Making ISPs Profitable

Solutions Overview

Introduction

With ISPs (Internet Service Providers) struggling to differentiate their service offerings, Internet access has remained a low margin business. However, all ISPs have the ability to introduce new services and service enhancements that can increase their margins as well as the profitability of services and network assets.

A key to increased ISP profitability is an understanding of the distinct wholesale and retail ISP business models. To date, vendor equipment has lacked the ability to distinguish between wholesale and retail traffic, forcing ISPs to develop inefficient infrastructures to compensate for these shortcomings.

ISP wholesale services (a.k.a. transit) are defined as bandwidth sold to other ISPs which are then resold to end users. Wholesale services are very bandwidth intensive. Due to the large amount of aggregation within their networks, retail ISPs tend to fill whatever size interfaces they purchase from their wholesale provider. It is therefore likely that a T1 transit link will run at 1.5 Mbps all day, everyday. Because of this, ISP wholesalers are forced to provision backbone bandwidth with minimal oversubscription to meet demands. If applied to retail Internet services, this provisioning model will render the service unprofitable due to high infrastructure costs.

In contrast to the "use what you buy" model of ISP wholesale services, the key to a profitable retail Internet service (sold by ISPs for end user consumption) is oversubscription. Few businesses consistently utilize the full capacity of their Internet connections. The bandwidth is needed periodically to speed up network-intensive transactions such as file transfers and loading web pages. As a result, an ISP can oversubscribe their backbone many times over, perhaps provisioning as little as 15 Kbps per T1 line sold.

This creates a dilemma for the ISP that sells both retail and wholesale services. They either:

- ***Oversubscribe their network and fail to meet the intense bandwidth utilization of wholesale requirements, or***
- ***Over provision their network and fail to generate profit on retail services.***

The solution is to utilize sophisticated traffic management in their edge routers to allow different subscription rates for retail and wholesale customers. This greatly simplifies infrastructure planning for both retail and wholesale

provisioning by enabling service providers to apply different policies for retail and wholesale customers within the same network.

ECI's ST™200 Service Edge Router includes sophisticated traffic classification and rate limiting features that for the first time enable ISPs to differentiate retail and wholesale services at the network edge without introducing complexities in the backbone. Incoming traffic from customers may be classified as "retail" or "wholesale" based on the interface on which it arrives. On trunk links to the core the retail portion of the traffic may be sent through a separate rate queue that limits the amount of retail traffic allowed to enter the backbone. This allows the retail traffic to be assigned a different oversubscription rate than wholesale traffic.

More sophistication may be applied to this service model by utilizing ECI's BGP policy-driven classifiers and counters. The simple classification technique described above is sufficient for handling the load going onto the network, but it does not take into account other dynamics that may be present. If usage-based billing is used on wholesale links, it might be beneficial to allow traffic arriving on a retail customer link to access the full trunk bandwidth for traffic destined to a wholesale customer of the same ISP.

To account for these complexities, more sophisticated classification techniques may be applied to align the oversubscription rate with the relative cost or value of the traffic. To do so, each customer link must be assigned a BGP community that corresponds to the type of customer. For example, there may be four types of links: "retail" for a retail customer, "wholesale" for a transit customer, "peer" for an ISP peer that exchanges traffic with another ISP at no cost and "transit" for a purchased wholesale link to another ISP. An import BGP policy assigns the appropriate community to each destination IP prefix learned on a link. Separate policies for each customer type are used to classify all incoming traffic into its oversubscription class as described in the following table:

From	To			
	Retail	Wholesale	Peer	Transit
Retail	Max	Min	Min	Max
Wholesale	Min	Min	Min	Max
Peer	Min	Min	Min	Max
Transit	Max	Max	Max	Max

Figure 1: Example Oversubscription Policy for a Retail/ Wholesale ISP

This policy utilizes oversubscription to limit traffic between edge interfaces that generate the least revenue per bps while not restricting bandwidth between interfaces that generate more revenue per bps. In this example, maximum oversubscription is applied to all traffic to and from transit links because transit is often very expensive. If the price charged to wholesale customers is higher than the cost of transit, it might make sense to reduce the subscription rate between wholesale and transit links. The remaining to and from peering sites and wholesale customers are unrestricted because peering relationships often require a certain amount of bandwidth and wholesale customers in this example are billed on a usage basis. Other traffic is subject to maximum oversubscription because it generates low revenue and/or represents high cost.

Creating Incentives to Attract Customers from Other ISPs

Usually a low margin business requires high volume to be profitable. The best way to grow a commodity business is to attract customers away from competitors utilizing incentives. This approach has been used extensively in the wireless voice business where it takes the form of "unlimited weekend or evening minutes" or "free nationwide calls." A similar approach may be used by ISPs to attract customers by offering value where it has minimal impact on the ISP's overall cost.

Offer Reduced Prices for Regional Traffic: This allows the ISP to effectively reduce prices in an effort to attract or retain regional customers, or customers that perceive a large volume of their traffic is regional. Since regional traffic traverses fewer network elements and lower-cost links, it represents lower cost to the ISP. By offering reduced prices just for this portion of traffic, the ISP keeps costs aligned with revenue. This enables ISPs to maintain solid margins, while attracting and retaining customers. The ST200 Service Edge Router's BGP Policy accounting feature may be used to implement such an approach by applying separate packet-by-packet hardware counters for regional and out-of-region traffic.

Offer Free Premium Delivery of Traffic Between Directly Attached Customers: Applied to traffic that does not go to a peer or a transit link, this creates customer loyalty and encourages customers to purchase Internet service for all sites from the same ISP. ECI's BGP policy classification, policing and marking features may be used to implement such an approach.

Reacting to Competitive Threats with New Services

Private peering between Tier 2 ISPs moves traffic off Tier 1 ISP networks and presents a competitive threat to Tier 1 providers offering transit services to Tier 2 providers. There are several ways for Tier 1 ISPs to react. They might reduce transit prices in an attempt to prevent customers from negotiating private peering arrangements. However, this devalues the transit service and reduces revenue across the board. A better approach is to offer a new service specifically targeting

customers who have negotiated private peering arrangements - distributed Internet peering.

Distributed Internet Peering: This is essentially a Layer 2 packet transport service that allows two ISPs to establish a direct peering relationship. Using the ST200 Service Edge Router's Layer 2 switching features, an ISP can create Layer 2 switched tunnels across their existing network. This service may be bundled on the same link as an Internet transit service, but metered and billed at a different rate. So long as the cost of the service is similar to the cost for the Tier 2 ISPs to interconnect via other means such as a private line, it will be attractive and effective at retaining the customer's traffic.

Expanding the Service Portfolio to Include Network Based Layer 2 and Layer 3 VPNs: Many ISPs have invested significantly in creating world-class networks optimized for packet transport. However, they often struggle to generate revenue because their service often represents lower value to the customer than other services. Enterprises often place higher strategic value on their private networks than they do the public Internet. In fact, some businesses restrict access to the Internet for fear that it may reduce productivity. Using the right technology, ISPs can exploit their infrastructure investment to offer private networking services that exceed the best available services in the market.

Private data networking services may be offered at either Layer 2 or Layer 3 in the form of a VPN. Some ISPs already offer Layer 3 VPNs as a managed service utilizing CPE (customer premise equipment) routers to create tunnels across the Internet. An alternative that represents the same value at lower cost to the ISP is a network-based VPN. Instead of creating the VPN on many costly CPE routers, the ISP can create a VPN from provider edge routers by creating secure routing protocol instances with associated secure routing tables. These are interconnected via secure connections between their own edge routers.

Many ISPs that have recognized the value of network-based VPNs have shied away due to scalability fears. Their own testing has revealed that a typical Internet router may only support a few dozen VPNs before exceeding capacity and degrading service. The ST200 Service Edge Router incorporates VPN features into its underlying hardware and software architecture. This allows the ST200 to create thousands of VPNs per device without any effect on throughput or service quality, greatly changing the ability of ISPs to offer profitable VPN services.

The other approach to private data networking is the Layer 2 VPN. Layer 2 VPNs have been available in the market for some time in the form of X.25, Frame Relay, and ATM switched services. All of these services offer security in the form of dedicated connections between customer sites. Prior to the introduction of the ST200, an ISP would have been forced to use different edge devices to create a Frame Relay or ATM service. With the ST200, both routed and switched services may be offered on the same edge platform utilizing a common backbone network. Each interface on the ST200 may be configured for both routed and switched

services allowing the creation of a compelling Layer 2 VPN service portfolio. When configured for a switched service, the ST200 offers precise QoS that matches that of a traditional ATM or Frame Relay switch.

Any-to-Any Service Interworking: A unique benefit of Layer 2 services via the ST200 is interworking between ATM, Frame Relay and Ethernet Private Line services, so that customer sites can be connected regardless of access network type. Supported Layer 2 service modes include: Frame Relay PVC and port modes; ATM AAL5-SDU VCC mode, VCC cell relay mode, VPC cell relay mode and transparent port mode; cell relay services including cell concatenation; Frame-to-ATM service interworking (FRF.8.1); high-speed Frame Relay; Ethernet port mode; 802.1q VLAN; IP services (any-to-any IP interworking for improved efficiency between IP, ATM, Frame Relay, Ethernet).

Conclusion

ISPs have the ability to expand their service portfolio while increasing the efficiency of their network infrastructure to increase profitability, attract new customers and retain existing customers. With the ST200, ISPs can move to optimized infrastructures for retail and wholesale traffic in a single platform. They can also begin to align their offerings with their cost structure with the ST200's BGP policy accounting feature. Expanding their service portfolio is now possible to include a complete range of switched and routed service offerings over their existing backbone.

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About ECI Telecom
ECI Telecom offers future-ready telecommunications solutions that leading carriers and service providers rely on for delivering revenue-generating services to their business and residential customers. With its current products, ECI can deliver a full complement of access-to-edge IP transport solutions today. Known for its ability to translate customer needs into scalable, flexible, cost-effective solutions, ECI helps companies increase the value of their network infrastructure and reduce operating expenses. The company's single-shelf networking systems simplify network deployment and enable Build-as-You-Grow™ next generation telecommunication networks.

The Data Networking Division
The Data Networking Division (DND) adds next-generation IP/MPLS edge routing technology to ECI Telecom's product and services portfolio. DND's edge routers offer full-featured, multi-service support and complete Internet routing in a carrier-class, IP-based platform. ECI's ST-series routers provide the automated subscriber management, reliability, and performance that service providers need to implement advanced, revenue-generating broadband applications, like video on demand or voice over IP.