

Research and Application on the Reliability of PTN Electric Power Communication Network Security Isolation

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Abstract: Along with the development of intelligent electric grid, the access of communication service bring a new challenge to the distribution network communication system, so an integrated communication system is necessary to support channel segregation for carrying a variety of service. In this paper, the PTN security isolation mechanism such as PTN tunnel layer physical isolation, SVLAN business layer logic isolation and interface segregation between information network and communication network was analyzed. By building PTN security isolation simulation experiment network we analyze and judge whether PTN has similar security isolation reliability with SDH network. The security isolation strategy of PTN electric power communication network, interface safety segregation between information network and communication network were formulated.

Introduction

In traditional SDH communication transmission system, the basic business unit which based on 2 Mbps is using circuit time slot reusing and time slot switching to realize the business transfer. MSTP system which is based on SDH transmission platform can carry a variety of business, but this technology which is based on TDM kernel has complex configuration, low efficiency and poor flexibility when bearing IP group business. In order to realize the efficient load on the upper service, it is necessary to build a new generation of service transmission platform. PTN (Packet Transport Network, Packet transmission Network) technology meets the new needs of electric power communication Network. PTN is a kind of general cross technology which is block-oriented, it has the advantages of SDH/MSTP transmission network such as good scalability, rich operation and maintenance function and fast protection switching, at the same time it also increases many suitable characteristics for data service transmission such as packet switching, statistical multiplexing, connection-oriented label switching, grouping QoS mechanism and control surface flexible. PTN technology supports for multiple two-way point-to-point connection channels which are based on the Packet Switching Service[1-2]. PTN is suitable for all kinds of coarse and fine particle service and end-to-end network; It also provides a "soft" transmission pipeline which is better suite to IP business characteristic[3-4]. The protection switching of the point-to-point connection channel can be done in 50 milliseconds.

In this paper, we study and analyze PTN security isolation mechanism such as PTN tunnel layer physical isolation, SVLAN business layer logic isolation and interface segregation between information network and communication network. By building PTN security isolation simulation experiment network we analyze and judge whether PTN has similar security isolation reliability with SDH network and formulate PTN electric power communication network different safety zones' security isolation strategy, the same safety zone's security isolation strategy, interface safety

segregation between information network and communication network and the way to evaluate security isolation reliable.

The Key Technique Of PTN

PTN is a plane between IP service and the underlying optical transmission, it puts packet services as the core. It supports for multiple two-way point-to-point connections channel which is based on packet switching. PTN is suitable for various thicknesses services and has the capacity to realize end-to-end network. Provides a more "flexible" transmission pipeline which is suitable for IP services characteristics, as shown in Fig.1. At the same time takes traditional advantages of the optical transmission telecom network including high availability and reliability, efficient bandwidth management mechanism and traffic engineering, convenient OAM and network management, scalability, high security [5].

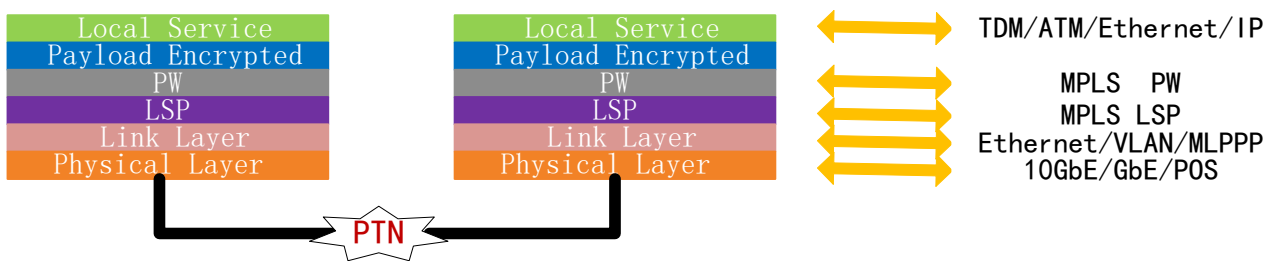


Figure1 PTN protocol encapsulation model

PTN is TDM, Ethernet business transmission technology, its basis bandwidth can be $n \times 2$ mbit/s according to the business information, also can be $N \times 64$ kbit/s particles timely dilatancy link according to the increase of network traffic [6]. PTN implements multiple QoS technology to avoid network congestion, ensure business arrived quickly. Using PTN LSP/PW channel implement physical isolation between the business through E (V) P-Line, E (V) P-LAN, E(V) P - TREE. Different safety zone business use port + VLAN for identification and isolation and ensure mutual un-interference between the same business and different business. PTN technology also can access authentication which can satisfy the complex security isolation requirement of communication network.

Service Application

PTN should be mainly solved: multi-service transport which is based on packet switching, ground time synchronization service.

Multi-service transport which is based on packet switching. Existing rigid SDH/MSTP network model is difficult to meet the large bandwidth, high elasticity, end-to-end quality and the future demand for electric power business because of IP-based and Diversification of Electric power business. To establish a unified business platform which based on the grouping has become the trend of electric power communication network.

Packet transport network (PTN) sets up a level between IP business and the underlying optical transmission medium. It is designed according to the sudden of grouping business flow and the requirement of statistical multiplexing transmission, supports multi-service, has a lower total cost of ownership (TCO) and at the same time takes the traditional advantages of optical transmission, including high availability and reliability, efficient bandwidth management mechanism and traffic engineering, convenient OAM and network management, extensibility, high security.

Ground time synchronization service. Substation providing time benchmark for measurement and control device, protection device has been widely used the U.S. global positioning system (GPS), so there is a reliance on GPS. Only relying on the air of GPS time synchronization system is not safe, installs difficult, has high cost. But SDH optical communication system can't handle 1588 v2 precise time synchronization protocol.

Implementing Scheme

Investigation on the problem in practical work such as Security isolation theory analysis, Design security isolation experiment network and Testing Scheme, Analysis and summary test data, design safety isolation strategy, making PTN network security isolation evaluation methods by adopting the technical route of theoretical research and practice combination. Project implementation is divided into four stages:

Theoretical analysis. Research PTN security isolation mechanism, analysis the reliability of PTN security isolation technology, determine the application scope of PTN power business from three aspects: PTN tunnel layer physical isolation, SVLAN business logic isolation, information network and communication network interface segregation.

Design experiment Network and test scheme. Determine PTN experiment network topology structure, business organization, circuit allocation, equipment and instrumentation. Formulate PTN experiment network design scheme. Study and establish PTN experiment network test scheme. Put the validation of different safety zone and the same safety zone business isolation principle and actual effect as the key.

Test experimental network in laboratory. Formulate and verify PTN packet transport network general design principles, channel security isolation strategy, end-to-end quality assurance strategy, network protect rearrangement strategy, operations, maintenance and management principles. Formulate and verify packet transport network (PTN) communication system security isolation quality evaluation method.

Test experimental network On the Internet. Allocate actual electric power business, actual opening and running test network, actual verification experiment network security isolation reliability and QoS performance of different safety zone and the same safety zone. Verify security isolation quality evaluation method of PTN communication network.

Conclusion

SDH network cannot meet the demand of business growth, but PTN network can solve the problem. Considering the current and long-term investment benefit, building PTN is better than comprehensive reforming SDH equipment; PTN networking capability is strong, OAM function is powerful, optical fiber resource utilization is high, construction cost is low comparing with router networking.

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