

Scalable Wireless AD-HOC Network Simulation using XTC

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Received: 16/11/2015, Revised: 12/12/2015 and Accepted: 13/03/2016

Abstract

The system entitled Scalable Adhoc network simulation uses XTC Algorithm for reducing the network density and for ensuring confirmed data transmission with reduced energy consumption based on rank creation for each node in the network. Finally the data is transmitted to the destined node by establishment and removal of connection based on the ranking.

For two communicating ad-hoc nodes u and v , the energy consumption of their communication grows at least quadratically with their distance. Having one or more relay nodes between u and v therefore helps to save energy. The main purpose of a topology control algorithm is to abandon long distance communication links and instead route a message over small (energy-efficient) hops. For this purpose each node in the ad-hoc network chooses a "handful" of "close by" neighbours in all points of the compass. Clearly nodes cannot abandon links to "too many" far-away neighbours in order to prevent the ad-hoc network from being partitioned or the routing paths from becoming noncompetitively long. The advantage of this network node that provides services for any other node will be considered ad servers, thereby reducing the network density with confirmed data transmission.

**Reviewed by ICETSET'16 organizing committee*

1. Introduction

In areas in which there is little or no communication infrastructure or the existing infrastructure is expensive or inconvenient to use, wireless mobile users may still be able to communicate through the formation of an ad hoc network.

In such a network, each mobile node operates not only as a host but also as a router, forwarding packets for other mobile nodes in the network that may not be within direct wireless transmission range of each other. Each node participates in an ad hoc routing protocol that allows it to discover "multi-hop" paths through the network to any other node. The idea of ad hoc networking is sometimes also called infrastructure less networking since the mobile nodes in the network dynamically establish routing among themselves to form their own network "on the fly."

1.1 Objective

The prime purpose of this project is to reduce network density. The multicasting technique currently implemented in the ad-hoc networks uses either Expanded Ring Search algorithm (mesh) or Core resolution algorithm (Tree creation & shortest path) where the network is highly densed. Mobile Ad Hoc networks need efficient distributed algorithms to determine network organization, link scheduling, and routing.

Factors such as variable wireless link quality, distance coverage, power expended, and topological changes, become relevant issues. The network should be able to adaptively alter the routing paths to alleviate any of these effects. As betterment, XTC algorithm is chosen to reduce the network density and hence simulated.

1.2 Scope

The Ad-hoc network using XTC provides a confirmed data transmission. The XTC ad-hoc network topology control algorithm shows three main advantages over previously proposed algorithms.

- ❖ It is extremely simple and fast
- ❖ The algorithm does not require availability of node position information.
- ❖ Conserves energy.

2. System Specification

2.1 Hardware Specification

The hardware requirements are

RAM	: 128 MB
Hard Disk Drive	: 10GB
Processor	: Pentium iii and above
Monitor	: 15” colour monitor
Others	: 1.44MB, FDD, 52X CDR, keyboard, mouse.

2.2 Software Specification

The software requirements are

Operating system	: WIN XP
Programming Language	: J2SDK1.4.1 or Above

3. SOFTWARE DESCRIPTION

3. Software Description

3.1 Core JAVA

Java can be used to create two types of programs: application and applet. An application is a program that

runs on your computer, under the operating system of that computer. That is, an application created by java is more or less like one created using C or C++. When used to create application, java is not much different from any other computer language. Rather, it is java's ability to create applets that makes it important. An APPLET is an application designed to be transmitted over the internet and executed by a java-compatible Web Browser. An APPLET is actually a tiny java program, dynamically downloaded across the network, just like an image, sound file, or video clip. The important difference is that an APPLET is an intelligent program, not just an animation or media file. In other words, an APPLET is a program that can react to user input and dynamically change-not just run the same animation or sound over and over. Java having a major role in internet and the intranet application. The reason for this is quite simple: Java expands the universe PF objects that can move about freely in cyberspace. In a network, two very broad categories objects are transmitted between the server and your personal computer: passive information and dynamic, active programs.

3.2 Security

As you are likely aware, every time that you download a “normal” program , you are risking viral infection. Prior to java, most users did not download executable programs frequently, and those who did scanned them for viruses prior to execution. Even so, most users still worried about the possibility of infecting their system with a virus. When you use a java-compatible web browser, you can safely download java applets without fear of viral infection or malicious intent. Java achieves this protection by confining a java program to the java execution environment and not allowing it access to other parts of computer.

3.3 Portability

Many types of computers and operating systems are in use throughout the world-and many are connected to the internet. For program to be dynamically downloaded to all the various type of platforms connected to the Internet, some means of generating portable executable code is needed.

3.4 Byte code

The key that allows java to solve both the security and the portability problems just described is that output of a java compiler is not executable code. Rather, it is BYTECODE. Byte code is a highly optimized set of instruction designed to be executed by the java run-time system, which is called the Java Virtual Machine (JVM). That is, in its standard form, the JVM is an interpreted code.

3.5 Simple

Java was designed to be easy for the professional programmer to learn and use effectively. Assuming that you have some programming experience, you will not find java hard to master. If we know the basic concept of object-oriented programming, learning java will be even easier.

3.6 Objects-Oriented

Object-Oriented programming is the core of java. In fact, all java programs are object-oriented-this isn't an option the way that it is in C++, for example. OOP is so integral to java that you must understand its basic

principles before you can write even simple java programs.

3.7 Abstraction

The essential element of object-oriented programming is abstraction. Humans manage complexity through abstraction. For example, people do not think of a car as a set of ten of individual parts. They think of it as a well-defined object with its own unique behaviour. So this ignores the details of how the engine, transmission, and braking systems work.

3.8 Swing

Swing components facilitate efficient graphical user interface (GUI) development. These components are a collection of light weight visual components. Swing components contain a replacement for the heavyweight AWT components as well as complex user-interface components such as trees and tables. Swing is a set of classes that provides more powerful and flexible components than are possible with the AWT. In addition to that the familiar components such as buttons, check box and labels swings supplies several exciting additions including tabbed panes, scroll panes, trees and tables. Even familiar components such as buttons have more capabilities in swing. For example a button may have both an image and text string associated with it. Also the image can be changed as the state of button changes.

Unlike AWT components swing components are not implemented by platform specific code instead they are return entirely in JAVA and, therefore, are platform-independent. The term lightweight is used to describe such elements. The number of classes and interfaces in the swing packages is substantial.

The Swing architecture is shown in the figure given blow:

3.9 Advantages of Swings

- Wide variety of Components
- Pluggable Look and Feel
- MVC Architecture
- Keystroke Handling
- Action Objects
- Nested containers
- Customized Dialogs
- Compound Borders
- Standard Dialog Classes

- Structured Table and Tree Components
- Powerful Text Manipulation
- Generic Undo Capabilities

4. System Analysis

4.1 Feasibility Study

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

4.1.1 Economical Feasibility:

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

4.1.2 Technical Feasibility:

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

4.1.3 Social Feasibility:

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

4.2 Existing Systems

Currently used technique is multicasting Here one node connects to the other by finding the path using Expanded ring search algorithm, core resolution algorithm, Tree creation algorithm.

These algorithms has the following disadvantages

- Increased network density
- Increased energy consumption

- Increased bandwidth
- Congestion problems
- Signal interference
- Cannot assure for confirmed data transmission.

4.3 Proposed System

The Ad-hoc network using XTC provides a confirmed data transmission in a density reduced network. Ad hoc routing extends communication beyond the radio signal range by relaying data packets through intervening devices, enabling packets to "hop" across devices to the final destination. Because ad hoc networks do not depend upon a fixed infrastructure, they are ideal for disaster scenarios where cables and routers have been damaged, or for remote areas where no infrastructure exists. In addition to disaster response and military operations, ad hoc networks are being developed for applications as diverse as inter-vehicular communication, space networks, and environmental monitoring. Devices and applications vary greatly in communication patterns, mobility, and operational constraints such as battery size. The XTC ad-hoc network topology control algorithm shows three main advantages over previously proposed algorithms.

- ❖ It is extremely simple and fast
- ❖ The algorithm does not require availability of node position information.
- ❖ Conserves energy.

5. Conclusion

Currently, the disadvantages of the multicasting techniques are easily overcome by the XTC algorithm. The current disadvantages such as Increased network density, Increased energy consumption, Increased bandwidth, Congestion problems, Signal interference, Cannot assure for confirmed data transmission are rectified using this system. It provides confirmed transmission of data, reduction of network density, and lesser consumption of energy, reduced bandwidth, portable network irrespective of geographical area and elimination of congestion. This system is very optimal in smaller network coverage area. This can be enhanced to satellite transmissions which will be possible to achieve message communication over a wide range of networks.

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