# Technical Bulletin,
# Network Printing

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**NOTE:** User Manual Reference - This Technical Bulletin complements the information contained in the OMNICOM Help Menu of all Firmware Revisions listed in the Scope.

## Table of Contents

## Figures

## Scope

To allow users to print reports generated in the flow computer via an Ethernet connection onto a network printer.  One (1) or two (2) network printers can be selected to print out the various reports from the flow computer to these printers.

## Abstract

SE Module Configuration via OMNICOM and Network Printing is available with OMNI firmware versions 20.74.30, 22.74.30, 23.74.30, 24.74.19, 26.74.10, and 27.74.21 and later using OMNI SE Module firmware v1.50 and up and OMNICOM v1.25 and later.  Note that the network printing configuration is not available via the front panel.  Network Utility supports configuration of the SE Module firmware prior to v1.50 (back to v1.22); however, it does not include the Network Printing configuration.

## Printer Requirements

Printer interfacing with the OMNI Flow Computer must be capable of LPD (Line Printer Daemon) protocol.

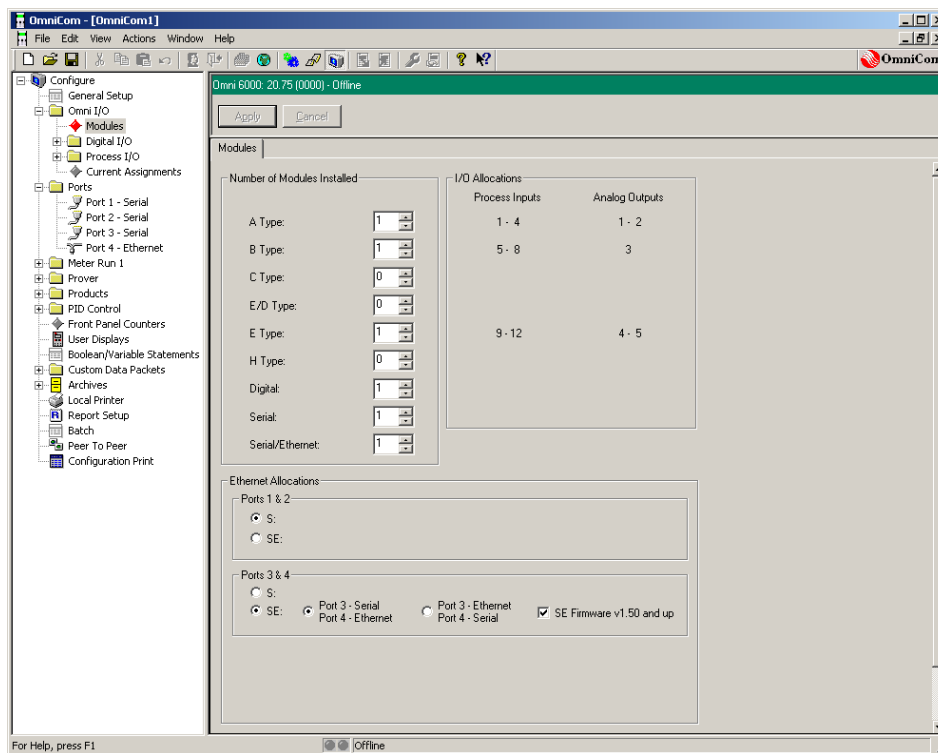## OMNICOM Screens



**Figure 1.  OMNICOM Screen**

OMNICOM screen (Figure 1) shows the flow computer modules installed and the serial and Serial/Ethernet module.  User must select the correct ports for the SE module installed in the flow computer and also select that SE firmware is 1.50 and up.

Once Figure 1 screen has been selected go to the next screen.  In this example, it is "Port 4 Ethernet".
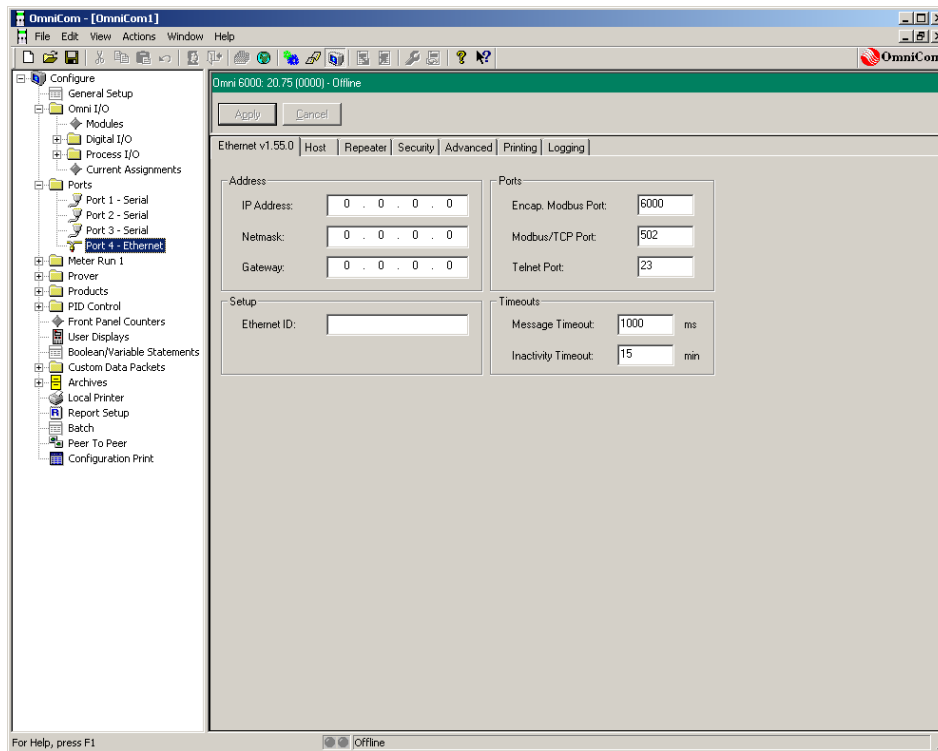
**Figure 2.  Display of Tabs**

Figure 2 will display the tabs which the user will be required to enter the necessary data.

## Ethernet Tab

### IP Address

All devices on a network require a unique IP address.  This is the static IP address used for all network connections to the SE Module and is the same as the one configured in the OMNI for the Ethernet port.  The IP address is entered in dotted decimal notation.  The default is 10.0.0.1.

### Netmask

IP addresses contain a Network Identifier (netid), a Subnet Identifier (subnetid), and a Host Identifier (hostid).  Subnet masks or Netmasks identify the portion of the address occupied by the netid and the subnetid.  The Netmask is entered in dotted decimal notation and is the same as the one configured in the OMNI for the Ethernet port.  The default is 255.0.0.0.

### Gateway

If a gateway exists for accessing other subnets, it can be entered here.  The Gateway is entered in dotted decimal notation and is the same as the one configured in the OMNI for the Ethernet port.  The default is 0.0.0.0 or disabled.

### Encapsulated Modbus Port

The TCP/IP port number used to communicate with the flow computer using standard Modbus encapsulated by TCP/IP.  It may be changed to meet any special needs of your network.  Entering zero (0) for the port number will disable Modbus connections.  This port number must be different from the Modbus/TCP port number.  The default is 6000.

### Modbus/TCP Port

The TCP/IP port number used to communicate with the flow computer using Modbus over TCP.  The default is the standard Modbus/TCP port of 502.  It may be changed to meet any special needs of your network.  Entering zero (0) for the port number will disable Modbus/TCP connections.  This port number must be different from the Encapsulated Modbus port number.

### Telnet Port

This is the port number used for Telnet connections.  The default is the standard Telnet port of twenty-three) 23.  It may be changed to meet any special needs of your network.  Entering zero (0) for the Telnet port will disable Telnet connections.

**NOTE:**  Network Utility v1.07 and up will detect the configured Telnet port and use that for the connection.  It can also detect a disabled port and give you a chance to reset it to the default of twenty-three) 23.  If you are using any other Telnet program and the port is set to zero (0), configuration changes can only be made through the SE Module's onboard serial port.

### Ethernet ID

A fifteen (15) character ID that can be used to name or describe the SE Module in an OMNI.

### Message Timeout

This is the time in milliseconds that the SE Module will wait for a complete message on the TCP connection.  It should be long enough to account for any network delays but shorter than the retry time out in any application software used for communications.  The default is 1000 milliseconds (1 second).

### Inactivity Timeout

This is the time in minutes that a connection to the Encapsulated Modbus and Modbus/TCP ports can remain idle before being disconnected.  The default is fifteen (15) minutes.  Entering zero (0) will disable the Inactivity Timeout.

**NOTE:**  This setting does not apply to the time out for idle Telnet connections, which is fixed at five (5) minutes.

### Host Tab

The Host refers to the flow computer in which the SE Module is installed.  These parameters should match the configuration parameters in the OMNI for the port the Ethernet channel occupies.

Once you enter the information and/or make your selections, press the **[Apply]** button to write to the OMNI.  The OMNI writes the new configuration to the SE Module.

### Modbus ID

The Modbus ID of the Host serial port.  It is used to determine if messages are sent to the Host or sent out the Repeater port.  It is the Modbus ID in the OMNI configured for the Ethernet port.  The default is one (1).  It can be changed to any valid Modbus ID (1-247).  This address will not be accessible on the Repeater port.

### Modicon Compatible

Available with firmware versions 20.74.20, 22.74.30, 23.74.19, 24.74.17, 26.74.10, and 27.74.18 and up.

Check the box if the Modbus communications are using Modicon compatible format.  It is the Modbus Compatible setting in the OMNI configured for the Ethernet port.

Note that for Modicon Compatible units, OMNICOM automatically subtracts one (1) from the register number and formats the protocol to conform with 16-bit integers before transmitting to the OMNI.  If float data types are used, the float bytes are swapped from 'aa bb cc dd' to 'cc dd aa bb'.

### Initial Delay

This is the time in milliseconds that the SE Module waits for a response from the OMNI before freeing up the TCP port for other connections.  The default is 200 ms and that is the recommended setting.

### Char Delay

This is the time in milliseconds that the SE Module waits between characters (after the first character has been received) sent from the OMNI before freeing up the TCP port for other connections.  The default is 20ms and that is the recommended setting.

### Repeater Tab

The Repeater port is used to 'extend' the Ethernet connections to other OMNI Flow Computers or compatible Modbus devices using a 2-wire multi-dropped RS-485 connection.  Any transaction that is destined for a Modbus ID that does not match the Host Flow Computer configuration is routed out the Repeater port.

Once you enter the information and/or make your selections, press the **[Apply]** button to write to the OMNI.  The OMNI writes the new configuration to the SE Module.

### Protocol

This is the protocol used over the Repeater Port.  It can be set to Modbus RTU, Modbus ASCII or Modbus Mixed.  It does not determine what protocol is used over TCP/IP.  The messages will be converted if required.  When set to Modbus Mixed, the messages are sent as received with no RTU/ASCII conversion.  The default is Modbus RTU.

### Initial Delay

This is the time in milliseconds that the OMNI will wait for a response before freeing the repeater port for other connections.  The default is 200 ms.

### Char Delay

This is the time in milliseconds that the OMNI will wait between characters following receipt of the first character on the Repeater Port before it is freed for other connections.  The default is 20ms.

### Baud Rate

The baud rate used by the repeater port.  The choices are 9600, 19200, 38400 and 57600.  It should be set as high as possible.  The default is 38400.

### Data Bits

The Repeater port can be selected for seven (7) or eight (8) data bits.  The default is eight (8).  Seven (7) data bits only applies when Modbus ASCII is selected.  All other protocols require eight (8) data bits to be selected.

### Stop Bits

The Stop Bits can be selected for one (1) or two (2).  If two (2) stop Bits are selected the Parity will be set to None.  The default is one (1).

### Parity

The parity may be selected to be None, Even or Odd.  Even and Odd Parity can be used only with one (1) Stop Bit.  The default is "None".

### Security Tab

This dialog allows parameter changes that determine who has access via the network.  Once you enter the information and/or make your selections, press the **[Apply]** button to write to the OMNI.  The OMNI writes the new configuration to the SE Module.

### Serial Password

If a password is entered here, it will be required when using the SE Module's on-board serial DB-9 connector configuration port.  It may be cleared by leaving the password entry blank.  If cleared, no passwords will be required.  The default password is omni (lower case).  The passwords are case sensitive.  If you have forgotten your password, contact OMNI technical support for the procedure to recover it.

## Telnet Password

This is the Password required when performing remote configuration of this module using Telnet. The password can be cleared by leaving the entry blank. If cleared, no password will be required. The default password is omni (lower case). The passwords are case sensitive.

**NOTE:** To disable Telnet access set the Telnet port to zero (0) instead of the standard default of twenty-three (23) on the Ethernet page.

## TCP/IP Password

This is a password required for any connection to the Encapsulated Modbus or Modbus/TCP port numbers. An OMNI "Password Needed" exception code (05) will be returned for any transaction until the password is accepted. If cleared, no password will be required. The password is cleared by default. If this password is set, it needs to be written to Modbus address 4850 before further communications are allowed. Alternatively, serial port passwords level A, B, or C may be used. See the OMNI Technical Bulletin 960701 (52-0000-0001), for details on using the Serial Port passwords. Note that "serial port" passwords in the OMNI apply to "Ethernet ports" as well.

**NOTE**: Do not use the TCP/IP password simultaneously with serial port passwords on an Ethernet port!

## Respond to Ping

Responses to ICMP Echo Requests or Pings can be enabled or disabled for added security. The default value is Enabled.

## IP Filter & Filter Mask

Connections to the Encapsulated Modbus and Modbus/TCP ports can be limited to an individual IP address or a range of IP addresses. The mask determines which bits are significant when testing the address. If the IP Filter is set to 0.0.0.0, it will be disabled.

## MAC Addresses

Media Access Control (MAC) addresses provide the highest level of security. Connections to the Encapsulated Modbus and Modbus/TCP ports can be limited to a list of hardware Ethernet addresses. This limits access to a particular machine. If they are set to zeros (0) they will be disabled.

## Advanced Tab

The Advanced page allows parameter changes that determine how data is sent over the network.

Once you enter the information and/or make your selections, press the **[Apply]** button to write to the OMNI. The OMNI writes the new configuration to the SE Module.

**WARNING:** Use Caution when changing these parameters!

## Retransmit Minimum

This field may be useful for VSAT communications. A time in milliseconds that represents a lower boundary for a retransmit time out. The default is 10ms.

**NOTE:** Beware of reducing this, since modern hosts try to acknowledge only every second segment. If the time out is too small, the SE module will unnecessarily retransmit if it doesn't get the ack for the first of the two segments (especially on a fast LAN, where the RTT measurement will tempt you to set a small time out).

## Retransmit Maximum

This field may be useful for VSAT communications. A time in milliseconds that represents an overall upper boundary for the retransmit time out. The default is 10000 ms.

## Nagle Algorithm

Nagle's algorithm is a means of improving the efficiency of TCP/IP networks by reducing the number of packets that need to be sent over the network. The default is Enabled.

## Socket Close Timeout

The amount of time the host waits before closing the socket connection after the client device has powered down during active communication.  The value ranges from 10 to 240 seconds with the default at 120 seconds.

## Printing Tab

The printing page allows you to set up the printers used for network printing and assign which reports go to which printers.  Two (2) printers are available for network printing on each SE Module.

**NOTE:**  This is not the setup for the serial printer.  To set up the serial printer go to the Local Printer dialog.

The OMNI SE firmware follows the LPD (Line Printer Daemon) protocol outlined in RFC 1179.  The OMNI SE uses ports 721 through 731 and communicates to the printers using the configured IP address and port 515.  The hostname used is "OmniSE".  The user name is the Ethernet ID configured in the Ethernet screen.  If the Ethernet ID is blank, the default user name is "user".

Network Printing is available with OMNI firmware versions 20.74.30, 22.74.30, 23.74.30, 24.74.19, 26.74.10, and 27.74.21 and up and OMNI SE Module firmware v1.50 and up.

**NOTE:**  OMNI's Network Utility Program does not allow the user to setup a printer configuration.

Once you enter the information and/or make your selections, press the **[Apply]** button to write to the OMNI.  The OMNI writes the new configuration to the SE Module.

## IP Address

All devices on a network require a unique IP address.  This is the static IP address used for the network printer connection to the SE Module.  The IP address is entered in dotted decimal notation.  The default is 0.0.0.0 or not used.

## Print Queue Name (valid for OMNI SE firmware v1.56 and up)

Enter a 16-byte ASCII character name for the print queue.  If the name is blank, the Ethernet firmware uses "LPT1" as the default.

The queue names are case sensitive and may contain any of the ASCII characters listed in Table 1.

### Table 1.  ASCII Characters

| Character | Hex Code | Description |
|---|---|---|
| ! | 21 | Exclamation Point |
| # | 23 | Number Sign |
| $ | 24 | Dollar Sign |
| % | 25 | Percent Sign |
| & | 26 | Ampersand |
| ' | 27 | Apostrophe |
| ( | 28 | Open Parenthesis |
| ) | 29 | Close Parenthesis |
| - | 2D | Hyphen |
| 0123456789 | 30-39 | Numbers |
| @ | 40 | At Sign |
| ABCDEFGHIJKLMNOPQRSTUVWXYZ | 51-5A | Upper Case Letters |
| ^ | 5E | Carat |
| _ | 5F | Underscore |
| ` | 60 | Accent |
| abcdefghijklmnopqrstuvwxyz | 61-7A | Lower Case Letters |
| { | 7B | Open Brace |
| } | 7D | Close Brace |
| ~ | 7E | Tilde |

## Printer Type

**Printer Type:**  Select the type of network printer.  If you select something other than "Custom", a default condensed and normal mode string for that printer type will be displayed.

**Printer Condensed/ Normal Mode String:**  These entries are meaningful only when using the default report templates stored in EPROM.  Some of these reports are more than eighty (80) characters wide under certain circumstances (four meter runs + station).  The flow computer will send an ASCII escape string to switch the printer to condensed character mode (approximately 16+ characters per inch) or to normal (approximately 10 characters per inch).  Enter the data as hexadecimal characters (groups of two characters, enter '0F' not just 'F') with up to sixteen (16) sets of characters (Table 2).

### Table 2.  Printer Condensed

| Printers | Condensed Mode String | Normal Mode String |
|---|---|---|
| HP Laser Jet | 1B266B3253 | 1B266B3053 |

## Report Printer Assignment

Assign a network printer for each of the reports in the list by checking the box under the printer where you want the report to be printed.  It can be printed to more than one printer or not be sent to any network printer.

**NOTE:**  All reports are sent to the local serial printer if one is configured.  See the help for Local Printer.

## Logging Tab

The Logging page is used to enable the logging of system information and alerts called the "Syslog".  The syslog protocol provides a transport for the transmission of event notification messages across networks to event message collectors, or syslog servers, using UDP via port 514.  The OMNI SE firmware follows the syslog protocol outlined in RFC 3164.

Examples of Syslog notification messages sent by the Omni SE Module,

<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet card restart

<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Network up

<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet board reset - IP: 192.168.157.216

<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet board reset - Serial

<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet Flash download - IP: 192.168.157.216

<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet set to factory defaults - IP: 192.168.157.216

<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet set to factory defaults – Serial

Once you enter the information and/or make your selections, press the **[Apply]** button to write to the OMNI.  The OMNI writes the new configuration to the SE Module.

## Syslog IP

The IP Address of the syslog event message collector or syslog server.  If an IP address is entered, the Syslog is enabled and events are transmitted via UDP to that IP address using the standard Syslog port 514.  The default is disabled.

**NOTE:**  It is recommended to use a static IP address for the syslog server instead of using an IP Address obtained using DHCP.

## Network Printing Trouble Shooting

If your OMNI firmware and Ethernet firmware support network printing, you should be able to view the Ethernet version on the Status display of the OMNI front panel.  For example:  **SE-2 EthV. 1.56.0**

## Reports are not Printing

- Have you configured a Printer IP in the Ethernet Printer configuration?

- Have you checked the box for the reports you would like to print to each printer (printers 1 and 2) in the Ethernet Printer Configuration?

- Is the Printer IP address on your OMNI's SE Module's network (refer to Ethernet Configuration)?

- Does the configured Netmask for the OMNI SE Module include the address for the printers (see Ethernet Configuration)?

- Have you configured the IP Address on the printer or printer interface itself?  (Consult the manuals that came with the printer).

- Does your printer or printer interface support the LPD protocol?

- If you are still having problems, please consult the SE Module Technical Bulletin at our web site, www.omniflow.com

### SE Module Printer Error Codes

#### Table 3.  Printer Error Codes

| Error Code | Description |
|:---:|:---|
| 0 | Error cleared |
| 1 | Printer socket open error or error establishing socket |
| 2 | Receive Job Command error |
| 3 | Receive Control File Command error |
| 4 | Control File error |
| 5 | Receive Data File Command error |
| 6 | Error while sending report |
| 7 | Error while sending nulls |
| 8 | Job Done Character error |
| 9 | Last report record not received from OMNI |
| 255 | Network parameter change |

If there is an error printing a report, the OMNI reports an "SE Printer" alarm.  If you retrieve the alarm report via OMNICOM, the error code is in the value column.  The report ID is in the Mass column.

The following are the printer error code definitions:

- **Code 1** - Go through the check list above under "Reports not Printing".  This is most likely a problem with the Ethernet configuration set up.  The SE Module is not able to make a connection to the printer.

- **Codes 2-8** - Correspond with the actual transfer of the report to the printer.

- **Code 9** – While a report was being queued in the SE Module, the last record of the report was not received by the SE Module from the OMNI within a timeout.  The report is printed after the timer expires however it may be incomplete.

- **Code 255** - Each time the SE Module's IP address or the Printer IP address changes, the connection between the SE Module and the printer is no longer valid.  This is more of an informational error.

The following are Report IDs:

| Report ID | Description |
|-----------|-------------|
| 16 | Meter 1 - Daily Report |
| 17 | Meter 1 - Batch Report |
| 18 | Meter 1 - Prove Report |
| 19 | Meter 1 - Prove Passes Report |
| 20 | Meter 1 - Detailed Daily Report (application 23 only) |
| 32 | Meter 2 - Daily Report |
| 33 | Meter 2 - Batch Report |
| 34 | Meter 2 - Prove Report |
| 35 | Meter 2 - Prove Passes Report |
| 36 | Meter 2 - Detailed Daily Report (application 23 only) |
| 48 | Meter 3 - Daily Report |
| 49 | Meter 3 - Batch Report |
| 50 | Meter 3 - Prove Report |
| 51 | Meter 3 - Prove Passes Report |
| 52 | Meter 3 - Detailed Daily Report (application 23 only) |
| 64 | Meter 4 - Daily Report |
| 65 | Meter 4 - Batch Report |
| 66 | Meter 4 - Prove Report |
| 67 | Meter 4 - Prove Passes Report |
| 68 | Meter 4 - Detailed Daily Report (application 23 only) |
| 80 | Snapshot |
| 81 | Previous Batch (1-8) Report |
| 82 | Previous Daily (1-8) Report |
| 83 | Previous Prove (1-8) Report |
| 84 | Historical Alarm Report |
| 85 | Audit Trail Report |
| 86 | Text Archive |
| 87 | Status Report |
| 88 | Previous Snapshot Report |
| 89 | Prove Abort Report |
| 90 | Trial Prove Report |
| 91 | Product File Report |
| 92 | OMNI Initialization Report |

# DOCUMENT REVISION HISTORY

DOCUMENT INITIAL RELEASE DATE................................................. 10-August-2008

| REVISION | DATE | PURPOSE / CHANGE REQUEST |
|----------|------|--------------------------|
| A | 10-August-2008 | Maintained on the Web - Initial release |
| B | 04-Feburary-2009 | DCR 090024 |
| C | 02-June-2011 | DCR 110073 |
| D | 08-September-2011 | DCR 110162 |