

En este apéndice se incluyen los códigos tomados de otras fuentes auxiliares y que se utilizaron para el desarrollo de la simulación de transmisión de datos en un ADSL *transceiver*.

FUNCIÓN *add_noise*

```
function out = add_noise(symbol, noise);
% ADD_NOISE Add noise
%
% -----
% created by Anders Backstig
% Ericsson Microelectronics AB
% contact information: Anders.Backstig@mic.ericsson.se
% -----
% out = add_noise(symbol, noise)
% add_noise(symbol, noise) add noise to a symbol.
% noise is the value from a noise model or = if no noise are used.

if noise == 0;
    out = symbol;
    return
end

transmission_power = -36.5; %dBm/Hz
in_signal_power = -40; %dB; % Signal before transmission
carriers = 256;
N=length(symbol);

new_noise_power = (noise - transmission_power) + in_signal_power; %dB
new_noise_power = new_noise_power + 33.3; %from dB to dBm

varians = 0.01 * randn(1,carriers) .* (new_noise_power);
awgn = varians + new_noise_power;
awgn = 10.^(awgn./20);
awgn=dsl_idft(awgn,256);
awgn=add_prefix(awgn,32);
out=symbol+awgn;
```

FUNCIÓN *noise_model_a*

```

function noise = noise_model_a;
% NOISE_MODEL_A Calculate noise model A

kn=4312.5;% Channel frequency
f=(1.*kn:kn:255.*kn);% Chanells 6-255=25875-1.1MHz

% Vid "brusfri linje" brukar man ha -140dBm/Hz.
% Vissa anser att det finns linjer som har mindre brus, men ovanligt.
% CO sidans ADSL komponenter ligger har idag ca -115dBm/Hz - -125dBm/Hz
% CPE sidans ADSL komponenter ligger har idag ca -125dBm/Hz - -140dBm/Hz
% mvh
% Tobbe

% noise model A -100dBm/Hz ->79.5kHz sen -40db/dec ->795kHz
nmap=79.5e3;
nman=795e3;
nma_db=f;% fixing a vector
nma_db(1:18)=-100;% -100dBm to ch 18 (77.6kHz)
nma_db(184:255)=-140;% -140dBm from ch 184 (793.5kHz)
nma_db(19:183)=96.5 + 20 .*log10(abs(1./f(19:183).^2));
% nma_db(19:183)=(((f(19:183)./nmap)-1).*-4.5)-100;
% lutningen=(noll_db-pol_db)*polf/(nollf-polf)
% nma1=20 .*log10(abs(((1+ i .* f ./ nman) .^2) ./ ((1+ i .* f ./ nmap) .^2)));
% nma_db=-100+nma1; %-100dBm->79kHz sen -40dB/dec Noise model A
nma_db(22)=-70;% (dBm) -70-10*Log(4312.5)-106.4 changed to -100 as i fig T1E1
nma_db(48)=-70;
nma_db(77)=-70;
nma_db(89)=-70;
nma_db(123)=-70;
nma_db(139)=-70;
nma_db(164)=-70;
% nma_db(1:255)=-140;% removing nma!

noise = [nma_db(1) nma_db];

```

FUNCIÓN PARA CALCULAR LOS COEFICIENTES DE FILTROS FIR

```

% MY_TEQ Calculate the teq-filter
%
% -----
% created by Anders Backstig
% Ericsson Microelectronics AB

```

```
% contact information: Anders.Backstig@mic.ericsson.se
% -----
% [W, channel] = my_teq() calculate the teq-filter and the
% channel model, there W is a vector with 16 teq filter
% coefficients and channel is the 512 filter coefficients that
% are used to simulate the channel.
%
% Loopnum is the number of one of the eight possible loops that
% the function can simulate.

% Everything is copied from teqdemo.

% open a figure for progress bar
[figHndl statusHndl] = setprogbar('Training TEQ');

% init variables
Nb = 32;
Nw = 16;
N = 512;
codingGain = 4.2;
margin = 6;
Dmin = 15;
Dmax = 35;
totalInputPower = 23;
AWGNpower = -140;
%loopNum = 1;
method = 5; % min-isi
barflag = 0;
% number of iteration per TEQ tap
numIter = 1000;

% update progress bar
updateprogbar(statusHndl,1,5);

% generate signal, noise, and channel data
[recNoisySig, receivedSignal, noise, channel, inputSignal, gamma, fs] = ...
    siggen(N, AWGNpower, loopNum, totalInputPower, codingGain, margin, barflag);

% update progress bar
updateprogbar(statusHndl,2,5);

% estimate the power spectrums
[inputSpecAll, noiseSpecAll, channelGainAll]=...
    specestim(inputSignal, noise, channel, N, barflag);

% update progress bar
updateprogbar(statusHndl,3,5);
```

```
% calculate SNRs and usable channels
[subMFBall,subMFB,usedSubs,noiseSpec,channelGain,inputSpec] = ...
calcsnrs(inputSpecAll,channelGainAll,noiseSpecAll,gamma);

% update progress bar
updateprogbar(statusHndl,4,5);

% chose method and design TEQ
[B, W, D, MSE, Dv, I,title_str] = selmeth(method,inputSignal,...
receivedSignal,noise,channel(1:N),...
Nb,Nw,Dmin,Dmax,barflag,N,numIter,inputSpec,noiseSpec,channelGain,...
usedSubs,gamma);

% update progress bar
updateprogbar(statusHndl,5,5);

% get performance results
[SSNR, SNR, subSNR,geoSNRfinal,geoSNRmfb,bDMTfinal,bDMTmfb,...
RDMTfinal,RDMTmfb,hw,Fh,Fw,colorNoiseaft,Fhw] = ...
perform(W,B,channel,D,Nb,N,inputSignal,noise,...
channelGainAll,inputSpecAll,noiseSpecAll,margin,codingGain,fs,subMFBall,usedSubs);

% close progress bar
close(figHndl);
```