TFN T6300A Network Comprehensive Tester

User's Manual

Notice

Thank you for choosing TFN network comprehensive tester. Please read this manual carefully before using it for correct operation.

Safety Notice

The following general safety measures must be taken at all stages of the operation of this instrument. Failure to take these safety measures or to comply with the specific warnings described elsewhere in this manual will violate the safety standards for the design, manufacture and use of the instrument. TFN Technology is not responsible for the consequences of customer breaches of these requirements.

Battery Warning

You can only use lithium batteries and use an AC adapter to charge the lithium batteries. For additional safety details, refer to the safety information section of this manual.

Attention

Product performance may be involved, not according to the specification operation may affect the product performance, please do not dismantle the machine, if it will cause damage to the parts. Only qualified personnel can perform the maintenance.

Functional Module

The contents presented in this manual includes all functions of the instrument. But it does not mean that each meter has all functions, depending on which function modules are purchased, and if you are not on the purchase list, you may find that some of the functions described in the manual do not appear in your meter.

catalogue

1. Instrument Introduction

This instrument contains two separate Ethernet ports, each including a RJ45 10 / 100 / 1000M adaptive port and a 100 / 1000M configurable SFP optical port, and integrating E1, V.35/V.24, optical power meter, red light source and other physical interfaces. It is a handheld data network test instrument that provides powerful functions. Simple operation, easy to carry, a variety of automatic detection functions, can save a lot of time for the site installation, debugging and maintenance of engineering maintenance personnel.

Test interface

1). RJ45-1：10/100/1000M Ethernet electricalinterface

2). SFP-1: 100/1000M optical interface

3). RJ45-2: 10/100/1000M Ethernet electricalinterface

4). SFP-2: 100/1000M optical interface

5). BNC： Non-equilibrium 75Ω interface

6). RJ48: Balance 120Ω interface

7). DB26: v.35/v.24 interface 8).

Optical power meterinterface 9).

Red light source interface

10). 0TDR interface

screen

1). Screen: Screen:7.0-inch LCD screen（800*480）

Pilot lamp

Power	Power supply and charging indicator light Green light: instrument is woring state Green light off: instrument is powered off Red light: instrument battery charging Red light off: instrument battery full

Auxiliary interface

DC	Instrument external power supply, 5V~12V,can be directly connected to the car charging
RJ45	Manage Ethernet interface for remote control,test results data export;Internet test interface
USB interface	1. Support U-disk export data 2. Support wireless network card
TF card interface	Support TF card for storing test results

2. General operation

Power supply and battery

The instrument uses a built-in lithium battery. Make sure the battery is live before you turn it on. If the battery is exhausted, connect the DC-5V~12V external power supply. When connected to an external power supply, the battery can be charged and the instrument can also be supported.

Without an external power supply, the instrument battery can be guaranteed for about 5 to 6 hours of use. Therefore, the instrument needs to be connected to an external power supply when it is tested for a long time (more than 6 hours or even a few days).

The external power supply is DC-5V~12V, please do not connect the external power supply with too high voltage to the instrument. Otherwise, it may cause faults in the power supply part of the instrument.

The red light inside the Power light indicates the charging status. The red light is on to indicate that charging is in progress; Red out indicates that the battery is full; Red flashes to indicate charging failure.

Startup & Shutdown

1). Turn on

In power-off state, keep pressing and holding the red "Power" key in the lower right corner of the gauge. After about 3 seconds, the green "Power" light in the upper right corner will light up, and then release the "Power" key. The instrument starts to power on, carries out system self-check, LED lights self-check, lights up the LCD screen, and enters the working state.

If you keep pressing and holding the "Power" key and don't let go, the green light on the "Power" indicator will go out again and the meter will not turn on. The purpose of this design is to prevent the instrument from turning on by mistake due to accidental squeezing of the "Power" key during long-distance transportation.

2). Shutdown

In power-on state, keep pressing and holding the red "Power" key under the gauge. After about 3 seconds, the gauge cuts off the power supply and goes into power-off state.

Power on and off do not affect the charging status.

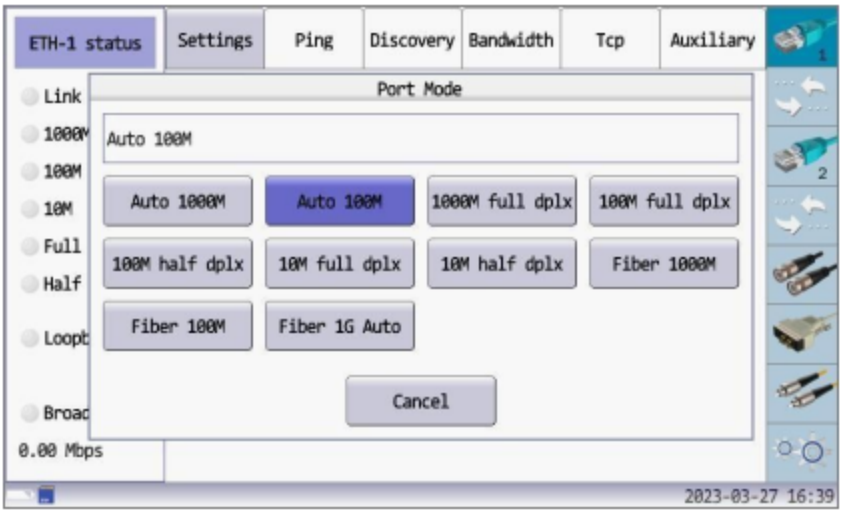
Operation Style

In the leftmost column on the screen is the test port selection; In the sub-windows of each test port, the lower part is the Tab form of functional subitems, different tests, different functional subitemsselected.

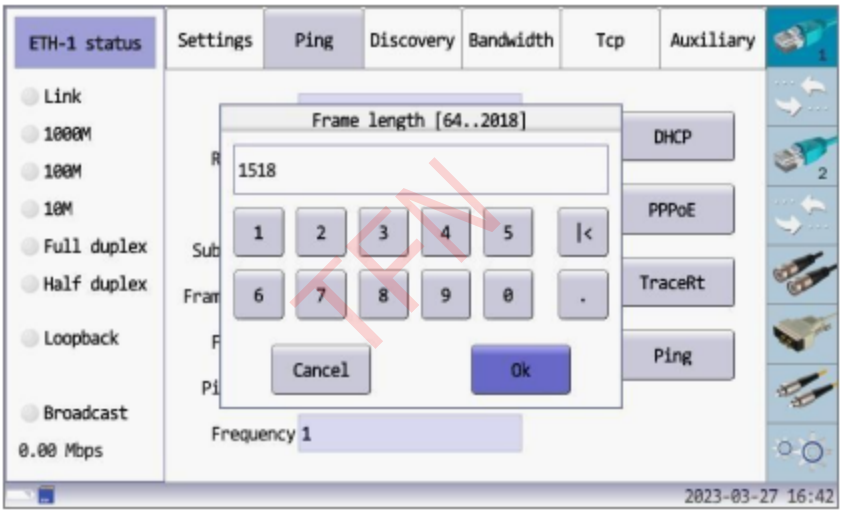
Test parameter configurations may be in the form of a choice or a number or name.

1). Select Configuration Item

List the options in the form of a drop-down menu, and select the desired configuration value by screen tapping or keyboard operation.

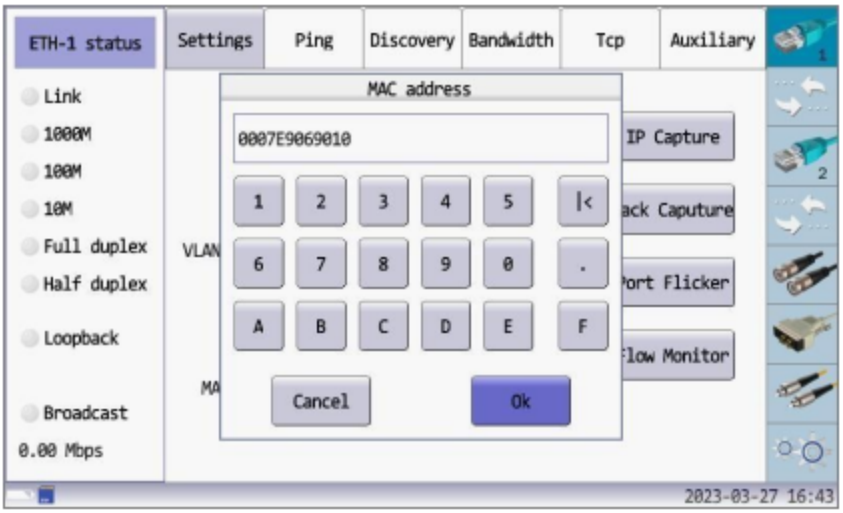


2). Enter the value



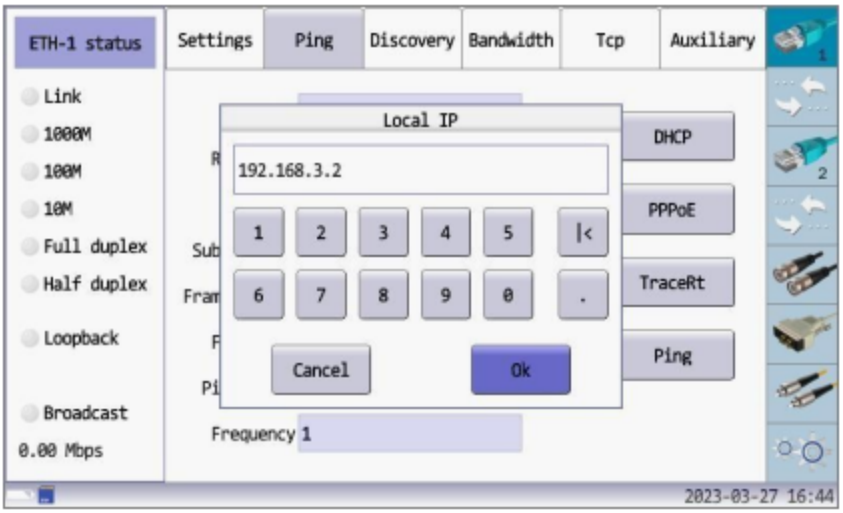
Configuration parameters used to enter numerical form. If the input is wrong, there will be an error prompt.

3). Enter the MAC address



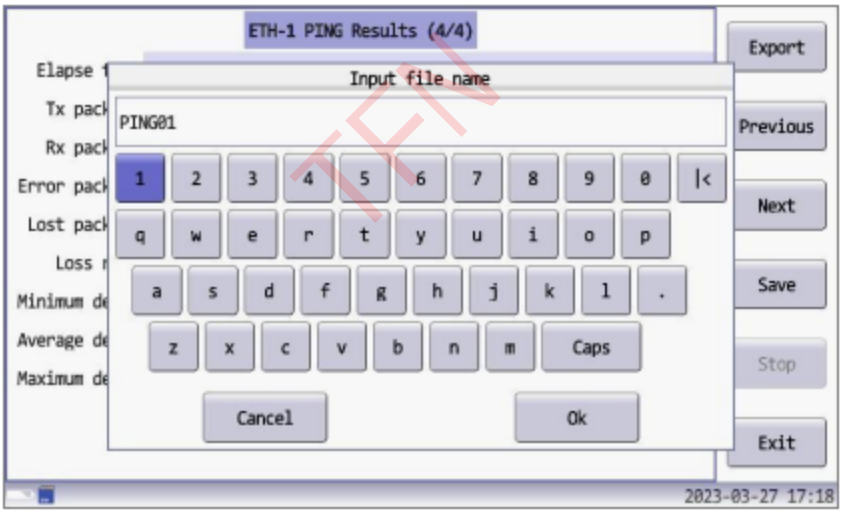
MAC address for input Ethernet interface. If the input is wrong, there will be an error prompt.

4). Enter the IP address



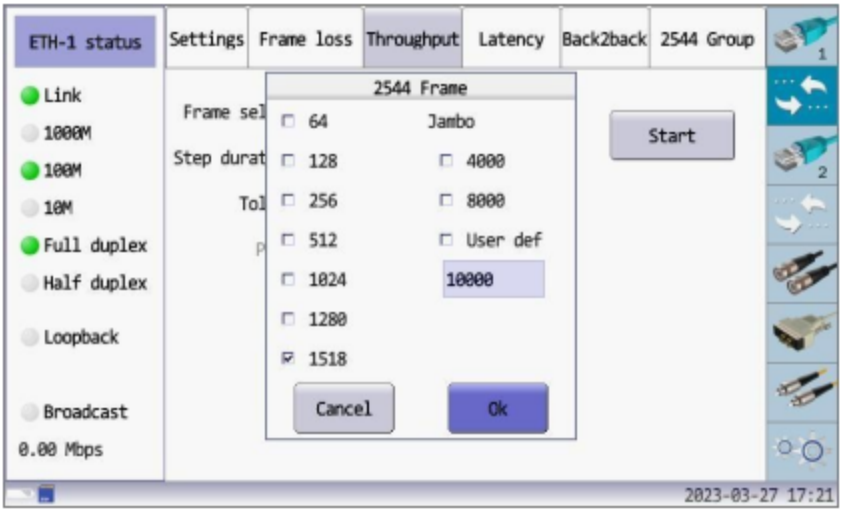
Used to enter the IP address. If the input is wrong, there will be an error prompt.

5). Enter file name



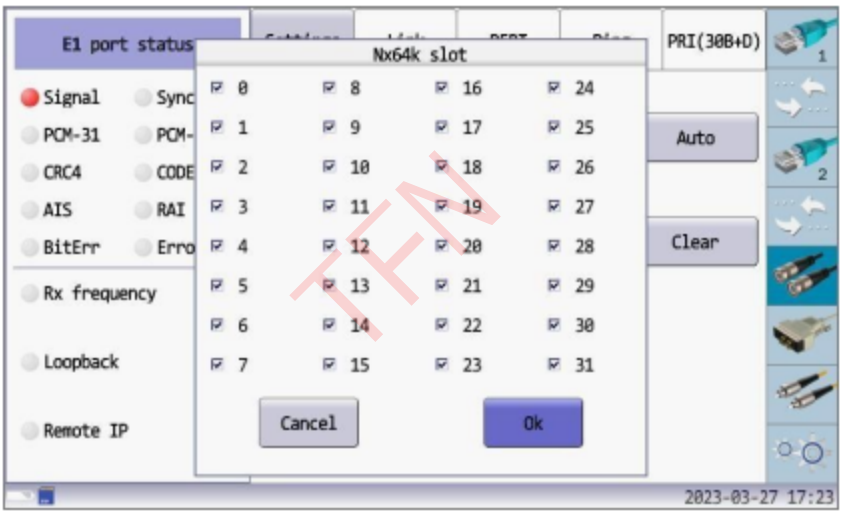
File name to save test results.

6). RFC2544 Multi-frame selection



For RFC2544 test, select several different frame lengths to test.

7). E1 timeslot configuration

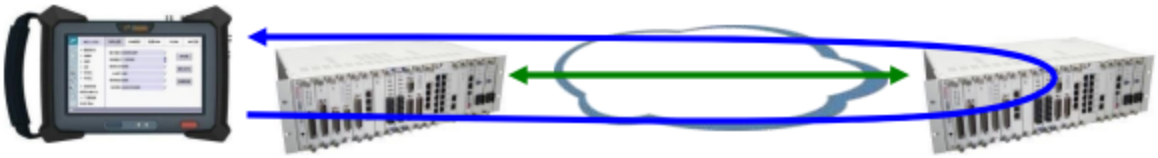


CE1 mode for E1 interface framing mode, configuring used and unused time slots.

3. RFC2544 Specification Test

Test networking

1). Single instrument test A : Hard or soft ring

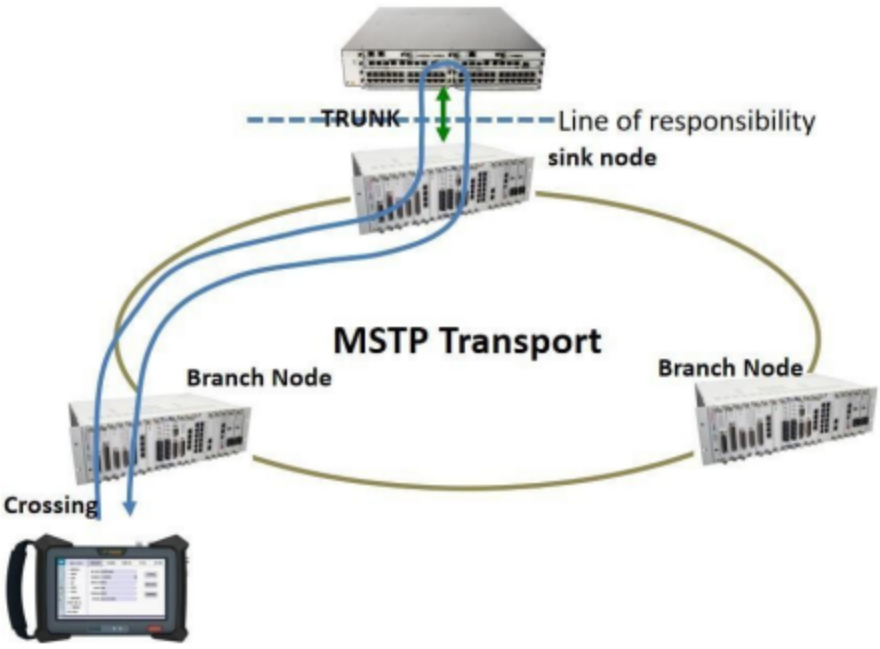


Test with an instrument, and loop the remote device (network pipe as soft ring, or ring plug)

2).Single instrument test B: Router-based peer-to-peer

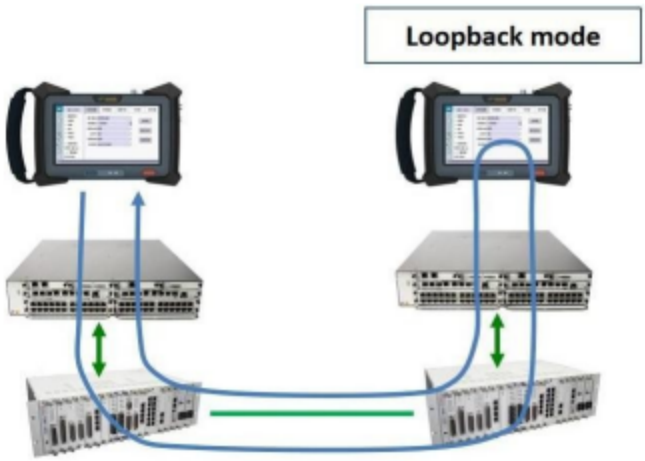
Use an instrument test to connect remote transport devices to user routers

3). Single instrument test C: Point-to-multipoint based on router convergence



Using an instrument test, remote transport devices connect to user routers through a pool port

4). Dual Instruments Cooperative Test

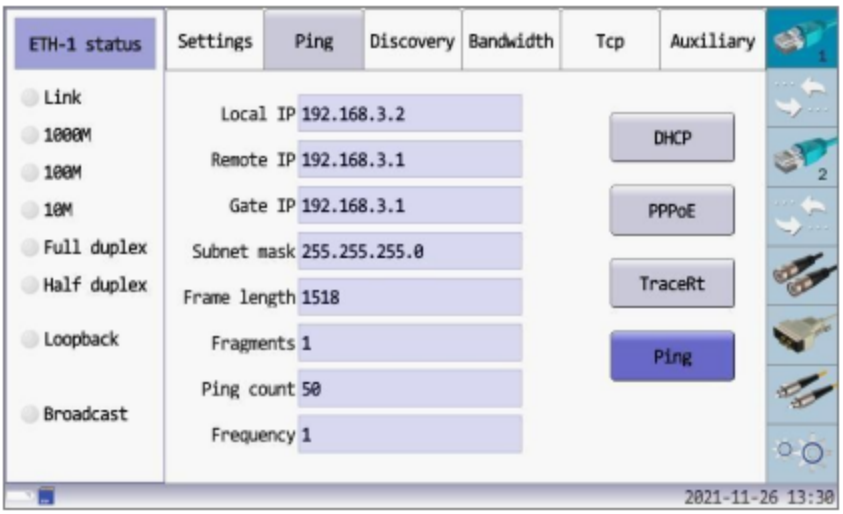


Testing with two instruments, remote instruments working in loopback mode

Remote Instrument Test Preparation

Note: This step is not required for single instrument loop test

1). Local IP Address Configuration: Coordinate with each other to set the appropriate IP address



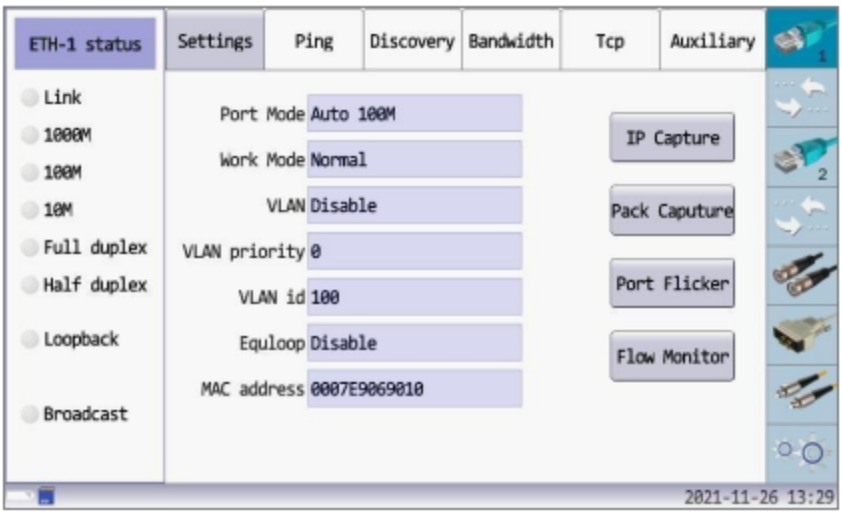
2). Ethernet Port Configuration

A. Set the appropriate Ethernet port MAC address to ensure that the port works properly

[Note: Each time the instrument restarts, the MAC address is restored to the default MAC address of the system]

B. Set the VLAN label correctly if using VLAN

C. "Transceiver Mode" Select the appropriate loopback mode.



3). Connect the Ethernet cable (or optical), see the Ethernet port light on, confirm the port's

A. Link state

B. Port rate

C. Duplex mode

All working as expected

4). The remote instrument is ready to finish.

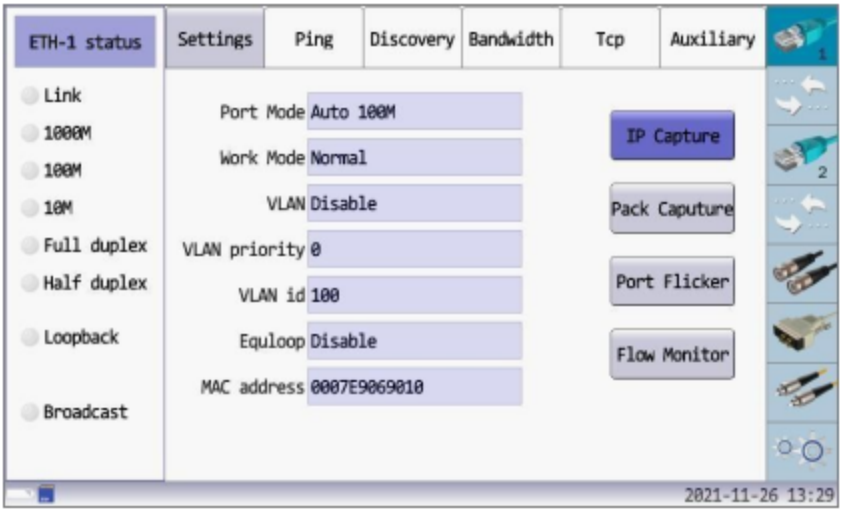
Local Instrument Test Preparation

1). Ethernet Port Configuration

Set the appropriate MAC address of the Ethernet port to ensure that the port works properly;

[Note: Each time the instrument restarts, the MAC address is restored to the default MAC address of the system]

If using VLAN, set the VLAN label correctly;



2). Connect the Ethernet cable (or optical), see the Ethernet port light on, confirm

A. Link state

B. Port Rate

C. Duplex Mode

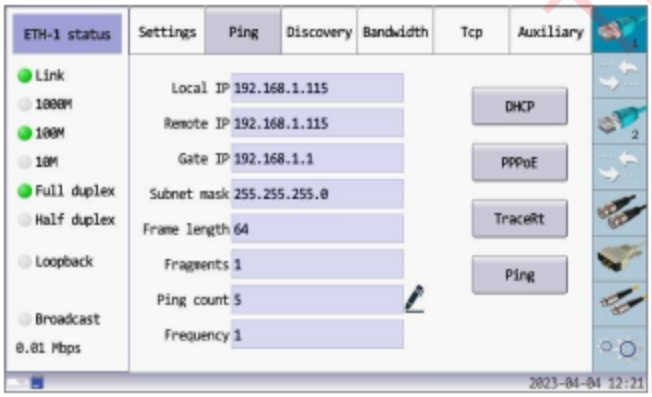
All working as expected

3). Local IP Address Configuration

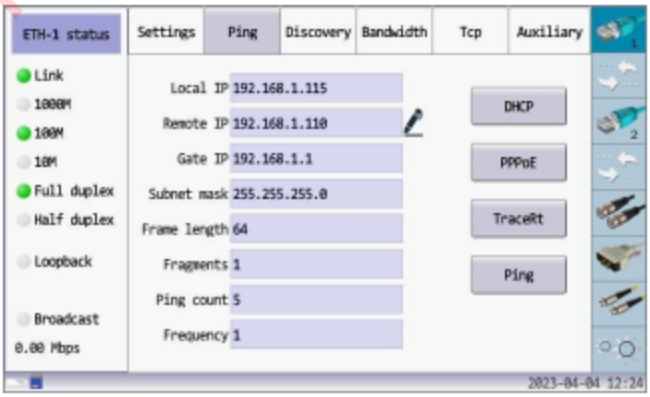
Configure native IP address

Configure Destination IPAddress

Configure the gateway address and subnet mask if needed



Single Instrument Test, Local IP and Destination IP set to the same



Dual Instrument Test, where both sides coordinate to determine their IP address settings

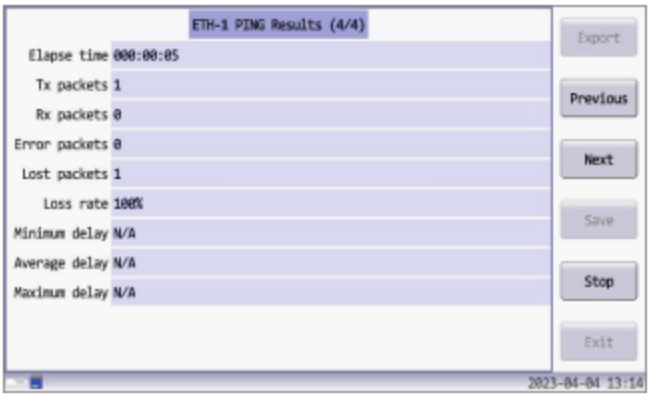
4). First of all, PING connectivity is required.

Single frame length: 64

Number of slices in package: 1 (no slicing)

Number of pings: 5

Outgoing frequency: 1



Click on PING Test and wait for thetest results Toconfirm that PING has not lost apacket

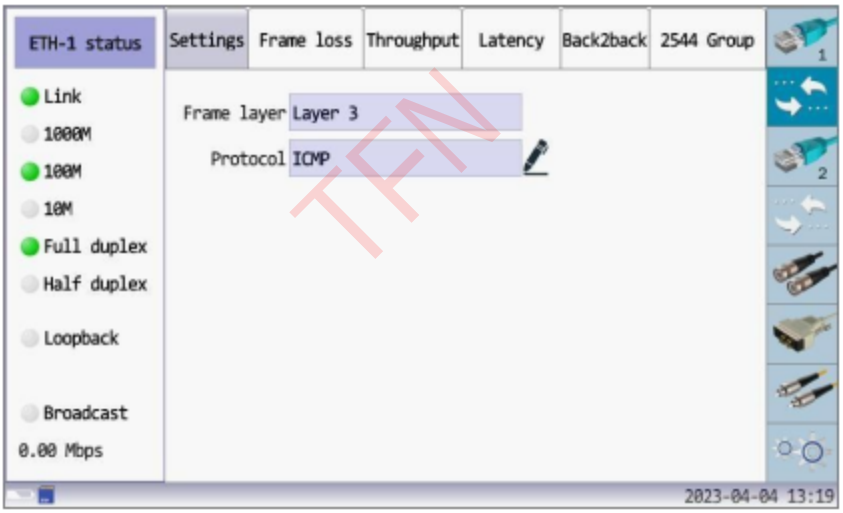
If a packet is lost in this step, it means:

A. There is a problem with the parameter configuration in the first few steps; or

B. There are serious problems with the circuit or equipment under test;

Both cases require further examination.

5). 2544 Protocol Selection: ICMP or UDP can be chosen as appropriate, ICMP is more common ingeneral. Layer3 is usually the choice for protocol layer.



6). End of Instrument Preparation

RFC2544 Packet Loss Rate and Bit Error Rate Test

1). Test Definition

Tests the packet loss rate of the specified circuit segment under different bandwidth loads for different frame lengths of packets.

Definition of packet loss rate in RFC1242: The percentage of all frames that should be forwarded by a network device due to lack of resources under a fixed state load. This measure can be used to report the performance of network devices under overload. For networks under heavy load, such as those impacted by a broadcast storm, this standard can be useful for reporting how network devices operate.

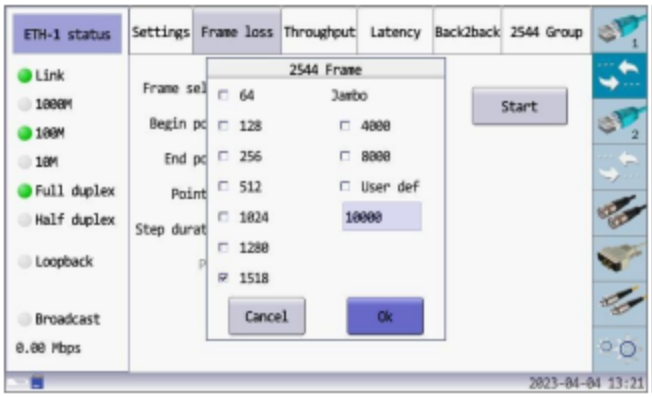
Test process: Send a specific number of frames at a specific frequency through the test device under test, and

record the total number of frames sent by the test device. The frame loss rate at each point is calculated as a percentage using the following formula:

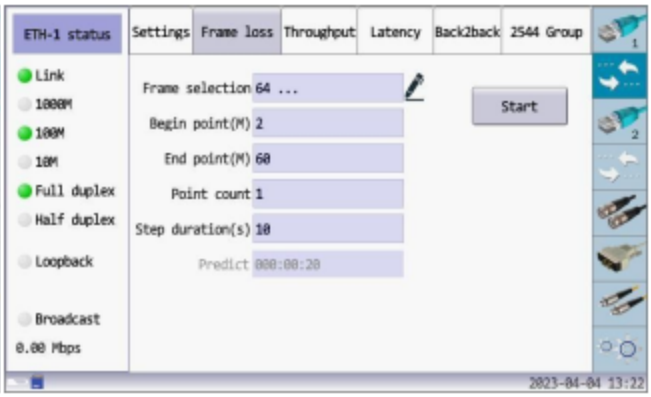
((Input-Output) *100)/Input

The first experiment runs with the maximum bandwidth frame frequency; Reduce test bandwidth step by step according to the set number of test points; The last experiment was run using the minimum bandwidth frame frequency.

2). Parameter Settings



Choose the frame length to testas needed



Set Bandwidth and Test Points

3). Description of the Jambo Frame

Giant frames refer to "non-fragmented" + single frame"+ extra-long frame. Usually used for testing special devices in the intranet.

4). Description of the test process (illustrated by the parameters in this diagram)

Frame selection: 64, 256, 1280, 1518

Start point: 90M

End point: 70M

Test Points: 3

Step length: 30

Repeats: 1

The testing process for this configuration is as follows:

64 byte frames:

90M, run for 30 seconds

80M, run for 30 seconds

70M, run 30 seconds

256 byte frame:

90M, run for 30 seconds

80M, run for 30 seconds

70M, run 30 seconds

1280 byte frames:

90M, run for 30 seconds

80M, run for 30 seconds

70M, run 30 seconds

1518 byte frames:

90M, run for 30 seconds

80M, run for 30 seconds

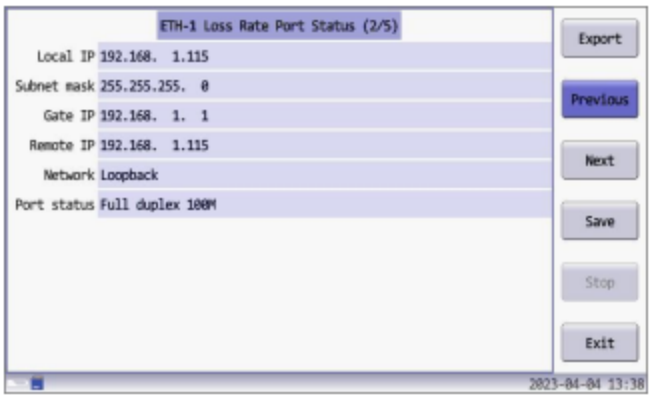
70M, run 30 seconds

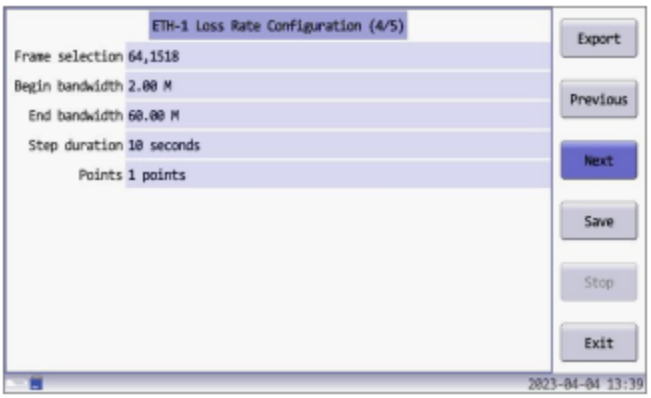
Description 1: According to the RFC2544 specification, if the loss rate of two consecutive bandwidth runs is 0 for each frame length, the test of the frame will be completed.

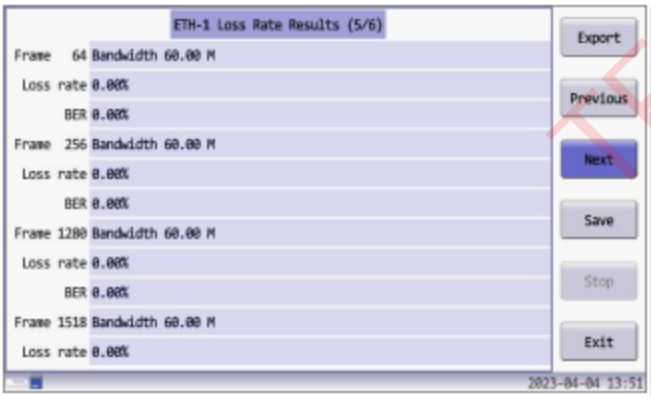
Description 2: The last line of the gauge configuration interface is the gray "estimated time", which is the longest time required for this test. The actual test time may be shorter than this time.

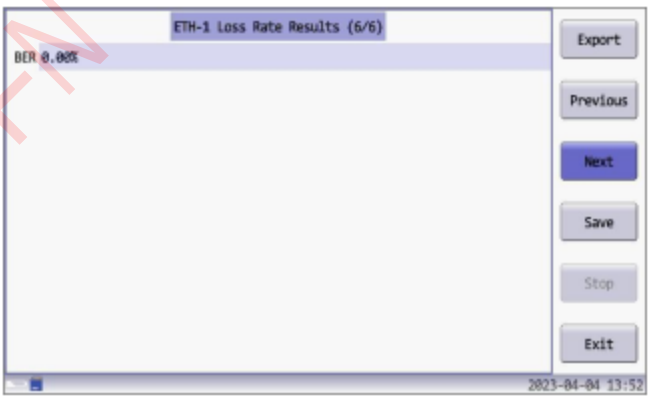
5). Test results

The test results have multiple pages, listing the loss rate results according to different frame lengths and bandwidth.









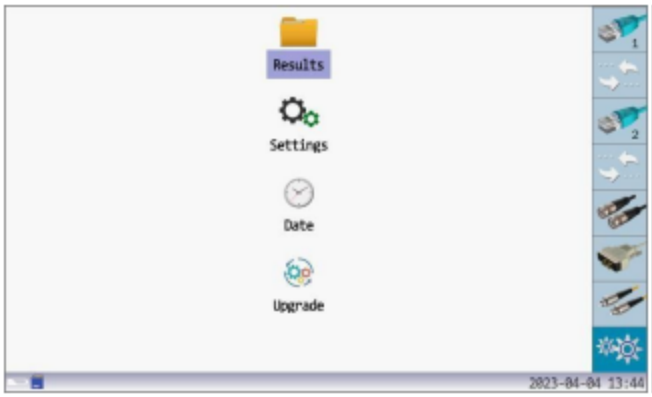
6). Save test results as needed

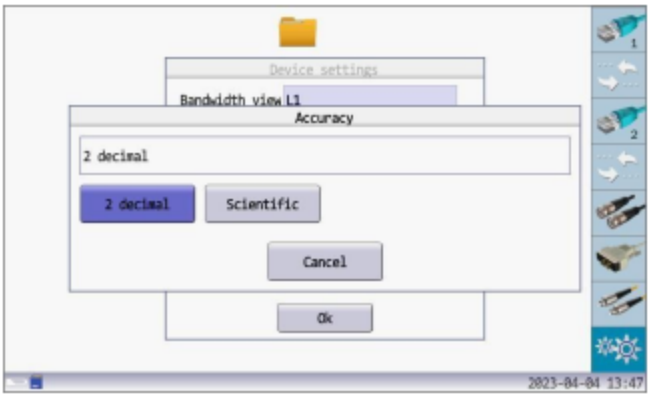
7). End of Test

8). Appendix: More accurate test results

Packet loss rate test results, displayed as a percentage by default, with precision 2 bits after the decimal point. There is a problem with this, for example, the actual value of the packet loss rate in the field test is 0.001%, the value on the screen display is 0.00%, and the last one cannot be displayed. If you need to display test results more accurately, you can use the Scientific Count option to achieve this.

9). Configuration of Scientific Counting



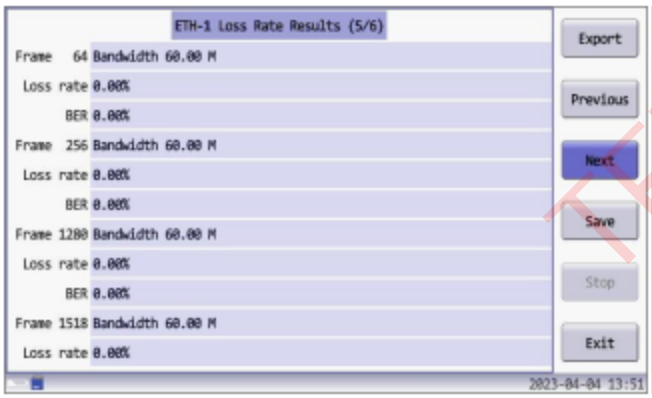


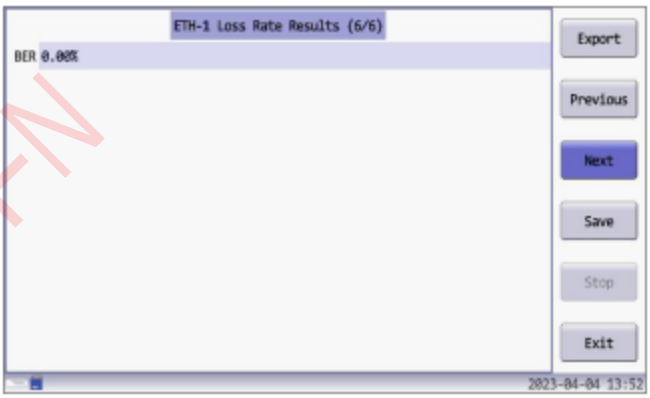
To Instrument Configuration Page　　Configure Numeric Accuracy as Scientific Count

[Note: The value of this option is automatically restored to the 2-digit decimal state each time the power is restarted]

10). Return to the Loss Rate test interface and start the Loss Rate test again

11). Observe test results





The results are displayed using the Scientific Count, and the most accurate data loss rate can be observed.

RFC2544 Throughput Test

1). Test Definition

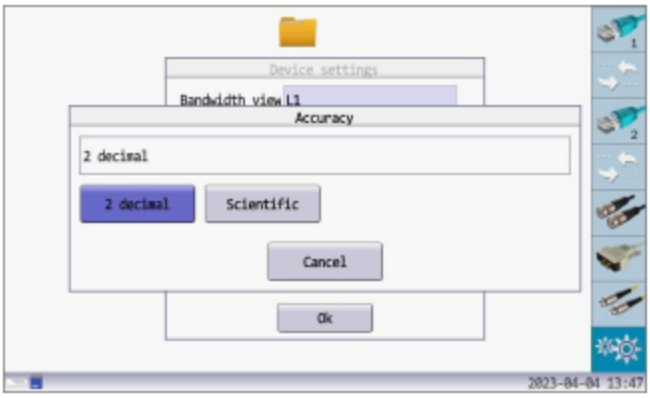
Tests the throughput of specified circuit segments for packets of different frame lengths.

Definition of throughput in RFC1242: The maximum rate that a device can accept without frame loss.

Send a specific number of frames forwarded by the test device. If the number of frames provided is equal to the number of frames received or less than the number of frames sent, the frequency of the data stream provided is reduced and the test returns. Throughput is the highest frequency at which test frame counts forwarded by the test device are equal to the number of test frames issued by the test instrument.

2). Parameter Settings

Select test frame length as needed



Setting step length and discriminant tolerance

3). Description of the Jambo Frame

Giant frames refer to "non-fragmented" + single frame"+ extra-long frame. Usually used for testing special devices in the intranet.

4). Explanation of discriminant tolerance

Throughput testing is done through multiple iterations of packet loss testing. After each step of the loss rate test for a bandwidth, a criterion is required to determine whether the bandwidth passes: if the loss rate for the current test step is lower than the set tolerance value, the current bandwidth passes; If the loss rate of the current test step is higher than the set tolerance value, the current bandwidth is considered to fail.

Options provided by the instrument include:

Variance option	Variance value
5e-3	Five percent
1e-3	One percent
5e-4	Five in ten thousand
1e-4	One in ten thousand
5e-5	5 out of one hundred thousand
1e-5	1 out of one hundred thousand
0	0

The selection of tolerances will affect the test results for throughput. Common recommendations are 5e-3 or 1e-3.

5). Description of the test process (illustrated by the parameters in this diagram)

Frame selection: 64, 1518

Step length: 10 seconds

Repeats: 1

64 byte frames:

Each step is based on 10 seconds and uses different bandwidth with 2-minute method to gradually obtain bandwidth.

1518 byte frames:

Each step is based on 10 seconds and uses different bandwidth with 2-minute method to gradually obtain bandwidth.

Description: The last line of the gauge configuration interface is the gray "estimated time", which is the longest time required for this test. The actual test time may be shorter than this time.

6). Test results

The test results may be multiple pages, listing throughput results based on different frame lengths:

L1 bandwidth: bit bandwidth with Ethernet frame gap

7). Save test results as needed

8). End of Test

RFC2544 Delay and Dither Test

1). Test Definition

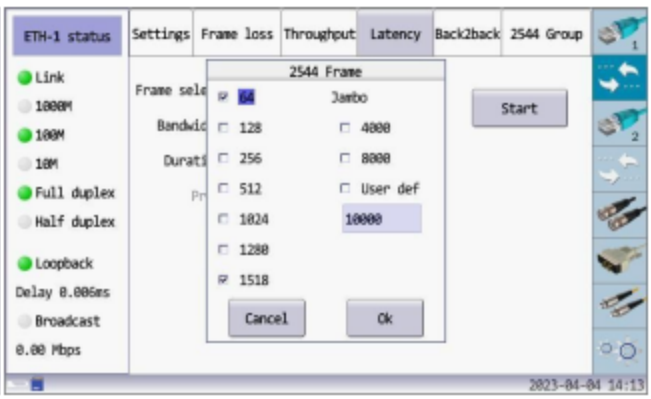
Tests the specified circuit segment for delay indicators of packets of different frame lengths.

Definition of time delay in RFC1242: For storage and forwarding devices, the time interval begins to calculate when the last input frame reaches the input port. The interval calculation ends when the first bit of the output frame is visible at the output port. For bitwise forwarding devices, the time interval starts when the end of the first bit of the input frame reaches the input port. The interval calculation ends when the start of the first bit of the output frame is visible at the output port.

2). Parameter Settings

Note: The background bandwidth should be less than the throughput of the circuit segment.

Choose the frame length to testas needed



Set background bandwidth and test duration

3). Description of the Jambo Frame

Giant frames refer to "non-fragmented" + single frame"+ extra-long frame. Usually used for testing special devices in the intranet.

4). Description of the test process (illustrated by the parameters in this diagram)

Frame selection: 64, 1518

Background bandwidth: 1M

Test duration: 60 seconds

Repeats: 1

64 byte frames:

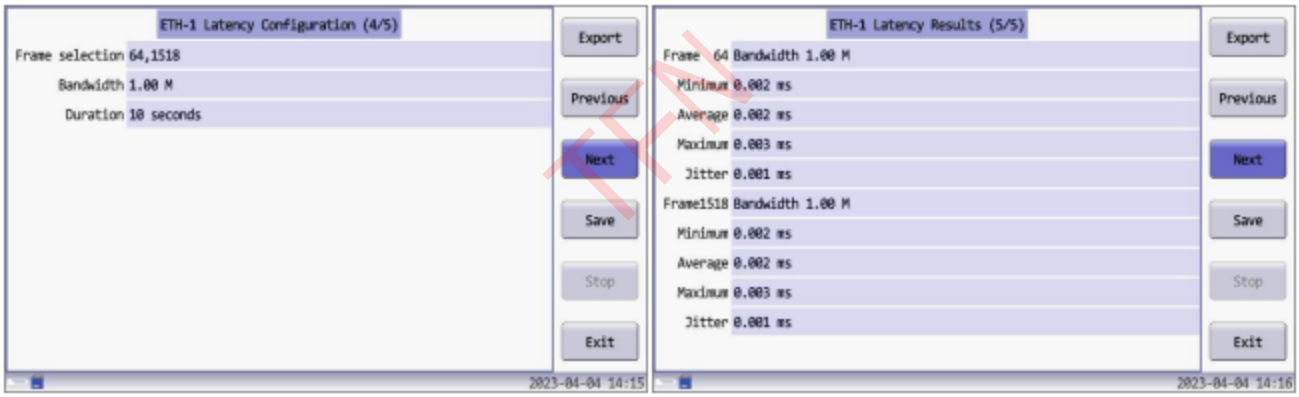
Testing for 60 seconds, using 1M as background bandwidth to get minimum, average and maximum delay;

1518 byte frames:

Testing for 60 seconds, using 1M as background bandwidth to get minimum, average and maximum delay;

Description: The last line of the gauge configuration interface is the gray "estimated time", which is the time required for this test.

5). Test results



The test results may have multiple pages, listing the delay data based on different frame lengths, including the shortest, average, longest three columns, and jitter time.

6). Save test results as needed

7). End of Test

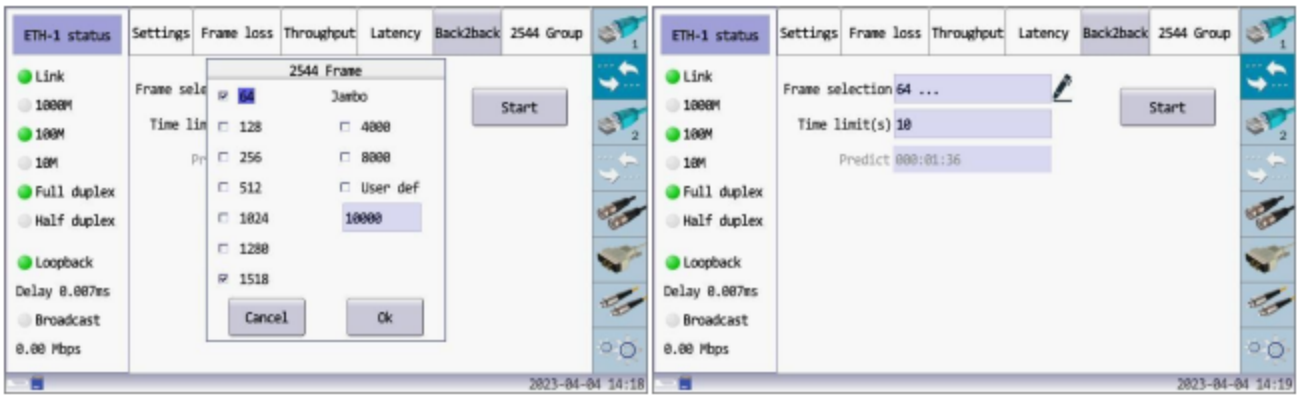
RFC2544 Back to Back Test

1). Test Definition

Test the specified circuit segment for back-to-back performance of packets with different frame lengths. The back-to-back indicator is an indicator used to measure the storage depth of storage forwarding devices.

Send a sequence of frames to the test device using the minimum internal frame interval to record the number of frames forwarded by the test device. If the number of sent frames recorded is the same as the number of forwarded frames, the length of the frame traffic string is increased, and the test returns. If the number of frames forwarded is less than the number of frames sent, the length of the frame traffic string is reduced, and the test returns.

2). Parameter Settings



Choose the frame length to testas needed　　Set Upper Limit Time

Note: A "maximum time" is required because for devices with line-speed forwarding capabilities, the back-to-back value is virtually unlimited, and testing needs to end in a limited time, so set this "maximum time" to handle this situation.

3). Description of the Jambo Frame

Giant frames refer to "non-fragmented" + single frame" + extra-long frame. Usually used for testing special devices in the intranet.

4). Description of the test process (illustrated by the parameters in this diagram)

Frame selection: 64, 1518

Upper limit time: 10 seconds

Repeats: 1

64 byte frames:

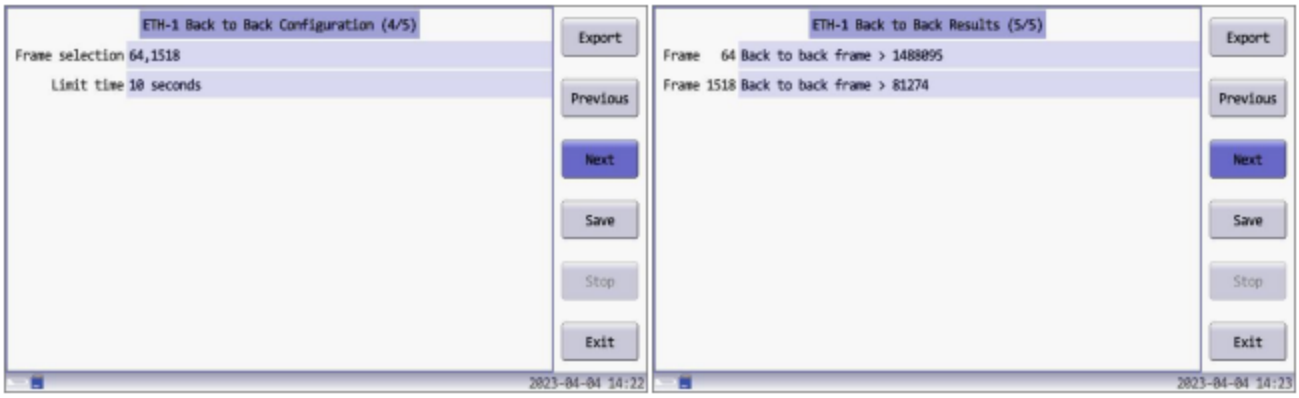
The upper time limit of 10 seconds step test is used to detect the back-to-back value of the measured circuit segment step by step.

1518 byte frames:

The upper time limit of 10 seconds step test is used to detect the back-to-back value of the measured circuit segment step by step.

Description: The last line of the gauge configuration interface is the gray "estimated time", which is the time required for this test.

5). Testresults



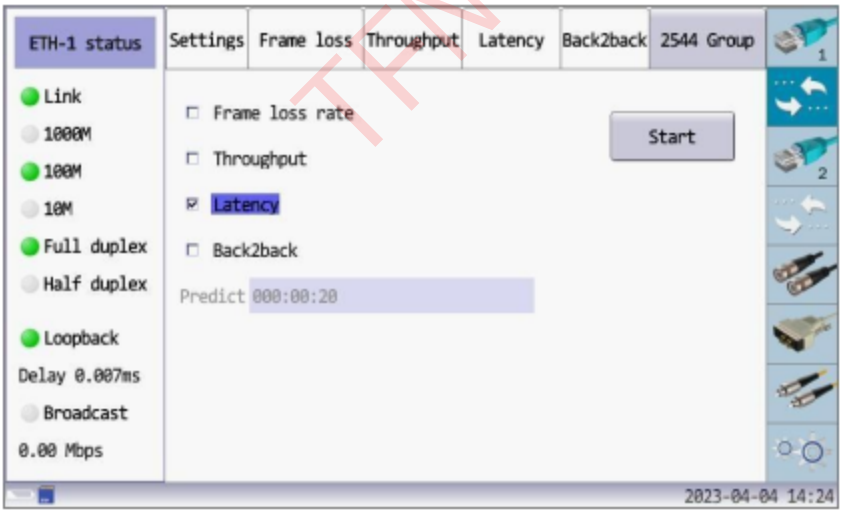
The test results may have multiple pages, listing back-to-back metrics according to different frame lengths.

6). Save test results as needed

7). End of Test

RFC2544 Combination Test

The four projects in RFC2544 can be carried out individually or together.



On the interface of the combination test, select the test you want to test; The selected test items are tested one by one.

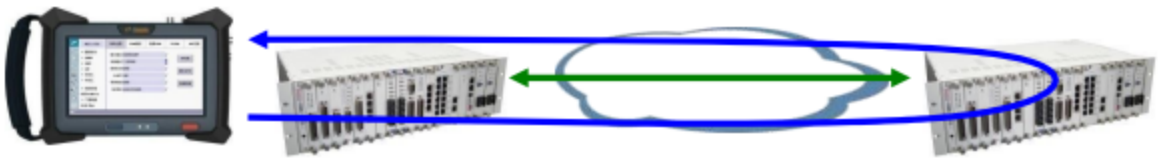
Description: The last line of the gauge configuration interface is the gray "estimated time", which is the longest time required for this test. The actual test time may be less than this time.

The test results may have multiple pages, and the results of each individual test are arranged one by one in the test order.

4. Ethernet Interface Test

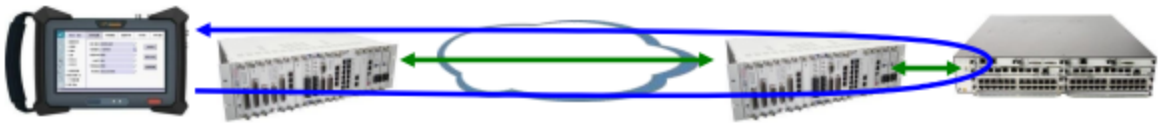
Test networking

1). Loop test



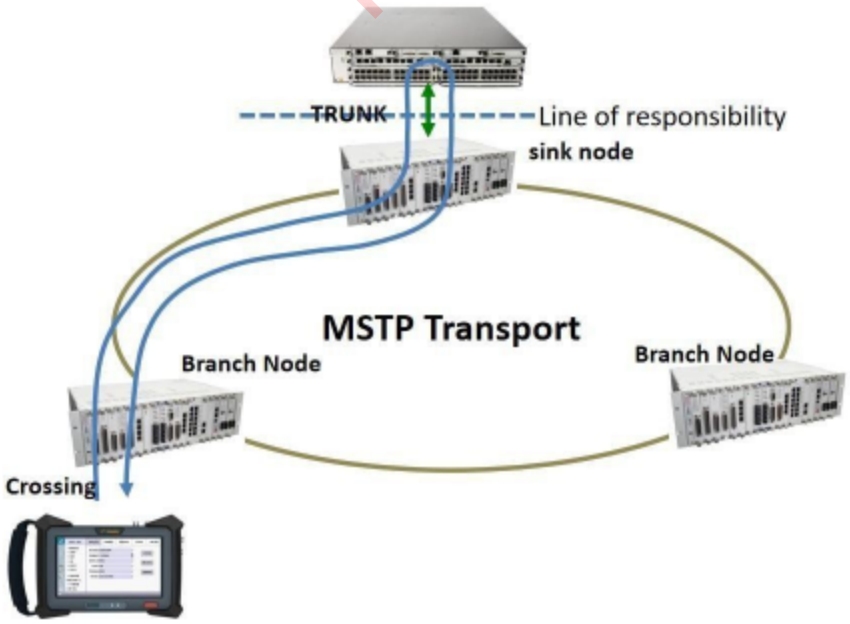
Loop test, remote equipment to loop (network management to do soft loops, or use loops).

2). Router-based peer-to-peer



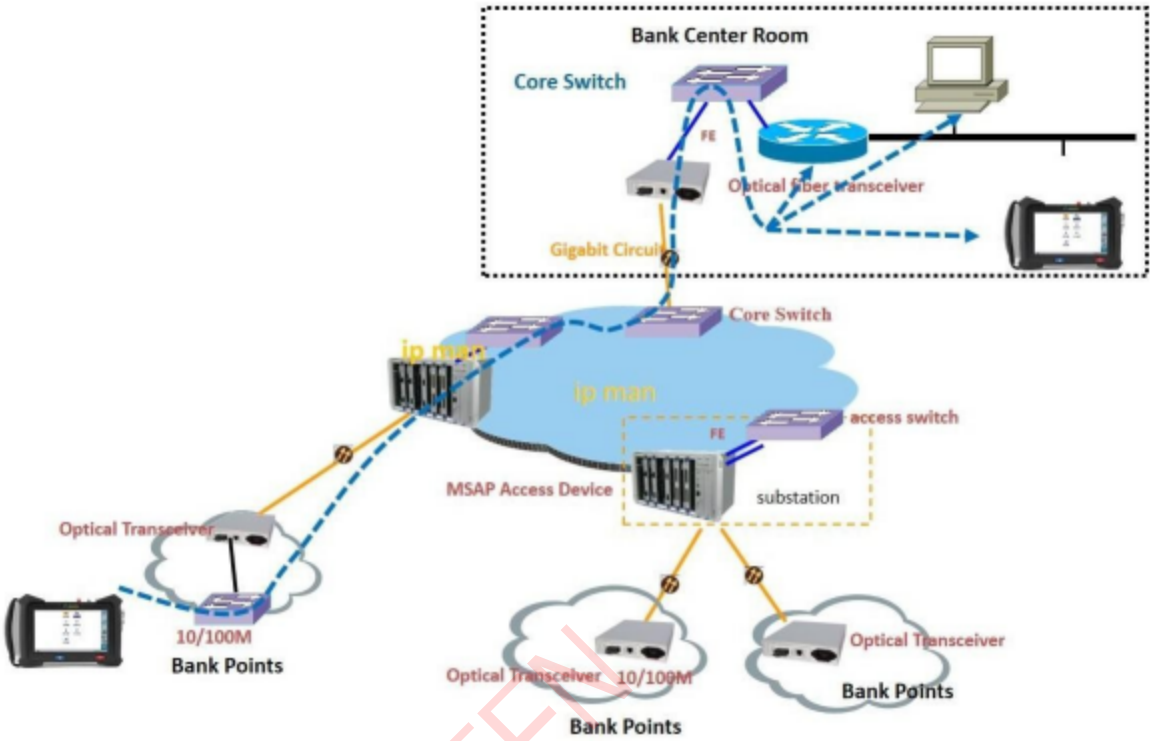
Use an instrument test to connect remote transport devices to user routers

3). Point-to-multipoint based on router convergence



Using an instrument test, remote transport devices connect to user routers through a pool port

4). Network Testing

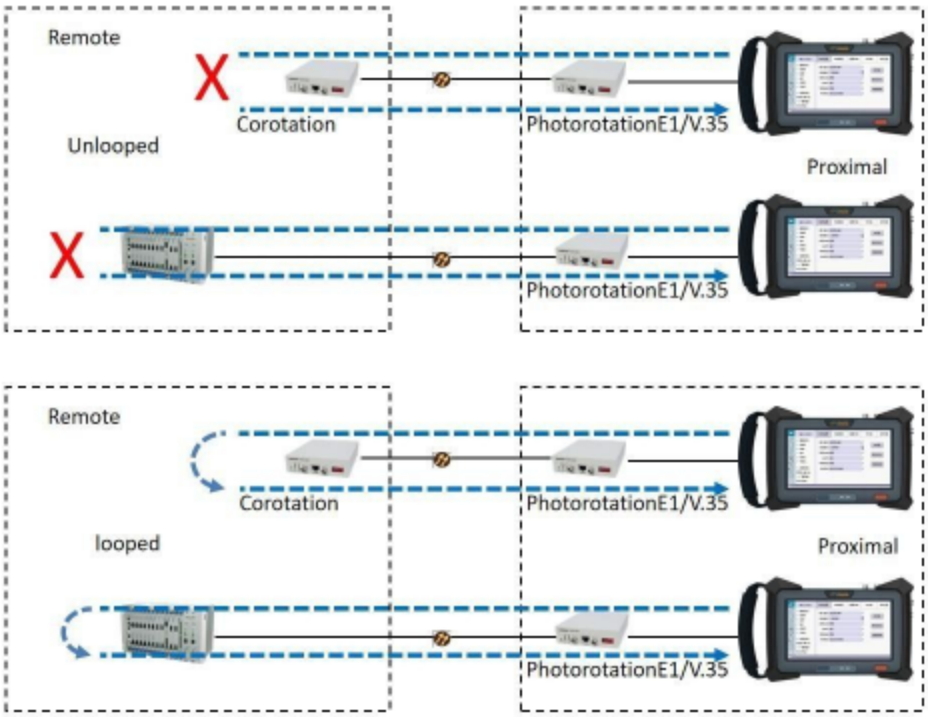


Network testing, peer-to-peer devices may be routers, servers, terminals, or instrumentation.

Loop Discovery

In the process of field operation and maintenance, loop PING or loop bandwidth measurement is often required, which requires loops on remote devices: soft or hard rings. Soft rings need to be completed by the network administrator's colleagues, and hard rings need to be completed by remote colleagues on the device with a ring plug.

Site conditions are often more complex, and it is sometimes difficult to determine if the distal ring has been made. The purpose of the loop discovery function of this instrument is to provide a simple and clear representation of the current state of the loop.



Connect the Ethernet cable to the instrument and adjust the interface parameters. If the remote end is looped, the Loop Discovery indicator turns green and provides a rough round-trip delay value for reference. If there is no loop at the far end, the Loop Discovery indicator is gray and has no value for the loop delay.

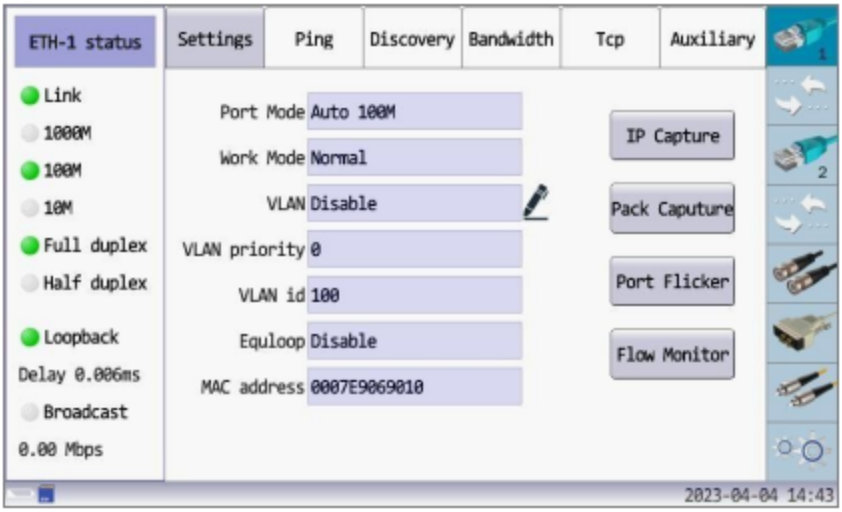
Status of remote uncycled

Loop state at the far end, providing reference for loopdelay

Once the status of the remote loop is confirmed, further loop PING tests or loop bandwidth tests can be performed.

VLAN Settings

If the instrument is connected to a TRUNK port or a mixed port, VLAN needs to be enabled.

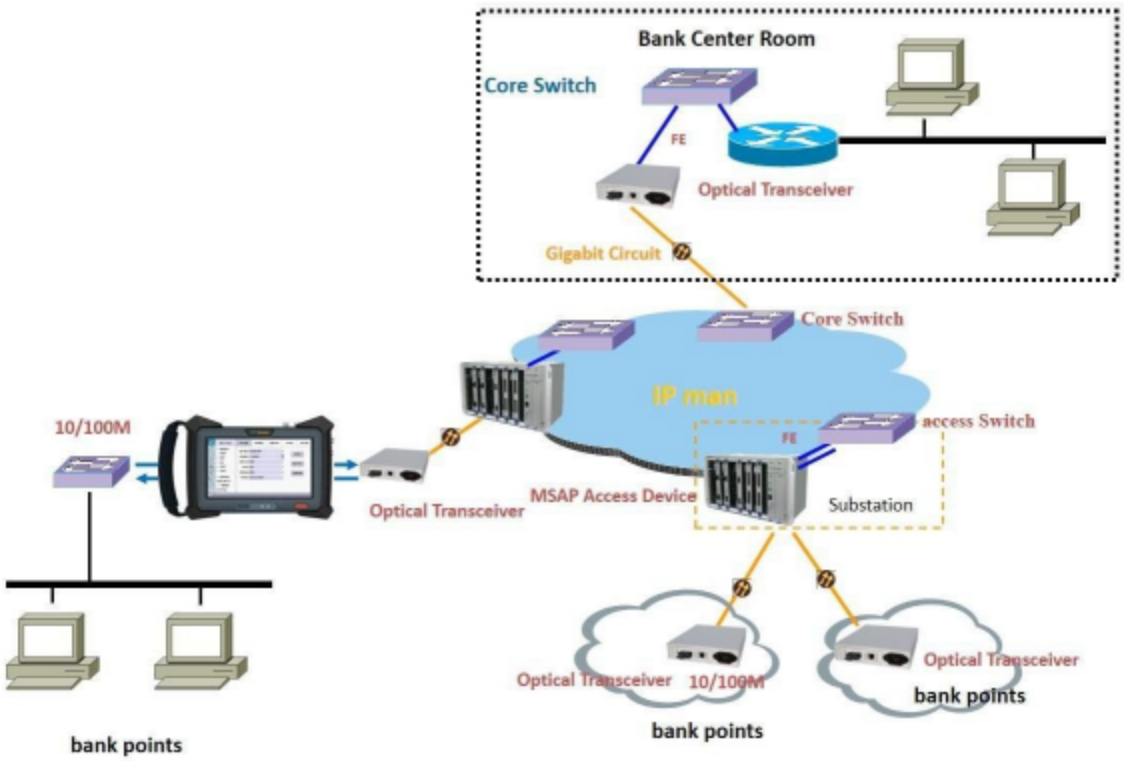


When VLANs are enabled, the packets sent by the gauge are labeled with VLANs.

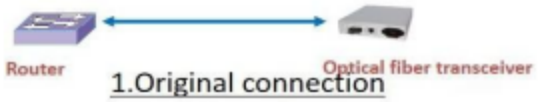
Flow Monitoring

1). Test Instructions

Sometimes, you want to know the flow on an active circuit without interrupting your business, which can be accomplished by using the Flow Monitoring function.



This monitoring requires two Ethernet ports of the instrument. In the illustrated network, the instrument is placed between an optical transceiver and a router.



1.Original connection

2.Connect to one port of the instrument

3.Connect to the other port of the instrument

2). Test Conditions

The test starts with the precondition that the two ports of the gauge are connected

A. Port speed

B. Duplex mode

To be the same, for example, if port 1 is 100-megabyte full duplex, then port 2 is also 100-megabyte full duplex to start monitoring.

3). Start the test

Click the Traffic Monitoring button to start the test.

4). Test results

The test results show the current traffic bandwidth in both the up and down directions. According to the user's requirements and the requirements of on-site test, the factory will adjust and upgrade the display data and form of test results.

Test preparation

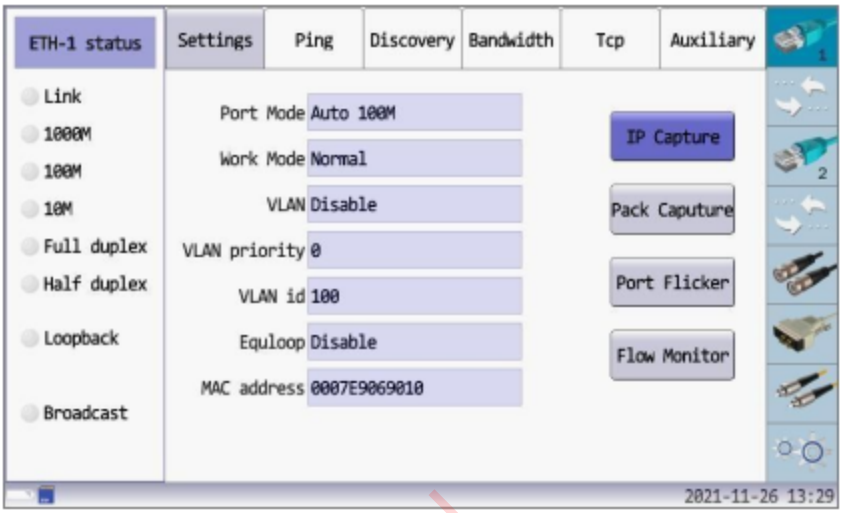
1). Ethernet Port Configuration

Set the appropriate MAC address of the Ethernet port to ensure that the port works properly;

[Note: Each time the meter restarts, the MAC address is restored to the default MAC address of the system]

If using VLAN, set the VLAN label correctly;

Connect the Ethernet cable (or optical) and see the Ethernet port indicator light up.

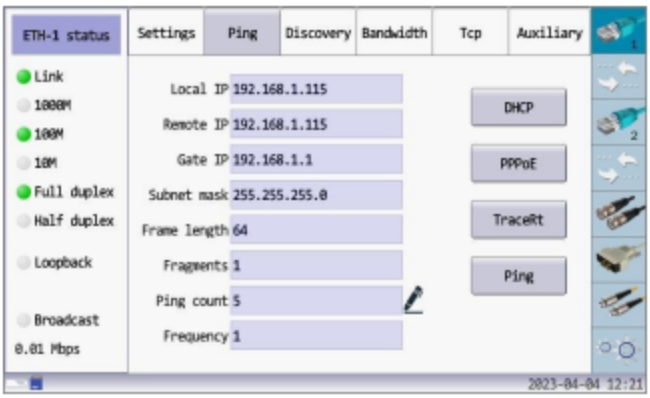


2). Local IP Address Configuration

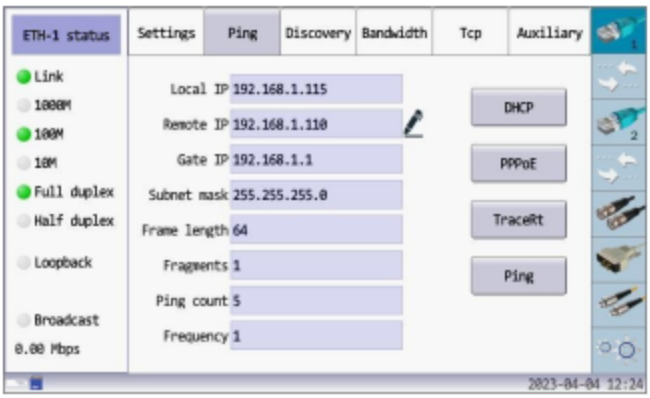
Configure native IP address

Configure Destination IPAddress

Configure the gateway address and subnet mask if needed



Loop test, local IP and destination IP set tothe same



Network test, set local IP address according to specificsituation

3). End of test preparation

PING Test

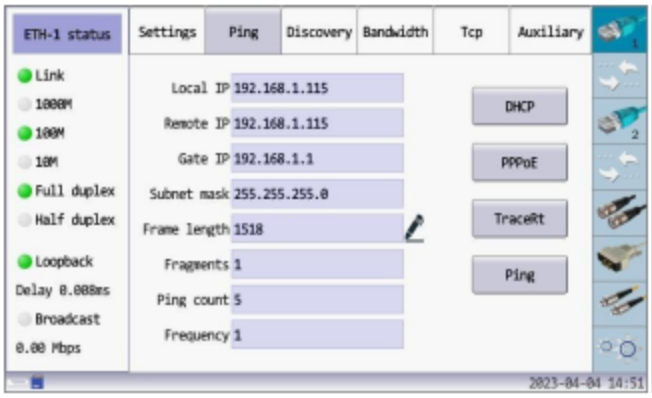
1). Test Definition

PING is the most commonly used test method for network, which is used to test IP connectivity between two devices.

PING uses ICMP REQ and ICMP ACK messages to complete the test.

In a real world, you can use a long package PING or adjust the speed of the PING package.

2).Test parameters

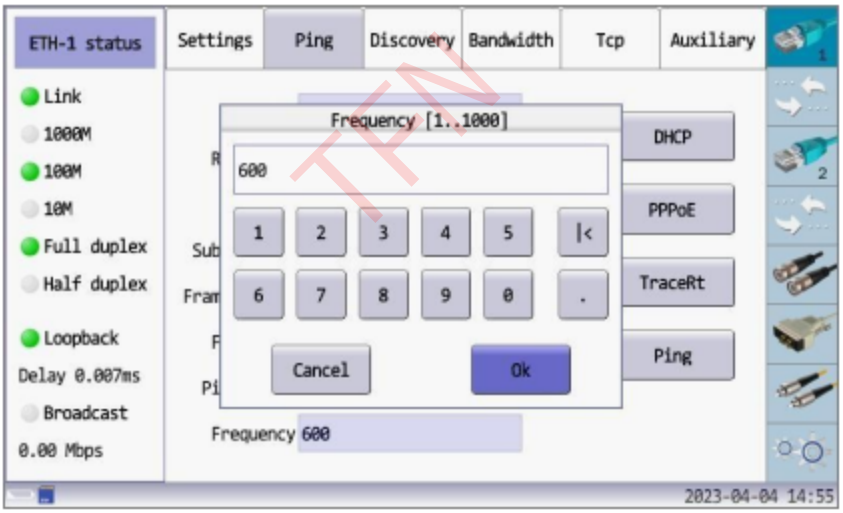


Single Frame PING

IP Fragmentation PING (Long Packet)

Description: "Number of Long Packet Slices" If greater than 1, it is the Long Packet Slice PING. With a frame length of 1518 and 44 long packets, the IP load is 65120 bytes long, which is equivalent to executing commands on a computer:

Ping 192.168.9.2-l 65120



Outsourcing Frequency Settings

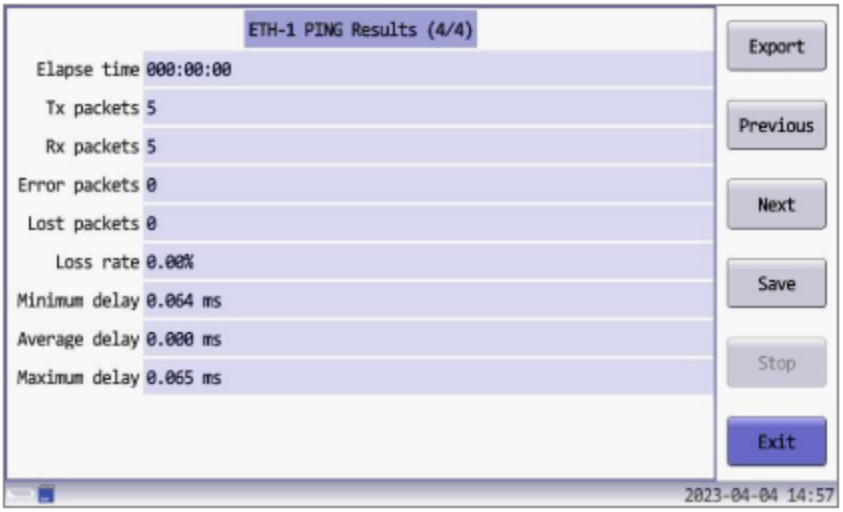
Description: Using a certain frequency of fast PING measurement, the speed is faster. The actual speed of PING depends on the frame length and the delay of the circuit segment. Short frame and low delay speed will be faster, long frame and high delay will reduce the speed of PING.

3). Test process

During the test, the instrument sends ICMP-REQ packets at a certain frequency, receives, checks and counts the received ICMP-ACK packets, calculates the packet loss and error packets, and the results are displayed as a percentage of the packet loss rate.

While receiving ICMP-ACK, the delay of ICMP-ACK frame is calculated to display with minimum, average and maximum delay.

4). test result



5). Save test results as needed

6). End of Test

Long Packet PING

Refer to the previous section:

If "Number of Long Packet Slices" is greater than 1, it is the Long Packet Slice PING. With a frame length of 1518 and 44 long packets, the IP load is 65120 bytes long, which is equivalent to executing commands on a computer:

Ping 192.168.9.2-l 65120

Traffic (Bandwidth) PING

1). Test Definition

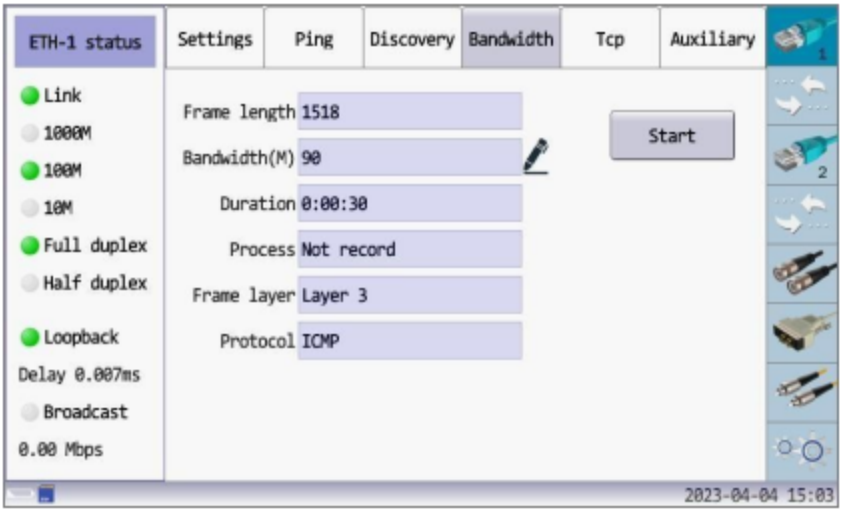
This is a flexible form of PING that can be used for certain specific testing needs:

A. Giant Frame (Jambo Frame) PING: up to 10,000 bytes per frame

B. Super-high speed PING: up to Gigabit line speed

In fact, this PING is achieved indirectly through RFC2544 packet loss rate test using ICMP protocol.

2). Test parameters



Choose the frame length and circuit bandwidth to use

3). Test process

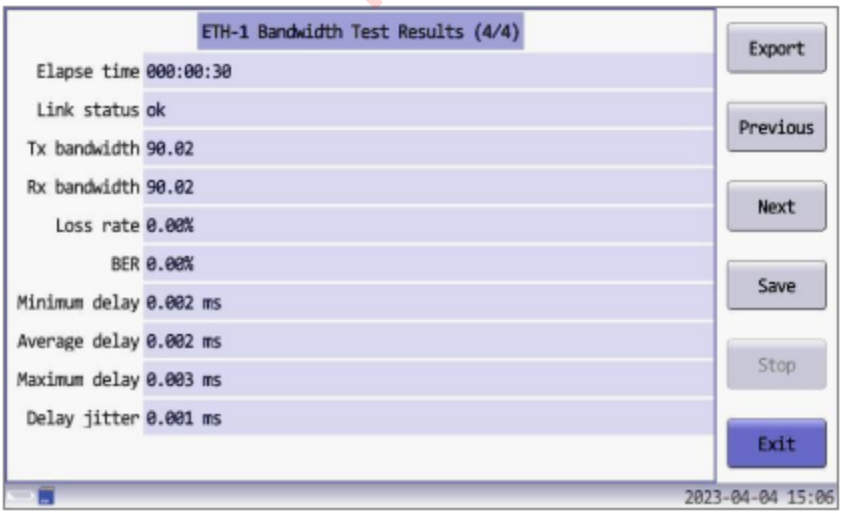
Unlike ordinary PING, in bandwidth PING, ICMP-REQ packets are sent without waiting for ICMP-ACK to arrive. The ICMP-REQ data frame is sent only at the set frequency and bandwidth. Check the arrival number of ICMP-ACK at the receiver and count the number of packets lost. The results are displayed as a percentage of the packet loss rate.

In this example:

Frames using 1518 bytes

Test for 10 seconds with 90M bandwidth;

4). Test results



5). Save test results as needed

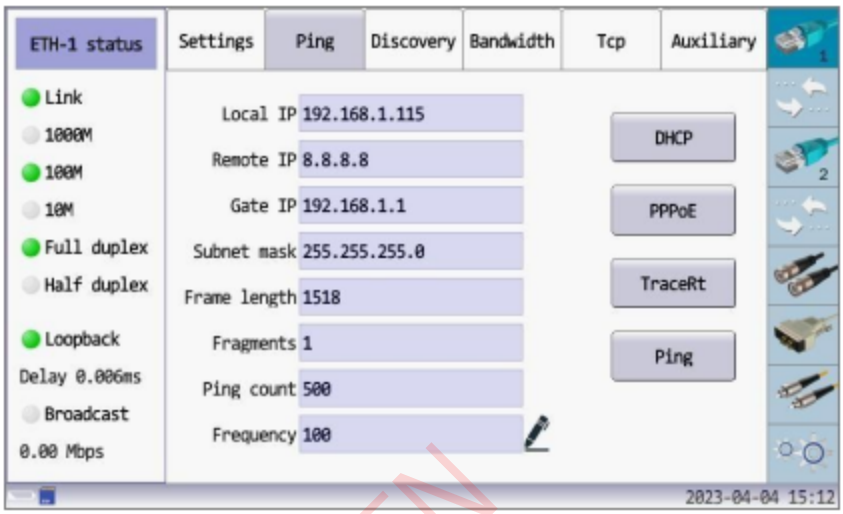
6). End of Test

Route Tracking Test

1). Test Definition

From the local device to the destination device at the remote end of the network, there will be multiple routing and forwarding devices on the IP path of the network. Sometimes we need to know which routers we've experienced, from local devices to remote devices, and the routing tracking test function serves that purpose.

2). Test parameters



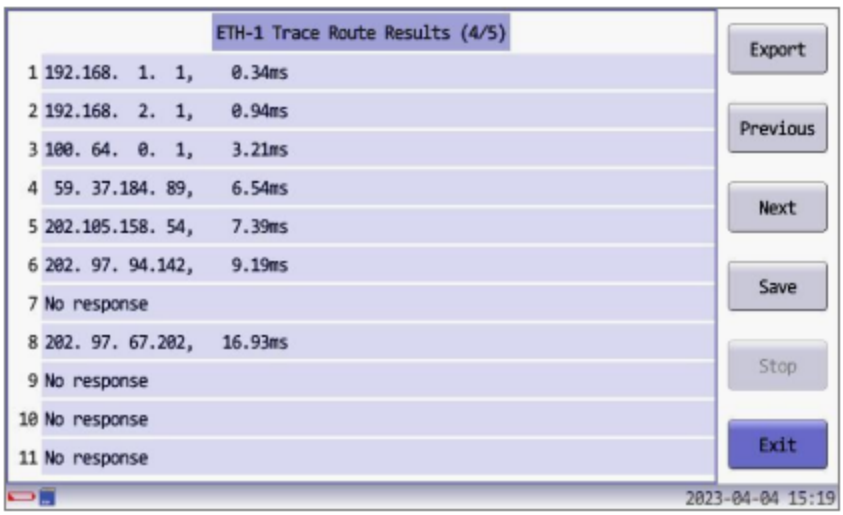
Set the local IP address, network management IP address, and subnet mask;

Set the remote destination IP address.

3). Test process

Click Route Tracking to start the test. The instrument sends a certain number of ICMP request packets with preset TTL values. As these packets pass through the network, the TTL value decreases with each hop. When the TTL value decreases to 0, the router returns a special notification packet from which the instrument can know which router this packet has reached. This allows you to compile a list of routers along the road and their corresponding delay values.

4). Test results



5). Save test results as needed

6). End of Test

DHCP Server Test

1). Test Definition

Intranets typically use DHCP services to assign IP addresses to each device in the network. Through this function, the instrument detects DHCP servers on the internal network and attempts to request an available legal IP address from the server.

In another case, if there are more than two DHCP servers in the intranet at the same time, it may lead to the confusion of IP allocation management, which may lead to device communication failure. In this case, the gauge will attempt to discover all DHCP servers in the intranet. If you see more than one DHCP server in the test results, there are illegal servers in it for proper cleanup.

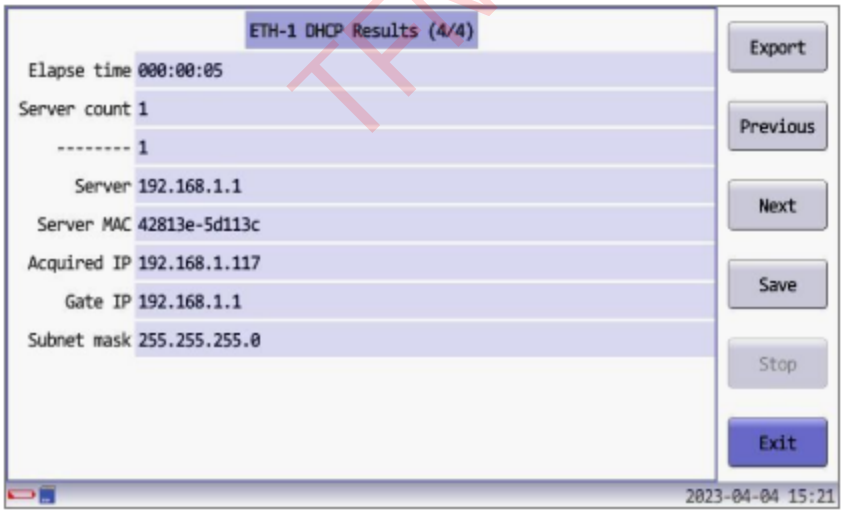
2). Test parameters

This test does not require test parameters.

3). Test process

Click the "DHCP" button to start the test.

4). Test results



5). Save test results as needed

6). End of Test

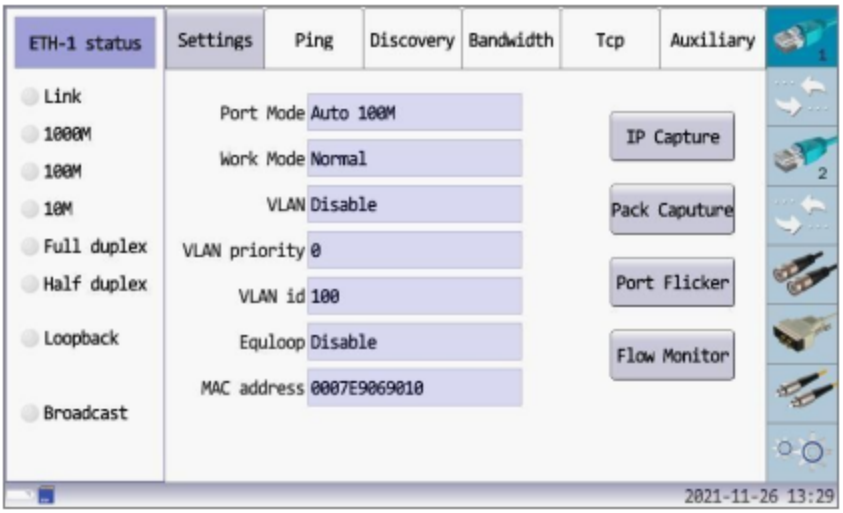
IP Discover

1). Test Definition

In some situations in the field, it may be necessary to determine certain characteristics of a port: whether there is a VLAN, and what is the VLAN? What are IP's? In this case, if you can capture a small number of packets from the port and analyze the contents of the packets, you can determine these contents.

The process of testing is actually accomplished through Ethernet port packet capture and analysis.

2). Test parameters

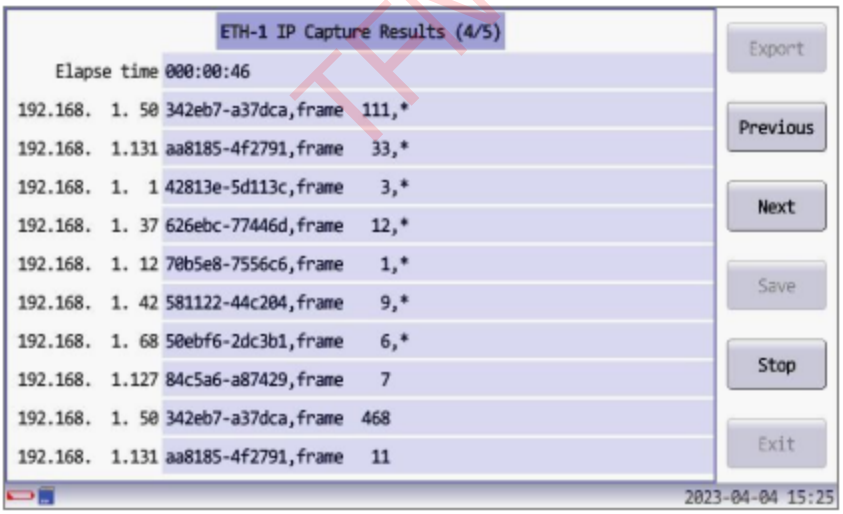


Start the test by clicking the Start Test button directly

3). Test process

During the test, the instrument monitors each received packet on the Ethernet interface and stores them.

4). Test results



Test results show IP and VLAN addresses of IP packets captured by the port

5). Save test results as needed

6). End of Test

ARP Scanning

1). Test Instructions

Sometimes it is necessary to know which active devices are present in the Intranet in order to have a preliminary understanding of the network and to decide on further testing projects. In this case, ARP scanning can be used to achieve this goal.

2). Test parameters

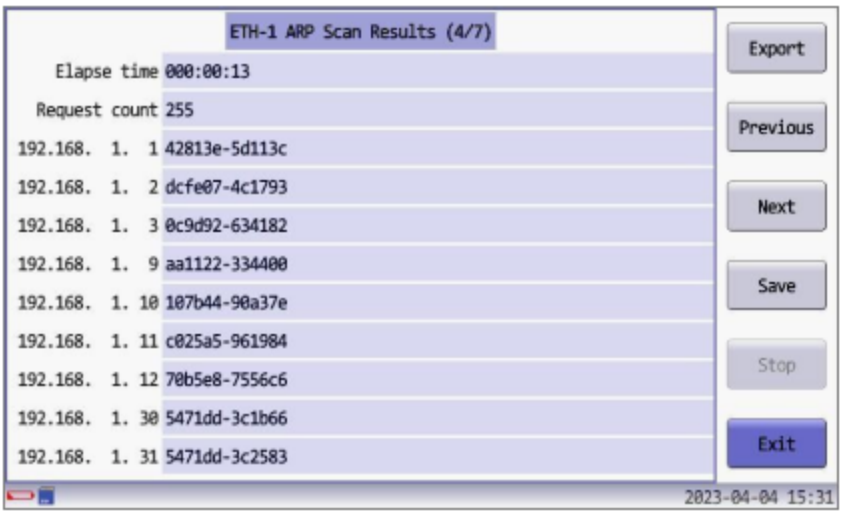
Start IP: Scan the starting IP address

Number of IPs: Incrementally scan the number of IP addresses, such as the one that will be scanned in this example:192.168.1.1 ~ 192.168.1.255

3). Test process

Click Start Test to start the scanning process.

4). Test results



The test results list the IP addresses of the active devices scanned and their corresponding network card MAC addresses.

5). Address conflict

In the list of test results, an asterisk at the end of the line indicates that there is an IP address conflict. In this example, two "192.168.1.3" devices were found during the scan, but their MAC addresses are different, indicating address conflicts.

6). Save test results as needed

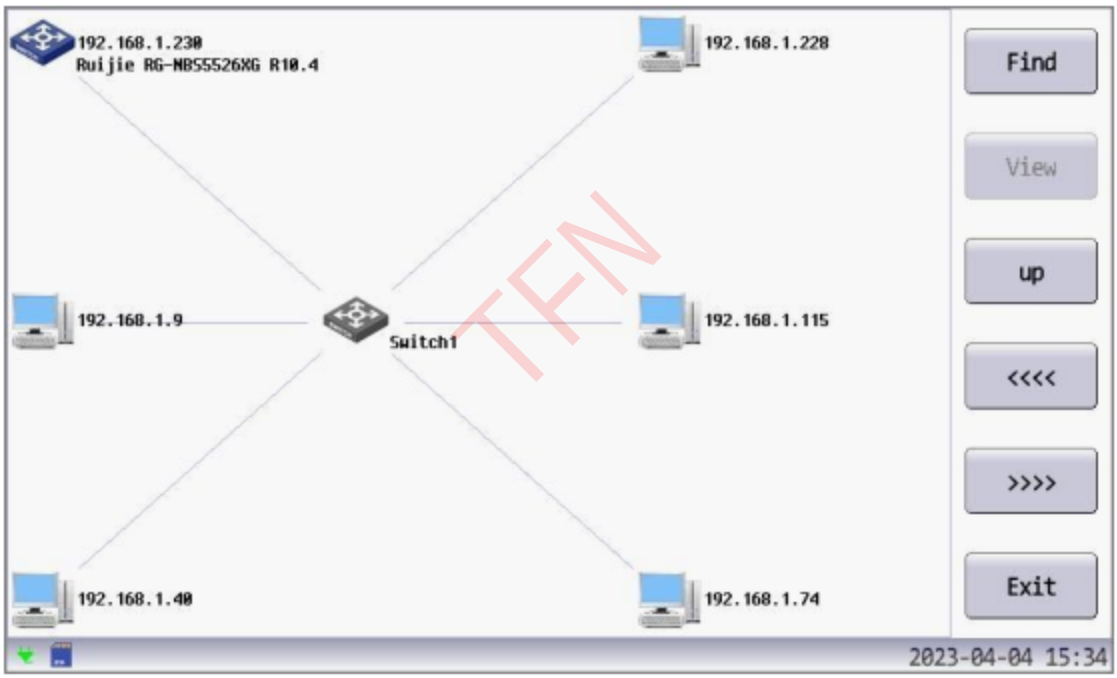
7). End of Test

Subnet Topology

1). Functional introduction

The instrument's "subnet topology" functionality relies on the SNMP protocol, which requires the switches in the internal network to support the SNMP protocol (version V1 or V2C) and the BRIDGE-MIB database (generally supported by midrange and above switches). Use the community name "public" to extract data from intranets and switches, perform operations, and restore topology.

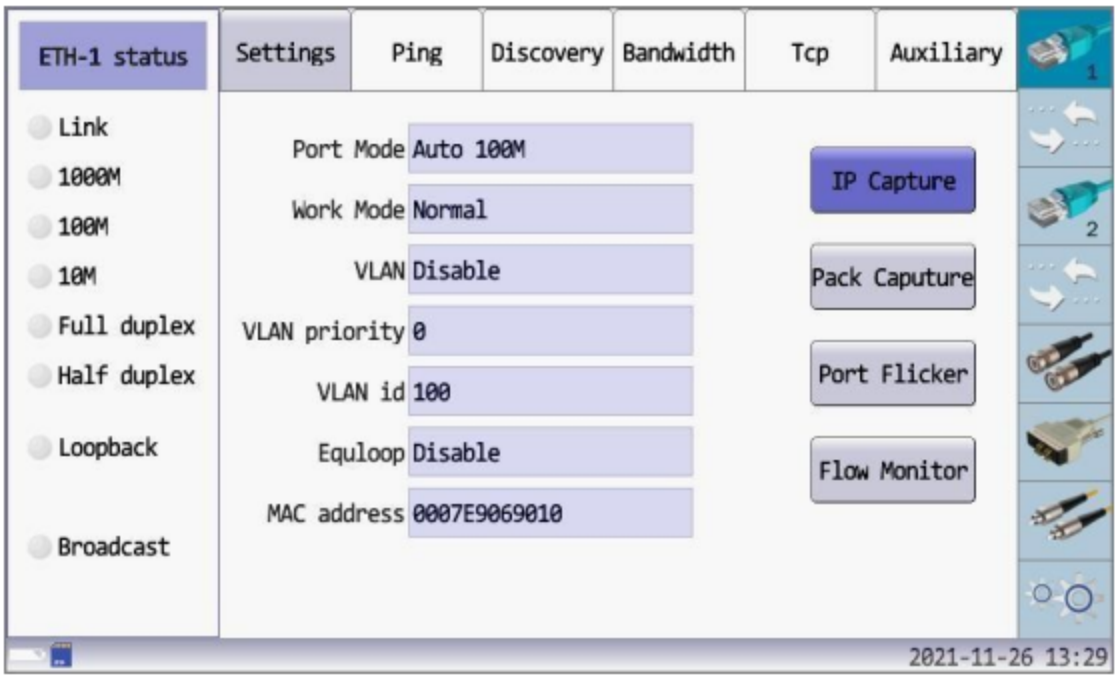
The process information, warning information, and topology views at all levels of the whole testing process can be saved in a PDF file for subsequent management and archiving.



2). Operation Configuration

Before Subnet Topology starts, there are four configurations to confirm: port configuration, local address, and subnet mask.

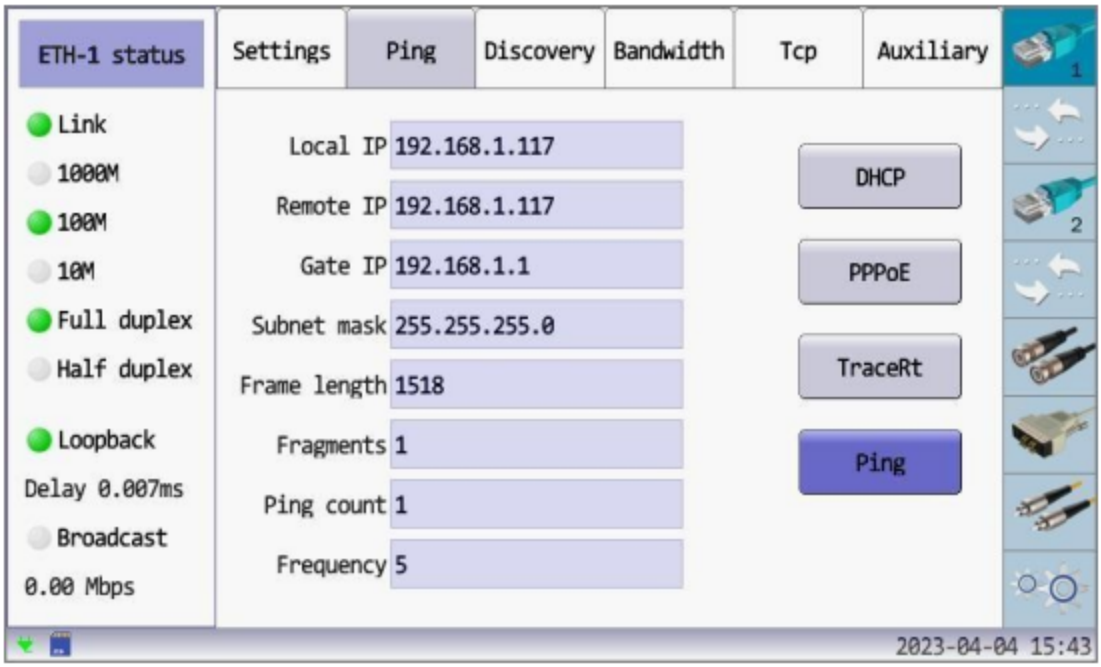
Port configuration, in the Basic Settings page.



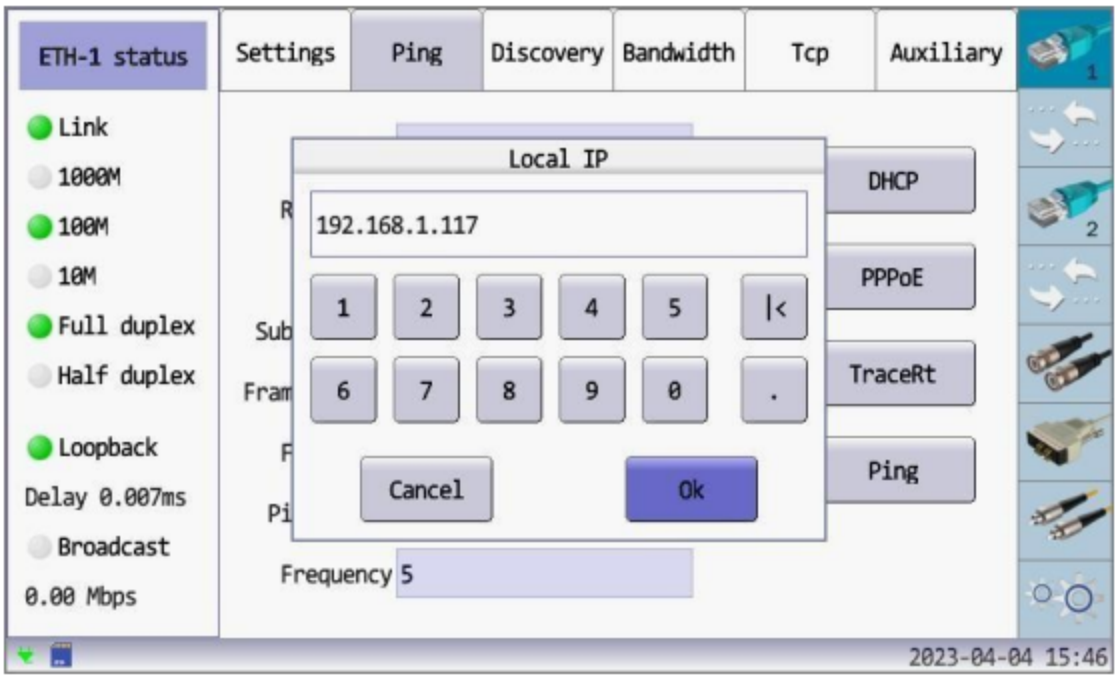
As shown in the diagram, this is an available configuration. It is possible that the only configuration item that needs to be adjusted is the Port Mode configuration item, which is determined by the situation of the field network device. The way to verify the port configuration is to connect to the Internet at that port. If the corresponding indicator turns green in the "Port Status" column on the left side of the screen, the configuration is considered valid.

If the MAC address is required by Intranet Security Management, the MAC Address configuration item at that location needs to be coordinated.

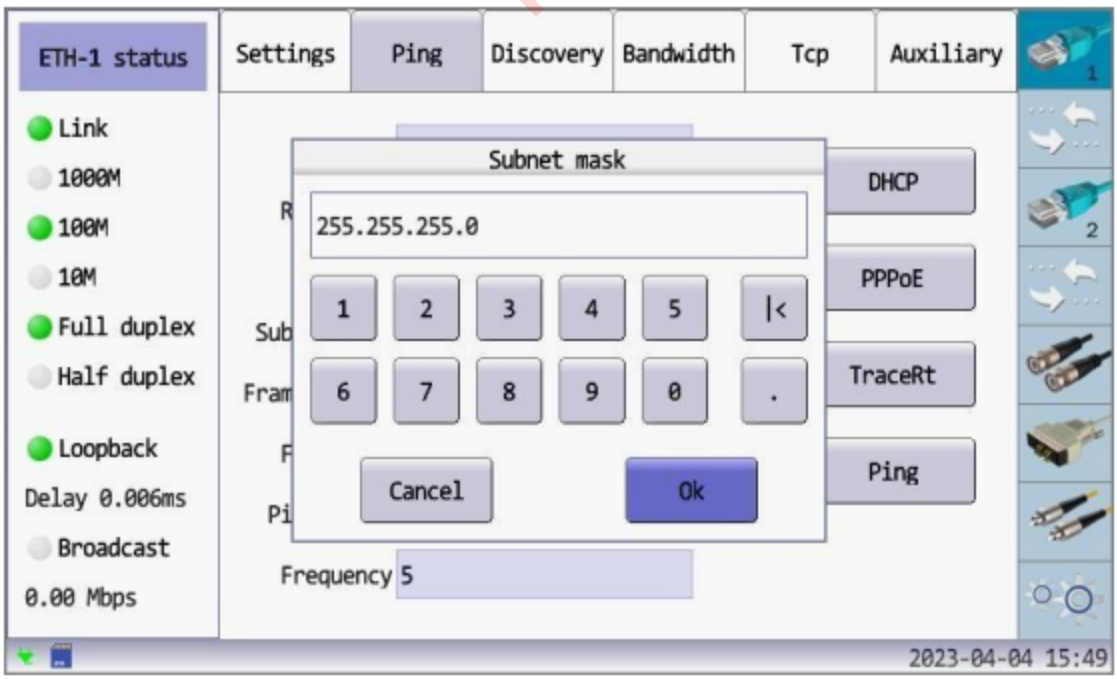
Configuration of local address and subnet mask, in the PING Test page.



Configure IP address: Click on the "Local IP" configuration item to configure the local IP address.



Configure Subnet Mask: Click on the Subnet Mask configuration item to configure the local subnet mask. Subnet mask is important because it determines the maximum number of potential IPs in the intranet, which directly affects the time consumed by device scanning. For example, "255.255.255.0", determines that the maximum potential number of IPs in an intranet is 256; "255.255.0.0" determines the maximum potential number of IPs in the intranet to be 65536, which means the scan time will be very long. It is recommended that this be noted when setting the subnet mask.



If there is a DHCP server in the intranet, you can click the "DHCP" button directly. The instrument will automatically get the IP address and subnet mask from the DHCP server, which can save the tedious manual configuration.

3). Subnet Topology

Connect the gauge to the target subnet with a network cable and confirm that the port light is on correctly before you are ready to start testing.

On the Network Discovery page, click the Subnet Topology button.

The process of subnet topology discovery includes a series of steps: device scanning, switch detection, switch data extraction, topology integration.

Device scan. The instrument uses ARP scanning to scan all active IP in the current subnet. This method requires a certain amount of data packets to be injected into the subnet, which will generate a certain amount of traffic. However, the traffic is small and the duration is short, so the impact on the network is small. Considering that this function is used for asset management and, most importantly, the reliability and accuracy of the data obtained, this approach is adopted, which is one of the most reliable and accurate data extraction methods.

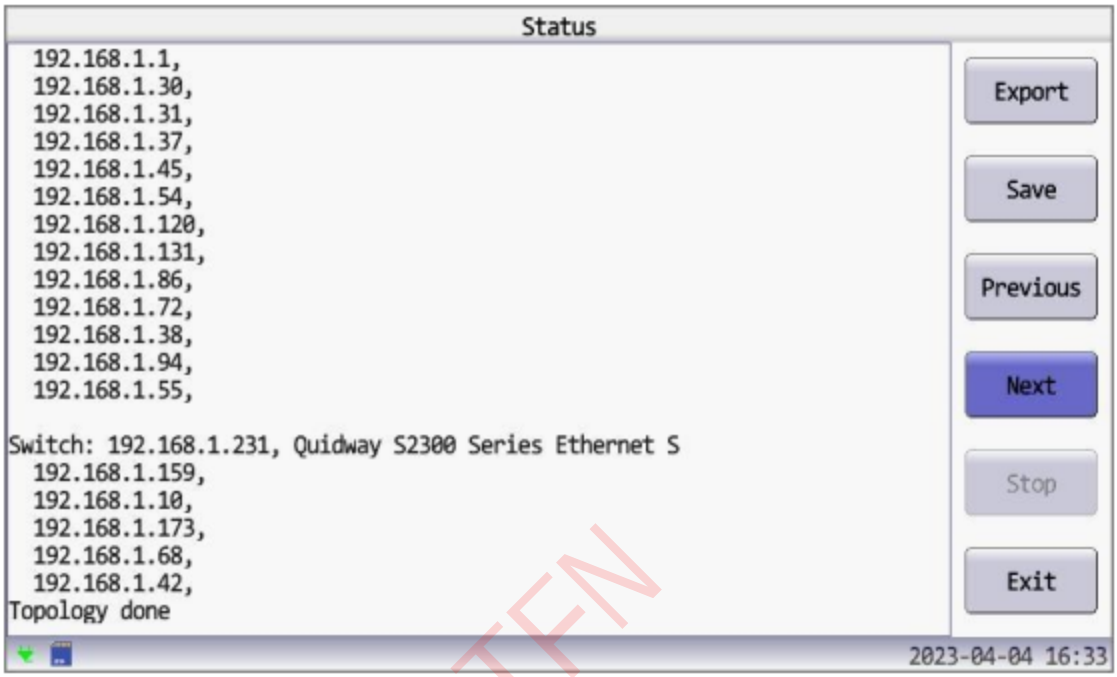
Switch detection. The meter detects each IP in the list of active IPs it acquires one by one to detect whether the device is a switch. The discovery of topology depends on the internal data of the switch, which needs to be extracted from the switch using the SNMP protocol. The switch is required to support the SNMP protocol (version V1 or V2C) and the BRIDGE-MIB database. The community name used for instrument extraction data is "public". Switches that do not support the SNMP protocol are considered normal hosts.

Switch data extraction. For IP that is determined to be a switch, the instrument uses the SNMP protocol (version V1 or V2C) and the "public" community name to extract relevant data from within it. Because the switch's response to data extraction is slightly slower, the data extraction process is correspondingly slower. Switches that do not support BRIDGE-MIB will not be able to extract data. If there are multiple switches in the subnet, the instrument will extract their data in parallel.

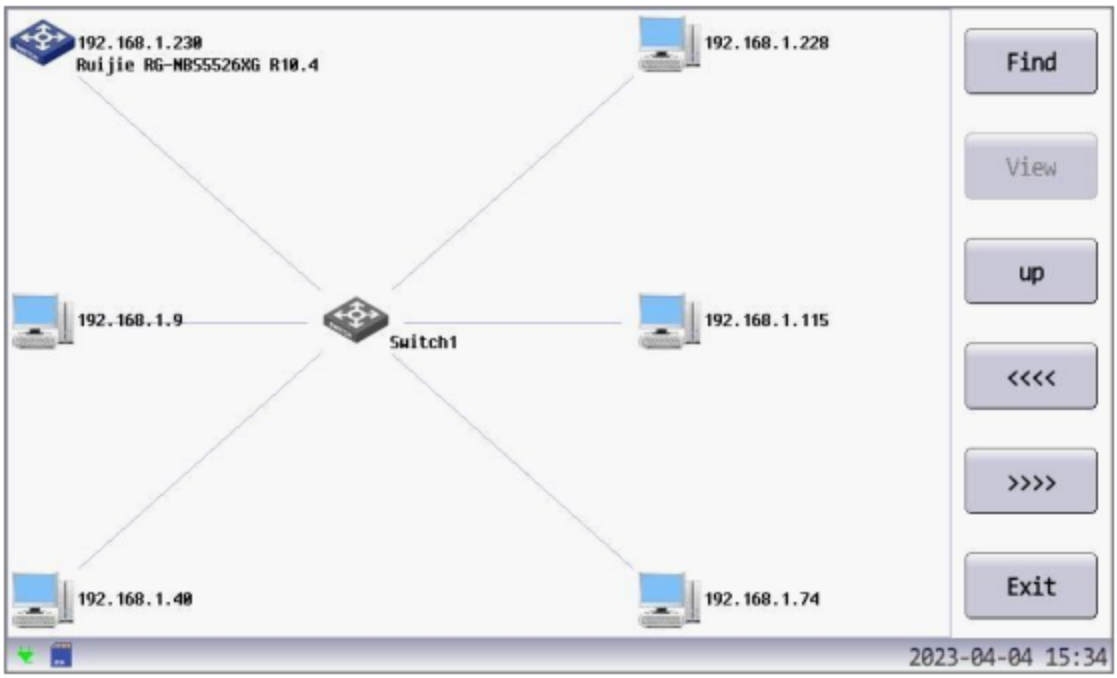
Topology integration. Integrate the data obtained in these steps to infer the most likely network topology. The results may be different from the actual subnet topology. There are several reasons for the difference, one of which is that during the detection operation, **the network structure has changed**: unplugging network cables, switching devices, etc. Therefore, in order to obtain accurate data, keep the network topology as stable as possible during the time of running topology detection. Another reason for the difference is the dummy switches that **exist in the subnet.**

Limitations of dummy switches. Devices that do not support network management, SNMP protocol, switches that support but do not open SNMP protocol, hubs, etc., are transparent from the perspective of the internal network. Such devices are referred to as dumb switches. During the process of topological integration, some dummy switches can be deduced, while others cannot. The existence of dummy switches can affect the results of topological integration, so it is recommended to use switches that support SNMP network management whenever possible.

Running interface of subnet topology:



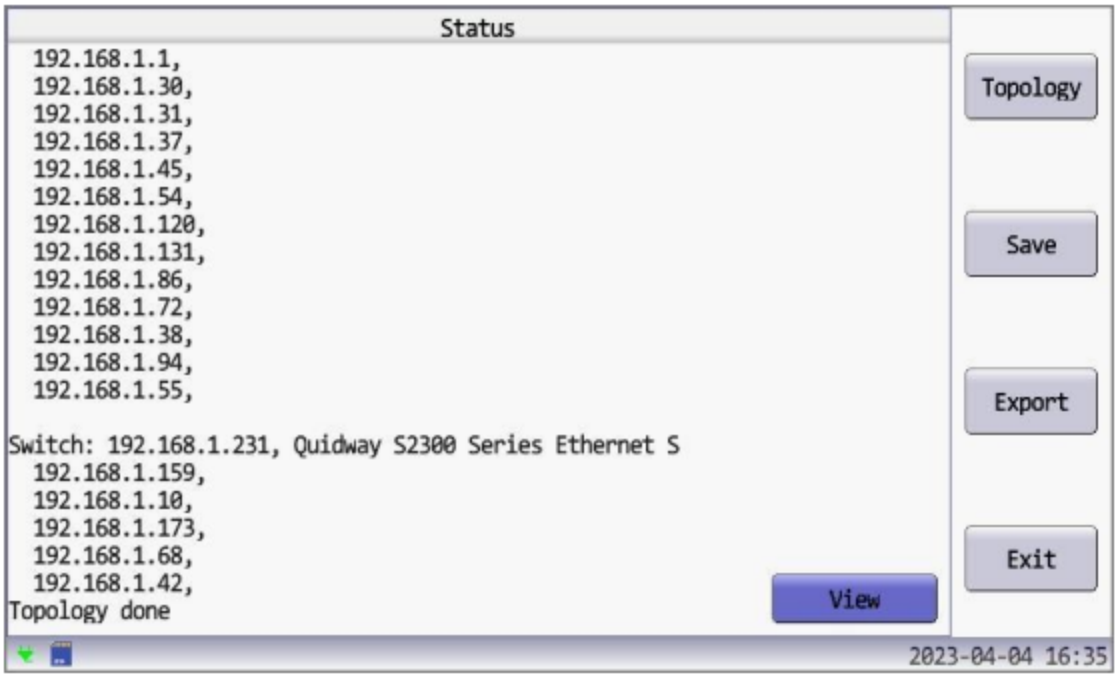
Topology Diagram Running Interface:



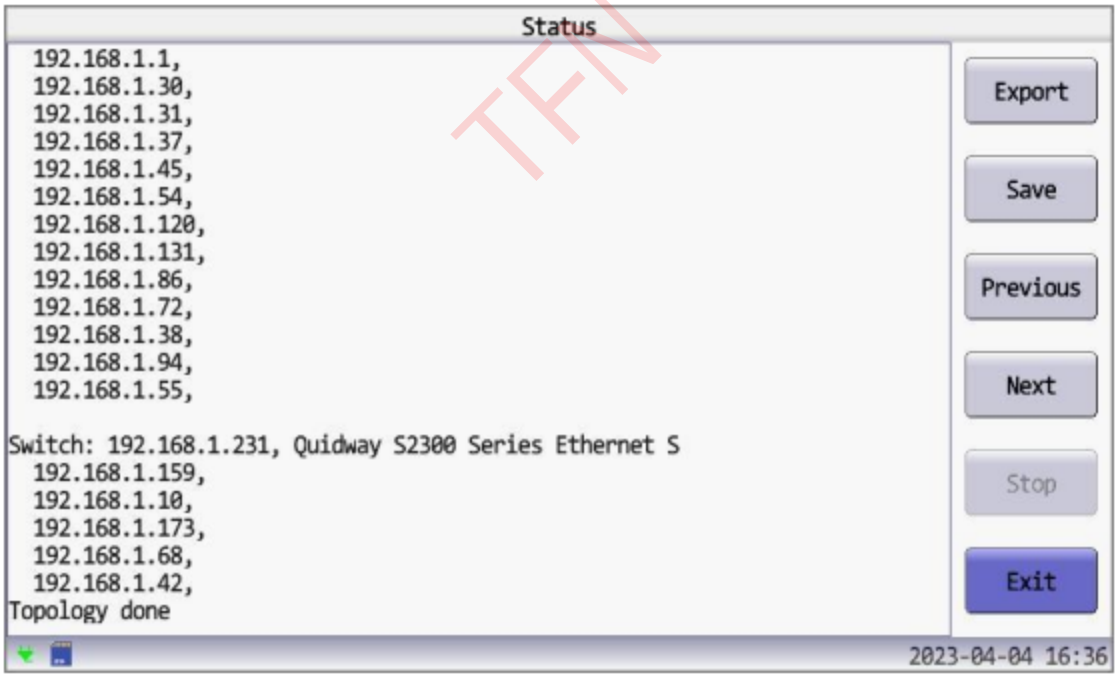
After the test results come out, you can browse, find, store and export data.

4). Process information

All process information for the entire probing process is recorded in the Status Information window, which can be stored separately or together with the topology view.



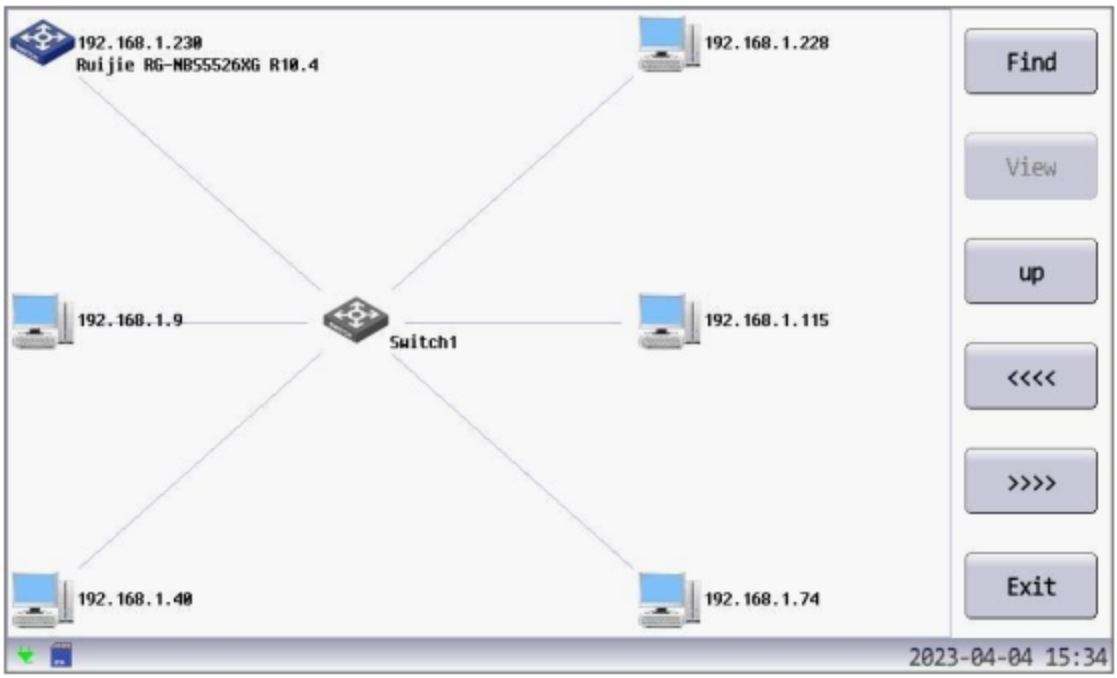
Click the View button in the Status Information subwindow to see all the detailed process information:



In this window, you can turn pages back and forth, export to a U drive, or save locally.

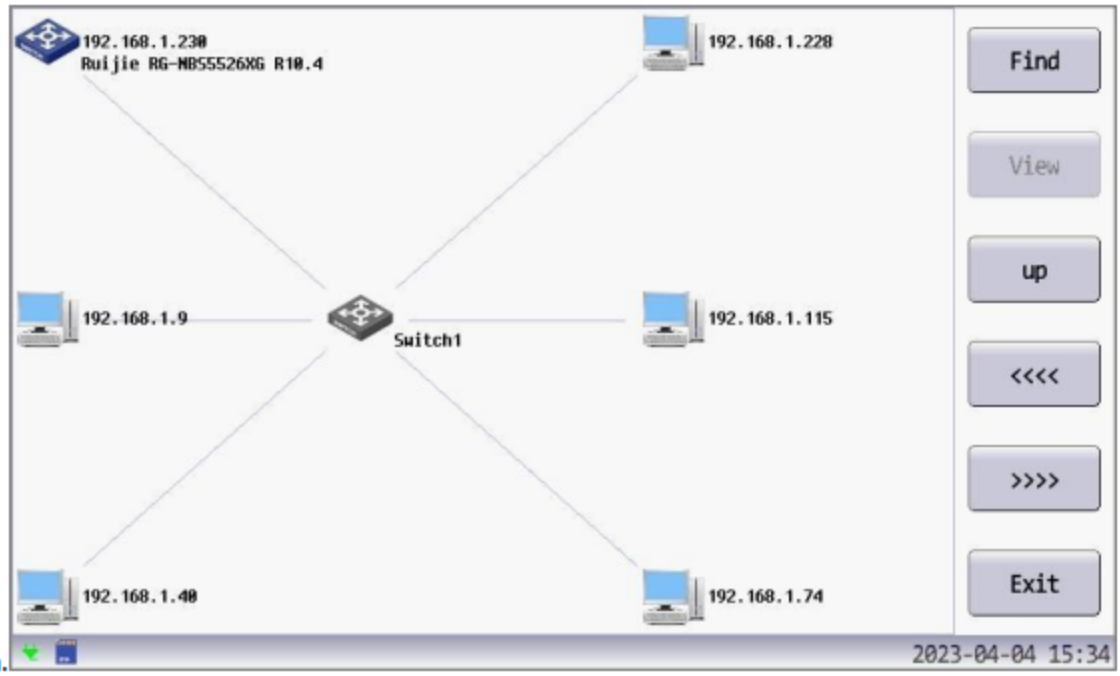
5).Topology operation

The results of topology detection are presented in the form of a topology view. In the topology view, switches that are directly connected to the instrument are used as the root node of the topology tree.



Icon description. As shown in the diagram, the computer icon is used to represent a common host. A coloredswitch icon used to represent a network management switch; Black and white switch icon for dumb switches,using DSW_ X denotes its name.

Topology browsing: upper, lower, left and right pages. The switch in the center of the screen, which represents the center of the view at this layer, clicks on it and browses back to the previous layer. Around the screen, representing the devices connected to the central switch in this layer, clicking on the icon of the switch in the surrounding area will bring you to the next layer of view centered on that switch. If the current switch connects so many devices that it exceeds one screen, you can turn left and right by clicking the <<< and >>> buttons and browse through all the devices page by page. You can also go back to the previous view by clicking the Upper

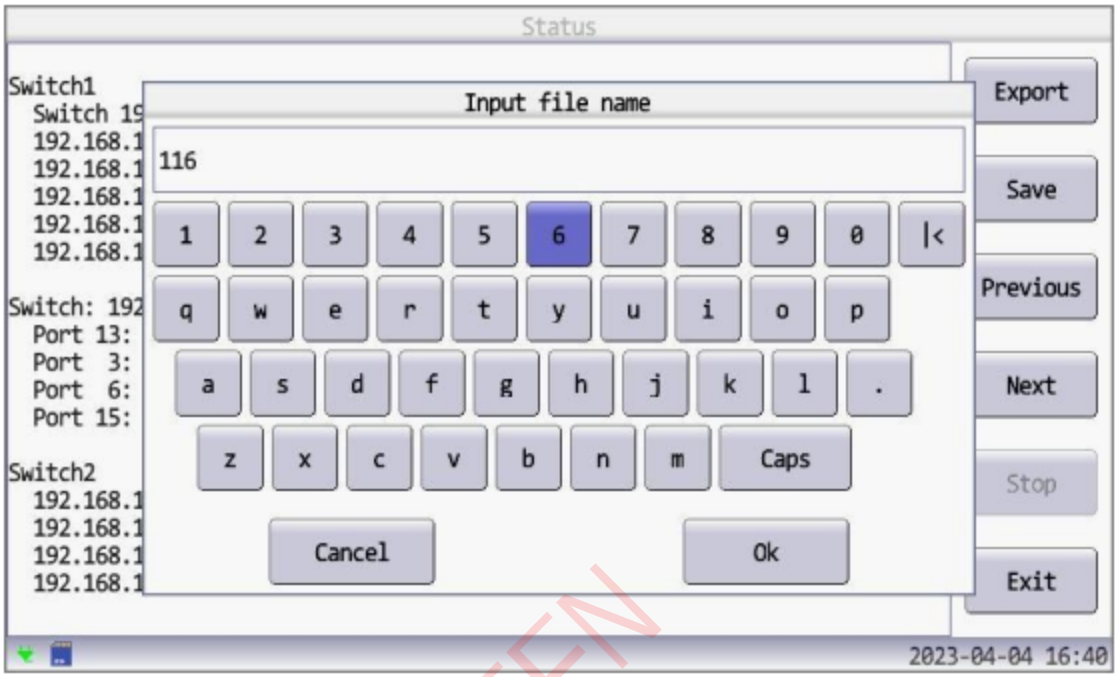


button.

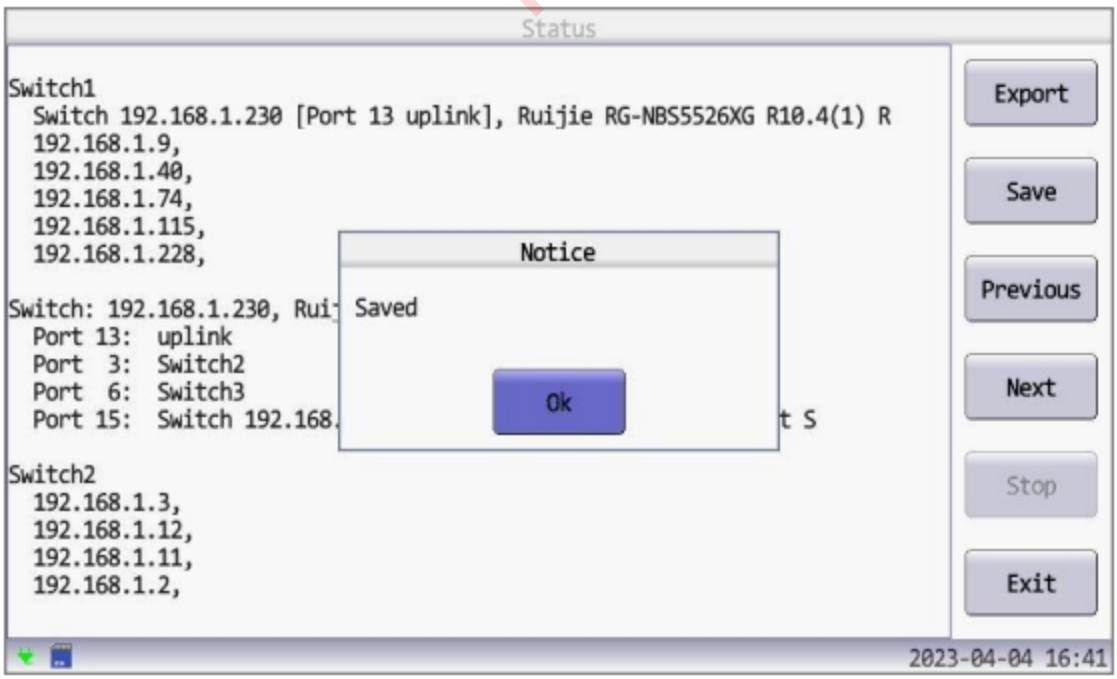
Port information. The port number shown on the peripheral icon refers to the port number of the central switch

to which the device is connected. The "Up Port" number displayed on the central switch icon refers to the upstream port number of the switch. With the port number, you can patrol to find all the physical devices.

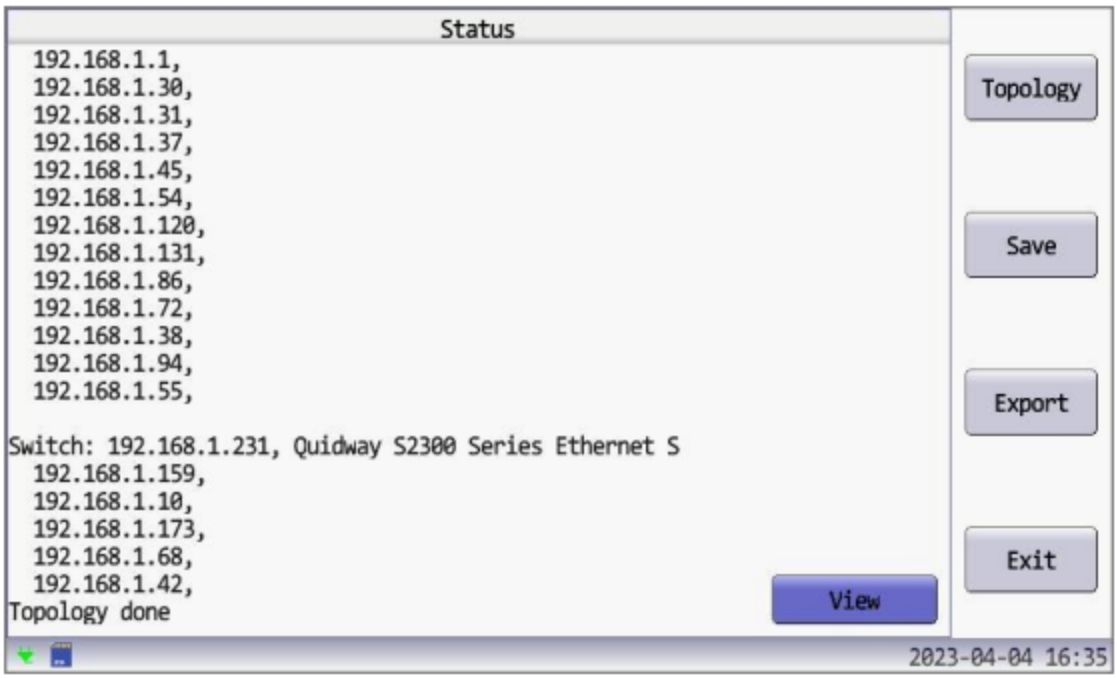
IP lookup. If there are many devices in the internal network, browsing and searching will be slow and inconvenient. Therefore, the instrument provides the function of IP lookup. Click the Find button of the topology browsing interface and enter the last number of IP addresses to find:



The gauge finds the first tail-matching IP device and locates the browse view at the layer where the IP device resides.



Click the Exit button to exit the browsing view; But by clicking the Topology button in the results window, you can immediately go back to the browsing view you just saw.



6). Result Storage

Process information, alert information, and topology views at all levels during the topology testing process can be stored in a PDF file.

Clicking the Save button in the test results window will store the PDF file in the internal TF card of the instrument.

By clicking the Export button in the test results window, the PDF file will be stored on the U drive outside the instrument.

Files stored in TF cards can be copied from the inside of the instrument to the computer through a browser or FTP client software.

5. E1 Interface Test

Introduction to E1 interface

E1 is a group of digital transmission systems (PCM30) standard developed by ITU-T and named by the European Postal and Telecommunications Association (CEPT). It is formed by 32 64 kbps PCM paths through time-sharing multiplexing. Its transmission rate is 2.048 Mbps. Thirty of these paths transmit user information such as voice. The other two paths transmit synchronization codes, signaling codes and other auxiliary signals as system overhead. The physical and electrical characteristics of E1 interface conform to the G.703 standard of CCITT. E1 standard is also used as the base group of PCM system and N-ISDN in China. At present, E1 interface based on G.703 is widely used in grouping network, frame relay network, GSM mobile base station and military communication, transmitting voice signal, data, image and other services.

An E1 is a 2.048M link, encoded in PCM. The frame length of an E1 is 256 bits, divided into 32 slots and 8 bits in one slot. Eight E1 frames per second pass through the interface, that is, 8K*256=2048 kbps. Each time slot accounts for 8bit in E1 frame, 8*8k=64k, that is, 32 64K in an E1.

In E1 channel, 8bit makes up a time slot (TS), 32 time slots make up a frame (F), 16 frames make up a complex frame (MF). In one frame, TS0 is mainly used to transmit frame positioning signal (FAS), CRC-4 (cyclic

redundancy check) and end-to-end warning indication. TS16 mainly transmits along-the-way signaling (CAS), multi-frame positioning signal and end-to-end warning indication, TS1 to TS15 and TS17 to TS31 in a total of 30 time slots to transmit voice or data. We refer to TS1 to TS15 and TS17 to TS31 as net charges and TS0 and TS16 as costs. If out-of-band common channel signaling (CCS) is used, TS16 loses the purpose of signaling, and this time slot can also be used to transmit information signals, when the net load of the frame structure is TS1 to TS31 and the cost is only TS0.

Based on the slot characteristics of E1 in PCM encoding, E1 is divided into 32 slots TS0-TS31. Each time slot is 64K, of which TS0 is occupied by frame synchronization codes, Si, Sa4, Sa5, sa6, Sa7, A bits. If the system uses CRC checking, the position of the Sibit changes the CRC checking. TS16 is a signaling time slot, which is used to transmit signaling when signaling (common or on-the-way) is used, and users cannot use it to transmit data. So 2M PCM code types are:

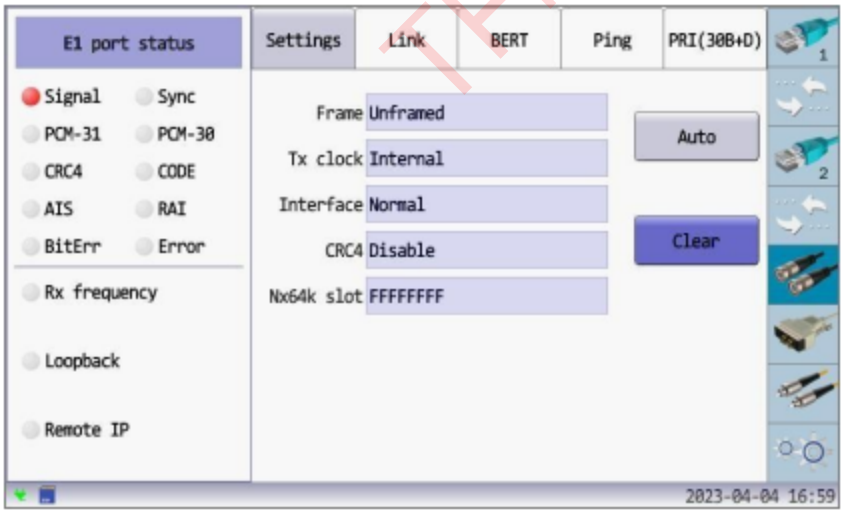
PCM30:PCM30 Users have 30 available time slots, TS1-TS15, TS17-TS31. TS16 transmits signaling without CRC check.

PCM31:PCM30 Users have 31 available time slots, TS1-TS15, TS16-TS31. TS16 does not transmit signaling, and there is no CRC check.

PCM30C:PCM30 Users have 30 available time slots, TS1-TS15, TS17-TS31. TS16 transmits signaling with CRC check.

PCM31C:PCM30 Users have 31 available time slots, TS1-TS15, TS16-TS31. TS16 does not transmit signaling and has CRC checks.

Interface parameters



The E1 interface parameters involved in this instrument include:

1). Frame structure: non-frame, PCM31, PCM30

E1 is divided into PCM31, PCM30 and non-frame. In E1 of PCM31, slot 0 is used to transmit frame synchronization data, and the remaining 31 slots are used to transmit valid data. In E1 of PCM 30, except for time slot 0, time slot 16 is used to transmit signaling, only time slots 1 to 15, 17 to 31 totaling 30 can be used to transmit valid data; In non-frame E1, all 32 time slots can be used to transmit valid data.

2). Send Clock: Internal Clock, Receive Clock

The E1 interface contains two ports: the receiving port and the sending port. Clocks on these two ports are related to clock synchronization. There are two options for sending a clock source: a receive clock extracted from the

receive port, or an internal clock of the gauge.

Experience: Usually in the field of operation and maintenance, if the instrument is docked with network-side equipment (e.g. light cat), select "Receive clock"; If the instrument is docked to a user device (e.g., a router), select Internal Clock.

3). CRC Checks: Disable, Use

The CRC check here refers to the CRC-4 check.

In E1 channel, 8bit makes up a time slot (TS), 32 time slots make up a frame (F), 16 frames make up a complex frame (MF). In a frame, TS0 is mainly used to transmit frame positioning signals (FAS), CRC-4 (cyclic redundancy check), and warning alerts to the peers. CRC checks are used in synchronous mode (PCM31 or PCM30) with multiple frames.

4). Access mode: 75 ohm, 120 ohm, high resistance crossover

The G.703 standard terminal impedance matching unbalance is 75 ohm, the balance is 120 ohm, and the high impedance crossover mode connects the measured circuit by means of high impedance shunt.

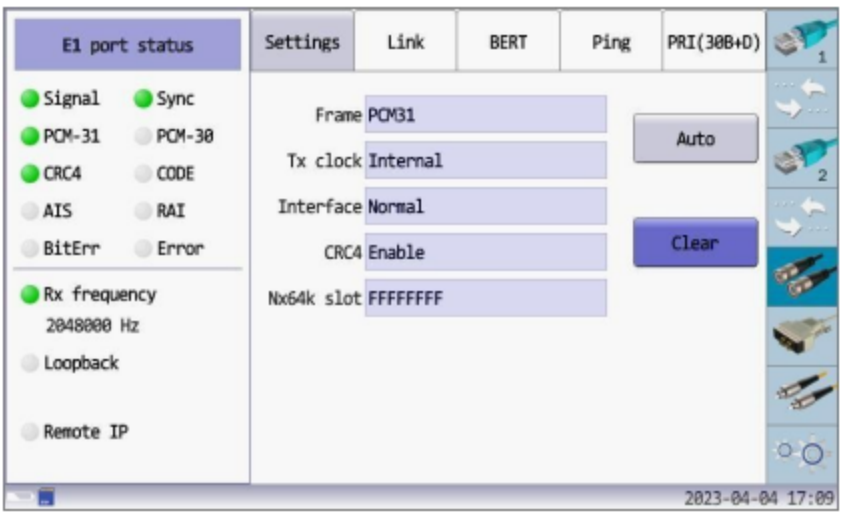
The choice of access mode depends on the configuration of the device docked with the instrument or the access mode of the instrument.

5).Nx64k time slot

CE1, which divides 2M transmission into 30 64K time slots, is generally written as N*64. You can use several of these time slots, that is, only n 64K, which must be connected to the CE1/pri interface. The CE1/pri interface works in two ways: the E1 mode of operation (also known as the non-channel mode of operation) and the CE1/PRI mode of operation (also known as the channel mode of operation).

Automatic Detection

Before the E1 interface test, the E1 interface parameters need to be set correctly, which is the basis for establishing communication with the device under test. In order to simplify the setup of E1 interface parameters, the instrument provides interface parameters "auto-detection" function. This function is for three parameters: frame structure, CRC check, Nx64k time slot.



1). Connect the TX port of the measured device E1 to the RX port of the instrument through the E1 cable.

2). Observe that the E1 signal light of the instrument turns green

3). Click on the Auto-detect button and wait for a few seconds

4). At the end of the auto-probe, the "Frame Structure" and "CRC Check" update the configuration basedonthe

result of the probe

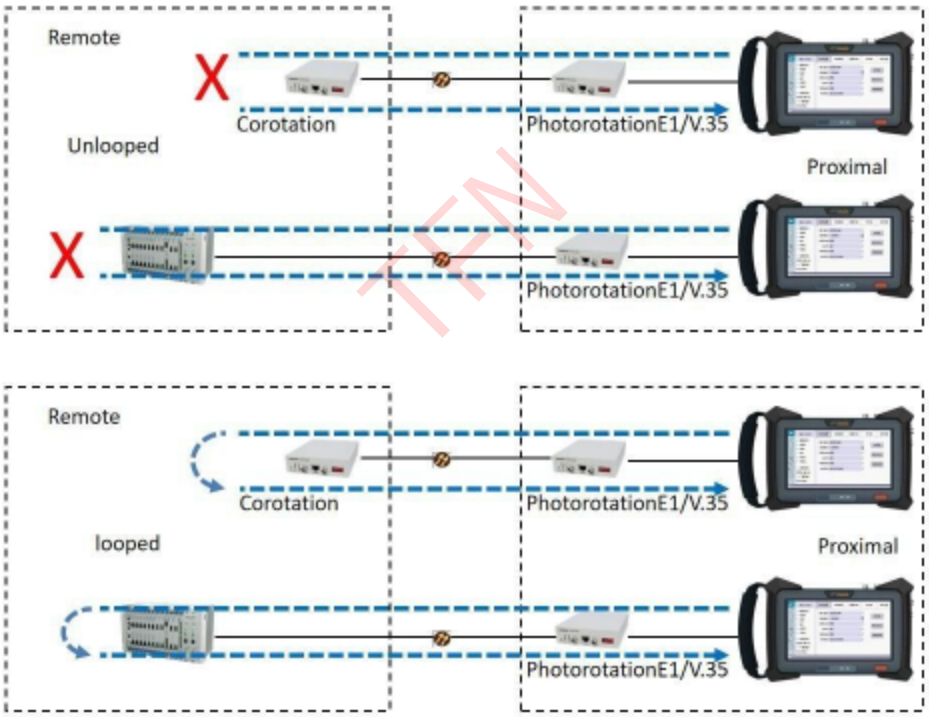
5). If the detected Nx64k slot usage changes, the user will be prompted to update the configuration

6). End of automatic detection

Loop Discovery

In the process of field operation and maintenance, it is often necessary to measure loop error code or loop PING, which requires rings on remote devices: soft rings or hard rings. Soft rings need to be completed by the network administrator's colleagues, and hard rings need to be completed by remote colleagues on the device with a ring plug.

Site conditions are often more complex, and it is sometimes difficult to determine if the distal ring has beenmade. The purpose of the loop discovery function of this instrument is to provide a simple and clear representation of the current state of the loop



Connect the E1 cable to the instrument and adjust the interface parameters. If the remote end is looped, the Loop Discovery indicator turns green and provides a rough round-trip delay value for reference. If there is no loop at the far end, the Loop Discovery indicator is gray and has no value for the loop delay.

Status of remote uncycled Loop state at the far end, providing reference for loop delay

Once the status of the remote loop is confirmed, further loop error testing or loop PING testing can be performed.

Alert Cleanup

Changes in the interface signal may cause transient signal instability during long testing or during unplugging of E1 connector cables. To indicate that such signal instability has occurred, the signal indicator flashes to alert the instrumentation operator that there has been a signal instability event.

The Alert Cleanup button is used to clear the Event of Signal Instability. After clicking, the instrument clears the historical alarm and the signal indicator stops flashing and enters a stable display state.

Err Test

1). Test Definition

Error (Error Error): In digital communication, any inconsistency between the sending and receiving sequences is called an error, also known as an error in practice.

Bit Error: The inconsistency of the corresponding individual numbers in the send and receive sequences is a bit error, and the term "error code" used in the G.821 recommendation refers to a bit error.

Block Error: A block error refers to a group of codes as a whole, in which one or more bit errors occur. The term "error block" used in the G.826 recommendation refers to a block error.

Error seconds (ES): One or more bit errors in a one-second time cycle are called error seconds.

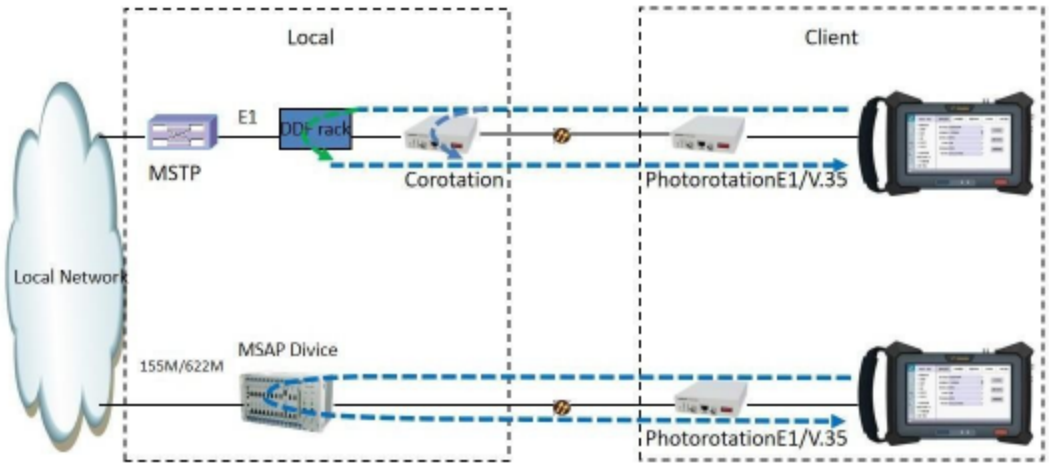
Error block seconds (ES): One or more error blocks in a one-second time cycle are called error block seconds.

Error seconds (ES): The symbol of error seconds and error block seconds.

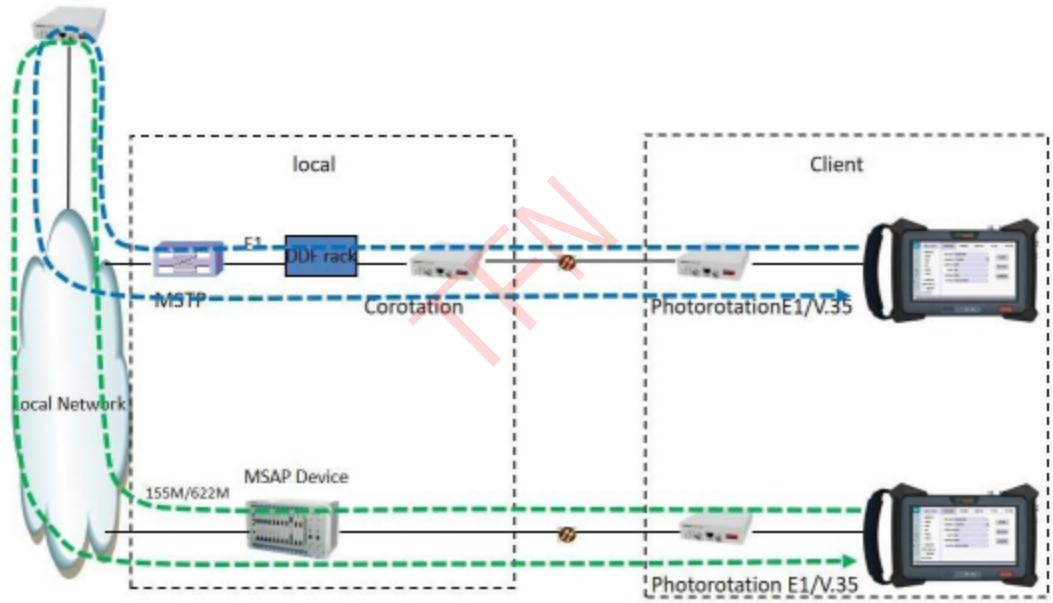
Serious Error Seconds, Serious Error Block Seconds, or Serious Error Seconds (SES): In Error Block Seconds, Error Block Seconds, or Error Seconds, some of the errors are particularly large and are defined as SES.

2). Test networking

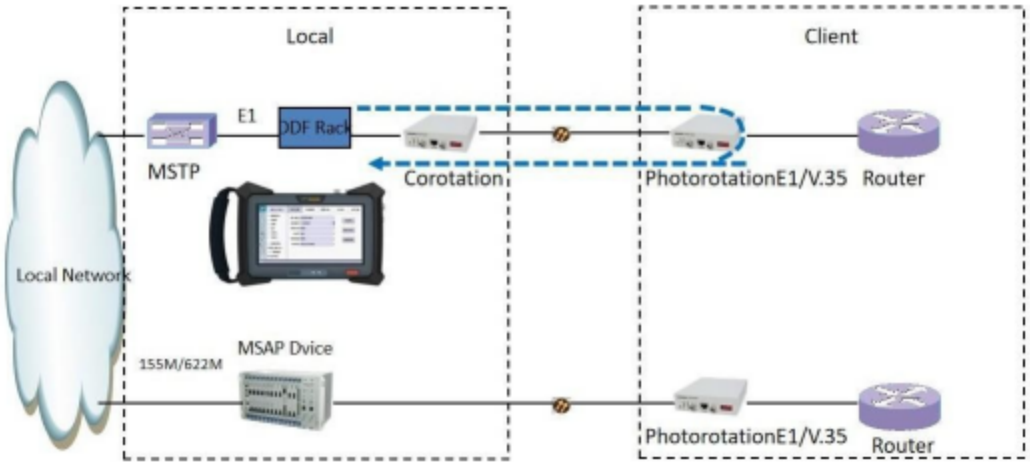
Error code testing generally takes the form of loops. Depending on the site conditions, there are several ways of networking testing.


Local
Client
E1
DDF rack
MSTP
Corotation
PhotorotationE1/V.35
Local Network
MSAP Divice
155M/622M
PhotorotationE1/V.35

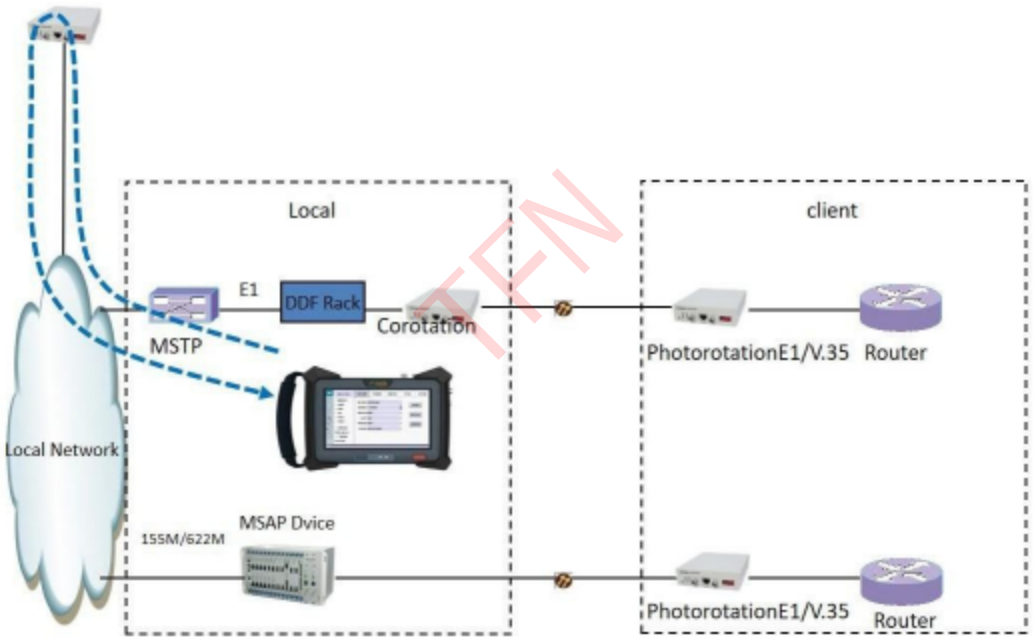
Loop 1


local
Client
E1
DDF rack
MSTP
Corotation
PhotorotationE1/V.35
Local Network
MSAP Device
155M/622M
Photorotation E1/V.35

Loop 2

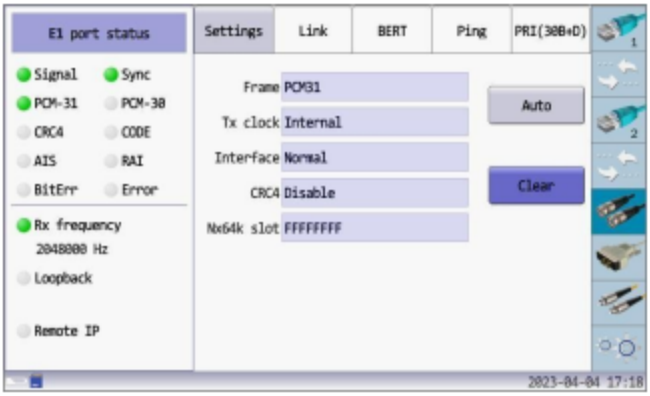

Local
Client
E1
DDF Rack
MSTP
Corotation
PhotorotationE1/V.35
Router
Local Network
MSAP Dvice
155M/622M
PhotorotationE1/V.35
Router

Loop 3


Local
client
E1
DDF Rack
Corotation
MSTP
PhotorotationE1/V.35
Router
Local Network
MSAP Dvice
155M/622M
PhotorotationE1/V.35
Router

Loop 4

3). Test parameters



Configure E1 port parameters correctly

Select Test Code Type

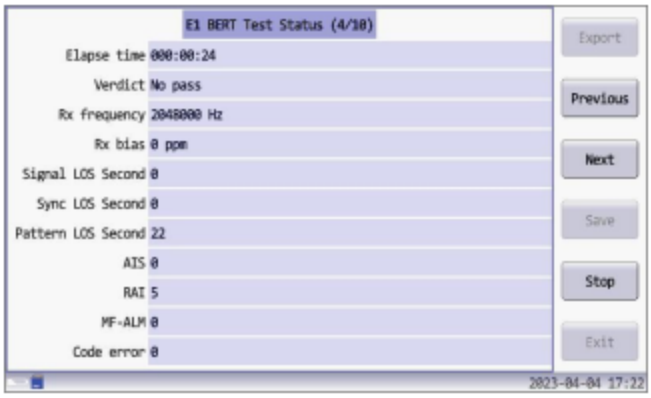
Test code type: choose one from 2E7 to 2E21
Error code insertion: when maintaining on-site testing, generally select "none"
Error Type: Used with Error Insertion, this item can be ignored if Error Insertion is None.

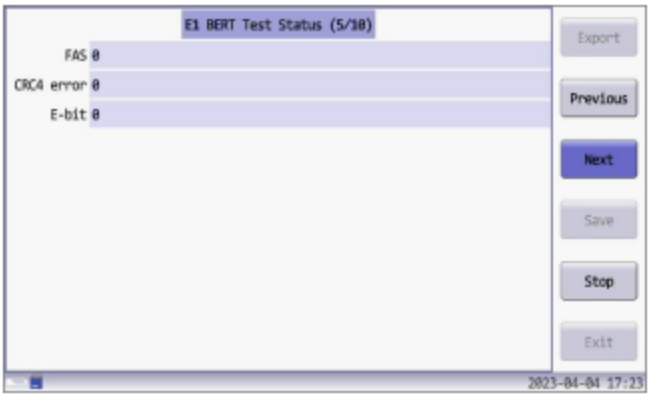
4). Test process

During the error code test, TX port of E1 interface sends test PRBS code stream, RX port of E1 interface detects received PRBS code stream, and counts the number of line error codes and BIT error codes.

5). Test results

The test results have multiple pages, showing the error code test results of the E1 interface.





6). Save test results as needed

7). End of Test

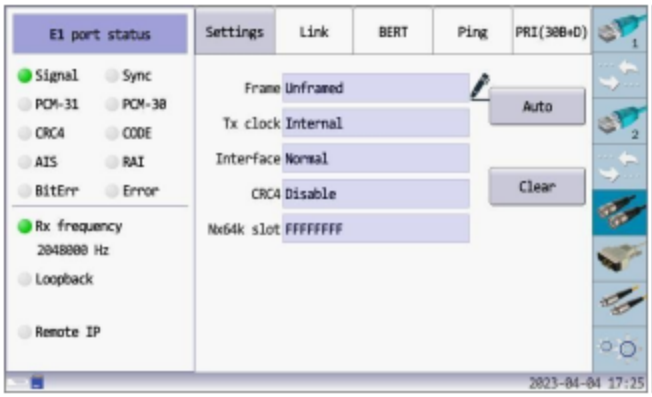
Loop PING

In loop mode, in addition to error code testing, self-loop PING can also be used to verify line quality.

1). Test networking

Same as Error Code Test.

2). Test parameters



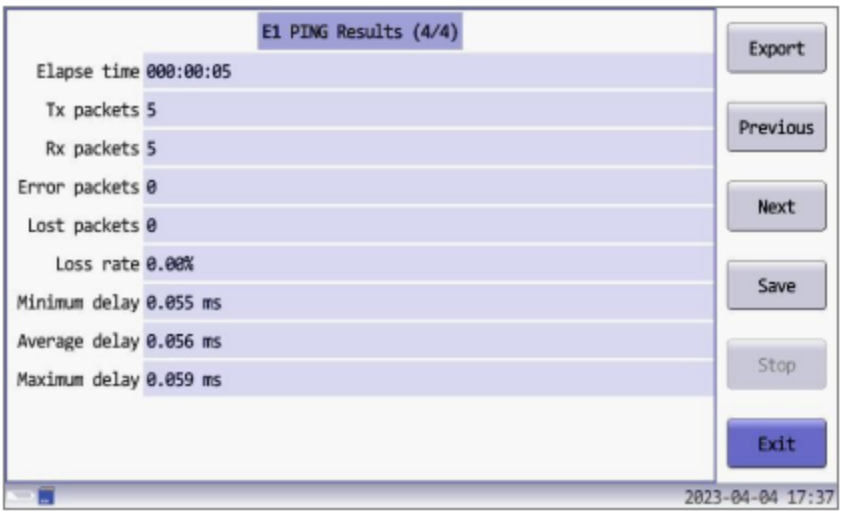
Configure E1 port parameters correctly

Set Local IP and Destination IP to be the same

3). Test process

During the test, the instrument sends ICMP packets through the TX end of the E1 interface, and receives ICMP packets returned from the loop at the RX end of the E1 interface. The results are displayed as a percentage.

4). Test results



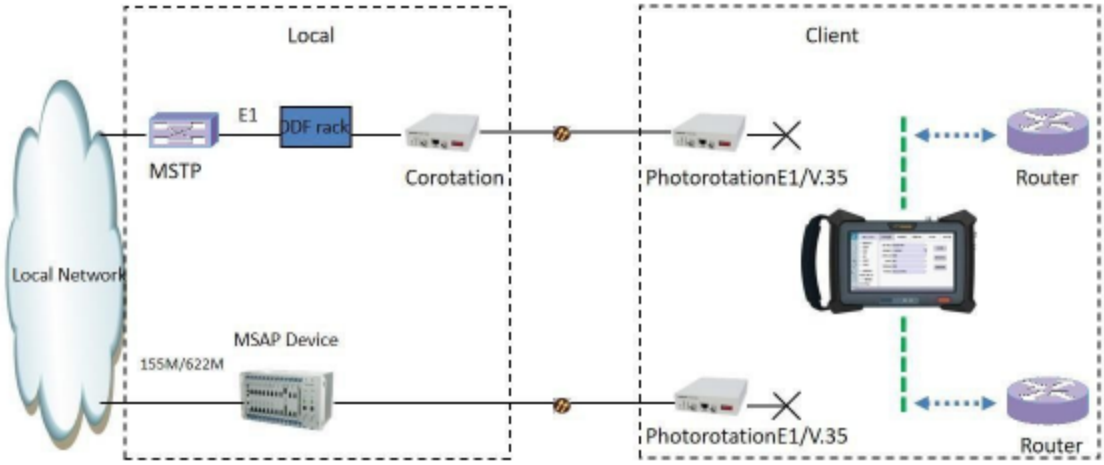
5). Save test results as needed

6). End of Test

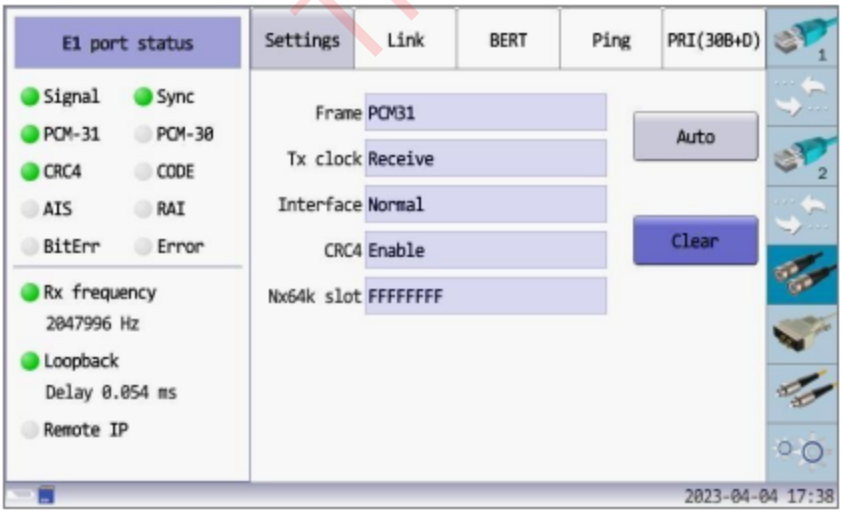
Proximal PING

1). Test networking

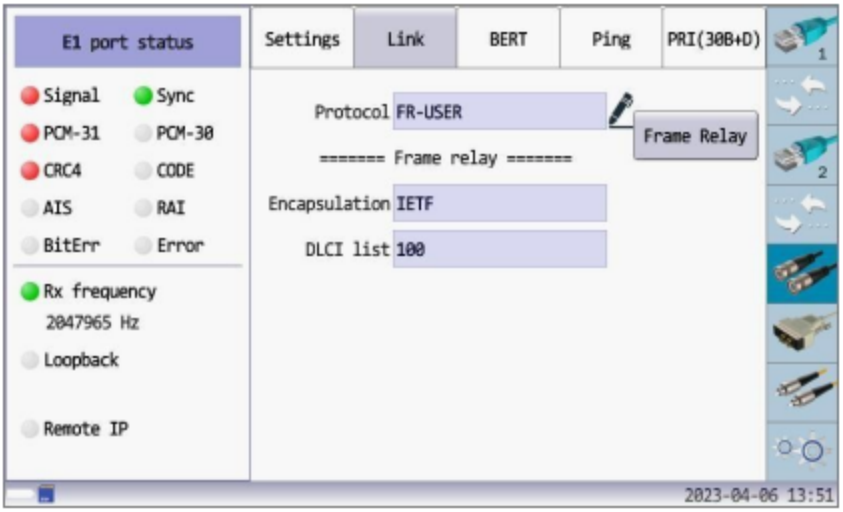
The proximity PING test is for the WAN port of the proximity router. For barrier detection needs, disconnect user routers from protocol converters, replace protocol converters with instrumentation, establish connections with proximal routers, and conduct PING tests to troubleshoot barriers.



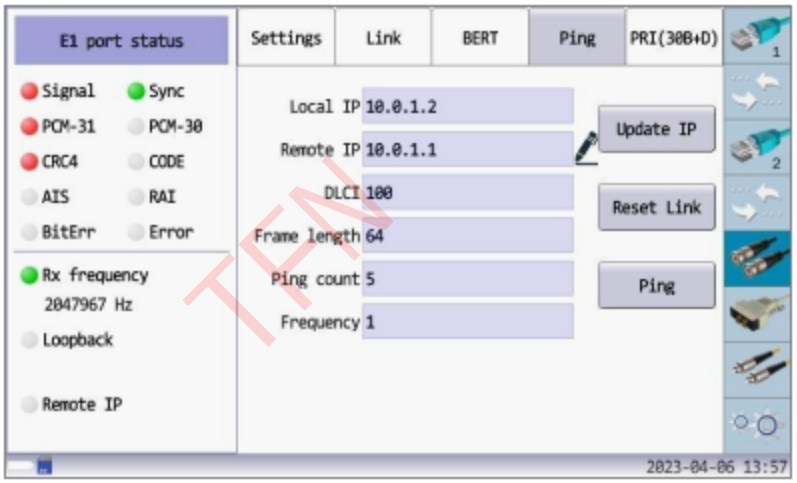
2). Test parameters



Set E1 port parameters, in this case, "Send Clock" generally selects "Internal Clock", other parameters can be obtained by "Auto Detect".



If the WAN port protocol is frame relay, the frame relay parameters and DLCI need to be set correctly. In this case, Frame Relay Mode generally chooses Network Side, and DLCI is determined by the configuration of the field router.



Set IP address and PING parameters.

First observe if the Link indicator is green. If the link light is gray, it means that the data link layer protocol of E1 port is not up yet and PING test cannot be carried out. This situation requires waiting for the link to link up or checking the configuration.

If the link light turns green, the data link layer protocol between the instrument and the router is up and PING is possible.

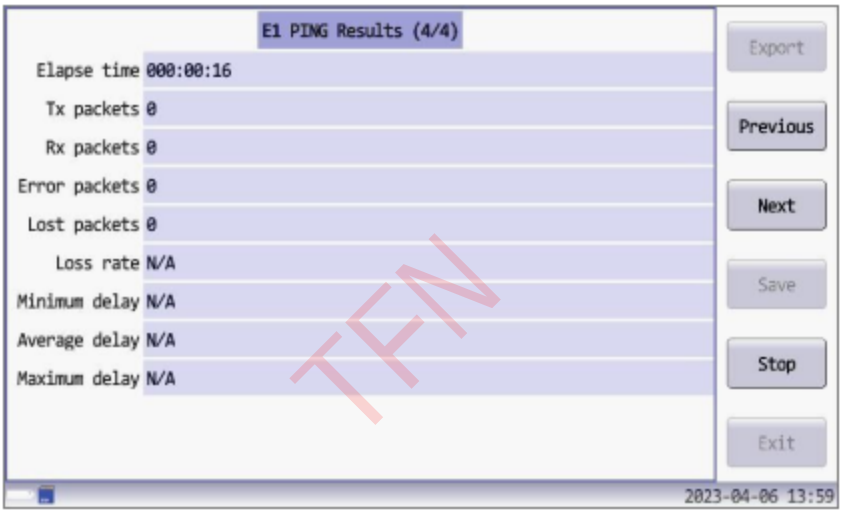
Destination IP can use automatically acquired values: click the View button to see the IP address of the WAN port of the router, which can be used. The destination IP can also be set to another value if there is a special need. If you can't see the IP address of the router, you need to decide the destination IP based on the field configuration.

Local IP can be obtained by adding or subtracting one from the destination IP, for example, if the destination IP is 1.0.0.3, then the local IP can be set to 1.0.0.2 or 1.0.0.4. Local IP can also be set to other values if specific requirements exist.

3). Testprocess

During the test, the instrument sends ICMP-REQ packets to the router through E1 interface, waits for ICMP-ACK packets to be received from the router, checks and counts the packet loss, and the results are displayed as a percentage.

4). Testresults



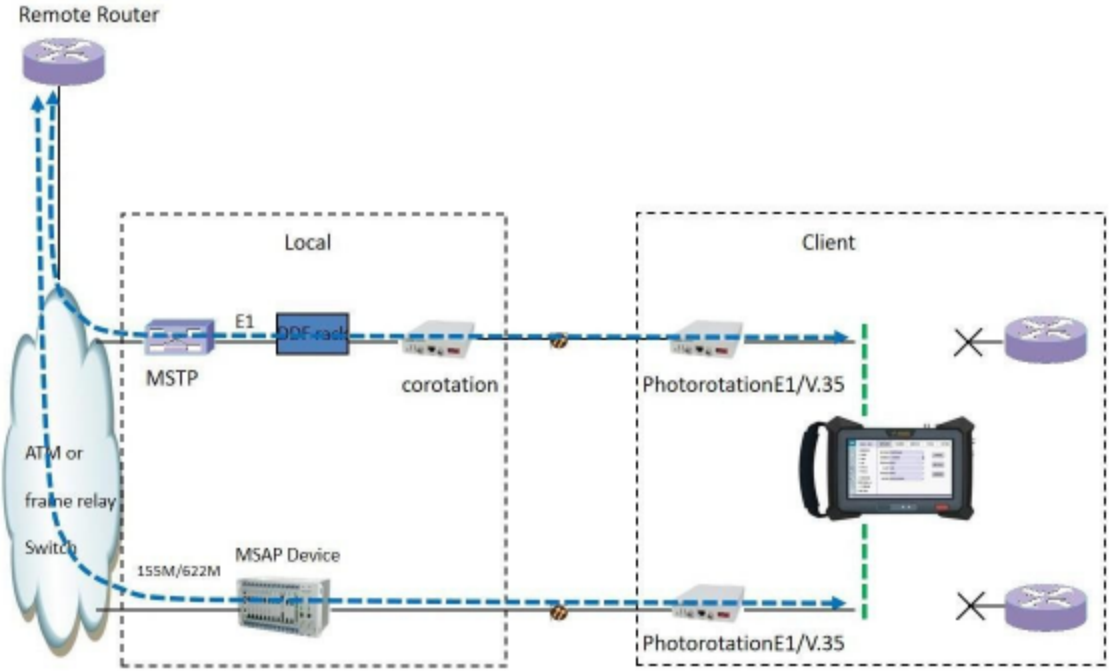
5). Save test results as needed

6). End of Test

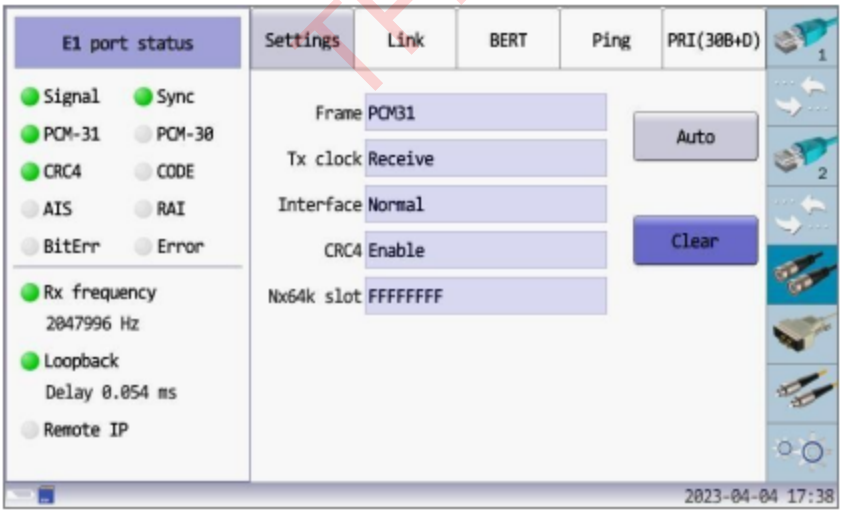
Remote PING

The remote PING test is a test for the WAN port of a remote router. In some cases where loop error testing is not possible, a direct connection to a remote router can be established to perform PING tests to verify line quality.

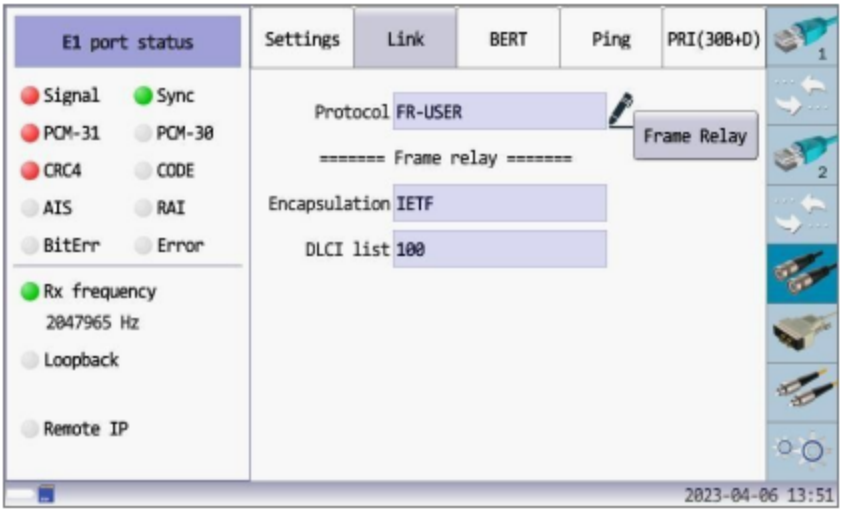
1). Testnetworking



2). Test parameters



Set E1 port parameters, in this case, "Send Clock" generally selects "Receive Clock", other parameters can be obtained by "Auto Detect".



If the WAN interface protocol is frame relay, it is necessary to correctly set the frame relay parameters and DLCI. In this case, the "frame relay mode" generally selects "user side", and the DLCI needs to be determined based on the on-site configuration.

Set the IP address and PING parameters.

First, observe whether the "Link" indicator is green. If the link light is gray, it indicates that the data link layer protocol for the E1 port has not yet been established, and the PING test cannot be performed. In this case, you need to wait for the link to come up or check the configuration.

If the link light turns green, it indicates that the data link layer protocol between the instrument and the remote router has been established and can be pinged.

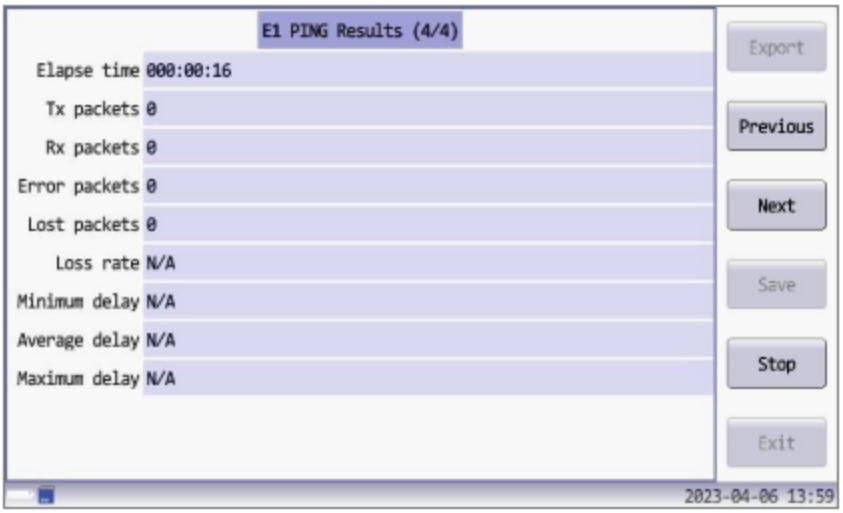
The destination IP can use the automatically obtained value: click the "View" button to see the IP address of the WAN port of the remote router, which can be used. If there are special requirements, the destination IP can also be set to other values. If you cannot view the IP address of the remote router, you need to determine the destination IP based on the on-site configuration.

The local IP address can be obtained by adding or subtracting one from the destination IP address. For example, if the destination IP address is 1.0.0.3, the local IP address can be set to 1.0.0.2 or 1.0.0.4. If there are specific requirements, the local IP address can also be set to other values.

3). Test process

During the testing process, the instrument sends ICMP-REQ packets to the router through the E1 interface, waits for ICMP-ACK packets to be received from the router, checks and counts packet loss, and displays the results in percentage form.

4). Test results



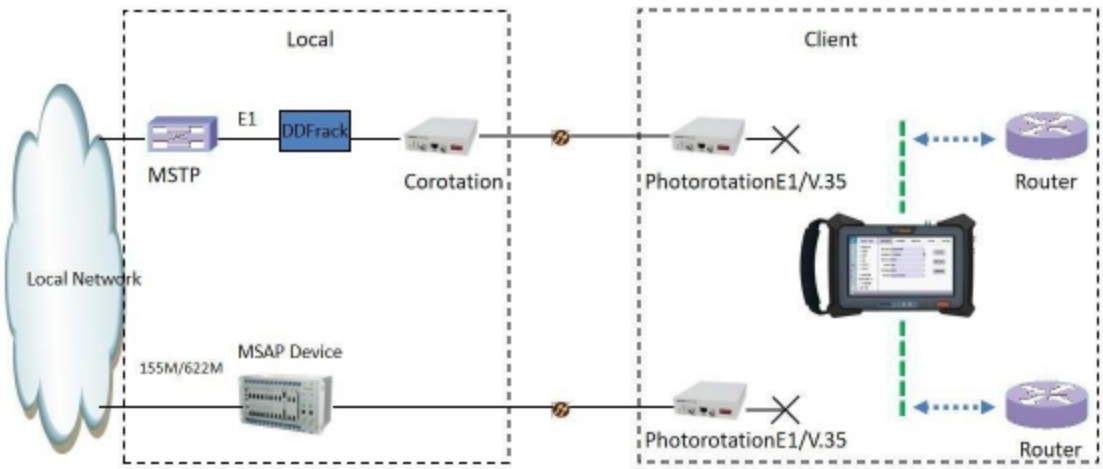
5). Save test results as needed

6). End of Test

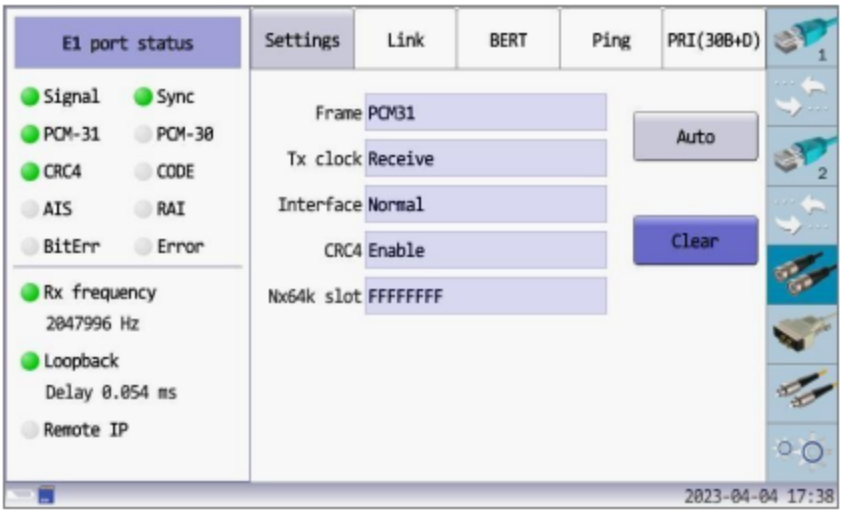
Network side frame relay test

1). Test networking

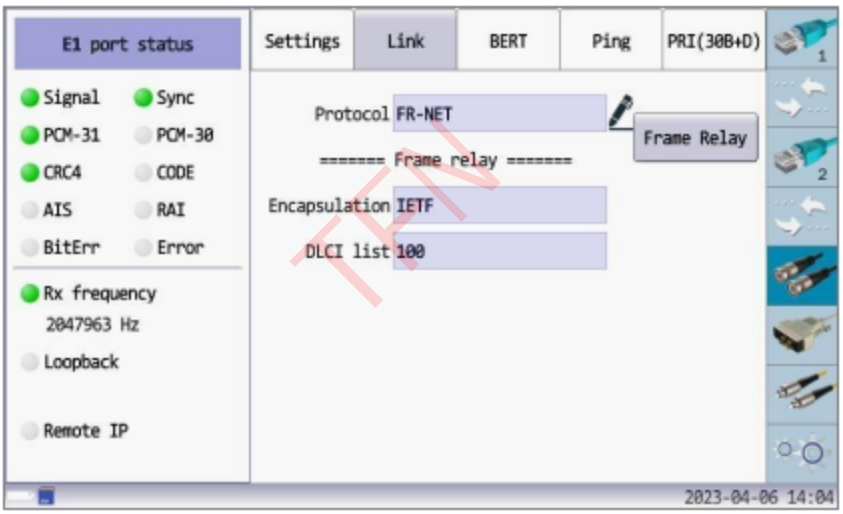
When the WAN port protocol of the router is frame relay, the frame relay test on the simulation network side is a test for the WAN port of the near-end router. For the purpose of troubleshooting obstacles, disconnect the user router from the protocol converter, replace the protocol converter with a meter, establish a connection with the proximal router, and perform a frame relay test to troubleshoot obstacles.



2). Test parameters



Set E1 port parameters. In this case, "Send Clock" generally selects "Internal Clock", and other parameters can be obtained using "Automatic Detection".



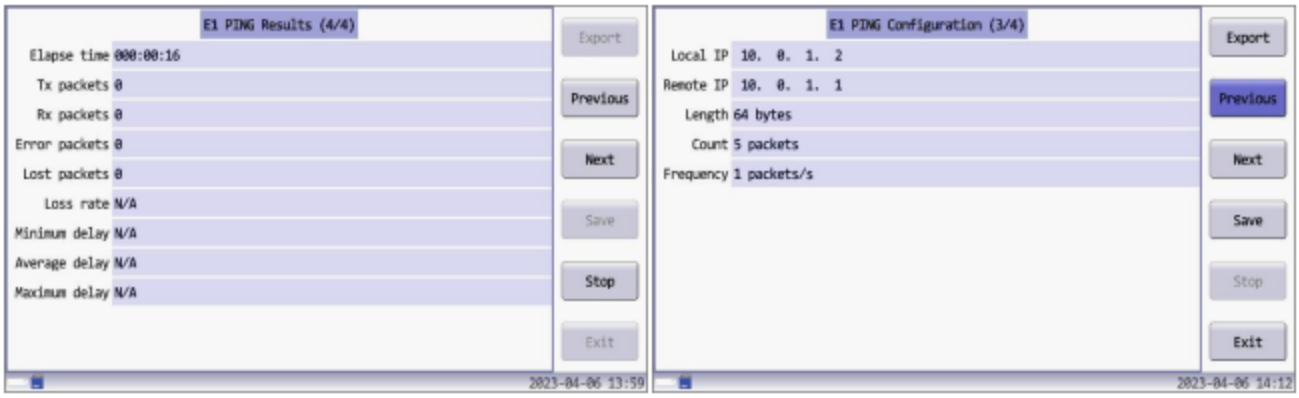
Set frame relay parameters and DLCI correctly. In this case, select "Network Side" for "Frame Relay Mode", and the DLCI needs to be determined based on the configuration of the on-site router.

3). Test process

During the testing process, the instrument simulates the frame relay network side, establishes a frame relay link with the router, and records and counts the transmission and reception data packets of the frame relay interface protocol.

4). Test results

The test results have multiple pages that record the operational status information of the frame relay interface.



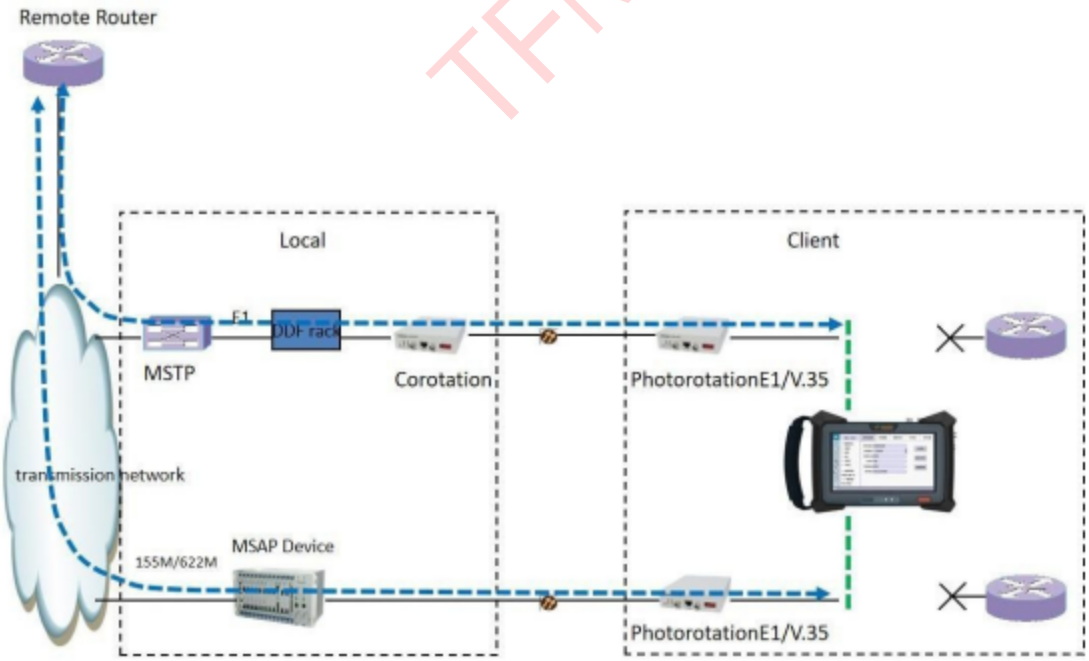
5). Save test results as needed

6) End of Test

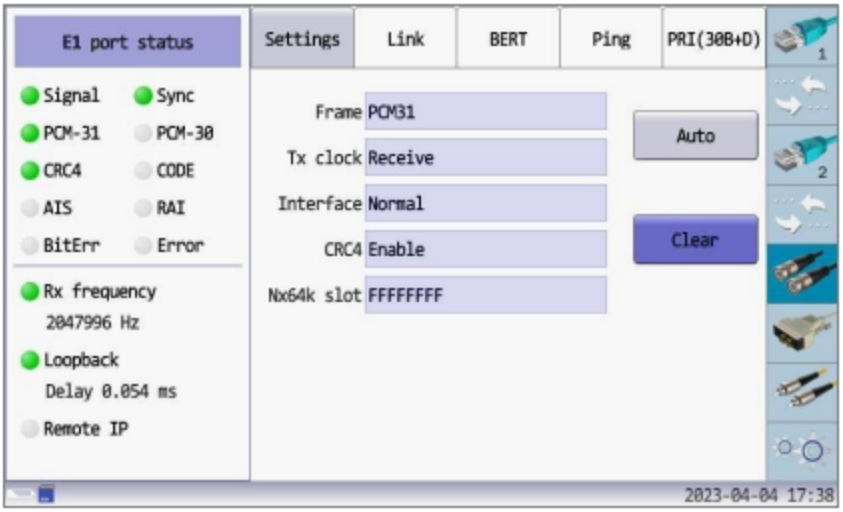
User side frame relay test

1). Test networking

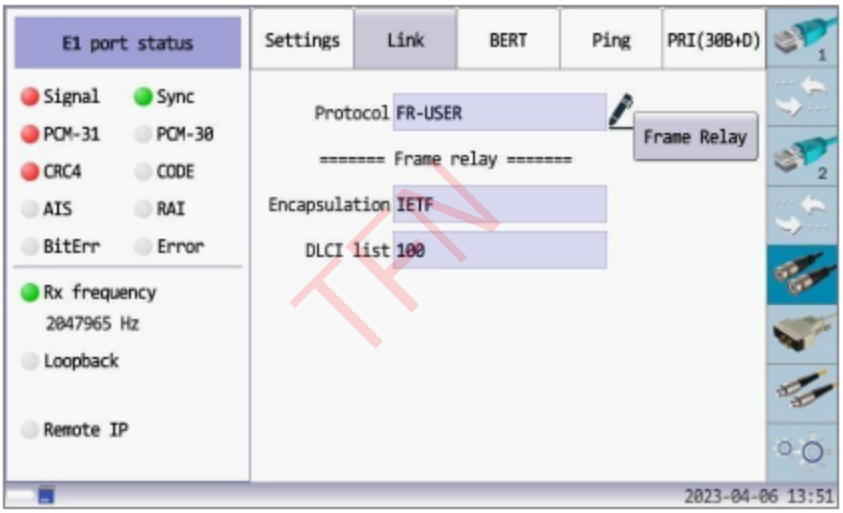
When the router WAN port uses a frame relay protocol, the simulated user side frame relay test is an interface protocol test for a frame relay switch



2). Test parameters



Set E1 port parameters. In this case, "Send Clock" generally selects "Receive Clock", and other parameters can be obtained using "Automatic Detection".



Set frame relay parameters and DLCI correctly. In this case, select "User Side" for "Frame Relay Mode", and the DLCI needs to be determined based on the on-site configuration.

3). Test process

During the testing process, the instrument simulates a router, establishes a frame relay link with an ATM or frame relay switch, and records and counts the transmission and reception of data packets from the frame relay interface protocol.

4). Test results

The test results have multiple pages that record the operational status information of the frame relay interface.

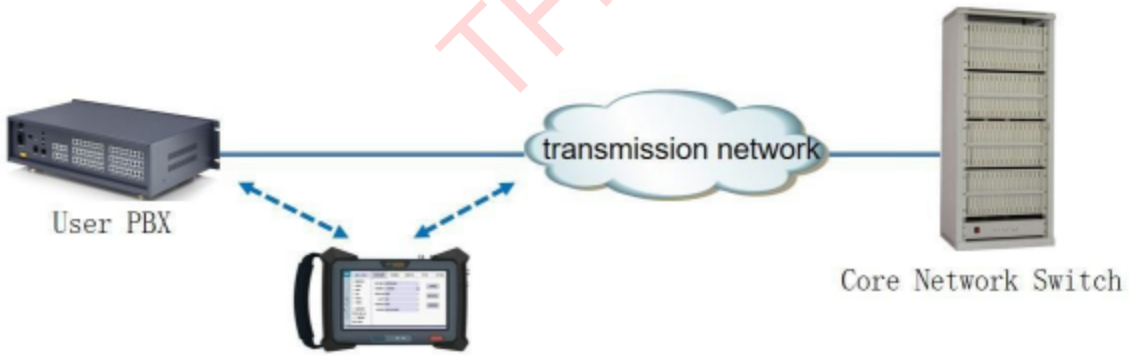
5). Save test results as needed

6). End of Test

PRI (30B+D) call test

1). Test networking

Group users will use PBX (Private Branch Exchange) to support voice call functions. The PBX is connected to the core network switch through an E1 PRI (30B+D) dedicated line. This function is used for the opening and maintenance of PRI (30B+D) dedicated lines.



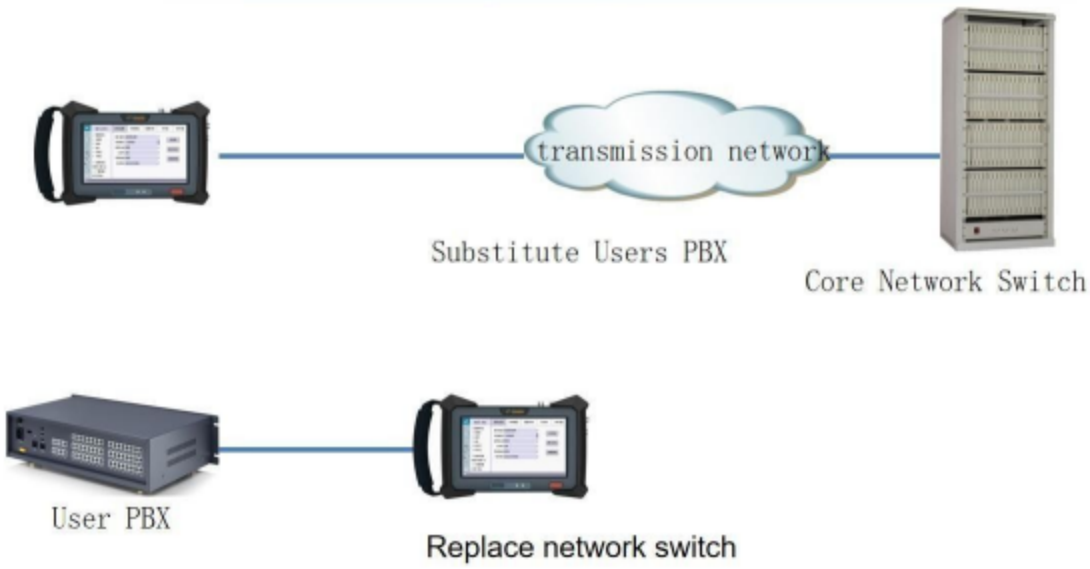
On the site of a PRI dedicated line, there may be two situations:

A. Substitute for PBX and conduct call testing with core network switches through PRI dedicated lines to test PRI dedicated lines and data configurations;

B. Replace the core network switch and conduct call testing with the PBX to test the PBX;

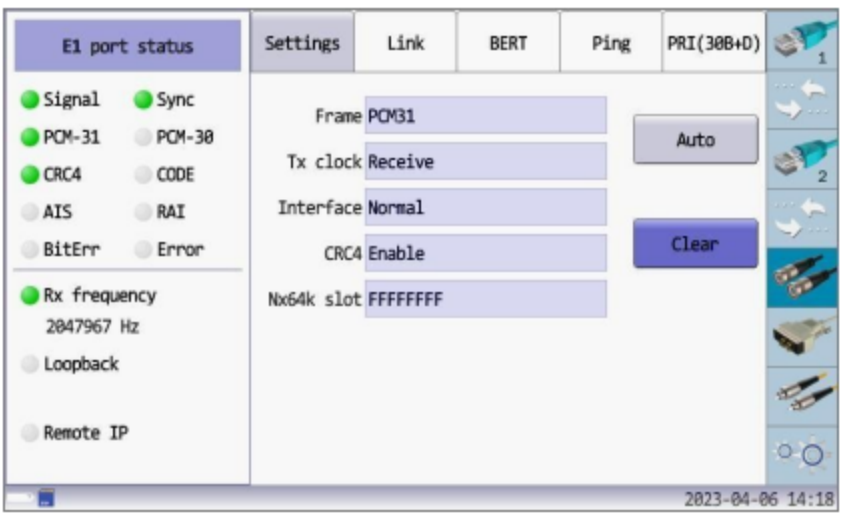
Scenario A is a common scenario.

Two roles in PRI field

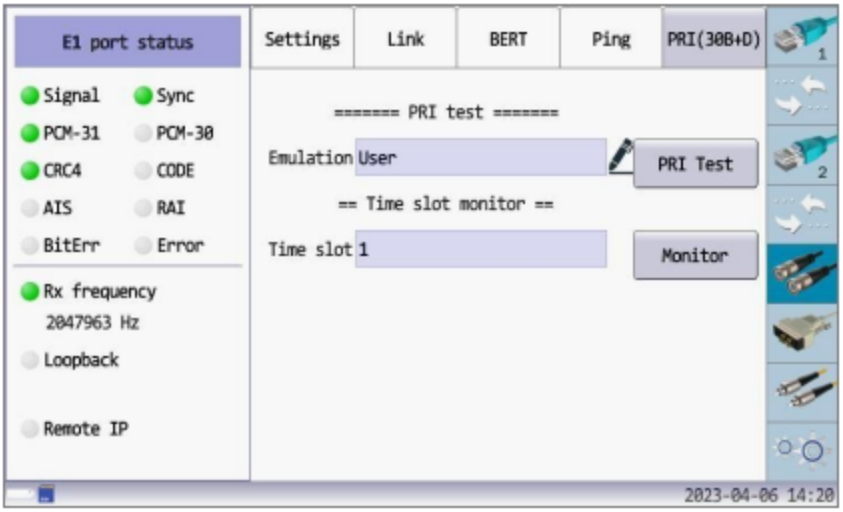


2). Test parameters

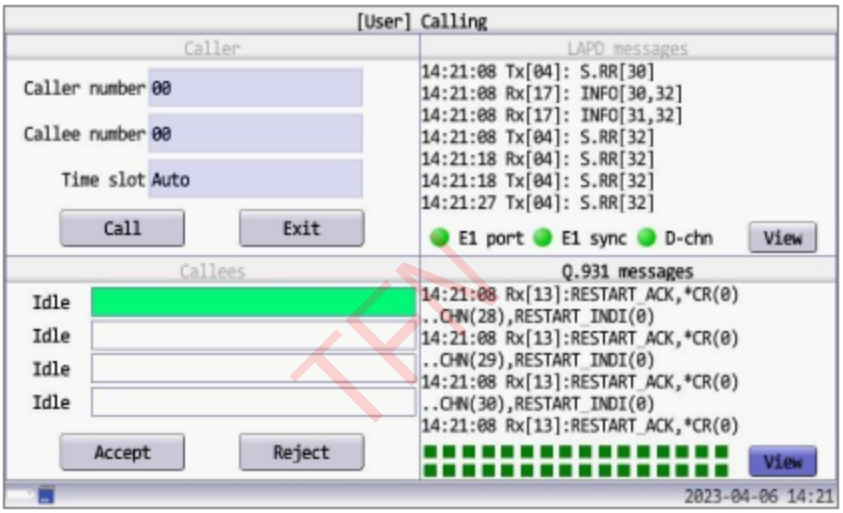
Set E1 port parameters. In this case, "Send Clock" generally selects "Receive Clock", and other parameters can be obtained using "Automatic Detection".



PRI simulation should be chosen as appropriate, generally "user side".



Click PRI Test to start the PRI test interface.



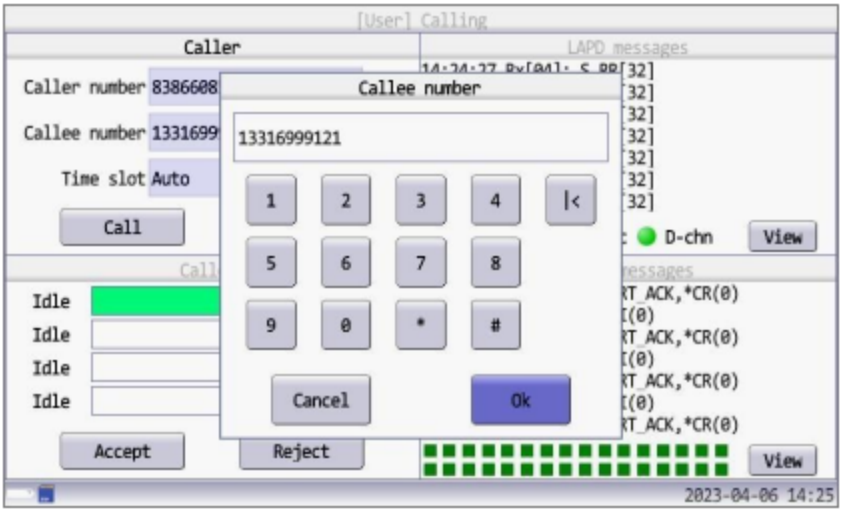
In the PRI main window, pay attention to the "E1 Signal", "Frame Synchronization", "D Path" and other signals in the "LAPD Link Message" sub-window. Normally, these signals should be green; At the same time, in the sub-window of Q931 Call Message, there are 32 B-channel status indicators in the lower part. Normally, after the PRI interface is docked, it should also be green.

In the Outlet Settings, fill in the Caller Number and Callee Number correctly, which are determined by the situation on the spot.

3). Test process

First, plug the headphone cable into the "PHONE" headphone hole on the side of the gauge.

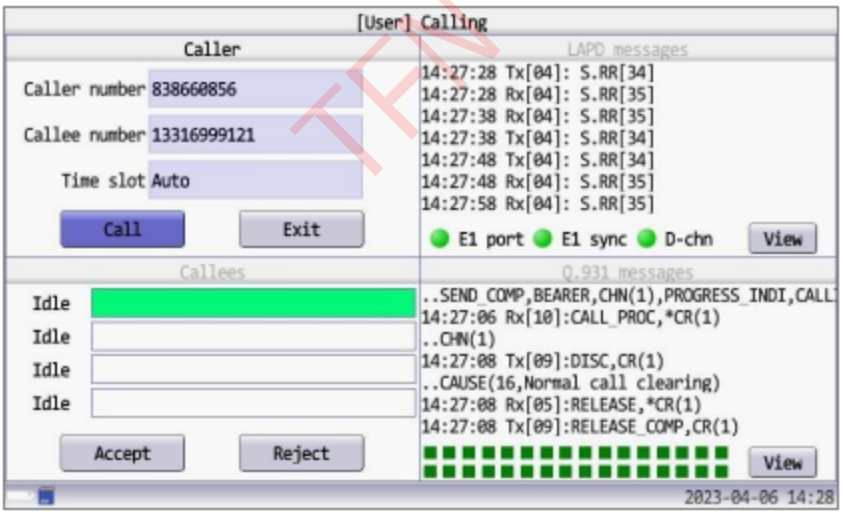
Exhalation test: In the Exhalation Settings subwindow, click the Call button to start the Exhalation test.



If the settings are correct, you can hear the ringtone at this time, and if the other party answers, you can have a voice call.

If the settings are incorrect, the call sub-window closes as soon as it flashes and the call fails, you can view the reason code in the call message through the Q931 call sub-window to find out the cause of the failure and make the correct call.

Inbound test:



When calling into PRI from an external network, the Call-in Queue subwindow displays the current call information, including the caller and called number of this call, and flashes. Click the "Answer" button to answer the call and enter the call status.

During a call, you can make a call through the headset and the microphone.

4). Result Storage

The contents of the LAPD Link Message and Q931 Call Message subwindows can be stored in files. These include LAPD link-to-link messages and Q.931 protocol messages during a call, which can be used to track the progress of a call.

5). End of Test

6. V.35 Interface Test

Introduction to V.35 Interface

The initial version of the V.35 recommendation was released in 1968 by ITU-T. At that time, with the increase of data communication transmission rate, the transmission over 48kbps of audio circuit was more and more widely used. In order to solve this kind of problem on analog circuit, so that data over 48kbps can be transmitted on 60kHz-108kHz base group circuit. ITU-T formulated V.35, V.36 and V.37 standards, and implemented the broadband modem for 48kbps-144kbps data transmission. In some books, V.35, V.36 and V.37 were also available. The V.36 and V.37 standards are collectively referred to as the V.35 protocol cluster. The V.35 recommendation itself is considered an interface between a broadband analog modem and a DTE with a data rate of 48 Kbps and 64 kbps

As the use of broadband analog modems decreases, V.35 is often used as an interface between different types of data service unit (DSU) connections to support DTE and emerging digital transmission facilities. As a result, after several revisions to the original V.35 recommendation, it now supports data transfer rates up to 6Mbps and has become a popular high-speed synchronization interface for connecting remote devices. Currently, most service units, such as packet switches, routers, remote bridges, and gateways, have V.35 interfaces.

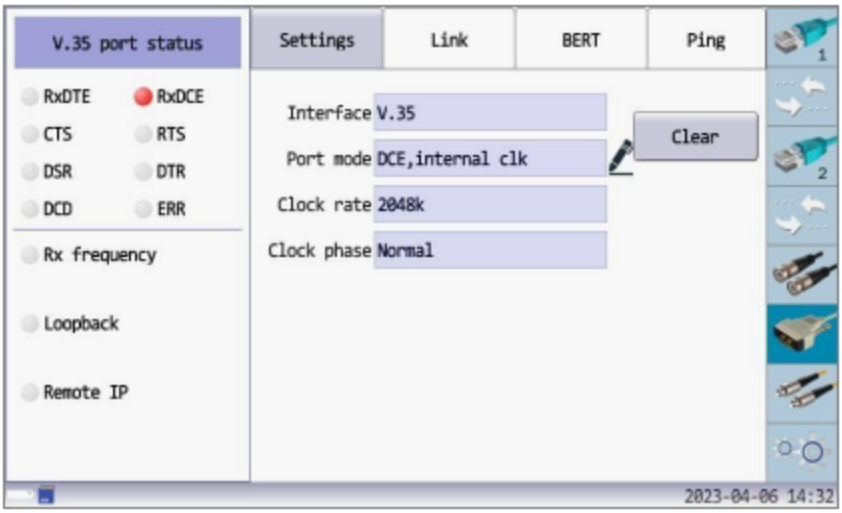
V.35 does not specify the mechanical characteristics, that is, the shape of the connector. However, due to the popularity of Bell-size modems with 48kbps-64Kbps in the United States, the 34-pin ISO2593 is widely used. It is a 34-pin plug/seat and the connector is shaped like the 34-pin plug-in in the figure. In practical applications, it is common to use pin connectors at both ends of V.35 cables and connectors, whereas hole connectors are used on DTE and DCE devices.

The ability of ISO2593 to transmit at high speed depends on its signal mode. To accommodate high-speed signal transmission, similar to RS-422, the V.35 data and timing signal circuits use a balanced (differential) approach, which can reduce or prevent interference and support higher data transmission rates. V.35 uses both single-ended and differential signals, with differential levels for data and clock lines and unbalanced V.28 levels for control lines.

V.35 interface cable uses balanced twisted multi-wire pair cable with characteristic impedance of 80 ohm-120 ohm, signal source impedance of 50 ohm-150 ohm, load impedance of 100 ohm, normal voltage between pairs of balanced lines: 0.55V++ 20%, binary'0'for voltage V+>V-and binary'1' for voltage V+.

Although the common rate range for V.35 is 48-64 Kbps, it can also support higher rates such as ISDN (64 or 128 Kbps), channelized T1 from 128 Kbps to 1.544 Mbps, ATM, and frame relay. With a V.35 of 100 Kbps, the theoretical length of the cable can reach 4,000 feet (1,200 meters), depending on the equipment and cable quality.

Interface parameters



1). Port type: V.35, V.24

The V.24 mode interface only supports synchronous data transfer mode.

2). Port mode: DTE receive clock, DCE internal clock

Provides support for these two modes for typical situations on maintenance sites. Use DTE to receive clock when docking with protocol converter; Use DCE internal clock when docking with router.

3). Test rate: 64kHz-2048kHz

Set the clock frequency of the interface.

4). Clock phase:

Defines the clock phase of the transmission line. Normally select Normal.

Alert Cleanup

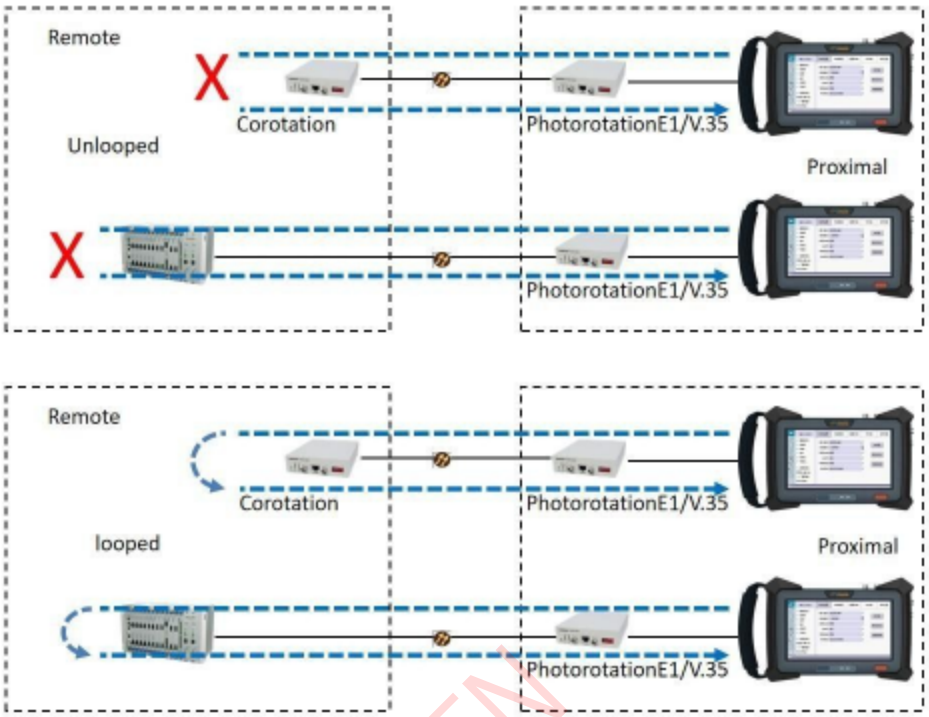
Changes in the interface signal may cause transient signal instability during long testing or during the unplugging of V.35 connector cables. To indicate that such signal instability has occurred, the signal indicator flashes to alert the instrumentation operator that there has been a signal instability event.

The Alert Cleanup button is used to clear the Event of Signal Instability. After clicking, the instrument clears the historical alarm and the signal indicator stops flashing and enters a stable display state.

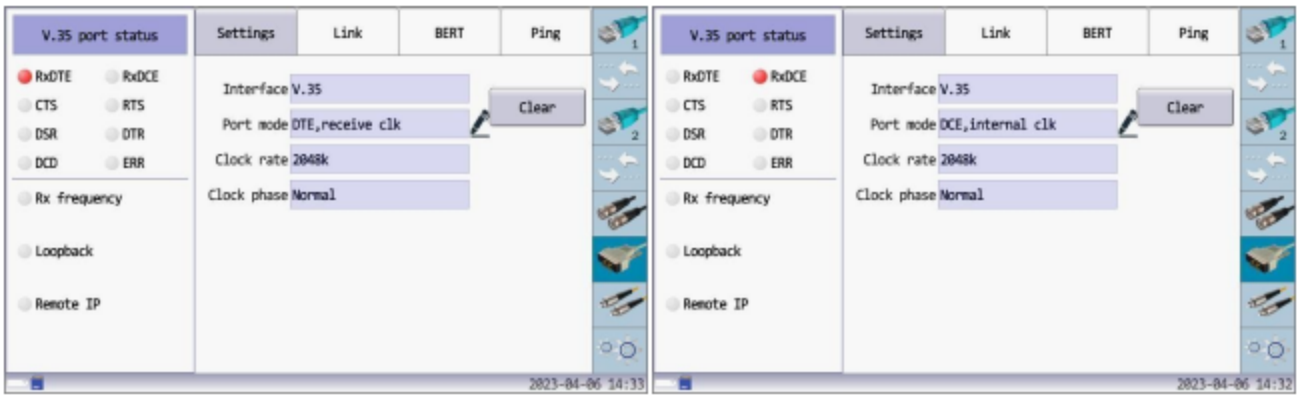
Loop Discovery

In the process of field operation and maintenance, it is often necessary to measure loop error code or loop PING, which requires rings on remote devices: soft rings or hard rings. Soft rings need to be completed by the network administrator's colleagues, and hard rings need to be completed by remote colleagues on the device with a ring plug.

Site conditions are often more complex, and it is sometimes difficult to determine if the distal ring has been made. The purpose of the loop discovery function of this instrument is to provide a simple and clear representation of the current state of the loop.



Connect the V.35 cable to the instrument and adjust the interface parameters. If the remote end is looped, the Loop Discovery indicator turns green and provides a rough round-trip delay value for reference. If there is no loop at the far end, the Loop Discovery indicator is gray and has no value for the loop delay.



Status of remote uncycled

Loop state at the far end, providing reference for loop delay

Once the status of the remote loop is confirmed, further loop error testing or loop PING testing can be performed.

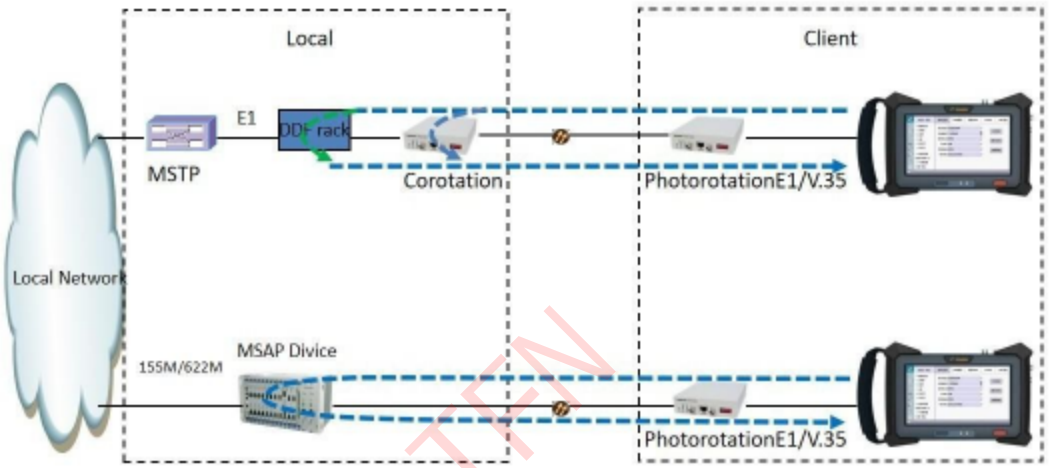
Err Test

1).Test Definition

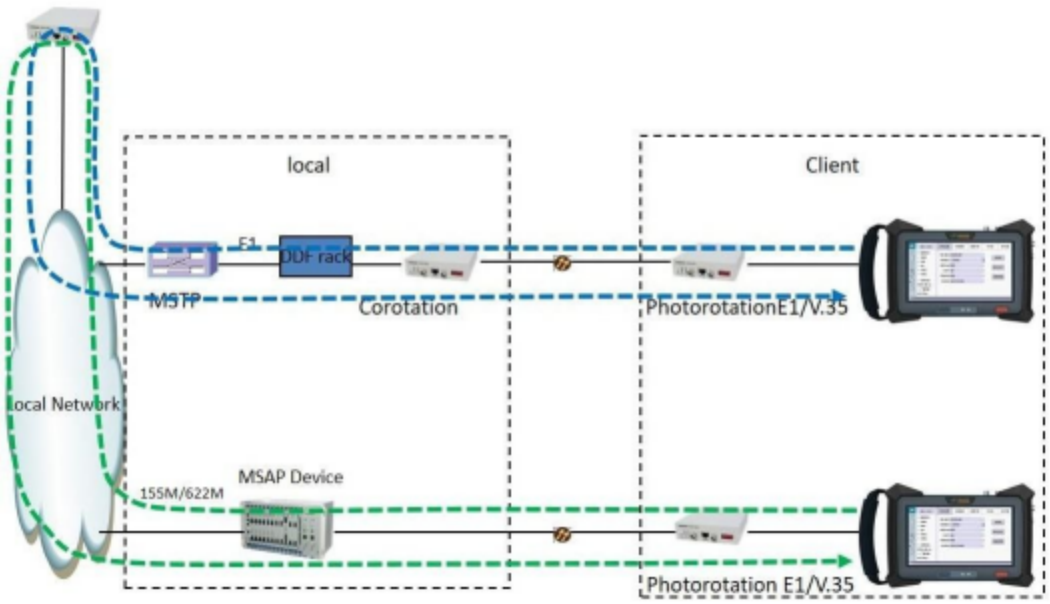
Refer to the definition of error code test in E1 interface.

2). Test networking

Error code testing generally takes the form of loops. Depending on the site conditions, the following networking testing methods can be used

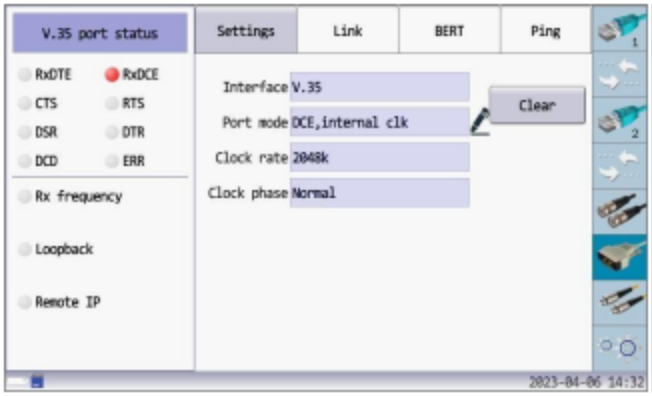


Loop 1

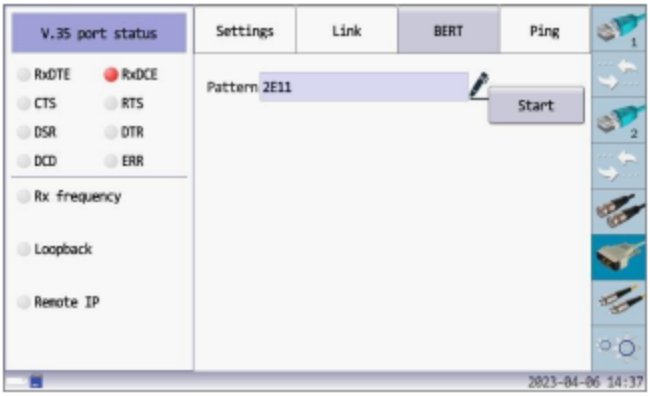


Loop 2

3).Test parameters



Configure V.35 port parameters correctly



Select Test Code Type

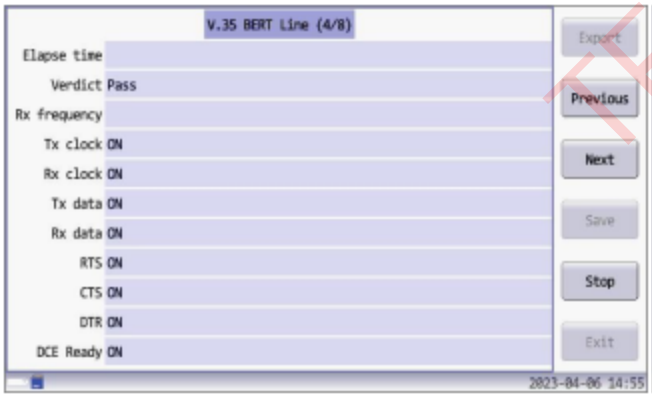
Test code type: choose one from 2E7 to 2E21

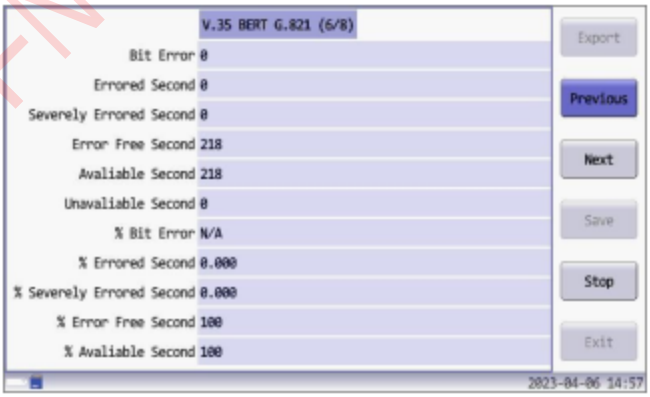
4). Test process

During the error code test process, the sending line of V.35 interface sends the test PRBS code stream, the receiving line of V.35 interface detects the received PRBS code stream, and counts the number of line errors and BIT errors.

5). Test results

The test results include multiple pages showing the statistical results of the error code test.





6). Save test results as needed

7). End of Test

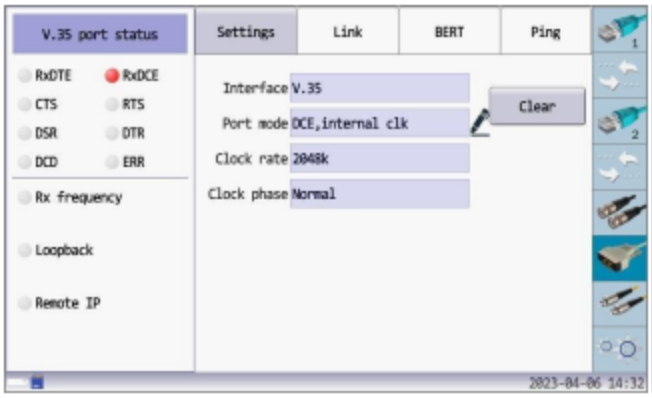
Loop PING

In loop mode, in addition to error code testing, self-loop PING can also be used to verify line quality.

1). Test networking

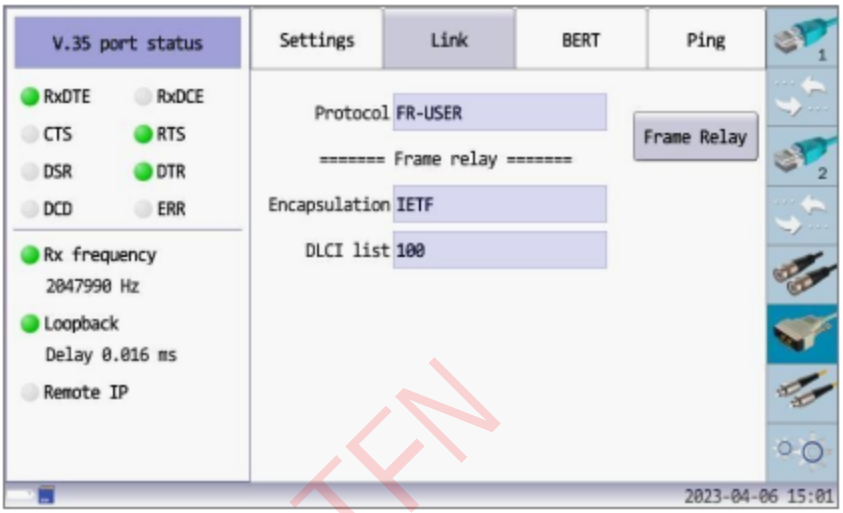
Same as Error Code Test.

2). Test parameters



Configure V.35 interface parameters correctly

Set Frame Relay Mode to User Side

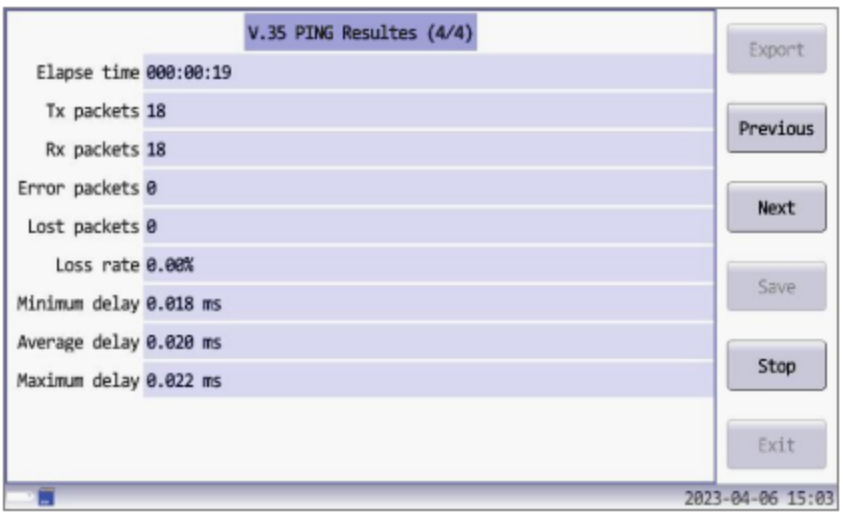


Set Local IP and Destination IP to be the same

3). Test process

During the test, the instrument sends ICMP packets through the transmission line of the V.35 interface, and receives the ICMP packets returned from the loop on the receiving line of the V.35 interface. The results are displayed as a percentage.

4). Test results



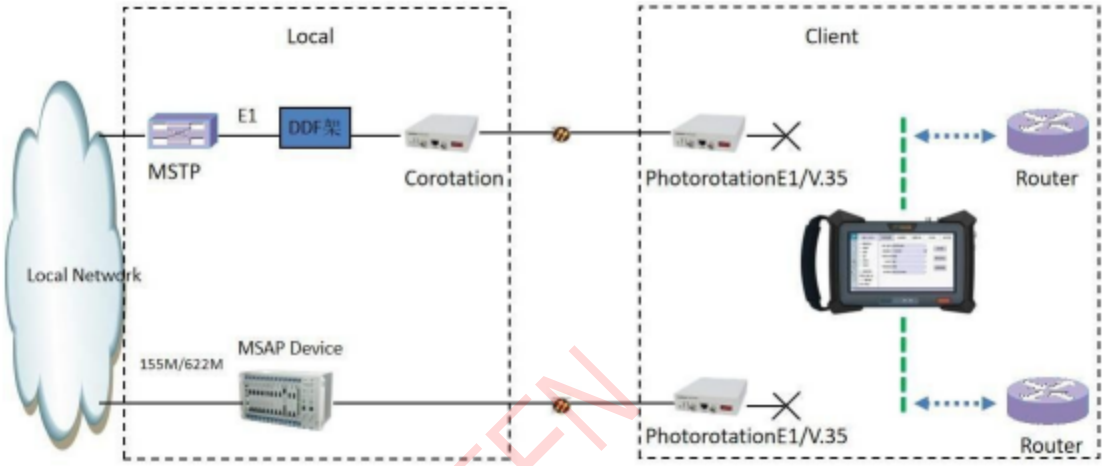
5). Save test results as needed

6). End of Test

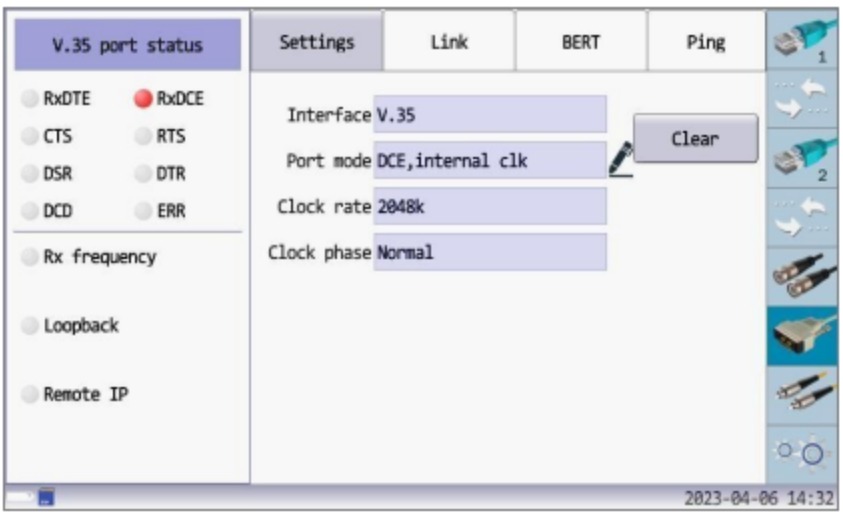
Proximal PING

1). Test networking

The proximity PING test is for the WAN port of the proximity router. For barrier detection needs, disconnect user routers from protocol converters, replace protocol converters with instrumentation, establish connections with proximal routers, and conduct PING tests to troubleshoot barriers.



2).Test parameters



Setting V.35 port parameters, in this case, "port mode" generally selects "DCE internal clock".

If the WAN port protocol is frame relay, the frame relay parameters and DLCI need to be set correctly. In this case, Frame Relay Mode generally chooses Network Side, and DLCI is determined by the configuration of the field router.

Set IP address and PING parameters.

First observe if the Link indicator is green. If the link light is gray, it means that the data link layer protocol of V.35 port is not up yet and PING test cannot be performed. This situation requires waiting for the link to link up or checking the configuration.

If the link light turns green, the data link layer protocol between the instrument and the router is up and PING is possible.

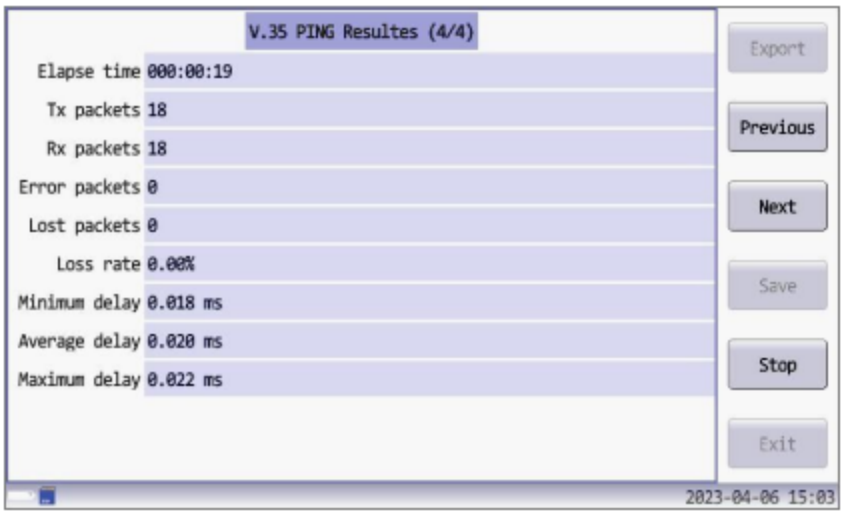
Destination IP can use automatically acquired values: click the View button to see the IP address of the WAN port of the router, which can be used. The destination IP can also be set to another value if there is a special need. If you can't see the IP address of the router, you need to decide the destination IP based on the field configuration.

Local IP can be obtained by adding or subtracting one from the destination IP, for example, if the destination IP is 1.0.0.3, then the local IP can be set to 1.0.0.2 or 1.0.0.4. Local IP can also be set to other values if specific requirements exist.

3). Test process

During the test, the instrument sends ICMP-REQ packets to the router through the V.35 interface, waits for ICMP-ACK packets to be received from the router, checks and counts the packet loss, and the results are displayed as a percentage.

4). Test results



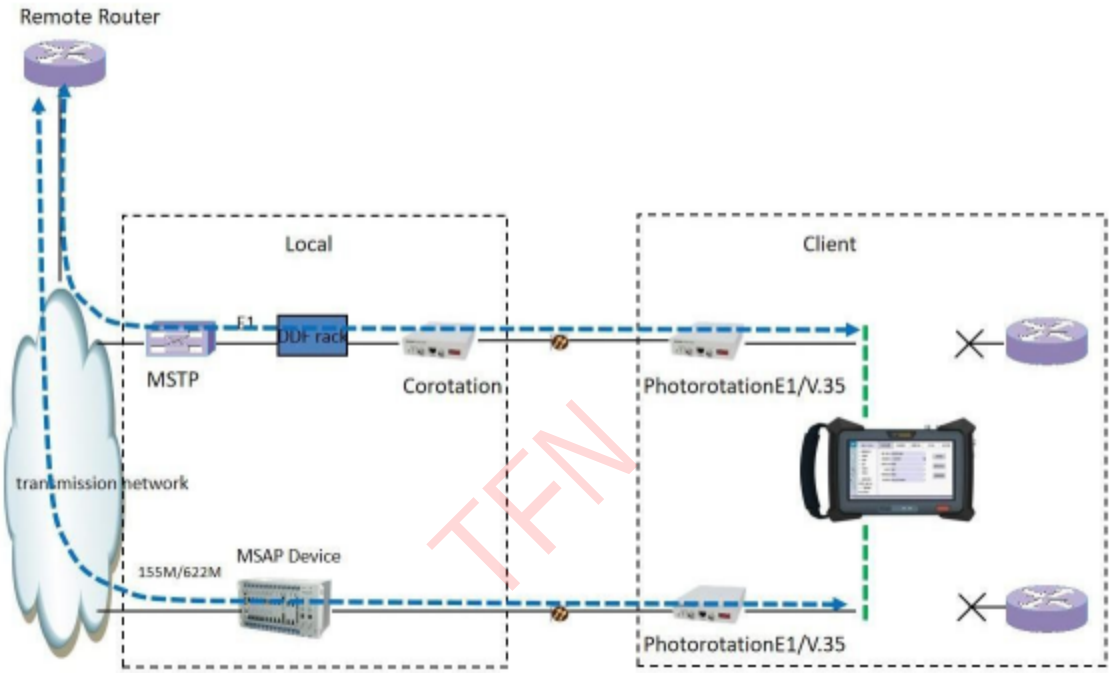
5) Save test results as needed

6). End of Test

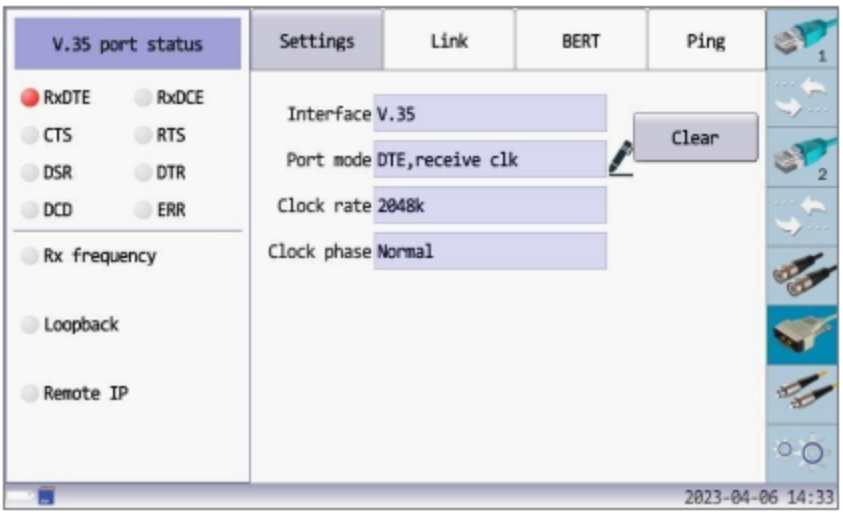
Remote PING

The remote PING test is a test for the WAN port of a remote router. In some cases where loop error testing is not possible, a direct connection to a remote router can be established to perform PING tests to verify line quality.

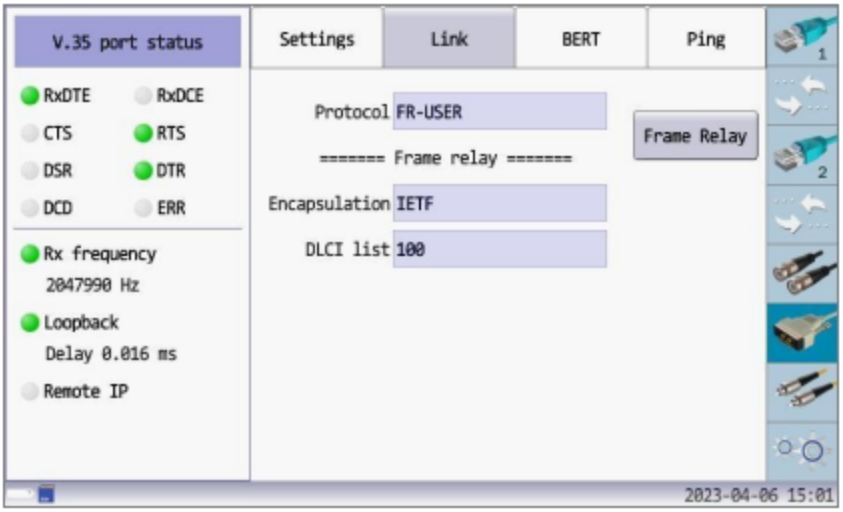
1). Test networking



2). Test parameters



Setting V.35 port parameters, in this case, "port mode" generally selects "DTE receive clock".



If the WAN port protocol is frame relay, the frame relay parameters and DLCI need to be set correctly. In this case, "Frame Relay Mode" generally chooses "User Side", and DLCI needs to be determined according to the field configuration.

Set IP address and PING parameters.

First observe if the Link indicator is green. If the link light is gray, it means that the data link layer protocol of V.35 port is not up yet and PING test cannot be performed. This situation requires waiting for the link to link up or checking the configuration.

If the link light turns green, the data link layer protocol between the meter and the remote router is up, you can PING.

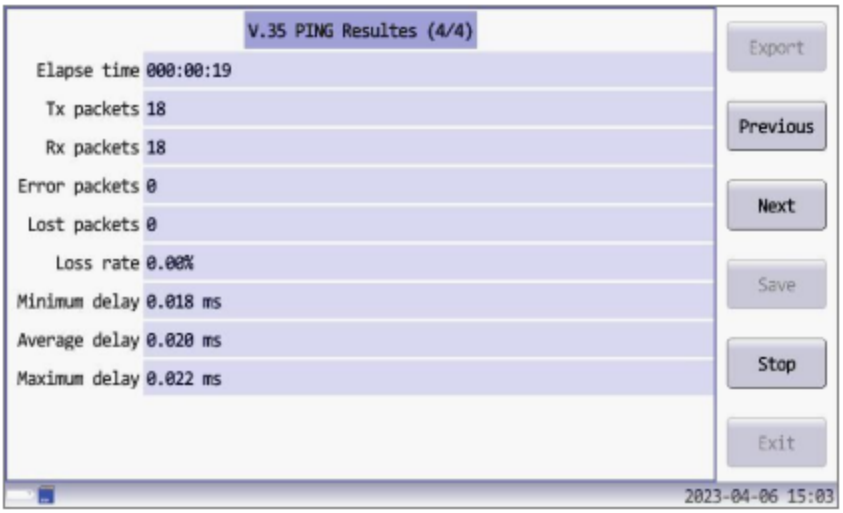
Destination IP can use automatically acquired values: click the View button to see the IP address of the WAN port of the remote router, which can be used. The destination IP can also be set to another value if there is a special need. If the IP address of the remote router cannot be viewed, the destination IP needs to be determined based on the field configuration.

Local IP can be obtained by adding or subtracting one from the destination IP, for example, if the destination IP is 1.0.0.3, then the local IP can be set to 1.0.0.2 or 1.0.0.4. Local IP can also be set to other values if there is a specific requirement.

3). Test process

During the test, the instrument sends ICMP-REQ packets to the remote router through the V.35 interface, waits for ICMP-ACK packets to be received from the router, checks and counts the packet loss, and the results are displayed as a percentage.

4). Test results



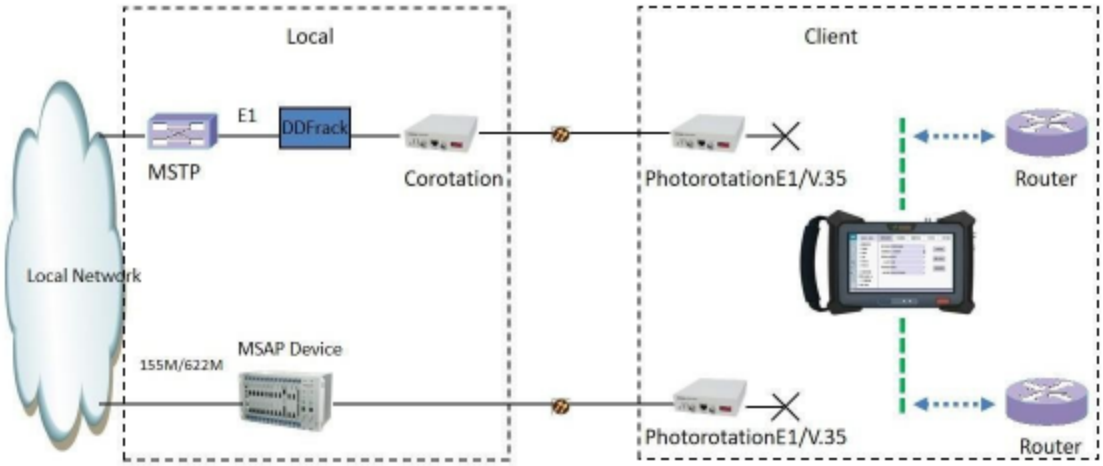
5). Save test results as needed

6). End of Test

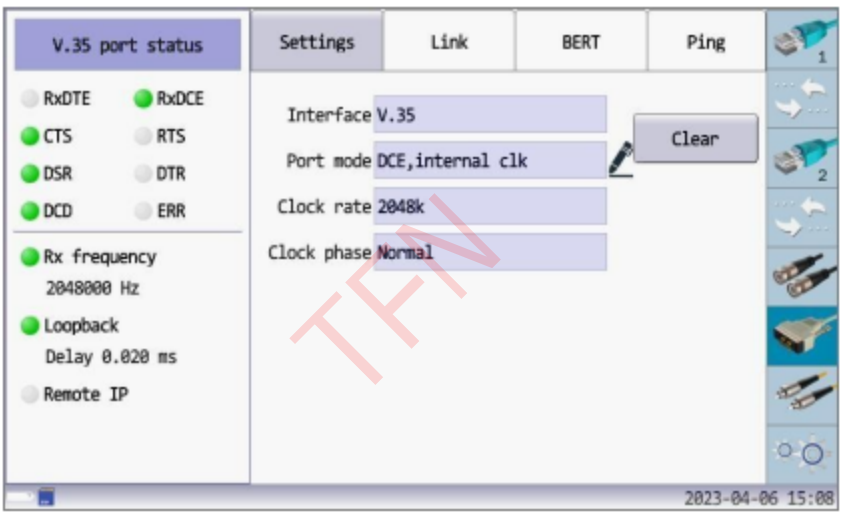
Network Side Frame Relay Test

1). Test networking

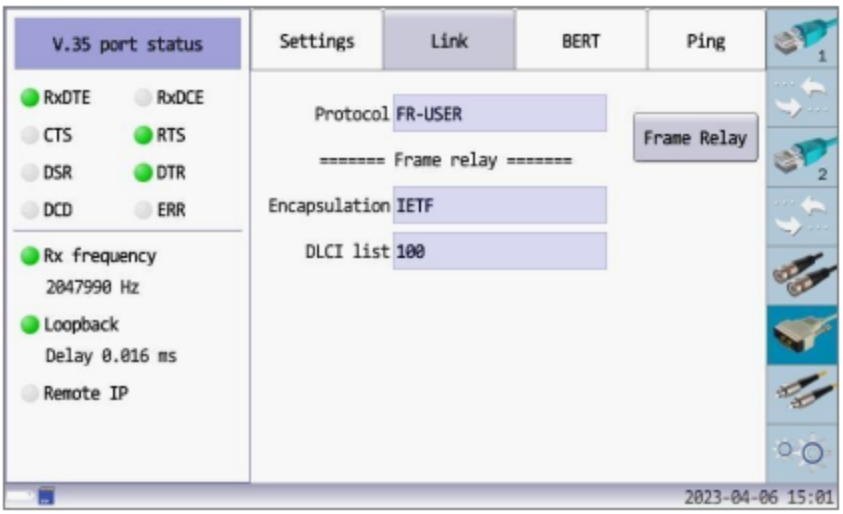
In the case where the WAN port protocol of the router is frame relay, the frame relay test on the analog network side is for the WAN port of the near-end router. For the purpose of troubleshooting, disconnect the user router from the protocol converter, replace the protocol converter with instrumentation, establish a connection with the near-end router, and conduct frame relay testing to troubleshoot the obstacles.



2).Test parameters



Set V.35 port parameters, in which case "port mode" generally chooses "DCE internal clock"



Set frame relay parameters and DLCI correctly. In this case, Frame Relay Mode selects Network Side, and DLCI is determined by the configuration of the field router.

3). Test process

During the test, the instrument simulates the frame relay network side, establishes the frame relay link with the router, records and statistics the received and received packets of the frame relay interface protocol.

4). Test results

The test results have multiple pages, recording the running state information of the frame relay interface.

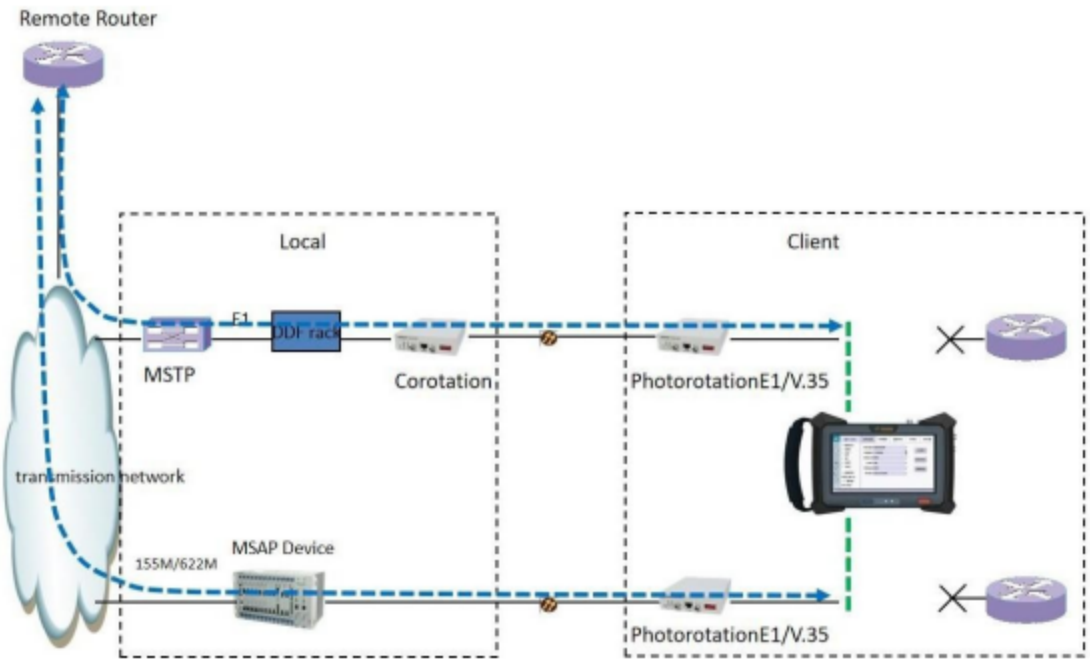
5). Save test results as needed

6). End of Test

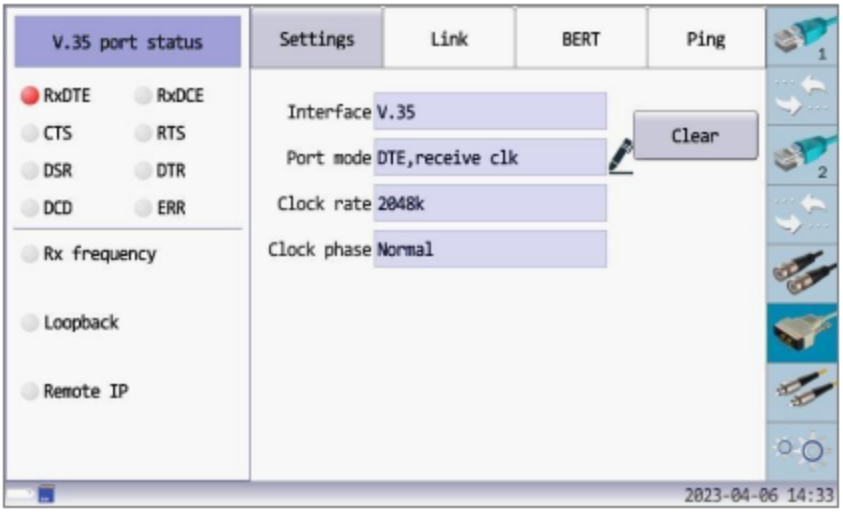
User Side Frame Relay Test

1). Test networking

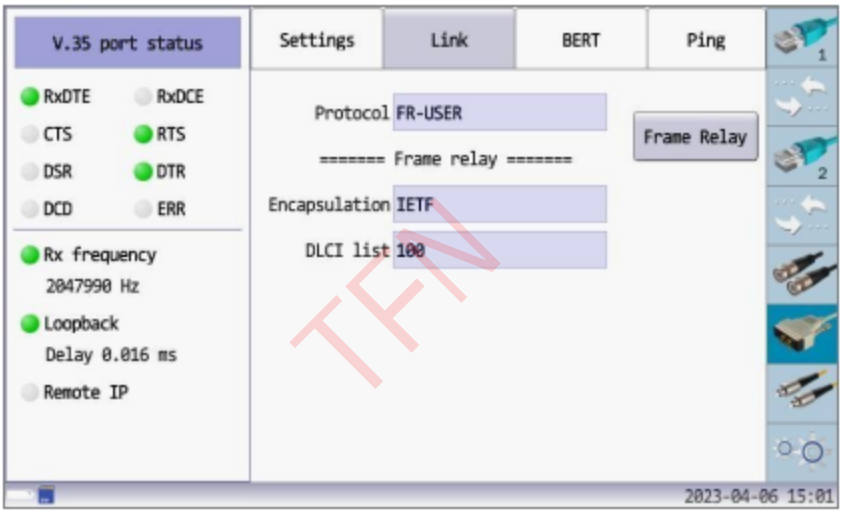
In the case of frame relay protocol used in router WAN port, frame relay test on analog user side is an interface protocol test for frame relay switch.



2). Test parameters



Set the V.35 port parameters, in which case Port Mode selects DTE Receive Clock.



Set frame relay parameters and DLCI correctly. In this case, "Frame Relay Mode" chooses "FR-User ", and DLCI is determined by field configuration.

3). Test process

During the test, the instrument simulates a router, establishes frame relay links with ATM or frame relay switches, and records and counts packets sent and received by the Frame Relay Interface protocol.

4). Test results

The test results have multiple pages, recording the running state information of the frame relay interface. 33

5). Save test results as needed

6). End of Test

7. Optical Interface Testing

Optical power meter

1). Test Instructions

The meter has a dedicated optical power meter built in.

Wavelength range: 800 to 1700 NM

Calibrated wavelength: 850/980/1300/1310/1490/1550

Probe type: InGaAs

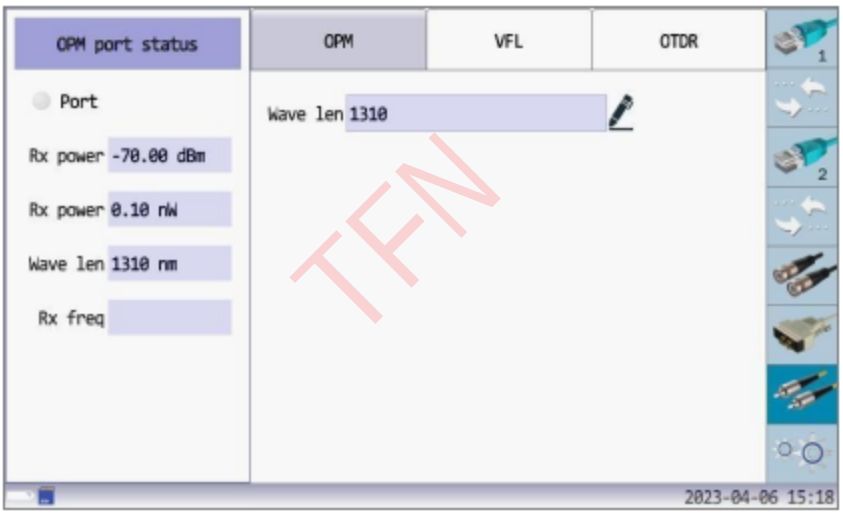
Power measurement range: -70dBm~+6dBm / -50dBm~+26dBm

Uncertainty: ++ 0.25dB

Linearity: 0.03dB

Display resolution: 0.01dB

2). Test process and results



The optical power connector is located on the side panel of the instrument. Open the optical power connector, connect the optical fiber to be measured, and read the current received optical power value directly from the instrument interface.

3). End of Test

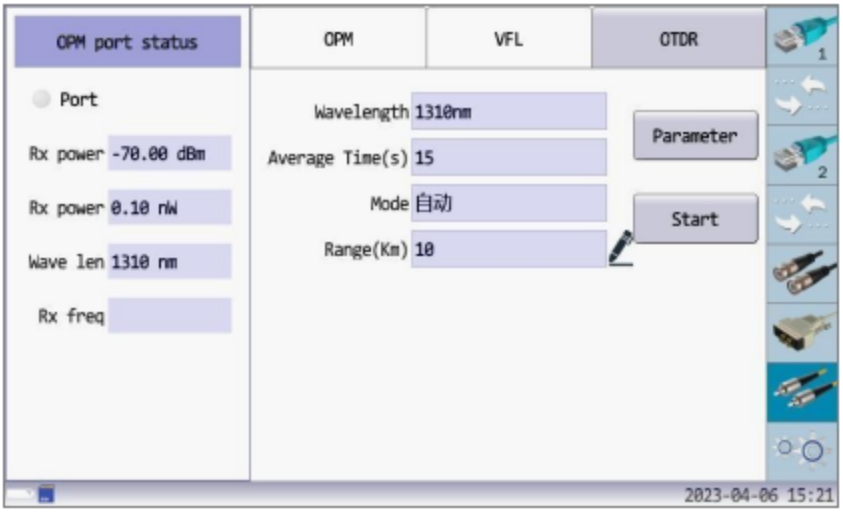
Fiber optic breakpoint test

1). Test Instructions

Fiber optic breakpoint test function, which measures the distance from the current fiber to the distal breakpoint, end, dirty end, or excessive reflection events.

2). Test process and results

Enter the refractive index parameters of the optical fiber and click Start Test to start the test.



3). End of Test

Red light source

1). Test Instructions

The instrument has a special red light source (visual fault detector) built in.

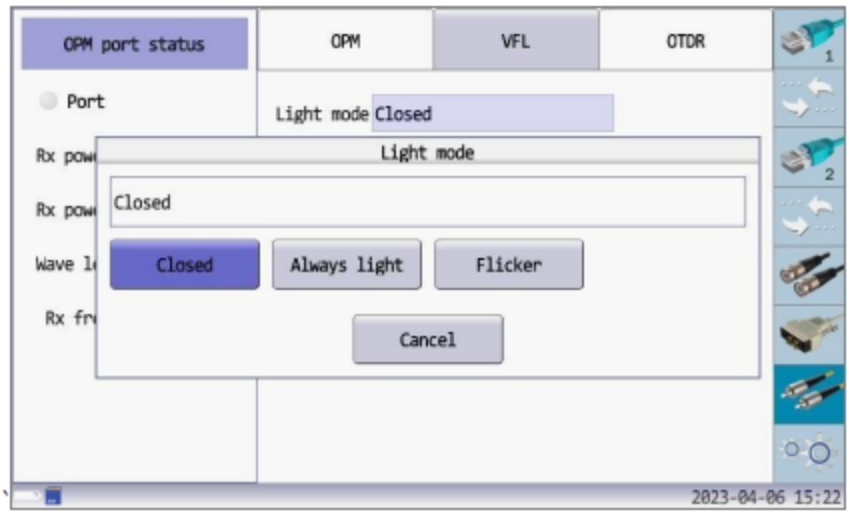
Operating wavelength: 650 nm

Output power: >10mW

Frequency flicker: Off/Always bright/2Hz

2). Test process

The red light source connector is located on the side panel of the instrument. Open the red light source connector and connect the optical fiber to be measured. The light-emitting mode selected directly on the interface of the gauge enables the red light source of the gauge to operate in the specified mode.



3). End of Test

8. Test Result Management

Built-in FTP Server

The instrument has a built-in FTP server for managing test results.

Manage IP Addresses

Unlike the Ethernet interface used for testing, it is located on the side of the dashboard and has an RJ45 network port, which is dedicated for instrument management. Corresponding to this network port, there is an IP address for management and data export, called "Manage IP Address".

Connect the network cable to the management outlet on the side of the gauge.
A. If there is a DHCP server in the intranet, the meter will automatically get the IP address in about 10 seconds;
B. If there is no DHCP server on the intranet or if the meter is connected directly to the computer, the instrument uses the default local IP address: 192.168.1.6;
C. Click on the "Manage Settings" icon, and in the information box that pops up, you can see the current "Locally Managed IP Address" of the gauge.

storage medium

Each time the meter is turned on, the default storage medium used is the TF card. You can also choose to use a U disk as the storage medium through the Storage Selection item in Administrative Settings. Instrument factory defaults to a 8G TF card.

Browser/Explorer

Connect directly to the computer and instrument with a network cable, and manually set the IP of the computer to 192.168.1.7.
Turn the instrument on.
Open a browser on your computer and type in the address bar
ftp://192.168.1.6
The browser page will display
/sdcard
/usbdisk
Two directories, click in as needed, and you will see the result file of *.test, which can be "saved locally" to back up on your local computer.

FTP On The Go PRO

You can also use other FTP client software to download and manage the test result files inside the instrument in bulk.

9. Warranty Period

TFN offers a one-year warranty on instrumentation hardware, software and solids from the date of shipment to the customer. TFN Technology also offers customers an extended warranty or a three-year warranty on the original purchase. In this way, the tester cabinet, software and firmware can be guaranteed for a longer period of time.

Contacting Customer Service

Please check our website (www.tfngj.com) for updates to this manual and additional application information. If you need technical or sales support, please contact local TFN Technologies Customer Service.

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