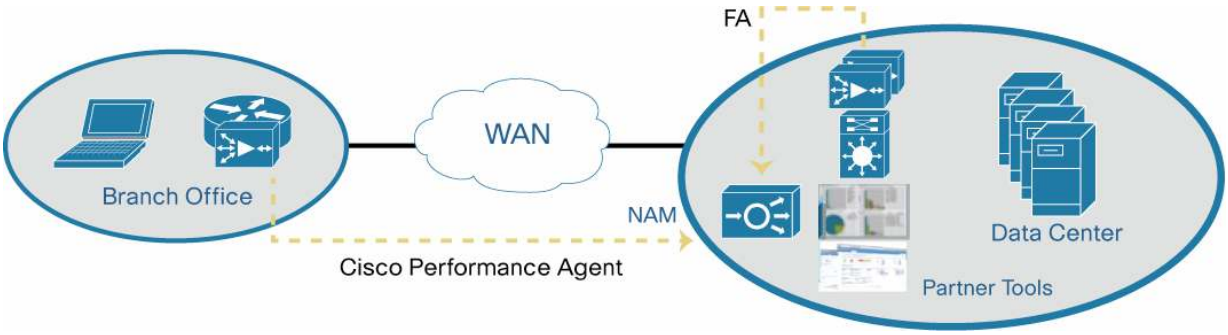
Cisco Performance Agent

Figure 1. Application visibility in all network segments using Performance Agent in branch office



Cisco® Performance Agent is a licensed software feature of Cisco IOS® Software that offers comprehensive application performance and network usage data valuable for network administrators to accurately characterize user experience and optimize the use of network resources. When enabled, the feature can be configured to export application performance analytics, traffic statistics, and WAN optimization metrics in a NetFlow Version 9 template-based format, making it easier for management applications to consume.

Cisco Performance Agent provides visibility into branch-office applications and network performance. It collects application response time metrics and reports to the Cisco Prime™ Network Analysis Module (NAM) or partner reporting tool. Cisco Performance Agent can be deployed in Cisco 880 and 890 Series Integrated Services Routers, part of the Cisco Integrated Services Routers Generation 2 (ISR G2) portfolio. You can use Cisco Performance Agent as an application performance data source; the application works with Cisco Wide Area Application Services (WAAS) Express. The Cisco Flow Agent is used as an application performance data source and works with the Cisco Wide Area Application Engine (WAE) and Cisco WAAS Services-Ready Engine (SRE). When the Cisco Performance Agent is deployed with Cisco WAAS Express, it will also report Cisco WAAS optimization statistics. The performance agent takes advantage of Network-Based Application Recognition (NBAR) Deep Packet Inspection (DPI) for a more accurate application representation. It provides the Cisco Common Classification Policy Language (C3PL) user interface for configuration.

When using WAN optimization, application visibility in all network segments can be achieved by deploying the NAM in the data center. You can use Cisco Performance Agent running in the branch-office router and Cisco Flow Agent running in the Cisco WAE appliance in the data center as data sources for collecting application performance data.

The Cisco Prime NAM measures and reports application response time, traffic statistics, WAN bandwidth usage, LAN and WAN data throughput, and other application performance metrics**.** You can use the NAM to identify the source of performance degradation across multiple network segments based on the following data:

- Transaction time (TT)
- Monitoring the WAN latency using the server-network-delay (SND) metric
- Monitoring the LAN latency using the client-network-delay (CND) metric

- Monitoring the server processing time using the application-delay (AD) metric

This document describes two common use cases for the following deployment scenarios:

- Application performance visibility without WAN optimization
- Application performance visibility across various network segments before and after WAN optimization

Hardware and Software Requirements

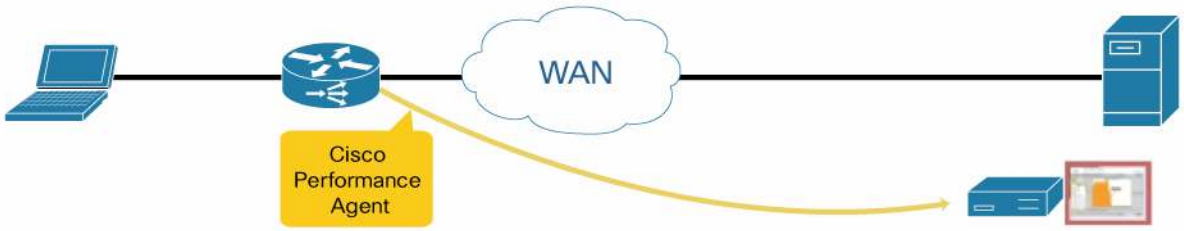
- Hardware for Cisco Performance Agent: Cisco 880 and 890 Series and Cisco ISR G2 routers
- Software for Cisco Performance Agent: Cisco IOS Software Release 15.1(4)M or later
- Cisco Prime Network Analysis Module, running software Version 5.1 or later

Application Performance Visibility Without WAN Optimization

Topology

Figure 2 shows the topology for measuring and managing application performance without WAN optimization.

Figure 2. Topology for Measuring and Managing Application Performance Without WAN Optimization



Cisco Performance Agent is used as an application performance data source from the branch office to the NAM. Optionally, it can also be used on the data center side. No WAN optimization is used in this use case. Application performance is measured and reported in the NAM.

Cisco Performance Agent Data Source Configuration in the Branch-Office Router

To collect application performance data from branch-office and data center routers, configure the following: The keyword MACE (Measurement, Aggregation, and Correlation Engine) is used for Cisco Performance Agent configuration.

```
! Configure flow exporter
flow exporter mace-export
 destination 172.30.104.128
 transport udp 3000
!
! Configure PA flow record
flow record type mace mace-record
 collect application name
 collect art all
!
```

```
! Configure PA flow monitor type
flow monitor type mace mace-monitor
 record mace-record
 exporter mace-export
!
! interesting traffic
access-list 100 permit tcp any host 10.0.0.1 eq 80
class-map match-any mace-traffic
 match access-group 100
!
! Configure PA policy map
policy-map type mace mace_global
 class mace-traffic
  flow monitor mace-monitor
!
! Enable PA in the WAN interface
interface Serial0/0/0
 mace enable
```

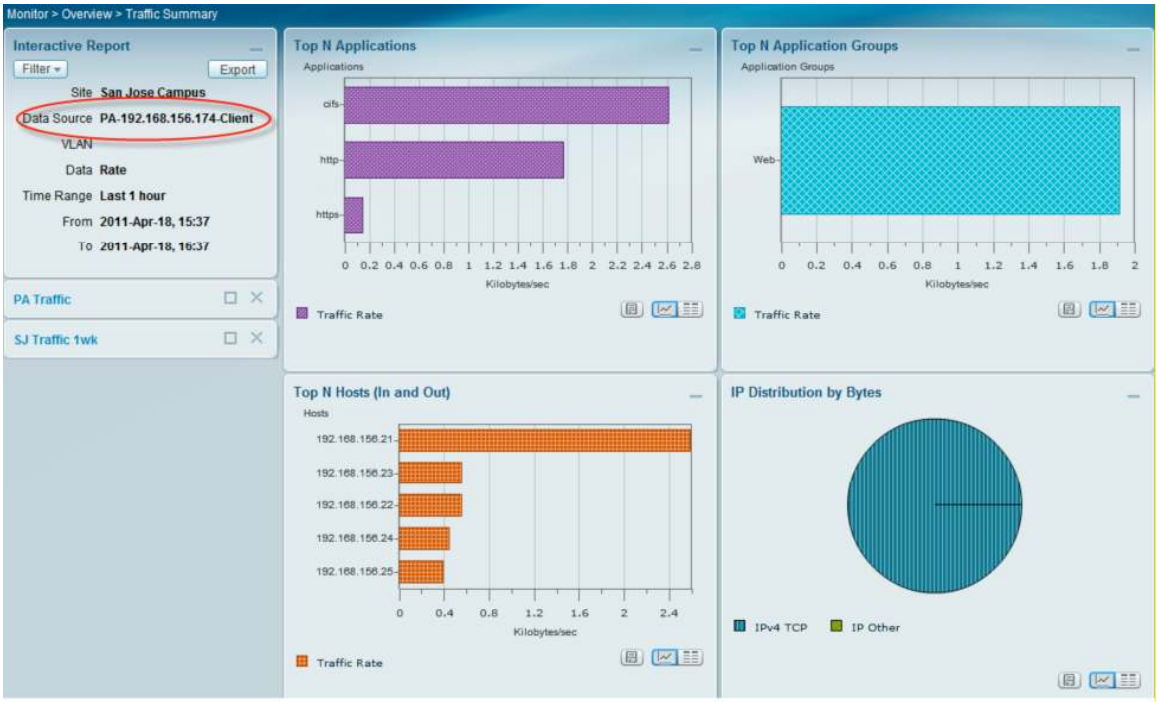
Using Cisco Prime NAM to Report Application Performance

Step 1. To validate data from Cisco Performance Agent is received on the NAM, go to Setup > Traffic > NAM Data Sources. An example is shown in Figure 3.

Figure 3. Validating data from Cisco Performance Agent on NAM

Step 2. After confirming that Cisco Performance Agent data is received, the NAM reports on Cisco Performance Agent in the different dashboards, such as traffic summary (for example, Monitor > Overview > Traffic Summary), as shown in Figure 4.

Figure 4. NAM Summary Reports



On the same dashboard, Top N DSCP (differentiated services code point) and Top N VLAN charts are provided.

Step 3. Cisco Prime NAM can also report on interface usage as well as Top Application, Host, or DSCP per interface (Analyze> Traffic > NDE Interface) in the Cisco Performance Agent, as shown in Figure 5.

Figure 5. Interface Traffic Report

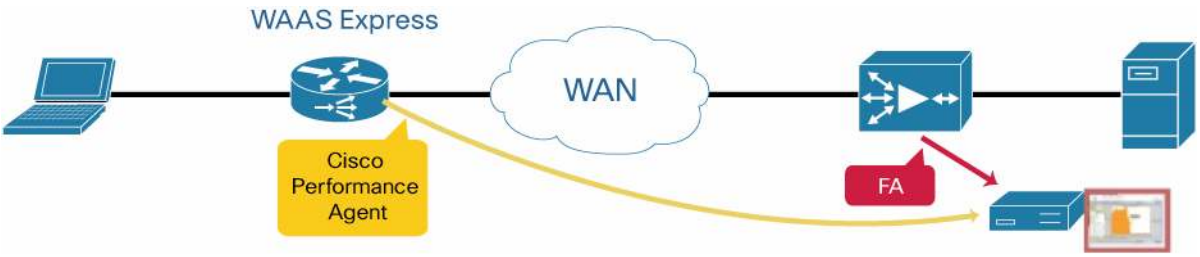
On the same dashboard, Top N Application (In and Out), Host (In and Out), and DSCP (In and Out) charts are provided.

Application Performance Visibility with WAN Optimization

Topology

Figure 6 shows the topology for measuring and managing application performance across various network segments.

Figure 6. Topology for Measuring and Managing Application Performance Across Network Segments



Cisco Performance Agent is used as an application performance data source from the branch-office router. Cisco Flow Agent is used as an application performance data source from the Cisco WAAS appliance in the data center. The Cisco Prime NAM in the data center correlates metrics from all sources and presents the overall application performance report. As part of the initial WAAS deployment lifecycle, the NAM can report on traffic for application response time (latency) trends through the Cisco Performance Agent. This information helps with short listing candidate applications or servers for WAAS optimization. Cisco WAAS is deployed after a site is selected with a baseline of an application or server measured with the NAM. With WAN optimization service turned on in the branch office and data center, application performance is measured and reported in the NAM, helping users to analyze the effect of WAN optimization. Data measurements are used to ensure service-level agreements (SLAs) for the application delivery are met.

Cisco Performance Agent Data Source Configuration in the Branch-Office Router

The following configuration will send traffic in pass-through mode without WAN optimization on the branch-office router:

```
paramater-map type waas waas_global
 no tfo optimize
```

The following shows the configuration for Cisco Performance Agent:

```
! Configure flow exporter
flow exporter mace-export
 destination 172.30.104.128 ! NAM IP address
 transport udp 3000
!
! Configure flow record of the type PA
flow record type mace mace-record
 collect application name
 collect art all
 collect waas all
!
! Configure flow monitor using PA
```

```
flow monitor type mace mace-monitor
 record mace-record
 exporter mace-export
!
! Configure PA to monitor WAAS policies
mace monitor waas all mace-monitor
!
! WAN interface with WAAS enabled
interface Serial0/0/0
 waas enable
```

After you measure application performance for a baseline, you can configure traffic to be sent using WAN optimization and then measure the application performance using the Cisco Prime NAM:

```
paramater-map type waas waas_global
 tfo optimize full
```

Cisco Flow Agent Data Source Configuration in Data Center Using Cisco WAAS Appliance

To collect performance data from the data center segment with the WAN optimization service, configure the following in the Cisco WAAS appliance:

```
flow monitor tcpstat-v1 host 40.40.91.50  ! NAM IP Address
flow monitor tcpstat-v1 enable
tfo optimize full
```

Using Cisco Prime NAM to Report Application Performance

Step 1: Following step 3 in the section “Using Cisco Prime NAM to Report Application Performance” to help shortlist candidates for WAN optimization (predeployment), the Cisco Prime NAM can report on WAN optimization parameters after the WAAS has deployed (postdeployment), such as transaction time improvement from the Analyze > WAN Optimization > Application Performance Analysis menu (Figure 7).

Figure 7. Application Performance Analysis with and without WAN optimization

The same dashboard has the following charts: compression ratio, average concurrent connections, and multisegment network time that shows before and after WAAS optimization.

Step 2: To complete the WAAS deployment lifecycle, the NAM provides dashboards to help you perform a detailed analysis and troubleshoot WAN optimization from the Analyze > WAN Optimization > Conversation Multi-Segments menu (Figure 8).

Figure 8. Conversation Multi-Segments

Client	Client Site	Server	Server Site	Application	Average Client Network Time (ms)	Average WAN Network Time (ms)	Average Server Network Time (ms)	Average Server Response Time (ms)	Average Transaction Time (ms)
192.168.156.21	San Jose Campus	192.168.156.16	Data Center	cifs	34	24	55	21	56
192.168.156.23	San Jose Campus	192.168.156.16	Data Center	cifs	33	70	44	16	66
192.168.156.22	San Jose Campus	192.168.156.16	Data Center	cifs	34	31	53	10	64
192.168.156.24	San Jose Campus	192.168.156.16	Data Center	cifs	36	54	49	11	68
192.168.156.25	San Jose Campus	192.168.156.16	Data Center	cifs	66	49	60	7	72
192.168.156.21	San Jose Campus	192.168.156.16	Data Center	http	-	1	27	82	16,341
192.168.156.21	San Jose Campus	192.168.156.16	Data Center	http	-	3	39	92	9,531
192.168.156.21	San Jose Campus	192.168.156.16	Data Center	http	-	2	36	85	21,422
192.168.156.21	San Jose Campus	192.168.156.16	Data Center	http	-	1	22	127	1,953
192.168.156.21	San Jose Campus	192.168.156.16	Data Center	http	-	2	27	92	4,230
192.168.156.21	San Jose Campus	192.168.156.16	Data Center	https	-	3	36	14	6,595

Troubleshooting

Useful Cisco Performance Agent CLI commands

Following are some useful Cisco Performance Agent command-line interface (CLI) commands:

- Show mace metrics (displays all Cisco Performance Agent metrics that were collected at the last export timeout):

```
Router# show mace metrics ?

A.B.C.D   Source IP Address
any       All Source IP addresses
art       Application Response Time Metrics
fm1       User defined
name      Name a specific Flow Monitor
summary   MACE Metrics Summary
waas      WAAS Metrics
```

- Display Cisco Performance Agent metric summary:

```
Router# show mace metrics summary

Segment          Client Pkts             Server Pkts             Flows Exported
0                 0                       0                       0
1                 618                     771                     155
2                 906                     890                     155
4                 0                       0                       0
8                 0                       0                       0
16                182                     181                     46
```

- Display Cisco Performance Agent metrics:

```
UUT#sh mace metrics 1.1.1.1
=================================================================================================================
Key fields:    | Client          | Server          | Dst. Port  | Protocol | Segment ID
=================================================================================================================
MACE Metrics:  | DSCP        AppId
               | cByte       cPkts       sByte       sPkts
=================================================================================================================
ART Metrics:   | sumRT       sumAD       sumNT       sumCNT      sumSNT      sumTD       sumTT       numT
               | sPkts       sByte       cPkts       cByte       newSS       numR
=================================================================================================================
WAAS Metrics:  | optMode
               | InBytes     OutBytes    LZByteIn    LZByteOut   DREByteIn   DREByteOut
=================================================================================================================

Rec. 1    :    | 1.1.1.1         | 3.3.3.2         | 80         | 6        | 1
MACE Metrics:  | 0           0
               | 3085        141         203126      142
ART Metrics:   | 156         144         2016        2004        12          2160        28068       1
               | 142         200254      141         261         1           1
WAAS Metrics:  | 7
               | 261         200253      30643       201011      200254      200254
=================================================================================================================

Rec. 2    :    | 1.1.1.1         | 3.3.3.2         | 80         | 6        | 2
MACE Metrics:  | 0           0
               | 16170       266         40353       256
ART Metrics:   | 28152       27592       8           4           4           28712       30164       140
               | 256         32157       266         7642        1           140
WAAS Metrics:  | 7
               | 32167       7652        389         389         261         261
=================================================================================================================
```

Troubleshooting Cisco Performance Agent

Cisco Performance Agent uses Flexible NetFlow (FNF) to export performance data to the Cisco Prime NAM.

- Symptom: The Cisco Prime NAM is not receiving data collected from Cisco Performance Agent.
  Check whether FNF sent data to NAM (**show flow exporter statistics):**

```
UUT#sh flow exporter statistics
Flow Exporter fe1:
  Packet send statistics (last cleared 00:01:45 ago):
    Successfully sent:         2                      (1868 bytes)

  Client send statistics:
    Client: MACE EXPORTER GROUP MACE-EXP-1
      Records added:           6
        - sent:                6
      Bytes added:             1356
        - sent:                1356
```

- Symptom: FNF has sent data to the NAM from Cisco Performance Agent, but the NAM is not receiving data from the Cisco Performance Agent.
  Troubleshoot the network path between Cisco WAAS Express and Cisco Prime NAM.

- Symptom: FNF did not send data.

  Check Cisco Performance Agent (*show mace metrics summary)*. Check whether flows are exported.

- Symptom: Flows are not exported by Cisco Performance Agent.

  Debug Cisco Performance Agent to identify the error (***debug mace cp*):**

```
Router# #debug mace cp
          MACE Control-Plane debugging is on
      *Mar  4 03:46:40.251:  MACE export timer process started at 46 minutes & 40
sec
      *Mar  4 03:46:40.251:  Next timer expiry after 0 minutes and 20 seconds.
      *Mar  4 03:47:00.255:  MACE export process wokeup at 47 minutes and 0
seconds.
      *Mar  4 03:47:00.255:  Next timer expiry after 1 minutes and 0 seconds.
      *Mar  4 03:47:00.259:  Total Active L4_flows = 5
      *Mar  4 03:47:00.259:  Total Dead L4_flows = 39
```

For More Information

For more information about the Cisco Prime NAM and Cisco WAAS Express:

- Cisco Prime NAM: http://www.cisco.com/go/nam
- Cisco WAAS Express: http://www.cisco.com/en/US/products/ps11211/index.html

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