Configuring Virtual Machines for Aveva, WonderWare & ControlLogix Integration

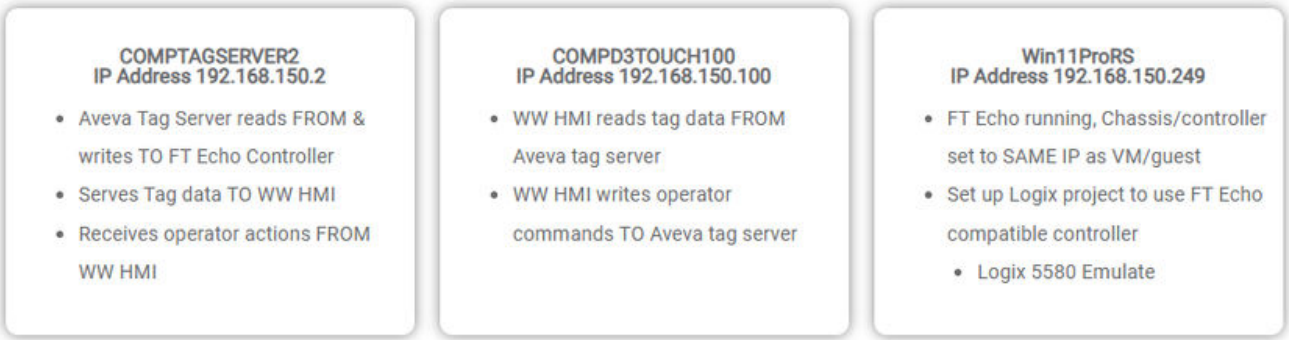
Configuring a Multiple Virtual Machine Environment for an Aveva + WonderWare & ControlLogix IAT/FAT

Modern industrial control systems are more complex and interconnected than they've ever been. They're also expected to be robust, reliable, easy to maintain, predictable, secure, fast, intuitive, and to require less and less operator interaction to function properly.

Field installations of these complex control systems will often involve a network of computers, perhaps including separate physical computers, a stand-alone virtual machine (VM), multiple VMs hosted on one physical computer, remote operator stations of various types, and more.

When system integrators such as Cross are developing a new control system or modifying an existing one, we often need to reproduce the customer's system to properly perform our development, testing, and validation. For many systems, replicating the physical architecture would be cost-prohibitive. One solution to this is to create a network of multiple VMs that more-or-less replicates that architecture.

A process for setting up a Virtual Machine (VM) based Aveva+WonderWare (WW) HMI talking to a FactoryTalk Echo (FT Echo) Logix Controller. Three Virtual Machines running in VMWare Workstation 17.6.



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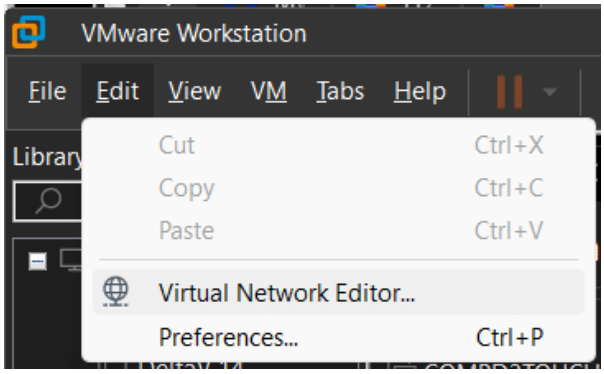
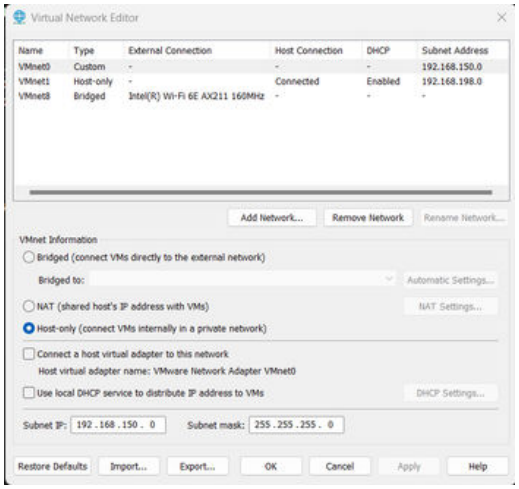
Setting up the Virtual Network
In VMWare Workstation, launch VMWare Network Editor.



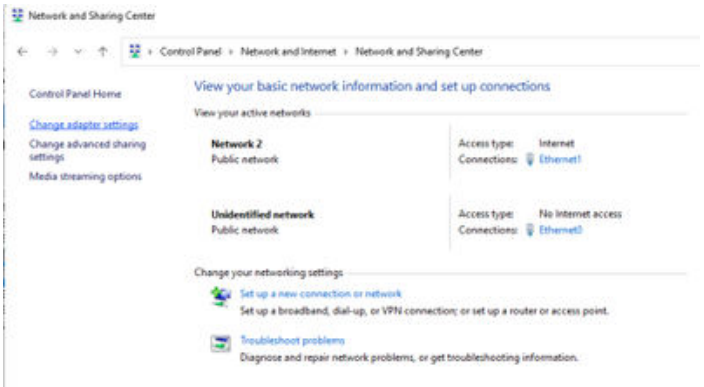
In this case, VMNet0 will be the “common” virtual Ethernet network, but users with different configurations need only ensure they’re using the same network across all three VMs.



The crucial settings are:

- Host-only – this allows the VMs to communicate with one another
- Subnet IP: 192.168.150.0 – the “base” network address
- Subnet mask: 255.255.255.0 – restricts the network to a Class C (smallest) subnet

In each VM, navigate to the Network and Sharing Center



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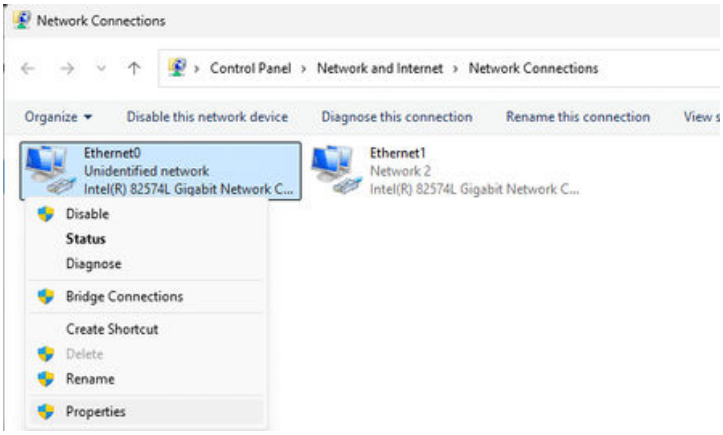
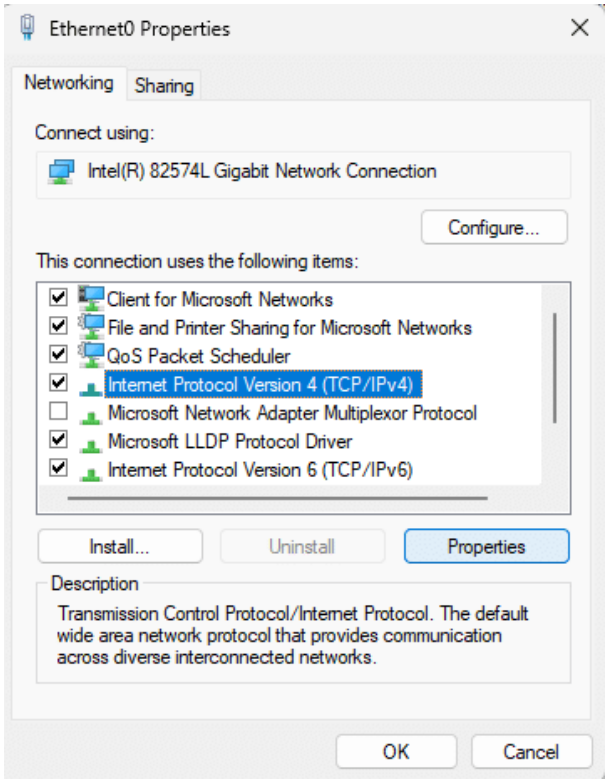
Right-click on the correct Ethernet adapter and choose “Properties”



Select Internet Protocol Version 4 (TCP/IPv4) and click “Properties”



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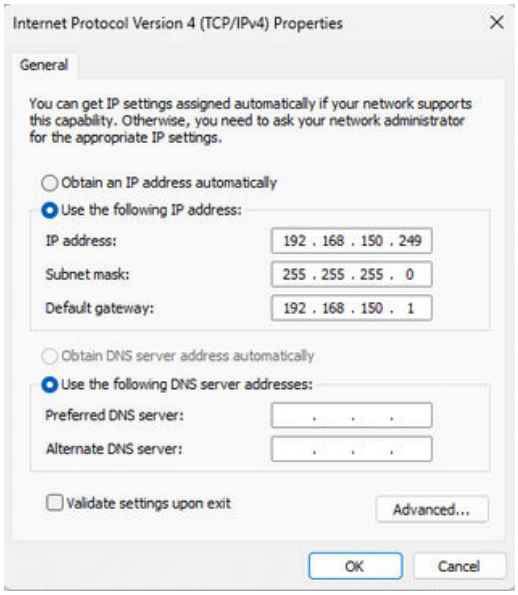
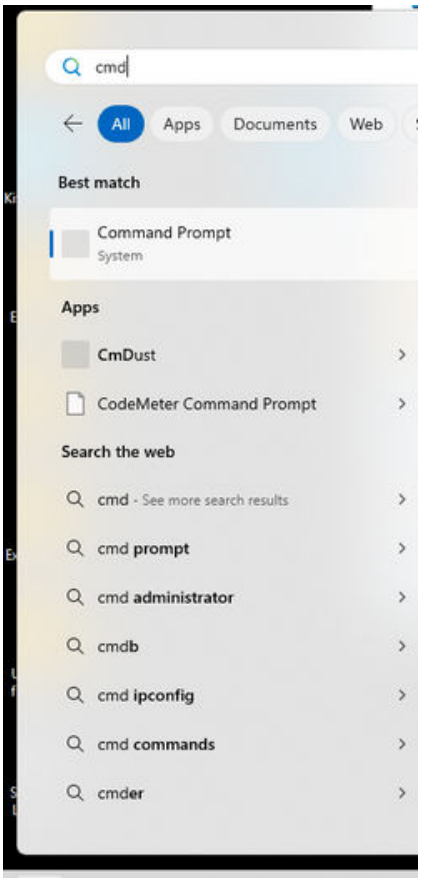
Configure the Ethernet settings for each VM. In this example, as mentioned previously:

COMPTAGSERVER2 – IP: 192.168.150.2
COMPD3TOUCH100 – IP: 192.168.150.100
Win11ProRS – IP: 192.168.150.249 (pictured)

Most critical are the IP address (e.g. 192.168.150.249) and the subnet mask (i.e. 255.255.255.0). Setting the gateway (x.x.x.1) can reduce potential problems, but isn't strictly necessary.



Once all 3 VMs are configured, verify the Virtual Network is working by opening a Command Prompt, and running a ping to each partner computer.



If all VMs are able to ping all other VMs on the Virtual Network, this part of the setup is complete.

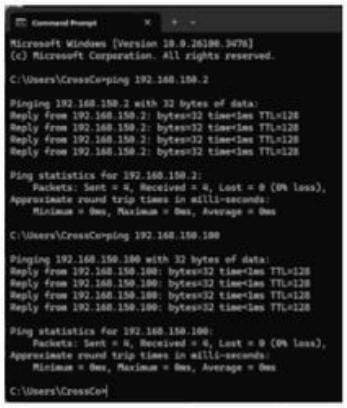


Figure 8 – Pinging the Tag Server & Operator HMI VMs from the FT Echo VM

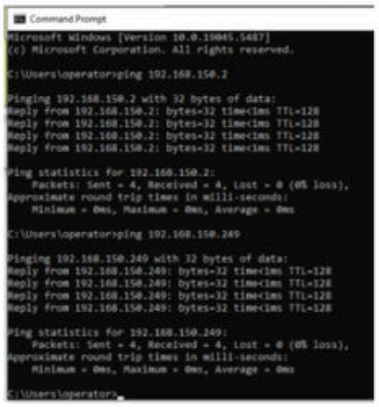


Figure 9 – Pinging the Tag Server & FT Echo VMs from the Operator HMI VM

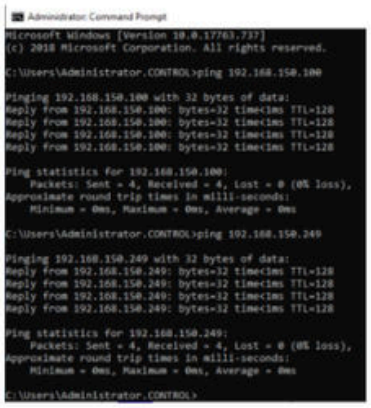


Figure 10 – Pinging the Operator HMI & FT Echo VMs from the Tag Server VM

Setting Up The Emulated Controller

In the VM that has FT Echo and ControlLogix installed, open FT Echo, right-click and add a chassis, and create a new ControlLogix CPU. Currently, FT Echo only supports 1756 ControlLogix 5580s.

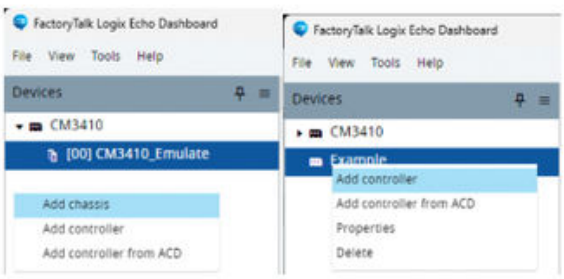


Figure 11 – Adding a chassis and controller in FT Echo

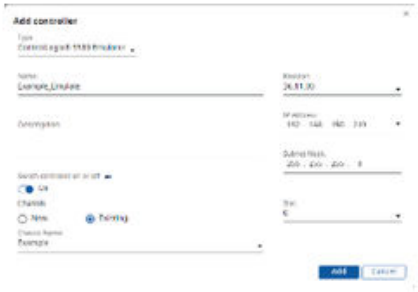


Figure 12 – Configuring the new controller in FT Echo

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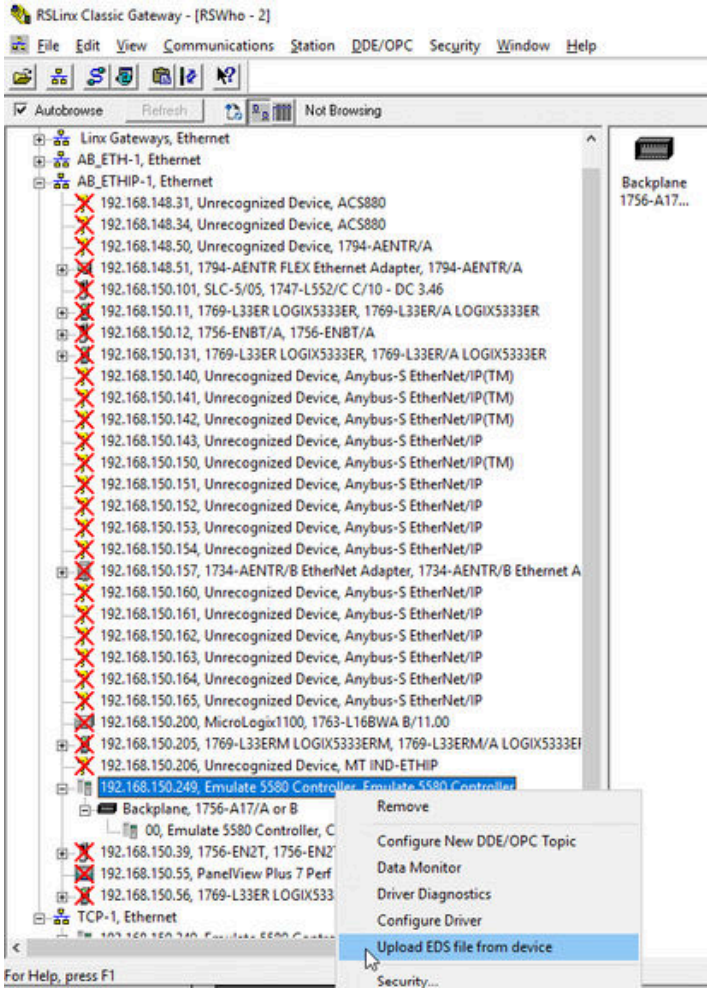
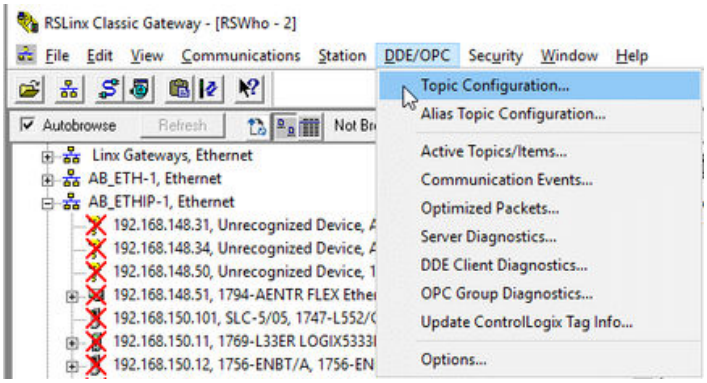
Setting up the Aveva Tag Server

In the VM that hosts the Aveva Tag Server, the OPC topic that handles the tag interchange with the controller and the HMI must be updated. First, open RSLinx Classic Gateway and expand the AB_ETHIP-1 Driver, and locate the FT Echo controller at the IP address of the FT Echo VM. It may be necessary to upload the EDS by right-clicking the FT Echo controller.



Next, set up the OPC Topic by clicking on DDE/OPC in the menu bar and selecting Topic Configuration.



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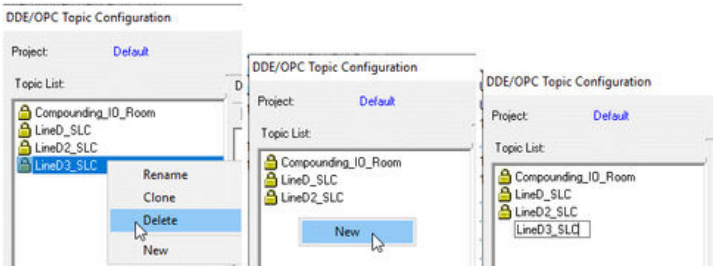
If the OPC Topic already exists and has a lock icon next to it, the easiest way to reconfigure it is to delete it and recreate it.



In the Data Source window, scroll down to the desired controller, select it, click Apply, and choose Yes on the dialog box asking “Are you sure you want to update the topic (Your_Topic)?”

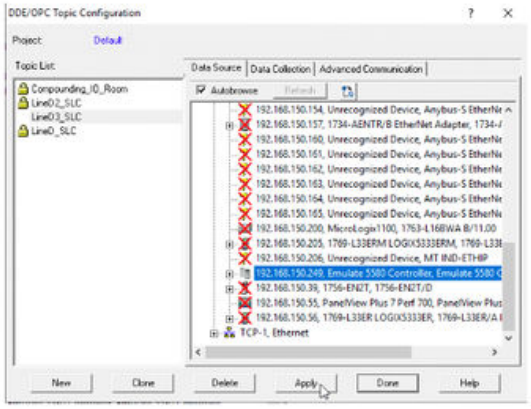


Figure 17 – Setting the Data Source for the new OPC Topic

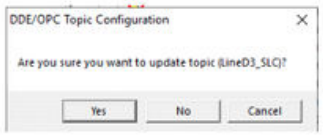
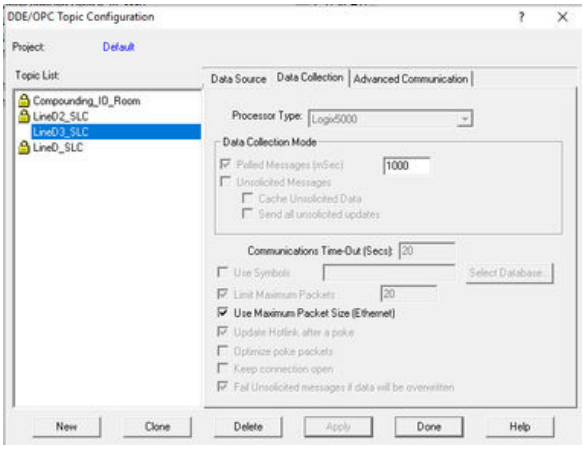


Figure 18 – OPC Topic Update Confirmation dialog box

In the Data Collection Tab, confirm that the controller appears as a Logix5000 controller.



If the Tag Server is actively exchanging data between the Logix controller and the Operator HMI, this will be shown in the Active Topics/Items window. If the Aveva/WW Database (DB) must be updated, perform a DB Dump & Load procedure in the InTouch HMI Application Manager. That process is outside the scope of this document.

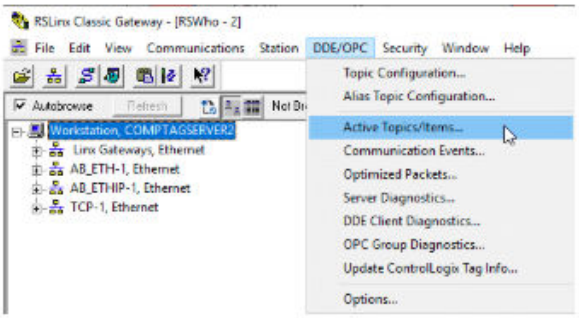


Figure 20 – Accessing the Active Topics window

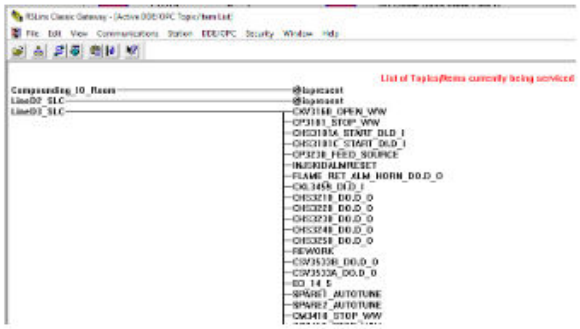


Figure 21 – The Active Topics window

Once all these steps are complete and the Aveva WW DB has been updated, the Operator HMI should be available for testing and validating the control logic.

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