

Connecting Multiple Networks with Router

Spoken Tutorial Project

<https://spoken-tutorial.org>

National Mission on Education through ICT

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Learning Objectives

In this tutorial, we will learn to



Learning Objectives

In this tutorial, we will learn to

- Create a star topology with 4 nodes



Learning Objectives

In this tutorial, we will learn to

- ▶ Create a star topology with 4 nodes
- ▶ Create a CSMA bus topology with 4 nodes



Learning Objectives

In this tutorial, we will learn to

- ▶ Create a star topology with 4 nodes
- ▶ Create a CSMA bus topology with 4 nodes
- ▶ Configure client and server applications on the nodes



Learning Objectives

► Connect two networks



Learning Objectives

- ▶ **Connect two networks**
- ▶ **Route packets from one network to the other**



Learning Objectives

- ▶ Connect two networks
- ▶ Route packets from one network to the other
- ▶ 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 22.04 OS



System Requirements

To record this tutorial, I am using

▶ **Ubuntu Linux 22.04 OS**

▶ **ns-3.38**



System Requirements

To record this tutorial, I am using

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



Pre-requisites

To follow this tutorial

- ▶ You must have basic knowledge of using Linux terminal



Pre-requisites

To follow this tutorial

- ▶ You must have basic knowledge of using Linux terminal
- ▶ You must know how to create a point-to-point and a CSMA network in ns-3



Pre-requisites

- For pre-requisite Linux and ns-3 tutorials, please visit <https://www.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

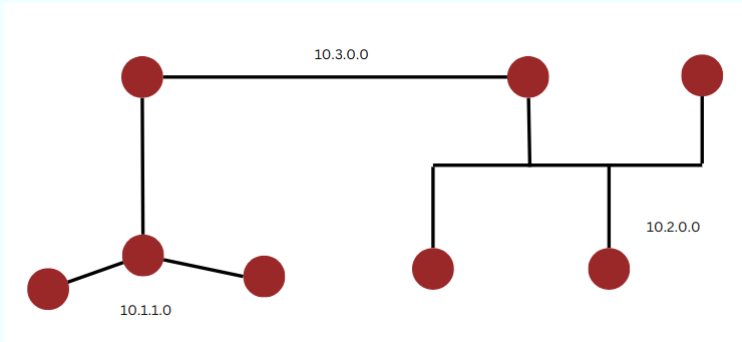


Code Files

- ▶ 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



Topology



Summary

In this tutorial, we have learnt to

- ▶ Create a star topology with 4 nodes
- ▶ Create a CSMA bus topology with 4 nodes
- ▶ Configure client and server applications on the nodes



Summary

- ▶ **Connect two networks**
- ▶ **Route packets from one network to the other**
- ▶ **Visualize the network using NetAnim**



Assignment

As an assignment, please do the following

- ▶ **Write an ns-3 program with two CSMA networks**
- ▶ **Both networks should have 4 nodes**



Assignment

- ▶ **Assign IP address 10.1.0.0 to first network**
- ▶ **Assign IP address 10.2.0.0 to second network**



Assignment

- ▶ **Route packets from node 2 of the first network to node 3 of the second network**

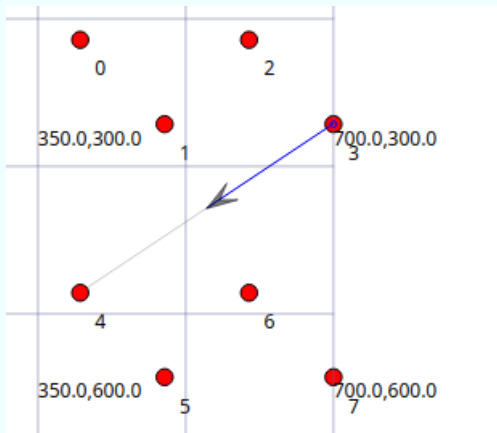


Observation: Terminal

```
karthik@karthik-ThinkPad:~/ns-allinone-3.38/ns-3.38$ ./ns3 run scratch/t
[0/2] Re-checking globbed directories...
[1/2] Building CXX object scratch/CMakeFiles/scratch_two-csma.dir/two-cs
/home/karthik/ns-allinone-3.38/ns-3.38/scratch/two-csma.cc: In function
/home/karthik/ns-allinone-3.38/ns-3.38/scratch/two-csma.cc:17:10: warnin
17 |         bool verbose = true;
    |         ^~~~~~
[2/2] Linking CXX executable ../build/scratch/ns3.38-two-csma-default
At time +2s client sent 1024 bytes to 10.3.0.3 port 9
At time +2.00992s server received 1024 bytes from 10.1.0.2 port 49153
At time +2.00992s server sent 1024 bytes to 10.1.0.2 port 49153
At time +2.03184s client received 1024 bytes from 10.3.0.3 port 9
karthik@karthik-ThinkPad:~/ns-allinone-3.38/ns-3.38$
```



Observation: NetAnim



About the Spoken Tutorial Project

- ▶ Watch the video available at 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



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



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

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



Acknowledgement

- ▶ **Spoken Tutorial Project was established by the Ministry of Education, Government 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 Josiga, a FOSSEE Summer fellow 2023, IIT Bombay signing off

