The Future of Web Content Delivery: Will P2P Change the Rules?

A PeerToPeerCentral.com Research Report

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Definitions

**Backbone:** The Internet backbone is the part of the Internet that connects Internet Service Providers and other organizations with large to very large networks to each other. Some providers of this type of service are UUNET, Williams Communications and Level 3 Communications.

**Bandwidth:** The amount of bits per second to which a network connection is limited. A T1 circuit, for example, carries 1.544 megabits per second, so 1.544 Mbps is its bandwidth.

Typical dialup users are connecting at anywhere from 300 bits per second -- 56 kilobits per second. However, it's unlikely that a user who is connecting at much less than 33.6 Kbps will have the ability to use any form of audio or video content distribution. Typical home broadband connections might run anywhere from 100Kpbs - 1.5 Mbps.

Generally speaking, a T-1 is too small to be of any practical use to a major content provider, or to a P2P service provider unless the intent is test usage only. These data rates are the ones most likely to come up in major content server or discussions.

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Alternatively, a content provider might use one of the service providers such as Yipes that provide direct 100 Mbps Ethernet connections to the backbones to which they are connected.

**Content delivery network (CDN):** A network of servers and intermediate connections, either owned or leased, designed to bring delivery of Internet content as quickly and smoothly as possible to end users. Examples include Akamai, Digital Island, iBeam and Speedera.

**Digital subscriber line:** DSL uses a modified standard voice-type telephone line to deliver a high-speed digital data connection considerably faster than dialup modems, using a specialized DSL modem connected to the user's computer or router. It is frequently used to support home and small business LANs and even a few Web servers. The data rate can be anywhere from 128k - 6.1 Mbps. It is usually run over the same wire pair that supports the user's voice telephone connection.

A DSL connection may be symmetrical, i.e. the same speed in most directions (SDSL) or asymmetrical (ADSL) meaning that it supports different data rates for incoming and outgoing.
data. ADSL generally supports a fast incoming connection and a slower outgoing connection, reflecting the fact that most end users use DSL for faster Websurfing and to get incoming multimedia content. The majority of service providers provide ADSL service. At this point, the telcos are the main source for DSL service, given the disappearance of independent DSL service providers.

**Distributed computing:** In some contexts, this term can be used to describe software which runs in a distributed manner across a client-server network. In this case, however, we refer to the use of multiple computers, connected either to a company’s internal network or to the Internet, linked together to share bandwidth, connectivity, or network-attached storage. See also P2P.

**Hosting company:** A third-party provider who provides server access and network connectivity to make customer data or other content available over the Internet.

**ISP (Internet Service Provider):** A company which provides connections to the Internet for a fee. In recent times, the consumer Internet market has segmented into two types of access: 1) broadband access, via cable modem, DSL (Digital Subscriber Line service), satellite or wireless 802.11b, and 2) traditional dial-up connectivity. See Bandwidth above for discussion of typical bandwidth available to end users.

**Latency:** In the context we’re using the term, latency is the lag time between the moment an end user requests Web information and the moment he or she gets the first packet of the content they requested.

**NSP (Network Service Provider):** A company providing access to network facilities. Such companies often provide Internet access but may also restrict themselves to offering private connectivity for enterprises.

**Peer to peer networking:** In theory, P2P architectures allow communication and data sharing between computing devices (including PCs, PDAs, cell phones and laptops) without the intervention of any form of central server to handle either applications or file management. In practice, most P2P architectures are “hybrid,” melding some form of server into their functionality, but also allow device-to-device connectivity as well. This allows the injection of customer content into one end of the network.

In the case of P2P content delivery networks, content is mediated via a central server. Not only does the server provide the original content, but it also provides DRM (Digital Rights Management), monitors the end points of the network to determine the optimum connection paths between users, decides who is eligible to receive specific content, etc. In P2P CDNs, once the content leaves the server it is eventually redistributed from user PC to user PC.
Quality of Service (QoS): A term referring, in most environments, to the ability of a network service provider to provide a specified level of performance, often in terms of factors such as data throughput and network uptime.

Streaming media: This term refers to the continuous transmission of audio or video data across a network, typically but not necessarily the Internet.

Webcasting: Using a network such as the Internet to broadcast traditional media, e.g. audio or video.
Quick Takeaway: 10 Key Points

1. Even If P2P CDNs Don’t Deliver On All of Their Claims, Their Cost Advantages Will Shift The Marketplace.

In our research for this report, we’ve heard some contend that even if P2P players offer large cost savings, it won’t matter, because they supposedly can’t offer Quality of Service guarantees along the lines of a standard network service provider.

Well, we disagree. We believe the P2P streaming players’ quality and cost savings claims have at least some merit, and more importantly, that their message is getting through to buyers in the marketplace. In particular, we believe Webcasting customers, ISPs and telcos/backbone providers are like to see P2P streaming as promising -- or at least worth testing.

As a result, non-P2P infrastructure players such as Akamai will find themselves will find themselves under unprecedented downward price pressure, in all probability changing the way they price and bundle their services.


Looked at one way, it’s a no-brainer. There are millions of Madonna fans eager to hear her next single, and comparatively few enterprise users eager to review their company’s HR orientation video.

On the other hand, enterprises have a well-defined need for affordable, well-managed communication. And P2P streaming, which must be managed minutely to offer any sort of quality, seems to fit the bill. Enterprise needs, ultimately, are where the stable source of bucks lies.

3. Network Service Providers And Telcos Are The Ultimate P2P Streaming Channel

Since they’re still only toddlers, peer to peer content delivery companies are still making their pitches in the marketplace largely on their own. But a few have already begun to do what we think more or less all will do -- seek partnerships with ISPs and telcos to bring networking muscle to their proposals.

4. The Logical Corollary: Hosting Companies Should Consider Partnering With, Investing In or Acquiring Distributed Computing Companies to Offer Their Own Streaming P2P Services
ISPs and Web hosting firms, let’s face it. If your customers do any sort of broadcasting, it’s already better to join the P2P streaming companies than try to beat them. With estimated bandwidth savings ranging from 50% to 90%, hosting firms and ISPs owe it to themselves to at least give P2P streaming a try.

5. “Traditional” Content Delivery Networks Won’t Survive The Next Wave of Consolidation And Competition Without an Infrastructure Partner

It’s no coincidence that Williams owns 49% of iBeam and Cable & Wireless picked up all of Digital Island, lock, stock and barrel. While building a monster network of servers and data centers to deliver far-flung content may have made sense a few years ago, these days it just doesn’t make financial sense unless you’re benefitting from the economies of scale a telco enjoys. Look for more telco/CDN marriages, and soon.

6. Hybrid “Traditional” Content Delivery Networks With P2P Content Delivery At The Edge Will Begin To Form

Akamai may have the muscular network of nearly 12,000 servers and the greater cash flow, but it’s United Devices that’s an Internet distributed computing power. We can envision UD forming Akamai’s new P2P streaming edge.

Sure, UD doesn’t own the computers in their network any more than Blue Falcon does when 100,000 customers spontaneously sign on to listen to Jennifer Lopez on Radio Free Virgin, but we think larger, more-conservative CDNs like Akamai, RBOCs like Verizon and other “suits” will see the existing networks as a safer play.

After all, the distributed comp companies at least have some idea of exactly where the computing edges are and which users, exactly, are signed up to provide the computer. The fact that the telco/CDN/whomever will have to then acquire or license P2P content delivery technology as well won’t hold them back from this strategy; the market is growing rapidly enough that they’ll have their choice of potential vendors/partners from which to choose.

7. Security Issues Raised By P2P Could Remain Critical For At Least The Next 12 Months; Enterprises, However, Need Not Share These Fears

On-demand P2P content delivery can raise some security questions. If a Webcast reserves chunks of a consumer’s hard disk and passes information along via successive hard disks, only the most stringent attention to security could lock down the data well enough to please those with serious security concerns.

On the other hand, enterprises whose PCs behind a firewall may only wish to initiate Webcasts from within that firewall, and therefore very well may not fear security breaches nearly as much.
For the near term, however, those critics who dislike, fear or compete with P2P streaming do have some leverage when they complain that there are inherent security concerns in sharing hard disks for on-demand P2P Webcasting. Even if a P2P content delivery solution doesn’t use this method, P2P CDN will find themselves defending against this “straw man” in their sales meetings.

8. P2P CDN Providers Will Need To Own Key Channels Of Their Business

With ChainCast acquiring Internet radio broadcaster StreamAudio and ramping up rapidly in their delivery channels, we believe the first shoe has fallen. This deal illustrates an important principle at work -- that P2P content delivery may work better if providers pick up others downstream in their delivery plans.

We expect to see more acquisitions integrating P2P CDNs with their channels in the near future. Further acquisitions are likely in the Webcasting arena; we also expect to see P2P content companies acquire financial fulfillment technology firms (to offer a more complete content sales option to customers. (Along the way, we also expect to see broadcasters work the deal in the opposite direction, acquiring P2P CDNs to shore up their distribution mechanisms.)


We think the companies we’ve profiled in this report may be the first wave of tech firms to re-experience a healthy IPO climate, and we expect them to take advantage of it.

Sometime in the second quarter of 2002, look for a few of the players with positive cash flow and big-name partners to hit the public markets.

10. P2P Content Delivery Will Find Consumer Acceptance Quietly, But Widely

The P2P content delivery market is maturing more quietly than most, but it has a better chance of gaining traction than it may appear on first glance, we believe.

Consumers are already familiar with user-to-user computer sharing through networks like Napster and Gnutella. If explained properly, P2P CDN plug-ins really aren’t hard for consumers to swallow.

Though we haven’t done primary research in this area -- so readers are advised to treat this as the hunch it is -- we believe that it won’t be hard to win user acceptance of P2P content distribution generally, though large client downloads will probably still meet with some resistance.
With a growing number of intelligent, decently funded companies seeding the market with this technology, consumer and for that matter enterprise acceptance will firm up with seeming suddenness within six to twelve months.

**Chapter 1 Introduction: The Times, They Are A Changin’**

Early on in the Web revolution, content creators discovered that they had a problem. When they let it be known that a desirable, relatively high-bandwidth piece of content was going to be broadcast, --- say, a video stream of the desire-inducing Victoria’s Secret models strutting their stuff in this year’s new lingerie collection --- all hell was unleashed on their servers.

With thousands upon thousands of end users requesting copies of the same content from the same server group, users experienced slowdowns, denials of service or other annoyances that didn’t improve their quality of experience one bit.

Before long, hosting firms, ISPs and specialized content distribution services began to offer specialized methods for delivering both static and streaming Web content to end users more efficiently.

A couple of major models emerged right away, one focused on accelerating Web server and/or network performance, the other providing an entire network controlled from end to end through which to provide a carefully-controlled high quality user experience. Both were intended to make the unpredictable, delay-prone Web a stable and smoothly-flowing source of content.

Luckily for the future of the Web, these content delivery solutions worked. Users saw much less latency and better throughput, which kept them hooked and assured that the phenomenal growth of the commercial Web would continue. Companies like Akamai and Digital Island grew dramatically as global enterprises signed on to take advantage of their content delivery muscle.

Rapid expansion was typical during the Gold Rush days of the mid- to late-1990s, when it seemed the dotcom bucks would never go away, and big marketers were spending very big dollars to establish secure brand names on the Web.

Sure, Akamai might charge $17K, $20K, maybe even $70K a month in unusual cases to carry a high-quality streaming broadcast. But if you were a product manager with Universal or Sony or Procter & Gamble, you probably decided that the lower-risk, better known solution was worth the high price tag.

Still, traditional content delivery players were headed for a major fall. When the tech market imploded, in fact, the more compromised of the content delivery networks began to teeter dangerously. Waiting for your long-term “waiting for profitability” strategy to materialize takes a
lot of patience as it is. Having your giant market capitalization vaporized can snatch the ground right out from under a company with a high burn rate.

Given the damage resulting from the stock market free fall, as well as some underlying issues inherent in building out an expensive infrastructure, things are changing the content delivery world.

For that reason, we believe that the P2P streaming companies have at least a six- to 12-month opening in which to make their case to consumer and enterprise buyers interested in Web performance. These days, in other words, some folks will take them seriously that might never have done so if the tech market hadn’t collapsed.

Just how big an opportunity do they have? We project that the Web content delivery services market will increase from about $404 million in revenue for 2001 to $3.1 billion in 2005, climbing at a compound annual growth rate of 68%. The CDN services niche will be held back slightly by competition from infrastructure players in the intelligent caching market, as some key potential corporate customers choose to build their own Web content delivery infrastructure over their existing networks.

At the same time, we think it likely that P2P content delivery will shave an increasingly large share of the pie away from the traditional CDNs from a scant 2% over the next twelve months to 17% by the year 2005.
After all, there’s the bottom line to drive the business forward even if nothing else. Even if the P2P streaming price claims are exaggerated, meanwhile, there’s so much “wiggle room” that P2P streaming is likely to offer very substantial savings even if the real numbers are greatly reduced.

What’s more, today’s content delivery networks are in a rather vulnerable position, as we see it, despite some rather formidable strengths on their side as well.
Chapter 2: Traditional Web Content Delivery

Many lessons can be drawn from the tragic World Trade Center and Pentagon bombings on September 11. During the first hours of the crisis, millions of other Americans tried to reach CNN.com and other large news sites, but had little or no luck pulling down live content. This was true despite the support and intervention of traditional content delivery networks.

Coping with peak loads of this intensity is just one of the challenges traditional CDNs face if they hope to make it into the next phase of Internet growth. While we feel confident that both these infrastructure-based CDNs and P2P CDNs can and will find opportunity, traditional CDNs have their work cut out for them.

CDNs vs. caching players

In discussing CDN fortunes, it’s important to separate them from hardware/software players focused primarily on caching mechanisms as a means of speeding up content delivery (see chart below).

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<th>Table 2.1 Major Web Content Delivery Models</th>
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<td><strong>Facilities-Based Content Delivery Services</strong></td>
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<td><strong>Examples:</strong> Akamai, Digital Island, iBeam, Speedera</td>
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Companies like Akamai and Digital Island own some or all of their server infrastructure. Their strategy is to control broadcasts of content from end to end all the way to the end user’s desktop. They do this by keeping careful control of the pages served or streams which are broadcast, making provisions for failover and most often, managing as much of the manner of content delivery as possible through the use of sophisticated software. Akamai’s FreeFlow service, for example, offers software capable of serving pages prioritized according to content type.

To stay in business, these companies must invest large amounts of capital in maintaining their infrastructures, which may include many thousands of servers, leased backbone connections and globally dispersed data centers.

**Strengths:** There will always be a certain price-insensitive segment which, if it considers Akamai and Digital Island and iBeam to be the top drawer players in the market, won’t switch to less expensive options casually despite hard economic times. Also, owning a lot of infrastructure does offer conspicuous control over a user’s ultimate quality of service.
Hardware/Software-Based Caching and Acceleration


This group of vendors offers solutions that speed up and improve the quality of Web content delivery through varied content caching schemes. Depending on the vendor involved, caching may occur at the server, within the network operating system or at the edge of the network close to the user. Hardware/software bundles are common, but software-only solutions exist, as do solutions that rely primarily on a caching “box” placed strategically in an ISP’s rack room.

These vendors aren’t usually selling directly to end users, although very large enterprises may be large enough in scale to benefit from the efficiencies provided by such products. More typically, this class of companies comes into a project either to assist an ISP in strengthening its content delivery or help build a new content delivery service with an existing managed service provider.

Strengths: ISPs and hosting firms on intimate terms with a given piece of hardware are unlikely to part with it lightly. If a CacheFlow box and operating system are integrated into an ISP’s network, for example, and the administrator likes how they work, he or she is unlikely to forego their favored platform the next time around.

According to IDC, the intelligent Web caching market alone is primed to explode during the next few years, climbing from $514 million in 2000 to $4.5 billion in 2004.

To understand how facilities-based CDNs will compete with the emerging P2P CDNs, it’s important to take a close look at how the previous generation of CDNs gained their position, how they currently operate, where they are today and where they seem to be headed.

The buildout race

The content delivery networks that emerged as brand leaders during the first era of expansion -- notably iBeam, Digital Island and Akamai -- went through very similar growth phases, investing heavily in infrastructure and burning through capital at a frantic rate.

Over a period lasting just about 18 months, ranging roughly from mid 1999 to late 2000, content delivery networks went through an intense period of infrastructure build-out, scattering servers and connecting with networks throughout the United States and a large number of foreign nations.
Looked at from a bulk standpoint, the winner of the content networking sweepstakes was almost certainly Akamai, which had 8,000 servers in 55 counties in place by the end of 2000 (and has since built that number to 11,600).

During that same period, iBeam co-located its servers in 190 ISPs), including At Home Corporation, America Online, Inc. and regional Bell operating company BellSouth Telecommunications Inc. To shunt data from place to place, iBeam put in place a combination of standard wired connections and satellite broadcasting channels.

Digital Island, meanwhile, could boast 2,200 edge servers and eight data centers touching 260 networks by the end of the year 2000. In its annual report for that year, Digital Island touted its ability to reach 95% of the world’s business population.

Other firms competing with these players built out overlay networks intended to deliver content largely over the Net’s existing servers and connections. Companies like EpicRealm, Internap Network Services Corp. and Speedera introduced technologies and designed to route data intelligently and fight network congestion.

**Emerging markets**

During this key period, the content delivery networks were competing intensely for customers. With the industry exploding, and the solutions sounding rather similar -- even if priced differently and playing out differently in practice -- the tug-of-war was intense.

Since then, the CDNs have learned some of their key lessons: 1) enterprise clients may actually offer a brighter future than the originally attractive media and entertainment giants and 2) CDNs probably can’t achieve sufficient economies of scale to deliver network services unless they team up with much-larger network service providers and 3) E-business content delivery and data management may be as important or even more so than handling the throughput of streaming media or standard editorial and artistic content found on traditional Web sites.

iBeam, for example, had set out to focus on entertainment and media customers. But over time, it found that enterprise customers were the ones filling its coffers. Enterprises represented 53% of revenue in 2000, including Accenture (formerly Andersen Consulting), Lotus Development Corporation, Honeywell International, Inc., Merrill Lynch Fenner & Smith, Inc., Morgan Stanley & Co., The Goldman Sachs Group, Inc. and Salomon Smith Barney Inc.

For another example, look at Akamai: a substantial minority of its business was generated by Apple Computer during its first two years of growth, amounting to 22% of revenues during its first year of business and 12% during its second year.
Financial struggles

By the end of 2000, more than a few of the pure CDNs ended up a thoroughly compromised position financially, and the year 2001 has not improved their prospects much.

CDNs have generally been unable to raise prices fast enough to keep up with the cost of providing the elite and highly specialized services they have to offer. Akamai, for example, found that the cost of service went up 118% during the last six months of the year 2000 alone, making rising customer volume a further drag on profits rather than a financial benefit. (see Akamai profile, below). This is true despite the fact that Akamai’s prices are among the top tier in the industry.

Amidst a host of workout-style tactics, including restructurings, layoffs, and moves to drop smaller, less profitable customers, it appears clear that being a pure CDN is a very difficult business in which to achieve a profit, though it may be quite possible to generate a great deal of revenue.

Over the last several months, a financially tottering iBeam found its salvation in Williams Communications, a major backbone operator whose network spans 33,000 miles across North America. Williams took a 49% stake in iBeam. Even with the $40 million infusion that came with the Williams investment, iBeam’s management isn’t sure the company will stay alive past the 4th quarter of this year.

Digital Island, meanwhile, was acquired in full by telco Cable & Wireless. Like iBeam, Digital Island burned through huge amounts of cash building out its core infrastructure, but the company has never yet turned a profit. The telco deal bought the company some breathing room, and margins are improving.

Akamai remains perhaps the largest facilities-based CDN that hasn’t joined with a major external partner as a means of keeping on its feet.

Pluses and minuses

As these traditional CDNs have lasted out these storms and matured, time has thrown both their strengths and weaknesses (financial and operational) sharply into relief (see Table 2.2, below)

On the negative side of the balance sheet, forces are now work which might make CDNs attempts at financial recovery insufficient on their own despite varied cost-cutting measures, investments and mergers.

Price-cutting pressures are descending from various directions which may undercut the profitability of CDNs to an unacceptable degree, perhaps even CDNs which fall into the arms of a brawny networking player like Williams or C&W.
We don’t mean to imply that traditional infrastructure-based CDNs will dry up and blow away in a matter of months. Given the growth in revenues realized by companies like Akamai, demand is clearly there -- or at least has been prior to the tech crash, and may very well be there again as the current U.S. recession heals.

Also worth mentioning, virtually all of the CDNs noted plans to expand internationally, but none appears to have been highly successful to date. If any of the players now struggling for life were to find a solid new market in, for example, Internet-friendly Asia, it’s possible the dynamics of their business could be different -- and reward the costly buildout of their infrastructure which has bled them dry to date.

We do, however, see it as obvious that the existing CDNs are more vulnerable than they have ever been to competition from newcomers, especially those that can deliver even a reasonable facsimile of their product at a lower price. As we’ve noted earlier, we believe that this has opened up a window of opportunity for the P2P players which might not have existed so much as six to eight months ago.

As P2P content delivery players go to market, boasting prices dramatically lower than those possible for CDNs with a massive network infrastructure, we see it as inevitable that significant
downward price pressure will take place. While it’s too early in the game to say whether all of
the cost-savings claims made by the P2P CDNs can be realized -- 90% discounts are a very
tall order -- even the air of credibility is enough to begin to shift the perceptions of buyers, we
believe.

Combine that with an overall feeling among those buying the services that the Internet gold rush
era is over and that “price is no object” philosophies don’t play anymore, and you have a
situation in which consolidation, acquisition or collapse of unprofitable CDNs is inevitable.

However, we don’t think the traditional CDNs’ model is untenable. If the CDNs find a way to
amortize the cost of their infrastructure across a larger network -- whether through partnership,
merger or investment -- they do offer a unique service which seems to be in demand among e-
business players.

Quick uptake of Akamai’s new EdgeSuite among e-businesses points to an unmet data delivery
need -- and security arguments that a publicly-channeled P2P CDN won’t win, at least for now.
Securing corporate data while assuring good throughput will probably be the a key business
model for traditional CDNs that survive.
Chapter 3: P2P Content Distribution: Background and Basics

Over the past eighteen months or so, a new force has hit the Internetworking world, one which many see as capable of changing the dynamics of content delivery. “Peer to peer” applications are a new class of solutions which link computing devices together -- usually desktop PCs, but quite often handheld computers, PDAs and cellphones as well.

In the P2P model’s “pure” form, the peers work together without needing a server to mediate or control how they interact in any way. In all practicality, most P2P models touch a server at some point in the architecture, but most still offer edge computing devices a remarkable degree of freedom from the central computing infrastructure.

P2P companies: A background briefing

Among the list of companies that call themselves peer to peer, several major categories have emerged.

To provide some perspective, we’ve listed below some examples of the leading players in each of some of the major peer to peer subsectors (other than the P2P content delivery space, handled later), and provided a few details on these vendors’ basic configuration.

P2P collaboration

This class of applications allow users to form workgroups and collaborate on the fly, with no intervention from a mediating server. While servers play a role in this type of app, they usually aren’t needed as go-betweens to support task and file-sharing between computing devices like PDAs and handhelds.

- **Groove Networks**
  Launched by Ray Ozzie, developer of the world-famous Lotus Notes collaborative software, Groove Networks has built a P2P platform emphasizing secure, spur-of-the-moment peer group collaboration. Activity between workers takes place in “shared spaces” available only to invited parties; all data is encrypted.

- **Endeavors Technology**
  Endeavors’ Magi Enterprise product offers file sharing, file searching, instant messaging and chat between peer devices, which in its current implementation include Win CE handheld devices, PCs and laptops. When used as P2P infrastructure, Magi makes use of HTTP, WebDAV and other open standards protocols.

Distributed computing on the public Internet

Internet-based distributed computing schemes tie hundreds or thousands of consumer computers together across the Internet. Firms in this category resell these “virtual
supercomputers” -- composed of the aggregated spare CPU capacity of hundreds or thousands of Net-connected user PCs --to companies needing intense computing power.
• **United Devices**
The grandfather of Internet-based supercomputing, UD provides an Internet-based computing utility through its hosted “Global MetaProcessor” service, which draws on the power of UD’s member network of Internet-connected PCs. In addition, UD offers enterprises its MetaProcessor Platform for consolidation of internal PC resources.

• **Parabon Computation**
In addition to providing enterprises with the capability to link their spare computing resources together, Parabon’s Frontier solution includes an option using the public Internet to offer supercomputing capabilities to industries with high-intensity computational needs.

**Distributed computing in the enterprise**

Enterprise-based distributed computing systems work like Internet-based schemes, connecting large numbers of PCs together to produce a massive computer or a distributed application processed in tandem by multiple computers. However, these platforms only access internally-owned PCs connected to a given enterprise’s LAN or WAN.

• **Avaki Corp.**
Avaki’s 2.0 technology aggregates the power not only of desktop computers but also workstations, servers and clusters together. Their approach is to either provide shared data access or link these computers into a single computing grid.

• **Entropia**
Entropia’s solution creates a “virtual supercomputer” pulled together from desktop PCs connected to an enterprise network. Components include a Network Manager (located on a server PC), a Job Manager allowing users to submit and monitor jobs and client software for the desktop PCs.

• **Data Synapse**
Data Synapse’s Live Cluster solution can draw on desktop PCs, workstations or servers. The client machines, known as “engines,” are coordinated by a server responsible for parcelling out jobs. A component known as a “driver” communicates between the engine (client machine) and the server.

• **Platform Computing**
Platform’s product manages work across servers, desktops, supercomputers and clusters. Its solution includes: 1) a resource management component which monitors distributed resources, responding automatically to increase app and services availability and 2) a performance management component offering enterprises insight into workload and system performance.
P2P content management

- **NextPage**
NextPage’s products allow employees, partners and customers to access distributed content, create and store business processes, and collaborate with peers. Its product line includes NXT 3, a platform tying distributed content servers together; NextPage Matrix, which enables business processes and where needed, captures them; and NextPage Solo, which provides offline access to the NXT 3 content network.

- **WorldStreet**
WorldStreet offers the World Street Net, an infrastructure enabling users to manage and automate content sharing with others - including colleagues, partners, clients, and suppliers - based on the specific nature of their relationships with these individuals.

- **Xdegrees**
Xdegrees is a networking company offering its own method for tracking content and other resources on the Internet and corporate networks. Its eXtensible Resource Name System, which gives resources addresses similar to IP numbers, allows companies to access files, services and machines securely from any connected point on the Internet or network.

P2P content delivery

As P2P development has gathered steam, P2P methods for delivering Web content have emerged. They vary distinctly from “content management” vendors such as Next Page, described above, in that they go outside the corporate network to get their job done, physically piggybacking onto infrastructure enterprises don’t own.

Along the way, each of these companies intends to offer corporate content creators and Webcasters a substantial savings over traditional content delivery methods. These players say they can offer lower prices because their approaches consume far less bandwidth, server resources and support infrastructure than technologies employed by their traditional CDN peers.

How do the P2P CDNs propose to offer such a big savings? While their technologies differ in the specifics of how they get the job done, they’re more or less all talking about using user PCs to pick up and broadcast streams or download to their neighbors. Rather than servers doing all of the content pumping, servers distributed once and PCs pump to PCs. Below, we’ve provided an overview comparing the standard process of server-intensive content distribution with the emerging P2P content delivery network model.
Table 3.1  
**Standard Web Content Delivery vs. P2P Content Delivery**

**Standard Web Content Delivery**

1. A user sits at their computer and makes a Web content request.  
2. The request comes from across the Internet. If the user requesting the information is not close to the server geographically, the request will “hop” from router to router until it reaches the server in question.  
3. The hops it makes are following the path the router has determined to be most efficient, based on its current “understanding” of Internet topology.  
4. Web content is pushed out by a server, a computer whose job it is to send along a document or other identifiable piece of data to a user upon request.  
5. The user receives the HTML-coded content and can view it with his/her browser.

**P2P Web Content Delivery**

1. A user sits at their computer and makes a Web content request. The request is handled by special P2P content management software already downloaded to their machine.  
2. If the user is very close to the server, the user’s request may end up going to directly to the original server across the Internet.  
3. If the user is further away from the server (more likely) User #1 will be pointed by directly to the PC of another user who has downloaded the content requested. The “host” PC is chosen by the topology-aware software User #1 has already downloaded, and typically is intended to be as close as possible geographically.  
4. The P2P system may try to match User #1’s bandwidth with User #2’s bandwidth.  
5. User #1 downloads their content item. If User #2 happens to sign off during the download -- as she/he may or may not be aware of the download -- P2P Web content systems typically switch User #1 over to another host machine instantly.

Of course, in practice, the various companies attempting to bring P2P content delivery down to earth have come down with a wide variety of interpretations of this scheme outlined above. Among the key distinctions come in how the companies manage digital content (existing solutions from, say, Microsoft vs. their own), how they deal with any failure in the content network and how they actually deliver the content delivery.
Over the coming pages, we’re going to acquaint you with the range of P2P content players which have emerged to date and explain how they differ, both in their attempts to monetize the P2P delivery model and in their basic technical underpinnings (see chapter 4 for more details).

**Categories: P2P content delivery**

Generally speaking, there are two categories of P2P content delivery provider, though newer models with unique features have begun to emerge over the last quarter. It’s important to note that some of the P2P CDN competitors offer both streaming and download-oriented services

- **Streaming delivery**

Companies offering streaming P2P content delivery have developed a variety of technologies designed to superimpose a virtual content delivery network over a spontaneously-formed of end user PCs equipped with client software. These companies, generally, intend to make money by helping enterprises, entertainment companies or network service providers reduce their content delivery costs.

**Competition:**
- Traditional audio and videoconferencing providers
- Infrastructure-based streaming services providers
- Infrastructure-based content delivery networks such as Akamai and Digital Island
- Possibly, traditional radio and television, to the extent that traditional streaming services offer any competition to these existing media

- **Download delivery**

Download-oriented P2P content delivery providers are emphasizing “time-shifted” delivery, in which the user downloads a larger file for later use (in the case of software) or viewing (in the case of video or possibly audio files). Their bet is that users are willing to wait for downloads and pay a fee to see high-quality entertainment or use software.

**Competition:**
- DVD, CD- or videocassette-based entertainment products (movies or multimedia games)
- DVD or CD-delivered software products
- Entertainment streamed by traditional means (e.g. Digital Island, Akamai, Speedera)
- Entertainment delivered via traditional radio, television and cinema venues
Other/hybrid

At least one company, Uprizer, is looking to get content out to mobile wireless devices using a secured P2P content delivery approach. (See profile, below, in our Appendix.) Uprizer’s approach is complex, but among its notable features is a proposed service charging a monthly fee to provide downloadable clips of entertainment-oriented video -- for example, a key play in a football game -- to a user’s mobile device. Uprizer does not propose to “time shift” in a mobile environment, however; Uprizer anticipates delivering content instantaneously on demand.

Competition:

- Text-based entertainment or news-oriented services delivered via wireless carriers
- Streaming services delivered by traditional players
- Streaming services delivered by P2P players

Technology comparison

When comparing these companies, it’s helpful to separate out their approaches to key portions of their technology. In this paper, we do not propose to undertake a highly technical analysis these products, but we do hope to familiarize readers with basic functional differences between them.

Below, we offer a review of key features among a few P2P streaming content delivery players:

AllCast

- **Technology:** The AllCast Broadcaster, a Windows-based application for broadcasting live with P2P technology. The Broadcaster distributes bandwidth usage among the P2P participants in the broadcast network.

- **Client side:** Users connect using the AllCast Plug-In, which integrates with the Windows Media Player. Includes a “chat” function.

- **Network side:** The Live Broadcasting Server manages the connection structure among the users connected to the network, performing live data compression and then broadcasting the data. It also offers supplementary data transmission in order to display advertising information.

- **Management tools:** The Plug-In provides statistical information about current P2P conditions via a taskbar icon. The Broadcaster software also provides content delivery information.
ChainCast Networks

_ Technology: _ChainCast’s core technology is the Network Topology Engine, which keeps track of online listeners in real time as they connect and disconnect. It can handle up to 500,000 end users connected to a given content source. The NTE’s job is to determine the best content source for a given client computer and ultimately, to optimize performance of the entire virtual network it has created.

_ Client side: _To participate in the ChainCast Virtual Network, users download the VMR (Virtual Multicast Router) Player.

_ Network side: _The VMR Server receives audio content from a Webcaster, encodes it, and transmits the stream over the ChainCast Virtual Network.

_ Management tools: _The ChainCast Manager offers control of the virtual network through a central operations point. It can offer origin server signal detection, system fault monitoring and event management, virtual network topology recordings, performance monitoring, data collection and management and security.

VTrails

_ Technology: _Uses “Full Duplex Packet Cascading” technology to deliver streams across networks of user PCs. When receiving IP requests, the vTCaster maps the network context of the end users based on their network location and connection type. vTCaster then builds the most efficient cascade delivery path, prioritizing the order in which the end users are served and connecting users coming from the same network, ISP, or organization. vTCaster keeps track of end users joining and leaving the stream, and dynamically updates the cascade delivery path.

_ Client side: _To participate in the network, users download vTPass client software, which integrates with standard media players.

_ Network side: _The vTCaster box sits at the broadcast source and processes IP events. When needed, the vTEdge server will be implemented to further remove load from the network and content closer to the end user.

_ Management tools: _vTrails offers VTRreport, an application tracking unique stream requests, regional information, stream duration, usage count and usage habits, and vTControl, a broadcast management app offering control over the vTrails System.

Conclusions
P2P content delivery is a unique service which differs substantially from other emerging P2P services and products.

For the short term, streaming services and download services are likely to take different paths:

- Streaming P2P players will be plugging themselves into the Internet side of the broadcast world or competing/cooperating with corporate audio/videoconferencing service providers.

- Large-download oriented P2P players will form partnerships with the big boys creating large-file style content (film-makers, software developers, music video producers) and if effective at creating a revenue stream, get acquired by those players.

At the moment, a few companies are trying to offer themselves as experts at both sides of the equation, but we don’t think this positioning will last. Ultimately, we think these markets will split further apart, at least if they keep the character we’ve outlined, because as outlined companies in each sector are really going for different results.
Chapter 4: Markets And Models

The P2P CDN market (and, we believe, the infrastructure-based CDN market in all likelihood) is well on its way to splitting into a handful of market segments, each of which will call for its own approach and entail its own risks. Below, we’ve provided some details on the opportunities and challenges we see for each niche:

Entertainment/media
The P2P or non-P2P player that delivers quality streaming, on-demand streaming or even file-downloaded entertainment (think movies) or broadcast content cheaply could potentially make a fortune. On the other hand, the market is still very volatile, and it’s still not clear quite how consumers want to buy.

_ Business model_
At least in some sectors, entertainment buyers are used to paying a modest fee for content they can only access briefly (e.g. video rental, movie theater shows, game rental) or items they can download (shareware and some types of software). Selling technology to the creators of such content can result in big bucks for vendors if the fees sharing/licensing deals are structured correctly. The software market, meanwhile, has long been waiting for an efficient way to deliver its product via rights-managed downloads that don’t turn off buyers.

_ Challenges_
Many other forms of entertainment come in packages which don’t require a download and persist in a form (CDs and videocassettes) with which users are already familiar. Getting them to pay for entertainment delivered to a computer -- which may lack the multimedia capabilities to do such content justice -- is far from a lock. Software buyers, too, can always resort to their CD player.

Enterprise content delivery
As enterprises become accustomed to using their PCs in distributed computing networks, we believe that they will be quite receptive to considering P2P streaming and management of key downloads as well, at least within their own networks. As large as the entertainment/media niche is, this market will ultimately outstrip it.

_ Business model_
There are at least two existing niches within the corporate market for P2P content delivery. Companies may buy streaming P2P services as an alternative to traditional streaming or even network-based video- or audioconferencing. Enterprises may also use the download vendors’ capability to deliver e-training to employees across their LAN or WAN.

_ Challenges_
Change happens and new approaches get adopted, but often too slowly for technology vendors. While we think it’s inevitable that the enterprise P2P market blossoms, we think it could take as much as 18 months before large enterprise begin to take a serious look at this approach. In the meantime, some lesser-funded P2P CDN players who could have won in this space may fold instead.

**Network service providers**

P2P technology developers are beginning to license their technology to network services providers of various kinds (ISPs, ASPs and other xSPs), with the expectation that they will in turn offer its capabilities as a managed service. It’s still up in the air how to charge for these licenses, but it’s clear that turning the tech over to networking companies can be a beneficial deal for both sides. The P2P CDN developer gets the cash, and the NSP gets a means to deliver a valuable service cheaply, produce happy customers and presumably still make a profit.

_ Business model_

In existing models, network service providers license P2P content delivery software on a per-user or per-MB-delivered basis, filling the coffers of vendors while simultaneously growing the overall market acceptance of P2P CDNs generally. In other instances, the xSP may buy the technology outright, with similar market-building results.

_ Challenges_

Few. This is perhaps the most promising market for P2P CDNs if they wish to maintain their current configurations as technology vendors. The only real question is how to best build on the NSP relationship to further develop the software; that may call for a closer partnership than many of the “mile-wide, inch-deep” relationships appearing in press releases, and those take time to develop.

**Telcos**

Carriers eager to sell their broadband services might find cheap streaming or download delivery to be a potent incentive to sign on -- that is, at least, what some of the P2P CDNs are banking on as an initial strategy. We see their logic as compelling, and think telcos like AT&T -- with its cable assets along with traditional telco infrastructure -- as very logical players in the streaming market, especially if it has a new technology in hand which can overlap entrenched players like the infrastructure-based CDNs.

_ Business model_

Models here resemble models for network service providers, described above. But given that carriers in this instances are after consumers and small businesses, strategies for licensing software are likely to be different. Business models will probably revolve around offering the software as a packaged product for hosting in the carriers’ own network operations centers.
Challenges
Even a deep-pockets carrier may balk at being constrained by per-MB charges if they’re hoping to encourage high use of broadband services in homes and small businesses. P2P content delivery vendors will probably need to be creative in structuring fees if they go the licensing route. As for software sales, we think the main issue will be overcoming the conservative carrier mindset, which may distrust the P2P virtual network even if its engineers support a vendor’s claims.

Enterprise data delivery
As the success of Akamai’s EdgeSuite service has demonstrated, companies are willing to pay heavily to have bits from their data-intensive Web sites delivered reliably. It’s not surprising -- success in e-commerce, of course, can depend heavily upon the timely delivery of such data. We realize that such customers may be loath to trust the security of such deliveries, but it’s beginning looks like secure transmission of P2P data is possible. One company not profiled in depth in this report, QuMatrix, apparently developed such secure P2P technology that an international bank is now using its technology to transmit financial data.

Business model
If a P2P CDN can offer airtight security, businesses are likely to pay a premium to distribute critical data, particularly across trusted environments such as intranet or locked-down supply chain architectures.

Challenges
Security is as much about politics as it is about science. As long as the content delivery is within a corporate network, it will be easier to make and win an argument that security is adequate. Once a vendor tries to promote P2P-relayed content delivery of secure data, they’ll face the same concerns that Internet-based distributed computing companies like have -- which is to say, worries which will require a lot of reassurance and lots of technical backup to calm.

Conclusion
We think the market has a ways to go in sorting out pricing issues -- there’s a great deal of wavering going on among vendors -- but that will sort itself out within the next six months, we predict.

Another area which still shows fuzzy outlines is the conflict between serving as a managed service provider and serving as a software/technology vendor. Vendors interviewed for this research seem convinced that they can work effectively cultivating both managed service relationships with clients and selling software or other technology to end users. But based on our experience with other network-based services, we’re skeptical that the two strategies can coexist comfortably.
We think that the P2P CDNs will have to take a stand as to their mission. They’ll have to decide whether they’re going to sell raw technology (in which case they’re probably better off going nuts building software-industry partnerships and plugging themselves into corporate solutions) or service (in which case they need to really focus on building out data centers or partnerships with bandwidth providers and so on.)

In covering these various niches, we haven’t gotten into some emerging wireless content schemes which may soon be important in the P2P content delivery world. For more detail on one such scheme, see the Uprizer profile in the profiles section of this report, below. The sectors listed in this chapter, however, represent the P2P CDNs’ main areas for growth in the next 24 months, we believe.
Chapter 5: Forecasts

Savings will trump all

We’d argue that for a large segment of technology buyers -- including enterprises, broadcasters and entertainment companies -- price is more important than it was before. For that reason, P2P content delivery will look awfully attractive. Any technology boasting savings ranging from 50% to 90% over traditional Web content delivery has got to have the ear of a great many content creators.

At this point in the discussion, we’re not engaging in arguments as to whether the results produced by P2P streaming or on-demand offerings are of an equal quality to those produced by traditional CDNs. We’re only noting that if something’s cheap enough, there’s usually a fair number of folks who’ll decide that it’s good enough.

P2P/traditional CDN hybrids will emerge

Before the traditional infrastructure-based CDNs give up, we think they’re going to make their truce and join the force -- P2P content delivery players -- they know they can’t beat. For CDN infrastructure players too cash-strapped to keep up the endless server buildout (and that includes pretty much everybody in the first generation) P2P content delivery may be a way out.

The user-PC-to-user-PC architecture underlying P2P content delivery (described in detail in the next chapter) is certainly frightening to companies used to centralized control of content delivery. The idea of ping-ponging content across a thousand or a million user computers, each of which is both a client and server, may very well scare the heck out of the leadership of companies like Digital Island, iBeam and Akamai.

Bear in mind that we’re not scoffing at conservatism; we started out skeptical too. But we now believe that the empirical evidence will convince skeptics that the leading P2P players do have sufficient control of failover, fault tolerance, and general network scalability to produce quality results in real time if they wish. Ultimately, we believe, the traditional CDNs will make the same decision, for reasons of cold, hard survival if nothing else.

When they do, traditional CDNs will begin to employ P2P content delivery networking techniques rather at the edge of their networks rather than bulking up on servers. They may turn to distributed computing companies such as United Devices first to test the application in a real-world distributed environment with scores of connected end-users, but over time, they will employ the technology, we contend.
Look for quiet beta tests over the next twelve months and eventually, a fairly noise about-face by traditional CDNs as they come to acknowledge the benefits of P2P content delivery at the network’s edge. Also, look for consumer infrastructure companies with less ego invested in proving the P2P CDNs wrong -- think AT&T, for example -- to step up to the P2P CDN business.

**IPOs are on the way**

We think the companies we’ve profiled in this report may be the first wave of tech firms to re-experience a healthy IPO climate, and we expect them to take advantage of it. Sometime in the second quarter of 2002, look for a few of the players with positive cash flow and big-name partners to hit the public markets.

Why? First of all, here’s our feeling about public markets and technology, which you may want to bear in mind through the rest of this section. We believe that the best time for a technology company to have an initial public offering is not when it’s at its most mature stage, but when it has established itself at a certain post-startup, pre-maturity level. Perhaps we could compare this to getting second-round VC funding. We know others may think of IPOs as appropriate for mezzanine-style cash, but we think it’s more appropriate to sink dollars into a company when dollars can have a slingshot effect, boosting companies rapidly up into the stratosphere.

That being said, we believe that the markets and a few of the better positioned P2P CDN companies fit the profile of tech companies which can benefit from an IPO and represent a reasonable investment.

The leaders in this space are offering a promising service which:

- Offers substantial savings over alternatives
- Attracts companies with large war chests
- Already boasts developed and rapidly refining technologies
- Is beginning to attract big-company interest
- Sits on top of a growing overall market (see our projections in Chapter 1).

In sum, all of the signs are there for a public markets surge. If a P2P CDN player can also demonstrate upward mobility of income and a short time frame to profitability (i.e. about one year), we think they’ll be set to go -- and will.

**P2P CDNs will acquire infrastructure, channels**

P2P CDNs are moving into a new, better defined stage right now or at least they should be, as indecisiveness will be decisively punished in the marketplace next year.
As mentioned above, they have at least two apparently viable business models, to go either into the managed services business or the technology sourcing business. A third, which came into focus when ChainCast acquired Internet radio broadcaster StreamAudio.com, is to build out into becoming more of a full-service provider offering not only technology and channels, but also distribution and possibly added services.

If buying an Internet radio broadcaster is a good way of increasing your reach, wouldn’t buying a financial fulfillment vendor be a great way of increasing your attractiveness to content vendors?

Rather than building a server farms or partnering, even with intelligently-managed hosting companies, why not buy hosting companies with smart technologies?

What about merging with one of the companies (e.g. Speedera) that specialize in optimizing networks? The combination of off-the-edge services and a smart network could be a winner.

In short, expect to see these and other border-expanding transactions happen for companies, like ChainCast, with the financial backing to make them happen.

**Security will be a 12-month issue**

We predict that security will come up as an issue for P2P CDNs, but will only pose a real barrier to growth in instances where data is particularly sensitive or users are particularly paranoid.

Under the covers, many of the P2P content relay schemes tread lightly on a PC, and some don’t even access the hard drive at all. That takes away some key security mumblings regarding the hackability of user hard drives. The distribution of files into chunks across a PC network, meanwhile, only makes it less likely that an intruder would be able to steal copyrighted content or data.

Still, for the next twelve months or so, we think that security will be the issue most frequently raised by potential buyers with objections, at least for consumer applications.

There’s something about the notion of streaming across PCs across the great wide world of the Internet that unnerves content creators and network managers --perhaps rightly in some cases! -- and it may take more than logic to calm them down.

Luckily for the health of P2P CDN players, corporate entities with secure LANs and WANs have less to fear from a streaming P2P solution at the outset. Streaming from machine to machine within their network may seem like a reasonable solution immediately.
All told, we predict that PC security will remain an often-raised issue -- even if it’s a “straw man” that doesn’t apply to a given technology -- for about the next year, but will die away as a persistent buyer concern by 2003.
Profiles of traditional content delivery players

Akamai Technologies Inc.
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www.akamai.com

History

Founded in August 1998 -- with $8.4 million in from VC firms Battery Ventures and Polaris Venture Partners -- Akamai is probably the oldest and largest of the pure content delivery networks.

Akamai introduced its services commercially in April 1999. Since its inception, Akamai has built out a network comprising more than 11,600 servers touching 820 networks in 62 countries. No other content delivery player can claim that kind of muscle. Akamai’s strategy, which has been to bring its servers to more or less every neighborhood its customers wish to reach, appears to have been largely realized.

While Akamai has attracted a blue-chip client-list cutting across many key vertical industries, Apple Computer has played a particularly important part in its growth, representing 22% of total revenues for the year ended December 31, 1999 and 12% of total revenues for the year ended December 31, 2000. Yahoo was another important early customer, representing 13% of total revenues in 1999.

Other Akamai customers have cut across the media, news and corporate worlds, including Barnes&Noble.com, E!Online, MSNBC, Office.com, Progressive Insurance, JCPenney, Lycos, Martha Stewart Living Omnimedia, Reuters, CBS, C-SPAN, Xerox and The Motley Fool.

Over the heady years of the Internet boom, Akamai was able to bring a wide range of content distribution or enhancement technologies in house through strategic acquisitions.

Acquisitions included InterVU, a publicly traded company offering automated streaming media services for live and on-demand video and audio over the Net; Network24 Communications Inc., an Internet broadcasting software and services firm; CallTheShots, a company focused on Web site personalization and content aggregation; and Virage Inc., a firm developing digital video management software for the Net.

These acquisitions were fed by proceeds from the company’s highly successful stock offering, which took place on October 29, 1999. Climbing almost immediately to a high of nearly $350
a share, Akamai’s huge market capitalization supported the company’s ongoing need for infrastructure expansion.

Services

Akamai seems to have been able to integrate its technology acquisitions relatively quickly and well, into services which now form parts of its core product set. Akamai’s current core services include the following:

Content Delivery Services

EdgeSuite: Positioned to appeal to enterprise customers, this is Akamai’s package of edge services through which companies can control how data and applications are assembled, presented and delivered to end users.

Streaming Solutions

FreeFlow Streaming: Akamai’s streaming content delivery service.

Akamai Conference: Interactive Web broadcasting solution targeted to business functions such as training seminars, corporate announcements, production introductions, and investor updates.

Akamai Forum: Going head to head with traditional corporate audio/videoconferencing providers, Akamai is providing an automated event system which allows its customers to provide an audio or video Web conference which can include slides and on-demand delivery.

Akamai has had particular success with the launch of EdgeSuite, a recent addition to its service lineup, which has attracted 75 new customer contracts, including BestBuy.com, Monster.com, Novartis Pharmaceuticals Corp., Six Flags.com and Victoria’s Secret.

Financial Standing

Akamai’s financial situation is compromised. The company’s expenses continue to climb, as it invests in forward-looking R&D and builds out its infrastructure further. More critically, the cost of delivering service has gone up considerably as well.

According to the company’s SEC filing for the 2nd quarter, revenue climbed dramatically, to $83.3 million from $25.3 million during the same period in the year 2000.

Still, the cost of service climbed 118% over the same six months, more than doubling from $29.8 million compared with $13.7 million for the same period in 2000. According to the filing, cost of service went up due to higher bandwidth costs as a result of expansion of the Akamai
network and “an increased amount of content delivered over our network,” according to the filing.

This stood out for us. If increasing the amount of content a content delivery company sends across its network does not result in increased profits, something is wrong with this picture. This is particular striking given that Akamai is known as being one of the pricier companies in its domain; if anyone should be charging enough to be making a profit, they should. At the very least, the company is in an awkward moment in its growth.

Akamai’s stock, meanwhile, like that of all Internet companies, has taken an incredible beating since its peak days in 1999. As of this writing in late August, it stood at $4.44 per share, down approximately $340 per share from its peak in the year 2000.

**Current Situation**

If the initial success of EdgeSuite leads to longer-term commitments from key corporate customers, Akamai is in as good a position as it could be given its overhead. It still remains to be seen, however, whether their current business model is fixable, given the company’s reliance on playing the infrastructure game.

If international telcos with much better economies of scale find it challenging to build out a hosting network, we doubt Akamai’s smaller network can pay for itself simply through the sale of network services.

Another, sadder factor may also affect Akamai’s future. Just recently, the company tragically lost its chief technology officer, Danny Lewin, to the terrorist attacks on September 11 of this year. It’s not clear yet whether the company’s progress will be impeded by the loss of Lewin, a well-credentialed and respected technologist.

**Net/Net**

Akamai has built an incredible infrastructure, appears to have a fine brain trust and has acquired lots of finely crafted intellectual property. On the other hand, the company’s burn rate seems to be increasing and its chances of profitability dropping as its expenses increase and competition from peer to peer content delivery players -- and as-yet unnamed but sure-to-appear additional competitors -- smell blood in the water.

As we see it, P2P content delivery players will begin to pick off some of Akamai’s less visible customers -- those more concerned about saving a buck than buying from the corporate standby which Akamai has become -- and that depending on how Akamai reacts, the process could accelerate over the next 12 months.
In time, P2P content delivery may even pick up some primo customers Akamai will hate to lose. In that case, It won’t be the little P2P companies themselves doing the cherry-picking, either; it will be the larger, more muscular telco and ISP partners recruited by the P2P companies which will make the more juicy propositions.

We say, hey Akamai, you really can’t ignore P2P content delivery. It’s going to happen, and you can build on it faster than anybody. Get on board.
Profiles of traditional content delivery players

Digital Island
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History

Digital Island began life in 1996 as an independent company. Their hook was promising to speed up content delivery on the Net by shifting traffic off overcrowded main arteries onto its private “overnet.”

Attracting strong investment interest early on, Digital Island raised $11.5 million to support its vision within its first year of existence. It followed up the fundraising success with $10.5 million in March of 1998 and yet another $10.5 million round in September 1998.

In December 1999, it merged with content delivery networking pioneer Sandpiper Networks. Working together, the two went after major content players on the Net, early on signing a content delivery agreement with America Online. The company also went after networking business, for example cutting a deal with cable networking player Road Runner under which it would speed up content delivery in Road Runner’s key U.S. markets.

The merged companies began to acquire. Early in 2000, Digital Island acquired live and on-demand streaming media provider Live Online, which it picked up for $65.9 million and $5.2 million in cash. Later that year it bought distributed hosting provider SoftAware Networks for $390.5 million in stock, $20 million in cash and $3 million in stock options.

Still, financial concerns continued to trouble the company. Such expense worries very well may have been the reason why Digital Island agreed in May of this year to be acquired by telco Cable & Wireless. (The deal closed in August.)

Services

2WayWeb

-2Transact
This is Digital Island’s e-business hosting product. Services include two content-related offerings:
1) Secure content delivery of shared Web content
2) Digital Rights Management options providing digital media content creators with the ability to sell their wares on a pay-per-view, pay-per-download or subscription basis. (Subscription option is due to be available in 2002.) Rights management based on Windows Media Rights Manager 7.0; Real format should be supported next year.

- 2Manage

This is a suite of services streamlining the process of delivering e-business content, including Web management and reporting features. Facets include the following:

1. Geographic intelligence services
2. Traffic and performance reporting
3. Web site, application and server monitoring
4. Intelligent traffic management services
5. Online service center
6. Digital content preparation
7. Digital content management
8. Digital rights management
9. E-learning services
10. Streaming media, audio/video production and encoding
11. Secure corporate communications

- 2Deliver

This group of services is Digital Island’s content delivery service, supporting both static and dynamic content. Services include the following:

1. Streaming audio and video support
2. Distributed hosting
3. Premium network service
4. Content peering, in which Digital Island links up with content delivery infrastructure of other content service providers to increase performance and support interoperability.

Footprint

Emerging from Digital Island’s merger with Sandpiper Networks, Footprint is the technology enabling Digital Island’s 2Way services.

Financial Standing

Perhaps due to the intervention of C&W, things actually appear to be moving in the right direction for Digital Island. Improving gross margin and steadying costs point to a reasonable hope of profit in 2002, at least when compared to competitors such as iBeam.
Working with C&W seems to be improving the level at which it can utilize this network, however. Unusual for its sector, Digital Island’s gross margins improved 64% for the nine months ended June 30, 2001 as compared with the nine months ended June 30, 2000. Still, it is still sitting on top of a very substantial fixed infrastructure nonetheless, with roughly 2600 hungry server mouths to feed.

Working to keep the margins healthy, Digital Island instituted staff cuts in May of this year, saving $6.7 million for the three months ended June 30, 2001 compared with the three months ending March 31, 2001.

Current Situation

Digital Island seems to be transforming itself from a primarily infrastructure-driven player into a more flexible company offering content- as well as transaction-driven edge services of various kinds.

As the growing Digital Island has gained resources, it has attracted a long list high-profile customers including AOL, Schwab & Co., CNBC.com, Glaxo Wellcome, Microsoft, Sony Entertainment and Universal Music Group.

The 2Way Web Services launch, a repositioning of its product line emphasizing its high-end content services over raw infrastructure power, attracted customers such as Walt Disney Internet Group, Pearson and Cisco Networking Academy. Digital Island was also chosen by Microsoft to stream the launch of its Windows XP operating system in late October.

Still, ultimately, it’s making a profit that matters, and Digital Island hasn’t gotten there yet, though it hopes to do so in early 2002. What’s more the cost of revenues has continued to increase all the way through 2001, a scary sign for a company that hopes to make money sooner as opposed to later.

Net/Net

Among the infrastructure-driven CDNs, Digital Island seems the most focused, and its financial trends are somewhat brighter than the others profiled in this report. With the help of C&W, Digital Island is certainly in the game for the long term.

What remains to be seen, we believe, is whether a meaningful number of Digital Island’s key customers will be stolen away by less-expensive P2P streaming options as they prove themselves in the marketplace.
If P2P content delivery can deliver strong results there’s fewer and fewer reasons for companies to pay premium prices for high-end infrastructure-based services. As we’ve noted elsewhere, it could be that companies like this one will actually need to adopt streaming and download-oriented P2P content delivery at some point in the next 12 months to stay competitive in price-sensitive segments.
Profiles of traditional content delivery players

iBeam Broadcasting Corp.
645 Almanor Avenue, Suite 100
Sunnyvale, CA 94085
Phone: (408) 523-1600
www.ibeam.com

History

IBeam began its life in October 1999 as a streaming media company focused on delivering entertainment content.

Like its competitors, iBeam was to find that sales volume was much easier to generate than profit. From March 1998 through June 30, 2001, iBeam had accumulated a $609.6 million deficit.

The company was headed for the end. But in a nick of time, a financially tottering iBeam found its salvation in Williams Communications. Williams, a major backbone operator whose network spans 33,000 miles across North America, wanted to beef up its streaming capabilities. And iBeam, having run ashore during a tech recession, badly needed cash.

Williams took a 49% stake in iBeam, putting up $20 million in cash and $10 million in services to the streaming media firm. Other parties pledged $10 million in cash as well, bringing the total to $40 million in investment.

Services

Streaming Communications Services Group
This group with iBeam enterprises to help plan and optimize infrastructure for streaming media within corporations.

Activecast
This is iBeam’s interactive Webcast product, offering a combined package of video, audio, presentation slides, dynamic Web links, live chat, audience polling, advertising and e-commerce.

TalkPoint
A Webcasting tool which allows users to offer on-demand or live streaming to a dispersed audience. Audiences view presentations on a browser and listen to audio over either a telephone or a PC.
Advertising Agent
This is iBeam’s streaming media advertising service. Users can insert live full-motion video or audio advertisements into streams.

Digital Rights Agent
This service allows users to keep control of copyrighted digital material, either downloadable or streaming. Makes use of Microsoft Windows Media Rights Manager to encrypt content for management until the content is sold under terms the creator approves.

Geo Agent
A service allowing content providers to tailor ad delivery to an end user’s location.

Pay Per View Agent
Handles registration, reporting and payment processing for pay-per-view content.

Syndication Media Agent
A hosted application allowing companies to manage distribution of digital media to affiliated Web sites.

Financial Standing

In recent times, iBeam has fought hard to regroup, discontinuing service to almost a quarter of its less-profitable and higher-risk customers while cutting back on its employee roster. Dropping about 100 staffers over the 2nd quarter of 2000, the move cut its engineering staff by more than two thirds.

iBeam has managed to lower its cost of revenue slightly from first to second quarters of this year, in part through staff cuts but also due to a drop in revenue between those two quarters. The drop in revenue, possibly sparked by fears as to iBeam’s future, doesn’t bode terribly well in a market where Akamai continues to ramp up revenue.

Even with the $40 million cash infusion that came with the Williams investment, iBeam’s management isn’t sure the company will stay alive past the 4th quarter of this year. The company still isn’t in a very good position to slow its burn rate, and $40 million doesn’t buy a cash-hungry networking business much time.

Current Situation

iBeam remains on shaky ground financially -- as of mid-August the company was fighting to keep its NASDAQ listing -- but the company has at least succeeded in shifting its emphasis to the more-predictable consumer market.

**Net/Net**

iBeam seems to have evolved into one of the better-operated infrastructure-based CDNs, but as noted, even the company’s own leadership isn’t sure if it can keep paying for its cash-burning infrastructure.

iBeam’s executives are now focused on offering business services, and this orientation can do the job of keeping them afloat, we believe. The question, which remains open at the moment, is whether business will adopt this alternate model of networked audio and video delivery quickly enough to support a company iBeam’s size.

Frankly, at the moment we doubt that the cash will move in quickly enough, but we don’t doubt that the market is there to support a company with iBeam’s profile if things go right. If iBeam can achieve very substantial enterprise sales penetration -- and it has been doing well with enterprises of late -- it may just be one of the infrastructure players that survives into the next generation.

Especially if it finds a way to embrace rather than compete with the P2P CDNs, there’s clearly a place for iBeam, a CDN that understands how to deliver content to businesses.
Profiles of P2P content delivery players

Acceloop Inc.
1701 W. Northwest Highway Suite 240
Grapevine, Texas 76051
Phone : (866) 222-8140
www.acceloop.com

History

Founded in 2000, Acceloop has focused tightly on content delivery software. Organizationally, it has a familiar profile for companies with an Israeli arm. The company has declared its Grapevine, TX location but maintains an R&D center in Nesher, Israel.

Acceloop made the beta of its Web server accelerator available in early 2001 and launched a commercial version for IIS Web servers later in the year.

Services

Primarily a software infrastructure provider, Acceloop enters the P2P content distribution arena obliquely. Acceloop’s **Web Server Accelerator**, which starts at $2990 for a single CPU Web server, is a software product designed to accelerate high-volume content transfers up to 700% over the Internet and Intranets.

What makes Acceloop interesting, for the purposes of this report, is that the company also offers an optional technology under which content can be delivered on a peer-to-peer basis across a network of user PCs. It calls this product the **Streaming Server Accelerator**. The SSA is still in beta. The company says it can triple the number of concurrent users of live streaming.

Financial Standing

Acceloop was seed-funded by private investors.

Current Situation

Acceloop is at work developing versions of its core Web Server Accelerator for Apache and iPlanet Web servers, which should be ready before the end of this year.
It’s too soon to tell what kind of traction this new company will get in the marketplace. The notion of accelerating content delivery from the Web server is sensible in today’s current architectures, but certainly does little if anything to alleviate the underlying infrastructure cost burden.

The addition of the peer--to-peer streaming functionality, however, intrigues us. Perhaps it will be through Acceloop -- or another company like it -- that traditional infrastructure-based CDNs can inconspicuously begin to experiment with PC-chained content delivery at the edge of their infrastructure-based network.

If they do, Acceloop has quite a promising future ahead in the CDN world.
Profiles of P2P content delivery players

AllCast
535 West 34th St.
New York, NY 10001
Phone: (646) 792-2435
www.allcast.com

History

Founded in 1996, AllCast execs claim bragging rights as having the earliest patent in the P2P CDN space. The company was awarded a patent for its “peer-to-multi-peer” audio distribution software in 1999.

Services

AllCast’s software, the AllCast Broadcaster, is licensed to content creators on a per-listener basis. The license starts at a 100 user license for one year at $500 and goes up from there. AllCast is also willing to do event-based pricing or work with other fee models.

The company is proposing to offer dramatic savings over the infrastructure-based players. For example, if a radio station incurred an $11K per month bill for audio Webcasting (based on 20 KB/second x 86,400 seconds per day x 30 days per month x 200 average listeners), AllCast says it could bring costs down to roughly $200 per month -- including a high-speed connection. Its fees are based on a MB transfer cost of 0.009 cents/MB.

Financial Standing

AllCast is privately funded and does not provide additional information on its funding sources.

Current Standing

Allcast began beta testing of its technology early this year, offering free access to the beta version of the broadcasting software. At the same time, users began to download the plug-in that makes their Webcasts available on Windows Media Player -- a total of 27,000 users as of mid-August, the company said.

In September, AllCast made additional progress in getting its product established, announcing that it would be providing the software behind BRS Media’s My Radio.FM online broadcasting service and professional AM/FM division WEBCASTi (http://www.webcasti.fm). The same month, AllCast announced that it was chosen to
Webcast independent filmmaker group Independent Feature Project’s Market Seminars and Panels taking place in late September/early October.

Meanwhile, in a step designed to underscore its legitimacy as a broadcaster, AllCast struck a deal with Internet broadcasting measurement service MeasureCast in October. Under the terms of the deal, MeasureCast will monitor audience size and demographics for AllCast’s broadcasts.

**Net/Net**

With roots extending back to 1996, AllCast has had time to finesse its product and its pricing structure carefully. Working its technology as a plug-in to Windows Media Player certainly doesn’t hurt on the consumer acceptance end.

At the same time, its current pricing structure is sensible and solid, with a relatively simple structure and an entry-level price point accessible to smaller operators.

Still, at this stage, it appears that AllCast will be fighting a savage competitive battle for audio-only delivery with ChainCast, one in which marketing, M&A dollars and a dash of plain luck will play a role.

Ultimately, we don’t anticipate that AllCast and ChainCast will continue to compete in the same niche for more than six or eight months. Instead, we predict that will be acquired by a broadcasting or media company -- or even a telco such as AT&T with media interests -- that wants to control the Internet media side of their business.
Profiles of P2P content delivery players

Blue Falcon Networks
The Bradbury Building
304 S. Broadway, Suite 596
Los Angeles, CA 90013
Phone: (213) 617-6900
www.bluefalcon.com

History

Blue Falcon was founded in 1995. Previously, the company was known as Static and focused on online gaming technology, particularly P2P-related distributed networking. Over the past three years, the company has been transforming that technology into the P2P content delivery platform now moving into production. The company renamed itself Blue Falcon recently and dedicated itself publicly to the streaming business.

Services

Blue Falcon distinguishes itself as a company offering streaming audio and video services that work when delivered to large-scale audiences. One service, Streamer Live, is designed deliver real-time Webcasts. Streamer On Demand, meanwhile, provides on-demand streaming content (for example, when customers find and choose to play a particular video at their leisure).

The company offers its content creator/broadcaster customers two ways to buy its streaming technology.

Choice one is licensing. Blue Falcon’s first, flagship broadcast customer, Radio Free Virgin, is leasing Blue Falcon’s technology and managing that technology at its own collocation facility. Blue Falcon charges a per-megabytes-transferred licensing fee (similar in spirit to the per-CPU fees charged by Oracle for its databases).

Blue Falcon also offers a hosted service in which it hosts its own application and then charges a different per-megabyte fee for streaming data transferred.

Financial Standing

Blue Falcon is closemouthed about its financing. The company is funded by VC firm Zone Ventures, but execs don’t disclose how much it has received, considering the numbers to be proprietary. As of late October, the company expected to close soon on a second funding round.
Current Situation

Blue Falcon continues to take steps to reinforce its position as a credible Internet media entity.

Most recently (as of this writing), it signed a deal with Internet broadcasting measurement service MeasureCast, a third-party streaming audience measurement service. The measurement deal brings Blue Falcon in line with non-P2P Internet broadcasting companies, which have gradually begun to accept the necessity for media monitoring techniques comparable to those employed by offline broadcasters.

As of late October, the Radio Free Virgin deployment was scheduled to roll out to 44 channels, available to the 3 million users who had downloaded Virgin’s player. In the works were deals with enterprise customers to bring up enterprise streaming projects, in what Blue Falcon executives describe as a wave of post-terrorism nervousness over physical travel.

Net/Net

There’s plenty to say about this company, which appears to have a technically robust offering on the way as well as having snagged a high-profile customer. However, Blue Falcon still hasn’t showed its hand entirely.

For the moment, we can only say that the company’s initial steps appear be well-taken. Let’s see if Blue Falcon can build its initial, visible success with Radio Free Virgin into a few entertainment players or wedge open the enterprise streaming door.
Profiles of P2P content delivery players

CenterSpan Communications Corp.
7175 NW Evergreen Pkwy, Suite 400
Hillsboro, OR 97124
Phone: (503) 615-3200
www.centerspan.com

History

CenterSpan evolved from a game controls company called ThrustMaster Corp. In September 1999, the company dumped its hardware business along with the ThrustMaster name and turned to P2P technologies.

In December 2000, a key turning point in its development, CenterSpan acquired the assets of Scour Inc., the company behind consumer online P2P service Scour. (*The engineers behind Scour have since moved on to form Red Swoosh. See company profile, below.*)

More recently, in August of this year, CenterSpan acquired a group of technical assets from Supertracks Inc., including the company’s BridgePort Music System, a secure local cache streaming technology, along with its digital music distribution technology and several associated patents-in-process.

The beta version of Scour’s retooled version launched in March of this year. A commercial edition should launch before the end of 2001.

Services

CenterSpan’s **C-star** application allows content owners to deliver content via downloadable files or via streaming media formats on a peer to peer basis. CenterSpan’s research has concluded that their service can be delivered at 1/3 the cost of client-server driven downloads and 1/9 the cost of existing streaming media technologies.

Its C-star service can be deployed either as part of a content creator’s existing infrastructure or used as a turn-key product with custom templates.

The templates provide customer-specific views into a given content creator’s catalog. With these tools, the idea is to allow customers to create their own branded content catalogs, and then control the access rights of each individual subscriber.

CenterSpan’s service is designed to offer the maximum possible Digital Rights Management controls. Currently using Microsoft’s Windows Media DRM technology, the C-star platform
compresses and encrypts content in a DRM wrapper, divided into segments, divided further into packets and sent across the network, themselves encrypted. Packets are later assembled on the desktop, as taken disparate user PCs with copies, by users with permission to receive the content.

**Financial Standing**

Even in a down economy, there are advantages to being a public company. Despite slumping tech stock prices, CenterSpan was able to finance its recent purchase of Supertracks assets with approximately 67,000 shares of stock (valued at $750K) rather than a pure cash outlay. This puts it ahead of other P2P players, most of whom are private and will almost certainly need to invest a meaningful amount of cash if they want to do mergers or acquisitions.

As of June 30, 2001, according to its most recent quarterly filing, CenterSpan had $11.4 million in working capital, a better financial position than many Internet startups. (Despite its age as a company, its business model is new and that makes it a startup in our book.) Flows of cash have come in periodically during the year, with investments from a varied group of players.

Sales revenue is still more or less non-existent, however. It remains to be seen how the Scour launch will do in bringing the company up to profitability.

**Current Situation**

All told, CenterSpan seems to have set itself up nicely to begin to sell. The question now, which we haven’t been able to answer to our satisfaction, is whether it can ramp up income quickly enough to recoup all of this expense and survive solely on its own revenues.

While free Internet file sharing services have been quite popular, it’s still a very tricky open question whether people are willing to pay for downloadable or streaming content. Advertiser-supported models are familiar from the broadcast media, but pay-for-play is still a bit new.

**Net/Net**

We’re calling this one a wait-and-see playÖ.almost a coin flip.

CenterSpan is at a critical point in its evolution, having acquired or developed the technologies it needed and gone through beta with a popular platform (Scour). The rubber, so to speak, is about to hit the road.

If demand for paid-for digital content is there, we think CenterSpan’s in an excellent position to meet it, but we’re still not sure entertainment buyers are ready.
Profiles of P2P content delivery players

ChainCast Networks
100 Century Center Court, Suite 800
San Jose, CA 95112
Phone: (408) 467-4040
www.chaincast.com

History

ChainCast was founded in March 1999, and took in its first equity funding in December of that year. The company holds 10 patents related to various aspects of its “chaincasting” technology.

Services

ChainCast is offering managed P2P content delivery services and at the same time, pitching its products to network service providers and telcos. Pricing models for ChainCast’s managed services are listed below:

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**ChainCast pricing models**

**95th Percentile Bandwidth (Mbps)**
The 95th percentile bandwidth model is based on the average of samples of the bandwidth served (in megabits) during each 5-minute segment of the month. The top 5% of the 5-minute averages are discarded, and the Webcaster is charged for the next highest, or peak 5-minute average.

**Aggregate Monthly Volume (GB or TB)**
The aggregate volume served model is based on the total number of bytes delivered over a monthly period, which is a function of the number of user sessions, the length of the sessions, and the bit stream encoding rate.

**Monthly Average Bandwidth (Mbps)**
The monthly average bandwidth in Mbps is the aggregate volume delivered during the month (converted from bytes to bits) divided by the number of seconds in the month or alternately, the average of all of the 5-minute segment averages for the month.

Information courtesy of ChainCast Networks
Financial Standing

To date, ChainCast has taken in over $15 million in venture funding. Its backers include Bellwether Investments, Creative Technology Ltd., Cuscaden Investments, MediaCorp Interactive, Mid-City Investments Holding, WIIG Global Ventures and the founders of Creative Labs and InnoMedia Pte Ltd.

Current Situation

ChainCast has been conducting ongoing beta tests of its audio Webcasting technology since mid-2000 with six radio stations. Over that time, of course, it has been tweaking its product to ready it for wider adoption.

The company has now begun tests with telcos, but is not yet prepared to go public with the results of those tests. It is also hosting an as-yet unnamed event for a media firm, an event which expected to draw as many as 100,000 listeners.

ChainCast has not announced any post-beta commercial deals as of yet, though talks with company officials suggest that they may do so shortly if the trials above go well.

However, ChainCast did reach a landmark with its acquisition of Internet radio streaming and ad replacement vendor StreamAudio. By acquiring StreamAudio, ChainCast went overnight from a technology vendor to a large-scale distributor, an important distinction in a tightening marketplace.

Net/Net

ChainCast is one of only a few players (alongside contenders such as Allcast, Blue Falcon Networks and vTrails) proposing to deliver high-quality audio content in real time via a P2P infrastructure on the public Internet. The competition between these companies is going to be very intense over the next six to twelve months. With its acquisition of StreamAudio, ChainCast has done something decisive to stand out; it will be interesting to see how it leverages this asset competitively.

Looking at ChainCast’s broad base of VC support, we believe the company has reason for financial enthusiasm, though it is worth noting that the original cash infusion came before the Net biz crash. If ChainCast is meeting whatever goals the original VC’s had set, there may well be more money to come -- and if the money goes into more strategic acquisitions, the game could get very interesting indeed.
We’re also a fan of its managed services/telco channel sales model; we believe these are likely to appeal to the broadest possible audience while keeping good control of reputation-building quality and results reporting. For enterprises, managed P2P content delivery services also bear a close resemblance to other network services they’re used to buying, and that can only help to close deals.

Focused as it is only on audio, the company takes some flack from its competitors with video capacity, who view the ChainCast product as too limited. For our part, we believe this purported limitation could be a strength; after all, video and audio media markets are discrete enough that focusing on just one may lead to a better strategic focus. Still, that may change as the market matures, and this is a risk factor for this otherwise well-positioned firm.
Profiles of P2P content delivery players

EverNet Systems Inc.
225 Velarde Street
Mountain View, CA 94041
Phone: (650) 386-5545
www.evernet.com

History

Publicly launched in August of this year, EverNet has been in stealth mode for about two years. The company’s founder and current acting chief executive officer, Mike Helm, previously ran an ISP, as well as having developed and operated several Web sites. Many of the technical staff members on the engineering team had previously worked together at desktop entertainment software company Sierra On-Line of Bellevue, Wa.

Services

To begin taking advantage of EverNet’s service, a user clicks on a link connected to an EverNet supported file. The company’s thin client installs automatically on a user’s desktop the first time the user requests a file. The client is currently about 800K in size; EverNet is working to reduce it to 500K.

After connecting, the parent EverNet server determines which 20 connected desktops are closest to that user within 20 milliseconds. Each of these 20 desktop computers sends the user little pieces of the requested file. If a sending desktop goes offline, gets overloaded or begins sending a corrupted file, EverNet’s servers automatically switch the feed off to another computer. According to EverNet’s research, file delivery performance improves as users join the party.

EverNet’s technology is designed to work with all standard digital content file types, including Windows Media, RealPlayer and QuickTime.

Standard pricing for services starts at approximately 2/10 of a cent per megabyte, or about $2 per gigabyte. The company offers discounts for greater volume. The company expects to set a minimum delivery level, as their P2P approach won’t work for tiny files.

Financial Standing

To date, EverNet has taken in $1.8 million in angel funding from unnamed investors. However, the company has invested all of that money in development of its proprietary technology and sales activity. Other than Filmspeed (see below), the company has not publicly identified any
live customers; if it doesn’t have any, it’s likely that EverNet urgently needs more customers or customers to stay afloat.

**Current Situation**

At present, EverNet is just beginning to build and audience and connect with partners.

Its first content partner relationship is with Filmspeed, which distributes DVD-quality motion picture content to computers and mobile devices. The two companies have worked together to create a joint product, Filmspeed RipTide powered by EverNet, which can be tested at [Error! Bookmark not defined.](#).

**Net/Net**

EverNet appears to be going head to head with Kontiki, CenterSpan and perhaps Uprizer. This is a race it will lose unless a) execs can demonstrate a compelling cost savings, which to be fair is entirely possible or b) the company offers services so compellingly differentiated that nobody cares about, say, the sexiness of a company backed by Marc Andreessen and Jim Barksdale.

We have talked with EverNet and think the players there are shrewd enough to make it happen, at least if their resources hold out. We don’t expect to see them hold on unless they cut a few more deals quickly -- either VC or customers, though customer deals have more lasting value -- but if they can get cash flowing we see them as a real contender.

One remaining question, which will dog Kontiki, CenterSpan, EverNet and any other future download-oriented P2P content delivery player, is whether users will be willing to wait for downloads in order to experience high-res movies and the like. That is simply an unknown at the moment. We’re skeptical about this -- the Internet is an “instant” culture -- but feel it’s too soon to call the play. Our guess is that corporate markets delivering say, training films may take to this better than impatient entertainment masses but time will tell.
Profiles of P2P content delivery players

**Kontiki**
1350 Villa Street, Suite 200
Mountain View, CA 94041
Phone: (650) 625-3000
www.kontiki.com

**History**

Kontiki began life as an ultra-stealthy firm -- the mysterious Zodiac Networks -- then burst into life in August, splashing its new name about and garnering lots of press attention in the process.

The attention was probably due in substantial part to the leadership of Mike Homer, a former executive vice president with Netscape Communications Corp, and investment from Netscape whiz kid Marc Andreessen and leader Jim Barksdale. Thanks to the presence of Homer and other former Netscape players, Kontiki snared prestige capital early on and has gotten a jump on its plans to deliver audio, video, software and digital media.

The company initially described its technology as peer to peer at the outset but has since backed away from the P2P label, according to press representatives, who declined to be interviewed for our research. Still, we think Kontiki belongs in this report, and so we have still followed through with our profile here.

**Services**

Kontiki’s core service is a “delivery network” leveraging the power of user PCs to cut media delivery costs. Kontiki files are sent from caches held at the edge of its delivery network. To avoid wasting bandwidth, the system sends files at off-hours when connections are typically underutilized.

To dispatch the files, Kontiki uses what it calls “Adaptive Rate Multiserving”, connecting user computers to many servers in a network simultaneously. To receive a file, a Kontiki-enabled computer requests small parts of a file from each upstream computer. The system adjusts the serving pattern based on the available bandwidth and throughput. In this manner, user computers pass files on to user computer computers down the line.

Among the core features of the system are digital rights management controls which prevent content from being played without permission of its creators.
While Kontiki declined to speak with us, CEO Mike Homer was quoted in Interactive Week magazine as saying that Kontiki is planning to charge customers a $10K activation fee and a minimum of $6K per month to deliver 500,000 MB of data.

**Financial Standing**

Kontiki has taken in $18 million in its first round of funding. Investors include some of the more prestigious VC money out there, including the Barksdale Group and Benchmark Capital. It has also attracted funding from several prominent angel investors, including Marc Andreessen and VeriSign chief executive officer Stratton Sclavos. Given the high profile of Kontiki CEO Homer and other ex-Netscape players in the company, odds seem high that Kontiki can attract additional funding despite a currently hostile environment for venture investment.

**Current Situation**

Kontiki is positioning itself to compete most heavily in a sector -- time-shifted media delivery -- which has attracted fewer competitors to date. While it offers both streaming and on-demand delivery of media sources, most coverage of Kontiki has emphasized its on-demand service, and in fact, on-demand service does differentiate it from the pack more than streaming services do anyway.

Though a meaningful and growing number of players are making similar sounding offers to distribute streaming media, only one other company on our radar screen -- EverNet -- is focused tightly on the time-shifted delivery of the P2P content delivery market. While there may very well be others, there don’t appear to be many.

For this reason, we believe that Kontiki is currently in an excellent position to test out its theory (and we see it as a theory rather than a known fact) that consumers and businesses want to download files at off times then view them at their leisure from files stored on their hard drive.

However, they’re also in a good position to fall on their if this idea doesn’t catch on quickly. As we see it, their period of opportunity is relatively narrow.

**Net/Net**

If fame and prestige mean something -- and they probably do in the corporate market -- Kontiki already has something of a pole position in the time-shifted peer to peer market. On the other hand, this is still an extremely volatile space, and market frenzy isn’t enough to sustain a company’s lead more than six months at best.

We think corporate buyers seeking to distribute training materials will be somewhat interested in Kontiki, but not necessarily that much more than streaming players such as ChainCast, AllCast
and vTrails. Enterprises with a strong outsourcing philosophy might like Kontiki’s outsourced approach, but prefer to access vTrails’ rack-mounted hardware solution through an ISP to parcel out bits when they deliver the CEO’s speech across the WAN.

On the entertainment and media side of things, meanwhile, we think the “sexiness quotient” will go a lot further. The mere glamour of techno-plutocrats like Andreessen and Homer, who are quite the counterparts of the moguls in the entertainment business, will resonate well with their opposite numbers in the music, film, television and movie business. In this sector, we think they’ll be hard to beat, at least if the “schedule download, play later” model becomes popular with consumers.
Profiles of P2P content delivery players

Red Swoosh, Inc.
1100 Glendon Ave., Ste. 1700
Los Angeles, CA 90024
www.redswoosh.com

History

Red Swoosh has been in extreme stealth mode since its launch. (The only telephone number listed for the company at the time of this writing was disconnected!)

All that we know about RedSwoosh to date is that its principals were engineers behind Scour Inc.’s multimedia search technology prior to the buyout of Scour’s assets by CenterSpan. Its principals have been quoted in the press claiming that they have mature technology on par with if not in advance of P2P content delivery competitors.

Services

Because RedSwoosh has not responded to our inquiries to date, we can only quote the very brief self-description on their site to describe their services:

“Red Swoosh builds software that has knowledge of all caches of data objects on the global network and coordinates the most cost effective delivery and storage of those objects at a quality of service that is unattainable on today's network.”

Financial Standing

No information available to date.

Current Standing

RedSwoosh began a content delivery beta program in September 2001, and according to its site, hopes to become the premier provider of next-generation, intelligent digital media delivery systems to enterprises, media companies and ISPs. In other words, it’s clearly not going for the end user audience pursued by some of its P2P CDN competitors profiled above in this report.

Net/Net

From the little information the company has provided on its site, RedSwoosh seems to be positioning itself as a player in the space shared by Speedera and other networking players,
making their bread optimizing networks for content delivery.


Uprizer Inc.
1007 Montana Ave., Suite 323
Santa Monica, CA 90403
www.uprizer.com

History

Founded in 2000 but debuting publicly in October 2001, Uprizer has proven to be one of the stealthier firms on this list. Among other things, its phone number is nowhere to be found on its site or the Web.

Uprizer was in deep cloaked mode for quite some time, though an April 2001 announcement on Intel’s site noted that Intel and a few prominent venture capital players had invested in the new firm.

The firm comes with a healthy P2P pedigree. Uprizer was co-founded by Ian Clarke, who is already somewhat of a P2P legend as the creator of the million-plus node Freenet file-sharing platform.

Services

Uprizer’s core offering is the KARMA (Key Accessed Redundant Memory Architecture) Platform, a P2P content distribution app with distinct grid computing features. It is capable of operating solely with client software, available for a wide range of computing devices, but a server is available for companies that wish to license one for redundant content availability.

In addition to content distribution, Uprizer aggregates unused storage capacity across these devices, and presents this storage capacity in the form of a virtual disk it calls the KARMA Drive.

KARMA is available for license, or as a managed service (complete with Service Level Agreement) through an Uprizer certified Service Provider. Uprizer is also looking into distribution deals of various kinds, including providing branded KARMA clients to content providers and preloaded clients for PC manufacturers.

Along the way, Uprizer expects to save content producers money. The company claims KARMA can decrease content distribution costs by more than two-thirds, from an average $1.50/GB to less than $0.50/GB.

Financial Standing
Uprizer raised $4 million this year from a group of well-heeled investors including Intel Capital, Kline Hawkes Pacific LP and Shugart Ventures. The company does not appear to have any commercial customers as of yet, so it’s unclear how they are situated other than having VC funding. With the money coming in after much of the costly initial development was completed, however, Uprizer can plow a good percentage of the funding into sales. That bodes well for getting their message across despite a crowded marketplace.

**Current Situation**

As of October 2001, Uprizer was beta testing its platform, doing scalability tests as part of a testbed agreement with IBM. Working in concert, the computing giant and Uprizer are simulating the effects of various forms of connectivity (e.g. cable modems, DSL connections and dial-up) on file distribution performance.

Executives expect to launch KARMA commercially in the first quarter of 2002. Going forward, Uprizer is exploring the possibility of turning its client into a chipset for use in wireless phones. Uprizer is also preparing to offer a streaming P2P distribution product sometime in the middle of 2002.

**Net/Net**

Uprizer is coming into the P2P distribution market at a good time, as interest is rising and traditional CDNs weakening. What’s more, Uprizer’s hybrid architecture -- with aspects of grid computing and content distribution to offer -- should offer extra value to enterprise users hoping to experiment with varied P2P computing modes.

Uprizer is investing considerable energy in the wireless space, and this could distract executives from plucking the low-hanging fruit of corporate streaming services which we see as a clear option for most players. On the whole, however, Uprizer’s approach seems smart and their security infrastructure well-considered, something which may get its salespeople in the door where others fail.
Profiles of P2P content delivery players

vTrails
65 Broadway, Ste. 902
New York, 10006 NY
Phone: (212) 742-1395
www.vtrails.com

History

VTrails was founded in 1999 with funding from an Israeli venture capital firm. Like many Israeli firms with aggressive expansion plans, the company maintains an R&D facility in Tel Aviv but located its sales, marketing and media functions in a New York city office.

Services

Unlike many of its competitors, vTrails is selling hardware rather than software services. VTrails systems vary not only in price but also in how many channels they can serve. At present, all models except the vTrails Basic are multichannels and can concurrently serve six to 10 broadcasts. The Basic can serve two audio channels.

The vTrails system sits on a rack next a company or ISP’s media server, and works with standard media servers including Real, QuickTime and Windows as well as ad insertion technologies such as Vignette.

System prices are structured as follows (as of August 2001):

<table>
<thead>
<tr>
<th>System</th>
<th>Approximate maximum concurrent end-users</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>vTrails Basic</td>
<td>1,500 audio</td>
<td>$9,500</td>
</tr>
<tr>
<td>vTrails System</td>
<td>7,500 audio or 2,000 video</td>
<td>$25,000</td>
</tr>
<tr>
<td>vTrails Plus</td>
<td>25,000 audio or 5,000 video</td>
<td>$45,000</td>
</tr>
<tr>
<td>vTrails Premiere</td>
<td>50,000 audio or 10,000 video</td>
<td>$75,000</td>
</tr>
</tbody>
</table>

Financial Standing

VTrails received seed funding from Israeli incubator teamDCL in August of 1999. The company has not disclosed any other financial information.
Current Situation

vTrails appears to be in early startup mode. The company has begun beta testing with Chicago-based Webcasting firm RadioWave and San Francisco-based Internet broadcaster CreativeBroadcasting, and recently gave its technology a public debut at the Streaming Media West trade show, but has not begun a formal product rollout.

Net/Net

vTrails is unique in its hardware-based approach. Depending on how easily -- or painfully -- it installs in server racks, this could be a breakthrough technology for network service providers, simply because it fits in with the business model and approach providers expect. However, we know too little about the company’s financial status and administrative capabilities to know whether it can execute on sales and manufacturing well enough to capitalize on that promise.