SIMULATION-BASED PERFORMANCE COMPARISON OF TCP OVER IPV6 AND IPV4

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ABSTRACT

Internet Protocol ver-4 (IPv4) has been used for long times ago, but the great growth of the Internet and its change in drastic way over time makes IPv4 face many problems. The main one is the lack in address space, not to forget issues such as mobility and security. To meet requirements that didn't exist in IPv4, IP version 6 (IPv6) was designed. TCP protocol is as fundamental as IP protocol in the TCP/IP Protocol Suite. TCP adds some mechanisms to overcome unreliability and connectionless IP functionalities so can guarantee delivery the messages. In this project, we investigated the impact of using IPv6 on the behavior of TCP by comparing the performance of TCP over IPv6 and IPv4. TCP Reno (one of TCP flavors) is used in the comparison; NS-2 and OMNeT++ are tools used to perform the simulation experiments. During the course of simulation, throughput and delay (measured RTT) of TCP over IPv6 and IPv4 have been studied, and two different type of traffic (FTP, HTTP) are generated on same network topology with two scenarios run for each type of traffic (single flow, compete flow). Project results have shown a poor performance of TCP over IPv6 in terms of a lot of packet loss and long delay (measured RTT).

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In the name of Allah, Allah says:

((Work; so Allah will see your work and (so will) His Messenger and the believers;))

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LIST OF ABBREVIATIONS

IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
TCP/IP	Transmission Control Protocol/Internet Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
IP	Internet Protocol
rwnd	Receiver's advertised window
cwnd	Congestion window
ssthresh	Slow Start THRESHold
ACK	ACKnowledgment
RTO	Retransmission Time Out
IW	initial value of cwnd
SMSS	Sender Maximum Segment Size
LW	loss window
IETF	Internet Engineering Task Force

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

Transmission Control Protocol/Internet Protocol (TCP/IP), the most common of all network protocol suites, used for communication on the Internet. TCP/IP is a hierarchical protocol made up of interactive layers (as shown in Figure 1) each layer has a specific functionality.

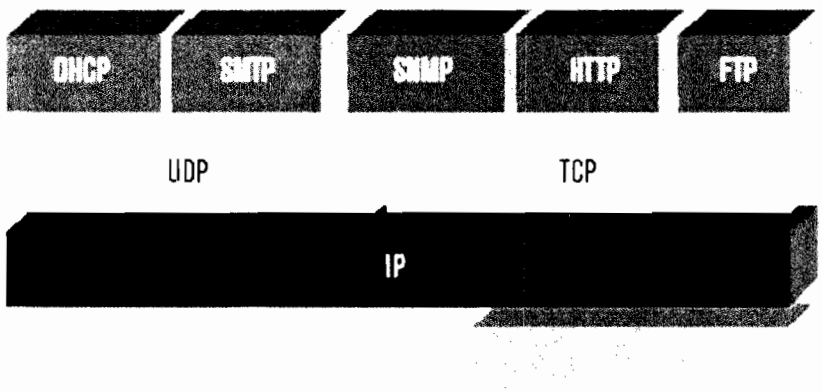

Figure 1. **TCP/IP Protocol Suite**

Application layer are placed at the top of TCP /IP stack, it defines protocols such as (FTP, HTTP, Telnet and so on) for application communication. These protocols are acting as interface for the actual application program.

The transport layer follows the application layer. TCP/IP makes available two distinct transport layer protocols to the application layer: Transmission Control Protocol (TCP) and User Datagram Protocol (UDP). TCP provides reliable, connection-oriented services to the invoking application [KR05] and also provides congestion control [APS99, S97, J95]. However, the congestion control is not so much a service provided to the invoking application as it is a service for the Internet as a whole [KR05]. For a more detailed introduction to TCP, see [KR05].

The contents of the thesis is for internal user only

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