



Pairing Advanced CDN Services with Dynamic Computing Environments



Just five years ago applications tended to have very predictable usage patterns. Applications for business users could generally expect a usage bell curve from about 8:00am to 6:00pm each day in the work week. To meet the needs of these users, infrastructure was scaled to meet the demand at the top of the curve with a small safety buffer factored in for additional headroom. Weekend underutilization and holiday patterns created some inefficiency, but the traffic patterns were predictable enough to make building capacity to accommodate peaks feasible.

Over the last few years, new applications and network delivery capabilities have caused these patterns to change dramatically. Today we might see a social networking or news site start with a very small amount of user traffic and then, because of some dynamic event, traffic spiking several orders of magnitude over normal usage. The inauguration of President Obama on January 20, 2009 caused multi-terabit per second spikes across 10 of the largest US ISPs—CNN reported delivering more than 21.3 million video streams over a nine-hour span, 1.3 million live streams simultaneously. (Please refer to “The Great Obama Traffic Flood” graph on the next page.)

Planning for these types of usage patterns using traditional infrastructure is nearly impossible, both from a technical and financial standpoint. The result would be an enormous investment in infrastructure in order to have sufficient capacity to cover a massive spike and acres of unused capacity sitting around waiting for the spike.

New traffic patterns, new forms of content and new applications are key drivers of the cloud computing movement. Content owners need to rent resources that can be dynamically allocated to meet capacity demands while paying for these same resources on a consumption-based usage model. Amazon.com, the poster child for this kind of usage, created the cloud

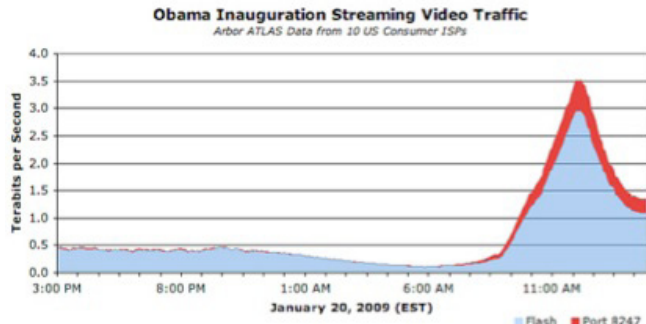
computing movement as we know it today. In Amazon’s case, infrastructure was optimized to handle the surge in retail traffic from Black Friday through the New Year. The under-utilized resources—largely idle for the rest of the year—represented a huge opportunity cost, which led to the development of Amazon Web Services.

At the same time that applications and the underlying physical infrastructure are evolving, the transport networks are changing to make reliable delivery of high bandwidth applications and large files possible. Content delivery networks (CDNs) are key players in the migration of huge applications and files to dynamic environments. Checking for election results or the score for a football game creates small bursts of traffic over several hours. The Obama inauguration was an event that everyone wanted to watch on video and that produced rich streams of data traveling from media companies’ data centers out to people at work and in their homes. Traditional network models would have been completely paralyzed by the huge surge in traffic where as the distributed edge caching and streaming of content by a CDN takes the load off central servers and reduces latency for end users. The 30% annual growth in the CDN market reflects the increasing importance of improving the performance and reliability of content and application delivery across the Internet.

Changing Global IT Imperatives



The Great Obama Traffic Flood



Source: Arbor Networks. Posted on Tuesday, January 20th, 2009
The Great Obama Traffic Flood by Craig Labovitz

When we take a closer look at emerging global IT demands, we see three key elements:

1. Servers

We must be able to dynamically allocate more compute power to a particular workload to ensure SLAs are met and the customer experience is within tolerances.

2. Storage

With large volumes of users comes the need for a dynamic storage solution capable of meeting the scale/performance requirements of any application while providing fine grain scaling down to the gigabyte per month level.

3. Network

High quality distributed delivery of the application data is needed to support the sheer volume of content while distributed services, such as streaming optimized to the geographic location of the users, are essential to improving website performance.

When we combine all three in an integrated solution, not only do the consumers of the content/applications receive the best possible experience, but the owners of the applications are also able to create business value by leveraging the most cost-effective solutions and optimizing performance and experience for each end user.

In this white paper, we explore the benefits of marrying best-in-class hosting and dynamic cloud computing solutions with top tier content delivery network services. The result is a dynamic infrastructure capable of storing and transporting massive amounts of data at exceptional performance levels.

Things you will learn:

- How a cloud infrastructure can help you overcome challenges faced by your business
- The advantages you can gain by delivering content directly from the cloud over a top tier CDN
- What you can accomplish with third-generation CDN technologies

Carpathia Hosting's Cloud Storage and Computing Capabilities

What is Cloud Computing?

Cloud computing is the use of on-demand, dynamic computing platforms to provide compute and storage resources as a service over the Internet. Services are typically offered on a usage, or utility, basis with a pay-as-you go pricing model.

The Web hosting market is evolving rapidly and creating new opportunities for cost savings, scalable infrastructure and flexibility for enterprise business and government. Virtualization technologies — the use of software to simulate hardware—have enabled the development of on-demand infrastructure. This allows companies to move away from purchasing physical infrastructure to meet peak capacity requirements towards buying what they need when it's needed.

The rapid proliferation of cloud services has created a dizzying array of choices with service providers offering everything from basic virtualization to public computing and storage services. All cloud offerings have a basic set of characteristics in common:

Metered By Use

Services are tracked with usage metrics to enable multiple payment models.

Shared

Services share a generalized pool of resources to build economies of scale.

Scalable & Elastic

Services scale on-demand to add or remove resources as needed.

Service Based

Consumer concerns are abstracted from provider concerns through service interfaces.

Internet Technologies

Services are delivered through use of Internet identifiers, formats, and protocols.

While virtualization and cloud computing promise to simplify computing environments, customers may experience the exact opposite. How will security patches, server monitoring, as well as virus and malware threats be managed? What about technical support at 2:00 am?

To unlock the true potential of cloud computing, customers should look for the same level of service traditionally associated with managed hosting services. Carpathia's cloud offering achieves this through a unique combination of dedicated and on-demand services — a fully managed solution backed by the E3 Promise.

Carpathia InstantOn™

Carpathia Hosting's InstantOn cloud computing platform is designed specifically to meet the needs of Enterprise and Federal customers. InstantOn blends the technology of cloud computing with the services customers require to implement and fully exploit the benefits of dynamic computing.

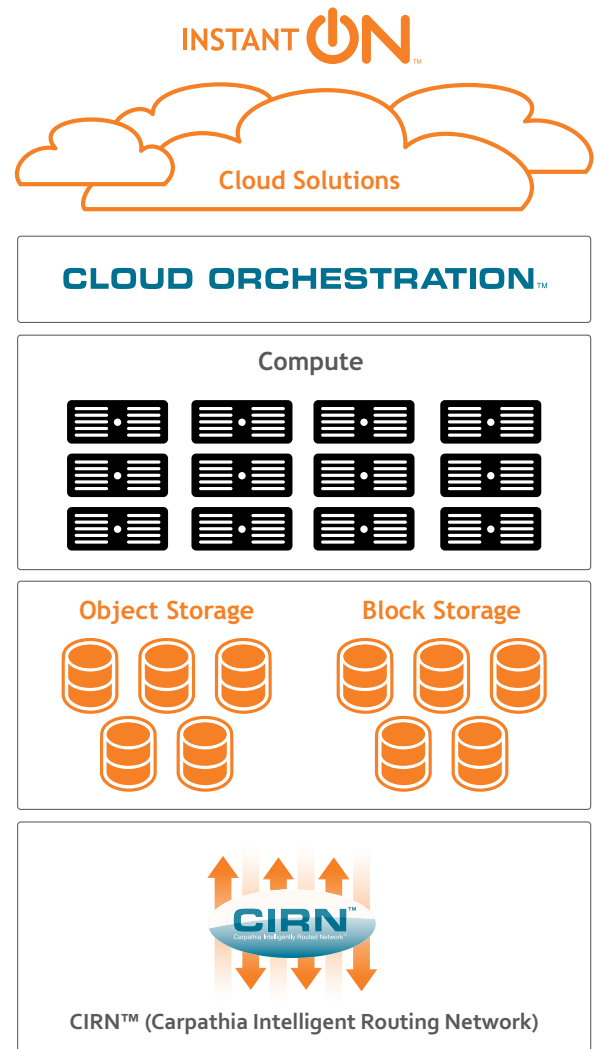
There are two unique characteristics of Carpathia InstantOn:

1. Seamless blending of dedicated infrastructure with cloud resources.

This capability allows customers to select the best blend without being forced to compromise. For example, a database with high I/O requirements may be run on a dedicated server cluster, while the Web and application tiers can be scaled into the cloud.

2. Cloud services are delivered.

Customers experience the same level of discipline associated with our managed services in the delivery of our cloud offering, including 24x7 support, administration services and ITIL-based operations processes.



Paired with these unique delivery abilities is the industry-leading technology implemented within Carpathia Hosting's cloud solution:

1. Compute.

Customers can select basic, small, medium, large and custom compute units. These allow cost-effective matching between virtual servers and workloads. Units can be purchased in increments up to 8 cores and 32Gb of memory per virtual instance. This can deliver significant cost savings for commercial applications with software licenses based on the number of cores or amount of allocated memory.

2. Object-based storage.

Delivered as an average gigabyte per month consumption model, Carpathia Hosting has integrated ParaScale object-based storage into the cloud platform. ParaScale provides native file system support to cloud storage, which makes using our cloud as easy as copying a file to a directory—no API's or recoding required. Each copy of the data is replicated multiple times inside the cloud to ensure availability.

3. Block-based storage.

Local file storage for virtual machines and a number of custom appliances, such as virtual NAS, are delivered via block-based storage. All of the cloud compute local disks are pooled together prior to allocation. Each local server uses striping to provide high speed I/O—greater than 140% the speed of any single disk. A synchronous mirror of the data is then taken and replicated to another compute node. This provides all virtual machines with N+1 storage. Storage is also persistent after the virtual machine is stopped, allowing customers to hibernate virtual machines and simply pay for storage on a usage basis.

4. Cloud Orchestration™

This capability—unique to Carpathia Hosting—allows the cloud to monitor the performance of dedicated or cloud resources and autonomously add or remove resources based on any number of criteria. For example, should the web application tier become overloaded, Orchestration is able to add more web tier resources, while dynamically reconfiguring the load balancer to cover the required capacity. Once the capacity need passes, Orchestration can de-provision the resources, freeing them up for other users. This workflow capability paired with a large number of custom appliances (IDS, firewalls, load balancers, etc) is the engine that drives the Carpathia cloud dynamic infrastructure capabilities.

Carpathia InstantOn with Highwinds CDN

Carpathia Hosting currently provides hosting and managed services to some of the largest content providers on the Internet. Adding Highwinds' CDN services to its already comprehensive managed service portfolio allows Carpathia to provide additional solutions aimed at the global distribution of content— including streaming live or on-demand video, as well as distribution of large files. For customers using Carpathia's InstantOn storage cloud, Highwinds' CDN services enable efficient delivery of cloud content directly over the CDN to end users, guaranteeing quality and availability from end-to-end. Direct origin pulling of files from the object storage avoids the need for origin servers and provides native hotspot distribution and auto-scaling of storage resources.

Carpathia has fully integrated Highwinds' CDN into their managed, compliant and cloud services portfolios, giving customers the ability to pair advanced content delivery with dynamic computing environments. Federal and enterprise customers can now take advantage of the CDN for secure delivery of content, meeting the needs of our user communities for high quality, cost effective delivery models.

Customers may deliver any file stored in the object storage system via CDN simply by copying the file into their "public" directory and referencing it via a CDN URL.

Customers may also deliver static and streaming content from cloud compute servers. By leveraging Carathia's Cloud Orchestration, the number of compute servers will dynamically increase to ensure all dynamic content is effectively distributed to the CDN to meet end user requests.

Benefits of Carpathia InstantOn computing

- Cost savings
- Capacity flexibility
- Rapid provisioning
- Simplified configuration and management

Why Carpathia Hosting is offering CDN services

As the Internet continues to experience significant growth in live and on-demand video and large file distribution, the topology of the Internet is changing. According to a recent Arbor Networks research study, traffic on the Internet is no longer originating from tens of thousands of servers connected through large ISPs, carriers, and exchange points. It is now driven largely by the direct exchange of huge volumes of content between a small number of content owners. What this means in real numbers is that in 2007, most of the traffic on the Internet was accounted for by 30,000 entities around the world, with 50% of the traffic created by about 10,000 companies. Today, over half of the traffic on the Internet is generated by a mere 150 companies. This staggering change in a short 24 months indicates the power of content in the new Internet economy and the new imperative to deliver high-quality content, quickly and reliably, to end users.

The rapidly growing CDN market further evidences the changing face of the global Internet. CDN traffic is growing at a 30% year-over-year basis, with the market growing from \$280M in 2007 to \$1.25B by 2012 according to Frost & Sullivan market forecasts.

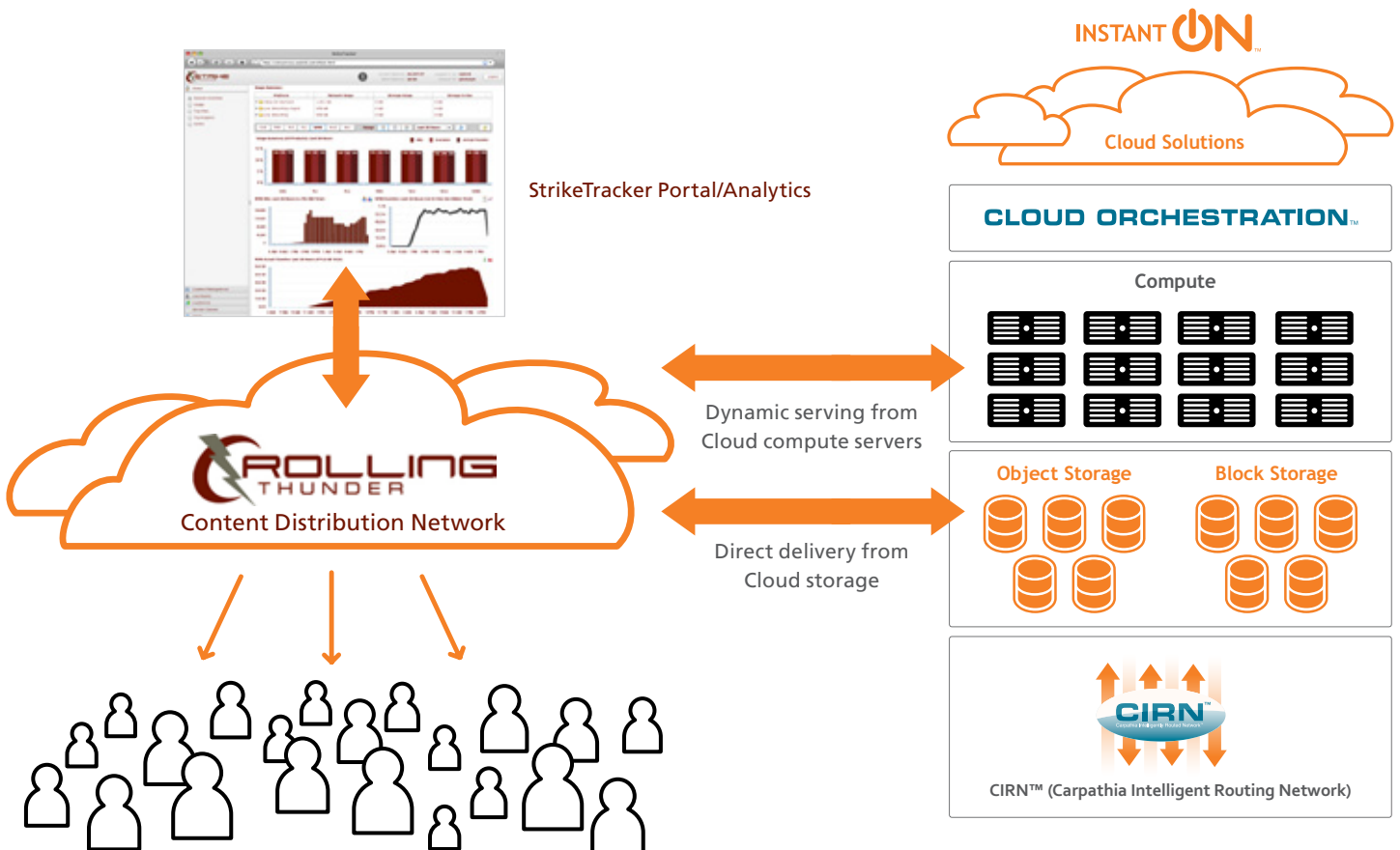
CDN delivery can augment e-commerce website performance and provide resiliency and continuous availability. As more consumers look to online service options for searching for and

acquiring content, an efficient and seamless experience will mean the difference between success and failure for many businesses. CDNs assist in improving end-user performance, for example, by storing and streaming cached assets. They can also help reduce bandwidth costs for high volume and content-heavy sites by reducing delivery over long distances from centralized servers. Not only can a CDN reduce direct costs, but site performance improvements can help drive increased page views, longer site visits, higher conversion rate and higher "shopping cart" value.

The global, next-generation infrastructure of the Highwinds CDN, which was built to ensure the rapid and reliable delivery of all types of media and downloadable content, makes Highwinds an ideal CDN partner to support Carpathia Hosting's wide customer base.

What makes Highwinds a top tier CDN provider?

- Global delivery
- Massive capacity and ability to scale for traffic spikes
- Reliability and quality of live and on-demand streaming and progressive downloads
- Real-time operations, reporting, and analytics
- Advanced content protection and monetization products



Advantages of the Highwinds CDN

Global Delivery

Highwinds maintains and operates a global Tier 1 network called RollingThunder®. Highwinds' network is under continuous expansion and currently includes datacenters in North and South America, and Europe. Each datacenter holds hundreds of delivery servers and is interconnected with fully-ringed and redundant multiple 10Gbps backbones. Highwinds reach is further expanded by over 1,430 peering connections to Internet provider networks that create privatized delivery to the last mile. The network design is fully fault-tolerant with several diverse paths. Through multiple points of presence and multiple rings, the infrastructure provides for redundancy in moving content at lightning-fast speeds from point to point. On Highwinds, every end-user receives the performance they expect and customers have access to all the delivery resources they need.

Scale for traffic spikes

Highwinds CDN was designed from the ground up with an architecture built for scale. Customers are never hard wired to resources and the entire CDN is able to respond immediately to traffic spikes. Highwinds' custom software and massive network infrastructure enable traffic to ramp from 0 to 100Gbps + in a smooth and fully automated way.

Highwinds owns and maintains several custom in-house software products used in the CDN delivery platform. Pull back the covers on Highwinds CDN, and every product used is internally designed to address the specific challenges of CDN delivery trends seen today. The result is a truly unique and revolutionary approach to content distribution that provides customers with high quality third generation delivery services.

Reliability and Quality

Highwinds maintains A+ delivery across all regions at all times. The 24/7/365 Network Operations Center continuously monitors for quality and immediately handles any scenarios that do arise. Highwinds confirms SLA through the ubiquitous 3rd party performance monitoring tools provided by KeyNote and Gomez.

HIGHWINDS CDN THIRD GENERATION TECHNOLOGY

RollingThunder DFS

RollingThunder DFS, the Highwinds distributed file system, is software that powers the high-speed RollingThunder network by managing the storage and distribution of millions of files on multiple POPs. RollingThunder DFS provides rapid provisioning to the edge – the ability to instantaneously replicate files at different CDN nodes, ensuring high-speed replication with proven scalability. It also automatically monitors the popularity of content to anticipate and accommodate increases in demand for any particular piece of content. As requests per second increase, more servers are automatically made available to handle the increased demand.

RollingThunder Doppler Server



RollingThunder Doppler Server helps guarantee the best user experience by delivering all types of content through the fastest, most efficient and cost-effective means. Armed with a whole-network view, it optimizes content routing by finding the best transfer location for an end user route, taking geographic location, network traffic and QoS controls into consideration. A request typically goes to the server geographically closest to the end user device making the request. But when traffic congestion on a portion of the network threatens to slow delivery, the request is automatically rerouted to the server that can deliver the content fastest. RollingThunder Doppler Server makes routing decisions in real time, constantly evaluating different routes and choosing the fastest one.



Reporting and Analytics



Highwinds offers an award-winning reporting solution that leverages years of expertise to provide customers with immediate feedback about their traffic and trends. All data points are available in real-time through the StrikeTracker® portal (30 seconds or less) or through raw access logs (15 minutes or less).

Content Protection and Monetization

Monetization strategies require content owners to protect their assets from viral distribution. Highwinds gives content providers the ability to create delivery business rules enforced by the CDN. With Highwinds Content Protection products, end users must view the media through the workflow designated by the publisher.

Content Protection policies for many of the Highwinds products are configured inside the StrikeTracker console. This means you can independently manage the configurations that build restrictions on which end-user requests are honored by the CDN.

HIGHWINDS REPORTING AND ANALYTICS

Multiple online reports are available via the StrikeTracker® console, such as:

- Account Overview
- Usage
- Top Files
- Top Regions
- Top Referrals
- 3-D Global Usage

Each of these reports draws from aggregate, per-file, and per-geo data streams, and provides multiple key metrics, including the following:

- Hits
- Total Transfer
- Transfer Rate
- Completion Ratio (Abandonment)
- Delivery Duration

Highwinds offers several products designed to help customers secure and monetize their content:

URL Signing

Content owners use URL Signing to publish content with a query string parameter token that includes a URL expiration time-stamp. This private token is created on-the-fly in a server-side implementation, and can be used to create unique publishing URLs for each end user request.

GEO Blocking

Allows publishers to restrict content to end users in specified locations. The IP address of incoming requests is checked against a current list of "Include" and "Exclude" IP allocations.

HTTP Referrer Restriction

Prevents CDN-publishing URLs from being freely distributed on unauthorized websites (also known as hot linking or deep linking). Content owners configure one or more approved websites that end users can visit and successfully request content hosted by the CDN.



RTMPe

Fast, real-time encryption supported by the Flash Media Server that secures data transfer between the server and the client. This feature prevents third-party applications from listening to or “ripping” the stream.

SWF Verification

An Adobe Flash Media Server feature that compares the SWF playing in the client with one or more SWFs approved by the content publisher. Highwinds FMS servers inspect both the Flash player size and the Flash player hash, or the last 32 bytes of the first handshake packet.

Live Streaming IP Lock & Login

IP Lock allows only a specified IP address to provide the source stream to a Highwinds push publishing point. This product is supported for both Windows Live Push and Flash Live Push where Push is the method of getting Highwinds a seed or source feed for the live video stream. Login requires an authentication step for an encoder that wants to push a seed stream to a Highwinds Live Flash publishing point.

HTTP Authentication

End-users are prompted to enter login credentials that are approved by the customer’s Web server before the media is delivered

Selection of a content delivery provider is one of the most critical execution tasks for Internet properties. Highwinds aims to make the CDN provider decision a simple one and completes the offering with a commitment to smooth deployment and integration. Highwinds has taken steps with Carpathia Hosting to ensure that customers looking to add CDN services to their existing Carpathia solutions can do so quickly and easily with no disruption to their online streaming and download services. By providing high-performance delivery and customer focused service, Highwinds continues to be regarded as the CDN of choice.



Carpathia Hosting is a leading provider of managed hosting services, delivering secure, reliable and compliant IT infrastructure and management for some of the world’s most demanding enterprises and federal agencies. Founded in 2003, Carpathia Hosting is a growing, profitable business run by a seasoned management team with deep experience in delivering enterprise hosting solutions including colocation, managed services and cloud computing. Carpathia’s suite of services is designed for organizations seeking scalable, secure, robust and enterprise-grade hosting solutions that can be quickly provisioned or tailored to meet unique requirements. Backed by its E3 Promise, Carpathia Hosting consistently delivers an experience that exceeds customers’ expectations. Contact Carpathia Hosting at 1.888.200.9494, or visit www.carpathiahosting.com for more information.

43480 Yukon Drive, Suite 200 Ashburn, Virginia 20147
Voice: 1.703.840.3900 Toll Free: 1.888.200.9494 Fax: 1.703.997.5577

Conclusion

Content owners and distributors currently using Carpathia Hosting’s managed hosting and cloud computing platform can benefit immediately by delivering their content from the source to the cloud using Highwinds CDN, and then again using the Highwinds CDN for rapid deployment to their global customers. Agencies and enterprises currently not using cloud computing should consider the benefits of fast, reliable high-performance delivery of their content over the global Internet. Now more than ever, those benefits are extended by the marriage of best-in-class hosting and cloud computing solutions with a top tier content delivery network. Together, Carpathia Hosting and Highwinds Network Group improve total site performance – the cloud for dynamic site acceleration and Highwinds to boost static content and video.

If you’d like to learn more about Carpathia Hosting’s hosting and managed cloud services or Highwinds’ global content delivery network services, send an email to sales@carpathiahost.com or info@highwinds.com.



Highwinds is a leader in multiplatform IP services, file replication and content delivery software and services. Since 2002, Highwinds has provided for the advancement of a variety of technologies – including messaging bus architecture, network management, distributed file systems and content routing methods. The Highwinds CDN leverages the company’s high-performance RollingThunder network and user-friendly StrikeTracker media manager and reporting dashboard to globally deliver content, videos, live events and other media. It sets the pace among content delivery networks by offering advantages in data center peering, real-time analytics, instant account provisioning, complete content control and massive scalability. Highwinds is headquartered in Winter Park, Fla., and maintains data centers throughout North America, South America and Europe. For more information, visit www.highwinds.com

807 W. Morse Blvd., Suite 101, Winter Park, FL 32789
Voice: 1.407.215.2400 Toll Free: 1.866.872.0357 Fax: 1.407.647.0392