It is required to simulate the transmission of two mobile stations of different users to one base station. The transmission scheme is BPSK-DSSS. The system model is shown in Fig. 1

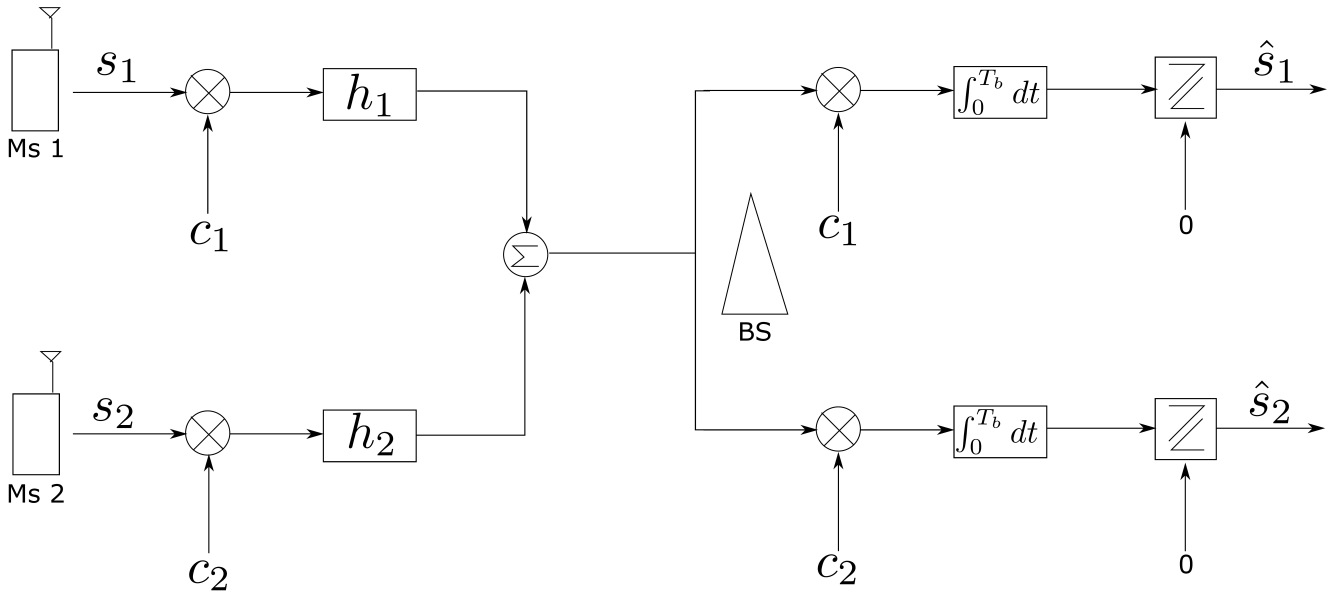

Fig. 1

Project Description

1) Generate the BPSK symbols of user 1 and user 2 according to

$$s_1 = [-1 \ -1 \ +1 \ -1\ ]$$
$$s_2 = [+1 \ -1 \ +1 \ -1\ ]$$

2) Generate the maximal length spreading codes for user 1 and user 2.
   Useful MATLAB functions are **commsrc.pn()**.
3) Spread the signal by multiplying each BPSK symbol with the spreading code.
   Useful MATLAB function is **kron()**.
4) Convolute the spreaded signal with the channel impulse response.
   Useful MATLAB function is **conv()**.
5) At the base station, apply correlator for user 1 and user 2.
6) Finally, apply hard decision decoding (threshold $= 0$) to estimate the transmitted BPSK symbols.

Deliverables

Deliver, individually, the following in **printed** format

1) Plot the received signal (using **stairs()**) before and after de-spreading for $h_1 = h_2 = [1]$ using the PN spreading sequence c_1 and c_2 of length $7, 15$ and 127. Then plot the estimated transmitted information in the de-spread sequence.
2) Plot the received signal (using **stairs()**) before and after de-spreading for $h_1 = h_2 = [1 \quad 0.7 \quad 0.2]$ using the PN spreading sequence c_1 and c_2 of length $7, 15$ and 127. Then plot the estimated transmitted information in the de-spread sequence.
3) Plot the received signal (using **stairs()**) before and after de-spreading for $h_1 = [1 \quad 0.7 \quad 0.2]$ and $h_2 = [1 \quad 0.1 \quad 0.4]$ using the PN spreading sequence c_1 and c_2 of length $7, 15$ and 127. Then plot the estimated transmitted information in the de-spread sequence.
4) Include with the report a readable MATLAB code with comments as well as a brief description of the simulation.

Additionally, submit a **soft-copy** of the MATLAB codes, figures and the overall report (in .pdf format) combined in one .zip folder. Submission by e-mail to samy.soliman@cu.edu.eg.