Verification of ASA-ML using IBIS-AMI

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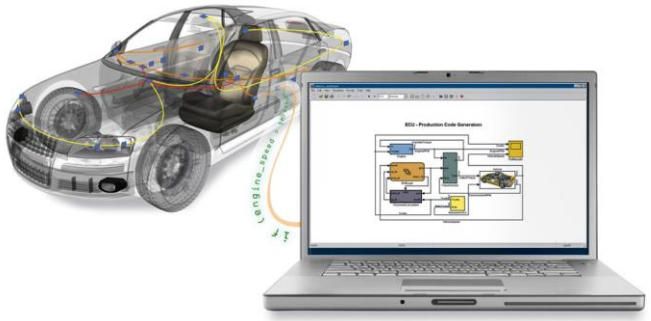
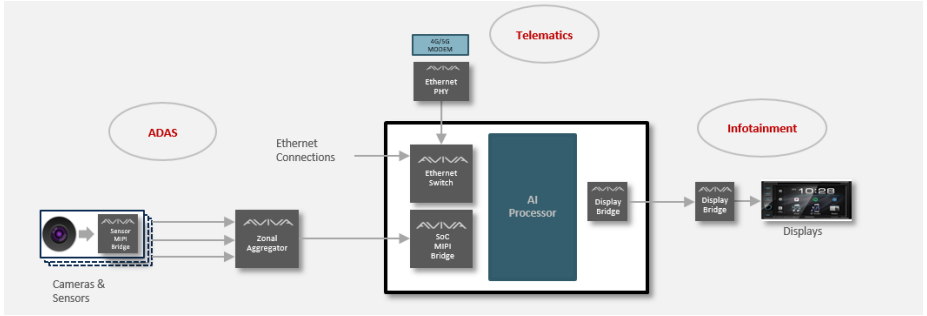
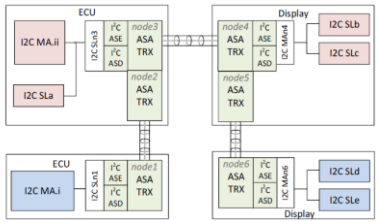
Automotive Networks



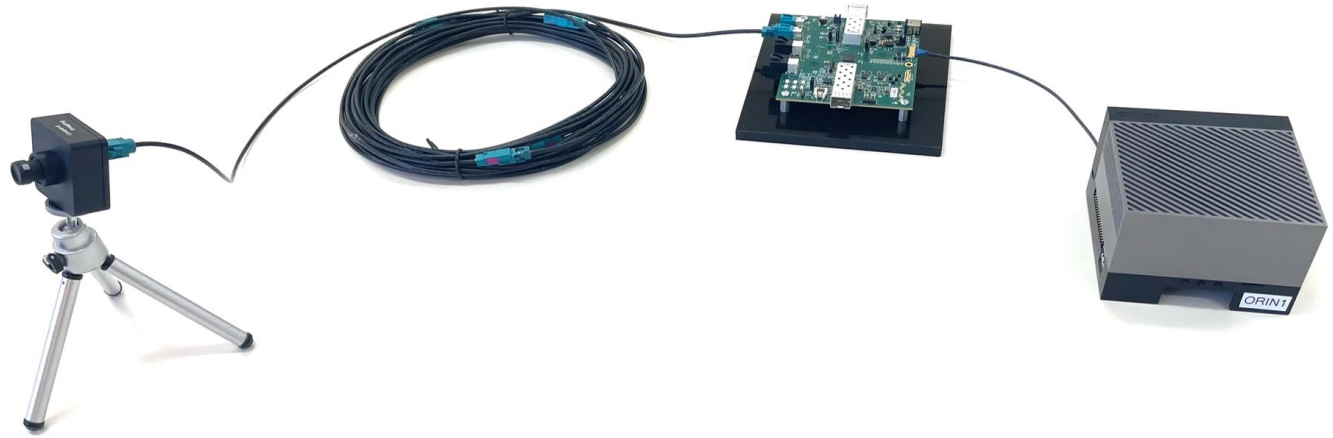




- Bidirectional Interfaces:
  - NRZ and PAM4
  - Downstream Baud rates: 8/6/4/2 GHz
  - Downstream Payload rates: 1.8/3.6/6.4/9.7/13 Gbps
  - Upstream Baud rates: 2/4 Ghz
  - Upstream Payload rates: 100M/50M
- Cabling:
  - 50Ω Coax up to 15 meters with Power Delivery
- Synchronization:
  - Half Duplex Precision Time Base (PTB) mechanism enables precise timing synchronization using time stamping, making these parts ideal for use in time sensitive multi-sensor applications.

Example

AVIVA: Automotive Camera to NVIDIA ORIN System Demo



Automotive Camera Modules

- Form factor camera modules
- Include the Sensor + Aviva Ser boards
- Imager examples
  - Omnivision OX03F10 3MP
  - Sony IMX728 8MP

Cable support

- > 15m Coax w/ 4 inline connectors
- > 12m STP w/ 4 inline connectors
- Power over Coax and STP supported

Orin Jetson AGX platform

- Camera drivers running on Orin

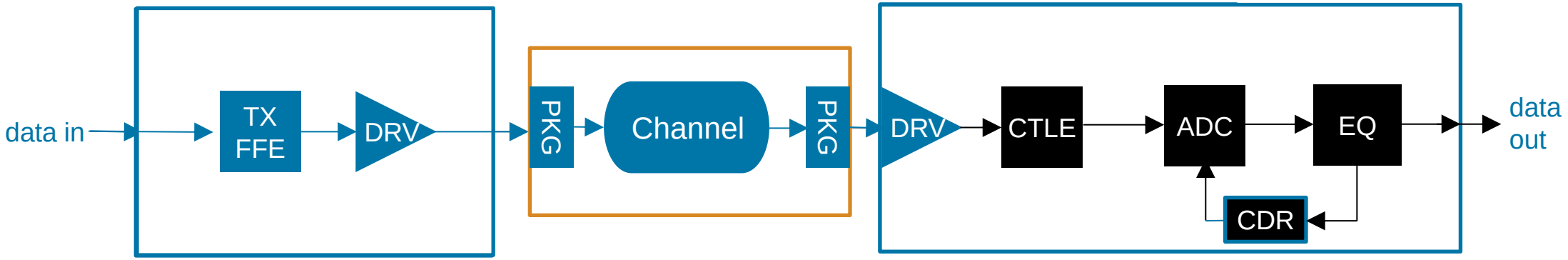
Modeling a Physical Product

AVIVA Silicon

- 4-Ports ASA-ML 16Gbps SerDes
- DAC/ADC-based architecture
- Fully Adaptive to channel conditions

IBIS-AMI model using tools from Mathworks

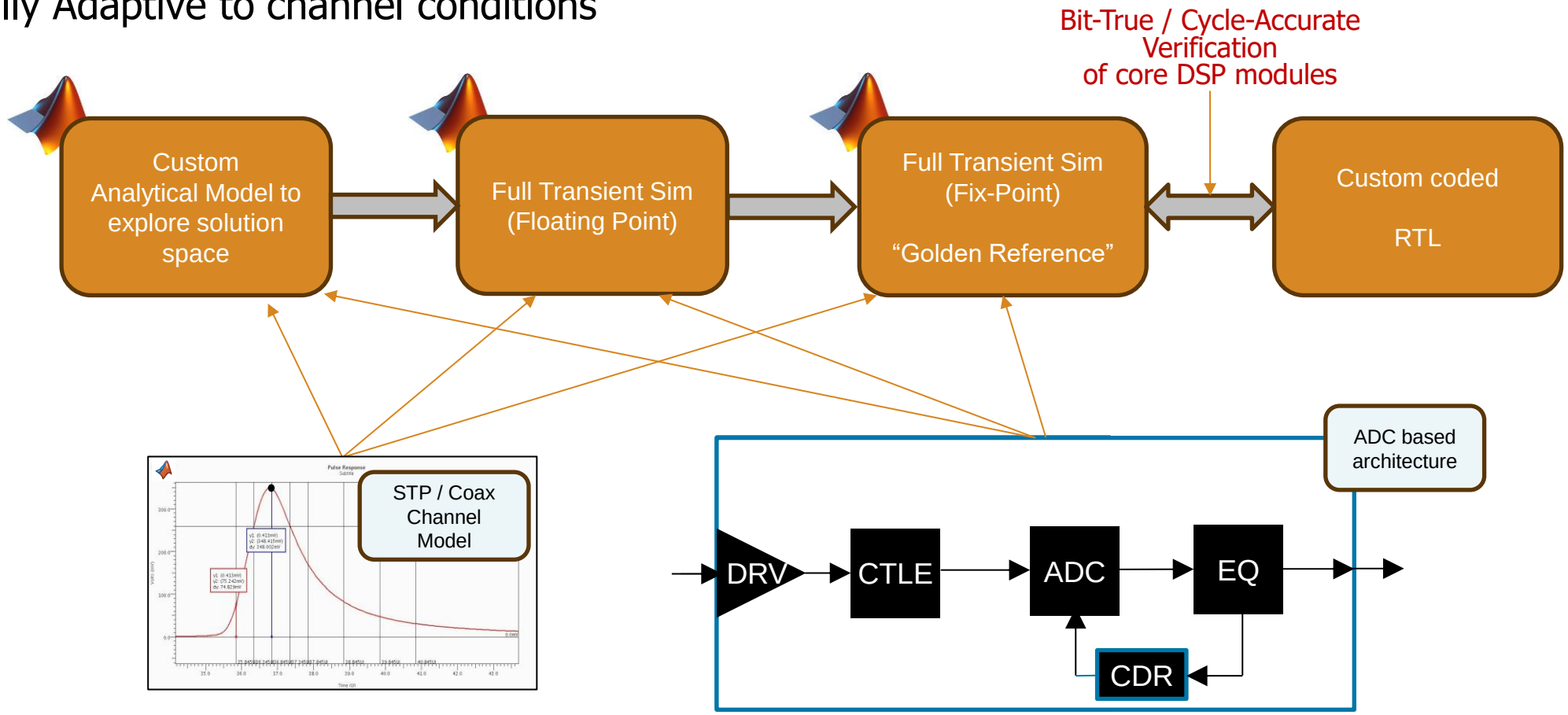
- Import key MATLAB DSP blocks from "Golden Reference"
- Specify CTLE response based on characterized device
- Validate results against full transient simulations
- Generate and deliver IBIS-AMI model to customers



Designing a SerDes Receiver

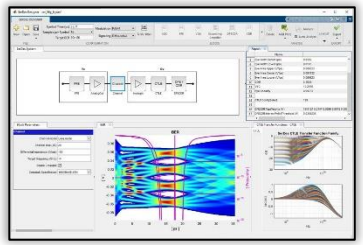
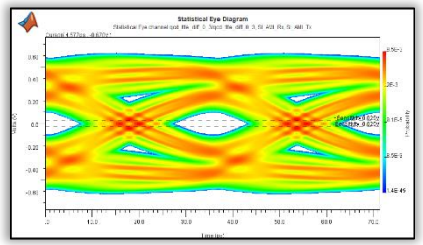
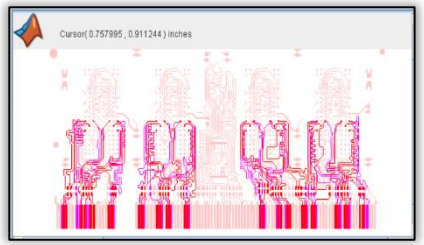
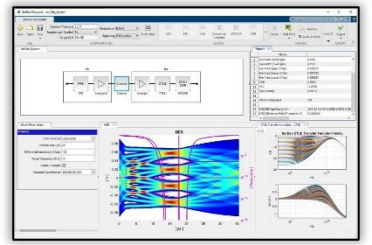
High-Speed SerDes for Automotive Connectivity

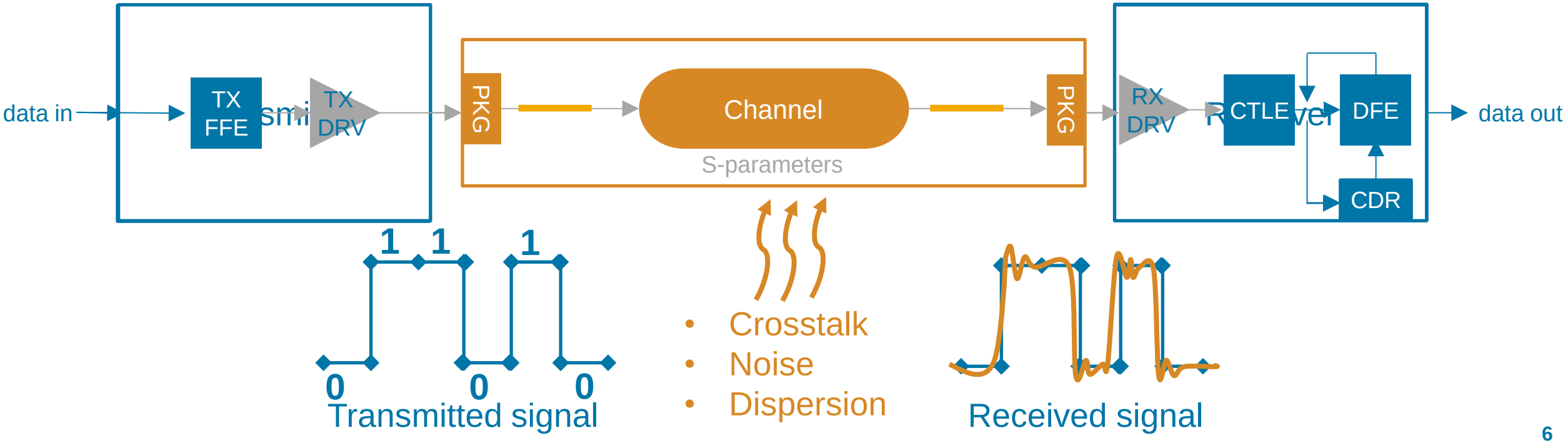
- ASA 16Gbps SerDes
- ADC-based architecture
- Fully Adaptive to channel conditions



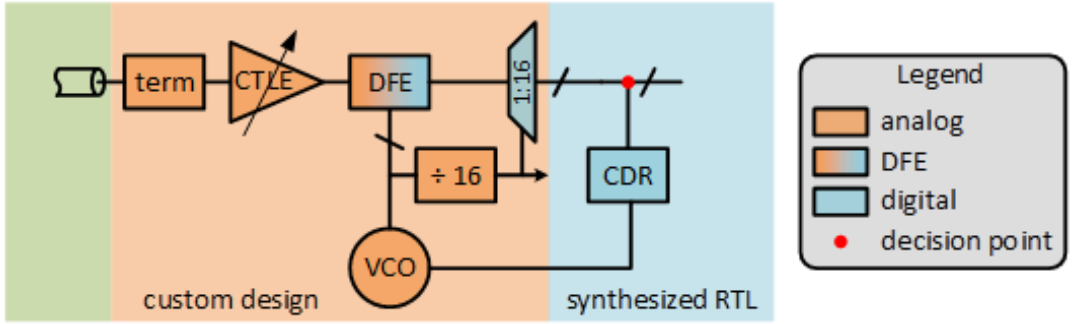
SerDes and Signal Integrity Analysis with MATLAB®

SerDes Architecture | Pre-layout Simulation | Post-layout | Model Generation

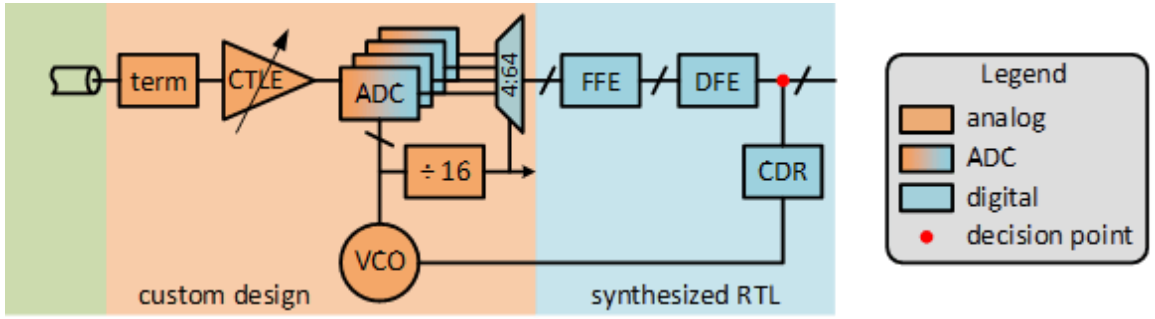


Types of Architecture



Analog Based SerDes

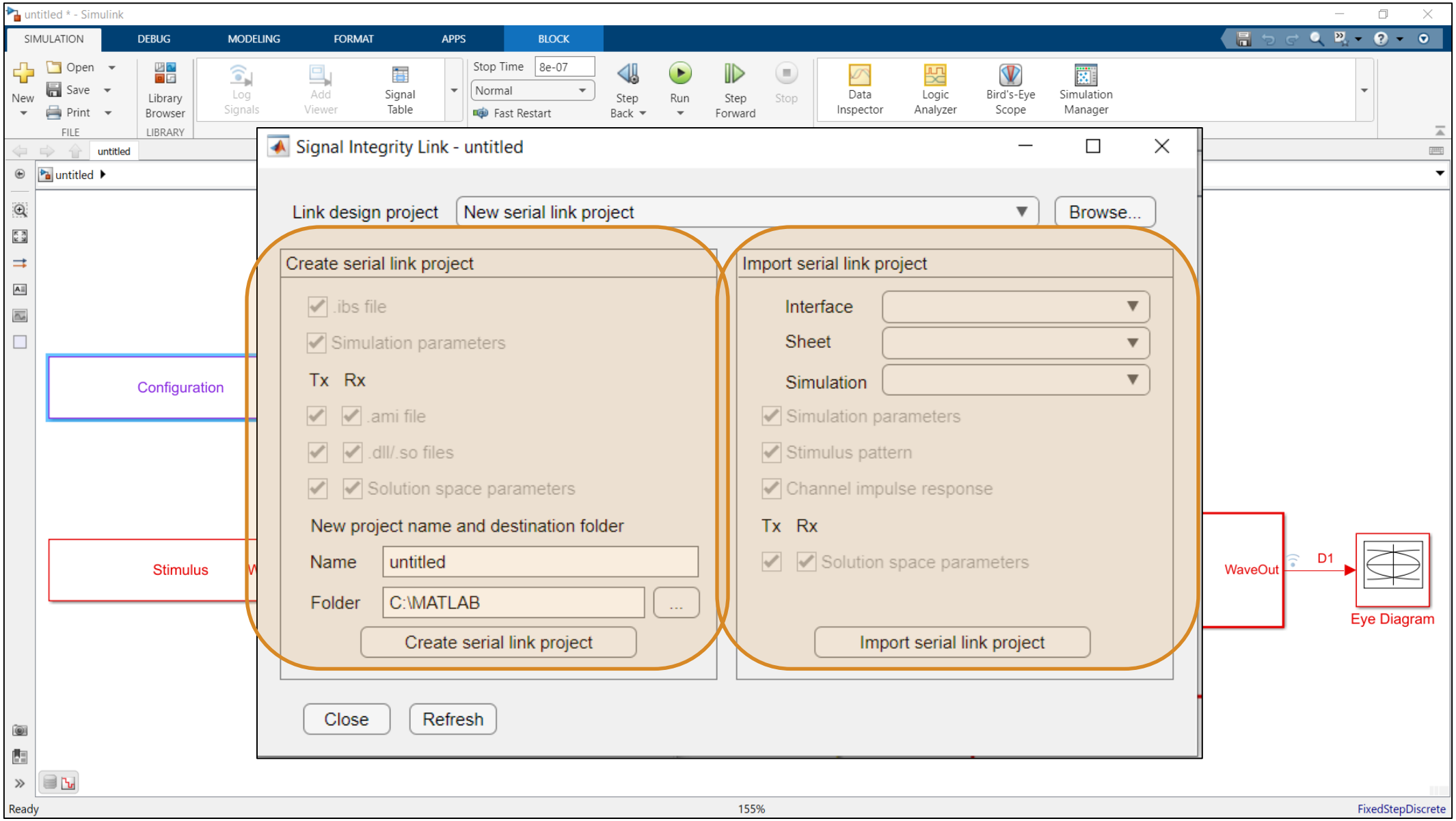
Smaller Area
Lower Power
Suitable for high-scale integration in large ASICs



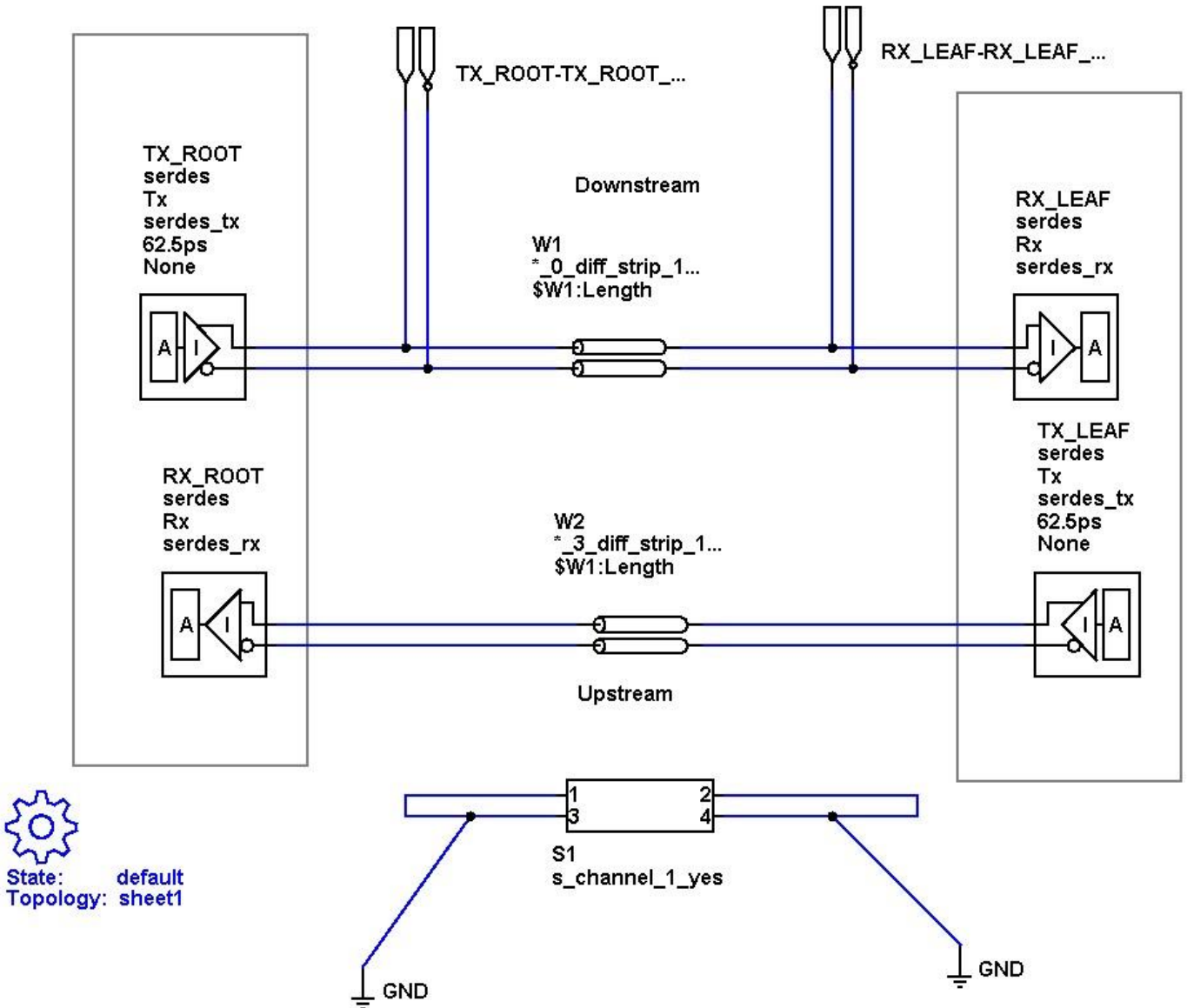
ADC Based Digital SerDes

Higher performance
Flexible architecture
Powerful diagnostics
Easier to port to smaller geometries
Less susceptible to PVT variations

Signal Integrity Link



Signal Integrity setup

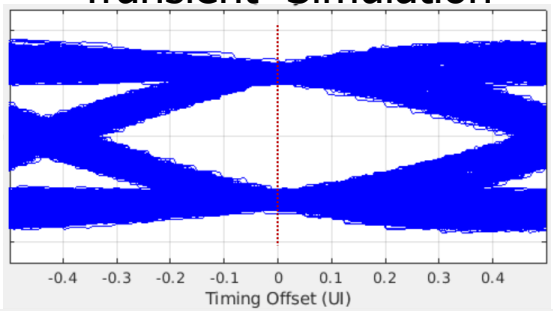


Full Transient vs. IBIS-AMI

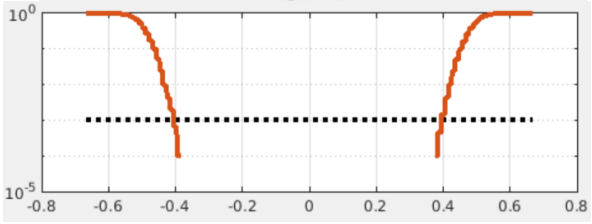
"Golden Reference"

Transient Simulation

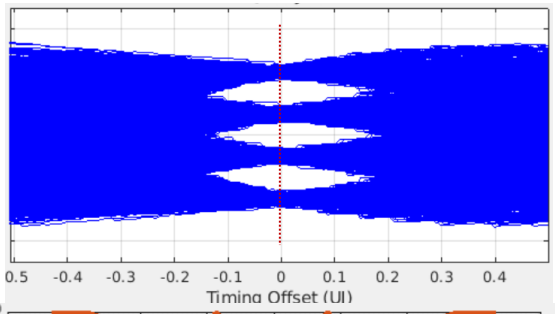
SG3 (8Gbps)



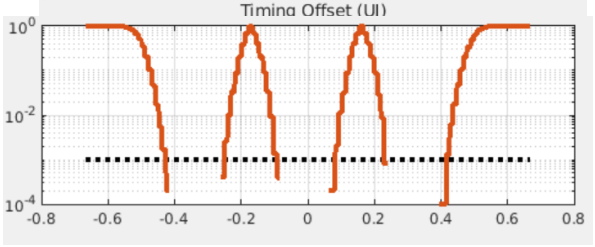
Vertical Bathtub



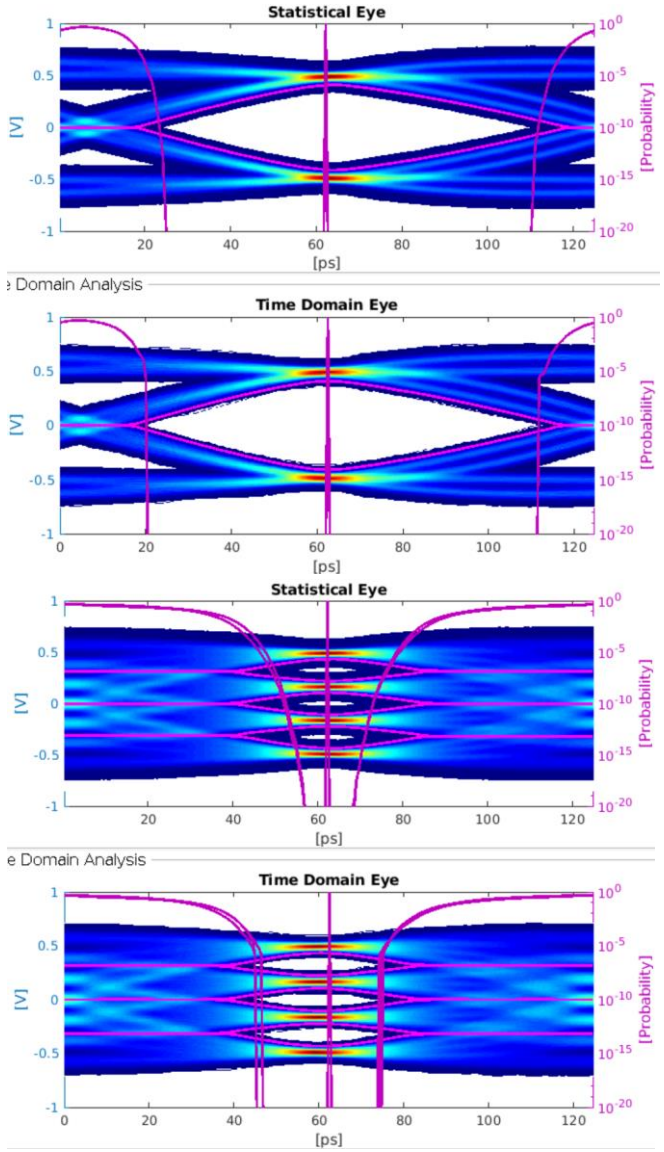
SG5 (16Gbps)



Vertical Bathtub



IBIS-AMI Simulation



Summary

- Complex architecture can be easily verified for different baud rates
- Time domain simulation to capture time-varying effects and including customization
- Compiling link to IBIS-AMI model to do regression analysis
- Compare results to all standard specification

Thank you

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