

## Chapter 5

# Installing and Understanding AI-Scripts

This chapter describes Advanced Insight Scripts (AI-Scripts) and how they operate in the Advanced Insight Solutions system. AI-Scripts are available to all Advanced Insight Solutions (AIS) customers with a valid support contract. This chapter describes how to install AI-Script install packages automatically (recommended for many devices) and manually (for few devices only) on Juniper Networks devices running JUNOS.

Devices running AI-Scripts are the first component in the AIS system. AI-Scripts installed on Juniper Networks devices provide the intelligence needed to automatically detect and report problem (incident) and intelligence events to ensure maximum network uptime.



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**NOTE:** To use AIM and AI-Scripts, you must configure the archive location (archive-site destination) used for devices to send incident and intelligence JMBs and for AIM to retrieve this data. You can add the archive location to the device JUNOS configuration for both AI-Scripts and AIM during or after the initial installation, but the components are not really usable until the archive location is configured. You can install AIM and AI-Scripts in any order.

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- Installing AI-Script Packages on page 41

## AI-Script Overview

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AI-Scripts provide the intelligence devices need to automatically detect and report incident and intelligence events to ensure maximum network uptime.

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- AI-Script Modes on page 38
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### **What AI-Scripts Do**

AI-Scripts do the following:

- React to specific incident events that occur on devices and provide relevant information about the problems for analysis
- Periodically collect data on events that can be used to predict and prevent risks in the future.
- Package all incident and intelligence event data into a structured format [a Juniper Message Bundle (JMB)] and send it to a remote archive location so that it can be collected and displayed by, the second component in the AIS system, Advanced Insight Manager (AIM). AIM can be configured to send event data to Juniper Support Systems (JSS), the third component in the AIS system. JSS collects incident and intelligence information from AIM and sends intelligence information back to AIM specifically for your network.

### **AI-Script Modes**

AI-Scripts operate in two distinct modes:

- Reactive (incident-driven)—A trigger event occurs and is detected on a device. An AI-Script is executed. An AI-Script builds a Juniper Message Bundle (JMB) with event and router data, and sends it to a designated AIM archive location. See Figure 9 on page 41.

Each AI-Script corresponds to a specific device event. The list of device events that can be detected and reported will evolve over time. For the latest device events supported by AI-Scripts, see the *AI-Scripts Release Notes* at the AIS documentation Web site.

- Proactive (intelligence-driven)—AI-Scripts monitor device system resources for fluctuations that could signal a future problem. AI-Scripts collect intelligence data for analysis. A tailored AI-Script builds a JMB with intelligence data, and sends it to a designated remote AIM archive location.

## Events Detected by AI-Scripts

AI-Scripts detect the following types of events:

- Common software events, including daemon and Packet Forwarding Engine crashes
- Common hardware events, such as PIC alarms
- Hardware platform-specific events, such ASIC issues

For more information about the types of incidents that are detected by a specific AI-Script package, see the *AI-Scripts Release Notes* located on the AIS documentation Web site.

## JMB Contents

The JMB for both incident and intelligence events includes the following:

- Manifest—basic router and event data
- Trend data—device counters, statistics, and settings
- Attachments—show command output for the incident event.

## AI-Script Tools

AI-Scripts use the following tools on JUNOS devices:

- Event policies
- Event scripts responsible for automating event policies
- Operation (op) scripts
- JUNOScript
- Stylesheet Language Alternative Syntax (SLAX)

### Event Policies

An event policy is an if-then-else construct that defines actions to be executed by the software on receipt of a system log message. For each policy, you can configure multiple actions, as follows:

- Ignore the event.
- Upload a file to a specified destination.
- Execute JUNOS software operational mode commands.
- Execute JUNOS event scripts (op) scripts.

For more information about event policies, see the *JUNOS Configuration and Diagnostic Automation Guide*.

## Operation (Op) Scripts

An op script automates network troubleshooting and network management by doing the following:

- Automatically diagnosing and fixing problems in your network
- Monitoring the overall status of a routing platform
- Customizing the output of operational mode commands
- Ensuring a routing platform is configured to avoid known problems in the JUNOS software
- Running automatically as part of an event policy that detects periodic error conditions
- Changing the device configuration in response to a problem

For more information about op scripts, see the *JUNOS Configuration and Diagnostic Automation Guide*.

## JUNOScript

The JUNOScript API (application programming interface) is an Extensible Markup Language (XML) application that client applications use to request and change configuration information on routing platforms that run the JUNOS software. The operations defined in the API are equivalent to configuration mode commands in the JUNOS command-line interface (CLI). Applications use the API to display, edit, and commit configuration statements (among other operations), just as administrators use CLI configuration mode commands such as **show**, **set**, and **commit** to perform those operations. For more information about JUNOScript, see the *JUNOScript API Guide*.

## Stylesheet Language Alternative Syntax

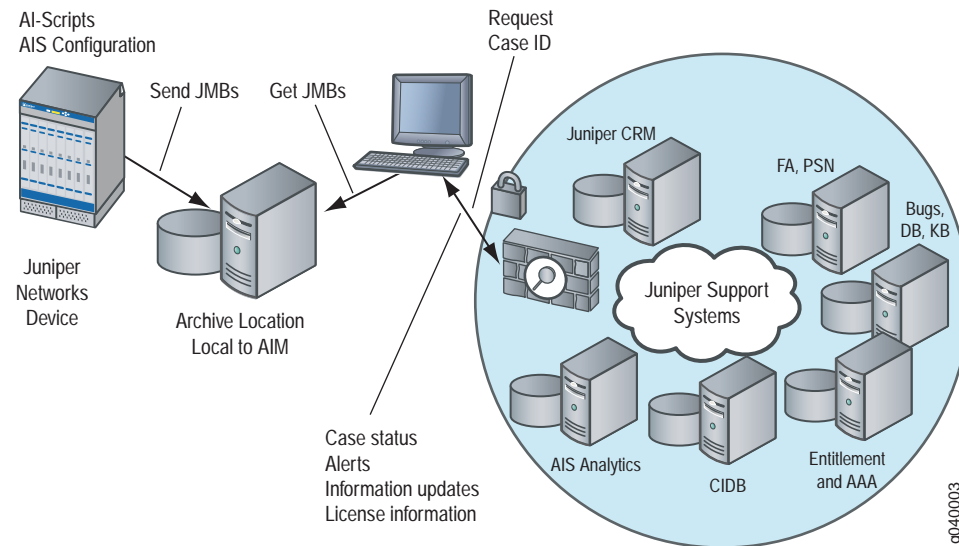
Stylesheet Language Alternative Syntax (SLAX) is a language for writing JUNOS commit and op scripts and is an alternative to Extensible Stylesheet Language Transformations (XSLT). SLAX has a distinct syntax, but the same semantics as XSLT.

SLAX has a simple syntax that follows the style of C and PERL. It provides a practical and succinct way to code, thus allowing you to create readable, maintainable commit and op scripts. SLAX removes programming instructions and XPath expressions from XML elements. XML angle brackets and quotation marks are replaced by parentheses and curly brackets ( { } ), which are the familiar delimiters of C and PERL.

## AI-Script Process Flow

Figure 9 shows the AI-Script process flow.

**Figure 9: AI-Script Process Flow**



The AIM Archive location can either be a local directory on the same system as AIM, or a directory mounted from another system onto the system running AIM.

AIM connects to the AIM archive location, retrieves, then displays the JMB information in Incident Manager for reactive services and Intelligence Manager for proactive services. For reactive services, AIM submits a case for resolution by JSS. For proactive services, JSS analyzes intelligence information, then sends AIM pertinent information to prevent problem events from occurring in the future.

## Installing AI-Script Packages

There are two ways to install AI-Scripts:

- Automatically (recommended), using the JUNOScope Script Management feature to automatically install AI-Scripts to multiple devices at once. For more information about automatically installing AI-Scripts, see “Automatically Installing AI-Script Bundles” on page 43.
- Manually by installing AI-Scripts on one device at a time. For more information about manually installing AI-Scripts to devices, see “Manually Configuring and Installing AI-Scripts on Devices” on page 44.

## Downloading AI-Script Install Packages and Release Notes

AI-Scripts are released in AI-Script install packages. AI-Script install packages are available for download from the AIS download site. Download also the *AI-Scripts Release Notes*.

To download an AI-Script install package, follow these steps:

1. Using a Web browser, go to the following location:

<http://www.juniper.net/support/csc/swdist-encr/ais/>

2. Log in to the Juniper Networks authentication system using the username and password supplied by Juniper Networks. To download the software, you must have a service contract and an access account. If you do not have an access account, complete the registration form at the Juniper Networks Web site, <https://www.juniper.net/registration/Register.jsp>.
3. Download the AI-Script install package.

If you are installing an AI-Script install package manually, move the package to the `/var/sw/pkg` directory on the device. If you do not move the AI-Script install package to the device, you have to use `ftp` or `scp` in conjunction with the `request system scripts add` command.

If you will use the JUNOScope software to automatically install a package to a group of devices at once, Download the AI-Script install package to the same server as Advanced Insight Manager (AIM).

## AI-Script Install Package Versioning

AI-Script install packages are versioned as follows:

`jais-m.nZx.x-signed.tgz`

For example:

`jais-1.0R1.5-signed.tgz`

- `m.n` is two integers that represent the software release number; `m` denotes the major release number; `n` the minor.
- `Z` is a capital letter that indicates the type of software release. In most cases, it is an `R`, to indicate that this is released software. If you are involved in testing prereleased software, this letter might be a `B` (for beta-level software).
- `x.x` is the software build number and spin number.

The AI-Script files that in the install package are compressed into a `tgz` tarball file.

Each AI-Script install package supports up to 3 previous years of JUNOS software releases.

The `show version` CLI operational command displays the version of the AI-Script install package that is installed on a device.

The JMB contains the output of the `show version` CLI command to indicate the version of the AI-Script install package installed on a device.

Refer to the *AI-Script Release Notes* for current release information.

### AI-Script Install Locations on Devices

AI-Scripts are installed on a device hard disk in the following location:

```
/var/db/scripts/
```

AI-Scripts are installed on a device flash drive in the following location:

```
/config/scripts
```

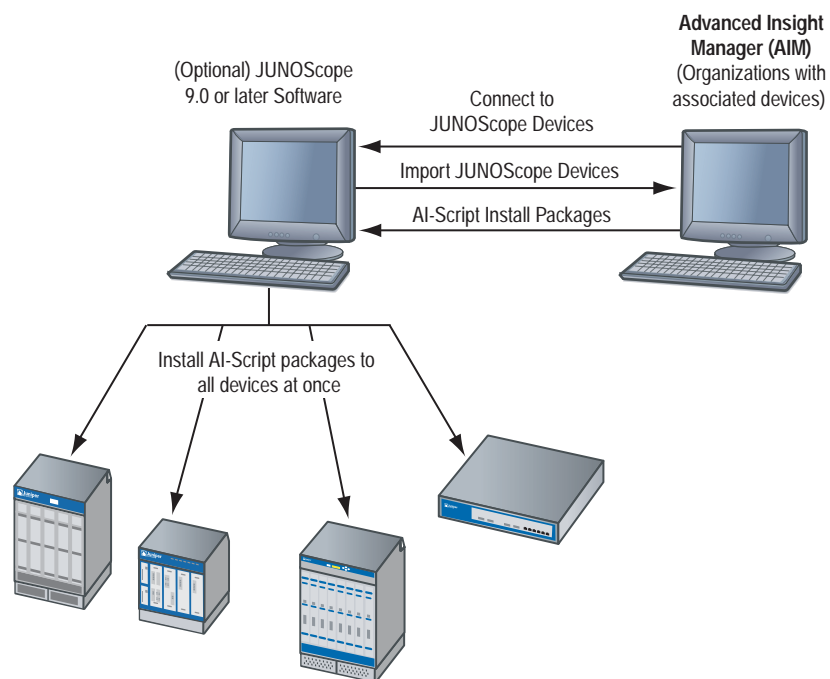


**NOTE:** If you configure the `load-scripts-from-flash` option, the system reads event-scripts from `/config/scripts/` directory. Otherwise the system reads AI-Scripts from the `/var/db/scripts/` directory. The `/var/run/scripts` directory will always point to the right `scripts` directory.

### Automatically Installing AI-Script Bundles

You can optionally use AIM to install AI-Script bundles (also known as AI-Script install packages) on devices as long as there is a JUNOScope software installation. AIM communicates with JUNOScope to install AI-Script bundles on JUNOS devices managed by JUNOScope. See Figure 10.

**Figure 10: Automatic Installation of AI-Script Install Packages Using JUNOScope**



To configure auto installation of AI-Script bundles to devices, follow these steps:

1. Configure the credentials used to communicate with JUNOScope, see “Configuring JUNOScope Settings” on page 53.
2. Import devices that are managed by JUNOScope, see “Configuring JUNOScope Settings” on page 53.
3. Configure Script Bundles, see “Configuring Script Bundle Settings” on page 57.
4. Associate imported devices with a device group, see “Creating Device Groups” on page 74.
5. Configure the Script Bundle of the device group and set the No-copy and Unlink installation attributes, see “Creating Device Groups” on page 74.
6. Add archive locations specifying the upload command password attributes, see “Configuring Archive Locations” on page 76.
7. Press the Save Changes button, AIM sends a message to JUNOScope to install the selected script bundle on the associated devices.

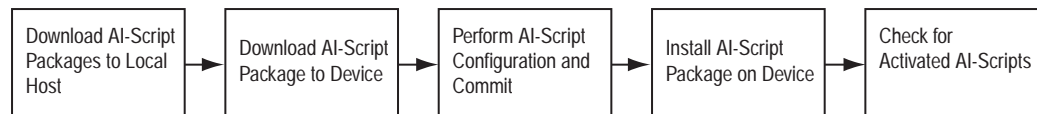
If you do not want to use AIM to install AI-Script bundles, you can manually configure and install AI-Script bundles to each device separately. To install AI-Script bundles manually, see “Manually Configuring and Installing AI-Scripts on Devices” on page 44.

### **Manually Configuring and Installing AI-Scripts on Devices**

Within AIM, devices that are configured for AIS manually will automatically be added to the device group that is associated with the AIM archive location to which the JMB was sent. When the AIM detects a JMB for a device that is not managed by JUNOScope Script Management, it will note it.

Figure 11 shows the basic steps you must perform to manually configure and install AI-Scripts to devices.

**Figure 11: Basic Steps to Manually Configure and Install AI-Scripts on Devices**



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To manually configure and install AI-Scripts on Devices, follow these steps:

1. Configure the device:
  - a. Enter the **configure** command or the **edit** command to enter configuration mode. The CLI prompt changes from **user@host>** to **user@host#** and a banner appears to indicate the hierarchy level.

- b. Enter an ais destination under group juniper-ais:

```
user@host# set groups juniper-ais event-options destination
juniper-junoscope {...}
```

This configuration determines the AIS archive location where JMBs are deposited for a device.

- c. Configure the commit script:

```
user@host# set groups juniper-ais system scripts commit file
jais-activate-scripts.slax optional
```

The AI-Script installer creates this script to activate AI-Scripts on the device.

- d. Configure the allow-transients option to allow transient changes:

```
user@host# set groups juniper-ais system scripts commit
allow-transients
```

Transient changes are configuration changes made by commit scripts that do NOT appear in the committed configuration (except with a special command).

- e. Apply the juniper-ais group:

```
user@host# set apply-groups juniper-ais
```

This configuration applies the configuration group juniper-ais.

- f. (Optional) Configure the load-scripts-from-flash option:

```
user@host# set groups juniper-ais system scripts load-scripts-from-flash
```




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**NOTE:** If you configure the load-scripts-from-flash option, the system reads AI-Scripts from /config/scripts/ directory otherwise the system reads AI-Scripts from the /var/db/scripts/ directory. The /var/run/scripts directory will always point to the right scripts directory.

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2. Verify that the syntax of a configuration is correct by using the configuration mode `commit check` command:

```
[edit]
user@host# commit check
configuration check succeeds
```

3. Commit the configuration. To save software configuration changes to the configuration database and activate the configuration on the router, use the `commit` configuration mode command. You can issue the `commit` command from any hierarchy level.

```
[edit]
user@host# commit
commit complete
```

4. View the configuration:

```

groups {
  juniper-ais {
    system {
      scripts {
        commit {
          allow-transients;
          file jais-activate-scripts.slax {
            optional;
          }
        }
        load-scripts-from-flash;
      }
    }
    event-options {
      destinations {
        juniper-junoscope {
          archive-sites {
            "ftp://anonymous@10.7.0.124/aimdemo";
          }
        }
        . . .
      }
    }
  }
}

```

5. If you have not moved the AI-Script to the device, do so now. See “Downloading AI-Script Install Packages and Release Notes” on page 42.
6. Install the AI-Script package. (For more information about working with AI-Script packages, see the Working With AI-Scripts on page 47.

```
request system scripts add <package-name>
```

7. Verify that the AI-Scripts are activated:

```
user@host# show groups juniper-ais | display commit-scripts
```

```
user@host# show configuration groups juniper-ais | display commit-scripts
system {
  scripts {
    commit {
      allow-transients;
      file jais-activate-scripts.slax {
        optional;
      }
    }
  }
}
event-options {
  event-script {
    file problem-event-pfcrash.slax;
    file problem-event-dcrash.slax;
    file intelligence-event-main.slax;
    file SPD_EVLIB_CREATE_FAILURE.slax;
    file SPD_DAEMONIZE_FAILED.slax;
    file RPD_TASK_FORK.slax;
    . . .}
  destinations {
    juniper-junoscope {
      archive-sites {
        "ftp://anonymous@10.7.0.124/aimdemo";
      }
    }
  }
}
```

## Working With AI-Scripts

This section describes the basic commands you perform to install, delete, or roll back AI-Scripts.

- Installing an AI-Script Package on page 47
- Deleting an AI-Script Package on page 47
- Rolling Back an AI-Script Package on page 48
- Not Saving Copies of AI-Scripts Package Files During Installation on page 48
- Removing AI-Script Packages After Installation on page 48

### Installing an AI-Script Package

To install an AI-Script package to a router, use the following command:

```
user@host> request system scripts add <package-name>
```

### Deleting an AI-Script Package

To delete an AI-Script from a router, use the following command:

```
user@host> request system scripts delete
```

### Rolling Back an AI-Script Package

After the deletion of an AI-Script jais package, you can roll back to the last installed jais package by using the following command:

```
user@host> request system scripts rollback
```

### Not Saving Copies of AI-Scripts Package Files During Installation

To prevent the installer from saving copies of AI-Script jais package files during installation, use the following command:

```
user@host> request system scripts add no-copy <package-name>.l
```

---



**NOTE:** If you use the no-copy option during the jais installation, the jais package cannot be rolled back.

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You can specify the no-copy option in AIM Device Group settings by selecting the no-copy check box.

### Removing AI-Script Packages After Installation

To remove the AI-Script jais bundle after successful installation, use the following command:

```
user@host> request system scripts add unlink <package-name>
```

You can specify the unlink option in AIM Device Group settings by selecting the unlink check box.