

# Design and Implementation of High Performance Computing Communication System Based on TCP and UDP

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**Abstract:** The network communication has become a universal communication method. The traditional communication system has too much noise and long delay in communication. Based on TCP and UDP, the high performance computing communication system is designed and the hardware system and software programming are designed respectively. The hardware of the system is composed of GPS signal receiver, microwave processor and data transmitter. In order to test the feasibility of the system, compared with the simulation experiment of the traditional communication system, this paper codes software system according to the neural network control algorithm. The experiment proves that the given system's communication efficiency is higher, the communication ability is stronger, which has a good development potential.

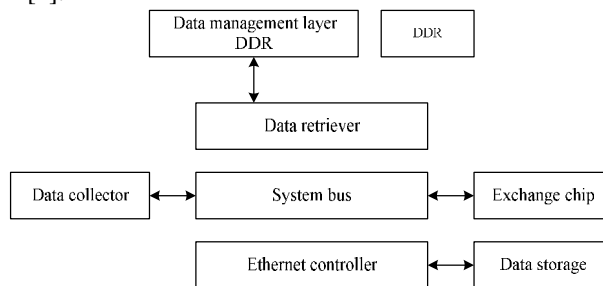
**Keywords:** TCP; UDP; High performance computing; Communication system design

## 1. Introduction

TCP's full English name is Transmission Control Protocol. The transmission control protocol expands based on byte stream, which has high reliability and is defined as RFC 793 of IETF. TCP plays an important role in the computer network communication system, and it can accomplish the functions specified by the fourth transmission layer. The TCP layer resides on the middle layer which is between the top of the IP layer and the below of the application layer in the Internet protocol suite. It can connect the application layers of different hosts and can detect data through functions. UDP is called user datagram protocol in English, which is another important transmission protocol of computer network communication system, and it does not need to be connected. In the transmission process, its delay is little, the data transmission efficiency is high, which is suitable for the reliability of the less demanding advantages. The emergence of UDP and TCP can greatly improve the efficiency and accuracy of computer network communication. This paper designs a high performance computer communication system based on TCP and UDP, and designs the hardware and software parts of the system respectively. The advantages of the designed system are verified through experiments. The experimental results show that the proposed system not only can efficiently accomplish computer network communication, but also requires low cost and has great development advantages in the communication network [1].

## 2. Hardware Design of High Performance Computing Communication System Based On TCPUDP

The designed hardware part of high performance computer communication system based on TCP and UDP consists of GPS signal receiver, microwave processor and data transmitter. The designed workflow of the hardware part is shown as follows: GPS receives the external communication signal, the microwave processor converts the received signal into a digital code, and the data transmitter transmits it to the other party of the communication. The overall design framework of the hardware design of high performance computing communication system based on TCPUDP is shown in Figure 1 [2]:



**Figure.1. The Overall Design Framework of The Hardware Design of High Performance Computing Communication System**

### 2.1. Design of GPS Signal Receiver

The GPS signal receiver designed in this paper is a 16/32-bit Chipest156 chip developed by Camed Logic Company in the United Kingdom. The core logic of the chip is a RIC structure and is built around a microwave processor. There are 36 internal interfaces (20 TEA interfaces, 16 UEA Interfaces) and 40 the external interfaces (20 MMY interfaces, 20 MMU interfaces). When the GPS signal receiver works, the input voltage should reach 220V above, the supply frequency should between 50MHz and 120MHz, while connecting the core programming system, the embedded ICE should be used to scan GPS signals [3]. The GPS receiver accepts all types of signals such as language, text, images, data and converts the resulting signals to electrical signals with the aid of a computer terminal and screens them easily, which includes coding, modulation, amplification or transmission.

### 2.2. Design of Microwave Processor

The microwave in the microwave processor selects the long-range and large-capacity radio communication signal, all the frequency bandwidth the microwave and the ultra-short wave band of the transmitted signal can finish work, but the microwave processing effect is better. The microwave processor selects the ARM 11 processor chip developed by ARM Company, which can connect a number of data together and has a stable processing characteristics in the line of sight, but if you want to deal with long-distance communication signals, you need to use relay communication signal processing method and make connection through each relay station, the processing range up to 20 ~ 50 km. Microwave processor can process both analog relay communication signals and digital relay communication signals. It has good encryption ability and is very convenient for the latter part of the transmission, therefore it attracts people's attention increasingly.

### 2.3. Design of Data Transmitter

The core chip of the data transmitter is a CEDA chip developed by IBM Company. The chip can convert the baseband signal into a form suitable for transmission in a transmission medium, and then transmit through a transmission medium, and reverse the conversion to recover into message on the receiving end through a receiving end device to provide it for the recipient. The selected transmission method is two-way transmission, which has very short delay, usually between 2 $\mu$ s and 5 $\mu$ s. CEDA chip footprint is very small, so it will not consume too much power and will not produce noise pollution when it works, which is unmatched by other current chips in the market. The data transmitter sets the sending terminal and the receiving terminal at both ends where the communication object is located, which greatly improves the transmission efficiency.

## 3. Design of High Performance Computing Communication System Software Based on TCP And UDP

On the basis of the completion of the above hardware design, the system software part is designed. According to the neural network control algorithm coding, TCP and UDP work in the high performance computer communication system at the same time. The core program is shown as follows:

First set up a Socket, set the TCP as a service agreement, set the port attribute as local part, set the port property as the listening port, and set the answering method as "Listen". After entering the listening state, select waiting until the client can connect with the host program; next, receive the connection request sent by the client, and record the program, the receiving mode is "Accept", the received signal is recorded as "request", analyze the received signal property, and if the property does not belong to the "state", it will be automatically filtered out; then, send the signal on the send data service platform and trace the signal by get data; finally, make sure that the signal has been input to the receiving end, close the Socket and finish the conversation [4].

## 4. Experimental Research

In order to test the performance and operability of high performance computer communication system based on TCP and UDP designed in this paper, it is compared with the traditional high performance computer communication system [5], through the software debugging and hardware test design experiments, the experimental parameters are set as follows: the working voltage is 220V, the input AC is 20A ~ 50A, the input DC is 50A ~ 100A, the working frequency is 60MHz, the working mode is C/S mode, the working duration is 70min. According to the above set parameters, comparative experiments is carried out and the obtained experimental results is shown in Figure 2 below.

Analysis of Figure 2 shows that both the traditional communication system and the communication system set in this paper can accomplish high performance computer communication. However, after 30 minutes, the communication capacity of the traditional system is significantly reduced, but the communication capacity set in this paper is always enhanced.

## 5. Conclusion

This paper has designed the high performance computer communication system based on TCP and UDP, the hardware of the system is divided into GPS signal receiver, microwave processor and data transmitter, and the design of software part is realized by using the neuronal network control algorithm. The system set up in this paper not only has high work efficiency, but also has short

working time and low cost, which has a good development potential.

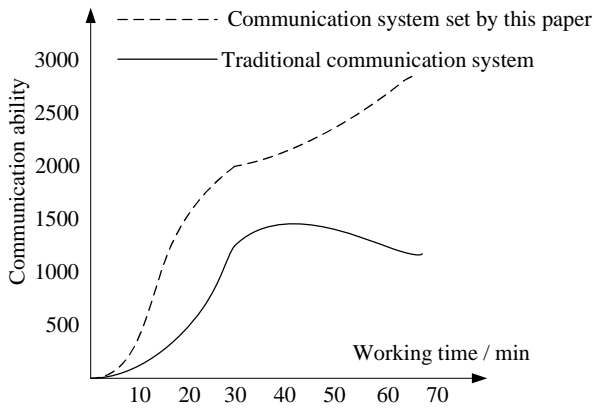


Figure.2. Experimental Comparison Figure

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