

The private line services that industries really need

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Changes are prompting new demand

The acceleration of enterprise digital transformation and massive cloud deployment have changed requirements on enterprise networks in various ways:

Network connections: In 2019, enterprises globally spent 24 percent more on cloud than in 2018. Hybrid cloud is the main scenario where applications and data are distributed on different clouds. The new architecture requires connections between enterprise branches and multiple clouds and between different clouds.

Changes in operations model: Products providing 10 ms latency and OTN high-quality private lines are popular in the market as soon as they're launched. The performance factors of traditional business models, such as bandwidth and latency, are gradually changing to a fine-grained traffic operations model that's flexible and on-demand and features time-division and slicing characteristics.

Changes in requirements on value-added network value: In areas such as fast OAM response and proactive fault diagnosis, value isn't determined by importance, but by scarcity. Cloud makes IT simpler, but this is at the cost of complex network connections. This scarcity is about network maintenance instead of network resources.

Discussions on private line requirements in typical industries

In the first half of 2019, we interviewed leading enterprises in various industries to understand the differentiated requirements that various industries have for private lines. Thus, we could determine whether a new business model is available for enterprise private lines.

Commercial banks: High requirements on security, latency, and after-sales support

Banks are undergoing two changes: (1) online banking and (2) digitalized, intelligent business halls. By 2019, about 90 percent of business halls in China had been converted from counter services to robot services, and the service offload rate of online banking had reached 50 percent.

- **Security and reliability is still the first rule**

Online banking has greatly improved the business transaction efficiency of traditional banks. It also makes complete physical isolation between the bank intranet and Internet impossible. If users roaming internationally don't want their data to be transferred abroad, logical isolation based on services and network layers is a challenge.

- **Direct relationship between network latency and customer experience**

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ATMs are replacing counter staff, cutting delays in service completion due to face-to-face interaction. However, if an ATM's operating system or machine interface isn't updated when required, business transaction efficiency is affected and customers may lose trust in service security.

- **Higher private line bandwidth due to camera deployment**

An ATM has a standard configuration for real-time images. A conventional 2M private line can support the data transmission of the service system from a business hall. Currently, 2M is the minimum requirement for a camera to provide image flows. But now, small business halls need to provide service bandwidth of tens of Mbps and large business halls need to provide hundreds of Mbps.

- **Rapid coverage of branches**

Banks have many branches and ATMs. They require that operators provide fast service provisioning and maintenance to guarantee a good customer experience.

Therefore, when operators are planning their private line bank connections, they must provide super-low latency and sufficient bandwidth to ensure no more than 1-second latency during a transaction to meet the new requirements of banking services. Operators

in China are moving to construct independent low-latency financial networks, with an OTN backbone network established between major cities dealing with core financial transactions to provide high-security and low-latency private lines for enterprises. In addition, developed provinces can establish regional OTN financial networks to interconnect with the nationwide backbone network to provide high-value services.

Media industry: On-demand ultra-high bandwidth and DCI requirements at different locations

The media industry has felt the greatest impact of the Internet. In a shift away from the traditional model of shooting, production, and broadcasting, the emergence of a multitude of dispersed, micro, and finely divided media companies has completely separated content shooting, production, and broadcasting. A program may be shot by a company in a remote city in China, transferred to another city thousands of kilometers away for production, and then transferred to a third city for broadcasting.

We found that leading media enterprises in China are building a media industry cloud and deploying data centers in major cities to provide network, cloud, and application capabilities for small companies in the industry. Under this design, new private line requirements are as follows:

- **Anytime, anywhere access to services with elephant flows**

There are two challenges when rapidly transmitting footage from remote cities to the closest data center. First, the shooting location isn't always known in advance, and so video companies are unlikely to rent private lines at a remote location for an extended period of time. Second, the program source typically takes up more than 100 GB. So, how can transmission time for content be kept to within hours?

- **DCI requirements for video cloud**

There are many small players in the media industry. Media giants need to build a public cloud to provide small players with capabilities, including studios, program orchestration, and editing. This creates DCI requirements. The media giant we interviewed runs clear and stable services, but has typical demands for using a specific network for the media industry, including help from operators to construct a nationwide DCI network.

To cope with the exclusive demands of building a dedicated network, operators should be able to build a media-specific network with managed construction and maintenance capabilities. And it should be possible to transfer elephant flows to the media-specific network anytime, anywhere. In response, operators should design appropriate services with a unified account for users to quickly access networks nationwide. The network should provide ultra-large upstream and downstream bandwidth on demand to complete video transmission.

Large ICT enterprises: Requirements for private line performance and fast fault detection

Large ICT enterprises typically have complex networks and high requirements on network maintenance personnel. Based on our interviews, a typical large ICT enterprise has more than 30 R&D and sales

branches across the country, with tens of thousands of employees performing two or three remote videoconferences and data access operations every day. Currently, the information flow between nodes runs on the MPLS VPN network provided by the operator for low-latency interconnections between all nodes. The enterprise, however, receives hundreds of complaints about the unsatisfactory quality of its internal IT service every month, which include freezing during videoconferencing and audio delays. What's behind these complaints is a lack of real-time network quality information. Instead, IT personnel have to provide feedback to operators for fault location, which lowers efficiency and affects user experience. After the public cloud is introduced, increasing enterprise connections makes network architecture more complex, intensifying IP application problems.

Fast fault location and in-time network optimization are major challenges to enterprise network management. Large ICT enterprises responded that they want operators to provide self-service queries on private line performance (such as packet loss rate and latency), so that they can obtain WAN performance data during a specific period with minute- or even second-level precision for better analysis and fault location.

However, the current situation is that network performance is queried periodically. Generally, operators provide enterprises with network quality data on a monthly or weekly basis. A lack of effective solutions exist for real-time performance queries, a problem that's only to some extent mitigated by new software architecture, algorithms, cloud architecture, and network management systems. The latest network management system, for example, can automatically trigger network recovery upon discovery of network quality deterioration and send the latest system data to enterprises on demand.

Internet industry: High-bandwidth redundancy between multiple operators

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The network requirements of the Internet industry reflects its operations principles: fast, efficient, and iterative. The Internet industry has the highest network requirements, underpinned by a “broad-based” concept in terms of reliability and bandwidth. This concept balances techniques and costs to achieve the most cost-effective route. The enterprises we interviewed selected three lines from different operators, all lacking an SLA covering high-reliability. By optimizing their software and networks, they can evenly balance services among the three links. As long as the bandwidth utilization of each private line is less than 30 percent, services aren’t interrupted even if two out of the three links are compromised. Therefore, three data links, each with 99.9 percent availability, can be joined together to achieve 99.999 percent availability to create a “broad-based reliability design.”

This decentralized process requires Internet companies to have strong network design and management capabilities and be able to communicate network requirements to different operators. ISPs in the existing market can sell operator networks to enterprises with unified interfaces, which responds well to the network demands of Internet companies. Traffic optimization and hosted management on the integrated network can further meet demands for startup Internet companies that want to focus on service development or are experiencing fast growth.

Large stores: Wi-Fi + video surveillance + one-stop broadband requirements

To provide a better shopping experience and thus retain customers, large stores typically provide indoor Wi-Fi to combat weak phone signals.

The outlet we interviewed is in a campus with over 200 customers, many of which run their own Wi-Fi networks. Due to a lack of technical skills, the outlet finds it challenging to manage these Wi-Fi networks – in one case, it took a month to resolve signal interference between customers using the 2.4 GHz frequency band. The outlet hopes that operators can provide a one-stop solution for Wi-Fi management, video surveillance, and broadband Internet access.

The new business model requires seamless online and offline working modes, unified goods delivery, and an efficient supply chain. In response, employees and customers need to connect to the same network, inventory management system, and data interaction platform between the payment system and headquarters, so that vendors can adjust how they run their stores. Vendors require trained technicians to provide IT and network support for public Wi-Fi networks and vendor Wi-Fi networks. In addition to providing traditional network solutions, network service providers can leverage the latest software technologies

to introduce customer flow analysis and advertisement push services that match the new business model.

Chain restaurant industry

Fast service provisioning and stable and reliable cloud service connections

The catering industry is the fastest-growing industry when it comes to cloudifying IT systems. The company we interviewed has reduced its on-site servers from 11 cabinets to 2. By 2020, the enterprise will be fully cloud-based, with no cabinets.

With all services moving to cloud, this chain restaurant enterprise plans to move all traditional private line services from its outlets distributed to HQ and change the subscription to public cloud-centric private line services. In response to this strategy, the enterprise wants new network products and new network architecture.

Fast access to cloud. After services move to cloud, the IT SaaS of a new outlet takes only two days from subscription to service provisioning. By contrast, it took several weeks or even a month if the restaurant enterprise engaged with an operator for a private line that was connected to the public cloud, which slowed down service development.

Flexibility. During busy hours, Wi-Fi access volumes are huge. In this case, bandwidth adjustment can improve customers' Internet access experience and enhance their brand image. This also applies to the hotel industry.

Stable and reliable bandwidth. After services are moved to the cloud, catering outlets depend on cloud services to fulfill their orders and payments. Stable and reliable services are critical. Daily bills, procurement data, and financial data from outlets will be uploaded to the cloud for processing, which

requires more from upstream network bandwidth.

The cloud private lines of enterprises must provide subscribe-and-play and flexible features, and ensure basic reliability. In addition to meeting the requirements of new features for traditional private lines, cloud private lines require traditional networks to be reconstructed into software-defined networks (SDN). Operators need to construct flexible SDNs and support one network for multi-cloud. Currently, there are nearly 100 operators in the world that can provide secure and direct-connect-to-cloud private lines.

Given the momentum of IT cloudification and the Internet, enterprise development cannot exist without network support. Different industries have different network requirements due to their service characteristics, but there are still common requirements.

Security: Regardless of high-quality, network-wide private lines in the bank industry or the broad-based reliability design of Internet enterprises, the essence of different solutions is to enhance network security.

High network speed: High bandwidth and low latency are the two factors that ensure fast network response, especially in the era of image content floods.

The solutions vary from industry to industry. For example, Wi-Fi monitoring in the retail industry, multi-line hosted management in the Internet industry, and the cloud-network association of the catering industry, all have their own characteristics.

In the enterprise private line field, operators need to consider how to support "soft" features over hard pipes. On the one hand, soft indicates the fast response of private lines, fast fault location, and flexibility. On the other, it means rethinking the market and marketing portfolio. Differentiated soft features allow us to build differentiated competitiveness. 