Reduce Network Latency Downtime and Improve Web Service Retrieval Time Using Zone Based Frequency Partition Technique

S.Jayamoorthi[#1], A.Gokul[#2], V.Ashwath Vickram[#3], S.Chandru [#4]

[#1] *Asst. Prof , Department of CSE, Manakula Vinayagar Institute of Technology, Pondicherry University, India.*

[#2, 3, 4] *B.Tech - CSE, Manakula Vinayagar Institute of Technology, Pondicherry University, India.*

[1] *jayamoorthyme@gmail.com,* [2] *gokulvijay.pec@gmail.com,* [3] *vickramashwath@gmail.com,*

[4] *samchandru.1@gmail.com*

Abstract: **In past few years the network users rapidly increased in the entire region especial in our Asian region then will be a more amount user the Internet services. But the Bandwidth & frequency used by all the region server for over the global is not equal so that variations identified in the following criteria such as frequency, bandwidth, time delay, latency, response time, etc. For this analysis the Downloaded time for receiving data from US server is 0.4 second sat the same time data we received from our region will takes 0.16 seconds approximately. In order to overcome this issues proposed method called zone passed frequency partitioning technique(ZBFPT) to regulates the data flow between all the regional server in almost equal i.e, 12.4 mlli sec variations approximately while implementing this concept in real time scenario. In our simulation work it is observed that 20% of overall improved efficiency rate. (In future is implemented with in every region network service provider to ISP/Server to improve the response time).**

Keywords: **Upgraded Network Service Provider (UNSP) Architecture, Network Traffic Avoidance, Dynamic Network Path (DNP), Target Zone, Frequency Partition, etc.**

I. INTRODUCTION

The data that we are searching could be found from a much distance from the user's end, during it's time of retrieval, so it is necessarily important in maintaining a tidiness in its time and accession in their hop count during this traversal process. During this phenomenal effect it requires some supporting agent that is certainly capable to attaining the goal much easier. Till date the prototype that has been followed in the scenario of global level data transfer is conventional Network Service Provider (NSP) Architecture. In this type of Architecture each and every LAN is concerned of its own client's information, cache memory, etc in its response to its client node's activities, and it does not penetrate into other Local Area Network's performance.

If it is capable of doing the above expected task then it could easily identify the location of the target node. Hence it makes the entire process easier. With the view of achieving this goal we formulated this concept from the base strategies of International Telecommunication Union (ITU)'s performance report during the 3rd Quarter of the year 2013.

A. Contribution

The contribution that is pounded here is dealing with approaches in understanding the difficulties in existing Network Service Provider (NSP) Architecture mechanism and in parallel how can we overcome those issues. It also have chart and graph representations of various strategies like amount of network users, amount of network usages, and density of servers, etc which play main role in analyzing the status. Based upon these data we manipulated the ratio of network bandwidth allocation with respect to each and every zone that has been partitioned. Ultimately the summary over this concept is evaluated with its merits and impacts.

B. Organization

This piece of work is organized in an order of identifying the problematic issues and analyzing them with its base strategies and manipulating the numerical basis and accordingly a new Network Service Provider (NSP) Model is proposed. Ultimately the bandwidth allocation is estimated in a ratio level between various zones. Here section 2 consists of the basic ideas that stood behind this proposal; Section 3 describes the newly proposed Upgraded Network Service Provider Architecture (UNSP), Section 4 describes about its working, Section 5 exhibits its user flow, Section 6 summaries the work content.

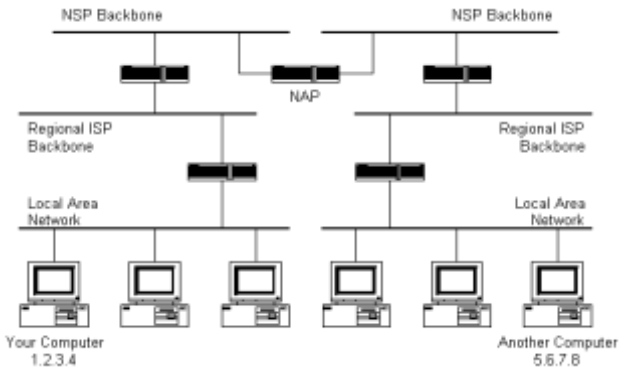

Fig: 1 CONVENTIONAL NETWORK SERVICE PROVIDER ARCHITECTURE

II. BASIC IDEA

The basic idea is to draw a new network transfer path that facilitates the much effective Upgraded Network Service Provider (UNSP) Architecture which could provide increased speed of the internet, and with better Quality of Service. By maintaining the list of classification of the target zone and its pertinent frequency bandwidth allocation in the regional server's database of each and every zone, we can trace the location of the target node for obtaining the data as soon as possible. After finding the location using some frequency hopping techniques we can transfer the data by modulating the frequency range. This modulation can be read only at the gate ends of the distinct zones. With the help of this data the target servers can identify the requested data easily and respond more quickly than the expected speed.

On reviewing the features of Conventional Network Service Provider (NSP) Architecture certain basic ideas were drawn and they are as follows:

- Establishment of Global Internet Zones.
- Creating Zone based Index.
- Lending some enhanced facilities for Local Server.
- Managing the Frequency Partition

A. Establishment Of Global Internet Zones

In order to manipulate the request and identify the request arousal region or requesting region without any information except the request it becomes tedious and few addition information also provided along with this request.

This information was given in the unused spaces of header region of the IP packets or else in the destination address were usually the next router's address or location is given. And this information which is to be added is that the zone index number along with the data that is obtained while parsing the request. And for this reason the entire world is divided into six separate zones and their nomenclature is established.

In turn each gate end server can read the information about the request and response message from other end and it can easily respond by modulating the response back to the requesting zone according to the bandwidth assigned.

B. Creating Zone Based Index

After dividing the entire world into six zones they were given index number and represented as given below. Based upon this zone index number provided in the Zone Identification Nomenclature the destination system's location is identified by the local server or regional server itself instead of finding at Network Service Provider (NSP) Backbone level. And this is done with the help of parsing the request that is received at the local server or regional server to find that whether the target is found at the respective cache memory itself or not.

If it is found then there will be no difficulties for the server in bringing back the web content, on the other hand if it is not there then what will be the next move?

Moving across the entire Network Service Provider (NSP) Architecture is the only option. Why can't we make some changes here? After finding the zone to which the request belongs and similarly the zone to which the source system is requesting for getting the web content the Server is rapidly accelerated with is extended feature which is provided to them.

A. Lending Some Enhanced Facilities For Local Server

The additional feature that is imposed to the Local Server is that it can parse the request and it can identify that the request belongs to which zone, With this extended feature the Local Server or Regional Server could identify the information regarding the zone in which the network carrying destination system is located.

When you consider the below hyperlink that is requested, it will get parsed out into a series of binary digits, and it is then transformed into a data packet and then after moving through the lower layers of OSI getting labeled with the IP information (based upon which routing happens) the stream of binary information about the data packet is obtained. When we parse any hyperlink we may get such stream of binary information in a data packet and in this stream the first set of bit information is highlighted with different color and this is the key information and it is going to represent to which zone's information the source system is requesting for. Since the above hyperlink's server belongs to Asia zone hence it obtains the index number **[001]** from Nomenclature mentioned above. And this initial set of bits information is stored in the destination address of the IP packet where usually the next hop router's information is available. And it is given in the below example:

[001]**[0100100101000…….01001010 01011]**

Fig: 2 PARSING OCCUR AS GIVEN ABOVE

B. Managing the Frequency Partition

After this zone identification process the further operation to be done is frequency management. And this frequency management is done based upon the following set of parameters.

1. Number of Internet Servers
2. Number of Internet Users
3. Amount of Internet Usage

Statistical Reports that supports the concept of proposed network partition is taken from 2nd Quarter Report of 2012 provided by International Telecommunication Union.

Based upon number of Internet Servers the proposed six zones were listed in this graph from this we can infer that Asia Zone and North America Zone were having a large number of Servers hosted. In turn right now the other regions of world have less number of servers but in future it may not be same and number of servers may increase and the number of request that is going to revolve across them may increase and at that time the network traffic will become more and it is not an appreciable thing.

So it should be cared now. So the frequency bandwidth allocation made now will not be sufficient for them so it must be revised.

While you are going through the second parameter where the number of internet users is considered it is highly beneficial if you look from future point of view, where the population rate may increase but with current specifications it is not easy to satisfy them. Currently countries like United States, Australia, and other European Countries have maximum number of internet users and this list could include Africans, South Americans where the expected population is quite high.
But still the internet bandwidth requirement is ironically given to other regions like North America and European countries. And this is thing which is necessarily needed to be changed for future.

Ultimately the next parameter is Amount of Internet Usage and in this all the developed countries takes the top position and leaves the remaining positions for the developing counties. And this current economic status of the world is not a static one and may face some changes. Especially in countries like India, Brazil the internet's essentialness will become quite high in future. And there we cannot afford again and again revised bandwidth allocations.

The average speed of India is much lesser than the above countries and ranks behind them. And other countries of African and South American continent were far behind. And in future these countries may develop and require much more facilitated internet speed. So the required infrastructure should be laid now.

From the statistics given below it will be clear that the fastest and slowest speed lies between the Asian Region and the difference between Median and Average value is quite large. And it explains that more than half of the internet users in the Asian region enjoy internet speed less than its average. But the condition in Africa is still worse. While in other countries it is considerably better. So this is one of point that is to be taken into account.

So it is necessary to equalize this graph. From the below set of diagrams it will be clear that the network bandwidth allocations and its related features were quite away from the required future necessities. In the above diagram it is mentioned that about 45 percent of bandwidth is allocated with North America and 15 percent of bandwidth is allocated for European countries even though it is less than Asian region still the population parameter should be considered here because the population of entire European countries may hardly equals to South East Asian countries. So indirectly it is also enjoying quite large bandwidth. Number of servers versus Network bandwidth allocation is drawn as a graphical representation. In North America, Europe and Australia the network bandwidth allocation is self sustained with respect to its requirement scale. But in rest other regions this is reversed hence the countries that comes under this category suffers a lot.

It will be fine if the bandwidth is equally divided among all the regions based on all the three conditions satisfaction. And based upon all these criteria a table is established and rank were provided and based upon this manipulation the required bandwidth requirement can be allocated. And from this inference Asia requires about 2.8 times much bandwidth required than Africa and Australia at current stage and it may change with respect to African continent. So it must be viewed carefully. For the above tabulation the graphical chart is drawn below and if this chart is going to be followed while establishing the Upgraded Network Service Provider (NSP) Architecture then it can satisfy both the provider's and receiver's wishes in terms of better Quality of Service.

III. WORKING MECHANISM

According to this proposed Architecture diagram we can identify the mechanism of this process where initially the request is raised by the user system and then this raised request is transferred to the local server or regional server of the network to which the user system belongs and there it is parsed and scanned in order to find to which zone's information does the user system is requesting for. And there if the local server finds that the information requested belongs to the same zone then it initially checks its cache memory to find quickly whether the data is available and if the data is found then it retrieves and send the data back to the user system. Else if it is not there then it moves on to traverse its database and searches for the data that is requested and if it is found then it transfers the data. On the other hand if the data that has been requested belongs to any other zone then the local server send a request for establishing path between itself and target zone's local server. And here the server converts the frequency of the data (Request and data packet) equal to the frequency bandwidth allocated to the target zone. And this transformation is done based upon the zone frequency matching table. Using this table's information the frequency is hopped by frequency hopping mechanism like FHSS or DSSS. After sending the request it undergoes for hibernation

(or) waiting state. After waiting for some time still if the acknowledgement is not received the local server send back the request again to the target zone's server in case of any kind of loss in the request. At the other end the target zone after receiving the request start to process and send an acknowledgement.

This request and acknowledgement together constitute the virtual Pipeline and it is used to establish the dynamic network path or connection between the two networks.

After receiving the request it demodulates the request and find from which zone the request is arrived and send an acknowledgement, later it scans the frequency modulated data packet and then it initiates data traversal in cache and also in its database. And after finding the data from the cache memory or database it transmits the data back to the requesting server.

Before transmitting the data to the requested server it modulates the frequency of the data that equals to the frequency bandwidth allocation of the requesting server and after this modulation it transfers the data.

After receiving the data that is requested it acknowledges the target server back. Ultimately after this entire process is completed the intimation about this entire event is transferred to the global server from either Regional or Local Server.

In turn global server sends back the acknowledgement. And in future if any necessity arises in order to search for any data transfer across the global network then it is possible to find them from global server because is going to store intimations about all the transactions that have happened in the past. From the server we can identify who has transferred but from the local servers only we can find what data has been transacted. So it avoids excess memory space requirement in Global Server. Moreover through this security threats for a system of any network can be reduced effectively.

This is the working mechanism that is being followed in this idea.

IV. USER FLOW NETWORK (ASSUMPTION)

Based upon this architecture diagram the expected flow of the data transfer across this new Network Service Provider (NSP) Architecture is drawn here as an assumption.

The user flow diagram of the Network Service Provider (NSP) Architecture given below is a diagrammatic representation of the expected work flow. Various paths and network lines are explained below:

A. Already Existing Network Connectivity

The Already Existing Network Connectivity defines the previously among various LAN or MAN or some other network. In other words to say these already existing network connectivity are the actual path that is currently being practiced in any network.

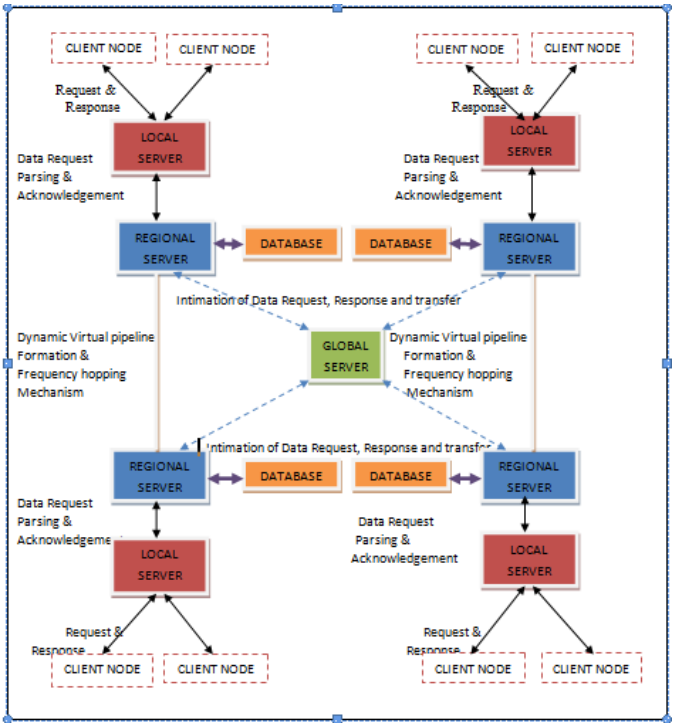

Fig 3: EXPECTED USER FLOW DIAGRAM FOR NEW NETWORK SERVICE PROVIDER (NSP) ARCHITECTURE

B. Dynamically Generated Network Connectivity

The Dynamically Generated Network Connectivity path is defined during run time based upon the frequency zone matching table and this path is suggested by the local server of the requesting network. This Dynamic Generated Network Connectivity path comprises of the frequency modulation and demodulation phases.

C. 5.3 Creating Virtual Process

This elemental parameter is for requesting for the establishment of connection between the requesting and target zones. And here the request is transferred and under the requesting server goes for waiting state until the response is received.

D. 5.4 Data transfer with frequency modulation

After the Dynamically generated Network Connectivity path is established the target zone's server starts transferring the data to the requesting server. And they transfer the data by modulating the data into frequency range equal to the frequency specified in the Zone Frequency matching table.

E. 5.5 Intimation about dynamic network establishment and data transfer

After the establishment of this Dynamically Generated Network Connectivity path the regarding information is transferred to the global server. This intimation is done based upon the reason that the global server should have at least abstract information regarding the data transfer between one network and another network. Moreover this intimation about the updates help to trace during the times of security issues as it can find at what time the connection is established, and between whom does the connection is established, and when does the connection is closed, etc.

F. 5.6 Virtual Pipeline

Virtual Pipeline is a collection of Already Existing Network Connectivity, Creating Virtual Process, Intimation about Dynamic Network Establishment and Data Transfer. And this channel acts as a virtual passage through which the data transfers. These are the parameters of Network Service Provider (NSP) Architecture.

V. ADVANTAGES

The prime advantages of this Network Service Provider (NSP) Architecture are listed below:

- Acquires an ability of establishing the individual dynamic network bridge so that data transfer does not stick to pre defined path.
- It becomes simpler for retrieving the web content since the location is identified at the Regional Server level itself.
- Requires less cache memory at the Global Server since Global Server is going to store information regarding the Zones which involved in the data transfer and not what information is transferred. Due to this database mirroring process gets sufficient time interval between them at the Global Server.
- High speed with ignorable time latency could be achieved because the process of frequency modulation and the Target Zone identification are done as much earlier as possible..
- As the Global Server is not going to involve in the data transfer or data retrieval process shortest path without reaching the Global Server could be attained very well.
- The prime advantage is that it is easy to maintain distinctness of data packets due to sufficient frequency modulations done at the local Regional Server level in order to find that to which Zone the request should be handed over.

VI. CONCLUSION

The proposed idea for providing better network service to all the region is almost similar when the criteria for frequency setting parameters on the regional server working procedure based in number of Internet servers, Internet users, Internet usage so that our overall data Retrieval time is reduced base layer protocol since it acts as a skeleton for establishing the new era of Internet Service Provider for providing its services. From the basis of this prototype traversal we can experience the reduction in the traffic flow of the data, data congestion, time delay or jitter in the network through which the request and response data traverse. On the whole it can be used to reduce the unnecessary data storage and server maintenance. So the model involves only the implementation cost and a nominal maintenance cost which is comparatively lesser than older model. So it is not only speeding efficient but also economic in its nature in its performance.

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