Multiple Layer-2 Switches

**Goal:** Emulate the behavior of five Layer-2 Switches connected together for traffic fail-over testing.

In this test scenario, the function of several layer-2 switches will be emulated using multiple LANforge Bridge devices with Spanning Tree Protocol (STP) so that each bridge can be connected to at least two others and fail-over tests can be demonstrated.

1. Setup seven Netsmith Connections.
   A. Right-click inside the Netsmith window and select *New Connection*

   ![Netsmith configuration](image)

   B. Accept defaults *Auto Create* everything then click *OK.*
C. Repeat and create a total of seven (7) connections

D. Click the **Apply** button to commit the changes in Netsmith to the LANforge-Server

A. **NOTE**: Modifications in Netsmith are only sent to the LANforge-Server after Applying them
For more information see LANforge-GUI User Guide: Virtual Interfaces
2. Setup five Bridge devices.
   A. Right-click inside the Netsmith window and select **New Bridge**

   ![Netsmith configuration for Resource: jw2(1.1) Version: 5.3.7](image)

   B. Select the **Bridge** button, enter a name and quantity 5

   ![Create VLANs on Port](image)

   A. **NOTE**: The 5 bridges here are sw-0, sw-1, sw-2, sw-3, and sw-4
C. In Netsmith, position the bridge devices into separate areas so they can be grouped with WanLink entry points.

For more information see **LANforge-GUI User Guide: Ports (Interfaces)**

3. Move the WanLinks into their desired positions.
A. Position the WanLink entry points in groups near the bridges as follows:

B. Click Netsmith **Apply** to commit the changes
4. Modify each Bridge to enable Spanning Tree Protocol (STP) and add Bridge Members.
   
   A. Right-click bridge sw-0 and select **Modify Port**

   ![Image of configuration tool with bridge sw-0 and port selection]

   B. Select the 'Set Bridge Info' and 'Spanning Tree' checkboxes, then add bridge members rddVR1 and rddVR3

   ![Image of configuration tool with bridge configuration settings]

   A. **NOTE:** Selecting the 'Spanning Tree' checkbox enables Spanning Tree Protocol (STP) for that port
   
   B. Click the **Apply** or **OK** button to commit the changes in bridge configuration to the LANforge-Server
C. Right-click bridge sw-1 and select **Modify Port**

A. Enable STP and add members rddVR5 and rddVR7

D. Right-click bridge sw-2 and select **Modify Port**

A. Enable STP and add members rddVR11 and rddVR13
E. Right-click bridge sw-3 and select **Modify Port**

A. Enable STP and add members rddVR0, rddVR4, rddVR8 and rddVR10

F. Right-click bridge sw-4 and select **Modify Port**

A. Enable STP and add members rddVR2, rddVR6, rddVR9 and rddVR12
5. Create virtual interfaces for traffic generation and fail-over tests.
   A. Right-click sw-0 and select **Create Ports** and choose Redirect

   ![Create VLANs on Port: 1.1.34](image)

   A. This step will create two Redirect Devices, rddA and rddB

   ![sw-0 (If0350-10ac) Configure Settings](image)

   B. Add rddA to bridge sw-0

   A. Click the **Apply** or **OK** button to commit the changes in bridge configuration to the LANforge-Server
C. Right-click rddB and select **Create Ports**, then select the **MAC-VLAN** button

![Image of MAC-VLAN configuration]

A. Enter a starting MAC address, quantity 5, and starting IP address

D. Repeat for bridge sw-1

![Image of Netsmith configuration]

A. **NOTE**: The Netsmith display has been 'zoomed-out' by clicking the '-' magnifying glass icon located at the top left of the Netsmith display.
E. Repeat for bridge sw-2

6. Create Layer-3 connections.
   A. On the Layer-3 tab, create a Layer-3 UDP connection between rddB#0 and rddD#0
B. Create 4 more connections between the remaining rddB and rddD ports

C. Create 5 connections between the rddD and rddF ports

A. Repeat this step for the rddf and rddb ports for a total of 15 connections
7. Test Fail-Over condition.

A. On the **Layer-3** tab, select all 15 connections and click **Start**.
8. In Netsmith, verify traffic is flowing through sw-3 or sw-4 via 3 separate WanLinks

A. In this case, VRWL1.1.001, VRWL-1.1.003 and VRWL-1.1.006 all show traffic flowing

9. Right-click WanLink VRWL-1.1.001 and select **Toggle WanLink**
10. After approximately 1 minute, the traffic will find an alternate path

11. Right-click WanLink VRWL-1.1.001 and select **Toggle WanLink**
12. After approximately 1 minute, traffic resumes on its original path

13. Traffic flow after simulating multiple path failures

A. A sample LANforge HTML report of this fail-over test can be found here: