Schedule Report

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Contents

Original Plan

Plan A

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    4. PAPR(Peak to Average Power Ratio) problem(sub-carrier, phase, power).

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- Matlab code

```
% 'numbits' is the number of bits generated by the source.
% 'fp' is the carrier frequency of the generated signal
% 'fc' is the sampling frequency
% 'T0' is the block lenght in [s], i.e. 1/T0 is the carrier separation
% 'TP' is the length of the cyclic prefix [s]
% 'TG' is guard time
% 'A' is the amplitude of the rectangular impulse response [V]
% 'N' is the number of carriers (tones) used in the OFDM system
%
function [bits,S,SI,SQ,Stx,fc,fp,T0,TP,TG,N] = cp0203_OFDM_qpsk;
%-------------------------------------
% Step Zero - Input parameters
%-------------------------------------
numbits = 1024;          % number of bits to be transmitted
fp = 1e9;                % central frequency
fc = 50e9;               % sampling frequency
T0 = 242.4e-9;           % information length
TP = 60.6e-9;            % cyclic prefix
TG = 70.1e-9;            % total guard time
A = 1;                   % amplitude of the rectangular impulse response
N = 128;                 % number of carriers of the OFDM system
%-------------------------------------
% Step One - OFDM modulator
%-------------------------------------
tc = T0 / N;             % chip time
```

```
ntcp = floor(TP/tc);      % number of tones of the cyclic prefix
n = (-ntcp+1:1:N);        % tone counter
NT = length(n);           % total number of tones per symbol

% Bit generation
[bits] = cp0201_bits(numbits);

% QPSK modulator
[S,Sc,Ss] = cp0203_qpsk_mod(bits);

% OFDM modulator
nb = ceil(length(S)/N);       % number of OFDM blocks to be transmitted
S0 = zeros(1,nb*N);           % zero padding
S0(1:length(S))=S;

dt = 1 / fc;                  % sampling period

if ntcp>0
    tc = (T0+TP)/NT;          % tone duration
end
tonesamples = floor(tc/dt);   % samples per tone
toneres = floor((TG-TP)/dt); % samples for the residual part

symsamp = (tonesamples*NT)+toneres;
% number of samples representing one OFDM symbol
```

```
totsamp = symsamp * nb;
% number of samples representing the transmitted signal

X = [zeros(1,totsamp)'];

for b = 1 : nb

    c = S0((1+(b-1)*N):(N+(b-1)*N));     % block extraction

    % S/P conversion and zero padding
    A = length(c);
    a1 = floor(A/2);
    a2 = A - a1;
    FS = 2*A;
    Czp=zeros(FS,1);
    Czp(1:a1)=[c(1:a1).'];
    Czp(FS-a2+1:FS)=[c(A-a2+1:A).'];

    C = ifft(Czp);  % IFFT of the zero-padded input

    if ntcp>0 % Insertion of the cyclic prefix
        C1=zeros(length(C)+2*ntcp,1);
        C1(1:(2*ntcp))=C(2*N+1-(2*ntcp):2*N);
        C1(2*ntcp+1:length(C1))=C;
    else
        C1=C;
```

```
    end
    %what does this module do???
    zp = floor(tonesamples/2);
    C2 = [C1.';zeros((zp-1),length(C1))];
    C3 = C2(:);
    g = ones(1,zp);
    C4 = conv(g,C3);

    C4 = C4(1:(zp*NT*2));

    ics = 1 + (b-1)*symsamp + toneres;
    X(ics:ics+length(C4)-1)=C4;

end % for b = 1 : nb

XM = X';                    % P/S conversion
XM = XM(1:totsamp);

I = real(XM);
Q = imag(XM);
% Carrier modulation
time = linspace(0,totsamp*dt,length(I));
SI = I.*(cos((2*pi*fp).*time));
SQ = Q.*(sin((2*pi*fp).*time));
Stx = SI - SQ;
```

Contents

Goal

1. Learn the knowledge of MAC layer and communication protocol under $60\,GHz$

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1. Learn the knowledge of MAC layer and communication protocol under $60\,GHz$
2. Understand the theory of OFDM communication model under $60\,GHz$ system, and make the Matlab code operating normally and successfully. I will need everyone's help as you smart guys. and I really appreciate your answer, and it will truly help me a lot.

...

Acknowledgement

Hello! UWB Lab!