SIERRA AUTOMATED SYSTEMS

Static ARP How-to Guide

TCP/IP Communications between station automation PCs/DAWs and a RIO can be optimized through the use of static ARP entries.

ARP Stands for 'Address Resolution Protocol', and is how an IP address is translated into a hardware/Ethernet address. By default ARP is dynamic, which means that two computers don't initially need to know each other's Ethernet addresses to talk to each other. ARP messages are sent back and forth between devices until both computers have an 'ARP' entry for each other, mapping the other computer's IP address to its hardware/Ethernet address.

Having a static ARP entry can help reduce lag on real-time communications over TCP/IP. If a computer has a static ARP entry for another computer, it doesn't need to send out ARP requests and wait for ARP replies any time it attempts to transmit data.

Setup

The automation PC can be set up with static ARP entries for each RIO that it communicates with. Under windows, the 'ARP' command can be used from the command line to add a static entry. The syntax for ARP is:

arp -s <IP address of RIO> <Ethernet address of RIO>

To determine the Ethernet address of the RIO, you can open a command prompt window and type the following:

1. On the automation computer, open a command prompt window

2. Type 'ping <IP address of RIO>'. For example, if the RIO's IP address is 192.168.1.10, you would type:

    ping 192.168.1.10

3. Ping will display something like:

    Reply from 192.168.1.10: bytes=32 time<1ms TTL=255

4. Print out the ARP table by typing 'arp –a':

    arp –a

5. 'Arp -a' will print out all of the ethernet addresses that the PC knows about, including the one you just pinged (it picked up the address from you doing the ping.) 'Arp -a' will display something like this:

> *Interface: 192.168.1.200 --- 0x2*
>
> *Internet Address   Physical Address   Type*
>
> *192.168.1.1   00-1b-0c-0f-68-59   dynamic*
>
> *192.168.1.10   00-07-41-ff-ff-00   dynamic*

6. The 'Internet Address' and 'Physical Address' are what you should use for the 'arp –s' command arguments. So in this example, to add a static route to 192.168.1.10 the command would be:

arp -s 192.168.1.10 00-07-41-ff-ff-00

On any particular automation PC, you would only need to add static routes for the RIOs that PC communicates with. Figure 1 shows an example where Automation PC 1is communicating with RIOs in both Studio A and Studio B, while Automation PC 2 is communicating with the RIO in studio B. The static arp commands for each PC are shown below.
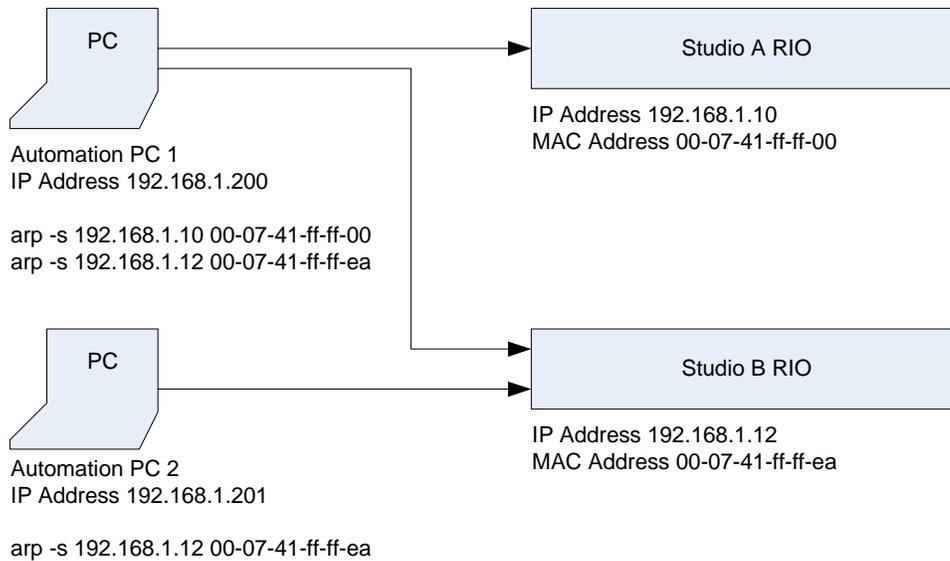
PC

Studio A RIO

IP Address 192.168.1.10
MAC Address 00-07-41-ff-ff-00

Automation PC 1
IP Address 192.168.1.200

arp -s 192.168.1.10 00-07-41-ff-ff-00
arp -s 192.168.1.12 00-07-41-ff-ff-ea

PC

Studio B RIO

IP Address 192.168.1.12
MAC Address 00-07-41-ff-ff-ea

Automation PC 2
IP Address 192.168.1.201

arp -s 192.168.1.12 00-07-41-ff-ff-ea

figure 1. Static ARP commands for two different automation PCs

Maintenance

Static ARP entries entered from the command line are persistent until re-boot. To add the entries automatically on reboot, you can enter them into a batch file and add the batch file to either the startup group (add a shortcut to your batch file in \Documents and Settings\<login user>\Start Menu\Programs\Startup), or create a scheduled task to run on bootup or login (Start->Control Panel->Scheduled Tasks->Add Scheduled Task.)

The static ARP entries will need to be updated any time a RIO is swapped out, or its IP address is changed.