GILDER TECHNOLOGY REPORT

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Can Broadwing Catch the Tortoise?

As network traffic increases, Broadwing's uniqueness will give it a higher premium as it surges past the leviathan turtles in its path

Like Achilles racing the tortoise, some companies expend a lot of energy to go nowhere. Achilles was fast, but the tortoise was smart, tricking Achilles into allowing him a head start. Whenever Achilles arrived at the point where the tortoise was, the tortoise had moved on. True, he had only moved a bit, but still, he wasn't there.

Let's call the tortoise "Profitability" and name our Achillean hero **JDS Uniphase** (JDSU), **Avanex** (AVNX), or some other comely modern moniker such as **Broadwing** (BWNG). All are racing to catch "Profitability." It should be easy. But the wily tortoise keeps dissolving into the mists of the future like an op-turtle illusion.

After five years of running a treadmill of restructuring, for example, the optical components giant JDSU is dauntless and peerless at downsizing. Yet at the end of each quarter, breakeven has moved a wee bit beyond the latest cost-savings "advance," with loss per share hovering between one and four cents over the past two years. At heart, JDSU's problem is not financial follies or managerial meltdown. It's the technology. Without ascendant innovations to set it apart from its optical components rivals Avanex and **Bookham** (BKHM), its products become commodities.

So last week JDSU essentially ceded that race to the tortoise, and bought itself a head start in a new race. Announcing its first major acquisition since SDL in 2000, JDSU purchased privately-held **Acterna** for $450 million in cash and $310 million in JDSU common stock. Opening a whole new business for JDSU, Acterna supplies test and measurement gear for optical, cable, access, and other communications customers, including **Verizon** (VZ), **AT&T** (T), **BellSouth** (BLS), **SBC** (SBC), and **Comcast** (CMCSA). With sales of $440 million, Acterna becomes JDSU's largest segment at 40 percent of sales, followed by communications at 36 percent and consumer at 24 percent. More importantly, with a gross margin around 50 percent and EBITDA (earnings before interest, taxes, depreciation and amortization) profitability of 11 percent, Acterna gives JDSU the elusive elixir of *earnings per share*.

Inside:

Offering scant synergies with JDSU's current operations, making gear for optical systems suppliers, Acterna will likely be run as a substantially separate entity while the "rest" of the company continues its struggles to streamline. Perhaps JDSU would do better divesting itself of the whole problem and becoming, well, Acterna. Especially since JDSU is getting a deal, buying Acterna at a discount to JDSU's own enterprise value, currently about $1,359 million or 1.9 times sales. (*Enterprise value* is essentially a company's takeover or sale price and is equal to its stock market capitalization, plus the balance sheet debt a buyer would have to pay, minus the cash he can pocket.) By paying $760 million, JDSU purchases profitable Acterna at just 1.7 times its test gear sales, giving the combined company a value of 1.8 times sales. Unfortunately, if you buy into JDSU for Acterna, you carry the unprofitable baggage of the old JDSU, about 60 percent of sales. Give Acterna's 40 percent a reasonable value of 2 times revenue (the midpoint of the typical valuation of its peers), and you are paying 1.7 times sales for the old JDSU, above its recent market low and no bargain for the chronically unprofitable business. So it may be a deal for JDSU, but it is probably not a deal for you at this price.

Opening a whole new business for JDSU, Acterna supplies gear for Verizon, AT&T, BellSouth, SBC, and Comcast

Hey, the entire industry is still in the op-turtle soup. Faring far worse fiscally than JDSU, Avanex is chasing the even more sluggish tortoise of positive gross margins. At current low volumes over the last three quarters, its components have cost between 2.6 percent and 5.8 percent more to make than Avanex can get for them. More akin to JDSU, components midget **Oplink** (OPLK), whose shareholders rejected a takeover bid by Avanex three years ago, has discovered fiscal Brownian motion, wandering over the last seven quarters between a loss of two cents per share to literally dollars under breakeven.

Which prompts us to ask: Could Broadwing have entered an Achilles shuffle of its own? Consider the dismal closing minutes of last month's quarterly conference call. CFO Lynn Anderson highlighted the heroic narrowing of EBITDA loss in communications services over the past year, from $20.8 million down to $4.1 million. Then he left us to "speculate" as to when Broadwing will crack breakeven. It gets "tougher and tougher," he said; the easy cost take-outs are done. But two years ago, Broadwing promised it would reach operating breakeven last year. Parsing the smoke, Wall Street paled and punished Broadwing.

In this environment, Broadwing is fighting to become free-cash-flow positive, while fending off critics who falsely fear the company will go bust, while the market goes bonkers over a misconception that Broadwing is diluting its shares into gruel as it pays off its convertible debt by issuing more shares. Amid the confusion, what can a sensible shareholder do? Or a potential sharebuyer looking for a bargain. Our advice is to calm down and concentrate on the long-term prospects, safe in the knowledge that no one else is, except Huber and his taciturn team of technologists.

At the stock's recent low-water mark of $3.68 the company was on sale for an enterprise value of $190 million, or less than a quarter of a year's worth of revenues. At $190 million the carrier was priced at far less than the replacement value of its assets, which cost more than $5 billion for Broadwing to acquire and create, and an additional $200 million for Corvis to upgrade into the world's first true all-optical, long-haul network. Although skeptics say Broadwing is actually worthless, since with today's capacity glut, no one wants to buy a fiber-optic network, they are wrong. Not all networks are created equal, and carriers continue to upgrade, including **British Telecom**'s (BT) planned $19 billion network revamp over the next half-decade or so.

Broadwing? Who's that?

Built by Corvis around the turn of the millennium, Broadwing remains the only national communications system that transmits its contents entirely on wings of light. That's the poetry of it. The prosaic reality is that while our old favorite paradigm player Corvis was a clear leader in building true all-optical network technology, Corvis went into a coma in the deflationary telecom crash. Then came an amazing rescue operation when some two years ago Corvis founder-CEO David Huber turned around and bought the network in a brazen effort to demonstrate the huge technological lead of Corvis's Raman-based systems. Over eight years, this technology has enhanced the potential cost effectiveness of optics (measured in wavelengths times bits per second, times miles per cable, without optoelectronic regeneration) by 16 thousand-fold.

In a wavelength division multiplexed (WDM) network such as Broadwing's, multiplexers take several "colors" or wavelengths of infrared light, each bearing a separate bitstream, and fuse them together on a single fiber. Demultiplexers separate them again at the other end to be sent to their destinations. In between, amplifiers boost the signal down the line; without them it dwindles and has to be recovered by electronics. Corvis's system amplifies light with sound (that's the Raman effect), increasing the distance between electronic regeneration in the network from 400 kilometers to 3,000 km. This enables all-optical wavelength switching, a much cheaper, far more scalable, and more reliable architecture (we have said for a decade) than a packetized IP-routed Cisco core where every packet has to be read at every node and add-drop point.

As a result, Broadwing's Corvis-built network uses more

than a thousand fewer laser line cards than competing networks built by **Ciena** (CIEN) or **Lucent** (LU), each elaborating networks on a foundation of opto-electronic (O-E-O) switches at major hubs. Retaining the E (electronics) also requires lots of additional and expensive O (optics). By completely removing distance from the equation, Broadwing hugely reduces the cost of a bit-mile and creates a network where latency is chiefly governed by the speed of light alone. For physics buffs, the global network becomes an Einstein/Minkowski light cone.

Although few of Broadwing's customers may be physics buffs—trust me, I'm a physicist—physical effects can reach the bottom line. Now capable of lighting 320 wavelengths per fiber, with an ultimate limit of around 14 thousand wavelengths per fiber, the network uniquely supplies hundreds of thousands of direct end-to-end lightwave connections between metro nodes and business locations. At the same time, it operates with superior latency and hence superior quality of service for lower cost and greater reliability than its optoelectronics competitors. Customers should be flocking to Broadwing's better deals and superior quality. Right?

Well, last month Huber did point out that while his rivals continue to shrivel, sales from Broadwing's data and broadband transport services, mostly unaffected by revenues added by the **Focal Communications** acquisition, grew 19 percent from the first quarter of 2004 to the first quarter of 2005. Over that same period, comparative revenues at **AT&T** (T) shrank by 9 percent, while **Sprint** (FON) contracted by 10 percent and **Level 3** (LVLT) by 2 percent. Still, first quarter transport revenues for the big three alone—AT&T, **MCI** (MCIP), and Sprint—totaled $13.5 billion compared to Broadwing's $217 million. For building the world's widest all-optical web, Broadwing's harvest is still meager.

Edging out Ma Bell

The trouble is that in connecting his long-haul network to customers, Huber has suffered from America's continuing 50-state broadband paralysis. The nation continues to divide every call into local and long distance segments and Balkanize the worldwide web into thousands of local access transport areas (LATAs), each regulated differently. Therefore, transporting bits the last 20 miles costs five times as much as transporting them over the entire backbone network. Until last fall, with the average Broadwing customer 17 miles from the Broadwing network, the company was choking on mileage charges to the RBOCs for local connections. Some Broadwing competitors could charge customers less for a T1 connection (1.544 megabits a second) than Broadwing was paying in access fees. Corvis's initial solution was Access Forward, a project designed to sharply reduce access costs through new agreements with the carriers and by grooming and extending the network. As a result, during 2004 average termination costs per minute fell 15 percent and average cost per customer access circuit decreased 9 percent. Even more important than the achievements of Access Forward, last September Huber acquired Focal.

With access in 23 cities, Focal may have been the best equipped of the all the CLECs (competitive local exchange carriers) and its access receipts handsomely outpace its access payments. Apart from the usual administrative economies of any merger, Focal brings switching facilities and leased fiber in nine key metro areas, including New York, Chicago, Los

For building the world's widest all-optical web, Broadwing's harvest is still meager

Angeles, San Francisco, DC, and Dallas. On the flipside, Broadwing eliminates Focal's significant long-haul fees. With a single integrated network platform as of this April, Broadwing can now enhance Access Forward cost cuts by optimizing traffic across a seamless network.

These gains come at the cost of at least another quarter of sizable continued capital outlays. ($28.6 million in the December quarter and $13.5 million in March.) That's good news. At Broadwing, paybacks come faster than at rival O-E-O networks. On a coast-to-coast link, just four line cards are needed to bring up an additional Broadwing WDM lambda versus installing 48 O-E-O interfaces, requiring dozens of truck rolls to light a traditional circuit over the same distance. Even if operational capex (opex) were half of the $13.5 million of March's investments, it would have consumed only 3 percent of revenues. Hence the cost of maintaining the all-optical network, just to stay alive and in business, is minimal. Score one for Huber and the physics buffs' light cone.

Though the physical interconnect of Focal was not completed until April, gross margin for communication services increased from 30.9 percent in December to 32.4 percent in March. With Broadwing's year-ago gross margin for services at 31 percent, up from the mid-20s due primarily to Access Forward savings, the further gains suggest benefits from Focal even in the face of integration burdens that affect cost of revenues.

As Broadwing axes access costs, the efficiency of the all-optical long-haul network, where gross margins can exceed 90 percent, makes total gross margin extremely sensitive to growth. Broadwing must keep its network humming with traffic by getting face-to-face with Focal's voice customers and bundling deals for data, while Focal gives Broadwing customers VoIP (voice over Internet protocol) offers they can't refuse, and the unified optical network attracts altogether new customers. Among new offerings, the poster child is the media services business.

TELECOSM TECHNOLOGIES

Advanced Micro Devices	(AMD)
Agilent	(A)
Altera	(ALTR)
Analog Devices	(ADI)
Broadcom	(BRCM)
Broadwing	(BWNG)
Cepheid	(CPHD)
Corning	(GLW)
Equinix	(EQIX)
Essex	(KEYW)
EZchip	(LNOP)
Flextronics	(FLEX)
Intel	(INTC)
JDS Uniphase	(JDSU)
Microvision	(MVIS)
National Semiconductor	(NSM)
NetLogic	(NETL)
Power-One	(PWER)
Qualcomm	(QCOM)
Semiconductor Manufacturing International	(SMI)
SK Telecom	(SKM)
Sprint	(FON)
Synaptics	(SYNA)
Taiwan Semiconductor	(TSM)
Texas Instruments	(TXN)
Wind River Systems	(WIND)
Xilinx	(XLNX)
Zoran	(ZRAN)

Note: The Telecosm Technologies list featured in the Gilder Technology Report is not a model portfolio. It is a list of technologies that lead in their respective application. Companies appear on this list based on technical leadership, without consideration of current share price or investment timing. The presence of a company on the list is not a recommendation to buy shares at the current price. George Gilder and Gilder Technology Report staff may hold positions in some or all of the stocks listed.

Cepheid (CPHD)

PARADIGM PLAY: MICROELECTRONIC MACHINES FOR DNA IDENTITY

JUNE 1: 9.15; 52-WEEK RANGE: 6.71 – 11.54; MARKET CAP: 388.48M

Cepheid is about to release its first ASR (analyte specific reagent) product for use on GeneXpert in the clinical market. The product will increase sensitivity up to a thousand times over other systems, detecting pico gram levels versus nano gram levels. GeneXpert may be the world's only fully-integrated and automated genetic analysis system. It is currently being sold to the biothreat market through a Northrop Grumman–led consortium developing an anthrax tester for the USPS. So far, over 650 thousand anthrax tests have been performed by the postal service using GeneXpert, with no false positives. Meanwhile, Cepheid continues to develop its first FDA product for detection of Group B strep using GeneXpert while adding two new ASRs to the four ASR primer and probe sets for identifying B. pertussis and HSV which began shipping last fall.

An early leader in lab-on-a-chip technology, Cepheid continues to be a long-term investment play. Trading at an enterprise value of 4.4x forward 2005 revenues, the stock likely has baked in management's forecast of a 55% revenue surge this year, which seems to be on track based on the March quarter results. However, profits will have to wait. Although sales are trending toward higher gross margin products, royalty and license costs should keep overall margins in the mid- to upper 40s through the year. Cepheid will also continue its spending pace on R&D and manufacturing to accelerate delivery of clinical products, sacrificing near-term profits for long-term growth. Management projects crossover to profitability in 2006. *-CB*

Equinix (EQIX)

PARADIGM PLAY: WHERE STORAGE & BANDWIDTH CONVERGE

JUNE 1: 38.94; 52-WEEK RANGE: 26.50 – 46.39; MARKET CAP: 917.47M

The company is richly valued by all conventional metrics but retains unparalleled strategic advantages in the industry. At a price-to-sales multiple of 5.11 and a forward estimated P/E of 64, EQIX looks scary. But its financial model, leveraged with low variable costs, continues to prove attractive. For the March 2005 quarter, sales were up 32% from March 04, but cost of sales was up just 9%. Gross profit thus almost quadrupled, from just over $3m to almost $12m, and EBITDA rose from $5.7 to $14.3m. The company now expects 2005 EBITDA to reach $61-$65m on sales of between $209 and $215m. Equinix believes pricing in the data center sector is firming and that the company is growing four to five times the industry rate. The company gained 75 new customers in the quarter and received new orders from 47% of its existing customers.

The analogy comparing data centers to the real estate business is true for much of the industry but proves too narrow for Equinix, which differentiates its square footage, or cabinet space, with unique direct peering access to other networks and content providers and with sophisticated high-nines power capabilities. Equinix thus benefits from economies of concentration (and stickiness) and from additional revenue streams beyond mere cabinet space. These unique interconnection services, such as the Gigabit Ethernet Exchange and the Financial Exchange, account for 23% of U.S. sales and 20% of sales worldwide.

Although Equinix shares appear expensive and may fluctuate in the short-term, the company is a strategic hold in the Internet and digital media sectors. *-BTS*

EZchip (LNOP)

PARADIGM PLAY: TWO GENERATIONS AHEAD IN NETWORK PROCESSORS

JUNE 1: 8.25; 52-WEEK RANGE: 4.77 – 15.17; MARKET CAP: 88M

EZchip's slower than hoped for revenue growth of 9% in the March quarter is more than offset by surging design wins. The company now boasts some 53 active designs: 13 designs in production using the first generation NP-1c; 20 NP-1c designs in process (pre-production); and more than 20 designs in process for the upcoming NP-2 family, scheduled to sample at the end of June.

The company reaffirmed that it will enter the 2.5 Gig (OC-48) network processor market using a pruned version of its 10 Gigabit NP-2. The NP-2/5 is actually a 5 gigabit full-duplex chip, offering twice the processing power of competitors but priced for the mid-market metro Ethernet and data center spaces. EZchip believes the NP-2/5 will double its addressable market to cover the top two-thirds of the net processor arena, which the Linley Group estimates will total $300m in 2007.

With $23m in cash and equivalents, EZ could last for almost two years with no sales at all. At the current run rate, the company could last three years. Fifty-three design wins, however, suggest EZchip could take a major portion of the NPU market over the next few years. Accounting for LNOP's 53% ownership stake, EZ is currently valued at $153m, and we continue to believe it will move toward a $1b market cap over the next few years. *-BTS*

Power-One (PWER)

PARADIGM PLAY: DIGITAL POWER MANAGEMENT CHIPS

JUNE 1: 5.60; 52-WEEK RANGE: 4.08 – 11.17; MARKET CAP: 474.05M

Expert in the power arena for 30 years, Power-One has recently figured out how to digitize power management. Instead of many tens or hundreds of parts,

MEAD'S ANALOG REVOLUTION

NATIONAL SEMICONDUCTOR (NSM)
SYNAPTICS (SYNA)
SONIC INNOVATIONS (SNCI)
FOVEON
IMPINJ
AUDIENCE INC.
DIGITALPERSONA

COMPANIES TO WATCH

ADAPTIX
AMEDIA (AANI.OB)
ATHEROS
ATI TECHNOLGOIES (ATYT)
BLUEARC
COX (COX)
ENDWAVE (ENWV)
FIBERXON
LINEAR (LLTC)
LUMERA (LMRA)
ISILON
LENOVO
MEMORYLOGIX
NOVELLUS (NVLS)
POWERWAVE (PWAV)
SAMSUNG
SEMITOOL (SMTL)
SIRF
SOMA NETWORKS
STRETCH INC.
SYNOPSYS (SNPS)
TEKNOVUS
TENSILICA
VIA TECHNOLOGIES
XAN3D

Power-One condenses all board-level power into two with its digital Z-One power management products. Z-One promises to remake the company's already strong line of power products. It may remake the industry.

The number of Z-One design wins more than doubled to almost two-dozen last quarter. Most of the wins came from new customers, including a major embedded computing manufacturer, and spanned applications from wireless, networking, telecom, and test equipment to aerospace, aviation, and computing. To incorporate Z-One, customers must make major architectural changes to their products. Thus, PWER does not expect significant sales from its new technology until 2006. However, that extended sales cycle may disappear with the new Z1000 No-Bus digital products, available for trials this quarter. With no bus, there's no programming, no protocol, no memory. Hence the design cycle for the Z1000 series will be 30% to 50% shorter than for the original Z7000 series of digital products, and customers can incorporate Z1000 with only minor design changes.

Design wins in the traditional business were also strong in March, including significant AC-to-DC front-end designs with large server and storage companies which should result in millions of dollars in new business in 2006 and should open up additional Z-One opportunities. Using digital power management in storage and server systems with thousands of disc drives can save 10,000 or 20,000 components compared to the typical savings of 200 or 300 components in other industries.

Though revenue in the quarter decreased $5.2m sequentially to $66.7m, more troublesome was the gross margin of 24%. Until December, gross margin had been holding in the mid- to upper 30s. About 6% of the margin loss in the quarter came from one-time inventory charges. That, along with the restructuring of telecom power systems operations in Norway, should help gross margin to rebound to the mid-30s in the second half of the year while breakeven drops to $68m in quarterly sales. Interestingly, management expects sales to flirt with that $68m figure during the next two quarters. Power-One has no long-term debt and net cash of $81.8m declined only $14m during a quarter of intense restructuring. The stock trades at a an enterprise multiple of 1.4x forecasted 2005 sales.

The digital economy now consumes some 14% of U.S. electricity, having become the chief source of new energy consumption. Power drives this microeconomy of silicon: As the number of distinct supply voltages keeps increasing, delivering the right current at the right voltage with increasing reliability has become a key challenge of the telecosm. In addition, power management is the thermostat of an electronic architecture that continues to heat up. Power-One is a long-term play on a fundamental innovation that will not pay off fully for half a decade or longer. If you buy this one, leave it alone for a few years. *-CB*

Qualcomm (QCOM)

PARADIGM PLAY: WORLD'S BEST TECHNOLOGY COMPANY

JUNE 1: 38.10; 52-WEEK RANGE: 32.08 – 44.99; MARKET CAP: 62.24B

Qualcomm shares have bounced off their lows of around 33 after the market absorbed slightly lower guidance for the rest of the year. Although the expected ramp of WCDMA chip sales may have been delayed by a few months, the larger Qualcomm story remains intact. Perhaps no one besides Intel, Maxim, and Linear enjoys the operating margins of Qualcomm—averaging 28% over the last five years. Now Qualcomm is using that earnings power to sustain and increase its wireless technology advantage. Up almost 50% from 2004, the company will invest some $1b this year in R&D, mostly for new high-speed wireless technologies and for multimedia processing and applications. This level of R&D should be enough to fend off many would-be WiMAX competitors, but clearly there is a massive race on for the next big thing in wireless.

Last week, EVP and chipset chief Sanjay Jha emphasized continued feats of integration, noting that in Q3 the company will produce a single chip that combines GSM/GPRS and UMTS (WCDMA) receive and transmit functionality. By early next year, Qualcomm will integrate a CDMA2000 baseband processor, receive and transmit RF, and power management on a single CMOS device. Jha believes the company retains a significant lead in HSDPA, the broadband downlink upgrade for WCDMA networks that Cingular, among other carriers, will begin deploying later this year. Jha says Qualcomm has the broadest expertise in all the disciplines that matter in bringing a new handset to life: radio frequency integrated circuits, modems, very large scale integration, digital signal processing, microprocessors, software, graphics, video, and overall phone design, not to mention more CDMA experience than anyone.

Jha also speculated that China will build at least one WCDMA (UMTS) network, one CDMA2000 network, and possibly two TD-SCDMA networks. All would yield royalties to Qualcomm, which already has strong chipset lineups for the first two standards, and will also be respectable in TD-SCDMA, though Siemens has been in China for years partnering on TD-SCDMA.

At a forward estimated P/E multiple of 26, Qualcomm is not trading outside its lofty potential. Its guidance and outside estimates could be conservative as the most recent field reports have improved since the perceived spring softness. Moreover, in the coming quarters new 3G networks in the U.S. and Europe will come online, potentially sparking a new wave of advanced handset upgrades. Industry projections say CDMA/WCDMA handset volumes could double from just over 200 million this year to 400 million in 2007 and triple to 600 million in 2009. CDMA variants could comprise more than half the market by 2008. *-BTS*

Synaptics (SYNA)

PARADIGM PLAY: ANALOG-DIGITAL INTERFACES FOR HAPTICS: FOVEON

JUNE 1: 19.69; 52-WEEK RANGE: 13.53 – 41.19; MARKET CAP: 506.58M

SYNA shares were cut in half following rumors that Apple was dropping Synaptics as chief supplier of its famous iPod scroll wheel and also of its notebook touchpads. With over $4 a share in net cash, the profitable company responded by announcing $40m worth of potential share repurchases. But, investors are waiting for proof that all is not lost, that SYNA has many other growing markets like mobile phones, and that even its Apple business is still pretty good. We'll see, but we think at a forward P/E of just 17, operating margins of 20%, and very fast growth prospects, combined with its still unaccounted-for ownership of Foveon, Synaptics could double in the next year. *GTR* readers had a great run with Synaptics before the rotten Apple story, and they are likely to have another good run when they can buy under 20. *-BTS*

Terayon (TERN)

REMOVED FROM THE LIST THIS MONTH

JUNE 1: 3.29; 52-WEEK RANGE: 1.44 – 3.73; MARKET CAP: 252.90M

After exiting the cable modem termination system (CMTS) business last summer, Terayon further narrowed its focus in February by selling its cable-modem chip development group to ATI Technologies. Since last spring, CMTS sales have plunged 84%, from $10.3m to $1.7m, on the way to zero. Over the same period, sales of home access products slid from $25m to $11.6m. With the exception of the declining home access line, Terayon is betting the farm on its CDMA-based headend solutions for HDTV, gaming, simulcasting, ad insertion, videoconferencing, and P2P. So far, revenue erosion from CMTS and home access have more than offset growth in the digital video line, and company-wide sales have dropped from $42.8m last June to $26.4m in March. However, with the accelerating growth in digital video expected this quarter, the trend should finally reverse as total sales inch up a few million. The company has steered through the downsizing well, and the balance sheet remains solid. However, the company is navigating a narrow path into the future, and Terayon shares, having more than doubled over the past 10 months, are now fully valued. Thus we remove Terayon from our Telecosm list this month. *-CB*

Not just lip service

Launched about a year ago, Broadwing media services already carry significant amounts of video traffic originated by movie studios. Today films are made in several locations and then sent back to editing centers for post processing, requiring transport around the world at faster than real-time, without any losses. The all-optical network is ideal for this. Over the next few years Broadwing is in a position to leverage its Hollywood partnerships into a niche monopoly as DVDs begin to phase out in favor of Internet distribution of video content, a business that has been retarded in the U.S. by regulations that stifle broadband build-outs.

Another cutting-edge application, high data-rate video, a natural for all-optical networks, actually allows you to see the ball in a tennis match or puck in a hockey game (important to the NHL if it returns to the "air"). Select media are now using Broadwing to collect and distribute special events, news, and sports full-time or by event, including major league baseball games and NBA playoffs. Enabling this service is Broadwing's recent expansion of its media network to twenty major cities from five.

Being rolled out ever more widely, Broadwing's newest products, such as VoIP and converged media, eliminate the jitter and echoes caused by IP routers and O-E-O conversions along rival routes. An all-optical network is ideal for real-time communications such as voice and streaming video or for faster-than-real-time communications. Chalk up another win for the physicists.

Almost alone in North America, Broadwing offers Layer 2 in addition to Layer 3 services (**Allstream** in Canada and **Masergy** also have Layer 2). Layer 3 is where routing happens, expensively optoelectronic, replete with exotic memories, dense processors, amplifiers, and lasers. Networks running on Layer 3 require IP addresses to complete the connection hop-by-hop through the network's routers. Layer 2 is the data link layer where Broadwing's all-optical switching happens. Since Broadwing's switches steer the traffic flow by wavelengths, they send packets much more efficiently, using end-to-end circuits as opposed to node hopping. Transparent to protocol, Broadwing's Layer 2 VPNs (virtual private networks) enable customers to the protocols used inside their LANs (local area networks), from legacy types such as ATM and frame relay to DSL and Ethernet.

Since IP protocol isn't required for switching across the network, companies don't have to give out their routing tables. Particularly attracted to Layer 2 wide-area LANs will be enterprises in the financial, healthcare, and defense fields, including DoD, where ceding control of routing tables is a security risk. Today, Broadwing is almost their only option. But Broadwing is also winning VoIP traffic. Steadily gaining voice revenues, Broadwing enables customers to avoid expensive gateways to connect IP voice packets inside corporate LANs to the public switched telephone networks (PSTN).

Our industry contacts tell us most of these products carry "high" margins. According to Infonetics Research, one of the reasons Ethernet services revenues should more than double this year from last year's $2.5 billion is because companies, such as banks and traders, are so hungry for secure bandwidth they are even buying their own fiber at $350 per mile to get it. With an all-optical network in place, Dr. Huber is ready for this market boom.

Catching the tortoise

With communications services revenues of $217 million in the March quarter, the EBITDA loss of $4.1 million comes to a meager 1.9 percent of revenues. Any combination of gross margin increase and R&D and SG&A decrease that closes that 1.9 percent gap, brings Broadwing to EBITDA breakeven. The numbers on cash flows support these estimates.

To push the process along, Dr. Huber has decided to sell or dissolve the stagnant equipment business, which last quarter accounted for a third of company-wide EBITDA loss. But to maintain his all-optical leadership, he will continue the two-thirds of the Corvis overhead covering the cost of engineers servicing the Broadwing network.

"EBITDA positive," however, will not take this company home without operational cash inflow that exceeds capital expenditures and interest expenses over time. In March, $23.1 million of the $26.5 million total depreciation was attributed to the acquired Focal assets, implying a fast eight quarter writedown. Perhaps a device to trick the tortoise, this move gives the company increased short-term accounting losses, but enables an earlier surge of profits. The initial depreciation gouges, though, offer a drastically misleading view of real long-term capital requirements. These are better gauged by opex—operating expenses—which we guesstimated earlier at about 3 percent of revenues. The current rate of capex, running in December at 13.5 percent of services revenue and at 6.2 percent last quarter, should eventually drop to around 5 percent or below.

Likewise, interest of $9.2 million reported last quarter is not representative of Broadwing's financial expenses. Most of the amount, $7.7 million, is noncash amortization of warrants related to the convertible notes. These warrants will never be exercised. Almost all of the remaining $1.5 million is that cash interest on the convert that investors have learned to despise.

In the long-term, however, the convert kerfuffle may prove to be a red herring compared to the more important gross margin. Share count from 31 July 2004 to 30 April

2005 increased (on a split-adjusted basis) from 48.8 million to 75.1 million. But revenues per share remained roughly even and per-share gross profit actually increased over the same period, from $0.91 to $1.07. Those hated share issues were actually *accretive* as the extra capital enabled expanded services and network savings.

Broadwing paid its May 19 tranche in cash, with the remaining three tranches due over the next nine months. Payment of any of these in stock might yet result in a dilution over the short-term. But the balance sheet is improving—last quarter, net long-term cash increased sequentially from $82.5 million to $86.7 million—increasing likelihood of cash payments or conventional refinancing.

Level 3: The Great Pretender

Metrics such as "the highest revenue per employee" and "lowest-cost core bandwidth" are nice, but the superiority of Broadwing's network must eventually show up on the bottom line. The key to catching the profitability tortoise is a generous gross margin. Broadwing will need a gross margin of about 37 to 38 percent to cover operating expenses and interest. A gross margin of 75 percent, such as Level 3 reports, would propel Broadwing to stardom. Based on last quarter's income statement, we would be looking at an annualized profit of $2.52 per share. But even at those high margins Level 3 is losing money. Could we be detecting a difference in networks?

To achieve its high margins and low access cost, Level 3 went an unsustainable $5 billion into debt to build an extensive access network. Most of Broadwing's cost of service comes from access charges. The more Broadwing increases the traffic on its high margin, long-haul fiber while simultaneously decreasing access miles to the network, the more the company will prosper.

Thus, key for Broadwing is how much business it can generate nearest its network edge (called points-of-presence or POPs). Depending on the amount of traffic on these routes, Broadwing achieves from 40 percent up to 90 percent margins, a tribute to the all-optical network. Level 3 doesn't have 90 percent margins in its equation, and almost certainly has higher opex as well. Margins that invigorate Broadwing (as low as 40 percent catches the tortoise) would mean sudden death for Level 3. Indeed, Level 3's high gross margins on an inferior network dramatize Broadwing's huge potential upside.

To upgrade its network, Level 3 is gambling $50 million it doesn't have on a quick fix from startup **Infinera**. Combining stealth technology with high-profile publicity, Infinera has garnered funds from most of the leading venture funds of Silicon Valley, led by Kleiner Perkins. Taking advantage of photonic chip technology advances, Infinera crams up to 10 lasers, modulators, and other odds and ends on a single chip that can transmit more than 100 billion bits per second. Packaging costs drop dramatically and a refrigerator-size cabinet in a telco central office shrinks to the size of drawer in a filing cabinet.

The idea is to reduce the cost of optics to a point where opto-electronic conversion is no longer prohibitively costly and carriers can avoid the mental and strategic wrench entailed by an all-optical-paradigm. But by enabling TCP-IP and other Internet protocols to be processed repeatedly in electronics across the communications paths of the global web, an Infinera network goes against the grain of the technology. As belated broadband deployments from the regional Bells and cable companies multiply traffic at last, in ever proliferating multimedia forms, from HDTV to massively multiplayer games, the Infinera efficiencies will create a software and processing maze. Meanwhile even the long heralded explosion of millions of channels of broadband Internet "TV" will only enhance the protocol-neutral efficiencies of Broadwing's seamless wavelength circuits of light.

Enabling a programmable and tunable edge, Infinera may well help Broadwing more than Level 3

The paradigm ordains that the software hardens to glass at the core of the network and hardware softens to programmable electronics at the edge. As attractive as it is for many applications on the network edge, the Infinera technology is a deadly temptation for the global carriers. It invites them to perpetuate their old tolls, practices, and protocols in software throughout the network. Yet this old infrastructure of scores of millions of lines of software code at every hub reflects the same crippling old regulatory order of Balkanized lawyer-run networks of long distance and local that caused the industry crash. Broadband networks at every office and residence, linking to Broadwings of glass, can ultimately liberate the industry from this regulatory morass. To the degree Infinera enables a programmable and tunable edge, it may well help Broadwing more than Level 3.

Broadwing is the story of a superior asset—the only all-optical long-haul network—combined with an acquisition that energizes that asset by connecting it to its source of energy—the network edge. If the Focal conversion succeeds in 2005, and today it shows every indication of doing so, the company will survive. But to soar, it will need to convert a congregation of believers in the legacy Bell Empire, now being transformed by a series of mega-mergers.

Just as with Broadwing & Focal but on a grander scale, a major motivation behind the mega-mergers between ATT & SBC and MCI & Verizon is to cut access costs and long-haul fees. But upgrading old plants, already in progress at MCI, will come at considerable expense, and minus Raman-based architectures, these "all-optical" networks will fall short of Broadwing's capabilities.

Hey guys, we're over here!

Wooing customers away from entrenched service providers is Huber's greatest hurdle. The legacy Bells are marketing heavyweights, larger and better-heeled operators with *perceived* financial stability and sales feet on the street. They offer more services in a broader geographic area and have much greater resources than the Tier-2 upstarts. And they don't blink when they tell customers they have all-optical networks.

Adding to Broadwing's difficulty, the carrier is a relative newcomer even among the Tier-2 set, with less than 1 percent market share in legacy enterprise service markets. Competitors already offering Ethernet on network-based IP VPNs, such as Sprint, **WilTel**, **Time Warner Telecom** (TWTC), Level 3, Verizon, and Masergy, can point out that their services have been up and running for some time and have a track record to prove it. Meanwhile, it will take Broadwing six to twelve months to develop case studies of satisfied customers.

A major motivation behind the mega-mergers between ATT & SBC and MCI & Verizon is to cut access costs and long-haul fees

Insiders tell us that Huber has been pricing aggressively when he gets the chance. Typically when bids are issued, the Tier-1s are invited and then the customer may invite a token **Global Crossing** (GLBC) or Broadwing. If the customer comes back and says the new kid's cheaper, the incumbent will often match the rate—or move toward it just enough to catch the tortoise.

A further issue is *reciprocal compensation,* the fees local phone companies charge one another for traffic terminating on each other's networks. Because of the nature of its customers, Focal generally terminates many more minutes of traffic than it originates, resulting in substantially more revenue than expense; reciprocal compensation carries a gross margin in the 80 percent range according to people we spoke to. The concern is that the FCC may reduce or eliminate these fees sometime this year.

In our melancholy zeal to protect our subscribers, perhaps we have overestimated Broadwing's reciprocal compensation at $13 million a quarter. If the FCC decides to tighten the noose, it likely won't take effect until late next year or early 2007. And on the long-haul side of the business, Broadwing pays significantly more in access fees than it gets in reciprocal compensation and access fees. So, while eliminating reciprocal compensation would hit Broadwing's revenues, it may help as much or more with costs, depending on the ruling. But this problem does remind us that Broadwing may well stand or fall on the whims of regulators, who for all we know can delay broadband deployment for another decade or so or further outsource regulation from the state Public Utility Commissions to small town historical commissions.

So, let's see. We spar with sales gorillas…while wading through marketing mires…and dodging regulatory nooses…on a diet of common stock gruel. Hey, no one said this would be easy. Looking for a double on Broadwing? Based on today's balance sheet, a $10 share price requires an EBITDA profit of $133 million if enterprise value is to exceed it by 5 times (comparable to zombie MCI's 6.4 EBITDA today emerging from bankruptcy or ATT's 4.1 rising up from the dark lagoons of its Washington lobby). Annual sales would have to increase 15 percent to near $1 billion, with a gross margin of 45. It seems a tall order, but when broadband comes at last, such numbers could prove modest.

Other possible upside surprises include wireless fixed broadband from the WiMAX folks, which could allow Broadwing to bypass a lot of access charges, and surges of traffic across Broadwings media services networks as the cell phone people begin transmitting TV and other video over **Qualcomm**'s (QCOM) Media Flo. As traffic increases, Broadwing's uniqueness will give it a higher premium as it surges past the leviathan turtles in its path. It's worth a bet, but not the farm.

– Charles Burger with George Gilder, June 1, 2005

Got Questions?

Visit our subscriber-only discussion forum, the Telecosm Lounge, with George Gilder and Nick Tredennick, on www.gildertech.com

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