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PLUS:

Finding the Silver Lining

By Grant Seiffert, President/CEO, TIA

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Walker and Associates

Tel: 800.Walker1
info@walkerfirst.com
www.walkerfirst.com

Fujitsu Network Communications Inc.

2801 Telecom Parkway, Richardson, TX 75082
Tel: 800.777.FAST (3278) Fax: 972.479.6900
us.fujitsu.com/telecom

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As we venture into 2009 we are continually reminded of the collapse that our economy has faced recently. Corporate America is falling apart, the real estate market is crumbling, the stock market is plummeting, and retail chains are showing record losses. The effects of the recession are resulting in an increase in the un-employment rate, and leaving many Americans wondering how long their jobs will remain intact.



Jennifer Beck
Sr. Product Marketing Mgr.
Walker and Associates, Inc.

Given these facts, many people have been forced to make financial changes in their personal activities in order to save a dollar. I have been called frugal multiple times over the years, so I'll share some of my favorite ways to save money.

- Shop at wholesale stores and buy in bulk. The price at the register may be higher than your usual shopping trip, but the net savings will pay off.
- Take advantage of discount clothing outlets. You can typically find very nice apparel at attractive prices.
- Invest in a food saver, then buy the value packs of meat and split them up in portioned size bags.
- Buy generic brands whenever possible. Most are just as good as the brand name items.
- Pack your lunch four out of five days during the week. It's gratifying to allow yourself one day a week to dine out.
- Brew your coffee at home in the mornings. Buy the flavored creamers if you like the taste of gourmet coffee.
- While driving, accelerate easier and keep your RPMs under 2000. This will help increase your gas mileage.
- Do your own house work and home repairs. If you're uncertain of how to perform specific repairs use the internet to search on "how to" topics.

Not only have changes in habits been necessary for our personal benefit, they are also essential for the success of our professional careers in telecom. As you look for ways to work smarter and reduce costs in your business make sure you maintain your brand/image in the market. Don't lose focus on staying in front of your customer base or you'll soon be forgotten. Build relationships with partners who

"Build relationships with partners who can help expand your service offerings..."

can help expand your service offerings at a less expensive price than performing the function internally. Some of the key cost savings solutions include network management devices, hardware with expandable services via software downloads, and providing managed/hosted services.

On a positive note, evidence shows that voice and video are somewhat immune to economic downturns. Most families find other means of reducing personal budgets, while keeping their voice and video services as a form of inexpensive entertainment. This does not conclude that all telecom providers will be unaffected by the economic downturn. It does, however give us a glimpse of hope that telecom may not be as badly affected as other industries by this recession.

In a nutshell, we all understand how important it is to concentrate our efforts on producing higher revenue services via cost cutting avenues. This issue of the Skinny Wire was designed to help you succeed in a down economy with a smaller budget. Walker and Associates has obtained advice from several well known manufacturers in the telecom industry that focuses on delivering higher bandwidth services with existing infrastructure or lower cost solutions. With Walker's key OEM partnerships we can provide you the solutions you need to run your business successfully in a down economy!

Finding the Silver Lining: Helping Small Businesses Weather the Stormy Economy

By Grant Seiffert
President/CEO, TIA

There's no getting around it, the current business climate is grim. The recession is affecting all industries, including the already hypercompetitive information and communications technology (ICT) industry. We can't avoid reality, but we can react creatively, and trade associations like the Telecommunications Industry Association (TIA) can provide valuable resources to help guide the industry through troubled times and offer small businesses a helping hand.

TIA represents more than 500 member companies, approximately 80 percent of which are small- and medium-sized businesses. Our members' shared goal is not just surviving, but thriving. We work to create opportunities and revitalize and strengthen the industry so that businesses are positioned to take advantage of the next growth cycle.

To that end, we have to begin by assessing the current state of the ICT industry, and we have to be realistic, with no punches pulled.

The recession we're in has created a significant pan-industry downturn that threatens promising economic opportunities. In the last months of 2008, orders for TIA members' products virtually collapsed. Member companies are reporting significant profit losses and are making workforce reductions on a large scale. Technology sector job cuts in 2008 are projected to rise to approximately 180,000 – the highest amounts since 2003. The pinch is being felt across the board.

Where does that leave you? Struggling? Perhaps. But, don't despair. Despite the current challenges, small, innovative businesses that smartly and nimbly navigate the waters of economic uncertainty can create opportunities for success.

In fact, there are some bright spots. Analysts preparing TIA's annual ICT Market Review & Forecast – 2009, due to be released in April, give this overview for the industry through 2012: "Growth in the U.S. telecommunications market slowed in 2008 and we expect a decline in 2009 followed by a more moderate decrease in 2010. We then look for a strong rebound during 2011–12. Equipment and support services will be hard hit in the near term as will the circuit-switched landline market. Among the bright spots are video and web conferencing, IPTV, VoIP, and smartphones. We expect broadband growth to moderate during the next two years and then return to double-digit increases in 2011 and 2012. Wireless will continue to expand at mid-to-high single-digit rates, boosted by double-digit annual growth in wireless data revenue."

With that kind of forecast, the next question we ask at TIA is: What can we do to help?

Ongoing Advocacy Efforts in Washington

In Washington, we're sharing all of our expertise and knowledge with lawmakers of the 111th Congress and with the Obama administration, educating them about the benefits of increased deployment of broadband networks that directly affect the productivity of our industries and our economy, and unequivocally affect public safety, education, health care, and countless other functions in Americans' daily lives.

The message that our nation's near and long-term economic welfare, jobs, and leadership all depend on the continuous success of broadband deployment, is not just being received, it's being enthusiastically taken to heart. At an open forum held by the House Small Business Committee, broadband infrastructure and solutions were cited

as a top priority for stimulus legislation to help create jobs in the technology sector and beyond. President Obama has also been a leading proponent for public-private investment in broadband infrastructure.

TIA also strongly advocates for small-company exemptions in complying with the debilitating requirements of the Sarbanes-Oxley Act and fights any economic regulations whose benefits do not outweigh the financial burdens that impair small companies' ability to function and operate efficiently.

" . . . it's critical to invest in innovation and new ideas to stay competitive and profitable."

Member companies see the value of TIA's advocacy efforts in Washington.

"[Associations like TIA give us] a steady flow of valuable information and access to the best thinking," said Jack W. Blumenstein, President and CEO of AirCell. "We're a voice in Washington if that's needed."

Trade Shows Evolve to Meet New Demands

As key as access is in Washington, for business success, nothing beats the access to peers, competitors and potential customers that trade shows provide as they evolve to meet the shifting demands of the ICT industry. We recently asked leaders at TIA's small member companies about the value of trade shows during tough times.

"Associations provide trade shows, and an understanding of the market ahead of the industry," said Robert Smithline, Senior Director of Next Generation Strategy at VPIsystems.

"Trade groups bring customers together," said Toni Gibbs, Vice President, North America, Shields Environmental, Inc. "You can't meet every customer in the state of Iowa, but the trade shows still attract them, giving the salesperson the opportunity to meet customers who are otherwise difficult to get to."

The value added and ROI is realized through understanding the needs of exhibitors and attendees. TIA's trade show SUPERCOMM®, which will be held at McCormick Place in Chicago, June 8-11, is brimming with networking opportunities. The show's programming has evolved to showcase the business and technology solutions needed to maximize networks and offers the applications and services customers demand. SUPERCOMM, which TIA co-owns with USTelecom, affords access to the visionaries, executives and engineers transforming an industry and changing the way we live our lives.

Breathing New Life into the ICT Industry

Remember the old maxim: Nothing ventured, nothing gained? It has never been more true.

Start-ups and garage inventors are the lifeblood of our industry. The innovation that results from these high-risk endeavors many times leads to the household names we have become familiar with over the years.

However, the current economic crisis is contributing to the crippling of this essential part of the innovation cycle, making it difficult, if not impossible, for these groundbreaking technologies to be realized.

According to the National Venture Capital Association, in all of 2008 there were just six companies that went public. Compare that with the 269 initial public offerings (IPOs) in 1999, 272 in 1996, and 365 in 1986. These numbers illustrate the unwillingness of otherwise independent inventors to take personal financial risks in an uncertain marketplace.

As tech companies face daunting challenges from tightened credit markets, they are holding the line on expenses, afraid to take risks or spend money – yet it's critical to invest in innovation and new ideas to stay competitive and profitable. Obtaining venture capital is becoming tougher, and obtaining financing requires greater creativity.

Facing these challenges head-on, TIA launched a series of free Small Business Symposia, tapping the resources of its membership in an effort to help small- to mid-sized tech companies. The Winter Symposium, co-sponsored by Cisco, in association with iHollywood Forum, was held Feb. 4 at Cisco's headquarters in San Jose, Calif. There, dozens of companies attending heard from leading investors, venture capitalists, and Cisco executives with practical solutions on how to grow their business and generate deals. Presentation topics included:

- Raising financing and finding new sources of capital
- Cutting costs without sacrificing productivity
- Making sound management decisions
- Increasing revenue and reducing marketing costs
- Networking with peers and investors to share ideas

Watch for details on the next TIA Small Business Symposium.

Environmental Regulations and Global Markets

Another challenge manufacturers and service providers face is the global mandate for a cleaner environment. Again, opportunity in disguise for the well-informed. EIATRACK – TIA's subscription-based environmental regulatory tracking service – was developed specifically for product stewardship. The EIATRACK team is made up of legal and technical partners that cut across the nebulous disciplines of law, environmental policy and science. Compliance issues are tracked through subject updates and reports.

EIATRACK tracks environmental laws and regulations in more than 100 jurisdictions globally, from the EU to China to Brazil, and in each of the 50 United States.

For example, India was added in December. At the time most of the existing environmental laws in India were formulated, the concept of product stewardship was little known or understood. The Indian legal framework now calls

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As president and CEO of TIA, Grant Seiffert oversees the policy, standards, tradeshow and marketing efforts for the leading advocate in Washington, D.C., for the information and communications technology (ICT) industry. TIA's member companies represent the entire supply chain of the ICT industry; these companies manufacture products, provide services and offer applications that transmit content by

video, voice and data, thereby merging communications and entertainment options. As leaders in the industry, the companies and organizations participating in TIA develop and deliver communications innovations for consumers, government users and businesses alike, while improving productivity and access to information around the world.

Seiffert joined TIA in 1996 as director of government relations. His main priority was the representation of the equipment industry's interests, particularly regarding competitive issues during implementation of the Telecommunications Act of 1996 by the Federal Communications Commission (FCC). He was promoted to vice president in 1998, directing domestic and global pol-

icy to help the association's supplier members gain marketing opportunities around the world. In that role, he oversaw policy, including interaction with the U.S. Congress, the FCC and the Administration, as well as with international regulatory bodies and government leaders and fulfilling the senior management role for association membership and TIA tradeshow. Prior to joining TIA, Seiffert served five years with Senator John McCain (R-Ariz.).

He holds a Bachelor of Science degree in political science from Radford University, where he served as vice president of his sophomore class and as a senator in student government for three years. He and his wife, daughter and son reside in Mt. Vernon, Virginia.

Energy Conso



The Wise Guy

industry is responsible for 2% to 3% of the world's greenhouse gas emissions, with data centers being a large contributor. How do we assume a leadership role in changing this?

Telecom manufacturers are being urged to develop energy efficient products. Businesses are seeking ways to use renewable sources of energy to power their facilities. In addition, service providers are beginning to use software enabled devices to monitor and manage their network equipment.

a number of years, renewed interest is rampant as businesses seek legitimate alternatives to lower their cost of doing business.

Power reduction and corresponding utility savings on telecom equipment is one thing, but what about the initial savings of not buying that huge HVAC system that generates hurricane force winds we are all familiar with in switch and data centers. While digging a little deeper into the need to remove heat from our beloved silicon and carbon derived CPU's and optical transceivers, I wonder how many budgets could have been spared expensive raised floor "plenums" if the installed equipment generated fifty percent less heat. It is definitely something to consider when proposing new equipment purchases or facilities, and fortunately there are more options than ever that factor the total cost of ownership into the overall equation.

As we weather this current storm of recession, it is a proven fact that corporations are struggling, and are actively pursuing creative ways to drastically cut their spending. There is no doubt that the costs of operation have been on the rise for sometime. As businesses feel the pinch, wages are likely to be depressed, making a bad situation for workers even worse. With this kind of economy it is no wonder so many companies are looking for new ways to save budget dollars.

The time may have indeed arrived when we can gain some traction with these three often discussed but rarely initiated ideas, each of which impact our industry. The good news is that we can implement these ideas in our own businesses, making us role models for other corporations. A more significant impact, however, is that broadband will be a key driver on the road to recovery. Our industry must focus on how it will emerge as a player with business and residential services that help businesses balance budgets through telecommunications technologies.

In this troubled economic time businesses are becoming more cost-conscious than ever. A few ideas have been around for a long time that never really gained widespread acceptance. After finishing a year when the stock market experienced its largest percentage loss since 1931, we now have an opportunity to reposition these ideas with the latest technologies. Energy consciousness, or "green" initiatives appear to be long term strategies rather than merely a fad, as unstable energy prices have driven the costs of goods and services higher and higher. While video conferencing technologies and the notion of telecommuting have also been with us

Becoming More "Green"

When manufacturers originally began marketing lower powered green products, I thought it was a bit comical that they proposed a single product or product line would be that beneficial in the overall scheme of things. The more I thought about it, however, the more I realized how important these products are to the environment and to telecom budgets today.

Over the last couple of years, the focus on carbon footprint reduction has become a widespread hot topic across America and around the world. According to some of the most recent research, the information technology

Video Conferencing

Telecommunication service providers will experience some savings with lower powered equipment, such as routers, integrated access devices, and switches, but on a relatively smaller scale. These businesses are experiencing pressures to lower costs in additional ways. Offering IP video conferencing instead of spending travel budgets is one cost cutting idea.

A benefit of video conferencing is that it can create an increase in the productivity rate among employees. Used effectively, conferencing can bring key personnel together for business meetings that may have not been an option

Conservation and Costs Savings Ideas

otherwise. As a result, decisions can be made faster so projects are met at or before set deadlines.

Video conferencing can also save time and money by reducing the amount of travel expense, as well as reducing the amount of downtime for employees. Reduced travel, in turn, curtails the use of non-renewable energy in the form of fuel for cars, planes, etc. Additionally, video conferencing should also be viewed as a way to strengthen bonds with remote partners and customers between required personal visits.

Telecommuting

Providing both the flexibility and the technology for employees to telecommute is another way business are reducing facility costs, as well as providing a way for employees to save on personal expenses. Long considered a perk for only select employees, businesses are now reviewing their telecommuting policies in order to lower costs, attract talent into the organization, and retain valued employees longer. Geography can nearly become insignificant when effective technology is in place.

There is a collection of advantages of telecommuting for employees and the environment. It is an excellent way to conserve energy. The three areas that are affected most by this form of conservation are vehicle, highway, and office related materials and resources. Telecommuting also preserves our environment by reducing the amount of land needed for parking lots. It preserves air quality by reducing fuel consumption, traffic congestion and air pollution. It promotes safety by reducing the amount of traffic accidents on the highways, as well as reduces employee stress levels.

Telecommuting has proven to be a success for business owners as well, as it lowers office occupancy costs, allows for quicker and less costly recruitment, and creates better retention of valued employees. New trends indicate that businesses are provisioning their

employees with increased levels of bandwidth within the home to accommodate speedy access to remote servers and systems. Enhancing the current DSL offerings and possibly getting the opportunity to provide FTTH based on increased bandwidth demand revenue forecasts are ways to participate in the overall cost cutting measures going on today.

Bottom Line

Sometimes we don't consider the best ideas until we're backed into a corner. Sometimes we get so comfortable with what we know, it just doesn't seem necessary to try anything new or risky. This is the time to embrace change and transform ideas into action items. It is doubtful we'll ever go back to "business as usual," which requires us to consider all the options on the table that will move us to long term success.

Make no mistake about it - technology will become an even greater driver in the new global economy. Industries ranging from education to manufacturing to retail require increased productivity that we are uniquely prepared to offer. Perhaps now is the time to wear the hat of role model by fully embracing the technologies we're selling?



As Director of Engineering Services, Rodney Wise confronts a variety of technical questions on a daily basis. His broad background provides him a real-world perspective of challenges and opportunities telecom engineers and project planners face in the field. This experience, along with continual training from the manufacturing community and a staff of equally talented Sales Engineers provide customers with a wealth of pre and post-sales engineering support. The Wise Guy is a regular feature in *The Skinny Wire* and on our website, www.walkerfirst.com.

Factoids:

The annual CO2 footprint of the average mobile subscriber is around 25 kilograms, which is equivalent to driving an average car on the motorway for an hour or running a 5-watt lamp for a year.

Simply using conferencing and collaboration to replace travel and allow telecommuting saved British Telecom nearly 100,000 metric tons of carbon in 2006.

The information and communications technology industry already is responsible for 2% to 3% of the world's greenhouse gas emissions, and data centers alone are on track to outpace the airline industry in the next decade when it comes to polluting the Earth.

In a 2004 research study, Walls and Nelson estimate that a 25-ton per year reduction in volatile organic compounds could be achieved in a given metropolitan area with approximately 4,500 telecommuters working at home, on average, 1.8 days per week.

Troop Support Initiatives at Walker

A number of associates at Walker and Associates have ties to friends and family members who are deployed in service to our country around the world. In fact, some of our customers who are reservists have been called up for active duty. In a show of support for these amazing Americans, some associates spearheaded initiatives to demonstrate their appreciation, pride and respect for the men and women of our military. They chose tangible ways to help military personnel stay in touch with family members at home, and designed a tee shirt expressing their support of our troops.



Joyce Wilson, who works in Walker's credit department, began a campaign by simply wearing a red item on Fridays in support of troops. Eventually this grew into an idea for a customized shirt specifically stating "Walker and Associates Supports Our Troops." Interest among associates was significant and the first run of shirts sold out immediately. A second order was placed, and now numbers of associates proudly display their shirts each week as a reminder of the sacrifices our uniformed men and women make each day.

Leading up to the recent holiday season, Joyce led a drive to provide phone cards for service members. Donations were received from associates and then forwarded to the USO. The donation was designated for the purchase of \$10.00 phone cards that were then delivered to soldiers overseas so they could make contact with family members over the holidays. Separation between family and friends for lengthy periods of time makes it both difficult and expensive for these families, and this seemed like a helpful way to keep them in touch.

Walker is proud to demonstrate support and appreciation for the people providing these important services for us throughout the year. These small tokens of thanks cannot begin to fully express how indebted we are for the important contributions they make.



Continued from page 5
upon every stakeholder to jointly protect and improve the natural environment.

New market research may help to put into perspective EIATRACK's value: There were more than 340 million wireless subscribers in India in 2008. TIA's soon-to-be-released ICT Market Review and Forecast projects 700 million wireless subscribers in India by 2012.

Another eye opener: There are more than 360 million Indians under the age of 15, more than the entire U.S. population, which itself has a Millennial generation coming of age that is the largest generation in U.S. history. The value in being in environmental compliance in such rich markets: Priceless.

To help facilitate trade with India, TIA traveled to New Dehli in December as U.S. Chair of the Telecommunications

Subcommittee, presenting the U.S. ICT industry's policy recommendations to the Indian Ministry of Communications and Information Technology, and advocating for critical policies related to spectrum, licensing and regulatory issues and liberalization of Voice over IP (VoIP) in India.

TIA also re-established a longstanding relationship with the Telecommunications Equipment Manufacturers Association of India (TEMA), and gave a presentation on the future of broadband at India Telecom 2008 – a tradeshow organized by the Federation of Indian Chambers of Commerce and Industry (FICCI).

New Initiatives

TIA is launching a new online magazine, ICT2020. We're creating a new forum for industry leaders to share their long-term vision and goals as

well as best practices for success. Also this year, TIA is developing an online product directory as a free resource for members to showcase goods and services and connect them with purchasers through an interface on TIA's Web site.

Small businesses weathering the economic storm should take advantage of every opportunity that trade associations like TIA offer, often at no cost. We're there to support companies on the bleeding edge of technological innovation, bringing our resources to bear in a holistic effort to improve the economic health of and create opportunities for the entire ICT community.

For more information, please visit tia-online.org, where we post industry news, TIA members' white papers and news releases and provide RSS feeds to help track ICT trends.

2008 Walker Sales Awards

Walker and Associates honored two of its own sales associates this past November at the annual end of year sales and marketing awards dinner at Graylyn International Conference Center in Winston-Salem, NC. Tom Kane, Vice President of Sales, presented the 2008 Outside Sales Person of the Year Award to Bill Durham.



This is Bill's second year in a row of winning the prestigious Red Blazer. Bill was given a huge round of applause for such an accomplishment. Bill was modest in his acceptance and stated that "Winning this award for a second year was a real surprise." He also mentioned, "This really indicates the consistency and quality of the support that I receive from the team at Walker. The team includes Inside Sales, Operations, Marketing, Engineering, IT, Field Services and Executive Management. My customers are great people to work with. Without their willingness to join us in creating solutions for them, none of our success including this award would

be possible." This was a significant accomplishment for Bill considering he has only been with Walker three years.

The evening also marked a special recognition to an outstanding associate in Walker's sales senior management. A second red blazer was awarded to Tom Kane, Vice President of Sales, for all of his hard work on and off the sales field. Tom was never awarded the prestigious red blazer due to rapid promotion to his role as Vice President of Sales. Tom proudly accepted the honor and thanked everyone.

The Chris Walker Red Blazer is the highest award attainable by a Regional Account Manager. It represents strong sentiments, values, and emotions for everyone at Walker. The founder, Chris Walker, made the Red Blazer his trademark when calling on his customers during the establishment of Walker back in the early 1970's. Walker's website recounts the history of how it all began by Chris Walker prior to his passing in 2000. One of Chris's original red wool blazers is proudly displayed in the lobby of the corporate headquarters in Welcome, NC.



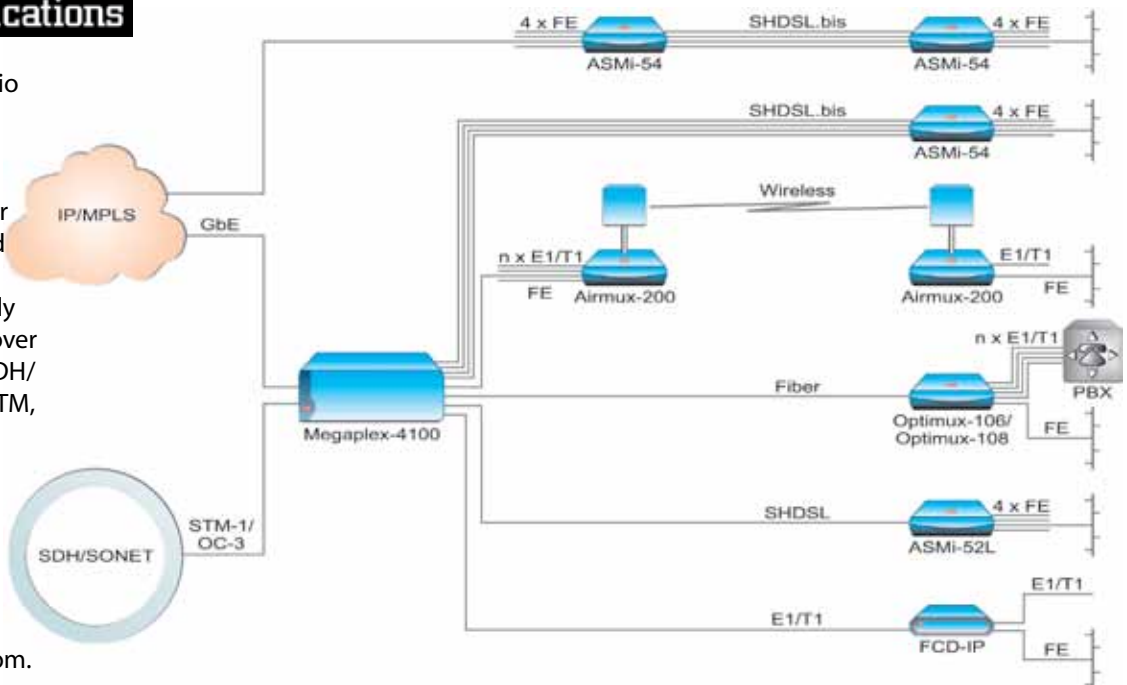
Scott Stoll, Director of Inside Sales, presented the 2008 Inside Sales Person of the Year Award. This year's Inside Sales Executive recipient went to Lee Ann Gilley, who like Bill, now boasts consecutive wins of this top honor. Along with Scott, Tom Kane, Vice President of Sales, congratulated and thanked Lee Ann for her continued dedication and hard work on behalf of Walker and her customers. Scott took a few minutes to mention qualities that make Lee Ann a top performer. He said "She has the qualities that we want every Inside Sales Executive to possess. She is a team player over and above, a forward thinker, uses proactive thinking and shows tremendous leadership within her group. Lee Ann always puts forth strong effort to accomplish her goals and objectives." Lee Ann graciously accepted her award with thanks and gratitude to her co-workers and most importantly her customers.



data communications

RAD's extensive portfolio of Ethernet Access solutions includes intelligent Ethernet demarcation devices for terminating high-speed fiber links, Ethernet bridges for economically transporting Ethernet over PDH, bonded PDH or SDH/SONET, Ethernet over ATM, Ethernet over ADSL2+, SHDSL and VDSL, and Ethernet over wireless.

For more information about RAD's Ethernet Access solutions, visit www.ethernetaccess.com.



The transformation of Ethernet into a carrier-class access technology is occurring at a rapid pace. Customers are increasingly demanding the cost-effectiveness and flexibility that Ethernet affords. At the same time, they require the deterministic performance, reliability and management capabilities of traditional TDM and ATM services that they have come to rely upon.

“SIP Trunking As You Are”



An Interview with AudioCodes' Alan Percy, Director of Market Development, Discussing Deploying SIP Trunking with Legacy TDM PBXs

What is SIP Trunking?

Most businesses today have traditional TDM trunks that interface between their in-house telephone system and the public switched telephone network (PSTN). SIP Trunking replaces those expensive TDM trunks with an IP-based service that uses SIP and the customer's internet connectivity to perform the same function, connecting their telephone system to the public network. SIP Trunking fits a wide range of enterprise and SMB businesses and can significantly reduce costs.

What is “SIP Trunking As You Are”?

The strategy behind “SIP Trunking As You Are” is allowing businesses to enjoy the benefits of SIP Trunking with their existing TDM telephone system (PBX or Key Systems). This strategy allows the cost savings to be realized immediately and postpones/separates the decisions or costs associated with telephone system replacements.

What are the Business challenges in selling SIP Trunking to legacy TDM Telephone Systems?

A key challenge for both the business and their reseller is separating the sale of SIP trunking from any potential upgrades or replacement of the existing TDM telephone system. The objective is to avoid the protracted evaluation process required by the customer to select a new system, work out a migration plan and then execute a cut over.

Another significant business challenge is the current economy. Most CFOs are not interested in large capital expenditures that would tie up cash or their lines of credit. The CFO wants to save money without spending money to get those savings. We think this strategy is a good fit for the current economy.

What are the Technical challenges when connecting SIP Trunking to legacy TDM Telephone Systems?

The biggest technical challenges that face organizations that want to move to SIP Trunking is interfacing with their existing TDM telephone system. The SIP trunks must be converted to a TDM format that is compatible with that specific PBX or key system, allowing the TDM circuits from the telephone system to be moved from the PSTN trunks to the SIP trunks with little or no adjustments to the telephone system. Why spend more money on a PBX that you know is going to be replaced in a few years?

What equipment is needed for SIP Trunking with a TDM PBX?

Media gateways provide the interface between SIP Trunks and legacy TDM PBXs, converting from SIP signaling and VoIP packets to TDM formats that are compatible with the legacy TDM PBX. The AudioCodes Mediant 1000 is an excellent example of a modular and scalable media gateway that converts from SIP to a wide range of TDM protocols and physical interfaces. For very small analog-only installations, the AudioCodes MediaPack™ 11x line of analog media gateways is an alternative low-cost solution.

Give some recommended configuration(s)?

For TDM phone systems that use T1/

E1 digital trunk circuits, an AudioCodes Mediant™ 1000 should be ordered with the same number of T1/E1 ports. Most small and medium business installations use from one to four T1/E1 circuits, which can be serviced by one Mediant 1000.

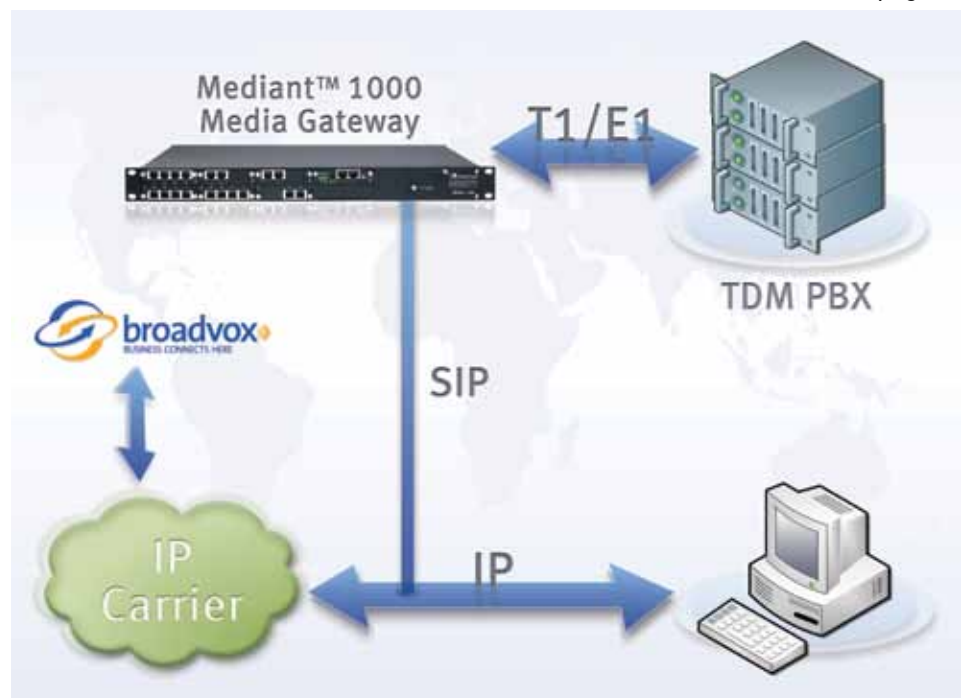
For phone systems that use analog trunk circuits, either a Mediant 1000 with analog FXO modules installed or a MediaPack™ 112/FXO (2 ports), MediaPack™ 114/FXO (4 ports), or MediaPack™ 118/FXO (8 ports) would be utilized, matching the number of ports on the media gateway with the analog trunk circuits on the PBX. For installations that require more than 8 analog ports, the Mediant 1000 with FXO modules should be used as it scales up to 24 FXO ports.

For more complex environments, the Mediant 1000 can also support a mix of digital and analog interfaces. (Check the Mediant 1000 User Manual for limitations)

What other important capabilities/features should be noted?

- TDM Interoperability – allowing the installation of SIP Trunking while eliminating/minimizing the changes to the legacy TDM phone system

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Deployment of Precision Time Protocol for Synchronization

By Symmetricom

The Precision Time Protocol (PTP) is a time-transfer protocol defined in the IEEE 1588-2002 standard that allows precise synchronization of networks (e.g., Ethernet). Accuracy within the nanosecond range can be achieved with the protocol when using hardware generated time-stamps.

Key Considerations for Deployment of PTP

Several conditions must exist for PTP to be deployed as the synchronization technology. The first is that the underlying network is built on a packet-based transport technology, such as native Ethernet, without embedded synchronization or time services available. Secondly, deployment of PTP requires that the access nodes or end stations should be enabled with PTP client functionality. A third condition is that the network is to provide mission critical real-time services and applications; mobile network services such as wireless backhaul impose stringent frequency and time requirements on the underlying transport. Finally, the underlying network architecture is also important in order to determine the placement of the PTP Grandmaster Clock (GM) servers. The location and distribution model of the GM is critical for the overall accuracy, consistency, and cost of the synchronization service and the choice made here can seriously impact the performance of the network.

To determine exactly how and where GM servers are deployed, the network planner has to take into account factors such as potential network load, congestion – especially at the aggregation points of the network – and the performance of the individual network elements. The MinimumTime Deviation (MinTDEV) analysis enables an explicit evaluation of the tolerable noise budget on the access and aggregation links. This is a major benefit in determining the placement of the GM

servers with reference to this overall network performance.

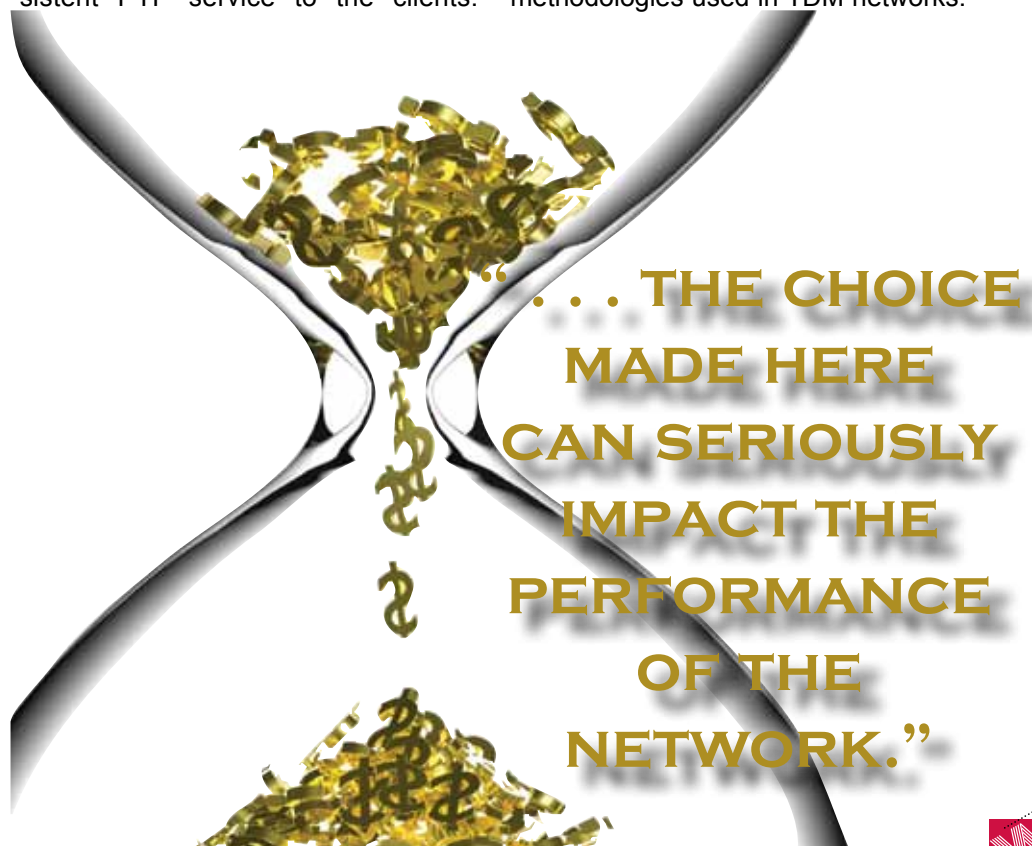
To avoid excess accumulation of delay or packet jitter in propagation of PTP, it is advisable to deploy the Grandmaster servers as close as possible to the edge devices. However, the actual hop count will be determined by factors other than just the underlying transport technology. In addition to the overall network load and congestion state, these include the efficiency of the network elements on the packet path, the stability of the local oscillator on the final access device, and finally the quality of the PTP client server algorithms.

Grand Master Clock server placement will also be affected by innate scale factors such as the CPU performance limitations of the Grandmaster servers, and reliability considerations. For the latter, the critical importance of synchronization and timing services implies that the network architect will require redundant Grandmasters each of which is able to provide consistent PTP service to the clients.

“Excerpt from Deployment of Precision Time Protocol for Synchronization of GSM and UMTS Base stations.”
By Symmetricom, November 2008, www.symmetricom.com

Cautious engineering will ensure the GM is deployed at the point where it is most effective and least risk, most probably at the aggregation point nearest the fan out to the end stations. Thus to ensure carrier class availability of the PTP GM the network planner must carefully evaluate the number of active clients per server under various failure conditions (capacity planning), the redundancy architecture of the servers, and the quality and type of network element in terms of impact on propagation of PTP.

To understand how PTP will add value in this environment it is important for network planning, operations, service engineering, and eventually of course cost-benefit analysis, to have an evaluation tool that will enable the operator to predict the performance of the network whatever the underlying transport mode. The deployment of packet-based networks and the migration to NGN has therefore introduced a need to analyze the performance of synchronization and timing instances in a network in a different way from the methodologies used in TDM networks.

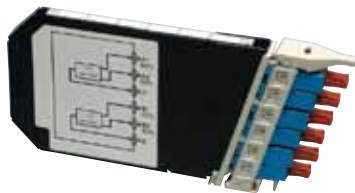


“... THE CHOICE MADE HERE CAN SERIOUSLY IMPACT THE PERFORMANCE OF THE NETWORK.”



Optical Distribution Frames and Fiber Optic Panels

ADC Optical Distribution Frames provide a centralized point for termination, splicing, slack storage and housing passive optical components, featuring industry-leading density and fiber management. Fiber Optic Panels provide fiber termination, splice and/or slack storage and excellent cable management in a high-density, discrete panel solution for network element, OSP, RNC and distribution network applications.



Coarse Wave Division Multiplexing (CWDM) Solutions

ADC Coarse Wave Division Multiplexing (CWDM) Solutions, part of the ADC's Value-Added Module (VAM) family, separate light, or wavelengths, allowing multiple signals to be transmitted simultaneously over a single fiber. The benefits of this are easily translated to your bottom line by installing easily, maximizing the existing fiber network and enabling out-of-band testing



FlexDSX® and RZX-3 Digital Signal Cross Connect Systems

ADC's FlexDSX and RZX-3 systems allow technicians to patch, terminate and rear-range DS1 and DS3 circuits. FlexDSX's modular chassis accommodate four-port cards with dual monitor ports that enable bi-directional monitoring. The rear crossconnecting RZX-3 features mid-size jacks and BNC connectors, and accommodates 24, 32, or 36 circuits per chassis in 19" or 23" racks.



LoopStar® SONET Access and Transport Solutions

ADC's LoopStar SONET Access and Transport product family allows service providers to cost effectively provide TDM and Ethernet business services to enterprise customers from a single platform. The LoopStar 800 SONET solution is ideally suited for all network deployment applications. The compact design and ability to scale from an OC-3 to OC-192 network, make the LoopStar 1600 and 3600 low-cost, high-growth solutions for adding services at the central office or at the edge of the network.



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Walker and Associates carries the complete portfolio of ADC's industry-leading connectivity products



OmniReach® Solutions for Multiple Dwelling Units

ADC's OmniReach solutions for Multiple Dwelling Unit (MDU) applications provide high performance interconnection of fiber cables and equipment at MDUs (apartments, condominiums, universities). These solutions support both low and high fiber count applications and include environmentally protective enclosures and high performance cable assemblies and connectivity components. With ADC's pre-terminated enclosures, distribution nodes can be added to the network with greatly reduced installation times and improved system reliability.

OmniReach RealFlex™ Drop Cables

ADC's OmniReach RealFlex™ Drop Cables are an ideal solution for the unique challenges encountered when deploying FTTX networks in today's Multiple Dwelling Unit (MDU) or Multi-Tenant Units (MTU) buildings. RealFlex Drops allow for a bend radius as small as 7.5 mm without changing attenuation characteristics of the cable and improve insertion loss (IL) performance for 90 degree bend locations. With the average MDU or MTU installation including as many as seven 90 degree turns, this new fiber greatly reduces the risk to bend induced IL during installation. In addition to the improved bend radius performance, the rugged cable construction provides the flexibility and durability to withstand the most demanding applications.



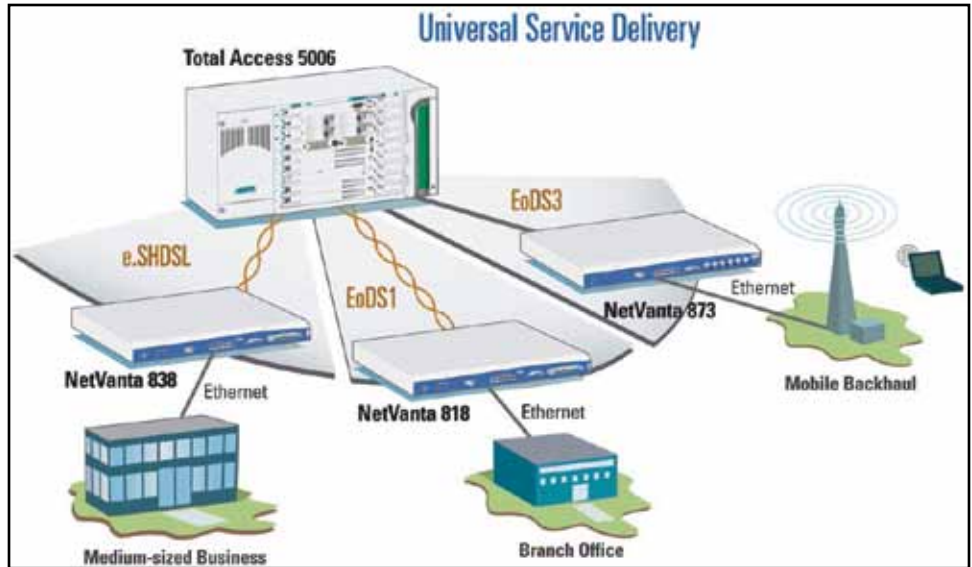
OmniReach Fiber Distribution Hubs

ADC's OmniReach Fiber Distribution Hub (FDH) solutions provide for rapid connection between fiber optic cables and passive optical splitters in the outside plant segment of Fiber-to-the-Premises (FTTP) networks, facilitating fast service connection and reconfiguration, simplified network installations and improved installation efficiencies in the field.

Cost Effective Carrier Ethernet

By ADTRAN

Carrier Ethernet (CE) Access continues to gain acceptance as a business class service delivery technology. Carrier Ethernet service dramatically reduces the complexity required to deploy Layer 2 services such as transparent LAN services and Layer 2 VPNs. In addition CE allows the delivery of managed layer 3 services, such as voice and video. Carrier Ethernet enables carriers to lower operating costs as a result of a reduction in network management complexity. Carrier Ethernet provides operators extended customer deployment with reliable, flexible class of service and quality of service (QoS/CoS) control.



The ADTRAN Total Access 5000 Carrier Ethernet Access Platform and NetVanta 800 series of intelligent network termination devices allow service providers to deliver better services to more customers — sooner. New advanced services like Carrier or

Metro Ethernet services usually require expensive network overlays that negatively impact time to market. However, Carrier Ethernet over TDM (EoTDM) allows service providers to extend new generation Ethernet services to any business that is serviced by TDM ser-

vices today. This means delivering to customer sites that reside both on- and off-network. This means reducing your capital outlay to deploy new services as you are using the existing TDM and copper infrastructure and not building a new overlay network.

Continued from page 10

- SIP Interoperability – certified with a large number of service providers, allowing a choice between a wide range of SIP Trunking offerings
- Voice Quality – delivering as good or better than PSTN voice quality
- Fax Reliability – support for T.38 fax for reliable and efficient fax transport
- Ease of installation and configuration – easy to use web configuration interface for both local and remote administration
- Security – supporting industry standard security capabilities
- Compact 1U package
- Cost-effective

calling or back-up TDM trunks. The Mediant 1000 can also be upgraded to a Multi-Service Business Gateway (MSBG), providing a secure interface between a new IP-PBX and the SIP Trunks. Other capabilities of the MSBG include data router, SIP-aware firewall and other security features.

Where can we learn more?

We've hosted a number of web-based seminars on this and other related topics that can be viewed on demand at: www.audiocodes.com/webinars.

Another great resource is your Walker and Associates sales associate or www.walkerfirst.com

Biography for Alan Percy
Mr. Percy is Director of Market Development at AudioCodes, a leading provider of Voice over IP Telephony enabling technology. In this role, Mr. Percy is responsible for identifying market trends and building relationships to foster new business opportunities. Mr. Percy joined AudioCodes in 2001 and brings over two decades of experience in the telecommunications, networking and wireless equipment industries. Mr. Percy is a frequent industry speaker and contributes to a number of industry journals and blogs. He can be reached at alan.percy@audiocodes.com

What's on the Roadmap?

When the time comes for TDM phone systems to be replaced, the Mediant media gateway continues to play an important role and can be repurposed to provide connectivity to analog phones, fax machines, E911

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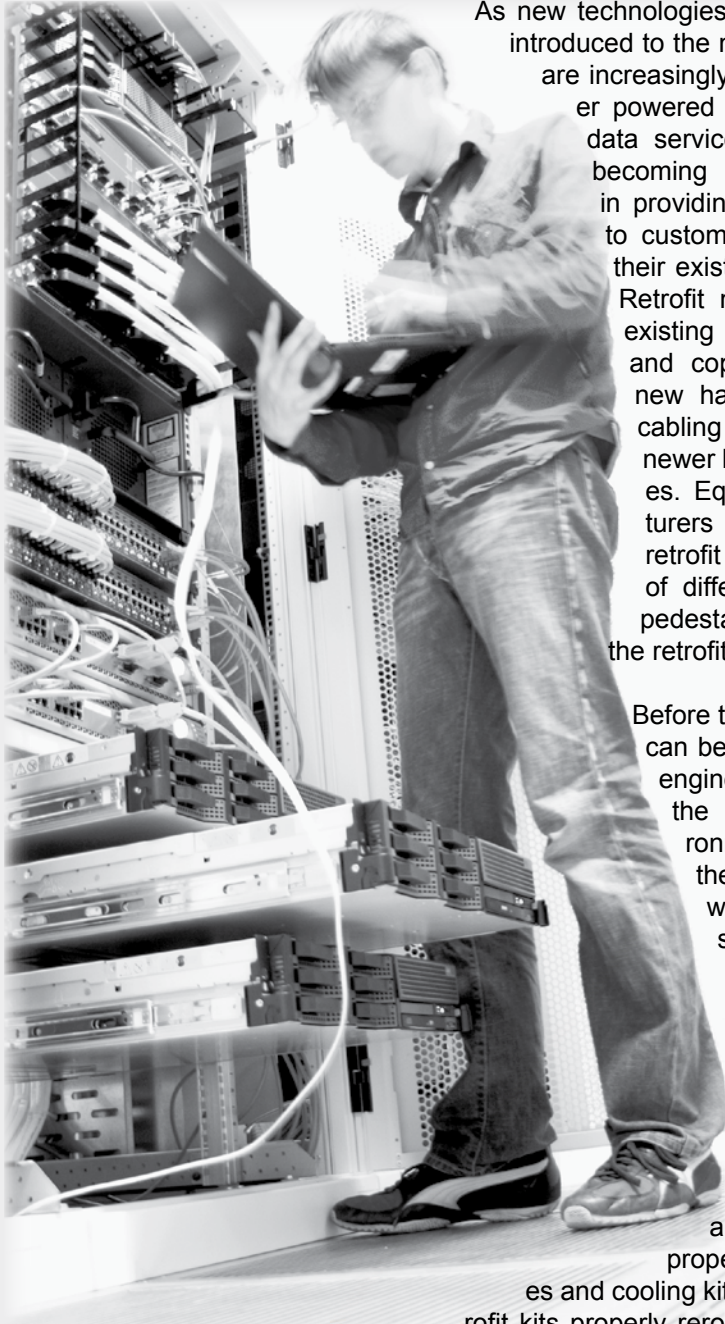
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Retrofit Solutions for Existing Infrastructures

By: Don Davidson, Engineering & Implementation Manager, Walker and Associates



As new technologies and gadgets are introduced to the market, customers are increasingly demanding higher powered voice, video, and data services. Carriers are becoming more economical in providing better solutions to customers by retrofitting their existing infrastructure. Retrofit means to replace existing legacy equipment and copper cabling with new hardware and fiber cabling that will provide newer high-speed services. Equipment manufacturers are now offering retrofit kits for a number of different cabinet and pedestal styles to aid in the retrofit process.

Before the retrofit process can begin, it is crucial to engineer the solution to the surrounding environment. Make sure the new equipment will fit into the design plans for the cabinet or pedestal designated to be cleaned and filled. Does the equipment manufacturer have the correct retrofit package available that includes proper power harnesses and cooling kits? Can these retrofit kits properly reroute and terminate existing fiber and copper cabling? These are just a few of the many things to assess during a site survey to make sure all information is gathered and reviewed.

Once engineering is complete and all parties agree on the project scope, it is time to start looking for a competent vendor to install the retrofit solution. Usually the original equipment manufacturer will recommend a contractor that has experience in installation and turn up of their equipment. Using a recommended contractor typically results in a better solution versus a service provider performing the instal-

lation. In considering expertise, experience, and efficiency, an external vendor can usually perform the retrofit services more economically. Make sure all available avenues are analyzed before deciding on a clean and fill partner. A rule of thumb is a messy installation means trouble with the equipment down the line.

An experienced project manager is critical. This role relieves the carrier from managing timelines, scope creep, and monitoring progress throughout the project. This leadership role guarantees quality requirements as well, making sure, for example, that the installation crew follows all Telcordia standards. He or she should immediately discuss any issues or concerns with the contractor to prevent delayed turn-up or mistakes resulting in lack-of-service.

In the end, perform a final audit to be certain the equipment is installed per specification and looks aesthetically pleasing. Take time to review and report anything that looks unsatisfactory or incomplete. Make sure all cables are terminated properly and labeled at both ends. Also, make sure the installation leader reviews the functionality of the equipment. Verify power criteria and cable continuity to make sure everything is running correctly. Never let the installation contractor leave unless everything has been accounted for.

Remember that retrofitting existing structures is not an exact science. It carries certain risks and unique considerations for each application. If done correctly, however, it can be a solid economical solution when all parties work together in creating a successful retrofit installation.

The Economics of FTTN vs. FTTP

By Bryan Kennedy, ADC Business Development Manager

There are two predominant schools of thought regarding how to meet the ever increasing bandwidth needs of consumers and businesses. Fiber-to-the-premise (FTTP) architectures take optical fiber all the way to the home or office and offer the most future-proof solution in terms of pure bandwidth capabilities. But in some cases, FTTP may not be the optimal solution in terms of overall cost and the value of existing infrastructure.

Fiber-to-the-node (FTTN) solutions offer operating companies an alternative solution to providing the necessary bandwidth required by today's voice, data, and video services while taking advantage of existing infrastructure. In many cases, FTTN can actually complement FTTP deployments.

At the end of the day, the key consideration in choosing which architecture will work best for any provider boils down to bandwidth – now and in the future. This article addresses several key considerations in helping service providers decide if FTTN makes sense for all or part of their network.

The Business Case

Every operating company must consider its own business case in relation to the capabilities of the existing network. Since an FTTN strategy seeks to leverage existing facilities as much as possible, it will ultimately come down to what each individual carrier sees as the real demand for customer bandwidth – and where that demand will be five to ten years from now.

Installation cost is always the primary concern in making a business case for the network architecture. The FTTN architecture will be less expensive to install than FTTP because it re-uses legacy infrastructure for the final 3000 to 5000 feet. But, installation costs alone should not necessarily dictate choosing FTTN over FTTP, particularly if the FTTN overbuild network will only provide a five-year life in terms of bandwidth demand.

Bandwidth – how much is enough?

The biggest unknown in the broadband services equation lies in how much bandwidth will be enough to support video into the next decade. For the moment, MPEG4-encoded high-definition television (HDTV) requires about 9-10 Mbits/sec, enabling consumers to receive four HDTV stations from a 50-Mbits/sec very high speed digital subscriber line (VDSL) service. Without knowing content requirements of the future and how much bandwidth will be required to deliver new applications and services, a limited service of 50 Mbits/sec could easily come up short in just a few years.

**“There is no
“one size fits all”
solution when
transforming
the traditional
switched
approach network
into a high-speed,
high-capacity
broadband
network.”**

Pair bonding can be used to produce higher bandwidth capability from FTTN buildouts that use copper-based “last mile” architectures. This technique enables the electronic bonding, inside the DSLAM, of two output DSLAM ports for providing twice the bandwidth to a single customer. This requires the availability of two continuous copper pairs to the customer premise. Also, the service delivery platform, such as the cross box or interface, must support the pair bonding.

There are other issues that must be considered to successfully implement this technique. For example, this technique requires using more of

the DSLAM to serve fewer customers. With that in mind, a 192-circuit DSLAM may only be capable of handling 96 customers if multiple HDTV services are demanded at each residence. Also, if the distribution area requires resectionalization as reachable distances decrease (for example, deploying VDSL will require new cabinets for reaching customers outside a 3000-foot perimeter), the deployment of additional adjunct DSLAMS may be necessary. Furthermore, if existing cross boxes do not have the necessary binding posts to support them, this initiative can quickly become very complicated and expensive.

Business cases must be determined by customer needs today and the best determination of what they will need in the future. An increasing demand for additional bandwidth for cutting-edge broadband services seems like the one thing everyone agrees on. But will the network upgrades to provide that additional bandwidth be a simple matter of swapping out a card at each end of the network? Will it require a higher quality fiber plant to support high-end services? Will factors like better forward error correction techniques enable longer use of existing infrastructure?

The long and short of FTTN

FTTN offers several advantages over the short term to operating companies that want to be first in reaching customers with today's broadband services. Because it re-uses existing infrastructure to the customer, turn-up can be achieved faster to meet immediate consumer demand. For the same reason, FTTN is a less expensive overbuild and, therefore, will provide a faster return on investment, particularly in many brownfield situations.

However, there are still many unanswered questions about bandwidth demand over the long term that cannot be ignored. FTTN architectures will continue to have bandwidth limits that may be exceeded– perhaps in five years or less. On the other hand, FTTP is certainly a more future-proof network

Continued on page 20

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- Manage network quality, monitor performance, and support frequency and timestamps synchronized to nanosecond levels
- Performs client-side management, monitoring and calibration

Walker and Associates Service Awards

Walker and Associates held its annual holiday dinner at Walker's corporate headquarters this year in Welcome, NC on December 15th, 2008. Associates from the Welcome and Winston-Salem, NC locations were treated to a delicious Christmas lunch.

Multiple service awards were presented to associates that have put in many years of hard work and dedication. This year's service awards included one 30 year recipient, Becky Wynn, who recounted several stories that she recalled from Walker's fledgling years. Some were humorous, while others were emotionally touching. Four associates were each recognized for 20 years, 15 years, and 10 years of employment with the company.

Mark Walker, President, and Laura Walker-Michaud, Board of Directors member, presented both the "Al Stokes Customer Care Award" and the "Chris Walker Award" at this year's Christmas celebration. The "Al Stokes Customer Care Award" is given to an associate who exemplifies and shows persistent effort in voicing and acting upon the needs of customers. The "Chris Walker Award" is awarded to an associate who "unwaveringly lives by the values of our namesake and co-founder, and who regularly demonstrates the dynamic and charismatic resolve in his or her daily effort." The 2008 nominations for both awards are collected from Walker's associates and then delivered to the Board of Directors who make the final decision.

The 2008 recipient of the "Al Stokes Customer Care Award" went to Chad Everhart, Planner/Scheduler. Mark read some of the characteristics that Chad's co-workers had written

about him that resulted in his well deserved award. Some were as follows: "He is unique and persistent when it comes to customer care", "the customer is the most important person in Walker's business", "he goes the extra mile", and "unfettered commitment to getting the job done". Chad was actually running late to receive his award because he was assisting with customer needs at the warehouse! Chad thanked Mark, Laura and his co-workers for the honor of receiving the "Al Stokes Customer Care Award".

The 2008 "Chris Walker Award" went to Dwayne Miller, Senior Sales Executive/Team Leader. A few of the many comments describing Dwayne leading up to the announcement that he had won were "Dwayne is a consummate customer satisfaction agent, rapidly finds solutions to customer problems; He continually looks for opportunities to service them with appropriate products, services and helpful information; Dwayne helps other salespeople improve their sales and customer service skills; As a team leader, Dwayne shares with them methods of developing opportunities, often at his own expense of time and opportunity; Dwayne is a tireless go-getter who manages his time and his assertiveness well in getting great results for Walker." These were just a few comments illustrating Dwayne's commitment to customer service. Walker is proud to have such an outstanding salesman on its team.

In Mark and Laura's closing statements they thanked everyone for the hard work put forth by all Walker associates and wished everyone a Merry Christmas.

Maximum Service Deployment, Minimum Investment

By ADTRAN

With the demand for higher-bandwidth services growing at a phenomenal rate, it is more important than ever to be able to leverage existing infrastructure in the delivery of new services. Time to market is crucial and network redesign or new cabinet deployment is simply not an option. The solution is cabinet revitalization. The ADTRAN® Total Access 5000/5006 Multiservice Access and Aggregation Platform is the best solution for revitalizing existing cabinet infrastructure to deploy higher-bandwidth, next-generation services easily and cost effectively.

Why Retrofit? Cost is the major barrier to the deployment of new services. The average total cost of placing a new cabinet could approach \$50,000, while the average retrofit costs less than one-third of the price of a new installation. Thousands of small line count cabinets, originally deployed for Plain Old Telephone Service (POTS), are

“ . . . retrofitting provides a complete solution for next-generation deployment, . . . ”

not equipped to handle the thermal and power requirements for the deployment of high- bandwidth services. However,

retrofitting provides a complete solution for next-generation deployment, while eliminating the costs associated with new cabinet fees, cabinet installation, powering, and right-of-way negotiation. Retrofitting minimizes capital expenditures and speeds service deployment. When compared to a new installation, retrofitting allows you to upgrade many cabinet sites with the same amount of money.



The photo on the right is the same cabinet as the one pictured on the left, cleaned and filled with ADTRAN's TA5000 Retrofit Kit Solution. This enabled the service provider to use the same cabinet to expand services to highspeed broadband at reduced cost.

Manufacturer Service Awards

Manufacturer relationships are highly valued at Walker and Associates, and represent a lifeline to meeting customer requirements. Individuals within these corporations make significant contributions toward business objectives, and make it possible for us to build, maintain and strengthen market positioning. At the end of 2008, Walker presented awards to two stand-out individuals from strategic manufacturers.

Hank Ford Award



The Hank Ford Award is presented in memory of Hank Ford, formerly of Symmetricom, who died of cancer in 2003, and is awarded each

year to an OEM account manager who understands and exemplifies the ideal manufacturer partner. Lisa Smiley, Vice President of Marketing, presented the 2008 Hank Ford award to Mark Ogden,

ADTRAN's Director of Service Provider Distribution Sales. He was selected based on his consistent demonstration of exemplary qualities that Hank Ford possessed. Some of those qualities include superior support for Walker staff, always accessible when called upon, creative, thoughtful, sincere, and enthusiastic in daily actions and work ethics.

Mark makes it a point to visit with Walker on a regular basis, and works hard to develop his relationships within all levels of Marketing, Sales, Senior Management, as well as other departments within Walker. He is extremely dedicated to the success of Walker and Associates and the partnership with ADTRAN.

Career Service Award

This year a new award was presented to one of Walker's longtime friends and a true partner. It was presented to Larry Fowler, Director of Sales at Symmetricom. Larry was recognized by Walk-

er, because of his relentless efforts to support Walker throughout his career, and in recognition of his retirement at the end of the year.

Mark Walker, President of Walker and Associates, presented the award to Larry during the 2008 Sales and Marketing Awards Banquet. Donna Nichols, Senior Product Marketing Manager, worked with Larry on a daily basis at Walker, and she had many wonderful things to say about him. "Larry worked with Walker's founder, Chris Walker, when the company was created back in 1970. He always supported Walker whole-heartedly, and always sought opportunities for the two companies to work together."

Larry will truly be missed, not only as a business partner, but also as a friend to all who met him. Walker wishes Larry a happy retirement with his family and friends.

2009 Winter/Spring

March

Minnesota Telecom Alliance 100th Annual Convention & Trade Show
Minneapolis, MN

UTC Region 3 Showcase and Conference
Columbia, SC

ITA Showcase
Portland, OR

NCTIA Technology Showcase
Winston-Salem, NC

RIITA Expo
Des Moines, IA

April

CTIA 2009
Las Vegas, NV

Texas Communications Expo
Belton, TX

TANE Spring Vendor Showcase
Bretton Woods, NH

Broadband Properties Summit
Dallas, TX

RCA Wireless 2009
Las Vegas, NV

May

TOC Showcase
 Fargo, ND

June

UTC Telecom 09
Las Vegas, NV

SUPERCOMM 09
Chicago, IL

Tradeshow & Event Schedule

Continued from page 16

design. In greenfield models, there is no question it is the architecture of choice.

In the end, the final decision for FTTN boils down to current architecture and several considerations that each operating company must resolve. Is it more advantageous to opt for an initial cost savings model with faster return on investment? Can we depend on technology improvements that will allow us to avoid the need to upgrade in the near future? Or is it more important, despite additional costs, to upgrade directly to FTTP

to ensure future-proofing the network against any future bandwidth demand?

There is no "one size fits all" solution when transforming the traditional switched approach network into a high-speed, high-capacity broadband network. These are challenging days for any service provider – but making decisions based on today's information coupled with a concern for future events will help network architects develop a solid business plan that meets each unique situation.



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EFM
Metro Wi-Fi
POTS
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BRAIN FREEZE

Fun With Facts and Figures

1. Take the number of the date that Independence Day falls on in July and multiply it by the number of runs scored in a grand slam home run.
2. Next, add the number of minutes in a half-hour.
3. Now subtract the value of the Roman numeral XXXVI.
4. Divide by the number of people who ride a tandem bicycle.
5. Subtract the lowest number on a gambler's die.

Our answer is the number of leaves on a lucky clover. Is yours?

			3	6	4			
	5					6		9
7		6				2		
8		7	4				6	
				3				
	9				6	3		4
		4				7		3
5		1					2	
			2	9	5			

SUDOKU

Sudoku (sūdoku) is a logic based number placement puzzle. The objective is to fill a 9x9 grid so that each column, each row, and each of the nine 3x3 boxes contains the digits from 1 to 9. The puzzle setter provides a partially completed grid. Try your luck and check your answers at www.skinnywire.net/solutions.



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ADTRAN® has been delivering smart solutions and innovation for more than twenty years.

Our comprehensive product portfolio includes solutions for both carrier and enterprise customers. ADTRAN's products and systems deliver reliable services across the entire access network, including copper, fiber, and wireless technologies. Our success in the access network has established ADTRAN as a leader in the industry, with a reputation for quality products and superior customer service.

Whether developing innovative fiber and Ethernet-centric access systems, providing continuous improvements to business services delivery, or minimizing the cost of mobile backhaul, ADTRAN engineers solutions with proven reliability and sustained value—benefits that our customers have come to expect.




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