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IPv6 configuration in Voyager for IPSO 3.8NET

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1 Overview of IPv6

IPv6 is the next generation IP protocol and is expected to replace IPv4, the current IP protocol. The Internet Engineering Task Force (IETF) formally began to work on the new protocol in 1994. IPv6 enhances IPv4 in many ways including:

- Expanded-addressing capabilities
- Simplified-header format
- Improved support for extensions and options
- Flow-labeling capability
- Plug and Play autoconfiguration

The IPv6 implementation includes basic features specified in IPv6 RFCs and features that support IPv6-capable hosts in a network.

IPv6 includes a transition mechanism that allows users to adopt and deploy IPv6 in a highly diffuse way and provides direct interoperability between IPv4 and IPv6 hosts.

The Nokia implementation supports the following features as specified in the corresponding RFCs:

- IPv6 Specification (RFC 2460)
- ICMP v6 (RFC 2463)
- Neighbor Discovery (RFC 2461, router only)
- Basic IPv6 Socket Interface (RFC 2553)
- IPv6 Addressing Architecture (RFC 2373)
- IPv6 Aggregatable Global Unicast Address Format (RFC 2374)
- IPv6 UDP support
- IPv6 TCP support

- IPv6 over IPv4 Tunnel (RFC 2185)
- IPv6 over Ethernet (RFC 2464)
- IPv6 over PPP (RFC 2472)
- IPv6 over ATM (RFC 2492, PVC only)
- IPv6 over ARCNET (RFC 2497)
- IPv6 over IPv4 (RFC 2529)
- IPv6 to IPv4 (Internet Draft)
- Generic Packet Tunneling (RFC 2473, IPv4 through IPv6 only)
- RIPng for IPv6 (RFC 2080)
- Static Routes
- Route Aggregation
- Route Redistribution
- IPv6 inetd
- IPv6 telnet client and server
- IPv6 ftp client and server
- Utilities (ping, netstat, tcpdump, ndp, traceroute6)
- OSPFv3 (RFC 2740)

2

Configuring IPv6 logical interfaces



Steps

1. Click **Configuration** on the home page.
2. Click the *IPv6 Configuration* link in the IPv6 section.
3. Click the logical interface link in the IPv6 section.
4. Click the logical interface link you want to configure in the **Logical column**.

For example: eth-s1p1c0

5. Enter the IP address prefix in the **New IP Address** edit box and the mask length (in bits) in the **New Mask Length** edit box.

The default mask length is 64.
6. Click **Apply**, and then click **Save** to make your changes permanent.
7. Click **Up** at the top of the page to take you back to the *IPv6 Logical Interfaces* page.
8. To enable the IPv6 address, click **On** in the **IPV6 Active** field.
9. Click **Apply**, and then click **Save** to make your change permanent.

3

Configuring neighbour discovery



Steps

1. **Click Configuration on the home page.**
2. **Click the *IPv6 Configuration* link in the IPv6 section.**
3. **In the Global Neighbour Discovery Settings field, enter the value for the queue limit in the Queue Limit edit box.**

This value represents the maximum number of output packets to be queued while the link-layer destination address is being resolved.

4. **In the Global Neighbour Discovery Settings field, enter the value for the unicast retry limit in the Unicast Retry Limit edit box.**

This value represents the number of times to retry unicast neighbour discovery requests.

5. **In the Global Neighbor Discovery Settings field, enter the value for the multicast retry limit in the Multicast Retry Limit edit box.**

This value represents the number of times to retry multicast neighbour discovery requests.

6. **In the Global Neighbour Discovery Settings field, enter the value for the duplicate address detection retry limit in the Duplicate Address Detection Retry Limit edit box.**

This value represents the number of times to retry duplicate address detection neighbor discovery requests.

7. **In the Static Neighbour Discovery Entries field, enter the IPv6 address for the permanent neighbor discovery destination in the New Permanent Neighbor Discovery Entry edit box.**

8. **Click Apply.**

9. **In the Static Neighbour Discovery Entries field, enter the MAC address of the Neighbour whose IPv6 address you entered in step 7.**
10. **Click Apply and then click Save to make your changes permanent.**
11. **To flush current dynamic Neighbor Discovery entries, click the Flush button in the Dynamic Neighbor Discovery Entries field, and then click Apply.**

Further information

See *Configuring ICMPv6 router discovery*

4

Configuring IPv6 in IPv4 tunnels

Purpose

If your IPv6 traffic needs to travel through IPv4 networks to reach its destination, you need to set up a virtual link by configuring a tunnel.



Steps

1. Click **Configuration** on the home page.
2. Click the **IPv6 Configuration** link.
3. Click the **IPv6 in IPv4 Tunnels** link in the **IPv6** section.
4. Enter the IPv4 address of the local tunnel endpoint in the **Local IPV4 Address** edit box.
5. Enter the IPv4 address of the remote tunnel endpoint in the **Remote IPV4 Address** edit box.

Note

The local address must be the address of another interface configured for the router.

6. (Optional) Enter the IPv6 link-local address of the local tunnel endpoint in the **Local IPV6 Link Local** edit box.

If you do not specify an address a default will be configured.

7. (Optional) Enter the remote IPv6 link-local address of the remote tunnel endpoint in the **Remote IPV6 LINK Local** edit box.
8. (Optional) Enter a value for the **Time to Live (TTL)** for packets sent on the tunnel in the **Time to Live** edit box.

- 9. Click Apply, and then click Save to make your changes permanent.**

Further information

See *Configuring IPv4 in IPv6 tunnels*, *Configuring IPv6 in IPv6 tunnels*,
Configuring IPv6 to IPv4 and *Configuring IPv6 over IPv4*

5

Configuring IPv6 to IPv4

Purpose

This feature allows you to connect an IPv6 domain through IPv4 clouds without configuring a tunnel.



Steps

1. Click **Configuration** on the home page.
2. Click the **IPv6 Configuration** link.
3. Click the **IPv6 to IPv4** link in the **IPv6** section.
4. In the **Enable IPV6 To IPV4** field, click the **On** radio button.
5. In the **Active** field, just below the **Logical Interface** field, click the **On** radio button to enable the logical interface.

This value represents the pseudo-interface that is associated with this feature. It does not correspond to a specific physical device.

6. Enter the IPv4 address of the local interface in the **Local IPV4 Address** edit box.

Note

This address must be the address of another interface configured for the router.

7. (Optional) Enter a value for the **Time to Live (TTL)** for packets sent in the **Time to Live** edit box.
8. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Configuring IPv6 in IPv4 tunnels*, *Configuring IPv4 in IPv6 tunnels*, *Configuring IPv6 in IPv6 tunnels* and *Configuring IPv6 over IPv4*

6

Configuring IPv6 over IPv4

Purpose

This feature allows you to transmit IPv6 traffic through IPv4 domains without configuring a tunnel.



Steps

1. Click **Configuration** on the home page.
2. Click the **IPv6 Configuration** link.
3. Click the **IPv6 over IPv4** link in the **IPv6** section.
4. In the **Enable IPV6 Over IPV4** field, click the **On Radio** button.
5. In the **Active** field, just below the **Logical Interface** field, click the **On radio** button.

This value represents the pseudo-interface that is associated with this feature. It does not correspond to a specific physical device.

6. Enter the IPv4 address of the local interface in the **Local IPV4 Address** edit box.

Note

This address must be the address of another interface configured for the router.

7. (Optional) Enter a value for the **Time to Live (TTL)** of the packets sent in the **Time to Live** edit box.
8. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Configuring IPv6 in IPv4 tunnels*, *Configuring IPv4 in IPv6 tunnels*,
Configuring IPv6 in IPv6 tunnels and *Configuring IPv6 to IPv4*

7

Configuring IPv4 in IPv6 tunnels

Purpose

This feature allows you to set up a point-to-point link to permit traffic from IPv4 domains to travel through IPv6 domains.



Steps

1. Click **Configuration** on the home page.
2. Click the **IPv6 Configuration** link.
3. Click the **IPv4 in IPv6 Tunnels** link in the **IPv6** section
4. Enter the IPv6 address of the local tunnel endpoint in the **Local IPV6 Address** edit box.
5. Enter the IPv6 address of the remote tunnel endpoint in the **Remote IPV6 Address** edit box.
6. (Optional) Enter a value for the maximum number of hops the packets sent on the tunnel can take to reach their destination in the **Hop Limit** edit box.
7. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Configuring IPv6 in IPv4 tunnels*, *Configuring IPv6 in IPv6 tunnels*, *Configuring IPv6 to IPv4* and *Configuring IPv6 over IPv4*

8

Configuring IPv6 in IPv6 tunnels

Purpose

This feature allows you to set up a virtual point-to-point link to encapsulate IPv6 traffic in an IPv6 packet.



Steps

1. Click **Configuration** on the home page.
2. Click the **IPv6 Configuration** link.
3. Click the **IPv6 in IPv6 Tunnels** link in the **IPv6** section
4. Enter the IPv6 address of the local tunnel endpoint in the **Local IPv6 Address** edit box.
5. Enter the IPv6 address of the remote tunnel endpoint in the **Remote IPv6 Address** edit box.
6. (Optional) Enter a value for the maximum number of hops the packets can take to reach their destination in the **Hop Limit** edit box.
7. Click **Apply** and then click **Save** to make your changes permanent.
8. Click the **Logical tunnel interface** link to view and set the configuration values for the selected logical interface.
 - a. Enter the IPv6 address of local tunnel endpoint in the **Local IPv6 Address** edit box.
 - b. Enter the IPv6 address of remote tunnel endpoint in the **Remote IPv6 Address** edit box.
 - c. (Optional) To change the logical name of the tunnel, enter new logical name in the **Logical Name** edit box.
9. Click **Apply** and then click **Save** to make your changes permanent.

9

Configuring IPv6 default routes



Steps

1. Click **Config** on the home page.
2. Click the *Static Routes* link in the *IPv6* section.
3. To enable a default route, click the **On** radio button in the **Default** field, and click **Apply**.
4. Enter the IPv6 address of the gateway router in the **Next Hop** edit box.
5. Select the type of next hop the static route will take from the **Next Hop Type** drop-down window.
6. Select the interface the static route will use to reach the gateway in the **Interface** field.

Note

This interface must be specified only if the gateway is a link local address.

7. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Creating IPv6 static routes* and *Creating IPv6 aggregate routes*

10

Creating IPv6 static routes



Steps

1. Click **Config** on the home page.
2. Click the *Static Routes* link in the *IPv6* section.
3. Enter the IPv6 address prefix in the **New Static Route** edit box.
4. Enter the mask length (number of bits) in the **Mask Length** edit box.
5. Click **Apply**.
6. Enter the IPv6 address of the gateway router in the **Next Hop** edit box.
7. Select the type of next hop the static route will take from the **Next Hop Type** drop-down window.
8. Select the interface the static route will take to reach the gateway in the **Interface** field.
9. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Configuring an IPv6 default route* and *Creating IPv6 aggregate routes*

11

Configuring OSPFv3

In order to be able to manage OSPFv3 using the Voyager interface, you have to enable it using command line.

1. To enable OSPFv3 Voyager management, use the following command:

```
dbset xpan:ospf3 t
```

2. To disable OSPFv3 Voyager management, use the following command:

```
dbset xpan:ospf3
```

To make the settings permanent, click the **Save** button in Voyager or give the following command:

```
dbset :save
```

For further information on OSPFv3 configuration, see *Configuring OSPF/OSPFv3*, *Configuring inbound route filtering (OSPF/OSPFv3 external)* and *Example of configuring OSPF/OSPFv3* in Routing configuration in Voyager for IPSO 3.8NET

12 Creating IPv6 aggregate routes



Steps

1. Click **Config** on the home page.
2. Click the *IPv6 Route Aggregation* link in the *IPv6* section.
3. Enter the IPv6 prefix for the new aggregate route in the **Prefix For New Aggregate** edit box.
4. Enter the mask length (number of bits) in the **Mask Length** edit box.
5. Click **Apply**.
6. Scroll through the **New Contributing Protocol** list and click the protocol you want to use for the new aggregate route, and then click **Apply**.
7. Click **Save** to make your changes permanent.
8. Click the **On** radio button in the **Contribute All Routes From <protocol>** field.
9. (Optional) If you want to specify an IPv6 prefix, enter the IPv6 address and mask length in the edit boxes in the **Prefix For New Contributing Route From <protocol>** field.
10. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Configuring IPv6 default routes* and *Creating IPv6 static routes*

13

Configuring RIPng



Steps

1. Click **Config** on the home page.
2. Click the *RIPng* link in the *IPv6* section.
3. To enable RIPng, click the **On** radio button next to the logical interface on which you want to run RIP, and then click **Apply**.
4. Enter a value for the RIPng metric to be added to routes that are sent by way of the specified interface in the **Metric** edit box.
5. Click **Apply**, and then click **Save** to make your changes permanent.

14 Redistributing static routes into RIPng



Steps

1. Click **Config** on the home page.
2. Click the **Route Redistribution** link in the **IPv6** section.
3. Click the **Static Routes** link.
4. To redistribute all currently valid static routes into RIPng, click the **On** button in the **Redistribute All Statistics In The RIPng** field.
5. Enter a value for the metric cost that the created RIPng routes will have in the **Metric** edit box.
6. Click **Apply**, and then click **Save** to make your changes permanent.
7. To redistribute a specific static route or routes into RIPng, click the **On** radio button next to the **IPv6** interface(s) for the static route(s) you want to redistribute to RIPng.
8. Enter a value for the metric cost that the created RIPng route(s) will have in the **Metric** edit box.
9. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Creating IPv6 static routes*, *Redistributing aggregate routes in RIPng* and *Redistributing interface routes into RIPng*

15 Redistributing aggregate routes in RIPng



Steps

1. Click **Config** on the home page.
2. Click the *Route Redistribution* link in the *IPv6* section.
3. Click the *Aggregate Routes* link.
4. To redistribute all currently valid aggregate routes into RIPng, click the **On** button in the **Redistribute All Aggregates Into RIPng** field.
5. Enter a value for the metric cost that the created RIPng routes will have in the **Metric** edit box.
6. Click **Apply**, and then click **Save** to make your changes permanent.
7. To redistribute a specific aggregate route or routes into RIPng, click the **On** radio button next to the **IPv6** interface for the aggregate route (s) you want to redistribute into RIPng.
8. Enter a value for the metric cost that the created RIPng route(s) will have in the **Metric** edit box.
9. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Creating IPv6 aggregate routes*, *Redistributing static routes into RIPng* and *Redistributing interface routes into RIPng*

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Redistributing interface routes into RIPng



Steps

1. Click **Config** on the home page.
2. Click the *Route Redistribution* link in the *IPv6* section.
3. Click the *Interface Routes* link.
4. To redistribute all currently active interface routes into RIPng, click the **On** button in the **Export All Interfaces Into RIPng** field.
5. Enter a value for the metric cost that the created RIPng routes will have in the **Metric** edit box.
6. Click **Apply**, and then click **Save** to make your changes permanent.
7. To redistribute a specific interface route or routes into RIPng, click the **On** radio button next to the IPv6 interface for the route(s) you want to redistribute into RIPng.
8. Enter a value for the metric cost that the created RIPng route(s) will have in the **Metric** edit box.
9. Click **Apply**, and then click **Save** to make your changes permanent.

Further information

See *Redistributing static routes into RIPng* and *Redistributing aggregate routes in RIPng*

17

Configuring ICMPv6 router discovery

Purpose

The ICMPv6 router discovery protocol allows hosts running an ICMPv6 router discovery client to locate neighboring routers dynamically as well as to learn prefixes and configuration parameters related to address autoconfiguration. Nokia implements only the ICMPv6 router discovery server portion, which means that the Nokia platform can advertise itself as a candidate default router, but it will not adopt a default router using the router discovery protocol.



Steps

1. **Click Config on the home page.**
2. **Click the *ICMPv6 Router Discovery Link* in the *IPv6* section.**
3. **To enable ICMPv6 router discovery, click the **On** radio button next to the interface(s) on which you want to run the protocol.**
4. **Click Apply.**
5. *If you want to enable the managed address configuration flag in the router advertisement packet*

Then

click the **Yes radio button in the **Managed Config Flag** field.**

This flag enables hosts to perform stateful autoconfiguration to obtain addresses.

6. *If you want to enable the other stateful configuration flag in the router advertisement packet*

Then

click the **Yes radio button in the **Other Config Flag** field.**

This flag enables hosts to perform stateful autoconfiguration to obtain information other than addresses.

7. *If you want to enable the MTU options field in the router advertisement packet*

Then

click the Yes radio button in the Send MTU Option field.

8. **(Optional) Enter a value (in seconds) for the minimum time between which unsolicited multicast ICMPv6 router advertisements are sent on the interface in the Min ADV Interval edit box.**
9. **(Optional) Enter a value (in seconds) for the maximum time between which unsolicited multicast ICMPv6 router advertisements are sent on the interface in the Max ADV Interval edit box.**

Note

Whenever an unsolicited advertisement is sent, the timer is set to a value between the maximum advertisement interval and the minimum advertisement interval.

10. **(Optional) Enter a value (in seconds) for router advertisement packet's router lifetime field in the Router Lifetime edit box.**

A value of zero indicates that the router is not to be used as a default router.

11. **(Optional) Enter a value for the router advertisement packet's reachable time field in the Reachable Time edit box.**

The value represents the time that a node assumes a neighbor is reachable after having received a reachability confirmation.

12. **(Optional) Enter a value (in seconds) for the router advertisement packet's retransmission timer field in the Retransmission Time edit box.**

This value represents the time between which neighbor solicitation messages are retransmitted if the node doesn't receive a response.

13. **(Optional) Enter a value for the router advertisement packet's hop limit field in the CUR Hop Limit edit box.**

14. **(Optional) To specify that the IPv6 prefix can be used for on-link determination, click the Yes Radio button in the Onlink Flag field.**
15. **(Optional) To specify that the IPv6 prefix can be used for autonomous address configuration, click the Yes radio button in the Autonomous Flag field.**
16. **(Optional) Enter a value (in seconds) for the prefix information option's valid lifetime field in the Prefix Valid Lifetime edit box.**

This value represents the length of time—relative to the time the packet is sent—that the prefix is valid for the purpose of on-link determination.

17. **(Optional) Enter a value (in seconds) for the prefix information option's preferred lifetime field in the Prefix Preferred Lifetime edit box.**

This value represents the length of time— relative to the time the packet is sent—that addresses generated by the prefix through stateless autoconfiguration remain preferred.

18. **Click Apply.**
19. **Click Save to make your changes permanent.**

Further information

See *Configuring neighbour discovery*

18 Enabling IPv6 network access

Purpose

Note

If you have local interfaces on a general purpose line card (GPLC), you must first select the line card by clicking the *LineCard Configuration* link on the configuration page, click the name of the line card, and then click the *Network Access and Services (v6)* link. See *Making configuration changes to general purpose line cards*.



Steps

1. **To enable IPv6 FTP access, click the Yes radio button in the Allow IPV6 FTP Access field.**
2. **To enable Ipv6 Telnet Access, click the Yes radio button in the Allow IPV6 Telnet Access field.**
3. **Click Apply.**
4. **Click Save to make your changes permanent.**

Further information

See *Configuring IPv6 logical interfaces*