OptiX OSN 500 STM-1/STM-4 Multi-Service CPE Optical Transmission System

V100R002

Configuration Guide

Issue 01

Date 2009-01-20

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, please contact our local office or company headquarters.

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About This Document

Purpose

This document describes the configuration of different types of services in the following terms:

- Basic concepts
- Networking diagram
- Signal flow and timeslot allocation
- Configuration process

Related Versions

The following table lists the product versions related to this document.

Product Name	Version
OptiX OSN 500	V100R002
OptiX iManager T2000	V200R007C02

Intended Audience

This document is intended for:

- Data configuration engineers
- System maintenance engineers
- Installation and commissioning engineers

Organization

This document is organized as follows.

Topic	Description
1 Starting the T2000	Describes the basic operations to quickly start of the T2000.

Topic	Description
2 Creating the Network	Describes how to create an NE, how to create boards, how to create fibers and cables, how to configure the protection subnet, and how to configure SDH services, and how to configure the clock on the T2000.
3 Configuring SDH Services	Describes how to configure SDH services on the T2000.
4 Configuring Ethernet Services	Describes how to configure Ethernet services on the T2000.
5 Configuring Broadcast Data Services	Describes how to configure broadcast data services on the T2000.
6 Modifying the Configuration Data	Describes how to modify the configuration data on the T2000.
7 Task Collection	Describes the common operations required for configuring various services on the T2000.
9 Glossary	Lists the terms used in this document.
10 Acronyms and Abbreviations	Lists the acronyms used in this document.

Conventions

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 of risk, which if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium or low level of risk, which if not avoided, could result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
TIP	Indicates a tip that may help you solve a problem or save time.
NOTE	Provides additional information to emphasize or supplement important points of the main text.

General Conventions

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Boldface	Names of files, directories, folders, and users are in **boldface**. For example, log in as user **root**.
Italic	Book titles are in *italics*.
`Courier New`	Examples of information displayed on the screen are in Courier New.

Command Conventions

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

<table>
<tr><th>Convention</th><th>Description</th></tr>
<tr><td>Boldface</td><td>The keywords of a command line are in boldface.</td></tr>
<tr><td>Italic</td><td>Command arguments are in italics.</td></tr>
<tr><td>[ ]</td><td>Items (keywords or arguments) in brackets [ ] are optional.</td></tr>
<tr><td>{ x | y | ... }</td><td>Optional items are grouped in braces and separated by vertical bars. One item is selected.</td></tr>
<tr><td>[x | y | ...]</td><td>Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.</td></tr>
<tr><td>{ x | y | ... }*</td><td>Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.</td></tr>
<tr><td>[x | y | ...]*</td><td>Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.</td></tr>
</table>

GUI Conventions

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

Convention	Description
Boldface	Buttons, menus, parameters, tabs, window, and dialog titles are in **boldface**. For example, click **OK**.
>	Multi-level menus are in **boldface** and separated by the ">" signs. For example, choose **File** > **Create** > **Folder**.

Keyboard Operations

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

Format	Description
Key	Press the key. For example, press **Enter** and press **Tab**.
Key 1+**Key 2**	Press the keys concurrently. For example, pressing **Ctrl**+**Alt**+**A** means the three keys should be pressed concurrently.
Key 1, **Key 2**	Press the keys in turn. For example, pressing **Alt**, **A** means the two keys should be pressed in turn.

Mouse Operations

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

Action	Description
Click	Select and release the primary mouse button without moving the pointer.
Double-click	Press the primary mouse button twice continuously and quickly without moving the pointer.
Drag	Press and hold the primary mouse button and move the pointer to a certain position.

Update History

Updates between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous issues.

Updates in Issue 01 (2009-01-20)

Initial formal release.

1 Starting the T2000

About This Chapter

The following pages introduces some preparation operations that will ensure a smooth, trouble-free launch of the T2000.

1.1 Starting or Shutting Down the T2000
The T2000 uses the standard client/server architecture and multiple-user mode. So, you are recommended to start or shut down the T2000 by strictly observing the following procedure, in order not to affect other users that are operating the T2000.

1.2 Entering the T2000 Common Views
In the common views of the T2000, you can manage the topology, equipment, protection subnet, trail and clock.

1.1 Starting or Shutting Down the T2000

The T2000 uses the standard client/server architecture and multiple-user mode. So, you are recommended to start or shut down the T2000 by strictly observing the following procedure, in order not to affect other users that are operating the T2000.

Background Information

- Start the computer and the T2000 application in the following steps:
  1. Start the computer.
  2. Start the T2000 server.
  3. Start the T2000 client.
- Shut down the T2000 application and the computer in the following steps:
  1. Exit the T2000 client.
  2. Stop the T2000 server.
  3. Shut down the computer.

To avoid computer damage or data loss, refer to the procedure provided to start the computer. The startup procedures of the workstation are different from those of a normal PC. Follow the correct procedure to perform the operations as required.

After starting the computer, you need to start the T2000 server. Then you can log in to the T2000 to manage the network.

When you fail to log in to the T2000 client or abnormally exit the T2000 client, you can use the System Monitor to view the T2000 process status to decide whether the server is faulty.

You can manage the network in the graphic user interface (GUI) only after logging in to the T2000 client.

Before restarting the T2000 client or shutting down the T2000 server, you must exit the T2000 client.

When the T2000 server is managing the system normally, do not perform this operation. In special circumstances, for example, when modifying the system time of the computer where the T2000 resides, or when upgrading the version, you can use the System Monitor to shut down the T2000 server.

Normally, do not shut down the computer. In special situations, for example, when the computer becomes faulty, shut down the computer in the correct sequence. The shutdown procedures of the workstation are different from those of a normal PC. Follow the correct procedure to perform the operations as required.

1.1.1 Starting the Computer

To avoid computer damage or data loss, refer to the procedure provided to start the computer. The startup procedures of the workstation are different from those of a normal PC. Follow the correct procedure to perform the operations as required.

Prerequisite

- The T2000 must be installed correctly.
- The power cable of the workstation or the computer, the power cable of the monitor, data line and Ethernet line must be connected correctly.
- If there is printer, modem or other peripherals, their power line and data line must be connected correctly.

Background Information

The T2000 can run in the UNIX or Windows operating systems. The functions are the same in each operating system. To learn about the recommended hardware configuration, refer to the *OptiX iManager T2000 Product Description*.

Procedure

- On UNIX
  1. Power on the printer, modem and other peripherals.
  2. Power on the workstation and the Solaris is automatically started. The **Prompt** dialog box is displayed.
  3. Enter the **Username** and the **Password** in the **Login** dialog box. For example, **User**: **t2000** (by default); **Password**: **t2000** (by default).
  4. Click **OK** to open the Common Desktop Environment (CDE) window.
- On Windows
  1. Power on the printer, modem and other peripherals.
  2. Power on the computer and the Windows is automatically started.
  3. Enter the **Username** and the **Password** in the **Login** dialog box. For example, **User**: **t2000** (by default); **Password**: **t2000** (by default).
  4. Click **OK** to open the Windows user interface.

----End

1.1.2 Starting the T2000 Server

After starting the computer, you need to start the T2000 server. Then you can log in to the T2000 to manage the network.

Prerequisite

- The computer where the T2000 is installed must be started correctly.
- The operating system of the T2000 server must be running correctly.

- The T2000 license must be in the correct directory. If the T2000 server is installed on UNIX, copy the license to the directory **/T2000/server/license/**. If the T2000 server is installed on Windows, copy the license to the directory **\T2000\server\license**.
- On UNIX, the Sybase must be started and work normally. On Windows, the SQL Server must be started and work normally.

Procedure

Step 1 Double-click the **T2000Server** icon on the desktop of the T2000 server.

Step 2 In the **Login** dialog box, enter **User Name**, **Password** and **Server**. For example, User Name: **admin**, Password: **T2000** (**T2000** is the default password of the **admin** user.) and Server: **Local**.

NOTE

Periodically change the password and memorize it.

If the System Monitor logs in to the server that is installed on another computer, you need to set the server to be logged in to in advance. The settings are similar to the settings of the server that a client logs in to remotely. For details, see **Set the server parameters**.

Step 3 Click **Login**. Wait until the database process, T2000 core process, and the processes that are optional according to the actual situation are in the **Running** state. Now the T2000 server is started successfully.

Step 4 **Optional:** When needed, right-click on the process, and choose **Start Process** from the shortcut menu to start the **Extended NE Management Process**, **NGWDM NE Management Process**, **RTN NE Management Process**, **SDH NE Management Process**, **WDM NE Management Process**, **ASON SDH Management Process**, **ASON WDM Management Process**, **End-to-End Common Management Process**, **End-to-End Eth Management Process**, **End-to-End OTN Management Process**, **End-to-End SDH Management Process**, and **Northbound Interface Module(SNMP) Process** processes manually.

NOTE

If the System Monitor application is started, you can restart the T2000 server on the System Monitor. Perform the following step:

Choose **System** > **Start Server** on the Main Menu of the System Monitor. Wait until the database process, T2000 core process, and the processes that are optional according to the actual situation are in the **Running** state, the T2000 server is started properly.

----End

1.1.3 Viewing the T2000 Process Status

When you fail to log in to the T2000 client or abnormally exit the T2000 client, you can use the System Monitor to view the T2000 process status to decide whether the server is faulty.

Background Information

To view the status of the T2000 processes by UNIX command line, run the following command:

```
# /T2000/server/bin/showt2000server
```

If each process entered has a corresponding process ID and the specific ID does not change, the T2000 processes are normal.

Procedure

Step 1 Start and log in to the System Monitor.

Step 2 In the user interface of the System Monitor, click the **Process** tab, and view whether the status of each process is **Running**.

- If the process status is **Stopped**, right-click on the process, and choose **Start Process** from the shortcut menu. In this manner, the process is in the **Running** state.
- If the manual startup fails, it indicates that the process is abnormal.
- To save resources, you can close unwanted processes. Set the startup mode of the desired process to **Manual**, and then select **Stop Process**.

----End

1.1.4 Logging In to the T2000 Client

You can manage the network in the graphic user interface (GUI) only after logging in to the T2000 client.

Prerequisite

The T2000 server must be started correctly.

Background Information

When the T2000 server and the T2000 client are not on a computer, you need to install the client on the computer where the server resides. Set **ACL** on the client and then issue the ACL setting to the server.

- On the T2000 client, choose **System** > **NMS Security Settings** > **ACL** from the Main Menu.
- Click **Add**. In the dialog box displayed, enter related information.
  - Select **IP Address or Segment** and set an IP address or network section that can be accessed according to the **Example of format**.
  - Select **Start IP address to end IP address** and set the rang of IP addresses that can be accessed according to the **Example of format**.

Procedure

Step 1 On the computer of the T2000 client, double-click the **T2000Client** icon on the desktop.

Step 2 Enter the **User Name**, **Password** of the T2000 client. For example, **User Name**: **admin**; **Password**: **T2000**.

NOTE

- After the automatic login is selected, you do not need to enter the user name and password.
- By default, the initial user name is admin, and the password is T2000. To protect the T2000 from unauthorized logins, you need to immediately change this password.
- The administrator needs to create new T2000 users and assign them to certain authority groups.

Step 3 **Optional:** Set the server parameters.

1. Click ... to display the **Server Setting** dialog box.

2. Click **New** to display another **Add Server** dialog box.
3. In the **Add Server** dialog box, specify the **IP Address**, **Mode** and **Server Name**.

NOTE

- The **IP Address** is the IP address used by the T2000 server.
- The **Mode** has two options including **Common** and **Security (SSL)**. When you choose the **Security (SSL)** mode, the communication between the client and the server is encrypted.
- The communication mode of the client must be consistent with that of the server. Otherwise, the client cannot log in to the server. To view the communication mode of the server, choose **System** > **Communication Mode Settings** on the Main Menu of the System Monitor.
- You need not enter the **Port** number. After the **Mode** is specified, the system selects a **Port** number automatically.

4. Click **OK** to complete adding a server.
5. Click **OK** to complete the server settings.

Step 4 Select a server and click **Login** to access the T2000.

----End

1.1.5 Exiting a T2000 Client

Before restarting the T2000 client or shutting down the T2000 server, you must exit the T2000 client.

Prerequisite

The T2000 client must be started normally.

Procedure

Step 1 Choose **File** > **Exit** from the Main Menu.

Step 2 Click **OK** in the **Confirm** dialog box.

NOTE

If the layout of the view is changed and not saved, the **Save Coordinates** dialog box is displayed. Make a selection and then exit the client automatically.

----End

1.1.6 Shutting Down the T2000 Server

When the T2000 server is managing the system normally, do not perform this operation. In special circumstances, for example, when modifying the system time of the computer where the T2000 resides, or when upgrading the version, you can use the System Monitor to shut down the T2000 server.

Prerequisite

All the T2000 clients connected to the T2000 server must be shut down.

Background Information

When performing the operations related to the database (such as initializing the T2000 database, restoring T2000 databases and restoring T2000 MO data) or the operations related to the T2000 (such as the upgrade, installing patches and re-installing the T2000), you need to shut down the T2000 server first. You are recommended to shut down the T2000 server in the way of "shut down the T2000 server and the System Monitor".

Procedure

- Shut down the T2000 server only.

  NOTE

  In this case, the MDP process is not shut down and the database cannot be initialized.

  1. In the System Monitor, choose **System** > **Stop Server** from the Main Menu.
  2. Click **OK** in the confirmation dialog box. When all the processes are in the **Stopped** status, the T2000 server is stopped normally.
- Shut down the T2000 server and the System Monitor.

  NOTE

  After all the T2000 processes are finished, you can initialize the database.

  1. In the System Monitor, choose **System** > **Shutdown System** from the Main Menu.

----End

1.1.7 Shutting Down the Computer

Normally, do not shut down the computer. In special situations, for example, when the computer becomes faulty, shut down the computer in the correct sequence. The shutdown procedures of the workstation are different from those of a normal PC. Follow the correct procedure to perform the operations as required.

Prerequisite

The T2000 server and client applications must be stopped.

Precaution

CAUTION

To avoid equipment damages or data loss, perform the following step one by one to shut down the workstation.

Procedure

- On UNIX platform
  1. Enter the following commands in the terminal window, the UNIX workstation shuts down automatically:

```
% su root
Password: rootkit
# sync;sync;sync;sync;sync
# shutdown -y -g0 -i5
```

NOTE

- **rootkit** is the default password of super user **root**. If the password is changed, enter the new password.
- To restart the Sun workstation, the last command is **# shutdown -y -g0 -i6**.

2. Turn off the peripheral equipment.

- On Windows platform
  1. Choose **Start** > **Shut down** from the Windows desktop.
  2. Choose **Shut down** and click **OK** in the dialog box. The computer shuts down automatically.
  3. Turn off the monitor and the peripheral equipment.

----End

1.2 Entering the T2000 Common Views

In the common views of the T2000, you can manage the topology, equipment, protection subnet, trail and clock.

1.2.1 Opening the Main Topology

On the Main Topology, you can manage topologies, protection subnets, and trails.

Prerequisite

You must be an NM user with "NE monitor" authority or higher.

Procedure

- To open the Main Topology, log in to the T2000 client.
- Choose **Window** > **Main Topology** from the Main Menu.

----End

1.2.2 Opening the NE Explorer

The NE Explorer is the key interface for the T2000 to configure a single station. After opening the NE Explorer, you can configure, manage and maintain each NE, board or port in a hierarchical manner.

Prerequisite

You must be an NM user with "NE monitor" authority or higher.

Background Information

You can open a maximum of five NE Explorer windows at the same time.

Procedure

Right-click an NE on the Main Topology and choose **NE Explorer** from the shortcut menu.

----End

1.2.3 Opening the Clock View

After opening the Clock View, you can set an NE clock, query a network clock synchronization status, or trace a clock.

Prerequisite

You must be an NM user with "NE monitor" authority or higher.

Procedure

Choose **Configuration** > **Clock View** from the Main Menu.

----End

2 Creating the Network

About This Chapter

NEs and fibers or cables can be managed on the T2000 only after their topologies are created.

2.8 Configuring Orderwire

You can configure orderwire for NEs by using the T2000.

2.1 Creating NEs

Each equipment is represented as an NE on the T2000. Before the T2000 manages the actual equipment, you need to create the corresponding NEs on the T2000. There are two ways of creating NEs: creating a single NE and creating NEs in batches. When you need to create a large number of NEs, for example, during deployment, it is recommended that you create NEs in batches. When you need to create just a few NEs, it is recommended that you create the NEs one by one.

2.1.1 Creating a Single NE

After the NE is created, you can use the T2000 to manage the NE. Although creating a single NE is not as fast and exact as creating NEs in batches, you can use this method regardless of whether the data is configured on the NE or not.

Prerequisite

- You must be an NM user with "NM operator" authority or higher.
- The license must be installed and the license must support creating the NE of the type.
- The NE Explorer instance of the NEs must be created.

Context

First create a GNE, and then create a non-gateway NE.

For easy management, create optical NEs before creating NEs in batches. Otherwise, new NEs are allocated to idle optical NEs automatically.

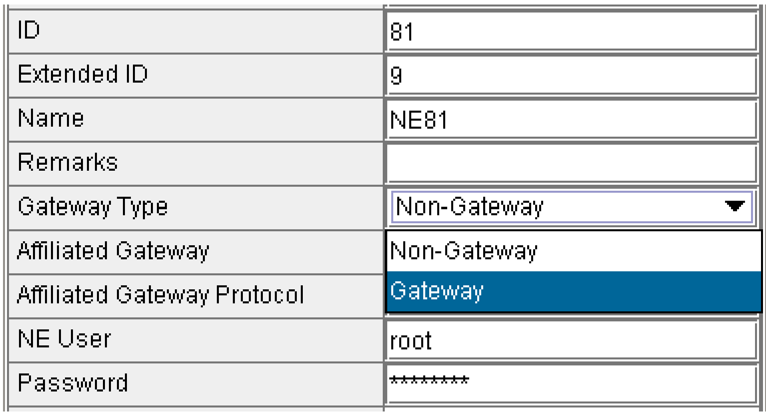
If the NE is not created properly or the communication between the NE and the T2000 is abnormal, the NE is displayed in gray color.

Procedure

Step 1 Right-click in the blank space of the Main Topology and choose **New** > **Device** from the shortcut menu. The **Add Object** dialog box is displayed.

Step 2 Select the NE type from the Object Type tree.

Step 3 Complete the following information: **ID**, **Extended ID**, **Name** and **Remarks**.



Step 4 To create a GNE, proceed to Step 5. To create a non-gateway NE, proceed to Step 6.

Step 5 Choose **Gateway Type**, **Protocol** and set the IP address and NSAP address or serial port no. and serial port rate.

1. Select **Gateway** from the **Gateway Type** drop-down list.
2. Select the **Protocol** type.

If the T2000 communicates with NEs through	Do...
IP protocol	Select **IP** from the **Protocol** drop-down list. Enter the **IP Address** and use the default value for the **Port** number of the GNE.
OSI protocol	Select **OSI** from the **Protocol** drop-down list. Enter the **NSAP Address** of the GNE.

NOTE

The NSAP address is a hexadecimal number that contains a maximum of 20 bytes. Its format is: domain address+08003e+NE ID+NSEL.

The **domain address** that contains a maximum of 13 bytes is entered by the user. **NSEL** is the port number of the network-level protocol, with a fixed value of 1d (one byte).

Step 6 Select **Non-Gateway** from the **Gateway Type** drop-down list. Select the GNE to which the NE is associated to from the **Affiliated Gateway** drop-down list.

Step 7 Enter the **NE User** and **Password**.

NOTE

The default NE user is **root**, and the default password is **password**.

Step 8 **Optional:** If you do not want to apply the NE configuration data in the T2000 to the NE, check the **NE Preconfiguration** check box, and set **NE Software Version**.

NOTE

If you apply the configuration data of the preconfigured NE to the actual NE when the configuration data on the preconfigured NE is inconsistent with that on the actual NE, the actual services will be affected.

Step 9 Click **OK**. Click in the blank space of the Main Topology and the NE icon appears in the position where you clicked.

----End

Result

After an NE is successfully created, the system automatically saves the information, such as the IP address, NSAP address, subnet mask, and NE ID to the T2000 database.

Postrequisite

After an NE is created, if you fail to log in to the NE, possible causes are listed as follows:

- The communication between the T2000 and the NE is abnormal. Check the settings of communication parameters, such as the IP address of the NE and NE ID.
- The password for the NE user is incorrect. Enter the correct password for the NE user.
- The NE user is invalid or the NE user is already logged in. Change to use a valid NE user.

2.1.2 Creating NEs in Batches

When the T2000 communicates properly with the GNE, you can create NEs in batches by searching for all NEs that communicate with the GNE, by using the IP address of the GNE or the network segment to which the IP address is associated, or by using the NSAP address of the NE. This method is quicker and more accurate than manual creation.

Prerequisite

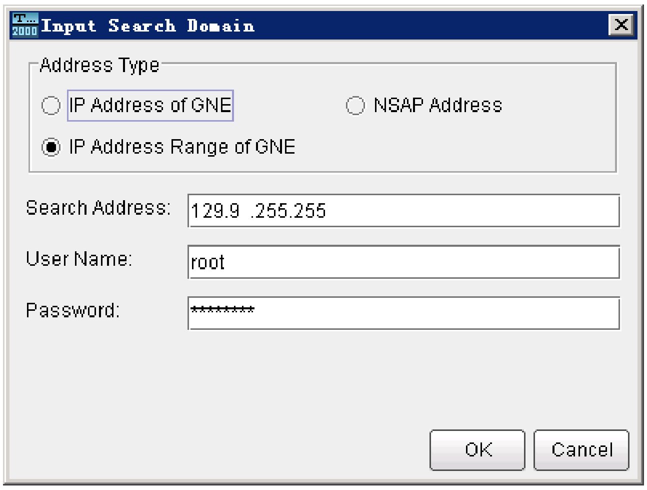
- You must be an NM user with "NE administrator" authority or higher.
- The T2000 must communicate properly with the GNE.
- The NE Explorer instance of the NEs must be created.

Procedure

Step 1 Choose **File** > **Search for NE** from the Main Menu. The **Search for NE** window is displayed.

Step 2 Click **Add** and the **Input Search Domain** dialog box is displayed.

Step 3 Set **Address type** to **IP Address Range of GNE**, **IP Address of GNE** or **NSAP Address**, and enter the information of the search address. Click **OK**.



NOTE

You can repeat Steps 2 through 3 to add more search fields. You can delete the system default search field.

- If you use IP address to search for NEs, and the IP address of the T2000 computer and that of the GNE are within the same network segment, you can select **IP Address Range of GNE** or **IP Address of GNE**.
- If the IP addresses are not within the same network segment, select only **IP Address of GNE**.
- If you use NSAP address, you can only select **NSAP address**.

Step 4 Click **Start**. The NEs found are displayed after the search.

Step 5 When the search ends or if you click **Stop**, select the uncreated NEs in the **Result** list and click **Create**. The **Create** dialog box is displayed.

Step 6 Enter the NE user name and password.

NOTE

- The default NE user is **root**.
- The default password is **password**.

Step 7 Click **OK**.

----End

Postrequisite

After an NE is created, if you fail to log in to the NE, possible causes are listed as follows:

- The password for the NE user is incorrect. Enter the correct password for the NE user.
- The NE user is invalid or the NE user is already logged in. Change to use a valid NE user.

2.2 Configuring the NE Data

Though an NE is successfully created, it is not configured. You need to configure the NE first so that the T2000 can manage and operate the NE.

2.2.1 Configuring the NE Data Manually
By configuring NE data manually, you can configure the board slot information of an NE.

2.2.2 Replicating the NE Data
During the network planning, virtue NEs are used to simulate the entire network. In this situation, you need to configure a lot of identical NE data. The function of duplicating the NE configuration data can simplify your operation and improve the efficiency.

2.2.3 Uploading the NE Data
By uploading the NE data, you can synchronize the current NE configuration data to the network management system directly.

2.2.1 Configuring the NE Data Manually

By configuring NE data manually, you can configure the board slot information of an NE.

Prerequisite

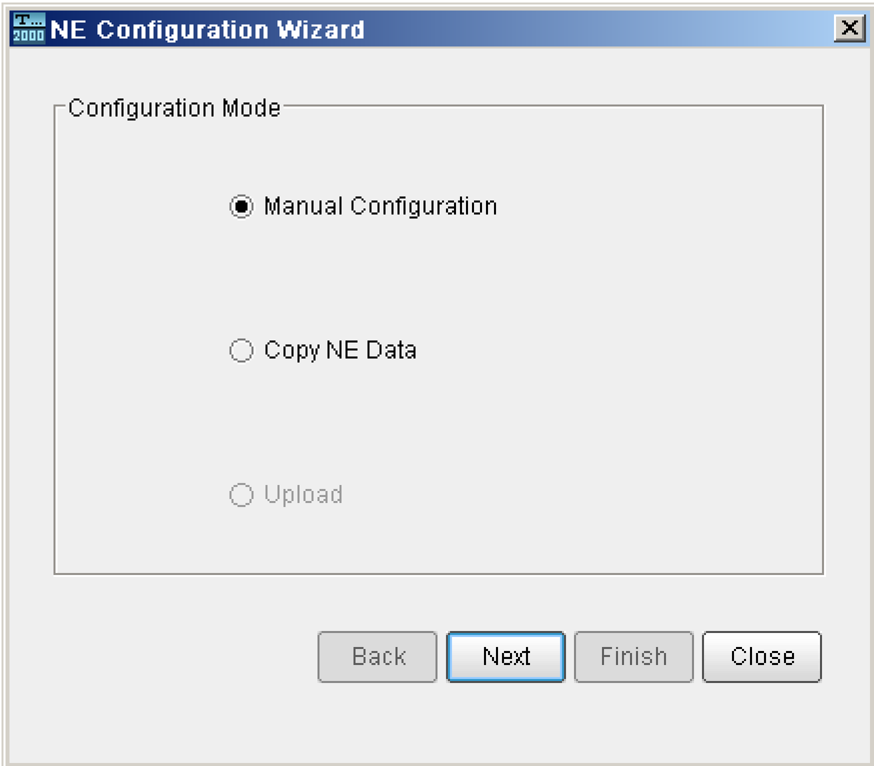
You must be an NM user with "NE operator" authority or higher.

The NE must be created successfully.

Procedure

Step 1 Select the NE whose data you want to configure.

If the NE to be configured is the	You need
SDH equipment	Double-click the unconfigured NE on the Main Topology. The **NE Configuration Wizard** dialog box is displayed.



Step 2 Choose **Manual Configuration** and click **Next**. The **Confirm** dialog box is displayed indicating that manual configuration clears the data on the NE side.

Step 3 Click **OK**. The **Confirm** dialog box is displayed indicating that manual configuration interrupts the service on the NE.

Step 4 Click **OK**. The **Set NE Attribute** dialog box is displayed.

Step 5 Set **NE Name**, **Equipment Type**, **NE Remarks** and **Subrack Type** and then click **Next**. The NE slot window is displayed.

Step 6 **Optional:** Click **Query Logical Information** to query the logical boards of the NE.

Step 7 **Optional:** Click **Query Physical Information** to query the physical boards of the NE.

NOTE

The **Query Logical Information** and **Query Physical Information** operations cannot be performed for a preconfigured NE.

Step 8 Right-click on the slot to add a board. Click **Next** to display the **Send Configuration** window.

Step 9 Choose **Verify and Run** as required and click **Finish**.

NOTE

Verification is to run the verification command. Click **Finish** to deliver the configuration to NEs and the basic configuration of the NEs is complete. After the successful verification, the NEs start to work normally.

----End

2.2.2 Replicating the NE Data

During the network planning, virtue NEs are used to simulate the entire network. In this situation, you need to configure a lot of identical NE data. The function of duplicating the NE configuration data can simplify your operation and improve the efficiency.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

The NE must be created successfully.

The NE type and NE software version of the source NE must be consistent with those of the copied NE.

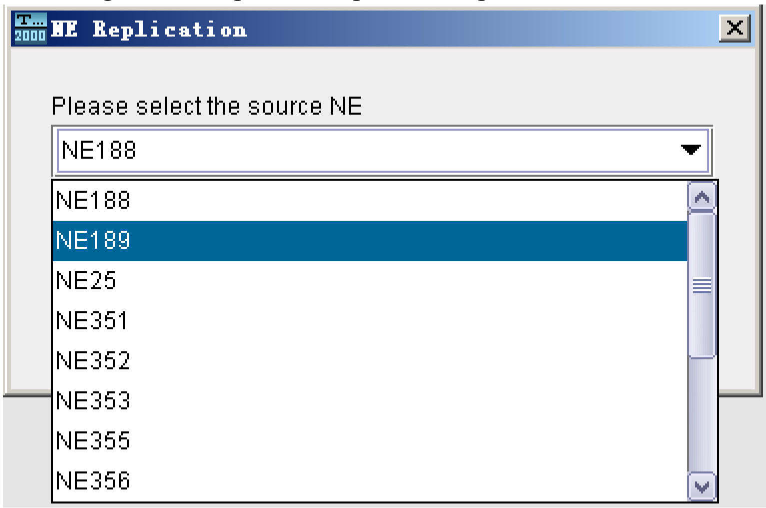
Procedure

Step 1 Select the NE whose data you want to Replicate.

If the NE to be configured is the	You need
SDH equipment	Double-click the unconfigured NE on the Main Topology. The **NE Configuration Wizard** dialog box is displayed.

Step 2 Choose **Copy NE Data** and click **Next**. The **NE Replication** dialog box is displayed.

Step 3 Select the NE in the drop-down list and click **Start**. The **Confirm** dialog box is displayed indicating that the replication operation copies all the data of the source NE.



NOTE

After the NE data is replicated, only the data on the T2000 side is changed, but the data on the equipment side is not changed.

Step 4 Click **OK**. The **Confirm** dialog box is displayed indicating that the replication operation results in the loss of the original data of the NE to which the data is copied.

Step 5 Click **OK** to start the replication. Wait for a few seconds. The **Operation Result** dialog box is displayed.

Step 6 Click **Close**.

----End

2.2.3 Uploading the NE Data

By uploading the NE data, you can synchronize the current NE configuration data to the network management system directly.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

The NE must be created successfully.

Procedure

Step 1 Select the NE whose data you want to Replicate.

If the NE to be configured is the	You need
SDH equipment	Double-click the unconfigured NE on the Main Topology. The **NE Configuration Wizard** dialog box is displayed.

Step 2 Choose **Upload** and click **Next**. The **Confirm** dialog box is displayed indicating that the upload may take a long time.

Step 3 Click **OK** to start the upload. The **Operation Result** dialog box is displayed when the uploading is completed.

Step 4 Click **Close**.

----End

2.3 Checking Board Parameters

To learn about board parameter status, you can check board parameters. Before actual configuration operations in networking, you need to check board parameters, to make sure that the board parameter status meets the requirements of actual networking.

Procedure

Step 1 Select the corresponding navigation path and check the related board parameters.

1. Check SDH board parameters. For the SDH board parameters, see **Table 2-1**.

Table 2-1 SDH board parameters

<table>
<tr><th>Board Type</th><th>Parameter</th><th>Navigation Path</th><th>Application Scenario</th></tr>
<tr><td rowspan="4">SDH</td><td>MSP sharing</td><td rowspan="4">a. In the NE Explorer, select a board.
b. Choose Configuration > SDH Interface from the Function Tree.
c. Click By Board/Port (channel) and select Port from the drop-down list.</td><td>When configuring MSP shared services on an optical interface of a board, enable this parameter.</td></tr>
<tr><td>Laser Switch</td><td>When configuring services on an optical interface of a board, enable this parameter.</td></tr>
<tr><td>Optical (Electrical)Interface Loopback</td><td>● Non-loopback: It is a normal state. When the equipment runs normally, set this parameter to non-loopback.
● Inloop: The loop is performed toward the local NE.
● Outloop: The loop is performed toward the opposite NE. Inloop and outloop of an optical interface affect services. They are used to locate faults.</td></tr>
<tr><td>Hardware REG Enable</td><td>In the REG working mode, the board processes only the framer header and regenerator section overheads. In the case of the non-REG service configuration, set this parameter to Disabled.</td></tr>
</table>

2. Check PDH board parameters. For the PDH board parameters, see **Table 2-2**.

Table 2-2 PDH board parameters

Board Type	Parameter	Navigation Path	Application Scenario
PDH	Tributary Loopback	a. In the NE Explorer, select a board. b. Choose **Configuration** > **PDH Interface** from the Function Tree. c. Click **By Board/Port (channel)** and select **Port** from the drop-down list.	● Non-loopback: It is a normal state. When the equipment runs normally, set this parameter to non-loopback. ● Inloop: When input service signals reach the tributary board of the target NE, the signals revert to the original trail. This function is used to locate faults of each service path. ● Outloop: When input service signals reach the tributary board through the input port of the local NE, the signals are looped back directly to the service output end.

Board Type	Parameter	Navigation Path	Application Scenario
	Service Load Indication		● Non-loaded: The service path does not process the services that are carried, to suppress alarms in non-loaded service paths. ● Load: The service path processes the services that are carried. In the case of a tributary board that has services, set this parameter to **Load**.

3. Check RTN board parameters. For the RTN board parameters, see **Table 2-3**.

Table 2-3 RTN board parameters

Board Type	Parameter	Navigation Path	Application Scenario
RTN	Radio Work Mode	a. In the NE Explorer, select a board. b. Choose **Configuration** > **IF Interface** from the Function Tree. c. Click **By Board/Port (channel)** and select **Port** from the drop-down list.	Specifies the microwave working mode. Its formats are service capacity, working bandwidth and modulation mode. The transmit end and the receive end must have the same settings of the microwave working mode.
	Radio Link ID		Radio Link ID: 1 to 4094
	IF Port Loopback		Sets the loopback status of an intermediate frequency interface on the equipment. **Non-Loopback** refers to the normal status. It is not required to set loopback during normal equipment operation. **Outloop** means that the input signal passes through the ingress port and reaches the intermediate frequency board at the local NE and then is directly loopbacked to the service egress end. **Inloop** means that the input signal returns from the intermediate frequency board of the destination NE along the original trail. This function is usually used to locate faults for various IF interfaces. Performing loopback on an intermediate frequency interface is a diagnosis function which may affect services of related ports. Exercise caution before performing this function.

Board Type	Parameter	Navigation Path	Application Scenario
	2M Wayside Enable Status		Enables or disables a 2 Mbit/s bypath service. This parameter is available only when you set **Radio Work Mode** to **STM-1,28MHz, 128QAM**.
	ATPC Enable Status		When the ATPC is enabled, according to the current receive power of the ODU and the set ATPC thresholds, the ATPC module inserts the ATPC overhead. According to the ATPC overhead, the opposite ODU adjusts the transmit power. When the ATPC is disabled, the ATPC module does not insert any ATPC overhead.

4. Check data board parameters. For the data board parameters, see **Table 2-4**.

Table 2-4 Data board parameters

Board Type	Parameter	Navigation Path	Application Scenario
Ethernet	Enabled/ Disabled	a. In the NE Explorer, select a board. b. Choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree. c. Click **External Port**. d. Click the **Basic Attributes** tab.	When configuring Ethernet board port services, set the port to **Enabled**.
	Working Mode		Set the working mode of Ethernet ports according to networking configuration requirements.
	Maximum Frame Length		When a packet exceeds the maximum frame length that is set, the packet is discarded. Alternatively, the packet length is minimized to satisfy the specified frame length. By default, the value is set to 1522, unless otherwise specified.
	MAC Loopback		• Non-loopback: It is a normal state. When the equipment runs normally, set this parameter to non-loopback. • Inloop: Inside the equipment, services from the cross-connect side are looped back to the cross-connect side. This operation affects services configured on ports and is used to locate faults.

Board Type	Parameter	Navigation Path	Application Scenario
	PHY Loopback		● Non-loopback: It is a normal state. When the equipment runs normally, set this parameter to non-loopback. ● Inloop: Inside the equipment, services from the cross-connect side are looped back to the cross-connect side. This operation affects services configured on ports and is used to locate faults.
	TAG	a. In the NE Explorer, select a board. b. Choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree. c. Click **External Port**. d. Click the **TAG Attributes** tab.	● Tag Aware: If the client-side equipment sends tag packets, set the TAG attribute of external ports to **Tag Aware**. ● Access: If the client-side equipment sends untag packets, set the TAG attribute of external ports to **Access**. ● Hybrid: If the client-side equipment sends tag and untag packets, set the TAG attribute of external ports to **Hybrid**.
	Entry Detection		This parameter is used to identify tags in data packets. During the configuration of VLAN services, set this parameter to **Enabled**.
ATM	Port Type	a. In the NE Explorer, select a board. b. Choose **Configuration** > **ATM Interface Management** > **ATM Interface Management** from the Function Tree. c. Click **External Port**.	● UNI: The maximum number of VPI bits is 8. The UNI is used on edge nodes between the user network and ATM network. ● NNI: The maximum number of VPI bits is 12. The NNI is used between ATM networks.
	UPC/NPC Enabled/Disabled		● Enabled: When the traffic parameter is valid and strict control of traffic is required, set this parameter to **Enabled**. ● Disabled: When the traffic parameter is invalid (excepting the PCR of CBR services) and service burst and grooming are permitted, set this parameter to **Disabled**.
	Loopback		Inloop is used to locate faults. During normal service configuration, set this parameter to **No Loopback**.

Board Type	Parameter	Navigation Path	Application Scenario
	Laser Switch		This parameter is used to set the on/off status of a laser. During normal service configuration, set this parameter to **Open**.

Step 2 Modify board parameters according to service planning and actual board configurations. For details, see **6.2.3 Modifying Board Configuration Parameters**.

----End

2.4 Creating Links

You can create fibers, Ethernet cables, serial port cables, extended ECC and virtual fibers by using the T2000.

By using the fiber search feature, you can check whether the specified optical interface is connected to a fiber. You can quickly create a fiber for this optical interface by using the T2000. For a newly created network, after configuring boards on the T2000, you can search for all optical interfaces to create fibers for the entire network. In this way, you can monitor the actual working status of fibers.

Before you configure services, you need to create the required fibers. You can create a small number of fibers manually one after another.

When the T2000 manages the SDH, PTN and WDM equipment at the same time, you can create virtual fibers for SDH or PTN equipment with WDM equipment in between, to facilitate administration.

The T2000 can communicate with NEs through the Ethernet port or serial port. The NEs also communicate with each other through the extended ECC. Depending on the communication mode, different types of cables can be created on the T2000.

2.4.1 Creating Fibers Automatically

By using the fiber search feature, you can check whether the specified optical interface is connected to a fiber. You can quickly create a fiber for this optical interface by using the T2000. For a newly created network, after configuring boards on the T2000, you can search for all optical interfaces to create fibers for the entire network. In this way, you can monitor the actual working status of fibers.

Prerequisite

- You must be an NM user with "NE maintainer" authority or higher.
- The optical interfaces of every NE must be connected using fibers.

- The boards of every NE must be created on the T2000.

Context

- If conflicting fibers are found during the creation, delete the conflicting fibers on the T2000 before you start creating fibers.
- When a fiber between two SDH NEs passes through a WDM NE, if the normal fiber between an SDH NE and a WDM NE has been created on the T2000, the fiber found by the trail search function is created as a virtual fiber. If the WDM NE is not created on the T2000, the fiber is created as a normal fiber.
- When a fiber is created, it is usually bidirectional. But when the fiber is connected to the ports of the REG functions or the SDH and WDM equipment, the fiber is unidirectional.

Procedure

Step 1 Choose **File** > **Search for Fiber/Cable** from the Main Menu.

Step 2 In the left pane select some ports from one or more NEs and click **Search** to search for the fibers or cables. A progress bar is displayed showing the progress of the search.

NOTE

- If you check the **Do not search for ports of created fibers on T2000** check box, the system only searches for the ports that do not have fibers.
- To check if the created fiber is consistent with the actual fiber connection, leave the check box unchecked.
- If you check the **Do not search for ports of created fibers on T2000** check box, and if all the selected ports have fibers created, the system displays a message indicating that the search field is null.

Step 3 A prompt appears telling you that the operation was successful. Click **Close**.

Step 4 To create fibers, select one or more fibers from the **Newly Searched Fiber** list and click **Create Fiber/Cable**.

NOTE

- When one or more fibers are selected in the **Newly Searched Fiber** list, fibers that conflict with the selected fibers, are shown in the **Existing Conflicting Fiber** list. If there is any conflicting fiber, proceed to Step 5 and delete it before creating fibers.
- During fiber creation, if all the selected fibers are in an **Already created** state, the system displays the message – `No fiber to create`.

Step 5 To delete the conflicting fibers, from the **Existing Conflicting Fiber** list select one or more fibers whose values are **Yes** for the **Existing Conflicting link (Y/N)** parameter in the **Misconnected Fiber** list. Click **Delete Fiber/Cable**.

----End

2.4.2 Creating Fibers Manually

Before you configure services, you need to create the required fibers. You can create a small number of fibers manually one after another.

Prerequisite

- You must be an NM user with "NE maintainer" authority or higher.

- The required boards must be created on each NE.

Context

Generally, the fiber that is created are bidirectional. If the fiber is connected to a port that has the REG function, SDH equipment, or WDM equipment, however, the fiber is unidirectional.

Procedure

Step 1 Right-click in the Main Topology and choose **New** > **Link** from the shortcut menu. Then, the **Add Object** dialog box is displayed.

Step 2 Choose **Link** > **Fiber/Cable** from the left pane.

Step 3 Click the button in **Source NE**. Select the source board and source port in the **Select the source end of the link** dialog box that is displayed.

Step 4 Click **OK**. Then, the cursor changes to a + sign.

Step 5 Click the sink NE of the fiber in the Main Topology.

Step 6 Click the button in **Sink NE**. Select the sink board and sink port in the **Select the sink end of the link** dialog box that is displayed.

TIP

If an incorrect sink NE is selected, right-click and click **OK** in the **Object Selection** dialog box that is displayed to exit.

Step 7 Click **OK**. Set the corresponding attributes of the fiber in the **Add Object** dialog box that is displayed.

Step 8 Click **OK**.

Then, the created fiber is displayed between the source NE and the sink NE in the Main Topology.

Step 9 Right-click the created fiber and choose **Detect Link** from the shortcut menu.

The **Operation Result** dialog box is displayed, indicating the information on the fiber connections.

----End

2.4.3 Creating Virtual Fibers

When the T2000 manages the SDH, PTN and WDM equipment at the same time, you can create virtual fibers for SDH or PTN equipment with WDM equipment in between, to facilitate administration.

Prerequisite

- You must be an NM user with "NE maintainer" authority or higher.
- You must create fiber connections according to the true fibers that connect the SDH and WDM equipment.

Context

- For SDH equipment, the virtual fibers ensure the independence of automatic fiber search and SDH trail management. .

- For WDM equipment, when true fibers change into virtual fibers at the bearer layer, wavelength management is not affected even if the true fibers are deleted
- The source and sink ports of the virtual fibers must be the SDH ports. On the source and sink ports, there must be two physical fibers that are connected to the WDM equipment.
- The virtual fiber does not support the expansion function.

Procedure

Step 1 Right-click in the blank space of the Main Topology, and choose **New** > **Link** from the shortcut menu.

Step 2 In the **Add Object** dialog box, choose **Link** > **Virtual Fiber/Cable** .

Step 3 Set the attributes of the fiber or cable in the right-hand list.

Step 4 Click **OK**.

----End

2.4.4 Creating DCN Communication Cable

The T2000 can communicate with NEs through the Ethernet port or serial port. The NEs also communicate with each other through the extended ECC. Depending on the communication mode, different types of cables can be created on the T2000.

Prerequisite

You must be an NM user with "NM operator" authority or higher.

Procedure

Step 1 Right-click in the blank space of the Main Topology and choose **New** > **Link** from the shortcut menu.

Step 2 Select a cable type from the expanded items.

Step 3 Enter the cable attributes in the right-hand pane.

Step 4 Click **OK**. The cable is displayed on the Main Topology between the T2000 and the GNE.

----End

2.5 Creating a Topology Subnet

The subnet created here is based on a topological concept to facilitate management. In the case of topology objects in the same network area or with similar attributes, you can allocate them in one topology subnet.

Prerequisite

You must be an NM user with "NM operator" authority or higher.

Context

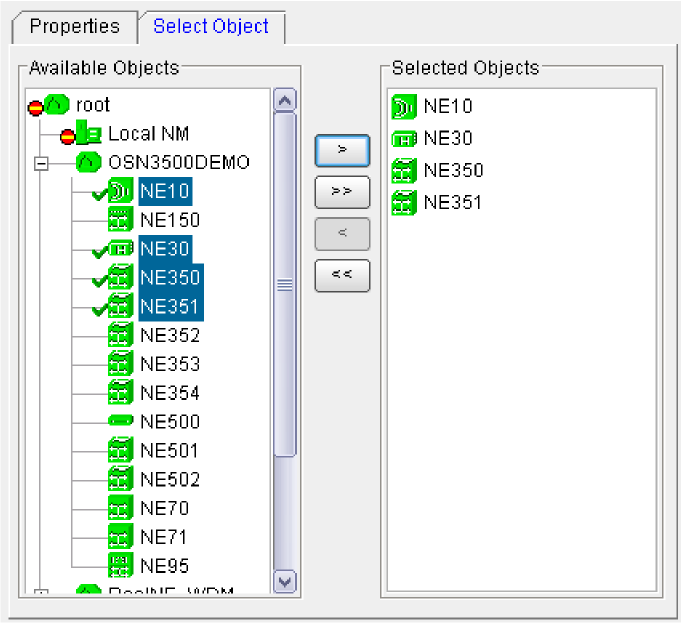
A topology subnet is created only to simplify the user interface and has no impact on the NEs.

Procedure

Step 1 Right-click in the blank space of the Main Topology and choose **New** > **Subnet** from the shortcut menu.

Step 2 Click the **Properties** tab in the **Add Object** dialog box. Enter the attributes of the subnet.

Step 3 Click the **Select Objects** tab. Select the created NEs or subnet from the **Available Objects** pane. Click .



NOTE

In the case of a similar dialog box for selecting objects,

- indicates that to select the objects to be selected on the left to the selected objects on the right.
- indicates that to select all the objects to be selected on the left to the selected objects on the right.

Step 4 Click **OK**. Click in the blank space of the Main Topology, the icon appears in the position where you clicked.

----End

2.6 Configuring the Protection Subnet

The OptiX OSN 500 supports various network level protection schemes, including the linear MSP and ring MSP.

2.6.1 Configuring a Non-Protection Chain
If a service in the chain does not need to be protected, you can configure a non-protection chain. In this case, all the timeslots in the chain can be used to transmit the service.

2.6.2 Configuring a Non-Protection Ring
When services on a ring need not be protected, you can configure a non-protection (NP) ring. All timeslots on the ring can be used to transmit services.

2.6.3 Creating an MS Ring Protection Subnet

Generally, the MS ring protection is configured on the public ring network whose protection paths are used to transmit extra services. By running the APS protocol, it achieves the MS level protection.

2.6.4 Creating a Linear MS Protection Subnet
In a chain network, an NE can protect the services in different fiber sections after a linear MS protection subnet is created.

2.6.1 Configuring a Non-Protection Chain

If a service in the chain does not need to be protected, you can configure a non-protection chain. In this case, all the timeslots in the chain can be used to transmit the service.

Prerequisite

- You must be an NM user with "network maintainer" authority or higher.
- On the NM, the data of each NE must be configured, and fibers must be created correctly.

Procedure

Step 1 Choose **Protection Subnet** > **Create SDH Protection Subnet** > **NP Chain** from the Main Menu to display the **Create SDH Protection Subnet** dialog box.

Step 2 Enter the name of the protection subnet.

Generally, enter the default name, for example, non-protection chain_1.

Step 3 Select the capacity level of the protection subnet,

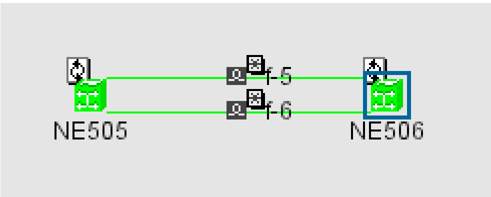
for example, STM-4.

Step 4 Select **Resource Sharing** and **Assigned by VC4** as needed.

NOTE

- **Resource Sharing** indicates that a port is mapped into multiple protection subnets. When multiple protection subnets occupy a port of a board, **Resource Sharing** must be selected. When different protection subnets occupy different ports of a board, **Resource Sharing** is not required.
- **Assigned by VC4** indicates that different VC4s belong to different protection subnets to achieve virtual optical path protection. For example, in the case of an STM-16 fiber, the first through fourth VC4s belong to an STM-4 MS shared protection, while the fifth through eighth VC4s belong to a non-protection ring. If you enable multiple MSPs for a single optical port, you can configure multiple MSP rings by VC4 for the optical port.

Step 5 Select a node to create a non-protection chain. Double-click an NE in the Main Topology and add it to the left node list. At the same time,  is displayed on the NE icon. Double-click the NE icon again to cancel the selection.



Step 6 Click **Next** to display the **Select Link** dialog box. Set parameters, such as **Physical Link Information**.

Step 7 Click **Finish** to deliver the configuration data. Then the **Operation Result** prompt box is displayed. Click **Close**.

----End

2.6.2 Configuring a Non-Protection Ring

When services on a ring need not be protected, you can configure a non-protection (NP) ring. All timeslots on the ring can be used to transmit services.

Prerequisite

- You must be an NM user with "NE maintainer" authority or higher.
- The NE data must be configured, and fibers must be created properly.

Procedure

Step 1 Choose **Protection Subnet** > **Create SDH Protection Subnet** > **NP Ring** from the Main Menu. Then, the **Create Protection Subnet** dialog box is displayed.

Step 2 Enter the name of the protection subnet.

Generally, the default name is used, for example, NP_Ring_1.

Step 3 Select the capacity level of the protection subnet,

for example, STM-4.

Step 4 Select **Resource Sharing** and **Assigned by VC4** according to the requirement.

Step 5 Select the nodes that belong to the protection subnet that needs to be created. Double-click the selected NE in the Main Topology to add the NE to the NE list on the left. In addition,  is displayed on the NE icon. If you need to cancel the selection, double-click the NE again.

Step 6 Click **Next** to enter the **Select link** window. Set the parameters such as **Physical Link Information** in the window.

Step 7 Click **Finish** to deliver the configuration data. Then, the **Operation Result** dialog box is displayed. Click **Close**.

----End

2.6.3 Creating an MS Ring Protection Subnet

Generally, the MS ring protection is configured on the public ring network whose protection paths are used to transmit extra services. By running the APS protocol, it achieves the MS level protection.

Prerequisite

- You must be an NM user with "network maintainer" authority or higher.
- The NE data must be configured and fibers must be created properly.

Context

- The number of nodes in an MSP ring should not exceed 16.

- When creating a protection subnet, select SDH NEs only. Do not select REG or WDM NEs.

CAUTION

Starting the protocol controller may interrupt the services.

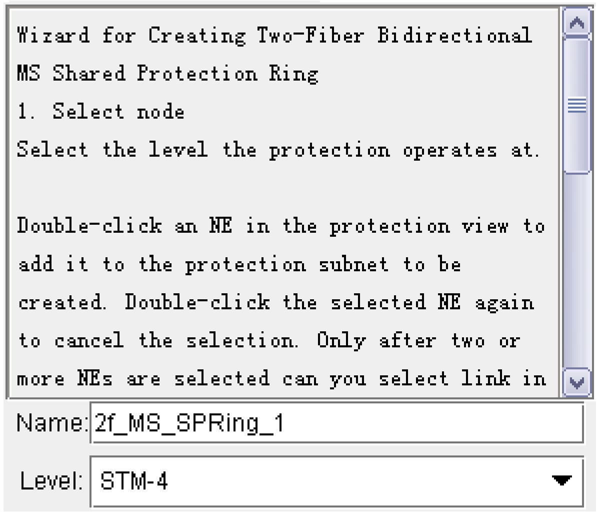
Procedure

Step 1 Choose **Protection Subnet** > **Create SDH Protection Subnet** > **2f_MS_SPRing** from the Main Menu. Click **OK** in the dialog box that is displayed. Click **OK**. Then, the **Create Protection Subnet** window is displayed.

Step 2 Enter the name of the protection subnet.

Generally, the default name is used, for example, 2f_MS_SPRing_1.

Step 3 Select the capacity level of the protection subnet, for example, STM-4.

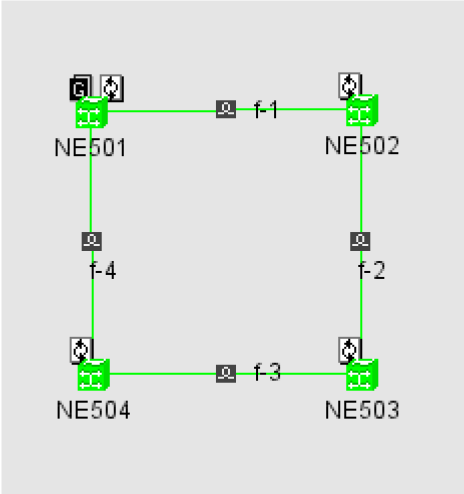


Step 4 Choose **Resource Sharing** and **Assigned by VC4** according to the requirement.

NOTE

- **Resource Sharing** indicates that a port is mapped into multiple protection subnets. When multiple protection subnets occupy the same port of a board, **Resource Sharing** must be selected. When different protection subnets occupy different ports of a board, **Resource Sharing** is not required. If multiple protection subnets use one port of a board, you need to select the **Resource Sharing** check box. If **MSP Sharing** is enabled, you can select the **Resource Sharing** check box to map a port of the board to multiple MSP subnets.
- **Assigned by VC4** indicates that different VC-4s belong to different protection subnets, thus achieving virtual optical path protection. For example, in the case of an STM-4 fiber, the first and second VC-4s are allocated for the STM-4 MS shared protection, and the third and fourth VC-4s are allocated for the non-protection.

Step 5 Select the nodes that belong to the protection subnet that needs to be created. Double-click the selected NE in the Main Topology to add the NE to the NE list on the left. In addition, is displayed on the NE icon. If you need to cancel the selection, double-click the NE again.



NOTE

To facilitate maintenance, it is recommended that you add the nodes anticlockwise to the protection subnet.

Step 6 Set the attribute of each node to **MSP Node**.

Step 7 Click **Next** to enter the **Select link** window. Set the parameters such as **Physical Link Information** in the window.

NOTE

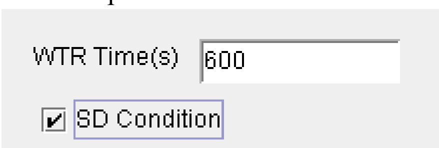
- If there are multiple fibers between two NEs, select the required links from the **Physical Link Information** drop-down list.
- If **Assigned by VC4** is selected, you can Select the working and protection VC-4 timeslots according to the requirement.

Step 8 Click **Finish** to deliver the configuration data. Then, the **Operation Result** dialog box is displayed. Click **Close**.

Step 9 Right-click the protection subnet and choose **Protection Subnet Attributes** from the shortcut menu.

Step 10 Click the **Protection Subnet Maintenance** tab to check whether the protocol controller is started. If the protocol controller is not started, select all the NEs of the protection subnet. Right-click and choose **Start/Stop Protocol** > **Start** from the shortcut menu. Click **Yes** in the dialog box that is displayed twice. Ensure that the status of all the values in the **Protocol Controller** column is **Protocol Started**.

Step 11 Click the **Protection Subnet Parameters** tab. Set **WTR time** and **SD Condition** according to the requirement. Click **Apply** to deliver the configuration data. The **WTR time** of all NEs in the same protection subnet should be the same.



NOTE

The default value is 600s.

----End

2.6.4 Creating a Linear MS Protection Subnet

In a chain network, an NE can protect the services in different fiber sections after a linear MS protection subnet is created.

Prerequisite

- You must be an NM user with "network maintainer" authority or higher.
- The NE data must be configured and fibers must be created properly.

Context

Fibers that are used for the linear MSP cannot be used by other protection subnets. That is, a linear MS protection subnet and other subnets cannot be used together to form virtual fibers.

CAUTION

Starting the protocol controller may interrupt the services.

Procedure

Step 1 Choose **Protection Subnet** > **Create SDH Protection Subnet** > **1+1 linear MSP** from the Main Menu. Then, the **Create Protection Subnet** window is displayed.

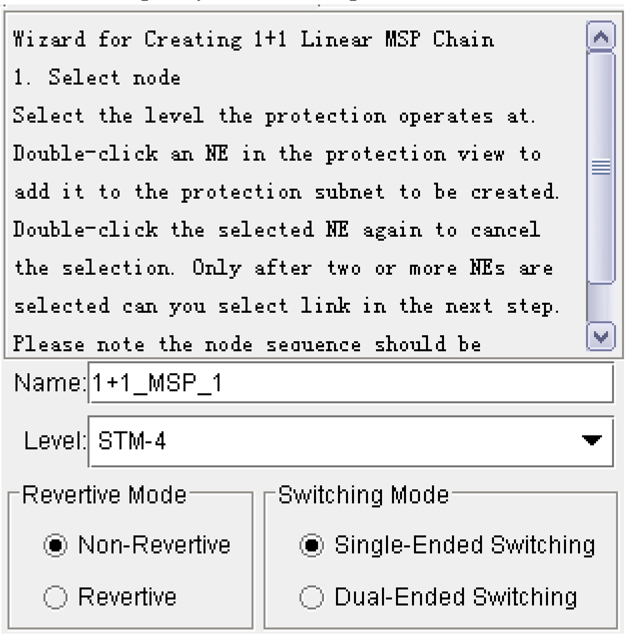
NOTE

To create the M:N linear MS protection, choose **Protection Subnet** > **Create SDH Protection Subnet** > **M:N Linear MSP** from the Main Menu. Then, the corresponding window is displayed.

Step 2 Enter the name of the protection subnet.

Generally, the default name is used, for example, 1+1_MSP_1.

Step 3 Select the capacity level of the protection subnet, for example, STM-4.



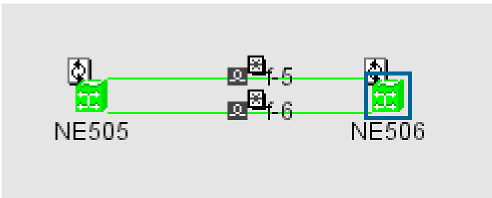
Step 4 Set **Revertive Mode** and **Switching Mode** according to the protection type and related requirements.

NOTE

When setting the parameters, note the following points:

- In the case of the M:N linear MS protection scheme, set the number of working links to **N**. **M** indicates the number of protection links and cannot be set manually. Currently, the value of **M** can be 1 only.
- **Revertive Mode** indicates the handling strategy that is used after the faulty line is recovered. **Non-Revertive**: The service is not automatically reverted to the working channel after the faulty line is recovered. **Revertive**: The service is automatically reverted to the working channel after the faulty line is recovered.
- **Switching Mode** indicates the switching strategy that is used after a fault occurs in the line. **Single-ended switching**: To protect services, a switching occurs at the receive end when the receive end is faulty and a switching occurs at the transmit end when the transmit end is faulty. **Dual-ended switching**: To protect services, a switching occurs at the receive and transmit ends when the receive end or transmit end is faulty.
- **Resource Sharing** indicates that a port is mapped into multiple protection subnets. When multiple protection subnets occupy the same port of a board, **Resource Sharing** must be selected. When different protection subnets occupy different ports of a board, **Resource Sharing** is not required.
- **Assigned by VC4** indicates that different VC-4s belong to different protection subnets to achieve virtual optical path protection.

Step 5 Select the nodes that belong to the protection subnet that needs to be created. Double-click the selected NE in the Main Topology to add the NE to the NE list on the left. In addition,  is displayed on the NE icon. If you need to cancel the selection, double-click the NE again.



Step 6 Click **Next** to display the **Select Link** dialog box. Set **Physical Link Information** of **Working Link** and **Protection Link**.

Step 7 Click **Finish** to deliver the configuration data. Then, the **Operation Result** dialog box is displayed. Click **Close**.

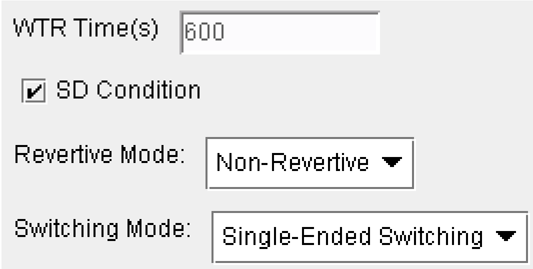
Step 8 Right-click the protection subnet and choose **Protection Subnet Attributes** from the shortcut menu.

Step 9 Click the **Protection Subnet Maintenance** tab to check whether the protocol controller is started.

NOTE

If the protocol controller is not started, select all the NEs of the protection subnet. Right-click and choose **Start/Stop Protocol** > **Start** from the shortcut menu. Click **Yes** in the dialog box that is displayed twice. Ensure that the status of all the values in the **Protocol Controller** column is **Protocol Started**.

Step 10 Click the **Protection Subnet Parameters** tab. Set **WTR time** and **SD Condition** according to the requirement. Click **Apply** to deliver the configuration data.



NOTE

The **WTR time** of all NEs in the same protection subnet should be the same.

----End

2.7 Configuring Clocks

A clock is the basis for the normal running of NEs. You must configure clocks for all NEs prior to configuring services. In addition, you need to configure clock protection for complex networks.

2.7.1 Configuring the NE Clock Source
Before configuring services, you must configure the NE clock source and specify the priority level to ensure that correct clock trace relations are created for all the NEs in the network.

2.7.2 Configuring the Clock Source Protection
In a complicated clock network, you need to configure the clock protection for all NEs. After you set the clock source and specify the clock priority level for the NEs, you can enable the standard SSM or extended SSM protocol to prevent the NEs from tracing an incorrect clock source. This is how the clocks are protected.

2.7.1 Configuring the NE Clock Source

Before configuring services, you must configure the NE clock source and specify the priority level to ensure that correct clock trace relations are created for all the NEs in the network.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Context

To implement clock protection, you must configure at least two traceable clock sources for the equipment. Usually, the tributary clock is not used as the clock source for the equipment.

After you set the clock sources for all the NEs, query the networkwide clock trace status again. For details, see **7.18 Viewing the Clock Trace Search**.

Procedure

Step 1 In the NE Explorer, select an NE and choose **Configuration** > **Clock** > **Clock Source Priority** from the Function Tree.

Clock Source	External Clock Source Mode	Synchronous Status Byte	
External Clock Source 1	2Mbit/s	SA4	-

Step 2 Click **Query** to query the existing clock source.

Step 3 Click **Create**. In the **Add Clock Source** dialog box, select a new clock source and click **OK**.

Step 4 Set **Lowest Traceable Clock Quality** of the clock source.

Step 5 **Optional:** If an external clock source is selected, select **External Clock Source Mode** according to the type of external clock signals. For 2 Mbit/s clocks, specify the **Synchronous Status Byte** to deliver SSM message.

Step 6 Select a clock source, and click  or  to adjust its priority level. The clock sources are arranged in the descending order. The clock source on top is the preferred one for the NE.

NOTE

Internal clock sources have the lowest priority because of their low precision.

Step 7 Click **Apply**. In the **Operation Result** dialog box, click **Close**.

NOTE

If the clock trace relation changes because of the clock source change, the **Prompt** dialog box is displayed, asking you whether to refresh the clock trace relation. Usually you can click **OK**. If you select **Disable Prompting Next Time**, the **Prompt** dialog box is not displayed even when the clock trace relation changes.

----End

2.7.2 Configuring the Clock Source Protection

In a complicated clock network, you need to configure the clock protection for all NEs. After you set the clock source and specify the clock priority level for the NEs, you can enable the standard SSM or extended SSM protocol to prevent the NEs from tracing an incorrect clock source. This is how the clocks are protected.

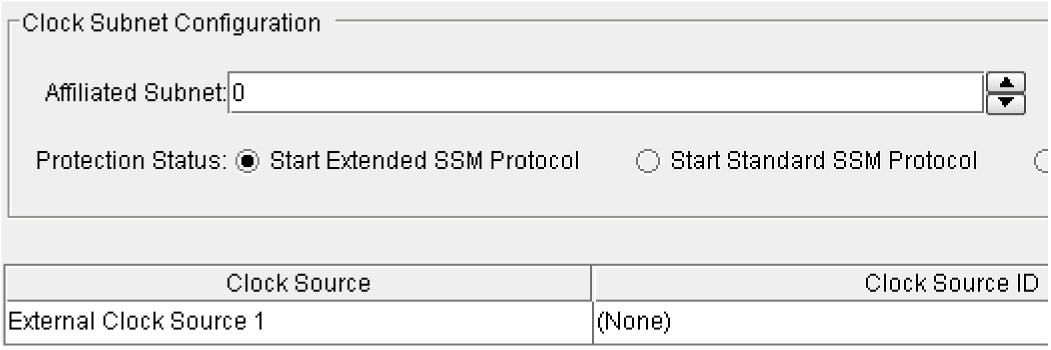
Prerequisite

You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select an NE and choose **Configuration** > **Clock** > **Clock Subnet Configuration** from the Function Tree.

Step 2 Click the **Clock Subnet** tab. Click **Query** to query the existing parameter settings.



Step 3 Select **Start Standard SSM Protocol** or **Start Extended SSM Protocol**.

NOTE

The same SSM protection protocol must be used within the same clock protection subnet.

Step 4 Set the subnet number of the clock subnet to which the NE is associated.

NOTE

Allocate the same subnet number to NEs tracing the same clock source.

Step 5 **Optional:** If the extended SSM protocol starts, set the clock ID of the clock source.

Step 6 Click **Apply**. In the **Operation Result** dialog box, click **Close**.

Step 7 **Optional:** If the clock ID is specified for the line clock of an NE, click the **Clock ID Status** tab, and set the **Enabled Status** to **Enabled**. Click **Apply**. In the **Operation Result** dialog box, click **Close**.

----End

2.8 Configuring Orderwire

You can configure orderwire for NEs by using the T2000.

2.8.1 Configuring the Orderwire
The orderwire provides a dedicated communication channel that the network maintenance personnel can use in the case of emergencies. You can configure the orderwire after configuring the NEs and boards on the T2000.

2.8.2 Configuring the Conference Calls
The conference calls ensure one or more dedicated communication channels that the network maintenance personnel can use in the case of emergencies.

2.8.1 Configuring the Orderwire

The orderwire provides a dedicated communication channel that the network maintenance personnel can use in the case of emergencies. You can configure the orderwire after configuring the NEs and boards on the T2000.

Prerequisite

You must be an NM user with "network operator" authority or higher.

Procedure

Step 1 In the NE Explorer, click the NE, and then choose **Configuration** > **Orderwire** from the Function Tree. Click the **General** tab.

Step 2 Click **Query** to query the related NE-side information.

Step 3 Set **Call Waiting Time(s)**, **Telephone No.** and the orderwire ports.

NOTE

- **Call Waiting Time** should be set to the same value for all NEs that are involved in the orderwire communication. When the number of NEs is less than 30, set **Call Waiting Time** to 5s. Otherwise, set **Call Waiting Time** to 9s.
- The orderwire phone numbers must be unique to each other in the same orderwire subnet.
- Set the length of the telephone number according to the actual requirements. The maximum length is eight digits and the minimum length is three digits. In the same orderwire subnet, the number lengths of the orderwire phone numbers must be the same.
- The length of the telephone number must be the same as the length of the conference call number.
- If the length of the subnet number is 1, the first digits of the two orderwire numbers must be the same. If the length of the subnet number is 2, the first two digits of the two orderwire numbers must be the same.

Step 4 Click **Apply**. A dialog box is displayed, indicating that the operation is successful.

Step 5 Click **Close**.

----End

2.8.2 Configuring the Conference Calls

The conference calls ensure one or more dedicated communication channels that the network maintenance personnel can use in the case of emergencies.

Prerequisite

You must be an NM user with "network operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select the NE, and then choose **Configuration** > **Orderwire** from the Function Tree. Click the **Conference Call** tab.

Step 2 Click **Query** to query the conference call configuration of the NE.

Step 3 In the **Available Conference Call Port** pane, select the port where you need to configure a conference call, and click >>.

NOTE

If the optical interfaces that support conference calls form a loop, howler tone is generated. Hence, "releasing loop" is required, that is, only one optical port can be set for the conference calls on a certain node.

Step 4 Click **Apply**. A dialog box is displayed, indicating that the operation is successful.

Step 5 Click **Close**.

Step 6 Click the **General** tab. Set the **Conference Call** number.

NOTE

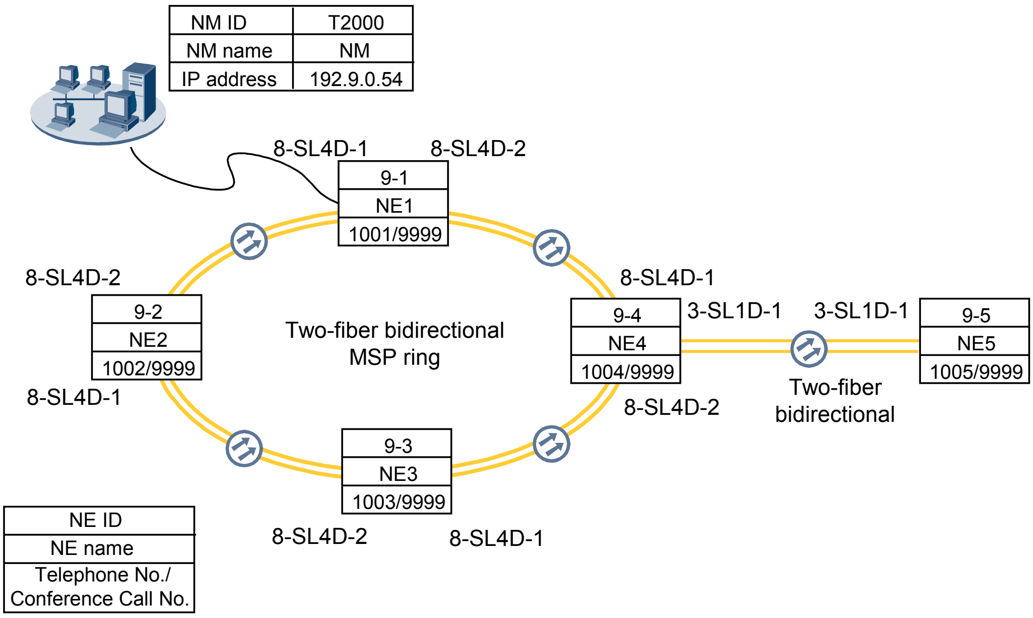
The conference call numbers for all the NEs must be the same, and must have the same length as the corresponding orderwire phone numbers. If the orderwire phone number has four digits, it is recommended that you set the conference call number to **9999**.

Step 7 Click **Apply**.

----End

Example

You can follow the sample configuration to prevent a conference call loop.



As shown in the preceding figure, if conference calls are configured for all optical interfaces, howler tone is generated. You can configure a conference call for the optical interface NE3-8-SL4D-2 only, instead of the optical interface NE3-8-SL4D-1.

3 Configuring SDH Services

About This Chapter

This topic uses an example to describe how to configure SDH services on the T2000.

Compared with the services on an MSP ring, the services on an SNCP ring have dedicated physical paths as the protection paths. In addition, the services on an SNCP ring are dually fed and selectively received. When you configure services on an SNCP ring, you need not configure the protection subnet and the services separately. When you configure services on an SNCP ring, however, you need to configure the working services and protection services separately.

To configure the services on the SNCP ring, you can directly configure the working service and protection service, without first configuring the protection subnet. To configure the services on the non-protection chain, you can configure the services only after the protection subnet is created.

Configure the protection subnet for the MSP, Protection Subnet for the non-protection chain, and services on the MSP ring with a non-protection chain separately. It is recommended that you configure the protection subnets before configuring the services on the MSP ring with a non-protection ring chain.

3.1 Basic Concepts

The following basic concepts help you understand and configure the relevant SDH services correctly.

Unidirectional Service

The unidirectional service indicates the service that is received and transmitted on different paths. A unidirectional service created between NE A and NE B can only be transmitted from NE A (source) to NE B (sink) or only be transmitted from NE B (sink) to NE A (source).

Bidirectional Service

The bidirectional service indicates the service that is received and transmitted on the same path. A bidirectional service created between NE A and NE B can be transmitted and received from NE A to NE B or from NE B to NE A.

MSP

The multiplex section protection (MSP) provides a function that switches the signals from the working section to the protection section.

Shared MSP Ring

As an SDH ring structure, the shared MSP protection ring provides the working and protection paths for each node in the ring network. When the service in the working path is abnormal or interrupted, the service is automatically switched to the protection path for further transmission. In this case, the service loss can be avoided.

Two-Fiber Shared MSP Ring

To form a two-fiber shared MSP ring, you need to use two fibers. In each fiber, one half of channels are used as working timeslots, and the other half of channels are used as protection timeslots. For example, in the case of an STM-4 service, VC-4s numbered 1 to 2 are used as working timeslots and VC-4s numbered 3 to 4 are used as protection timeslots. When VC-4s numbered 1 to 2 is abnormal or faulty, the service is switched to the corresponding protection timeslots 3 to 4 for further transmission.

SNCP Principle

The sub-network connection protection (SNCP) is defined by the ITU-T Recommendations. With 1+1 single-ended switching function, the SNCP is used for protecting services that travel across different subnets. The SNCP is characterized by the dual-fed and selective-receiving mode.

Principles for Generating SNCP Services

The SNCP is characterized by the dual-fed and selective receiving mode. Thus, to configure the SNCP service, you should configure the dual-fed service and the selective receiving service. On the T2000, the service can be automatically created. When the selective receiving service is configured on the T2000, the dual-fed service of the NE can be automatically created. Thus, you only need to configure the selective receiving service in actual service configuration. That is, if the SNCP service pair is configured, the service configuration of the SNCP is complete.

3.2 Configuring Services on the Non-Protection Chain

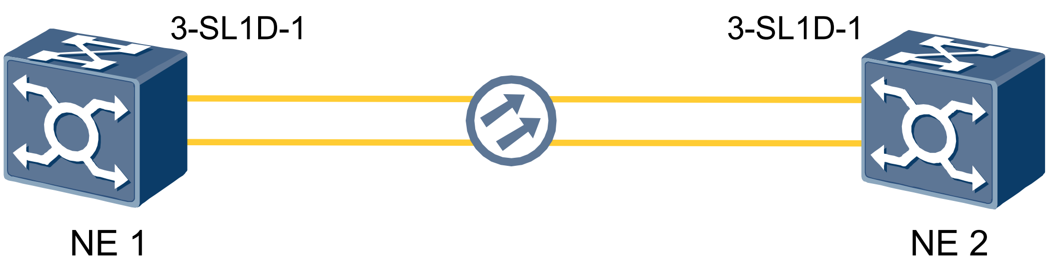
Configure the protection subnet and the services on the non-protection chain separately. It is recommended that you configure the protection subnet before configuring the services on the non-protection chain.

3.2.1 Networking Diagram

You can configure a non-protection chain if the services on the chain need not be protected. In this case, all the timeslots on the chain can carry services.

Figure 3-1 shows a point-to-point non-protection chain. In this example, the SP3D boards are configured on the source NE (NE1) and the sink NE (NE2) as tributary boards to add and drop services, and the SL1D boards are used as line boards to transmit SDH services.

Figure 3-1 Networking diagram of the non-protection chain

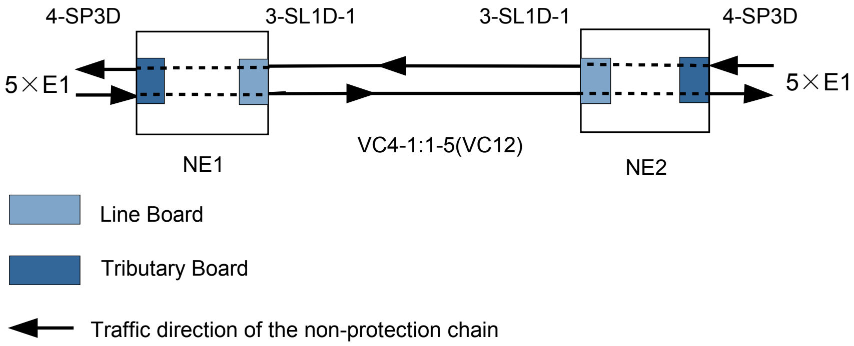


3.2.2 Signal Flow and Timeslot Allocation

To configure services on the non-protection chain, you need to plan the traffic direction and timeslot allocation for the services on the non-protection chain.

Figure 3-2 shows the signal flow and timeslot allocation. In this example, five E1 services are added to or dropped from NE1 and NE2.

Figure 3-2 Signal flow and timeslot allocation of the services on the non-protection chain



3.2.3 Configuration Process

The configuration of services on the non-protection chain is not related to the configuration of the protection subnet. To configure the services on the non-protection chain, configure the SDH services from the tributary board to the line board on the source and sink NEs if the protection subnet is already created.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see **2.6.1 Configuring a Non-Protection Chain**.
- You must be familiar with the information about **3.2.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure SDH services on the source NE (NE1).

1. Select NE1 in the NE Explorer, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click >>.
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**,

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received over the same path. That is, the services are **Bidirectional** services.

Parameter	Value in This Example	Description
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE1 is configured as the source tributary board. See **Figure 3-2**.
Source Timeslot Range (e.g.1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE2. Hence, the service source occupies VC-12s 1–5.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 of NE1 is configured as the sink line board. See **Figure 3-2**.
Sink VC4	VC4-1	The service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE 1 and NE2. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 2 Refer to **Step 1** and configure SDH services on the sink NE (NE2). Set the parameters as follows.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received over the same path. That is, the services are **Bidirectional** services.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE1 is configured as the source tributary board. See **Figure 3-2**.
Source Timeslot Range(e.g.1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE2. Hence, the service source occupies VC-12s 1–5.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 of NE1 is configured as the sink line board. See **Figure 3-2**.
Sink VC4	VC4-1	The service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g.1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE2. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 3 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and need to be deleted, see Deleting SDH Services.

3.3 Configuring Services on the Non-Protection Ring

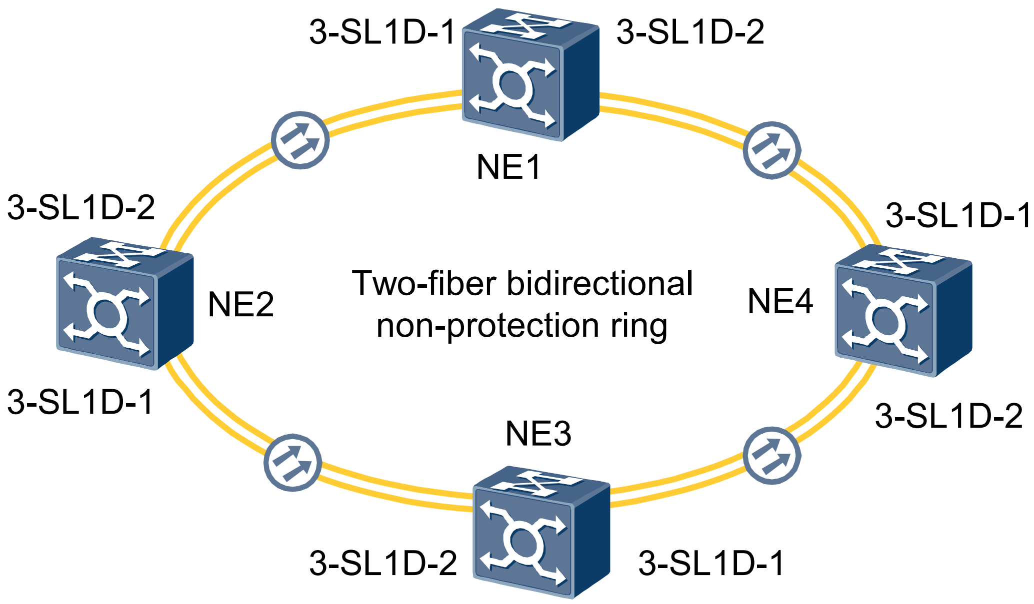
Configure the protection subnet and the services on the non-protection ring separately. It is recommended that you configure the protection subnet before configuring services on the non-protection ring.

3.3.1 Networking Diagram

You can configure a non-protection ring if the services on the ring need not be protected. In this case, all the timeslots on the ring can carry services.

Figure 3-3 shows a non-protection ring consisting of four pieces of equipment. In this example, the SP3D boards are used on the source NE (NE1) and the sink NE (NE3) as tributary boards to add and drop services, and the SL1D boards are used as line boards to transmit SDH services.

Figure 3-3 Networking diagram of the non-protection ring

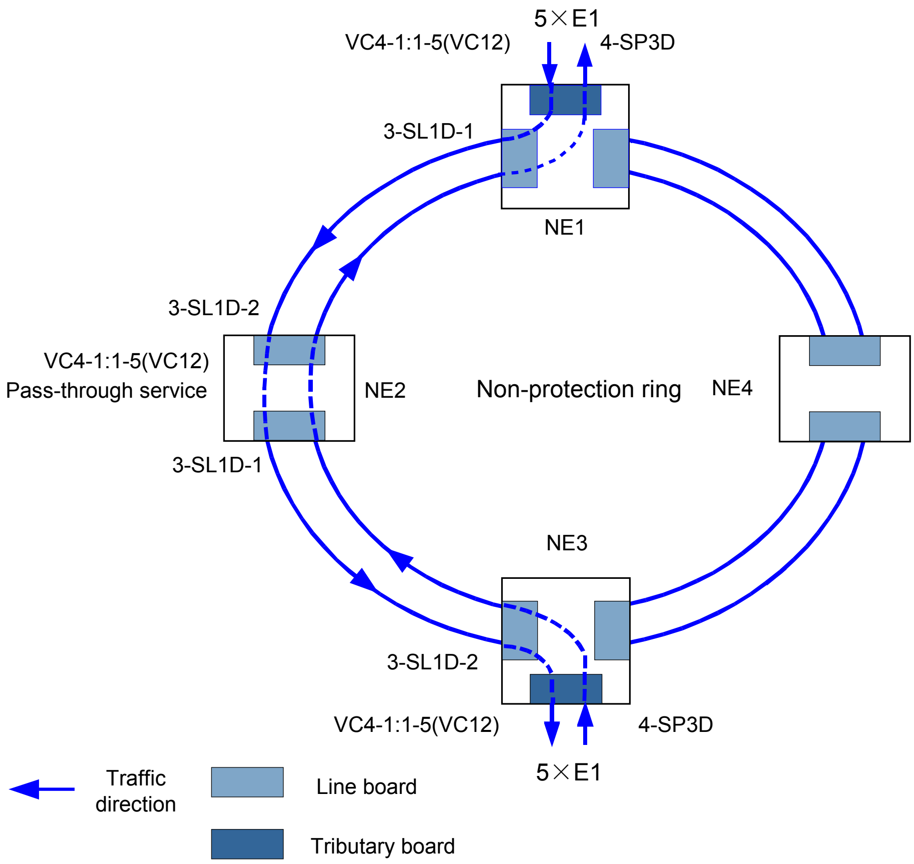


3.3.2 Signal Flow and Timeslot Allocation

To configure services on the non-protection ring, you need to plan the traffic direction and timeslot allocation for the services on the non-protection ring.

Figure 3-4 shows the signal flow and timeslot allocation. In this example, five E1 services are added to or dropped from NE1 and NE3, and they pass through NE2.

Figure 3-4 Signal flow and timeslot allocation of the services on the non-protection ring



3.3.3 Configuration Process

The configuration of the services on the non-protection ring is not related to the configuration of the protection subnet. To configure the services on the non-protection ring, configure the SDH services from the tributary board to the line board on the source and sink NEs and the pass-through services on the intermediate NEs if the protection subnet is already created.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see Configuring a Non-Protection Ring.
- You must be familiar with the information about **3.3.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure SDH services of the source NE (NE1).

1. Select NE1 in the NE Explorer, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click >>.
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received over the same path. That is, the services are **Bidirectional** services.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE1 is configured as the source tributary board. See **Figure 3-4**.
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE3. Hence, the service source occupies VC-12s 1–5.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 of NE1 is configured as the sink line board. See **Figure 3-4**.
Sink VC4	VC4-1	The timeslots where the service sink is located belong to the first VC-4 (VC4-1).
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE2. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 2 Configure SDH services on the sink NE (NE3). Refer to **Step 1**. Set the parameters as follows.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received over the same path. That is, the services are **Bidirectional** services.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE3 is configured as the source tributary board. See **Figure 3-4**.

Parameter	Value in This Example	Description
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE3. Hence, the service source occupies VC-12s 1–5.
Sink Slot	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 of NE2 is configured as the sink line board. See **Figure 3-4**.
Sink VC4	VC4-1	The service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE3. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 3 Configure pass-through services on NE2.

1. Select NE2 in the NE Explorer, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click .
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received over the same path. That is, the services are **Bidirectional** services.
Source Slot	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 of NE2 is configured as the source line board. See **Figure 3-4**.
Source VC4	VC4-1	The timeslots where the service source is located belong to the first VC-4 (VC4-1).
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE3. Hence, the service source occupies VC-12s 1–5.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 of NE2 is configured as the sink line board. See **Figure 3-4**.
Sink VC4	VC4-1	The service sink uses the timeslots of VC4-1.

Parameter	Value in This Example	Description
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE1 and NE3. Hence, the service source occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 4 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 5 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 6 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and need to be deleted, see Deleting SDH Services.

3.4 Configuring 1+1 Linear MSP Services

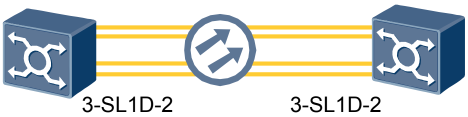
In the case of the 1+1 linear multiplex section protection (MSP), services are transmitted on the working path and protection path at the same time. The sink NE selects the services from the working path in normal cases, and selects services from the protection path when the working path becomes faulty.

3.4.1 Networking Diagram

The networking diagram of the point-to-point 1+1 linear MSP services is simple. Two NEs are connected with two pairs of optical fibers.

As shown in **Figure 3-5**, the SP3D boards are used on NE1 and NE2 as tributary boards to add and drop services, and the SL1D boards are used as line boards to transmit SDH services.

Figure 3-5 Networking diagram of the 1+1 linear MSP services



3.4.2 Signal Flow and Timeslot Allocation

To configure the 1+1 linear MSP services, you can configure the services that need to be added to the source NE and dropped from the sink NE if the 1+1 linear MSP is already created.

As shown in **Figure 3-6**, the signal flow and timeslot allocation are as follows:

- Traffic direction from NE1 to NE2: NE1→NE2

  Services are added to the source NE (NE1) and are transmitted from the working path and protection path at the same time. Then, the services are dropped from the sink NE (NE2), which selects the services from the working path.

- Traffic direction from NE2 to NE1: NE2→NE1

  Services are added to the source NE (NE2) and are transmitted on the working path and protection path at the same time. Then, the services are dropped from the sink NE (NE1), which selects the services from the working path.

- The services between NE 1 and NE2 occupy VC-12s 1–5 of VC4-1 (VC4-1:VC-12:1–5) on the SDH link between NE1 and NE2. The capacity of the services is 5xE1.

When the working path from NE1 to NE2 becomes faulty, in the case of single-ended switching, the signal flow is as follows:

- Traffic direction from NE1 to NE2: NE1→NE2

  Services are added to the source NE (NE1) and are transmitted on the working path and protection path at the same time. Then, the services are dropped from the sink NE (NE2), which selects the services from the protection path.

- The services from NE2 to NE1 are not affected, and the traffic direction is NE2→NE1.

  Services are added to the source NE (NE2) and are transmitted on the working path and protection path at the same time. Then, the services are dropped from the sink NE (NE1), which selects the services from the working path.

When the working path from NE1 to NE2 becomes faulty, in the case of dual-ended switching, the traffic flow is as follows:

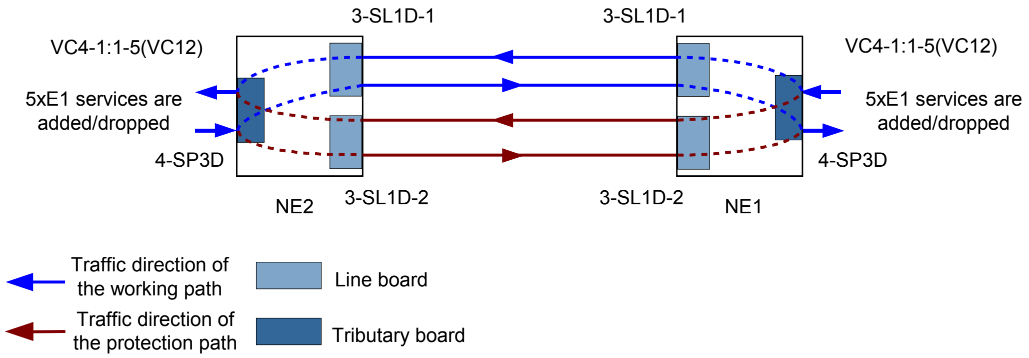
- Traffic direction from NE1 to NE2: NE1→NE2

  Services are added to the source NE (NE1) and are transmitted on the working path and protection path at the same time. Then, the services are dropped from the sink NE (NE2), which selects the services from the protection path.

- Traffic direction from NE2 to NE1: NE2→NE1

  Services are added from the source NE (NE2) and are transmitted on the working path and protection path at the same time. Then, the services are dropped from the sink NE (NE1), which selects the services from the protection path.

Figure 3-6 Signal flow and timeslot allocation of the 1+1 linear MSP services



3.4.3 Configuration Process

This topic describes how to configure the 1+1 linear MSP services.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see Creating a Linear MS Protection Subnet.
- You must be familiar with the information about **3.4.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure SDH services on the source NE (NE1).

1. In the NE Explorer, select NE1 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click [>>].
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectiona l	In this example, services are transmitted and received over the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.

Parameter	Value in This Example	Description
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the source tributary board for the bidirectional services from NE1 to NE2. See **Figure 3-6**.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the service is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the sink line board. See **Figure 3-6**.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

Step 2 Configure SDH services on the sink NE (NE2).

Click , and select NE2 from the displayed **NE Navigator**. Click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received over the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.
Source Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the source line board. See **Figure 3-6**.
Source VC4	VC4-1	In this example, the service requires five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.

Parameter	Value in This Example	Description
Sink Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the sink tributary board for the bidirectional services from NE1 to NE2. See **Figure 3-6**.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

Step 3 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

3.5 Configuring 1:1 Linear MSP Services

In the case of the 1:1 linear MSP, services are transmitted on the working path and the sink NE receives the services from the working path in normal cases. When the working path becomes faulty, the services are switched to the protection path for transmission and the sink NE receives the services from the protection path.

3.5.1 Networking Diagram
The networking diagram of the point-to-point 1:1 linear MSP services is simple. Two NEs are connected with two pairs of optical fibers.

3.5.2 Signal Flow and Timeslot Allocation
To configure the 1:1 linear MSP service, you can configure the services that need to be added to the source NE and dropped from the sink NE if the 1:1 linear MSP is already created.

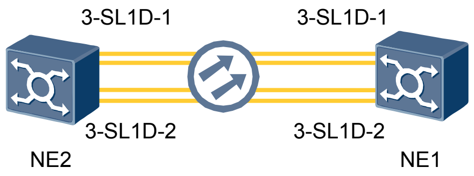
3.5.3 Configuration Process
This topic describes how to configure the 1+1 linear MSP services.

3.5.1 Networking Diagram

The networking diagram of the point-to-point 1:1 linear MSP services is simple. Two NEs are connected with two pairs of optical fibers.

As shown in **Figure 3-7**, the SP3D boards are used on NE1 and NE2 as tributary boards to add and drop services, and the SL1D boards are used on NE1 and NE2 as line boards to transmit SDH services.

Figure 3-7 Networking diagram of the 1:1 linear MSP services



3.5.2 Signal Flow and Timeslot Allocation

To configure the 1:1 linear MSP service, you can configure the services that need to be added to the source NE and dropped from the sink NE if the 1:1 linear MSP is already created.

As shown in **Figure 3-8**, the signal flow and timeslot allocation are as follows:

- Traffic direction from NE1 to NE2: NE1→NE2

  Services are added to the source NE (NE1) and then are dropped from the sink NE (NE2). The services are transmitted on the working path.
- Traffic direction from NE2 to NE1: NE2→NE1

  Services are added to the source NE (NE2) and then are dropped from the sink NE (NE1). The services are transmitted on the working path.
- The services between NE1 and NE2 occupy VC-12s 1–5 of VC4-1 (VC4-1:VC-12:1–5) on the SDH link between NE1 and NE2. The capacity of the services is 5xE1.

When the working path between NE1 and NE2 becomes faulty, the signal flow is as follows:

- Traffic direction from NE1 to NE2: NE1→NE2

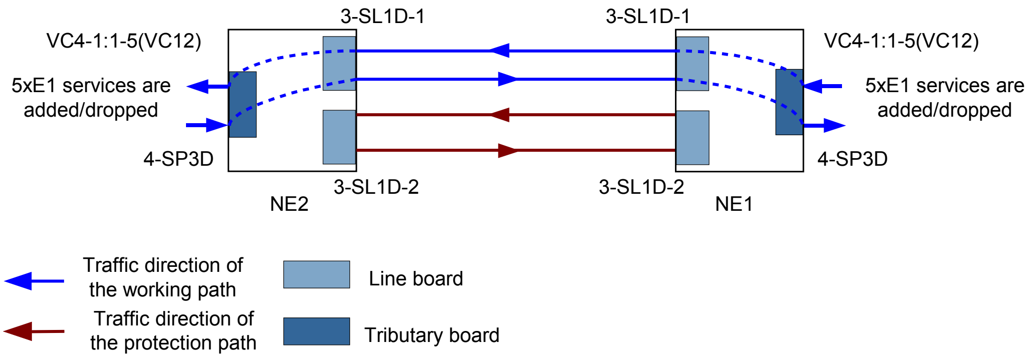
  Services are added to the source NE (NE1) and then are dropped from the sink NE (NE2). The services are transmitted on the protection path.
- Traffic direction from NE2 to NE1: NE2→NE1

  Services are added to the source NE (NE2) and then are dropped from the sink NE (NE1). The services are transmitted on the protection path.

The difference between the 1:1 linear MSP service and the 1+1 linear MSP service is as follows:

- In the case of the 1+1 linear MSP service, services are transmitted on the working path and protection path at the same time. The sink NE selects the services from the working path.
- In the case of the 1:1 linear MSP service, services are transmitted only on the working path. Services are switched to the protection path for transmission only when the working path becomes faulty.

Figure 3-8 Signal flow and timeslot allocation of the 1:1 linear MSP services



3.5.3 Configuration Process

This topic describes how to configure the 1+1 linear MSP services.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see Creating a Linear MS Protection Subnet.
- You must be familiar with the information about **3.5.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure SDH services on the source NE (NE1).

1. Select NE1 in the NE Explorer, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click .
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectiona l	In this example, services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the source tributary board for the bidirectional services from NE1 to NE2. See **Figure 3-8**.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the service is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the sink line board. See **Figure 3-8**.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.

Parameter	Value in This Example	Description
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

Step 2 Configure SDH services on the sink NE (NE2).

Click , and select NE2 from the displayed **NE Navigator**. Click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.
Source Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the source line board. See **Figure 3-8**.
Source VC4	VC4-1	In this example, the service requires five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the sink tributary board for the bidirectional services from NE1 to NE2. See **Figure 3-8**.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

Step 3 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

3.6 Configuring Two-Fiber Unidirectional MSP Services

The two-fiber unidirectional MSP services can provide network level protection for the services on NEs on the MSP ring. On the T2000, you can add all the NEs on the MSP ring into the protection subnet to create a two-fiber unidirectional MSP ring.

3.6.1 Networking Diagram
The networking diagram of a single two-fiber unidirectional MSP ring is simple. When you construct the network, follow a certain order to create and name these NEs and ensure that the traffic flows in a proper direction. This helps when you plan the traffic direction planning and service configuration in future.

3.6.2 Signal Flow and Timeslot Allocation
To configure the two-fiber unidirectional MSP service, you can configure the services that need to be added to the ring network on the source NE, to pass through the intermediate nodes, and to be dropped from the sink NE if the MSP protection subnet is already created.

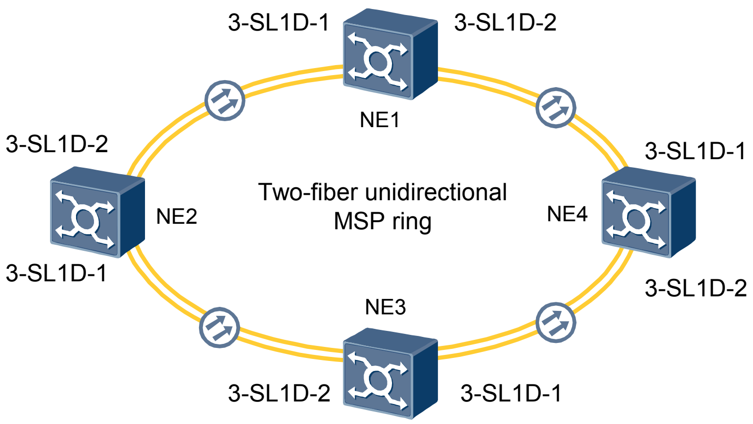
3.6.3 Configuration Process
This topic describes how to configure the two-fiber unidirectional MSP service.

3.6.1 Networking Diagram

The networking diagram of a single two-fiber unidirectional MSP ring is simple. When you construct the network, follow a certain order to create and name these NEs and ensure that the traffic flows in a proper direction. This helps when you plan the traffic direction planning and service configuration in future.

As shown in **Figure 3-9**, the SP3D boards are used on NE1 and NE3 as tributary boards to add and drop services, and the SL1D boards are used as line boards to transmit SDH services.

Figure 3-9 Networking diagram of the services on the two-fiber unidirectional MSP ring



3.6.2 Signal Flow and Timeslot Allocation

To configure the two-fiber unidirectional MSP service, you can configure the services that need to be added to the ring network on the source NE, to pass through the intermediate nodes, and to be dropped from the sink NE if the MSP protection subnet is already created.

As shown in **Figure 3-10**, the signal flow and timeslot allocation are as follows:

- Traffic direction from NE1 to NE3: NE1→NE2→NE3

  Services are added to the ring on the source NE (NE1), pass through NE2, and finally are dropped from the sink NE (NE3). The capacity of the services is 5xE1.

- Traffic direction from NE3 to NE1: NE3→NE4→NE1

  Services are added to the ring on the source NE (NE3), pass through NE4, and finally are dropped from the sink NE (NE1). The capacity of the services is 5xE1.

- VC-12s 1–5 of VC4-1 carry the five E1 services for transmission.

When the transmission path between NE1 and NE2 becomes faulty, the signal flow and timeslot allocation are as follows:

- Traffic direction from NE1 to NE3: NE1→NE4→NE3→NE2→NE3

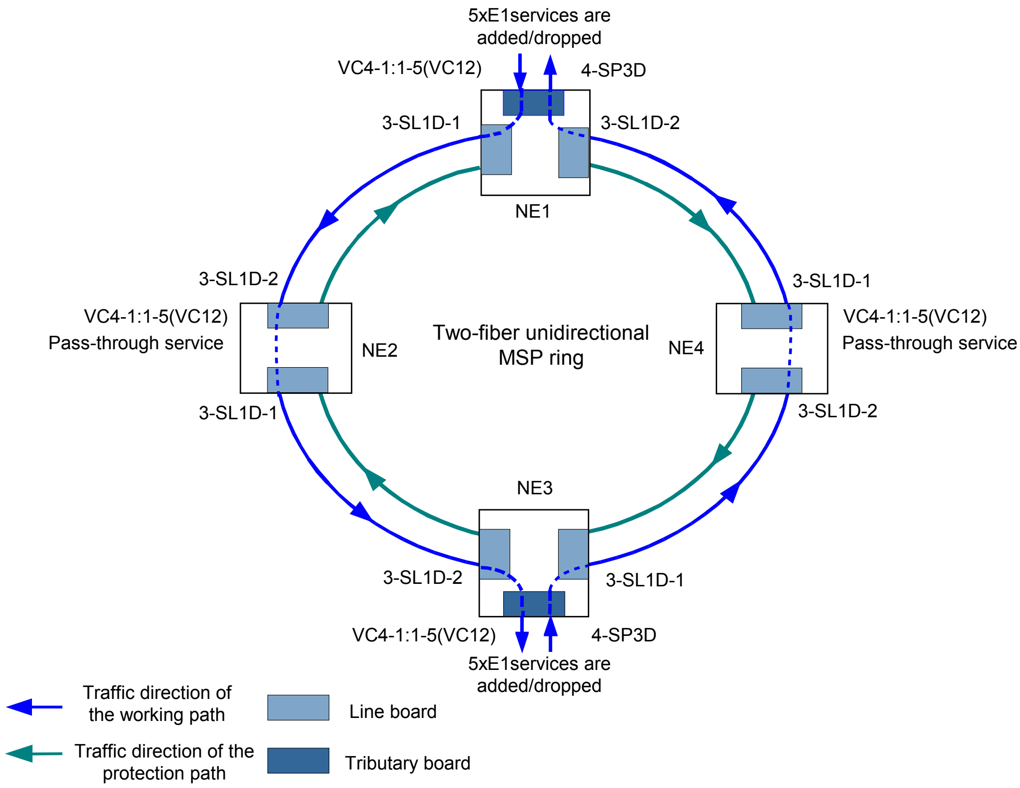
  Services are added to the ring on the source NE (NE1) and switched from the original working path to the protection path. Then, the services pass through NE4 and NE3. After that, the services are switched from the protection path to the working path on NE2. Finally, the services are dropped from NE3.

- The services from NE3 to NE1 are not affected, and the traffic direction is NE3→NE4→NE1.

The difference between the two-fiber unidirectional MSP service and the two-fiber bidirectional MSP service is as follows:

- The two-fiber unidirectional MSP service uses the diverse routes, whereas the two-fiber bidirectional MSP service uses the uniform route.
- In the case of the two-fiber unidirectional MSP service, different optical fibers are used for the working timeslot and protection timeslot. That is, one optical fiber is used for carrying the working service, and the other optical fiber is used for protection. In the case of the two-fiber bidirectional MSP service, the same optical fiber is used for the working timeslot and protection timeslot. That is, a certain capacity of the optical fiber is used for carrying the working service, and a certain capacity of the optical fiber is used for protection.

Figure 3-10 Signal flow and timeslot allocation of the two-fiber unidirectional MSP services



3.6.3 Configuration Process

This topic describes how to configure the two-fiber unidirectional MSP service.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see Creating an MS Ring Protection Subnet.
- You must be familiar with the information about **3.6.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure unidirectional services from NE1 to NE3.

1. Configure SDH services on the source NE (NE1).
   - In the NE Explorer, select NE1 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click >>.
   - Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Unidirectional	In this example, the services are transmitted and received on different paths. That is, the services are unidirectional services. Hence, **Direction** of the services is set to **Unidirectional**.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the source tributary board for the unidirectional services from NE1 to NE2. See **Figure 3-10**.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the sink line board. See **Figure 3-10**.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

2. Configure unidirectional pass-through services on NE2.

Click , and select NE2 from the displayed **NE Navigator**. Click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Unidirectional	In this example, the services are transmitted and received on different paths. That is, the services are unidirectional services. Hence, **Direction** of the services is set to **Unidirectional**.

Parameter	Value in This Example	Description
Source Slot	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 is configured as the source line board. See **Figure 3-10**. You can select different source boards depending on the actual situation.
Source VC4	VC4-1	In this example, the services require five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the sink line board. See **Figure 3-10**.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

3. Configure SDH services on the sink NE (NE3).

   Click , and select NE2 from the displayed **NE Navigator**. Click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Unidirectional	In this example, the services are transmitted and received on different paths. That is, the services are unidirectional services. Hence, **Direction** of the services is set to **Unidirectional**.
Source Slot	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 is configured as the source line board. See **Figure 3-10**.
Source VC4	VC4-1	In this example, the services require five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.

Parameter	Value in This Example	Description
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the sink tributary board for the unidirectional services from NE1 to NE3. See **Figure 3-10**.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the planning. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

Step 2 Configure unidirectional services from NE3 to NE1.

To configure unidirectional services from NE3 to NE1, refer to **Step 1**.

1. Configure SDH services on the source NE (NE3).

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Unidirectional	In this example, the services are transmitted and received on different paths. That is, the services are unidirectional services. Hence, **Direction** of the services is set to **Unidirectional**.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the source tributary board for the unidirectional services from NE3 to NE1. See **Figure 3-10**.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the sink line board. See **Figure 3-10**.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.

Parameter	Value in This Example	Description
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

2. Configure unidirectional pass-through services on NE4.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Unidirection al	In this example, the services are transmitted and received on different paths. That is, the services are unidirectional services. Hence, **Direction** of the services is set to **Unidirectional**.
Source Slot	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 is configured as the source line board. See **Figure 3-10**.
Source VC4	VC4-1	In this example, the services require five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to**1-5**.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the sink line board. See **Figure 3-10**.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

3. Configure SDH services on the sink NE (NE1).

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Unidirectional	In this example, the services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.
Source Slot	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 is configured as the source line board. See **Figure 3-10**.
Source VC4	VC4-1	In this example, the service requires five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Source Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Sink VC4	4-SP3D	In this example, the SP3D board in slot 4 is configured as the sink tributary board for the unidirectional services from NE3 to NE1. See **Figure 3-10**.
Sink Timeslot Range(e.g. 1,3-6)	1-5	The total capacity of the services is 5xE1 according to the plan. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**.
Activate Immediately	Yes	-

Step 3 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

3.7 Configuring the Two-Fiber Bidirectional MSP Services

To configure the two-fiber bidirectional MSP services, you need to create the MSP subnet protection and MSP services separately. There is no requirement for the configuration sequence.

3.7.1 Networking Diagram

The networking diagram of a single two-fiber bidirectional MSP ring is simple. When you construct the network, follow a certain order to create and name the NEs and ensure that the traffic flows in a proper direction. This helps when you plan the traffic directions and configure services in future.

3.7.2 Signal Flow and Timeslot Allocation
To configure the two-fiber bidirectional MSP service on a ring network, configure the services that need to be added to the ring network on the source NE, to pass through the intermediate nodes, and to be dropped from the sink NE, if the MSP protection subnet is already created. In the case of the ring network, more than one route is available from the source NE to the sink NE. In actual application scenarios, not all the routes need to be configured. Hence, you need to properly plan and configure the service directions and timeslots before the configuration.

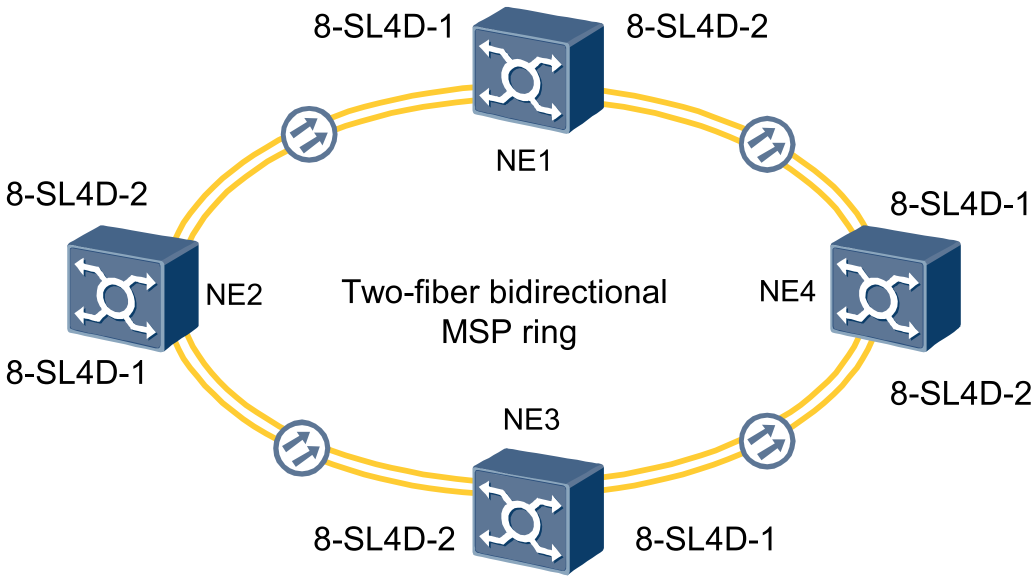
3.7.3 Configuration Process
The configuration of the two-fiber bidirectional MSP services is independent of the configuration of the protection subnet. To configure the two-fiber bidirectional MSP service, if the protection subnet is configured, configure the SDH services from the tributary board to the line board on the source and sink NEs and configure the pass-through services on the intermediate NEs.

3.7.1 Networking Diagram

The networking diagram of a single two-fiber bidirectional MSP ring is simple. When you construct the network, follow a certain order to create and name the NEs and ensure that the traffic flows in a proper direction. This helps when you plan the traffic directions and configure services in future.

Figure 3-11 shows the networking of the two-fiber bidirectional MSP ring that comprises four pieces of OptiX OSN 500 equipment. In this example, the SP3D boards are configured on the source NE (NE1) and the sink NE (NE3) as tributary boards to add and drop services, and the SL4D boards are used as line boards to transmit SDH services.

Figure 3-11 Networking diagram of the services on the two-fiber bidirectional MSP ring

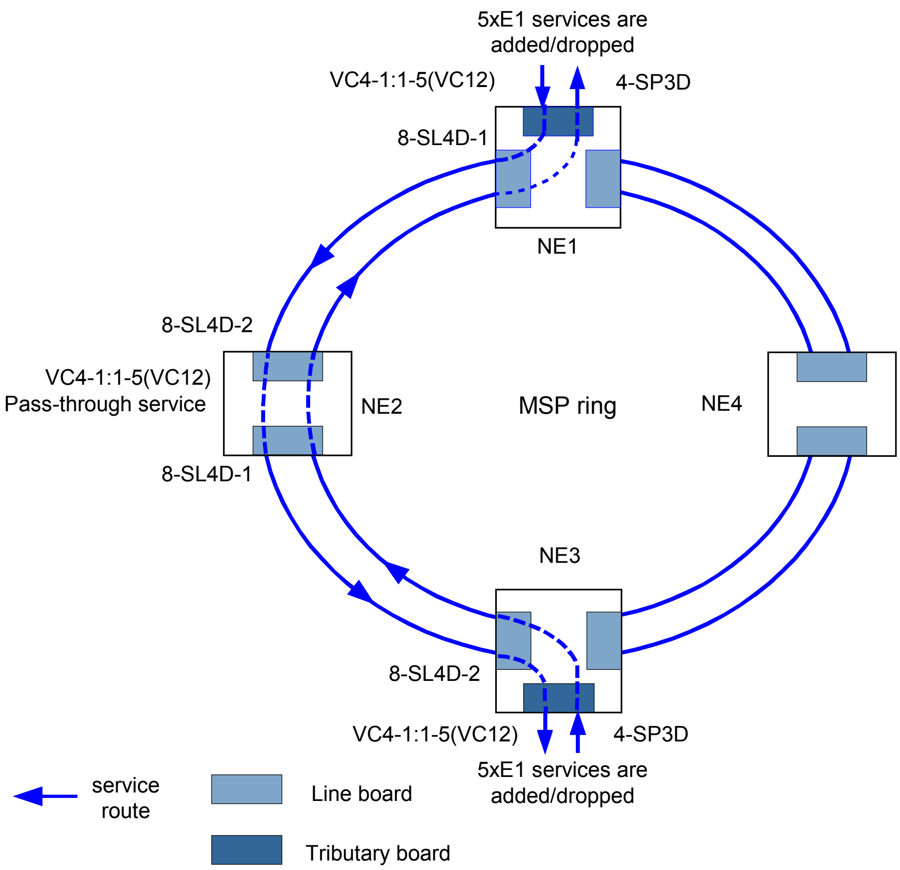


3.7.2 Signal Flow and Timeslot Allocation

To configure the two-fiber bidirectional MSP service on a ring network, configure the services that need to be added to the ring network on the source NE, to pass through the intermediate nodes, and to be dropped from the sink NE, if the MSP protection subnet is already created. In the case of the ring network, more than one route is available from the source NE to the sink NE. In actual application scenarios, not all the routes need to be configured. Hence, you need to properly plan and configure the service directions and timeslots before the configuration.

Figure 3-12 shows the service signal flow and timeslot allocation. In this example, five E1 services are configured so that the services enter the ring network from NE1, pass through NE2, and then are dropped on the sink NE (NE3).

Figure 3-12 Signal flow and timeslot allocation



3.7.3 Configuration Process

The configuration of the two-fiber bidirectional MSP services is independent of the configuration of the protection subnet. To configure the two-fiber bidirectional MSP service, if the protection subnet is configured, configure the SDH services from the tributary board to the line board on the source and sink NEs and configure the pass-through services on the intermediate NEs.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.

- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see Creating an MS Ring Protection Subnet.
- You must be familiar with **3.7.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure the SDH services of the source NE (NE1).

1. In the NE Explorer, select NE1, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click .
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectiona l	In this example, the services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the source tributary board. See **Figure 3-12**. You can select different source boards depending on the actual situation.
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-12**.
Sink Slot	8-SL4D-1 (SDH-1)	In this example, the SL4D board in slot 8 is configured as the sink line board. See **Figure 3-12**. You can select different sink boards depending on the actual situation.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-12**.
Activate Immediately	Yes	-

Step 2 Configure the SDH services of the sink NE (NE3). Refer to **Step 1** and configure the SDH services of NE3. Set the parameters as follows.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.
Source Slot	8-SL4D-2 (SDH-2)	In this example, the SL4D board in slot 8 is configured as the source line board. See **Figure 3-12**. You can select different source boards depending on the actual situation.
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-12**.
Sink Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the sink tributary board. See **Figure 3-12**. You can select different sink boards depending on the actual situation.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-12**.
Activate Immediately	Yes	-

Step 3 Configure the pass-through services of NE2.

1. In the NE Explorer, select NE2 and then choose **Communication** > **SDH Service Configuration** from the Function Tree. Click .
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.

Parameter	Value in This Example	Description
Source Slot	8-SL4D-2 (SDH-2)	In this example, the SL4D board in slot 8 is configured as the source line board. See **Figure 3-12**. You can select different source boards depending on the actual situation.
Source VC4	VC4-1	In this example, the services require five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-12**.
Sink Slot	8-SL4D-1 (SDH-1)	In this example, the SL4D board in slot 8 is configured as the sink line board. See **Figure 3-12**. You can select different sink boards depending on the actual situation.
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-12**.
Activate Immediately	Yes	-

Step 4 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 5 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 6 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see Deleting SDH Services.

3.8 Configuring Services on the SNCP Ring

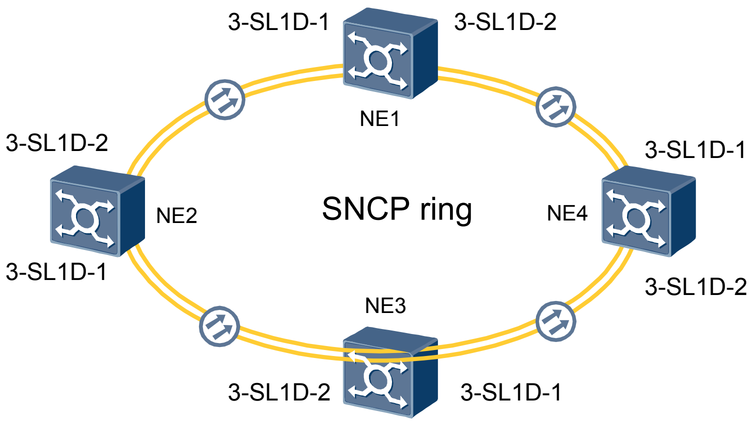
Compared with the services on an MSP ring, the services on an SNCP ring have dedicated physical paths as the protection paths. In addition, the services on an SNCP ring are dually fed and selectively received. When you configure services on an SNCP ring, you need not configure the protection subnet and the services separately. When you configure services on an SNCP ring, however, you need to configure the working services and protection services separately.

3.8.1 Networking Diagram

The creation of an SNCP ring network is similar to the creation of an MSP ring network. For example, the MSP and SNCP rings are constructed based on two fibers and their services must pass through the intermediate nodes for transmission from the source NE to the sink NE. The difference is that the SNCP protection and SNCP services can be created on the T2000 at a time.

Figure 3-13 shows an SNCP ring that comprises four pieces of MSTP equipment. In this example, the SP3D boards are configured on the source NE (NE1) and the sink NE (NE3) as tributary boards to add and drop services, and the SL1D boards are used as line boards to transmit SDH services.

Figure 3-13 Networking diagram of the services on the SNCP ring

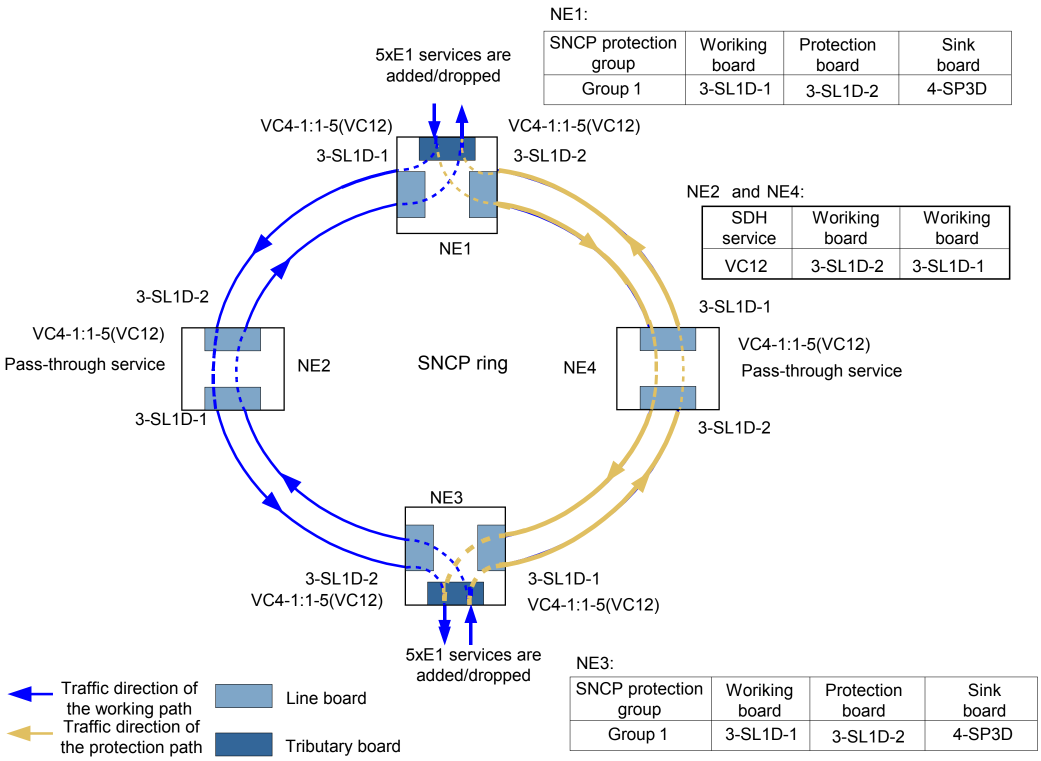


3.8.2 Signal Flow and Timeslot Allocation

Similar to the service configuration of an MSP ring, you need to plan proper traffic directions before configuring the services on an SNCP ring, if multiple service routes are available from the source end to the sink end. In the case of the services on the SNCP ring, allocate timeslots for the source slot of the working service and timeslots for the source slot of the protection service, when allocating timeslots for source slots.

Figure 3-14 shows the signal flow of the services on the SNCP ring and the timeslot allocation to the services on the SNCP ring. In the actual configuration, you can plan other proper working paths and protection paths according to the requirement. In this example, the working service route is NE1-NE2-NE3 and the protection service route is NE1-NE4-NE3. There are five E1 services.

Figure 3-14 Signal flow and timeslot allocation



3.8.3 Configuration Process

The SNCP protection and the services on the SNCP ring are configured on the T2000 at a time. To configure the SNCP services on the source and sink NEs, you need to determine the source boards and timeslots for the working service and protection service. In addition, you need to configure the pass-through service on the intermediate nodes.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- You must be familiar with **3.8.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure the SDH services of the source NE (NE1).

1. In the NE Explorer, select NE1, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click >>.
2. Click **Create** on the lower-right pane to display the **Create SNCP Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Service Type	SNCP	In this example, **Service Type** adopts the default value, namely, **SNCP**.
Level	VC12	In this example, E1 services are configured on the ring. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the services is set to **Bidirectional**.
Revertive Mode	Revertive	This parameter indicates whether the services are switched back after the faulty line is recovered, that is, whether the switching is revertive or non-revertive. In this example, **Revertive Mode** is set to **Revertive**.
Hold-off Time (100ms)	0	It is recommended that this parameter adopts the default value.
WTR Time (s)	600	After the working path is recovered to normal and the normal state lasts for 600s, the switching restoration occurs. This parameter is valid only when the **Revertive Mode** parameter is set to **Revertive**.
Source Slot of the Working Service	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the source line board of the working service. See Figure 3-14. You can select different source boards depending on the actual situation.
Source Timeslot Range of the Working Service	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Source Timeslot Range of the Working Service** is set to **1-5**. See Figure 3-14.
Source Slot of the Protection Service	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 is configured as the source board of the protection service. See Figure 3-14. You can select different source boards depending on the actual situation.
Source Timeslot Range of the Protection Service	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Source Timeslot Range of the Protection Service** is set to **1-5**. See Figure 3-14.

Parameter	Value in This Example	Description
Sink Slot	4-SP3D	In this example, the SP3D board in slot 4 is configured as the sink tributary board. See **Figure 3-14**. You can select different sink boards depending on the actual situation.
Sink Timeslot Range of the Working Service	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Source Timeslot Range of the Working Service** is set to **1-5**. See **Figure 3-14**.

Step 2 Configure the SDH services of the sink NE (NE3). Refer to **Step 1** and configure the SDH services of NE3. The method and parameters for configuring the SDH services of NE3 are the same as the method and parameters for configuring the SDH services of NE1.

Step 3 Configure the pass-through services of NE2.

1. In the NE Explorer, select NE2 and then choose **Communication** > **SDH Service Configuration** from the Function Tree. Click .
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured on the ring. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received on the same path. That is, the services are bidirectional services. Hence, **Direction** of the E1 services is set to **Bidirectional**.
Source Slot	3-SL1D-2 (SDH-2)	In this example, the SL1D board in slot 3 is configured as the source line board. See **Figure 3-14**. You can select different source boards depending on the actual situation.
Source VC4	VC4-1	In this example, the services require five VC-12s. **Source VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Source Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-14**.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 is configured as the sink line board. See **Figure 3-14**. You can select different sink boards depending on the actual situation.

Parameter	Value in This Example	Description
Sink VC4	VC4-1	In this example, the services require five VC-12s. **Sink VC4** is set to **VC4-1**, because a VC-4 contains 63 VC-12s.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, the total capacity of the services is 5xE1 according to the plan. The service level is **VC12**. Hence, **Sink Timeslot Range(e.g.1,3-6)** is set to **1-5**. See **Figure 3-14**.
Activate Immediately	Yes	-

Step 4 Configure the pass-through services of NE4. Refer to **Step 3** and configure the pass-through services of NE4. The method and parameters for configuring the pass-through services of NE4 are the same as the method and parameters for configuring the pass-through services of NE2.

Step 5 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 6 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 7 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see Deleting SDH Services.

3.9 Configuring Services on the SNCP Ring with a Non-Protection Chain

To configure the services on the SNCP ring, you can directly configure the working service and protection service, without first configuring the protection subnet. To configure the services on the non-protection chain, you can configure the services only after the protection subnet is created.

3.9.1 Networking Diagram
The networking of the SNCP ring in the case of configuring the services on the SNCP ring with a non-protection chain is similar to the networking in the case of configuring the services on the SNCP ring. The services from the SNCP ring to the non-protection chain pass through the intersecting node and are added to or dropped from the NE on the non-protection chain.

3.9.2 Signal Flow and Timeslot Allocation
To configure services on the SNCP ring with a non-protection chain, you need to plan proper traffic directions for the services on the SNCP ring and the services on the non-protection chain. In the case of the services on the SNCP ring, allocate timeslots for the source slot of the working

service and timeslots for the source slot of the protection service, when allocating timeslots for source slots.

3.9.3 Configuration Process
Before you configure the services on the SNCP ring with a non-protection chain, familiarize yourself with the information about the source slot, sink slot, and their corresponding timeslots of the working service and protection service on the source and sink NEs on the SNCP ring. You need to configure the pass-through services on the intersecting NE.

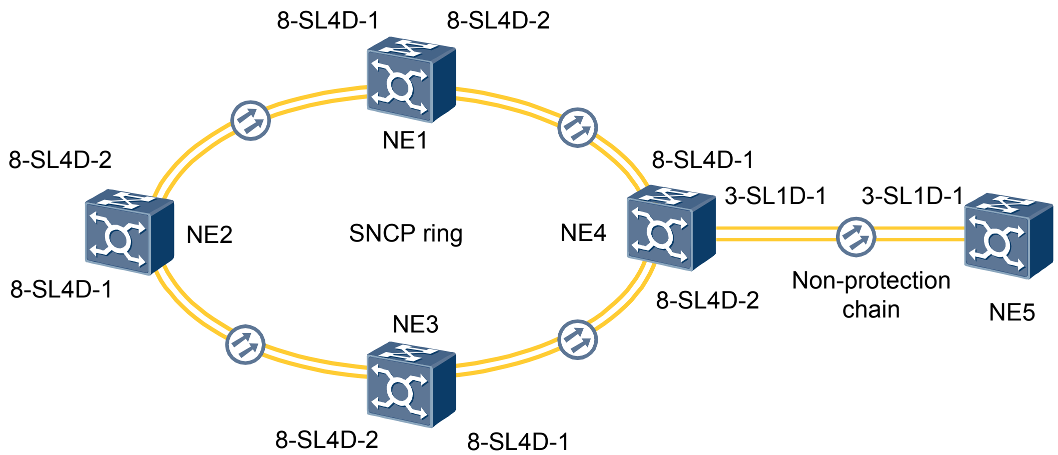
3.9.1 Networking Diagram

The networking of the SNCP ring in the case of configuring the services on the SNCP ring with a non-protection chain is similar to the networking in the case of configuring the services on the SNCP ring. The services from the SNCP ring to the non-protection chain pass through the intersecting node and are added to or dropped from the NE on the non-protection chain.

Figure 3-15 shows the networking diagram of the SNCP ring with a non-protection chain. The SNCP ring comprises five pieces of equipment.

In this example, 5xE1 services are configured between NE3 and NE5. The SP3D boards are configured on the source NE (NE3) and the sink NE (NE5) as tributary boards to add and drop services. The SL4D and SL1D boards are used as the line boards for transmitting SDH services.

Figure 3-15 Networking diagram of the services on the SNCP ring with a non-protection chain



3.9.2 Signal Flow and Timeslot Allocation

To configure services on the SNCP ring with a non-protection chain, you need to plan proper traffic directions for the services on the SNCP ring and the services on the non-protection chain. In the case of the services on the SNCP ring, allocate timeslots for the source slot of the working service and timeslots for the source slot of the protection service, when allocating timeslots for source slots.

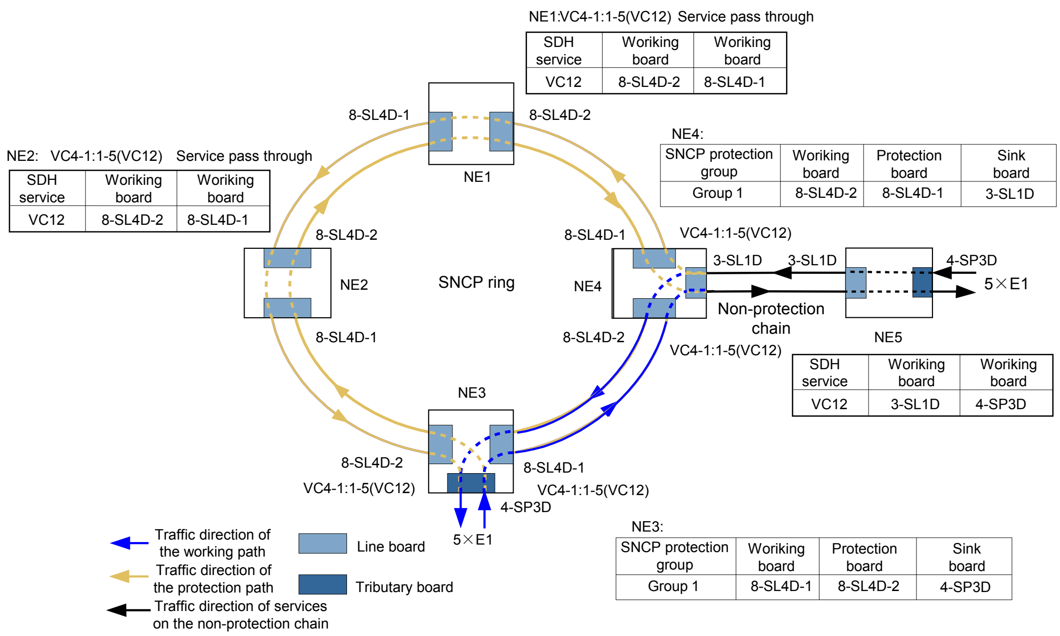
Figure 3-16 shows the signal flow of the services on the SNCP ring with a non-protection chain and the timeslot allocation to the services on the SNCP ring with a non-protection chain . In this example, five E1 services are configured between NE3 and NE5.

In this example, the traffic direction of the services on the SNCP ring, is configured as follows:

- Traffic direction of the working service between NE3 and NE4: NE3-NE4
- Traffic direction of the protection service between NE3 and NE4: NE3-NE2-NE1-NE4

In the actual configuration, you can plan other proper working paths and protection paths according to the requirement.

Figure 3-16 Signal flow and timeslot allocation



3.9.3 Configuration Process

Before you configure the services on the SNCP ring with a non-protection chain, familiarize yourself with the information about the source slot, sink slot, and their corresponding timeslots of the working service and protection service on the source and sink NEs on the SNCP ring. You need to configure the pass-through services on the intersecting NE.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see **2.6.1 Configuring a Non-Protection Chain**.
- You must be familiar with **3.9.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure the SDH services of the source NE (NE3).

1. In the NE Explorer, select NE3, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click >>.

2. Click **Create** on the lower-right pane to display the **Create SNCP Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter		Value in This Example	Description
Service Type		SNCP	In this example, **Service Type** is set to **SNCP**.
Level		VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Revertive Mode		Revertive	When an NE is in the switching state, the NE is restored from the switching state to the normal state some time after the working path is recovered to normal.
Direction		Bidirectional	In this example, the cross-connections are configured in the SNCP receive direction and in the SNCP transmit direction.
Hold-off Time (100ms)		0	It is recommended that this parameter adopts the default value.
WTR Time(s)		600	After the working path is recovered to normal and the normal state lasts for 600s, the switching restoration occurs. This parameter is valid only when the **Revertive Mode** parameter is set to **Revertive**.
Working Service	Source Slot	8-SL4D-1 (SDH-1)	In this example, the SL4D board in slot 8 of NE3 is configured as the source line board of the working service. See **Figure 3-16**.
	Source VC4	VC4-1	In this example, the working service source uses the timeslots of VC4-1.
	Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the working service source occupies VC-12s 1–5.
	Sink Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE3 is configured as the sink line board of the working service. See **Figure 3-16**.
	Sink VC4	-	-
	Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the working service source occupies VC-12s 1–5.
Protection Service	Source Slot	8-SL4D-2 (SDH-2)	In this example, the SL4D board in slot 8 of NE3 is configured as the source line board of the protection service. See **Figure 3-16**.

Parameter		Value in This Example	Description
	Source VC4	VC4-1	In this example, the protection service source uses the timeslots of VC4-1.
	Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the protection service source occupies VC-12s 1–5.

Step 2 Configure the SDH services of the sink NE (NE4).

1. In the NE Explorer, click , and then select NE4. Click **OK**.
2. Choose **Configuration** > **SDH Service Configuration** from the Function Tree and click .
3. Click **Create** on the lower-right pane to display the **Create SNCP Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter		Value in This Example	Description
Service Type		SNCP	In this example, **Service Type** is set to **SNCP**.
Level		VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Revertive Mode		Revertive	When an NE is in the switching state, the NE is restored from the switching state to the normal state some time after the working path is recovered to normal.
Direction		Bidirectional	In this example, the cross-connections are configured in the SNCP receive direction and in the SNCP transmit direction.
Hold-off Time (100ms)		0	It is recommended that this parameter adopts the default value.
WTR Time(s)		600	After the working path is recovered to normal and the normal state lasts for 600s, the switching restoration occurs. This parameter is valid only when the **Revertive Mode** parameter is set to **Revertive**.
Working Service	Source Slot	8-SL4D-2 (SDH-2)	In this example, the SL4D board in slot 8 of NE4 is configured as the source line board of the working service. See **Figure 3-16**.
	Source VC4	VC4-1	In this example, the working service source uses the timeslots of VC4-1.

Parameter		Value in This Example	Description
	Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the working service source occupies VC-12s 1–5.
	Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 of NE4 is configured as the sink line board of the working service. See **Figure 3-16**.
	Sink VC4	VC4-1	In this example, the working service sink uses the timeslots of VC4-1.
	Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the working service sink occupies VC-12s 1–5.
Protection Service	Source Slot	8-SL4D-1 (SDH-1)	In this example, the SL4D board in slot 8 of NE3 is configured as the source line board of the protection service. See **Figure 3-16**.
	Source VC4	VC4-1	In this example, the protection service source uses the timeslots of VC4-1.
	Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the protection service source occupies VC-12s 1–5.

Step 3 Configure the pass-through services of NE2.

1. In the NE Explorer, click , and then select NE2. Click **OK**.
2. Choose **Configuration** > **SDH Service Configuration** from the Function Tree and click .
3. Click **Create** on the lower-right pane to display the **Create SNCP Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, **Direction** of the service is set to **Bidirectional**.
Source Slot	8-SL4D-2 (SDH-2)	In this example, the SL4D board in slot 8 of NE2 is configured as the source line board. See **Figure 3-16**.

Parameter	Value in This Example	Description
Source VC4	VC4-1	In this example, the working service source uses the timeslots of VC4-1.
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the working service source occupies VC-12s 1–5.
Sink Slot	8-SL4D-1 (SDH-1)	In this example, the SL4D board in slot 8 of NE2 is configured as the sink line board. See **Figure 3-16**.
Sink VC4	VC4-1	In this example, the service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 4 Configure the pass-through services of NE1. Refer to **Step 3** and configure the SDH services of NE1. The method and parameters for configuring the pass-through services of NE1 are the same as the method and parameters for configuring the pass-through services of NE2.

Step 5 Configure the services on the non-protection chain at NE5.

1. In the NE Explorer, click , and then select NE5. Click **OK**.
2. Choose **Configuration** > **SDH Service Configuration** from the Function Tree and click >>.
3. Click **Create** on the lower-right pane to display the **Create SNCP Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, **Direction** of the E1 services is set to **Bidirectional**.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE5 is configured as the source tributary board. See **Figure 3-16**.

Parameter	Value in This Example	Description
Source Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the working service source occupies VC-12s 1–5.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 of NE5 is configured as the sink line board. See **Figure 3-16**.
Sink VC4	VC4-1	In this example, the service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 6 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 7 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 8 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see Deleting SDH Services.

3.10 Configuring Service on the MSP Ring with a Non-Protection Chain

Configure the protection subnet for the MSP, Protection Subnet for the non-protection chain, and services on the MSP ring with a non-protection chain separately. It is recommended that you configure the protection subnets before configuring the services on the MSP ring with a non-protection ring chain.

In the case of the MSP ring with a non-protection chain, the networking diagram of the MSP ring is similar to the networking diagram of the single two-fiber bidirectional MSP ring. The only difference is that one line board needs to be configured on the intersecting NE when the non-protection chain is added. This can realize the pass-through of the services when the services are required to be transmitted out of the MSP ring.

To configure the service on the MSP ring with a non-protection chain, you should plan a proper traffic direction and a timeslot allocation scheme for the services on the SNCP ring and the services on the non-protection chain.

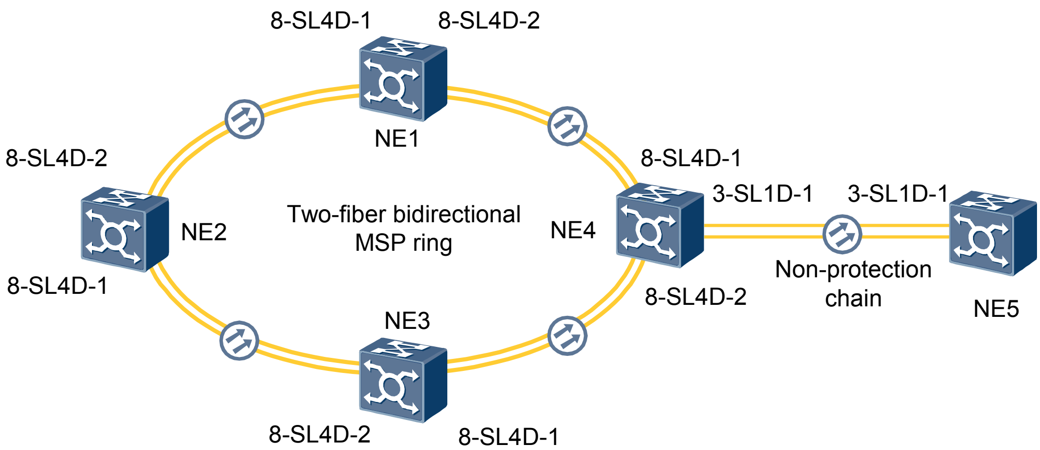
3.10.3 Configuration Process
The configuration of the services on the two-fiber bidirectional MSP ring with a non-protection chain is independent of the creation of the protection subnets for the MSP and for the non-protection chain. To configure the services on the two-fiber bidirectional MSP ring with a non-protection chain, configure the SDH services from the tributary board to the line board on the source and sink NEs and configure pass-through services on the intermediate NEs, if the protection subnet is already created.

3.10.1 Networking Diagram

In the case of the MSP ring with a non-protection chain, the networking diagram of the MSP ring is similar to the networking diagram of the single two-fiber bidirectional MSP ring. The only difference is that one line board needs to be configured on the intersecting NE when the non-protection chain is added. This can realize the pass-through of the services when the services are required to be transmitted out of the MSP ring.

Figure 3-17 shows the networking diagram of the MSP ring with a non-protection chain. The MSP ring comprises five pieces of equipment. In this example, the SP3D boards are configured on the source NE (NE3) and sink NE (NE5) as tributary boards to add and drop services, and the SL4D and SL1D boards are used as line boards to transmit SDH services.

Figure 3-17 Networking diagram of the services on the two-fiber bidirectional MSP ring with a non-protection chain



3.10.2 Signal Flow and Timeslot Allocation

To configure the service on the MSP ring with a non-protection chain, you should plan a proper traffic direction and a timeslot allocation scheme for the services on the SNCP ring and the services on the non-protection chain.

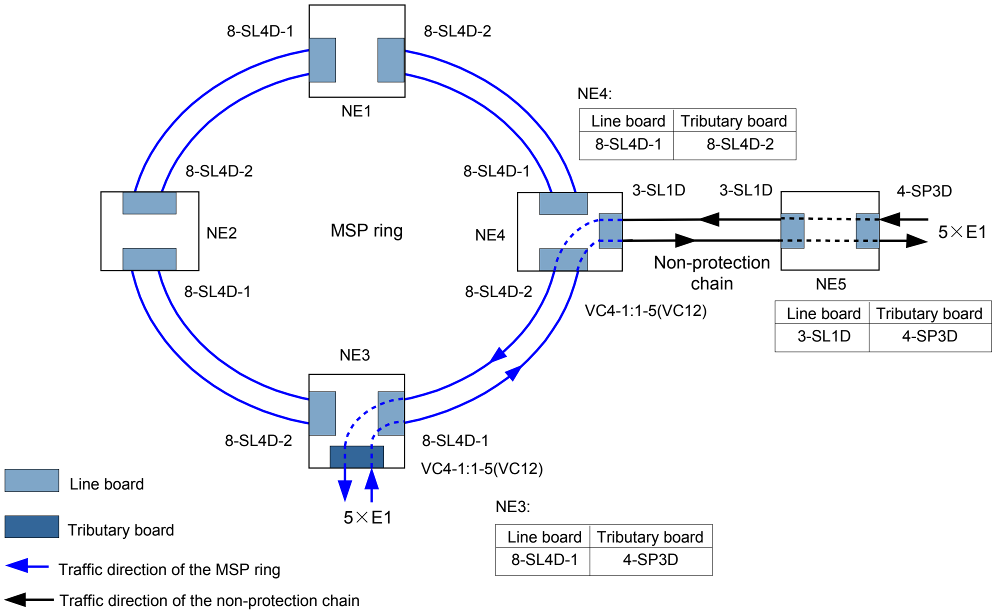
Figure 3-18 shows the signal flow of the services on the MSP ring with a non-protection chain and the timeslot allocation to the services on the MSP ring with a non-protection chain. In this example, five E1 services are added to or dropped from NE3 and NE5, and these services pass through NE4.

On the MSP ring, the services from NE3 to NE4 in this example are transmitted on the short path. In the actual configuration, you can plan other service paths according to the requirement.

NOTE

On a ring network, the long path and short path do not actually refer to the geographical distance. They are determined by the number of intermediate NEs. As shown in **Figure 3-18**, when the service is transmitted from NE3 to NE4, NE3→NE4 is the short path, and NE3→NE2→NE1→NE4 is the long path.

Figure 3-18 Signal flow and timeslot allocation



3.10.3 Configuration Process

The configuration of the services on the two-fiber bidirectional MSP ring with a non-protection chain is independent of the creation of the protection subnets for the MSP and for the non-protection chain. To configure the services on the two-fiber bidirectional MSP ring with a non-protection chain, configure the SDH services from the tributary board to the line board on the source and sink NEs and configure pass-through services on the intermediate NEs, if the protection subnet is already created.

Prerequisite

- The physical topology of the network must be created.
- The NEs, boards, and fibers must be created on the T2000.
- The created protection subnet must be consistent with the actual network topology. For details about how to create the protection subnet, see **2.6.1 Configuring a Non-Protection Chain** and Creating an MS Ring Protection Subnet.
- You must be familiar with **3.10.2 Signal Flow and Timeslot Allocation**.

Procedure

Step 1 Configure the SDH services of the source NE (NE3).

1. In the NE Explorer, select NE3, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree. Click .
2. Click **Create** on the lower-right pane to display the **Create SNCP Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received on the same path. That is, the services are **Bidirectional** services.
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE3 is configured as the source tributary board. See **Figure 3-18**.
Source Timeslot Range (e.g.1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service source occupies VC-12s 1–5.
Sink Slot	8-SL4D-1 (SDH-1)	In this example, the SL4D board in slot 8 of NE3 is configured as the sink line board. See **Figure 3-18**.
Sink VC4	VC4-1	In this example, the service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 2 Refer to **Step 1** and configure the SDH services of NE5. Set the parameters as follows.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectional	In this example, the services are transmitted and received on the same path. That is, the services are **Bidirectional** services.

Parameter	Value in This Example	Description
Source Slot	4-SP3D	In this example, the SP3D board in slot 4 of NE5 is configured as the source tributary board. See **Figure 3-18**.
Source Timeslot Range(e.g.1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service source occupies VC-12s 1–5.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 3 of NE5 is configured as the sink line board. See **Figure 3-18**.
Sink VC4	VC4-1	In this example, the service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g.1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 3 Configure the pass-through services of NE4.

1. In the NE Explorer, select NE4 and then choose **Communication** > **SDH Service Configuration** from the Function Tree. Click [>>].
2. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters that are required, and then click **OK**.

Parameter	Value in This Example	Description
Level	VC12	In this example, E1 services are configured. Hence, **Level** of the E1 services is set to **VC12**.
Direction	Bidirectiona l	In this example, the services are transmitted and received on the same path. That is, the services are **Bidirectional** services.
Source Slot	8-SL4D-2 (SDH-2)	In this example, the SL4D board in slot 8 of NE4 is configured as the source line board. See **Figure 3-18**.
Source VC4	VC4-1	In this example, the service source uses the timeslots of VC4-1.
Source Timeslot Range (e.g.1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service sink occupies VC-12s 1–5.
Sink Slot	3-SL1D-1 (SDH-1)	In this example, the SL1D board in slot 12 of NE5 is configured as the sink line board. See **Figure 3-18**.

Parameter	Value in This Example	Description
Sink VC4	VC4-1	In this example, the service sink uses the timeslots of VC4-1.
Sink Timeslot Range(e.g. 1,3-6)	1-5	In this example, five E1 services are configured between NE3 and NE5. Hence, the service sink occupies VC-12s 1–5.
Activate Immediately	Yes	-

Step 4 Check whether the services are configured correctly. For details, see **7.6 Verifying the Correctness of the SDH Service Configuration**.

Step 5 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 6 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see Deleting SDH Services.

4 Configuring Ethernet Services

About This Chapter

In compliance with ITU-T G.8011x/Y.1307x, Huawei MSTP equipment supports Ethernet private line (EPL), Ethernet virtual private line (EVPL), Ethernet private local area network (EPLAN), and Ethernet virtual private local area network (EVPLAN) services.

When the data of multiple users without VLAN tags sent to a transmission network is transmitted on the same VCTRUNK, the VCTRUNK-shared EVPL (VLAN) service is used to isolate the data by adding VLAN tags. In this way, the bandwidth is shared on the SDH side.

The EPLAN service (IEEE 802.1d bridge) provides a LAN solution for multipoint-to-multipoint convergence. This service applies where the user-side data communication equipment connected to the transmission network does not support VLANs or where the VLAN planning is kept secret from the network operator.

The EVPLAN service (IEEE 802.1q bridge) provides an LAN solution for multipoint-to-multipoint convergence. This service applies in cases where user-side data communication equipment connected to the transmission network does not support VLANs or where the VLAN planning is open to the network operator.

The QinQ technology provides a cheap and easy solution for Layer 2 virtual private networks (VPNs). The IEEE 802.1ad bridge uses the QinQ technology to provide the VPN solution, thus facilitating the identifying, differentiating and grooming EVPLAN services.

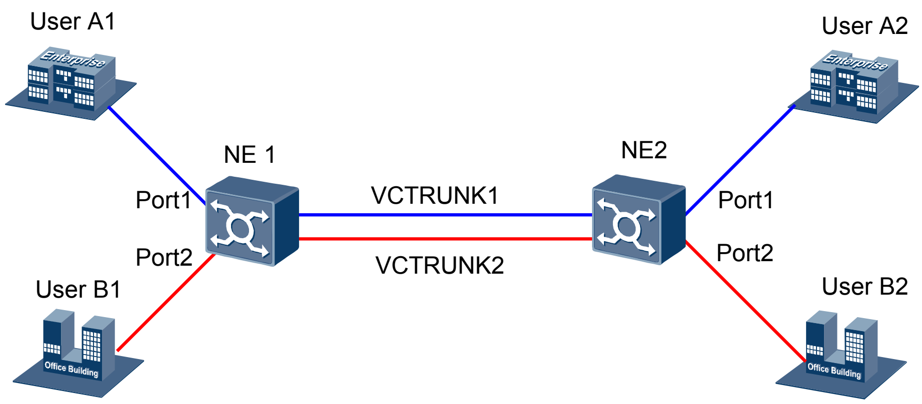
4.1 Service Types

In compliance with ITU-T G.8011x/Y.1307x, Huawei MSTP equipment supports Ethernet private line (EPL), Ethernet virtual private line (EVPL), Ethernet private local area network (EPLAN), and Ethernet virtual private local area network (EVPLAN) services.

EPL Services

Two nodes are used to access EPL services and implement transparent transmission of the Ethernet services of the users. The service of one user occupies one VCTRUNK and need not share the bandwidth with the services of the other users. Hence, in the case of EPL services, a bandwidth is exclusively occupied by the service of a user and the services of different users are isolated. In addition, the extra QoS scheme and security scheme are not required.

Figure 4-1 EPL services



The corresponding relations between the PORTs (namely, external ports) and the VCTRUNKs are listed in **Table 4-1**.

Table 4-1 Corresponding relations between the external ports and the VCTRUNKs (EPL services)

NE1		NE2	
User A1	PORT1←→VCTRUNK1	VCTRUNK1←→PORT1	User A2
User B1	PORT2←→VCTRUNK2	VCTRUNK2←→PORT2	User B2

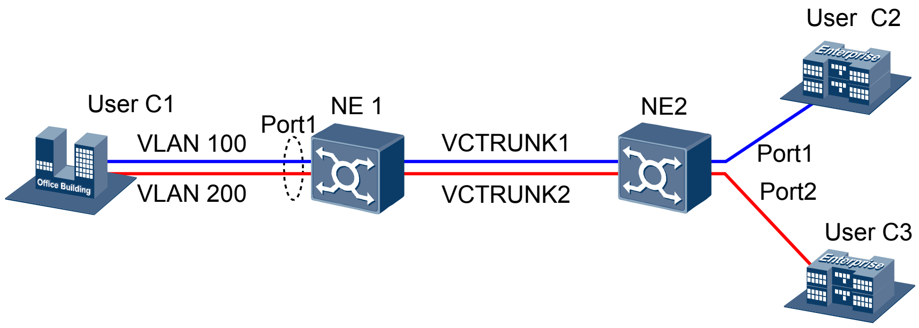
EVPL Services

In the case of EVPL services, services of different users share the bandwidth. Hence, the VLAN/QinQ scheme needs to be used for differentiating the services of different users. If the services of different users need to be configured with different quality levels, you need to adopt the corresponding QoS scheme. EVPL services are classified into two types, depending on whether the PORT or VCTRUNK is shared.

- PORT-shared EVPL services

As shown in **Figure 4-2**, the services of different users are accessed through a PORT at a station, and are then isolated from each other by using the VLAN IDs. Services are transmitted to other PORTs at this station through different VCTRUNKs.

Figure 4-2 PORT-shared EVPL services



The corresponding relations between the PORTs and the VCTRUNKs are provided in **Table 4-2**.

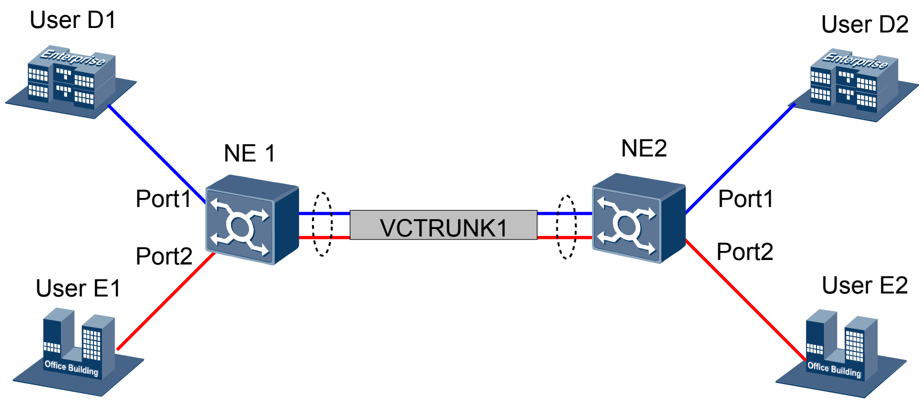
Table 4-2 Corresponding relations between the PORTs and the VCTRUNKs (PORT-shared EVPL services)

NE1		NE2	
User C1	PORT1←→VCTRUNK1	VCTRUNK1←→PORT1	User C2
	PORT1←→VCTRUNK2	VCTRUNK2←→PORT2	User C3

- VCTRUNK-shared EVPL services Ethernet boards support the convergence and distribution of EVPL services by using the following modes:
  - VLAN tag-based convergence and distribution of EVPL services
  - QinQ technology-based convergence and distribution of EVPL services

As shown in **Figure 4-3**, the services of different users are isolated by using the VLAN/QinQ scheme. Hence, the services of different users can be transmitted in the same VCTRUNK.

Figure 4-3 VCTRUNK-shared EVPL services



The corresponding relations between the PORTs and the VCTRUNKs are provided in **Table 4-3**.

Table 4-3 Corresponding relations between the PORTs and the VCTRUNKs (VCTRUNK-shared EVPL services)

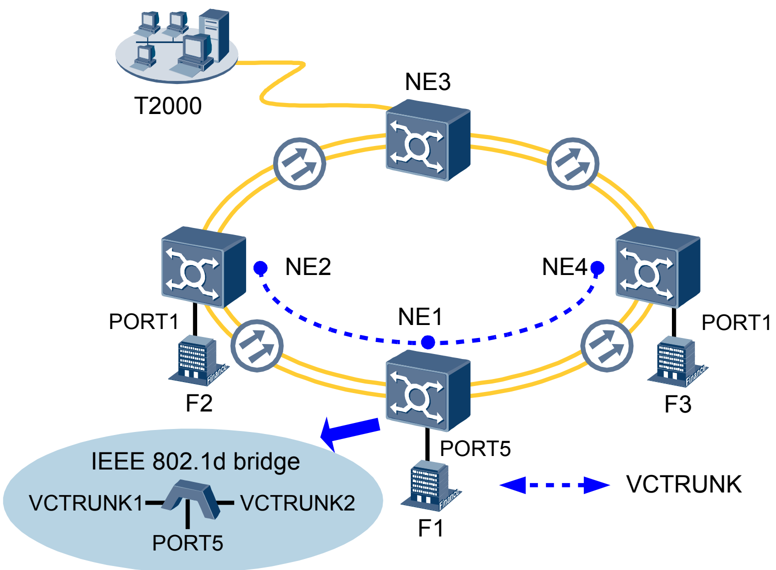
NE1		NE2	
User D1	PORT1←→VCTRUNK1	VCTRUNK1←→PORT1	User D2
User E1	PORT2←→VCTRUNK1	VCTRUNK1←→PORT2	User E2

EPLAN Services

The EPLAN services can be accessed from a minimum of two nodes. Hence, the services of different users need not share the bandwidth. That is, in the case of EPLAN services, a bandwidth is exclusively occupied by the service of a user and the services of different users are isolated. In addition, the extra QoS scheme and security scheme are not required. re is more than one node. Hence, the nodes need to learn the MAC addresses and forward data according to MAC addresses. Therefore, Layer 2 switching is realized.

As shown in **Figure 4-4**, three branches of user F need to communicate with each other. On NE1, the IEEE 802.1d bridge is established to achieve EPLAN services. The IEEE 802.1d bridge can create the MAC address-based forwarding table, which is periodically updated by using the self-learning function of the system. The accessed data can be forwarded or broadcast within the domain of the IEEE 802.1d bridge according to the destination MAC addresses.

Figure 4-4 EPLAN services (IEEE 802.1d bridge)



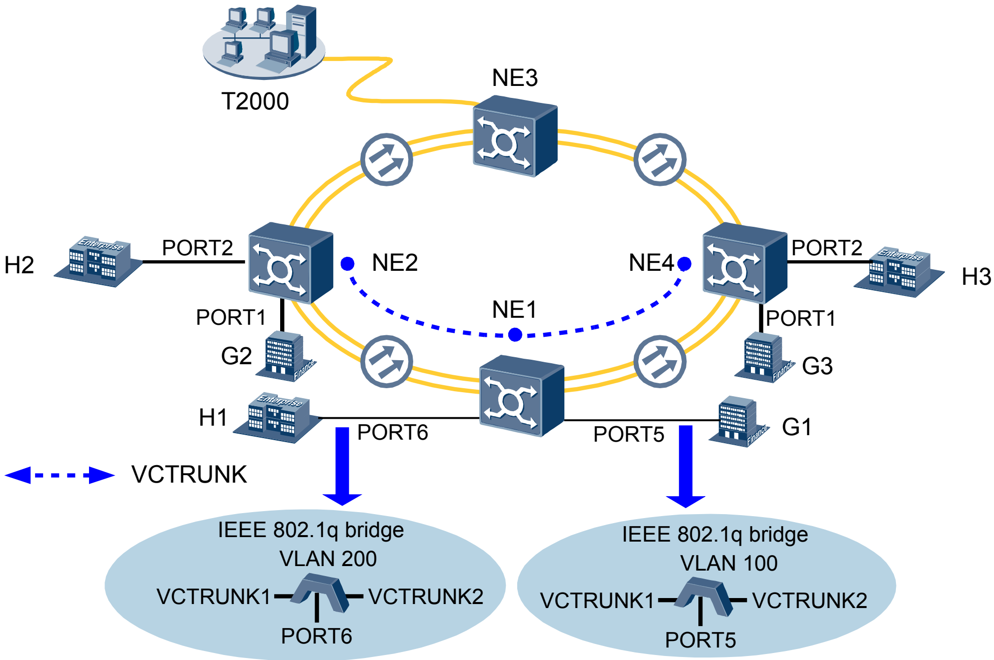
EVPLAN Services

EVPLAN services of different users need to share the bandwidth. Hence, the VLAN/QinQ scheme needs to be used for differentiating the data of different users. If the services of different users need to be configured with different quality levels, you need to adopt the corresponding QoS scheme.

As shown in **Figure 4-5**, three branches of user G need to communicate with each other. Services of user G need to be isolated from the services of user H. Hence, the IEEE 802.1q bridge needs to be established on NE1 to achieve EVPLAN services.

IEEE 802.1q bridge: IEEE 802.1q bridge supports isolation by using one layer of VLAN tags. This bridge checks the contents of the VLAN tags that are in the data frames and performs Layer 2 switching according to the destination MAC addresses and VLAN IDs.

Figure 4-5 EVPLAN services (IEEE 802.1q bridge)

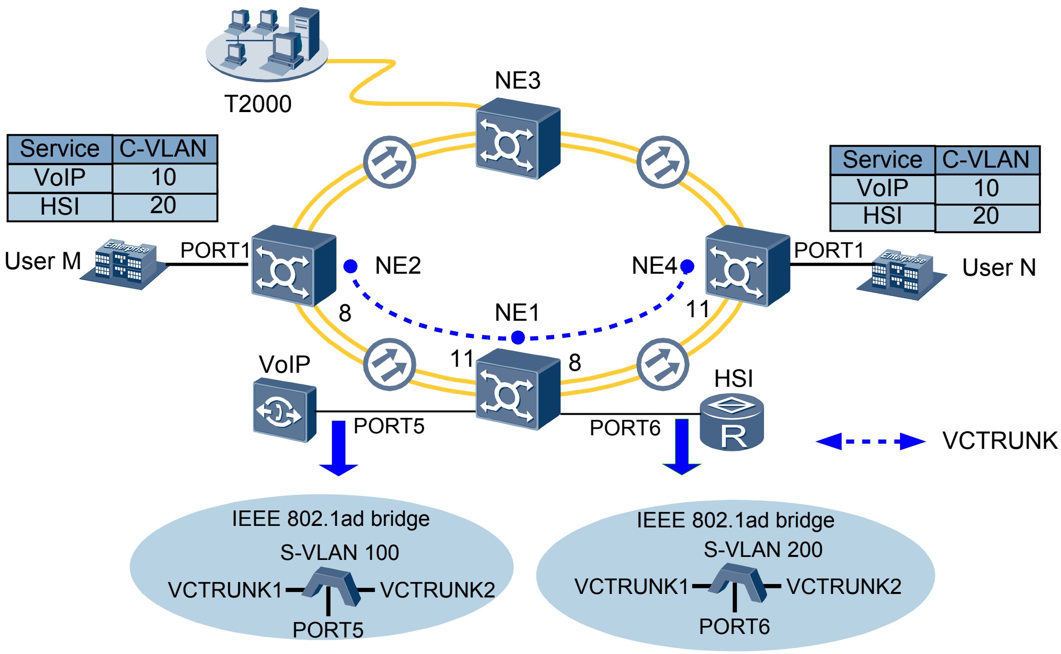


As shown in **Figure 4-6**, the VoIP services from user M and the HSI services from user N need to respectively access the VoiP server and the HSI server. In this case, the operator needs to separately groom the VoIP services and HSI services, and isolate the data on the transmission network side. On NE1, the IEEE 802.1ad bridge must be established to support the EVPLAN services.

IEEE 802.1ad bridge: The IEEE 802.1ad bridge supports data frames with two layers of VLAN tags. This bridge adopts the outer S-VLAN tags to isolate different VLANs and supports only the mounted ports whose attributes are C-Aware or S-Aware. This bridge supports the following switching modes:

- This bridge does not check the contents of the VLAN tags that are in the packets and performs Layer 2 switching according to the destination MAC addresses of the packets.
- This bridge checks the contents of the VLAN tags that are in the packets and performs Layer 2 switching according to the destination MAC addresses and the S-VLAN IDs of the packets.

Figure 4-6 EVPLAN services (IEEE 802.1ad bridge)



4.2 Basic Concepts

Before you configure Ethernet boards with services, you need to learn the basic concepts including external port, internal port, logical port, and bridge so that you can understand the service configuration process and the signal flow when the boards process the services.

4.2.1 Formats of Ethernet Frames
To implement the VLAN and QinQ functions, the IEEE 802.1q and IEEE 802.1ad protocols define different formats of the Ethernet frames, which contain different VLAN information.

4.2.2 Internal Ports and External Ports
External ports on Ethernet boards are used to access the services on the user side. Internal ports on Ethernet boards are used to encapsulate and map the services to the transmission network for transparent transmission.

4.2.3 Auto-Negotiation
The auto-negotiation function allows the network equipment to send information of its supported working mode to the opposite end on the network and to receive the corresponding information that the opposite end may transfer.

4.2.4 Flow Control
When the data processing/transferring capability of the equipment fails to handle the flow received at the port, congestion occurs on the line. To reduce the number of discarded packets due to buffer overflowing, proper flow control measures must be taken.

4.2.5 Encapsulation and Mapping Protocol
To ensure that Ethernet frames can be transparently transmitted over the optical transmission network, the Ethernet frames need to be encapsulated and mapped into VC containers at the access point. The encapsulation and mapping protocols used by the Ethernet service board

include the high-level data link control (HDLC), link access procedure - SDH (LAPS), and generic framing procedure (GFP).

4.2.6 Virtual Concatenation
The rate of the Ethernet service does not adapt to the rate of the standard VC container. Hence, if you directly map the Ethernet service data into a standard VC container, there is a great waste of the transmission bandwidth. To solve the problem, use the virtual concatenation technology to concatenate many standard VC containers to a large VC container that adapts to the rate of the Ethernet service.

4.2.1 Formats of Ethernet Frames

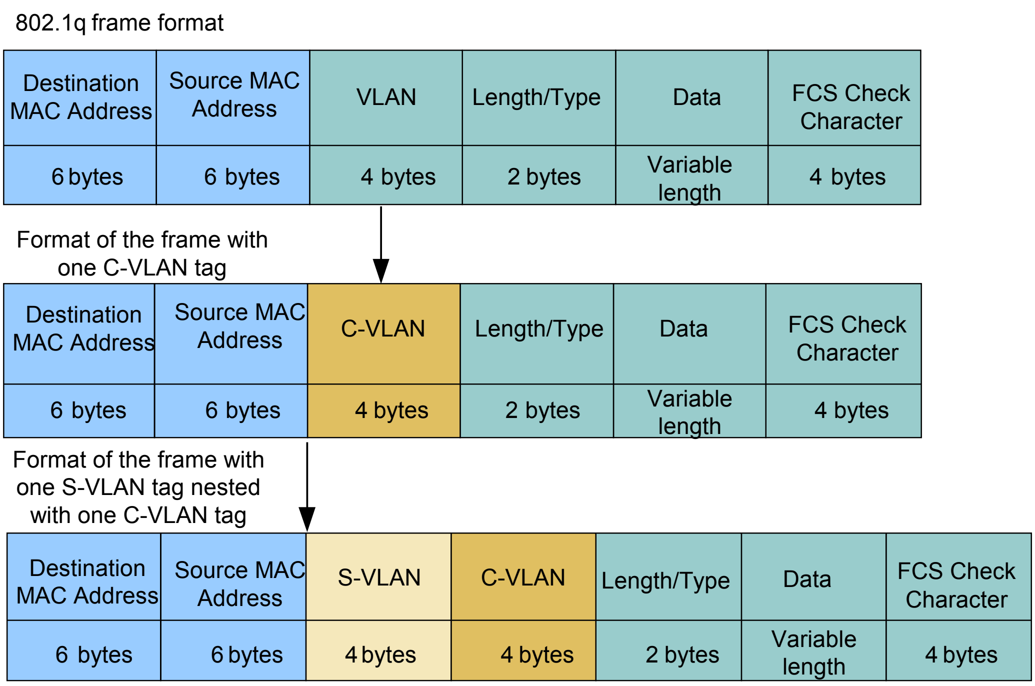
To implement the VLAN and QinQ functions, the IEEE 802.1q and IEEE 802.1ad protocols define different formats of the Ethernet frames, which contain different VLAN information.

To implement the VLAN function, the IEEE 802.1q protocol defines the Ethernet frame format that contains the VLAN information. Compared with the ordinary Ethernet frame, the frame with the format defined by the IEEE 802.1q protocol is added with a four-byte header.

To implement VLAN mesting (QinQ), the IEEE 802.1ad protocol defines two VLAN tag types. See **Figure 4-7**. The VLAN tag types are defined to differentiate the services on the client side and the services on the supplier service side.

- The VLAN tag used on the client side is represented as C-VLAN, of which the frame format is the same as the frame format defined by the IEEE 802.1q protocol.
- The VLAN tag used on the supplier service side is represented as S-VLAN.

Figure 4-7 Formats of Ethernet frames

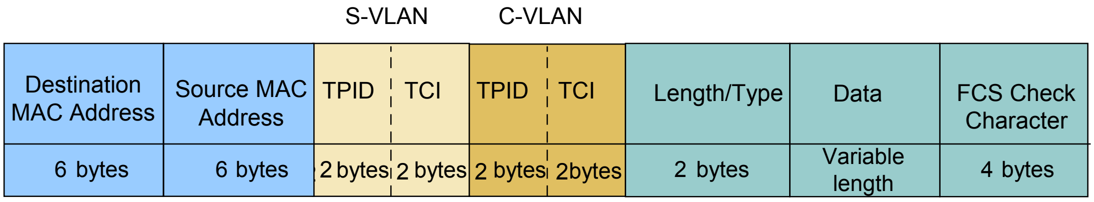


The length of the data field is variable. maximum length of the data field depends on the maximum frame length that the ports of the equipment support.

The four-byte S-VLAN or C-VLAN field is divided into two sub-fields: the tag protocol ID (TPID) and the tag control Information (TCI).

Both the TPID and TCI consist of two bytes. See **Figure 4-8**.

Figure 4-8 Positions of the TPID and TCI in the frame structure



- TPID structure

The TPID consists of two bytes and indicates the VLAN tag type. TPID of the C-VLAN is always 0x8100 whereas the TPID of the S-VLAN can be customized. Refer to **Table 4-4**.

Table 4-4 Tag types defined by using the TPID

Tag Type	Name	Value
C-VLAN Tag	802.1q Tag Protocol Type	0x8100
S-VLAN Tag	802.1q Service Tag Type	Customizable

NOTE

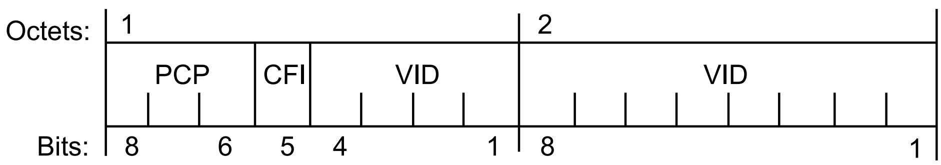
The IEEE 802.1ad specifies the TPID of the S-VLAN to 0x88a8. In actual application, the setting of TPID for the S-VLAN tag varies according to the equipment manufacturer. To ensure compatibility between interconnected equipment, it is recommended that you set the TPIDs of the S-VLAN tags of the interconnected equipment to the same value within 0X600–FFFF.

- TCI structure

The TCI structure of the S-TAG is basically the same as the TCI structure of the C-TAG. VLAN ID (VID) field consists of 12 bits and ranges from 0 to 4095. The difference is that the TCI of the S-TAG contains the drop eligible (DE) indication and works with the priority code point (PCP) to indicate the priority of the S-TAG frame.

The TCI structures of the C-TAG and S-TAG are shown in **Figure 4-9** and **Figure 4-10**.

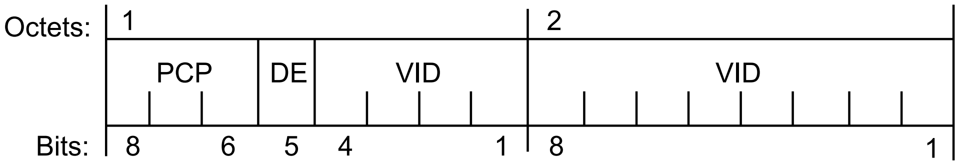
Figure 4-9 TCI structure of the C-TAG



The TCI field of the C-TAG consists of the following bytes:

- PCP: three bits
- CFI: one bit

Figure 4-10 TCI structure of the S-TAG



The TCI field of the S-TAG consists of the following bytes:

- PCP: three bits
- DE: one bit
- VID: 12 bits

4.2.2 Internal Ports and External Ports

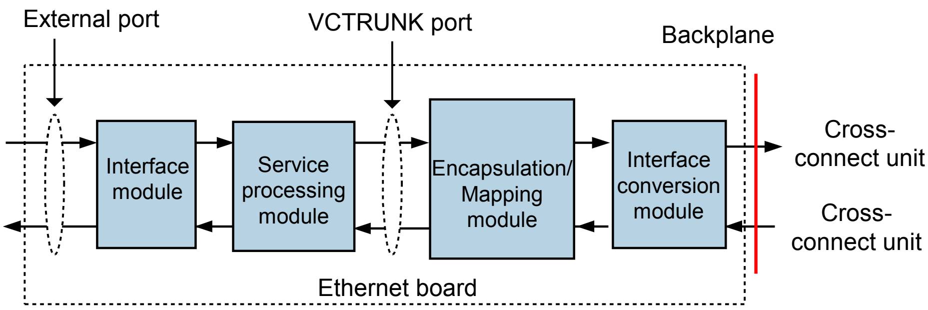
External ports on Ethernet boards are used to access the services on the user side. Internal ports on Ethernet boards are used to encapsulate and map the services to the transmission network for transparent transmission.

External ports on Ethernet boards (that is, external physical ports) are also referred to as client-side ports or user-side ports, which are used to access the Ethernet services on the user side.

Internal ports on Ethernet boards (that is, internal VCTRUNKs) are also referred to as system-side ports or backplane-side ports in certain cases, which are used to encapsulate and map the services to the SDH side.

VCTRUNKs are VC-based transmission paths, which can be implemented by using the adjacent concatenation or virtual concatenation technology. On the T2000 window, paths are bound to specify the bandwidth of different granularities for a VCTRUNK port.

Figure 4-11 External ports and internal ports on Ethernet boards



4.2.3 Auto-Negotiation

The auto-negotiation function allows the network equipment to send information of its supported working mode to the opposite end on the network and to receive the corresponding information that the opposite end may transfer.

The working modes of the interconnected ports on the equipment at both ends must be the same. Otherwise, the services are affected.

If the working mode of the port on the opposite equipment is full duplex and if the working mode of the port on the local equipment is auto-negotiation, the local equipment works in the half-duplex mode. That is, the working modes of the interconnected ports at both ends are different, and thus packets may be lost. Hence, when the working mode of the port on the opposite equipment is full duplex, you need to set working mode of the port on the local equipment to full duplex.

NOTE

When the interconnected ports at both sides work in the auto-negotiation mode, the equipment at both sides can negotiate the flow control through the auto-negotiation function.

The auto-negotiation function uses fast link pulses (FLPs) and normal link pulses (NLPs) to transfer information of the working mode so that no packet or upper layer protocol overhead needs to be added.

NOTE

This topic considers FE electrical interfaces as an example to describe how to implement the auto-negotiation function.

The FLP is called the 100BASE-T link integrity test pulse sequence. Each set of equipment on the network must be capable of issuing FLP bursts in the case of power-on, issuing of management commands, or user interaction. The FLP burst consists of a series of link integrity test pulses that form an alternating clock/data sequence. Extraction of the data bits from the FLP burst yields a link code word that identifies the working modes supported by the remote equipment and certain information used for the negotiation and handshake mechanism.

To maintain interoperability with the existing 100BASE-T equipment, the auto-negotiation function also supports the reception of 100BASE-T compliant link integrity test pulses. The 10BASE-T link pulse activity is referred to as the NLP sequence. equipment that fails to respond to the FLP burst sequence by returning only the NLP sequence is treated as the 100BASE-T compatible equipment.

The first pulse in an FLP burst is defined as a clock pulse. Clock pulses within an FLP burst occur at intervals of 125 us. Data pulses occur in the middle of two adjacent clock pulses. The positive pulse represents logic "1" and the absence of a pulse represents logic "0". An FLP burst consists of 17 clock pulses and 16 data pulses (if all data bits are 1). The NLP waveform is simpler than the FLP waveform. NLP sends a positive pulse every 16 ms when no data frame needs to be transmitted.

Figure 4-12 Waveform of a single FLP

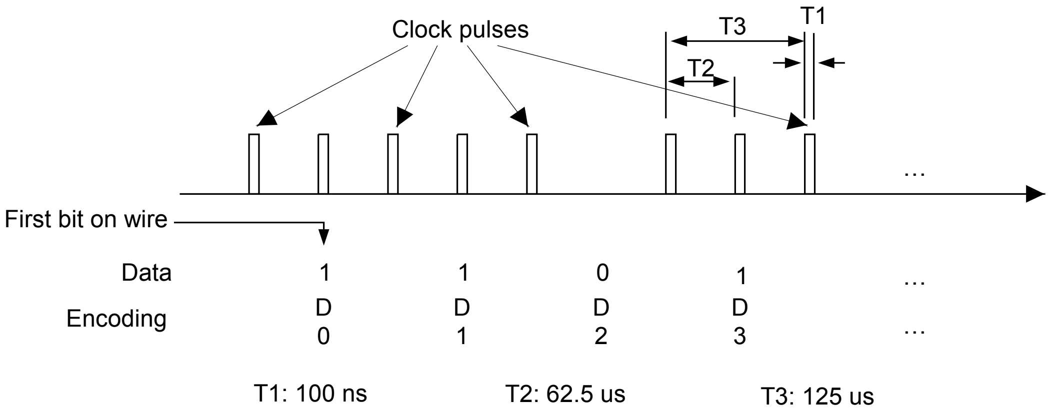
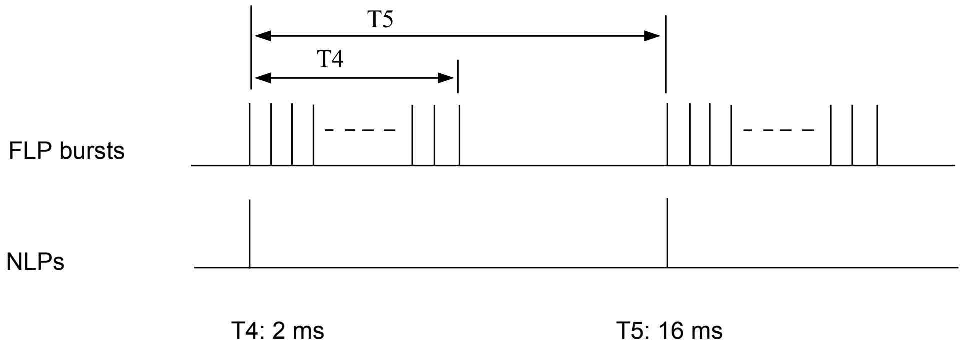


Figure 4-13 Consecutive FLP and NLP bursts



4.2.4 Flow Control

When the data processing/transferring capability of the equipment fails to handle the flow received at the port, congestion occurs on the line. To reduce the number of discarded packets due to buffer overflowing, proper flow control measures must be taken.

The half-duplex Ethernet port applies the back-pressure mechanism to control the flow. The full-duplex Ethernet port applies PAUSE frames to control the flow. Currently, the half-duplex Ethernet function is not widely applied. Hence, the flow control function realized by Ethernet service boards is used for the full-duplex Ethernet ports.

The flow control function realized by Ethernet service boards is classified into two types: auto-negotiation flow control and non-auto-negotiation flow control.

Auto-Negotiation Flow Control

When the Ethernet port works in the auto-negotiation mode, you can adopt the auto-negotiation flow control function. The auto-negotiation flow control modes include the following:

- Enable dissymmetric flow control

The port can transmit PAUSE frames in the case of congestion but cannot process the received PAUSE frames.

- Enable symmetric flow control

  The port can transmit PAUSE frames and process the received PAUSE frames.

- Enable symmetric/dissymmetric flow control

  The port has the following abilities:

  - Transmits and processes PAUSE frames.
  - Transmits PAUSE frames but cannot process the received PAUSE frames.
  - Processes the received PAUSE frames but cannot transmit PAUSE frames.

- Disable

  Disables the auto-negotiation flow control function.

Non-Auto-Negotiation Flow Control

When the Ethernet port works in a fixed working mode, you can adopt the non-auto-negotiation flow control function. The non-auto-negotiation flow control modes include the following:

- Send only

  The port can transmit PAUSE frames in the case of congestion but cannot process the received PAUSE frames.

- Receive only

  The port can process the received PAUSE frames but cannot transmit PAUSE frames in the case of congestion.

- Send and receive

  The port can transmit PAUSE frames and process the received PAUSE frames.

- Disable

  The port does not support the auto-negotiation flow control function.

Realization Principle

The realization principle of the flow control function is described as follows:

1. When congestion occurs in the receive queue of an Ethernet port (the data in the receive buffer exceeding a certain threshold) and the port is capable of sending PAUSE frames, the port sends a PAUSE frame to the opposite end. pause-time value in the frame is N ($0<N\leq65535$).
2. If the Ethernet port at the opposite end is capable of processing PAUSE frames, this Ethernet port stops sending data within a specified period of time N (the unit is the time needed for sending 521 bits) after receiving the PAUSE frame.
3. If the congestion at the receive port is cleared (the data in the receive buffer is below a certain threshold) but the pause-time does not end, the port sends a PAUSE frame whose pause-time is 0 to notify the opposite end to send data.

IEEE 802.3 defines the format of the PAUSE frame as follows:

- Destination address: 01-80-C2-00-00-01 (multicast address)
- Source address: MAC address of the source port
- Type/Length: 88-08 (MAC control frame)

- MAC control code: 00-01 (PAUSE frame)
- MAC control parameter: pause-time (two bytes)

Figure 4-14 Structure of the PAUSE frame

Destination address	01-80-C2-00-00-01	6 octets
Source address	XX-XX-XX-XX-XX-XX	6 octets
Type/Length	88-08	2 octets
MAC control opcode	00-01	2 octets
MAC control parameter (pause-time)	XX-XX	2 octets
	Reserved	

4.2.5 Encapsulation and Mapping Protocol

To ensure that Ethernet frames can be transparently transmitted over the optical transmission network, the Ethernet frames need to be encapsulated and mapped into VC containers at the access point. The encapsulation and mapping protocols used by the Ethernet service board include the high-level data link control (HDLC), link access procedure - SDH (LAPS), and generic framing procedure (GFP).

HDLC

The HDLC is a general data link control procedure. When using the HDLC protocol, the system encapsulates data services into HDLC-like frames as information bits and maps the frames into SDH VC containers.

LAPS

The LAPS is also a data link control procedure. It is optimized based on the HDLC. The LAPS complies with ITU-T X.86.

GFP

The GFP is the most widely applied general encapsulation and mapping protocol. It provides a general mechanism to adapt higher-layer client signal flows into the transport network and can map the variable-length payload into the byte-synchronized transport path. The client signals can be protocol data units (PDU-oriented, such as IP/PPP and Ethernet), block code data (block-code oriented, such as Fiber Channel and ESCON), or common bit data streams. The GFP protocol complies with ITU-T G.7041.

The GFP defines the following modes to adapt client signals:

- Frame-mapped GFP (GFP-F)

The GFP-F is a PDU-oriented processing mode. It encapsulates the entire PDU into the GFP payload area and makes no modification on the encapsulated data. It determines whether to add a detection area for the payload area, depending on requirements.

- Transparent GFP (GFG-T)

  The GFP-T is a block-code (8B/10B code block) oriented processing mode. It extracts a single character from the received data block and maps the character into the fixed-length GFP frame.

4.2.6 Virtual Concatenation

The rate of the Ethernet service does not adapt to the rate of the standard VC container. Hence, if you directly map the Ethernet service data into a standard VC container, there is a great waste of the transmission bandwidth. To solve the problem, use the virtual concatenation technology to concatenate many standard VC containers to a large VC container that adapts to the rate of the Ethernet service.

The concatenation is defined in ITU-T G.707 and contains contiguous concatenation and virtual concatenation. Both concatenation methods provide concatenated bandwidth of X times Container-N at the path termination.

Contiguous concatenation concatenates the contiguous VC-4s in the same STM-N into an entire structure to transport. It maintains the contiguous bandwidth throughout the whole transport. Virtual concatenation concatenates many individual VC containers (VC-12 containers, VC-3 containers, or VC-4 containers) into a bit virtual structure to transport. The virtual concatenation breaks the contiguous bandwidth into individual VCs, transports the individual VCs, and recombines these VCs to a contiguous bandwidth at the transmission termination point.

In the case of virtual concatenation, transport of each VC container may occupy different paths and there may be a transport delay difference between VC containers. Hence, there are difficulties to restore the client signal. Virtual concatenation requires concatenation functionality only at the path termination equipment and it can flexibly allocate bandwidth. Hence, the virtual concatenation technology is widely used.

Virtual concatenation is available in two types: virtual concatenation in a higher order path and virtual concatenation in a lower order path. A higher order virtual concatenation VC4-Xv provides a payload of X Container-4s (VC-4s). The payload is mapped individually into X independent VC-4s. Each VC-4 has its own POH. A lower order virtual concatenation VC-12-Xv provides a payload of X Container-12s (VC-12s). The payload is mapped individually into X independent VC-12s. Each VC-12 has its own POH. It is the same case with the virtual concatenation of VC-3s.

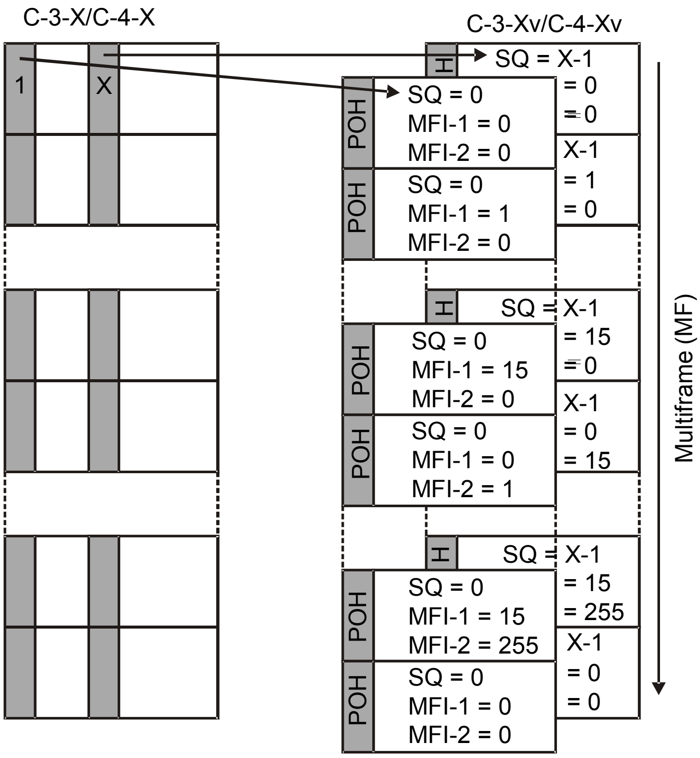
VC4-Xv and VC-3-Xv

The virtual container that is formed by a VC4-Xv/VC-3-Xv can be mapped into X individual VC-4/VC-3s that form the VC4-Xv/VC-3-Xv. Each VC-4/VC-3 has its own POH. POH has the same specifications as the ordinary VC-4 POH. The H4 byte in the POH is used for the virtual concatenation-specific multiframe indicator (MFI) and sequence indicator (SQ).

MFI indicates the position of a frame in the multiframe. Each frame sent by the source carries the MFI information. The sink end combines the frames with the same MFI into the C-n-Xv. MFI includes MFI-1 and MFI-2. MFI-1 is transmitted by bits 5–8 of the H4 byte and ranges from 0 to 15. MFI-2 is transmitted by the two frames of which the MFI-1 is "0" and "1" in the multiframe. Bits 1–4 of the H4 bytes of the two frames indicate the higher four bits and lower four bits of the MFI-2 respectively. Hence, the MFI-2 ranges from 0 to 255. That is, a multiframe consists of 4096 frames and the period is 512 ms.

SQ indicates the position of a frame in the C-n-Xv. The source end inserts the SQ information into the frame according to the payload allocation sequence. The sink end determines the sequence to extract the payload from the frames that form C-n-Xv according to the SQ. SQ is transmitted by the two frames of which the MFI-1 is "14" and "15" in the multiframe. Bits 1–4 of the H4 bytes of the two frames indicate the higher four bits and lower four bits of the SQ respectively.

Figure 4-15 VC-3-Xv/VC4-Xv multiframe and sequence indicator



With the MFI and SQ, the sink end can correctly restore the position of each frame in the C-n-Xv to prevent the frame alignment problem due to the different propagation delays of the frames.

VC-12-Xv

The virtual container that is formed by a VC-12-Xv can be mapped into X individual VC-12s which form the VC-12-Xv. Each VC-12 has its own POH. POH has the same specifications as the ordinary VC-12 POH. Bit 2 of the K4 byte in the POH is used for the virtual concatenation-specific frame count and sequence indicator.

Bit2s of the K4 bytes in every 32 multiframes (one multiframe comprising four VC-12s) are extracted to form a 32-bit character string to express the frame count and sequence indicator. Bits 1–5 of the string express the frame count, whose value range is between 0 and 31. structure formed by 32 multiframes has 128 frames. Hence, the resulting overall multiframe is 4096 frames with the period of 512 ms. Bits 6–11 of the string express the sequence indicator. The frame count/sequence indicator in the VC-12-Xv has the same usage as the multiframe indicator/ sequence indicator in the VC4-Xv/VC-3-Xv.

4.3 Flow of Configuring Ethernet Services

This topic describes the configuration processes related to Ethernet services. Before you configure Ethernet services according to the flow, you need to complete the basic configurations of the NEs according to the flow of creating a network.

4.3.1 Flow of Configuring EPL Services

The EPL services feature simplicity, transparent transmission, and dedicated bandwidth. The configuration flow differs depending on whether Ethernet transparent transmission boards or Ethernet switching boards are configured.

Ethernet transparent transmission boards or Ethernet switching boards can be used to configure EPL services. The Ethernet transparent transmission boards and Ethernet switching boards are provided in **Table 8-1**.

Figure 4-16 Flow of configuring EPL services

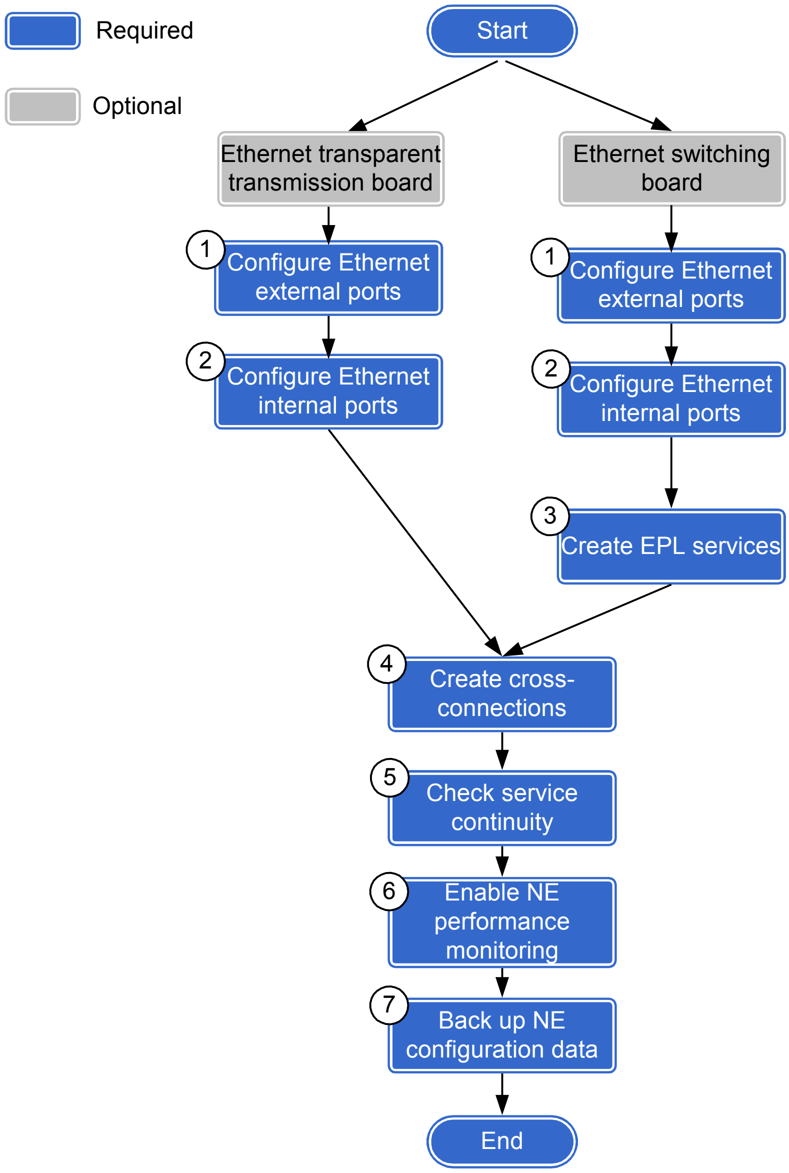


Table 4-5 Flow of configuring EPL services

Step	Operation	Remarks
1	**7.7 Configuring External Ports on Ethernet Boards**	Required When an NE accesses Ethernet services through the external ports on the Ethernet board, you need to configure the attributes of the external ports so that the external ports can work with the data communication equipment on the client side, thus ensuring the normal accessing of the Ethernet services.
2	**7.8 Configuring Internal Ports on Ethernet Boards**	Required When an NE transmits Ethernet services through the internal ports (that is, VCTRUNK ports) on the Ethernet board to the SDH side, you need to configure the attributes of the VCTRUNK ports so that the VCTRUNK ports can work with the Ethernet board on the opposite equipment. This ensures that the transmission of the Ethernet services in the SDH network is normal.
3	**7.10 Creating EPL Services**	● If Ethernet transparent transmission boards are used, skip to Step 4. On Ethernet transparent transmission boards, the EPL service connections from the PORTs to the VCTRUNKs are considered to be created by default. ● If Ethernet switching boards are used, the EPL service connections between the PORTs and the VCTRUNKs must be created.
4	**7.1 Creating SDH Services**	Required This topic describes how to create the timeslot connections between the bound paths and the line board, thus ensuring that the Ethernet services are transmitted in specified timeslots over the transmission line.
5	**7.15 Testing Ethernet Service Channels**	Required After the Ethernet services are created, test the service continuity.
6	**7.5 Setting Performance Monitoring Parameters of an NE**	Required Enable the performance monitoring function for a specific NE. Then, you can obtain detailed performance records during the operation process of this NE. These records can be used for monitoring and analyzing the running status of this NE.

Step	Operation	Remarks
7	**7.16 Backing Up the NE Database to the SCC Board**	Required Back up the NE database to ensure that the NE can be automatically recovered to normal operation after the SCC data is lost or after the equipment is powered off.

4.3.2 Flow of Configuring EVPL Services

In the case of EVPL services, services of different users share the bandwidth. Hence, the VLAN ID or other schemes need to be used for differentiating the services of different users. If the services of different users need to be configured with different quality levels, you need to adopt the corresponding QoS scheme.

The Ethernet switching boards are required for configuring EVPL services. The Ethernet switching boards that support EVPL services are provided in **Table 8-1**.

Figure 4-17 Flow of configuring EVPL services

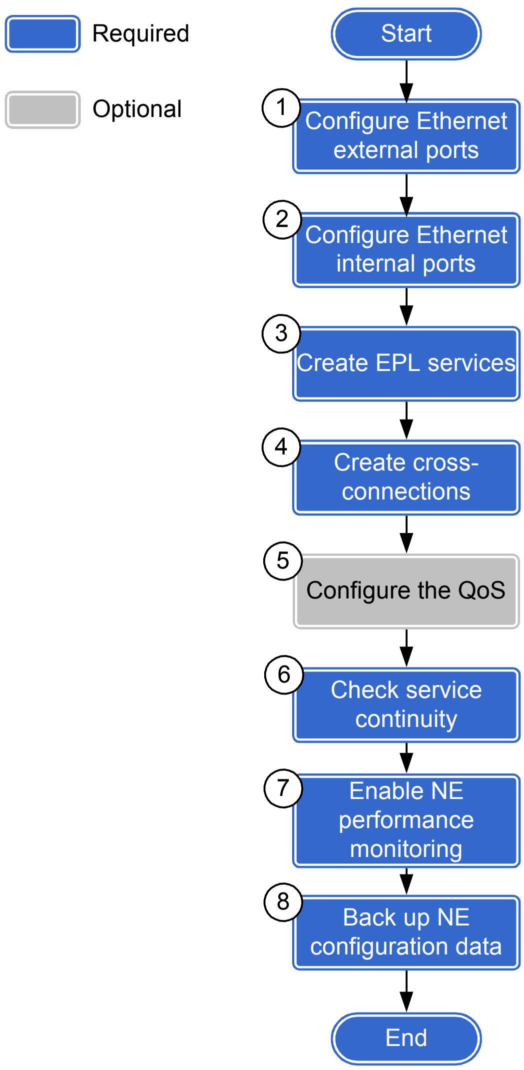


Table 4-6 Flow of configuring EVPL services

Step	Operation	Remarks
1	**7.7 Configuring External Ports on Ethernet Boards**	Required When an NE accesses Ethernet services through the external ports on the Ethernet board, you need to configure the attributes of the external ports so that the external ports can work with the data communication equipment on the client side, thus ensuring the normal accessing of the Ethernet services.
2	**7.8 Configuring Internal Ports on Ethernet Boards**	Required When an NE transmits Ethernet services through the internal ports (that is, VCTRUNK ports) on the Ethernet board to the SDH side, you need to configure the attributes of the VCTRUNK ports so that the VCTRUNK ports can work with the Ethernet board on the opposite equipment. This ensures that the transmission of the Ethernet services in the SDH network is normal.
3	**7.10 Creating EPL Services**	Required When an Ethernet switching board carries private line services, the relevant information of the private line services, such as the service source and service sink, must be specified.
4	**7.1 Creating SDH Services**	Required This topic describes how to create the timeslot connections between the bound paths and the line board, thus ensuring that the Ethernet services are transmitted in specified timeslots over the transmission line.
5	Configuring QoS	Optional The services of different users need to share the bandwidth. If the services of different users need to be configured with different quality levels, you need to adopt the corresponding QoS scheme.
6	**7.15 Testing Ethernet Service Channels**	Required After the Ethernet services are created, test the service continuity.

Step	Operation	Remarks
7	**7.5 Setting Performance Monitoring Parameters of an NE**	Required Enable the performance monitoring function for a specific NE. Then, you can obtain detailed performance records during the operation process of this NE. These records can be used for monitoring and analyzing the running status of this NE.
8	**7.16 Backing Up the NE Database to the SCC Board**	Required Back up the NE database to ensure that the NE can be automatically recovered to normal operation after the SCC data is lost or after the equipment is powered off.

4.3.3 Flow of Configuring EPLAN Services

EPLAN services provide the customers with Layer 2 switching-based multipoint-connected LAN services.

The Ethernet switching boards are required for configuring EPLAN services. The Ethernet switching boards that support EPLAN services are provided in **Table 8-1**.

Figure 4-18 Flow of configuring EPLAN services

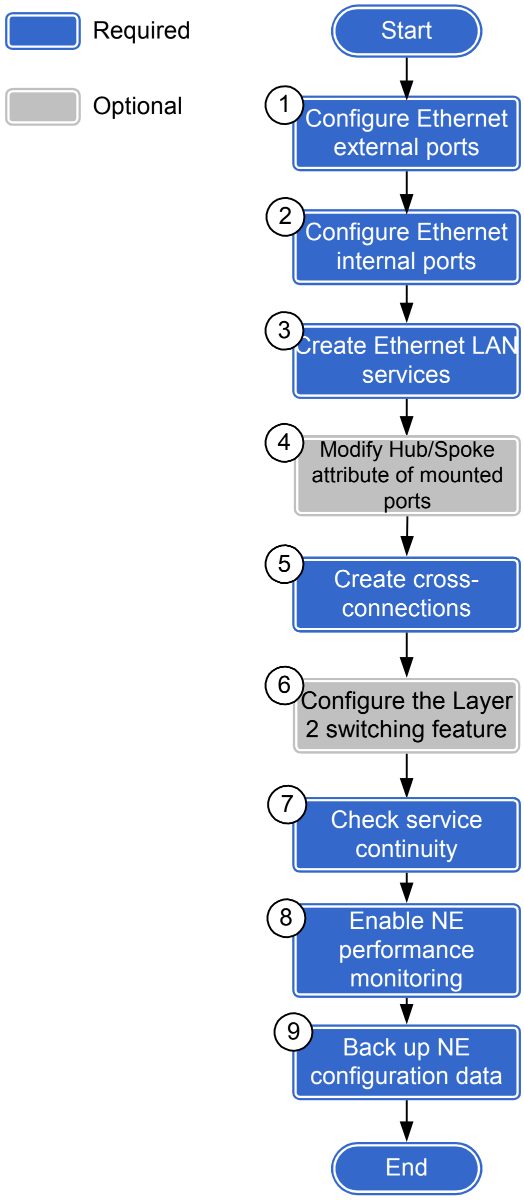


Table 4-7 Flow of configuring EPLAN services

Step	Operation	Remarks
1	7.7 Configuring External Ports on Ethernet Boards	Required When an NE accesses Ethernet services through the external ports on the Ethernet board, you need to configure the attributes of the external ports so that the external ports can work with the data communication equipment on the client side, thus ensuring the normal accessing of the Ethernet services.

Step	Operation	Remarks
2	**7.8 Configuring Internal Ports on Ethernet Boards**	Required When an NE transmits Ethernet services through the internal ports (that is, VCTRUNK ports) on the Ethernet board to the SDH side, you need to configure the attributes of the VCTRUNK ports so that the VCTRUNK ports can work with the Ethernet board on the opposite equipment. This ensures that the transmission of the Ethernet services in the SDH network is normal.
3	**7.11 Creating Ethernet LAN Services**	Required When an Ethernet switching board carries LAN services, you need to create the bridge and set the attributes of the bridge and the port mounted to the bridge.
4	Modifying Ports Mounted to the Bridge	Optional In the case of Ethernet LAN services, you can modify the Hub/Spoke attribute between access nodes from the default value of Hub to Spoke, thus disabling the communication between the access nodes; however, the communication between the access nodes and the convergence node is not disabled.
5	**7.1 Creating SDH Services**	Required This topic describes how to create the timeslot connections between the bound paths and the line board, thus ensuring that the Ethernet services are transmitted in specified timeslots over the transmission line.

Step	Operation	Remarks
6	Configuring the Layer 2 switching feature ● Creating MAC Address Entries ● Modifying Aging Time of MAC Addresses ● Configuring the Spanning Tree	Optional ● You can manually specify the port for forwarding the MAC frames to create the VLAN unicast entries and you can suppress the forwarding of certain MAC frames to create the MAC address disabled entries. The manually created MAC entries are not affected by the aging time. ● The aging time of the dynamic MAC address entries of an Ethernet switching board is five minutes by default. You can modify the aging time according to the actual requirements. ● There may be loops in the network topology of Ethernet services. Hence, the STP/RSTP protocol is enabled to prevent packets from being proliferated and endlessly cycled in the loop network.
7	**7.15 Testing Ethernet Service Channels**	Required After the Ethernet services are created, test the service continuity.
8	**7.5 Setting Performance Monitoring Parameters of an NE**	Required Enable the performance monitoring function for a specific NE. Then, you can obtain detailed performance records during the operation process of this NE. These records can be used for monitoring and analyzing the running status of this NE.
9	**7.16 Backing Up the NE Database to the SCC Board**	Required Back up the NE database to ensure that the NE can be automatically recovered to normal operation after the SCC data is lost or after the equipment is powered off.

4.3.4 Flow of Configuring EVPLAN Services

EVPLAN services of different users need to share the bandwidth. Hence, the VLAN ID or other schemes need to be used for differentiating the services of different users. If the services of different users need to be configured with different quality levels, you need to adopt the corresponding QoS scheme.

The Ethernet switching boards are required for configuring EVPLAN services. The Ethernet switching boards that support EVPLAN services are provided in **Table 8-1**.

Figure 4-19 Flow of configuring EVPLAN services

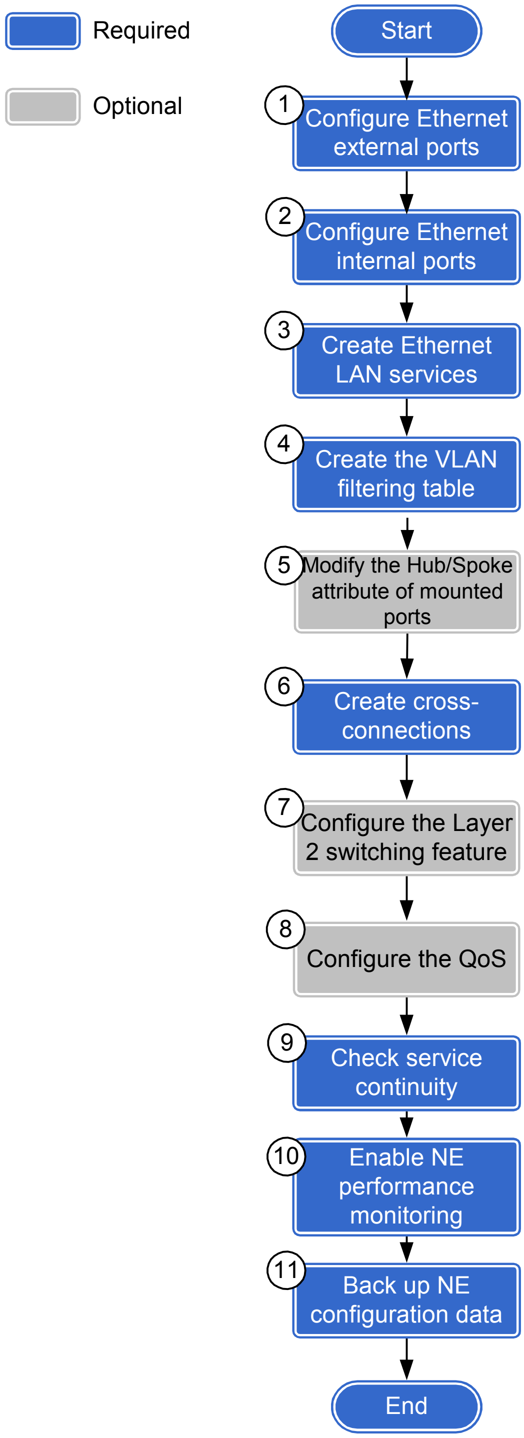


Table 4-8 Flow of configuring EVPLAN services

Step	Operation	Remarks
1	**7.7 Configuring External Ports on Ethernet Boards**	Required When an NE accesses Ethernet services through the external ports on the Ethernet board, you need to configure the attributes of the external ports so that the external ports can work with the data communication equipment on the client side, thus ensuring the normal accessing of the Ethernet services.
2	**7.8 Configuring Internal Ports on Ethernet Boards**	Required When an NE transmits Ethernet services through the internal ports (that is, VCTRUNK ports) on the Ethernet board to the SDH side, you need to configure the attributes of the VCTRUNK ports so that the VCTRUNK ports can work with the Ethernet board on the opposite equipment. This ensures that the transmission of the Ethernet services in the SDH network is normal.
3	**7.11 Creating Ethernet LAN Services**	Required When an Ethernet switching board carries LAN services, you need to create the bridge and set the attributes of the bridge and the port mounted to the bridge.
4	Creating VLAN Filtering Table	Required In the case of Ethernet LAN services, when the type of the bridge is IEEE 802.1q or IEEE 802.1ad, the VLAN filtering table needs to be created for the bridge if VLANs are used to isolate the data of different users.
5	Modifying Ports Mounted to the Bridge	Optional In the case of Ethernet LAN services, you can modify the Hub/Spoke attribute between access nodes from the default value of Hub to Spoke, thus disabling the communication between the access nodes; however, the communication between the access nodes and the convergence node is not disabled.
6	**7.1 Creating SDH Services**	Required This topic describes how to create the timeslot connections between the bound paths and the line board, thus ensuring that the Ethernet services are transmitted in specified timeslots over the transmission line.

Step	Operation	Remarks
7	Configuring the Layer 2 switching feature ● Creating MAC Address Entries ● Modifying Aging Time of MAC Addresses ● Configuring the Spanning Tree ● Enabling the IGMP Snooping Protocol	● You can manually specify the port for forwarding the MAC frames to create the VLAN unicast entries and you can suppress the forwarding of certain MAC frames to create the MAC address disabled entries. The manually created MAC entries are not affected by the aging time. ● The aging time of the dynamic MAC address entries of an Ethernet switching board is five minutes by default. You can modify the aging time according to the actual requirements. ● There may be loops in the network topology of Ethernet services. Hence, the STP/RSTP protocol is enabled to prevent packets from being proliferated and endlessly cycled in the loop network. ● When a multicast router is located on the network, the IEEE 802.1q or IEEE 802.1ad bridge can enable the IGMP Snooping protocol to work with the router, thus implementing the multicast function.
8	Configuring QoS	Optional The services of different users need to share the bandwidth. If the services of different users need to be configured with different quality levels, you need to adopt the corresponding QoS scheme.
9	**7.15 Testing Ethernet Service Channels**	Required After the Ethernet services are created, test the service continuity.
10	**7.5 Setting Performance Monitoring Parameters of an NE**	Required Enable the performance monitoring function for a specific NE. Then, you can obtain detailed performance records during the operation process of this NE. These records can be used for monitoring and analyzing the running status of this NE.
11	**7.16 Backing Up the NE Database to the SCC Board**	Required Back up the NE database to ensure that the NE can be automatically recovered to normal operation after the SCC data is lost or after the equipment is powered off.

4.4 Configuring EPL Services on an Ethernet Transparent Transmission Board

EPL services provide the point-to-point Ethernet transparent transmission solution with the bandwidth exclusively occupied. EPL services are applicable when the communication equipment that is used to access the client-side data in the transmission network does not support VLANs or when the VLAN planning must be kept secret to the network operator.

4.4.1 Networking Diagram

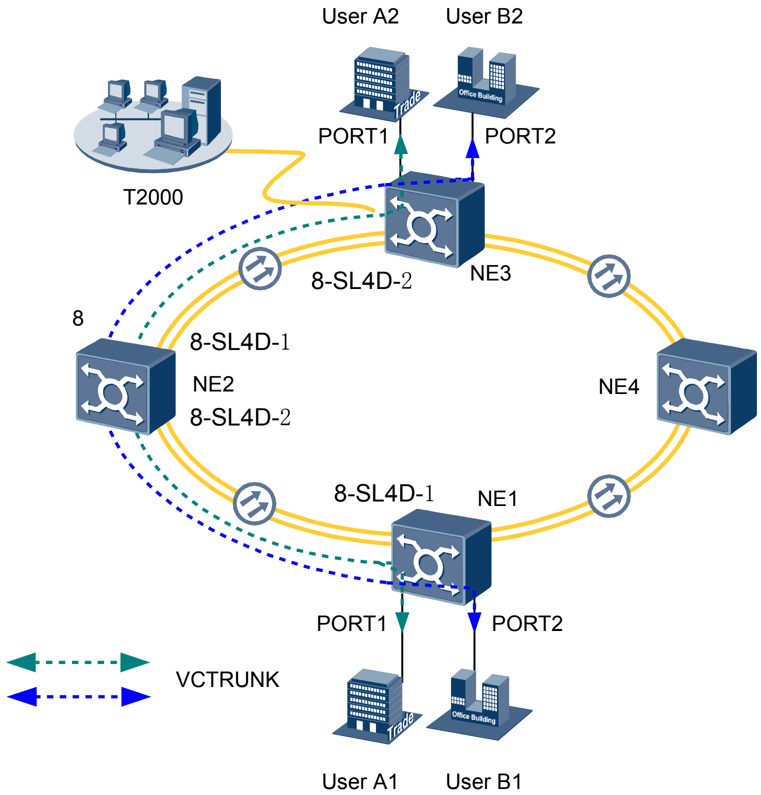
The completely isolated data services of two users at a station must be transported to another station.

Service Requirement

In the network as shown in **Figure 4-20**, the service requirements are as follows:

- The two branches of user A that are located at NE1 and NE3 need to communicate with each other over Ethernet. A 10 Mbit/s bandwidth is required.
- The two branches of user B that are located at NE1 and NE3 need to communicate with each other over Ethernet. A 20 Mbit/s bandwidth is required.
- The services of user A must be isolated from the services of user B.
- The Ethernet equipment of user A and user B provides 100 Mbit/s Ethernet ports of which the working mode is auto-negotiation, and does not support VLANs.

Figure 4-20 Networking diagram of the EPL services



Board Configuration Information

Ethernet transparent transmission boards or Ethernet switching boards can be used for configuring EPL services. In this example, NE1 and NE3 are configured with one ISU board respectively. The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The Ethernet unit of the ISU board is displayed as the EFT8 on the T2000, which occupies logical slot 7. The STM-4 optical module of the ISU board is displayed as the SL4D board on the T2000, which occupies logical slot 8.

In this example, NE1 and NE3 are each configured with one EFT8 board, which is an Ethernet transparent transmission board.

NOTE

As provided in **Table 8-1**, the Ethernet boards are classified into the Ethernet transparent transmission boards and Ethernet switching boards, based on the type of the accessed service. The transparent transmission boards support only EPL services whereas the Ethernet switching boards support EPL services, EVPL services, and Layer 2 switching.

4.4.2 Signal Flow and Timeslot Allocation

Ethernet services are received from an external port, encapsulated through an internal port, and mapped to the SDH network for transparent transmission. In this way, the node communicates with a remote node.

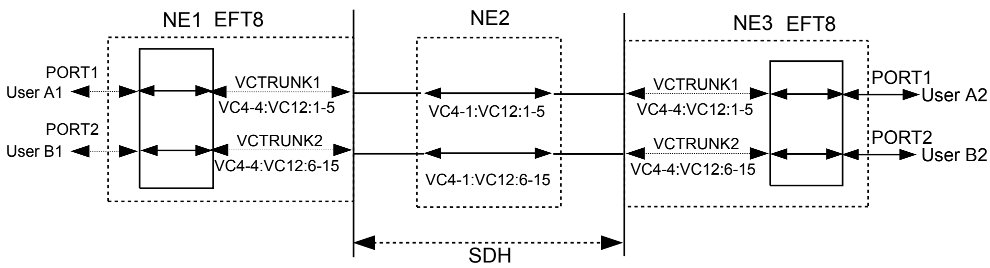
Figure 4-21 shows the signal flow and timeslot allocation of the EPL services.

For the method of calculating the bandwidth of the Ethernet services carried by a VCTRUNK, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

Figure 4-21 Signal flow and timeslot allocation (Ethernet transparent transmission board)

NOTE

The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The Ethernet unit of the ISU board is displayed as the EFT8 board on the T2000.



- The EPL services of user A:
  - Occupy the first to fifth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-5) on the SDH link between NE1 and NE3 and pass through NE2.
  - Are added and dropped by using the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFT8 board of NE1 and the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFT8 board of NE3.
- The EPL services of user B:
  - Occupy the sixth to fifteenth VC-12 timeslots of the first VC-4 (VC4-1:VC12:6-15) on the SDH link between NE1 and NE3 and pass through NE2.
  - Are added and dropped by using the sixth to fifteenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-15) on the EFT8 board of NE1 and the sixth to fifteenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-15) on the EFT8 board of NE3.

Table 4-9 Parameters of external ports on the Ethernet boards

Parameter	NE1		NE3	
Board	EFT8		EFT8	
Port	PORT1	PORT2	PORT1	PORT2
Enabled/ Disabled	Enabled	Enabled	Enabled	Enabled
Working Mode	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation
Maximum Frame Length	1522	1522	1522	1522

Table 4-10 Parameters of internal ports on the Ethernet boards

Parameter	NE1		NE3	
Board	EFT8		EFT8	
Internal Port	VCTRUNK1	VCTRUNK2	VCTRUNK1	VCTRUNK2
Mapping Protocol	GFP	GFP	GFP	GFP
Bound Path	VC4-4:VC12-1 –VC12-5	VC4-4:VC12-6 –VC12-15	VC4-4:VC12-1 –VC12-5	VC4-4:VC12-6 –VC12-15

4.4.3 Configuration Process

The Ethernet transparent transmission boards support only EPL services. The EPL are already created by default and hence you need not configure the Ethernet transparent transmission boards on the T2000.

Prerequisite

You must be familiar with **4.3.1 Flow of Configuring EPL Services**.

Background Information

By default, EPL service connections from external ports to internal ports are already created for Ethernet transparent transmission boards. The EPL service connections can be queried on the T2000, but cannot be created, modified, or deleted on the T2000.

If the Ethernet transparent transmission boards in the actual application scenarios are different from the boards in this example, you need to learn about the requirements for configuring specific boards.

- For the EPL services supported by Ethernet transparent transmission boards, see **8.1 Service Support Capability of Ethernet Boards**.
- For the VCTRUNK binding requirements of Ethernet transparent transmission boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

Procedure

Step 1 Configure the EPL services of user A1 and user B1 on NE1.

1. Set the attributes of the external ports (PORT1 and PORT2 of the EFT8 board) used by the services of user A1 and user B1.
   - In the NE Explorer, select the EFT8 and then choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.
   - Select **External Port**.
   - Click the **Basic Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabled/Disabled	PORT1: Enabled PORT2: Enabled	PORT1 is used by the service of user A1. PORT2 is used by the service of user B1. In this example, **Enabled/Disabled** is set to **Enabled** for PORT1 and PORT2.
Working Mode	PORT1: Auto-Negotiation PORT2: Auto-Negotiation	In this example, the Ethernet service access equipment of user A1 and user B1 supports the auto-negotiation mode. Hence, **Working Mode** is set to **Auto-Negotiation** for PORT1 and PORT2.
Maximum Frame Length	PORT1: 1522 PORT2: 1522	Generally, this parameter adopts the default value **1522**.
MAC Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The MAC loopback setting is used for fault diagnosis. In this example, **MAC Loopback** is set to **Non-Loopback**.
PHY Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The PHY loopback setting is used for fault diagnosis. In this example, **PHY Loopback** is set to **Non-Loopback**.

2. Set the attributes of the internal ports (VCTRUNK1 and VCTRUNK2 of the EFT8 board) used by the services of user A1 and user B1.
   - Select **Internal Port**.
   - Click the **Encapsulation/Mapping** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Mapping Protocol	VCTRUNK1: GFP VCTRUNK2: GFP	In this example, the EFS8 board is used. This parameter adopts the default value **GFP**. **Mapping Protocol** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Scramble	VCTRUNK1: Scrambling mode [X43+1] VCTRUNK2: Scrambling mode [X43+1]	In this example, this parameter adopts the default value **Scrambling mode [X43+1]**. **Scramble** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Check Field Length	VCTRUNK1: FCS32 VCTRUNK2: FCS32	In this example, this parameter adopts the default value **FCS32**. **Check Field Length** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

Parameter	Value in This Example	Description
FCS Calculated Bit Sequence	VCTRUNK1: Big endian VCTRUNK2: Big endian	When **Mapping Protocol** is set to **GFP**, **FCS Calculated Bit Sequence** is set to **Big endian**. **FCS Calculated Bit Sequence** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Extension Header Option	VCTRUNK1: No VCTRUNK2: No	When **Mapping Protocol** is set to **GFP**, this parameter is valid and adopts the default value **No**. **Extension Header Option** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

- Click the **Bound Path** tab. Click the **Configuration** button. Set the following parameters in the **Bound Path Configuration** dialog box that is displayed. Then, click **Apply**.

<table>
<tr><th>User</th><th colspan="2">Parameter</th><th>Value in This Example</th><th>Description</th></tr>
<tr><td rowspan="4">User A1←→user A2</td><td colspan="2">Configurable Ports</td><td>VCTRUNK1</td><td>As shown in Figure 4-21, VCTRUNK1 is used by the service between user A1 and user A2.</td></tr>
<tr><td rowspan="3">Available Bound Paths</td><td>Level</td><td>VC12-xv</td><td>The service between user A1 and user A2 uses a 10 Mbit/s bandwidth. Hence, five VC-12s need to be bound.
For the method of computing the bound timeslots based on the service bandwidth, see 8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards.</td></tr>
<tr><td>Service Direction</td><td>Bidirectional</td><td>The service between user A1 and user A2 is a bidirectional service.</td></tr>
<tr><td>Available Resources</td><td>VC4-4</td><td>For the resources used by the specific boards, see 8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards.</td></tr>
</table>

User	Parameter		Value in This Example	Description
		Available Timeslots	VC12-1 to VC12-5	Five VC-12s need to be bound for the service from user A1 to user A2. In this example, the first to the fifth VC-12 need to be selected in sequence.
User B1←→user B2	Configurable Ports		VCTRUNK2	As shown in **Figure 4-21**, VCTRUNK2 is used by the service between user B1 and user B2.
	Available Bound Paths	Level	VC12-xv	The service between user B1 and user B2 uses a 20 Mbit/s bandwidth. Hence, 10 VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user B1 and user B2 is a bidirectional service.
		Available Resources	VC4-4	For the resources used by the specific boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-6 to VC12-15	Ten VC-12s need to be bound for the service from user B1 to user B2. In this example, the sixth to the fifteenth VC-12 need to be selected in sequence.

3. Configure the cross-connections from the Ethernet services to the SDH links for user A1 and user B1.
   - In the NE Explorer, select NE1 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
   - Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

User	Parameter	Value in This Example	Description
User A1	Level	VC12	The timeslot bound with the service of user A1 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Service Direction	Bidirectional	The service of user A1 is a bidirectional service.
	Source Slot	7-EFT8	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source Timeslot Range(e.g. 1,3-6)	1-5	The value range of the source timeslot is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK1. In this example, the value range of **Available Timeslots** is from VC12-1 to VC12-5.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-5	The value range of the sink timeslot can be the same as or different from the value range of the source timeslot. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are five VC-12s, the sink timeslots must be five VC-12s.
	Activate Immediately	Yes	-
User B1	Level	VC12	The timeslot bound with the service of user B1 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Service Direction	Bidirectional	The service of user B1 is a bidirectional service.

User	Parameter	Value in This Example	Description
	Source Slot	7-EFT8	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source Timeslot Range(e.g. 1,3-6)	6-15	The value range of the source timeslot is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK2. In this example, the value range of **Available Timeslots** is from VC12-6 to VC12-15.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	6-15	The value range of the sink timeslot can be the same as or different from the value range of the source timeslot. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are 10 VC-12s, the sink timeslots must be 10 VC-12s.
	Activate Immediately	Yes	-

Step 2 Configure the pass-through services of user A1 and user B1 on NE2.

1. Click . Select NE2 in the **Navigation Tree** that is displayed. Then, click **OK**.
2. In the NE Explorer, select NE2 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
3. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

Parameter	Value in This Example	Description
Level	VC12	The SDH service of NE1, which passes through NE2, is at the VC-12 level.

Parameter	Value in This Example	Description
Service Direction	Bidirectional	As shown in **Figure 4-21**, the SDH service from NE1 to NE2 is a bidirectional service.
Source Slot	8-SL4D-1 (SDH-1)	As shown in **Figure 4-21**, the service signals are transmitted from 8-SL4D-1(SDH-1) to 8-SL4D-2 (SDH-2). In this example, **Source Slot** is set to **8-SL4D-1 (SDH-1)**.
Source VC4	VC4-1	VC4-1 is allocated to the service from NE1 to NE2.
Source Timeslot Range(e.g. 1,3-6)	1-15	The service between user A1 and user B1 uses timeslots 1–15.
Sink Slot	8-SL4D-2 (SDH-2)	As shown in **Figure 4-21**, the service signals are transmitted from 8-SL4D-2(SDH-2) to 8-SL4D-1 (SDH-1). In this example, **Sink Slot** is set to **8-SL4D-2 (SDH-2)**.
Sink VC4	VC4-1	It is recommended that you set **Sink Slot** to be the same as **Source Slot**.
Sink Timeslot Range(e.g. 1,3-6)	1-15	The service between user A1 and user B1 uses timeslots 1–15.
Activate Immediately	Yes	-

Step 3 Configure the EPL services of user A2 and user B2 on NE3.

Refer to Step 1 and configure the EPL services for users A2 and B2.

Step 4 Check whether the service between user A1 and user A2 and the service between user B1 and user B2 are correct. For the operation procedure, see **7.15 Testing Ethernet Service Channels**.

Step 5 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 6 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see **6.4.3 Deleting Ethernet Private Line Services**.

4.5 Configuring EPL Services on an Ethernet Switching Board

EPL services provide the point-to-point Ethernet transparent transmission solution with the bandwidth exclusively occupied. EPL services are applicable when the communication equipment that is used to access the client-side data in the transmission network does not support VLANs or when the VLAN planning must be kept secret to the network operator.

4.5.1 Networking Diagram

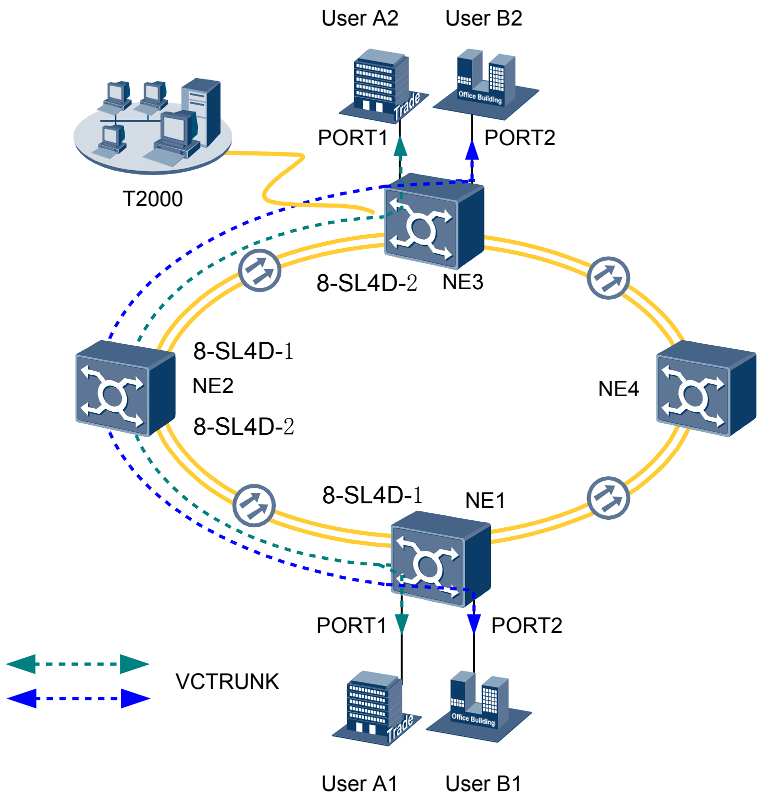
The completely isolated data services of two users at a station must be transported to another station.

Service Requirement

In the network as shown in **Figure 4-22**, the service requirements are as follows:

- The two branches of user A that are located at NE1 and NE3 need to communicate with each other over Ethernet. A 10 Mbit/s bandwidth is required.
- The two branches of user B that are located at NE1 and NE3 need to communicate with each other over Ethernet. A 20 Mbit/s bandwidth is required.
- The services of user A must be isolated from the services of user B.
- The Ethernet equipment of user A and user B provides 100 Mbit/s Ethernet ports of which the working mode is auto-negotiation, and does not support VLANs.

Figure 4-22 Networking diagram of the EPL services



Board Configuration Information

Ethernet transparent transmission boards or Ethernet switching boards can be used to configure EPL services. The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The Ethernet unit of the ISU board is displayed as the EFT8 on the T2000, which occupies logical slot 7. The STM-4 optical module is displayed as the SL4D board on the T2000, which occupies logical slot 8.

In this example, NE1 and NE3 each are configured with one EFS8 board, which is an Ethernet switching board.

NOTE

As provided in **Table 8-1**, the Ethernet boards are classified into the Ethernet transparent transmission boards and Ethernet switching boards, based on the type of the accessed service. The transparent transmission boards support only EPL services whereas the Ethernet switching boards support EPL services, EVPL services, and Layer 2 switching.

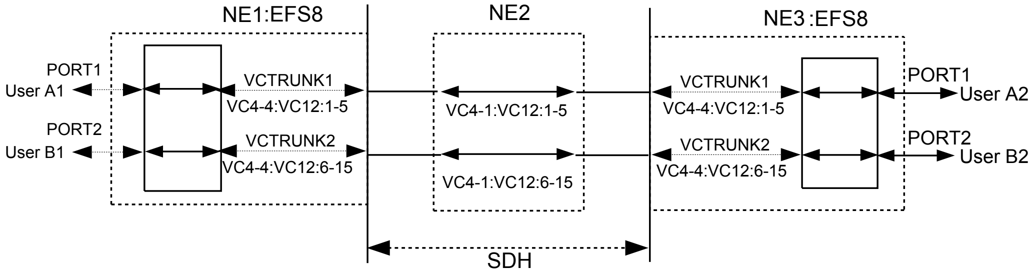
4.5.2 Signal Flow and Timeslot Allocation

Ethernet services are received from an external port, encapsulated through an internal port, and mapped to the SDH network for transparent transmission. In this way, the node communicates with a remote node.

Figure 4-23 shows the signal flow and timeslot allocation of the EPL services.

For the method of calculating the bandwidth of the Ethernet services carried by a VCTRUNK, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

Figure 4-23 Signal flow and timeslot allocation (Ethernet switching board)



- The EPL services of user A:
  - Occupy the first to fifth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-5) on the SDH link between NE1 and NE3 and pass through NE2.
  - Are added and dropped by using the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFS8 board of NE1 and the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFS8 board of NE3.
- The EPL services of user B:
  - Occupy the sixth to fifteenth VC-12 timeslots of the first VC-4 (VC4-1:VC12:6-15) on the SDH link between NE1 and NE3 and pass through NE2.
  - Are added and dropped by using the sixth to fifteenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-15) on the EFS8 board of NE1 and the sixth to fifteenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-15) on the EFS8 board of NE3.

Table 4-11 Parameters of external ports on the Ethernet boards

Parameter	NE1		NE3	
Board	EFS8		EFS8	
Port	PORT1	PORT2	PORT1	PORT2
Enabled/ Disabled	Enabled	Enabled	Enabled	Enabled
Working Mode	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation
Maximum Frame Length	1522	1522	1522	1522

Table 4-12 Parameters of internal ports on the Ethernet boards

Parameter	NE1		NE3	
Board	EFS8		EFS8	
Internal Port	VCTRUNK1	VCTRUNK2	VCTRUNK1	VCTRUNK2

Parameter	NE1		NE3	
Mapping Protocol	GFP	GFP	GFP	GFP
Bound Path	VC4-4:VC12-1–VC12-5	VC4-4:VC12-6–VC12-15	VC4-4:VC12-1–VC12-5	VC4-4:VC12-6–VC12-15
Entry Detection	Disabled	Disabled	Disabled	Disabled
Port Type	UNI	UNI	UNI	UNI

Table 4-13 Parameters of the EPL services

Parameter	EPL Services of User A	EPL Services of User B
Board	EFS8	
Service Type	EPL	
Service Direction	Bidirectional	
Source Port	PORT1	PORT2
Source C-VLAN (e.g. 1,3-6)	Null	Null
Sink Port	VCTRUNK1	VCTRUNK2
Sink C-VLAN (e.g. 1,3-6)	Null	Null

4.5.3 Configuration Process

This topic describes the process of configuring Ethernet private line services for Ethernet switching boards.

Prerequisite

You must be familiar with **4.3.1 Flow of Configuring EPL Services**.

Background Information

If the Ethernet switching boards in the actual application scenarios are different from the boards in this example, you need to learn about the requirements for configuring specific boards.

- For the EPL services supported by Ethernet switching boards, see **8.1 Service Support Capability of Ethernet Boards**.
- For the VCTRUNK binding requirements of Ethernet switching boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

Procedure

Step 1 Configure the EPL services for users A1 and B1 on NE1.

1. Set the attributes of the external ports (PORT1 and PORT2 on the EFS8 board) used by the services of users A1 and B1.

- In the NE Explorer, select the EFS8 and then choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.
- Select **External Port**.
- Click the **Basic Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabled/Disabled	PORT1: Enabled PORT2: Enabled	PORT1 is used by the service of user A1. PORT2 is used by the service of user B1. In this example, **Enabled/Disabled** is set to **Enabled** for PORT1 and PORT2.
Working Mode	PORT1: Auto-Negotiation PORT2: Auto-Negotiation	In this example, the Ethernet service access equipment of user A1 and user B1 supports the auto-negotiation mode. Hence, **Working Mode** is set to **Auto-Negotiation** for PORT1 and PORT2.
Maximum Frame Length	PORT1: 1522 PORT2: 1522	Generally, this parameter adopts the default value **1522**.
MAC Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The MAC loopback setting is used for fault diagnosis. In this example, **MAC Loopback** is set to **Non-Loopback**.
PHY Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The PHY loopback setting is used for fault diagnosis. In this example, **PHY Loopback** is set to **Non-Loopback**.

- Click the **Flow Control** tab. The parameters in the **Flow Control** tab page adopt the default values.
- Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
TAG	PORT1: Access PORT2: Access	The access equipment of user A1 and user B1 does not support the VLAN. Hence, the access equipment transmits only the packet without the VLAN tag. In this example, it is recommended that you set the TAG flags at PORT1 and PORT2 to **Access**.
Default VLAN ID	PORT1: 1 PORT2: 1	The services of user A1 and user B1 exclusively occupy the PORTs and VCTRUNKs. Hence, the VLAN ID is not required for isolating the services. In this example, **Default VLAN ID** adopts the default value.

Parameter	Value in This Example	Description
VLAN Priority	PORT1: 0 PORT2: 0	Both the VLAN ID and VLAN priority are unnecessary for users A1 and B1. In this example, **VLAN Priority** adopts the default value.
Entry Detection	PORT1: Disabled PORT2: Disabled	The services of user A1 and user B1 are EPL transparent transmission services. Hence, you need not enable the entry detection function to check the VLAN tags of the packets. In this example, **Entry Detection** need to be set to **Disabled**. When **Entry Detection** is set to **Disabled**, the parameters of **TAG**, **Default VLAN ID**, and **VLAN Priority** are invalid.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

2. Set the attributes of the internal ports (VCTRUNK1 and VCTRUNK2 of the EFS8 board) used by the services of user A1 and user B1.

- Select **Internal Port**.
- Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Entry Detection	VCTRUNK1: Disabled VCTRUNK2: Disabled	The services of user A1 and user B1 are EPL transparent transmission services. Hence, you need not enable the entry detection function to check the VLAN tags of the packets. In this example, **Entry Detection** need to be set to **Disabled**. When **Entry Detection** is set to **Disabled**, the parameters of **TAG**, **Default VLAN ID**, and **VLAN Priority** are invalid.

- Click the **Network Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Port Type	VCTRUNK1: UNI VCTRUNK1: UNI	UNI indicates the user-network interface, namely, the interface of the service provider located near the user side. The UNI interface processes the tag attribute of IEEE 802.1Q-compliant packets. That is, the UNI interface processes and identifies the VLAN information of the accessed user packets, according to the supported tag flag, namely, **Tag Aware**, **Access**, and **Hybrid**.

- Click the **Encapsulation/Mapping** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Mapping Protocol	VCTRUNK1: GFP VCTRUNK2: GFP	In this example, the EFS8 board is used. This parameter adopts the default value **GFP**. **Mapping Protocol** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Scramble	VCTRUNK1: Scrambling mode [X43+1] VCTRUNK2: Scrambling mode [X43+1]	In this example, this parameter adopts the default value **Scrambling mode [X43+1]**. **Scramble** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Check Field Length	VCTRUNK1: FCS32 VCTRUNK2: FCS32	In this example, this parameter adopts the default value **FCS32**. **Check Field Length** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
FCS Calculated Bit Sequence	VCTRUNK1: Big endian VCTRUNK2: Big endian	When **Mapping Protocol** is set to **GFP**, **FCS Calculated Bit Sequence** is set to **Big endian**. **FCS Calculated Bit Sequence** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Extension Header Option	VCTRUNK1: No VCTRUNK2: No	When **Mapping Protocol** is set to **GFP**, this parameter is valid and adopts the default value **No**. **Extension Header Option** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

- Click the **Bound Path** tab. Click the **Configuration** button. Set the following in the **Bound Path Configuration** dialog box that is displayed. Then, click **Apply**.

User	Parameter		Value in This Example	Description
User A1←→user A2	Configurable Ports		VCTRUNK1	As shown in **Figure 4-23**, VCTRUNK1 is used by the service between user A1 and user A2.
	Available Bound Paths	Level	VC12-xv	The service between user A1 and user A2 uses a 10 Mbit/s bandwidth. Hence, five VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

User	Parameter		Value in This Example	Description
		Service Direction	Bidirectional	The service between user A1 and user A2 is a bidirectional service.
		Available Resources	VC4-4	The fourth VC-4 of the EFS8 board can be bound with VC-12s. In this example, **Available Resources** is set to **VC4-4**. For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-1 to VC12-5	Five VC-12s need to be bound for the service from user A1 to user A2. In this example, the first to the fifth VC-12s need to be selected in sequence.
User B1←→user B2	Configurable Ports		VCTRUNK2	As shown in **Figure 4-23**, VCTRUNK2 is used by the service between user B1 and user B2.
	Available Bound Paths	Level	VC12-xv	The service between user B1 and user B2 uses a 20 Mbit/s bandwidth. Hence, 10 VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user B1 and user B2 is a bidirectional service.
		Available Resources	VC4-4	The fourth VC-4 of the EFS8 board can be bound with VC-12s. In this example, **Available Resources** is set to **VC4-4**. For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

User	Parameter		Value in This Example	Description
		Available Time slots	VC12-6 to VC12-15	Ten VC-12s need to be bound for the service from user B1 to user B2. In this example, the sixth to the fifteenth VC-12s need to be selected in sequence.

3. Configure the Ethernet private line services for user A1 and user B1.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Service** > **Ethernet Line Service** from the Function Tree.
   - Click **New** on the lower-right pane to display the **Create Ethernet Line Service** dialog box. Set the following parameters, and then click **OK**. The **Operation Result** dialog box is displayed, indicating that the operation is successful. Click **Close**.

User	Parameter	Value in This Example	Description
User A1	Service Type	EPL	The service of user A1 is an EPL service.
	Service Direction	Bidirectional	The service of user A1 is a bidirectional service.
	Source Port	PORT1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific PORT as the source port. In this example, the service of user A1 occupies PORT1.
	Source C-VLAN (e.g. 1, 3–6)	Blank	In this example, the EPL service does not carry the VLAN tag.
	Sink Port	VCTRUNK1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific VCTRUNK as the sink port. In this example, the service of user A1 occupies VCTRUNK1.
	Sink C-VLAN (e.g. 1, 3–6)	Blank	In this example, the EPL service does not carry the VLAN tag.
User B1	Service Type	EPL	The service of user B1 is an EPL service.
	Service Direction	Bidirectional	The service of user B1 is a bidirectional service.

User	Parameter	Value in This Example	Description
	Source Port	PORT2	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific PORT as the source port. In this example, the service of user B1 occupies PORT2.
	Source C-VLAN (e.g. 1, 3–6)	Blank	In this example, the EPL service does not carry the VLAN tag.
	Sink Port	VCTRUNK2	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific VCTRUNK as the sink port. In this example, the service of user B1 occupies VCTRUNK2.
	Sink C-VLAN (e.g. 1, 3–6)	Blank	In this example, the EPL service does not carry the VLAN tag.

4. Configure the cross-connections from the Ethernet services to the SDH links for user A1 and user B1.
   - In the NE Explorer, select NE1 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
   - Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

User	Parameter	Value in This Example	Description
User A1	Level	VC12	The timeslot bound with the service of user A1 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Service Direction	Bidirectional	The service of user A1 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK1. In the case of VCTRUNK1, the value of **Available Resources** is VC4-4.

User	Parameter	Value in This Example	Description
	Source Timeslot Range(e.g. 1,3-6)	1-5	The value range of the source timeslots is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK1. In this example, the value range of **Available Timeslots** is from VC12-1 to VC12-5.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-5	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are five VC-12s, the sink timeslots must be five VC-12s.
	Activate Immediately	Yes	-
User B1	Level	VC12	The timeslot bound with the service of user B1 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Service Direction	Bidirectional	The service of user B1 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK2. In the case of VCTRUNK2, the value of **Available Resources** is VC4-4.

User	Parameter	Value in This Example	Description
	Source Timeslot Range(e.g. 1,3-6)	6-15	The value range of the source timeslots is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK2. In this example, the value range of **Available Timeslots** is from VC12-6 to VC12-15.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	6-15	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are 10 VC-12s, the sink timeslots must be 10 VC-12s.
	Activate Immediately	Yes	-

Step 2 Configure the EPL services for users A1 and B1 on NE2.

1. Click . Select NE2 in the **Navigation Tree** that is displayed. Then, click **OK**.
2. In the NE Explorer, select NE2, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
3. Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

Parameter	Value in This Example	Description
Level	VC12	The SDH service of NE1, which passes through NE2, is at the VC-12 level.
Service Direction	Bidirectional	As shown in **Figure 4-23**, the SDH service from NE1 to NE2 is a bidirectional service.

Parameter	Value in This Example	Description
Source Slot	8-SL4D-1 (SDH-1)	As shown in **Figure 4-23**, the service signals are transmitted from 8-SL4D-1(SDH-1) to 8-SL4D-2 (SDH-2). In this example, **Source Slot** is set to **8-SL4D-1 (SDH-1)**.
Source VC4	VC4-1	VC4-1 is allocated to the service from NE1 to NE2.
Source Timeslot Range(e.g. 1,3-6)	1-15	The service between user A1 and user B1 uses timeslots 1–15.
Sink Slot	8-SL4D-2 (SDH-2)	As shown in **Figure 4-23**, the service signals are transmitted from 8-SL4D-1(SDH-1) to 8-SL4D-2 (SDH-2). In this example, **Sink Slot** is set to **8-SL4D-2 (SDH-2)**.
Sink VC4	VC4-1	It is recommended that you set **Sink Slot** to be the same as **Source Slot**.
Sink Timeslot Range(e.g. 1,3-6)	1-15	The service between user A1 and user B1 uses timeslots 1–15.
Activate Immediately	Yes	-

Step 3 Configure the EPL services for users A2 and B3 on NE3.

Refer to Step 1 and configure the EPL services for users A2 and B2. The parameter values of user A2 and user B2 must be consistent with the parameter values of user A1 and user B1.

Step 4 Check whether the service between user A1 and user A2 and the service between user B1 and user B2 are correct. For the operation procedure, see **7.15 Testing Ethernet Service Channels**.

Step 5 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 6 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see **6.4.3 Deleting Ethernet Private Line Services**.

4.6 Configuring PORT-Shared EVPL (VLAN) Services

The PORT-shared EVPL (VLAN) service is applicable when the services of multiple users received from the same external port on the Ethernet board at a station are transmitted on different VCTRUNKs to another station or to another external port of the station.

4.6.1 Networking Diagram

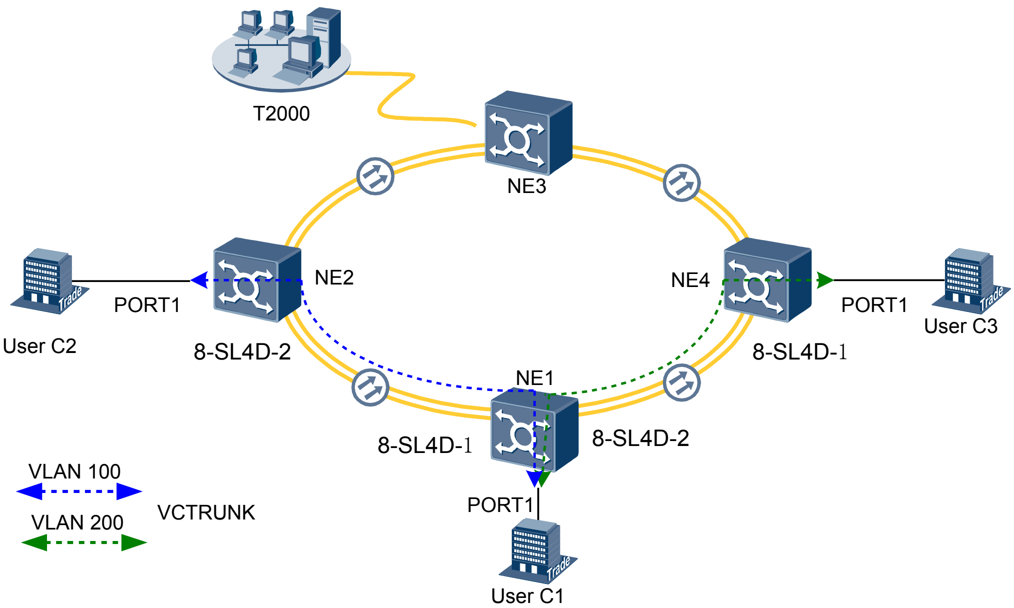
The services of multiple users received from the same external port on an Ethernet board of a station are transmitted to different stations on different VCTRUNKs.

Service Requirement

In the network as shown in **Figure 4-24**, the service requirements are as follows:

- The headquarters C1 of user C is located at NE1. Two branches (C2 and C3) of user C are located at NE2 and NE4. The services between C1 and C2 are transmitted in the VLAN of which the VLAN ID is 100. The services between C1 and C3 are transmitted in the VLAN of which the VLAN ID is 200.
- The services of C2 are isolated from the services of C3. The services of C2 and C3 require a 20 Mbit/s bandwidth respectively.
- The Ethernet equipment of C1, C2, and C3 provides 100 Mbit/s Ethernet electrical interfaces that work in auto-negotiation mode. The Ethernet equipment of C1 supports VLANs, but the Ethernet equipment of C2 and C3 does not support VLANs.
  - The VLAN ID used by the Ethernet services between C1 and C2 is 100.
  - The VLAN ID used by the Ethernet services between C1 and C3 is 200.

Figure 4-24 Networking diagram for configuring PORT-shared EVPL (VLAN) services



Board Configuration Information

In this example, NE1 is configured with an EFS8 board. VLAN IDs are used to isolate the data of different users received from the same port. NE2 and NE4 are each configured with an EFT8 board. The EPL services are configured to implement service transparent transmission from NE2 and NE4 to NE1. The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The Ethernet unit of the ISU board is displayed as the EFT8 on the T2000, which occupies logical slot 7. The STM-4 optical module is displayed as the SL4D board on the T2000, which occupies logical slot 8.

In this example, NE1 is configured with an EFS8 board. NE2 and NE4 are each configured with an EFT8 board.

NOTE

As provided in **Table 8-1**, the Ethernet boards are classified into the Ethernet transparent transmission boards and Ethernet switching boards, based on the type of the accessed service. The transparent transmission boards support only EPL services whereas the Ethernet switching boards support EPL services, EVPL services, and Layer 2 switching.

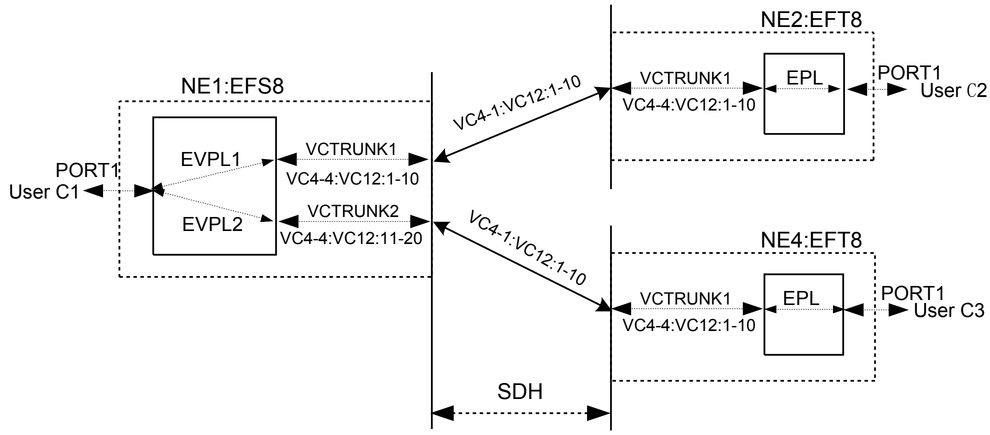
4.6.2 Signal Flow and Timeslot Allocation

Ethernet services wherein different VLAN IDs are used to isolate the data of different users are received from the same external port of NE1, encapsulated through an internal port, and transparently transmitted on the SDH network. In this way, the node communicates with a remote node.

Figure 4-25 shows the signal flow of the PORT-shared EVPL (VLAN) services and the timeslot allocation to the PORT-shared EVPL (VLAN) services .

For the method of calculating the bandwidth of the Ethernet services carried by a VCTRUNK, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

Figure 4-25 Signal flow and timeslot allocation



- The EVPL service from C1 to C2:
  - Occupies the first to tenth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-10) on the SDH link from NE1 to NE2.
  - Is added and dropped by using the first to tenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-10) on the EFS8 board of NE1 and the first to tenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-10) on the EFT8 board of NE2.
- The EVPL service from C1 to C3:
  - Occupies the first to tenth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-10) on the SDH link from NE1 to NE4.
  - Is added and dropped by the using the eleventh to twentieth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:11-20) on the EFS8 board of NE1 and the first to tenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-10) on the EFT8 board of NE4.

Table 4-14 Parameters of external ports on the Ethernet boards

Parameter	NE1	NE2	NE4
Board	EFS8	EFT8	EFT8
Port	PORT1	PORT1	PORT1
Enabled/Disabled	Enabled	Enabled	Enabled
Working Mode	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation
Maximum Frame Length	1522	1522	1522
TAG	Tag Aware	-	-

Table 4-15 Parameters of internal ports on the Ethernet boards

Parameter	NE1		NE2	NE4
Board	EFS8		EFT8	EFT8
Port	VCTRUNK1	VCTRUNK2	VCTRUNK1	VCTRUNK1
Mapping Protocol	GFP	GFP	GFP	GFP
TAG	Access	Access	-	-
Entry Detection	Enabled	Enabled	-	-
Default VLAN ID	100	200	-	-
VLAN Priority	0	0	-	-
Bound Path	VC4-4:VC12-1 to VC12-10	VC4-4:VC12-11 to VC12-20	VC4-4:VC12-1 to VC12-10	VC4-4:VC12-1 to VC12-10
Port Type	UNI	UNI	-	-

Table 4-16 Parameters of the PORT-shared EVPL (VLAN) services

Parameter	NE1	
	EVPL1 (PORT1←→VCTRUNK1)	EVPL2 (PORT1←→VCTRUNK2)
Board	EFS8	
Service Type	EVPL	
Service Direction	Bidirectional	
Source Port	PORT1	PORT1
Source C-VLAN (e.g. 1,3-6)	100	200
Sink Port	VCTRUNK1	VCTRUNK2
Sink C-VLAN (e.g. 1,3-6)	100	200

4.6.3 Configuration Process

Ethernet switching boards are required for creating EVPL services of different VLAN IDs on NE1. In this way, the data of different users received from the same external port can be differentiated. Ethernet transparent transmission boards are required for creating EPL transparent transmission services on NE2 and NE4.

Prerequisite

You must be familiar with **4.3.2 Flow of Configuring EVPL Services**.

Background Information

If the Ethernet boards in the actual application scenarios are different from the boards in this example, you need to learn about the requirements for configuring specific boards.

- For the EVPL services supported by Ethernet switching boards, see **8.1 Service Support Capability of Ethernet Boards**.
- For the VCTRUNK binding requirements of Ethernet switching boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

Procedure

Step 1 Configure the EVPL services for user C1 on NE1.

1. Set the attributes of the external port (PORT1 of the EFS8 board) used by the service of user C1.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.
   - Select **External Port**.
   - Click the **Basic Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabled/Disabled	PORT1: Enabled	The service of user C1 occupies PORT1. In this example, **Enabled/Disabled** is set to **Enable**.
Working Mode	PORT1: Auto-Negotiation	The Ethernet service access equipment of user C1 supports the auto-negotiation mode. In this example, **Working Mode** is set to **Auto-Negotiation**.
Maximum Frame Length	PORT1: 1522	Generally, this parameter adopts the default value **1522**.
MAC Loopback	PORT1: Non-Loopback	The MAC loopback setting is used for fault diagnosis. In this example, **MAC Loopback** is set to **Non-Loopback**.
PHY Loopback	PORT1: Non-Loopback	The PHY loopback setting is used for fault diagnosis. In this example, **PHY Loopback** is set to **Non-Loopback**.

   - Click the **Flow Control** tab. The parameters in the **Flow Control** tab page adopt the default values.
   - Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
TAG	PORT1: Tag Aware	When the port is set to **Tag Aware**, all data frames transmitted and received at the port must have VLAN tags. In this example, **TAG** is set to **Tag Aware**.
Default VLAN ID	-	When **TAG** is set to **Tag Aware**, you need not set **Default VLAN ID**.
VLAN Priority	-	When **TAG** is set to **Tag Aware**, you need not set **VLAN Priority**.
Entry Detection	PORT1: Enabled	The equipment of user C1 supports VLANs. Hence, the entry detection function must be enabled to check the VLAN tag. In this way, the user data frames with different VLAN tags can be distinguished at one port. In this example, **Entry Detection** of PORT1 is set to **Enabled**.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

2. Set the attributes of the internal ports (VCTRUNK1 and VCTRUNK2 of the EFS8 board) used by the services between user C1 and user C2 and between user C1 and user C3.
   - Select **Internal Port**.
   - Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
TAG	VCTRUNK1: Access VCTRUNK2: Access	This parameter is set to **Access** if the Ethernet equipment of users C2 and C3 does not support VLANs and if the transmitted packets do not carry VLAN tags.
Default VLAN ID	VCTRUNK1: 100 VCTRUNK2: 200	According to the plan, the VLAN ID is set to 100 on the transmission network side for Ethernet services between user C1 and user C2. The VLAN ID is set to 200 on the transmission network side for Ethernet services between user C1 and user C3.
VLAN Priority	VCTRUNK1: 0 VCTRUNK2: 0	In this example, this parameter adopts the default value.

Parameter	Value in This Example	Description
Entry Detection	VCTRUNK1: Enabled VCTRUNK2: Enabled	VCTRUNK1 is used by the service between user C1 and user C2. VCTRUNK2 is used by the service between user C1 and user C3. Then, you need to enable the entry detection function to detect the VLAN tags of the received packets.

- Click the **Network Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Port Type	VCTRUNK1: UNI VCTRUNK2: UNI	UNI indicates the user-network interface, namely, the interface of the service provider located near the user side. The UNI interface processes the tag attribute of IEEE 802.1Q-compliant packets. That is, the UNI interface processes and identifies the VLAN information of the accessed user packets, according to the supported tag flag, namely, **Tag Aware**, **Access**, and **Hybrid**.

- Click the **Encapsulation/Mapping** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Mapping Protocol	VCTRUNK1: GFP VCTRUNK2: GFP	**Mapping Protocol** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Scramble	VCTRUNK1: Scrambling mode [X43+1] VCTRUNK2: Scrambling mode [X43+1]	In this example, this parameter adopts the default value **Scrambling mode [X43+1]**.
Check Field Length	VCTRUNK1: FCS32 VCTRUNK2: FCS32	In this example, this parameter adopts the default value **FCS32**. **Check Field Length** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
FCS Calculated Bit Sequence	VCTRUNK1: Big endian VCTRUNK2: Big endian	When **Mapping Protocol** is set to **GFP**, **FCS Calculated Bit Sequence** is set to **Big endian**. **FCS Calculated Bit Sequence** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

Parameter	Value in This Example	Description
Extension Header Option	VCTRUNK1: No VCTRUNK2: No	When **Mapping Protocol** is set to **GFP**, this parameter is valid and adopts the default value **No**. **Extension Header Option** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

- Click the **Bound Path** tab. Click the **Configuration** button. Set the following parameters in the **Bound Path Configuration** dialog box that is displayed. Then, click **Apply**.

User	Parameter		Value in This Example	Description
User C1←→ user C2	Configurable Ports		VCTRUNK1	As shown in **Figure 4-25**, VCTRUNK1 is used by the service between user C1 and user C2.
	Available Bound Paths	Level	VC12-xv	The service between user C1 and user C2 uses a 20 Mbit/s bandwidth. Hence, 10 VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user C1 and user C2 is a bidirectional service.
		Available Resources	VC4-4	Select **VC4-4**. For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-1 to VC12-10	Ten VC-12s need to be bound. In this example, the first to the tenth VC-12s need to be selected in sequence.
User C1←→ user C3	Configurable Ports		VCTRUNK2	As shown in **Figure 4-25**, VCTRUNK2 is used by the service between user C1 and user C3.

	Available Bound Paths	Level	VC12-xv	The service between user C1 and user C3 uses a 20 Mbit/s bandwidth. Hence, one VC-12 needs to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user C1 and user C3 is a bidirectional service.
		Available Resources	VC4-4	Select **VC4-4**. For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-11 to VC12-20	Ten VC-12s need to be bound. In this example, the eleventh to the twentieth VC-12s need to be selected in sequence.

3. Configure the Ethernet private line services between user C1 and user C2 and between user C1 and user C3.
   - In the NE Explorer, select the EFS8 board and then choose **Configuration** > **Ethernet Service** > **Ethernet Line Service** from the Function Tree.
   - Click **New** on the lower-right pane to display the **Create Ethernet Line Service** window. Set the following parameters and then click **OK**. The **Operation Result** dialog box is displayed, indicating that the operation is successful. Click **Close**.

User	Parameter	Value in This Example	Description
User C1←→user C2	Service Type	EPL	The service between user C1 and C2 is a point-to-point Ethernet private line service.
	Service Direction	Bidirectional	The service between user C1 and user C2 is a bidirectional service.
	Source Port	PORT1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific PORT as the source port. **PORT1** is the external port used by the service between user C1 and user C2.

User	Parameter	Value in This Example	Description
	Source C-VLAN (e.g. 1, 3–6)	100	According to the plan, the VLAN ID is set to 100 for the Ethernet service between user C1 and user C2.
	Sink Port	VCTRUNK1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific VCTRUNK as the sink port. **VCTRUNK1** is the internal port used by the service between user C1 and user C2.
	Sink C-VLAN (e.g. 1, 3–6)	100	According to the plan, the VLAN ID is set to 100 for the Ethernet service between user C1 and user C2.
User C1←→user C3	Service Type	EPL	The service between user C1 and C3 is a point-to-point Ethernet private line service.
	Service Direction	Bidirectional	The service between user C1 and user C3 is a bidirectional service.
	Source Port	PORT1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific PORT as the source port. PORT1 is the external port used by the service between user C1 and user C3.
	Source C-VLAN (e.g. 1, 3–6)	200	According to the plan, the VLAN ID is set to 200 for the Ethernet service between user C1 and user C3.
	Sink Port	VCTRUNK2	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific VCTRUNK as the sink port. **VCTRUNK2** is the internal port used by the service between user C1 and user C2.
	Sink C-VLAN (e.g. 1, 3–6)	200	According to the plan, the VLAN ID is set to 200 for the Ethernet service between user C1 and user C3.

4. Configure the cross-connections from the Ethernet service between user C1 and user C2 to the SDH link and the Ethernet service between user C1 and user C3 to the SDH link.
   - In the NE Explorer, select NE1 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
   - Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

User	Parameter	Value in This Example	Description
User C1←→ user C2	Level	VC12	The timeslots bound with the service between user C1 and user C2 is at the VC-12 level. The service level must be consistent with the level of the paths bound with the VCTRUNK.
	Service Direction	Bidirectional	The service between user C1 and user C2 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK1. In this example, **Source VC4** is set to **VC4-4**.
	Source Timeslot Range(e.g. 1,3-6)	1-10	The value range of the source timeslots is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK1. In this example, the value range of **Available Timeslots** is from VC12-1 to VC12-10.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-10	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are 10 VC-12s, the sink timeslots must be 10 VC-12s.
	Activate Immediately	Yes	-

User	Parameter	Value in This Example	Description
User C1←→ user C3	Level	VC12	The timeslots bound with the service between user C1 and user C3 is at the VC-12 level. The service level must be consistent with the level of the paths bound with the VCTRUNK.
	Service Direction	Bidirectional	The service between user C1 and user C3 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK1. In this example, **Source VC4** is set to **VC4-4**.
	Source Timeslot Range(e.g. 1,3-6)	11-20	The value range of the source timeslots is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK2. In this example, the value range of **Available Timeslots** is from VC12-11 to VC12-20.
	Sink Slot	8-SL4D-2 (SDH-2)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-10	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are 10 VC-12s, the sink timeslots must be 10 VC-12s.
	Activate Immediately	Yes	-

Step 2 Configure the EPL services on NE2 and NE4.

NOTE

The Ethernet services of NE2 and NE4 are point-to-point transparent transmission services. See **4.4 Configuring EPL Services on an Ethernet Transparent Transmission Board** to set the parameters.

Step 3 Check whether the services are configured correctly. For the operation procedures, see **7.15 Testing Ethernet Service Channels**.

- Before testing the service connectivity between headquarters C1 and branch C2, set **TAG** of PORT1 on the EFS8 board to **Access** and **Default VLAN ID** to **100**.
- Before testing the service connectivity between headquarters C1 and branch C3, set **TAG** of PORT1 on the EFS8 board to **Access** and **Default VLAN ID** to **200**.

NOTE

After the test, change the modified parameter values to the values specified in the service configuration.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see **6.4.3 Deleting Ethernet Private Line Services**.

4.7 Configuring VCTRUNK-Shared EVPL (VLAN) Services

When the data of multiple users without VLAN tags sent to a transmission network is transmitted on the same VCTRUNK, the VCTRUNK-shared EVPL (VLAN) service is used to isolate the data by adding VLAN tags. In this way, the bandwidth is shared on the SDH side.

The data of multiple Ethernet users received from the same station is transmitted on the same VCTRUNK and isolated by using different VLAN IDs. In this way, the bandwidth is shared on the SDH side.

The services of multiple users that are received from different external ports on an Ethernet board are tagged with different VLAN IDs and then transmitted on the same VCTRUNK. In this way, the data of different users is isolated. After the data arrives at the sink node, the VLAN tags are stripped.

Ethernet switching boards are required on both the source and sink nodes for creating EVPL services of different VLAN IDs. In this way, the packets received from different external ports are added with different VLAN tags. As a result, the packets are isolated when they are transmitted on the same VCTRUNK.

4.7.1 Networking Diagram

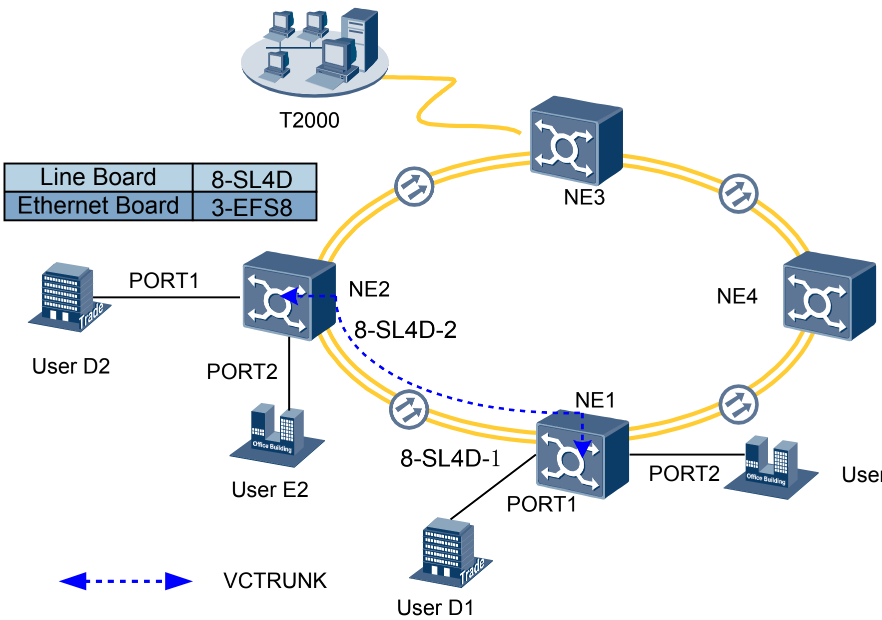
The data of multiple Ethernet users received from the same station is transmitted on the same VCTRUNK and isolated by using different VLAN IDs. In this way, the bandwidth is shared on the SDH side.

Service Requirement

In the network as shown in **Figure 4-26**, the service requirements are as follows:

- Two branches of user D are located at NE1 and NE2, and need to communicate with each other.
- Two branches of user E are located at NE1 and NE2, and need to communicate with each other.
- The services of user D need to be isolated from the services of user E. The traffic of user D and user E, however, are complementary in terms of time and can share a 20 Mbit/s bandwidth.
- The Ethernet equipment of user D and user E provides 100 Mbit/s Ethernet ports of which the working mode is auto-negotiation, and does not support VLAN tags.

Figure 4-26 Networking diagram for configuring VCTRUNK-shared EVPL (VLAN) services



Board Configuration Information

The Ethernet switching boards that support EVPL services are provided in **Table 8-1**.

In this example, NE1 and NE2 each are configured with an EFS8 board. Different VLAN IDs are used to isolate the data of different users transmitted on the same VCTRUNK. The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The Ethernet unit of the ISU board is displayed as the EFT8 on the T2000, which occupies logical slot 7. The STM-4 optical module is displayed as the SL4D board on the T2000, which occupies logical slot 8.

In this example, NE1 and NE2 each are configured with one EFS8 board, which is an Ethernet switching board.

- When the data of user D arrives at the transmission network, the VLAN ID of 100 is added to the data. When the data leaves the transmission network, the VLAN tag is stripped.
- When the data of user E arrives at the transmission network, the VLAN ID of 200 is added to the data. When the data leaves the transmission network, the VLAN tag is stripped.

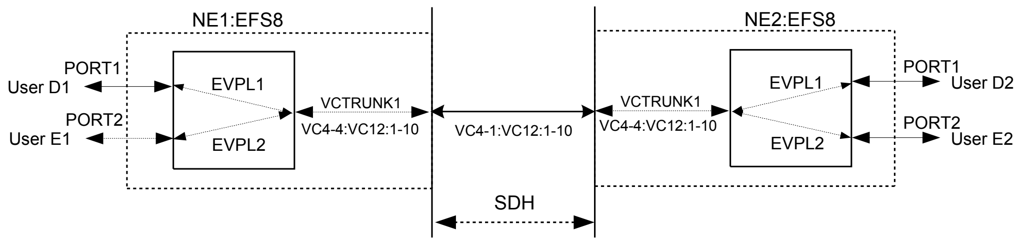
4.7.2 Signal Flow and Timeslot Allocation

The services of multiple users that are received from different external ports on an Ethernet board are tagged with different VLAN IDs and then transmitted on the same VCTRUNK. In this way, the data of different users is isolated. After the data arrives at the sink node, the VLAN tags are stripped.

Figure 4-27 shows the signal flow of the VCTRUNK-shared EVPL (VLAN) services and the timeslot allocation to the VCTRUNK-shared EVPL (VLAN) services.

For the method of calculating the bandwidth of the Ethernet services carried by a VCTRUNK, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

Figure 4-27 Signal flow and timeslot allocation



- The EVPL services of user D and user E that share VCTRUNK1 occupy the first to tenth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-10) on the SDH link from NE1 to NE2.
- The services are added and dropped by using the first to tenth VC-12 timeslots of the eight VC-4 (VC4-1:VC12:1-10) on the EFS8 board of NE1 and the first to tenth VC-12 timeslots of the fourth VC-4 (VC4-1:VC12:1-10) on the EFS8 board of NE2.

Table 4-17 Parameters of external ports on the Ethernet boards

Parameter	NE1		NE2	
Board	EFS8		EFS8	
Port	PORT1	PORT2	PORT1	PORT2
Enabled/ Disabled	Enabled	Enabled	Enabled	Enabled

Parameter	NE1		NE2	
Working Mode	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation
Maximum Frame Length	1522	1522	1522	1522
TAG	Access	Access	Access	Access
Entry Detection	Enabled	Enabled	Enabled	Enabled
Default VLAN ID	100	200	100	200
VLAN Priority	0	0	0	0

Table 4-18 Parameters of internal ports on the Ethernet boards

Parameter	NE1	NE2
Board	EFS8	EFS8
Port	VCTRUNK1	VCTRUNK1
Mapping Protocol	GFP	GFP
TAG	Tag Aware	Tag Aware
Entry Detection	Enabled	Enabled
Bound Path	VC4-4:VC12-1–VC12-10	VC4-4:VC12-1–VC12-10
Port Type	UNI	UNI

Table 4-19 Parameters of the VCTRUNK-shared EVPL (VLAN) services

Parameter	NE1		NE2	
	EVPL1 **PORT1←→VCTRUNK1**	**EVPL2** **PORT2←→VCTRUNK1**	**EVPL1** **PORT1←→VCTRUNK1**	**EVPL2** **PORT2←→VCTRUNK1**
Board	EFS8		EFS8	
Service Type	EVPL		EVPL	
Service Direction	Bidirectional		Bidirectional	
Source Port	PORT1	PORT2	PORT1	PORT2
Source C-VLAN (e.g. 1,3-6)	100	200	100	200
Sink Port	VCTRUNK1	VCTRUNK1	VCTRUNK1	VCTRUNK1

Parameter	NE1		NE2	
	EVPL1 PORT1←→VCTRUNK1	EVPL2 PORT2←→VCTRUNK1	EVPL1 PORT1←→VCTRUNK1	EVPL2 PORT2←→VCTRUNK1
Sink C-VLAN (e.g. 1,3-6)	100	200	100	200

4.7.3 Configuration Process

Ethernet switching boards are required on both the source and sink nodes for creating EVPL services of different VLAN IDs. In this way, the packets received from different external ports are added with different VLAN tags. As a result, the packets are isolated when they are transmitted on the same VCTRUNK.

Prerequisite

You must be familiar with **4.3.2 Flow of Configuring EVPL Services**.

Background Information

If the Ethernet boards in the actual application scenarios are different from the boards in this example, you need to learn about the requirements for configuring specific boards.

- The Ethernet switching boards that support EVPL services are provided in **8.1 Service Support Capability of Ethernet Boards**.
- For the VCTRUNK binding requirements of Ethernet switching boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

Procedure

Step 1 Configure the EVPL services for users D1 and E1 on NE1.

1. Set the attributes of the external ports (PORT1 and PORT2 of the EFS8 board) used by the service of user D1 and user E1.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.
   - Select **External Port**.
   - Click the **Basic Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabled/Disabled	PORT1: Enabled PORT2: Enabled	The service of user D1 occupies PORT1 and the service of user E1 occupies PORT2. In this example, **Enabled/Disabled** is set to **Enabled**.

Parameter	Value in This Example	Description
Working Mode	PORT1: Auto-Negotiation PORT2: Auto-Negotiation	The Ethernet access equipment of user D1 and user E1 supports the auto-negotiation mode. **Working Mode** of PORT1 and PORT2 is set to **Auto-Negotiation**.
Maximum Frame Length	PORT1: 1522 PORT2: 1522	Generally, this parameter adopts the default value **1522**.
MAC Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The MAC loopback setting is used for fault diagnosis. In this example, **MAC Loopback** is set to **Non-Loopback**.
PHY Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The PHY loopback setting is used for fault diagnosis. In this example, **PHY Loopback** is set to **Non-Loopback**.

- Click the **Flow Control** tab. The parameters in the **Flow Control** tab page adopt the default values.
- Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
TAG	PORT1: Access PORT2: Access	This parameter is set to **Access** if the Ethernet equipment of user D2 and user E1 does not support VLANs and if the transmitted packets do not carry VLAN tags.
Default VLAN ID	PORT1: 100 PORT2: 200	According to the plan, the VLAN ID is set to 100 on the transmission network side for Ethernet services between user D1 and user D2. The VLAN ID is set to 200 on the transmission network side for Ethernet services between user E1 and user E2.
VLAN Priority	PORT1: 0 PORT2: 0	In this example, this parameter adopts the default value.
Entry Detection	PORT1: Enabled PORT2: Enabled	If the equipment of users D1 and E1 does not support VLANs, you need to enable the entry detection function to detect wether the received packets contain VLAN tags. In this case, **Entry Detection** is set to **Enabled**.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

2. Set the attributes of the internal port (VCTRUNK1 on the EFS8 board) used by the services between user D1 and user D2 and between E1 and user E2.

- Select **Internal Port**.
- Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
TAG	VCTRUNK1: Tag Aware	When the port is set to **Tag Aware**, all data frames transmitted and received at the port must have VLAN tags. In this example, **TAG** is set to **Tag Aware**.
Default VLAN ID	-	When **TAG** is set to **Tag Aware**, you need not set **Default VLAN ID**.
VLAN Priority	-	When **TAG** is set to **Tag Aware**, you need not set **VLAN Priority**.
Entry Detection	VCTRUNK1: Enabled	VCTRUNK1 is used by the service between user D1 and user D2 and the service between user E1 and user E2. Then, you need to enable the entry detection function to detect the VLAN tags of the received packets.

- Click the **Network Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Port Type	VCTRUNK1: UNI	UNI indicates the user-network interface, namely, the interface of the service provider located near the user side. The UNI interface processes the tag attribute of IEEE 802.1Q-compliant packets. That is, the UNI interface processes and identifies the VLAN information of the accessed user packets, according to the supported tag flag, namely, **Tag Aware**, **Access**, and **Hybrid**.

- Click the **Encapsulation/Mapping** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Mapping Protocol	VCTRUNK1: GFP	**Mapping Protocol** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Scramble	VCTRUNK1: Scrambling mode [X43+1]	In this example, this parameter adopts the default value **Scrambling mode [X43+1]**. **Scramble** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

Parameter	Value in This Example	Description
Check Field Length	VCTRUNK1: FCS32	In this example, this parameter adopts the default value **FCS32**. **Check Field Length** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
FCS Calculated Bit Sequence	VCTRUNK1: Big endian	When **Mapping Protocol** is set to **GFP**, **FCS Calculated Bit Sequence** is set to **Big endian**. **FCS Calculated Bit Sequence** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Extension Header Option	VCTRUNK1: No	When **Mapping Protocol** is set to **GFP**, this parameter is valid and adopts the default value **No**. **Extension Header Option** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

- Click the **Bound Path** tab. Click the **Configuration** button. Set the following parameters in the **Bound Path Configuration** dialog box that is displayed. Then, click **Apply**.

User	Parameter		Value in This Example	Description
User D1←→user D2 User E1←→user E2	Configurable Ports		VCTRUNK1	As shown in **Figure 4-27**, VCTRUNK1 is used by the service between user D1 and user D2 and the service between user E1 and user E2.
	Available Bound Paths	Level	VC12-xv	The service between user D1 and user D2 and the service between user E1 and user E2 share a 20 Mbit/s bandwidth. Ten VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user D1 and user D2 and the service between user E1 and user E2 are bidirectional services.

User	Parameter		Value in This Example	Description
		Available Resources	VC4-4	Select **VC4-4**. For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-1 to VC12-10	Ten VC-12s need to be bound. In this example, the first to the tenth VC-12s need to be selected in sequence.

3. Configure the Ethernet private line services between user D1 and user D2 and between user E1 and user E2.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Service** > **Ethernet Line Service** from the Function Tree.
   - Click **New** on the lower-right pane to display the **Create Ethernet Line Service** window. Set the following parameters and then click **OK**. The **Operation Result** dialog box is displayed, indicating that the operation is successful. Click **Close**.

User	Parameter	Value in This Example	Description
User D1←→user D2	Service Type	EPL	The service between user D1 and user D2 is a point-to-point EVPL service.
	Service Direction	Bidirectional	The service between user D1 and user D2 is a bidirectional service.
	Source Port	PORT1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific PORT as the source port. In this example, PORT1 is the external port used by the service between user D1 and user D2.
	Source C-VLAN (e.g. 1, 3–6)	100	According to the plan, the VLAN ID is set to 100 on the transmission network side for Ethernet service between user D1 and user D2.
	Sink Port	VCTRUNK1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific VCTRUNK as the sink port. In this example, VCTRUNK1 is the internal port used by the service between user D1 and user D2.

User	Parameter	Value in This Example	Description
	Sink C-VLAN (e.g. 1, 3–6)	100	According to the plan, the VLAN ID is set to 100 on the transmission network side for Ethernet services between user D1 and user D2.
User E1←→user E2	Service Type	EPL	The service between user E1 and E2 is a point-to-point Ethernet private line service.
	Service Direction	Bidirectional	The service between user E1 and user E2 is a bidirectional service.
	Source Port	PORT2	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific PORT as the source port. In this example, PORT2 is the external port used by the service between user E1 and user E2.
	Source C-VLAN (e.g. 1, 3–6)	200	According to the plan, the VLAN ID is set to 200 on the transmission network side for Ethernet service between user E1 and user E2.
	Sink Port	VCTRUNK1	When creating the bidirectional Ethernet service from a PORT to a VCTRUNK, it is recommended that you use a specific VCTRUNK as the sink port. In this example, VCTRUNK1 is the internal port used by the service between user E1 and user E2.
	Sink C-VLAN (e.g. 1, 3–6)	200	According to the plan, the VLAN ID is set to 200 on the transmission network side for Ethernet service between user E1 and user E2.

4. Configure the cross-connections from the Ethernet services to the SDH links for user D1 and user E1.
   - In the NE Explorer, select NE1 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
   - Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

User	Parameter	Value in This Example	Description
User D1←→user D2 user E1←→user E2	Level	VC12	The timeslots bound with the service between user D1 and user D2 and the service between user E1 and user E2 are at the VC-12 level. The service level must be consistent with the level of the paths bound with the VCTRUNK.

User	Parameter	Value in This Example	Description
	Service Direction	Bidirectional	The service between user D1 and user D2 and the service between user E1 and user E2 are bidirectional services.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK1. In this example, **Source VC4** is set to **VC4-4**.
	Source Timeslot Range(e.g. 1,3-6)	1-10	The value range of the source timeslots is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK1. In this example, the value range of **Available Timeslots** is from VC12-1 to VC12-10.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-10	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of sink timeslots must be, however, consistent with the number of sink timeslots.
	Activate Immediately	Yes	-

Step 2 Configure the EVPL service on NE2.

Refer to **Step 1** and configure the EVPL service of NE2.

Step 3 Check whether the services are configured correctly. For the operation procedures, see **7.15 Testing Ethernet Service Channels**.

- Test the service connectivity between user D1 and user D2.
- Test the service connectivity between user E1 and user E2.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see **6.4.3 Deleting Ethernet Private Line Services**.

4.8 Configuring EPLAN Services (IEEE 802.1d Bridge)

The EPLAN service (IEEE 802.1d bridge) provides a LAN solution for multipoint-to-multipoint convergence. This service applies where the user-side data communication equipment connected to the transmission network does not support VLANs or where the VLAN planning is kept secret from the network operator.

4.8.1 Networking Diagram

The convergence node needs to exchange Ethernet services with two access nodes at Layer 2. The two access nodes need not communicate with each other.

Service Requirement

In the network as shown in **Figure 4-28**, the service requirements are as follows:

- Three branches (F1, F2, and F3) of user F are located at NE1, NE2, and NE4. F1 needs to communicate with F2 and F3, and requires a 10 Mbit/s bandwidth for communication with each branch.
- The Ethernet equipment of user F provides 100 Mbit/s Ethernet electrical interfaces that work in auto-negotiation mode and support VLANs. The VLAN IDs and the number of VLANs, however, are unknown and may change.

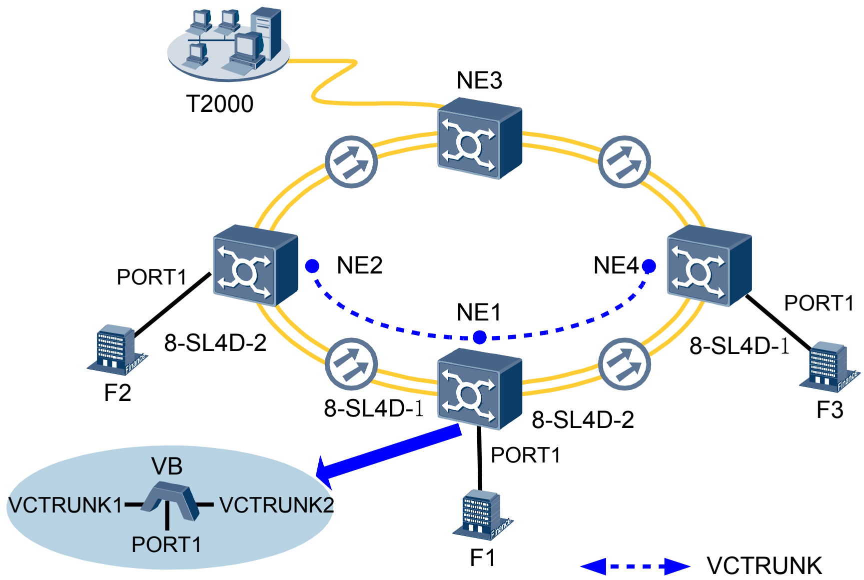
NOTE

The application scenarios where one branch needs to communicate with other branches are as follows:

- Branches F2 and F3 need to communicate with each other.
- Branches F2 and F3 need not communicate with each other.

If branches F2 and F3 need to communicate with each other, skip **Step 1.4**.

Figure 4-28 Networking diagram for configuring EPLAN services (IEEE 802.1d bridge)



Board Configuration Information

For the EPLAN (IEEE 802.1d bridge) services supported by Ethernet switching boards, refer to **Table 8-1**.

In this example, the convergence node NE1 is configured with an EFS8 board that supports the IEEE 802.1d bridge to implement EPLAN services wherein user VLANs are not limited.

The access nodes NE2 and NE4 each are configured with an EFT8 board. The EPL services are configured to be transparently transmitted from NE2 and NE4 to NE1.

The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The Ethernet unit of the ISU board is displayed as the EFT8 on the T2000, which occupies logical slot 7. The STM-4 optical module is displayed as the SL4D board on the T2000, which occupies logical slot 8.

NOTE

As provided in **Table 8-1**, the Ethernet boards are classified into the Ethernet transparent transmission boards and Ethernet switching boards, based on the type of the accessed service. The transparent transmission boards support only EPL services whereas the Ethernet switching boards support EPL services, EVPL services, and Layer 2 switching.

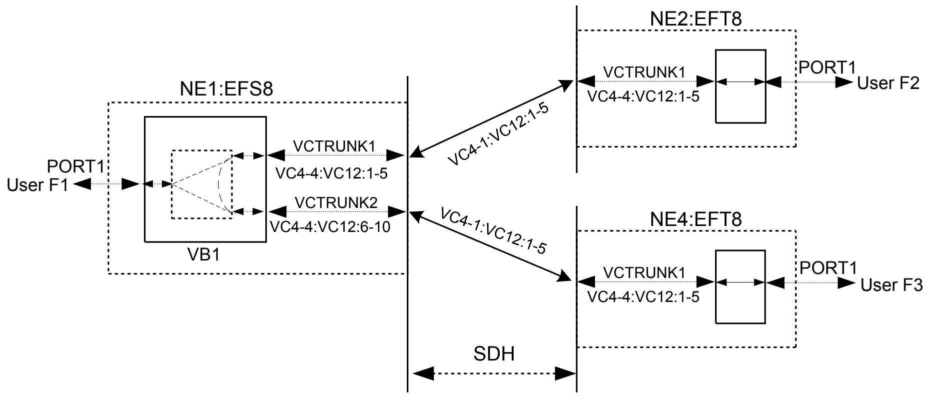
4.8.2 Signal Flow and Timeslot Allocation

The Ethernet services of the convergence node are received from an external port, forwarded to an internal port through Layer 2 switching, encapsulated, and transparently transmitted on the SDH network. In this way, the node communicates with a remote node.

Figure 4-29 shows the signal flow of the EPLAN services (IEEE 802.1d bridge) and the timeslot allocation to the EPLAN services (IEEE 802.1d bridge).

For the method of calculating the bandwidth of the Ethernet services carried by a VCTRUNK, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

Figure 4-29 Signal flow of and timeslot allocation



- The Ethernet LAN service of user F occupies the first to fifth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-5) on the SDH link from NE1 to NE2 and the first to fifth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-5) on the SDH link from NE1 to NE4.
- The Ethernet LAN service from NE1 to NE2 is added and dropped by using the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFS8 board of NE1 and the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFT8 board of NE2.
- The Ethernet LAN service from NE1 to NE4 is added and dropped by using the sixth to tenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-10) on the EFS8 board of NE1 and the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFT8 board of NE4.

Table 4-20 Parameters of external ports on the Ethernet boards

Parameter	NE1	NE2	NE4
Board	EFS8	EFT8	EFT8
Port	PORT1	PORT1	PORT1
Enabled/Disabled	Enabled	Enabled	Enabled
Working Mode	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation

Parameter	NE1	NE2	NE4
Maximum Frame Length	1522	1522	1522
Entry Detection	Enabled	-	-
TAG	Tag Aware	-	-

Table 4-21 Parameters of internal ports on the Ethernet boards

Parameter	NE1		NE2	NE4
Board	EFS8		EFT8	EFT8
Port	VCTRUNK1	VCTRUNK2	VCTRUNK1	VCTRUNK1
Mapping Protocol	GFP	GFP	GFP	GFP
Entry Detection	Enabled	Enabled	-	-
TAG	Tag Aware	Tag Aware	-	-
Bound Path	VC4-4:VC12-1–VC12-5	VC4-4:VC12-6–VC12-10	VC4-4:VC12-1–VC12-5	VC4-4:VC12-1–VC12-5
Port Type	UNI	UNI	-	-

Table 4-22 Parameters of Ethernet LAN services (IEEE 802.1d bridge)

Parameter		Ethernet LAN Service of NE1
Board		EFS8
VB Name		VB1
Bridge Type		IEEE 802.1d
Bridge Switch Mode		SVL/Ingress Filter Disable
Bridge Learning Mode		SVL
Ingress Filter		Disabled
VB Mount Port		PORT1, VCTRUNK1, VCTRUNK2
Hub/Spoke	PORT1	Hub
	VCTRUNK1	Spoke
	VCTRUNK2	Spoke

4.8.3 Configuration Process

At the convergence node NE1, you need to create an EPLAN service (IEEE 802.1d bridge). At the access nodes NE2 and NE4, you need to configure only transparent transmission EPL services.

Prerequisite

You must be familiar with **4.3.3 Flow of Configuring EPLAN Services**.

Background Information

If the Ethernet boards in the actual application scenarios are different from the boards in this example, you need to learn about the requirements for configuring specific boards.

- For the EPLAN services supported by Ethernet switching boards, see **8.1 Service Support Capability of Ethernet Boards**.
- For the VCTRUNK binding requirements of Ethernet switching boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

Procedure

Step 1 Configure the EPLAN services for users F1, F2, and F3 on NE1.

1. Set the attributes of the external port (PORT1 of the EFS8 board) used by the service of user F1.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.
   - Select **External Port**.
   - Click the **Basic Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabled / Disabled	PORT1: Enabled	In this example, PORT1 carries the services and is set to **Enabled**.
Working Mode	PORT1: Auto-Negotiation	The Ethernet service access equipment of user F1 supports the auto-negotiation mode. In this example, **Working Mode** is set to **Auto-Negotiation**.
Maximum Frame Length	PORT1: 1522	Generally, this parameter adopts the default value **1522**.
MAC Loopback	PORT1: Non-Loopback	The MAC loopback setting is used for fault diagnosis. In this example, **MAC Loopback** is set to **Non-Loopback**.

Parameter	Value in This Example	Description
PHY Loopback	PORT1: Non-Loopback	The PHY loopback setting is used for fault diagnosis. In this example, **PHY Loopback** is set to **Non-Loopback**.

- Click the **Flow Control** tab. The parameters in the **Flow Control** tab page adopt the default values.
- Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Entry Detection	PORT1: Enabled	If the packets of user F1 carry VLAN tags, you need to enable the entry detection function to detect the VLAN tags of packets. In this example, **Entry Detection** is set to **Enabled**.
TAG	PORT1: Tag Aware	The service access equipment of user F1 supports VLANs and the transmitted data frames carry VLAN tags. In this example, **Tag** is set to **Tag Aware** for PORT1.
Default VLAN ID	-	When **TAG** is set to **Tag Aware**, you need not set **Default VLAN ID**.
VLAN Priority	-	When **TAG** is set to **Tag Aware**, you need not set **VLAN Priority**.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

2. Set the attributes of the internal ports (VCTRUNK1 and VCTRUNK2 of the EFS8 board) used by the services of user F2 and user F3 on NE1.
   - Select **Internal Port**.
   - Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Entry Detection	VCTRUNK1: Enabled VCTRUNK2: Enabled	If the packets of user F2 and user F3 carry VLAN tags, you need to enable the entry detection function to detect the VLAN tags of the packets. In this example, **Entry Detection** is set to **Enabled**.
TAG	VCTRUNK1: Tag Aware VCTRUNK2: Tag Aware	The service access equipment of user F2 and user F3 supports VLANs and the transmitted data frames carry VLAN tags. In this example, **Tag** is set to **Tag Aware** for VCTRUNK1 and VCTRUNK2.

Parameter	Value in This Example	Description
Default VLAN ID	-	When **TAG** is set to **Tag Aware**, you need not set **Default VLAN ID**.
VLAN Priority	-	When **TAG** is set to **Tag Aware**, you need not set **VLAN Priority**.

- Click the **Network Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Port Type	VCTRUNK1: UNI VCTRUNK2: UNI	UNI indicates the user-network interface, namely, the interface of the service provider located near the user side. The UNI interface processes the tag attribute of IEEE 802.1Q-compliant packets. That is, the UNI interface processes and identifies the VLAN information of the accessed user packets, according to the supported tag flags, namely **Tag Aware**, **Access**, and **Hybrid**.

- Click the **Encapsulation/Mapping** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Mapping Protocol	VCTRUNK1: GFP VCTRUNK2: GFP	In this example, the EFS4 board is used. This parameter adopts the default value **GFP**. **Mapping Protocol** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Scramble	VCTRUNK1: Scrambling mode [X43+1] VCTRUNK2: Scrambling mode [X43+1]	In this example, this parameter adopts the default value **Scrambling mode [X43+1]**. **Scramble** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Check Field Length	VCTRUNK1: FCS32 VCTRUNK2: FCS32	In this example, this parameter adopts the default value **FCS32**. **Check Field Length** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

Parameter	Value in This Example	Description
FCS Calculated Bit Sequence	VCTRUNK1: Big endian VCTRUNK2: Big endian	When **Mapping Protocol** is set to **GFP**, **FCS Calculated Bit Sequence** is set to **Big endian**. **FCS Calculated Bit Sequence** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Extension Header Option	VCTRUNK1: No VCTRUNK2: No	When **Mapping Protocol** is set to **GFP**, this parameter is valid and adopts the default value **No**. **Extension Header Option** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

- This operation is optional. Click the **LCAS** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabling LCAS	VCTRUNK1: Enabled VCTRUNK2: Enabled	In this example, the LCAS function is enabled.
LCAS Mode	VCTRUNK1: Huawei Mode VCTRUNK2: Huawei Mode	In this example, this parameter adopts the default value **Huawei Mode**. When Huawei equipment is used at both ends, **LCAS Mode** of the equipment at both ends is set to **Huawei Mode**.
Hold off Time (ms)	VCTRUNK1: 2000 VCTRUNK2: 2000	In this example, this parameter adopts the default value **2000**. This parameter can also be set according to the requirement of the user.
WTR Time(s)	VCTRUNK1: 300 VCTRUNK2: 300	In this example, this parameter adopts the default value **300**. This parameter can also be set according to the requirement of the user.
TSD	VCTRUNK1: Disabled VCTRUNK2: Disabled	In this example, the TSD function is disabled. The LCAS does not check the B3 bit error or BIP status of the VCTRUNK members.

- Click the **Bound Path** tab. Click the **Configuration** button. Set the following parameters in the **Bound Path Configuration** dialog box that is displayed. Then, click **Apply**.

User	Parameter	Value in This Example	Description
User F1←	Configurable Ports	VCTRUNK1	As shown in Figure 4-29, VCTRUNK1 of the EFS8 board is used by the service between user F1 and user F2.

User	Parameter		Value in This Example	Description
→user F2	Available Bound Paths	Level	VC12-xv	The service between user F1 and user F2 uses a 10 Mbit/s bandwidth. Hence, five VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user F1 and user F2 is a bidirectional service.
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-1 to VC12-5	Five VC-12s need to be bound for the service between user F1 and user F2. In this example, the first to the fifth VC-12s need to be selected in sequence.
User F1←→user F3	Configurable Ports		VCTRUNK2	As shown in **Figure 4-29**, VCTRUNK2 of the EFS8 board is used by the service between user F1 and user F3.
	Available Bound Paths	Level	VC12	The service between user F1 and user F3 uses a 10 Mbit/s bandwidth. Hence, five VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user F1 and user F3 is a bidirectional service.

User	Parameter		Value in This Example	Description
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-6 to VC12-10	Five VC-12s need to be bound for the service between user F1 and user F3. In this example, the sixth to the tenth VC-12s need to be selected in sequence.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

3. Create a bridge for the EFS8 board on NE1.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree.
   - Click **New**.
   - Set the parameters in the **Create Ethernet LAN Service** dialog box that is displayed.

Parameter	Value in This Example	Description
VB Name	VB1	This parameter is a character string used to describe the bridge. It is recommended that you set this parameter to a character string that contains the information about the detailed application of the bridge.
VB Type	802.1d	The IEEE 802.1d MAC bridge learns and forwards the packets according to the MAC addresses of the user packets. The information in the VLAN tags of the user packets, however, is not considered in the learning and forwarding process. The IEEE 802.1d MAC bridge is used when the entire information of the VLANs used by the client cannot be learned or when the data between the VLANs of the client need not be isolated.

Parameter	Value in This Example	Description
Bridge Switch Mode	SVL/Ingress Filter Disable	When the bridge adopts the SVL learning mode, all the VLANs share the same MAC address table. That is, the bridge learns and forwards the packets according to the MAC addresses of the user packets only. The information in the VLAN tags of the user packets, however, is not considered in the learning and forwarding process.
Bridge Learning Mode	SVL	-
Ingress Filter	Disabled	The IEEE 802.1d MAC bridge does not detect the VLAN tags of the received packets.

- Click **Configure Mount**.
- In the **Available Mounted Ports** window, select PORT1, VCTRUNK1, and VCTRUNK2. Then, click .
- Click **OK**.
- In the **Create Ethernet LAN Service** dialog box, click **OK**.

4. Change the Hub/Spoke attribute of the port that is mounted to the bridge.

NOTE

If normal communication is required between user F2 and user F3, go to **Step 1.5**.

- Select the created bridge and click the **Service Mount** tab.
- Change the Hub/Spoke attribute of the port that is mounted to the bridge. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Hub/Spoke	PORT1: Hub VCTRUNK1: Spoke VCTRUNK2: Spoke	If user F1 needs to communicate with user F2 and user F3, PORT1 that accesses the services of user F1 is set to **Hub**. A port of the **Hub** attribute can communicate with a port of the **Spoke** or **Hub** attribute. If user F2 need not communicate with user F3, set the two VCTRUNKs that receive the services of users F2 and F3 to **Spoke**. Ports of the **Spoke** attribute cannot communicate with each other.

5. Configure the cross-connections from Ethernet services (between user F1 to user F2 and between user F1 to user F3) to the SDH links.
   - In the NE Explorer, select NE1 and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
   - Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

User	Parameter	Value in This Example	Description
User F1←→user F2	Level	VC12	The timeslot bound with the service between user F1 and user F2 is at the VC-12 level. The service level must be consistent with the level of the paths bound with the VCTRUNK.
	Direction	Bidirectional	The service between user F1 and user F2 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK1. In the case of VCTRUNK1, the value of **Available Resources** is VC4-4.
	Source Timeslot Range(e.g. 1,3-6)	1-5	The value range of the source timeslots is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK1. In this example, the value range of **Available Timeslots** is from VC12-1 to VC12-5.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-5	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are five VC-12s, the sink timeslots must be five VC-12s.
	Activate Immediately	Yes	-

User	Parameter	Value in This Example	Description
User F1←→user F3	Level	VC12	The timeslot bound with the service between user F1 and user F3 is at the VC-12 level. The service level must be consistent with the level of the paths bound with the VCTRUNK.
	Direction	Bidirectional	The service between user F1 and user F3 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK2. In the case of VCTRUNK2, the value of **Available Resources** is VC4-4.
	Source Timeslot Range(e.g. 1,3-6)	6-10	The value range of the source timeslots is consistent with the value range of **Available Timeslots**, which is set for the paths bound with VCTRUNK2. In this example, the value range of **Available Timeslots** is from VC12-6 to VC12-10.
	Sink Slot	8-SL4D-2 (SDH-2)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-5	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are five VC-12s, the sink timeslots must be five VC-12s.
	Activate Immediately	Yes	-

Step 2 Configure the EPL services on NE2 and NE4.

NOTE

The Ethernet services of NE2 and NE4 are point-to-point transparent transmission EPL services. See **4.4 Configuring EPL Services on an Ethernet Transparent Transmission Board** to set the parameters.

Step 3 Check whether the services are configured correctly. For the operation procedures, see **7.15 Testing Ethernet Service Channels**.

- Before testing the service connectivity between F1 and F2, set **TAG** to **Access** and set **Default VLAN ID** to **1** for PORT1 and VCTRUNK1, which receive the services of F1 and F2 respectively, on the EFS4 board.
- Before testing the service connectivity between F1 and F3, set **TAG** to **Access** and **Default VLAN ID** to **1** for PORT1 and VCTRUNK2, which receive the services of F1 and F3 respectively, on the EFS4 board.

NOTE

After the test, change the modified parameter values to the values specified in the service configuration.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see **6.4.4 Deleting EPLAN Services**.

4.9 Configuring EVPLAN Services (IEEE 802.1q Bridge)

The EVPLAN service (IEEE 802.1q bridge) provides an LAN solution for multipoint-to-multipoint convergence. This service applies in cases where user-side data communication equipment connected to the transmission network does not support VLANs or where the VLAN planning is open to the network operator.

4.9.1 Networking Diagram
The convergence node needs to exchange Ethernet services with two access nodes at Layer 2. LAN services of the two users (H and G) need to be isolated.

4.9.2 Signal Flow and Timeslot Allocation
The Ethernet services of the convergence node are received from an external port and tagged with the corresponding VLAN IDs. After the services are forwarded to an internal port through Layer 2 switching, the VLAN IDs are stripped and then the services are transparently transmitted in the SDH network. In this way, the node communicates with a remote node.

4.9.3 Configuration Process
At the convergence node NE1, you need to create An EVPLAN service (IEEE 802.1q bridge) and a VLAN filtering table need to be created for the convergence node NE1. The access nodes NE2 and NE4 need to be configured with EPL transparent transmission services only.

4.9.1 Networking Diagram

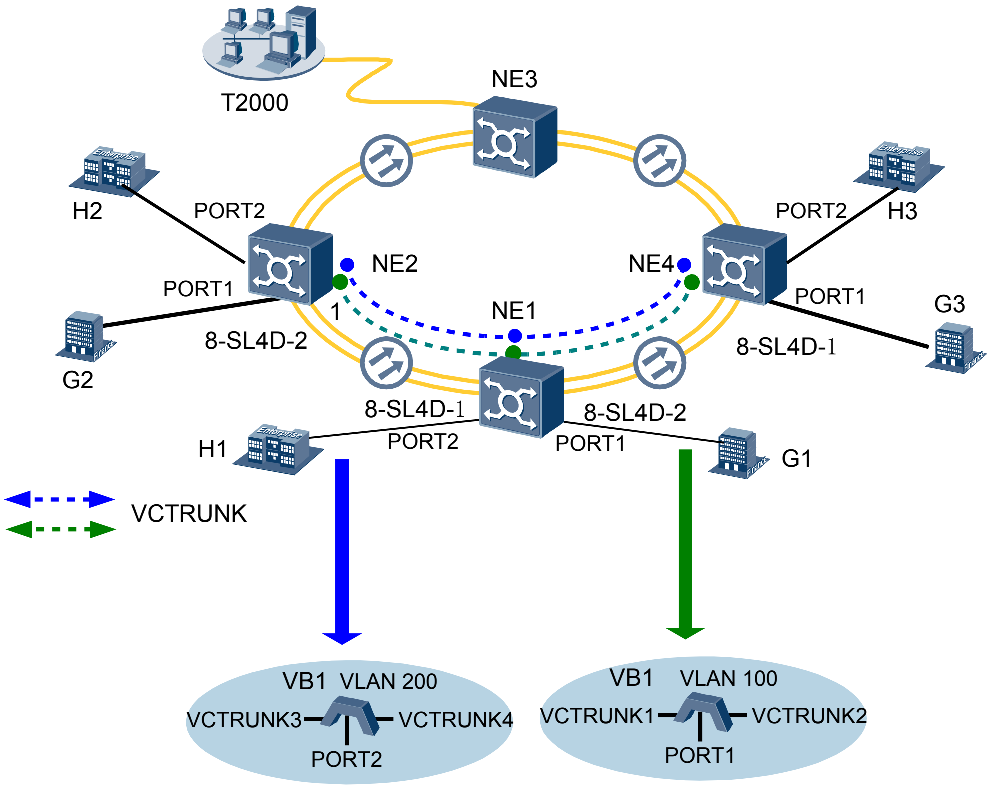
The convergence node needs to exchange Ethernet services with two access nodes at Layer 2. LAN services of the two users (H and G) need to be isolated.

Service Requirement

In the network shown in **Figure 4-30**, the service requirements are as follows:

- Three branches (G1, G2, and G3) of user G are located at NE1, NE2, and NE4 respectively. The branches need to form a LAN and share a 10 Mbit/s bandwidth. G2 and G3 do not need to communicate with each other.
- Three branches (H1, H2, and H3) of user H are located at NE1, NE2, and NE4 respectively. The branches need form a LAN and share a 20 Mbit/s bandwidth.
- The service of user G needs to be isolated from the service of user H.
- The Ethernet equipment of user G and user H provides 100 Mbit/s Ethernet electrical interfaces that work in auto-negotiation mode and do not support VLANs.

Figure 4-30 Networking diagram for configuring EVPLAN services (IEEE 802.1q bridge)



Board Configuration Information

For the EVPLAN (IEEE 802.1q bridge) services supported by Ethernet switching boards, refer to **Table 8-1**.

In this example, the convergence node NE1 is configured with an EFS8 board that supports the IEEE 802.1q bridge to implement EVPLAN services in which user data is isolated.

The access nodes NE2 and NE4 each are configured with an Ethernet transparent transmission board respectively. The EPL services are configured to implement transparent transmission from NE2 and NE4 to NE1.

The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The data transparent transmission unit of the ISU board is displayed as EFT8 on the NMS and occupies logical slot 7. The STM-4 optical interface module of the ISU board is displayed as SL4D on the NMS and occupies logical slot 8.

NOTE

As provided in **Table 8-1**, the Ethernet boards are classified into the Ethernet transparent transmission boards and Ethernet switching boards, based on the type of the accessed service. The Ethernet transparent transmission boards only support EPL services, whereas the Ethernet switching boards support EPL services, EVPL services, and Layer 2 switching.

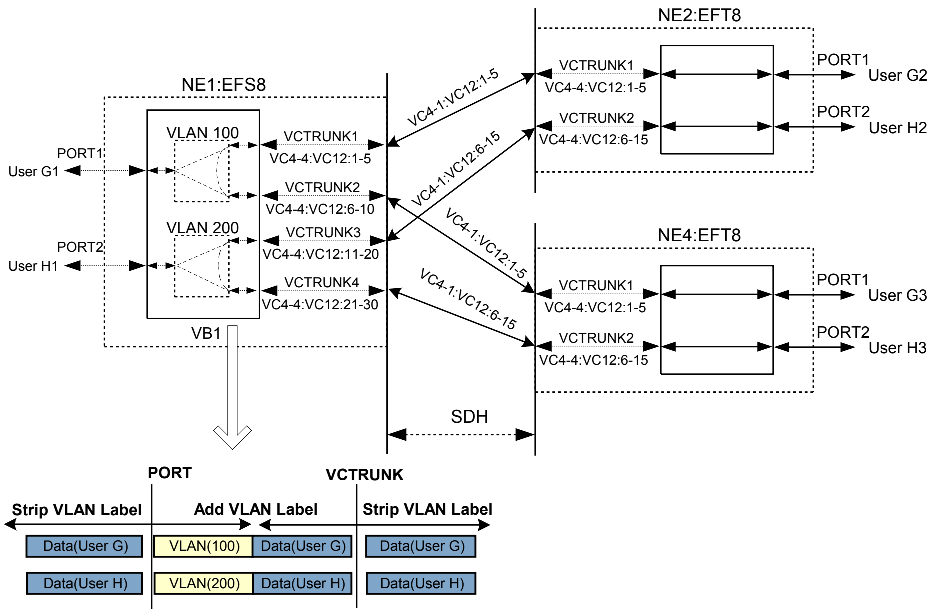
4.9.2 Signal Flow and Timeslot Allocation

The Ethernet services of the convergence node are received from an external port and tagged with the corresponding VLAN IDs. After the services are forwarded to an internal port through Layer 2 switching, the VLAN IDs are stripped and then the services are transparently transmitted in the SDH network. In this way, the node communicates with a remote node.

Figure 4-31 shows the signal flow of the EVPLAN services (IEEE 802.1q bridge) and the timeslot allocation to the EVPLAN services (IEEE 802.1q bridge).

For the method of calculating the bandwidth of the Ethernet services carried by a VCTRUNK, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

Figure 4-31 Signal flow of and timeslot allocation to EVPLAN services (IEEE 802.1q bridge)



- The Ethernet LAN services of user G:
  - Occupy the first to fifth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-5) on the SDH link from NE1 to NE2 and the first to fifth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-5) on the SDH link from NE1 to NE4.
  - Are added and dropped by using the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFS8 board of NE1 and the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFT8 board of NE2.

- Are added and dropped by using the sixth to tenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-10) on the EFS8 board of NE1 and the first to fifth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-5) on the EFT8 board of NE4.

- The Ethernet LAN services of user H:
  - Occupy the sixth to fifteenth VC-12 timeslots of the first VC-4 (VC4-1:VC12:6-15) on the SDH link from NE1 to NE2 and the sixth to fifteenth VC-12 timeslots of the first VC-4 (VC4-1:VC12:6-15) on the SDH link from NE1 to NE4.
  - Are added and dropped by using the eleventh to twentieth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:11-20) on the EFS8 board of NE1 and the sixth to fifteenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-15) on the EFT8 board of NE2.
  - Are added and dropped by using the twenty-first to thirtieth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:21-20) on the EFS8 board of NE1 and the sixth to fifteenth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:6-15) on the EFT8 board of NE3.

Table 4-23 Parameters of external ports on the Ethernet boards

Parameter	NE1		NE2		NE4	
Board	EFS8		EFT8		EFT8	
Port	PORT1	PORT2	PORT1	PORT2	PORT1	PORT2
Enabled/ Disabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Working Mode	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation
Maximum Frame Length	1522	1522	1522	1522	1522	1522
TAG	Access	Access	-	-	-	-
Entry Detection	Enabled	Enabled	-	-	-	-
Default VLAN ID	100	200	-	-	-	-
VLAN Priority	0	0	-	-	-	-

Table 4-24 Parameters of internal ports on the Ethernet boards

Parameter	NE1				NE2		NE3	
Board	EFS8				EFT8		EFT8	
Port	VCTRUNK1	VCTRUNK2	VCTRUNK3	VCTRUNK4	VCTRUNK1	VCTRUNK2	VCTRUNK1	VCTRUNK2

Parameter	NE1				NE2		NE3	
Mapping Protocol	GFP	GFP	GFP	GFP	GFP	GFP	GFP	GFP
TAG	Access	Access	Access	Access	-	-	-	-
Entry Detection	Enabled	Enabled	Enabled	Enabled	-	-	-	-
Default VLAN ID	100	100	200	200	-	-	-	-
VLAN Priority	0	0	0	0	-	-	-	-
Bound Path	VC4-4: VC12-1–VC12-5	VC4-4: VC12-6–VC12-10	VC4-4: VC12-11–VC12-20	VC4-4: VC12-21–VC12-30	VC4-4: VC12-1–VC12-5	VC4-4: VC12-6–VC12-15	VC4-4: VC12-1–VC12-5	VC4-4: VC12-6–VC12-15
Port Type	UNI	UNI	UNI	UNI	-	-	-	-

Table 4-25 Parameters of Ethernet LAN services (IEEE 802.1q bridge)

Parameter		Ethernet LAN Service of NE1	
Board		EFS8	
VB Name		VB1	
Bridge Type		IEEE 802.1q	
Bridge Switch Mode		IVL/Ingress Filter Enable	
Bridge Learning Mode		IVL	
Ingress Filter		Enabled	
VB Mount Port		PORT1, PORT2, VCTRUNK1, VCTRUNK2, VCTRUNK3, VCTRUNK4	
VLAN Filtering	VLAN Filtering	VLAN filter table 1	VLAN filter table 2
	VLAN ID	100	200
	Forwarding Physical Port	PORT1, VCTRUNK1, VCTRUNK2	PORT2, VCTRUNK3, VCTRUNK4

Parameter		Ethernet LAN Service of NE1
Hub/Spoke	PORT1	Hub
	PORT2	Hub
	VCTRUNK 1	Spoke
	VCTRUNK 2	Spoke
	VCTRUNK 3	Hub
	VCTRUNK 4	Hub

4.9.3 Configuration Process

At the convergence node NE1, you need to create An EVPLAN service (IEEE 802.1q bridge) and a VLAN filtering table need to be created for the convergence node NE1. The access nodes NE2 and NE4 need to be configured with EPL transparent transmission services only.

Prerequisite

You must be familiar with **4.3.4 Flow of Configuring EVPLAN Services**.

Background Information

If the Ethernet switching boards in the actual application scenarios are different from the boards in this example, you need to learn about the requirements for configuring specific boards.

- For the EVPLAN services supported by Ethernet switching boards, see **8.1 Service Support Capability of Ethernet Boards**.
- For the VCTRUNK binding requirements of Ethernet switching boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

Procedure

Step 1 Configure the EVPLAN services for user G1 and user H1 on NE1.

1. Set the attributes of the external ports (PORT1 and PORT2 on the EFS8 board) used by the services of user G1 and user H1.
   - In the NE Explorer, select the EFS8, and then choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.
   - Select **External Port**.
   - Click the **Basic Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabled/Disabled	PORT1: Enabled PORT2: Enabled	In this example, PORT1 and PORT2 carry the services and are set to **Enabled**.
Working Mode	PORT1: Auto-Negotiation PORT2: Auto-Negotiation	In this example, the Ethernet service access equipment of user G1 and user H1 supports the auto-negotiation mode. Hence, **Working Mode** is set to **Auto-Negotiation** for PORT1 and PORT2.
Maximum Frame Length	PORT1: 1522 PORT2: 1522	Generally, this parameter adopts the default value **1522**.
MAC Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The MAC loopback setting is used for fault diagnosis. In this example, **MAC Loopback** is set to **Non-Loopback**.
PHY Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The PHY loopback setting is used for fault diagnosis. In this example, **PHY Loopback** is set to **Non-Loopback**.

- Click the **Flow Control** tab. The parameters in the **Flow Control** tab page adopt the default values.
- Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Entry Detection	PORT1: Enabled PORT2: Enabled	The packets of user G1 and user H1 do not carry VLAN tags. You need to enable the entry detection function to detect whether the packets carry VLAN tags. In this example, **Entry Detection** is set to **Enabled**.
TAG	PORT1: Access PORT2: Access	If the service access equipment of user G1 and user H1 does not support VLANs and if the transmitted packets do not carry VLAN tags, **TAG** is set to **Access** for PORT1 and PORT2.
Default VLAN ID	PORT1: 100 PORT2: 200	According to the plan, the VLAN ID is set to 100 on the transmission network side for EVPLAN services between user G1, user G2, and user G3. The VLAN ID is set to 200 on the transmission network side for EVPLAN services between user H1, user H2, and user H3. In this case, the service data is isolated.

Parameter	Value in This Example	Description
VLAN Priority	-	This parameter adopts the default value.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

2. Set the attributes of the internal ports (VCTRUNK1, VCTRUNK2, VCTRUNK3, and VCTRUNK4 on the EFS8 board) used by the service between user G1 and user G2, the service between user G1 and user G3, the service between user H1 and user H2, and the service between user H1 and user H3.
   - Select **Internal Port**.
   - Click the **TAG Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Entry Detection	VCTRUNK1: Enabled VCTRUNK2: Enabled VCTRUNK3: Enabled VCTRUNK4: Enabled	The packets of user G2, user G3, user H2, and user H3 do not carry VLAN tags. You need to enable the entry detection function to detect the VLAN tags of the packets. In this example, **Entry Detection** is set to **Enabled**.
TAG	VCTRUNK1: Access VCTRUNK2: Access VCTRUNK3: Access VCTRUNK4: Access	If the service access equipment of user G2, user G3, user H2, and user H3 does not support VLANs and if the transmitted packets do not carry VLAN tags, **TAG** is set to **Access** for the four VCTRUNKs.
Default VLAN ID	VCTRUNK1: 100 VCTRUNK2: 100 VCTRUNK3: 200 VCTRUNK4: 200	According to the plan, the VLAN ID is set to 100 on the transmission network side for EVPLAN services between user G1, user G2, and user G3. The VLAN ID is set to 200 on the transmission network side for EVPLAN services between user H1, user H2, and user H3. In this case, the service data is isolated.
VLAN Priority	VCTRUNK1: 0 VCTRUNK2: 0 VCTRUNK3: 0 VCTRUNK4: 0	This parameter adopts the default value.

   - Click the **Network Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Port Type	VCTRUNK1: UNI VCTRUNK2: UNI VCTRUNK3: UNI VCTRUNK4: UNI	UNI indicates the user-network interface, namely, the interface of the service provider located near the user side. The UNI interface processes the tag attribute of IEEE 802.1Q-compliant packets. That is, the UNI interface processes and identifies the VLAN information of the accessed user packets, according to the supported tag flag, namely, Tag Aware, Access, and Hybrid.

- Click the **Encapsulation/Mapping** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Mapping Protocol	VCTRUNK1: GFP VCTRUNK2: GFP VCTRUNK3: GFP VCTRUNK4: GFP	In this example, the EFS8 board is used. This parameter adopts the default value **GFP**. **Mapping Protocol** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Scramble	VCTRUNK1: Scrambling mode [X43+1] VCTRUNK2: Scrambling mode [X43+1] VCTRUNK3: Scrambling mode [X43+1] VCTRUNK4: Scrambling mode [X43+1]	In this example, this parameter adopts the default value **Scrambling mode [X43+1]**. **Scramble** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Check Field Length	VCTRUNK1: FCS32 VCTRUNK2: FCS32 VCTRUNK3: FCS32 VCTRUNK4: FCS32	In this example, this parameter adopts the default value **FCS32**. **Check Field Length** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
FCS Calculated Bit Sequence	VCTRUNK1: Big endian VCTRUNK2: Big endian VCTRUNK3: Big endian VCTRUNK4: Big endian	When **Mapping Protocol** is set to **GFP**, **FCS Calculated Bit Sequence** is set to **Big endian**. **FCS Calculated Bit Sequence** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

Parameter	Value in This Example	Description
Extension Header Option	VCTRUNK1: No VCTRUNK2: No VCTRUNK3: No VCTRUNK4: No	When **Mapping Protocol** is set to **GFP**, this parameter is valid and adopts the default value **No**. **Extension Header Option** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

- This operation is optional. Click the **LCAS** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabling LCAS	VCTRUNK1: Enabled VCTRUNK2: Enabled	In this example, **Enabling LCAS** is set to **Enabled**.
LCAS Mode	VCTRUNK1: Huawei Mode VCTRUNK2: Huawei Mode	In this example, this parameter adopts the default value **Huawei Mode**. If the interconnected equipment at both ends is Huawei equipment, **LCAS Mode** is set to **Huawei Mode** for the interconnected equipment.
Hold off Time (ms)	VCTRUNK1: 2000 VCTRUNK2: 2000	In this example, this parameter adopts the default value **2000**. You can set this parameter according to the expected hold off time of LCAS switching.
WTR Time(s)	VCTRUNK1: 300 VCTRUNK2: 300	In this example, this parameter adopts the default value **300**. You can set this parameter according to the expected WTR duration of LCAS recovery.
TSD	VCTRUNK1: Disabled VCTRUNK2: Disabled	In this example, **TSD** is set to **Disabled**. In this case, the LCAS protocol does not monitor the status of the B3 or BIP bit errors of a VCTRUNK member.

- Click the **Bound Path** tab. Click the **Configuration** button. Set the following in the **Bound Path Configuration** dialog box that is displayed. Then, click **Apply**.

User	Parameter	Value in This Example	Description
User G1←→ user G2	Configurable Ports	VCTRUNK1	As shown in **Figure 4-31**, VCTRUNK1 of the EFS8 board is used by the service between user G1 and user G2.

User	Parameter		Value in This Example	Description
	Available Bound Paths	Level	VC12-xv	The service between user G1 and user G2 uses a 10 Mbit/s bandwidth. Hence, five VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user G1 and user G2 is a **Bidirectional** service.
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-1 to VC12-5	Five VC-12s need to be bound for user G2. In this example, the first to the fifth VC-12s need to be selected in sequence.
user G1←→ user G3	Configurable Ports		VCTRUNK2	As shown in **Figure 4-31**, VCTRUNK2 of the EFS8 board is used by the service between user G1 and user G3.
	Available Bound Paths	Level	VC12-xv	The service between user G1 and user G3 uses a 10 Mbit/s bandwidth. Hence, five VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user G1 and user G3 is a **Bidirectional** service.
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

User	Parameter		Value in This Example	Description
		Available Timeslots	VC12-6 to VC12-10	Five VC-12s need to be bound for the service between user G1 and user G3. In this example, the sixth to the tenth VC-12s need to be selected in sequence.
User H1←→ user H2	Configurable Ports		VCTRUNK3	As shown in **Figure 4-31**, VCTRUNK3 of the EFS8 board is used by the service between user H1 and user H2.
	Available Bound Paths	Level	VC12-xv	The service between user H1 and user H2 uses a 20 Mbit/s bandwidth. Hence, 10 VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service between user H1 and user H2 is a **Bidirectional** service.
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-11 to VC12-20	Ten VC-12s need to be bound for the service between user H1 and user H2. In this example, the eleventh to the twentieth VC-12s need to be selected in sequence.
User H1←→ user H3	Configurable Ports		VCTRUNK4	As shown in **Figure 4-31**, VCTRUNK4 of the EFS8 board is used by the service between user H1 and user H3.
	Available Bound Paths	Level	VC12-xv	The service between user H1 and user H3 uses a 20 Mbit/s bandwidth. Hence, 10 VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

User	Parameter		Value in This Example	Description
		Service Direction	Bidirectional	The service between user H1 and user H3 is a **Bidirectional** service.
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-21 to VC12-30	Ten VC-12s need to be bound for the service between user H1 and user H3. In this example, the twenty-first to the thirtieth VC-12s need to be selected in sequence.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

3. Create a bridge for the EFS8 board on NE1.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree.
   - Click **New**.
   - Set the required parameters in the **Create Ethernet LAN Service** dialog box that is displayed.

Parameter	Value in This Example	Description
VB Name	VB1	This parameter is a character string used to describe the bridge. It is recommended that you set this parameter to a character string that contains the information about the detailed application of the bridge.
VB Type	802.1q	IEEE 802.1q bridge supports isolation by using one layer of VLAN tags. This bridge checks the contents of the VLAN tags that are in the packets and performs Layer 2 switching according to the destination MAC addresses and the VLAN IDs of the packets.

Parameter	Value in This Example	Description
Bridge Switch Mode	IVL/Ingress Filter Enable	When the bridge adopts the SVL learning mode, all the VLANs share the same MAC address table. That is, the bridge learns and forwards the packets according to the MAC address of the user packets only. The information in the VLAN tags of the user packets, however, is not considered in the learning and forwarding process.
Bridge Learning Mode	IVL	-
Ingress Filter	Enabled	-

- Click **Configure Mount**.
- In **Available Mounted Ports**, select PORT1, PORT2, VCTRUNK1, VCTRUNK2, VCTRUNK3, and VCTRUNK4. Then, click >>.
- **OK**.
- In the **Create Ethernet LAN Service** dialog box, click **OK**.

4. Create a VLAN filtering table.
   - Select the created bridge and click the **VLAN Filtering** tab.
   - Click **New**.
   - Create the VLAN filtering table for user G1, user G2, and user G3.

Parameter	Value in This Example	Description
VLAN ID	100	According to the plan, the VLAN ID is set to 100 on the transmission network side for EVPLAN services between user G1, user G2, and user G3.

   - In **Available Forwarding Ports**, select PORT1, VCTRUNK1, and VCTRUNK2. Click >>. Then, click **Apply**.
   - Create the VLAN filtering table for user H1, user H2, and user H3.

Parameter	Value in This Example	Description
VLAN ID	200	According to the plan, the VLAN ID is set to 200 on the transmission network side for EVPLAN services between user H1, user H2, and user H3.

   - In **Available Forwarding Ports**, select PORT2, VCTRUNK3, and VCTRUNK4. Click >>. Then, click **OK**.

5. Change the Hub/Spoke attribute of the ports mounted to the bridge.

- Select the created bridge and click the **Service Mount** tab.
- Change the Hub/Spoke attribute of the port mounted to the bridge. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Hub/Spoke	PORT1: Hub VCTRUNK1: Spoke VCTRUNK2: Spoke PORT2: Hub VCTRUNK3: Hub VCTRUNK4: Hub	If user G2 need not communicate with user G3, set VCTRUNK1 and VCTRUNK2 ports that receive the services of user G2 and user G3 to Spoke. Ports of the Spoke attribute cannot communicate with each other. A port of the Hub attribute can communicate with a port of the Spoke or Hub attribute.

6. Configure the cross-connections from the Ethernet service to the SDH link for user G2, user G3, user H2, and user H3.

- In the NE Explorer, select NE1, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
- Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

User	Parameter	Value in This Example	Description
User G1←→ user G2	Level	VC12	The timeslot bound with the service between user G1 and user G2 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Direction	Bidirectional	The service between user G1 and user G2 is a **Bidirectional** service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK1. In the case of VCTRUNK1, **Available Resources** is set to VC4-4.

User	Parameter	Value in This Example	Description
	Source Timeslot Range(e.g. 1,3-6)	1-5	The value range of the source timeslots is consistent with the value range of **Available Timeslot**, which is set for the paths bound with VCTRUNK1. In the case of VCTRUNK1, the value of **Available Timeslot** is from VC12-1 to VC12-5.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-5	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are five VC-12s, the sink timeslots must be five VC-12s.
	Activate Immediately	Yes	-
User G1←→ user G3	Level	VC12	The timeslot bound with the service between user G1 and user G3 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Direction	Bidirectional	The service between user G1 and user G3 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK2. In the case of VCTRUNK2, **Available Resources** is set to VC4-4.

User	Parameter	Value in This Example	Description
	Source Timeslot Range(e.g. 1,3-6)	6-10	The value range of the source timeslots is consistent with the value range of **Available Timeslot**, which is set for the paths bound with VCTRUNK2. In the case of VCTRUNK2, the value of **Available Timeslot** is from VC12-6 to VC12-10.
	Sink Slot	8-SL4D-2 (SDH-2)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-5	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are five VC-12s, the sink timeslots must be five VC-12s.
	Activate Immediately	Yes	-
User H1←→ user H2	Level	VC12	The timeslot bound with the service between user H1 and user H2 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Direction	Bidirectional	The service between user H1 and user H2 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK3. In the case of VCTRUNK3, **Available Resources** is set to VC4-4.

User	Parameter	Value in This Example	Description
	Source Timeslot Range(e.g. 1,3-6)	11-20	The value range of the source timeslots is consistent with the value range of **Available Timeslot**, which is set for the paths bound with VCTRUNK3. In the case of VCTRUNK3, the value of **Available Timeslot** is from VC12-11 to VC12-20.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	6-15	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are 10 VC-12s, the sink timeslots must be 10 VC-12s.
	Activate Immediately	Yes	-
User H1←→ user H3	Level	VC12	The timeslot bound with the service between user H1 and user H3 is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Direction	Bidirectional	The service between user H1 and user H3 is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK4. In the case of VCTRUNK4, **Available Resources** is set to VC4-4.

User	Parameter	Value in This Example	Description
	Source Timeslot Range(e.g. 1,3-6)	21-30	The value range of the source timeslots is consistent with the value range of **Available Timeslot**, which is set for the paths bound with VCTRUNK4. In the case of VCTRUNK4, the value of **Available Timeslot** is from VC12-21 to VC12-30.
	Sink Slot	8-SL4D-2 (SDH-2)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	6-15	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots. For example, if the source timeslots are 10 VC-12s, the sink timeslots must be 10 VC-12s.
	Activate Immediately	Yes	-

Step 2 Configure the EPL services on NE2 and NE4.

NOTE

The Ethernet services of NE2 and NE4 are point-to-point transparent transmission services. See **4.4 Configuring EPL Services on an Ethernet Transparent Transmission Board** to set the parameters.

Step 3 Check whether the services are configured correctly. For the operation procedures, see **7.15 Testing Ethernet Service Channels**.

Step 4 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 5 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see Deleting SDH Services.

4.10 Configuring EVPLAN Services (IEEE 802.1ad Bridge)

The QinQ technology provides a cheap and easy solution for Layer 2 virtual private networks (VPNs). The IEEE 802.1ad bridge uses the QinQ technology to provide the VPN solution, thus facilitating the identifying, differentiating and grooming EVPLAN services.

4.10.1 Networking Diagram
A network operator requires that the voice over IP (VoIP) and high speed Internet (HSI) services sent to the transmission network be uniformly labeled and groomed at the convergence node.

4.10.2 Signal Flow and Timeslot Allocation
The services of user M and user N are transmitted from the access nodes NE2 and NE4 respectively to the convergence node NE1 through the Ethernet transparent transmission boards. VoIP and HSI services carrying different C-VLAN IDs are tagged with different S-VLAN IDs. The service data is isolated and exchanged at Layer 2 through S-VLAN filtering.

4.10.3 Configuration Process
An EVPLAN service (IEEE 802.1ad bridge) and the corresponding S-VLAN filtering table need to be created for the convergence node NE1. The access nodes NE2 and NE4 need to be configured with EPL transparent transmission services only.

4.10.1 Networking Diagram

A network operator requires that the voice over IP (VoIP) and high speed Internet (HSI) services sent to the transmission network be uniformly labeled and groomed at the convergence node.

Service Requirement

As shown in **Figure 4-32**, the transmission network is required to carry the VoIP and HSI services.

User requirements:

- The VoIP services of user M and user N are sent to the transmission network at NE2 and NE4 respectively and to the VoIP server at the convergence node NE1. The services share a 20 Mbit/s bandwidth.
- The HSI services of user M and user N are sent to the transmission network at NE2 and NE4 respectively and to the HSI server at the convergence node NE1. The services share a 40 Mbit/s bandwidth.
- The VoIP services need to be isolated from the HSI services.
- The data communication equipment of user M and user N provides 100 Mbit/s Ethernet electrical interfaces of which the working mode is auto-negotiation, and does not support VLAN.
  - C-VLAN ID of the VoIP services: 10
  - C-VLAN ID of the HSI services: 20

NOTE

The application scenarios where one branch needs to communicate with other branches are as follows:

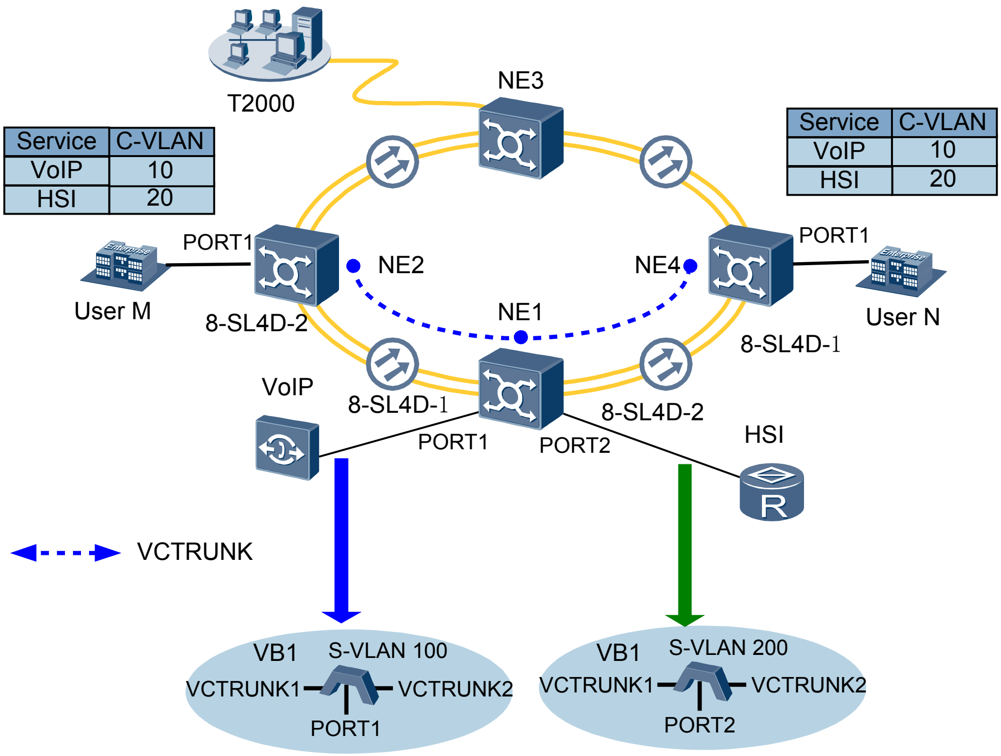
- User M needs to communicate with user N.
- User M need not communicate with user N.

If user M and user N need to communicate with each other, skip **Step 1.4**.

Requirement of the operator: The operator requires that all services received from the user side should be uniformly labeled and groomed through planned S-VLANs.

- S-VLAN ID of the VoIP services: 100
- S-VLAN ID of the HSI services: 200

Figure 4-32 Networking diagram for configuring EVPLAN services (IEEE 802.1ad bridge)



Board Configuration Information

For the EVPLAN (IEEE 802.1ad bridge) services supported by Ethernet switching boards, refer to **Table 8-1**.

In this example, the convergence node NE1 is configured with an EFS8 board that supports the IEEE 802.1ad bridge to implement EVPLAN services in which VoIP data is isolated from HSI data.

- The VoIP services tagged with C-VLAN ID 10 from NE2 and NE4 are further tagged with S-VLAN ID 100 when they arrive at the IEEE 802.1ad bridge of NE1. Then, the services are forwarded to the VoIP server through Layer 2 switching.
- The HSI services tagged with C-VLAN ID 20 from NE2 and NE4 are further tagged with S-VLAN ID 200 when they arrive at the IEEE 802.1ad bridge of NE1. Then, the services are forwarded to the HSI server through Layer 2 switching.

The access nodes NE2 and NE4 each are configured with an EFT8 board. The EPL services are configured to implement transparent transmission from NE2 and NE4 to NE1.

The ISU board integrates the SCC unit, cross-connect unit, clock unit, tributary unit, line unit, and data transparent transmission unit. The data transparent transmission unit of the ISU board is displayed as EFT8 on the NMS and occupies logical slot 7. The STM-4 optical interface module of the ISU board is displayed as SL4D on the NMS and occupies logical slot 8.

NOTE

As provided in **Table 8-1**, the Ethernet boards are classified into the Ethernet transparent transmission boards and Ethernet switching boards, based on the type of the accessed service. The Ethernet transparent transmission boards only support EPL services, whereas the Ethernet switching boards support EPL services, EVPL services, and Layer 2 switching.

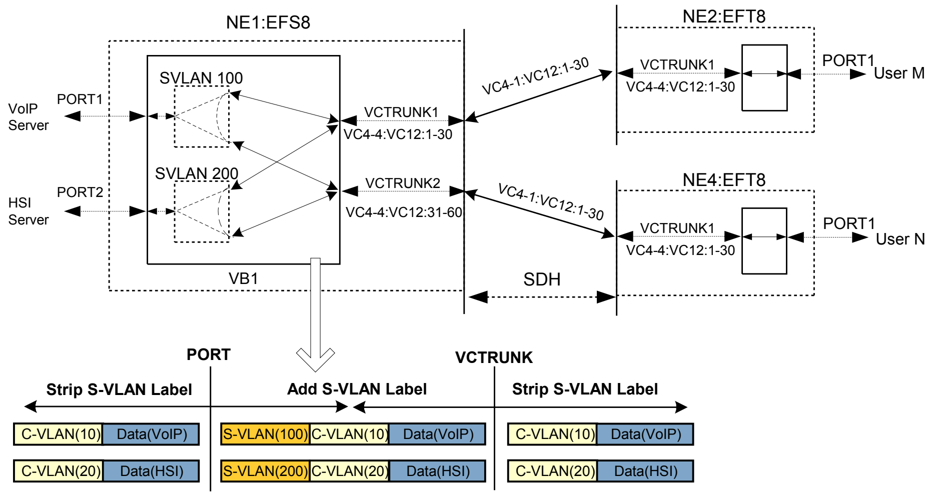
4.10.2 Signal Flow and Timeslot Allocation

The services of user M and user N are transmitted from the access nodes NE2 and NE4 respectively to the convergence node NE1 through the Ethernet transparent transmission boards. VoIP and HSI services carrying different C-VLAN IDs are tagged with different S-VLAN IDs. The service data is isolated and exchanged at Layer 2 through S-VLAN filtering.

Figure 4-33 shows the signal flow of the EVPLAN services (IEEE 802.1ad bridge) and the timeslot allocation to the EVPLAN services (IEEE 802.1ad bridge).

For the method of calculating the bandwidth of the Ethernet services carried by a VCTRUNK, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.

Figure 4-33 Signal flow of and timeslot allocation to EVPLAN services (IEEE 802.1ad bridge)



- The services of user M:
  - Occupy the first to thirtieth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-30) on the SDH link from NE1 to NE2.
  - Are added and dropped by using the first to thirtieth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-30) on the EFS8 board of NE1 and the first to thirtieth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-30) on the EFT8 board of NE2.
- The services of user N:
  - Occupy the first to thirtieth VC-12 timeslots of the first VC-4 (VC4-1:VC12:1-30) on the SDH link from NE1 to NE4.

- Are added and dropped by the using the thirty-first to sixtieth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:31-60) on the EFS8 board of NE1 and the first to thirtieth VC-12 timeslots of the fourth VC-4 (VC4-4:VC12:1-30) on the EFT8 board of NE4.

Table 4-26 Parameters of external ports on the Ethernet boards

Parameter	**NE1**		**NE2**	**NE4**
Board	EFS8		EFT8	EFT8
Port	PORT1	PORT2	PORT1	PORT1
Enabled/ Disabled	Enabled	Enabled	Enabled	Enabled
Working Mode	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation	Auto-Negotiation
Maximum Frame Length	1522	1522	1522	1522
Port Type	C-Aware	C-Aware	C-Aware	C-Aware

Table 4-27 Parameters of internal ports on the Ethernet boards

Parameter	**NE1**		**NE2**	**NE3**
Board	EFS8		EFT8	EFT8
Port	VCTRUNK1	VCTRUNK2	VCTRUNK1	VCTRUNK1
Mapping Protocol	GFP	GFP	GFP	GFP
Port Type	C-Aware	C-Aware	-	-
Bound Path	VC4-4:VC12-1–VC12-30	VC4-4:VC12-31–VC12-60	VC4-4:VC12-1–VC12-30	VC4-4:VC12-1–VC12-30

Table 4-28 Parameters of Ethernet LAN services (IEEE 802.1ad bridge)

Parameter	**Ethernet LAN Service of NE1**
Board	EFS8
VB Name	VB1
Bridge Type	IEEE 802.1ad
Bridge Switch Mode	IVL/Ingress Filter Enable
Bridge Learning Mode	IVL
Ingress Filter	Enabled
Operation Type	Add S-VLAN base for Port and C-VLAN

Parameter		Ethernet LAN Service of NE1					
VB Port		1	2	3		4	
Mount Port		PORT1	PORT2	VCTRUNK1		VCTRUNK2	
C-VLAN		10	20	10	20	10	20
S-VLAN		100	200	100	200	100	200
VLAN Filtering	VLAN Filtering	VLAN filter table 1		VLAN filter table 2			
	VLAN ID	100		200			
	Forwarding Physical Port	PORT1, VCTRUNK1, VCTRUNK2		PORT2, VCTRUNK1, VCTRUNK2			
Hub/ Spoke	PORT1	Hub					
	PORT2	Hub					
	VCTRUNK 1	Spoke					
	VCTRUNK 2	Spoke					

4.10.3 Configuration Process

An EVPLAN service (IEEE 802.1ad bridge) and the corresponding S-VLAN filtering table need to be created for the convergence node NE1. The access nodes NE2 and NE4 need to be configured with EPL transparent transmission services only.

Prerequisite

You must be familiar with **4.3.1 Flow of Configuring EPL Services**.

Background Information

If the Ethernet switching boards in the actual application scenarios are different from the boards in this example, you need to learn about the requirements for configuring specific boards.

- For the EVPLAN services supported by Ethernet switching boards, see **8.1 Service Support Capability of Ethernet Boards**.
- For the VCTRUNK binding requirements of Ethernet transparent transmission boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.

The IEEE 802.1ad provider bridge supports ports with the C-Aware and S-Aware attributes only.

The C-Aware ports are used to add and strip the S-VLAN tags. The S-Aware ports are used to transparently transmit the S-VLAN tag.

The IEEE 802.1ad provider bridge supports the following operation types:

- Adding the S-VLAN tag based on the port

- Adding the S-VLAN tag based on the port and C-VLAN
- Performing port mounting based on the port
- Performing port mounting based on the port and the S-VLAN

This topic describes the four operation types when **Bridge Switch Mode** of the IEEE 802.1ad provider bridge is set to **IVL/Ingress Filter Enabled**.

- Adding the S-VLAN based on the port: The packets that enter the C-Aware port are added with the preset S-VLAN tag, and are forwarded in the bridge according to the S-VLAN filtering table. Before the packets leave the C-Aware port, the S-VLAN tag is stripped.
- Adding the S-VLAN tag based on the port and C-VLAN: The entry detection is performed for the packets that enter the C-Aware port. Then, the corresponding S-VLAN tags are added to the packets according to the mapping relation between the C-VLAN tags and the S-VLAN tags of the packets. If the mapping relation does not exist, the packets are discarded. After the S-VLAN tags are added, the packets enter the bridge, where the packets are forwarded according to the S-VLAN filtering table. Before the packets leave the C-Aware port, the S-VLAN tag is stripped.

  NOTE

  - The same C-Aware port supports different C-VLAN tags being mapped to different S-VLAN tags, but does not support the same C-VLAN tag being mapping to multiple S-VLAN tags.
- Performing port mounting based on the port: The packets that enter the S-Aware port are not filtered. Instead, the S-VLAN switch is performed directly. The packets must have the S-VLAN tags. Otherwise, the packets are discarded. When the packets leave the S-Aware port, the packets are transparently transmitted.
- Performing port mounting based on the port and the S-VLAN: The entry filtering is performed according to the preset S-VLAN tag. The packets that do not belong to the S-VLAN are discarded. Then, the packets are forwarded according to the S-VLAN filtering table. When the packets leave the S-Aware port, the packets are transparently transmitted.

In the case of the four operation types, the following conditions must be met before the packets leave a port:

- The port is contained in the S-VLAN filtering table that is created by the user.
- The S-VLAN ID corresponding to the port must be specified when the user manually mounts the port to the bridge.
  - In the case of a C-Aware port, the S-VLAN ID corresponding to the port is the S-VLAN ID that is added when the packets enter the port.
  - In the case of an S-Aware port, the S-VLAN ID corresponding to the port is the S-VLAN ID that is set when the user mounts the port to the bridge. If the S-Aware port is mounted based on the port, the S-VLAN ID is considered to contain all the legal S-VLAN IDs.

Procedure

Step 1 Configure the EVPLAN services on NE1.

1. Set the attributes of the external ports (PORT1 and PORT2 on the EFS8 board) used by the VoIP server and HSI server.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.
   - Select **External Port**.

- Click the **Basic Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabled/Disabled	PORT1: Enabled PORT2: Enabled	In this example, PORT1 and PORT2 carry the services and **Enabled/Disabled** is set to **Enabled** for PORT1 and PORT2.
Working Mode	PORT1: Auto-Negotiation PORT2: Auto-Negotiation	In this example, the VoIP server and HSI server support the auto-negotiation mode. Hence, **Working Mode** is set to **Auto-Negotiation** for PORT1 and PORT2.
Maximum Frame Length	PORT1: 1522 PORT2: 1522	Generally, this parameter adopts the default value **1522**.
MAC Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The MAC loopback setting is used for fault diagnosis. In this example, **MAC Loopback** is set to **Non-Loopback**.
PHY Loopback	PORT1: Non-Loopback PORT2: Non-Loopback	The PHY loopback setting is used for fault diagnosis. In this example, **PHY Loopback** is set to **Non-Loopback**.

- Click the **Flow Control** tab. The parameters in the **Flow Control** tab page adopt the default values.
- Click the **Network Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Port Type	PORT1: C-Aware PORT2: C-Aware	The C-Aware or S-Aware attribute must be selected for the port when you configure the IEEE 802.1ad bridge. The C-Aware port connects to the port in the client network, identifies and processes the packets that contain C-VLAN tags (namely, client tags). The S-Aware port connects to the port on the network side, identifies and processes the packets that contain S-VLAN tags (namely, service tags of the network operator).

- It is unnecessary to set the parameters on the **TAG Attributes** tab. If the port type is set to C-Aware or S-Aware, the parameters on the **TAG Attributes** are meaningless.
- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

2. Set the attributes of the internal ports (VCTRUNK1 and VCTRUNK2 on the EFS8 board) used by the services of user M and N.
   - Select **Internal Port**.

- Click the **Network Attributes** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Port Type	VCTRUNK1: C-Aware VCTRUNK2: C-Aware	The C-Aware or S-Aware attribute must be selected for the port when you configure the IEEE 802.1ad bridge. The C-Aware port connects to the port in the client network, identifies and processes the packets that contain C-VLAN tags (namely, client tags). The S-Aware port connects to the port on the network side, identifies and processes the packets that contain S-VLAN tags (namely, service tags of the network operator).

- It is unnecessary to set the parameters on the **TAG Attributes** tab. If the port type is set to C-Aware or S-Aware, the parameters on the **TAG Attributes** are meaningless.
- Click the **Encapsulation/Mapping** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Mapping Protocol	VCTRUNK1: GFP VCTRUNK2: GFP	In this example, the EFS4 board is used. This parameter adopts the default value **GFP**. **Mapping Protocol** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Scramble	VCTRUNK1: Scrambling mode [X43+1] VCTRUNK2: Scrambling mode [X43+1]	In this example, this parameter adopts the default value **Scrambling mode [X43+1]**. **Scramble** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
Check Field Length	VCTRUNK1: FCS32 VCTRUNK2: FCS32	In this example, this parameter adopts the default value **FCS32**. **Check Field Length** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.
FCS Calculated Bit Sequence	VCTRUNK1: Big endian VCTRUNK2: Big endian	When **Mapping Protocol** is set to **GFP**, **FCS Calculated Bit Sequence** is set to **Big endian**. **FCS Calculated Bit Sequence** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

Parameter	Value in This Example	Description
Extension Header Option	VCTRUNK1: No VCTRUNK2: No	When **Mapping Protocol** is set to **GFP**, this parameter is valid and adopts the default value **No**. **Extension Header Option** of the VCTRUNKs on the Ethernet boards of the interconnected equipment at both ends must be set to the same value.

- This operation is optional. Click the **LCAS** tab. After setting the parameters, click **Apply**.

Parameter	Value in This Example	Description
Enabling LCAS	VCTRUNK1: Enabled VCTRUNK2: Enabled	In this example, **Enabling LCAS** is set to **Enabled**.
LCAS Mode	VCTRUNK1: Huawei Mode VCTRUNK2: Huawei Mode	In this example, this parameter adopts the default value **Huawei Mode**. If the interconnected equipment at both ends is Huawei equipment, **LCAS Mode** is set to **Huawei Mode** for the interconnected equipment.
Hold off Time (ms)	VCTRUNK1: 2000 VCTRUNK2: 2000	In this example, this parameter adopts the default value **2000**. You can set this parameter according to the expected hold off time of LCAS switching.
WTR Time(s)	VCTRUNK1: 300 VCTRUNK2: 300	In this example, this parameter adopts the default value **300**. You can set this parameter according to the expected WTR duration of LCAS recovery.
TSD	VCTRUNK1: Disabled VCTRUNK2: Disabled	In this example, **TSD** is set to **Disabled**. In this case, the LCAS protocol does not monitor the status of the B3 or BIP bit errors of a VCTRUNK member.

- Click the **Bound Path** tab. Click the **Configuration** button. Set the following in the **Bound Path Configuration** dialog box that is displayed. Then, click **Apply**.

User	Parameter	Value in This Example	Description
User M	Configurable Ports	VCTRUNK1	As shown in **Figure 4-33**, VCTRUNK1 of the EFS8 board is used by the service of user M.

User	Parameter		Value in This Example	Description
	Available Bound Paths	Level	VC12-xv	The service of user M uses a 60 Mbit/s bandwidth. Hence, 30 VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service of user M is a bidirectional service.
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-1 to VC12-30	Thirty VC-12s need to be bound for user M. In this example, the first to the thirtieth VC-12s need to be selected in sequence.
User N	Configurable Ports		VCTRUNK2	As shown in **Figure 4-33**, VCTRUNK2 of the EFS8 board is used by the service of user N.
	Available Bound Paths	Level	VC12-xv	The service of user N uses a 60 Mbit/s bandwidth. Hence, 30 VC-12s need to be bound. For the method of computing the bound timeslots based on the service bandwidth, see **8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards**.
		Service Direction	Bidirectional	The service of user N is a bidirectional service.

User	Parameter		Value in This Example	Description
		Available Resources	VC4-4	For the resources used by other boards, see **8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards**.
		Available Timeslots	VC12-31 to VC12-60	Thirty VC-12s need to be bound for user N. In this example, the thirty-first to the sixtieth VC-12s need to be selected in sequence.

- Click the **Advanced Attributes** tab. The parameters in the **Advanced Attributes** tab page adopt the default values.

3. Create a bridge for the EFS8 board on NE1.
   - In the NE Explorer, select the EFS8 board, and then choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree.
   - Click **New**.
   - Set the required parameters in the **Create Ethernet LAN Service** dialog box that is displayed.

Parameter	Value in This Example	Description
VB Name	VB1	This parameter is a character string used to describe the bridge. It is recommended that you set this parameter to a character string that contains the information about the detailed application of the bridge.
VB Type	802.1ad	The IEEE 802.1ad bridge supports data frames with two layers of VLAN tags. This bridge adopts the outer S-VLAN tags to isolate different VLANs and supports only the mounted ports whose attributes are C-Aware or S-Aware.
Bridge Switch Mode	IVL/Ingress Filter Enable	This bridge checks the contents of the VLAN tags that are in the packets and performs Layer 2 switching according to the destination MAC addresses and the S-VLAN IDs of the packets.
Bridge Learning Mode	IVL	-
Ingress Filter	Enabled	-

- Click **Configure Mount**.
- Set the parameters for service mounting in the **Service Mount Configuration** dialog box that is displayed.

Attribute	Attribute Value					
Operation Type	Adding S-VLAN tags based on Port and C-VLAN					
VB Port	1	2	3		4	
Mount Port	PORT1	PORT2	VCTRUNK1		VCTRUNK2	
C-VLAN	10	20	10	20	10	20
S-VLAN	100	200	100	200	100	200

- Click **OK**.
- In the **Create Ethernet LAN Service** dialog box, click **OK**.

4. Create a VLAN filtering table.
   - Select the created bridge and click the **VLAN Filtering** tab.
   - Click **New**.
   - Create the VLAN filtering table of the VoIP service.

Parameter	Value in This Example	Description
VLAN ID	100	According to the plan, the S-VLAN ID is 100 for the VoIP service.

   - In **Available Forwarding Ports**, select PORT1, VCTRUNK1, and VCTRUNK2. Click . Then, click **Apply**.
   - Create the VLAN filtering table of the HSI service.

Parameter	Value in This Example	Description
VLAN ID	200	According to the plan, the S-VLAN ID is 200 for the HSI service.

   - In **Available Forwarding Ports**, select PORT2, VCTRUNK1, and VCTRUNK2. Click . Then, click **OK**.

5. Change the Hub/Spoke attribute of the ports mounted to the bridge.

   NOTE

   If user M and user N need to communicate with each other, proceed to **Step 1.6**.

   - Select the created bridge and click the **Service Mount** tab.
   - Change the Hub/Spoke attribute of the port mounted to the bridge.

Parameter	Value in This Example	Description
Hub/Spoke	PORT1: Hub PORT2: Hub VCTRUNK1: Spoke VCTRUNK2: Spoke	User M and user N need not communicate with each other. In this case, set VCTRUNK1 and VCTRUNK2 that access the services of user M and user N to the Spoke attribute. Ports of the Spoke attribute cannot communicate with each other. A port of the Hub attribute can communicate with a port of the Spoke or Hub attribute.

6. Configure the cross-connections from the Ethernet service to the SDH link for user M and user N.
   - In the NE Explorer, select NE1, and then choose **Configuration** > **SDH Service Configuration** from the Function Tree.
   - Click **Create** on the lower-right pane to display the **Create SDH Service** dialog box. Set the parameters as follows.

User	Paramete r	Value in This Example	Description
User M	Level	VC12	The timeslot bound with the service of user M is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Direction	Bidirectiona l	The service of user M is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK1. In the case of VCTRUNK1, **Available Resources** is set to VC4-4.
	Source Timeslot Range(e.g. 1,3-6)	1-30	The value range of the source timeslots is consistent with the value range of **Available Timeslot**, which is set for the paths bound with VCTRUNK1. In the case of VCTRUNK1, the value of **Available Timeslot** is from VC12-1 to VC12-30.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.

User	Parameter	Value in This Example	Description
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.
	Sink Timeslot Range(e.g. 1,3-6)	1-30	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of sink timeslots must be, however, consistent with the number of sink timeslots.
	Activate Immediately	Yes	-
User N	Level	VC12	The timeslot bound with the service of user N is at the VC-12 level. The service level must be consistent with the level of the path bound with the VCTRUNK.
	Direction	Bidirectional	The service of user N is a bidirectional service.
	Source Slot	4-EFS8-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the Ethernet board as the source slot.
	Source VC4	VC4-4	The value range of **Source VC4** is consistent with the value range of **Available Resources**, which is set for the paths bound with VCTRUNK2. In the case of VCTRUNK2, **Available Resources** is set to VC4-4.
	Source Timeslot Range(e.g. 1,3-6)	31-60	The value range of the source timeslots is consistent with the value range of **Available Timeslot**, which is set for the paths bound with VCTRUNK2. In the case of VCTRUNK2, the value of **Available Timeslot** is from VC12-31 to VC12-60.
	Sink Slot	8-SL4D-1 (SDH-1)	When you create a bidirectional SDH service from an Ethernet board to a line board, it is recommended that you set the slot of the line board as the sink slot.
	Sink VC4	VC4-1	In this example, VC4-1 is specified as the VC-4 timeslot of the Ethernet service on the line board.

User	Parameter	Value in This Example	Description
	Sink Timeslot Range(e.g. 1,3-6)	1-30	The value range of the sink timeslots can be the same as or different from the value range of the source timeslots. The number of source timeslots must be, however, the same as the number of sink timeslots.
	Activate Immediately	Yes	-

Step 2 Configure the EPL services on NE2 and NE4.

NOTE

The Ethernet services of NE2 and NE4 are point-to-point transparent transmission services. See **4.4 Configuring EPL Services on an Ethernet Transparent Transmission Board** to set the parameters.

Step 3 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 4 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

Relevant Task

If the services are configured incorrectly and thus need to be deleted, see Deleting SDH Services.

5 Configuring Broadcast Data Services

About This Chapter

When the OptiX OSN equipment is connected to the data terminal equipment through the broadcast data port and is configured with broadcast data services, the broadcast data communication can be realized.

5.1 Basic Concepts

The equipment uses the RS232 or RS422 broadcast data port to realize the full-duplex communication of the universal asynchronous receiver/transmitter (UART).

Overview

The data is transparently transmitted through the broadcast data port. Hence, you need not configure the port rate and transmission control protocol. The maximum transmission rate is 19.2 kbit/s. The broadcast data port is connected to the data terminal equipment. Hence, you can configure the point-to-point and point-to-multipoint communication modes. The data can be broadcast to multiple optical interfaces.

As shown in **Figure 5-1**, the overheads SERIAL1–SERIAL4 can be used as the broadcast data channels. The broadcast data port uses the RJ-45 connector. For the pin assignment of the broadcast data port, refer to **Table 5-1**.

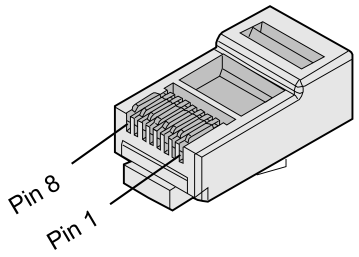
NOTE

The broadcast data port accesses the asynchronous data and then transmits the data to the opposite end over byte SERIAL1, SERIAL2, SERIAL3, or SERIAL4. The opposite end receives the digital signal and converts the digital signal into an asynchronous serial signal.

Figure 5-1 Overhead channel

A1	A1	A1	A2	A2	A2	J0		
B1			**E1**			**F1**		
D1			D2			D3	**Serial1**	**Serial2**
AU_PTR								
B2	B2	B2	K1			K2		
D4	**Serial4**		D5			D6		
D7			D8			D9		
D10			D11			D12		**Serial3**
S1					M1	**E2**		

Table 5-1 Pin assignment of the broadcast data port

RJ-45 Connector	Pin Number	Signal	Description
	1	422TXD+	RS422 TX+
	2	422TXD-	RS422 TX-
	3	422RXD+	RS422 RX+
	4	232RXD	RS232 RX
	5	GND	Grounding
	6	422RXD-	RS422 RX-
	7	N.C	Not defined
	8	232TXD	RS232 TX

Requirements of the Environment Monitor

The environment monitor has the following requirements for the power level and transmission rate of the port:

- The port must be of the RS232 level, where logic 1 ranges from –5 V to –15 V and logic 0 ranges from +5 V to +15 V.
- When the data is not transmitted, the port must be of the RS232 high level (approximately –9 V). Only one slave station can transmit data to the master station at a time.
- The maximum rate must not exceed 19.2 kbit/s.

Precautions for Configuring the Broadcast Data Port

When you configure the broadcast data port, note the following points (including the configuration of the optical interfaces and the direction of the signal flow):

- The optical interfaces that are not required must not be configured in the broadcast domain of the broadcast data port.
- The NEs where the broadcast ports are not used must not be configured in the broadcast domain.
- It is recommended that the signal flow is in the same direction as the NE clock tracing direction.

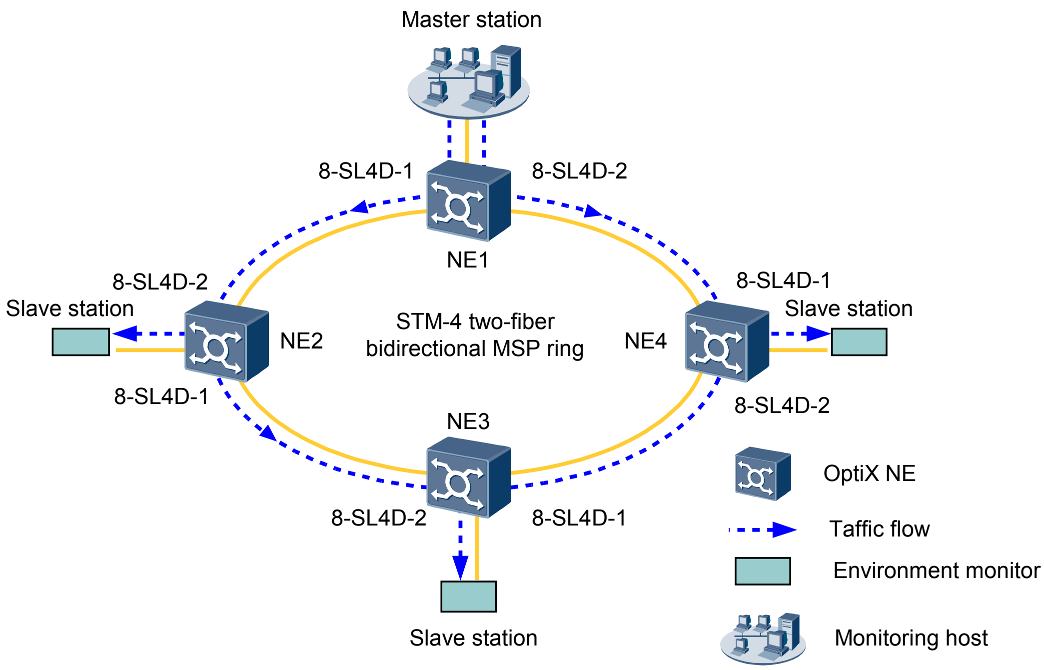
5.2 Networking Diagram

NE1 is configured with the monitoring host. NE2, NE3, and NE4 are configured with the environment monitors. Communication between the monitoring host and the environment monitors is required.

As shown in **Figure 5-2**, the service requirements are as follows:

- NE1 is configured with the monitoring host. NE2, NE3, and NE4 are configured with the environment monitors.
- The monitoring host functions as the master station, controls the data reporting from NE2, NE3, and NE4, and broadcasts commands to the environment monitors of NE2, NE3, and NE4.
- The environment monitors of NE2, NE3, and NE4 function as the slave stations, collect data, and report the data to the monitoring host.

Figure 5-2 Networking diagram of the broadcast data port



5.3 Signal Flow and Timeslot Allocation

Before you configure the broadcast data services, you need to learn the signal flow of a broadcast data service according to the networking diagram.

- During the communication between the master station and the slave station, the signal flow is as follows:
  - The data of the monitoring host is added to the SDH line board of NE1 through the broadcast data port of NE1 and is then transmitted towards the directions of NE2 and NE4.
  - On the NE2 side, the data that is transmitted from the NE1 side is dropped to the broadcast data port of NE2 through the SDH line board of NE2, and is then transmitted to the environment monitor of NE2. That is, the data of the monitoring host is transmitted to the environment monitor on the NE2 side. At the same time, the data of the monitoring host passes through the SDH line board and is then transmitted to the direction of NE3.
  - On the NE3 side, the data that passes through the NE2 side is dropped to the broadcast data port of NE3 through the SDH line board of NE3, and is then transmitted to the

environment monitor of NE3. That is, the data of the monitoring host is transmitted to the environment monitor on the NE3 side.

- On the NE4 side, the data that is transmitted from the NE1 side is dropped to the broadcast data port of NE4 through the SDH line board of NE4 and is then transmitted to the environment monitor of NE4. That is, the data of the monitoring host is transmitted to the environment monitor on the NE4 side.

- The signal flow from each slave station to the master station is in the opposite direction to the signal flow from the master station to each slave station.

You can determine the overhead bytes, source, and sink of the broadcast data of each NE according to the service signal flow and **Table 5-2**.

Table 5-2 NE parameters

NE	Overhead Interface	Broadcast Data Source	Broadcast Data Sink
NE1	SERIAL1	SERIAL1	8-SL4D-1, 8-SL4D-2
NE2	SERIAL1	8-SL4D-2	8-SL4D-1, SERIAL1
NE3	SERIAL1	8-SL4D-2	SERIAL1
NE4	SERIAL1	8-SL4D-1	SERIAL1

NOTE

After the settings are performed for NE1, NE1 broadcasts the data that is input from the broadcast data source (broadcast data port) to the directions of the 8-SL4D-1 and 8-SL4D-2 at the same time. The 8-SL4D-1 and 8-SL4D-2 transmit the input data to the broadcast data port. Hence, only one environment monitor can transmit data to the monitoring host at a time.

5.4 Configuration Process

To meet the requirements for the broadcast data services between the monitoring host and the environment monitors, you need to configure the broadcast data services of NE1–NE4.

Prerequisite

- The **2 Creating the Network** task must be completed.
- You must be familiar with **5.3 Signal Flow and Timeslot Allocation**.

Precautions

CAUTION

- The OptiX OSN 500 supports a maximum of six broadcast data sinks.
- When you configure the broadcast data ports, ensure that the broadcast data ports do not form a loop. Certain optical interfaces cannot be configured as the broadcast data ports.

Procedure

Step 1 To configure the broadcast data service of NE1, do as follows:

- In the NE Explorer, select NE1, and then choose **Configuration** > **Orderwire** from the Function Tree.
- Click the **Broadcast Data Port** tab and set the parameters as listed in the following table. Then, click **Apply**.

Parameter	Value in This Example	Description
Overhead Byte	SERIAL1	Select the broadcast data channel that needs to be set. Selects one from SERIAL1, SERIAL2, SERIAL3, and SERIAL4, which correspond to the SERIAL1, SERIAL2, SERIAL3, and SERIAL4 bytes as shown in **Table 5-2**. In this example, select SERIAL1.
Working Mode	RS232	Set the working mode of the selected broadcast data port.
Broadcast Data Source	SERIAL1	The broad data source indicates the source channel of the broadcast data.
Broadcast Data Sink	8-SL4D-2 and 8-SL4D-1	The broadcast data sink indicates the sink channel of the broadcast data. In the broadcast mode, one broadcast data source can correspond to multiple broadcast data sinks.

Step 2 To configure the broadcast data service of NE2, do as follows:

- Click the quick NE switching icon  and select NE2. Click **OK**.
- In the NE Explorer, select NE2, and then choose **Configuration** > **Orderwire** from the Function Tree.
- Click the **Broadcast Data Port** tab and set the parameters as listed in the following table. Then, click **Apply**.

Parameter	Value in This Example	Description
Overhead Byte	SERIAL1	Select the broadcast data channel that needs to be set. The setting must be the same as the setting of NE1.
Working Mode	RS232	Set the working mode of the selected broadcast data port.
Broadcast Data Source	8-SL4D-2	The broad data source indicates the source channel of the broadcast data.

Parameter	Value in This Example	Description
Broadcast Data Sink	8-SL4D-1 and SERIAL1	The broadcast data sink indicates the sink channel of the broadcast data. In the broadcast mode, one broadcast data source can correspond to multiple broadcast data sinks.

Step 3 To configure the broadcast data service of NE3, do as follows:

- Click the quick NE switching icon  and select NE3. Click **OK**.
- In the NE Explorer, select NE3, and then choose **Configuration** > **Orderwire** from the Function Tree.
- Click the **Broadcast Data Port** tab and set the parameters as listed in the following table. Then, click **Apply**.

Parameter	Value in This Example	Description
Overhead Byte	SERIAL1	Select the broadcast data channel that needs to be set. The setting must be the same as the setting of NE1.
Working Mode	RS232	Set the working mode of the selected broadcast data port.
Broadcast Data Source	8-SL4D-2	The broad data source indicates the source channel of the broadcast data.
Broadcast Data Sink	SERIAL1	The broadcast data sink indicates the sink channel of the broadcast data.

Step 4 To configure the broadcast data service of NE4, do as follows:

- Click the quick NE switching icon  and select NE4. Click **OK**.
- In the NE Explorer, select NE4, and then choose **Configuration** > **Orderwire** from the Function Tree.
- Click the **Broadcast Data Port** tab and set the parameters as listed in the following table. Then, click **Apply**.

Parameter	Value in This Example	Description
Overhead Byte	SERIAL1	Select the broadcast data channel that needs to be set. The setting must be the same as the setting of NE1.
Working Mode	RS232	Set the working mode of the selected broadcast data port.

Parameter	Value in This Example	Description
Broadcast Data Source	8-SL4D-1	The broad data source indicates the source channel of the broadcast data.
Broadcast Data Sink	SERIAL1	The broadcast data sink indicates the sink channel of the broadcast data.

Step 5 Enable the performance monitoring function of the NEs. For details, see **7.5 Setting Performance Monitoring Parameters of an NE**.

Step 6 Back up the configuration data of the NEs. For details, see **7.16 Backing Up the NE Database to the SCC Board**.

----End

6 Modifying the Configuration Data

About This Chapter

When you need to adjust the existing configuration data related to topologies and services, you can modify the configuration data.

6.1 Modifying NE Attributes

You can modify the existing NE configuration data that needs adjustment.

6.1.1 Modifying the NE ID

The ECC protocol uses the NE ID as the unique identifier of an NE. The T2000 also uses the NE ID to identify different NEs in the user interface and databases, and uses the NE ID as the key word in searches. Hence, you need to assign a unique NE ID to each NE when planning a network. If an NE ID conflicts with another NE, it results a collision in the ECC route. As a result, it becomes difficult to manage some NEs. In the commissioning or expansion process, when you need to adjust the original planning and modify the NE ID, you can use the T2000 to achieve it.

Prerequisite

- You must be an NM user with "NE operator" authority or higher.
- The NE must be created.

Precautions

CAUTION

Modifying the NE ID may interrupt NE communication and reset the NE.

Issue 01 (2009-01-20)

Procedure

Step 1 In the NE Explorer, select an NE and choose **Configuration** > **NE Attribute** from the Function Tree.

Step 2 Click **Modify NE ID**, and the **Modify NE ID** dialog box is displayed.

Step 3 Enter the **New ID** and the **New Extended ID**. Click **OK**.

Step 4 Click **OK** in the **Warning** dialog box.

----End

6.1.2 Modifying the NE Name

You can modify the NE name as required. This operation does not affect the running of the NE.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 In the NE Explorer, click the NE and choose **Configuration** > **NE Attribute** from the Function Tree.

Step 2 In the NE Attribute dialog box, enter a new NE name in **Name**. Click **Apply**. A prompt appears telling you that the operation was successful.

NOTE

An NE name can contain a maximum of 64 letters, symbols, and numerals, but cannot contain the following special characters: | : * ? " < >.

Step 3 Click **Close**.

----End

6.1.3 Deleting NEs

If you have created a wrong NE, you can delete the NE from the T2000. Deleting an NE removes all information of the NE from the T2000 but does not affect the running of the equipment.

Prerequisite

You must be an NM user with "NM maintainer" authority or higher.

Context

CAUTION

If an NE is deleted, the links related to the NE are also deleted.

Procedure

- Delete a single SDH PTN NE.
  1. Right-click the NE on the Main Topology and choose **Delete** > **Delete Device** from the shortcut menu. The **Confirm** dialog box is displayed.
  2. Click **Yes**. The **Delete Device Results** dialog box is displayed.
  3. Click **Close**, The NE icon is deleted from the Main Topology.
- Delete NEs in batches.
  1. Choose **Configuration** > **Configuration Data Management** from the Main Menu. The **Configuration Data Management** window is displayed.
  2. In the left-hand pane, select multiple NEs and click . The **Configuration Data Management List** pane displays the configuration data of all the selected NEs.
  3. Select the NEs to be deleted, right-click and choose **Delete** from the shortcut menu. The **Delete the NE** dialog box is displayed.
  4. Click **OK**.

----End

6.1.4 Modifying GNE Parameters

During the network optimization and adjustment, you may need to change the GNE type or modify the communication address.

Prerequisite

You must be an NM user with "NE maintainer" authority or higher.

Precautions

CAUTION

This operation is risky, because it may interrupt the communication.

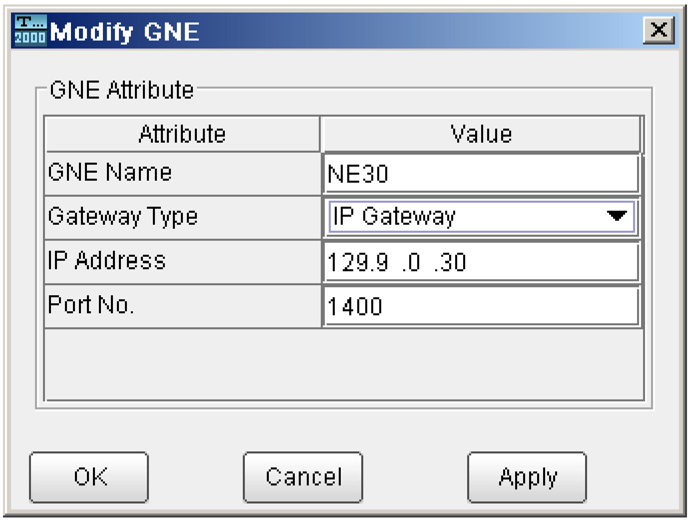
Procedure

Step 1 Choose **System** > **DCN Management** from the Main Menu. Click the **GNE** tab.

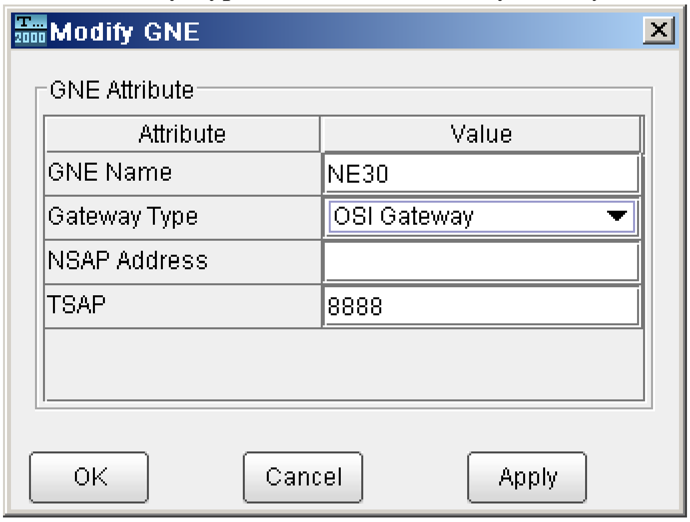
Step 2 Select the GNE to be modified, right-click and choose **Modify GNE** from the shortcut menu.

Step 3 In the **Modify GNE** dialog box displayed, set **Gateway Type** .

- When **Gateway Type** is set to **IP Gateway**, modify **IP Address**.



- When **Gateway Type** is set to **OSI Gateway**, modify **NSAP Address**.



NOTE

- Do not modify the **Port No.**.
- Make sure that the IP address of the GNE is in the same network segment as the IP address of the T2000. If they are not in the same network segment, set the corresponding network ports, to make sure that the T2000 can log in to the GNE.

Step 4 Click **OK**. In the **Operation Result** dialog box that is displayed, click **Close**.

----End

6.1.5 Changing the GNE for NEs

When the GNE that the non-gateway NE belongs to is changed and this non-gateway NE does not belong to another GNE, you need to change the GNE to maintain the communication between the NEs and the T2000. Alternatively, if a GNE manages more than 50 NEs, change the GNE for some NEs so that the communication between the T2000 and the NEs is not affected.

Prerequisite

You must be an NM user with "NE maintainer" authority or higher.

Procedure

Step 1 Choose **System** > **DCN Management** from the Main Menu.

Step 2 Click the **NE** tab.

Step 3 Select an NE. Double-click the **Primary GNE1** field and select a GNE from the drop-down list.

Step 4 Click **Apply**. Click **Close** in the **Operation Result** dialog box.

Step 5 Click **Refresh**.

----End

6.2 Modifying the Board Configuration Data

You can modify the existing board configuration data that needs adjustment.

6.2.1 Adding Boards

When manually configuring the NE dataAfter the NE data is configured, if physical boards are added, you need to add boards on the NE Panel. You can either add the physical boards that actually operate on the NE or add the logical boards that do not exist on the actual equipment.

Prerequisite

- You must be an NM user with "NE operator" authority or higher.
- The NE must be created.
- There must be idle slot on the NE Panel.

Context

The physical boards are the actual boards inserted in the subrack. The logical boards are created on the T2000 and are saved on the SCC board, but they do not exist on the actual equipment.

NOTE

The NE panel is able to indicate the mapping relation between slots that house processing boards and interface boards. When you click a processing board that is paired with an interface board in the NE panel, the ID of the slot that houses the mapping interface board is displayed in orange.

Procedure

Step 1 Double-click the icon of the NE to open the NE Panel.

Step 2 Right-click the selected idle slot. Select the board you want to add from the drop-down list.

NOTE

If the cross-connect board is installed in the subrack, add its corresponding logical board on the T2000.

----End

6.2.2 Deleting Boards

To modify the network configuration or the NE configuration, you may need to delete the boards from the NE Panel.

Prerequisite

- You must be an NM user with "NE maintainer" authority or higher.
- The services and protection groups must be deleted.

Procedure

Step 1 Double-click the icon of the NE to open the NE Panel.

Step 2 Right-click the board you want to delete and choose **Delete** from the shortcut menu.

NOTE

Some boards, such as PIU and AUX boards, cannot be deleted.

Step 3 Click **OK** in the **Delete Board** dialog box.

Step 4 Click **OK** to delete the board.

----End

6.2.3 Modifying Board Configuration Parameters

You can modify the existing board configuration data that needs adjustment.

Prerequisite

To modify different configuration parameters of different boards, you may need to operate as NM users with different authorities. You must be an NM user with "NE operator" authority or higher. must be available at least.

Procedure

Step 1 In the NE Explorer, select a board and choose a proper item from the Function Tree.

Board Type	Parameters
SDH board	Multiplex section shared attribute, laser enabling/disabling, optical interface loopback, hardware REG enabling

Board Type	Parameters
PDH board	Tributary loopback, service load indication
Ethernet board	Port enabling, working mode, maximum frame length, MAC loopback, PHY loopback, TAG, entry test

Step 2 In the right-hand pane, modify the existing parameter settings and click **Apply**.

----End

6.3 Modifying the Fiber Configuration Data

You can modify the existing fiber configuration data that needs adjustment.

6.3.1 Deleting Fibers
When adjusting the network if you need to delete the NEs or change the links between NEs, you need to delete the fiber connections between the NEs.

6.3.2 Modifying Fiber Cable Information
You can modify the name, attenuation, length, and type of a fiber cable according to its connection status and physical features.

6.3.3 Deleting DCN Communication Cables
In certain scenarios such as network adjustment, you can delete an unwanted DCN communication cable that is created previously.

6.3.1 Deleting Fibers

When adjusting the network if you need to delete the NEs or change the links between NEs, you need to delete the fiber connections between the NEs.

Prerequisite

You must be an NM user with "NE maintainer" authority or higher.

Procedure

Step 1 Choose **File** > **Fiber/Cable Management** from the Main Menu.

Step 2 Select the fiber you want to delete, right-click and choose **Delete Fiber/Cable** from the shortcut menu. The **Warning** dialog box is displayed. Click **OK** to delete the fiber cable.

Step 3 Click **Close** in the **Operation Result** dialog box.

----End

6.3.2 Modifying Fiber Cable Information

You can modify the name, attenuation, length, and type of a fiber cable according to its connection status and physical features.

Prerequisite

You must be an NM user with "NE maintainer" authority or higher.

Procedure

Step 1 Choose **File** > **Fiber/Cable Management** from the Main Menu. The information of all fiber cables is displayed in the pane on the right.

Step 2 In the **Name** column, right-click the value for a fiber cable and choose **Modify Fiber/Cable** from the shortcut menu. In the **Modify Fiber/Cable** dialog box displayed, enter a proper name for the fiber cable and click **OK**. Click **Close** in the **Operation Result** dialog box.

Step 3 In the **Length(km)** column, right-click the value for a fiber cable and choose **Modify Fiber/Cable** from the shortcut menu. In the **Modify Fiber/Cable** dialog box displayed, enter the actual length for the fiber cable and click **OK**. Click **Close** in the **Operation Result** dialog box.

Step 4 Modify the attenuation of a fiber.

1. In the **Attenuation** column, right-click the value for a fiber and choose **Modify Fiber/Cable** from the shortcut menu.
2. In the **Modify Fiber/Cable** dialog box, enter the actual loss and click **OK**. Click **Close** in the **Operation Result** dialog box.

Step 5 Modify the type of the fiber.

1. In the **Type** column, right-click the value for a fiber and choose **Modify Fiber/Cable** from the shortcut menu.
2. In the **Modify Fiber/Cable** dialog box displayed, select the actual type of the fiber from the drop-down list and click **OK**. Click **Close** in the **Operation Result** dialog box.

----End

6.3.3 Deleting DCN Communication Cables

In certain scenarios such as network adjustment, you can delete an unwanted DCN communication cable that is created previously.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 On the Main Topology, select a cable, right-click and choose **Delete** from the shortcut menu.

Step 2 In the **Delete Link** dialog box displayed, click **OK**.

----End

6.4 Modifying the Service Configuration Data

You can modify the existing service configuration data that needs adjustment.

You can delete an existing SDH service.

6.4.3 Deleting Ethernet Private Line Services
Ethernet private line services need to be deleted when the Ethernet boards that are configured with the Ethernet private line services need to be deleted or when the service configuration is incorrect.

6.4.4 Deleting EPLAN Services
EPLAN services need to be deleted when the Ethernet boards that are configured with the EPLAN services need to be deleted or when the configuration of the EPLAN services is incorrect.

6.4.5 Deleting EVPLAN Services
EVPLAN services need to be deleted when the Ethernet boards that are configured with the EVPLAN services need to be deleted or when the configuration of the EVPLAN services is incorrect.

6.4.1 Modifying SDH Services

To modify an SDH service, you can use the modification function of the T2000, or delete the service and then create the cross-connection again.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Context

CAUTION

Performing this operation interrupts the service that you modify.

Procedure

Step 1 In the NE Explorer, select an NE and choose **Configuration** > **SDH Service Configuration** from the Function Tree.

Step 2 Select a cross-connection and choose **Display** > **Expand to Unidirectional**.

Step 3 **Optional:** If the service to be modified is active, you should deactivate the service. Select the service that you want to modify, and click **Deactivate**.

CAUTION

Deactivation will interrupt services.

Step 4 Click **OK** in the **Confirm** dialog box is displayed twice. The **Operation Result** dialog box is displayed telling you that the operation was successful.

Step 5 Click **Close**.

Step 6 After the cross-connection is deactivated, modify the SDH service in the mode in **Step 7** or **Step 8**.

NOTE

- By using the mode in **Step 7**, you can modify the source or sink of a service, but the source and sink must be on the same board before and after the modification.
- If the modification requirement cannot be met in the mode in **Step 7** (for example, a pass-through service needs to be configured to the local through modification), you can delete the original service and create the cross-connection again in the mode in **Step 8**, to achieve the modification.

Step 7 **Optional:** To modify the SDH service, choose **Modify** from the shortcut menu.

1. Select the service that you want to modify, right-click, and choose **Modify** from the shortcut menu. The **Modify SDH Service** dialog box is displayed.
2. Modify **Source VC4** or **Sink VC4**, **Source Timeslot Range**, and **Sink Timeslot Range**.

   NOTE

   In this mode, you can modify only **Source VC4** or **Sink VC4**. The source VC4 and sink VC4 cannot be modified at the same time.
3. Click **OK**. The **Operation Result** dialog box is displayed telling you that the operation was successful.
4. Click **Close**.
5. Select the service that is modified, and click **Activate**.
6. Click **OK**. The **Operation Result** dialog box is displayed.
7. Click **Close**.

Step 8 **Optional:** To modify the SDH service, delete the service and then create the service again.

1. Select the service that you want to modify, and click **Delete**.
2. Click **OK** and the **Operation Result** dialog box is displayed telling you that the operation was successful.
3. Click **Close**. The service is deleted.
4. Create the service again as required. For details, see Creating SDH Services.

----End

6.4.2 Deleting SDH Services

You can delete an existing SDH service.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select an NE and choose **Configuration** > **SDH Service Configuration** from the Function Tree.

Step 2 Click **Query** to query existing services.

Step 3 **Optional:** If the service to be deleted is active, you should deactivate the service. Select the service that you want to delete and click **Deactivate**.

CAUTION

Deactivation will interrupt services.

Step 4 Select the desired service and click **Delete**.

Step 5 In the **Confirm** dialog box displayed, click **OK**.

Step 6 In the **Operation Result** dialog box displayed, click **Close**.

----End

6.4.3 Deleting Ethernet Private Line Services

Ethernet private line services need to be deleted when the Ethernet boards that are configured with the Ethernet private line services need to be deleted or when the service configuration is incorrect.

Prerequisite

- You must be an NM user with "NE or network operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select an Ethernet board and then choose **Configuration** > **Ethernet Service** > **Ethernet Line Service** from the Function Tree.

Step 2 Click **Query**.

Step 3 Select the Ethernet private line service to be deleted and click **Delete**. Click **OK** in the **Prompt** dialog box that is displayed. Then, a dialog box is displayed, indicating that the operation is successful, that is, the Ethernet private line service is deleted successfully.

Step 4 Click **Query** to check whether the Ethernet private line service is deleted.

Step 5 See **6.4.2 Deleting SDH Services** to delete the cross-connections of the Ethernet private line service.

----End

6.4.4 Deleting EPLAN Services

EPLAN services need to be deleted when the Ethernet boards that are configured with the EPLAN services need to be deleted or when the configuration of the EPLAN services is incorrect.

Prerequisite

- You must be an NM user with "NE or network operator" authority or higher.

Context

CAUTION

When the EPLAN services are deleted, the VLAN unicast entries and disabled MAC address entries are deleted.

Procedure

Step 1 In the NE Explorer, select an Ethernet board, and then choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree.

Step 2 Click **Query**.

Step 3 Select the EPLAN service to be deleted and click **Delete**. Click **OK** in the **Prompt** dialog box that is displayed. Then, a dialog box is displayed, indicating that the operation is successful, that is, the EPLAN service is deleted successfully.

Step 4 Click **Query** to check whether the EPLAN service is deleted.

Step 5 See **6.4.2 Deleting SDH Services** to delete the cross-connections of the EPLAN service.

----End

6.4.5 Deleting EVPLAN Services

EVPLAN services need to be deleted when the Ethernet boards that are configured with the EVPLAN services need to be deleted or when the configuration of the EVPLAN services is incorrect.

Prerequisite

- You must be an NM user with "NE or network operator" authority or higher.

Background Information

Deleting an EVPLAN service involves the following:

1. Deleting the VLAN filtering table
2. Deleting the service mounting configurations

Context

CAUTION

When the VLAN filtering table is deleted, the VLAN unicast entries and disabled MAC address entries are deleted.

Procedure

Step 1 In the NE Explorer, select an Ethernet board and then choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree.

Step 2 Click **Query**.

Step 3 Click the **VLAN Filtering** tab.

Step 4 Select the VLAN filtering entry to be deleted and click **Delete**.

Step 5 Click the **Service Mount** tab.

Step 6 Select the EVPLAN service to be deleted and click **Delete**. Click **OK** in the **Prompt** dialog box that is displayed. Then, a dialog box is displayed, indicating that the operation is successful, that is, the EVPLAN service is deleted successfully.

Step 7 Click **Query** to check whether the EVPLAN service is deleted.

Step 8 See **6.4.2 Deleting SDH Services** to delete the cross-connections of the EVPLAN service.

----End

6.5 Modifying the Protection Subnet

This topic describes how to modify the configuration data of the existing protection subnet.

6.5.1 Deleting Protection Subnets
Before you delete an NE or a fiber cable connection on the T2000, you need to delete the related protection subnets first.

6.5.2 Setting Protection Subnet Parameters
For the SDH equipment, you can set parameters for MSP protection subnet by using the protection subnet maintenance function.

6.5.1 Deleting Protection Subnets

Before you delete an NE or a fiber cable connection on the T2000, you need to delete the related protection subnets first.

Prerequisite

- You must be an NM user with "network maintainer" authority or higher.
- If one or more trails are configured in the protection subnet that you want to delete, delete the trails first.

Procedure

Step 1 Choose **Protection Subnet** > **SDH Protection Subnet Management** from the Main Menu.

Step 2 Right-click the protection subnet to be deleted and choose **Delete from the NM**or **Delete from the NE**or **Delete All from the NM** from the short-cut menu.

NOTE

The methods to delete a protection subnet are as follows:

- **Delete from the NM**: Deletes the relation between the protection subnet and logical systems at the NE side, to allow deleting of fibers, re-uploading, and so on. This command is not delivered to the NE and does not affect the services. The deleted protection subnet can be located by using the search feature. The T2000 locates it according to the NE layer protection information.
- **Delete from the NE**: Deletes the protection subnet, logical systems at the NE side, and all traffic in the protection subnet. The deleted protection subnet cannot be restored without being created again.
- **Delete All from the NM** : Deletes data other than fibers in the network layer. The deleted protection subnet can be located by using the search feature. It is recommended that you do not select this option, as a large amount of data can be deleted.

Step 3 In the **Operation Prompt**dialog box, click **Yes**. After completion, the **Operation Result** dialog box is displayed.

NOTE

If **Delete from the NE**is selected, you need to confirm the operation once more.

Step 4 Click**Close** to complete the operation.

----End

6.5.2 Setting Protection Subnet Parameters

For the SDH equipment, you can set parameters for MSP protection subnet by using the protection subnet maintenance function.

Prerequisite

- You must be an NM user with "network maintainer" authority or higher.
- On the T2000, the data of each NE must be configured, and fibers are created correctly.
- The MSP protection subnet must be configured.

Procedure

Step 1 Choose **Protection Subnet** > **SDH Protection Subnet Maintenance** from the Main Menu to display the **Protection Subnet Attributes** dialog box.

Step 2 Select an MSP protection subnet from the left pane. The attribute information of the protection subnet is displayed in the right pane.

Step 3 Click the **Protection Subnet Parameters** tab.

Step 4 Click **Query** to query the parameters of the protection subnet in the MSP ring.

Step 5 Click the **WTR Time(s)** text box and enter a value.

NOTE

By default, enter 600. You can also enter a value from 300 to 720.

Step 6 **Optional:** Select **SD Condition**.

Step 7 Click **Apply** to display the **Operation Result** prompt box. Then click **Close**.

----End

7 Task Collection

About This Chapter

This topic describes each operation on the T2000 that is required during the service configuration.

7.1 Creating SDH Services
To add or drop services between a tributary board and a line board, thereby realizing service transmission in an SDH network, you need to create SDH cross-connections from the tributary board to the line board.

7.2 Creating SNCP Services
The SNCP is characterized by the dual-fed and selective-receiving mode. The SNCP is used for protecting services that travel across different subnets. When you configure SDH services on a per-NE basis, you need to configure the SNCP if the services that travel across different subnets need to be protected.

7.3 Configuring Trace Bytes
The trace bytes allow a receiving terminal to verify its continued connection to the intended transmitting terminal. The characters in the trace byte must be set identically at both ends if the interconnection involves only the equipment from the same vendor. If the interconnection involves equipment from different vendors, the trace bytes should be set to defined characters. Otherwise, the interconnection fails.

7.4 Configuring the C2 Byte
The C2 byte is used to indicate the multiplexing structure of the VC frames and the type of payload (such as PDH services).

7.5 Setting Performance Monitoring Parameters of an NE
By setting performance monitoring parameters of an NE properly and starting the performance monitoring for the NE, you can obtain the detailed performance record during the running of the NE. This facilitates the monitoring and analysis of the NE running status performed by maintenance personnel.

7.6 Verifying the Correctness of the SDH Service Configuration
According to the alarm reported on the T2000 and MSP switching status, you can check whether the service configuration is correct. In addition, you can obtain the service switching time from the SDH test meter.

7.7 Configuring External Ports on Ethernet Boards

When an NE accesses Ethernet services through the external ports (that is, PORTs) on the Ethernet board, you need to set the attributes of the PORTs so that the PORTs can work with the data communication equipment on the client side. This ensures that the Ethernet services can be accessed normally.

7.8 Configuring Internal Ports on Ethernet Boards
When an NE transmits Ethernet services through the internal ports (that is, VCTRUNK ports) on the Ethernet board to the SDH side, you need to Set the attributes of the VCTRUNK ports so that the VCTRUNK ports can work with the Ethernet board on the equipment at the opposite end. This ensures that Ethernet services are transmitted normally on the SDH network.

7.9 Configuring Bound Paths
You can set the bandwidth and direction of a VCTRUNK by setting a bound path.

7.10 Creating EPL Services
When an Ethernet switching board carries private line services, the relevant information of the private line services, such as the service source and service sink, must be specified.

7.11 Creating Ethernet LAN Services
When an Ethernet switching board carries LAN services, you need to create the bridge and set the attributes of the bridge and the port mounted to the bridge.

7.12 Creating VLANs Filtering
In the case of Ethernet LAN services, when the type of the bridge is IEEE 802.1q or IEEE 802.1ad, the VLAN filtering table needs to be created for the bridge if VLANs are used to isolate the data of different users.

7.13 Creating VLAN Unicast
You can configure VLAN unicast, to allow a packet whose destination address is the specified MAC address to be forwarded through the specified port in the specified VLAN.

7.14 Disabling an MAC Address
You can disable an MAC address. As a result, this address receives no packets even in the same VLAN.

7.15 Testing Ethernet Service Channels
If network cables are incorrectly connected or are faulty, the Ethernet service channels become faulty. This affects the services. Hence, the Ethernet service channels must be normal.

7.16 Backing Up the NE Database to the SCC Board
You need to back up the NE database during daily maintenance, to ensure that the SCC board of the NE automatically restores to normal operation after a data loss or equipment power failure. When you back up the NE database to the SCC board, you actually back up the NE data to the FLASH of the SCC board. When the NE is restarted after a power failure, the SCC board automatically reads the configuration from the FLASH and issues the configuration to the boards.

7.17 Checking the Network Communication Status
On some occasions, the T2000 cannot manage some NEs during the running of the network. By checking the communication status of the network, you can know the communication status between the T2000 and NEs.

7.18 Viewing the Clock Trace Search
Correct clock trace relations are critical to ensure the clock synchronization within the entire network. Using the T2000, you can monitor the clock trace status of each NE.

7.1 Creating SDH Services

To add or drop services between a tributary board and a line board, thereby realizing service transmission in an SDH network, you need to create SDH cross-connections from the tributary board to the line board.

Prerequisite

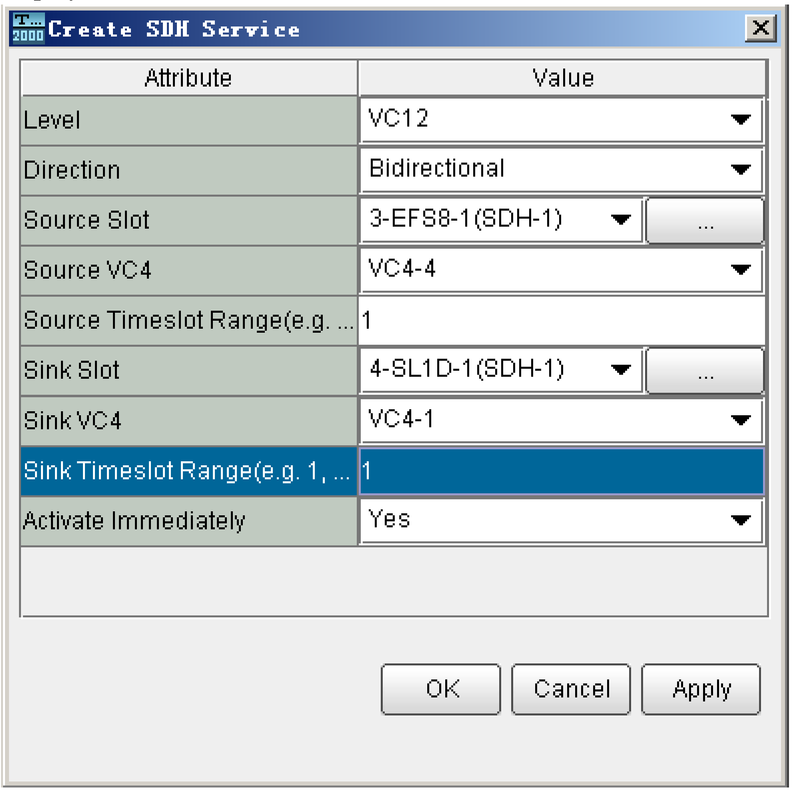
You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select the NE and choose **Configuration** > **SDH Service Configuration** from the Function Tree.

Step 2 Click **Query** to query SDH services from the NE.

Step 3 Click **Create** and set the required parameters in the **Create SDH Service** dialog box that is displayed.



Step 4 Click **OK**.

----End

7.2 Creating SNCP Services

The SNCP is characterized by the dual-fed and selective-receiving mode. The SNCP is used for protecting services that travel across different subnets. When you configure SDH services on a per-NE basis, you need to configure the SNCP if the services that travel across different subnets need to be protected.

Prerequisite

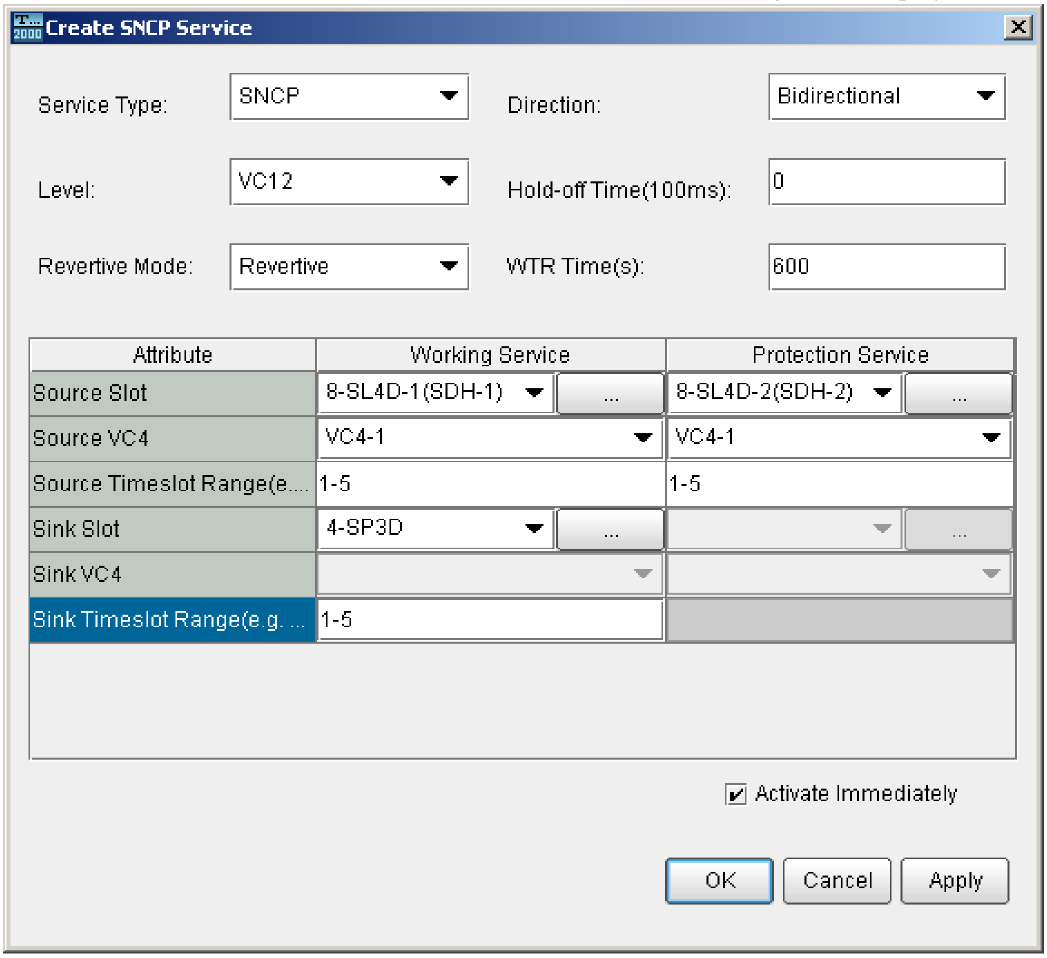
You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select the NE and choose **Configuration** > **SDH Service Configuration** from the Function Tree.

Step 2 Click **Query** to query SNCP services from the NE.

Step 3 Click **Create SNCP Service**. Then, the **Create SNCP Service** dialog box is displayed.



Step 4 Set **Service Type**, **Direction**, **Level**, SNCP protection parameters, **Working Service**, and **Protection Service**. Click **OK**. Then, the **Operation Result** dialog box is displayed, indicating that the operation is successful.

Step 5 Click **Close**.

----End

7.3 Configuring Trace Bytes

The trace bytes allow a receiving terminal to verify its continued connection to the intended transmitting terminal. The characters in the trace byte must be set identically at both ends if the interconnection involves only the equipment from the same vendor. If the interconnection involves equipment from different vendors, the trace bytes should be set to defined characters. Otherwise, the interconnection fails.

Prerequisite

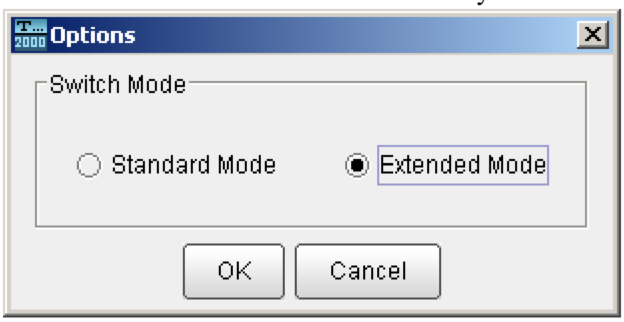
- You must be an NM user with "NE maintainer" authority or higher.
- The VC-12/VC-3/VC-4 trace bytes can be queried or set only after the VC-12/VC-3/VC-4 cross-connection is created.

Procedure

Step 1 Select the trace byte to be configured.

If...	Then...
You need to configure the J0 byte	In the NE Explorer, select the board and choose **Configuration** > **Overhead Management** > **Regenerator Section Overhead** from the Function Tree.
You need to configure the J1 byte	• In the NE Explorer, select the board and choose **Configuration** > **Overhead Management** > **VC4 Path Overhead** from the Function Tree. Then, click the **Trace Byte J1** tab. • In the NE Explorer, select the board and choose **Configuration** > **Overhead Management** > **VC3 Path Overhead** from the Function Tree. Then, click the **Trace Byte J1** tab.
You need to configure the J2 byte	In the NE Explorer, select the board and choose **Configuration** > **Overhead Management** > **VC12 Path Overhead** from the Function Tree. Then, click the **Trace Byte J2** tab.

Step 2 Click **Options**. Then, the **Options** dialog box is displayed. Select the mode of processing the read and write attributes of the overhead byte.



NOTE

- In the case of the J0 byte, the mode setting is unavailable.
- The T2000 uses **Extended Mode** or **Standard Mode** to process the read and write attributes of the overhead byte. The T2000 functions more efficiently when processing the read and write attributes of the overhead byte in extended mode than in standard mode.

Step 3 Right-click the trace byte and choose the input mode.

If...	Then...
You choose Copy All Form Received	Click **Copy All Form Received**.
You choose Manual Input	Click **Manual Input**. Then, the **Please input the overhead byte** dialog box is displayed. Choose **Byte Mode** and **Input Mode** and enter the value of the trace byte. Then, click **OK**.

NOTE

- If you choose **Copy All Form Received**, the value of the trace byte that is currently received is automatically copied to the table.
- If you choose **Manual Input**, you can customize the value of the trace byte.

Step 4 Click **Apply**. Then, the **Confirm** dialog box is displayed.

Step 5 Click **OK**. Then, a dialog box is displayed indicating that the operation is successful. Click **Close**.

----End

7.4 Configuring the C2 Byte

The C2 byte is used to indicate the multiplexing structure of the VC frames and the type of payload (such as PDH services).

Prerequisite

- You must be an NM user with "NE maintainer" authority or higher.
- The cross-connection must be created on the NE.

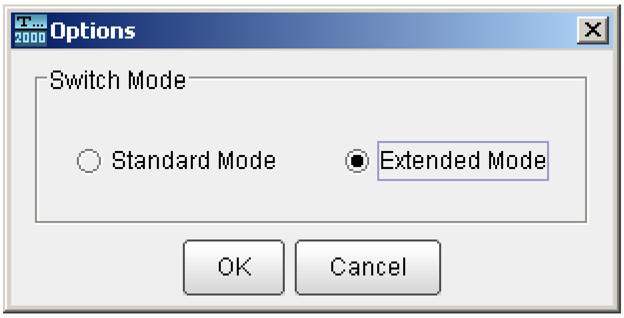
Procedure

Step 1 Select the service level of the C2 byte.

If...	Then...
The service level of the C2 byte is VC-4	In the NE Explorer, select the board and choose **Configuration** > **Overhead Management** > **VC4 Path Overhead** from the Function Tree. Then, click the **Signal Flag C2** tab.
The service level of the C2 byte is VC-3	In the NE Explorer, select the board and choose **Configuration** > **Overhead Management** > **VC3 Path Overhead** from the Function Tree. Then, click the **Signal Flag C2** tab.

Step 2 Click **Options**. Then, the **Options** dialog box is displayed.

Step 3 Set **Switch Mode** to **Extended Mode**. Then, click **OK**.



NOTE

- You can set the C2 byte only when the mode is set to **Extended Mode**.
- The T2000 uses **Extended Mode** or **Standard Mode** to process the read and write attributes of the overhead byte. The T2000 functions more efficiently when processing the read and write attributes of the overhead byte in extended mode than in standard mode.

Step 4 Set **C2 to be Sent** and **C2 to be Received**.

Step 5 Click **Apply**. Then, the **Confirm** dialog box is displayed.

Step 6 Click **OK**. Then, a dialog box is displayed indicating that the operation is successful. Click **Close**.

----End

7.5 Setting Performance Monitoring Parameters of an NE

By setting performance monitoring parameters of an NE properly and starting the performance monitoring for the NE, you can obtain the detailed performance record during the running of the NE. This facilitates the monitoring and analysis of the NE running status performed by maintenance personnel.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

NE time is synchronized with the T2000 server.

Procedure

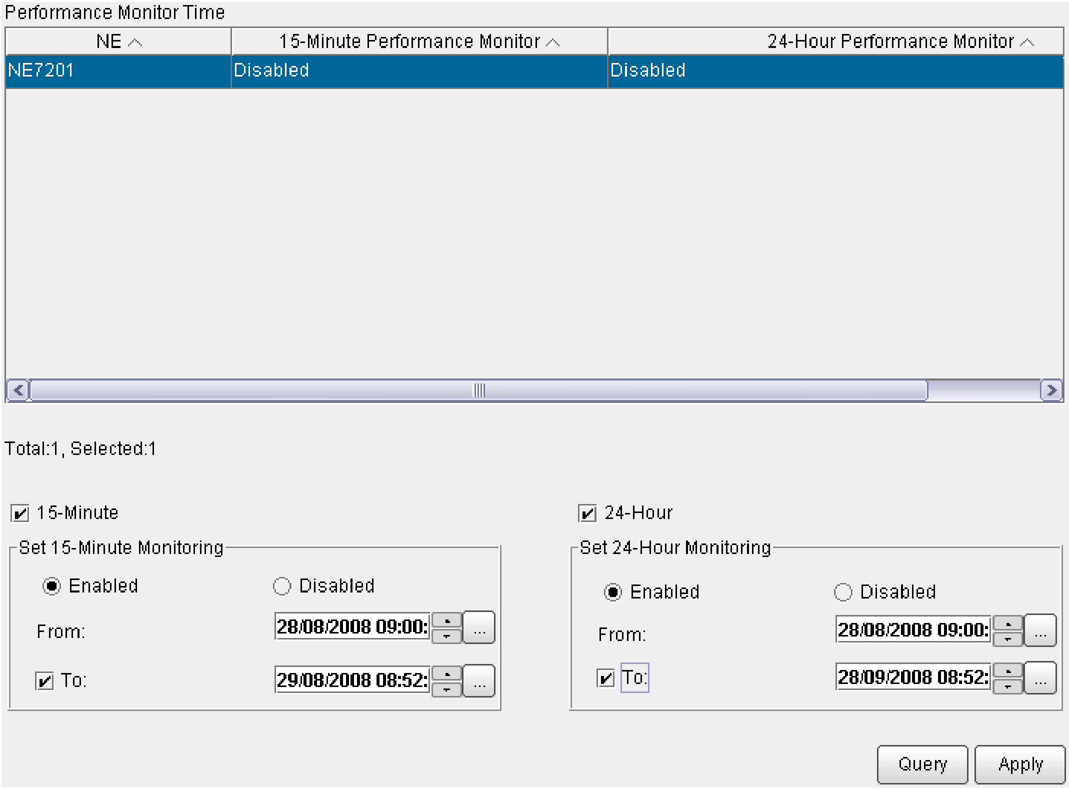
Step 1 Choose **Performance** > **NE Performance Monitoring Time** from the Main Menu.

Step 2 Select NEs from the NE list. Click the double-right-arrow button.

Step 3 Select one or more NEs, and set 15-minute and 24-hour performance monitor parameters according to the requirement.

NOTE

- The start time must be later than the current time of the network management system and the end time must be later than the start time.
- If the end time is not set, this indicates that the performance monitoring starts from the start time and does not stop.



Step 4 Click **Apply** and click **Close** in the **Operation Result** dialog box.

----End

7.6 Verifying the Correctness of the SDH Service Configuration

According to the alarm reported on the T2000 and MSP switching status, you can check whether the service configuration is correct. In addition, you can obtain the service switching time from the SDH test meter.

Prerequisite

- The creation of the physical topology of the network must be complete.

- NEs, boards, and fibers must be successfully created on the T2000.
- The SDH test meter must be correctly connected to the source end and the sink end, and the corresponding service type and rate must be configured.
- You must be a T2000 user with "NE and network administrator" authority or higher.

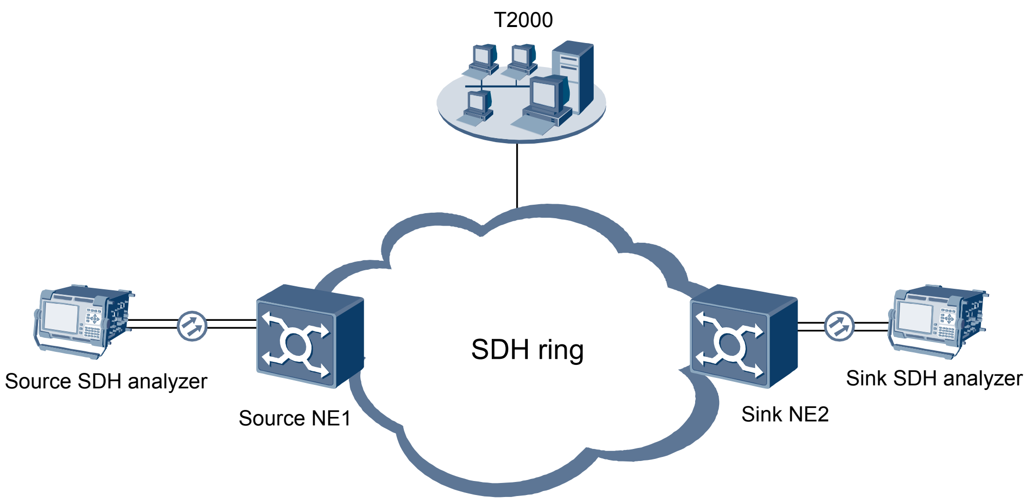
Background Information

When the service type and rate are set on the test meter, the "SIGNAL" and "FRAME" indicators of the 37718 SDH analyzer turn green from red and are constantly on. If no alarm indicator is flashing on the test meter, it indicates that the SDH test meter is connected properly to the network.

Test Connection Diagram

As shown in **Figure 7-1**, the SDH test meters are connected to the source end and sink end of the network to be tested. At the same time, the T2000 must be connected properly to the network to be tested.

Figure 7-1 Test connection diagram



Precautions

CAUTION

An optical attenuator should be added at the "TX" optical interface on the board that is directly connected to the SDH test meter. You also need to add an attenuator at the "RX" optical interface if required. In this case, the attenuator can prevent the damage due to excessive optical power on the test meter and board.

Procedure

Step 1 Enable the SDH test meter at the source end and the SDH test meter at the sink end to monitor the service switching in the network.

Step 2 In the Main Topology of the T2000, right-click the source NE and choose **NE Explorer**. In the board directory tree on the left pane, Select the line board for service transmission. Then, choose **Configuration** > **SDH Interface** from the Function Tree.

Step 3 On the right pane, set **Laser Switch** to **Close**.

Step 4 Click **Apply**. Then, the **Confirm** dialog box is displayed. Click **OK**.

NOTE

By performing Steps 2–4, you can shut down the laser that transmits services at the source end. In this case, the service on the working path is interrupted and the service switching condition is met.

Step 5 Choose **Fault** > **Browse Current Alarms** from the Main Menu on the T2000.

Step 6 Click **OK** in the **Filter** dialog box that is displayed. In the **Current Alarms** window, you can browse various alarms such as the R_LOS alarm reported by the line board of the sink NE that is directly connected to the line board of the source NE and whose laser is shut down, the LASER_SHUT alarm reported by the source NE, and tributary alarms reported by the tributary boards on the source NE and sink NE. For the meanings of the alarms and processing methods, see the *Maintenance Guide*.

Step 7 The service interruption time displayed on the RESULT TS window on the test meter is equal to the service switching time.

NOTE

On the test meter, the LONGEST and SHORTEST parameters in the RESULT TS window record the longest switching time and the shortest switching time when the switching is performed multiple times. The LAST parameter records the time of the latest switching.

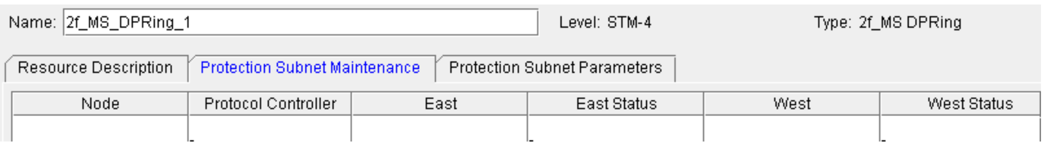
Step 8 Query the switching state and service state on the T2000.

NOTE

Querying the MSP switching status is different from querying the SNCP switching status. Refer to Steps 9–11 to query the MSP service status. Refer to Steps 12 and 13 to query the SNCP service status.

Step 9 Choose **Protection Subnet** > **SDH Protection Subnet Maintenance** from the Main Menu on the T2000.

Step 10 Click the **SDH Protection Subnet Maintenance** tab on the right side of the **Protection Subnet Attributes** pane. Query **East Status** and **West Status**. If the status is "Signal Fail Switching - Ring", "SF Switching - Span", or "Lockout of protection-Span", the MSP switching is successful.



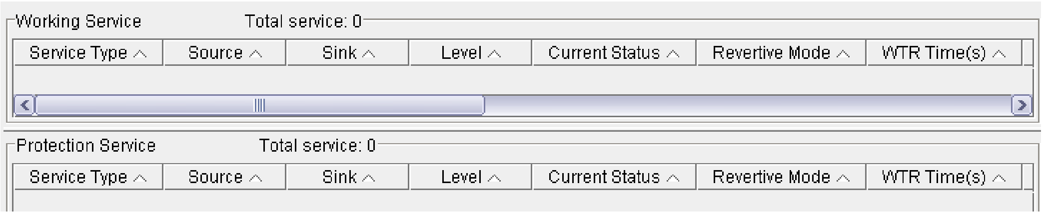
Step 11 Choose **Fault** > **Browse Current Alarms** from the Main Menu on the T2000. If no service alarm is reported from the working path, the service switching is successful.

NOTE

According to the verification result obtained by performing Steps 10 and 11, the configuration of MSP ring services is successful.

Step 12 Select the NE to be queried in the Main Topology on the T2000, right-click the NE, and choose **NE Explorer**. Then, choose **Configuration** > **SNCP Service Control** from the Function Tree.

Step 13 Query **Current Status**, **Trail Status**, and **Active Channel** from the **Working Service** list and **Protection Service** list on the right pane to check whether the service is switched successfully.



NOTE

The service switching and SNCP service configuration are successful if the following conditions are met: 1. The current status is SF switching. 2. The status of the working service path is SF. 3. The status of the protection service path is normal. 4. The current path is the protection path.

----End

7.7 Configuring External Ports on Ethernet Boards

When an NE accesses Ethernet services through the external ports (that is, PORTs) on the Ethernet board, you need to set the attributes of the PORTs so that the PORTs can work with the data communication equipment on the client side. This ensures that the Ethernet services can be accessed normally.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

The Ethernet boards must be created.

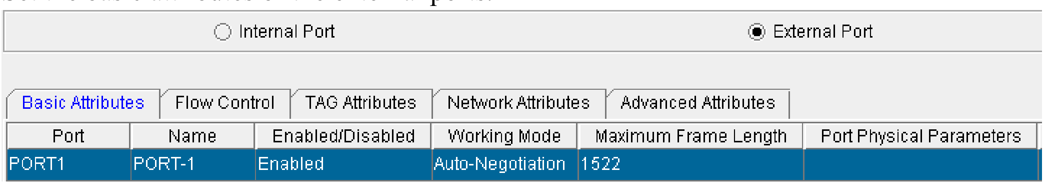
Procedure

Step 1 In the NE Explorer, select the Ethernet board and choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.

Step 2 Select **External Port**.

Step 3 Set the basic attributes of the external ports.

1. Click the **Basic Attributes** tab.
2. Set the basic attributes of the external ports.



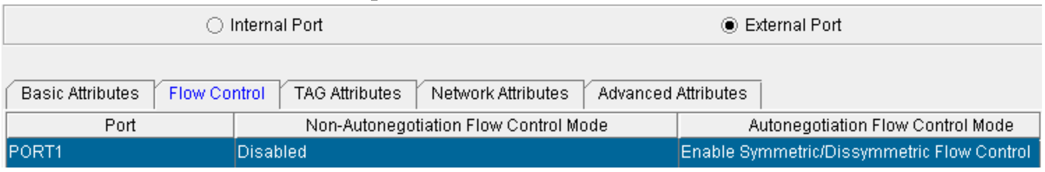
NOTE

Working mode: By default, the working mode is auto-negotiation. That is, two ports operate in the working mode of the highest level with pulse negotiation signals between them. The interconnected ports must be set to consistent working modes. Otherwise, the services are unavailable.

3. Click **Apply**.

Step 4 Set the flow control mode of the port.

1. Click the **Flow Control** tab.
2. Set the flow control mode of the port.



NOTE

- Auto-negotiation flow control mode: Select this flow control mode when the working mode of the port is auto-negotiation. **Enable Dissymmetric Flow Control** indicates that flow control frames are transmitted rather than being received. **Enable Symmetric Flow Control** indicates that PAUSE frames can be transmitted and received. **Enable Symmetric/Dissymmetric Flow Control** indicates that the auto-negotiation determines whether to adopt the symmetric or dissymmetric flow control.
- Non-auto-negotiation flow control mode: Select this flow control mode when the working mode of the port is not auto-negotiation. **Enable Symmetric Flow Control** indicates that PAUSE frames can be transmitted and received. **Send Only** indicates that PAUSE frames can only be transmitted. **Receive Only** indicates that PAUSE frames can only be received.

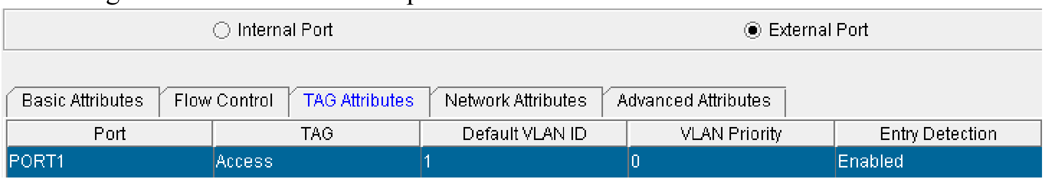
3. Click **Apply**.

Step 5 Set the tag attributes of the external ports.

NOTE

Ethernet transparent transmission boards do not support the tag attributes.

1. Click the **TAG Attributes** tab.
2. Set the tag attributes of the external ports.



3. Click **Apply**.

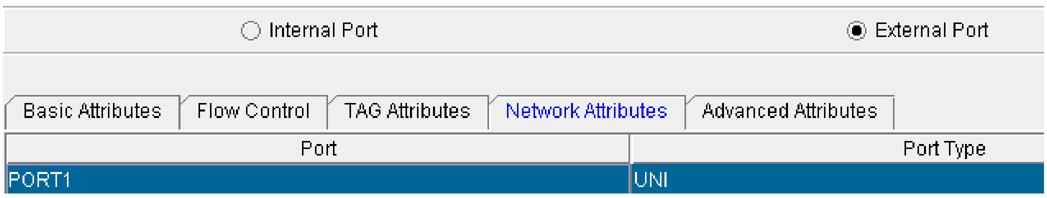
Step 6 Set the network attributes of the external ports.

NOTE

Ethernet transparent transmission boards do not support the network attributes.

1. Click the **Network Attributes** tab.
2. Set the network attributes of the external ports.

Figure 7-2 Attributes of the external ports on the Ethernet boards that support the QinQ function



NOTE

- When the network attribute of the port is set to UNI, the port processes the TAG attributes of the 802.1Q-compliant packets. The UNI port has the tag aware, access, and hybrid attributes.
- When the network attribute of the port is set to C-aware, the port does not process the TAG attributes of the 802.1Q-compliant packets. The C-aware port considers that the accessed packet does not contain an S-VLAN tag and processes only the packets that contain a C-VLAN tag.
- When the network attribute of the port is set to S-aware, the port does not process the TAG attributes of the 802.1Q-compliant packets. The S-aware port considers that the accessed packet does not contain a C-VLAN tag and processes only the packets that contain an S-VLAN tag.

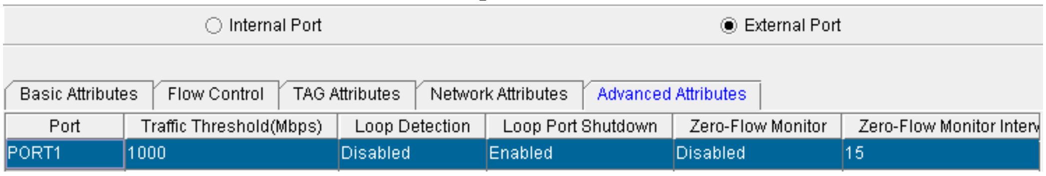
3. Click **Apply**.

Step 7 Set the advanced attributes of the external ports.

NOTE

Ethernet transparent transmission boards do not support the advanced attributes.

1. Click the **Advanced Attributes** tab.
2. Set the advanced attributes of the external ports.



3. Click **Apply**.

----End

7.8 Configuring Internal Ports on Ethernet Boards

When an NE transmits Ethernet services through the internal ports (that is, VCTRUNK ports) on the Ethernet board to the SDH side, you need to Set the attributes of the VCTRUNK ports so that the VCTRUNK ports can work with the Ethernet board on the equipment at the opposite end. This ensures that Ethernet services are transmitted normally on the SDH network.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

The Ethernet boards must be created.

Precautions

CAUTION

Incorrect configuration of binding paths may cause service interruption.

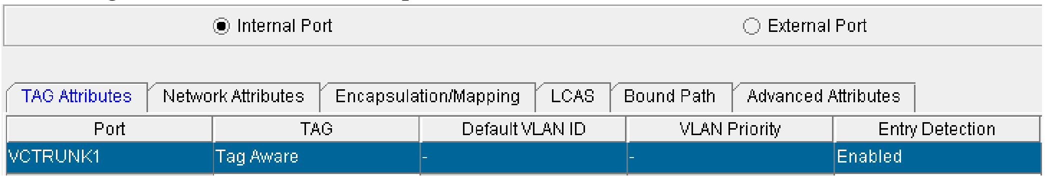
Procedure

Step 1 In the NE Explorer, select the Ethernet board and choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree.

Step 2 Select **Internal Port**.

Step 3 Set the tag attributes of the internal ports.

1. Click the **TAG Attributes** tab.
2. Set the tag attributes of the internal ports.

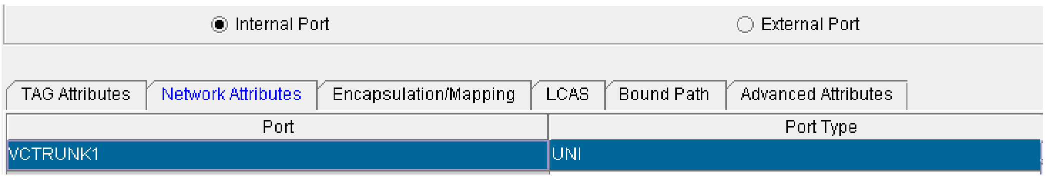


3. Click **Apply**.

Step 4 Set the network attributes of the internal ports.

1. Click the **Network Attributes** tab.
2. Set the network attributes of the internal ports.

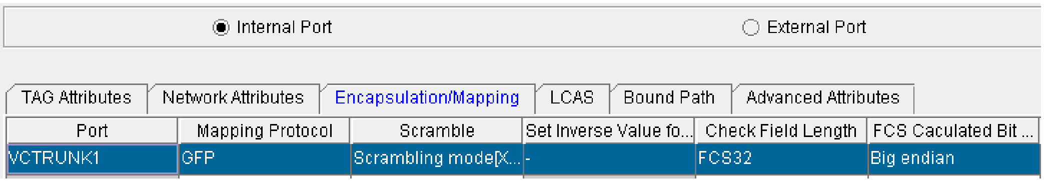
Figure 7-3 Attributes of the internal ports on the Ethernet boards that support the QinQ function



3. Click **Apply**.

Step 5 Set the encapsulation/mapping protocol for the internal ports.

1. Click the **Encapsulation/Mapping** tab.
2. Set the mapping protocol and the protocol parameters.



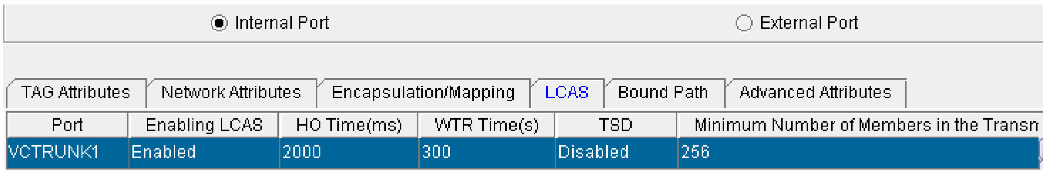
NOTE

Mapping Protocol of the VCTRUNKs must be consistent on the Ethernet boards at both ends of the transmission line. In addition, the protocol parameters must also be consistent.

3. Click **Apply**.

Step 6 Configure the LCAS function of the internal ports.

1. Click the **LCAS** tab.
2. Set **Enabling LCAS** and the other LCAS parameters.



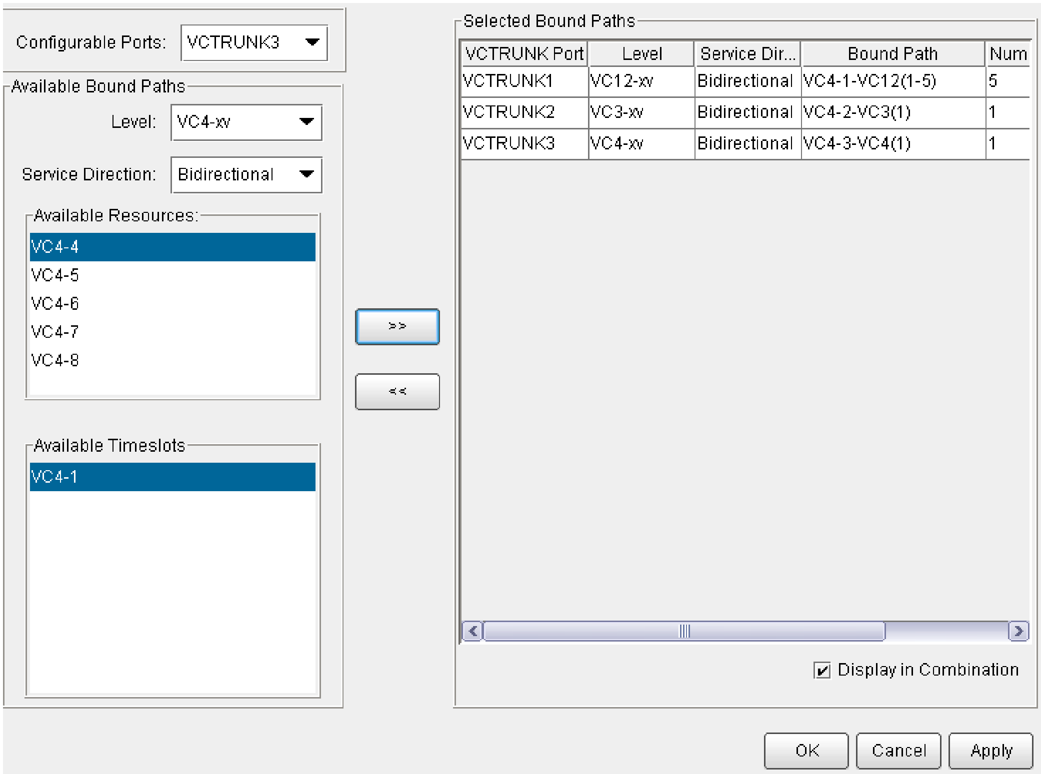
NOTE

Enabling LCAS of the VCTRUNKs must be consistent on the Ethernet boards at both ends of the transmission line. In addition, the LCAS protocol parameters must also be consistent.

3. Click **Apply**.

Step 7 Set the paths to be bound with the internal ports.

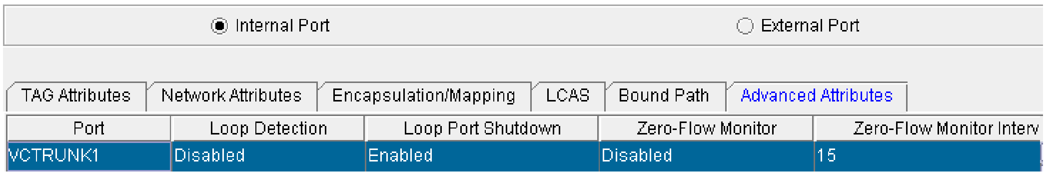
1. Click the **Bound Path** tab and click **Configuration**. Then, the **Bound Path Configuration** dialog box is displayed.
2. Select a VCTRUNK port as the port to be configured from the **Configurable Ports** drop-down list. In **Available Bound Paths**, select the timeslots of the bearer layer. Then, click .



3. Click **OK**, and then click **Yes**. The **Operation Result** dialog box is displayed indicating that the operation is successful.
4. Click **Close**.

Step 8 Set the advanced attributes of the internal ports.

1. Click the **Advanced Attributes** tab.
2. Set the advanced attributes of the internal ports.



3. Click **Apply**.

----End

7.9 Configuring Bound Paths

You can set the bandwidth and direction of a VCTRUNK by setting a bound path.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

The Ethernet board must be created.

Context

CAUTION

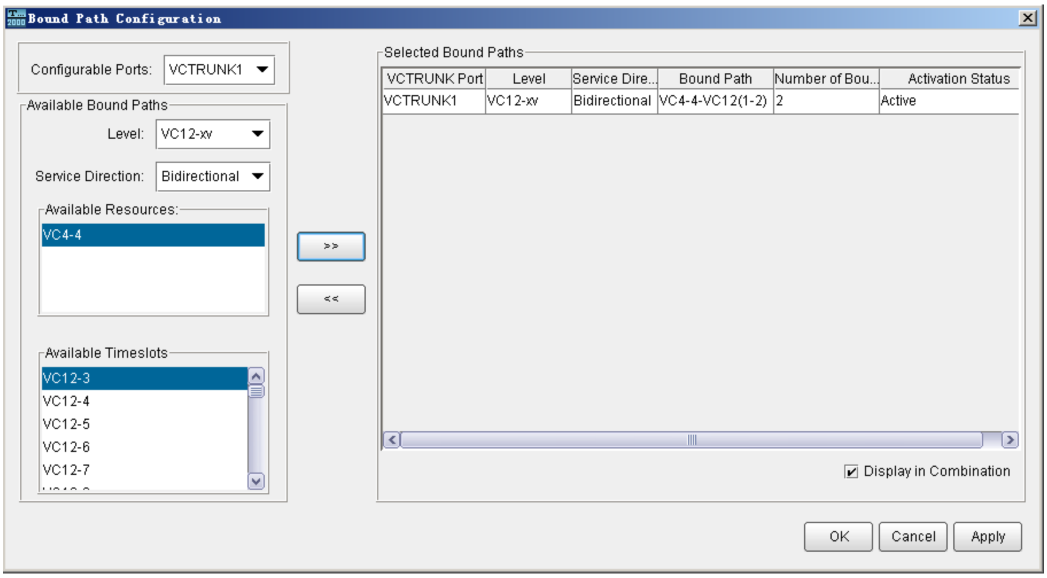
Configuring the bound path may interrupt services.

Procedure

Step 1 In the NE Explorer, select an Ethernet board and choose **Configuration** > **Ethernet Interface Management** > **Ethernet Interface** from the Function Tree. Click the **Internal Port** option button.

Step 2 Click the **Bound Path** tab. Click **Configuration**, and the **Bound Path Configuration** dialog box is displayed.

Step 3 Select the VCTRUNK port you want to bind from **Configurable Ports**. Select the bearer layer path from the **Available Bound Paths** combo box. Click 
.



NOTE

Refer to the actual service requirement to select the level of the bound path. For example, if you want to configure 10 Mbit/s services, select **VC12-xv**. To configure 100 Mbit/s services, select **VC3-xv**.

Step 4 Click **OK**. A dialog box is displayed.

Step 5 Click **Yes**, and click **Close** in the **Operation Result** dialog box.

----End

7.10 Creating EPL Services

When an Ethernet switching board carries private line services, the relevant information of the private line services, such as the service source and service sink, must be specified.

Prerequisite

- You must be an NM user with "NE or network operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select the Ethernet board and choose **Configuration** > **Ethernet Service** > **Ethernet Line Service** from the Function Tree.

Step 2 Select the proper operation from the following options according to the type of the EPL services to be created.

Option	Description
EPL services	Proceed to Step 3.
EVPL (QinQ) services	Select **Display QinQ Shared Service**.

Step 3 Click **New**.

The **Create Ethernet Line Service** dialog box is displayed.

Step 4 Set the attributes of the private line service.

Attribute	Attribute Value
Board	NE61-3-EFS8
Service Type	EPL
Service Direction	Bidirectional
Source Port	PORT3
Source VLAN(e.g.1, 3-6)	
Sink Port	VCTRUNK2
Sink VLAN(e.g.1, 3-6)	

Step 5 Set the attributes of the source port and sink port.

Figure 7-4 Attributes of the ports on the Ethernet boards that support the QinQ function

Port Attributes

Port	Port Type	Port Enabled	TAG
PORT7	UNI	Enabled	Access
VCTRUNK3	UNI	-	Tag Aware

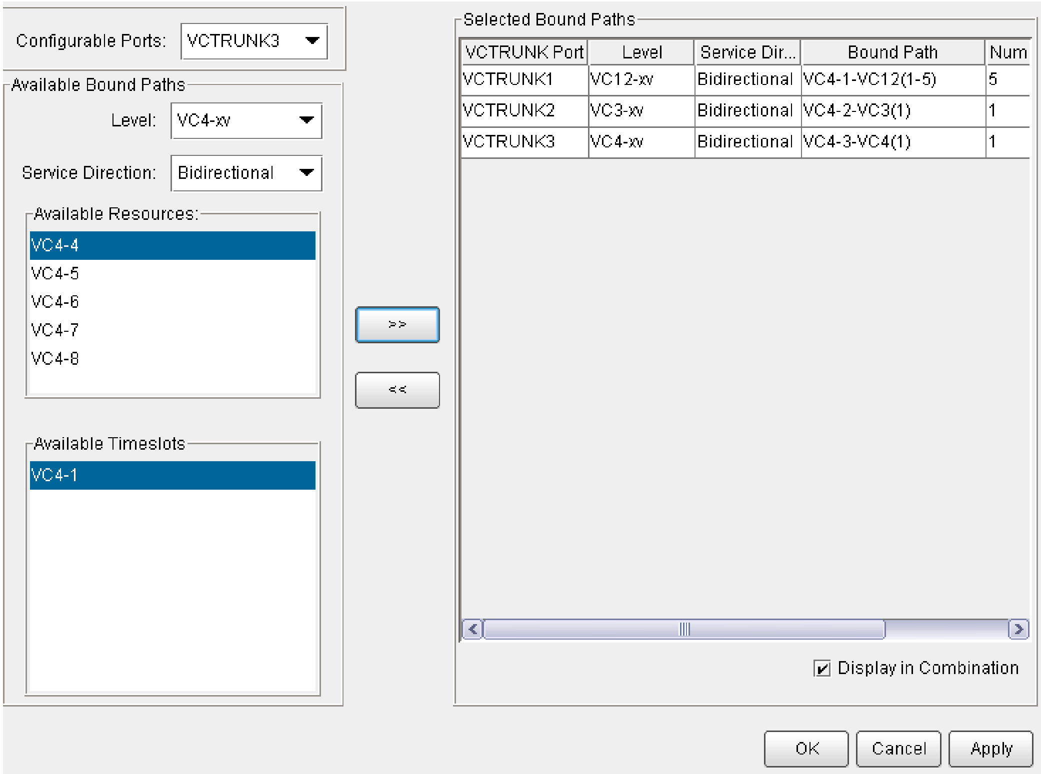
Step 6 Set the VC paths to be bound with the internal ports.

1. Click **Configuration**.

   The **Bound Path Configuration** dialog box is displayed.
2. In **Configurable Ports**, select a VCTRUNK as the port to be configured.
3. In **Available Bound Paths**, set **Level** and **Direction** of the bound paths.
4. Select the required items in **Available Resources** and **Available Timeslots** and click >> .
5. Repeat Steps **Step 6.2** to **Step 6.4** and bind other VC paths.
6. Click **OK**.

   NOTE

   The timeslots on the transmission line that correspond to the paths bound with the VCTRUNKs at both ends of the transmission line must be consistent.



Step 7 Click **OK**.

The **Operation Result** dialog box is displayed indicating that the operation is successful.

----End

7.11 Creating Ethernet LAN Services

When an Ethernet switching board carries LAN services, you need to create the bridge and set the attributes of the bridge and the port mounted to the bridge.

Prerequisite

- You must be an NM user with "NE or network operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select the Ethernet board and choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree.

Step 2 Click **New**.

The **Create Ethernet LAN Service** dialog box is displayed.

Step 3 Set the attributes of the bridge.

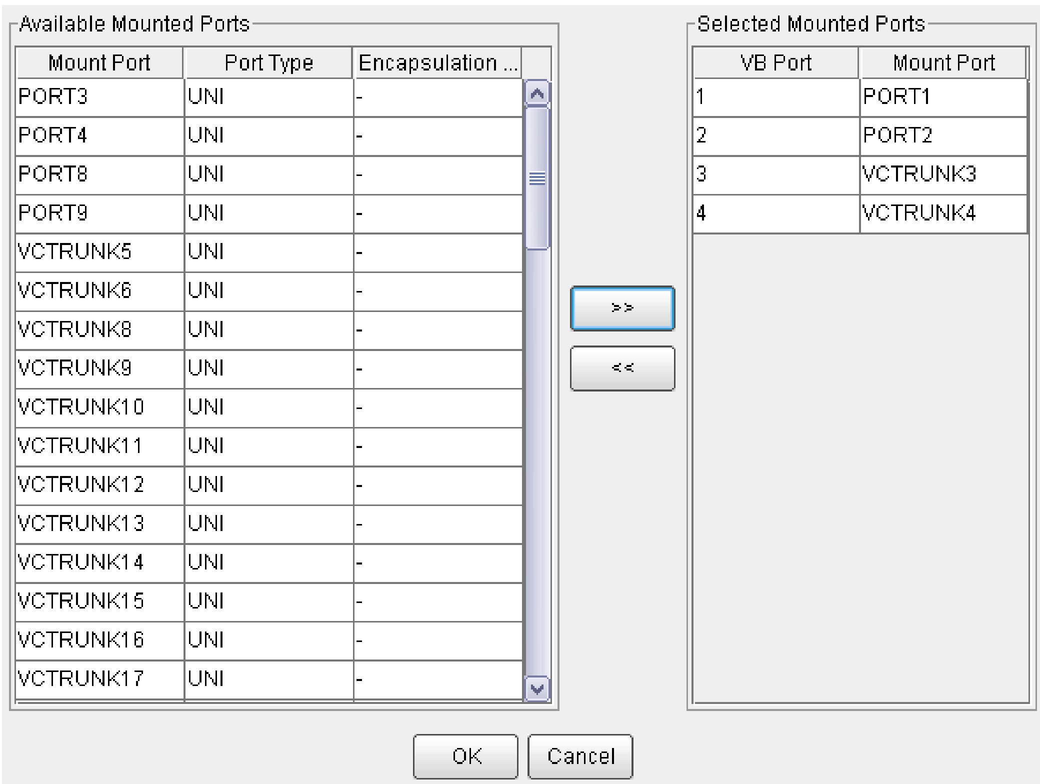
Attribute	Attribute Value
Board	NE61-3-EFS8
VB Name	VB1
Bridge Type	802.1q
Bridge Switch Mode	IVL/Ingress Filter Enable
Bridge Learning Mode	IVL
Ingress Filter	Enabled
MAC Address Self-learning	Enabled

Step 4 Configure service mounting relations.

Option	Description
Configure the services that are mounted to the IEEE 802.1d or IEEE 802.1q bridge.	Proceed to Step **Step 5**.
Configure the services that are mounted to the IEEE 802.1ad bridge.	Go to Step **Step 6**.

Step 5 **Optional:** Configure the services that are mounted to the IEEE 802.1d or IEEE 802.1q bridge.

1. Click **Configure Mount**.
2. Select **Available Mounted Ports** and click 
.
3. **Optional:** Repeat Step **Step 5.2** and select the other ports to be mounted.



4. Click **OK**.

Service Mount

VB Port	Mount Port	Port Type	Port Enabled	TAG	Default VLAN ID	Working Mode	Active	Service Directi...
1	PORT3	-	Enabled	Tag Aware	-	Auto-Negotiati...	Active	Bidirectional
2	VCTRUNK2	UNI	-	Tag Aware	-	-	Active	Bidirectional
3	VCTRUNK3	UNI	-	Tag Aware	-	-	Active	Bidirectional

Step 6 **Optional:** Configure the services that are mounted to the IEEE 802.1ad bridge.

1. Click **Configure Mount**.
2. Set the parameters for configuring the mounted services.

Attribute	Attribute Value
Operation Type	Add S-VLAN base for Port and C-VLAN
VB Port	2
Mount Port	VCTRUNK3
Port Type	C-Aware
C-VLAN	100
S-VLAN	200
C-VLAN Priority	-
S-VLAN Priority	-

Add Mount Port | Delete Mount Port

Service Mount

VB Port	Mount Port	Port Type	Port Enabled	TAG	Default VLAN ID	Working Mode	Act
1	PORT1	C-Aware	Enabled	Tag Aware	-	Auto-Negotiati...	Active
2	VCTRUNK3	C-Aware	-	Tag Aware	-	-	Active

3. Click **Add Mount Port**.
4. Repeat Steps **Step 6.2** to **Step 6.3** to add the other mount ports.
5. Click **OK**.

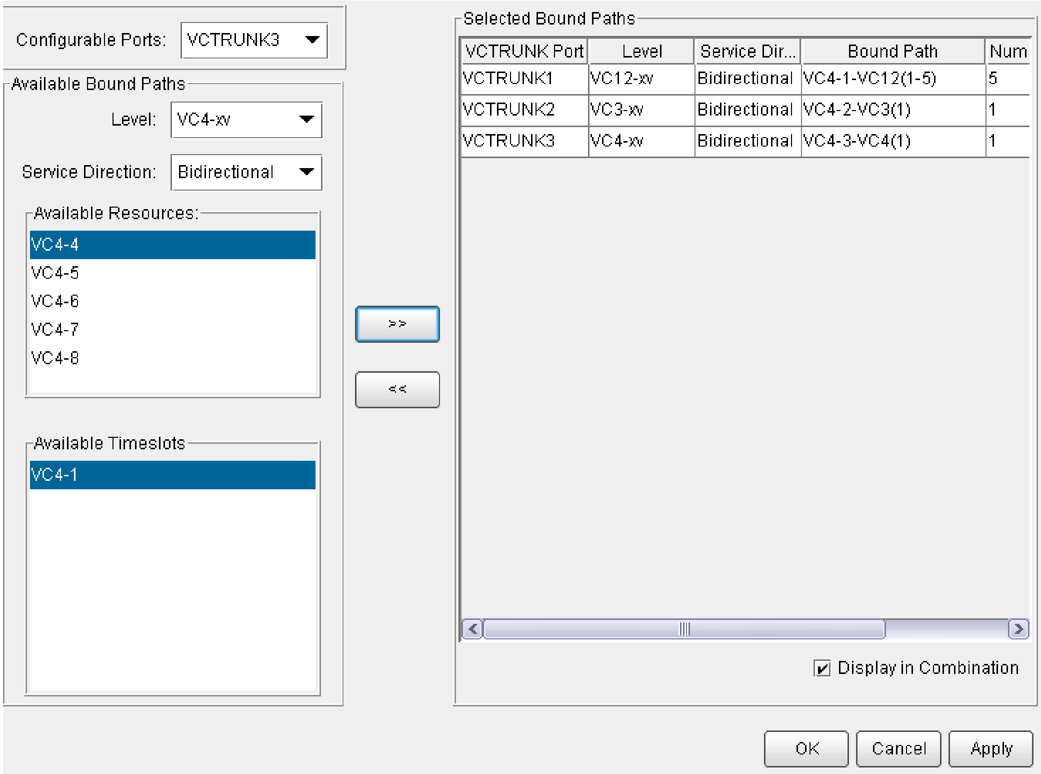
Step 7 Set the VC paths to be bound with the internal ports.

1. Click **Configuration**.

   The **Bound Path Configuration** dialog box is displayed.
2. In **Configurable Ports**, select a VCTRUNK as the port to be configured.
3. In **Available Bound Paths**, set **Level** and **Direction** of the bound paths.
4. Select the required items in **Available Resources** and **Available Timeslots** and click >> .
5. Repeat **Step 7.2** to **Step 7.4** and bind other VC paths.
6. Click **OK**.

NOTE

The timeslots of the paths bound with the VCTRUNKs on the Ethernet board must be consistent with the timeslots on the line board.



----End

7.12 Creating VLANs Filtering

In the case of Ethernet LAN services, when the type of the bridge is IEEE 802.1q or IEEE 802.1ad, the VLAN filtering table needs to be created for the bridge if VLANs are used to isolate the data of different users.

Prerequisite

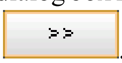
You must be an NM user with "NE operator" authority or higher.

The bridge and mount ports must be created.

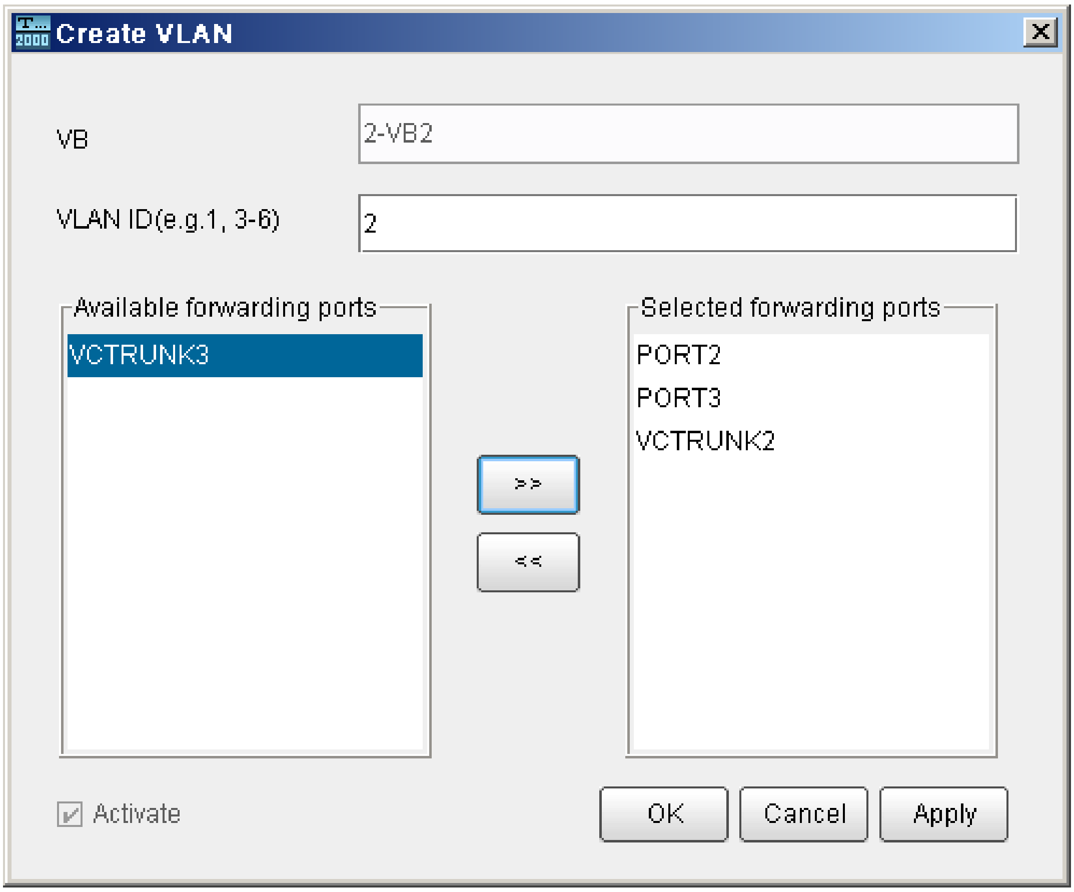
Make sure that you set **Bridge Switch Mode** to **IVL/Ingress Filter Enable**. Only in this way, you can create VLAN filtering tables

Procedure

Step 1 In the NE Explorer, select an Ethernet board and choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree. Click the **VLAN Filtering** tab.

Step 2 Click **New** and the **Create VLAN** dialog box is displayed. Enter a **VLAN ID**, select an **Available forwarding ports**, and then click 

.



Step 3 Click **OK**. **Close** in the **Operation Result** dialog box.

Step 4 Create other VLAN filtering tables as required.

----End

7.13 Creating VLAN Unicast

You can configure VLAN unicast, to allow a packet whose destination address is the specified MAC address to be forwarded through the specified port in the specified VLAN.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 In the NE Explorer, select an Ethernet board and choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree. Click the **VLAN Unicast** tab.

Step 2 Click **New** and the **Create VLAN Unicast** dialog box is displayed. Set **VLAN ID**, **MAC Address**, and **Physical Port**.

Step 3 Click **OK**. Click **Close** in the **Operation Result** dialog box.

----End

7.14 Disabling an MAC Address

You can disable an MAC address. As a result, this address receives no packets even in the same VLAN.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Context

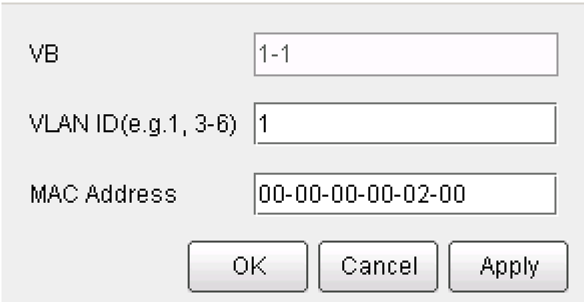
CAUTION

This operation may interrupt the service.

Procedure

Step 1 In the NE Explorer, select an Ethernet board and choose **Configuration** > **Ethernet Service** > **Ethernet LAN Service** from the Function Tree. Click the **Disable MAC Address** tab.

Step 2 Click **New** and the **Disable MAC Address Creation** dialog box is displayed. Set **VLAN ID** and **MAC Address**.



NOTE

The first byte of the **MAC Address** of VLAN unicast must be even.

Step 3 Click **OK** and then click **Close** in the **Operation Result** dialog box.

----End

7.15 Testing Ethernet Service Channels

If network cables are incorrectly connected or are faulty, the Ethernet service channels become faulty. This affects the services. Hence, the Ethernet service channels must be normal.

Prerequisite

The Ethernet services must be created and activated.

Tools, Equipment, and Materials

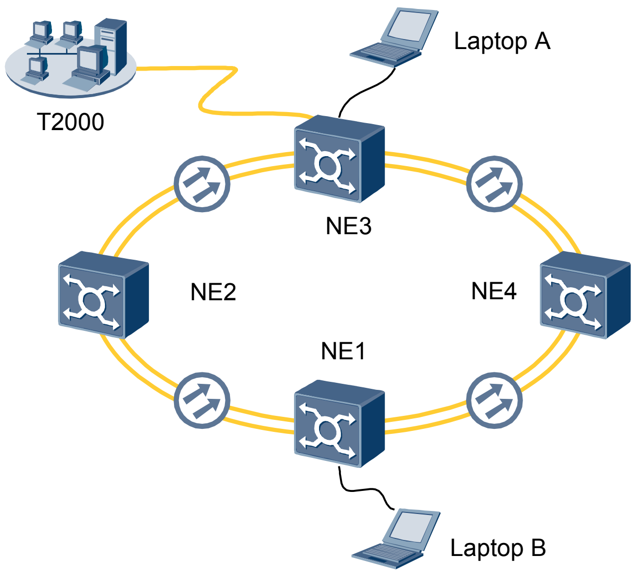
Two laptops on which the Windows operating system is installed, two straight through cables

Test Connection Diagram

Figure 7-5 shows the connection for testing the Ethernet service channels.

If an Ethernet service is configured between NE1 and NE3, you can connect the two laptops to the Ethernet boards through network cables and perform a ping test.

Figure 7-5 Connection for testing the Ethernet service channels



Precautions

NOTE

TAG of the external ports on the Ethernet boards at the source and sink ends of the accessed Ethernet service must be set to **Access**. In addition, **Default VLAN ID** of the external ports must be set to the same value.

Procedure

Step 1 Connect the external ports on the Ethernet boards to the network ports of the laptops at the source and sink ends of the service by using network cables according to **Figure 7-5**.

Step 2 Set IP addresses for laptop A and laptop B. Ensure that the two IP addresses are in the same network segment. Set the IP addresses as follows:

- Set an IP address for laptop A.
  - IP address: 192.168.0.100
  - Subnet mask: 255.255.0.0
- Set an IP address for laptop B.

- IP address: 192.168.0.101
- Subnet mask: 255.255.0.0

NOTE

The IP addresses must not be set to loopback addresses within the 127.0.0.0 network segment.

Step 3 Choose **Start** > **Run** on laptop A. Then, a dialog box is displayed. Enter the following ping command: **ping 192.168.0.101**.

Step 4 Click **OK** to run the ping command.

- If the information in the displayed window contains "Lost = 0 (0% loss)", it indicates that no packet is lost and the Ethernet channels are normal.
- If the displayed window returns the message **Request timed out**, the Ethernet channels are abnormal. Check the connection of the network cables and the configuration of the Ethernet services. Rectify the fault and then continue the test.

----End

7.16 Backing Up the NE Database to the SCC Board

You need to back up the NE database during daily maintenance, to ensure that the SCC board of the NE automatically restores to normal operation after a data loss or equipment power failure. When you back up the NE database to the SCC board, you actually back up the NE data to the FLASH of the SCC board. When the NE is restarted after a power failure, the SCC board automatically reads the configuration from the FLASH and issues the configuration to the boards.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

You must log in to the NE as an NE user with system level authority.

Procedure

Step 1 In the Main Menu, choose **Configuration** > **Configuration Data Management**.

Step 2 In the Object Tree on the left, select an NE and click 

.

Step 3 In **Configuration Data Management List**, select an NE or multiple NEs.

Step 4 Choose **Back Up NE Data** > **Back Up Database to SCC**.

NOTE

Backing up the database may takes about 30 minutes.

Step 5 Click **OK** in the confirmation dialog box.

Step 6 The **Operation Result** dialog box is displayed. After the backup is successful, click **Close**.

----End

7.17 Checking the Network Communication Status

On some occasions, the T2000 cannot manage some NEs during the running of the network. By checking the communication status of the network, you can know the communication status between the T2000 and NEs.

Prerequisite

You must be an NM user with "NE maintainer" authority or higher.

Context

If you know the IP address or the NSAP address of an NE, you can choose **File** > **Ping** from the Main Menu to use the ping command to check the communication status of the NE.

Procedure

- Check the communication status between the T2000 and a non-gateway NE.
  1. Choose **System** > **DCN Management** from the Main Menu.
  2. Click the **NE** tab. Click **Refresh** to view the communication status of all NEs.
  3. Select an NE. Right-click in the **Communication Status** column and choose **Test NE** from the shortcut menu.
  4. The **Operation Result** dialog box is displayed indicating the test result of the non-gateway NE.
- Check the communication status between the T2000 and the GNE.
  1. Choose **System** > **DCN Management** from the Main Menu.
  2. Click the **GNE** tab. Click **Refresh** to view the communication status of the GNE.
  3. Right-click an NE and choose **Test GNE** from the shortcut menu.
  4. The **Operation Result** dialog box is displayed indicating the test result of the GNE.

----End

7.18 Viewing the Clock Trace Search

Correct clock trace relations are critical to ensure the clock synchronization within the entire network. Using the T2000, you can monitor the clock trace status of each NE.

Prerequisite

You must be an NM user with "NE operator" authority or higher.

Procedure

Step 1 In the Clock View, right-click and choose **Clock Trace Search** from the shortcut menu.

Step 2 In the **OK** dialog box, click **OK**.

Step 3 If the clock trace relation changes, the **Prompt** dialog box is displayed, asking you whether to refresh the clock trace relation. Click **Yes**. When the search for the clock trace relation is complete, the Clock View displays the refreshed clock trace status.

NOTE

If you right-click in the Clock View and choose **Disable Clock Status Change Prompting** from the shortcut menu, the **Prompt** dialog box is not displayed even when the clock trace relation changes.

Step 4 In the Clock View, right-click and choose **Query Networkwide Clock Synchronization Status** from the shortcut menu, to refresh the clock tracing relation.

----End

8 Equipment Information

About This Chapter

You need to consider the service support capability of the boards used by the equipment and the configuration requirements during the configuration process.

8.1 Service Support Capability of Ethernet Boards

Ethernet boards are classified into Ethernet transparent transmission boards and Ethernet switching boards, based on the type of the accessed service. The Ethernet transparent transmission boards support only EPL services, whereas the Ethernet switching boards support EPL services, EVPL services, and Layer 2 switching function.

Table 8-1 Service support capability of Ethernet boards

Board Type	Board Name	Supported EPL Service	Supported EPLAN Service
Ethernet transparent transmission board	EFT8	EPL	-
	EGT1	EPL	-
Ethernet switching board	EFS8	EPL EVPL	EVPLAN (IEEE 802.1q bridge), EPLAN (IEEE 802.1d bridge), and EVPLAN (IEEE 802.1ad bridge)

8.2 Requirements for Binding Paths with VCTRUNKs on Ethernet Boards

One VCTRUNK on an Ethernet board can only be bound with timeslots of the same level.

Table 8-2 Requirements for binding paths with VCTRUNKs on Ethernet boards

Board	Requirement for Binding Paths with a VCTRUNK
EFT8	● The VCTRUNKs can be bound with the VC-12 paths and VC-3 paths. ● Eight VCTRUNKs are supported. ● VCTRUNK1 to VCTRUNK8 can only be bound with the fourth VC-4, namely, VC4-4, if the path binding is at VC-12 level. ● VCTRUNK1 to VCTRUNK8 can be bound with the first to third VC-4s, namely, VC4-1 to VC4-3, if the path binding is at VC-3 level.
EGT1	● The VCTRUNKs can be bound with the VC-12 and VC-3 paths. ● Only one VCTRUNK is supported. ● VCTRUNK1 can only be bound with the fourth VC-4, namely, VC4-4, if the path binding is at VC-12 level. ● VCTRUNK1 can be bound with the first to fourth VC-4s, namely, VC4-1 to VC4-4, if the path binding is at VC-3 level.

Board	Requirement for Binding Paths with a VCTRUNK
EFS8	● The VCTRUNKs can be bound with the VC-12 paths and VC-3 paths. ● Eight VCTRUNKs are supported. ● VCTRUNK1 to VCTRUNK8 can only be bound with the fourth VC-4, namely, VC4-4, if the path binding is at VC-12 level. ● VCTRUNK1 to VCTRUNK8 can be bound with the first to third VC-4s, namely, VC4-1 to VC4-3, if the path binding is at VC-3 level.

8.3 Ethernet Service Bandwidths Carried by VCTRUNKs of Ethernet Boards

To determine the level of the bandwidths to be bound with a VCTRUNK and the number of paths that are required for an Ethernet service, you need to calculate the theoretical bandwidth of the Ethernet service that can be carried by a VCTRUNK.

Bandwidth = Number of paths bound with the VCTRUNK x Payload rate of the binding granularity x Encapsulation efficiency of the encapsulation protocol

The payload rate of the VC-12 is 2.176 Mbit/s and the payload rate of the VC-3 is 48.384 Mbit/s. GFP encapsulation efficiency is equal to the Ethernet frame length that is divided by the sum of the Ethernet frame length and an overhead of eight bytes. Hence, in the case of the VCTRUNK that are bound with five VC-12 paths, when the transported Ethernet frame length is 1500 bytes, the theoretical bandwidth is 10.82 Mbit/s; when the transported Ethernet frame length is 64 bytes, the theoretical bandwidth is 9.67 Mbit/s.

In actual situations, you can estimate the level and quantity of the paths according to the following principle: One VC-12 path carries 2 Mbit/s services and one VC-3 path carries 48 Mbit/s services. For example, in the case of a 10 Mbit/s Ethernet service, the VCTRUNKs can be bound with five VC-12 paths.

9 Glossary

B

Back up Copy the important data into a backing storage in case that the original is damaged or corrupted.

BITS Building Integrated Timing Supply. A building timing supply that minimizes the number of synchronization links entering an office. Sometimes referred to as a synchronization supply unit.

Bound path The VC Trunk refers to the 2 Mbps paths which are bound together to transmit Ethernet data. The VC Trunk is an entity between the Ethernet port and the 2 Mbps path.

C

CAR Committed Access Rate. The CAR limits the input or output transmission rate on an interface.

E

ECC Embedded Control Channel. An ECC provides a logical operations channel between SDH NEs, utilizing a data communications channel (DCC) as its physical layer.

EPL Ethernet Private Line. An EPL service is a point-to-point interconnection between two UNIs without SDH bandwidth sharing. Transport bandwidth is never shared between different customers.

EPLAN Ethernet Private LAN. An EPLAN service is both a LAN service and a private service. Transport bandwidth is never shared between different customers.

EVPL Ethernet Virtual Private Line. An EVPL service is a service that is both a line service and a virtual private service.

EVPLAN Ethernet Virtual Private Local Area Network. An EVPLAN service is a service that is both a LAN service and a virtual private service.

Ethernet A data link level protocol comprising the OSI model's bottom two layers. It is a broadcast networking technology that can use several different physical media, including twisted pair cable and coaxial cable. Ethernet usually uses CSMA/CD. TCP/IP is commonly used with Ethernet networks.

G

Gateway IP IP address is used for TCP/IP communication between an NE and the T2000, which is effective only when it is used for TCP/IP communication. That is, only the gateway NE needs the IP address. IP address cannot be used to identify an NE uniquely. NEs in different TCP/IP networks may have the same IP address. And one NE may have several IP addresses (for example: an IP address of a dial-up network, an IP address of the Ethernet port and so on).

L

LCAS Link Capacity Adjustment Scheme. A solution features flexible bandwidth and dynamic adjustment. In addition, it provides a failure tolerance mechanism, which enhances the viability of virtual concatenations and enables the dynamic adjustment to bandwidth (non-service affecting).

Loopback The fault of each path on the optical fiber can be located by setting loopback for each path of the line. There are three kinds of loopback modes: No loopback, Outloop, Inloop.

M

MPLS Multiprotocol Label Switching. Multi-protocol label switching. It is a standard routing and switching technology platform, capable of supporting various high level protocols and services. The data transmission over an MPLS network is independent of route calculating. MPLS, as a connection-oriented transmission technology, guarantees QoS effectively, supports various network level technologies, and is independent of the link layer.

MSTP Multi-service transmission platform. It is based on the SDH platform, capable of accessing, processing and transmitting TDM services, ATM services, and Ethernet services, and providing unified management of these services.

O

Orderwire It establishes the voice communication among the operators and maintenance engineers work in each working station.

P

PDH Plesiochronous Digital Hierarchy. PDH is the digital networking hierarchy that is used before the advent of Sonet/SDH.

PRBS Pseudo-random binary sequence. A sequence that is random in a sense that the value of an element is independent of the values of any of the other elements, similar to real random sequences.

R

RSTP The Rapid Spanning Tree Protocol is an evolution of the Spanning Tree Protocol, providing for faster spanning tree convergence after a topology change.

S

SDH Synchronous Digital Hierarchy. A hierarchical set of digital transport structures, standardized for the transport of suitably adapted payloads over physical transmission networks.

SNCP Subnetwork Connection Protection. A working subnetwork connection is replaced by a protection subnetwork connection if the working subnetwork connection fails, or if its performance falls below a required level.

SSM Synchronization Status Message. ITU-T defines S1 byte to transmit the network synchronization status information. It uses the lower four bits of the multiplex section overhead S1 byte to indicate 16 types of synchronization quality grades.

STP STP is a protocol that provides a loop free topology for any bridged LAN and is used in switched networks to prevent loops.

Subnet mask Also referred to as the network mask off code, it is used to define network segments, so that only the computers in the same network segment can communicate with one another, thus suppressing broadcast storm between different network segments.

Subnet Subnetwork is the logical entity in the transmission network and comprises a group of network management objects. A subnetwork can contain NEs and other subnetworks. A subnetwork planning can better the organization of a network view.

Switching priority There may be the case that several protected boards need to be switched; thus the tributary board switching priority should be set. If the switching priority of each board is set the same, the tributary board that fails later cannot be switched. The board with higher priority can preempt the switching of that with lower priority.

T

TCP/IP	Transmission Control Protocol/Internet Protocol. Common name for the suite of protocols developed to support the construction of worldwide internet networks.
Timeslot	Single timeslot on an E1 digital interface—that is, a 64-kbps, synchronous, full-duplex data channel, typically used for a single voice connection.
TPS	Tributary Protection Switching. A function provided by the equipment, is intended to protect N tributary processing boards through a standby tributary processing board.
Trail management function	A network level management functions of the T2000. Through trail management, you can configure end-to-end services, view graphic interface and visual routes of a trail, query detailed information of a trail, filter, search and locate a trail quickly, manage and maintain trails in a centralized manner, manage alarms and performance data by trail, and print a trail report.
TUG	A unit group that contains one or more Tributary Units, occupying fixed, defined positions in a higher order VC-n payload. TUGs are defined in such a way that mixed capacity payloads made up of different size Tributary Units can be constructed to increase flexibility of the transport network.

V

VLAN ID	Namely, it is the virtual LAN identifier. One Ethernet port can support 4K VLAN routes, and one NE can support up to 8K VLAN routes.
VLAN	Virtual local area network. A subset of the active topology of a Bridged Local Area Network. Associated with each VLAN is a VLAN Identifier (VID).

W

WTR time	A period of time that must elapse before a – from a fault recovered – trail/ connection can be used again to transport the normal traffic signal and/or to select the normal traffic signal from.
WTR	Wait to Restore. This command is issued when working channels meet the restoral threshold after an SD or SF condition. It is used to maintain the state during the WTR period unless it is pre-empted by a higher priority bridge request.

10 Acronyms and Abbreviations

B

BIP	Bit-Interleaved Parity
BITS	Building Integrated Timing Supply System

C

CPE	Customer Premises Equipment

E

EPL	Ethernet Private Line

G

GFP	Generic Framing Procedure

L

LPT	Link State Pass Through
LCAS	Link Capacity Adjustment Scheme

M

MSP	Multiplex Section Protection
MSTP	Multi-Service Transport Platform
MTU	Maximum Transmission Unit

P

PDH	Plesiochronous Digital Hierarchy

S

SDH	Synchronous Digital Hierarchy
SNCP	Sub-Network Connection Protection
SNMP	Simple Network Management Protocol
SSM	Synchronization Status Message