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INTEGRATED INTERNET MEASUREMENT MODEL

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ABSTRACT

In an effort to measure the current network for suppliers and users of internet service, a paradigm shift is needed. This condition is stimulated by the increasing scale of internet users worldwide reaching 34.4% of the total world population according to Internet World Stats as of June 2012. Internet network measurement is directly impacting the end-user satisfactory level as the target factor for Quality of Experience (QoE). This research proposes an integrated internet measurement model which is involving the Quality of Service (QoS) parameters through active measurement system activated from passive measurement. The proposed measurement model is capable of giving feedbacks in form of network performance recommendation at any given time interval.

Keywords: Measurement, Internet, Integrated, QoE, QoS, Recommendation.

I. INTRODUCTION

Basic definition of the meaning of the measurements is to compare a known amount of standard size with the amount that would be known size, the interesting thing here is generally the amount of which will be known to the static size as measuring length, weight, mileage, etc., while the issue of Internet measurement scale which will be known size is dynamic, the dynamic can be seen from the background associated with the development of the Internet. Things that need to be underlined related to Internet measurement is: characterization (traffic /topology/application), detection(failure /worm/DDoS), prediction(delay /loss/throughput).(Liu, Y., 2005).

Measurement is an important area today, although in the early growth of the Internet has not been a top priority. Measurements arising from the three kinds of reasons, namely: commercial, social and technical. Commercial reasons, related to the ability to sell products or provide information about a product, in this case the Internet service products to many people who need a variety of Internet traffic measurements for specific needs for social reasons related to the need to obtain a clear statistical data. Whereas for technical reasons are many and varied, one of which, the design of

network components and protocols are very encouraged by the nature of the workload of the internet. (Crovella, M., and Krishnamurthy, B., 2006).

Internet traffic measurement is an internet network measurement process and data analysis to identify the structure and character of the Internet. Research related to this is already pretty much done but mostly based vendors, for example, support for the development of operating systems, Internet applications and network-based devices. Because the vendor-based research results of studies done in private and confidential, the results are presented only the final product, so the end result is more support in terms of marketing the product, less supportive of the development of research related to the measurement of Internet traffic public researchers. Until now there is no standardized measurement of Internet traffic issued. Forum to discuss issues such as the Internet traffic measurement study. The Internet Engineering Task Force (IETF), IP Performance Metrics (IPPM), Working Groups (WG) and in laboratory studies conducted in the Internet community continue to be pursued, one of its tasks is to explore internet traffic measurement techniques before it is ready to become an IETF standard. Location measurements performed in almost every point on the spectrum of the Internet, namely: on or near the router, the link connecting the router, the local network, the network entry points and exit points administrative infrastructure network, the backbone network, in a wider area(wide area), by mapping can be seen in Figure 1.

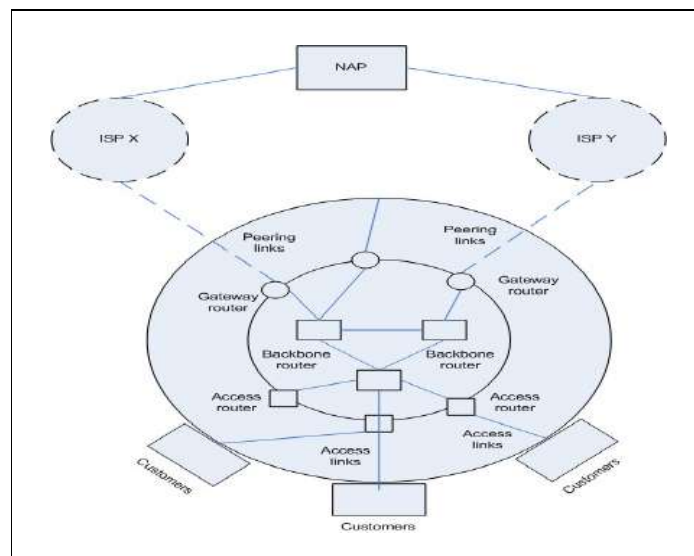


Figure 1: Measurement location
[Internet Measurement :81]

II. ACTIVE MEASUREMENT

Active measurement is a measurement by sending data to the network to measure and check the response. Active measurement consists of measurements: packet loss, delay(latency), jitter and throughput. Active measurements can cause interference on the network in case of excessive traffic. Measurements can be done on both ends of the network or one end of the network. Another factor to consider is against the server load and network latency on the back of the system(end-to-end). Active measurement can be divided into three categories based on how the network provides information on the network structure and network conditions: End-to-end, Hop-by-hop, and link-by-link. Seen in Figure 2, Figure 3, Figure 4(Peuhkuri, M., 2002).

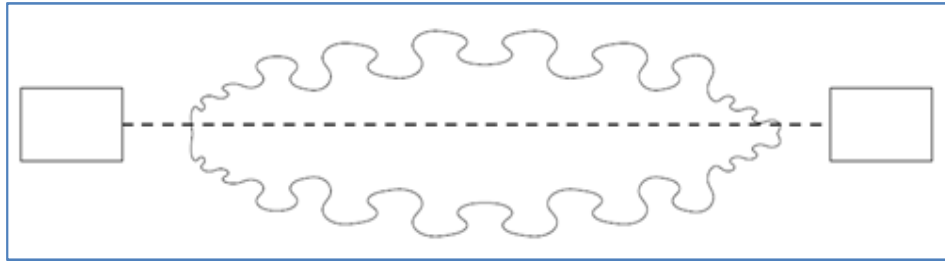


Figure 2: end-to-end measurements

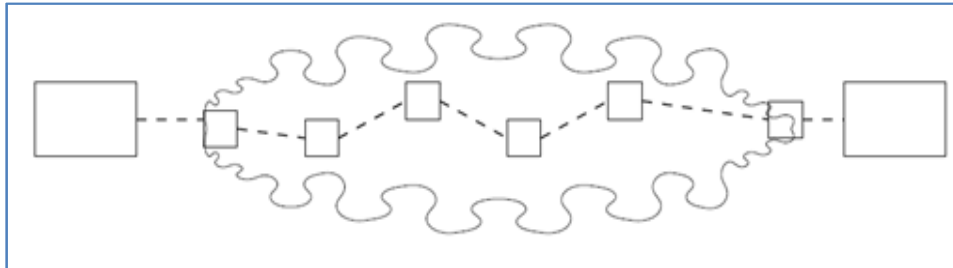


Figure 3: hop-by-hop measurements

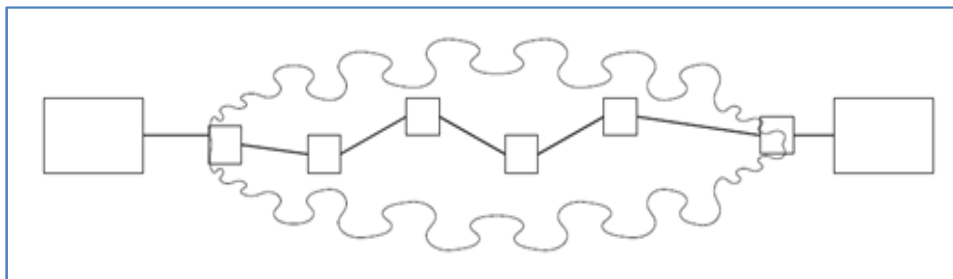


Figure 4: link-by-link measurements

III. PASSIVE MEASUREMENT

Passive measurement has the advantage that it does not interfere with the normal operation of the network work despite increased traffic. There are quite a lot of redundancy in the data that can be compressed, all the information is not always attractive, so when measurements are planned, should decide what information is unnecessary. Measurement of the packet-based circuit-switched networks can facilitate the comparison of measurement.

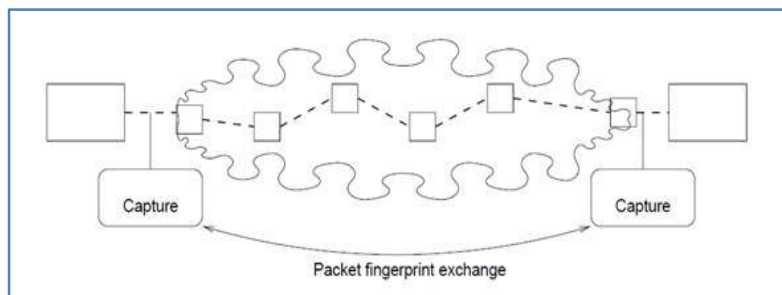
Network passive measurement technology used is through the data capture. There are several ways to capture the data:

- Copying data in a network node or copy the data in the network nodes per layer. For example, the layer 2 can be known how much jitter that occurs
- Passive listening or reading data passively. Optical data link can be copied using the optical splitter shifting some portion of the light signal to other fibers.
- Pass-through measurement or measurement device that passes through the equipment. Connections between devices on. If the device is not working properly, the network traffic will be disrupted.

Data collection can be either full or sampling monitoring. The sampling strategy:

- Choosing a random traffic frames without preference to avoid any particular class of traffic.
- Selecting the frames as much as possible without disturbing traffic important tasks other.
- Contributions to monitoring minimal over head.

Statistical data can be derived based on data taken through measurement on: backbone, LAN, Dial-Up. For a simple statistical requirements can use management protocols such as SNMP, through his protocol counter to monitoring as collecting statistical data includes the number of packets and bytes transmitted and received as well in case of system failure can be seen. Measurements can take place in one location or may occur in some locations, as shown in Figure 5. (Peuhkuri, M., 2002).



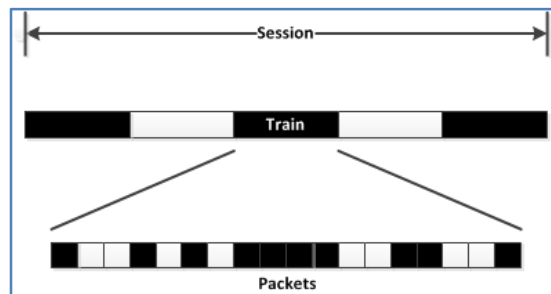
Figur 5: Traffic capture et end points

IV. INTERNET TRAFFIC

Internet traffic is the flow of data through the Internet. Internet network can be analogized as follows. There are hosts that can be analogized as a house. There is a small road connecting the houses, in this case a LAN that connects between hosts. Small road further relates to a highway in this case the WAN. Simply put, every house in this case the analogy of a host connected hierarchically to each other in the city, although not know each other directly. And the relationship between the cities is connected to the provincial road and country and between countries. So that in case of inter-house mail delivery in this case happens very possible data exchange occurs. Only problem which arises then, how the delivery route selection, how the problems that occur on the road as the data was not even until late. On the road there was a policeman directing traffic, on the police internet network analogize a router that regulate Internet traffic, which only allowed in the data which should not be, and the data must pass through which the network. Routers have the same properties as the police. If anyone asks where the location of a house that is sought, if not knowing then directed to the questioner asks police to another which is usually considered to be know as the default. In this case the router will send to its default gateway. And continues to be found, if not found then the searcher will know that the address is incorrect. Internet network is very extensive, stretching across the surface of the earth. Obviously the type of road that is very diverse. Like the land, sea, and air, there is a lot of media used in data transmission. Call it a copper cable, fiber optic, microwave, radio, and so forth. Just as in the real world there is the traffic (full bandwidth), detours (multi-hop), the bypass road (one-hop), until a certain way to hard to reach are as (remote-site). It required a router to handle data traffic on the Internet. A router must understand the protocol (rules), the global routing (BGP) and able to handle the traffic itself.

V. PACKETS

In Internet traffic are important entities in the IP protocol that is written in packets or free translation as a package. All Internet traffic can be seen at the IP level in a set of packets. So that looks the most basic to the Internet traffic is a collection of packets that pass through routers and many links. If viewed from a network element instance on a router or a link there is a collection of packets that pass through the network. Three traces of traffic that can be distinguished based on the observations that have been made, namely: observation of traffic traces arrival (arrivals), observation of traffic traces of the number of packets (packets), observation of the traffic trace amount Byte (Bytes). (Crovella and Krishnamurthy, 2006). If viewed from a higher level structure of the package, there are three levels of structure in traffic sequentially from lowest to highest, namely: packets, train, session. As seen in Figure 6. (Crovella and Krishnamurthy, 2006). In the picture the black box represents no package/train. Session sensor the condition is usually stated in the ON condition. And the opposite is in the OFF condition.



Figur 6: Three levels in the structure of traffic

VI. QUALITY OF SERVICE (QoS)

Quality of Service (QoS) or in a free translation service quality is often called, is a mechanism that allows network applications or services can operate as expected. As described in CCITT recommendation E.800 is the collective effect of service performance which determines the degree of satisfaction of a user of a service, it is the later are associated with QoE achievement, which will be explained in the next subsection. Internet continues to grow is a challenge ISP (Internet Service Provider) and network operators to bring the future needs of the global computer network traffic and QoS features are expected. To keep competitive, ISPs and network operators should be able to solve two main problems: the increase of Internet back bone traffic adjust lalul continuous need sand provide good QoS for such traffic. Two approaches have emerged to solve the problem of the addition of continuous internet traffic.

VII. QUALITY OF EXPERIENCE (QoE)

Quality of Experience (QoE) is a new approach to the quality of the communication media, which can explain there ality of how important a service change based on what a user feel while enjoying the services provided. Different QoE of QoS which is more inclined to the level of satisfaction of the user, when the user is not so know the technical terms, the user understands and feels just feel the quality of the experience in a network or service that has been provided by the provider. QoE is used to answer "Are the services provided are in accordance with desired by the user?". Therefore we need anew concept to explain and regulate the interaction between user and application. This is where the QoE approach will be used for that purpose, because QoE refers to the human side to a service. QoE discuss all the elements that influence the perception of the user, and

metrics and technologies that have relevance to get the best experience possibility perceived by the user. The difference between QoE and QoS that is the purpose of a network or service should get the maximum rating of the user (QoE), which the net work quality (QoS) is the main part to achieve these objectives effectively.

VIII. CORRECTION MEASUREMENTS

From the research that has been conducted through questionnaires, measurement of network traffic is still fragmentary and each stands alone. Measurement of network traffic, topology, performance and other measures do not have a system of inter-related and in general have always just done at the beginning of construction until the trial period only computer network system. Such a framework can no longer be done on a global computer network conditions are already very complex at this time. Especially if the expected target acquisition system infrastructure, traffic and best applications with the goal of satisfaction on the part of the user in this case the standard QoE (Chang, R., K., C., 2013). The need for a paradigm change in network traffic measurement framework to support the Internet that already have a highlevel of complexity.

IX. MEASURING QUALITY OF SERVICE

The proposed modeling is the development of a model of QoS monitoring the proposed system by B.Y.Jiang (Jiang, M.et al, 2000) combined with the architectural model RTFM (Real Time Flow Measurement). The components of the system models required are as follows:

- Objects of traffic, a traffic information network to be measured. In the context of this measure to be taken is the QoS parameters.
- QoS measurement, as a measure of information traffic QoS parameters, in this form of idolatry: packet loss, delay (latency), jitter and throughput.
- Analysis application, is an interface for network administrators who work in processing information has been taken from the QoS Measurement subsequent analysis of network conditions.
- Network Traffic Report, is a medium traffic information and recommendations.

In an effort to gain the necessary QoS guarantees comparative results for the attainment of truth closeness results. On the basis of the components formed in the post system, where the system A is a system that is attached to the side of the service users and system B is a system that is mounted on the side of the service provider. Here factor transparency will also be visible. The implementation of the model depicted in Figure7. Shown in the picture monitor component, QoS monitoring, and analysis application there is one pair. Components of network traffic report is the result of the comparison and analysis of media from both analys is application on two different sides. Of the proposed modeling there are two sides, one side of the measurement of the service users and the other side of the service provider. Cross check system is necessary remedy conduct comparative test results from two opposite sides, and do some testing times. Recapitulation of application systems analyst quality of service is the final information for network attached recommendation.

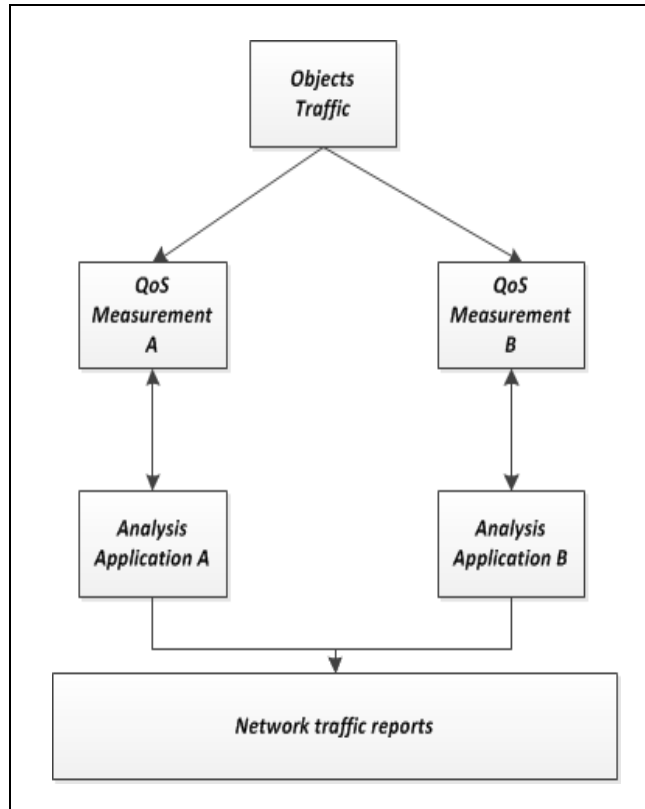


Figure 7: Measuring Quality of Service

X. RECORDING NETWORK TRAFFIC

Modeling traffic recording is monitoring network traffic in general are many available on the Internet with the acquisition system using the network packets that pass through a standard library libpcap(Crovella and Krishnamurthy, 2006), with a standard package tapper (packet sniffer). Modeling is categorized as passive measurements. In the category of passive measurement, because the data are used as the measurement is passing traffic, so that measurements can be carried out continuously by intervals chosen because it will not interfere with the performance of the network. The end product of this observation is the formation characteristics and recapitulation data network usage both on the downstream and upstream. The implementation of the model depicted in Figure 8. The components of the system model required are as follows:

1. Monitored Objects, an information such as attributes and activities are monitored in the network. This information is streams of datapackets are monitored in real time. Type the flow of data packets can be known from the source and destination in the layers IP, UDP portor TCP is used for example, and the parameters in the RTP packet.
2. Monitor, as collecting and recording the datapacket traffic information.
3. Traffict monitoring application, is the result of collecting and recording processing traffic information data packets in real time as forming the network characteristic data.
4. Meter application traffic, as forming a digital meter data downstream and upstream usage is another form of collecting and recording the results of processing traffic information data packet.
5. Network Traffic Report, is a medium traffic information and recommendations.

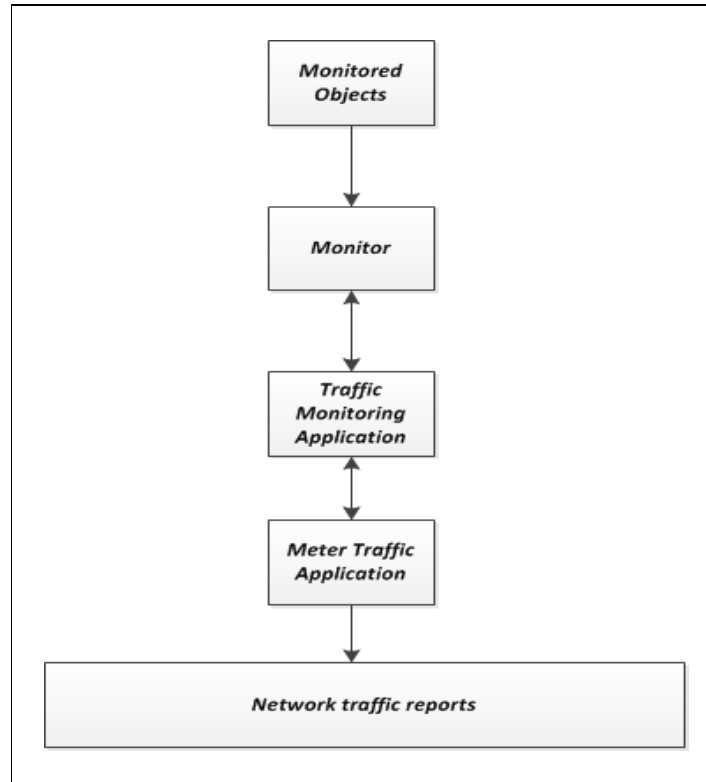


Figure 8: Recording Network Traffic

XI. INTEGRATED INTERNET MEASUREMENT MODEL

By integrating measuring the quality of service with the active measurement system and recording network traffic with passive measurement system, established measurement model with integrated Internet application QoS guarantees as QoE acquisition efforts. Implementation blueprint form of measurement that can be seen in Figure 9 with the involvement of the Internet traffic itself, which in turn generates a feedback form on Internet traffic. The measurement results will be mapped QoS parameters on network performance improvement recommendations attached, if obtained less than the quality category will be informed recommendations for improvement of network performance.

The process flow of the system blueprint is starting from Internet traffic, the next traffic through the measurement of service quality measurement system on the attached network when the network is done on a scheduled basis in a relatively empty condition, only use the network operating system. Scheduled service quality measurement involves recording the trigger of Internet traffic as an effort to form an integrated system. Records of Internet traffic that generates the work of the network usage is conducted continuously with the selected time interval. The output of measuring the quality of service and network traffic recording process will then be carried out through the data storage and analysis of data units and analysis of Internet traffic. The results provide input data storage formation and analysis of network usage characteristics of Internet traffic into feedback to the acquisition of traffic on the internet.

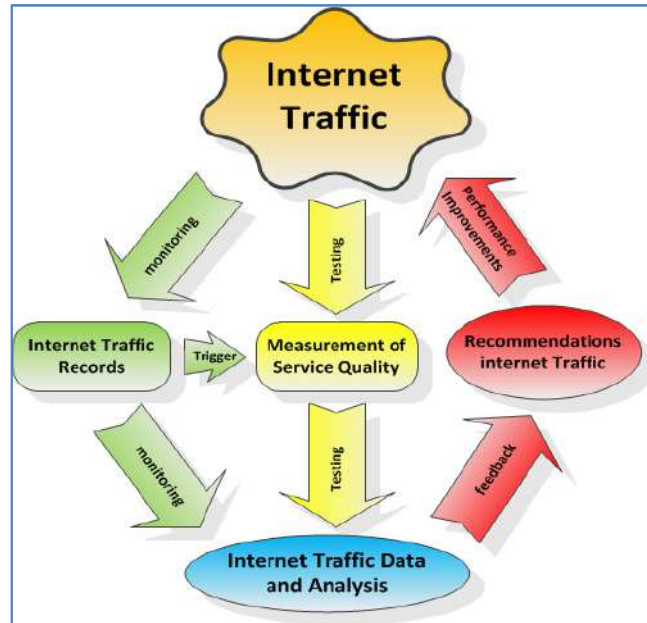


Figure 9: Blueprint for the proposed measurement

XII. CONCLUSION

The blue print which is the implementation of the proposed model of Internet measurement, which is oriented on the basis of QoS guarantees as QoE acquisition efforts, is expected to be an alternative solution to keep Internet traffic is installed, always keep pace with the needs of internet users. This condition can be met through the recommendations given of the proposed integrated measurement model. Such recommendations can be used as network performance improvement if needed at any time for internet users. Such recommendations can be used as input material evaluation installed Internet traffic runs, good for internet service users both large and small scale as an increase in the provision of network services that better future.

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