INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, ALLAHABAD

ELECTRONICS AND COMMUNICATION ENGINEERING DEPARTMENT

COURSE NAME: EWCN LABORATORY

Experiment 4.1: Consider a system where a source node S communicates with a destination node D via a direct $S \rightarrow D$ link and with the help of a relay R employing decode-and-forward (DF) protocol over a wireless channel. For the given system, assuming nodes with single antenna and half-duplex operation, under Rayleigh fading, and with maximum ratio combining technique at D, 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 DF relay with direct link 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, capacity versus signal-to-noise ratio (SNR) performance curves. Also, plot the capacity and outage vs relay location curves.

Experiment 4.2: Consider a system where a source node S communicates with a destination node D via a direct $S \rightarrow D$ link and with the help of a relay R employing decode-and-forward (AF) protocol over a wireless channel. For the given system, assuming nodes with single antenna and half-duplex operation, under Rayleigh fading, and with maximum ratio combining technique at D, 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 with direct link 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 outage, capacity versus signal-to-noise ratio (SNR) performance curves. Also, plot the capacity and outage vs relay location curves.