

# The Application of Input Electronic Information System in Communication Satellite Platform

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**Abstract:** The communication satellite platform can simulate the satellite communication link completely, and can effectively analyze the anti-interference ability of the satellite communication system, so as to reduce the number of field tests, accelerate the research and development cycle and save hardware resources. The function of communication satellite platform has great influence on the overall technical level of communication satellite. The main tasks of electronic information system include data processing, satellite management, power supply and distribution management, Autonomous Fault handling, etc. It plays a key role in the control and management of satellite information flow. It is an intelligent system for autonomous management and control of satellites, and also a bridge for communication management between satellites and ground, satellites and satellites. With the application of the new electronic information system in the communication satellite platform, China's communication platform has made significant progress in terms of system integration, expansion capability and emergency processing capability, from optimizing the electronic platform structure of the satellite platform and strengthening the development of the public platform. In other respects, suggestions were made.

## 1. Introduction

One of the most important systems in the communication satellite platform is the on-board electronic information system, which includes many functions such as remote control test, data and satellite management, orbit control, antenna mechanism control, effective load control [1]. Because of the outstanding advantages of satellite communication, the world's major economic powers are developing various satellite communication systems. Almost all countries and regions in the world are using satellite communication. Countries with large territory have their own domestic dedicated communication satellites. At present, most of the satellite communication systems used are geosynchronous orbit communication satellites. The communication capacity has been significantly increased, and the transmission power requirement for the earth station has been reduced. The signal intensity of the earth station has been significantly improved. The quality of the received television image has been greatly improved, and the transmission quality has exceeded the "international communication satellite" leased at that time [2]. Protocol analysis, information distribution, priority control, queue management, and information security provide a unified information input and output interface and transparent transmission and service for business application software [3]. Provide standard bus interface and electrical interface to realize central computer control, telemetry parameter acquisition, remote command output, primary power distribution, pyrotechnics management, antenna control, load control, energy control, temperature control, and sensor for satellite platform electronic system Integrated service functions such as interfaces and actuator interfaces. It is also a system for information synthesis and functional integration of dense and complex on-board electronic equipment in harsh space environments [4].

Because of the particularity of the electronic information system equipment function, there is no general integrated chip in the market which can be directly used. Therefore, in the process of developing the electronic information system of the new generation of domestic telecommunication satellite platform, we are based on the existing radiation hardening technology [5]. At present, the electronic information system of communication satellite still has the disadvantages of many platform states, many product states and weak system scalability. The design and technical status of

the control subsystem and data management subsystem of communication satellite based on the second and third generation platforms often need to be changed according to the task requirements [6]. Through the updating and upgrading of the communication satellite platform, the on-board electronic information system of the major international communication satellite platforms has basically realized the system topology based on the standard bus, which has strong compatibility and expandability; A unified computer is used to accomplish various tasks [7]. The switching service layer completes the information format conversion, the exchange protocol encapsulation according to the channel requirements or the agreement with the receiver, and transfers the exchange service layer information to the transmission service. The spread spectrum code module is used to realize the spreading of the baseband digital signal, and the spreading code is selected as the sequence, and the spreading code generating module passes through the linear shift register. Satellite segments are sent into orbit and then rendezvous and docked in orbit; another approach is to develop under existing vehicle-to-satellite size and weight constraints [8].

## **2. Materials and Methods**

The satellite adopts a new idea of overall design, assembly and test, which puts forward high standard requirements for subsystems, and overcomes many key technologies to make its payload capability. The attitude measurement, remote control, tracking and ranging of satellite operation and bus management of on-board system are all accomplished by the spacecraft computer. The spacecraft computer has a high-performance processor and RAM area. In addition, the computer is equipped with power protection device and data memory of security mode, which can ensure the storage of data in case of system and platform accidents. The research on standard bus selection, information flow and control flow protocols of the system information system can greatly improve the engineering flexibility of the system without sacrificing or even improving the sensitivity and dynamic range of the system, and greatly reduce the quality, volume and power consumption. The grounding point of each device in the electronic system is directly connected to the grounding bus closest to him. The advantage is that the grounding wire is short, which greatly reduces the high frequency impedance. The transparent multi-protocol encapsulation and parsing process is mainly implemented in the upper layer information security processing software (such as encryption processing) or on the channel-related level, completes format conversion in the exchange service layer, encapsulation and parsing of the exchange protocol, and completes the transmission protocol in the transport service layer. Encapsulation and parsing.

With the increasing power demand of communication satellites, the output power of solar arrays should be increased while the capacity of storage batteries should be increased accordingly. In the early days of satellite, Ni-Sn batteries were used as rechargeable and dischargeable batteries. Through the data simulation platform, satellite communication links can be simulated completely, and the anti-interference ability of satellite communication system can be effectively analyzed, so as to reduce the number of field tests, accelerate the development cycle and save hardware resources. Therefore, it can be used for various satellites with different payloads in a certain range of mass and power consumption. It realizes the batch production of satellite, has high reliability, and shortens the development cycle of satellite. Serial communication, instruction drive, data acquisition, DC-DC module and other fields greatly reduce the quality and volume of single computer, improve the reliability and optimize the information flow of electronic information system. Deliver the remaining information to the exchange service layer. The switching service layer parses its switching protocol according to channel requirements or conventions, completes the format conversion, and distributes the information to the corresponding service processing software. The data bus network is connected to the satellite management and other electronic devices of the platform through the data interface unit of the platform. The payload data of the communication cabin is connected to the satellite management unit and the payload device to realize the control of the satellite running track and the heat to the platform. Control and control of the power system.

Strengthen the optimization design of the electronic information system, combine the functions of the system appropriately, and improve the efficiency of resource utilization; Strengthen the

development of the public part of the platform, according to the trend and demand of the future development of communication satellites. The remote terminal transmits data and adopts full backup mode. Each remote terminal is connected with the main and standby two remote unit interfaces through different transceivers, which effectively prevents high level noise voltage from appearing on the cable shield. In addition, due to the skin effect of high frequency, the noise current flows only on the outer surface of the shield, while the signal flows only in the inner layer of the conductor, and the mutual interference is minimized. At the same time, traffic control is adopted. When information enters the queue, new information replaces old information in time, eliminates the old information which has been queued too long and lost its use value in the buffer, and extracts information from the queue to send when it has transmission conditions. Effective information transmission is shown in Table 1. The unified mechanical interface is adopted, and the internal information transmission of the device is realized through the standard secondary bus interface of the backplane, thereby ensuring the device to be easily modularized, integrated, assembled and debugged. The biggest benefit of using a cross-twisted heat sink is that it reduces the heat sink area of the north and south radiators required for the payload. Thereby reducing the size and weight of the satellite.

Table 1 Effective Information Sending

	Output	Measure
Medium priority	11.30±0.21	10.72±0.12
High priority	12.02±0.27	10.35±0.31
Most priority	11.08±0.29	10.71±0.45

### 3. Result Analysis and Discussion

Many electronic equipments in satellite, such as all kinds of sensor components and sensors, are connected to the bus through the internal remote terminal. Data and information of all kinds of devices are collected and stored through the bus, and control instructions of the system are transmitted to each terminal device through the bus. After the shield layer is grounded, the interference current is short-circuited to the ground through the shield layer. Therefore, the proper grounding of shielding is very important, otherwise it can not reduce the interference, but will increase the interference. For a long message requiring reliable transmission, if the transmission of a data packet fails, only the packet can be retransmitted. The use of long message packet transmission can greatly improve the efficiency and reliability of long message transmission, and embodies the superiority of long message packet transmission. However, with the increasing load capacity of communication satellites, the number of switches has increased sharply, and the burden of components and cable networks brought by single-channel measurement circuits has made the satellite platform electronic system unbearable.

Research departments should vigorously carry out research on the selection of standard bus and information flow of system information, and formulate and establish reasonable bus redundancy backup strategy according to satellite mission requirements. In the design of electronic products, a lot of integrated electronic technologies such as FPGA and ASIC are used to realize platform weight reduction, and the burden and cost of long-term on-orbit management of satellites are reduced by continuously improving the system's autonomy and security design. These improvements make the platform longer in life and higher in control accuracy. According to the current situation of communication resources and business transmission requirements, real-time transmission capability matching, automatic allocation of communication resources, to ensure the real-time and reliability of end-to-end transmission of information. Large communication satellite platforms use electric propulsion technology to save satellite weight. The principle of electric propulsion is to convert the propellant into kinetic energy (high temperature and high velocity jet gas) in the electric thruster by using the power of the satellite power source. The goal of autonomous fault management of communication satellite platform is to realize information injection and control independent of the outside world, or to rely on external control as little as possible to accurately sense its own state and

external environment, and to detect faults and faults autonomously based on such information. Isolation and recovery.

In terms of modularization and interface standardization of electronic equipment, there is a big gap between communication satellites, and customized interfaces and customized functions still exist widely. During the separation of the satellite from the launch vehicle, the solar wing is deployed and the concentrator is deployed at the same time. The concentrator reflects the solar energy onto the solar cell, which is equivalent to increasing the solar constant, thus increasing the solar cell power generation (current). The satellite uses the on-board data management system, which can automatically control the working temperature of normal equipment on the satellite and manage the charging and discharging of batteries. The satellite is equipped with V-type momentum wheel control system and on-board computer, which can provide higher attitude and orbit control accuracy. The remarkable advantage of matrix instruction drive circuit is to save the drive circuit and reduce the quality of cable network. In the case of using high power MOS transistors, matrix instructions can directly drive high power load devices such as radio frequency switches and relays. At this stage, the electronic information system platform status and product status of the communication satellite are many, and the system's scalability is not strong. In actual use, the system is often redesigned according to the demand changes, resulting in the platform development cycle. extend. After receiving the information, the recipient retains the required information and discards other information. The purpose of this method is mainly to save channel resources and to balance the relatively limited channel resources with the relatively large information transmission requirements.

#### **4. Conclusion**

In this paper, the application of access electronic information system in communication satellite platform is studied. With the development of information technology and the improvement of communication technology, the electronic information system of communication satellite represents the overall level of the development of communication satellite and its future application prospects. The network transmission control service software must form a general information transmission platform with expandable and tailorable functions and easy access to all kinds of systems. The next step will take this as a starting point, continue to study various advanced technologies, combined with the characteristics and needs of electronic information systems. New large satellite platforms developed for orbital communication satellites and ground imaging satellites use many new technologies, such as electric propulsion technology, network heat pipe and deployable radiator, lithium ion batteries and three-junction gallium arsenide batteries. The communication satellite platform electronic information system has reached the international advanced level in the fields of system architecture design, integration degree, reliability, fault handling, mass volume and power consumption, and has strong applicability and scalability. Effectively analyze the anti-interference ability of the satellite communication system, thereby reducing the number of field experiments, speeding up the research and development cycle, and saving hardware resources. Strengthening the research on satellite technology and improving related research and development capabilities are of great significance for the development of the communications satellite industry and the improvement of the overall level and strength of space technology.

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