns - begin_response_method
Target: 202 ACCEPTED (GP, BEGIN_RESP, 0 s)
Info: select_initiator.cpp: 1924 ns - nb_transport_bw
Initiator: 102 nb_transport_bw (GP, BEGIN_RESP, 0 s) from Addr: 0x00000200
Initiator: 102 transaction moved to send-end-response PEQ
Initiator: 102 ACCEPTED (GP, BEGIN_RESP, 0 s)
Info: select_initiator.cpp: 1931 ns - send_end_rsp_method
Initiator: 102 starting send-end-response method
Initiator: 102 nb_transport_fw (GP, END_RESP, 0 s)
Info: select_initiator.cpp: 1931 ns - send_end_rsp_method
Initiator: 102 COMPLETED (GP, END_RESP, 0 s)
Info: at_target_ooo_2_phase.cpp: 1931 ns - nb_transport_fw
Target: 202 nb_transport_fw (GP, END_RESP, 0 s)
Target: 202 COMPLETED (GP, END_RESP, 0 s)
...
```

Expected Output (3 of 3)

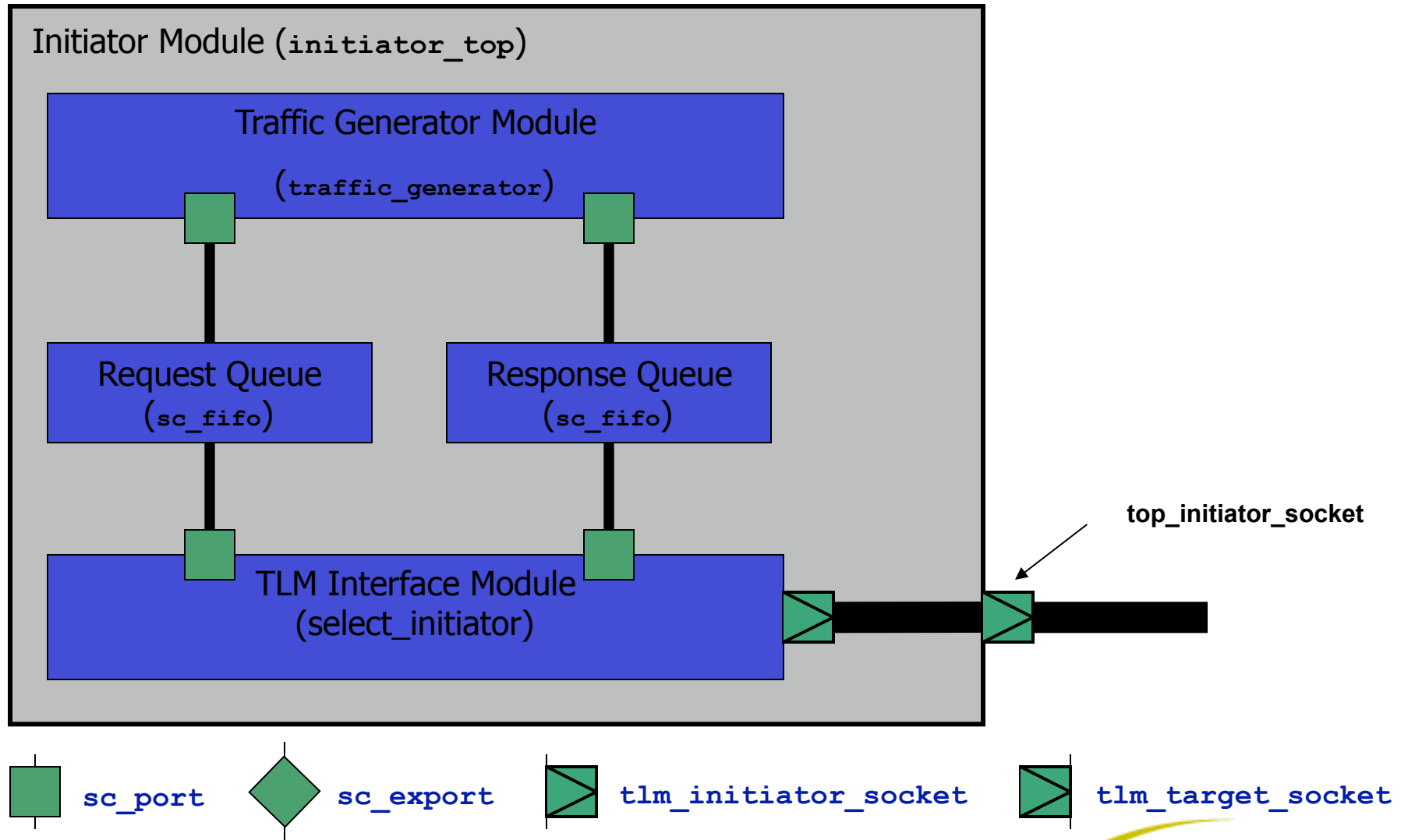
Router has
"modified"
address

Approximately line
#3043 of log file

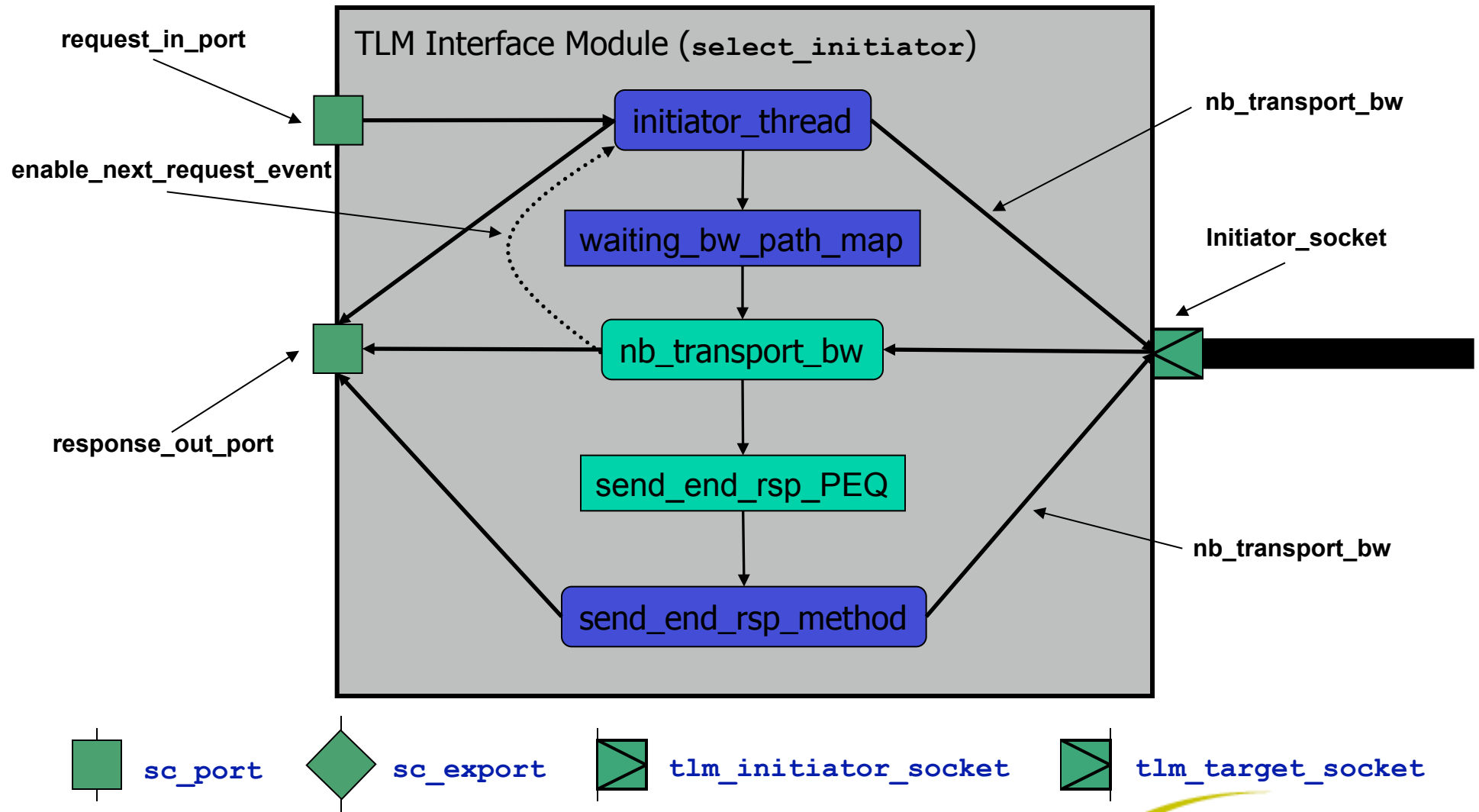
RESP for first
Transaction
(out of order)

```
Info: at_target_ooo_2_phase.cpp: 2604 ns - begin_response_method
Target: 202 Starting response method for Addr: 0X00000100
Info: memory.cpp: 2604 ns - print
ID: 202 COMMAND: WRITE Length: 04
Addr: 0x00000000000000100 Data: 0xEFFFFFFF
Info: at_target_ooo_2_phase.cpp: 2604 ns - begin_response_method
Target: 202 nb_transport_bw (GP, BEGIN_RESP, SC_ZERO_TIME)
Info: at_target_ooo_2_phase.cpp: 2604 ns - begin_response_method
Target: 202 ACCEPTED (GP, BEGIN_RESP, 0 s)
Info: select_initiator.cpp: 2604 ns - nb_transport_bw
Initiator: 101 nb_transport_bw (GP, BEGIN_RESP, 0 s) from Addr: 0x00000100
Initiator: 101 transaction moved to send-end-response PEQ
Initiator: 101 ACCEPTED (GP, BEGIN_RESP, 0 s)
Info: select_initiator.cpp: 2611 ns - send_end_rsp_method
Initiator: 101 starting send-end-response method
Initiator: 101 nb_transport_fw (GP, END_RESP, 0 s)
Info: select_initiator.cpp: 2611 ns - send_end_rsp_method
Initiator: 101 COMPLETED (GP, END_RESP, 0 s)
Info: at_target_ooo_2_phase.cpp: 2611 ns - nb_transport_fw
Target: 202 nb_transport_fw (GP, END_RESP, 0 s)
Target: 202 COMPLETED (GP, END_RESP, 0 s)
```

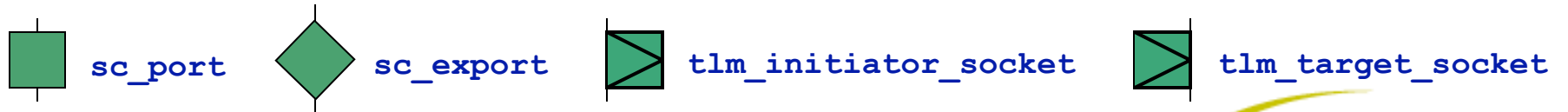
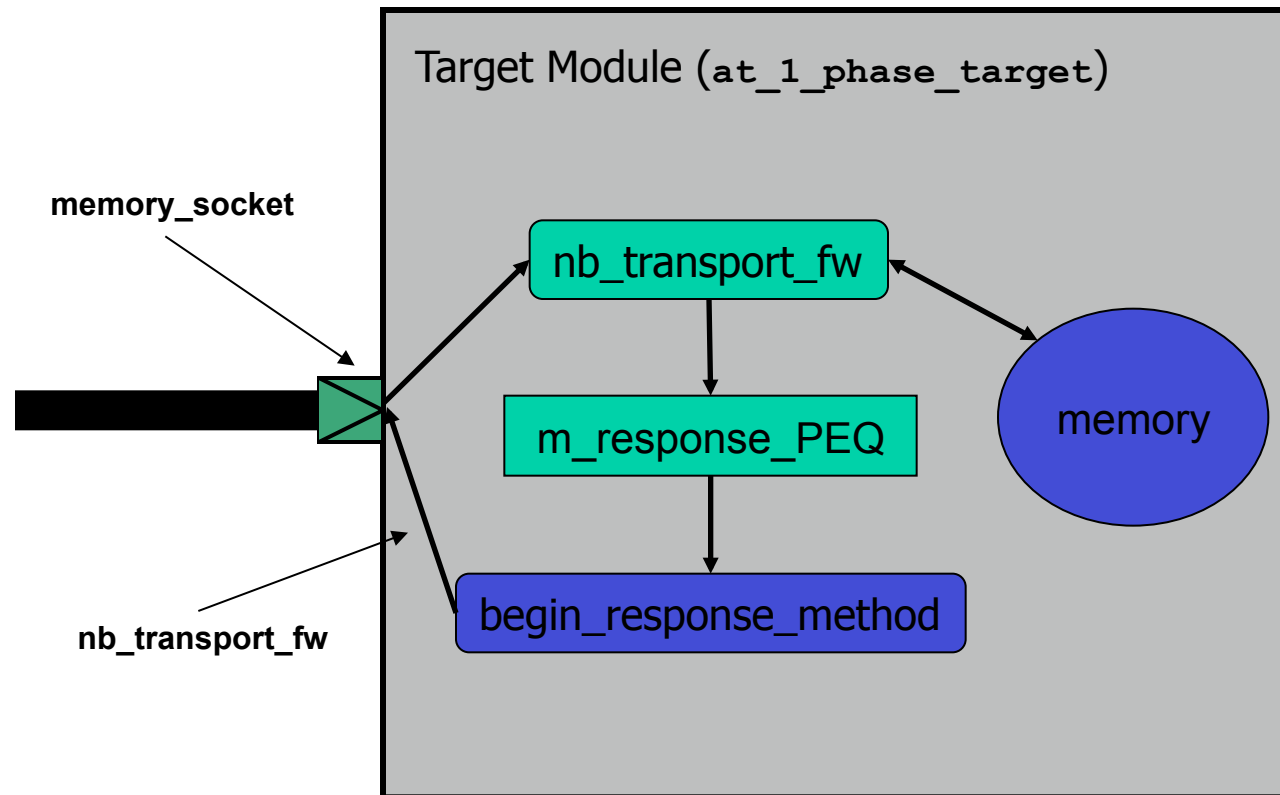

Initiator Module



TLM Interface Module



Target Module



Router Component

