



NORTEL

IT Tools: Multicast Hammer User Guide

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Introduction to Multicast Hammer

What is this tool used for?

When a multicast server sends traffic to multicast clients, the server does not typically know anything about the clients it is sending to. The server relies on multicast enabled nodes throughout the network to forward the transmission to clients that the nodes know are listening. As there is no direct connection from the server to the client, tracing or troubleshooting an issue in a multicast environment can be very challenging using common networking tools. Because of this, Nortel IT created Multicast Hammer to use as a testing tool for internal trials of multicast products.

Multicast Hammer is an easy to use testing tool that allows a network engineer or administrator to test and validate multicast configurations on their network. The tool provides a quick and simple means of creating multicast servers that transmit unicast streams to multicast group addresses, along with the setup of multiple clients that listen to these addresses. Multicast Hammer can be placed at multiple points in the network, and each instance of the tool serves as either a client or server to log events and control the input of the streams (see Figure 1).

**Sending Multicast UDP
Traffic to Multicast Group
Address**

**Listening for Multicast
UDP Traffic on Multicast
Group Address**

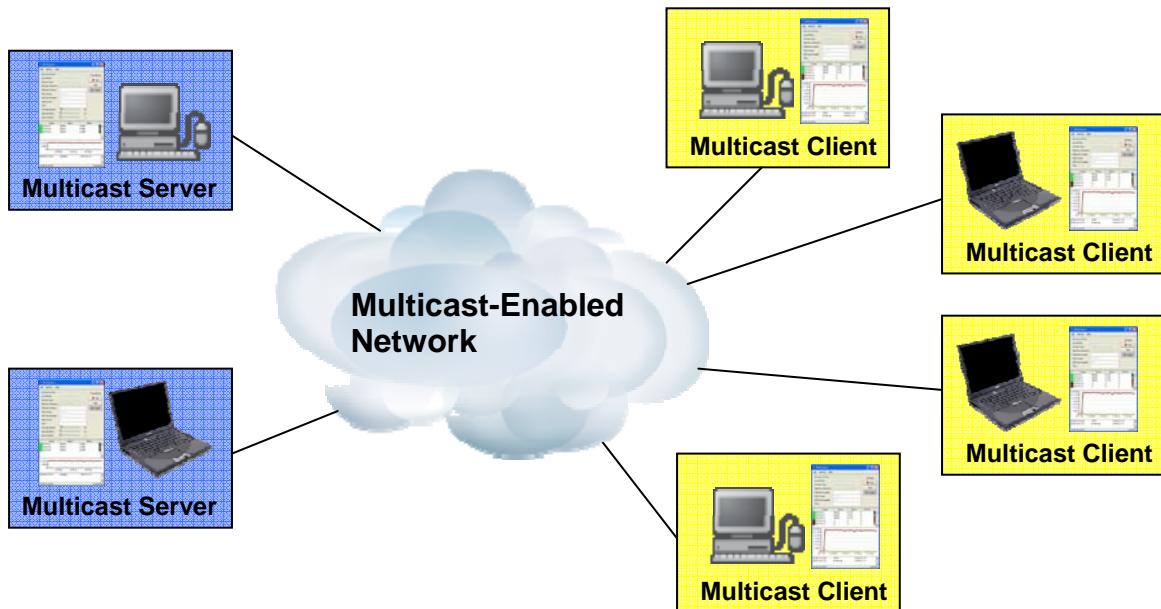


Figure 1: Multicast Hammer Network Topology

Multicast Hammer is used in a graphical user interface (GUI) form. The GUI form (Figure 2) of the tool is very easy to use and configure so that the tester can perform a wide range of tests on their multicast environment.

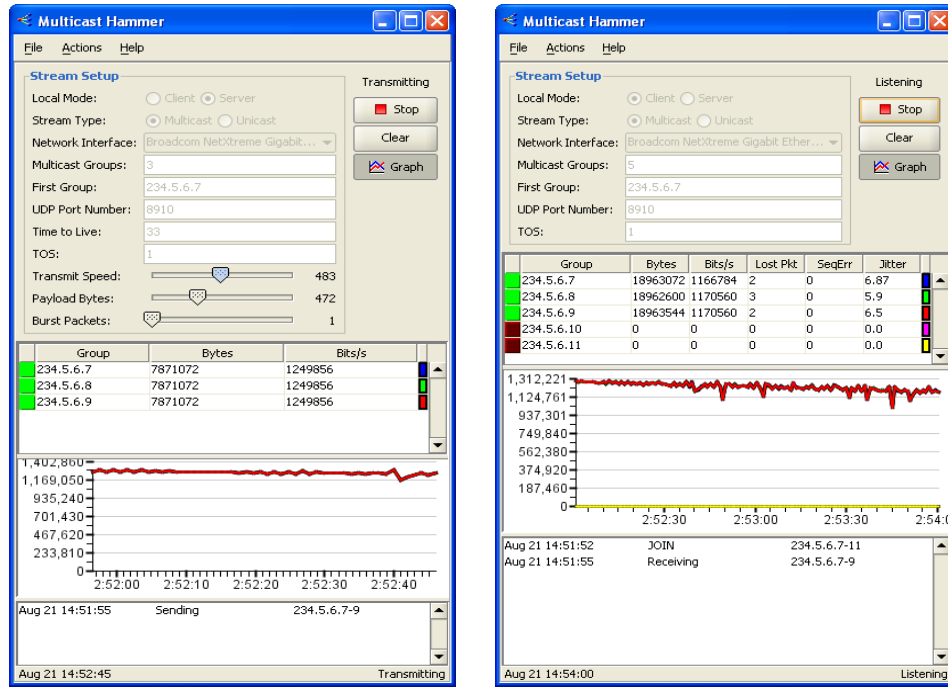


Figure 2: Multicast Hammer GUI in Server (Left) and Client (Right) modes.

Getting Started

This section contains information on system requirements and describes how to install the tool.

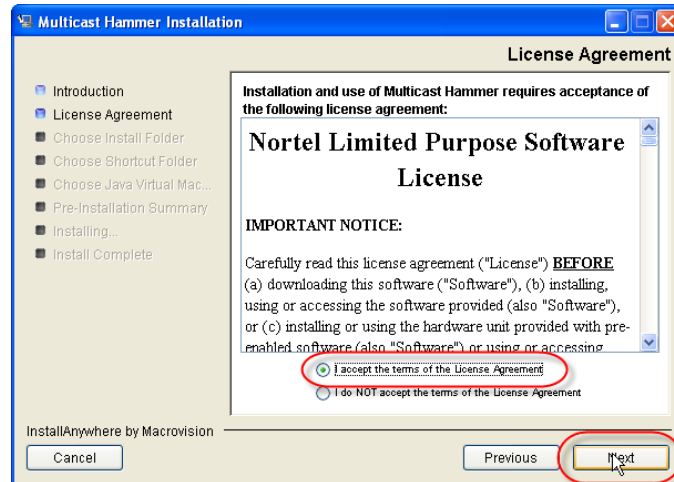
System Requirements for Multicast Hammer

The Multicast Hammer tool can be run on any Windows based operating system that can support Java applications. As the tool is a Java based application, Java version 1.4 or higher is required to run the tool.

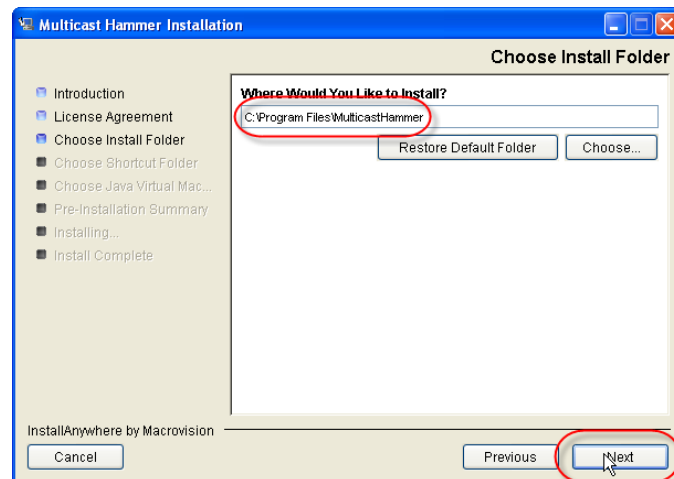
Installing Multicast Hammer

- 1) Download the tool to the system(s) it will be run on for your tests.
- 2) Run **multicasthammer_install_2.1.exe** on the system that will be part of your test environment.

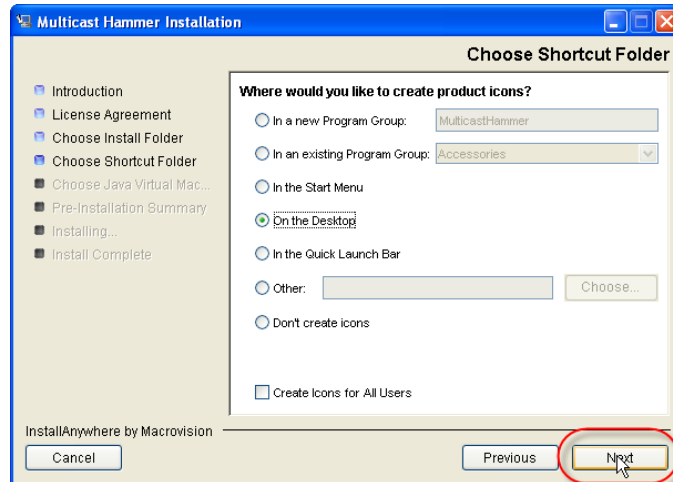
- 3) An Introduction window will appear after the installer is unpackaged. Click on **Next** and the License Agreement window will appear like the one below. After reading the License Agreement, select the radio button saying “**I accept the terms of the License Agreement**” if you agree and click **Next**.



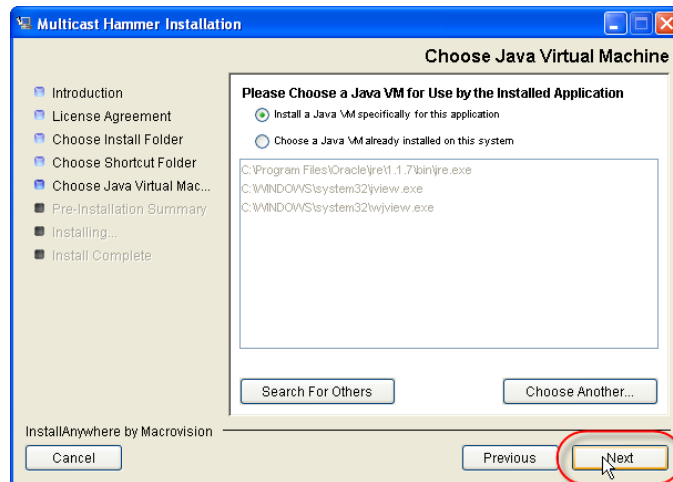
- 4) Choose where you would like to install the tool on your system or use the default location already populated in the field. Then click **Next**.



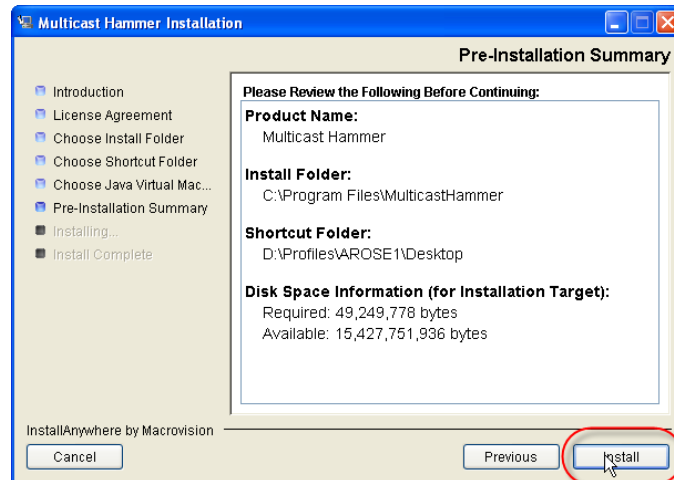
- 5) There are many options for shortcuts during the installation but only one can be selected. Select which shortcut type you would prefer for accessing the tool once it is installed and click **Next**.



- 6) Determine if you would like to install the Java Virtual Machine (version 1.4) with the tool or if you would prefer to use an existing Java Virtual Machine on your system. **Remember that the Java Virtual Machine must be version 1.4 or higher.** Once you have selected the Java Virtual Machine you would like to use, click **Next**.



- 7) Review the Pre-Installation Summary and then click **Install**.



- 8) Once the installation has completed, click **Done** on the Install Complete window. You should be able to start the tool by using which ever shortcut medium you selected in Step 5.

Using the Multicast Hammer Tool

There are a number of configurations that can be made depending on your network configuration and test scenarios. In the following sections, the graphical user interface of the tool will be discussed in terms of how to start it and what it is capable of doing.

Graphical User Interface

In order to run the tool, you can either run the executable or use your command prompt to start the tool's graphical user interface.

To run the GUI from a Windows command prompt, open your command prompt and **cd** to the Program_Files\MulticastHammer directory. If you chose to have your tool installed in a different directory during the installation, use the directory that the tool was installed in. Then type in the following command to start the GUI:

MulticastHammerGUI

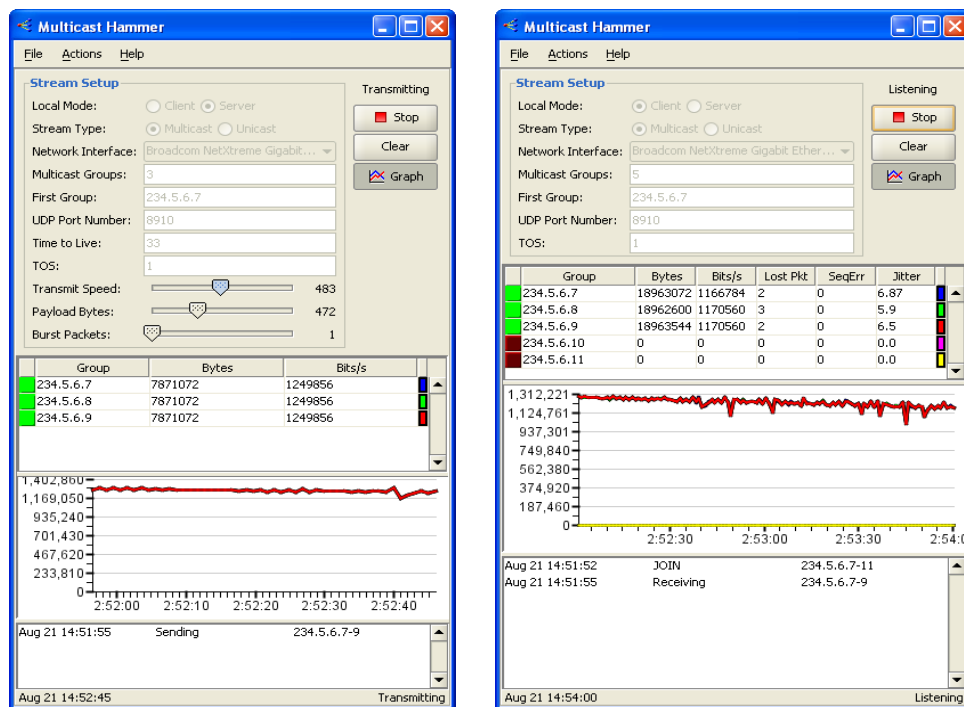


Figure 3: Multicast Hammer GUI in Server (Left) and Client (Right) modes.

The GUI has many options that can aid you in performing a wide range of testing on a multicast network. In the GUI, options change depending on if the tool is running in client versus server mode and if the traffic is to be multicast or unicast traffic. In order to more effectively use each option, a description of each option and the mode that the option is useable in has been provided below.

| GUI Options | Client or Server Mode | Multicast or Unicast Mode | Description |
|--------------------------|-----------------------|---------------------------|--|
| Local Mode | Both | Both | This setting sets the tool to either be a server (traffic generator) or a client (traffic listener). There can be multiple instances of both clients and servers within your test network, but typically you only need one server. |
| Stream Type | Both | Both | There are two transmission stream types that can be selected, either a unicast stream or multicast streams. Both types of transmission streams generate UDP (User Datagram Protocol) and ICMP (Internet Control Messaging Protocol) traffic. Multicast streams are useful in verifying multiple nodes and paths along the network while unicast streams verify a specific node and path. |
| Traffic Direction | Server | Unicast | The server can send either One-Way traffic to the client or it can send Bidirectional traffic to the client. With bidirectional traffic, the server sends the data to |

| | | | |
|------------------------------|--------|-----------|--|
| | | | the client and requests a response back from the client. This can be helpful in establishing the round trip time for messages. |
| Network Interface | Both | Both | This setting allows you to select which network interface on the test device should be used in order to perform the test. |
| Multicast Groups | Both | Multicast | This setting can range from 1 to 255 and designates the number of multicast group addresses that the multicast traffic will be sent across or listened to. The number of group addresses does not have to be the same between the server and client instances of the tool. |
| First Group | Both | Multicast | This setting sets the starting multicast address for the multicast group. All other addresses in the group will increment by one until the desired number of addresses are created. The range for valid multicast addresses is from 224.0.0.1 to 239.255.255.255 . |
| UDP Port Number | Both | Both | This represents the port that the UDP traffic is sent to from the server and that the client is listening to. It is recommended that you not use ports that are known to already be in use on your network. The default UDP Port Number for the tool is 8910 . |
| Time to Live | Both | Both | This setting ranges from 0 to 255 and represents the time for a packet of traffic to remain in the system before being discarded. The default time to live is 33 . Note: Very low time to live numbers could cause an increase in lost/dropped packets depending on the number of routing hops in your network test. |
| TOS (Type of Service) | Both | Both | This setting sets up the type of service octet within your packets. The default value is 1 , but you should check with your network administrator to determine how your network defines type of service. |
| Transmit Speed | Server | Both | The slider for the transmit speed gives a relative measure of the transmission speed possible by the tool. It can be moved throughout the tests or left at a set point depending on your test scenario. |
| Payload Bytes | Server | Both | The slider for the payload bytes ranges from 32 to 1400 and sets the size of the payload for the UDP traffic. This can be modified throughout your test if you would like to change the payload size during the test. |
| Burst Packets | Server | Both | The slider for burst packets allows the tester to stress the network link by adding additional packets to the transmission, as you would see when a high bandwidth application transmits through the network. For most testing, this slider should be set to 1 , but it can be changed during tests to observe performance under additional stress. |
| Graph | Both | Both | The Graph button pulls up a window in the tool that |

| | | | |
|---------------------|--------|---------|---|
| | | | tracks the fluctuations in traffic over a period of time. |
| Add | Server | Unicast | The Add button allows you to add a destination IP address that you wish to send unicast traffic to. This button is only viewable in unicast mode. |
| Del (Delete) | Server | Unicast | The Del button allows you to remove destination IP addresses when running in unicast mode. |

As your test is being run, there is also a set of fields that track the performance of each multicast group address from the client side. Here is a description of each of the fields:

- **Bytes (Shown in both the Client and Server mode)** – The number of bytes transmitted (Server) or the number of bytes received (Client).
- **Bits/second (Shown in both the Client and Server mode)** – The transmission speed of the server or the receiving speed of the client.
- **Lost Packets (Client Only)** – The number of packets that were lost during the transmission. In an ideal world the number of lost packets would be zero, so you would want this value to be as low as possible.
- **Jitter (Client Only)** – This measurement tracks the congestion and variation that is present in the network as the packets travel through. Jitter is close to zero in a well set up network, but tolerances will vary based on transmission speed. The jitter measurement is based off of RFC 1889 and the calculation for it is:

$$J = J + (|D(i-1, i)| - J) / 16$$

Note: $D(i-1, i)$ is the difference in arrival times from one packet to the next packet that arrives (not necessarily in sequence) at the receiver.

- **Sequence Error (SEQERR)** – The number of packets that are received in a different order than the order they were sent in. Like packet loss, this number should be as low as possible.

Example Multicast Test

A basic test for multicast traffic is to test the connectivity between a single server and client. To perform this test or a similar test, follow the steps below:

1. Start the Multicast Hammer tool on both the server device and the client device.
2. Set the Multicast Hammer tool's **Local Mode** to **Server** on the server device and **Client** on the client device.
3. Ensure that **Multicast** is set as the **Stream Type** on both the server and client tools.
4. Select the **Network Interface** for each device and insert the number of **Multicast Groups** (for this example we are using three) that you would like to test with.
5. Set the **First Group** address to a multicast address (**224.0.0.1** to **239.255.255.255**) that is the same for both the client and the server.
6. Set the **UDP Port** number to the same number on both the server and client, but make sure that you are not using a port that is already in use on your network.
7. On the server, insert a **Time to Live** number that will give the multicast traffic enough time to be transmitted to the client.

8. For both the server and the client, set the **Type of Service** for your multicast traffic in accordance with the type of service settings for your network.
9. Slide the **Transmit Speed**, **Payload Bytes**, and **Burst Packets** sliders on the multicast server to the settings that you would like to start with for your test. These sliders can be adjusted throughout the test so that you can test multiple facets of the network. It is recommended that the **Burst Packets** slider be set to 1 unless you are trying to place additional strain on the network in your test.
10. For both the server and the client, click on the **Start** button to begin transmitting and receiving multicast traffic, respectively.

Figures 4 and 5 show the settings for this test.

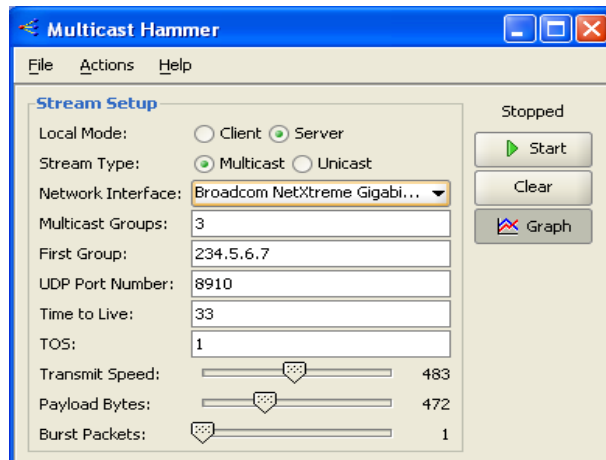


Figure 4: Multicast Hammer Test Server Settings



Figure 5: Multicast Hammer Test Client Settings

After the test has been run, you can look at the results on the client node to see if there was any packet loss, network jitter or sequence errors that occurred during the transmission. These values obtained from your test should give you a good idea of how well your multicast network is running and if there are any issues that need to be corrected.

Example Unicast Test

Unicast traffic can be tested by verifying the connectivity between a single server and client. To perform this test or a similar test, follow the steps below:

1. Start the Multicast Hammer tool on both the server device and the client device.
2. Set the Multicast Hammer tool's **Local Mode** to **Server** on the server device and **Client** on the client device.
3. Ensure that **Unicast** is set as the **Stream Type** on both the server and client tools.
4. Set the **Traffic Direction** to **One-Way** on the server device.
5. Select the **Network Interface** for each device from the drop-down list.
6. Set the **UDP Port** number to the same number on both the server and client, but make sure that you are not using a port that is already in use on your network.
7. For both the server and the client, set the **Type of Service** for your multicast traffic in accordance with the type of service settings for your network.
8. Slide the **Transmit Speed**, **Payload Bytes**, and **Burst Packets** sliders on the multicast server to the settings that you would like to start with for your test. These sliders can be adjusted throughout the test so that you can test multiple facets of the network. It is recommended that the **Burst Packets** slider be set to 1 unless you are trying to place additional strain on the network in your test.
9. Click on the **Add** button and enter the IP address for the client being tested into the pop-up box provided (Figure 6).

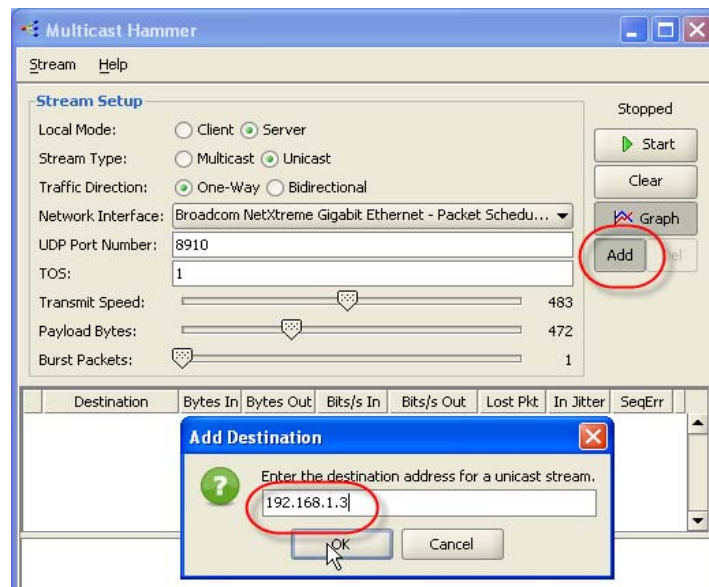


Figure 6: Adding a Destination IP for the Unicast Test

10. For both the server and the client, click on the **Start** button to begin transmitting and receiving multicast traffic, respectively. Figure 7 shows the settings and results from a brief run of this test.

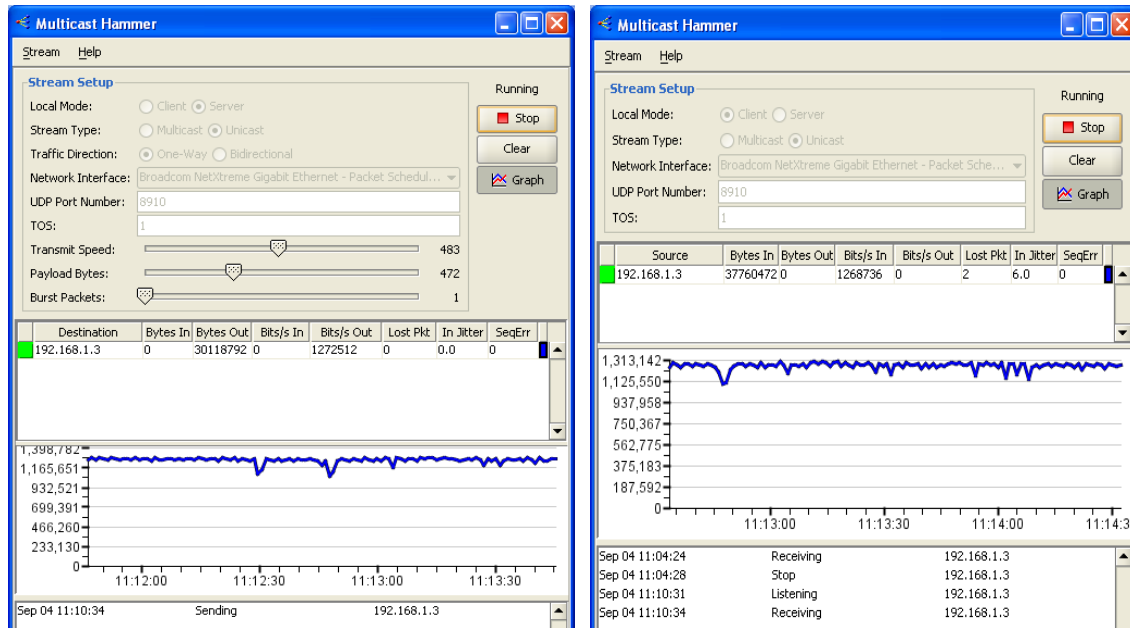


Figure 6: Multicast Hammer running Unicast test with Server (Left) and Client (Right)

Once your test has been run, you can view the results on the client node to see if there was any packet loss, network jitter or sequence errors that occurred during the transmission. The results from your test should give you a good idea of how well your unicast link is running and if there are any issues that need to be corrected.

Known Issues

- If you have problems getting the Multicast Hammer tool to work, please check your firewall software as it can prevent the transmission of Multicast Hammer's ICMP (Internet Control Message Protocol) messages and other test traffic.
- As Multicast Hammer can generate a heavy load of UDP (User Datagram Protocol) traffic, other users on the network may experience lower network performance during high bandwidth testing.

Support for the Tool

This tool is not formally supported, but we will provide email assistance as we are able. If you require support on this tool, please email the IT tools team at: talkIT@nortel.com

Additional IT Tools Information

Multicast Hammer and other Nortel IT tools can be found in the **IT Tools** section of the [Nortel on Nortel](#) site.

Additional Multicasting Information

RFC 3170: <http://tools.ietf.org/html/rfc3170>

Wikipedia.org entry for Multicasting: <http://en.wikipedia.org/wiki/Multicast>

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