

# Remote Wireless Automatic Meter Reading System Based on GPRS

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**Abstract:** For reliability and real-time data transfer requirements of Automatic Meter Reading System(AMRS), we design a remote wireless automatic meter reading system based on GPRS to achieve data transmission between meter reading terminal and the main station. System is easy to install, reliable and rapid for data transmission. when the bill payment is delayed meter connection is automatically disconnected.

**Keywords:** automatic meter reading (AMR): wireless Network: GPRS: TCP I/P protocol

## 1. INTRODUCTION

With the rapid progress of mobile communications technology and the deepening reform of the electricity market, more and more information collection instrument was introduced into the production and livelihood. Only if realize the accurate, real-time, low cost of information collection and control for meter, operators can gain a competitive advantage in the industry[ 1]. Automatic meter reading system (AMRS) is an integrated technology to automatically collect and process by special equipment to meter with the use of telecommunications, computer technology. It greatly saves manpower, material resources, reduce labor intensity, while ensure real-time meter reading and to avoid errors caused by manual meter reading.

## 2. GPRS NETWORK ARCHITECTURE

GPRS network is an increase in the existing GSM network, GGSN and SGSN to send and receive packet mode data, and take into account the network smoothly the transmute to 3G. The system network architecture shown in Figure 1.

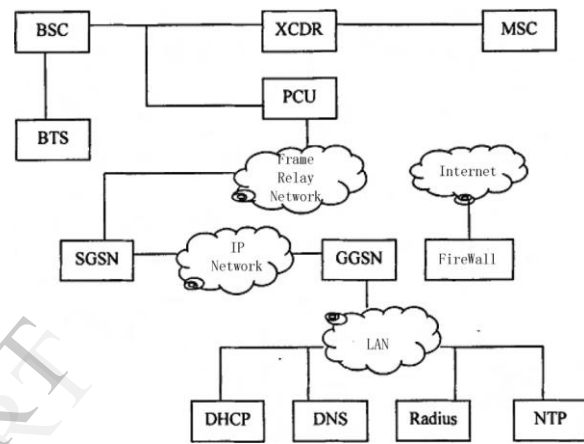


Figure 1. GPRS network structure

There are two GPRS packet network node: GPRS Service node (SGSN) and GPRS gateway node (GGSN). GPRS SGSN is responsible for user mobility management, user access, send and receive short messages, packet data forwarding; GGSN is responsible for forwarding user data to other data networks through the Gi interface[2]. Brief summary, the newly introduced wireless network elements of GPRS system can be divided into the wireless part and data part. Which, PCU is part of wireless management, SGSN is common part of wireless management and data management, GGSN is entirely part of data management section. Although a number of other ancillary units are not given in the definition of GPRS system, but essential in the data network, which is part of GPRS network, such as Domain Name Server (DNS), Dynamic Address Allocation Server (DHCP), Network Time Protocol Server (NTP), Authentication and Radius Authentication Server.

### 3. SYSTEM HARDWARE DESIGN

According to the functional design requirements. The wireless remote automatic meter reading system is divided into the following sections: Meter pulse acquisition system (hereinafter referred to as collectors). for capturing and storing the number of pulses; Meter data concentrator (referred to as concentrator) for the regular collection of meter data collector pulse and sending data through the GPRS module to the remote PC data server; GPRS module, for wireless data communications between Meter data collection system and remote data server PC; Remote PC data server (referred to as PC data server)for receiving and processing all the meter data to achieve power level query, real-time power analysis and other services. System block diagram shown in Figure 2.

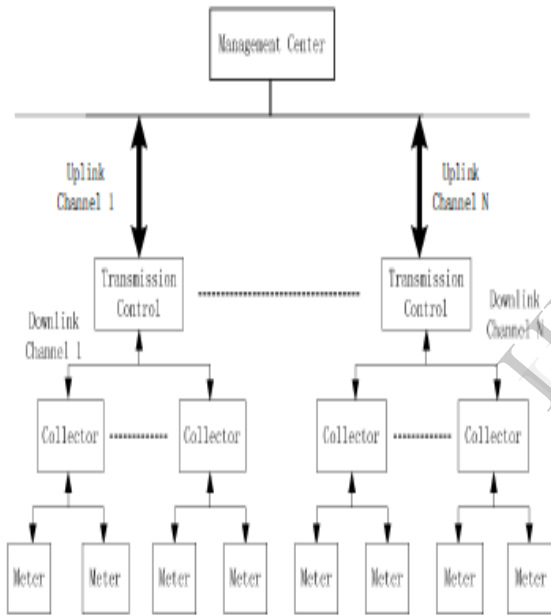


Figure 2. Meter Reading System

In summary, communication is the key to automatic meter reading technology. Therefore, the choice is mainly the choice of means of communication.

In automatic meter reading system, the underlying proximal communication, namely, data collecting and communication between the centralized controller, due to the small amount of data and structure is simple, should be through the RS-485 connection. Because the requirements of the wireless remote meter reading system is a real-time, two-way data transfer, and GPRS data traffic communication is billed, the upper remote communications used in this always-on mode, that is, GPRS module Actively connected to lower computer

terminal after launch control center, and to smoothly maintain the link to ensure the normal communication in the future [3].

To ensure the system's data processing capabilities and to meet future system expansion. The system adopts a centralized AT9 1 RM9200 chip. It is a 32-bit ARM7TDMI-S Microprocessor core with high computing power. Meanwhile, meet the system functional requirements.

The chip can be set the following parameters by remote or local communication port: the communication-related parameters between the main station and the concentrator; meter reading program; line loss and alarm type parameter; measuring meter parameters, including the summary meter, meter, common meter; cascade Parameters.

GPRS uplink communication uses a Sony GR47 series of modules, which is an advanced wireless module with a full set of GSM / GPRS voice and data features. Its ultra-small size - all functions are concentrated in an integrated chip (only 50 x 33 x 7.2 mm); the most convenient development-embedded TCP/IP protocol stack, allows the user to the greatest degree of shortening GPRS product development cycle[4].

GPRS interface circuit shown in Figure 3

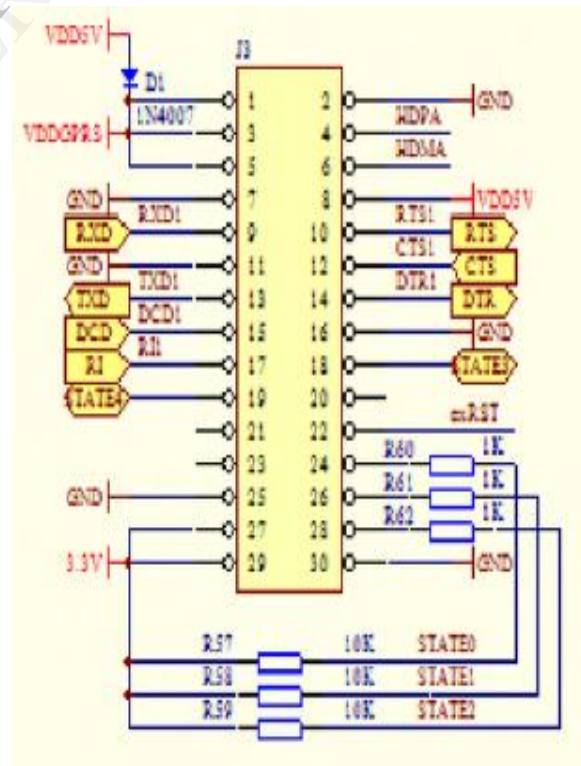


Figure 3. GPRS interface circuit

Overall hardware system is shown in Figure 4

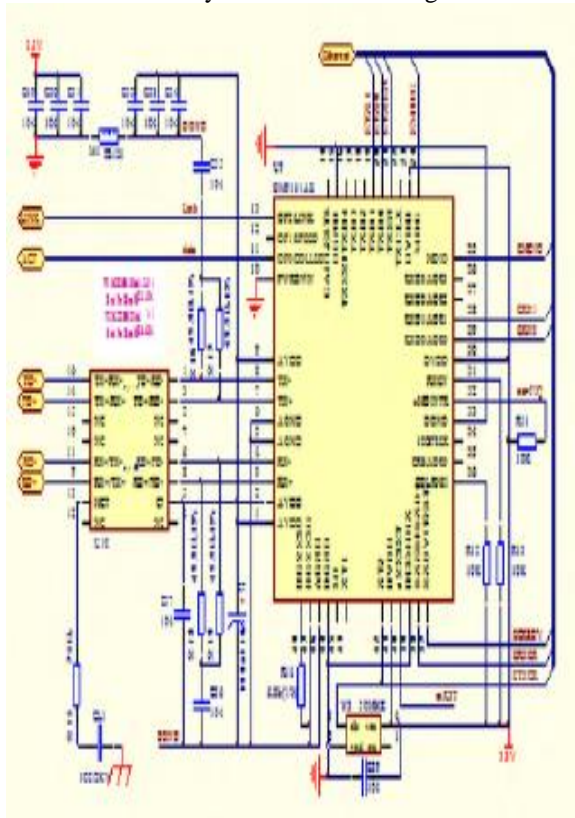


Figure 4. The Overall System Hardware Chart

#### 4. SYSTEM SOFTWARE DESIGN

System software design is based on windows XP operating system, using VC programming. Design steps are as follows:

1. Monitor Module: start/stop the server data services for GPRS collection terminal can have a fixed IP address with the server to send and receive TCP/IP data packet, the function prototype is `BOOL - stdcall DS Start Service (u16tuiListen-Port)`. This, GPRS for PPP dial-up, initiates TCP link to the application and sends a registration packet, the server center establish a TCP link. After this application.

2. Transmit module: This module can send control commands to the specified GPRS data collection terminal such as collection terminal address setting, the terminal voltage/current analog

parameters, etc... The function prototype is `BOOL-stdcall DSSendData (u32t mo-demId, U16t len, u8t * but)`.

3. Data processing module: GPRS collection terminal is divided into packets that are registration bag, heart bag and off-line package. According to the different types of packages, data processing function `BOOL-stdcall DSGetMo-demByPosition (u32t pos, ModemInfoStruct * pModemInfo)` can make different treatment, and then store the required information into the database.

4. The error processing module: The function prototype is `void-stdcall DS-GetLastError (char * str, int nMaxBufSize)`, which can be obtained the previous API error occurs through the implementation to help us make further processing.

#### 5.CONCLUSION

This design of remote automatic reading meter system is fast and highly reliable. The system, which connects to Internet through the GPRS network, can achieve reliable real-time data transmission; especially overcome the shortcomings of traditional transmission mode under a poor environment. when the bill payment is delayed meter connection is automatically disconnected.

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