Matlab Simulation Example 5: PHY abstraction under 11ax OFDM/ OFDMA MIMO/MU-MIMO system

Matlab code part is colored in orange.

Setup:
MCS = 4
num of transmit antenna = 4, num of receive antenna = 2
{106, 8x{2,2}:{2,2}} mixed MU-MIMO OFDMA (allocation index = 97)
Channel: Model-D, bandwidth = 20MHz
APEP length = 1000
1 interference
RX INR = RX SNR -10dB
Channel coding = LDPC

Step 1: running full PHY simulation

1.1 Set the above parameters in 1 full PHY/3 full PHY mixed channles 1Ints/fullPHY.m:

```
mcs = [4]; % Vector of MCS to simulate between 0 and 9
numTxRx = [8 2]; % Matrix of MIMO schemes, each row is [numTx numRx]
chan = "Model-D"; % String array of delay profiles to simulate
maxnumberrors = 40*1e3;  % The maximum number of packet errors at an SNR point
maxNumPackets = 40*1e3; % The maximum number of packets at an SNR point

% Fixed PHY configuration for all simulations
cfgHE = wlanHEMUConfig(97);
for userIdx = 1:numel(cfgHE.User)
    cfgHE.User{userIdx}.APEPLength = 1000; % Payload length in bytes
end
```

In box0Simulation1IntUser1.m, set interference power to be 10dB smaller than desired signal transmit power:

```
intPathloss =  1/10^(10/10); % Interference path loss in linear scale
```

1.2 run fullPHY.m. This takes a long time (around a few hours).

1.3 You can see the output: snrPer_config97_Model-D_8-by-2_MCS4.mat.

Step 2: optimize EESM parameter beta

2.1 Copy snrPer_config97_Model-D_8-by-2_MCS4.m into the second folder: 2 EESM parameter optimization

2.2 Open eesmAbstractionPerVsEffSnr.m
Correctly load snrPer_config97_Model-D_8-by-2_MCS4.mat in eesmAbstractionPerVsEffSnr.m:

```
load('snrPer_config97_Model-D_8-by-2_MCS4.mat');
```

Randomly choose an initial beta value (usually the larger MCS value, the larger initial beta value):

```
% Initialize EESM parameters beta = 7;
```

2.3 run eesmAbstractionPerVsEffSnr.m

2.4 You can see output eesmEffSnr_Config97_Model-D_8-by-2_MCS4.mat This file includes optimized eesm parameter beta

Step 3: EESM-log-SGN PHY abstraction

3.1 Copy snrPer_config97_Model-D_8-by-2_MCS4.mat and eesmEffSnr_Config97_Model-D_8-by-2_MCS4.mat into the third folder: 3 log-SGN method

3.2 Open skewGeneralizedNormalApp.m
Correctly load snrPer_config97_Model-D_8-by-2_MCS4.mat and eesmEffSnr_Config97_Model-D_8-by-2_MCS4.mat in skewGeneralizedNormalApp.m:

load(‘snrPer_config97_Model-D_8-by-2_MCS4.mat');
load(‘eesmEffSnr_Config97_Model-D_8-by-2_MCS4.mat')

Change the index of

snrIdx

can change the RX SNR.

3.3 Run skewGeneralizedNormalApp.m. Then, you can obtain optimal log-SGN parameters