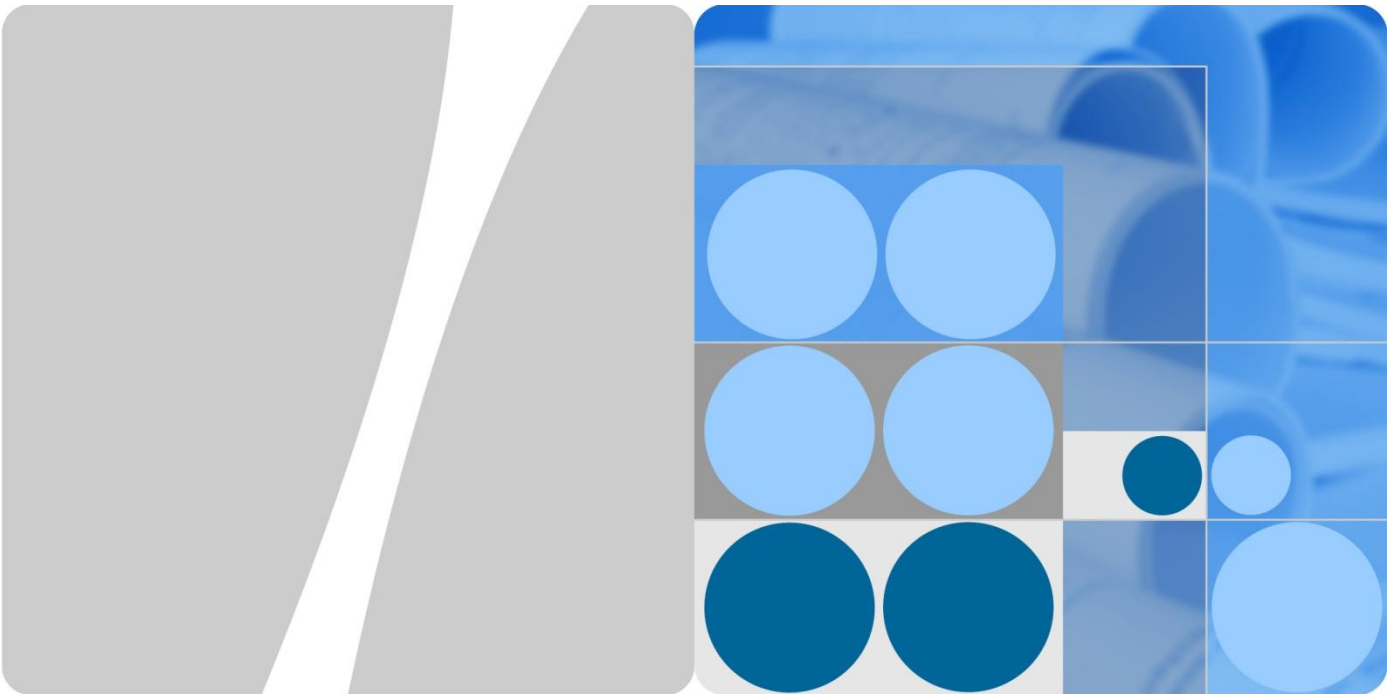

S Series Switches

Cisco DTP Interoperation Technology White Paper

Issue 01

Date 2013-08-05

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About This Document

Overview

This document compares Huawei Link-type Negotiation Protocol (LNP) with Cisco Dynamic Trunking Protocol (DTP), and provides configuration procedures of deploying Huawei switches and Cisco switches in mixed networking scenarios.

Intended Audience

This document is intended for:

- Network planning engineers
- Commissioning engineers
- Data configuration engineers
- Onsite maintenance engineers
- Network monitoring engineers
- System maintenance engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level or medium level of risk which, if not avoided, could result in death or serious injury.
WARNING	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.
TIP	Provides a tip that may help you solve a problem or save your time.

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Symbol	Description
NOTE	Provides additional information to emphasize or supplement important points in the main text.

Change History

Changes between document issues are cumulative. The latest document issue contains all changes made in earlier issues.

Issue 01 (2013-08-05)

This is the first official release.

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1 Introduction to DTP and LNP

1.1 Cisco DTP

The Dynamic Trunking Protocol (DTP) is a proprietary protocol developed by Cisco. Two directly connected ports of two switches can use DTP to probe the configuration of each other. They automatically negotiate the link type and Ethernet encapsulation type of Layer 2 ports, and automatically adapt to the negotiation results. When the configuration of the peer port is changed, the configuration of the local port does not need to be changed manually. The local port can adapt to the changes automatically.

When the networking is unknown, DTP enables a device to work properly after installation. When the network topology is changed, the configuration of Layer 2 ports does not need to be changed manually.

1.1.1 DTP Implementation

DTP uses Layer 2 trunking to enable the communication between directly connected ports of two switches. DTP packets can only be used for the communication between two directly connected ports to maintain the link type and Ethernet encapsulation type of the two ports. Figure 1-1 shows how DTP is implemented.

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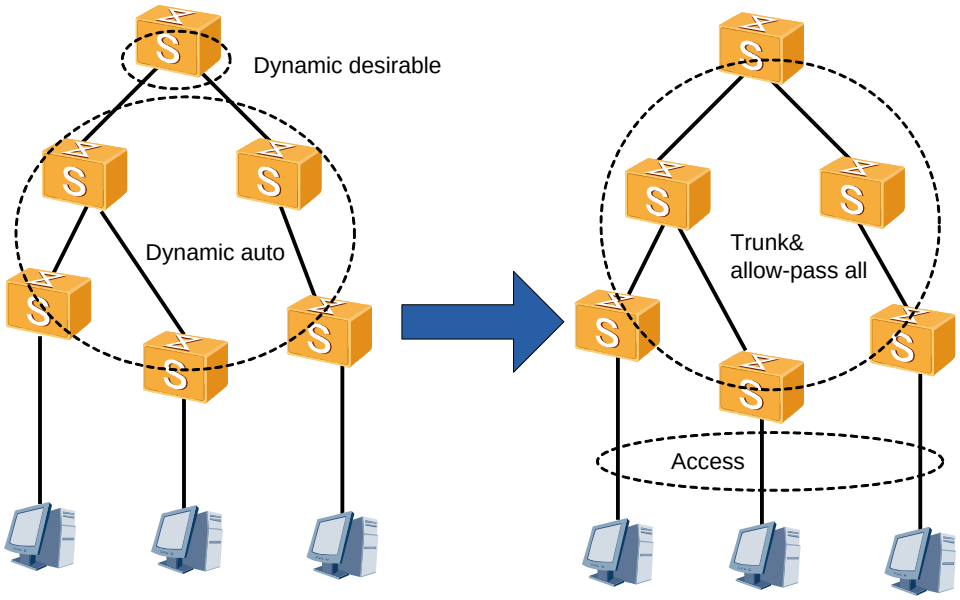
Figure 1-1 DTP implementation



1.2 Huawei LNP

The Link-type Negotiation Protocol (LNP) is a proprietary protocol developed by Huawei.

1.2.1 LNP Implementation

Two directly connected ports can use LNP to dynamically negotiate the link type. LNP supports the industry-standard IEEE 802.1Q Ethernet encapsulation protocol.

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2 Replacement Possibility Analysis

2.1 Solution Replacement

DTP is a Cisco proprietary protocol. Huawei devices cannot directly communicate with DTP-enabled Cisco devices. When Huawei devices and Cisco devices coexist on a network, only simple configurations need to be performed on their directly connected ports for them to communicate with each other. For details, see examples in chapter 3 "Mixed Networking Examples".

Huawei LNP, supported by Huawei S series switches since V200R005, can completely replace Cisco DTP.

2.2 Configuration Comparison

Configuration	Cisco	Huawei
Global configuration	Add devices to be negotiated to the same VTP domain. vtp domain <string>	Enable the LNP function globally. undo lnp disable
Port configuration	switchport mode dynamic auto switchport mode dynamic desirable	port link-type { trunk | hybrid | access | dot1q-tunnel | negotiation-auto | negotiation-desirable }

I. Command Line Differences

- Cisco DTP configuration

```
Switch(config)#vtp domain cisco
Switch(config)#interface gigabitEthernet 1/0/23
Switch(config-if)#end
Switch#show running-config interface gigabitEthernet 1/0/23

Building configuration...
```


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```
Current configuration : 112 bytes
!
interface GigabitEthernet1/0/23
 switchport trunk encapsulation dot1q
 switchport mode dynamic desirable
end
```

- Huawei LNP configuration

```
[HUAWEI-GigabitEthernet1/0/1]display this
#
interface GigabitEthernet1/0/1
port link-type negotiation-desirable
#
return
```


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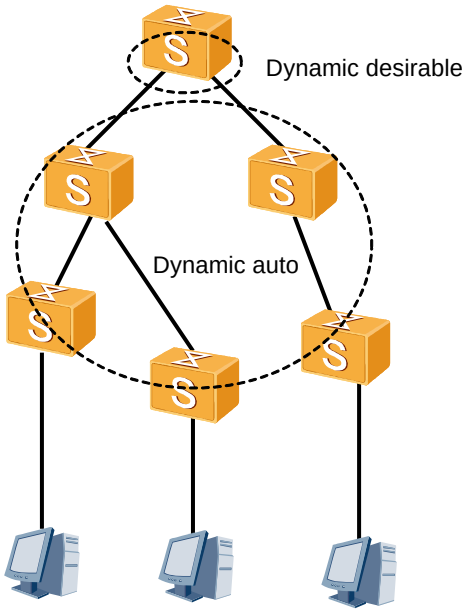
3 Mixed Networking Examples

3.1 Example 1: Basic Integrated Network Configuration

This example describes the basic configuration of Cisco DTP.

3.1.1 Network Topology

Figure 3-1 Typical DTP networking



In Figure 3-1, all devices are configured with the same VTP domain. If a device is connected to another device, the link between the two devices is negotiated as the trunk link. If a device is connected to a terminal or an access port, the link between them is negotiated as the access link.

3.1.2 Network Configuration

I. Configuration Requirements

A VTP domain is configured on Cisco switches to manage the entire network.

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II. Configuration Key Points

Cisco device: Configure a VTP domain on all Cisco devices.

III. Configuration Briefs

```
Switch(config)#vtp domain cisco
Switch(config)#interface gigabitEthernet 1/0/23
Switch(config-if)#end
Switch#show running-config interface gigabitEthernet 1/0/23
Building configuration...

Current configuration : 112 bytes
!
interface GigabitEthernet1/0/23
 switchport trunk encapsulation dot1q
 switchport mode dynamic desirable
end
```

3.1.3 Points to Note

To ensure successful negotiation, two neighboring Cisco devices must be configured with the same VTP domain. If their VTP domains cannot be the same, the connected ports must be configured to specified modes.

3.2 Example 2: C-H Model

In the C-H model, a Cisco device is directly connected to a Huawei device, and the Huawei device is not connected to any other Cisco device.

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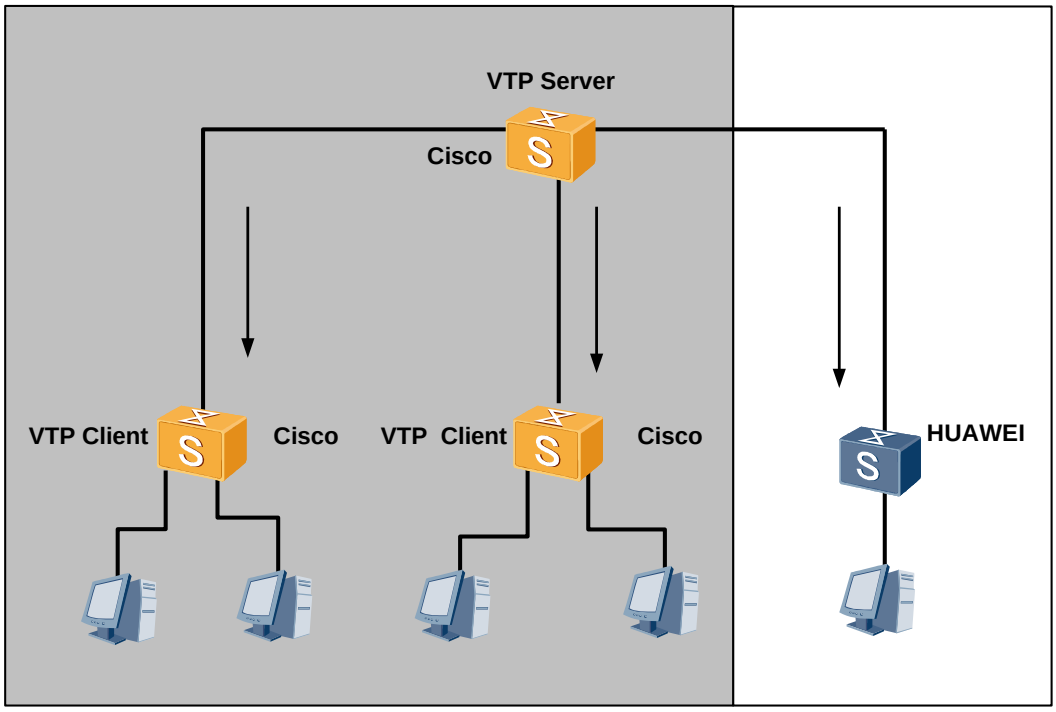
3.2.1 Network Topology

Figure 3-2 C-H model networking



3.2.2 Network Configuration

I. Configuration Requirements

The DTP function is enabled on Cisco switches. The Huawei device needs to communicate with Cisco devices on the live network when it does not support the DTP function.

II. Configuration Key Points

Cisco device: Enable the DTP function. Configure ports connected to switches as trunk ports and allow all VLANs on the ports. Configure ports connected to users as access ports.

Huawei device: Configure ports connected to switches as trunk ports and allow all VLANs on the ports. Configure ports connected to users as access ports.

III. Configuration Briefs

- Cisco device in VTP server mode

```
Switch(config)#vtp domain cisco                  //Configure the VTP domain name as cisco.
Switch (config)#vtp mode server                  //Configure the VTP mode as server.
Switch(config)#vtp password cisco                //Configure the VTP password as cisco.
interface GigabitEthernet5/0
 switchport access vlan 10
 switchport mode dynamic desirable
end
```

- Cisco device in VTP client mode

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```
Switch(config)#vtp domain cisco                    //Configure the VTP domain name as cisco.
Switch (config)#vtp mode client                    //Configure the VTP mode as client.
Switch(config)#vtp password cisco                  //Configure the VTP password as cisco.
interface GigabitEthernet0/1
switchport mode dynamic desirable
end
```

- Huawei device

```
vlan batch 20                                      //Multiple VLANs can be created.
interface GigabitEthernet0/0/1
 port link-type trunk
 port trunk allow-pass vlan 2 to 4094
interface GigabitEthernet0/0/2
 port link-type access
```

3.2.3 Points to Note

DTP is a Cisco proprietary protocol. Huawei devices cannot directly communicate with DTP-enabled Cisco devices. On a Huawei device, a port directly connected to a Cisco device needs to be configured as the trunk port or access port according to the Huawei device's location on the network.

3.3 Example 3: C-H-C Model

In the C-H-C model, a Cisco device is directly connected to a Huawei device, and the Huawei device is connected to a downstream Cisco device. A Layer 2 protocol tunnel is configured on the Huawei device to transparently transmit VTP packets to the downstream Cisco device. The transmission mode is the same as the transparent transmission mode of Cisco.

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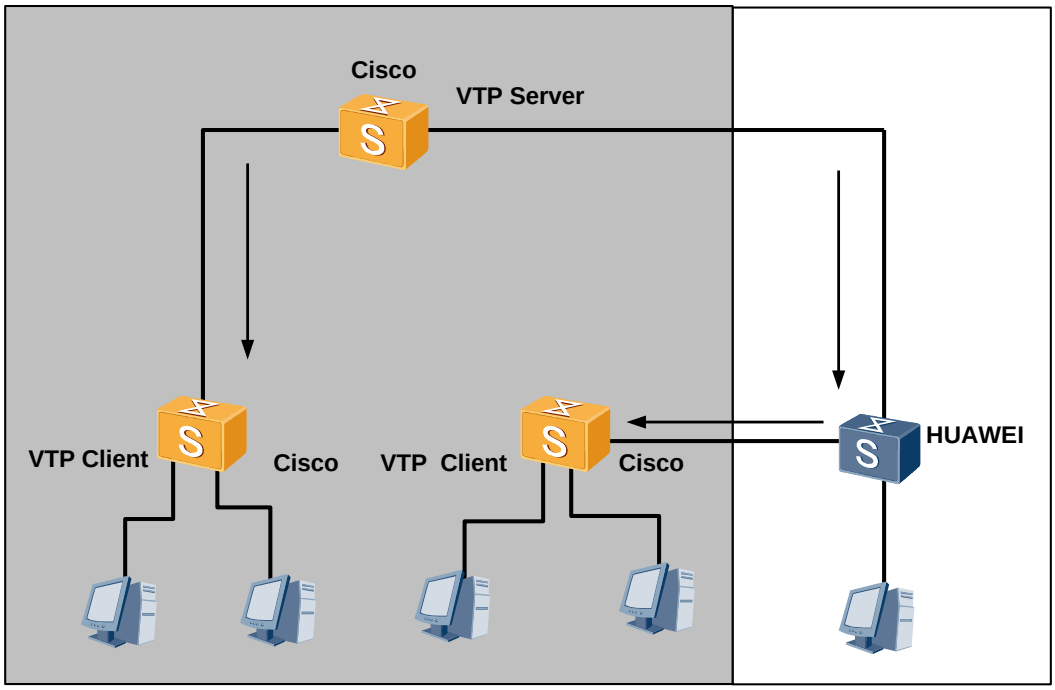
3.3.1 Network Topology

Figure 3-3 C-H-C model networking



3.3.2 Network Configuration

I. Configuration Requirements

The DTP function is enabled on Cisco switches. The Huawei device needs to communicate with Cisco devices on the live network when it does not support the DTP function.

II. Configuration Key Points

Cisco device: Enable the DTP function. Configure ports connected to switches as trunk ports and allow all VLANs on the ports. Configure ports connected to users as access ports.

Huawei device: Statically configure the link type. Configure ports connected to switches as trunk ports and allow all VLANs on the ports. Configure ports connected to users as access ports.

III. Configuration Briefs

- Cisco device in VTP server mode

```
Switch(config)#vtp domain cisco                  //Configure the VTP domain name as cisco.
Switch (config)#vtp mode server                  //Configure the VTP mode as server.
Switch(config)#vtp password cisco                //Configure the VTP password as cisco.

interface GigabitEthernet5/48
 switchport access vlan 20
 switchport mode dynamic desirable
end
```

- Cisco device in VTP client mode

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```
Switch(config)#vtp domain cisco
Switch (config)#vtp mode client
Switch(config)#vtp password cisco

interface GigabitEthernet0/48
 switchport access vlan 20
 switchport mode dynamic desirable
end
```

- Huawei device

```
l2protocol-tunnel dtp group-mac 0100-5e00-0011        //Map the DTP destination MAC address to a specified multicast address.

interface GigabitEthernet0/0/1
 port link-type trunk
 port trunk allow-pass vlan 2 to 4094
l2protocol-tunnel dtp enable

interface GigabitEthernet0/0/26
 port link-type access
```

3.3.3 Points to Note

DTP is a Cisco proprietary protocol. Huawei devices cannot directly communicate with DTP-enabled Cisco devices. On a Huawei device, a port directly connected to a Cisco device needs to be configured as the trunk port or access port according to the Huawei device's location on the network.

3.4 Example 4: C-H-H-C Model

In the C-H-H-C model, a Cisco device is directly connected to a network of Huawei devices, and another Cisco device is connected to a Huawei device on the network edge. A Layer 2 protocol tunnel is configured on Huawei devices to transparently transmit VTP packets to the downstream Cisco device. The transmission mode is the same as the transparent transmission mode of Cisco.

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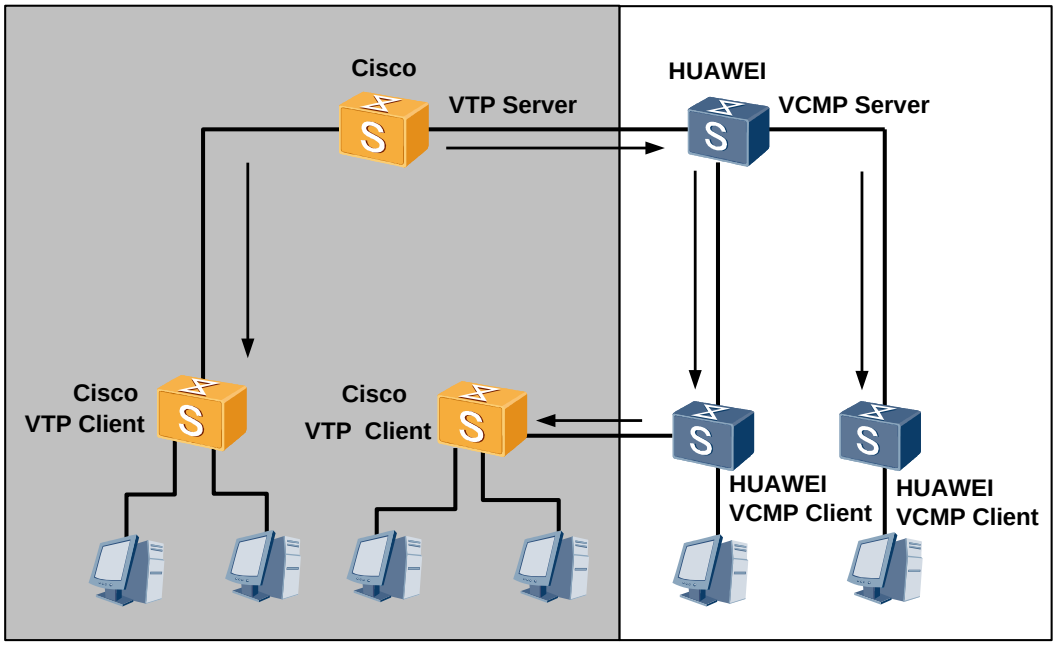
3.4.1 Network Topology

Figure 3-4 C-H-H-C model networking



3.4.2 Network Configuration

I. Configuration Requirements

The DTP function is enabled on Cisco switches. The Huawei device needs to communicate with Cisco devices on the live network when it does not support the DTP function.

II. Configuration Key Points

Cisco device: Enable the DTP function. Configure ports connected to switches as trunk ports and allow all VLANs on the ports. Configure ports connected to users as access ports.

Huawei device: Statically configure ports directly connected to Cisco switches as trunk ports, and allow all VLANs on the ports. Configure ports connected to users as access ports. Enable the LNP function on Huawei devices on the internal network of Huawei devices.

III. Configuration Briefs

- Cisco device in VTP server mode

```
Switch(config)#vtp domain cisco                  //Configure the VTP domain name as cisco.
Switch (config)#vtp mode server                  //Configure the VTP mode as server.
Switch(config)#vtp password cisco                //Configure the VTP password as cisco.

interface GigabitEthernet5/48
 switchport access vlan 20
 switchport mode dynamic desirable
end
```

- Cisco device in VTP client mode

```
Switch(config)#vtp domain cisco
```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```
Switch (config)#vtp mode client
Switch(config)#vtp password cisco

interface GigabitEthernet0/48
 switchport access vlan 20
 switchport mode dynamic desirable
end
```

- Huawei device

```
l2protocol-tunnel dtp group-mac 0100-5e00-0011      //Map the DTP destination MAC address to a specified multicast address.
interface GigabitEthernet0/0/1                      //Ports that directly connect Huawei devices.
port link-type negotiation-desirable
l2protocol-tunnel dtp enable

interface GigabitEthernet0/0/26            //Ports that directly connect Huawei and Cisco devices.
port link-type trunk
l2protocol-tunnel dtp enable

interface GigabitEthernet0/0/48              //Ports that connect Huawei devices and terminals.
 port link-type access
```

3.4.3 Points to Note

DTP is a Cisco proprietary protocol. Huawei devices cannot directly communicate with DTP-enabled Cisco devices. On a Huawei device, a port directly connected to a Cisco device needs to be configured as the trunk port or access port according to the Huawei device's location on the network.

3.5 Example 5: Overall Replacement Solution

In the overall replacement solution, Huawei devices replace Cisco devices completely.

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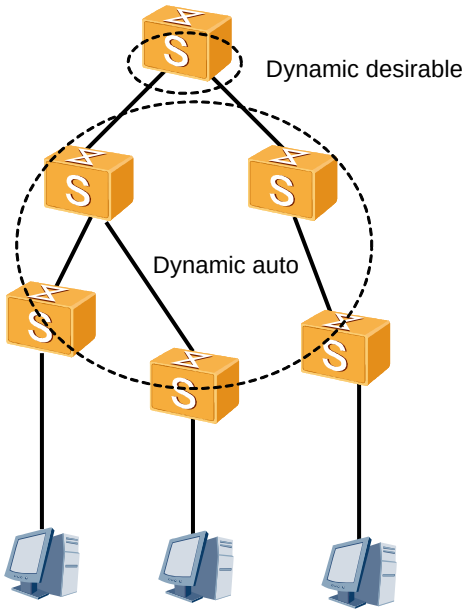
3.5.1 Network Topology

Figure 3-5 Networking of the overall replacement solution



3.5.2 Network Configuration

I. Configuration Requirements

The LNP function is enabled on Huawei devices.

II. Configuration Key Points

Huawei device: Enable the LNP function. Configure ports connected to switches as trunk ports and allow all VLANs on the ports. Configure ports connected to users as access ports.

III. Configuration Briefs

- Huawei device in the server mode

```
[HUAWEI] vcmp domain huawei
[HUAWEI] vcmp role server
[HUAWEI] vcmp authentication sha2-256 password huawei

interface GigabitEthernet5/48
 port link-type negotiation-desirable
port default vlan 20
end
```

- Huawei device in the client mode

```
[HUAWEI] vcmp domain huawei
[HUAWEI] vcmp role client
[HUAWEI] vcmp authentication sha2-256 password huawei

interface GigabitEthernet0/48
port link-type negotiation-desirable
```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```
port default vlan 20
end
```

3.5.3 Points to Note

Cisco DTP and VTP form a VLAN dynamic management and distribution solution. When replacing Cisco devices with Huawei devices, enable Huawei LNP and VCMP (supported by S series switches since V200R005) on Huawei devices.

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4 References

1. http://www.cisco.com
2. Product documents
3. Configuration translation tool

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