ENGINEERING A COMPETITIVE ADVANTAGE :

THE CRITICAL ROLE OF AUTOMATED TESTING EQUIPMENT IN DSL PROVISIONING

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Introduction

Competitive Local Exchange Carriers (CLECs) can now battle for local telephone service business. And the opportunities are compelling, because deregulation was quickly followed by explosive Internet growth and the development of Digital Subscriber Line (DSL) Broadband Access. The net result was a soaring demand for high-speed data transmission and value added voice services.

But while the opportunities are compelling, the challenges are great. CLECs must first attract new customers away from Incumbent Local Exchange Carriers (ILECs), then install DSL service successfully, and then maintain the customer's loyalty through careful service monitoring. As if that weren't daunting enough, installation and monitoring must be done as frugally as possible to assure profitability.

With the growing demand for the technology, delivering DSL service can be a bedrock for a CLEC's business, as long as it can deploy the service quickly and efficiently. Failure, however, will almost certainly drive the business or residential customer back to "the phone company"—the established ILEC.

Consequently, any CLEC offering DSL service must be certain that it has testing and switching equipment which can pinpoint problems in service, make service changes effortlessly, and otherwise manage the company's DSL infrastructure.

This is the only way that CLECs can guarantee the smooth, uninterrupted service that will lead to profitability. This paper will demonstrate that through the provisioning of the proper equipment, CLECs can engineer a competitive edge in the DSL marketplace.

That edge is crucial, because CLECs are often operating on the tightest of profit margins, and must therefore look for automated, rather than personnel, solutions to their operational concerns. As no two CLECs are exactly alike in their business practices and needs, it is also important that this automated testing and switching

Operating costs mandate a lean personnel structure

In September, 1999, Copper Mountain Networks published an insightful paper entitled "DSL Architecture and Business Case," analyzing the startup and operating costs of the theoretical enterprise Aggressive Communications, Inc., a company offering DSL services in ten different metropolitan areas, averaging 1.5 million population each, throughout the U.S.

Examining a CLEC's cost structure, as posited by Copper Mountain, makes it clear that a startup DSL operation is driven to watch every dollar. For example, a CLEC must be able to put a collocation cage in every central office (CO) of every ILEC in the city in which it does business. The cost of establishing this cage—a dedicated, caged room in which the CLEC places equipment—is estimated by Copper Mountain to cost $35,000 per central office. Then the CLEC will pay an average of $1,400 per month in rent and power for the collocation cage for as long as it does business in the CO.

Realize that each city in which Aggressive Communications does business may have 20 COs. That means the startup cost for the collocation cages alone would be $700,000, and the monthly operating costs just to maintain the cages would be $28,000. Multiply by 10 cities and you have $7 million in startup costs, $280,000 for monthly rentals.

Remember, these are only the costs for setting up and running the collocation cages. Customer acquisition and provisioning costs, as well as a host of other non-recurring and recurring costs, haven't even come into play yet.

Since it is impossible for a CLEC to skimp on equipment and marketing efforts if it ever hopes to be profitable, cost containment must be directed toward personnel, particularly toward service personnel, as having a sales force is an absolute requirement for getting customers. Whenever an individual or business calls an ILEC for Plain Old Telephone Service (POTS), the ILEC just sends a truck right out to the home or office without a second thought.

A startup CLEC doesn't have the luxury of dispatching "truck rolls" whenever a customer needs service—the CLEC has to be lean, efficient, and hire as it goes. (Even Bell Atlantic, one of the most successful of the regional companies spun off from AT&T, is parsimonious with DSL service personnel. As of December, 1999, Bell Atlantic was employing approximately seven service technicians to support installations at homes and businesses throughout Maryland, Virginia, and West Virginia.)

While CLECs vary enormously in their operating capital, minimizing truck rolls is a goal they all share, because that can result in a huge cost savings, leaving funds that can be plowed back into marketing or CO provisioning.

To husband financial resources, CLECs, from the outlet, must equip themselves with the tools to do the necessary testing and switching tasks with just a few keyboard strokes, instead of rolling trucks. That equipment must also deal with the realities of DSL, which is a rapidly changing and evolving data transmission format.

DSL: Not one product, but many, with more coming on line

As if startup costs weren't demanding enough, CLECs are faced with the fact that DSL is not a single technology, like VHS video recording, but a constantly evolving group of technologies, some of which are backed by the resources of major corporate concerns looking to find the "killer" DSL variant that could achieve market dominance.

Of course, not all CLECs offer all the current versions of DSL—and they certainly won't offer all of the variants coming onto the market. But the constant mutation of telecommunications technology, which has evolved with breathtaking speed in only five years, exerts additional pressure on CLECs to provision themselves with testing and switching equipment that lets them move customers from one DSL format to another with ease and precision.

This returns us to the main contention of this paper: that CLECs must engineer their competitive edge through the use of testing and switching equipment that is flexible and adaptable enough to do the job today, and in the near future as technology evolves. Such equipment must be able to carry out four key tasks confronting CLECs: pre-qualification and provisioning; benchmarking and maintaining service; maintenance and troubleshooting to preserve customer loyalty; and service changes.

But before discussing each of those four tasks, an examination of the characteristics of the testing/switching equipment needed is in order, starting with the moment a CLEC's service to a customer begins.

The right testing equipment is a CLEC's ultimate protection.

When a CLEC takes a customer from a regional ILEC the physical transfer of the line is a remarkably simple process. An ILEC technician simply unbundles the loop that carries the particular customer's line, picks up the wire pair that goes to that customer's phone and hands it to the CLEC technician, making the CLEC now free to deliver whatever service the customer has ordered.

But—and it is a critical "but"—once the CLEC accepts the line from the ILEC technician, its maintenance and proper function becomes solely the CLEC's responsibility. As a sound business practice, most CLECs will, in negotiating contracts with ILECs, have a performance guarantee to make sure that the line is cut over properly and actually provides connectivity to the customer.

However, that guarantee counts for nothing to a new DSL customer who doesn't receive the right service as soon as the line is cut over. Saying, "I'm sorry, it's the ILEC's fault that your line isn't working correctly" won't do any good. So CLECs must perform their own independent testing to confirm proper line function before taking ownership.

To perform that testing, two pieces of equipment are required. The first, a "test set," or "test head," is the actual device that tests the line and is capable of performing the many different sorts of tests that may be required. Secondly, an access device is needed, so that the test set can be connected to a particular line for testing.

Such a device is needed because of a current anomaly in DSL technology. The network equipment that is currently in place—DSL Access Modules, or DSLAMS—does not have built in test access. So CLECs need an external device to enable them to gain access and test the line that will deliver DSL service.

Without such a device, the CLEC needs to dispatch someone to the CO with a test set, clip it to the wire pair by hand, and perform the test. Given the CLEC cost model for provisioning DSL service cited earlier in this paper, "hands on" testing, performed time and time again, would obviously be prohibitively expensive.

"All in one" isn't for everyone

At first glance, the obvious solution would seem to be an "all in one" product that wraps testing equipment and the test access device into one package. A number of products currently in the marketplace do just that, usually at a compelling price point. However, there is a downside to purchasing both pieces of equipment together.

For example, one leading manufacturer offers an all-inclusive product, but purchasing it means the CLEC has committed to being ruled by that proprietary testing technology. Will that be enough to do the job? The answer may well be no.

The more far seeing solution is for the CLEC to purchase the test equipment that meets its specific needs most comprehensively, then marry that equipment to a test access switch that can integrate with any test vendor's product.

Such a vendor independent switch gives the CLEC ultimate choice, especially when it is driven by standards based software, so that integration with other network software packages is as easy as possible. As CLECs partner with ILECs, Inter Exchange Carriers (IXCs, aka long distance companies), and Internet Service Providers (IPSs), ease of integration into other systems is mandatory.

And, as has already been noted, the test access equipment and switch must be able to perform in four critical situations for the CLEC.

Situation One: Pre-Qualification and Provisioning

Pre-qualification for DSL service comes down to one basic question: is the customer's line physically able to accommodate the service, based on the distance to the CO and technical factors. The ILEC may have tested for this electronically, but in point of fact, pre-qualification is usually based either on plain old record keeping, or is done via the use of global positioning technology.

The ILEC and the CLEC will look at records, ascertain that the customer is within the required distance (18,000 feet from the CO, or fewer) and that the customer's line has no physical abnormalities recorded. Once this is done, the ILEC will cut the line over at the CLEC's request.

However, the possibility of human error always exists. Record keeping may have not been complete, or the global positioning technology not applied properly. This could mean that, after cutting the line over, the ILEC discovers the presence of bridge taps or load coils, two physical abnormalities that can short-circuit DSL service.

A bridge tap means, essentially, that a single telephone line has been routed to two different locations, as was done with "party lines" in the old days of telephone service. Today, this could happen if a second line into a customer's home was terminated electronically, rather than by sending a lineman out to climb a pole. Then that line may be placed in service to another residence and a bridge tap results. This means that the strength of the electronic signal is degraded—essentially half of it would go to each residence. The impact of the bridge tap varies depending upon the type of DSL service used, as well as the length of the tap.

A load coil, however, is a very serious problem to discover ex post facto, because no DSL services can be provided on a loop with load coils, which are basically devices that regenerate a signal—subscriber loops longer than 18,000 feet used to have load coils placed on them routinely in order to increase voice quality. As coils substantially increase the attenuation of the higher frequencies on which DSL relies, transmission becomes impossible. (In fact, load coils are so detrimental to data transmission that they can degrade the performance of standard 56-kbps "dial up" modems.)

So a CLEC should never rely on the good offices of the local ILEC to make sure records are clean and bridge taps and load coils are not present on a potential customer's line. Pre-testing by the CLEC's own testing and switching equipment is vital to successful, trouble-free deployment of DSL service.

Situation Two: Benchmarking and Lifecycle Testing

As in any business, service to the DSL customer should not stop with the sale. On-going testing, throughout the lifecycle of the account, is key to upgrading customers and actively getting them to seek those upgrades.

Think of it as being akin to the old General Motors philosophy, which sought to begin building customer loyalty with the purchase of a Chevrolet, then move that customer up through GM's divisions until, now older and wealthy, the customer moved to the apogee of the product line, Cadillac. CLECs selling DSL service should adapt the same mentality, so that IDSL customers, who want the lowest price and are therefore willing to settle for the lowest speed, can be moved up to HDSL as their requirements change.

This starts by benchmarking performance on the customer's line once it is up and running, so that there is a baseline measurement which can be used for comparison at a later date in the event service attributes change.

And by benchmarking the line and knowing its physical capabilities, a CLEC is then in the position to offer a customer an upgrade, to move that customer from Chevrolet to Oldsmobile, if you will. Before making that sales attempt, however, the CLEC must know that the customer's line can support a move from IDSL to HDSL, so the offer won't have to be retracted and the customer alienated.

On-going monitoring via regular line testing is the best way to make sure the customer gets quality service, while also putting the CLEC in a knowledgeable position to sell DSL service upgrades.

Situation Three: Maintaining the customer through troubleshooting

Many people over age 40 or so look back fondly on the days when AT&T was the "phone company." Yes, long distance prices were much higher, available services were limited, and—amazingly—you rented your phone, you couldn't just buy one in a store. On the other hand, if there was a service problem—on the line, in a jack, or with the phone—AT&T, through the local phone company, dispatched a qualified technician to fix the problem at absolutely no charge to the customer. In short, the phone company was a source of security.

So with that historical model, is it any wonder that effective troubleshooting is a key to keeping customers? This is especially true in the highly competitive DSL market, where a single day's interruption in service can have devastating consequences for a business.

Again, the best insurance against losing a customer because troubles aren't resolved quickly can be found in testing and switching equipment. Certain problems, such as interference from AM radio signals, which are on the same frequency as DSL, do involve "double sided" testing, which means a "truck roll" to the customer's home or office must be ordered. But other problems, such as an unbalanced circuit, which can lead to "crosstalk noise" that slows DSL transmission, can be discovered by "single-sided" testing in the co-location cage.

Pinpointing problems quickly, so that solutions can be rapidly deployed, will make a CLEC's customers secure—just as they felt in the old days of the "phone company."

Situation Four: Service Changes Via Cross Connection

In Situation Two, the importance of benchmarking the line so customer upgrades could be offered was discussed. There is another component to that, however, because once the customer is upgraded, the switch to the new service must take place. The most efficient, effective was to do that is via cross connection, a modular, scalable approach to DSL facility management.

Out of a DSLAM in a phone company central office, multiple lines emanate offering different types of DSL service. All three of the most common types—IDSL, ADSL and HDSL—can originate from a single DSLAM. The circuits for all these services can pass through a single switching device for routing to a customer's house or office.

If a business decides that upgrading from IDSL to HDSL is warranted, the proper switching device can, in virtually no time at all, reroute that business's line from the IDSL to HDSL, making a cross connection with no hands needed to pull wires. The switch can also be used to connect a new customer to that now vacant spot on the IDSL port.

The efficiency of making service changes through switching is obvious, especially as it once again allows the CLEC to save on personnel costs by performing the change not with an old-fashioned "truck roll," but with a few strokes on a keyboard.

Summation: A competitive advantage at the flick of the right switch.

Automated, test vendor-neutral DSL switching equipment enables CLECs to:

• Reduce, even nearly eliminate, “truck rolls” preserving capital for sales and infrastructure provisioning.
• Perform any variety of tests with maximum flexibility.
• Make certain customer lines are in good working order prior to “cut over.”
• Benchmark service for baseline assessments and for upgrading customers in the future.
• Perform maintenance and troubleshooting promptly, greatly aiding customer retention.
• Cross-connect to make service changes/upgrades more efficiently.

By being ultra-competitive technologically, through the use of the proper testing and switching equipment, CLECs can put themselves in a strong position against rivals whose cash is drained through heavy payroll loads and repeat “in person” service calls.

In the telecommunications industry, where change seems now to occur nearly on an hourly basis, the companies that survive and prosper will be the ones who embrace flexible technology and use it to forge a competitive advantage.

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