Fault Tolerant Administration And Control of TCP/IP Based Network Via Mobile Device

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Abstract: **Network administration is a service that employs a range of tools and applications to recognize existing and potential loss of service, as well as helping the managers in monitoring and maintaining the network. Fault management tools can help to increase the reliability of the network by identifying the fault and then initiate the recovery process to overcome these faults. Fault management is the process of locating, analyzing, fixing and reporting network problems such as wrong system configuration, error in proxy server and other overhead problems. This, in turn, makes the network more efficient and productive. Fault management can save repair costs during detections, isolations and faults correction procedures.**
In this system, we can detect the fault in the network via mobile agent and can repair that fault. Because every time it is unfeasible to send a technician to test every faulty node because there will, potentially, be too many to cover. An MA with enough knowledge about the problem may run a number of tests and attempt to repair the node remotely.
Index terms- **Network Fault Detection, Fault Removal, Mobile Agent, and Proxy Server**

I INTRODUCTION

 In a computer network all the terminal are connected to each other, whenever any terminal in a network is not working properly then any fault is occurred in any terminal in a network. Though we are able to detect fault in a network all times we have to go close to the network. But the obligation to detect the fault in the network and remove it at anytime anywhere arises. To provide the anytime, anywhere fault detection in the move, we have to enable the computer network access from the mobile phones itself. So the application that detects the fault and Removes it in the network is need to be urbanized and deployed to the mobile phones to provide the same. Through this mobile application we can manage whole network through mobile that is we can detect any fault in remote network and remove it by mobiles, in which application are installed.

Fault management can help increase the availability of the network by quickly identifying the faults and then, proactively, start the recovery process. Current centralized configured network management systems undergo from problems such as insufficient scalability, accessibility and flexibility as networks become more distributed. Mobile agents (MAs), with integral intelligence, can present a reasonable new technology that will help to achieve distributed management, several researchers have embraced these approaches.

Whenever anyone will come in the network, he has to register the system with a registration system with following specified parameters:-

1) Name
2) Contact number and address
3) Mobile number
4) MAC address
5) IP address

By a mobile agent a server side script program will be initialized to find the fault. After detection it can correct the error, Suggest the option to correct the error manually, it can intimate the owner/responsibility holder, it can suggest intimating a person manually, and it can respond the system is unregistered.

II ANALYSIS AND REVIEW

During the implementation of this application, we study some research papers. The authors of them give their ideas to detect fault and remove them in a computer network.

According to Ibrahiem M. M. El Emary and Adanan I, Al Rabia, fault can be detected in a computer communication network using an expert system. The main objective of this study was to build an expert system for assisting the network administrator in his work of management and administration of the computer communication network. [1]

According to Constantin Volosencu and Ioan Daniel Curiac, fault can be detected using a sensor network. He presents some considerations related to fault detection and diagnosis, using Bayesian networks, in the complex distributed parameter systems with time

and space variables, where the intelligent wireless sensor networks are used as a distributed sensor.[2]
According to M. Zaki, A. and Ramadan, fault can be detected and corrected using active routers. They describe fault detection and correction procedure in two parts in their paper: - 1) Network Fault Detection and Correction System-based on a Multiagent System (MAS). 2) Active Routing (AR) scheme model. They describe a generic architecture of network fault detection and correction. ..[3]

By analyzing all these research papers, I develop a system which detect the faults in the network and the address of the faulty node via mobile and remove that with the help of mobile agents. And with the help of this system there is no need to remember the contact number of appropriate person for the specific fault because when a fault is occur in any node of the network then automatically a message will be send to the appropriate mobile agent depending upon the type of the faults.

III   GENERAL FRAMEWORK

In this paper, we propose a generic architecture of Fault Detection and Removal in the Network via Mobile Agent. The system as such is designed and implemented by using technology, namely, mobile agent.

Agent based system for fault detection and removal that consists of:-

1. Manager agent: it is the main agent i.e. the owner of the network. It receives the fault information and automatically sends the message of the fault information to the appropriate mobile agent according to the type of the fault.
2. Mobile agents (MA): they act for fault recovery and they contain of the recovery steps. Every mobile agent receives the fault information from the manager, and travels to the faulty client.
3. Recovery agents: every recovery agents enables the underlying mobile agent to run on the faulty client in order to recover the corresponding fault.
    In the figure 1, a general framework has been shown which contains manager agent, mobile agents and recovery agents.
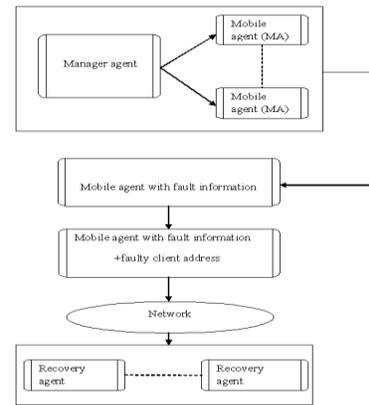

Figure 1: General Framework

IV ARCHITECTURE

Such architecture, Fig. 2, consists of three main components that work together:
1. Manager Agent
    Receives the fault information.
    Makes decision (recover or not) based on collected management information.
    Automatically message the appropriate Management Agent if the fault can recover.
2. Mobile Agent
    Receives the fault information from the Manager.
    Travels through the LAN to the faulty client and access recovery agent.
3. Recovery Agent
    Performs the recovery steps that are stored at the mobile agent.
    Sends acknowledgement message to the mobile agents to pass it to the manager.
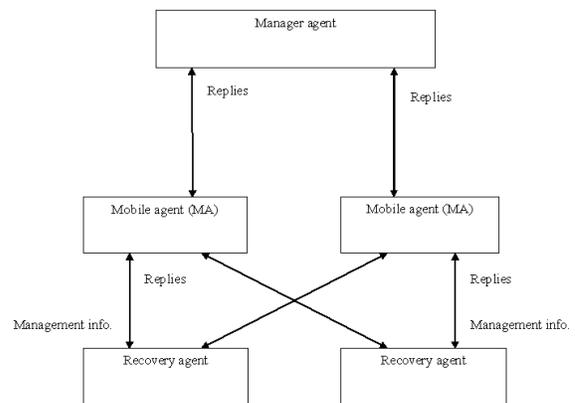

Figure 2: Architecture

The proposed architecture is based on the following assumptions:

1. The fault information is expressed to the manager agent in the form of text message via SMPP (Short Message Point-to-Point Protocol). From which manager agent can locate and isolate the underlying fault.
2. The manager is the central program that can only check the whole network connection.
3. The relationship between the manager agent and mobile agents is one to many. Also the relationship between mobile agents and recovery agents is one to many.
4. A forward recovery method is employed.
5. The number of mobile agents, MAs is dependent on the number of fault types that can be recovered.
6. The number of recovery agents is dependent on the number of network clients.

V ELECTRONIC MODEL

With the help of figure 3 i.e. e-model 1, the connection of how the manager agent will check the nodes in the network shows. Manager agent is linked to the SMPP server with the help of mobile network. SMPP server is connected to the ISP(Internet service provider) through the world wide web.All the web browsers are connected to the ISP which are further connected to the LAN. In this way, manager agent checks the whole network by pinging the nodes.
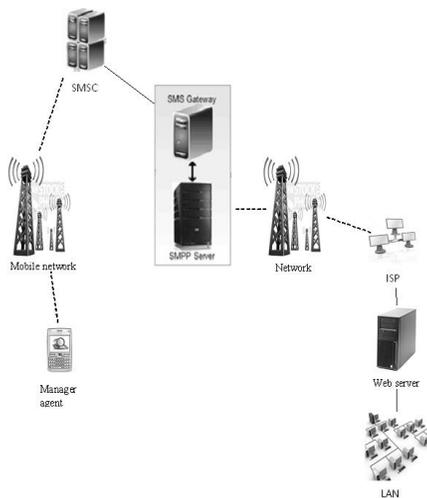

Figure 3: e-Model 1

After knowing about the fault, manager agent will send the message to the appropriate mobile agent depending on the type of the fault that contains the fault information and the address of the faulty node. Manager agent connects with the mail server via ozeki sms server which is connecting with the internet service provider (ISP) and LAN. LAN is connecting with the web server. Then, the message of the fault information is send to the specific mobile agent via network with the help of ozeki mail server which is shown in figure 4: e-Model2.
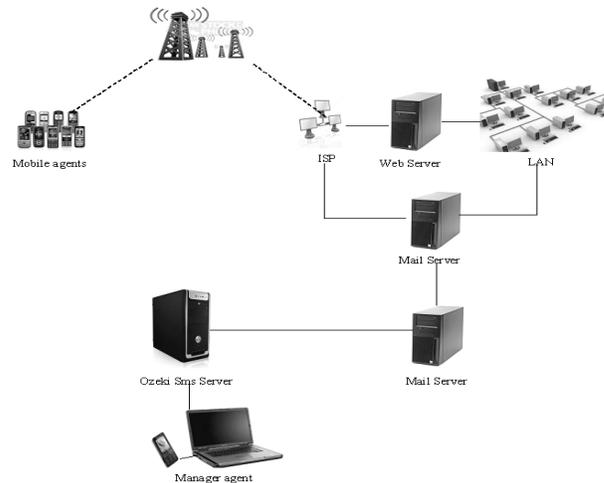

Figure 4: e-Model 2

VI ALGORITHMS

A) Algorithm for fault detection procedure

1. Manager agent detects fault by pinging the nodes in the network. He receives fault information in the form of message via SMPP (Short message Point to Point Protocol) where a message contains a header along with information (payload).

2. If there is any fault then

I.   Automatically send the fault information to the appropriate mobile agent.

II. Wait and listen to the mobile agent.

III. If the recovery is accomplished, display "the problem information and recovery is done!"

3. Else, announce that such there is no fault in the network.

4. Goto step 1

B) Algorithm for Manager Agent

Begin

Receive fault information in the form of message via SMPP (short message peer to peer protocol).

If (there is no fault)

Display "there is no fault in the network".

Return to receive a new message.

Else

Send the fault information to the appropriate mobile agent.

Do

Wait and listen to that mobile agent

If there is a received message

Display the received message

End if

Until time is expired or a new message is received

End do

End else

End if

End

C) Algorithm for the Mobile Agent

Begin

Listen and receive.

Check out the source of the message.

If the source of the manager agent

Read the fault information.

Add the fault information to the recovery steps.

Go to the faulty node.

Else

Send the received message to the manager.

End else

End if

End

D) Algorithm for the Recovery Agent

Begin

Allow the recovery steps of the underlying mobile agent.

Checks the recovery operation.

If recovery is succeeded

Send success message to the mobile agent.

Else

Send fail message to the mobile agent.

End else

End if

End

VII MODEL WITH OPERATIONAL STEPS

Figure 3.9 shows the operational steps of the system. The following steps explain the whole repair procedure:

1. Manager agent receives the hypothesis of the fault from the SMPP packet. Such packet is sent as the "trap" from the faulty node to the management information system to indicate that something is happened to that node.
2. Manager agent investigates the hypothesis and check
If there is no fault in the network, manager agent will return to step 1.
Else, automatically a message will be send to the suitable mobile agent (MA) to deal with the underlying fault.
3. The mobile agent stores the fault information followed by its recovery steps and travels to the network.
4. Mobile agent will go to the recovery agent via network interface card.
5. The recovery agent will enable the mobile agent to run at the client environment. After finishing successfully the repair task, the recovery agent will send a confirmation message to the mobile agent.
6. The mobile agent will carry the confirmation message and returns to the manager agent.
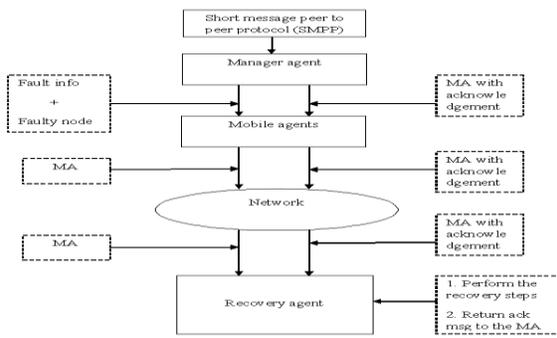**7.** In this way manager will knows about the recovery status.

Figure 4: Model with Operational Steps

VIII FUNCTIONAL FLOW DIAGRAMS

In figure 5, the overall structure is shown with the help of the functional flow diagram i.e. how the manager agent check the whole network and what kind of procedure he applies when any fault arises in the network. At first manager agent will check the whole network via his mobile i.e. every node in the network. Then if there is no fault in the network then a message will be display on the screen of the mobile phone of the manager agent i.e. all the nodes in the network are working properly, and if there is any fault in any node of the network then automatically a message will be send to the appropriate mobile agent based on the type of the fault. Then recovery agent recovers that fault then it goes back to the manager agent and again manager agent check the network via his mobile. In this way this procedure continues.
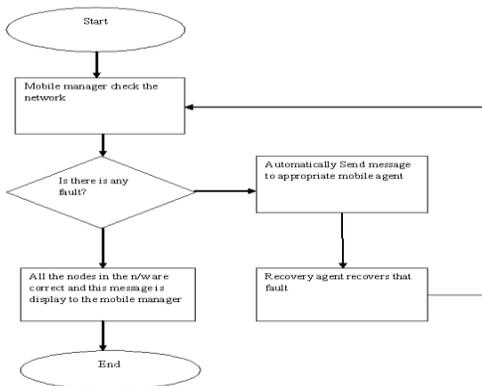

Figure 5: Flow Chart 1

IX ADVANTAGES

1. The owner of the network can make sure the whole network via mobile.

2. With the help of this system, he can detect the type of fault and the address of the faulty node.
3. If any fault comes into any node of the network, he can repair that node via mobile agents by sending them a message.
4. Fault recovery with low overhead during the recovery operation.
5. Support for communication agent, which is essential for distributed applications.
6. No modification to hardware.
7. A flexible and scalable approach to network management.
8. Separation between application and agent kernel to facilitate user transparency and to make it possible that one agent can execute different application to modules in its life cycle.
9. Reduction of management traffic on the network (no bandwidth-intensive client/server message exchange)
10. Reduction of administrations overhead and cost owing to function delegation. The human manager only initiates the process, and the agent performs the whole task autonomously.
11. Providing a convenient programming paradigm. Intelligent Mobile Agents are lightweight (the first version of our Smartlet is only 3.25K), flexible modular entities that can be created, deployed, enhanced and deleted in real time.

X RESULT

After analyzing this system, we have established the output underneath. This output will be displayed on the screen of mobile phones of mobile agents. This message will be automatically send to the appropriate mobile agent based on the type of fault. In this way the owner of the network can test out the whole network and can find the type of the particular fault. This system provides the mobility to the manger agent i.e. there is no need to go to the network to test out that every time.
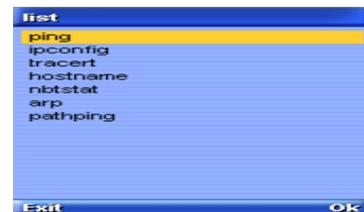

Figure 6 a

10.20.81.50|
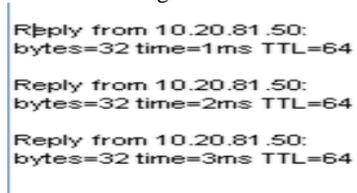
Figure 6 b

Reply from 10.20.81.50:
bytes=32 time=1ms TTL=64

Reply from 10.20.81.50:
bytes=32 time=2ms TTL=64

Reply from 10.20.81.50:
bytes=32 time=3ms TTL=64

Figure 6 c

Nokia Communication Centre - Message Viewer - ...
From: Bishnoi Sir
Time: Thursday, December 09, 2010 4:29 PM

There is a error of system configuration
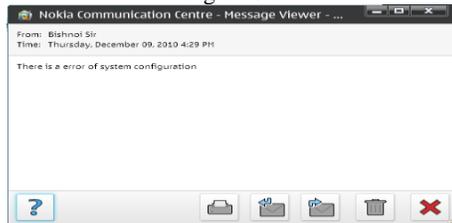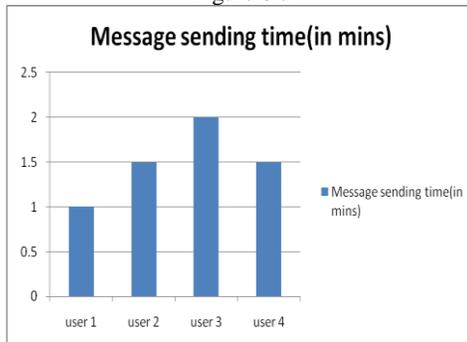
Figure 6 d

Message sending time(in mins)

XI CONCLUSION & FUTURE DIRECTION

In this system, we develop an intelligent mobile agent, which combines the network management functionality with intelligence mobility. The manager agent checks the whole network via SMPP (Short message point to point protocol) and if any fault is occur in any node of the network then automatically a message will be send containing that fault information to the appropriate person. In this way node recover from the error.

In future some enhancement can be done in this system. As we know that our mobile configuration is very limited, so it can only exhibit a message of the limited length. If there is a fault message of very big length that cannot be display on the mobile screen then we can set a camera on the LAN that will display whole configuration of LAN on a big screen. After that the exhibit of that big screen can show on the small screen of mobile phones in the form of video, and we can also do the assignment of higher priorities to MA threads to ensure faster execution of time critical management functions in this system. We can also do the exploration of other network management areas where MA (Mobile agent) technology can be employed, such as network performance, testing or software distribution.

ACKNOWLEDGEMENT

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