INTELLIGENT COMMUNICATION INTERFACE
IN DISTRIBUTED M&C SYSTEM

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Abstract – *A communication interface card with intelligent feature is described. It can be widely used in distributed system. Taking the advantage of isolation and dual-CPU technology, the card makes station identification and network data analysis easier and more intelligent, and improves the situation of code leakage that may occur during practical application.*

Keywords – distributed system, communication interface, intelligent.

1. INTRODUCTION

With the development of digital technology, distributed systems are applied in engineering projects more and more widely. In these systems, local measurement and control (M&C) unit identification and communication protocol are very important and rather a little complex. Both the reliability of data communication and the high communication speed are important especially in the situation of excessive local M&C unites existing in a system. In this paper, a new method of intelligent communication interface is discussed, which is a little different from others. In general, M&C units can perform sending and receiving functions. The channel from network to LMU (local monitoring unit) internal bus is transparent. With the growing of LMU's number and data size, the system is apt to overload and have too long data processing time to result worse system communication performance. It is a better way setting an intelligent communication interface between local M&C units and monitoring operation station (NOS).

2. INTELLIGENT COMMUNICATION INTERFACE

The communication interface is designed for AUTO-3000 distributed dam safety monitoring system, which consists of local monitoring unit(LMU), network operation station(NOS) and communication bus. The network communication adapts RS485 bus protocol. The station computer sends down various configuration commands and parameters. LMU acquires the monitoring data and store the data in the RAM. In the situation of communicating with the station computer, LMU sends data to it if there is a command from the NOS for data retrieving requirement.
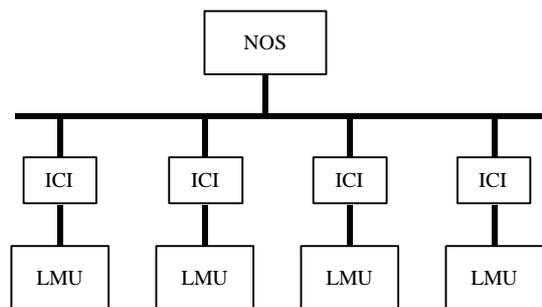

Fig.1 – AUTO-3000 system network structure.

As shown in Fig.1, all the connected LMU share the communication bus and sign themselves with an exclusive address. The intelligent communication interface checks the address and decides whether the network data broadcasting in the network bus should be received or not.

3.IMPLEMENTATION

As shown in Fig.2, this intelligent communication interface has the common functions as general Local M&C units: it translates the I/O parallel data in LMU internal bus into serial data, then converts these TTL data into RS232/485 level. RS485 level is applied in distance transmission, RS232 in field order.

Aiming at large scale distributed systems, the intelligent concept is brought into the design of communication interface. An on-board processor is used to control the LMU identification and manage the system communication. It receives all the information broadcasting in the system bus and analyses it. At first it only gets the number in the broadcasting information and compares it with its LMU

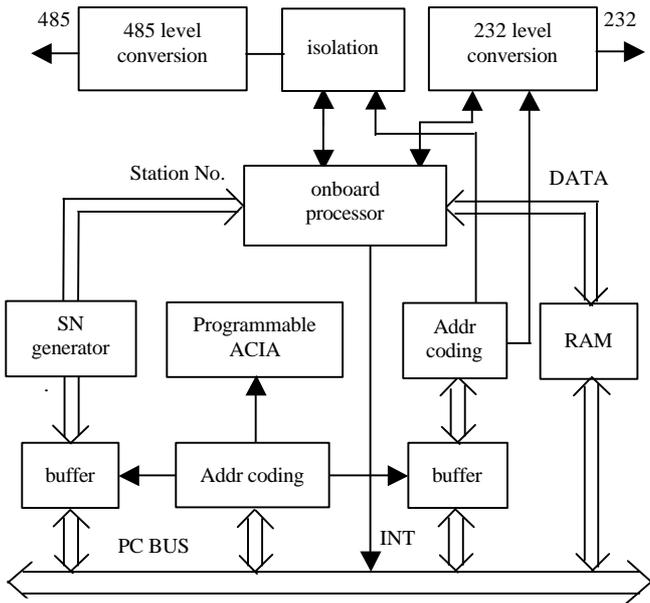address. If the two numbers are the same, that means that

Fig 2. Function Frame of the Intelligent Communication Interface

the information is sending to current LMU, the data can pass through the interface and enter into LMU internal parts to be processed. The process and the information in bus never affect other LMUs. The role of safeguard that the interface plays makes system operation safely. It also makes the structure of the system clear and reasonable.

The code leakage in data communication may occur while upper computer orders data but the LMU is running its monitoring program. Because LMU's processor can not run monitoring program and receive information at the same time, it may result code mistake especially at the situation of high-speed communication. The solution in this paper is building up a RAM area in the communication card. This RAM area is shared by both intelligent interface and LMU. It is used to store communication data that passes through the interface so that LMU can read it after its monitoring period. In this way, the conflict between the monitoring and communication may be solved.

In most engineering projects, a lot of complicated situation like high common voltage, lightning etc may appear, which may damage the devices and system. The intelligent interface includes a RS232—RS485 converter. Optical-electrical isolation technology is employed in the level conversion that protects devices from the possible attack. At the same time, the redundancy technology is adopted. Obviously, add the extra standby level conversion circuit makes the system become more reliable and usable.

In addition to the above, the function of communication card can be expanded. The processor onboard can response some configuration commands, analyze and preprocess the network data. All these methods enhance the intelligence

feature of the interface card.

4. SOFTWARE

The communication program is shown in fig.3 and fig.4. In the beginning, the onboard processor initializes its
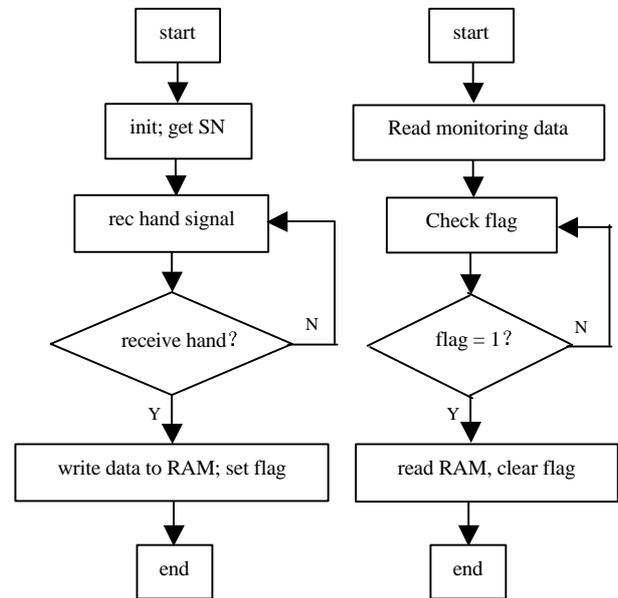

Fig 3. onboard processor program   Fig 4. LMU main program

inner registers, specifies the communication protocol and reads the current station number. Once the data's destination is current LMU, they are written into shared RAM area and wait to be read by LMU's main program. When LMU detects the flag goes high which means the RAM area is not empty, it reads the RAM after the current monitoring period and clear the flag.

5. SUMMARY

This intelligent communication interface has been used in AUTO-3000 distributed dam safety monitoring system successfully. Since the complete isolation and redundancy technology is applied, the system resists heavy disturbance and be prevented from damage of lightning. The intelligent concept is introduced into the design of communication interface successfully, which harmonizes the synchronous work between field monitor and communication, thereby improves the performance of the whole system.

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