# Sky X Technology

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*Abstract*— **Satellites are ideal for providing internet and private network access over long distance and to remote locations. However the internet protocols are not optimized for satellite conditions and consequently the throughput over the satellite networks is restricted to only a fraction of available bandwidth.**

**The Sky X Gateway and Sky X client/server systems replaces TCP over satellite link with a protocol optimized for the long latency, high loss and asymmetric bandwidth conditions of the typical satellite communication.**

**The Sky X client and the Sky X server enhance the performance of data transmissions over satellites directly to end user PC's, thereby increasing web performance by 3 times or more and file transfer speeds by 10 to 100 times.**

***Keywords— Sky X Technology, Client/Server, TCP/IP***

## I. INTRODUCTION

Satellites are attractive office for carrying internet and other IP traffic to many locations across the global where terrestrial options are limited or prohibited. But data networking on satellite is faced with overcoming the large latency and high bit error rates typical of satellite communication as well as the asymmetric bandwidth design of most satellite network. Satellites are ideal for providing internet and private network access over long distance and to remote locations. However the internet protocols are not optimized for satellite conditions. So the throughput over the satellite networks is restricted to only a fraction of available bandwidth. The Sky X family consists of Sky X Gateway, Sky X client/server and Sky X OEM products.

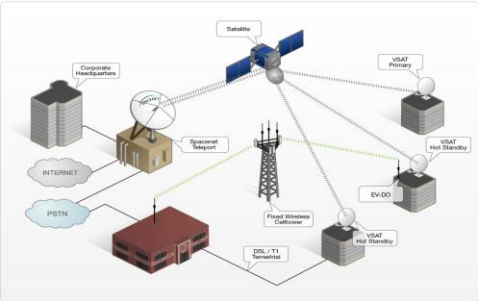

**Fig-1** Satellite

## II. WHY SKY X TECHNOLOGY

Satellites are ideal for providing internet and private network access over long distance and to remote locations. However the internet protocols are not optimized for satellite conditions and consequently the throughput over the satellite networks is restricted to only a fraction of available bandwidth. Thus we need sky x technology to over these restrictions and to access maximum bandwidth.

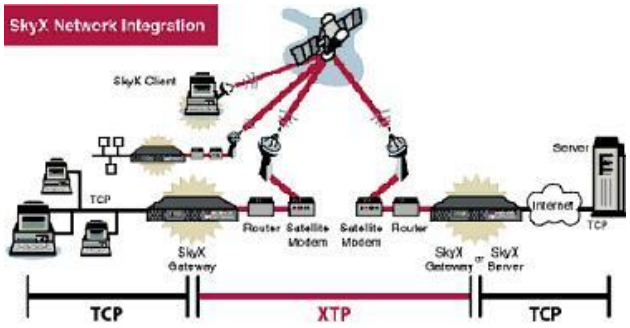


**Fig-2 sky X technology**

## III. PERFORMANCE OF TCP OVER SATELLITE

Data networking over satellite is faced with overcoming the latency and high bit error rated typical of satellite communication. Performance of TCP over satellite is achieving high data rates and increased latency. Satellites interact with a number if elements of TCP architecture, a single TCP have a poor performance in the context of satellite communication.

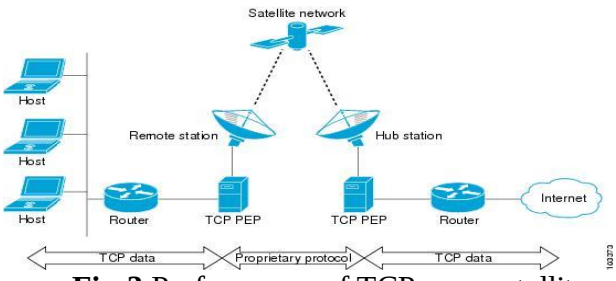


**Fig-3** Performance of TCP over satellite

A. *Window size-*

TCP utilizes a sliding window mechanism to limit the amount of data in flight. When the window becomes full, the sender stops transmitting until it receives new acknowledgement. The minimum window size needed to fully utilize an error- free link known as "bandwidth-delay product" is 100 KB for a T1 satellite link and 675KB for a 10 Mbps link.

*B. Congestion Avoidance*

In order to avoid the possibility of congestive network, TCP usually assumes that all data loss is caused by congestion and responds to this by reducing the transmission rate.

*C. Sky X Technology overcomes TCP performance limitations-*

Sky X products increase the performance of IP over satellite through a combination of protocol connection – splitting, data compression. The Sky X Gateway replaces TCP by XTP (Xpress Transport Protocol).

## IV. SKY X PERFORMANCE

The performance benefits of the Sky X gateway depend on many factors including the bandwidth, delay, asymmetric and bit error rate of the link.

A. *Transfer-*

*The file transfer benefits of Sky X performance enhancement for different windows sizes, link band-width, round-trip times and bit error rates.*

*B. Window size and Link speed VS Throughput*

*Without performance enhancement, a default window size of 8 KB limits TCP throughput to less than 100 kbps over satellite. Server operating systems using a 32 KB window, TCP is only able to reach a throughput of 440kbps. In Sky X Gateway, on compressing data, it can provide throughput rates for greater than the link File bandwidth*

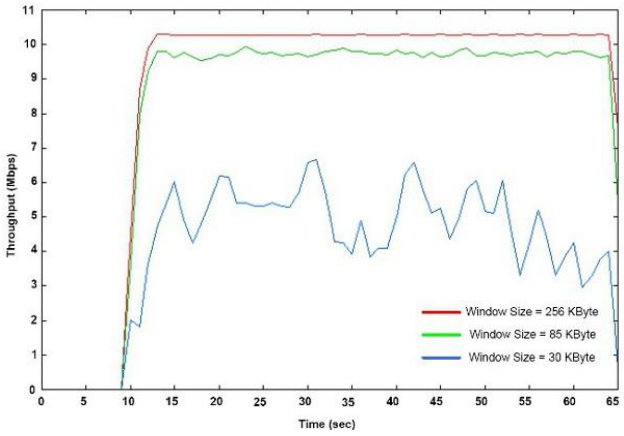


**Fig-4Graph of TCP window size thoughtput**

*C. Web Performance-*

*Men tat's innovative fast start feature specially optimizes web performance by reducing time required to establish new connection. The web stone HTTP benchmark shows that for an 8 Mbps error-free link, the average response time for a mixture of 50 simultaneous web connections using the Sky X gateway is between 0.7 and 1.1seconds depending on the compressibility of the data, compared to 30 seconds with TCP.*

## V. SKY X CLIENT/SKY X SERVER OPERATION

The Sky X Client/Server increases the throughput and efficiency of network access over satellite by transparently replacing TCP with the Xpress Transport Protocol (XTP) for satellite segment of the connection. The Sky X Client and Sky X Server enhance the performance of data transmission over satellite directly to end user PC's.

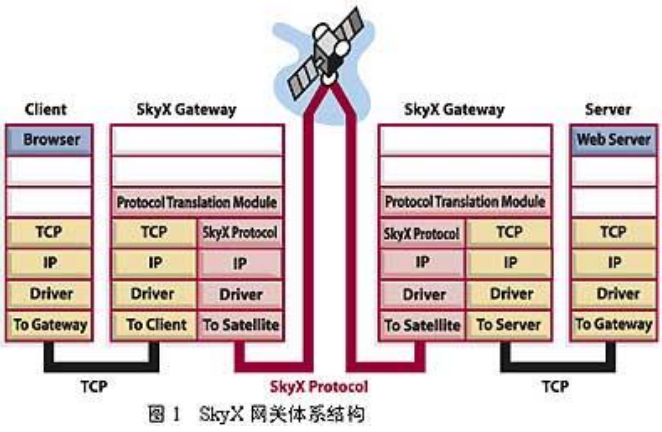


**Fig-5** Performance of Sky X protocol

It also enhances the performance of the internet and private network access over satellite links.

## VI. SKY X GATEWAY

The Sky X gateway works by interchanging the TCP connection from the client and converting the data to the XTP for transmission over the satellite. The Sky X gateway on the opposite side of the satellite link translates the data back to TCP for communication with the server. This architecture offers vastly improved performance while remaining entirely transparent to the end user and fully compactable with the internet infrastructure. No changes are required to the client to server and all applications continue to function without modification. The Sky X Gateway is well suited to networks with high latency, high bit error and asymmetric links. Designed as an remote device, it performs best at maximum bandwidth with a single, very large FTP—and supports an industry-best number of simultaneous sessions and connection turnover rate. The Sky X gateway splits the single TCP connection into three separate components.

A TCP connections on the remote side between the client and Sky X gateway, an XTP connection involving Sky X protocol over the satellite between the two Sky X gateway and a TCP connection between the opposite Sky X gateway and server.

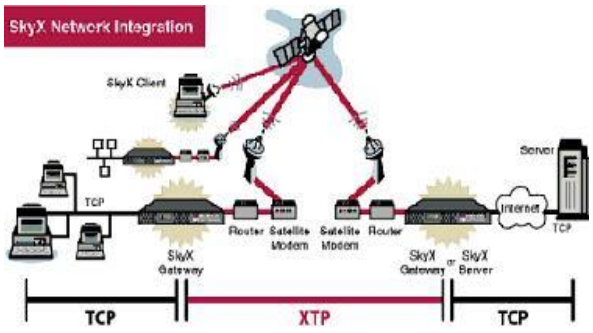


**Fig-6** Sky X Network Integration

## VII. APPLICATIONS

Sky X gateway has been tested by many organizations and various independent third parties for a wide variety of different conditions and has been found satisfactory. Sky X is mainly used for Satellite communication, for accessing web in fastest speed, and for data transfer, File transfer efficiently.

### *A. Dynamic window sizing*

- The large Sky X Protocol window removes the depending of the network on the bandwidth-delay product, allowing high throughput independent of the TCP window size of the end nodes.

### *B. Data Compression-*

Integrated on the fly data compression functionality, offering lossless compression ratios of up to 5:1 increased the amount of data that can be sent over the link.

### **C.** *Rate Control-*

TCP uses slow skeet and Congestion Avoidance algorithms to determine a safe transmission rate based on how quickly acknowledgements return.

## VIII. SKY X ACCELERATOR

When TCP protocol design limitations, high latency and host packets threaten applications speed, Sky X Accelerator ramps flow, fully utilize links and keep data moving along.

- Accelerate file transfer, large and small.
- Speed XML, and HTTP sessions, disaster recovery, database sync and backups
- Optimize application performance over high-latency and satellite links
- Increase link utilization on far WAN links
- Maximize retransmission and recover more quickly from errors.

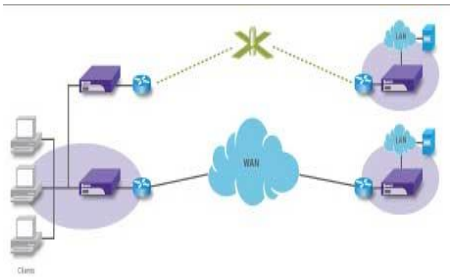


**Fig-6**Sky X Accelerator)

A. *TCP acceleration-*

Enjoy faster database connectivity, Web and remote-access applications while maintaining full TCP reliability and end-to-end flow control. Specially optimized for long delay, high bit error and symmetric bandwidth conditions. Accelerate all TCP-based applications-including Web access, FTP file transfers, and e-mail.

*B. Data Centre Replication Acceleration-*

Sky X Accelerator technology overcomes latency effect on TCP over high-bandwidth links by using bandwidth much more efficiently and improving replication performance over high capacity data centre-to-data centre links.

## IX. FUTURE ENHANCEMENT

- A product called XipLink which is faster developing will replace the Sky X.
- It is very much the same as the Sky X with extra capabilities.
- It optimizes all TCP/IP traffic, basically the link itself.

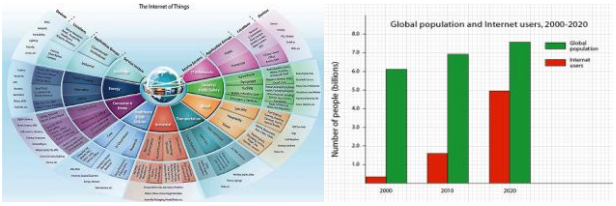


**FIG-7**FUTURE ENHANCEMENT OF INTERNET

## X. CONCLUSIONS

The Sky X gateway is the leading satellite for overcoming the limitations of TCP/IP over satellite ISP's. Corporations, Governments, and military organizations around the world rely on Sky X gateway to enhance the performance of their satellite networks.

The satellite is reducing to a global village by the use of satellite communication and so the improvement in the rate of information interchange through satellite is a must and thus Sky X technology becomes unavailable.

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