

36. CDP and LLDP (Layer 2 Discovery Protocol)

INTRO TO LAYER 2 DISCOVERY PROTOCOLS

- LAYER 2 DISCOVERY PROTOCOL, such as CDP and LLDP share information WITH and DISCOVER information about NEIGHBORING (Connected) DEVICES
- The SHARED INFORMATION includes:
 - Hostname
 - IP Address
 - Device Type
 - etcetera.
- **CDP** is a Cisco Proprietary Protocol
- **LLDP** is an Industry Standard Protocol (IEEE 802.1AB)
- Because they SHARE INFORMATION about the DEVICES in the NETWORK, they can be considered a security risk and are often NOT used. It is up to the NETWORK ENGINEER / ADMIN to decide if they want to use them in the NETWORK or not.

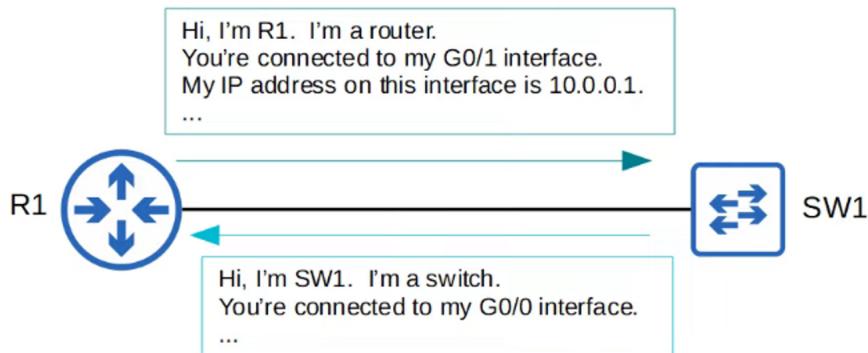


Figure 1: image

CISCO DISCOVERY PROTOCOL (CDP)

- CDP is a Cisco proprietary protocol
- It is enabled on Cisco devices (routers, switches, firewalls, IP Phones, etc) by DEFAULT

CDP Messages are periodically sent to Multicast MAC ADDRESS 0100.0CCC.CCCC

- When a DEVICE receives a CDP message, it PROCESSES and DISCARDS the message. It does NOT forward it to other devices.
- By DEFAULT, CDP Messages are sent once every **60 seconds**
- By DEFAULT, the CDP hold-time is **180 seconds**. If a message isn't received from a neighbor for 180 seconds, the neighbor is REMOVED from the CDP Neighbor Table
- CDPv2 messages are sent by DEFAULT

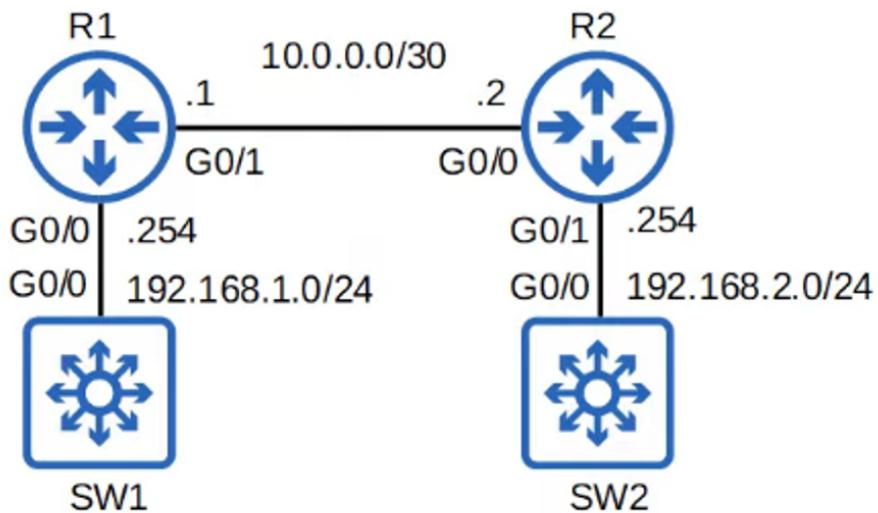


Figure 2: image

CDP NEIGHBOR TABLES

“Device ID” = What devices were DISCOVERED by CDP

“Local Interface” = What LOCAL device interface the neighbors are connected to

“Holdtime” = Hold-time countdown in seconds (0 = device removed from table)

“Capabilities” = Refers to Capability Codes table (located above output)

“Platform” = Displays the MODEL of the Neighbor Device

“Port ID” = Neighbor ports that LOCAL device is connected to

MORE DETAILED OUTPUT

“Version” = shows what version of Cisco’s IOS is running on the device

```

R1#show cdp
Global CDP information:
    Sending CDP packets every 60 seconds
    Sending a holdtime value of 180 seconds
    Sending CDPv2 advertisements is enabled

R1#
R1#show cdp traffic
CDP counters :
    Total packets output: 105, Input: 112
    Hdr syntax: 0, Chksum error: 0, Encaps failed: 0
    No memory: 0, Invalid packet: 0,
    CDP version 1 advertisements output: 0, Input: 0
    CDP version 2 advertisements output: 105, Input: 112

R1#
R1#show cdp interface
GigabitEthernet0/0 is up, line protocol is up
    Encapsulation ARPA
    Sending CDP packets every 60 seconds
    Holdtime is 180 seconds
GigabitEthernet0/1 is up, line protocol is up
    Encapsulation ARPA
    Sending CDP packets every 60 seconds
    Holdtime is 180 seconds
GigabitEthernet0/2 is administratively down, line protocol is down
    Encapsulation ARPA
    Sending CDP packets every 60 seconds
    Holdtime is 180 seconds
GigabitEthernet0/3 is administratively down, line protocol is down
    Encapsulation ARPA
    Sending CDP packets every 60 seconds
    Holdtime is 180 seconds

    cdp enabled interfaces : 4
    interfaces up          : 2
    interfaces down        : 2

```

Figure 3: image

```

R1#show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
                  D - Remote, C - CVTA, M - Two-port Mac Relay

Device ID      Local Intrfce     Holdtme   Capability Platform Port ID
SW1           Gig 0/0          153        R S I       Gig 0/0
R2           Gig 0/1          146        R B         Gig 0/0

Total cdp entries displayed : 2
R1#

```

Figure 4: image

```
R1#show cdp neighbors detail
Device ID: SW1
Entry address(es):
Platform: Cisco , Capabilities: Router Switch IGMP
Interface: GigabitEthernet0/0, Port ID (outgoing port): GigabitEthernet0/0
Holdtime : 174 sec

Version :
Cisco IOS Software, vios_12 Software (vios_12-ADVENTERPRISEK9-M), Version 15.2(4.0.55)E, TEST ENGINEERING ESTG_WEEKLY BUILD, synced to END_OF_FLO_ISP
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advertisement version: 2
VIP Management Domain: ''
Native VLAN: 1
Duplex: full

-----
Device ID: R2
Entry address(es):
IP address: 10.0.0.2
Platform: Cisco , Capabilities: Router Source-Route-Bridge
Interface: GigabitEthernet0/1, Port ID (outgoing port): GigabitEthernet0/0
Holdtime : 169 sec

Version :
Cisco IOS Software, IOSv Software (VIOS-ADVENTERPRISEK9-M), Version 15.6(2)T, RELEASE SOFTWARE (fc2)
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Compiled Tue 22-Mar-16 16:19 by prod_rel_team

advertisement version: 2
Duplex: full
Management address(es):
IP address: 10.0.0.2

Total cdp entries displayed : 2
```

Figure 5: image

SHOW SPECIFIC CDP NEIGHBOR ENTRY

```
R1#show cdp entry R2
-----
Device ID: R2
Entry address(es):
IP address: 10.0.0.2
Platform: Cisco , Capabilities: Router Source-Route-Bridge
Interface: GigabitEthernet0/1, Port ID (outgoing port): GigabitEthernet0/0
Holdtime : 178 sec

Version :
Cisco IOS Software, IOSv Software (VIOS-ADVENTERPRISEK9-M), Version 15.6(2)T, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
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advertisement version: 2
Duplex: full
Management address(es):
IP address: 10.0.0.2
```

Figure 6: image

CDP CONFIGURATION COMMANDS

- CDP is GLOBALLY ENABLED, by DEFAULT
- CDP is also ENABLED on each INTERFACE, by DEFAULT
- To ENABLE / DISABLE CDP globally: R1(config)# [no] cdp run



CDP show commands summary

- R1# **show cdp**
→ shows basic information about CDP (timers, version)
- R1# **show cdp traffic**
→ displays how many CDP messages have been sent and received
- R1# **show cdp interface**
→ displays which interfaces CDP is enabled on
- R1# **show cdp neighbors**
→ lists CDP neighbors and some basic information about each neighbor
- R1# **show cdp neighbors detail**
→ lists each CDP neighbor with more detailed information
- R1# **show cdp entry name**
→ displays the same info as above, but for the specified neighbor only

Figure 7: image

- To ENABLE / DISABLE CDP on specific interfaces : R1(config-if)# [no] **cdp enable**
- Configure the CDP timer: R1(config)# **cdp time *seconds***
- Configure the CDP holdtime: R1(config)# **cdp holdtime *seconds***
- ENABLE / DISABLE CDPv2: R1(config)# [no] **cdp advertise-v2**

LINK LAYER DISCOVERY PROTOCOL (LLDP)

- LLDP is an INDUSTRY STANDARD PROTOCOL (IEEE 802.1AB)
- It is usually DISABLED on Cisco devices, by DEFAULT, so it must be manually ENABLED
- A device can run CDP and LLDP at the same time

LLDP Messages are periodically sent to Multicast MAC ADDRESS 0180.c200.000E

- When a DEVICE receives an LLDP message, it PROCESSES and DISCARDS the message. It does NOT forward it to OTHER DEVICES
- By DEFAULT, LLDP Messages are sent once every **30 seconds**
- By DEFAULT, LLDP Holdtime is **120 seconds**
- LLDP has an additional timer called the 'reinitialization delay'
 - If LLDP is ENABLED (Globally or on an INTERFACE), this TIMER will DELAY the actual initialization of LLDP (**2 seconds**, by DEFAULT)

LLDP CONFIGURATION COMMANDS

- LLDP is usually GLOBALLY DISABLED by DEFAULT
- LLDP is also DISABLED on each INTERFACE, by DEFAULT
- To ENABLE LLDP GLOBALLY : R1(config)# lldp run
- To ENABLE LLDP on specific INTERFACES (tx): R1(config-if)# lldp transmit
- To ENABLE LLDP on specific INTERFACES (rx): R1(config-if)# lldp receive

YOU NEED TO ENABLE BOTH TO SEND AND RECEIVE (Unless you want to only enable SEND or RECEIVE LLDP Messages)

- Configure the LLDP timer: R1(config)# lldp timer *seconds*
- Configure the LLDP holdtime: R1(config)# lldp holdtime *seconds*
- Configure the LLDP reinit timer: R1(config)# lldp reinit *seconds*

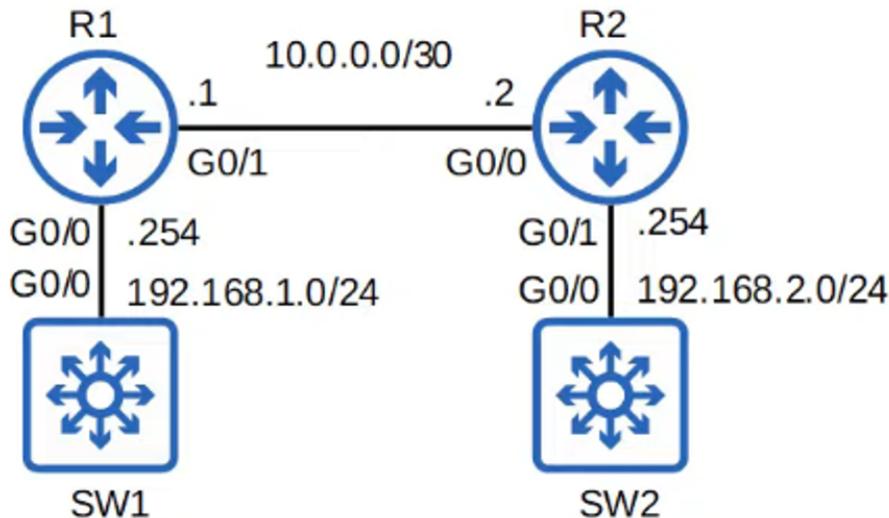


Figure 8: image

SHOW LLDP STATUS

SHOW ALL LLDP NEIGHBORS

SHOW LLDP NEIGHBORS in DETAIL

SHOW SPECIFIC LLDP DEVICE ENTRY

```
R1#show lldp traffic

LLDP traffic statistics:
    Total frames out: 4
    Total entries aged: 0
    Total frames in: 3
    Total frames received in error: 0
    Total frames discarded: 0
    Total TLVs discarded: 0
    Total TLVs unrecognized: 0

R1#
R1#show lldp interface

GigabitEthernet0/0:
    Tx: enabled
    Rx: enabled
    Tx state: IDLE
    Rx state: WAIT FOR FRAME

GigabitEthernet0/1:
    Tx: enabled
    Rx: enabled
    Tx state: IDLE
    Rx state: WAIT FOR FRAME

GigabitEthernet0/2:
    Tx: enabled
    Rx: enabled
    Tx state: INIT
    Rx state: WAIT PORT OPER

GigabitEthernet0/3:
    Tx: enabled
    Rx: enabled
    Tx state: INIT
    Rx state: WAIT PORT OPER
```

Figure 9: image
7

```
R1#show lldp

Global LLDP Information:
  Status: ACTIVE
  LLDP advertisements are sent every 30 seconds
  LLDP hold time advertised is 120 seconds
  LLDP interface reinitialisation delay is 2 seconds
```

Figure 10: image

```
R1#show lldp neighbors

Capability codes:
  (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
  (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Device ID          Local Intf    Hold-time  Capability      Port ID
SW1                  Gi0/0        120          R              Gi0/0
R2                  Gi0/1        120          R              Gi0/0

Total entries displayed: 2
```

Figure 11: image

```
R1#show lldp neighbors detail

Local Intf: Gi0/0
Chassis id: 0c04.41d2.1a00
Port id: Gi0/0
Port Description: GigabitEthernet0/0
System Name: SW1

System Description:
Cisco IOS Software, vios_12 Software (vios_12_ADVENTERPRISEK9-M), Version 15.2(4.0.55)E, TEST ENGINEERING ESTG WEEKLY BUILD, synced to END_OF_FW_ISP
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Time remaining: 99 seconds
System Capabilities: B,R
Enabled Capabilities - not advertised
Management Addresses - not advertised
Auto Negotiation - not supported
Physical media capabilities - not advertised
Media Attachment Unit type - not advertised
Vlan ID: - not advertised
```

Figure 12: image

```
R1#show lldp entry SW1
Capability codes:
  (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
  (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
-----
Local Intf: Gi0/0
Chassis id: 0c04.41d2.1a00
Port id: Gi0/0
Port Description: gigabitethernet0/0
System Name: SW1
System Description:
Cisco IOS Software, vios_12 Software (vios_12-ADVENTERPRISEK9-M), Version 15.2(4.0.55)E, TEST ENGINEERING ESTG WEEKLY BUILD, synced to END_OF_FLOISP
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Time remaining: 119 seconds
System Capabilities: R,R
Enabled Capabilities: R
Management Addresses - not advertised
Auto Negotiation - not supported
Physical media capabilities - not advertised
Media Attachment Unit type - not advertised
Vlan ID: - not advertised
```

Figure 13: image

LLDP show commands summary

- R1# **show lldp**
→ shows basic information about LLDP (timers, version)
- R1# **show lldp traffic**
→ displays how many LLDP messages have been sent and received
- R1# **show lldp interface**
→ displays which interfaces LLDP tx/rx is enabled on
- R1# **show lldp neighbors**
→ lists LLDP neighbors and some basic information about each neighbor
- R1# **show lldp neighbors detail**
→ lists each LLDP neighbor with more detailed information
- R1# **show lldp entry name**
→ displays the same info as above, but for the specified neighbor only

Figure 14: image