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1. Managing Network Changes

Managing network changes can be a challenging task for network engineers during regular maintenance, which is prone to human errors and requires seamlessly planning, implementation and verification. Based on the executable runbook automation framework, the Network Change Management feature introduces an adaptive workflow to document the best practices of the change management process and ensures a safer network change task:

- Reduce Human Error in Network Changes the Design, Implementation, and Operations teams can leverage a single map to define and validate changes. Changes can even be deployed with automation.
- Implement Changes with One Click the Design team can pre-define a configuration template which the Implementation team can execute with one click. If required, these changes can be rolled back easily.
- Validate Changes Visually the Operations team can verify whether the changes were implemented as-planned by executing a pre-defined runbook, without adverse impact.

Network Change Task Flow

The typical workflow of a Change Management task is as follows:



- 1. **Define Network Change** define network changes, such as commands and devices.
- 2. **Benchmark Before** collect network data as a baseline before implementing the change.
- 3. <u>Approve Network Change</u> approve a network change task in the NetBrain system or an external system.
- 4. **Execute Network Change** execute commands on devices.
- 5. Benchmark After collect network data after implementing the change.
- 6. <u>Compare</u> compare and validate the differences between two benchmark baselines.

1.1. Creating a Network Change Task

This section introduces how to create a network change task as well as the nodes and their functions involved in the network change task.

Tip: Before creating a network change task, ensure that you have sufficient privilege. See <u>Access Controls</u> for more details.

1. Click Network Change on the taskbar.

+	Network Change					ε×
<u> </u>	Network Change	Scheduled Tasks + New Network	Change 🛛 😨 Network Change Tem	nplates 📃 Configuration Templat	tes	
Files	3 Changes	Status	II All V Search	Q From	to To	蘭 🔶 Reset
2	Change Name	Status	Creator	Approver	Executor	Last Activity Date
Site	Security Enhancement	🧿 Planning	kang			03/16/2021 06:29 PM
8	New Network Change1	🧿 Planning	kang			03/16/2021 06:29 PM
Network	New Network Change2	Planning	kang			03/16/2021 05:31 PM
Path Runbook Template	-					

2. In the Network Change pane, click New Network Change.

Tip: The Network Change pane displays all network change tasks created in a domain.

3. In the **New Network Change** dialog, enter the task name, select a template and click **OK**. The Runbook pane opens. Then you can define the network change task node by node in the runbook.

New Network Change					
* Name:	New Network Change1				
Description:					
2 escription.					
Change Template:	Default Template V				
	Auto Create an Incident				
	Cancel OK				

Note: You can keep the **Auto Create an Incident** check box selected to associated with an incident for cross-team collaboration. See Using Incident for more details.

- Defining the Change node
- Defining the Benchmark Before node
- Defining the Execute Node
- Defining the Approval Node
- Defining the Benchmark After node
- Defining the Compare node
- Adding and Defining a Change Note Node
- 4. Click the icon to save the map. The network change task is saved in the map.

1.1.1.Defining the Change Node

The Define Change node is to define target devices and commands to execute on the target devices.

- 1. Select the **Define Change** node in the runbook.
- 2. In the **Define Change** pane, define the following settings:
 - 1) Click the \checkmark icon to select the target devices. By default, all devices on the map will be selected.

Tip: Point to a device and click the $\stackrel{\checkmark}{}$ icon to select more options.

2) Click the **Config Change** tab and enter the commands that you want to execute on the target devices.



Example: Enter the commands to encrypt a password.

```
config t
password encryption {{password}}
end
```

Tip: You can use variables to hide the sensitive data in a command, and only users with specific privileges can view the data. See <u>Using variables in a command</u> for details.

Tip: You can click **Load Template** and select a predefined configuration template. To create a new configuration template, see <u>Managing Configuration Templates</u> for details.

Note: You need to define the new variables before proceeding. Click the new variable and define it in the pop-up window.

3) Select **All Devices** and click **Append** to add the command to all devices.

Tip: To clear the applied change command to all devices, click All Devices and click Overwrite.

Tip: To cancel a specific change, click the Rollback tab and enter the rollback commands.

1.1.1.1. Using Variables in a Command

When you define commands in a **Change** node, the commands may contain some sensitive data, such as passwords and values. You can use variables in commands to protect sensitive data, and only users with specific privileges can view the data.

New Network Change1 ∨	Document	Define Change			[↑] Note (0) ×		
Select Action	Ξ	Please input description for thi	s action		4		
Start		4 Devices 🗸	4 Devices 🗸				
· · · · · · · · · · · · · · · · · · ·		Filter: All	\checkmark	All devices	Insert Variable Load Template		
Planning		All Devices	V	1 config t 2 enable password level: password123			
		BJ*POP (0)		3 Write			
	_	BJ_Acc_Sw4 (0)					
Define Change	-	<i>—</i> BJ_Acc_SW1 (0)					
		BJ_Acc_SW2 (0)					
Benchmark Before							

Follow the steps below to define variables to hide the sensitive data in a command.

- 1. At the **Define Change** node, click **Insert Variable**.
- 2. In the Insert Variable dialog, add a variable for each data that you want to protect and assign values.

1) Click Add. The Add Variable dialog opens.

Insert Variable						×
Total:0 items	+ Add			Search		٩
Variable		Add Varia	ble		×	
		Add this	; variable to t	he variable list.		
		Name:	enable_pas	sword		
		Value:	enable 123			
			Cancel	Add Variable		
				Cancel		Insert

- 2) Enter a meaningful name for the variable.
- 3) Enter the value of the variable. The value will be decrypted to form the actual commands sent to the device when the system executes the changes.
- 4) Click Add Variable.
- 5) Repeat the above steps to add more variables.
- 3. In a command, enter { { and select the corresponding variable in the pop-up drop-down list.

All dev	ices	Insert Variable
1	config t	
2	enable password level 7 {{	
3	er	able_password
	cc	on_password
	pa	ssword
	pa	issword

Tip: You can use the {{variable}} to create a new variable in a command and click the variable to edit it. The new variable will be automatically added to **Insert Variable**.

New Network Change1 V	Document	Define Change			[₁] Note (0) ★	
Select Action	≡	Please input description	for this action		2	
Start		None			Config Change Rollback	
\checkmark		Filter: All	~	All devices	Insert Variable Load Template	
Planning		All Devices	0 💌	1 config t 2 enable password level 7 ((Add Variable	×
					Add this variable to the variable	list.
Define Change					Name: password	
					Value: password123	
Benchmark Before					Cancel Add Var	riable
						in the second se

The system only shows variable names and hide specific values in the commands. Only users with the specific privileges can edit or view the variables and values.

Privilege	View Variable	Add/Delete/Edit Variable	
Create Network Change	Yes	Yes	
Approve Network Change	Yes	No	
Execute Network Change	Yes	No	
View Network Change	No	No	

1.1.2. Defining the Benchmark Before Node

The **Benchmark Before** node is used to store the live data of the involved devices before the task implementation. Additionally, the data will be used as the source for data comparison before and after executing the change management task.

- 1. Select the **Benchmark Before** node in the runbook.
- 2. In the **Benchmark Before** pane, define the following settings:
 - 1) Click the ^O icon to select the target devices for the benchmark.
 - 2) Add CLI commands by using either way:
 - Manually enter a CLI command and click Add. You can add multiple commands.
 - 3) Click select data to select data types that you want to retrieve.

1.1.3.Defining the Execute Node

The **Execute** node is used to implement one of the defined changes on devices.

Tip: The **Execute** node cannot be executed unless the change management task is approved. See <u>Defining the Approval Node</u> to submit the approval request.

1. Click the **Execute** node in the runbook.

2. In the **Execute** pane, define the following settings:

Execute	[†] Note (0) X
Please input description for this action	۷.
Execute: Define Change V	Config Change Rollback
4 Devices with Config Changes	🤹 Export CSV Report 🏒 Edit Config Change
Filter: All 🗸	,
Select All Clear All	
🔄 🥶 Bj*POP	
🖉 🥏 BJ_Acc_Sw4	
🗾 🥏 BJ_Acc_SW1	
🔄 🥏 BJ_Acc_SW2	
	Select a device of fer to view the log
4 Devices Selected Execute	③ One by One Automatically Pre-check Hostname before Execution

1) Select a change node from the drop-down list. The related devices and change commands will be loaded.

- 2) Click the ⁽²⁾ icon next to the **Execute** button at the bottom to set the execution methods:
 - One by One Automatically push change commands to a device, and then push them to the next device automatically after a brief pause.
 - In Batches Automatically push change commands to a batch of devices, and then push them to the next batch of devices automatically after a brief pause.
 - One by One Manually push change commands to a device manually, and you need to click Execute to
 push commands to the next device manually.
 - Sleep Time between all command the time interval of sending CLI commands. By default, the interval is 2 seconds.
- 3) Keep the Pre-check Hostname before Execution option. With this option selected, the system will check whether the hostnames of devices change before sending commands. The commands will not be sent to the devices with hostname change.

1.1.4. Defining the Approval Node

The **Approval** node is used to define the approval request to execute the change.

You can define two types of approval requests:

- <u>NetBrain</u> define and complete an approval workflow in the system.
- **External** integrate with an external ticket system and approve the task in the external system.

Tip: Before using this feature, ensure that you have sufficient privilege. See Access Controls for more details.

Defining a NetBrain Approval Request

- 1. Select the **Planning** node in the runbook.
- 2. In the Approval pane, select NetBrain in the Approval System field.
- 3. Click Approval Request, and adjust the following settings in the Request Approval dialog.

~	Data View	Runbook	M Intent		
New Ne	etwork Change2 🗸		Document	Approval	(1) Note (0) 🗙
Select A	Action		=	Please input description for this action	4
		Start		Approval System: O External NetBrain	
				Please submit a request for Approval. Approval Request	
		Planning	-	Request Approval	×
		+		Please select the approver you would like to send the request to.	
		Define Change		Approver: admin V	Date
		Benchmark Before		Comment:	
	\$	Execute			
		Benchmark After		Network Change: 😗 New Network Change2	_
	<u>A</u>	Compare		Cancel	Submit

1) Select an approver from the **Approver** drop-down list.

Tip: If the user you want to select is not on the list, contact your NetBrain administrator to assign the required privilege to the user.

2) In the **Comment** field, enter some comments about the approval request.

3) Click **Submit**. After the request is submitted, the designated approver will receive an email (if the email setting is configured) and system notification.



Defining an External Approval Request

- 1. Select the **Planning** node in the runbook.
- 2. In the Approval pane, select External in the Approval System field.

Note: If the External option is disabled, see Approval Settings for how to adjust the approval option.

- 3. Click **Copy** to copy and paste the runbook ID. The ID will be used to link with a ticket in an external system, thus building a connection with the **Approval** node in the external system for status synchronization.
- 4. Create a change ticket in the external system and customize two fields in the ticket to save the Change Management ID and returned NetBrain URL.
- 5. Create a business rule to define ticket and network change task status mapping and API calls in the external system. The rule mainly covers the following components:
 - How to access your domain.
 - Map ticket state and Change Management status.
 - Bind ticket ID to Change Management ID.
 - Call NetBrain API to Set Change Management Status when ticket state changes.

Example: Define Status Mapping and API Calls in ServiceNow.

```
/**
* ServiceNow Script Example, Please follow this script
*
*
/
(function executeRule(current, previous /*null when async*/) {
    var NB_API_PREFIX = 'http://your web API server address/ServicesAPI/API/V1/';
    // login to get token & logout
    var tokenEndPoint = NB_API_PREFIX + 'Session';
    var tenantDomainEndPoint = NB_API_PREFIX + 'Session/CurrentDomain';
    // credential to log into netbrain
    var credential = {
        username: 'admin',
    }
}
```

```
password: 'admin'
};
var tenantDomain = { tenantId: 'xxx', domainId: 'xxx' };
// api time out default is 10 seconds
var API TIME OUT = 10 \times 1000;
// store the netbrain api token
var nbToken = '';
// ***************
var vendor = 'ServiceNow';
var stateMapping = {
   'not requested': 0, // planning
    'requested': 1, // pending
    'approved': 2,
    'rejected': 3
};
/**
* Request the token
 * @return hasToken: bool
*/
function login() {
   var request = newRequest(tokenEndPoint, 'POST', credential);
    try {
        gs.info('send request to netbrain, get the token'); //
       var response = request.execute();
       var responseBody = response.getBody();
        var obj = new JSON.parse(responseBody);
       nbToken = obj.token;
       return nbToken.length > 0;
    } catch (ex) {
       // todo handle get token failed exception where to check this error msg
        gs.error('get netbrain token failed.');
        gs.error(ex.getMessage());
       return false;
   }
   return false;
}
/**
 * logout netbrain, remove token
* @return
 * @constructor
 */
function logout() {
   var body = {
       token: nbToken
   };
   var request = newRequest(tokenEndPoint, 'DELETE', body);
    try {
        gs.info('logout netbrain.');
        request.execute();
```

```
gs.info('logout netbrain success.');
        } catch (ex) {
           gs.error('get netbrain token failed.');
            gs.error(ex.getMessage()); // should retry?
       }
    }
   function addActivity(message) {
       current.work notes = message;
       current.update();
   }
   /**
     * Request to set tenant & domain
     * @return success: bool
    */
   function setTenantDomain() {
       var request = newRequest(tenantDomainEndPoint, 'PUT', tenantDomain);
       try {
           gs.info('set tenant & domain info.');
           var response = request.execute();
           var responseBody = response.getBody();
           var obj = new JSON.parse(responseBody);
           return true;
        } catch (ex) {
           gs.error('set tenant & domain failed.');
           gs.error(ex.getMessage()); // should retry?
           return false;
        }
       return false;
   }
    /**
     * make a http call to netbrain to bind change request id to a cm runbook id
    * @return
    */
   function apiCMBinding() {
       var ticketId = current.getValue('sys id');
       var runbookId = current.getValue('netbrain_cm_id');// this might be different for
different customer
       var ticketName = current.getValue('number'); // this might be different for different
customer
       var endPoint = NB API PREFIX + 'CM/Binding';
       var snState = current.getValue('approval');
       if (stateMapping[snState] == null) {
           gs.error('cannot find the correspond state from netbrain.');
           return;
        }
       var postData = {
           runbookId: runbookId,
           ticketId: ticketId,
           vendor: vendor,
```

```
ticketName: ticketName,
            state: stateMapping[snState]
        };
        var request = newRequest(endPoint, 'POST', postData);
        try {
            gs.info('send change management binding request.');
            var response = request.execute();
            var responseBody = response.getBody();
            var obj = new JSON.parse(responseBody);
            if (obj.statusCode == 0) {
                gs.info('change management binding to ' + runbookId + ' success.');
                addActivity('change management binding to ' + runbookId + ' success.');
            } else {
                gs.info(obj.statusDescription);
                // please change it to a proper msg, and this message is going to display on
service now page
                gs.addErrorMessage('binding Failed: ' + obj.statusDescription);
                addActivity('binding Failed: ' + obj.statusDescription);
            }
        } catch (ex) {
            gs.error('change management binding failed.');
            gs.error(ex.getMessage()); // should retry?
            gs.addErrorMessage('binding Failed: ' + ex.getMessage());
            addActivity('binding Failed: ' + ex.getMessage());
        }
    }
    /**
     * make a http call to netbrain to set cm runbook approval state
    function apiUpdateCMApprovalState() {
       var ticketId = current.getValue('sys id'); // this might be different for different
customer
       var runbookId = current.getValue('netbrain cm id');// this might be different for
different customer
        var endPoint = NB API PREFIX + 'CM/approval/state';
       var ticketName = current.getValue('number'); // this might be different for different
customer
       var snState = current.getValue('approval');
       if (stateMapping[snState] == null) {
            gs.error('cannot find the correspond state from netbrain.');
            return;
        }
        var postData = {
           runbookId: runbookId,
            ticketId: ticketId,
           vendor: vendor,
           ticketName: ticketName,
           state: stateMapping[snState]
        };
       var request = newRequest(endPoint, 'POST', postData);
        try {
            gs.info('set change management state.');
            var response = request.execute();
```

```
var responseBody = response.getBody();
           var obj = new JSON.parse(responseBody);
           if (obj.statusCode == 0) {
               var msg = 'set change management(' + runbookId + ') to state ' + snState + '
success.'
               gs.info(msg);
               addActivity(msg);
            } else {
               gs.info(obj.statusDescription);
               gs.addErrorMessage('update approval failed: ' + obj.statusDescription);
               addActivity('update approval failed: ' + obj.statusDescription);
           }
       } catch (ex) {
           gs.error('set change management state failed.');
           gs.error(ex.getMessage());
           gs.addErrorMessage('Error: ' + ex.getMessage());
           addActivity('Error: ' + ex.getMessage());
       }
   }
   function newRequest(url, method, data) {
       var request = new sn ws.RESTMessageV2();
       request.setEndpoint(url);
       request.setHttpMethod(method);
       request.setRequestBody(JSON.stringify(data));
       request.setRequestHeader('Accept', 'application/json');
       request.setRequestHeader('Content-Type', 'application/json');
       request.setRequestHeader('token', nbToken);
       request.setHttpTimeout(API TIME OUT);
       return request;
   }
   /**
    * update a value of service now
    */
   function updateColumnValue(table, primaryKey, primaryVal, targetColumn, targetVal) {
       var gr = new GlideRecord(table);
       gr.addQuery(primaryKey, primaryVal);
       gr.query();
       if (gr.next()) {
           gr.setValue(targetColumn, targetVal);
           gr.update();
       }
   }
   /**
    * make a http call to netbrain to binding change request id to a cm runbook id
    */
   function main() {
       var hasToken = login();
       if (hasToken) {
           gs.debug('login success.');
           if (setTenantDomain()) {
               // business logic
```

```
apiCMBinding();
apiUpdateCMApprovalState();
}
logout();
} else {
gs.info('login failed, quit now...');
}
}
main(); // run
})(current, previous);
```

Approval Settings

- 1. Log in to the Domain Management page.
- In the Domain Management page, click Operations > Domain Settings > Change Management Settings from the quick access toolbar.
- 3. On the Change Management Settings tab, enable the approval method you want to use.



4. Click Submit.

1.1.5. Defining the Benchmark After Node

The **Benchmark After** node is used to collect network data after the change is implemented, thus verify if the change has been deployed successfully. Additionally, the benchmark results will be used to compare with the data collected in the **Benchmark Before** node.

- 1. Select the **Benchmark After** node in the runbook.
- 2. In the Benchmark After pane, define the following settings:
 - 1) Click the [•] icon to select the target devices for the benchmark.
 - 2) Add CLI commands by using either way:

- Manually enter a CLI command and click Add. You can add multiple commands.
- 3) Click **select data** to select data types that you want to retrieve.

1.1.6.Defining the Compare Node

The **Compare** node is used to compare the data between <u>Benchmark before</u> and <u>Benchmark after</u> to verify the changes.

When you define or edit a **Compare** node, no settings are required. Select the data source for comparison when you <u>execute the Compare node</u>.

1.1.7. Adding and Defining a Note Node

The **Other Change** node provides note function to remind the change executor to do some operations, such as discovering new devices to the domain, removing devices from the domain and updating modules beyond the change management task.



1. Point to the **Define Change** node and click the 😌 icon.

2. In the Select Action dialog, select Other Change on the Network Change tab.

3. Enter the descriptions in the **Description** field.



Tip: You can mark the **Other Change** node as **Completed** when it is approved. Then it will be locked and cannot be edited anymore.

1.2. Approving a Network Change Task

When a network change task is created, it needs to be approved before the implementation. Select to approve a network change task based on the way that the task creator submits the approval request:

- Approving a Network Change in NetBrain System
- Approving a Network Change in an External System

Approving a Network Change in NetBrain System

If a task creator selects the way to approve in the system, the designated approver will receive an email and system notification after the approval request is submitted.

Example: Approve an SNMP Security Check Change Request.



1. Click the **Security Enhancement** hyperlink in the notification list.

- 2. In the **Runbook** pane, click the **Pending** node.
- 3. In the **Approval** pane, click **Approve**.
- 4. In the pop-up dialog, enter the username and password of the approver account, and click **Approve**.

Approve		×						
Please enter your username and password to approve the Network Changes.								
Username:	Darren							
Password:								
Comment:	The task is approved. Now it can be executed.							
	Cancel	Approve						

5. Click **Yes** to confirm the approval in the **Confirmation** dialog.

The creator who submits the request will receive an email and system notification about the approval status change.

Approving a Network Change in an External System

After a ticket is created and associated with the network change task in an external system, the change task status will be triggered to synchronize when you change the ticket status.

Welcome: chriszhao 🔏									Logo	nut 🔯
😭 (Filter) 💿	1		je Request - CHG	0030023	Ø	Ø 🕐 י	へ I () Update C	opy Chang	e Delete	$\uparrow \downarrow$
☆ Watched Requested Items		Number	CHG0030023			Approval	Requested	•		-
☆ My Profile		Requested by	chris zhao	Q	0	Туре	Not Yet Requested			- 1
☆ My Tags ☆ My Knowledge Articles		Category	Other	•		State	Requested			- 1
습 Take Survey 습 My Approvals		Configuration item		Q		Conflict status	Approved			- 1
☆ My Assessments & Surveys		Priority	4 - Low	•		Assignment	Rejected			
☆ My Assets		Risk	Moderate	•		group		~		
My Notification Preferences Event Management		Impact	3 - Low	•		Assigned to		Q		
Multi-Provider SSO	s	hort description							0	
Service Desk		Description								

Example: A ticket state associated with the network change status in ServiceNow.

For how to integrate a change management task with an external ticket system for approval, see <u>Defining an External</u> <u>Request</u> for details.

1.3. Executing a Network Change Task

After a network change task is approved, users with the required privileges can execute the network change task ondemand or on a schedule.

- Executing a Network Change Task on Demand
- Executing a Network Change Task on Schedule

1.3.1.Executing a Network Change Task on Demand

This section introduces how to manually execute a network change task based on the following typical flow:

- 1. Execute Benchmark Before Change collect the live data of the involved devices before the network change.
- 2. Implement Change implement network changes.
- 3. <u>Execute Benchmark After Change</u> collect the live data of the involved devices after the network change.
- 4. <u>Compare Before and After</u> compare the differences before and after the network change.

1.3.1.1. Executing Benchmark Before Network Change

To minimize the risk of implementing a network change, it is recommended to execute a benchmark task to back up the live data of the involved devices before the change. Additionally, the data will be used as the source for comparison and validation.

- 1. Click the Benchmark Before node in the runbook.
- 2. In the **Benchmark Before** pane, click the [•] icon to customize devices and define data type respectively if necessary. The predefined devices, CLI commands, and data types will be used by default.
- 3. Click Run to benchmark data. Click Yes to save the map when the Confirmation dialog prompts.

Tip: If you select the Auto update all selected data in Current Baseline, the configuration files stored in the Current Baseline will be overwritten with the latest retrieved data.

- 4. Click the **Results** tab and select a device to view its results.
- 5. Click the **Execution Log** tab and select a device to view its logs.

1.3.1.2. Implementing Network Change

Before implementing the change, it is recommended to make the following preparations:

- Set access credentials to log in to devices. See Managing Network Change Credentials for details.
- Tune devices to check their reachability.
 - Tune Shared CLI Settings: click the Define Change node > drop-down list of All Devices > Tune Shared CLI Settings.
 - Tune Private CLI Settings: click the Define Change node > drop-down list of All Devices > Tune Private CLI Settings.

Proceed to the following steps to implement a network change task.

- 1. Click the **Execute** node in the runbook.
- 2. In the **Execute** pane, click the ³ icon to define the execution options.
 - One by One Automatically push change commands to a device, and then push them to the next device automatically after a brief pause.
 - **In Batches Automatically** push change commands to a batch of devices, and then push them to the next batch of devices automatically after a brief pause.
 - One by One Manually push change commands to a device manually, and you need to click Execute to push commands to the next device manually.
 - **Sleep Time between all commands** the time interval of sending CLI commands. By default, the interval is 2 seconds.
- 3. Check the Pre-check Hostname before Execution option.

This option checks whether the target devices that you will push commands to are still the same as planned before sending change commands to devices. If a device hostname changed or retrieving hostname failed, skip the device to push commands.

4. Click Execute. Read the notices and click OK when the WARNING dialog prompts.

All Rupbooks > New Network Change1	Execute			[_↑] Note (0) ×	
An Randooks - Rev Retwork enanger	Please input description for this action				
Select Action ∨ G 🖸 Ξ	Executed 1 out of 4 Devices	Config Change Rollback			
Start	📰 All 4 🛛 🕑 Commands Ser	🕜 Edit Config Change			
· · · · ·	Filter: All	\sim	────────────────────────────────────		
Approved	Select All Clear All		Login to device and send commands		
	BJ*POP	9	show version		
Define Change 🔒	📄 🍘 BJ-R1	0	Login to device and pre-check hostname Pre-check hostname: Successful Retrieved hostname "BJ*POP" matched		
	🔲 🍘 BJ-R2	0	Login to device and send commands Telnet to device 172.24.31.195 via Front Server (AUT(DSVR209)	
Benchmark Before	📃 🍘 BJ-R3	0			
			User Access Verification		
\sim			Username: nb		
Execute			BJ*POP>		
			BJ*POP>enable Password:		
Ţ			BJ*POP#enable		
Benchmark After			BJ=POV#HEEMINAL LENGTN 0 BJ=POP#show version Cisco IOS Software, 2800 Software (C2800NM-ADVIPSERV)	ICESK9-M), Version 12.3(11)T3	

- To roll back the config change, select the **Rollback** tab and then click **Execute** to execute the rollback config.
- If you select **One by One Manually** in step 2, click **Continue** to execute the change on the next device.
- When the execution of a device is done, an execution status icon will be displayed on the device. The following table describes the execution status in detail:

Execution status	Description
Commands Sent	All commands have been sent to devices.
Incomplete	Parts of commands have been sent to devices.
Pre-Check Failed	Failed to retrieve device hostname.
Login Failed	The system fails to remotely connect to the device using Telnet and SSH.
Invalid	Failed to execute the command successfully because the command is invalid.

1.3.1.3. Executing Benchmark After Network Change

To validate the network change, it is recommended to collect the network data after the network change and use the data for further comparison.

- 1. Click the **Benchmark After** node.
- 2. In the **Benchmark After** pane, click the [•] icon to customize devices and define data type respectively if necessary. The predefined devices, CLI commands, and data types are used by default.

3. Click Run to benchmark data.

Tip: If you select the **Auto update all selected data in Current Baseline** check box, the configuration files stored in the **Current Baseline** will be overwritten with the retrieved data.

- 4. Click the **Results** tab and select a device to view its results.
- 5. Click the **Execution Log** tab and select a device to view its logs.

1.3.1.4. Comparing After and Before

To verify whether the network changes go as expected, you can use the **Compare** node to validate the network differences after and before the network change.

- 1. Click the **Compare** node in the runbook.
- 2. In the **Compare** pane, click the icon to select the target devices. By default, all devices on the map page are selected.
- 3. Select the results of Benchmark After and Benchmark Before respectively in the Dataset1 and Dataset2 fields.
- 4. Click Compare.

1.3.2. Executing a Network Change Task on Schedule

You can set a scheduled time point for a change management task. The task will be executed automatically and sequentially when the predefined time point reaches.

Note: Some nodes in a change management task cannot be executed automatically, including Define Change node, Config Change node, Other Change node, Free Text node, Path node, Compare node, Data View Template node, and Verify Application node.

- 1. Open the target change management task, and click the = icon to select **Schedule**.
- 2. In the **Schedule** dialog, select the time point to execute the change:
 - **Execution Time** the time to start the task.
 - **Do not Execute After** the time to drop the task if it does not start before the time.

3. Click Save.

New Network Change1 🗸 👔 Docu	ment Benchmark Before		Schedule		
Select Action 🗸					
	Save as Network Change		Network Change:	🛃 New Network Change1	
Start	Share Network Change		Execution time:	05/21/2018 10:37 AM	
Ţ.	Duplicate				
C Approved	Delete	1	Do Not Execute After:	05/22/2018 3:37 AM	
	Schedule			There might be a system delay due to the backlog of tasks.	
	Archive Change			In the event of a system delay, please enter the time you	
Define Change	Export to Word			want to abort the execution.	
	Copy Runbook URL				
Benchmark Before	Refresh Runbook		Note: This Network Change	e will be locked after it is scheduled. Cancel Save	
	View >				

If you are managing network change tasks in a third-party system, you can also execute a network change task on schedule via REST APIs.

ΑΡΙ	Description
Schedule a Change Management Task	Call this API to schedule a network change task.
Get a Scheduled CM Task	Call this API to get the information of a scheduled network change task.
Update a Scheduled CM Task	Call this API to update a scheduled network change task.
Delete a Scheduled CM Task	Call this API to delete a scheduled network change task in the "Waiting" status.

Note: A network change task can only be scheduled to run after being approved.

1.4. Exporting a Network Change Task to Word

You can document a network change task, including definition, device data and results of a node, to MS Word.

1. Open the target change management task, click the ⁼ icon and select **Export to Word** from the drop-down menu.

CMM V	Document Define Change	
Select Action ∨	.= .	Export to Word
C Approved	Save as Network Change Share Network Change Duplicate Delete Schedule	V Document Name: CMM_20200103_093932 AM V Location: Private
Benchmark Before	Archive Change Export to Word 2 Copy Runbook URL	Select Result:
Execute	Refresh Runbook View >	Image Image Image Image
		✓ Result 2 31/12/2019 02:12:31 PM □ Result 1 31/12/2019 02:09:30 PM
Uther Change		 ■ & Execute ✓ Image Other Change
Compare	2	Compare
Ansible Task		Result 1 31/12/2019 02:14:16 PM
CLI Execute CLI Comma	ands 2	Advanced Settings Cancel Export

- 2. In the Export to Word dialog, define the export settings:
 - 1) Modify the document name if necessary.
 - 2) Specify the location to save the document.
 - 3) Select the nodes and results that you want to export.
- 3. Click Export.

1.5. Archiving a Network Change Task

When a change task is completed, you can archive it. Once archived, a change task cannot be edited anymore. But you can still open and view historical results of it.

1. Open the target change management task, click the [■] icon and select **Archive Change** from the drop-down menu.

2. In the **Archive** dialog, click **Archive**.

SNMP Change V	ocument	
Select Action ∨		Archive
Start Approval	Save as Network Change Share Network Change Duplicate Delete Schedule Archive Change Export to Word Copy Runbook URL Refresh Runbook	Archiving will lock all functions in this Runbook. Are you sure you want to proceed? You can make changes by creating a copy of this Runbook. Cancel Archive
Config Change	View >	

1.6. Sharing a Network Change Task

You can share a network change task via the following steps:

1. In a network change task, click the [≡] icon and select **Share Network Change** from the drop-down menu.



2. In the **Share Runbook** dialog, specify the users that you want to share the runbook with.

Share	Runbook	×
To:	a	ţÌ
CC:	w <mark>a</mark> ngh <mark>a</mark> oqi	î și
Subj	hu <mark>a</mark> n.c <mark>a</mark> o@netbr <mark>a</mark> intec	
Тур	shiy <mark>a</mark> ng	
	y <mark>a</mark> n.c <mark>a</mark> o@netbr <mark>a</mark> intech	
	y <mark>a</mark> ngd <mark>a</mark> n	•
Сор	y Runbook Link to Clipboard	
htt	ps://10.10.34.84/map.html?t=61eec5c6-06a4-454a-a715-a60e534953f6&d+	=7fa9¢
4		•
	Cancel Shar	e

1) Enter a username and then select the matched user account from the populated drop-down list, or directly enter an email address.

Note: To complete an email address, you can enter a comma, semicolon, or press the Enter key, Tab key, or Space key.

Note: Users in the **To** field will receive both a system notification and an email; users in the **CC** field will only receive an email.

- 2) The subject is auto-populated. Modify it based on your needs.
- 3) Type a message if required.
- 3. Click Share.

1.7. Network Change Templates

You can save frequently used network changes tasks as templates so that you can quickly create other network change tasks based on the predefined templates.

To browse network change templates in your domain:

- 1. Click Network Change in the taskbar.
- 2. In the Network Change Manager, click **Network Change Templates**. The system provides the following three categories of change templates:

- Built-in Templates contain the pre-installed change templates. This category is accessible to all users but can only be modified by system and tenant administrators.
- Shared Templates contain the change templates that are accessible to all users in this domain.
- My Templates contain the change templates that are only accessible to yourself in this domain.
- 3. To quickly find your interested change template, use the one or a combination of the following filters:
 - **Device Types** filter network change templates by specified device type (only if it has been defined in the **Start** node of a network change template).
 - Authors filter network change templates by specified author name.
 - **Tags** filter network change templates by specified tag (only if it has been defined in the **Start** node of a network change template).

OSPF Config ∨	Network Change S	ummary				
Select Action V G	3	zhanghong				
Last Modified: 2018-02-23 11:00 AM						
Approval	Device Type:	3Com Switch	~			
\square	Tags:	OSPF	→ + Add Tag			

Creating a Network Change Template

- 1. Create a network change task.



3. Click Save, select a location in the pop-up dialog, enter a name and click OK.

w Network Change1		Document	Runbook Document		_
	Start		Save As Network Change Template	×	
			Built-in Templates		
			Shared Templates		
	A Pending		My Templates		
					0 1:05 PN
[Define Change				
(*				
	Benchmark Before				
	Execute	0			
	Benchmark After	0	Name: New Template		
G	L +			Cancel OK	
<u> </u>	Compare				
			No description is defined.	-	
	<u>.</u>				
	•		E Benchmark After		
			Description		-
					_
				Cancel	Save

1.8. Managing Configuration Templates

To reuse configurations for network change tasks in the future, you can pre-define it as a config template. When <u>Defining the Change Node</u>, you can directly load a config template instead of writing commands manually.

Proceed with the following steps to create a configuration template:

- 1. Click **Network Change** on the taskbar.
- 2. In the Network Change pane, click **Configuration Templates**.
- 3. In the **Manage Configuration Templates** pane, point to a folder and click the drop-down menu to select **New Template**.

4. In the **Configuration Template Properties** dialog, enter the template name and commands.

Configuration Templ	ate Properties	×
* Template Name:	SNMP Change	
* Commands:	1 config t 2 snmp-server community nb 3 snmp-server community IE	
Description:		
	Cancel Save	

5. Click **Save** to complete the configuration template.

1.9. Managing Network Change Credentials

When users execute a change management task, the task will call and use the predefined credentials to access devices and issue relevant commands. Based on all possible credential policies, the system offers multiple access modes and you can select a proper one according to your network credential mechanism.

To set the credential mode for network change management:

- 1. Log in to the Domain Management page.
- In the Domain Management page, click Operations > Domain Settings > Advanced Settings from the quick access toolbar.
- 3. On the Advanced Settings tab, select an access credential mode:
 - Use Private Credentials and shared Privilege Credentials use credentials defined in the Private CLI Settings to log in to devices and then use privilege credentials defined in the Shared Device Settings to enter the privileged mode. It is the default access credential mode.
 - Use Private Credential and Private Privilege Credential use credentials in the Private CLI Settings to log in to devices and then use privilege credentials defined in the Private Device Settings to enter the privileged mode.

 Use Shared Credentials and Shared Privilege Credentials — use credentials defined in the Shared Device Settings to log in to devices and then use privilege credentials defined in the Shared Device Settings to enter the privileged mode.

Note: Credentials in the Private CLI Settings are only available to the user account that creates these credentials. While credentials in the Shared Device Settings are available to all users who can access the domain.

1.10. Access Controls

The Change Management is an add-on feature that is only available on request. Contact <u>NetBrain Support Team</u> for further assistance.

Network Change Privileges

To ensure network security, only authorized users with the following privileges can create, approve or execute a network change task:

- **Create Network Change** users with this privilege can create and edit a network change task. Domain admins and power users have this privilege by default.
- **Approve Network Change** users with this privilege can approve a network change task. Domain admins and power users have this privilege by default.
- **Execute Network Change** users with this privilege can execute a network change task. Domain admins and power users have this privilege by default.
- **View Network Change** users with this privilege can open and view network change tasks in a domain, but cannot edit them. Domain admins and power users have this privilege by default.

Assigning Network Change Privileges to a Specific User

To assign privileges of change management to specific users, complete the following steps:

- 1. Log in to the Domain Management page.
- 2. In the Domain Management page, click **Operations** > **Share Policy** from the quick access toolbar.
- 3. On the **Share Policy** tab, select a user in the left pane and check the **Network Change Creator/Executor/Approver** option based on your needs.

4. Click Apply.

Start Page Share Policy × Assign privileges for the users in this domain, and multi-select users to batch set. Search User... Q S Refresh 31 users with Domain Access Tenant Admin • Authentication Type • User Group • Username • Domain Access System Admin Engineer Guest ▲ Local (32) Network Change Creator Network Change Executor . Local Group (32) ~ ~ ~ Network Change Approver admin aileen ~ Privileges carmen.g ~ ~ ~ * Domain Management ~ ~ ~ chendezhi