An experiment of high-speed data transfer technique from Syowa via INTELSAT

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Achieving the quality of service (QoS) is an important requirement in a communication network. Satellite communication is posing many challenges due to the limitation of transmission control protocol (TCP) over networks with high latency. To overcome these issues, the wide area network (WAN) optimization provides the data transfer on such long-distance networks. However, this optimization is not able to utilize the available bandwidth of provided network efficiently since it performs fixed bandwidth allocation. This paper proposes a technique to enhance the available bandwidth utilization for International Telecommunications Satellite Organization (ITSO, or INTELSAT) network. This technique adopts a high-speed data transfer protocol, named high-performance and flexible protocol (HpFP), to transfer data between the satellite and the ground station. The HpFP is a connection-oriented protocol to work on the top of user datagram protocol (UDP) and provides us with a stream-type of reliable data transfer even under high packet loss rate. One of the ingenious attempts in the HpFP is to set an internal target throughput for pace control of sending packets. Since this parameter setting is time-dependent, the target throughput is calculated based on network conditions monitored by the HpFP. The HpFP detects the unused bandwidth in the satellite bandwidth resources at every moment, then dynamically allocates HpFP data transfers. The results of laboratory experiments show how effectively the HpFP utilizes the available network bandwidth in the condition of the WAN optimization control on INTELSAT satellite network.
[1] Praphan Pavarangkoon, K. T. Murata, M. Okada, K. Yamamoto, Y. Nagaya, T. Mizuhara, A. Takaki, K. Muranaga, and E. Kimura, “Bandwidth utilization enhancement using high-performance and flexible protocol for INTELSAT satellite network,” in Proc. 7th IEEE Annu. Information Technology, Electronics and Mobile Communication Conf. (IEMCON), 2016. doi: 10.1109/IEMCON.2016.7746292

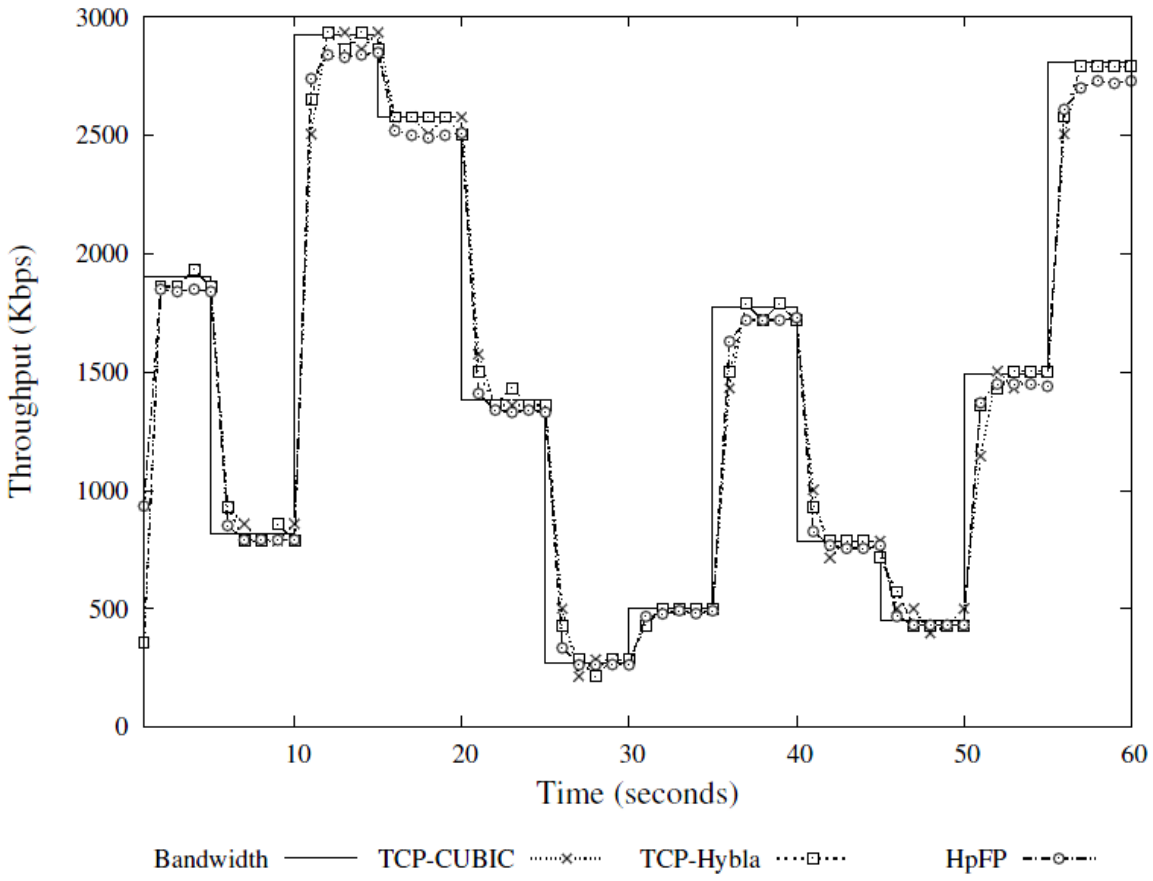

Fig. 10. Comparison of TCP-CUBIC, TCP-Hybla, and HpFP under the situation with the changing interval of the available bandwidths in every 5 sec

