Cornell Scintillation Simulator: User Guide

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The set of MATLAB files provided implement the Cornell Scintillation Simulator in two stages. Stage 1 creates a synthetic scintillation data set. Stage 2 formats the data from Stage 1 into a file that can be directly loaded into a scenario on a Spirent GNSS Signal Simulator. While these two stages are designed to work together, they can be implemented separately depending on the application.

Stage 1: Creation of synthetic scintillation data

- Run the script *guiscint.m*. It will open a user interface.
- Select the desired scintillation parameters. The Cornell Scintillation Model specifies scintillation statistics by two parameters, S_4 and τ_0. S_4 is the standard index of scintillation severity. τ_0 is the autocorrelation time of the scintillation, which relates to how quickly the signal phase and amplitude change.
- Select the expected carrier-to-noise ratio. This value will not affect the scintillation data generated, but it is used, along with the scintillation parameters, to estimate the severity of the scintillation.
- Set the time step size (10 ms or 20 ms) and the total length of scintillation data desired.
- Push the "Simulate" button. The data will be written to a file called "*scintDat.mat*". If desired, push the "View" button to see a plot of scintillation amplitude and phase.

Stage 2: Formatting data for use with simulator

- Load the data from the *scintDat.mat* file (or other source). It should contain the variables tkhist and zkhist. tkhist is a column of times corresponding to the complex scintillation data in the column zkhist.
- Open the file *genUAF2.m* and read the initial comments explaining the function inputs. Note in particular that the zkhist required for input to this function requires two columns, one each for scintillation at L1 and L2. Either of these columns may be set to a column of zeros for single-frequency scintillation.
- Call the function with properly formatted inputs and no outputs. It will prompt you for a file name; make sure you use the extension *.cmd. The User Actions File generated may be viewed as a text document if desired.
- Save the User Actions File in the folder for the SimGen scenario to which it is to be applied. From within the scenario, find "User Actions File" in the scenario Options settings (NOT the Options menu on the top menu bar). Click to select this option, and right click to select a file. Navigate to the scintillation file and choose it. Run the scenario.