RF Blockset 2

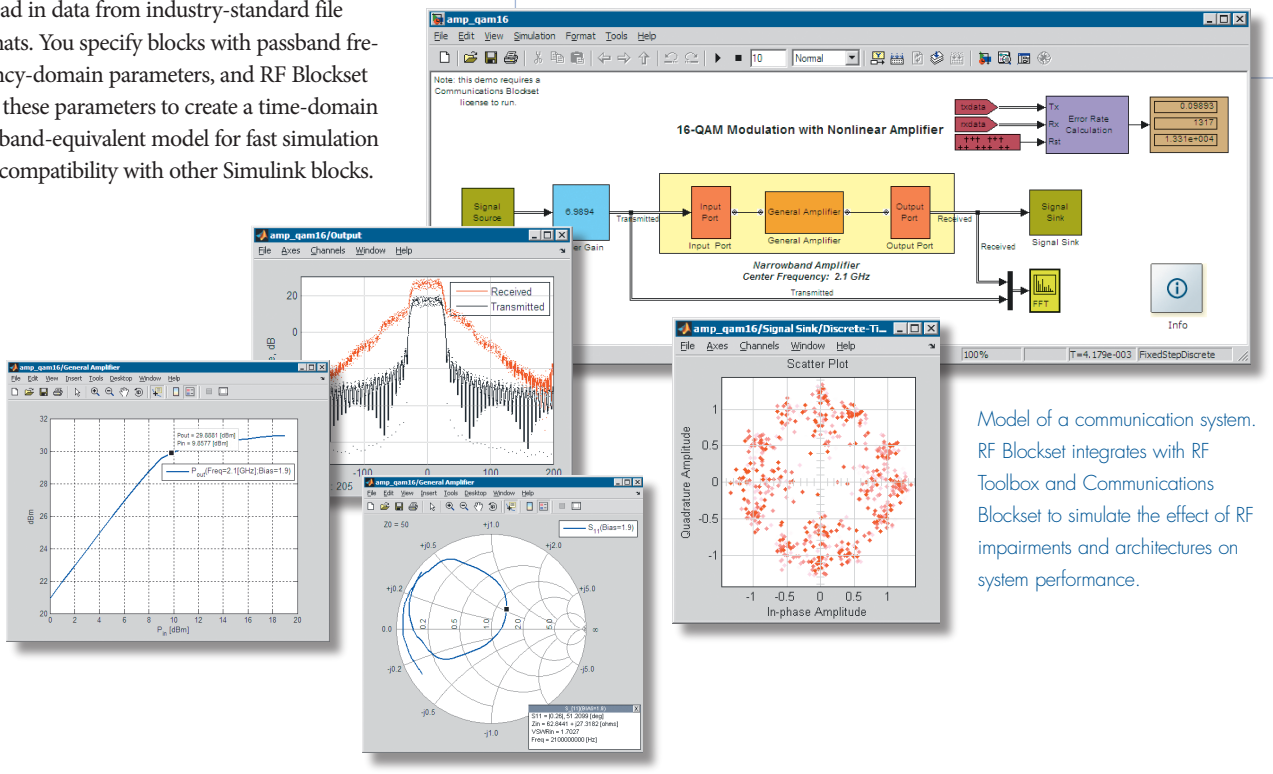
Design and simulate the behavior of RF systems and components in a wireless system

RF Blockset extends Simulink® with a library of blocks to model the behavior of radio frequency (RF) filters, transmission lines, amplifiers, and mixers. It helps you implement commercial and defense wireless communication systems and their semiconductors. You validate your working model in Simulink, and then use the model as an executable specification for RF circuit design using third-party EDA tools. After circuit design, you can use RF Blockset to read industry-standard system-level models and verify that the design meets specification.

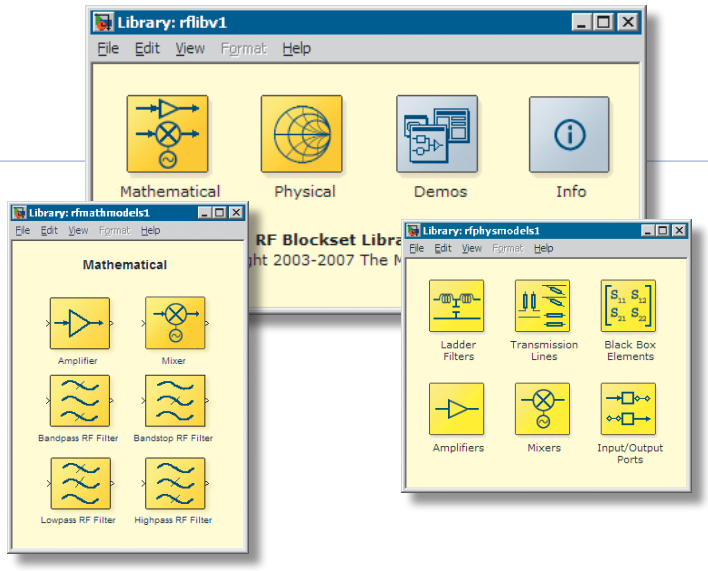
The blockset lets you specify components by their network parameters, noise properties, non-linear properties, mathematical behavior, and physical properties. RF Blockset works with RF Toolbox to manipulate network parameters in the MATLAB® workspace or to read in data from industry-standard file formats. You specify blocks with passband frequency-domain parameters, and RF Blockset uses these parameters to create a time-domain baseband-equivalent model for fast simulation and compatibility with other Simulink blocks.

KEY FEATURES

- Defines and simulates the behavior of RF components, including filters, transmission lines, amplifiers, and mixers
- Specifies components based on network parameters, mathematical behavior, or physical properties
- Cascades components to model the RF architecture
- Integrates with RF Toolbox to manage file and verification model import
- Converts passband network parameters to a baseband-equivalent time-domain model for fast simulation and compatibility with other Simulink blocks
- Includes visualization tools for examining the properties of individual components and RF systems



Model of a communication system. RF Blockset integrates with RF Toolbox and Communications Blockset to simulate the effect of RF impairments and architectures on system performance.



Mathematical and Physical libraries in RF Blockset. You can use mathematical equations and physical properties to represent the RF component.

Defining RF Components

RF Blockset lets you specify RF amplifiers, filters, mixers, and transmission lines by their network parameters (S, Y, Z, ABCD, h, and T format), noise properties, non-linear properties, mathematical behavior, and physical properties (topology and values). You can generate network parameters from within MATLAB or read them in from external data.

RF Blockset enables access to industry-standard data file formats for network parameters and noise properties, such as S2P, Y2P, Z2P, and H2P. In addition, you can import system-level verification models in the S2D, P2D, and AMP formats that specify not only the network parameters and noise properties, but also non-linear properties of the component. You can obtain S2D and P2D files from component manufacturers, measured data, and the Verification Model Extractor feature in ADS (from Agilent).

Designing Cascades

You can build a receiver or transmitter cascade from blocks specified by physical properties, mathematical behavior, or a mixture of both. Matching between blocks from the Mathematical library is assumed to be perfect, and so no reflections occur. In contrast, any imperfect matching and reflections between Physical library blocks are taken into account. The Input Port and Output Port blocks act as gateways to and from the physical parts of the model.

If your network of components cannot be described as a simple cascade, you can configure RF Toolbox components as series, parallel, cascade, hybrid, or inverse hybrid subnetworks, using nesting if necessary, and then use the resulting subnetworks as part of an RF Blockset cascade.

The blockset also calculates noise figures and third-order intercept points (IP3s) for cascaded components. The link budget plot enables you to visualize the effect of individual components on the cascade, to assist optimum gain and filter distribution.

Mitigating RF Impairments

RF Blockset integrates with RF Toolbox and Communications Blockset to simulate the effect of RF impairments and architectures on system performance. You can develop algorithms to mitigate those impairments as part of a system simulation, for example, an adaptive digital predistortion algorithm to compensate for RF power amplifier saturation.

Visualizing Component and Cascade Behavior

You can plot the network parameters of the blocks in your model directly from the Block Parameters dialog box of each physical block. You can also plot the characteristics of the entire cascade from the Block Parameters dialog box of the Output Port block.

RF Blockset includes the following visualization tools:

- Rectangular plots
- Polar plots
- Smith® charts
- Composite plots
- Link budget plots

Required Products

MATLAB
Simulink
RF Toolbox
Signal Processing Blockset
Signal Processing Toolbox

Related Products

Communications Blockset. Design and simulate the physical layer of communication systems and components

Communications Toolbox. Design and analyze algorithms for the physical layer of communication systems

Filter Design Toolbox. Design and analyze fixed-point, adaptive, and multirate filters

For more information on related products, visit *www.mathworks.com/products/rfblockset*

Platform and System Requirements

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