INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, ALLAHABAD

ELECTRONICS AND COMMUNICATION ENGINEERING DEPARTMENT

COURSE NAME: EWCN LABORATORY

Experiment 3.1: Consider a system where a source node S communicates with a destination node D with the help of a relay R employing amplify-and-forward protocol over a wireless channel. For the given system, assuming nodes with single antenna and half-duplex operation, under Rayleigh fading, plot the outage versus signal-to-noise ratio (SNR) performance. Also, with path loss modeling, plot outage versus relay location plot.

Objective: To simulate a basic cooperative wireless communication network scenario with AF relay in MATLAB and to evaluate its outage performance.

Materials/ Component Required: MATLAB Software

Procedure: Follow the below mentioned steps:

1) Generate an exponentially distributed random variables of a given mean value.
2) Obtain the Instantaneous SNRs.
3) Check if $C_D < R$, then counter $c \rightarrow c + 1$.
4) Repeat Steps 1, 2, and 3 for a given number of trails for a ρ.
5) For a given ρ, after finishing up with the trials we have $P_{out} = \frac{\text{c}}{\text{number of trials}}$
6) Repeat the above steps 1-5 to obtain the outage values for different ρ.

Results: Plot the system outage versus signal-to-noise ratio (SNR) performance.

Experiment 3.2: Consider a system where a source node S communicates with a destination node D with the help of a relay R employing amplify-and-forward (AF) protocol over a wireless channel. For the given system, assuming nodes with single antenna and half-duplex operation, under Rayleigh fading, plot the capacity versus signal-to-noise ratio (SNR) performance. Also, with path loss modeling, plot capacity versus relay location plot.

Objective: To simulate a basic cooperative wireless communication network scenario with AF relay in MATLAB and to evaluate its capacity performance.

Materials/ Component Required: MATLAB Software

Procedure: Follow the below mentioned steps:

1) Generate an exponentially distributed random variables of a given mean value.
2) Obtain the Instantaneous SNRs.
3) Do $k = C_{SD} + k$.
4) Repeat Steps 1, 2, and 3 for a given number of trails for a ρ.
5) For a given ρ, after finishing up with the trials we have Capacity $= \frac{k}{\text{number of trials}}$

6) Repeat the above steps 1-5 to obtain the capacity values for different ρ.

Results: Plot the system capacity versus signal-to-noise ratio (SNR) performance.