

Executive Summary

Broadband providers must be able to adapt to changes in subscribers' behaviors and new applications by rapidly creating new services and business models. At the same time performance demands must be managed intelligently to sustain network infrastructure and conserve resources.

Procera Networks' Intelligent Policy Enforcement (IPE) solutions enable Intelligent Policy Enforcement (IPE), allowing broadband operators to provide personalization, service optimization, network assurance, and rapid creation of business models to monetize their infrastructure investments. IPE solutions provide three main capabilities: awareness, analysis and control. Awareness associates subscriber identities to IP addresses with applications in real time. Analysis extracts business and network intelligence from the traffic flowing through the network. Control enforces network policies that utilize the capabilities of the IPE systems to meet business goals. These capabilities combined enable the personalization and application awareness needed to craft and execute monetization and cost-avoidance strategies.

ACG Research conducted one combined and seven analyses of IPE enabled solution business cases. Four monetization business cases leverage the detailed awareness of individual subscriber profiles established by the IPE. This allows matching of individual needs with network conditions to create incremental revenue beyond that obtainable with "one-size-fits-all" pricing plans. Three business cases extract intelligence from the traffic flowing through the network to create and execute avoided cost strategies that address issues such as bandwidth usage, congestion management, traffic steering and peering control. ACG Research examined the economy of scope of the IPE platform and found that it can increase return on investment (ROI) by approximately five times by hosting multiple solutions on a common platform.

Key Takeaways

Procera Networks' intelligent policy enforcement solutions monetize network infrastructure investments and enable cost reduction strategies. One combined and seven business cases found:

- Monetization use cases produced ROI of 84% to 420% with payback in 8–18 months.
- Avoided cost use cases produced ROI of 82% to 136% with payback in 14–18 months.
- Hosting of multiple use cases on the same IPE platform increased ROI to more than 800% and reduced payback to 8 months.

Introduction

Consumers are hyper-connected via social networking, entertainment, and cloud applications and now access content from multiple devices across numerous broadband connections. Broadband providers (mobile and fixed) must be able to adapt to changes in users' behaviors and new applications by rapidly creating new services and business models that deliver a high quality of service to their subscribers. Simultaneously, providers must intelligently manage their resources to ensure that they do not strain performance and scalability, break broadband infrastructures and deplete available resources.

Intelligent Policy Enforcement (IPE) enables broadband operators to provide personalization, service optimization, network assurance, and rapid creation of business models to monetize their infrastructure investments. IPE solutions deliver three main capabilities:

1. **Awareness:** Associates identities to IP addresses with applications in real time through integration with AAA and OSS systems. For the purposes of analytics and service enforcement, awareness includes the ability to associate attributes such as location, devices, service plans, user groups, and other business-critical information with a subscriber's identity. Subscribers also can represent specific content within the cloud, as well as cloud consumers in a cloud operator's deployment.
2. **Analysis:** Extracts business and network intelligence from the traffic flowing through the network to enable easy resolution of critical business planning questions on bandwidth usage and needs, new services planning, congestion management, peering expansion, content delivery networks, and application popularity. This analysis is used to create incremental revenue and cost avoidance strategies.
3. **Control:** Enforces network policies by utilizing the capabilities of the IPE systems to meet business goals (revenue, profitability, and service stickiness). Intelligent charging, service tiers, usage quotas, traffic filtering, congestion management, traffic management, traffic steering, and peering control are all requirements for IPE based control.

Seven IPE business cases that exploit these capabilities are analyzed. Four business cases illustrate the monetization capabilities of IPE:

1. Intelligent charging
2. Advanced traffic steering
3. Usage management
4. Top-up portal

Three business cases illustrate the cost avoidance capabilities of IPE:

1. Peering control
2. Congestion management
3. Advanced traffic steering

The final business case illustrates the economy of scope that is obtained by running multiple solutions on a single IPE platform.

IPE Implementation

Procera's products have been deployed in a variety of the world's largest private and service provider broadband networks to monitor, manage or monetize network traffic while attaining high scalability and reliability. Procera brings these capabilities to the market through its comprehensive software environment called the PacketLogic O/S running on optimized appliance and chassis-based hardware. There are three platform types performing various software functions that when configured together operate as an Intelligent Policy Enforcement (IPE) system. These platforms are the PacketLogic Real-Time Enforcer (PRE), the PacketLogic Intelligence Center (PIC), and the PacketLogic Subscriber Manager (PSM) platforms.

Procera offers a comprehensive range of PacketLogic PRE platforms addressing various points of scale. Each of the platforms offers consistent feature richness enabled through the different PacketLogic software modules: LiveView, Filtering, Traffic Shaping, and Statistics. The PacketLogic PRE platforms offer a range of configurations. At the entry level the 1RU PL7810 system supports up to 5 Gbps of throughput; the mid to high-range PL8720, PL8820, PL8920 appliances support up to 15 Gbps, 30 Gbps and 50 Gbps throughput, respectively, in compact 2RU form factors. The PL10024 is the chassis-based solution with capacity up to 120 Gbps and 10M subscribers per system in a 13/14RU modular AdvancedTCA (ATCA) chassis form factor. The newest addition to the PacketLogic family is the PL20000 with 100 GE ports, a 14RU modular AdvancedTCA (ATCA) chassis system with support for up to 320 Gbps of throughput in a single system and multisystem performance scaling up to 5 Tbps.

Incremental Revenue Business Cases

These business cases exploit awareness, analysis, and control capabilities of IPE to create differentiated service offerings that match individual subscriber's needs with real-time changes in network availability conditions. This precise matching of needs with network conditions creates incremental revenue beyond what can be obtained by "one-size-fits-all" pricing plans.

Intelligent Charging

The business case envisions the development of incremental revenue by creating special buckets of data that are charged at different rates than flat-rate data. For example, traffic could be exempted from billing (Facebook for free) or a video or VoIP bucket could be offered for an additional fee. Billing buckets could be based upon:

- Zero-rate content/applications for a flat fee
- Reduction in cost for a specific application type

The business case is quantified by performing a cash flow analysis over 36 months.

Revenue Assumptions

Incremental revenue produced by the intelligent charging service offering is estimated as a function of the total number of basic service subscribers. Modeling assumptions include:

- 2 million basic mobile service subscribers
- Intelligent charging service penetration grows to 30 percent over 36 months
- \$10 per month additional fee for intelligent charging service
- 20 percent of incremental revenue assigned to IPE solution platform. The remaining revenue covers operating expenses such as sales, marketing and administrative expenses
- 6 months delay from project initiation to revenue generation

Capital Expense (CapEx) Estimation Assumptions

The PacketLogic PRE platform is sized to meet the throughput requirement of the last month (36th). Twenty-five percent concurrency rate, 2 Mbps average data rate during the busy period and number of intelligent charging service subscribers are used to calculate the system throughput requirement.

More CapEx is assigned for additional software and systems integration work on a per site basis. The CapEx per site is \$125,000, and 20 sites are used to serve the two million basic service subscribers.

Operations Expense (OpEx) Computations

Network operations expenses directly related to the operation and maintenance of the IPE system also are computed and included in the cash flow analysis:

- Engineer, Furnish and Install
- Network upgrades and patches
- Network care
- Testing and certification operations
- Training
- Floor space cost
- Power cost
- Cooling cost
- Service contract

Figure 1 shows the total cost (CapEx and OpEx), incremental revenue, and net cash flow for the intelligent charging service.

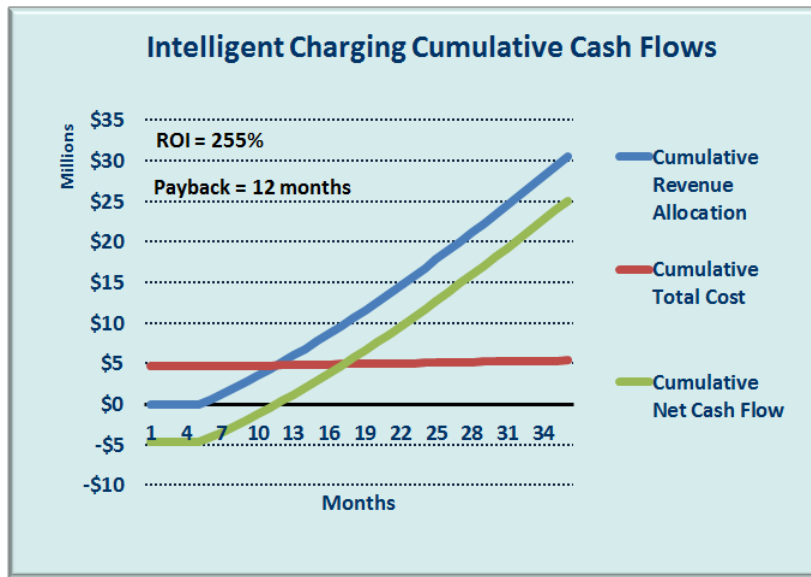


Figure 1 – Intelligent Charging Cash Flows

Intelligent charging provides incremental revenue and cash flow to service providers. Perhaps more importantly, it builds subscribers’ loyalty and stickiness by tightly linking service fees to the content most highly valued by subscribers. This yields 255 percent ROI over 36 months and a 12 month payback. The high ROI is due to the scale economy of the IPE system.

Advanced Traffic Steering

Advanced traffic steering is used to create value-added applications that are included in mobile subscribers’ base subscriptions. One such value-added application is parental controls. Traffic steering is used on an individual subscription basis to allow parents to restrict children’s access to objectionable web content. In this case study the parental control fee is \$5 per month and 20 percent of the benefit is assigned to recovery of the IPE system cost. Figure 2 shows the cash flow analysis.

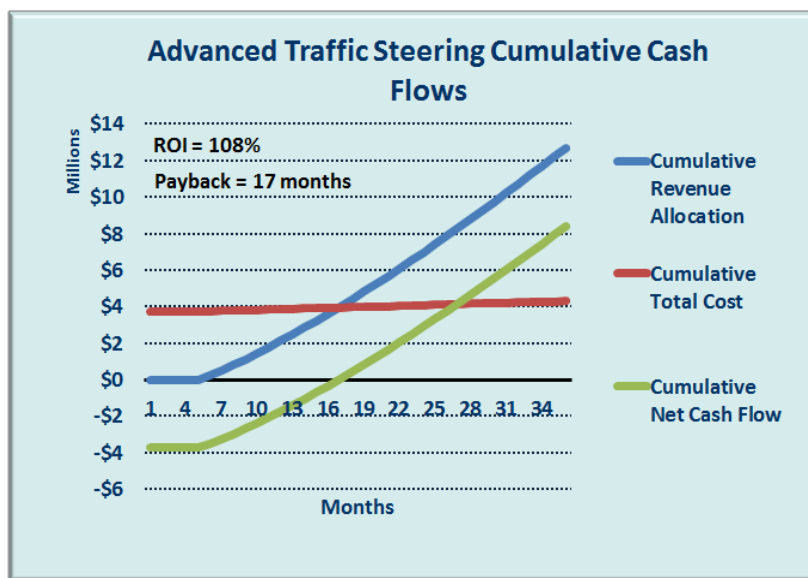


Figure 2 – Advanced Traffic Steering Cash Flows

The economic tradeoffs of advanced traffic steering are similar to those of intelligent charging services. With 20 percent of the incremental revenue allocated to the IPE platform a 108 percent ROI over 36 months is produced.

Usage Management

The usage management business case addresses those subscribers who exceed their monthly data limit. This is a bigger issue for wireless than wireline broadband operators because the cost of supplying bandwidth is higher for wireless operators. Policy-based usage management is a more attractive option for subscribers than the traditional overage treatments of automatically limiting access or assessing excess usage fees. Under policy-based usage management subscribers are presented a choice when they exceed their usage limit:

1. Pay an additional fee to continue receiving standard performance rates
2. Pay no additional fee and have service rate limited to very low performance levels

Subscribers' perceived value is increased by offering a service choice. The service provider realizes two forms of benefit from policy-based service management: 1) Incremental revenue is gained from those subscribers that elect the first option; 2) an avoided cost benefit is realized from those subscribers that elect rate limiting.

Business Case Assumptions

- 400,000 basic service mobile subscribers
- 20 percent of subscribers exceed the monthly data limit
- 40 percent of subscribers who exceed the monthly data limit elect to pay for more access; 60 percent of subscribers elect not to pay
- \$10 per subscriber for additional access
- \$5 per subscriber for avoided cost due to rate limiting
- 20 percent of additional revenue assigned to the IPE system

Figure 3 shows the cash flow analysis for the usage management business case.

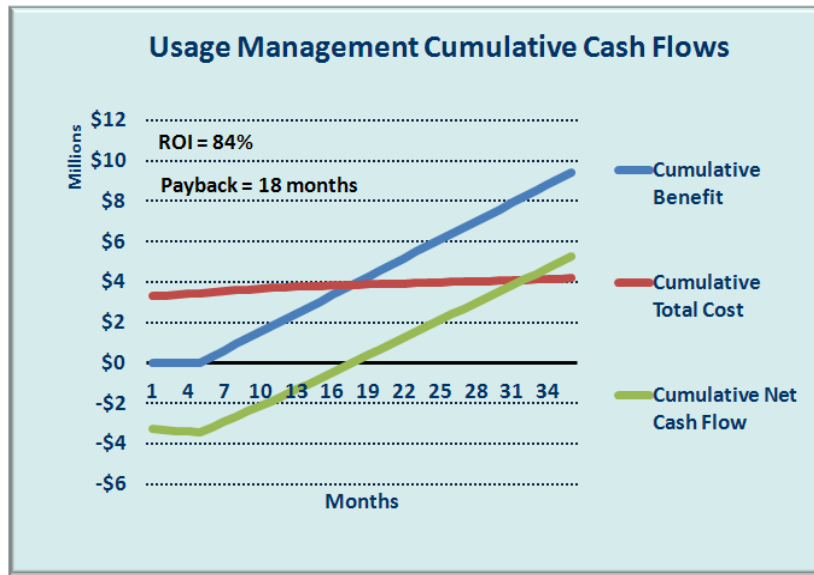


Figure 3 – Usage Management Cash Flows

The combination of additional revenue and avoided cost produces strong positive cash flow that delivers a solid return on the initial IPE system investment. The avoided cost benefit does not involve the costs associated with the billing and collection costs associated with incremental revenue opportunities. Consequently, the entire avoided cost benefit accrues to the IPE platform initiative.

Top-Up Portal

A top-up portal allows subscribers to add more data capacity to their broadband subscriptions or to re-fill a prepay account. This service is particularly attractive to wireless broadband subscribers using roaming services.

Revenue Assumptions

- 2 million basic fixed broadband service subscribers
- 25 percent of subscribers require top-up service
- \$5 per month average top-up fee
- 20 percent of revenue assigned to IPE system
- Revenue recognition begins 1 month after IPE installation begins

Figure 4 shows top-up service cumulative cash flows.

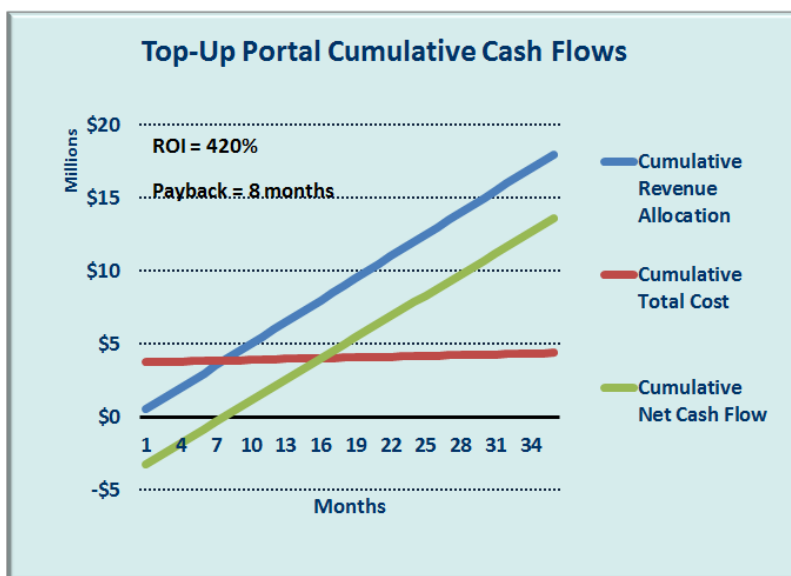


Figure 4 – Top-Up Portal Cash Flows

The top-up portal is a highly attractive offering for service providers and subscribers. It provides service providers with incremental revenue at a low incremental cost, and it increases the attractiveness of broadband service for subscribers by eliminating a barrier to increased usage.

Cost Avoidance Business Cases

These business cases extract network intelligence from the traffic flowing through the network to enable easy resolution of business and network planning issues, such as bandwidth usage, congestion management, traffic steering and peering control.

Peering Control

In instances when traffic flows are asymmetrical across a peering point the ISP that is a net receiver of content is charged for the excess traffic flow. This business case uses the traffic shaping capabilities of the IPE system to bring the traffic flows across the peering point back to equilibrium and thus eliminate the charge for excess traffic flow. Since costs are assessed for peak period usage subscriber traffic is only rate limited during the peak usage period. A cash flow analysis is conducted to compare the cost of deploying and operating the IPE solution versus the avoided cost benefit obtained by eliminating the excess peering cost.

Study Assumptions

- 20 Gbps of transit traffic across peering point without rate shaping
- Rate shaping reduces transit traffic by 25 percent
- \$10,000 per month per Gbps transit traffic fee
- Benefit accrues 2 months after project initiation

Figure 5 shows the cash flows for the peering control business case.

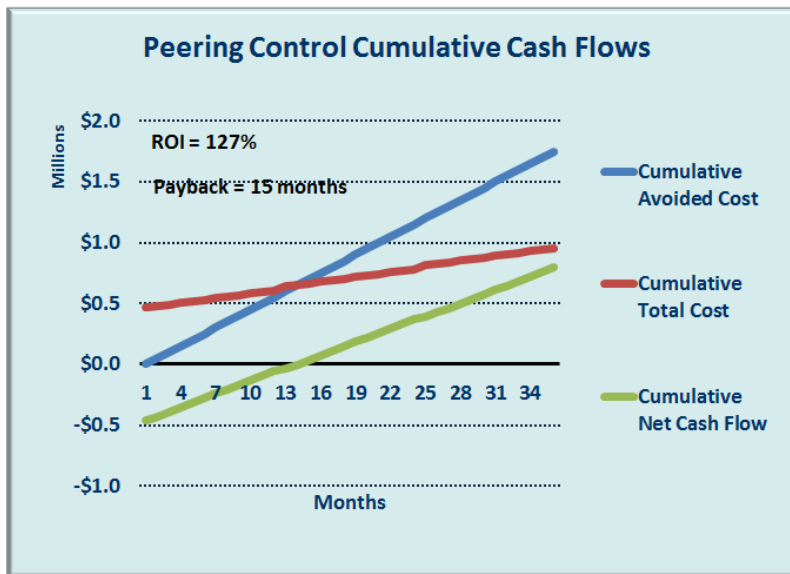


Figure 5 – Peering Control Cash Flows

The peering control business case breaks even in 15 months and has a return on investment of 127 percent. Project breakeven will be even shorter at higher traffic volumes because the IPE system has strong scaling economics.

Congestion Management

This business case avoids cost by controlling traffic congestion, which eliminates the cost of adding router capacity to the network. Traffic congestion is controlled by applying acceptable use policies, such as limiting top talkers and allocating subscribers' bandwidth. In the mobile network quality of experience for each cell site is controlled. Router capacity in the access and aggregation networks is reduced by applying congestion management for both wireline and wireless networks.

Study Assumptions

- Network serves 400,000 basic fixed broadband service subscribers
- 25 percent concurrency rate
- 1 Mbps average data rate per concurrent subscriber during the busy period
- 20 percent network traffic reduction related to congestion management
- \$94,000 per year cost of 1 Gbps of router capacity¹
- Avoided cost savings are realized 1 month after project initiation

Figure 6 shows the cash flows for the congestion management business case.

¹ The \$94,000 per year per Gbps avoided cost is derived from ACG Research's studies of access and aggregation network total cost of ownership. See www.acgresearch.net for recent examples of these studies.

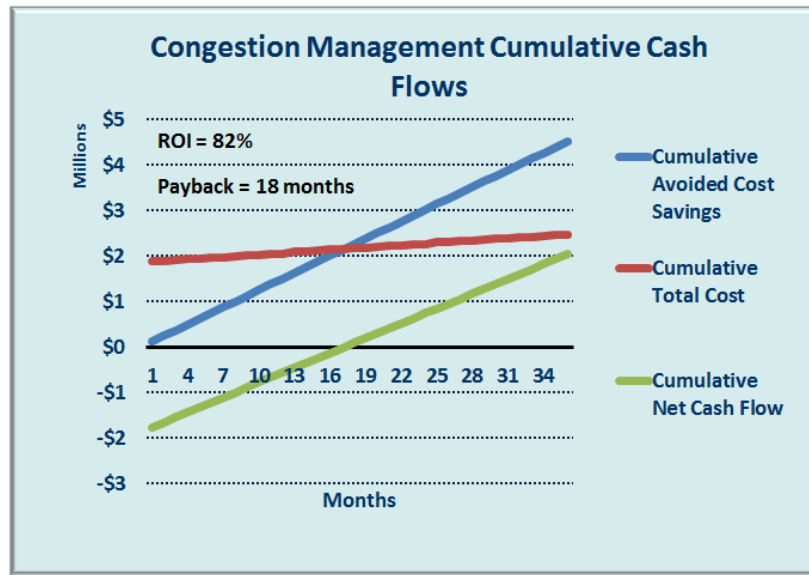


Figure 6 – Congestion Management Cumulative Cash Flows

The avoided cost savings rise much more rapidly than the cost of installing and operating the IPE based congestion management solution. This yields 82 percent ROI over 36 months. ROI and payback will increase with higher subscription levels because of the strong scaling economics of the IPE solution.

Advanced Traffic Steering

Advanced traffic steering is used to provide video caching and optimization services that reduce router capacity requirements in the aggregation and access networks. Caching services reduce network capacity requirements by locating the video content closer to the subscriber. This decreases bandwidth requirements on the section of the network that is upstream from the cache. Optimization services trans-code the video traffic so that the download is sized to the screen size. For example, the download to a laptop would be larger than the download to a smart phone. This optimization reduces network capacity requirements between the subscriber and the trans-coding system.

Study Assumptions

- 400,000 subscribers to basic fixed broadband service
- 10 percent network traffic reduction due to trans-coding
- 15 percent network traffic reduction due to video caching
- \$94,000 per year cost of 1 Gbps of network router capacity
- Cost avoidance benefits realized 1 month after project initiation

Figure 7 shows the cumulative cash flows for the advanced traffic steering business case.

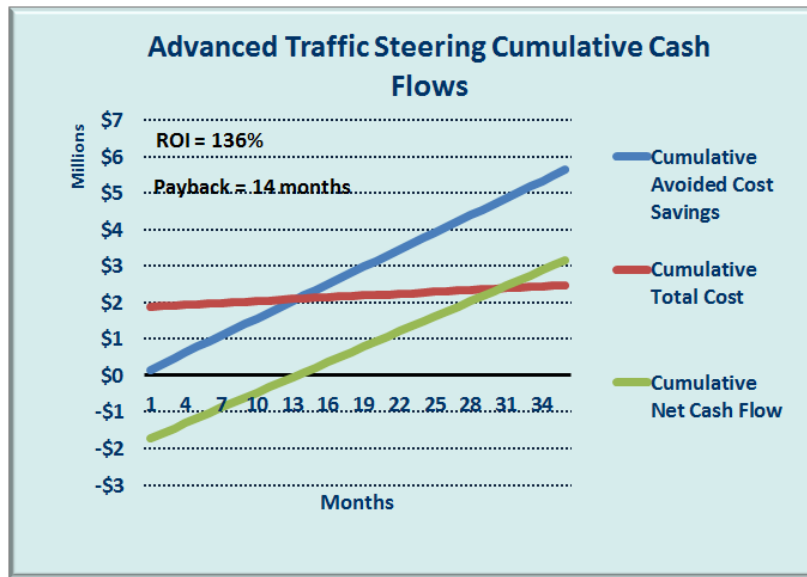


Figure 7 – Advanced Traffic Steering Cumulative Cash Flows

The advanced traffic steering initiative is internal to the networking organization and produces immediate and sustained benefits. The avoided cost savings accrue within one month and are not prorated between the network operation and other parts of the service provider’s business.

Combined Scenario

This scenario illustrates the economy of scope that is obtained by providing multiple use cases on the same IPE platform. In this example, intelligent charging services, usage management and congestion management are provided on the same IPE system. This produces an 821 percent ROI over 36 months and eight month payback. When each of the three use cases is hosted separately ROI is 255 percent, 84 percent and 82 percent, respectively, and payback is 12 months for the first use case and 18 months for the other two use cases. The approximately five times increase in average ROI when the use cases are jointly hosted illustrates the strong economies of scope of the IPE system.

Conclusion

Broadband providers must be able to adapt to changes in subscribers’ behaviors and new applications by rapidly creating new services and business models. At the same time performance demands must be managed intelligently to sustain network infrastructure and conserve resources.

Procera’s Intelligent Policy Enforcement system enables broadband operators to provide personalization, service optimization, network assurance, and rapid creation of business models to monetize their infrastructure investments and intelligently manage resources.

Four business case studies that create incremental revenue and cash flow by deploying IPE-based solutions are analyzed. Table 1 summarizes the results of these studies.

Business Case	ROI	Payback (Months)
Intelligent Charging	255%	12
Advanced Traffic Steering	108%	17
Usage Management	84%	18
Top-Up Portal	420%	8

Table 1 – Incremental Revenue Use Cases

The high returns are produced by the strong scale economy of the IPE system and its capability to precisely match individual subscribers’ needs to custom billing policies.

Three avoided cost business cases are analyzed. Table 2 summarizes their returns and payback.

Business Case	ROI	Payback (Months)
Peering Control	127%	15
Congestion Management	82%	18
Advanced Traffic Steering	136%	14

Table 2 – Avoided Cost Business Cases

The avoided cost business cases are more directly under the control of network operations. They are easier to implement and provide faster recognition of benefits than the incremental revenue business cases.

A combined business case shows that returns are increased by approximately five times by operating multiple use cases on the same IPE system, leveraging the economy of scope of the deploying multiple solutions.