Virtual Serial Port for Tridium Niagara

User Guide

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niagara4

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Contents

1 Introduction

Virtual Serial Port is a Niagara framework module that creates virtual COM ports communicating over TCP/IP instead of physical serial cables. Each virtual port connects to a low-cost serial-to-Ethernet gateway that converts TCP data back to RS-485 or RS-232 on the device side. It implements the standard Niagara serial port interface and has been tested with common serial drivers, including Siemens Apogee P1[1], Johnson Controls N2, and Modbus RTU.

Common use cases include:

- **Extra serial ports for JACE** – add more RS-485 ports without additional hardware.
- **Remote RS-485 over IP** – reach serial devices across the network instead of running long cable or deploying another JACE.
- **Supervisor direct integration** – connect a Supervisor directly to serial devices without any JACE in between.

The module has been tested with common serial-to-Ethernet gateways, including Moxa NPort, Lantronix XPort, Digi Connect, Perle IOLAN, USR-TCP232, Schneider EGX, Atop SE59xx, and Advantech EKI.

2 Requirements

- Niagara-powered device with software v4.8 or later, such as JACE, Supervisor, or any OEM version
- Virtual Port module and license
- Serial-to-Ethernet gateway with a known IP address and TCP port
- TCP/IP network access between Niagara host and the gateway

3 Quick Start

1. Copy virtualPort-rt.jar module to the Niagara `/modules` folder.
    a. If the module is hosted on a Supervisor: restart the Supervisor station.
    b. If the module is hosted on a JACE: import the module into the JACE and restart it.
2. Open Workbench and navigate to the station.
3. If running on a **Supervisor**: open the **virtualPort** palette and add **Virtual Port Service** under **Services / Platform Services** in the station navigation tree.

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4. Open the **virtualPort** palette and add a **Virtual Port** component under the **Virtual Port Service** (Supervisor) or under the native **Serial Port Platform Service** in **Services / Platform Services** (JACE).
5. Configure **Address** and **Port** properties to match the serial-to-Ethernet gateway.
6. Enter the license code in the **License** property. On a Supervisor, the license is on the **Virtual Port Service**. On a JACE, a **License** property appears automatically on the native serial service after the first virtual port is added.
7. Open the serial driver and enter the virtual port name exactly as it appears in the station (e.g., `VCOM1`) into the driver's **Port Name** property.

4 Virtual Port Service

The Virtual Port module works on both Supervisor and JACE, but the setup is different because each platform manages serial ports in its own way.

4.1 Supervisor

On a Supervisor, add **Virtual Port Service** from the **virtualPort** palette. Virtual ports added under this service are visible to all serial drivers in the station.

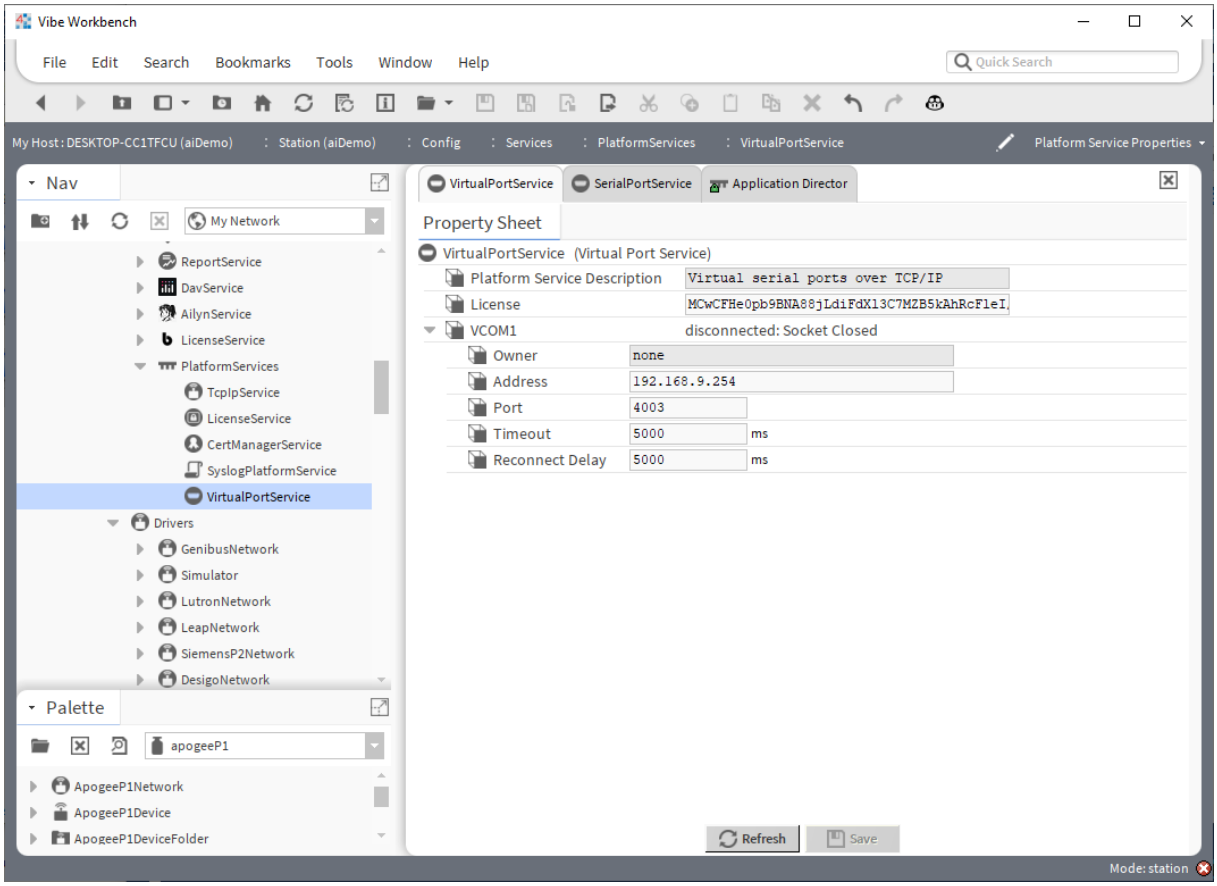

Figure 1: Virtual Port Service on a Supervisor

The service has the following properties:

- **Platform Service Description** – read-only description of the service.
- **License** – the code that allows the module to run on your host.

Virtual ports are added as child components under the service. Each child appears as a named serial port in the Niagara port list. To communicate with field devices directly from a Supervisor, the Supervisor license must include global capacity for devices and points.

4.2 JACE

On a JACE, there is no separate Virtual Port Service. The JACE already has a built-in **Serial Port Platform Service** under **Platform Services** that manages physical COM ports. Virtual ports are added directly under this native service, alongside the existing COM1, COM2, and other physical ports.

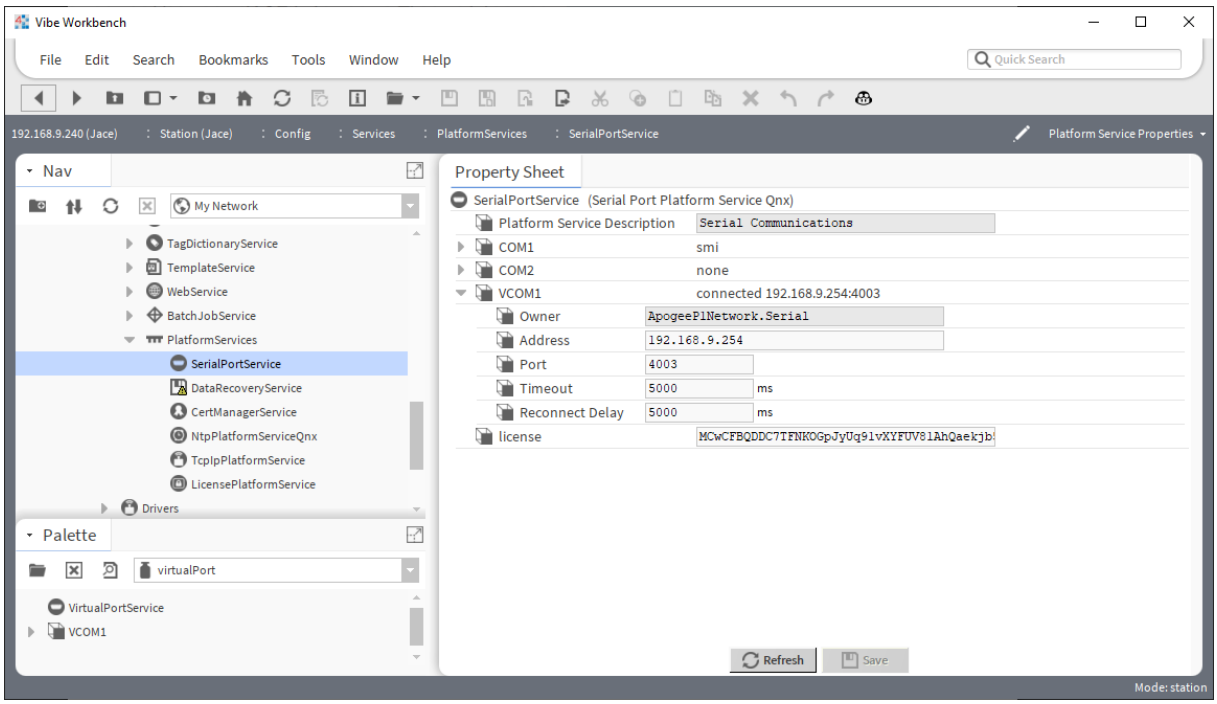

Figure 2: Virtual Port on a JACE under the native Serial Port Platform Service

The first time a virtual port starts on a JACE, it creates a **License** property on the native serial service automatically. Enter the license code there – all virtual ports under the same service share one license.

No palette or service installation is needed on a JACE. Add a **Virtual Port** component directly under the native serial service and it is ready to use.

5 Virtual Ports

Each **Virtual Port** component represents a single TCP connection to a serial-to-Ethernet gateway. In the palette, the component is called **VCOM1**. When multiple virtual ports are added, Niagara automatically names them VCOM2, VCOM3, and so on. The component name is the port name that serial drivers use to reference it. The properties below are the same on both Supervisor and JACE.

Properties:

- **Owner** – read-only field showing the driver that currently holds the port. Displays `none` when the port is not in use.
- **Address** – IP address or hostname of the serial-to-Ethernet gateway. Default: `192.168.1.1`.

- **Port** – TCP port number of the gateway. Default: `4001`. Common values are 4001 (Moxa), 10001 (Lantronix), and 2101 (Digi). Many gateways have multiple serial ports, each with its own TCP port number (e.g., 4001, 4002, 4003). Create a separate virtual port for each serial port on the gateway.
- **Timeout** – connection and read timeout in milliseconds. Default: `5000`. Increase this value for gateways on slow or high-latency networks.
- **Reconnect Delay** – minimum time in milliseconds between reconnection attempts after a connection failure. Default: `5000`. Prevents flooding the gateway with connection requests during an outage.

The current connection state is displayed next to the port name in the navigation tree: `idle`, `connecting`, `connected`, `disconnected`, `closed`, or `error` with a description.

5.1 Connection Behavior

The virtual port does not connect when it is added to the station. The TCP connection is established lazily – when a serial driver first reads from the port. This design ensures that no network resources are consumed by unused ports.

If the connection is lost, the port automatically reconnects on the next read attempt, subject to the **Reconnect Delay** timer. This means serial drivers do not need to handle reconnection logic – the virtual port handles it transparently.

To manually reset a connection, use the **Reset Port** action on the virtual port component.

5.2 Gateway Configuration

The serial-to-Ethernet gateway must be configured in **TCP Server** mode (sometimes called “Raw TCP” or “Direct IP” mode). In this mode, the gateway listens on a TCP port and forwards data bidirectionally between the TCP socket and the serial port. Do not use Telnet, RFC 2217, or other encapsulated modes.

Gateway serial port parameters (baud rate, data bits, stop bits, parity) must match the settings expected by the serial device. These parameters are configured on the gateway itself, not on the virtual port – the virtual port only handles the TCP transport layer.

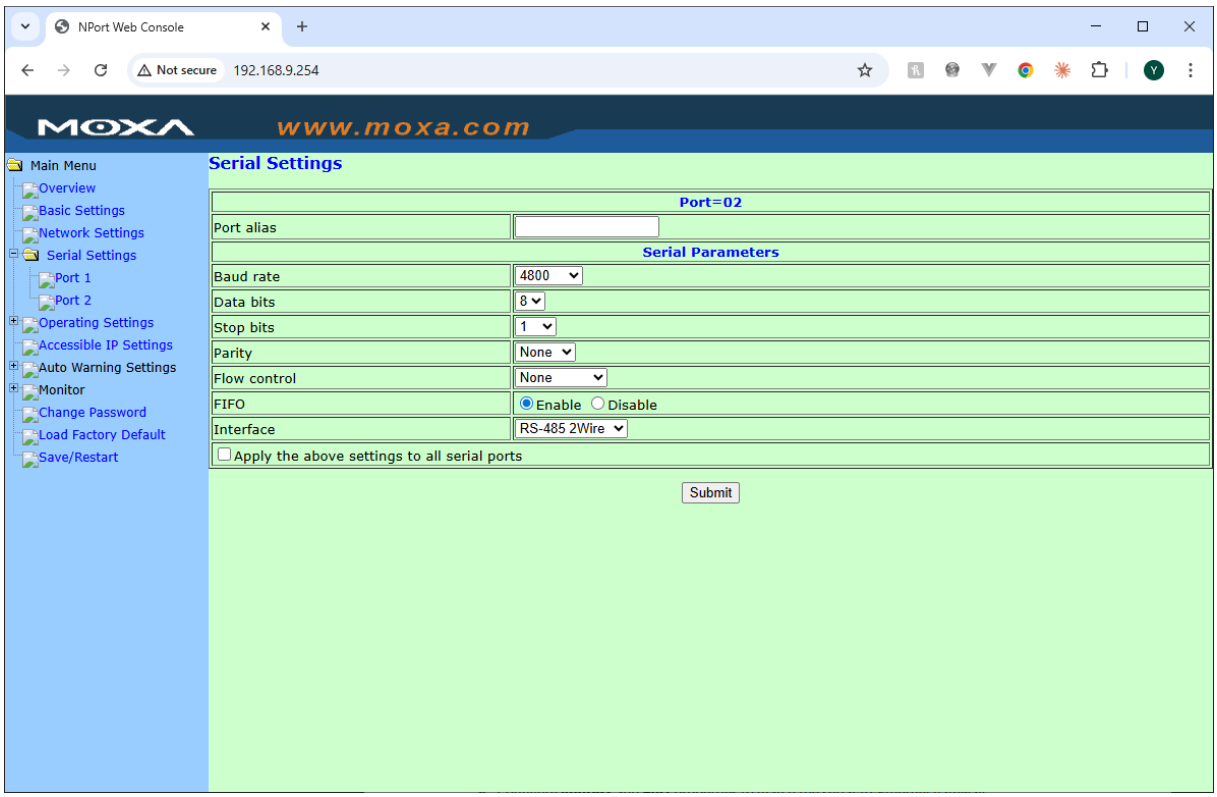

Figure 3: Moxa NPort serial settings web page

The screenshot above shows the serial settings page of a Moxa NPort gateway. Set the baud rate, data bits, stop bits, and parity to match the field device, and select the correct interface (RS-232, RS-422, or RS-485). Refer to the gateway manufacturer documentation for details on operating mode and network settings.

6 Serial Driver Integration

The following screenshot shows a Siemens Apogee P1 driver on a JACE configured to use a virtual port instead of a physical COM port. The **Port Name** in the driver's **Serial Config** is set to **VCOM1** – the name of the virtual port component.

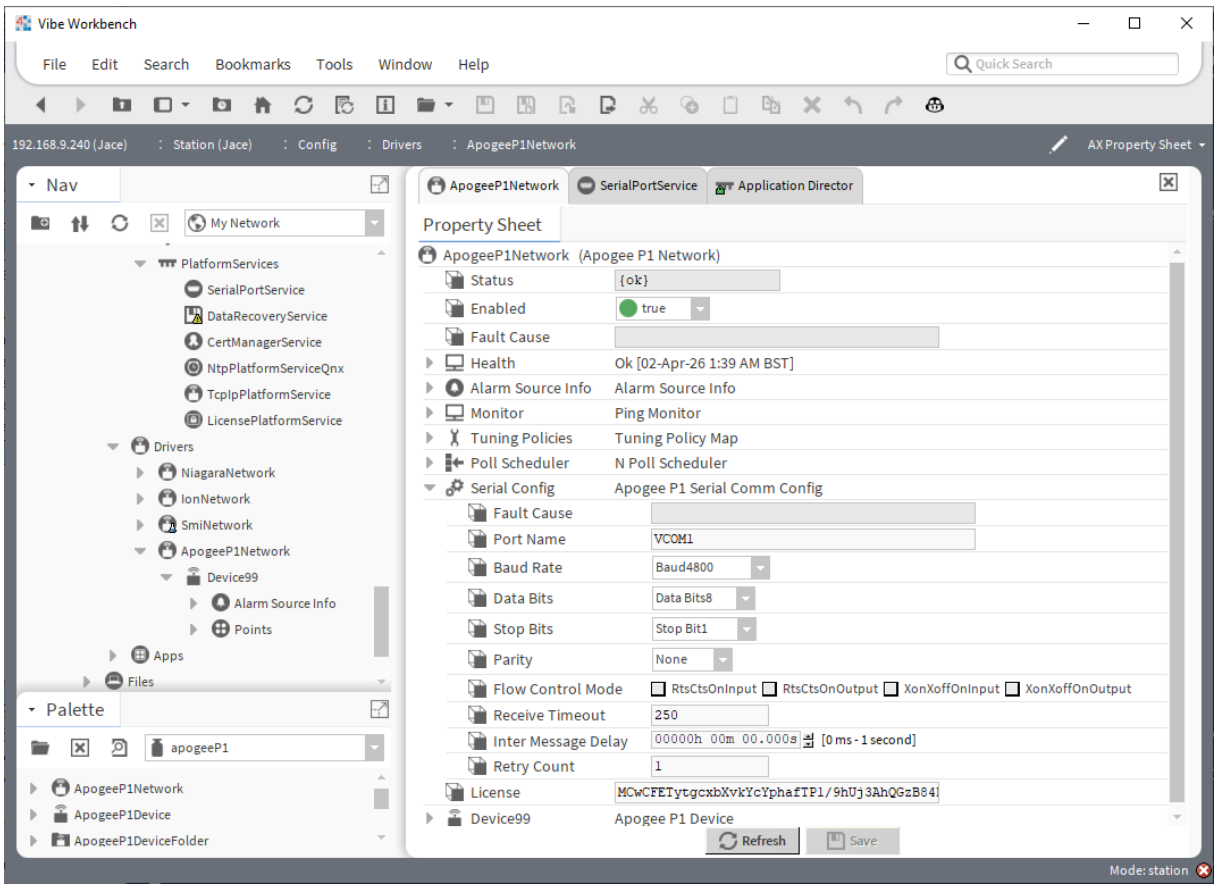

Figure 4: Apogee P1 driver on a JACE using a virtual port

In this configuration, the JACE communicates with Apogee field controllers via a serial-to-Ethernet gateway instead of a direct RS-485 cable. This allows the JACE to reach serial devices on a remote network segment, or to add more serial trunks without additional hardware.

The same approach works on a Supervisor: the driver's **Port Name** is set to the name of the virtual port, and the rest of the driver configuration remains unchanged.

7 Licensing

The Virtual Port module requires a license to operate. Each license is bound to a specific Niagara host and defines the number of virtual ports that can be open simultaneously.

- On a **Supervisor**, the license code is entered in the **License** property of the **Virtual Port Service**.
- On a **JACE**, the license code is entered in the **License** property that appears automatically on the native Platform serial service.

All virtual ports under the same parent service share one license. The license is validated every time a serial driver opens a virtual port. If the license is missing, invalid, or expired, the port open operation fails and the driver reports a communication error.

Only the licensed number of virtual ports can be open simultaneously. Additional ports will be denied until an existing port is released by its driver.

A demo mode is available for evaluation. In demo mode, the module operates without a license for a limited time after each station restart. After the demo period expires, a valid license is required.

To obtain a license, contact support@baudrate.io with your Niagara host ID. The host ID can be found in the Workbench Platform administration view.

8 FAQ

8.1 The virtual port status shows “error” and the driver cannot communicate.

- Verify that the gateway IP address and TCP port are correct.
- Try to ping the gateway from the Niagara host to confirm network connectivity.
- Check that the gateway is configured in TCP Server (Raw TCP) mode, not Telnet or RFC 2217 mode.
- Increase the **Timeout** property if the gateway is on a slow or high-latency network.
- Check that no firewall is blocking the TCP connection between the Niagara host and the gateway.

8.2 The driver works intermittently or loses communication.

- Check the connection state displayed next to the port name in the navigation tree. If it alternates between “connected” and “disconnected”, the TCP connection is dropping. This is often caused by network instability or gateway configuration issues.
- Increase the **Reconnect Delay** to avoid overwhelming the gateway with rapid reconnection attempts.
- Ensure the gateway serial parameters (baud rate, parity) match the field device. Mismatched parameters cause garbled data and timeouts at the driver level.
- If multiple drivers share the same gateway, ensure each serial port on the gateway has its own TCP port number.

8.3 Can I use the virtual port with any serial driver?

The virtual port implements the standard Niagara serial port interface and has been tested with common serial drivers, including Modbus RTU, Siemens Apogee P1, and Johnson Controls N2. Most serial drivers work without modification. However, drivers that rely on precise timing, high baud rates, or multi-master protocols may experience issues due to TCP/IP latency. Contact support@baudrate.io if you are unsure about compatibility with a specific driver.

8.4 How many virtual ports can I create?

The number of virtual ports is defined by your license. Contact support@baudrate.io for licensing options.

8.5 Does the virtual port support serial port parameters like baud rate and parity?

The virtual port does not use serial parameters itself – it communicates over TCP/IP. Serial parameters (baud rate, data bits, stop bits, parity) are configured on the serial-to-Ethernet gateway, which handles the conversion between TCP and the physical serial interface.

8.6 Can I use the virtual port on both JACE and Supervisor?

Yes. The module is compatible with both JACE and Supervisor platforms running Niagara v4.8 or later. On a Supervisor, virtual ports live under the **Virtual Port Service**. On a JACE, they are added under the native Platform serial service.

8.7 Does the virtual port work with RS-232 devices?

Yes. The virtual port works with both RS-485 and RS-232 devices. The serial interface type (RS-232, RS-422, or RS-485) is determined by the serial-to-Ethernet gateway, not by the virtual port. Select a gateway model that supports the required interface and configure it accordingly.

8.8 The license property does not appear on the JACE.

The **License** property is created automatically the first time a virtual port starts on a JACE. Add a virtual port component under the Platform serial service and restart the station. The license property will appear on the parent service.