Glow Networks Research Series

Network Consulting Services

A Different View of the Network

The rapid drop in valuation of telecommunications stocks has left service providers and carriers scrambling for their next steps. Historically, market chaos separates the winners from the losers. The winners recognize that in chaos, there is opportunity. At Glow Networks, our research has indicated that the public network is evolving towards a new paradigm – one that offers opportunity for service providers and carriers to revamp their business models and push through the chaos.

The drivers for this new model are simple:

1. ***The bandwidth glut***. Recent estimates have highlighted that only 30% of the available capacity in the network backbone is being used. This fact has created an environment where capacity on the backbone becomes a commodity.

2. ***The ongoing need for broadband access***. Broadband revenues have increased 200% YOY since 1999. While the residential market will most likely plateau until the ISPs and content provider vertical has worked out its debt issues, the business market will continue to grow as companies find more and more strategic use for connectivity.

3. ***Reduced access to capital***. Venture capital is hard to come by. The large debt load of the telecommunications industry has limited the ability of service providers to spend money on their networks. This translates into the need to ensure any capital drives incremental improvements in revenue or decreased costs.

By rethinking the fundamental structure of their networks, service providers can uncover new areas of differentiation. They can also uncover areas of weakness within a

competitor, allowing them to "drive …a wedge"[1] into the market and exploit the opportunity. The need for differentiation is not the sole purview of the next generation carriers. Incumbents and the marquee name IXCs must differentiate as well to be successful in the long run. The incumbents can seize the opportunity offered in the downturn to rebrand themselves from a provider of telephony service to a more dynamic and flexible organization capable of leveraging technology to the benefit of customers.

The New Network Model. One new way of looking at the public network consists of segmenting the network into three key layers: access, aggregation and backbone. The rules and cost structure are different across each layer.

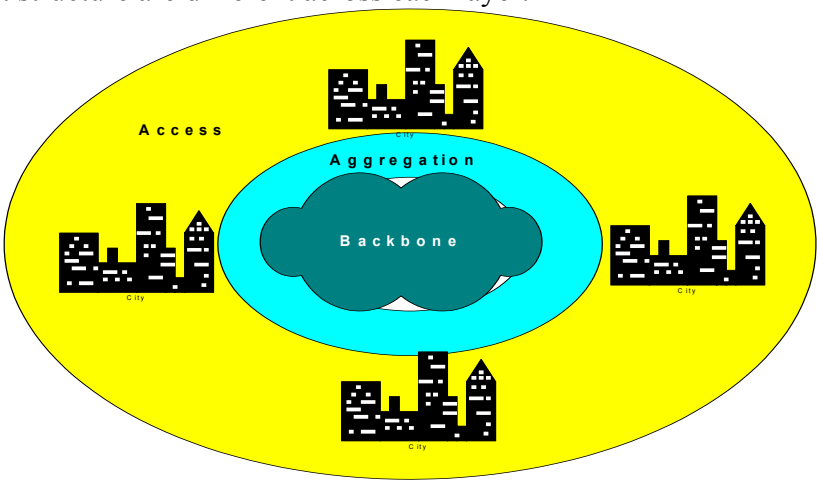

Figure 1 - Network Layers

The Access Layer

The access layer is the piece that touches the business or residential customer. It is facilities based. As the optical technology being deployed in the network matures, it will offer the customer additional flexibility in handling the bursty nature of their data traffic. Trends driving the rules within the access layer include a strong enterprise investment in IP telephony and an increased need for seamless integration of Ethernet connectivity. Keys to success within the access layer are:

- *Owning the entire service delivery process*. Taking a 50,000-foot view of the DLECs and BLECs, their business plans were based on the ability of a direct competitor to handle the last mile provisioning. While the Telecom Act of 1996 opened the door to a lot of potentials, it was only a first step towards a competitive telecom environment. Facilities are the key. Unless a provider can reach out and touch the customers via its Operational Support Systems, and own

[1] Attack and Defense: Managing the Competitive Cycle in Telecom. David Dean et al, Boston Consulting Group, 2001.

the capability to initiate, deliver and restore service, it's going to be a tough to compete.

- *Increasing the speed of service delivery*. Churn is going to be around for a while. Typical business models take into account a 4% churn on the access side of the network. The recent demise of a number of CLECs is going to increase this churn. As the cost of bandwidth decreases due to pricing pressures, the ability to gain and keep customers is not going to be based upon how much bandwidth a given carrier can deliver, but more on the speed of the service delivery cycle and the reliability of the end link.

- *Scalability*. Scalability means that when the load offered to the service increases, an incremental and linear increase in hardware can maintain the same per-user level of service.[i] What can handle this right now? SONET certainly cannot. The technology that does scale consists of transparent DWDM transport leveraging the flexibility of Gigabit Ethernet. Emerging technologies like free space lasers can also scale. An additional benefit of free space lasers is a decreased dependence on fixed plant infrastructure for last mile access. Going forward, time division multiplexing, while robust and deeply entrenched in a service provider mindset, actually hamstrings the access network.

Aggregation Layer

The aggregation layer provides the ability to groom and aggregate traffic for handoff into the backbone. The layer is characterized by ingress of multiple traffic types, the ability to groom traffic based upon source/destination, and the ability to nimbly route "flex" capacity based upon demand. Keys to success in the aggregation layer are:

- *Location, location, location*. The aggregation layer highlights the need for carrier neutral "hotels" which allow access to multiple backbone routes and access routes. Equally important is access to Tier 1 Internet providers for handoff. Buildings like the Info Mart in Dallas and 55 South Street in San Jose are prime examples.

- *Aggressive cost management*. The infrastructure investment made into the aggregation layer should be for one purpose – to gain efficiencies and route traffic economically on the backbone. Especially during a service provider's nascent stages, the service provider will not be able to gain any economic efficiency on the backhaul unless they are nimble enough to allocate capacity to backhaul only when they need it. Even mature carriers must strive to eliminate inefficiencies in their backhaul in order to improve gross margins. Investment in the aggregation layer should be characterized by aggressive ROI timelines.

- *Dynamic and flexible operations support systems*. The aggregation layer highlights the need to drive intelligence into the network elements. Operational support systems become an enabler to access bandwidth as required in the backbone. Operational support systems also become instrumental in achieving the cost optimization available due to the excess capacity on the backbone.

The Backbone Layer

The backbone, when viewed as the combination of the total capacity available across carriers, has the ability to provide 100% availability in the near term. The backbone layer will become a pure commodity play, and will become the purview of the "bandwidth traders," those utility companies that are leveraging their trading engines to enter the telecommunications market.[2] "Old school" IXCs need to face the fact that given the state of technology, (in most cases) it no longer makes sense to own an end-to-end network. Keys to success in the backbone layer are:

- *Pooling points*. Like the aggregation layer, facilities and their locations are going to play a key role. To finalize the transition of the backbone into a commodity, carriers need to be able to access and handoff traffic from multiple carriers.
- *Speed*. Even more so than the access layer, players in the backbone layer need to have the ability to quickly create and tear down circuits to allow other carriers to leverage time sensitivity in bandwidth pricing. This requires a robust back office infrastructure, as well as intelligent network elements that can map connectivity without the need to manually provision paths.
- *Transparent pricing*. If bandwidth is going to be turned into a commodity, it needs to be treated like a commodity. Cost must become transparent, much like tariff pricing, though without the need to wade through dense regulatory language. The models used in the commodity trading sector can be as effective with bandwidth as they are with livestock, oil and other standard commodities.

So how can providers leverage this model? There are a number of processes that can be reviewed in light of this model, all providing food for thought to stimulate change in the models used to plan and operate service provider networks. The end goal, again, is differentiation and increased margin.

1. *A reshaping of the capital-spending model*. Network optimization should become a key component of the capacity-planning model. Rather than invest money in new capacity, why not invest a more modest amount to stretch existing capacity? Second, the economics of the day highlight the need for service providers to focus their capital in a specific space where they can leverage their sales force and provide truly differentiated services.

[2] Robert Bryce, "Fueling Bandwidth Trading." Interactive Week, 13 August 2001.

2. *Constant invigoration of the service set*. Claim the sky in terms of the value of your offering. Make the end customer believe that the combination of your customer relationship management and your stable but leading edge technology is the best in the business.[3] Ensure that the focus on services is accompanied by a constant review of how to reduce the cost of sales, allowing greater margins while the ARPU remains static (or even decrease).
3. *Rethink the need for total network ownership*. Ensure that a detailed lease versus build analysis accompanies any capacity plan, whether that is at the sub traffic or even lambda level. The rapid drop in bandwidth pricing across the long haul network demands that carriers better understand the traffic affinity within their networks and not feel so compelled to build capacity themselves.
4. *Interoperability counts*. Make sure that whatever equipment you select to groom and dispense traffic along its way, it is interoperable with the majority of the equipment being deployed in the network today. Your aggregation equipment needs to be able to groom traffic using the next generation of optical signaling - protocols like O-UNI and NNI are key to being able to rapidly set up and tear down optical paths on demand. Make sure your equipment can handle it, and equally as important, make sure your back office can trigger and manage change at that pace.
5. *Make it easy for customers to find you and work with you*. Pick the right channels to market. Make your provisioning systems simple – rely upon the intelligence that can be built into the network rather than drive the network behavior directly from the back office.

No one can fully predict the future. Reviewing the industry analyst's reports from as little as six months ago against the reports being presented today shows that no one has a crystal ball that provides anything more than a muddied attempt to define the future. However, one issue is clear- the old models won't work. Telecommunications executives must rethink the impacts of their services versus their network cost structure through a new lens. New ideas on how to plan and rollout capacity and services, plus a reshaping of the network economic and operations models, are key to ensuring survivability in the long run.

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[i] Fox, Armando et al. "Cluster Based Scalable Network Services" University of California at Berkley (need publication and year).

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[3] Attack and Defense, p.4.