MSO Profit Target: The Business Internet User
How Advanced Internet Caching Appliances Can Assist The MSO In Capturing This Business

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OVERVIEW

The goal of this paper is to identify a new profit center for the MSO: The Business Internet User. By applying general core competency already existing inside of an MSO operation, it is now possible, through the recent advancement of sophisticated Internet caching systems, to vigorously attack this mature market with what can be the premier last-mile product in the industry.

There are several obstacles in the path of this business decision, however. And, as you will see, only caching can provide a ready-now solution to these issues, and allow for quick entry into this market.

HISTORY

This paper will not go into detail about the history of the Internet, only to say that a majority number of business users still use the same archaic type of circuit they first installed five years ago. Traffic surges have dictated a major network upgrade.

The birth of the Internet happened in the early 70's with the early users being the academia and government employees. By the arrival of the 80's and the birth of the PC, all elements were starting to fit into place to allow this new communication medium to explode. This did not happen until the early-90's, when fiber networks were installed across the country by new Inter-Exchange Carriers (IXC's). The fiber networks provided not only a pure digital signal, but also a cost-effective transport medium to allow these new business players (ISP's) to get into the game. And when they did join the game, they started the process of building these massive router-to-router-to-router based networks, spanning the country with a myriad of connections.

Peering relationships between the larger carrier based ISP's started to take place in the mid-90's. Not only did this function create faster throughput for the end user, (peering helped deliver the user directly to the network that owned the origin server), but it also saved the carrier significant access fees to the common Internet cloud.

These peering points are the key to how today's Internet really works. The vast majority of transactions today connect over a series of router-based carrier networks that are tied together at various private peering points around the country. The original Internet network still exists, but is primarily used to resolve the delivery process of any domain address that is not currently housed with one of these a major players.

This transport process is *critical* to the MSO in its plans to attack the business market, as these router-based carrier networks are now congested to

the point of failure, with no quick solution in sight from a transport perspective. In today's model, the average browser-to-origin server journey for any common www.xxx.com request creates an average of 12-15 routers hops each way. If one closely examined the congestion possibilities on each one of these hops that occur during the millions of connections and handshakes that are required to pass along internet data, they would soon realize why things on the net seem so slow.

So, the issue at hand is how to address latency in the Internet, not how much bandwidth the user has between his equipment room and the ISP's POP.

This solution plays right into the High-Speed Data (HSD) cable modem feature set.

Latency becomes even a bigger issue when these legacy-type networks attempt to offer any new and exciting applications, such as streaming, distributed content, secure socket layers transmissions, and e-commerce support. In some cases, these applications require up to 100 times the downstream bandwidth of a static web page session. Again, this is a perfect fit for a HSD cable modem service.

The only solution to the latency issue is to cache this data as close to the end user as possible, completely removing the latency problem. Only the MSO has the perfect kind of deployment architecture that can cost-effectively support these needs in the business sector.

TARGET MARKET

The specific business user that the MSO should be looking for should have the following common traits:

- Reasonably close to the existing coax plant
- Subscribes to a high-speed data offering from a legacy ISP
- Uses the RBOC or a local xDSL provider for their last-mile connectivity to the ISP's POP
- Has an on-site router connected to the current uplink circuit
- Looking to upgrade to faster speeds from his provider
- Unhappy with latency

It is estimated by the Department of Energy that there are over 21,000 skyscrapers, 26,000 midsize buildings, and 61,000 small buildings in the United States. Using a blue-sky factor that 90% of all domestic businesses will be directly connected to the Internet by the end of year 2000, this leaves a target market of an estimated 3,000,000+ users of this service. And perhaps the most important statistic is that the MSO's current nationwide coax plant passes right by more than 80% of these profitable customers.

Let's examine this average user just a little closer. Over the last six years, when an organization wanted a connection to the net, they simply called one of the popular ISP's to set up service. In the early days, if this location had less than 20 users, a dial-up connection was the common choice. If there were more than 20 users, a Local Area Network (LAN) device was installed, along with a router.

This network then connected the router to a new technology called "frame relay" which offered uplink speeds from 56KB up to 1.544 MB. These circuits required a dedicated last-mile DS-1 circuit from the end user to the ISP's frame switch for any speeds greater, or equal to, 128KB. This frame switch then provided the uplink to the carrier's ISP backbone and they charged the end user up to $2K a month for this service.

The MSO can win big in this market by simply providing standard HSD services that have sophisticated caching devices installed in their network. This design will improve ***delivery of content*** by over 10-20x, verses the old ISP model.

Coupling the current features of HSD, with caching, will simply terminate the competition and remove the fear, uncertainty, and doubt (FUD) that have kept the MSO out of this game in the past.

COMPETITION

In the late 90's, we saw xDSL architecture develop. As long as to many flavors of xDSL are not placed in the same 50-pair copper binder, or to many high-speed xDSL circuits with legacy DS-1 circuits are grouped in the same copper binder, performance will be satisfactory. And as long as the RBOC can provide a "dark" copper pair completely free of any bridge tabs or digital loop carrier (DLC) devices, the same positive outcome will be achieved. If all of the above conditions are met as planned, xDSL service works extremely well.

A new application we are starting to see in the industry, which should be of strong concern to the MSO, is the deployment of small xDSL boxes into so-called "lit" buildings. This kind of service is designed to be full-flavor with voice, video, and data offerings bundled into one xDSL stream. Creating this model requires an expensive uplink dedicated circuit from the "lit" building to the vendors POP, to allow transport of these multiple services to take place. As a result of this costly design, the MSO can successfully compete with, at a minimum, the data side of this offering. Perhaps there's even a new business partnership with these players that should be explored in more detail by the local MSO.

xDSL players can, and in some cases, are, deploying caching systems in their models today. But, they still cannot match either the speed or the low delivery costs that a MSO can offer with a cached cable modem design.

We come back to the end user who currently has a 256KB dedicated Internet connection with an incumbent that is consistently getting slower and slower due to increased latency. The only option offered from the incumbent is to increase the speed of the last-mile to, for example, a 512KB circuit, which almost doubles the user's monthly cost.

The downside in this commonly offered solution is that, in the end, the improvement to overall service is less that 5% primarily because: ***the latency is in the backbone and not the last-mile!***

MSO OBSTACLES

"If it was easy everyone would be doing it," someone once wrote. Well, attacking this market is not as difficult as it seems, but will require some dedication, focus, and commitment on the MSO's part.

There are five major obstacles the MSO must overcome to enter into this business market. The technical issues can be solved today through the implementation of caching, with the remaining obstacles being a simple business development and/or partnering issue.

These obstacles are:

- Footprint
- HFC Uplink Issues
- Origin Servers behind Cable Modems
- Sales Force (or lack of)
- Layer 2 and wiring management and installation

Footprint

An easy argument can be made that the MSO has historically never wired any business locations with HFC. They have only wired homes, and this business model is not cost-effective.

Everyone then jumps to the conclusion that running fiber is the best means to success.

HFC Uplink

There has always been an underlying FUD issue about the limitation of the uplink capability of a particular HFC community. Although this issue does exist in a number of cases due to local cabling architecture coupled with the number of cable modem end users, it can be addressed in a number of ways. These ways include, but are not limited to caching, splitting off communities into separate frequencies and extending HFC fiber.

What needs to be addressed in this model, however, is the increased load placed on the network by a business-community user verses a one-work station user. Bandwidth savings on the HFC uplink will become a priority issue down the road as more and more businesses join the pool.

Origin Servers Behind Cable Modems

Everyone has a web page these days. The MSO can no longer simply turn this kind of client down, as they soon will run out of potential clients to sell to. So, the question is: How can a MSO survive if his HFC plant starts taking a gazillion hits going to one cable modem location?

To resolve this issue is rather simple with caching.

Sales Force

The MSO has two basic options here.

The first option is to proactively create an internal sales organization to market their own in-house labeled ISP service.

The second option is to support Open Access thereby creating an instant wholesale sales force model. By allowing every ISP the right to tap into your network to use this HSD cached last-mile connectivity will allow you to create a near zero cost sales model,

increasing your profits significantly. We all know (and maybe fear) that when this business model finally does get deployed, these hungry players will blanket your current audience with strong advertising pitches to "buy now!"

In either of these sales models, the MSO can become very profitable using this sophisticated last-mile delivery system, allowing them to generate huge profits by simply applying their existing core competencies.

Layer 2 and Wiring Issues

In past models, the ISP simply told the RBOC where to install the circuit to allow the customer to plug and play. As long as your cable installation team can place the cable modem in the same spot as the telecom connection, there are no issues.

But reality indicates there could be a problem, as buildings are already internally wired for telecom connectivity and not necessarily cable. So, risers, equipment rooms and other labor-intensive connectivity problems could become deal-breaking issues if not resolved.

To solve this, the MSO must enter into a business relationship with either a local, or national expert in this field who can easily handle this task.

WHAT IS CACHING?

We discussed earlier how the latency in the Internet is caused. A computer user clicks onto his web browser, types in a web site connection and hits the button. The request goes out across the carrier's network, in-and-out of numerous routers, until it finally reaches the origin server on the other side of the net. Then, a series of transactions take place to move objects from the server to the desktop to allow them to be painted onto the screen.

As we can see in our own daily use of the Internet, objects take between 2 seconds and forever to arrive for viewing. This delay is nearly always caused by the inherent latency in today's connectivity architecture.

A cache intercepts this request before it goes out to the Internet path. It then attempts to instantaneously deliver fresh data from its storage medium to the user. How each cache product accomplishes this task is completely different, but the goal remains the same: deliver data fast, without getting caught in the latency trap.

Let's remember that a router was built to move bytes from and to, and a cache was made to do just the opposite and keep the bytes close to home.

There are various types of caching systems available today. They range from full-scale platforms that perform a variety of sophisticated tasks, including caching, to custom-built devices using a freeware called Squid. The available caching systems also include new plug-in applications that connect to legacy devices, such as filers, and more recently simple to use caching appliances that just plug and play.

Some key factors to study when choosing a cache are:

- Is caching the primary function of the box?

- How hard is this product to install and maintain?
- How does this device react when it sees a web page request for the first time?
- How does the product go out and refresh and store its data?
- Can it support future applications such as streaming, distributed content, secure socket layer transactions, and address security and filtering issues?

The process of selecting a cache should carefully take each of these issues into consideration, as they directly relate to both MSO manpower needs and overall performance objectives.

THE TECHNICAL SOLUTION

Footprint and HFC Uplink Issues

By installing basic coax based services and not expensive fiber connections into these business sites, the MSO can now use its core competency to provide cost-effective HSD service.

What is still missing in this design, however, is how to overcome the FUD (some real/some perceived) already laid down by the competitors on this type of offering. The answer is to offer an HSD ***content delivery service*** that is cached at different locations in the network verses a plain bandwidth pipe to nowhere.

The MSO can now turn the FUD against the legacy provider. Caching devices should be placed at the main Head Ends, out into the network next to the CMTS, and even in the equipment room of multi-tenant buildings, driving the most frequently asked for content right to the edge of the network. Not only will this design significantly reduce the load off the HFC plant, but it will also create an unbelievable user experience that has never been matched by their old ISP.

This enhanced last-mile cached network design can then also be offered for a premium fee to the Open Access ISP when, and if, they arrive on the scene. Everyone will buy the cached version, as they will not want to be the slowest one on the block.

Origin Server Issue

A different set of problems exists here.

To allow the MSO to provide service to any end user who has a web site which is currently active on an in-house origin server, they must move the content of that web page as close as possible to the main uplink Internet connection to the carrier's network. Then, all traffic coming into the web site will be satisfied by the primary uplink circuit, and as a result, will never burden the HFC plant.

One fast way to accomplish this task is to outsource this activity to a web-hosting specialist. Not only will you lose total control of the customer, but this option is also a timely and expensive experience for all parties involved. So, instead, let's build one of these sites and keep all of the profit internally. With no track record of revenue, a very time consuming and expensive process, coupled with it being totally outside of the typical MSO core competency, we would be hard pressed to find a divisional MSO President who would fund this.

Instead, solve this issue by caching. By employing a simple DNS redirection process, one can point the DNS of the origin server directly over to the cache device installed at your Head End. When any Internet user requests this web site, the path will now go directly to the cache from your ISP uplink connection, and be delivered instantaneously back to the user.

The origin server can then easily contact the cache when it wants to update data on a particular object, in order to maintain freshness.

One additional feature of this design is that you will automatically create a firewall-type security system to keep hackers from corrupting the client's origin server. This is a billable item. (Not all caches can perform this feature, so please check before you try and deploy this model.)

The initial cost of this cached web-hosting model can be as low as $10K per city, making it both cost effective and easy to manage by the MSO team.

RISK/REWARD

The MSO should ask at this point "What's in it for me?"

The answer is: revenue and lots of it!

The current billing to an end user for a 1.544 MB DS-1 connection to the Internet can average well over $1200.00 per month, with a 512KB circuit averaging over $600.00 per month. The cost the MSO can now bill this business user is, at a minimum, 18:1 over what they can bill a residential user.

The great news is that this service will use the same gear, the same plant, the same billing systems, and the same CMTS devices they already have in place to service the residential community. The only additional architecture costs to deploy this business service will be the cost of adding the caching equipment.

The associated risk if the MSO ignores this market segment is that they will miss out on a tremendous market, which is begging for change. Furthermore, without a distributed cached network, the current HSD architecture will never be able to support all of the bandwidth glut type applications that are just now starting to create tremendous revenue streams for other players.

SUMMARY

Malcolm Forbes once stated that "for a company to succeed it must do one thing well".

The MSO has already proven that this strategy works. The challenge for the industry is to again apply its core competencies to create additional revenues from the surging Internet market, without disturbing the existing business model.

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