Performance Enhancing Proxy (PEP)

Overview

Performance Enhancing Proxy (PEP for short) is one of the ways to address performance issues when transmitting TCP over a satellite link. This technique splits TCP connection in 2 (in case of asymmetric PEP configuration) or 3 (in case of symmetric) separate connections. Standard TCP protocol is used when talking to the endpoints (client and server computers) while an advanced protocol can be used to communicate between PEPs over the satellite link.

The "inter-PEP" protocol is tuned and optimized for the satellite link. The most obvious parameters to be tuned are TCP window size and congestion algorithm, but not the only.

While in some cases even single PEP working on one ("sending", or "server") side of the Satellite link can make a big difference in performance, for the best performance PEP should be placed on both ends of the satellite link.

In case of symmetric PEP configuration there is a vast choice of other optimization techniques to use, like advanced compression, content filtering, content caching, prefetching and so on. Even symmetric PEP allows some limited choice of application protocol optimizations, for instance: HTTP compression, HTTP caching, image quality reduction.

A strong feature of PEP is that it doesn't modify the application protocol, thus it's totally transparent to the applications.

The main advantage of Advantech Wireless PEP over other implementations is that it's aware of the network topology. The main goal of any PEP is to improve TCP performance and try to reach maximum performance per single TCP connection. But in real life every single IDU has its own limitation which may be caused by hardware or by specific infrastructure configuration (for example, user pays only for the small channel). In this case, Advantech PEP doesn't try to exceed maximum bandwidth per IDU and instead distributes the resources where it may be used.

Features

Advantech Wireless' PEP implements many transport layer and application-level optimizations:

- Fast connection establishment. While usual TCP uses 3-way handshake to establish connection and therefore theoretically minimal time for small web page retrieval is 2RTT, Advantech PEP can do it 2 times faster.
- Web caching on the client side. According to the preliminary test results, the satellite web traffic can be reduced up to 40% for typical middle size company
- DNS caching on the client side can reduce number of DNS requests made over the satellite link.
- Stream compression. Compression rate can vastly differ depending on the content type. One can expect about 40-50% compression achieved on the average text or HTML document. Since Advantech Wireless' PEP uses advanced protocol specific compression, in some cases much higher compression rate can be achieved.
- Web compression. In case the web server isn't configured to compress web pages it sends, server-side PEP can compress it to save the traffic over the link. The advantage of the web compression over generic stream compression is that the decompression is done on the client machine by the browser, thus freeing the client side PEP resources for other tasks.
- Incremental content compression. Advantech Wireless' PEP uses an advanced compression technique allowing it to send only small portion of partially changed content over the network.
- Image quality reduction- Some images can be significantly reduced in size without noticeable degradation in image quality.
- Web image filtration- User may configure some sites to be filtered out on the server side, for example, so that only the small images from this site (buttons, icons and so on) will be sent over, while big images will be retrieved only when user explicitly says so. It can radically improve user's experience.

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