Migrate to IOS XR 64 bit on ASR9K

ASR9K IOS XR 64 Bit (ASR9K-X64) Migration User Guide

This document will help you in getting started with your migration from ASR9K standard 32 bit image to the new 64 bit image. Prior to scheduling migration, you can use these two modules to verify and prepare for migration:

- Configuration Conversion – Visualization of configuration conversion/migration
- Migration-Audit – Hardware audit for migration

Actual migration takes three major steps:

- Pre-Migrate – System preparation
- Migrate – Installation of new 64-bit OS
- Post-Migrate – Post-installation actions

Notes on Device Configurations

Important: The ASR 9000 operational configuration is not completely compatible with ASR9K-X64, therefore it must be converted/migrated* for use in the 64-bit version. A copy of the 32-bit configuration is backed up for reference.

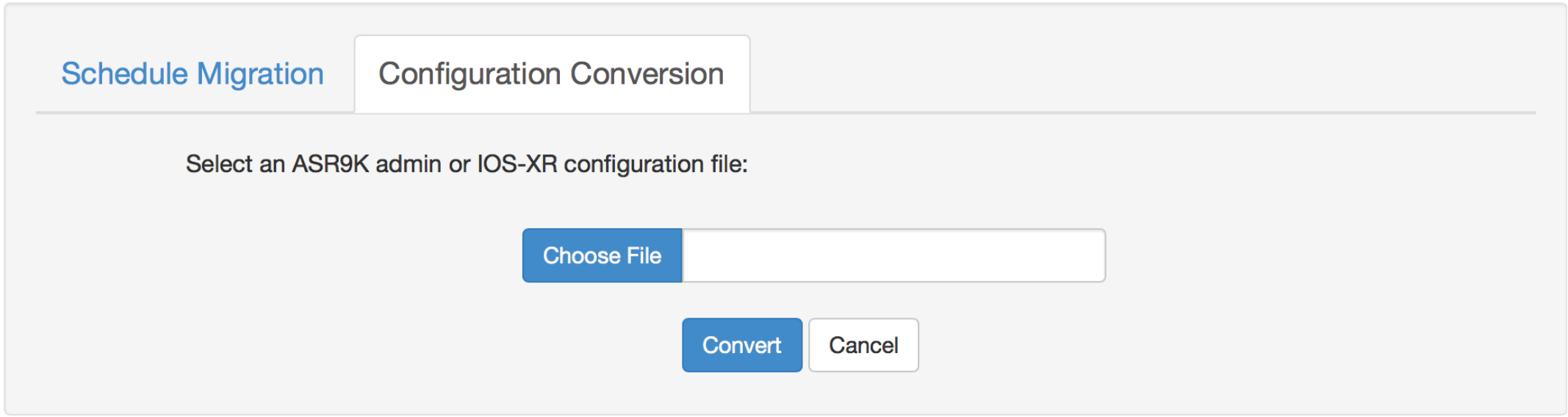
You have the following two options:

Option 1: Migration of On-box Configurations	Option 2: Loading Custom Configurations
• CSM will migrate the “on-box” ASR9K configurations (admin & IOS-XR) only	• CSM will migrate the “on-box” ASR9K admin configuration • In addition, CSM will load any valid ASR9K-X64 user-specified IOS-XR configuration

* Configuration migration is accomplished using the NoX tool. For more information, please visit this site: http://xrgeeks.cisco.com/sox/Nox_Tool.html

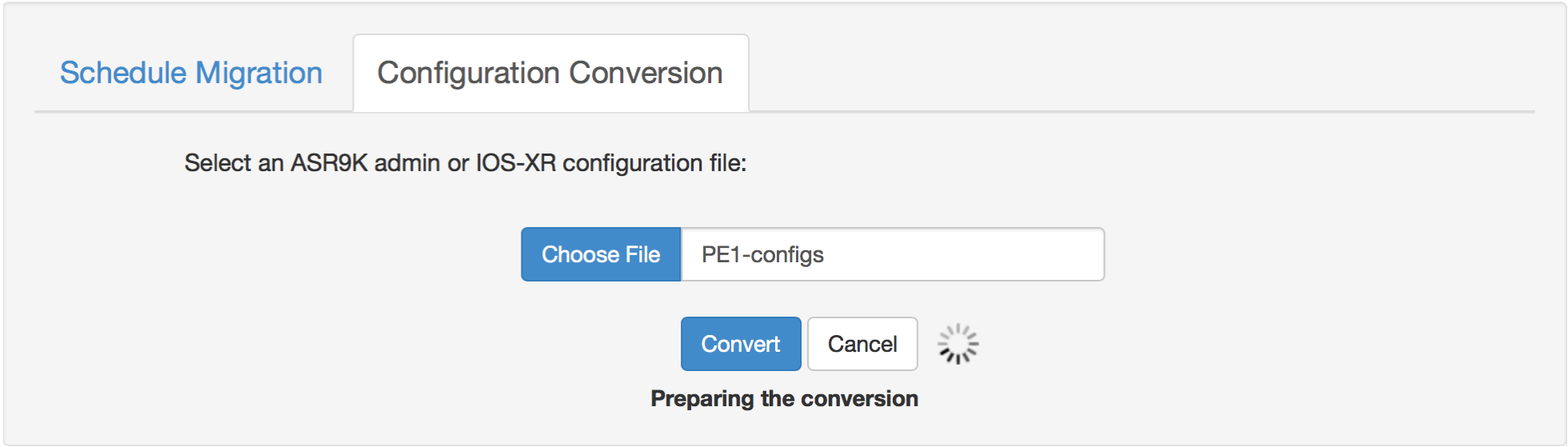
Configuration Conversion

- In the Configuration Conversion module, CSM allows users to see how NoX processes each line of ASR9K configuration.
- **How to access**: Tools > ASR9K to ASR9K-X64 Migration, click on Configuration Conversion tab.
- Choose a ASR9K configuration file on the file system and click Convert.

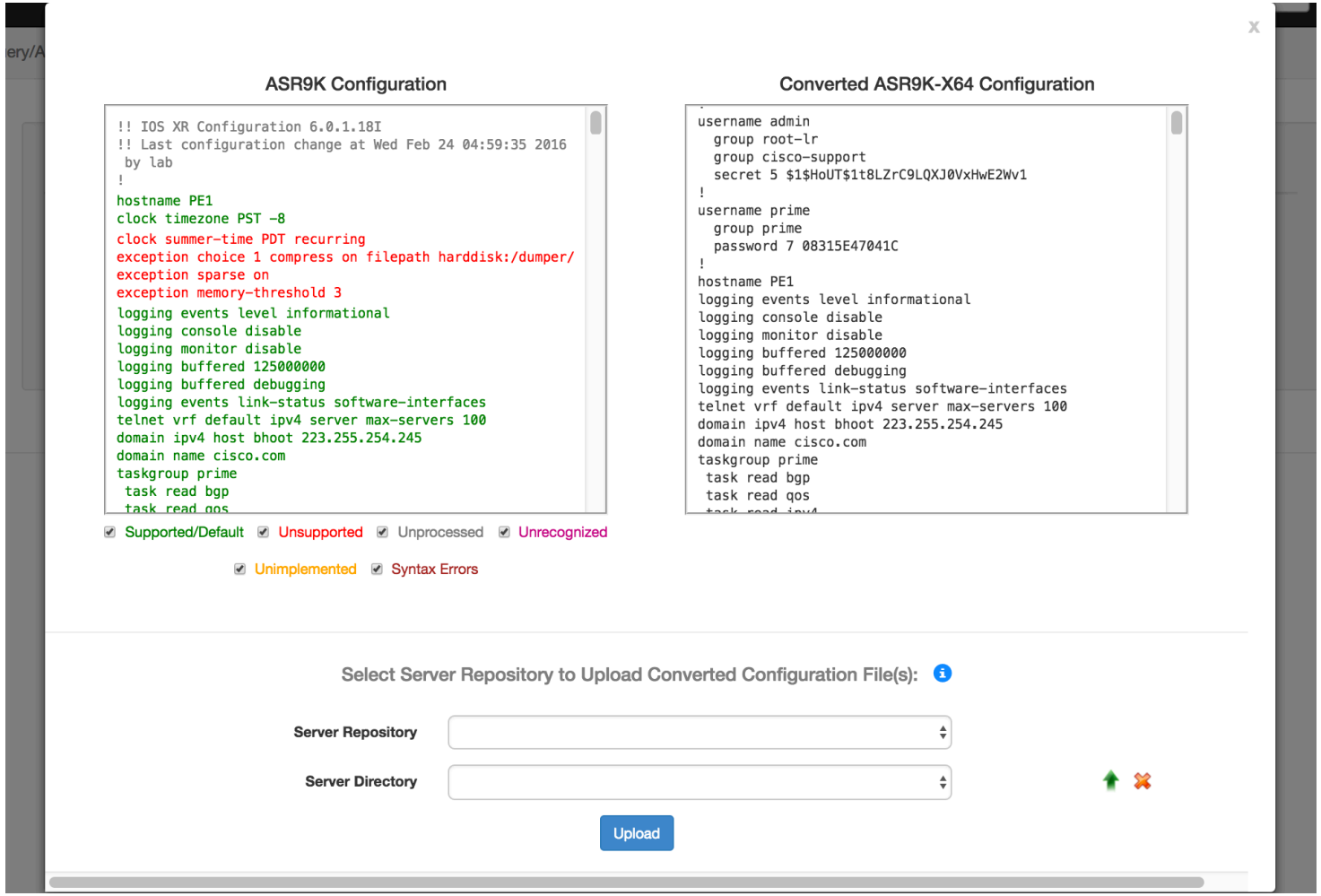


Configuration Conversion - Continue

- The conversion process will first make sure that the latest NoX conversion tool from CCO is downloaded.
- Depending on the size of the configuration file, it may take up to minutes to finish conversion and loading.
- The status of the conversion is displayed under the convert button. Some possible statuses:
  - Preparing the conversion
  - Converting the configurations
  - Conversion completed. Loading the files.



Configuration Conversion - Continue



In the end, you will see this pop-up.

- The textbox on the left contains your input configuration file, with each line color coded according to the conversion report from NoX.
- Each color code/category is explained in the tooltip when you hover over it.
- You can choose to filter certain categories to hide and show lines that belong to certain category. Note that if the configuration file is large, it will take several seconds to update the display.
- The textbox on the right displays the converted ASR9K-X64 configurations.
- The part on the bottom allows user to upload converted configuration file(s) to a selected server repository. Click the blue instruction icon to see why there could be one or two converted files.
- The input file and converted files can be found at csm_data/temp/<username>/config_conversion/

Migration Pre-requisites

- In order to migrate to ASR9K-X64 images, the release version on device MUST be at release 6.1.3 or greater.
- Supported hardware for RP, RSP, FC, FAN, PEM and MPA. The full list is on next page.
  - The unsupported line cards may not boot up after migration.
  - User also has a chance to skip the hardware audit for FAN and PEM with the acknowledgement that the unsupported FAN and PEM will fail to boot.
- All supported hardware are in their appropriate final states:
  - RSP, RP and LC: IOS XR RUN
  - FC: OK
  - FAN and PEM: READY
  - MPA: OK
- User must provide console connection for all devices on CSM.
- Must be able to ping the selected server repository (FTP, SFTP or TFTP) from the device.
- FPD package must be already installed on device.

Supported hardware: (*Note: Card types in red are only supported in 6.2.1 onwards, everything else is supported in 6.1.3 onwards.)

Supported RP/RSP	Supported Line Cards	Supported Fans PIDs	Supported PEMS PIDs	Supported FC PIDs	Supported MPA PIDs
A99-RP2-SE	A99-8X100GE-CM	ASR-9904-FAN	PWR-2KW-DC-V2	A99-SFC2	*A9K-MPA-4X10GE
A99-RP2-TR	A99-8X100GE-SE	ASR-9006-FAN-V2	PWR-3KW-AC-V2	*A99-SFC-S	*A9K-MPA-20X10GE
A9K-RSP880-RL-SE	A99-8X100GE-TR	ASR-9010-FAN-V2	PWR-4.4KW-DC-V3		
A9K-RSP880-RL-TR	A99-12x100GE	ASR-9910-FAN	PWR-6KW-AC-V3		
A9K-RSP880-SE	A9K-4X100GE-SE	ASR-9912-FAN			
A9K-RSP880-TR	A9K-4X100GE-TR	ASR-9922-FAN-V2			
ASR-9922-RP-SE	A9K-8X100GE-CM				
ASR-9922-RP-TR	A9K-8X100GE-L-SE				
*A99-RSP-SE	A9K-8X100GE-L-TR				
*A99-RSP-TR	A9K-8X100GE-LB-SE				
	A9K-8X100GE-LB-TR				
	A9K-8X100GE-SE				
	A9K-8X100GE-TR				
	*A9K-400G-DWDM-SE				
	*A9K-400G-DWDM-TR				
	*A9K-MOD200-SE				
	*A9K-MOD200-TR				
	*A9K-MOD400-SE				
	*A9K-MOD400-TR				

CSM Migration to ASR9K-X64

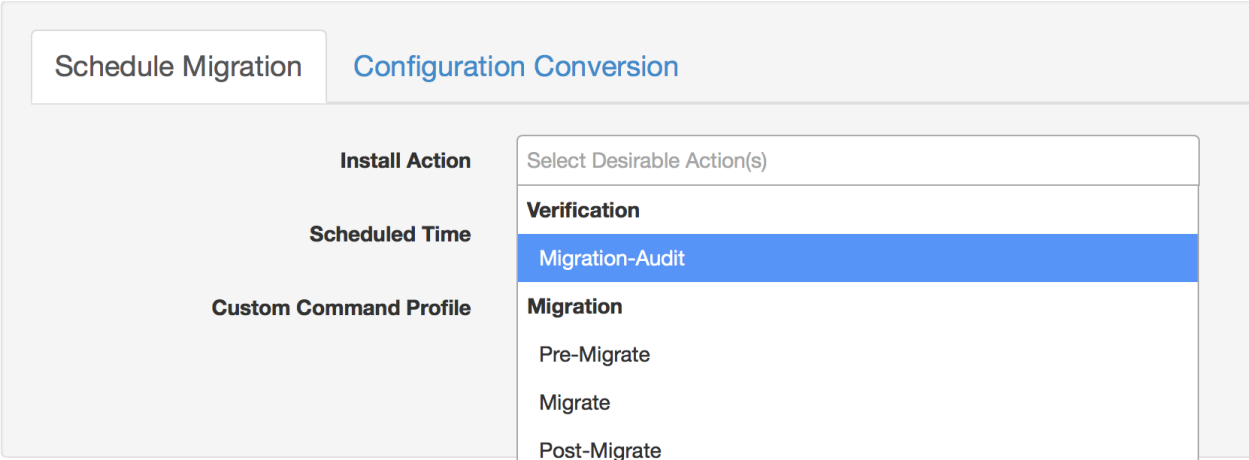
- CSM allows for the migration from IOS-XR (classic) to IOS-XR 64 bit for ASR9K devices.
- **How to access**: Tools > ASR9K to ASR9K-X64 Migration.
- **Verification action**: Migration-Audit

  Migration-Audit checks if the hardware on device(s) is supported in ASR9K-X64 and is in operational state.
- **Migration actions:** Pre-Migrate, Migrate and Post-Migrate.

  Pre-Migrate prepares the device(s) for migration. It also executes Migration-Audit as a part of the pre-requisite check.

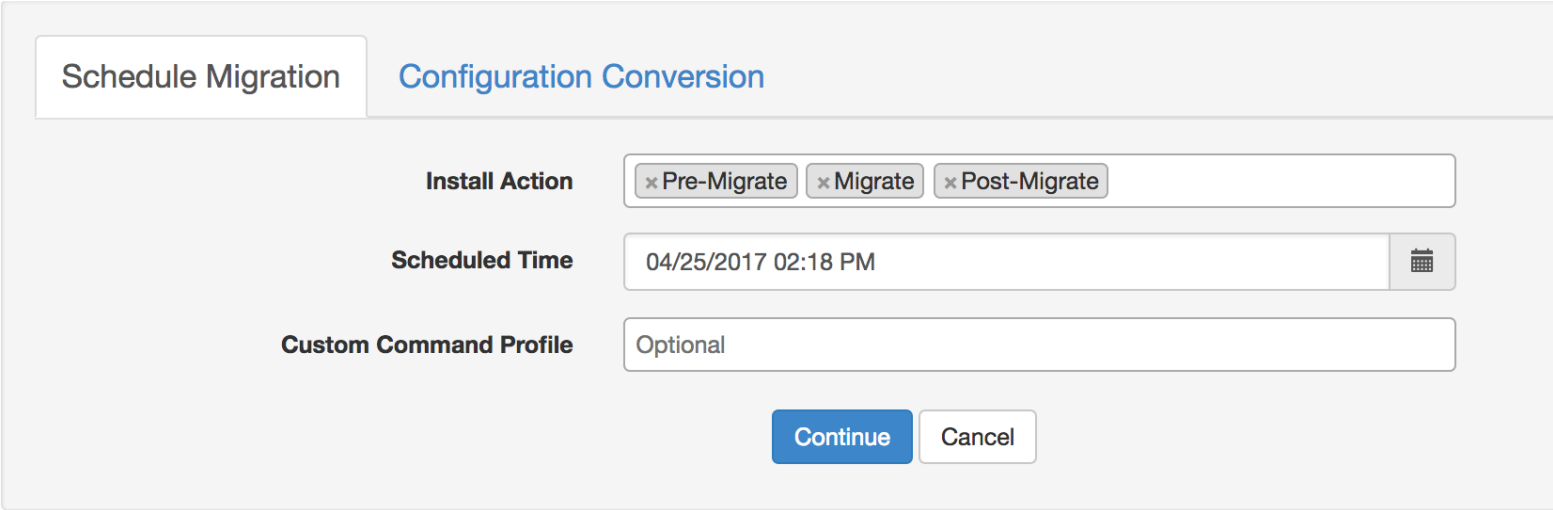
  Migrate updates settings and reloads the device(s) to boot ASR9K-X64 image.

  Post-Migrate upgrades FPD's upon successful booting.



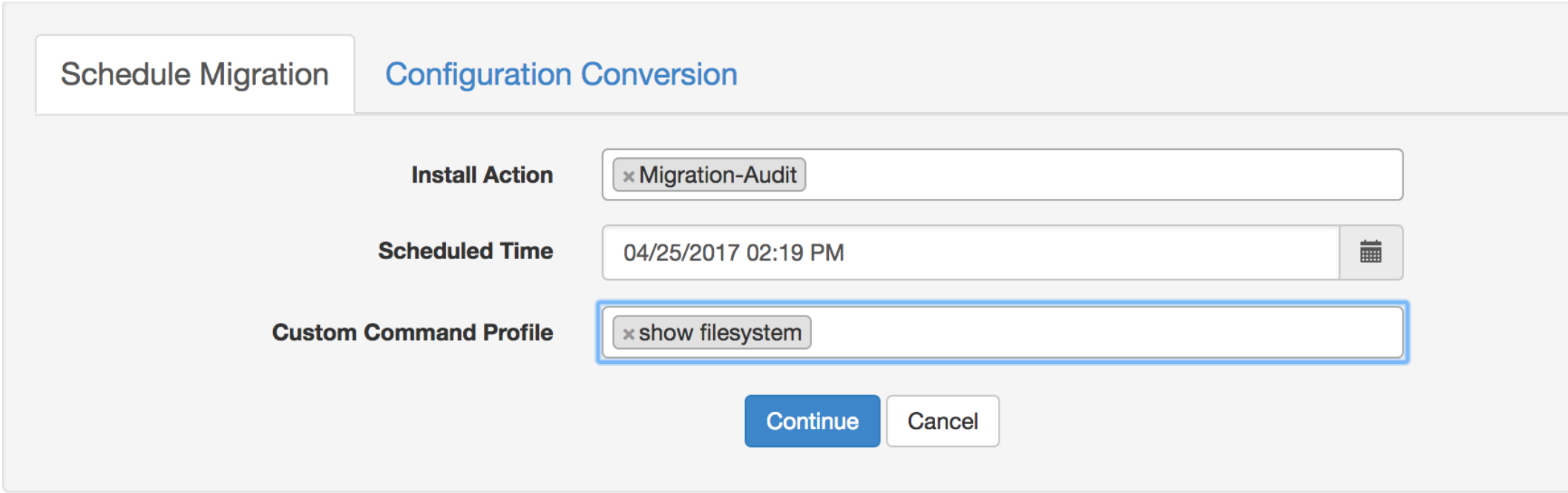
Scheduling Action

- Dependencies of the actions:
  - The verification action Migration-Audit can only be selected by itself. The three migration actions has no dependency on it.
  - In order to complete migration, all three migration actions must have successfully executed.
  - Migration actions can be scheduled all at once or one at a time, but they must occur in the order shown below.
  - For example, Migrate cannot be scheduled unless Pre-Migrate is scheduled to run, or is in progress, or has already completed successfully.
  - Failures in pre-requisite actions can suspend the execution of any remaining options.
  - Deleting the pre-requisite will also delete all actions that are dependent on it.
- Choose desirable scheduled time

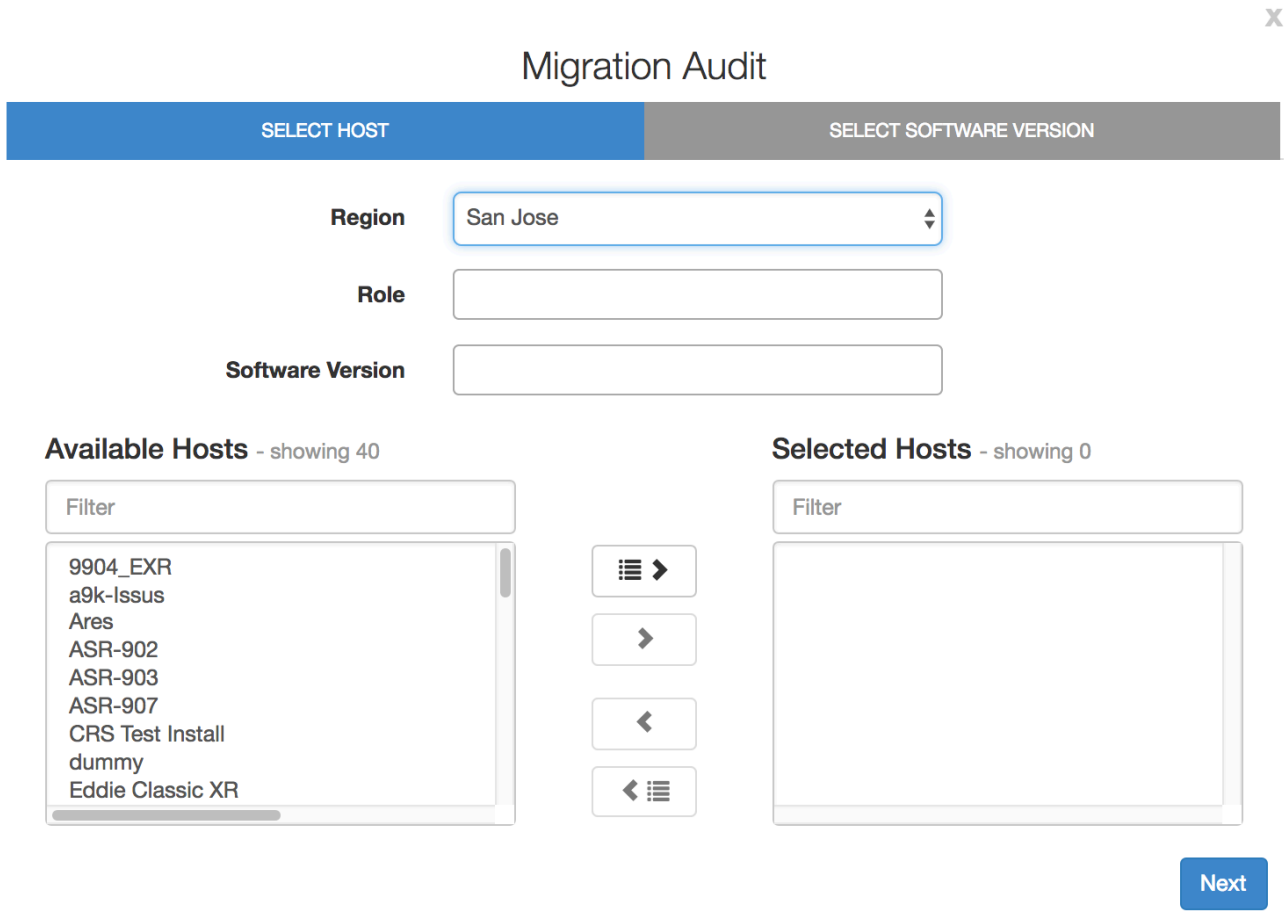


Scheduling Action - Continue

- (Optional) Use the Custom Command Profile if you wish to capture any CLI command output. These custom commands will be executed **before** each selected migration action executes.
  - Note: By default, the following CLI commands already run in their appropriate stages and do not need to be duplicated in the Custom Command Profile: admin show running-config, show running-config, show platform.
- Click Continue to trigger the Migration Wizard.

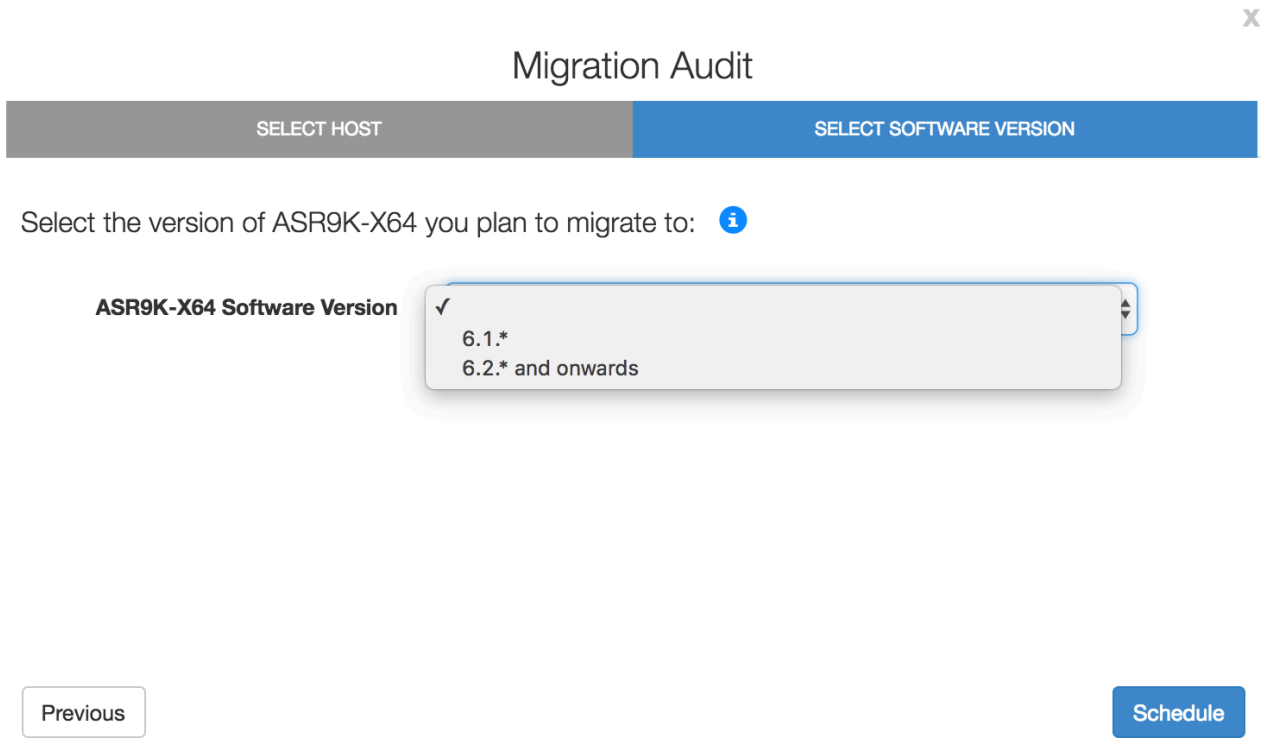


Scheduling Migration-Audit



- Depending on the action(s) selected, the Migration Wizard will prompt the user with different options.
- If the Migration-Audit is selected, you will start on the screen shown to the right in the “SELECT HOST” section.
- **Select Host**:
  - In this first section, you will select the device(s) to schedule the action on.

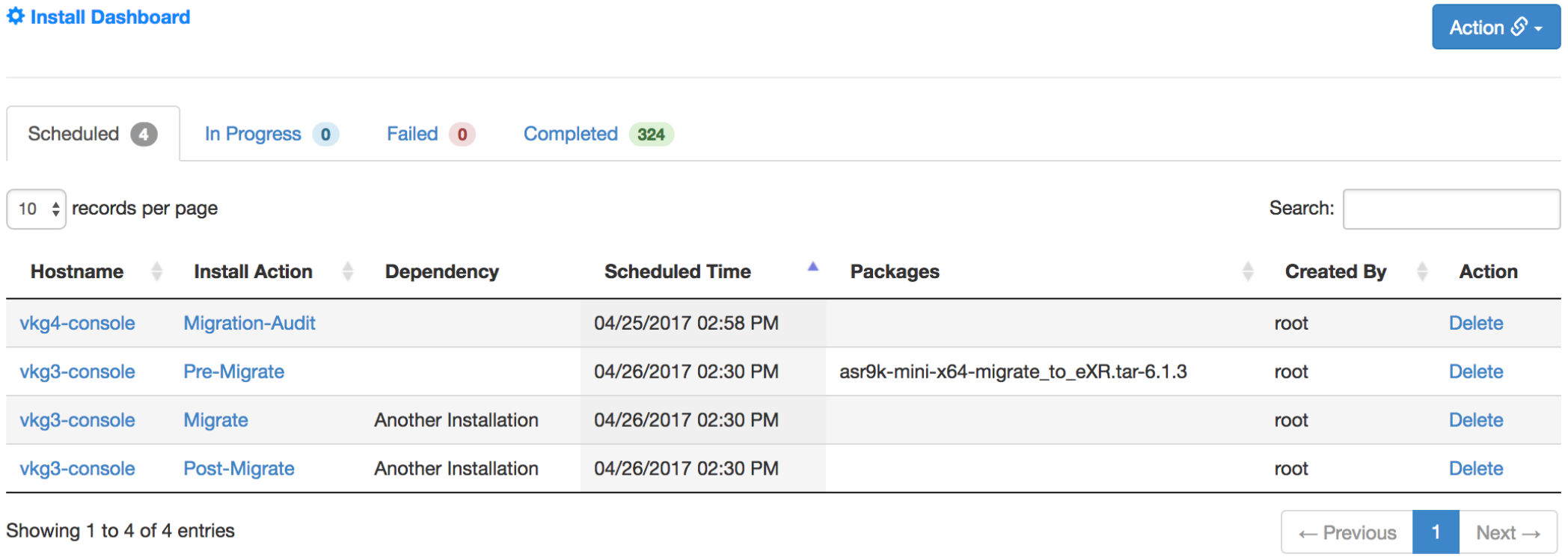
Scheduling Migration-Audit - Continue



- **Select Software Version:**
  - This is where you select the version of ASR9K-X64 you plan to migrate to.
- Then, click Schedule to schedule the Migration-Audit.

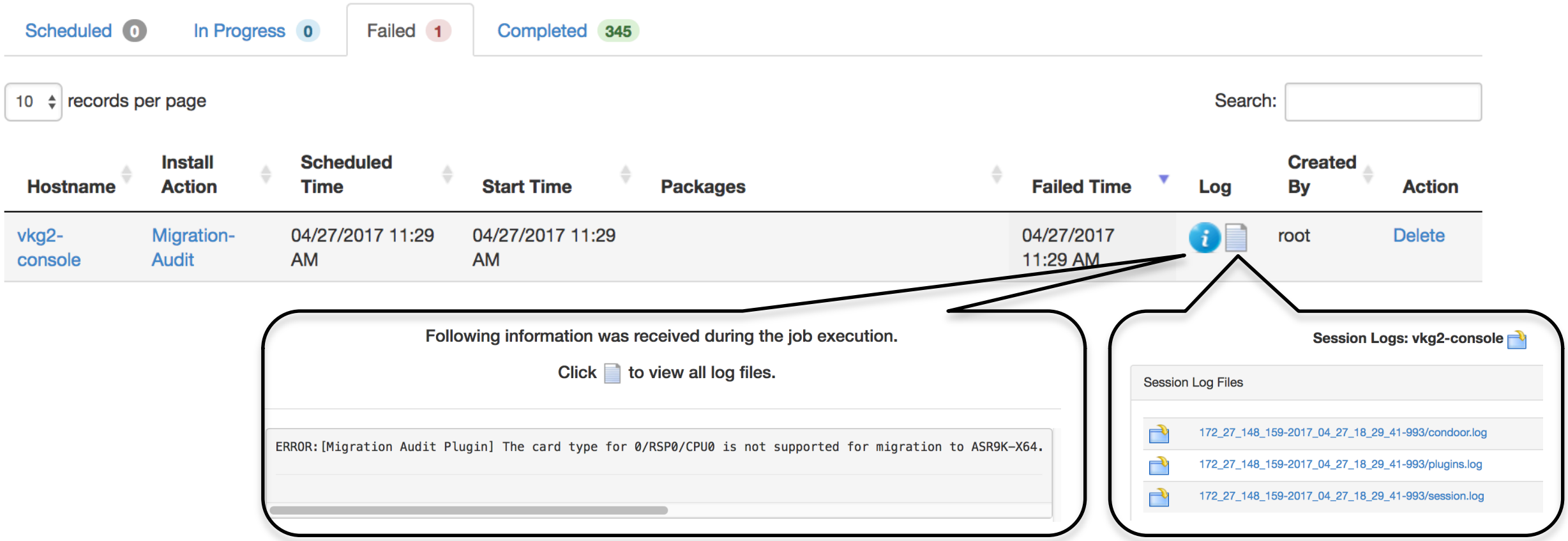
Install Dashboard

- After scheduling any of the verification or migration actions, CSM will redirect you to the install dashboard, where you can:
  - Monitor the job in progress by checking the status and clicking into the Session Logs.
  - Edit scheduled or failed jobs and resubmit them.
  - Check completed jobs.
  - Delete scheduled or failed jobs.



Session Logs: Migration-Audit

- Session Logs are available for in-progress, failed and completed jobs. The blue job info icon takes you to any outstanding error/warning/info of the job, if any.
- If a job failed, check plugins.log, session.log and condoor.log for error.



Session Logs: Migration-Audit - Continue

- Below is an example of plugins.log for a failed Migration-Audit job. In this case, the RSP on the device is not supported in the ASR9K-X64 6.1.* release version.

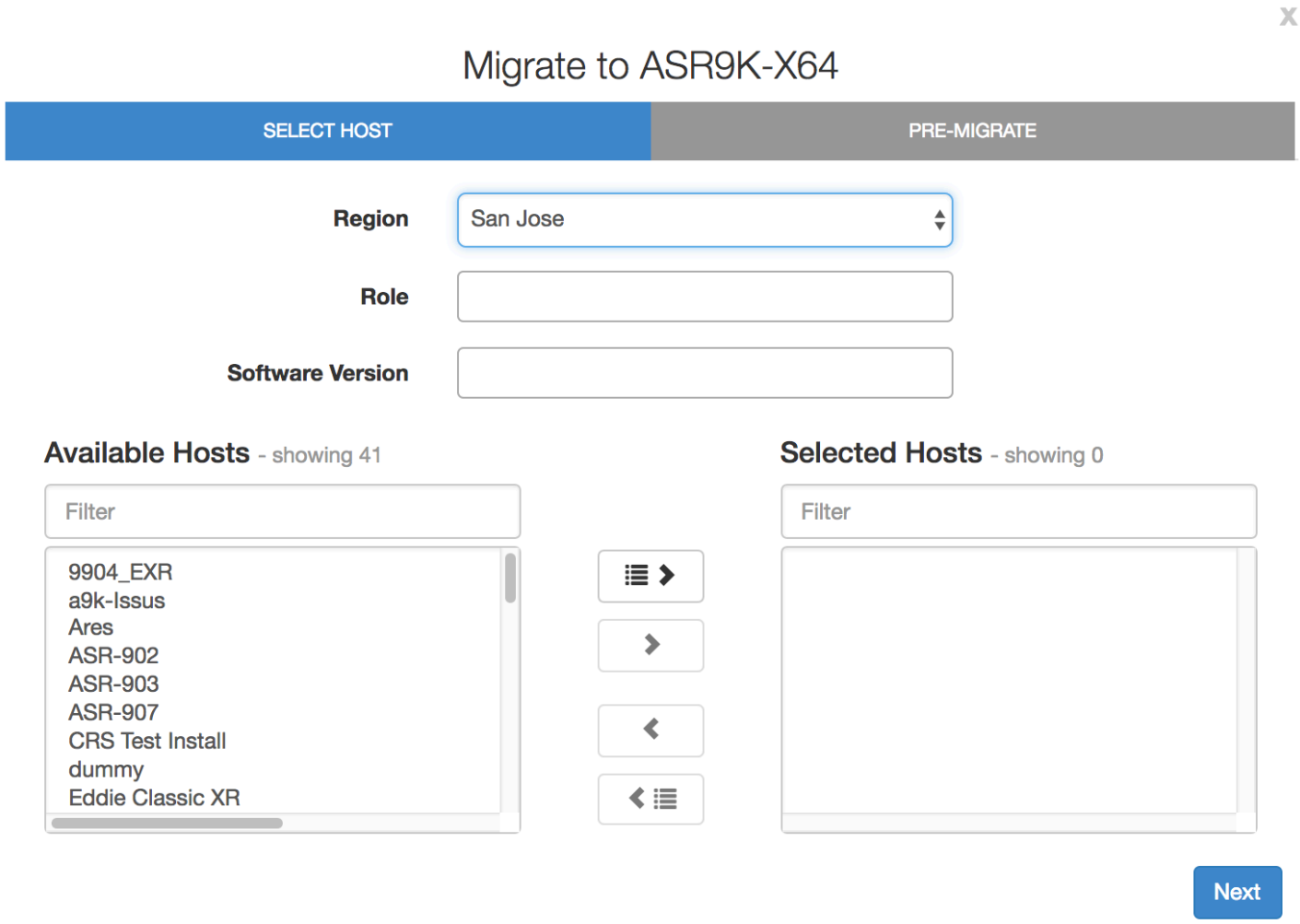
Session Logs: vkg2-console

Contents

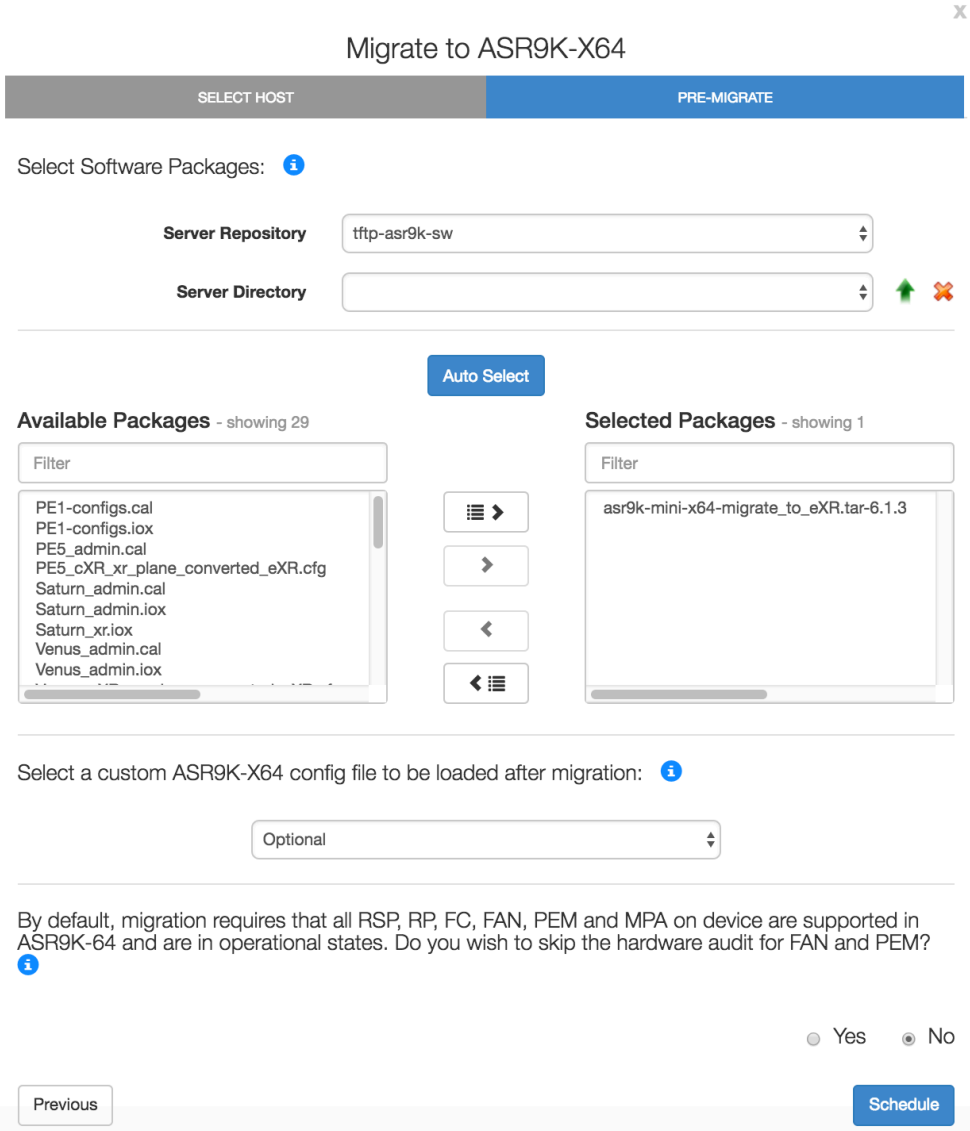
```
2017-04-27 11:29:41,305     INFO: Phase: Connecting
2017-04-27 11:29:41,328     INFO: Connection chain 1/2: telnet://root@172.27.148.159:2033
2017-04-27 11:29:41,331     INFO: Connection chain 2/2: telnet://root@172.27.148.159:2035
2017-04-27 11:29:41,336     INFO: Connection chain/attempt [1/1]
2017-04-27 11:29:41,340     INFO: Connecting telnet://root@172.27.148.159:2033
2017-04-27 11:29:50,688     INFO: Connected telnet://root@172.27.148.159:2033
2017-04-27 11:29:50,697     INFO: Target device connected in 9.36s.
2017-04-27 11:29:50,703     INFO: Hostname: vkg2
2017-04-27 11:29:50,703     INFO: Hardware family: ASR9K
2017-04-27 11:29:50,703     INFO: Hardware platform: ASR-9006
2017-04-27 11:29:50,703     INFO: OS type: XR
2017-04-27 11:29:50,704     INFO: Version: 5.3.4
2017-04-27 11:29:50,704     INFO: Connection type: console
2017-04-27 11:29:50,809     INFO: Phase: Migration-Audit
2017-04-27 11:29:50,809     INFO: Dispatching: 'Custom Commands Capture Plugin'
2017-04-27 11:29:50,814     INFO: [Custom Commands Capture Plugin] No custom commands provided.
2017-04-27 11:29:50,814     INFO: Dispatching: 'Migration Audit Plugin'
2017-04-27 11:29:50,821     INFO: [Migration Audit Plugin] Key 'hardware_audit_version' loaded from CSM storage
2017-04-27 11:29:50,822     INFO: [Migration Audit Plugin] Hardware audit for software release version 6.1
2017-04-27 11:29:50,822     INFO: [Migration Audit Plugin] Running hardware audit on all nodes.
2017-04-27 11:29:52,531     INFO: [Migration Audit Plugin] Check if cards on device are supported for migration.
2017-04-27 11:29:52,543    ERROR: [Migration Audit Plugin] The card type for 0/RSP0/CPU0 is not supported for migration to ASR9K-X64. Please check the user manual under 'Help' on CSM Server for list of supported hardware for ASR9K-X64.
```

Scheduling a Migration

If any of the migration action(s) is selected, you will start in the “SELECT HOST” section, where you select the device(s) to schedule the migration actions on.



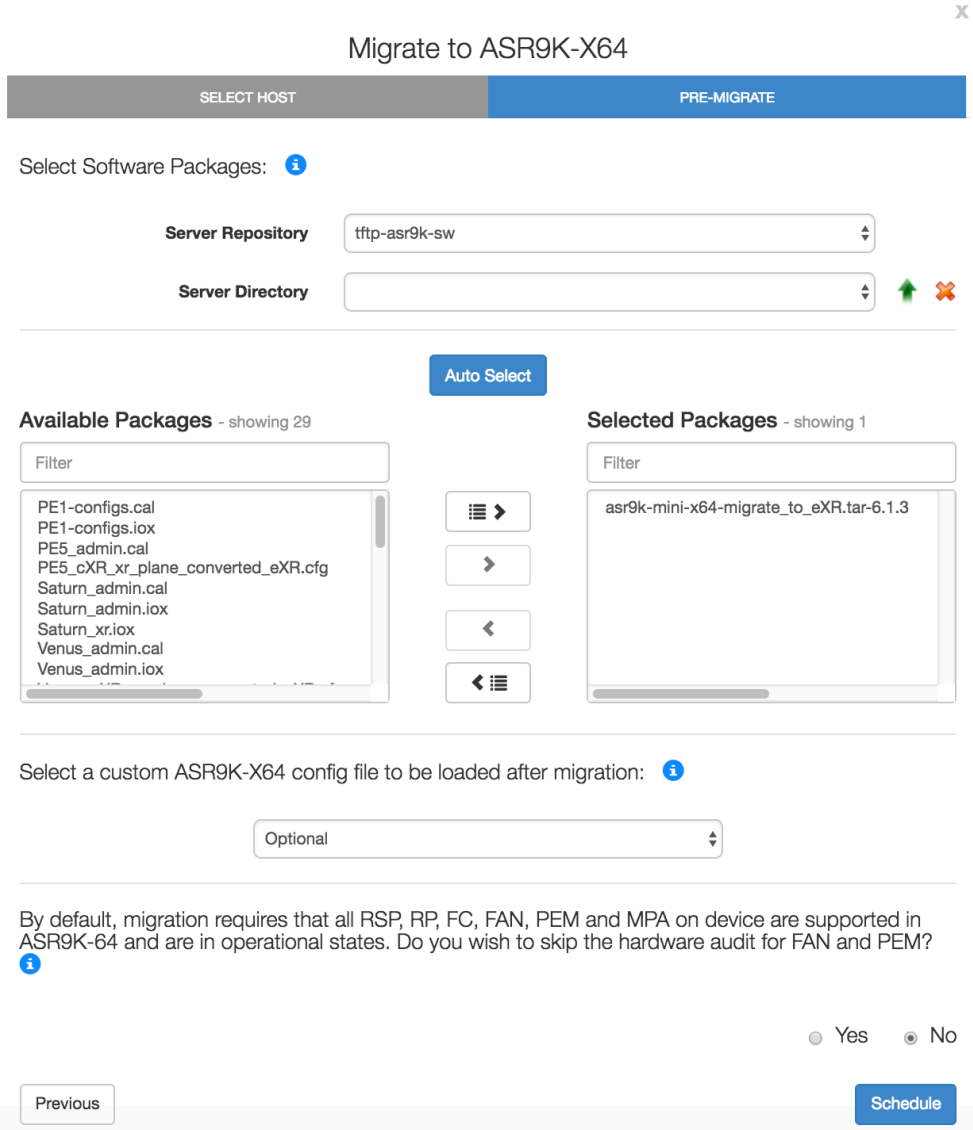
Scheduling a Migration - Continue



- If Pre-Migrate is selected, you will see this section.
- **Pre-Migrate:**
  - Specify a FTP, SFTP or TFTP server repository and the directory. At this stage, only the following two files can be selected:
    1. The ASR9K-X64 tar file containing the ISO image and boot files. The filename must match wildcard expression **asr9k*.tar*** and must include the 3 digit ASR9K-X64 version. Example: asr9k-mini-x64-migrate_to_eXR.tar-6.1.3
    2. (Optional) If you are migrating to a k9 ASR9K-X64 tar file and you wish that the system generates crypto keys for you when the k9sec package gets loaded after migration, you can provide a txt file, preferably named as “crypto_auto_key_gen.txt”. In this file, you should put the CLI’s that generate the crypto keys you want to have. For example, you can write “crypto key generate rsa 2048” into the file. The CLI’s to generate crypto keys follow this structure:
       a) crypto key generate rsa/dsa general-keys <label> <keysize>
       b) crypto key generate rsa/dsa usage-keys <label> <keysize>
       c) crypto key generate rsa/dsa <nooption> <nooption> <keysize>

    You can find your current key settings on your hosts with CLI’s “show crypto key my rsa” and “show crypto key my dsa”.
    Note that the default key size in ASR9K is 1024, whereas the default key size in ASR9K-X64 is 2048.

Scheduling a Migration - Continue



- **Pre-Migrate - Continue:**
  - (Optional) You can select a customized IOS-XR configuration file for CSM to load during Post-Migrate. If so, the existing IOS-XR configurations on device will be ignored.
  - Alternatively, if no file is provided, CSM will migrate the existing configurations, and the system will load the migrated configurations automatically during Migrate.
  - You also have the option of overriding the hardware audit for FAN and PEM.

Scheduling a Migration - Continue

- The migration action(s) can only be scheduled if CSM confirms that:
  - The pre-requisite for the selected action(s) is scheduled or completed successfully.
  - The latest configuration migration tool NoX from CCO is in csm_data/migration/, if not, CSM will download it before scheduling the actions.
- Click Schedule to schedule the action(s). CSM will redirect you to the install dashboard.

Walk-Through: Pre-Migrate

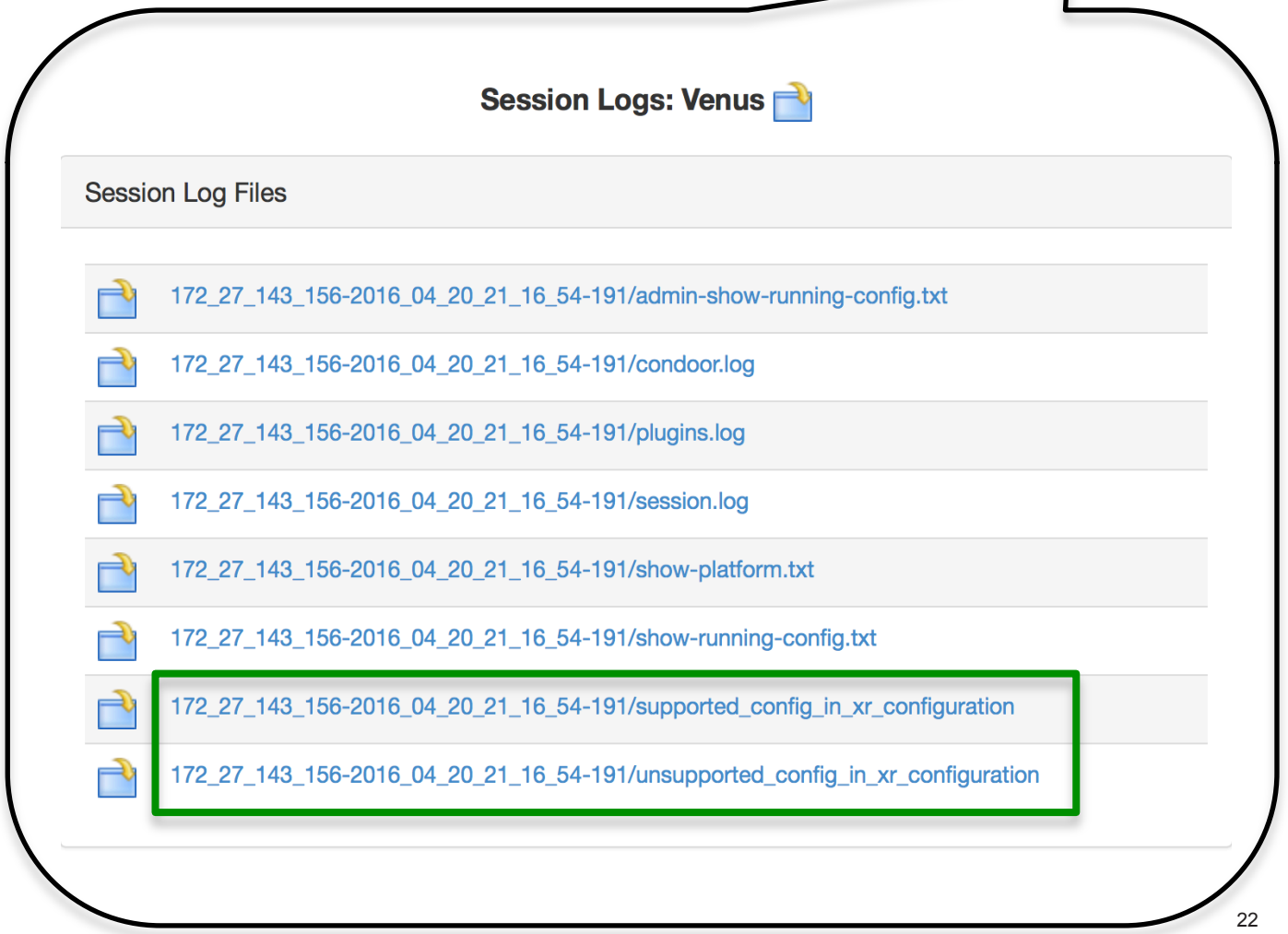
The CSM Pre-Migrate step is a collection of automated tasks designed to ensure your system is prepared for migration. Actions include (but are not limited to):

- Hardware and software checks
- Removing content from harddiskb:/ and harddisk:/dumper and harddisk:/showtech
- Backing up the admin and IOS-XR configurations in harddiskb:/
- Copy, conversion and storage of existing operational configuration (to be applied later in the Migrate step)
- Copying the ASR9K-X64 tar file to harddisk:/
- Checking FPD versions and performing FPD upgrades if necessary.

Session Logs: Pre-Migrate

Venus	Pre-Migrate	04/20/2016 02:04 PM	04/20/2016 02:16 PM		04/20/2016 02:24 PM		root

- Same as the other actions, check plugins.log, session.log and condoor.log for errors if any.
- Other Pre-Migrate logs:
  - .txt – Are CLI command output capture files.
  - Configuration Log (shown in green) – Are available when the configuration migration tool (NoX) encounters configuration conversion issues. This does not necessarily mean the Pre-Migrate step will fail but you are advised to inspect these files if they exist.



Session Logs: Pre-Migrate - Continue

```
Configurations Known and Supported to the NoX Conversion Tool

Line No.    Configuration
5          interface MgmtEth0/RSP0/CPU0/0
6           ipv4 address 1.66.27.25 255.255.0.0
8          interface MgmtEth0/RSP0/CPU0/1
9           shutdown
11         interface MgmtEth0/RSP1/CPU0/0
12          shutdown
14         interface MgmtEth0/RSP1/CPU0/1
15          shutdown
23         interface HundredGigE0/0/0/0
24          shutdown
26         interface HundredGigE0/0/0/1
27          shutdown
29         interface HundredGigE0/0/0/2
30          shutdown
32         interface HundredGigE0/0/0/3
33          shutdown
35         interface HundredGigE0/0/0/4
36          shutdown
38         interface HundredGigE0/0/0/5
39          shutdown
41         interface HundredGigE0/0/0/6
42          shutdown
44         interface HundredGigE0/0/0/7
45          shutdown
47         router static
48          address-family ipv4 unicast
49           223.255.254.0/24 MgmtEth0/RSP0/CPU0/0 1.66.0.1


Please find original configuration in csm_data/migration/Venus/xr.cfg
The final converted configuration is in csm_data/migration/Venus/xr.iox
```

More concerning the configuration logs

- If you only scheduled a Pre-Migrate, you can choose to download “show-running-config.txt” and “admin-show-running-config.txt” and use the Configuration Conversion module to see details of the conversion.
- You can also check supported_config_in_xr_configuration and unsupported_config_in_xr_configuration for a brief overview.

Session Logs: Pre-Migrate - Continue

```
Configurations Known and Supported to the NoX Conversion Tool

Line No.    Configuration
5          interface MgmtEth0/RSP0/CPU0/0
6           ipv4 address 1.66.27.25 255.255.0.0
8          interface MgmtEth0/RSP0/CPU0/1
9           shutdown
11         interface MgmtEth0/RSP1/CPU0/0
12          shutdown
14         interface MgmtEth0/RSP1/CPU0/1
15          shutdown
23         interface HundredGigE0/0/0/0
24          shutdown
26         interface HundredGigE0/0/0/1
27          shutdown
29         interface HundredGigE0/0/0/2
30          shutdown
32         interface HundredGigE0/0/0/3
33          shutdown
35         interface HundredGigE0/0/0/4
36          shutdown
38         interface HundredGigE0/0/0/5
39          shutdown
41         interface HundredGigE0/0/0/6
42          shutdown
44         interface HundredGigE0/0/0/7
45          shutdown
47         router static
48          address-family ipv4 unicast
49           223.255.254.0/24 MgmtEth0/RSP0/CPU0/0 1.66.0.1


Please find original configuration in csm_data/migration/Venus/xr.cfg
The final converted configuration is in csm_data/migration/Venus/xr.iox
```


More concerning the configuration conversion logs (supported_config_in_xr_configuration and unsupported_config_in_xr_configuration)

- At the end of both files, CSM points you to the original configuration file and the migrated configuration file. They are stored in csm_data/migration/<hostname_of_device>/. The hostname may be slightly different from the one stored in CSM to ensure it's valid filename.
- If you only scheduled a Pre-Migrate, you will have the option of checking how the conversion went. Otherwise, if there is no serious failure, you can check if any configurations failed to be converted/loaded after the Post-Migrate.
- The following files are available after Pre-Migrate completes:
  - admin.cfg and xr.cfg are the original configurations on device.
  - admin.cal is a part of the migrated admin.cfg that will be loaded in the Calvados/admin plane in ASR9K-X64 during Post-Migrate. During Pre-Migrate, we copy this file to device as harddiskb:/cXR_admin_plane_converted_eXR.cfg.
  - If a custom ASR9K-X64 IOS-XR configuration was selected, during Pre-Migrate, CSM will copy this custom configuration file to device as harddiskb:/cXR_xr_plane_converted_eXR.cfg, which is loaded during Migrate step.
  - If no custom ASR9K-X64 IOS-XR configuration was selected, xr.iox and admin.iox are available as migrated xr.cfg and a part of the migrated admin.cfg. During Pre-Migrate, CSM merges these two files to create cXR_xr_plane_converted_eXR.cfg and then copy it to harddiskb:/ on device, which is loaded during Migrate step.
  - admin.csv and xr.csv(if available) contain the line by line configuration migration detail.

Walk-Through: Migrate

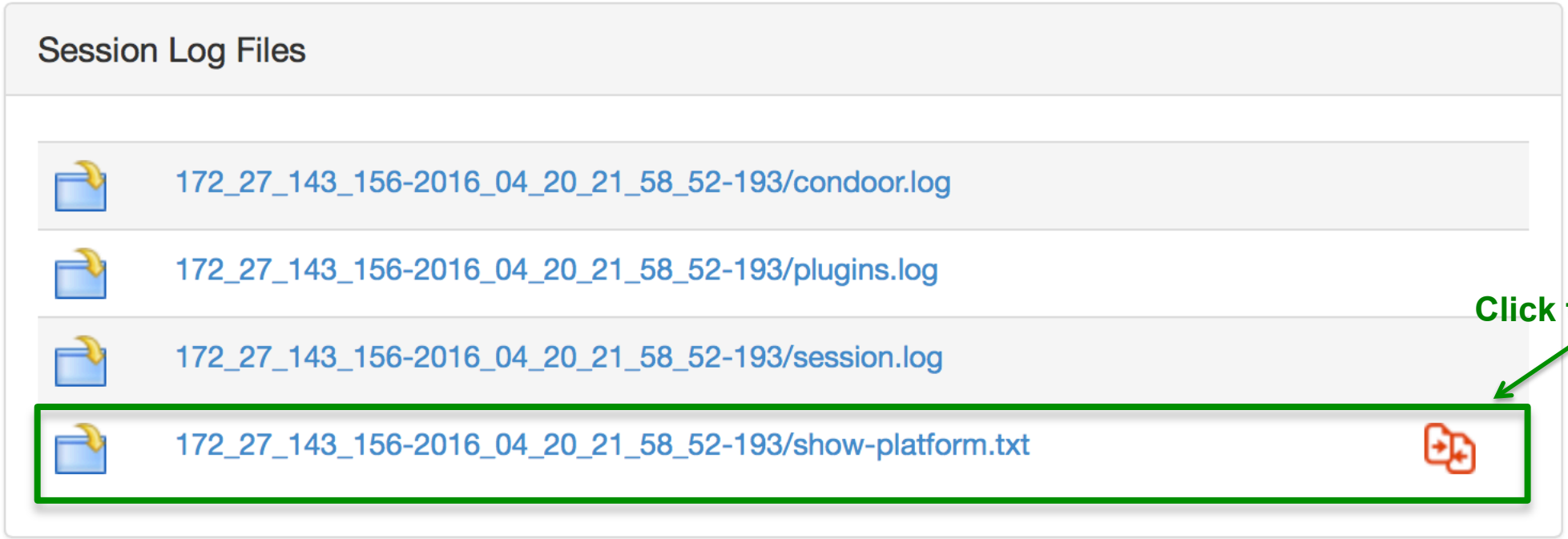
CSM manages the system migration which includes (but is not limited to) these major steps:

- Un-tars the ASR9K-X64 tar file to put image and boot files in place.
- Sets the boot mode
- Reloads the device in order to boot the ASR9K-X64 image
- Waits for all RSP/RP and supported line cards to reach their final operational state

Note that during the booting process of ASR9K-X64, the system will load the migrated admin configurations; it will also load with best effort either the (a) migrated (converted) IOS-XR configuration or (b) a user-provided (custom) IOS-XR configuration (depending on the operators selection during scheduling).

Session Logs: Migrate

- A completed Migrate action will have the logs shown below (or more if added by the operator during the scheduling phase).
- By default, “show platform” is executed after the device boots up ASR9K-X64 image. Click the red file comparison icon to compare the node status after Migrate completes with the node status during Pre-Migrate.



Walk-Through: Post-Migrate

Once the Migrate action has completed, CSM performs the following during the Post-Migrate phase:

- Ensures all RSP/RP and supported line cards are in their final operational state
- Checks FPD versions and, if needed, upgrade FPD’s and reload device

Session Logs: Post-Migrate

- A completed Post-Migrate will have at least the txt files below besides the logs. Post-Migrate executes “admin show running-config“ and “show running-config” after loading corresponding configurations. It executes “show platform” in the end. Click the red icon to compare outputs with those from Pre-Migrate.