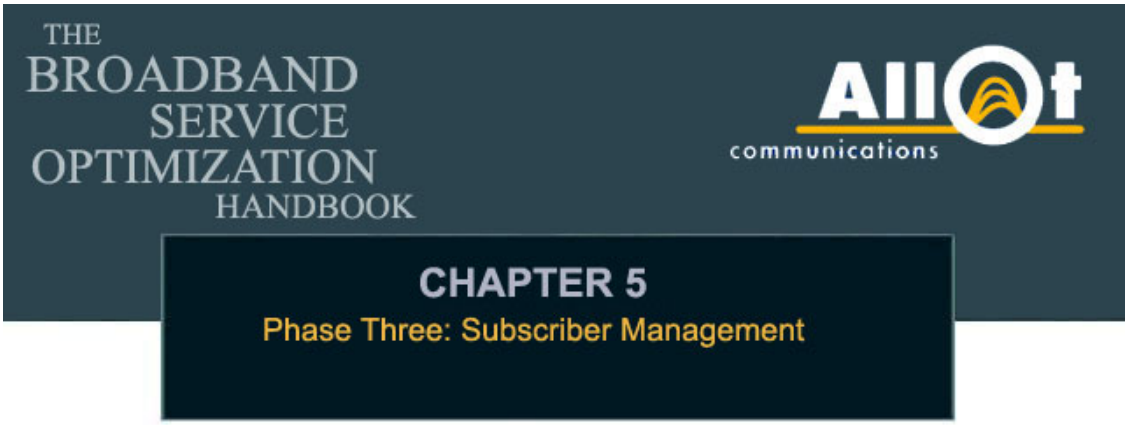

Today's broadband subscribers are unpredictable and dynamic. Their tastes and expectations can change overnight, especially with respect to the way they interact in the virtual world. So what is the best way to meet the challenge of unpredictable subscriber demands while retaining customer loyalty? The answer is to use subscriber management capabilities to maintain the service flexibility required to meet dynamic customer needs.

Like application control (Chapter 4), subscriber management involves traffic classification and assigning actions, but at a more granular level. Subscriber management focuses on managing the experience of individuals or groups of subscribers. Enabling you to offer a range of services, subscriber management lets you meet new expectations that evolve with subscriber behavior changes. By monitoring trends and the behaviors of individual subscribers and subscriber groups, you can seize opportunities to refine subscriber choices and charge customers based on a number of variables, thereby increasing revenue and customer satisfaction.

Subscriber management gives you the tools to do the following:

- Offer a variety of service package options based on particular types of users/application types
- Provide consistent delivery of service level agreements (SLAs)
- Guarantee quality of experience (QoE) across a full range of customer types, from residential to business subscribers
- Identify opportunities for increased levels of customer service and usage-based charging

- Send usage statistics to operational support systems (OSSs) for integrated charging and provisioning

These capabilities help you separate yourself from the pack as competition escalates and provider differentiation based on service offerings becomes important. Let's look at specific ways subscriber management can improve revenue generation and control business costs.

Increased Revenue Opportunities

You can use subscriber management to target specific groups of subscribers, such as voice-over-IP (VoIP) users, gamers, businesses, high-bandwidth users, casual users, peer-to-peer (P2P) users, P2P-free users, and others. You can improve their QoE by offering specific service packages and charging options to each of them, such as:

• ***Tiered services.*** Most providers already offer at least three classes of service - typically gold, silver and bronze - each of which executes different SLAs for throughput, relative priority, latency, and, in some cases, packet loss. But not all providers are consistently delivering on their SLA promises because of a lack of visibility and control over network usage. Policy-enforcement capabilities, on the other hand, keep these levels operating within agreed-upon limits.

• ***Service plans and packages.*** Once a subscriber base has been monitored and usage and trend information has been gathered, it is possible to design service plans and packages that match these trends. Providers can create targeted packages for general groups of subscribers, such as those described in the chart below.

Premium Home User	For home users who require high bandwidth or for heavy P2P users
Casual Home User	A low-cost, best-effort throughput plan
Business Premium	Premium services with higher speeds, optimized priorities, and bandwidth guarantees, possibly for application–specific business-critical traffic
VoIP Services	Guaranteed bandwidth per voice connection for providers who want to offer their own VoIP service or who want to tap into Skype, Vonage, or other third-party VoIP markets and services
Gaming services	Increased throughput and highest priority treatment during weekend or evening hours

Let's look at an example of a possible gaming offering and how you might set it up. We'll call the service "Power Gamer." The "Power Gamer" is going to be interested in guaranteed bandwidth for games. Most games require a minimum of 128 Kbps for successful operation. To set up a "Power Gamer" subscription, you would classify gaming traffic and set up a priority and guaranteed bandwidth levels specifically for gaming traffic. In Figure 1, the priority/action has been set to "high" priority with a 128-Kbps minimum bandwidth guarantee. You could also offer the "Power Gamer" service as an attachment to your regular Gold, Silver, or Bronze levels of service for an additional fee.

Figure 1. Classifications and Actions for "Power Gamer" Service Class

Traffic Type	Applications / Protocols	Priority or Action
Games	World-of-WarCraft X-Plane Plane Shift	High priority/Guaranteed minimum bandwidth of 128 Kbps

• ***Performance and SLA reports.*** Some customers, but especially business subscribers, may want to monitor usage and network performance; subscriber management allows providers to generate reports (see Figure 2) for an additional fee and an additional source of revenue.

Figure 2. Sample Report "Most Active Conversations during 24-hour Period"

Most Active Conversations During a 24-Hour Period

From	To	Internal Host	External Host	Protocol	Total Bandwidth (Kbps)	In Bandwidth (Kbps)	Out Bandwidth (Kbps)
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	22.113.191.195	22.65.78.249	HTTP	1386.8	692.4	694.4
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	79.116.118.247	80.155.46.124	HTTPS	1384.3	692.6	691.7
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	79.191.236.99	90.152.254.70	HTTP-Proxy	1372.8	687.4	685.4
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	88.85.205.113	127.252.234.98	HTTP	1351.4	678.6	672.9
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	5.220.60.180	116.130.216.28	TFTP	914.5	456.2	458.2
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	17.238.82.212	29.9.161.82	FTP	910	454.9	455.1
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	61.80.59.249	56.0.223.104	FTPS	908.5	454.3	454.3
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	81.146.152.1	18.87.110.176	FTP	905.5	453.9	451.6
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	39.215.36.87	13.130.118.21	FTP-DATA	895.9	447.4	448.5
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	97.39.93.109	27.56.209.47	FTPS-DATA	893.2	446.6	446.7
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	110.119.118.65	98.46.112.91	DNS	466.8	234.1	232.8
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	100.229.183.192	19.220.12.85	DNS	463.3	232.7	230.6
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	adsl-68-123-209-146.dsl	102.2.129.233	BGP	460.9	230.7	230.2
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	2.12.143.200	100.233.112.18	IMAP3	460.9	230.8	230.1
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	121.90.82.233	56.37.107.156	Biff	460.2	230.2	230
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	29.34.227.158	53.57.202.139	CC-MAIL	460.1	230.5	229.5
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	94.220.192.142	14.65.154.165	IMAPS	459.4	230.4	229
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	55.243.237.173	120.58.51.162	ICMP	459	229.4	229.7
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	22.20.171.83	46.244.86.51	BGP	458.5	229.1	229.3
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	90.152.205.234	115.18.103-84.rev.g	OSPF	456.9	228.4	228.5
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	119.137.9.85	117.34.36.183	IGMP	456.6	228.4	228.2
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	91.76.142.121	20.166.249.244	MS Exchange	456.5	228.1	228.4
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	102.24.140.249	98.206.250.13	IMAP2	455.4	227.1	228.4
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	49.240.110.134	123.24.206.45	IMAP2	455.2	227.6	227.6
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	29.91.142.63	28.41.175.253	IMAPS	454.2	227.1	227.2
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	82-37-65-252.cable.ubr(	124.125.230.95	GRE	454.1	227.1	227
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	23.78.216.10	1.126.177.84	MS Exchange	452.8	226.9	225.9
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	25.52.159.120	c-68-37-75-81.hsd1.	RIP	452.7	226.6	226.1
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	26.180.175.193	45.208.174.19	EGP	450.9	225.6	225.3
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	108.218.9.168	37.156.205.227	ARP	450.4	225.2	225.2
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	91.9.239.89	3.198.163.236	SMTP	448.9	224.2	224.6
Aug 15 2006 17:00:00	Aug 16 2006 16:59:59	98.91.191.219	i125-204-28-215.s11	CC-MAIL	448.7	224.8	223.9

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• ***P2P-free Internet.*** Some subscribers, such as parents of teenagers, might wish to automatically protect against fines for illegal P2P file sharing, such as those that have been levied by the Recording Industry Association of America for music copyright infringement. A P2P-free service for a minimal monthly fee prevents P2P activity from taking place on their connection. It generates additional revenue and also frees up bandwidth. To set this up, you would block all P2P protocols and traffic, both download and upload, for the customer account in question. Subscriber management allows the blockage of the P2P downloads and uploads without interfering with other download and upload activities for that subscriber.

• ***Usage-based charging.*** Because of the growing gulf between heavy and casual users, usage-based charging is gaining in popularity. When subscribers pay by the megabyte, service costs become fairer. When tiered package usage caps are exceeded, incremental charges apply. In addition, it would be possible to provide your subscribers with warnings that they are about to exceed their contracted limits.

• ***Bandwidth booster options and self-provisioning.*** Another service option is giving control of service directly to the user. Booster options that provide a temporary increase in speed through a secure portal for such uses as video-on-demand downloads give the subscriber both control and power while adding provider revenue. With this kind of self-provisioning, business subscribers can access a “virtual policy manager” to set and change application priority policies and view trending and real-time reports.

Containing Costs

Using deep packet inspection (DPI) to gain visibility into the network and enable application control at the subscriber level has important additional benefits that relate to cost containment. By optimizing the network through traffic management, providers minimize adding infrastructure and bandwidth to improve network performance. Instead, subscriber management can be used to improve customer

service and increase customer loyalty, thereby reducing churn, maximizing the subscriber base, and improving charging procedures. Here's how:

- ***Faster troubleshooting.*** Increasingly, subscribers are choosing service providers based on the quality of the customer service. By using service optimization to increase the array of service offerings, to improve the QoE, to maintain SLAs, and to speed up the complaint response time, providers are able to reduce operational costs while considerably improving customer service.

- ***More accurate charging.*** Inaccurate or inexact charging information can result in a loss of revenue. Subscriber usage information, once unattainable, is now delivered by subscriber identification and tracking capabilities and enables sophisticated charging plans. As mentioned earlier, usage-based charging is increasingly popular, as is quota-based charging. These usage statistics gathered by the service optimization system can be integrated with third-party billing systems and OSSs, which we cover in detail in the next chapter.

Chapter Summary

Subscriber management, the third phase of traffic management, emphasizes the customer satisfaction element for service providers by accommodating changes in subscriber behavior, recognizing trends, enforcing SLAs, and allowing providers to increase the scope of their service offerings. Subscriber management enhances revenue by enabling providers to meet user needs more thoroughly through such options as tiered services, premium plans for businesses and heavy users, VoIP services, usage-based charging, and self-provisioning. Subscriber management also contains costs by accelerating troubleshooting for faster customer service response times.

