CHAPTER 6

Understanding and Configuring DLEP

After configuring the interfaces and verifying connectivity as described in Chapter 3, "Configuring the Interfaces," the next step is to configure the protocols for those interfaces. The Dynamic Link Exchange Protocol (DLEP) is a radio aware routing (RAR) protocol.

Prerequisite Reading

Read Chapter 5, "Introduction to Radio Aware Routing and MANET" before selecting the appropriate protocol per each interface configured in Chapter 3, "Configuring the Interfaces,".

Note See Appendix A, "Command Reference" for detailed command reference.

Configuring DLEP

This chapter provides the following major sections for initiating, verifying, and managing all aspects of Dynamic Link Exchange Protocol (DLEP) on an interface:

Configuring the Physical Interface

In addition to configuring a description, IP address, and other interface characteristics, you must specify that the physical interface use a virtual template which is the source for all of the DLEP Virtual-Access interfaces.

To configure the virtual template for an interface, perform the following procedure:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **intereface FastEthernet0/1**
4. **description** *description*
5. **ip address** *A.B.C.D a.b.c.d*
6. **no ip proxy-arp**
7. **ip dlep vtemplate** *number*
8. **duplex auto**
9. **speed auto**
10. **ipv6 enable**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**enable**
	
	Example:
	`Router> enable`
	`Router#`
		Enables privileged EXEC mode.
		• Enter your password if prompted.

Step 2	**configure terminal**
	
	Example:
	`Router# configure terminal`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`Router(config)#`
		Enters global configuration mode.

Step 3	**interface fastethernet***number*
	
	Example:
	`Router(config)# interface fastethernet0/1`
	`Router(config-if)#`
		Enters interface configuration mode.

Step 4	**description** *description* **Example:** `Router(config-if)#description DLEP RADIO CONNECTION`	Specifies a description for the interface. In this example, the description is DLEP RADIO CONNECTION.

	Command or Action	Purpose
Step 5	**ip address** *A.B.C.D a.b.c.d* **Example:** `Router(config-if)#ip address 10.10.10.4 255.255.255.0`	Specifies the IP address and subnet mask for the physical interface. In this example, the IP address is set to10.10.10.4 and the subnet mask is 255.255.255.0.
Step 6	**no ip proxy-arp** **Example:** `Router(config-if)#no ip proxy-arp`	Prevents the interface from responding to ARP requests for other routers on the interface. This command is required for DLEP.
Step 7	**ip dlep vtemplate** *number* **port** *number* **Example:** `Router(config-if)#ip dlep vtemplate number 13`	Initiates DLEP on the interface by setting the virtual-access template number and optional port number. The valid values for the templates range from 1 to 4096. The valid values for the port number range from 1 to 65534. If you do not specify a port number, Port number 55555 is used be default.
Step 8	**duplex auto**	Configures the interface to automatically set up duplexing.
Step 9	**speed auto**	Configures the interface to automatically negotiate with the corresponding interface and set the communication speed.
Step 10	**ipv6 enable**	Enables IPv6 on the interface.

Step 11	**exit**
	
	Example:
	`Router(config-if)# exit`
	`Router(config)#`
		Exits the current mode.

Disabling Virtual Template Subinterfaces

By default, Cisco IOS configures virtual-access interfaces as subinterfaces. You must enter the **no virtual-template subinterface** command so that the virtual access interfaces are not configured as sub-interfaces.

Creating the Virtual Template

Perform this task to create the DLEP virtual template:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface Virtual-Template** *number*
4. **ip unnumbered FastEthernet0/1**
5. **exit**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**enable**
	
	Example:
	`Router> enable`
	`Router#`
		Enables privileged EXEC mode.
		• Enter your password if prompted.

Step 2	**configure terminal**
	
	Example:
	`Router# configure terminal`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`Router(config)#`
		Enters global configuration mode.

Step 3	**interface Virtual-Template** *number*
	
	Example:
	`Router(config)# interface Virtual-Template 13`
	`Router(config-if)#`
		Creates a virtual template for DLEP.
		
		This example creates virtual template 13.

Step 4	**ip unnumbered FastEthernet0/1** **Example:** `Router(config-if)#ip unnumbered FastEthernet0/1`	Specifies the physical interface where the VMI retrieves the IP address for the physical interface.

Step 5	**exit**
	
	Example:
	`Router(config-if)# exit`
	`Router(config)#`
		Exits the current mode.

Configuring the VMI

The VMI is the upper level in the RAR environment that communicates with the routing protocols. It is important to set the IP address to unnumbered and to the physical interface so that the VMI knows where to get the IP address for each virtual-access interface.

It is equally important to set the physical interface correctly, so that DLEP knows where to insert the packets for delivery.

To configure the VMI, perform the following procedure:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **intereface vmi** *number*
4. **ip unnumbered FastEthernet0/1**
5. **physical-interface Fast-Ethernet0/1**

6. **ipv6 enable**
7. **ospfv3 1 network manet**
8. **ospfv3 1 area0**
9. **ospfv3 2 network manet**
10. **ospfv3 2 area 0 ipv4**
11. **exit**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**enable**
	
	Example:
	`Router> enable`
	`Router#`
		Enables privileged EXEC mode.
		• Enter your password if prompted.

Step 2	**configure terminal**
	
	Example:
	`Router# configure terminal`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`Router(config)#`
		Enters global configuration mode.

Step 3	**interface vmi** *number*
	
	Example:
	`Router(config)# interface vmi1`
	`Router(config-if)#`
		Creates a VMI and enters interface configuration mode.
		
		This example creates VMI1.

Step 4	**ip unnumbered FastEthernet0/1** **Example:** `Router(config-if)#ip unnumbered FastEthernet0/1`	Specifies the physical interface where the VMI retrieves the IP address for the physical interface.
Step 5	**physical-interface FastEthernet0/1** **Example:** `Router(config-if)#physical-interface FastEthernet0/1`	Specifies where the Virtual-Access interface inserts packets for delivery.
Step 6	**ipv6 enble**	Enables IPv6 on the VMI.

	Command or Action	Purpose

Step 7	**Example:**
	`Router(config-if)#ospfv3 1 network manet`
	`Router(config-if)#ospfv3 1 area 0`
	`Router(config-if)#ospfv3 2 network manet`
	`Router(config-if)#ospfv3 area 0 ipv4`
		Configure the routing protocols for your network. These commands will vary depending on the routing protocol for the network.
		This example configures ospfv3 as the routing protocol using manet as the network type, and uses address families for IPv4 addressing.

Step 8	`exit`
	Example:
	`Router(config-if)# exit`
	`Router(config)#`
		Exits the current mode.

Configuring Optional Timers

DLEP has several optional timers that you can configure. Cisco recommends that you use the defaults settings for these timers. These commands are documented in the Appendix A, "Command Reference."

Verifying DLEP Configuration

The following examples show how to verify DLEP configuration on the router interface:

- Displaying Information for DLEP Clients, page 6-7
- Displaying DLEP Router Configuration, page 6-7
- Displaying Neighbors on a DLEP Interface, page 6-7

Note You can display general information as in the following examples:

- For DLEP clients:

```
Router> show dlep clients ?
FastEthernet  FastEthernet IEEE 802.3
  Vlan          Vlan IEEE 802.1q
  |             Output modifiers
  <cr>
```

- For the DLEP server configuration:

```
Router> show dlep config ?
FastEthernet  FastEthernet IEEE 802.3
  Vlan          Vlan IEEE 802.1q
  |             Output modifiers
  <cr>
```

- For DLEP neighbors:

```
Router> show dlep neighbors ?
FastEthernet  FastEthernet IEEE 802.3
  Vlan          Vlan IEEE 802.1q
  |             Output modifiers
  <cr>
```

Displaying Information for DLEP Clients

This example shows how to display router-to-radio peer associations on DLEP interfaces.

```
Router> show dlep clients

DLEP Clients for all interfaces:


DLEP Clients for Interface FastEthernet0/1
DLEP Server IP=12.12.12.101:55555 Sock=1


DLEP Client IP=12.12.12.7:38681
 Peer ID=1, Virtual template=13
 Description: DLEP_Radio_Sim_1
 Peer Timers (all values in seconds):
  Heartbeat=10, Dead Interval=40, Terminate ACK=10
 Neighbor Timers (all values in seconds):
  Activity timeout=0, Neighbor Down ACK=10
```

Displaying DLEP Router Configuration

This example shows how to display configuration details for the DLEP server configuration:

```
Router> show dlep config
DLEP Configuration for FastEthernet0/1.5

DLEP Server IP=10.10.5.4:55555
 Virtual template=13
 Missed heartbeat threshold=4, Peer Terminate ACK timeout=10
 Neighbor activity timeout=0, Neighbor Down ACK timeout=10
```

Displaying Neighbors on a DLEP Interface

This example shows how to display information about established neighbor sessions on DLEP interfaces.

```
Router> show dlep neighbors
DLEP Neighbors for Interface FastEthernet0/1
DLEP Server IP=12.12.12.101:55555 Sock=1


SID=2150  MAC_Address=1122.3344.5566
  Addresses:
  No Layer 3 addresses are specified.
  Metrics:  rlq=100  resources=100  latency=250 milliseconds
            cdr=100000000 bps  mdr=100000000 bps
```

Technical Support for DLEP

Contact your Cisco Support engineer for any troubleshooting support you may need. The following information is available for your reference:

- Debug Commands, page A-1
- Default Settings for DLEP, page C-1

Caution We do not recommend that you change the default DLEP configuration unless a Cisco Support engineer instructs you to do so.