KISTI activities and plans

Global experiment Science Data hub Center

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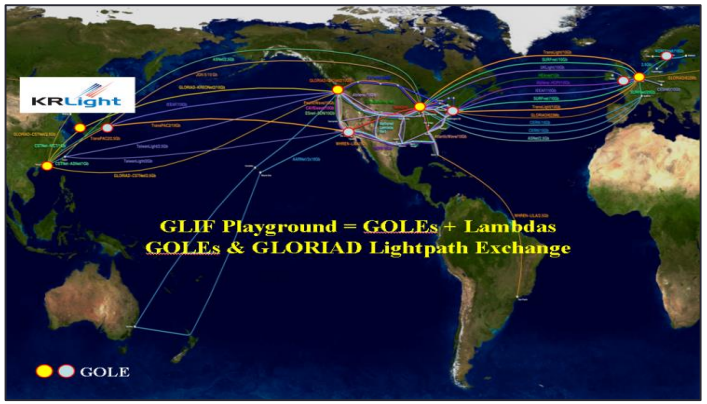
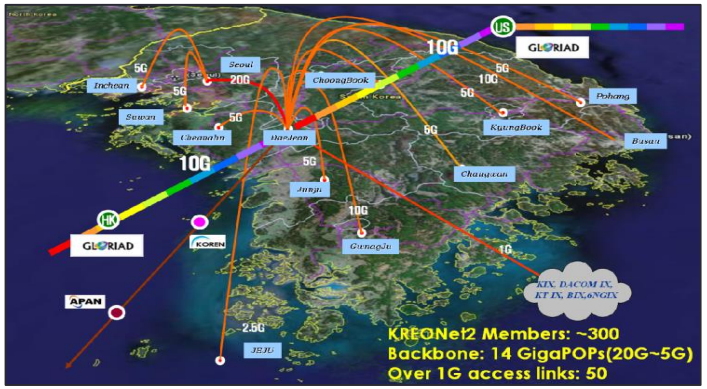
Agenda

- KISTI GSDC
- GSDC system overview
- GSDC & network
  - Internal & External
- GLORIAD & TEIN
  - Test
- Submarine cable issue

KISTI GSDC





KISTI (Korea Institute of Science and Technology Information)

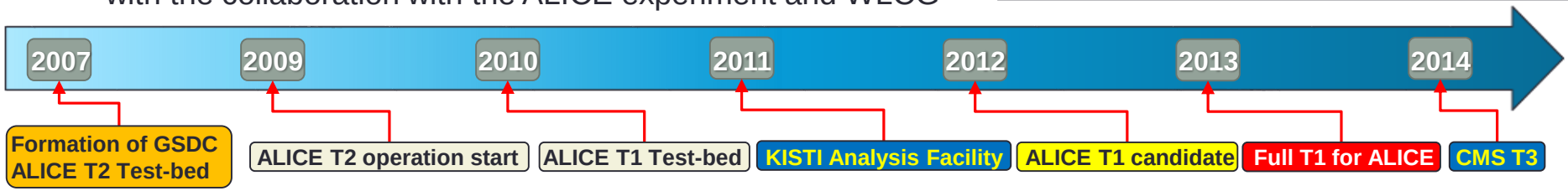
- Government funding research institute for IT founded in 1962
  - 600 people working for National Information Service(distribution & analysis), **Supercomputing and Networking**
- Operating **Supercomputing** and **NREN Infrastructure**
  - Supercomputer: **307.4 TFlops** at peak(14th ranked at Top500 in 2009; 201st now)
  - NREN Infrastructure: KREONet2
    - Domestic: **Seoul ←(100G)→ Daejeon**
    - International: **HK ←(10G)→ Chicago/Seattle**(Member of GLORIAD)

GSDC (Global Science experiment Data hub Center)

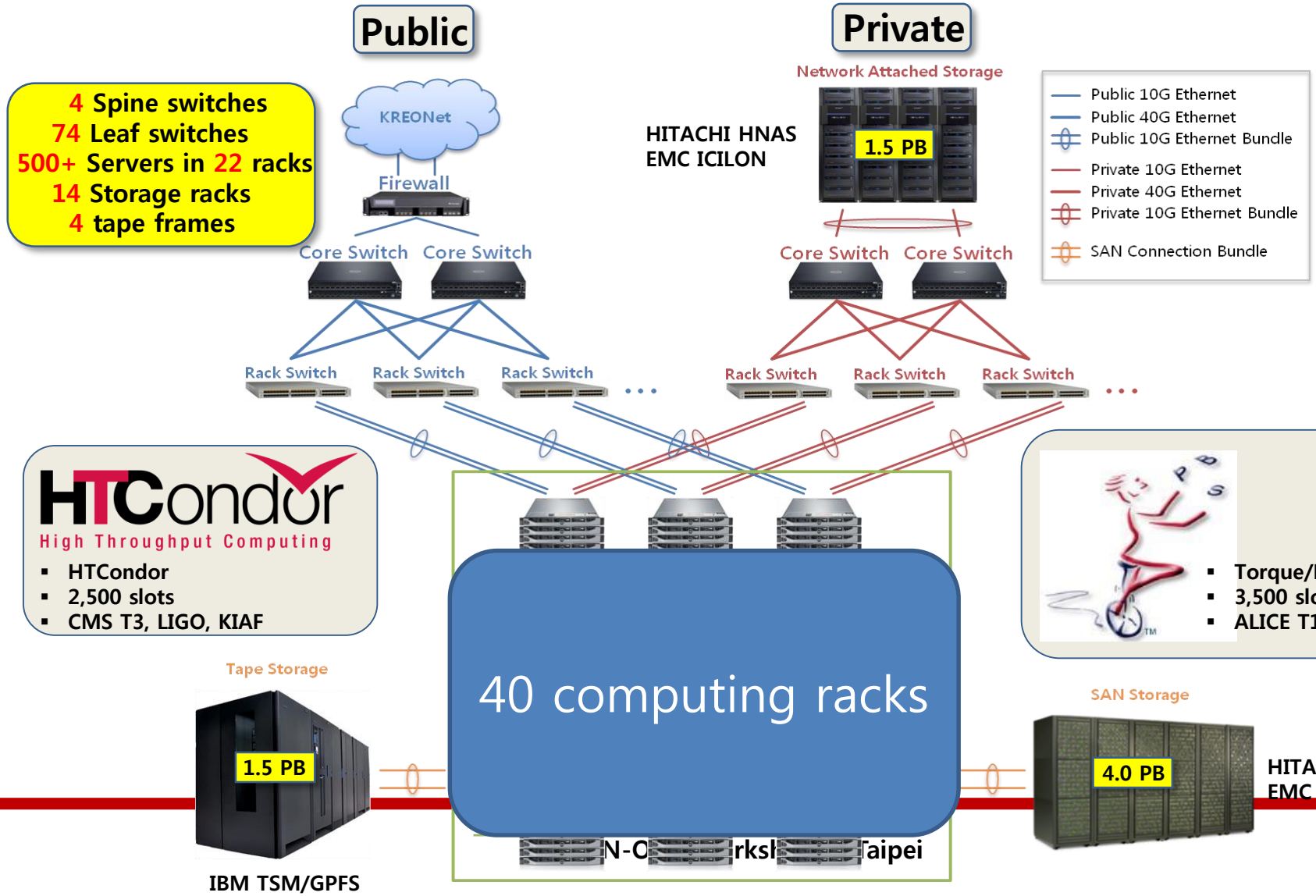
- Government funding project to promote research experiment providing computing power and storage
  - HEP: ALICE, CMS, Belle, RENO
  - Others: LIGO, Bioinformatics, electronic telescope.
- Running **Data-Intensive Computing Facility**
  - 15 staffs: sysadmin, experiment support, external-relation, administration
  - Total 6,000 cores, 6,500 TB disk and 1,500 TB tape storage

History of GSDC

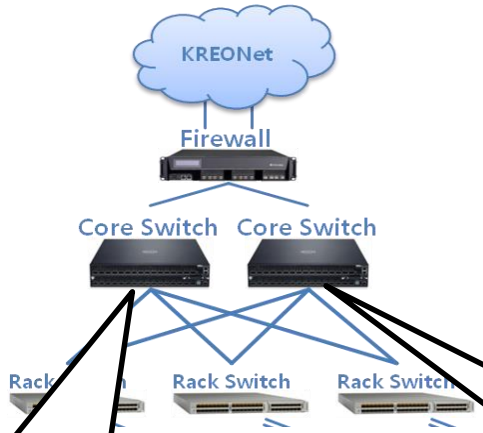
- 7 years of the experience running grid computing centre with the collaboration with the ALICE experiment and WLCG



GSDC System Overview

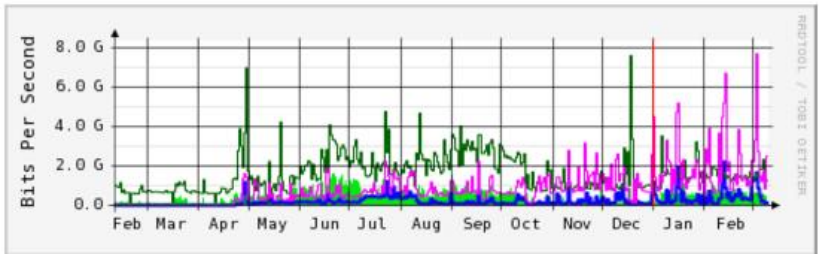


GSDC System Overview

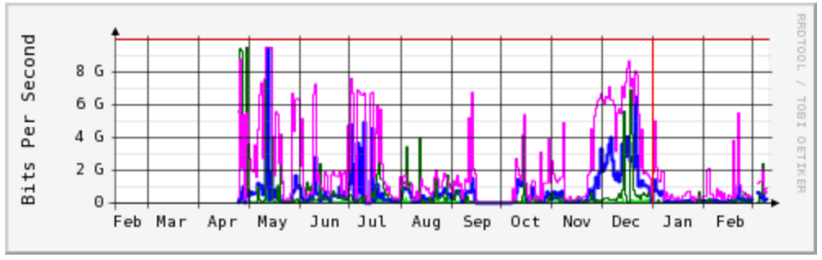


Dedicated SW for ALICE Tier 1 center

`Yearly' Graph (1 Day Average)



`Yearly' Graph (1 Day Average)



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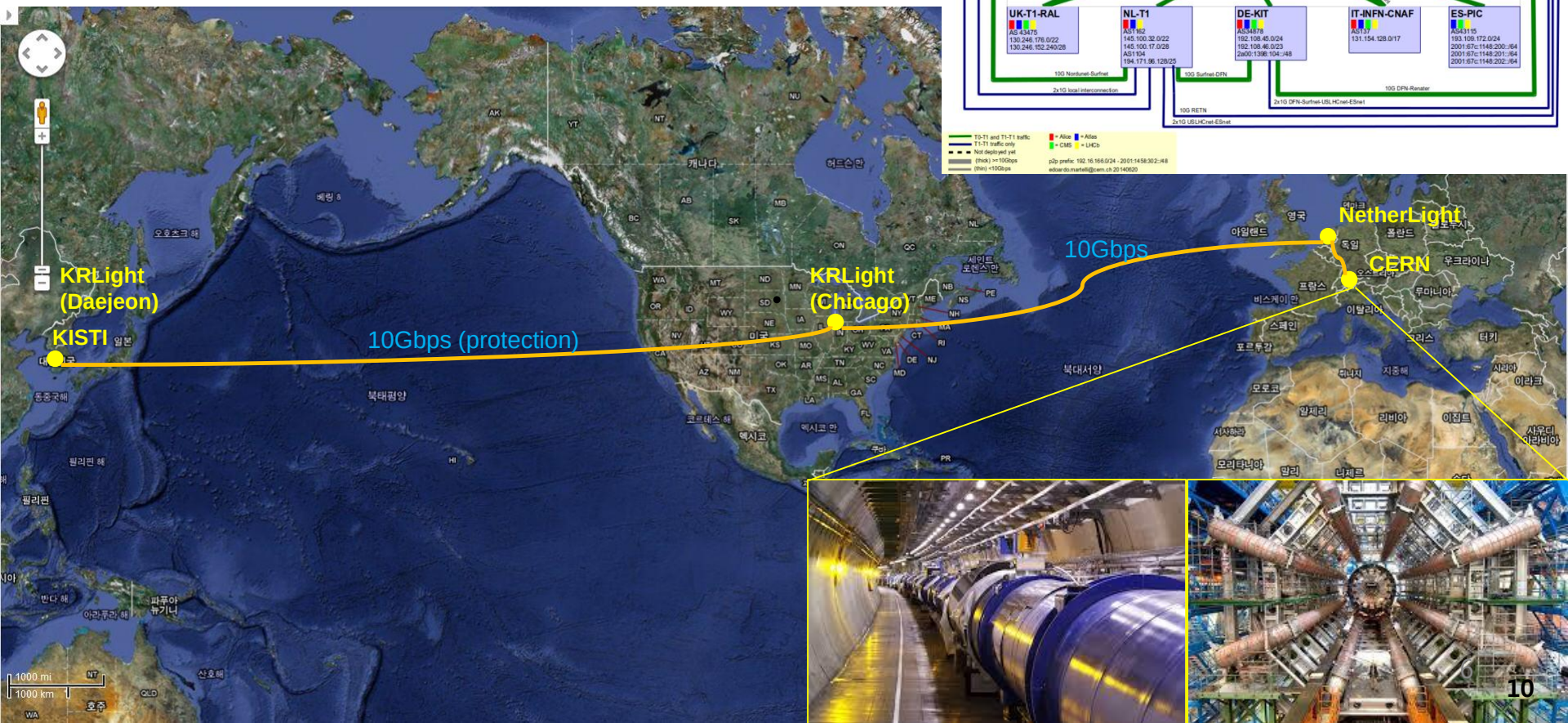
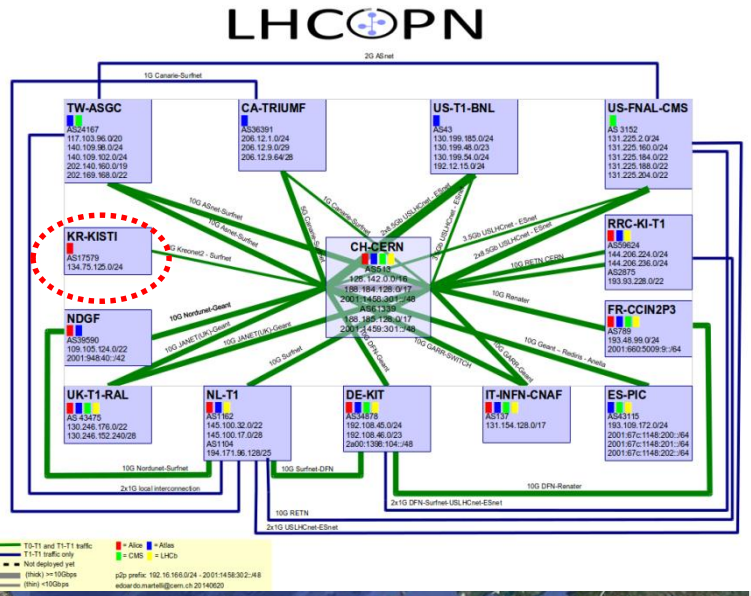
LHC Optical Private Network

GSDC (Global Science Data hub Center) in KISTI as CERN LHC Alice Tier 1 center Since 2013

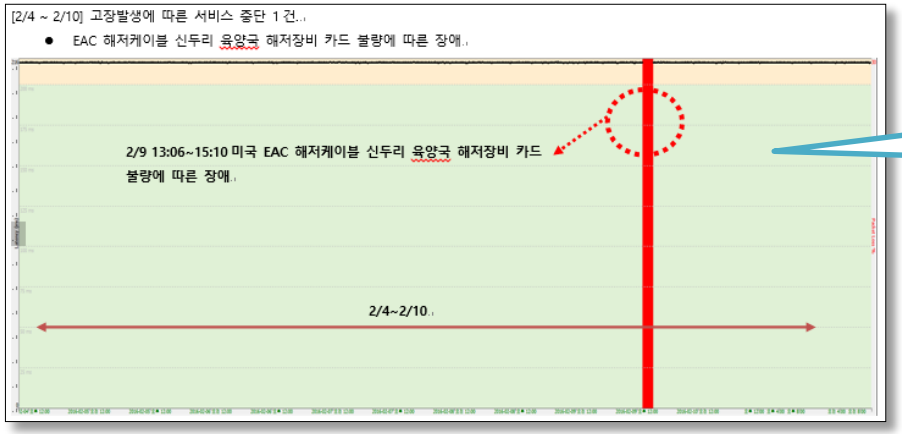




Maintain the LHCOPN

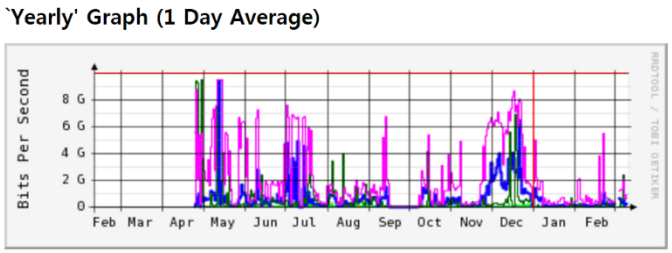
- Report by ISP (SKB) once in a month
- Latency check every hour

K-LHCOPN 대전(KISTI)~시카고(StarLight) 전용 회선 운영결과 보고

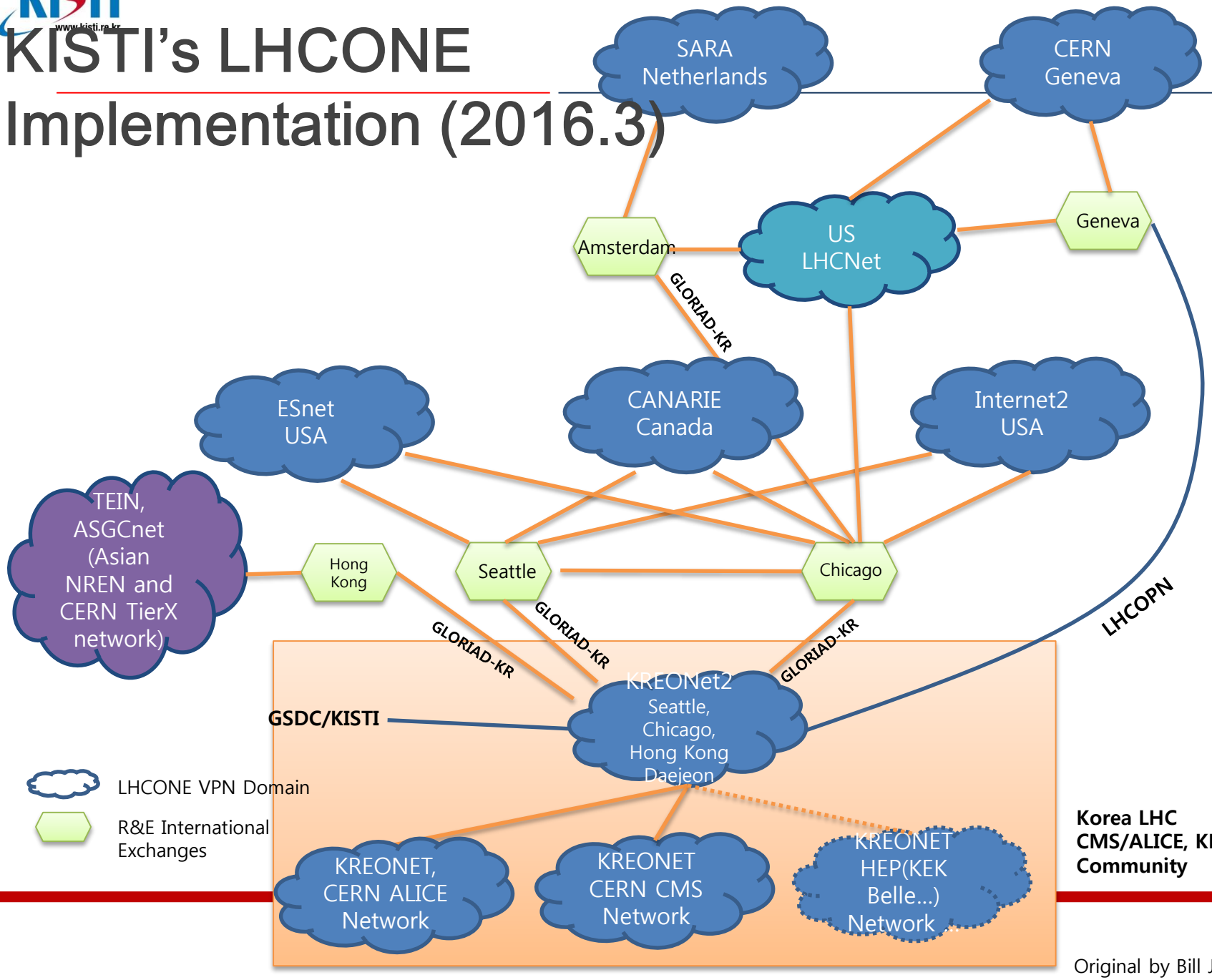


Disable is occured

- MRTG graph check
  - Chicago and KISTI backbone



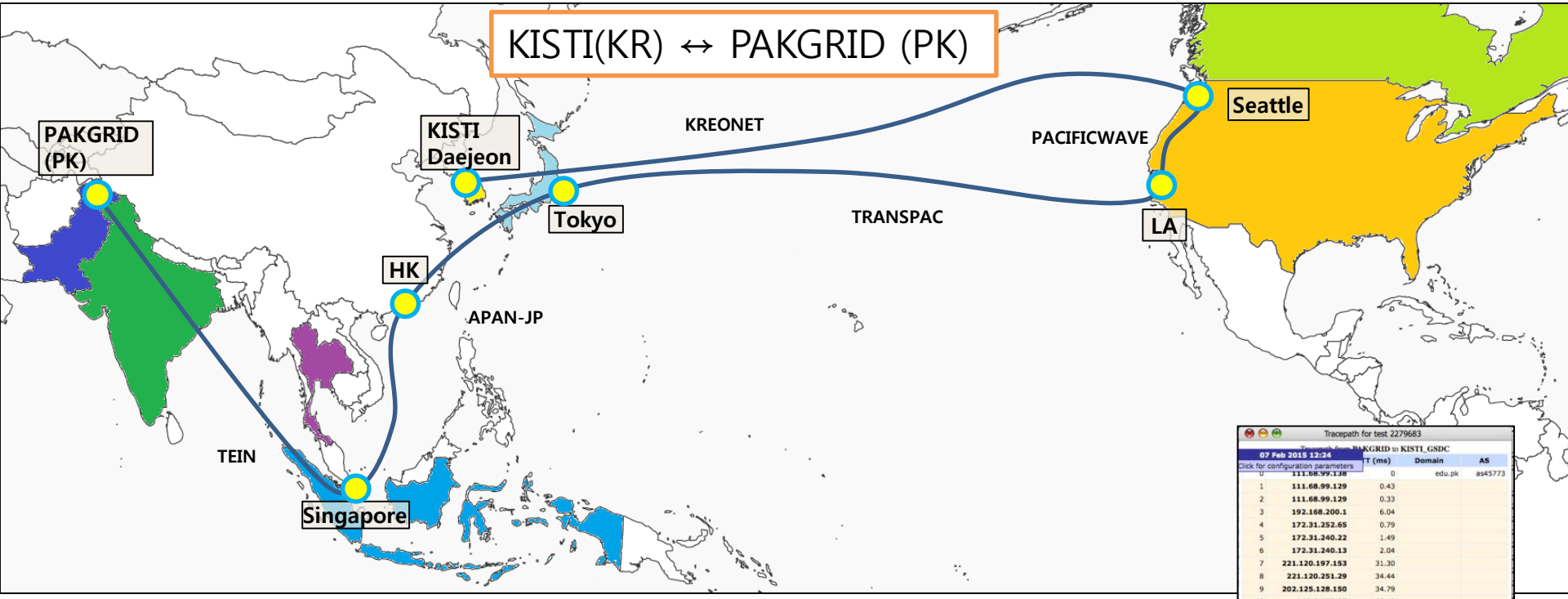
KISTI's LHCONE Implementation (2016.3)



Korea LHC CMS/ALICE, KEK Belle Community

Original by Bill Johnston, Esnet

Example: Previous Status




```
[root@vobox11 ~]# tracepath 111.68.99.138
 1?: [LOCALHOST]      pmtu 1500
 1:  134.75.125.2 (134.75.125.2)                           9.817ms
 1:  134.75.125.2 (134.75.125.2)                           0.286ms
 2:  203.250.102.5 (203.250.102.5)                         0.308ms
 3:  rtr.seat.kreonet2.net (134.75.105.50)               120.033ms
 4:  abilene-1-lo-jmb-706.sttlwa.pacificwave.net (207.231.240.8) 120.118ms
 5:  et-10-0-0.114.rtr.losa.net.internet2.edu (198.71.45.26) 144.286ms
 6:  transpac-1-lo-jmb-702.lsanca.pacificwave.net (207.231.240.136) 150.037ms asymm  7
 7:  tokyo-losa-tp2.transpac.org (192.203.116.146)       149.931ms asymm  6
 8:  kote-dc-gm1-xe2-2-1-4005.jp.apan.net (203.181.248.249) 150.228ms asymm  7
 9:  sg-xe-01-v4.bb.tein3.net (202.179.249.77)           343.952ms asymm 13
10:  202.179.249.38 (202.179.249.38)                     414.595ms asymm 24
11:  no reply
12:  no reply
13:  no reply
14:  no reply
15:  no reply
16:  no reply
17:  no reply
18:  no reply
19:  pcncp25.ncp.edu.pk (111.68.99.138)                  442.810ms reached
     Resume: pmtu 1500 hops 19 back 37
```

Tracepath over 400ms latency

30 hops

Tracepath for test 2279683

Tracepath from PAKGRID to KISTI_GSDC

07 Feb 2015 12:24

Click for configuration parameters

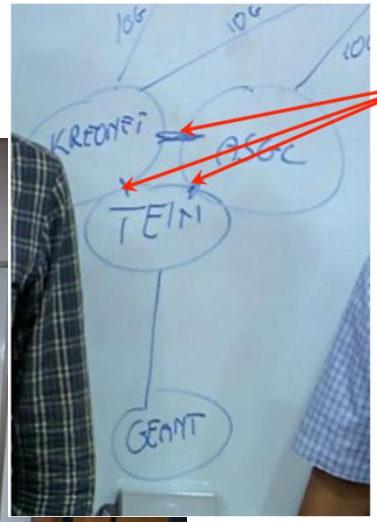
		T (ms)	Domain	AS
0	111.68.99.138	0	edu.pk	as45773
1	111.68.99.129	0.43		
2	111.68.99.129	0.33		
3	192.168.200.1	6.04		
4	172.31.252.65	0.79		
5	172.31.240.22	1.49		
6	172.31.240.13	2.04		
7	221.120.197.153	31.30		
8	221.120.251.29	34.44		
9	202.125.128.150	34.79		
10	149.6.155.25	146.42		
11	154.54.38.170	146.32		
12	154.54.38.173	146.83		
13	130.117.1.157	157.20		
14	154.54.29.117	227.96		
15	154.54.42.85	233.25		
16	154.54.31.125	239.56		
17	154.54.28.130	259.28		
18	154.54.28.70	264.92		
19	154.54.7.54	295.67		
20	38.104.84.190	317.27		
21	38.104.84.190	320.64		
22	112.174.87.233	423.92		
23	112.174.83.17	325.33		
24	203.234.255.166	443.79		
25	134.75.5.209	443.42		
26	134.75.5.209	448.22		
27	134.75.2.2	447.84		
28	134.75.105.114	448.33	kreonet2.net	as1237
29	203.250.102.2	452.02		
30	134.75.125.244	446.94	sdfarm.kr	as1237

Tracepath OK, target reached

KISTI-CERN 250ms latency

LHCONE in Asia

A consensus for LHCONE inter-VRF con nection among KREONet2/GLORIAD-KR(KISTI), ASGC and TEIN



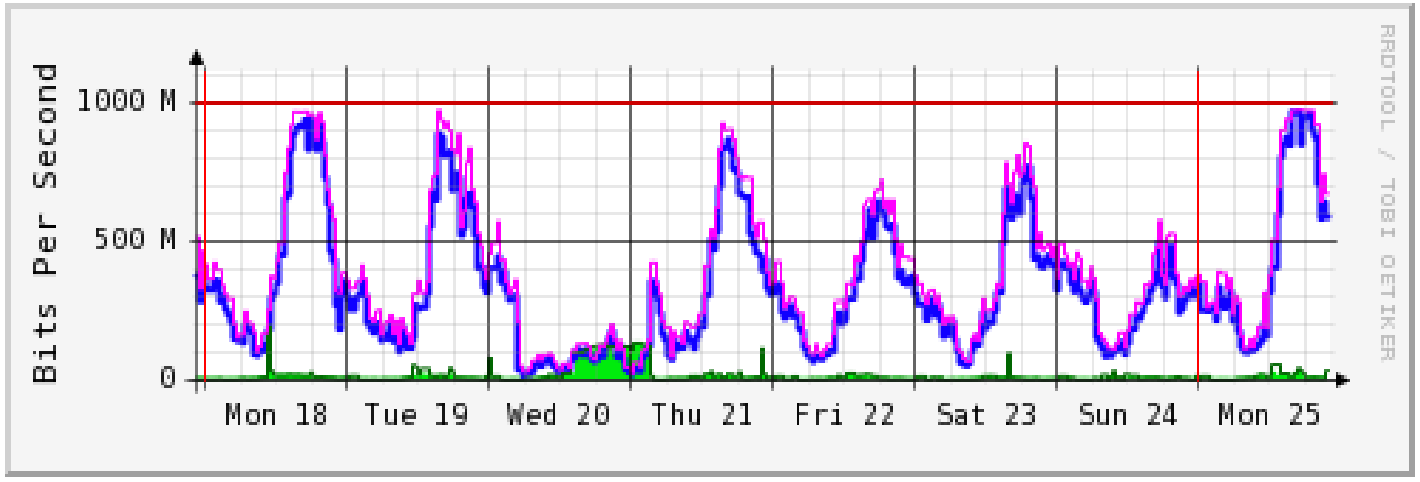
In the context fo LHCONE VRF rules and inter-VRF connections

Asia Tier Center Forum,
KISTI 22-24 September 2015

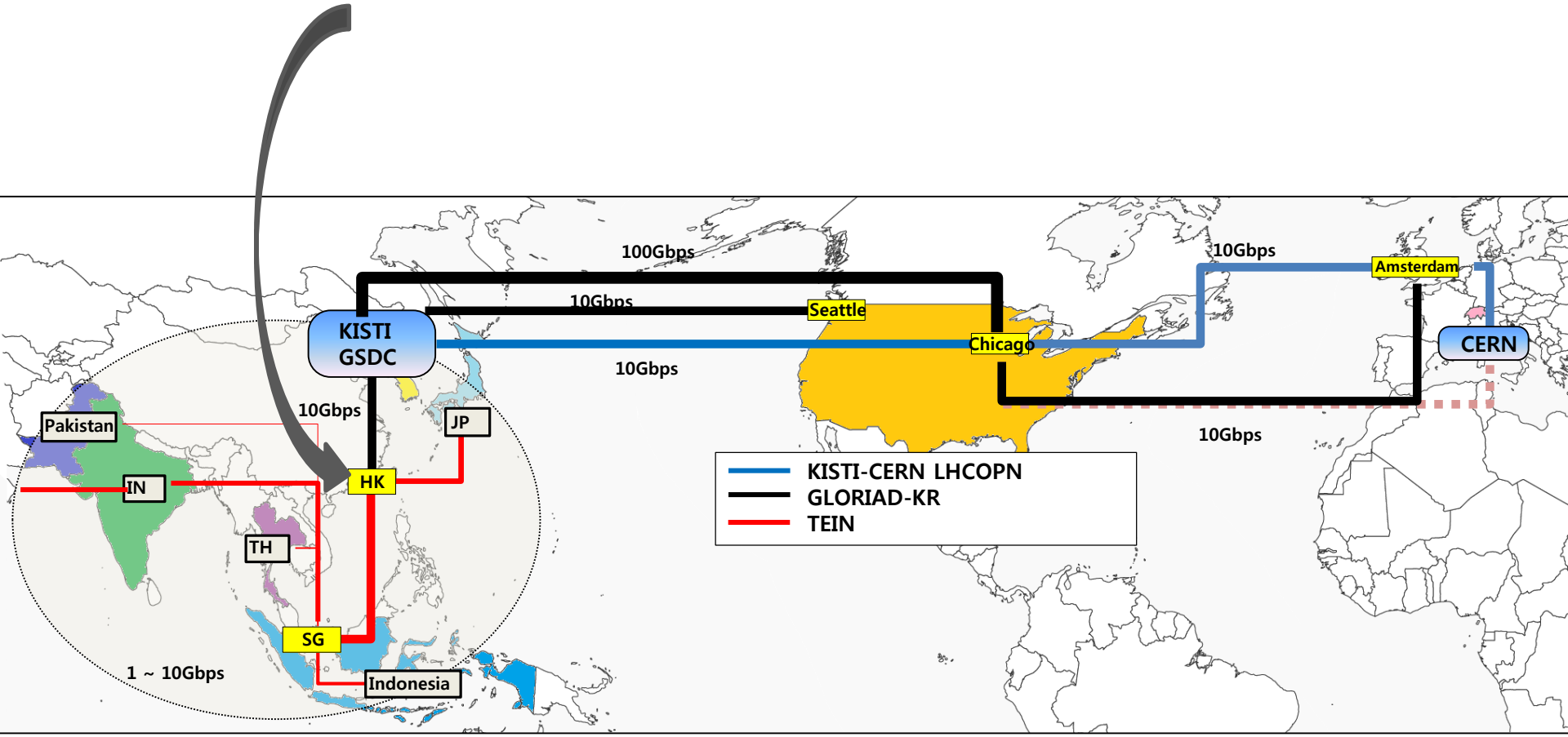
TEIN-GLORIAD-KR (KREONet2) Interconnection

- **Both are col-located in Megai-advantage**
  - ✓ **GLORIAD-KR MX960: MEGA-TOP(32/F)**
  - ✓ **TEIN M120: 8/F**

- **Interconnection : 1G -> 10G**
  - ✓ **Short-term: 1G**



TEIN-GLORIAD-KR Interconnection



Traceroute test

Test

- alice-t1-vobox.sdfarm.kr
  - IP : 134.75.125.152
  - VM Host IP : 134.75.125.27 (alice-prd-ovirt-03.sdfarm.kr)
- tracepath to Asian ALICE sites
  - SUT (TH)
  - COMSATS, PAKGRID (PK)
  - Kolkata (IN)
  - Cibinong, Bandung (ID)

Test Summary

- Thailand
  - SUT : 202.28.43.133
    - Latency = 157.702 ms
    - Hops = 10
- Pakistan
  - PAKGRID : 111.68.99.138
    - Latency = 287.264 ms (over 400ms)
    - Hop = 10 (-9)
  - COMSATS : 210.56.24.242
    - Latency = 424.073 ms
    - Hop = 21
- India
  - Kolkata : 144.16.112.13
    - Latency = 305.338 ms
    - Hop = 11
- Indonesia
  - Bandung : 203.160.128.98
    - Latency = 127.573 ms
    - Hop = 19
  - Cibinong : 203.160.128.89
    - Latency = 109.401 ms
    - Hop = 16

		Thailand	Pakistan		India	Indonesia	
Site		SUT	PAKGRID	COMSATS	Kolkata	Bandung	Chibinong
Latency	Now	157.702	194.064	424.073	305.338	127.573	109.401
	pre		450		450.04	351.38	289.84
Hops		10	10	21	11	19	16

Thailand

SUT : 202.28.43.133
- Latency = 157.702 ms
- Hops = 10

```
[root@alice-t1-vobox ~]# tracepath 202.28.43.133
 1?: [LOCALHOST]      pmtu 1500
 1:  134.75.125.3 (134.75.125.3)                                    7.690ms
 1:  134.75.125.3 (134.75.125.3)                                    6.067ms
 2:  203.250.102.1 (203.250.102.1)                                  0.329ms
 3:  134.75.105.18 (134.75.105.18)                                 34.983ms
 4:  202.179.241.109 (202.179.241.109)                            114.062ms asymm  5
 5:  sg-xe-03-v4.bb.tein3.net (202.179.241.102)                   152.323ms asymm  6
 6:  th-pr-v4.bb.tein3.net (202.179.249.66)                       149.275ms asymm  9
 7:  pyt-to-02-bdr-pyt-link-2.uni.net.th (202.29.12.14)           153.500ms asymm 10
 8:  100.64.253.1 (100.64.253.1)                                  157.589ms asymm 14
 9:  nrm-cr-01-bundle-ether-10-to-sut.uni.net.th (202.28.208.18) 153.005ms asymm 14
10:  alice.sut.ac.th (202.28.43.133)                              157.702ms reached
     Resume: pmtu 1500 hops 10 back 13
```

Pakistan

PAKGRID : 111.68.99.138
- Latency = 287.264 ms (over 400ms)
- Hop = 10 (-9)

```
[root@alice-t1-vobox ~]# tracepath 111.68.99.138
 1?: [LOCALHOST]      pmtu 1500
 1:  134.75.125.3 (134.75.125.3)                            0.424ms
 1:  134.75.125.3 (134.75.125.3)                            5.670ms
 2:  203.250.102.1 (203.250.102.1)                          0.479ms
 3:  134.75.105.18 (134.75.105.18)                         35.183ms
 4:  202.179.241.109 (202.179.241.109)                    100.635ms asymm  5
 5:  sg-xe-03-v4.bb.tein3.net (202.179.241.102)           139.148ms asymm  6
 6:  pk-pr-v4.bb.tein3.net (202.179.249.46)               234.701ms
 7:  172.31.254.65 (172.31.254.65)                        276.455ms
 8:  172.31.254.66 (172.31.254.66)                        282.080ms
 9:  no reply
10:  pcncp25.ncp.edu.pk (111.68.99.138)                   287.264ms reached
     Resume: pmtu 1500 hops 10 back 10
```

COMSATS : 210.56.24.242
- Latency = 424.073 ms
- Hop = 21

```
[root@alice-t1-vobox ~]# tracepath 210.56.24.242
 1?: [LOCALHOST]      pmtu 1500
 1:  134.75.125.3 (134.75.125.3)                            0.418ms
 1:  134.75.125.3 (134.75.125.3)                            0.439ms
 2:  203.250.102.1 (203.250.102.1)                          0.526ms
 3:  134.75.105.113 (134.75.105.113)                        0.402ms
 4:  134.75.2.1 (134.75.2.1)                                3.190ms
 5:  134.75.5.210 (134.75.5.210)                            3.500ms
 6:  203.234.255.165 (203.234.255.165)                     13.010ms asymm  7
 7:  112.174.83.121 (112.174.83.121)                        7.214ms
 8:  112.174.84.106 (112.174.84.106)                        4.648ms asymm  9
 9:  112.174.87.222 (112.174.87.222)                      139.409ms asymm 10
10:  121.189.2.98 (121.189.2.98)                          162.902ms asymm 11
11:  ae1-xcr2.nyk.cw.net (195.2.30.38)                    269.966ms asymm 17
12:  ae0-xcr1.nyh.cw.net (195.2.25.70)                    270.266ms asymm 16
13:  et-10-3-0-xcr1.ptl.cw.net (195.2.24.242)             288.357ms asymm 12
14:  ae5-xcr1.mar.cw.net (195.2.30.214)                   311.381ms asymm 13
15:  ptcl-gw.prp.cw.net (195.10.54.222)                   429.265ms asymm 24
16:  static-10GE-KHI275-P01-SwB.pie.net.pk (202.125.128.156) 406.853ms asymm 24
17:  rwp44.pie.net.pk (221.120.254.13)                    431.267ms asymm 22
18:  rwp44.pie.net.pk (221.120.253.34)                    445.429ms asymm 23
19:  210.56.8.129 (210.56.8.129)                          430.091ms asymm 28
20:  210.56.8.129 (210.56.8.129)                          437.199ms asymm 28
21:  cern-56-24-242.comsats.edu.pk (210.56.24.242)        424.073ms reached
     Resume: pmtu 1500 hops 21 back 27
```

India

Kolkata : 144.16.112.13

- Latency = 305.338 ms 450.04 ms
- Hop = 11

```
[root@alice-t1-vobox ~]# tracepath 144.16.112.13
 1?: [LOCALHOST]      pmtu 1500
 1:  134.75.125.3 (134.75.125.3)                            0.396ms
 1:  134.75.125.3 (134.75.125.3)                            8.539ms
 2:  203.250.102.1 (203.250.102.1)                          0.436ms
 3:  134.75.105.18 (134.75.105.18)                         35.044ms
 4:  202.179.241.109 (202.179.241.109)                    108.333ms asymm  5
 5:  sg-xe-03-v4.bb.tein3.net (202.179.241.102)           139.646ms asymm  6
 6:  202.179.249.2 (202.179.249.2)                        145.190ms
 7:  202.179.249.14 (202.179.249.14)                      203.584ms
 8:  in-pr-v4.bb.tein3.net (202.179.249.42)               209.447ms
 9:  no reply
10:  144.16.112.28 (144.16.112.28)                        296.045ms asymm 12
11:  grid01.tier2-kol.res.in (144.16.112.13)              305.338ms reached
     Resume: pmtu 1500 hops 11 back 13
```

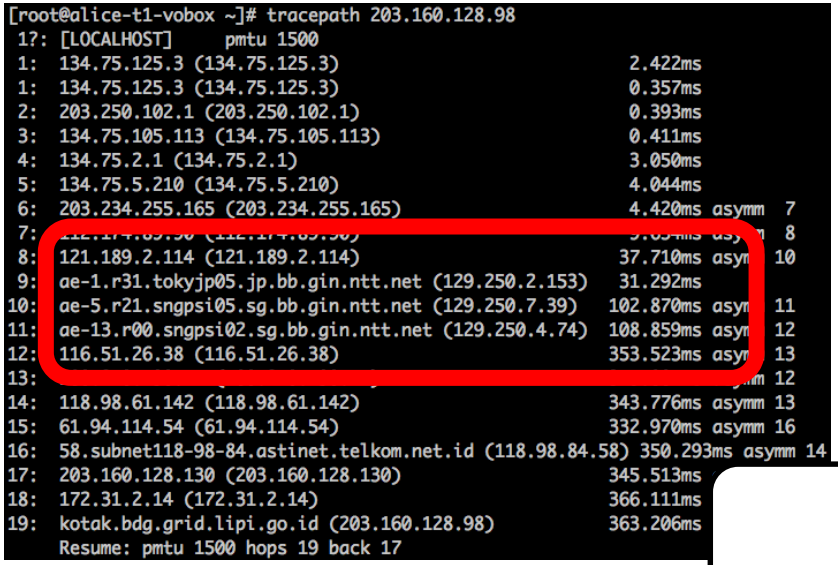
Indonesia

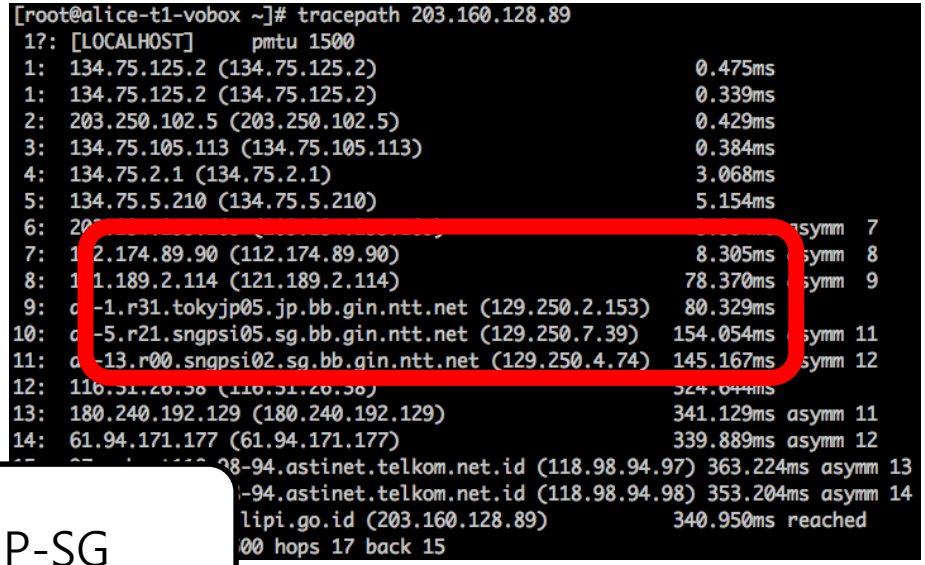
Bandung : 203.160.128.98
- Latency = 127.573 ms
- Hop = 19

351.38 ms

Cibinong : 203.160.128.89
- Latency = 109.401 ms
- Hop = 17

289.84 ms





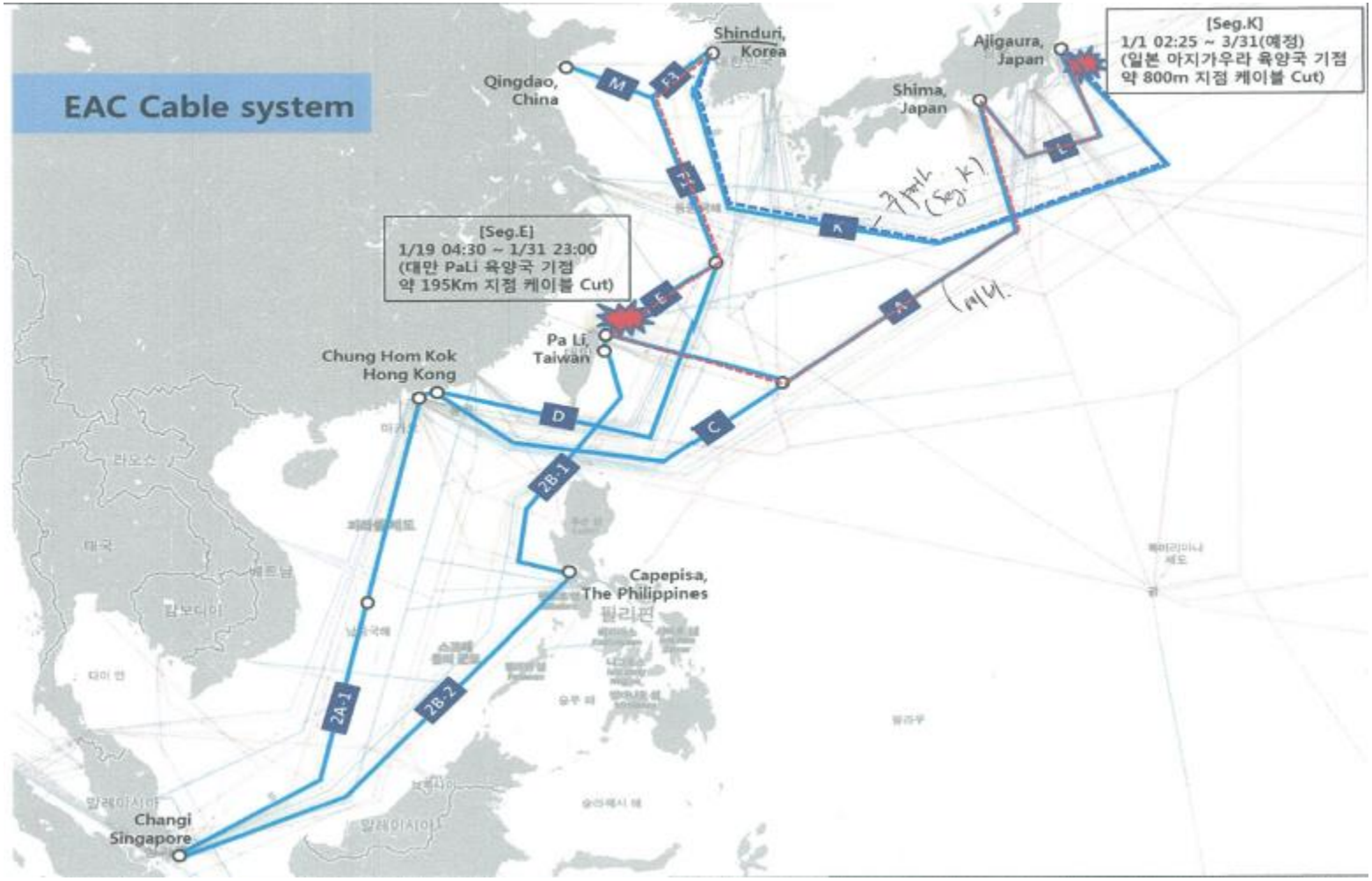
KR-JP-SG

Submarine cable issue

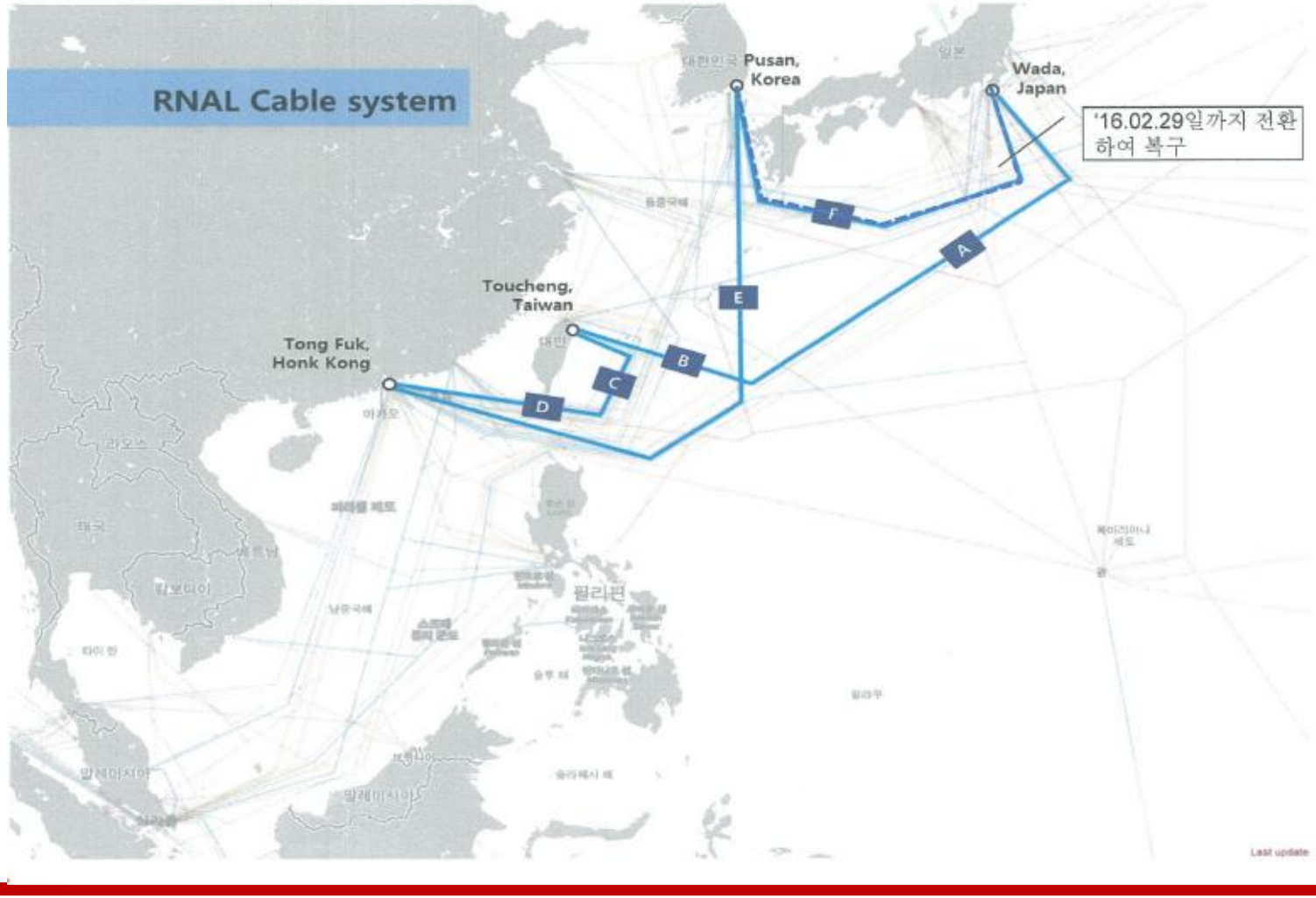
Submarine cable Disable

- First disable
  - 2015. 8. 14 sub-cable cut (HK-Taiwan)
  - 2015. 9. 19 main-cable cut (Kor – Jap)
  - Total disable time: 29H 56M
- Second disable
  - 2016. 1. 1 main-cable cut (Kor-Jap)
  - 2016. 1. 19 sub-cable cut (HK-Taiwan)
  - Total disable time: 9H 14M

Submarine cable Issue (1/2)



Submarine cable Issue (2/2)



Thank You (Q or C)