TechnologyInformationBrief

XHO One-way Hub-Optimizations

XiPix™, GZIP Compression, One-Way Acceleration, QoS

Introduction

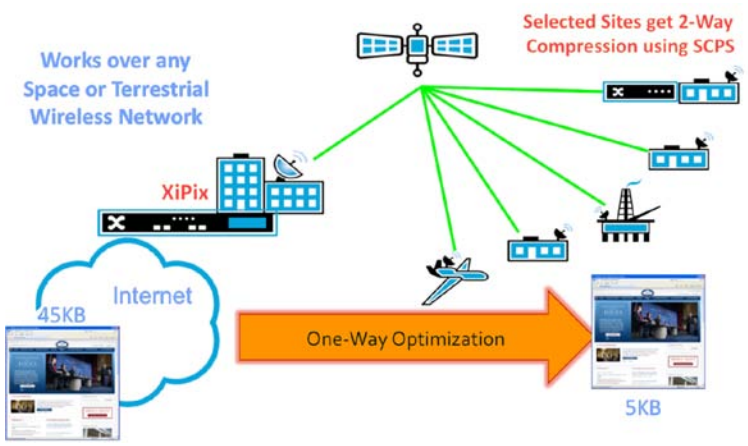
XipOS Hub Optimizations ("XHO") feature bandwidth savings and performance enhancements that operate on a standalone appliance located at the hub-side or Internet point of presence in a wireless network. These features operate on unencrypted web traffic and are implemented in the XA-30K and XA-10K appliances that are installed in-line in the path from the Internet to the wireless network and the remote sites.

The primary features of the XipOS Hub Optimizations include:

- XiPix™ – JPEG image transcoding – Lossy Compression
- GZIP – Compression of HTTP data – Lossless Compression
- TCP Acceleration – One way TCP acceleration
- QoS – Shaping and bandwidth control of traffic

XHO features transparently intercept web pages and optimize the contents to conserve bandwidth. XHO options can typically deliver a 1.5 compression ratio or 33% bandwidth savings with no discernable changes to the majority of web content.

The XHO feature set provides Hub side bandwidth optimization for service providers, saving bandwidth and increasing performance. The solution when implemented in any network will help increase revenues or significantly decrease operational costs. By using less bandwidth and when used in conjunction with XipOS "push" TCP acceleration capabilities, web pages are also delivered considerably faster to the user, thus enabling an service provider to offer differentiated services.



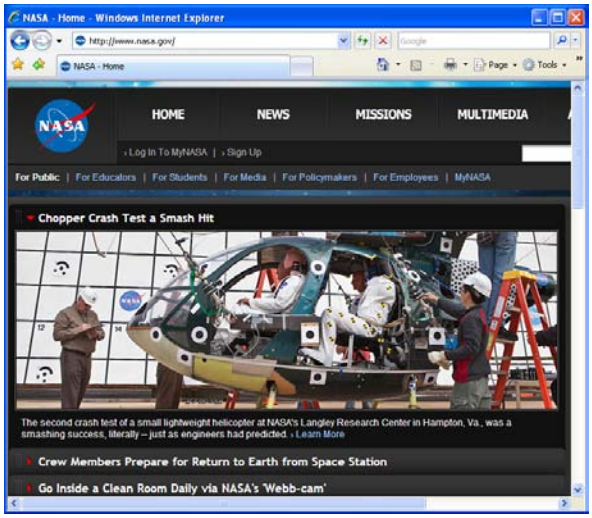
The XHO solution is simple and easy to deploy as it resides on the Hub side only with many deployment options available. No client software or configuration changes are required. The highly scalable Hub appliances can be used to provide Two-Way Optimization where required, by deploying a smaller XA appliance at selected remote sites.

XiPix™ – JPEG Image Compression

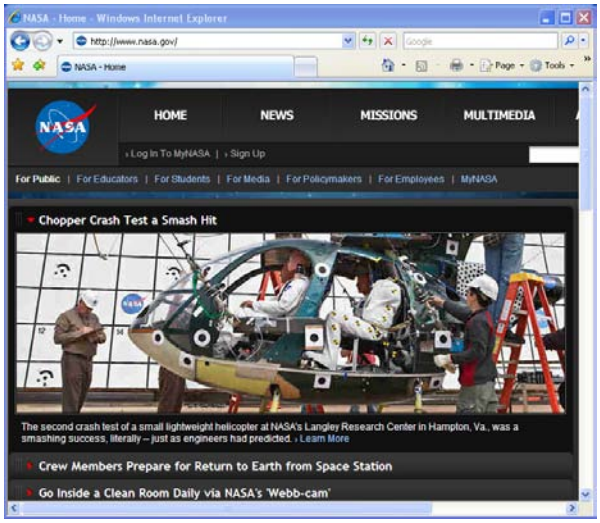
XiPix transparently transcodes images from the quality at which they are received from a web site to a lower quality JPEG image resulting in a much smaller file for downstream transmission. The bandwidth savings are dramatic with only a minor impact on the user experience. The dimensions and pixel counts of XiPix processed images remain unchanged so there is never an impact on the web page display itself. Instead, XiPix algorithms exploit the fact that Internet content producers frequently set an unnecessarily high quality setting for JPEG images when saved for use on web sites.

Each network operator can select the image quality metric they are most comfortable with, trading off the bandwidth savings this feature can deliver to customer perception of the image. In our experience, it is quite difficult to detect changes in images that were saved with the default JPEG quality setting and the lower quality XiPix processed image. Thus, the settings become a policy and preference decision by the service provider. The full resolution version of the images can be accessed by users by doing a forced reload on the page (Control-Shift-R on most web browsers).

Original JPEG as received = 213 KB



XiPix processed to Quality 20 = 21.5 KB



HTTP Compression – Gzip Compression Gateway

GZIP one-way compression automatically compresses non-image web site content using HTTP compression standards, which can be automatically and transparently de-compressed by all modern web browsers. This XHO feature will compress this data for transmission over the wireless network, where each browser can uncompress that data transparently to the user. The combination of XiPix and GZIP HTTP compression results in dramatic bandwidth savings.

Web Site	Download Ratio	Upload Ratio
Whitehouse.gov	3.01	1.59
Tennis.com	3.12	1.62
Fifa.com	1.27	1.13
Bbc.co.uk	1.55	1.37

One-Way SCPS TCP Acceleration

Used at the hub of a network, a XipLink device can provide single-sided benefit for the acceleration of all TCP/IP traffic. It will mainly benefit the 'push' or outbound flow of TCP/IP data, but there is a small gain to be had from the return channel as well.

Firstly, XipOS technology can push the TCP traffic using algorithms more appropriate for wireless communications, offering rate controlled, adaptive rate controlled and per-connection adaptive algorithms to maximize the bandwidth utilization of download on any network technology. Secondly, because the TCP control loop from the end hosts to the servers is broken into two, the wireless network can be optimized independent of the noise on the Internet and thus uploads will enjoy a limited improvement as well.

QoS – Bandwidth Control and Shaping

The XipLink devices have an advanced QoS functionality built-in, which works along with other optimization functions. This provides operators with the ability to prioritize and shape traffic using a Hierarchical Class Based Queuing technology. In addition, the operator can configure committed, maximum and relative priorities. In combination with TCP acceleration, the network pipe can be filled to its maximum and shaped to match network goals or SLAs.

Scalable – Two-way optimization and full SCPS Interoperability

The Hub appliances can be used to provide two-way optimization to the premium sites, by deploying a XipLink optimization solution at the remote site. The remote site will gain the full benefit of SCPS based protocol acceleration and stream data compression in both the upstream and downstream directions. This is useful for sites that may be moving content upstream or sites that require the absolute maximum capacity from a wireless link. The XipOS Active Resource Manager will ensure that data is compressed using the best algorithm

available over each connection bi-directionally. Internet access links deploying bracketed XipLink installs with full optimization can exceed a 2:1 compression ratio.

Conclusion

The XipLink XHO feature set provides a quick and straight-forward hub only deployment for service providers with about 30-40% overall Internet traffic bandwidth savings. A typical ROI for this solution is about 4 Months. A service provider can extend optimization benefits with XipLink Two-way optimization where the bandwidth gain can be as high as 400%. This not only improves User satisfaction with high performance and highly responsive network, but is also scalable to support multiple networks (point to point, multipoint, shared, SCPC, TDMA, meshed, etc.) from one appliance.