Configuration of Frame Relay- A Standardized Wide Area Network Technology

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ABSTRACT: In this paper, the frame relay has been configured using Cisco packet tracer.The frame-relay is nothing by a technology where the connections are made virtually due to this it is cost efficient. The configuration of it is verified by using ping command and the results are explained . Frame Relay uses a dlci number for every virtual connection .

KEYWORDS: DLCI, Cisco Packet Tracer, Frame Relay, WAN technology.

I. INTRODUCTION

Frame relay is a methodology used mainly for the voice and data transfer in WAN(Wide Area Network) and LAN (Local Area Network)connections. Its is less cost because of this usage of low equipment .It is widely used because of the simple configuration than the other networking techniques. This technique makes the data in units called 'Frames'. It will not include any unwanted data such as retransmission of data to the end points.

II. RELATED WORK ON FRAME RELAY

It uses the concept of DLCI number for every virtual connection. The DLCI number is the data link connection identifier is a 10 bit size. The main router makes the sub-branches in the one serial port that is connected to the cloud frame relay. The sub-branches ports depends on the number of routers that the main router need to connect. Every vitual connection must assign the unique dlci number such that the data cannot be collide with each other. There are actually 1024 dlci are present.
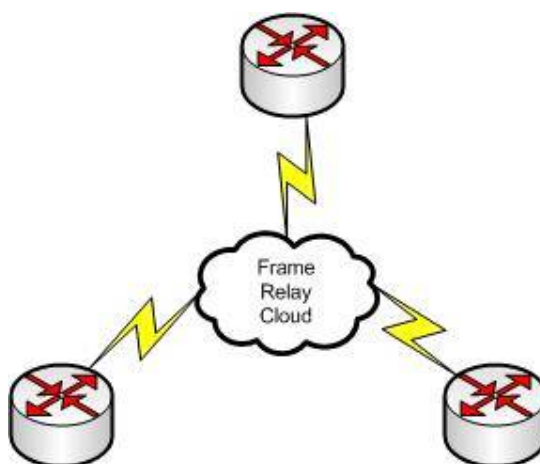

Figure 1 : Explains the connection of frame-relay using three routers.

After packet has been reached to the destination, destination will wait for time δt and collects all the packets. After time δt it calls the optimization function to select the path and send RREP. Optimization function uses the individual node's battery energy; if node is having low energy level then optimization function will not use that node.

III. IMPLIMENTATION OF FRAME RELAY

In this topology the frame relay is implemented by using the three routers and a cloud , the connection between the router and cloud is using the serial port.The most important one is that here using one serial ports we are connected three routers i.e, using one serial port we are connected three routers. By this method cost has been decreased and due to increase in error handling at the ends of the destination allows this protocol to discard incorrect frames and thus increases the process to complete fast because the time consumed by the error frames has been decreased.
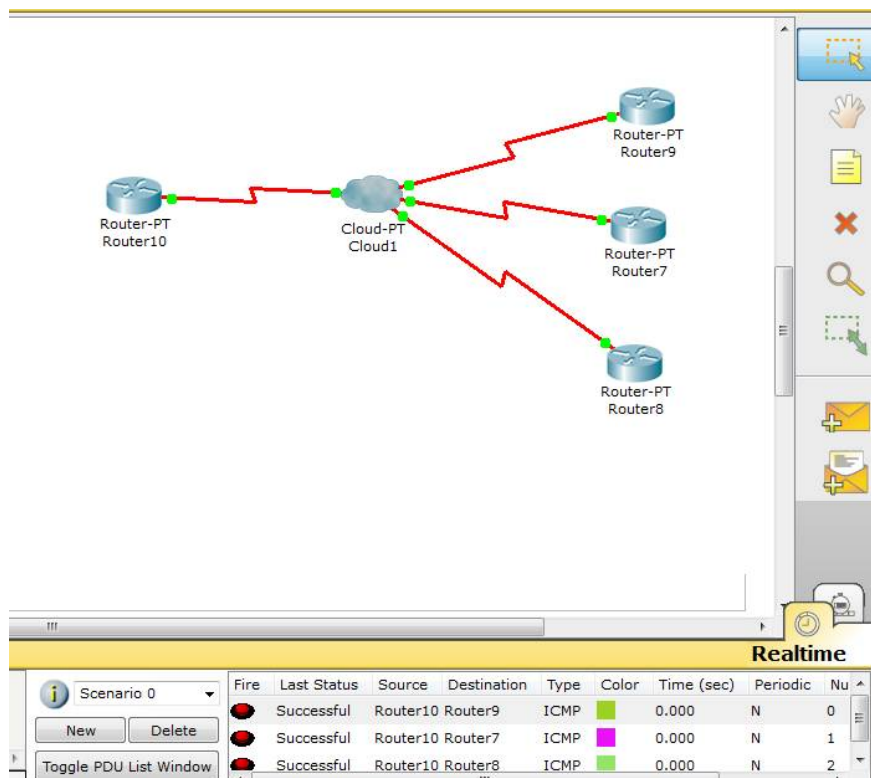

Figure 2: showing the connection of routers using frame relay.

The figure also explains the flow of packets from router 10 to other router connected to each other are successful.

IV. CONFIGURATION OF FRAME RELAY USING CISCO PACKET TRACER

Firstly we have to made the physical connections as mentioned in the topology, Then we have configure the router 10 as follows:

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int s2/0
Router(config-if)#encap frame-relay
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#int s2/0.2 point-to-point
Router(config-subif)#
%LINK-5-CHANGED: Interface Serial2/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0.2, changed state to up


Router(config-subif)#frame-relay interface-dlci 100
Router(config-subif)#ip add 10.0.0.1 255.0.0.0
Router(config-subif)#exit
Router(config)#int s2/0.3 point-to-point

%LINK-5-CHANGED: Interface Serial2/0.3, changed state to up
Router(config-subif)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0.3, changed state to up


Router(config-subif)#frame-relay interface-dlci 101
Router(config-subif)#ip add 11.0.0.1 255.0.0.0
Router(config-subif)#exit
Router(config)#int s2/0.4 point-to-point
Router(config-subif)#
Router(config-subif)#
%LINK-5-CHANGED: Interface Serial2/0.4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0.4, changed state to up

Router(config-subif)#frame-relay interface-dlci 102
Router(config-subif)#ip add 12.0.0.1 255.0.0.0
Router(config-subif)#exit
Router(config)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#write
Building configuration...
[OK]
Router#
```

Here if you observe the code, you will notice that the serial port is divided in to three because we are connecting three routers to the single router of one port only.

Then we have to configure the router 9 as follows:

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int s2/0
Router(config-if)#ip add 10.0.0.2 255.0.0.0
Router(config-if)#encap frame-relay
Router(config-if)#frame-relay interface-dlci 103
Router(config-if)#frame-relay lmi cisco
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#write
Building configuration...
[OK]
Router#
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int s2/0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
```

Then we have to configure the router 7 as follows:

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int s2/0
Router(config-if)#encap frame-relay
Router(config-if)#frame-relay interface-dlci 104
Router(config-if)#frame-relay lmi cisco
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#ip add 11.0.0.2 255.0.0.0
Router(config-if)#exit
Router(config)#
```

The configuration of router 8 as follows:

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int s2/0
Router(config-if)#ip add 12.0.0.2 255.0.0.0
Router(config-if)#encap frame-relay
Router(config-if)#frame-relay interface-dlci 105
Router(config-if)#frame-relay lmi cisco
Router(config-if)#no shut

Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down


%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#write
Building configuration...
[OK]
Router#
```

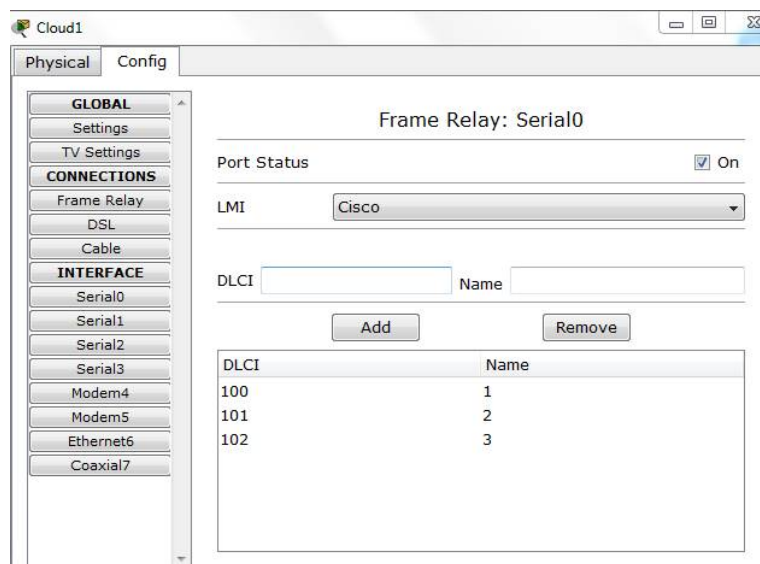After the configuration of routers, we have to add the connections i.e the virtual links in the cloud as follows:

Figure 3 : shows the adding of dlci numbers in serial 0 port.

Ex:100 is the dlci number and we given the name as '1' . The name can be anything.
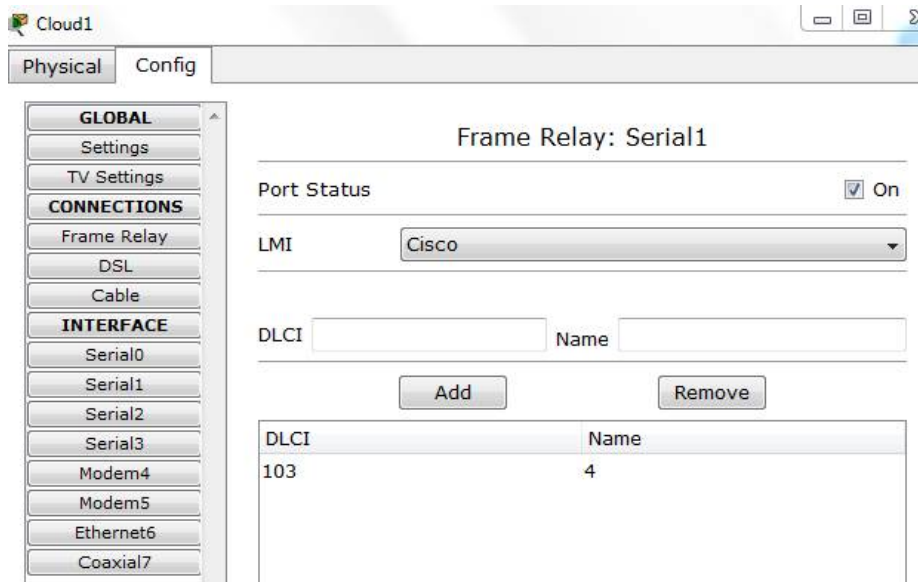
Figure 4 : shows the adding of dlci numbers in serial 1 port.
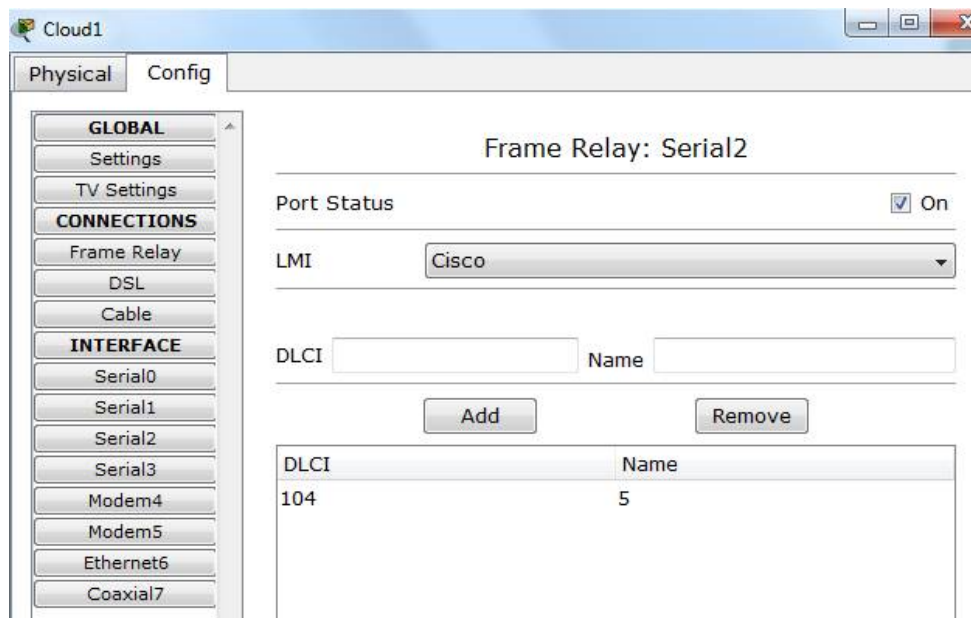

Figure 5 : shows the adding of dlci numbers in serial 2 port.

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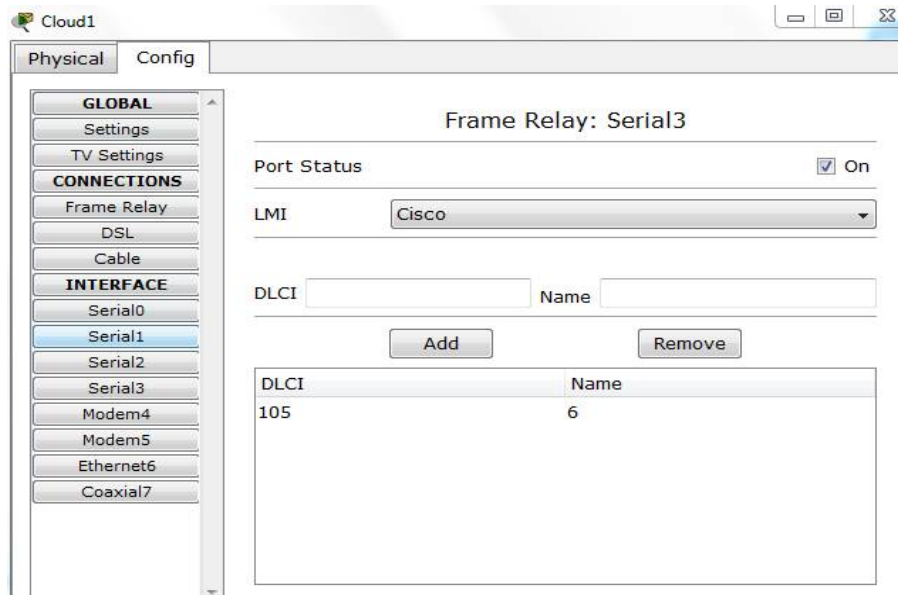**Vol. 4, Issue 3, March 2016**

Figure 6: shows the adding of dlci numbers in serial 3 port.

After all adding the dlci number we have to add links like the following figures:
Dlci-100 (s0) to Dlci-103 (s1)
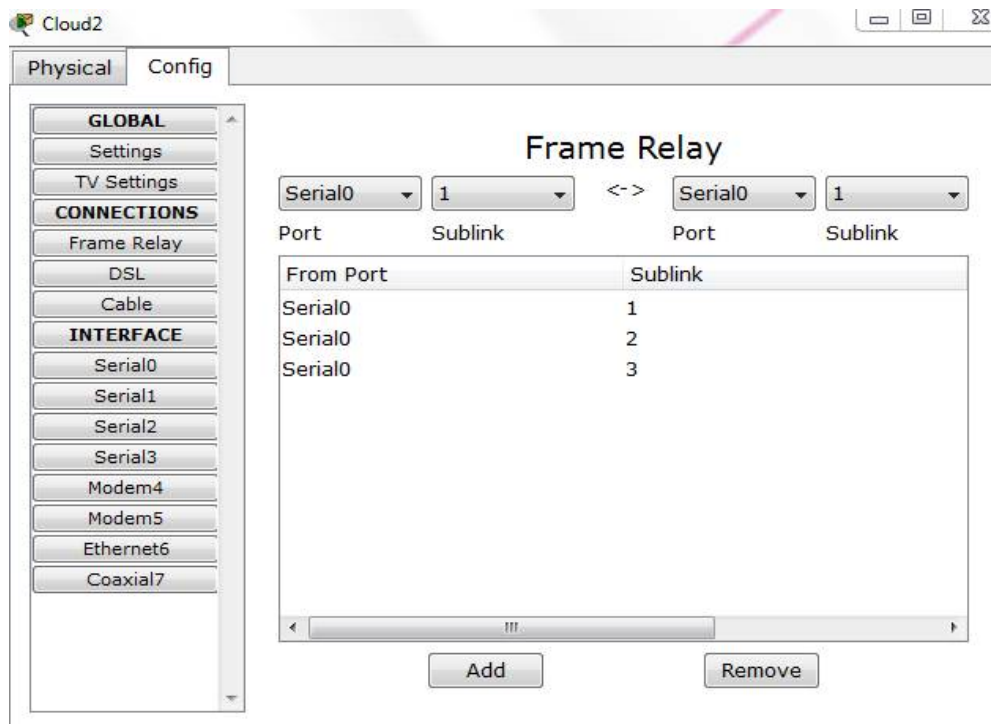Dlci-101 (s0) to Dlci-104 (s2)
Dlci-102 (s0) to Dlci-105 (s3)

Figure7: showing the virtual connections in the frame relay

In the figure the port: serial port, sublink : is the name given in the previous figures at the serial ports.
We provide the reference to these connection above this figure.

V. EVALUATION OF FRAME RELAY CONNECTION

Here, we use the pinging command to check the connection from router 10 to router7, router 8, router 9 after pinging we must get the 100% success rate need to prove that the connections are working properly.

```
Router#ping 10.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/7/9 ms

Router#ping 11.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 11.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/9/11 ms

Router#ping 12.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 12.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/6/10 ms
```

Router name	Ip address	Serial port	Dlci
Router10	10.0.0.1	2/0.2	100
Router 10	11.0.0.1	2/0.3	101
Router 10	12.0.0.1	2/0.4	102
Router 9	10.0.0.2	2/0	103
Router 7	11.0.0.2	2/0	104
Router 8	12.0.0.2	2/0	105

Table1: showing the assigning of ip address, dlci, connection of serial ports.

IV. CONCLUSION

In this paper, mainly focused on the usage of frame relay concept of connecting the three routers using single router serial port. The configuration and results are explained .The software used here is 'Cisco Packet Tracer' for configuration and simulation of the frame-relay concept.

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BIOGRAPHY

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