Navigating the Rough Waters of Modern Networking Protocols

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Abstract

This is the last part of the paper that will be written after everything else has been completed.

1 Introduction

The organization of this paper is as follows. There will be a brief introduction where the paper's format, framing, topics, and previous work will be introduced. Next will be a general discussion of different networking protocols and standards with corresponding case studies. The topics to be discussed are network-size increase and the IP address space problem, global networking and countries who don't conform, and a current effort in creating and adapting security protocols. We conclude by examining the affects network protocols have on new businesses entering a market.

The focus of our research regards the relative ease or difficulty an entrepreneur faces when deciding to enter a market place saturated with technological protocols. Because of the rapid advancement in networking technologies that mankind made in the past century, protocols have become more and more complex.

Modern networking touches almost every aspect of a successful business; from marketing and advertisement to accepting payment and collecting customer data. Hence it becomes necessary to inspect the costs and benefits of protocols before considering entrance into a market place.

There is much interest in the overall sustainability of certain networking protocols[5]. In our paper we examine the impact of exponential network growth and problems that are posed with IP addressing on an expanding market. There has also been work done on analyzing the development of protocols [10] and relaying older protocols to new uses [8]. New protocols are always under development as well[1].

2 Exponential Address Space Increase

There are both good aspects and bad ones of an increasing network size on the Internet. More devices on the Internet means that your advertisements will reach a larger audience. It also means you will get more business if you are running an on-line shop. But under the hood of the Internet this rapid growth is causing major problems.

The fundamental standard upon which the Internet is based is known as the Internet Protocol, or IP for short. The IP works by assigning a unique address to every device connected to the Internet. The address assigned to a particular device is that device's IP address. The reason that this protocol exists is to make communication between two devices called the client and the host possible.

The IP was first introduced in 1981 by DARPA[9], based on previous work by Vint Cerf and Bob Khan[2]. Back in 1981 it was assumed that an address of 32 bits (1's and 0's) was large enough to assign a unique IP address to all devices connected to the Internet for the foreseeable future. An address of this length can accommodate roughly 2^{32} or about 4 billion devices. Unfortunately we live in an age when the number of networked devices is beginning to exceed this limit.

In it's original introduction with the 32-bit addresses IP was widely adopted. The form of IP that was adopted at that point in time was known as the Internet Protocol version 4 (or IPv4). Since then a new form of IP has been proposed[3][4] and deployed in some cases. IPv6 has an address field of 128 bits. This corresponds to approximately 3.4×10^{38} addresses. It is estimated that there are about 10^{24} stars in the universe, just to put this in perspective.

IPv6 has been deployed, but as of March 2014 has only seen a 3.4 % deployment.[6] Google takes statistics on domains that register IPv6 addresses in order to monitor the deployment. The figures below were taken

from Googles IPv6 deployment statistics page.

[7]

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