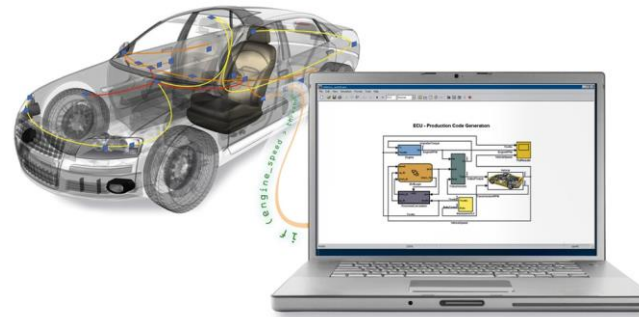


Verification of ASA-ML using IBIS-AMI

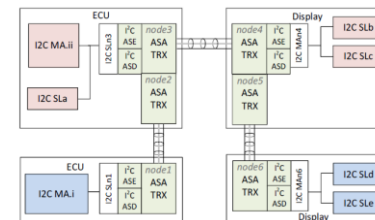
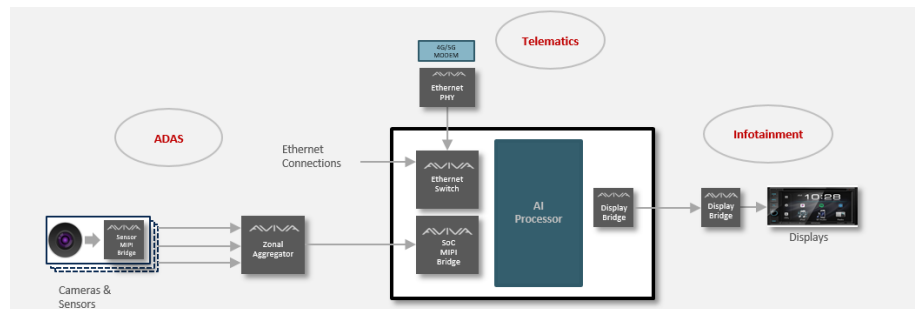
Ganesh Rathinavel, William Warner, Hiok-Tiaq Ng, Walter Katz, Graham Kus

DesignCon IBIS Summit
Santa Clara, CA
January 31, 2025

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

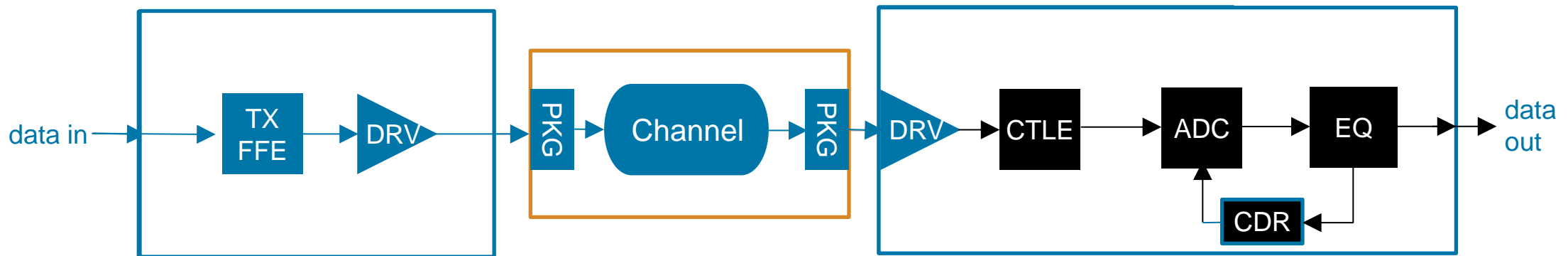
AVIVA Silicon

- 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



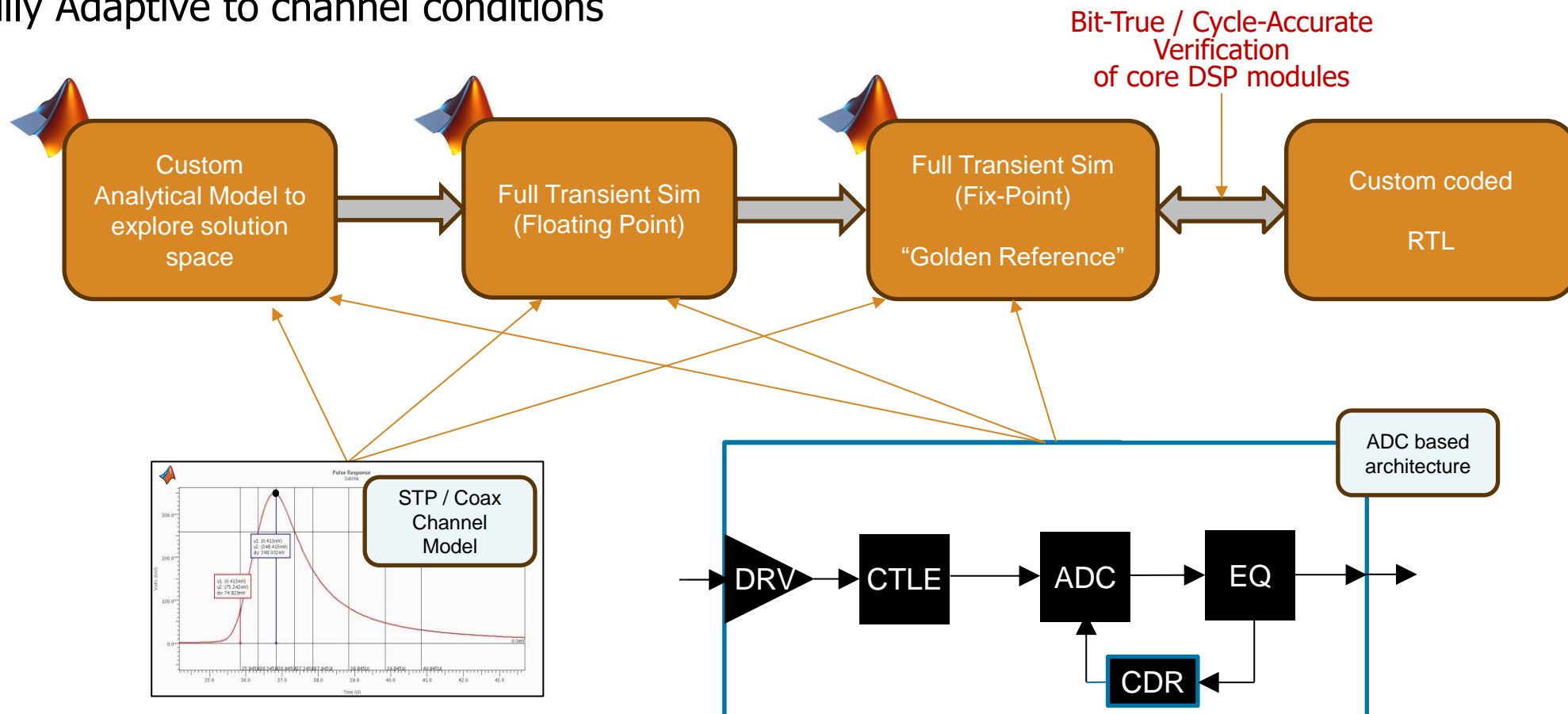
Designing a SerDes Receiver

High-Speed SerDes for Automotive Connectivity

ASA 16Gbps SerDes

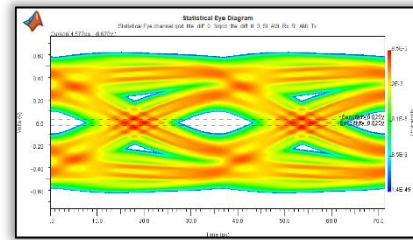
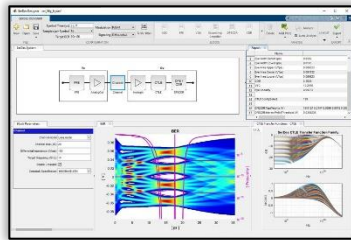
ADC-based architecture

Fully Adaptive to channel conditions

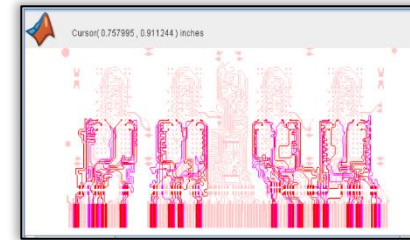


SerDes and Signal Integrity Analysis with MATLAB®

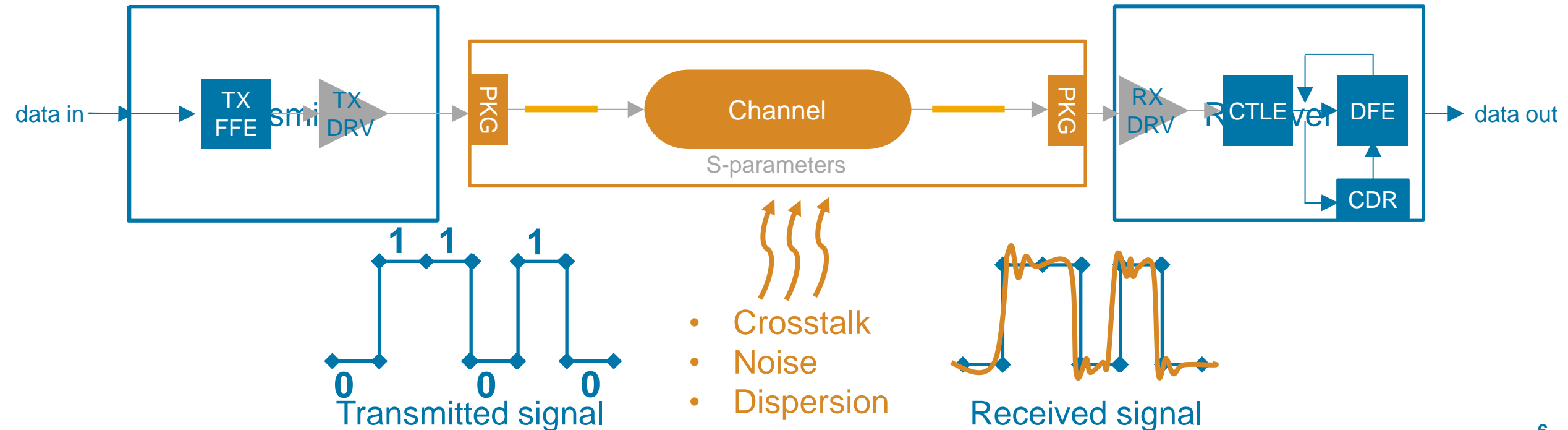
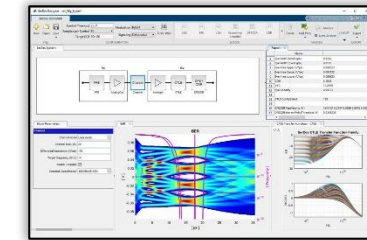
SerDes Architecture Pre-layout Simulation



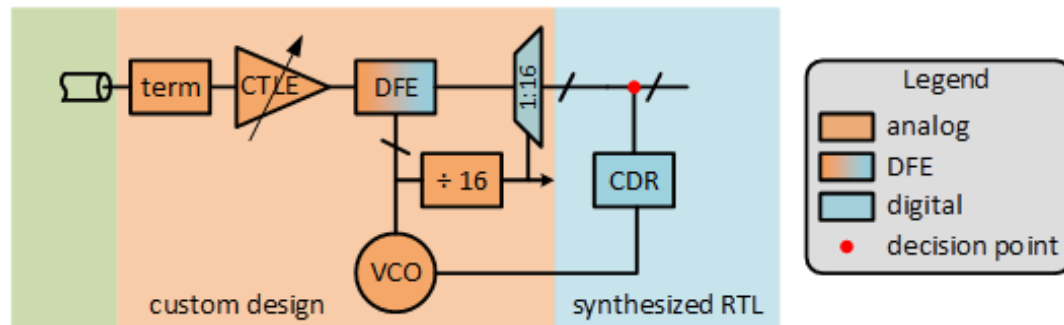
Post-layout



Model Generation

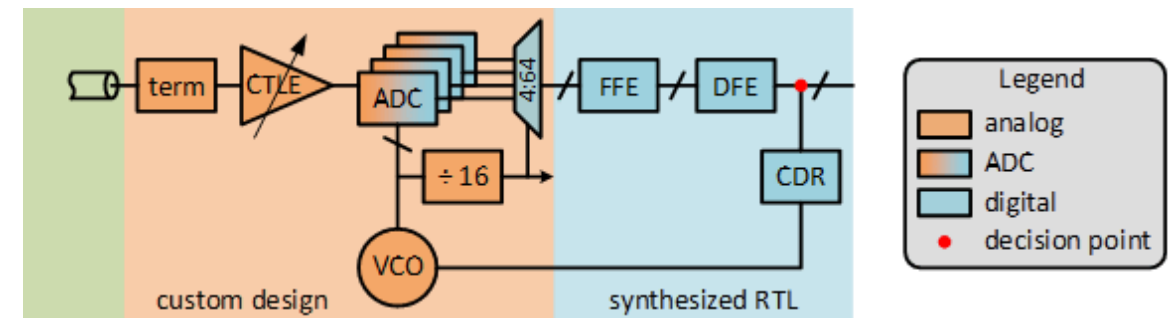


Types of Architecture



Analog Based SerDes

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



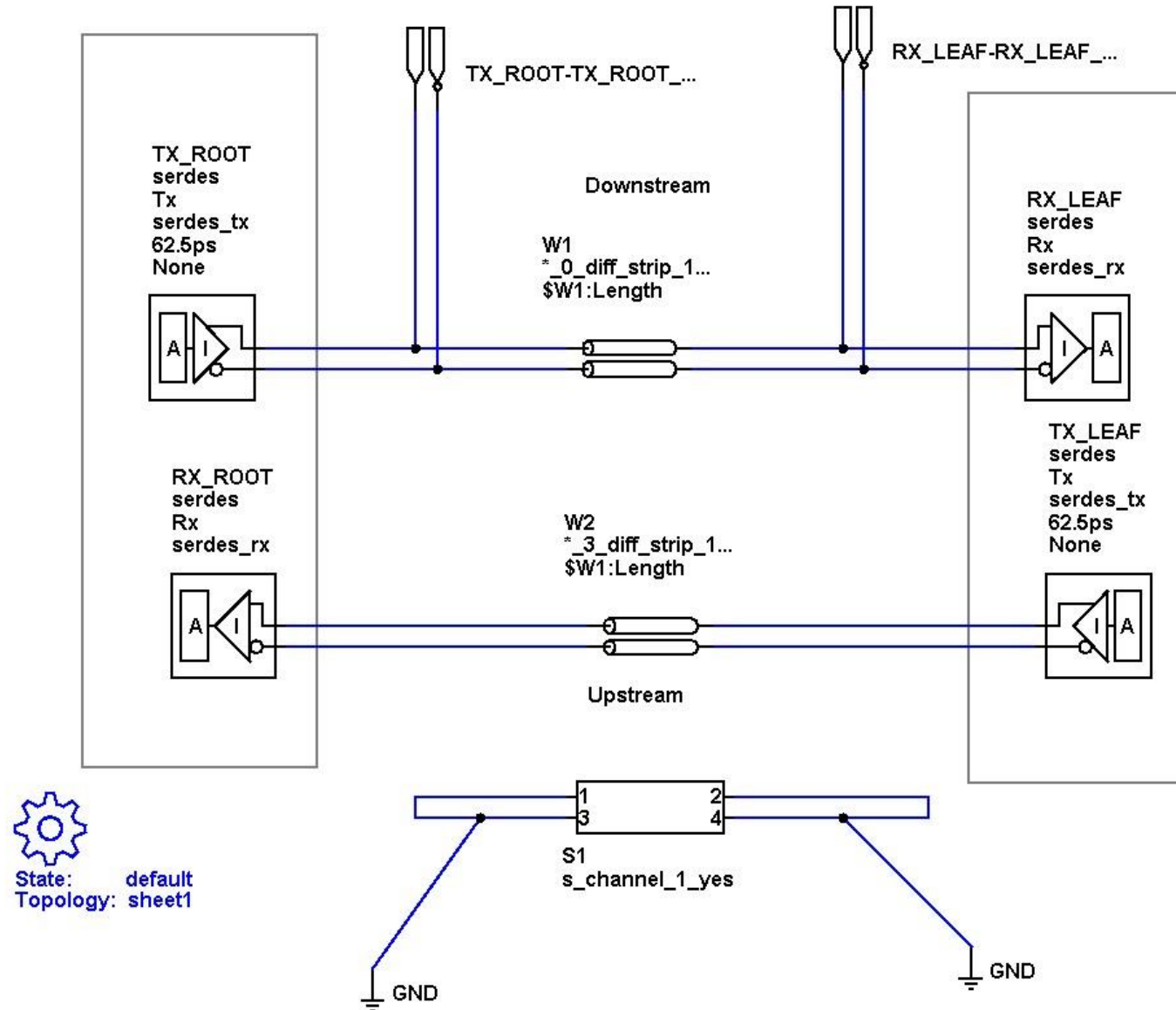
ADC Based Digital SerDes

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

Signal Integrity Link

The screenshot shows the Simulink environment with the 'Signal Integrity Link - untitled' dialog box open. The dialog is divided into two main sections: 'Create serial link project' and 'Import serial link project'. The 'Create serial link project' section includes checkboxes for file types (.ibs, .ami, .dll/.so, Solution space parameters), a 'New project name and destination folder' section with 'Name' set to 'untitled' and 'Folder' set to 'C:\MATLAB', and a 'Create serial link project' button. The 'Import serial link project' section includes dropdown menus for 'Interface', 'Sheet', and 'Simulation', checkboxes for 'Simulation parameters', 'Stimulus pattern', 'Channel impulse response', and 'Solution space parameters', and an 'Import serial link project' button. Annotations include a blue box labeled 'Configuration' pointing to the 'Create serial link project' section, a red box labeled 'Stimulus' pointing to the 'Simulation parameters' checkbox, a red box labeled 'WaveOut' pointing to the 'WaveOut' block in the background, and a red box labeled 'Eye Diagram' pointing to the 'Eye Diagram' block in the background. The background shows a Simulink model with a 'WaveOut' block connected to an 'Eye Diagram' block.

Signal Integrity setup

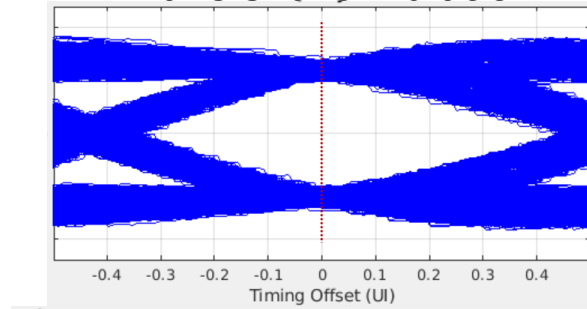


Full Transient vs. IBIS-AMI

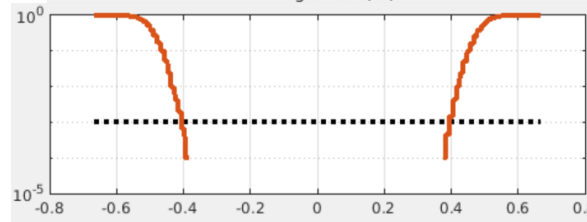
"Golden Reference"

Transient Simulation

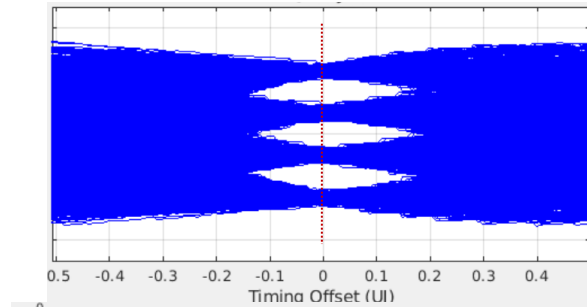
SG3
(8Gbps)



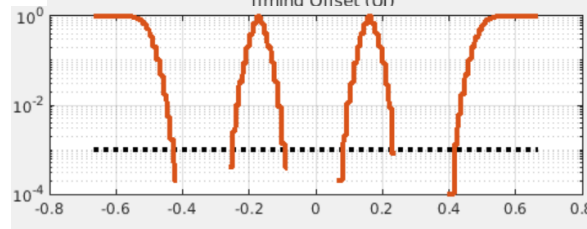
Vertical
Bathtub



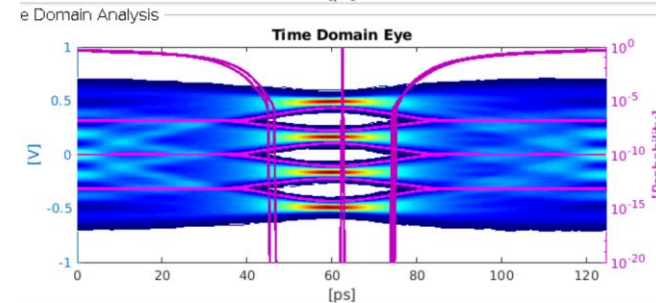
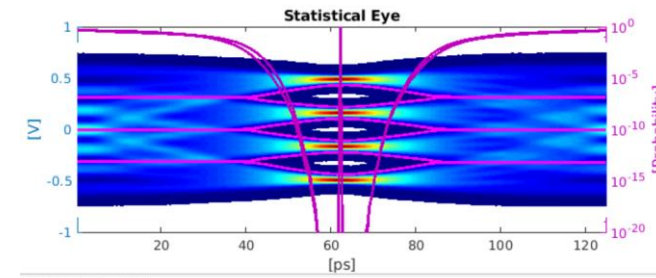
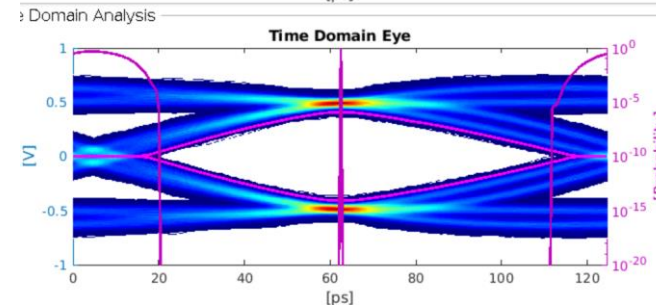
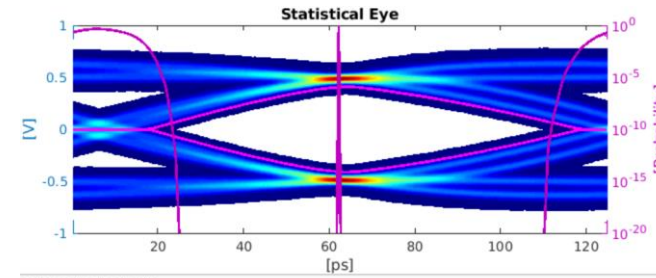
SG5
(16Gbps)



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