

# S4 OPEN APPLIANCES

USER MANUAL AND INSTALLATION GUIDE



# S4 OPEN APPLIANCES

Table of Contents

## TABLE OF CONTENTS

<b>Table of Contents</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>5</b>
<b>S4 Open Appliance relationship with Johnson Controls Metasys®</b> .....	<b>5</b>
<b>Verifying the Integrity of the N2 Bus</b> .....	<b>6</b>
<b>Physical Specifications</b> .....	<b>6</b>
<b>Concepts</b> .....	<b>7</b>
<b>S4 Open: Management Console</b> .....	<b>7</b>
<b>S4 Open Appliance</b> .....	<b>8</b>
• N2 Device Type Templates.....	8
• Configure Wizard.....	8
<b>Building Control Network</b> .....	<b>8</b>
<b>Network Connections</b> .....	<b>9</b>
• Metasys N2 & Ethernet Interfaces .....	9
• Upstream Network.....	10
• Open Upstream Interfaces.....	10
• Network 1, Network 2 ... Network n .....	11
• Network Extended N2 Connections .....	11
• Com Port Assignments .....	12
<b>System Administration and Operation</b> .....	<b>13</b>
<b>Automatic Windows Security and Port Configuration</b> .....	<b>13</b>
<b>Auto Detecting S4 Open Appliances</b> .....	<b>13</b>
<b>Manually Linking to S4 Open Appliances</b> .....	<b>14</b>
<b>Setting System Options</b> .....	<b>15</b>
<b>System Status</b> .....	<b>15</b>
<b>Remote System Reboot</b> .....	<b>15</b>
<b>Enabling or Disabling Physical Networks</b> .....	<b>16</b>
<b>Configure Wizard</b> .....	<b>16</b>
<b>N2 Device Properties</b> .....	<b>17</b>
<b>N2 Point Assignments</b> .....	<b>17</b>
<b>Testing Points</b> .....	<b>18</b>
<b>Updating an S4 Open Appliance</b> .....	<b>18</b>
<b>Updating The Management Console</b> .....	<b>19</b>

# S4 OPEN APPLIANCES

## Table of Contents

<b><i>IT Security and Network Administration Considerations</i></b> .....	<b>21</b>
<b>S4 Open: Management Console Installation</b> .....	<b>21</b>
<b>Automated Error Reporting</b> .....	<b>21</b>
<b>TCP / IP Port Requirements and Firewall Settings</b> .....	<b>21</b>
<b>Windows CE Remote Management Tool</b> .....	<b>21</b>
<b>IP Address Configuration</b> .....	<b>21</b>
• <b>Configuring a static IP address without a DHCP or BOOTP server</b> .....	<b>22</b>
<b>Windows Domain or Workgroup Membership</b> .....	<b>22</b>
<b><i>Appendix A – OPC Specific Information</i></b> .....	<b>23</b>
<b>Device Naming Conventions</b> .....	<b>23</b>
<b>Addressing the OPC-N2 Router</b> .....	<b>23</b>
<b><i>Appendix B – BACnet Specific Information</i></b> .....	<b>24</b>
<b>Point Naming Conventions</b> .....	<b>24</b>
<b>PICS Information</b> .....	<b>24</b>
<b>APDU Settings</b> .....	<b>24</b>
<b>Metasys® N2 to BACnet Point Mapping</b> .....	<b>25</b>
<b><i>Appendix C – An Overview of the Metasys® N2 Bus</i></b> .....	<b>26</b>
<b>Physical Specifications of the N2 Bus</b> .....	<b>26</b>
<b>Operating Specifications</b> .....	<b>26</b>
<b>N2 Protocol Information</b> .....	<b>26</b>

# S4 OPEN APPLIANCES

Introduction

## INTRODUCTION

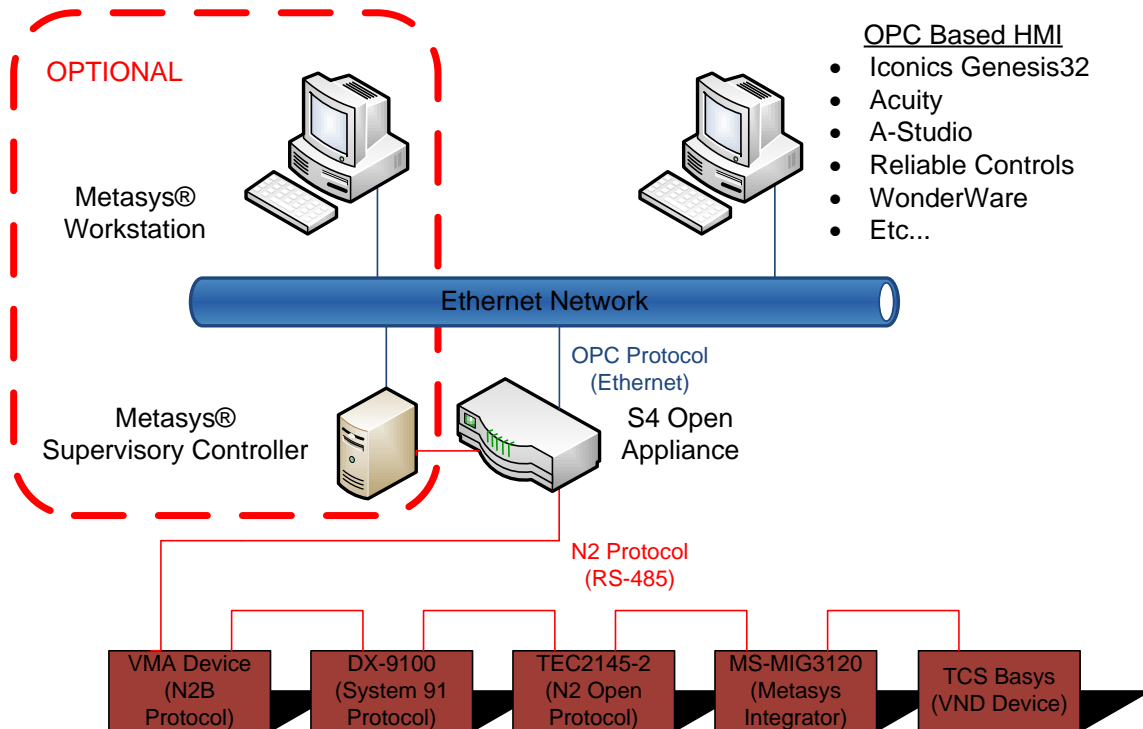
This document orients the new user to the user interface, concepts of operation, and administration of all S4 Open Appliances. Currently available S4 Open Appliances are the S4 Open: N2 Switch, the S4 Open: OPC-N2 Router, and the S4 Open: BACnet-N2 Router. The functionality of each product is determined by factory installed licensing certificates and can be easily upgraded in the field at any time. The S4 Open: Management Console is used for the administration, configuration and diagnostic evaluation of all members of the S4 Open product line.

## S4 OPEN APPLIANCE RELATIONSHIP WITH JOHNSON CONTROLS METASYS®

This section provides an orientation of how the S4 Open Appliance relates to a Metasys® building automation system. For a general overview of the Metasys® N2 Bus, please refer to Appendix C.

The following graphic illustrates an S4 Open: OPC-N2 Router installation with:

- One Upstream N2 Network on COM4,
- One Downstream N2 Network on COM1
- One OPC interface utilizing the Ethernet port



All N2 communications from the supervisory controller pass through the S4 Open Appliance. The S4 Open Appliance is the gatekeeper for access to the N2 field devices and controls which upstream system is

# S4 OPEN APPLIANCES

## Introduction

allowed to become the master of the N2 bus at any time.

### VERIFYING THE INTEGRITY OF THE N2 BUS

Before attempting to install an S4 Open Appliance, it is strongly recommended that the integrity of the N2 Bus be verified. A standard digital volt meter may be used to accomplish this, but we recommend using a [B&B Electronics ComBus Quick Tester](#). The ComBus Quick Tester quickly tests the entire N2 bus. It checks bus voltages indicating Pass/Fail, counts all devices on the bus, and identifies each device for display. It works as a Master Controller to check the entire system or segments of the network. Refer to Appendix C for further information.

### PHYSICAL SPECIFICATIONS

S4 Open Appliances are hosted on an Advantech UNO-2059GL industrial PC

- *Power supply voltage:* 10-30 VDC, reversed wiring protection
- *Power Consumption:* 0.6A max under +24V power input or 1.2A max. under +12V power input
- *Power Requirement:* 1A typical under +24 V power input or 1.5 A typical under +12 V power input
- *Operating temperature:* -10 ~ 55°C (14 ~ 131°F)
- *Chassis size:* 164.8 mm (W) x 106.5 mm (L) x 35.5 mm (H) (6.5" x 4.2" x1.4")
- *Weight:* 0.8 kg

# S4 OPEN APPLIANCES

Concepts

## CONCEPTS

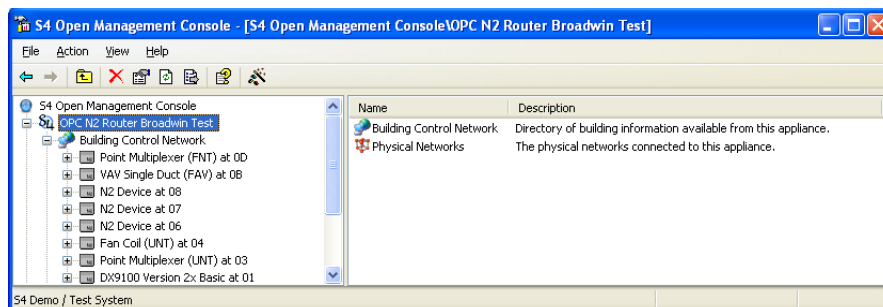
### S4 OPEN: MANAGEMENT CONSOLE

All user interaction with the system is done through the S4 Open: Management Console. The console enables you to manage all S4 Open Appliances in your enterprise. Launch the console from the Windows Start menu. The S4 Open: Management Console is compatible with all versions of Microsoft Windows from XP on. The console may be installed on as many machines as you need at no additional charge.

**IMPORTANT NOTE:** You may need to manually uninstall any previous versions of the console prior to installation through the Add/Remove Programs utility in Windows Control Panel.

S4 Open Appliances are implemented using advanced object oriented technology. This gives our developers the power to perform the tasks necessary to deliver the services you need. More importantly, all of the proprietary details of physical devices are managed behind the scenes, presenting a consistent and predictable view of your building automation environment to you.

- Objects will dynamically be added or removed from the left hand navigation pane (as folders or detail objects) as needed to represent your building automation environment. You can expand or minimize the amount of detail that is presented in the navigation pane.
- Details about each object in the navigation pane are presented in the right hand pane.
- Properties pages are available as right click options from many objects. Wizards and drill down links provide more details about the objects and allow you to adjust user settable parameters.
- Real Time performance statistics are available from the properties page of many objects.
- Color coded icons are included in many places to give you quick look status information about the objects that they represent.
- Most operations are intuitive but help is available any time you need it. You can use the main Help menu item, right click on any object and select Help in the drop down menu, or press F1 on your keyboard at any time.
- Configuration changes can be made on an operational system and will automatically be reflected in the data provided on all interfaces.



# S4 OPEN APPLIANCES

*Concepts*

## S4 OPEN APPLIANCE

All system level commands are issued from the S4 Open Appliance object folder or set through associated Properties pages. In the above example, the specific product is the S4 Open: OPC-N2 Router, the default name displayed for the appliance object. This name may be customized for your installation on the appliance Properties page.

## N2 DEVICE TYPE TEMPLATES

Point mappings are provided as N2 Device Type Templates. A unique Device Type Template is provided for each combination of Metasys<sup>®</sup> hardware platform and application loaded into the Unitary or Application Specific Controller. Vendor provided N2 Compatible devices also have Device Type Templates. Device Type Templates are automatically assigned to each device object by the Configure Wizard. You have the option to override the assigned Device Type Template with your own variation for custom applications.

A default set of N2 Device Type Templates comes pre-loaded in the S4 Open Appliance. Additional Device Type Templates may be loaded via a library provided with the S4 Open: Management Console from a Properties page in the S4 Open Appliance main folder, or you may develop your own for unique requirements. Refer to other documentation for details on creating and maintaining Device Type Templates.

## CONFIGURE WIZARD

The primary system level configuration wizard is initiated as a right click command option on the S4 Open Appliance folder. In most cases, initiating this command is all you need to do to fully configure and commission an S4 Open Appliance. Do this after loading the appropriate set of N2 Device Type Templates into the appliance, if needed.

## BUILDING CONTROL NETWORK

The virtual objects in the Building Control Network (BCN) provide a unified view of your building automation environment. All devices and their points found on the downstream physical networks are represented as objects under this folder. Most of your interaction with the system will be with objects contained in this folder.

N2 address translation is automatically performed as multiple legacy downstream N2 networks are merged into the BCN during the Auto Configure process, ensuring that each N2 address published to the Upstream N2 network is unique. This allows you to merge multiple legacy N2 networks into one virtual N2 network without having to physically touch any of the N2 devices to adjust addresses. The Properties page for a device object shows the N2 address that it will publish on the Upstream N2 network. This is a user configurable value. You can also see the physical network and physical N2 address where the device



# S4 OPEN APPLIANCES

*Concepts*

was found on a legacy N2 network.

**IMPORTANT NOTE:** There is no data routing between the upstream interfaces and the physical N2 networks until after the Auto Configure process is completed. Points that exist on the devices on the physical N2 networks are not accessible via any upstream interface until this process is completed.

The Configure Wizard:

- Scans all physical networks
- Creates all of the virtual objects in the BCN
- Assigns N2 Device Type Templates to device objects
- Creates the appropriate routing algorithms for all published objects, and
- Publishes the point objects to the default upstream interfaces.

The virtual devices and points contained in the BCN folder can be published to any licensed upstream interface. You have the option of overriding the default publishing configuration on the Properties page of any point object.

By default:

- All current S4 Open Appliances publish all point and device objects to the Upstream N2 interface.
- The S4 Open: OPC-N2 Router, in addition, publishes all device and point objects to the industry standard open OPC interface with the addition of “Release” points, which OPC does not natively support.
- The S4 Open: BACnet-N2 Router, in addition, publishes all device and point objects to the industry standard open BACnet/IP interface.

You can manually create purely virtual device objects and point objects in the BCN. That is, objects that have no linkage to a physical device. These objects are used by our optional controller packages to store the results of calculations or publish global variables.

The “online” status of a N2 device is denoted by the color of the associated device object icon. Green indicates the device has seen recent activity, grey indicates that it has not. If access to a device fails, the N2 router will try multiple times to re-initialize the N2 device and try the N2 command again. Please note: This is completely independent from the online / offline status of a device in a Metasys<sup>®</sup> supervisory controller, Operator Workstation, or M-Series Workstation.

## NETWORK CONNECTIONS

### METASYS N2 & ETHERNET INTERFACES

Folders and objects within the container represent communications interfaces to the S4 Open Appliance.

# S4 OPEN APPLIANCES

## Concepts

The following options are available within the Properties page for each network object:

- Associate a physical COM port with the network
- Associate an Ethernet Serial Server with the network
- Monitor real time performance of the network
- Examine the properties of devices found on the legacy N2 network
- Search for Field Devices on the network
- Enable or Disable the network

Most of your interaction with objects within the Physical Networks folder will be during initial setup of the S4 Open Appliance or when using the S4 Open Appliance as a diagnostic tool for your legacy N2 networks.

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## UPSTREAM NETWORK

The upstream N2 interface used to publish device and point objects is displayed as a network object under the Physical Networks folder. By default, this is configured for COM4.

Connecting a Metasys<sup>®</sup> supervisory controller to the Upstream N2 port is completely optional (except when using the S4 Open: N2 Switch). If no Metasys<sup>®</sup> supervisory controller is attached, the S4 Open Appliance will automatically assume the role of the N2 Master. To shut off communications to the Metasys<sup>®</sup> supervisory controller, you can disable the Upstream N2 network from its Properties page, available as a right click option in the navigation pane.

**IMPORTANT NOTE:** We always caution customers about the risks of keeping both the legacy Metasys<sup>®</sup> supervisory controller and the new head end in the configuration. Doing this is technically viable, but the two head end systems may try to control the value of a point on a N2 device at the same time. You need to understand the control algorithms and programming implemented in both head end systems and make certain there are no conflicting control actions being generated.

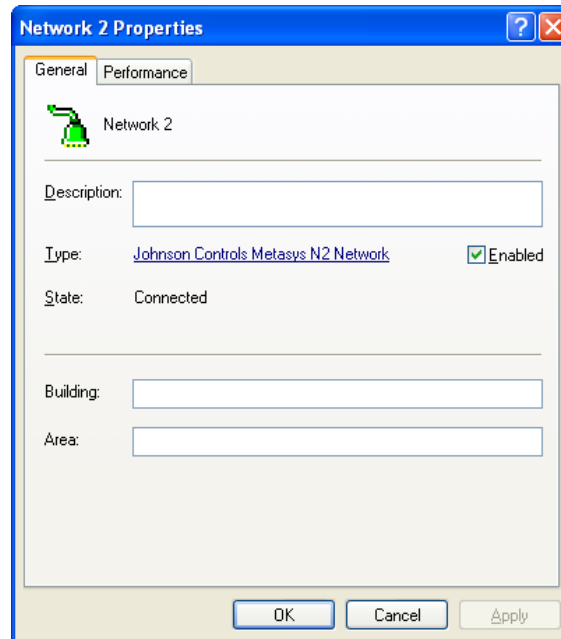
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## OPEN UPSTREAM INTERFACES

Depending on the model of your S4 Open Appliance, it will support one or more of the following open protocols / interfaces as a target for publishing Device and Point objects to. OPC, BACnet / IP, XML, and SNMP utilize the system's Ethernet port; therefore, these options will **not** have a network object in the Physical Networks folder. Others, like BACnet MS/TP require a physical interface. In these cases, you will see additional network objects in the form of additional folders under the Physical Networks folder.

# S4 OPEN APPLIANCES

## NETWORK 1, NETWORK 2 ... NETWORK N



Network n is a view of what the S4 Open Appliance has found on each of the Downstream legacy BAS networks or field buses. “N” refers to the network number. The network type is found in the Properties page for the network. In this case, you can see we are working with Metasys® N2 networks.

**IMPORTANT NOTE:** The “Search Field Devices” command, available from a right click on the Network device object folder, should be used only when manually configuring the system or using the console as an N2 network diagnostic tool. Search Field Devices creates device objects in the corresponding Network n folder-- but it does not fully configure the system. Under normal circumstances, the Configure Wizard at the router node level will handle the entire process of setting up the system.

## NETWORK EXTENDED N2 CONNECTIONS

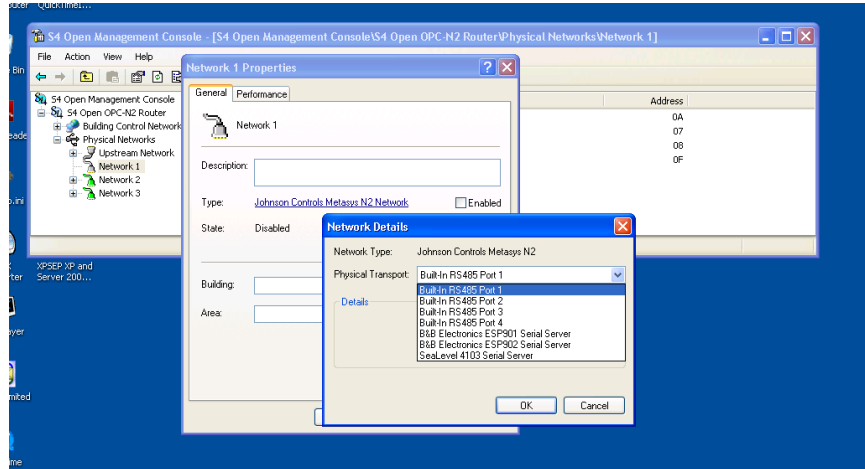
If you need more Downstream N2 interfaces than are physically provided by the COM ports on the appliance, or you need to extend N2 connections over your Ethernet infrastructure, commercially available Ethernet Serial Servers may be utilized.

The serial server is fully integrated with the network object interface. You will select a serial server type and its IP address via the Properties page for the Downstream or Upstream interface. Utilizing this technology, you can add as many Downstream networks as you need to license for an installation (within reason). This feature is not available for Upstream N2 Networks. Contact your reseller if you need to purchase licenses for additional interfaces.

# S4 OPEN APPLIANCES

## Concepts

S4 Open Appliances currently support Advantech, B&B and Sealevel Systems Ethernet serial servers. Check the S4 Group web site for an updated list of tested and supported devices.



**IMPORTANT NOTE:** S4 Open Appliances provide a lot of flexibility when integrating legacy N2 networks, but please be aware that you must still follow address space limitations and honor the Metasys® reserved N2 addresses when publishing to the Upstream N2 network. Typically, this means that you can assign N2 addresses 1 through 253. Addresses 0, 254, and 255 are reserved for Metasys®.

## COM PORT ASSIGNMENTS

Physical COM ports are labeled on the S4 Open Appliance case. The default assignment of the UNO 2059 serial ports by an S4 Open Appliance is:

- COM4 – Upstream N2 Network
- COM1 – Downstream N2 Network 1
- COM2 – Downstream N2 Network 2
- COM3 – Downstream N2 Network 3

The assignments of N2 networks may be changed as required by your project through the S4 Open Management Console. All COM ports have been factory configured to be compatible with your Metasys® N2 bus.

# S4 OPEN APPLIANCES

*System Administration and Operation*

## SYSTEM ADMINISTRATION AND OPERATION

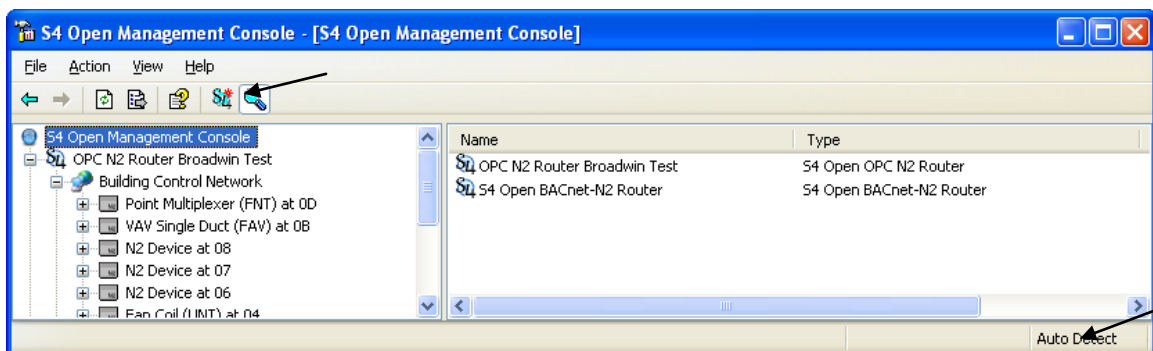
This section provides a sample of the most used features and services provided by S4 Open Appliances. It is intended as a general overview to continue your orientation to the system and not as a complete user's manual. The system has many more features and capabilities than described here. Refer to the on-board Help menu for complete details.

## AUTOMATIC WINDOWS SECURITY AND PORT CONFIGURATION

Upon startup the S4 Open: Management Console automatically verifies that the host it is running on has its ports and firewall configured properly for communications with any S4 Open Appliance. It will prompt you for permission to change any settings that need to be adjusted for proper operation. The S4 Open: Management Console will also make any adjustments necessary for 3<sup>rd</sup> party client programs running on the same host to successfully communicate with the S4 Open Appliance.

## AUTO DETECTING S4 OPEN APPLIANCES

The S4 Open: Management Console starts in Auto Detect mode by default. Any S4 Open Appliance in the same local network segment will automatically identify itself to the console. An identified S4 Open Appliance object will be represented by a new folder in the console navigation pane. The status of the Auto Detect service is indicated in the lower right hand corner of the window any time that the "Console" node is selected in the left hand pane.



Notice that the magnifying glass icon is selected in the menu bar. You can use this button to put the system into Auto Detect mode or to do a scan of a specified range of IP addresses for S4 Open Appliances.

**IMPORTANT NOTE:** In the S4 Open: Management Console, you can see a periodic snapshot of status information from the S4 Open Appliances. You may need to use the F5 key (Refresh Screen) to get the most recent status of an appliance or object configured in an appliance. Please try this before assuming that the information you see is incorrect.

# S4 OPEN APPLIANCES

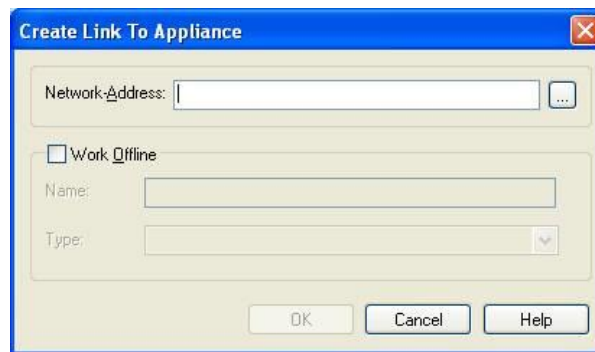
*System Administration and Operation*

## MANUALLY LINKING TO S4 OPEN APPLIANCES

To manually add appliances that are not Auto Detected, right click on S4 Open: Management Console and select New -> Link to S4 Appliance. Add the appliance to the console by IP address. Refer to Help for detailed instructions on the Auto Detection Service for your S4 Open Appliance.

Alternatively, you can click on the S4\* icon on the menu bar to manually set up a link to a S4 Open Appliance.

The process is completed by entering the IP address of the desired S4 Open Appliance in the following window.

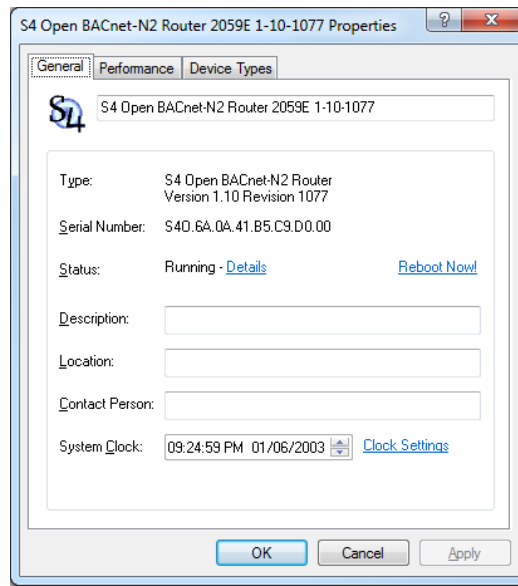


# S4 OPEN APPLIANCES

*System Administration and Operation*

## SETTING SYSTEM OPTIONS

The Date, Time, and Time Zone can be configured from the General tab on the Appliance Properties page. To get to the Properties page, right click on the S4 Open Appliance folder in the navigation pane and select Properties.



## SYSTEM STATUS

The S4 Open Appliance is normally in “Running” mode when the Properties/General tab is viewed. If the system is in “Service,” or any mode other than “Running,” this typically indicates either a licensing problem or incorrect software installation on the S4 Open Appliance. In this case, contact your reseller for assistance.

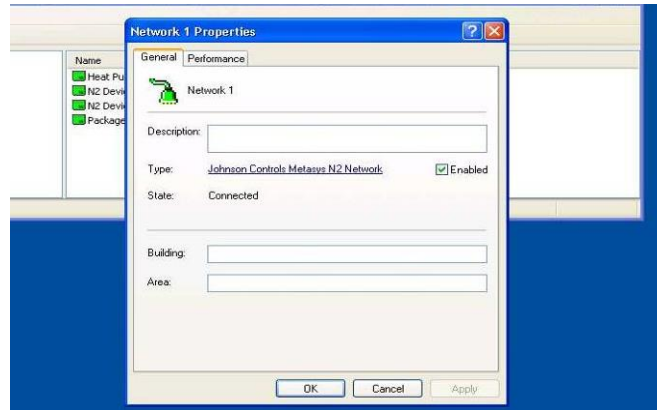
## REMOTE SYSTEM REBOOT

If it ever becomes necessary to reboot your S4 Open Appliance, this can be done remotely by using the Reboot button on the General tab of the Properties page. You will see a change in the system status, hear a short beep from the appliance itself, and the system will be restarted.

# S4 OPEN APPLIANCES

*System Administration and Operation*

## ENABLING OR DISABLING PHYSICAL NETWORKS



You can disable unneeded physical networks by checking or unchecking the “Enabled” box on the Network Properties page. When a network is disabled, it will be ignored during the “Configure” process. No communications will occur with disabled networks at run time. You will see the network device object icon go grey for disabled networks. For instance, here you can see the Upstream Network is enabled.

## CONFIGURE WIZARD

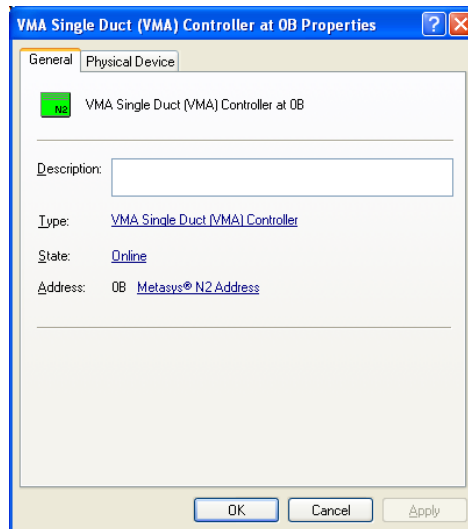
To run the Configure Wizard, right click the top level folder of the S4 Open Appliance and select Configure.

**IMPORTANT NOTE:** You can skip forward in the process by using the “GoTo Next” control when the system is exploring or searching downstream networks- just select the down arrow icon to the right of the progress bar. This feature can significantly decrease the amount of time that it takes to commission an S4 Open Appliance. Do this only if you are sure of the number of N2 devices on each legacy N2 network and the highest address where a device will be found.



# S4 OPEN APPLIANCES

## N2 DEVICE PROPERTIES



Each device object configured by the system has a Properties page where you can investigate details about the device.

- The N2 device hardware type
- The loaded Metasys<sup>®</sup> application
- The N2 Device Type Template assigned. You can click on the name of the assigned type to open the Type Details window.
- The device's actual N2 address on the physical network
- The virtual N2 address assigned to the device
- The Metasys<sup>®</sup> firmware version running in the device
- The HVAC Pro version
- The device creation date

## N2 POINT ASSIGNMENTS

Device Types are defined based on the hardware family and loaded application. The point mappings come from information available in vendor documentation and are provided based on the information available. Before relying on these mappings for mission critical activities, we advise you to take a few preliminary steps:

- Prune any unneeded points from the device to minimize the volume of traffic generated.
- Look at the comments for each point and adjust the source string to reflect the actual configuration of the device. **Note:** In some cases, point addresses are dynamically assigned to the next available I/O when the application is generated by HVAC Pro.
- If your devices include any manually configured single side loop point definitions, etc. these will

# S4 OPEN APPLIANCES

## *System Administration and Operation*

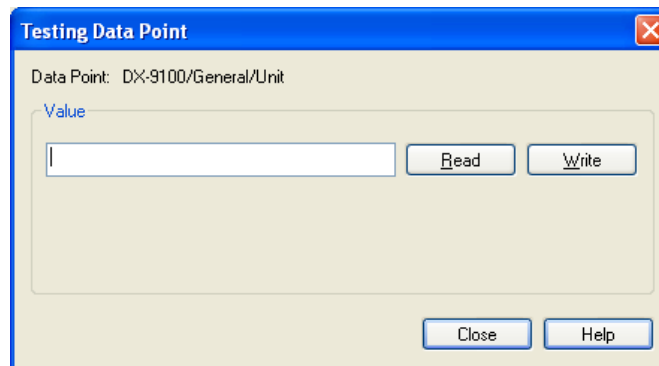
need to be manually added to the S4 Open Appliance Device Type definition.

- In some cases the application generation process uses points for different purposes, depending on your responses to the Q&A session while the device is being defined and loaded. In these cases, multiple alias names for the point have been provided. We advise you to remove those that are unnecessary from the Device Type definition.

Device Type definitions may be modified in several ways. You can always edit the point definitions from the S4 Open Management Console; these changes will take effect immediately. Alternatively, you can edit the N2 Device Type Template for the device. This is a comma separated value (.CSV) file delivered with the system or obtained by exporting a Device Type Template from the Management Console. After editing the N2 Device Type Template to reflect your requirements, you will need to import it back into the Device Type Template library.

## TESTING POINTS

- Select a point associated with a device object in the right hand pane of the Building Control Network object in the S4 Open: Management Console.
- Right click on the point and select Properties.
- Use the Test button on the Source tab to start the point test process.
- Select the appropriate button to confirm that the point can be read or written.



Before writing a value to a point, be sure that the point is configured as writable in the S4 Open Appliance and that the BAS field device will allow the point to be written. Values entered into the write dialog box must be of the proper data type and within the size range of the data point being tested or an error will be displayed.

## UPDATING AN S4 OPEN APPLIANCE

The S4 Appliances can be easily updated with a USB thumb drive. All of the files and folders that are part of the update package, (these will include a “startup” folder, an “automation\_net” folder, and control files) should go in the root directory of the USB drive. The system recognizes the following commands in

# S4 OPEN APPLIANCES

## *System Administration and Operation*

the form of control files (note that these files are empty, the system maintenance process just looks for their existence in the root directory):

### FILE NAME – ACTION

**NOS4APPLIANCE** - Will start up the UNO 2059 without initiating the S4 Open applications. If this file exists on the USB thumb drive, the appliance application will not start up.

**UPDATES4APPLIANCE** - saves the certificate and automation.net.xml files from the current configuration. Then updates the build and startup.bat file on the appliance. After the action is completed, the file is renamed to prevent accidental multiple updates.

**INITS4APPLIANCE** - saves the automation.net.xml file from the current configuration onto your USB thumb drive. This replaces the automation.net.xml on the appliance with a default configuration file. After the action is completed, the file is renamed to prevent accidental initialization of the system configuration.

**UPDATEDNA** - saves the automation.net.xml file from the current configuration. Then replaces the file on the appliance with the one located in the \usb hard disk\dna folder. After the action is completed, the file is renamed to prevent accidental multiple updates.

**UPDATECERT** - saves the automation.cert.xml file from the current configuration. Then replaces the file on the appliance with the one located in the \usb hard disk\cert folder. After the action is completed, the file is renamed to prevent accidental multiple updates.

You can request several maintenance actions simultaneously by creating the appropriate files in the root of the USB thumb drive.

To initiate the process, simply insert the USB thumb drive into the appliance and reboot the system via the Management Console; this ensures that all configuration information is saved before the reboot.

Note: You must use a USB 1.0 compatible thumb drive.

The update and initialize process may take several minutes to complete. While the update is in process you will not be able to access the appliance through the Management Console. You will hear a beep from the appliance when the reboot is initiated and another beep as the N2 Router application starts its initialization process. A log file is created in the Startup folder on the USB thumb drive indicating the results of the update process. Verify that all file copies were successful in this log file. When the application is fully operational, you will regain access to it through the S4 Open: Management Console. As a final step, verify the version information through the Management Console- found on the Properties page for the appliance.

## UPDATING THE MANAGEMENT CONSOLE

S4 Open: Management Console updates are applied separately on your Windows PC using the provided

# S4 OPEN APPLIANCES

*System Administration and Operation*

.msi file.

# S4 OPEN APPLIANCES

## *IT Security and Network Administration Considerations*

### IT SECURITY AND NETWORK ADMINISTRATION CONSIDERATIONS

Under normal circumstances you will not need to use the information in this section. It provides information about system installation, how the system utilizes your IT environment, and security considerations. It is provided here to assist your IT staff in supporting the S4 Open Appliances.

### S4 OPEN: MANAGEMENT CONSOLE INSTALLATION

The S4 Open: Management Console is installed from a Microsoft installation package. Typically, this is named "S4 Open Management Console.msi". Simply copy this file to each PC upon which you want to install the software and double click on the file name. The installation process will automatically start and a wizard will guide you through the process.

### AUTOMATED ERROR REPORTING

All S4 Open Appliances and the S4 Open: Management Console are capable of automatically sending error reports to the development team. In order to enable this capability, you must ensure that an SMTP path exists through any routers or firewalls from the device to the Internet.

### TCP / IP PORT REQUIREMENTS AND FIREWALL SETTINGS

The following ports must be open to enable full functionality of your S4 Open Appliances. The S4 Open: Management Console properly configures these resources for the host system it is running on but there may be occasions where your IT support staff or network administrator needs to know these details.

- UDP Port 135 – DCOM / OPC Support
- TCP Port 25 – Outbound SMTP support
- UDP Port 61134 – Auto Detect S4 Open Devices
- UDP Port 68 – BOOTP Support for the S4 Open: Management Console
- UDP Port 68 – DHCP support for the S4 Open: Management Console

### WINDOWS CE REMOTE MANAGEMENT TOOL

The Windows CE Remote Management Tool is available on all UNO-2059GL systems and later. The Remote Management Tool can be accessed using a web-browser pointed to the IP Address of the S4 Open Appliance. The default user name is Admin and the password is S4Appliance. Please note that the S4 Appliance must be power-cycled in order for configuration changes made using the remote management tool to take effect.

### IP ADDRESS CONFIGURATION

A new system installation defaults to automatic IP assignment. If the customer network contains either a BOOTP or DHCP server it will use the MAC address of the appliance to assign either a fixed IP address or a dynamic IP

# S4 OPEN APPLIANCES

## *IT Security and Network Administration Considerations*

address to the S4 Open Appliance. We highly recommend that your IT department configures your BOOTP or DHCP server to assign a fixed IP address to the S4 Open Appliance.

### CONFIGURING A STATIC IP ADDRESS WITHOUT A DHCP OR BOOTP SERVER

By default, the S4 Open Appliance will attempt to retrieve an IP address from a DHCP or BOOTP server. If one is not available on the network where the S4 Open Appliance is being installed, the Appliance can be configured to use a static IP address. Microsoft Windows includes a DHCP failover mechanism known as APIPA. With APIPA, DHCP clients can obtain IP addresses when DHCP servers are nonfunctional or absent. APIPA exists in all popular versions of Windows except Windows NT. To complete this procedure, it is important to follow the next steps EXACTLY as prescribed:

1. Start with the S4 Open Appliance powered off.
2. Install the S4 Open Management Console on a Windows PC.
3. Set your PC Ethernet adapter to automatically obtain an IP address. (Refer to Windows help for additional information on this procedure.)
4. Connect a **CROSSOVER** Ethernet cable between the S4 Open Appliance and the PC.
5. Power on the S4 Open Appliance. The network status on the PC will indicate "Acquiring IP Address"
6. The S4 Open Appliance will go through its normal initialization process.
7. The PC and the S4 Open Appliance will negotiate addresses, with Windows automatically assigning IP addresses in the range of 169.254.x.x.

THE FOLLOWING TWO STEPS MAY TAKE SEVERAL MINUTES, PLEASE BE PATIENT.

When the initialization process is complete and the addresses are negotiated, the S4 Open Appliance will be auto-detected by the Management Console and its folder will show up in the navigation pane. At this point you will have normal communication between the Management Console and the appliance. Now, you will be able to go to the S4 Open Appliance's Properties page, select Communications Protocols, and change the IP address to a fixed IP address and subnet mask of your choice; the other fields can be left blank. Once this is done, hit the Apply button. The S4 Open Appliance will need to be rebooted for the changes to take effect; use the Reboot button on the General Properties tab to initiate the reboot sequence. The S4 Open Appliance will re-initialize itself with the address and subnet mask that was assigned to it.

To maintain communication between the Management Console and the S4 Open Appliance it is necessary to change the IP address of the PC running the Management Console to a fixed IP address in the same subnet as the S4 Open Appliance.

### WINDOWS DOMAIN OR WORKGROUP MEMBERSHIP

The UNO 2059GL chosen for the production release of the S4 Open Appliances runs a release of Windows CE.NET that cannot fully participate as a host in a Windows domain or Workgroup environment. Any OPC client with a built in OPC browser that is Windows aware can search for and attach to remote S4 Open: OPC-N2 Routers.

# S4 OPEN APPLIANCES

*Appendix A – OPC Specific Information*

## APPENDIX A – OPC SPECIFIC INFORMATION

### DEVICE NAMING CONVENTIONS

Each N2 device is assigned a folder name under the OPC Server. Points for each N2 device are enumerated under the device folder.

### ADDRESSING THE OPC-N2 ROUTER

From the Microsoft networking standpoint, our appliance looks like a standalone application server that is outside of the Windows domain environment. This brings up several concerns that users and integrators traditionally have with distributed OPC installations:

- DCOM configuration and security.
- Many developers have written their OPC clients in a way that is very dependent on Microsoft Active Directory and domain services.
- Some OPC clients support only local OPC servers or provide much better support for local OPC servers than for remote servers.

The S4 Open Management Console eliminates all of these typical issues with remote OPC server support. As it detects each S4 Open: OPC-N2 Router in your network, it transparently creates a local OPC Proxy Server and establishes a tunnel to the appliance. The OPC Proxy Server, and associated tunnel, is established on the local machine during the Auto Detection process, or manual linking process, for S4 Open Appliances. We take care of all of the details for you! From the standpoint of your OPC client application, it is talking to a local OPC server so there are no DCOM configuration or security issues, and you benefit from the full functionality of a local OPC server and can simply use the client's OPC browser functionality to map points. If you're interested in more technical details - it is actually an In-Process OPC Server. Some OPC clients make a distinction between a local OPC Server and an in-process OPC Server. If this is the case for your OPC client, configure the interface as an in-process OPC Server.

# S4 OPEN APPLIANCES

*Appendix B – BACnet Specific Information*

## APPENDIX B – BACNET SPECIFIC INFORMATION

### POINT NAMING CONVENTIONS

The BACnet-N2 Router is assigned a user selectable BACnet Network Number and Device ID and uses the BACnet/IP protocol. Points on N2 devices connected to the BACnet-N2 Router are assigned standard BACnet Object Types and Instance numbers. The Instance numbers are generated as 7 digit integers as follows:

- First (rightmost) digit: attribute code of the originating N2 device.  
1 = Value, 2 = Override, 3 = Release; all other instance numbers will end in 0.
- Digits 2-5: the Metasys® object number
- Digits 6-7: the Metasys® Region code number (see chart on the following page)

For example, the instance number 100010 represents the point AI.0 – Region 1, object 1, with no specified attribute code.

### PICS INFORMATION

If one has not been provided along with this documentation, a copy of the PICS statement can be found in the Documentation section of the S4 Group's website.

### APDU SETTINGS

In order to ensure maximum performance, verify that the APDU settings for the BACnet-N2 Router are correct. Under the Protocols tab in the Properties dialog box, click on Advanced Communications Settings. There, it is possible to adjust APDU Timeout and APDU-Segment Timeout settings. For best performance, it is recommended that APDU Timeout be set to at least 10,000. These settings should be adjusted before running the Configure Wizard.



# S4 OPEN APPLIANCES

## Appendix B – BACnet Specific Information

### METASYS® N2 TO BACNET POINT MAPPING

This table lists all the Metasys® N2 point types and the default BACnet point types the N2 Router maps them to.

Metasys N2 Point Type	Maps to BACnet Point Type	Region Code
<b>AI</b> (Analog Input)	<b>AI</b>	<b>1</b>
<b>BI</b> (Binary Input)	<b>BI</b>	<b>2</b>
<b>AO</b> (Analog Output)	<b>AO</b>	<b>3</b>
<b>BO</b> (Binary Output)	<b>BO</b>	<b>4</b>
<b>ADF</b> (Analog Data Float)	<b>AV</b>	<b>5</b>
<b>ADI</b> (Analog Data Integer)	<b>AV</b>	<b>6</b>
<b>BD</b> (Binary Data)	<b>BV</b>	<b>7</b>
<b>LRS</b> (Logic Results)	<b>BV</b>	<b>8</b>
<b>PMK</b> (Programmable Module Constants)	<b>AV</b>	<b>9</b>
<b>PMO</b> (Programmable Module Outputs)	<b>AV</b>	<b>10</b>
<b>PML</b> (Programmable Module Logic)	<b>BV</b>	<b>11</b>
<b>PMA</b> (Programmable Module Accumulator)	<b>AV</b>	<b>12</b>

# S4 OPEN APPLIANCES

*Appendix C – An Overview of the Metasys® N2 Bus*

## APPENDIX C – AN OVERVIEW OF THE METASYS® N2 BUS

The Johnson Controls Metasys® building automation system is divided into two sections. The system level network, known as the N1 Bus, connects the various supervisory controllers (i.e. NAEs, NCMs, N30s, etc.) to one another and to operator workstations. The other half of this architecture is the N2 Bus, or field level network, which provides communication to and from the supervisory controllers and the various controllers, thermostats, and other devices in the field.

### PHYSICAL SPECIFICATIONS OF THE N2 BUS

The N2 Bus communications interface is RS-485, 2-wire plus reference, half-duplex at 9600 baud. The format for transmission is 8 data bits with one start and one stop bit, no parity is used.

### OPERATING SPECIFICATIONS

In order to complete a successful integration the N2 Bus must meet the following electrical standards. The ComBus Quick Tester can automate validating that the N2 Bus is within operating specifications, although a standard volt meter can be used for this same purpose.

- + to Ref VDC 2.45 – 3.00
- - to Ref VDC 1.90 – 2.54
- + to - VDC 0.38 – 0.92

### N2 PROTOCOL INFORMATION

The N2 protocol itself comes in three different variants: N2Open, N2B and System91. N2Open was the first developed and has the largest number of examples in the field. This is also the protocol used by 3<sup>rd</sup> party vendor devices. N2B is essentially an early generic of BACnet wrapped in an N2 envelope and is only used by VMA devices. The System91 standard is used by the DX-9100, which can be used as a standalone controller, and other System-91 devices. The S4 Open family of products supports all of these variants.