Journal of applied science and engineering innovation Vol.1 No.1 2014
ISSN (Print): 2331-9062
ISSN (Online): 2331-9070

Network Firmware Design of Cross-station in Cable Telemetric Seismic Instrument

Shuaishuai Zhang

College of Instrumentation & Electrical Engineering, Jilin University, Changchun, China

237059826@qq.com

Keywords: Cross Station Powerpc+Linux communications

Abstract In today's society, the increasing demand of energy leads people to conducting projects of explorating resources constantly. Geophysical exploration methods of seismic exploration is one of the commonly used methods . Most current seismograph are imported from abroad nowadays, especially the seismic instruments of large telemetry seismograph system, which will seriously restricts the development of the cause of domestic geological exploration. This design has realized the cable telemetry seismograph based on the cable telemetry seismograph cross station, so as to realize the 3d resources exploration. As the core of the cable telemetry seismographs, It will timely forward the data collected from an array of different directions.Cross Station using the frame structure of the PowerPC + Linux has realized the internet transmission of data collected under the TCP / IP protocol network. This design is mainly developed for the design of IP allocation and routing of network traffic management, in order to achieve communication with the host computer.

Introduction

Design Cross Station Based on the design of the firmware, is implemented in hardware on the basis of cross station. Design cross station network management firmware, mainly is the cross station line management, network communication is the main dynamic IP assignment and the establishment of the routing table of the network interface, which is cross station built row after row, built to achieve data recovery. The design of the main completed a management line, on the two network interface IP dynamic allocation and routing table. The connectivity test and host Ping command, the TFTP server and host interoperability test simple.

Cross station construction software development environment based on Linux

Building embedded PowerPC development environment should include the following four parts: Based on U-BOOT transplantation, Dts transplantation, Linux kernel transplantation, and the preparation of the root file system (ramfs.8xx) production. In the Linux system kernel before transplantation to build embedded PowerPC cross compiler environment, design the design of cross compile environment includes software and hardware based on. The design of the cross compiler environment for the construction of the target machine (mpc8360) cross compile environment is debian+colinux.

The principle of IP allocation and routing management the design of network communication based on

Cable telemetry seismic instrument combined with existing, put forward a kind of anti harsh

environment, 3D exploration relay network structure of multi-channel, which improves the efficiency of information collection work. Three dimensional exploration relay network structure as shown in figure 1.

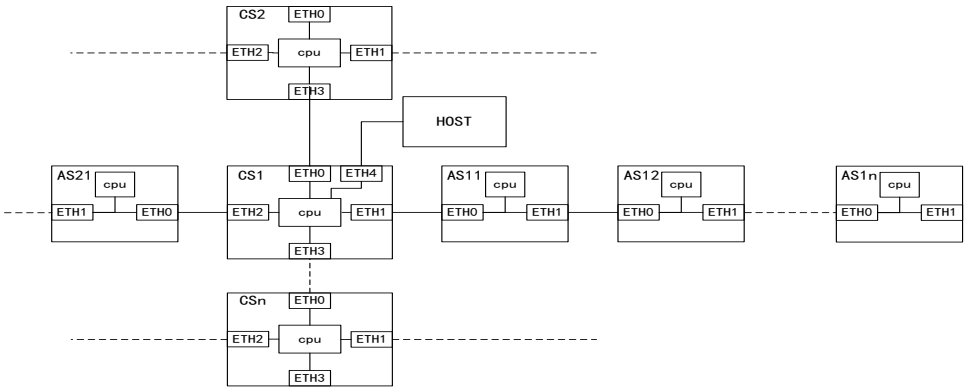

Fig. 1 3D exploration relay network topology

For the network structure on the collection station with two network interfaces, each network interface, are connected in turn, the main function is to collect the information, and the five network interface for the cross site CS1, the main function is responsible for the conversion of the data collected, and the acquisition station collecting data are uploaded to the host, to control the host can be corresponding to the gathering station and cross station.Is the use of TCP/IP protocol for distribution throughout the three exploration and the structure of IP management. With IP forwarding function for the whole structure of the gathering station and cross station, the host is through the radio mode IP forwarding, belong to the same segment for any adjacent network interfaces.The host broadcast mode dynamic allocation of IP, when the cross station adjacent to the received command, first of all to judge on the 5 network interface transmission direction, and then control the IP distribution at this time to be the host for each network interface of the machine, cross station began cross station and acquisition and adjacent building acquisition array, until the command sent to the host at the end of a collection station every road, so that the IP assigned.For the allocation and IP routing table at the same time, a mechanism similar to. Before the establishment of the routing table, first determine the uplink and downlink direction for the upstream routing and IP distribution at the same time, for the downlink direction of routing is established by the IP information to determine, when receiving a downlink IP information establishment and routing information the collection station, then IP information uploaded to the uplink direction acquisition station routing in this way, IP dynamically allocated at the same time, I completed the routing table.

Cross station network module

MPC8360 QUICC engine with 8 universal communication controller (UCC), according to the need, this design uses 5 UCC Ethernet interface design, MII interface is configured.MII is mainly responsible for MAC (Ethernet media access controller) and PHY (Ethernet physical layer transceiver) communication between. The MII interface comprises a data interface and management interface. Data interface with 2 independent channels, are used to send and receive. 2 channels respectively have their own data, clock and control signals. Management interface with two signal lines (MDC/MDIO), to monitor and control the action of PHY. MPC8360 through the MII management interface to PHY assign a different address to distinguish between 5 PHY chip system. Specific to the PHY address pins PHYADx by setting (x=1,2,3,4,5) connected pull-up or pull-down

resistors to distinguish up to 32 PHY chip.

Network communication firmware design

Design of network communication firmware is the network interface IP automatic allocation and establish a routing table, the design is the TCP/IP protocol based programming, the client and server modeType, when the host sends the request, request the client to complete the operation.

The function call to Socket

Network communication calls the socket function to establish a socket, so that you can communicate, can indicate the application protocol and service data flows needed to call the socket function.

The Connect function calls

When the socket established by calling the connect function to establish a connection with the server, the connect function is connected through the development of IP address and protocol port number, as long as the connection can transmit data, for the set of characters are described with the IP address and port number and protocol pointer length.

The Sendto function calls

The client and server to send data and receive data when the need to connect with SendTo, SendTo transmission request the client and server, transmitting response. The Sendto function to send data stored in the operating system memory, when congestion occurs, this time until the network communication free enough space. ,

The Recvfrom function calls

When the client and server using recvfrom receive data when using recvfrom, server to accept client to send data, when the data is sent using the recvfrom response. Applications often use three parameters to call this function: to accept data pointer address, length and the descriptor set interface.

The Close function calls

Close () function is mainly when the data transmission is completed on the socket function release.

The function call to Bind

When the socket is established, the network communication application calls the bind function is mainly for the socket address specified port number, while the server is mainly used to specify the

port number, the design of the TCP/IP protocol based on the endpoint address, main function pointer sockaddr_in.

The function call to Listen

After the socket is established, when executing the application, he is neither active nor passive mode, it calls the listen function is a set of interface conversion in the passive mode, prepare them for the connection.

The Accept function calls

Accept () function is when a client makes a request, the server response and then enter the resting state waiting for other clients. The parameters of which are: socket descriptor pointer address for the client, and port number, a pointer and call the port number of the length of the.

Summary

To load the network communication firmware, the IP dynamic allocation and routing table so that the network interface Cross station, cross station network interface and main control machine for simple operation IP dynamic allocation, then open the TFTP server, simple operation, can make the target host on the source file in the test file to the MPC8360 FPGA, can also put on the board of the target file to a main control machine, in order to achieve a simple operation.This can be detected by monitoring the TFTP log to verify the complete file transmission

Acknowledgements

Supported by The national deep exploration special project (201011081)

References

[1] Han Xiaoquan. Seismic exploration instrument present situation and development trend of geophysicalprospecting equipment [J].2008(01):43-52.

[2] Zhang Linhang. Based on relay Ethernet vibroseis seismic data transmission technology [D]. Changchun: Jilin University Instrument Science and electrical engineering

[3] Lin Yu edited by Guo Lingyun Linux network programming [M]people post And Telecommunications Press,2000.

[4] A dry, Hajime embedded network communication development and application of Beihang University press[M],2010

[5] Edited by Liu Biao network programming with a layered protocol ,design: Based on the Linux platform[M]mechanical industry press，2011.

[6] Lin Jie, edited by Zheng Huisong Internet programming based on Socket principle and method[J]. Chongqing posts and Telecommunications school Bao. 1997, (4):5759.