

High-Speed Digital SI/PI Simulation Platform



Highlights

High-speed serial and parallel interfaces pose several signal integrity (SI) and power integrity (PI) challenges that need to be addressed to ensure reliable and efficient data transfer. SerDes evolves from 28 Gbps NRZ to 112 Gbps PAM4, all impedance discontinuities will cause more signal reflections and distortions, and multi-channels will bring more serious crosstalk noise. DDR5 increases memory density to a potential maximum of 6.4 Gbps and doubles DDR4's data rate, which brings a number of data transmission performance enhancements, as well as new design challenges.

Xpeedic high-speed SI/PI simulation platform offers a wide range of tools and solutions to address SI/PI challenges in both serial and parallel interfaces to enable engineers to model, analyze, optimize, and verify their designs. These tools include:

ChannelExpert: fast channel simulation tool to analyze both SerDes and DDR

Hermes: 3D full-wave EM modeling for package and board designs

Notus: PI analysis including DC IR drop, AC impedance, decoupling capacitor optimization, and electrical-thermal co-simulation.

ViaExpert: quick via modeling and simulation tool with built-in templates and fast 3D EM solver engine

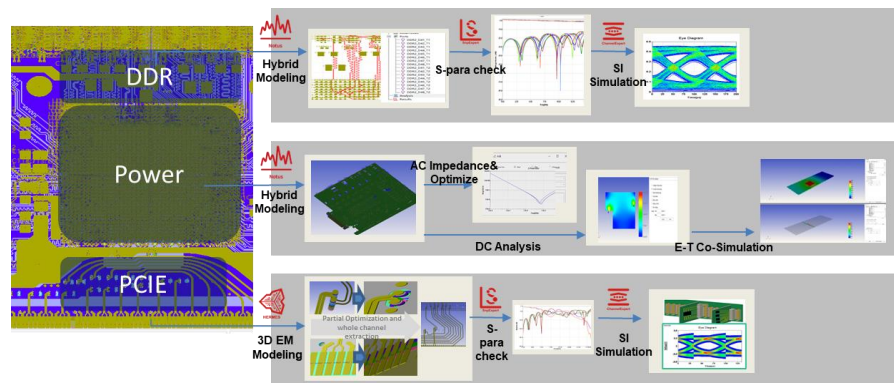
TmlExpert: quick transmission line modeling and simulation tool with built-in transmission line template and fast 2D RLGC solver.

Snpxpert: fast S-parameter exploration tool.

Overview - High-Speed Serial/Parallel Interfaces

Xpeedic provides a comprehensive platform supporting high-speed serial/parallel interfaces, including

1. Channel interconnect modeling and optimization
2. DDRx bus modeling and analysis
3. High-speed SerDes modeling and analysis
4. PDN system power integrity analysis
5. Electrical-Thermal co-simulation

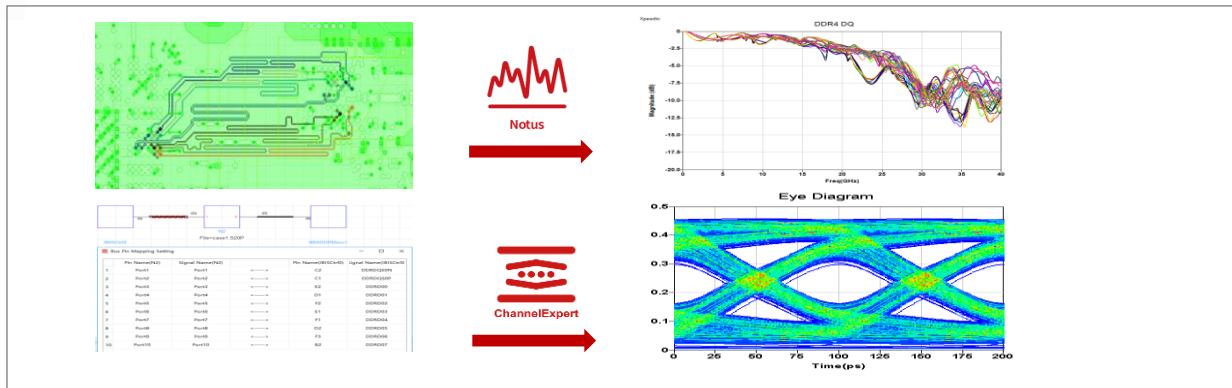


Channel Interconnect Modeling and Optimization

Channel interconnect such as transmission line, via, BGA fan-out, AC coupling capacitor can be quickly modeled and optimized

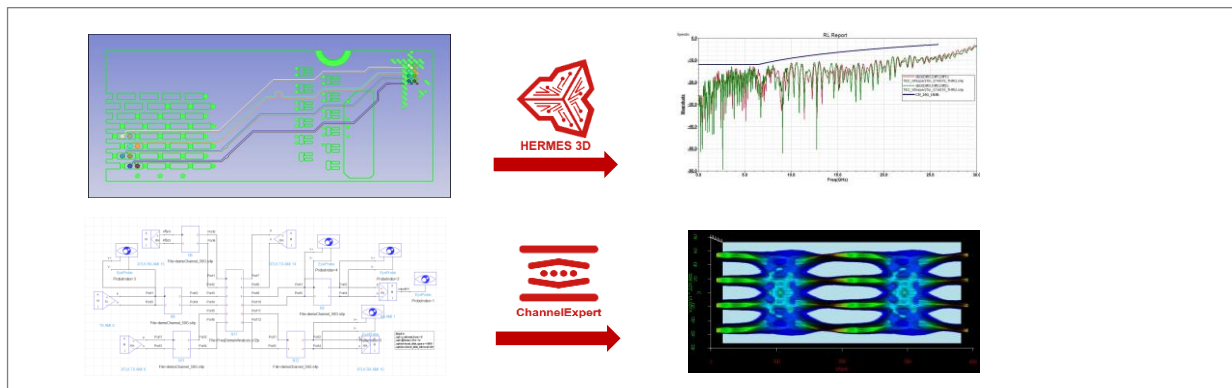
DDRx Bus Modeling and Analysis

- Fast DDRx S-parameter extraction in Notus
- DDRx bus crosstalk histogram calculation in SnpExpert
- Quick DDRx bus model creation for waveforms and eye diagrams in ChannelExpert



High-Speed SerDes Modeling and Analysis

- Accurate S-parameter extraction for SerDes channel in Hermes 3D
- Compliance check in SnpExpert including IL, RL, ILD, Crosstalk, COM, etc.
- Statistical eye-diagram analysis in ChannelExpert



PDN System Power Integrity Analysis

- Notus provides both AC impedance and DC IR-drop simulation
- AC impedance simulation can optimize the value, location of decoupling capacitor to stabilize the power fluctuations at the chip pins within the noise tolerance
- DC IR-drop simulation can check the amount of voltage drop on a power system by given DC current consumption
- Electrical-thermal co-analysis can accurately evaluate the temperature rise of the system by considering the influence of devices and Joule heat together

