

Use Cases: Application Hosting

This chapter describes use cases for running applications on IOS XR.

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Hosting iPerf in Docker Containers to Measure Network Performance using Application Manager

Measuring the network performance is important to test the efficiency of the network. Network throughput, bandwidth, latency, and packet loss are some of the parameters used to measure the network performance. iPerf is a commonly used application for measuring network performance. The iPerf application is hosted on systems at both ends of the connection that is measured. One system is used as the server, and the other system is used as the client. At least one system must be a Cisco IOS XR router, the other system can be any other external entity like a controller or another router.

This use case illustrates the procedure for hosting the iPerf application in docker containers on two Cisco IOS XR routers, Router A and Router B to measure network performance. Router A hosts the iPerf server and Router B hosts the iPerf client.

In this usecase, we demonstrate the example of testing network bandwidth when a route update takes place. Router A hosts the iPerf Server and Router B hosts the iPerf Client. Router C and Router D are intermediate routers that allow traffic flow from Router A to Router B and vice-versa.

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Figure 1: Hosting iPerf Application in Cisco IOS XR Routers

Verify Connection between the iPerf Server and iPerf Client Applications

commar	nd on Rou	ter A. When the iPerf clien	t is up and running, the entry in	the State field disp	lays "ESTABLISHED"
Router#	bash net	stat -anput			
Thu Dec	: 3 10:0	0:33.535 UTC			
Active	Internet	connections (servers	and established)		
Proto F	Recv-Q Se	nd-Q Local Address	Foreign Address	State	PID/Program name
tcp	0	0 0.0.0.0:646	0.0.0:*	LISTEN	8585/mpls ldp
tcp	0	0 0.0.0:22	0.0.0:*	LISTEN	8567/ssh server
tcp	0	0 0.0.0.0:830	0.0.0:*	LISTEN	8567/ssh server
tcp6	0	0 :::5201	:::*	LISTEN	20829/iperf3
tcp6	0	0 :::22	:::*	LISTEN	8567/ssh server
tcp6	0	0 :::830	:::*	LISTEN	8567/ssh server
tcp6	0	0 30.5.7.1:5201	100.0.0.9:65322	ESTABLISHED	20829/iperf3
tcp6	0	0 30.5.7.1:5201	100.0.0.9:65302	ESTABLISHED	20829/iperf3
udp	0	0 0.0.0:646	0.0.0:*		8585/mpls ldp
udp	0	0 0.0.0:3232	0.0.0:*		6833/pim
udp	0	0 0.0.0.3503	0.0.0:*		10762/lspv server
udp	0	0 0.0.0.0:68	0.0.0:*		10704/xr_dhcpcd
udp	0	0 0.0.0:496	0.0.0:*		6833/pim
udp6	0	0 :::3503	:::*		10762/lspv_server

Verify whether the connection is established between iPerf server and iPerf clients by executing the **bash netstat -anput**

Router D

Install the iPerf Server Application

Step 1 Install the iPerf application RPM on Router A. Only the RPM file format is supported.

Router#appmgr package install rpm /misc/disk1/iperf-0.1.0-XR_7.3.1.x86_64.rpm

Step 2 Configure the application to run as iPerf server.

Router#config

```
Thu Dec 3 09:57:54.034 UTC

Router(config)#appmgr

Router(config-appmgr)#application iperf-server-app

Router(config-application)#activate type docker source iperf docker-run-opts "--net=host" docker-run-cmd

"iperf3 -s -d"

Router(config-application)#commit

Thu Dec 3 09:57:54.398 UTC
```

Step 3 Verify the basic details (application name and state) about the activated iPerf server application.

```
Router#show appmgr application-table
Name
                   Type Config State Status
-----
                    _____
                                                   _____
iperf-server-app
                             Activated Up 2 seconds
                    Docker
Router#
Thu Dec 3 09:57:54.398 UTC
Router#show appmgr application name iperf-server-app info summary
Thu Dec 3 09:58:15.569 UTC
Application: iperf-server-app
   Type: Docker
   Source: iperf
   Config State: Activated
   Container ID: 0118f9006cde2787e9809eb7c62ad8b552925b559a689c7aaa80f80d7ce43c02
   Image: alpine1:latest
   Command: "iperf3 -s -d"
   Status: Up 7 seconds
Thu Dec 3 09:57:54.398 UTC
Router#show appmgr application name iperf-server-app info detail
Thu Dec 3 09:58:26.401 UTC
Application: iperf-server-app
   Type: Docker
   Source: iperf
   Config State: Activated
   Docker Information:
       Container ID: 0118f9006cde2787e9809eb7c62ad8b552925b559a689c7aaa80f80d7ce43c02
       Container name: iperf-server-app
       Labels:
       Image: alpine1:latest
       Command: "iperf3 -s -d"
       Created at: 2020-12-03 09:58:08 +0000 UTC
       Running for: 18 seconds ago
       Status: Up 18 seconds
       Size: OB
       Ports:
       Mounts:
       Networks: host
```

```
LocalVolumes: 0

Router#show appmgr application name iperf-server-app stats

Thu Dec 3 09:58:39.594 UTC

Application Stats: iperf-server-app

CPU Percentage: 0.00%

Memory Usage: 624KiB / 31.23GiB

Memory Percentage: 0.00%

Network IO: 0B / 0B

Block IO: 0B / 0B

PIDs: 1

Router#
```

Step 4 Verify if the iPerf server is listening on the default port (5201) by using the netstat command inside the container.

The appmgr application exec name *app_name* docker-exec-cmd command can be used to execute any commands inside the container.

```
Router#appmgr application exec name iperf-server-app docker-exec-cmd name netstat -lnput
Active Internet connections (only servers)
                                    Foreign Address
Proto Recv-Q Send-Q Local Address
                                                                State
                                                                            PID/Program name
                                        0.0.0.0:*
        0 0 127.0.0.11:46727
                                                                LISTEN
tcp
               0 0.0.0.0:5201 0.0.0:*
0 127.0.0.11:39552 0.0.0.0
         0
                                                             LISTEN
tcp
udp
         0
                0 127.0.0.11:39552
                                     0.0.0.0:*
Router#
```

Install the iPerf Client Application

Step 1 Install the iPerf application RPM on Router B.

Step 2 Configure the application to run as iPerf client with a timeout (600s in this case).

```
Router#config
Thu Dec 3 09:57:54.034 UTC
Router(config)#appmgr
Router(config-appmgr)#application iperf-client-app
Router(config-application)#activate type docker source iperf docker-run-opts "--net=host" docker-run-cmd
    "iperf3 -c 30.5.7.1 -t 600"
Router(config-application)#commit
Thu Dec 3 09:57:54.398 UTC
```

- **Note** Hosting the iPerf client application on Router B by providing the iPerf server physical interface IP address (30.5.7.1) establishes communication between Router B and Router A.
- **Step 3** Verify the basic details (application name and state) about the activated iPerf client application.

. . .

```
Router#
Thu Dec 3 09:57:54.398 UTC
Router#show appmgr application name iperf-client-app info summary
Thu Dec 3 09:59:54.534 UTC
Application: iperf-client-app
   Type: Docker
   Source: iperf
   Config State: Activated
   Container ID: 40e1730a97666b2b44c8c9313b94b0138925c9198ae63244ff3bd386132d9c9c
   Image: alpine1:latest
   Command: "iperf3 -c 30.5.7.1 -t 600"
   Status: Up 9 seconds
Router#show appmgr application name iperf-client-app info detail
Application: iperf-client-app
   Type: Docker
   Source: iperf
   Config State: Activated
   Docker Information:
        Container ID: 40e1730a97666b2b44c8c9313b94b0138925c9198ae63244ff3bd386132d9c9c
        Container name: iperf-client-app
       Labels:
       Image: alpine1:latest
        Command: "iperf3 -c 30.5.7.1 -t 600"
        Created at: 2020-12-03 09:59:45 +0000 UTC
       Running for: 20 seconds ago
        Status: Up 20 seconds
       Size: OB
       Ports:
        Mounts:
       Networks: host
       LocalVolumes: 0
Router#show appmgr application name iperf-client-app stats
Thu Dec 3 10:00:18.079 UTC
Application Stats: iperf-client-app
   CPU Percentage: 0.11%
  Memory Usage: 720KiB / 31.23GiB
  Memory Percentage: 0.00%
   Network IO: OB / OB
   Block IO: 0B / 0B
   PIDs: 1
Router#
```

Verify Connection between the iPerf Server and iPerf Client Applications

Verify whether the connection is established between iPerf server and iPerf clients by executing the **bash netstat -anput** command on Router A. When the iPerf client is up and running, the entry in the **State** field displays "ESTABLISHED".

Router#	basn net	stat	-anput			
Thu Dec	3 10:0	0:33.	.535 UTC			
Active	Internet	conr	nections (servers a	and established)		
Proto Re	ecv-Q Se	nd-Q	Local Address	Foreign Address	State	PID/Program name
tcp	0	0	0.0.0.0:646	0.0.0:*	LISTEN	8585/mpls_ldp
tcp	0	0	0.0.0.0:22	0.0.0:*	LISTEN	8567/ssh_server
tcp	0	0	0.0.0.0:830	0.0.0:*	LISTEN	8567/ssh_server
tcp6	0	0	:::5201	:::*	LISTEN	20829/iperf3
tcp6	0	0	:::22	:::*	LISTEN	8567/ssh_server
tcp6	0	0	:::830	:::*	LISTEN	8567/ssh_server
tcp6	0	0	30.5.7.1:5201	100.0.0.9:65322	ESTABLISHED	20829/iperf3

tcp6	0	0 30.5.7.1:5201	100.0.0.9:65302	ESTABLISHED 20829/iperf3
udp	0	0 0.0.0:646	0.0.0:*	8585/mpls ldp
udp	0	0 0.0.0:3232	0.0.0:*	6833/pim
udp	0	0 0.0.0:3503	0.0.0:*	10762/lspv server
udp	0	0 0.0.0:68	0.0.0:*	10704/xr dhcpcd
udp	0	0 0.0.0:496	0.0.0:*	6833/pim
udp6	0	0 :::3503	· · · *	10762/lspv server

Measure Network Performance

Step 1 Verify the traffic route from Router B to Router A using the **show ip route** command, on Router B.



Step 2 Check the network performance between iPerf client and iPerf server (on Router B and Router A).

You can view the network monitoring parameters by executing the **show appmgr application name iperf-client-app logs** command, on Router B that hosts the iPerf client.

Router#show appmgr application nam	ne iperf-client-app log	<u>ys</u>
Tue Dec 1 12:50:27.862 UTC		
Connecting to host 30.5.7.1, port	5201	
[4] local 100.0.0.9 port 61384 co	onnected to 30.5.7.1 po	ort 5201
[ID] Interval Transfer	Bandwidth Retr (Cwnd
[4] 0.00-1.00 sec 1.05 MBytes	8.82 Mbits/sec 0	80.6 KBytes
[4] 1.00-2.00 sec 1.26 MBytes	10.6 Mbits/sec 0	136 KBytes
[4] 2.00-3.00 sec 1.18 MBytes	9.90 Mbits/sec 0	191 KBytes
[4] 3.00-4.00 sec 1.24 MBytes	10.4 Mbits/sec 0	246 KBytes
[4] 4.00-5.00 sec 1.18 MBytes	9.90 Mbits/sec 0	301 KBytes
[4] 5.00-6.00 sec 1.37 MBytes	11.5 Mbits/sec 0	362 KBytes
[4] 6.00-7.00 sec 1.37 MBytes	11.5 Mbits/sec 0	423 KBytes
[4] 7.00-8.00 sec 1.43 MBytes	12.0 Mbits/sec 0	486 KBytes
[4] 8.00-9.00 sec 1.30 MBytes	11.0 Mbits/sec 0	547 KBytes
[4] 9.00-10.00 sec 1.43 MBytes	12.0 Mbits/sec 0	611 KBytes
[4] 10.00-11.00 sec 1.62 MBytes	13.6 Mbits/sec 0	707 KBytes
[4] 11.00-12.00 sec 1.62 MBytes	13.6 Mbits/sec 0	875 KBytes
[4] 12.00-13.00 sec 1.93 MBytes	16.2 Mbits/sec 0	1.07 MBytes
[4] 13.00-14.00 sec 1.68 MBytes	14.1 Mbits/sec 0	1.29 MBytes
[4] 14.00-15.00 sec 1.06 MBytes	8.86 Mbits/sec 0	1.56 MBytes
[4] 15.00-16.00 sec 891 KBytes	7.30 Mbits/sec 0	1.83 MBytes
[4] 16.00-17.00 sec 970 KBytes	7.95 Mbits/sec 0	2.12 MBytes
[4] 17.00-18.00 sec 1.24 MBytes	10.4 Mbits/sec 0	2.58 MBytes
[4] 18.00-19.00 sec 885 KBytes	7.24 Mbits/sec 0	2.65 MBytes
[4] 19.00-20.00 sec 1.55 MBytes	13.0 Mbits/sec 0	3.10 MBytes
[4] 20.00-21.00 sec 820 KBytes	6.71 Mbits/sec 0	3.10 MBytes
[4] 21.00-22.00 sec 1.72 MBytes	14.4 Mbits/sec 6	2.42 MBytes
[4] 22.00-23.00 sec 0.00 Bytes	0.00 bits/sec 5	2.30 MBytes
[4] 23.00-24.00 sec 256 KBytes	2.10 Mbits/sec 0	1.35 MBytes
[4] 24.00-25.00 sec 1.56 MBytes	13.1 Mbits/sec 237	1.83 MBytes
[4] 25.00-26.00 sec 1.90 MBytes	15.9 Mbits/sec 0	2.17 MBytes
[4] 26.00-27.00 sec 382 KBytes	3.12 Mbits/sec 61	1.95 MBytes
[4] 27.00-28.00 sec 0.00 Bytes	0.00 bits/sec 0	1.39 MBytes
[4] 28.00-29.00 sec 3.35 MBytes	28.1 Mbits/sec 0	1.52 MBytes
[4] 29.00-30.00 sec 954 KBytes	7.82 Mbits/sec 0	1.58 MBytes
[4] 30.00-31.00 sec 1018 KBytes	8.34 Mbits/sec 0	1.64 MBytes
[4] 31.00-32.00 sec 1.24 MBytes	10.4 Mbits/sec 0	1.71 MBytes
[4] 32.00-33.00 sec 1.25 MBytes	10.5 Mbits/sec 0	1.76 MBytes
[4] 33.00-34.00 sec 1.61 MBytes	13.5 Mbits/sec 0	1.80 MBytes
[4] 34.00-35.00 sec 1.46 MBytes	12.2 Mbits/sec 0	1.82 MBytes
[4] 35.00-36.00 sec 1.18 MBytes	9.89 Mbits/sec 0	1.83 MBytes
[4] 36.00-37.00 sec 1.36 MBytes	11.4 Mbits/sec 0	1.84 MBytes
[4] 37.00-38.00 sec 1.36 MBytes	11.4 Mbits/sec 0	1.84 MBytes
[4] 38.00-39.00 sec 1.24 MBytes	10.4 Mbits/sec 0	1.84 MBytes
[4] 39.00-40.00 sec 1.25 MBytes	10.5 Mbits/sec U	1.85 MBytes
[4] 40.00-41.00 sec 1.25 MBytes	10.5 Mbits/sec 0	1.86 MBytes
[4] 41.00-42.00 sec 1.40 MBytes	11.8 Mbits/sec 0	1.88 MBytes
[4] 42.00-43.00 sec 1.12 MBytes	9.3/ Molts/sec 0	1.91 MBytes
[4] 43.00-44.00 sec 1.12 MBytes	9.40 MDITS/SEC U	1.96 MBytes
[4] 44.00-45.00 Sec 1.20 MBytes	10.1 MDITS/SEC U	2.UZ MBYTES
[4] 45.00-40.00 Sec 1.2/ MBytes	10.7 MDITS/SEC U	2.11 MBytes
[4] 40.00-47.00 Sec 1.30 MBytes	10.5 Mbits/sec 0	2 36 MDytes
$\begin{bmatrix} 1 \end{bmatrix}$ 1,00-40.00 Sec 1.25 MBytes	12 0 Mbits/sec 0	2 53 MDrrtoo
[-] 40.00-49.00 Sec 1.43 MBYLES	IZ.U MUILS/SEC U	Z.JJ MDYLES

Step 3 Bring down the interface on Router D using the **shut** command to trigger a route update.

Router(config)#interface FourhundredGig0/0/0/0
Router(config-if)#shut
Router(config-if)#commit

Note Because of the interface shutdown, the route to 30.5.7.1 needs to be updated and hence momentarily there will be no route to this address.

Step 4 During the route update, check the network performance by executing the **show appmgr application name** *app_name* **logs** command.

You will notice that the entries in the **Bandwidth** field is Zero for a short duration, when the new route is installed.



[4]	24.00-25.00 se	ec 1.	56 ME	Bytes 1	3.1 1	Mbits/sec	237	1.8	3 MBytes
ſ	41	25.00-26.00 se	ec 1.	90 ME	- Bytes 1	5.9 1	Mbits/sec	0	2.17	MBvtes
ſ	41	26.00-27.00 se	ec 38	2 KBV	/tes 3.	12 M	bits/sec	61	1.95	MBvtes
ſ	41	27.00-28.00 se	-c 0.	00 Bi	tes 0.	00 b	its/sec 0	1	39 MF	lytes
ſ	41	28.00-29.00 se	-c 3.	35 MF	Bytes 2	1.8°	Mbits/sec	0	1.52	MBvtes
ſ	41	29 00-30 00 se	-c 95	4 KB1	/tes 7	82 M	hits/sec	า .	1 58 №	Bytes
г Г	11	30 00-31 00 80	$20 \ 10$	19 KE	20+00 P	1 2 2 1	Mbite/sec	0 .	1 61	MBytes
L F	4 J // 1	31 00-32 00 50	= 10	20 NE	vytes (0.041	Mbits/sec	0	1 71	MBytes
L r	4]	31.00-32.00 St	=C 1.	24 ME OF ME	ytes 1	0.41	MDILS/SEC	0	1 70	MBytes
L	4]	32.00-33.00 St	EC 1.	CI ME	syles i	.U.J I 2 E 1	MDILS/Sec	0	1 00	MBytes
L	4]	33.00-34.00 Se	3C I.	OI ME	syles i		MDILS/Sec	0	1.80	MBytes
l	4]	34.00-35.00 se	ec I.	46 ME	Sytes 1	.2.2 [Mbits/sec	0	1.82	MBytes
L	4 J	35.00-36.00 se	ec 1.	18 ME	Bytes 9	0.89 1	Mbits/sec	0	1.83	MBytes
[4]	36.00-37.00 se	ec 1.	36 ME	Bytes 1	.1.4 1	Mbits/sec	0	1.84	MBytes
[4]	37.00-38.00 se	ec 1.	36 ME	Bytes 1	.1.4 1	Mbits/sec	0	1.84	MBytes
[4]	38.00-39.00 se	ec 1.	24 ME	Bytes 1	.0.4 1	Mbits/sec	0	1.84	MBytes
[4]	39.00-40.00 se	ec 1.	25 ME	Bytes 1	0.5 1	Mbits/sec	0	1.85	MBytes
[4]	40.00-41.00 se	ec 1.	25 ME	Bytes 1	0.5 1	Mbits/sec	0	1.86	MBytes
[4]	41.00-42.00 se	ec 1.	40 ME	Bytes 1	1.8 1	Mbits/sec	0	1.88	MBytes
[4]	42.00-43.00 se	ec 1.	12 ME	Bytes 9).37 I	Mbits/sec	0	1.91	MBytes
[4]	43.00-44.00 se	ec 1.	12 ME	- Bytes 9	.40 I	Mbits/sec	0	1.96	MBytes
ſ	41	44.00-45.00 se	ec 1.	20 ME	- Bvtes 1	0.1 1	Mbits/sec	0	2.02	MBvtes
ſ	41	45.00-46.00 se	-c 1	27 MF	Svtes 1	0.71	Mbits/sec	0	2.11	MBvtes
ſ	41	46 00-47 00 se	rac 1	30 ME	Rytes 1	0 9 1	Mbits/sec	0	2 22	MBytes
r r	11	95 00-96 00 86	rac 1	78 ME	Autos 1	2 / 1	Mbite/sec	0	1 82	MBytes
L F	7 J	96 00-97 00 30	rac 1	25 ME	vytes 1	0 5 1	Mbits/sec	0	1 02	MBytes
L r	4]	90.00-97.00 Se	=C 1.	2.J ME De Me	ytes 1	0.51	MDILS/SEC	0	1 00	MBytes
L	4]	97.00-98.00 Se	3C I.	25 ME	syles i	.0.51	MDILS/Sec	0	1.03	MBytes
Ļ	4]	98.00-99.00 se	ec I.	49 ME	Sytes 1	.2.5 [Mbits/sec	0	1.84	MBytes
L	4]	99.00-100.00 \$	sec l	.25 №	1Bytes	10.5	Mbits/se	C 0	1.86	MBytes
[4]	100.00-101.00	sec	1.21	MBytes	s 10.2	2 Mbits/s	ec O	1.8	9 MBytes
[4]	101.00-102.00	sec	1.34	MBytes	\$ 11.2	2 Mbits/s	ec O	1.9	94 MBytes
[4]	102.00-103.00	sec	1.25	MBytes	10.5	5 Mbits/s	ec O	2.0	1 MBytes
					-					
L	4]	103.00-104.00	sec	1.30	MBytes	10.9	9 Mbits/s	ec O	2.0	9 MBytes
L [4] 4]	103.00-104.00 104.00-105.00	sec sec	1.30 1.25	MBytes MBytes	10.9 10.9	9 Mbits/s 5 Mbits/s	ec O ec O	2.0 2.1	9 MBytes 7 MBytes
L [[4] 4] 4]	103.00-104.00 104.00-105.00 105.00-106.00	sec sec sec	1.30 1.25 1.39	MBytes MBytes MBytes	s 10.9 s 10.9 s 11.0	9 Mbits/s 5 Mbits/s 6 Mbits/s	ec O ec O ec O	2.0 2.1 2.3	9 MBytes 7 MBytes 3 MBytes
 [[4] 4] 4] 4]	103.00-104.00 104.00-105.00 105.00-106.00 106.00-107.00	sec sec sec sec	1.30 1.25 1.39 1.01	MBytes MBytes MBytes MBytes	s 10.9 s 10.9 s 11.9 s 8.4	9 Mbits/s 5 Mbits/s 6 Mbits/s 7 Mbits/s	ec 0 ec 0 ec 0 ec 0	2.0 2.1 2.3 2.4	9 MBytes 7 MBytes 3 MBytes 6 MBytes
 [[]	4] 4] 4] 4] 4]	103.00-104.00 104.00-105.00 105.00-106.00 106.00-107.00 107.00-108.00	sec sec sec sec sec	1.30 1.25 1.39 1.01 526 F	MBytes MBytes MBytes MBytes KBytes	10.9 10.9 11.0 8.4 4.31	9 Mbits/s 5 Mbits/s 6 Mbits/s 7 Mbits/s Mbits/se	ec 0 ec 0 ec 0 ec 0 c 0	2.0 2.1 2.3 2.4 2.54	9 MBytes 7 MBytes 3 MBytes 6 MBytes 1 MBytes
L [[[[4] 4] 4] 4] 4] 4] 4]	103.00-104.00 104.00-105.00 105.00-106.00 106.00-107.00 107.00-108.00 108.00-109.00	sec sec sec sec sec	1.30 1.25 1.39 1.01 526 F 0.00	MBytes MBytes MBytes MBytes (Bytes Bytes	<pre>10.9 10.9 10.9 10.9 11.0 8.4 4.31 0.00</pre>	9 Mbits/se 5 Mbits/se 6 Mbits/se 7 Mbits/se bits/sec	ec 0 ec 0 ec 0 ec 0 ec 0 c 0	2.0 2.1 2.3 2.4 2.54 2.54	9 MBytes 7 MBytes 3 MBytes 6 MBytes 8 MBytes MBytes
L [[[[[4] 4] 4] 4] 4] 4] 4] 4]	103.00-104.00 104.00-105.00 105.00-106.00 106.00-107.00 107.00-108.00 108.00-109.00 109.00-110.00	sec sec sec sec sec sec sec	1.30 1.25 1.39 1.01 526 F 0.00 0.00	MBytes MBytes MBytes MBytes Bytes Bytes Bytes	<pre>10.9 10.9 10.9 11.0 8.4 4.31 0.00 0.00</pre>	9 Mbits/se 5 Mbits/se 6 Mbits/se 7 Mbits/se bits/sec bits/sec	ec 0 ec 0 ec 0 ec 0 c 0 0 0	2.0 2.1 2.3 2.4 2.54 2.54 2.54	09 MBytes 7 MBytes 3 MBytes 6 MBytes 8 MBytes MBytes MBytes
[[[[[[4] 4] 4] 4] 4] 4] 4] 4] 4] 4]	103.00-104.00 104.00-105.00 105.00-106.00 106.00-107.00 107.00-108.00 108.00-109.00 109.00-110.00 110.00-111.00	sec sec sec sec sec sec sec sec sec	1.30 1.25 1.39 1.01 526 F 0.00 0.00 0.00	MBytes MBytes MBytes MBytes Bytes Bytes Bytes Bytes	<pre>10.9 10.9 10.9 11.0 8.4 4.31 0.00 0.00 0.00</pre>	9 Mbits/se 5 Mbits/se 6 Mbits/se 7 Mbits/se bits/sec bits/sec bits/sec	ec 0 ec 0 ec 0 ec 0 c 0 0 0 0	2.0 2.1 2.3 2.4 2.54 2.54 2.54 2.54	 9 MBytes 7 MBytes 3 MBytes 6 MBytes 4 MBytes MBytes MBytes MBytes MBytes MBytes
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	 4] 	103.00-104.00 104.00-105.00 105.00-106.00 106.00-107.00 107.00-108.00 109.00-110.00 110.00-111.00 111.00-112.00 112.00-113.00 113.00-114.00 115.00-116.00 116.00-117.00	Sec Sec Sec Sec Sec Sec Sec Sec Sec Sec	1.30 1.25 1.39 1.01 526 F 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	MBytes MBytes MBytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes Bytes	<pre>5 10.9 5 10.9 5 11.0 5 11.0 6 8.4 7 4.31 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0</pre>	9 Mbits/se 5 Mbits/se 6 Mbits/se 7 Mbits/se bits/sec bits/sec bits/sec bits/sec bits/sec bits/sec bits/sec bits/sec bits/sec bits/sec bits/sec bits/sec	ec 0 ec 0 ec 0 o 0 0 0 1 0 0 0 0 1 0 0 0 1 0	2.0 2.1 2.3 2.4 2.54 2.54 2.54 1.41 1.41 1.41 1.41 1.41 1.41 1.41	9 MBytes 7 MBytes 3 MBytes 4 MBytes MBytes MBytes MBytes KBytes KBytes KBytes KBytes KBytes KBytes KBytes KBytes
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receiver

[4] 0.00-600.00 sec 702 MBytes 9.82 Mbits/sec

iperf Done.

<!-On Router A!> Router#show appmgr application name iperf-server-app stats Thu Dec 3 11:45:47.790 UTC Application Stats: iperf-server-app CPU Percentage: 0.00% Memory Usage: 816KiB / 31.23GiB Memory Percentage: 0.00% Network IO: 0B / 0B Block IO: OB / OB PIDs: 1 <!-On Router B!> Router#show appmgr application name iperf-client-app stats Thu Dec 3 11:45:59.418 UTC Application Stats: iperf-client-app CPU Percentage: 0.00% Memory Usage: OB / OB Memory Percentage: 0.00% Network IO: OB / OB

```
Block IO: OB / OB
PIDs: O
```

Stop iPerf Applications

Stop the iPerf applications on Router A and Router B using the **appmgr application stop name** *app_name* command. The **application stop** command can only be used for applications that are registered, activated, and are currently running. The **application stop** command stops only the application and does not clean up the resources used by the application.

You can verify the status of the application using the **show appmgr application-table** command. The **Status** is displayed as **Exited** if the application has been stopped successfully.

Start iPerf Applications

Start or restart an application that has been stopped (and not deactivated) using the **appmgr application start name** *app_name* command.

```
Router#appmgr application start name iperf-server-app

Tue Dec 1 13:06:21.996 UTC

Router#show appmgr application-table

Mon Nov 30 13:38:36.999 UTC

Name Type Config State Status

------ iperf-server-app Docker Activated UP(1) Less than a second

Router#
```

Deactivate iPerf Applications

Step 1 Deactivate the iPerf applications using the **no appmgr application** *app_name* command. You deactivate the installed application when you want to release all resources used by the application.

```
Router#config
Router(config)#no appmgr application iperf-server-app
Router(config)#commit
```

Step 2 Verify the status of the application by using the **show appmgr application-table** *app_name* **stats** command.

```
Router#show appmgr application-table
Mon Nov 30 13:39:51.197 UTC
Router#
```

Note You can activate a deactivated application using the **appmgr application** *app_name* **activate type docker source** *source_name* command.

Uninstall iPerf Applications

Uninstall the applications using the appmgr package uninstall package package_name command.

After the application is successfully uninstalled, executing the show appmgr source-table command displays no result.

```
Router#appmgr package uninstall package iperf
table
Mon Nov 30 13:41:05.155 UTC
Router#show appmgr source-table
Mon Nov 30 13:41:05.936 UTC
Router#
```