



# Contents

1.	Sur	nmary	/	5
2.	Nev	w Feat	ures and Feature Enhancements	6
2	.1.	New	Event-driven Automation Framework	6
	2.1	.1.	Configure Third-party System to Send Events to NetBrain via APIs	7
	2.1	.2.	Define Event Templates to Process Events	9
	2.1	.3.	View Results in System Automation Manager	12
2	.2.	Searc	ch Engine Extension	13
	2.2	.1.	Search for Network Context Map	14
	2.2	.2.	Search for One-IP Table	14
	2.2	.3.	Search for A/B Paths across a Specific Hop	15
	2.2	.4.	Search for Event	15
	2.2	.5.	Search for ACI Endpoint Table	16
2	.3.	New	Multicast Reverse Path Calculation	16
	2.3	.1.	Calculate Multicast Reverse Path	16
	2.3	.2.	View Path Legend on Map	17
	2.3	.3.	Gateway for Multicast Reverse Path	18
2	.4.	Docu	iment Network Change and Runbook Automation in Word	18
2	.5.	Enha	ncements to Reference Flow	20
	2.5	.1.	New Indicators for Golden Baseline Alerts on Map	20
	2.5	.2.	Message Golden Baseline Alerts to More Users	22
	2.5	.3.	Enable Golden Baseline Dynamic Calculation for Parser Variable	27
	2.5	.4.	Schedule Data View Template Task on an Hourly Basis	27
	2.5	.5.	Custom Column to Show SPOG URL in DVT	28
2	.6.	New	Domain Health Report	28
2	.7.	Мар	Enhancements	32
	2.7	.1.	Map One-IP Table Entries with Drag-and-Drop	32

2.7.2	2. Narrow Down Auto-link Scope and Count	33
2.7.3	3. Custom Node Icons	33
2.7.4	4. Free Text for Network Design/Troubleshooting Annotation	
2.7.5	5. Copy, Cut and Paste Stencil Icons and Shapes	
2.7.6	5. Enriched Map Operation Menu	
2.8.	Site Enhancements	35
2.8.1	1. Exclude Specified Device Types from Site Assignment	
2.8.2	2. Allow Hiding Neighbor Sites from a Site Map	
2.8.3	3. Allow User Input for Site Type	
2.8.4	4. Move Site Name Underneath Site Icon to Show Full Site Name	
2.9.	Enhancements to Domain Maintenance	
2.9.1	1. Categorize Unknown IP by Reason	
2.9.2	2. Show Data Table Retrieval Success Rate in Benchmark Report	
2.9.3	3. Enhanced Discovery/Benchmark Execution Log	
2.9.4	4. Enhanced Benchmark Device Log	40
2.10.	Enhancements to Service Monitor	40
2.10	.1. Schedule Service Auto-Restart for Front Server (Controller)	40
2.10	.2. Alert for Stopped Services	41
2.10	.3. Log Analysis for System Health	41
2.11.	Enhancements to Change Management	
2.11	.1. Use Variables in Config-let	42
2.11	.2. Schedule Change Management Task via REST APIs	44
2.12.	More Feature Enhancements	44
2.12	.1. Enhancements to API-Triggered Automation	
2.12	.2. Support the Display of Multiple Device Data Dialogues Concurrently	
2.12	.3. Enhanced Device Data Comparison Flow	47
3. Platf	form Enhancements	
3.1.	Enhanced Platform Framework	
3.1.1	1. New Multi-CLI Mode Support	
		40

	3.1.	3.	New APIs for Plugin/Qapp	50			
3	.2.	Exter	nsion Based on Enhanced Platform Framework	50			
	3.2.	1.	QoS Path Support	50			
	3.2.	2.	Cisco Wireless L2 Path Support	52			
	3.2.	3.	Hostname Change Support to VDC Devices	53			
3	.3.	Path	Framework Enhancements	53			
	3.3.	1.	Enhanced Path Debuggability	53			
	3.3.	2.	Enhanced Path Calculation for Unknow End Systems	55			
	3.3.	3.	Pin the Path Result Pane	56			
3	.4.	Fully	Extensible MPLS Cloud Framework	56			
	3.4.	1.	Add Cloud Type	57			
	3.4.	2.	Define Specific Clouds for a Cloud Type	58			
	3.4.	3.	Build Cloud Topology and NCT Data for Path Calculation	59			
	3.4.	4.	Calculate Path Across a Cloud	60			
3	.5.	L2 To	pology Improvements	60			
	3.5.	1.	Auto Clean Unknown End Systems	60			
	3.5.	2.	Enhanced L2 Topology of SDN Nodes	61			
3	.6.	New	REST APIs	63			
4.	Sec	urity E	Enhancements	64			
4	.1.	Limit	Guest User's Privilege	64			
4.2. Upgrade Third-Party Components to the Latest Version				64			
4.3. Validate Data Access Privilege for Extended Device Scope				65			
4.4. Single Source for Website Base URL							
4	.5.	Othe	r Enhancements	66			
5.	5. Performance Enhancements						
6.	Kno	۲nown Issues					

## 1. Summary

NetBrain Integrated Edition 8.02 (IEv8.02) is a minor release that introduces many feature enhancements and bug fixes.

- Enhanced Reference Flow and Functionalities:
  - <u>Event-driven Automation Framework</u> to Proactively Integrate with 3<sup>rd</sup>-party Systems.
  - <u>Enhanced Search Capability</u> to Search for 5 New Objects: Network Context, Path, Event, One-IP
     Table, ACI Endpoint Table.
  - o Calculate a Multicast Path from a Receiver to a Source
  - o Document Network Change and Runbook Automation Word
  - <u>5 Enhancements to Reference Flow</u>, such as New Hints for Golden Baseline Alerts, Messaging Golden Baseline Alerts, etc.
  - o <u>New Domain Health Report</u>
  - <u>6 Map Enhancements</u>, such as Mapping One-IP Table Entry with Drag-and-Drop, Narrowing Down Auto-link Scope and Count, Custom Node Icons, Free Test for Network Design/Troubleshooting Annotation, etc.
  - <u>4 Site Enhancements</u>, such as Excluding Specified Device Types from Site Assignment, Allowing Hiding Neighbor Sites from a Site Map, etc.
  - o <u>4 Enhancements to Domain Maintenance</u>
  - <u>3 Enhancements to Service Monitor</u>, such as Scheduling Auto-Restart for Front Server (Controller),
     Alerting for Stopped Services, Log Analysis for System Health, etc.
  - <u>2 Enhancements to Change Management</u>, such as Scheduling a Network Change, Using Variables to Protect Data Security.
  - o <u>3 More Feature Enhancements</u>
- Platform Enhancements
  - <u>3 Enhancements to Platform Framework</u>, such as Multi-CLI Mode support, Configuration Retrieval for SDN Nodes via TechSpec, New APIs for Plugin/Qapp.
  - <u>3 Extensions Based on Enhanced Platform Framework</u>, such as QoS Path Support, Cisco Wireless
     L2 Path Support, Hostname Change Support to VDC Devices.
  - o <u>3 Enhancements to Path Framework</u>, such as Enhanced Path Debuggability, etc.
  - Fully Extensible MPLS Cloud Framework
  - <u>2 Enhancements to L2 Topology</u>, such as Enhanced L2 Topology for SDN, etc.
  - o <u>8 New REST APIs</u>
- 9 Security Enhancements and Performance Enhancements

# 2. New Features and Feature Enhancements

#### 2.1. New Event-driven Automation Framework

Event-driven Automation is a new feature in v8.02, integrating with 3<sup>rd</sup>-party systems by processing triggered events, mapping problem areas, and executing runbooks based on predefined event conditions. With this capability, users only need to define general event templates in the NetBrain system, and they will process event analysis when receiving the 3<sup>rd</sup>-party event.

Event-driven Automation brings benefits as follows:

- It eases the burden for power users and 3<sup>rd</sup>-party system admin. They do not have to write lots of scripts in a 3<sup>rd</sup>-party system to call NetBrain maps or runbooks event by event. Instead, they only need to enable the 3<sup>rd</sup>-party system to send events to their NetBrain system directly and track event status by using REST APIs.
- It only has a minimal requirement of script supportability for a 3<sup>rd</sup>-party system. A system that can call REST APIs to send event data to NetBrain is ready to use NetBrain's automation capabilities.
- It improves the NetBrain system capability to process a large number of events by transferring task execution from Web API Server to Worker Server. It also enables horizontal scalability to improve event processing capacity.



Figure: Event-driven Automation Data Flow

#### **Use Flow**

Configure Third-party System to Send Events to NetBrain via APIs

Define Event Templates to Process Events Match event templates and conditions to create map and execute runbook

View Results

#### 2.1.1.Configure Third-party System to Send Events to NetBrain via APIs

The system provides two REST APIs to send events from a 3<sup>rd</sup>-party system to NetBrain and track its status.

- Drive Events used to send all events generated in a 3<sup>rd</sup>-party system to a NetBrain domain.
- Track Event Status used to get the execution status of an event.

Example: Define business rule in ServiceNow to send events to NetBrain IE.

```
import requests
import json
import time
import requests.packages.urllib3 as urllib3
urllib3.disable warnings()
# Need to install requests package for python
# pip install requests
user = "admin"
                                              # account to log in to your NetBrain Domain
pwd = "admin"
                                             # password
host url = "http://10.10.0.29"
                                              # The URL of your NetBrain Domain
headers = {'Content-Type': 'application/json', 'Accept': 'application/json'}
headers1 = {'Content-Type': 'application/json', 'Accept': 'application/json'}
1.1.1
Get token for netbrain
1 1 1
TENANT = 'Initial Tenant'
DOMAIN = 'domain1'
def getTokens(user,password):
   login_api_url = r"/ServicesAPI/API/V1/Session"
   Login url = host url + login api url
   data = \{
        "username": user,
        "password": password
    }
    token = requests.post(Login url, data=json.dumps(
       data), headers=headers, verify=False)
    if token.status code == 200:
        print(token.json())
        return token.json()["token"]
    else:
       return "error"
# get token
token = getTokens(user,pwd)
headers["Token"] = token
```

```
def get tenant domain id():
   tenant id url = '/ServicesAPI/API/V1/CMDB/Tenants'
   full url = host url + tenant id url
   data = requests.get(full url,headers=headers,verify=False)
    # tenant id = '78a825ef-24bd-729d-f56f-a1ad2b79f2ff'
    # domain id = '36700aff-c585-4f23-95eb-8ea00214b778'
   print(data.json())
   if data.status code == 200:
        for tenant in data.json()['tenants']:
            if TENANT == tenant['tenantName']:
                tenant id = tenant['tenantId']
        if tenant id:
            domain id url = '/ServicesAPI/API/V1/CMDB/Domains'
            full domain url = host url +domain id url
            domain data =
requests.get(full domain url,params={'tenantId':tenant id},headers=headers,verify=False)
            print(domain data.json())
            if domain_data.status_code == 200:
                for domain in domain data.json()['domains']:
                    if DOMAIN == domain['domainName']:
                        domain id = domain['domainId']
       return tenant id, domain id
   else:
       return tenant id, domain id
tenant_id, domain_id = get_tenant_domain_id()
print(tenant id, domain id)
headers["TenantGuid"] = tenant id
headers["DomainGuid"] = domain id
def Logout():
   logout url = "/ServicesAPI/API/V1/Session"
   time.sleep(2)
   full url = host url + logout url
   body = \{
       "token": token
        }
   result = requests.delete(full url, data=json.dumps(body), headers=headers, verify=False)
   print('Logout: ' + str(result.json()))
   if result.status_code == 200:
       print("LogOut success...")
   else:
       data = "errorCode" + "LogOut API test failed... "
       return result.json()
# Trigger API function
def PublishEvent(Event Data):
   # Trigger API url
   API URL = r"/ServicesAPI/API/V1/CMDB/EventDriven/Events"
   # Trigger API payload
   print (headers)
   api_full_url = host_url + API_URL
   print('api full url: ' + api full url)
   api result = requests.post(api full url, data=json.dumps(Event Data), headers=headers,
verify=False)
   if api result.status code == 200:
```

```
return api_result.json()
   else:
       return api_result.json()
if name ==" main ":
    #tenant id,domain_id = get_tenant_domain_id()
   #print(tenant_id, domain_id)
    # tenant id = '0b7eb490-d9cf-aacc-672c-ff9d58a47032'
    # domain id = '53e4b108-086e-4b6f-95b8-ee23bd7d142a'
    Event Data = {
        "parent": "",
        "u path_analysis_set": "",
        "made sla": "true",
        "cause by": "",
        "watch list": "",
        "u_nb_task": "",
        "upon_reject": "cancel",
        "sys updated on": "2019-06-27 15:54:14",
        "child incidents": "0",
        "approval history": "",
        "skills": "",
        "number": "INC0011879",
        "u destination port": "1234",
        "u_source_ip_new": "1.1.1.1",
        "resolved by": "chris.zhao",
        "opened by": {
            "link": "https://ven01749.service-now.com/api/now/table/sys_user/22121da321adf",
            "value": "232s9i2asko92asdf232322d098s"
        },
        "user_input": "",
        "state": "2",
        "knowledge": "false",
        "active": "true"
   }
print(PublishEvent(Event Data))
```

#### 2.1.2.Define Event Templates to Process Events

An event template is a custom executor in the NetBrain system to process events from a specified 3<sup>rd</sup>-party system. After NetBrain receives an event, it will check the qualification defined in each event template and use the qualified event template to decide whether to map and execute a runbook for the event based on conditions.

An event template is defined through python scripts and contains the following functions:

- Define Qualification define the criteria that an event template can be applied to an event. There are two methods to define a qualification:
  - Regular expression

"type":.\*?servicenow.\*?

• Def qualify

```
def qualify(raw_event):
    raw_event_json = nbjson.loads(raw_event)
    if "number" in raw_event_json and "INC" in
    raw_event_json["number"]:
        return True
    else:
        return False
```

Define Condition and Automation (def translate) – used to translate an event to a NetBrain task and

define conditions and corresponding drill-down actions. The actions include:

o Parse the values of variables required for map and runbook automation.

```
map_setting = mapSettingHelper.build_device_map_setting("device_name", True,
"L3_Topo_Type")
```

• Define the conditions for automation.

```
if True:
    mapSettingHelper = MapSetting()
    map_setting = mapSettingHelper.build_site_map_setting("device_name", False)
    Pass
```

o Define the input values required to draw a map or execute a runbook, and variable mapping.

```
# node name: 2. Retrieving the CLI commands of Failover, type: Execute CLI Commands
Node
rb_node = rbt.get_rbt_node("632653e6-4676-4f94-927f-86a6318f71e5")
cli_command_node = CLISetting(rb_node)
#cli_command_node.set_cli_commands(["show failover","show monitor-interface","show
failover interface"])
rbt.update(cli_command_node.value())
```

**Example:** Define an event template for events from ServiceNow.

Event Template					×
Template Name: ServiceNow-EVT01		Description:	event template for service now		Sample Script
Qualification: \"state\":.*?2.*?,					
<pre>Source is a set of the set o</pre>	1 ii 2 f 3 f 4 f 6 f 7 f 8 f 9 f 10 f 11 f 12 f 13 f 11 f 12 f 13 f 12 f 12 f 12 f 12 f 13 f 12 f 13 f 12 f 13 f 12 f 12 f 13 f 12 f 13 f 12 f 13 f 12 f 13 f 12 f 13 f 12 f 13 f 1	<pre>mport json room netbrain.utils import nbjs room netbrain.sysapi import dat room netbrain.event.qapp import om netbrain.event.qapp import om netbrain.event.nudes.map imp room netbrain.event.nudes.qapp room netbrain.event.nudes.gapp room netbrain.event.nudes.retri room netbrain.event.nudes.retri room netbrain.event.nudes.retri room netbrain.event.nudes.am i room netb</pre>	<pre>on amodel Qapp Ort MapSetting late import RunbookTemplate import GappSetting import FraceSetting mort CLISetting mort OUTSetting moort AMSSetting rt utils ds(raw_event) ification criteria. ds(raw_event) c setting. asic_setting("ServiceNow") ng() per.build_device_map_setting("device_name", True, t-in Runbook Templates/Configuration and Best Pro-</pre>	, "L3_Topo_Type") actice/Check OSPF	A Running Status")
Test Reset Script to Default					Cancel OK

#### Event Process Logic:

After receiving an event, the system will:

- 1. Check all event templates in order until finding the one matching the event conditions.
- 2. Execute data parsing, mapping and automation actions defined in the matched event template.
- 3. Return the result to the 3<sup>rd</sup>-party system in the form of a Map URL, and generates the corresponding task in NetBrain IE.

For more details on how to define an event template, refer to Online Help.

#### 2.1.3.View Results in System Automation Manager

All 3<sup>rd</sup>-party events and results are recorded in the System Automation Manager of NetBrain IE. Once an event task is completed, end users can view the map as well as the data collected by the Runbook.



The map URL of an event will be sent back to the 3<sup>rd</sup>-party system as a response result.

#### Example: Map URL of ServiceNow incident:

(7 Incident	8	<  Incident						∥ ∧ 昔 ∞	Follow - Update Resolve Incident Show	Embedde
e \star O	į	Opened by		Q		0		Impact	2 - Medium	•
incident integrations	^	Caller		Q				Urgency	2 - Medium	•
▼ Configuration		Location	New York	Q	16	0		Priority	3 - Moderate	
Incident Reference Fields Defini		Category	Network					Severity	3-Low	•
Incident Field Redirections		Subcategory	IP Address	•				Assignment group	Q	
Incident		Business service		Q				Assigned to	Q	
Create New		Configuration item	NB_BO5_HQ_SVR_SW1	Q	ic,	£ 0				
Assigned to me		Short description 0	150.1.1.123 FastEthernet0/0 ifouterrs (SNMP Cust	om)						
Open		Short description Y								
Open - Unassigned		Description								
Resolved										
Closed										
All							Related Search Results >			
Overview		NetBrain Notes Related Records Closure	information NetBrain Automation							
Critical Incidents Map			[							
▼ Administration		Source IP						Path Direction		
Incident Properties		Source Gateway						Path Analysis Set		
ATF Suites		Destination IP						Protocol		
Solunk Integration		Destination Port						NetBrainMapUrl	https://integrationlabv71.netbraintech.com/map.html?	8
Solunk Incidente								1	t=CD36f82D-4126-2fef-5310-C3a66f3dae4d&d=6f9De63d-	
-	-							1	b323-b5757c1656a0	
0								I		

# 2.2. Search Engine Extension

IEv8.02 expands the scope for visual search and supports multiple search terms for each new category.

Search Object	Supported Search Terms
<u>Network Context</u>	<ul> <li>Network Tree Node Name</li> </ul>
<u>One-IP Table</u>	<ul> <li>IP Address</li> <li>LAN Segment</li> <li>MAC Address</li> <li>Vendor</li> <li>Switch Port</li> <li>DNS Name</li> <li>Description</li> </ul>
<u>Path</u>	<ul> <li>Hop IP/Hostname</li> <li>Source or Destination</li> <li>Application Name</li> <li>Path Name</li> </ul>
<u>Event</u>	<ul><li>Object (Device or Path)</li><li>Event Message</li></ul>
<u>Endpoint Table</u>	<ul> <li>APIC Domain</li> <li>End Point</li> <li>IP address</li> <li>MAC Address</li> <li>Interface Name</li> <li>VLAN</li> <li>Learning Source</li> <li>EPG</li> <li>Reporting Controller</li> <li>Multicast Address</li> </ul>

## 2.2.1.Search for Network Context Map

IEv8.02 extends the capability to show network contexts in the search results for an SDN node. With the context map, users can quickly understand the network design and perform drill-down actions.

apic	× 🔍	Reth	
Search Results(6)	~ ≣ - ∓ ×	apic1(192.168.48.135)	
<ul> <li>Device (3/3)</li> </ul>		Context Maps Device Details	
<ul> <li>Network Context (3/3)</li> </ul>	Launch Network Pane	😤 Pod1_Physical Network	
Built-in Category: Cisco ACI, View: Network Centric\Fabric POD View			Open Map
US ACI1(192.168.48.135)\Pod1\ <mark>apic1</mark> (192.168.48.135)		Context Action. None	
US ACI1(192.168.48.135)\Pod1\ <mark>apic2</mark> (192.168.48.145)			
US ACI1(192.168.48.135)\Pod1\ <mark>apic3</mark> (192.168.48.146)			
		Last updated by zhaoxu at 12/10/2019, 2:18:06 PM	

#### 2.2.2.Search for One-IP Table

IEv8.02 adds the capability to show the One-IP table in the search results for an IP address. Users can directly view a device's L2 neighbors from the Switch Port column and map them out.

arch Results(22)					~	≣ - ₹ ×
Device (11/11)						
One-IP Table (11/	11)				Launch	One-IP Table
IP Address	LAN Segment	MAC Address	Vendor	Switch Port	DNS Name	Description
10.138.158.2	10.138.158.0/24	748E.F8B0.DAC0	Brocade C	BIOM-E024-R		LAWB-3:
10.138.158.3	10.138.158.0/24	748E.F89E.F4A4	Brocade C	BIOM-E024-R		LAWB-3:
10.138.158.8	10.138.158.0/24	748E.F805 5409	Procedo C	PIOM-E024-R		LAWB-3
10.138.158.7	10.138.158.0/24	748E.F8		)M-E024-R		LAWB-3:
10.138.158.11	10.138.158.0/24	748E.F89D.04BC	Brocade C	BIOM-E024-R		LAWB-3:
10.138.158.9	10.138.158.0/24	748E.F879.F228	Brocade C	BIOM-E024-R		LAWB-3:
10.138.158.10	10.138.158.0/24	748E.F89E.F4DC	Brocade C	BIOM-E024-R		LAWB-3:
10.138.158.4	10.138.158.0/24	748E.F879.EE64	Brocade C	BIOM-E024-R		LAWB-3:
10.138.158.6	10.138.158.0/24	748E.F879.F050	Brocade C	BIOM-E024-R		LAWB-3:
10.138.158.12	10,138,158,0/24	748E.E89D.0664	Brocade C	BIOM-E024-R		LAWB-3

#### 2.2.3.Search for A/B Paths across a Specific Hop

IEv8.02 adds the capability to search for all A/B paths crossing a specific hop by using the device name or IP address of the hop as the search term. For example, users can quickly address all the paths impacted by a problematic device, and map them out for drill-down troubleshooting.



Note: The search scope for A/B paths only includes those saved in the Path Browser.

#### 2.2.4.Search for Event

IEv8.02 adds the capability to search for events by using a keyword in the message as the search term. Users can start from search to map out the devices with alerts for drill-down troubleshooting.

bj*			X Q
Search Results(196)		~	·≣ - ₹ ×
<ul> <li>Device (20/28)</li> </ul>			
<ul> <li>Site (1/1)</li> </ul>			
<ul> <li>Network Context (20/45)</li> </ul>			
<ul> <li>One-IP Table (121/121)</li> </ul>			
✓ Event (1/1)		Launch	Event Console
Object	Event	First Time	Last Time
<mark>B</mark> *POP	😵 The value of five_min_cpu_usag	21/01/2020, 16:12:36	21/01/2020, 16
•			۱.

## 2.2.5.Search for ACI Endpoint Table

Global Endpoint Table is mainly dedicated to path calculation for a Cisco ACI network, listing all endpoint information collected from an ACI fabric. IEv8.02 adds the capability to show the related endpoint table entry in the search results for an IP address. Users can quickly launch the full ACI Endpoint Table to drill down.

1	20.0.0						×Q		Global Endpoir	nt Table of NBI	EAF-4									×
4	Search Results(12)					~ ≡	- * ×													
	<ul> <li>Network Context (</li> </ul>	8/8)							Data Source:	Current Ba	seline	Execution	Time: 12/10	/2019, 3:17:5	7 PM			6	1 0	£
	<ul> <li>ACI Global Endpoir</li> </ul>	nt Table (4/4)				Launch Global Endpo	int Table		NCT: Globa	al Endpoint Ta	V Su	bname: 'Glo	bal'	~		2	0.0.0			×
	APIC Domain	EPG	End Point	MAC	IP	Learning Sour	Reporting		MAC	IÞ	EPG	Fabric Pat	VLAN ID	Interface	Policy Tag	Scope ID	VRF	VTEP IP	Device N	a
	US ACI1(192	NB.BOS/APP		0050.56be.5339	20.0.0.11				0050.56b	20.0.0.10	NB.BOS/A	Pod-1/Nod	135	Switch101	49154	3112960	NB.BOS/Pr	10.0.176.64	NBLEAF-	ų
	US ACI1(192	NB.BOS/APP		000c.2946.5dee	20.0.0.15				0050.56b	20.0.0.11	NB.BOS/A	Pod-1/Nod	135	Switch101	49154	3112960	NB.BOS/Pr	10.0.176.64	NBLEAF-	·
	US ACI1(192	NB.BOS/APP		0050.56be.33af	20.0.0.21	Launch Globa	i Endpoint Tab	e	0050.56b	20.0.0.21	NB.BOS/A	Pod-2/Nod	135	Switch103	49154	3112960	NB.BOS/Pr	10.1.32.64	NBLEAF-3	J.;
	US ACI1(192	NB.BOS/APP		0050.56be.307b	20.0.0.10				000c.294	20.0.0.15	NB.BOS/A	Pod-2/Nod	135	Ethernet1/2	49154	3112960	NB.BOS/Pr	10.1.144.65	NBLEAF-3	
	4						Þ													

#### 2.3. New Multicast Reverse Path Calculation

#### 2.3.1.Calculate Multicast Reverse Path

When a problem occurs in a multicast network, users often need to troubleshoot the connection from a receiver to a source based on a specific group. In the previous versions, the system helped users troubleshoot multicast issues by drawing multicast paths via Qapps.

In IEv8.02, the system has extended the path framework, which enables users to calculate multicast paths. End users can specify a multicast group, source IP, and receiver IP to calculate a unidirectional multicast path from a receiver to a source. A multicast reverse path includes four parameters: receiver, source, group, and gateway.



#### **Multicast Path Calculation Logic**

Compared with a unicast path, the following calculation logics are added for a multicast path.

 IEv8.02 adds an NCT "Multicast Route Table" and uses it to look up L3 next-hop devices during a path calculation.

**Note:** For the first-hop device, the system looks up its next-hop device based on the original routing table.

 When checking ACL/Policy on interfaces, the system checks whether the group IP as a destination is matched and continues path calculation based on the matching result.

#### 2.3.2.View Path Legend on Map

IEv8.02 introduces the Path Legend function to differentiate paths on a map based on styles and types.



By default, the Path Legend pane is invisible. To view path legends, click Map > Path Legend.

#### 2.3.3.Gateway for Multicast Reverse Path

IEv8.02 uses the unicast path gateway logic to look up the gateway for a multicast path, but adds filter mechanism to the logic:

- If a candidate gateway is not configured with multicast, it will be removed from the gateway list.
- If devices associated with a particular technology such as HSRP, VXLAN anycast gateway, and VIP, is configured with multicast, they will be added to the gateway list.
- If the device that an input IP belongs to is a network device, the device will be added to the gateway list no matter it is configured with multicast or not.

#### 2.4. Document Network Change and Runbook Automation in Word

Accurate documentation is critical for managing a reliable network. IEv8.02 adds the documentation feature for two important automation features: Change Management and Runbook. With the "Export to Word" function, each network change task can be documented in a controlled and consistent manner for archive and collaboration throughout the planning, approval, implementation and verification process, as well as other Runbook actions and results.



#### User Flow to Document Runbook



Check out the golden sample files exported from two Runbooks:



#### **Custom Content Settings**

Besides Runbook result selection, the Runbook content that can be exported is configurable in the Advanced Settings.



The default settings for the exported Runbook content can be referenced at <u>online help</u>.

#### 2.5. Enhancements to Reference Flow

#### 2.5.1.New Indicators for Golden Baseline Alerts on Map

The Golden Baseline of a variable represents the reference standard of "healthy" status for a network metric type. Starting from IEv8.0, NetBrain allows the predefinition of the Golden Baseline for specific variables and can detect an anomaly as soon as it arises, for example, the value of <code>\$crc</code> increases or the value of <code>\$eigrp\_q\_count</code> is not equal to 0. These anomalies can be highlighted on a map as alerts to warn users.

IEv8.02 adds new color and count indicators to visualize the hints for Golden Baseline Alerts proactively. With these new indicators in the Data View pane, end users can instantly know whether there are any recent or historical Golden Baseline Alerts per Data View Template, and how many of them. As a benefit, end users only need to apply a Data View Template that has an indicator to look into anomalies. From the map legend, end users can quickly address the devices/interfaces that have an alert recently or historically.



Example of Indicator	Explanation
6 (Latest GB Alerts)	This data view has Golden Baseline Alerts for <b>6</b> device/interface variables, detected in the latest run. Note: If the latest run was one month ago, these alerts will be treated as Historical GB Alerts.
(Historical GB Alerts)	This data view has Golden Baseline Alerts for <b>1</b> device/interface variable, detected in the last six months.
(A Combination of Latest and Historical GB Alerts)	<ul> <li>This data view has Golden Baseline Alerts for X device/interface variables, detected in the latest run.</li> <li>This data view has Golden Baseline Alerts for Y device/interface variables, detected in the last six months.</li> <li>X + Y = 6</li> </ul>

<u>Note</u><sup>1</sup>: The GB alert count statistics only refer to those detected through scheduled DVT/parser tasks (cached data). The alerts detected by using live data are NOT included.

<u>Note</u><sup>2</sup>): If two devices/interfaces in a data view contain the same variable that has an alert, the system calculates the alert count as 2.

#### 2.5.2. Message Golden Baseline Alerts to More Users

To warn users about network data deviations when they are not monitoring, IEv8.02 adds the function to message alerts via NetBrain system alerts, or email alerts, or both. As a result, end users can timely respond by analyzing the root cause on an addressed dynamic map and performing drill-down troubleshooting.

By default, only the action executor can receive system alerts for golden baseline deviations. The executor can configure whether to message more users proactively. Detected alerts will be categorized as errors in the Event Console.

#### **Use Flow**



- 1. Configure the alert settings for a Data View Template by sharing with specified domain user accounts, or sending email alerts to specified email addresses, or both. For example:
  - Before running a Data View Template Node in a Runbook:

Map_for_GBAlert_G * [View Only] > Page	1∨	🔲 🖂 🖍 Stencils   Instant Qapp   Dashboard   Ma
« 💟 Data View 📒 Runbook	Cache IIII Live G	Settings X
JeffreyZhao Runbook ∨	**************************************	
Select Action ∨ S 53 Ξ		Share Alert with: weical; Zhao.J.F;
Start	DVT_flow, for_GBAlert_20191205           Data Source:         Pull live data regularly           Every:         20           Seconds         V Repeat:           3         Times	Send Enail to: shaqilefei@netbrain.com;liuweicai@netbrain.com Duplicate an alert in emails when alert count increases by 1
V         DVT_flow_for_GBAlert_2         1           0         12         Result 1         11:12 AM Ξ	Input V	Cancel OK

• When toggling to apply a Data View Template with Live Data to a map:

Cache	Live		Settings	
	Live Live Live 2 Devices on Map Pull live data once Pull live data regularly Every: 20 Seconds V Repeat 3 Times Cancel Run			
			Share Alert with: welcal; Zhao.J.F;	
	Pull live data once		Send Email to: zhaojiefei@netbrain.com;liuweicai@netbrain.com	
	Pull live data regularly			
	Every: 20 Seconds V Repeat 3 Times		Duplicate an alert in emails when alert count increases by 7	
		/		
	Cancel Run 💚		Cancel OK	
				_

• When scheduling a Data View Template Task:

Schedule Task 🛛 🗙		Edit Task				
Discovery/Benchmark	Schedule Data View Template/Parser	* Task Name:	BuTask	Description:	Periodically retrieve d	ata for built-in data
Task Name	Data View Template	Pa			F	
BuTask	1 folders and 0 Data View Templates	Frequency	Device	Select Data Vie	w Template/Parser	Notification
Built-in task	1 folders and 0 Data View Templates					
			Share Alert with:	Jeffrey.Zhao		
			Send Email to:	zhaojiefei@netbrain.com;l	iuweicai@netbrain.com	1
	Schedule Task × Discovery/Benchmark sk Task Name BuTask Built-in task	Schedule Task       Schedule Data View Template/Parser         biscovery/Benchmark       Schedule Data View Template/Parser         sk       Task Name       Data View Template         BuTask       1 folders and 0 Data View Templates         Built-in task       1 folders and 0 Data View Templates	Schedule Task × Discovery/Benchmark Schedule Data View Template/Parser sk BuTask Name Data View Template Pa BuTask 1 folders and 0 Data View Templates Built-in task 1 folders and 0 Data View Templates	Schedule Task       Schedule Data View Template/Parser       Edic Task         sk       Task Name       Data View Template       Parser         BuiTask       1 folders and 0 Data View Templates       Frequency       Device         BuiTask       1 folders and 0 Data View Templates       Share Alert with:       Share Alert with:	Schedule Task       Schedule Data View Template/Parser       Edit Task         sk       Task Name       Data View Template       Para View Template         BuiTask       1 folders and 0 Data View Templates       Prequency       Device       Select Data View         Built-in task       1 folders and 0 Data View Templates       Share Alert with:       Jeffrey Zhao       Share Alert with:       Jeffrey Zhao	Schedule Task       Schedule Data View Template/Parser       Edit Task         sk.       Edit Task       Edit Task         Task Name       Data View Template       Para View Template         BulTask       1 folders and 0 Data View Templates       Prequency         Built-in task       1 folders and 0 Data View Templates       Share Alert with:         Jeffrey Zhao       Send Email to:       zhaojjefel@netbrain.com,liuweicai@netbrain.com

For more details about the email alerting rules, refer to <u>Alerting Rules</u>.

2. Receive alert messages from system alerts, or email alerts, or both.

Example 1: Golden Baseline Alerts in System Event Console

	💊 🛴 🛓 weicai 🌐 QGBAlert 🛢 135 Nodes 💡 Net子ro	in?					
Instant Qapp	Dashboard   N   Actions [0] — — — + 200% 🖺 a	×					
Event type: My	events,Shared eve v Level: SError, 🖲 Warning v Time ran	ge: Last 24 hou	ırs v	Source:	Data Viev	/ Template	×
Object	Event	First Time	Last Time Count	Acknowle	Status	Executed	Task Type
BJ-R2	S The value of double_0 0.00 doesn't match Golden Baseline "Equals: 1.1"	12/9/2019, 11:	12/9/2019, 3	No	Open	Jeffrey.Zhao	Run Data View Template
BJ-R3	😵 The value of bool_false "False" doesn't match Golden Baseline "Equals: True"	12/9/2019, 11:	12/9/2019, 3	No	Open	Jeffrey.Zhao	Run Data View Template
BJ-R3	😵 The value of string_value "value" doesn't match Golden Baseline "Equals: Netbrain@@"	12/9/2019, 11:	12/9/2019, 3	No	Open	Jeffrey.Zhao	Run Data View Template
BJ-R3	S The value of double_0 0.00 doesn't match Golden Baseline "Equals: 1.1"	12/9/2019, 11:	12/9/2019, 3	No	Open	Jeffrey.Zhao	Run Data View Template
BJ-R2	😵 The value of string_value "value" doesn't match Golden Baseline "Equals: Netbrain@@"	12/9/2019, 11:	12/9/2019, 3	No	Open	Jeffrey.Zhao	Run Data View Template
BJ-R2	😵 The value of bool_false "False" doesn't match Golden Baseline "Equals: True"	12/9/2019, 11:	12/9/2019, 3	No	Open	Jeffrey.Zhao	Run Data View Template
QoS-Path-SW2	O The value of ospf_intf doesn't match Golden Baseline	12/9/2019, 10:	12/9/2019, 10	No	Open	Zhao.J.F	Data View Template Scheduler
BST_POP2	S The value of ospf_intf doesn't match Golden Baseline	12/9/2019, 10:	12/9/2019, 10	No	Open	Zhao.J.F	Data View Template Scheduler
NY_Core	S The value of ospf_intf doesn't match Golden Baseline	12/9/2019, 10:	12/9/2019, 10	No	Open	Zhao.J.F	Data View Template Scheduler

#### **Example 2:** Golden Baseline Alert Messages in Email

17 Golder	n Baseline Al	erts Detected for CDom_BRack_GBome_Map.Page	1.Result 3	.DVT-Flow-	for-GBAle		
Q qate	est1@netbrain.co iuweicai@netbrain.c	om om					
enant: Initial T Domain: domai ask: CDom_BR	enant n1 ack_GBome_Map	Page 1.Result 3.DVT-Flow-for-GBAlert-20200111 executed by user Zhao.	J.F				
Golden Baseline	Check for Device	Variables:					
Object		Message		me			
BJ*POP	The value of upti	me_minutes 26 doesn't match Golden Baseline "Continuously Increase"	2020-01-17 1	4:54:51 +08:00			
BJ_core_3550	The value of upti	me_minutes 25 doesn't match Golden Baseline "Continuously Increase"	2020-01-17 1	4:54:51 +08:00			
BJ_L2_Core_5	The value of tabl	e_test doesn't match Golden Baseline	2020-01-17 1	4:54:30 +08:00			
BJ_L2_Core_5	The value of upti	me_minutes 28 doesn't match Golden Baseline "Continuously Increase"	2020-01-17 1				
BJ_L2_Core_5	The value of tabl	e_test doesn't match Golden Baseline	2020-01-17 1	4:55:32 +08:00			
BJ-L2-Core-A	The value of upti	The value of uptime_minutes 26 doesn't match Golden Baseline "Continuously Increase" 2020-01-17					
olden Baseline	Check for Interfa	ce Variables:					
Object	Interface	Message		Tin	1e		
BJ*POP	FastEthernet0/0	The value of input_drops 0 doesn't match Golden Baseline "Continuous	ly Increase"	2020-01-17 14	:54:51 +08:00		
BJ*POP	Serial0/1/1	The value of input_drops 0 doesn't match Golden Baseline "Continuous	ly Increase"	2020-01-17 14	54:51 +08:00		
BJ_core_3550	FastEthernet0/1	The value of input_drops 0 doesn't match Golden Baseline "Continuous	ly Increase"	2020-01-17 14	:54:51 +08:00		
BJ_core_3550	Port-channel10	The value of input_drops 0 doesn't match Golden Baseline "Continuous	ly Increase"	2020-01-17 14	:54:51 +08:00		
BJ_L2_Core_5	Vlan10	The value of input_drops 0 doesn't match Golden Baseline "Continuous	ly Increase"	2020-01-17 14	:54:51 +08:00		
BJ-L2-Core-A	Port-channel10	The value of input_drops 0 doesn't match Golden Baseline "Continuous	ly Increase"	2020-01-17 14	:54:51 +08:00		
BJ-L2-Core-A	Vlan10	The value of input_drops 0 doesn't match Golden Baseline "Continuous	ly Increase"	2020-01-17 14	:54:51 +08:00		
BST,POP1	Serial1	The value of input_error 9660 doesn't match Golden Baseline "Less or E	quals: 7"	2020-01-17 14	:54:31 +08:00		
BST,POP1	Serial1	The value of input_error 9660 doesn't match Golden Baseline "Less or E	quals: 7"	2020-01-17 14	54:51 +08:00		
BST,POP1	Serial1	The value of input_drops 479 doesn't match Golden Baseline "Continuo	usly Increase"	2020-01-17 14	54:51 +08:00		
BST DOD1	Sorial1	The value of input error 9660 doesn't match Golden Baseline "Less or F	auale: 7"	2020-01-17 14	55-21 ±02-00		

#### 3. Open the map to troubleshoot.

Object	Event	First Time	Last Time Count	Acknowle	Status Executed		From Task
BLR2	The value of double 0.0.00 doesn't match Golden Baseline "Fouals: 1.1	12/9/2019 11	12/9/2019 2	Ne	Onen laffrey 7	Rup Data View Template	<maps-dvt 20191205<="" flow="" for="" gralert="" td=""></maps-dvt>
RI-P3	The value of bool faire "Faire" doern't march Golden Baseline "Fourier"	True" 12/0/2010 11:	12/9/2019 2	No	Open Jeffrey.21	ao Run Data View Template	Acknowledge flow for GBAlar 20191205
DJ.02	The value of project value "value" descrit match Colden Bateline "Found	ri Nethraio@@" 12/0/2019, 11:	12/9/2019	NO	Open Jenrey.2	ao Run Data view Template	Close few for GRAIng 20101205
0,00	The value of string value value doesn't match dolden Baseline Equa	12/9/2019, 11	12/9/2019, 3	NO	Open Jettrey.21	ao Run Data View Template	Delete (inc. (co. CRAiner 2010/1205
6)-83	o ine value of double_0 u.uu doesn't match Golden baseline Equais: 1.1	12/9/2019, 11:	. 12/9/2019, 3	No	Open Jettrey.2	ao Run Data View Template	Copy
BJ-R2	The value of string_value "value" doesn't match Golden Baseline "Equal	s: Netbrain@@" 12/9/2019, 11:	. 12/9/2019, 3	No	Open Jeffrey.Z)	iao Run Data View Template	Open Map
BJ-R2	The value of bool_false "False" doesn't match Golden Baseline "Equals:	True" 12/9/2019, 11:	. 12/9/2019, 3	No	Open Jeffrey.Zi	ao Run Data View Template	flow_for_GBAlert_20191205
	K     ID bas View     ■ Runbook       JeffreyZhao Runbook ∨     Select Action ∨     S 15 Ξ       Select Action ∨     S 15 Ξ     Start       Overall Health Monitor     1	Coche Uve 😒				172.24.10.8/29	era Unit
	V         DVT_flow_for_GBAlert.2         2           VL         Result 2         01:26 PM           VZ         Result 1         11:12 AM ≡				172.24-10-16/28	Coversion         Coversion         Filter_resci           filter_resci         filter_resci         filter_resci           coversion         memory_w         westCoversion           coversion         Name: N/A         westCoversion           172.2.2.114.0024         (nrc_1)-1         gg	vika Unit Vika IshParaMemoid: 7.00 Juli: N/A
		Details for 👿 DVT_flow_for_GBAler	rt_20191205 - Result 1				
		BJ-R2 ∨	🖬 double_0 🛛 💿				
		Device Data Interface Data 5 bool_false * 5 string_value 6 filter_test 6 testConf 1 memory_withParaMemoid	Golden Baseline Analy	sis: Alert Detecter	d — Golden Ba	eline: Equals: 1.1	
		() rvame () testConf_null () double_0 () int_1	0		11:12:30 AM		11:12:45 AM
		4	11.12.30 AM				

**Note:** If the alert is detected in a scheduled DVT task, the alert message will be attached to the map as a device note.

< 💟 Data View 📒	Runbook	Cache	Live		
weicai Runbook 🗸	»				
Select Action V	G 🖬 =		LA.DIS,1 172.24.33.1 Cisco Router	0/0 172.24.32.66/26 172.24.32.64/2	6 LA.POP 172.24.32.10 Cisco Router
Overall Health Check				Golden Baseline Alert	^
Ğ				The value of five_min_cp Golden Baseline "Equals	u_usage 11 doesn't match : 4"
				Jeffrey.Zhao	12/11/2019, 5:16:23 PM
			B *POP 172.24 32.225 Cisco Router	XE-MGMT 172.25.7.254 Cisco 105 Switch	172.255.7.0/24

#### **Emailing Rules for Golden Baseline Alerts**

The system provides three general rules to avoid duplicate and excessive email alerts.

- By default, the system sends alert emails every 5 minutes.
   The frequency is configurable at System Management > Email Settings.
- The system emails GB Alerts per Data View Template.
   For example, if a task (on-demand or scheduled) contains 4 Data View Templates, and 3 of them have Golden Baseline deviations, the system will send out 3 emails separately.



3. When the data source of an on-demand DVT task is "Pull live data regularly", the system will duplicate an alert message in one email if it reaches a specified threshold. It is configurable in the alert settings, and the default threshold value is 7.

Cache	IIII Live		Settings X
		e	
		Share Alert with: W Send Email to: Z	Share Alert with: weicai; Zhao.J.F;
	Pull live data once		Send Email to: zhaojiefei@netbrain.com;liuweicai@netbrain.com
	Pull live data regularly		
	Every: 20 Seconds 🗸 🗷 Repeat 3 Times		Duplicate an alert in emails when alert count increases by 7
	Cancel Run @	1	Cancel OK

#### **Minor Enhancements in Event Console**

#### • Use three filters to narrow events by task source.

Event type: My events,Shared eve v	Level: 🛛 Error, 🕕 Warning 🗸 🗸	Time range: Last 24 hour	rs v	Source:	Data View Template 🗸 🗸				Search Q
Object	Event	First Time	Last Time	Cou	Qapp/Gapp     Date View Template	itus	Executed By	Task Type	From Task
BJ-R2	😵 The value of double_0 0.00 doesn't match	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26	AM 3	Application Assurance Module	en	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
BJ-R3	😵 The value of bool_false "False" doesn't mat	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26	AM 3	No U	pen	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
BJ-R3	The value of string_value "value" doesn't m	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26	AM 3	No O	pen	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
BJ-R3	The value of double_0 0.00 doesn't match	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26	AM 3	No O	pen	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
BJ-R2	The value of string_value "value" doesn't m	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26	AM 3	No O	pen	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>

#### • Export events into a CSV file by clicking the Export button.

Event type: My events,Shared eve V	Level: 🗞 Error, 🚯 Warning 🗸 🗸	Time range: Last 24 hour	s v So	urce: Qapp/G	app,Data View T	$\checkmark$			Search	Q 1 @
Object	Event	First Time	Last Time	Count	Acknowledged	Status	Executed By	Task Type	From Task	
QoS-Path-NXOS-2.Ethernet4/9	😵 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:54 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	A
QoS-Path-NXOS-2.Vlan1	😵 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:54 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	
QoS-Path-NXOS-2.Vlandot1Q	😣 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:54 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	
QoS-Path-NXOS-1.Ethernet4/9	😵 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:54 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	
QoS-Path-NXOS-1.Vlan1	😵 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:54 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	
QoS-Path-NXOS-1.Vlandot1Q	😣 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:54 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	
QoS-Path-NXOS-2.Ethernet4/43	😣 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:53 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	
QoS-Path-NXOS-2.Ethernet4/44	😣 Interface is down or SNMP failed.	12/9/2019, 10:32:01 AM	12/9/2019, 11:05:53 AM	5	No	Open	Zhao.J.F	Qapp Scheduler(Qapp)	HRP.Overall Health Monitor [SNMP]	

• Events are highlighted and differentiated through Error/Warning icons, rather than font colors.

#### • Configure the Auto Refresh Frequency to auto-refresh event entries in Event Console.

Event type: My events,Shared eve V	Level: 😵 Error, 🚯 Warning 🗸 🗸	Time range: Last 24 hour	rs V S	Source: Data	view Template	$\sim$			Search Q 1
Object	Event	First Time	Last Time	Count	Acknowledged	Status	Executed By	Task Type	From Task
BJ-R2	S The value of double_0 0.00 doesn't match	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26 AM	3	No	Open	Jeffrey.Zhao	Run Data View Template	<map+:dvt_flow_for_gbalert_20191205< td=""></map+:dvt_flow_for_gbalert_20191205<>
BJ-R3	The value of bool_faise "Faise" doesn't mat	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26 AM	3	No	Open	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
BJ-R3	S The value of string_value "value" doesn't m	. 12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26 AM	3	No	Open	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
8J-R3	The value of double_0 0.00 doesn't match	12/9/2019, 11:12:46 AM	12/9/2019, 11:13:26 AM	3	No	Open	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
BJ-R2	SThe value of string_value "value" doesn't m	. 12/9/2019, 11:12:46 AM			*	Open	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
BJ-R2	O The value of bool_faise "Faise" doesn't mat	. 12/9/2019, 11:12:46 AM	Setting		×	Open	Jeffrey.Zhao	Run Data View Template	<map>:DVT_flow_for_GBAlert_20191205</map>
QoS-Path-SW2	The value of ospf_intf doesn't match Golde	. 12/9/2019, 10:53:48 AM				Open	Zhao.J.F	Data View Template Sch	BuTask.OSPF Overview
BST_POP2	The value of ospf_intf doesn't match Golde	. 12/9/2019, 10:53:48 AM	Auto refresh	every 2min	~	Open	Zhao.J.F	Data View Template Sch	BuTask.OSPF Overview
NY_Core	SThe value of ospf_intf doesn't match Golde	. 12/9/2019, 10:53:48 AM				Open	Zhao J.F	Data View Template Sch	BuTask.OSPF Overview
Multicast-MGMT	S The value of ospf_intf doesn't match Golde	. 12/9/2019, 10:53:48 AM		Canad	OK	Open	Zhao.J.F	Data View Template Sch	BuTask.OSPF Overview
FLEX-MGMT	SThe value of ospf_intf doesn't match Golde	. 12/9/2019, 10:53:48 AM		Cancer	OK	Open	Zhao.J.F	Data View Template Sch	BuTask.OSPF Overview
BJ-L2-coreB	The value of ospf_intf doesn't match Golde	. 12/9/2019, 10:53:48 AM	12/9/2019, 10:53:48 AM	5	No	Open	Zhao,J.F	Data View Template Sch	BuTask.OSPF Overview
QoS-Path-MGMT	SThe value of ospf_intf doesn't match Golde	12/9/2019, 10:53:48 AM	12/9/2019, 10:53:48 AM	5	No	Open	Zhao,J.F	Data View Template Sch	BuTask.OSPF Overview

 Auto-clean event entries regularly by enabling and setting the corresponding rule (Domain Management > Global Data Clean Settings > Event Entries in Event Console).

Start Page Global Data Clean Settings ×						
Data Engine Data () Manually Delete Data						
Only keep 2 data points for each data type in a month for data older than 4	months					
Delete data older than     6     months						
Other Data						
Data Type	Data Size	Auto - Clean Rule				
Qapp/Gapp Execution Logs	N/A	Delete data older than	14	days	•	
One-IP Table Entries	232KB	Delete data older than	14	days	*	
Discovery/Benchmark Logs 🕦	N/A	Delete data older than	14	days	•	
Application Path History Data	N/A	Delete data older than	6	months	•	
DataUnitStorage 1	32KB	Delete data older than	1	months	•	
Backup Maps	OBytes	Delete data older than	1	months	•	
API Triggered Automation Task	N/A	Delete data older than	6	months	*	
Event Entries in Event Console	236KB	Delete data older than	1	months	*	
Execution Logs for Scheduled Data View Template & Parser Tasks	N/A	Delete data older than	14	days	•	

#### 2.5.3.Enable Golden Baseline Dynamic Calculation for Parser Variable

In previous versions, users had to define a global variable first before enabling the dynamic calculation of the golden baseline (GB) for a parser variable.

IEv8.02 allows users to enable the GB dynamic calculation as soon as they place a parser variable of a legacy device to a device/interface position in a Data View Template.



<u>Note</u>: The original enablement process based on each global variable is also available. If one parser variable has its global variable defined and associated, the dialog box will show as below:



#### 2.5.4.Schedule Data View Template Task on an Hourly Basis

To support the schedule of a Data View Template Task at a higher frequency, IEv8.02 adds "Hours" as one of the unit options for the frequency setting. The default option is still "Days".

Add Task	
* Task Name: Infrastructure Description:	
Frequency Device Select Data View Template/Parser Notification	
Every 1 Hours V First Run Time: 11 Days V	
Time Zone: (UTC+ ngqing, Hong Kong, Urumqi V 🕦	
Cancel Submit	

#### 2.5.5.Custom Column to Show SPOG URL in DVT

To enhance the reference flow for single pane of glass, IEv8.02 allows power users to attach a SPOG URL to a specific table column flexibly in a Data View Template.

For example, to attach the ServiceNow Incident URL to the Incident Numer column of the table Incident\_Detail, users can assign the <code>\$Number</code> variable as the value of the <code>link\_on\_columns</code> parameter in the script of Action Input. As a benefit, when end users look into the table of incident details on a map, they can be redirected to the ServiceNow system.



#### 2.6. New Domain Health Report

To accelerate the tune-up phase (customization for topology/path data accuracy) before delivering a finetuned domain to end users, IEv8.02 provides a report with more detailed statistics about domain health. As a benefit, the domain administrators can proactively focus on the items that need their attention and resolve the potential problems existing in a domain as earlier as possible. The domain health report is generated on-demand and contains both a summary and a variety of categories.

main Mana	agement		Tenant: Initial Tenant	Domain: domain16	Operations	🔔 kang	0	NetBrain
Start Page	Domain Health Report							
Report Gene	rated Time: 12/18/2019 01:15:30 PM	😋 Refresh				Creat	e Health	Report
Basic Netwo	rk Settings: 6 need attention Disco	very Status: 5 need attention Pa Report Summary	ath: 2 failed Others: 11	need attention			₫ Đ	oprt
Driver Ass 22 Driver App	ociated Device: olied, 148 Devices, 4887 Interfaces	Report Detail						-
Device Drive	r	Associated Device Count						
Cisco IOS Sw	vitch	50	*					- 8
End System		45						
Cisco Router	e.	26						
Cisco ASA Fir	rewall	5						
Cisco Nexus	Switch	2						
Avaya Switch	1	2						
Arista Switch	1	2						
Juniper EX S	witch	2						
Dell Sonicwa	ll	1	-					
Basic Netv	vork Settings Completeness:							
Attention	Index	Count						
	Stand-alone Front Server (defined)	3						
1	Stand-alone Front Server (unused)	2						

Report Category	Description and Example								
Summary	This summary shows the number of items that need the domain admin to pay attention to.								
Driver Associated Device	This category shows th 22 Driver Applied, 148 Devices,	ne number of devices that are of 4887 Interfaces	discovered by drivers.						
	Device Driver	Associated Device Count							
	Cisco IOS Switch	50							
	End System	45							
	Cisco Router	26							
	Cisco ASA Firewall	5							
	Cisco Nexus Switch	2							
	Avaya Switch	2							
	Arista Switch	2							
	Juniper EX Switch	2							
	Dell Sonicwall	1							
Basic Network Setting	This category shows th	ne summary of the predefined	Network Settings, including the number of						
	Front Server, Front Ser	ver Group, Private Key, Jumpb	ox, Teinet/SSH Login, Privilege Login, SNMP						

eport Category	Descriptio	on and Example	
	String, AP	l Server, CheckPoint OPSEC an	d their usage.
	Attention	Index	Count
		Stand-alone Front Server (defined)	3
	1	Stand-alone Front Server (unused)	2
		Stand-alone Front Server (over 5000 devices)	0
		Front Server Group (defined)	0
		Front Server Group (unused)	0
		Front Server Group (over 5000 devices per	0
		Private Key (defined)	6
	1	Private Key (unused)	6
		Jumpbox (defined)	3
	1	Jumpbox (unused)	3
		Telnet/SSH Login (defined)	44
	1	Telnet/SSH Login (unused)	44
		Privilege Login (defined)	21
	1	Privilege Login (unused)	21
		SNMP String (defined)	18
		SNMP String (unused)	18
		API Server	11
		CheckPoint OPSEC	0
iscovery Status	Note: The users can This categ in the disc	attention ( <sup>1</sup> ) is a reminder, bu ignore the attention. gory shows a summary of the d covery process.	it not an alert. If the configuration
scovery Status	Note: The users can This categ in the disc Attention	attention ( <sup>1</sup> ) is a reminder, built ignore the attention. gory shows a summary of the d covery process.	It not an alert. If the configuration
scovery Status	Note: The users can This categ in the disc Attention	attention ( <sup>1</sup> ) is a reminder, built ignore the attention. gory shows a summary of the discovery process. Index Discovered Devices	It not an alert. If the configuration
covery Status	Note: The users can This categ in the disc Attention	attention ( !) is a reminder, built ignore the attention. gory shows a summary of the decovery process. Index Discovered Devices Licensed Node Usage	It not an alert. If the configuration
covery Status	Note: The users can This categ in the disc Attention	attention ( !) is a reminder, built ignore the attention. gory shows a summary of the discovery process. Index Discovered Devices Licensed Node Usage Discovered by SNMP	It not an alert. If the configuration
covery Status	Note: The users can This categ in the disc Attention	attention ( <sup>‡</sup> ) is a reminder, built ignore the attention. gory shows a summary of the discovery process. Index Discovered Devices Licensed Node Usage Discovered by SNMP Unknown IP	It not an alert. If the configuration
overy Status	Note: The users can This categ in the disc Attention	attention ( !) is a reminder, built ignore the attention. Fory shows a summary of the decovery process. Index Discovered Devices Licensed Node Usage Discovered by SNMP Unknown IP Missed Devices	It not an alert. If the configuration
covery Status	Note: The users can This categ in the disc Attention	attention ( !) is a reminder, bui ignore the attention. gory shows a summary of the d covery process. Index Discovered Devices Licensed Node Usage Discovered by SNMP Unknown IP Missed Devices Unclassified Network Devices	tt not an alert. If the configuration
overy Status	Note: The users can This catego in the disc Attention	attention ( <sup>‡</sup> ) is a reminder, built ignore the attention. ory shows a summary of the discovery process. Index Discovered Devices Licensed Node Usage Discovered by SNMP Unknown IP Missed Devices Unclassified Network Devices Unknown SNMP SysObjectID	It not an alert. If the configuration
covery Status	Note: The users can This catego in the disc Attention	attention ( !) is a reminder, built ignore the attention. covery process. Index Discovered Devices Licensed Node Usage Discovered by SNMP Unknown IP Missed Devices Unclassified Network Devices Unclassified Network Devices	tt not an alert. If the configuration
scovery Status	Note: The users can This categ in the disc Attention	attention ( !) is a reminder, built ignore the attention. covery process. Index Discovered Devices Licensed Node Usage Discovered by SNMP Unknown IP Missed Devices Unclassified Network Devices Unclassified Network Devices Subnet with Conflicted IPs Zone	tt not an alert. If the configuration

Report Category	Descriptio	on and Example				
Site Definition	This cate	gory shows the usa	age summary	of each site.		
Completeness	Latest Build Ti					
	Attention					
	1	Container Site		0		
	1	Leaf Site			0	
		Leaf Site (with 0 device)			0	
	-	Leaf Site (over 100 devic	:es)		0	
	1	Unassigned Devices			148	
Benchmark Task Health	This category shows the latest two execution summaries of each benchma					
	Attention	Execution Time	Result	Duration	Configuration Re	trieval Success Rate
		12/16/2019 12:58:31 PM	Succeeded	8 mins 34 secs	99.32% (145/146	devices)
	Benchmark1	For the Time	Desult	Dumtin	Configuration -	
	Attention	Execution Time	Result	Duration	Configuration Re	trieval Success Rate
		12/18/2019 9:39:13 AM	Succeeded	37 secs	40% (2/5 devices	)
Disk Management Setting Completeness	This cates disk alert Global Data Cle	gory shows the sur rules for MongoD can Settings	mmary of the B.	predefined auto	-clean rules for	global data anc
	Attention	Data Type		Data	Clean	
		Data Engine Data		Enab	oled	
		Qapp/Gapp Execution Logs	5	Enab	bled	
	I.	One-IP Table Entries		Disa	bled	
	I.	Discovery/Benchmark Logs	5	Disa	bled	
	I.	Application Path History Da	ata	Disa	bled	
	I.	DataUnitStorage		Disa	bled	
		Backup Maps		Enab	oled	
	I.	API Triggered Automation	Task	Disa	bled	
	I.	Event Entries in Event Cons	sole	Disa	bled	
		Execution Logs for Schedul	led Data View Templa		bled	
		Dashboard Activity Data Ta	able	te & Parser Tasks Enab		
	MongoDB Dick	Alert Rules: (System Settings)		te & Parser Tasks Enab Enab	led	
	Attention	A STATE OF		te & Parser Tasks Enab Enab	led	
		Type		te & Parser Tasks Enat	Status	
		Type Send emails when alert det	tected	te & Parser Tasks Enab Enab	Status Disabled	
	1	Type Send emails when alert det	tected	te & Parser Tasks Enat	Status Disabled	
	1	Type Send emails when alert det Send emails and delete Da	tected ta Engine data when	te & Parser Tasks Enab Enab	Status Disabled Disabled	
	1	Type Send emails when alert det Send emails and delete Da	tected ta Engine data when rite permisssion to M	te & Parser Tasks Enab Enab	Status Disabled Disabled Enabled	
	1	Type Send emails when alert det Send emails and delete Da Send emails and disable wi Email Address	tected ta Engine data when rite permisssion to M	te & Parser Tasks Enab Enab	Status Disabled Disabled Enabled None	

Report Category	Descripti	on and Example	
Map Layout	This cate	gory shows the number of custom	tags.
Settings Completeness	Attention	Index	Count
	1	Customized Layout	0
		Devices with Tags Associated	0
	1	Devices without Tags Associated	148
		Site Maps with Layouts Associated	0
		Site Maps without Layouts Associated	0

For more reference about the report content, refer to <u>online help</u>.

## 2.7. Map Enhancements

## 2.7.1.Map One-IP Table Entries with Drag-and-Drop

Launching the One-IP Table from the start menu will open a pane rather than a separate tab, so that users can map out devices and their L2 topology links with easy drag-and-drop, or compare table entries with the topology on a map.

)ne-IP Table				G	Ŧ×
ONS Server Settings	⚠ Export 😋 ।	Refresh Resolve All DNS	s		
Total Entries: 1194	Show Unknown	n End System Only	Search by IP/MAC	C/LAN/DNS Name	Q
IP Address	LAN Segment	MAC Address	Vendor	Switch Port	
100.1.1.1	100.1.1.0/24	3C8A.B0EF.DC57		EX2200-1.ge-0/0/	* <del></del>
100.1.1.2	100.1.1.0/24	3C61.04F9.D8D7		EX2200-2.ge-0/0/	
172.24.32.5	172.24.32.4/30	0010.7B80.CF2D	CISCO SYS	LA_POP.Ethernet	
172.24.32.6	172.24.32.4/30	0007.50D1.2EB3	Cisco Syst	BST,POP1.Ethern	
172.24.10.33	172.24.10.32/27	0023.3323.1720	Cisco Syst	BJ_core_3550.Fast	
172.24.10.34	172.24.10.32/27	000E.D7A7.B900	Cisco Syst		

#### 2.7.2.Narrow Down Auto-link Scope and Count

#### Enable to Exclude Management Links from a Map

IEv8.02 allows users to exclude management links from a map when using the auto-link function. By default, this option is enabled.



Note: Considering management links are usually managed in one subnet, IEv8.02 provides a new built-in plugin "recognize\_management\_interface" to identify management links by subnet matching. This plugin is executed along with the Basic System Benchmark. Those interfaces within the specified subnets will be identified as management interfaces, and their interface property isMgmtIntf will be updated to "true" in the GDR.

#### Limit the Number of One-Time Auto Links

To improve the performance for the auto-link function, IEv8.02 adds control to limit that at most 50 devices can be auto-linked at one time on a map. Users have to repeat the auto-link action to link more devices.

<u>**Tip:</u>** This threshold is configurable in back-end config files.</u>

#### 2.7.3.Custom Node Icons

To meet the diverse needs for network mapping, IEv8.02 allows users to upload custom node icons to the Map Stencils pane. The uploaded node icons can be directly used for mapping with drag-and-drop.

Note: Only PNG is allowed.



#### 2.7.4.Free Text for Network Design/Troubleshooting Annotation

IEv8.02 adds the shape of Text to the Map Stencil pane. The style of the text can be customized, such as font, size, color, alignment, etc.



#### 2.7.5.Copy, Cut and Paste Stencil Icons and Shapes

IEv8.02 adds the copy, cut, and paste functions for map components, including icons and shapes.



The following shortcut keys are allowed:

- Copy (CTL+C)
- Cut (CTL+X)
- Paste (CTL+V)

#### Editing Rights Ô 2.7.6.Enriched Map Operation Menu > Lock Map A Copy Map URL D 👟 Undo IEv8.02 adds a variety of map tools to the map Redo > Select Mode operation menu and optimizes the menu order. Þ Save As Ð Print > <u>.</u> Export Path Legend **9**2 Map Settings S.

📃 🗆 🖌 💉 Stencils | Instant Qapp | Dashboard 🛛 Map

📩 Auto Layout

🖧 Update Map

📃 View Change Analysis Report

Actions [0]

#### 2.8. Site Enhancements

#### 2.8.1.Exclude Specified Device Types from Site Assignment

During a domain setup process, one of the power users' tasks is to complete site management by assigning many "unassigned" devices to target sites they belong to. However, in real-world cases, many End Systems and WAPs, such as PCs and printers, are not involved in any site build or topology build. It is usually timeconsuming to go through the long "unassigned" list to get rid of them.

To elevate the operation efficiency of site management, IEv8.02 allows power users to exclude specific device types from the scope at the beginning. With this setting configured, devices of the specified devices types are categorized into a new category "Excluded from site" in the site tree and cannot be assigned to any site.

Domain Management	Settings			×
Start Page Schedule Task X Site Manager	Select device ty	/pes that should be excluded from any sit	es.	
Container Site(0) Unassigned(101)	E ID	Device Type	Category 🔺	lcons
Excluded from site(87)	✓ 1046	i4 Uplogix	End System	<b>b</b>
	✓ 3008	7 Viptela vSmart	End System	•
	☑ 1012	Mac Server	End System	
	1094	APC UPS	End System	<i>a</i>
	✓ 1004	End System	End System	b
	✓ 1006	Windows Server	End System	10
	✓ 1009	Ubuntu Server	End System	
	✓ 2101	0 NSX Manager	End System	196 <mark>-</mark> 0
	✓ 3003	Cache Engine	End System	2
	1061	6 Cisco Meraki Firewall	Firewall	0
	2009	Cisco ASA Firewall	Firewall	9
	1095	0 Watchguard Firewall	Firewall	<b>#</b>
	Auto exten	d neighbor sites on a site map		Cancel OK
Add Site V Import from File	얈 Settings			

## 2.8.2.Allow Hiding Neighbor Sites from a Site Map

IEv8.02 adds control to hide neighbor sites from a site map to avoid mapping unnecessary neighbors. By default, this function is enabled.

Start Page Site Manager ×						
▲ ◯ My Network(145)	Settings					
Americas(15)						
▷ 🌰 China(5)	Select de	evice types that s	hould be excluded from any sites.			
⊳ 🌑 liuxiu(0)						_
▷ 🌑 NB1(19)		ID	Device Type	Category	lcons	
(*) pppp(1)		10336	MikroTik	L3 Switch	*	
▷ Site_1Rw(0)		10578	Peplink Load Balancer	Load Balancer		
▷ Site_aP9(0)		21012	NSX Logical Switch	L3 Switch	•	-
▷ Site_Lw2(0)		10616	Ciner Manala Firewall	E	4	-
▷ Site_OWP(0)	<b></b>	10010	CISCO Meraki Firewali	Firewall		_
Site_qMS(0)		10624	Calix B-Series	L3 Switch	<i></i>	
Site_uis(0)		3034	LWAP	WAP	<i>_</i>	
() Unassigned(105)		10357	Cisco ACE	Load Balancer	-	
		2013	Arista Switch	L3 Switch	2	
		1024	MPLS Cloud	MPLS Cloud	and .	
		13100	HP Router	Router	<b>(</b> *)	
		1008	Redhat Linux Server	End System		
		10674	Cumulus OS	L3 Switch	2	
	e Auto	extend neighbor	sites on a site map		Cancel Of	<
Add Site 🗸 Import from File 🚳 Settings						

To unhide neighbor sites, go to Site Manager > Settings and select the Auto extend neighbor sites on a site map check box.

r Input for Site Type	Name: China
i input for site rype	Region:
	Location/Address:
rty is used to label the usage of a site,	Employee Number: 0
data center, regional office, or disaster	Device Count: 5
se built-in options, IEv8.02 allows custom	Contact Name:
	Phone Number:
more definitions, such as by location, by	Email:
or by branch.	Type: APAC X
	Description: Headerquarter
	Data Center Regional Office
	Disaster Recovery
	Cancel OK
l	<u> </u>

## 2.8.3.Allow Use

The "Site Type" prope such as headquarter, recovery. Besides the user input to support network architecture

#### 2.8.4. Move Site Name Underneath Site Icon to Show Full Site Name

To fully display a site name on a map despite the scale of a site icon, IEv8.02 changes the visual design of the site icon by moving the site name underneath the site icon.



#### 2.9. Enhancements to Domain Maintenance

## 2.9.1.Categorize Unknown IP by Reason

IEv8.02 splits 10 sub-categories for the Unknown IP category in the Fine Tune module to sort discovered IP addresses by reason.

ive Access	IP addresse	s that NetBrain discov	ered but failed on both SNMP a	and Telnet/SSH attempts.	Help	1	Rediscover Search	Q 🛧 Export 😋 Re
Discovered by SNMP Only (111)								
<ul> <li>Unknown IP (94)</li> </ul>	IP Address	Source Device	Source Interface	Interface Description	Collection Source	Description	Reason	Discovery Time
Ping Failed, SNMP Failed (47)	10.10.10.99	sw-4500-15.254	Vlan30 (10.10.11.254/22)		Routing Table	Routing next hop	Ping Succeeded, SNMP Failed	17/12/2019, 17:58:52
Ping Succeeded, SNMP Failed (44)	10.10.13.122	sw3560-123	Vlan1 (10.10.30.13/22)		CDP	Switch,GigabitEthern	Ping Succeeded, SNMP Failed	17/12/2019, 18:02:49
Don't Support CLI (0)	10.10.24.10	sw3850-103	Vlan40 (10.10.13.103/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:13:36
CLI Non-privilege Login Failed (0)	10.10.24.11	sw3850-103	Vlan40 (10.10.13.103/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:13:40
CLI Privilege Login Failed (0)	10.10.24.2	sw3850-102	Vlan40 (10.10.13.102/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:02:57
CLI Configuration Retrieve Failed (1)	10.10.24.3	sw3850-102	Vlan40 (10.10.13.102/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:02:59
CLI Configuration Update Failed (0)	10.10.24.4	sw3850-102	Vlan40 (10.10.13.102/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:03:03
Others (2)	10.10.24.5	sw3850-102	Vlan40 (10.10.13.102/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:03:07
Missed Devices (0)	10.10.24.6	sw3850-103	Vlan40 (10.10.13.103/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:13:48
Unclassified Network Devices (2)	10.10.24.7	sw3850-103	Vlan40 (10.10.13.103/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:13:53
Unknown SNMP SysObjectID (2)	10.10.24.9	sw3850-103	Vlan40 (10.10.13.103/22)		CDP		Ping Succeeded, SNMP Failed	17/12/2019, 18:14:01
etwork and Topology	10.10.32.188	GW2Lab	GigabitEthernet0/0.20 (10		Routing Table	Routing next hop	Ping Succeeded, SNMP Failed	17/12/2019, 17:55:15
Duplicated IP and Subnet Manager	10.10.32.189	GW2Lab	GigabitEthernet0/0.20 (10		Routing Table	Routing next hop	Ping Failed, SNMP Failed	17/12/2019, 17:55:58
Topology Link Manager	10.10.32.200	GW2Lab	GigabitEthernet0/0.20 (10		Routing Table	Routing next hop	Ping Succeeded, SNMP Failed	17/12/2019, 17:55:15
MPLS Cloud (0) Generic Device (0)	10.10.33.119	GW2Lab	GigabitEthernet0/0.20 (10		Routing Table	Routing next hop	Ping Succeeded, SNMP Failed	17/12/2019, 17:55:16
Internet Cloud (0)	10.10.4.225	sw-4500-15.254	Vlan30 (10.10.11.254/22)		Routing Table	Routing next hop	Ping Succeeded, SNMP Failed	17/12/2019, 17:58:59
ther	10.10.44.1	Song_sp	Sw_InterConnected (172.2.		Routing Table	Routing next hop	Ping Failed, SNMP Failed	17/12/2019, 18:11:15
Hostname Change (0)	10.10.5.204	sw-4500-15.254	Vlan30 (10.10.11.254/22)		Routing Table	Routing next hop	Ping Failed, SNMP Failed	17/12/2019, 17:59:14
	10.10.7.117	sw-4500-15.254	Vlan30 (10.10.11.254/22)		Routing Table	Routing next hop	Ping Failed, SNMP Failed	17/12/2019, 17:59:16

Category (by Reason)	Description
Ping Failed, SNMP Failed	It contains the discovered IP addresses that the system failed to ping or access via SNMP.
Ping Succeeded, SNMP Failed	It contains the discovered IP addresses that the system can ping successfully but cannot access via SNMP.
Don't Support CLI	It contains the discovered IP addresses that don't support Telnet/SSH access.
CLI Connection Failed	It contains the discovered IP addresses that the system failed to access via both Telnet/SSH and SNMP.
CLI Non-Privilege Login Failed	It contains the discovered IP addresses that the system can access via Telnet/SSH but failed to log in.
CLI Privilege Login Failed	It contains the discovered IP addresses that the system can log in via Telnet/SSH in Non- privilege mode, but failed in Privilege mode.
CLI Configuration Retrieval Failed	It contains the discovered IP addresses that the system can log in via Telnet/SSH but failed to retrieve CLI configurations.
CLI Configuration Update Failed	It contains the discovered IP addresses that the system can log in via Telnet/SSH but failed to update the retrieved CLI configurations.
SNMP Configuration Update Failed	It contains the discovered IP addresses that the system can access via SNMP but failed to access via Telnet/SSH and update SNMP configurations fully.
Others	None of the above.

#### 2.9.2.Show Data Table Retrieval Success Rate in Benchmark Report

To provide a hint for path analysis, IEv8.02 adds a column for the retrieval success rate of data tables to each benchmark result, including system tables and network control tables (NCT).

Start from	m 2019-11-09										
	2010 11 05				to	2019-12-10		1000 1000			🔓 Refresh
Start T	lime	Duration	Task Resul	t	Configura	tion Retrieval Success Rate	Data Tabl	e Retrieval Success Rate	Retrieved Data Size (MB	Retrieved Data I	Log
12/9/2	2019, 1:43:01 PM	10 min	Succeeded		92.81% (1	55/167 devices)	78.32% (8	802/1024 tables)	14.46	4964	E 😚 📷
12/9/2	2019, 12:19:23 PM	5 min	Succeeded	1	95.81% (1	60/167 devices)	79.71% (8	13/1020 tables)	14.52	5036	E 😭 🐻

## 2.9.3.Enhanced Discovery/Benchmark Execution Log

To enable the lookup for the most time-consuming sub-task in a discovery/benchmark task, IEv8.02 separates a new column for Total Time Spent in the task execution log. This column shows the time spent on each subtask and can be sorted by value size.

Date & Time	Messages	Total Time Spent
12/9/2019, 1:43:01 PM	Begin: retrieve devices data.	
12/9/2019, 1:50:33 PM	End: retrieve devices data.	0 hrs 7 mins 32 secs
12/9/2019, 1:50:33 PM	There are no MPLS Cloud devices in your domain.	
12/9/2019, 1:50:33 PM	Begin:build topology	
12/9/2019, 1:50:33 PM	Try to build topology IPv4 L3 Topology	
12/9/2019, 1:50:57 PM	End: build IPv4 L3 Topology with 417 links.	0 hrs 0 mins 24 secs
12/9/2019, 1:50:57 PM	Try to build topology IPv6 L3 Topology	
12/9/2019, 1:51:04 PM	End: build IPv6 L3 Topology with 36 links.	0 hrs 0 mins 6 secs
12/9/2019, 1:51:04 PM	Try to build topology L2 Topology	

#### 2.9.4.Enhanced Benchmark Device Log

IEv8.02 introduces the following usability enhancements to the benchmark device log:

Ŭ	chMark_cb4caa: 12/9/2019, 1:4	3:01 PM						
5 Items		View:	Devices	with retrieval failures	~	Search device nar	me 🔍 🟦 E	xport 🔓 Refresh
Device Name	Device Type	Retrieval Time (s	econds	Configuration	Route Table	ARP Table	MAC Table	NDP Table
sw2960-121	Cisco IOS Switch	9		Succeeded via SNMP	Failed	Succeeded	Failed	Succeede
sw2960-105	Cisco IOS Switch	9		Succeeded via SNMP	Failed	Succeeded	Failed	Succeeder
sw2960-107	Cisco IOS Switch	9		Succeeded via SNMP	Failed	Succeeded	Failed	Succeeder
sw2960-106	Cisco IOS Switch	9		Succeeded via SNMP	Failed	Succeeded	Failed	Succeeded
FLEX-MGMT	Cisco IOS Switch	11		Succeeded via CLI	Succeeded	Succeeded	Succeeded	Succeeder
🧾 sw2960-130	Cisco IOS Switch	10		Succeeded via SNMP	Failed	Succeeded	Failed	Succeeded
😚 VRF-CE4	Cisco Router	14		Succeeded via CLI	Succeeded	Succeeded	Failed	Succeeded
😚 BJ-R1	Cisco Router	11		Succeeded via SNMP	Failed	Succeeded	Failed	Succeeded
😚 Multicast-R1	Cisco Router	14		Failed	Succeeded	Succeeded	Failed	Succeeded
IPSEC-Router	Cisco Router	15		Succeeded via CLI	Succeeded	Succeeded	Failed	Succeeder 🚽
		4						•
ve Access Log of s	w2960-130:							
13:43:08 Begin data	a retrieving task							1
13:43:08 Prepare re	etrieving command.							
13:43:08 Can not Te	elnet/SSH to the device.							
13:43:13 Retry to ge	et device command							
13:43:13 Can not Te	elnet/SSH to the device.							
13:43:13 Begin to re	etrieve NDP table via SNMP.							•

- Add device icons in the column of Device Name and add a column for Device Type to distinguish the vendor/model.
- Freeze the two columns: Device Name and Device Type to ensure users won't be lost when scrolling horizontally.
- Change the font color for failures to red.

#### 2.10. Enhancements to Service Monitor

#### 2.10.1. Schedule Service Auto-Restart for Front Server (Controller)

The longer time the system has been running for, the more memory usage it will consume, and the more junk data it will generate. IEv8.02 adds the capability to schedule an auto-restart of the service for Front Server and Front Server Controller recurringly, to solve some complicated issues with can be fixed by a restart button.

By default, the auto-restart settings are disabled. Users can enable an auto-restart on specified servers and select a proper time point and frequency.

Auto-restart	Settings		x
🛕 Please	select a proper time to auto-restart	server services. Note: Running tasks might be ended by se	rvice restart.
Enable	Service Type	Servers	Auto-restart Time and Frequency
•	NetBrain Front Server Controller	AutoWebServer-32-105(10.10.32.105)	Every 100 days, Start Time: 12/17/2019 02:16 PM
	NetBrain Front Server	AutoWebServer-32-105(10.10.32.105), I 🗸	Every 100 days, Start Time: 12/17/2019 01:00 AM
			Cancel OK

**Note:** Running tasks might be ended by a service restart.

#### 2.10.2. Alert for Stopped Services

Service anomaly may cause functionality issues in the Thin Client. It usually takes too much time to debug an issue about functions, but finally, it turns out to be caused by stopped services.

IEv8.02 can alert users when any system service has stopped. Users can timely take actions if required, such as restarting these services.



#### 2.10.3. Log Analysis for System Health

In previous versions, the system added the capability to collect Support Logs for troubleshooting purposes. To proactively check system health, IEv8.02 Service Monitor adds the capability to analyze a large number of logs for various NetBrain services and even Windows Event Logs, and extract key words out of them to summarize the addressed issue types and causes. As a benefit, both the Support Team and admin users are able to look into the detailed logs to drill down and resolve the issues before end users might encounter them.

Net	Brain Serv	vice Monitor				🉀 MongoDB [	Disk Alert Rules	G Refresh 🛛 🗕 admin ▼
Server:	All	✓ Type: All		∨ From	Click to select a date/time	To Click to sele	ect a date/time	Log Analyze
Tasks:	12/31/2019, 3:20:51 PM	✓ Download 12/14/2019	9, 2:40:00 PM	1/4/2020, 2:40:00	Issues			×
	Server •	Service	Known	Unknown	/			
	DB31	RabbitMQ	1	21	Category		Description	
	DB31	Redis	0	4	start		OnStart	
	WIN-RT25HL0D3UV	NetBrain Worker Server	7	6978	task		SubmitTaskFlow t	timeout
	WIN-RT25HL0D3UV	NetBrain Front Server Controller	0	3	task		SubmitTaskFlow e	error
	WIN-RT25HL0D3UV	Event	9	0	BuildL3MultiDeviceMediaIpMask		redisHelper.Locki	Media failed
	WIN-RT25HL0D3UV	NetBrain Task Engine	1	0	BuildL3MultiDeviceMediaIpMask		redisHelper.AddN	Nedia2Edges failed
	WIN-V86T8P82MUJ	IE Web	4	68	task		send result to XFA	Agent
	WIN-V86T8P82MUJ	NetBrain Front Server	1	2				
	WIN-V86T8P82MUJ	NetBrain Front Server Controller	0	143	Issues			~
	WIN-V86T8P82MUJ	Event	28	0				^
	WIN-V86T8P82MUJ	Knowledge Cloud Proxy	0	3	Category		Description	
	WIN-V86T8P82MUJ	NetBrain Task Engine	1	0	UnknowError		failed to load DLA	task
					UnknowError		parser table not e	exist.

#### 2.11. Enhancements to Change Management

#### 2.11.1. Use Variables in Config-let

The change configs in Change Management (CM) are displayed in plain text, so there are security risks in some cases. For example, when users modify the device login password in batches through a CM task, it is not secure because passwords are displayed in plain text. Another example is that when users perform ACL security configuration for traffic access control through a CM task, they face the risks of security configuration reveal.

To resolve the security vulnerability and make change config more flexible, IEv8.02 enables users to use variables in config-let. The creator can hide sensitive data with variables when defining a Change node. For example, they can use variables to hide the passwords in a config-let. Only users with specific privileges can view or edit the values of the variables.

#### **Use Flow**



#### 1. Add Variables

At the **Define Change** node, click **Insert Variable** to add variables and assign values.

Insert Variable					×
Total:2 items + Add	Edit Varia	ble		~	٩
enable_password con_password	Name:	enable_passv	word		
	Value:	enable 123			
		Cance	Save		
			Cancel		Insert

#### 2. Replace Data with Variables

Insert the corresponding variable to replace sensitive data you want to protect. The value will be decrypted to form the actual commands sent to the device when the system executes the changes. Enter [] and select the corresponding variable.



The system only shows variable names and hide specific data in the commands. The execution logs also hide the specific data.



Only users with 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

#### 2.11.2. Schedule Change Management Task via REST APIs

IEv8.02 allows users to schedule a network change task via Restful APIs. See <u>section 3.6</u> for more details.

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

#### 2.12. More Feature Enhancements

#### 2.12.1. Enhancements to API-Triggered Automation

IEv8.02 has improved the API-triggered task function in the following ways:

• Allow drawing multiple devices and their neighbors and auto-link them on a map.

Service Stub		5.576			
		Variable Input			* Requir
I Stub Name: st	tub1	Туре	Variable Name	Default Value	
scription:		API Service Stub			
			* \$stub_name	stub1	
			\$mode	Real-Time	
gger Option: R	teal-time Edit		\$max_waiting_hours	1	
Ta	sk will be run automatically when triggered. Max wait time:	1 Hrs	* \$domain_name	BVT_DB2DOM_cdca8	
How would yo	u like to create the map?	A Map Creation			
Map Multip	ale Davises and Their Neighbors		* \$devices	N/A	
wap wurup	Devices and men reignoors		\$auto_link	true	
Auto Link A	All Devices IPv4 L3 Topology V		\$auto_link_type	L3_Topo_Type	
Include Dev	vice's Neighbors		\$include_neighbor	false	
			<pre>\$neighbor_type</pre>		
	Device 3				
Would you like	Sampi e to add a Runbook? (Optional)	e Map			
	browse kunbook	5		Ca	ncel Save

- Improve the API-triggered automation to allow searching the basic information of a map under a folder and decide whether to execute the runbook contained in the map.
- Improve the <u>path API</u> to draw multicast reverse paths. Set \$path\_type to multicast, assign the
  multicast receiver address value to \$destination, multicast source value to the \$source, group value
  to \$group, and call APIs to draw the multicast path.

		Variable Input			* Require
API Stub Name:	stub1	Туре	Variable Name	Default Value	
Description:		API Service Stub			
			* \$stub_name	stub1	
Triana Ontina			\$mode	Real-Time	
Trigger Option:	Real-time Edit		<pre>\$max_waiting_hours</pre>	1	
	Task will be run automatically when triggered. Max wait time: 1	Hrs	* \$domain_name	BVT_DB2DOM_db634	
How would	you like to create the map?	Map Creation			Settings
Man a P	ath		* \$source	auto	
Map a 1			* \$source_gateway	auto	
			* \$destination	auto	
\$sour	ce \$source_gateway	source gateway source			
172.24	1/222/3218/27		\$group	source_gateway     auto       \$destination     auto       \$path_type     unicast       \$group     auto       \$destination_gateway     auto	
	\$destination		\$destination_gateway	auto	
			\$protocol	IPv4	
	172.24.32.224/28 BSTX.Core 17.2.24.32.19 Mgmt IP: 172.24.31.195		\$source_port		
	Sample		\$destination_port		
			\$data_source	Live Network	
			\$direction	false	
2 Would you	like to add a Runbook? (Optional)		<pre>\$use_config_in_current</pre>	. true	
	Browse Runbooks		\$I3_active_path	false	
				C	ancel Save

A multicast path is shown as follows:



## 2.12.2. Support the Display of Multiple Device Data Dialogues Concurrently

IEv8.02 enables users to concurrently launch multiple dialogues from the Device Detail pane by introducing non-modal dialogue (resizable). As a benefit, users can view information from multiple device data tables in one screen under the following circumstances:

• Compare the interface configurations between a pair of neighbor devices on a map to troubleshoot the IP mismatch issue.



• Check the configuration file, route table and ARP table for a single problematic device.

	Þj									×C	Ret Path				🧙 🌲	💄 adm	in 💮 E	IVT_DB2D	ООМ_8460
De	vice Details	0							-	Configur	ration File of BJ*POP								×
	BJ*PO Cisco-28	<b>P</b>				_		_	-	Data Si	ource: Current Ba	seline	✓ Execution Time: 1	7/12/2019, 13:44:02			۹.	•	£
	Properties oute AF	Configu P MAC	NDP N	Topolog	S/ Da	ta Tables	CLI Commi	1 Export	t sj	Full C	Configuration aaa authenticatio aaa authenticatio aaa authorization	v n login n enable config-	default group tacacs+ local default group tacacs+ enab commands	Search	<b>a</b> ~	^	Match	Whole V	Word
Site	'Global'		~			Search Dest.	Addr, Next H	op IP or Hos	tnome	32	aaa authorization aaa authorization	command command	s 0 default group tacacs+ local s 1 default group tacacs+ 1 s 1 default group tacacs+ 1	ocal					
	Alg.	Dest.Add	Mask	Distance	Metric	Interface	Next Ho	Next Ho	Age	34 35	aaa authorization aaa session-id co	command mmon	s 15 default group tacacs+	local					
cwork	0	1.1.1.1	32	110	66	Serial0/1/0	172.24.3	BSTX.Core	e 7w0d	36	ip subnet-zero								
	O E2	192.168	24	110	28	FastEthe	172.24.3	NY-core	. 7w0d	38 39 * 40	· ip cef								
ath	O E2	2.2.2.2	32	110	200	FastEthe	172.24.3	Bj_core	5d22	41	in yef Bl								
-	O E2	192.168	24	110	20	FastEste	172.24.3	NY-core	. 7w0d	43 44	rd 100:100 route-target exp	ort 100:	100						
	O E2	192.168	32	110	20	FastEthe	172.24.3	NY-core	. 7w0d	45 46	route-target imp	ort 100:	100						
mplate	O E2	172.21.3.0	24	110	200	FastEthe	172.24.3.	B]_core	. 7w0d	47 - 48	rd 200:200								
<del>59</del>	O E2	172.25.5	24	110	300	FastEthe	172.24.3	Bj_cone_	6w1d	49 50	route-target exp route-target imp	ort 200: ort 200:	200 200					_	
ange	O E2	172.25.5	24	110	300	FastEthe	172.24.3	BJ_core_	'Global	l' ARP Table	e of BJ*POP								
2	O E2	172.25.5	24	110	300	FastEthe	172.24.3	BJ_core_		-									
arch	O E2	172.25.3	24	110	300	FastEthe	172.24.3	BJ_core_	Data	Source:	Current Baseline	~	Execution Time: 17/12/20:	19, 13:44:02		6	1º •	£	
	O E2	172.25.3	24	110	300	FastEthe	172.24.3	BJ_core_											
	O E2	172.25.4	24	110	300	FastEthe	172.24.3	BJ_core_	'Gl	lobal'	~				Search			Q	
	O E2	172.25.1	24	110	300	FastEthe	172.24.3	BJ_core_	Inte	erface		IP Ad	ddress	MAC Address	Vendor				
	O E2	172.25.1	24	110	300	FastEthe	172.24.3	BJ_core_	Fas	stEthernet0	0/1	172.	24.31.195	0021.5589.B521	Cisco Systems			Â	*
	O E2	172.25.1	24	110	300	FastEthe	172.24.3	BJ_core_	Fas	stEthernet0	0/1	172.	24.31.193	0009.7CC9.2D61	Cisco Systems				
	O E2	172.25.5.0	24	110	300	FastEthe	172.24.3	Bj_core_	Fas	stEthernet0	0/0	172.	24.32.225	0021.5589.B520	Cisco Systems				
	O E2	172.25.4.0	24	110	300	FastEthe	172.24.3	B]_core_	Fas	stEthernet0	0/0	172.	24.32.226	000E.D7A7.B900	Cisco Systems			-	
								~											

## 2.12.3. Enhanced Device Data Comparison Flow

IEv8.02 enables users to directly view the comparison result for device data from the Device Detail pane, including configurations and a variety of data tables.

When users click the Compare button on the Configuration File or Data Table tab, the system directly displays the comparison result rather than launching a Runbook, which requires a few more clicks.

Device Details	s ×		
L2_NDP_HPpro_sw1 H3PreCurve Skt2s		Compare Result	x
sh Compare t. Export	n Note	Device: 🥔 BAS-H2-DTP06A	Data: 📴 Configuration File
Properties Configuration File Topology Data Tables		2019-12-17 11:03:52 AM (Current Baseline) $\vee$	
		! Info via SNMP: sysoid=1.3.6.1.4.1.2636.1.1.1.4.82.5,vendor=Juniper Networks,model=QFX	5100-485,hostname 📩 Info via SNMP: sysoid=1.3.6.1.4.1.2636.1.1.1.4.82.5,vendor=Juniper Networks,model=QFX5100-485,hostname
Full Configuration	Ф 🛛 💶 🗩	BAS-H2,DTP064#show configuration   normore	show configuration   normane
Search 🖬 🗸 🔪 Match Who	e Word	Entrementer aur@PAS.H2.DTD06Aselaur seefin variant Line mans	
		factoryscript.svogex-n2-b1Puex-snew configuration   no-more	tactoryscript.svc@bk3-m2-D1Pubk>snow.comiguration   no-more
1 * 1 Into Via SWPP: Sysoid=1.3.6.1.4.1.11.2.3.7.11.51,Vendor=MP,Model=Procurve Switch 2 L2_NDP_HPpro_swl#show running-config	541221 .	## Last commit: 2018-05-19 13:52:25 BST by hhector	## Last commit: 2018-05-19 13:52:25 BST by hhector
3 L2_NDP_HPpro_swl#show running-config 4		version 14.1X53-D40.8;	version 14.1X53-D40.8;
5 Running configuration:		groups {	groups {
7 ; J8698A Configuration Editor; Created on release #K.15.06.0017 View #02120 Au15		common-agg-policies {	common-agg-policies {
9 10 hostone 112 MD Hose and 1		policy-options {	policy-options {
11 time timerone 60		community dc-to-dc-mcast members 64553:2000;	community dc-to-dc-mcast members 64553:2000;
13 fastboot		community dc-to-dc-unicast members 64553:2001;	community dc-to-dc-unicast members 64553:2001;
15 module 2 type 39307A		community dc-to-sfti-uc-NYSEGROUPCORP members 64553:1064;	community dc-to-sfti-uc-NYSEGROUPCORP members 64553:1064;
10 module 3 type 3930/A 17 module 9 type 39534A		community dc-to-sfti-RVBB members 64553:1025;	community dc-to-sfti-RVBB members 64553:1025;
18 module 10 type 38782A 19 module 11 type 39388A		community db2-sw1 members 64553:2	community db2-sw1 members 64553:2
20 module 12 type 39309A 21 switch-interconnect L4		community production-ylans members "/64553/(1121)\$"	community production-vians members "A64553/[112]_18"
22 interface A1 23 name "Monitor Port"			5 (100 (100 (100 (100 (100 (100 (100 (10
24 exit		community std-external-mc memoers 04050:2002;	community site-external-inc memoers 6400012002;
25 Interface b22 26 disable		community csp-external-mc members 64553:2004;	community csp-external-mc members 64553:2004;
27 exit		community dh5-sw1 members 64553:0;	community dh5-sw1 members 64553:0;
29 name "sa_33"		community dh5-sw2 members 64553:1;	community dh5-sw2 members 64553:1;
30 exit 31 interface C9		community db2-sw2 members 64553-3	community db2-sw2 members 645533
32 name "sa_40" 33 exit			· · · · · · · · · · · · · · · · · · ·
34 interface C13		community dc-users-on-sfti members 64553:2009;	✓ community dc-users-on-sttl members 64553:2009;
35 power-over-ethernet high 36 poe-allocate-by value			
37 poe-value 33			🗌 0 Added 📃 0 Removed 🛄 3 Modified
38 exit			A

#### 3.1. Enhanced Platform Framework

#### 3.1.1.New Multi-CLI Mode Support

In previous versions, the system allowed users to customize login prompts and commands based on the privilege and non-privilege modes. However, this customization is not applicable when a device type has other CLI modes. For example, a Cisco Firepower includes three modes: FXOS mode, FTD mode, and ASA mode, so the customization based on the privilege and non-privilege modes does not apply to this scenario.

To support more CLI modes and enable users to define commands dedicated to a mode, IEv8.02 optimizes the multi-CLI mode function.

#### **Define More CLI Modes in Driver**

Power users can customize to add multiple CLI modes for a device type in the device driver. The customization includes expected prompts and commands for each mode, and the dedicated CLI commands. During the live access to a device, the system attempts CLI modes from top to bottom until addressing the right one.

**Example1:** Define a mode and the corresponding prompts

							w Mode			
						Ν	Jame: FTD Mode			
							UI JSON			
Login Proce	ess Settings: 🔘 Stan	dard login pro	cess			L	ogin: + Add Row			
+ Add Mode	e						Expected Prompt	Send Command	Hide Comma	nd
Order	Mode	Command	CLI Mode for Change Management	CLI Mode for Ping/Traceroute			#	connect ftd		v
1	Non-privilege Mode	None	Disable	Disable		F				
2	Privilege Mode	None	Disable	Disable						
					-					
				Cancel O	к	A	dd CLI commands to this mode 🜖			
						0	show running-config show route			
						9	show mac-address-table			
							Enable this mode for Change Manageme	nt 🔒		
							Enable this mode for Ping/Traceroute			
									Cancel	OK

**Note:** After defining CLI modes in a driver, users can modify the login scripts in the advanced settings of the Shared Device Settings, but the modified scripts will not be synchronized to the driver.

If users specify CLI commands dedicated to a mode, the system will send the commands in the specified mode.

w Mode			
Ismo: ETD Mode			
ame: FID Mode			
UI JSON			
ogin: + Add Row			
ogin. · Addition			
Expected Prompt	Send Command	Hide Comman	ld
#	connect ftd		~
dd CLI commands to this mode	: 🚯		
vdd CLI commands to this mode show running-config show route	2		
ted CLI commands to this mode show running-config show route show mac-address-table	• •		
Add CLI commands to this mode show running-config show route show mac-address-table Enable this mode for Change	e 🚯 Management 🚯		
Add CLI commands to this mode show running-config show route show mac-address-table Enable this mode for Change Enable this mode for Ping/Tra	Management 1		
Add CLI commands to this mode show running-config show route show mac-address-table Denable this mode for Change Denable this mode for Ping/Tra	e 🜒 Management 🏮 aceroute 👔	Cancel	OK

Note: If multiple modes are associated with the same command, the system does not try the command in the subsequent modes when it is executed successfully in a mode.

## 3.1.2.Build/Retrieve Configuration File for SDN Nodes via TechSpec

In previous versions, the system did not retrieve configuration files for some SD-WAN devices after discovering them via APIs (TechSpec), which caused the problem that Policy and ACL check based on configuration files cannot be implemented in the system.

IEv8.02 improves the configuration retrieval for SDN nodes in the following aspects:

- Enable the configuration file retrieval in TechSpec.
- Add the logic to retrieve configuration files via API > CLI > SNMP when retrieving them in the benchmark/live path/parser/device configuration pane.

#### 3.1.3.New APIs for Plugin/Qapp

IEv8.02 introduces two system APIs for Plugin/Qapp functions:

Category	APIs	Description
Tune	ExcuteSharedTuneDevice()	Tune devices and report tune results.
	ExcuteTuneOneDevice()	
	ExcutePrivateTuneDevices()	
	ExcutePrivateTuneOneDevice()	
	GetTuneDeviceResultByDevlds()	
	GetPrivateTuneDeviceResultByDevIds()	
Hostname Change	GetHostnameChangeList()	Detect hostname change and keep the latest
	UpsertHostnameChangeList()	hostnames.
	KeepLastChangeDevice()	
	SubmitHostNameChangeChildTask()	

#### 3.2. Extension Based on Enhanced Platform Framework

#### 3.2.1.QoS Path Support

In previous versions, the platform framework provided the capability of traffic path calculation above Layer 4, such as checking DSCP value/URL in ACL or PBR. However, the specific scripts to calculate a QoS path were not available.

IEv8.02 system adds the path scripts to enable the L3 QoS path calculation. The system retrieves QoS parameters such as DSCP, IP Precedence and QoS-Group based on the server-policy information configured

on an interface. It automatically calculates an L3 QoS path based on the QoS policies.



<u>Note:</u> The system cannot recognize and retrieve the QoS information of an end system. When the source device is an end system with QoS configured, end users need to configure the QoS values manually before calculating a QoS path.

Path Settings		×		
Protocol:	IPv4			
Data Source:	Live Network			
	Use configuration in Current Baseline           Calculate L3 Active Path	Configure		×
, Advanced	Use CLI command with arguments ()	Co5 Value:	0	
Path Logic:	Continue calculation even if denied by interface-level policy (such as ACL)	DSCP Value:	default	
	Continue calculation even if denied by device-level policy (such as policy) Enable Path IP and Gateway Fix-up Rule	Precedence Value:		
Log Mode:	Production	QoS-Group Value:		
	Debug			
Parameters:	Configure		Cancel OK	
	Cancel OK			

## 3.2.2.Cisco Wireless L2 Path Support

IEv8.02 improves the support of the L2 path across wireless devices and supports an L2 path calculation across Cisco LWAPs in the Local and Flexconnect mode.

#### L2 Path across LWAPs in Local Mode:



#### L2 Path across LWAPs in Flexconnect Mode:



#### 3.2.3. Hostname Change Support to VDC Devices

IEv8.0 introduced the **Hostname Change** function to detect and resolve device hostname duplication issues. It scans device serial numbers and lists the devices with duplicate serial numbers as possible candidates with hostname changes. But this logic does not apply to VDC devices, because each VDC device in a group is a unique device with the same SN. The system always recognizes VDC devices as hostname-changed devices.

IEv8.02 enhances the hostname change logic for VDC devices:

- The system adds a GDR property **VDC\_MAC** to differentiate VDC devices in a group.
- The system checks both SN and MAC address during the hostname change check for VDC devices.
   Only when two devices have the same SN and MAC address, the system determines that one device is the other one's hostname-changed device.

#### 3.3. Path Framework Enhancements

#### 3.3.1.Enhanced Path Debuggability

To help end users address the underlying causes of path issues quickly, IEv8.02 introduces the following improvements on path debuggability:

- Add logs for retrieving data tables and CLI commands during path calculation.
- Add path message categories and error tips.

#### Add Logs for Data Tables and CLI Commands

IEv8.02 records the logs of retrieving data tables and CLI commands during a live path calculation in the Debug mode.

 View the execution logs of system tables and NCTs (network control tables) generated during a path calculation.

Execution Ti	ime: 1/7/2020, 10:	49:37 AM	V		6	Ŧ	£
'Global'	~		View Log			lostnam	ne.Q
Alg.	Dest.Addr	Mask	1	SSH to device 10.10.7.253 via FS1(10.10.32.144)			
0	1.1.1.1	32	2 3	SSH to device 10.10.7.253 successfully via FS1(10.10.32.144) Sending "" command			-
0 E2	2.2.2.2	32	4	Return from Device:[GW2Lab>] Sending "show ip route summary" command		h	
с	3.3.3.3	32	67	Received:GW2Lab>show ip route summary IP routing table name is default (0x0)			
с	3.3.3.4	32	8 9	IP routing table maximum-paths 15 32			
С	3.3.3.5	32	10	Sending "show ip route" command			
с	3.3.3.6	32	13 14	Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGF D - EIGRP, EX - EIGRP external. O - OSPF. IA - OSPF inter area	,		
с	3.3.3.7	32	15 16				
с	3.3.3.8	32	17 18	Sending "exit" command SSH to device 10.10.7.253 disconnected.			
с	3.3.3.9	32	19				
0 E2	9.8.130.0	24					
0 E2	10.10.0.0	16					
с	10.10.0.0	22					
L	10.10.3.253	32					
с	10.10.4.0	22					
L	10.10.7.253	32					
С	10.10.8.0	22					
L	10.10.11.253	32		OF	<		-

• View the execution logs of CLI commands generated during an L3 active path calculation.



#### Add Result Categories for Failed Paths

IEv8.02 adds result categories for failed paths in the Path Browser and Application Manager to help identify problem types about failed paths, such as missing data, path logics and framework flaws. The categories enable NetBrain Teams to target the problem scope faster than before and improve the efficiency of resolving path issues.

Path	Browser								_	G ₽ >
+ N	ew Application + I	New Path 😃	Import 🟦 Expo	t∨					Appli	cation Manager
Tota	l Entries: 1 Applicatio	ons, 3 Paths	2 Succeeded 1 Fa	iled					Search	٩
	Application	Path	Source	Destination 🚯	Group 🚯	Protocol	Last Result	Result Category		History
-	Untitled Applic									
		U path1	10.10.16.17	10.10.32.1		IPv4	Succeeded			-1
		U Path2	10.10.16.17	172.24.101.52		IPv4	Suc No next	hop IP and output in	nterface were fou	nd
		U path3	10.10.16.17	8.8.8.8		IPv4	Failed	Lack of related inf	formation	1 🗸

The information in the result category can be exported along with the path exports in the Application Manager and Path Browser.

#### 3.3.2.Enhanced Path Calculation for Unknow End Systems

In previous versions, a path related to unknown end systems failed when

- Duplicate unknown end systems were found as a next-hop device during a path calculation.
- Many existing virtual IP addresses were recognized as unknown end systems.

To resolve these issues, IEv8.02 enhances path calculation for unknown end systems:

- Use the latest unknown end system as the next-hop device when the system finds multiple ones during a path calculation.
- Exclude more virtual MAC addresses for Cisco, Juniper, and Fortinet devices, so that the system will not recognize them as unknown end systems.
- Allow users to delete One-IP table entries and unknown end systems together manually.

		Search for de	evice, configura	tion text						Q
		One-IP Table							G	ŧ×
	,	DNS Server	Settings <u>,</u> ↑	, Export	G Refresh	Resolve All DN	15			
+		Total Entries: 6	500	Show Unknow	wn End System	Only	Search by IP/M/	AC/LAN/DNS Na	me (	2
		IP Addres	LAN Segm	MAC Addr	Vendor	Switch Port	DNS Name	Descriptio	Data So	ur
Files		9.8.130.1	9.8.130.0/24	0011.9389	Cisco Syst		BII 2 Corre_3		Device I	*
		172.26.10	172.26.10	0019.2FBE	Cisco Syst	Map Delete	-A		Device I	
*		172.24.10	172.24.10	0017.59F3	Cisco Syst	Delete	bit		Device I	
Site		172.24.10	172.24.10	001B.2A9A	Cisco Syst	BJ-R1.Gigabit	BJ-R2.FastEth		Device I	
		158.2.4.81	158.2.4.0/24	AABB.CCO			SNMPv3all.Et		Device I	
Network		172.26.7.1	172.26.7.0	0011.9389	Cisco Syst		BJ_L2_Core_3		Device I	1
<u>9</u> 2		172.26.7	172.26.7.0	00A0.C902	INTEL COR	BJ_L2_Core_3	ASA-AA/admi	connect to	Device I	
Path Browser		172.26.7	172.26.7.0	00A0.C902	INTEL COR	BJ_L2_Core_3	ASA-AA/admi	connect to	Device I	1

#### 3.3.3.Pin the Path Result Pane

In the previous versions, some devices might be overlapped by the Path Result pane after calculating a path. To resolve this issue, IEv8.02 adds a Pin function. After users pin the Path Result pane, it will squeeze the map so that the map content can be fully displayed.



#### 3.4. Fully Extensible MPLS Cloud Framework

In the previous versions, MPLS Cloud was used to simulate an MPLS network that carries traffics for customer networks at different regions, which enabled users to calculate the traffics across the MPLS Cloud to make their network complete in the NetBrain system. However, as more cloud deployment scenarios and technologies increase, the limitations of the MPLS Cloud framework arise:

- It cannot simulate PE-side redundancy deployment scenarios because the CE interface cannot be configured to connect to multiple PE IPs.
- It cannot simulate CE-side redundancy deployment scenarios because multiple CE interfaces cannot be configured to connect to the same PE IP.
- It cannot add CE interfaces configured with IP unnumbered configuration.

- It is not extensible to support the deployment scenarios of Carrier Supporting Carriers (CSC) and Inter-Provider.
- It is not extensible to support other cloud technologies, such as VPLS.

To resolve the above limitations, IEv8.02 has redesigned the Cloud framework to make it a generic with high scalability. The new Cloud framework enables NetBrain Platform Team to define a cloud-based via JSON and Python so that they can flexibly adjust and develop cloud functions based on network situations.

Besides MPLS Cloud, the new Cloud framework uses the Cloud concept to represent the network connecting to users' networks but not managed by the users, for different technologies such as VPLS and IPv6.

#### **Use Flow**



# 3.4.1.Add Cloud Type

Each cloud type is composed of four components, which are used to build the data model for cloud topology and path calculation:

Component	Description
Property	Define which parameters need to be filled in. For an MPLS Cloud, the parameters include PE devices, CE interfaces, and other parameters.
NCT	Define the NCT needed by a cloud to calculate the path crossing cloud. For example, the virtual route table for an MPLS Cloud, the virtual MAC table for a VPLS cloud.
Тороlоду	Define the logic to calculate the topology for a cloud and its neighbor devices.
lcon	Define the Cloud icon displayed in the system.

<u>Note</u>: After adding or modifying a cloud type, you need to add or adjust the path scripts used to calculate paths for this cloud type.

To enable users to use the MPLS Cloud function directly, the system offers a built-in "MPLS L3 VPN" cloud type and power users can define an MPLS cloud as usual based on this cloud type.

#### Example: Built-in Cloud Type for MPLS L3 VPN

		-1							
User Authorization $\times$	Domain List	× Clou	d Type Defin	ition ×					
🕂 Add Cloud Type 🛛 🛓 Ir	mport	Name: MPLS	L3 VPN			ID: 1024	ļ.		
MPLS L3 VPN	~	Property	NCT Table	Topology	lcon				
		JSON Scr	ipt						
		Please enter	JSON to defin	e property. 🌈					
		1 - [	-						
		2 -	{ "name":	"cloud into	erface".				
		4	"displa	ayName": "PE	Interface,	ce",			
		5	"dataTy	/pe": "strin ped": true	g",				
		7	},	cu i cruc					
		8 -	{						
		10	"displa	avName": "IP	, of PE In	nterface".			
		11	"dataTy	/pe": "ip",					
		12	"requir	red": true					
		13	35 {						
		15	'name":	cloud_vpn	",				
		16	"displa	ayName": "VPI	Ν",				
		1/	"dataly	/pe": "string	g",				
		19	}.	cu . Tuise					
		20 -	{						
		21	"name"	edge_devi	ce",				•
								Save	
								Save	

## 3.4.2. Define Specific Clouds for a Cloud Type

After defining a cloud type, power users can define specific clouds in their domain. After they select a cloud type, the system automatically loads the parameters defined in the cloud type.

		MAN			
Ping Succeeded, SNMP Fail	U Define your cloud to	or wan connectivity.			n
Don't Support CLI (0)	+ <u>Add</u> 2				
CLI Connection Failed (0)	Cloud Name	Cloud Type	Edge Device Count	Name:	MPLS_BOS_WDC
CLI Privilege Login Failed (	MPLSBGP	MPLS I 3 VPN	2	Cloud Type:	MPLS L3 VPN
CLI Configuration Retrieve	MPLS AdevertisePout	MDIS 13 VDN	2	Description:	
CLI Configuration Update F		MPLS LS VPN	-		
SNMP Configuration Upda	MPLS_Aggregation2	MPLS L3 VPN	2		
Others (0)	MPLS_BigAsNumber	MPLS L3 VPN	2		
Missed Devices (0)	MPLS_GlobaltoVRF	MPLS L3 VPN	2		
Unclassified Network Devices ((				+ Static Int	erface + Dynamic Search Interface - + Exclude - Search Q
Unknown SNMP SysObjectID (0				251	
Discovered Devices (2)				PEInt	terface CE Device CE Interface IP of PE Inte VPN CE Interface VRF on Inte
<ul> <li>Network and Topology</li> </ul>					
Duplicated IP and Subnet Mana					
Topology Link Manager					
Cloud Manager (5)					

Compared with the previous versions, there are some changes in the MPLS Cloud definition:

1. Select **MPLS L3 VPN** as the cloud type.

- 2. Fill in the PE interface instead of the routing protocol when manually defining an MPLS cloud via Static Interface
- 3. Fill in any content based on display needs on a map for the configuration of a PE interface. For example, fill in the PE interface "Connect to ATT Boston", then they will see that MPLS Cloud uses this interface to connect to the CE device on the map.

						×	
Name: Cloud Type:	MPLSBGP	1			V	-	
Description:	mpls						
+ Static Int	erface + D	ynamic Search	Interface	Add Static Interface			×
A PE Int	erface	CE Device	CE Interfa	* PE Interface:	Connect to ATT Boston		
⊿ Dyna	mic Searched (2)			* IP of PE Interface:	172 27 44 2		
Ether	net0/1-172.27	CE1	Ethernet(				
Ether	net0/2-172.26	CE2	Ethernet(	VPN:			
				* CE Device:	CE1		Browse
				* CE Interface:	Ethernet0/1		$\sim$
				CE Interface Description:			
CE Device Co	unt: 2			VRF on Interface:			
Help					Clo	ise	ОК

# 3.4.3.Build Cloud Topology and NCT Data for Path Calculation

After defining a cloud, power users need to build the connection topology between a cloud and its neighbors and retrieve the NCT data used for path calculation through a benchmark task.

Take MPLS L3 VPN for example:

• Build the MPLS topology via the **IPv4 L3 Topology** option.

∨ Build Topology	
Enable	Operation Name
	IPv4 L3 Topology
	IPv6 L3 Topology

• Calculate the virtual route table via the **Recalculate Cloud NCT Table** option.

∨ Update Cloud							
Enable	Operation Name						
	Recalculated Cloud						
	Recalculate Cloud NCT Table						

## 3.4.4.Calculate Path Across a Cloud

After building the topology and NCT data, end users can calculate a path across the defined cloud.

#### Example: A Path across MPLS Cloud



#### 3.5. L2 Topology Improvements

#### 3.5.1.Auto Clean Unknown End Systems

For a network using DHCP, an IP address may be assigned to different PCs at different times. This causes multiple unknown end systems with the same IP address, but different MAC addresses existed in the domain. When the system calculates a path across this kind of unknown end system, the path will fail due to duplicated MAC entries.

To resolve this issue, IEv8.02 will automatically clean outdated unknown end systems when a One-IP table entry is deleted via either of the following methods

• When a One-IP table entry older than the specified days (auto clean) is automatically deleted from the system, the unknown end systems generated by the One-IP table entry will be deleted.

Data Type	Data Size	Auto - Clean Rule			
Qapp/Gapp Execution Logs	N/A	<ul> <li>Delete data older than</li> </ul>	14	days	•
One-IP Table Entries	4KB	Delete data older than	14	days	•

 When One-IP table entries are deleted at L2 topology rebuilding after enabling the DHCP Filter function, the unknown end systems generated by the One-IP table entries will be deleted.
 Build L2 Topology Option

Minimum subnet mask:	16
Filter DHCP Entries	

Only save One-IP table entries that have values in Switch Port or DNS Name parameter

<u>Tip:</u> When the DHCP filter is enabled, the system filters out the outdated DHCP entries and only keeps the latest IP addresses when building build L2 topology.

## 3.5.2.Enhanced L2 Topology of SDN Nodes

IEv8.02 has enhanced the L2 topology algorithm to improve the accuracy of L2 Topology in the virtualization, legacy and SDN mixed network.

#### Gateway of a VM host in Legacy Network

In the previous versions, when the gateway of a VM host was a legacy device and the ACI Leaf Switch connected to the gateway worked as a pure L2 switch, the system cannot calculate the L2 path in this network scenario because of topology issues.



IEv8.02 has resolved the L2 topology connection issues and supported the path calculation by optimizing topology calculation logic: When generating an end system, if an entry in the Global Endpoint Table has only MAC Address without IP Address, the system uses the MAC Address to find the IP + MAC entry without a

switchport in the One-IP Table, generates a legacy end system and then save the L2 Topology relationship to ACI L2 Topology Table.

#### Gateway in ACI and End Point Connecting to legacy Switch

In the previous versions, when the gateway of a VM host was an ACI Leaf Switch and there was a legacy device between the gateway device and VM host, the system cannot calculate the connection between the VM host and gateway device.



IEv8.02 has fixed this issue by optimizing the L2 topology calculation logic in this scenario.

#### VM Host's L3 Neighbor is ASA Firewall

An ASA Firewall does not support NDP. In the previous versions, when a VM host connected to VDS  $\rightarrow$  Legacy Device  $\rightarrow$  ASA Firewall (shown as the figure below), the system would generate two L2 topology connections for the VM host, one calculated based on legacy topology logic (VM Host Vnic 1  $\leftarrow$  → Legacy Switch G0/1), the other based on SDN L2 topology logic (VM Host Vnic 1  $\leftarrow$  → VDS107).



IEv8.02 adds the legacy topology to Multi-Source Topology Priority Rules and relies on the following priority to select topology when a topology is generated from different sources: NSX > vCenter > Legacy > ACI.

#### **Duplicate VRF and IP Subnet**

In the previous versions, when ACI Fabric Instances deployed in different regions were configured with the same VRF and Any Gateway, these ACI instances would connect to the same one LAN Media when NetBrain calculated topology for them.

IEv8.02 has resolved the issue by generating and assigning different zones for ACI Fabric instances.

#### Virtual Network Device installed on VM Host via Image

In the previous versions, when a virtual network device (such as a virtual ASA) was generated on a VM host via installing network device image, the system treated the virtual network device and host as two devices, and L2 topology generated in this system were not incorrect in this scenario.

IEv8.02 has improved the topology logic to discover them as one device.

#### 3.6. New REST APIs

IEv8.02 introduces the following new REST APIs:

API	Description
<u>Get License Node Info</u>	Call this API to get the overall system license node information.
Get Production Info	Call this API to get the information related to the product version.
Schedule Change Management Task	Call this API to create a scheduled task for an approved network change.
<u>Get a Scheduled CM Task</u>	Call this API to get a scheduled task of an approved network change.
Update a Scheduled CM Task	Call this API to update a scheduled task of an approved network change.
Delete a Scheduled CM Task	Call this API to delete a scheduled task in the "Waiting" status.

# 4. Security Enhancements

#### 4.1. Limit Guest User's Privilege

By default, the system only grants Guest Users with limited access to system resources by disabling their privilege of Shared Resource Management. In previous versions, the privilege of Shared Resource Management only covered most resource types in the system, such as Qapps, Gapps, Parsers, Runbook Templates, etc., but not all of them. It might cause potential security risk that Guest Users can modify or delete public resources, such as public maps and A-B paths.

To limit Guest User's privileges, IEv8.02 expands the privileged scope for Shared Resource Management to cover more resources, including:

- One-IP Table
- Inventory Report
- Device Property
- CLI Commands Template
- My Files/Desktop
- Path Browser Pane
- Network Pane
- Application Manager
- Static Data View Manager
- Context Action Manager
- System Automation Task Manager

#### 4.2. Upgrade Third-Party Components to the Latest Version

To ensure the longevity of support and the most up-to-date code from a security standpoint, IEv8.02 upgrades the following components to their latest versions.

Component	From Version	To Version
RabbitMQ	3.7.14	3.8.1

Component	From Version	To Version
Python	3.7.1	3.7.5
Gojs	1.6.9	2.0.18
Node.js	8.2.1	9.3.0
OpenSSL (Windows + Linux)	1.0.2p	1.0.2t
psutil	5.5.1	5.6.7

#### 4.3. Validate Data Access Privilege for Extended Device Scope

The device access policy introduced in the previous version allows specified users to have the privilege of data access to specified devices. However, it might be out of control when it comes to Qapp execution because the device scope of Qapp might be expanded to neighbor devices depending on the device input settings for a Qapp.

To fix this vulnerability, IEv8.02 starts to validate the data access privilege on the extended device scope for Qapp execution. If the executor is not authorized to view the device data for any extended neighbor device, the system will not run Qapp on that device.

#### 4.4. Single Source for Website Base URL

In previous versions, when users wanted to share a map or reset a password, the system provided an assembled URL for redirection by directly obtaining the domain URL from the client's web browser cache, which may have potential security risks.

To fix this vulnerability, IEv8.02 enforces the definition for a base URL and uses it as a single source for website URL assembly. Every time a user requests a website URL, the system uses the predefined base URL to assemble it, rather than obtaining the base URL from the user's web browser cache.

IEv8.02 guides the system administrator upon login to configure the base URL at System Management >

#### Advanced Settings > Website Base URL.

System Management	Operations	🔔 admin	Log Out	?	NetBrain 🖓
Home Page × Advanced Settings ×					*
Enable Login Banner					
Title:					
Content:					
Site Configuration					
Website Base URL: https://10.10.7.209/					
The Website Base URL is the url via which users access NetBrain. ()					
Save					11
					-

## 4.5. Other Enhancements

- Clear Browser Temporary Data after User Logout
   Note: Refreshing webpage will not clear browser temp data.
- Disable Insecure Communication Protocols (SSL and TLS < 1.2) Unless Required
- Protect Redis Sentinel by Authentication and Rename Default Command
- Remedy Aged Libraries for Redis
- Fix REST API Vulnerability about Roles and Privileges

# 5. Performance Enhancements

Compared to previous versions, the system performance to load the site tree and the device group tree with a large number of entries has been improved a lot in many features.

Category	Test Scenario	IEv8.01	IEv8.02
Load Site Tree	Load a tree with 9000 sites (5 devices per site) in: <ul> <li>Site Panel</li> <li>Site Manager</li> <li>Dynamic Search</li> <li>Select Device/Interface</li> <li>Inventory Report</li> </ul>	3~4 minutes or failed	1~3 seconds
Load Device Group Tree	Load a tree with 3000 device groups (50 devices per group) in: Device Group Panel Dynamic Search Select Device/Interface Network Panel Plugin Manager Search Result Add to Device Group Scheduled Task Tune <u>Note:</u> This improvement is not significant in <b>Shared Device</b> <b>Settings &gt; Apply to Device Group</b> .	5~20 seconds or failed	1 second

# 6. Known Issues

The known issue (ENG-69067) for upgrading from IEv8.0 or IE8.01 to IEv8.02 is as follows:

- If the system upgrades without any of components: License Agent/Elasticsearch/RabbitMQ/Redis, user's input for SSL files (Public Key, Private Key and CA) is required no matter what the component is lack, and there is no validation for the mismatching between the newly uploaded certificates and previous ones.
- Changing SSL files (Public Key, Private Key and CA) is not allowed.