Integrated DPI and Cisco In-Line Services: Optimize the Flow of Traffic and Monetize Your Network

What You Will Learn

As mobile broadband traffic increases, network operators must find new ways to lower the cost of operating their networks and deliver innovative revenue-generating services to their subscribers. This white paper explains the two leading solutions to these challenges: integrate the applications needed to optimize and monetize a mobile network into the mobile gateway or provision each application on separate standalone servers.

Introduction: Optimize and Monetize Your Network

Mobile operators, from cell phone companies to ISPs, are faced with two challenges: how to optimize and monetize their networks. With mobile broadband traffic projected to increase up to 35 times its current volume by 2015, the response to these two issues could mean the difference between significantly growing your business over the next five years or falling behind the competition.

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Facts that underscore the need for mobile operators to act sooner rather than later are:

- By 2014, mobile broadband networks will take up 40 exabytes (1 billion gigabytes) annually, up from a total of 1.08 exabytes in all of 2009.
- Smartphones and laptop air cards will drive more than 90 percent of global mobile traffic by 2014.
- Global mobile video traffic is forecasted to be 2.3 exabytes per month by 2014.
- By 2014, more than 400 million of the world's Internet users will access the network solely through a mobile connection.[1]

Innovative, new services as well as popular existing ones will propel this exponential increase in traffic. Examples include:

- YouTube accounted for 10 percent of global bandwidth during Q3 and Q4, 2009.
- Skype represents 77 percent of the global voice over IP (VoIP) bandwidth.
- Peer-to-peer (P2P) traffic is the single largest factor leading to cell congestion, and accounts for 34 percent of bandwidth utilization in the top 5 percent of cells.[2]

Two Choices: Integrate DPI in the Gateway or Leave It Out

Policy and Charging Control (CPP), Deep Packet Inspection (DPI) and a simplified architecture are the baseline elements needed to monetize a mobile broadband network and reduce your overall capital expenditures (CapEx) and operational expenses (OpEx), yet increase performance.

There are two ways to achieve these goals: 1) integrate deep packet inspection (DPI) and associated applications in the mobile network gateway, or 2) run all of these applications on separate, standalone servers outside the gateway.

[1] "Cisco: The Mobilpocalypse Is Coming!!!!!," Gigaom, February 9, 2010, http://gigaom.com/2010/02/09/cisco-the-mobilpocalypse-is-coming/.
[2] Global Mobile Broadband Traffic Up 72%," WebProNews, February 28, 2010, http://www.webpronews.com/topnews/2010/02/08/global-mobile-broadband-traffic-up-72.

Integrated Solution Costs 38 Percent Less to Operate

According to a five-year study comparing the TCO of an integrated network to a standalone solution serving one million subscribers, the integrated model costs 38 percent less to operate and its TCO was 17 percent less. The study went on to say, "As mobile operators reduce their capital expenditure budgets the integrated architecture's operational expenditure advantage will create an even larger TCO differential."[3]

DPI: The Foundation for Monetizing Networks

DPI – the ability to inspect packets on a granular level and read information such as the application type and protocol as well as the subscriber source and location – is the leading technology for adding intelligence and visibility to mobile broadband networks. For example, a service provider could use DPI not just to identify a video stream but to pinpoint its source as YouTube, abc.com, etc.

DPI is also the key to monetizing a network. One industry report explains that, "with DPI, each user's application stream can be plucked out of a sea of IP packets and either assigned a QoS [quality of service] and billed for it or blocked. Billing can even be more granular, for instance, based on a price per transaction. Most [service providers] are beginning to lean toward the practical use of DPI equipment for usage-sensitive pricing. For mobile carriers, DPI can enable per-transaction-based services that have not previously been charged for. For example, a mobile carrier could charge for a single MMS message.... They might also set different prices for picture attachments than for video attachments, etc. This type of use for DPI will grow as service complexity increases."[4]

"Some operators are moving toward sophisticated forms of metered pricing based on speed and consumption, striving to balance profitability and consumer satisfaction."

DPI Plays a Key Role in Optimizing Networks

When it comes to optimizing, another industry analysis shows that, "the most important uses [of DPI] today are around internally facing network optimization and control. Solutions designed for security detection and mitigation and QoS prioritization, while not readily transparent to the subscriber base at all times, enable operators to maximize network efficiency and ultimately maintain subscriber happiness."[5]

DPI in combination with applications that further optimize the network and monetization – such as content filtering, firewall, payload compression, application detection, content charging, and others – form a foundation for PCC and other services that will address the business needs of mobile network operators now and into the future.

Choosing Between an Integrated or Standalone Solution

Industry experts agree that DPI and its complementary applications are the best way to increase network efficiency and a mobile operator's revenue. However, a major point of discussion in the market, and one of extreme importance because it determines how complex and expensive the mobile network will be, is whether to integrate these applications into a single platform or provision each one on a separate server that sits next to the gateway as an external solution.

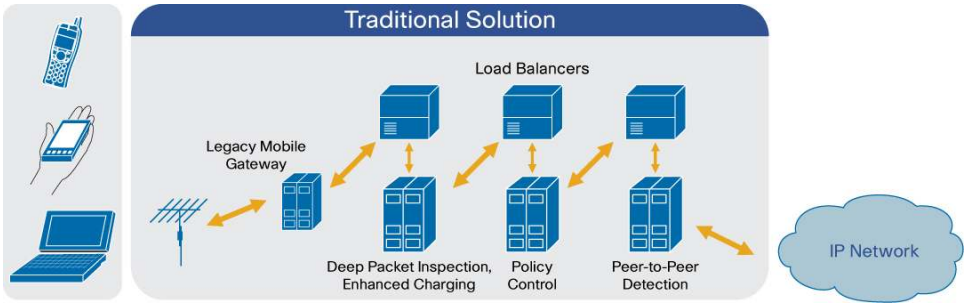
Standalone Option Requires More Network Elements

In the traditional standalone solution, the services are deployed serially (Figure 1). Each subscriber session runs sequentially through each server whether or not the customer is using the service on that server. As a result,

[3] "The Business Case for an Integrated Policy and Charging Control (PCC) Solution in the Multimedia Core," white paper by Network Strategy Partners, February 2010, p. 12.
[4] "Packet Sniffing: Deep Packet Inspection and Net Neutrality," Laurence Surtees, et al, IDC, July 2008, p. 5.
[5] "Quantifying the Demand for DPI," a survey analysis by David Vorhaus, Yankee Group, June 12, 2008, p. 3.

operators must overprovision the hardware and software for each service in order to deploy enough bandwidth for the sessions. Because the network cannot intelligently route each session based on a subscriber's preferences, it is virtually impossible to offer customized, tiered services and content packages to customers.

Figure 1. Serially Connected Standalone Servers



The standalone option also creates situations where operators may need to bundle services and charge a flat rate for them in order to cover the cost of the services that subscribers do not use or want (a major customer satisfaction concern). Operators may also have to give away services because they cannot turn a service on or off on a per-subscriber basis. In either case, the result is an unhappy subscriber and revenue loss. In addition, the standalone architecture:

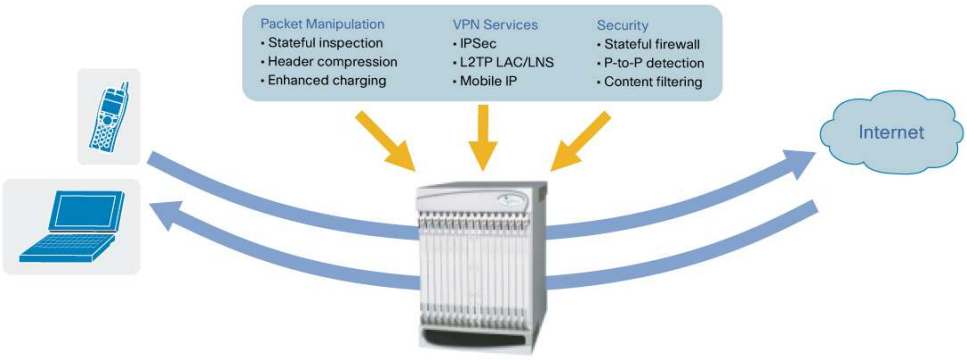
- Adds significantly to network complexity, ballooning the network's operational costs
- Introduces more elements that can fail or become points of entry for a malicious attack
- Increases OpEx due to management of multiple network elements and interfaces
- Increases CapEx for additional equipment and installation
- Provides limited session-state awareness and control in applying services on a per-subscriber basis, for example, time-of-day policy enforcement
- Reduces efficiency by requiring redundant tasks to be performed by the separate network elements
- Increases latency, from traffic traveling across multiple devices, which becomes perceptible to subscribers on services such as VoIP, where annoying gaps reduce the value of the service

Integrated Approach Simplifies Network Architecture

Integrating DPI and its companion applications into a single platform simplifies the network and gives the operator more control. By easily scaling services through a single provisioning point and eliminating unnecessary equipment, an integrated solution speeds up service installation and time to market. In addition, it improves performance by, for example, eliminating traffic hops across multiple devices and the associated latency, which can degrade VoIP services. Compared to the external standalone model, an integrated architecture provides a more profitable and flexible network by allowing operators to:

- Provide security services to safeguard against malicious P2P activities by mobile subscribers
- Create new revenue streams, such as offering corporate customers secure intranet access and special tariffs
- Offer performance improvements for popular voice, video, and data services
- Simplify network topology and reduce support requirements, which dramatically increases reliability
- Reduce CapEx and OpEx, which makes services more profitable

Figure 2. In-Line Services Integrated in the Gateway with DPI



A survey of mobile network operators showed that a majority "would like to see DPI monitoring and control capabilities embedded into another network element to broaden its usefulness and effectiveness.... The reason for this is twofold. First, it allows the inspection technology to easily feed intelligence into other control mechanisms, and thus increases the ability to monetize that intelligence. Second, it decreases the number of distinct elements that an operator must place directly in the routing path – therefore reducing network complexity and potential points of failure or delay."[6]

"The vendor community would be wise to focus its strategic direction on moving away from a standalone model."[7]

Cisco's Integrated Solution

The Cisco® ASR 5000 mobile multimedia services solution is designed specifically to meet the needs of operators seeking to implement a high-performance, integrated network. The Cisco ASR 5000:

- Has a minimal impact on network performance due to its distributed hardware and software architecture
- Activates DPI with a simple license key without altering any mobile core elements
- Provides a comprehensive set of license-key-enabled In-Line Services utilizing the integrated DPI. Services include: enhanced charging, content filtering, network-based traffic optimization, application detection and optimization (for applications such as P2P), and stateful firewall
- Has a lower total cost of ownership (TCO) than an external or bladed model (see sidebar on page 2)
- Includes a robust, integrated Cisco Unified Reporting Solution, not available on external platforms, which provides detailed reports on subscriber traffic and In-Line Services such as content filtering, as well as firewall and chassis health statistics (for example, CPU idle time, interface utilization, etc.)

Cisco In-Line Services

In-Line Services allow mobile operators to offer new services and easily scale them while helping ensure efficient end-to-end traffic flow with a simplified network topology. These services are deployed within the call flow, as opposed to requiring the call to be off-loaded to application servers. In addition, the simplified architecture eliminates the need for load balancers, firewalls, and routers to deploy and support additional services. The Cisco ASR 5000's In-Line Services include:

- **Enhanced content charging** allows operators, through DPI, to implement detailed billing schemes based on each mobile subscriber session or transaction.
- **Content filtering** controls access to defined content-enabling services such as parental controls.

[6] "Quantifying the Demand for DPI," p. 2.
[7] "Quantifying the Demand for DPI," p. 3.

- **Network-based traffic optimization** optimizes sessions or flows and provides quality of service based on parameters such as volume, usage, time-of-day, and traffic type. For example, bandwidth may be increased or restricted on a per-user basis depending on the service.
- **Application detection and optimization** service detects specific applications, such as P2P, and allows the network to appropriately manage those applications.
- **Stateful firewall** provides a security-layer application to detect and prevent unsolicited network applications and denial-of-service (DoS) attacks, and to efficiently manage IP addressing through Network Address Translation (NAT)/Port Address Translation (PAT).

Conclusion

Compared to a standalone solution, the integrated option, provisioning DPI and In-Line Services on a single platform, represents the most efficient and cost-effective way for mobile operators to optimize and monetize their networks. The integrated approach creates new revenue streams, simplifies network topology and management, and lowers OpEx and CapEx.

For More Information

For more information about how the Cisco ASR 5000 and Cisco In-Line Services can help you supercharge your mobile network, please contact your account representative or visit: http://www.cisco.com/go/mobileinternet.

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