CISCO ROUTER CONFIGURATION USING GUI CONCEPT

JUZAILAH BINTI MOHD KHERI @ MOHD KHAIRI

A theses submitted in fulfillment of the
requirements for the award of the degree of
Bachelor of Computer Science (Computer Systems & Networking)

FACULTY OF COMPUTER SYSTEMS & SOFTWARE ENGINEERING

UNIVERSITY MALAYSIA PAHANG

APRIL, 2010

ABTRACT

Router is one of the important devices in the network environment. It is a device that its task is to route or forward information to the destination requires in a network. All these while, the configuration of router has been done manually which is by using text-based interface or what is known as command line interface (CLI) concept. However, this method has few flaws such as time consuming, prone human-error and not easy to understand especially by beginners. A study of router configuration has been done and found that there is a more suitable method of configuring the router which is Graphical User Interface (GUI) concept. The purpose of this project is to introduce GUI configuration on Cisco router and show its advantages. System Development Life Cycle (SDLC) will be the main methodology of this project. The system of this project will be develop using NetBeans IDE by using JAVA language and network programming. The system develop will make an easier understanding while making the configuration of the router free from human-error.

ABTSRAK

Router merupakan salah satu peralatan yang penting dalam persekitaran rangkaian. Ia merupakan peralatan yang menjalankan tugas untuk penghantaran maklumat ke destinasi yang sepatutnya dalam sesebuah rangkaian. Selama ini, konfigurasi sesebuah *router* adalah secara manual iaitu denagn menggunakan kaedah terminal bentuk teks atau lebih dikenali sebagai Antara Muka Baris Perintah (Command Line Interface). Walau bagaimanapun, kaedah ini terdapat beberapa kelemahan seperti memakan masa yang lama, lebih mudah untuk terjadi kesalahan yang dilakukan oleh manusia dan juga sukar untuk difahami terutamanya untuk pengguna yang baru. Satu kajian terhadap konfigurasi terhadap router telah dijalankan dan mendapati terdapat kaedah lain yang lebih baik dan sesuai untuk konfigurasi router iaitu cengkerang grafik (Graphical User Interface). Tujuan projek ini dilakukan adalah untuk memperkenalkan konsep GUI sekaligus mengetengahkan kelebihannya. Kitaran Hidup Pembangunan Sistem atau lebih dikenali sebagai "SDLC" adalah metodologi utama bagi projek ini. Sistem ini dibangunkan dengan menggunakan NetBeans IDE . Bahasa pengaturcaraan yang digunakan adalah JAVA dan Pengaturcaraan Rangkaian. Sistem yang dibangunkan akan menghasilkan kaedah konfigurasi yang lebih mudah difahami lantas mengurangkan kesalahan yang dilakukan oleh manusia semasa kerja konfigurasi dijalankan.

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IOS	INTERNETWORK OPERATING SYSTEM
CLI	COMMAND LINE INTERFACE
GUI	GRAPHICAL USER INTERFACE
OO	OBJECT-ORIENTED
IDE	INTEGRATED DEVELOPMENT ENVIRONMENT
SDLC	SYSTEM DEVELOPMENT LIFE CYCLE
SSH	SECURE SHELL PROTOCOL

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Router is the device that its task is to route or forward information to the destination requires in a network. One of the popular suppliers in network technology is provided by Cisco, one of the leading companies in network management. Routers provided by Cisco use Internetwork Operating System called Cisco IOS which has a characteristic of command line interface (CLI).

All the initial configurations of the routers will be configured using command line concept. Routers will be configured via console from the computers that acts as its interface.

However, the problem of using the command line concept is too many command lines and steps to remember and very little guidance. This will cause human error and takes longer time to make the configurations.

The application that will be introduced for this project will apply the GUI concept. The purpose of this introduction is to make the configuration of the router easier by reducing typing error for the command line and save much more time in configuring router in a network.

1.2   PROBLEM STATEMENT

Currently, the configuration of the router is quite difficult to understand especially for the beginners. This is because the current applications used to configure routers do not provide a proper guideline on how to configure the router correctly.

So, router configuration command line must be memorized. Even though application such as HyperTerminal does provide simple help, unfortunately it is confusing and time consuming.

Besides that, the major problem of using the command line concept for configuration other than typing error is forgetting the command line.

Hence, by developing this application via mobile not only provide mobility in configuring the routers but also will solve the problems arise when using the current configuration applications such as avoiding human error and more less memorizing the steps and command line.

By using GUI concept in configuration, less typing will make sure less mistakes. It is easier to understand even though with less guidelines.

1.3 OBJECTIVE

i. To make the configuration of the Cisco router easier by using GUI configuration

ii. To avoid human error while doing the configuration on the router using command line concept.

iii. To have an easier understanding on how to configure the router.

1.4 SCOPE

i. This application will be meant for the use of the router administrator for the configuration of Cisco routers.

ii. GUI configuration concept will be implemented instead of the command line concept.

iii. JAVA NetBeans program will be used to develop this application.

iv. PC will be connected to the console of the router for the purpose of configuration.

CHAPTER 2

LITERATURE REVIEW

2.1 Cisco router

A router is a networking device which software and hardware are usually designed to the tasks of routing and forwarding information. The largest routers interconnect the Internet Service Providers (ISPs) or maybe used in very large enterprise networks. The smallest routers provide connectivity for small and home offices. There are many type of routers used in the global network such as Juniper, Nortel and Cisco.

Cisco routers are widely used in the networking industry. Cisco approach a system with a single and a very flexible platform such as the Cisco integrated services routers. It combines intelligent services within and between services weaves voice, security, routing, and application services together. [1] The process becomes automated

thus offering a higher Quality of service (QoS) for data, voice, and video traffic that increased time to productivity and better use of network resources. The network router is quickly evolving from a device dedicated to connecting different way of networks to an integrated services device capable of multiple functions beyond routing.

Organizations of all sizes that need fast, secure access to today's mission-critical applications as well as a foundation for future growth, Cisco routers: [2]

i.   Provide the industry's first portfolio engineered for secure, wire-speed delivery of concurrent data, voice, and video services

ii. Embed security and voice services into a single routing system

iii. Use an integrated systems approach to embedded services that speeds application deployment and reduces operating costs and complexity

iv. Provide unparalleled services performance and investment protection

The benefits of integrated services network routers are high secure, flexible and built compatible with future technologies. It provides multiple functions of only one device, same access to the remote sites, centralized management and integrated network security.

2.2 Cisco router configuration

Several research works have shown that the process of Internet routing configuration is error prone. The primary method used by operators to determine whether their routing configurations are correct is to try them out in operation.

A more advanced method is the static analysis of router configurations before they are deployed. There is a need of broader approaches to verify router configurations automatically and continuously, that is, without human error before and after they are deployed. The Cisco 1801, 1802, 1803, 1811, and 1812 Integrated Services Routers are fixed configuration, while the Cisco 1841 Integrated Services Router is modular. [3]

Router configuration has always been a text-based interface which is by using command-line method or command line interface (CLI). Configuration of router in the network is divided into two (2) mode which are the EXEC mode and Privilege EXEC mode. When configuring a router, certain basic tasks are performed such as naming the router, setting passwords, configuring interfaces, configuring router operations and protocols.

User EXEC Commands - Router>
ping
show (limited)
enable
etc...

Privileged EXEC Commands - Router#
all User EXEC commands
debug commands
reload
configure
etc...

Global Configuration Commands - Router(config)#
hostname
enable secret
ip route

interface   ethernet
            serial
            bri
            etc...

Interface Commands - Router(config-if)#
ip address
ipx address
encapsulation
shutdown / no shutdown
etc...

router   rip
            ospf
            igrp
            etc...

Routing Engine Commands - Router(config-router)#
network
version
auto-summary
etc...

line   vty
            console
            etc...

Line Commands - Router(config-line)#
password
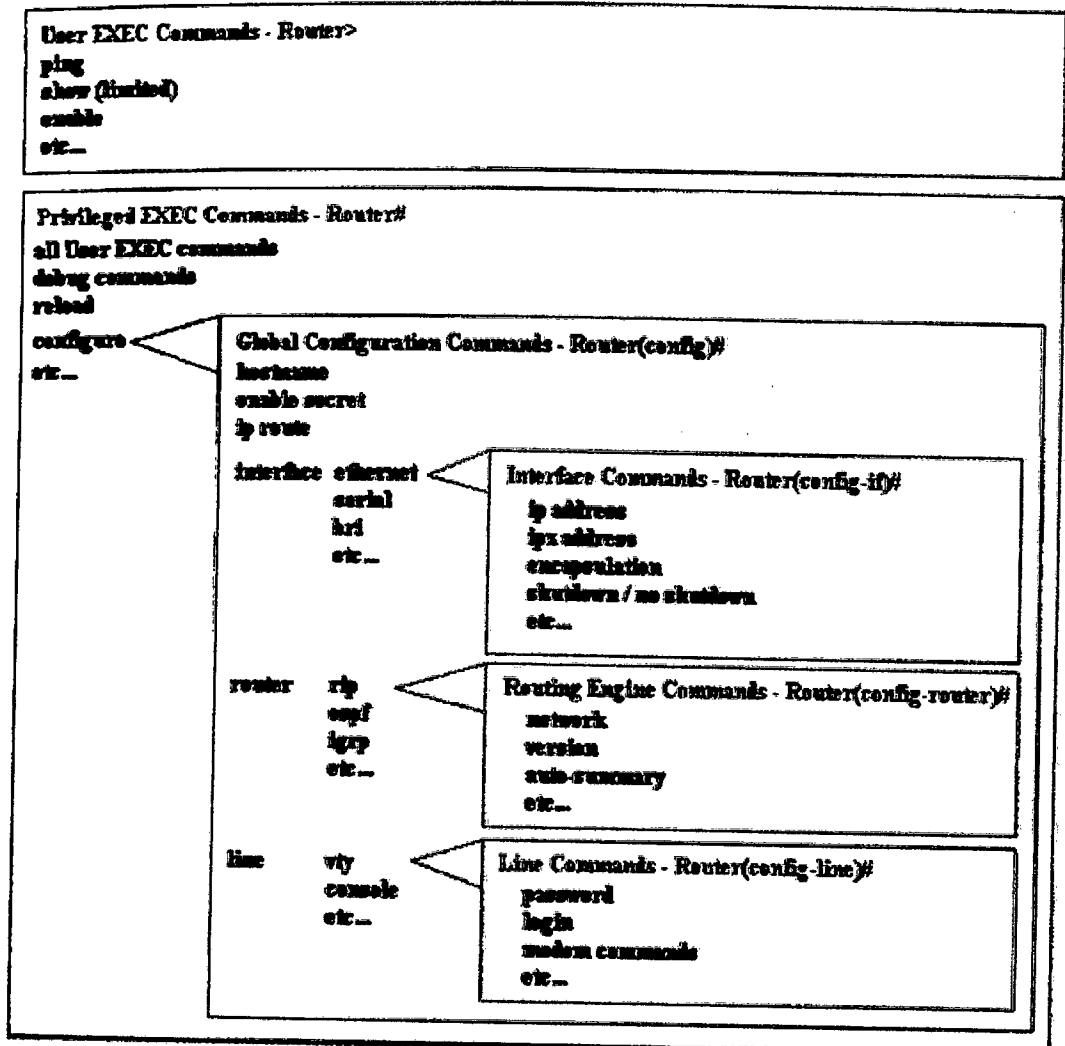login
modem commands
etc...

Figure 2.1 : Commands that are configured to a network router

2.3 Command line interface (CLI)

A command-line interface (CLI) is a text-only interface mechanism use to interact with a computer operating system or software by typing commands to perform specific tasks. It use different method from the graphic user interface (GUI) which is perform by pointing and clicking or menus on a text user interface (TUI) to select options.

In order to instruct a computer to perform its task, user has to input type-command and press enter. A command-line interpreter then receives, analyses, and executes the requested command.

Upon completion, the command usually returns output to the user in the form of text lines on the CLI. This output may be an answer if the command was a question, or otherwise a summary of the operation.

However, command line interface is hardly applied nowadays. Instructions of performing tasks are now simplify and Graphical user interface (GUI) are more convenient. Command line interface are too much to be done. Configurations line and instructions are so many to understand and memorize. These are the reasons why CLI are not preferred much.

2.4 Graphical User Interface concept

Graphical User Interface (GUI) is develop to allow the purpose easy interaction between human and electronic devices such as computers, hand phone and many more. It works by offering a graphical design solution such as graphical icons and visual indicators. The concept of GUI is the manipulation of the graphic element in developing

a platform for user to interact and operate devices more conveniently, for the tasks of gathering and producing information

Elements of visual language have evolved to represent information stored in computers. This makes it easier for people with little computer skills to work with and use computer software.

Graphical user interface (GUI) programming provides a particularly effective vehicle for this purpose because it is relevant to virtually all applications and provides immediate feedback on the correctness of Object-oriented (OO) structures through tangible, visual results. Table 2.1 shows the differences between GUI and CLI.

2.4.1 GUI vs. CLI

Table 2.1 Differences between GUI and CLI

Task	CLI (Command Line Interface)	GUI (Graphical User Interface)
Ease of Use	Because of the memorization and familiarity needed to operate a command line interface, new users find it much more difficult to navigate and operate a command line interface.	Although new users may have a difficult at time learning to use the mouse to operate and use a GUI most users pick up this interface much easier when compared to a command line interface.

Table 2.1 Differences between GUI and CLI (Continue)

Task	CLI (Command Line Interface)	GUI (Graphical User Interface)
Multitasking	Although many command line environments are capable of multitasking they do not offer the same ease and ability to view multiple things at once on one screen.	GUI users have windows that enable a user to easily view, control, and manipulate multiple things at once.
Appearance	CLIs usually do not change in their appearance which in turn means once a user got familiar with the lcommand there is no need get familiarized every now and then the CLI appearance changes again.	GUIs for particular program tend to change often, mostly with every major release version. Thus a user has to invest time over and over again each time the GUI changes in order to become familiar again.
Speed	Because command line users only need to use their keyboards to navigate a command line interface and often only need to execute a few lines to perform a task an advanced command line interface user is mostly able to get something done much faster than an advanced GUI user.	A GUI may be easier to use because of the mouse, however using a mouse and/or keyboard to navigate and control your operating system for many things is going to be much slower then someone who is working in a command line environment.

Table 2.1 Differences between GUI and CLI (Continue)

Task	CLI (Command Line Interface)	GUI (Graphical User Interface)
Resources	A computer that is only using the command line takes a lot less of the computers resources. Also, with CLIs there is no need to install a graphical layer at all onto a computer system which saves a lot of resources e.g. storage space.	A GUI will require a lot more system resources because of each of the elements that need to be loaded such as icons, fonts, etc. In addition video drivers, mouse drivers, and other drivers that need to be loaded will also take additional resources.
Scripting	A command line interface enables a user to easily script a sequence of commands to perform a task or execute a program.	Although a GUI enables a user to create shortcuts, tasks, or other similar actions to complete a task or run a program it does not even come close in comparison to what is available through a command line.
Control	Users have much more control of their file system and operating system in a command line interface. For example, users can easily copy a specific type of file from one location to another with a one-line command.	Although a GUI offers plenty of control of a file system and operating system often advanced users or users who need to do specific tasks may need to resort to a command line to complete a particular task.

2.5   Configuration file

Configuration files, or config files, are used to configure the initial settings for some computer programs. They are used for user applications, server processes and operating system settings.

Some files are created and modified using an ASCII editor. Others are created and modified as a side-effect of changing settings in a graphical user interface (GUI) program. The formats of configuration files are often poorly documented.

Some applications provide tools to create, modify, and verify the syntax of their configuration files.

2.6   Terminal server

A terminal server is a specialized computer which aggregates multiple communication channels together that provides terminal for PCs, printers and other devices. It works by knowing how to respond to a client process that is run on the host. The channel is divided into two (2) models which multiple entities connect to a single resource and a single entity connects to multiple resources. A terminal server can provide both physical and virtual resources.

The use of a terminal server means that each terminal doesn't need its own network interface card or modem. The connection resources inside the terminal server are usually shared dynamically by all attached terminals.

Some terminal servers can be shared by up to 128 terminals. The terminals can be PCs, terminals that emulate 3270s, printers, or other devices with the RS-232/423

interface. With some terminal servers, a given terminal user can have multiple host connections to different kinds of host operating systems. [5]

2.7 Telnet Protocol

TELNET came from the word Terminal Network which is a network protocol used on the Internet or local area networks to provide a bidirectional interactive text-oriented communications facility using a virtual terminal connection. It is a tool that allows you to remotely connect into other computers and access them just as if you were sitting directly in front of them. Using telnet is as simple as launching the telnet application, and then opening a connection to a host. Once the connection is established, you can interact with the remote computer directly by typing commands.

Telnet, by default, does not encrypt any data sent over the connection including passwords and so it is often practical to eavesdrop on the communications and use the password later for malicious purposes. Telnet is being used can intercept the packets passing by and obtain login and password information. Communication between a telnet client and server is initiated by the client opening a TCP/IP socket to a port on the server and the assigned telnet well-known port is 23. [6]

Most implementations of Telnet have no authentication that would ensure communication is carried out between the two (2) desired hosts and not intercepted in the middle. The advantage of telnet is that it is the most widely used protocol for remote logins and as such you can be guaranteed to be able to connect with it.