High Tech Resource Consulting Group

The Future of IP Services

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About The HTRC Group

The High-tech Resource Consulting Group focuses on service provider networking, providing consulting, custom market research, and market research studies to service providers and product manufacturers.

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1 Executive Summary

Internet Protocol (IP) Services represent an increasingly large opportunity for service providers, IT companies and enterprises. Yet expense and inflexibility of current network solutions continue to constrain the market for IP services.

Network service providers (NSPs) continue to witness an explosion in data traffic. Yet generating high-margin revenue and creating unique customer value from selling pure access and bandwidth remains a challenge. NSPs are examining how to break out of traditional access service models and into high-margin IP services.

Application service providers (ASPs) have been offering information technology (IT) outsourcing to enterprise customers for some years. However, this form of outsourcing often requires expensive private or leased network arrangements to meet network quality needs. Although the Internet provides a cheaper delivery alternative, performance and security are uncertain.

Enterprise customers desiring advanced IP services typically make expensive capital and networking investments, limiting the penetration of IP services across the industry. Competitive companies continue to focus on their core and strategic competencies, while outsourcing IT applications and services. Several factors, however, constrain the outsourcing trend, including service flexibility, concerns over service quality and security, and expensive network access arrangements.

All consumers and suppliers of IP services will benefit from a service delivery architecture that addresses fundamental business requirements. Network connectivity between ASPs and consumers needs to be as reliable and secure as private leased-line networks, with the affordability of the Internet. In addition, enterprise customers want the flexibility to purchase and consume advanced IP services when required, without expensive IT and networking infrastructure.

A new architecture for advanced IP services will consist of partnerships between three suppliers: the Service Portal, the ASP and NSP. The architecture reflects the well-established business relationships between retailer, wholesaler, distributor and end-customer.

Service Portals are easy-to-navigate, point-and-click, Web-based interfaces that let customers order any number of advanced IP services such as unified messaging, software rental, or videoconferencing. The Service Portal is the retail storefront for advanced IP services.

ASPs wholesale advanced IP services to the Service Portal, which then retails the service to the business customer. ASPs focus on their core IT outsourcing competence and not on network services nor on marketing. With broadband service deployments solving bandwidth bottlenecks, ASPs will offer a broad-range of attractive applications that will take the form of advanced IP services, such as Voice over IP and videoconferencing over IP.

Network service providers own the service networks that connect business customers to the Service Portals and ASPs. This distribution infrastructure allows consumers to obtain services which they have purchased from the Service Portal and which originate from the ASP. NSPs will deploy quality and security mechanisms in the IP network to offer secure, latency dependent applications across an affordable Internet infrastructure.

Through the example of video and data conferencing, this document will show how all three players in the service delivery architecture can profitably address the demand of enterprise customers for future IP services.

The result of the next revolution in IP services will be the delivery of outsourced applications to the enterprise market. NSPs, ASPs, and Service Portals will capitalize on the multi-billion dollar high-margin IP services revenue opportunity. The new architecture introduced in this paper provides a structure for delivering the next generation of IP services.

2 IP Services

Undeniably, business applications and services have gravitated to a common application and networking protocol - the Internet Protocol. This section describes the current characteristics of business consumers and suppliers in this evolving IP services market, with the intent of articulating the key requirements of a future architecture to address the existing shortcomings.

2.1 Examples of IP Services

IP services are going beyond today's website and e-commerce applications to provide advanced services of ever-increasing value to business around the world. Advanced IP services include the following:

- Integrated Voice and Data Applications
- Video Conferencing
- Document Storage and Backup
- Outsourcing of Mission-Critical Applications
- Software Rental
- Unified Messaging
- Computer / Telephony Integration
- Network based Training Services

Many of these applications and services are available in various forms today; however, their implementations are typically capital intensive and lack flexibility, resulting in limited deployment to a few early adopters. In addition, an inherent lack of end-to-end performance guarantees inhibits wide-scale deployments of these applications across the Internet.

2.2 Enterprise Customers

Back in the 1970's and 80's, a few large companies were able to achieve strategic advantage through enterprise-wide applications, but implementation of IT strategies required costly investments in networking and data processing technologies. While these infrastructures provided process automation across the enterprise, they were expensive to maintain and inflexible to changing business conditions.

Even as the costs of basic networking and applications continue to decrease, the costs of skilled IT staff to keep systems operating and properly maintained are increasing. Additionally, most Chief Information Officers (CIOs) want to focus on the competitive advantage brought by Information Strategy, and not the "bits and bytes" of Information Technology.

These trends have motivated many CIOs to focus capital and resources on core and strategic competencies and to outsource non-strategic IT applications and services. Companies no longer have to operate large and expensive data centers and private voice and data networks in-house.

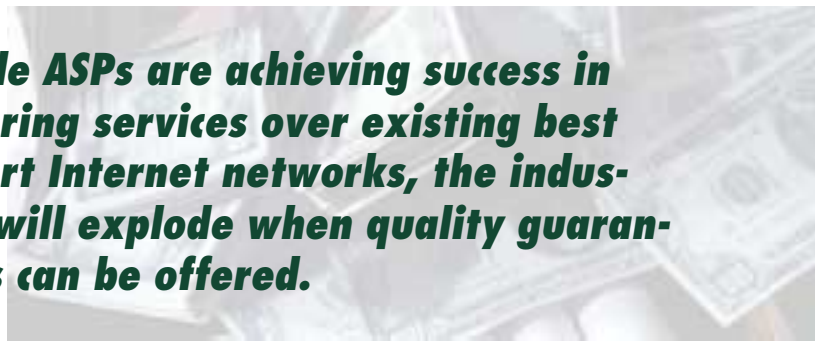
Competitive pressures and technological advances have long since chiseled away the high margins on data access.

This move toward outsourcing points to an even greater latent need: the unmet demand for guaranteed, secure, flexible, and affordable IP based applications and services.

2.3 Service Providers

2.3.1 Application Service Providers

First generation ASPs have been offering IT application outsourcing for some years. Many ASPs provide scale economy benefits to their customers by sharing the costs of expensive data center mainframes, databases, and infrastructure across many customers. Hence, customers can save money through outsourced data center arrangements, compared to operating dedicated data centers in-house. However, these initial offerings have been limited in their flexibility as most arrangements required multi-year commitments. In addition, expensive dedicated networking arrangements have been typically required in order to meet service level guarantees to each customer site. As a result, the expense and commitment associated with traditional outsourcing has essentially limited the market to mid to large enterprises.



While ASPs are achieving success in offering services over existing best effort Internet networks, the industry will explode when quality guarantees can be offered.

Web hosting ranks as one of the more common IP application services offered today. The explosion of web-based content and services has permanently transformed the way businesses interact with their customers and partners. A notable advancement in web hosting has been the re-architecting of large, mission-critical applications into so-called "thin-client" IP applications. Thin client applications minimize bandwidth usage through communications between user client workstations, centralized application and data servers. Companies like Arepa.com and Interliant AppsOnline have adopted thin-client technology and are already offering applications for rent over an IP network.

While ASPs are achieving success in offering services over expensive private networks or via existing best-effort Internet networks, the IP services industry will explode when quality guarantees can be offered across the Internet. The market will take off when a broad range of enterprise-class IP services is within the reach of small to mid-sized companies. Offering end-to-end guarantees for service quality is necessary to support advanced IP services. For ASPs to increase their revenues and market share, future IP services will need to be "bundled" offerings of both network and application components. The offerings must be easy to purchase, with flexible billing and configuration arrangements. Business customers will subscribe to applications that are tightly coupled with reliable, secure delivery. Ordering and using the service will be as easy as placing a phone call.

2.3.2 Network Service Providers

Network service providers continue to witness an explosion in IP data traffic. To address these demands, today's providers offer a plethora of data network access and bandwidth options.

NSPs are starting to offer affordable Virtual Private Network (VPN) services based on IP technologies. Most businesses understand a data VPN's fundamental benefits: facilitating communication with customers, suppliers, and partners, and reducing Wide Area Network (WAN) costs by using public networks rather than expensive leased-line networks. Businesses can use VPNs to connect employees, work sites, and external organizations (including outsourced data centers). VPNs based on IP technologies have significant cost benefits relative to dedicated, ATM, or Frame Relay offerings. However, IP technologies are currently limited in their ability to support bandwidth guarantees.

While IP traffic continues to grow exponentially, generating high-margin revenue and creating unique customer value from selling pure bandwidth remains a challenge. Competitive pressures and technological advances have long since chiseled away the high margins on data access and bandwidth. Although NSPs are filling their networks with bandwidth due to ongoing improvements in broadband access technologies, the revenue produced from that bandwidth is relatively small compared to voice services and the margins are being eroded.

NSPs need to shift their focus to selling high-margin data application services, analogous to the multitude of enhanced voice services (call waiting, messaging, voice mail, voice conferencing, 1-800 numbers), that are offered to business customers along with basic voice transport.

To capture their share of future IP service revenues and margins, NSPs will need to overcome

Advanced IP services will be usage based—much like pay-per-view movie services...

customers' concerns regarding IP bandwidth guarantees and security. NSPs will also need to offer on-demand configuration of IP VPN connectivity for network based IP services in order to address the rapid, unpredictable pace of business today.

3 Requirements for Future IP Service Delivery

Business consumers and service suppliers will all benefit from an infrastructure that supports the following common requirements: guaranteed quality of service, security and on-demand subscription.

3.1 Guaranteed Quality of Service

In this paper, Guaranteed Quality of Service (QoS) refers to the IP network's ability to deliver deterministic performance from end-to-end, measured by a number of specific parameters including bandwidth, delay, and jitter.

Standard IP QoS mechanisms (e.g. DiffServ) do not apply to specific applications or users, limiting the utility of these standard measures for granular control of mission-critical applications or for high-profile users. In contrast, Guaranteed QoS will be delivered and measured by user and by application.

Another important distinction is that Guaranteed QoS must be offered across the complete network connection – from ASP to the business customer's LAN. While ASPs typically offer Service Level Agreements (SLAs) within their areas of control (i.e. the data center) and NSPs typically offer SLAs between the edges of their core networks, what business consumers require is Guaranteed QoS from the ASP data center to the business location.

3.2 Security

Security over IP networks has received a great deal of attention across the industry. Unlike frame relay, ATM, or private line services, IP networks do not assign a "dedicated" physical or logical circuit between applications or users.

Fortunately, the industry is making progress on security mechanisms across IP networks. Using tunneling technologies (IPSec), encryption algorithms (DES, triple-DES, Blowfish), key-exchange algorithms (Diffie-Hellman), and authentication mechanisms, security is being addressed. Business consumers can feel increasingly confident that sensitive business information can be securely transmitted across an IP network.

3.3 On-Demand Subscription

Another common requirement is the on-demand subscription, provisioning, and activation of future IP services. This capability allows the enterprise to respond quickly, with minimal cost, to new and unforeseen business needs. All the components of the architecture must facilitate this objective, including the dynamic provisioning of the appropriate Guaranteed QoS and security starting from the ASP, across the NSP's network, to the enterprise consumer.

On-demand subscriptions must also be supported by usage based billing mechanisms - much like pay-per-view movie services offered by cable television operators. The cable network is similar to the IP network in that both are transparent to the subscriber. Customers will subscribe to advanced IP services, and not to the transport and application infrastructure. Instead of purchasing bandwidth (e.g. 56K, T1, T3) users will be able to subscribe to a collection of services ranging from renting applications to scheduling videoconferences as needed.

4 A New Architecture for IP Services

The objective of this section is to provide a guide for service providers on implementing a new architecture to support the on-demand subscription of advanced IP services.

4.1 The Three Partners in the New Architecture

Three partners have unique roles in supplying advanced IP services to enterprise customers in the proposed architecture: Service Portals, Application Service Providers, and Network Service Providers. Figure 1 shows the three partners working together. The architecture reflects the well-established business relationships between retailer, wholesaler, distributor, and business consumer. To illustrate the relationships, fictitious names have been assigned to the different elements. Beacon Network Services Inc. is an NSP that operates both the Service Portal (Beacon Portal) and the service network (Beacon Network). Spinnaker Inc. is an ASP.

Implementing a service portal requires the development of intimate business and technology relationships with business consumers, ASPs, and facilities-based NSPs.

4.1.1 Service Portals

Service Portals are the retail storefront for advanced IP services. They are easy-to-navigate, point-and-click Web based interfaces that let business consumers order from a number of advanced IP services such as unified messaging, software rental, or videoconferencing. Service portals deliver advanced IP services based on the bundling of required resources from both application and network service providers. In addition, Ser-

vice Portals provide the first line of technical support and customer service for advanced IP services.

4.1.2 Application Service Providers

ASPs provide advanced IP services to Service Portal customers and act as wholesalers to the Service Portals. With broadband service deployments resolving bandwidth bottlenecks, ASPs focus their core IT competence on providing a growing range of applications, including voice over IP and videoconferencing.

4.1.3 Network Service Providers

Network service providers are the distribution component of the IP services architecture, and own the QoS-enabled network infrastructure that connects business consumers to the Service Portals and ASPs.

To guarantee QoS for each application, a service demarcation point at the customer's location is recommended. The LAN/WAN boundary is a queuing point, making it the best place to perform policy management and to guarantee performance and security. Secure, Guaranteed QoS will work best with a new class of Customer Located Equipment (CLE) at each business location. By managing and operating CLE for broadband services and Point of Presence (POP) equipment for dial-up services, the NSP can control security and Guaranteed QoS features for a myriad of advanced IP services.

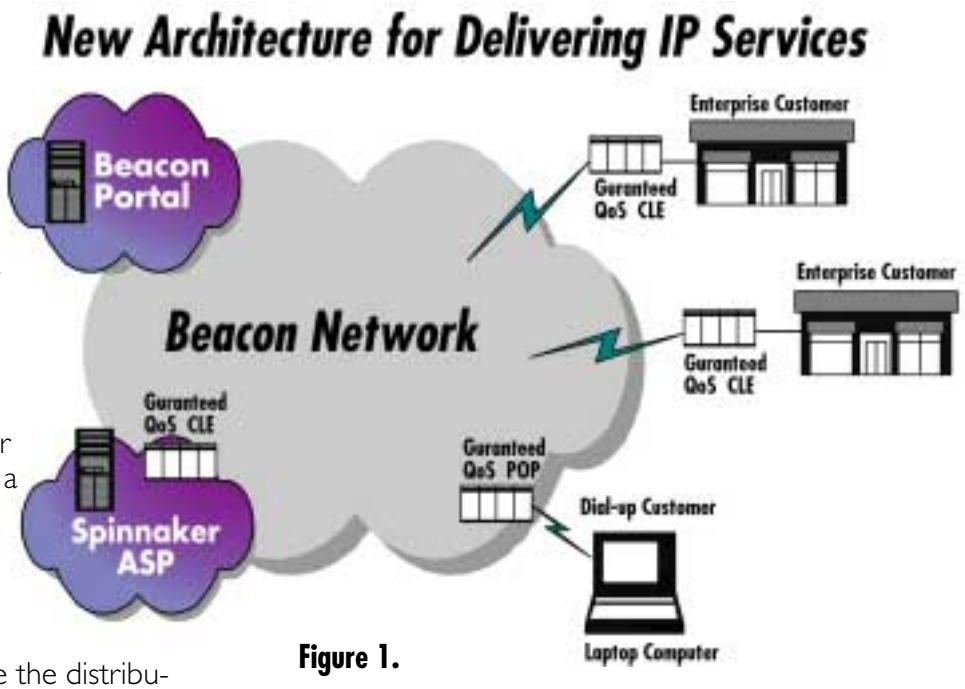


Figure 1.

4.2 Service Portals

4.2.1 Business Strategy

Beacon Portal, the Service Portal, generates revenues by offering advanced IP services to enterprise customers. Beacon Portal's core competency is marketing IP services to customers. Beacon Portal's key challenge is attracting and retaining customers to new services.

Advanced IP services will consist of the bundling of two wholesale service components. ASPs, such as Spinnaker, will provide the application services while NSPs, such as Beacon Network, will offer the network connectivity services. In essence, Beacon Portal takes advantage of an arbitrage opportunity between wholesale and retail pricing, while adding value in exceptional service bundling, customer care, and billing/settlement capabilities.

To combat competition and minimize churn, Beacon Portal will differentiate itself through the creation of "sticky services"-advanced IP services with a strong potential for retaining existing business customers, as well as attracting new ones. For example, a sticky service is an integrated voice and data application. A Web site can be enabled with IP telephony, so that a customer browsing the site can talk "on-line" with a live service representative. The Web site would have a Guaranteed QoS connection to service representatives in order for users browsing the Web site to communicate effectively. Beacon Portal may also focus on vertical markets, such as financial, medical, or manufacturing sectors.

4.2.2 Service Portal Operations

Implementing a Service Portal requires the development of close business and technology relationships with business consumers, ASPs, and NSPs. Beacon Portal will need to integrate its service order systems with its wholesale providers. Service Portal operational systems will use open, standards based technologies to best integrate with NSPs and ASPs. The objective is to support "on-demand" subscription to the application and network resources required for the service.

In this example, business consumers order conferencing services "on-demand" through Beacon Portal's interactive, Web based Service Portal.

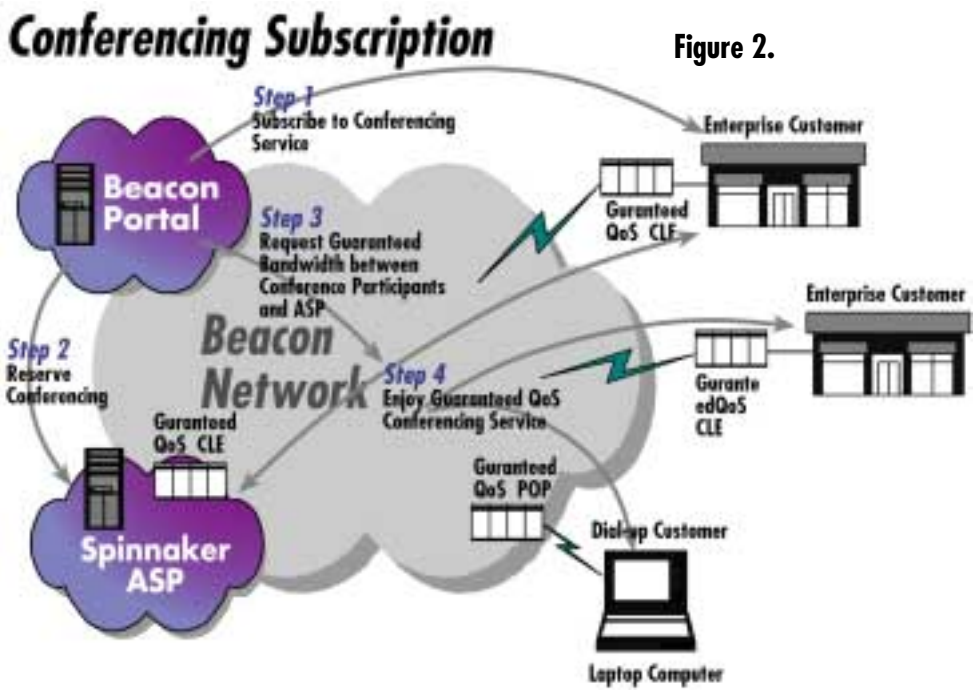


Figure 2.

The Service Portal automatically contacts the NSP and the ASP to ensure service resource availability. Once resource and service availability have been confirmed, Beacon Portal provides its customer with a service confirmation message and a password to allow access to the service. When the service has been "activated", the conference participants can log on to the ASP for the videoconferencing call over Guaranteed QoS network connections provided by the NSP. Figure 2 shows Spinnaker providing services to enterprise customers.

4.2.3 Billing and Settlement Mechanisms

Service Portal operations will also require integrated billing and settlement mechanisms with its wholesale service providers. Beacon Portal collects usage information from the network and bills the customer, retaining its fee, and sending settlement notices to Beacon Network for the network resource used, and to Spinnaker for provisioning the videoconference service. Providing a unified bill is a competitive advantage, solidifying the customer relationship. In the service architecture, Beacon Portal provides the unified bill.

Figure 3 shows revenue flow from the enterprise customer to Beacon Portal, which then pays settlement fees to Spinnaker and Beacon Network.

4.2.4 Managing the Customer

Beacon Portal is responsible for managing first-level customer support operations. When a problem occurs, the business consumer first contacts Beacon Portal, who attempts to diagnose the problem through the integrated network monitoring and trouble management systems it maintains with its partners. If Beacon Portal's first-level support team can't resolve the problem, they escalate the issue with the appropriate partner to take action and restore service.

4.2.5 Financial Example

Beacon Portal provides the retail storefront for advanced IP services. Beacon Portal offers Spinnaker's "on-demand" video- and data-conferencing services over Beacon Network's Guaranteed QoS network services.

All the financial examples presented in this document identify revenue, cost of sales, and gross profit over a three-year period. The assumptions used in the creation of all examples were based on feedback from service providers and portal companies, and on extrapolations from industry trends. The examples are intended to be used as a guideline only. Actual costs, revenues, and return on investment may vary.

Common conferencing service assumptions across all examples include an 8 % adoption rate of existing customers being serviced by a large NSP. Customers use the conferencing service an average of 30 minutes per day.

Beacon Portal Assumptions:

- Retail revenue is based on charges of $.35 metered rate per minute.
- Cost of sales includes settlement charges to Beacon Network and Spinnaker ASP, support costs, and amortization of capital investments ($650,000 for Web Server, customer care, on-demand service ordering, and billing and settlement systems)

To combat competition and churn, service providers will sell "sticky services," and not just bandwidth

Beacon Portal Business Model

($000s)	Year 1	Year 2	Year 3
Revenues	$11,464	$63,086	$146,421
Cost of sales	$8,987	$48,482	$112,240
Gross Profit	$2,477	$14,604	$34,181
% of revenues	22%	23%	23%

4.2.6 The Bottom Line

As the retail storefront of the delivery architecture, Beacon Portal's revenues are substantial. Remembering that this financial example represents only one of what will be many services, the opportunity exists to generate significant revenues and cash flow.

The largest costs are the settlements paid to the ASP for the conferencing service and to the NSP for Guaranteed QoS connectivity. After settlements, the largest operational cost is support, as Beacon Portal provides first-line support for its subscribers. The net margins, after Sales, General and Administrative expenses, after the first year, are around 8%.

Beacon Portal quickly recovers its initial capital investment of $650,000 for a billing and settlement system, customer management software, and portal web servers.

The cost of sales is high and the margins relatively low compared to those of ASPs and NSPs because Beacon Portal's business is an arbitrage opportunity between business customers and wholesale suppliers (ASPs and NSPs).

Like any retailer with wholesale suppliers, the Service Portal's business model is based on cash flow and volume. Beacon Portal has the largest revenue of the three partners because it is charging retail prices to end customers.

4.3 Application Service Providers

4.3.1 Business Strategy

ASPs specialize in providing network based applications and services. In the example, Spinnaker partners with Beacon Portal to gain access to retail customers. Spinnaker generates wholesale revenue by delivering advanced IP services to the Service Portal's customers. Spinnaker relies on Beacon Portal to bundle and provision the guaranteed network connectivity for Spinnaker's advanced conferencing services. Spinnaker, a wholesaler of advanced IP services, can partner with many Service Portals to maximize its customer base.

Spinnaker's core competency is server farm and application management. Spinnaker faces the challenge of building partnerships with application developers, portals and NSPs. Application developers provide content and services for ASPs to host.

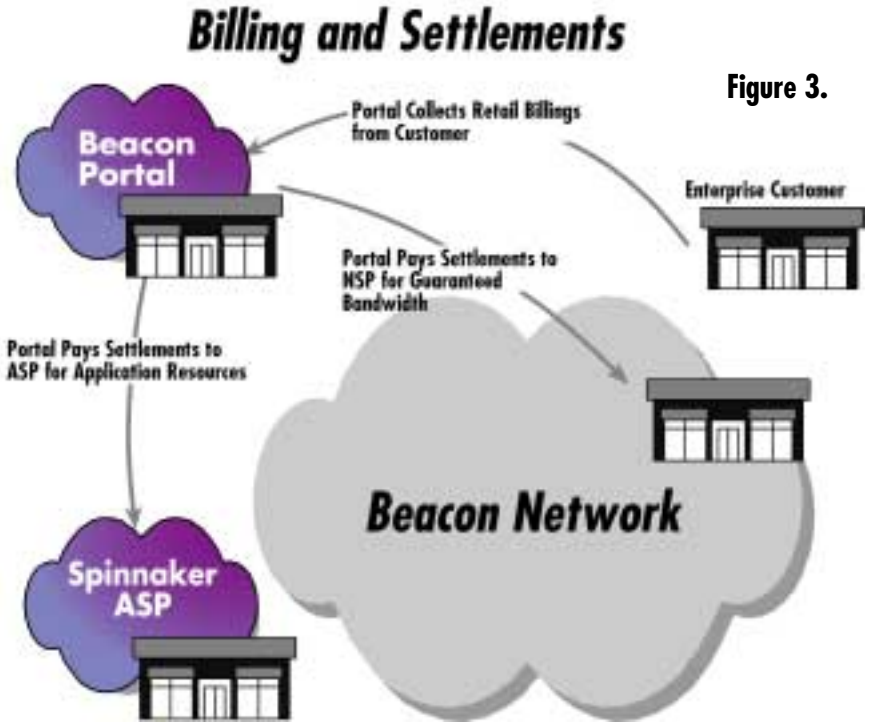


Figure 3.

Historically, the relatively high cost and commitment associated with traditional outsourcing has limited the market to mid and large-sized enterprises. By lowering these barriers, the new architecture opens ASPs to a wide range of customers, from small business to large corporations.

PictureTel provides a real-life example of a developing ASP business in the context of the proposed architecture. PictureTel's IP based videoconferencing application is being used by Enron Communications to deliver conferencing services to users. Enron is both the NSP and the Service Portal. PictureTel plans to offer its suite of conference applications through Enron to enterprise and service provider customers.

4.3.2 Service Requirements

Applications may require that certain service characteristics, such as bandwidth and latency, are in place in order to fulfill the business customer's expectations. Spinnaker defines the service and specifies the required IP security and Guaranteed QoS parameters required to support the service across the network. This is a one-time activity performed and negotiated with the Service Portal. Once the service definition is established, the Service Portal can support thousands of subscriptions to a single definition.

ASPs can offer a range of service quality guarantees. For example, an ASP could specify three levels of service quality and security:

- Real-Time priority would be required for latency-sensitive applications such as voice over packet or videoconferencing. This quality level requires a low level of latency (e.g. under 60ms).
- Mission-Critical priority could be for applications less sensitive to latency, but requiring strict security and encryption requirements. ASPs can assign a Mission-Critical quality level to Enterprise Resource Planning (ERP) applications. Distinguishing ERP traffic from best-effort traffic guarantees that large data backups and file transfers do not interfere with ERP processing at critical times.
- Best-Effort priority could be assigned to applications such as data backups or email. This level of service would be the most economical for non-latency dependent applications.

Spinnaker also specifies the parameters required to provision the service (e.g. IP addresses), how to bill for the service (e.g. $/minute of use), and what guaranteed bandwidth is required across the network (e.g. 356 Kbps per conference attendee).

Once the service definition is agreed upon with the Service Portal, the integrated on-demand order processing software will reference this definition. This software system will forward the parameters for quality and service requirements, along with user-defined variables (e.g. IP addresses) to the ASP for application resources and to the NSP for IP network connectivity.

4.3.3 ASP Operations

ASPs host applications and make them available to business users. ASPs may develop their own applications and application content, or they may partner with application developers. Most of the ASPs provide IT hosting and outsourcing. Some ASPs also venture into software development, converting existing applications, such as ERP, to function as networked interactive applications. IT outsourcing companies see an opportunity in adapting to an on-demand provisioning business paradigm. And application developers view the ASP business as a new way to distribute applications to users, targeting new market segments facilitated by developing network technologies.

In the example, Spinnaker has established integrated provisioning, trouble management and settlement systems with Beacon Portal. Beacon Portal's relationships with the Beacon Network provides Spinnaker with the infrastructure that enables services to be delivered with true end-to-end QoS and security guarantees, extending service quality commitments beyond Spinnaker's data centers.

4.3.4 Managing the Applications

Service problems that arise are initially identified and resolved by the Service Portal. When required, complex application problems are escalated and subsequently resolved by Spinnaker. To identify, track and facilitate resolution of problems, Beacon Portal integrates network management systems and trouble-ticketing applications into the ASP infrastructure.

Customer billing information is sent from Spinnaker to Beacon Portal, allowing the Service Portal to track usage and billing information.

4.3.5 Financial Example

Spinnaker Inc. Assumptions:

- Wholesale settlements are based on a $.15 metered rate per customer minute from Beacon Portal.
- Cost of sales includes support, and amortization of capital investments (conferencing servers, customer relationship management software, and billing and settlement systems, integration, and data-center facilities).

Spinnaker Inc. Business Model

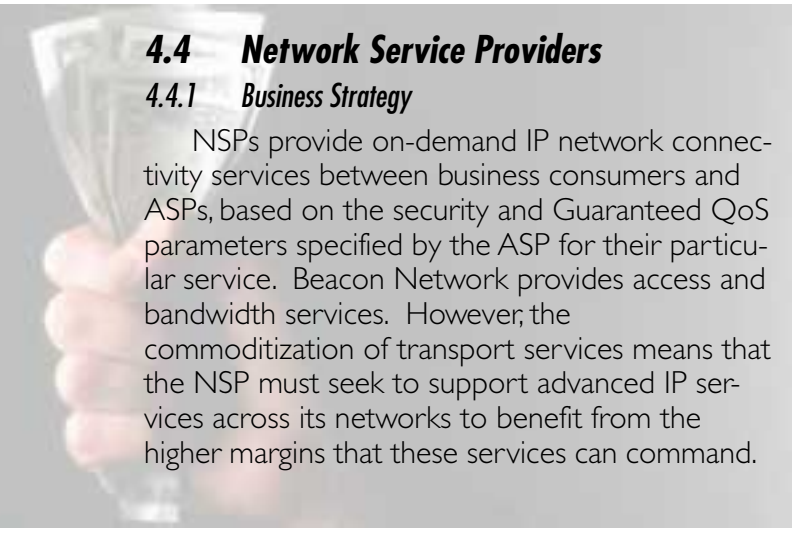
($000s)	Year 1	Year 2	Year 3
Revenues	$4,913	$27,037	$62,752
Cost of sales	$3,687	$13,818	$30,200
Gross Profit	$1,226	$13,219	$32,552
% of revenues	25%	49%	52%

4.3.6 The Bottom Line

The wholesale revenues for Spinnaker's video and data conferencing services are significant. Remembering that this financial example represents only one of what could be many services, the opportunity exists to operate a profitable ASP.

Costs are dominated by the amortization of capital investment. In the example, Spinnaker makes a $3,750,000 investment for server farm facilities, servers, conferencing software, billing and settlement systems, and integration. This initial investment accounts for the lower gross margin in the first year. Ongoing SG&A costs will likely be low because of the partnership with Beacon Portal, since the Service Portal will bear most of the marketing and customer acquisition costs, and will sell services directly to customers. Additional ASP costs will include developing new or enhanced application service offerings, and building partnerships with application developers, portals, and NSPs. In the financial example, the net margins are 33% in the second year and 36% in the third year.

The financial model indicates that ASPs can expect significant margins on their revenues.



4.4 Network Service Providers

4.4.1 Business Strategy

NSPs provide on-demand IP network connectivity services between business consumers and ASPs, based on the security and Guaranteed QoS parameters specified by the ASP for their particular service. Beacon Network provides access and bandwidth services. However, the commoditization of transport services means that the NSP must seek to support advanced IP services across its networks to benefit from the higher margins that these services can command.

The new architecture for delivering IP services enables Beacon Network to partner with third-party Service Portals and ASPs to deliver advanced IP services. NSPs can offer network based services, such as voice over packet and VPNs, as well as network services packaged with application services offered by ASPs, such as software rental or data backup services. Advanced IP services further drive bandwidth and application usage, increasing Guaranteed QoS bandwidth consumption and thereby increasing Beacon Network's revenues.

Beacon Network's core competencies are operating a large network and maintaining Guaranteed QoS connectivity to a significant number of customers. Beacon Network's key challenge is partnering with as many Service Portals and ASPs as possible, in order to maximize its share of connectivity revenues for future IP services.

An actual example of an NSP operating in the new architecture is Enron Communications. Enron is an NSP that delivers high-bandwidth products and services to its customers. Enron has overbuilt its network to provide performance and has integrated intelligence into the network to deliver advanced IP services. Enron can define security and QoS on a per-application basis and it has partnered with companies such as PictureTel to offer advanced IP services designed to attract new customers and retain existing ones. Enron Communications' advanced IP service offerings include delivering live television content, videoconferencing, streaming video, distance learning, network hosted applications, and new forms of entertainment. Enron Communications offers these advanced IP services to both broadband enterprise and service provider customers.

4.4.2 NSP Operations

When business consumers order advanced, on-demand IP services through Beacon Portal, the Service Portal forwards the necessary service provisioning information to Beacon Network. For pure network based services (e.g. on-demand IP VPN connectivity), Beacon Network will provision Guaranteed QoS connectivity between the requested locations. For ASP based services (e.g. conferencing), Beacon Network will provision Guaranteed QoS connectivity between the ASP's data center and the consumer location.

The NSP will require an on-demand provisioning system that can automatically configure the

QoS requirements into the CLE equipment, based on subscription requests from Beacon Portal.

The integrated systems among Beacon Portal, Beacon Network and Spinnaker provide the foundation to deliver guaranteed end-to-end QoS and security.

4.4.3 Technology Alternatives for an NSP

In order to offer advanced IP services, security and QoS must extend to the customer's location and must assign network resources by user or by application. Providers are just starting to implement QoS technologies, such as MPLS and DiffServ, on their backbones today.

The network for delivering advanced IP services will be transparent to the business consumer and may include a variety of technologies and protocols such as ATM and IP routing utilizing copper, fiber, and wireless communications services. Both IP routed networks and ATM networks have advantages and disadvantages. Operating on Layer 3 of the OSI model, IP routing is more common and relatively easy to maintain. The IP routing QoS mechanisms, however, are not yet deterministic. Operating at Layer 2 of the OSI model, ATM QoS mechanisms are more evolved and deterministic. ATM, however, is more complex to operate and maintain.

Most NSP networks will likely include a combination of both ATM and IP routing topologies, which together must be equipped to provide end-to-end service guarantees for advanced IP services.

4.4.4 Managing the Service Network

The Service Portal will identify and resolve service problems that arise. When required, Beacon Portal will escalate complex network problems to Beacon Network. To identify, track and facilitate resolution of problems, Beacon Network integrates the Service Portal's network management systems and trouble-ticketing applications into the NSP infrastructure.

Customer billing information is sent from Beacon Network to the Service Portal, so that Beacon Portal can track all usage and billing information. Hence, integrated settlement systems will be required.

Because the NSP owns and manages the infrastructure that supplies IP services to end users, it can provide service level reporting to business consumers, Service Portals and ASPs.

4.4.5 Financial Examples

Beacon Network generates revenue in two basic areas — basic access to the Guaranteed QoS network and fees for transport of usage based advanced IP services. For simplicity, Guaranteed QoS and advanced IP services opportunities are examined separately in this model.

- The first financial example examines Beacon Network's investment and return for the basic access service to the Guaranteed QoS network, including CLE.
- The second financial example examines the business case for delivering an advanced IP service over the Guaranteed QoS network.

4.4.5.1 Financial Example - Guaranteed QoS Access

Beacon Network Assumptions:

- Beacon Network has an existing QoS-enabled network backbone.
- Revenue from basic access services to the Guaranteed QoS network assumes 2,000 customer connections added over a three-year period.
- Revenue sources include recurring access charges to the Guaranteed QoS network and CLE installation fees.
- Cost of sales includes Guaranteed QoS enabled CLE, on-demand service activation OSS, monthly local loop circuit and leased equipment, installation and OSS provisioning integration.

Beacon Network Guaranteed QoS Access Business Model

($000s)	Year 1	Year 2	Year 3
Revenues	$5,525	$29,660	$68,142
Cost of sales	$6,016	$19,843	$42,006
Gross Profit	($491)	$9,817	$26,136
% of revenues	-9%	33%	38%

4.4.5.2 The Bottom Line – Guaranteed QoS Access

The financial example is typical of a broadband IP access service. Although revenues are significant and growing, margins will continue to be squeezed. Continuing to offer only basic access and bandwidth services does not present the most compelling business case.

Cost of sales includes capitalization of CLE and local loop equipment, and expenses for CLE installation and support. Costs also include the capitalization of first year investments including $5 million for initial billing, on-demand service activation OSS and systems integration. The first year loss is largely due to the cost of integrating critical operations and provisioning systems. In the model, the net margins after the first year will increase from 7% in the second year to 18% in the third year.

The key value of the service network is the foundation that is created for high-margin revenues from the transport of advanced IP services.

4.4.5.3 Financial Example – Connectivity for Advanced IP Services

Beacon Network Assumptions:

- Wholesale settlements based on an $.08 metered rate per videoconferencing customer minute and a $.03 metered rate per secured data-conferencing customer minute from Beacon Portal.
- Cost of sales includes Guaranteed QoS bandwidth between ASP conferencing servers and customers connected to the service network, as well as support and network operations.

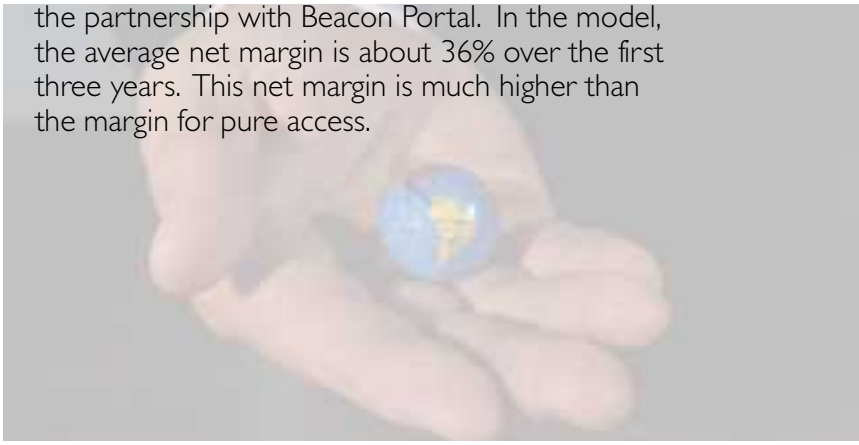
Beacon Network Business model

($000s)	Year 1	Year 2	Year 3
Revenues	$2,138	$11,766	$27,309
Cost of sales	$1,163	$4,602	$10,152
Gross Profit	$975	$7,164	$17,157
% of revenues	46%	61%	63%

4.4.5.4 The Bottom Line – Advanced IP Services

Although wholesale revenues from Guaranteed QoS transport are expected to be less than the wholesale revenues generated by the ASP, the revenues and margins for Beacon Network are still significant. It is important to remember that this financial example represents only one of what will be many advanced IP services transported across the network. In addition, the revenues created by the delivery of advanced IP services are incremental, over and above existing access and bandwidth income generated by typical network service providers today.

The incremental costs of additional bandwidth provisioned across an installed network infrastructure is quite low. Support costs are low because Beacon Portal is handling level-one support. Ongoing SG&A costs will likely be low because of the partnership with Beacon Portal. In the model, the average net margin is about 36% over the first three years. This net margin is much higher than the margin for pure access.



5 The Result

The table below summarizes the key findings for the Service Portal, ASP, and NSP in the proposed architecture and illustrates the tremendous gain for all players, in terms of core competency, revenue magnitude and gross profit.

Enterprise customers will leverage the latest networked applications in an on-demand, pay-as-you-go format, with little incremental investment. Advanced IP services offer a viable and attractive outsourcing alternative to internal IT initiatives which are capital and resource intensive. Small and medium enterprises, who previously could afford neither extensive internal IT departments nor high-end outsourcing, now gain access to a range of valuable IP services.

The three architecture partners will capture an increasing share of corporate IT spending, by addressing the common requirements of guaranteed bandwidth, security, and on-demand service activation. The combination of services created by partnerships generates customer loyalty and reduces churn.

The architecture allows each player to focus on its core competency in turning the vision of advanced IP services into a reality.

	Core Competency	Revenue Magnitude	Gross Profit
Spinnaker (ASP)	**Information Technology**	**Medium**	**Medium (52%)**
Beacon Portal (Service Portal)	**Marketing**	**Large**	**Low (23%)**
Beacon Network (NSP)	**Networking**	**Medium for Access Large for IP Services**	**Medium (38%) High (63%)**

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