

IPv6 Adoption at LEARN

12th - 16th July 2021

SANOG 37 – Colombo

Dhammika Lalantha / LEARN

IPv6 history of LEARN

Oct – 2008

LEARN obtained provider-independent Ipv6 address space 2401:DD00::/32 from APNIC and started peering with Sri Lanka Telecom (SLT).

April – 2010

Started Peering with TEIN3 Network.

09 – July – 2013

Held a two day workshop for institute members (customers) and Ipv6 addressing part of the workshop.

IPv6 history of LEARN

23 -Jan – 2014

A Workgroup was formed for Ipv6. Objective was to first deploy Ipv6 in institutes whose involved in Workgroup and then to support deployment in other institutes.

16 – June – 2014

10 day internship program was held for selected members and Ipv6 deployment was involved in the training.

IPv6 history of LEARN

09 – July – 2014

1st meeting of Ipv6 Workgroup was held. In the meeting,

- Reviewed Current status of deployment of IPv6
- Technical matters and knowledge requirements were discussed
- Decided to,
 - Configure the Ipv6 on Web servers
 - Configure the Ipv6 on Mails servers
 - Check the IPv6 capability of L3 device of their own institutes

IPv6 history of LEARN

06 – May – 2016

2nd meeting of Ipv6 Workgroup was held. In the meeting,

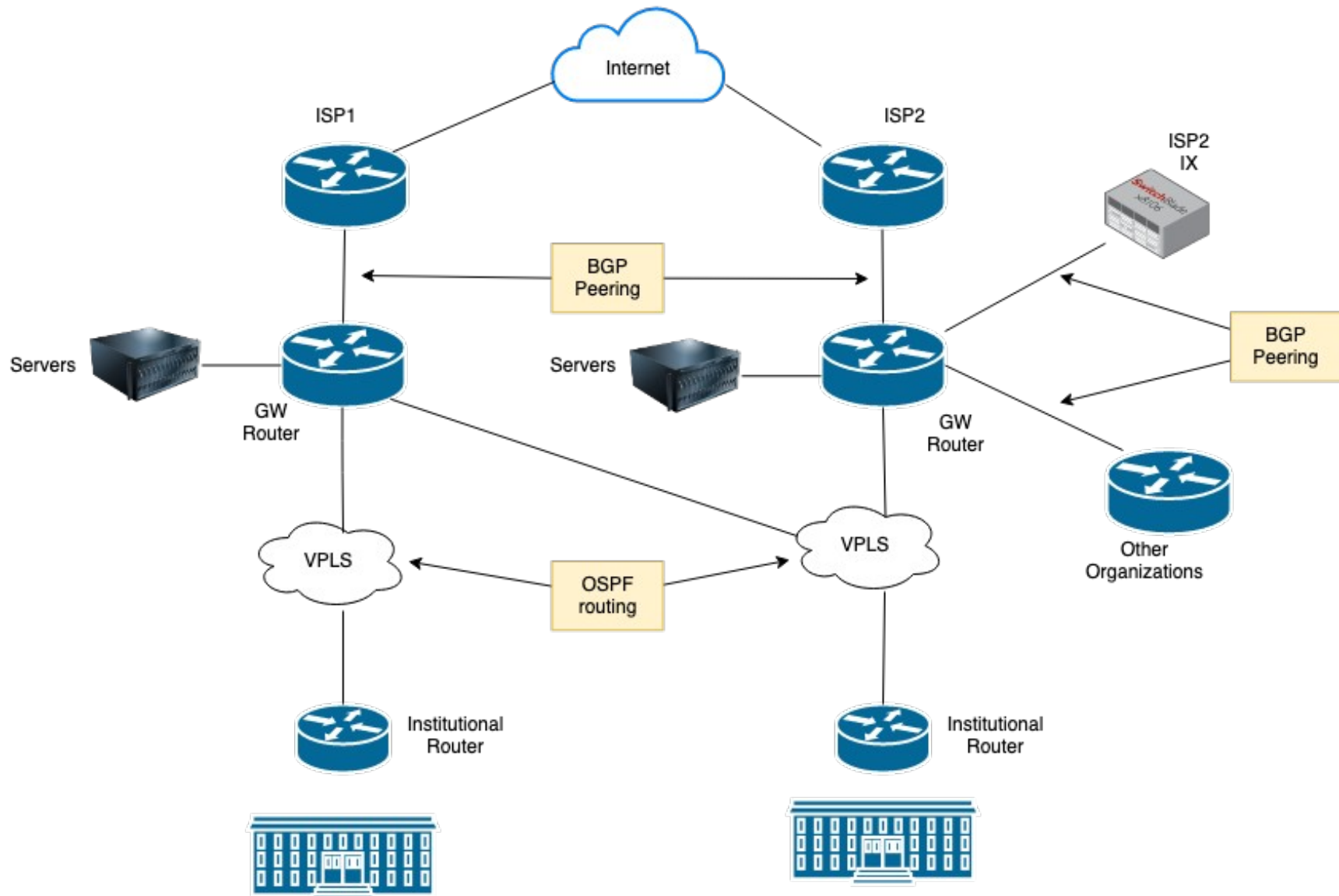
Current status of deployment of institutions were reviewed. University of Kelaniya was identified to be the first Institute that IPv6 has fully deployed.

Few institutes had partial deployment.

22 – May – 2017

A Complete two day workshop was conducted on Ipv6 for member institutes to help remaining institutes to deploy Ipv6.

LEARN Network & IPv6



IPv6 Addressing Plan & Usage

- Given address space
 - 2401:DD00::/32
- Leased subnet size for institutes
 - 2401:DD00:xxxx::/48
- Currently used range
 - 2401:DD00:0000:0000::/64 – 2401:DD00:0400:ffff::/64
- Usage of address space as a percentage
 - Total - 0.198%
 - Within LEARN – 0.015%
 - Total untouched range – 98.44%

IPv6 Addressing at member institutes (Customer sites)

Example 1:

University Reserved Subnet - 2401:DD00:50::/48

Subnet prefix length is 64

2401:DD00:50:XXYY::/64

XX - Faculty (max 256)

YY - Department (max 256)

IPv6 Addressing at member institutes (Customer sites)

Faculty	Department	VLAN	IPv6 Subnet
Faculty 1	Dept 1	101	2401:DD00:50:0101::/64
	Dept 2	102	2401:DD00:50:0102::/64
	Dept 3	103	2401:DD00:50:0103::/64
	Dept 4	104	2401:DD00:50:0104::/64
Faculty 2	Dept 1	201	2401:DD00:50:0201::/64
	Dept 2	202	2401:DD00:50:0202::/64
	Dept 3	203	2401:DD00:50:0203::/64
	Dept 4	204	2401:DD00:50:0204::/64
Faculty 3	Dept 1	301	2401:DD00:50:0301::/64
	Dept 2	302	2401:DD00:50:0302::/64
	Dept 3	303	2401:DD00:50:0303::/64

IPv6 Addressing at member institutes (Customer sites)

Example 2:

University Reserved Subnet - 2401:DD00:50::/48

Subnet prefix length is 64

2401:DD00:50:**XYYZ**::/64

X - Faculty (max 16)

YY - Department (max 256)

Z - Department Unit / Section / Lab (max 16)

IPv6 Addressing at member institutes (Customer sites)

Faculty	Department/Unit	VLAN	IPv6 Subnet
Faculty 1	Dept 1	110	2401:DD00:50:1010::/64
	Dept 2	120	2401:DD00:50:1020::/64
	Dept 3	130	2401:DD00:50:1030::/64
	Dept 3 Unit 1	131	2401:DD00:50:1031::/64
Faculty 2	Dept 1	210	2401:DD00:50:2010::/64
	Dept 2	220	2401:DD00:50:2020::/64
	Dept 2 Unit 1	221	2401:DD00:50:2021::/64
	Dept 3	230	2401:DD00:50:2030::/64
Faculty 3	Dept 1	310	2401:DD00:50:3010::/64
	Dept 2	320	2401:DD00:50:3020::/64
	Dept 3	330	2401:DD00:50:3030::/64

IPv6 migration of LEARN member institutes

LEARN recommended steps ...

- Create a suitable subnet plan which matches your existing topology
- First configure Core network at the institute with ipv6
- Verify the connectivity from outside
- Configure the internally hosted Servers (specially any DNS servers)
- Verify the services from outside
- Configure internal VLANs
- Confirm End User Connectivity

Challenges faced by member institutes

- Ipv6 Knowledge of the technical staff
- No feeling benefit to customer
- IPv6 capability of Devices
- Convincing management
- Reluctance to change
- Possible customer complaints

Current status of IPv6 deployment

- All LEARN Hosted Services are currently on Dual Stack.
- Member institutes are provided with /48 subnets.
- 110 of subnets have been given to institutes
- All institutional access routers are IPv6 enabled
- But not all of Institutes actively using IPv6s

IPv6 performance : Reachability

Test IPv6 [FAQ](#) [Mirrors](#)

[stats](#)

Test your IPv6 connectivity.



[Summary](#) [Tests Run](#) [Other IPv6 Sites](#)

[For the Help Desk](#)

Because you have IPv6, we've added this tab to show you whether or not you can reach other IPv6 web sites on the Internet. Consider notifying your ISP, if there are sites that show up as broken. If you are the ISP, you can click the Info link to see what test URLs are being used.

Hint: Columns are sortable (click the first row); [click here](#) to re-check reachability from where you are to those mirrors.

link	location	provider	ipv6?	info	mirror
test-ipv6.sin.vr.org	SG	HostVirtual	✓	i	mirror
test-ipv6.cgates.lt	LT	Cgates	✓	i	
test-ipv6.ke.liquidtelecom.net	KE	Liquid Telecom	✓	i	mirror
test-ipv6.carnet.hr	HR	Croatian Academic and Research Network	✓	i	mirror
test-ipv6-vm3.comcast.net	US	Comcast	✓	i	mirror
test-ipv6.tld.sk	SK	Sk-nic	✓	i	mirror
test-ipv6.ttk.ru	RU	TTK	✓	i	mirror
www.limeconsultants.com	IN	Lime Consultants	✓	i	
sixte.st	SG	Delan Azabani	✓	i	mirror
test-ipv6.belwue.net	DE	Bel Wü	✓	i	mirror
test-ipv6.hkg.vr.org	HK	HostVirtual	✓	i	mirror
ams2.test-ipv6.com	NL	HostVirtual	✓	i	mirror
test-ipv6.roedu.net	RO	RoEduNet	✓	i	mirror
test-ipv6.go6.si	SI	Go6 Lab - Slovenian IPv6 Iniciative	✓	i	mirror
test-ipv6.cl	CL	NIC Chile	✓	i	mirror
ayepv6.com	UK	Stephen Strowes (hosted at Digital Ocean)	✓	i	
www.vyncke.org/ipv6status/	FR	Eric Vyncke (personal)	✓	i	
antradar.com	US (NJ)	Antradar Software	✓	i	

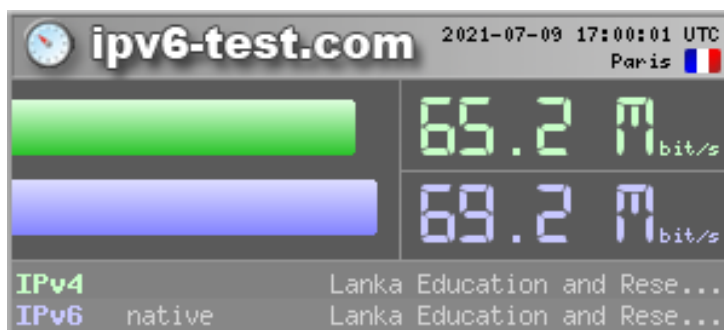
IPv6 performance : Latency

- ICMP tests conducted from LEARN to famous domains

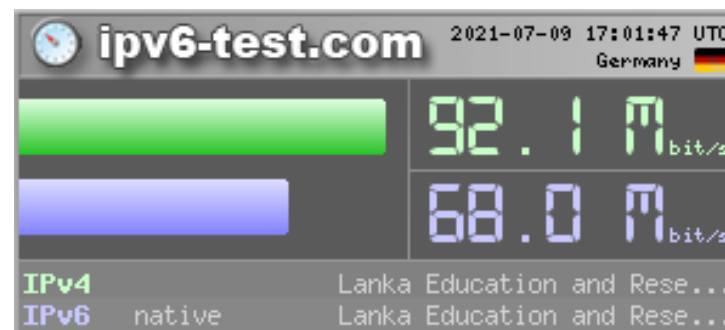
Domain	Round Trip Time (RTT) / ms	
	IPv4	IPv6
Google	34.3	34.8
Youtube	34.3	34.4
Facebook	24.1	52.6
Wikipedia	33.4	40.5
Yahoo	252.5	285.5
CNN	33.5	36.5
LinkedIn	78.3	41.2
Cloudflare	48.3	37.0
Office.com	78.9	95.4
Blogger.com	34.2	34.3

IPv6 performance : Bandwidth

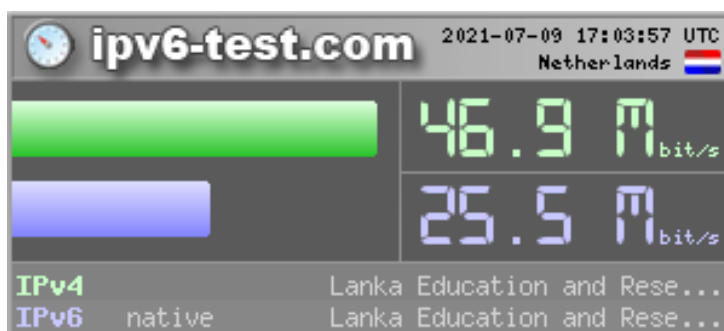
- Speed tests against four places.



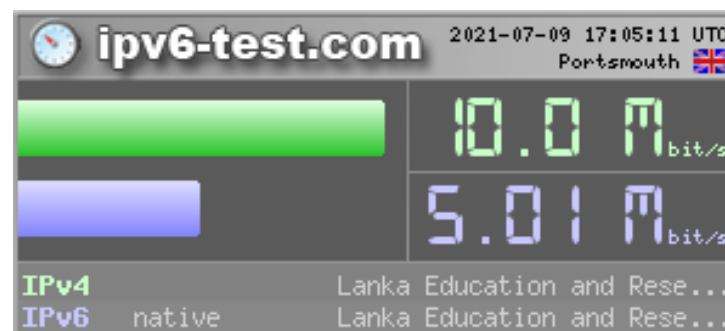
Paris - France



Germany



Netherlands

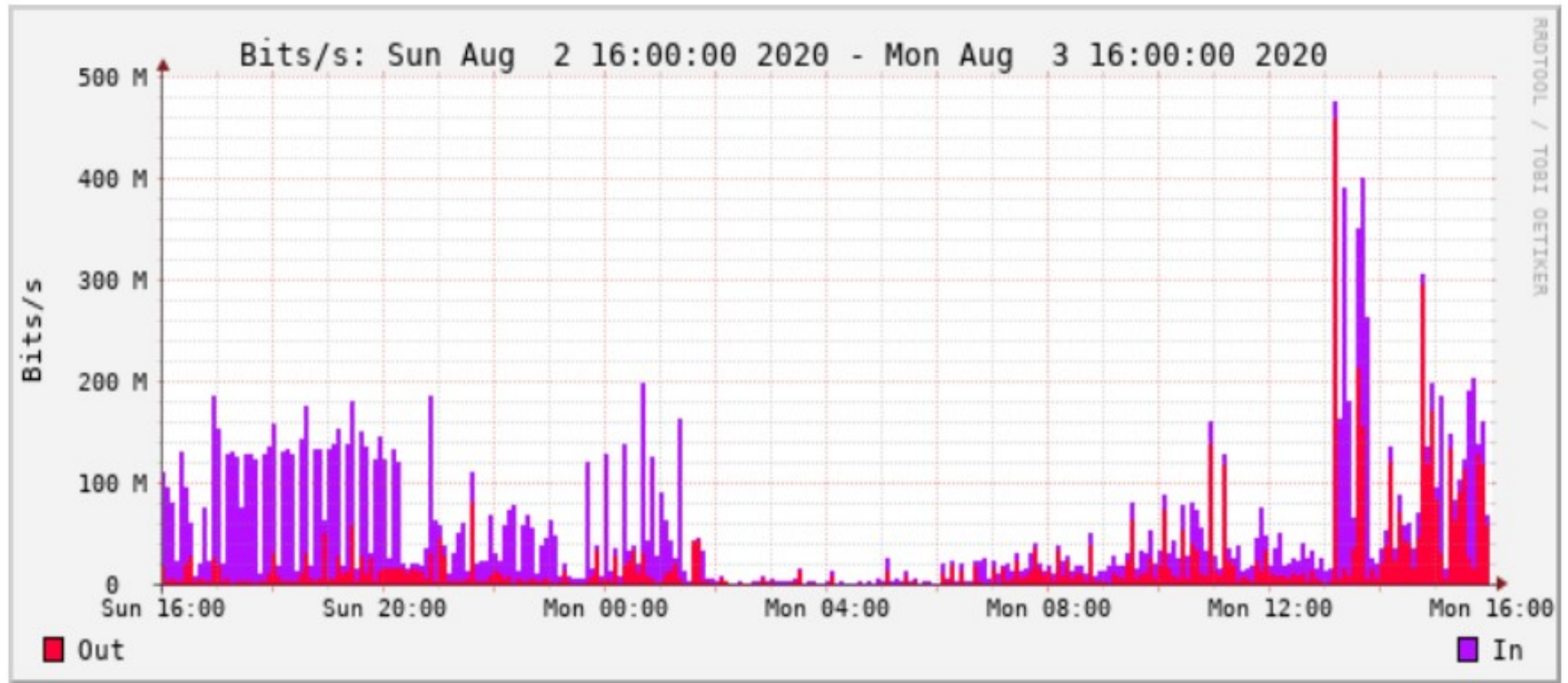


Portsmouth - GB

Traffic monitoring at LEARN

- Uses several open source tools,
 - Cacti, LibreNMS, SmokePing, Nfsen with Netflow
- Currently network automation software from a local company is tested at POC level which supports,
 - Configuration management
 - Network status check (Interface, OSPF, BGP, NTP)

IPv6 traffic monitoring



International collaborations

- Project UPROUSEwithLEARN
- Granted under the Asi@Connect project
- 5 Day Ipv6 deployment workshop was held in Laos
 - Enhancing the Ipv6 knowledge of NREN engineers representing 9 Asian economies
 - Providing on-site support basically to Royal University of Bhutan and Laos R&E institutes

Lanka Education and Research Network

Thank You

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