

# Infrastructure based Wireless Network

**Spoken Tutorial Project**

<https://spoken-tutorial.org>

**National Mission on Education through ICT**

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**VIT Chennai**

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# Learning Objectives

**In this tutorial, we will learn to**



# Learning Objectives

In this tutorial, we will learn to

- **Create an infrastructure based wireless network**



# Learning Objectives

In this tutorial, we will learn to

- ▶ Create an infrastructure based wireless network
- ▶ Create three UDP flows in the channels



# Learning Objectives

- Analyze the flow using a flow monitor



# Learning Objectives

- ▶ **Analyze the flow using a flow monitor**
- ▶ **Visualize the network using NetAnim**



# System Requirements

**To record this tutorial, I am using**



# System Requirements

To record this tutorial, I am using

► **Ubuntu Linux OS version 22.04**





# System Requirements

To record this tutorial, I am using

- ▶ Ubuntu Linux OS version 22.04
- ▶ ns-3 version 3.38



# System Requirements

To record this tutorial, I am using

- ▶ Ubuntu Linux OS version 22.04
- ▶ ns-3 version 3.38
- ▶ NetAnim visualizer tool



# Pre-requisites

**To follow this tutorial,**



# Pre-requisites

**To follow this tutorial,**

- ▶ **The learner must have basic knowledge of using ns-3 software**



# Pre-requisites

To follow this tutorial,

- ▶ The learner must have basic knowledge of using ns-3 software
- ▶ For pre-requisite ns-3 tutorials, please visit this website  
<https://spoken-tutorial.org>



# Code Files

- The files used in this tutorial are provided in the Code Files link



# Code Files

- ▶ The files used in this tutorial are provided in the Code Files link
- ▶ Please download and extract the files



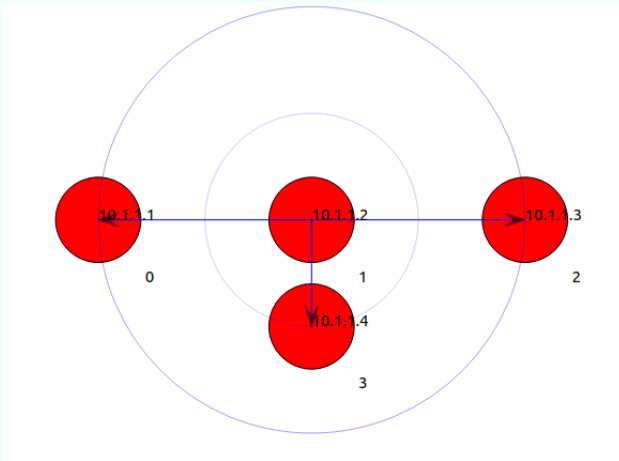
# Code Files

- ▶ The files used in this tutorial are provided in the Code Files link
- ▶ Please download and extract the files
- ▶ Make a copy and then use them while practicing





# Infrastructure based Wireless Network



**VIT**  
Vellore Institute of Technology  
(Approved by the University Grants Commission's UGC-AAC, 1986)

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education



# About DSSS

- ▶ **DSSS rate is data rate in a Wifi system**



# About DSSS

- ▶ **DSSS rate is data rate in a Wifi system**
- ▶ **It uses Direct Sequence Spread Spectrum modulation**



# About DSSS

- ▶ DSSS rate is data rate in a Wifi system
- ▶ It uses Direct Sequence Spread Spectrum modulation
- ▶ In a DSSS system, data is spread over a wider bandwidth using a spreading code



# About DSSS

- The spreading code is a sequence of chips that modulates the data signal



# About DSSS

- ▶ The spreading code is a sequence of chips that modulates the data signal
- ▶ DSSS rate represents the speed of information transmitted after spreading



# About DSSS

- ▶ DSSS can transfer up to 11 Mbps of data



# Summary

**In this tutorial, we have**

- ▶ **Created an infrastructure based wireless network**
- ▶ **Created three UDP flows in the channels**





# Summary

- ▶ Analyzed the flow using a flow monitor
- ▶ Visualized the network using NetAnim



# Assignment

**As an assignment, please do the following**

- ▶ **Create a simulation for a wireless network with three nodes**
- ▶ **Create one access point(AP) and two stations**



# Assignment

- ▶ The AP and stations should use an 802.11g physical layer
- ▶ Implement UDP traffic between the stations and the AP



# Assignment

- ▶ **Set packet size as 1500 bytes and send 200 packets from each station to the AP**
- ▶ **Set the RSS at the AP to -70 dBm**
- ▶ **Set the interval between packets to 0.005 seconds**



# Assignment

- ▶ **Analyze the flow using flow monitor**
- ▶ **Visualize the network using NetAnim**

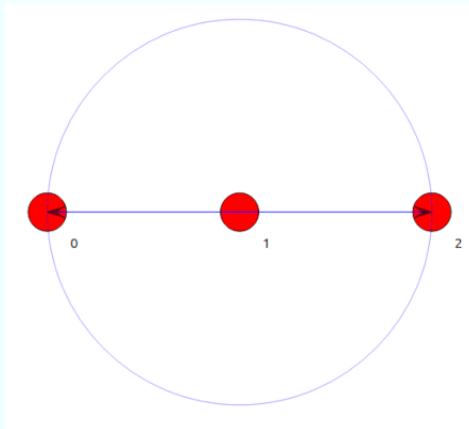


# Assignment-Observation

```
arun@arun-dot-com:~/ns-allinone-3.38/ns-3.38$ ./ns3 run scratch/exp-9assignment.cc
[0/2] Re-checking globbed directories...
[2/2] Linking CXX executable ../build/scratch/ns3.38-exp-9assignment-default
Topology
  n1 (AP node)
  .
  .
n0      n2 (Station nodes)
-----
Testing 100 packets sent with receiver rss -70
Testing 200 packets sent with receiver rss -70
Flow ID:- 1 Source addr: 10.1.1.1 Dest Addr: 10.1.1.2
Type: UDP Flow
Tx Packets = 100
Rx Packets = 31
Lost packets = 69
Times forwarded = 0
Delay = +1.90143e+10ns
Throughput: 168.66 Kbps
-----
Flow ID:- 2 Source addr: 10.1.1.3 Dest Addr: 10.1.1.2
Type: UDP Flow
Tx Packets = 200
Rx Packets = 40
Lost packets = 160
Times forwarded = 0
Delay = +3.10568e+10ns
Throughput: 275.795 Kbps
-----
arun@arun-dot-com:~/ns-allinone-3.38/ns-3.38$
```



# Assignment-Observation



# About the Spoken Tutorial Project

- ▶ Watch the video available at [http://spoken-tutorial.org/What\\_is\\_a\\_Spoken\\_Tutorial](http://spoken-tutorial.org/What_is_a_Spoken_Tutorial)
- ▶ It summarises the Spoken Tutorial project
- ▶ If you do not have good bandwidth, you can download and watch it





# Spoken Tutorial Workshops

## The Spoken Tutorial Project Team

- ▶ Conducts workshops using spoken tutorials
- ▶ Gives certificates to those who pass an online test
- ▶ For more details, please write to [contact@spoken-tutorial.org](mailto:contact@spoken-tutorial.org)



# Answers for THIS spoken tutorial

- ▶ Questions in THIS Spoken Tutorial
- ▶ Visit <https://forums.spoken-tutorial.org>
- ▶ Choose the minute and second where you have the question
- ▶ Explain your question briefly
- ▶ The Spoken Tutorial project will ensure an answer
- ▶ You will have to register to ask questions



# FOSSEE Forum

- ▶ For any general or technical questions on ns-3, visit the FOSSEE forum and post your question

<https://forums.fossee.in/>



# Acknowledgement

- ▶ **The Spoken Tutorial project was established by Ministry of Education, Govt. of India**



# Acknowledgement

- ▶ We thank Dr.Moyukh Laha from IIT Kharagpur for his domain support
- ▶ We would also like to thank Dr. R. Radha, Dr. X. Anita, and Dr. T. Subbulakshmi from VIT Chennai for their support



# Thank you

- ▶ **This is Arun Santhosh, a FOSSEE Summer Fellow 2023, IIT Bombay signing off**

