



Application Brief: Boosting Throughput by 50X and Application Performance up to 8X in Satellite Networks

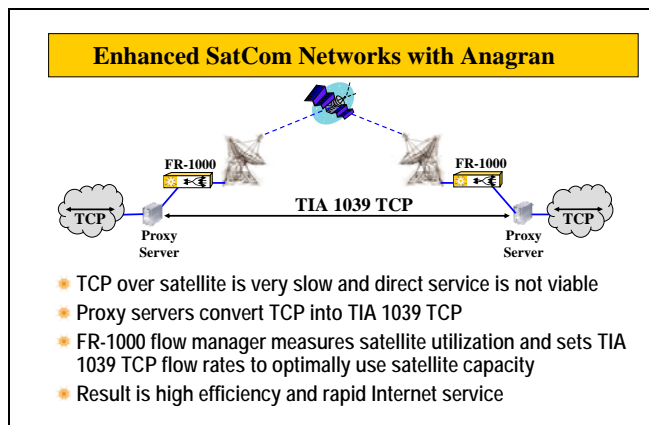
Premise: TCP throughput suffers considerably over Satellite Communications (SatCom) networks due to distance-induced delay, which severely compromises overall TCP performance. Anagran flow management products with enhanced TIA-1039 flow-based signaling vastly improves throughput and application performance over satellite networks.

Challenge: Satellite communications exhibit high delay links, high error rates, and large bandwidth variability, resulting in poor TCP performance. Users experience tediously slow response time or even "frozen" screens that fail to refresh.

Solution: Anagran overcomes satellite delay restrictions for sustained high throughput and consistent application performance.

Anagran solves the "TCP satellite delay problem" by combining the unparalleled traffic management capabilities of the FR-1000 flow manager with support of the new industry-standard enhanced rate signaling protocol known in the Telecommunications Industry Association (TIA) as *TIA-1039*. This standard protocol specifies in-band signaling to define the maximum rate at which host computers and network nodes can operate for that particular session. The greatest benefit of TIA-1039 is that it allows a session to immediately operate at its maximum transmission rate, thereby bypassing the time-consuming process (especially over satellite and radio links) of *TCP Slow Start*. To end users, applications run with much higher performance since the satellite transmission now yields much greater throughput.

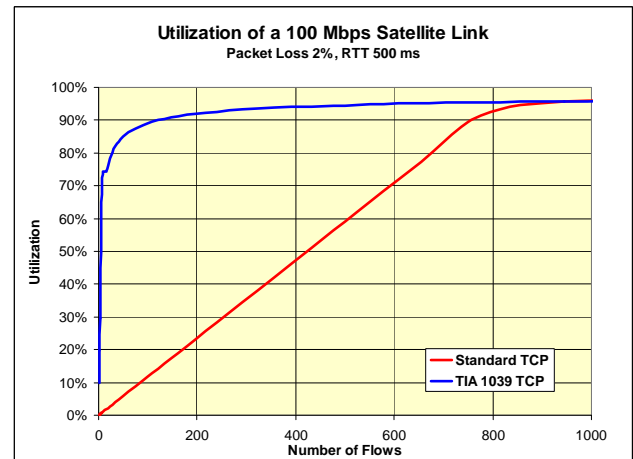
The protocol informs the network about the requirements of the flow. It allows the network (supported through TIA-1039 enabled devices such as the FR-1000) to respond to the request and specify the rate that can be supported. The maximum available rate is thus immediately determined with TCP sessions established at that rate. With TCP Slow Start now bypassed, throughput is instantly maximized.



The initiating TIA-1039 signaling can originate and terminate in the form of a proxy server as shown in the figure above. Thus, there is no need to change anything on the host computer(s) to enjoy the advantages of TIA-1039. The proxy server sends the TIA-1039 request in the first packet to the network (FR-1000). The FR-1000 determines the available capacity over the satellite link and communicates that value back to the requestor, at which point the rate is determined end-to-end. The FR-1000 constantly monitors the available capacity and periodically adjusts the rate of each flow by marking update packets between the TIA-1039 enabled proxies. The sending proxy then adjusts its rate accordingly.

Finally – SatCom Unrestricted

As the figure below illustrates, Anagran's TIA-039 rate signaling yields significant utilization improvement compared to normal TCP in the face of both delay and loss over satellites. With TIA-1039, utilization levels instantly increase to above 90%, regardless of the number of users or flows. Compared to TCP acceleration devices, this is typically at least twice the throughput achieved. For example, a typical 45Mbps satellite link that only achieves an average throughput of 10Mbps can instantly realize an average throughput boost to 40Mbps by adding the FR-1000 and TIA-1039!



Comprehensive Improvement and Control with TIA-1039

TIA-1039 improves standard TCP performance over a satellite by up to 50:1 by allowing the proxy computers to stream at the maximum available rate. In addition, it defines the mechanisms for user-negotiated fixed rate (UDP-based applications) such as video streaming where the application can specify its peak rate and the network returns the best available peak rate

Conclusion:

Anagran solves the SatCom issue of poor throughput due to distance-induced delay. With the FR-1000 flow manager and the associated proxy computers, supporting TIA-1039 enhanced rate signaling protocol, SatCom networks benefit from consistently lower delay and big improvements in TCP throughput, resulting in much-improved application performance. With the FR-1000 and TIA-1039 enhanced flow rate signaling, SatCom networks can finally shed the limitations of high delay and poor throughput to achieve their maximum potential performance per cost.

For the first time, improve SatCom network throughput by up to 50X AND reduce delay with Anagran!