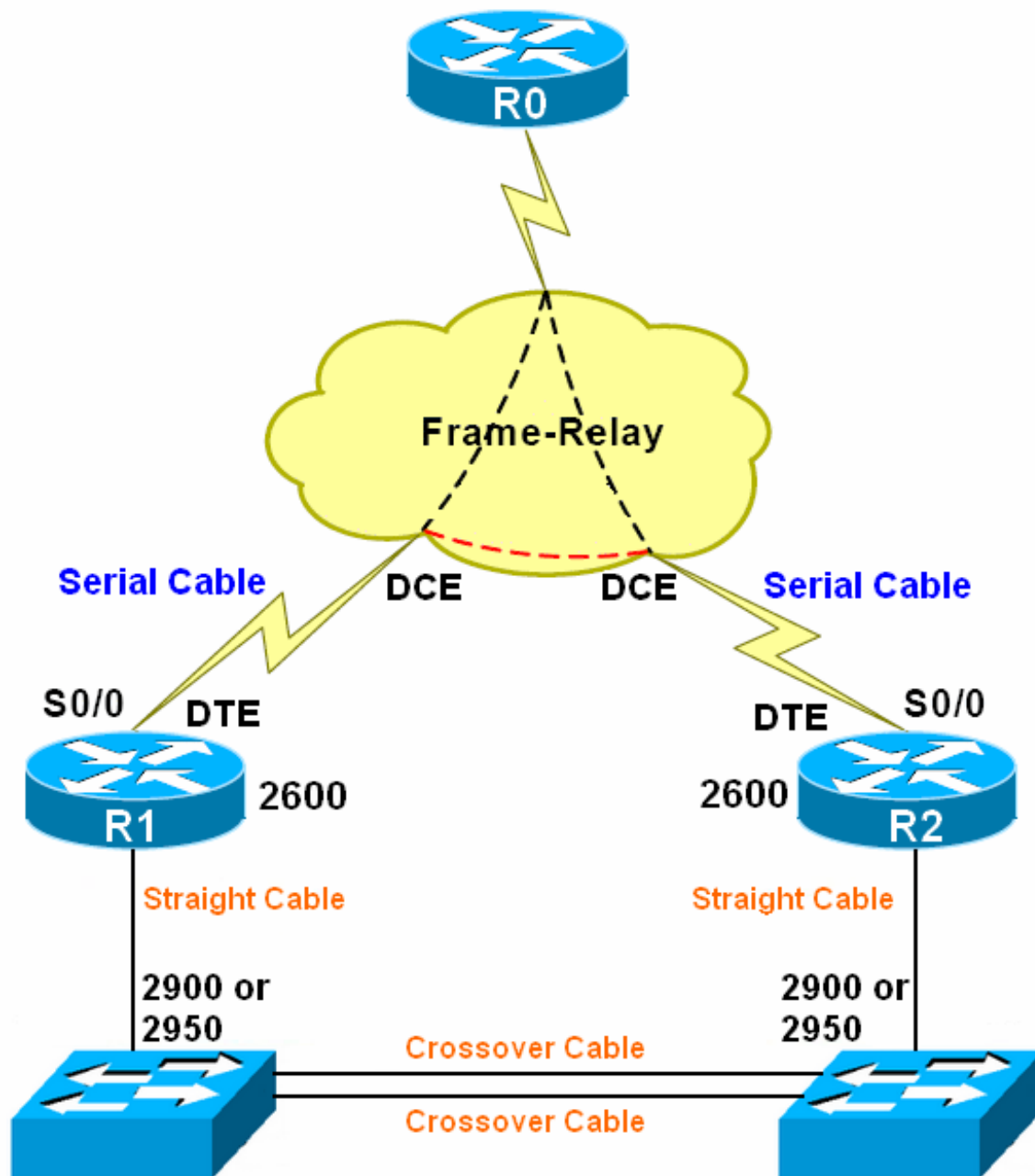


Cisco Basic CCNA Lab Setup Instructions



Thank you again for choosing our Cisco Lab! This documents provides some easy to follow setup instructions, which apply to the **Basic CCNA Lab** and to all of our Labs with a **2-Ports Frame Relay Switch**.

In the diagram shown above, **R0** actually represents the 2-Ports Frame Relay Switch. However, when you **upgrade this Lab to a 4-Ports Frame Relay Switch**, **R0** would represent an additional Router that could be used for **Frame Relay Hub-and-Spoke** Lab scenarios, while the F/R Switch would be implicitly represented by the “cloud”

But with a regular 2-Ports Frame Relay Switch, **R0** is the F/R Switch, while **R1 & R2** (typically 2600 series Routers), are the **end-points of this F/R network**.

With this in mind, the diagram shows the basic connections, which include the **WAN** or Serial Connections as well as the **LAN** connections.

WAN Connections:

The Lab comes with **two Serial Crossover Cables** (Back-to-Back), which should be used to connect the end-point (2600s) to the Frame Relay Switch. [The type of Serial Cable depends on the type of Frame Relay Switch.](#) So Serial Cables may come with **DB60** connectors or with **RJ-45** connectors. We will explain more about this later.

The Frame Relay Switch is typically implemented with a Cisco 2500 Router, which comes with **two built-in serial interfaces** (DB60 connectors).

However, this F/R Switch could actually be implemented with any other type of Router! Thus, some of our Labs use a 2600 Router as a Frame Relay Switch! However, since 2600 series Routers do not have any built-in serial interfaces, we would need to add at least a pair of them. That means, adding a couple of **WIC** cards (WAN Interface Cards) to the Router

There are several WIC cards that can be used to implement serial interfaces. The most typical is the **WIC-1T** card. However, it can also be done with **WIC-1DSU-T1** and **WIC-1DSU-56K**.

We mainly use WIC-1T cards, simply because they use the same type of connector and signaling as the built-in interfaces of the 2500; that is, a Cisco **60-pin** "5-in-1" (DB-60) connector.

But when the Frame Relay Switch **is not** implemented with a Cisco 2500, then we may implement the serial ports with other types of cards such as WIC-1DSU-56K or WIC-1DSU-T1. Both types of cards use RJ-45 sockets, for which they require Serial Cables with RJ-45 connectors!

But regardless of the device used to implement a Frame Relay Switch, this device will always be shipped pre-configured as such!

Keep in mind that when a Router is doing the Frame Relay function, it is still **capable of routing packets!** However, [it can't route packets through its interfaces doing the Frame Relay Switching function!](#)

For instance, in the case of a 2500, its serial interfaces (Serial 0 & Serial 1) will be configured for the Frame Relay Switching function (**frame-relay route** command), which means that only its **Ethernet interface** could be used as a **regular IP interface**. Something similar would happen to any other Router used as a Frame Relay Switch.

Important: The Frame Relay configuration is actually [independent of the type of Router and type of serial interfaces being used!](#) This configuration can be found in the following file: Frame Relay Switch**Frame-Relay-2-Ports-Config.TXT**

Serial connections require a "**clocking signal**". In real life this clock is usually provided by the actual carrier (through a CSU/DSU). But it can also be provided by a Cisco Router. The actual command used to do so depends on the particular type of serial interface being used.

From now on, we will assume that our Frame Relay Switch is being implemented with a Cisco 2500. In this case, the command used to configure the clocking signal is: **clock rate <clock speed>** command.

The side of the link that provides the clocking signal is called the **DCE** (Data Communications Equipment) and the side that receives this signal is the **DTE** (Data Terminal Equipment). Please make sure that you **connect the DCE side of the Cable to the 2500** and the **DTE side to the 2600's**.

You can also make direct serial connections between the pair of 2600 Routers. If you do so, you must configure the “clock” command on the Router with the DCE side of the Cable.

```
2610(config)# interface serial 0/0
2610(config-if)#clock rate 64000
```

You can use a Back-to-Back physical connection with any Data Link Protocol such as **HDLC** (default), **PPP** or **Frame Relay**. Each one has its own configuration details, which are covered in the different documents included in the CD.

But if you want to use Frame Relay, then you must follow the instructions given in file: “Frame Relay Switch\[Back-to-Back Frame-Relay.PDF](#)” that can be found in the documentation CD.

The Frame Relay Switch is configured as follows:

- a) The first serial port (serial 0) is configured with **DLCI 102**
- b) The second serial port (serial 1) is configured with **DLCI 201**

When configuring the Lab Routers, you must use these particular **DLCI numbers**. Since the DLCI numbers are kept in a 10 bits field, then the **valid range of DLCI numbers is: 0-1023**. You can always issue the “**sh frame pvc**” command to see what DLCI number (or numbers) your Router is receiving from the Frame Relay Switch (multiple DLCI's can be configured).

When connecting two Routers Back-to-Back using the Frame-Relay Layer 2 Protocol (that is, with **NO** Frame-Relay Switch in between), you have to use the **SAME DLCI number on both Routers!** In addition, you must configure the command: “**no keepalive**” on both sides, **otherwise the link won't come up!**

Please refer to the file “Frame Relay Switch\[Back-to-Back Frame-Relay.PDF](#)” for more details about it.

Once you complete the setup of the Frame Relay section of the Lab you can start working on the different Lab scenarios included in the CD. Please check out file: Frame Relay Switch\[Frame-Relay-Labs.PDF](#).

Please take into account that this Lab has been configured using a **2-Ports** Frame Relay Switch. Therefore, all the Lab scenarios included in file [Frame-Relay-Labs.PDF](#) are based on this configuration.

If you want to do more complex exercises, such as those involving a **Hub-and-Spoke** configuration (one Hub and at least 2 Spokes), then you need to **upgrade to a [4-Ports Frame Relay Switch configuration](#)**.

There are two alternatives to do so:

1. **Upgrade the 2500 to a 2520**, which comes with **4 built-in Serial Ports**.
2. **Purchase an NM-4A/S card** for the 2600 Router.

Please check out our website (www.ciscoland.net) for the latest prices on these and other upgrade options available.

. **Please ask for price and availability.**

For a more in-depth look at the Frame Relay Technology, please take a look at the following Cisco document: Frame Relay Switch**Frame Relay Basics.PDF**.

LAN Connections:

The **LAN Connections** section of the Lab should be very straightforward. You should use the **Straight Cables** (yellow ones) to connect the Ethernet ports of each Router to the any port in the **LAN Switches** (2900 or 2950). By default they are configured with **Auto settings**, but you can play with different Speed & Duplex settings (Full Duplex, Half Duplex, 10 or 100 Mbps).

Please note that **you MUST use a Crossover Cable** (orange cables) **to make a Switch-to-Switch connection!** Otherwise the link won't come up! Please try with the Straight Cables and check by yourself!

Two Crossover Cables are provided, so that you can do different types of exercises. Having two connections between the same pair of Switches creates a redundant path that **may cause some Layer 2 problems!**

Fortunately, these potential problems are taken care of by the **Spanning Tree Protocol** which is enabled by default in the Switches!

With Spanning Tree in place, one link is put in "Active State" (or Forwarding Mode), while the second one is put in "Standby State" (or Listening Mode).

You can make both Switch-to-Switch Links to be active at the same time by creating an **EtherChannel**. For more details about this very useful and important technology, please check this file:

e-Lectures\Cisco Switching**EtherChannel and 802 dot1Q Trunks.PDF**

This completes the Lab Setup Instructions. However, you can use this Lab in many other different ways.

If you don't have a lot of experience with Cisco Equipment, then you should check out the document: Lab Setup Instructions**How to Get Started.DOC**

This document should give a good and quick jump start. **Perhaps you should follow these guidelines even before you start assembling this Lab**, because you don't really need the suggested connections to complete the basic sections.

If you do have some experience with Cisco Equipment, then you can skip this document and can simply peek around the CD to find the particular topics you are interested in.

You should be able to find information about any CCNA/CNNP topic such as **Dynamic Routing Protocols** (RIP, IGRP, EIGRP, OSP & BGP, etc.), **Spanning Tree Protocol, Network Security, Wireless Technology, VPN, etc.**

Finally, please don't forget to check out the "**Cisco Questions & Answers**" folder for exam-like questions (with answers & explanations) that should give you a pretty good idea of what topics you need to master for your exam!

That's it! Please don't forget to check out our website (www.ciscoland.net) for the latest prices on all of the upgrade options available. **Thank you!!**

Lab Setup Instructions\Cisco Basic CCNA Lab Setup Instructions.PDF