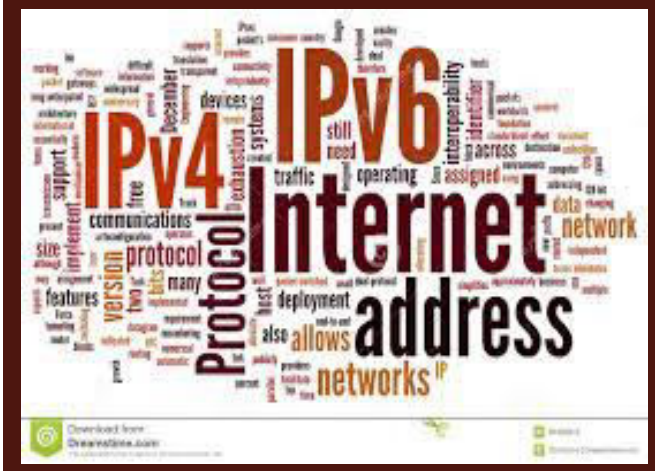
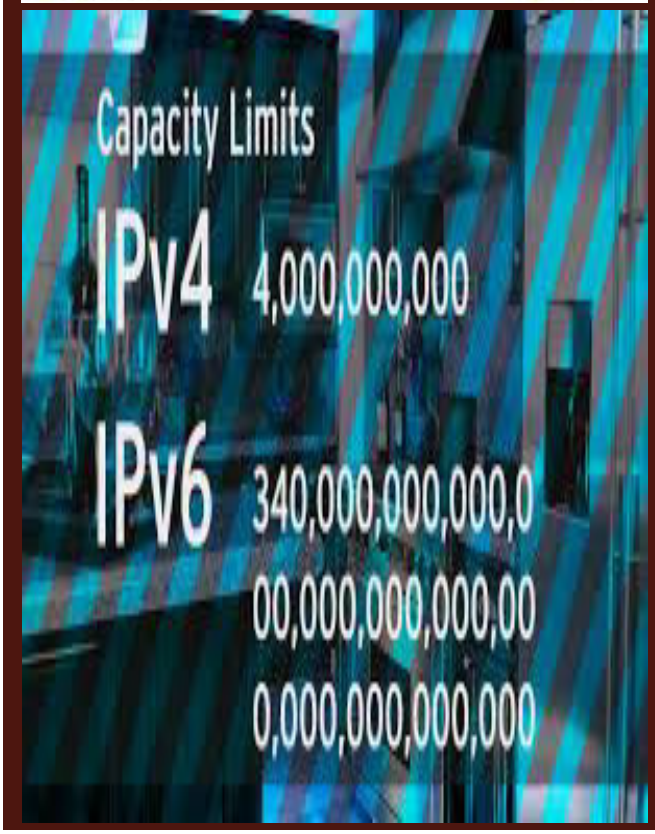
Institute of Information and Communication Technology





DATA COMMUNICATION
ICT-5105

ASSIGNMENT ON " IPV4 vs. IPV6 "

To Honorable:
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ABSTRACT

Objectives: Assignment jobs to find out the specific classification between IPV4 & IPV6 .Where the IPV4 is to represents the current IP version along with its benefits & extra efficiency. However IPV6 also the specialized & enlarged integration of IPV4 performance & newest IP version technology having with the benefits & future effective efficiency. Here we have shown all descriptions about IPV4 & IPV6 internet version protocol along with differ, benefits & implementations in internet connectivity world over Bangladesh.

ACKNOWLEDGEMENT

In performing my assignment work, I had to take the help and guideline of some respected persons, who deserve our greatest gratitude. The completion of this assignment gives us much Pleasure. We would like to show our gratitude Dr. Shahin Akter, Asst. Professor, IICT, BUET, Course title- Data Communication [ICT-5105].Even the class contribution of our Dr.Rubayet Hossein Mondol, Professor, IICT, BUET, and Course Title- Computer Network which supported to covers the assignment topic completeness with configurations & standardizations. They are the best minded& helpful to encourage us to perform with the latest technology research era with subjective to reach destinations & improve expertness.

PAGE INDEX

FINAL ASSIGNMENT WORK - IPV4 vs. IPV6

INTRODUCTION

IPV4:
IPv4 stands for Internet Protocol version 4. It is the underlying technology that makes it possible for us to connect our devices to the web. Whenever a device access the Internet (whether it's a PC, Mac, Smartphone or other device), it is assigned a unique, numerical IP address such as 99.48.227.227. To send data from one computer to another through the web, a data packet must be transferred across the network containing the IP addresses of both devices.

Features:

- Connectionless Protocol
- Allow creating a simple virtual communication layer over diversified devices
- It requires less memory, and ease of remembering addresses
- Already supported protocol by millions of devices
- Offers video libraries and conferences

IPV6:
Internet Protocol Version 6 is a revised protocol for the ID systems used to differentiate computers on a network routing traffic across the Internet. Every computer that communicates over the Internet must carry its own address. Up until 2013, IPv4 had been used, however the world's supply of IPv4 addresses have been depleted; IPv6 succeeds IPv4 web addresses.

Features:

- **Large address space:** IPv6 uses 128-bit addresses, which means that for each person on the Earth there are 48,000,000,000,000,000,000,000,000,000 addresses!
- **Enhanced security:** IPSec (Internet Protocol Security) is built into IPv6 as part of the protocol. This means that two devices can dynamically create a secure tunnel without user intervention.
- **Header improvements:** the packed header used in IPv6 is simpler than the one used in IPv4. The IPv6 header is not protected by a checksum so routers do not need to calculate a checksum for every packet.
- **No need for NAT:** since every device has a globally unique IPv6 address, there is no need for NAT.
- **Stateless address auto configuration:** IPv6 devices can automatically configure themselves with an IPv6 address.

DIFFERENCE BETWEEN- IPV4 vs. IPV6

IPV4	IPV6
1. Address length 32 bit.	1. Address length 128 bit.
2. Address representation is 4 decimal numbers from 0-255 separated by periods.	2. Address representation is 8 groups of 4 hexadecimal digits separated by colons
3. Packet header 20 bytes long.	3. Packet header 40 bytes long, but simpler than the IPV4 packet header
4. Configuration are manual or through DHCP.	4. Configurations are auto-configuration of addresses is available
5. IPSec support optional	5. IPSec support is Built-in.
6. There are 3 types – Unicast, Anycast & Multicast.	6. There are 3 types – Unicast, Anycast & Multicast,
7. Has checksum fields	7. Doesn't has the checksum fields
8. Example -12.244.233.165	8. Example- 2001:0db8:0000:0000:0000:ff00:0042:7879
9. IPv4 support VLSM (Virtual Length Subnet Mask).	9. IPv6 does not offer support for VLSM.
10. Fragmentation is done by sending and forwarding routes.	10. Fragmentation is done by the sender.
11. RIP is a routing protocol supported by the routed daemon.	11. RIP does not support IPv6. It uses static routes.
12. Widespread use of NAT (Network address translation) devices which allows single NAT address can mask thousands of non-routable addresses, making end-to-end integrity achievable.	12. It allows direct addressing because of vast address Space.
13. Use for the designated network from host portion.	13. Not used.
14. SNMP is a protocol used for system management.	14. SNMP does not support IPv6.
15. Relatively constrained network topologies to which move restrict mobility and interoperability capabilities.	15. IPv6 provides interoperability and mobility capabilities which are embedded in network devices.
16. Security is dependent on applications - IPv4 was not designed with security in mind.	16. IPSec (Internet Protocol Security) is built into the IPv6 protocol, usable with a proper key infrastructure.

BENEFITS OF IPV4

Advantages of IPV4:
IPv4 is still dominating the industry because of the many advantages it provides.
4 top benefit of IPV4:

- 1.Reliable Security
- 2.Large Routing Task
- 3.Video Libraries & Conferences
- 4.Flexible

- All systems have no problem handling IPV4 routing. This makes it easy to connect devices with IPV4 address and manage them
- IPV4 offers incredible security, the Internet Protocol has been safe for years & there is no difference now.
- IPV4 has many functional routers which form the backbone of the internet.
- IPV4 offers flexibility and scalability.

Limitations of IPV4:

- 1. The lack of address space - the number of different devices connected to the Internet grows exponentially, and the size of the address space is quickly depleted;
- Weak protocol extensibility - the insufficient size of the IPv4 header, which does not accommodate the required number of additional parameters;
- The problem of security of communications - no means are provided to limit access to information hosted on the network. IPv4 has never been designed for security.
  - Originally designed as an isolated military network
  - Then adapted for public education and research network
- Lack of quality of service support - placement of information about bandwidth, delays required for smooth operation of some network applications are not supported;
- Geographic limitations - since the Internet was created in the USA, this country is also involved in the distribution of IP addresses. Almost 50% of all addresses are reserved for the United States.

  It is impossible to stop the IPv4 depletion and transition to IPv6 is inevitable.

BENEFITS OF IPV6

Advantages of IPV6:

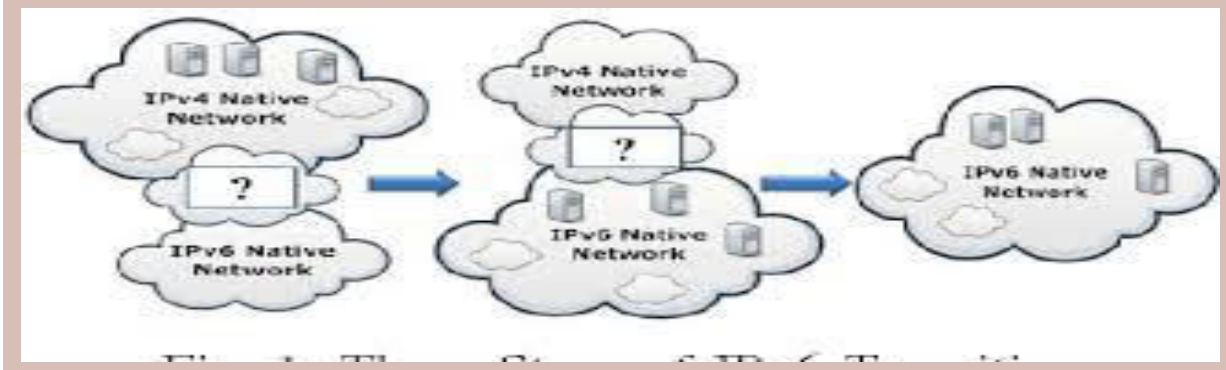
IPV6 is the upgraded & rising IP version to future integrations.

- **Increased Capacity:** of address space—resources are efficiently allocated to accommodate additional web addresses.
- **Efficient Routing:** allows for easy aggregation of prefixes assigned to IP networks.
- **Efficient Data Flow:** enables large data packets to be sent simultaneously helping to conserve bandwidth.
- **Security:** is improved due in part to improved authentication methods built into network firewalls.

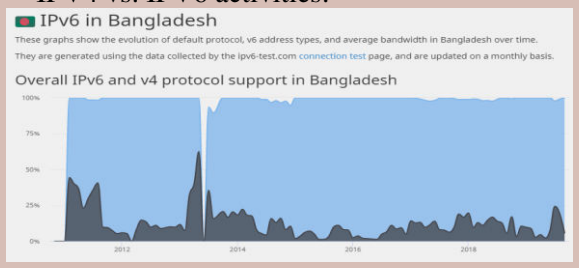
Limitations of IPV6:

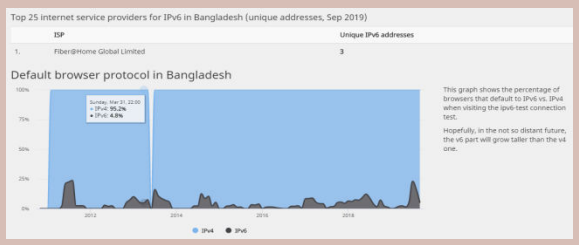
- **Conversion:** IPv4 is still widely used and the world is slow to convert to IPv6.
- **Communication:** IPv4 and IPv6 machines cannot communicate directly to each other, in the very rare circumstance that they would need to.
- **Transition:** The process of making the switch to IPv6 from IPv4 is slow and tedious.
- **Readability:** Understanding IPv6 subnetting can be difficult on its own, let alone trying to remember/memorize your IPv6 address.

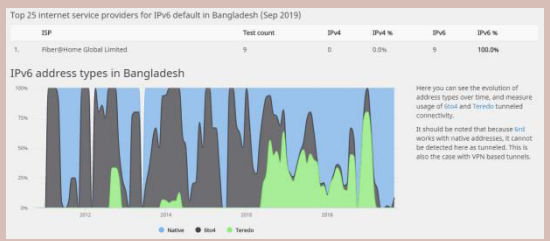
IPV4 or IPV6 in Bangladesh

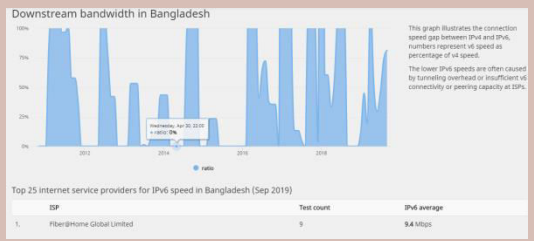


- IPV4 is commonly used all over the world & it's the efficiently working every internet connectivity sectors. As like that, IPV4 are being used widely in Bangladesh for a long time.
- But the deployment of IPv6 is far beyond satisfactory level in Bangladesh.IPV6 is the startup feature for the internet protocol. Though some organizations or company already started or thinking to begin with that version adoptions.
- IPV4 vs. IPV6 activities:









SPECIFICALLY USED- IPV4 & IPV6

IPV4 & IPV6 used in the internet service sector even as with the business value.IPV4 is old and currently using in the market place but IPV6 has the huge market in future implementations consider with its features in Bangladesh.

IPV6 ADOBTION BY THAT ORGANIZATIONS:

IPV6 Deployment in Bangladesh:

- Connectivity towards Bangladesh
- Network Hierarchy
- Prefix Status-International & Domestic
- Readiness of Network
- Industry Practice & Feedback
- Community Initiatives

IPV6: Last Mile Broadband

Biggest challenge mentioned by ISP engineers:

- need to upgrade their PPPoE/RADIUS SERVER
- Bandwidth Control in a dual stack environment is a challenge for them.

IPV6: Corporate offices

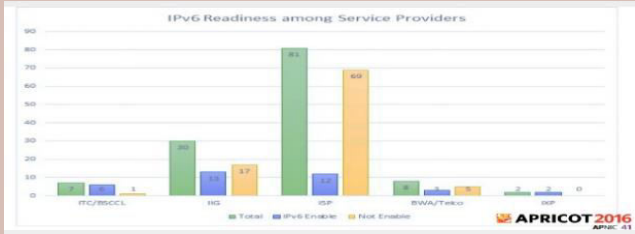
- IT Team to Corporate organizations does not aware of IPV6
- Still very happy in NATed Environment
- Need to create awareness among Corporate IT Teams.

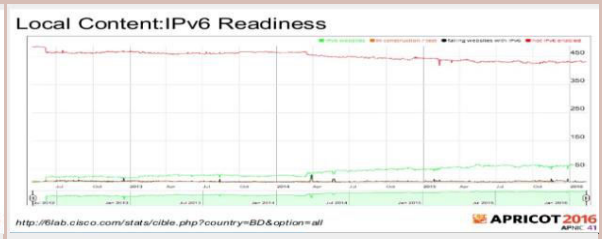
IPV6 : Community Initiatives

- SANOG, BDNOG AND ISPAB hosting at least 2 workshops per year on IPV6 deployment with active support from APNIC.
- Internet Society, Dhaka Chapter hosted event for creating awareness on IPV6.

Need engagement with ISP Management.ISP Association promised to take initiatives.

Need awareness in Corporate IT Teams. Probably need to bring then in NOG meetings?


IPv6 Readiness among Service Providers
ITC/BSCCL
IIG
ISP
BWA/Telco
IXP
Total
IPv6 Enable
Not Enable
APRICOT 2016


Local Content:IPv6 Readiness
http://6lab.cisco.com/stats/cible.php?country=BD&option=all
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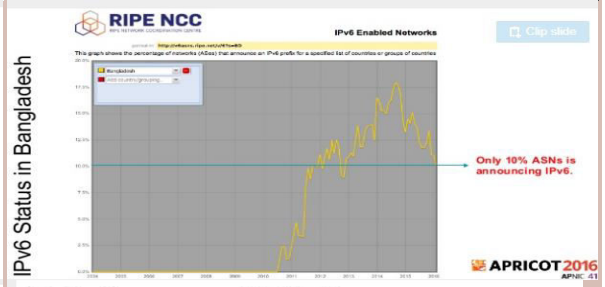
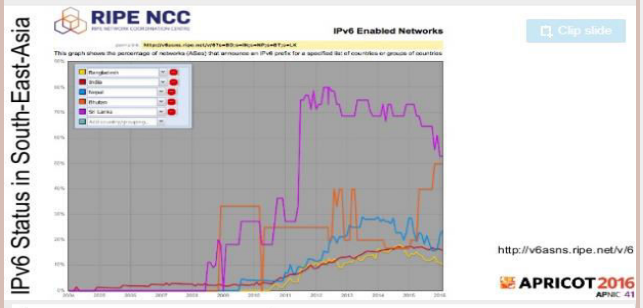
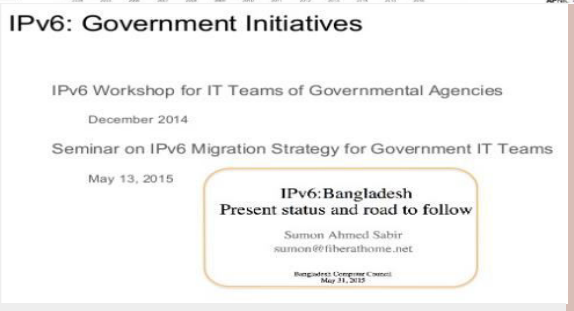
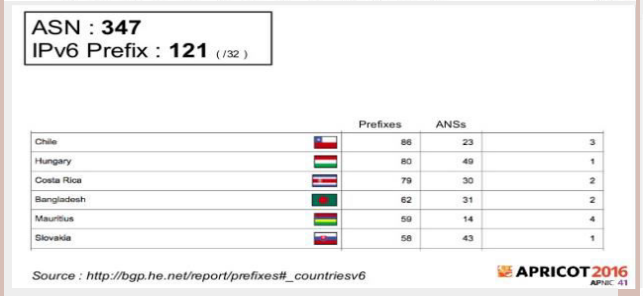
IPv6: .BD and .বাংলা (.Bangla)
BDNOG Supported BTCL to implement IPv6 support for .BD and .বাংলা Root Servers.
;; ANSWER SECTION:
dns.bd. 86400 IN AAAA 2407:5000:88:5::3

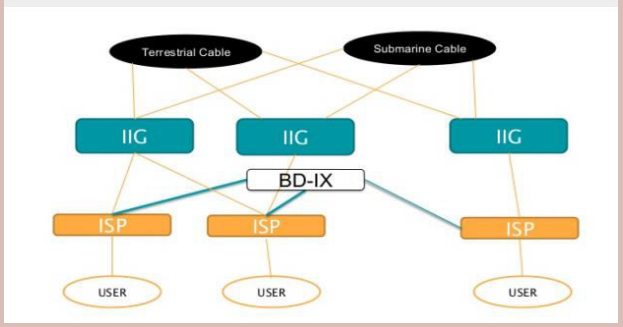

RIPE NCC
IPv6 Enabled Networks
IPv6 Status in Bangladesh
Only 10% ASNs is announcing IPv6.
APRICOT 2016

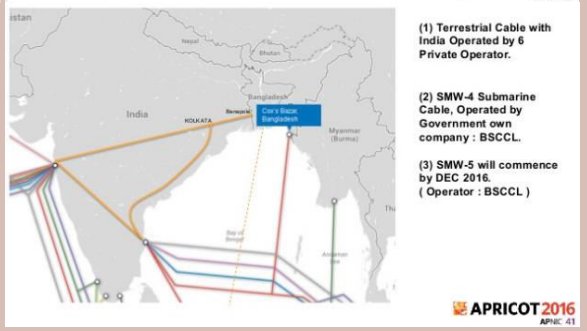

RIPE NCC
IPv6 Enabled Networks
IPv6 Status in South-East-Asia
http://v6asns.ripe.net/v/6
APRICOT 2016


IPv6: Government Initiatives
IPv6 Workshop for IT Teams of Governmental Agencies
December 2014
Seminar on IPv6 Migration Strategy for Government IT Teams
May 13, 2015
IPv6:Bangladesh
Present status and road to follow
Sumon Ahmed Sabir
sumon@fiberathome.net


ASN : 347
IPv6 Prefix : 121 (/32)
Prefixes
ANSs
Chile 86 23 3
Hungary 80 49 1
Costa Rica 79 30 2
Bangladesh 62 31 2
Mauritius 59 14 4
Slovakia 58 43 1
Source : http://bgp.he.net/report/prefixes#_countriesv6
APRICOT 2016


[Delegated by APNIC]
Bangladesh
ASN : 347
IPv4 Prefix : 515 (aggregated)
IPv6 Prefix : 121 (/32)
APRICOT 2016


Terrestrial Cable
Submarine Cable
IIG
IIG
IIG
BD-IX
ISP
ISP
ISP
USER
USER
USER


India
KOLKATA
Cox's Bazar Bangladesh
Myanmar (Burma)
(1) Terrestrial Cable with India Operated by 6 Private Operator.
(2) SMW-4 Submarine Cable, Operated by Government own company : BSCCL.
(3) SMW-5 will commence by DEC 2016.
(Operator : BSCCL)
APRICOT 2016

CONCLUSION

Transitioning to IPv6 is a very significant event in the history of the Internet. Moreover, the push to upgrade to IPv6 connectivity will intensify—and those who do not upgrade will be stuck in slower communication mediums.

In other words, websites engineered to run on IPv6 connectivity will be forced to go through another gateway just to communicate with a business or household stuck on IPv4 connectivity. IPv6 protocols have officially debuted and represent the next generation of networking protocols. As previously stated, the world has depleted its supply of IPv4 addresses.

The world is quickly evolving to offer Internet connectivity through various devices apart from computers and mobile phones. More IPv6 web addresses will need to be allocated to accommodate growth in the coming years.

Perhaps the only downside is that IPv4 and IPv6 networking protocols will have trouble communicating with one another, but companies and researchers are still coming up with ways to "wrap" IPv4 packet data in IPv6 format, if only to bridge the gap between these two communication channels.

How IPv6 Supports the Growth of the Internet
The Internet Protocol (IP) is one of the pillars in support of the Internet, which has been around for almost 25 years. It originated as a concise set of 45 pages in RFC 791 and acts as the network-layer protocol for the Internet.

In 1991 the IETF determined that the IPv4 had outgrown its design and moved to develop the next thing. After much research, the IETF released a clear direction and IPv6 started to be formed in 1994. It is now described in the Internet standard document RFC 2460, published in December 1998. As of 1994, over 30 IPv6 RFCs have been published. The most impactful change from IPv4 to IPv6 is the actual address. IPv4 had a 32 bit long (4 bytes) address, which is composed of a network and host portions.

With IPv6, address is now 128 bits long (16 bytes), typically the host portion of this address will be derived from a MAC address or other interface identifier. While IPv4 is still the most widely used, the Internet Engineering Task Force is advising all to use IPv6 because of the foreseeable exhaustion of IPv4. This expansion gives the flexibility that allocating address and routing traffic needs, as well as eliminates the need for NAT (network address translation).

- An Internet Protocol address is also known as IP address
- IPv4 was the first version of IP which was deployed for production in the ARPANET in 1983
- IPV6 is the most recent version of the Internet Protocol. Internet Engineer Taskforce initiated it in early 1994.
- IPV4 allows creating a simple virtual communication layer over diversified devices
- IPV6 supports Hierarchical addressing and routing infrastructure
- IPv4 is a 32-Bit IP Address while IPv6 is 128 Bit IP Address
- IPv4 offers five different classes of IP Address.
- IPv6 is 128 Bit IP Address

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[9]	
[10]	

BIOGRAPHY

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