The Design and Implementation of OPC Sever for 3G Industrial Network

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Abstract. This paper uses the idea of object-oriented software engineering to abstract field devices, variables, and the OPC tags of 3G industrial network as objects. And, it uses the theory of modular software engineering to design and implement OPC server for 3G industrial network. In order to accomplish the asynchronous communication of 3G network, event-based approach is used, and complete the data acquisition and write back of 3G industrial nodes. By the approach of using third-party dynamic link library, the processes of developing OPC sever are simplified, and help complete the development OPC server. After the validation of the standard OPC client-side, it suggested that the design and development of this OPC server meet the requirements of OPC specification.

Keywords: 3G Industrial Network, OPC Server, DLL.

1 Introduction

OPC technology is made and released by OPC Foundation, which is now one of the standard specification of data communication in industry network. OPC focus on the achievements of system integration and data exchange between hardware or software made by different manufacturers[1]. The OPC Specification contains OPC Data Access Server, OPC Alarms and Events server, OPC server and OPC Historical Data Access server volume. There mainly there methods of developing OPC server: using COM provided by the MFC to develop OPC server, using ATL to develop OPC server and using OPC development tools[2].

3G Industrial node consists of three parts: MU103 communication module, MSP430 processor module and traditional instruments. MSP430 MCU completes reading data from a traditional instrument and sent the date through MU103 module. MU103 can send data via both in SMS and TCP. The OPC server designed in this paper uses TCP protocol.

2 The System Architecture of OPC Server for 3G Industrial Network

The design of system architecture. In this paper, we develop the OPC server by using WTOPCSvr.dll. WTOPCSvr.dll provide us with a easy way of using API
functions to construct OPC data item. In this way, all the details of COM and OPC specifications are encapsulated, developers only focus on the reading of field instrumentations and do not need to concern the implementation details of OPC interfaces. WTOPCSrv.dll plays as a database, 3G OPC server applications with the name and size of the structure marked and passed to the API function through the dynamic link library, dynamic link library record mark and construct OPC data item. The picture below shows 3G OPC server software architecture.

![3G OPC server system architecture](image)

**Fig. 1. 3G OPC server system architecture**

The design of 3G OPC takes the client-server communication model, and the software system architecture includes an OPC client, OPC server and 3G industrial device notes. The data communication between OPC client and OPC server, OPC server and industrial device notes are on the basis of TCP/IP. The data source serves as OPC server, and it is responsible for providing the data used by the client, and the client is the user of these data. 3G OPC server contains three COM objects: 3G OPCServer objects, 3G OPCGroup objects and 3G OPCItem objects. OPCServer object provides a way of accessing the source data, and served as the container of 3G OPCGroup objects. 3G OPCGroup object provides the function of manipulating 3G OPCGroup objects for the OPC clients, and provides interfaces through IOPCServer and IOPCBrowseServerAddress. 3G OPCItem object is at the bottom layer of the OPC model, and is included in the OPCGroup object. Each 3G OPCItem corresponds to a specific 3G industrial device monitoring data node[3].

**The design of software architecture.** OPC server software architecture can be divided into two parts: the first part is responsible for creating OPC, OPCItem queue management and updating data; the other part is responsible for reading and writing data through TCP/IP communication, by using listening and communicating Sockets to complete the design of 3G industrial nodes, and the data communication with the industrial nodes, as well as the write-back operation for the client.