

GPS Signal Simulation Toolbox

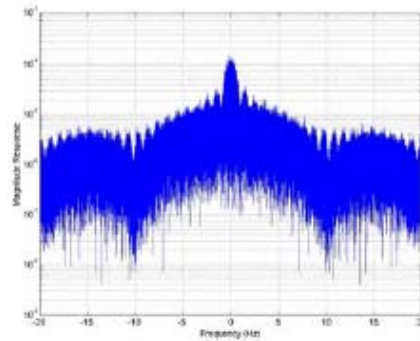
Customized MATLAB based tools for GPS data analysis & signal processing

Signal Simulation Tool: The signal simulation tool simulates the effect of GPS satellite signals on a conventional GPS receiver's code and carrier tracking loops. The Toolbox's GPS signal processing simulation architecture includes a truth profile. This truth profile is used to generate the simulated GPS signals as a function of the signal strength, pseudo-range, Doppler, and Doppler-rate. The receiver profile defines the receiver being simulated, and the parameters used by the receiver to process the GPS signals. The state output from the simulated receiver models the output from an actual GPS receiver experiencing the simulated conditions. The signal simulation tool can be used as an analysis aid to assist in test and evaluation of GPS receivers beyond the capability of conventional RF signal simulators that do not provide low-level insight into the operation of a GPS receiver. This insight can in turn be used to specify key parameters for receivers to optimize their performance in the presence of perturbed GPS environments.

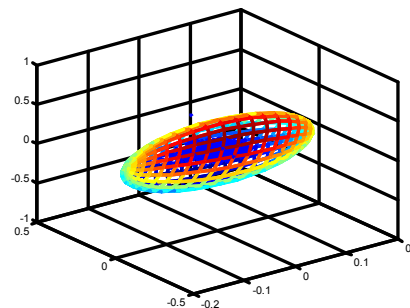
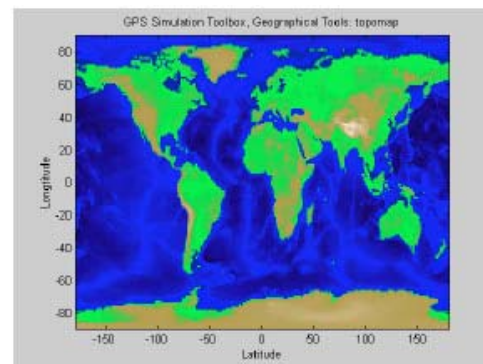
Geographical Tools: The Toolbox's geographic tools facilitate the transformation of data between the various coordinate systems commonly used in GPS research, such as latitude-longitude-altitude, WGS-84 ECEF, North-East-Down, and body reference frames. These tools provide the user flexibility in data representation.

Satellite Geometry Tools: The Toolbox also provides tools to read GPS almanacs and ephemerides and compute ECEF and line-of-sight vectors to GPS satellites as a function of user position and time. The tools can also compute GPS dilution of precision (DOP) values and determine predicted GPS satellite visibility.

Receiver Design and Analysis Tools: The receiver design and analysis tools model different receiver architectures and simulate different error scenarios. With these tools, a simulation can predict how a receiver will react in different environments, such as urban environments; environments susceptible to multi-path effects; and high-dynamic situations.



Spectrum of simulated signal: CA and P code



EXCELLENCE

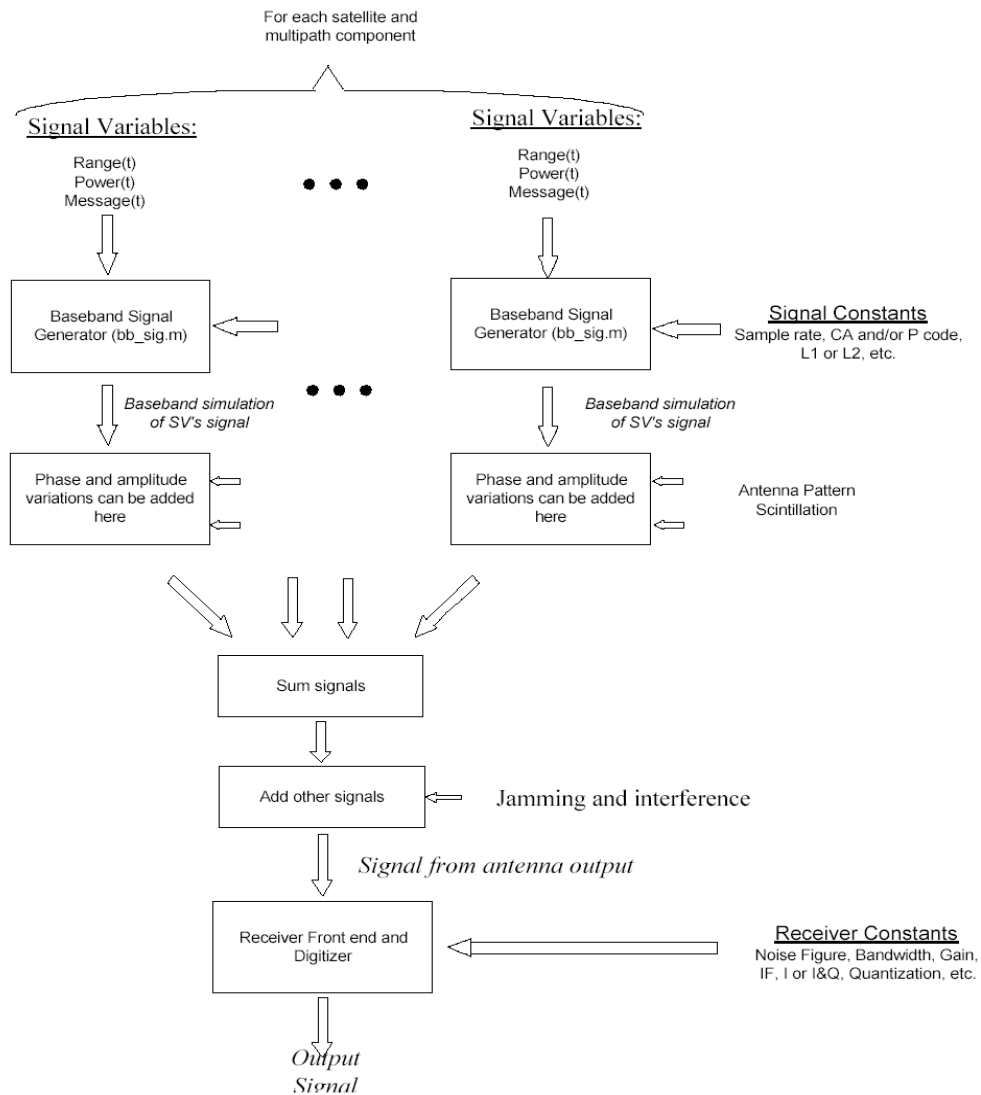
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GPS Signal Simulation Toolbox Flow Diagram

The signal simulation flow that is executed when generating a simulation profile is illustrated above. This can be used to generate simulated data sets for playback and analysis by the built in receiver module within the MATLAB tools. The simulated GPS signals can also be played back into a GPS receiver, under test, as live digital or RF signals using the NAVSYS Advanced GPS Hybrid Simulator (AGHS) product.

Platforms: Windows 95, 98, 2000, XP
MATLAB 5.0 or higher

Application Areas:
 GPS performance analysis
 GPS research and development
 GPS system design
 Data acquisition, analysis and modeling
 GPS precision applications
 Next generation GPS signals in space M&S
 Data recording and playback from real-time systems

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