



# Cisco Secure DDoS Edge Protection

**Table 1: Feature History Table**

Feature Name	Release Information	Description
Cisco Secure DDoS Edge Protection	Release 7.11.1	<p>Introduced in this release on: NCS 5500 fixed port routers; NCS 5700 fixed port routers; NCS 5500 modular routers (NCS 5500 line cards; NCS 5700 line cards [Mode: Compatibility; Native])</p> <p>We have now moved DDoS protection to the network edge, ensuring you can mitigate any DDoS attacks at the ingress points and minimize the impact of such attacks on your network and applications running on it. This solution deploys a centralized controller application that manages a distributed network of edge detectors that analyze and mitigate threats across networks.</p>

The Cisco Secure DDoS Edge Protection software solution stops DDoS attacks at the ingress side of the network.

The DDoS Edge Protection solution helps you detect DDoS attacks and take mitigation actions on the router. To enable detection services at the core network, you need to configure the following entities:

- **DDoS Edge Protection Controller:** This entity manages and monitors the Detector docker application, mitigates attacks, and oversees a distributed network of edge detectors. It analyzes detection trends across the network, orchestrates cross-network visibility and mitigation, and provides complete system management for the entire service.
- **DDoS Edge Protection Detector:** This entity is a real-time DDoS detection microservice container application that runs as a docker-application on a router with the DDoS controller. The DDoS controller can run on a cloud, server, or customer premises and is connected to this application.

The DDoS Edge Protection supports DDoS detection of both IPv4 and IPv6 traffic. You can choose the interface on which the traffic should be monitored. When the protection software solution is implemented, it filters the IPv4/IPv6 traffic flow and detects DDoS attacks.

Once a DDoS attack is detected, the DDoS Edge Protection Controller initiates a mitigation action, specifying the necessary steps to counteract the attack. This includes enabling traffic classification (TC) as part of the mitigation measures, implementation of rate limiting and so on.

### Supported Routers

Cisco Secure DDoS Edge Protection is supported on the following hardware:

- NCS-55A1-48Q6H
- NCS-55A1-48Q6H-SE
- NCS-55A1-48Q-DTC
- NCS-57D2-18DD-S
- NCS-57C3-MOD-S
- NCS-57C3-MOD-SE-S
- NCS-55A1-36H-SE-S
- NCS-55A1-36H-DTC
- NCS-55A1-36H-GLE
- NCS-55A1-36H-S
- NCS-55A2-MOD-SE-S
- NCS-55A2-MOD-HD-S
- NCS-55A2-MOD-SYS
- NCS-55A2-MOD-HX-S
- NCS-55A2-MOD-SE-H-S
- NCS-55A1-24H
- NCS-57B1-6D24H-S
- NCS-57B1-5D24H-SE
- NCS-5501
- NCS-5501-SE
- NCS-55A1-24Q6H-S
- NCS-55A1-24Q-DTCR
- NCS-55A1-24Q-RPHY
- NCS-55A1-24Q6H-SS
- NCS-57C1-48Q6D-S
- NCS-5502-SE
- NCS-5502-U100

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## Guidelines for Installing DDoS Edge Protection

- Configure the management interface to reach the DDoS controller IP address.
- Manually configure the base ACL, UDF, NetFlow, and SSH configurations.  
For more information, see .
- Reload the router as a hw-module profile configuration is being performed.

## Restrictions of DDoS Edge Protection Solution

- Only IPv4 and IPv6 traffic is supported.
- Only default VRF configuration is supported and is limited to the management port. To ensure smooth communication between the Docker and the controller, make sure to set up the management port exclusively in the default VRF.

## Install and Configure DDoS Edge Protection

You can install the DDoS Edge Protection application through the DDoS edge protection controller. Perform the following:

1. Install and download the DDoS Edge Protection Controller Software package from the [Software Download](#) page. You can access the user interface, when the controller installation is complete.  
Log in to the controller services instance to monitor, manage, and control the device.
2. Perform the following base configurations such as ACL, UDF, hw-module, NetFlow configuration, and SSH manually on the router:

Configure UDF

```
RP/0/RP0/CPU0:ios(config)#udf udf-ident header outer 13 offset 4 length 2
RP/0/RP0/CPU0:ios(config)#udf udf-chksum header outer 14 offset 16 length 2
RP/0/RP0/CPU0:ios(config)#udf udf-seqnum header outer 14 offset 4 length 4
```

The user-defined field, allows you to define a custom key by specifying the location and size of the field to match.

Configure the hardware module or TCAM

```
RP/0/RP0/CPU0:ios(config)#hw-module profile tcam format access-list ipv4 src-addr dst-addr
src-port dst-port proto tcp-flags packet-length frag-bit precedence enable-capture
ttl-match udf1 udf-chksum udf2 udf-seqnum udf3 udf-ident
```

```
RP/0/RP0/CPU0:ios(config)#hw-module profile tcam format access-list ipv6 src-port dst-addr
dst-port next-hdr tcp-flags payload-length ttl-match
```

Reload the router (as hw-module profile and UDF configuration is performed).

### Configure Loopback

```
RP/0/RP0/CPU0:ios(config)#interface Loopback100
RP/0/RP0/CPU0:ios(config-if)# ipv4 address 15.1.1.2 255.255.255.255
RP/0/RP0/CPU0:ios(config)#interface Loopback101
RP/0/RP0/CPU0:ios(config-if)# ipv4 address 17.1.1.2 255.255.255.255
RP/0/RP0/CPU0:ios(config-if)#
```

### Configure Netflow

```
//Configuring Monitor Map
RP/0/RP0/CPU0:ios(config)#flow monitor-map DetectPro_Monitor_IPV6
RP/0/RP0/CPU0:ios(config)# record ipv6 extended
RP/0/RP0/CPU0:ios(config)#exporter DetectPro_GPB
RP/0/RP0/CPU0:ios(config)# cache entries 1000000
RP/0/RP0/CPU0:ios(config)#cache entries active 1
RP/0/RP0/CPU0:ios(config)#cache entries inactive 1
RP/0/RP0/CPU0:ios(config)#cache timeout inactive 1
RP/0/RP0/CPU0:ios(config)#cache timeout rate-limit 1000000
!
RP/0/RP0/CPU0:ios(config)#flow monitor-map DetectPro_Monitor_IPV4
RP/0/RP0/CPU0:ios(config)# record ipv4 extended
RP/0/RP0/CPU0:ios(config)#exporter DetectPro_GPB
RP/0/RP0/CPU0:ios(config)# cache entries 1000000
RP/0/RP0/CPU0:ios(config)#cache entries active 1
RP/0/RP0/CPU0:ios(config)#cache entries inactive 1
RP/0/RP0/CPU0:ios(config)#cache timeout inactive 1
RP/0/RP0/CPU0:ios(config)#cache timeout rate-limit 1000000
!
//Configuring Exporter Map
RP/0/RP0/CPU0:ios(config)#flow exporter-map DetectPro_GPB
RP/0/RP0/CPU0:ios(config)#version protobuf
RP/0/RP0/CPU0:ios(config)#transport udp 5005
RP/0/RP0/CPU0:ios(config)#source TenGigE0/0/0/16
RP/0/RP0/CPU0:ios(config)#destination 15.1.1.2
!
//Configuring Sampler Map
RP/0/RP0/CPU0:ios(config)#sampler-map DetectPro_NFv9
RP/0/RP0/CPU0:ios(config)#random 1 out-of 100
!
```

### Configure ACL

```
RP/0/RP0/CPU0:ios(config)#ipv4 access-list myACL
RP/0/RP0/CPU0:ios(config-ipv4-acl)# 1301 permit ipv4 any any
!
RP/0/RP0/CPU0:ios(config)#ipv4 access-list myACL
RP/0/RP0/CPU0:ios(config-ipv6-acl)# 1301 permit ipv6 any any
!
```

For more information on implementing access lists and prefix lists, see [Understanding Access-List](#).

If there is any DDoS attack, the controller performs the mitigation action using the ACL rule automatically.

The following is a sample configuration to deny DDoS attacker traffic using user defined ACE rule:

```
1 deny udp any eq 19 host 45.0.0.1 eq 0 packet-length eq 128 ttl eq 64
2 deny tcp any host 45.0.0.1 eq www match-all -established -fin -psh +syn -urg
packet-length eq 60 ttl eq 64
1301 permit ipv4 any any
```

Configuration updates are sent by the controller to the router.

### Configure SSH

```
RP/0/RP0/CPU0:ios(config)#ssh server v2
RP/0/RP0/CPU0:ios(config)#ssh server netconf
RP/0/RP0/CPU0:ios(config)#netconf agent tty
RP/0/RP0/CPU0:ios(config)#netconf-yang agent ssh
!
RP/0/RP0/CPU0:ios(config)#ssh timeout 120
RP/0/RP0/CPU0:ios(config)#ssh server rate-limit 600
RP/0/RP0/CPU0:ios(config)#ssh server session-limit 110
RP/0/RP0/CPU0:ios(config)#ssh server v2
RP/0/RP0/CPU0:ios(config)#ssh server vrf default
RP/0/RP0/CPU0:ios(config)#ssh server netconf vrf default
```

To configure TPA, perform the following steps:

```
RP/0/RP0/CPU0:ios(config)#tpa
RP/0/RP0/CPU0:ios(config-tpa)#linux networking
RP/0/RP0/CPU0:ios(config-tpa-vrf)#vrf default
RP/0/RP0/CPU0:ios(config-tpa-vrf)#east-west Loopback101
RP/0/RP0/CPU0:ios(config-tpa-vrf)#address-family ipv4
RP/0/RP0/CPU0:ios(config-tpa-vrf-afi)#default-route software-forwarding
RP/0/RP0/CPU0:ios(config-tpa-vrf-afi)#source-hint default-route interface Loopback100
RP/0/RP0/CPU0:ios(config-tpa-vrf-afi)#
```




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**Note** TPA configuration is not required for NCS 5700 routers.

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3. Reload the router (as the hw-module profile configuration is performed).
4. Check the device connection to the DDoS controller using the **ping** command.

```
RP/0/RP0/CPU0:ios#ping 10.105.237.54
Thu Jun  1 07:16:43.654 UTC
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.105.237.54 timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/4 ms
RP/0/RP0/CPU0:Router#bash
Thu Jun  1 07:16:53.024 UTC
[Router:~]$ping 10.105.237.54
PING 10.105.237.54 (10.105.237.54) 56(84) bytes of data.
64 bytes from 10.105.237.54: icmp_seq=1 ttl=63 time=1.73 ms
64 bytes from 10.105.237.54: icmp_seq=2 ttl=63 time=1.29 ms
64 bytes from 10.105.237.54: icmp_seq=3 ttl=63 time=1.27 ms
64 bytes from 10.105.237.54: icmp_seq=4 ttl=63 time=1.75 ms
^C
--- 10.105.237.54 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 1.270/1.510/1.751/0.230 ms
[Router:~]$
```

5. Add device details on the controller panel and ensure that all the three indicators (Deployment, Container, and Configuration) are green.

For more information on installing the DDoS controller, see the DDoS Edge Protection Installation guide.

For more information on the DDoS Edge Protection, see Cisco Secure DDoS Edge Protection Data Sheet.

# Verify DDoS Edge Protection Application Configuration

You can also verify if the DDoS controller pushes the CLI to the device using the following **show running-config** commands on the device:

```
RP/0/RP0/CPU0:Router#show running-config appmgr
Thu Jun  1 07:33:36.741 UTC
appmgr
  application esentryd
    activate type docker source esentryd-cisco-20230431633 docker-run-opts "-p 10000:10000/tcp
-p 5005:5005/udp --env-file /harddisk:/ENV_6478443711ac6830700d1aeb --net=host"
  !
!
```

```
RP/0/RP0/CPU0:Router#show flow monitor DetectPro_Monitor_IPV4 cache location 0/0/CPU0
Thu Nov 16 06:13:38.066 UTC
Cache summary for Flow Monitor DetectPro_Monitor_IPV4:
Cache size:                               1000000
Current entries:                           0
Flows added:                               2243884200
Flows not added:                           0
Ager Polls:                                2243884200
- Active timeout                           0
- Inactive timeout                         0
- Immediate                                0
- TCP FIN flag                             0
- Emergency aged                           0
- Counter wrap aged                        0
- Total                                    2243884200
Periodic export:
- Counter wrap                             0
- TCP FIN flag                             0
Flows exported                              2243884200

Matching entries:                           0
!
```

```
RP/0/RP0/CPU0:Router#show flow monitor DetectPro_Monitor_IPV6 cache location 0/0/CPU0
Thu Nov 16 06:13:43.734 UTC
Cache summary for Flow Monitor DetectPro_Monitor_IPV6:
Cache size:                               1000000
Current entries:                           0
Flows added:                               59971
Flows not added:                           0
Ager Polls:                                94437
- Active timeout                           59971
- Inactive timeout                         0
- Immediate                                0
- TCP FIN flag                             0
- Emergency aged                           0
- Counter wrap aged                        0
- Total                                    59971
Periodic export:
- Counter wrap                             0
- TCP FIN flag                             0
Flows exported                              59971

Matching entries:                           0
```

```
RP/0/RP0/CPU0:Router#show flow exporter
exporter exporter-map
```

```
RP/0/RP0/CPU0:tortin#show flow exporter DetectPro_GPB location 0/0/CPU0
Thu Nov 16 06:13:58.059 UTC
Flow Exporter: DetectPro_GPB
Export Protocol: protobuf
Flow Exporter memory usage: 5265344
Used by flow monitors: DetectPro_Monitor_IPV4
                        DetectPro_Monitor_IPV6
```

```
Status: Disabled
Transport:  UDP
Destination: 15.1.1.2      (5005) VRF default
Source:      0.0.0.0      (54482)
Flows exported:                                0 (0 bytes)
Flows dropped:                                0 (0 bytes)

Templates exported:                            0 (0 bytes)
Templates dropped:                            0 (0 bytes)

Option data exported:                          0 (0 bytes)
Option data dropped:                          0 (0 bytes)

Option templates exported:                    0 (0 bytes)
Option templates dropped:                    0 (0 bytes)

Packets exported:                            20355756 (27716506821 bytes)
Packets dropped:                              0 (0 bytes)
```

```
Total export over last interval of:
  1 hour:                                     12 pkts
                                                1879 bytes
                                                12 flows
  1 minute:                                  0 pkts
                                                0 bytes
                                                0 flows
  1 second:                                  0 pkts
                                                0 bytes
                                                0 flows
```

```
RP/0/RP0/CPU0:Router#show apmgr application-table
Thu Nov 16 06:13:58.059 UTC
Name      Type   Config State Status
-----
esentryd Docker Activated  Up 8 minutes
RP/0/RP0/CPU0:Router#
```

