



# **NSP**

## **Network Services Platform**

Release 20.9

# **IP/MPLS Simulation Application Help**

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# Contents

<b>1</b>	<b>IP/MPLS Simulation</b>	<b>5</b>
1.1	Why use IP/MPLS Simulation?	5
1.2	IP/MPLS Simulation API support	5
1.3	How do I import a network?	5
1.4	How do I add an admin domain?	6
1.5	How do I add a node?	7
1.6	How do I add a link?	8
1.7	How do I create PCE-initiated LSPs?	9
1.8	How do I turn down a link set?	10
1.9	How do I create a path profile policy?	11
1.10	How do I create a router ID mapping policy?	13
1.11	How do I group NEs by region?	14
1.12	How do I run a worst case failure scenario?	15
1.13	How do I modify the demand bandwidth of an LSP?	15



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# 1 IP/MPLS Simulation

## 1.1 Why use IP/MPLS Simulation?

### 1.1.1

The IP/MPLS Simulation application provides the ability to simulate changes in the IP topology that was discovered by the IP/MPLS Optimization application.

This application is run in a separate VM and imports the IP topology and LSPs from the IP/MPLS Optimization application. The specific simulation functions supported on this application are:

1. Modifying link attributes
2. Modifying the status links
3. Creating or deleting LSPs
4. Modifying the profile of imported LSPs
5. Optimizing LSPs via the GCO algorithm

For each change, the Simulate button is activated to determine the visual impact of that change. The general functionality supported in addition to the above functionality are:

1. Import IP/TE topology only
2. Import LSPs
3. Import profiles
4. Delete an imported topology

## 1.2 IP/MPLS Simulation API support


IP/MPLS Simulation functions are available for OSS using programmable APIs. For general information about developer support, visit the Nokia Network Developer Portal at <https://network.developer.nokia.com/api-documentation>.

For specific information about the REST APIs for the IP/MPLS Simulation application, append `/sdn/doc` to the server URL. For example: `https://server-ip:8543/sdn/doc`.

## 1.3 How do I import a network?

1


\_\_\_\_\_

If the network will be imported from a file, the file must first be created by opening the IP/MPLS Optimization application to the Network Map page, clicking **More** , and choosing **Export Network**. The network is exported as a .zip file.

2

\_\_\_\_\_

Open the IP/MPLS Simulation application and perform one of the following:

- a. If opening the IP/MPLS Simulation application for the first time, the Import Network form will appear.
- b. Click **More**  on the Network Map page of the application and choose **Import Network**. The Import Network form appears.

3

Perform one of the following:

- a. Enable the **From Live Network** radio button, then either the **Network** radio button or the **Network and LSPs** radio button to specify which elements of the network to import, then configure the parameters:

Parameter	Description
Remote CAS server IP address	The IP address of the CAS server from which to retrieve a security token
Username	The username with which to log in to the CAS server
Password	The password to be used with the specified username

- b. Enable the **From File** radio button, then either click **browse** to select the file created in [Step 1](#), or drag and drop the file into the Import Network form.

4

Click **IMPORT**. The Network topology is imported from the IP/MPLS Optimization application.


**i** **Note:** The default maximum file size for an imported network topology is 5 M. This can be modified by editing the arm-system.conf file as follows:

```
nrcp {  
  file-import  
  { max_file_size_in_byte = <desired_size> }  
}
```

END OF STEPS

## 1.4 How do I add an admin domain?

1

From the Network Map page of the application, click  and choose **Add Domain**. The Create Admin Domain form appears.

---

2

Configure the parameters:

Parameter	Description
Network ID	Specifies the network identifier
AS number	Specifies the AS number
BGPLS ID	Specifies the BGP-LS identifier

---

3

Click **CREATE**. The admin domain is added to the network topology.



**Note:** An admin domain is automatically deleted if not populated with network elements.

END OF STEPS

---


## 1.5 How do I add a node?



**Note:** An admin domain must have been imported or added to the application before a node can be successfully added. See [1.3 “How do I import a network?” \(p. 5\)](#) or [1.4 “How do I add an admin domain?” \(p. 6\)](#) for more information.

---

1

From the Network Map page of the application, or the Node List page of the application, click  and choose **Add Node**. The Create Node form appears.

---

2

Configure the parameters:

Parameter	Description
Router ID	Specifies the router identifier
Topology	Specifies the domain to which the router belongs
Protocol	Specifies the protocol to be used by the router; OSPF or ISIS
Region	Specifies the region to which the node will belong


---


3

As required, enable the **Create New** checkbox and populate the **New region** field to create a new region to which the node will belong.

4


Perform one of the following:

- a. Click on the **CREATE** button that features a refresh icon . The node is added to the network topology and the form remains open for further additions.
- b. Click **CREATE**. The node is added to the network topology.


 **Note:** Nodes can be deleted from the network entirely or removed on a per-instance basis.

END OF STEPS

## 1.6 How do I add a link?

 **Note:** Nodes must have been imported or added to the application before a link can be successfully added. See [1.3 “How do I import a network?” \(p. 5\)](#) or [1.5 “How do I add a node?” \(p. 7\)](#) for more information.

1

From the Network Map page of the application, or the Link List page of the application, click  and choose **Add PointToPoint Link** or **Add Broadcast Link** from the contextual menu. A creation form appears.

2

Configure the parameters:

Parameter	Description
Admin Domain	Specifies the administrative domain in which to create the link
Protocol	Specifies the protocol to apply to the link
Source	Specifies the link source
New Subnet	Specifies whether or not a new subnet will be created; only for broadcast links.
Destination	Specifies the link destination

3

Click on the Forward Direction tab and configure the parameters:

Parameter	Description
<b>Source to destination parameters</b>	

Parameter	Description
IP Address	Specifies the IP address of the destination node (forward direction) or source node (reverse direction)
Latency	Specifies the maximum latency to consider
Cost	Specifies the maximum cost to consider
<b>Traffic engineering parameters</b> These parameters are only configurable when the Enable Traffic Engineering slider is enabled	
Bandwidth (Mbps)	Specifies the maximum bandwidth to consider
Admin Group	Specifies the admin group to which the link will belong
SRLG	Specifies the SRLG to which the link will belong
TE Metric	Specifies the maximum TE metric to consider
RSVP	Specifies whether or not the link will be RSVP
SR	Specifies whether or not the link will be SR

4


Click on the Reverse Direction tab and configure the parameters as described in step [Step 3](#).



**Note:** The Reverse Direction tab is available only for Point-To-Point links.

5

Perform one of the following:

- a. Click on the **CREATE** button that features a refresh icon . The link is added to the network topology and the form remains open for further additions.
- b. Click **CREATE**. The link is added to the network topology.

END OF STEPS

## 1.7 How do I create PCE-initiated LSPs?

1

From the LSP List page of the application, click **Create PCE LSP** .

2

Configure the required parameters:

Parameter	Description
Path Name	The name of the PCE-initiated LSP
PCC Address	The address of the PCC
Objective (Optimize on)	Specifies the primary goal when identifying path resources
Max Hops (Span)	Specifies the maximum number of hops to consider
Bandwidth (Mbps)	Specifies the bandwidth required for the LSP
Include Any Bit Pos	Specifies any bit between 0 and 31 to exclude
Exclude Any Bit Pos	Specifies any bit between 0 and 31 to exclude
Path Type	Specifies the type of path (must be Segment Routing)
Source	Specifies the source node for the path
Destination	Specified the destination node for the path
Profile ID	Specifies the identifier of the path profile to apply
Group ID	Specifies the identifier of the group to which this LSP belongs

3



Click **SAVE**. The PCE-initiated LSP is created.

END OF STEPS

## 1.8 How do I turn down a link set?

1

Perform one of the following:

- a. To turn down a link set from the Network Map page of the application, perform the following:
  1. Select an IGP link on the map and click **Info** .
  2. Click **More**  and choose **Turn Link Set Down**. The link set is turned down.
- b. To turn down a link set from the Link List page of the application, perform the following:
  1. From the Link List page of the application, select an IGP link from the list.

- 
2. Click **Turn Link Down** ↓ inline with the desired link. The link, and the other member of its set, is turned down.

2

---

Click **SIMULATE**. The Simulation Results form opens.

**i** **Note:** The **SIMULATE** button is only available when a traffic-affecting network enhancement or degradation has occurred. Some actions, such as Create LSP or Re-signal, are disabled when the **SIMULATE** button is available.

**i** **Note:** Simulation results are only available for the most recent simulated activity and will be overwritten when the **SIMULATE** button is next clicked.

3

---

Click **DETAILS** to view a list of LSPs affected by the configuration.

**i** **Note:** This list can be revisited by clicking on the Simulation Results tab. Only the results of the most recent configuration are displayed.

4

---

As required, perform one of the following:

- a. To return a link set to an operational state from the Network Map page of the application, perform the following:
  1. On the map, select an IGP link that is operationally down and click **Info** ⓘ .
  2. Click **More** ⋮ and choose **Turn Link Set Up**. The link set is turned down.
- b. To return a link set to an operational state from the Link List page of the application, perform the following:
  1. From the Link List page of the application and select an operationally down IGP link from the list.
  2. Click **Turn Link Up** ↑ inline with the desired link. The link, and the other member of its set, is turned up.

END OF STEPS

---

## 1.9 How do I create a path profile policy?

1

---

From the Policy List page of the application, choose Path Profiles from the drop-down menu and click **Create Policy** ⊕ . The Create Path Profile policy form opens.

2


Configure the required parameters:

Parameter	Description
Reserved Profile ID	When this parameter is enabled, the Path Profile template assumes the Name and role of the default Path Profile template
Name	The name of the Path Profile template
Profile ID	The Profile ID of the paths to be included in path computation
Bidirectional	The bidirectional mode to be used in path computation
Disjoint	The Disjoint mode to be used in path computation
Optimize on (Objective)	Specifies the primary goal when identifying paths for path computation
Bandwidth Strategy	Specifies the strategy to use for LSP bandwidth in the path computation
Explicit Route Strategy	Specifies the explicit route strategy for the service
Control Route Strategy	Specifies the strategy to use when recomputing the path
Max Hops (span)	Specifies the Max Hops constraint to be used in path computation
Max Cost	Specifies the Max Cost constraint to be used in path computation
Max TE Metric	Specifies the Max TE Metric constraint to be used in path computation
Max Latency	Specifies the maximum latency to consider
Latency Threshold	Specifies when to re-signal an LSP that is optimized on latency. If no change in latency (0), re-signal is automatically triggered. If the change is less than 0, the LSP is not re-signalled. If the change is greater than 0, the LSP is re-signalled. The default value is -1.
Description	Describes the Path Profile template

- 
- 3 \_\_\_\_\_  
As required, Exclude Route Objects by adding the IP address(es) of the object(s) to be excluded.
  - 4 \_\_\_\_\_  
As required, Include Route Objects by adding the IP address(es) of the object(s) to be included. You must also specify Hop Type.
  - 5 \_\_\_\_\_  
Click **CREATE**. The Path Profile policy is created.

END OF STEPS \_\_\_\_\_

## 1.10 How do I create a router ID mapping policy?

- 1 \_\_\_\_\_  
From the Policy List page of the application, choose Router ID Mapping from the drop-down menu and click **Create Policy**  . The Create Router ID Mapping Policy form opens.
- 2 \_\_\_\_\_  
Configure the required parameters:

Parameter	Description
Name	Specifies the name of the Router ID Mapping template
System IP Address	Specifies the system IP address of the router
System Name	Specifies the router system name
PCC Address	Specifies the address of the PCC associated with the router
Description	Specifies the router description

---

Parameter	Description
Router Info	Click <b>ADD</b> to add as many Router Info entries, as required. For each Router Info entry, you must specify the following information: <ul style="list-style-type: none"><li>• Network Identifier</li><li>• AS Number</li><li>• BGP-LS ID (topology identifier)</li><li>• Router ID</li><li>• Protocol (the protocol that the IGP router is using)</li></ul>

3

Click **CREATE**. The Router ID Mapping policy is created.

END OF STEPS

---

## 1.11 How do I group NEs by region?

This procedure can be used to group NEs by region on the IP/MPLS Simulation application's network map.


1

In the Group Manager application, add a region to a layout, and populate it with NEs. See the Group Manager application help for specific instructions.



**Note:** When regions are to be used, it is recommended that all NEs in the network are added to a region.

2

From the Network Map page of the IP/MPLS Simulation application, click **Clustering Controls**  and enable Regions.



**Note:** When regions are enabled, Auto Layout functionality is disabled.

3

Click on a region to populate the Info panel with details. Double click to expand the region, displaying all nodes and associated subnets.



**Note:** Equally-weighted subnets may move between regions when the map is refreshed.




END OF STEPS

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## 1.12 How do I run a worst case failure scenario?

This procedure can be used to simulate a worst case failure scenario, in which multiple operational links are turned down.

- 1 \_\_\_\_\_  
From the IP/MPLS Simulation application, click **Run Scenario** and then choose one of the following:
  - a. Choose Run Worst Case Failure on All Operational Links. Go to [Step 3](#).
  - b. Choose Run Worst Case Failure on Select Links. A list of available operational links appears. Continue to [Step 2](#).
- 2 \_\_\_\_\_  
Select one or more links from the list and click **RUN SCENARIO**.
- 3 \_\_\_\_\_  
A dialog box appears, displaying the simulation's progress. When complete, click **VIEW SIMULATION RESULTS**.
- 4 \_\_\_\_\_  
A list of links is displayed. Perform any of the following:
  - a. Click **Show on Map**  inline with any link to highlight that link on the Network Map.
  - b. Click **More**  inline with any link and choose LSP Paths Impacted to view a list of LSP paths that were affected by the selected link's failure.
  - c. Click **More**  inline with any link and choose Links Impacted to view a list of Links that were affected by the selected link's failure.

END OF STEPS \_\_\_\_\_

## 1.13 How do I modify the demand bandwidth of an LSP?

This procedure can be used to manually modify the demand bandwidth of one or more LSPs. An LSP's demand bandwidth is the aggregate bandwidth requested by its source and destination.

- 1 \_\_\_\_\_  
To enable this functionality, modify the arm-system.conf file as follows:


```
nr_cp {  
  
    demand-matrix {  
  
        enabled = true  
  
    }  
}
```

}


2



From the LSP List page of the IP/MPLS Simulation application, choose LSP Demand Matrix from the drop-down menu. A list of all demands associated with all existing LSPs is displayed.

3

Click **Show in LSP List**  inline with any demand. A list of the LSPs affected by the selected demand is displayed.

4

Click the  icon to return to the list of demands and perform one of the following:

- a. Click **Edit Bandwidth**  inline with a single demand. The Edit Demand Bandwidth form opens.
- b. Select multiple demands and click **Edit Bandwidth**  . The Edit Demand Bandwidth form opens.

5

Enable the radio button next to one of the following parameters to provide a value:

Parameter	Description
Set to (Mbps)	Specifies a new demand bandwidth value in Megabits per second.
Increase by %	Specifies an increase in demand bandwidth relative to the existing value.
Decrease by %	Specifies a decrease in demand bandwidth relative to the existing value.

6

Click **SAVE**. The Edit Demand Bandwidth form closes.

7

Click **SIMULATE**. The Simulation Results form opens.

8

A dialog box appears, displaying the simulation's progress. When complete, click **VIEW SIMULATIONS RESULTS**. A list of rerouted LSPs is displayed.

END OF STEPS