



How to Succeed In Wireless Backhaul

A Whitepaper: State of the Industry and Suggestions for Success

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State of the Industry

Without question, society is going mobile. Mobile broadband to be exact. Consumers have discovered the value of mobile broadband and they are building expectations for it to be available everywhere. The explosion in the adoption of mobile devices, including smartphones and tablets, is driving insatiable demand for bandwidth, both inside and outside of the home.

Indeed, the move to mobile broadband is well underway. Consider some of these market statistics and predictions:

- The number of wireless connections in 2011 for the U.S. and its territories totaled 327.6 million as compared to a total population of 315.5 million. That's a 103.9% penetration rate (CTIA, 2011).
- More Americans will be accessing the Internet using mobile devices than through PCs or other wireline devices by 2015 (IDC, 2011 – “Worldwide New Media Market Model”).
- Forty percent of mobile consumers over 18 in the U.S. own smartphones (Nielsen Media Research, 2011).
- Average mobile data consumption per month rose to 435 MB from 230 MB between 1Q10 and 1Q11 (Nielsen Media Research, 2011).
- The total number of active video calling users will surge over the next five years, expanding more than five-fold, from a 2010 total of 63 million to more than 380 million in 2015 (NPD In-Stat, 2011 - “Video Calling Across Screen Types: PC, Mobile, and Living Room”).

The trends are clear and definitive, and wireless providers need to prepare their networks for this reality. That preparation includes ensuring wireless backhaul facilities are robust and adaptive to meet this growing demand.

Seize the Moment

This mobile broadband society presents interesting implications for telecom service providers. Wireline carriers have been feeling the impact for some time, particularly through growing trends like wireless substitution. That trend initially involved customers substituting wireless voice services for traditional wireline voice services. As mobile broadband matures, wireless substitution may expand to include substitution for wireline broadband services as well.

But where there are challenges, there are also opportunities. The average consumer doesn't realize that mobile broadband is hardly wireless. In fact, wireline infrastructure is what truly enables a mobile broadband experience. The wireless portion travels a few miles at most. The majority of mobile broadband's journey travels over wireline facilities. Therein lies the opportunity.

Wireline carriers with robust middle mile fiber networks are well positioned to grow their transport business by providing backhaul for wireless carriers. Connecting those middle mile facilities to wireless towers for backhaul represents one of the best business development opportunities available today. It's a fairly lucrative one as well, when planned and executed properly. Providing wireless backhaul and transport services for wireless carriers is an excellent long term business which can help wireline carriers better adapt to the wireless world we increasingly find ourselves in.

For wireless carriers, the mobile broadband explosion has far reaching implications as well. The bandwidth demands it creates, challenges wireless carriers to keep pace. Customers have little patience for slow or inconsistent performance. Wireless carriers need to ensure their facilities can meet this demand both today, and tomorrow.

Wireless backhaul facilities are critical components for this challenge. These facilities need to be properly provisioned and utilizing the right technology to efficiently meet the demand. Choosing the right vendors, partners, and backhaul carriers are crucial for long term success.

CHR Solutions Wireless Backhaul Tips for Success

We've assembled a comprehensive list of 10 tips for wireless backhaul success. These tips provide excellent guidance to carriers who are developing and implementing wireless backhaul strategies.

1. **When planning, look out at least three years.** Growing capacity on a yearly basis can be costly in engineering, installation and implementation costs. When purchasing

equipment for backhaul needs you should avoid multiple purchases of equipment by forecasting on a three year basis. This will save you money on redundant purchases and ensure more network stability. It will also provide a good opportunity for forecasting training needs for your staff and avoiding write-offs from accelerated depreciation.

2. **Design your backhaul for scalability whenever possible.** It will save time and money if you already have the capability to add bandwidth without additional construction and implementation costs. A scalable design will allow your staff to respond more quickly to growth needs and will reduce service outages for testing and turn-up of new services. This construct enables agility, and in turn, will give you the advantage of waiting longer to make the next capacity purchase of bandwidth.
3. **Plan and order early.** Extended delivery times and unplanned delays happen often with construction and implementation of backhails. If microwave or fiber are needed, it can easily take 6-12 months to get the bandwidth required. On remote projects, the lead time can be even longer. Planning early will allow your team to make critical project dates with less cost and better quality. The more time you give your staff to test the new service, the better the chance of finding hidden problems with equipment or design.
4. **Keep the number of carriers involved in a single path to a minimum.** The more vendors or carriers you have to engage on an outage, the more delay there will be in restoring your customers' service. When you purchase a circuit or bandwidth that traverses several carrier networks, you add inherent delays in turn-up and restoration of the service. It can be very frustrating and challenging when you have to coordinate multiple companies and ticket processes during service outages. Having only one group to contact and escalate can substantially improve your restoration time and service levels.
5. **Deploy diverse transmission paths when appropriate.** Make sure you engineer to meet expected service levels based on a assigned hierarchy of critical services. In cases where a service you offer is not critical you can get away with little or no diversity in your backhaul. A single point to point T1 or a VPN over the Internet might meet your needs. However, in cases where you need to provide critical services, like SS7 links or E911 trunking, you might want to consider 100% diversity of equipment in your path. Make sure your design includes diversity in carriers, geographic routing,

equipment, and power. Match the diversity with the criticality of the services you carry.

6. **Design an IP based network if possible.** Plan to migrate away from traditional TDM networks as soon as it makes financial sense. In the future, most products will only IP based. The sooner you get your network there, the better. In most cases you have the choice of an IP based backhaul or a traditional TDM service. It may be a little more expensive to upgrade to an IP based service, but the longer you wait, the more equipment write-offs you will incur. By transitioning to the IP network you will have the benefit of all the new features and functionality being offered on the new platforms. IP equipment and bandwidth will continue to become more affordable and will lower the cost of providing service over time.
7. **Design for minimum delay on all circuits.** Delay is critical to most types of data and voice services. Depending on the service you are looking to support, delay can adversely affect overall performance. In most cases, delay is caused by inefficient routing of facilities or traversing multiple carriers or networks. Each piece of equipment a backhaul traverses adds to the overall delay. When possible, keep your backhaul efficient and direct. Design to traverse a minimal number of carriers and remember to verify the delay on both the primary and alternate routes.
8. **Design where you want the DMARC.** If you are in an office building, make sure your DMARC is at your equipment location. If not, you may have to deal with in-building transport or wiring. This is particularly critical in large buildings or compounds. If the DMARC is on the first floor and your equipment on the 10th—getting connectivity can be quite challenging and costly. Reaching your location across a large compound can also be very costly and time consuming. In many cases, the existing in-building plant or wiring may be dated. It may be unreliable or simply maxed out in terms of capacity. By placing your DMARC in your equipment space, you can avoid the cost and problems of using in-building wiring.
9. **Get a good SLA with each service provider involved.** The devil is in the details! Make sure you fully understand the support resources, expected restoration times, financial obligations for outages, escalation times, termination language for non-performance, required status updates on open tickets and contact information before you sign up for service. Having a good SLA from each service provider on your backhaul can really make a difference in restoration times and network reliability. It also allows an exit strategy if your service provider is not meeting your needs or the

SLA. Make sure there is a requirement to keep escalation and contact lists current with names and phone numbers, along with a high level management contact for potential direct intervention. You should include predefined escalation times that a problem or outage will be taken to the next tier of technical support.

- 10. Get 24/7 access to all test points of your backhaul when possible.** If your DMARC is located in a building, telephone equipment space or someone else's space, it is important to ensure 24-hour access for testing. In many cases, transport is delivered to a Telco room that only the owner or their representative can access after business hours or to which access is limited to 8 - 5 Monday through Friday. In other cases you might be required to have an escort to gain access to your equipment space. In any case, make sure your lease or service agreement specifies that you have 24/7 access and provides for keys, codes or cards required for access.

CHR Solutions Wireless Engineering

With more than 60 years of experience in communications network engineering and integration, including the design and build of one of the top five LTE networks in the United States—expertise and knowledge of emerging technology is our business. CHR Solutions' professional engineers provide complete solutions in traditional wireline and next-gen wireless network design, base station engineering, radio engineering, system performance and switch engineering. Our services span the spectrum of projects, from small, individual equipment projects to complete network designs. We deliver results—wireless projects designed to meet your service and coverage expectations.

CHR Solutions' wireless engineering team delivers comprehensive assessments that reach beyond technology and provide consideration for individual requirements including time-to-market, service features, budget and return on investment.

CHR optimizes your wireless operations with project planning and specifications, equipment negotiations, review of vendor proposals, complete project coordination, acceptance testing, on-site training and cutover assistance. We have secured nearly \$1.5 billion for our clients in private, Broadband Stimulus and Rural Development Utilities Program (RDUP) funding and can assist in fund acquisition and managing compliance in funded project fulfillment.

Wireless Engineering Services Include:

- Complete Network and RF System Architecture, Design and Implementation
- Capacity Planning and Forecasting
- Feasibility Studies for New Systems and Expansion
- Network Design and System Objectives

- RF Coverage and Performance Models
- Licensing and Frequency Coordination Support
- Base Stations, DACS, Switch, Backhaul and Billing System Integration
- Field Support Engineering Services
- Microwave Radio Design (Licensed or Unlicensed)
- Drive Test Management & Annual System Verification
- Mobile Switching Office and Cell Site Power and Battery Systems
- Data and Internet Access Systems
- Long Range Planning Support
- Spectrum Evaluation and Interference Management
- Manage and Negotiate Contour Extensions
- Construction Management Services
- Transport/Backhaul and IP Design
- Problem Isolation and Repair
- 4G LTE, Cellular, PCS, Wireless Local Loop, MMDS, LMDS, Point to Point Microwave, Unlicensed Bands, Wireless Internet, Switching Centers (Voice and Data), Broadband Wireless

About CHR Solutions

CHR is the largest, single-source provider of business process outsourcing, engineering services, software solutions, and technology managed services to communications service providers across the globe. Our team of industry experts from multi-faceted disciplines helps clients grow revenues and improve operations. CHR's local presence, national network and global reach provide the scale and skill to elevate your business. Our clients include: telephone, Internet, cable TV and wireless providers and city municipalities. We employ more than 500 team members with twelve offices and two network operating centers in five states and two countries. For more information, visit www.CHRSolutions.com.

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