

## 1. INTRODUCTION

The OPC server acts as a master on Johnson Controls Metasys N2 network consisting of a mix of slave devices communicating using N2 (original Johnson Controls protocol) or N2Open protocol. N2 and N2Open are Optomux-based protocols used in HVAC (Heating, Ventilation and Air Conditioning) and other building automation networks. The server supports DC, DX, FX, TC, VND and many other N2/N2Open devices, and is extensible using “hardware type definition” files.

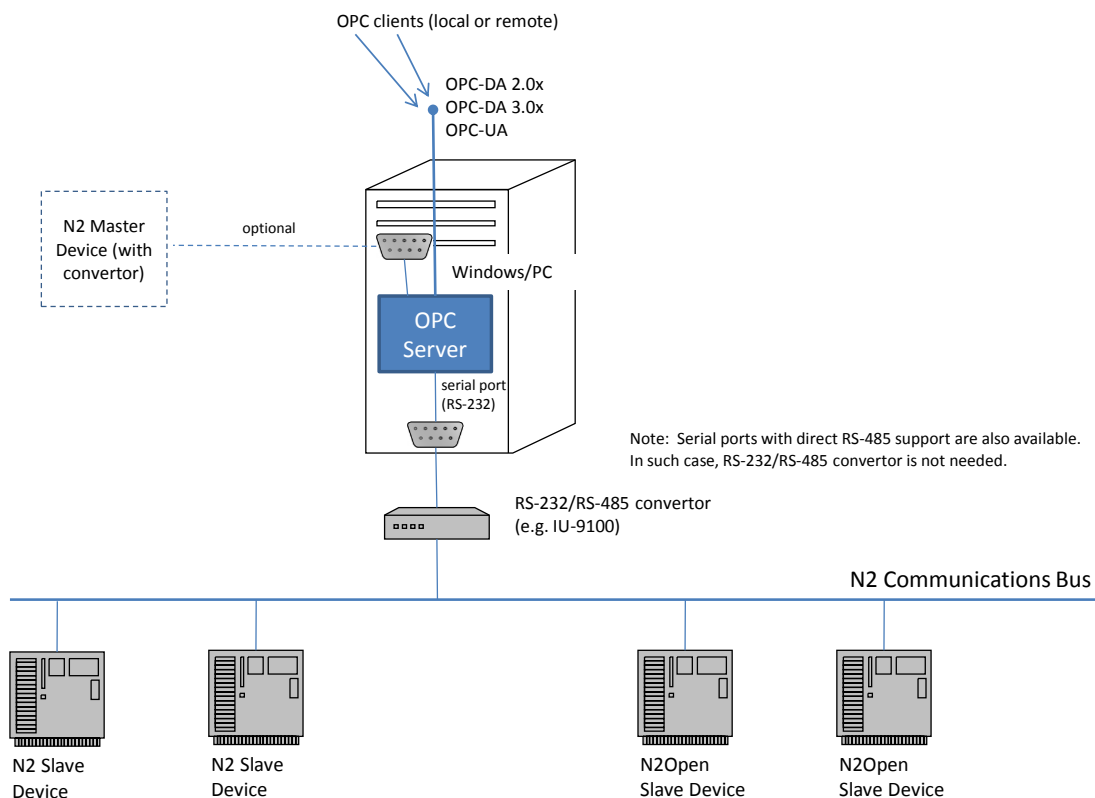
Can be used to replace the NCM (Network Control Module) and enable OPC access to N2 slaves. Optionally, the OPC server can also pass through (forward) communication from other master, such as the NCM unit.

The server can handle multiple N2 networks simultaneously, and up to 255 slave devices on each network. The computer can connect to an N2 network via serial port, or using TCP through an Ethernet/serial convertor.

Configuration program with rich user interface is supplied with the server. You can use both the items pre-defined for a hardware type of your device, or add your own named items. The configuration is stored in an XML file. The server can run as Windows Service or Local Server.

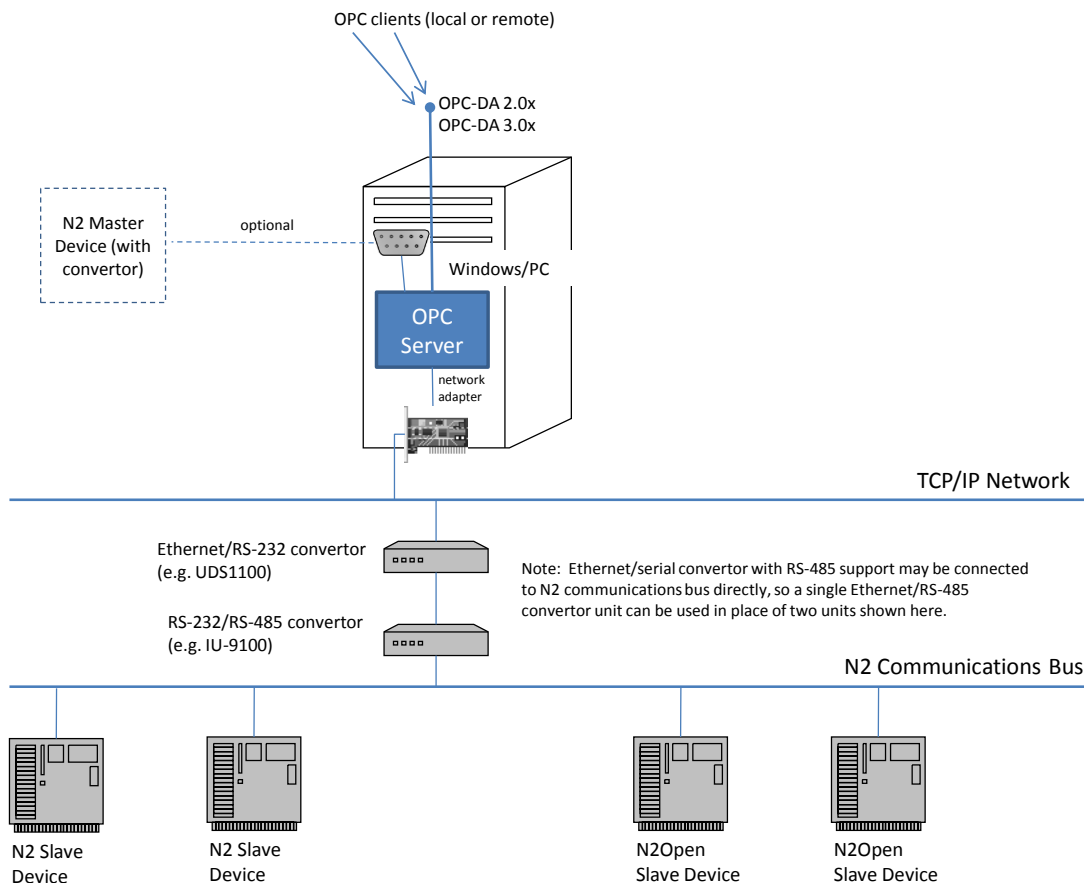
## Block Diagrams

### Connection via serial port:



Serial port may be internal, or external to the PC (e.g. connected by USB).

**Connection using TCP through an Ethernet/serial convertor:**



## Modes of Operation

The OPC server collects data by reading values from N2 and N2Open slaves. The reading is one-shot (for OPC reads) and/or periodic (for OPC subscriptions). Multiple subscriptions to the same item are merged together. OPC writes are transformed to N2 write commands on per call basis.

## 2. REQUIREMENTS

### Hardware

Any PC hardware compatible with operating systems listed below.

Serial communication port(s) for RS-232 connection to slave devices, and/or for connection to a master device for pass-through (if configured).

Ethernet network adapter(s) for connection with slave devices through Ethernet/serial convertor (if configured).

## Software

### Operating system:

- Microsoft Windows XP with Service Pack 2 or later (x86)
- Microsoft Windows Vista with Service Pack 1 or later (x86, x64)
- Microsoft Windows 7 (x86, x64)
- Microsoft Windows Server 2003 with Service Pack 1 or later (x86)
- Microsoft Windows Server 2008 (x86, x64)
- Microsoft Windows Server 2008 R2 (x64)

### Prerequisites:

- Microsoft .NET Framework 2.0 with Service Pack 1 (x86)
- Microsoft .NET Framework 3.5 with Service Pack 1 (x86)

## 3. CONNECTION INFORMATION

Serial port to Metasys N2 network:

Setting	Recommended (default)	Available
<b>Baud rate</b>	9,600	Standard rates between 110-256,000
<b>Byte size</b>	8	7/8
<b>Parity</b>	None	None/Odd/Even/Mark/Space
<b>Stop bits</b>	1	1/1.5/2
<b>Handshaking</b>	None	None/Hardware/Software

TCP/IP socket to Ethernet/serial convertor:

Setting	Recommended (default)	Available
<b>Host address</b>	(192.168.1.21)	Any numeric IP address, or symbolic DNS host name
<b>Host port</b>	10001	1-65535

## 4. SUPPORTED FUNCTIONALITY

### Commands

#### N2 Protocol:

- |                               |                                |
|-------------------------------|--------------------------------|
| ✓Single Item Read             | ✓Single Item Write             |
| ✓Extended Single Item Read    | ✓Extended Single Item Write    |
| ✓Functional Module Block Read | ✓Functional Module Block Write |

#### N2Open Protocol:

- |  |   |
|--|---|
| ✓Read Analog Input (Region 1)            | ✓Read Binary Input (Region 2)             |
| ✓Read Analog Output (Region 3)           | ✓Read Binary Output (Region 4)            |
| ✓Read Internal Parameter (Regions 5,6,7) | ✓Write Analog Input (Region 1)            |
| ✓Write Binary Input (Region 2)           | ✓Write Analog Output (Region 3)           |
| ✓Write Binary Output (Region 4)          | ✓Write Internal Parameter (Regions 5,6,7) |
| ✓Override Analog Input                   | ✓Override Binary Input                    |
| ✓Override Analog Output                  | ✓Override Binary Output                   |

- ✓Override Internal Parameter
- ✓Identify Device Type (\*)

- ✓Override Release

(\*) issued automatically

## Data Types

### N2 Protocol:

- ✓Floating point number (16 bits JC format)
- ✓Unsigned 16 bits
- ✓Other types that can be mapped to types listed here
- ✓Unsigned 8 bits
- ✓Unsigned 32 bits

### N2Open Protocol:

- ✓Float (32 bits IEEE format)
- ✓Integer (32 bits signed)
- ✓Integer (16 bits signed)
- ✓Byte (8 bits unsigned)

## 5. COMPATIBILITY

### Slave Devices

Protocol	Device Model	Abbreviation	Compatibility	Hardware Type Definition Provided
N2	Johnson Controls DC-9100 Plant Controller	DC9100	Assumed	✓Yes
N2	Johnson Controls DX-9100 Extended Digital Plant Controller	DX9100	✓Tested	✓Yes
N2 through DX9100	Johnson Controls XT-9100 Extension Module		Assumed	✓Yes
N2	Johnson Controls TC-9100 Universal Controller	TC9100	Assumed	✓Yes
N2 through TC9100	Johnson Controls TM-9180 Room Command Module		Assumed	✓Yes
N2	other models		Assumed	No
N2Open	General Vendor Device	VND	✓Tested	✓Yes
N2Open	Johnson Controls MR40 Advanced Electronic Control for compressor and defrost management		✓Tested	✓Yes (VND)
N2Open	IME NEMO 96/35 Multimeter		✓Tested	✓Yes (VND)
N2Open	Johnson Controls FX-15 "Universal" Controller		Assumed	✓Yes (VND)
N2Open	Johnson Controls FX-16 Master Controller (multi-media programmable controller)		Assumed	✓Yes (VND)
N2Open	other models		Assumed	✓Yes (VND)

VND test represented by MR40 device. Single hardware type definition is provided for all VND devices.

### Master Devices

The OPC server can pass through (forward) requests and responses from/to any Optomux-compatible master, including N2/N2Open serial masters.

## Communication Devices

### Serial to N2 (RS-232/RS-485) converters:

Protocol	Device Model	Compatibility
serial	Johnson Controls IU-9100 Interface Unit	✓Tested
serial	other models	Assumed

The convertor must support automatic DSC (Data Send Control).

### Ethernet/serial converters:

Protocol	Device Model	Compatibility
TCP	Lantronix UDS1100	✓Tested
TCP	Lantronix UDS2100	Assumed
TCP	MOXA NPort 5150	✓Tested
TCP	MOXA NPort 5110	Assumed
TCP	other models	Assumed

## Supported OPC Interfaces

- ✓ all OPC DA (Data Access) 2.0x Specifications (Released)
- ✓ all OPC DA (Data Access) 3.0x Specifications (Released)
- ✓ all OPC Common 1.0x Specifications (Released)
- ✓ OPC UA (Universal Architecture) 1.00 Specifications for Data Access
- ✓ OPC UA (Universal Architecture) 1.01 Specifications for Data Access

OPC clients can access the server locally, or remotely (over DCOM, or UA transport protocols).

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