



MATRIX – REMOTE LOGIN

BusyBees Corporation



Table of Contents

PROBLEM STATEMENT	3
PROBLEM SOLUTION	3
ADVANTAGES	6
APPLICATIONS	6

PROBLEM STATEMENT

The unique concept of the project is VLSI implementation of controlling microprocessor based devices over Ethernet. Many electronic devices that appear on stands are serial or parallel interface compatible. Our concept deployment can help networking all these devices over Ethernet. This would simplify the control mechanism in any business or production entity. And one can control devices in vast campuses of universities, factories rather in any entity remotely over Ethernet. **Thus provides a single chip solution of Ethernet to raw data conversion or vice versa** Protocols Implemented:

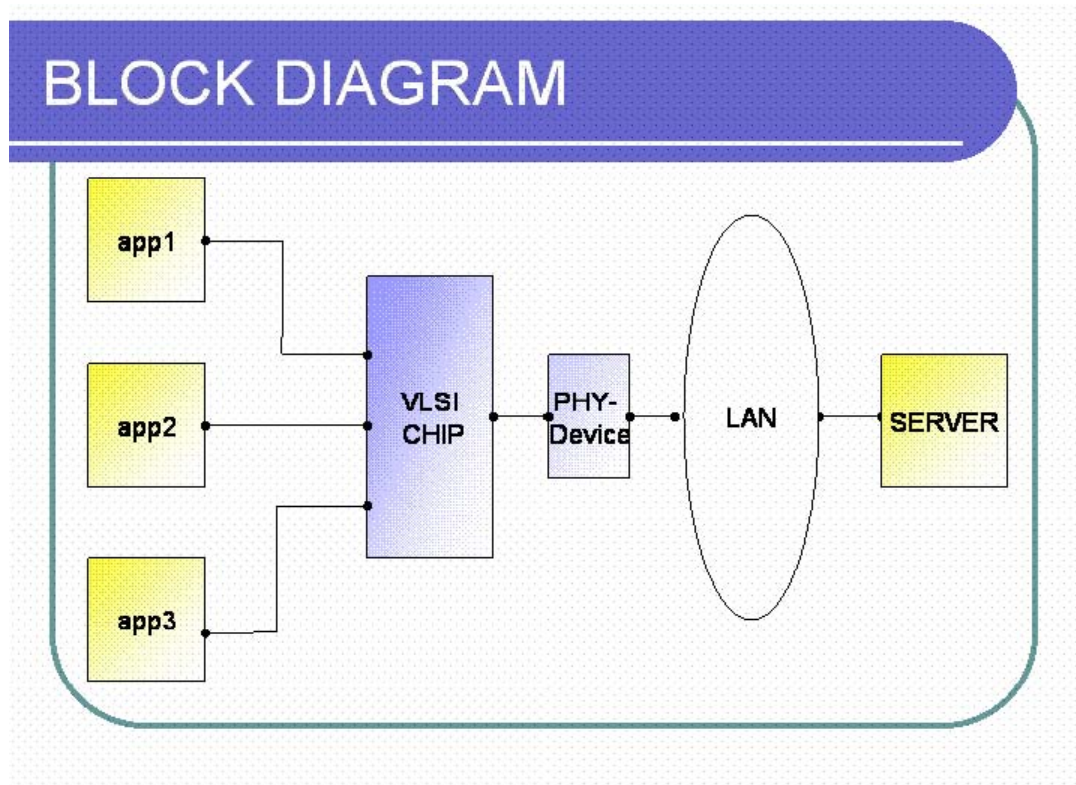
- **MAC:** ETHERNET.
- **NETWORK:** IP, ARP.
- **TRANSPORT:** UDP, ICMP.

Packet processing followed by the data interface block gives the final raw data which acts as instruction code for controlling the microprocessor. Similarly data can be transmitted from microprocessor to remote end computer over LAN.

PROBLEM SOLUTION

Now days as we know many electronic devices in this world on stand have serial or parallel interface and most of them have microprocessors or controllers in them. So we have decided to provide a single chip solution using VLSI in order to access and control such devices over LAN.

BLOCK DIAGRAM





1. APPLICATION:

At this end there can be any electronic device which is having serial or parallel interface. Also the devices having microprocessors or controllers in them can be used. For accessing these devices, raw data can be taken from them by NCU and for controlling, raw data can be given to these devices by the NCU.

2. NCU: Network Converter Unit:

This is the module implemented in VLSI. For sending raw data over LAN the data has to be encapsulated according to the various protocols for network packet formation. Similarly for receiving the raw data over LAN the network packet has to be de-capsulated. Thus network converter unit (NCU) includes implementation of following protocols in VLSI:

- i. MAC and Data Link Layer – Ethernet-II.
- ii. Network Layer – IP and ARP.
- iii. Transport Layer-UDP and ICMP

3. PHY DEVICE:

It is a physical layer device which converts the data to be transmitted in Manchester coded form and decodes the received Manchester coded data. This is done using LAN83c183 from SMSC.

4. LAN:

The data transmitted over LAN using PHY-DEVICE through RJ-45 connector using CAT-5 cables at 10 BASE-T Half Duplex communications.

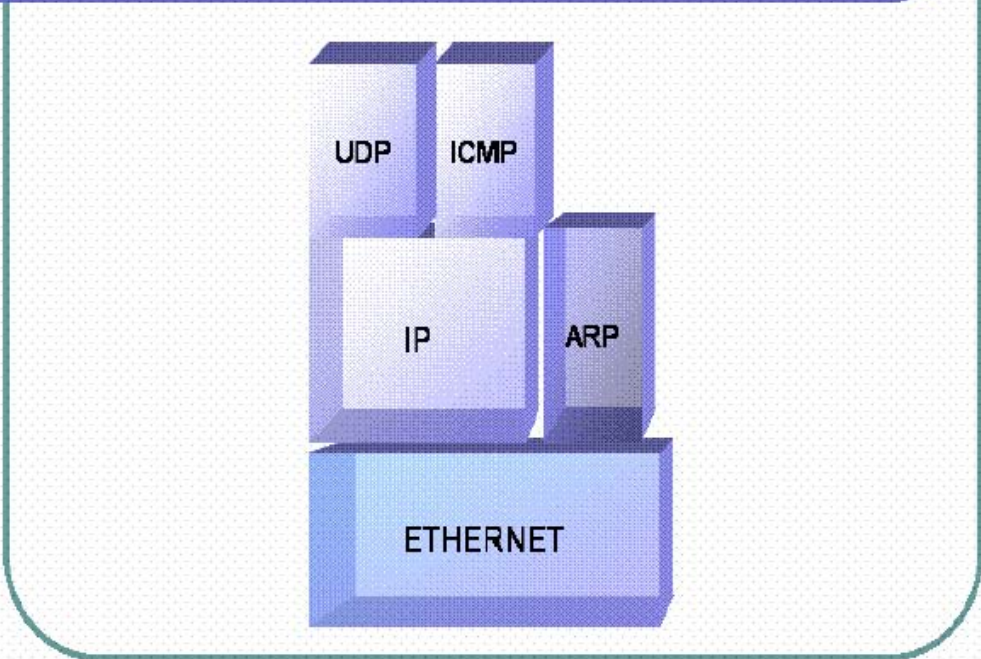
5. SERVER:

The data from the application device can be accessed over LAN by the server and also data from the server can be given over LAN to control the electronic device.

2.2 NETWORK LAYERS IMPLEMENTED:

For establishing communication over LAN following network layer protocols are implemented.

Minimal IEEE Standard compliant



ABOUT NETWORK LAYERS IMPLEMENTED:

LAYER	PROTOCOL	SIGNIFICANCE
Data Link Layer	Ethernet-2	This is the lowest layer of the UDP/stack. The ETHERNET-2 standard is used .The functionality of the layer is to establish physical level communication between the two terminals. The functionality of the layer includes forming of frames assigning physical level addresses to it, mention the upper layer protocol and perform the 32 bit CRC of the entire frame.
Network Layer	IP	The IP protocol is used at the network layer helps in routing of the data packets from one terminal to the other. It takes care of fragmentation. It CRC check of the header. It uses logical address or IP addresses to perform its functionality.
Network Layer	ARP	The ARP protocol is used in order to find physical address of the destination end if the logical address is available. It is a very important protocol for the network activity to take place.



Transport Layer	UDP	The UDP protocol is used for encapsulation of the data frames. It consists of the logical port addresses of the source and destination from where the data transfer takes place.
Transport Layer	ICMP	The ICMP protocol is used in many applications one of it is like to find if the opposite terminal is alive for which ping requests are send to the destination.

Advantages

- Cheap and single chip solution.
- Easy to plug the FPGA module to any large device requiring network interface.
- Easy maintenance of devices placed at far places and thus maintenance overhead is reduced.
- Management of distant devices through centralized control.

APPLICATIONS

- **Educational Institutes:** Sharing instruments, kits and expensive devices over LAN. The various electronic kits available in the educational institutes are mostly expensive and hence less in quantity. Thus accessing of such devices remotely can make them easily available to everyone by sharing them over LAN.
- **Home Appliances:** Controlling Washing machines, Home Security systems etc. remotely. As most of the household appliances and electronic instruments have microprocessors or controllers in them, controlling from far places and confirming their security is possible.
- **Industries/Factories:** Control /maintenance of devices. In huge industries or factories where workspace is widespread in such situations controlling and maintaining devices at far distances is expensive and also cumbersome. But with the help of already developed strong LAN backbone, centralized control and maintenance of these devices remotely is possible.
- **Medical:** Monitoring ECG, fetal monitor, etc. With the help of accessing remote devices over LAN the latest updates about all the patients in the hospital is easily available to the doctor at the server end. Thus in less critical cases the doctor need not visit all the patients in the entire hospital all the time and thus this leads to more effective monitoring of the patients.
- **Government Services:** Reading the energy meter based at every residential / industrial place. The government officials normally need to go to each and every house to confirm the reading of the energy meter. This can be easily done remotely by transferring the reading on LAN.
- **Electronic:** Controlling of UPS and programming it remotely over LAN.