Configuring Copy Services

- About Copy Services, on page 1
- Copy Services Limitations, on page 1
- Configuring Copy Services Using the GUI, on page 2
- Configuring Copy Services Using the NX-OS-Style CLI, on page 4
- Configuring Copy Services Using the REST API, on page 6

About Copy Services

Unlike SPAN that duplicates all of the traffic, the Cisco Application Centric Infrastructure (ACI) copy services feature enables selectively copying portions of the traffic between endpoint groups, according to the specifications of the contract. Broadcast, unknown unicast and multicast (BUM), and control plane traffic that are not covered by the contract are not copied. In contrast, SPAN copies everything out of endpoint groups, access ports or uplink ports. Unlike SPAN, copy services do not add headers to the copied traffic. Copy service traffic is managed internally in the switch to minimize impact on normal traffic forwarding.

A copy service is configured as part of a Layer 4 to Layer 7 service graph template that specifies a copy cluster as the destination for the copied traffic.

Copy services require you to do the following tasks:

- Identify the source and destination endpoint groups.
- Configure the contract that specifies what to copy according to the subject and what is allowed in the contract filter.
- Configure Layer 4 to Layer 7 copy devices that identify the target devices and specify the ports where they attach.
- Use the copy service as part of a Layer 4 to Layer 7 service graph template.
- Configure a device selection policy that specifies which device will receive the traffic from the service graph. When you configure the device selection policy, you specify the contract, service graph, copy cluster, and cluster logical interface that is in copy device.

Copy Services Limitations

The following limitations apply when using the copy services feature:

- Copy services are only supported on the N9K-9300-EX and -FX leaf switches.
- For data path traffic that is copied to the local and remote analyzer port, the Class of Service (CoS) and Differentiated Services Code Point (DSCP) values are not preserved in the copied traffic. This is because the contract with the copy action can be hit on either the ingress or egress TOR before or after the actual COS or DSCP value gets modified.

  When policing the data path traffic at a given endpoint ingress direction, the traffic that is copied is the actual incoming traffic before the traffic is policed. This is due to an ASIC limitation in the N9K-93108TC-EX and N9K-93180YC-EX switches.
- Copy services support only one device per copy cluster.
- A copy cluster supports only one logical interface.
- You can configure copy analyzers in the consumer endpoint or provider endpoint only in N9K-93108TC-EX and N9K-93180YC-EX switches. Faults are raised if you configure copy analyzers in N9K-93128TX, N9K-9396PX, or N9K-9396TX switches.
- The `tn-common/ctx-copy` VRF instance, also known as the copy VRF instance, is a system-reserved context for a copy service. The copy VRF instance is auto-configured by the system during the boot up sequence. The copy VRF instance cannot be configured nor deleted by the user.
- Copy services with a vzAny contract is not supported.
- When using a separate copy device for each direction of a flow, you must have two different unidirectional filters.

Configuring Copy Services Using the GUI

This procedure uses the GUI to configure copy services.

Note When you configure a copy device, the context aware parameter is not used. The context aware parameter has a default value of `single context`, which can be ignored.

Procedure

Step 1 Create one or more copy devices.

For information about creating a copy device, see Creating a Copy Device Using the GUI, on page 3.

Step 2 Create a service graph template to use for copy services.

For information about creating a service graph template, see Configuring a Service Graph Template Using the GUI.

a) If you want to create one or more service nodes, drag Layer 4 to Layer 7 service devices from the **Device Clusters** section to in-between the consumer endpoint group and provider endpoint group.
b) Create one or more copy nodes by dragging copy devices from the **Device Clusters** section to in-between any two objects.

The location where you drop the copy device becomes the point in the data flow from where the copy device will copy the traffic.

Step 3 Apply the Layer 4 to Layer 7 service graph template.

For information about applying a service graph template, see Applying a Service Graph Template to Endpoint Groups Using the GUI.

Creating a Copy Device Using the GUI

A copy device is used as part of the copy services feature to create a copy node. A copy node specifies at which point of the data flow between endpoint groups to copy traffic.

This procedure only creates a copy device and does not configure anything else that is required to use the copy services feature. For information about configuring copy services, see Configuring Copy Services Using the GUI, on page 2.

Before you begin

You must have configured a tenant.

Procedure

Step 1 On the menu bar, choose **Tenants** > **All Tenants**.

Step 2 In the Work pane, double-click the tenant's name.

Step 3 In the Navigation pane, choose **Tenant** ***tenant_name*** > **Services** > **L4-L7** > **Devices**.

Step 4 In the Work pane, choose **Actions** > **Create Copy Devices**.

Step 5 In the **Create Copy Devices** dialog box, in the **General** section, complete the following fields:

Name	Description
Name field	Enter a name for the copy device.
Device Type buttons	The device type. A copy device can only be a physical device.
Physical Domain drop-down list	Choose the physical domain for the device.

Step 6 In the **Device 1** section, click + to add a device interface, complete the following fields, and then click **Update**:

Name	Description
Name field	Enter a name for the device interface.
Path drop-down list	Choose a port, port channel, or virtual port channel for the device interface to use. The copy device connects to that port, port channel, or virtual port channel and copies traffic from it.

Step 7 In the **Cluster** section, click + to add a cluster interface, complete the following fields, and then click **Update**:

Name	Description
Name field	Enter a name for the cluster interface.
Concrete Interfaces drop-down list	Choose one or more concrete interfaces for the cluster interface to use.

Encap field	Enter a VLAN to use for encapsulation. The VLAN name format is as follows:
	`vlan-#`
	# is the VLAN's ID. For example:
	`vlan-12`

Step 8 Click **Submit**.

Configuring Copy Services Using the NX-OS-Style CLI

This procedure provides examples of using the CLI to configure copy services.

Note When you configure a copy device, the context aware parameter is not used. The context aware parameter has a default value of `single context`, which can be ignored.

Procedure

Step 1 Create a copy cluster.

Example:

```
l417 cluster name Copy_1 type physical vlan-domain phys_scale_copy service COPY function none
  cluster-device Copy_1_Device_1
  cluster-interface Tap_copy vlan 3644
    member device Copy_1_Device_1 device-interface int1
      interface ethernet 1/15 leaf 104
      exit
    member device Copy_1_Device_1 device-interface int2
      interface ethernet 1/15 leaf 105
      exit
    member device Copy_1_Device_1 device-interface int3
      interface ethernet 1/20 leaf 105
      exit
    exit
  exit
```

Step 2 Create an abstract graph and device context, and then apply the graph.

Example:

```
l417 graph g5 contract c5
  service CP1 device-cluster-tenant t1 device-cluster Copy_1 mode OTHER service COPY
    connector copy cluster-interface Tap_copy
```

```
    exit
  exit
connection C1 terminal consumer terminal provider copyservice CP1 connector copy
Exit
```

Step 3 Attach the contract to the graph.

Example:

```
contract c5
  scope tenant
  subject Subject
    access-group default both
    l4l7 graph g5
    exit
  Exit
```

Step 4 Attach the endpoint groups to the contract.

Example:

```
epg epg2210
  bridge-domain member bd5
  contract consumer c5
  exit
epg epg2211
  bridge-domain member bd5
  contract provider c5
  Exit
```

Example

The following example creates a firewall service graph with a copy device on both sides:

```
tenant tenant_cmd_line
  l4l7 graph graph_fire contract fire
    service Fire device-cluster-tenant tenant_cmd_line device-cluster Fire mode FW_ROUTED

      connector consumer cluster-interface Outside_cmdline
        bridge-domain tenant tenant_cmd_line name Consumer_BD_1
        exit
      connector provider cluster-interface Inside_cmdline
        bridge-domain tenant tenant_cmd_line name Provider_BD1
        exit
      exit
    service CP2 device-cluster-tenant tenant_cmd_line device-cluster copy1 mode OTHER
     service COPY
      connector copy cluster-interface int1
        exit
      exit
    service CP3 device-cluster-tenant tenant_cmd_line device-cluster copy1 mode OTHER
     service COPY
      connector copy cluster-interface int1
        exit
      exit
    connection C1 terminal consumer service Fire connector consumer copyservice CP2
     connector copy
    connection C2 terminal provider service Fire connector provider copyservice CP3
     connector copy
    exit
  Exit
```

The following example creates a firewall and load balance in one-arm mode with copy devices attached in all the links:

```
l4l7 graph Graph_LB_Firewall contract c1_firewall
  service Fire device-cluster-tenant Tenant_Firewall_LB device-cluster Firewall_1 mode
   FW_ROUTED
    connector consumer cluster-interface Outside_Firewall
      bridge-domain tenant Tenant_Firewall_LB name BD1_Consumer
      exit
    connector provider cluster-interface Inside_Firewall
      bridge-domain tenant Tenant_Firewall_LB name BD2_Provider
      exit
    exit
 service LB device-cluster-tenant Tenant_Firewall_LB device-cluster LB_1 mode ADC_ONE_ARM

    connector consumer cluster-interface LB_Inside
      bridge-domain tenant Tenant_Firewall_LB name BD2_Provider
      exit
    connector provider cluster-interface LB_Inside
      bridge-domain tenant Tenant_Firewall_LB name BD2_Provider
      exit
    Exit
  service CP6 device-cluster-tenant Tenant_Pass2 device-cluster Copy_pass2 mode OTHER
   service-type COPY
    connector copy cluster-interface tap_copy
      exit
    Exit
  service CP7 device-cluster-tenant Tenant_Pass2 device-cluster Copy_pass2 mode OTHER
   service-type COPY
    connector copy cluster-interface tap_copy
      exit
    Exit
  service CP8 device-cluster-tenant Tenant_Pass2 device-cluster Copy_pass2 mode OTHER
   service-type COPY
    connector copy cluster-interface tap_copy
      exit
    exit
  connection C1 terminal consumer service Fire connector consumer copyservice CP6
   connector copy
  connection C2 intra-service service1 Fire connector1 provider service2 LB connector2
   consumer copyservice CP7 connector copy
  connection C3 terminal provider service LB connector provider copyservice CP8
   connector copy
  exit
exit
```

Configuring Copy Services Using the REST API

A copy device is used as part of the copy services feature to create a copy node. A copy node specifies at which point of the data flow between endpoint groups to copy traffic.

This procedure provides examples of using the REST API to configure copy services.

Note When you configure a copy device, the context aware parameter is not used. The context aware parameter has a default value of `single context`, which can be ignored.

Before you begin

You must have configured a tenant.

Procedure

Step 1 Create a copy device.

Example:

```
<vnsLDevVip contextAware="single-Context" devtype="PHYSICAL" funcType="None" isCopy="yes"
  managed="no" mode="legacy-Mode" name="copy0" packageModel="" svcType="COPY" trunking="no">
    <vnsRsALDevToPhysDomP tDn="uni/phys-phys_scale_copy"/>
    <vnsCDev devCtxLbl="" name="copy_Dyn_Device_0" vcenterName="" vmName="">
        <vnsCIf name="int1" vnicName="">
            <vnsRsCIfPathAtt tDn="topology/pod-1/paths-104/pathep-[eth1/15]"/>
        </vnsCIf>
        <vnsCIf name="int2" vnicName="">
            <vnsRsCIfPathAtt tDn="topology/pod-1/paths-105/pathep-[eth1/15]"/>
        </vnsCIf>
    </vnsCDev>
    <vnsLIf encap="vlan-3540" name="TAP">
        <vnsRsCIfAttN tDn="uni/tn-t22/lDevVip-copy0/cDev-copy_Dyn_Device_0/cIf-[int2]"/>
        <vnsRsCIfAttN tDn="uni/tn-t22/lDevVip-copy0/cDev-copy_Dyn_Device_0/cIf-[int1]"/>
    </vnsLIf>
</vnsLDevVip>
```

Step 2 Create a logical device context (also known as a device selection policy).

Example:

```
<vnsLDevCtx ctrctNameOrLbl="c0" descr="" graphNameOrLbl="g0" name="" nodeNameOrLbl="CP1">
    <vnsRsLDevCtxToLDev tDn="uni/tn-t22/lDevVip-copy0"/>
    <vnsLIfCtx connNameOrLbl="copy" descr="" name="">
        <vnsRsLIfCtxToLIf tDn="uni/tn-t22/lDevVip-copy0/lIf-TAP"/>
    </vnsLIfCtx>
</vnsLDevCtx>
```

Step 3 Create and apply the copy graph template.

Example:

```
<vnsAbsGraph descr="" name="g0" ownerKey="" ownerTag="" uiTemplateType="UNSPECIFIED">
    <vnsAbsTermNodeCon descr="" name="T1" ownerKey="" ownerTag="">
        <vnsAbsTermConn attNotify="no" descr="" name="1" ownerKey="" ownerTag=""/>
        <vnsInTerm descr="" name=""/>
        <vnsOutTerm descr="" name=""/>
    </vnsAbsTermNodeCon>
    <vnsAbsTermNodeProv descr="" name="T2" ownerKey="" ownerTag="">
        <vnsAbsTermConn attNotify="no" descr="" name="1" ownerKey="" ownerTag=""/>
        <vnsInTerm descr="" name=""/>
        <vnsOutTerm descr="" name=""/>
    </vnsAbsTermNodeProv>
    <vnsAbsConnection adjType="L2" connDir="provider" connType="external" descr="" name="C1"
      ownerKey="" ownerTag="" unicastRoute="yes">
        <vnsRsAbsConnectionConns tDn="uni/tn-t22/AbsGraph-g0/AbsTermNodeCon-T1/AbsTConn"/>
        <vnsRsAbsConnectionConns tDn="uni/tn-t22/AbsGraph-g0/AbsTermNodeProv-T2/AbsTConn"/>
        <vnsRsAbsCopyConnection tDn="uni/tn-t22/AbsGraph-g0/AbsNode-CP1/AbsFConn-copy"/>
    </vnsAbsConnection>
    <vnsAbsNode descr="" funcTemplateType="OTHER" funcType="None" isCopy="yes" managed="no"
      name="CP1" ownerKey="" ownerTag="" routingMode="unspecified" sequenceNumber="0"
      shareEncap="no">
        <vnsAbsFuncConn attNotify="no" descr="" name="copy" ownerKey="" ownerTag=""/>
```

```
        <vnsRsNodeToLDev tDn="uni/tn-t22/lDevVip-copy0"/>
    </vnsAbsNode>
</vnsAbsGraph>
```

Step 4 Define the relation to the copy graph in the contract that is associated with the endpoint groups.

Example:

```
<vzBrCP descr="" name="c0" ownerKey="" ownerTag="" prio="unspecified" scope="tenant"
  targetDscp="unspecified">
    <vzSubj consMatchT="AtleastOne" descr="" name="Subject" prio="unspecified"
      provMatchT="AtleastOne" revFltPorts="yes" targetDscp="unspecified">
        <vzRsSubjFiltAtt directives="" tnVzFilterName="default"/>
        <vzRsSubjGraphAtt directives="" tnVnsAbsGraphName="g0"/>
    </vzSubj>
</vzBrCP>
```

Step 5 Attach the contract to the endpoint group.

Example:

```
<fvAEPg name="epg2860">
    <fvRsCons tnVzBrCPName="c0"/>
    <fvRsBd tnFvBDName="bd0"/>
    <fvRsDomAtt tDn="uni/phys-phys_scale_SB"/>
    <fvRsPathAtt tDn="topology/pod-1/paths-104/pathep-[PC_int2_g1]" encap="vlan-2860"
      instrImedcy="immediate"/>
</fvAEPg>
<fvAEPg name="epg2861">
    <fvRsProv tnVzBrCPName="c0"/>
    <fvRsBd tnFvBDName="bd0"/>
    <fvRsDomAtt tDn="uni/phys-phys_scale_SB"/>
    <fvRsPathAtt tDn="topology/pod-1/paths-105/pathep-[PC_policy]" encap="vlan-2861"
      instrImedcy="immediate"/>
</fvAEPg>
```