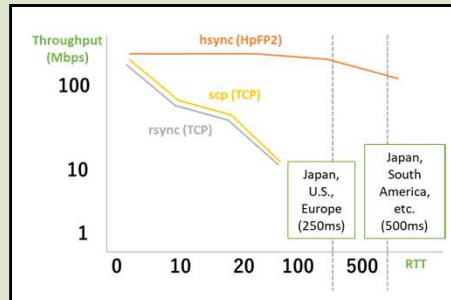# Report for High-Performance File Transfer Tools in the Data Mover Challenge

■Technical Overview of Technologies Exceeding 100Gbps

To achieve ultra-high-speed file transfers exceeding 100Gbps, technical enhancements were implemented at each layer.
At the transport layer, we developed HpFP (High-performance and Flexible Protocol), which excels in delay- and loss-prone environments, enabling congestion control that balances delay/loss tolerance with fairness.This enables congestion control that balances delay/loss tolerance with fairness. At the sxession layer, performance limits were extended through transmission channel multiplexing, and overhead during small-scale transfers was reduced by separating the control channel.
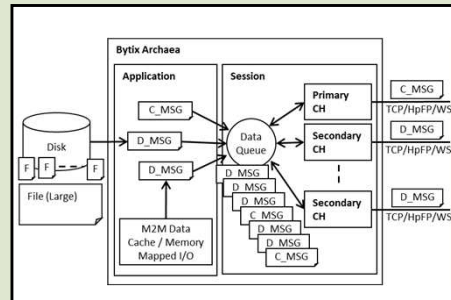
●Improved Delay and Loss Tolerance

・ A protocol with TCP-equivalent transmission control (HpFP) using the UDP protocol
・ High delay tolerance via 64-bit buffers (※TCP uses 32-bit buffers)
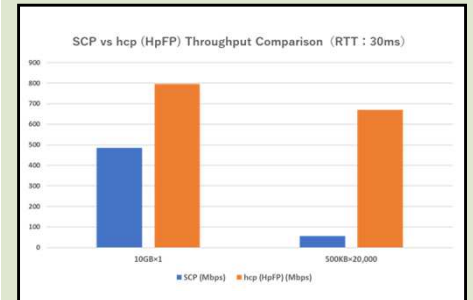・ High loss tolerance through a unique retransmission mechanism

●Communication Session Multiplexing Control

・ Highly flexible control through separation of data and control communications
・ Wideband data communication not achievable in a single communication session

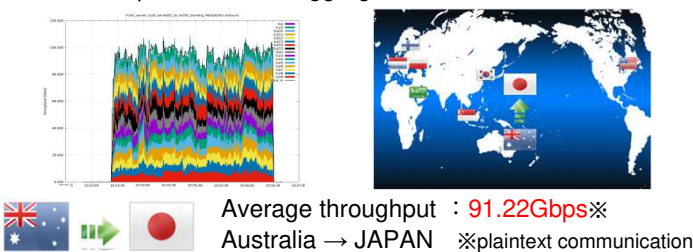### ●Improving Transmission Efficiency Across Various File Distributions

・ Data size leveling for file distribution to optimize transfer
・ Memory copy reduction
・ Design architecture symmetry enables performance improvements anywhere on clients and servers

■DMC Performance Evaluation Results

An experiment was conducted to transfer a total of 2TB of compressed (random) data sets over a 100Gbps international network.
Using DMC21, two distinct 100Gbps paths between Japan and Australia were simultaneously utilized.
By employing a session path splitting technique, communication exceeding 100Gbps was achieved.
The copy performance between RAM DISKs recorded an average transmission speed of 91.2Gbps and a peak speed of 103.8Gbps.

Achieved a peak instantaneous throughput of 103.8Gbps on a 200Gbps link via link aggregation!
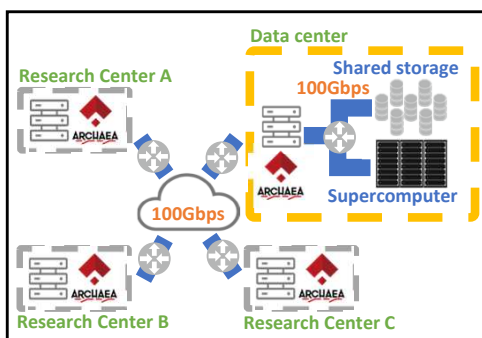

Average throughput ：91.22Gbps※
Australia → JAPAN   ※plaintext communication

🏅Awards

●DMC23
・ Awarded "Best performing in impaired networks"
●DMC21
・ Awarded "The Most Innovative"
・ Awarded "The Best IPv6 Performance"
  ※Achieved the highest IPv6 performance
●DMC20
・ Awarded the "Experimental Excellence Award"

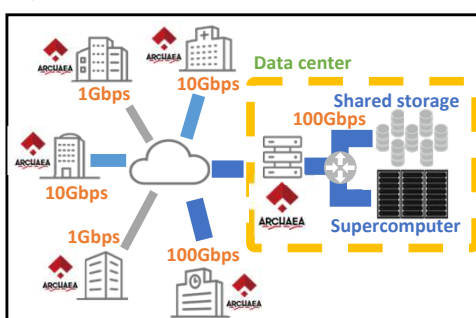## ■Tools Practical Use Cases

●High-Speed Data Sharing in Ultra-Wideband Networks Connecting Research Centers

This high-speed data transfer tool maximizes the potential of ultra-wide bandwidth exceeding 10Gbps, enabling more efficient and rapid sharing of research data than ever before.
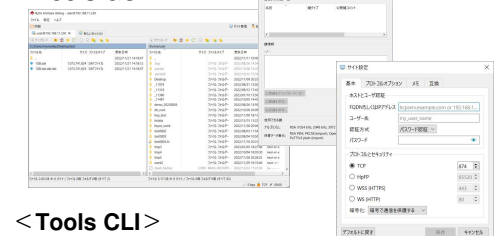

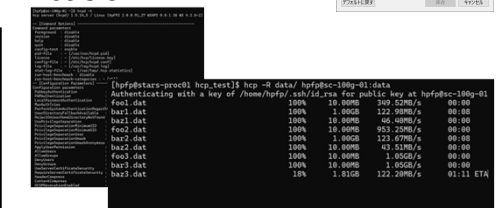### ●Optimizing Data Transfer from Various Networks to a 100Gbps Supercomputer Environment

Wide-bandwidth users and users with conventional bandwidth like 1Gbps or 10Gbps achieve balanced data transfer without compromising each other's convenience. The HpFP technology has high delay tolerance, various congestion controls and fairness even with TCP. That technology and TCP multiplexing maintain optimal and efficient communication over mixed environments where HpFP and TCP work.

＜Tools GUI＞

＜Tools CLI＞

Target Products : Archaea
https://hcp.clealink.jp/
Supported OS:
RHEL ・ Debian ・ Mac ・ Windows

■NEWS

Recent development has also improved I/O performance through Direct IO, significantly enhancing the tool's practical performance.