

CDN Business Models - Not All Cast from the Same Mold

Rebecca Wetzel

Most casual observers know of just one business model for content distribution networks (CDNs) – Akamai's. In this model, content providers pay CDNs (who own no transport infrastructure), to have content of their choosing replicated in servers located in data centers closer to end-users than the origin servers.

This model has captured the imagination of Wall Street, and continues to draw the lion's share of the attention. There are, however, other models designed to further the interests of a different cast of characters. We set out to identify and examine various CDN business models, delving into questions of who distributes which content for whom, why and who pays whom.

The Cast of Characters

CDNs burst onto the scene in 1999 to address the fact that the Internet was not designed to handle large transmissions of Web content over long distances. Network congestion and traffic bottlenecks, exacerbated by burgeoning payloads of Web traffic, degrade individual Web site performance and compromise network performance.

CDNs address the problem by storing and serving content from many distributed locations rather than from a few centralized origin points - thus bypassing network congestion. Using caching technology, CDNs store replicas of content near users, rather than repeatedly transmitting identical versions of the content from an origin server. The result accelerates and improves the quality of content delivered to end users, while lowering network congestion and bandwidth costs for ISPs.

The CDN stage is populated by a cast of five characters, each with its own needs and agenda. The CDN playbill includes:

- **Content providers**, who need to get their content to end-users.
- **Hosting providers**, whose Internet-connected data centers house content providers' servers.
- **Backbone carriers**, who provide wide-area transport for ISPs.
- **Access ISPs**, who connect end users to the Internet.
- **End users**, who are consumers of content.

These five groups make up a content distribution value chain, the purpose of which is to connect consumers to purveyors of content. Note that there is overlap among access ISPs, backbone carriers and hosting providers. Some backbone carriers offer access and hosting services, and many access ISPs offer hosting services. But even when one provider assumes multiple identities, distinctions among the functions remain valid.

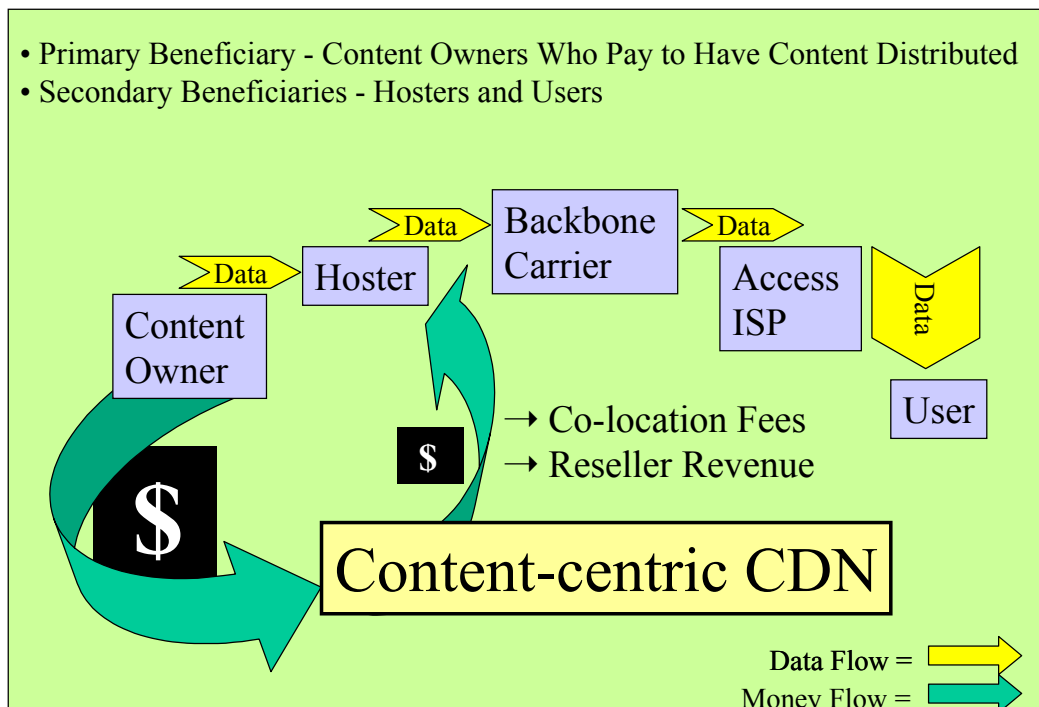
Who Pays Whom for What?

There are two primary CDN business models. The first is a content provider-centric model driven by the needs of content owners, and the second is an Internet access provider-centric model driven by the needs of ISPs. In both models, the payer seeks to please content consumers; what differs is the choice of content distributed, the way it is distributed and who pays.

* **Content-centric CDNs:** In this model (see **Figure 1**), exemplified by Akamai, Digital Island and Speedera, content providers pay CDNs to accelerate their content, in order to please the content consumers, and thus prevent them from defecting to competitors' sites. Content-centric CDNs replicate and deliver only content that the owners specify (in the case of Akamai, this is content that is specially tagged or "akamaized") from caching servers throughout the Internet. Content-centric CDNs employ routing intelligence to guide user requests to local servers.

Content-centric CDN caching servers are co-located by mutual agreement within data centers belonging to hosting providers, access ISPs and/or backbone carriers. Sometimes the hosting provider, access ISP or backbone carrier co-locates the CDN servers for free, but more commonly, the CDN pays a co-location fee covering space, utilities and network connectivity. In some cases, hosting providers resell content-centric CDN services and receive a share of the CDN's sales revenue.

FIGURE 1 Content-centric CDN Business Model



Access ISPs and backbone carriers do not typically receive a portion of the revenue generated by a content-centric CDN, even though they carry the content to the content consumer “eyeballs.” This is, however, beginning to change, as content-centric CDNs realize that they need to earn the cooperation of network providers. This especially true for access ISPs, which connect large numbers of content consumers.

Some content-centric CDNs are therefore moving beyond simply doling out co-location fees to access ISPs and backbone carriers. Akamai, for example, pays AOL for access to AOL users, and for information about content served from AOL’s own caches. Without AOL’s cooperation, Akamai’s customers would be “cache blind” - that is, all information about their content that is served from AOL caches would be lost.

Other types of business relationships are also cropping up. Speedera, for example, enables ISPs and backbone carriers to OEM its services, or to build and operate private CDNs for them. In a variation on the content-centric business model, Speedera is developing an enterprise focus, in which enterprises pay to have content distributed to themselves or to audiences of their choosing. These services can be used for business applications like on-demand training, product launches, shareholder meetings and corporate communications.

* **Access-centric CDNs:** In this model (see **Figure 2**) deployed by Edgix, Orblinx and SkyServ, ISPs pay access-centric CDNs to serve popular content from caches close to the ISPs’ subscribers. This model is built on the tenets that storage is cheaper and faster than bandwidth, and that there is strength in numbers. By caching frequently-accessed content near users (regardless of who owns the content), access ISPs save bandwidth, and with upstream bandwidth costs being the single largest business expense for most access ISPs, this is vital to ISP profitability.

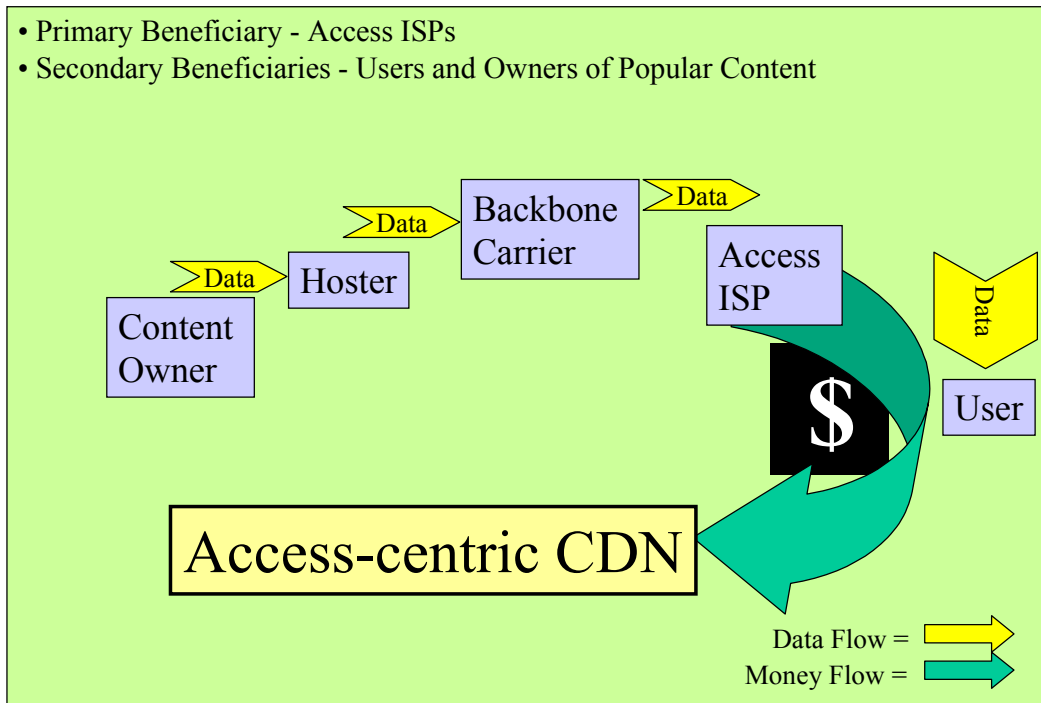
Moreover, by serving popular content faster, access CDNs help keep the access ISPs’ customers from defecting elsewhere for a better/faster experience. Again, this has enormous implications for ISP profitability -- the rate at which customers switch access ISPs, the “customer churn,” currently averages between 4 and 8 percent *per month*, and acquisition costs of \$400 per customer are not uncommon.

The access-centric model draws strength from numbers, because a large community requests more objects than a small one. The larger the pool of users served, the greater the opportunity for common requests, and the greater the chance that content will be delivered from the cache instead of the origin server. By pooling the experience of many users across many ISPs, an access-centric service can dramatically improve the chance that content will be served locally when requested.

Abhi Chaki, vice president of market development for Edgix, says his company chose the access-centric model because, “We very quickly saw that the [content-centric] CDN business model could not solve the

business issues that access providers were battling on a daily basis. Their needs and requirements with respect to efficient content delivery were very different than the needs of the content publishers. ISPs were being plagued with spiraling cost structures along with rising churn. Their biggest issue was how to scale profitably and increase margins over time. This was the catalyst behind developing an access-centric model, because [it] does take the interests of the ISPs into account.”

FIGURE 2 Access-centric Business Model



The Increasing Importance of Network Infrastructure

The first CDNs, including Akamai, Sandpiper (now part of Digital Island) and Mirror-Image Internet were “network agnostic” – they relied on an overlay network of servers, but did not own or even control any network transport infrastructure. For HTML content, CDNs have successfully relied on the Internet to distribute content to local servers.

In the case of streaming content, however, infrastructure matters more because streaming files are big and sensitive to latency. These days, for quality reasons, CDNs are partnering with broadband backbone carriers (mostly satellite) to transport large streaming files to local caches. Some access-centric CDNs are delivering HTML as well as streaming content over broadband networks to minimize ISPs’ upstream bandwidth costs (see **Table 1** – Comparative Matrix of CDN Service Providers).

TABLE 1 Comparative Matrix Of CDN Service Providers

Service Provider	Business Model Type		Services Offered					
	Content-centric	Access-centric	Content-centric Svcs		Managed Caching		Additional Services	
			Static	Streaming	Static	Streaming	Usenet	Other
Adero	✓		✓	✓				
Akamai	✓		✓	✓				Web Site Load Balancing and Dynamic Content Speedup
AT&T	✓		✓	✓				
Cidera	✓	✓		✓	✓		✓	
Digital Island	✓		✓	✓				
Edgix		✓			✓	✓	✓	
Epic Realm	✓		✓					Dynamic Content Speedup and User/Content Prioritization
Globix	✓		✓	✓				
iBeam	✓			✓				
MadgeWeb	✓		✓	✓				
Mirror Image Interne	✓		✓	✓				
Orblynx	✓	✓			✓	✓		
SkyServ		✓			✓	✓	✓	
Speedera	✓		✓	✓				Web Site Load Balancing
Teleglobe	✓	✓	✓	✓	✓	✓		Web Site Load Balancing

Concerned about being left out or relegated to a bit part, backbone carriers like AT&T and Teleglobe are rallying to insert themselves into the CDN loop by offering content distribution services which capitalize on their broadband transport to the network edge. Last July, AT&T announced that it would invest \$200 million in an “Ecosystem for Content Delivery.”

Comparing itself to prime time television, AT&T described its goal as follows: To give content providers the ability to offer 10 million simultaneous viewers of broadcast events among its cable and Internet access customers. AT&T’s business model consolidates the role of hosting provider, backbone carrier, access ISP and CDN into one entity, which it claims is an advantage because of the ability to control end-to-end service quality.

Given a different set of strengths, which include a massive worldwide network but no last mile infrastructure (except that belonging to parent company Bell Canada), Teleglobe is approaching the CDN opportunity differently. It is deploying an intelligent caching network that will use a hybrid access/content-centric business model. Teleglobe will sell CDN services to content owners, and will make its access ISP customers into “service delivery affiliates.” These access ISP affiliates will receive a share of the revenue for content served from within their networks, and each affiliate can resell Teleglobe’s CDN services to their customers as well.

According to Luis Fiallo, Teleglobe’s vice president of product development, Teleglobe is uniquely situated to offer CDN services. “A successful CDN network requires global reach, speed, content and infrastructure. Teleglobe’s network reaches over 100 countries, serving

over 180 ISP customers world wide, and accounting for about 15 percent of all Internet routes in the world. We own and operate the infrastructure that integrates Internet data centers and a global satellite network with the fifth largest IP network in the world.”

The Role of the Hosting Provider

The losers in the all the above scenarios are the hosting providers, such as Exodus and Digex. The fact is that hosting providers lose business to CDNs. Providing content from local servers can dramatically reduce the load on origin servers, translating into fewer and smaller hosting servers, lower bandwidth requirements and diminished need for mirrored sites.

The content providers can save money using more CDN and fewer hosting services, because content distribution has a cost structure advantage over hosting. By putting servers at or near the edge of the Internet, CDNs cut outgoing bandwidth from hosted servers. Bandwidth costs are higher for content served from within the network core and at network peering points than for content delivered near users.

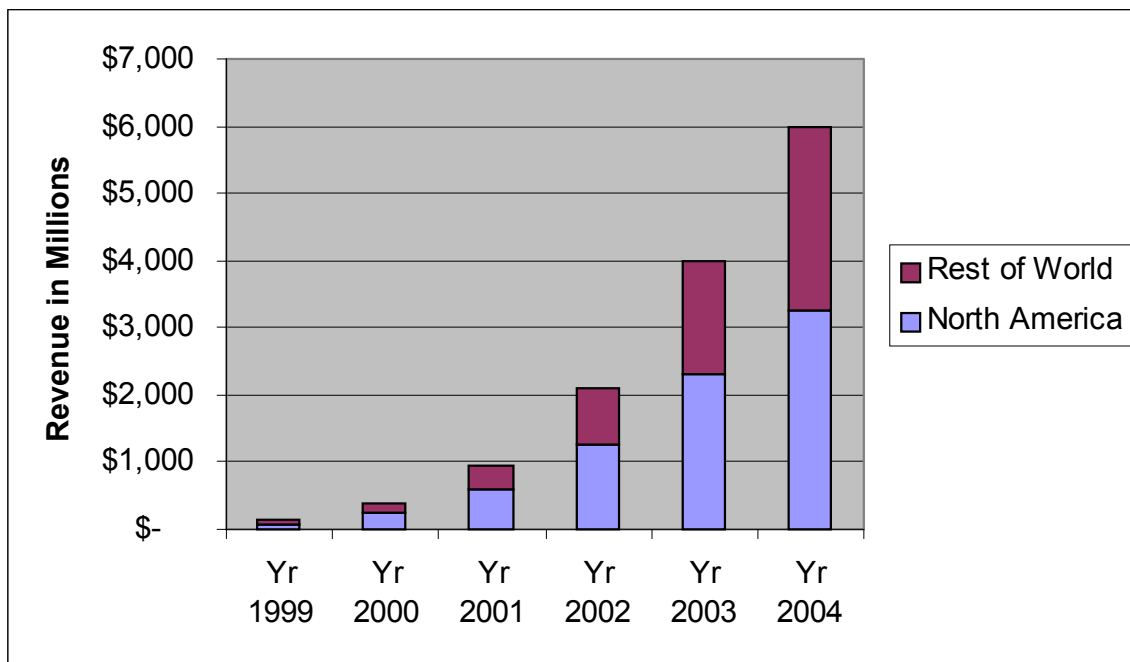
The hosting providers, acutely aware of this threat, aren't standing idly by just watching as their business languishes. Many are developing CDN strategies; Exodus acquired a stake in Mirror Image, Digital Island acquired Sandpiper and a number of hosting providers have reseller relationships with content-centric CDNs.

Some hosting providers, like Genuity and Exodus, have developed CDN services within their own network footprint. Because their reach is not as ubiquitous as the network-agnostic CDNs, however, these “on net” CDN services are at a competitive disadvantage. Along with Speedera, CDN service provider Adero, hopes to take advantage of this situation by offering private label CDN services to hosting providers.

Partnerships and Settlements

According to Jupiter Communications, the worldwide market for both products and services enabling content distribution will top \$6 billion by 2004 (see **Figure 3** --Worldwide Market for Content Distribution Services and Products). As hosting providers, backbone carriers and access ISPs look for ways to seize a piece of the CDN market pie, new business models are emerging which incorporate concepts of partnership and settlements. The Content Bridge alliance, owned and operated by Inktomi, is a newly-minted example of this trend. Its aim is to create an end-to-end contractual relationship for the sale and delivery of content delivery services.

FIGURE 3 Worldwide Market For Content Distribution Services and Products



The alliance allows hosting providers, backbone carriers and access ISPs to offer content distribution services beyond the limits of their own networks, gives them a share of revenue for services rendered within their own networks, and provides content providers with visibility and control over content served from edge caches. Content Bridge relies on hosting providers to sell the service, capitalizing on their existing relationships with content providers, and it relies on backbone carrier partners to deliver content to access ISP partners, who store the content in local caches.

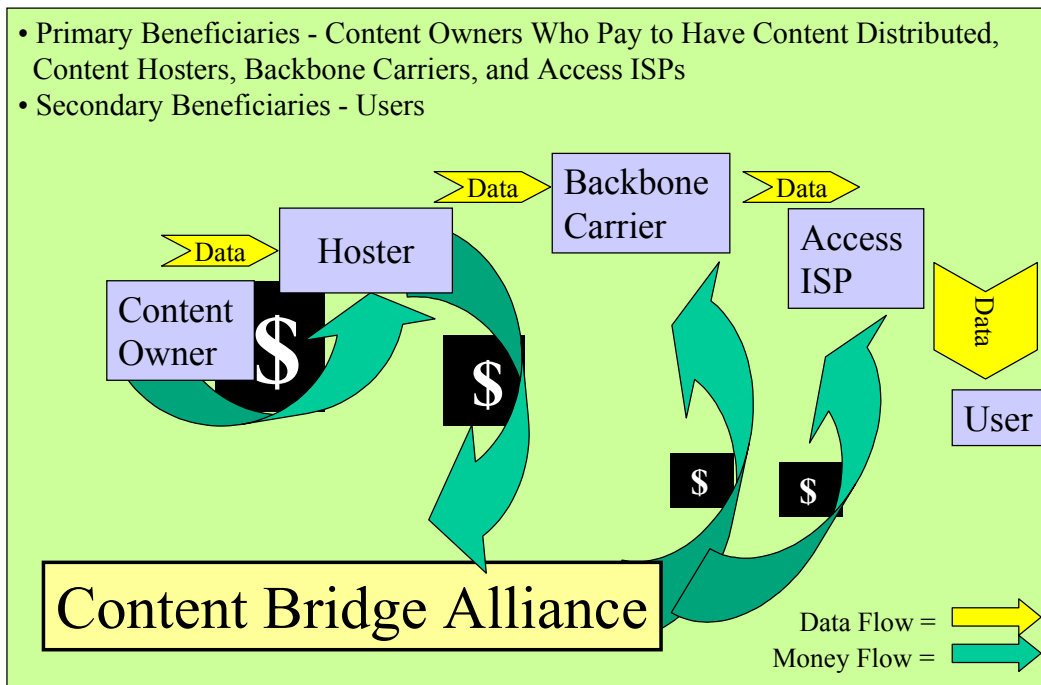
Content Bridge hopes to create a mutually beneficial alignment of business interests - with partners as both stakeholders and beneficiaries (see **Figure 4** -- Inktomi's Content Bridge Business Model). The fact that service will be delivered by Content Bridge partners over networks which they own, should allow better control over service quality and enable service-level guarantees that the network-agnostic CDNs will have trouble matching. In theory at least, access ISPs and carriers will be motivated to install more servers in partnership with the Content Bridge alliance than they would for content-centric CDNs, because they will be compensated for content served within their networks.

The jury is still out, however, about whether this model will gain a foothold. Its appeal is potentially hobbled by its close ties to Inktomi, which makes it appear dedicated to the proposition of selling Inktomi products. Content Bridge product manager Jordan Frank disagrees, however, and maintains, "...alliances require at least one strong member

to help set and drive the group agenda, and Inktomi is playing that role for the Content Bridge alliance. Currently Inktomi supports the alliance as both a technology supplier and as the operator for Content Bridge alliance services. By driving for open standards for cross-network content distribution we expect to be joined by other companies in both of these roles.”

Other, more informal affiliation and settlement mechanisms are also in the works through standards groups such as the Cisco-initiated Content Exchange, and the Nortel-initiated Broadband Content Delivery Forum.

FIGURE 4 Content Bridge Business Model



Pay-Per-View and Advertising Business Models

There’s much more talk than action about CDN business models in which users pay for content they consume. This shows special promise in the areas of payment for video streaming of movies to the home and high-quality distribution of multi-user games, but as yet, the business model for pay-per-view content distribution is in its larval form.

Says Gordon Smith, vice president of marketing at Speedera, “It’s a great model for adult content today. It has not yet caught on elsewhere on a large scale, but I would predict that it will - especially for sports and entertainment, and to a lesser degree for distance learning.

“However, widespread adoption will require lots of cable modem deployment - especially with the sports and entertainment category - and the 3 million or so U.S. households who have it now aren’t a big enough market for that to be interesting yet,” he continued. “We’re still at least a

couple of years away from pay-per-view being really big business, since you not only need lots of potential broadband customers but also cheap bandwidth. The user's cost of downloading a pay-per-view feature length movie has to be less than \$2, for DVD quality content. I'd say that translates to bandwidth costs needing to fall by 75 percent or so from where they are today."

Some believe that distribution of some content will be subsidized by advertising in a model similar to broadcast television. Ads will be targeted and inserted based on the interests and geography of the content consumer. As Edgix's Abhi Chaki explained, "Advertisers online will be willing to pay a premium for targeted placement of content and for feedback on when and how that content was consumed. I definitely see advertisers subsidizing global content delivery efforts for networks that can give them global reach combined with localized targeting."

Speedera's Smith agrees. "Advertising is one of many ways of paying for content and - indirectly - for content distribution. Evidence to date suggests that it's not the Holy Grail many had hoped for. It will be a secondary source of revenue."

What the Future Might Hold

The future of CDN services is the subject of keen speculation and investor interest. Each of the current business models has adherents and detractors, and new business models continue to bubble up. In addition to an impressive stable of startups pursuing innovative product ideas, stalwarts Nortel and Cisco are touting integrated product lines devoted exclusively to content distribution. In addition, storage giant EMC has partnered with caching vendor CacheFlow to provide "end-to-end solutions for storage, management and delivery of content from the data center to the network edge." The result is a continuous flow of new service offerings that shows no sign of flagging.

Industry analyst Peter Christy from Jupiter Communications is a strong believer in the content-centric model, and he predicts that Akamai will be the big winner in the long run because it "provides a fundamentally faster and less expensive way to deliver content. The performance of the Internet is somewhere between unacceptable and sucky, and Akamai has performance information from Keynote Systems that shows they accelerate median average content downloads by a factor of 8, and by a factor of 13 during peak usage times. There's no other way to deliver those kinds of results so cheaply." As for other business models, Christy predicts that the access-centric business model will be a niche play for disadvantaged ISPs, and that the Content Bridge alliance model will fail to thrive because it is unwieldy.

By contrast, Edgix's Abhi Chaki sees the content and access-centric models as being complementary, and he predicts that both will thrive. "Together, the [access-centric] and [content-centric] businesses offer an end-to-end solution for the entire Internet value chain - from the content provider to the end user. In fact, recent attempts to address end-to-end

content delivery issues that have been championed by coalitions put together by industry leaders like Cisco, Nortel and Inktomi are indicative of the fact that the [content-centric] business model cannot solve all the problems associated with global content delivery.”

Unlike Christy, Inktomi’s Frank sees a bright future for the Content Bridge alliance. “We believe that network cooperation is required as base content distribution services become commoditized. The Content Bridge alliance has presented the first model for this type of cooperation, and based on the support and phenomenal cooperation of the Content Bridge partners, who are otherwise competitors, we feel that Content Bridge is well on its way to defining the next generation of content distribution services.”

With diverse business models and technological innovation the order of the day, one thing is certain. The content distribution services market is one of the most interesting games in town, and will remain so for some time.

Rebecca Wetzel is an Internet industry analyst, consultant and writer. At ground zero during the Internet’s most formative years, she headed marketing for one of the first commercial ISPs, BBN Planet, and went on to become VP of marketing for caching vendor InfoLibria. She can be reached at rwetzel@rwetzel.com.