

ENHANCEMENT OF MPLS IPVPN BACKUP NETWORK FROM ISDN TO ADSL
INTERM OF TIME SWITCHING

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Specially.....

To my beloved parents

To my kind brothers and sisters

And to all my friends

For their Love, Encouragements, and Best Wishes

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ABSTRACT

This thesis presents the Enhancement of Multi Protocol Label Switch (MPLS) IP Virtual Private Network (IPVPN) Backup Network from Integrated Services Digital Network (ISDN) to Asymmetric Digital Subscriber Line (ADSL) Inter of Switching Time. This project is a collaboration between Universiti Teknikal Malaysia Melaka (UTeM) and Telekom Malaysia (TM). The advantage of using ADSL as a backup network is, it can reduce the switching time to take over the primary line during major breakdown compared to ISDN. This project will be focus on the studies of IPVPN, ADSL and ISDN network topology and relate it back to the project. As for routing protocols, this project will focus on the Border Gateway Protocol (BGP) only. Simulation results of the switching time between ISDN and ADSL during major break down take over will be compared and will be carried out at Telekom Malaysia (TM) Test Lab.

ABSTRAK

Tesis ini membentangkan tentang pembaharuan dalam plan alternatif bagi rangkaian *Multi Protocol Label Switch (MPLS) IP Virtual Private Network (IPVPN)* daripada *Integrated Services Digital Network (ISDN)* kepada *Asymmetric Digital Subscriber Line (ADSL)* dari segi pensuisan masa. Projek ini adalah kolarborasi di antara Universiti Teknikal Malaysia Melaka (UTeM) dan Telekom Malaysia (TM). Kelebihan menggunakan sistem ADSL sebagai rangkaian plan alternatif adalah, ia dapat mengurangkan masa pensuisan yang diambil untuk menggantikan talian utama ketika berlaku kerosakan besar pada talian utama berbanding dengan ISDN. Projek ini akan memfokuskan pada pembelajaran terhadap rangkaian topologi bagi IPVPN, ADSL dan ISDN dan menggaitkan kembali kepada tajuk asal projek. Bagi jalan laluan protocol pula, projek ini akan memfokuskan pada *Border Gateway Protocol (BGP)* sahaja. Keputusan simulasi pensuisan masa di antara ISDN dan ADSL ketika pengambilan talian utama di saat kerosakan besar berlaku akan di bandingkan di Makmal Ujian milik Telekom Malaysia (TM).

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LIST OF ABBREVIATIONS

ADSL	-	Asymmetric Digital Subscriber Line
ATM	-	Asynchronous Transfer Mode
B2B	-	Business-to-business
B2C	-	Business-to-consumer
BGP	-	Border Gateway Protocol
BRI	-	Basic Rate Interface
CE	-	Customer Edge
CR-LDP	-	Constraint-based Routing Label Distribution Protocol
DSL	-	Digital Subscriber Line
EIGRP	-	Enhanced Interior Gateway Routing Protocol
FIB	-	Forwarding Information Base
IGP	-	Interior Gateway Protocol
IPVPN	-	IP Virtual Private Network
ISDN	-	Integrated Services Digital Network
ISP	-	Internet Service Provider
LAN	-	Local Area Network

LDP	-	Label Distribution Protocol
LL	-	Leased Line
LSP	-	Label Switched Path
MPLS	-	Multi Protocol Label Switch
OSI	-	Open Systems Interconnection
OSPF	-	Open Shortest Path First
P Router	-	Provider Router
PE	-	Provider Edge
PRI	-	Primary Rate Interface
RIP	-	Routing Information Protocol
RSVP	-	Resource Reservation Protocol
SLA	-	Service Level Agreements
SONET	-	Synchronous Optical Networking
TM	-	Telekom Malaysia
VoIP	-	Voice over IP Address
VPN	-	Virtual Private Network
VRF	-	Virtual and Routing Forwarding

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CHAPTER 1

INTRODUCTION

This chapter covers the introduction of the project, background study regarding the project topic, project objectives, the problem statement involves, the scope of work and the methodology of this project.

1.1 Project Background

Converged services (Voice +Data + Internet) are gaining traction in the Multi Protocol Label Switch (MPLS) Virtual Private Network (VPN) space with customers increasingly asking for access to Internet and Voice over IP Address (VoIP) to be bundled with data networks on their VPNs. Specifically, VoIP is acting as a key driver for migration from other services to VPN services. No longer can organizations afford not to include a thorough and comprehensive plan for their continued availability as part of their business continuity and disaster recovery planning efforts.

Based on recover planing efforts and the realization of it importantness in the industry, hence come the idea which to implement a new backup system for the MPLS IP Virtual Private Network (IPVPN) leased line services network system which using Asymmetric Digital Subscriber Line (ADSL) network for the recovering plan.

1.2 Project Objective

Enhancement from Integrated Services Digital Network (ISDN) to Asymmetric Digital Subscriber Line (ADSL) as a solution for IP Virtual Private Network (IPVPN) leased line service backup network interm of switching time.

1.3 Problem Statement

Every new technology and invention brings along a promise of revolutionizing some area of our lives. The introduction of Integrated Services Digital Network (ISDN) in Malaysia's in the late 90's bringing lot of promising in the telecommunication fields from analog to digital transmission. ISDN provides voice calls, video conferencing and access to the internet to the end user customers.

But then, as years pass by, technology become more advance, more competitive and more sophisticated, thus old technologies such ISDN will slowly been excluded from the main stream. Nowadays, it is difficult to find ISDN spare parts for maintenance due to principle vendor has discontinued the production of the ISDN spare part products.

Aside of this, it is found out that the switching time from primary to backup line for the ISDN is a bit slow during major breakdown take over on the leased line. This is because, ISDN need to dial-up to the Telekom Malaysia (TM) Host Radius for authentication to get temporary IP address (dynamic IP address) before it can take over the leased line.

Considering the information and problem stated, enhancement for the backup network from ISDN to ADSL on the switching time will be implemented to overcome the problems. Results simulation to compare the switching time during major breakdown take over between ISDN and Asymmetric Digital Subscriber Line (ADSL) will be carried out at the TM Test Lab.

1.4 Scope of Work

These are the main things and areas identified to be considered in this project.

1.4.1 Understand the Network Topology

This project will focus on the IP Virtual Private Network (IPVPN), Integrated Services Digital Network (ISDN) and Asymmetric Digital Subscriber Line (ADSL) network. By understanding the network topology, it will be helpful during the progression of this project.

1.4.2 Routing Protocols

A routing protocol is a protocol that specifies how routers communicate with each other, spreading information that enables them to select routes between any two nodes on a computer network, the choice of the route being done by routing algorithms. A routing protocol shares this information first among immediate neighbors, and then throughout the network. In this project it will focus more on the Border Gateway Protocol (BGP). This way, routers gain knowledge of the topology of the network.

1.4.3 Router Configuration

It is important to gain information on how to configure the router. It enables user to set how to fully use of the router. Basically, routing configurations are used when the network topology has been set up.

- I. IP setting at the interface involve (serial interface, fast Ethernet interface & backup interface (i.e BRI card – ISDN / ATM card interface for ADSL backup).

- II. Understanding the routing table.

1.4.4 Software Tools

Secure CRT is one of the software that being used by TM's for managing routers. All configurations are done by using this tool.