

```

function [ Pservice_ob_S ] =
Pservicesim(Wx,Wy,lam,P,Ns,BW,alpha,Mt,K,F,bf,zf,T)
%Pservicesim(Wx,Wy,lam,P,Ns,BW,alpha,Mt,K,bf,zf,ob,T):
%Returns the simulated value Pservice_ob_S of the service
probability for
%(T), number of iterations
%Further parameters:
%(lam), node density
%(Wx), x dimension
%(Wy), y dimension
%(P), transmission power
%(Ns), Noise power/Hz
%(BW), Bandwidth
%(alpha), Path-loss exponent
%(Mt), Mean lifespan
%(K), Cache size
%(F), Catalog size
%(bf), placement probability vector
%(zf), object size vector
%
% Author: Anastasios Giovanidis
% CNRS CR2, LTCI - Telecom ParisTech, Paris,
% January 2016.
%
for tt=1:T
    % generate random Poisson number N
    N(tt) = poissrnd(lam*Wx*Wy);
    %
    % randomly position N points on the plane
    clear Xn Yn D
    Xn = (rand(1,N(tt))*Wx-Wx/2)';
    Yn = (rand(1,N(tt))*Wy-Wy/2)';
    Dn = ((Xn.^2+Yn.^2).^(0.5));
    %
    % illustrate if you want...
    % figure(1), hold on, plot(Xn, Yn, 'ob');
    % figure(1), plot(0,0,'+r');
    %
    % fast fading generator (assumed exponential)
    hn = [exprnd(P,1,N(tt))]' ;
    %
    % resulting SNR
    SNRn = hn/Ns/BW.*(Dn.^(-alpha));
    %
    % lifespan generator (assumed exponential)
    tn = (exprnd(Mt,1,N(tt)))';
    %
    % generation of a file-vector per node (K-size)
    % uses the policy from Blaszczyszyn & Giovanidis, ICC'15
    % calls subroutine objgen(placement prob.,cache size)
    VN = [];
    for kn = [1:N(tt)]
        clear v
        v = objgenK(bf,K);
    end
end

```

```

        VN = [VN;v];
    end
    %
    % choice of object at receiver
    %
    %%%%%%%%%%%
    % EVALUATION
    % Indicate if there is a node among N:
    % (a) that has the object "ob"
    for ob=1:F
        clear I1 I2 H1
        H1 = (VN==ob);
        I1 = sum(H1');
        I1 = I1';
        %
        % (b) that can satisfy the service constraint
        I2 = (SNRn>=(exp((zf(ob)/BW)./tn)-1));
        %
        % Evaluate Condition
        PSI(ob,tt) = (sum(I1.*I2)>=1);
    end
end
%
Pservice_ob_S = sum(PSI')/T;

end

```