

The EN-4000's Solid-State Input/Output Card

This document discusses the EN-4000's solid-state input/output card (solid-state I/O card). The card performs the following functions:

- The solid-state I/O card detects inputs from local devices, and reports that information to other devices or to enCloud™.
- The solid-state I/O card generates outputs to control local devices.

Note: All values and selections in this document's procedures are examples. Confer with your network administrator to determine appropriate parameter values and reasons for selections.

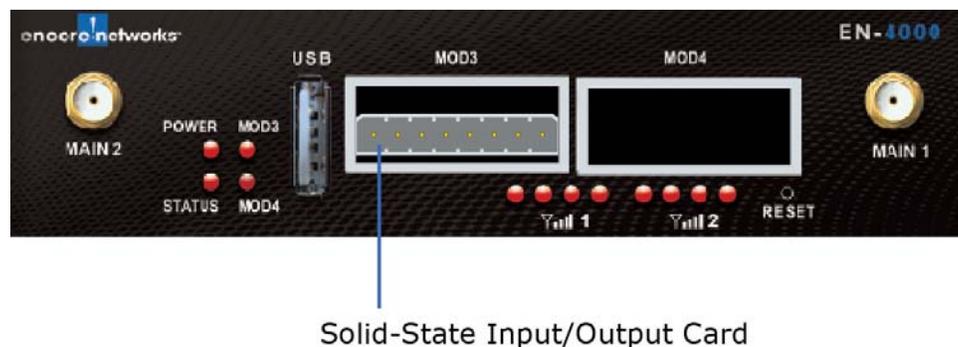
See the following:

- [Section 8.1, Solid-State I/O Card Hardware](#), on page 1
- [Section 8.2, Management of the Solid-State I/O Card](#), on page 6

8.1 Solid-State I/O Card Hardware

The solid-state input/output card can be installed into module 3 or module 4 of the EN-4000 chassis (Figure 8-1).

Figure 8-1. EN-4000 with Solid-State I/O Card



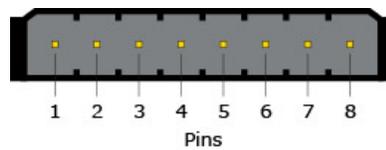
See the following:

- [Section 8.1.1, *Pin Configuration*](#), on page 2
- [Section 8.1.2, *Connecting the Solid-State I/O Card to Local Devices*](#), on page 2
- [Section 8.1.3, *Input Wiring*](#), on page 4
- [Section 8.1.4, *Output Wiring*](#), on page 5

8.1.1 Pin Configuration

The front of the solid-state I/O card has one 8-pin I/O connector port ([Figure 8-2](#)), from Phoenix Contact GmbH. The port provides three inputs and two outputs.

Figure 8-2. Pins on the I/O Connector Port (Phoenix Part Number 1778829)



[Table 8-1](#) lists the pin configuration for the port.

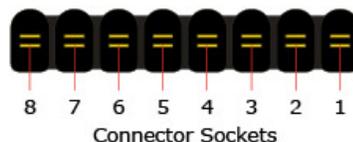
Table 8-1. Pin Configuration for the I/O Connector Port

Pin	Description
1	Channel 1 out, Relay 1
2	Channel 1 out, Relay 1
3	Channel 2 out, Relay 2
4	Channel 2 out, Relay 2
5	Channel 1 in
6	Channel 2 in
7	Channel 3 in
8	GND (Ground)

8.1.2 Connecting the Solid-State I/O Card to Local Devices

Encore Networks, Inc., provides the mating connector (front, [Figure 8-3](#), from Phoenix Contact GmbH) for the I/O connector port.

Figure 8-3. Mating Connector (Phoenix Part Number 1778890)



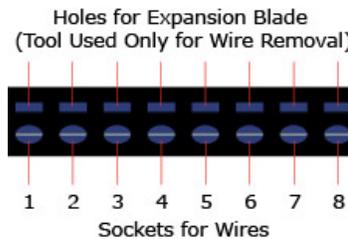
Note: The customer will need to connect wires to the mating connector. Each connecting wire (cable) must have a maximum 0.5 mm² diameter (= 20 AWG, a.k.a. 20 gauge).

- 1 Trim about 0.236" (6 mm) length of insulation off a wire, to expose the wire for connection.

It is recommended that a ferrule be used with each wire. The CRIMPFOX6 tool (Phoenix part number 1212034) and a ferrule for 20 AWG wire (Phoenix part number 3200218) are suggested.

- 2 Crimp the ferrule onto the end of the stripped wire.
- 3 Insert the crimped ferrule into the desired circuit ([Figure 8-4](#)).

Figure 8-4. Mating Connector, Back View



- 4 Connect the other end of the wire (cable) to the device that the EN-4000's solid-state I/O card will monitor or control.
- 5 Repeat [step 1](#) through [step 4](#) as required.

Figure 8-5. Mating Connector, with Cables, Back View
(Shown fully connected; sites may vary in number of connected circuits.)

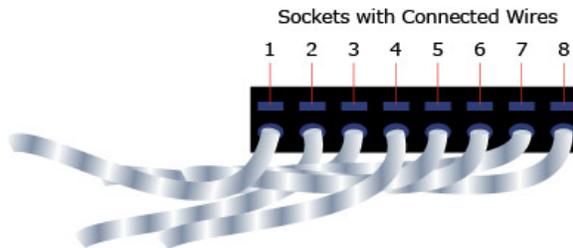
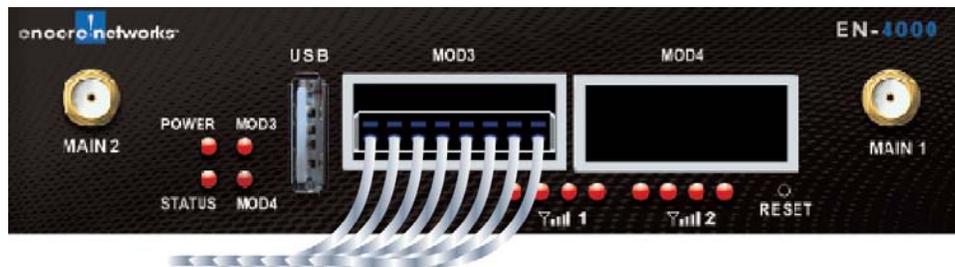


Figure 8-6. EN-4000 with Solid-State I/O Card and Cables



If a wire needs to be removed:

- a On the back of the mating connector (recall [Figure 8-4](#)), insert a small-blade screwdriver into the corresponding expansion blade hole above the wire's socket.

Note: The screwdriver blade should measure 0.4 mm x 2.0 mm. (Available from Phoenix Contact GmbH, www.phoenixcontact.com; order number 1205202; part number SZS 0,4X2,0.)

8.1.4 Output Wiring

Figure 8-8 is a schematic of the solid-state input/output card's pin connections. During power loss, SSR 1 and SSR 2 are open (as shown in the figure).

Figure 8-8. SSR Connections for Power Loss or Alarm Condition

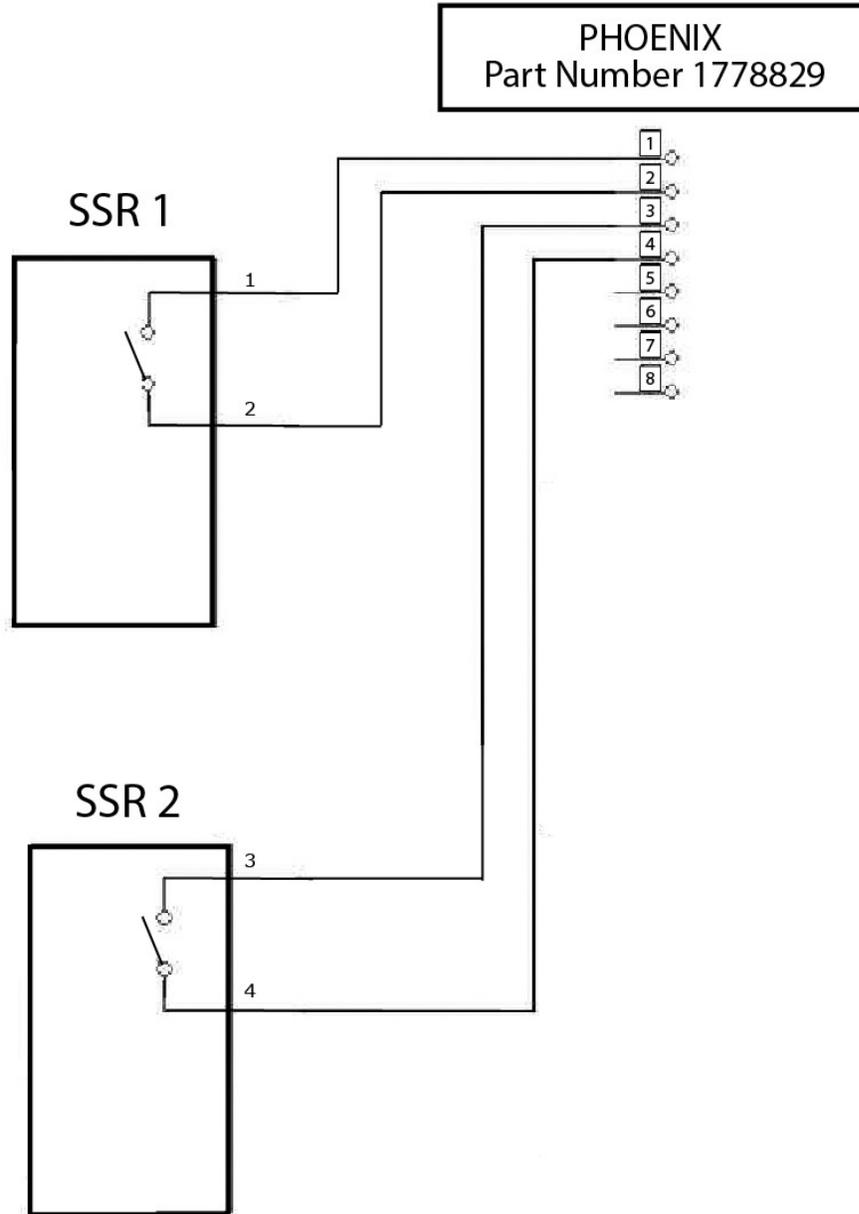


Table 8-2 lists electrical information for the solid-state I/O card.

Table 8-2. Solid-State I/O Card Electrical Information

Item	Value
Maximum current	4 amps
Typical on time	1.2 ms
Typical off time	0.1 ms
Isolation	2500 V _{rms}
Maximum switching voltage	60 V

8.2 Management of the Solid-State I/O Card

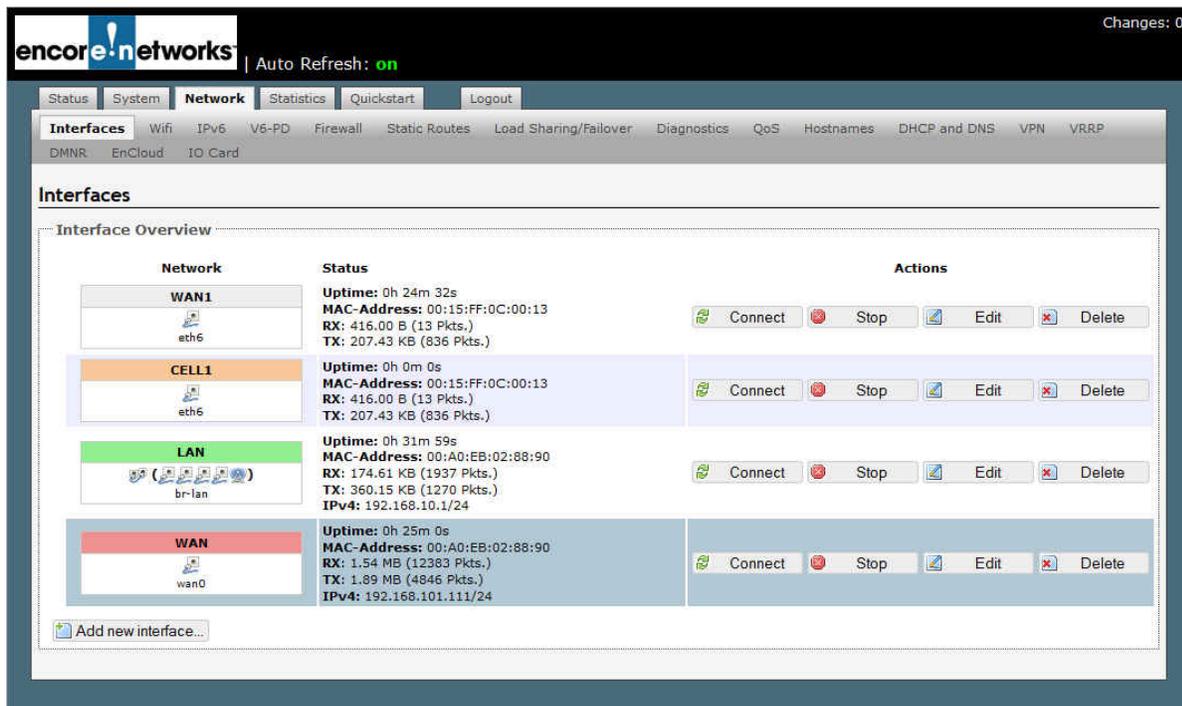
- 1 Connect the EN-4000 to its network. (See [Connecting to the EN-4000](#), on page 1 of the document [Configuring General Settings for the EN-4000](#).)
- 2 Connect a management terminal to the EN-4000 and log into the management system. (See [Logging In](#), on page 2 of the document [Configuring General Settings for the EN-4000](#).)
- 3 Then see the following discussions in the current document:
 - [Section 8.2.1, Configuring the Solid-State I/O Card](#), on page 6
 - [Section 8.2.2, Reviewing the EN-4000's Solid-State Input/Output Settings](#), on page 11
 - [Section 8.2.3, Enabling the EN-4000 in the enCloud™ or enSite™ Management System](#), on page 11
 - [Section 8.2.4, Using enCloud™ or enSite™ to Monitor I/O Card Settings](#), on page 12

8.2.1 Configuring the Solid-State I/O Card

Note: Confer with your network administrator to determine parameter values and reasons for choices.

- 1 On the EN-4000 Management System, select the **Network** tab.
 - ❖ The Network Interface Overview is displayed ([Figure 8-9](#)).

Figure 8-9. Network Interface Overview



- 2 On the Network Interface Overview, select the tab for the **IO Card**.
 - ❖ The Configuration Screen for the I/O Card is displayed ([Figure 8-10](#)).

Figure 8-10. Configuration Screen for the I/O Card

encore networks Changes: 0

Status System **Network** Statistics Quickstart Logout

Interfaces Wifi IPv6 V6-PD Firewall Static Routes Load Sharing/Failover Diagnostics QoS Hostnames DHCP and DNS VPN VRRP
DMNR EnCloud **IO Card**

IO Card Configuration

Configure IO Card

IO Card Parameters

IO Card Enabled	<input type="checkbox"/>
Interval	60
Input Channel 1	Encloud
Description of Input Channel 1	in1
Input Channel 2	Encloud
Description of Input Channel 2	in2
Input Channel 3	Encloud
Description of Input Channel 3	Door
Connection of Output Channel 1	To Camera
Description of Output Channel 1	Camera
Connection of Output Channel 2	To Fan
Description of Output Channel 2	Fan
Temperature in Degrees Celsius for Fan To turn off	70
Temperature in Degrees Celsius for Fan To turn on	75

Reset Save Save & Apply

- 3 On the screen, select the checkbox marked **IO Card Enabled** (as in [Figure 8-11](#)).

Figure 8-11. Detail: Checkbox Selected to Enable the I/O Card

encore networks Changes: 0

Status System **Network** Statistics Quickstart Logout

Interfaces Wifi IPv6 V6-PD Firewall Static Routes Load Sharing/Failover Diagnostics QoS Hostnames DHCP and DNS VPN VRRP
DMNR EnCloud **IO Card**

IO Card Configuration

Configure IO Card

IO Card Parameters

IO Card Enabled	<input checked="" type="checkbox"/>
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- 4 Set the **Interval** for the router to send and receive data for tasks (that is, to send data to output channels and to receive data from input channels). The minimum interval is **60** seconds, as shown in [Figure 8-12](#), on page 8. The maximum interval is **604800** seconds (7 days).

Note: In this field, do not include commas in numbers.

- 5 To set the value for **Input Channel 1**, select an item in the field's dropdown list. [Figure 8-12](#), on page 8, shows the selected value **enCloud**.
- 6 If you wish, type a short description in the field **Description of Input Channel 1**.

Figure 8-12. Selecting the Value for Input Channel 1

encore! networks Changes: 0

Status System **Network** Statistics Quickstart Logout

Interfaces Wifi IPv6 V6-PD Firewall Static Routes Load Sharing/Failover Diagnostics QoS Hostnames DHCP and DNS VPN VRRP

DMNR EnCloud **IO Card**

IO Card Configuration

Configure IO Card

IO Card Parameters

IO Card Enabled	<input checked="" type="checkbox"/>
Interval	60
Input Channel 1	Encloud
Description of Input Channel 1	None
Input Channel 2	Encloud
Description of Input Channel 2	in2
Input Channel 3	Encloud
Description of Input Channel 3	Door
Connection of Output Channel 1	To Camera
Description of Output Channel 1	Camera
Connection of Output Channel 2	To Fan
Description of Output Channel 2	Fan
Temperature in Degrees Celsius for Fan To turn off	70
Temperature in Degrees Celsius for Fan To turn on	75

Reset Save Save & Apply

- 7 To set the value for **Input Channel 2**, select an item in the field's dropdown list. [Figure 8-12](#) shows the value **enCloud**.
 - 8 If you wish, type a short description in the field **Description of Input Channel 2**.
 - 9 To set the value for **Input Channel 3**, select an item in the field's dropdown list. [Figure 8-12](#) shows the value **enCloud**.
 - 10 If you wish, type a short description in the field **Description of Input Channel 3**. (In [Figure 8-12](#), the description is **Door**.)
 - 11 To set the local device for **Output Channel 1**, select an item in the field's dropdown list. (**To Camera** is shown in [Figure 8-13](#).)
- Note:** Depending on the device selected, fields for output control might be displayed.
- 12 If you wish, type a short description in the field **Description of Output Channel 1**.

Figure 8-13. Selecting the Value for Output Channel 1

The screenshot shows the 'IO Card Configuration' page in the Encore Networks management interface. The 'IO Card Parameters' section is expanded, showing a list of configuration fields. The 'Connection of Output Channel 2' dropdown menu is open, showing a list of options: 'To Camera', 'Open', 'Closed', 'To Fan', 'To Camera' (highlighted in blue), 'To In1', 'To In2', and 'To In3'. Other fields include 'IO Card Enabled' (checked), 'Interval' (60), 'Input Channel 1' (Encloud), 'Description of Input Channel 1' (in1), 'Input Channel 2' (Encloud), 'Description of Input Channel 2' (in2), 'Input Channel 3' (Encloud), 'Description of Input Channel 3' (Door), 'Connection of Output Channel 1' (To Camera), 'Description of Output Channel 1', 'Connection of Output Channel 2', 'Description of Output Channel 2', 'Temperature in Degrees Celsius for Fan To turn off' (70), and 'Temperature in Degrees Celsius for Fan To turn on' (75). Buttons for 'Reset', 'Save', and 'Save & Apply' are located at the bottom right of the configuration area.

- 13 To set the local device for **Output Channel 2**, select an item in the field's dropdown list. (for example, **To Fan**).
 - ❖ Additional fields might be displayed, for output control (for example, fan control).
- 14 If you wish, type a short description in the field **Description of Output Channel 2**.
- 15 If additional fields are displayed for output control, indicate values for those fields (described here for [Figure 8-13](#)):
 - a Type the **Temperature in Degrees Celsius for Fan to Turn Off** (shown as **70** in [Figure 8-14](#)).
 - b Type the **Temperature in Degrees Celsius for Fan to Turn On** (shown as **75** in [Figure 8-14](#)).

Figure 8-14. Completed Configuration for Solid-State I/O Card

The screenshot shows the 'IO Card Configuration' page in the EN-4000 management system. The page is titled 'IO Card Configuration' and contains a form for configuring IO Card parameters. The form includes the following fields and values:

Parameter	Value
IO Card Enabled	<input checked="" type="checkbox"/>
Interval	60
Input Channel 1	Encloud
Description of Input Channel 1	in1
Input Channel 2	Encloud
Description of Input Channel 2	in2
Input Channel 3	Encloud
Description of Input Channel 3	Door
Connection of Output Channel 1	To Camera
Description of Output Channel 1	Camera
Connection of Output Channel 2	To Fan
Description of Output Channel 2	Fan
Temperature in Degrees Celsius for Fan To turn off	70
Temperature in Degrees Celsius for Fan To turn on	75

At the bottom right of the form, there are three buttons: 'Reset', 'Save', and 'Save & Apply'.

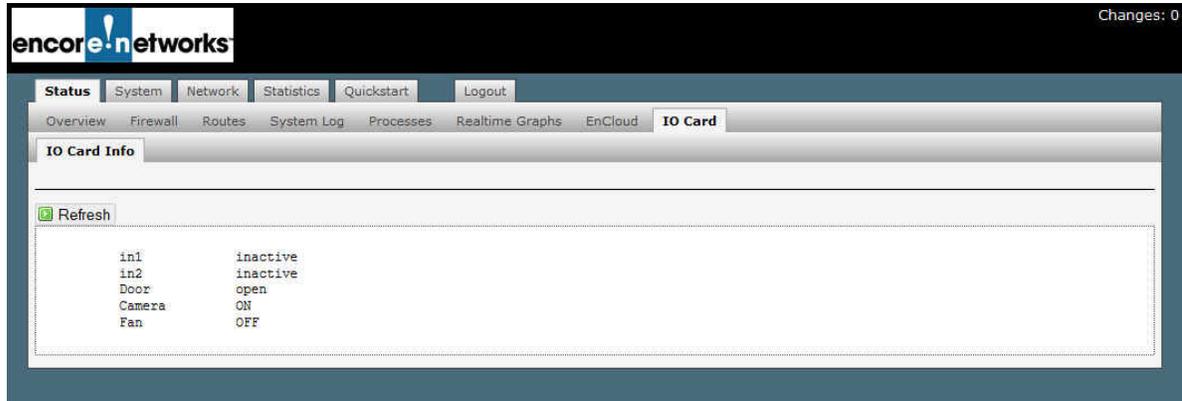
- 16** After values have been completed for the I/O card parameters, do one of the following:
- To save the configuration and use it immediately, select the **Save & Apply** button (in the lower right corner of the screen).
 - ❖ The solid-state I/O card's ports are configured for your network. The new configuration will be effective immediately.
 - To save the configuration and use it the next time you log into the EN-4000 management system, select the **Save** button (near the lower right corner of the screen).
 - ❖ The solid-state I/O card's ports are configured for your network. The new configuration will be effective the next time this EN-4000's management system is restarted. (A user log-in screen will be presented when the EN-4000 restarts.)
 - To discard your changes, select the **Reset** button (near the lower right corner of the screen).
 - ❖ The changes are discarded. The parameters on the screen resume their previous settings.

8.2.2 Reviewing the EN-4000's Solid-State Input/Output Settings

Do the following to review the solid-state I/O card's settings:

- 1 On the management screen, select the tab for **Status**.
- 2 Select **IO Card**; then select **IO Card Info**.
 - ❖ The Status of the EN-4000's I/O Card is displayed ([Figure 8-15](#)).

Figure 8-15. Status of the EN-4000's I/O Card



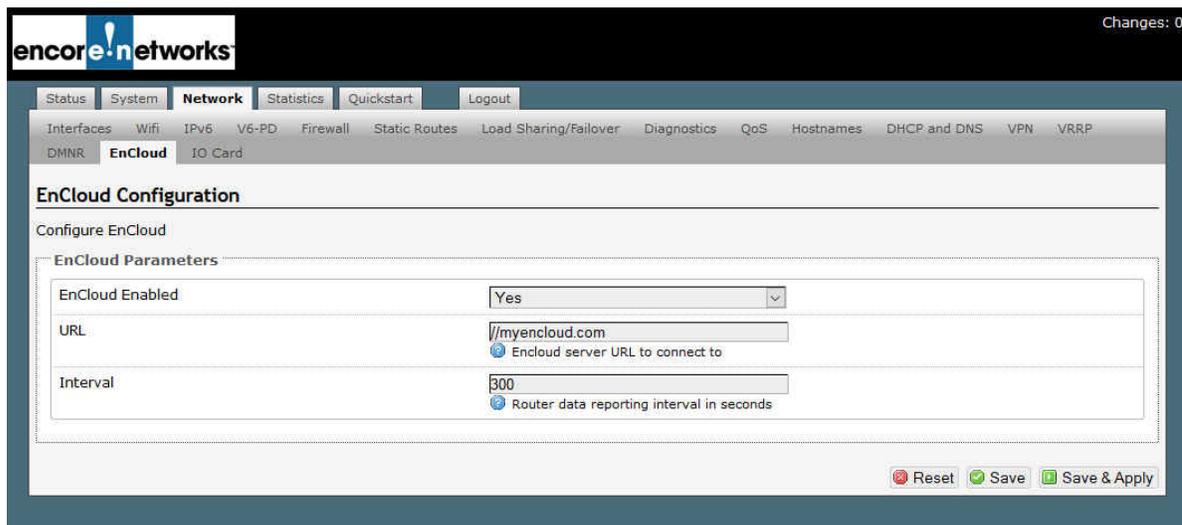
Note: In [Figure 8-15](#), input 1 and input 2 are **inactive**, because the EN-4000 router has not yet been enabled in enCloud™. Input 3 shows that the door is **open**. Output 1 shows that the camera is **on**, and output 2 shows that the fan is **off**.

8.2.3 Enabling the EN-4000 in the enCloud™ or enSite™ Management System

After you have reviewed the solid-state I/O card's configuration, do all of the following to enable a connection between this EN-4000 and enCloud or enSite:

- 1 In the EN-4000 management tabs, select **Network**; then select **enCloud**.
 - ❖ The router's EnCloud Configuration screen is displayed ([Figure 8-16](#)).

Figure 8-16. Communication Enabled between EN-4000 and enCloud



- 2 In the field **enCloud Enabled**, select **Yes**.
- 3 Make sure the **URL** field points to enCloud™ or to your server for enSite™.
Note: The URL for enCloud™ is <https://myencloud.com>. Get information for the enSite™ server from your network administrator.
- 4 Do one of the following:
 - a To save the configuration and use it immediately, select the **Save & Apply** button (in the lower right corner of the screen).
 - ❖ The EN-4000 can now be managed via enCloud™ or enSite™. The new configuration will be effective immediately.
 - b To save the configuration and use it the next time you log into the EN-4000 management system, select the **Save** button (near the lower right corner of the screen).
 - ❖ The EN-4000 can now be managed via enCloud™ or enSite™. The new configuration will be effective the next time the EN-4000 is restarted. (A user log-in screen will be presented after the EN-4000 has restarted.)
 - c To discard your changes, select the **Reset** button (near the lower right corner of the screen).
 - ❖ The changes are discarded. The parameters on the screen resume their previous settings.

8.2.4 Using enCloud™ or enSite™ to Monitor I/O Card Settings

Note: For details of navigating through accounts in enCloud™ or enSite™, see the [Account Development Module](#) for the [enCloud™ Management System](#).

- 1 Open enCloud or enSite.
- 2 In the enCloud menu (along the left side of the screen), select your **Tier 1** account.
- 3 In the displayed table, select the tier 2 account that contains the device that you wish to monitor (the EN-4000 with a solid-state I/O card).
- 4 Then, when that tier 2 account is displayed, select **Devices** in the enCloud menu.
 - ❖ The tier 2 customer's table of devices is displayed. You can use filters to select one or more devices to display.

Note: [Figure 8-17](#), below, lists the customer's table of devices, filtered to list this discussion's EN-4000 with a solid-state I/O card. (For this discussion, red rectangles indicate use of filters.) [Figure 8-18](#) shows some detail from [Figure 8-17](#).

Figure 8-17. Table of Devices, Filtered to List the EN-4000 with Solid-State I/O Card

The screenshot shows the 'Devices' page in the Encore Networks management system. The interface includes a sidebar with navigation options like System Management, Tier 1 (NAM), Tier 2 (Customer), Devices, Tier Profiles, Rule Management, Roles, Events, Alerts, User Management, Users, Report Management, Billing, and Help. The main content area displays a summary of device statistics: Unassigned Devices (205), Tier 2 (Customer) Devices (392), Online Devices (24), Offline Devices (573), Total Alerts (2872), Resolved Alerts (493), Unresolved Alerts (2379), Passive Devices (207), Waiting for Response Devices (115), Registered Devices (72), and Expired Devices (203). Below the summary, there are options for 'Actions for Selected Device', 'records per page' (set to 100), and a search bar. A table of devices is shown with columns for HW Profile, Online, State, Tier 1 (VAR), Tier 2 (Customer), Tier 3 (Group), Name, Device UID, Description, Last Seen, col.RSDP, Class of Service, Activation Date, Subscription End Date, col.MEM, col.BME, and col.IP. The 'Filter' button is highlighted with a red box. The table shows one device: EN4000, Online, Registered, ABC (Encore Engineering), ABCtenant, newapp, Sunny's ENK, 00A0E802532E, A few seconds ago, 30 Days Subscription(Demo), 05/01/2019 10:41:18 PM, 06/30/2019 10:41:18 PM, and Actions.

Figure 8-18. Detail from Figure 8-17 (Table of Devices, Filtered)

This screenshot provides a detailed view of the device table. The sidebar on the left includes options for Events, Alerts, User Management, Users, Report Management, Billing, and Help. The main content area shows 'Actions for Selected Devices', 'records per page' (set to 100), and a search bar. The 'Filter' button is highlighted with a red box. The table has columns for HW Profile, Online, State, Tier 1 (VAR), Tier 2 (Customer), and Tier 3 (Group). The table shows one device: EN4000, Online, Registered, ABC (Encore Engineering), ABCtenant, newapp. Below the table, it says 'Showing 1 to 1 of 1 entries (filtered from 597 total entries)'.

5 In the table, select the device you wish to review. (For this discussion, that device is the EN-4000 with a solid-state I/O card.)

- ❖ An overview of the router's information is displayed (Figure 8-19, on page 14).

Note: The EN-4000 reports its information to the enCloud management system. The display in the top middle section of Figure 8-19 lists the statuses for the device's solid-state input channels and output channels. Use the button on the right side of the display to scroll down the list of channel statuses.

Figure 8-20 is a detail from Figure 8-19: the list of channel statuses for devices connected to the solid-state I/O card. As shown in Figure 8-20, the router reports an input channel as **on line** if the channel is connected to any output channel. Otherwise, the EN-4000 reports the input channel as **off line**.

Figure 8-19. Information about Selected Device (EN-4000 with Solid-State I/O Card)

The screenshot displays the management console for a Sunny's EN4K device. The device is currently 'Offline'. The interface includes sections for System Info, Cellular Information, and a table of I/O Channels. The I/O Channels table is as follows:

Sensor	Value
io.input_1_description	in1
io.input_2_description	in2
io.input_3_description	Door
io.input_channel1	✗
io.input_channel2	✗
io.input_channel3	✗
io.output_1_description	Camera
io.output_2_description	Fan
io.output_channel1	✓
io.output_channel2	✗

Figure 8-20. Detail: Statuses of I/O Channels in Selected EN-4000

The detailed view of the I/O Channels table is as follows:

Sensor	Value
io.input_1_description	in1
io.input_2_description	in2
io.input_3_description	Door
io.input_channel1	✗
io.input_channel2	✗
io.input_channel3	✗
io.output_1_description	Camera
io.output_2_description	Fan
io.output_channel1	✓
io.output_channel2	✗

Note: The following list reflects the channel values shown in Figure 8-20.

- io.input_channel1 off line (red x)
- io.input_channel2 off line (red x)
- io.input_channel3 off line (red x)
- io.output_channel1 on line (green checkmark)
- io.output_channel2 off line (red x)