

Basic IPv6 configuration

Tutorial pdfs

This lab is divided into five different pdf documents. This is basic information document. You can read the other four tutorial documents in this order:

1. Known_IPv6_addresses_or_ranges.pdf
2. General_IPv6_node_configuration_and_commands.pdf
3. Basic_routing_using_IPv6.pdf
4. Configuring_Linux_machine_as_IPv6_router.pdf

Three teams can work together in this lab to perform tasks mentioned in last two routing related pdfs and three machines would be required to perform those tasks.

Learn about IPv6

You should learn about IPv6 using video tutorial hosted at [6deploy website](#) before you perform lab so that you have proper understanding of IPv6 before you actually try to use it.

Additional very good resources related to IPv6 are available at:

- [APNIC website](#)
- [6choice website](#)

Minimum understanding

You should understand at least following things about IPv6 before you read other documents and proceed with lab:

- IPv6 address structure and :: shorthand notation
- IPv6 header format and significance of various fields present in it.
- Different types of extension headers defined so far and their purpose.
- Recommended order of extension headers within a IPv6 packet
- You should understand following option header formats properly:
 - Hop-by-hop options header

- Destination options header
 - Structure of small extension header options that are used to specify individual options in hop-by-hop and destination options header. Also understand significance of higher three bits of option type field.
 - Routing header. Understand how multiple address can be specified in routing header and how destination addresses get changed based on addresses mentioned in IPv6 routing header. This header complements IPv6 loose source routing header, but does not suffers from same 9 IP address limit as IPv4 header.
 - Fragment header. Notice how fields that were present in IPv4 header and helped with fragmentation are moved as it is to this header.
 - No next header.
- You should understand various IPv6 address classes. You can refer to [Known_IPv6_addresses_or_ranges.pdf](#) tutorial pdf for basic IPv6 address class information. Given that IPv6 is rapidly evolving one should prefer information available on websites mentioned above over the information mentioned in this pdf as those websites will have more recent information.
 - How 48-bit MAC address is converted to IEEE EUI-64 address
 - Neighbour discovery protocol
 - Duplicate address detection
 - Stateless auto-configuration process.

Motivated students should try to understand following headers also to improve their understanding of IPv6:

- Generic ICMPv6 message format
- ICMPv6 error messages reporting
 - Destination unreachable
 - Packet too big
 - Time exceeded
 - Parameter problem

- ICMPv6 information messages related to
 - Echo request
 - Echo reply
 - Neighbour solicitation
 - Neighbour advertisement
 - Redirect
 - Router solicitation
 - Router advertisement
 - Multicast listener query
 - Multicast Listener report
 - Multicast listener done

Lab work

As part of lab you must capture packets using wireshark for every small step of the lab and verify your understanding of IPv6 protocols and header formats by seeing the description and fields of packets captured.

Do not keep wireshark running continuously in single run to capture all packets sent / received during lab as that much memory would not be available. You would have to restart packet capture after every few steps so that older packets get discarded. You can optionally save interesting packet captures in pcap format for future reference.

Submission

There is no submission required as part of this lab. But thorough understanding of IPv6 is very important for anyone who wants to have a career in network field. So ensure that you do all the tasks properly and go through all reading material.