

TEIN NOC Report

Zhonghui Li

1 Aug 2016

Outline

- TEIN General Operation Updates
- TEIN Backbone Traffic Statistics
- Total Traffic over TEIN Backbone
- SCU/DCU Analysis Example
- Change on routing to NA R&E Networks

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- **TEIN General Operation Updates**
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- Change on routing to NA R&E Networks

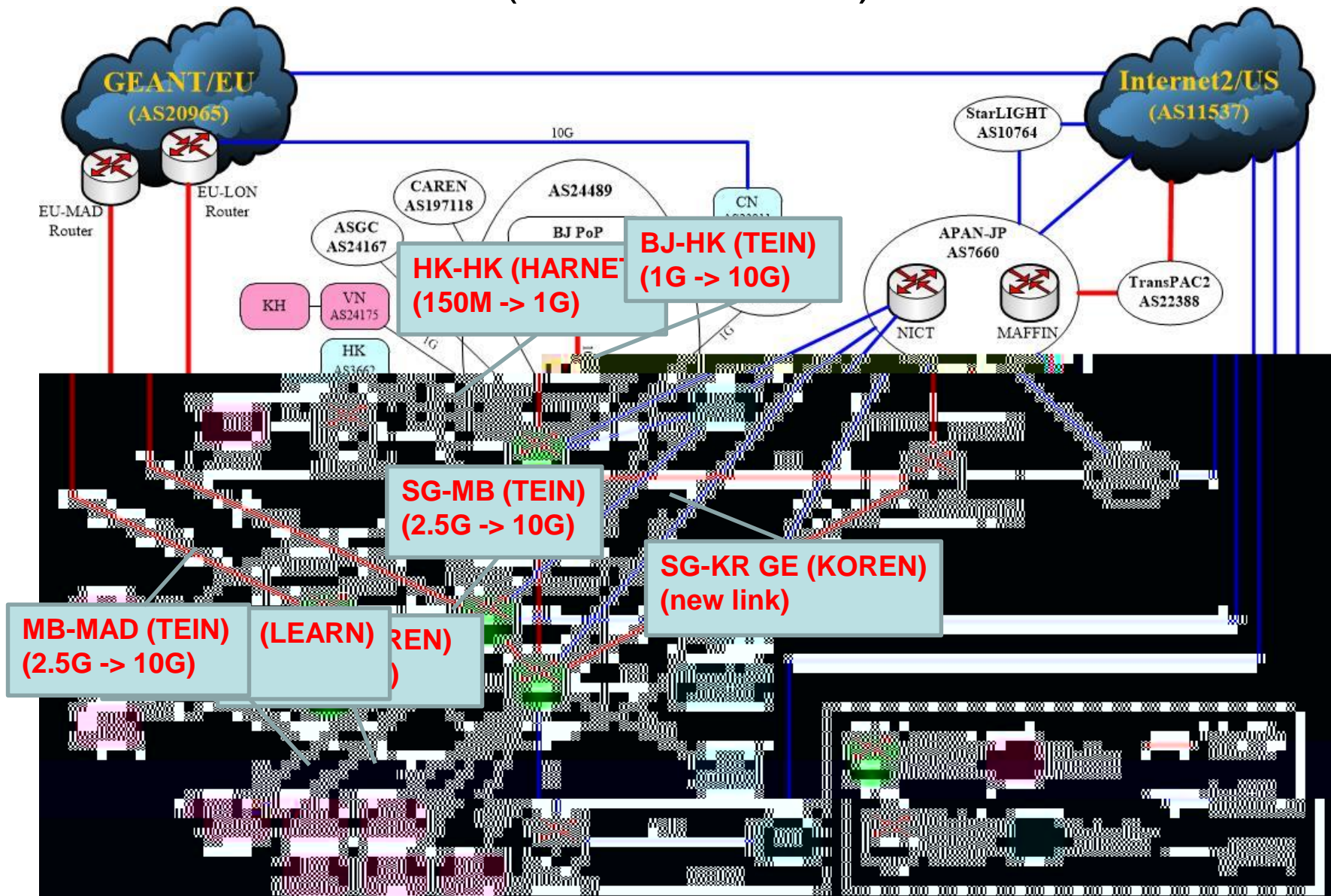
TEIN General Operation Updates

(Jan 2016 – Jun 2016)

- TEIN Topology
- Major Operation Issues
- Trouble Ticket Statistics
- Link Availability
- Link Utilization
- Current Status of Advanced Service

TEIN Topology

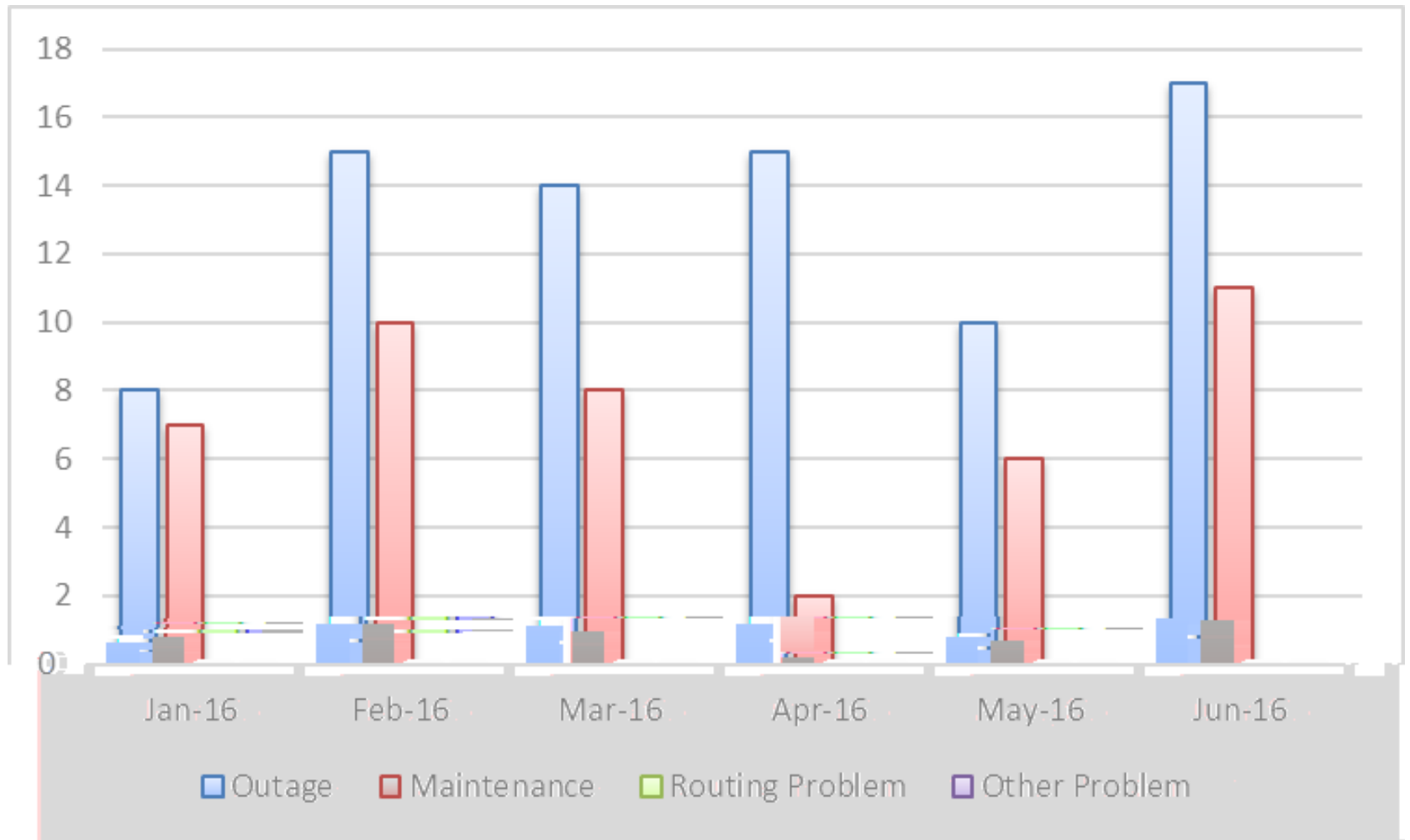
(~ 31 Jul 2016)



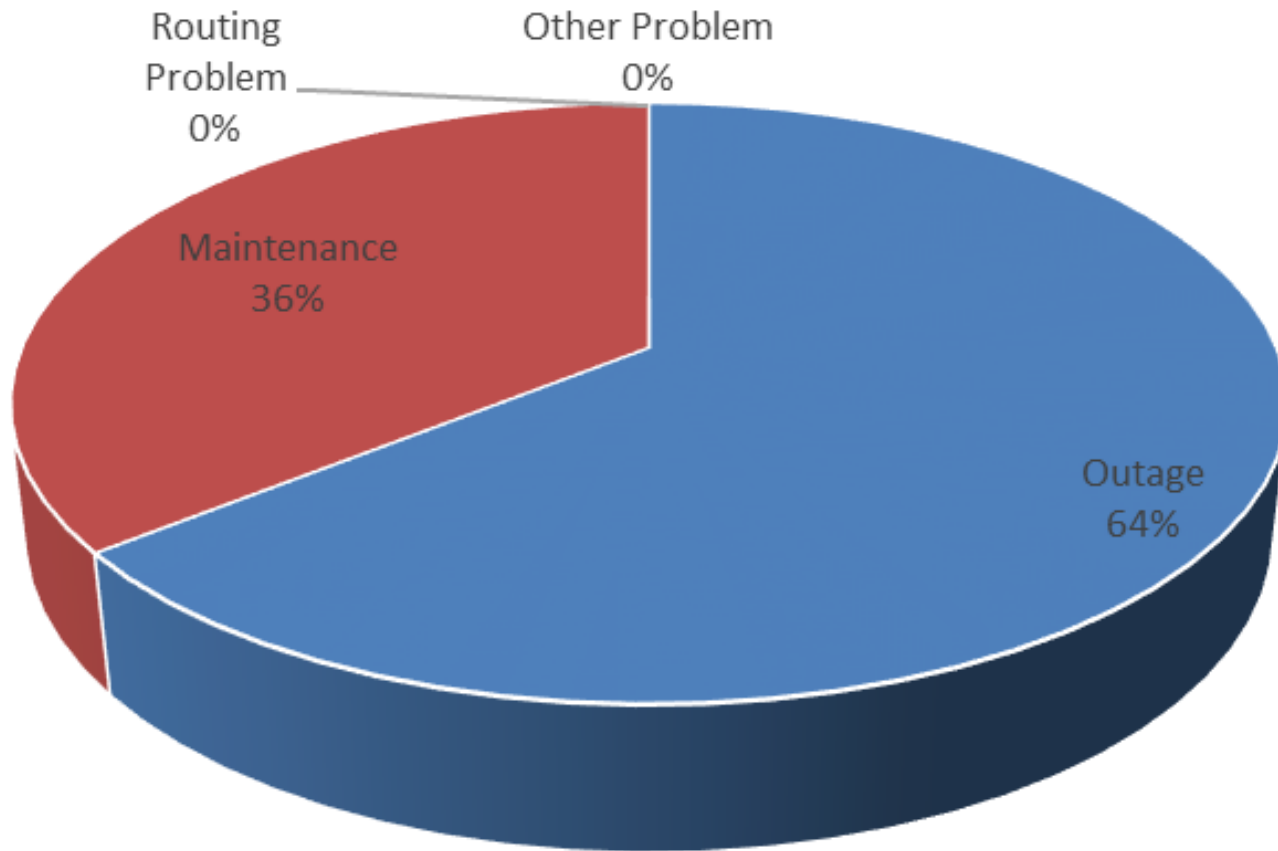
Major Operation Issues

- Upgraded SG-MB link from 2.5G to 10G
- Brought up SG-KR GE link
- Increased rate-limit for HARNET access link from 150Mbps to 1Gbps
- Upgraded SG-MY link from 622M to 1G
- Upgraded MB-MAD link from 2.5G to 10G
- Brought up SG-LK GE link (decommissioned MB-LK link)
- Upgraded BJ-HK link from 1G to 10G
- Established L2VPN between SingAREN and MYREN for their direct peering

Trouble Ticket Statistics

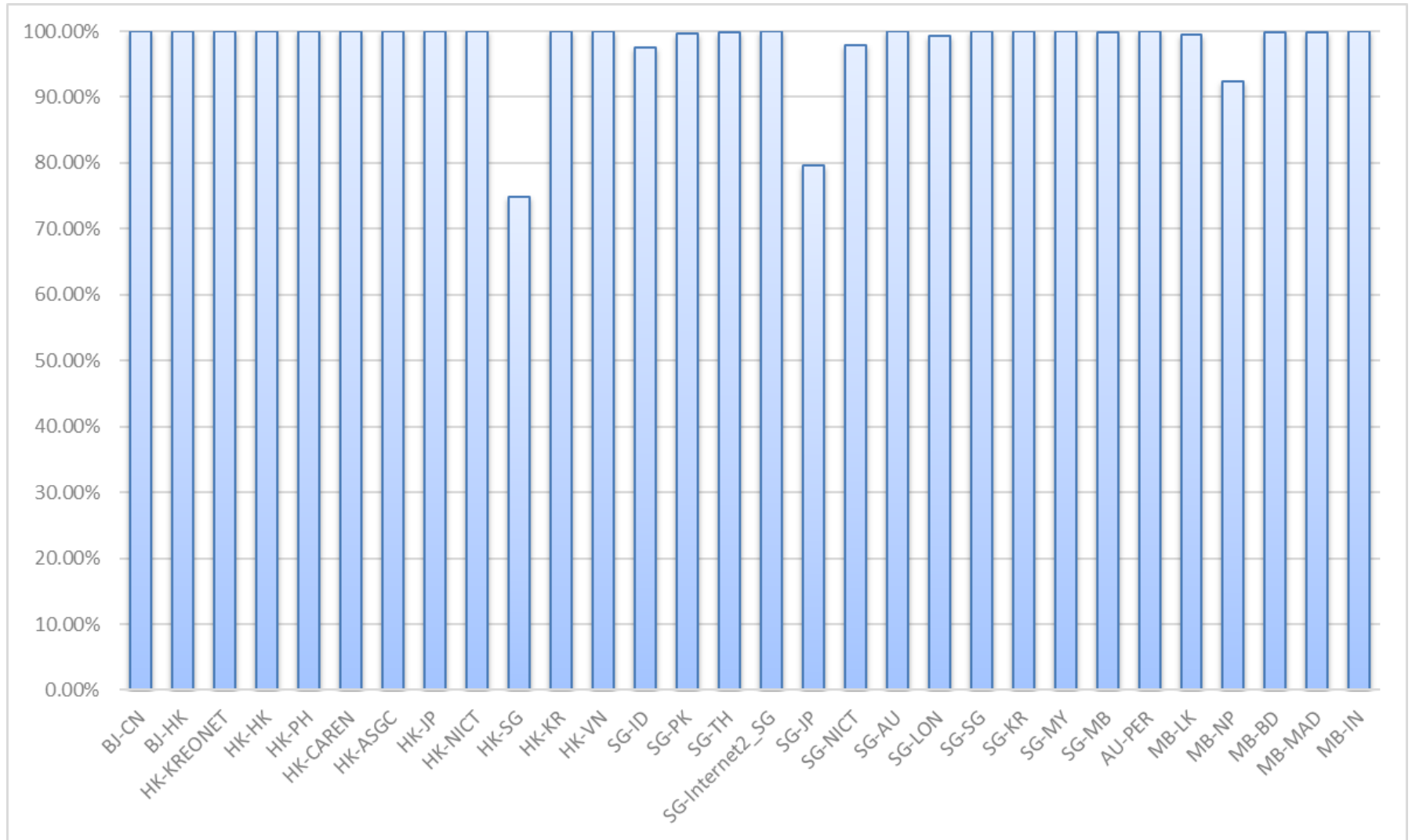


Trouble Ticket Statistics



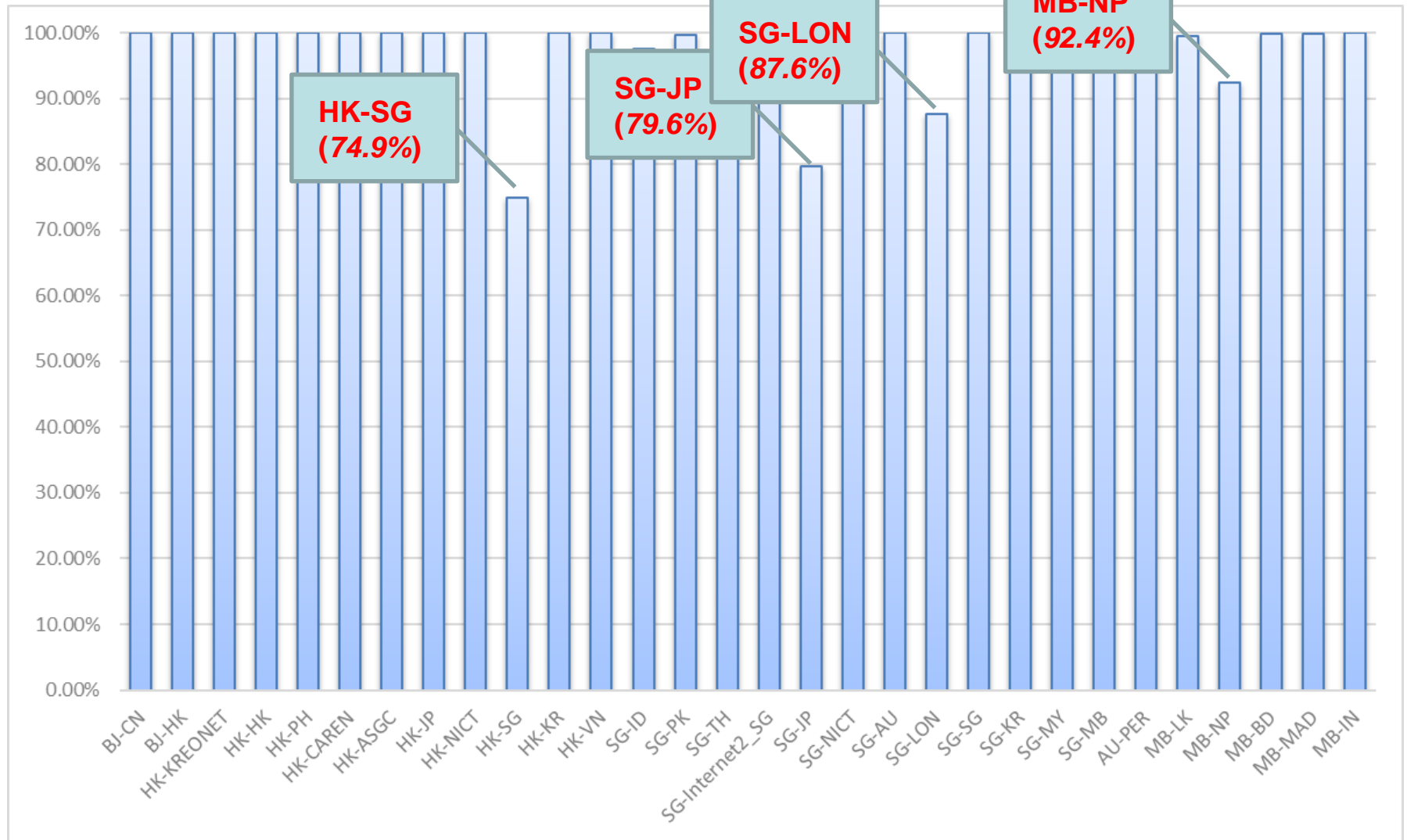
Link Availability

(w/o maintenance)

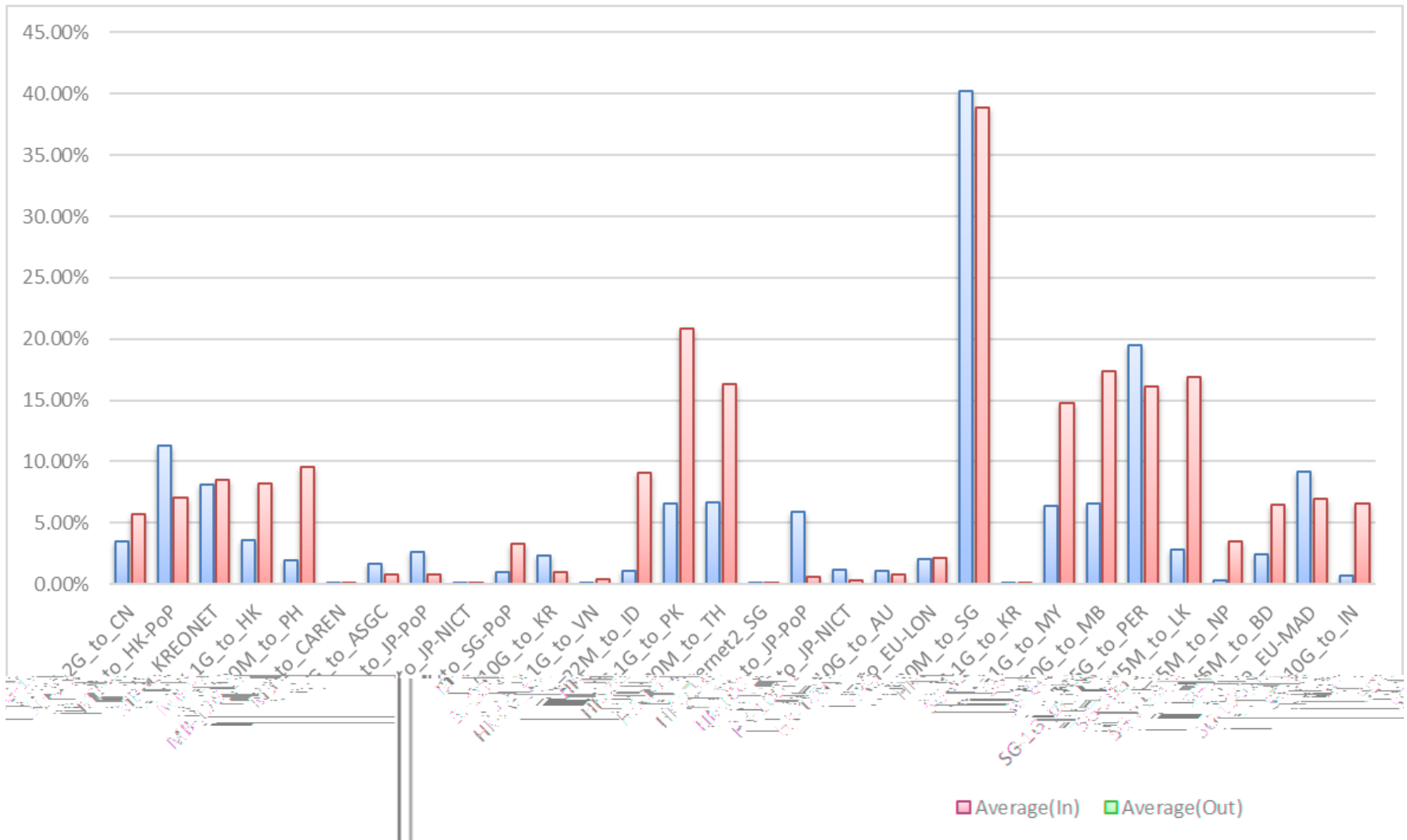


Link Availability

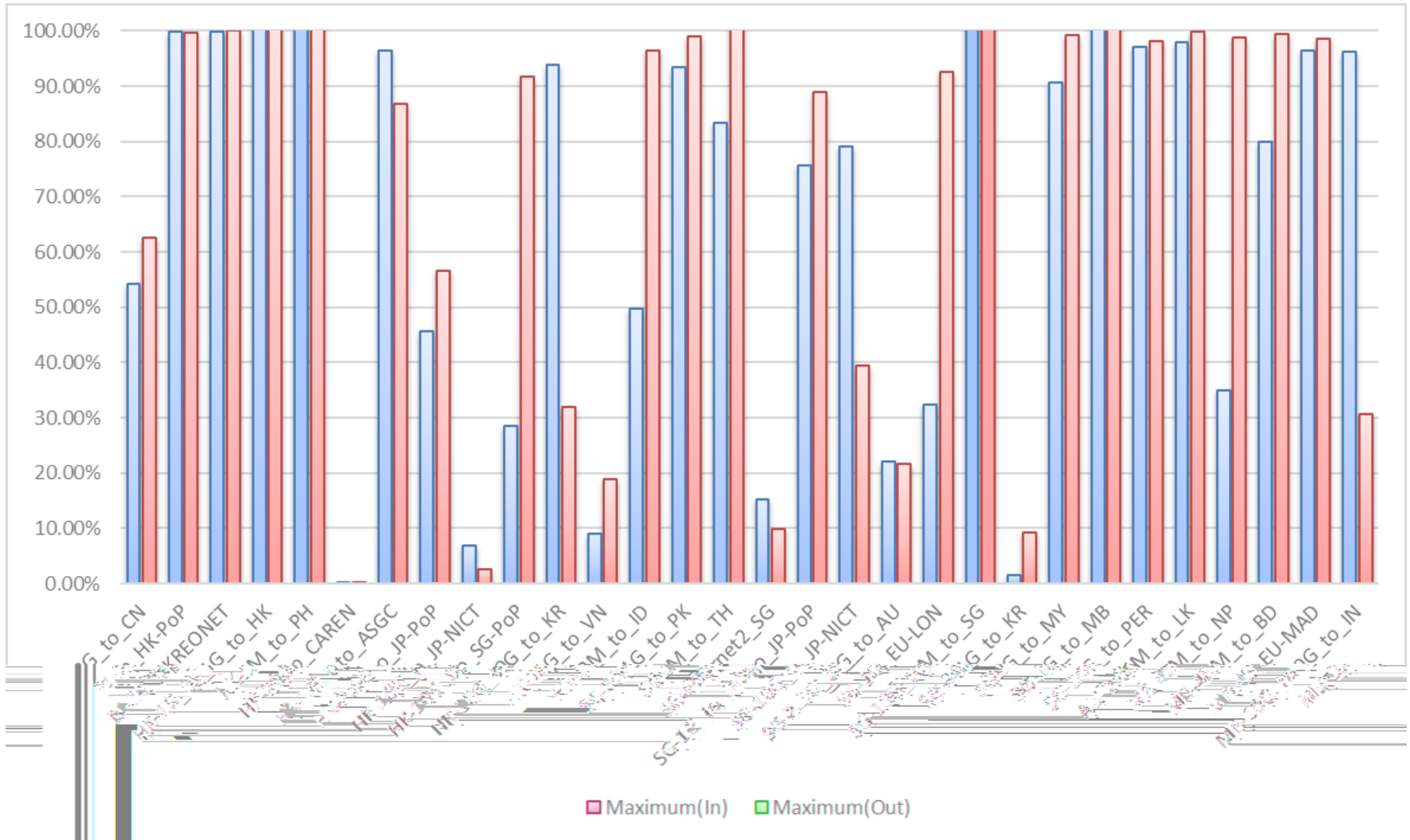
(with maintenance)



Link Utilization (average)



Link Utilization (maximum)



Status of Advanced Service (~ 31 Jul 2016)

[illegible]

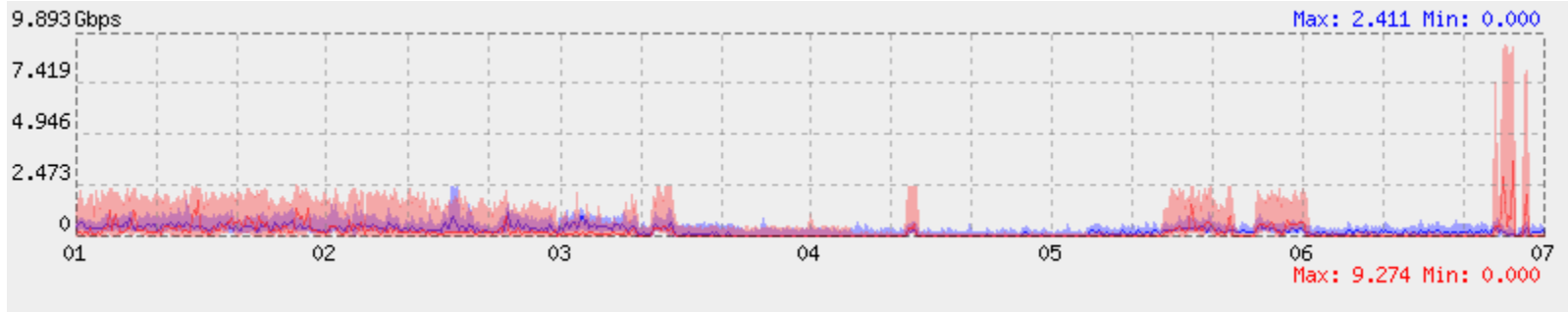
Outline

- TEIN General Operation Updates
- **TEIN Backbone Traffic Statistics**
- Total Traffic over TEIN Backbone
- SCU/DCU Analysis Example
- Change on routing to NA R&E Networks

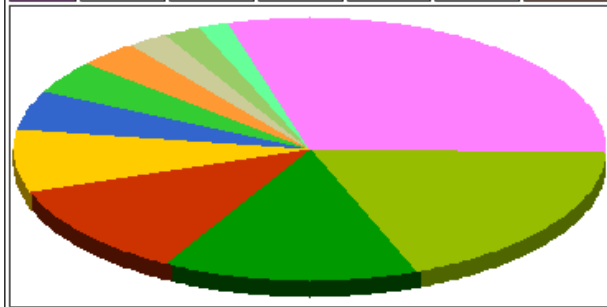
TEIN Backbone Traffic Statistics

- 2 TEIN-EU links and NREN access links
- Time scale
 - 1 Jan 2016 ~ 30 Jun 2016
- Statistics
 - Traffic graph
 - AS Top 3
 - Interface mode (more details in monthly report)
 - IPv4 only (exclusive of L2VPN traffic)

MB-MAD 2.5G & 10G

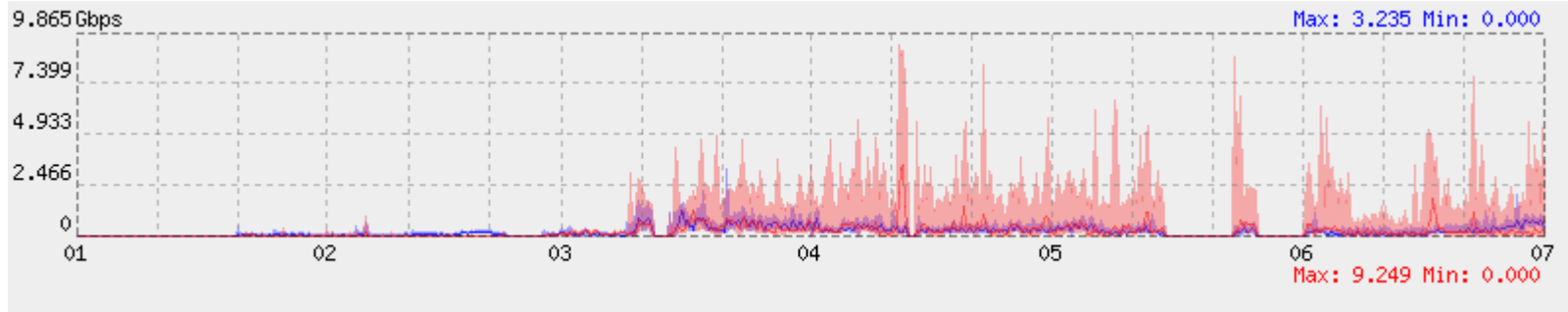


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
786	894.7M	700.5M	1.6G	1.0T	508.2G	1.5T
137	563.7M	550.6M	1.1G	708.7G	434.4G	1.1T
513	256.5M	755.6M	1.0G	314.8G	659.3G	974.1G
680	271.0M	380.0M	651.1M	288.5G	347.5G	636.0G
1853	25.0M	270.1M	295.1M	29.7G	354.3G	384.1G
766	197.4M	125.8M	323.2M	240.7G	101.2G	342.0G
789	93.5M	231.8M	325.3M	103.8G	180.6G	284.4G
2200	128.3M	57.3M	185.6M	151.8G	35.3G	187.1G
1930	132.4M	15.9M	148.2M	143.8G	6.9G	150.6G
559	109.6M	52.9M	162.6M	123.9G	25.0G	148.8G
Other	1.7G	839.7M	2.6G	1.9T	567.8G	2.4T

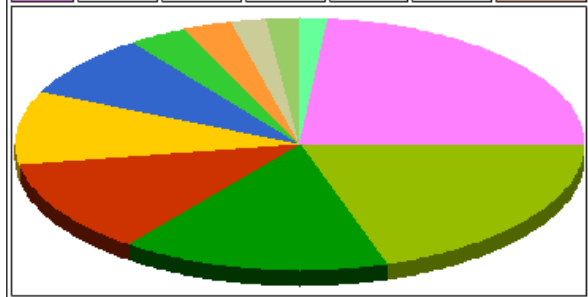


AS786: JANET (UK)
 AS137: GARR (Italy)
 AS513: CERN (Switzerland)

SG-LON 10G

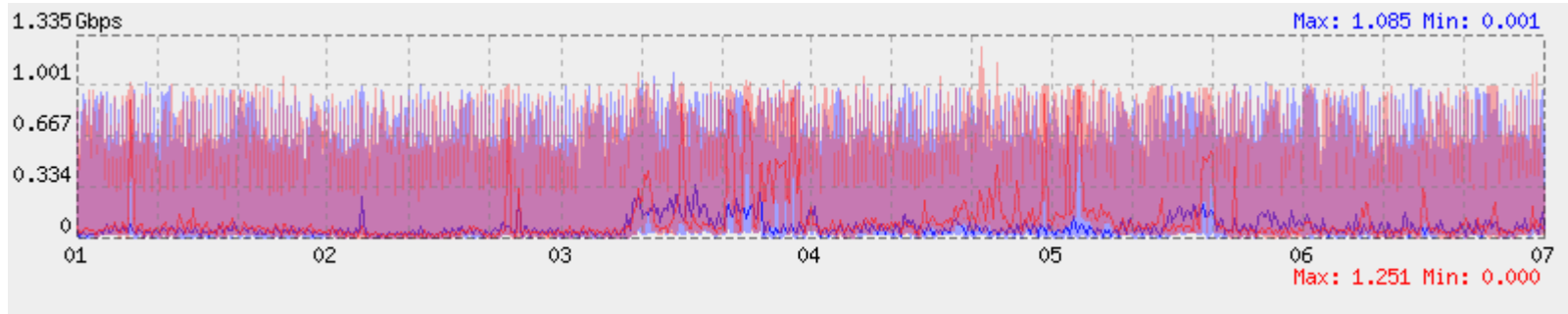


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
786	496.9M	599.1M	1.1G	607.9G	395.9G	1003.7G
680	105.4M	554.6M	660.0M	119.8G	639.1G	758.8G
513	180.4M	434.7M	615.0M	230.5G	363.7G	594.2G
137	225.2M	359.6M	584.8M	277.4G	206.6G	484.1G
31703	321.4M	106	321.4M	396.3G	4.8K	396.3G
789	68.9M	108.0M	176.9M	80.4G	92.7G	173.1G
766	61.3M	82.1M	143.5M	70.9G	73.4G	144.3G
1853	5.8M	73.1M	78.9M	6.5G	92.1G	98.6G
559	56.0M	45.5M	101.5M	62.9G	27.8G	90.6G
2200	49.2M	53.3M	102.6M	56.6G	27.6G	84.2G
Other	669.7M	726.2M	1.4G	734.7G	435.3G	1.1T

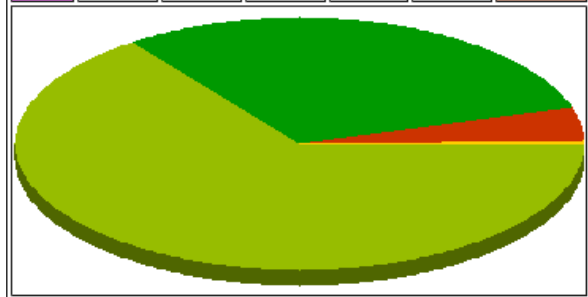


AS786: JANET (UK)
 AS680: DFN (Germany)
 AS513: CERN (Switzerland)

CERNET 2G

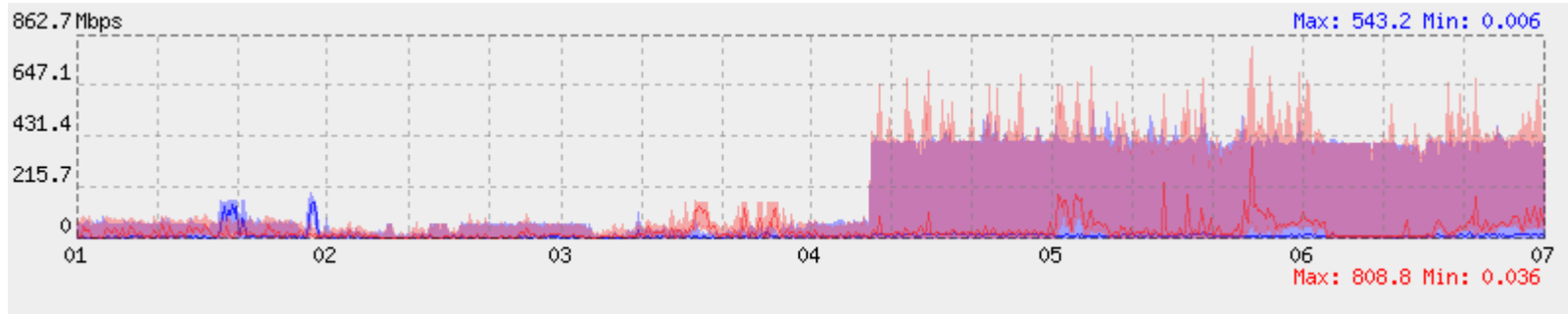


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
7497	245.3M	1.6G	1.9G	180.6G	1.8T	2.0T
4538	677.4M	532.9M	1.2G	560.5G	389.0G	949.6G
23911	27.2M	109.1M	136.3M	29.0G	98.2G	127.3G
24489	35.9M	2.5M	38.4M	13.7G	371.8M	14.1G
9401	424.4K	6.4M	6.8M	162.9M	4.0G	4.2G
18011	2.5M	0	2.5M	2.0G	0	2.0G
24134	1.6M	5.3M	6.9M	501.8M	668.2M	1.1G
23910	6.5M	308.7K	6.8M	890.0M	121.9M	1012.0M
24573	588.9K	0	588.9K	470.3M	0	470.3M
24151	273.1K	2.5M	2.7M	108.9M	171.5M	280.4M
Other	444.6K	1.1M	1.6M	306.8M	393.6M	700.4M

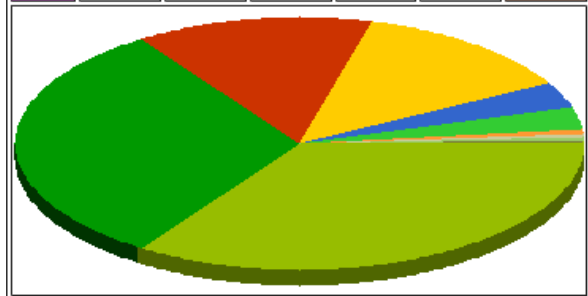


AS7497: CSTNET (China)
 AS4538: CERNET (China)
 AS23911: CNGI-6IX (China)

HARNET 1G

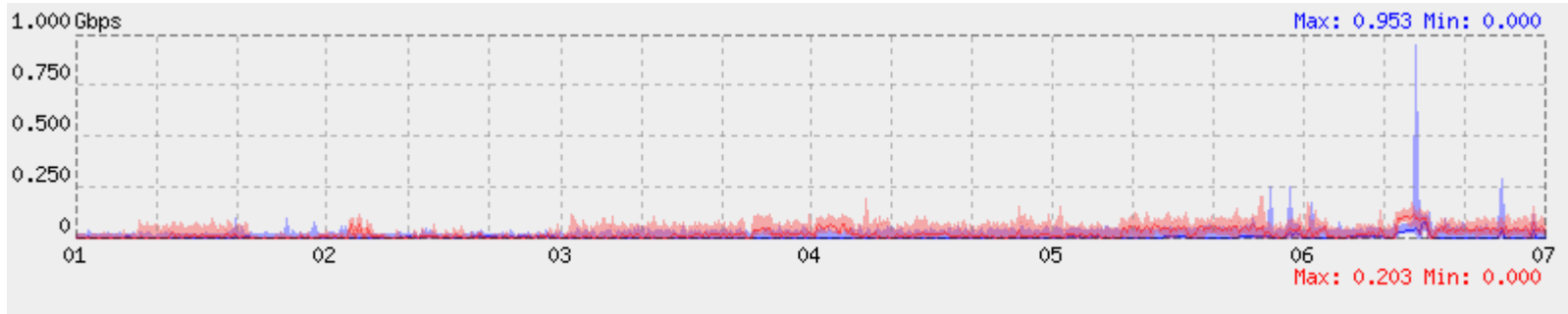


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
3363	29.5M	384.7M	414.2M	8.0G	448.1G	456.1G
3661	261.9M	171.2M	433.1M	244.7G	164.7G	409.3G
4528	10.2K	182.7M	182.7M	9.3M	179.9G	179.9G
4616	317.5K	144.9M	145.2M	153.5M	166.8G	166.9G
4153	123.3M	1.0M	124.4M	43.5G	1.3G	44.8G
4603	2.7M	35.9M	38.6M	795.5M	36.2G	37.0G
7650	128.1K	9.2M	9.3M	67.5M	8.1G	8.1G
3662	7.6M	6.6M	14.2M	3.8G	3.6G	7.4G
24489	5.8M	107.1K	5.9M	2.6G	11.5M	2.6G
17764	7	1.3M	1.3M	7.0K	1.1G	1.1G
Other	1.3M	696.1K	1.9M	552.7M	494.5M	1.0G

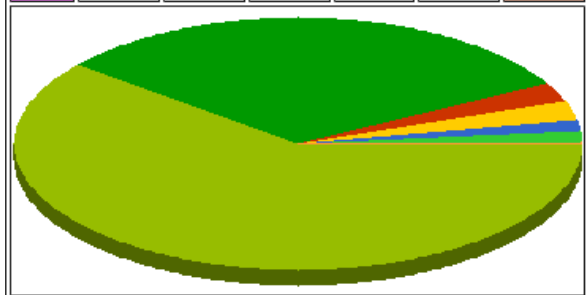


AS3363: HKUST (Hong Kong)
AS3661: CUHK (Hong Kong)
AS4528: HKU (Hong Kong)

ASTI 1G

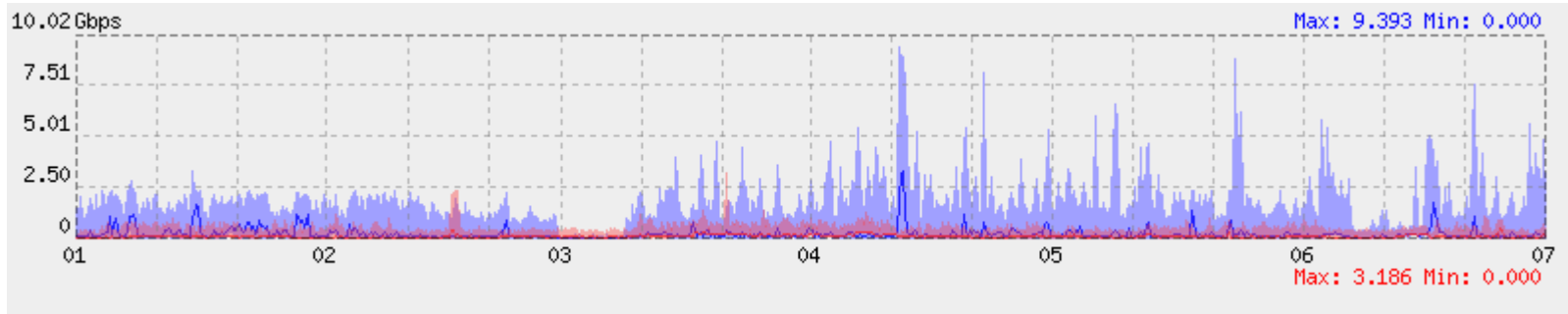


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
9821	226.4M	375.4M	601.9M	118.5G	184.0G	302.4G
23862	2.7M	148.8M	151.4M	725.1M	154.4G	155.1G
23456	3.0M	9.9M	12.9M	936.2M	11.6G	12.5G
17721	4.2M	10.2M	14.4M	674.3M	11.1G	11.8G
45209	1.8M	6.0M	7.9M	207.6M	7.4G	7.6G
18188	2.6M	5.9M	8.4M	1.4G	5.6G	7.1G
45600	48.7K	735.7K	784.4K	24.5M	766.9M	791.3M
63848	173.7K	326.0K	499.7K	23.4M	294.5M	317.8M
24489	1.2M	135.7K	1.3M	172.2M	22.6M	194.8M
7660	9.6K	0	9.6K	522.1K	0	522.1K
Other	1.1K	0	1.1K	385.9K	0	385.9K

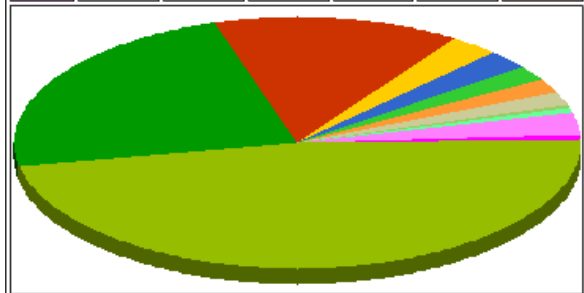


AS9821: ASTI (Philippines)
 AS23862: DILNET (Philippines)
 AS23456: Aggregation of 4-byte AS

KOREN 10G

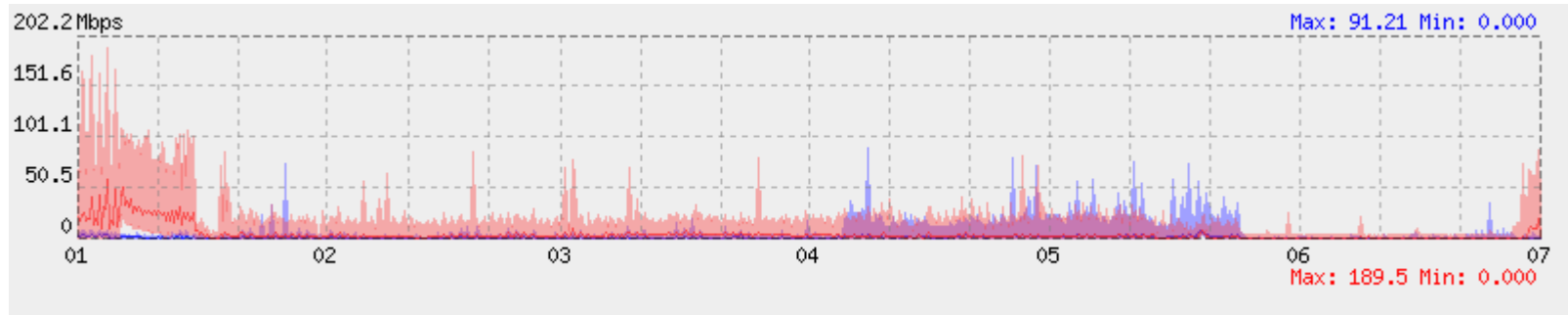


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
10052	2. 2G	177. 5M	2. 4G	1. 8T	117. 9G	1. 9T
9270	1. 5G	889. 4M	2. 4G	743. 0G	230. 0G	973. 0G
4665	41. 3M	443. 6M	484. 9M	12. 0G	583. 3G	595. 3G
9488	464. 8K	151. 0M	151. 5M	425. 0M	119. 4G	119. 8G
10063	81. 8M	1. 0M	82. 8M	105. 2G	157. 9M	105. 4G
10197	36. 2M	70. 2M	106. 4M	18. 1G	68. 7G	86. 8G
18158	24. 2M	118. 8M	143. 0M	1. 8G	69. 9G	71. 7G
1781	27. 1M	75. 5M	102. 5M	12. 1G	57. 2G	69. 4G
9686	68. 6M	12. 1M	80. 7M	15. 1G	11. 7G	26. 8G
17870	14. 3M	21. 5M	35. 8M	4. 3G	20. 8G	25. 2G
Other	34. 5M	145. 2M	179. 6M	12. 2G	110. 0G	122. 2G




AS10052: KNU (Korea)
 AS9270: KOREN (Korea)
 AS4665: YONSEI (Korea)

VinaREN 1G



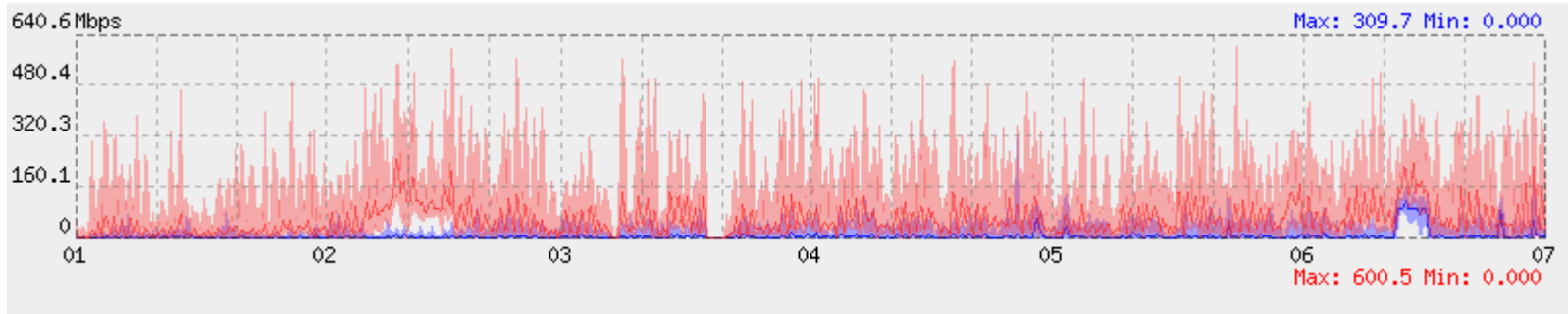
AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
24175	97.3M	127.5M	224.8M	32.3G	137.0G	169.3G
24489	885.9K	102.0K	987.8K	41.0M	12.6M	53.6M



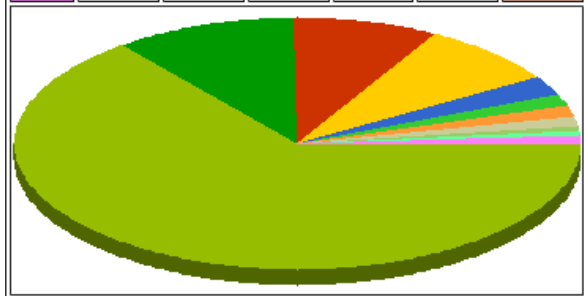
A large, solid green oval shape is positioned below the table. It has a slight 3D effect with a darker green shadow on its right side.

AS24175: VinaREN (Vietnam)

ITB 622M

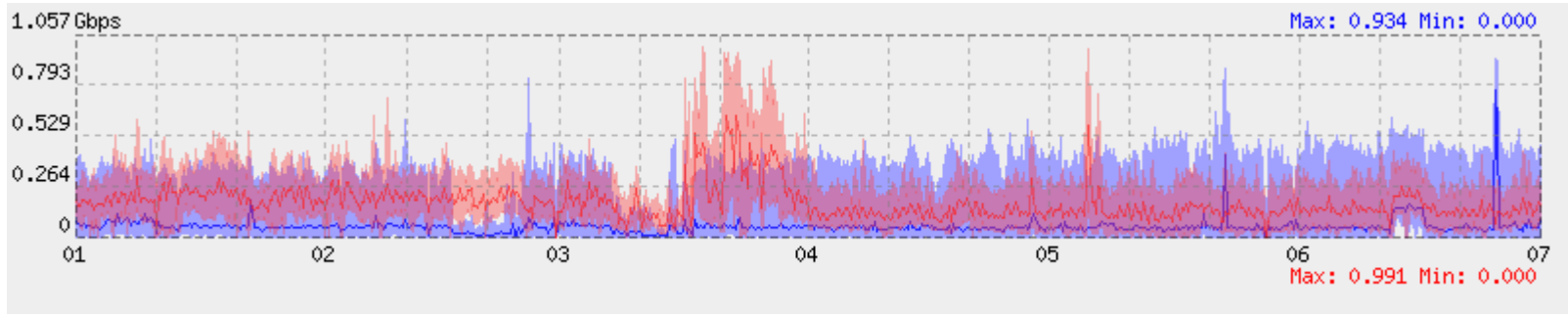


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
4796	516.8M	1.1G	1.6G	92.4G	1.1T	1.2T
3382	71.8M	145.8M	217.6M	20.0G	176.6G	196.5G
45705	89.3M	109.1M	198.4M	29.3G	128.7G	158.0G
46019	79.7M	108.2M	188.0M	23.6G	130.1G	153.7G
38331	22.0M	33.5M	55.4M	2.6G	43.1G	45.8G
55697	0	22.6M	22.6M	0	28.6G	28.6G
23456	18.8M	22.6M	41.4M	2.4G	25.8G	28.2G
55674	14.7M	17.7M	32.4M	4.4G	21.5G	25.9G
46047	2.9M	7.8M	10.7M	185.5M	9.5G	9.7G
58818	4.9M	6.9M	11.8M	710.5M	8.1G	8.8G
Other	14.3M	14.8M	29.0M	3.1G	17.1G	20.2G



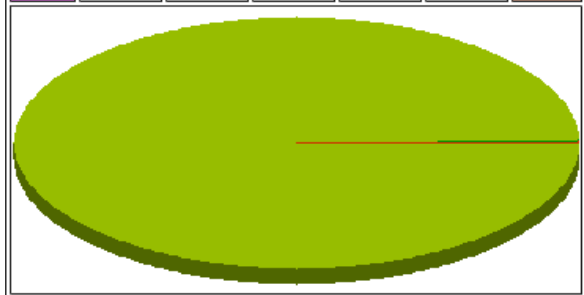
AS4796: ITB (Indonesia)
 AS3382: UI (Indonesia)
 AS45705: ID-NIC (Indonesia)

PERN 1G

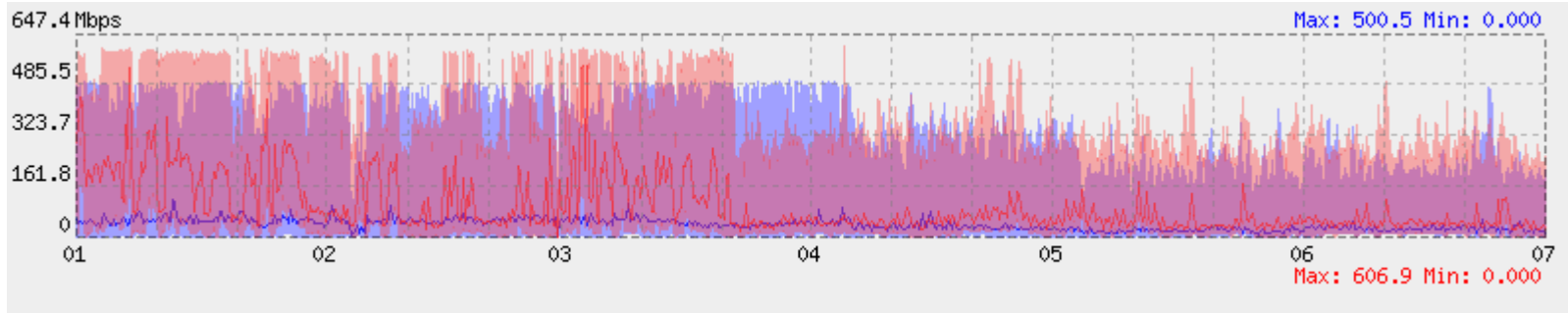


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
45773	748.8M	1.7G	2.5G	510.9G	2.0T	2.5T
24490	24.8M	1.8M	26.6M	8.8G	1.9G	10.7G
0	13.2M	213.1K	13.4M	5.7G	254.3M	6.0G
13371	309.7K	0	309.7K	24.1M	0	24.1M
3480	78.7K	0	78.7K	6.2M	0	6.2M
6068	17.6K	0	17.6K	1.8M	0	1.8M
3	81	0	81	6.3K	0	6.3K
23007	83	0	83	5.5K	0	5.5K
7377	59	0	59	4.2K	0	4.2K
2907	36	0	36	3.9K	0	3.9K
Other	180	0	180	13.1K	0	13.1K

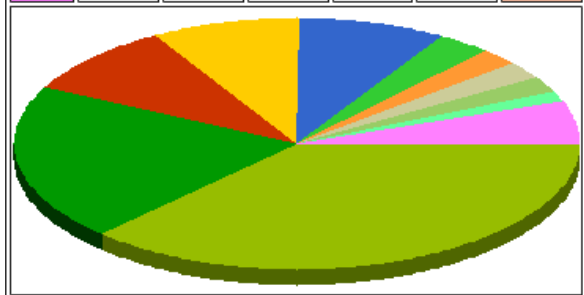
AS45773: PERN (Pakistan)



ThaiREN 1G

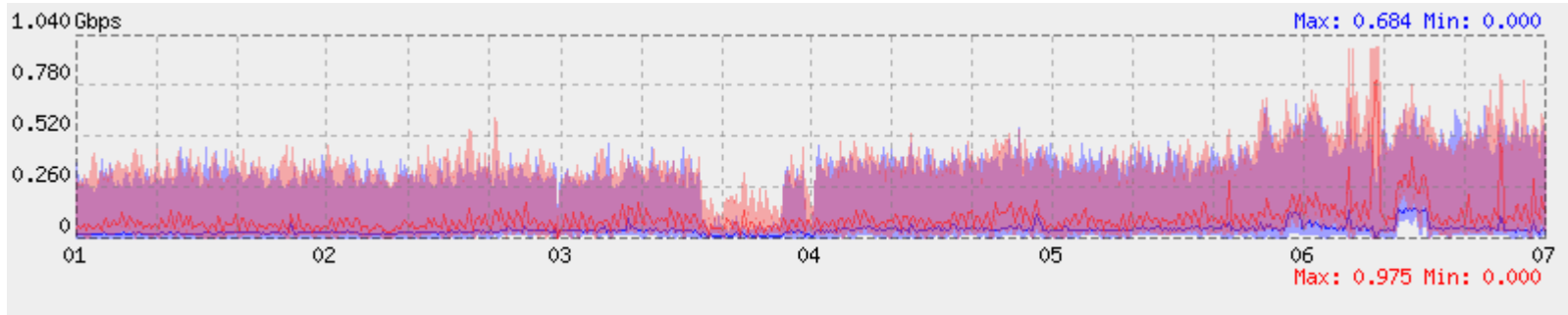


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
3836	560.6M	628.0M	1.2G	242.5G	726.5G	969.0G
4621	374.9M	284.3M	659.2M	283.1G	246.3G	529.4G
55545	143.6M	113.5M	257.1M	150.1G	89.2G	239.2G
3839	540.4M	497.0M	1.0G	94.2G	131.6G	225.8G
23919	21.5M	166.6M	188.0M	1.1G	219.0G	220.0G
4767	52.9M	52.7M	105.6M	29.4G	46.8G	76.3G
9411	24.4M	46.8M	71.1M	10.2G	48.1G	58.3G
9464	25.6M	43.5M	69.1M	12.2G	44.0G	56.3G
17479	28.7M	35.0M	63.7M	10.4G	40.7G	51.1G
9551	16.7M	26.5M	43.2M	4.6G	30.7G	35.4G
Other	92.7M	100.3M	193.0M	61.9G	82.5G	144.5G

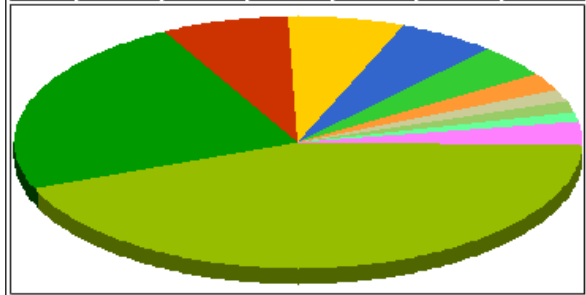


AS3836: THAISARN (Thailand)
AS4621: UNINET (Thailand)
AS55545: SUT (Thailand)

MYREN 622M & 1G

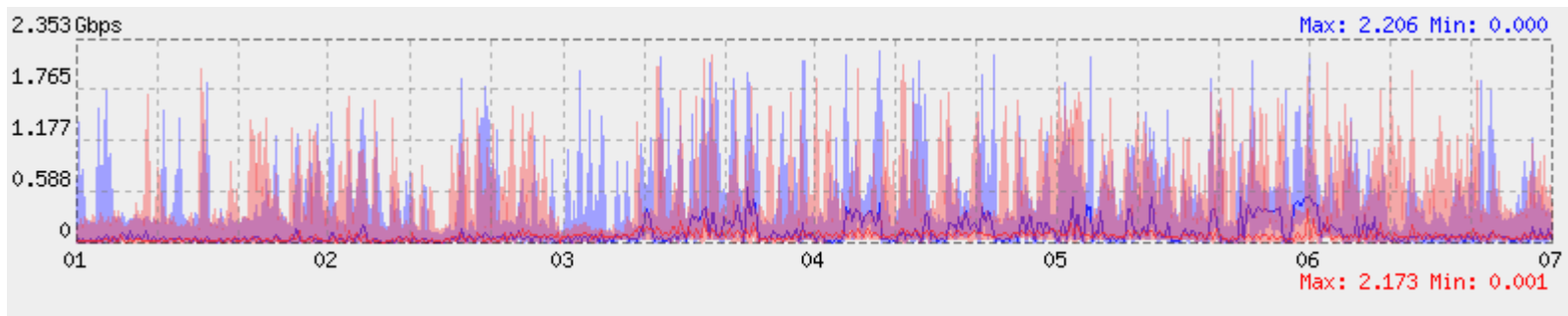


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
24514	988.7M	1.1G	2.0G	630.6G	649.7G	1.3T
23456	280.4M	551.3M	831.6M	64.9G	620.5G	685.4G
45344	45.7M	168.0M	213.7M	3.4G	205.4G	208.8G
38280	123.3M	142.0M	265.4M	67.0G	127.4G	194.4G
38868	95.1M	113.2M	208.2M	38.0G	121.9G	159.9G
24090	59.9M	96.5M	156.4M	19.6G	100.3G	119.9G
45808	35.3M	49.9M	85.2M	6.0G	62.3G	68.3G
24020	1.1M	36.6M	37.7M	439.2M	45.4G	45.9G
55856	15.7M	32.2M	48.0M	1.7G	40.3G	42.0G
59263	1.9M	23.6M	25.5M	246.2M	30.0G	30.3G
Other	43.0M	74.8M	117.8M	12.7G	89.1G	101.9G

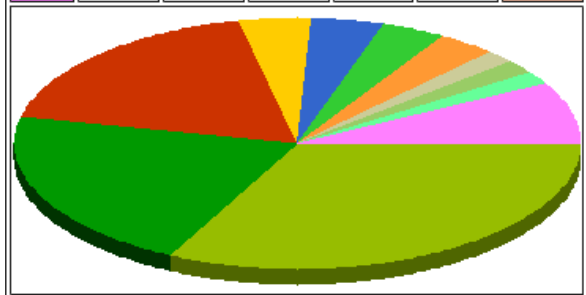


AS24515: MYREN (Malaysia)
 AS23456: Aggregation of 4-byte AS
 AS45344: IIUM (Malaysia)

AARNet 10G

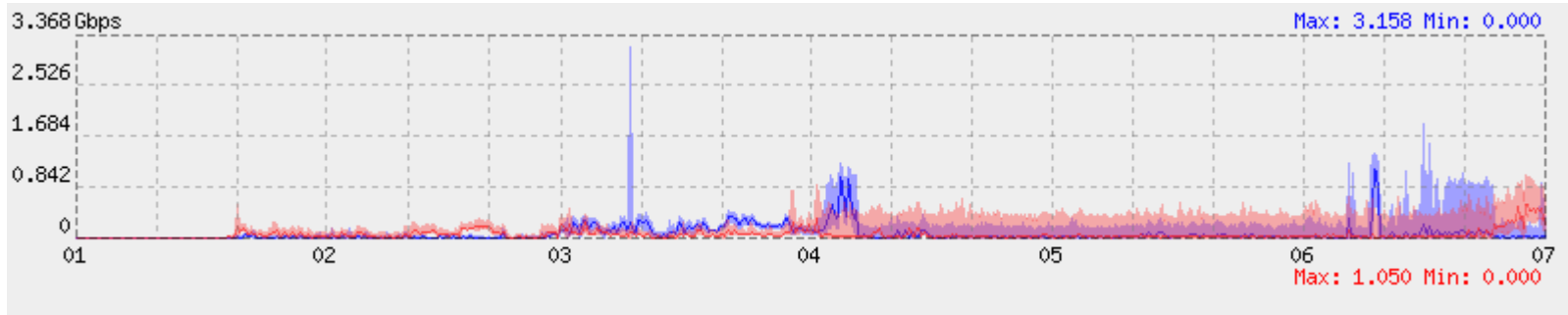


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
7573	1.2G	59.4M	1.3G	1.5T	37.9G	1.6T
7575	866.6M	409.1M	1.3G	817.3G	219.2G	1.0T
10148	497.9M	390.1M	888.0M	470.1G	414.6G	884.7G
56132	172.8M	190.2M	363.0M	100.5G	109.3G	209.8G
9431	22.0K	162.9M	163.0M	11.7M	199.3G	199.3G
23456	165.5M	8.4M	173.9M	179.6G	4.2G	183.8G
6262	81.4M	91.7M	173.2M	89.4G	80.0G	169.4G
33011	0	186.3M	186.3M	0	85.6G	85.6G
23859	32.3M	70.5M	102.8M	19.2G	64.2G	83.5G
24437	154.3M	47.2M	201.5M	43.6G	36.3G	79.9G
Other	224.8M	374.8M	599.6M	151.7G	242.8G	394.5G

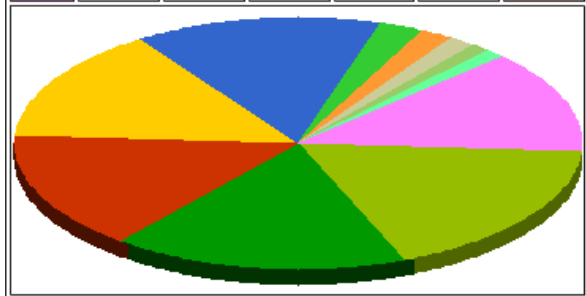


AS7573: UTAS (Australia)
 AS7575: AARNet (Australia)
 AS10148: UNIMELB (Australia)

SingAREN 10G

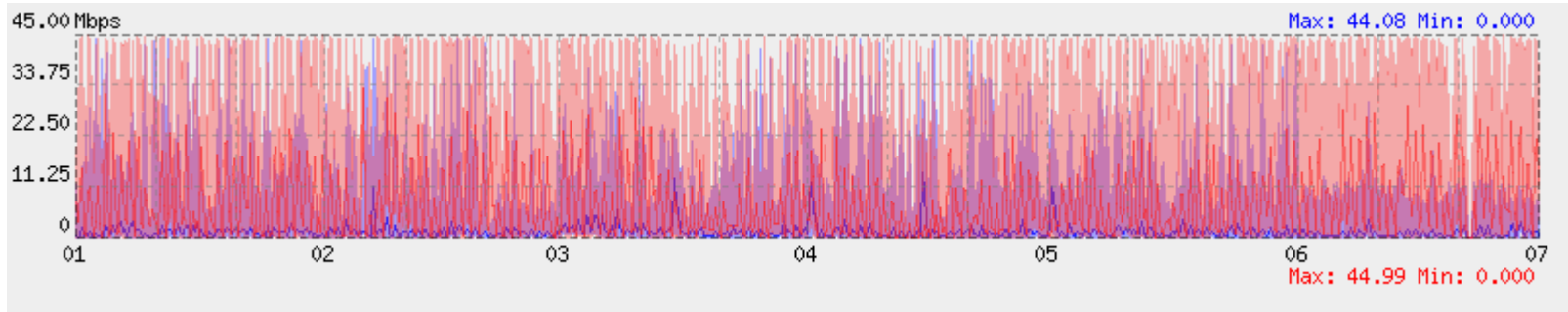


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
9419	100.0M	119.6M	219.7M	89.4G	113.5G	202.9G
23767	114.9M	123.3M	238.1M	21.0G	165.9G	187.0G
7472	125.9M	130.4M	256.3M	77.1G	93.1G	170.2G
7941	119.1M	0	119.1M	160.5G	0	160.5G
23855	60.2M	95.3M	155.5M	60.9G	95.1G	156.0G
17932	20.4M	0	20.4M	26.6G	0	26.6G
6629	16.5M	0	16.5M	21.5G	0	21.5G
2500	11.9M	0	11.9M	16.1G	0	16.1G
23456	12.8M	649.7K	13.4M	11.6G	258.8M	11.9G
7212	8.0M	0	8.0M	11.1G	0	11.1G
Other	177.6M	1.1M	178.7M	147.0G	632.1M	147.6G



AS9419: NTU (Singapore)
 AS23767: A-Star (Singapore)
 AS7472: NUS (Singapore)

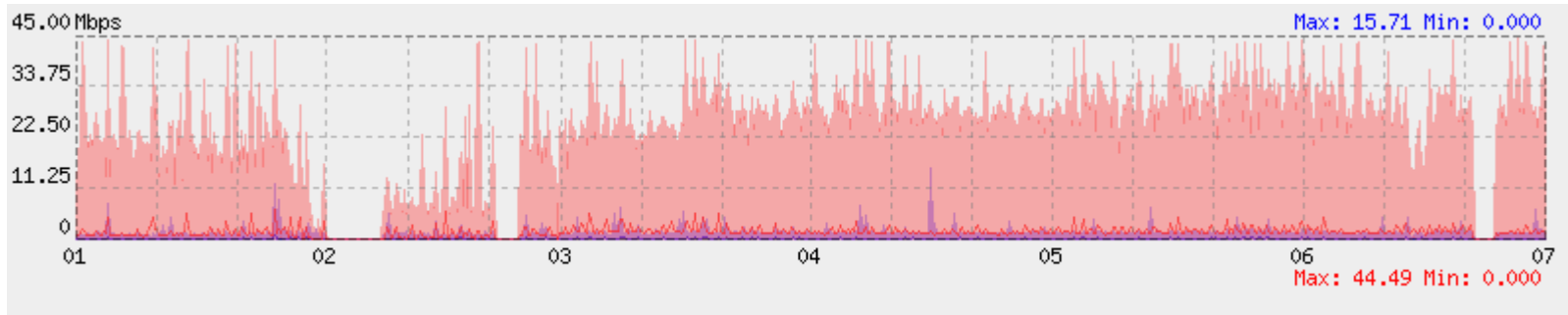
LEARN 45M



AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
38229	176.3M	226.9M	403.1M	42.3G	246.9G	289.1G
56288	0	190.6K	190.6K	0	119.0M	119.0M
24490	277.3K	181.7K	459.1K	28.2M	87.6M	115.8M
0	623	409	1.0K	137.1K	104.3K	241.4K

AS38229: LEARN (Sri Lanka)
AS56288: SCHOOLNET (Sri Lanka)

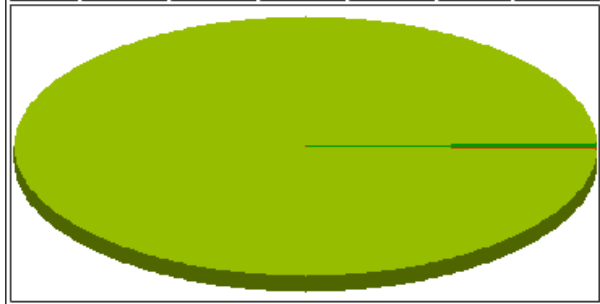
NREN 45M



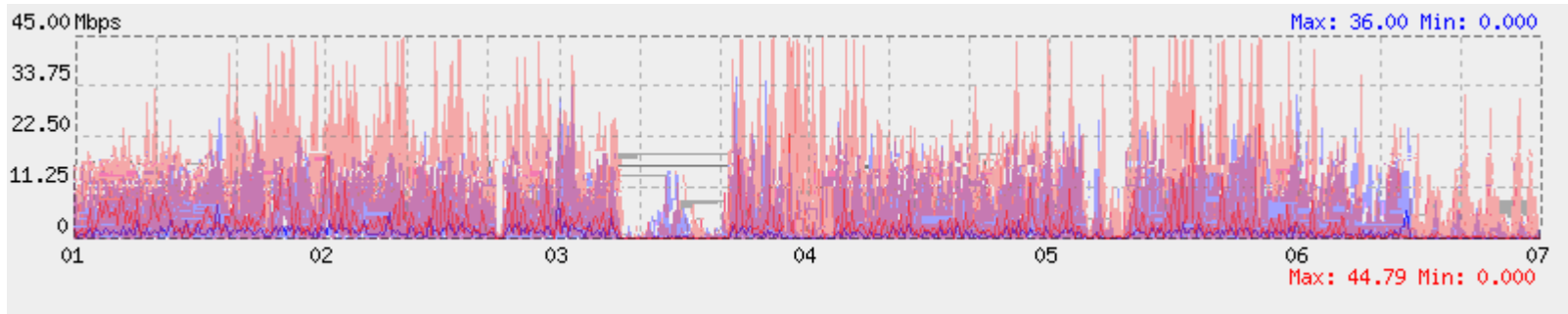
AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
45170	23.5M	55.3M	78.8M	4.0G	53.3G	57.4G
24490	1.6M	161.7K	1.8M	392.9M	36.9M	429.8M
24474	438.0K	527.6K	965.7K	55.5M	37.2M	92.8M
0	30	0	30	5.1K	0	5.1K
37501	3	0	3	252	0	252
1659	2	0	2	112	0	112

AS45170: NREN (Nepal)

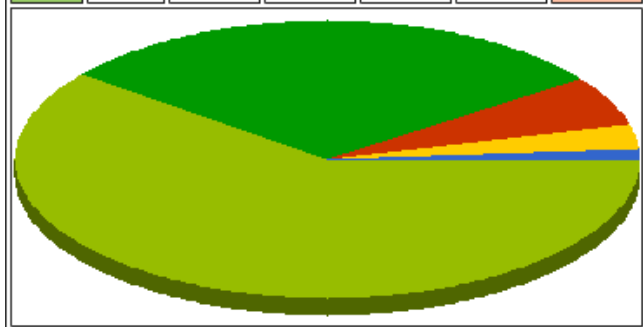
AS24474: NPANYCAST (Nepal)



BdREN 45M

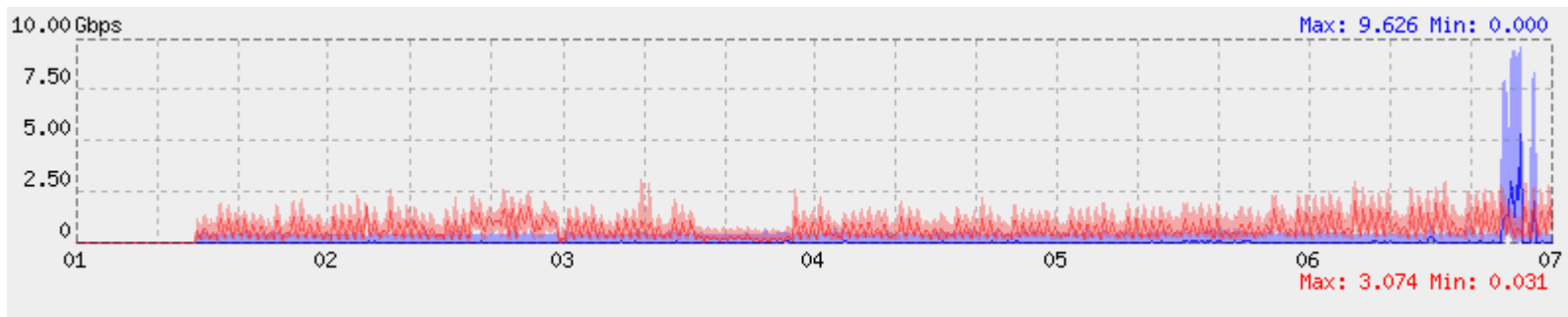


AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
56032	47.6M	56.2M	103.8M	23.4G	57.2G	80.6G
56031	22.5M	28.6M	51.2M	7.5G	31.5G	39.1G
63961	4.1M	6.5M	10.6M	943.0M	6.9G	7.8G
24490	4.5M	196.8K	4.7M	3.5G	60.0M	3.5G
23456	1.4M	1.6M	3.0M	1.1G	955.5M	2.0G
0	339	0	339	418.7K	0	418.7K
137	1.2K	0	1.2K	105.7K	0	105.7K
4538	3	0	3	1.0K	0	1.0K
2907	1	0	1	468	0	468

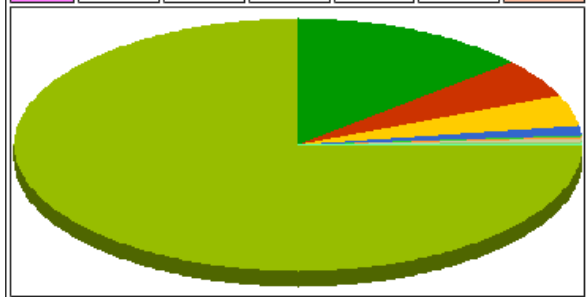


AS56032: DU (Bangladesh)
AS56031: BUET (Bangladesh)
AS63961: BdREN (Bangladesh)

NKN 10G



AS	PKTS IN	PKTS OUT	PKTS ALL	OCTS IN	OCTS OUT	OCTS ALL
55824	591.4M	7.7G	8.3G	264.2G	9.5T	9.7T
23456	311.5M	1.5G	1.8G	65.8G	1.7T	1.8T
4758	9.3M	546.1M	555.4M	6.8G	642.6G	649.4G
55847	77.6M	393.5M	471.1M	47.2G	482.2G	529.4G
24490	121.5M	127.2K	121.6M	139.5G	57.2M	139.6G
55433	11.3M	41.3M	52.6M	1.0G	47.4G	48.4G
23770	133	35.8M	35.8M	132.9K	41.7G	41.7G
2697	55.6M	3.6M	59.2M	28.9G	287.2M	29.2G
59193	342.0K	20.9M	21.3M	16.4M	26.3G	26.3G
55566	9.4M	22.9M	32.2M	2.0G	23.2G	25.1G
Other	384.9K	13.5M	13.9M	139.3M	15.9G	16.1G



AS55824: NKN (India)

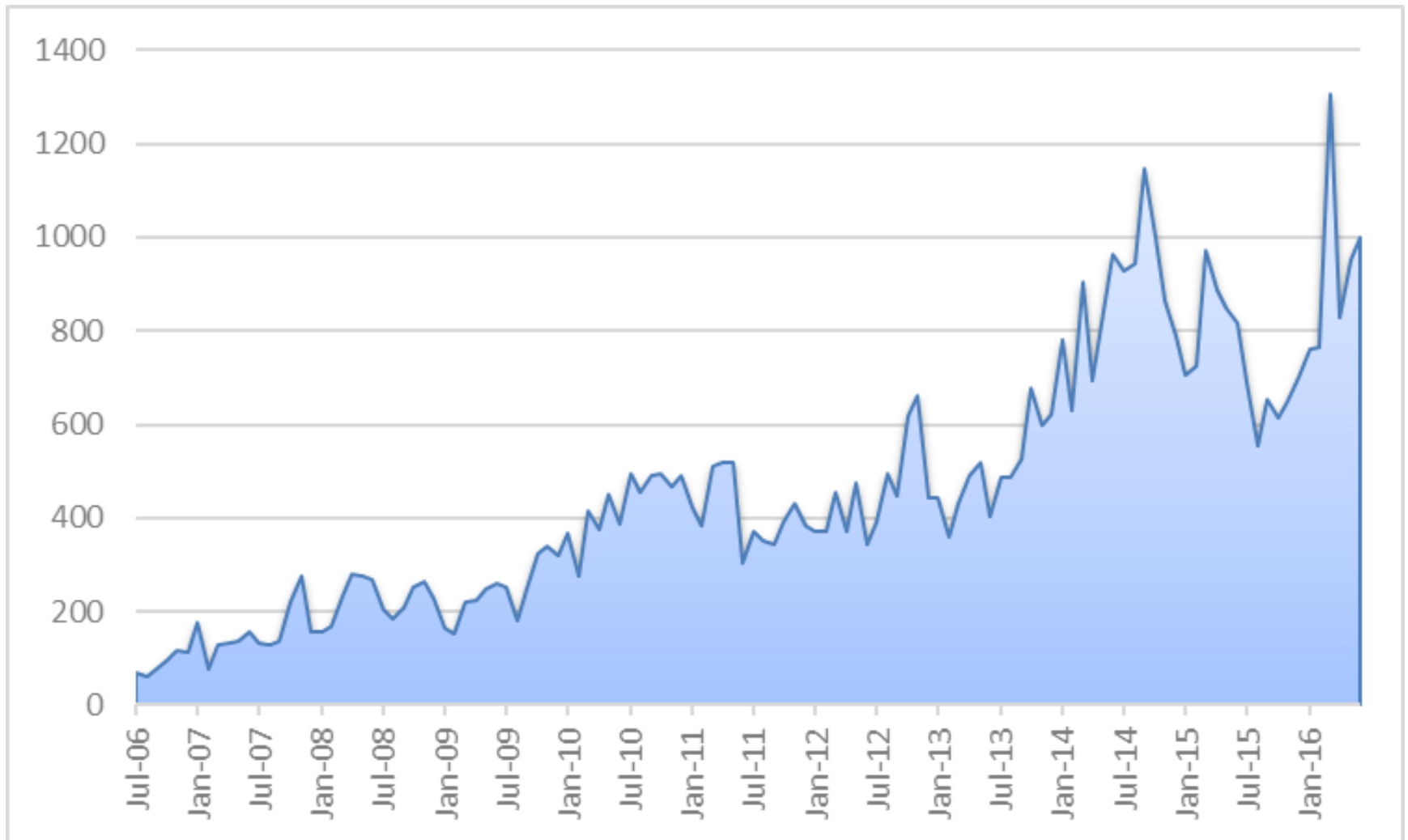
AS23456: Aggregation of 4-byte AS

AS4758: APNIC (Asia)

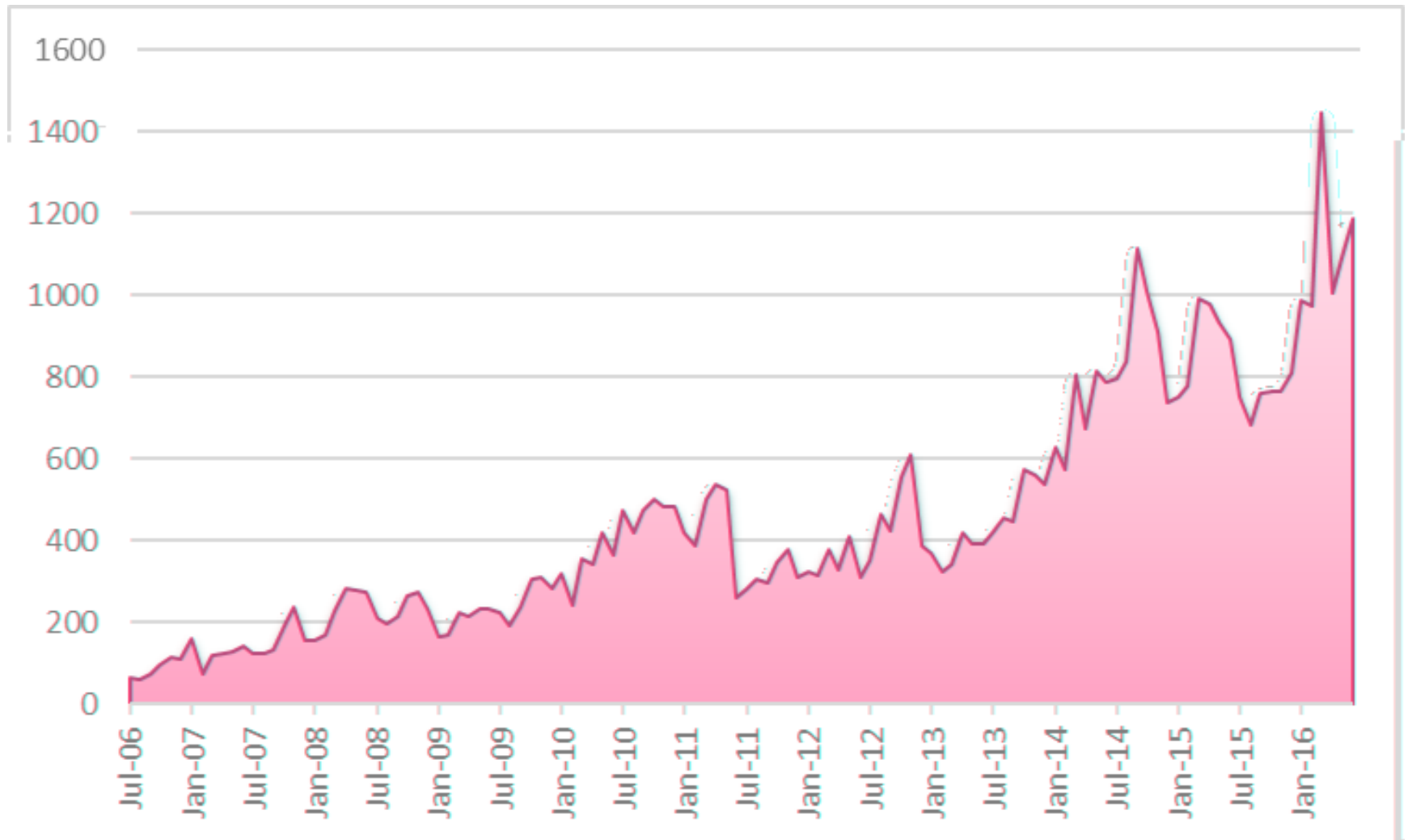
Outline

- TEIN General Operation Updates
- TEIN Backbone Traffic Statistics
- **Total Traffic over TEIN Backbone**
- SCU/DCU Analysis Example
- Change on routing to NA R&E Networks

Total Traffic over TEIN Backbone (inbound, TBytes , since Jul 2006)



Total Traffic over TEIN Backbone (outbound, Tbytes, since Jul 2006)



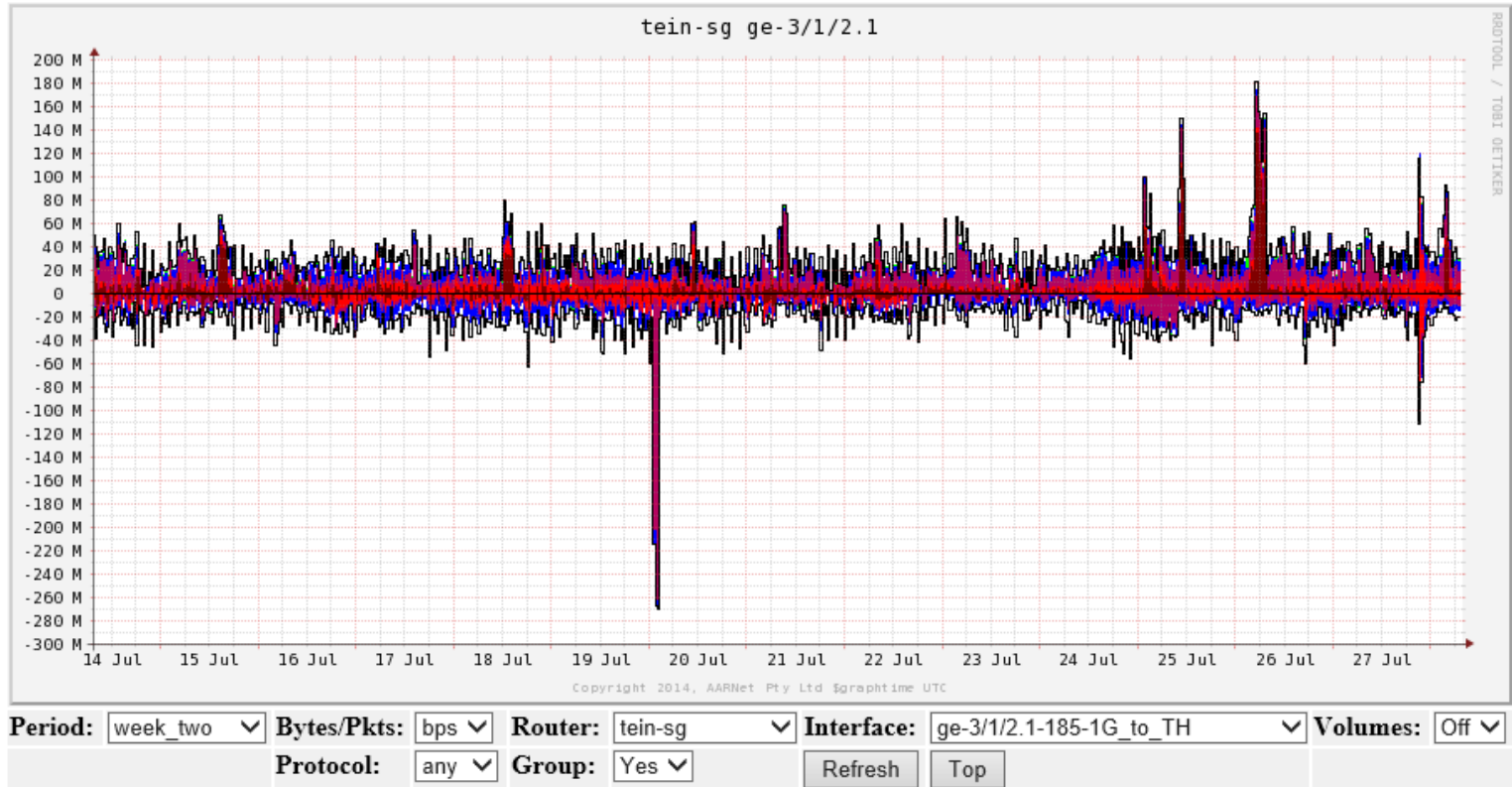
Outline

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- Routing to NA R&E Networks

SCU/DCU Analysis Example

- Trial SCU/DCU monitoring server configured by AARNet (*many thanks to Bruce*)
- Several NREN access links on TEIN SG PoP routers
- ThaiREN link as an example
 - 2-week statistics
 - Exclusive of LHCONe traffic

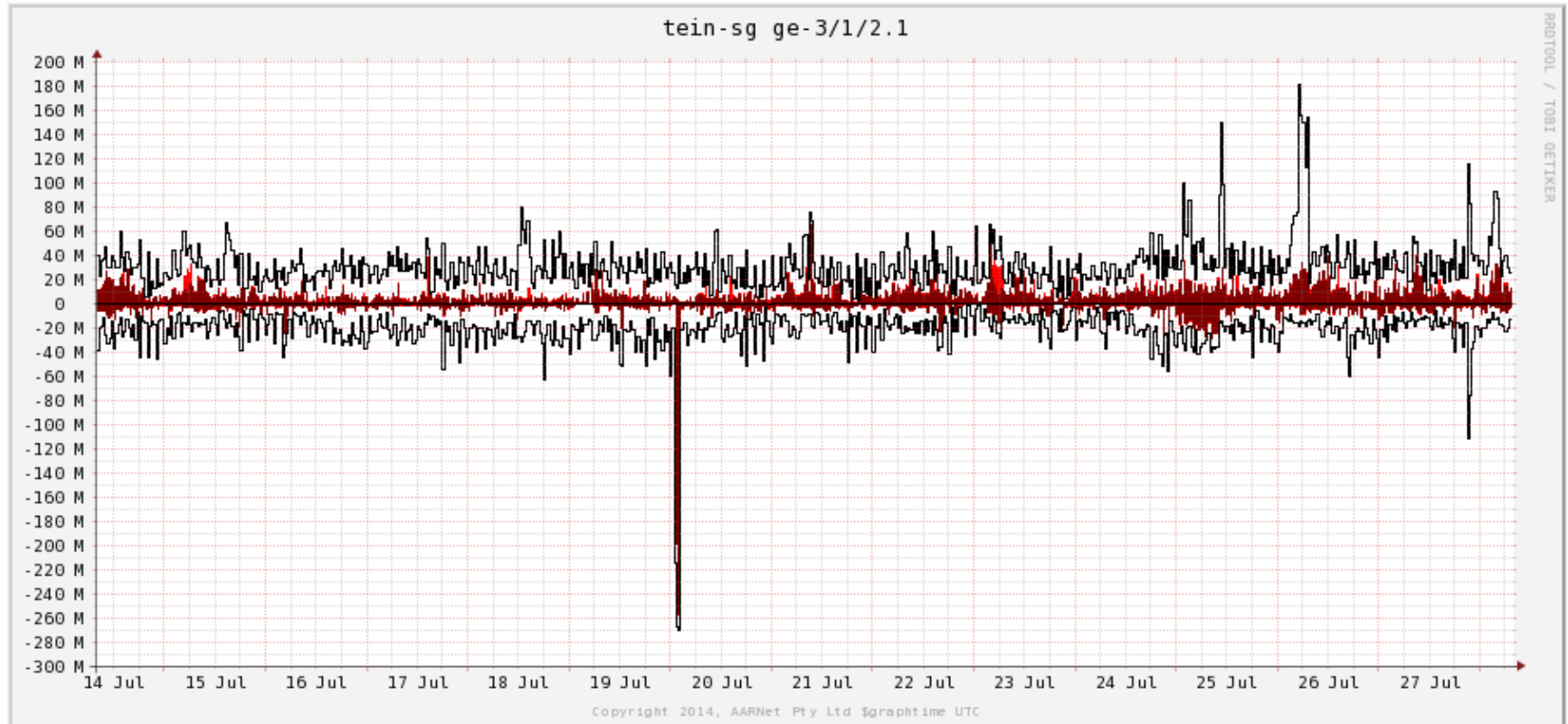
Total traffic



Units are Megabits per second

	Prot	Description	95th in	95th out	Avg in	Avg out	Max in	Max out	Last in	Last out
		other	22.12	7.17	5.95	1.71	142.18	17.15	3.31	2.55
		non-beneficiary	11.75	14.74	4.11	3.49	122.26	155.14	6.52	3.27
		geant	27.42	14.62	10.91	6.15	101.35	256.91	10.19	5.33
		beneficiary	15.79	14.24	7.13	5.71	41.47	40.74	8.28	4.28
		apan-jp	0.04	0.00	0.06	0.00	10.88	0.11	0.85	0.00
		ge-3/1/2.1	58.86	40.40	31.91	21.68	181.37	270.18	30.33	19.76

Traffic from/to GEANT



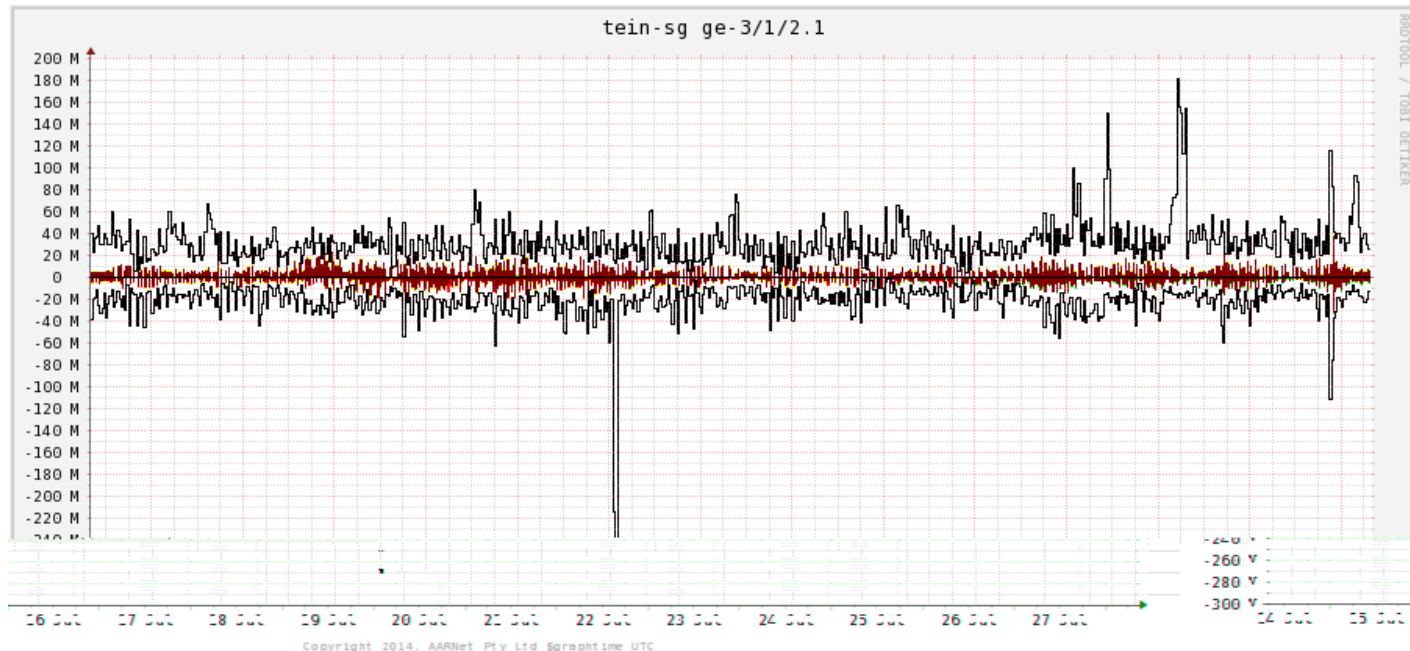
Period: Bytes/Pkts: Router: Interface: Volumes:
Protocol: Group:

Restricting to group geant

Units are Megabits per second

	Prot	Description	95th in	95th out	Avg in	Avg out	Max in	Max out	Last in	Last out
	ipv4	geant_nrn	24.62	14.62	10.07	6.14	66.73	256.91	13.29	3.42
	ipv6	geant_nrn	2.80	0.00	0.83	0.00	34.62	0.00	0.20	0.00
		ge-3/1/2.1	58.86	40.40	31.92	21.64	181.37	270.18	26.26	13.05

Traffic from/to beneficiary NREN



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Bytes/Pkts: Router: Interface: Volumes: Period:

Protocol: Group:

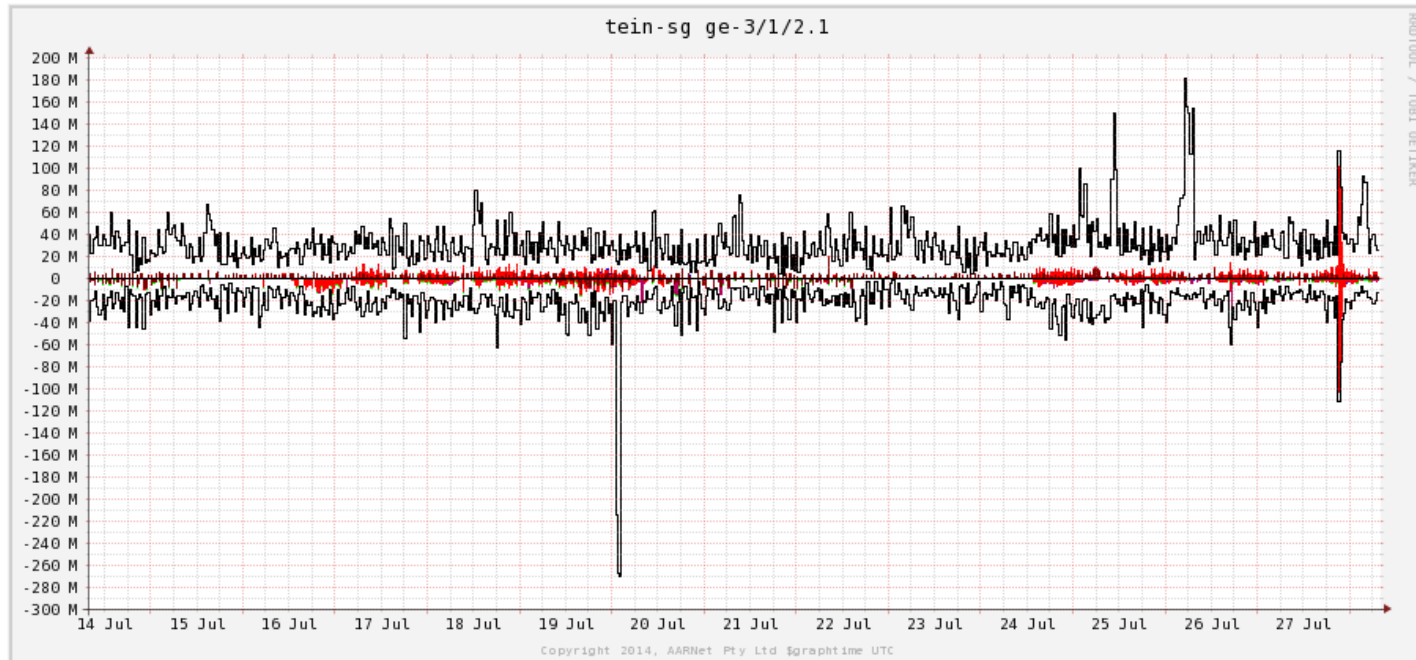
up beneficiary

Units are Megabits per second

Restricting to gro

Description	95th in	95th out	Avg in	Avg out	Max in	Max out	Last in	Last out	Prot
myren_ren	15.76	13.15	7.12	5.10	38.76	32.44	6.23	5.56	ipv4
itb_ren	0.00	1.03	0.00	0.60	0.00	6.77	0.00	0.03	ipv4
learn_ren	0.03	0.05	0.01	0.01	0.46	0.45	0.00	0.00	ipv4
bdren_ren	0.00	0.00	0.00	0.00	2.16	1.01	0.00	0.00	ipv4
nren_ren	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	ipv4
learn_ren	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	ipv6
vinaren_ren	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	ipv4
myren_ren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ipv6
ge-3/1/2.1	58.86	40.40	31.92	21.64	181.37	270.18	26.26	13.05	

Traffic from/to non-beneficiary NREN



Period: Bytes/Pkts: Router: Interface: Volumes: Protocol: Group:

Restricting to group non-beneficiary

Units are Megabits per second

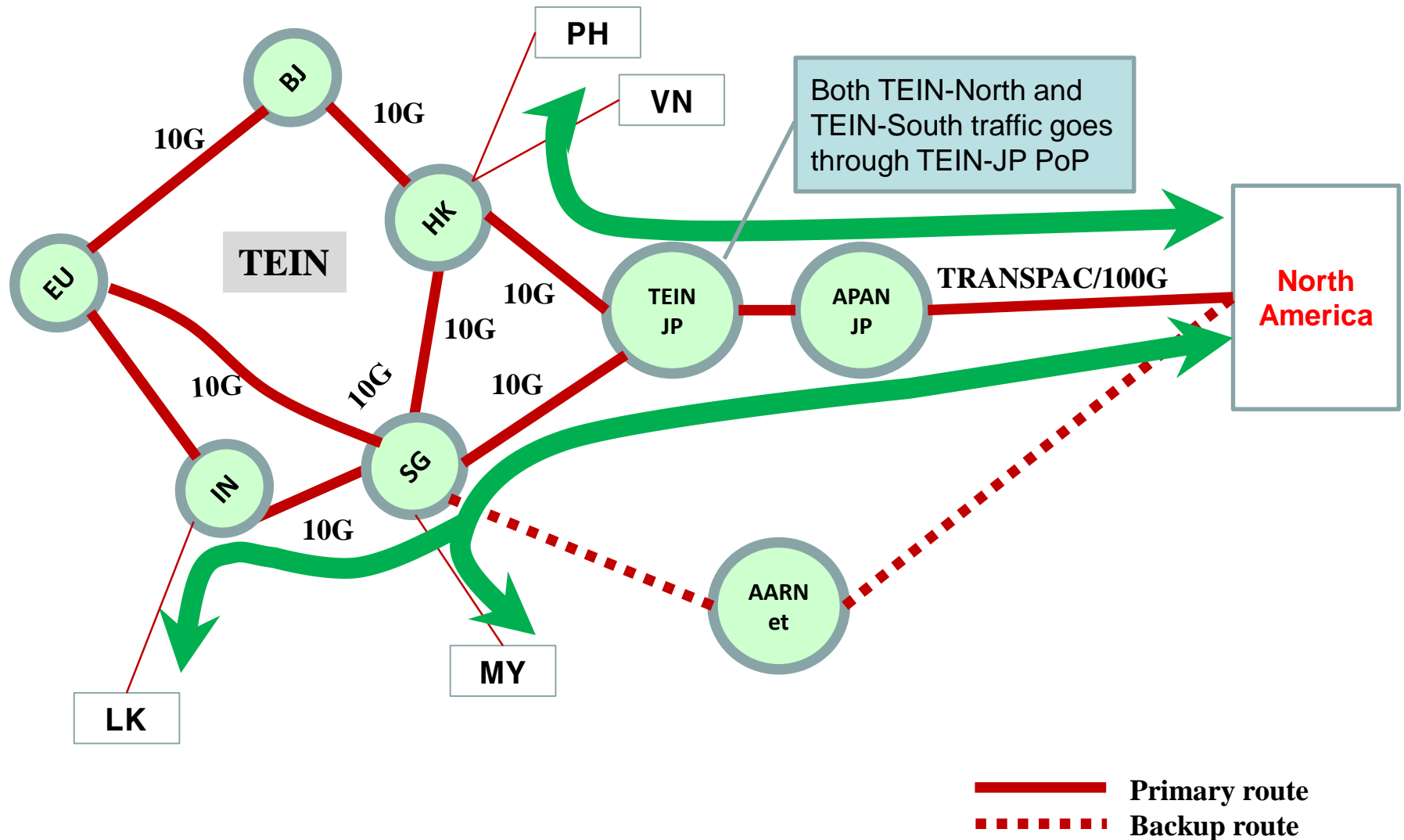
	Prot	Description	95th in	95th out	Avg in	Avg out	Max in	Max out	Last in	Last out
	ipv4	singaren_ren	5.61	6.90	2.24	1.01	20.25	19.98	0.45	0.00
	ipv4	koren_ren	6.14	6.99	1.87	2.15	101.99	102.72	1.68	1.49
	ipv4	aarnet_ren	0.00	0.85	0.00	0.33	0.00	32.41	0.00	0.30
	ipv6	aarnet_ren	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
	ipv4	harnet_ren	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
	ipv6	singaren_ren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ipv6	harnet_ren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ipv6	koren_ren	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		ge-3/1/2.1	58.86	40.40	31.92	21.64	181.37	270.18	26.26	13.05

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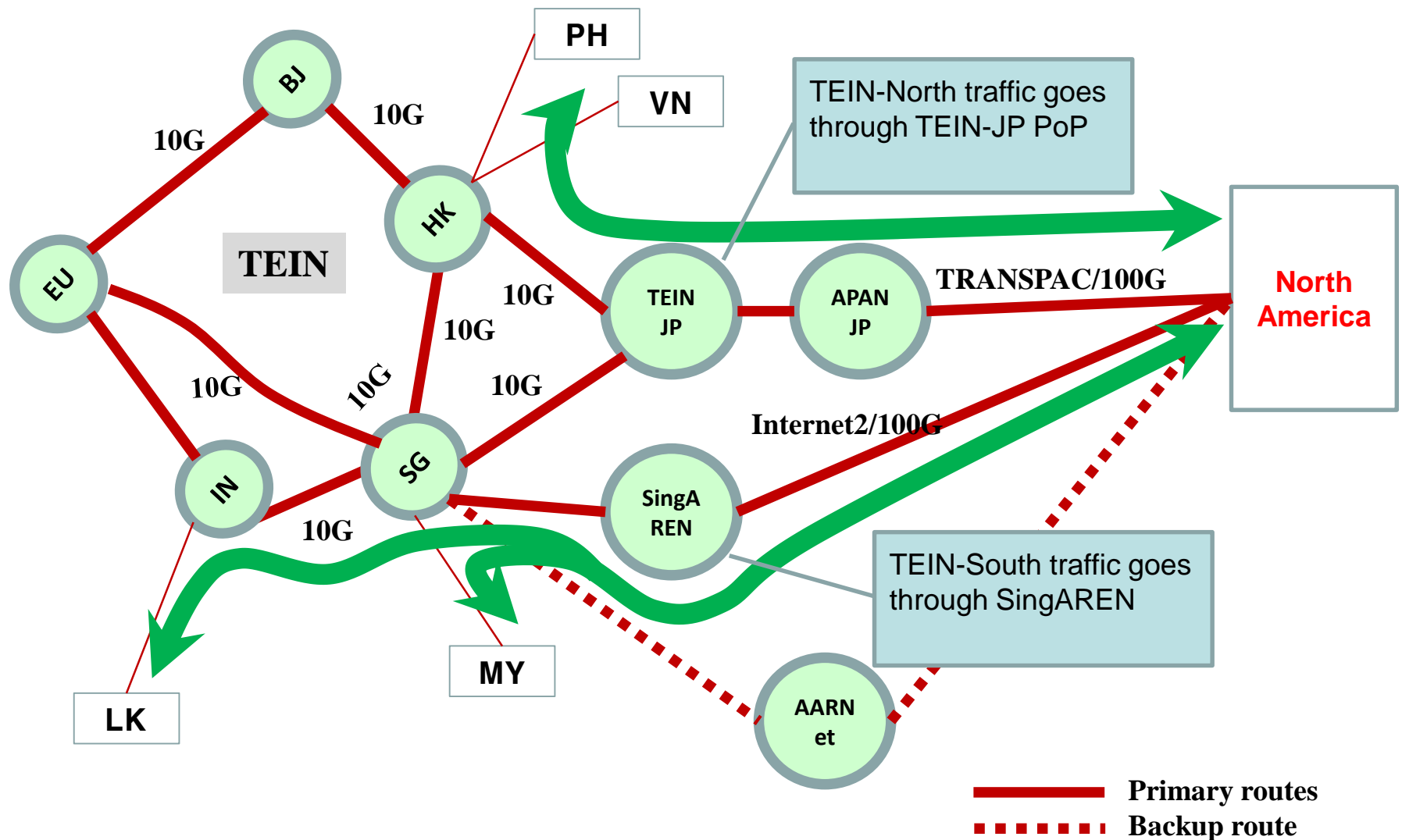
Change on routing to NA R&E Networks

- Before SingAREN-Internet2 100G link activation



Change on routing to NA R&E Networks

- After SingAREN-Internet2 100G link activation



Thanks!