

DHCP Option 82 Per-Port Per-VLAN

Ethernet Switch

ZyNOS 4.10

Support Notes

Version 4.10 Sep 2013



Feature Overview

Option 82 is a relay agent option which records the location information of the DHCP client. When a DHCP snooping device receives a client's request, it adds Option 82 to the request message and sends it to the server. Then, the DHCP server can assign a proper IP address and other parameters for the client. The administrator can also use Option 82 to implement security control and accounting.

Why use DHCP Option 82?

The Dynamic Host Configuration Protocol (DHCP) option 82 enables a DHCP relay agent to put some information into the DHCP packets that are sent from the DHCP clients to the DHCP server. It offers this information to the DHCP server when the DHCP server assigns IP addresses and configuration information to the clients. The Option 82 allows the DHCP server to tell which DHCP packets are from legitimate clients. The DHCP server will assign IP addresses to the legitimate DHCP clients and discard the illegitimate DHCP clients.

The DHCP option 82 includes circuit-ID and remote-ID. Service providers can choose circuit-ID and/or remote-ID in the DHCP option 82.

Circuit-ID and Remote-ID Picture

New Features of Trunk 4.10

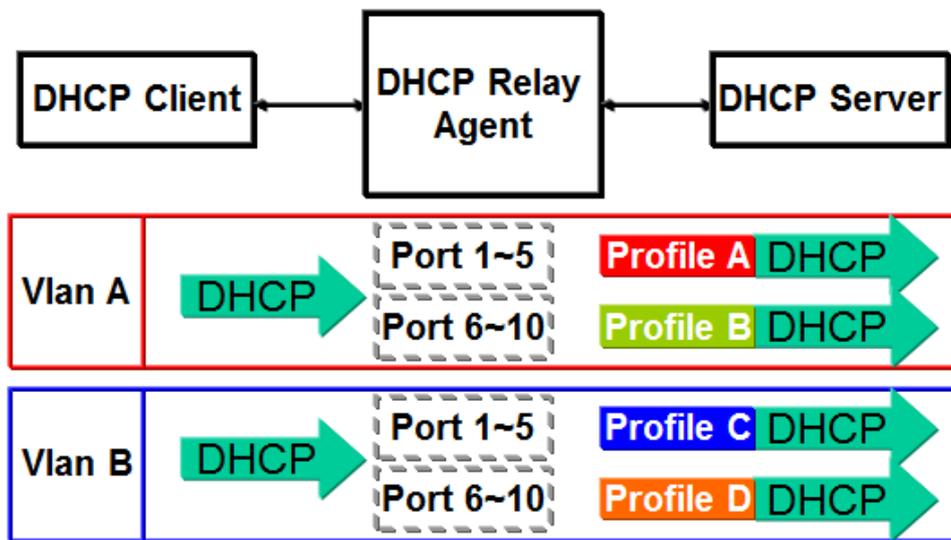
	Trunk 4.00	Trunk 4.10
Smart Relay	Global	Per port
VLAN Relay	Per VLAN	Per port per VLAN

Trunk 4.00 only supports DHCP smart relay, which includes DHCP packets sent from the DHCP clients to the DHCP server. The DHCP relay agent can be configured with option 82 profiles, and is known as global DHCP relay. However, for per-port per-VLAN DHCP relay, we do not support Trunk 4.00 as it may cause inflexibilities when deploying DHCP clients in per-port per-VLAN setup.

Trunk 4.10 includes the following enhancement for DHCP option 82. When DHCP packets are sent from the DHCP clients to the DHCP server, the DHCP relay agent will insert option 82 profiles

per-port per-VLAN to make implementation much more flexible.

For example, profile A can be added in VLAN A for port 1 to port 5, and profile C can be added in VLAN B for port 6 to port 10.



Description

This specification implements the following DHCP option 82 items in ZyXEL products. More details are described in section 3.

DHCP option 82 is a TLV (type, length, value) in the DHCP control packets. The DHCP relay agent fills that option information when the DHCP client sends DHCP packets to the DHCP server.

DHCP Relay Agent support:

Option:

Type 82: Relay Agent Information Option

Sub-option:

- 1: Agent Circuit ID Sub-option
- 2: Agent Remote ID Sub-option

How does DHCP Option 82 Work on Trunk 4.10?

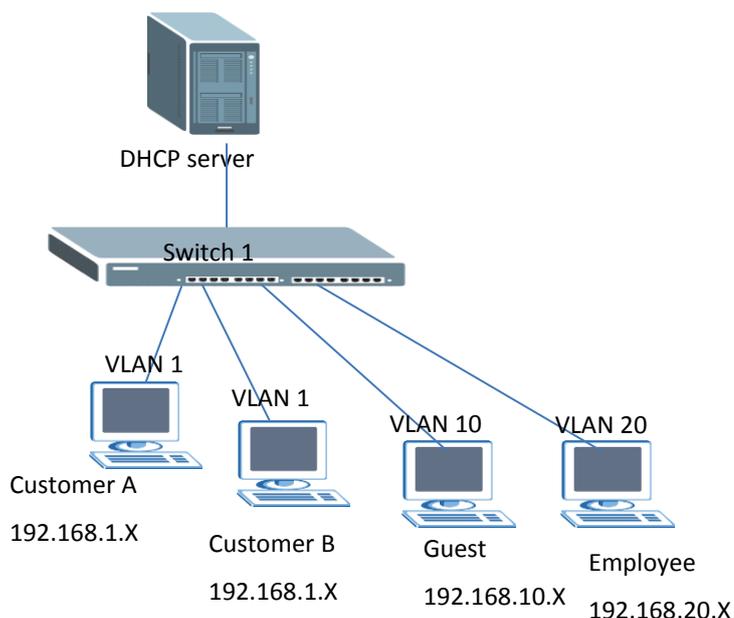
The original design only supports global relay with option 82; but new with trunk 4.10 we can also support per-port per-VLAN option 82.

The following Scenario is an example to show how it works.

We separate two conditions with this feature:

1. Only enable global relay and per-port option (Cannot enable VLAN relay at the same time).
2. Enable per-port per-VLAN relay. Please check the following scenario as an example.

Scenario



DHCP Relay with DHCP Option 82 Test

We use our switch and PC to test our function.

We connect port 1~4, 7~8 of Switch 1 to the DHCP clients.

We connect port 22 of Switch 1 to the DHCP Server.

Step 1: Create Guest VLAN, Employee VLAN, and DHCP server VLAN.

Static VLAN Configuration: Guest

ACTIVE

Name: Guest

VLAN Group ID: 10

VLAN Type: Normal Private

Association VLAN List: [Empty]

Port	Control	Tagging
*	Normal	<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
7	<input type="radio"/> Normal <input checked="" type="radio"/> Fixed <input type="radio"/> Forbidden	<input type="checkbox"/> Tx Tagging
8	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
9	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

Static VLAN Configuration: Employee

ACTIVE

Name: Employee

VLAN Group ID: 20

VLAN Type: Normal Private

Association VLAN List: [Empty]

Port	Control	Tagging
*	Normal	<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
7	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
8	<input type="radio"/> Normal <input checked="" type="radio"/> Fixed <input type="radio"/> Forbidden	<input type="checkbox"/> Tx Tagging
9	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
10	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

Static VLAN VLAN Status

ACTIVE

Name: DHCP

VLAN Group ID: 100

VLAN Type: Normal Private

Association VLAN List:

Port	Control	Tagging
*	Normal	<input checked="" type="checkbox"/> Tx Tagging
1	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
2	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
3	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
4	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
5	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
6	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
21	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
22	<input type="radio"/> Normal <input checked="" type="radio"/> Fixed <input type="radio"/> Forbidden	<input type="checkbox"/> Tx Tagging
23	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
24	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
25	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
26	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
27	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging
28	<input checked="" type="radio"/> Normal <input type="radio"/> Fixed <input type="radio"/> Forbidden	<input checked="" type="checkbox"/> Tx Tagging

Step 2: Set up an IP interface for each VLAN.

IP Address 192.168.0.1

IP Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

Apply Cancel

IP Interface

IP Address: 0.0.0.0

IP Subnet Mask: 0.0.0.0

VID:

Add Cancel

Index	IP Address	IP Subnet Mask	VID	Delete
1	10.59.1.10	255.255.255.0	100	<input type="checkbox"/>
2	192.168.1.1	255.255.255.0	1	<input type="checkbox"/>
3	192.168.10.10	255.255.255.0	10	<input type="checkbox"/>
4	192.168.20.10	255.255.255.0	20	<input type="checkbox"/>

Delete Cancel

Step 3: Configure DHCP option 82 profiles for Customers A and B, as well as Guest

and Employee.

DHCP Option 82 Profile DHCP Setting

Profile Setup

Name	Customer A
Circuit-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> slot-port <input checked="" type="checkbox"/> vlan <input checked="" type="checkbox"/> hostname string 192 IP
Remote-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> mac string test

Add Cancel

DHCP Option 82 Profile DHCP Setting

Profile Setup

Name	Customer B
Circuit-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> slot-port <input checked="" type="checkbox"/> vlan <input checked="" type="checkbox"/> hostname string IP192 port 3-4
Remote-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> mac string test

Add Cancel

DHCP Option 82 Profile DHCP Setting

Profile Setup

Name	Guest
Circuit-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> slot-port <input checked="" type="checkbox"/> vlan <input checked="" type="checkbox"/> hostname string IP10
Remote-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> mac string test

Add Cancel

DHCP Option 82 Profile DHCP Setting

Profile Setup

Name	Employee
Circuit-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> slot-port <input checked="" type="checkbox"/> vlan <input checked="" type="checkbox"/> hostname string Employee
Remote-ID	<input checked="" type="checkbox"/> Enable <input checked="" type="checkbox"/> mac string

Add Cancel

Step 4: Enable DHCP relay option 82 per-port for customers A and B on VLAN 1 relay. Then click on **Port** to set up the per-port option 82 profile.

VLAN Setting Port Status

VID: 1

DHCP Status: Server Relay

Server

Client IP Pool Starting Address: 0.0.0.0

Size of Client IP Pool: [Slider]

IP Subnet Mask: 0.0.0.0

Default Gateway: 0.0.0.0

Primary DNS Server: 0.0.0.0

Secondary DNS Server: 0.0.0.0

Relay

Remote DHCP Server 1: 10.59.1.1

Remote DHCP Server 2: 0.0.0.0

Remote DHCP Server 3: 0.0.0.0

Option 82 Profile: [Dropdown]

[Add] [Cancel] [Clear]

Step 5: Set up VID, ports and option 82 profile for Customers.

Port VLAN Setting

VID: 1

Port: 1-2

Option 82 Profile: Customer A

[Add] [Cancel] [Clear]

Index	VID	Port	Profile Name	Delete
1	1	1-2	Customer A	<input type="checkbox"/>
2	1	3-4	Customer B	<input type="checkbox"/>

[Delete] [Cancel]

Step 6: Set up VLAN relay option 82 profiles for Guest and Employee.

VLAN Setting Port Status

VID: 10

DHCP Status: Server Relay

Server

Client IP Pool Starting Address: 0.0.0.0

Size of Client IP Pool: [Slider]

IP Subnet Mask: 0.0.0.0

Default Gateway: 0.0.0.0

Primary DNS Server: 0.0.0.0

Secondary DNS Server: 0.0.0.0

Relay

Remote DHCP Server 1: 10.59.1.1

Remote DHCP Server 2: 0.0.0.0

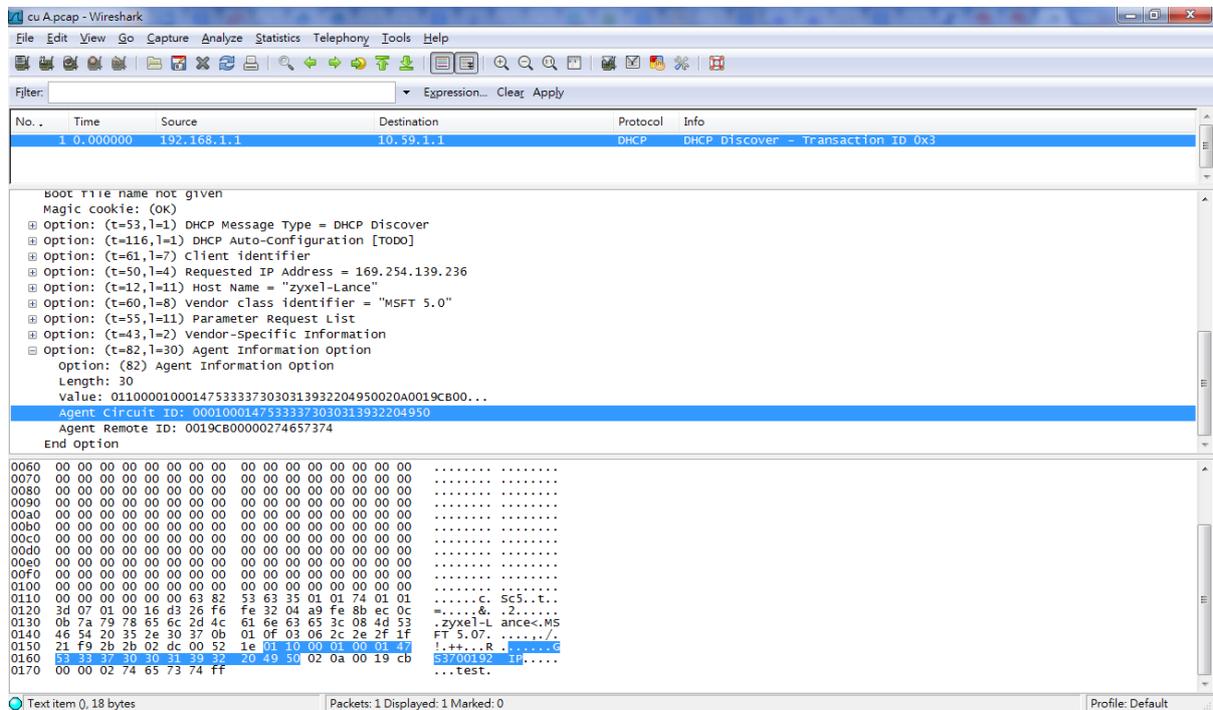
Remote DHCP Server 3: 0.0.0.0

Option 82 Profile: Guest

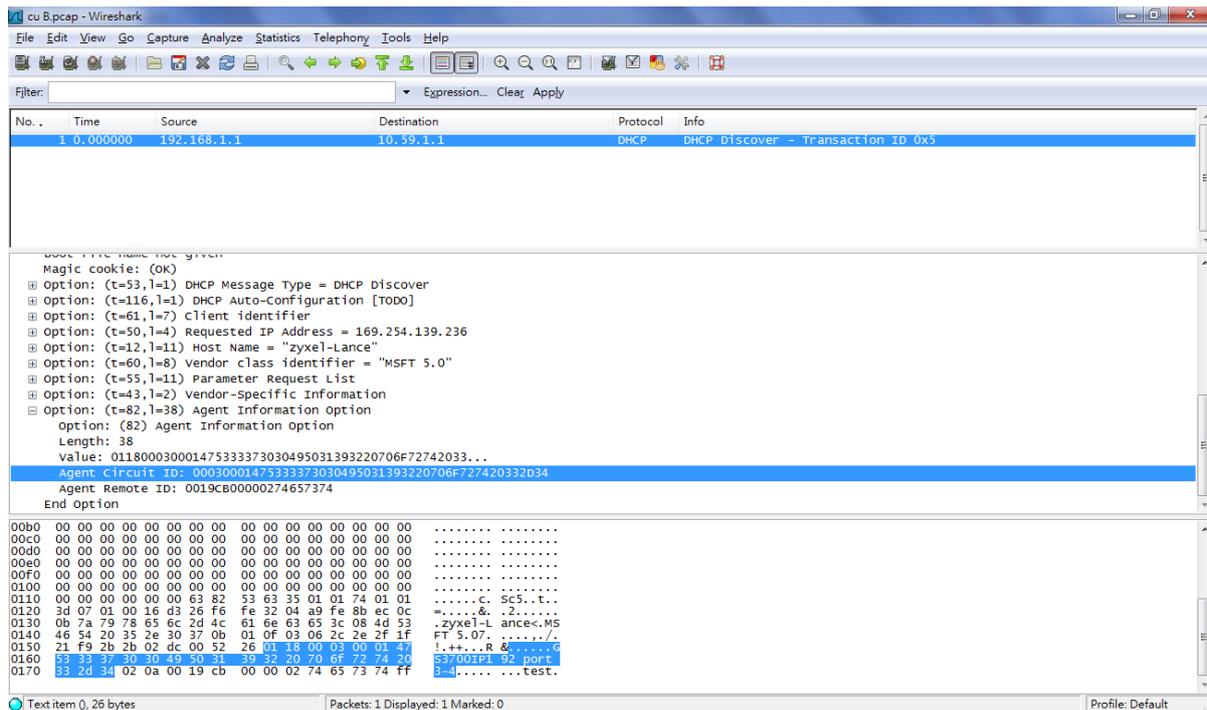
[Add] [Cancel] [Clear]

The screenshot shows the 'VLAN Setting' configuration page. The 'VID' is set to 20. Under 'DHCP Status', 'Relay' is selected. Under the 'Server' section, 'Client IP Pool Starting Address' is 0.0.0.0, 'Size of Client IP Pool' is empty, 'IP Subnet Mask' is 0.0.0.0, 'Default Gateway' is 0.0.0.0, 'Primary DNS Server' is 0.0.0.0, and 'Secondary DNS Server' is 0.0.0.0. Under the 'Relay' section, 'Remote DHCP Server 1' is 10.59.1.1, 'Remote DHCP Server 2' is 0.0.0.0, and 'Remote DHCP Server 3' is 0.0.0.0. The 'Option 82 Profile' is set to 'Employee'. Buttons for 'Add', 'Cancel', and 'Clear' are at the bottom.

After following the steps above, the DHCP client will send a DHCP request to get IP addresses from the DHCP server. We can use “Wireshark” at the DHCP server to capture packets to ensure that the DHCP packets include DHCP option 82. When capturing packets at DHCP clients, confirm that the DHCP packets do not include DHCP option 82. We can receive DHCP packets including option 82 on the DHCP server as shown below.



Customer A's option 82



cu B.pcap - Wireshark

Filter: Expression... Clear Apply

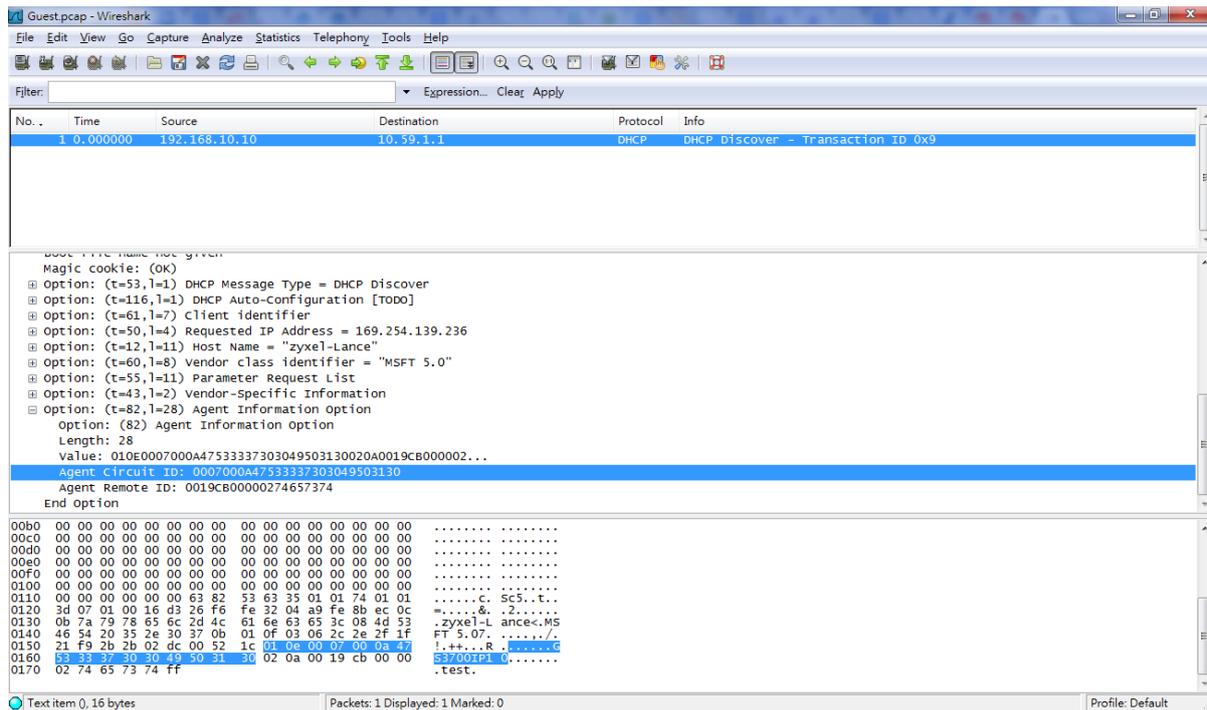
No.	Time	Source	Destination	Protocol	Info
1	0.000000	192.168.1.1	10.59.1.1	DHCP	DHCP Discover - Transaction ID 0x5

```

DHCP type name not given
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP Discover
Option: (t=116,l=1) DHCP Auto-Configuration [TODO]
Option: (t=61,l=7) Client identifier
Option: (t=50,l=4) Requested IP Address = 169.254.139.236
Option: (t=12,l=11) Host Name = "zyxel-Lance"
Option: (t=60,l=8) Vendor class identifier = "MSFT 5.0"
Option: (t=55,l=11) Parameter Request List
Option: (t=43,l=2) Vendor-Specific Information
Option: (t=82,l=38) Agent Information Option
  Option: (82) Agent Information Option
  Length: 38
  Value: 011800030001475333373030495031393220706F72742033...
Agent Circuit ID: 00030001475333373030495031393220706F727420332034
Agent Remote ID: 0019c800000274657374
End Option
00b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0110 00 00 00 00 00 00 63 82 53 63 35 01 01 74 01 01 .....c. Sc5..t...
0120 3d 07 01 00 16 d3 26 f6 fe 32 04 a9 fe 8b ec 0c .....&. 2.....
0130 0b 7a 79 78 65 6c 2d 4c 61 6e 63 63 3c 08 4d 53 .....zyxel-L ance<.MS
0140 46 54 20 35 2e 30 37 0b 01 0f 03 06 2c 2e 2f 1f .....FT 5.07. ....//.
0150 21 f9 2b 2b 02 dc 00 52 26 01 18 00 03 00 01 47 !...R &.....G
0160 53 33 37 30 01 04 50 51 36 02 0a 00 19 cb 00 00 53700IP1 92 port
0170 02 74 65 73 74 ff .....test.
    
```

Text item 0, 26 bytes Packets: 1 Displayed: 1 Marked: 0 Profile: Default

Customer B's option 82



Guest.pcap - Wireshark

Filter: Expression... Clear Apply

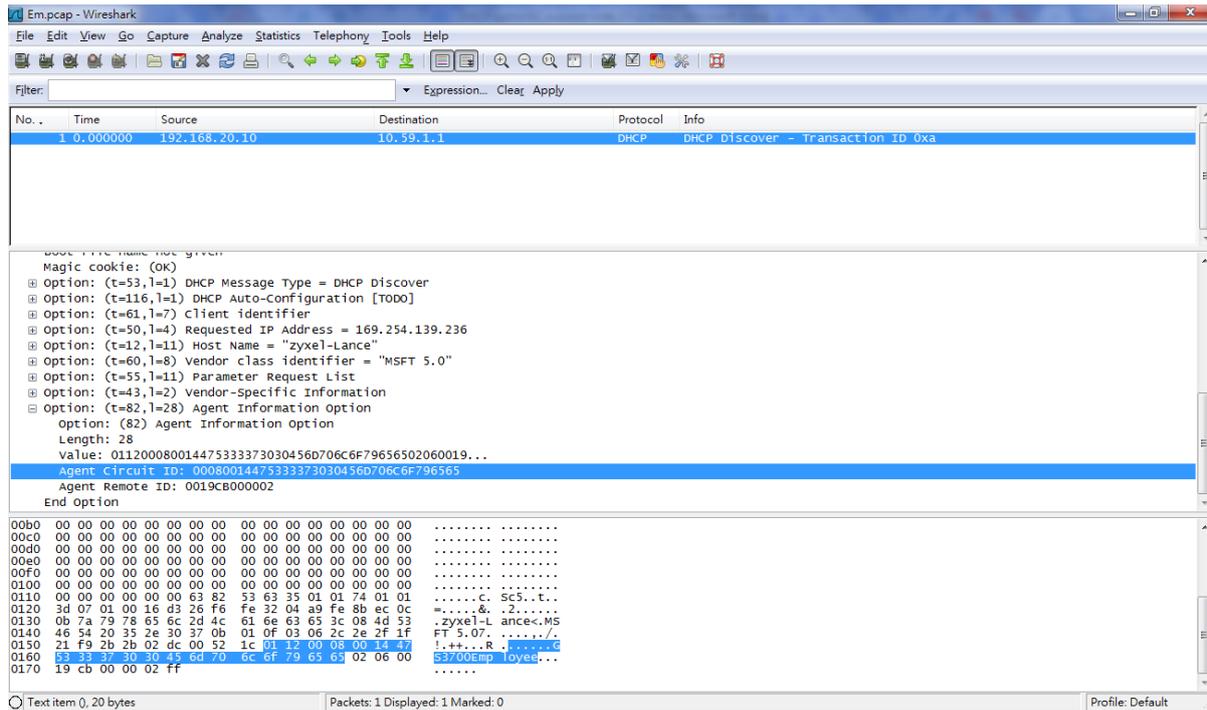
No.	Time	Source	Destination	Protocol	Info
1	0.000000	192.168.10.10	10.59.1.1	DHCP	DHCP Discover - Transaction ID 0x9

```

DHCP type name not given
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP Discover
Option: (t=116,l=1) DHCP Auto-Configuration [TODO]
Option: (t=61,l=7) Client identifier
Option: (t=50,l=4) Requested IP Address = 169.254.139.236
Option: (t=12,l=11) Host Name = "zyxel-Lance"
Option: (t=60,l=8) Vendor class identifier = "MSFT 5.0"
Option: (t=55,l=11) Parameter Request List
Option: (t=43,l=2) Vendor-Specific Information
Option: (t=82,l=28) Agent Information Option
  Option: (82) Agent Information Option
  Length: 28
  Value: 010E0007000A4753333730304950313002A0019c8000002...
Agent Circuit ID: 0007000A47533337303049503130
Agent Remote ID: 0019c800000274657374
End option
00b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0100 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0110 00 00 00 00 00 00 63 82 53 63 35 01 01 74 01 01 .....c. Sc5..t...
0120 3d 07 01 00 16 d3 26 f6 fe 32 04 a9 fe 8b ec 0c .....&. 2.....
0130 0b 7a 79 78 65 6c 2d 4c 61 6e 63 65 3c 08 4d 53 .....zyxel-L ance<.MS
0140 46 54 20 35 2e 30 37 0b 01 0f 03 06 2c 2e 2f 1f .....FT 5.07. ....//.
0150 21 f9 2b 2b 02 dc 00 52 1c 01 0e 00 00 00 0a 47 !...R &.....G
0160 53 33 37 30 01 04 50 51 36 02 0a 00 19 cb 00 00 53700IP1 92 port
0170 02 74 65 73 74 ff .....test.
    
```

Text item 0, 16 bytes Packets: 1 Displayed: 1 Marked: 0 Profile: Default

Guest's option 82



Employee's option 82

Configuration Using the CLI

```

vlan 1
  name 1
  normal 22
  fixed 1-21,23-28
  forbidden ""
  untagged 1-28
  ip address 192.168.1.1 255.255.255.0
exit
vlan 10
  name Guest
  normal 1-6,8-28
  fixed 7
  forbidden ""
  untagged 7
  ip address 192.168.10.10 255.255.255.0
exit
vlan 20
  name Employee
  
```

```
normal 1-7,9-28
fixed 8
forbidden ""
untagged 8
ip address 192.168.20.10 255.255.255.0
exit
vlan 100
name DHCP
normal 1-21,23-28
fixed 22
forbidden ""
untagged 22
ip address 10.59.1.10 255.255.255.0
exit
interface route-domain 10.59.1.10/24
exit
interface route-domain 192.168.1.1/24
exit
interface route-domain 192.168.10.10/24
exit
interface route-domain 192.168.20.10/24
exit
interface port-channel 7
pvid 10
exit
interface port-channel 8
pvid 20
exit
interface port-channel 22
pvid 100
exit
ip address 192.168.0.1 255.255.255.0
service-control http 80 180
dhcp option profile "Customer A" circuit-id slot-port vlan hostname string "192 IP" remote-id
mac string test
dhcp option profile "Customer B" circuit-id slot-port vlan hostname string "IP192 port 3-4"
remote-id mac string test
dhcp option profile Guest circuit-id slot-port vlan hostname string IP10 remote-id mac string
```

test

dhcp option profile Employee circuit-id slot-port vlan hostname string **Employee** remote-id
mac

dhcp relay 1 helper-address 10.59.1.1

dhcp relay 10 helper-address 10.59.1.1 option profile Guest

dhcp relay 20 helper-address 10.59.1.1 option profile Employee

dhcp relay 1 interface port-channel 1-2 option profile Customer A

dhcp relay 1 interface port-channel 3-4 option profile Customer B