

ENHANCEMENT OF GLOBAL BANDWIDTH OF INTERNET USING INTERNET EXCHANGE POINT

BY

AL NAHIAN BIN EMRAN

ID: 151-15-5195

AMAN ULLAH JUMAN

ID: 151-15-5291

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Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

GAZI ZAHIRUL ISLAM

Assistant Professor

Department of Computer Science and Engineering

Daffodil International University



DAFFODIL INTERNATIONAL UNIVERSITY

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APPROVAL

This research project titled “**Enhancement of Global Bandwidth Using Internet Exchange Point**” submitted by **Al-Nahian Bin Emran**, ID No: **151-15-5195** and **Aman Ullah Juman**, ID No: **151-15-5291** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering (BSc) and approved as to its style and contents. The presentation has been held on December 2018.

BOARD OF EXAMINERS

Dr. Syed Akhter Hossain
Professor and Head

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Chairman

Sheak Rashed Haider Noori

Associate Professor and Associate Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner

Dr. Mohammad Shorif Uddin
Professor and Chairman

Department of Computer Science and Engineering
Jahangirnagar University

External Examiner

DECLARATION

I hereby declare that, the work presented in this thesis paper based on research project is done by me under the supervision of Mr. Gazi Zahirul Islam, Assistant Professor of Department of Computer Science and Engineering, Daffodil International University, in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering. I am declaring this report is my original work. I ensure that neither this report nor any part has been submitted elsewhere for the award of any degree.

Supervised by:

Gazi Zahirul Islam

Assistant Professor
Department of Computer Science and Engineering
Daffodil International University

Co-Supervised by:

Ms. Farhana Sharmin

Lecturer
Department of Computer Science and Engineering
Daffodil International University

Submitted by:

Al Nahian Bin Emran

ID: 151-15-5195
Department of Computer Science and Engineering
Daffodil International University

Aman Ullah Juman

ID: 151-15-5291
Department of Computer Science and Engineering
Daffodil International University

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ABSTRACT

Not all internet service providers provide the same amount of bandwidth to their users. Based on bandwidth allocation and pricing service providers capped their users' bandwidth. As a result, we observe bandwidth limitation among users. In this paper, we will show a new approach to bypass bandwidth and firewall restriction using the virtual private network, where we will use common internet exchange point route to bypass initial level of the bandwidth cap. Using functional simulation, we will show that internet speed of international path can be a bypass, if there are multiple ISPs use common internet exchange point with better internet speed allocation. Usually, regional ISPs use common internet exchange point to share their local traffic. We will utilize that internet exchange point to distribute bandwidth cap among the low amount of bandwidth user who has better bandwidth allocation for internet exchange point. We will show performance measurement compared with others enhancing approaches such as routing, tunneling.

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CHAPTER 01

INTRODUCTION

1.1 Introduction

It is totally undeniable that internet is a ground breaking revolution in this century. We can hardly think of a day without an internet connection. There's hardly any sphere in human life left where the internet hasn't brought any change yet. From the outer space to the deepest trench of the world, the internet has brought the world to our finger's end. For the greater welfare of mankind, Internet should reach to every people's hand at their greatest conveniences. But There are too many deficiencies in our system that has been hindrance to spread the internet at a convenient cost. Pointing out all of the deficiencies of internet isn't the main focus of this paper. Nevertheless, we came up with a solution to make internet handy. In our country Internet bandwidth isn't thoroughly distributed with a well-maintained pricing list. Pricing of package varies from one end to other end is making conundrum for every person who has to use internet. People aren't getting proper bandwidth by paying money which they yearn for. Somewhere they are getting well served by internet packages by paying decent money and somewhere they can't think of getting the same service with same amount of money. So focusing on the pricing variation, we will try to have a convenient solution by using the bandwidth we have in our country.

1.2 Motivation

Bangladesh could have remained in the dark if submarines were not connected to get internet. Sub marines have brought the world a step closer to us, without submarines it could have been impossible for us to get us involved in the era where the internet has covered every movement of our life. Bangladesh is a developing country in where getting connected to the internet wasn't so easy. We can easily guess how strenuous it was to disseminate the internet to every home. Plenty of internet providers showed up after connected to IIG and International Submarine. But they added costs and delays, as upstream providers charge by capacity or utilization, and the traffic will often be passed

through other cities before reaching its destination. It consumes time and money and unusual cost of bandwidth. So as coping strategy to accomplish cost-effective mechanism, Bangladesh narrowed down the multiple connections to a server to one common internet exchange point from where all the local ISPs coalesced and can exchange local traffic locally without routing through the VSAT with another country. A direct interconnection between two networks is naturally the most efficient way for those networks to exchange data. With IXP in Bangladesh which is known as BDIX, one can easily anticipate a higher speed internet connection by paying off a decent amount [10]. IXP was supposed to create proper propagation of global and local bandwidth. But Internet providers are ensuring local traffic exchanges and in the meanwhile capping global bandwidth for their interest. Thus people aren't getting the service from Internet exchange point what they yearned for or expected. While local internet exchange has a satisfactory ascendance over people, Global bandwidth has been fluctuating in the overall traffic pattern. The customer of cities facing disproportion between local and global bandwidth. On the contrary, in the suburbs people aren't having a decent amount speed neither global bandwidth nor the local one too by paying off a huge amount of money. Thus we got persuaded to get over with syndication of bandwidth and disproportion of speed by using IXP.

1.3 Objective

In this era where technology has been a buzzword itself and changed the whole structure of our thinking, we can't afford to lag behind just because of fluctuations of internet speed in our country. And it's not possible to uproot syndication from the system all at a once. Overcoming the deficiencies and use every bit of bandwidth with maximized speed is our main aim. Internet exchange point was invented to effect the speed of internet and give our country a whole new infrastructure of communication. Internet Exchange point has maximized our local exchange rather than the peer to peer connection before IXP was introduced. But capped global bandwidth has been a hindrance of speeding up our internet. As IXP ensured us better local traffic, our goal is to use local traffic speed to get

over with global bandwidth syndication and ensure a thorough distribution and maximized speed of global traffic with a decent amount of money.

1.4 Expected Outcome

As we know, Internet exchange point established a remarkable change in our communication but also can't ensure proper propagation of internet bandwidth both globally in proportion to money that people are willing to give to have a maximized internet connection. Our goal is to use the internet exchange point to get a proper distribution of bandwidth for everyone. We can ensure that the method we came up for the solution is the answer to the syndication of global bandwidth and disproportion. Beyond all dispute we can think of a maximized international traffic with a decent amount of money by using VPN, Proxy Server, peering to gain maximum international traffic through IXP. Internet Exchange Point establishes local traffic speed to a maximized level. So, People who do have the low bandwidth for global traffic, our method will establish a decent speed of global bandwidth by using the existing bandwidth.

CHAPTER 02

BACKGROUND

2.1 Introduction

Bangladesh is going through some massive change regarding technology issues. From early nineties' communication system of email via dialup to today's Internet accessibility through IIG, our country's communication pattern has faced some challenges and not only overcame them also has been developing through intellectual steps. If we look behind and take a glance over our communication infrastructure, our whole internet system took a flight after the connection with information super highway using the submarine cable. After internet connection by submarines, local internet providers grew up more and more day by day. Before the revolution of IXP, data has to travel to other cities to reach its final destination. That system was vulnerable for user's data security, and by this way, it was quite hard to cope up with limited bandwidth. With limited bandwidth, that system was huge hindrance to accomplish a user-friendly, cost-effective mechanism.

Except North Korea, Myanmar and Sierra Leon, the internet penetration of Bangladesh is noticeable quite steady process than other developed country around the world [2]. From one of the press release the CEO of Grameenphone has enlighten us with a current status of user of Internet on the basis of rapid growth of internet speed and usage and forecasts that in the very near future, by the year 2020, the user of internet in Bangladesh will increase and will touch the milestone of 20 million, which is quite impressive. Authorities in Bangladesh, Like BTCL and The WiMax operators and mobile operators aren't leaving any stone unturned to reach every corner to expand their service to make the internet a daily and useful companion.

Table 2.1: An estimate of internet users and their growth [3],[4]

Year	Number of users	Population	% penetration	Source
2000	93,261	131,280,739	0.1 %	<i>Internet Live Stats</i>
2005	345,372	142,929,979	0.2 %	<i>Internet Live Stats</i>
2010	5,609,821	151,616,777	3.7 %	<i>Internet Live Stats</i>
2014	15,271,441	159,077,513	9.6 %	<i>Internet Live Stats</i>
2015	19,420,674	160,995,642	12.1 %	<i>Internet Live Stats</i>
2016	21,439,070	162,910,864	13.2 %	<i>Internet Live Stats</i>

Nevertheless, Internet provider had no control over traffic flows. So the reduction of the usage of the bandwidth and to get an elevated internet flow, all ISP's coalesced underneath one router which is known as Internet Exchange point. A Direct Interconnection between ISP's has sped up the local traffic and caused the reduction of usage of Bandwidth. But as we know it's not possible for BRTC to have an eye on every ISP in Bangladesh. Although providing satisfactory Local traffic, Internet providers for their own interest syndicating global traffic which causes a poor connectivity in global bandwidth. Although over the cities global traffic is kind of average but in the suburbs, for an established global traffic they have to count a huge amount which is against the freedom of usage of Internet. Our whole research paper based on Internet Exchange Point. As Internet Exchange Point has a remarkable change over local traffic, we proposed to initiate a method where local traffic can be used for an elevated global traffic by creating a third wheel. And as third wheel we will use VPN and proxy server. If a user has a well-established local traffic, our method can establish an elevated global traffic by counting little extra money to pay the internet provider. If set up an actual example, it might have an actual and clear visualization about our proposed method. As example, one internet provider is serving their customer with 1 Mbps Global bandwidth along with 20

Mbps of BDIX bandwidth known as local traffic also within 500 BDT. On the other hand, one of the providers is easily providing his customer with 5 Mbps of global traffic and 50 Mbps of local traffic within the same amount. If we keep the disproportion of global bandwidth aside, we can see that there is a slight difference between the local traffic bandwidth of two internet providers. So using a good quality of local traffic, our method can get a maximized global bandwidth with the same amount of local traffic what has been allocated for users.

2.2 Related Works

Bangladesh Telecommunication Regulatory Commission (BRTC) has been working efficiently on making our internet handy to everyone, and beside of this they are taking a quintessential step to make a revolutionary change in current infrastructure since the day when Bangladesh connected to the IIG. And as the result of simultaneous effort, Bangladesh has experienced the enjoyment of using internet through IXP. Without Internet Exchange Point, local data had to travel to other cities to reach its final destination. So Internet Exchange Point has been a ground breaking invention in the world of communication as it changed the whole communication pattern of Bangladesh. As our project is based on IXP, there has been a lot of researches and projects for getting better results and further more development on Internet Exchange Point. Internet Exchange Point: A Context of Bangladesh is one of the finest IEE approved research paper based on IXP. In this paper writer's attempted to go through a general overview that how Internet Exchange Point works and how a whole infrastructure of a county can be changed through the set-up of IXP. And It also enlightens the cost-effective mechanism can be achieved by deployment of Internet Exchange Point [1].

Unlike Bangladesh, there are other countries who are facing high cost of bandwidth and also the issue of the high rated usage of international bandwidth to exchange data at a local and national dimension cannot be ignored. The aforementioned two issues came to the limelight after the publication of the paper which was authored by Russell Southwood (2004) on the entreaty of the International Telecommunication Union (ITU) and the International Development Research Centre (IDRC). The paper spotted light on the fact

the high cost of bandwidth and the usage of international traffic to exchange data is a hindrance to the rapid growth of Internet usage in those countries and dragging the cost-effective mechanism down to a poor level. And also, it needed to be mention that the paper also came up with the crying need for a setup of an Internet Exchange to expedite the growth of local traffic and save the incurring international bandwidth [5].

Every system needs intellectual and unique strategical approach to make a system beyond all deficiencies and also cope up with future hindrance. Andrew McLaughlin (2004) wrote a paper namely "Internet Exchange Points Their Importance to Development of the Internet and strategies for their Deployment- The African Example" where he has pointed out the drawbacks and opportunities for IXP implementation in Africa. It includes two distinct case studies for Kenya and Bangladesh on their local Internet traffic, cost of bandwidth and IXP implementation related issues [6].

It cannot be declined that internet bandwidth cost, Internet transition, a balanced system of peer wise Internet connection have a direct relevance and close connection to the backbone of the structure of our Economy. A paper entitled "Economics of Internet Exchange Points" by Mouhamet Diop (2009) has a comprehensive analysis of impact of Internet dissemination and how impactful a balanced system of internet peering could be for a country's economy. However, this paper created strong point on how the deployment and operation of Internet Exchange can be a contributor to the effective and balanced Economical system. In this paper the writer also tries to introduce a smooth and appropriate business mode for the system. [7]

2.3 Research Summary

No research can be truly justified without its proper findings. Adoption of the internet and deploying it in a country isn't a simple procedure. It requires a lot of inspection and ground breaking implement to mend its impediment and make it perfect handy and less costly for everyone. So focusing on every issues and impediment can be hard to cover in one research paper. So, in summarization of this paper we dropped a spot light on the factor of the lack of speed in global traffic and how we can contribute a method to use

local traffic speed which is increased after the innovation Internet Exchange Point, to achieve a facilitated growth in international global speed and make the best use of our valuable bandwidth. Moreover, we didn't shadow the fact the third world country like us have to come up with an effective cost-effective mechanism to make the internet reach to one's finger end. Despite all this development we can't shadow the fact of Syndication and Capping of global Internet traffic can't be unrooted from the depth of whole communication system. But in our research we had tried our level best to override all the deficiencies in the system and get over with the corruption by adding a third wheel of VPN, proxy server to boost the global internet traffic to its best using the local internet traffic which is a development of implementing Internet Exchange Point.

2.4 Scope of the problem

Every system has its deficiencies either it could be systemically, or it could be a bunch of small wrong doings which create loopholes in the implementations. If one has to overcome the problems of a system and boost its efficiency, there is no way but going into the depth of the problem. Finding the core of the impediment and overcome it with a proper solution. As Surfing Internet may seem easy but the depth of the implement it needs serious attention because of its complicity in the adoption of internet and deploying it thoroughly among the mass people. If we focus deeply on the system, we can focus on a bunch of loopholes that can wreck the main purpose of Internet communication. Focusing some of them, the biggest negative factor would be corruption. There is barely any system can go all around beyond any corruption or syndication. Massive Syndication of bandwidth is effecting our bandwidth dissemination. And creating inconsistency of bandwidth proportion to one area to another one. For a convenient and updated system of any kind of business, there exists a community behind who controls every strategy to maintain the rhythm between supply and demand and keep the development at its peak. All ISPs who are coalesced in one point maintain a community to have better keep the equipoise of the money and the service they wanted to give. In cities where a good number of ISP's maintain community they all keep the all most proportion of local internet traffic and global internet traffic. But in remote areas

like suburbs, there are few ISP who maintains the small community that sparsely spread out, they show their arbitrariness and keep the price high in comparison of bandwidth they serve. For this reason, we can experience a quite good global service like 50 Mbps and local traffic 5 Mbps in 700 BDT in cities, on the contrary in the suburbs people have to satisfy within local traffic 1 Mbps and global traffic 20 Mbps for 1000 BDT. That creates an imbalance of distribution of bandwidth. Our method can be used for those areas where syndication has somehow managed to wreck the interest of people to surf over internet. As IXP blessed us with a good quality of local traffic, we can easily win over the disproportion through our method.

2.5 Challenges

Where adoption of internet doesn't come without any complicacy, boosting up its facilities, filling the loopholes, cutting the drawback wouldn't be the easiest one moreover it comes with pretty difficult challenges to work with. Lots of negative factors have been experienced since the day one of the connections of internet through IIG. And innovative solution also came up though. Our research isn't to fixate on every other issue in the communication. We have to look up one particular problem and face the challenge with intellectual insights. As per our aforementioned problem of internet is the lack of speed in global bandwidth despite of having good amount of storage of bandwidth present in our country and also disproportion of bandwidth caused by syndication, we came up with a method to use IXP given local traffic to get over with the problem by using VPN, proxy server. And our method doesn't come with a constant manual to fight with every problem we will in our day to day maintenance. So first challenge of our method is having a deepest and strong basic about VPN and proxy server. Knowledge has no bound. Being thirsty about knowledge about VPN and proxy server is one kind of perfection one should achieve before handling server. One of the preponderant challenges is to find out the problem cutting to the chase, one has to be at home in maintaining a server perfectly to give the best service to the customer, and that is not possible without being constantly patient and checking every pros and con of problem. There is no

constant manual to solve every problem so one has to innovative enough to meet up with new problems and to hit the nail over the head and being patient with them.

CHAPTER 03

RESEARCH METHODOLOGY

3.1 Introduction

Internet has been connecting people over the decades and from the day one Internet communication has faced challenges to meet the need of the people and to gift a better communication infrastructure to the next generation. In 21st century what we are experiencing through internet is a blended result of hundreds of researches and innovative minds push their dimension of thinking to boost up the facilities of the internet and speed up the connectivity with a low cost. As there are many scopes left behind to make internet handy and facilitate the growth of its speed, innovation of newer to newest methods have been introduced every day in the world of communication. To make the Internet much easier to use and speedy, we also came up with a method through our research which based on one of the most intellectual innovations which is called IXP (Internet Exchange Point). In this section, we are going to have some insights and a general overview of the mechanism of IXP. Especially how did IXP make possible to boost up the speed and it's effecting our whole communication pattern. Our method is not a solo warrior to fight over the lack of speed in global traffic, Internet Exchange point is the basic of our method. A typical IXP block schematic is given below [1]:

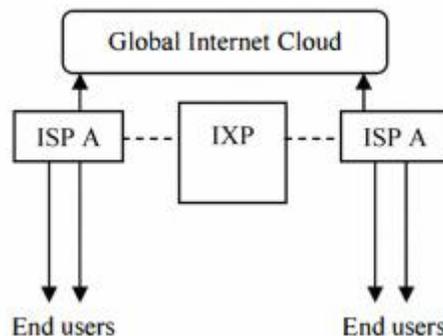


Fig 3.1: Basic Block Diagram of an IXP [1]

This section also has an overview of how we can use our method by using local traffic as strength to maximize our global bandwidth. As aforementioned, our method will be successful if the local traffic has a good amount of speed, so the need for IXP in our method is quite unassailable. No method can be justified successful if there is no comparison between previous status and proposed status that promises a betterment. For proving our method to be a successful one, we have also introduced, descriptive analysis that helps us to distinguish the difference between current status and future status if we imply our method.

3.2 Research Subject and Instrument:

Since the day Internet has been introduced in our country, people yearned to have a good quality of speed with a meager cost. And years passing, innovations are making minor steps every day to meet the primary need or what people wants to surf over the internet. Good quality of local traffic speed has meet some of the necessity of an elevated speed but accelerating global speed will push the dimension of the satisfaction of surfing internet. Internet system has a lot of deficiencies that are hindering to meet its ultimate expectation. But in this paper, we tried our best to focus on how we can use our existing bandwidth to have an upgraded speed in international traffic using local traffic that has been elevated after the deployment of Internet Exchange Point, BDIX in our country. Our method is an upgradation based on IXP. So our main and primary instrument is Internet Exchange Point, After this, we will need VPN and proxy server to use the local traffic to accelerate the growth of international traffic speed. Here we are going to show some graphical representation of the mechanism of IXP and how our instrument is implemented as per our proposed method.

3.3 Apparatus and Mechanism of Internet Exchange Point

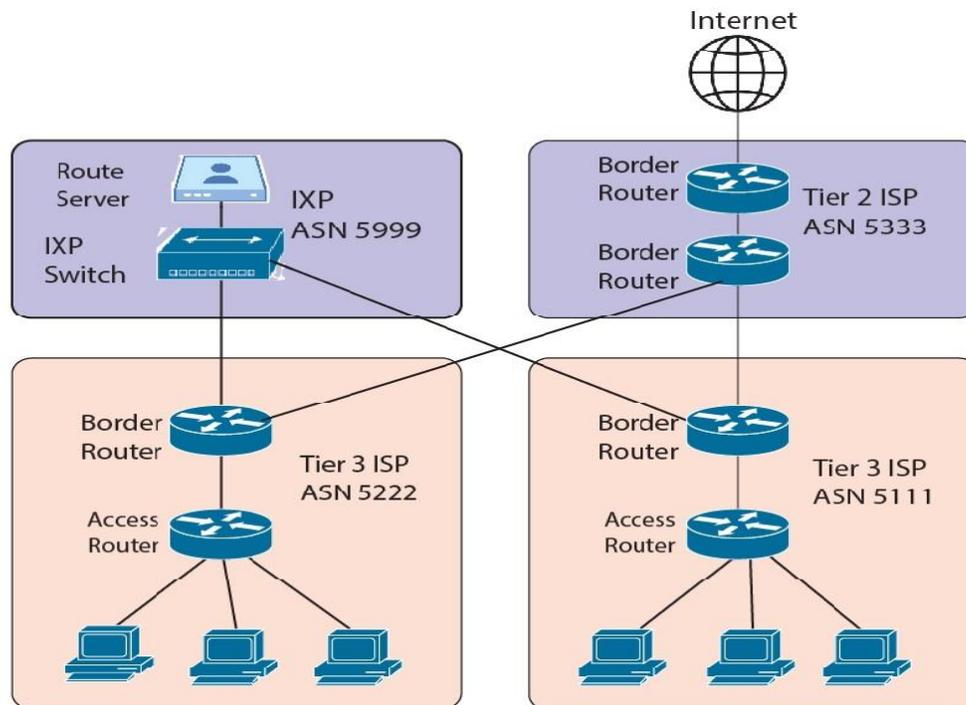


Fig 3.2: A typical network with an IXP in the middle

Internet exchange point is a data center where Internet infrastructure companies coalesce on a router where they contain network switches that route traffic among different companies. It also saves the cost and time of a large intermediate portion of internet flow from source to destination. It's a must-have requirement, IXP itself have to connect with IIG. Here from graphical representation, we can easily interpret that TIER 1 providers are the backbone of international traffic. And TIER 2 is a thorough distributor of international traffic to TIER 3 by peering agreements. TIER 3 buys internet access from TIER 2 and provide bandwidth connection in home and residences. Throughout the whole journey of bandwidth, IXP reduces the usage of global bandwidth by filtering data to reduce intermediary traffic flow which uses international bandwidth. If data remains in the domestic bound traffic Internet exchange point binds the bandwidth to use local traffic. Thus the usage of international traffic reduces dramatically. If we investigate the top 20 websites searched by Bangladeshi users, we get to see Prothom alo, Kalerkantha,

Jugantor, Bdjobs etc ruling in top 20. Here is the list below to show top 20 websites which are surfed at most of the time by Bangladeshi users [7].

Table 3.1: Top 20 websites among Bangladeshi users [7]

1. Google.com	11.Bd24live.com
2. Youtube.com	12.Teletalk.com.bd
3. Facebook.com	13.Bdjobs.com
4. Prothomalo.com	14.Blogspot.com
5. Jugantor.com	15. Jagonews24.com
6. Yahoo.com	16. Banglanews24.com
7. Kalerkantho.com	17. 24livenewspaper.com
8. Google.com.bd	18. Crickbuzz.com
9. Wikipedia.org	19. Bdnews24.com
10. Bd-pratidin.com	20.Daraz.com.bd

As in top 20, there have many local web services, so this traffic or data has not to travel through TIER 1 as local traffic keep it in a pace with local demand. Thus the Internet system promotes a faster and secured connection all over the world as well as in our country.

For establishment of an IXP, it basically requires some element root server, route server, NTP server, looking glass etc. In Figure 3.3, these are illustrated:

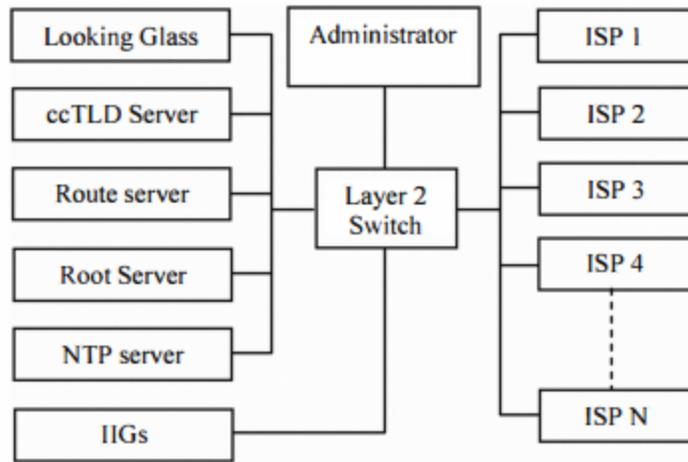


Fig 3.3: Schematic Diagram of an IXP [9]

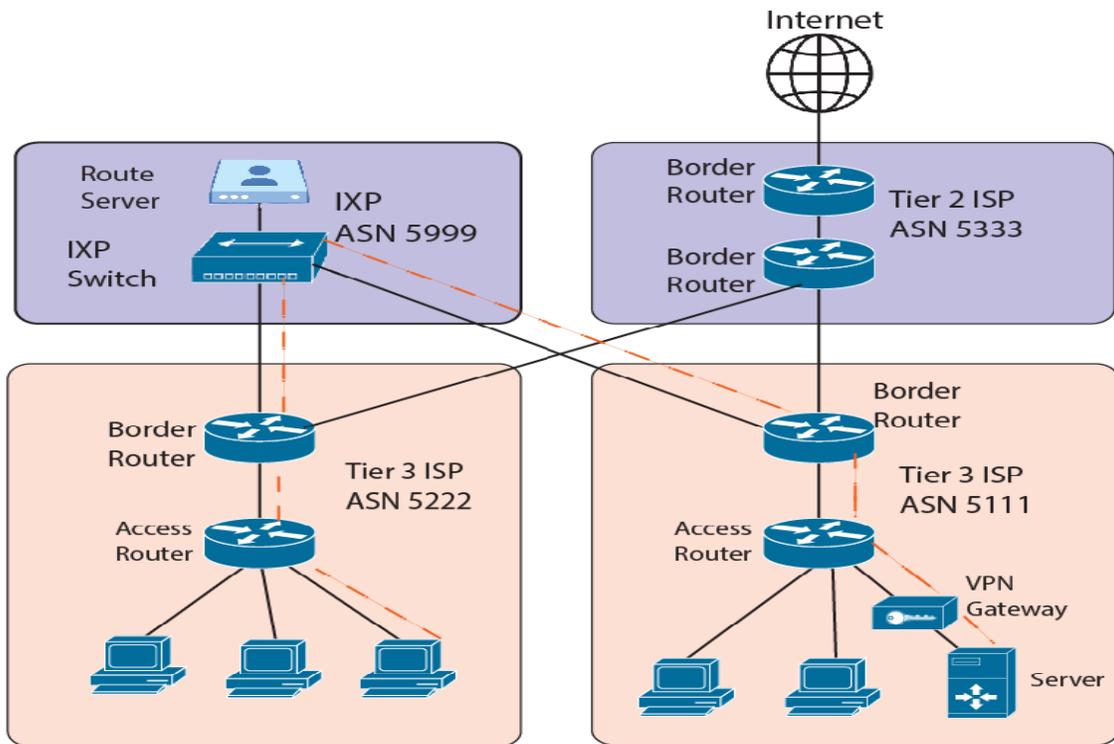


Fig 3.4: A typical network of proposed method with an IXP in the middle

Our mission is to work with the local traffic which has been dramatically accelerated by the use of IXP, to maximize the global traffic connectivity. In remote areas where users have to compromise with international global traffic, IXP has blessed them with a good amount of the local traffic. To boost up the global traffic they can use the local traffic to hop on the satellites directly by using the VPN Server. All a user has to do to buy a VPN server from the ISP which they are connected to. As all the ISPs are under the jurisdiction of IXP, VPN server under that ISP has an elevated and efficiently working global bandwidth. When a user wants to access the internet via VPN server, their IP's directly hit on the TIER one, and as a result, they experience the highest amount of global bandwidth. In other words, we can easily interpret that the VPN server is the third wheel which helps a user to have a direct connection to the web on behalf of a user. In Figure 3.3 these are illustrated.

3.4 Data Collection Procedure

No analytic writing is good enough to prove a system to be a good one in the first place if there is no existing data that doesn't show any comparison between before and after consequences by using the method. Our method has also gone through some tests to stand on what we claimed. In Table 3.2, There are some data to represent the present criteria of our infrastructure:

Table 3.2: Specified and collective data of Different ISP

No	ISP Name	Package Specification	Conditions	Cost	Internet Speed availability	Time	Latency
01	Matchnet	5Mbps (Global Bandwidth) 100Mbps (BDIX Bandwidth)	5Mbps (GB) From 2AM-8PM 2Mbps (GB) From 8PM-2AM	500 BDT	1.7Mbps	12.51AM 10/04/20 18	45ms
02	Explore Online	20Mbps (Global Bandwidth) 100Mbps (BDIX Bandwidth)	10Mbps (GB) From 2AM-8PM 10Mbps (GB) From 8PM-2AM	1500 BDT	6Mbps	11pm 10/04/20 18	
03	Mazeda Network	8Mbps (Global Bandwidth) 100/30Mbps (BDIX Bandwidth)	8Mbps (GB) From 2PM-9PM 3Mbps (GB) From 9PM-2PM	700 BDT	2.6Mbps	11.30PM 10/04/20 18	53ms
04	ICC Communication	4Mbps (Global Bandwidth) 30Mbps (BDIX Bandwidth)	4Mbps (Global Bandwidth) 30Mbps (BDIX Bandwidth)	700 BDT	3.96Mbps	10.40PM 10/05/20 18	180ms

On the first row, the first column we can see that an ISP namely Matchnet is offering 5 Mbps of global bandwidth and 100 Mbps of BDIX bandwidth in 500-BDT conditioning time validity that binds the flow of internet flow for a specific time being. And another ISP namely Explore Online are serving their user with 20 Mbps of global bandwidth and 100 Mbps of BDIX bandwidth. If we go through the whole chart and compare their local traffic, a common thing can't be unnoticed that IXP has given the user to enjoy the accelerated Local bandwidth as per the money they pay to the ISP. It is the global traffic that is fluctuating among the ISP's

Now we are going to introduce our methods result in the following chart that shows the difference of before and after the status of using our methods.

After Using our method:

Table 3.3: Comparable data after using proposed scheme

No	Source ISP	VPN Type	Target Port Speed	Internet Speed availability	Target ISP	Target ISP Cost	Latency	Improvement
01	Matchnet	MSSTP	50Mbps	20Mbps	Xeon	400BDT	43ms	11.97 times faster
02	Explore Online	MSSTP	50Mbps	33Mbps	Xeon	400BDT	105ms	5.5 times faster
03	Mazeda Network	MSSTP	50Mbps	16Mbps	Xeon	400BDT	50ms	6.15 times faster
04	ICC Communication	MSSTP	50Mbps	27.48Mbps	Xeon	400BDT	95ms	6.94 times faster

As we can see Matchnet which is providing 5 Mbps of global bandwidth, after using internet via our method, the speed and efficiency of the global bandwidth have accelerated more than the multiple of previous speed by adding a little amount of money. Thus we can come to a conclusion that using internet via our method can use the local traffic to have an elevated and more efficient global bandwidth.

3.5 Statistical Analysis

If we draw a chart that shows the increment of the speed by using our method. It will look like this:

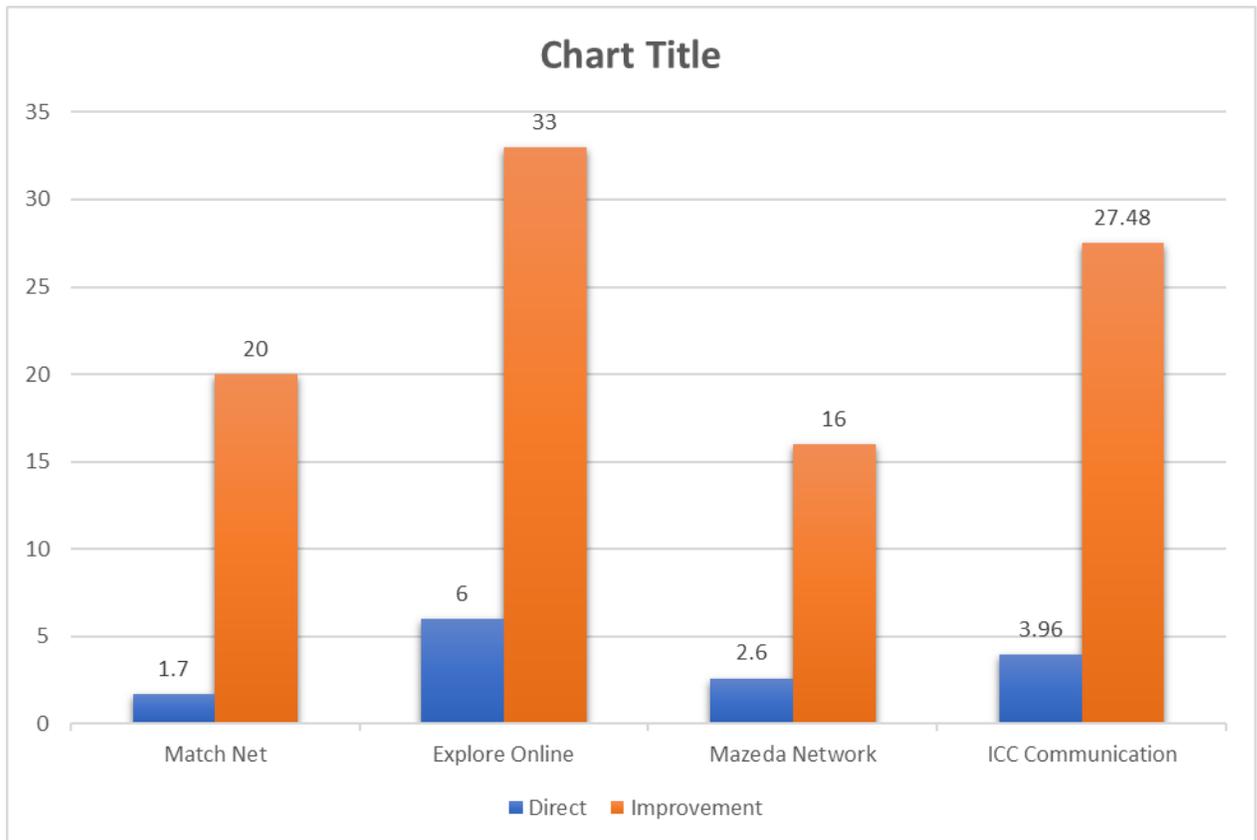


Fig 3.4: Comparable data analysis between proposed method and current system.

The blue rectangle represents the global bandwidth speed which is given by ISP. and The orange rectangle represents the result we get by the usage of our method. We can easily sense the difference between previous status and current status.

3.6 Implementation Requirements

Without Internet Exchange Point our method can't be introduced. So first and Foremost requirement is, ISP has to be connected to the IXP. For the third wheel that helps us to accelerate the global bandwidth, we need to have a VPN, proxy server. For the real-life Implementation, we had to buy VPN server from Xenon. We have determined our result using our method by using the XENON VPN server. Fast.com is the link that helped us to detect the acceleration of Bandwidth.

CHAPTER 04

EXPERIMENTAL RESULT AND DISCUSSION

4.1 Introduction

Internet Exchange Point has served the user with a faster and even more secure connection worldwide. But for further more accelerated and secured connection many experiments have been done, and successful experiments have been implied for the betterment of our traffic pattern. So proofing our method which is based IXP to be a secure and successful one, we have to test our method from different ISP's. And in this Section, we are going to show the effects of our experiment derived result and using our result as evidence, we are going to drop a light how we can lower the need of International bandwidth and how are method going to keep pace with an advanced cost-effective scheme for making internet access easier, safer and less pricy.

4.2 Experimental Results

Experiments were run using our method on different ISP to measure that in which extent our method is creating differences. Comparable result is going to proof that our method can cut the cost of bandwidth and money. For our very first experiment (Fig-1), we collected data of ISP namely Matchnet. They claimed that they serve their customer with 5mbps of global traffic and 100 Mbps of domestic bound traffic that is also known by BDIX speed. They also impose a condition of time validity to cut the rate of bandwidth usage. They provide 5mbps from 2 Am to 8 pm and on the other hand, slows down the flow from 8 pm to 2 Am at the rate of 2 Mbps, and latency is observed at the rate of 45ms. With all this service user have to pay 500 BDT. Another ISP namely Explore Online. They try to serve their customer with 20 Mbps of global bandwidth and 100 Mbps of BDIX bandwidth which is quite impressive Speed at the amount of 600 BDT. Mazeda Network, a renowned ISP, provide their customer with 8 Mbps of Global bandwidth along with 100/300 Mbps of domestic bound bandwidth. They also bind the global and local bandwidth in a time limit. They slow down the speed to 8 Mbps from 2

pm to 9 pm, and 3 Mbps from 9 pm to 2 pm And their latency is observed 53 ms. And per user have to pay 700 BDT to enjoy their service. Another ISP working named ICC communication enables a user to surf over internet with their providing speed of 4 Mbps global bandwidth and 30 Mbps of local bandwidth and the latency is recorded 180 ms. They provide their service at the price of 700 BDT. 4 Different ISP has to go through our experiment. After experiment we recorded the changed speed of every network (Fig-2). Matchnet network which was observed with 5 Mbps of global traffic, using internet through our method the speed has recorded 36 Mbps with the latency 43 ms. Explore online ISP users experience 33 Mbps global traffic of by using internet via our VPN server which cost 400 BDT. Mazda Network ISP's global traffic was observed 16 Mbps of international traffic with the latency of 50 ms and lastly ICC communication ISP user recorded 27.48 Mbps of international bandwidth with the latency 95 ms.

4.3 Descriptive Analysis

From our collective data, we can easily distinguish the differences and see the effects and came to a conclusion. If we go through the data we recorded before using our experiment, we can easily interpret that IXP has elevated the local traffic and there exists a slight difference among the local traffic flows. But Global traffic is varying from one ISP to another. For our experiment, we bought a VPN server which cost 400 BDT and made a third media to hit the web directly to maximize Global traffic with existing local bandwidth. If we go through the after-effects of the ISP speed, we can see the increments. As Example, if we check Fig-2 on Matchnet network, they got a promoted global speed of 36 Mbps from the initially recorded global traffic speed of 5 Mbps. If we count it on, the ISP got 11.97 times faster than before. And latency was cut down from 53 ms to 50 ms. Explore Online, the other ISP got an elevated speed of 33 Mbps which is 5.5 times faster than what global traffic speed the provide. And as claimed it also has reduced the latency. Mazda Network users have experienced 6.14 times faster speed of 16 Mbps of global traffic which was previously recorded 8 Mbps, and a reduced latency was observed which is 50 ms. Lastly recorded ICC communication users have experienced

6.94 times increased global traffic with a reduced latency of 95 ms from the internet connection via our method.

4.4 Rules and Regulations for our method

Our method is neither super perfect nor beyond all limitations. There are some drawbacks that can cause a null result. Our method can't be performed if the ISPs are under two different IXP. As an example if one ISP is beneath BDIX and another one is from American IXP, our method will fail. So our method has some restrictions to abide by to get full efficiency.

First and foremost, Two Different ISPs should coalesce under one common IXP.

Secondly, a speedy global bandwidth depends on speedy local traffic. Without it our method can't be proved effective one.

Last but important one, User who want to experience an elevated global bandwidth, has to buy a VPN server from the ISP to get an effective result from our method.

4.5 Summary

Our research method's goal is to obtain the growth of global traffic speed using local traffic speed we own. And It is unassailable that IXP made the domestic bound traffic speedy and more efficient. Based On BDIX bandwidth, we have gathered down the data and observed the fluctuations of international bandwidth. Throughout the section, our experiment driven result showed that there is a scope to increase global bandwidth by using our method. By running our experiment, we can easily interpret that a good quality of local bandwidth is enough to override the problem of the lower global bandwidth.

CHAPTER 5

SUMMARIZATION OF THE STUDY AND CONCLUSION

5.1 Summary

The Internet has been a tremendous electric gateway for acquiring knowledge, a constant companion of entertainment. It has made the world look smaller and despite of having borders on the country line, one can easily go through the information, culture and many more via the internet. So an advanced schematic internet system assures an advanced nation. So the Internet should be accessible for all for the betterment of next generation. There is a lot of scopes where innovation has yet to make a breakthrough to make the Internet easier, faster and secure. Our motto is to provide a method that can pass all the syndication, capping of bandwidth and provide every user a pleasant experience of using the Internet with a maximized global bandwidth without paying huge money.

5.2 Conclusion

Throughout the research paper, we have made it crystal clear that despite of having a poor global bandwidth, there is a way that can help us to achieve the goal of high speedy global bandwidth. The Internet is a global network which is connection host servers, and faster and instant access can assure the satisfaction of the user. So our method can be used to override the syndication problem and deficiencies of internet speed and gift a better future for the next generation.

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