

Руководство пользователя

QSR-2830

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1 CONFIGURING WAN-4G

1.1 Overview

1.1.1 Brief Introduction

The fourth generation (4G) of mobile communication technology is a kind of new mobile communication technology. with a theoretical maximum data transmission rate of 100 Mbps, 4G network can support such high-bandwidth applications as HD video transmission and satellite communication. The following gives a description of some basic concepts involved in 4G function configuration.

1.1.2 Basic Concepts

APN

The Access Point Name (APN) determines the access mode through which the user accesses the 4G network. Currently, Qtech devices support configuration of 3GNET.

PCO

User name and password.

Track

A Track object can track whether an IP address is reachable and whether an interface is up. The Track function separates the object to be tracked from the module that is interested in the status of this object. When the status of the Track object changes, track function modules can adopt different actions.

1.1.3 Working Principle

The network structure of the 4G mobile system can be divided into three layers: physical network layer, intermediate environment layer and application network layer. The physical network layer provides the access and routing functions, which are completed by the combine format of the wireless network and core network. The intermediate environment layer provides the function such as Qu's mapping, address translation and completeness management. The interface between the physical network layer and the intermediate environment layer and its application environment is open. It facilitates development and provision of new applications and services, provides seamless and high-rate wireless services, and runs on multiple bands.

The configuration commands described here can implement the 4G interface communication functions of Qtech devices.

1.1.4 Applications

4G integrates 3G and WLAN and can transmit high-quality video images. Its image transmission quality is equivalent to that of high-definition TV. The 4G system supports a download speed of 100 Mbps, a speed 2,000 times faster than that of current dial-up Internet access, and an upload speed of 20 Mbps, which can satisfy the requirements of almost all the users for wireless services. In addition, 4G network can be deployed in places not covered by DSL and cable TV modems and then expanded to the whole region. Obviously, 4G has incomparable superiority.

1.2 Configuring WAN-4G

To configure WAN-4G, you need to configure the following aspects: dialing function, 4G network access mode selection, protocol status of associated master interface, dial-on-demand, and anti-impact.

1.2.1 Single Card and Single Access Dialing Function

1.2.1.1 Configuration steps

Step	Configuration Task	Description
1	Configuring APN and PCO	Optional
2	Configuring APN and PCO	Optional

3	Configuring a Single 4G Interface to Associate with Track	Mandatory
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1.2.1.2 Configuring APN and PCO

➤ Configuration method 1:

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular1)# profile create master apn 3gnet	Configures APN.
Qtech(config-if-Cellular 0/0)# profile create master username 3gnet password 0 3gnet	Configures the specified user name/password.

- ⚡ 1: A public network SIM card can access the network normally without configuring the APN. The APN can also be configured manually by referring to the public network access requirements of the operator's network.
- ⚡ 2: The APN needs to be correctly configured for a dedicated line SIM card. If there is an APN configuration error, the SIM card may access a public network.
- ⚡ 3: After the APN or PCO configuration is modified, validate the configuration by using any one of the following three methods: Method 1: Execute **reset** on the interface to reset the interface. Method 2: Execute **shutdown** on the interface, and then execute **no shutdown** after waiting for at least two seconds. Method 3: Save the configuration and restart the host. If the configuration under the 4G interface is modified by remotely logging in to the device through the 4G line, only method 1 or 2 can be used. Any of the three methods can be used if the configuration is not modified through the 4G line.

Example: Configure the APN and PCO functions on the interface cellular 0/0.

```
Qtech#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 0/0)#profile create master apn 3gnet
Qtech(config-if-Cellular 0/0)#profile create master username user1 password pass1
Qtech(config-if-Cellular 0/0)#show run interface cellular 0/0
```

Building configuration...

Current configuration: 141 bytes

```
!
interface cellular 0/0
 profile create master apn 3gnet
 profile create master username user1 password pass1
```

➤ Configuration method 2 (recommended):

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 0/0)# plmn sent-username abc password 0 123 [apn 3gnet]	Configures the user name, password and APN (optional).

- ⚡ 1: A public network SIM card can access the network normally without configuring the APN. The APN can also be configured manually by referring to the public network access requirements of the operator's network.
- ⚡ 2: The APN needs to be correctly configured for a dedicated line SIM card. If there is an APN configuration error, the SIM card may access a public network.
- ⚡ 3: The dialing time is usually within 20s when the mobile network signal is normal. The dialing time is relatively long when the signal is poor. Dialing attempts will continue until the dialing succeeds. The modem will be reset during the period, and then dialing attempts are continuously made.
- ⚡ 4: After the router is restarted or the modem is reset, the modem needs to be initialized. In this case, the dialing time is about 90s.

Example: Configure the PCO and APN functions on the interface cellular 0/0.

```
Qtech#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 0/0)# plmn sent-username abc password 0 123 apn 3gnet
Qtech(config-if-Cellular 0/0)#show run interface cellular 0/0
```

Building configuration...

Current configuration : 141 bytes

!

```
interface cellular 0/0
 plmn sent-username abc password 0 123 apn 3gnet
```

1.2.1.3 Configuring a Single 4G Interface to Associate with Track

➤ Configuration method 1:

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# ip rns 1	Enters the IP RNS configuration mode.
Qtech(config-ip-rns)# icmp-echo 10.1.1.1	Configures an IP RNS object and uses it to send ICMP packets.
Qtech(config-ip-rns)# frequency 1000	The interval for the RNS to send packets, in milliseconds. This interval must be greater than or equal to the timeout duration. The value is 60 seconds by default. The value range is from 10 to 604800000.
Qtech(config-ip-rns)# timeout 1000	The time used to judge timeout after the RNS sends packets, in milliseconds. The value is 5 seconds for the ICMP Echo packet and 9 seconds for the DNS packet by default. The value range is from 10 to 604800000 when ICMP Echo detection is used and from 1000 to 604800000 when DNS detection is used.
Qtech(config)# track 1 rns 1	Tracks the status of an IP RNS object and enters the Track mode.
Qtech(config-track)# delay up 30	(Optional) Specifies a period of time. When the status of a Track object changes, the status will change after this period of time. There is no delay by default.
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if- cellular 1)# profile create master track 1	Configures the ID of the Track object associated with the 4G interface status.
Qtech(config-if- cellular 1)# backup-valid-check valid-timer 30 max-check-times 3	Configures the time and count of checking the availability query timer (60 seconds and 3 times by default).



Association of a 4G interface with Track can be configured on a Qtech 4G router to check the link service status. When the status of the Track object changes to down, 4G link reset can be triggered to initiate a dial-up connection. After successful dialing, if the Track status is not up and remains to be down, the corresponding 4G interface is still unavailable in this situation. In this case, this timer needs to be started to perform check. If it is within the time of set "seconds * max-times", the time is 60s * 3 = 180s (the default configuration is used as an example), the corresponding Track status is still down, and the 4G link is reset again to initiate a dial-up connection, thus ensuring link recovery.

Example: Configure a single 4G card to associate with Track.

```
Qtech# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)# ip rns 1
Qtech(config-ip-rns)# icmp-echo 10.1.1.1
Qtech(config-ip-rns)# frequency 1000
Qtech(config-ip-rns)# timeout 1000
Qtech(config)# track 2 rns 1
Qtech(config-track)# delay up 30
Qtech(config-track)# exit
Qtech(config)# interface cellular 0/0
Qtech(config-if-cellular 0/0)# profile create master track 1
Qtech(config-if-cellular 0/0)# backup-valid-check valid-timer 30 max-check-times 3
Qtech(config-if-cellular 0/0)# show run interface cellular 0/0
Building configuration...
Current configuration : 141 bytes
!
interface cellular 0/0
 backup-valid-check valid-timer 30 max-check-times 3
 profile create master apn 3gnet
 profile create master username 3gnet password 3gnet
 profile create master track 1
```


➤ **Configuration method 2 (recommended):**

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# ip rns 1	Enters the IP RNS configuration mode.
Qtech(config-ip-rns)# icmp-echo 10.1.1.1	Configures an IP RNS object and uses it to send ICMP packets.
Qtech(config-ip-rns)# frequency 1000	The interval for the RNS to send packets, in milliseconds. This interval must be greater than or equal to the timeout duration. The value is 60 seconds by default. The value range is from 10 to 604800000.
Qtech(config-ip-rns)# timeout 1000	The time used to judge timeout after the RNS sends packets, in milliseconds. The value is 5 seconds for the ICMP Echo packet and 9 seconds for the DNS packet by default. The value range is from 10 to 604800000 when ICMP Echo detection is used and from 1000 to 604800000 when DNS detection is used.
Qtech(config)# track 1 rns 1	Tracks the status of an IP RNS object and enters the Track mode.
Qtech(config-track)# delay up 30	(Optional) Specifies a period of time. When the status of a Track object changes, the status will change after this period of time. There is no delay by default.
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if- cellular 0/0)# plmn status track 1	Configures the ID of the track object associated with the 4G interface status.
Qtech(config-if- cellular0/0)#backup-valid-check valid-timer 30 max-check-times 3	Configures the time and count of checking the availability query timer (60 seconds and 3 times by default).



Association of a 4G interface with Track can be configured on a Qtech 4G router to check the link service status. When the status of the Track object changes to down, 4G link reset can be triggered to initiate a dial-up connection. After successful dialing, if the Track status is not up and remains to be down, the corresponding 4G interface is still unavailable in this situation. In this case, this timer needs to be started to perform check. If it is within the time of set "seconds * max-times", the time is 60s * 3 = 180s (the default configuration is used as an example), the corresponding Track status is still down, and the 4G link is reset again to initiate a dial-up connection, thus ensuring link recovery.

Example: Configure a single 4G card to associate with Track.

```
Qtech# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)# ip rns 1
Qtech(config-ip-rns)# icmp-echo 10.1.1.1
Qtech(config-ip-rns)# frequency 1000
Qtech(config-ip-rns)# timeout 1000
Qtech(config)# track 2 rns 1
Qtech(config-track)# delay up 30
Qtech(config-track)# exit
Qtech(config)# interface cellular 0/0
Qtech(config-if-cellular 0/0)# plmn status track 1
Qtech(config-if-cellular 0/0)# backup-valid-check valid-timer 30 max-check-times 3
Qtech(config-if-cellular 0/0)# show run interface cellular 0/0
Building configuration...
Current configuration : 141 bytes
!
interface cellular 0/0
backup-valid-check valid-timer 30 max-check-times 3
plmn status track 1
```

1.2.1.4 Configuring a Single 4G Interface to Associate with BFD

Command	Description
Qtech# configure terminal	Enters the global configuration mode.

Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if- cellular 0/0)# plmn status bfd	Configures the 4G interface status to associate with BFD.
Qtech(config-if- cellular0/0)#backup-valid-check valid-timer 30 max-check-times 3	Configures the time and count of querying the availability query timer (60 seconds and 3 times by default).



Association of a 4G interface with BFD can be configured on a Qtech 4G router to check the link service status. When the status of the BFD object changes to down, 4G link reset can be triggered to initiate a dial-up connection. After successful dialing, if the BFD status is not up and remains to be down, the corresponding 4G interface is still unavailable in this situation. In this case, this timer needs to be started to perform check. If it is within the time of set "seconds * max-times", the time is 60s * 3 = 180s (the default configuration is used as an example), the corresponding Track status is still down, and the 4G link is reset again to initiate a dial-up connection, thus ensuring link recovery.

Example: Configure a single 4G card to associate with BFD.

```
Qtech# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)# interface cellular 0/0
Qtech(config-if-cellular 0/0)# plmn status bfd
Qtech(config-if-cellular 0/0)# backup-valid-check valid-timer 30 max-check-times 3
Qtech(config-if-cellular 0/0)# show run interface cellular 0/0
Building configuration...
Current configuration : 141 bytes
!
interface cellular 0/0
 backup-valid-check valid-timer 30 max-check-times 3
 plmn status bfd
```

1.2.1.5 Configuring a Single 4G Interface and RSSI Status Detection

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if- cellular 0/0)# plmn status rssi-detect -100 interval 16 ntimes 4 percent 50	Configures RSSI detection on a 4G interface.



RSSI status detection can be configured on a Qtech 4G router to check the link service status for ntimes within the interval. If the current signal intensity is lower than the configured signal intensity value for ntimes * percent, the link is disconnected. Counter check is continued. If the checked signal intensity is greater than the configured signal intensity for ntimes * percent within the interval, the 4G link will be reset again to initiate a dial-up connection, thus ensuring link recovery.

Example: Configure a single 4G card to implement signal intensity detection.

```
Qtech# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)# interface cellular 0/0
Qtech(config-if-cellular 0/0)# plmn status rssi-detect -100 interval 16 ntimes 4 percent 50
Qtech(config-if-cellular 0/0)# show run interface cellular 0/0
Building configuration...
Current configuration : 141 bytes
!
interface cellular 0/0
 plmn status rssi-detect -100 interval 16 ntimes 4 percent 50
```

1.2.2 Single Card and Multiple Access Dialing Function

This access mode is applicable to the following scenarios: A single card configured with multiple APNs, user names and passwords. Different APNs access the corresponding dedicated line LNS servers. When the LNS server of a dedicated line fails, a normal LNS server can be accessed through another APN.

1.2.2.1 Configuring PCO and APN

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 0/0)# profile creat {master slave} [apn 3gnet] username abc password {0 7} 333 {bfd track 10 }	Configures the APN (optional), user name and password; track and bfd may not be used when slave is configured.

- ⚡ 1: A public network SIM card can access the network normally without configuring the APN. The APN can also be configured manually by referring to the public network access requirements of the operator's network.
- ⚡ 2: The APN needs to be correctly configured for a dedicated line SIM card. If there is an APN configuration error, the SIM card may access a public network.
- ⚡ 3: Any change in the APN, user name and password related to master arising from this command will trigger redialing. Its effect is equal to one time of shutdown and no shutdown. Changes to the related parameters of slave will trigger redialing only when the system operates under a slave user currently.

Example 1: Configure the PCO and APN functions on the interface cellular 0/0.

```
Qtech#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 0/0)# profile creat master apn 3gnet username abc password 0 333 track 10
Qtech(config-if-Cellular 0/0)#show run interface cellular 0/0
```

Building configuration...

Current configuration : 141 bytes

!

```
interface cellular 0/0
```

```
profile creat master apn 3gnet username abc password 0 333 track 10
```

1.2.2.2 Configuring a Single 4G Interface to Associate with Track

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# ip rns 1	Enters the IP RNS configuration mode.
Qtech(config-ip-rns)# icmp-echo 10.1.1.1	Configures an IP RNS object and uses it to send ICMP packets.
Qtech(config-ip-rns)# frequency 1000	The interval for the RNS to send packets, in milliseconds. This interval must be greater than or equal to the timeout duration. The value is 60 seconds by default. The value range is from 10 to 604800000.
Qtech(config-ip-rns)# timeout 1000	The time used to judge timeout after the RNS sends packets, in milliseconds. The value is 5 seconds for the ICMP Echo packet and 9 seconds for the DNS packet by default. The value range is from 10 to 604800000 when ICMP Echo detection is used and from 1000 to 604800000 when DNS detection is used.
Qtech(config)# track 1 rns 1	Tracks the status of an IP RNS object and enters the Track mode.
Qtech(config-track)# delay up 30	(Optional) Specifies a period of time. When the status of a Track object changes, the status will change after this period of time. There is no delay by default.
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if- cellular 0/0)# profile creat {master slave} [apn 3gnet] username abc password {0 7} 333 track 10	Configures the ID of the Track object associated with the 4G interface status.
Qtech(config-if- cellular0/0)#backup-valid-check valid-timer 30 max-check-times 3	Configures the time and count of checking the availability query timer (60 seconds and 3 times by default).



Association of a 4G interface with Track can be configured on a Qtech 4G router to check the link service status. When the status of the Track object changes to down, 4G link reset can be triggered to initiate a dial-up connection. After successful dialing, if the Track status is not up and remains to be down, the corresponding 4G interface is still unavailable in this situation. In this case, this timer needs to be started to perform check. If it is within the time of set "seconds * max-times", the time is 60s * 3 = 180s (the default configuration is used as an example), the corresponding Track status is still down, and the 4G link is reset again to initiate a dial-up connection, thus ensuring link recovery.

Example: Configure a single 4G card to associate with Track.

```
Qtech# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)# ip rns 1
Qtech(config-ip-rns)# icmp-echo 10.1.1.1
Qtech(config-ip-rns)# frequency 1000
Qtech(config-ip-rns)# timeout 1000
Qtech(config)# track 2 rns 1
Qtech(config-track)# delay up 30
Qtech(config-track)# exit
Qtech(config)# interface cellular 0/0
Qtech(config-if-cellular 0/0)# profile creat master apn 3gnet username abc password 0 333 track 10
Qtech(config-if-cellular 0/0)# backup-valid-check valid-timer 30 max-check-times 3
Qtech(config-if-cellular 0/0)# show run interface cellular 0/0
Building configuration...
Current configuration : 141 bytes
!
interface cellular 0/0
 backup-valid-check valid-timer 30 max-check-times 3
 profile creat master apn 3gnet username abc password 0 333 track 10
```

1.2.2.3 Configuring a Single 4G Interface to Associate with BFD

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if- cellular 0/0)# profile creat {master slave} [apn 3gnet] username abc password {0 7} 333 bfd	Configures the 4G interface status to associate with BFD.
Qtech(config-if- cellular0/0)#backup-valid-check valid-timer 30 max-check-times 3	Configures the time and count of querying the availability query timer (60 seconds and 3 times by default).




Association of a 4G interface with BFD can be configured on a Qtech 4G router to check the link service status. When the status of the BFD object changes to down, 4G link reset can be triggered to initiate a dial-up connection. After successful dialing, if the BFD status is not up and remains to be down, the corresponding 4G interface is still unavailable in this situation. In this case, this timer needs to be started to perform check. If it is within the time of set "seconds * max-times", the time is 60s * 3 = 180s (the default configuration is used as an example), the corresponding Track status is still down, and the 4G link is reset again to initiate a dial-up connection, thus ensuring link recovery.

Example: Configure a single 4G card to associate with BFD.

```
Qtech# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)# interface cellular 0/0
Qtech(config-if-cellular 0/0)# plmn status bfd
Qtech(config-if-cellular 0/0)# backup-valid-check valid-timer 30 max-check-times 3
Qtech(config-if-cellular 0/0)# show run interface cellular 0/0
Building configuration...
Current configuration : 141 bytes
!
interface cellular 0/0
 backup-valid-check valid-timer 30 max-check-times 3
 profile creat master apn 3gnet username abc password 0 333 bfd
```

1.2.2.4 Configuring Switching of Different Access Points

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 0/0)# profile switch access-point	Switches the access point information.

 1: Backup is configured. This command can be used to switch between the master account and slave account.

2: If only one access point is configured, the device automatically returns to the original access point if switching fails.

Example 1: Configure different access points on the interface cellular 0/0.

```
Qtech#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 0/0)# profile switch access-point
Qtech(config-if-Cellular 0/0)#show run interface cellular 0/0
```

```
Building configuration...
Current configuration : 141 bytes
!
interface cellular 0/0
```


1.2.3 Selecting 4G Network Access Mode

1.2.3.1 Configuration steps

Step	Configuration Task	Description
1	Configuring to Directly Set Current Access Mode (manual handover between 3G/4G)	Mandatory

1.2.3.2 Configuring to Directly Set Current Access Mode

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# plmn mode manual { lte wcdma ehrpd gsm td-scdma lte-evdo-cdma }	Configures the current access mode: lte , wcdma , ehrpd , gsm , td-scdma , lte-evdo-cdma .
Qtech(config-if-Cellular 1)# show cellular info network	Displays the current network access mode.

 After the access mode configuration is modified, validate the configuration by using any one of the following three methods: Method 1: Execute **reset** on the interface to reset the interface. Method 2: Execute **shutdown** on the interface, and then execute **no shutdown** after waiting for at least two seconds. Method 3: Save the configuration and restart the host. If the configuration under the 4G interface is modified by remotely logging in to the device through the 4G line, only method 1 or 2 can be used. Any of the three methods can be used if the configuration is not modified through the 4G line.

Example: Select the network access mode.

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# plmn mode manual lte
Qtech(config-if-Cellular 1)# show cellular info network
-----Network Information-----
System mode = LTE mode(17)
System submode = HSPA+ mode(9)
Service state = Effective service(2)
Roam state = Not roaming status(0)
Service domain = EPS service(4)
Cell ID = 134326788
LAC = 32796
```

1.2.4 Associating 4G Interface with Interface Protocol Status

1.2.4.1 Configuration steps

Step	Configuration Task	Description
1	Associated Master Interface Protocol Status (BFD or TRACK)	Optional

1.2.4.2 Configuring Association with Master Interface Protocol Status

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# apply detect interface vlan 10 {bfd track track_id}	Configures the protocol status association between the 4G link and primary link: BFD or TRACK.

Example: Configure association with the BFD protocol.

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# apply detect interface vlan 10 bfd
Qtech(config-if-Cellular 1)# show running-config interface cellular 0/0
Building configuration...
Current configuration : 65 bytes
!
interface Cellular 0/0
  apply detect interface vlan 10 bfd
```

1.2.5 Associating 4G Interface with Dial Stimulation (Interesting Traffic) Rule

1.2.5.1 Configuration steps

Step	Configuration Task	Description
1	Dial Stimulation (Interesting Traffic) Rule of 4G Interface Association	Optional

1.2.5.2 Configuring Association with Master Interface Protocol Status

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# apply detect dial-list { list_id list_name [idle-timeout seconds]}	Configures the association of the 4G link with the dial stimulation (interesting traffic) rule.

Example: Configure the association with the interesting traffic rule with the ACL ID of 100.

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# apply detect dial-list 100
Qtech(config-if-Cellular 1)# show running-config interface cellular 0/0
Building configuration...
Current configuration : 65 bytes
!
interface Cellular 0/0
  apply detect dial-list 100
```

1.2.6 Configuring 4G Backup

1.2.6.1 Configuration steps

Step	Configuration task	Description
1	Configuring 4G Backup Function	Optional

1.2.6.2 Configuring 4G Backup Function

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.

Qtech(config-if-Cellular 1)# apply detect interface vlan 10 {bfd track track_id}	Configures the protocol status association between the 4G link and primary link: BFD or TRACK.
Qtech(config-if-Cellular 1)#apply dial-on-demand min-delay delay1 max-delay delay2;	Configures dial-on-demand and configures the random delay access range.

- ⚡ 1. The association with master interface protocol status must be configured for dial-on-demand.
- ⚡ 2. The 4G backup link will be used only when the protocol status of the primary link is down.

Example: Configure backup-on-demand and set the dial delay range to 1-60s.

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# apply detect interface vlan 10 bfd
Qtech(config-if-Cellular 1)# apply dial-on-demand min-delay 1 max-delay 60
uijie(config-if-Cellular 1)# show running-config interface cellular 0/0
Building configuration...
Current configuration : 65 bytes
!
interface Cellular 0/0
  apply detect interface vlan 10 bfd
  apply dial-on-demand min-delay 1 max-delay 60
Qtech#
```

1.2.7 Configuring Interesting Traffic-Triggered Dialing

1.2.7.1 Configuration steps

Step	Configuration Task	Description
1	Configuring Interesting Traffic-Triggered Dialing	Optional

1.2.7.2 Configuring Dial-on-demand

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# apply detect dial-list { list_id list_name [idle-timeout seconds]	Configures the association of the 4G link with the dial stimulation (interesting traffic) rule.
Qtech(config-if-Cellular 1)#apply dial-on-demand	Configures dial-on-demand and configures the random delay access range.

- ⚡ The association with master interface protocol status must be configured for dial-on-demand.

Example: Configure the interesting traffic-triggered dialing function, and use the ACL rule with the ACL ID 100 as the condition for triggering 4G dialing. In other words, the IP packet with any source address and a destination address of 7.7.7.7 will trigger 4G dialing.

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# apply detect dial-list 100
Qtech(config-if-Cellular 1)# apply dial-on-demand
Qtech(config-if-Cellular 1)# show running-config interface cellular 0/0
Building configuration...
Current configuration : 65 bytes
!
ip access-list extended 100
  10 permit ip any host 7.7.7.7
!
interface Cellular 0/0
  apply detect dial-list 100
  apply dial-on-demand
Qtech#
```

1.2.8 Anti-traffic-impact

1.2.8.1 Configuration Steps

Step	Configuration Task	Description
1.	Configure the ACL for limiting traffic.	Mandatory.
2	Configure the anti-traffic-impact function.	Mandatory.

1.2.8.2 Configuring Anti-traffic-impact Function

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# ip access-list extended 109	Configures the ACL that limits traffic of video servers.
Qtech(config-ext-nacl)# deny ip any host 192.168.50.246	Limits traffic destined for a specified destination address.
Qtech(config-ext-nacl)# permit ip any any	Allows other traffic.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# apply detect interface vlan 10 {bfd track track_id}	Configures protocol state association between the 4G link and primary link: BFD or TRACK.
Qtech(config-if-Cellular 1)# apply traffic-anti-impact interface VLAN 1 list 109	Configures the anti-traffic-impact function.

- ⚡ 1. Configure protocol state association of the primary interface to perform dialing on demand.
- ⚡ The anti-traffic-impact function is supported only on 4G mobile routers of the RSR820 series.

Example: Configure dialing on demand and set the dialing delay from 1s to 60s.

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# apply detect interface vlan 10 bfd
Qtech(config-if-Cellular 1)# a apply traffic-anti-impact interface VLAN 1 list 109
Qtech(config-if-Cellular 1)# show running-config interface cellular 0/0
Building configuration...
Current configuration : 65 bytes
!
interface Cellular 0/0
  apply detect interface vlan 10 bfd
  apply traffic-anti-impact interface VLAN 1 list 109
Qtech#
```


1.2.9 PIN Code Protection

This function sets a password for a SIM card to prevent unauthorized users from using the SIM card. The PIN code of the SIM card is 1234 by default. Three PIN code protection modes are available, with the differences as follows:

Command	Use	Differences	Scenario
simple	Simple PIN code protection mode: The user needs to use the CLI command to enter the current PIN code of the SIM card. If the PIN code is correct, the simple PIN code protection function is enabled; if the PIN code is wrong, the SIM card cannot be used, and PUK unlocking is needed (for details, refer to operation of the PUK unlocking scenario). Use the NO command to disable the simple PIN code mode.	The numeric string entered by the user is the PIN code corresponding to the SIM card. This PIN code is visible to the PIN code administrator and the security level is low.	The SIM card can be inserted into a router or mobile phone terminal supporting the PIN code input function.
strict-pin	Strict PIN code protection mode: The user needs to use the CLI command to enter the current PIN code of the SIM card and a HASH string. If the PIN code is correct, the strict PIN code protection function is enabled and the HASH string will replace the current PIN code; if the PIN code is wrong, the SIM card cannot be used, and PUK unlocking is needed (for details, refer to operation of the PUK unlocking scenario).	A new PIN code is obtained after the numeric string entered by the user is hashed. The new PIN code is invisible to the PIN code administrator and the security level is high.	The SIM card can only be inserted into Qtech router for use.
bind-router	Binding the router PIN code protection mode: The user needs to use the CLI command to enter the current PIN code of the SIM card and a HASH string. If the PIN code is correct, the PIN code binding protection function is enabled and the current PIN code is replaced after hashing using the router serial number; if the PIN code is wrong, the SIM card cannot be used, and PUK unlocking is needed (for details, refer to operation of the PUK unlocking scenario).	A new PIN code is obtained after the router serial number is hashed. This PIN code is directly bound with the router and the security level is highest.	The SIM card can only be used on a fixed router of Qtech.

1.2.9.1 Enabling PIN Code Protection

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# plmn pin-protection simple 0 1234	Enables the simple PIN code protection function. The last numeric string in configuration is the PIN code corresponding to the SIM card.
Qtech(config-if-Cellular 1)# plmn pin-protection bind-router 0 1234	Enables the PIN code protection function of router binding mode. The last numeric string in configuration is the PIN code corresponding to the SIM card.
Qtech(config-if-Cellular 1)# plmn pin-protection strict-pin 12345678 0 1234	Enables the strictly encrypted PIN code protection function. The last numeric string in configuration is the PIN code corresponding to the SIM card. The first character string is a strictly encrypted hash string.

- ⚡ 1. When a 3G card and the corresponding SIM card are inserted for the first time, the initial password of the SIM card is known by the customer. The password is 1234 by default if it was not changed before.
- ⚡ 2. The router administrator enables the PIN code protection function through CLI. When this command is enabled, enter the correct initial PIN code of the SIM card. If the PIN code is wrong. The SIM card will be locked. PUK unlocking is needed. Refer to scenario 1 of PUK unlocking.
- ⚡ 3. When the router is bound or the strict encryption mode is enabled, the PIN code has been encrypted and is not the original PIN code 1234 any more, and 1234 cannot be used on other devices (such as a mobile phone) to enable the PIN code protection function. Only the **no plmn pin-protection** command can be used on this router to disable the PIN code protection function.
- ⚡ 4. In router binding or strict encryption mode, the new PIN code is encrypted for saving and invisible to the administrator.
- ⚡ 5. Each time when the SIM card connects to the network in dial-up connection mode, the router will use the new PIN code to unlock the SIM card. If the PIN code is correct, normal dialing can be implemented and the SIM card can be used to access the network normally.
- ⚡ 6. The three modes use the same command to cancel the PIN code protection: **no plmn pin-protection**. This command can be executed only when the PIN code protection command is executed.
- ⚡ 7. The SIM card is relocated from router A to router B, router B has been configured with the PIN code protection related command, and a new PIN code is available. There are **two cases** for SIM card replacement:

Case 1: If the PIN code of SIM card is consistent with the PIN code for the CLI command of router B, the related process is the same as the initial use process. The code can be replaced directly for use. The router first uses the initial password to enable PIN code protection. After the function is enabled, a new PIN code is generated according to the binding or strict encryption algorithm. After that, the router will use the new PIN code to unlock the SIM card each time the 3G card connects to the 3G network in dial-up connection mode. If the PIN code is correct, normal dialing can be implemented and the 3G card can be used to access the network normally.

Case 2: If the PIN code of the SIM card inconsistent with the PIN code for the CLI command of router B, directly replacement may lead to locking of the SIM card. In this case, a designated administrator needs to unlock the SIM card by using the PUK code, and then reset the PIN code (for details, refer to the section about PUK unlocking).

Case 2 above can be handled by using the following three methods:

- ①: Before replacing the SIM card, use another device (such as a mobile phone) to change the PIN code of SIM card to the initial PIN code configured on the router, and then insert the card into the router for use;
- ②: Before replacing the SIM card, delete router configuration, insert the new card, and then configure the PIN protection function again;

- ③: The SIM card is locked after replacement. In this case, the corresponding PUN code of SIM card can be used to unlock it. Refer to the description about the PUK unlocking scenario.

Example: Configure PIN code protection (in router binding mode; the configuration for other modes is similar).

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# plmn pin-protection bind-router 0 1234
uijie(config-if-Cellular 1)# show running-config interface cellular 0/0
Building configuration...
Current configuration : 65 bytes
!
interface Cellular 0/0
plmn pin-protection bind-router 0 1234
```

1.2.9.2 Changing PIN Code

Use the PIN code changing command to change the PIN code if required.

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# plmn pin-protection simple 0 1234	Enables the simple PIN code protection function. The last numeric string in configuration is the PIN code corresponding to the SIM card.
Qtech(config-if-Cellular 1)# plmn modify 2345	Changes the PIN code.

- ⚡ 1. The PIN code changing command can only run in the simple mode.
- ⚡ 2. To run this command, judge the modem status. Therefore, the PIN code changing command may fail if the modem status is abnormal. A prompt message is displayed in the system log, and the user can try again later. The PIN code may also be changed through a mobile phone.
- ⚡ 3. Command execution may fail if the operator's network is busy or due to other factors.
- ⚡ 4. Use this command with caution. When this command is used, it is necessary to save the existing router configuration.

Example: Configure PIN code protection (in router binding mode; the configuration for other modes is similar).

```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# plmn pin-protection bind-router 0 1234
Qtech(config-if-Cellular 1)# plmn modify 2345
Proceed with modify pin code and write config?[N0] y
pin code modify success !
Qtech(config-if-Cellular 1)# show running-config interface cellular 0/0
Building configuration...
Current configuration : 65 bytes
!
interface Cellular 0/0
plmn pin-protection bind-router 0 2345
```

1.2.9.3 PUK Unlocking

The SIM card will be locked when a wrong PIN code is used to enabled PIN code protection. In this case, PUK unlocking is needed, and a new PIN code needs to be set for the SIM card. When the SIM card is in the PUK locking status, the user will be prompted using the system log printing form, and the user can use the sh cell info command to view the SIM card status.

Command	Description
Qtech# configure terminal	Enters the global configuration mode.
Qtech(config)# interface cellular 0/0	Enters the interface configuration mode.
Qtech(config-if-Cellular 1)# plmn puk-unlock 12345678 1234	PUK unlocking; the first character string is the PUK code and the second character string is the new PIN code.

- ⚡ 1. The PUK unlocking is required in the following cases:

Case 1: When the PIN code protection function is enabled, the PIN code behind the command is inconsistent with the corresponding PIN code of SIM card. The SIM card will be locked.

Case 2: After the router binding function of PIN code is enabled, the SIM card is removed and placed in another router with the same configuration for use. The SIM card will be locked.

Case 3: After the strict encryption function of PIN code is enabled, the SIM card is removed and placed in another router with different configuration for PIN code protection. The SIM card will be locked.

Case 4: When the SIM card is replaced, the initial password of the SIM card is inconsistent with the initial PIN code configured for the router. The SIM card will be locked.

- ⚡ 2. After PUK unlocking, the PIN code protection is disabled in the SIM card.
- ⚡ 3. Use the PUK unlocking command with caution. The SIM card will be damaged when the number of wrong PUK code attempts reaches 10. Before unlocking, you are recommended to first ask the operator about the PUK code corresponding to the SIM card. PUK unlocking can also be implemented through a mobile phone or other terminals.

Example: Configure PIN code protection (in router binding mode; the configuration for other modes is similar).

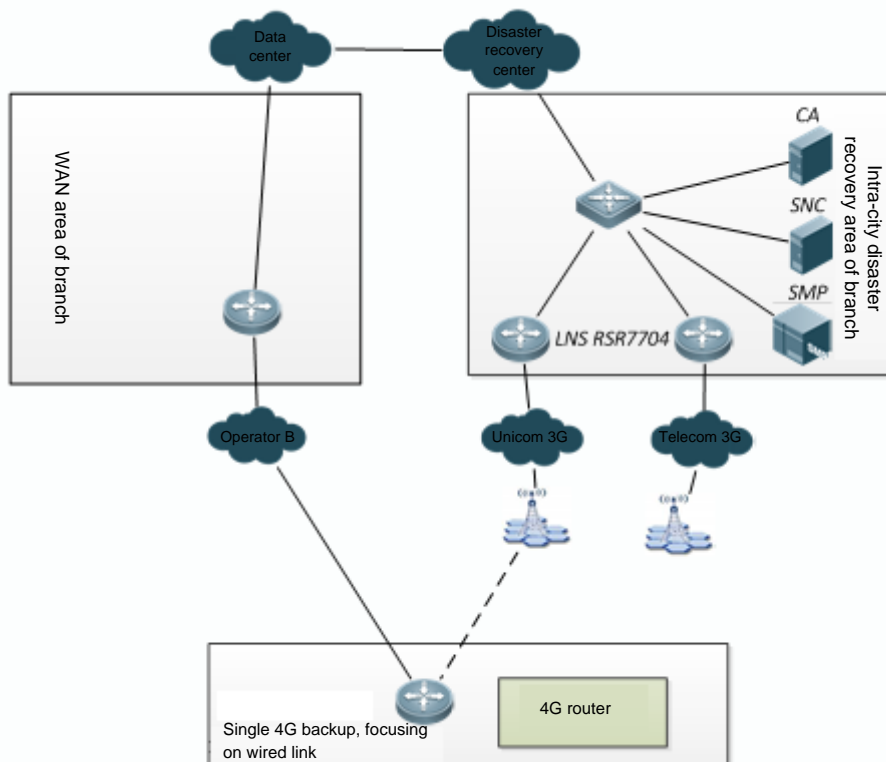
```
Qtech(config)#interface cellular 0/0
Qtech(config-if-Cellular 1)# plmn puk-unlock 12345678 1234
```

1.3 Examples of Typical Configuration

1.3.1 Disaster Recovery Scenario of Wired Link and Single 4G Link

1.3.1.1 Network requirements

The scenario involves the wired link and single 4G link disaster recovery. The wired link is used during normal operations. After communication of the wired link is interrupted, the device can automatically detect and then enable the 4G link. The 4G link is disconnected automatically after the wired link is recovered.



Wired and 4G networking topology

1.3.1.2 Configuration steps

Track detection is used in the configuration example. Alternatively, BFD can be used to associate with the wired link. For detailed configuration, refer to the BFD configuration section in the Configuration Manual.

(1) Configure the wired link for track detection:

```
!Here, it is assumed that the IP address of the LNS corresponding to the wired link is 10.10.10.10.
Qtech(config)#ip rns 1
Qtech(config-ip-rns-icmp-echo)# icmp-echo 10.10.10.10 out-interface VLAN 1 next-hop 10.10.10.1
Qtech(config-ip-rns-icmp-echo)# timeout 3000
Qtech(config-ip-rns-icmp-echo)# frequency 3000
Qtech(config-ip-rns-icmp-echo)# ntime 3
Qtech(config)# track 1 rns 1
```

(2) Configure 4G dial-on-demand:

```
Qtech(config)#interface Cellular 0/0
Qtech(config-if-Cellular 0/0)# apply detect interface VLAN 1 track 1
Qtech(config-if-Cellular 0/0)# apply dial-on-demand
```

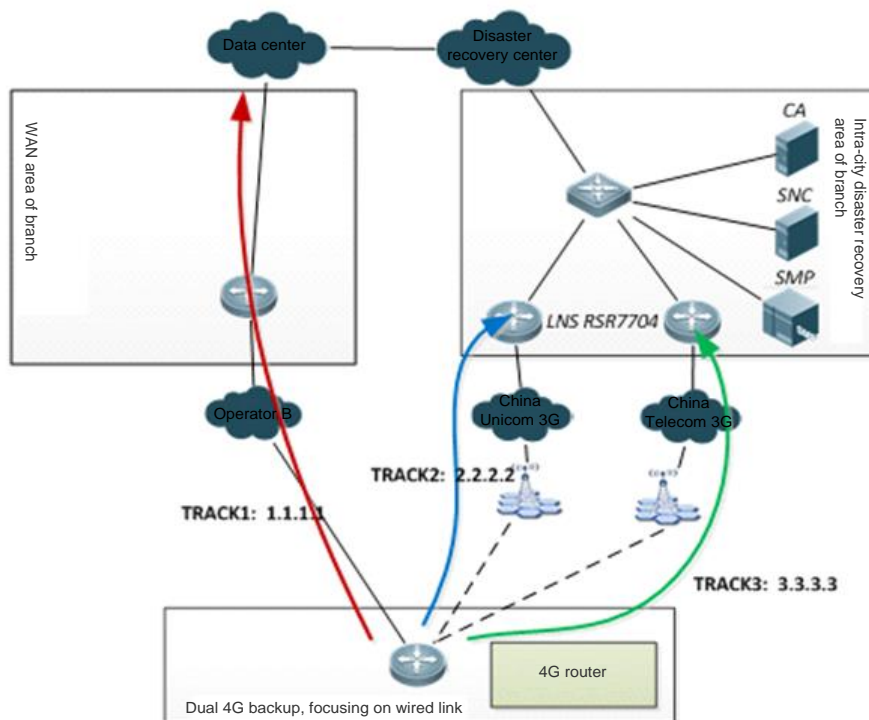
(3) Configure the static route:

```
Qtech(config)#ip route 0.0.0.0 0.0.0.0 VLAN 1 track 1
Qtech(config)#ip route 0.0.0.0 0.0.0.0 Cellular 0/0 100
```

1.3.2 Disaster Recovery Scenario of Wired Link and Dual 4G Links**1.3.2.1 Network requirements**

The scenario involves the wired link and dual 4G link disaster recovery. The wired link is used during normal operations. After communication of the wired link is interrupted, the device can automatically detect and then enable backup 4G link 1. After communication of backup 4G link 1 is interrupted, the device can automatically detect and then enable backup 4G link 2. Backup 4G link 2 is disconnected automatically after backup 4G link 1 is recovered. Both backup 4G link 1 and backup 4G link 2 are disconnected after the wired link is recovered.

Note: The RSR820 series mobile routers do not support the use method of this scenario.



Wired link and dual 4G links networking topology

1.3.2.2 Configuration steps

Track detection is used in the configuration example. Alternatively, BFD can be used to associate with the wired link. For detailed configuration, refer to the BFD configuration section in the Configuration Manual.

(1) Configure the wired link for track detection:

!Here, it is assumed that the IP address of the LNS corresponding to the wired link is 1.1.1.1.

```
Qtech(config)#ip rns 1
Qtech(config-ip-rns-icmp-echo)# icmp-echo 1.1.1.1 out-interface VLAN 1 next-hop 1.1.1.1
Qtech(config-ip-rns-icmp-echo)# timeout 3000
Qtech(config-ip-rns-icmp-echo)# frequency 3000
Qtech(config-ip-rns-icmp-echo)# ntime 3
Qtech(config)# track 1 rns 1
```

!Here, it is assumed that the IP address of the LNS corresponding to backup 4G link 1 is 2.2.2.2.

```
Qtech(config)#ip rns 2
Qtech(config-ip-rns-icmp-echo)# icmp-echo 2.2.2.2 out-interface Cellular 0/0
Qtech(config-ip-rns-icmp-echo)# timeout 3000
Qtech(config-ip-rns-icmp-echo)# frequency 3000
Qtech(config-ip-rns-icmp-echo)# ntime 3
Qtech(config)# track 2 rns 2
```

(2) Configure 4G dial-on-demand:

```
Qtech(config)#interface Cellular 0/0
Qtech(config-if-Cellular 0/0)# apply detect interface VLAN 1 track 1
Qtech(config-if-Cellular 0/0)# apply dial-on-demand
```

```
Qtech(config)#interface Cellular 1/0
Qtech(config-if-Cellular 1/0)# apply detect interface VLAN 1 track 1
Qtech(config-if-Cellular 1/0)# apply detect interface Cellular 0/0 track 2
```



```
Qtech(config-if-Cellular 1/0)# apply dial-on-demand min-delay 60 max-delay 120
```

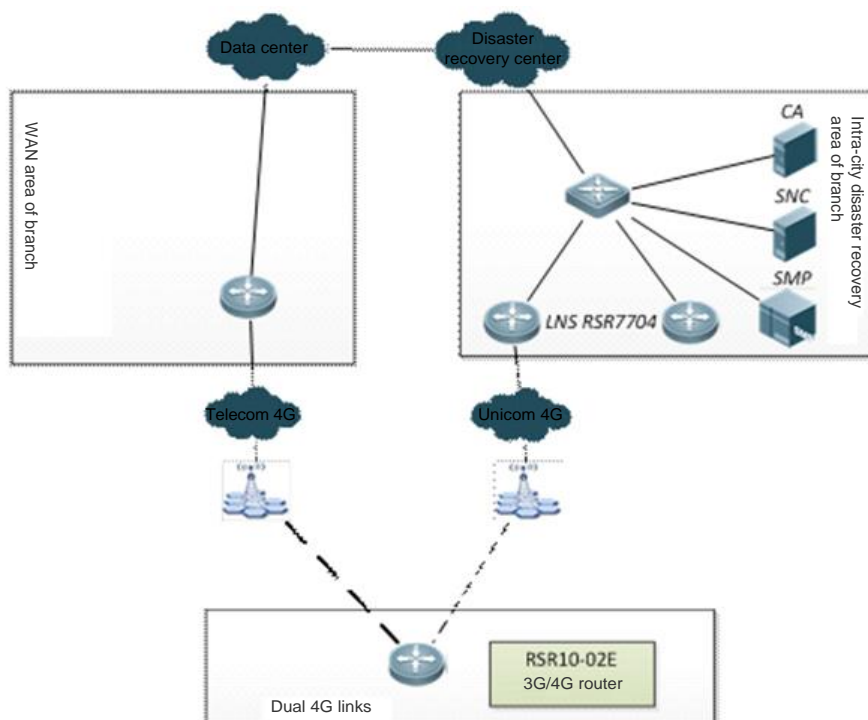
```
(3) Configure the static route:
ip route 0.0.0.0 0.0.0.0 VLAN 1 track 1
ip route 0.0.0.0 0.0.0.0 Cellular 0/0 100 track 2
ip route 0.0.0.0 0.0.0.0 Cellular 1/0 200 track 3
```

1.3.3 Scenario of Interesting Traffic-Triggered Dialing through Dual 4G Links

1.3.3.1 Network requirements

In this scenario, dialing is triggered by the interesting traffic over the dual 4G links. The active 4G link is used during normal operations, and the active 4G link is in the non-dialing status when there is no interesting traffic. When there is interesting traffic, dialing of the active 4G link is triggered. After communication of the active 4G link is interrupted, the device can automatically detect and then enable the backup 4G link. The backup 4G link needs interesting traffic to trigger dialing. The active 4G link is used preferably when the active 4G link is recovered from the fault.

Note: The RSR820 series mobile routers do not support the use method of this scenario.



Networking topology of interesting traffic-triggered dialing over dual 4G links

1.3.3.2 Configuration steps

```
(1) Configure the active 4G link for track detection:
!Here, it is assumed that the IP address of the LNS corresponding to backup 4G link 1 is 2.2.2.2.
Qtech(config)#ip rns 2
Qtech(config-ip-rns-icmp-echo)# icmp-echo 2.2.2.2 out-interface Cellular 0/0
Qtech(config-ip-rns-icmp-echo)# timeout 3000
Qtech(config-ip-rns-icmp-echo)# frequency 3000
Qtech(config-ip-rns-icmp-echo)# ntime 3
Qtech(config)# track 2 rns 2
```

```
(2) Configure the rule of interesting traffic-triggered dialing:
Qtech(config)#ip access-list extended 100
Qtech(config-ext-nacl)# 10 permit ip 124.124.124.0 0.0.0.255 any
Qtech(config-ext-nacl)# 20 permit ip 126.126.126.0 0.0.0.255 any
```



```
Qtech(config-ext-nacl)#!
```

```
Qtech(config-ext-nacl)#!
```

```
Qtech(config-ext-nacl)#ip access-list extended 199
```

```
Qtech(config-ext-nacl)# 10 deny icmp any any
```

```
Qtech(config-ext-nacl)# 20 permit ip any any
```

```
Qtech(config-ext-nacl)#!
```

(3) Configure the 4G interesting traffic-triggered dialing:

```
Qtech(config)#interface Cellular 0/0
```

```
Qtech(config-if-Cellular 0/0)# apply detect dial-list 100
```

```
Qtech(config-if-Cellular 0/0)# apply dial-on-demand
```

```
Qtech(config)#interface Cellular 1/0
```

```
Qtech(config-if-Cellular 0/0)# apply detect dial-list 199
```

```
Qtech(config-if-Cellular 1/0)# apply detect interface Cellular 0/0 track 2
```

```
Qtech(config-if-Cellular 1/0)# apply dial-on-demand min-delay 60 max-delay 120
```

(3) Configure the static route:

```
Qtech(config)#ip route 0.0.0.0 0.0.0.0 Cellular 0/0 track 2
```

```
Qtech(config)#ip route 0.0.0.0 0.0.0.0 Cellular 1/0 100
```

2 CONFIGURING DIALUP

2.1 PPPoE Dialup

2.1.1 PPPoE Overview

Qtech Device supports PPP running on the Ethernet (PPPoE, PPP over Ethernet) interface for DDR. Its characteristics are like the DDR: stimulating dialup if there is data communication and automatically disconnecting the line when it is idle for the specified period.

The PPPoE implementation on Qtech devices is similar to DDR Profiles, which binds the Ethernet interface to the logical interface and performs the negotiations on the logical interface.

2.1.2 PPPoE Configuration Tasks

From the implementation of PPPoE, the PPPoE configuration tasks include:

- Configuring the Ethernet interface
- Configuring the logical interface
- Configuring the necessary global parameters

2.1.2.1 Configuring the Ethernet interface

The configuration of the Ethernet interface includes:

- Enable the PPPoE on the interface
- Bind the Ethernet interface to the specified dialer pool

Some basic configurations of the Ethernet interface are also required, such as the interface activation (**no shutdown**).

Use the following command to enable PPPoE on the Ethernet interface in interface configuration mode.

Command	Function
Qtech(config-if)# pppoe enable	Enables PPPoE.

Since PPPoE is implemented via DDR Profiles, it is required to bind the Ethernet interface to the specified dialer pool available for the use of the logical interface in DDR Profiles. Use the following commands to bind the Ethernet interface to the specified dialer pool in interface configuration mode.

Command	Function
Qtech(config-if)# pppoe-client dial-pool-number pool-number dial-on-demand	Binds the Ethernet interface to the specified logical dialer pool (to enable the DDR function. The dialup to the PPPoE server is activated only when there is some message).
Qtech(config-if)# pppoe-client dial-pool-number pool-number no-ddr	Binds the Ethernet interface to the specified logical dialer pool (to enable automatic dialup to the PPPoE server).

One of **dial-on-demand** and **no-ddr** must be selected. **dial-on-demand** enables the PPPoE DDR function to disconnect the line when the specified idle period expires; **no-ddr** enables the PPPoE auto-dialup function to dial to the PPPoE server automatically.

2.1.2.2 Configuring the logical interface

All PPP negotiations of the PPPoE dialup are based on the logical interface, so it is required to configure the PPPoE dialup related parameters on the logical interfaces.

Use the following commands to configure the logical interface in global configuration mode.

Command	Function
Qtech(config)# interface dialer <i>dialer-number</i>	Enters the specified logical interface.
Qtech(config-if)# ip address negotiate	Obtains address from negotiation .
Qtech(config-if)# dialer pool <i>pool-number</i>	Associates the dialer pool, with the one in the Ethernet interface one-by-one.
Qtech(config-if)# dialer idle-timeout <i>seconds</i>	(Optional) Configures the timeout time to disconnect the line when the specified idle time times out.
Qtech(config-if)# encapsulation ppp	Encapsulates PPP because PPPoE is based on PPP.
Qtech(config-if)# mtu 1488	Configures the maximum transmission unit as 1488.
Qtech(config-if)# dialer-group <i>dialer-group-number</i>	Sets the dialer group associated with the dialup activation rule.
Qtech(config-if)# ppp pap sent-username <i>username</i> password <i>password</i>	Configures the username and password for authentication.

Except for the command in step 4, all other commands are required. Especially in step 6, the MTU value must be 1488 for normal communication.

If the IP address of the logical interface is modified after a PPPoE connection has been set up, run the **clear pppoe tunnel** command to trigger PPPoE re-negotiation for the modification to take effect in privileged mode.

2.1.2.3 Configuring the necessary global parameters

The necessary PPPoE global parameters include:

- Define the dialup activation rule
- Configure the dialup route

To use PPPoE with other functions, such as NAT, it is required to configure other global parameters. The global parameters must be configured according to the actual conditions.

Use the following command to define the dialup activation rule in global configuration mode.

Command	Function
Qtech(config)# dialer-list <i>dialer-group- number</i> protocol <i>protocol-name</i> { permit deny list <i>access-list-number</i> }	Defines the dialup activation rule.

Since the IP address of the interface is generally obtained from the negotiation and there is no directly-connected route of the logical interface, it is required to configure a dialup route to the destination for the logical interface with the PPPoE dialup, so that the data can be forwarded via the PPPoE interface.

Use the following command to configure the dialup route in global configuration mode.

Command	Function
Qtech(config)# ip route 0.0.0.0 0.0.0.0 dialer <i>dialer-number</i> [permanent]	Sets the default route. The permanent option enables the route always valid, even when the logical interface is in the line invalid period (enable-timeout) (here, the logical interface is in the down status).

It is also possible that the dialup route is not configured as the default route, and the specified route is configured as required. In whatever conditions, a dialup route must be configured to make dialup possible.

2.1.3 Monitoring PPPoE

Use the following commands to monitor the PPPoE in privileged EXEC mode.

Command	Function
Qtech# show pppoe {tunnel session}	Shows the PPPoE configuration.
Qtech# show interfaces dialer <i>dialer-number</i>	Shows the logical interface configuration.
Qtech# debug pppoe {datas errors events packets }	Turns on the PPPoE debug switch.

2.2 Callback

2.2.1 Callback Overview

2.2.1.1 Introduction

The callback needs the client/server relation between the two parties of the dialup. One remote callback client dials to connect the callback server, and the callback server performs authentication for the dial-in user. If the authentication passes, the callback server uses the related information of the remote host for callback.

If the callback fails due to busy line, no reply, or other reasons, no redialing is done. If the callback server has no available interface for callback, no retry will be done.

Callback client: remote device or host that requests the callback

Callback server: the device that accepts the callback request, and if the authentication passes, disconnects the current connection and locally initiates the dialing to the remote client.

2.2.1.2 Purposes

The callback is generally used in the following three scenarios:

- **Save cost:** The call charge may be different for different areas. For example, the dialing from village to city may be more expensive than the reverse direction, so it is possible to save cost by calling back from the city to village.
- **Unified call charge:** An organization may have quite a lot of branches. It is possible to call back from the center to the branches so that the calls are all paid by the center to facilitate the financial management and statistics.
- **Security considerations:** The callback numbers set for the callback server are the reliable and valid numbers that have been configured. This helps ensure the location of the callback client is valid, forbidding the invalid dialing from the range out of control.

2.2.1.3 Callback configuration tasks

Before configuring the callback, make sure the global DDR configuration preparations are completed. The callback configuration tasks involve:

- Configure the callback client
- Configure the callback server

Configuring the callback client

Use the following commands to configure the callback client for the device in global configuration mode.

Command	Function
Qtech(config)# interface <i>type number</i>	Specifies the interface and enters the interface configuration mode.
Qtech(config-if)# dialer in-band	Enables DDR.
Qtech(config-if)# encapsulation ppp	Encapsulates PPP.
Qtech(config-if)# ppp authentication {chap pap}	Configures the PPP authentication.
Qtech(config-if)# dialer map <i>protocol next-hop-address name hostname dial-string</i>	Maps the callback server hostname, address and telephone number.

Command	Function
Qtech(config-if)# ppp callback request	Configures the current interface as the callback client.
Qtech(config-if)# dialer hold-queue [<i>packets</i> [<i>timeout seconds</i>]]	(Optional) Configures the hold queue on the interface.
Qtech(config-if)# dialer-group <i>group</i>	Associates the dialup activation rule.
Qtech(config-if)# async mode dedicated	Enables automatic negotiation of the dialup mode.

Configuring the callback server

Use the following commands to configure the callback server for the device in global configuration mode.

Command	Function
Qtech(config)# interface <i>type number</i>	Specifies the interface and enters the interface configuration mode.
Qtech(config-if)# dialer in-band	Enables DDR.
Qtech(config-if)# encapsulation ppp	Encapsulates PPP.
Qtech(config-if)# ppp authentication { <i>chap</i> <i>pap</i> }	Configures the PPP authentication.
Qtech(config-if)# dialer map <i>protocol next-hop-address name hostname class classname dial-string</i>	Maps the callback client hostname, address and telephone number.
Qtech(config-if)# dialer hold-queue [<i>packets</i>] [<i>timeout seconds</i>]]	(Optional) Defines the hold queue on the interface.
Qtech(config-if)# dialer enable-timeout <i>seconds</i>	(Optional) Configures the line invalid waiting time (i.e. waiting time before the callback).
Qtech(config-if)# ppp callback accept	Accepts the callback request.
Qtech(config-if)# dialer-group <i>group</i>	Associates the dialup activation rule.
Qtech(config-if)# async mode dedicated	Enables automatic negotiation of the dialup mode.
Router(config-pmap)# exit	Returns to the global configuration mode.
Qtech(config)# map-class dialer <i>classname</i>	Defines the dialup mapping class and enters the mapping class configuration mode.
Qtech(config-map-class)# dialer callback-server [<i>username</i>] [<i>dial-string</i>]	Configures the dialup mapping class as the callback server.

On the callback server, **dialer enable-timeout** controls the callback start time. If not configured, the default time is used, namely 15 seconds.

2.2.2 Monitoring Callback

Use the following command to monitor the callback in privileged EXEC mode.

Command	Function
Qtech # debug dialer packet	Turns on the DDR debug switch.

2.3 Dialer Watch

2.3.1 Dialer Watch Overview

2.3.1.1 Introduction

The principle of the Dialer Watch is that the local route in the device is detected, and the backup dialup interface is triggered to dial if the specified route monitored does not exist in the routing table. If the specified route monitored appears in the routing table, the backup dialup interface will be triggered to disconnect the dialup line.

2.3.1.2 Purposes

For the general dialup backup, when the master line is disconnected, the backup link just turns from the standby status to the spoof up status but this does not indeed trigger the dialup. The dialup is triggered only when there is some traffic stimulation.

The purpose of the Dialer Watch is that it triggers the dialup as long as the monitored route disappears, freeing away the dependence of the traffic stimulation.

2.3.2 Dialer Watch Configuration Tasks

Before configuring the dialer watch, make sure the global DDR configuration preparations are completed. The dialer watch configuration tasks involve:

- Configure the backup interface for the DDR dialup
- Configure the monitored route for the dialup
- Configure how long to trigger dialup after the monitored route disappears
- Configure how long to disconnect the dialup after the monitored route appears

2.3.2.1 Configuring dialer watch

Use the following commands to configure the dialer watch in global configuration mode.

Command	Function
Qtech(config)# interface <i>type number</i>	Specifies the interface and enters the interface configuration mode.
Qtech(config-if)# dialer watch-group <i>group-number</i>	Enables dialer watch on the backup line.
Qtech(config)# dialer watch-list <i>group-number ip ip-address address-mask</i>	Defines all the routes to be monitored. The dialer watch function can monitor multiple routes.
Qtech(config)# dialer watch-list <i>group-number delay {connect connect-time }</i>	Configures how long to trigger dialup on the backup interface after the monitored route disappears. If not configured, the dialup is triggered immediately by default.
Qtech(config)# dialer watch-list <i>group-number delay {disconnect disconnect-time }</i>	Configures how long to disconnect the dialup on the backup interface after the monitored route appears. By default, it is disconnected immediately.