WHITE PAPER

Resectionalizing the DA

Central Office Home Distribution Area

ADC®

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Upgrading networks – from traditional circuit-switched services to support demand for an increasing array of broadband services – requires carriers to make several critical decisions. Delivering combined voice, video, and data services challenges every service provider to seek a migration path to broadband that can be implemented as painlessly as possible in terms of cost, time, and ensuring a future-proof network.

ADC offers complete solutions for any business model – whether re-using existing copper infrastructure, or driving fiber all the way to the customer premise – and can ensure a carrier knows all the challenges and trade-offs involved in migration to broadband. A major consideration for migration of a legacy network to broadband is the need to resectionalize the network to cost-effectively reach both new and existing customers.

As part of the broadband transformation process that all carriers are faced with, a resectionalization of the network is the key consideration. Although this paper will focus on one part of that process, some background is necessary on why resectionalization of the network is necessary for broadband upgrading.

The Need to Resectionalize

While fiber is the technology of choice for the vast majority of Greenfield broadband deployments, it may not be the optimal approach in all upgrade business models. The cost of trenching or boring fiber routes makes using existing copper plants in conjunction with new copper technologies a more attractive and cost-effective solution.

However, these new copper technologies, such as ADSL2+ and VDSL2, have range limitations for delivering today's broadband services. Although the reach could be as great as 5000 feet, most carriers are designing to 3000 feet to avoid the need for continuous infrastructure changes. Of course, each deployment is unique and must be considered in terms of geography and up-front costs.

Due to the reach limitations of deploying broadband services over existing copper infrastructure, the existing voice distribution areas will require a resectionalization process. Large DAs that once delivered voice services to customers tens of thousand of feet from a CO or remote terminal (RT) will now have to be re-designed with many smaller sub-areas to accommodate range limits of 3000 feet in order to provide optimum bandwidth.

With that in mind, most carriers view the network in three sub-classifications – customers reached directly from the CO, customers reached via remote terminal (RT) digital loop carriers (DLCs), and customers in low density areas. This paper will focus on those customers within 3000 feet of the CO, known as the Central Office Home Distribution Area, or CO Home DA.

The CO Home DA

Most carriers are providing some form of DSLAM services out of their CO, such as ADSL or other copper-fed services, associated with providing data transport. However, today's demand for broadband technology requires them to upgrade to broadband-capable copper technologies like ADSL2+, VDSL or VDSL2. In most instances, upgrading an older DSL line to ADSL2+ or VDSL2 will not be as simple as upgrading the DSLAM line card, as DSLAM backplanes are completely different in most platforms.

The first area of concern for reaching customers – and the easiest for the carrier to rapidly deploy broadband services – is in the CO Home DA. This area represents a 3000-foot circle around the CO and includes all customers currently being direct-fed on copper from the CO that fall within that circle. Since there are no new issues with space or infrastructure, the CO Home DA represents the easiest sub-section to upgrade for broadband services.

It should be noted that the carrier may still service some customers beyond 3000 feet from the CO. However, the requirement to provide enough bandwidth to support consumer demand estimates – one standard-definition video channel and two high-definition channels, along with voice and high-speed internet services – must be considered.

From the CO, the main concern is not how to feed various cabinets with sufficient fiber, but rather how to make efficient use of the existing copper plant. Therefore, the concern would center on the DSLAM – how it is installed and cabled to the main distribution frame (MDF) and where all the cables terminate to protection.

Deployment becomes more complicated when dealing with a system that lacks integrated splitters. If the DSLAM does not have integrated splitters for combining voice and data signals, carriers must plan what type of splitters will be used and where to locate them. The bottom line is that somehow the voice and data signals must be split and filtered at each end of the network segment. ADC provides an attractive splitter portfolio that works with many DSLAM products currently in use that may lack integrated splitters.

There are additional considerations and challenges with legacy DSLAMs that should be addressed by carriers for broadband upgrade. Even though DSLAMs are typically less than 10 years old, the new ADSL2+ and VDSL2 technologies are not spectrally compatible with original DSL flavors. The signal levels and power requirements of new next-generation DSLAMs can cause interference issues with existing ADSL DSLAMs between adjacent binding groups. In short, the original DSLAM may not mix well with new broadband DSL technologies.

For example, there may be customers that are currently being fed ADSL out of a particular cable group. If a new broadband ADSL2+ or VDSL2 system is placed downstream, those customers would likely need to be rolled down to the newer ADSL2+ or VDSL2 system. Both signals cannot reside in the same binder groups. Although there are some new technologies emerging that employ amplifiers to enable both signals in the same binder group, the technology is brand new and carriers need to carefully consider this challenge in terms of both cost and network efficiency.

Typical CO Upgrade to Broadband

Let's walk through an example of what carriers will typically be confronted with at the CO Home DA section during migration to broadband services. First, a new DSLAM will likely be installed and turned up for service. As orders begin arriving for new broadband services from the CO Home DA customers, those customers will be connected directly to the new DSLAM. Other customers will be left alone until they actually request broadband services. Therefore, carriers will continue to use existing DSLAMs to service existing customers who are not ready for next generation broadband upgrades.

Thus, the broadband network will evolve as demand is pinpointed and areas are identified that will generate the most revenues and the least up-front cost. Main targets will be the areas most easily upgraded – particularly in the CO Home DA. Here, it's a simple matter of mounting the broadband DSLAM in available relay rack space, cabling to the main frame, and turning up services. Legacy DSLAMs will continue providing ADSL to customers who are content with that service, and the broadband network will expand as customer demand increases.

Carriers may also require pair bonding to reach some customers who want broadband IP services, but are just beyond the 3000-foot reach. These "no man's land" areas – areas that reside just outside of both the CO reach and any remote terminal – must also be addressed during resectionalization. More new technologies are emerging to address these pockets, including new, very small 48-circuit hardened DSLAMs.

Conclusion

A resectionalization of the current switched-voice network is the first step in providing broadband services using as much of the legacy infrastructure as possible. Within the first 3000 feet of the CO – known as the CO Home DA – the move to broadband is relatively simple by upgrading the DSLAM and using legacy copper routing. Other sub-sections will be discussed in greater detail in follow-up papers.

As service providers decide on the most cost effective, reliable method for delivering today's broadband voice, video, and data services, they must weigh the pros and cons of both fiber-to-the-premise (FTTP) and fiber-to-the-node (FTTN) to determine how far to push the fiber. If overbuilding existing networks is cost prohibitive, then FTTN becomes an attractive alternative, particularly if it provides a smooth future migration to FTTP.

The resectionalization process is a key component in enabling carriers to upgrade their networks for delivering broadband services to new and existing customers. ADC offers services and solutions that reflect its many years of success in helping carriers ensure the most reliable, cost-effective, and future-proofed network upgrades for accommodating next-generation technologies.

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Web Site: www.adc.com

From North America, Call Toll Free: 1-800-366-3891 • Outside of North America: +1-952-938-8080

Fax: +1-952-917-3237 • For a listing of ADC's global sales office locations, please refer to our Web site.

ADC Telecommunications, Inc., P.O. Box 1101, Minneapolis, Minnesota USA 55440-1101

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