SNMP DISCOVERY TOOL USING SBC

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ABSTRACT

In commercial industries, computer networks are deployed on a very large scale. The manual management of these networks is not feasible. To tackle this issue, the network management system (NMS) comes into the picture. However, the current NMS are too complex to be understood and configured by an operator level person. This paper proposes a Simple Network Management Protocol (SNMP)-based web application that handles automatic device discovery, fault detection, devices monitoring and notifications for local network. This system is implemented through Single Board Computer (SBC). Key contribution of this paper is that system can be deployed at server side without making any major changes in existing server system. Main Purpose of using SBC is that it has low investment and maintenance cost, affordable replacement and fulfills single operation requirement. As it is Server based, it does not need to configure clients manually thus any number of clients can be traced. In short, this web software along with hardware gives effective solution for managing local networks.

Keyword: - *SNMP, SBC, NMS*

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1. Introduction

An inexperienced network joining an organization faces many difficulties due to the unavailability of a discovery tool, even for the experienced administrator, keeping track of devices and their connectivity details, while not having a correct methodology of visually presenting them becomes a troubleshoot task.

Simple Network Management Protocol (SNMP) is a protocol that widely used for network monitoring. SNMP protocol is associated degree application-layer protocol outlined by the net design board (IAB) in RFC1157 for exchanging management information between network devices.

It is a region of Transmission management Protocol / Internet Protocol (TCP⁄IP) protocol suite. Most of the professional–grade network parts go along with bundled SNMP agent. These agents have to be enabled and configured to communicate with the network management system (NMS) [5]. Due to the employment of SNMP protocol generates watching information within the type information, it's necessary to use intermediate applications therefore so as to form method watching become more efficient [6].

The network manager platform deployed in the network, manages the infrastructure consisting the network elements. The platform receives the events from the elements. The commonly available functions in the standard management platform are:

- Automatic Device Discovery
- Fault Detection
- Retrieve Device's Information
- Notification System [6].

Automatic device discovery finds out every device that is connected to a particular network. It searches along the length and breadth of the network and finds out all the different types of connected devices like switches, routers, hubs and PC's. This will also take care of automatic configuration of new device added to the network.

Whenever any fault occurs in the network like a device stops working or any device property goes beyond the restricted value or any device doesn't work properly, then this module will immediately notice that error and will generate an alert to notify the user about the network – fault. This system also creates report and log of the faults occurred in the network so that it can be used for future troubleshoot purpose.
In addition to this it lists the basic characteristics of devices like uptime, operating system installed etc. to identify them on network. Also, it provides remote read/ write abilities.

A Single Board Computer (SBC) is a complete computer in which a single circuit board comprises memory, input / output, a microprocessor and all other necessary features for functional computer. However, it does not rely on expansions for other functions. A single=board computer reduces the system's overall cost as the number of circuit boards, connectors and driver circuits are all reduced [2].

2. Literature Survey:

2.1. IP Network Topology Discovery Using SNMP, Suman Pandey Mi, Jung Choi, Sung-Joo Lee, James Hong [1].

This paper proposes a Simple Network Management Protocol (SNMP) – based solution that handles various types of network devices, including L2/L3/L4/L7 switches, routers, printers, hosts and discovery of end host connectivity with the switches and routers. It shows the network topology in combination of graph and tree layouts.

Limitations:
The algorithms given in this paper focuses on only automatic discovery of device but while adding any new device in network it needs to configure the device manually.

2.2 Design and Implementation Fast Response System Monitoring Server Using Simple Network Management Protocol (SNMP), Achmad Affandi, Dhany Riyanto, Istas Pratomo, Gatot [2].

Due to the use of SNMP protocol generates monitoring data in the form of raw data, it is necessary to use intermediate applications so in order to make process monitoring become more efficient with the appearance of the graph. To optimize the monitoring system this research design, manufacture and testing the technique for all interfaces that exist on the agent. The aim of testing this new technique is to determine the availability of devices and system availability with multiple testing, i.e. the rest of application, network mapping, network conditions, TCP traffic, bandwidth optimization and SMS notification.

Limitation:

1. This research uses SNMP version one and version two, which has less security as compared to SNMP version three.
2. This research does not considers the devices that don't support SNMP.

2.3 Network Discovery and Fault Detection, Suhrud Thakkar, Chintan Choksi, Bijon Desai, Bhavin [3].

Similar project is done by the students of Gujrat Technological University. Their Network Discovery and Fault Detection (NDFD) software represented the network-devices and their characteristics in a simplistic way and it is also easy to configure and operate.
Also, their network management software includes the facility of SNMP to OPC conversion so that the industries will not need to deploy an additional converter in order to convert and display the data on the SCADA screen. Their work consist of automatic network discovery, fault detection, report and log generation and remote device configuration.

Limitations:

To setup this particular software, settings on server needs to configure.

2.4 An SNMP-based Implementation of The Adaptive Distributed System-level Diagnosis Algorithm for LAN Fault Management, Elias Procopio Duarte Jr, Takashi [4].

This paper represents the application of distributed diagnosis results to practical SNMP-based fault management. We implemented a modified version of the Adaptive Distributed System-level Diagnosis algorithm [2] using SNMP facilities. Two important modifications were introduced in the algorithm:

        1] To permit management of a variety of agents, our implementation includes tested-only nodes, in addition to those that both test and rest are tested;

        2] Recognize the need for a Network Management Station (NMS) that doesn't tolerate large diagnosis delays, SNMP traps are used; the result is a diagnosis scheme that has high resilience to network faults and at the same time avoids inconvenient delays. The impact of the diagnosis on the performance of the network is analyzed in terms of the overhead imposed by SNMP diagnosis messages.
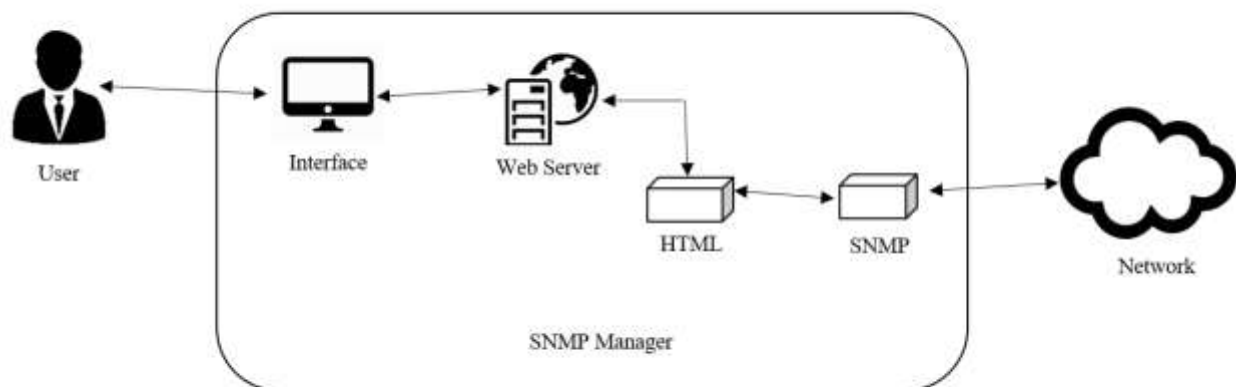
3. Methodology

Fig – 1: System Architecture

A) Implementation system:
We have designed an SNMP monitoring system as shown on Figure below. It consists of interface, web server, HTML, SNMP and mobile devices. The manager is connected to user and network.

B) Network Mapper Module:
As the name suggests, the main work of network mapper is simply to map the network i.e. it finds out any and Every device that is connected to a particular network. It searches along the length and breadth of the network and finds out all the different types of connected devices like switches, routers and hubs among others and enumerates these devices in a list form.

C) Custom Device Configuration Module:
It allows administrator to configure the devices and their properties as per his/her Requirement. It allows administrator to create and maintain profiles for individual devices. To allow secure access to these profiles of network devices, it also provides the functionality of setting-up of passwords. Using device configuration module,

the administrator can also set the threshold values for different properties of different devices, so that if a parameter-value of a certain device goes beyond the threshold-value then an alert could be generated.

D) Fault Detection and Notification Module:

This software module monitors the network 24*7.Whenever any fault occurs in the network like a device stops working or any device property goes beyond the restricted value or any device miss-performs, then this module will immediately notice that error and will generate an alert to notify the user about the network fault.

E) Conversion from SNMP to OPC format:

The fault detection and notification module represents the collected error-data in SNMP protocol. However, the SCADA screen present in the control room cannot interpret the data which is in SNMP protocol format; it can only understand the data which is represented in OPC format. Hence, in order to display the collected error-data on SCADA screen, we need to convert it from SNMP to OPC protocol.

F) Network Logger and Report Generation:

This module firstly generates the error-reports of the faults detected in the fault detection module; and it then stores these reports in a database for future reference. These reports contain the detailed information about the faults that occurred in the network like 1. Fault description, 2. Fault type.

4. CONCLUSIONS

SNMP network is feature based. We have featured our Network Management system (NMS) through SNMP on SBC. The proposed system discovers all nodes in same LAN, rectifies the network issues of the host and notifies them to administrator. Also provides read / write ability to reset password remotely.

Administrator is able to view the targeted host information remotely using web application where admin can query for targeted host are displayed on application. Our proposed system integrates all the functionalities that has been implemented so far. Also, we have tried to remove the limitations of previous systems.

Our proposed system will give effective solution for network management as:

     1] This is server based network management system.

     2] Provides remote monitoring of the network.

     3] Does not need experienced person to handle management system, even a newbie administrator can manage the network by using the system.

     4] Software is deployed on SBC, so it does not require any major changes in existing server system.

     5] Use of SBC effectively reduces installation and maintenance cost.

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