

## CASE STUDY

Improving Throughput  
for Ultra High-Speed  
Satellite Connectivity

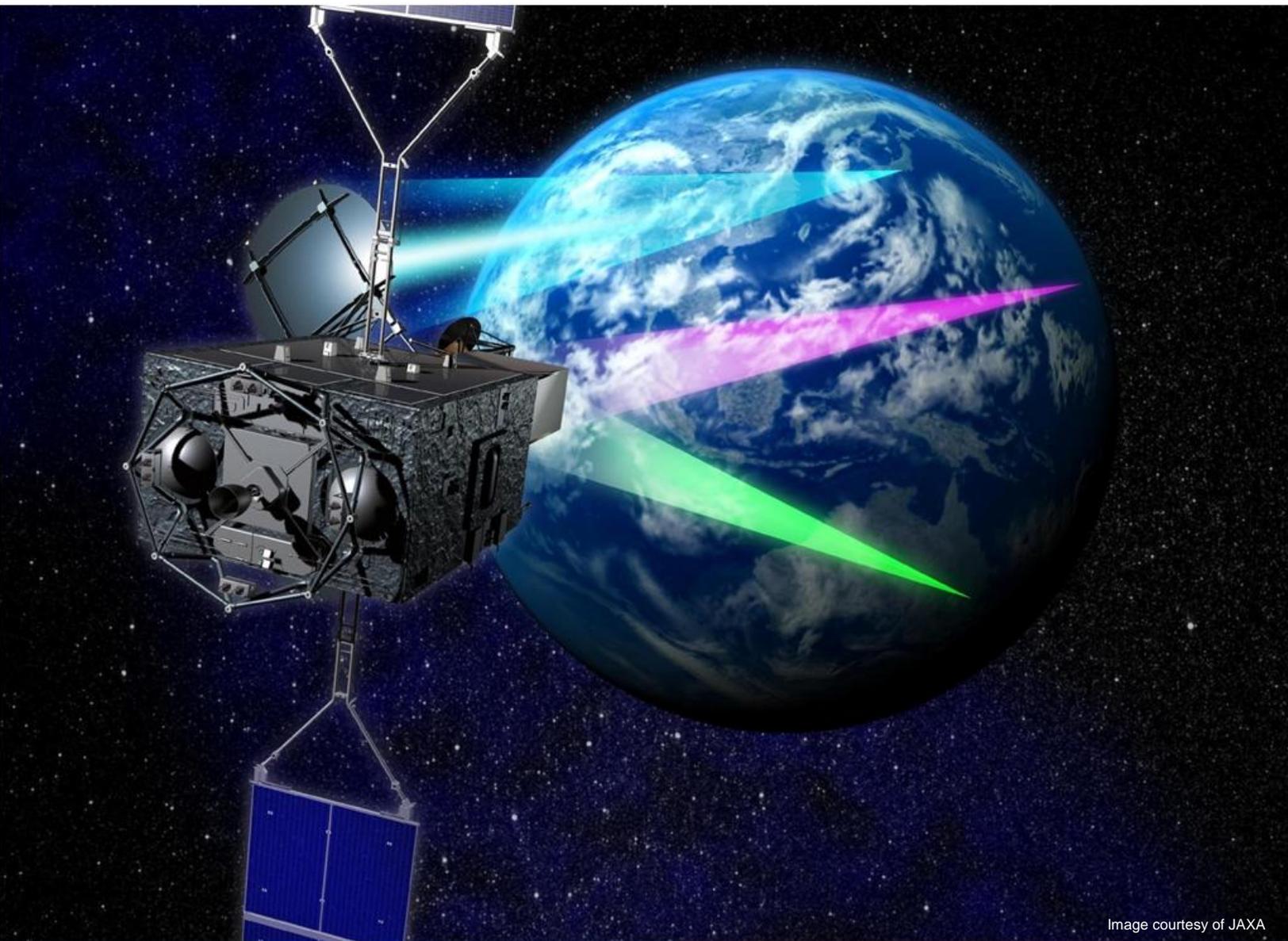


Image courtesy of JAXA



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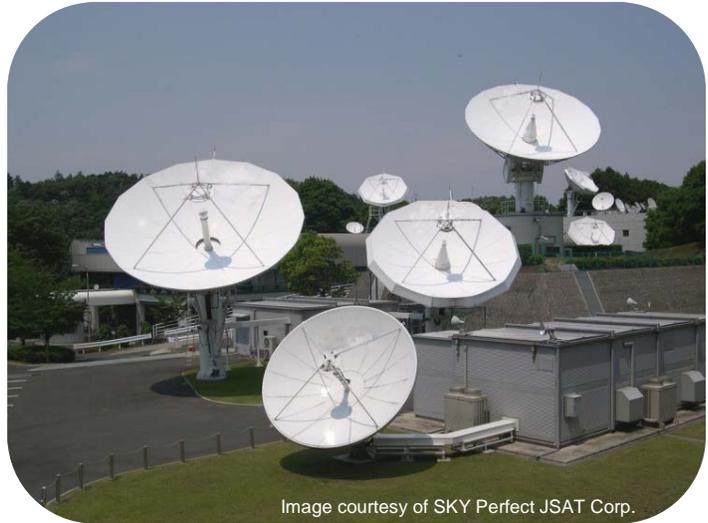
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## Overview

The Japan Aerospace Exploration Agency (JAXA) and the National Institute of Information and Communications Technology jointly developed and launched the Wideband Internetworking Engineering Test and Demonstration Satellite (WINDS), also known as KIZUNA. The satellite employs Ka-Band to enable high-speed, high-capacity communications by using the latest technology to create a faster, more efficient and more convenient communications environment. The target for the KIZUNA satellite communications systems is a maximum speed of 155 Mbps (receive) / 6 Mbps (transmit) for households with 45-centimeter aperture antennas and ultra high-speed 1.2 Gbps communications for offices with five-meter antennas. In addition to establishing a domestic ultra high-speed network, the project aims to construct ultra high-speed international Internet access, particularly with neighboring countries in the Asia Pacific region.

SKY Perfect JSAT Corporation, a leading satellite operator in the Asia-Pacific region, has undertaken the operation and promotion of WINDS on behalf of JAXA. SKY Perfect JSAT Corporation is facilitating experiments of the KIZUNA satellite communications system to support the development of a world-class information and communications network. The experiments encompass a variety of applications – emergency backup / restoral, remote education, telemedicine and the transmission of large-volume data communications. JAXA's and SKY Perfect JSAT's goal for the experiments is to accumulate the needed knowledge to improve Internet access anytime, anywhere even in the event of a disaster or when the terrestrial communications infrastructure is not available.



## TCP Acceleration Experiment



Rikei Corporation recently embarked on a KIZUNA experiment in conjunction with SKY Perfect JSAT Corporation to verify the affects of TCP acceleration on throughput given the latency that is customary for satellite links. The TCP acceleration product of choice was Comtech EF Data's Stampede FX Series. The parameters for the verification test included:

<b>TCP Accelerator Models Tested</b>	<ul style="list-style-type: none"><li>• Comtech EF Data FX-4000 ADC</li><li>• Comtech EF Data FX-4000 REM</li></ul>
<b>Applications Tested</b>	<ul style="list-style-type: none"><li>• File Transfer (FTP)</li><li>• Web Browsing (HTTP)</li></ul>
<b>Location of Test</b>	<ul style="list-style-type: none"><li>• Gunma Center of Satellite Network Inc. (a SKY Perfect JSAT Group company)</li></ul>
<b>Satellite Connection</b>	<ul style="list-style-type: none"><li>• Ultra high-Speed Internet Satellite "Kizuna" (Ka-Band Transponder)</li></ul>

## File Transfer Transmissions

For this portion of the experiment, the objective was to test the impact of TCP acceleration using the FX-4000 units on the transmission of file transfers via satellite. The upload speed from a client PC was 24 Mbps and the download speed was 40 Mbps. The measured roundtrip satellite delay was approximately 550 milliseconds. Utilizing this configuration, a high-volume file was uploaded / downloaded for comparison of line speeds and validation of connectivity both with TCP acceleration and without it. Adding the FX-4000 units into the mix as depicted in Figure 1 to provide TCP acceleration of the satellite link, the throughput was substantially improved – **by as much as 30X.**

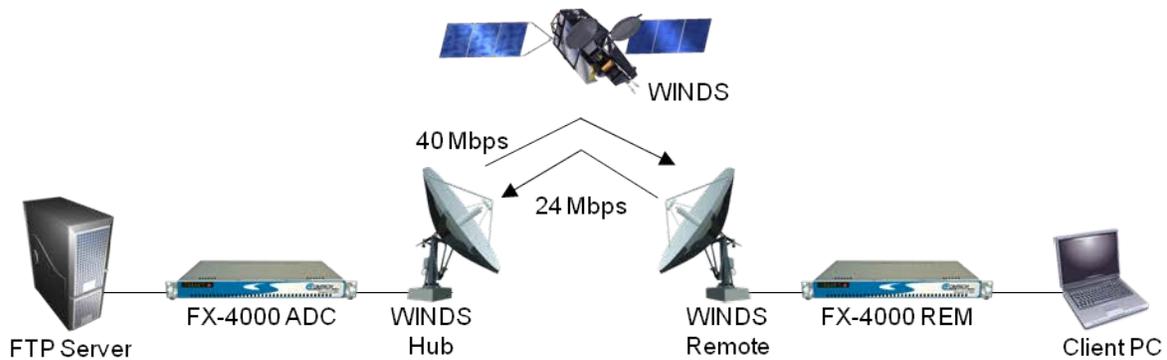


Figure 1: Configuration for File Transfer Experiment with the FX-4000

## Web Browsing

This stage of the experiment involved testing the affect of TCP acceleration when browsing the web over a satellite link. The upload speed from a client PC was 40 Mbps and the download speed was 24 Mbps. The measured roundtrip satellite delay was approximately 550 milliseconds, and the Internet line speed was 100 Mbps. Upload and download line speeds via the terrestrial Internet line were tested and compared. When employing TCP acceleration provided by the FX-4000 units (as depicted in Figure 2), the throughput was greatly improved – **by up to 10X.**

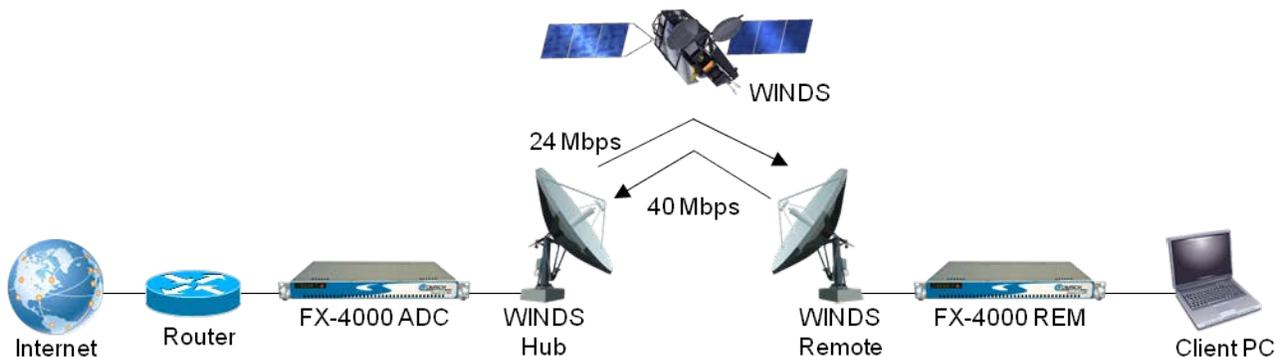


Figure 2: Configuration for Web Browsing Experiment with the FX-4000

## WAN Optimization

The Comtech EF Data FX Series combines Application Delivery Controller (FX Series ADC) and Remote WAN Optimization Controller (FX Series REM) capabilities. The FX Series ADC manages application interactions and applies coordinated acceleration and optimization techniques within satellite and terrestrial-based WANs. The WAN acceleration techniques can significantly improve satellite link performance, both in how the link is filled and in optimizing traffic throughput, by:



- Reducing the amount of unnecessary data sent over satellite networks
- Reducing the number of TCP and application turns (handshakes) required to complete transactions
- Offloading computationally intensive tasks from clients and servers

The FX Series enables the management of network traffic for increased efficiency and throughput of satellite links. It facilitates significant increases in data throughput, reduces network response times, improves the user experience and reduces bandwidth requirements for web traffic by 20-70%.



## The Bottom Line

The KIZUNA satellite communications system testing confirmed that the FX Series is very effective in mitigating the negative impact of latency on satellite link throughput. Moving forward, Rikei Corporation will actively promote the FX Series for enabling efficient satellite communications, particularly in environments where limited bandwidth is available.

## More Information

Our WAN optimization technologies can help you address increased bandwidth requirements, rising space segment costs and capacity shortages. To learn more about how your network can benefit from our technologies, visit [www.comtechefdata.com](http://www.comtechefdata.com)



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