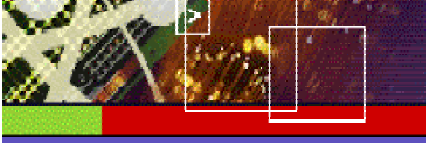

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The Proof is in the Numbers: The Business Case Behind Multiservice Edge Routers

Connecticut Office
803 Warrenville Road
Mansfield Center, CT 06250
860.429.0100

Texas Office
2208 Columbia Drive
Flower Mound, TX 75028
972.874.7791

Virginia Office
PO Box 17858
5 Paxton Road
Richmond, VA 23226
804.288.6864

www.telechoice.com

549001

The Strategic Catalyst
TeleChoice
for the Telecom Industry

The Proof is in the Numbers: The Business Case Behind Multiservice Edge Routers

Remember the days when a service provider's stock almost instantaneously spiked up with announcements about new service launches, a new technology deployment initiative, or the purchase of a new equipment platform to support value-added services?

Those days are long gone. The market no longer lives and dies by PROMISE or POTENTIAL. In today's environment, the financial and investor communities put service providers under a high-powered microscope, watching expense and revenue decisions that make immediate impacts on bottom line PROFITABILITY.

The intense focus on profitability and accompanying cost containment creates a challenge for service providers. They must have the ability to launch new services and react to competitive threats with minimal additional investment.

This document specifically concentrates on the role of multiservice edge routers in improving service provider profitability. In fact, some of these devices were designed and built from the ground up to address profitability through their ability to integrate routing and switching and to support multiple networking protocols and access technologies all in one device.

TeleChoice has conducted a study including research, analysis, and quantification of the benefits of deploying multiservice edge routers. This document highlights the following:

- Areas where service providers can cut the most cost and/or generate the most revenues
- Multiservice edge router features/functions that can help address these opportunities
- The financial impact of implementing multiservice edge router solutions

Cost Savings and Revenue-Generation Initiatives

In TeleChoice's discussions with service providers, it comes as no surprise that most of their current networking initiatives revolve around optimizing and building a more intelligent edge network to drive down cost and support as many services as they can. Some of the top network edge priorities are as follows:

- **Simplify the Edge.** Constant and rapid advancements in technology have resulted in one beast of an edge network. In the beginning, there were primarily multiplexers and DACS (Digital Access Crossconnect Systems) to support private lines. Then Frame Relay switches came along, then ATM switches, and then routers and Ethernet devices, plus all of the management systems required to support the different platforms. Before long, service

providers realized that deployment of point solutions was leading them into a downward profitability spiral. These point solutions were deployed as a result of rapid technology evolution, the need to launch services quickly to keep up with or stay ahead of the competition, and the desire to extend the life of installed platforms. The introduction of each new edge technology and/or platform has introduced incremental inefficiencies. Service providers must control these snowballing inefficiencies or lose their profitability and perhaps even their survivability.

- **Increase Flexibility by Supporting Different Services in One Device.** Although network simplification should increase service providers' flexibility by supporting different services, a multiservice edge really means more than a converged platform supporting multiple services. It means being able to quickly provision legacy services and launch new services with minimal additional investment and a reduced dependence on accurate forecasting for service adoption and growth. It means not having to predetermine the required number of Frame Relay, ATM, or IP cards/ports to support and spare for today's, tomorrow's, and next quarter's growth, for example. It also means not having to perform forklift upgrades as service providers integrate new services into their product mixes. Today's business needs and applications are dynamic and highly unpredictable; hence, the network edge needs to operate in that environment efficiently.

- **Scale and Futureproof the Network.** Service providers can no longer afford to rack-and-stack or daisy chain smaller, lower-speed devices or perform a forklift upgrade to support growth of new services such as IP VPNs. These techniques result in operational nightmares and often cause major CAPEX drains.

  Moreover, although there may be high**-**speed edge routers available in the market today, they tend to be devices that were built initially for core routing or Internet aggregation. As a result, service providers have to compromise speed/performance as they layer or enable incremental services or may not even be able to support a complete service portfolio due to inherent architectural limitations of these devices. Service providers then face the daunting balancing act of optimizing performance and offering a comprehensive service portfolio. A true multiservice edge device does not force service providers to make service and performance tradeoffs.

Key Multiservice Edge Router Evaluation Criteria

The list below is a compilation of key evaluation criteria that service providers can use to evaluate different edge platform solutions available in the market:

- **Multiservice.** Service providers should consider an edge router that combines routing and switching and supports multiple protocols, multiple access methods, and multiple speeds all in one platform. At the very least, it should support legacy technologies like private line, Frame Relay, and ATM, as well as allow the service provider to offer wide area Ethernet, Internet or IP-based services such as IP VPNs. It also needs to support a wide range of

speeds, from sub-T1/E1 to optical speeds, OC-3 and above, including Gigabit Ethernet. Obvious and immediate capital cost savings result from the deployment of one device with multiple capabilities. Those cost savings result not just from hardware and management system cost reductions but also in lessened space, power, and environmental requirements. Although oftentimes more difficult to quantify, service providers can also achieve significant operations savings, particularly in time and resource savings from reduced training, installation, maintenance, and management of just one device (and perhaps a single vendor).

More and more service providers are launching services that allow end users to choose the most appropriate interface, protocol, or service, not just on a network-wide basis but also on a site-by-site or application-by-application basis. With multiservice edge routers, end users have the ability to mix-and-match different technologies on their networks. They give users a solid migration strategy between technologies -- Frame Relay to IP, for example. They also enable service providers to offer bundled services, such as IP-enabled Frame Relay. Therefore, this capability allows service providers to cost-effectively support legacy services today and turn on new services in the future using the same platform. It also enables them to easily support service interworking and migration strategies.

- **Any Service, Any Port, Any Speed.** The "any service, any port, any speed" capability refers to an edge router's ability to software-define the service that the port will support, regardless of the speed of the port, on a per-channel basis. The definition of services, access speeds and functions (trunk or line) of physical port cards all happens logically in software.

  The task of accurate forecasting has become increasingly challenging as service providers give enterprises the ability to pick-and-choose, mix-and-match, and interwork services. One of the biggest advantages to "any service, any port, any speed" is in equipment and capacity planning. Since there are no service-specific cards, the network planner does not necessarily have to accurately predict the protocols/technologies that end user networks, sites, or applications will employ. As a result, network planners can focus on overall network growth or aggregated service growth forecasting, as opposed to per-service forecasting for equipment purchase.

  With service-specific cards, some cards may remain unused if there are no requests for a particular service. However, those cards need to be available in the event someone subscribes to the service. "Any service, any port, any speed" results in hardware cost savings because the service provider can use the cards deployed for any service the customers desire, regardless of how those needs change over time. This capability also allows cost savings in sparing, since a single card can be used to spare a range of services and access speeds. One can easily observe how "any service, any port, any speed" also accelerates provisioning. The service provider can initially populate a system with the "any service, any port, any speed" card and logically define services as customers subscribe. Without this capability, the service provider would need to physically populate the systems with the service-specific card when a customer subscribes or would need to order a service-specific card if the particular card is not in inventory.

"Any service, any port, any speed" also gives service providers flexibility to define services. For example, service providers can now offer Frame Relay beyond DS-3 if they so desire. The multiservice platform does not limit the service provider from offering services at any speed. Nor does it force the end user to choose a different technology once they reach a specific bandwidth threshold.

- **DACS/Grooming Capabilities.** The "any service, any port, any speed" capability combined with DACS/grooming capabilities can help service providers simplify the network edge. Figure 1 below shows a typical edge implementation where the service provider has discrete platforms for different services. This scenario is reflective of existing service providers who have built dedicated data service networks to support different service offerings.

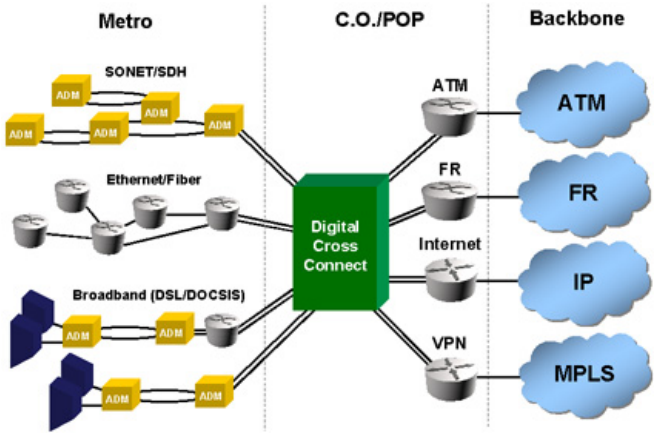

Figure 1. Implementation with Discrete DACS and Service-Specific Platforms

Note that the service provider has to backhaul the traffic to the DACS for access aggregation and to separate the traffic for transport over the appropriate data network. The traffic then goes to a service aggregation layer (one for each service) prior to transmission over the core network for a specific service.

A multiservice edge router with DACS/grooming functions (see Figure 2) replaces the DACS and the service aggregation layer for all of the services. This new configuration can save service providers considerable backhaul and hardware costs, while supporting a range of services in a single device.

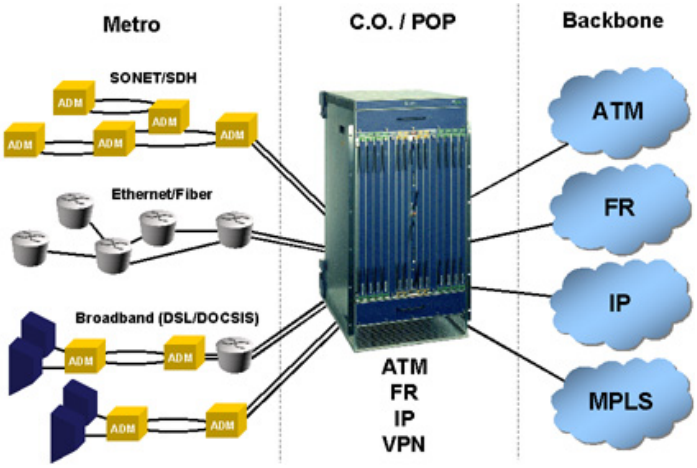

Figure 2. Access and Service Aggregation Layer Replacement with Multiservice Edge Router

For Greenfield service providers or those that plan to immediately or eventually migrate to a converged IP/MPLS backbone network, Figure 3 depicts an implementation where the multiservice edge router provides grooming functions and aggregates all of the services for transport over a single IP/MPLS backbone. Of the three configurations, this is the most cost-effective and most simplified network architecture.

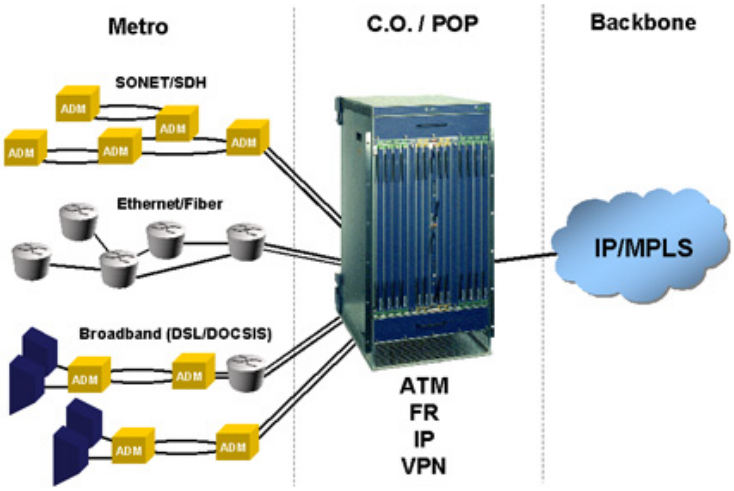

Figure 3. Grooming and Service Aggregation onto an IP/MPLS Network

- **Scalable Switching Capacity and Wire-Speed Performance.** With a multiservice edge device that supports multiple services and a wide range of port speeds plus the "any service, any port, any speed" capability — scalable switching capacity and wire-speed performance become increasingly important. The service provider will rely on the platform for more services, more connections, and more customers. Switching capacities previously found only in core switching networks are now required at the edge of the network as well.

Equally critical is the platform's ability to layer incremental features and services and provide these at wire speed, even as the number of connections and customers increase. Solutions that inherently add processing power via a distributed architecture as the service provider scales its network and services can best address this requirement, as no set amount of processing power is predefined and shared. Some of the incremental features that multiservice edge routers must support without impacting performance include packet filtering, prioritization, and Quality of Service.

In evaluating next-generation router platforms, TeleChoice found that Laurel Networks' ST200 Service Edge Router is positioned to address service provider requirements for network simplification, service flexibility, and scalability. TeleChoice also evaluated the economics of this platform compared to first-generation service-specific platforms for different applications. Some of the results of this business case analysis are discussed in the next section.

The Financial Impact

TeleChoice developed an interactive business case model to quantify the financial impact of deploying the ST200 multiservice edge router solution. The model helps service providers to understand the revenue, capital investment, operations expenses, and margins that can be achieved with the ST200 versus the traditional multi-device solution.

The model is flexible enough to represent a wide variety of business, implementation, and networking options, which can be reconfigured by service providers to mirror their distinct business environments. Some of these options are described below:

- **Implementation of the Multiservice Edge.** Service providers can decide to model a Greenfield, Cap and Grow, and Transition over Three Years scenario. Greenfield assumes that the service provider has no existing infrastructure in place and plans to deploy a new solution to support its data services. Cap and Grow represents a network that currently uses a multi-device solution where the service provider wants to migrate to the multiservice solution by provisioning new customers and new services on the new platform. Transition over Three Years allows the service provider to completely migrate all of the services from the multi-device solution to the multiservice platform.

- **Mix of Services.** The service provider can model Frame Relay, ATM, IP, Ethernet, and VPN services.

- **Service Demand.** The model allows the model user to input port demand for different speeds and connectivity demand.

- **Service Pricing.** Service providers have the flexibility to input monthly recurring charges as well as installation charges for the services.

- **Network Costs.** The model can support different assumptions for access costs, backhaul costs, and other transport costs.

Business Case Model Findings

The next sections summarize the financial impact for two scenarios. The first analyzes an implementation supporting ATM and Frame Relay legacy services in a Greenfield, Cap & Grow and Transition over Three Years Scenario. The second focuses on the deployment of new services (i.e., IP, VPN, and Ethernet) in addition to the legacy services, and again looks at the case of a Greenfield, Cap & Grow, and Transition over Three Years Scenario.

The Greenfield option assumes that the multiservice edge router is used as the edge platform attached to a new or existing IP/MPLS core network. Significant savings are achieved in a Greenfield deployment because the full advantages of a multiservice edge are realized.

The choice between Cap & Grow or a Transition over Three Years strategy is reliant primarily on internal Telco financial and network policies, but is influenced by many factors – the most sensitive of which is the rate of service growth.

The Cap & Grow option assumes that the multiservice edge router is used only where spending must occur to meet new orders for service. In this scenario, the value derived from a multiservice edge is directly proportional to the rate of service growth. The faster the growth rate, the better the business case for a Cap & Grow strategy.

By comparison, the Three Year Transition produces a far greater reduction in costs during slow growth periods, and so is more attractive from a profitability perspective. Through a transitional approach, the operator can evolve to a new network architecture that maximizes service flexibility while reducing costs in each year during the transitional period.

The assumption utilized in the model assumes a modest growth scenario for the deployment at hand. Because of this assumption, the cost savings derived are not as large as they would be in a faster growth scenario.

Legacy Service Scenario

Figure 4 compares the financial impact using the ST200 Service Edge Router versus a multi-device solution supporting Frame Relay and ATM services for each of the three implementation options.

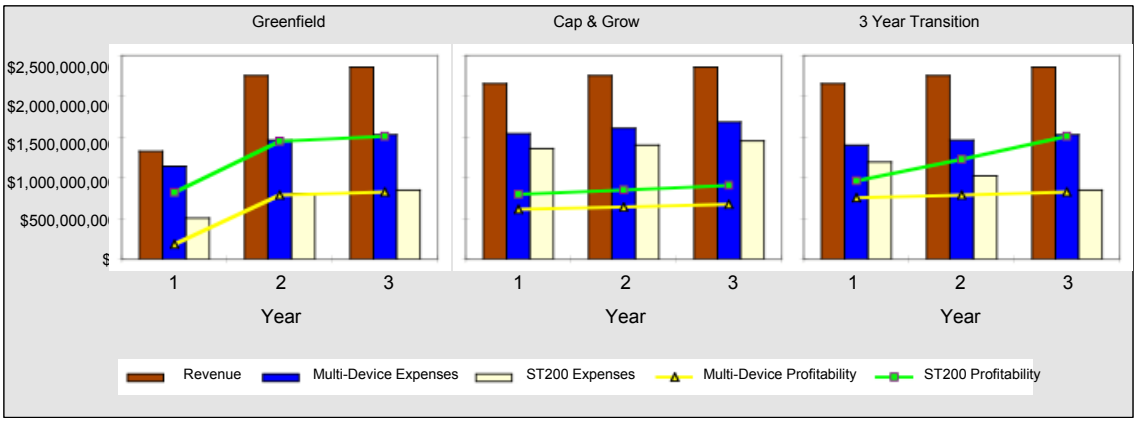

Figure 4. Legacy Services – Financial Comparison Between Implementation Options

Expanded Service Scenario

Figure 5 compares the financial impact using the ST200 Service Edge Router versus a multi-device solution supporting Frame Relay, ATM, IP, Ethernet, and VPN services for each of the three implementation options.

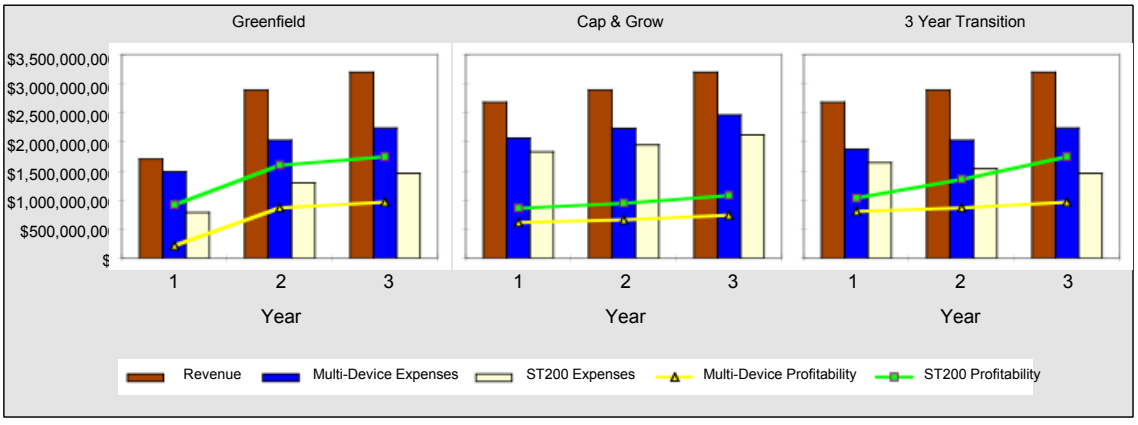

Figure 5. Legacy Services – Financial Comparison Between Implementation Options

With new services introduced, profitability increases more rapidly in all scenarios with a multiservice edge than with single service edge devices. This is a direct result of the service agility found in the ST200.

Conclusions

The ST200 Service Edge Router can help service providers achieve higher levels of profitability via its ability to support all types of switched and routed services over a range of access speeds and types, in a single platform. The ST200 also gives service providers the flexibility to support shifting customer requirements and new services, regardless of how those change over time. Greenfield service providers can use one platform to support all of their services. Established service providers can migrate existing connections for legacy services while supporting new installations for legacy services and new services.

As the model shows, the ST200 enhances service provider profitability in Greenfield, Cap & Grow, or Transition over Three Years scenarios by supporting legacy and new services.

In a Greenfield scenario, the ST200 shows an immediate, measurable impact on profitability and is clearly a superior choice over a multi-device solution, regardless of service provider growth rates or mix of legacy and new service deployments. For any type of carrier considering a new network build, the benefits of a multiservice edge device over multi-device solutions are unquestionable.

For carriers with existing infrastructure who are considering the introduction of a multiservice edge to support legacy services, new services or a combination, migration to a multiservice edge results in greater profitability over a multi-device solution. In this case, however, the rate of network growth will determine whether a Cap & Grow or Transition over Three Years model is the more efficient approach. For carriers anticipating a low rate of service growth (10% for example), a Transition over Three Years approach provides the most positive impact on profitability. In a high growth scenario (20% for example), a Cap & Grow approach has the most immediate impact on profitability, but creates a drag on operational efficiencies in later years, thereby reducing profitability.

Multiservice edge devices provide new levels of efficiency and flexibility to carriers, resulting in measurable, positive impact on profitability. The ST200 Service Edge Router, as analyzed in this scenario, provides quantifiable impact to carriers who introduce a multiservice edge in either a Greenfield, Cap & Grow, or Transition over Three Years model. Given their ability to impact profits, any service provider considering additional edge investment should closely evaluate the impact of a multi-service edge router on the profitability of their own business.

Interested in more detail?

The detailed business model is available by request directly from Laurel Networks and will enable service providers to prepare what-if analysis on the economics of multiservice edge networking. For further information, contact Laurel Networks at:

Laurel Networks, Inc.
Omega Corporate Center
1300 Omega Drive
Pittsburgh, PA 15205
Phone: 412-809-4200/Fax: 412-809-4201
Email: info@laurelnetworks.com/Web: http://www.laurelnetworks.com

About TeleChoice

TeleChoice assists companies in creating new markets around innovative business models, technologies, products, services, and applications. As the strategic catalyst for the telecom industry, TeleChoice helps start or greatly accelerate the process of crystallizing a business or market strategy, value proposition, or differentiated position. Playing a strategic role, TeleChoice enables clients to launch new businesses, new markets, and new products and services rapidly and successfully.

Supporting service providers and the technology vendors that serve them, TeleChoice focuses on leading-edge public network technologies. Since being founded in 1985, we have been differentiated by our proven ability to transform new technologies into successful products and services. Our portfolio of offerings helps clients conceptualize, launch, market, and capitalize on innovations in networking--faster, more efficiently, more profitably.