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Analysis and Implementation of Embedded SNMP Agent

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Abstract

With the extensive application of network devices and the rapid development of embedded technology, network management of embedded devices becomes increasingly complicated. SNMP management is the most widely used network management system(NMS). Most of the network components used in enterprise network have built-in network agents that can respond to an SNMP network management system. By analyzing the SNMP (Simple Network Management Protocol) and base on NET-SNMP development kit, discuss the construction of MIB modules and code conversion and complete embedded SNMP Agent extension. Through network management tools to verify the SNMP agent on the network management functions of the embedded device.

Keywords

Embedded technology, Network management, SNMP Agent, MIB modules, NET-SNMP development kit.

1. Introduction

Along with the popularization of the network application and the network equipment, it is also gradually increasing to the network management demand. Because Simple Network Management Protocol(SNMP) has obtained the widespread application in the industrial world by its simplicity. The TCP/IP major part router and the switchboard all support SNMP in the protocol standard certain main management information database (MIB). In addition, in other private network equipment management domain, the SNMP network management has also obtained the widespread application. In the SNMP management model, the management station is carries on the management and the monitoring center to AGENT, Agent is managed to the equipment to carry on the monitoring and front end the operation network management. Therefore, in the network equipment, to increase SNMP the network management to act AGENT adapts the network supervising and managing

development essential work. This article takes SNMP and the existing system resources as a foundation, analyzes the embedded SNMP proxy software with emphasis of the function module, with the aid of opens source tool development package NET-SNMP, has constructed the MIB storehouse module, and has developed the embedded equipment SNMP agent software.

2. Simple Network Management Model

Simple Network Management Protocol (SNMP) is a UDP-based network protocol. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention. SNMP management is also referred to as Internet management. It's called SNMP management because it has matured to the level that it manages more than the Internet, for example, intranet and telecommunication networks. Any network that uses the TCP/IP protocol suite is an ideal candidate for SNMP management. SNMP network management system can manage even non-TCP/IP network elements through proxy agents.

The SNMP management consist four elements: Network Management System (NMS), Agent, Management Information Base (MIB), and Simple Network Management Protocol (SNMP). It uses the concept of Client/Server application. A network management system (NMS) executes applications that monitor and control managed devices. On each manageable equipment, a SNMP Agent is running. This agent manages information relating to the equipment which is stored in a local database called the MIB. And the SNMP Protocol is used to connect the NMS and the Agents. SNMP is a protocol built on the top of UDP/IP:

The architecture specifies the management messages between the management system and the management agents. 5 types of SNMP messages or SNMP requests can be exchanged (SNMPv1) between a SNMP agent and a SNMP manager:

level. The access control subsystem provides access authorization security.

There is only one dispatcher in an SNMP engine, but it can handle multiple versions of SNMP message. It performs three sets of functions. First, it sends message to and receives message from the network. Second, it determines the version of the message and the interacts with the corresponding message processing model. Third, it provides an abstract interface to SNMP applications to deliver an incoming PDU to the local application and to send a PDU from the local application to a remote entity.

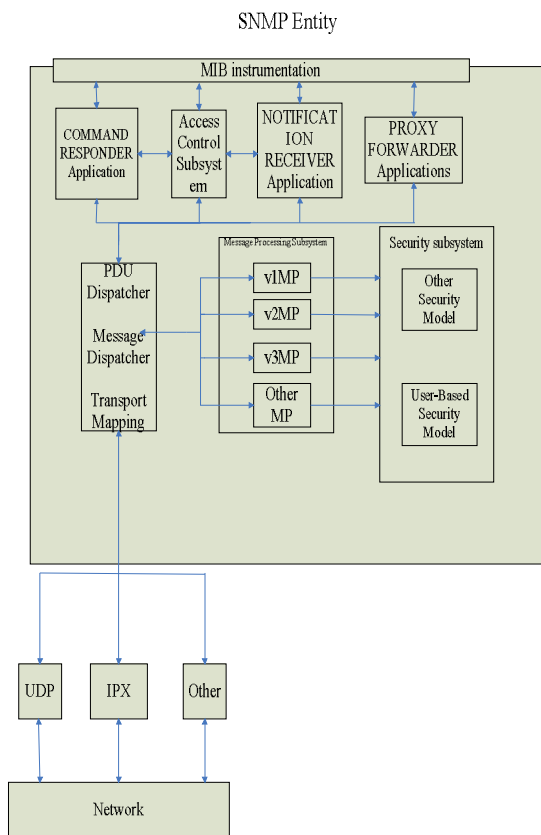


Figure 3. SNMP Agent Entity

To complete the SNMP Agent to a embedded device takes the steps as follows:

In the net-snmp-5.4.2.1 directory configure:

```
./ Configure - host = arm-linux target = arm --With-cc = /armv4l-unknownlinux-gcc - -with-ar = arm-linux-ar --disable-shared - with-endianness = little -With-mib-modules = "moudlename"
```

In the net-snmp-5.4.2.1 directory, compile: make.

In net-snmp-5.4.2.1/agent directory, you can see the generated snmpd process, as shown below:

Copy the snmpd program to the development board "/usr/bin" directory and start with the following command: /usr/bin/snmpd -V -c/etc/snmpd.conf

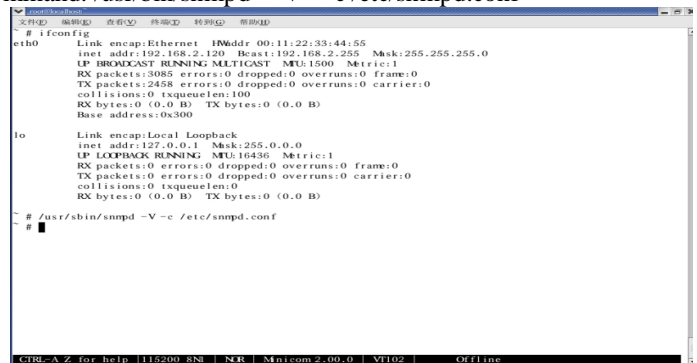


Figure 4. Run the snmpd program

5. Conclusion

The SNMP protocol was developed to facilitate the network management. In this paper the free software package, NET-SNMP is used to extend the NET-SNMP agent to an embedded system under the ARM-LINUX OS in order that the embedded can be controlled remotely by SNMP NMS. NET-SNMP makes it possible to integrate an embedded system into a network and to manage it with SNMP managers like MG-SOFT. The Management station's IP is 192.168.2.4, and the embedded equipment's IP is 192.168.2.120. The testing result of verifying the embedded SNMP agent shows as in Figure 5.

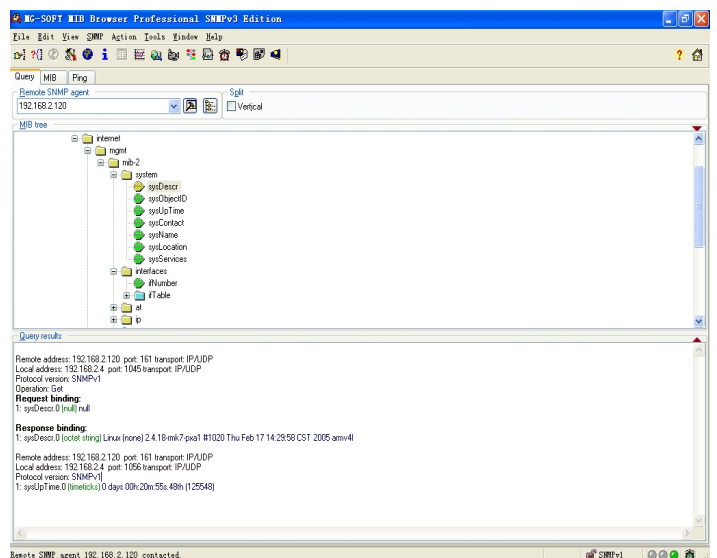


Figure 5. Verify the SNMP agent

6. Acknowledement

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