Base Switch Adapter

ARC-1289-32I

(PCIe 5.0 x16 NVMe Switch Adapter)

User Manual

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FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

Manufacturer's Declaration for CE Certification

We confirm ARC-1289-32I has been tested and found compliant with the requirements in the council directive relating to the EMC Directive 2004/108/EC. Regarding to the electromagnetic compatibility, the following standards were applied:

EN 55022: 2006, Class B
EN 61000-3-2: 2006
EN 61000-3-3: 1995+A1: 2001+A2: 2005

EN 55024:1998+A1:2001=A2:2003
IEC61000-4-2: 2001
IEC61000-4-3: 2006
IEC61000-4-4: 2004
IEC61000-4-5: 2005
IEC61000-4-6: 2006
IEC61000-4-8: 2001
IEC61000-4-11: 2004

Contents

1. Introduction

This section presents a brief overview of base switch adapters, PCIe Gen5 x16 ARC-1289-32I. ARC-1289-32I represents ARC-1389-32I using Base mode firmware (update from Synthetic mode to Base mode firmware.

1.1 Overview

The ARC-1289-32I is a high-performance PCIe 5.0 x16 base switch adapter utilizing Broadcom's PEX89048 chip to facilitate advanced data interconnections. It supports diverse applications such as fanout configurations, and NVMe hot-plug functionality for seamless device management. The hardware features four MCIO ports with flexible lane reconfiguration, allowing users to adjust downstream widths from x1 to x16 via a graphical interface. Comprehensive management is available through out-of-band LAN or in-band Archttp utilities, offering web-based controls for monitoring system health, link status, and error logs. Additionally, the adapter includes robust reliability features like redundant flash images for firmware safety and automated intelligent cooling systems. These sources collectively serve as a technical guide for installing, configuring, and leveraging the switch in building high-bandwidth, low-latency, and scalable interconnections for ML/AI (Machine Learning/ Artificial Intelligence), HPC (High-Performance Computing), and enterprise applications.

Gen 5.0 Performance Gains for Fast Device

Based on Broadcom's 48-Channel PEX89048 switch chip that provides x16 lanes of dedicated PCIe Gen 5.0 upstream station and flexible reconfiguration downstream station port widths to each device interface, ARC-1289-32I base switch adapter raises the standard to higher performance levels with several enhancements including a new high performance management engine, outstanding performance PCIe Gen 5.0 host and PCIe Gen 5.0 device interface bus interconnection.This switch adapter can support flexible reconfiguration each downstream station port widths: x1, x2, x4, x8, and x16 via on-board lan port or Archttp GUI interface.

Unsurpassed Advantages

During the adapter firmware upgrade process, it is possible for a problem to occur, resulting in corruption of the controller firmware. With redundant flash image feature the ARC-1289-32I adapter will revert back to the last known good firmware and continue operating.The advanced intelligent cooling continuously adapts to environmental conditions by automatically controlling the speed of the cooling fans. The firmware can monitor and check the current attached device status. It includes slot control capabilities, slot link status, transaction error count reports and device information. User can use it to test new designs or watch over active systems to prevent problems.

Maximum Interoperability

The ARC-1289-32I supports in-box (native) NVMe driver for most major operating systems, including Windows, Linux, FreeBSD, VMare and more, along with key system monitoring features such as enclosure management, SMTP and SNMP functions. ARC-1289-32I products and technology are based on extensive testing and validation processes, optimizing switch adapter in field-proven compatibility with operating systems, and motherboards.

Intuitive Management Access

Modern IT infrastructure relies heavily on efficient storage management to ensure optimal performance, reliability, and longevity of hardware components. Software management provides critical insights into adapter drive health, and predictive failure analysis. By leveraging these metrics, organizations can optimize storage efficiency, reduce downtime, and extend hardware lifespan. Similar to Areca switch adapter, the ARC-1289-32I switch adapter is supplied with fully validated and supported firmware and in-band or out of band manageability features.McBIOS switch setup utility is a BIOS based utility used to simplify manage switch adapter. The switch adapter firmware contains a browser-based switch storage manager which can be accessed through the ArcHttp proxy server in Windows, Linux, FreeBSD and on-board Lan port. The switch storage manager allows local and remote to configure from standard web browser.The adapter also supports CLI and API libraries

for custom configurations.

1.2 Features

Adapter Architecture

- PEX89048 Gen5 Switch/High-performance management engine
- PCIe Gen5 x16 lane 512GT/s in upstream
- PCIe Gen5 x32 1024GT/s in downstream
- Support 4x MCIO (PCIe Gen5 x8 per MCIO)
- Supports PCIe link rates of 32 GT/s
- Support SFF-9402 compliant connector side band pin-out

Firmware Features

- SRIS and REFCLK support
- Surprise Add and Remove (Hot-Plug) support
- Redundant flash image for adapter availability
- NVRAM for switch adapter event & transaction log
- Flexible reconfiguration downstream station port widths: x1, x2, x4, x8, and x16 via GUI interface
- Intelligent cooling and advanced slot control support

Monitors/Notification

- System status indication through alarm buzzer
- SMTP support for email notification
- SNMP support for remote manager
- Field-upgradeable firmware in flash ROM
- Web browser-based base manager via In-band/Out-of-Band
- Support push button and LCD display panel module

PCIe Gen5 x16 Base Switch Adapter	
Model Name	ARC-1289-32I
PCIe Switch	PEX89048 Gen5 Switch/Management Engine
Host Bus Type	PCIe 5.0 x 16 Lanes
Device Interface	Flexible reconfiguration downstream station port widths: x1, x2, x4, x8, and x16 using GUI interface
Form Factor (L x H)	LP-MD2 : 64.41(H) x 167.65(L) mm
Device Connector	4x MCIO (PCIe 5.0 x8 per MCIO) Connector
Management Port	Out-of_band:Lan Port/In-Band Archttp Utility
Power Consumption	Worst Case: 23.7 Watts, Typical: 18 Watts

2. Hardware Installation

This section describes the procedures for installing the ARC-1289-32I switch adapters.

2.1 Before You First Installing

Thanks for purchasing the switch adapter as your data storage system. This user manual gives simple step-by-step instructions for installing and managing the switch adapter. To ensure personal safety and to protect your equipment and data, reading the following information package list carefully before you begin installing.

Package Contents

If your package is missing any of the items listed below, contact your local dealers before you install.

- 1 x ARC-1289-32I switch adapter with full-height profil bracket in an ESD-protective bag
- 1 x Low-profile bracket

System Requirement

The ARC-1289-32I switch adapter can be installed in an universal PCIe slot and requires a motherboard that:
ARC-1289-32I switch adapter requires:

- Comply with the PCIe 5.0 x16 lanes
  The adapter can work on the PCIe 5.0 x1, x4, x8, and x16 signal with x16 mechanical slot M/B.
- Backward-compatibe with PCIe 2.0/3.0/4.0
- It can auto configure to the slot speed and width.

Installation Tools

The following items may be needed to assist with installing the ARC-1289-32I switch adapter into an available PCIe slot.

- Small screwdriver
- Host system hardware manuals and manuals for the disk or enclosure being installed

2.2 Board Layout

The ARC-1289-32I offers 4x MCIO (PCIe 5.0 x8 per MCIO connectors). This section provides the board layout and connector/LED for the switch adapter.

2.2.1 Top View Connectors

The following figure shows the key connectors of the ARC-1389-32I.

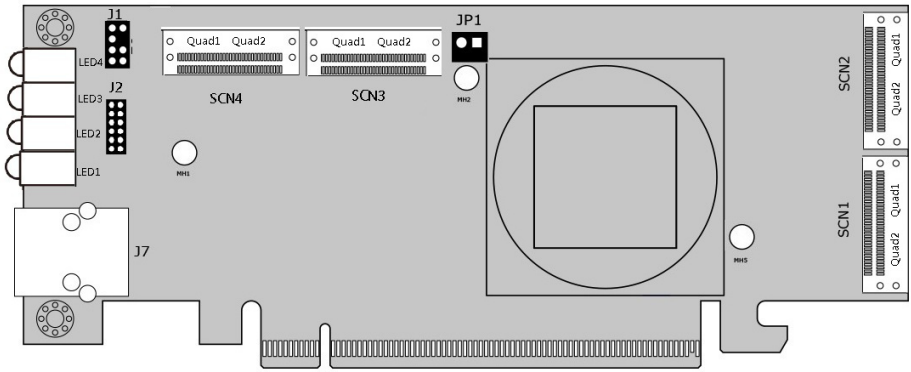


Figure 2-1, ARC-1289-32I Top View

Components	Description	Type
1. (J1)	I2C/LCD Control Function	7-pin Header
2. (JP1)	Fan Connector	2-pin Box Header
3. (SCN1)~(SCN4)	1. 4x MCIO[x8] (Dedicated PCIe 5.0 x8 per MCIO) for PCIE Device 2. A MCIO [x8] includes two quads (Quad1 and Quad2)	MCIO[x8] Connector
4. (LED1), (LED2), (LED3), (LED4)	Manufactor Reserved	Dual-Color LED
5. (J2)	Manufactor Reserved	12-pin Header
6. (J7)	Lan Port	RJ45

Table 2-1, ARC-1289-32I Components

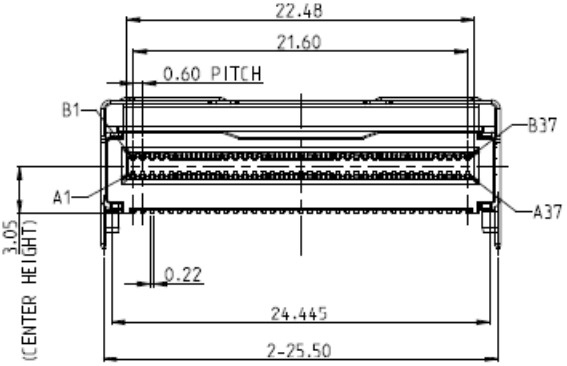
2.2.2 Connector Physical-to-Logical Mapping

The following table shows the adapter's physical connector to logical connector mapping as viewed from manager interface , when used with the switch manager. The adapter uses x8 MCIO connectors. Each connector is segregated into quads and mapped accordingly.

Physical Connector-to-Logical Connector Mapping			
Downstream Station	**Adapter Label**	**Tool Mapping**	**Port Number**
#2 (The PCIe switch groups 16 PCIe lanes into a station.)	**SCN1(CNT#1)**	**Quad1**	**0~3**
		Quad2	**4~7**
	SCN2(CNT#2)	**Quad1**	**0~3**
		Quad2	**4~7**
#1 (The PCIe switch groups 16 PCIe lanes into a station.)	**SCN3(CNT#3)**	**Quad1**	**0~3**
		Quad2	**4~7**
	SCN4(CNT#4)	**Quad1**	**0~3**
		Quad2	**4~7**

2.2.3 MCIO Connector

Mini Cool Edge (MCIO) Connectors offer increased flexibility by providing multiple circuit options and meet PCIe standards up to PCIe Generation 5 with high-speed data transmission rates. The following table defines the adapter's internal x8 MCIO connector (PCIe 5.0 x8 per MCIO connectors) pinouts. The adapter follows the SFF-9402 standard for connector sideband signal assignments. Each x8 connector includes eight PCIe transmit and receive lanes, and two sets of sidebands designated as A and B, in accordance with the SFF-9402 specification.



The following table defines the ARC-1289-32I MCIO connector pin definition.

	MCIO x8 Connector Pin Definition (SFF-TA-1016)			
	Pin	Name	Name	Pin
(SCN1)~(SCN4) Defined IO	A1	GND	BND	B1
	A2	PERp0	PETp0	B2
	A3	PERn0	PETn0	B3
	A4	GND	GND	B4
	A5	PERp1	PETP1	B5
	A6	PERn1	PETn1	B6
	A7	GND	GND	B7
	A8	PA_AUX_3V3	MCIO_SCL_A	B8
	A9	N/C	MCIO_SDA_A	B9
	A10	GND	GND	B10
	A11	MCIO_CLK_A_Dp	PERSTNA_A_L3V3	B11
	A12	MCIO_CLK_A_Dn	PA_CBL_DET	B12
	A13	GND	GND	B13
	A14	PERp2	PETp2	B14
	A15	PERn2	PETn2	B15
	A16	GND	GND	B16
	A17	PERp3	PETp3	B17
	A18	PERn3	PETn3	B18
	A19	GND	GND	B19
	A20	PERp4	PETp4	B20
	A21	PERn4	PETn4	B21
	A22	GND	GND	B22
	A23	PERp5	PETp5	B23
	A24	PERn5	PETn5	B24
	A25	GND	GND	B25
	A26	PB_AUX_3V3	MCIO_SCL_B	B26
	A27	N/C	MCIO_SDA_B	B27
	A28	GND	GND	B28
	A29	MCIO_CLK_B_Dp	PERSTNB_B_L3V3	B29
	A30	MCIO_CLK_B_Dn	PB_CBL_DET	B30
	A31	GND	GND	B31
	A32	PERp6	PETp6	B32
	A33	PERn6	PETn6	B33
	A34	GND	GND	B34
	A35	PERp7	PETp7	B35
	A36	PERn7	PETn7	B36
	A37	GND	GND	B37

2.3 Installation

Use the instructions below to install a ARC-1289-32I switch adapter.

Step 1. Unpack

Unpack and remove the switch adapter from the package. Inspect it carefully, if anything is missing or damaged, contact your local dealer.

Electrostatic Discharge

Static electricity can cause serious damage to the electronic components on this switch adapter. To avoid damage caused by electrostatic discharge, observe the following precautions:

- Do not remove the switch adapter from its antistatic packaging until you are ready to install it into a computer case.
- Handle the switch adapter by its edges or by the metal mount ing brackets at its each end.
- Before you handle the switch adapter in any way, touch a grounded, anti-static surface, such as an unpainted portion of the system chassis, for a few seconds to discharge any built-up static electricity.

Step 2. Power PC/Server Off

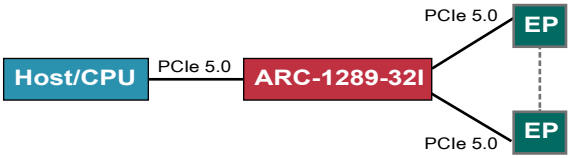
Turn off computer and remove the AC power cord. Remove the system's cover. For the instructions, please see the computer system documentation.

Step 3. Install the Switch Adapter

Topology 1: The Fanout Switch

In this configuration, the adapter acts as a simple connectivity system. It utilizes a wide upstream port (x16) to support multiple downstream ports of varying widths and speeds. This allows for flexible connections, such as endpoints configured at 32 GT/s even

if the host is only at 16 GT/s, or vice-versa.This switch adapter can support flexible reconfiguration each downstream station port widths: x1, x2, x4, x8, and x16 via on-board lan port or Archttp GUI interface.



Topology 2: NVMe Surprise Hot Add/Remove

The adapter supports systems where PCIe devices, such as NVMe drives, can be added to or removed from empty slots in a server or host at any time. This "Surprise Add and Remove" functionality ensures that the rest of the PCIe tree remains undisrupted during the process.

Step 4. Mount the PCIE Device

You can connect to the adapter through direct cable and backplane solutions.

Step 5. Power up the System

Thoroughly check the installation, reinstall the computer cover, and reconnect the power cord cables. Turn on the power switch at the rear of the computer (if equipped) and then press the power button at the front of the host computer.

Step 6. Install the Adapter Driver

ARC-1289-32I base switch adapter uses OS NVMe host (native) driver, no driver installation needed. All major operating systems natively support native NVMe driver. User does not need to install

device drivers, or software management suite. All attached PCIe device on the ARC-1289-32I will be automatically recognized by the operating system. If you don't monitor information from the adapter, belows step 7, step 8 and step 9 can be ignored.

Step 7. Manage Via McBIOS (Optional)

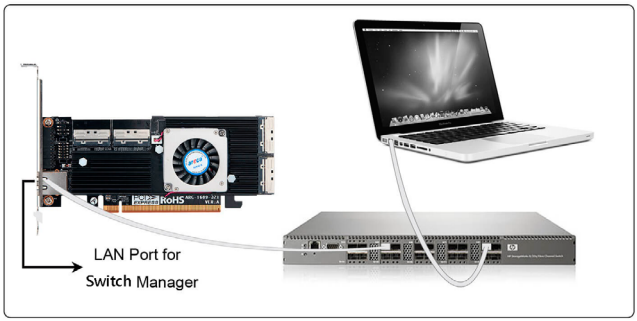
The adapter status can be managed via the McBIOS switch setup utility and web-based switch storage manager. Refer to Chapter 3 of the user manual, McBIOS Switch Setup Utility, for the detail.

Step 8. Manage Via ArcHTTP Proxy Server (Optional)

The switch adapter firmware has embedded the web-browser switch storage manager. ArcHTTP proxy server will launch the web-browser switch storage manager. It provides the management and monitor NVMe switch adapter status. Refer to the Chapter 4 ArcHTTP Proxy Server Installation and Chapter 5 Switch Storage Manager of the user manual, for the detail.

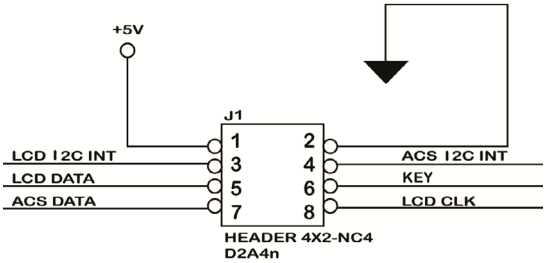
Step 9. Manage Via LAN Port Connection (Optional)

The ARC-1289-32I base switch adapter supports Ethernet port management and monitoring.The ARC-1289-32I base switch adapter has embedded the TCP/IP & web browser-based manager in the firmware. User can manage the adapter via standard web browsers directly connected to the RJ45 Ethernet port. Connect 10/100Mbit Ethernet port of the adapter to a Ethernet port or Ethernet switch. Refer to next section, Web Browser-based Configuration, for the detail.



2.4 Serial Interface Bus

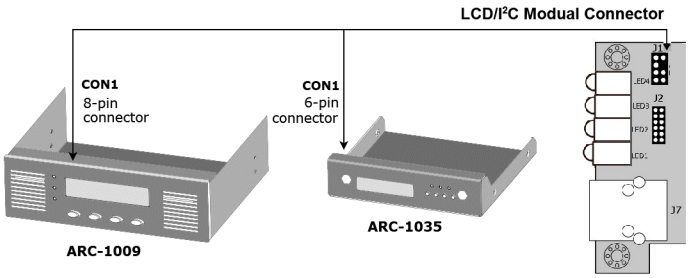
The serial interface connector can add optional accessories to add base switch adapter more functions. You can connect this interface to Areca LCD module for information, status indication, or menus or adapter LED indicator for status message. This interface can also cascade to another Areca serial bus accessories for the additional status display.The following picture and table are the serial bus signal name description for LCD & fault/activity LED.



Pin	Description	Pin	Description
1	Power (+5V)	2	GND
3	LCD Module Interrupt	4	Protect Key
5	LCD Module Serial Data	6	Fault/Activity Clock
7	Fault/Activity Serial Data	8	LCD Module Clock

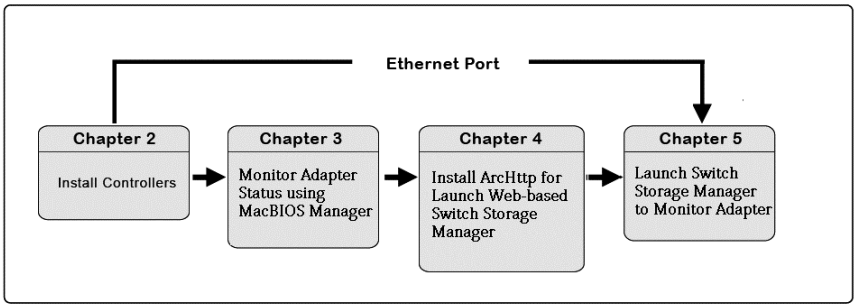
Table 2-3, Areca Serial Bus Pin Definition

ARC-1289-32I switch adapter supports one optional LCD front panel and keypad function to simply view adapter information without any creation function. The LCD status panel also informs user of the disk array's current operating status at a glance. The LCD configuration is described in a separate manual: RAID Card_ LCD manual. The LCD housed in a 5¼-inch half-height or 3.5 inch canister.



2.5 Summary of the installation

The flow chart below describes the installation procedures for base switch adapter.



These procedures monitor the base switch adapter through the McBIOS/switch setup utility, Ethernet port and installation of switch adapter software. The table below shows the software components that monitor the switch adapters.

Configuration Utility	Operating System Supported
McBIOS Switch Setup Utility	OS-Independent
Switch Storage Manager (Via on-board lan port)	OS-Independent
Switch Storage Manager (Via ArcHTTP proxy server)	Windows, Linux, and FreeBSD
ArcHTTP Proxy Server	Windows, Linux, and FreeBSD
CLI Utility	Windows, Linux, and FreeBSD
SAP Monitor (Scan multiple Switch units in the network)	Windows

Switch Storage Manager

There are two ways to launch switch storage manager on the ARC-1289-32I switch adapter: in-band PCIe host bus interface or out-of-band built-in LAN interface. Before launching the firmware-embedded web browser, switch storage manager through the PCIe bus, you need first to install the ArcHTTP proxy server on your server system. If you need additional information about start-up of this function, see the Switch Storage Manager section in Chapter 5 of the user manual.

ArcHTTP Proxy Server

ArcHTTP has to be installed for GUI switch console (switch storage manager) to run. It is used to launch the web browser switch storage manager. It also runs as a service or daemon in the background that allows capturing of events for mail and SNMP traps notification. If you need additional information about installation and start-up of this function, see the ArcHTTP Proxy Server Installation section in Chapter 4 of the user manual.

CLI Utility

CLI (Command Line Interface) lets you set up and manage switch adapter through a command line interface. CLI performs many tasks at the command line. You can download CLI manual from Areca website **https://www.areca.com.tw**.

Single Admin Portal (ArcSAP) Monitor

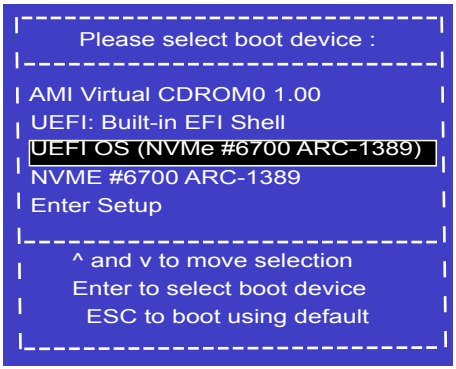
This utility can scan and manage multiple switch and RAID units in the local and remote systems and provide an effective mechanism to configure and monitor your switch and RAID units. For additional information, see the utility manual (ArcSAP) from the web site **https://www.areca.com.tw**.

3. McBIOS Switch Setup Utility

The McBIOS switch setup utility utility is designed to be user-friendly. It is a menu-driven program, residing in the firmware, which allows you to scroll through various menus and sub-menus and select among the predetermined management options. This section explains how to launch the McBIOS switch setup utility to monitor your switch adapters that the installed motherboard 'BIOS Mode' is UEFI.

M/B BIOS mode: UEFI and CSM (compatibility support module) option = disabled

a). Add switch adapters "UEFI OS(Areca A....)" in the M/B boot option: You must enter the setup of motherboard BIOS and add UEFI OS to the boot option if your motherboard BIOS does not automatically add it.

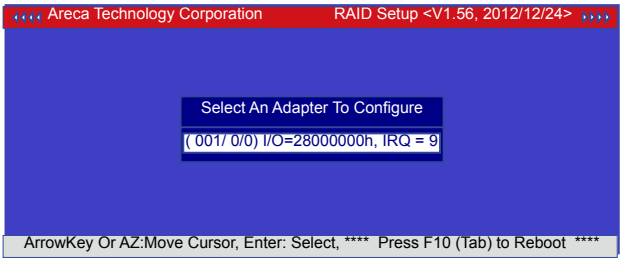


b). Restart your motherboard to boot from UEFI OS. The motherboard vendors provide two methods for choosing a boot device: Enter boot menu by using hotkey or enter boot menu through BIOS configuration.

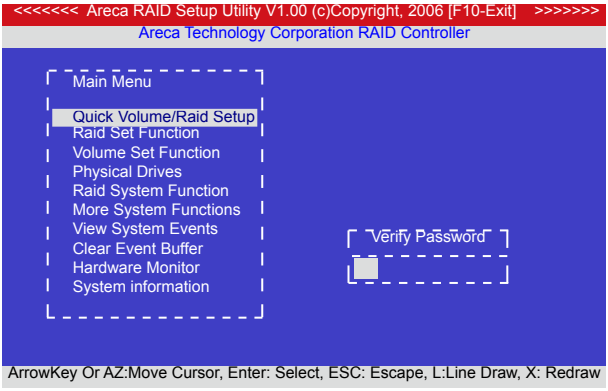
Note:

UEFI OS is not loaded when setting the 'Secure Boot' option=enabled in M/B BIOS setup.

c). When booted, the McBIOS switch setup utility window appears showing the main menu of the switch adapters that are installed in the system. If there have more than two switch adapters installed in the system, it will show a selection for user to choose one to configure the switch adapter.McBIOS setup utility operates upon a single switch adapter at a time. A selection dialog box listing the switch adapters that are installed in the system.



Use the **Up** and **Down** arrow keys to select the adapter you want to monitor. While the desired controller is highlighted, press the **Enter** key to enter the main menu of the McBIOS switch setup utility.



d). Follow the on-screen prompts to complete the configuration. After using "F10" to exit, you can enter " shell>exit" or need to hard power cycle it.

e). Enter the setup of motherboard BIOS to disable or adjust UEFI OS in the boot option priorities if it is the first priority of overall boot order. Otherwise the system will always boot into UEFI OS without using the hotkey.

Note:

The manufacture default password is set to **0000**; this password can be modified by selecting **Change Password** in the **Raid System Function** section.

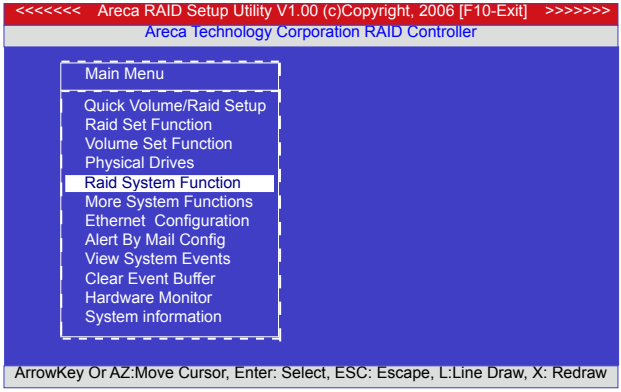
3.1 Main Menu

Since ARC-1289-32I uses same ARC-1689-32I McBIOS setup utility interface, it will be not avaliable any RAID function item on the McBIOS setup utility.
The main menu shows all functions that are available for executing actions, which is accomplished by clicking on the appropriate link. This password option allows user to set or clear the switch adapter's password protection feature. Once the password has been set, the user can only monitor and configure the switch adapter by providing the correct password. The password is used to protect the internal switch adapter from unauthorized entry. The adapter will prompt for the password only when entering the main menu from the initial screen. The switch adapter will automatically return to the initial screen when it does not receive any command in five minutes.

Option	Description
Quick Volume/Raid Setup	N/A
Raid Set Function	N/A
Volume Set Function	N/A
Physical Drives	N/A
3.2 Raid System Function	Setup the switch system configuration
More System Function	N/A
3.3 Ethernet Config	On-board Lan port configuration
3.4 Alert By Mail Config	Mail notifigation setting sent by on-board lan port
3.5 View System Events	Record all system events in the buffer
3.6 Clear Event Buffer	Clear all information in the event buffer
3.7 Hardware Monitor	Show the hardware system environment status
3.8 System Information	View the adapter system information

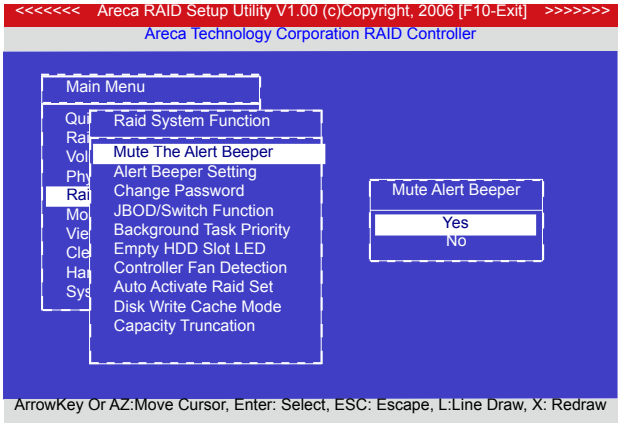
3.2 Raid System Function

To set the "Raid System Function", move the cursor bar to the main menu and select the "Raid System Function" item and then press **Enter** key. The "Raid System Function" menu will show multiple items. Move the cursor bar to an item, and then press **Enter** key to select the desired function.



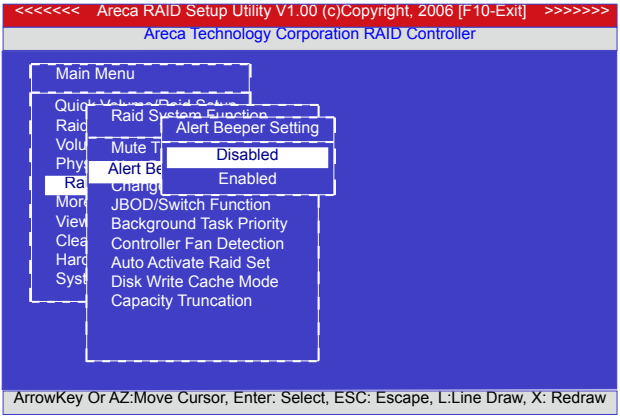
3.2.1 Mute The Alert Beeper

The "Mute The Alert Beeper" function item is used to control the NVMe Switch adapter beeper. Select **Yes** and press the **Enter** key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.



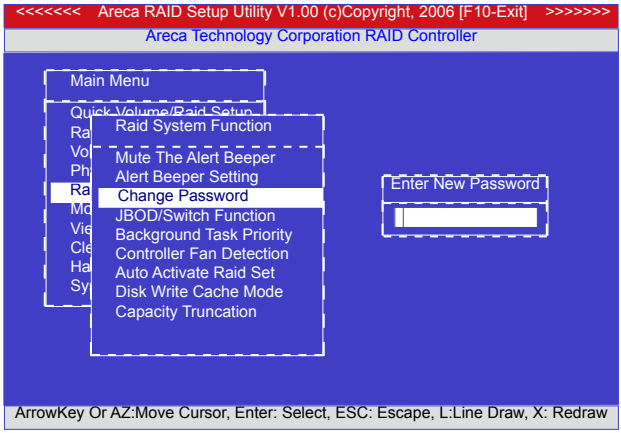
3.2.2 Alert Beeper Setting

The "Alert Beeper Setting" function item is used to "Disabled" or "Enabled" the NVMe Switch adapter alarm tone generator. Select "Disabled" and press the **Enter** key in the dialog box to turn the beeper off.



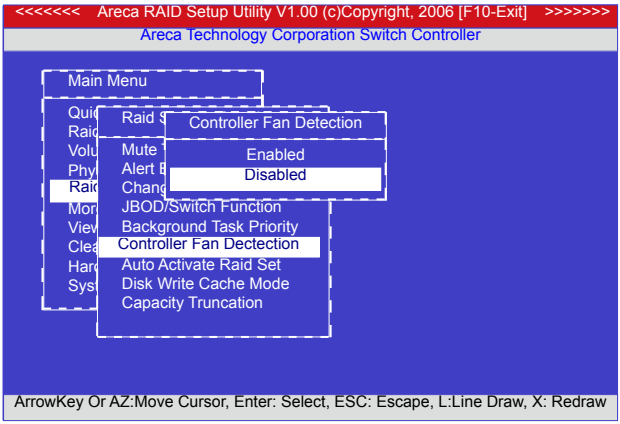
3.2.3 Change Password

The manufacture default password is set to 0000. The password option allows user to set or clear the password protection feature. Once the password has been set, the user can monitor and configure the adapter only by providing the correct password. This feature is used to protect the internal Switch system from unauthorized access. The adapter will check the password only when entering the main menu from the initial screen. The system will automatically go back to the initial screen if it does not receive any command in 5 minutes. To set or change the password, move the cursor to "Raid System Function" screen, press the "Change Password" item. The "Enter New Password" screen will appear. Do not use spaces when you enter the password, If spaces are used, it will lock out the user. To disable the password, only press **Enter** key in both the "Enter New Password" and "Re-Enter New Password" column. The existing password will be cleared. No password checking will occur when entering the main menu.



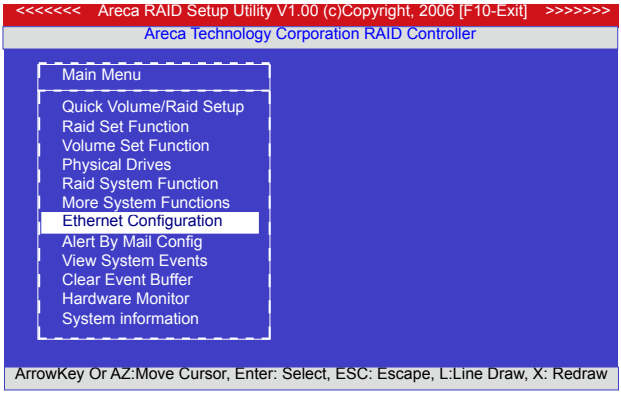
3.2.4 Controller Fan Detection

The ARC-1289-32I incorporate one big passive heatsink attaching one active cooling fans that allows the hot devices such as PCIe switch to keep cool. In addition, newer systems already have enough air flow blowing over the adapter. The "Controller Fan Detection" function is available in the firmware for detecting the cooling fan function on the heatsink which uses the active cooling fan. When using the passive heatsink on the adapter, disable the "Controller Fan Detection" function through this McBIOS switch setup utility setting. The following screen shot shows how to change the McBIOS switch setup utility setting to disable the warning beeper function.



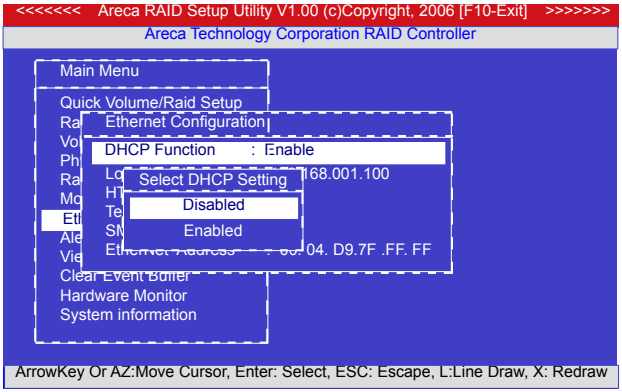
3.3 Ethernet Configuration

Use this feature to set the adapter Ethernet port configuration. It is not necessary to create reserved disk space on any hard disk for the Ethernet port and HTTP service to function; these functions are built into the adapter firmware.move the cursor bar to the main menu "Ethernet Configuration Function" item and then press the **Enter** key. The "Ethernet Configuration" menu appears on the screen. Move the cursor bar to an item, and then press **Enter** key to select the desired function.



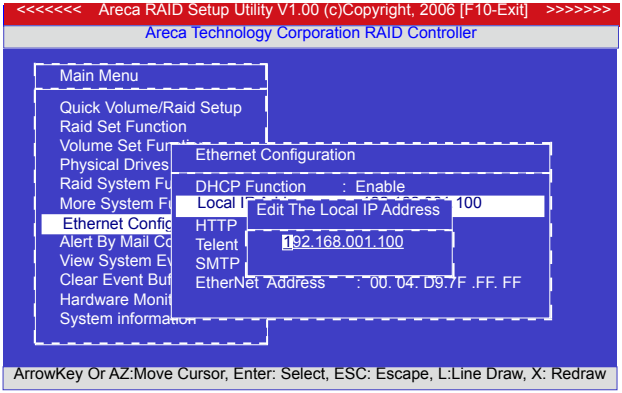
3.3.1 DHCP Function

DHCP allows network administrators centrally manage and automate the assignment of IP addresses on a computer network. When using the TCP/IP protocol, it is necessary for a computer to have a unique IP address in order to communicate to other computer systems. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to minimize the work necessary to administer a large IP network. To manually configure the IP address of the adapter, move the cursor bar to DHCP Function item, then press **Enter** key to show the DHCP setting.
Select the "Disabled" or "Enabled" option to enable or disable the DHCP function. If DHCP is disabled, it will be necessary to manually enter a static IP address that does not conflict with other devices on the network.



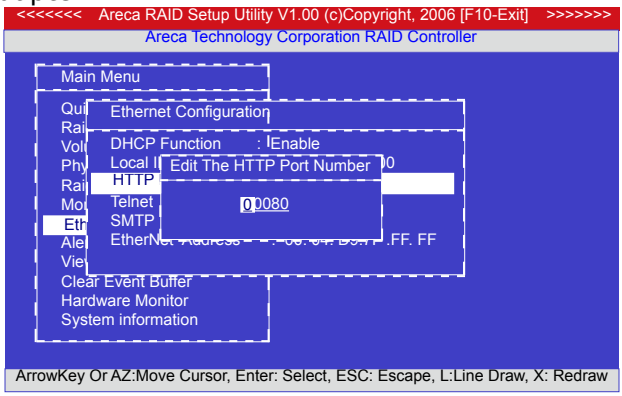
3.3.2 Local IP address

If you intend to set up your client computers manually (no DHCP), make sure that the assigned IP address is in the same range as the default router address and that it is unique to your private network. However, it is highly recommend to use DHCP if that option is available on your network. An IP address allocation scheme will reduce the time it takes to set-up client computers and eliminate the possibilities of administrative errors and duplicate addresses.
To manually configure the IP address of the adapter, move the cursor bar to Local IP address item, then press the **Enter** key to show the default address setting in the switch adapter. You can then reassign the static IP address of the adapter.



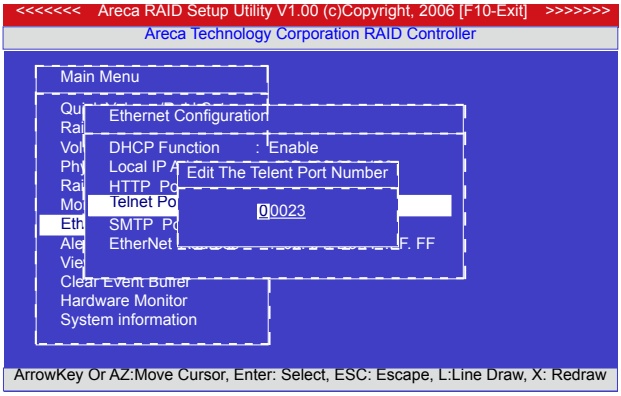
3.3.3 HTTP Port Number

To manually configure the "HTTP Port Number" of the adapter, move the cursor bar to "HTTP Port Number" item, then press the **Enter** key to show the default address setting in the switch adapter. Then You can reassign the default "HTTP Port Number" of the adapter.



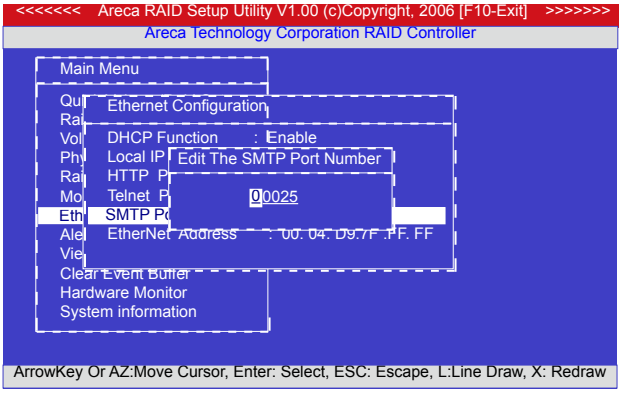
3.3.4 Telnet Port Number

To manually configure the "Telnet Port Number" of the adapter, move the cursor bar to "Telnet Port Number" item, then press the **Enter** key to show the default address setting in the adapter. You can then reassign the default "Telnet Port Number" of the adapter.



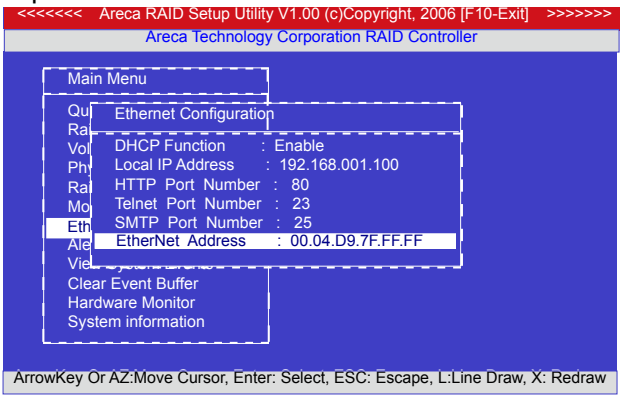
3.3.5 SMTP Port Number

To manually configure the "SMTP Port Number" of the adapter, move the cursor bar to the main menu "Ethernet Configuration" function item and then press **Enter** key. The "Ethernet Configuration" menu appears on the screen. Move the cursor bar to "SMTP Port Number" item, then press **Enter** key to show the default address setting in the switch adapter. You can then reassign the default "SMTP Port Number" of the adapter.



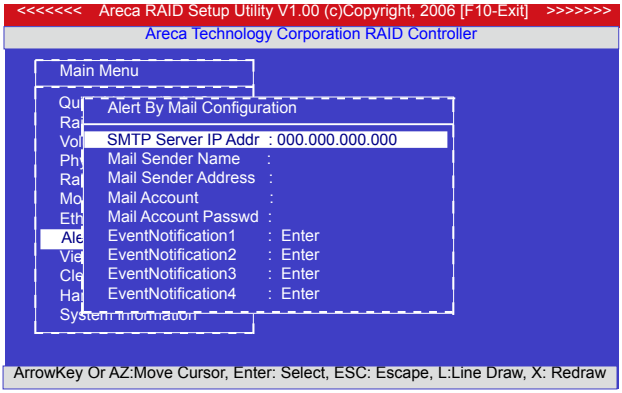
3.3.6 Ethernet Address

Each Ethernet port has its unique Mac address, which is also factory assigned. Usually, Ethernet address is used to uniquely identify a port in the Ethernet network.



3.4 Alert By Mail Config

To configure the switch adapter e-mail function, move the cursor bar to the main menu and click on the "Alert By Mail Config" link. The "Alert By Mail Config" menu will show all items. Move the cursor bar to the "Alert By Mail Config" item, then select the desired function.



SMTP Server IP Addr:
Enter IP address or domain name of the SMTP server to configure your mail program correctly. Ex: 192.168.0.2.

Mail Sender Name:
This is the sender name that the e-mail alerts will appear to be coming from. Ex: RaidController_1.

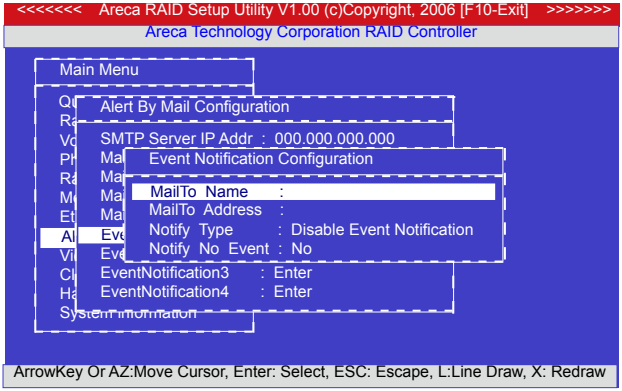
Mail Sender Address: This is the mail address that the e-mail alerts will appear to be coming from, but don't type IP to replace domain name. Ex: RaidController_1@areca.com.tw.

Mail Account: Enter the valid account if your SMTP mail server requires authentication.

Mail Account Password:
Enter the valid password if your SMTP mail server requires authentication.

EventNotification#:Event Notification Configurations

This step involves setting up of notification rules. Notification rules instruct "Alert By Mail" on the notifications that should be sent when certain types of alerts are detected.
MailTo Name:
Enter the alert receiver name that will be shown in the outgoing mail.



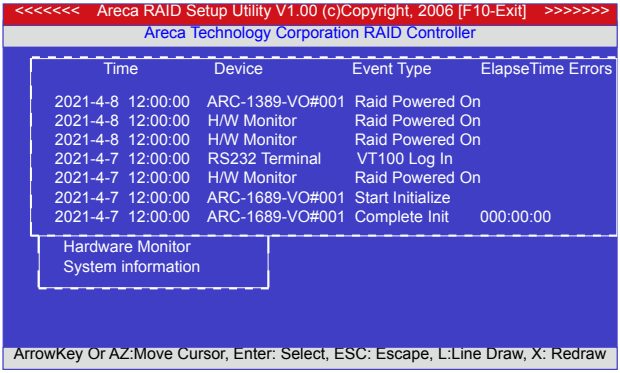
MailTo Address:
Enter the receiver's e-mail address. This is the address you want the e-mail alerts sent to. Ex: admin@areca.com.tw.
Notify Type:
According to your requirement, set the corresponding event level.
"Disable Event Notification" - No event notification will be sent.
"Urgent Error Notification" - Send only urgent events.
"Serious Error Notification" - Send urgent and serious events.
"Warning Error Notification" - Send urgent, serious and warning events.
"Information Notification" - Send all events.

Notification No Event:
Notify user if no event occurs within 24 hours.

3.5 View System Events

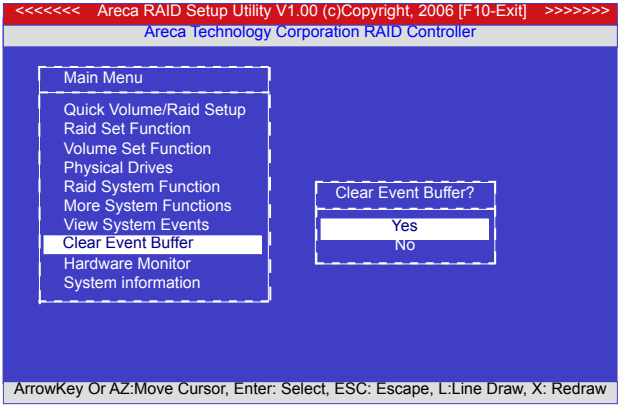
To view the base switch adapter's system events information, move the cursor bar to the main menu and select the "View System Events" link, then press the **Enter** key. The base switch adapter's events screen appear.

Choose this option to view the system events information: Timer, Device, Event type, Elapsed Time, and Errors. The switch adapter does not have a build-in real time clock. The time information is the relative time from the base switch adapter powered on.



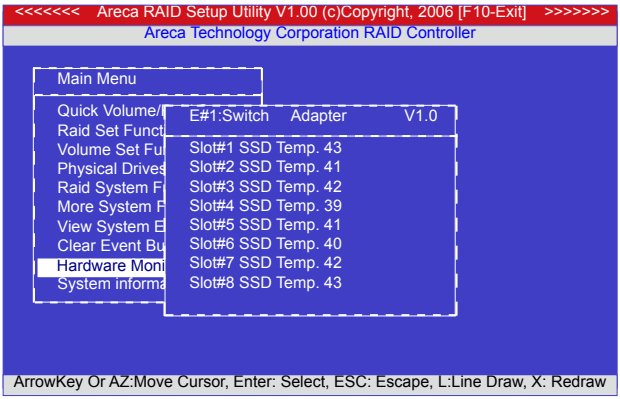
3.6 Clear Events Buffer

Use this feature to clear the entire events buffer.



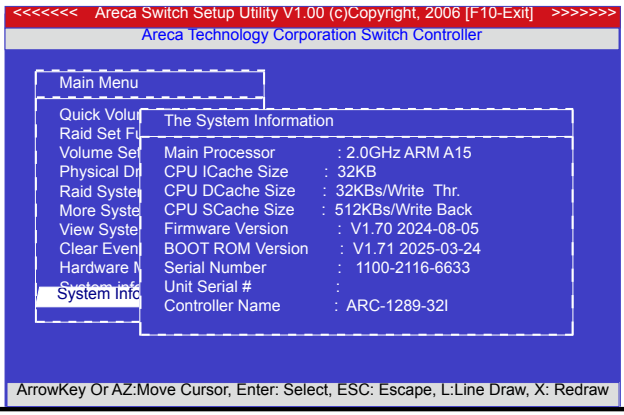
3.7 Hardware Monitor

To view the Switch adapter's hardware monitor information, move the cursor bar to the main menu and click on the "Hardware Monitor" link. The "Controller H/W Monitor" screen appears. The "Controller H/W Monitor" provides the PCIe switch chip temperature, adapter temperature and voltage of the NVMe switch adapter.



3.8 System Information

Choose this option to display adapter name, firmware version, BOOT ROM version, serial number, main processor, CPU instruction cache and data cache size, serial number, and controller name. To check the system information, move the cursor bar to "System Information" item, then press **Enter** key. All relevant adapter information will be displayed.



4. ArcHTTP Proxy Server Installation

Overview

The PCIe device connected to the base switch adapter can be monitored through the built-in configuration that resides in the adapter's firmware. It provides to monitor the adapter, eliminating the need for additional hardware or software.

In addition, a software utility to monitor the base switch adapter is provided on the areca website. This software utility can monitor the base switch adapter. The software utility and switch storage manager can configure and monitor the base switch adapter via ArcHTTP proxy server interface. The following table outlines their functions:

Configuration Utility	Operating System Supported
McBIOS Switch Setup Utility	OS-Independent
Switch Storage Manager (Via ArcHTTP proxy server)	Windows, Linux, and FreeBSD
SAP Monitor (Single Admin Portal to scan for multiple Switch units in the network, Via ArcHTTP proxy server)	Windows

The HTTP management software (ArcHTTP) runs as a service or daemon, and have it automatically start the proxy for all adapters found. This way the adapter can be managed remotely without having to sign in the server. The HTTP management software (ArcHTTP) also has integrated the email notification and SNMP extension agent. The email notification can be configured in local or remote standard web browser.

4.1 For Windows

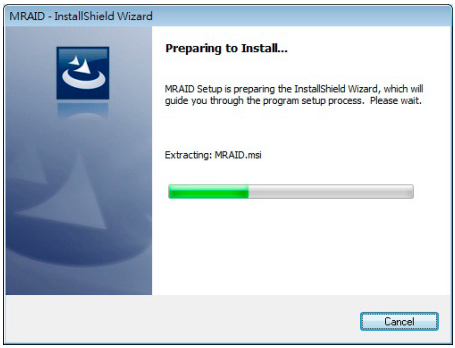
This section describes how to install the switch software to your operating system. The software installation includes ArcHTTP and CLI utility.

In this scenario, you are installing the switch software in an existing Windows system. You can use the installer to install ArcHTTP and CLI at once or "Custom" to install special components. Follow the steps below to install the utility for Windows.

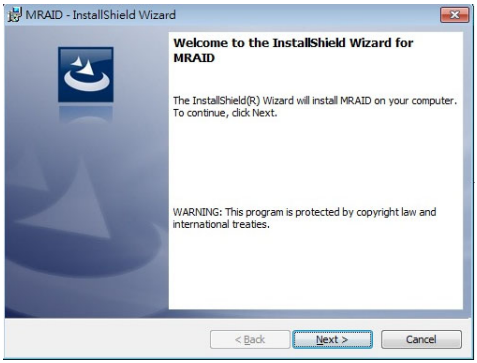
1. Download the install_mraid installer from the website at "*https://www.areca.com.tw/support/downloads.html*", the file name begins with "install_mraid" followed by the version control.

2. Double-click on the zipped file that comes from the website to unzip it. Double-click on the "setup.exe" file for installing MSwitch.

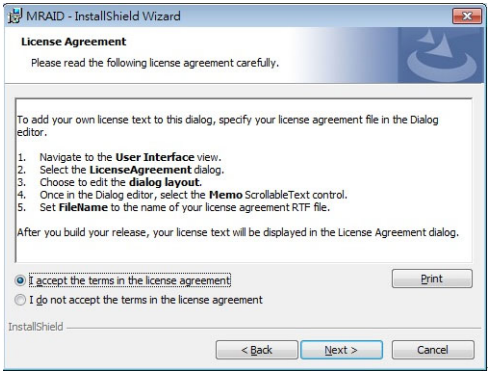
3. The screen shows Preparing to Install.



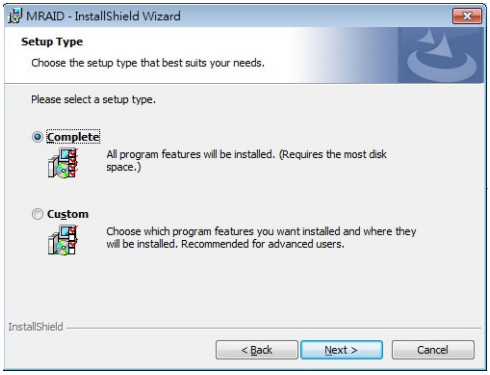
4. The Mraid Installer (or InstallShield Wizard) opens, preparing to install and click on the "**Next**" button to continue.



5. When the License Agreement screen appears, read and agree to the license information; then let the InstallShield Wizard guide you through the installation process.

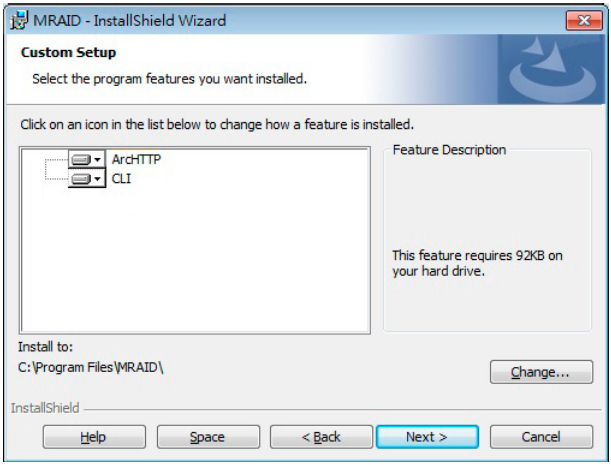


6. On the Setup Type screen, use the settings to specify these things: and click on the "**Next**" button to continue.



- "Complete" to install ArcHTTP and CLI utility at once, check the first box.
- "Custom" to install special components and change the program directory. When this "**Custom**" check box is checked, go to the Custom Setup screen.

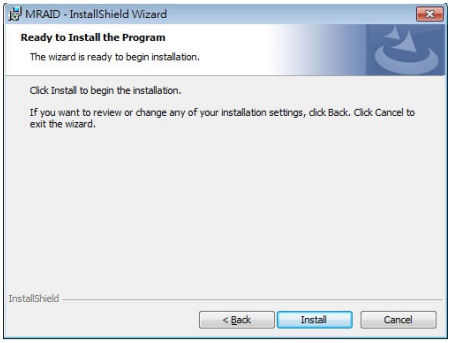
6-1. On the Custom Setup screen, click on an icon to install special components and click on the "**Next**" button to continue.



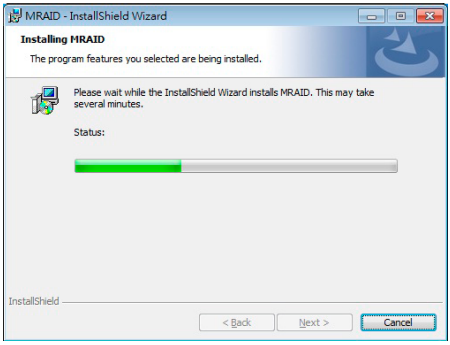
- **ArcHTTP** has to be installed for GUI switch console (switch storage manager) to run. It also runs as a service or daemon in the background that allows capturing of events for mail and SNMP traps notification. Refer to the section 4.4 ArcHTTP Configuration on ARC-1289-32I user manual, for details about the mail and SNMP traps configuration.

- **CLI (Command Line Interface)** provides the functionality available in switch storage manager through a Command Line Interface. You can set up and manage switch storage inline. CLI performs many tasks at the command line. You can download CLI manual from Areca website.

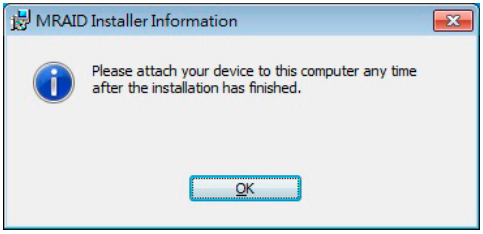
7. When you reach the installation page, click on the "**Install**" button to continue.



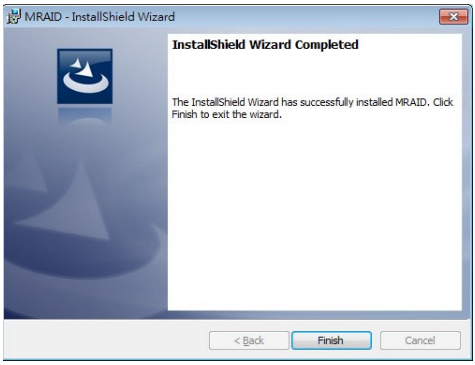
8. A program bar appears that measures the progress of the driver installation.



When this screen completes, you have completed the switch installation. If you have no ARC-1289-32I yet installed a "Switch Installer Information" message displays.

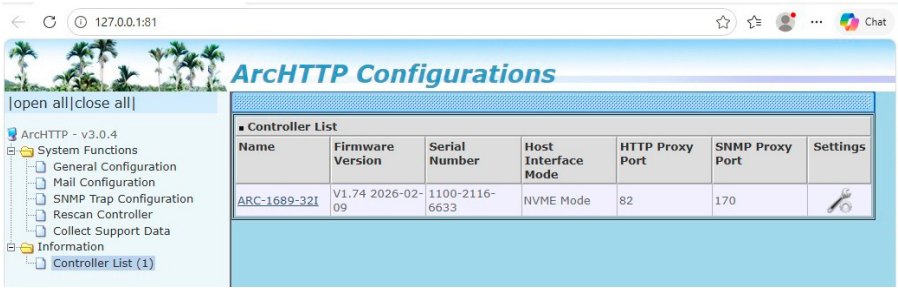


9. After installation is complete, click on the "**Finish**" button to exit the InstallShield Wizard.



10. Once ArcHTTP and CLI have been installed, the ArcHTTP background task automatically starts each time when you start your computer. There is one Switch icon showing on your "Programs" folder. This icon is for you to start up the Switch storage manager (by ArcHTTP) and CLI utility.

The "**ArcHTTP Taskbar**"  icon shows on the button of system tray by default. Double click "ArcHTTP Taskbar" to launch the ArcHTTP Configuration screen. It automatically scans the localhost switch adapters on the system and creates an total Controller List icon located in the left column screen. The child element belonged each switch adapter appears on the right column screen. Locate "ARC-1289-32I" and launch the switch storage manager.



1. See the next chapter detailing the Switch Storage Manager to monitor your switch adapter.

2. If you need to configure the "System Function" of ArcHTTP, please refer to section 4.4 ArcHTTP Configuration.

4.2 For Linux

You should have administrative level permissions to install base switch software. This procedure assumes that the base switch hardware and Linux are installed and operational in your system.

The following installation procedure explains how to install the base switch software for Linux. The ArcHTTP proxy server for the base switch adapter card can download from the **https://www.areca.com.tw**. The firmware embedded switch storage manager can configure and monitor the base switch adapter via ArcHTTP proxy server.

1. Login as root. Copy the ArcHTTP file to a local directory. Download from the www.areca.com.tw or from the email attachment.

2. You must have administrative level permissions to install and run Switch adapter ArcHTTP proxy server software. This procedure assumes that the base switch hardware and driver are installed and operational in your system.

   The following details are the installation procedure of the tri-mode Switch adapter for Linux ArcHTTP proxy server software.

   (a). Run the ArcHTTP proxy server by using the following command:
   Usage: ./archttp32 (TCP_PORT) or ./archttp64 (TCP_PORT). It depends on your OS version.
   Parameters: TCP_PORT value= 1~65535 (If TCP_PORT assigned, ArcHTTP will start from this port. Otherwise, it will use the setting in the archttpsrv.conf or default 81). This is the port address assigning for the ArcHTTP configuration (Cfg Assistant). Such as: archttp64 1553

   (b). ArcHTTP server console started, adapter card detected then ArcHTTP proxy server screen appears.

```
Copyright (c) 2004-2024 Areca, Inc. All Rights Reserved.
Areca HTTP proxy server, Version: v3.0.0, Arclib: 390, Date:
Oct23 2024

Starting HTTP Proxy Server...Please wait(MAX = 5 minutes)
Controller(s) list
-----------------------------------------------------
Cfg Assistant : Listen to port[81].
Controller[1](NVME) : Listen to port[82].
Binding IP: [0.0.0.0]
Note: IP[0.0.0.0] stands for any ip bound to this host.
-----------------------------------------------------
##############################
Press CTRL-C to exit program!!
##############################
```

(c). If you need the **"**Cfg Assistant**",** please refer to section 4.4 ArcHTTP Configuration.

(d). Launch your switch storage manager by entering http:// [Computer IP Address]:[Port Number] in the web browser. For detailing about switch storage manager to monitor your switch adapter is discussed in Chapter 5.

4.3 For FreeBSD

You must have administrative level permissions to install NVMe Switch software. This procedure assumes that the NVMe Switch hardware and FreeBSD are installed and operational in your system.

The following installation procedure explains how to install the base switch software for FreeBSD. The ArcHTTP proxy server for the base switch adapter card can download from the **https://www.areca.com.tw**. The firmware embedded switch storage manager can configure and monitor the base switch adapter via ArcHTTP proxy server.

1. Login as root. Copy the ArcHTTP file to a local directory. Download from the www.areca.com.tw or from the email attachment.

2. This procedure assumes that the NVMe switch hardware and driver are installed and operational in your system.The following details are the installation procedure of the base switch adapter ArcHTTP proxy server software.

   (a). Run the ArcHTTP by using the following command:
   Usage: ./archttp32 (TCP_PORT) or ./archttp64 (TCP_PORT). It depends on your OS version.
   Parameters: TCP_PORT value= 1~65535 (If TCP_PORT assigned, ArcHTTP will start from this port. Otherwise, it will use the setting in the archttpsrv.conf or default 81). This is the port address assigning for the ArcHTTP configuration (Cfg Assistant). Such as: archttp64 1553

   (b). ArcHTTP server console started, adapter card detected then ArcHTTP proxy server screen appears.

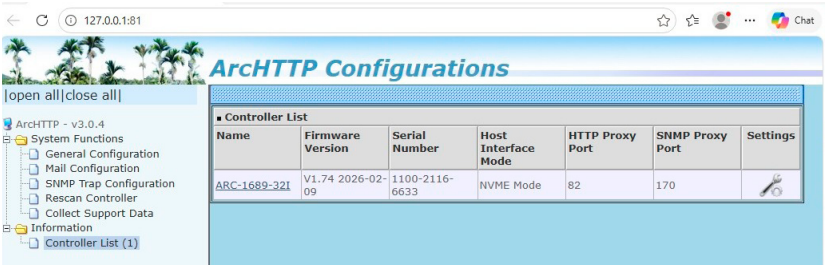
```
Copyright (c) 2004-2024 Areca, Inc. All Rights Reserved.
Areca HTTP proxy server, Version: v3.0.0, Arclib: 390, Date:
Oct 23 2024

Starting HTTP Proxy Server...Please wait(MAX = 5 minutes)
Controller(s) list
-----------------------------------------------------
Cfg Assistant : Listen to port[81].
ARCHTTP PROXY SERVER INSTALLATION
Controller[1](NVME) : Listen to port[82].
Binding IP: [0.0.0.0]
Note: IP[0.0.0.0] stands for any ip bound to this host.
-----------------------------------------------------
################################
Press CTRL-C to exit program!!
################################
```

(c). If you need the **"**Cfg Assistant**",** please refer to section 4.4 ArcHTTP Configuration.

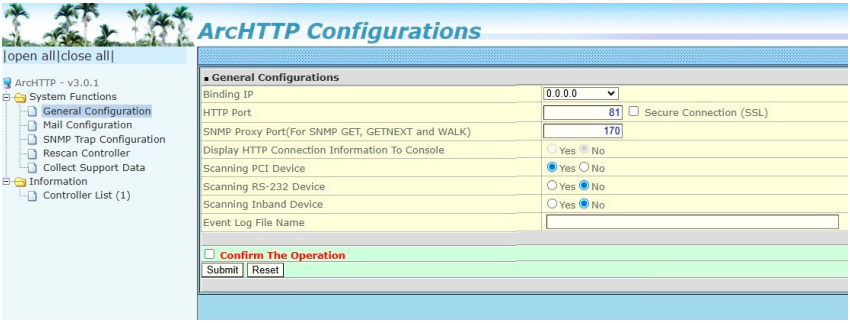
(d). Launch your switch storage manager by entering http:// [Compute IP Address]:[Port Number] in the web browser. For detailing about switch storage manager to monitor your switch adapter is discussed in Chapter 5.

4.4 ArcHTTP Configuration

The ArcHTTP proxy server will automatically assign one additional port for setup its configuration. If you want to change the "archttpsrv.conf" setting up of ArcHTTP proxy server configuration, for example: General Configuration, Mail Configuration, and SNMP Configuration, please start Web Browser http:\\localhost: Cfg Assistant. Such as http:\\localhost: 81. The port number for the first adapter switch storage manager is ArcHTTP proxy server configuration port number plus 1.



- **General Configuration:**

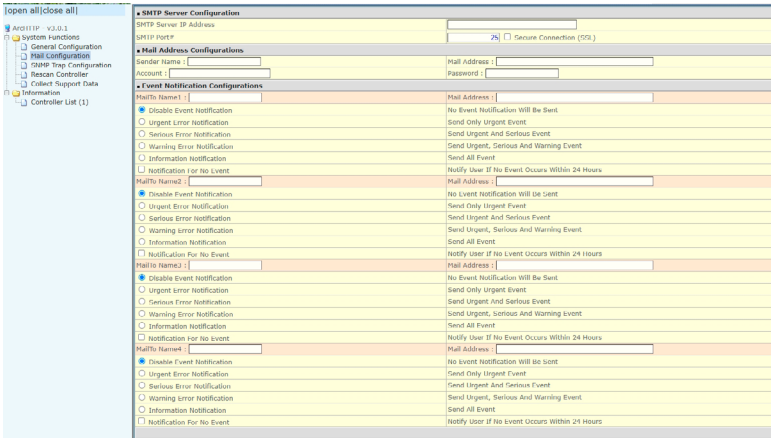


1. **Binding Ip:**
   Restrict ArcHTTP proxy server to bind only single interface (If more than one physical network in the server).
2. **HTTP Port#:**
   Value 1~65535. Click on the "check box" to enable the SSL.
3. **SNMP Proxy Port (For SNMP GET, GET NEXT and WALK):**
   The ArcHttp can send get requests to an SNMP agent to obtain data. After receiving a get request, the SNMP agent executes the corresponding instruction in the MIB and sends the result to the ArcHttp. It does not need a subagent.

4. **Display HTTP Connection Information to Console:**
   Select "Yes" to show Http send bytes and receive bytes information in the console.
5. **Scan PCI Device:**
   Select "Yes" for ARC-1XXX series adapter.
6. **Scan RS-232 Device:**
   Select "No" for ARC-1XXX series adapter.
7. **Scan Inband Device:**
   Select "No" for ARC-1XXX series adapter.
8. **Event Log File Name:**
   Redefine the file name for "Collect Data" function.

- **<u>Mail (Alert by Mail) Configuration:</u>**

Many users require that email notifications be sent to the appropriate administrators when an alert is detected. To set up your mail servers, click on the "Mail Configuration" link. The "SMTP Server Configurations" allows you to define settings for your mail server. This setup screen is shown as below:



The following article describes a best practice methodology for setting this up in the "SMTP Server Configurations".

1. **SMTP Server Configuration:**
   SMTP Server IP Address: Enter IP address or domain name of the SMTP server to configure your mail program correctly.
   Ex: 192.168.0.2. or smtp.gmail.com

2. Mail Address Configurations:

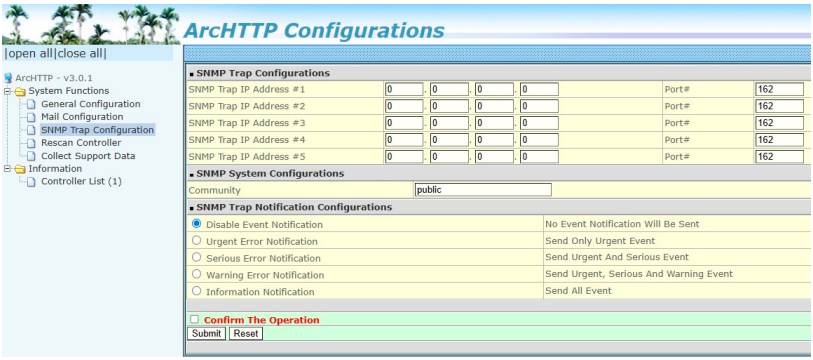
Sender Name: This is the sender name that the e-mail alerts will appear to be coming from.
Ex: RaidController_1.
Mail address: This is the mail address that the e-mail alerts will appear to be coming from, but don't type IP to replace domain name.
Ex: RaidController_1@areca.com.tw.
Account: Enter the valid account if your SMTP mail server requires authentication.
Password: Enter the valid password if your SMTP mail server requires authentication.

3. Event Notification Configurations:

This step involves setting up of notification rules. Notification rules instruct ArcHTTP on the notifications that should be sent when certain types of alerts are detected.
MailTo Name: Enter the alert receiver name that will be shown in the outgoing mail.
Mail Address: Enter the receiver's e-mail address. This is the address you want the e-mail alerts sent to.
Ex: admin@areca.com.tw.
According to your requirement, set the corresponding event level:
Disable Event Notification: No event notification will be sent.
Urgent Error Notification: Send only urgent events.
Serious Error Notification: Send urgent and serious events.
Warning Error Notification: Send urgent, serious and warning events.
Information Notification: Send all events.
Notification For No Event: Notify user if no event occurs within 24 hours.

- **SNMP Traps Configuration:**

This section discusses how to enable the SNMP traps on your Switch adapter, and how to control the sending of SNMP traps from the ArcHTTP. To send the SNMP traps to client SNMP manager such as Net-SNMP manager using the IP address assigned to the operating system, you can simply use the SNMP function on the ArcHTTP. The ArcHTTP only provides to send the trap without needing to install the SNMP extension agent on the host.



The following article describes a best practice methodology for setting this up in the "SNMP Traps Configurations".

1. SNMP Trap Configurations

Enter the SNMP trap IP address.

2. SNMP System Configurations

Community name acts as a password to screen accesses to the SNMP agent of a particular network device. Type the community names of the SNMP agent in this field. Most network devices use "public" as default of their community names. This value is case-sensitive.

3. SNMP Trap Notification Configurations

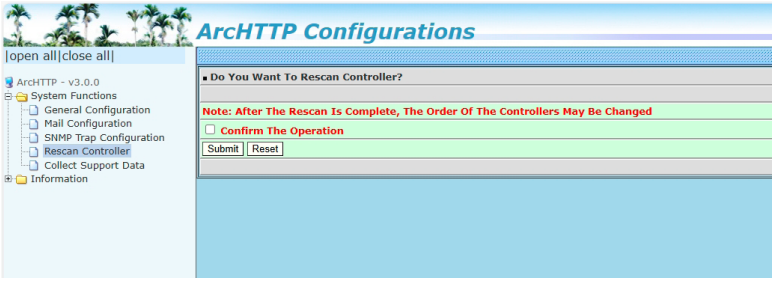
Event Notification Table refers to Appendix C. Before the client side SNMP manager application accepts the Switch storage traps, it is necessary to integrate the MIB into the management application's database of events and status indicator codes. Ensure the compilation process successfully integrates the contents of the areca_sas.mib file into the traps database. The MIBs file can download from https://www.areca.com.tw. Each Switch adapter needs to have its own MIBs file. Areca provide 4 adapters MIBs file for users. User can request it if more adapters install on one system.

Note:

After you confirm and submit configurations, you can use "Generate Test Event" feature to make sure these settings are correct.

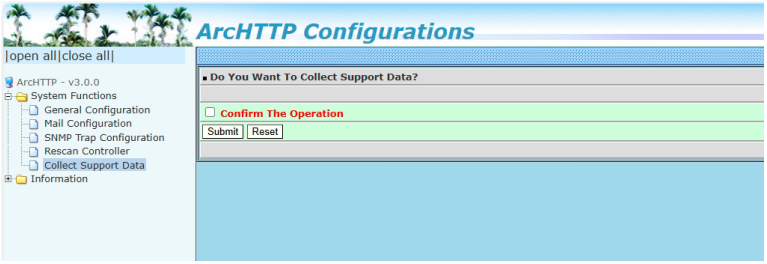
- **Rescan Device Configuration:**

The ArcHTTP scans the switch adapters on the system and creates an individual switch adapter icon located on left column of the "ArcHTTP Configurations" screen. If any switch adapter is missed at system start-up, then you can use the "Rescan Device" function to rescan the targets to allow a missed switch storage to be added.



- **Collect Support Data:**

The “Collect Support Data” option on the ArcHTTP is used to download all adapter’s information (system information, disk information and hardware information) to program directory (file name:ctlrxx-xxxxx.log). It will be automatically started when URGENT or SERIOUS event has occurred.



5. Web Browser-based Configuration

The switch storage manager is firmware-based utility, which is accessible via the web browser installed on your operating system. The web browser-based switch storage manager is a HTML-based application, which utilizes the browser (Edge, Chrome and Mozilla etc.) installed on your monitor station.

It can be accessed through the in-band PCIe bus or out-of-band LAN port. ArcHTTP is used to launch the in-band web browser-based switch storage manager. The firmware-embedded web browser-based switch storage manager allows local or remote to access it from any standard internet browser via a LAN or WAN.The firmware contains SMTP manager monitors all system events and user can select either single or multiple user notifications to be sent via LAN with "Plain English" e-mails. The firmware-embedded SNMP agent allows remote to monitor events via LAN with no SNMP agent required.

5.1 Start-up Switch Storage Manager

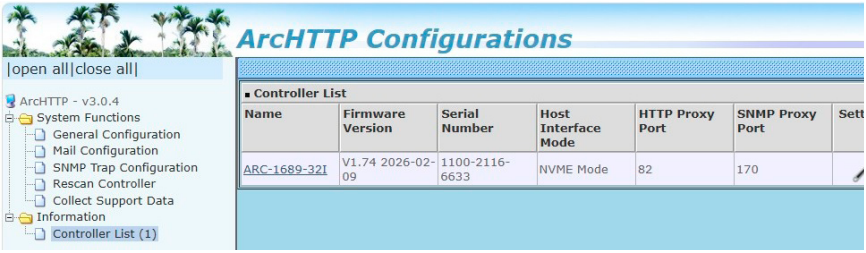
With switch storage manager, you can:

- Locally manage a system containing a supported switch adapter that has Windows or macOS, ArcHTTP and a supported browser.

- **Start-up from Windows Local Administration**

  Once ArcHTTP and CLI have been installed, the ArcHTTP - back ground task automatically starts each time when you start your computer.

  or one "**ArcHTTP Taskbar**"  icon showing on Windows system tray. This icon is for you to start up the ArcHTTP (launch the switch storage manager). When you click on the ArcHTTP64 from "**ArcHTTP Taskbar**" from system tray, it shows all switch adapters available on the host system and create an individual switch adapter icon located on left column of the "ArcHTTP Con figurations" screen. This switch adapter icon is for user to launch the selected switch adapter web browser switch storage manager.



The “Enter Network Password” dialog screen appears, type the User Name and Password. The switch adapter default User Name is “admin” and the Password is “0000”. After entering the user name and password, press **Enter** key to access the switch storage manager.

- **Start-up Switch Storage Manager from Linux/ FreeBSD Local Administration**

  To configure the internal NVMe switch adapter. From switch storage manager, you need to know its IP address. You can find the IP address assigned by the ArcHTTP proxy server installation: Binding IP:[X.X.X.X] and adapter listen port. See chapter 4.2/4.3 for ArcHTTP proxy server installation.

  1. You can click on the individual adapter icon located on left column of the “ArcHTTP Configurations” screen or Launch your switch storage manager by entering http://[Computer IP Address]:[Port Number] in the web browser.
  2. When connection is established, the "System Login" screen appears. The base switch adapter default user name is “admin” and the password is “0000”.

- **Start-up from Ethernet Port (Out-of-Band)**

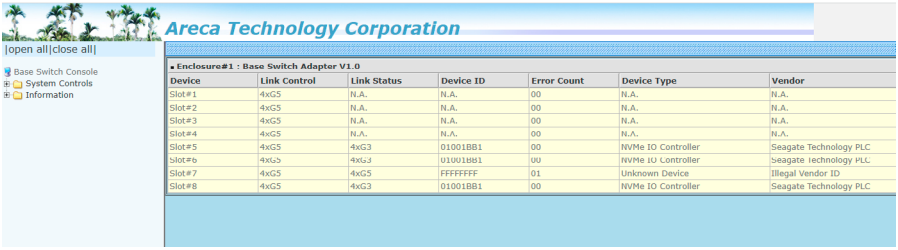
  The ARC-1289-32I switch adapter also offers an alternative out-of-band method for switch storage manager. User can access the built-in configuration without running the ArcHttp proxy server on the host system. The web browser-based switch storage manager is a HTML-based application, which utilizes the browser installed on your remote system. To ensure proper commu-nications between the base switch adapter and switch storage manager, please connect the base switch adapter LAN port to any LAN switch port.

The switch adapter has embedded the TCP/IP & web browser-based switch storage manager in the firmware. User can remote manage the base switch adapter without adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100Mbit RJ45 LAN port.

To configure base switch adapter on a remote machine, you need to know its IP address. The IP address is default shown on the LCD initial start-up screen and McBIOS "System Information' option. Launch your switch storage manager by entering http://[IP Address] in the web browser.

5.2 Switch Storage Manager

The following login screen is displayed in the browser. This screen displays the initial start-up configuration.



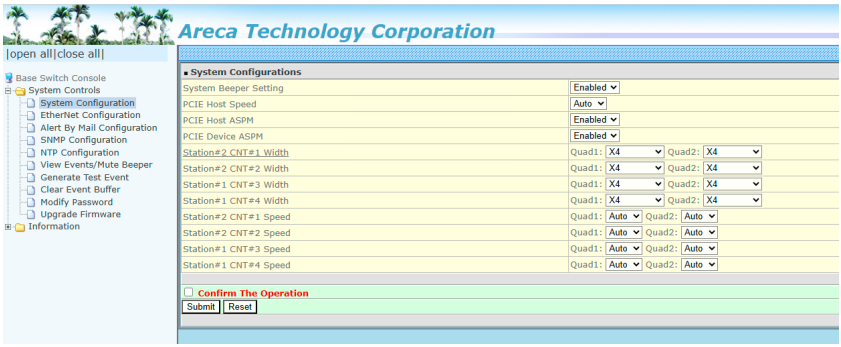
- To display device information, move the mouse cursor to the desired physical drive number, then click on it. The drive information will be displayed. Use this feature to view the base switch adapter current physical PCIe device information. The firmware can monitor and check the current attached device status. It includes slot control capabilities, slot link status, transaction error count reports and device information.

Individual Category	Description
3.3 System Controls	Setting the switch adapter configuration.
3.4 Information	Viewing the adapter information. The PCIE Device List can be viewed through the "PCIE Device List" item.

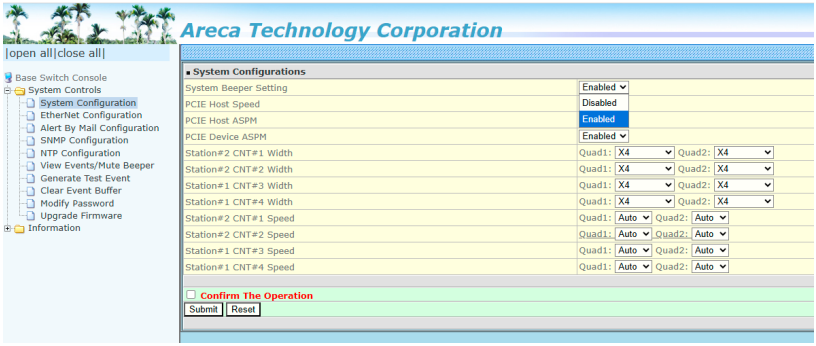
5.3 System Controls

5.3.1 System Config

To set the switch system function, move the cursor to the main menu and click on the "System Controls" link. The "Raid System Function" menu will show all items, and then select the desired function.

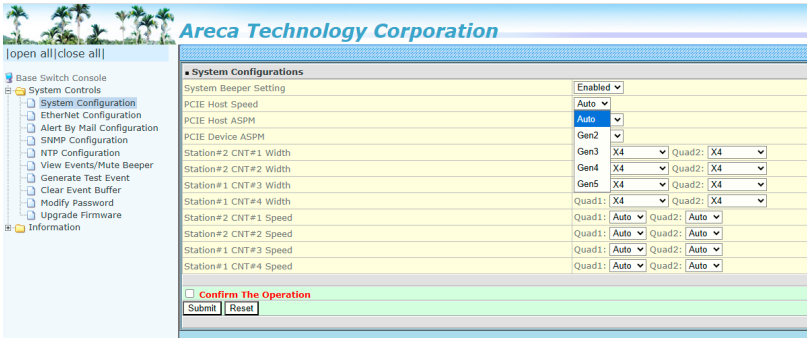


- **System Beeper Setting**
  The "System Beeper Setting" function is used to "Disabled" or "Enabled" the base switch adapter alarm tone generator.



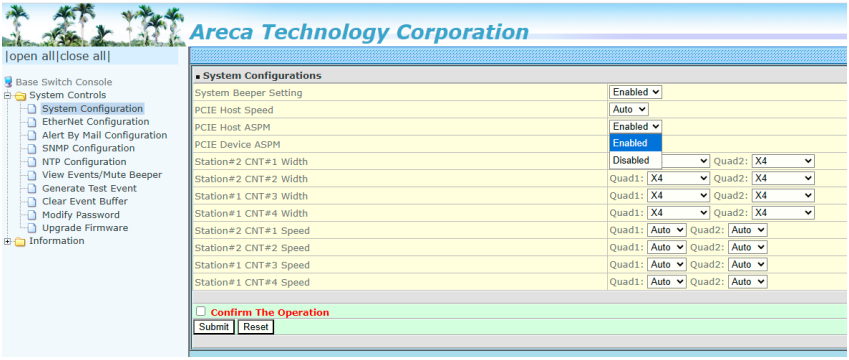
- **PCIE Host Speed**

  Use the PCIE Host Speed option to configure the upstream station PCI Express speed at which the host allows PCI Express devices to operate. The option can also used to address issues with problematic PCI Express devices. Setting this value to Maximum Supported configures the platform to run at the maximum speed supported by the platform or the PCIe device, whichever is lower. It's a configurable parameter, typically set to values like Auto,Gen2, Gen3, Gen4, or Gen5

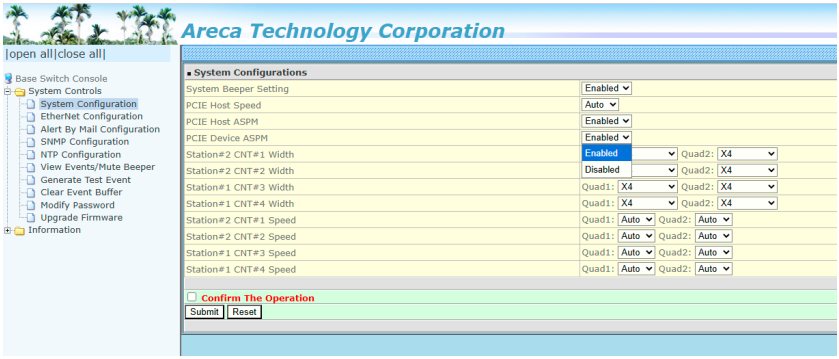


- **PCIE Host ASPM**

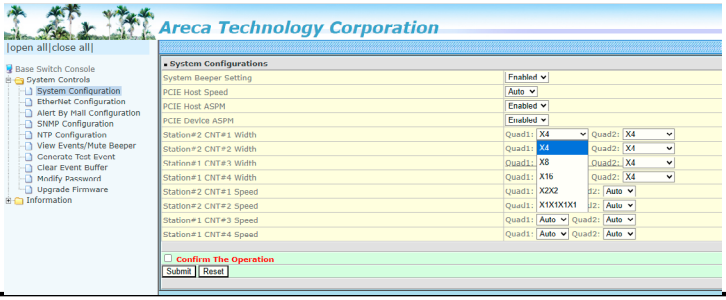
  PCIe Host Active State Power Management (ASPM) is a power management mechanism implemented at the PCIe link layer. Its primary purpose is to automatically adjust the PCIe link to a low-power state without requiring direct involvement from the system software, thereby saving energy. When a PCIe link is idle or has low traffic, ASPM allows it to enter a lower power consumption state. t's a configurable parameter, typically set to values Enabled or Disabled.

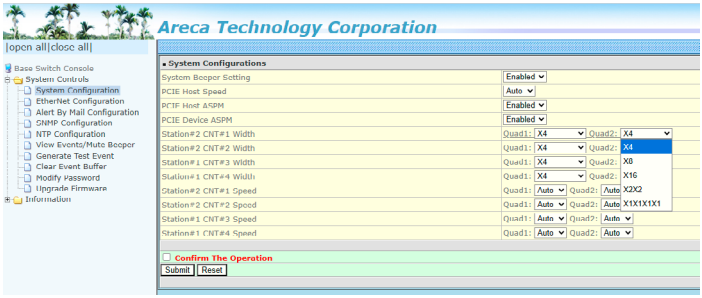


- **PCIE Device ASPM**
  Pcie Device Active State Power Management (ASPM) is a power management mechanism implemented at the PCIe device link layer. Its primary purpose is to automatically adjust the PCIe device link to a low-power state without requiring direct involvement from the system software, thereby saving energy. When a Pcie device link is idle or has low traffic,ASPM allows it to enter a lower power consumption state. It's a configurable parameter, typically set to values Enabled or Disabled.



- **Station # CNT# Width**
  Flexible port reconfiguration (port bifurcation, port consolidation, or both) allows reconfiguration of a group of lanes to a different width. The flexible port reconfiguration only works for downstream ports reconfigured to downstream ports.The PCIe switch groups 16 PCIe lanes into a station (station #1 and station #2) . Each station is organized in four quads (CNT#1/ CNT#2) or (CNT#3/CNT#4) . A MCIO [x8] CNT # includes two quads (Quad1 and Quad2). Each x4 port can be combined with its neighboring ports to form either a x8 or a x16 port within the same station.

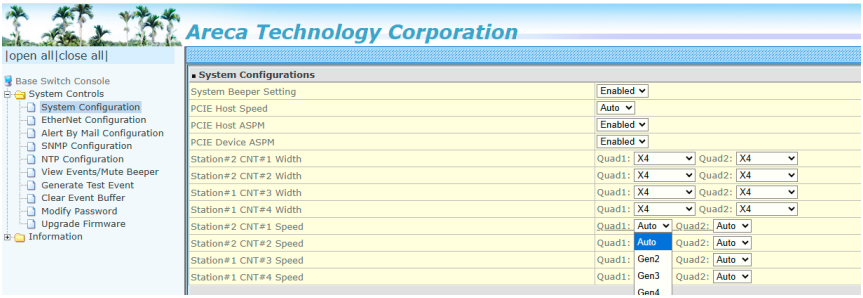


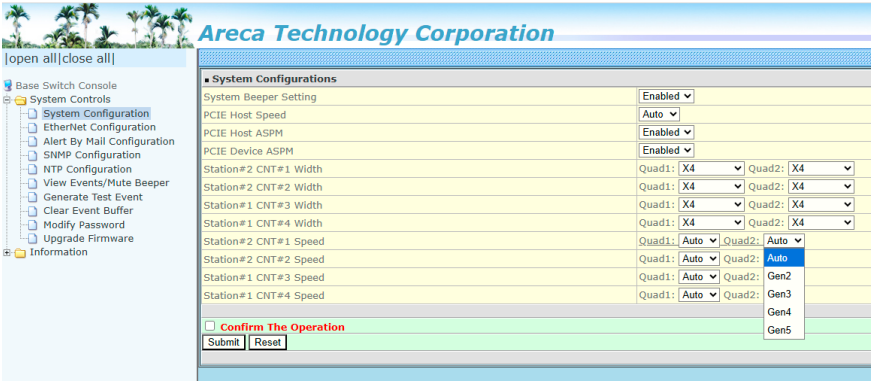


Physical Connector-to-Logical Connector Width Mapping			
Downstream Station	**Adapter Label**	**Tool Mapping**	**Width**
#2 (The PCIe switch groups 16 PCIe lanes into a station.)	**SCN1(CNT#1)**	**Quad1**	**x1x1x1x1, x2x2, x4, x8, x16**
		Quad2	**x1x1x1x1, x2x2, x4, x8, x16**
	SCN2(CNT#2)	**Quad1**	**x1x1x1x1, x2x2, x4, x8, x16**
		Quad2	**x1x1x1x1, x2x2, x4, x8, x16**
#1 (The PCIe switch groups 16 PCIe lanes into a station.)	**SCN3(CNT#3)**	**Quad1**	**x1x1x1x1, x2x2, x4, x8, x16**
		Quad2	**x1x1x1x1, x2x2, x4, x8, x16**
	SCN4(CNT#4)	**Quad1**	**x1x1x1x1, x2x2, x4, x8, x16**
		Quad2	**x1x1x1x1, x2x2, x4, x8, x16**

- **Station # CNT# Speed**

  Use the PCIE Device Speed option to configure downstream station Pcie device speed at which the ARC-1289-32I allows base device to operate. The option can also used to address issues with problematic PCIe devices. Setting this value to Maximum Supported configures the platform to run at the maximum speed supported by the ARC-1289-32I or the PCIe device, whichever is lower. It's a configurable parameter, typically set to values like Auto, Gen2, Gen3, Gen4, or Gen5.

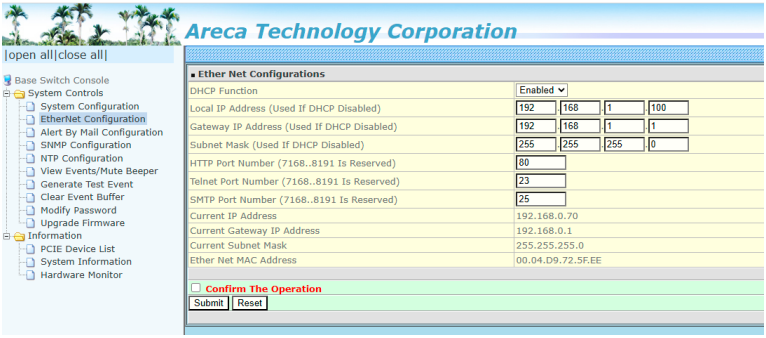




Physical Connector-to-Logical Connector Speed Mapping			
Downstream Station	**Adapter Label**	**Tool Mapping**	**Speed**
#2 (The PCIe switch groups 16 PCIe lanes into a station.)	**SCN1(CNT#1)**	**Quad1**	**Auto, Gen2, Gen3,Gen4, or Gen5**
		Quad2	**Auto, Gen2, Gen3,Gen4, or Gen5**
	SCN2(CNT#2)	**Quad1**	**Auto, Gen2, Gen3,Gen4, or Gen5**
		Quad2	**Auto, Gen2, Gen3,Gen4, or Gen5**
#1 (The PCIe switch groups 16 PCIe lanes into a station.)	**SCN3(CNT#3)**	**Quad1**	**Auto, Gen2, Gen3,Gen4, or Gen5**
		Quad2	**Auto, Gen2, Gen3,Gen4, or Gen5**
	SCN4(CNT#4)	**Quad1**	**Auto, Gen2, Gen3,Gen4, or Gen5**
		Quad2	**Auto, Gen2, Gen3,Gen4, or Gen5**

5.3.2 Ethernet Configuration

Use this feature to set the adapter Ethernet port configuration. A customer doesn't need to create a reserved space on the arrays before the Ethernet port and HTTP service are working. The firmware-embedded web browser-based switch manager can access it from any standard internet browser or from any host computer either directly connected or via a LAN or WAN with no software or patches required.
To configure the base switch adapter Ethernet port, move the cursor bar to the main menu and click on the "System Controls" link. The "System Controls" menu will show all items. Move the cursor bar to the "Ethernet Configuration" item, then select the desired function.



- **DHCP Function**

  DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators manage centrally and automate the assignment of IP (Internet Protocol) configurations on a computer network. When using the internet's set of protocols (TCP/IP), in order for a computer system to communicate to another computer system, it needs a unique IP address. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point.
  The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period

(called a lease period) and to eliminate the work necessary to administer a large IP network.Select the "Disabled" or "Enabled" option to enable or disable the DHCP function. If DHCP is diabled, it will be necessary to manually enter a static IP address that does not conflict with other devices on the network.

- **Local IP Address (Used If DHCP Disabled)**

  If you intend to set up your client computers manually (no DHCP), make sure that the assigned IP address is in the same range as the default router address and that it is unique to your private network. However, it is highly recommend to use DHCP if that option is available on the network. An IP address allocation scheme will reduce the time it takes to set-up client computers and eliminate the possibilities of administrative errors and duplicate addresses. It shows the default address setting in the base switch adapter. You can then reassign the static IP address of the adapter.

- **Gateway IP Address (Used If DHCP Disabled)**

  A gateway IP address is the address of a router on your local network that directs traffic to other networks, such as the internet. It acts as a "default gateway" for your devices, sending their requests to destinations outside your local network

- **Subnet Mask (Used If DHCP Disabled)**

  The subnet mask defines the portion of the IP address that identifies the network, so selecting the correct subnet mask ensures that your device can communicate with other devices on the local network and the internet

- **HTTP Port Number**

  This option manually configures the "HTTP Port Number" of the controller. It shows the default address setting in the switch adapter. Then You can reassign the default "HTTP Port Number" of the adapter.

Note:

If you configure the HTTP Port Number to 0, the HTTP console will be closed.

- **Telnet Port Number**

  This option manually configures the "Telnet Port Number" of the controller. It shows the default address setting in the base switch adapter. You can then reassign the default "Telnet Port Number" of the controller.

- **SMTP Port Number**

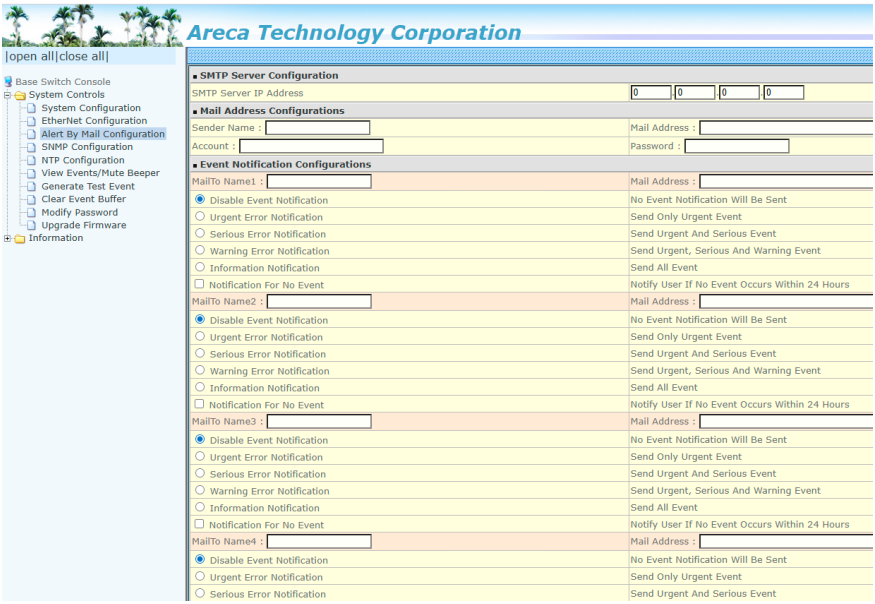
  This option manually configures the "SMTP Port Number" of the controller. It shows the default address setting in the base switch adapter. You can then reassign the default "SMTP Port Number" of the controlle

5.3.3 Alert By Mail Configuration

To configure the base switch adapter e-mail function, move the cursor bar to the main menu and click on the "System Controls" link. The "System Controls" menu will show all items. Move the cursor bar to the "Alert By Mail Configuration" item, then select the desired function. This function can only be set via web-based configuration.
The firmware contains a SMTP manager monitoring all system events. Single or multiple user notifications can be sent via "Plain English" e-mails with no software required.

The following article describes a best practice methodology for setting this up in the "SMTP Server Configurations".

1. **SMTP Server Configuration:**
   SMTP Server IP Address: Enter IP address or domain name of the SMTP server to configure your mail program correctly.
   Ex: 192.168.0.2. or smtp.gmail.com



2. Mail Address Configurations:

Sender Name: This is the sender name that the e-mail alerts will appear to be coming from.
Ex: RaidController_1.
Mail address: This is the mail address that the e-mail alerts will appear to be coming from, but don't type IP to replace domain name.
Ex: RaidController_1@areca.com.tw.
Account: Enter the valid account if your SMTP mail server requires authentication.
Password: Enter the valid password if your SMTP mail server requires authentication.

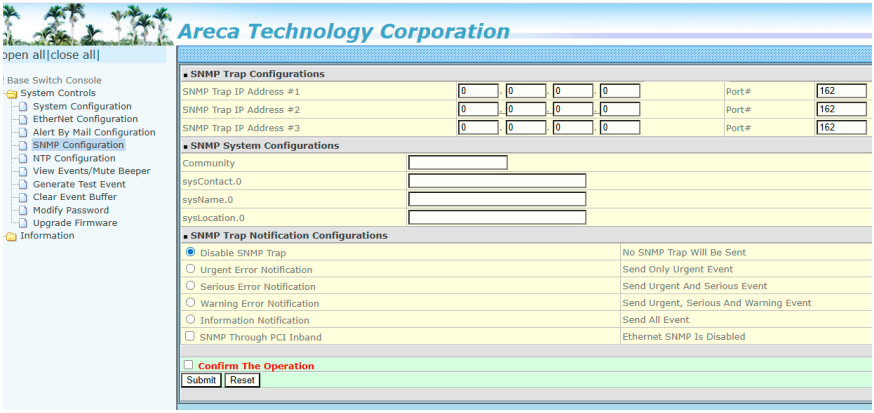
3. Event Notification Configurations:

This step involves setting up of notification rules. Notification rules instruct ArcHTTP on the notifications that should be sent when certain types of alerts are detected.
MailTo Name: Enter the alert receiver name that will be shown in the outgoing mail.

Mail Address: Enter the receiver's e-mail address. This is the address you want the e-mail alerts sent to.
Ex: admin@areca.com.tw.
According to your requirement, set the corresponding event level:
Disable Event Notification: No event notification will be sent.
Urgent Error Notification: Send only urgent events.
Serious Error Notification: Send urgent and serious events.
Warning Error Notification: Send urgent, serious and warning events.
Information Notification: Send all events.
Notification For No Event: Notify user if no event occurs within 24 hours.

5.3.4 SNMP Configuration

The following article describes a best practice methodology for setting this up in the 'SNMP Traps Configuration".



1. **SNMP Trap Configurations**
   Enter the SNMP trap IP address.

2. **SNMP System Configurations**
   Community name acts as a password to screen accesses to the SNMP agent of a particular network device. Type the community names of the SNMP agent in this field. Most network devices use “public” as default of their community names. This value is case-sensitive.

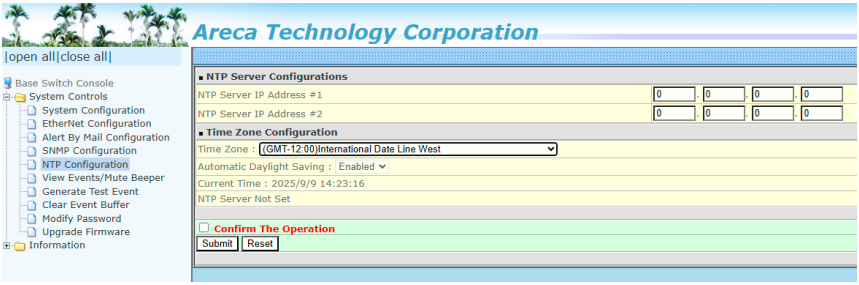
3. SNMP Trap Notification Configurations

Event Notification Table refers to Appendix C. Before the client side SNMP manager application accepts the switch storage traps, it is necessary to integrate the MIB into the management application's database of events and status indicator codes. Ensure the compilation process successfully integrates the contents of the areca_sas.mib file into the traps database.

The MIBs file can download from https://www.areca.com.tw. Each switch adapter needs to have its own MIBs file. Areca provide 4 adapters MIBs file for users. User can request it if more adapters install on one system.

5.3.5 Time Zone Configuration

The Network Time Protocol (NTP) is used to synchronize the time of a computer client or server to another server or reference time source, such as a radio or satellite receiver or modem. It provides accuracies typically within a millisecond on LANs and up to a few tens of milliseconds on WANs relative to Coordinated Universal Time (UTC) via a Global Positioning Service (GPS) receiver, for example:



- **NTP Sever Address**

  The most important factor in providing accurate, reliable time is the selection of NTP servers to be used in the configuration file. Typical NTP configurations utilize multiple redundant servers and diverse network paths in order to achieve high accuracy and reliability. Our NTP configuration supports two existing public NTP synchronization subnets.

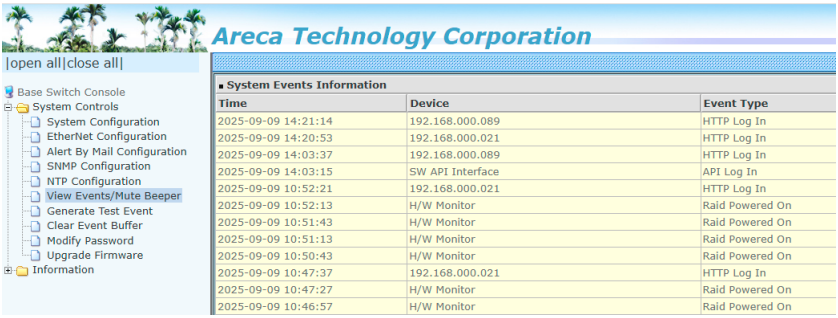
- **Time Zone**
  Time Zone conveniently runs in the system tray and allows you to easily view the date and time in various locations around the world. You can also quickly and easily add your own personal locations to customize time zone the way you want.
- **Automatic Daylight Saving**
  Automatic Daylight Saving will normally attempt to automatically adjust the system clock for daylight saving changes based on the computer time zone. This tweak allows you to disable the automatic adjustment.

Note:

NTP feature works through onboard Lan port. So you must make sure that you have connected onboard Lan port.

5.3.6 View Events/Mute Beeper

To view the NVMe switch adapter's event information, click on the "View Event/Mute Beeper" link. The NVMe switch adapter "System events Information" screen appears. The mute beeper function automatically enable by clicking on "View Events/Mute Beeper". Select this option to view the system events information: Time, Device, Event Type, Elapse Time and Errors. The switch adapter does not have a built-in real time clock. The time information is the relative time from the system time setting. The maximum event no. is 256 per adapter.



5.3.7 Generate Test Event

Use this feature to generate events for testing purposes.

5.3.8 Clear Events Buffer

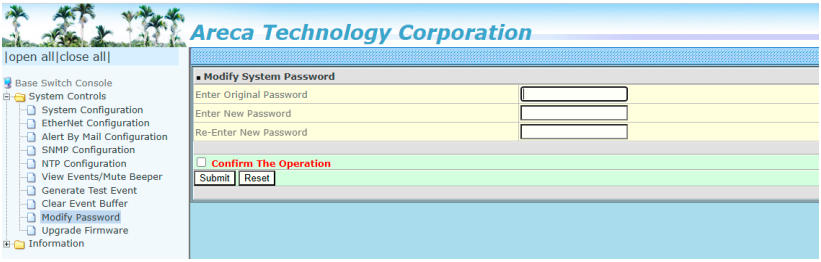
Use this feature to clear the entire events buffer.

5.3.9 Modify Password

To set or change the NVMe switch adapter password, select "System Controls" from the menu and click on the "Modify Password" link. The "Modify System Password" screen appears.The password option allows user to set or clear the password protection feature. **The manufacture default password is set to 0000.**

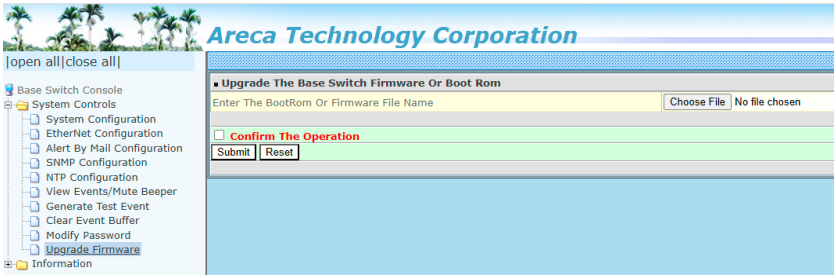
Once the password has been set, the user can monitor and configure the adapter only by providing the correct password. This feature is used to protect the internal switch adapter from unauthorized access. The adapter will check the password only when entering the main menu from the initial screen. The system will automatically go back to the initial screen if it does not receive

any command in 5 minutes. Do not use spaces when you enter the password, If spaces are used, it will lock out the user. To disable the password, leave the fields blank. Once the user confirms the operation and clicks on the "Submit" button, the existing password will be cleared. Then, no password checking will occur when entering the main menu from the starting screen.



5.3.10 Update Firmware

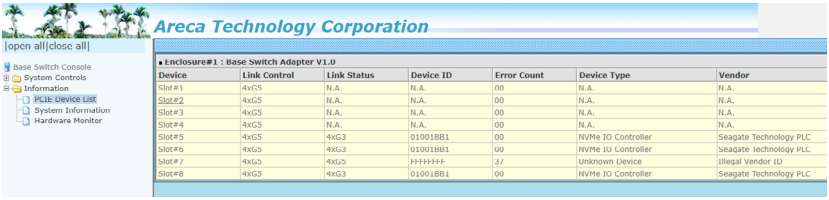
Please refer to the appendix A "Upgrading Flash ROM Update Process".



5.4 Information

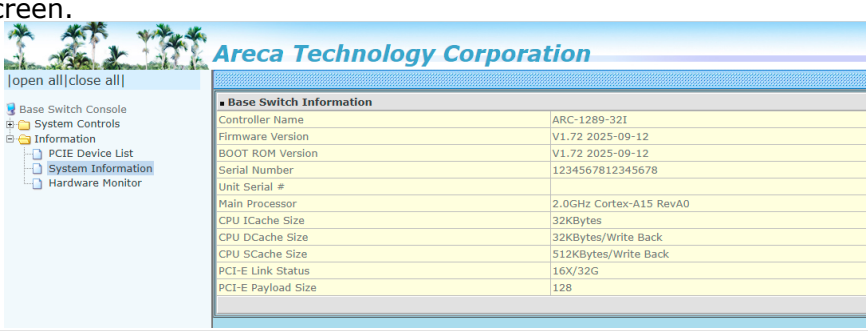
5.4.1 PCIE Device List

Use this feature to view the base switch adapter current physical device and slot signal integrity information. The firmware can monitor and check the current attached device status. It includes slot control capabilities, slot link status, transaction error count reports and device information. A error count refers to the number of bit errors detected by the physical layer transceivers within the PCIe switch. These errors can be correctable, where the system can recover without data loss or intervention, or uncorrectable, which negatively impact the interface's function and may lead to degraded performance or system failures.



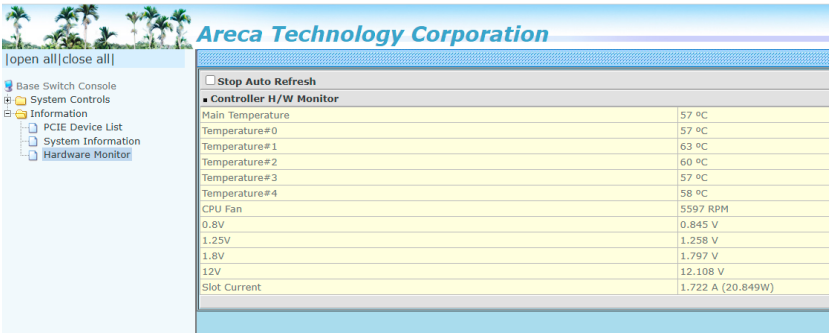
5.4.2 System Information

To view the base switch adapter's system information, move the mouse cursor to the main menu and click on the "Information" link. The base switch adapter "Base Switch Information" screen appears. Use this feature to view the switch adapter's system information. The adapter name, firmware version, Boot ROM version, serial number, main processor, CPU instruction/data cache size, PCI-E link status, and PCI-E payload size appear in this screen.



5.4.3 Hardware Monitor

Provides the PCIe switch temperature, CPU fan speed, voltage and slot current of the base switch adapter on this screen.



APPENDIX

Appendix A

Upgrading Flash ROM Update Process

A-1 Overview

Since the base switch adapter features flash ROM firmware, it is not necessary to change the hardware flash chip in order to upgrade the switch adapter firmware. The user can simply re-program the old firmware through the in-band PCIe bus, switch storage manager or nflash DOS utility. New releases of the firmware are available in the form of a DOS file on Areca website. The files available at the website for each model contain the following files in each version:

ARC1289UEFI.BIN:→ An EFI shell and home brewed small application
ARC1289BOOT.BIN :→ switch adapter hardware initialization
ARC1289FIRM.BIN :→ management kernel program

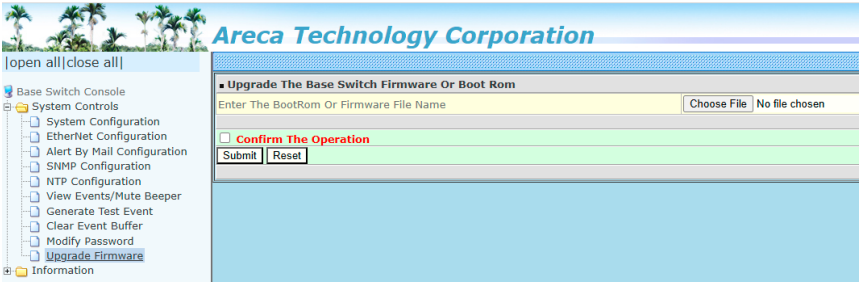
Release_note_version-date.TXT contains the history information of the software code change in the main directory. This file can download from **https://www.areca.com.tw/support/downloads.html** page. Read this file first to make sure you are upgrading to the proper binary file. Select the right file for the upgrade. Normally, user upgrades the ARC1289FIRM.BIN for management function. All these files in the firmware package are a part of the firmware. You should update all files in the package, no special update order needed. New firmware works after a system restart not instantant available, so you can update all files before restart the system. The adapter firmware is independent of the array, update firmware does not touch anything you stored in the array.

Note:

Please update all binary code (UEFI, BOOT, and FIRM) before you reboot system. Otherwise, a mixed firmware package may result the adapter hang.

A-2 Upgrading Firmware Through Switch Storage Manager

Get the new version firmware for your base switch adapter. For example, download the bin file from your OEM's web site onto the C: drive.



1. To upgrade the base switch adapter firmware, move the mouse cursor to "Upgrade Firmware" link. The "Upgrade The Switch System Firmware or Boot Rom" screen appears.

2. Click on "Browse". Look in the location to which the Firmware upgrade software was downloaded. Select the file name and click on "Open".

3. Tick on "Confirm The Operation" and press the "Submit" button.

4. The web browser begins to download the firmware binary to the adapter and start to update the flash ROM.

5. After the firmware upgrade is complete, a bar indicator will show "Firmware Has Been Updated Successfully".

6. After the new firmware package completes downloading, find a chance to restart the adapter/computer for the new firmware to take effect.

The web browser-based switch storage manager can be accessed through the in-band PCIe bus. The in-band method uses the ArcHTTP proxy server to launch the switch storage manager.

A-3 Upgrading Firmware Through nflash DOS Utility

Areca now offers an alternative means communication for the base switch adapter – Upgrade the all files (BOOT and FIRM) without necessary system starting up to running the ArcHTTP proxy server. The nflash utility program is a DOS application, which runs in the DOS operating system. Be sure of ensuring properly to communicate between base switch adapter and nflash DOS utility. Please make a bootable DOS USB devices from other Windows operating system and boot up the system from this bootable device.

- **Starting the nflash Utility**
  You do not need to short any jumper cap on running nflash utility. The nflash utility provides an on-line table of contents, brief descriptions of the help sub-commands. The nflash utility can download from **https:// www.areca.com.tw**. You can run the <nflash> to get more detailed information about the command usage. Typical output looks as below:

```
A:\nflash
Raid Controller Flash Utility
V1.61 2022-02-24
Command Usage:
NFLASH FileName
NFLASH FileName /cn --> n=0,1,2,3 write binary to adapter#0
FileName May Be ARC1289FIRM.BIN or ARC1289*
For ARC1289* Will Expand To ARC1289BOOT /FIRM/BIOS.BIN

A:\>nflash arc128~1.bin
Raid Controller Flash Utility
V1.61 2022-02-24
MODEL : ARC-1289-32I
MEM FE620000 FE7FF000
File ARC128~1.BIN : >>*** => Flash 0K
```

A-4 Upgrading Firmware Through CLI

This Command Line Interface (CLI) provides you to configure and manage the NVMe switch adapter components in Windows, Linux, FreeBSD and more environments. The CLI is useful in environments where a graphical user interface (GUI) is not available. Through the CLI, you perform firmware upgrade that you can perform with the switch storage manager GUI. The adapter has added protocol on the firmware for user to update the adapter firmware package (UEFI, BOOT and FIRM) through the utility.

To update the adapter firmware, follow the procedure below:

```
Parameter:<path=<PATH_OF_FIRMWARE_FILE>>
Fn: Firmware Updating.
Ex: Update Firmware And File Path Is In [C:\FW\ARC1289FIRM.BIN.]
Command: sys updatefw path=c:\fw\arc1289firm.bin [Enter]
```

Appendix B

Event Notification Configurations

The adapter classifies disk array events into four levels depending on their severity. These include level 1: Urgent, level 2: Serious, level 3: Warning and level 4: Information. The level 4 covers notification events such as initialization of the adapter; Level 2 covers notification events which once have happen; Level 3 includes events which require the issuance of warning messages; Level 1 is the highest level, and covers events that need immediate attention (and action) from the administrator. The following lists sample events for each level:

A. Hardware Monitor Event

Event	Level	Meaning	Action
Controller Over Temperature	Urgent	Abnormally high temperature detected on adapter	Check air flow and cooling fan of the enclosure, and contact us.
Fan Failed	Urgent	Cooling Fan # failure or speed below 1700RPM	Check cooling fan of the enclosure and replace with a new one if required.
Controller Temp. Recovered	Serious	Controller temperature back tonormal level	
Raid Powered On	Warning	Switch adapterpower on	
MainTemperature Over Temp	Urgent	PEX89048 over temperature	Hestsink is not attached to the switch chip.
Test Event	Urgent	Test event	
HTTP Log In	Serious	a HTTP login detected	
API Log In	Serious	a API login detected	

Appendix C

Data Protection

- **Recovery ROM**

  Switch adapter firmware is stored on the flash ROM and is executed by the management processor. The firmware can also be updated through the switch adapters PCIe bus port without the need to replace any hardware chips. During the adapter firmware upgrade flash process, it is possible for a problem to occur resulting in corruption of the adapter firmware. With our Redundant Flash Image feature, the controller will revert back to the last known version of firmware and continue operating. This reduces the risk of system failure due to firmware crash.