HP-WAN and Hackathon results

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IETF 125 @ Shenzhen March, 2026

HP-WAN Problem and Scope

HP-WAN Definition: A type of Wide Area Network (WAN) designed specifically to meet the *high-speed, low- latency, and high-capacity* needs of data-intensive applications.
Scope: *Existing NRENs and large dedicated backbones supporting data-intensive* science, and HPC. Examples: GÉANT, ESnet, Janet, Internet2, CANARIE, CERNET. And it *extended to public network* such as distributed AI training over WAN.
Requirements: Multi-petabyte data transmission across WANs demands *high throughput, low latency, high reliability within a job-based completion time.*
Problem: The exisiting congestion control algorithms such as BBR and CUBIC, and transport-related technologies such as RDMA, iWARP, and RoCEv2, may not be sufficient facing the challengies such as *poor convergence speed, unscheduled traffic, long feedback loop and concurrent multi-flows transmission*.
Data movement enablers: *Scheduled low-latency and bandwidth guarantees,*

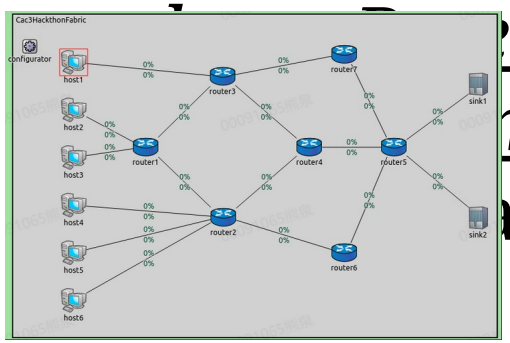
HP-WAN Activities and Progress in WIT Area

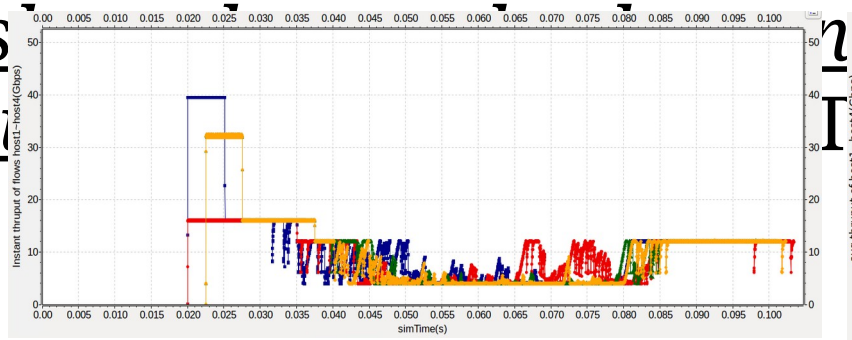
- **IETF120**: the first HP-WAN side meeting proposed the use cases and problems for *high-speed, low- latency, and high-capacity* needs of scientific research, education, and data-intensive applications
- **IETF121**: the first *HP-WAN BOF focused on an open discussion around networking approaches* including the JANET, GEANT, ESnet, CANARIE, and CERNET and emerging requirements for shared or public infrastructure
- **IETF122**: followup HP-WAN side meeting achived rough consensus on the *fundamental requirements for high-throughput transmission* and efficient use of network capacity
- **IETF123~IETF124**: followup HP-WAN side meetings focused on the *HP-WAN approches such as RSVP signalling* and transport protocols adaption
- **IETF125**: HP-WAN Hackathon provided *transport-oriented prototyping* to share early implementation results indluding RSVP-based and

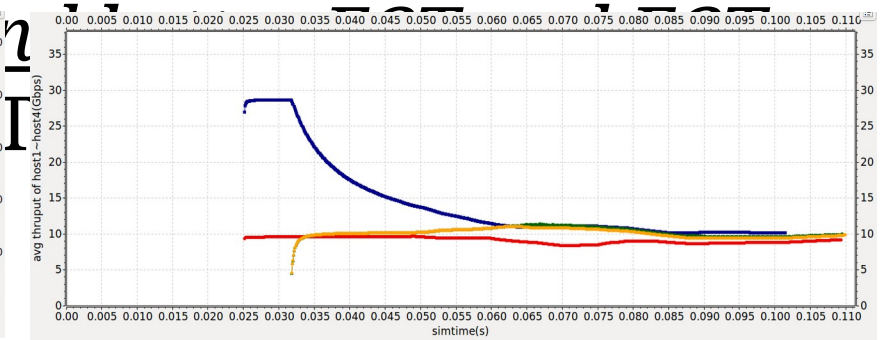
HP-WAN Prototyping Results

- **IETF125 Hackathon**
  - HPWAN integration and *simulation on topologies for public networks* and service scenarios based on the *HP-WAN framework and related functions*, such as the rate negotiation, admission control, traffic scheduling, and resource reservations with distributed signaling (IETF RSVP-TE).
  - Perform congestion control algorithm optimizations (e.g., DCQCN) to simulate traffic transmission with negotiated rates and compare results with the HPWAN approach.

- **Results**
  - The result of RSVP signaling with *rate negotiation of minRate*







Issues raised for TSVWG

- - HP-WAN host and network coordination signalling protocol at TSVWG ?
- - Impacts of the signalling upon the existing congestion control algorithms
- -HP-WAN service profiles (YANG models) for transport protocols.

Next Steps

- HP-WAN service YANG model for the fine-grained host and network collaberation
- Live deployments of hp-wan services and solutions for inter-regional and inter-continental hp-wan data transmission, betweeen China and Japan, China and North America and Europe, North American and Europe.
- Refine the state of the art and the framework drafts.

- **Thanks !**
- **Comments and suggestions are welcome.**