ARX®–4000 Hardware Installation Guide

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RF Interference Warning

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This unit generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Any modifications to this device, unless expressly approved by the manufacturer, can void the user's authority to operate this equipment under part 15 of the FCC rules.

Canadian Regulatory Compliance

This Class A digital apparatus complies with Canadian ICES-003.

Standards Compliance

This product conforms to the IEC, European Union, ANSI/UL and Canadian CSA standards applicable to Information Technology products at the time of manufacture.

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June 2008 — Rev A.

July 2008 — Rev B. Clarification of order of power-cable connections.

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Introduction

- Audience for this Manual
- Document Conventions
- Related Documents
- Safety and Regulatory Notices
- Contacting Customer Service

Audience for this Manual

This manual describes the F5 Adaptive Resource Switch 4000 (ARX-4000) and its hardware components. It also describes how to install the switch and connect it to the network.

This manual is intended for field engineers and network administrators responsible for setting up and connecting the switch to a network at an enterprise data center facility.

Document Conventions

This manual uses the following conventions, when applicable:

- `courier` text represents system output
- **bold** text represents user input
- *italic* text appears for emphasis, new terms, and book titles

Note

Notes provide additional or helpful information about the subject text.

Important

Important notices show how to avoid possible service outage or data loss.

WARNING

Warnings are instructions for avoiding damage to the equipment.

DANGER

Danger notices help you to avoid personal injury.

Related Documents

In addition to this guide, the following F5 Data Solutions documentation is also available:

- *ARX®-4000 Quick Installation*
- *ARX® GUI Quick Start: Network Setup*
- *ARX® CLI Reference*
- *ARX® CLI Network-Management Guide*
- *ARX® CLI Storage-Management Guide*
- *ARX® CLI Maintenance Guide*

Safety and Regulatory Notices

Important

The maximum ambient room temperature that the unit can operate in is 35° C.

Important

Do not block power supply vents or otherwise restrict airflow when installing unit in rack.

WARNING

Mechanical loading of rack should be considered so that the rack remains stable and unlikely to tip over.

Class A ITE Label

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may occur, in which case, the user may be required to take corrective actions.

Qualified Personnel Warning

WARNING

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

ATTENTION

Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés.

Environmental

High Temperature Warning

WARNING

To prevent the switch from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 95° F (35° C). To prevent airflow restriction, allow at least 3 inches (7.6 cm) of clearance around the ventilation openings.

ATTENTION

Pour éviter une surchauffe du commutateur, ne pas le faire fonctionner dans un local dont la température ambiante dépasse le maximum recommandé de 35° C (95° F). Pour faciliter la circulation d'air, aménager un dégagement d'au moins 7,6 cm (3 pouces) autour des bouches d'aération.

Restricted Area Warning

WARNING

This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

ATTENTION

Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.

Warning for Rack-Mounting and Servicing

WARNING

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

ATTENTION

Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

Power

Power Cord Usage

WARNING

The power supply cords were designed to be connected and used for F5 devices, and the safety for this purpose has been confirmed.

Please do not use them for other devices or usages. There may be danger of causing a fire or an electric shock.

注意 – 添付の電源コードを他の装置や用途に使用しない。
添付の電源コードは本装置に接続し、使用することを目的に設計され、その安全性が確認されているものです。決して他の装置や用途に使用しないで下さい。火災や感電の原因となる恐れがあります。

Electric Shock Warning

WARNING

This unit might use more than one power cord. To reduce the risk of electric shock, disconnect the power supply cords before servicing the unit.

ATTENTION

Il est possible que cette unité soit munie de plusieurs cordons d'alimentation. Pour éviter les risques d'électrocution, débrancher les cordons d'alimentation avant de réparer l'unité.

SELV Circuit Warning

WARNING

The ports labeled 2/1 through 2/14 are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits.

ATTENTION

Les ports étiquetés 2/1 à 2/14 sont des circuits de sécurité basse tension (safety extra-low voltage ou SELV). Les circuits SELV ne doivent être interconnectés qu'avec d'autres circuits SELV.

Circuit Breaker (15A)

WARNING

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).

ATTENTION

Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge).

Power Supply Disconnection Warning

WARNING

Before working on a chassis or working near power supplies, unplug the power cords on AC units.

ATTENTION

Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher les cordons d'alimentation des unités en courant.

Battery Handling Warning

WARNING

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

ATTENTION

Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

International Power Cord Requirements

International cords should have the following characteristics:

- Maximum length: 4.5 m/15 feet

- Female End: IEC-320-C13
- Capacity: 10A/250V
- Nominal Conductor size(s): 1.0mm2
- Approvals: Appropriate to the country in which they are to be used.

Laser Product Notice

WARNING

Class 1 laser product.

ATTENTION

Produit laser de classe I.

Class 1 lasers are defined as products which do not permit human access to laser radiation in excess of the accessible limits of Class 1 for applicable wavelengths and durations. These lasers are safe under reasonably foreseeable conditions of operation.

WARNING

Do not stare into the beam or view the beam with optical instruments.

Harmonized IC Label Requirements: The following statement is applicable to products that are intended for market in Canada under the harmonized FCC-DOC EMI requirements. Equipment Requirements for units imported into Canada shall bear both English and French translations as follows:

> “This digital apparatus does not exceed the Class A or B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.
>
> This Class A or B digital apparatus complies with ICES-003
>
> “Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.'1
>
> Cet appareil numerique de la classe A or B est conforme a la norme NMB-003 du Canada.

Contacting Customer Service

You can use the following methods to contact F5 Networks Customer Service:

F5 Networks Online Knowledge Base Online repository of answers to frequently-asked questions.	http://support.f5.com
F5 Networks Services Support Online Online customer support request system	https://websupport.f5.com
Telephone	Follow this link for a list of Support numbers: http://www.f5.com/training-support/customer-support/contact/

2

Unpacking and Installing the Switch

- Safety Instructions
- Recommended Tools and Equipment
- Verifying Shipment
- Unpacking the Switch
- Installing Slide Rails, Ear Assemblies, and Components
- Attaching the Cables and Powering On
- Attaching the Bezel
- Cabling the Client/Server Ports

Safety Instructions

To avoid personal injury or damage to equipment when installing or operating the switch, observe the following safety guidelines:

DANGER

Never assume that power is disconnected from a circuit; always check.

Before installing the switch, locate the power button on the front panel and make sure power is off. (LED not illuminated.)

Before moving the switch, disconnect any power cords or external cables.

To avoid electric shock, disconnect the power cord before servicing the device.

Recommended Tools and Equipment

The following tools and equipment are recommended for unpacking, rack-mounting, and installing the switch:

- Utility knife (optional, for the packaging)
- Phillips screwdriver
- Laptop (or PC) to use as a console connected to the serial console port
- Customer-supplied standard 19-inch EIA rack

Verifying Shipment

F5 Networks ships the ARX-4000 in one shipping box or two. If you received two boxes, it means that the control plane and data plane are in separate boxes. In addition to the component (control plane or data plane), each box contains an Accessory Kit packed on top of the component. To verify the contents of the Accessory Kits, see the following table.

Table 2.1 *Contents of Accessory Kits*

Control Plane Accessory Kit	Data Plane Accessory Kit
Power cords: • Y power cord in domestic shipments (1) • Power cords in international shipments (2)	Power cords: • Y power cord in domestic shipments (1) • Power cords in international shipments (2)
Instructions for installing the slide rails, *Slide Rail Installation* (in bubble bag).	Instructions for installing the slide rails, *Slide Rail Installation* (in bubble bag). Most equipment racks come with screws for mounting the chassis. You will need 10-32 screws (5/8" to 7/8" long). Quantity: 4.
ARX-4000 Quick Installation card.	*ARX-4000 Quick Installation* card.
	Optional X2 packs for the optical ports (if ordered).
	PCI-E cable, 1/2 meter, (1).
	Rollover serial console cable with RJ-45-to-DB9 adapter (1).
	ARX-4000 Hardware Installation Guide (this guide in hardcopy or PDF on CD-ROM).
	Ear mount assemblies.
	Front bezel.

If you receive the control plane and data plane in a single box, you will receive a single Accessory Kit and a kit containing the slide rails (rack-mount) that are used to support the switch in a standard EIA rack.

The following table lists the contents of the single Accessory Kit.

Table 2.2 *Contents of Accessory Kit*

Accessory Kit
Power cords: • Power cords supplied for international shipments (4). • Y power cords supplied for domestic shipments (2),
Power cord locks for data plane power supplies (2).

Table 2.2 *Contents of Accessory Kit (Continued)*

Accessory Kit
Instructions for installing the slide rails, *Slide Rail Installation* (in bubble bag). Most equipment racks come with screws for mounting the chassis. You will need 10-32 screws—5/8" to 7/8" long. Quantity: 4.
ARX-4000 Quick Installation card.
Optional X2 packs for the optical ports (if ordered).
PCI-E cable, 1/2 meter, (1).
Rollover serial console cable with RJ-45-to-DB9 adapter (1).
ARX-4000 Hardware Installation Guide (this guide in hardcopy or PDF on CD-ROM).
Ear mount assemblies.
Front bezel.

For more information on the slide rails, see *Installing Slide Rails, Ear Assemblies, and Components, on page 2-6*.

The following unpacking instructions apply to both components.

Unpacking the Switch

Important

Retain all packing materials. Product returns are acceptable only in the original packaging or in packaging obtained from F5 Networks.

1. Inspect the box for any shipping damage.
2. Open the box (top flaps) and remove the Accessory Kit.
3. Check the shock watch sticker on the inside of the packaging. The shock watch sticker is an orange sticker that alerts you to the possibility of damage from some physical shock (such as a drop). If the indicator is red, inspect the shipment for damage and immediately notify F5 Networks.

   If you need to return the component, consult the RMA instructions, *The F5 Return Materials Authorization (RMA) Process*. You can find these instructions in the following PDF on the AskF5 web site:

   http://www.f5.com/pdf/customer-support/rma-process.pdf

4. Carefully lift the component (control plane or data plane) and the slide rails out of the box.
5. Read the instructions, *Slide Rail Installation*. These instructions are critical to understanding how to install the rails in the rack and set the component (control plane or data plane) into the rails.

Installing Slide Rails, Ear Assemblies, and Components

Before you install the components, you must assemble and install the slide rails (rack-mount) shipped with the components.

1. Install the slide rails, using the instructions, *Slide Rail Installation*.

   The components are each 2 rack units (RU) tall. To allow for proper racking and support, install the rack rails 1 RU apart with at least 1 RU above the top rail.
2. When the rails are in place, install the screws in the back of the rack rails to hold the rails in the cabinet. Do not install the front screws because the ear assembly uses these holes to secure the device in the rack.
3. Extend the rails fully. (Rails will lock when partially out of the rack.)

   The rails are fully extended when the green levers on the outside of the rail are fully exposed and the rails are locked in place.
4. Line up the buttons on the outside of the component over the slots in the rails and lower the component onto the rails.

   The ARX-4000 requires 4 rack units (RUs). Install the control plane in the top 2 RUs and the data plane in the lower 2 RUs.
5. Gently push the component towards the rack to seat it on the rails.
6. Lift the green lever on the outside of the rails and gently push the component into the rack.

   Leave about 6 inches of the component extended out from the rack.
7. Repeat steps 4 through 6 to install the other component.

When both components are on the rails but extending out from the rack, attach the ear assemblies:

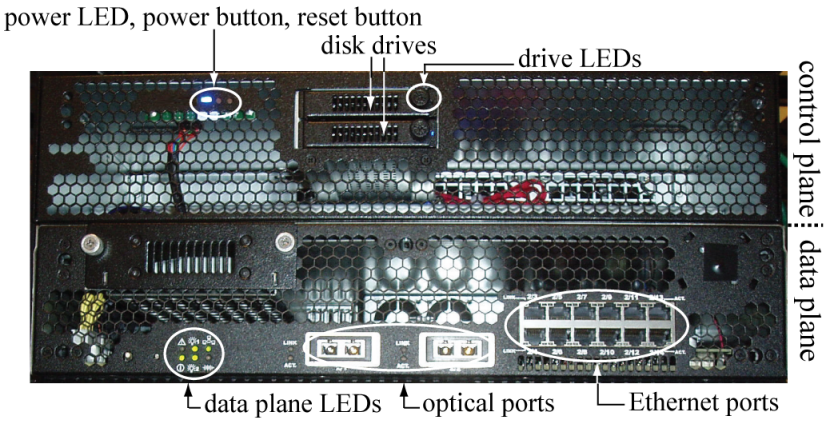
1. Line up each ear assembly with the holes on the side of each component.
2. Install the mounting screws.

   Position the handle on the ear assembly in front of the data plane.
3. Repeat the installation for the ear assembly on the other side.

4. When you have installed an ear assembly on each side, gently push the ARX-4000 back into the rack until it rests against the rails.
5. Screw the ear assemblies to the rack, using the screws provided.

This installation procedure guards against the switch sliding out during an extreme event, such as an earthquake. The following figure shows both the control plane and the data plane installed in a standard rack and identifies key components visible in the front view.

Figure 2.1 *Front Panel – No Bezel*



Attaching the Cables and Powering On

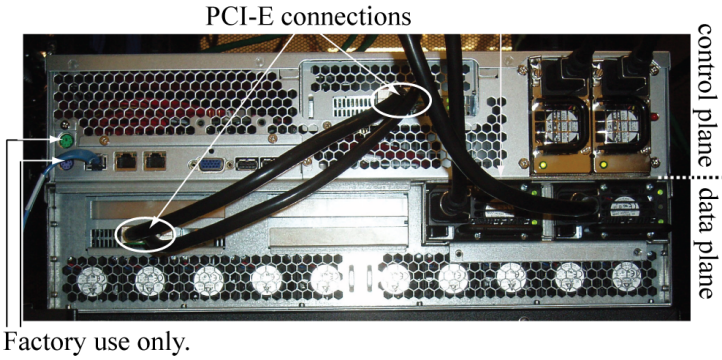
This section covers attaching the cables and contains a step where you power on the switch.

DANGER

Before powering on*, make sure all AC outlets to the switch are properly grounded. Never assume that power is disconnected from a circuit; always check.*

1. Attach the PCI-E cable. For the locations where you should attach the cable, see the following figure.

   Figure 2.2 *ARX-4000 PCI-E Connections*

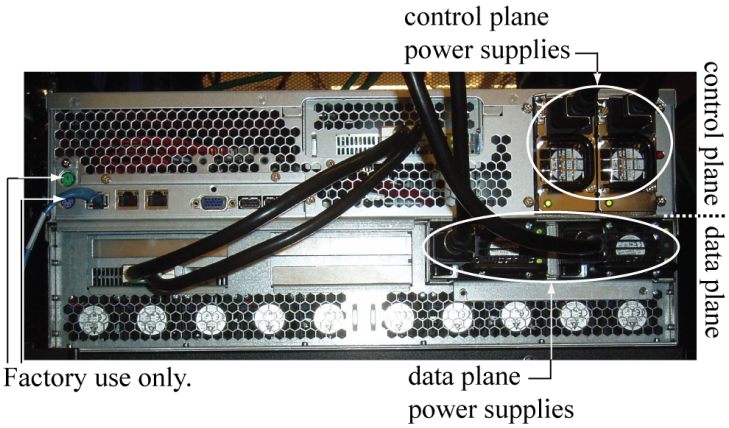


2. Attach power cords to the data plane and control plane power supplies. Attach one data plane power supply to one AC line feed and the second data plane power supply to a separate line feed.

   If using a Y power cord, attach one female end to a data plane power supply and the other female end (of the same cord) to a control plane power supply. Attach the second power cord in the same fashion: one female end to a data plane power supply and the other female end (of the same cord) to a control plane power supply.

   See the following figure for the plug locations; the data plane is on the bottom.

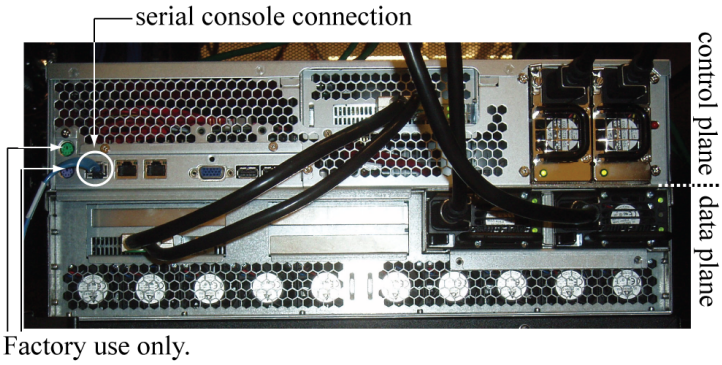
   Figure 2.3 *ARX-4000 Power Supplies*



3. Attach the serial console cable to the serial console port identified in

the following figure.

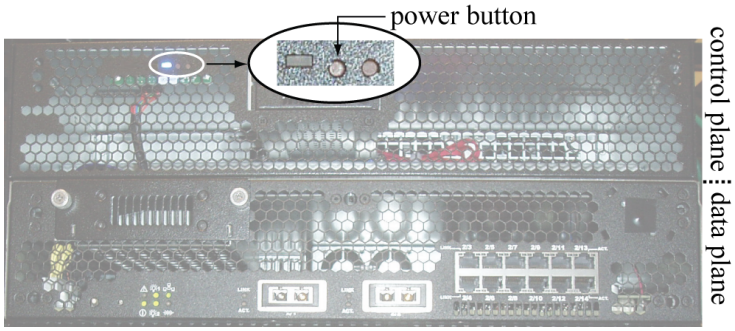
Figure 2.4 *ARX-4000 Serial Console Connection*



4. From the front of the switch, identify the power button located with the control plane LEDs.

   The power button powers up the switch or places the switch in sleep mode. (Sleep mode is accomplished by pressing and holding the power button for 5 seconds.) To fully remove power from the system, you must unplug all AC power cords from wall outlets. To locate the power button, see the following figure.

Figure 2.5 *ARX-4000 Power Button*



   For details on the control plane LEDs and buttons, see the *ARX® Hardware Reference Guide*.

5. Attach the front bezel. For details, see *Attaching the Bezel, on page 2-10*.

Attaching the Bezel

The front bezel and the ear assemblies hold the two components together in the rack. The following figure shows the appearance of the front bezel when attached.

Figure 2.6 *ARX-4000 Front Bezel*

To attach the front bezel:

1. Line up the bezel with the unit.
2. Gently push the bezel onto the front of the system until it clicks into place.
3. Connect any desired cables (Ethernet, optical, and so on) to the front of the system.

Cabling the Client/Server Ports

You can cable the client/server ports before or after the switch is connected to the network.

Ethernet cables are customer-supplied. For cable specifications and requirements, see *Required Power Cords, on page 3-5*. For cable connector and pinout information, see *Cable Connectors, on page 3-6* and *Pinout Assignments, on page 3-7*.

3

Connecting the Switch to the Network

- Identifying the Management Ports
- Booting the Switch
- Connecting the Out-of-Band Management Port

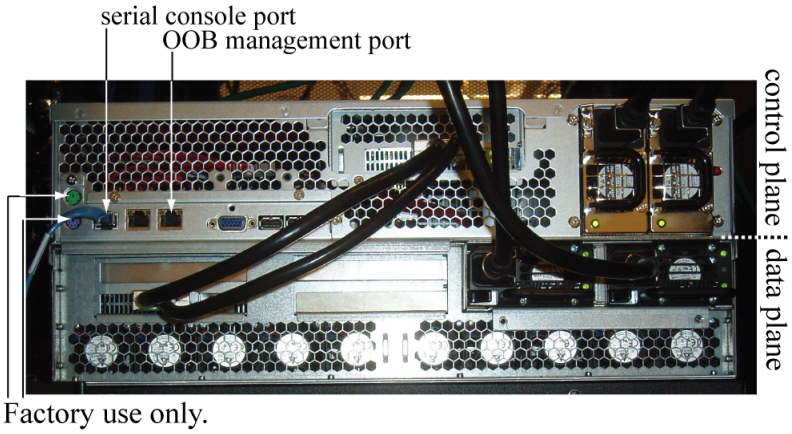
Identifying the Management Ports

This chapter describes how to connect the ARX-4000 to a serial console terminal and boot the switch for the first time. To that end, the ARX-4000 provides the following management ports:

- Serial console port for connecting a console terminal
- Ethernet port for connecting an out-of-band (OOB) management station

The following figure shows the back of the switch and points out the serial console port and the management port.

Figure 3.1 *ARX-4000 Management Ports*



During the initial-boot process described in *Booting the Switch, on page 3-4*, you can access only the serial (console) port. Locate the serial console port in *Figure 3.1* and connect the console terminal to the serial console port, using an RJ-45 connector.

Before booting the switch, set the following console-terminal parameters to match those on the serial console port (on the switch) as follows:

- 9600 baud rate (default)
- XON-XOFF flow control
- 8 data bits
- 1 stop bit parity

If you want to connect to a management station's serial DB9 port, use the RJ-45 to DB9 adapter included in the Accessory Kit. Configuring the OOB management port is described later in this chapter, *Connecting the Out-of-Band Management Port, on page 3-18*.

Booting the Switch

The initial-boot script runs automatically at switch startup. It prompts for basic configuration and security information required to access the switch and manage it remotely.

At the console terminal, boot the switch as follows:

1. Power-on the switch (as shown in *Attaching the Cables and Powering On the Switch, on page 2-5*). After some boot-up messages that may take several minutes, the following prompt appears:

   ```
   Press <Enter> to start the Switch Configuration Wizard.
   ```

2. Press the **Enter** key as prompted.

The initial-boot script is comprised of questions that prompt you for basic network information (such as management-IP address, subnet mask, and gateway). The script will also prompt you to enter the base registration key and a DNS name server IP address needed to access the license activation server.

If you have any questions about license activation, consult the ASKF5 Knowledge Base solution on that subject. Launch a browser and enter:

http://support.f5.com/kb/en-us/solutions

On the AskF5 Knowledge Base page, enter the keyword **sol12800** and click **Search**.

Booting a Non-Replacement Switch

The following sample shows the simplest initial-boot scenario: booting a new (non-replacement) switch that is either standalone or the *first* member of a redundant pair.

The answers in the example are *not* appropriate to the following scenarios:

- Replacing a defunct switch
- Joining a running switch as its redundant peer
- Re-installing a switch after F5 personnel performed a *Manufacturing Installation* on a previously-running switch (which returns a switch to its factory defaults)

Later sections discuss these contingencies and how to handle each of them. The answers below apply to the simplest case only — booting a new (non-replacement) switch that is either standalone or the *first* member of a redundant pair.

Answers are highlighted in bold text.

```
F5 ARX Startup

This F5 ARX switch does not currently have critical system
```

```
information programmed.  The following wizard prompts you
for this information.  You can connect to the switch through
the out-of-band management interface when you finish.

To restart the configuration program, enter 'r' at any prompt.

The switch's management port requires an IP address and mask.
1. Enter the management port IP address
   in the format nnn.nnn.nnn.nnn or 'none'. # 10.1.1.7
2. Enter the management port subnet mask
   in the format nnn.nnn.nnn.nnn.(default=255.0.0.0) # 255.255.255.0

The switch's management port requires a gateway IP address.
3. Enter the gateway IP address for the management interface
   in the format nnn.nnn.nnn.nnn or 'none'. # 10.1.1.1

A name server address must be assigned so that the software license
can be activated.
4. Enter the DNS name server IP address to access the license server
   in the format nnn.nnn.nnn.nnn. # 192.168.25.201


A switch replacement requires additional configuration questions.
5. Are you doing a switch replacement?
   in the format 'yes' or 'no'.(default=no) # no

The base registration key is used to activate the software license for this system.
6. Enter the switch's base registration key
   in the format xxxxxxx-xxxxxx-xxxxx-xxxx-xxxxxxx. (default=A362247-945361-27183-5068-9388182) #
<Enter>

The crypto-officer is the most privileged user in the system.
7. Enter the crypto-officer username
    in the format text (1-28 characters). # admin
8. Enter the crypto-officer password
    in the format text (6-28 characters). # mypassword
         Confirm the crypto-officer password # mypassword

A system password is required for access to the master key.
9. Enter a system password
    in the format text (12-28 characters). # d0uble$ecRET
         Confirm the system password # d0uble$ecRET

The master key is used to encrypt critical security parameters.
10. Enter the master key
      in the format base64-encoded key or keyword 'generate'.(default=generate) # generate
```

The system displays a configuration summary. See the following example.

```
Configuration Summary
    Management IP Address    10.1.1.7
    Management IP Mask       255.255.255.0
    Management Gateway       10.1.1.1
    DNS IP Address           192.168.25.201


    Power Configuration      110
    Private IP Subnet        169.254.78.0
    Private IP Mask          255.255.255.0
```

```
    Private VLAN            1010
    Private Metalog VLAN    1011

    Chassis GUID            d9bdece8-9866-11d8-91e3-f48e42637d58
    Chassis Base Reg Key    A362247-945361-27183-5068-9388182
    Switch Password         #######
    Switch Master Key       generate
    Crypto-officer Username admin
    Crypto-officer Password #######

Enter 'yes' to load configuration or 'r' to redo the interview # yes

 You have completed the switch startup configuration.
 The switch will now initialize the local database.
 When the login prompt appears, log into the switch using
 the crypto-officer's username and password.

Closing configuration file.
Processing configuration file. (boot-config)
...
```

The boot-up process continues to the **Username** prompt. Confirm that an administrator can log in by using the crypto-officer username and password that you entered in the initial-boot script, as in the following example.

```
...
User Access Authentication

Username: admin
Password: mypassword
SWITCH>
```

The switch is now ready for configuration through the CLI or GUI. For configuration instructions, see the *ARX GUI Quick Start: Network Setup* or the *ARX CLI Network-Management Guide*. Both are available from the ARX Manager GUI.

Preparing for Switch Replacement

The process of replacing a defunct switch is more complicated than the initial-boot process for a new (non-replacement) switch.

You can replace a single switch or a switch that is a member of a redundant pair. The interview that runs during installation is the same regardless of the type of replacement.

When Replacing a Standalone ARX

If you replace a standalone ARX, the replacement ARX must re-import managed volumes hosted by the failed ARX. This re-import occurs automatically at the end of the switch replacement process. With a

standalone installation, the configuration is not saved on a backup switch. Thus, you have to save key pieces of configuration data prior to the switch failure.

Every ARX keeps its local network parameters in *running-config*. To replace a standalone switch, you need to copy from running-config:

- Master key (extracted and wrapped)
- Master key wrapping key password

When Replacing a Member of a Redundant Pair

Every redundant pair of ARX devices shares a single *global-config*, containing namespace and service parameters.

An ARX *startup-config* contains both *running-config* and *global-config* in a single file. Therefore, a redundant pair requires two or more saved configuration files:

- Two startup-configs (one per ARX), or
- Two running-configs (one per ARX) and a single global-config

These items and the procedures for saving them are described fully in the *ARX Site Planning Guide*, *Best Practice: Regularly Saving the Configuration, on page 1-55*. For details, consult that guide (available from the ARX Manager).

Choosing Switch Replacement

When the initial-boot script asks if this is a switch replacement, answer **yes** to invoke the questions required to replace the failed switch as in the following example.

```
A switch replacement requires additional configuration questions.
6. Are you doing a switch replacement?
   in the format 'yes' or 'no'.(default=no) # yes
```

Matching the Private Subnet

The next set of questions ask for the switch *private subnet*, the *private VLAN* for that subnet, and the VLAN for a *private metalog subnet*.

If the failed switch was in a redundant pair and/or Resilient-Overlay Network (RON), the private subnets of the replacement switch should match those of the switch that failed. Each ARX uses its private subnet for communication with other ARXes in the same RON and/or the switch's redundant peer. All private subnets in the RON and/or pair are carried by the same VLAN. This private VLAN, and the separate metalog VLAN, must be reserved for ARX traffic only.

The private subnet and VLAN information appear at the top of the output of the **show running-config** command. The private subnet information is highlighted in bold in the following example.

```
; ARX-4000
; Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]
; Database version: 602000.33
; Generated running-config Fri Apr 27 12:12:46 2012
; System UUID  d9bdec8-9866-11d8-91e3-f48e42637d58
; ip private vlan internal 1010 metalog 1011 subnet 169.254.68.0 255.255.255.0
;
terminal character-set unicode-utf-8
;================================ vlan ==================================
config
  vlan 25
```

Entering the Private Subnet

Enter the private subnet and VLAN of the failed switch, as well as the VLAN for the private metalog subnet. The VLANs must be unique in your network, shared only among the ARX devices in the RON. The defaults may be sufficient for your installation (1010 and 1011). See the following example.

```
The switch's internal subnet requires an IP address and mask.
7. Enter the switch's private IP address
    in the format nnn.nnn.nnn.nnn.(default=169.254.6.0) #
169.254.78.0

8. Enter the switch's private subnet mask
    in the format nnn.nnn.nnn.nnn.(default=255.255.255.0) # <Enter>

The private subnet VLAN is used externally for redundancy traffic.
   Be sure this value does not conflict with existing VLAN IDs.
9. Enter the switch's private subnet VLAN
    in the format integer [1-4095].(default=1002) # 1010 <Enter>

The private subnet metalog VLAN is used for storing file-change
   logs on battery-backed NVRAM, possibly on a redundant peer.
   Be sure this value does not conflict with existing VLAN IDs.
10. Enter the switch's private subnet metalog VLAN
    in the format integer [1-4095].(default=1003) # 1011 <Enter>
```

Finding the UUID of the Failed Switch

When a switch imports storage from back-end file servers, it marks each share with its UUID (Universally-Unique ID). A replacement switch must use the same UUID or it will reject all shares imported by its predecessor. Also, you must set the UUID if the switch is brought back to its factory defaults. A *Manufacturing Installation* by F5 personnel resets the switch and its UUID.

The UUID appears at the top of the output of a **show running-config** command as in the following example from a switch named *bstnA*. The UUID is highlighted in bold.

```
bstnA# show running-config
; ARX-4000
; Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]
; Database version: 602000.33
```

```
; Generated running-config Fri Apr 27 12:12:46 2012
; System UUID  d9bdec7-9866-11d8-91e3-f48e42637d58
; ip private vlan internal 1010 metalog 1011 subnet 169.254.68.0 255.255.255.0
```

If the failed switch was a member of a RON, you can enter **show ron** from any other RON member. The output from this command shows the UUID even if the chassis is no longer online.

For example, the following **show ron** command (run on another switch in the RON) shows the UUID for a failed chassis, *bstnA*. Again, the UUID is bolded.

```
prtlndA(cfg)# show ron

Switch Name             HA Peer Switch                                Uptime
Status                  UUID                                   Management Addr
-------------------------------------------------------------------------------
bstnA                   (None)                                 0 days, 02:07:57
OFFLINE                 d9bdec7-9866-11d8-91e3-f48e42637d58          10.1.1.7

gffstnA                 (None)                                 0 days, 01:59:42
ONLINE                  e5d870ae-571e-1352-916b-ef324fbc05a2        10.1.49.60

minturnA                (None)                                 0 days, 02:00:16
ONLINE                  3d17e8ce-571e-11dc-9852-ef323fbb290f        10.1.27.69

provA                   (None)                                 0 days, 02:08:11
ONLINE                  db922942-876f-11d8-9110-8dtu78fc8329        10.1.38.19

prtlndA                 prtlndB                                0 days, 02:07:59
ONLINE                  876616f6-79ac-11d8-946f-958fcb4e6e35        10.1.23.11

prtlndB                 prtlndA                                0 days, 00:18:55
ONLINE                  64dcab94-a2b6-11d8-9d25-bf2c991c83f9        10.1.23.12
```

Applying the UUID

Enter the UUID of the replaced switch when prompted by the initial-boot script. See the following example.

```
11. Enter the switch's UUID
    in the format
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx.(default=6df0854c-6af4-11d8-954a-f844c83bc5f3) #
d9bdece8-9866-11d8-91e3-f48e42637d58
```

Important

No two running chassis should ever share the same UUID. Enter the UUID ***only*** *in a switch-replacement scenario.*

Installing a Redundant Peer or Cluster

If you are installing the second switch in a redundant pair (called an ARX cluster) or if you are configuring a second ARX cluster in a Disaster Recovery (DR) configuration, you need to provide additional information to the initial-boot script because all members of the cluster share a common master key.

Note

A master key is an encryption key for all critical-security parameters (CSPs), such as administrative passwords.

Redundant switches must use the same master key because they share the same users, groups, and passwords. In the case of of a DR configuration, all four ARX devices must be configured with a common master key.

At the peer that is currently installed, enter the **show master-key** command to create an encrypted copy of the master key.

The CLI prompts you for the following passwords:

- System password. The system password is entered at initial-boot time and validates that you have permission to access the master key. See *Booting a Non-Replacement Switch, on page 3-4*.

  The system password is 12 – 32 characters long.
- Wrapping password. The wrapping password is set with the **show master-key** command. The security software uses the wrapping password to encrypt (and later decrypt) the master key string.

  Enter 12 – 32 characters. At least one character in this password must be a number (0-9) or a symbol (!, @, #, $, and so on).

Important

Save this password because you will need it later to decrypt the master key on the replacement switch.

The **show master-key** command outputs a base64-encoded string that is the encrypted master key. Save this string and the wrapping password that you set in the command.

The following example shows the master key on a switch named *bstnB*:

```
bstnB# show master-key
Master Key System Password: %uper$ecretpw
Wrapping Password: an0ther$ecretpw
Validate Wrapping Password: an0ther$ecretpw

Encrypted master key:
  2oftVCwAAAAgAAAApwazSRFd2ww/H1pi7R7JMDZ9SoIg4WGA/XsZP+HcXjsIAAAADDR
bMCxE/bc=
bstnB# ...
```

Applying the Master Key

As discussed previously, the initial-boot script prompts for the master key. Answer this prompt with the encrypted master key. Next, the script prompts for the wrapping password (as shown in the following example).

```
The master key is used to encrypt critical security parameters.
15. Enter the master key
  in the format base64-encoded key or keyword
 'generate'.(default=generate)
# 2oftVCwAAAAgAAAApwazSRFd2ww9SoIg4WGA/XsZP+HcXjsIAAAADDRbMCxE/bc=

The wrapping password is used to encrypt and decrypt the master key.
16. Enter the wrapping password
  in the format text (6-28 characters). # an0ther$ecretpw
         Confirm the wrapping password # an0ther$ecretpw
```

Replacing a Redundant Peer

As shown in the example, use the following when replacing a failed peer:

- Private subnet
- UUID
- Master key

Note

If the replacement switch is running an outdated release of software, this example may not exactly match the text on your screen.

```
F5 ARX Startup

This F5 ARX switch does not currently have critical system
information programmed.  The following wizard prompts you
for this information.  You can connect to the switch through
the out-of-band management interface when you finish.

To restart the configuration program, enter 'r' at any prompt.


The switch's management port requires an IP address and mask.
1. Enter the management port IP address
   in the format nnn.nnn.nnn.nnn or 'none'. # 10.1.23.11
2. Enter the management port subnet mask
   in the format nnn.nnn.nnn.nnn.(default=255.0.0.0) # 255.255.255.0

The switch's management port requires a gateway IP address.
3. Enter the gateway IP address for the management interface
   in the format nnn.nnn.nnn.nnn or 'none'.(default=10.1.23.1) # 10.1.23.1

A name server address must be assigned so that the software license can be activated.
4. Enter the DNS name server IP address to access the license server
   in the format nnn.nnn.nnn.nnn. # 192.168.25.201
```

Note the questions regarding switch replacement in the following:

```
A switch replacement requires additional configuration questions.
5. Are you doing a switch replacement?
   in the format 'yes' or 'no'.(default=no) # yes

The switch's internal subnet requires an IP address and mask.
6. Enter the switch's private IP address
   in the format nnn.nnn.nnn.nnn.(default=169.254.52.0) # 169.254.78.0
7. Enter the switch's private subnet mask
   in the format nnn.nnn.nnn.nnn.(default=255.255.255.0) # <Enter>

The private subnet VLAN is used externally for redundancy traffic.
    Be sure this value does not conflict with existing VLAN IDs.
8. Enter the switch's private subnet VLAN
   in the format integer [1-4095].(default=1002) # 1010 <Enter>

The private subnet metalog VLAN is used for storing file-change
   logs on battery-backed NVRAM, possibly on a redundant peer.
   Be sure this value does not conflict with existing VLAN IDs.
9. Enter the switch's private subnet metalog VLAN
   in the format integer [1-4095].(default=1003) # 1011 <Enter>

The UUID should only be entered if this chassis is replacing a failed chassis
   and the entered UUID should match the UUID of the failed chassis.
10. Enter the switch's UUID
    in the format
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx.(default=6df0854c-6af4-11d8-954a-f844c83bc5f3) #
d9bdec7-9866-11d8-91e3-f48e42637d58

The base registration key is used to activate the software license for this system
11. Enter the switch’s base registration key
    in the format xxxxxxx-xxxxxx-xxxxx-xxxx-xxxxxxx. (default=A362247-945361-27183-5068-9388182) #
<Enter>

The crypto-officer is the most privileged user in the system.
12. Enter the crypto-officer username
    in the format text (1-28 characters). # admin
13. Enter the crypto-officer password
    in the format text (6-28 characters). # mypassword
         Confirm the crypto-officer password # mypassword

A system password is required for access to the master key.
14. Enter a system password
    in the format text (12-28 characters). # d0uble$ecRET
        Confirm the system password # d0uble$ecRET
```

Note the use of the encrypted master-key and the wrapping password from the redundant peer to answer the master-key question in the following.

```
The master key is used to encrypt critical security parameters.
15. Enter the master key
  in the format base64-encoded key or keyword 'generate'.(default=generate) #
2oftVCwAAAAgAAAApwazSRFd2ww/H1pi7R7JMDZ9SoIg4WGA/XsZP+HcXjsIAAAADDRbMCxE/bc=

The wrapping password is used to encrypt and decrypt the master key.
```

```
16. Enter the wrapping password
    in the format text (6-28 characters). # an0ther$ecretpw
        Confirm the wrapping password # an0ther$ecretpw


Configuration Summary
     Management IP Address   10.1.1.7
     Management IP Mask      255.255.255.0
     Management Gateway      10.1.1.1
     DNS IP Address          192.168.25.201


     Power Configuration     110
     Private IP Subnet       169.254.78.0
     Private IP Mask         255.255.255.0

     Private VLAN            1010
     Private Metalog VLAN     1011

     Chassis GUID             d9bdece8-9866-11d8-91e3-f48e42637d58
    Chassis Base Reg Key     A362247-945361-27183-5068-9388182
     Switch Password          #######
     Switch MasterKey 2oftVCwAAAAgAAAApwazSRFd2ww/H1pi7R7JMDZ9SoIg4WGA/XsZP+HcXjsIAAAADDRbMCxE/bc=
     Wrapping Password        #######
     Crypto-officer Username  admin
     Crypto-officer Password  #######

Enter 'yes' to load configuration or 'r' to redo the interview # yes

 You have completed the switch startup configuration.
 The switch will now initialize the local database.
 When the login prompt appears, log into the switch using
 the crypto-officer's username and password.

Closing configuration file.
Processing configuration file. (boot-config)
...
User Access Authentication

Username: admin
Password: mypassword
SWITCH>
```

Checking Software and Firmware Before Joining the Pair

At this point, the switch is ready for configuration through the GUI or CLI.

Before proceding, confirm that the replacement switch is running software and firmware compatible with its peer. This ensures a proper rendezvous with the redundant peer. If the replacement ARX is running a lower release or outdated firmware, upgrade it before you proceed.

Go to the redundant peer of the switch you are replacing and check the software version there. You can log into the CLI and use the **show version** command to find this information, or log into the GUI and access the Status page.

For example, the following CLI session shows the running software on an ARX named *bstnA*. The version number, 6.02.000, is highlighted in bold:

```
bstnA(cfg)# show version
   Copyright (c) 2002-2012 by F5 Networks, Inc. All rights reserved.
Running Release
test2.rel :  Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]

Armed Release
test2.rel :  Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]

Backup Release
test1.rel :  Version 6.02.000.14360 (Apr 23 2012 20:09:34) [nbuilds]

System Configuration:  Version 602000.33
```

Check the version at the replacement ARX. In this example, the software version (5.1.0) is outdated:

```
SWITCH> show version
  Copyright (c) 2002-2009 by F5 Networks, Inc. All rights reserved.
Running Release
test1.rel :  Version 5.01.000.11927 (Nov 23 2009 21:57:26) [nbuilds]

Armed Release
test1.rel :  Version 5.01.000.11927 (Nov 23 2009 21:57:26) [nbuilds]

Backup Release
test3.rel :  Version 5.01.000.11927 (Nov 23 2009 21:57:26) [nbuilds]

System Configuration:  Version 501000.36
```

Connecting to the Client/Server Network

The replacement switch must be connected to a machine on the network with:

- a new software-release file and
- the running-config file from the failed ARX.

If the replacement switch is running a release earlier than 6.00.000, the interview script connects the switch to your OOB management network only. If you are running 6.00.000 or later or if your ARX release files and running-config files are accessible through the out-of-band network, you can skip this section. These steps are required for systems that need to access the client/server network.

To access the client/server network, enable at least one client/server VLAN with at least one member interface and a management IP, and establish a default route on that VLAN's IP network. The following example reaches a client/server network on VLAN 74.

```
SWITCH> enable
SWITCH# config
SWITCH(cfg)# vlan 74
SWITCH(cfg-vlan[74])# members 1/5
SWITCH(cfg-vlan[74])# exit
SWITCH(cfg)# interface vlan 74
SWITCH(cfg-if-vlan[74])# ip address 192.168.74.66 255.255.255.0
SWITCH(cfg-if-vlan[74])# no shutdown
SWITCH(cfg-if-vlan[74])# exit
```

```
SWITCH(cfg)# interface gigabit 1/5
SWITCH(cfg-if-gig[1/5])# no shutdown
SWITCH(cfg-if-gig[1/5])# exit
SWITCH(cfg)# ip route 0.0.0.0 0.0.0.0 192.168.74.1
SWITCH(cfg)# exit
SWITCH#
```

If your network has more complex requirements, you can find the complete set of options and instructions in the *Configuring Layer 2* and *Configuring the Network Layer* sections of the *ARX® CLI Network-Management Guide* .

Upgrading the Software and Firmware on the Replacement ARX

If the replacement ARX is running an outdated release, you must upgrade its software and firmware. Use the stand-alone instructions in *Upgrading Software* in the *ARX® CLI Maintenance Guide*. If the software is more than two major releases behind the target release (that is, release 3.x.y or earlier), upgrade fully to a 4.x or 5.x release and then upgrade to the target release.

The following command sequence upgrades both the software and the firmware on the new *bstnA* switch from 5.01.000 to 6.02.000.

```
SWITCH# copy ftp://jusr:jpasswd@mysrv.wwmed.com/12345.rel
 releases test5.rel

% INFO: Copying 1013 megabytes from the specified source . . .

...

% INFO: The copy completed successfully.

SWITCH# show releases


  releases
  R A test1.rel               Dec  8 00:14  800 MB
  B   test2.rel               Dec  7 00:06  800 MB
      test5.rel               Sep 10 00:09  1.0 GB
```

Arm the system with the new release and then reload the ARX to activate.

```
SWITCH# boot system test5.rel

% INFO: The boot system command may take up to 5 minutes to complete.

SWITCH# show releases

releases
  R   test1.rel               Dec  8 00:14  800 MB
      test2.rel               Dec  7 00:06  800 MB
  A B test5.rel               Sep 10 00:09  1.0 GB

SWITCH# reload

Reload the entire chassis? [yes/no/diags] yes

System is resetting.
```

After the reboot, log in and confirm that you are running the new release.

```
User Access Authentication

Username: admin
Password: mypassword
bstnA# show version
  Copyright (c) 2002-2012 by F5 Networks, Inc. All rights reserved.
Running Release
test2.rel :  Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]

Armed Release
test2.rel :  Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]

Backup Release
test1.rel :  Version 6.02.000.14360 (Apr 23 2012 20:09:34) [nbuilds]

System Configuration:  Version 602000.33

  bstnA uptime is 12 weeks, 0 days, 1 hours, 20 minutes.

  Slot  Admin     ModuleType     ModuleState        FW Upgrade
  ----  -------   ------------   ----------------   ----------
    1   Enabled   ACM            Online             Disabled
    2   Enabled   NSM            Online             Disabled
```

Activating the License

To successfully join a redundant pair, activate the license. To prepare for activating a license, identify a DNS server that can resolve the name of the F5 license server (activate.f5.com). For example:

```
SWITCH> enable
SWITCH# config
SWITCH(cfg)# ip name-server 192.168.90.18
SWITCH(cfg)# end
SWITCH#
```

Confirm that you can reach the license server and then activate the software license. To continue the example:

```
SWITCH# ping license-server base-reg-key CRJGVQP-DYWST-ANKR-GBYYDMT

% INFO: Activation server response: 'Thu Aug 25 04:28:00 UTC 2011'

SWITCH# license activate base-reg-key CRJGVQP-DYWST-ANKR-GBYYDMT
% INFO: The license has been successfully activated.

SWITCH#
```

Checking and/or Updating the Firmware

Check for available firmware updates. If any updates are available, install them using the firmware upgrade all command. Note that this process results in a system reboot.

```
SWITCH# show firmware upgrade
Show Firmware Update
--------------------

Slot Status Summary
-------------------

1    Upgrade available
3    Upgrade available
5    Upgrade available
SWITCH# firmware upgrade all

Confirmation of this command commences a firmware upgrade on the
entire chassis. During the upgrade process, the chassis reboots
automatically to complete the upgrade process. If this includes a bios
upgrade, this could take at least 30 minutes.

Proceed? [yes/no] yes

System is resetting.
...
User Access Authentication

Username: admin
Password: mypassword
SWITCH>
```

Running the Running-Config Script and Joining the Redundant Pair

Once the software and firmware are synchronized between the peers, download and run the running-config script (previously saved from the failed chassis). The following example shows the process of downloading this running-config file to the replacement switch and then running it.

```
SWITCH> enable
SWITCH# copy ftp://juser:jpasswd@ftp.wwmed.com/a2kconfig scripts running
SWITCH# show scripts


  scripts
      running                 Feb 12 17:45  2.1k


SWITCH# run scripts running

The running-config script set up all local parameters, such as the hostname and the network
settings:

; ARX-4000
; Version 6.02.000.14337 (Mar  5 2012 20:05:49) [nbuilds]
; Database version: 602000.31
; Generated running-config Thu Mar  8 01:34:43 2012
; System UUID  d9bdece8-9866-11d8-91e3-f48e42637d58
; ip private vlan internal 1010 metalog 1011 subnet 169.254.86.0 255.255.255.0
;
terminal character-set unicode-utf-8
;================================ vlan ==================================
config
  vlan 25
    description "personnel dept."
```

```
    members 2/5 to 2/6
    exit

  exit

;=========================== config-if-vlan ============================
config
  interface vlan 25
    ip address 192.168.25.5 255.255.255.0
    no shutdown
    exit

  exit

;=============================== system ================================
config
  clock timezone America New_York
  hostname bstnA
  ip domain-list wwmed.com
bstnA(cfg)# ...
bstnA(cfg)# exit
bstnA#
```

If you copied the private subnet and mask from the defunct switch (recall *Matching the Private Subnet, on page 3-7*), this completes the switch replacement. Otherwise, the new switch learns its private subnet from its peer, re-configures itself, and reboots.

Note

A reboot is necessary to change the private subnet of an ARX.

For detailed configuration instructions, see the *ARX® CLI Network-Management Guide*.

Connecting the Out-of-Band Management Port

After you boot the switch, you can connect the Ethernet out-of-band management port to a management station or network. To locate the management port, see *Figure 3.1*. You can use this port to access the GUI (ARX Manager) or the CLI.

To access ARX Manager, direct a web browser to the port over HTTPS. For example:

```
https://10.1.23.11/
```

To log in, enter the crypto-officer username and password, as entered in the initial-boot script.

To access the CLI, use SSH with the management port IP address and the crypto-officer username.

```
ssh admin@10.1.1.7
```

For instructions on getting starting with ARX Manager, see the *ARX GUI Quick Start: Network Setup*. For instructions and best practices for using the CLI, see the *ARX® CLI Network-Management Guide*. Both are available from the ARX Manager GUI.

4

Maintenance

- Powering Down the ARX-4000
- Verifying Hardware Integrity

Powering Down the ARX-4000

You can power down the ARX-4000 with a CLI command (**shutdown**). This cuts power from all systems except the Non-Volatile RAM (NVRAM). The NVRAM contains namespace metadata information that managed volumes are currently using. Once the NVRAM loses power from an external source, it uses a battery backup for up to 72 hours.

For details on powering down a single ARX and a redundant pair, consult the *ARX CLI Maintenance Guide*, *Powering Down the ARX, on page 13-1*. This prepares the ARX pair for a planned power outage.

For power outages of greater than 72 hours, contact F5 Support.

Verifying Hardware Integrity

This chapter describes the ARX-4000 hardware power-on self-test (POST) diagnostics.

When the switch reboots and the system powers up, POST diagnostics run to verify basic hardware integrity. You can view any hardware failures at the system console through the show version or show chassis commands. These commands are documented fully in the *ARX CLI Reference*. For details, see the show version or show chassis commands.

See the following sample output for the **show version** command:

```
bstnA# show version
  Copyright (c) 2002-2012 by F5 Networks, Inc. All rights reserved.
Running Release
test2.rel :  Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]

Armed Release
test2.rel :  Version 6.02.000.14362 (Apr 26 2012 21:55:38) [nbuilds]

Backup Release
test1.rel :  Version 6.02.000.14360 (Apr 23 2012 20:09:34) [nbuilds]

System Configuration:  Version 602000.33

  bstnA uptime is 0 weeks, 0 days, 1 hours, 20 minutes.

  Slot  Admin     ModuleType     ModuleState        FW Upgrade
  ----  -------   ------------   ----------------   ----------
    1   Enabled   ACM            Online             Disabled
    2   Enabled   NSM            Online             Disabled


 Resource         State                              Forwarding
 --------         -------------------------------    ----------
  Switch           Up                                Disabled
```

See the following sample output for the **show chassis** command:

```
bstnA# show chassis

 Identification:
 Hostname                              UUID
 ------------------------------------- --------------------------------------
 bstnA                                 d9bdec7-9866-11d8-91e3-f48e42637d58

 Chassis:
 Chassis Type  Model Number                          HW Ver.  Serial
 ------------  ----------------------------------  -------  -------------
 ARX-4000 SR2500ALLXR-F5                                       0700000005

 Private Subnet:
 VLAN   Subnet             Subnet Mask
 ----   ----------------   ----------------
 1010   169.254.78.0       255.255.255.0

 Chassis Environment:
 Base MAC Address    Power            Fan(setting)    Temperature
 -----------------   --------------   -------------   -------------
 00:0a:49:17:78:00   Online           Online          Normal(<62 C)

 Power Details:
 Supply   State
 ------   -----
 1/1      Online
 1/2      Absent
 2/1      Absent
 2/2      Online

 Logical Disk Details:
 Disk    Status                 Verification Mode  Verification Rate
 ------  ---------------------  -----------------  -----------------
 1       Optimal                Manual             50 %

 Disk Details:
 Disk       Size          State               Transfer Rate   Model
 --------   -----------   -----------------   -------------   -----------------
  Bay 1     136.73G       Online              3.0Gb/sec        ST9146803SS
  Bay 2     136.73G       Online              3.0Gb/sec        ST9146803SS

 RAID Controller Details:
 Rebuild Rate  Max Transfer Rate  Firmware       RAID Alarm
 ------------  -----------------  -------------  ------------
 85 %          3.0Gb/sec          7.0.1-0061     Enabled

 Slot Environment:
 Slot  Type   State             Power    Temperature     NVR Battery  Drive
 ----  -----  ----------------  -------  --------------  -----------  ---------
  1    ACM    Online            Degraded Normal                       LSI Good
  2    NSM    Online            Degraded Normal          Good

 Module:
 Slot Ports Procs Card      Xeon               Sibyte             Serial
 ---- ----- ----- --------  -----------------  -----------------  ------------
  1    1     1    ACM       2.6 GHz  16128 MB  N/A                0700000005
  2    14    12   NSM       N/A                900 MHz  4096 MB   006003
```

```
Slot MAC Address                    HW Version  Rework  Deviation
---- ----------------------------  ----------  ------  --------------------
 1   000A49177800 to 000A4917783F
 2   000A49177840 to 000A4917789F  A 5

Slot Reset   Keeper   Power    Mux   BIOS Version
     CPLD    CPLD     CPLD     CPLD
---- ------- ------- ------- ------- ------------------------------------
 1   N/A     N/A     N/A     N/A     S5000.86B.10.00.0094.101320081858
 2   14      3       5       4

Slot Boot Version      Diag Version      BootLdr Version
---- ----------------  ----------------  ----------------
 1   N/A               N/A               N/A
 2                     5.01.000.11908    5.02.000.12627

             FPGA Version
Slot       LBA          NVR
---- -------------- ---------------
 1   N/A             N/A
 2   65              71

Port Media Details:
Slot/Port   Type                Vendor            Status
---------   ---------------     ---------------   -----------------------
 2/1        10GBASE-SR X2       JDSU              Good
 2/2        10GBASE-SR X2       JDSU              Good

Disk Usage:
Name                              Total MB    Used MB     Free MB     Used%
--------------------------------  ----------  ----------  ----------  -----
System                            2331        1404        808         64%
Releases                          5285        2673        2343        54%
Logs                              54951       314         51844       1%
Cores; DiagInfo; Lists            21133       1696        18363       9%
Scripts                           3172        546         2465        19%
Reports                           8458        35          7993        1%

Temperature Details:
               Sensor 1 (C)   Sensor 2 (C)   Sensor 3 (C)   Sensor 4 (C)
Slot  Module   Local Remote   Local Remote   Local Remote   Local Remote
----  ------   ----- ------   ----- ------   ----- ------   ----- ------
  1   ACM      29    21                      N/A   N/A      N/A   N/A
  2   NSM      25    44       26    52       34    40       N/A   N/A

NVR:
NVR Battery  ECC State                NVR Size (MB)
-----------  ---------------------    -------------
Good         No Error                 2048
```

A

Removing and Replacing FRUs

- Before You Begin
- Distinguishing Between ARX-4000 Models
- Removing and Replacing FRUs
- Removing and Reattaching the Front Bezel
- Removing the Ear Assemblies
- Troubleshooting the Control Plane and Data Plane
- Replacing the Control Plane
- Replacing the Data Plane
- Replacing the Disk Drives
- Replacing the NVRAM Battery
- Replacing the Optical Transceivers
- Replacing the PCI Express Cable
- Replacing the Power Supplies
- Replacing the Rail Kits

Before You Begin

When working on Field Replaceable Units (FRUs) for the ARX-4000, you need to know the chassis serial number. In some cases, you also need the chassis base MAC address.

You can enter the **show chassis** command to get the serial number and base MAC address. See the following example output.

```
bstnA> show chassis

Identification:
Hostname                UUID
------------------------ --------------------------------------
bstnA                   f4ad6628-78f6-11dd-b7a6-912e2a60a848

Chassis:
Chassis Type  Model Number           Serial Number
------------  ----------------------- -------------
ARX-4000      SR2500ALLXR-F5          0700000007
.
.
.
Chassis Environment:
Base MAC Address   Power          Fan(setting)   System Temp.   CPU Temp.
-----------------  ------------   -------------  -------------  ---------
00:0a:59:17:9c:00  Online         Online         Normal(<62 C)
```

Distinguishing Between ARX-4000 Models

With v5.00.005 of the ARX software, F5 Networks began shipping a redesigned ARX-4000. The redesigned model performs exactly like and is functionally equivalent to the previously-shipping model. Both models are comprised of a control plane and a data plane. The data plane does not change between models; the control plane does.

Before you begin removing FRUs, it is highly recommended that you know which model you are working with. The models have different serial numbers and other physical differences. The serial number is displayed on a sticker on the front lower left of the control plane and applies to the unit as a whole.

For more information, see *Table A.1* and the figures that follow the table.

The following table itemizes the differences between the two control plane models.

Table A.1 *Differences In ARX-4000 Control Planes*

Model	Depth	Width	Height	Drive Bays	Power Supplies	Serial Number
BZDS control plane	28”	17”	3.5”	6 bays — 2 bays populated with 3 1/2” drives	2 power supplies — installed one on top of the other	Begins with BZDS; for example: BZDS72000184
0700 control plane or 0200 control plane	24”	17”	3.5”	2 bays — 2 bays populated with 2 1/2” drives	2 power supplies — installed side-by-side	Begins with 0700 or 0200; for example: 07000000010 or 02000000010

Figure A.1 shows the BZDS control plane and points out the 6 drive bays and the LEDs and buttons to the right of the drive bays. Contrast that with the 0700/0200 control plane shown in *Figure A.2* (2 drive bays and the LEDs and buttons to the left of the drive bays). **The data plane is identical in both models**.

Figure A.1 *Front View BZDS Control Plane*

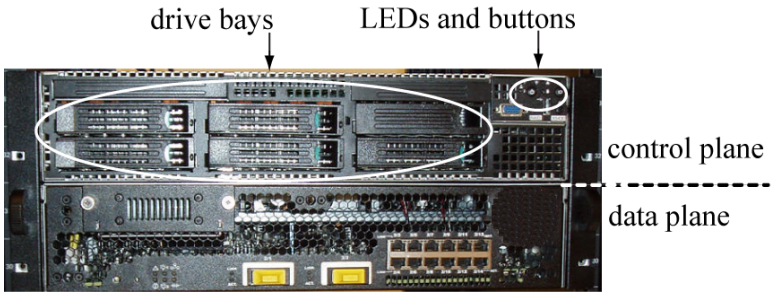


Figure A.2 *Front View 0700 Control Plane*

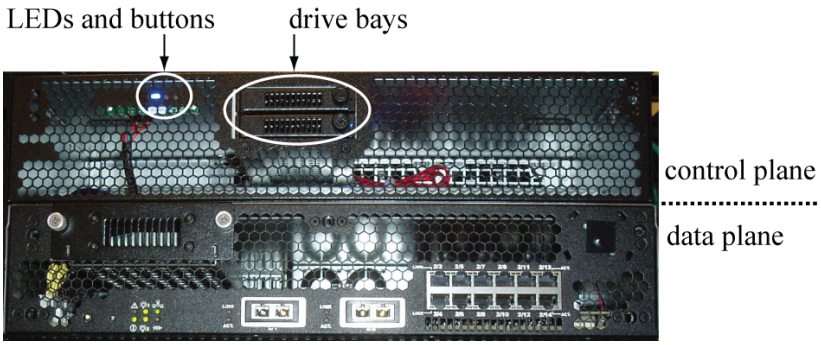


Figure A.3 shows the orientation of the BZDS control plane power supplies (PS 1/1 and PS 1/2). They are installed one on top of the other. Also, note that the perspective in this figure makes the control plane appear wider than the data plane. It isn't; both components are 17" wide. Contrast *Figure A.3* with *Figure A.4* which shows different power supplies (from a different manufacturer), installed side-by-side in the 0700/0200 control plane. Again, the data plane in both models is identical.

Figure A.3 *Back View BZDS*

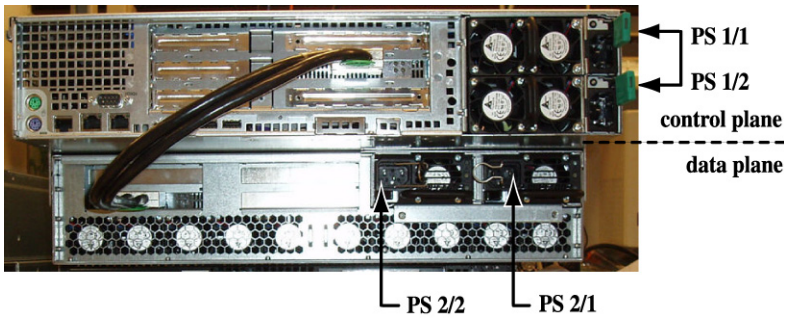
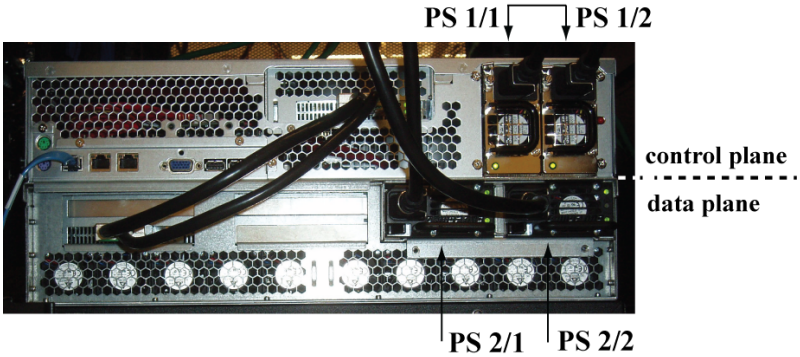


Figure A.4 *Back View 0700*



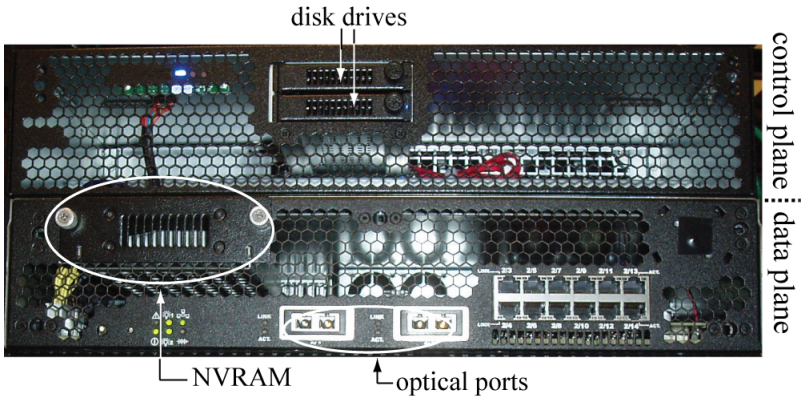
The rest of this appendix focuses on the redesigned ARX-4000 (data plane and 0700/0200 control plane) and describes how to remove and replace its FRUs.

Removing and Replacing FRUs

The ARX-4000 is made up of two separate components — a control plane and a data plane. These components are mechanically connected in the front by ear assemblies and electrically connected in the back by the PCI-E cable.

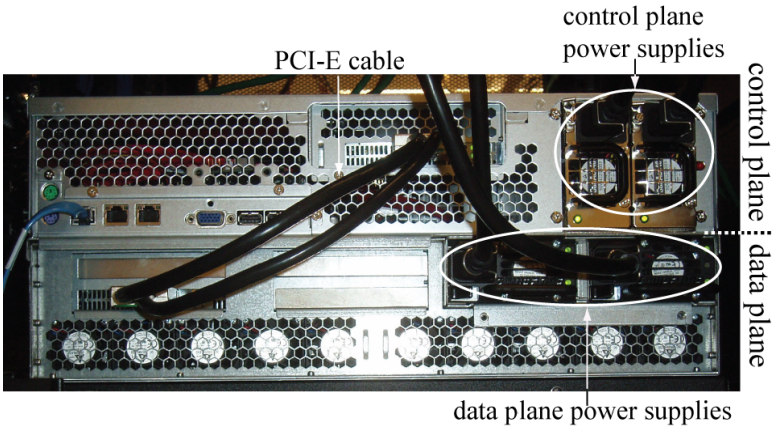
The FRUs that are accessible from the front of the ARX-4000 are called out in the following figure: disk drives, NVRAM battery, optical ports, control plane, and data plane.

Figure A.5 *Front View Showing FRUs*



The FRUs that are accessible from the back of the ARX-4000 are called out in the following figure: PCI-E cable, control plane power supplies, and data plane power supplies.

Figure A.6 *Back View Showing FRUs*



As a general rule, perform all FRU replacements on the backup switch.

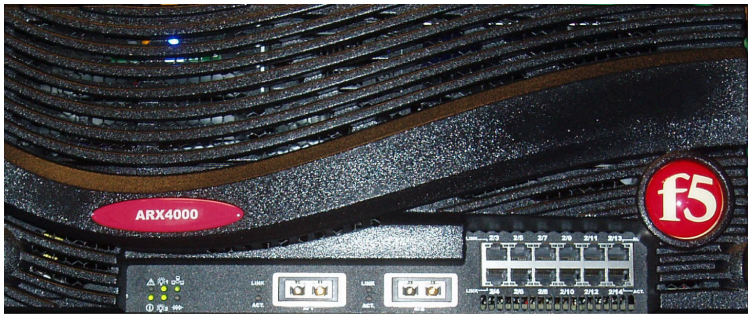
WARNING

Static electricity can damage switch components. Be sure to wear antistatic straps before handling hardware modules and disk drives.

Removing and Reattaching the Front Bezel

The ARX-4000 control plane and data plane are racked separately with the control plane on top of the data plane. The front bezel and the ear assemblies hold the two components together in the rack. The following figure shows the appearance of the front bezel when installed.

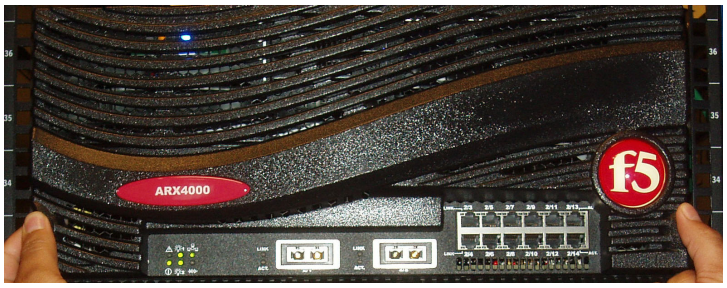
Figure A.7 *ARX-4000 Front Bezel*



To access the FRUs on the front of the ARX-4000, you must remove the bezel, as described in the following steps:

1. If necessary, remove any cables still attached to the switch.
2. Put your fingers through the two cutouts on the lower half on either side of the bezel and pull it gently towards you and away from the front of the switch, as shown in the following figure.

   Figure A.8 *Removing the Bezel*

To re-install the front bezel:

1. Line up the bezel with the switch.
2. Gently push the bezel onto the front of the switch until it clicks into place.
3. Connect any desired cables (Ethernet, optical, and so on) to the front of the switch.

Removing the Ear Assemblies

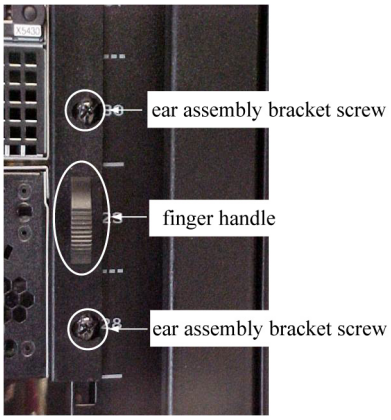
The ear mount assemblies are not FRUs, but they secure the ARX-4000 in the rack, and you must remove them before you can replace a data plane, control plane, or rack kit.

Prior to removing the ear mount assemblies, remove the bezel (front), PCI-E cable (back), and power cords (back).

To remove the ear assemblies:

1. Remove the 2 screws on each ear assembly bracket that secure the ARX-4000 in the rack.
2. Using the finger handles on the ear assemblies, gently slide the ARX-4000 towards you to expose the screws on the side of the ear assemblies. The following figure shows the location of the ear assembly bracket screws and the finger handle on the right side of the unit.

   Figure A.9 *Right Side Bracket Screws and Finger Handle*

3. Remove the 4 screws that hold each ear assembly on to the control plane and data plane.
4. At this point, you can slide out the control plane and data plane independently of each other.

Troubleshooting the Control Plane and Data Plane

Troubleshooting can be challenging when a failure condition exists, and it is not clear which component has failed — the control plane, the data plane, or another component. For example, when the data plane cannot detect the presence of the control plane, it could be the result of a control plane failure, a data plane failure, or a failure of the PCI-E cable connecting the two.

In such cases, step through the following procedure.

1. Remove and reconnect the PCI-E cable, ensuring that the control plane and data plane are securely connected. For details on removing the cable, see *Replacing the PCI Express Cable, on page A-21*.
2. Reboot the system.
3. Issue the CLI command, **show version**, to verify that the data plane is visible to the control plane.
4. If the data plane is not visible, replace the PCI-E cable with a new cable and reboot again.
5. If the data plane is still not visible, FRU the entire system, following the steps in *Replacing the Control Plane, on page A-10* or *Replacing the Data Plane, on page A-12*.

Important

Removing the control plane or the data plane causes the system to reboot.

In a redundant pair where this switch is active, services fail over to the backup switch. In a redundant pair where this switch is in the backup role, service is unaffected. A standalone switch does not offer any service for the duration of the reboot.

Failure indications may also arise from the following:

- Control plane/data plane uncorrectable Error-Check Circuitry (ECC) error reported by an SNMP trap.
- Control plane/data plane excessive correctable ECC errors reported by an SNMP trap.
- Control plane fan failure reported by an SNMP trap.
- Control plane over temperature reported by an SNMP trap.
- Control plane fails to boot.
- Data plane POST failure reported by an SNMP trap.
- DP not visible to the firmware. Issue the CLI command, **show version**, which will indicate that the data plane is offline.

To display the installed-software versions and a summary of the chassis configuration and state, issue the **show version** command. The following example output shows both the control plane (ACM) and data plane (NSM) as **Enabled** and **Online**:

```
bstnA# show version
  Copyright (c) 2002-2012 by F5 Networks, Inc. All rights reserved.
Running Release
test2.rel :  Version 6.02.000.14363 (Apr 27 2012 20:14:05) [nbuilds]

Armed Release
test2.rel :  Version 6.02.000.14363 (Apr 27 2012 20:14:05) [nbuilds]

Backup Release
```

```
test1.rel :  Version 6.02.000.14363 (Apr 27 2012 20:14:05) [nbuilds]

System Configuration:  Version 602000.33
  bstnA uptime is 0 weeks, 20 days, 2 hours, 14 minutes.

  Slot  Admin     ModuleType     ModuleState        FW Upgrade
  ----  -------   ------------   ----------------   ----------
    1   Enabled   ACM            Online             Disabled
    2   Enabled   NSM            Online             Disabled

 Resource         State                              Forwarding
 --------         -------------------------------    ----------
  Switch           Up                                Disabled
```

For more information on the **show version** command, consult the *ARX® CLI Reference*, *show version, on page 5-53*.

Replacing the Control Plane

Because lifting the ARX-4000 into or out of a rack requires two people, performing the procedure in this section may require two people.

Important

*The control plane and the data plane are **NOT** hot-swappable. Replacing the control plane or the data plane involves stepping through the following procedure which includes failing over and powering down the switch that contains the failed control plane.*

1. Use the **copy running-config** command to copy the current running configuration to the configs directory on the ARX. Use the **copy global-config** command to copy the global configuration to the configs directory on the ARX.
2. Write down the switch's system password, the IP address and subnet mask for the out-of-band management port, the UUID, the IP address for the private internal subnet, and the system master-key.

   These parameters were all set when the switch was installed. You can use the **show master-key** command to get an encrypted copy of the master key.
3. Ensure that you perform the replacement on the backup switch and that the active switch is fully functional. To determine which switch is the backup switch, issue the following command:

```
bstnA> show redundancy

                                                Transitions
Node Switch/Quorum Disk   Status     Role    Total Last (UTC)
---- -------------------- ---------- ------- ----- -------------------
*1   bstnA                Up         Active  1     06:58:42 05/01/2012
 2   bstnB                Up         Backup  Never -
 QD  192.168.25.21        Up         Quorum  1     06:56:58 05/01/2012
```

4. Power down the control plane (top unit) and data plane (bottom unit) by pressing the power button located on the front panel. See *Figure A.25*.
5. Turn off and unplug all peripheral devices connected to the system.
6. Label each network cable with the name of the port to which it was connected.
7. **Remove all cables, including the PCI-E cable and power cables.**
8. Remove the 4 screws (2 per bracket) that hold the brackets in place.
9. Pull the entire switch (both components — control plane and data plane) **partially** out of the rack together (6” – 8”) so that the ear assemblies are exposed and can be removed.
10. Remove the ear assemblies. For details, see *Removing the Ear Assemblies, on page A-8*.
11. Remove the front bezel.
12. Push the data plane back into the rack.
13. Lift up the gold levers on the outside of each of the rack rails to slide the failed control plane farther out of the rack.
14. When the rails lock in place again, you should be able to slide the failed control plane out another inch to the point where you can lift it up to free it from the rack rails.
15. Install the replacement control plane in the rack in place of the failed control plane.
16. Reattach the ear assemblies.
17. Slide the switch back into the rack and secure it with 4 screws (2 per bracket).
18. Reattach the front bezel.
19. Attach all cables to the data plane, including the PCI-E and power cables.
20. Connect to the console port (on the back of the switch).
21. Power the switch back on by pressing the power button located on the front panel. See *Figure A.25*.
22. Complete the switch replacement option of the Switch Configuration Wizard. When prompted, enter the UUID and private subnet information collected in step 1. For an example, see *Replacing a Redundant Peer, on page 3-11*.

    Failure to perform the switch replacement option will require that you rebuild the cluster.
23. Reboot the switch.
24. Replace the running configuration.

25. Ensure that the switch pairs with the active ARX. To confirm, issue the **show redundancy** command again.

Replacing the Data Plane

Because lifting the ARX-4000 into or out of a rack requires two people, performing the procedure in this section may require two people.

Important

*The control plane and the data plane are **NOT** hot-swappable. Replacing the control plane or the data plane involves stepping through the following procedure which includes failing over and powering down the switch that contains the failed control plane.*

1. Use the **copy running-config** command to copy the current running configuration to the configs directory on the ARX. Use the **copy global-config** command to copy the global configuration to the configs directory on the ARX.
2. Write down the switch's system password, the IP address and subnet mask for the out-of-band management port, the UUID, the IP address for the private internal subnet, and the system master-key.

   These parameters were all set when the switch was installed. You can use the **show master-key** command to get an encrypted copy of the master key.
3. Ensure that you perform the replacement on the backup switch and that the active switch is fully functional. To determine which switch is the backup switch, issue the following command:

```
bstnA> show redundancy

                                                Transitions
Node Switch/Quorum Disk   Status     Role    Total Last (UTC)
---- -------------------- ---------- ------- ----- -------------------
*1   bstnA                Up         Active  1     06:58:42 05/01/2012
 2   bstnB                Up         Backup  Never -
 QD  192.168.25.21        Up         Quorum  1     06:56:58 05/01/2012
```

4. Delete startup-config and boot-config, as follows:

   ```
   delete configs boot-config
   delete configs startup-config
   ```

   Failure to complete this step will require that you perform a Manufacturing Installation to bring the switch online. For details, see *Booting the Switch, on page 3-4*.

5. Power down the control plane (top unit) and data plane (bottom unit) by pressing the power button located on the front panel. See *Figure A.25*.
6. Turn off and unplug all peripheral devices connected to the system.
7. Label each network cable with the name of the port to which it was connected.
8. **Remove all cables, including the PCI-E cable and power cables.**
9. Remove the 4 screws (2 per bracket) that hold the brackets in place.
10. Pull the entire switch (both units — control plane and data plane) **partially** out of the rack together (6” – 8”) so that the ear assemblies are exposed and can be removed.
11. Remove the ear assemblies. For details, see *Removing the Ear Assemblies, on page A-8*.
12. Remove the front bezel.
13. Push the control plane back into the rack.
14. Lift up the gold levers on the outside of each of the rack rails to slide the failed data plane farther out of the rack.
15. When the rails lock in place again, you should be able to slide the failed plane out another inch to the point where you can lift it up to free it from the rack rails.
16. Install the replacement data plane in the rack in place of the failed data plane.
17. Reattach the ear assemblies.
18. Slide the switch back into the rack and secure it with 4 screws (2 per bracket).
19. Reattach the front bezel.
20. Attach all cables to the replacement data plane, including the PCI-E and power cables.
21. Connect to the console port on the back of the ARX-4000.
22. Press the power button located on the front panel to power the unit back on. *Figure A.25*.
23. Complete the switch replacement option of the Switch Configuration Wizard. When prompted, enter the UUID and private subnet information collected in step 1. For an example, see *Replacing a Redundant Peer, on page 3-11*

    Failure to perform the switch replacement option will require that you rebuild the cluster.
24. Reboot the switch.
25. Replace the running configuration.

26. Ensure that the switch pairs with the active ARX. To confirm, issue the **show redundancy** command again.

Replacing the Disk Drives

Replacing disk drives in the ARX-4000 is a hot-swap procedure and does not require powering down the switch nor does it involve a loss of service.

If you do not replace a failed drive, the system continues to run, in a degraded state, with the disk missing from the RAID set. Best practices dictate that you replace failed disk drives and that you replace them on the secondary (backup) switch only.

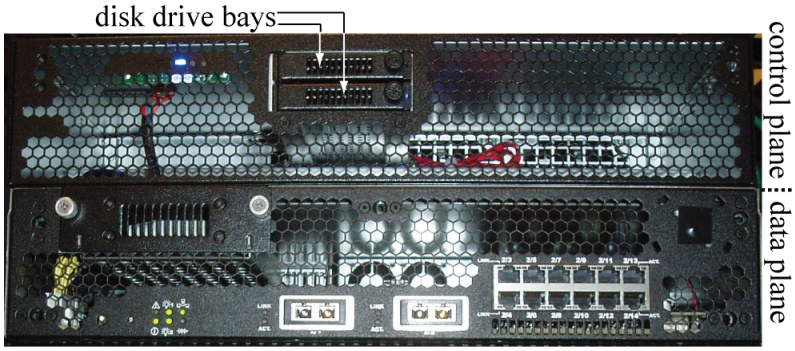
Simply replacing a failed disk does not incorporate the newly-installed disk into the RAID set nor does it initiate the process of rebuilding the RAID set. After replacing a disk, be sure to rebuild the RAID set. For instructions, see *Rebuilding the RAID Set, on page A-16*.

Note

To achieve maximum performance on the active switch and avoid service interruptions, rebuild the RAID set on the backup switch.

As shown in *Figure A.10*, the ARX-4000 contains two hot-swap disk drives — both located in the control plane.

Figure A.10 *Front Panel View Showing Disk Drive Bays*



The CLI designates the disk drives as Bay 1 (top drive) and Bay 2 (bottom drive).

The system notifies you of an internal disk failure through the CLI or an SNMP trap. If you receive an email notification of a internal disk failure (or potential failure), consult the *ARX SNMP Reference, Disks (Internal to the ARX)*.

Important

Before replacing a drive, verify that the bay number (of the drive you are about to replace) matches the bay number of the failed drive (from the CLI or the SNMP trap).

Replacing a Disk Drive

If you want to avoid a service interruption due to pulling the wrong drive or mishandling the drive, replace the drive on the secondary (backup) switch. If necessary, fail over the switch before starting the replacement process.

WARNING

Static electricity can damage switch components. Wear antistatic straps before handling disk drives.

1. From the CLI, ensure that the primary switch is fully functional by entering the **show redundancy** command.
2. From the CLI, enter the **show chassis diskuse** command to determine the bay number of the offline or failed drive.

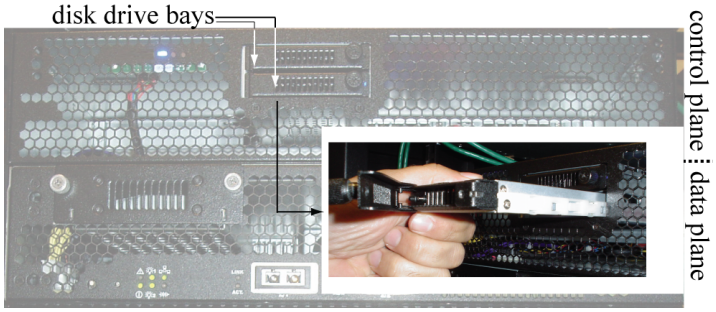
   The following example output from the **show chassis diskuse** command shows two disks installed and the disk in bay 2 as **Failed**:

```
bstnA> show chassis diskuse

 Logical Disk Details:
 Disk    Status                 Verification Mode  Verification Rate
 ------  ---------------------  -----------------  -----------------
 1       Optimal                Manual             50 %

 Disk Details:
 Disk    Size          State                Transfer Rate   Model
 --------   -----------   -----------------   -------------   -----------------
  Bay 1     136.73G       Online              3.0Gb/sec       ST3146855SS
  Bay 2     136.73G       Failed              3.0Gb/sec       ST3146855SS

 RAID Controller Details:
 Rebuild Rate  Max Transfer Rate  Firmware       RAID Alarm
 ------------  -----------------  -------------  ------------
 85 %          3.0Gb/sec          7.0.1-0061     Enabled
...
```

3. Remove the front bezel. If necessary, consult the instructions at *Removing and Reattaching the Front Bezel, on page A-7*.
4. Loosen the thumb screw on the right hand side of the drive carrier.

5. Slide the drive out of the control plane, as shown in the following figure.

   Figure A.11 *Removing a Disk Drive*



6. Insert the replacement drive into the slot and slide the drive in until the left side of the drive carrier is behind the faceplate of the control plane.
7. To fully seat the drive, grasp the thumb screw and push the carrier door closed.
8. Tighten the thumb screw to secure the drive in place.
9. Install the front bezel. If necessary, see the instructions *Removing and Reattaching the Front Bezel, on page A-7*.

Silencing the RAID Alarm

After you remove a drive, an audible alarm goes off to signal that the drive is missing. From the CLI (priv-exec mode), enter the **raid silence** command to quiet this alarm.

For example, the following command sequence logs into a switch at address 10.1.1.7, enters **enable** to go to priv-exec mode, and silences the RAID alarm:

```
$ telnet 10.1.1.7
Trying 10.1.1.7...
Connected to 10.1.1.7.
Escape character is '^]'.
Username: admin
Password: password
bstnA> enable
bstnA# raid silence
bstnA# ...
```

Rebuilding the RAID Set

Simply replacing a failed disk does incorporate the newly-installed disk into the RAID set nor does it initiate the process of rebuilding the RAID set.

◆ Note

Rebuilding the RAID set places a load on the disk subsystem. To achieve maximum performance on the active switch during the rebuilding process and to avoid service interruptions, rebuild the RAID set on the secondary (backup) switch.

To enable the newly-installed disk to join the RAID set, issue the **raid rebuild** command from the CLI priv-exec mode:

```
bstnA# raid rebuild {disk1 | disk2}
```

where disk1 | disk2 specifies the disk to rebuild. (The disk in bay 1 is disk1.)

For example, the following command rebuilds the disk in bay 2:

```
bstnA# raid rebuild disk2
bstnA# ...
```

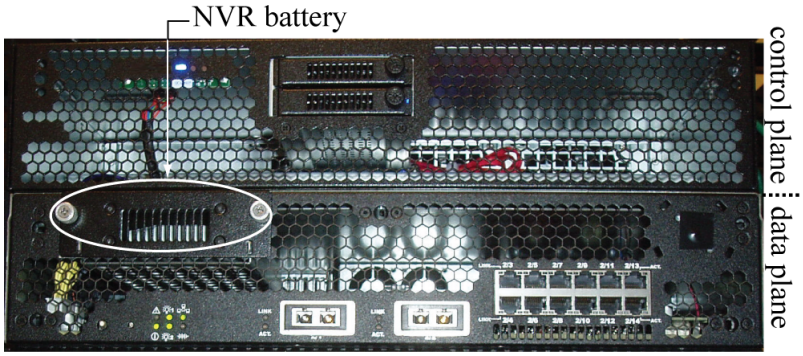
Monitoring the RAID Set Rebuild

Rebuilding a RAID set can be a lengthy process. To monitor progress, issue the **show chassis diskuse** command to see a percentage-complete meter. For more information, see *RAID Management, on page 6-1*in the *ARX CLI Reference*.

Replacing the NVRAM Battery

The ARX-4000 contains one NVRAM battery located in the data plane as shown in the following figure.

Figure A.12 *Front Panel View Showing NVRAM Battery Location*



The system notifies you of a failed (or degraded) battery through the CLI or an SNMP trap. If you receive an email notification of a failed (or degraded) battery, consult the *ARX SNMP Reference, NVRAM, on page 1-31*.

Preparing to Replace the NVRAM Battery

Note

Perform battery replacement only on a powered off secondary (backup) switch.

1. Ensure that the primary switch is fully functional by issuing the **show redundancy** command, as in the following example:

```
bstnA> show redundancy

                                                Transitions
Node Switch/Quorum Disk   Status     Role    Total Last (UTC)
---- -------------------- ---------- ------- ----- -------------------
*1   bstnA                Up         Active  1     06:58:42 05/01/2012
 2   bstnB                Up         Backup  Never -
 QD  192.168.25.21        Up         Quorum  1     06:56:58 05/01/2012
```

2. Check the status of the battery in the primary (active) switch by issuing the **show chassis nvr** command. The following example output from the show chassis nvr command shows an NVR battery status of **Good**:

```
bstnA> show chassis nvr

NVR:
NVR Battery  ECC State                NVR Size (MB)
-----------  ----------------------   -------------
Good         No Error                 2048
```

3. Ensure that the secondary switch is powered off.
4. Remove the front bezel. For instructions, *Removing and Reattaching the Front Bezel, on page A-7*.

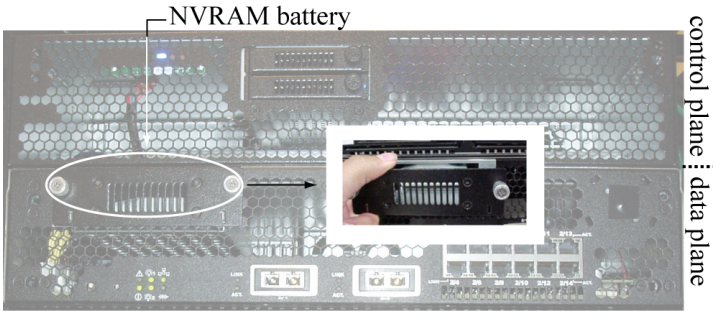
Replacing the Battery

Once you decide to replace a failed battery, use the following instructions to accomplish the task.

1. Loosen the thumb screws on either side of NVRAM battery tray. Turn both screws counter clockwise. They will not fall out.

2. Slide the entire tray out of the unit by grasping the top and bottom of the casing as shown in the following figure.

   Figure A.13 *Replacing the NVRAM Battery*



3. Insert the new NVRAM battery tray into the slot.
4. Tighten both thumb screws clockwise to secure the new battery tray
5. Turn on the switch.
6. Replace the front bezel. For instructions, see *Removing and Reattaching the Front Bezel, on page A-7*.

Note

After new battery insertion, the charging process starts. It takes approximately 8 hours to charge a completely discharged battery. Ensure the battery is charging and fully functional by issuing the show chassis nvr command again.

Replacing the Optical Transceivers

Note

Before replacing an optical transceiver, label any cables that need to be removed.

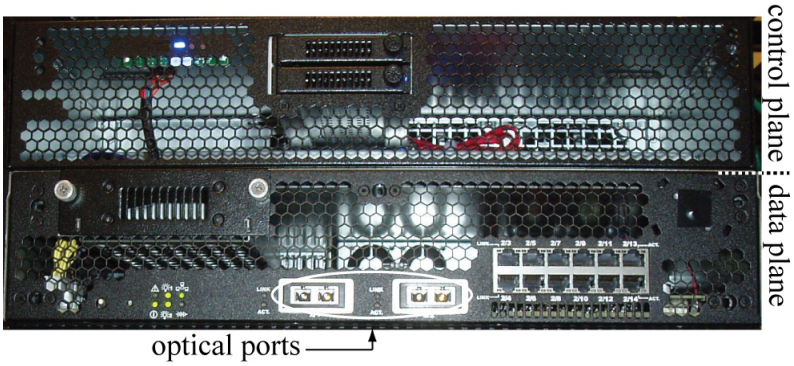
You can hot-swap a 10 gigabit Ethernet optical module in the ARX-4000, but you must reboot the system after swapping out the hardware.

WARNING

Fiber-optic ports must be protected by blank covers, rubber grommet fillers or cable connectors at all times to prevent dust from collecting in the transceivers.

The ARX-4000 contains two optical ports (located in the data plane) and designated in the CLI as 2/1 (left) and 2/2 (right). The location of the optical ports is shown in the following figure.

Figure A.14 *Front Panel View Showing Optical Ports*



The system will notify you of the failure of an optical transceiver through an SNMP trap. If you receive an email notification of a failure, consult the *ARX SNMP Reference* for details on how to proceed.

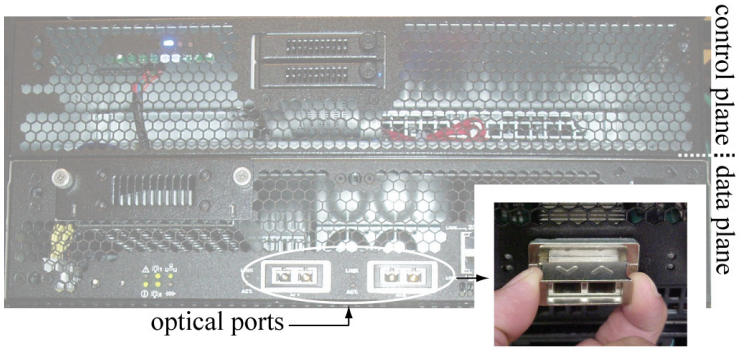
You can also check on the status of the optical transceivers by issuing the CLI command, **show chassis**. The following example output from the **show chassis** command shows optical transceivers installed in the data plane (2/1, 2/2) with a status of **Good**.

```
bstnA# show chassis

 Identification:
 Hostname                              UUID
 ------------------------------------- ---------------------------------------
 bstnA                                 d9bdece8-9866-11d8-91e3-f48e42637d58

 Chassis:
 Chassis Type  Model Number                          HW Ver.  Serial
 ------------  ------------------------------------  -------  -------------
 ARX-4000      SR2500ALLXR-F5                                 0700000005

.
.
.
Port Media Details:
 Slot/Port   Type                Vendor            Status
 ---------   ---------------     ---------------   -----------------------
  2/1        10GBASE-SR X2       JDSU              Good
  2/2        10GBASE-SR X2       JDSU              Good

...
```

To replace a failed optical transceiver:

1. Remove the cable (if installed).
2. Grasp either side of the front of the failed transceiver and gently slide it out as shown in the following figure.

   Figure A.15 *Removing an Optical Transceiver*

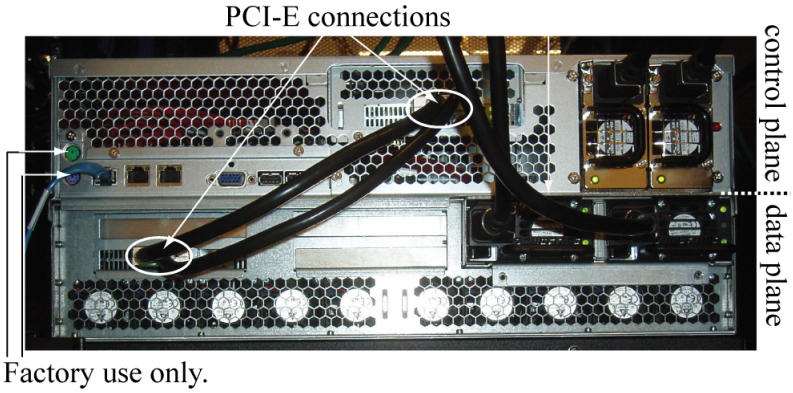


3. Insert the new transceiver, taking care to match the grooves on the sides of the transceiver with the rails in the slot.
4. Slide the replacement transceiver in until it clicks.
5. Reconnect the cable (if one was installed).
6. Reboot the system.

Replacing the PCI Express Cable

The ARX-4000 contains one PCI Express (PCI-E) cable, connecting the control plane and the data plane, as shown in the following figure.

Figure A.16 *Back Panel View Showing PCI-E Cable*

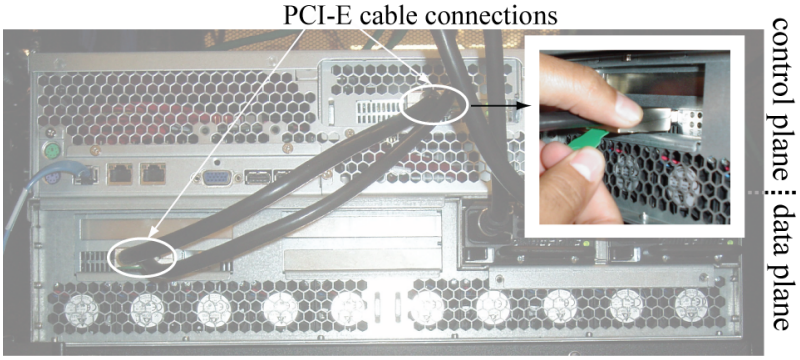


Before removing the PCI-E cable, make sure the ARX-4000 is powered off.

Removing the PCI-E Cable

To remove the cable, gently pull the green tab under the connector and slide it out, while grasping both sides of the connector, as shown in the following figure. Repeat this step for the other end of the cable.

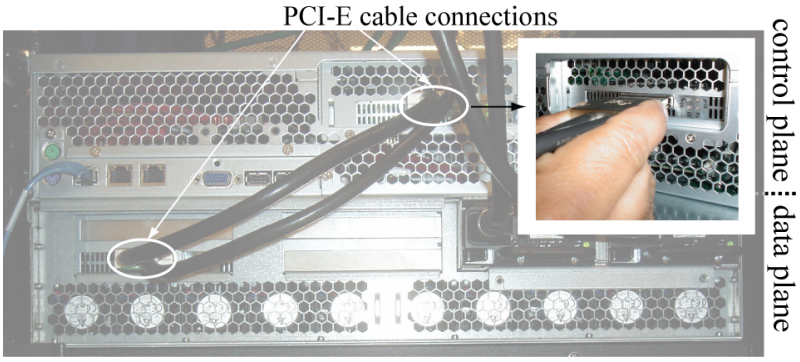
Figure A.17 *Removing the PCI-E Cable*



Replacing the PCI-E Cable

To replace the PCI-E cable, grasp both sides of the metal connector and gently slide the connector into the slot on the control plane, as shown in the following figure. Repeat these steps to connect the other end of the cable to the data plane.

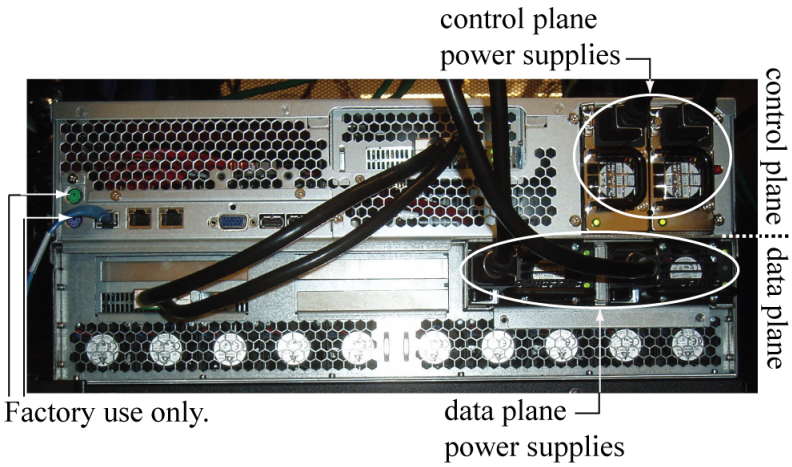
Figure A.18 *Replacing the PCI-E Cable*



Replacing the Power Supplies

The control plane and the data plane can each accommodate two power supplies. All four are accessible from the back of the system. *Figure A.19* shows the location of the power supplies.

Figure A.19 *Back Panel View Showing Power Supplies*



DANGER

An ARX-4000 configured with four power supplies has four power cords. If you must remove AC power from the system, disconnect all four power cords before servicing the system.

Facing the back of the system, the control plane power supplies are designated left-to-right as 1/1 and 1/2. The data plane power supplies are designated left-to-right as 2/1 and 2/2.

The control plane power supplies share a red push button (as can be seen in *Figure A.19*). Pushing the button silences alarms due to power supply fault conditions.

If you receive an email notification of a power supply failure, consult the *ARX SNMP Reference, Power, on page 1-37*.

The following example output from the CLI command, **show chassis chassinfo**, shows all four power supplies installed and online:

```
bstnA> show chassis chassinfo

 Identification:
 Hostname                              UUID
 ------------------------------------- ---------------------------------------
 bstnA                                 d9bdece8-9866-11d8-91e3-f48e42637d58

 Chassis:
 Chassis Type  Model Number                            HW Ver.  Serial
 ------------  ------------------------------------  -------  -------------
 ARX-4000      SR2500ALLXR-F5                                   0700000005
```

```
Chassis Environment:
Base MAC Address    Power            Fan(setting)    Temperature
-----------------   --------------   -------------   -------------
00:0a:49:17:78:00   Online           Online          Normal(<62 C)

Power Details:
Supply   State
------   -----
1/1      Online
1/2      Online
2/1      Online
2/2      Online
```

If the CLI output shows a state of **Failed**, consult the *ARX® CLI Reference*, *show chassis, on page 5-19* for information on how to proceed.

Important

Power supplies are hot-swappable. The system can remain in service with one power supply in the control plane and one power supply in the data plane.

If you have redundant power supplies installed in the control plane and data plane, you can hot-swap a power supply at any time.

If you have just one power supply installed in the control plane or data plane, before removing or replacing the power supply, you must first take the system out of service, turn off all peripheral devices connected to the system, turn off the system by pressing the power button, and unplug the AC power cords from the system or wall outlet.

You must replace a power supply if it fails or if one of the fans integrated in a power supply fails.

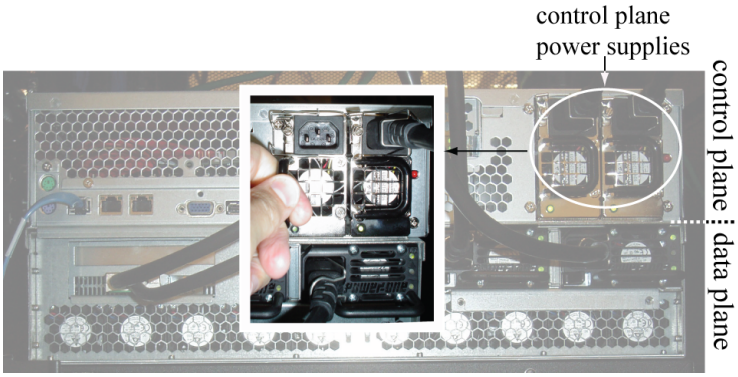
Replacing a Control Plane Power Supply

To replace a power supply in the control plane:

1. Unlock the AC power cord by flipping the cord lock to the left.
2. Pull the power cord out of the failed power supply and set it aside.
3. Unscrew the screw that attaches the power supply to the chassis.
4. Flip the black handle to the left.

5. Depress the metal lever at the top of the power supply while at the same time gently pulling the power supply towards you by the black handle as shown in the following figure.

   Figure A.20 *Removing a Control Plane Power Supply*



6. Insert the replacement power supply into the power supply cage and push it gently into place. You may need to exert some force to seat it fully.
7. Insert the power cord and flip the cord lock to the right to lock the cord in place.
8. Screw in the screw that attaches the power supply to the chassis.

◆ Note

The LEDs on the control plane power supply will not light up — even with power present — until the ARX-4000 is powered on.

Replacing a Data Plane Power Supply

◆ Note

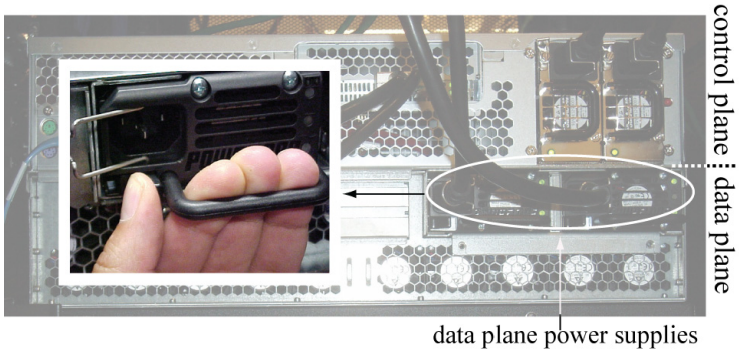
Facing the back of the data plane, power supply 2/1 is the left power supply and 2/2 is the right power supply.

To replace a power supply in the data plane:

1. Unlock the AC power cord by flipping the cord lock to the left
2. Pull the power cord out of the failed power supply and set it aside.

3. Push the black lever to the right and gently pull the power supply out by its handle. See the following figure.

Figure A.21 *Removing a Data Plane Power Supply*



4. Insert the replacement power supply into the slot until fully seated.
5. Insert the power cord, and flip the cord lock to the right to lock the cord.

Note

If power is present, data plane power supply LEDs will light up, regardless of whether or not the ARX-4000 is powered on.

Replacing the Rail Kits

In the unlikely event that you need to replace the rail kits, the following procedure will guide you through the process.

1. Reach inside the rack and squeeze the rail lock together, while pulling the end of the rail out of the rack. See *Figure A.22*.

Figure A.22 *Squeezing the Rail Lock*

2. Repeat as necessary to remove other rails.

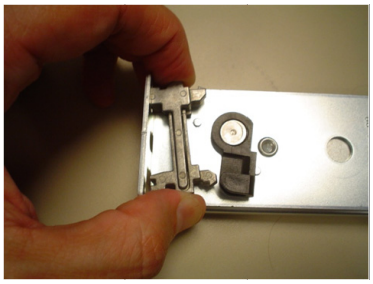
3. Replace the rails, making sure to install them on the proper side and in the proper direction. Rails are labeled to indicate which side of the rack they belong on and which end is the front. The following figure shows an example of the labeling.

   Figure A.23 *Rail Labeling*

   For further details, see the instructions shipped with your rail kit, *Slide Rail Installation*.

4. Rails are shipped setup for square punch, clip nut style racks, but you can reverse the rail lock to work with racks that have circular punch holes. The following figure gives you an idea of the size and location of the rail locks. For details on reversing the locks, consult the instructions shipped with your rail kit, *Slide Rail Installation, Setting the Multi-Pin Adapters for Rack Type*.

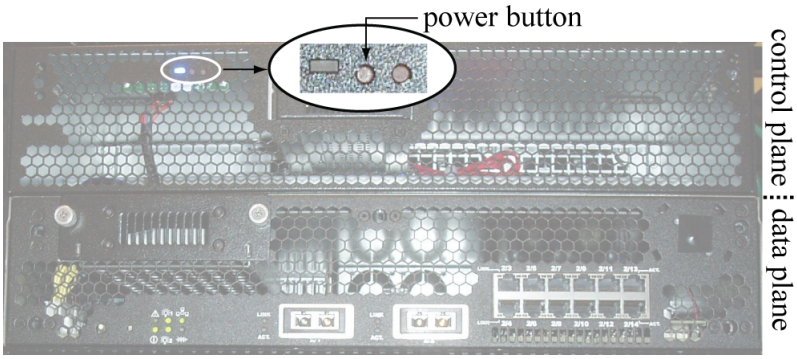
   Figure A.24 *Reversing the Rail Lock*

After any FRU replacement, reconnect the PCI-E cable and power cables as described in this appendix.

When you have reconnected all cables, press the power button on the control plane to power on the back panel of the ARX-4000. For the location of the power button, see the following figure.

Figure A.25 *Power Button Location*



Note

The LEDs on the control plane power supply will not light up — even with power present — until the ARX-4000 is powered on.

Install the front bezel by lining it up with the unit and gently pushing on the bezel to seat it. The bezel should click into place.

Contact the customer or F5 support personnel to verify that the unit is back online and that units that have been replaced are fully functional.

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