SpaceWire BFM for Test, Verification and Certification

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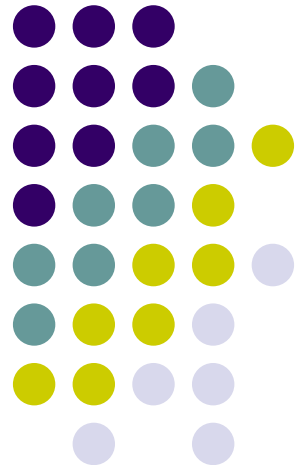
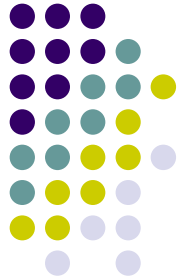


SUAI

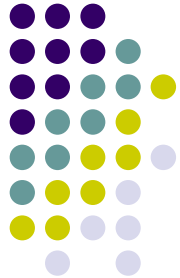
Testing, Verification and Certification



- **Device Interoperability testing (DI);** *demonstrates interoperability with a limited set of reference devices.*

- **Specification compliance testing (SC);** *demonstrates that a standard implementation complies the standard itself*

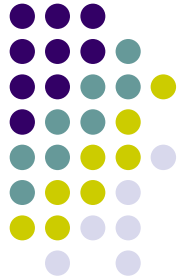
What to Test, Verify and Certify (TVC)



SpaceWire Test and Verification:

- Devices that implement SpaceWire
  - SpaceWire links, link controller chips
  - SpaceWire nodes
  - SpaceWire routers
- IP-blocks that implement SpaceWire
  - RTL-models
  - Post-synthesis models
  - System-level models

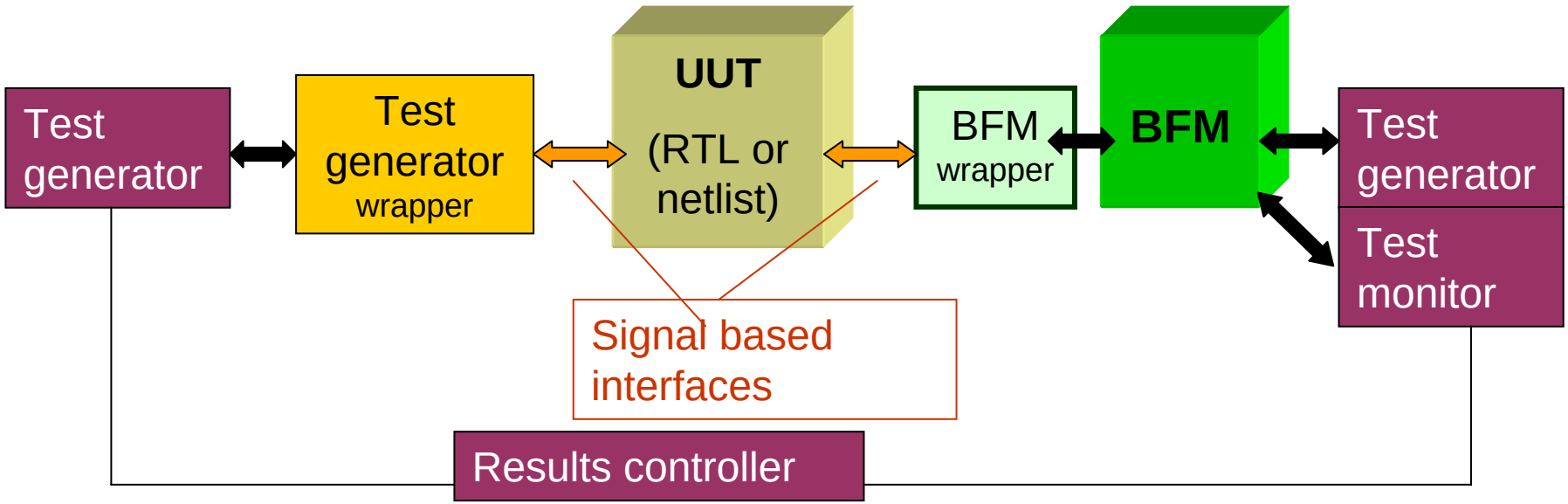
Support for IP-blocks testing and verification

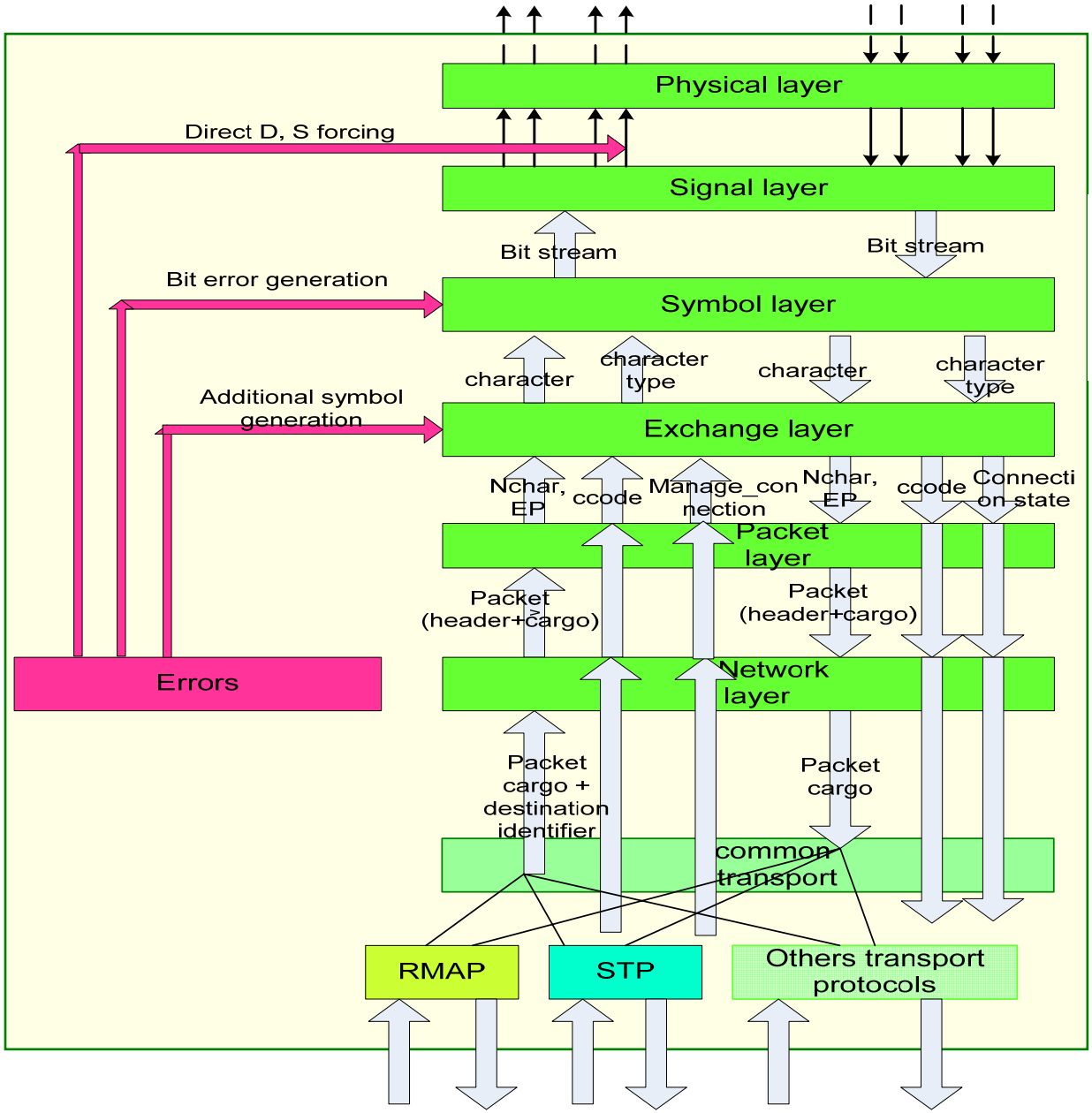


- BFM (Base Formal Model)
  - hierarchical model of a protocol stack
- BFM levels correspond to the standard's protocol stack layers.
- BFM are programmed in a high-level languages (e.g. **SystemC** for RapidIO BFM, VHDL, Verilog)

Basic TVC package with a BFM

- BFM (base formal model) of the protocol stack
- Test generator, test monitor and results controller
- BFM wrapper (to connect BFM to an RTL or netlist)
- Test generator wrapper (to connect test generator to an RTL or netlist)

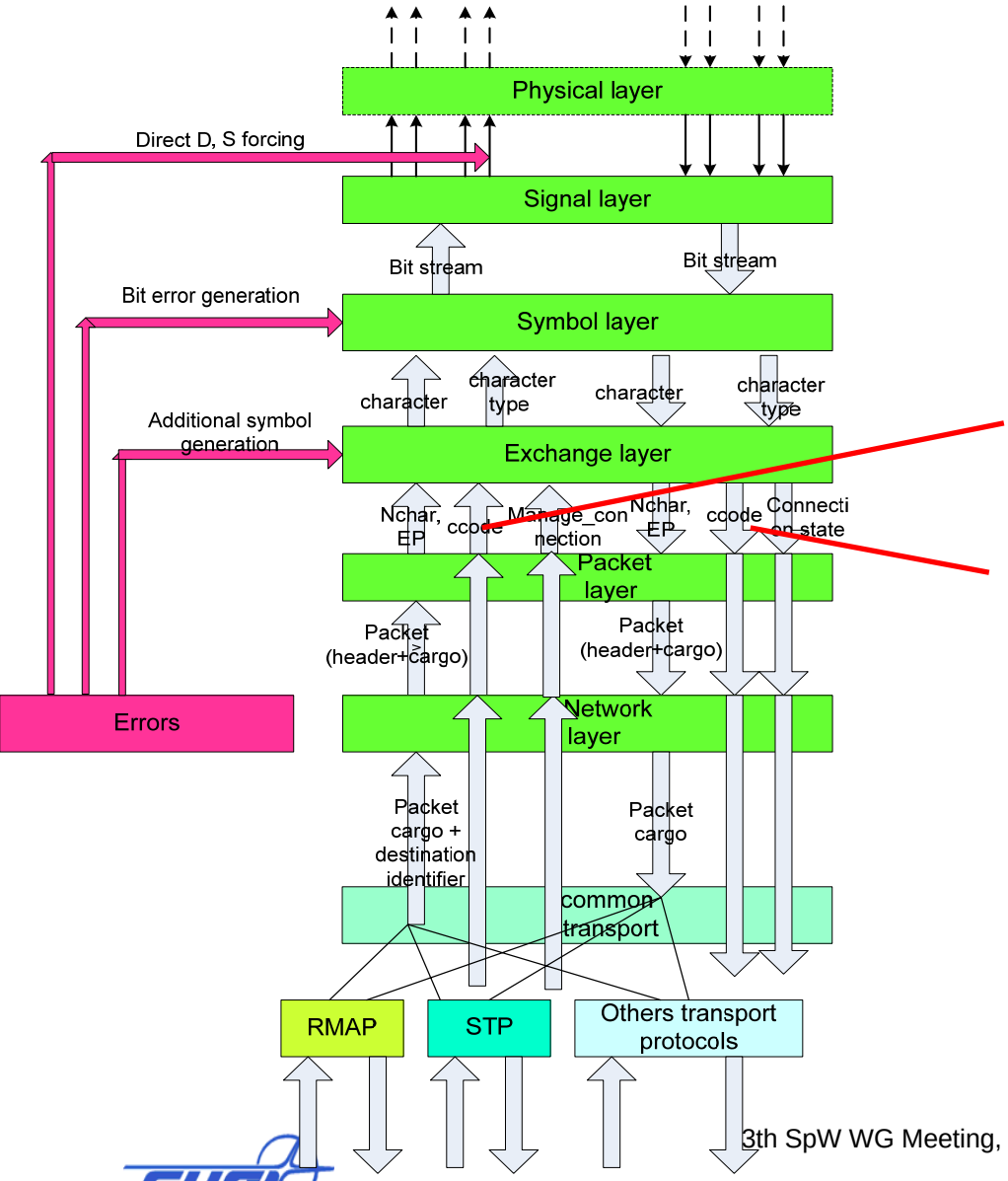




SpaceWire BFM Structure

- Multilayered structure
- Simulation of all correct situations
- Simulation of errors
- SystemC (VHDL, Verilog could be used)
- Works in ncSim, ModelSim, etc.

BFM. Logical ports

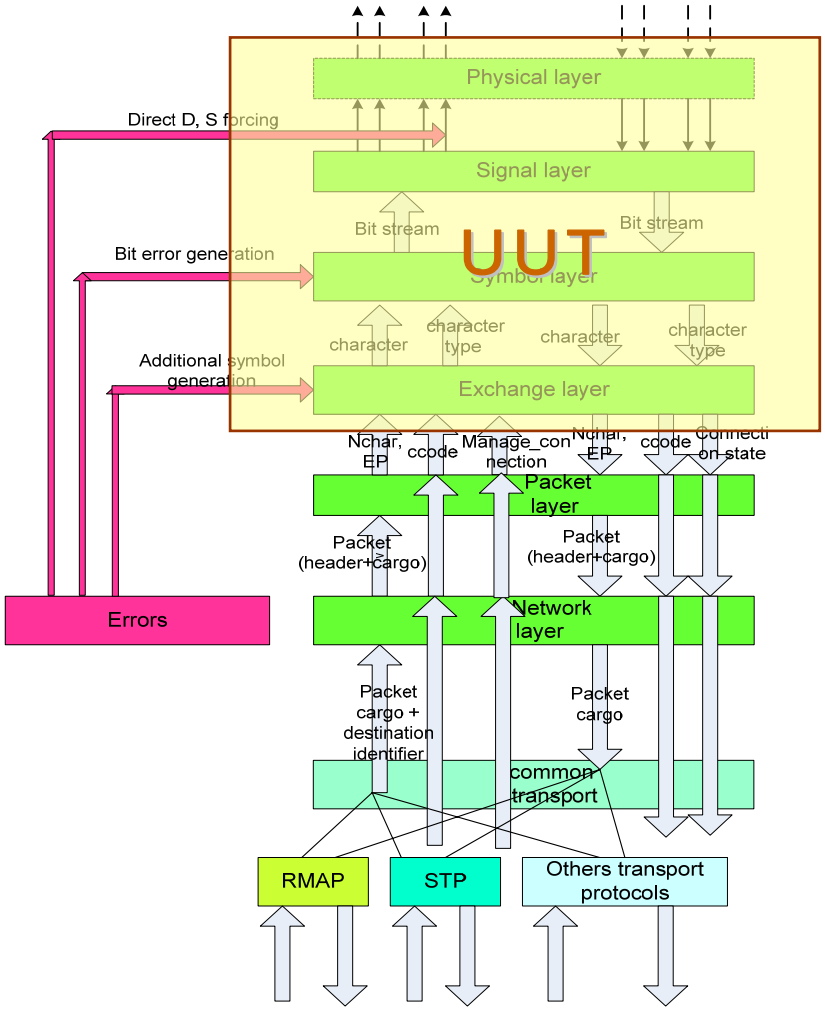


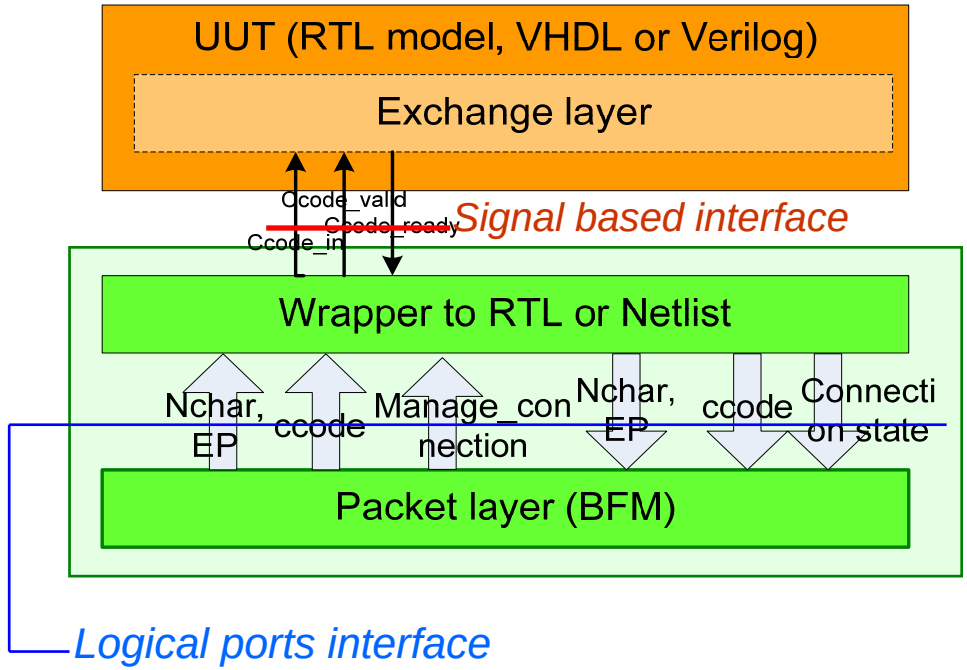
Example of interface structure (logical ports):

```
int send_Ccode(t_code Ccode_);
bool ready_to_send_Ccode();
```

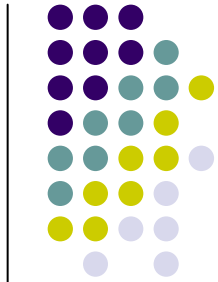
```
t_code receive_Ccode();
bool received_Ccode();
```

BFM wrappers.
Working with separate layers



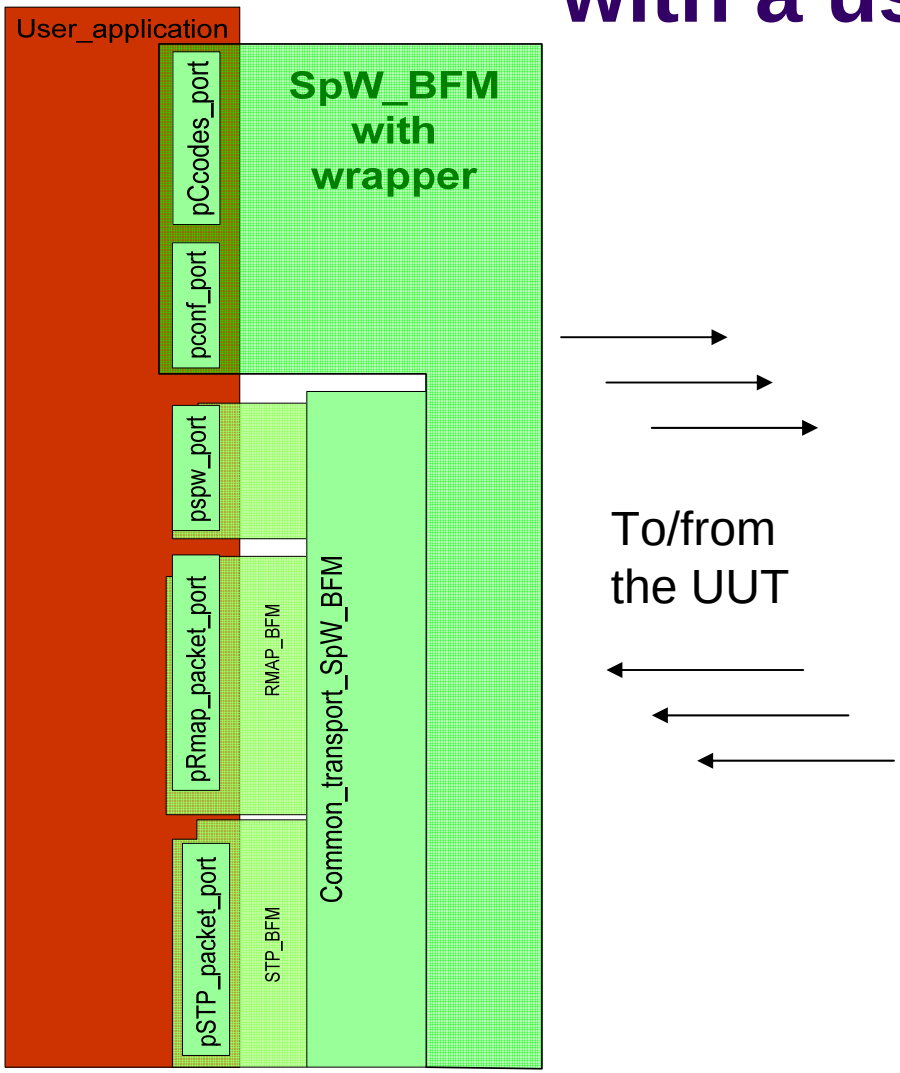


Testing with the BFM



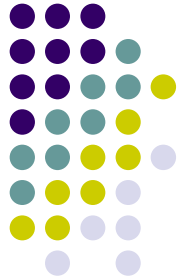
- IP-block (or chip) designer includes BFM modules in his testing environment , with the ready-made component models, test sequences and prescribed testing procedures
- Complement the standard test set by specific for particular UUT settings
- Runs the testing environment with his design for a sequence of standardized TVC procedures

BFM Integration with a user application



- An application integrates BFM layer classes and methods with which the testing application needs to work (Transport layer at the figure)
- The application can test sequences, send them through BFM to a UUT, receive reactions and analyse them

Open problems in TVC



To be provided with the SpaceWire standard :

- Methodology for Test and Verification (informative)
- Methodology for Certification (normative)
- Test sets that support the methodology
- Instruments for Test, Verification and Certification
  - support in development,
  - an open recommended list of instruments

Thank you !