



# **TLM 2.0 Approximately Time (AT) System Example – Mixed AT System**

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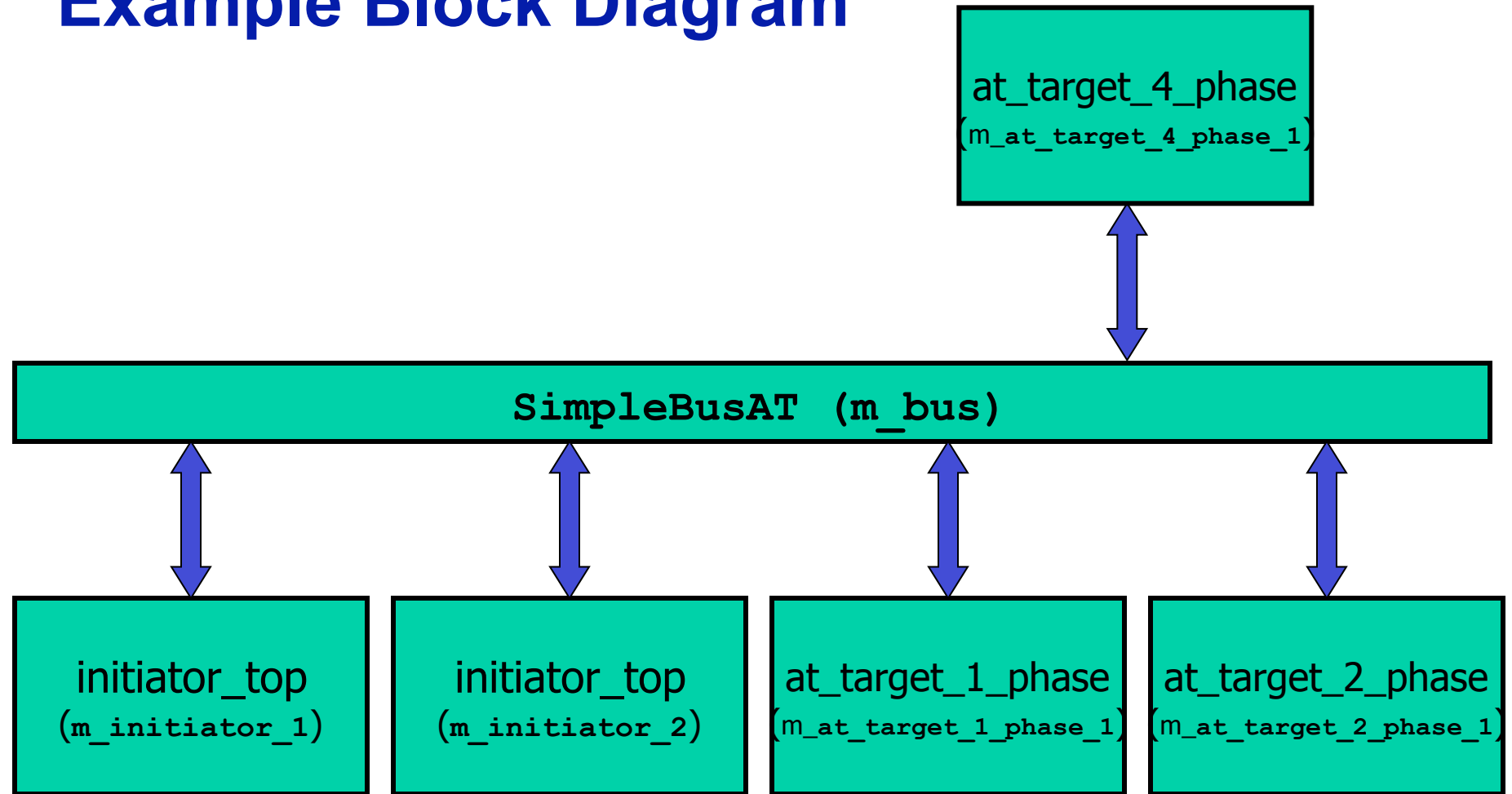
**June 2008**

# AT System Example - Annotated Timing

- **The Goal is to Illustrate:**
  - Application of TLM 2.0 in a real system
  - Illustrate interoperability of different AT styles
- **Possible Applications:**
  - Architectural exploration
  - Early software development
  - Continued modeling with available models



# Example Block Diagram



 TLM 2 GP

# How to run this example (Linux)

- Set `SYSTEMC_HOME` and `TLM_HOME`
- `cd examples/tlm/at_1_phase/build-unix`
- `make clean`
- `make`
- `make run`

# How to run this example (MSVC)

- Open a explorer window on `examples/tlm/at_1_phase/build-windows`
- Launch `at_1_phase.sln`
- Select '**Property Manager**' from the '**View**' menu
- Under '`at_1_phase > 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 – Target ID: 201

```
Info: traffic_generator.cpp: 0 s - traffic_generator_thread
Initiator: 101 Starting Traffic
...
Info: select_initiator.cpp: 0 s - initiator_thread
Initiator: 101 starting new transaction for Addr:0x00000100
Initiator: 101 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Info: select_initiator.cpp: 0 s - initiator_thread
Initiator: 101 ACCEPTED (GP, BEGIN_REQ, 0 s)
Initiator: 101 transaction waiting end-request on backward-path
...
Info: at_target_1_phase.cpp: 0 s - nb_transport_fw
Target: 201 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Info: memory.cpp: 0 s - print
ID: 201 COMMAND: WRITE Length: 04
Addr: 0x0000000000000100 Data: 0x00000100
Info: at_target_1_phase.cpp: 0 s - nb_transport_fw
Target: 201 COMPLETED (GP, BEGIN_REQ, 40 ns)
Info: select_initiator.cpp: 40 ns - nb_transport_bw
Initiator: 101 nb_transport_bw (GP, BEGIN_RESP, 0 s)from Addr:0x00000100
Initiator: 101 target omitted end-request timing-point returning ACCEPTED
```



# Expected Output – Target ID: 202

```
Info: select_initiator.cpp: 0 s - initiator_thread
      Initiator: 102 starting new transaction for Addr:0x10000200
      Initiator: 102 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Info: select_initiator.cpp: 0 s - initiator_thread
      Initiator: 102 ACCEPTED (GP, BEGIN_REQ, 0 s)
      Initiator: 102 transaction waiting end-request on backward-path
...
Info: select_initiator.cpp: 50 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_2_phase.cpp: 80 ns - begin_response_method
      Target: 202 starting response method
Info: memory.cpp: 80 ns - print
      ID: 202 COMMAND: WRITE Length: 04
      Addr: 0x0000000000000200 Data: 0x10000200
Info: at_target_2_phase.cpp: 80 ns - begin_response_method
      Target: 202 nb_transport_bw (GP, BEGIN_RESP, SC_ZERO_TIME)
Info: at_target_2_phase.cpp: 80 ns - begin_response_method
      Target: 202 ACCEPTED (GP, BEGIN_RESP, 0 s)
Info: select_initiator.cpp: 80 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: 87 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: 87 ns - send_end_rsp_method
      Initiator: 102 COMPLETED (GP, END_RESP, 0 s)
```



# Expected Output – Target ID: 203 (1 of 2)

```
Info: select_initiator.cpp: 1974 ns - initiator_thread
      Initiator: 102 starting new transaction for Addr:0x20000200
      Initiator: 102 nb_transport_fw (GP, BEGIN_REQ, 0 s)
Info: select_initiator.cpp: 1974 ns - initiator_thread
      Initiator: 102 ACCEPTED (GP, BEGIN_REQ, 0 s)
      Initiator: 102 transaction waiting end-request on backward-path
Info: at_target_4_phase.cpp: 1974 ns - nb_transport_fw
      Target: 203 nb_transport_fw (GP, BEGIN_REQ, 0 s)
      Target: 203 ACCEPTED (GP, BEGIN_REQ, 0 s)
Info: at_target_4_phase.cpp: 1984 ns - end_request_method
      Target: 203 starting end-request method
      Target: 203 transaction moved to send-response PEQ
      Target: 203 nb_transport_bw (GP, END_REQ, 0 s)
Info: at_target_4_phase.cpp: 1984 ns - end_request_method
      Target: 203 ACCEPTED (GP, END_REQ, 0 s)
Info: select_initiator.cpp: 1984 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)
```

...

Address  
modified  
by router!



# Expected Output – Target ID: 203 (2 of 2)

...

Info: at\_target\_4\_phase.cpp: 2014 ns - begin\_response\_method  
Target: 203 starting response method

Info: memory.cpp: 2014 ns - print  
ID: 203 COMMAND: WRITE Length: 04  
Addr: 0x0000000000000200 Data: 0xDFFFDFF

Info: at\_target\_4\_phase.cpp: 2014 ns - begin\_response\_method  
Target: 203 nb\_transport\_bw (GP, BEGIN\_RESP, SC\_ZERO\_TIME)

Info: at\_target\_4\_phase.cpp: 2014 ns - begin\_response\_method  
Target: 203 ACCEPTED (GP, BEGIN\_RESP, 0 s)

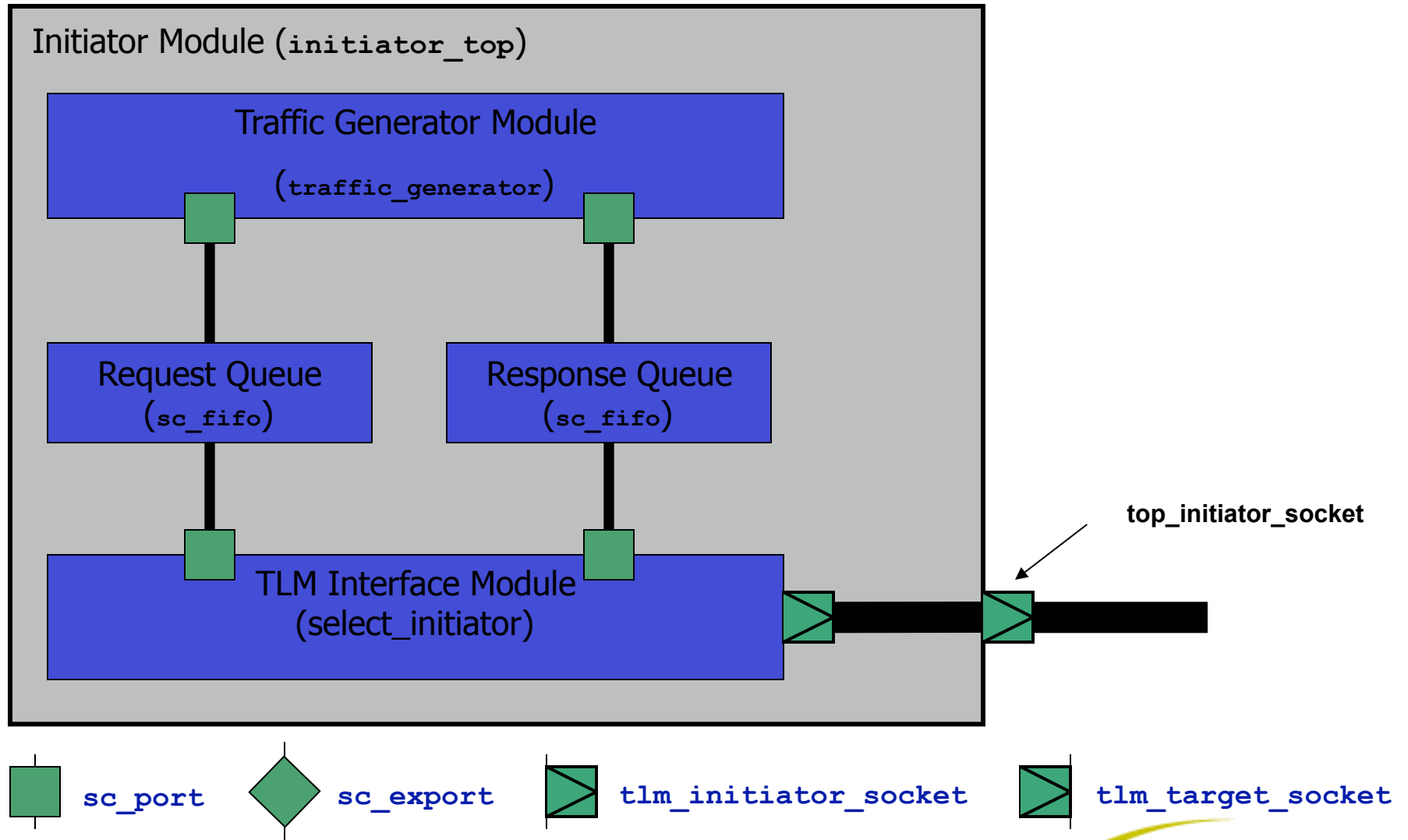
Info: select\_initiator.cpp: 2014 ns - nb\_transport\_bw  
Initiator: 102 nb\_transport\_bw (GP, BEGIN\_RESP, 0 s) from Addr: 0x00000200  
Initiator: 102 transaction moved to send-end-response PEQ  
Initiator: 102 ACCEPTED (GP, BEGIN\_RESP, 0 s)

Info: select\_initiator.cpp: 2021 ns - send\_end\_rsp\_method  
Initiator: 102 starting send-end-response method  
Initiator: 102 nb\_transport\_fw (GP, END\_RESP, 0 s)

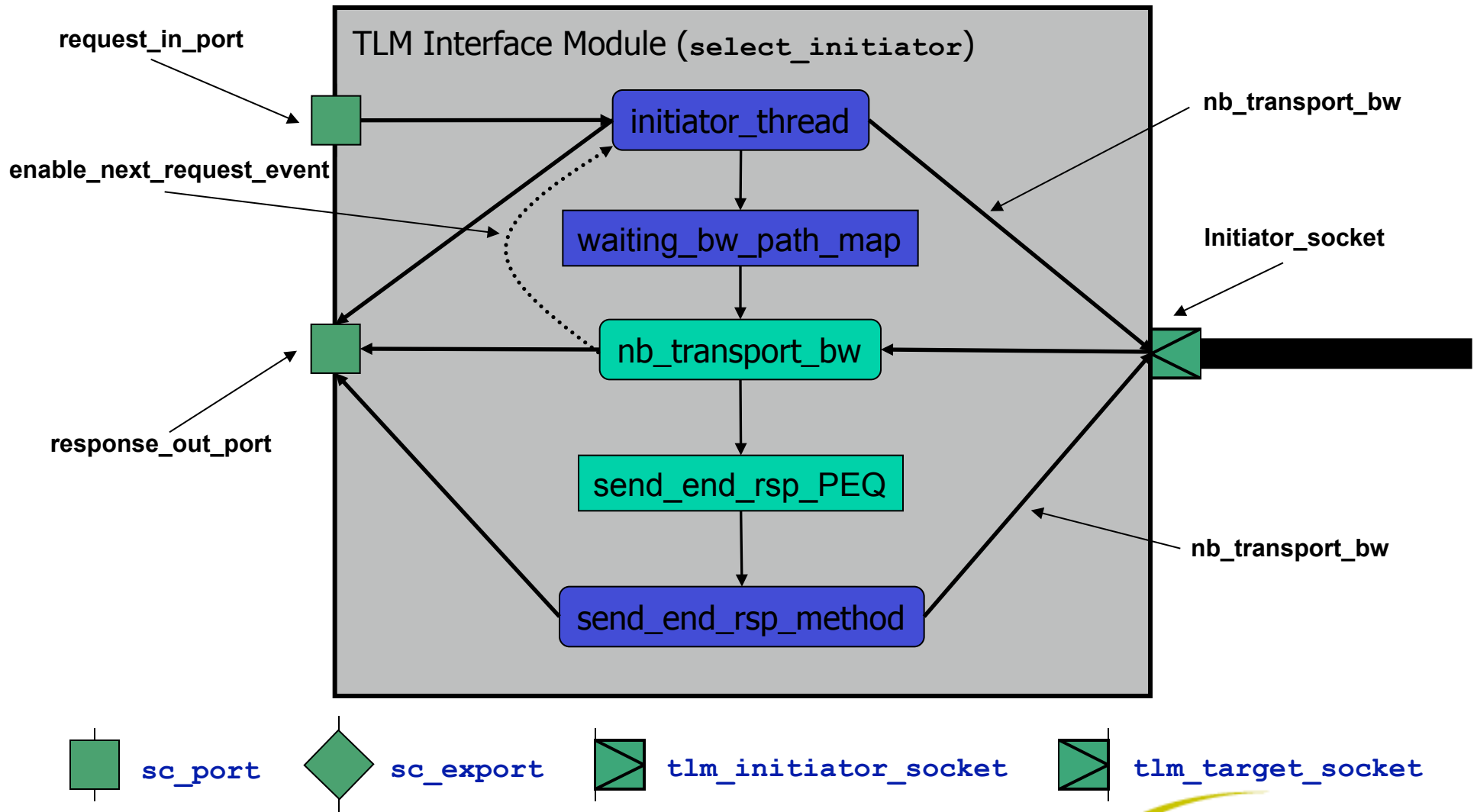
Info: select\_initiator.cpp: 2021 ns - send\_end\_rsp\_method  
Initiator: 102 COMPLETED (GP, END\_RESP, 0 s)



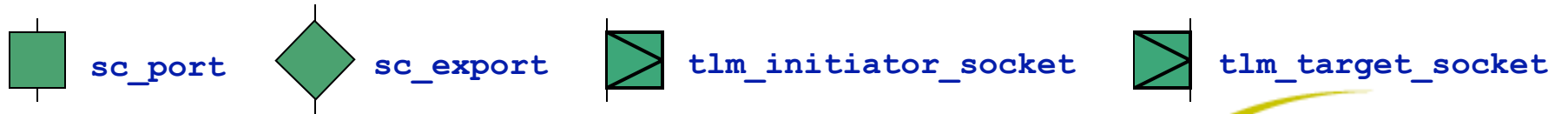
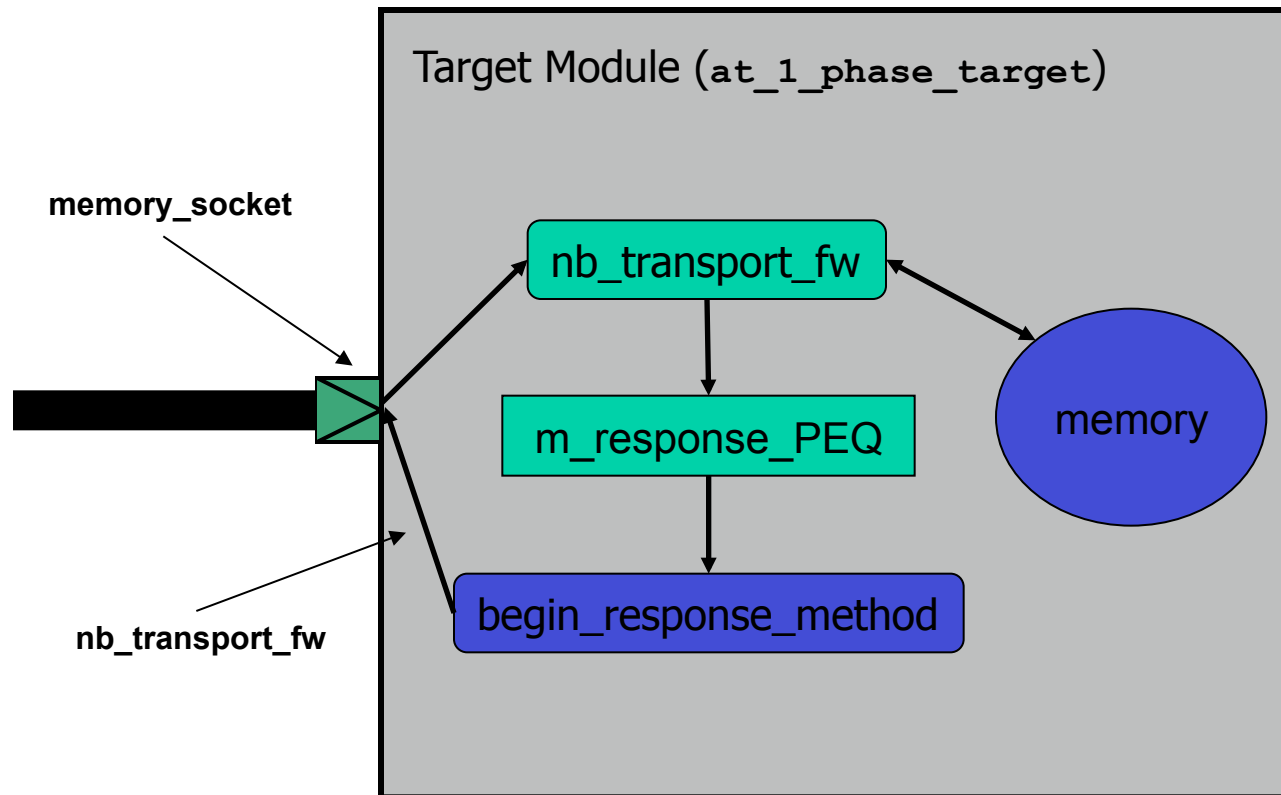
# Initiator Module



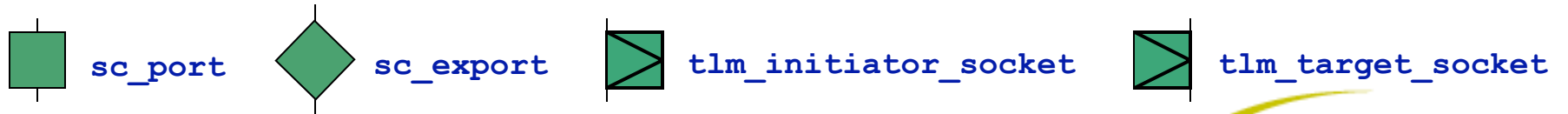
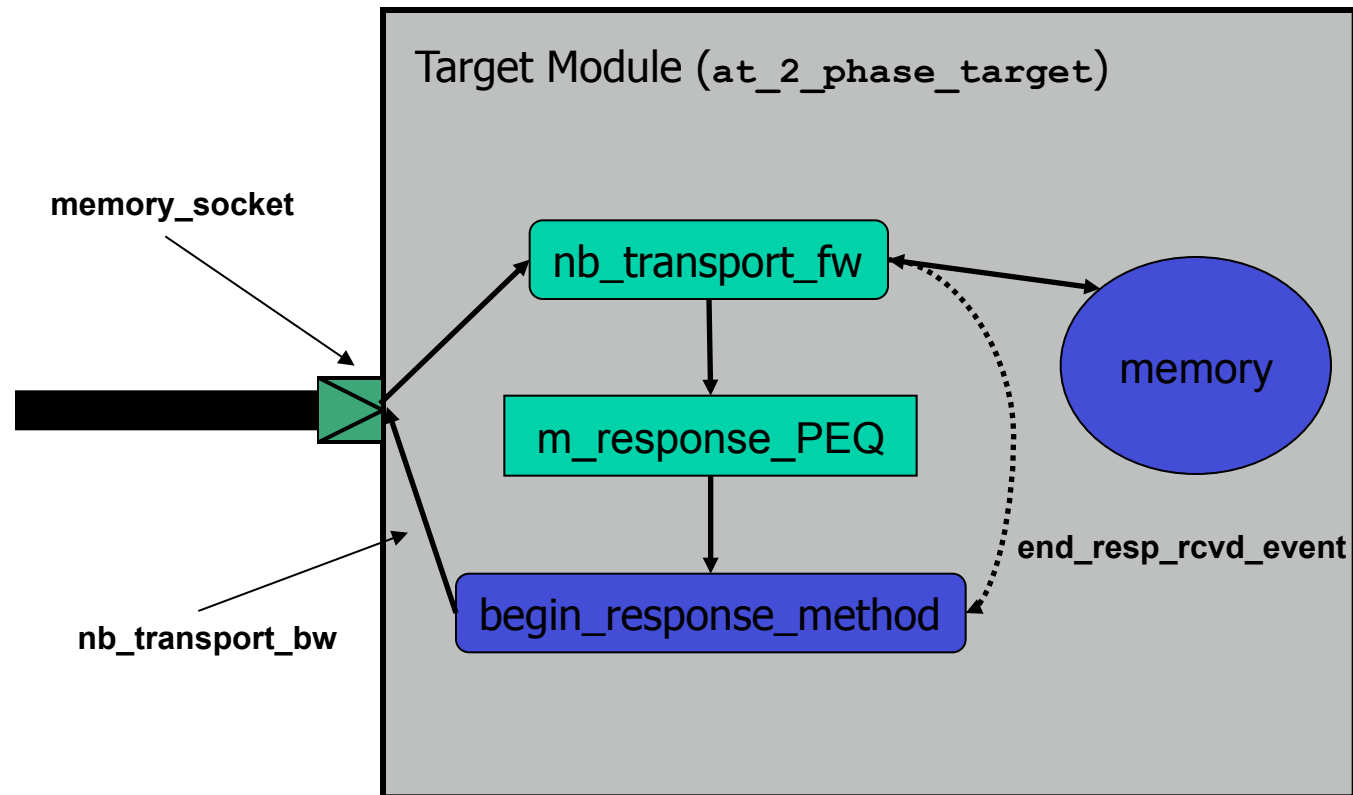
# TLM Interface Module



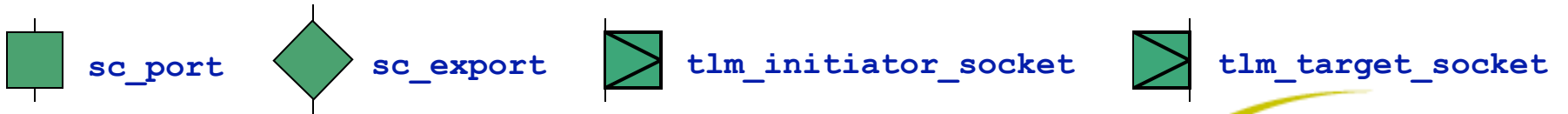
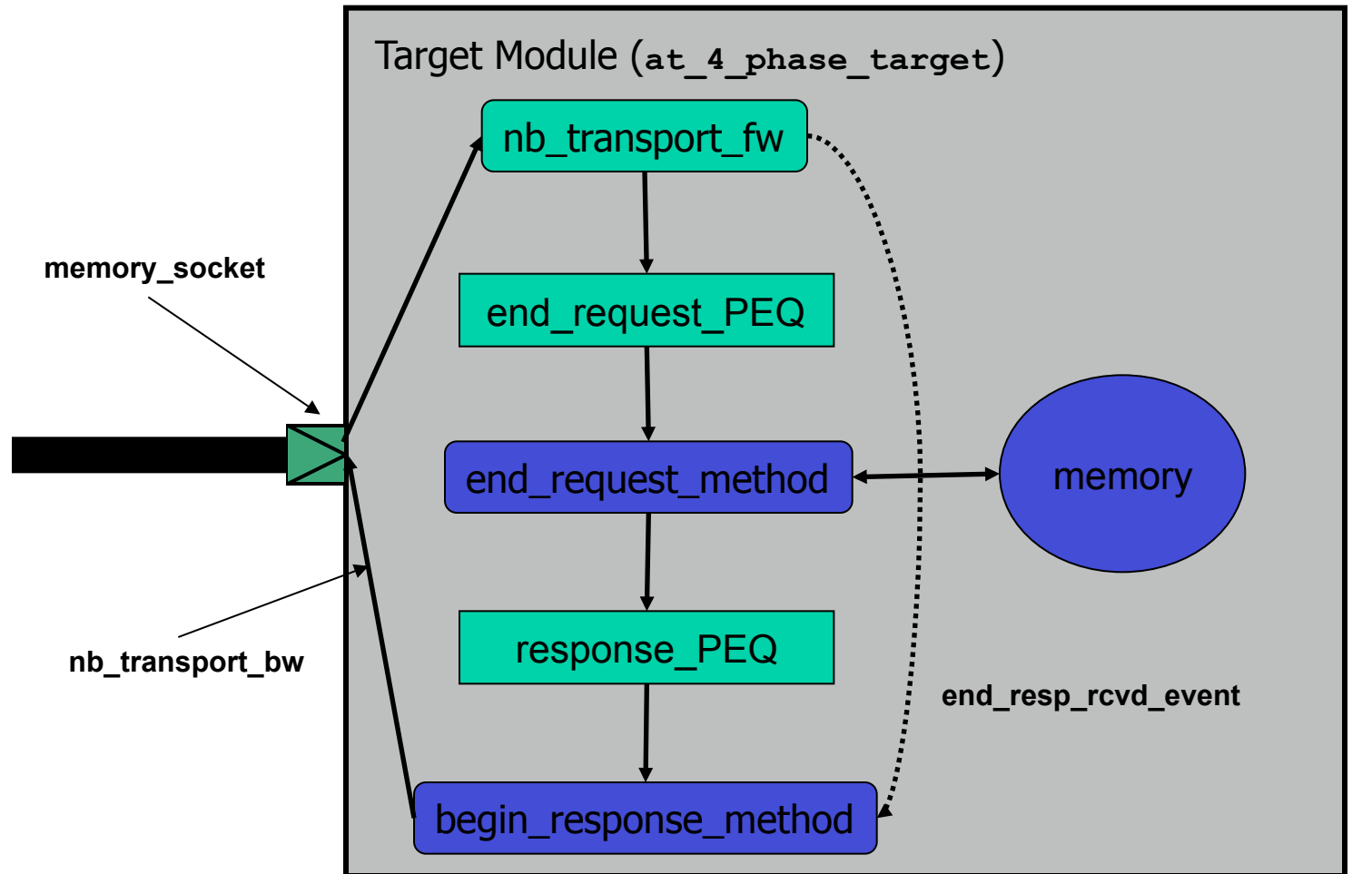
# Target Module



# Target Module



# Target Module



# Router Component

