

Intelligent IP service optimization tools are essential for long-term planning to determine what kind of services your network will be offering, to how many subscribers, and how much bandwidth will be required to support them. There are four variables that service optimization tools can help you predict and manage:

- **Number of Subscribers:** Is your subscriber base growing, shrinking, or holding steady? What are the trends?
- **Bandwidth Usage** — How are current subscribers using your network services. How will future subscribers use them?
- **Service Offerings** — What services are most popular? What new services should be added to your offering to keep you competitive and even ahead of the curve?
- **Bandwidth Capacity** — How much bandwidth capacity is required to support your service offering? How can that capacity be utilized to the fullest?

Let's take a closer look at these four variables and explore how service optimization tools can address them to help keep your network performing as expected and able to successfully support new offerings.

### Assessing Long-Term Usage

Chapter 6 showed how day-to-day monitoring of the network enables you to improve your network's performance and to track usage statistics. Analysis of your

subscribers' past usage behavior over longer periods of time can also help you improve the ongoing performance of your network.

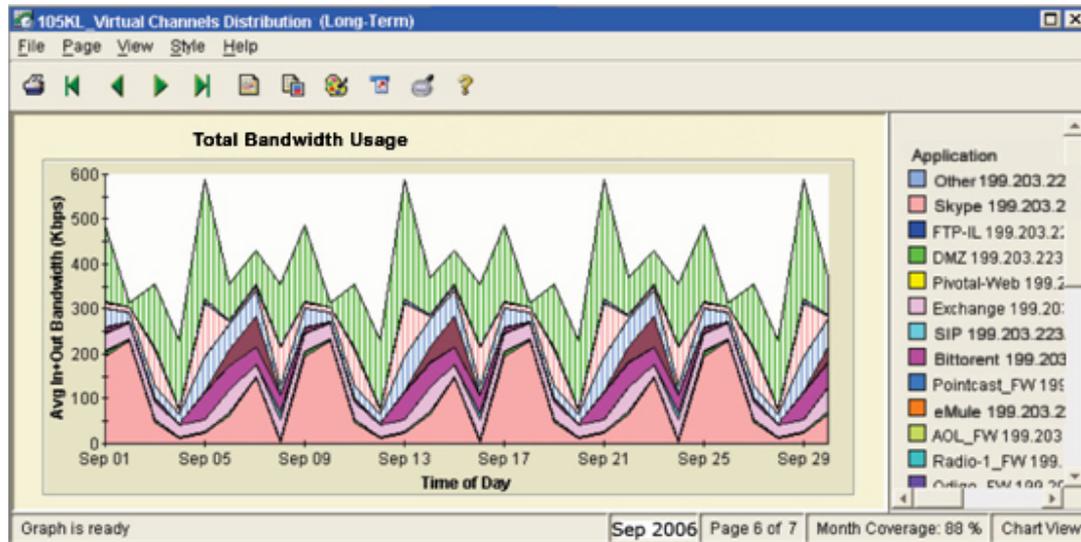
What trends do you see in your network? Have you noticed usage increases in the evenings? Has there been an increase in the amount of bandwidth consumed by VoIP applications? Are there recurring times when network usage is particularly low or high, and are these fluctuations predictable? Historical reports that show bandwidth usage over time can provide a clear sense of how your network is being used in general and the specific per application and per subscriber usage patterns that have evolved.

By monitoring traffic flows over an extended period of time (day, week, month, or entire year) you can see patterns and analyze changes in bandwidth consumption (see Figure 1). For example, you can monitor changes in network usage following the introduction of a new service or the launch of a targeted marketing campaign. Likewise, you can see the mix of applications that are consuming bandwidth, which ones are most popular – and with whom.

Another statistic of great interest is the percent of broadband traffic that stays "inside" the network (on-net) versus the percentage of traffic that goes outside your service domain and ends up on a competing provider's network (off-net). By tracking inbound and outbound flows, you can determine how much of the traffic you are handling exclusively, and explore ways to increase that percentage and realize even greater returns on your investment.

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**Figure 1. Month-Long View of Inbound/Outbound Bandwidth Usage**



This report shows how much of the total bandwidth each application is consuming during the month of September. There are distinct patterns emerging for the DMZ channel. This would signal the network operator to drill down further to see what might be causing these periodic spikes. Over time, the network operator may be able to identify usage patterns that could be made profitable through “special” service packages.

The insights that you gain from analyzing long-term usage reports allow you to identify real and potential trends that influence your service offering; to pinpoint problem areas that affect network performance; and to determine QoS requirements that can help you control service delivery and allocate available bandwidth more efficiently.

### **Adding Bandwidth vs. Network Optimization**

Service optimization tools help you leverage your bandwidth investment and delay or significantly reduce planned increases in broadband capacity. Time and again, it has been proven that throwing more bandwidth at a performance problem provides only temporary relief and is never a long-term solution. However, when adding capacity becomes necessary, IP service optimization tools can be used to obtain a more accurate forecast of your future requirements and to ensure that you do not incur the cost of bandwidth prematurely. To analyze whether or not you really need to add more bandwidth capacity to your network, consider these steps:

1. Review past bandwidth requirements in correlation with the number of subscribers, type of services in use, and service-level agreements (SLAs) in place at the time. Extrapolate those historical requirements to current or forecasted subscriber growth, new applications, etc.
2. Analyze specific application requirements and determine if their performance requires raw bandwidth or guaranteed quality of service or both. Define QoS policies that give each application the priority and QoS it needs, and see if that improves performance without increasing capacity.
3. Revisit your original oversubscription ratio. Is it still effective? If not, you can re-define your oversubscription ratio and adjust bandwidth allocation policies accordingly, or develop a cost-effective bandwidth upgrade plan.

In many instances, using IP service optimization reports can delay or eliminate additional investments in network bandwidth. For example, let's say there is an increase in customer complaints due to network slowdowns. You can check to see which applications are in use; which applications are consuming the most bandwidth, which subscribers are the top users of those applications, etc.

By drilling down ever deeper into your network traffic flows, let's say you discover that over the past week, there has been a significant increase in HTTP traffic, and most of it is being generated by a patch server from a major software vendor for its automatic application updates. You can tune your QoS policies to limit the bandwidth allocated to a specific traffic flow or a specific IP address, or subscriber host, so that it does not degrade network performance for other applications and subscribers.

### **Plan for New Service Offerings**

The next "killer application" in the digital world is anyone's guess, but analysts generally give the industry an early heads-up, as they did with the "triple play" of data, VoIP, and video, and as they are now doing with IPTV. To make sure you are ready for next generation services, you can use IP service optimization tools to analyze how well your network is prepared to support these new applications. The next few chapters will explore these issues in more detail.

For now, let's look at an example of how service optimization tools can reveal the impact of a new service on the network and how this critical information can help you plan the rollout of the service on a larger scale.

Let's say a service provider has a hunch that online gamers could be a potential source of increased revenue. The provider wants to find out more about gaming applications and the way people use them in order to explore potential business opportunities. One way to do this is to monitor the traffic flows and interactive sessions of all gaming applications. Over time, the provider will be able to see which games are most popular, how much bandwidth they require, who are the biggest "gamers" and whether usage is increasing or decreasing. From the results, let's say the provider identifies the 10 most popular online games during the last 6 months, and notices that the usage of the top three games has increased by 100% during last month.

Armed with this "network intelligence" the provider decides to launch a dedicated games package, guaranteeing minimum bandwidth during peak usage periods for the top-10 games. Direct marketing efforts for a pilot program would be aimed at the subscribers who were identified as top users. The provider can then monitor the effect that this special offer has on the use of gaming applications.

Of course, service optimization strategies such as these depend on the ability to accurately monitor all traffic flows on the network and to track bandwidth usage per application and per subscriber. Furthermore, optimization depends on the ability to combine full visibility with policy-based control that allows the provider to enforce different levels of service for different applications and subscribers.

### **Chapter Summary**

You can use the long-term reporting component of intelligent IP service optimization for a variety of planning activities. For example, you can collect historical information to help determine what bandwidth capacity will be required in the future so that you can optimize your spending. Usage, capacity, and service offering expansions can be justified more precisely when historical patterns of usage are fully known and integrated into future business models and plans.

Adding new applications and service levels should parallel existing trends and anticipate future ones. Trend reporting can help ensure that you are ready for the impact of new application services, which will be discussed in the next few chapters, by providing concrete analysis of demands.

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