Research on TMS-based Business Channel Bearing Compilation

Lixia Zhang*, Mengxi Yu and Honglin Xue
State Grid Shanxi electric power company information communication branch, Taiyuan, 030021, China

*Corresponding author: lixia_zhang@sgcc.com.cn

Abstract. This article is based on a comprehensive analysis of application bearing work methods and specific business models according to various types of power grid transmission services. For different application methods of power grid transmission services on each service transmission network and data transmission to the service network channel bearing work the way of analysis is different. Based on the security level of the power grid transmission service, the method of carrying the service transmission channel network, the method of carrying the service transmission network, the direction and flow of the service, this paper analyzes the way of carrying the channel on the business network.

Keywords: Power communication, planning, TMS.

1. Introduction
The power communication transmission network planning is an estimation and planning decision made on the planning development goals and planning implementation steps of the power communication transmission network in the future for a long period of time. It includes time, space, goals, steps, equipment and technology. And the six basic aspects of cost make a reasonable business planning arrangement and strategic estimate for future development. Usually planning is based on the nodes of the known network, predicting the changes and distribution of business scale and traffic between the nodes in the next few years, and seeking a cost-effective power communication network management structure to effectively manage and transmit the business of these nodes. According to the different design methods of transmission network planning and the business indicators used in the planning, it can be divided into qualitative transmission network planning and quantitative transmission planning. Quantitative transmission network planning generally requires accurately giving the business indicators that each node should reach at the end of the planning period, including relatively stable and static stability indicators, such as network topology, equipment size, number of circuits that can be continuously opened, equipment investment, etc.; Can also include relatively dynamic technical indicators, such as the number of network services, comprehensive utilization of resources, availability and so on. Qualitative network planning mainly analyzes development trends, technology trends, network evolution, life cycle, economic benefits, social benefits, and some deep-level problems. These deep-level problems are difficult to fully quantify, but they are different from traditional quantitative network planning. Compared with it, qualitative network planning involves a
wider area and a higher level of comprehensive consideration. It is more difficult for the planners to directly request a wider knowledge, so it is more difficult to make qualitative planning.

The optimization of the communication transmission network means that on the basis of fully guaranteeing the investment in the original communication transmission network, through the basic grasp and analysis of the existing network and business, the network optimization plan is proposed and implemented to better to achieve sustainable development of high-quality network utilization and business scale. Strictly speaking, the technology of communication transmission network planning and optimization is to thoroughly analyze the current status of the existing communication transmission network and the model of the communication transmission business to meet the actual needs of the sustainable development of the communication transmission business. Most of the communication transmission network optimization schemes are individual comprehensive optimizations of the key elements of the basic structure and composition of individual networks, and they are completely solved by adjusting their parts and changing the data resource configuration according to the specific existing network conditions. The fundamental problem of one aspect or several aspects of the network is often not comprehensive and thorough enough, and even causes continuous adjustment of the network.

2. Grid business security level analysis

Before the specific business bearer network model, various services need to be subdivided according to the security level. According to the provisions of the "General Plan for the Safety Protection of the Secondary Power System", the security level of the power grid business is divided into first, second, third, and fourth levels. The business characteristics and coverage of each level are as follows:

(a) The first-level security level business mainly refers to EMS, security business, line protection, PMU and other production control business. The business in this area has the characteristics of high real-time, low bit error rate and low flow requirements.

(b) The secondary security level business mainly refers to non-control production business such as dispatching telephone, EA, power market, protection management information system, etc. The business in this area is a quasi-real-time business, which has the characteristics of small flow and reliable reliability.

(c) The three-level security level business mainly refers to auxiliary services such as image monitoring, computer room monitoring, network management system, lightning positioning, hydrological system, optical cable monitoring and other production services. The large flow of business in this area belongs to the even-flow business.

(d) The four-level security level business mainly refers to information management services such as administrative telephone, conference TV, and various management information systems. The business in this area has the characteristics of large flow and strong suddenness.

3. Analysis of the load-bearing mode of power grid business channels

Previously, the channel bearing methods of various power grid services mainly used TDM interface (E1) and IP data interface (FE). According to the security level of the service, in order to ensure the redundancy and reliability of the channel used by the business, the same service can be carried in the same way. Use one or both of them at the same time. According to the results of the analysis of the power grid communication business and its transmission network security level, it is concluded that the current data channel bearing application methods of various types of power communication services in China include the following four types:

(a) Stable mobile communication system, line security protection, dispatching administrative service calls, conference broadcast TV data channel bearing application method is two E1 dedicated line data channels;

(b) EMS, PMU, and EAS services use one E1 dedicated line data channel and one channel carried by the scheduled data network called IP dedicated line data channel;
(c) The administrative telephone service uses one E1 dedicated line data channel or one IP data channel;
(d) Other data services in security zone two, other data services in security zone three, multimedia services, and other data services in security zone W use IP dedicated line data channels to carry data services.

4. Analysis of Power Grid Business Bearing Mode in Transmission Network

In order to clarify the overall bearer application mode of the transmission network of various power grid communication services, it is necessary to further combine the various bearer application methods of the grid communication service in the specific grid communication service program-controlled switching network or transmission network, as well as the power communication service program-controlled switching network and The relationship between various bearing modes of the transmission network is analyzed:

(a) Voice data communication service: Generally, the voice of the program-controlled data exchange transmission network is used to carry the service. According to the current status of the voice service channel of the power communication network in China, the main bearer of the voice data communication service includes dispatching administrative service calls and other administrative service calls. Among them, dispatching phones are currently mainly carried by two bearing methods. One type is to directly enter the superior dispatching agency after multiplexing of PCM. This type is mainly used in 500kV sites and some power plants, and the other is to enter various places after multiplexing of PCM. Tune, after the exchange of the switch in the voice path, through the local switch to the middle transfer, this type is mainly used in 0kV sites and some power plants. The two transfer methods for dispatching telephones should be carried on two different networks. For administrative telephones, which belong to management services, they only need to carry one transmission carrying platform.

(b) Data services: According to the overall requirements of security protection, the line protection and security system services in the security zone I should be directly carried through the M transmission line of the communication transmission network. Some of the line protection services can also be directly carried using dedicated line fiber; in the security zone I the PMU will use IP and dedicated lines for transmission. In addition to EAS still retaining the PCM multiplexing transmission method, the data services of the safety zone II will be carried on the dispatching data network. All data services in the safety zone III and the safety zone IV safety zone will be transmitted through the use of an integrated data network.

(c) Multimedia service: Due to the importance of the conference system, this service should also be carried on two different transmission planes. Based on the above analysis, for various types of services, the bearing relationship between the service network and the transmission network is shown in Table 1:
Table 1. Business bearing relationship analysis table.

| Business security level | Business application layer | business name                | Service carrying method | Business network layer          | Whether to carry two planes at the same time |
|-------------------------|----------------------------|------------------------------|-------------------------|---------------------------------|---------------------------------------------|
| zone 1                  | Data service               | EMS                          | IP(POS)                 | Dispatch Data Network           | N                                          |
| zone 1                  | Data service               | General EMS                  | E1                      |                                  | N                                          |
| zone 1                  | Data service               | Safety system                | E1+E1                   |                                  | Y                                          |
| zone 1                  | Data service               | PMU system                   | E1                      |                                  | N                                          |
| zone 1                  | Data service               | Line protection              | IP(POS)                 |                                  | Y                                          |
| zone 2                  | Data service               | EAS                          | E1(A network)+E1(B network) | Dispatch Data Network           | N                                          |
| zone 2                  | Data service               | Protection Management Information System | IP(POS/MSTP) | Dispatch Data Network           | N                                          |
| zone 2                  | Data service               | Dispatch phone               | EI                      |                                  | N                                          |
| zone 3                  | Multimedia services        | Electricity Market           | IP(POS)                 | Dispatch switching network      | N                                          |
| zone 3                  | Multimedia services        | Total dispatch electricity market | EI                      | Dispatch Data Network           | N                                          |
| zone 3                  | Data service               | Image Insight System         | IP(POS/MSTP)            |                                  | N                                          |
| zone 3                  | Data service               | Environmental monitoring system | IP(POS)                 | Integrated data network         | N                                          |
| zone 3                  | Data service               | Network management system    | IP(POS)                 | Integrated data network         | N                                          |
| zone 4                  | Voice service              | Lightning detection and positioning system | IP(POS)                 |                                  | N                                          |
| zone 4                  | Multimedia services        | Hydrological Information System | EI                      | Administrative Exchange         | Y                                          |

According to Table 1, the overall service bearing situation is graphically presented as shown in Figure 1:
Figure 1. The bearing relationship of the service channel on the service network and the transmission network.

5. Grid business flow demand analysis
Business demand is a key issue in network planning. The previous analysis of the flow of business can understand the business interaction requirements between various types of network elements in the power communication transmission network. The formation of specific planning principles also needs to analyze the traffic demand of the business to clarify the bandwidth allocation method of the transmission network to the business network.

With the launch of various types of power grid services, the current power communications transmission network presents a trend of multi-service carrying. At the same time, the bandwidth required for various services is not the same, generally based on E1 and VC4 level transmission channels. Among them, high-security services such as relay protection and security systems require SNCP protection because of the high reliability requirements of the channel, so that the transmission channel they occupy is the same rate level without the need to open the service channel of the protection function double.

6. Conclusion
This article analyzes and summarizes from the aspects of power grid business security level, business channel bearing mode, business network bearing mode, transmission network bearing mode, business flow and flow, etc., and provides the main reference basis for subsequent organization of transmission channel resource planning and arrangement.

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Research on intelligent auxiliary analysis technology of communication operation mode.
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