Design System: Networks Status Notification using Telegram Messenger

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Abstract. This paper discusses how to build a network interference notification system by integrating Telegram messenger. The problem faced is that when the system has not been integrated, a technician must check for interference based on complaints faced by the customer. After getting a disturbance report from a customer, a technician must check one by one to find out the disturbance. This is of course time consuming and inefficient. So, to facilitate the performance of technicians and to improve service, the system that was previously manual is integrated using a notification system that is integrated with Telegram. This system will automatically provide notifications through periodic checks conducted by Netwatch. Testing is done using simulations using virtual machines and GNS3. The results of this paper are a website-based application and Telegram-based messenger that are ready to be implemented on a real network.

1. Introduction

Today, the internet network is something that is very important for the community world, because the internet media will facilitate human. Nowadays in Indonesia there are already many companies competing to offer internet services with various services offered to their customers. With so much competition, companies are competing with each other in improving services to their customers.

At present there are many internet providers, one provider certainly has many internet customers, which uses a variety of services provided by the internet provider. To meet the needs of existing customers, example: PT. XYZ in Mataram, Lombok-Indonesia has 3 Base Transeiver Stations (BTS) for Broadband Wireless Access (BWA) access points. BWA is a high-speed network access technology via wireless network that utilizes radio waves as data transmission. The large number of customers which use BWA access makes the maintenance team must be faster in handling problems that occur in customers to provide the best service to their customers. The problem that occurs is in monitoring the customer's network which is still manual such as by customers contacting a technician or the call center. After receiving the problem report from the customer, the administrator will perform several stages including: (1) the administrator checks through an open source application such as Putty; (2) furthermore telnet IP Network Monitoring System (NMS) Jakarta, (3) log in to NMS Jakarta by entering the user name and password, (4) after successfully logging into Jakarta NMS, then telnet Provider Edge (PE) Denpasar, (5) login to PE Denpasar, (6) the next step is searching for customer data to ensure the customer's IP, (7) ensure the customer's link status by pinging the customer's IP.
Integration of an old systems with technology is needed to improve performance and service to customers in a company. Currently messenger technology is growing rapidly, along with the increasing use of mobile phones in the community. Apart from being cheap in its use, messenger technology is very easy for someone to communicate. One messenger technology that is currently developing is Telegram. Telegram is a messaging application that has simplicity in accessing and can be integrated into various types of devices [1]. In addition, Telegram is also an application that makes it easy for users to carry out the control process whenever and wherever [2]. Based on the ease of access and simplicity, Telegram is an application that is suitable to be integrated into a system to improve the service performance of a company.

There have been many studies that have been done related to implementing Telegram messenger (TM). Based on several studies that have been reviewed previously, the following examples of Telegram implementation are namely the use in education related to the effectiveness of integrated learning processes, to carry out the process of monitoring a system, and the presence system of student attendance [2]–[4]. In this paper, we developed a notification system to monitor the network performance of a company's Internet service provider by using TM. Based on the problems that are explained above, the system is still manual, making the maintenance team long in handling problems, then we need a system that will notify the network status quickly and real time to admin.

2. Related Work
Before implementing the system, we conducted a literature review process to see the use and implementation of Telegram messenger. In paper [5] a system is made for communication between guests at an institution that consists of many cultures. The system created is an interactive broadcast system that aims to get engaged interest in children. This system was made refers to an existing technologies such as Siri, Google Assistant, Cortana, and any messaging platforms such as Telegram, Whatsapp, Facebook Messenger, and Skype. Then in paper [6], Telegram messenger is integrated into a system to monitor the Space Monitoring Data Center (SMDC) system. The system monitors the entire data processing cycle so that the modeling process gets better. When an error occurs, the system will provide an error notification to the email and Telegram messenger. So that the measurement process can be done in a timely manner.

3. Business Process
Figure 1 shows the system before Telegram notifications were implemented. The system is still manual, which if there is interference from the customer side, the customer will report the disturbance to the admin. Then the admin tells the technician to check for interference. The following is an explanation of the business process flow when the system has not yet implemented Telegram notifications: (1) waiting for complaints from customers, (2) admin looking for the customer's IP address, (3) conducting an IP address ping test, (4) order to make improvements to the technician or maintenance team, and (5) technicians or maintenance teams make repairs.
Figure 1. System before using networks status notification

Whereas in Figure 2 is a system that has been implemented Telegram notifications. Admins can find out the status of the network without having to wait for reports from customers, and do not need to find a customer's IP address. Based on Figure 2, it appears that the process will require faster and more efficient handling when there is a disruption to the system. The business process flow for Figure 2 is described as follows: (1) The ping test is done in real time, (2) network status notification is up or down to the administrator automatically, (3) verifies to the customer if needed, (4) makes improvements by maintenance team / technician.

Figure 2. System after using network notification status

4. Design System

4.1. Prototype System

Figure 1 shows the system workflow on how the application works in scanning network status, then the status will be forwarded via a message to the administrator telegram. In the system design, the application will register the IP address that has been entered through the application to the proxy, then the proxy will scan the IP address that was registered earlier and send a message to the administrator when the network is up or down. Process scanning the network status is entirely carried out by proxy. The computer has no task in scanning. Process scanning can run even the application is turned off or the
computer is turned off. When administrators want to activate, deactivate, request specific locations and contacts, the system has a database and notify by using a reply message to the application.

A computer has a task to get updates from the server in real time so that the application can find out the request sent by the administrator and provide a reply to the request. Process activate, deactivate, request a location, and request customer contact via a reply message is done with certain keywords so that the application can recognize the reply message from the administrator and provide the requested data according to the request.

![Diagram of system notification](image)

**Figure 3.** Diagram of system notification

4.2. Use Case Diagram

Figure 4 describes about the usecase diagram of the system Telegram notification. The actors involved in this system are the technician or maintenance team and the admin. The system admin can do the phased data editing process from the customer, give orders to the Telegram, receive notifications in response to the commands given, customer management, user management, and receive automatic notifications. Meanwhile, a technician can only receive automatic notifications, provide command input, and receive responses from command input.

![Usecase Diagram of System Telegram Notification](image)

**Figure 4.** Usecase Diagram of System Telegram Notification

4.3. Flowchart

Figure 5 explains the process of checking if it is the system ‘up’ or ‘down’ by netwatch. Which starts from checking the customer's IP address by netwatch through inputting data connected to the network, if it is down then the proxy will automatically send a notification ‘down’ to the telegram and when the customer's network is up it will automatically sends notifications ‘up’ to telegrams.
4.4. Data Request

Figure 6 illustrates the technician request process, the first thing an application does is check the technician's request on the server, then if the request / location: there will be a check in the database according to the requested location. After checking, if the requested data is in the database then the location will be sent, whereas when the requested data is not available, the database will send a message that the requested data is not in the database, and for requests / contacts: have the same process as the request / location. While the request / start is to run the application, if the request / start there will be a check that the request was made by a particular admin or referred to as a super user. When not a super user, the system will send a message that you have no authority, but when the super user checks the connection between the application and the proxy. When the proxy is not connected it will send a message that the application is not connected to the proxy, but if it is connected there will be a process to enable the proxy netwatch. The / stop request to disable netwatch. The command / help is a request for assistance to the telegram.
4.5. Simulation

Because in making this notification application using a virtual proxy then in this discussion will explain the configuration of Mikrotik installed virtually in VirtualBox. In the Mikrotik configuration using virtual has the same goal that is to configure so that the proxy can connect to the internet, customer networks, and Laptop Servers. During the trial phase, two configurations are performed, namely the IP Service configuration and the Customer IP configuration. In the IP service configuration, the customer's virtual router uses GNS3 with the ip address and network topology shown in Figure 7. Then the IP Service configuration functions to activate the access point to the Mikrotik by using the API facility owned by the proxy with port 8728 so that the program can connect to the proxy.

![Network topology simulation](image)

Figure 7. Network topology simulation

5. Result System

The results of the system are divided into two models, namely the web based model and the notification model using Telegram. Figure 8 is the display when the user activates the notification system by sending command / start and / stop.

![Command display](image)

Figure 8. /start and /stop command
Figure 9 shows the Telegram system when giving network notifications when the conditions are 'up' and 'down', but it also shows results when running command / location and / contact. Figure 10 shows the display of applications run by the admin in web form. This web-form application is used to perform customer management, customer data management, and telegram application and website user management.

Figure 9. Display of Telegram chat command and response

Figure 10. Web based network notification application

6. Summary
In this paper, we describe how to implement the use of Telegram messenger as a notification of network outages. The system consists of two applications, namely web-based applications and TM-based applications. The two applications are made based on functionality, which is web-based used to perform system management and customers, then for TM is used as a notification system that gives notification to technicians. The communication system from TM to the system uses a netwatch microtic device, which has been set automatically to provide notification of interference on the network using API communication. For future work, the system will add queuing algorithm to location, contact, and start and stop commands.
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