

The Jiangxi e-government Initiative: Provisioning MPLS for Government and Public Online Services

Customer:

The government of Jiangxi Province

Challenge:

To implement a province-wide mission-critical infrastructure allowing secure and fault-tolerant communications between government departments, and deploying public online services for tens of millions of residents

Objectives:

- Implement a robust network for mission-critical internal government communications
- Allow flexibility for provisioning a wide variety of public online services
- Ensure high security measures to protect sensitive traffic and other digital resources
- Utilize open-standards to maximize interoperability of systems
- Future-proof network to facilitate extension into Infranet infrastructure
- Minimize total cost of ownership including administrative and footprint overhead

Solution:

Deploy Juniper Networks M10 and M5 routing platforms in a redundant, double-star topology to connect over 100 government departments

Benefits:

- Fault-tolerant design ensures non-stop operation for mission-critical services
- Integrated security measures protect digital assets
- Open-standards support ensures options for new services, and migration path to Infranet concept
- ASIC-based hardware delivers high-performance with stability and scalability
- Network aggregation ensures smaller footprint and lowered ongoing maintenance overhead

Introduction

Located in the central region of the People's Republic of China, Jiangxi Province is home to some 41 million inhabitants and covers an area of more than 1.6 million square kilometers. The province is known as the "capital of porcelain" and today its city of Jingdezhen remains a major centre of ceramics production in the country.

Starting in 1999, the China government had been implementing "e-government" initiatives

throughout the nation. E-government encompasses a wide range of applications and services that facilitate inter-departmental communication and foster cooperation within the government. Public online services are also provisioned to provide interactive resources to citizens. A major goal of e-government is promoting improved interaction between the government and industry, and encouraging greater efficiency and cost savings throughout the country.

Disparate departments

The Jiangxi government wanted to create an infrastructure that would connect more than 100 government departments, while being able to provide online services to the provincial population. After discussing its requirements with Juniper Networks, Jiangxi decided the network should be able to easily interconnect with a future Infranet, when that concept of a high-quality, multiservice public infrastructure becomes a reality.

This would be a crucial project for the province, as the ability to provision e-services and facilitate inter-departmental collaboration was seen as instrumental to furthering the province's economic success.

Demanding Requirements

Tasked with the job of serving a potential user-base of more than 41 million users, the network had to be extremely scalable and high-performance. There would be high levels of data traffic, as well as an enormous number of concurrent users. As well, the entire infrastructure had to be secure against both network downtime and hacker attacks. Finally, the project had to be within clearly-set budget constraints.

Juniper is selected

After considering a wide variety of options, the Jiangxi government decided the Juniper Networks approach best met the stringent criteria. Juniper M20 routing platforms were chosen to service the network core, with Juniper M5 routing platforms for each of the remote locations. The M20 is a high-performance, high-throughput device with strong reliability and scalability. The M5 is a similar device, but in a smaller, modular, and still scalable form. One of the key factors in the choice of M20s and M5s is the reliability of Juniper's redundant switching fabric and Routing Engine. As well, the modular JUNOS operating system and purpose-built ASIC hardware ensure maximum efficiency and scalability, saving considerable overhead in capital costs and ongoing maintenance.

Double Star Fault Tolerance

To provide optimum fault-tolerance, the network was configured as a double-star topology. Each of the centres of the stars – the network cores – are located at one of the two main provincial computing centres. At each centre is a Juniper M20 Multiservice Edge (MSE) platform. (Because the M20 is an MSE device, it has the ability to aggregate a wide variety of high-speed interfaces including ATM, Gigabit Ethernet and optical interfaces.) The M20s are each connected to Layer 2 switches, via a gigabit fibre link. The switches form one of the main aggregation points, consolidating communications from 10 remote locations.

The two M20 units are also connected to each other via redundant, long-range gigabit fibre, and also to additional remote Layer 2 switches. These remote L2 switches provide further aggregation of remote sites, as per their local counterparts.

The star topology extends further, with the M20 units connected directly to 10 more key remote cities via 155 Mbps primary POS (Packet over SONET) links. Each primary link terminates at the remote side at a Juniper Networks M5 MSE platform. These remote M5 units are connected to an additional, secondary, M20 unit via a 2 Mbps E1 alternate link. This arrangement provides extra fault-tolerance, and the connection is normally idle, to be utilized only in the event of failure of the primary 155 Mbps POS link.

For security, in addition to other standard network protection measures, the Jiangxi network utilizes various Juniper features. These include the highly-scalable J-Protect filtering capability and Deep-packet Filtering, which employ wire-speed filtering to establish security policies that can be applied to whole networks, a particular interface, or individual users. With the ability to deploy these filters either locally, or globally, fine-grained network policies can be implemented.

Jiangxi Province also has the option to deploy further protection with a stateful firewall featuring attack detection. As well, fundamental traffic security is available with Juniper's secure VPNs (Virtual Private Networks). A wide range of VPN implementations are available to Jiangxi for Wide Area Networking, to ensure secure remote-access to fixed sites, mobile employees, and temporary users. With the ability to create various VPNs, Jiangxi is free to establish a secure networking environment based on users profiles or needs-of-access to particular applications. During the project Layer 3 VPNs were implemented via MPLS (Multi-protocol Label Switching).

A Valuable Provincial Resource

The primary benefit of this advanced network for Jiangxi province is that it now has a secure, reliable and efficient means of delivery for a wide range of government services. This was achieved with minimal cost and ongoing overhead. Juniper's industry-leading MPLS support enables the network to behave as a predictable service despite the number of applications or users being supported. The M-series also ensure the infrastructure is future-proofed, with flexibility in configuration options, including support for a range of interfaces via add-in PICs (Physical Interface Cards). With the network implemented, the many government departments and branches were able to immediately take advantage of a wide variety of network applications. These include a highly-efficient document exchange mechanism, project examination and approval services, a complaint letter lodging system, Video on Demand services, email, and VoIP telephony. An electronic procurement application was also deployed on the network, facilitating this major activity of provincial governments. Public online services were also able to be launched, with a provincial-level public website being served through the network. Because the network impacts so many parties within the public sector, the value of the network to the provincial government is enormous. By the end of 2001, this mission-critical network had already connected more than 100 government departments. These connected areas have implemented their own city-level government systems, with sub-networks for specific department needs.

A Roadmap to the Future

When faced with the need to extend network services across a large area and to a large number of users, costs and associated management issues can be complex. In choosing a next-generation Infranet-ready solution from Juniper Networks, Jiangxi Province has benefited from a technology purpose-built with an understanding of how these issues can affect the overall success of government initiatives. This ability of Juniper Networks to transform complexity into simplicity is critical to customers, such as Jiangxi Province, who need to deliver a wide range of mission-critical services through a consolidated infrastructure. Most importantly, the deployed solution is technologically ready to migrate to the Infranet vision of a common virtual global infrastructure with high-performance, guaranteed throughput and delivery.



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