ENSC 427

"Implementing the Bit Torrent peer-to-peer protocol in OPNET and leech blocking algorithm"

Group 7

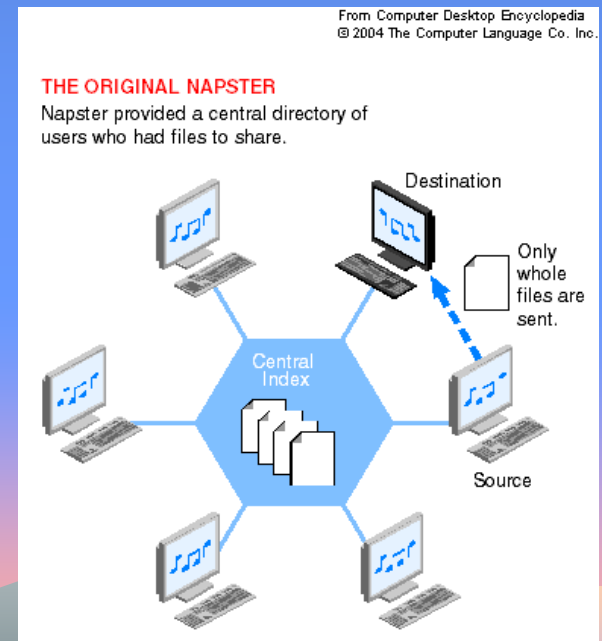Pavel Bloch

Amir Kamyabnejad

Gondang Prabowo Yudo

Overview

- Introduction to Bit Torrent peer-to-peer protocol
- Implementation of Bit Torrent on OPNET
- Implementation of Leech Detection Method
- Results and analysis

Introduction

❏ The concept of **P2P** file sharing protocol began with the invention of the **Napster Protocol** in 1999.

❏ **Minimum** amount of **server**. The client itself is the server.

❏ Currently there are 2 types of P2P protocol that dominates the internet. The **Gnutella** protocol (LimeWire, ShareAza) and **BitTorrent** protocol (BitTorrent, Vuze).

❏ For our project we decide to look at the latter.

From Computer Desktop Encyclopedia
© 2004 The Computer Language Co. Inc.

THE ORIGINAL NAPSTER
Napster provided a central directory of users who had files to share.

Destination

Only whole files are sent.

Central Index

Source

BitTorrent Peer-to-peer Protocol

❏ **Every client** is able to **prepare, request, and transmit any type of data** over the network.

❏ The clients that provide the files are called **Seeds** while the client that downloads the file are called **Peers**.

❏Every peer who downloads a part of the data also makes the data available for other peers.

❏After a peer completed downloading data, many **continue to make the data available** and becomes additional seeds.

❏ As **more seeds** added the **probability of successful** connection **increases** exponentially.

Our Project Goals

❑ To successfully implement the BitTorrent protocol in OPNET.

❑Reduce packet end-to-end delay and increase the P2P throughput through leech blocking

❑Ensure scalability and robustness by giving each node the ability to transmit both TCP and BitTorrent packets. Every node is a local area network of many computers.
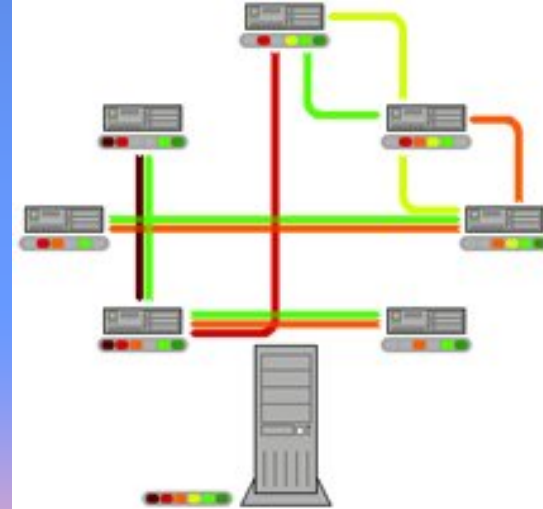
Implementation: *Scenario*
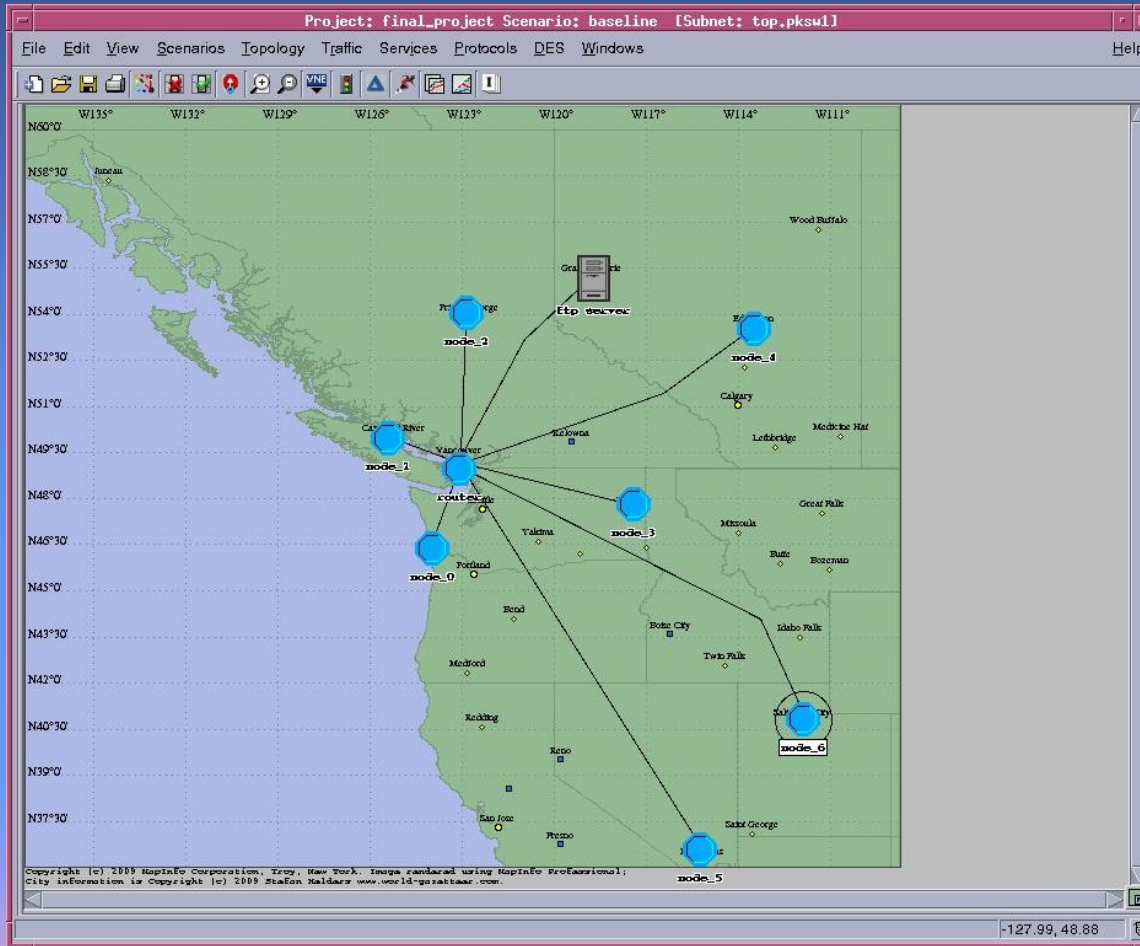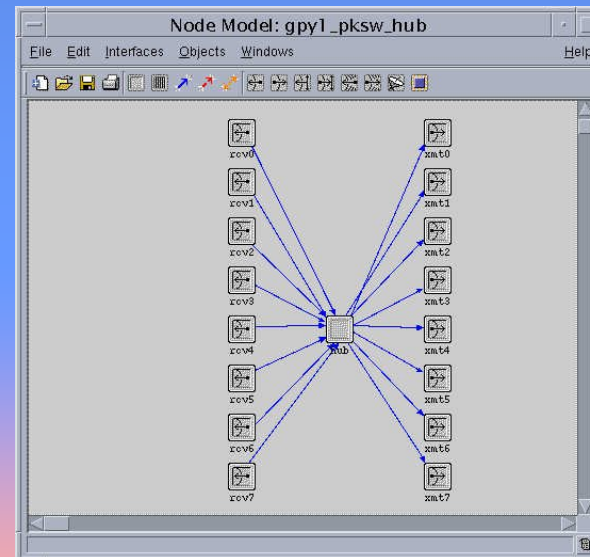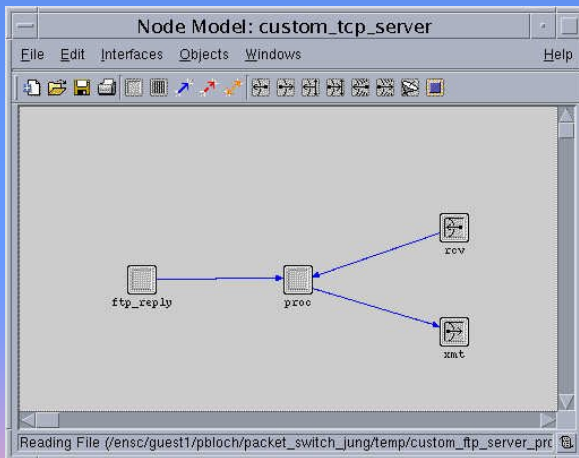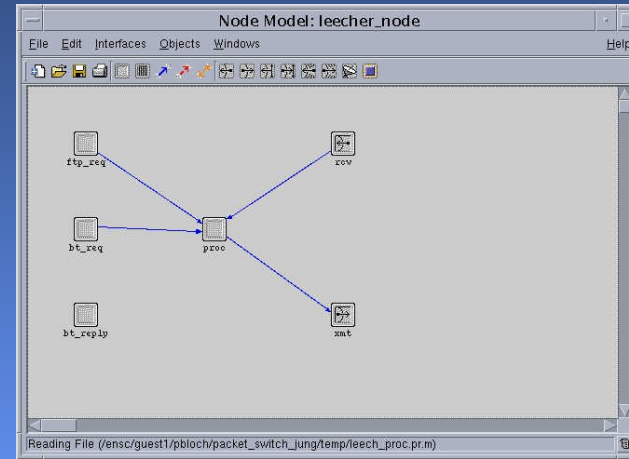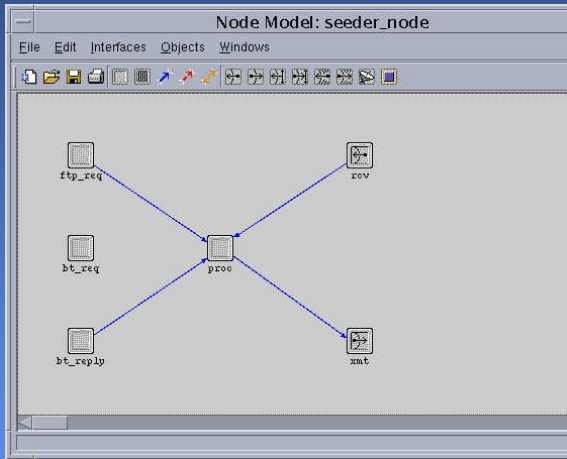
Implementation: *Packet Format*
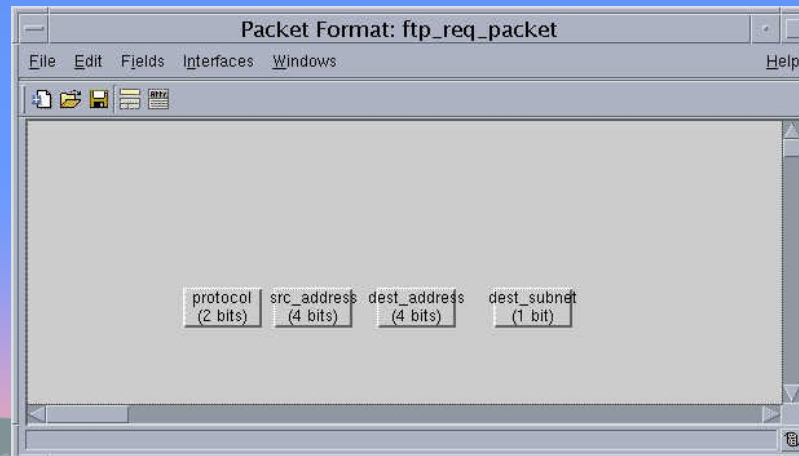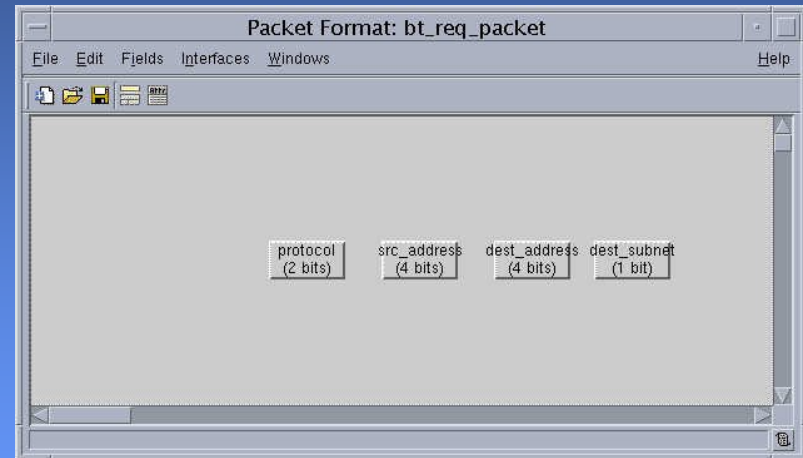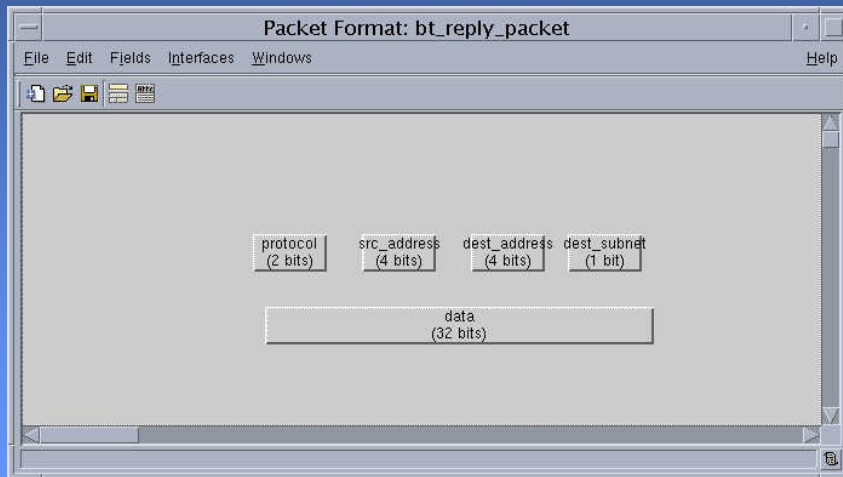
Implementation: *Node Model*

❑ Four nodes used, each uses a variety of packet formats
- Seeder node – ftp_request, bt_reply
- Peer node – ftp_request, bt_request, bt_reply
- Leecher node – ftp_request, bt_request
- Ftp server – ftp_reply
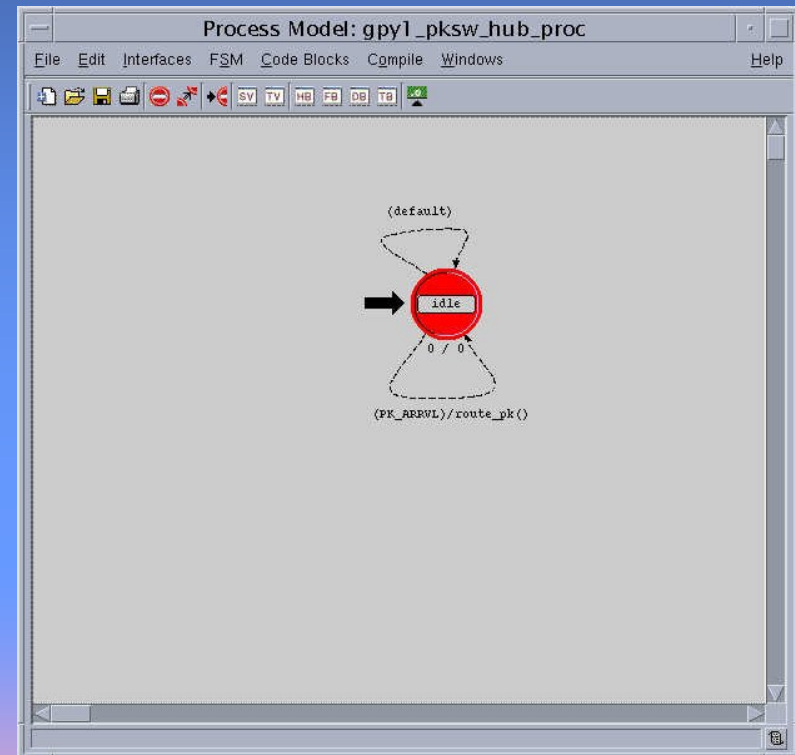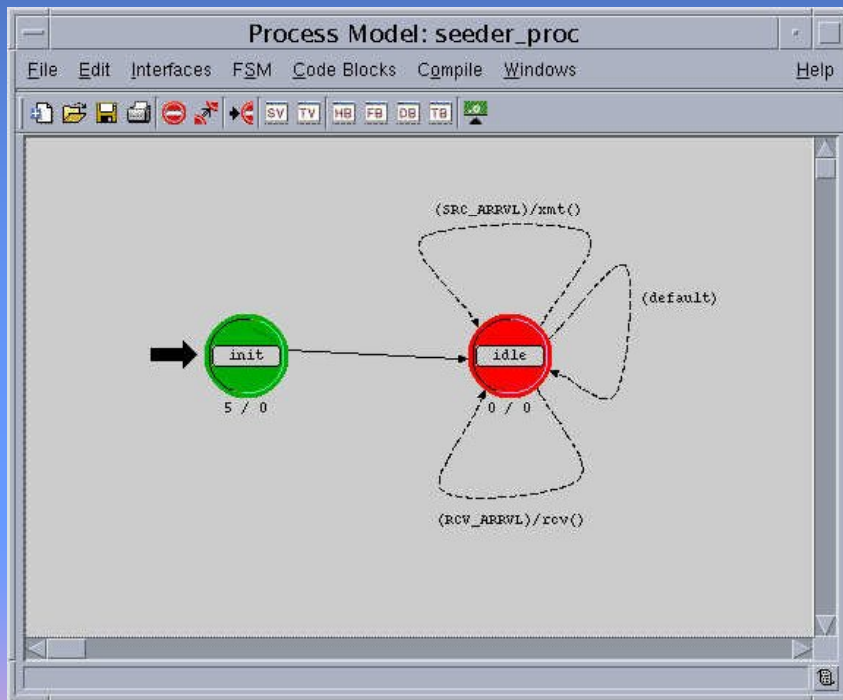- Seeder node bt_reply > peer node > leecher node = 0

Implementation: *Node Model*

Implementation: *Process Model*

❑ Two or three packet sources in each node.

Implementation: *Leech Blocking Algorithm*

❑ Leech (computing): practice of benefiting, usually deliberately, from others' information or effort but not offering anything in return (taking without giving).

❑ Leeching drains speed from the network.

❑ Detection: Router detects all incoming packets.

❑ If packets are BitTorrent packet requests, increment counter.

❑ If packets are BitTorrent packet reply, decrement the counter.

❑ If the counter exceeds threshold, router will suspend the channel to the node.

❑ FTP packets traffic is unaffected.

Implementation: *Router Leech Detection Method*

❑ Four methods exist to detect P2P activity :

- ▪ Crawlers

- ▪ Network Flow

- ▪ Port Blocking

- ▪ Packet Filtering (Chosen Method)

	Crawlers	Network Flow	Port Blocking	Packet Filtering
Description	A client of the P2P system modified to measure activity Crawlers join the P2P network like a client, learns system structure, IP addresses etc.	Characterize network activity with several parameters (Host distribution, bandwidth, traffic pattern, topology, and connection duration).	Blocks certain port used by P2P networks. HTTP servers use port 80, FTP server use port 23.	Inspect each packet and compare contents (Header) to known patterns.
Advantage	Can identify all IPs in P2P network with high accuracy.	Works for all P2P networks, changing P2P network won't affect this method's success.	Simplicity Fast	Fast, simpler than crawlers and network flow. Low probability of blocking other connections.
Disadvantage	High resource usage (CPU & memory). Detects and block only one specific P2P network.	Complicated, lots of analysis. Cant block specific P2P protocol while enabling another.	P2P network use dynamic port allocation. High Probability to block other connection	Work only for single P2P network Uses only specific parts of the protocol.

Implementation: *Results and Analysis*

final_project–baseline–DES–1 : average (in ETE Delay)
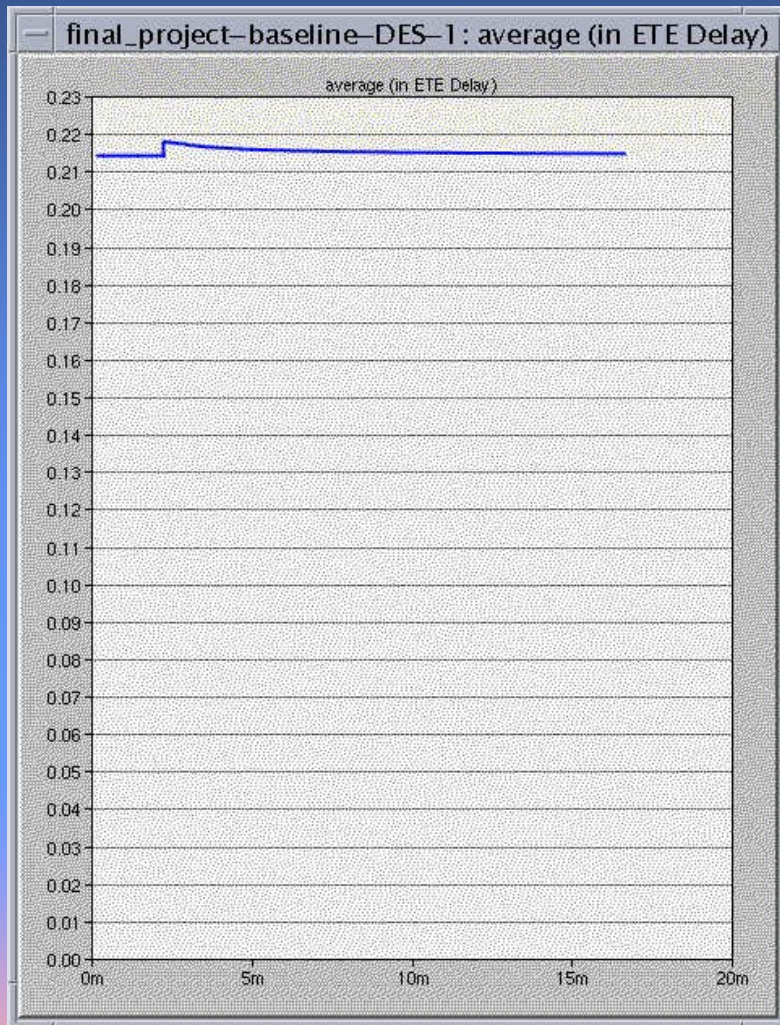
❑ The graph shows the packet end-to-end delay vs time

❑ The result illustrates that after 2 minutes router chokes off the leech bt_reply packets and ete delay decreases