Lab 6: Changing Frame Relay PVC Speeds in a WAN Environment

Objective

This lab investigates the performance of applications across a Wide Area Network. We examine how changing the speeds of Frame Relay PVCs impacts application performance.

Overview

Standard Chartered Bank has 70 branches, a Headquarters building, and the Richmond Processing Center.

To connect the sites, the bank has a three-tier network. First, individual branches are connected to regional routers. Second, the regional routers are connected to Verizon's Frame Relay cloud. This Frame Relay cloud has an internal ATM backbone.

One result of this arrangement is that each branch does not need separate PVC to the Richmond Processing Center. First, the only PVCs are between each the regional router and the ATM core. Second, the intermediation of the ATM core means that the Richmond Processing Center only needs single PVC to the ATM core. This is very different from pure Frame Relay networks, which would require separate PVC from the Processing Center to each branch or at least each regional router.

Initially, the regional branch office router PVCs have committed information rates (CIRs) of 64 kbps and may send data bursts up to 128 kbps. The access links between the regional routers and the Frame Relay Cloud run at 256 kbps.

The Frame Relay connection between the Processing Center and the Frame Relay cloud runs on a T1 access link. It has a CIR of 1 Mbps.

Our goal is to study the response time for file sharing and file transfer applications over different frame relay contracts between the bank and Verizon.

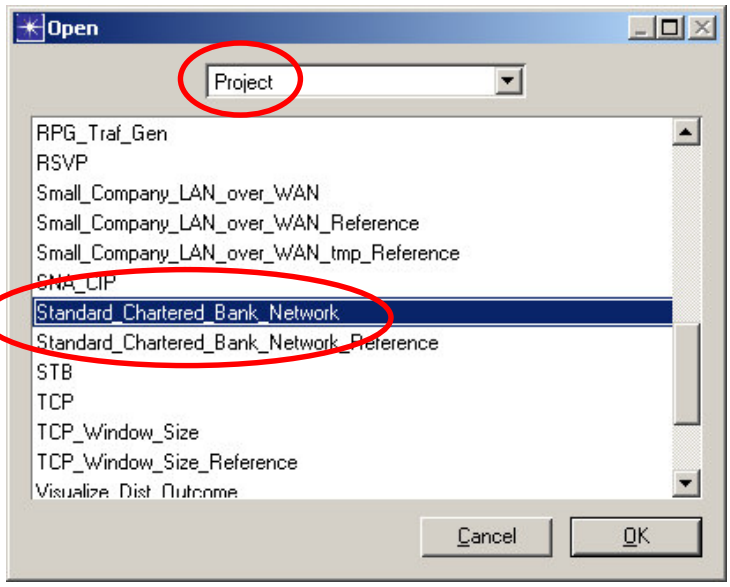
Lab Instructions

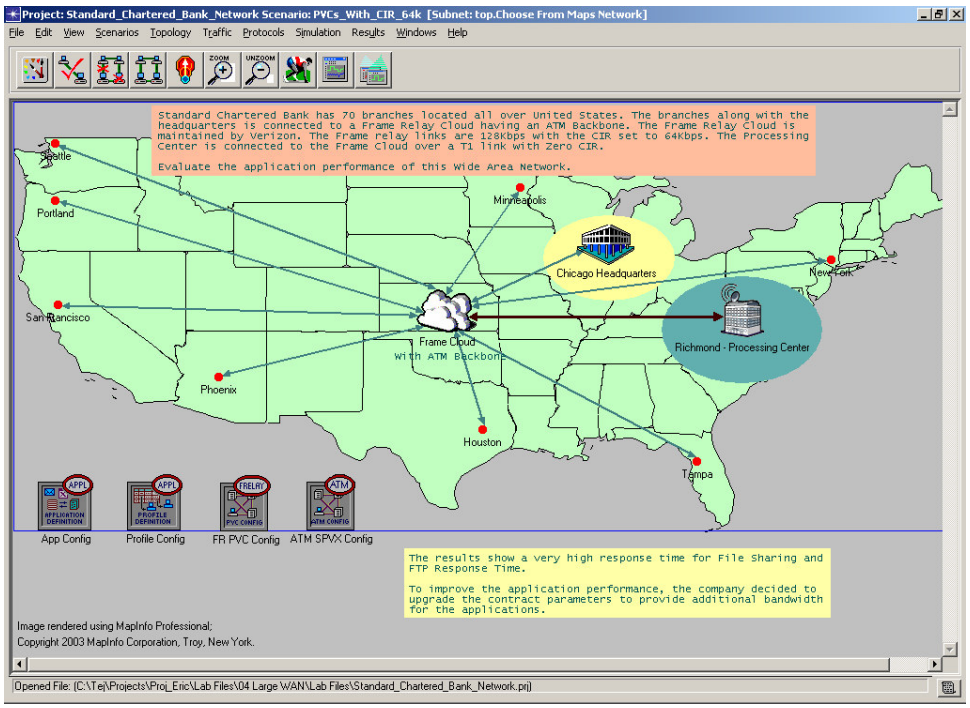
Step 1: Open Lab 6

1. Start IT Guru.

2. Select **File** ⇒ **Open…**

3. Scroll down to the project named **Standard_Charetered_Bank_Network**, select it and click **OK**.





The PVCs connecting all the branches to the frame cloud are configured with a CIR of 64 kbps. Even though the contract parameters agreed between the bank and Verizon can be accomplished by a 128 kbps access link, Verizon has a 256 kbps access link running from the regional routers to the frame cloud to anticipate future upgrade or additional bank branches. The PVC from

the processing center to the frame cloud has a CIR of 1 Mbps. To see this configuration, double-click on any of the subnets. Right-click on the dashed link coming out of the router and select **Edit Attributes**. If you do not see this link, select **View** ⇒ **Demand Objects** ⇒ **Show All** from the menu. In the Attributes window, double-click in the **Value** column for **Contract Parameters**. The Frame Relay PVC Contract Parameters, between the company and Verizon can be configured here. Click on **Cancel** twice to return back to the subnet.

Step 2: Configure and Run the Simulation

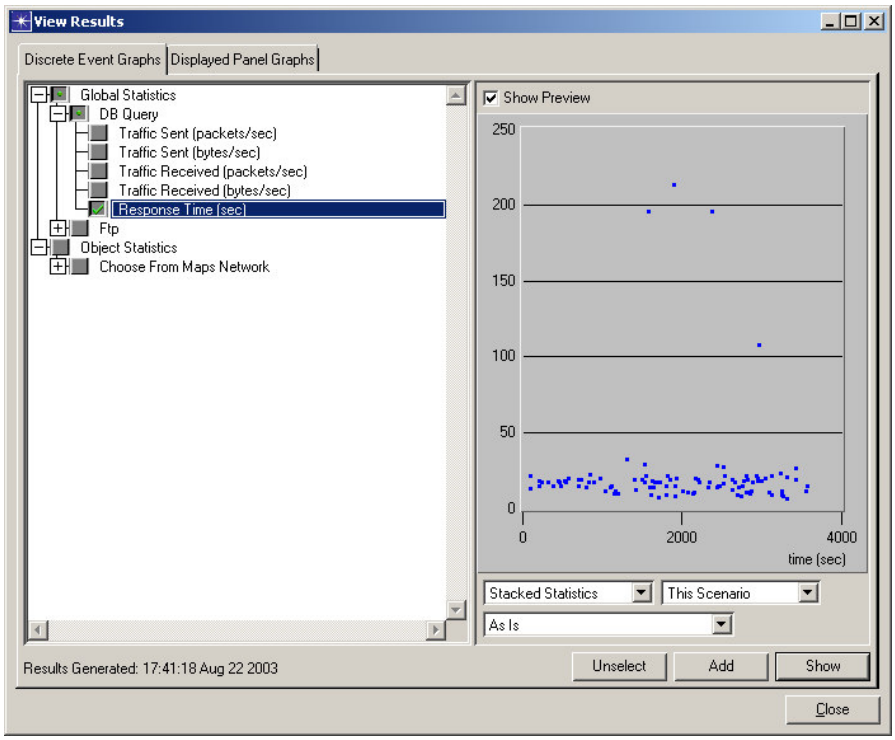
Evaluate the application performance for a busy hour of the day.

1. Click on the **configure/run simulation** toolbar button. 
2. Make sure the Simulation **Duration** is set to **1** hour.
3. Click **Run.** Monitor the progress bar as the simulation proceeds.
4. When the simulation completes, Click **Close**.

Step 3: View Results

View the FTP Download Response Time and File Sharing Response Time.

1. Right-click in the workspace and select **View Results**.
2. Choose **Global Statistics** ⇒ **DB Query** ⇒ **Response Time (sec).**

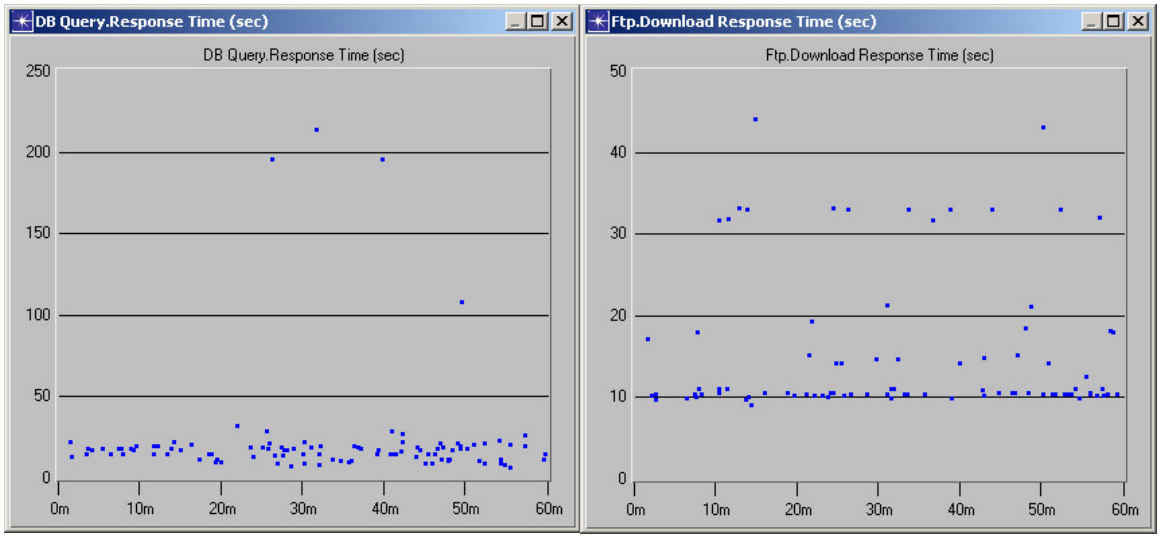


3. Click **Show**.

4. Unselect the previous statistic. Choose **Global Statistics** ⇒ **Ftp** ⇒ **Download Response Time (sec).**

5. Click **Show**.

Note: To toggle the graphs on and off, use the **hide or show all graphs** button.



Your results should be similar to the graphs above.

- Average File Sharing Response Time is approximately 20 seconds.
- FTP Download Response Time is high for some users compared to the others. Variations in latency and network congestion impact the response times. However, average FTP Download Response Time is high.

To improve the application performance, the company decided to upgrade the contract parameters for the PVCs connecting the regional routers and the frame cloud to have a CIR of 128 kbps.

Step 4: Duplicate Scenario

1. Select **Scenarios** ⇒ **Duplicate Scenario…**

2. Set the name as **PVCs_With_CIR_128k** and click **OK**.

Step 5: Configure the PVCs

Configure the PVCs connecting the branches to the frame cloud to have a CIR of 128 kbps.

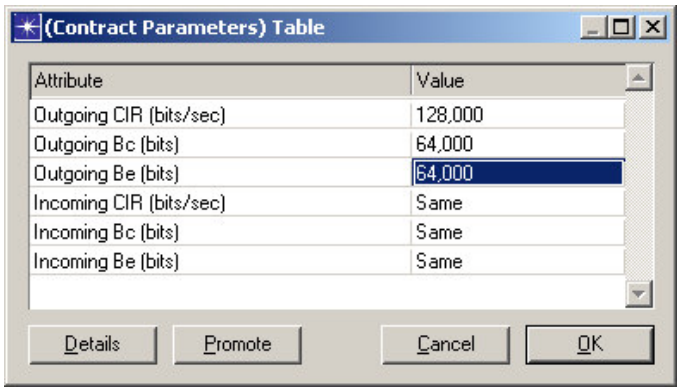
1. Double-click on the Phoenix subnet to enter the subnet.

2. Right-click on the dashed link coming out of the Phoenix Router, which represents the Frame PVC and choose **Select Similar Demands**. If you do not see the link then choose **View** ⇒ **Demand Objects** ⇒ **Show All**.

3. Right-click on the same link again and select **Edit Attributes**.

4. Click in the **Value** column for **Contract Parameters** attribute and select **Edit…**

5. Set the **Outgoing CIR** to **128000** and the **Outgoing Bc** and **Be** to **64000**.



6. Click **OK**.

7. Check the box for **Apply Changes to Selected Objects** and click **OK**.

Note: The PVC Contract Parameters at the Processing Center have changed too. So we need to set them back to 1 Mbps CIR.

8. Right-click in the workspace and select **Go To Parent Subnet**.

9. Double-click on the **Richmond - Processing Center** subnet.

10. Right-click on the PVC coming out of Processing Center Router and select **Edit Attributes**.

11. Double-click in the **Value** column for **Contract Parameters**.

12. Set the **Outgoing CIR** to **1024000**, **Outgoing Bc** to **256000** and **Outgoing Be** to **256000**.

13. Click **OK** to close the window and then close the attributes window as well.

Step 6: Configure and Run the Simulation

The PVCs have been reconfigured. Rerun the simulation for a busy hour of the day to see the effect of the upgrade on the application performance.

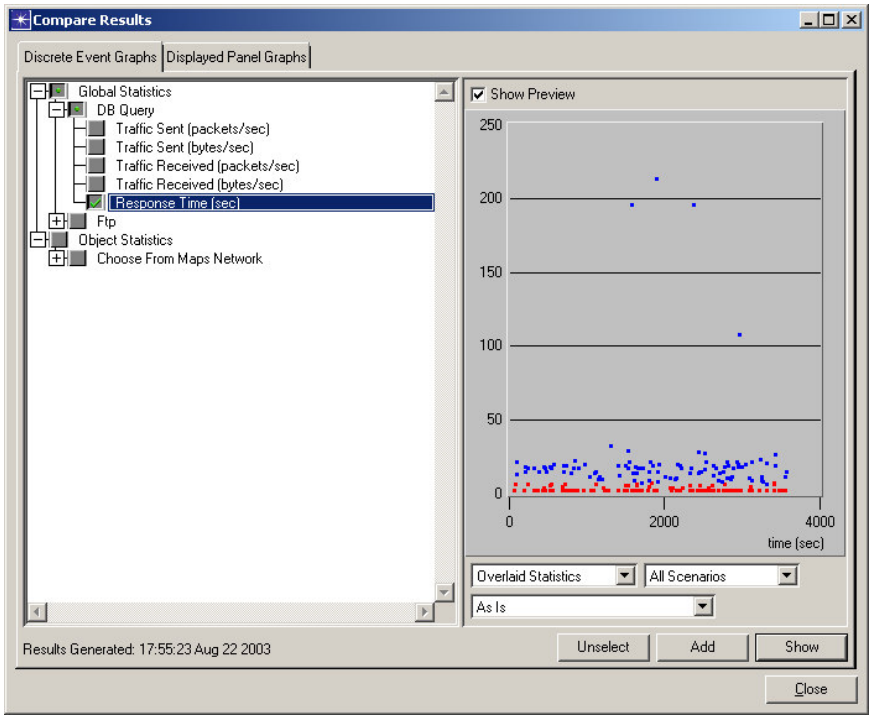
- Refer to previous steps for setting the duration and running the simulation.

Step 7: Compare Results

Compare the File Sharing and FTP Download Response Times. We expect that the additional bandwidth available with the new PVCs should reduce the application response times.

1. Right-click in the workspace and select **Compare Results**.

2. Choose **Global Statistics** ⇒ **DB Query** ⇒ **Response Time (sec).**

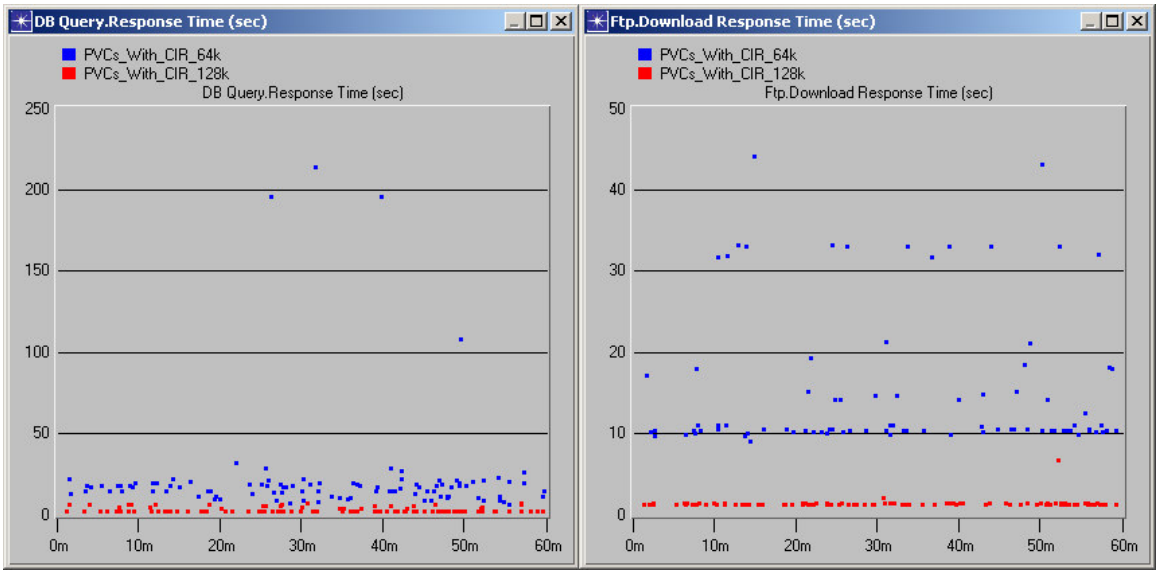


3. Click **Show**.

4. Unselect the previous statistic and repeat the same steps for **Ftp Download Response Time (sec)**.

5. Click **Close** in the View Results window.

Conclusion



- The results show that both; File Sharing and FTP Download response times reduce significantly by upgrading the contract parameters.

- Verizon usually maintains the access links between the branches and the frame cloud. So it might not be possible for the company to upgrade them. Thus, upgrading the contract parameters would be a feasible solution for the company and, as shown in the second scenario, it does improve the application performance.