

Simple SNMP Based Error – Reporter By SMS

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ABSTRACT

The project is a comprehensive and cost - effective solution to the absent of network management facility in small organizations such as educational institutes, campus area networks (CAN). In a LAN (local area network) of 50 to 70 computers (quite common in small – scale enterprises), there's a need to manage the nodes by periodically assessing their status to ensure flawless performance of the network services. SNMP (Simple Network Management Protocol) is the widely used protocol for network management. But it's implemented only in large network like telephone switching exchanges, internet backbone network etc. The reason is to establish and to provide the hardware support for SNMP costs nothing less than 20 lakhs. Due to the huge investment required to implement SNMP the management of the network is compromised in small networks. With the ever growing increase of network usage for the organization it's imperative to ensure the ceaseless operation and good management of the network. The proposed project is a solution in this direction.

INTRODUCTION

The relentless growth in the information[1] processing needs of organization has been accompanied by rapid development in computer and data networking technology to support those needs, and an explosion in the variety of equipment and network offered by vendors. Gone are the days when an organization would rely on a single vendor and a relatively straightforward architecture to support its needs. Today's typical organization has a large and growing but amorphous architecture, with a variety of local area networks (LANs) and wide area networks (WANs). Supported by bridges and routers, and a variety of distributed computing services and devices, including PCs,

workstations, and servers. And, of course, despite over two decades of premature eulogies, the mainframe lives on in countless distributed and a few centralized configurations.

To manage these systems and networks, which continue to grow in scale and diversity, a rich set of automated network management tools and applications is needed. Fundamental to the operation of such tools and applications in a multivendor environment are standardized techniques for representing and exchanging information relating to network management. In response these needs, managers and users have turned overwhelmingly to one standard: SNMP and the related RMOS (Remote Network Monitoring) specification.

In fact, SNMP and its allies are synonymous[2] to the network management. However, it is esoterically to the management of small LOANs of about 50 to 70 computers. The reason being the huge investment needed to its deployment and hardware support. With this as a potential drawback the proposed project is the solution.

WORKING AND IMPLEMENTATION

Architecture An SNMP – managed network[3] included management stations and network devices. The management stations execute management applications like SNMP, which monitor network performance. Network agents are responsible for maintain network statistics for management stations. When asked, each managed network device is expected to communicate such information for processing. SMI enables a vendor to write an SMI compatible management object. This object is run through a MIB compiler to create an executable code. The code is installed in network

devices and management consoles that in turn generate network reports.

SNMP Components

Commands, SNMP is a network management application. This application contains several basic commands, including read, write, trap, and traversal operations.

- The Read command enables system manager to monitor managed devices. It allows for the examination of different variables that the network device may be collecting .
- The write command allows the system manager to control managed devices. It lets the values stored in the variables to be changed.
- The trap command is used by a managed device to send updated to the system manager. If the managed device needs to report anything significant regarding its network status, it will use a trap command.
- Traversal operations let the system manager retrieve information found in variable tables. It allows a network manager to sort through information in a step- by step fashion.

SNMPv1 Protocol Operations among the SNMP commands are specific protocol operations that facilitate in the request and Responses of managed network devices. The most basic operations include: Get, GetNext, and Trap (see Figures 2).

- Get is used by the SMI to retrieve the value of an object instance from an agent.
- Get Next is used by the SMI to retrieve the value of the next object instance from a table within an agent. It allows the administrator to step through objects in tabular form.
- The **Set** function is used to write a value to an object instance within an agent.

- **Traps** are used by agents to send information to the network management system.

Block Diagram (Abstract View)

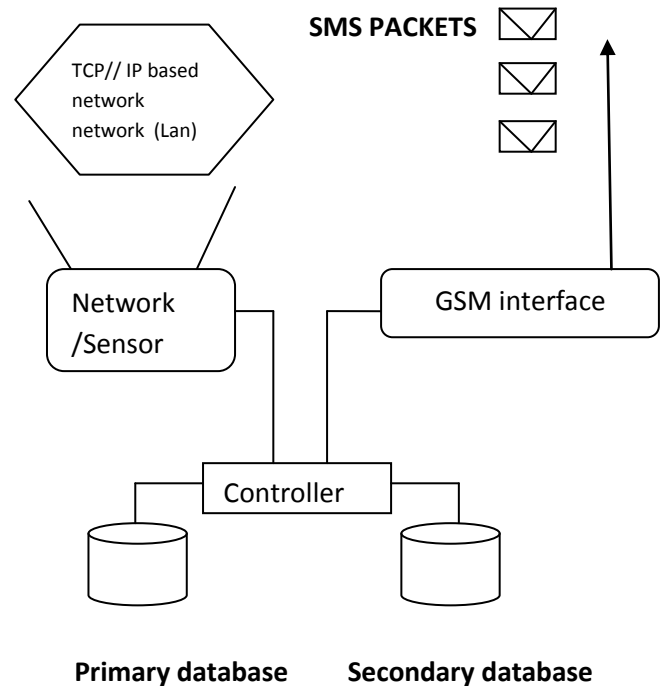


Fig. 1. Block diagram of error reporter

Microcontroller Philips P89C51RDN

Description

The 89C51RB2/RC2/RD2 device[4] contains a non – volatile 16 KB/32KB /64KB Flash program memory that is both parallel programmable and serial In – System and In application Programmable. In –system Programming (ISP) allows the user to download new code while the microcontroller sits in the application. In – Application Programming (IAP) means that the microcontroller fetches new program code and reprograms itself while in the system. This allows for remote programming over a modern link. A default serial loader (boot leader) program in ROM allows serial In – System Programming of the Flash memory via the UART without the need for a loader in the Flash code. For In- Application Programming, the user program erases and programs the Flash memory by use of standard routines contained in ROM.

This device executes one machine cycle, in 6 cycles, hence providing twice the speed of a conventional 80C51. This device is a Signal – Chip 8 – Bit Microcontroller manufactured in advanced CMOS process and is a derivative of the 80C51 microcontroller family. The device also has four 8 – bit I/O ports, three 16 – bit timer/event counters, a multi – source, four – priority – level, nested interrupt structure, an enhanced UART and on chip oscillator and timing circuits. The added features of the P89C5RB2/RC2/RD2 makes it a powerful microcontroller for applications that require pulse width modulation, high – speed I/O and Up /down counting capabilities such as motor control.

Flow Chart

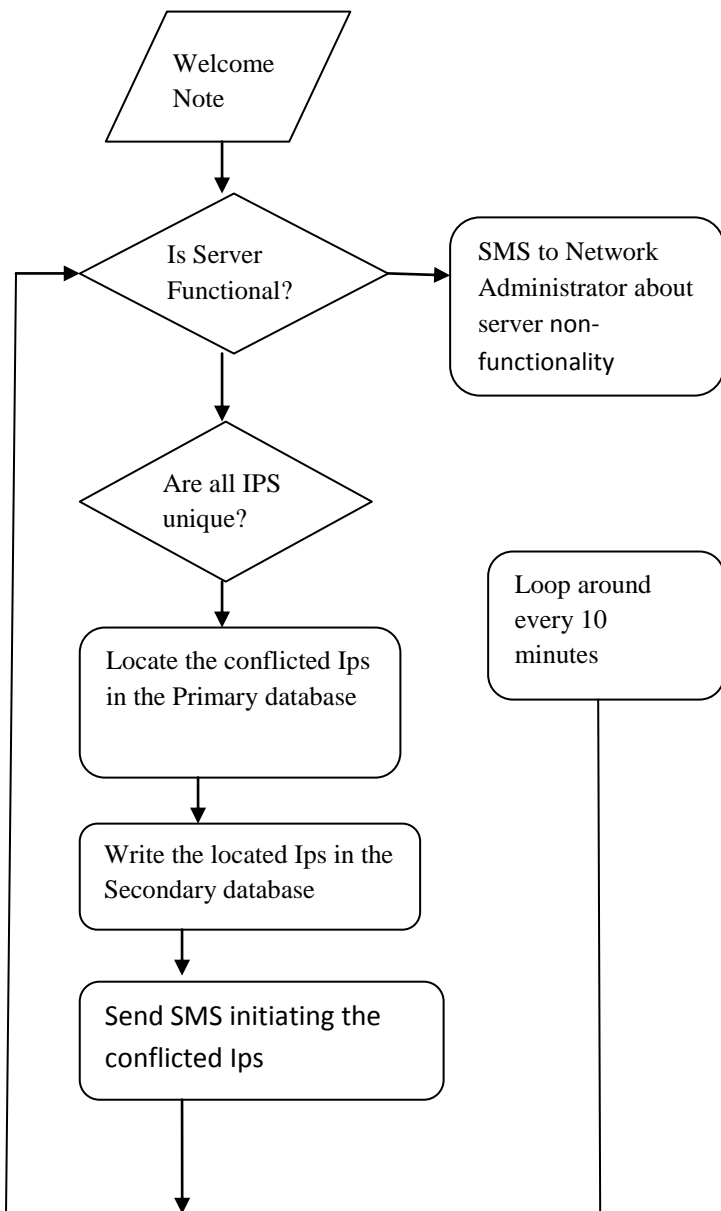


Fig. 2. Flow Chart of Monitoring Process

Simple SNMP (Simple Network Management Protocol) based error reporter in computer networks is an embedded system integrated to an IP based network, a GSM network and a couple of databases. The system effectively detects errors in the cloud (IP based network) and notifies it by sending an SMS to the person whose address (mobile identification number) is stored in the primary database.

Controller is the heart of the system to which two databases (primary and secondary), network sensor and GSM interface are integrated. Firstly, the IP address of all the systems and the mobile identification number to notify the error in the corresponding system are written into the primary database with the help of a QWERTY keyboard. Here the authentication and security protocols are implemented so that only the authorized network administrator can write into/read the data from the primary database.

A piece of software called “ Network sensor” has written in the controller which constantly monitors the network cloud. Upon finding an error in the network (Error could be IP address conflict, Server non-functionality etc) the network sensor rises an interrupt to the controller. Depending on the nature of the interrupt, the controller executes the ISR (Interrupt Service Routing).

The ISR includes writing the IP address of the system at which error has occurred into the secondary database. This is accomplished by first locating the IP address of the system in the primary database that has already written by the network administrator.

Meanwhile, the mobile identification[5] number to whom the message needs to be intimated is also found out by the controller which is pre-programmed to do so. Using the GSM network, a SMS will be delivered to the identified mobile identification number. On delivering the SMS the controller writes an acknowledgement[6] packet in the secondary database where the error prone system ID has been written previously so that the confirmation of the error to the concerned person (via SMS) will be ensured. Thus the system

successfully ensures the network is flawless and gives an edge to the unpredictable[7] errors they are going to arise.

Conclusion and Future Prospects

The additional functionalities that can be implemented on the network monitor (armmini 2440) to provide cutting –edge solution for network management is

i) APIPA (Automatic Private IP Address)

The additional functionalities that can be implemented on the network monitor (armmini2440) to provide cutting – edge solution for network management is

ii) PAP (Password Authentications Protocol)

A rudimentary authentication protocol PAP can be deployed so that authorization of the nodes can be done.

iii) Spanning Tree protocol (STP)

SNMP doesn't provide support for loop – back of packets in the network due to interconnection of switches forming a loop, due to which packets will have a tendency to get forwarded within the loop infinitely.

iv) Power management Policy

The network monitor can effectively be integrated with a dynamic power management policy which does a low – level optimization of power consumed by the client – nodes whilst they communicate amongst one another.

v) Fault – tolerance

Functionality to update and signal RAID (Redundant Array of Independent Discs) if available in the LAN can be configured in the network monitoring node.

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