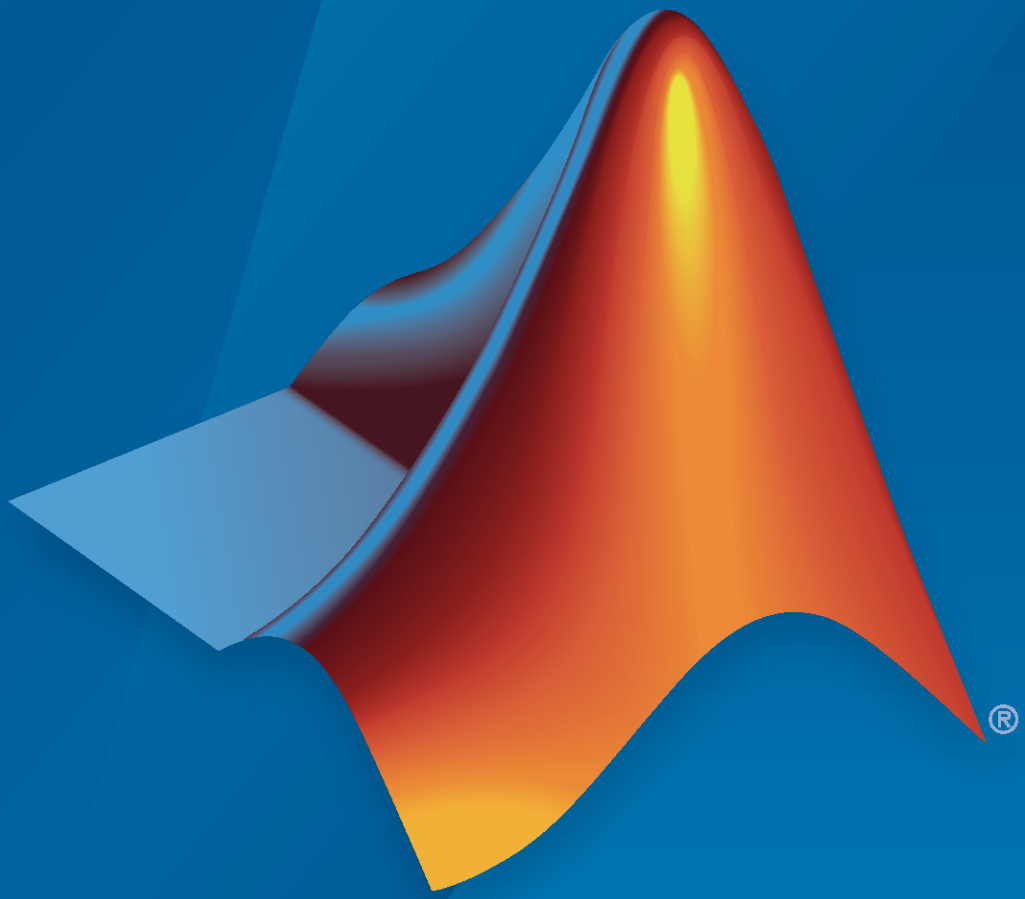
SerDes Toolbox™ Release Notes



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SerDes Toolbox™ Release Notes

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R2022b

Version: 2.4

New Features

Bug Fixes

PAMn Support: Support PAMn in SerDes Designer app, Simulink, and IBIS-AMI model generation

SerDes Designer app and Simulink® now support PAM8 and PAM16. IBIS-AMI model generation now supports PAM3, PAM8, and PAM16. `Modulation_Levels` and `PAM_Thresholds` IBIS-AMI parameters are also supported. For more information, see “PAMn Capabilities”.

IBIS BIRD 205 Support: Define clock position in statistical eye

Use the reserved IBIS-AMI parameter `Rx_Decision time` to define the timing of the clock in the statistical eye according to BIRD 205. For more information, see “Define Clock Position in Statistical Eye”.

SiSoft Link Discontinued: Use Signal Integrity Link

Use “Signal Integrity Link” for a smooth integration between SerDes Toolbox and Signal Integrity Toolbox™. SerDes Toolbox Interface for SiSoft® Quantum Channel Designer® and QSI™ Software support package is being discontinued and replaced by the Signal Integrity Link.

R2022a

Version: 2.3

New Features

Bug Fixes

Updated CTLE: Fit poles and zeros to frequency domain transfer function

Use frequency domain transfer functions to specify CTLE (continuous time linear equalizer) behavior using the **CTLE Fitter** app.

External Init: Customize Init function

Export the Init function to external script, customize the code for analysis and import the customized code back into the Simulink model. For more information, see Advance Init Options.

R2021b

Version: 2.2

New Features

Bug Fixes

S-Parameter Support of Channel Models: Import S-Parameter using SerDes Designer app

You can now import S-parameters as a Touchstone file in the **SerDes Designer** app to create an impulse response model of a channel. For more information, see

Import S-Parameters for Channel Model.

Examples: Improve IBIS models by implementing crosstalk cancellation, DC offset support and design 112G PAM4 ADC-based SerDes model

- Simulate Crosstalk Cancellation in IBIS AMI Receiver Models shows how to simulate crosstalk cancellation in a SerDes Rx AMI model.
- Design IBIS-AMI Models to Support DC Offset shows how to create Rx AMI models that support DC Offset as defined in the IBIS Buffer Issue Resolution Document (BIRD) 197.7.
- Architectural 112G PAM4 ADC-Based SerDes Model shows how to model a 112G PAM4 time-interleaved ADC-Based SerDes system using custom blocks.

R2021a

Version: 2.1

New Features

Bug Fixes

Transmitter Jitter Injection: Add IBIS-AMI transmitter jitter to Simulink model and post-simulation statistical analysis

You can now add transmitter jitter through the SerDes IBIS-AMI Manager dialog box from the Configuration block as well as in the **SerDes Designer** app. This includes transmitter jitter as the time-domain upstream jitter injection in the Stimulus block and jitters to the post-simulation statistical analysis eye. For more information, see Jitter Analysis in SerDes Systems.

Receiver Jitter Injection: Add IBIS-AMI receiver jitter to Simulink post-simulation results

You can now add receiver jitter through the SerDes IBIS-AMI Manager dialog box from the Configuration block as well as in the **SerDes Designer** app. This includes receiver jitter injection into the post-simulation time-domain eye and the statistical analysis eye. For more information, see Jitter Analysis in SerDes Systems.

PAM3 Analysis: Introducing PAM3 modulation analysis in Simulink

In addition to NRZ (nonreturn to zero or two-level pulse amplitude modulation) and PAM4 (four-level pulse amplitude modulation), you can also analyze PAM3 (three-level pulse amplitude modulation) in SerDes Toolbox Simulink models as well as in the **SerDes Designer** app. For more information, see Clock and Data Recovery in SerDes System.

S-Parameter Support of Channel Models: Introducing SParameterChannel object

Convert S-parameters to impulse response from .s*N*4p Touchstone files, where *N* is represents one or more ports using using the `SParameterChannel` object. You need an RF Toolbox™ license to use this object.

R2020b

Version: 2.0

New Features

Bug Fixes

IBIS-AMI Jitter Analysis: Add IBIS-AMI jitter from SerDes Designer app

You can now add IBIS-AMI jitter parameters for statistical analysis in the **SerDes Designer** app. Use the **Tx/Rx Jitter** button to include various transmitter jitters, receiver jitters, and noise parameters.

PAM3 Analysis: Introducing PAM3 modulation analysis from SerDes Designer app

In addition to NRZ (nonreturn to zero) and PAM4 (pulse amplitude modulation level 4), you can also analyze PAM3 (pulse amplitude modulation level 3) in the **SerDes Designer** app.

Eye Processing for Time Domain: Include time domain eye, clock times, and time domain metrics in display

You can now include time domain eye with clock times and time domain metrics (eye height, eye width, eye area, VEC, and COM) with the analysis display when you run a SerDes model in Simulink.

Improved Workflow for AMI Parameters: Automatically manage AMI parameter references and ability to hide them in AMI files.

The SerDes IBIS-AMI Manager dialog box from the Configuration block now automatically manages the references (Constant, Data Store Read, and Data Store Write blocks) to the AMI parameter so you do not have to manually insert the constants and data store blocks for custom AMI parameter creation. The relevant constant and data store blocks are automatically maintained for you.

You can also hide any AMI parameter and suppress them in either the AMI model input, output, or both.

Generate Clock Times for Custom DFECDR and CDR Blocks: Introducing IBIS-AMI Clock Times block

If you are using your custom DFECDR or CDR blocks, then you can generate the recovered clock times output using the IBIS-AMI clock_times block.

Examples: Create Industry Standard IBIS-AMI Models and Explore New Ways to Adapt Receivers

- ADC IBIS-AMI Model Based on COM shows how to create 802.3ck ADC-based transmitter and receiver IBIS-AMI models to model a time-agnostic ADC that conforms to IBIS-AMI specifications.
- PCIe5 Transmitter/Receiver IBIS-AMI Model shows how to create generic PCIe Generation 5 (PCIe5) transmitter and receiver IBIS-AMI models that conform to the PCIe Gen5 Base-Specification published by the PCIE-SIG.
- Globally Adapt Receiver Components in Time Domain shows how to configure a set of receiver components that adapt together globally during Time Domain (GetWave) Simulation.

R2020a

Version: 1.2

New Features

Bug Fixes

Crosstalk Parameterization: Specify crosstalk in SerDes Designer or Simulink model

Previously you could only inject crosstalk via an impulse response through the **SerDes Designer** app.

Now you can include crosstalk from either the **SerDes Designer** or in the Simulink model. You can choose to include the maximum allowed crosstalk for specifications such as 100GBASE-CR4, CEI-25G-LR, CEI-28G-SR, CEI-28G-VSR, or you can specify your own custom crosstalk ICN (integrated crosstalk noise) level.

From the Simulink model, you can also specify the crosstalk stimulus pattern and data rate.

IBIS-AMI Support: Support for I/O, Redriver, Retimer model, and selected IBIS version 7.0 features

You can now specify your IBIS-AMI model as I/O, Redriver, or Retimer from the SerDes IBIS-AMI Manager dialog box. SerDes IBIS-AMI manager also supports AMI parameters that represent the On-die S-parameters, as supported in IBIS version 7.0 through reserved parameters in the SerDes IBIS-AMI Manager dialog box.

Init Subsystems: Automatic connection of AMI parameters

Init Refresh button in the Init subsystems that handles statistical analysis now supports the automatic connection of AMI parameters based on the connection inside the Simulink model. For more information on Init subsystems, see Statistical Analysis in SerDes Systems.

Pulse Response Metric for Optimization: Introducing function optPulseMetric

Use the `optPulseMetric` function to calculate the eye height, eye width, eye area, and channel operating margin (COM) metrics at the BER target level from the pulse response metric.

Channel Operating Margin: Estimate channel operating margin and vertical eye closure from SerDes Designer app

SerDes Designer app now estimates the channel operating margin (COM), signal-to-noise ratio based on the equalized pulse response, and the vertical eye closure (VEC). To view the new results, in the app, go to **Add Plots > Report**.

R2019b

Version: 1.1

New Features

Bug Fixes

Channel Impulse Response: Specify impulse response and crosstalk in the SerDes Designer app channel model

Add impulse response from the **SerDes Designer** app or Simulink to model your desired channel. You can also inject crosstalk via an impulse matrix from the **SerDes Designer** app.

Tap Support: Introduce additional taps with IBIS-AMI manager

Introduce tap structure to equalizer blocks directly from the IBIS-AMI manager in the Configuration block. These additional taps are included both in the Simulink model and the exported IBIS-AMI models. The taps enable you to adjust equalization, especially when you define your custom blocks from scratch.

Jitter and Noise: Include standard-compliant jitter and noise specifications in generated AMI files

Select the transmitter and receiver jitter and noise profiles you want to add to the AMI file from the IBIS-AMI manager inside the Configuration block. The jitter and noise profile are only for the use of EDA tools. Simulink ignores these profiles.

R2019a

Version: 1.0

New Features

Introducing SerDes Toolbox: Design SerDes systems and generate IBIS-AMI models for high-speed digital interconnects

SerDes Toolbox provides a MATLAB® and Simulink model library and a set of analysis tools and apps for the design and verification of serializer/deserializer (SerDes) systems.

With the SerDes Designer app, you can use statistical analysis to rapidly design wired communication transmitters and receivers. The app provides MATLAB based parameterized models and algorithms that let you explore a wide range of equalizer configurations and generate eye diagrams to assess performance metrics.

With building blocks such as CTLE, DFE, FFE, and CDR, you can describe your chosen architecture and simulate control and adaptation algorithms. White-box examples of typical applications such as PCI, USB, Ethernet, and DDR provide reference designs that you can use as a basis for your own designs.

SerDes Toolbox supports automatic generation of dual IBIS-AMI models. These models can be used with third-party channel simulators for system integration and verification.

SerDes Designer App: Design and analyze SerDes systems including transmitters and receivers with arbitrary configuration

SerDes Toolbox provides **SerDes Designer** app to design SerDes system on a system-level and perform statistical analysis. From the app, you can generate MATLAB scripts and Simulink models for further customization and time-domain simulation. You can also generate IBIS-AMI analog models compliant with the industry standards directly from the app.

Statistical Analysis and Time-Domain Simulation: Perform link analysis, compute pulse response, visualize the eye diagram, and measure the performance of your SerDes system

SerDes Toolbox enables you to perform statistical analysis and time-domain simulation. You can perform link analysis and generate impulse response and sample-by-sample processing of the SerDes signal. Use the Eye Diagram Scope to visualize the eye diagram, and measure the key performance metrics from eye contours, bit error rate (BER), bathtub curves, and other metrics. You can also perform time-domain simulation of adaptive algorithms using customizable Simulink blocks and channel models capturing frequency-dependent attenuation, reflections, and arbitrary impulse responses.

Library of MATLAB System object and Simulink Blocks: Use parametrized equalization algorithms, non-ideal amplifiers, channel models, and other typical SerDes components

SerDes Toolbox provides white-box building blocks and System objects that you can use to develop adaptive equalizers and customize your SerDes system. You can use parametrized blocks and algorithms for single-ended and differential signals. You can also generate pseudorandom binary sequence (PRBS) and custom stimulus patterns supporting PAM4 and NRZ modulation.

For more information, see Design and Simulate SerDes Systems.

IBIS-AMI Dual Model Generation: Generate standard-compliant Init and GetWave IBIS-AMI models for import in any third-party channel simulator

SerDes Toolbox enables you to automatically generate statistical (Init) and time-domain (GetWave) IBIS-AMI models. You can customize the model interface by managing the IBIS-AMI parameters from **SerDes Designer** and Simulink. For more information, see Create and Customize IBIS-AMI Models.

You can use the generated IBIS-AMI models in third party channel simulators such as SiSoft QCD/QSI, Keysight ADS, Mentor Graphics HyperLynx, and Cadence Sigrity SystemSI.

Industry Standard Reference Designs: Use white-box models of communication protocols such as Ethernet CEI-56G, DDR5, PCI-Gen4

SerDes Toolbox provides reference models of standard-compliant designs of PCIe Gen4, DDR5, and Ethernet OIF. Refine these reference models to design the next generation communication protocols using NRZ and higher-order modulations such as PAM4. For more information, see Industry Standard IBIS-AMI Models.