New data transfer technique from Syowa via INTELSAT

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A communications satellite (INTELSAT) data receiving system with a 7.6m-diameter parabolic antenna was installed at Syowa Station in February 2004. So far, data transfer have been carried out using from the Antarctica station using the satellite network. The current bandwidth of the INTERSAT for data transfer between Syowa and NIPR (National Institute of Polar Research) in Tokyo is 3 Mbps. Since there is inevitable latency (RTT 500 msec) in between Syowa and NIPR, general file transfer applications, such as FTP, rsync, rcp and so on, don’t show good throughput. It is due to restriction of TCP function on networks with large latency (and packet-loss). The SteelHead provided by Riverbed is one of the WAN accelerators for long-distance data transfer. It intercepts TCP on both sides of the network, and accelerates TCP connection replacing with its own data transfer technologies.
The other role of the SteelHead is to control QoS of multiple data tarnsfers. Several projects at Syowa Station in many research fields are conducted so far, and data transfers are independent in principle. There needs a traffic control of network connections between Antarctica and Japan. Network managers at NIPR give priorities to each data transfer project, and the SteelHead allocates bandwidth to each network connection. However, this QoS control simply sets highest and lowest bandwidth. Total traffic could be lower than 3 Mbps in case that several traffics are lower than the given maximum bandwidth according to the QoS table.
Herein we propose a new data transfer protocol to work on the transport layer; the HpFP (High-performance and Flexible Protocol). This protocol is a connection-oriented protocol to works on the top of UDP. It provides us with a stream-type of reliable data transfer. Inside the HpFP, there are several ingenious attempts. One of the attemps is to set an internal target throughput to control pacing of sending packets. This parameter setting is time-dependent; the target throughput is derived from information of network monitored by the HpFP. The HpFP is able to detect unused bandwidth at every moment, then dynamically allocates the HpFP data connection. We discuss how effectively the HpFP covers the unused bandwidth on the condition of SteelHead control on the INTERSAT networks.

