

WXOS Transparent SCPS-TP Support for TCP Acceleration

Overview

The Space Communications Protocol Standards (SCPS) are an ISO, NASA and U.S. Military set of standards, based on the TCP/IP family of protocols, which provide for reliable and secure end-to-end file transfer. They also provide flexibility for routing and addressing. There are four SCPS protocols:

- SCPS-FP - A file transfer protocol based on FTP
- SCPS-TP - A transport protocol based on TCP and UDP
- SCPS-NP - A network protocol based on IP
- SCPS-SP - A security protocol based on ISO NLSP

Of these protocols, one is specifically interesting for TCP acceleration, SCPS-TP. SCPS-TP is TCP and UDP plus some extensions to improve operation across a high delay network, such as found in satellite communications networks. In specific, SCSP-TP addresses problems which are inherent in networks with a high Bandwidth-Delay product, where the bottleneck to throughput is delay (latency), not bandwidth.



WXOS Transparent SCPS-TP Support

With the Juniper WX operating system (WXOS) 5.0 software, the WX and WXC application acceleration platforms act as a Transparent SCPS-TP accelerator. This is achieved by enabling the Active Flow Pipelining and Forward Error Correction capabilities in the WXOS.

The need for transparent support arises from the way WX and WXC platforms are deployed in the network. The WX and WXC platforms provide advanced WAN optimization functions which require them to exist at both ends of an optimized WAN circuit. An IP tunnel is formed between the WX/WXC platforms to enable both a control channel and a compression channel between them. This tunnel uses algorithms which only another WX/WXC platform can understand. Therefore, the SCPS-TP function must take place transparently.

The acceleration service provided by SCPS-TP is used to accelerate TCP across WX/WXC-created tunnels. In the WX or WXC platform, traffic is encapsulated in the tunnel before being transported across the WAN. The SCPS-TP function must take place after the encapsulation is performed on the sending side and before decapsulation is performed on the receiving side. Because of this, the SCPS-TP function in the WX/WXC platform is transparent to any other device in the network.

The WXOS Transparent SCPS-TP service provides all of the mandatory requirements of SCSP-TP and also supports a number of optional requirements, including the following:

- Bit Error Rates of between 10^{-4} and 10^{-12}
- Explicit Corruption Response (avoid TCP back-off when loss occurs)
- Selective Negative Acknowledgment (only retransmit specific data which needs retransmission)
- Header Compression
- Rate Control
- Congestion Control
- Separate Corruption Response

Summary

In summary, the WXOS 5.0 and later software includes complete support for SCPS-TP as a transparent service within the system.