

Contents

Introduction	1
Prerequisites	1
General restrictions and guidelines	1
Example: Configuring an NQA ICMP echo operation	1
Network configuration	1
Applicable hardware and software versions.....	1
Restrictions and guidelines	3
Procedures	3
Verifying the configuration	4
Configuration files	5
Example: Configuring an NQA ICMP jitter operation	5
Network configuration	5
Applicable hardware and software versions.....	5
Restrictions and guidelines	7
Procedures	7
Verifying the configuration	8
Configuration files	9
Example: Configuring an NQA DHCP operation.....	10
Network configuration	10
Applicable hardware and software versions.....	10
Restrictions and guidelines	12
Procedures	12
Verifying the configuration	12
Configuration files	13
Example: Configuring an NQA DNS operation	13
Network configuration	13
Applicable hardware and software versions.....	13
Restrictions and guidelines	15
Procedures	15
Verifying the configuration	16
Configuration files	16
Example: Configuring an NQA FTP operation.....	17
Network configuration	17
Applicable hardware and software versions.....	17
Restrictions and guidelines	19
Procedures	19
Verifying the configuration	20
Configuration files	20
Example: Configuring an NQA HTTP operation	21
Network configuration	21
Applicable hardware and software versions.....	21
Restrictions and guidelines	23
Procedures	23
Verifying the configuration	23
Configuration files	24

Example: Configuring an NQA UDP jitter operation	24
Network configuration	24
Applicable hardware and software versions.....	24
Restrictions and guidelines	26
Procedures	27
Configuring Device B	27
Configuring Device A	27
Verifying the configuration	27
Configuration files	29
Example: Configuring an NQA SNMP operation.....	29
Network configuration	29
Applicable hardware and software versions.....	29
Restrictions and guidelines	31
Procedures	32
Configuring Device B	32
Configuring Device A	32
Verifying the configuration	32
Configuration files	33
Example: Configuring an NQA TCP operation	33
Network configuration	33
Applicable hardware and software versions.....	33
Restrictions and guidelines	35
Procedures	35
Configuring Device B	35
Configuring Device A	36
Verifying the configuration	36
Configuration files	37
Example: Configuring an NQA UDP echo operation.....	37
Network configuration	37
Applicable hardware and software versions.....	37
Restrictions and guidelines	39
Procedures	39
Configuring Device B	39
Configuring Device A	40
Verifying the configuration	40
Configuration files	40
Example: Configuring an NQA UDP tracert operation.....	41
Network configuration	41
Applicable hardware and software versions.....	41
Restrictions and guidelines	43
Procedures	43
Verifying the configuration	44
Configuration files	44
Example: Configuring an NQA voice operation	45
Network configuration	45
Applicable hardware and software versions.....	45
Restrictions and guidelines	47
Procedures	47
Configuring Device B	47
Configuring Device A	47
Verifying the configuration	48
Configuration files	49

Example: Configuring an NQA DLSw operation	50
Network configuration	50
Applicable hardware and software versions.....	50
Restrictions and guidelines	52
Procedures	52
Verifying the configuration	52
Configuration files	53
Example: Configuring an NQA path jitter operation	53
Network configuration	53
Applicable hardware and software versions.....	54
Restrictions and guidelines	55
Procedures	56
Verifying the configuration	56
Configuration files	57

Introduction

This document provides NQA configuration examples.

Prerequisites

The configuration examples in this document were created and verified in a lab environment, and all the devices were started with the factory default configuration. When you are working on a live network, make sure you understand the potential impact of every command on your network.

This document assumes that you have basic knowledge of NQA.

General restrictions and guidelines

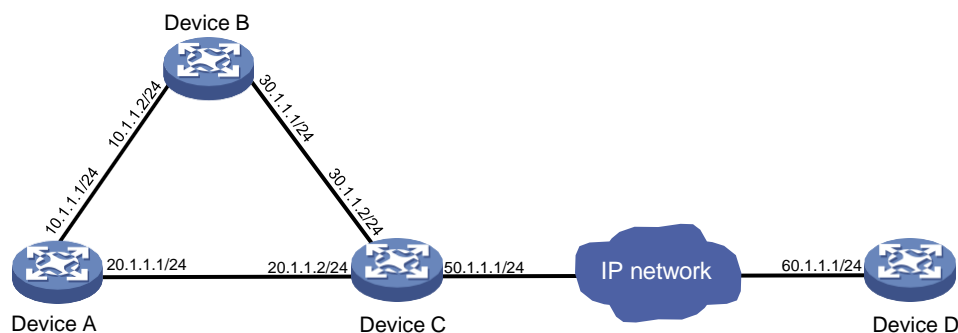
The ICMP echo operation is not supported in IPv6 networks. To test the reachability of an IPv6 address, use the `ping ipv6` command.

Example: Configuring an NQA ICMP echo operation

Network configuration

As shown in [Figure 1](#), configure an NQA ICMP echo operation to test the roundtrip time between Device A and Device D through Device B.

Figure 1 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx

SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA ICMP echo operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Create an NQA ICMP echo operation.

```
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type icmp-echo
```

Specify the destination IP address of ICMP echo requests as 60.1.1.1.

```
[DeviceA-nqa-admin-test-icmp-echo] destination ip 60.1.1.1
```

Specify the next hop of ICMP echo requests as 10.1.1.2.

```
[DeviceA-nqa-admin-test-icmp-echo] next-hop ip 10.1.1.2
```

Configure the ICMP echo operation to perform 10 probes.

```
[DeviceA-nqa-admin-test-icmp-echo] probe count 10
```

Specify the probe timeout time as 500 milliseconds for the ICMP echo operation.

```
[DeviceA-nqa-admin-test-icmp-echo] probe timeout 500
```

Configure the ICMP echo operation to repeat at an interval of 5000 milliseconds.

```
[DeviceA-nqa-admin-test-icmp-echo] frequency 5000
```

Enable saving history records.

```
[DeviceA-nqa-admin-test-icmp-echo] history-record enable
```

Configure the maximum number of history records that can be saved as 10.

```
[DeviceA-nqa-admin-test-icmp-echo] history-record number 10
[DeviceA-nqa-admin-test-icmp-echo] quit
```

Verifying the configuration

Start the ICMP echo operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the ICMP echo operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the ICMP echo operation.

```
[DeviceA] display nqa result admin test
```

NQA entry (admin admin, tag test) test results:

Send operation times: 10 Receive response times: 10

Min/Max/Average round trip time: 2/5/3

Square-Sum of round trip time: 96

Last succeeded probe time: 2019-03-23 15:00:01.2

Extended results:

Packet loss ratio: 0%

Failures due to timeout: 0

Failures due to internal error: 0

Failures due to other errors: 0

Display the history records of the ICMP echo operation.

```
[DeviceA] display nqa history admin test
```

NQA entry (admin admin, tag test) history records:

Index	Response	Status	Time
370	3	Succeeded	2019-03-23 15:00:01.2
369	3	Succeeded	2019-03-23 15:00:01.2
368	3	Succeeded	2019-03-23 15:00:01.2
367	5	Succeeded	2019-03-23 15:00:01.2
366	3	Succeeded	2019-03-23 15:00:01.2
365	3	Succeeded	2019-03-23 15:00:01.2

364	3	Succeeded	2019-03-23 15:00:01.1
363	2	Succeeded	2019-03-23 15:00:01.1
362	3	Succeeded	2019-03-23 15:00:01.1
361	2	Succeeded	2019-03-23 15:00:01.1

The output shows that the packets sent by Device A can reach Device D through Device B. No packet loss occurs during the operation. The minimum, maximum, and average round-trip times are 2, 5, and 3 milliseconds, respectively.

Configuration files

```
#
nqa entry admin test
type icmp-echo
destination ip 60.1.1.1
frequency 5000
history-record enable
history-record number 10
next-hop ip 10.1.1.2
probe count 10
probe timeout 500
#
```

Example: Configuring an NQA ICMP jitter operation

Network configuration

As shown in [Figure 1](#), configure an ICMP jitter operation to test the jitter between Device A and Device B.

Figure 2 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx

SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA ICMP jitter operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Create an NQA ICMP jitter operation.

```
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type icmp-jitter
```



```

# Specify 10.2.2.2 as the destination address for the operation.
[DeviceA-nqa-admin-test-icmp-jitter] destination ip 10.2.2.2

# Configure the operation to repeat every 1000 milliseconds.
[DeviceA-nqa-admin-test-icmp-jitter] frequency 1000
[DeviceA-nqa-admin-test-icmp-jitter] quit

```

Verifying the configuration

```

# Start the ICMP jitter operation.
[DeviceA] nqa schedule admin test start-time now lifetime forever

# After the ICMP jitter operation runs for a time period, stop the operation.
[DeviceA] undo nqa schedule admin test

# Display the most recent result of the ICMP jitter operation.
[DeviceA] display nqa result admin test

NQA entry (admin admin, tag test) test results:
    Send operation times: 10                Receive response times: 10
    Min/Max/Average round trip time: 1/2/1
    Square-Sum of round trip time: 13
    Last packet received time: 2019-03-09 17:40:29.8

Extended results:
    Packet loss ratio: 0%
    Failures due to timeout: 0
    Failures due to internal error: 0
    Failures due to other errors: 0
    Packets out of sequence: 0
    Packets arrived late: 0

ICMP-jitter results:
RTT number: 10
    Min positive SD: 0                    Min positive DS: 0
    Max positive SD: 0                    Max positive DS: 0
    Positive SD number: 0                 Positive DS number: 0
    Positive SD sum: 0                    Positive DS sum: 0
    Positive SD average: 0                Positive DS average: 0
    Positive SD square-sum: 0             Positive DS square-sum: 0
    Min negative SD: 1                    Min negative DS: 2
    Max negative SD: 1                    Max negative DS: 2
    Negative SD number: 1                 Negative DS number: 1
    Negative SD sum: 1                    Negative DS sum: 2
    Negative SD average: 1                 Negative DS average: 2
    Negative SD square-sum: 1             Negative DS square-sum: 4

One way results:
    Max SD delay: 1                      Max DS delay: 2
    Min SD delay: 1                      Min DS delay: 2
    Number of SD delay: 1                 Number of DS delay: 1
    Sum of SD delay: 1                    Sum of DS delay: 2
    Square-Sum of SD delay: 1             Square-Sum of DS delay: 4
    Lost packets for unknown reason: 0

```

Display the statistics of the ICMP jitter operation.

```
[DeviceA] display nqa statistics admin test
NQA entry (admin admin, tag test) test statistics:
NO. : 1
  Start time: 2019-03-09 17:42:10.7
  Life time: 156 seconds
  Send operation times: 1560          Receive response times: 1560
  Min/Max/Average round trip time: 1/2/1
  Square-Sum of round trip time: 1563
Extended results:
  Packet loss ratio: 0%
  Failures due to timeout: 0
  Failures due to internal error: 0
  Failures due to other errors: 0
  Packets out of sequence: 0
  Packets arrived late: 0
ICMP-jitter results:
RTT number: 1560
  Min positive SD: 1                Min positive DS: 1
  Max positive SD: 1                Max positive DS: 2
  Positive SD number: 18            Positive DS number: 46
  Positive SD sum: 18                Positive DS sum: 49
  Positive SD average: 1            Positive DS average: 1
  Positive SD square-sum: 18        Positive DS square-sum: 55
  Min negative SD: 1                Min negative DS: 1
  Max negative SD: 1                Max negative DS: 2
  Negative SD number: 24            Negative DS number: 57
  Negative SD sum: 24                Negative DS sum: 58
  Negative SD average: 1            Negative DS average: 1
  Negative SD square-sum: 24        Negative DS square-sum: 60
One way results:
  Max SD delay: 1                  Max DS delay: 2
  Min SD delay: 1                  Min DS delay: 1
  Number of SD delay: 4            Number of DS delay: 4
  Sum of SD delay: 4                Sum of DS delay: 5
  Square-Sum of SD delay: 4        Square-Sum of DS delay: 7
Lost packets for unknown reason: 0
```

Configuration files

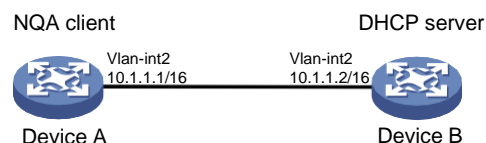
```
#
nqa entry admin test
  type icmp-jitter
  destination ip 10.2.2.2
  frequency 1000
#
```

Example: Configuring an NQA DHCP operation

Network configuration

As shown in [Figure 3](#), configure an NQA DHCP operation to test the time required for Device A to obtain an IP address from the DHCP server (Device B).

Figure 3 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx

Restrictions and guidelines

When you configure an NQA DHCP operation, follow these restrictions and guidelines:

- Complete the DHCP server configuration before you start the DHCP operation.
- Make sure the devices can reach each other before you start the operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Create an NQA DHCP operation.

```
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type dhcp
```

Specify the DHCP server IP address 10.1.1.2 as the destination address.

```
[DeviceA-nqa-admin-test-dhcp] destination ip 10.1.1.2
```

Enable the saving of history records.

```
[DeviceA-nqa-admin-test-dhcp] history-record enable
[DeviceA-nqa-admin-test-dhcp] quit
```

Verifying the configuration

Start the DHCP operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the DHCP operation.

```
[DeviceA] display nqa result admin test
```

```
  NQA entry(admin admin, tag test) test results:
```

```
    Send operation times: 1                Receive response times: 1
```

```
    Min/Max/Average round trip time: 624/624/624
```

```
    Square-Sum of round trip time: 389376
```

```

    Last succeeded probe time: 2020-03-24 09:56:03.2
Extend results:
    Packet lost in test: 0%
    Failures due to timeout: 0
    Failures due to internal error: 0
    Failures due to other errors: 0

# Display the history records of the DHCP operation.
[DeviceA] display nqa history admin test
    NQA entry(admin admin, tag test) history record(s):
      Index      Response      Status      Time
      1          624          Succeeded   2019-03-24 09:56:03.2

```

The output shows that it took Device A 624 milliseconds to obtain an IP address from the DHCP server.

Configuration files

```

#
nqa entry admin test
  type dhcp
  destination ip 10.1.1.2
  history-record enable
#

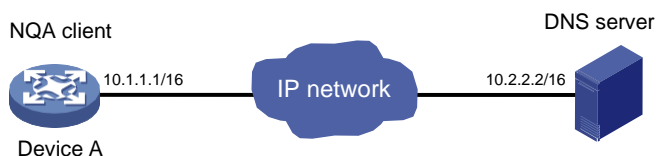
```

Example: Configuring an NQA DNS operation

Network configuration

As shown in [Figure 4](#), configure an NQA DNS operation to test whether Device A can perform address resolution through the DNS server and test the resolution time.

Figure 4 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx

SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA DNS operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Create an NQA DNS operation.

```
<DeviceA> system-view
```

```
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type dns

# Specify the IP address of the DNS server 10.2.2.2 as the destination address.
[DeviceA-nqa-admin-test-dns] destination ip 10.2.2.2

# Specify the domain name to be translated as host.com.
[DeviceA-nqa-admin-test-dns] resolve-target host.com

# Enable the saving of history records.
[DeviceA-nqa-admin-test-dns] history-record enable
[DeviceA-nqa-admin-test-dns] quit
```

Verifying the configuration

Start the DNS operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the DNS operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the DNS operation.

```
[DeviceA] display nqa result admin test
NQA entry(admin admin, tag test) test results:
  Send operation times: 1          Receive response times: 1
  Min/Max/Average round trip time: 62/62/62
  Square-Sum of round trip time: 3844
  Last succeeded probe time: 2020-03-24 10:49:37.3
Extended results:
  Packet lost in test: 0%
  Failures due to timeout: 0
  Failures due to internal error: 0
  Failures due to other errors: 0
```

Display the history records of the DNS operation.

```
[DeviceA] display nqa history admin test
NQA entry(admin admin, tag test) history record(s):
  Index      Response      Status      Time
  1          62           Succeeded   2019-03-24 10:49:37.3
```

The output shows that it took Device A 62 milliseconds to translate the domain name **host.com** into an IP address.

Configuration files

```
#
nqa entry admin test
  type dns
  destination ip 10.2.2.2
  history-record enable
  resolve-target host.com
#
```

Example: Configuring an NQA FTP operation

Network configuration

As shown in [Figure 5](#), configure an NQA FTP operation to test the file transmission time between Device A and the FTP server. The login username and password are **admin** and **systemtest**, respectively.

Figure 5 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA FTP operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- You cannot modify the operation configuration for a running NQA operation.
- When you perform the **put** operation with the **filename** command configured, make sure the file exists on the NQA client.
- Take the network bandwidth into consideration when you set the file size and the probe timeout.

Procedures

Create an NQA FTP operation.

```
<DeviceA> system-view
```

```
[DeviceA] nqa entry admin test
```



```
[DeviceA-nqa-admin-test] type ftp
# Specify the URL of the FTP server.
[DeviceA-nqa-admin-test-ftp] url ftp://10.2.2.2
# Specify 10.1.1.1 as the source IP address.
[DeviceA-nqa-admin-test-ftp] source ip 10.1.1.1
# Specify the FTP operation type as put.
[DeviceA-nqa-admin-test-ftp] operation put
# Specify the file to be uploaded as config.txt.
[DeviceA-nqa-admin-test-ftp] filename config.txt
# Specify the username for the FTP operation as admin.
[DeviceA-nqa-admin-test-ftp] username admin
# Specify the password for the FTP operation as systemtest.
[DeviceA-nqa-admin-test-ftp] password simple systemtest
# Enable the saving of history records.
[DeviceA-nqa-admin-test-ftp] history-record enable
[DeviceA-nqa-admin-test-ftp] quit
```

Verifying the configuration

Start the FTP operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the FTP operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the FTP operation.

```
[DeviceA] display nqa result admin test
```

```
NQA entry(admin admin, tag test) test results:
  Send operation times: 1          Receive response times: 1
  Min/Max/Average round trip time: 173/173/173
  Square-Sum of round trip time: 29929
  Last succeeded probe time: 2019-03-25 10:07:28.6
Extend results:
  Packet lost in test: 0%
  Failures due to timeout: 0
  Failures due to disconnect: 0
  Failures due to no connection: 0
  Failures due to internal error: 0
  Failures due to other errors: 0
```

Display the history records of the FTP operation.

```
[DeviceA] display nqa history admin test
```

```
NQA entry(admin admin, tag test) history record(s):
```

Index	Response	Status	Time
1	173	Succeeded	2019-03-25 10:07:28.6

The output shows that it took Device A 173 milliseconds to upload a file to the FTP server.

Configuration files

```
#
nqa entry admin test
  type ftp
  filename config.txt
  history-record enable
  operation put
  password cipher $c$3$BP255atzDilAfIPwfh+RMHqmP5LTiKWpVf/hpBs=
  source ip 10.1.1.1
  url ftp://10.2.2.2
  username admin
#
```

Example: Configuring an NQA HTTP operation

Network configuration

As shown in [Figure 6](#), configure an NQA HTTP operation on the NQA client to test the time required to obtain data from the HTTP server.

Figure 6 Network diagram



Device A

Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA HTTP operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Create an NQA HTTP operation.

```
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type http
```

Specify the URL of the HTTP server.

```
[DeviceA-nqa-admin-test-http] url http://10.2.2.2/index.htm
```

Enable the saving of history records.

```
[DeviceA-nqa-admin-test-http] history-record enable
[DeviceA-nqa-admin-test-http] quit
```

Verifying the configuration

Start the HTTP operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the HTTP operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the HTTP operation.

```
[DeviceA] display nqa result admin test
NQA entry(admin admin, tag test) test results:
```

Send operation times: 1 Receive response times: 1
Min/Max/Average round trip time: 64/64/64
Square-Sum of round trip time: 4096
Last succeeded probe time: 2019-03-25 11:12:47.9

```

Extend results:
  Packet lost in test: 0%
  Failures due to timeout: 0
  Failures due to disconnect: 0
  Failures due to no connection: 0
  Failures due to internal error: 0
  Failures due to other errors: 0

# Display the history records of the HTTP operation.
[DeviceA] display nqa history admin test
  NQA entry(admin admin, tag test) history record(s):
    Index      Response      Status      Time
    1          64          Succeeded   2019-03-25 11:12:47.9

```

The output shows that it took Device A 64 milliseconds to obtain data from the HTTP server.

Configuration files

```

#
nqa entry admin test
  type http
  history-record enable
  url http://10.2.2.2/index.htm
#

```

Example: Configuring an NQA UDP jitter operation

Network configuration

As shown in [Figure 7](#), configure a UDP jitter operation to test the jitter, delay, and round-trip time between Device A and Device B.

Figure 7 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx

SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA UDP jitter operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- Configure Device B as the NQA server before you start the NQA UDP jitter operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Configuring Device B

```
# Enable the NQA server.
<DeviceB> system-view
[DeviceB] nqa server enable

# Configure a listening service to listen on the IP address 10.2.2.2 and UDP port 9000.
[DeviceB] nqa server udp-echo 10.2.2.2 9000
```

Configuring Device A

```
# Create a UDP jitter operation.
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type udp-jitter

# Configure 10.2.2.2 as the destination IP address and port 9000 as the destination port.
[DeviceA-nqa-admin-test-udp-jitter] destination ip 10.2.2.2
[DeviceA-nqa-admin-test-udp-jitter] destination port 9000

# Configure the operation to repeat at an interval of 1000 milliseconds.
[DeviceA-nqa-admin-test-udp-jitter] frequency 1000
[DeviceA-nqa-admin-test-udp-jitter] quit
```

Verifying the configuration

```
# Start the UDP jitter operation.
[DeviceA] nqa schedule admin test start-time now lifetime forever

# After the UDP jitter operation runs for a time period, stop the operation.
[DeviceA] undo nqa schedule admin test

# Display the most recent result of the UDP jitter operation.
[DeviceA] display nqa result admin test
NQA entry (admin admin, tag test) test results:
    Send operation times: 10          Receive response times: 10
    Min/Max/Average round trip time: 1/1/1
    Square-Sum of round trip time: 10
    Last packet received time: 2019-07-30 09:46:36.9
Extended results:
    Packet loss ratio: 0%
    Failures due to timeout: 0
    Failures due to internal error: 0
    Failures due to other errors: 0
    Packets out of sequence: 0
    Packets arrived late: 0
UDP-jitter results:
    RTT number: 10
    Min positive SD: 1                Min positive DS: 0
```


Max positive SD: 1	Max positive DS: 0
Positive SD number: 1	Positive DS number: 0
Positive SD sum: 1	Positive DS sum: 0
Positive SD average: 1	Positive DS average: 0
Positive SD square-sum: 1	Positive DS square-sum: 0
Min negative SD: 0	Min negative DS: 0
Max negative SD: 0	Max negative DS: 0
Negative SD number: 0	Negative DS number: 0
Negative SD sum: 0	Negative DS sum: 0
Negative SD average: 0	Negative DS average: 0
Negative SD square-sum: 0	Negative DS square-sum: 0
One way results:	
Max SD delay: 0	Max DS delay: 0
Min SD delay: 0	Min DS delay: 0
Number of SD delay: 0	Number of DS delay: 0
Sum of SD delay: 0	Sum of DS delay: 0
Square-Sum of SD delay: 0	Square-Sum of DS delay: 0
SD lost packets: 0	DS lost packets: 0
Lost packets for unknown reason: 0	

Display the statistics of the UDP jitter operation.

[DeviceA] display nqa statistics admin test

NQA entry (admin admin, tag test) test statistics:

```
NO. : 1
Start time: 2019-07-30 09:46:22.7
Life time: 14 seconds
Send operation times: 150          Receive response times: 150
Min/Max/Average round trip time: 1/4/1
Square-Sum of round trip time: 165
```

Extended results:

```
Packet loss ratio: 0%
Failures due to timeout: 0
Failures due to internal error: 0
Failures due to other errors: 0
Packets out of sequence: 0
Packets arrived late: 0
```

UDP-jitter results:

RTT number: 150	
Min positive SD: 1	Min positive DS: 1
Max positive SD: 6	Max positive DS: 1
Positive SD number: 11	Positive DS number: 5
Positive SD sum: 16	Positive DS sum: 5
Positive SD average: 1	Positive DS average: 1
Positive SD square-sum: 46	Positive DS square-sum: 5
Min negative SD: 5	Min negative DS: 1
Max negative SD: 5	Max negative DS: 1
Negative SD number: 1	Negative DS number: 1
Negative SD sum: 5	Negative DS sum: 1
Negative SD average: 5	Negative DS average: 1

Negative SD square-sum: 25	Negative DS square-sum: 1
One way results:	
Max SD delay: 0	Max DS delay: 0
Min SD delay: 0	Min DS delay: 0
Number of SD delay: 0	Number of DS delay: 0
Sum of SD delay: 0	Sum of DS delay: 0
Square-Sum of SD delay: 0	Square-Sum of DS delay: 0
SD lost packets: 0	DS lost packets: 0
Lost packets for unknown reason: 0	

Configuration files

- **Device B:**

nqa server enable
nqa server udp-echo 10.2.2.2 9000
#
- **Device A:**

nqa entry admin test
type udp-jitter
destination ip 10.2.2.2
destination port 9000
frequency 1000
#

Example: Configuring an NQA SNMP operation

Network configuration

As shown in [Figure 8](#), configure an SNMP operation to test the time the NQA client uses to get a response from the SNMP agent.

Figure 8 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA SNMP operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- Configure Device B as the SNMP agent before you start the NQA SNMP operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Configuring Device B

```
# Set the SNMP version to all.
<DeviceB> system-view
[DeviceB] snmp-agent sys-info version all

# Set the read community to public.
[DeviceB] snmp-agent community read public

# Set the write community to private.
[DeviceB] snmp-agent community write private
```

Configuring Device A

```
# Create an SNMP operation.
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type snmp

# Configure 10.2.2.2 as the destination IP address of the SNMP operation.
[DeviceA-nqa-admin-test-snmp] destination ip 10.2.2.2

# Enable the saving of history records.
[DeviceA-nqa-admin-test-snmp] history-record enable
[DeviceA-nqa-admin-test-snmp] quit
```

Verifying the configuration

```
# Start the SNMP operation.
[DeviceA] nqa schedule admin test start-time now lifetime forever

# After the SNMP operation runs for a time period, stop the operation.
[DeviceA] undo nqa schedule admin test

# Display the most recent result of the SNMP operation.
[DeviceA] display nqa result admin test
NQA entry (admin admin, tag test) test results:
    Send operation times: 1                Receive response times: 1
    Min/Max/Average round trip time: 1/1/1
    Square-Sum of round trip time: 1
    Last succeeded probe time: 2019-07-30 10:07:28.2
Extended results:
    Packet loss ratio: 0%
    Failures due to timeout: 0
    Failures due to internal error: 0
    Failures due to other errors: 0

# Display the history records of the SNMP operation.
[DeviceA] display nqa history admin test
NQA entry (admin admin, tag test) history record(s):
```

Index	Response	Status	Time
1	1	Succeeded	2019-07-30 10:07:28.2

Configuration files

- Device B:

```
#
snmp-agent
snmp-agent local-engineid 800063A20300E0FC123456
snmp-agent community read public
snmp-agent community write private
snmp-agent sys-info version all
#
```

- Device A:

```
#
nqa entry admin test
type snmp
destination ip 10.2.2.2
history-record enable
#
```

Example: Configuring an NQA TCP operation

Network configuration

As shown in [Figure 9](#), configure a TCP operation to test the time required for Device A and Device B to establish a TCP connection.

Figure 9 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release Release 6628Pxx

SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA TCP operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- Configure Device B as the NQA server before you start the NQA TCP operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Configuring Device B

Enable the NQA server.

```

<DeviceB> system-view
[DeviceB] nqa server enable

# Configure a listening service to listen on the IP address 10.2.2.2 and TCP port 9000.
[DeviceB] nqa server tcp-connect 10.2.2.2 9000

```

Configuring Device A

```

# Create a TCP operation.
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type tcp

# Configure 10.2.2.2 as the destination IP address and port 9000 as the destination port.
[DeviceA-nqa-admin-test-tcp] destination ip 10.2.2.2
[DeviceA-nqa-admin-test-tcp] destination port 9000

# Enable the saving of history records.
[DeviceA-nqa-admin-test-tcp] history-record enable
[DeviceA-nqa-admin-test-tcp] quit

```

Verifying the configuration

```

# Start the TCP operation.
[DeviceA] nqa schedule admin test start-time now lifetime forever

# After the TCP operation runs for a time period, stop the operation.
[DeviceA] undo nqa schedule admin test

# Display the most recent result of the TCP operation.
[DeviceA] display nqa result admin test
NQA entry (admin admin, tag test) test results:
    Send operation times: 1                Receive response times: 1
    Min/Max/Average round trip time: 1/1/1
    Square-Sum of round trip time: 1
    Last succeeded probe time: 2019-07-30 10:37:29.5
Extended results:
    Packet loss ratio: 0%
    Failures due to timeout: 0
    Failures due to disconnect: 0
    Failures due to no connection: 0
    Failures due to internal error: 0
    Failures due to other errors: 0

```

Display the history records of the TCP operation.

```

[DeviceA] display nqa history admin test
NQA entry (admin admin, tag test) history record(s):

```

Index	Response	Status	Time
2	1	Succeeded	2019-07-30 10:37:29.5
1	0	Unknown error	2019-07-30 10:34:55.9

Configuration files

- Device B:

nqa server enable
nqa server tcp-connect 10.2.2.2 9000
#
- Device A:

nqa entry admin test
type tcp
destination ip 10.2.2.2
destination port 9000
history-record enable
#

Example: Configuring an NQA UDP echo operation

Network configuration

As shown in [Figure 10](#), configure a UDP echo operation to test the round-trip time between Device A and Device B. The destination port number is 8000.

Figure 10 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA UDP echo operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- Configure Device B as the NQAserver before you start the NQA UDP echo operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Configuring Device B

Enable the NQA server.

```
<DeviceB> system-view
```

```
[DeviceB] nqa server enable
```

Configure a listening service to listen on the IP address 10.2.2.2 and UDP port 8000.

```
[DeviceB] nqa server udp-echo 10.2.2.2 8000
```

Configuring Device A

Create a UDP echo operation.

```
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type udp-echo
```

Configure 10.2.2.2 as the destination IP address and port 8000 as the destination port.

```
[DeviceA-nqa-admin-test-udp-echo] destination ip 10.2.2.2
[DeviceA-nqa-admin-test-udp-echo] destination port 8000
```

Enable the saving of history records.

```
[DeviceA-nqa-admin-test-udp-echo] history-record enable
[DeviceA-nqa-admin-test-udp-echo] quit
```

Verifying the configuration

Start the UDP echo operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the UDP echo operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the UDP echo operation.

```
[DeviceA] display nqa result admin test
NQA entry (admin admin, tag test) test results:
    Send operation times: 1          Receive response times: 1
    Min/Max/Average round trip time: 1/1/1
    Square-Sum of round trip time: 1
    Last succeeded probe time: 2019-07-30 11:10:35.2
Extended results:
    Packet loss ratio: 0%
    Failures due to timeout: 0
    Failures due to internal error: 0
    Failures due to other errors: 0
```

Display the history records of the UDP echo operation.

```
[DeviceA] display nqa history admin test
NQA entry (admin admin, tag test) history record(s):


| Index | Response | Status    | Time                  |
|-------|----------|-----------|-----------------------|
| 1     | 1        | Succeeded | 2019-07-30 11:10:35.2 |


```

Configuration files

- **Device B:**

nqa server enable
nqa server udp-echo 10.2.2.2 8000
#
- **Device A:**
#

```

nqa entry admin test
type udp-echo
destination ip 10.2.2.2
destination port 8000
history-record enable
#

```

Example: Configuring an NQA UDP tracer operation

Network configuration

As shown in [Figure 11](#), configure a UDP tracer operation to determine the routing path from Device A to Device B.

Figure 11 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA UDP tracer operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- Configure Device B as the NQA server before you start the NQA UDP tracer operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

1. Execute the `ip ttl-expires enable` command on the intermediate devices and execute the `ip unreachable enable` command on Device B. (Details not shown.)

2. Configure Device A:

Create a UDP tracert operation.

```
<DeviceA> system-view
```

```
[DeviceA] nqa entry admin test
```

```
[DeviceA-nqa-admin-test] type udp-tracert
```

Specify 10.2.2.2 as the destination IP address for the operation.

```
[DeviceA-nqa-admin-test-udp-tracert] destination ip 10.2.2.2
```

Set the destination port number to 33434. (This step is optional because it is the default setting.)

```
[DeviceA-nqa-admin-test-udp-tracert] destination port 33434
```

Configure Device A to perform three probes to each hop.

```
[DeviceA-nqa-admin-test-udp-tracert] probe count 3
```

Set the probe timeout time to 500 milliseconds.

```
[DeviceA-nqa-admin-test-udp-tracert] probe timeout 500
```

Configure the UDP tracert operation to repeat every 5000 milliseconds.

```
[DeviceA-nqa-admin-test-udp-tracert] frequency 5000
# Specify M-GigabitEthernet 0/0/0 as the output interface for the probe packets.
[DeviceA-nqa-admin-test-udp-tracert] out interface m-gigabitethernet0/0/0
# Enable the no-fragmentation feature.
[DeviceA-nqa-admin-test-udp-tracert] no-fragment enable
# Set the maximum number of consecutive probe failures to 6.
[DeviceA-nqa-admin-test-udp-tracert] max-failure 6
# Set the TTL value to 1 for UDP packets in the start round of the UDP tracert operation.
[DeviceA-nqa-admin-test-udp-tracert] init-ttl 1
```

Verifying the configuration

Start the UDP tracert operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the UDP tracert operation runs for a period of time, stop the operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

Display the most recent result of the UDP tracert operation.

```
[DeviceA] display nqa result admin test
```

NQA entry (admin admin, tag test) test results:

```
Send operation times: 6          Receive response times: 6
Min/Max/Average round trip time: 1/1/1
Square-Sum of round trip time: 1
Last succeeded probe time: 2019-09-09 14:46:06.2
```

Extended results:

```
Packet loss in test: 0%
Failures due to timeout: 0
Failures due to internal error: 0
```

Failures due to other errors: 0

UDP-tracert results:

TTL	Hop IP	Time
1	3.1.1.1	2019-09-09 14:46:03.2
2	10.2.2.2	2019-09-09 14:46:06.2

Display the history records of the UDP tracert operation.

```
[DeviceA] display nqa history admin test
```

NQA entry (admin admin, tag test) history records:

Index	TTL	Response	Hop IP	Status	Time
1	2	2	10.2.2.2	Succeeded	2019-09-09 14:46:06.2
1	2	1	10.2.2.2	Succeeded	2019-09-09 14:46:05.2
1	2	2	10.2.2.2	Succeeded	2019-09-09 14:46:04.2
1	1	1	3.1.1.1	Succeeded	2019-09-09 14:46:03.2
1	1	2	3.1.1.1	Succeeded	2019-09-09 14:46:02.2
1	1	1	3.1.1.1	Succeeded	2019-09-09 14:46:01.2

Configuration files

```
#
nqa entry admin test
```

```

type udp-tracert
destination ip 10.2.2.2
frequency 5000
max-failure 6
no-fragment enable
out interface m-gigabitethernet0/0/0
probe timeout 500
#

```

Example: Configuring an NQA voice operation

Network configuration

As shown in [Figure 12](#), configure a voice operation to test the jitter, delay, MOS, and ICPIF between Device A and Device B.

Figure 12 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA voice operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- Configure Device B as the NQA server before you start the NQA voice operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Configuring Device B

Enable the NQA server.

```
<DeviceB> system-view
```

```
[DeviceB] nqa server enable
```

Configure a listening service to listen on IP address 10.2.2.2 and UDP port 9000.

```
[DeviceB] nqa server udp-echo 10.2.2.2 9000
```

Configuring Device A

Create a voice operation.

```
<DeviceA> system-view
```

```
[DeviceA] nqa entry admin test
```

```
[DeviceA-nqa-admin-test] type voice
```

Configure 10.2.2.2 as the destination IP address and port 9000 as the destination port.

```
[DeviceA-nqa-admin-test-voice] destination ip 10.2.2.2
[DeviceA-nqa-admin-test-voice] destination port 9000
[DeviceA-nqa-admin-test-voice] quit
```

Verifying the configuration

Start the voice operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the voice operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the voice operation.

```
[DeviceA] display nqa result admin test
```

NQA entry (admin admin, tag test) test results:

```
Send operation times: 157          Receive response times: 157
Min/Max/Average round trip time: 1/3/1
Square-Sum of round trip time: 165
Last packet received time: 2019-07-30 14:27:52.8
```

Extended results:

```
Packet loss ratio: 0%
Failures due to timeout: 0
Failures due to internal error: 0
Failures due to other errors: 0
Packets out of sequence: 0
Packets arrived late: 0
```

Voice results:

RTT number: 157

Min positive SD: 2	Min positive DS: 1
Max positive SD: 4	Max positive DS: 1
Positive SD number: 2	Positive DS number: 5
Positive SD sum: 6	Positive DS sum: 5
Positive SD average: 3	Positive DS average: 1
Positive SD square-sum: 20	Positive DS square-sum: 5
Min negative SD: 2	Min negative DS: 1
Max negative SD: 4	Max negative DS: 1
Negative SD number: 2	Negative DS number: 6
Negative SD sum: 6	Negative DS sum: 6
Negative SD average: 3	Negative DS average: 1
Negative SD square-sum: 20	Negative DS square-sum: 6

One way results:

Max SD delay: 0	Max DS delay: 0
Min SD delay: 0	Min DS delay: 0
Number of SD delay: 0	Number of DS delay: 0
Sum of SD delay: 0	Sum of DS delay: 0
Square-Sum of SD delay: 0	Square-Sum of DS delay: 0
SD lost packets: 0	DS lost packets: 0
Lost packets for unknown reason: 0	

Voice scores:

MOS value: 0.00	ICPIF value: 0
-----------------	----------------

Display the statistics of the voice operation.

```
[DeviceA] display nqa statistics admin test
```

```
NQA entry (admin admin, tag test) test statistics:
```

```
NO. : 1
```

```
Start time: 2019-07-30 14:30:30.0
```

```
Life time: 204 seconds
```

```
Send operation times: 4000
```

```
Receive response times: 4000
```

```
Min/Max/Average round trip time: 1/32/1
```

```
Square-Sum of round trip time: 12853
```

```
Extended results:
```

```
Packet loss ratio: 0%
```

```
Failures due to timeout: 0
```

```
Failures due to internal error: 0
```

```
Failures due to other errors: 0
```

```
Packets out of sequence: 0
```

```
Packets arrived late: 0
```

```
Voice results:
```

```
RTT number: 4000
```

```
Min positive SD: 1
```

```
Min positive DS: 1
```

```
Max positive SD: 32
```

```
Max positive DS: 1
```

```
Positive SD number: 76
```

```
Positive DS number: 72
```

```
Positive SD sum: 567
```

```
Positive DS sum: 72
```

```
Positive SD average: 7
```

```
Positive DS average: 1
```

```
Positive SD square-sum: 9011
```

```
Positive DS square-sum: 72
```

```
Min negative SD: 1
```

```
Min negative DS: 1
```

```
Max negative SD: 20
```

```
Max negative DS: 1
```

```
Negative SD number: 87
```

```
Negative DS number: 67
```

```
Negative SD sum: 569
```

```
Negative DS sum: 67
```

```
Negative SD average: 7
```

```
Negative DS average: 1
```

```
Negative SD square-sum: 6715
```

```
Negative DS square-sum: 67
```

```
One way results:
```

```
Max SD delay: 0
```

```
Max DS delay: 0
```

```
Min SD delay: 0
```

```
Min DS delay: 0
```

```
Number of SD delay: 0
```

```
Number of DS delay: 0
```

```
Sum of SD delay: 0
```

```
Sum of DS delay: 0
```

```
Square-Sum of SD delay: 0
```

```
Square-Sum of DS delay: 0
```

```
SD lost packets: 0
```

```
DS lost packets: 0
```

```
Lost packets for unknown reason: 0
```

```
Voice scores:
```

```
Max MOS value: 4.40
```

```
Min MOS value: 4.40
```

```
Max ICPIF value: 0
```

```
Min ICPIF value: 0
```

Configuration files

- Device B:

```
#
```

```
nqa server enable
```

```
nqa server udp-echo 10.2.2.2 8000
```

- Device A:

```
#
nqa entry admin test
  type voice
    destination ip 10.2.2.2
    destination port 9000
#
```

Example: Configuring an NQA DLSw operation

Network configuration

As shown in [Figure 13](#), configure a DLSw operation to test the response time of the DLSw device.

Figure 13 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA DLSw operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

Create a DLSw operation.

```
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type dlsw
```

Configure 10.2.2.2 as the destination IP address.

```
[DeviceA-nqa-admin-test-dlsw] destination ip 10.2.2.2
```

Enable the saving of history records.

```
[DeviceA-nqa-admin-test-dlsw] history-record enable
[DeviceA-nqa-admin-test-dlsw] quit
```

Verifying the configuration

Start the DLSw operation.

```
[DeviceA] nqa schedule admin test start-time now lifetime forever
```

After the DLSw operation runs for a time period, stop the operation.

```
[DeviceA] undo nqa schedule admin test
```

Display the most recent result of the DLSw operation.

```
[DeviceA] display nqa result admin test
NQA entry (admin admin, tag test) test results:
    Send operation times: 1                Receive response times: 1
    Min/Max/Average round trip time: 19/19/19
    Square-Sum of round trip time: 361
    Last succeeded probe time: 2019-07-22 10:40:27.7
Extended results:
    Packet loss ratio: 0%
    Failures due to timeout: 0
    Failures due to disconnect: 0
    Failures due to no connection: 0
    Failures due to internal error: 0
    Failures due to other errors: 0

# Display the history records of the DLSw operation.
[DeviceA] display nqa history admin test
NQA entry (admin admin, tag test) history records:
    Index      Response      Status      Time
    1          19          Succeeded   2019-07-22 10:40:27.7
```

Configuration files

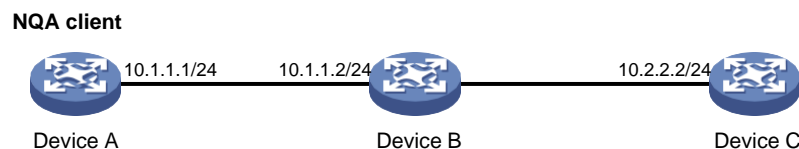
```
#
nqa entry admin test
type dlsw
destination ip 10.2.2.2
history-record enable
#
```

Example: Configuring an NQA path jitter operation

Network configuration

As shown in [Figure 14](#), configure a path jitter operation to test the round trip time and jitters from Device A to Device B and Device C.

Figure 14 Network diagram



Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure an NQA path jitter operation, follow these restrictions and guidelines:

- Make sure the devices can reach each other before you start the NQA operation.
- You cannot modify the operation configuration for a running NQA operation.

Procedures

1. Execute the **ip ttl-expires enable** command on Device B and execute the **ip unreachable enable** command on Device C. (Details not shown.)
2. Configure Device A:
 - # Create a path jitter operation.

```
<DeviceA> system-view
[DeviceA] nqa entry admin test
[DeviceA-nqa-admin-test] type path-jitter
```

 - # Specify 10.2.2.2 as the destination IP address for the operation.

```
[DeviceA-nqa-admin-test-path-jitter] destination ip 10.2.2.2
```

 - # Configure the path jitter operation to repeat every 10000 milliseconds.

```
[DeviceA-nqa-admin-test-path-jitter] frequency 10000
[DeviceA-nqa-admin-test-path-jitter] quit
```

Verifying the configuration

```
# Start the path jitter operation.
[DeviceA] nqa schedule admin test start-time now lifetime forever

# After the path jitter operation runs for a period of time, stop the operation.
[DeviceA] undo nqa schedule admin test

# Display the most recent result of the path jitter operation.
[DeviceA] display nqa result admin test
NQA entry (admin admin, tag test) test results:
Hop IP 10.1.1.2
Basic Results
  Send operation times: 10          Receive response times: 10
  Min/Max/Average round trip time: 9/21/14
  Square-Sum of round trip time: 2419
Extended Results
  Failures due to timeout: 0
  Failures due to internal error: 0
  Failures due to other errors: 0
  Packets out of sequence: 0
  Packets arrived late: 0
Path-Jitter Results
  Jitter number: 9
    Min/Max/Average jitter: 1/10/4
  Positive jitter number: 6
    Min/Max/Average positive jitter: 1/9/4
    Sum/Square-Sum positive jitter: 25/173
  Negative jitter number: 3
    Min/Max/Average negative jitter: 2/10/6
    Sum/Square-Sum positive jitter: 19/153
```

```
Hop IP 10.2.2.2
Basic Results
  Send operation times: 10          Receive response times: 10
  Min/Max/Average round trip time: 15/40/28
  Square-Sum of round trip time: 4493
Extended Results
  Failures due to timeout: 0
  Failures due to internal error: 0
  Failures due to other errors: 0
  Packets out of sequence: 0
  Packets arrived late: 0
Path-Jitter Results
  Jitter number: 9
    Min/Max/Average jitter: 1/10/4
  Positive jitter number: 6
    Min/Max/Average positive jitter: 1/9/4
    Sum/Square-Sum positive jitter: 25/173
  Negative jitter number: 3
    Min/Max/Average negative jitter: 2/10/6
    Sum/Square-Sum positive jitter: 19/153
```

Configuration files

```
#
nqa entry admin test
  type path-jitter
  destination ip 10.2.2.2
  frequency 10000
#
```