WIRELESS SENSOR NETWORK OPTIMIZATION BASED ON MACHINE TO MACHINE APPROACH USING ARTIFICIAL INTELLIGENCE

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ABSTRAK

Transmission media needs are minimal maintenance and can move around as needed, such as GSM celluar media began to be intended for the company PT Mega Finance in branch operations for data transfer and continues to increase each year, both in the form of data upload and download processes. This increase is based on the burden of using data both from the number of users or the size of the data itself, this raises the potential for failure in data transmission when uploading or downloading.

In this problem, this research tries to provide an alternative solution to M2M (Machine to Machine) to carry out the agreement / integration of 2 or more internet links (Load Balancer) and QOS (Service Qualification) Failover to link when the first link needs to be searched, in knowing that QOS becomes a reference whenever the link first moves to the second link or vice versa based on the amount of bandwidth each link has, bad dbm or signal strength from the operator, or jumping traffic at a certain hour related to the transmission process decreases. By using raspberry pi 3 as hardware that uses the M2M concept and QOS Failover as a modem at the branch, it is expected to help the problems at the PT Mega Finance branch.

Keywords :GSM *Cellular*, M2M (*Machine to Machine*), *Load Balancer*, QOS (*Qualtiy of Service*), *Failover*, Raspberry PI 3.

1. Introduction

GSM cellular is an option that can be used anywhere and can be easily replaced by other providers, but in its application based on the usage of excessive upload and download bandwidth by many users or from the size of the data file transferred, it causes a potential failure of the transfer process itself, it It can also be influenced by other factors, one of which is rush hour when using providers and the cessation of data collection or sales from the booth, which requires checking on the technical / IT infrastructure team on the side of the equipment installed at the booth.

Although manual connection can be changed to other providers to continue the transaction, this process is required to go to the initial process to avoid the data sent to the database is not perfect, but this also causes data duplication so that the technical / IT team data at the booth and hours of settlement interruptions. This certainly makes the business recovery process at the booth. In this problem, this study tries to provide an alternative

solution. When the process is carried out for safety using the Infra IT team and make transfers before it is done in connection with M2M (Machine to Machine), this M2M introduces the merging of 2 or more GSM providers to Share into 1 input which is used by users at each Mega Finance booth.And use the concept of failover to interact before moving that requires business processes at a standstill booth with QoS (Qualtiy of Service) as a reference whenever the first link moves to the second link or vice versa based on the bandwidth ratio associated with the link, poor dBm or signal strength from the operator , or a stepping traffic at a particular hour related to several factors such as air temperature or operating hours which makes the transmission process decrease with the help of raspberry pi 3 hardware to enable features in the bandwidth distribution (Load Balancer) and link provider failover.

2. *Machine to Machine* (M2M)

The concept of the Internet of Things (IoT) in relation to technology from one device to another is an M2M that discusses the process of connecting two or more internet connections to transmit data.This improves reliability with link redundancies, this process covers load balancing or failover modes, gathering bandwidth results which also vary in terms of cost.

Figure II-1 Bandwith Aggregator

2.1. Load Balancing

Load balancing is a distribution by dividing the traffic load of 2 or more links. So that traffic runs optimally load balancing is done to maximize throughput, reduce response time and avoid overload on one of the connection lines. This functions as a compilation user who has exceeded the capacity of the transferable link so that it can be redirected to another link, this can also be applied to the gsm link provider to calculate load traffic.

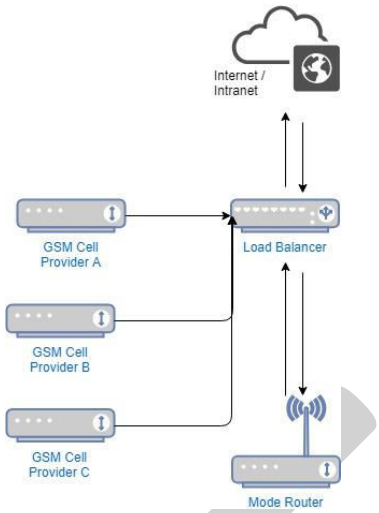


Figure II-2 Load Balancer Aggregation Mechanism

2.2. Failover

This is a function where applications on the main device fail and on other devices with the highest priority take over and answer the same request so as to reach the gateway that was intended before. Failover is done to avoid the connection line being cut off by changing the path created to support the main line where the delivery failure occurred.

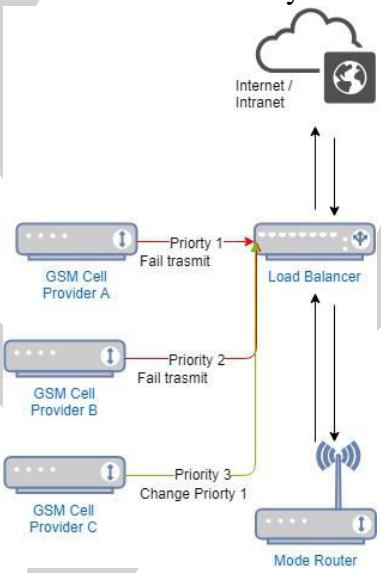


Figure II-3 FailoverAggregation Mechanism

2.3. QoS (Quality of Sevice)

Optimization of the main objectives to maximize the area and capacity of service quality is shown in Figure II-4. Obtained three elements from each in the cellular network in terms of capacity not in addition to those in or past that existed at the moment where that can occur, the wireless network provided can transmit data at the data rate and quality of service (QOS) is network provider service provider service provider to provide services that satisfy users.

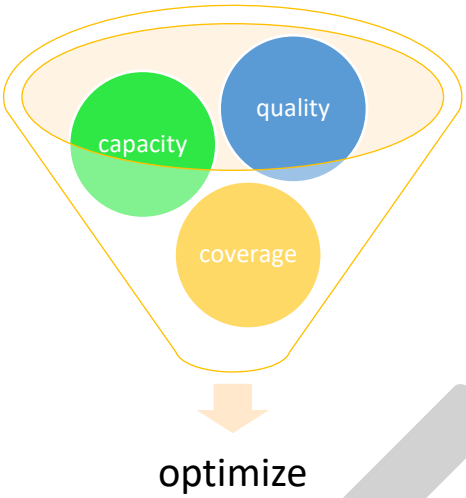


Figure II-4 ParameterQoS GSM

3. Sample Selection Method

Sampling is a process for obtaining samples from a population. The sample here must truly reflect the population, meaning that the conclusions to be drawn from the sample are conclusions on the population. The problem faced is about the process for sampling, and also how many units of analysis will be taken.

Table III-1*Signal Strength Equivalency*

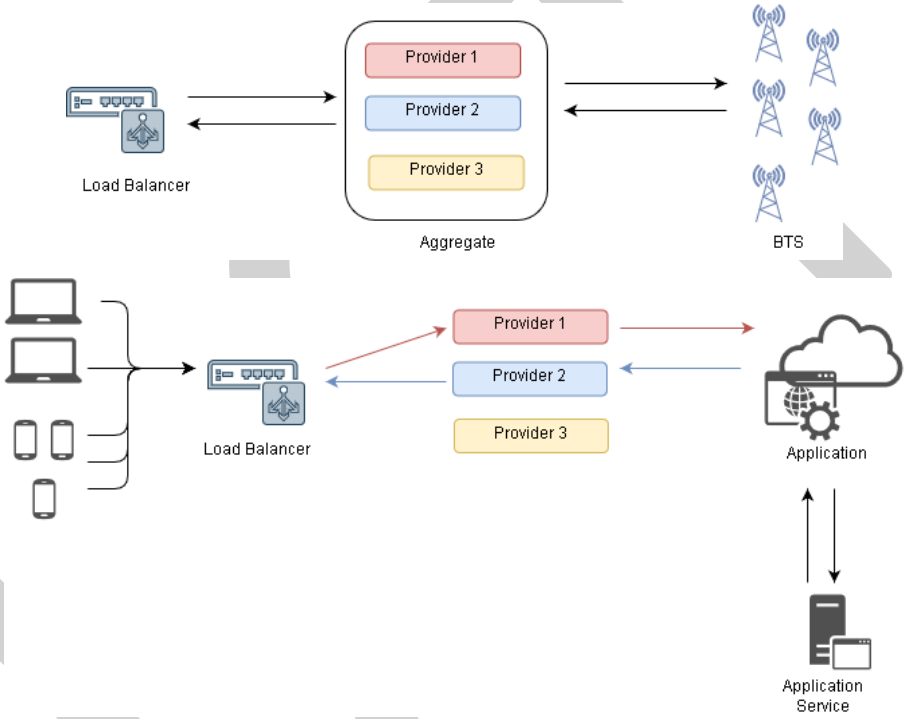
dBm	Classification
-80 or more	Good
-91 to -81	Average
-100 to -91	Weak
-101 or less	Very Weak

Table III-2 QOS (Quality Of Service) Jakarta Branch, Baseline 1 Month

	Tipe	Transmit	Klasifikasi
QOS	Latency	1ms to 100ms	Very Good
		101ms to 400ms	Good
		401ms to 1000ms	Weak
		> 1000ms	Very Weak
	Troughput	1% to 30 % (Utilization)	Very Good
		31% to 60 % (Utilization)	Good
		61% to 80 % (Utilization)	Weak
		< 81% (Utilization)	Very Weak
	dBm	> -70 dBm	Very Good
		-70 dBm to -80 dBm	Good
		-80 dBm to -91 dBm	Good
		-91 dBm to -101 dBm	Weak
		-101 dBm to -110 dBm	Very Weak
		< -110 dBm	No Signal

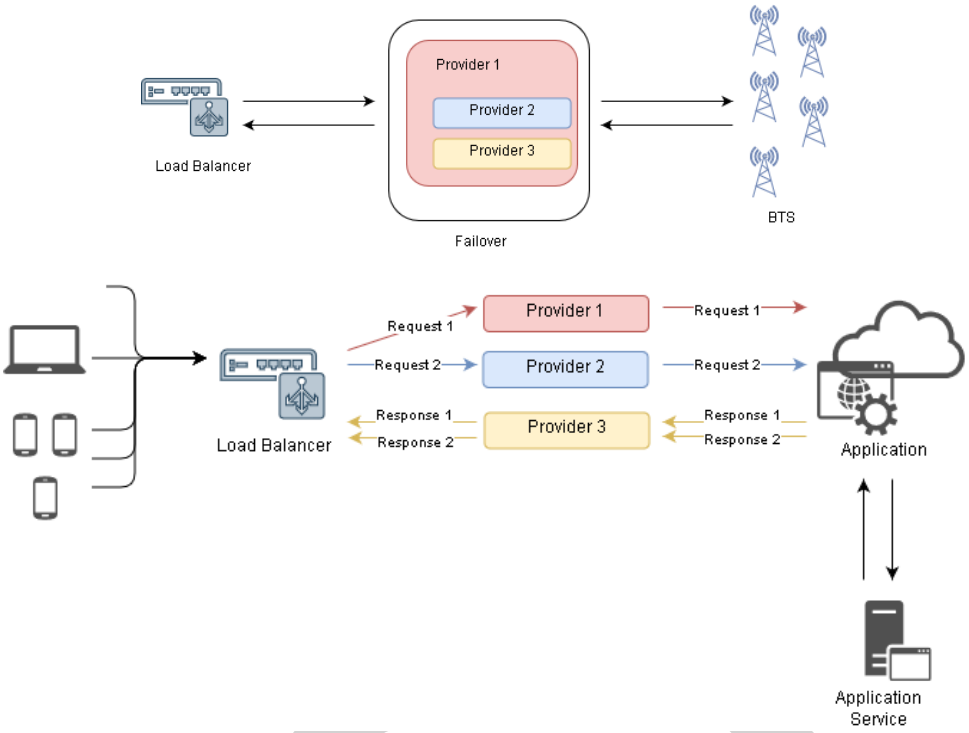
4. M2M System With QOS (Quality of Service)

In the application of QOS is divided into 2 models, namely aggregation and failover models. The model may be different for each provider unit installed.



FigureIV-1 Aggregation Model Using 3 Providers

This model is used when the transmission of each provider reaches a maximum or normal baseline so that QOS runs the aggregation model. The advantage of the aggregation process is that the bandwidth owned by each provider will be optimized for each GSM cell to be used to transmit, then the load is accommodated when branch users during operational hours do not feel the delay in accessing the internal web office for operational needs or just uploading and downloading files .

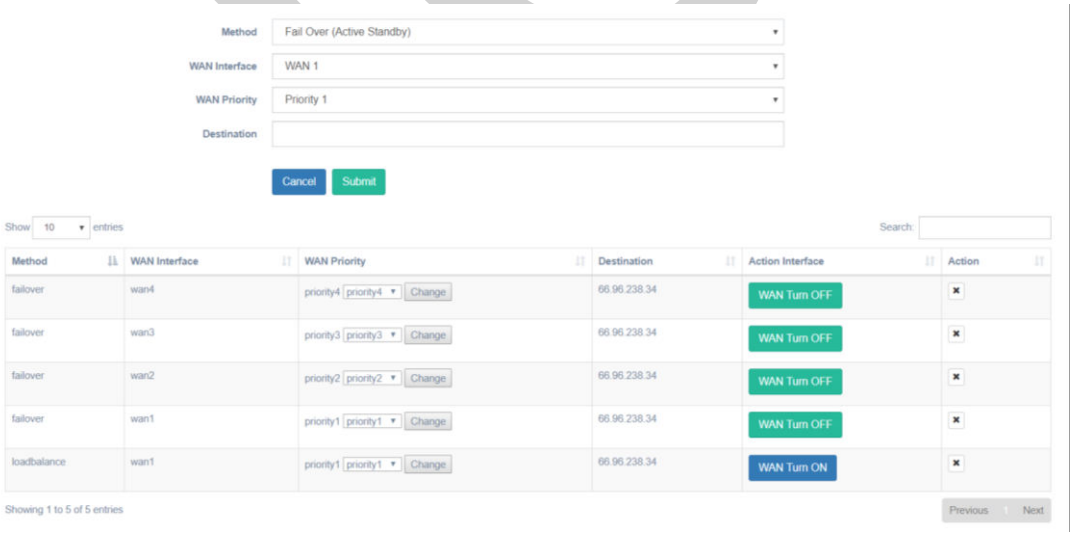


FigureIV-2 Failover Using 3 Provider

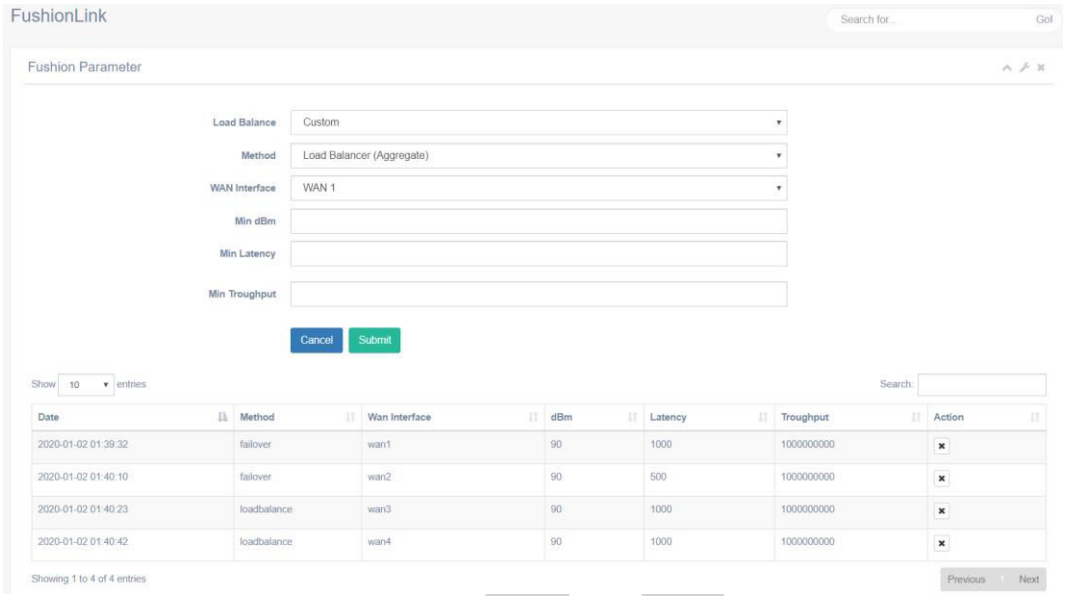
4.1. Implementation

In determining the priority wan will determine which wan will be made primary and which are secondary. Primary WAN acts as the Main link for internet / intranet data to pass, this will make the primary WAN be the WAN that is considered to have the best connection.

4.1.1. Preprocessing Machine Learning

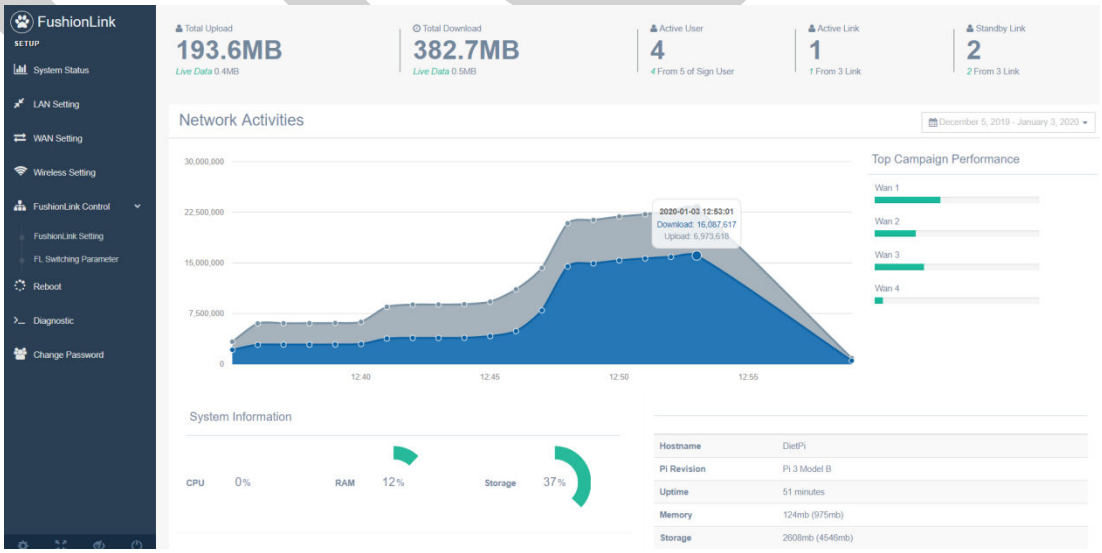


FigureIV-3 PageFushion*Setting Priority* WAN



FigureIV-4 PageFushionLink*Tracehold*WAN

4.1.2. FushionLink Dashboard



FigureIV-5 Page Dashboard FushionLink

5. Conclusion

Combining the QOS method and the failure to use a machine to reduce internet and intranet traffic. In this raised case where the QOS Register is based on the behavior of each provider in a different place. In the data obtained by Rawasari and Fatmawati, a good enough utilization was transferred to be carried out dynamically using the baseline 1 week before.

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