

# Operational Report for CNGI-6IX CN-US 10G Circuit

Zhonghui Li

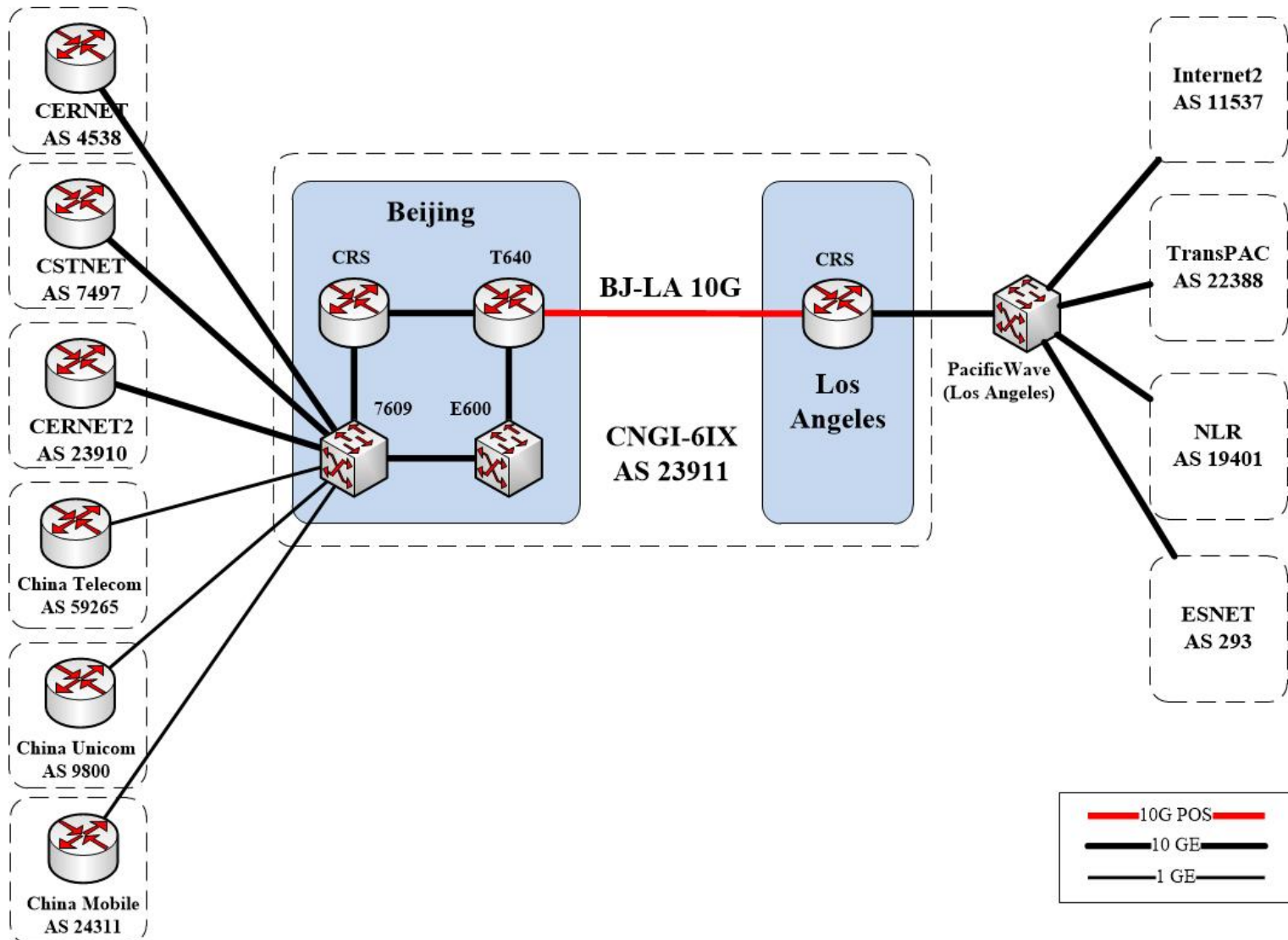
*CERNET2 NOC, Tsinghua University*

Sep 23 2015

# Outline

- Interconnection Information
- Backup Scheme
- Service
- Yearly Link Utilization
- Traffic Volume
- Quarterly Flow Analysis
- Future Plan

# Interconnection Information



# Interconnection Information

- BJ-LA 10G circuit
  - CNGI-6IX BJ node (Tsinghua University, Beijing)
    - Juniper T640 (210.25.189.2)
      - Interface: so-0/0/0 (STM-64)
      - IPv4 address: 210.25.189.49
      - IPv6 address: 2001:252:0:302::1
  - CNGI-6IX LA node (CoreSite, Los Angeles)
    - Cisco CRS (210.25.189.5)
      - Interface: PO0/1/1/0 (STM-64)
      - IPv4 address: 210.25.189.50
      - IPv6 address: 2001:252:0:302::2

# Interconnection Information

- 10GE to PacificWave (LA)
  - CNGI-6IX LA PoP
    - Cisco CRS (210.25.189.5)
      - Interface: Te0/1/4/0 (10GE)
        - VLAN 854: NLR
          - IPv4 address: 210.25.189.129
          - IPv6 address: 2001:252:0:501::1
        - VLAN 855: Internet2
          - IPv4 address: 210.25.189.133
          - IPv6 address: 2001:252:0:502::1
        - VLAN 856: TransPAC
          - IPv4 address: 210.25.189.137
          - IPv6 address: 2001:252:0:503::1
        - VLAN 1052: ESNET
          - IPv4 address: 210.25.189.141
          - IPv6 address: 2001:252:0:504::1

# Interconnection Information

- BGP Peering Information (Domestic)

- IPv4

Neighbor	Spk	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	St/PfxRcd
210.25.189.68	0	23910	1747921	6119707	40036813	0	0	2w2d	23
210.25.189.69	0	4538	911609	7213600	40036813	0	0	2w2d	6772
210.25.189.70	0	59265	993810	832332	40036870	0	0	2w2d	2
210.25.189.71	0	9800	1832646	1661081	40036870	0	0	2w2d	0
210.25.189.73	0	24311	990436	830979	40036870	0	0	2w2d	3
210.25.189.75	0	7497	1784031	6047839	40036813	0	0	2w2d	356

- IPv6

Neighbor	Spk	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	St/PfxRcd
2001:252:0:1::1	0	23910	1744912	15109280	70664523	0	0	2w2d	47
2001:252:0:1::2	0	59265	1859173	13837168	70664523	0	0	2w2d	9
2001:252:0:1::3	0	9800	1833098	15106617	70664523	0	0	2w2d	1
2001:252:0:1::5	0	24311	1172725	14002143	70664523	0	0	2w2d	1
2001:252:0:1::1001	0	4538	279457	4841650	70664523	0	0	2w2d	62
2001:252:0:1::2001	0	7497	1771038	15085572	70664523	0	0	2w2d	32

# Interconnection Information

- BGP Peering Information (US)

- IPv4

Neighbor	Spk	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	St/PfxRcd
210.25.189.130	0	19401	908350	329295	0	0	0	1y07w	Active
210.25.189.134	0	11537	11199274	1895024	45324203	0	0	1w1d	13156
210.25.189.138	0	22388	6494969	1880736	45324203	0	0	1w1d	11138
210.25.189.142	0	293	1867828	1879928	45324203	0	0	1w1d	130

- IPv6

Neighbor	Spk	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	St/PfxRcd
2001:252:0:501::2	0	19401	383020	365642	0	0	0	1y07w	Active
2001:252:0:502::2	0	11537	7897357	1931054	60079766	0	0	1w1d	995
2001:252:0:503::2	0	22388	5036645	1930752	60079766	0	0	1w1d	964
2001:252:0:504::2	0	293	1862488	1931343	60079766	0	0	1w1d	18

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- **Backup Scheme**
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- Yearly Link Utilization
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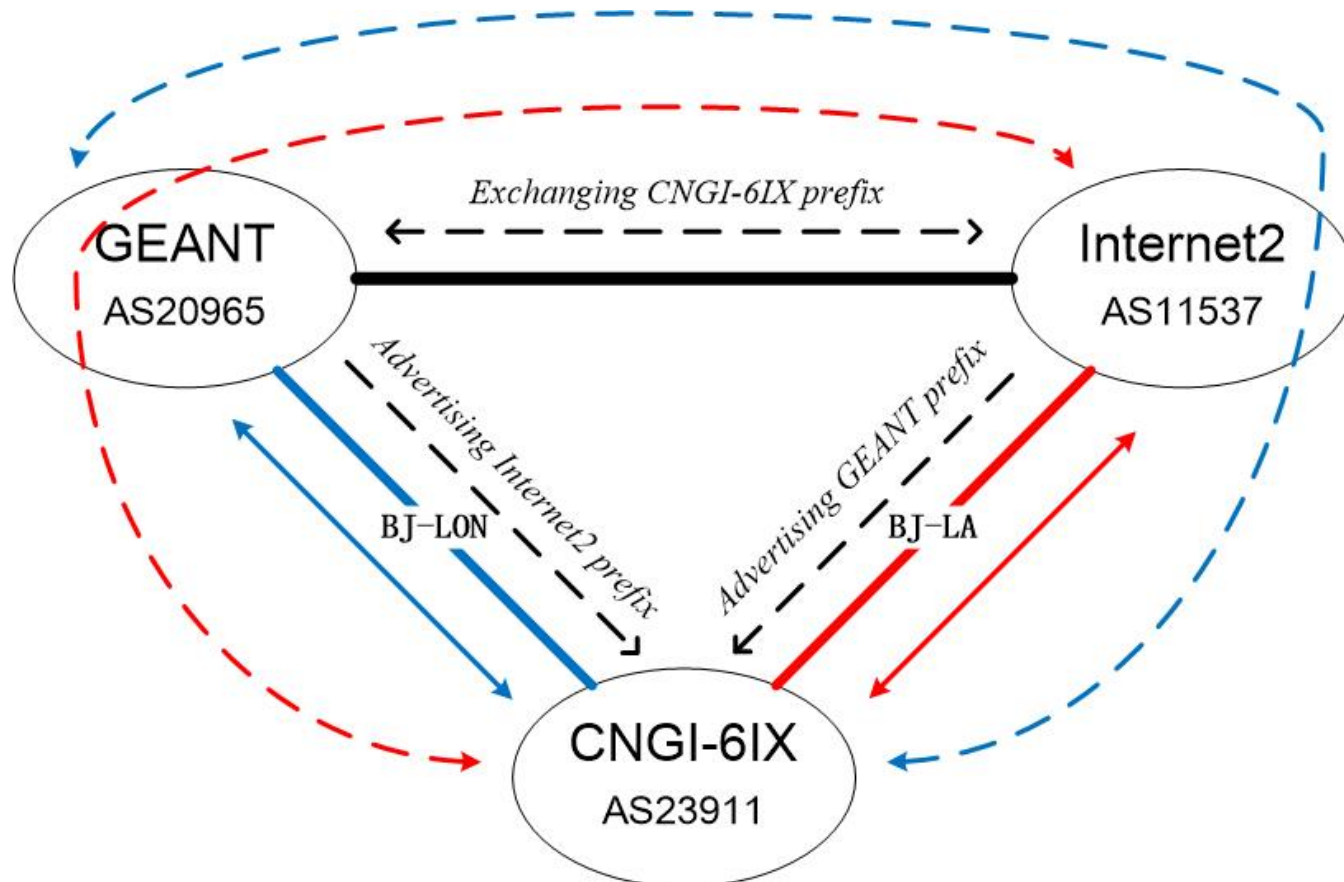


# Backup Scheme

- Layer 3 backup scheme
- Layer 2 backup scheme

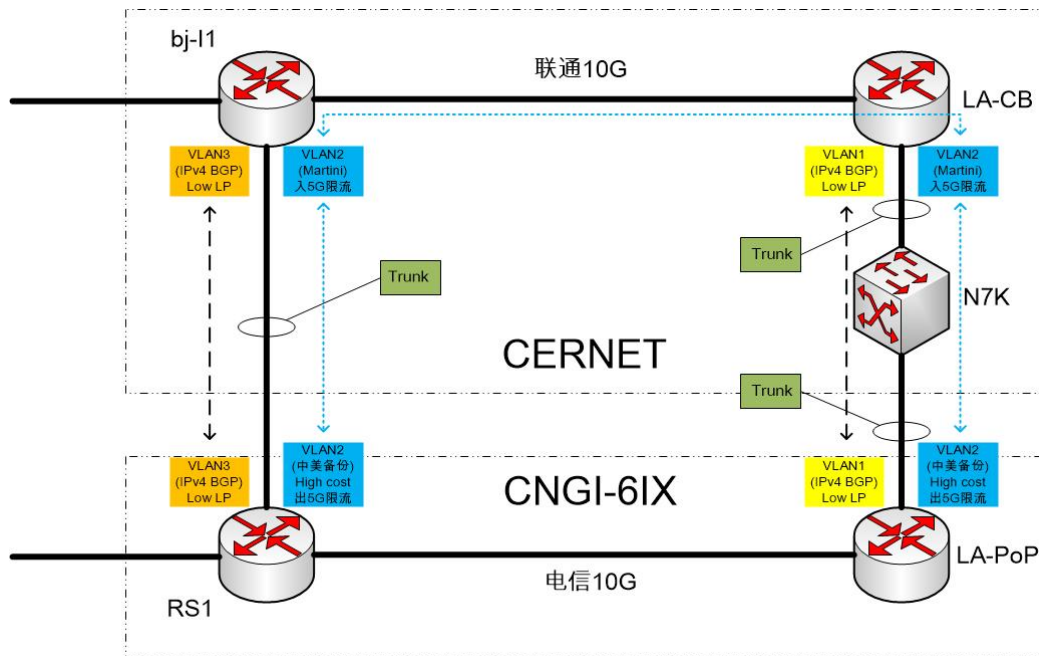
# Layer 3 backup scheme

- Multilateral agreement among CERNET/CNGI-6IX, Internet2 & GEANT



# Layer 2 backup scheme

- Backup L2VPN virtual link through CERNET BJ-LA 10G circuit (provided from different supplier)
  - Rate-limit applied to avoid side affect on CERNET customer traffic
  - Still under implementation



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# Service

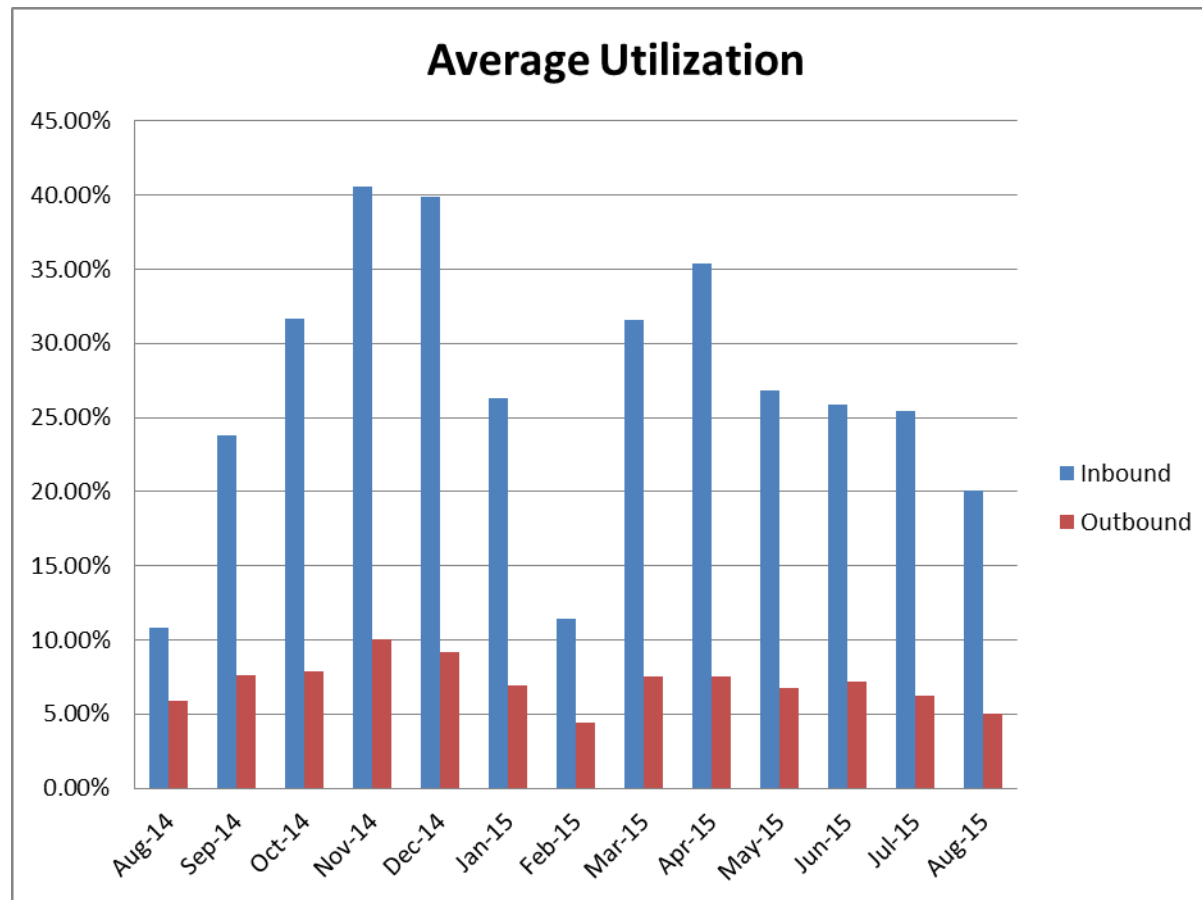
- IPv4 unicast
- IPv6 unicast
- L2VPN
  - SDN demo in CANS2014
- Measurement
  - perfSONAR-PS servers (10G) at BJ & LA PoPs

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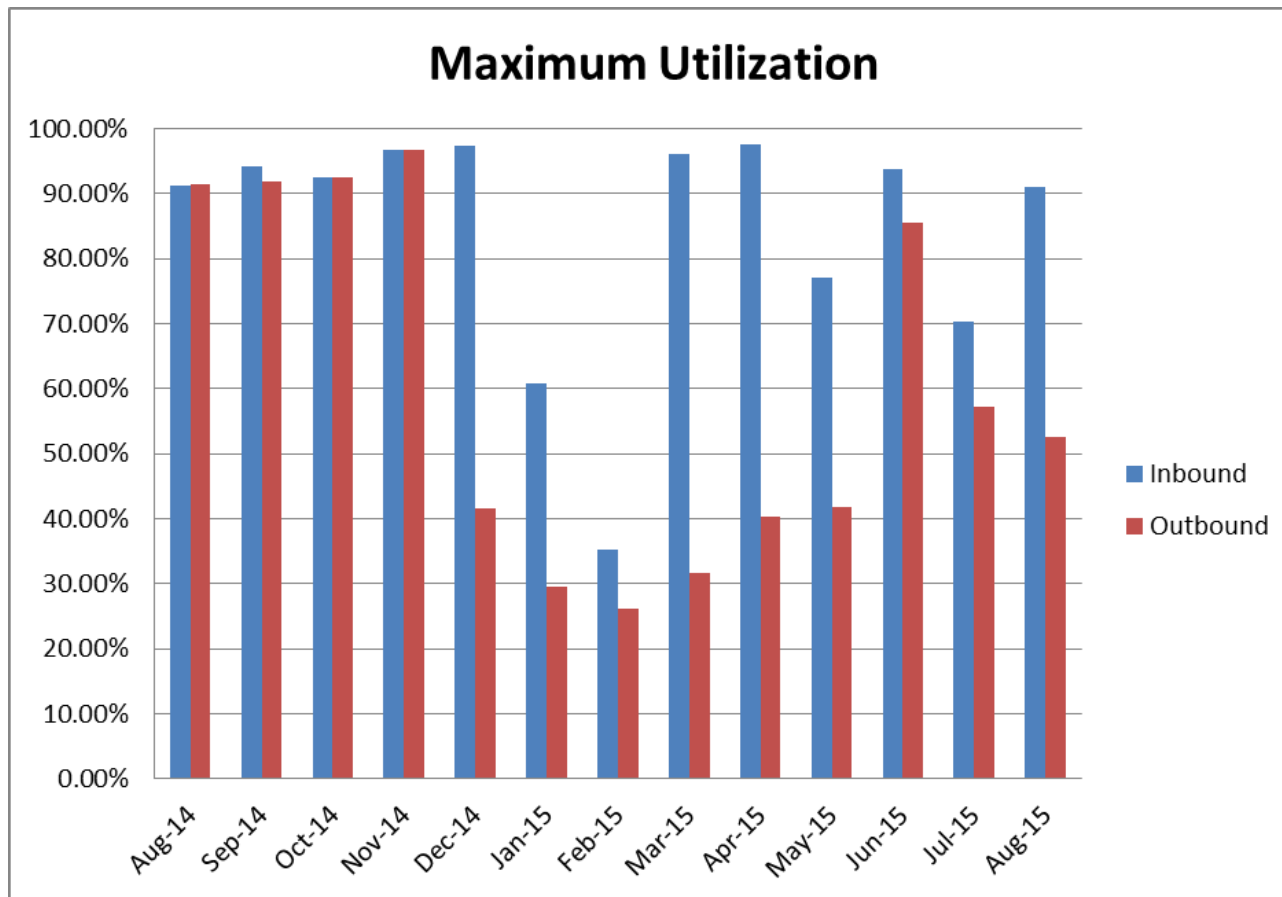
# Yearly Link Utilization

- Average utilization (Aug 2014 – Aug 2015)



# Yearly Link Utilization

- Maximum utilization (Aug 2014 – Aug 2015)



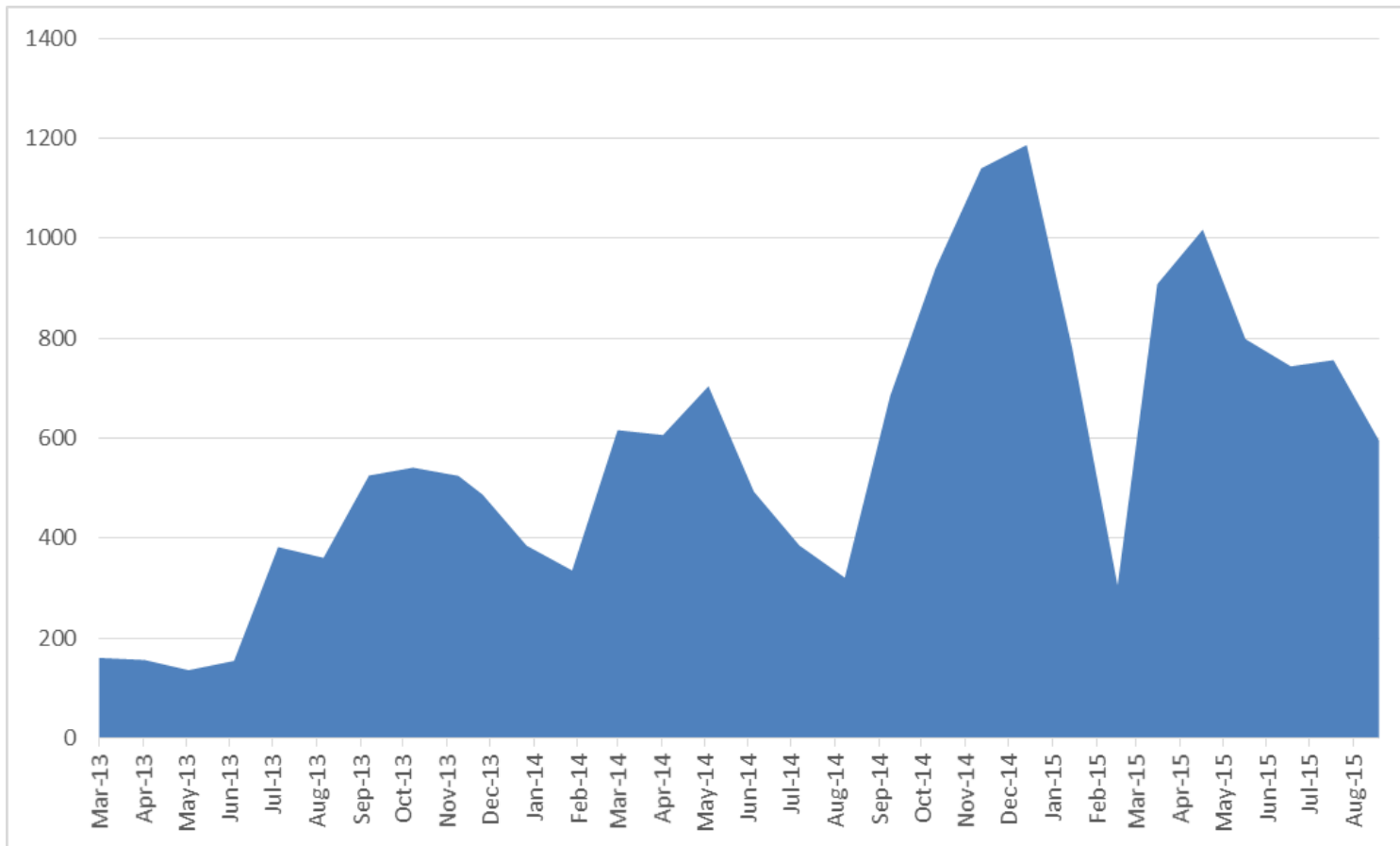


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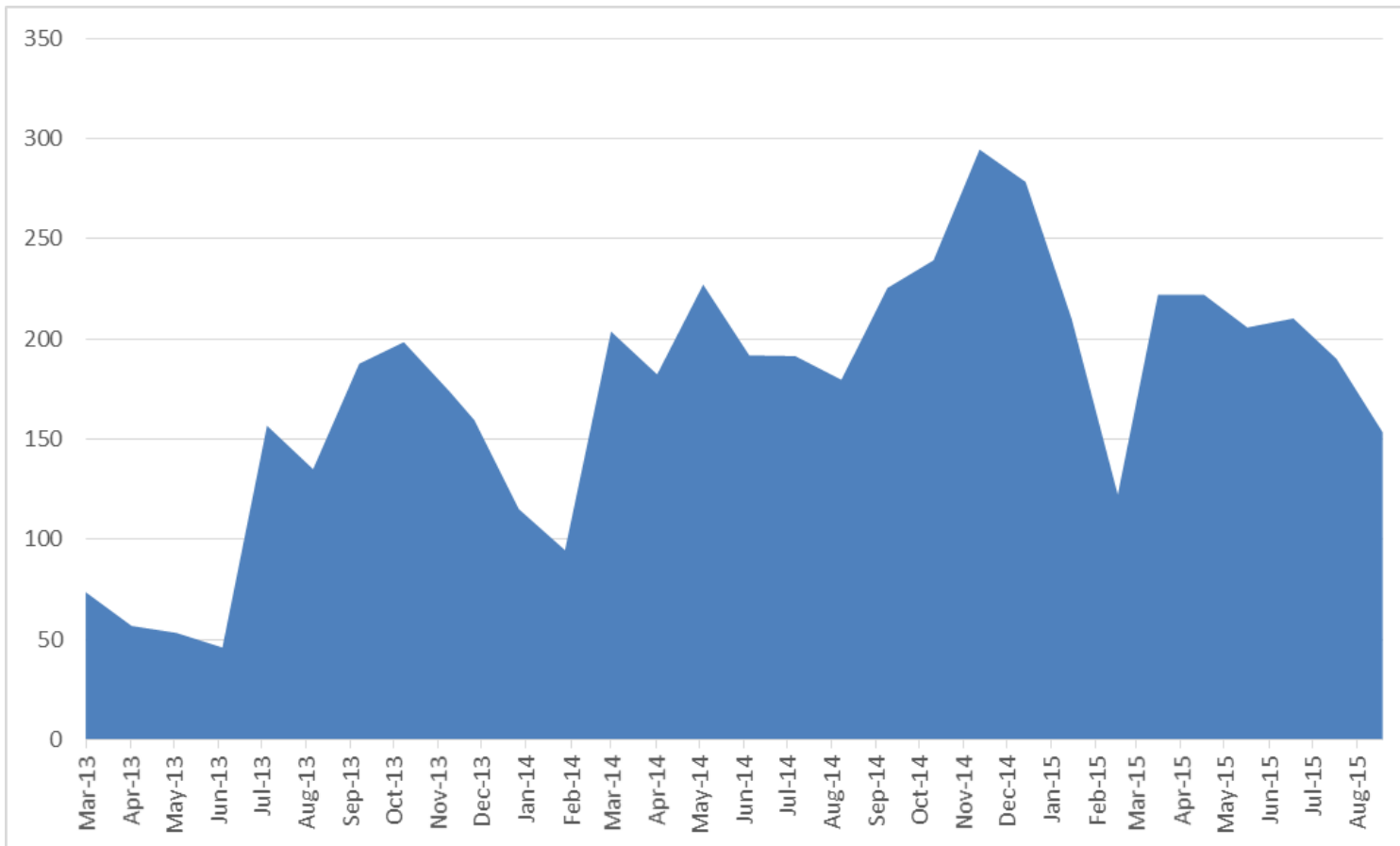
# Traffic Volume *(Since Mar 2013, Tbyte)*

- Inbound (US -> CN)



# Traffic Volume *(Since Mar 2013, Tbyte)*

- Outbound (CN -> US)



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# Quarterly Flow Analysis

- Statistics based on cflow
  - Sample rate: 1/100
- Time scale
  - Jun 1 ~ Aug 31, 2015
- IPv4 only
- *Not quite as accurate as expected sometimes*

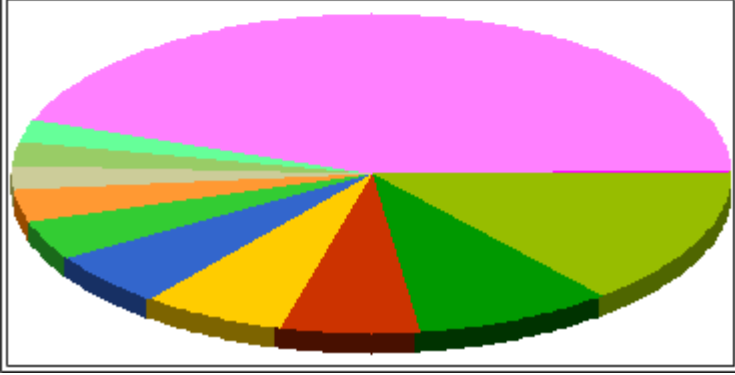
# AS Top 10 (inbound, LA -> BJ)

AS	PKTS SRC	PKTS DST	OCTS SRC	OCTS DST
AS70	1.5G	1.5K	1.9T	
AS1701	802.3M	131	1.2T	
AS5663	574.5M	2.7K	853.0G	
AS6620	615.1M	657	852.2G	
AS195	511.5M	341	724.2G	
AS32	379.4M	1.3K	528.2G	
AS104	308.4M	286	453.2G	
AS13371	286.3M	2.2K	321.8G	
AS23911	215.3M	547	321.2G	
CNGI-6IX (China)	233.2M	231.6M	299.7G	276.5G
Other	5.6G	10.8G	5.8T	11.7T

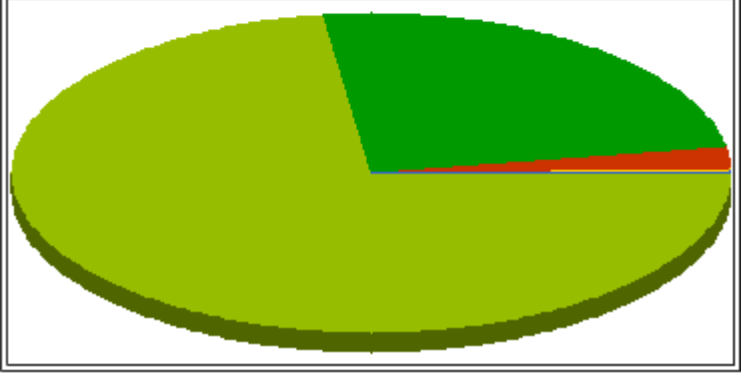
- AS70
- AS1701
- AS5663
- AS6620
- AS195
- AS32
- AS104
- AS13371
- AS23911
- CNGI-6IX (China)

AS	PKTS SRC	PKTS DST	OCTS SRC	OCTS DST
AS4538	155.0K	8.0G	40.5M	8.7T
AS7497	19.5K	2.6G	9.4M	2.9T
AS64513	233.2M	231.6M	299.7G	276.5G
Private AS	64513	52.2M	2.9M	46.8G
AS38345	23910	435	33.9M	20.7G
AS24134	7.0K	4.1M	1.4M	1.9G
AS9406	4134	2.9M	103.1K	762.8M
AS24575	9406	0	317.8K	403.9M
AS18011	380	1.2M	177.6K	279.9M
3TNET	18011	18	610.4K	30.9M
Other	10.1G	581.6K	12.3T	95.6M

- AS4538
- AS7497
- AS64513
- Private AS
- AS38345
- AS24134
- AS9406
- AS24575
- AS18011
- 3TNET



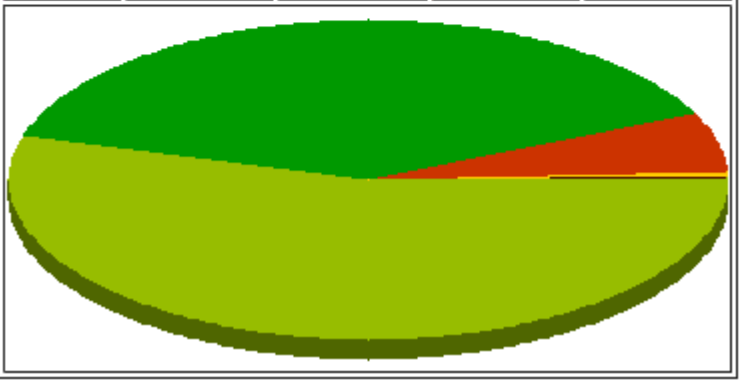
By source AS



By destination AS

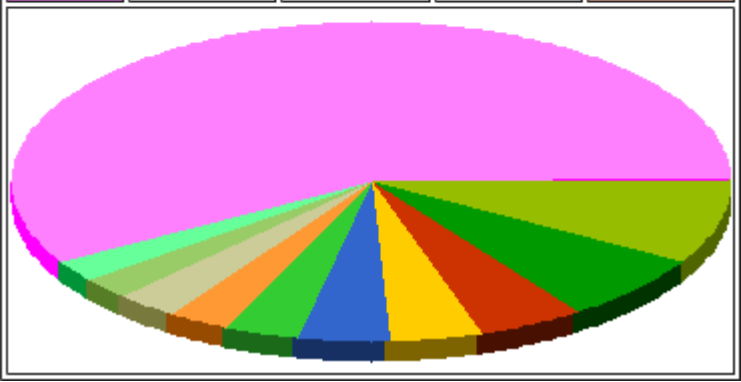
# AS Top 10 (outbound, BJ -> LA)

AS	PKTS SRC	PKTS DST	OCTS SRC	OCTS DST
AS7497				
AS4538				
AS23911				
AS64513	4.5G	1.4M	2.8T	
AS23910	5.8G	3	2.0T	
AS24151	340.1M	181.6M	313.3G	
AS24134	36.5M	0	14.9G	
AS24575	35.1M	0	4.4G	
AS24575	5.4M	195.4K	4.2G	
AS6629	3.4M	0	1.8G	
NOAA (USA) ???	2.6M	0	787.7M	
345	2.8M	37.4K	616.7M	
6629	181.0K	449.7M	252.7M	20.6G
Other	3.4M	10.0G	1.6G	4.4T



By source AS

AS	PKTS SRC	PKTS DST	OCTS SRC	OCTS DST
AS2026				
AS23911				
CNGI-6IX				
AS3152				
AS12				
AS2830				
RIPE				
AS13371				
AS202				
AS3 MIT				
2936	154	339.3M	94.2K	403.7G
43	142	255.8M	107.7K	323.3G
23911	340.1M	181.6M	313.3G	229.2G
3152	626	215.3M	793.2K	200.1G
12	194	571.4M	145.5K	199.7G
70	53.6K	461.3M	64.5M	157.2G
2875	838	139.9M	1.2M	136.1G
13371	236	201.3M	83.1K	134.4G
292	928	104.0M	50.1K	109.1G
3	24.6K	139.7M	13.7M	108.9G
Other	10.2G	8.0G	4.8T	2.7T

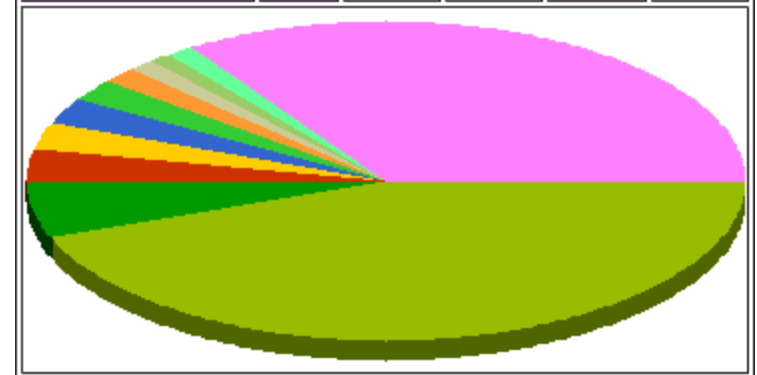


By destination AS

# Address Block Top 10 (BJ -> LA , Src IP)

- Institute of High Energy Physics (CSTNET)
- perfSONAR measurement (CNGI-6IX)
- Shanghai New York University (CERNET)
- NMIC (CSTNET)
- Duke Kunshan University (CERNET)
- IDCD (CERNET)
- Peking University (CERNET)
- Tsinghua University (CERNET)
- Remote Sensing Satellite (CSTNET)
- Shanghai Jiaotong University (CERNET)

Address	AS	PKTS SRC	PKTS DST	OCTS SRC	OCTS DST
202.122.32.0/21	7497	2.0G	242.0K	2.3T	316.3M
210.25.189.30/30	4538	232.7M	0	281.0G	0
59.79.127.0/24	4538	496.4M	0	186.9G	0
210.73.54.0/23	7497	473.0M	0	143.7G	0
180.208.39.0/24	4538	186.1M	0	133.6G	0
58.205.216.0/22	4538	76.3M	0	107.7G	0
162.105.0.0/17	4538	410.5M	0	78.7G	0
166.111.5.0/24	4538	54.1M	0	60.8G	0
159.226.224.0/23	7497	39.4M	0	58.2G	0
202.120.0.0/18	4538	168.7M	0	53.1G	0
Other	N/A	6.5G	9.0G	1.7T	4.0T

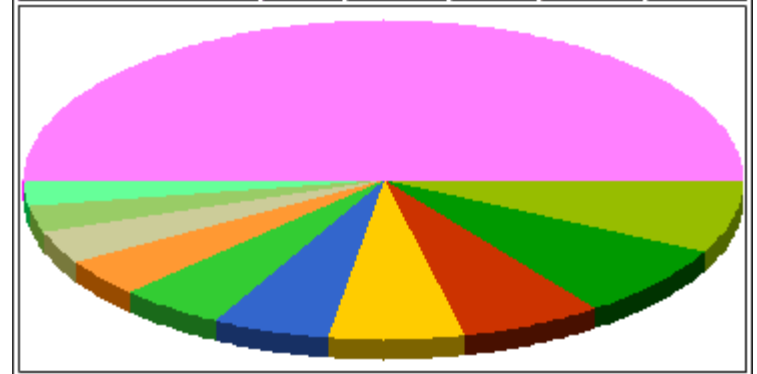




# Address Block Top 10 (LA -> BJ, Src IP)

National Aeronautics and Space Administration  
 National Library of Medicine  
 EROS Data Center (USGS)  
 National Oceanic and Atmospheric  
 Administration  
 University of California, Santa Cruz  
 (SDSC) National Library of Medicine  
 Stanford  
 National Center for Atmospheric Research  
 University  
 National Aeronautics and Space Administration  
 (NGSFC) Duke University

Address	AS	PKTS SRC	PKTS DST	OCTS SRC	OCTS DST
198.118.194.0/24	1701	666.5M	75	987.3G	3.4K
130.14.128.0/17	70	743.0M	824	973.2G	142.9K
152.61.128.0/18	5005	571.5M	184	848.4G	20.4K
140.90.101.0/24	6829	587.7M	600	814.3G	37.7K
192.35.223.0/24	195	493.5M	281	700.0G	20.8K
130.14.0.0/16	70	501.4M	0	633.5G	0
171.64.0.0/14	32	373.2M	1.2K	525.6G	120.9K
128.117.0.0/16	194	307.4M	102	452.1G	8.6K
169.154.128.0/17	7847	215.5M	347	321.2G	27.8K
152.3.0.0/16	13371	281.5M	2.2K	318.5G	640.0K
Other	N/A	6.2G	10.1G	6.6T	11.2T



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# Future Plan

- To be discussed with our CN and US partners
  - L3VPN (e.g. LHCONE VRF)?
  - SDN?
  - IPv6 Transition?
  - IPv6 Measurement (e.g. IPv6 flow collection & analysis)
  - GNA?

**Thanks!**