This README file contains information about the folder mc_sampler provided as part of the CTSS Sampling Toolbox written by Michael A Lexa, Mike E Davies, and John S Thompson, University of Edinburgh.

The folder contains 4 MATLAB m-files that simulate the multi-coset sampling and reconstruction of a continuous-time spectrally-sparse multiband signal:
bandsparse.m
mc_demo.m
mc_recovery.m
mc_sampling.m

Technical information about multi-coset sampling is found in the report "Multi-coset Sampling and Recovery of Sparse Multiband Signals" that is contained in the CTSS Sampling Toolbox Documentation folder.

These scripts are a research tool and by no means represent a finished software product.

To run the simulation execute mc_demo.m from within MATLAB, i.e. type mc_demo at the MATLAB command prompt. This script, in turn, calls bandsparse.m to generate a (discrete) sparse multiband signal, calls mc_sampling.m to sample it, and then calls mc_recovery.m to recover the original signal from the multi-coset samples.

The multiband signal that bandsparse.m generates can be thought of as being the Nyquist samples of at continuous-time multiband signal, i.e. as a signal that results from sampling a continuous-time multiband signal at the Nyquist rate. Hence, the simulation actually subsamples a discrete signal and recovers the Nyquist samples from the multi-coset samples.

There are several parameters that characterise the input multiband signal. These include the total bandwidth W, the number and maximum bandwidth of the occupied bands (K and B), and the centre frequencies of these bands. These parameters are set in mc_demo.m and bandspare.m.

q and L are the two parameters that characterise the multi-coset sampler. Each channel collects q non-uniform samples in L/W seconds. q also specifies the number of channels in the multi-coset sampler. L can also be thought of as the multi-coset subsampling factor: each channel samples at a rate that is L times slower than the Nyquist rate. The values of q and L are assigned in mc_demo.m.

The script mc_sampling.m accepts as input the simulated multiband signal and outputs multi-coset samples. This script also randomly generates and returns the multi-coset sampling pattern.

The script mc_recovery.m is the algorithm that recovers the Nyquist samples. The algorithm is that of Feng and Bresler (see the references listed at http://wwww.see.ed.ac.uk/~mlexa/CTSS.html)

The simulation outputs several plots to compare the time and frequency content of the original and recovered signals.