ARX®1000 Hardware Installation Guide

810-0006-00

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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.

Acknowledgments

This product includes software from several third-party vendors. Each vendor is listed below with the applicable copyright.

Revision History

June 2004 - Rev A

July 2004 - Rev B

September 2004 - Rev C

October 2004 - Rev D - new Hardware release

October 20, 2004 - Rev E - added safety notices

December, 2004 - Rev F - updated License notice, added admonishment

March 2005 - Rev G

April 2005 - Rev J - hot-swap procedure for disks

October 2005 - Rev K - support for Software Release 2.0/2.1

March 2006 - Rev L - support for Software Release 2.3

August 2006 - Rev M, updates for Software Release 2.4

September 2006 - Rev N, new links to multiple Users Guides

October 2006 - Rev P, updates for Related-Manuals links

March 2007 - Rev Q, streamline the hardware-features list

May 2007 - Rev R, clarify LED states

December 2007 - Rev S, updates for Software Release 3.0.0

February 2008 - Rev T, clarified Console-cable pinouts for Release 2.7.1

March 2008 - Rev U, updates for Software Release 3.1.0; apply F5 documentation format

August 2008 - Rev V, clarify Disk labels

October 2008 - Rev W, re-brand the OS

April 2009 - Rev X, move software version number up to doc-set index

November 2009 - Rev Y, change chassis names

September 2010 - Rev Z, updates for Software Release 5.2.0

Table of Contents

1

Introduction

This manual describes the F5 Adaptive Resource Switch 1000 (ARX®1000) and its hardware components. It also describes how to install the switch and connect it to the network.

This chapter contains the following sections:

Audience for this Manual

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®1000 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 ambient room temperature range that the unit can operate in is 5–35° 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 104° F (40° 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 40 \xb0 C (104 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

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

Do not use the attached power supply cable for other devices or usage.

WARNING

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

WARNING

Please do not use it 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?ドを他の? 置や用途に使用しない
添付の電源コ?ドは本? 置に接? 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? 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 have more than one power cord. To reduce the risk of electric shock, disconnect the two 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 deux cordons d'alimentation avant de réparer l'unité.

SELV Circuit Warning

WARNING

The ports labeled LINK, 1/1 through 1/6, CONSOLE, MGMT, MIRROR, and DEBUG are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits.

ATTENTION

Les ports étiquetés LINK, 1/1 through 1/6, CONSOLE, MGMT, MIRROR, et DEBUG 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 cord on AC units.

ATTENTION

Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher lecordon 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 it is 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

Product Overview

This chapter provides a general overview of the F5 ARX®1000. Topics include the following:

- ARX®1000 Overview
- Hardware Features
- Redundant Pairs
- Resilient Overlay Network (RON)
- Switch Management
- Supported Protocols

ARX®1000 Overview

The F5 Adaptive Resource Switch (ARX®) enables enterprises to globally access, manage, deliver and optimize information resources. The ARX®1000 is a cost-effective, small form factor Adaptive Resource Switch designed for use in small data centers and branch/remote offices. The ARX®1000 switch combines application processing and control, switch fabric throughput, and external interfaces into a single field replaceable unit (FRU) compact design. It offers the same software features as the ARX®500, ARX®4000, and ARX®6000, differing only in performance and scale. It has been superceded by the ARX®2000.

The ARX®1000's *Application Control Module* (*ACM*), provides a subset of features and components from the ARX®6000's Adaptive Services Module (ASM) and Network Services Module (NSM):

- storage aggregation of multiple back-end shares into a single client volume,
- inline management of storage capacity, to adapt the back-end storage to client demands,
- ability to add or remove back-end storage without any effect on clients, and
- the ability to seamlessly migrate files from one back-end storage device to another.

In addition, the ACM provides the switch fabric and control plane functions for the switch.

The ARX®1000 enables Fast Ethernet and Gigabit Ethernet throughput and provides six 100/1000 BASE-T external ports for connectivity to network infrastructure, network-attached storage (NAS) devices, and file servers with direct-attached storage (DAS).

Figure 2.1 *ARX®1000 Adaptive Resource Switch*

Hardware Features

The ARX®1000 switch provides or supports the following hardware features:

- 2U compact design
- Box-to-box failover capability (for redundant ARX®1000 switches; see the next section)
- External interfaces including:
  - serial console port
  - out of band 10/100Mbps Ethernet management port
  - two Gigabit Ethernet Small Form Factor Pluggable (SFP) ports (with SX fiber optics)
  - four 100/1000BASE-T Ethernet ports
- Front panel LEDs to indicate system status, port link status, and NVRAM battery status (shown in Figure 7.3 on page 7-6)
- Auto-sensing (110-220V) power supply
- 2 80GB internal Serial ATA (SATA) hard disks

  These are configured as a RAID1 (a redundant, mirrored array of disks). Either disk is hot-swappable.

Redundant Pairs

You can purchase two ARX®1000 switches and configure them as a redundant pair. If the primary switch fails, all services “fail over” to the secondary switch. This is a highly-available configuration.

The redundant switches are interconnected through one or more of their Gigabit Ethernet ports. You use the CLI to configure the ports for redundant-link traffic (as opposed to client/server traffic).

See the *ARX® CLI Network-Management Guide* and *ARX® CLI Reference* for information about configuring redundant switches.

If you are installing the second switch in a redundant pair, there are differences in the initial-boot procedure. The differences are outlined later in Chapter 6, *Connecting the Switch to the Network*.

Resilient Overlay Network (RON)

You can connect multiple ARX®es together in a Resilient Overlay Network (RON). A RON is composed of a series of IP tunnels between the switches. You can use the CLI to configure a RON tunnel, as described in the CLI manuals.

See the *ARX® CLI Network-Management Guide* and *ARX® CLI Reference* for information about configuring RON tunnels.

Switch Management

For local and remote management, the ARX® provides the following management interfaces:

- Serial Console port for accessing and managing the switch through a local console terminal and command-line interface (CLI).
- Out-of-band 10/100 Ethernet port (labeled MGMT) for accessing the CLI from your management network.
- Inband Ethernet interfaces for accessing the CLI your client or server networks.

Chapter 6, *Connecting the Switch to the Network*, explains how to configure the first two management interfaces.

See the *ARX® CLI Network-Management Guide* and *ARX® CLI Reference* for general information about using the CLI.

Supported Protocols

The ARX® supports a range of network, application, and file-access protocols, including the following:

Network

- spanning tree: 802.1D and Rapid Spanning Tree (802.1S)

◆ Note

In 802.1D mode, the switch executes the 802.1S protocol in 802.1D compatibility mode. This allows inter operability with legacy 802.1D-only devices.

- VLAN (802.1Q)

- passive link aggregation (802.3ad), without LACP
- Internet Protocol (IP)
- Transmission Control Protocol/User Datagram Protocol (TCP/UDP)
- Domain Name Service (DNS), as a client
- Network Time Protocol (NTP), as a client

File Services

- Common Internet File System (CIFS)
- Network File System (NFS): NFSv2 over UDP and NFSv3 over TCP or UDP
- Network Locking Manager (NLM)

Security and Authentication

- NT LAN Manager (NTLM) v1
- NT LAN Manager (NTLM) v2
- Kerberos authentication for Windows clients
- Network Information Service (NIS, also known as YP)
- Remote Authentication Dial-In User Service (RADIUS) for administrators

Management

- Simple Network Management Protocol (SNMP)
- TELNET
- SSH (Secure SHell)
- Hypertext Transfer Protocol (HTTP)
- Hypertext Transfer Protocol over SSH (HTTPS)
- SOAP-based API over HTTP and/or HTTPS
- For transferring maintenance and release files:
  - File Transfer Protocol (FTP)
  - Trivial File Transfer Protocol (TFTP)
  - Secure Copy (SCP)
  - NFS, for transfers to or from an ARX volume
  - CIFS, for transfers to or from an ARX volume
  - Simple Mail Transfer Protocol (SMTP), for sending email notices of trouble conditions

3

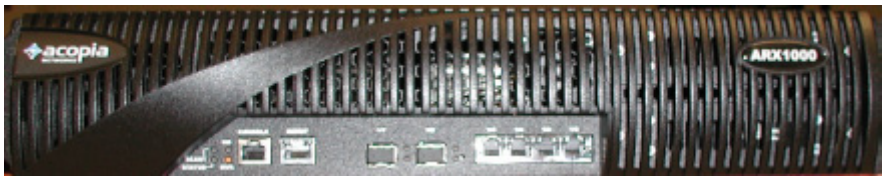
Switch Hardware

- Chassis Overview
- Interfaces
- Application Control Module (ACM)
- Power Supply
- Internal Disks
- Fan Unit

Chassis Overview

The F5 ARX®1000 switch is a 2-rack unit designed for a standard 19-inch rack installation.

Figure 3.1 *ARX®1000 Front Panel View*



The switch contains the following components:

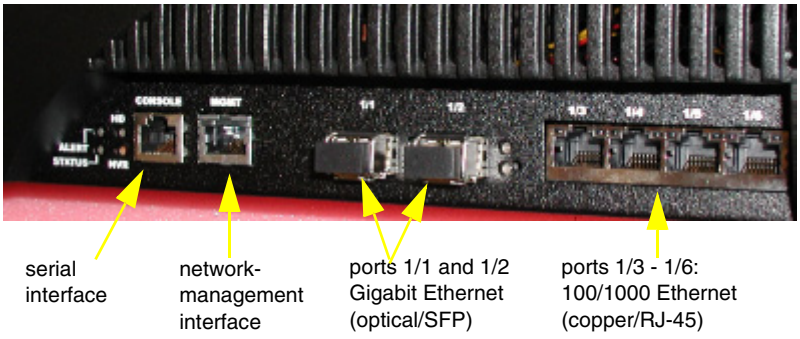
- Interfaces for client/server traffic and system management.
- Application Control Module (ACM), which supports all system control, adaptive services, and network functions for the switch.
- Power supply module.
- Internal hard disks.
- Fan Unit.

The following sections describe these components.

Interfaces

The switch provides eight external interfaces, including a serial Console interface, Ethernet management interface, two fiber-optic Gigabit Ethernet ports, and four copper 100/1000 Ethernet ports.

Figure 3.2 *ARX®1000 Interfaces*



Application Control Module (ACM)

The ARX®1000 switch provides all functionality through one basic module, the *Application Control Module* (ACM), which provides scaled down features and components from the ARX®6000's System Control Module (SCM), Adaptive Services Module (ASM), and Network Services Module (NSM).

Control and Management Functions

The ACM supports the following switch fabric and control functions:

- RS232/Console serial interface for local switch management
- Out-of-band 10/100 Ethernet interface for local/remote switch management
- Service definition and policy enforcement
- Failover signaling and configuration information
- Port mirroring and debugging
- MAC address assignment for Ethernet ports
- Real-time clock synchronization for user interfaces
- Switch health status and statistics monitoring and management through LEDs and software
- Temperature and power monitoring

Adaptive Services

The ACM module provides the core distributed filer functions for the switch, including:

- Virtual distribution of front-end file services for NFS v 2/3 and CIFS protocols
- Volume management and filer capabilities
- Back-end network-attached storage (NAS) aggregation

Network Services

The ACM supports the following network services:

- Two 1000BASE-X Gigabit Ethernet ports (small form-factor pluggable (SFP) optical connectors)
- Four 100/1000BASE-T Ethernet ports (RJ-45 connectors)
- Auto-negotiation for 100/1000 Ethernet transmission
- Standard Ethernet and jumbo-frame (9K) packet sizes
- Full-duplex switching at line rates for Layer 2 processing

- Low latency, store and forward switching, with built-in multicast support
- Load balancing and resource switching
- Network File System (NFS) Fast Path
- Common Internet File System (CIFS) Fast Path

Power Supply

The AC/DC power supply provides the following features and functions:

- Provides 400 Watts @ +2.5 V, +3.3 V, and +12.0 V for switch operations. (Note that the power supply draws a total of 440W from the AC power cord due to its operating efficiency.)
- Uses remote sensing to maintain stable voltage and to account for any DC loss in cabling.
- Provides an AC alarm to indicate when power is about to be removed from the system. When this alarm is activated, the power supply maintains full regulated load for a minimum of 20 milliseconds, enabling the system to shut down power gracefully.

Internal Disks

The switch uses internal disk drives to store its software image, configuration files, log files, and other maintenance-related data. The ARX®1000 contains two redundant SATA drives, configured RAID1. These drives are connected to the primary controller on the Application Control Module (ACM). They are Field-Replaceable Units (FRUs); procedures to swap a drive appear in a later chapter.

Fan Unit

The internal fans are an environmentally-controlled cooling system. The ACM is connected to the fan unit for temperature control and status monitoring at 60-second intervals.

4

System Specifications and Requirements

This chapter contains regulatory information and specifications for the ARX®1000:

- Regulatory Compliance
- FCC Compliance
- System Specifications
- System Power Requirements
- Power Cord and Cable Requirements
- Cable Connectors and Pinouts

Regulatory Compliance

The ARX®1000 switch complies with the following agency requirements:

Category	Compliance
Safety	• UL 60950 • cUL listed to CSA C22.2 No. 950 • IEC950 (EN60950) CE Marking
Emissions	• FCC Part 15 Class A • CISPR22 Class A (EN55022) CE Marking • EN 55024 • VCCI Class A

FCC Compliance

Important

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.

Changes or modifications not expressly approved by the manufacturer could void your FCC-granted authority to operate this equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference when the equipment is operated in a commercial environment. This equipment 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 will be required to correct the interference at his own expense.

System Specifications

Table 4.1 describes the ARX®1000 system specifications.

Component	Specification
Chassis Dimensions (includes front bezel)	Height: 3.375 in. Width: 19.00 in. (including the fixed mounting ears) Depth: 23.75 in.
Weight	35 lb (15.88 kg)
Power Load	5.7 amps @ 110Vac, 3.1 amps @ 220Vac
AC/DC Power Supply	450 Watts @ +2.5 V, +3.3 V, and +12.0 V Note that the power supply draws a total of 608W from the AC power cord due to its operating efficiency.
Environmental Requirements	Altitude: -200 ft. (-60 m) min. to 8000 ft. (2500 m) max.
	Humidity — Operating: 5% min. to 95% max. (non condensing) Storage: 5% to 95%
	Temperature — Operating: 32 deg. to 104 deg. F (0 deg. to 40 deg. C) Storage: -40 deg. to 149 deg. F (-20 deg. to 65 deg. C)

Table 4.1 *ARX®1000 System Specifications*

System Power Requirements

The ARX®1000 power supply distributes up to 450 Watts of DC power to the chassis components. The power supply runs at 74% efficiency, so it consumes up to 608 Watts of AC power (450/0.74) to meet the 450-Watt demand. This is equivalent to 2,075 BTUs/hour.

Power Cord and Cable Requirements

Table 4.2 lists the required cables and power cords for the switch. All cables *except* the AC power cord and console cable are customer-supplied.

Qty.	Cable/Cord	Used on...	Specification
1	AC power cord	AC/DC Power Supply	You can choose from the two cables shipped with the switch: • 20 A/250 Vac or • 15 A/120 Vac. Both have IEC-320 type connectors.
1	Console cable with RJ-45-to-DB9 adapter	Console port	100BASE-T Category 5 unshielded twisted pair (UTP); 24 AWG
1	Ethernet cable for connection to 10/100 Mbps Ethernet management port (RJ-45 connector);	MGMT interface	
4	Ethernet cables for connection to 100/1000 Mbps Ethernet (RJ-45 connectors)	4 copper Gigabit Ethernet ports	[a]100/1000BASE-T Category 5/6, unshielded twisted pair (UTP) cable; 24 AWG.
2	Fiber-optic cables for connection to 1-Gbps Ethernet small form-factor pluggable (SFP) optical connectors	2 optical Gigabit Ethernet ports	1000BASE-SX (Gigabit Ethernet) fiber cable: Short-reach multi-mode fiber (MMF) with duplex LC-style connectors. Distances up to 500m on 50/125um MMF, or 300m on 62.5/125um MMF.

Table 4.2 *Required Power and Data Cables*

a.Gigabit Ethernet ports support automatic MDI/MDIX cross-over. This feature automatically corrects the polarity of the attached CAT5 cable, regardless if it is a cross-over or straight-through type. However, for this feature to work, the port speed must be set to auto (auto-negotiate) through the CLI. When the port speed/duplex is forced (auto-negotiate is disabled), automatic MDI/MDIX cross-over is disabled, and you must cable the port using standard cross-over or straight-through cabling.

Cable Connectors and Pinouts

Table 4.3 describes the cable connectors used on the ARX®1000 switch.

Interface	Connector	Purpose
Console	RJ-45	Serial port for CLI access
MGMT	RJ-45	Ethernet port for CLI or GUI access
Gigabit Ethernet...		
Optical ports	small form-factor pluggable (SFP)	Two optical ports for 1-Gbps Ethernet connections over multi mode fiber
Copper ports	RJ-45	Four 100/1000BASE-T Ethernet ports
	Important *Fiber-optic ports are shipped with cable connectors installed. These ports must be protected by a rubber grommet filler or a cable connector at all times to prevent dust from collecting in the transceiver.*	

Table 4.3 *Cable Connectors*

Console Connector and Pinouts

The serial Console port requires a rollover cable (RJ-45 to RJ-45) that is included with the ARX®-installation kit. This cable is sufficient for connecting to a Terminal Server. For a direct connection to the serial port on a management station (such as a laptop), an RJ-45 to DB9 adapter is also included in the kit.

Figure 4.1 *RJ-45 Male Connector*

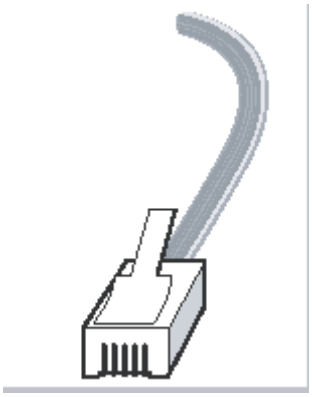


Figure 4.2 *RJ-45 to Serial DB9 Adapter*

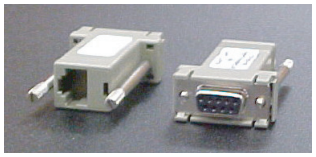


Table 4.4 lists the RJ-45 pinout assignments for the rollover cable and the adapter. The left column shows the transmit (TxD), ground (GND), and receive (RxD) signals. and the right column shows the signals reversed at the console device. The intervening columns show the pins that carry each of those signals.

SCM/ACM Console Port	RJ-45 Rollover Cable			RJ-45 to DB9 Adapter			Console Device
DTE Signal	RJ-45 Pinout	USOC Color	RJ-45 Pinout	RJ-45 Pinout	T568 Color	DB9F Pinout	DTE Signal
TxD	3	yellow	6	6	yellow	2	RxD

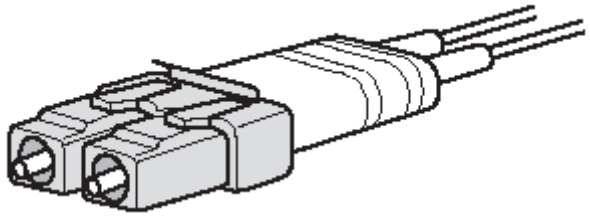
Table 4.4 *ACM Console Port Signaling/Cabling Using a Rollover Cable*

SCM/ACM Console Port	RJ-45 Rollover Cable			RJ-45 to DB9 Adapter			Console Device
GND	4	green	5	5	green	5	Signal Ground
GND	5	red	4	4	red		
RxD	6	black	3	3	black	3	TxD

Table 4.4 *ACM Console Port Signaling/Cabling Using a Rollover Cable (Continued)*

SFP Optical Connector

The Gigabit Ethernet optical ports use small form-factor pluggable (SFP) optical transceivers that accept LC-style multi-mode fiber connectors. These are for connection to Ethernet over fiber-optic cable.



WARNING

Fiber-optic ports are shipped with SFP optics installed. These ports must be protected by a rubber grommet filler or a cable connector at all times to prevent dust from collecting in the transceiver.

5

Unpacking and Installing the Switch

This chapter describes the following topics and tasks:

- Safety Instructions
- Tools and Equipment
- Verifying Shipment
- Unpacking the Switch
- Installing the Rack-Mount Rails
- Rack-Mounting the Switch
- Attaching the Power Cord
- Powering Up the Switch
- Cabling

Safety Instructions

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

DANGER

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

Before installing the switch, locate the power ON/OFF toggle on the back of the switch and make sure it is set to OFF.

Disconnect any power or external cables before moving the switch.

Disconnect the power cord before servicing the unit to avoid electric shock.

Tools and Equipment

You need the following equipment for unpacking, rack-mounting, and installing the switch:

- Utility knife (optional, for the packaging)
- Phillips screwdriver for #10 screws
- A laptop or PC to use as a serial console
- Customer-supplied standard 19-inch EIA rack

Note

Older revisions of the rails require a 3/8-inch nut driver in addition to the equipment above.

Verifying Shipment

The ARX®1000 shipment includes the 2U ARX®1000 itself and an Accessory Kit. The Accessory Kit is packed on top of the switch. Check the contents of the shipping crate to verify complete shipment:

- 1 15-Amp AC power cord with 8-ft. (2.4384-Meter) cable
- 1 250V locking power cord (an alternative to the above)
- 1 8-ft. (2.4384-M) crossover cable (for the Console) with RJ-45-to-DB9 adapter
- 2 mounting rails, 1 left and 1 right
- 2 sets of screws for mounting the rails to the rack: 12 #8 screws and 12 #10 screws
- 2 sets of Tinnerman nut retainers (12 nuts per set); each set fits a different type of rack rail
- *ARX®1000 Quick Installation* Card
- *ARX®*1000 *Hardware Installation Guide* (this manual)

Unpacking the Switch

The ARX®1000 switch is shipped in a single box with all components installed. The switch weighs approximately 35 lb. (without packaging).

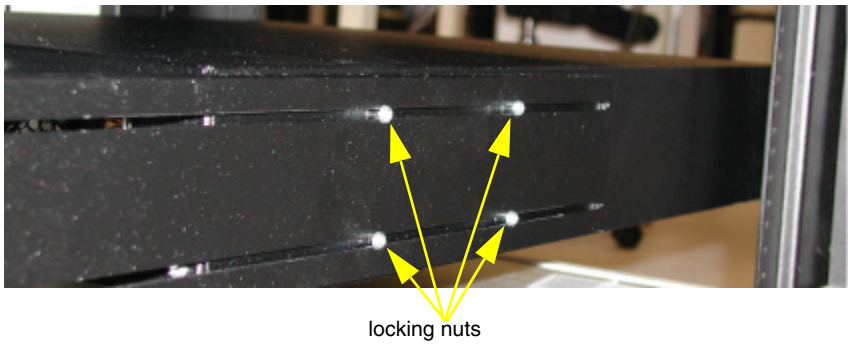
Unpack the switch as follows:

1. First 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. If it is red, the equipment may be damaged from some physical shock (such as a drop).
4. Verify the contents of the Accessory Kit (contents listed above).
5. Carefully lift the switch and separate rack-mount rails out of the box.

Installing the Rack-Mount Rails

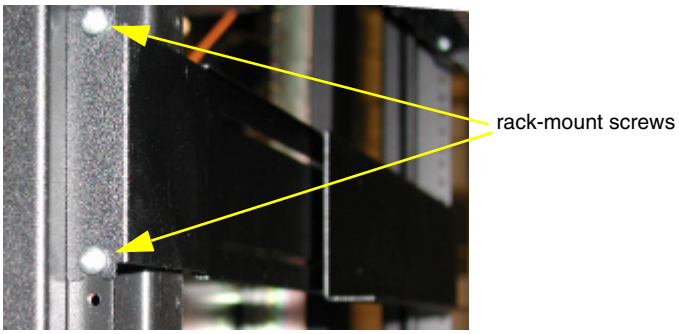
Before you install the switch, you must first assemble and install the rack-mount rails used to support the switch in a standard EIA rack. The rails are shipped with the switch unit.

1. Align each rail edge flush against the rack, aligning the screw holes.
2. If necessary, adjust the depth of the rails by loosening or tightening the locking screws with a Phillips-head screwdriver.



3. Secure the rails in place on both ends of the rack with the rack-mount screws (4 per rail) shipped in the accessory kit:
   a) Place the bottom screws loosely in the rack. If there are no threads in the rack rails, thread the screws through the Tinnerman nut retainers provided in the accessory kit.
   b) Set the rails on the bottom screws.
   c) Insert and tighten the remaining screws.
   d) Securely tighten the bottom screws.

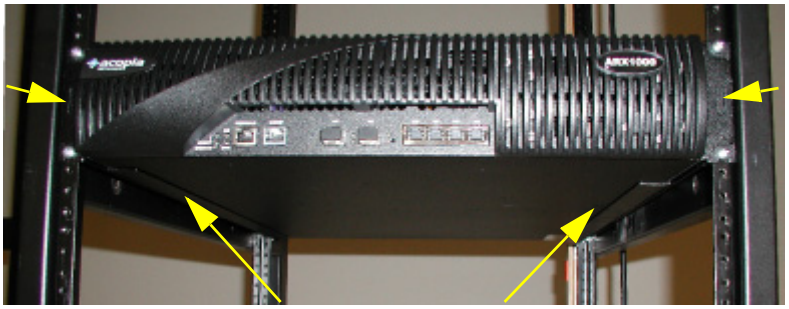
Figure 5.1 *Installing the Rack-Mount Rails*



Rack-Mounting the Switch

1. Holding the switch firmly, align the switch (front panel view) with the rack rails.
2. Carefully slide the switch into place on the rails.

Figure 5.2 *Aligning Switch with Rack Rails*



Firmly grip the switch edges and slide the switch into place on the rails.

3. Secure the switch to the rails by putting a screw through each ear on the front of the ARX®. This guards against the switch sliding out in the event of an extreme earthquake.

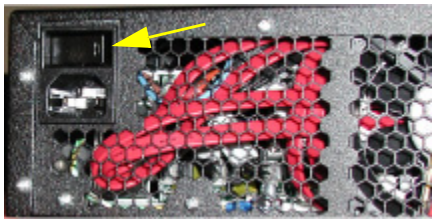
Attaching the Power Cord

Locate the power ON/OFF toggle switch on the back of the switch and ensure it is set to the OFF position.

DANGER

In the event that AC power must be removed from the system, disconnect the power cord before servicing the unit to avoid electric shock.

Figure 5.3 *ON/OFF Power Switch (Rear View)*



See *Power Cord and Cable Requirements*, on page 4-5 for power cord and cable specifications.

Powering Up the Switch

WARNING

Before applying power, ensure that the AC outlet to the switch is properly grounded.

To power up the switch, turn the ON/OFF toggle switch(es) to the ON position.

Cabling

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

Ethernet cables are supplied by the customer. For cable specifications and requirements, see *Power Cord and Cable Requirements*, on page 4-5. For cable connector and pinout information, see *Cable Connectors and Pinouts*, on page 4-6.

6

Connecting the Switch to the Network

This chapter describes how to connect the ARX® to a console terminal and boot the switch for the first time. It contains the following sections:

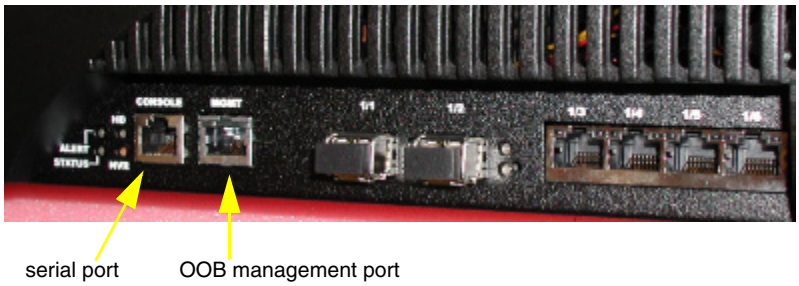
- Management Interfaces
- Connecting the Console Port
- Booting the Switch
- Connecting the Ethernet Management Port

Management Interfaces

As stated earlier, the switch provides the following management ports:

- Console - Serial Console port for connecting a console terminal, and
- Mgmt - 10/100 Ethernet port for connecting an out-of-band (OOB) management station

Figure 6.1 *ARX®1000 Front Panel View*



During the initial-boot process described in this chapter, you can only access the serial (Console) port. You configure the OOB management port ("MGMT") as part of the procedures in this chapter.

Connecting the Console Port

Set the following console-terminal parameters to match those on the Console port:

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

Connect the console terminal to the serial Console port (RJ-45) on the front panel. An RJ-45 to DB9 adapter is included in the installation kit if you want to connect to your management station's serial DB9 port.

Booting the Switch

The *initial-boot script* runs automatically at switch start-up. 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 *Powering Up the Switch*, on page 5-7). After some boot-up messages, the following prompt appears:

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

   This may take several minutes.

2. Press **<Enter>** as prompted.

Several questions appear, prompting you for basic network information (such as management-IP address, mask, and gateway). These questions comprise the initial-boot script. Answer these questions as they come up. Examples and instructions appear in the subsections below.

Sample: Booting a Non-Replacement Switch

This sample shows the simplest initial-boot scenario, for a new (non-replacement) switch that is either standalone or the *first* member of a redundant pair. The sample answers are not necessarily appropriate to the following scenarios:

- this replaces a defunct switch,
- this will join a running switch as its redundant peer, or
- this switch is being re-installed after F5 personnel performed a “Manufacturing Installation” on a previously-running switch.

Later sections discuss these contingencies and how to handle each of them. The answers below apply to the simplest case only. Sample answers are shown in bold text:

```
F5 ARX Switch 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.

Acknowledge acceptance of the following terms and conditions
by entering 'yes' at the next question.
1. Press <Enter> to continue. # <Enter>


                        END USER SOFTWARE LICENSE

     IMPORTANT - READ BEFORE INSTALLING OR OPERATING THIS PRODUCT
```

```
LICENSEE AGREES TO BE BOUND BY THE TERMS OF THIS AGREEMENT BY INSTALLING,
HAVING INSTALLED, COPYING, OR OTHERWISE USING THE PRODUCT.  IF LICENSEE
DOES NOT AGREE, DO NOT INSTALL OR USE THE PRODUCT.

1.  Scope.  This License applies to the software product ("Software")
you have licensed from F5 Networks, Inc. ("F5").  Certain Software is
licensed for use in conjunction with F5 hardware which together with the
Software will be referenced as the "Product". This License is a legal
agreement between F5 and the single entity ("Licensee") that has acquired
the Software from F5 under these terms and conditions.  The Software
incorporates certain third party software programs subject to the terms
and restrictions of the applicable licenses identified herein.
...


2. Enter 'yes' to accept these terms and conditions
   in the format 'yes' or 'no'. # yes

The switch's management port requires an IP address and mask.
3. Enter the management port IP address
   in the format nnn.nnn.nnn.nnn or 'none'. # 10.1.49.60
4. 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.
5. Enter the gateway IP address for the management interface
   in the format nnn.nnn.nnn.nnn or 'none'. # 10.1.49.1

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

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) # <Enter>
```

The system displays a configuration summary, for example:

```
Configuration Summary
    Management IP Address    10.1.49.60
    Management IP Mask       255.255.255.0
    Management Gateway       10.1.49.1

    Power Configuration      110
    Private IP Subnet        169.254.196.0
    Private IP Mask          255.255.255.0

    Private VLAN             1004
    Private Metalog VLAN     1005
```

```
    Chassis GUID             e5d870ae-571e-1352-916b-ef324fbc05a2
    Switch Password          #######
    Switch Master Key        generate
    Crypto-officer Username  admin
    Crypto-officer Password  #######

Enter 'yes' to load configuration or 'r' to restart #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 prompts continue until you reach 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. For example:

```
...

User Access Authentication

Username: admin
Password: mypassword
SWITCH>
```

The switch is now ready for configuration through the CLI. See the *ARX® GUI Quick Start: Network Setup* or the *ARX® CLI Network-Management Guide* (on the documentation CD provided with the switch) for configuration instructions.

Preparing for Switch Replacement

For switch replacement, the above process becomes more complicated.

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. For a single switch replacement, there are a few things you must have done prior to the switch failing. This includes saving your running and global configs, UUID, and master key and associated passwords as described in the *ARX® Site Planning Guide*, Best Practice: Regularly Saving the Configuration, on page 1-63. The only other differences between replacing a single switch and replacing a member of a redundant pair is that for a single switch, a re-import is required at the appropriate point during configuration. Since with a single switch installation, the configuration is not saved on a backup switch, you have to manage what you do with these key pieces of configuration data *prior* to the switch's failing.

Choosing Switch Replacement

The initial-boot script asks if this is a switch replacement. Answer **yes** to invoke the questions that are required to replace the failed switch. For 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's *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 ARX®es 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 appears at the top of a the failed switch's show running-config output. For example, this is the top of a running-config file from a failed switch. The private-subnet information is highlighted in bold text:

```
; ARX-1000+
; Version 5.02.000.12535 (Feb  5 2010 18:16:05) [nbuilds]
; Database version: 502000.21
; Generated running-config Sun Feb 14 01:55:01 2010
; System UUID  e5d870ae-571e-1352-916b-ef324fbc05a2
; ip private vlan internal 1004 metalog 1005 subnet 169.254.196.0 255.255.255.0
;
terminal character-set unicode-utf-8
;================================ vlan ================================
config
  vlan 158
...
```

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 amongst the ARX®es in the RON. The defaults (1002 and 1003) may be sufficient for your installation. For 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) # 169.254.196.0

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 chassis's private subnet VLAN
```

```
   in the format integer [1-4095].(default=1002) # 1004 <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 chassis's private subnet metalog VLAN
   in the format integer [1-4095].(default=1003) # 1005 <Enter>
```

Finding the UUID of the Failed Switch

When a switch imports storage from back-end filers, it marks each share with its Universally-Unique ID (UUID). A replacement switch must use the same UUID or it rejects all of the shares used by its predecessor. You also need to 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 a switch's show running-config output. For example, this is the top of a running-config file from a switch named "gffstnA." The UUID is highlighted in bold text:

```
; ARX-1000+
; Version 5.02.000.12535 (Feb  5 2010 18:16:05) [nbuilds]
; Database version: 502000.21
; Generated running-config Sun Feb 14 01:55:01 2010
; System UUID  e5d870ae-571e-1352-916b-ef324fbc05a2
; ip private vlan internal 1004 metalog 1005 subnet 169.254.196.0 255.255.255.0
;
terminal character-set unicode-utf-8
;================================= vlan ==================================
config
  vlan 158
...
```

If the failed switch was a member of a Resilient-Overlay Network (RON), you can alternatively use show ron from any other RON member. This shows the UUID even if the chassis is no longer online. For example, the following command (run on another switch in the RON) shows the UUID for a failed chassis, "gffstnA." Again, the UUID is highlighted in bold text:

```
bstnA# show ron

Switch Name             HA Peer Switch                                Uptime
Status                  UUID                                 Management Addr
-------------------------------------------------------------------------------
bstnA                   (None)                               0 days, 02:07:57
ONLINE                  d9bdece8-9866-11d8-91e3-f48e42637d58         10.1.1.7

gffstnA                 (None)                               0 days, 01:59:42
OFFLINE                 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

bstnA# ...
```

Applying the UUID

The initial-boot script has a prompt for the UUID (shown in the example above). This is where you enter the UUID of the replaced switch. For example,

```
...
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.
11. Enter the chassis's UUID
   in the format
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx.(default=6df0854c-6af4-11d8-954a-f844c83bc5f3) #
e5d870ae-571e-1352-916b-ef324fbc05a2
...
```

Important

No two running chassis should ever share the same UUID. Only enter the UUID 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. 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 ARXs 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 two passwords:

- System Password is a password entered at initial-boot time (see *Sample: Booting a Non-Replacement Switch*, on page 6-4). It is 12-32 characters long. This validates that you have permission to access the master key.
- Wrapping Password is set with this command. The security software uses this 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).

Save this password: you will need it to decrypt the master key later, on the new switch.

This 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.

For example, this shows the master key on a switch named "gffstnB:"

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

Encrypted master key:

2oftVCwAAAAgAAAApwazSRFd2ww/H1pi7R7JMDZ9SoIg4WGA/XsZP+HcXjsIAAAADDRbM
CxE/bc=
gffstnB# ...
```

Applying the Master Key

As shown earlier, there is a prompt for the master key in the initial-boot script. You can answer this prompt with the encrypted master key; the script then prompts for the wrapping password. For 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) #
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
...
```

Sample: Replacing a Redundant Peer

This sample script uses the private subnet, the UUID, and the master key to replace a failed peer.

```
 F5 ARX Switch 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.


Acknowledge acceptance of the following terms and conditions
by entering 'yes' at the next question.
1. Press <Enter> to continue. # <Enter>
```

```
...

2. Enter 'yes' to accept these terms and conditions
   in the format 'yes' or 'no'. # yes

The switch's management port requires an IP address and mask.
3. Enter the management port IP address
   in the format nnn.nnn.nnn.nnn or 'none'. # 10.1.49.60
4. 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.
5. Enter the gateway IP address for the management interface
   in the format nnn.nnn.nnn.nnn or 'none'. # 10.1.49.1
```

This next question invokes the questions for switch replacement:

```
A switch replacement requires additional configuration questions.
6. 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.
7. Enter the switch's private IP address
   in the format nnn.nnn.nnn.nnn.(default=169.254.52.0) # 169.254.196.0
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 chassis's private subnet VLAN
   in the format integer [1-4095].(default=1002) # 1004 <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 chassis's private subnet metalog VLAN
   in the format integer [1-4095].(default=1003) # 1005 <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.
11. Enter the chassis's UUID
   in the format
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx.(default=6df0854c-6af4-11d8-954a-f844c83bc5f3) #
e5d870ae-571e-1352-916b-ef324fbc05a2

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
```

This is the master-key question, where you use the encrypted master key and the wrapping password from the redundant peer:

```
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    10.1.49.60
    Management IP Mask       255.255.255.0
    Management Gateway       10.1.49.1

    Power Configuration      110
    Private IP Subnet        169.254.196.0
    Private IP Mask          255.255.255.0

    Private VLAN             1004
    Private Metalog VLAN     1005

    Chassis GUID             e5d870ae-571e-1352-916b-ef324fbc05a2
    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 restart #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>
```

The switch is now ready for configuration through the GUI or CLI.

To join it with its redundant peer, you can use the standard practice of copying and applying the failed switch's running config:

```
SWITCH> enable
SWITCH# copy ftp://juser:jpasswd@ftp.wwmed.com/a1kconfig scripts running
SWITCH# show scripts


  scripts
      running                Apr 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:

```
SWITCH#; ARX-1000+
SWITCH#; Version 5.02.000.12535 (Feb  5 2010 18:16:05) [nbuilds]
SWITCH#; Database version: 502000.21
SWITCH#; Generated running-config Sun Feb 14 01:55:01 2010
SWITCH#; System UUID  e5d870ae-571e-1352-916b-ef324fbc05a2
SWITCH#; ip private vlan internal 1004 metalog 1005 subnet 169.254.196.0 255.255.255.0
SWITCH#;
SWITCH#terminal character-set unicode-utf-8
SWITCH#;================================ vlan ================================
SWITCH#config
SWITCH#  vlan 158
SWITCH#    description "personnel dept."
SWITCH#    members 1/3 to 1/3
SWITCH#...
SWITCH#;================================ system ================================
SWITCH#config
SWITCH(cfg)#  clock timezone America New_York
SWITCH(cfg)#  hostname gffstnA
gffstnA(cfg)#  ip domain-list wwmed.com
gffstnA(cfg)# ...
gffstnA(cfg)# exit
gffstnA#
```

If you copied the private subnet and mask from the defunct switch, this completes the switch replacement. Otherwise, the new switch learns its private subnet from its peer, re-configures itself, and reboots. (A reboot is necessary to change the private subnet of an ARX®.)

See the *ARX® CLI Network-Management Guide* for detailed configuration instructions.

Connecting the Ethernet Management Port

After you boot the switch, you can connect the Ethernet out-of-band management port to a management station or network. You can use this interface to access the Graphical User Interface (GUI) or the Command Line Interface (CLI). To access the GUI, direct a web browser to the interface over HTTPS (for example, “https://10.1.49.60/”). Use the crypto-officer username and password, entered above, to log in. For the CLI, use SSH with the interface and the crypto-officer username (for example, “ssh admin@10.1.49.60”).

The *ARX® GUI Quick Start: Network Setup* manual contains instructions for getting started with the GUI, and the *ARX® CLI Network-Management Guide* contains instructions and best practices for using the CLI.

7

Maintenance

This chapter describes the ARX®1000 hardware power-down sequence, power-on self-test (POST) diagnostics, and module and port status indicators (LEDs) and their associated conditions.

- Powering Down the ARX®1000
- POST Diagnostics
- LED Status Indicators

Powering Down the ARX®1000

The ARX®1000 requires a manual power-down sequence, which cuts power from all systems including the NVRAM. 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.

POST Diagnostics

When the switch reboots and the system powers up, POST (power-on self-test) 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. See the following sample output.

Figure 7.1 *Show Version Sample*

```
gffstnA# show version
  Copyright (c) 2002-2010 by F5 Networks, Inc. All rights reserved.
Running Release
test1.rel :  Version 5.02.000.12535 (Feb  5 2010 18:16:05) [nbuilds]

Armed Release
test1.rel :  Version 5.02.000.12535 (Feb  5 2010 18:16:05) [nbuilds]

Backup Release
test3.rel :  Version 5.02.000.12535 (Feb  5 2010 18:16:05) [nbuilds]

System Configuration:  Version 502000.21

  gffstnA uptime is 0 weeks, 0 days, 1 hours, 36 minutes.

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

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

Figure 7.2 *Show Chassis Sample*

```
gffstnA# show chassis

 Identification:
 Hostname                            UUID
 ----------------------------------- --------------------------------------
```

```
gffstnA                              e5d870ae-571e-1352-916b-ef324fbc05a2

Chassis:
Chassis Type  Model Number                          HW Ver.  Serial
------------  -----------------------------------  -------  -------------
ARX-1000+     ARX1                                 B 09     03002130

Private Subnet:
VLAN   Subnet             Subnet Mask
----   ----------------   ----------------
1004   169.254.196.0      255.255.255.0

Chassis Environment:
Base MAC Address    Power            Chassis Revision
-----------------   --------------   ----------------
00:0a:49:08:52:00   Online

Logical Disk Details:
Disk    Status                Verification Mode  Verification Rate
------  --------------------  -----------------  -----------------
1       Optimal               Automatic          10 %

Disk Details:
Disk    Size          State               Transfer Rate   Model
--------   -----------   -----------------   -------------   -----------------
 Bay 1     139.73G       Online              1.5Gb/sec       WD1500HLFS-01G6U
 Bay 2     139.73G       Online              1.5Gb/sec       WD1500HLFS-01G6U

RAID Controller Details:
Rebuild Rate  Max Transfer Rate  Firmware       RAID Alarm
------------  -----------------  -------------  ------------
90 %          1.5Gb/sec          713S:G121      Enabled

Slot Environment:
Slot  Type   State              Power    Temperature     NVR Battery  Drive
----  -----  ----------------   -------  --------------  -----------  ---------
 1    ACM    Online             Online   Normal ( <45 C) Good         LSI Good

Module:
Slot Ports Procs Card      Xeon               Sibyte             Serial
---- ----- ----- --------  -----------------  -----------------  ------------
 1    7     5    ACM       3.1 GHz  4096 MB   700 MHz  2048 MB   03002130
 1                                            700 MHz  2048 MB

Slot MAC Address                   HW Version  Rework  Deviation
---- ----------------------------  ----------  ------  --------------------
 1   000A49085203 to 000A49085206  B 09        06      68,77

Slot Reset CPLD Keeper CPLD
---- ---------- -----------
 1   5          2

Slot Boot Version      Diag Version      BootLdr Version
---- ----------------  ----------------  ----------------
 1   2.04.003.09681    5.00.000.11559    5.00.000.11560

Slot FPGA Version     NSM Boot Version  NSM Diag Version  NSM BootLdr Version
---- ---------------  ----------------  ----------------  -------------------
 1   firetruck  17    5.01.000.11898    5.01.000.11898    5.01.000.11898
 1   hunchback  1     5.01.000.11898    5.01.000.11898    5.01.000.11898

Port Media Details:
```

```
Slot/Port   Type                Vendor            Status
---------   ---------------     ---------------   ----------------------
 1/1        1000BASE-SX         FINISAR CORP.     Good
 1/2        1000BASE-SX         FINISAR CORP.     Good

Disk Usage:
Name                             Total MB    Used MB     Free MB     Used%
-------------------------------  ----------  ----------  ----------  -----
System                           2331        1403        809         64%
Releases                         5285        2646        2370        53%
Logs                             115341      174         109306      1%
Cores; DiagInfo; Lists           8458        135         7893        2%
Scripts                          3172        47          2964        2%
Reports                          8458        33          7994        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      26    37       39    33       32    56       33    47

NVR:
NVR Battery  ECC State               NVR Size (MB)
-----------  ----------------------  -------------
Good         No Error                256
```

LED Status Indicators

This section describes the ARX®1000's status LEDs, including:

- system Alert and module Status LEDs (see Figure 7.3)
- hard-drive LED and NVR-battery-backup LEDs (also shown in Figure 7.3)
- Ethernet management port and user port LEDs (see Figure 7.4 on page 7-6)

***Figure 7.3** ARX®1000 System LEDs*

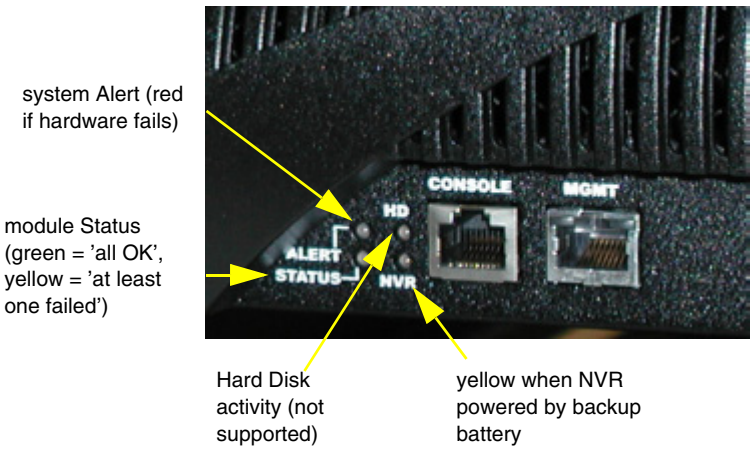


***Figure 7.4** ARX®1000 Port LEDs*

each port has one Activity LED (yellow) and one Link LED (green)

Status LEDs

The ARX®1000 front panel provides the following LED status indicators:

- **ALERT** — Illuminates *Red* to indicate an operational failure
- **STATUS** — Illuminates *Green* or *Yellow* based on the system's current operational state

During various module operations, LEDs display Green, Yellow, or Red with intermittent blinking patterns, depending on the state. When blinking, LEDs blink ON for a half second and OFF for a half second.

Table 7.1 describes the LED colors and blinking patterns that occur during various operational states, such as booting, diagnostics, and so on.

ALERT	STATUS	State
(Off)	Green	Online
Red	Green (Blinking)	Failed or powering down
(Off)	Yellow (Blinking)	Powering up and running all POST tests.
(Off)	Yellow	Online Partial: at least one processor is online, at least one is not online yet. If the offline processor does not come up in 5 minutes, this changes to Failed Partial.
Red	Yellow	Failed Partial: at least one processor is online, but at least one other processor failed.
(Off)	(Off)	Power Failure

Table 7.1 *Operational States and LED Patterns*

Ethernet-Port Link Status LEDs

The Ethernet ports on the ARX®1000, the MGMT port and the client/server ports, each have two LEDs in their upper corners:

- Upper left – Activity LED: blinking yellow indicates packet traffic.
- Upper right – Link-status LED: steady green indicates that the port is enabled and a link is established.

Hard-Drive (HD) LED

The hard drive (HD) LED is not supported.

A

Removing a Hard Disk

This appendix describes how to remove and replace a disk drive in the ARX®1000 chassis.

- Removing the Drive
- Silencing the RAID Alarm
- Replacing the Disk Drive

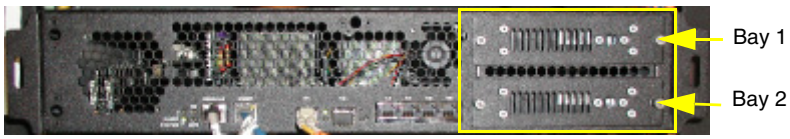
Removing the Drive

This is a hot-swap procedure, requiring no power-down of the switch and no loss of service.

WARNING

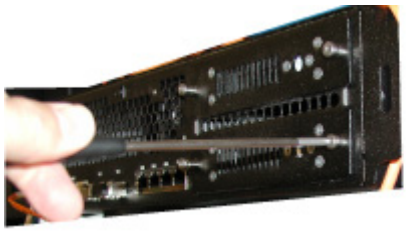
Static electricity can damage switch components. Be sure to wear antistatic wrist straps before handling disk drives.

Carefully remove the front bezel to expose the disk drives. The two replaceable drives are on the right side of the front panel, one over the other:



Each drive is held in place with two captive screws.

To remove a disk drive, use a Phillips-head screwdriver to loosen both captive screws.



Slide out the disk drive and sled from its slot in the chassis.

The chassis continues to run, in degraded state, with only one disk missing from the RAID.

Silencing the RAID Alarm

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

```
raid silence
```

For example, the following command sequence logs into a switch at 10.1.49.60, enters enable to go to priv-exec mode, and silences the RAID alarm:

```
$ telnet 10.1.49.60
Trying 10.1.49.60...
Connected to 10.1.49.60.
Escape character is '^]'.

Username: admin
Password: acopia
gffstnA> enable
gffstnA# raid silence
gffstnA# ...
```

Replacing the Disk Drive

To replace the disk drive, slide it into the empty slot and tighten its two captive screws. The screws should be at least finger tight for the drive to properly engage.

Incorporating the Disk into the RAID

To incorporate the disk into the RAID, use the raid rebuild command from priv-exec mode:

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

where **disk1 | disk2** specifies the disk to rebuild. The top disk is disk1.

For example, the following command rebuilds the lower disk:

```
gffstnA# raid rebuild disk2
gffstnA# ...
```

Monitoring the Rebuild

A disk rebuild can take more than an hour. To monitor the progress of the rebuild, you can use the show chassis diskuse command to see a percentage-complete meter:

```
show chassis diskuse
```

The meter is a number in the Rebuild Progress field, under Disk Details.

For example, the following command shows that the rebuild is 21% complete. The rebuild progress is shown in bold:

```
gffstnA# show chassis diskuse

 Logical Disk Details:
 Disk    Status                Verification Mode  Verification Rate
 ------  --------------------  -----------------  -----------------
 1       Optimal               Manual             10 %

 Disk Details:
 Disk       Size          State               Transfer Rate   Model
 --------   -----------   -----------------   -------------   -----------------
  Bay 1     68.50G        Online              320MB/sec       ATLAS10K4_73SCA
  Bay 2     68.50G        Rebuild 21%         320MB/sec       ATLAS10K4_73SCA

 RAID Controller Details:
 Rebuild Rate  Max Transfer Rate  Firmware       RAID Alarm
 ------------  -----------------  -------------  ------------
 90 %          320MB/sec          TL37:G117      Enabled

 Disk Usage:
 Name                              Total MB    Used MB     Free MB     Used%
 --------------------------------  ----------  ----------  ----------  -----
 System                            2121        998         1014        50%
 Releases                          4234        1701        2317        43%
 Logs                              2121        99          1914        5%
 Cores; DiagInfo; Lists            8460        37          7993        1%
 Reports; Scripts                  46940       66          44489       1%
gffstnA# ...
```

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