

# NDP – Neighbor Discovery Protocol (1/3)

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The **Neighbor Discovery Protocol (NDP)** facilitates the interaction between adjacent nodes

- **Adjacent (neighbor) nodes** are IPv6 nodes that are located on the same “link”
- **IPv6 link** is a network area bound by routers (equivalent to a broadcast domain)

NDP controls e.g. the following activities on the local IPv6 link (1/2):

- **Router detection** – makes it possible to localize the the host router on the local link
- **Automatic address configuration** – makes it possible for hosts to automatically configure IPv6 addresses for their own interfaces (→ IPv6 Autoconfiguration)
- ...

# NDP – Neighbor Discovery Protocol (2/3)

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NDP controls e.g. the following activities on the local IPv6 link (2/2):

- ...
- **Prefix detection** – makes it possible for hosts to detect known subnetwork prefixes, to distinguish destinations on the local link from destinations that can only be reached via a router (equivalent to subnet resolution)
- **Address resolution** – helps hosts to determine the link-local address of a neighboring node, if only the IP address of the destination is available (equivalent to ARP in IPv4)
- **Determination of the next hop** – algorithm for the determination of the next hop for routes that lead from the local link (equivalent of a default gateways)
- **Detection of a duplicate address**

# NDP – Neighbor Discovery Protocol (3/3)

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**NDP** – Neighbor Discovery Protocol uses **ICMPv6** messages for node communication on a link, e.g.

- Router solicitation
- Router advertisement
- Neighbor solicitation
- Neighbor advertisement
- Redirect
- Diverse messages for error notification

**ICMPv6** is thus required for integral IPv6 functions, it cannot however (as is often the case with IPv4) be filtered by firewalls

# IPv6 Autoconfiguration and DHCPv6 (1/3)

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Automatic configuration of network interfaces with IPv4 is only possible by means of **DHCP (Dynamic Host Configuration Protocol)**:

- Allocation of a (dynamic) **IP address**
- Allocation of **hostnames**
- Information about **default gateway**
- Information about **responsible DNS server** (Domain Name Service)

DHCP works in a stateful mode, i.e. the respective DHCP server knows which host uses which configuration and keeps track of the interactions

**IPv6 autoconfiguration** makes it possible for the host **to configure** interfaces in a **stateless** mode:

- By means of Neighbor Discovery protocol, the host localizes an IPv6 router on the local link and requests a local prefix
- The host creates a link-local address for each interface that does not require a router
- Host checks the **uniqueness of the address** on the link using NDP duplicate address detection
- Host calculates or obtains (using DHCPv6) global address
- Host determines **next hop** (default gateway) for destinations outside of the local link

# IPv6 Autoconfiguration and DHCPv6 (3/3)

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Autoconfiguration can also be used **together with DHCPv6**

- Autoconfiguration does not allow determining the responsible nameserver (common criticism of IPv6 autoconfiguration)
- With autoconfiguration (stateless) there is no logging of the interface configuration used by the host of a network segment. This is however possible with DHCPv6
- DHCPv6 allows the system administrator more control of the distribution of the IP addresses in the network

**But:**

- Without DHCPv6 there is less load on the network and the required infrastructure is also less complex