

CISCO IOS Management - Best Practices

Best Practices Follows:

Four Life Cycle components of CISCO IOS Management:

1. Planning - Building the Cisco IOS Management Framework

This will help to understand when to upgrade software, where to upgrade, and what process will be used to test and validate potential images.

It includes below points:

a) IOS Planning:

Assessment of current practices & to development to achieve goals and project planning. The following template can be used to measure the metric:

Availability (due to S/W Issue)	Cost of S/W Upgrade	Time required for Upgrades	No. of Software Version in Production	Software Upgrade change Success/Failure rates
---------------------------------	---------------------	----------------------------	---------------------------------------	---

b) Software Version Tracking:

The software selection based on Platforms, Module or feature requirements. The following template can be used across the company wide for software track:

Track	Area	Hardware Platforms	Features	Cisco IOS Version	Certification Status
-------	------	--------------------	----------	-------------------	----------------------

c) Upgrade Cycle:

Basic quality checks to identify when to initiate a Upgrade Cycle across the Core Network. The following template can be used across for the Upgrade cycle process:

Major / Minor Feature	New Service / Hardware / Capability Support	Risk Assessment (Edge/Distribution / Core) or No. Customer Impacted	Bug Analysis	EOL Analysis	Performance Testing	Topology Testing
-----------------------	---	---	--------------	--------------	---------------------	------------------

c.1) Emergency Updates:

In some cases, organizations face the need to upgrade software due to catastrophic bugs. This can lead to problems if the organization does not have an emergency upgrade methodology. Cisco recommends an emergency upgrade process for these situations where limited testing and pilots are performed in less business critical areas of the network.

If catastrophic errors occur with no apparent workaround and the problem is software defect related, "Cisco recommends" that Cisco support be fully engaged to isolate the defect and determine if or when a fix is available. When the fix is available, "Cisco recommends" an emergency upgrade cycle to quickly determine whether the problem can be repaired with limited downtime. Supported software Team is important to understand whether CISCO still adding bug fixes to the identified software train. By maintaining Support software Team in the network, the organization reduces validation time due to the more familiar and stable code base knowledge team available.

d) Certification process:

Testing / Validation of the Software Version and atleast some pilot production use. The following template can be used for certifying process:

Software Identification	Test / Validate	Pilot	Certify
-------------------------	-----------------	-------	---------

2. Design - Selection and Validation of IOS Versions:

Having a well defined process for selecting and validating Cisco IOS versions helps an organization to reduce unplanned downtime due to unsuccessful upgrade attempts and unplanned software defects.

It includes below points:

a) IOS Selection & Validation:

Define processes for selecting, testing, and validating new Cisco IOS versions. This includes a network test lab that emulates the production network. The template defines tools that can be used for IOS Selection & Validation process; the results can be populated across the checklist:

Traffic Generators	Packet Counter / Capture / Decoder	Network Simulator / Emulator	Session Emulators	Large Scale Network Emulators	WAN Simulators
--------------------	------------------------------------	------------------------------	-------------------	-------------------------------	----------------

b) Requirement Management:

Requirement management is the identification of software version requirements and potential risks for the particular hardware and enabled feature sets.

Using CCO Tools to identify S/W	Software Maturity / New Feature / Code Support	Identify Bugs / Issues / requirements	Behavior of Image	Back-out / Roll-back Plan	Bug Collection	Cisco Support
---------------------------------	--	---------------------------------------	-------------------	---------------------------	----------------	---------------

c) Testing & Validation:

Testing and validation is a critical aspect of software management and high availability networking. Proper lab testing can significantly reduce production downtime, help to train network support staff, and assist in streamlining network implementation processes.

Feature / Functionality	Regression Testing	Device Performance Testing	Topology / Feature / Hardware Combination	Common Outage Types
-------------------------	--------------------	----------------------------	---	---------------------

Continuation of Checklist →

Network Performance	Bug Fix	SNMP Support	Interoperability	Burst-in Tests
---------------------	---------	--------------	------------------	----------------

c. 1) Testing Methodology:

Test Name	Test Configuration Requirements	Test Steps	Measurements Expected	Expected Results	Actual Results	Pass / Fail	Modifications required
-----------	---------------------------------	------------	-----------------------	------------------	----------------	-------------	------------------------

3. Implementation - Successful IOS Deployment:

Well defined implementation processes allow an organization to quickly and successfully deploy new Cisco IOS versions.

It includes below points:

a) IOS Deployments:

Perform final certification via a pilot process and rapid deployment using upgrade tools and a well defined implementation process. Some of the Pilot guidelines that can be followed are:

Success Criteria	Acceptable Pilot Locations	Pilot Documentation	Pilot Owner Expectations	User Notification Requirements	Expected Pilot Notifications
------------------	----------------------------	---------------------	--------------------------	--------------------------------	------------------------------

b) Pilot Process:

In order to minimize potential exposure and to more safely capture any remaining production issues, a software pilot is recommended. The individual pilot plan should consider pilot selection, pilot duration, and measurement. The following template can be used to TEST under Pilot Phase:

Low Impact Area	No. of Users Impact	Evaluate device feature	Burn-in Test	Software Upgrade Test	Pilot Data Collection	Problem Collection	Success / Failure Criteria
-----------------	---------------------	-------------------------	--------------	-----------------------	-----------------------	--------------------	----------------------------

c) Implementation:

After the completion of the pilot phase, the Cisco IOS implementation phase should begin. The implementation phase may include several steps to ensure software upgrade success and efficiency including upgrade preparation, upgrade automation, and final validation. The following sample Checklist will help to fully validate the successful IOS Deployment:

Did the Device properly Reload	Is the Device Pingable / Reachable via NMS	Are the expected Interface in the Device are Up & Active	Does the device have correct routing protocol Adj..	Is the Routing table populated	Is the device passing Traffic Correctly
--------------------------------	--	--	---	--------------------------------	---

4. Operations - Managing the HA with Cisco IOS Implementation:

Best practices for Cisco IOS operations include software version control, Cisco IOS Syslog management, problem management, configuration standardization, and availability management.

It includes below points:

a) IOS Operations:

The first strategy is to keep the environment as simple as possible, avoiding variation in configuration and Cisco IOS versions. The second strategy is the ability to identify and quickly resolve network faults. The third strategy is consistent improvement, the primary role to improve the quality based improvement program. The tools that can be used for quality based IOS Operations support are:

Syslog Management	Cisco Works Device Configuration Manager	Cisco Output Interpreter
-------------------	--	--------------------------

b) Software Version Control:

Monitoring the network to validate or possibly change software due to non-version compliance. The same can be obtained by publishing the Version Standards on Central Server, training the implantation staff to review what version is running & to update the version if it is non - standard compliance. When non - standard software identified, Trouble Ticket or Change Ticket to be raised across the organization to bring the same to standard version.

c) Syslog Management:

Syslog collection, monitoring, and analysis are fault management processes recommended to resolve more Cisco IOS specific network problems that are difficult or impossible to identify by other means. In larger Service Provider Networks, Scripts can be used to collect the SYSLOG Messages.

d) Problem Management:

Detailed problem management processes that define problem identification, information collection, and a well analysed solution path. This data can be used to determine root-cause. Many situations involves, trying to resolve problem quickly using combination of service impacting commands or configuration change rather spending time on problem identification, information collection, well analysed path. The problem management is the path recommended in may large scale environments. The following template can be used for Incident Troubleshooting:

Tier 1 Engg.. Hrs Escalation	Collected Show Commands Output	Tier 2 Engg.. Hrs Escalation	Problem Identification / Description	Root- Cause Discovery
---------------------------------	-----------------------------------	---------------------------------	--	-----------------------------

Continuation of Checklist →

Workaround	Lab Identification / Intervention	Bug Reporting	Validate for CISCO Intervention
------------	--------------------------------------	------------------	------------------------------------

e) Configuration Standardization:

Configuration standards represent the practice of creating and maintaining standard global configuration parameters across like devices and services resulting in Network wide global configuration consistency.

The Global Standard Configuration Template:

Service Commands	IP Commands	VTY Commands	Console Port Commands	Logging Commands	AAA Commands	SNMP Commands	Banner Commands
------------------	-------------	--------------	-----------------------	------------------	--------------	---------------	-----------------

Device Naming Convention:

Identify the Device	Device Type	Device Location (Country / State / Local Region / Office Code)
---------------------	-------------	--

Sample Protocol Standard Configuration Template:

IP Routing Config	ACL Config	ATM Config	FR Config	STP Config	VLAN Assignment / Config	VTP	HSRP
-------------------	------------	------------	-----------	------------	--------------------------	-----	------

IP Standards Template:

Subnet Size	IP Address Used	Routing Protocol Used	Routing Protocol Config
-------------	-----------------	-----------------------	-------------------------

f) Availability Management:

Availability management is the process of quality improvement using network availability as the quality improvement metric. Measurement of outage types based on the following template:

Hardware Outage	Software Outage	Link / Carrier	Power / Environment	Design	User-Error	Processes
-----------------	-----------------	----------------	---------------------	--------	------------	-----------