

# ANALYSIS OF EFFECTIVENESS OF USING SIMPLE QUEUE WITH PER CONNECTION QUEUE (PCQ) IN THE BANDWIDTH MANAGEMENT (A CASE STUDY AT THE ACADEMY OF INFORMATION MANAGEMENT AND COMPUTER MATARAM (AMIKOM) MATARAM)

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## ABSTRACT

To obtain the information from the internet, a good internet network is required so that the users can search for information comfortably and easily. One of the problems is that there is no bandwidth management and the connection is bad and slow due to the users who are downloading or streaming. Downloading and streaming required a large bandwidth so that the users can get good connection. In managing bandwidth, Simple Queue and Per Connection Queue on mikrotik because they have similarity. However, they also have the difference on the effectiveness with configuration and result.

**Keywords:** *Bandwidth Management, Internet, Mikrotik, PCQ, Simple Queue, Questionnaire.*

## 1. INTRODUCTION

It cannot be denied that any activity required information. To gain the information, computer and technology are the most proper means (Debyo Hendry Santoso and Estiarto Wahyu Sumirat: 2012). The use of computers in various fields, as well as various ages make the computer as a tool of the most effective and efficient way to obtain and share information (Ismu Adhim, Abdilah Baraja and Bambang Eka Purnama: 2012). The demands of information need and the computers usage as means are the most effective and efficient way to get information that could encourage the formation of a very large computer network that is connected to other computers around the world (Lilia Ervina Jeronimo Guterres and Joko Triyono and Erna Kumalasari Nurnawati: 2014).

Nowadays, the development of computer networks is growing fast in the world, especially in Indonesia. The computer network is a piece of computers and other equipment interconnected using wired or wireless media so that network users can exchange information and data (Warsito and Bakti Ratna Timur Astuti: 2012). The term network is closely related to the Internet. Internet or Internetworking which is a group of computer

networks that exist around the world. The various companies or government agencies and even private use Internet facilities to facilitate access of the data and information needed both outside and inside the institution or corporation (Dani Ainur Rivai and Sukadi: 2013).

The need of internet to access any information, a company needs internet network that has a large bandwidth and regulate the bandwidth so that many people can use it effectively.

Academy of Information Management and Computer Mataram is an educational institution that have 32 lecturers (source: <http://forlap.dikti.go.id>) the necessary arrangements for the management of the network bandwidth so that all clients can get the bandwidth evenly. QoS (Quality of Services) or better known as bandwidth management can be used to manage the bandwidth. On Mikrotik RouterOS QoS implementation can be done with the Queue function. In the function Queue Queue has simple facilities and PCQ (<http://mikrotik.co.id>). From both these facilities will be analyzed how the level of effectiveness between simple Queue and PCQ to manage bandwidth.

Complaints are often experienced by frequent lecturer on Internet-related delays in the surf so that the search needed information becomes blocked, if one client to download on the same network system, the resulting uneven distribution of bandwidth. This is due to the lack of bandwidth management that is applied.

This research will be focused on how to analyze Effectiveness of using Simple Queue With PCQ In Bandwidth Management (Case Study: Amikom Mataram) with quantitative methods. While the goal to be achieved in this research is to provide a level of effectiveness in implementing simple queue with PCQ to manage bandwidth. the expected benefits of managing bandwidth in the preparation of this study is to provide comfort in the surf for male and female students at AMIKOM Mataram. While the data collection techniques used for this study using quantitative methods.

## 2. THEORETICAL REVIEW OF RELATED LITERATURE

### 2.1 The Internet Definition

Internet is an abbreviation of Interconnected Networking or a series of relationships that can be accessed computer networks in general throughout the world, which transmit data in the form of data packets based on the international standard protocol (Khoirul Huda, Dahlan Susilo and Firdhaus Hari Saputro: 2008). Internet can also be interpreted series of computers connected across a series (Eka Choliviana and Lies Yulianto: 2012).

### 2.2 The Definition of Management Bandwidth

In Indonesian dictionary, management defines as an effective use of resources to achieve the targets, while Bandwidth is a measure of the maximum frequency range of data that can flow from one place to another in a given time. The unit used in bandwidth is bits per second (bps) or bytes per second (Bps) where 1 byte = 8 bits. Bit or binary digit is the base number that consists of the digits 0 and 1. This unit describes how many bits that can flow from one place to another in every second through a medium. While the analog signals, bandwidth is defined as the range between the high frequency and low frequency is measured in Hertz (HZ) (Toni Wijanarko Adi Putra: 2004). Based on the previous definition, it can be concluded that the greater the bandwidth received by the client the more quickly access will be, whereas if the

bandwidth received is smaller it will cause a slow connection. If one of the downloading computers requires a lot of bandwidth, it will be sucked, so that other computers will be slow due to a small bandwidth. Thus, bandwidth management is managing or allocating bandwidth effectively and efficiently to every client (Muhammad Rofiq: 2013).

### 2.3 The Definition of Mikrotik Router

Router is created to manage a network. It connects multiple networks into a unified of a wider network. In mikrotik there are two types that are RouterOS and RouterBOARD Mikrotik (Imam Riadi: 2011). RouterOS is a Linux operating system base that is created to manage the network router, designed to provide convenience for users (Rizal Fakhruddin Lubis, Suwanto Raharjo and Edhy Sutanta: 2014) while the mikrotik RouterBoard hardware is designed by proxy itself by having a variety of series and interface. RouterBoard use RouterOS for the operating system (Dwi Ary Asmoro, Hesti Susilawati and Azis Wisnu Widhi Nugraha: 2011).

### 2.4 The Definition of Simple Queue

Simple Queue is a limit way using simple limited based data rate, this is a simple queue facility provided by mikrotik making it easier for users to manage bandwidth both uploads and downloads on each client, simple queue also often applied to small-to-medium-scale networks (Erristhya Darmawan, Indra Purnama, Tomy Ihromi Rohmat Mahardika and I Wayan S. Wicaksana: 2012).

### 2.5 Per Connection Queue (PCQ)

Per Connection Queue is a method that is complicated enough in managing bandwidth. However, it has the advantages from the results of bandwidth management because it can allocate bandwidth management smoothly from interconnected client (Aris Syaifuddin, Mahmud Yunus and Retno Sundari: 2013).

### 2.6 Questionnaire

Questionnaire is questions. It can help the researcher to make decision because there are so many questions types regarding the research problems. It can also be used to know the result of hardware or software work (Purwanti Nugraheni and Imam Subaweh: 2008).

### 3. RESULT AND DISCUSSION

Based on the analysis that have made by using quantitative method and questionnaire load by 32 respondents. The respondents are all lecturers and the data is filled with load questionnaire. While, unmatch data with the load questionnaire clue will not be made.

In accordance with the spread questionnaire to the respondents result the following data.

Table 1. Users Interaction With Hotspot Network

No	Questions	SD	D	Un	A	SA
1	Is the available hotspot can help your work?	5	22	5	0	0
2	Is your hotspot network in your place satisfy you?	25	7	0	0	0
3	Is your hotspot network depend on the need?	29	3	0	0	0
4	Is your hotspot network stable?	2	30	0	0	0

Details:

Strongly Disagree : SD  
 Disagree : D  
 Undecided : Un  
 Agree : A  
 Strongly Agree : SA

Based on the table above, the data is counted by using likert scale. Likert scale usually is used for survey research or questionnaire with five options (Wahyu Jati Anggoro and Wahyu Widhiarso: 2010). Here is the formula of likert scale:

Index Formula % = Total Score/Y x 100

To get the total score: T x Pn, where T is Respondents and Pn is Likert Score.

Table 2. Likert Score

Details	Score
SD	1
D	2
Un	3
A	4
SA	5

So, based on table 1 it is seen that

Table 3. The Result Of Total Score Formula Usage

Questions	T x Pn					Total
	SD	D	Un	A	SA	
Q1	5	44	15	0	0	64
Q2	25	14	0	0	0	39
Q3	29	6	0	0	0	35
Q4	2	60	0	0	0	62
Total Score						200

To get Y score based on the formula: Y= High Likert Score x Total Respondents, where Y = 5 x 32 = 160

After knowing the score from total score and Y, the next step is using the following formula:

$$\text{Index formula \%} = \frac{200}{160} \times 100 = 125$$

So the result is 125, because there are four questions and based on index formula, the totals questions is  $\frac{125}{4} = 31,25$

To know the effectiveness level based on the result of calculation, so it is essentially to know the percentage interval so that the assessment can be identified, and the formula is:

$$I \text{ 100/total score} = 100/5=20$$

I result is interval from the lower score 0% to the highest score 100%. So the percentage interval from the formula is:

0% - 19,99% = Strongly Disagree  
 20% - 39,99% = Disagree  
 40% - 59,99% = Undecided  
 60% - 79,99% = Agree  
 80% - 100% = Strongly Agree

So the index result that have been counted belongs to Disagree category.

In accordance with the result of questionnaire using hotspot network is Disagree. After asking some questions related to the problem to the users. Therefore the thing that should be done is bandwidth managing using Simple Queue and PCQ, the following table showed the tools of the study.

Table 4. Used Softwares

No	Items	Descriptions
1	Mikrotik	RB750, 700 version with 5 port in total
2	Computer Server	Asus K46CM with spec LanCard, Hardisk 500 GB, RAM 4GB
3	Computer Client	Asus K46CM with spec LanCard, Hardisk 500 GB, RAM 4GB
4	Wireless AP	DSL-260B
5	Mikrotik Operating System	RouterOS V6.24 (mikrotik controller)
6	Server Operating System	Windows
7	Client Operating System	Windows
8	Winbox	2.2.16 version
9	UTP cable	10 Meters
10	Connector	6 connectors
11	Speedy	1 M

The following picture showed the network scheme used at AMIKOM

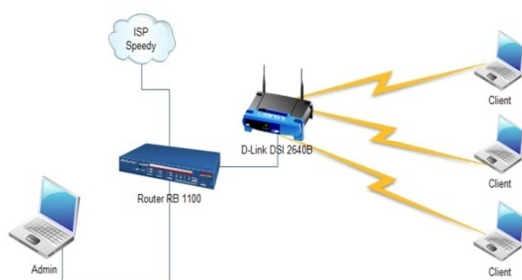


Figure 1: Computer Network scheme

With the existing scheme, it will be analyzed the effectiveness of the use of the method simple queue and PCQ.

### 3.1. Designing

In this design, the steps of using Simple Queue and PCQ will be discussed. A bandwidth will be used was 1M (1024 Kilo Byte) with the total number was 32

$$\frac{1024}{32} = 32$$

each client will get 32 kilo bytes or 256 kilo bit.

#### 3.1.1. Setting Simple Queue

In this scheme will be used with the IP 192.168.5.2 as the client and the amount of bandwidth provided 256 Kilo bits for uploading and downloading with the stage is: entering the main winbox page, a user and password must be entered

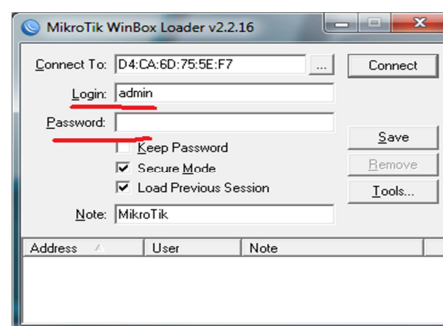


Figure 2: login winbox page

After login page will appear Home winbox

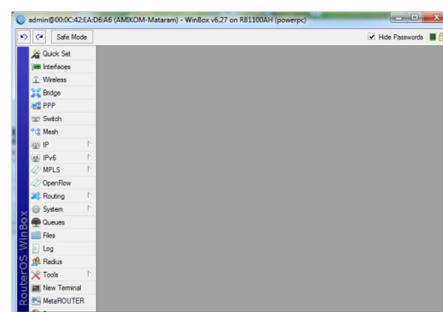


Figure 3: Pages Front winbox

After entering the main page winbox then select Queue menu on the left side and the list will appear Queue tab.

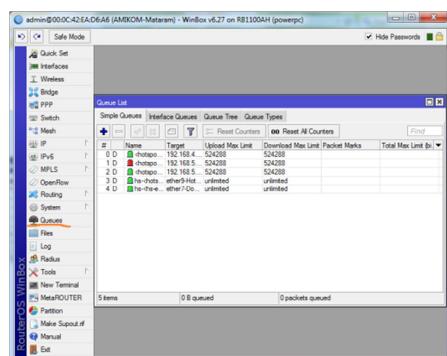


Figure 4: Page Queue list

After performing Queue tab list and then select Simple Queues form and click the plus sign (+) to set bandwidth limitations. In the form simple queue that must be considered is the IP that will dilimit and the amount of bandwidth that will be provided after that click OK.

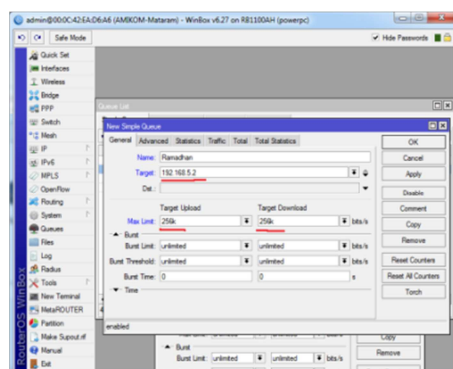


Figure 5: Form menu setting simple queue

Afterwards it will appear on the form of Simple Queues, it is the result of the bandwidth limit.

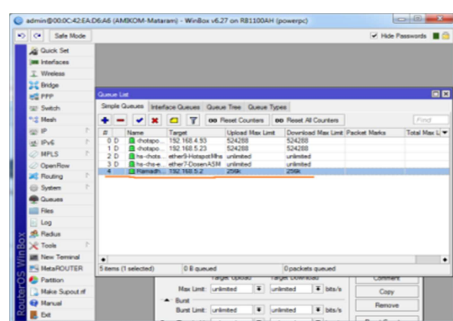


Figure 6: Appearance of simple configuration queue

### 3.1.2. Setting PCQ (Per Connection Queue)

To use PCQ design is still using the same IP with the same restrictions given bandwidth Similarly, the same pace as simple queue but the Queue List tab selected is the type Queue.

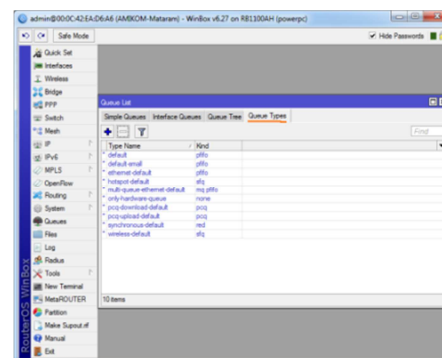


Figure 7: Form Queue Type

click button (+) on the Queue type and will appear new queue type, and fill in the name, change the kind column with pcq, a rate column is filled with 256 rate, limit 32 (for the number of clients) and tick dst. Click address to download and tick Src Address afterwards click OK.

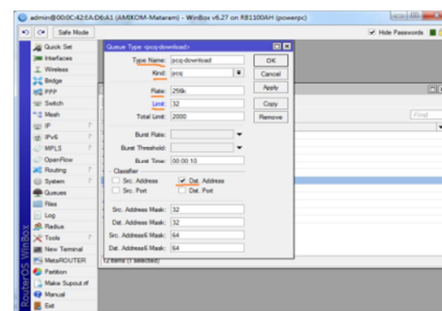


Figure 8: Form of menu setting PCQ for downloading



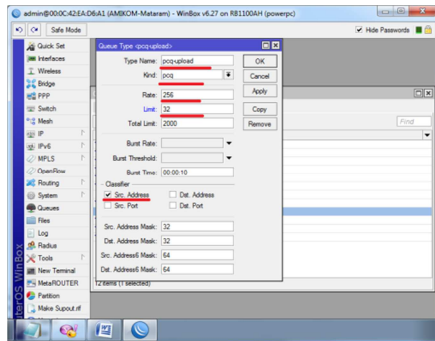


Figure 9: Form of menu setting PCQ for uploading

After the click OK it will be seen from the configuration that has been made

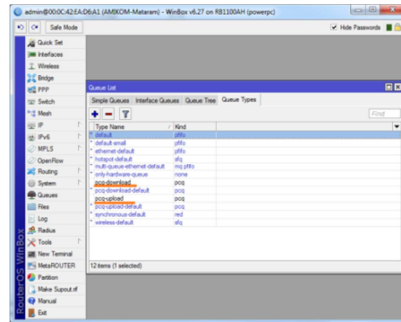


Figure 10: Queue Type Configuration

Then setting back the Queue Tree Form of uploading and downloading

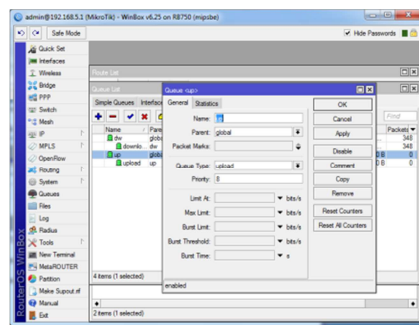


Figure 11: Setting Queue Tree for downloading

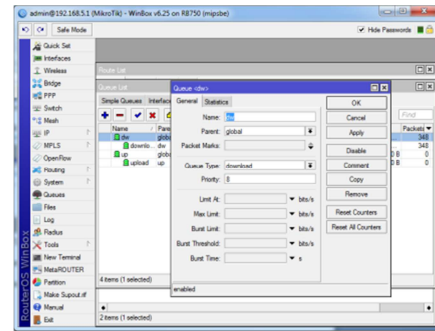


Figure 12: Setting Queue Tree for uploading

From the results of both methods configuration produced a very noticeable level of effectiveness ranging from configuration and results bandwidth management, system flowchart of the two methods

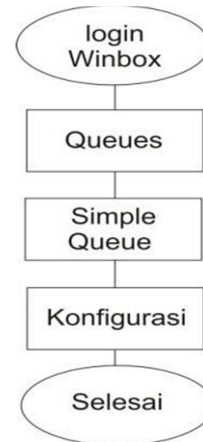


Figure 13: Flowchart Simple Queue

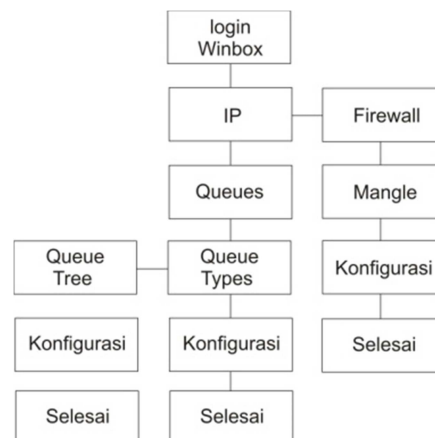


Figure 14: Flowchart PCQ

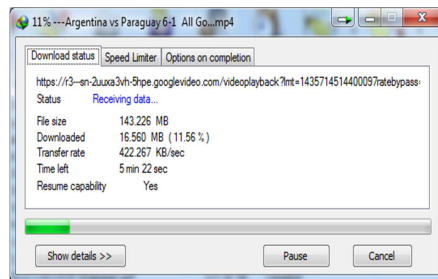


Figure 15: Before it is delimited

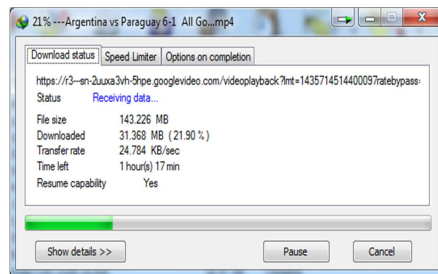


Figure 16: After it is delimited

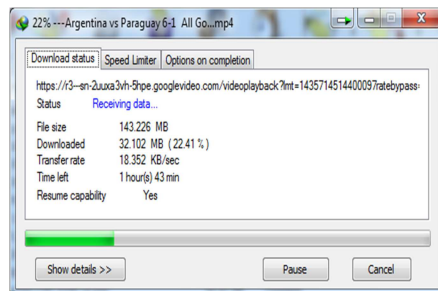


Figure 17: After it is delimited using Simple Queue

#### 4. DISCUSSION

Based on the result of the study and the steps that made for both methods, here are the result of the effectiveness from both methods:

Table 5. The Effectiveness Of Simple Queue And Pcq

The effectiveness	Simple Queue	PCQ
Configuration	Simple queue is very easy to use because it does not need another parameter still the IP should be set.	PSQ is more complex because it needs more parameter so the bandwidth management works. It is not necessary to set it one by one due to it will share to each client.
Downloading result	The result of downloading and uploading by using simple queue was not effective because it does not approach the limit that used on bandwidth setting.	The result of downloading and uploading by using Per Connection Queue was effective because it approaches the limit that used on bandwidth setting.
Stabilization	It is unstable because the longer, the lower bandwidth will be gained, it is far from the given bandwidth	It is stable because the up and down of bandwidth still approach the given bandwidth
bandwidth management	If the given bandwidth is 256kb or 32Kb with 32 clients, it result 1024KB or the same as 1M or ISP, but if only 2 interconnected, so the bandwidth used only 512kb or 64kb and the rest is 960KB	It is better to compare with simple queue because bandwidth is not useless due to bandwidth will be shared to each client, if it is only two, the bandwidth will be in group with 512kb, if the client is 4 for instance it will be 256kb and so forth and there were no left.
	IP should be set.	It is not necessary to set it one by one due to it will share to each client

## 5. CONCLUSSION

In making the Internet networks, it is essential to have bandwidth management because it will provide equitable benefits for each user, bandwidth management can be done using a proxy, it has been providing facilities to manage the bandwidth of one Simple Queue and PSQ, both facilities have the same function, with different levels of effectiveness seen from the analysis that has been carried out from the groove configuration, the effectiveness of both methods.

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