Contents

• Introduction
• 1st ATCF
• 2nd ATCF
• Plan
Introduction
Motivation

- In the construction of Tier-1 at KISTI, we realized that traffic of Asian sites for ALICE experiment is mostly directing to Europe or US
- Latency test to Asian sites confirmed that the connectivity within Asian sites is worse than Europe and US
- Small T2 relies on TEIN, Japan sites connect to SINET, KISTI runs KREONet
- However TEIN, SINET and KREONet were not peered
- APAN-JP provides connectivity between JP sites and a few T2 in Asia
- “Normalization of abnormality”
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• “Normalization of abnormality”
Goal of the forum

Short-term

• To discuss on the possible solutions for the improvement of connectivity among Asian Tier sites and their domestic network environment, and to monitor periodically the status of the established network environment.

Long-term

• To provide a place where Asian Tier sites can share and discuss not only the network issues but also any other potential issues, if any, so that we can collaborate to resolve them.

Target

• Mostly Asian Tier sites however, open to every interested parties, in particular, distributed computing coordinations of LHC experiments and network experts.
Asia Tier Center Forum

1st ATCF @ KISTI, Sep 2015

- 20 participants from 7 sites (COMSATS(*), Hiroshima, Wuhan(*), NECTEC, SUT, LIPI, KISTI), TEIN*CC(*), KREONet, ThaiREN, UniNET, GÉANT and CERN

2nd ATCF @ SUT, Nov 2016

- 34 participants from 10 sites (ASGC, COMSATS, Hiroshima, Tsukuba, Wuhan, SUT, LIPI, Kolkata, TIFR, KISTI), TEIN*CC, KREONet, ESnet and CERN

(*)Remote
1st ATCF
Asian Site Reports

- JP, KR, IN sites well connected to EU and US
- Some T2s in bad situation
- And no detailed information about their networks
Backbone Reports (Physical Connections)

10 T2 sites connected with TEIN
Useful Information

LHCONE L3VPN architecture
- TierX sites connected to National-VRPs or Continental-VRPs
- National-VRPs interconnected via Continental-VRPs
- Continental-VRPs interconnected by trans-continental/trans-oceanic links

Acronyms: VRP = Virtual Routing Platform (i.e., virtual routing instance)

LHCONE Site Architecture Examples

LHCONE Site Configuration

Outline
- Introduction
- ESnet LHCONE Traffic Volumes
- LHCONE BGP Reachability
- Customer Edge Routing Symmetry
- Site Connection Guidelines
- Lessons Learned From Early Adopters
- BNL VRF & Policy Routing Example
- Alternative Architectures for Destination Routing
- DTNs in the Science Enclave
- SDN Based Policy Routing Engine
- LHCONE BGP Prefix Filtering Conventions
- Cross Domain Troubleshooting
- PerfSONAR Measurement in LHCONE
- New Site Connection Data

Thanks to contribution from CERN and ESnet
Possible Solutions & Actions for Asian LHCONE

- Agree on the architecture
- Agree on the policies (transit)
- Agree on shared resources
- Define national and continental VRFs
- Interconnect
- Enjoy
And...

- Intensive discussion focusing on how to improve the network connectivity in Asia with the given conditions:
  - Local network environment as well as the connection to backbone for each site
  - Status of backbones for LHCONE
  - LHCONE implementation in US
  - Implementation model of LHCONE in Asia
  - LHCONE guidance for site configuration
The Outcome

In the context of LHCONE VRF rules and inter-VRF connections

The Edoardo Solution

- Edoardo Martelli (CERN) brokered the following:
  - TEIN, ASGC and KREONet have agreed to implement LHCONE VRFs in their networks, to interconnect the VRFs in HK, and to give each other transit over their peering links to GÉANT, Starlight and Seattle

From William Johnston’s ATCF report at LHCONE/LHCOPN workshop in Oct 2015

A part of LHCONE Map (v3.4)
William Johnston, ESNET
아빠! 힘내!
Site Status Update @ 2nd Forum

**The Good**
- T2s has managed to upgrade their networks
- Some sites the situation is still the same
- Some sites get worse than before

**The Bad**
- Asymmetry inside Japan
- Lost direct connection between JP and KR
- Wuhan site still inactivated because of network

**The Weird**
- Strong asymmetry inside Japan
- The low outbound b/w might be inconsistent with ML for KISTI
- Experts under investigation

**Network topology at SUT**
- VObox proxy
- CE BDII PBS
- Storage
- Commercial Internet

**perfSONAR Results: Surprise!**
- 200Mbps
- JGN-x - KREONet

**Networks**
- IP4: 202.28.63.190/255.255.255.192
- IP6: 2001:3:c83:301:17::1/64
- University Link
- ALICE Dedicated Link
- Updated on 31 Oct 2014.

**Commercial Internet**
- Hiroshima - SINET @Tokyo
- Tokyo - Hiroshima
- Lost direct connection between JP and KR
- JGN-x - KREONet

**Sucub: LIPI - Cibinong**
- Storage
- 2 Gbps
- Worker node

**Commercial Internet**
- Inbound
- 2 Gbps
- Worker node

**Commercial Internet**
- Outbound
- 200Mbps
- Worker node

**Commercial Internet**
- 1 Gbps
- Worker node

**Commercial Internet**
- 200Mbps
- Worker node
**Backbone Status Update**

- **TEIN**
  - Significant upgrade conducted in TEIN & KREONet
  - Full 10G (TEIN)
  - 100G up to US (KREONet)
- **KREONet**
  - GÉANT LHCONE Status
  - Some details about UniNet (TH)
LHCONE Update @ 2nd ATCF
Edoardo Martelli, CERN

Status of LHCONE VRFs in Asia

- Established their own VRF but some still not peered yet
- ThaiREN joined TEIN VRF (seen by GÉANT)
- Latency improved with physical connection between TEIN and KREONet
• More connections for full mesh & reachability
• We cannot resolve this at once
• Important to keep communicating with NRENs
• Just start of a long journey for network consolidation in Asia
Plan
Next

• Keep tracking the progress of LHCONE status in Asia through the forum

  • Communicating with TEIN and KREONet for their progress

• KISTI will hold ATCF again this year when the participation from NREN as well as Asian Tier sites can be maximized

  • This will be decided in April
More info

• Please feel free to visit: http://atcforum.org

• All the materials presented at 1st & 2nd ATCF and minutes

• Guidelines for LHCONE site configuration

  • Presented by Michael O’Connor, ESnet/BNL

  • https://indico.cern.ch/event/395656/contributions/1833956/attachments/1158490/1666790/LHCONE-site-connections-esnet.pdf

• Please refer to my previous talks presented at ISGC2017 for KISTI-GSDC status as well as KISTI CA
Thank you

Questions?