IP Addressing

for

Channel Attached Networks

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IP Addressing for Channel Attached Networks

There are currently two accepted approaches for providing high-speed connections between today's IP networks and an IBM System/390 channel. Products like IBM's Open Systems Adapter (OSA/OSA-2) along with Bus-Tech's Mainframe Appliance for Networking and NetShuttle are referred to as LCS (LAN Control Station) controllers because of the protocol they employee when communicating with System/390. The alternative approach is to use a channel-attached router such as the CISCO 7500 or the IBM 2216.

Connecting a mainframe to a LAN using a LCS-based controller versus a channel-attached router has significant implications on network planning. Specifically, LCS devices use a single IP address to connect the mainframe to the network while channel-attached routers require the mainframe be on it's own IP subnet. Installation of a new router for the purpose of channel attaching a mainframe will require modifications to existing network route tables and possibly even to individual client configurations. LCS controllers, on the other hand, require no change to the existing network provided there is a single IP address available for use.

Replacing an IBM OSA or OSA-2 adapter with a Mainframe Appliance for Networking or NetShuttle is simple and straightforward and will not affect the network at all. Replacing an OSA or OSA-2 with a channel-attached router requires up front network planning as well as possible configuration changes to existing IP routers and clients.

This document details the difference in how LCS controllers and channel-attached routers appear to the network.

LAN Control Station

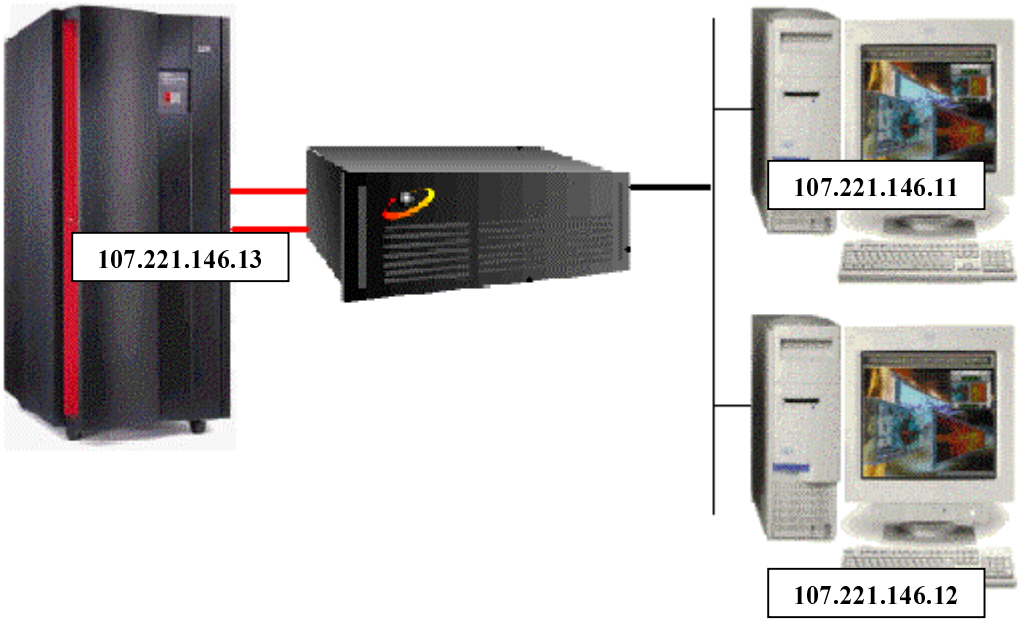

Figure 1. Simple NetShuttle Installation

Figure 1 shows a simple installation where a NetShuttle controller is used to connect a Fast Ethernet LAN to a System/390. There are two important points to notice about this picture. First there is no IP address required on the NetShuttle. LAN Control Station (LCS) devices are transparent to the network. A TN3270, telnet, or FTP client wanting to access the mainframe simply uses the mainframe's IP address (107.221.146.13).

Second, because LCS devices are transparent to the network, the mainframe's IP address is in the same IP subnet as the local clients. Installing a LCS controller only requires a single IP address on the existing LAN to be free. From a network configuration point of view connecting the mainframe to the network is no more difficult than adding an additional workstation or PC.

Customers migrating from OSA-2 installations can reuse the IP address(es) they had assigned to the mainframe since OSA-2 is also a LAN Control Station controller.

Channel-Attached Router

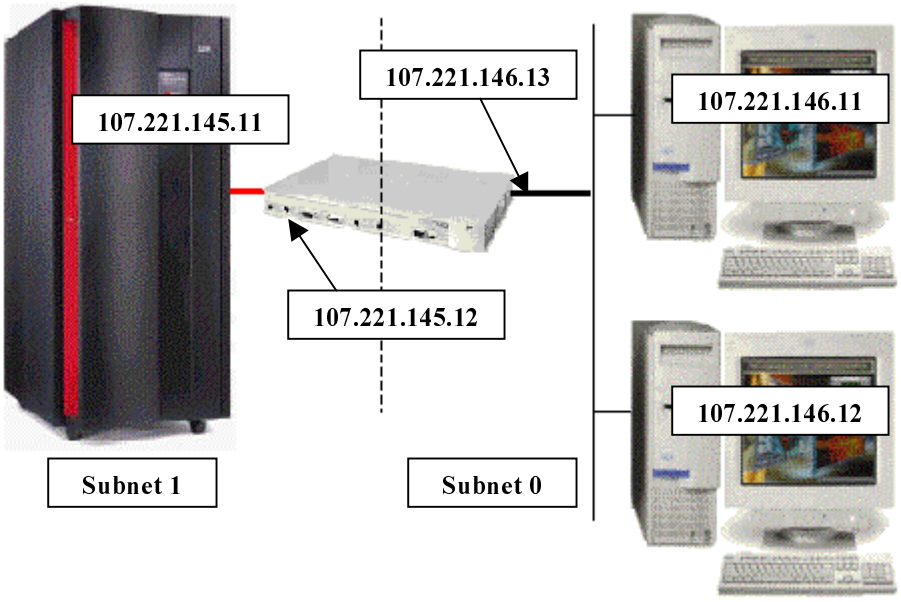

Figure 2. Channel-Attached Router

Figure 2 shows the same configuration using a channel-attached router. While physically a channel-attached router may appear the same as a NetShuttle controller, it is quite different in how it appears to the network.

To begin with routers are not transparent to the network. Each of the ports in the router requires it's own IP address. Notice in the picture that the Fast Ethernet port on the router has an IP address of 107.221.146.13 and the channel port has an address of 107.221.145.12.

More importantly, routers do not move (route) traffic between ports with IP addresses in the same network. So in order for a router to move traffic between the Ethernet port (107.221.146.13) and the channel port (107.221.145.12) these two addresses must be defined in different IP networks (subnets).

In other words in order to connect a mainframe to a LAN using a channel-attached IP router you must assign an unused IP subnet to the mainframe. This is typically not a problem if the network is not attached to the Internet because you can use any available subnet (whether it has been assigned to your company for use or not). As long as you never expose the mainframe's subnet to the public Internet you will never have a problem. But if your network is Internet attached or you need to make the mainframe available outside your company, you will be forced to doing one or more of the following:

1. Re-arrange you entire network to free up a subnet.
2. Implement variable length subnets (again to free up a subnet).
3. Get a new, approved subnet.
4. Implement IP Masquerading.

Even if you have an available subnet you can assign to your mainframe you will still need to make changes within your network configuration. The router in Figure 2 must be recognized as a gateway to the clients on the same network (subnet). If you add a channel-attached router to a LAN with no other routers or gateways you will have to modify client configurations to define the router (107.221.146.13 in the figure) as a gateway address. If you already have other routers / gateways installed then you will need to modify the route tables in those routers / gateways to redirect traffic destined for the mainframe (107.221.145.11) to the channel-attached router (107.221.146.13).

Conclusion

LAN Control Station devices such as the Mainframe Appliance for Networking and the NetShuttle are completely transparent to the network. These devices allow a single IP address to be assigned to the System/390 TCP/IP stack.

As long as there is an open IP address, a LCS controller can be implemented in existing IP networks without having to modify or change network route tables or client configurations.

Routers on the other hand are based on the principle that each port connected to the router represents a separate and different IP network (subnet). Channel ports are treated like any other port. Channel attaching a router to a mainframe requires an unused subnet that can be assigned to the mainframe's TCP/IP stack and router channel port. Implementing a new subnet into an existing network requires modifications to existing route tables and / or client configurations and therefore must be well thought out in advance.