# GIGATEST

**1 Port Compact Sized Wirespeed Gigabit Ethernet Tester**



**Hobbes®**
**I N N O V A T I O N**

# 1 Port compact sized wirespeed gigabit ethernet tester

GIGATEST is an innovative compact network test equipment in the market that constructs several pioneering features that make on–site cabling and analysis for network construction easy and efficient.

For the network cabling of a new building or office, it is often done by third party contractor. The technical personnel may not care about the real throughput and most of contractor only do the simple test by network cable tester to make sure that cable are well arranged and connected.

However, problems always happen when the MIS start to deploy the network equipment inside the office. They may find that the cables are either unable to reach the Wirespeed transmission or lots of error packets are received during data transmission.

GIGATEST is an ideal Ethernet tester for testing and troubleshooting potential problems of data transmission and bandwidth in the field. GIGATEST works by pair with roles of Lord and Servant. Without extra standby personnel at the other test site, two GIGATEST negotiate with each other automatically, start bi–directional symmetric/ asymmetric Wirespeed transmission, synchronize the test result and store result at Lord GIGATEST.

For installation of asymmetric transmission network such as ADSL that downstream speed is much faster than upstream speed, it is difficult to test the network by general loopback method that data transmission speeds between two sides must be the same. Unique Asymmetric Loop Test of

GIGATEST is able to do customized speeds asymmetric transmission test that can verify the transmission quality of ADSL for ISP or Telecom Company.

With this affordable price and excellent functions for network probe and test on–site, GIGATEST is comprehensive solution for data transmission test in cable wiring phase or troubleshooting phase in the field.

## Accessory

• USB power adapter

• USB 2.0 cable

• RJ45 cable

• Cleaning wipe

• Ceramics driver

• GIGATEST CD (driver and user manual)

## Key features

• Wirespeed gigabit packet generator and analyzer for bi–directional symmetric and asymmetric transmission test

• Packet generation of short, long and random length packet by on–panel operation

• A pair of GIGATEST that serve as Servant and Lord for Bi–directional or Loopback transmission test.

- Mesh Loop function test that forward test streams to up to five GIGATEST in mesh LAN

- Internet connectivity test by accessing and downloading file from internet.

- Support Layer 1 and Layer 2 loopback

- Five customized test modes on rotary switch that can be configured by PC in advance and operated by on–panel button at test site

- Time based test by rotary time switch or packet counts based test via configuration of utility software
- User–defined packet loss criteria for loopback test to determine Pass/Fail

- Asymmetric network Test such as ADSL without complicate settings.

- Powerful software application for advanced configuration/operation via USB cable

- Built–in rechargeable battery. Conduct tests on–site without extra power source

## Key benefits

- Connect PC is not required for operation of test procedure.

- Test product or network easily without specific expertise.

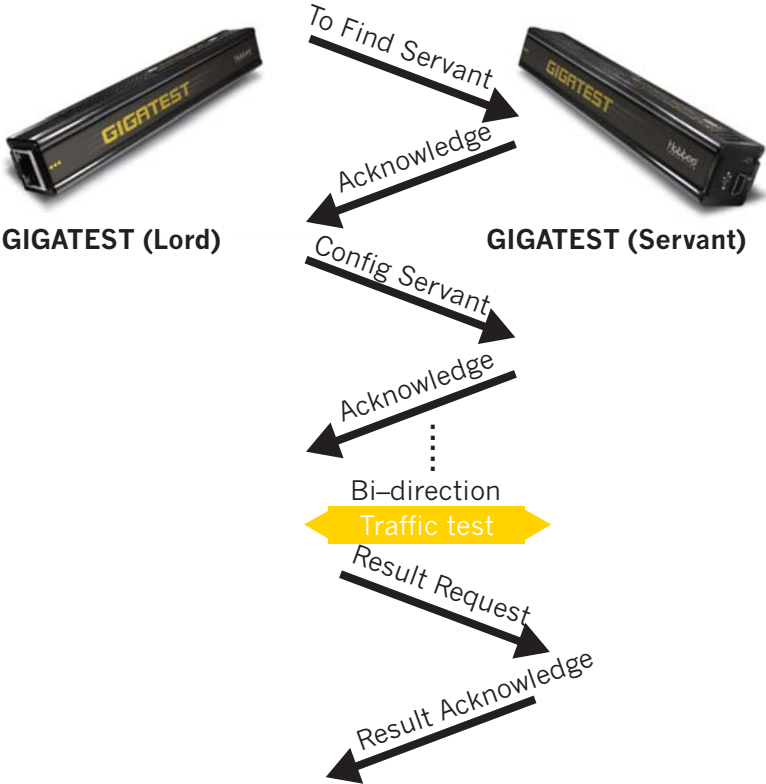- Compact and ultra light Gigabit Ethernet test device.

- Built–in rechargeable NI–MH battery for testing of Ethernet anywhere.

- 10 pre–defined test patterns, and 5 user–defined patterns for instant testing or customized application.

- Test Ethernet network by two GIGATEST that is located far away from each other.

- Auto–negotiation along with bi–directional Symmetric/ Asymmetric Wirespeed test or loopback test to measure the network.

## Main applications

- Network Detecting in Research and Development

- On–site test/repair/maintenance of network in telecommunication and cable wiring business

- Network wiring task and trouble–shooting in office or building

- Asymmetric transmission test such as ADSL

- Test connection status of Internet

- Solution of Last–mile test between CO (central office) and CPE (customer premises equipment)

- Integrated test solution for customized proposal.

## Bi–directional symmetric/asymmetric loop test

To Find Servant

Acknowledge

**GIGATEST (Lord)**          **GIGATEST (Servant)**

Config Servant

Acknowledge

Bi–direction
Traffic test

Result Request

Result Acknowledge

## Layer 1, layer 2 or bert koopback test



To Find Servant

Acknowledge

**GIGATEST (Lord)**

**GIGATEST (Servant)**

Config Servant

Acknowledge

Servant switch to the Loopback Mode
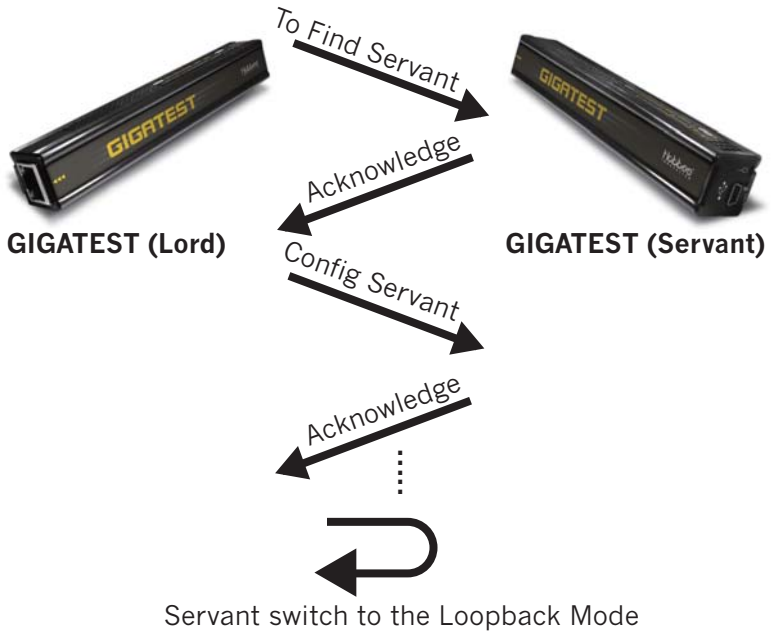
## Specifications

| Supported frame format | Ethernet II frame IEEE 802.3 frame |
|---|---|
| **Interface** | • Left Side:<br>-One 10/100/1000 Mbps UTP Ethernet port<br><br>• Right Side:<br>-One USB port (mini–USB connector)<br>-One power switch.<br><br>• Bottom Side:<br>-One set of 16 scales rotary switch for different function modes<br>-Two sets of 16 scales rotary switch for ID control<br>-Two sets of 16 scales rotary switch in second for control of test duration<br>-One clear counter button (Icon: 000)<br>-One broadcast test packet button (Icon: ▶t)<br>-One Run/Stop test button (Icon: ▶/■) |

| | |
|---|---|
| **Speed and link mode** | • Auto Negotiation/<br> Forced Mode<br> -10/100Mbps Half/<br> Full Duplex<br> -1000Mbps Full Duplex |
| **Traffic generation** | • Transfer rate<br> -Wirespeed by test button on<br> the device<br> -Customized in Mbps via<br> configuration of<br> utility software<br> -Asymmetric transfer rate by<br> a pair of GIGATEST for ADSL<br> test via configuration of<br> utility software<br><br> • Packet length<br> -Short packet length: 64<br> bytes by test button on<br> the device<br> -Long packet length: 1518<br> bytes by test button on<br> the device<br> -Random packet length: 64/<br> 128/256/512/768/1024/<br> 1518 bytes by test button |

| | |
|---|---|
| | • Specify fix length 64/128/256/512/768/1024/1518 bytes via configuration of utility software |
| | • Payload in frame<br>• Random by default button<br>• Selectable fix pattern, Byte increase, random or BERT via configuration of utility software |
| | • Time based test<br>• 0~255 seconds by rotary switch on the device or 00 on two rotary switches for infinite time till stop button is pressed<br>• Input test time required via configuration of utility software |
| | • Packet based test: Customized by packets counts via configuration of utility software |
| | • Generate specified VLAN ID tagged packet |
| | • Generate specified Destination IP/Source IP packet |

| Traffic receiving | • User–defined loss tolerance to identify Pass/Fail result of Loopback test<br><br>• No packet loss to identify Pass/Fail result of general test |
|---|---|
| Test result | • Pass or Fail LED indicator and log to show the result of test |
| Test mode | • Bi–directional Symmetric Loop Test from utility software<br><br>• Bi–directional Asymmetric Loop Test from utility software<br><br>• Packet Generation Test from utility software<br><br>• User–defined test modes from A~E scales rotary switch.<br><br>• Test mode A~E can be changed randomly<br><br>• Provide pre–defined template<br>A: P2P test<br>B: Packet Generation,<br>C: Web Access<br>D: Loopback Test,<br>E: ADSL 10M/20M for fast configuration |

| | |
|---|---|
| | • Default function and test modes from 0~9 scales rotary switch as below |
| **Function mode by rotary switch (0~F)** | • 0, Servant mode: Switch to Servant mode and accepts control from Lord. |
| | • 1, Short Packet: Symmetrical and bi–directional short packets (64 bytes length) test with test result. |
| | • 2, Long Packet: Same test as function 1 with long packets (1518 bytes length). |
| | • 3, Random Packet: Same test as function 1 with random (64~1518 bytes length) packets. |
| | • 4, BERT Loopback: Lord send BERT pattern to Servant for Loopback test by swapping DA and SA. |
| | • 5, Mesh Loop: Lord sends test packets to the 1st Servant, then the 1st Servant forward packets to 2nd Servant. It is repeated until packets return to Lord. |

| | |
|---|---|
| | • 6, Web Access: Get IP from DHCP and download a specified file from Internet |
| | • 7, Broadcast packet: Send 60 broadcast frames per second in increased frame length. |
| | • 8, Loopback (layer1): Switch to layer 1 loopback mode (as servant). |
| | • 9, Loopback (layer2): Same as function 8 with swapped DA and SA and recalculated CRC. |
| | • A~E, Customized settings: Customized settings configured by PC such as ADSL network test. |
| | • F, PC control: Control by PC via USB port. |
| **LED indicator** | • Power/run ▶: Power and Test Running status |
| | • Speed: Connection Speed, different blinking frequency shows different speeds, able to identify 10Mbps, 100Mbps and 1000Mbps |

|  | • Low bat ▮◧⚡: Low battery warning |
|  | • Get_IP: Status for getting IP from DHCP |
|  | • TX: Data Transmission (fast blinking indicates Wirespeed) |
|  | • RX: Data Receiving (fast blinking indicates Wirespeed) |
|  | • Pass: Passed test result |
|  | • Loopback ⇆: Loopback test in servant mode |
|  | • Servant: Under Servant state |
|  | • Connect ♟—♟: Connection status with other GIGATEST |
|  | • CRC: Error CRC packet received |
|  | • TX_loss: Packet loss at transmission side |
|  | • RX_loss: Packet loss at receiving side |
|  | • Fail: Failed test result |

| Hardware counter | Tx Packet, Rx Packet, CRC Error Packet:, Tx Bytes, Rx Bytes, Tx Rate, Rx Rate, Rx Broadcast Packet, Rx Multicast Packet, Rx Unicast Packet, Rx Pause Packet, Rx VLAN Packet, Rx IPv4 Packet, Rx Dribble Packet, Rx Alignment Error Packet, Rx Under Size Packet, Rx Over Size Packet, Rx 64 Bytes Packet, Rx 65–127 Bytes Packet, Rx 128–255 Bytes Packet, Rx 256–511 Bytes Packet, Rx 512–1023 Bytes Packet, Rx 1024–1522 Bytes Packet |
|---|---|
| **Software support** | GIGATEST: GIGATEST 1.0 is a GUI (graphic user interface) application software for GIGATEST, which is for controlling, configuration, counters data collecting and system upgrade of this machine. |
| **Dimension** | 141mm x 22mm x 22mm |
| **Temperature** | Operating: 0°C to 40°C (32°F to 104°F) |
| | Storage: 0°C to 50°C (32°F to 122°F) |

| Humidity | Operating: 0% to 85% RH |
| | Storage: 0% to 85% RH |
| Power source | Two built–in 3.7V NI–MH batteries From USB cable via PC or external adapter. |

## Built–in battery characteristics

| Link mode | Utilization | Operation time of fresh battery |
|---|---|---|
| 1000Mbps Gigabit ethernet | 100% | 100minutes |
| | 10% | 110minutes |
| 100Mbps Fast ethernet | 100% | 200minutes |
| | 10% | 220minutes |
| 10Mbps Ethernet mode | 100% | 180minutes |
| | 10% | 205minutes |
| Battery Charging time | Charge device | Charging time |
| | External Power Adapter | 420 minutes if power is totally exhausted |

# General description of GIGATEST

GIGATEST is a compact size packet generator and analyzer. There are several LED indicators, rotary switches, operation buttons and one connection ports for convenient on–site test.

1. Rotary ID switches

2. Rotary function switch

3. LED indicators

4. Network UTP port

5. Rotary test time switches

6. Operation buttons

7. Power switch

8. Mini–USB port

## LED indicators
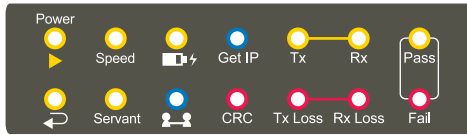


| | |
|---|---|
| Power: Power Status | ⇄ : Loopback status |
| Speed: Link speed status | Servant: In Servant state |
| ▇▇▶⚡ : Low battery warning | ♟♟ : Connection status |
| Get IP: Current IP status | CRC: CRC error found |
| Tx: Transmission | Tx Loss: Tx loss found |
| Rx: Receiving | Rx Loss: Rx loss found |
| Pass: Pass test | Fail: Test is fail |

## Rotary function switch

| Label | Scale | Description |
|---|---|---|
| **Function** | 1 set 16 scales 0~9, A~F | 16 function modes 0~9: Pre–defined function A~E: Customized settings F: Control by PC via mini–USB port of GIGATEST. |
| **ID** | 2 sets 16 scales 0~9, A~F | Pair mapping control of GIGATEST if there are more then one pair of GIGATEST connected in the same network. |

| Test Time (sec.) | 2 sets 16 scales 0~9, A~F | It is for the configuration of test duration each time. Duration in seconds is configured in hex mode. |

## Operation buttons

Three operation buttons for operation of rotary function switch.

| Label | Action | Description |
| --- | --- | --- |
| ▶/■ | Push once | Run/stop keypress it to start or stop the procedure configured in Rotary Function Switch. |
| ▶t | Push once | Tx Test key transmit 10 broadcast short packet by 2 different MAC address. |
| 000 | Push once | Clear Key clear the test result for next test. |

## Operation of GIGATEST configuration switch rotary function switch

One 16 scales rotary switch, scales from 0 to 9, A to F for

16 test function modes.

Current
Setting

Scale: No. 0~9.
A~F

**Rotary Switch**
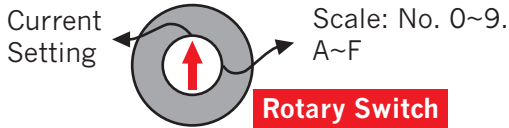
| Scale | Function name | Description |
|-------|---------------|-------------|
| 0 | Servant mode | Switch to servant mode and accepts control from Lord. |
| 1 | Short packet | Tx Test key transmit 10 broadcast short packet by 2 different MAC address. |
| 2 | Long packet | Clear key clear the test result for next test. |
| 3 | Random packet | Same test as function 1 with random (64~1518 bytes length) packets. |
| 4 | BERT loopback | Lord send BERT pattern to Servant for Loopback test by swapping DA and SA. |
| 5 | Mesh loop | Lord sends test packets to the 1st Servant, then the 1st Servant forward packets to 2nd Servant. It is repeated until packets return to Lord. |

| | | |
|---|---|---|
| **6** | Web access | Get IP from DHCP and download a specified file from Internet |
| **7** | Broadcast packet | Send 60 broadcast frames per second in incrementing frame length. |
| **8** | Loopback (layer1) | Switch to layer 1 loopback mode (as servant). |
| **9** | Loopback (layer2) | Same as function 8 with swapped DA and SA and recalculated CRC. |
| **A~E** | Customized settings | Customized settings configured by PC such as ADSL network test. |
| **F** | PC control | Control by PC via USB port. |

## Rotary ID settings switches

Two sets of 16 scales rotary switch, 256 combinations for this ID settings.

• GIGATEST with the same ID works as a pair (Lord and Servant)

• Set it to "0". For Lord GIGATEST, it accepts any reply from Servant. For Servant GIGATEST, it replies any request from Lord.

• Lord and Servant works as pair that is based on MAC address. One GIGATEST uses 2 MAC address, one is for

transmission of test data and the other is for negotiation and communication. DUT/NUT has to register totally 4 MAC addresses in its MAC address table for a pair of GIGATEST.

## Rotary test duration switches

Two sets of 16 scales rotary switch, 0~255 seconds for this Test Duration settings.

It is for the configuration of test duration each time.

Duration in seconds is configured in hex mode. Test stops when duration is time out. If it is configured to "00", user has to press Stop button to stop the test.

## Operation buttons

Three operation keys for operation of rotary function switches.

### Clear key (000 button)

When test is done, all LEDs display the test result of pervious test task. Press Clear key to reset all LED and get GIGATEST into ready mode for next test task.

### Run/Stop key ( ▶/■ button)

Press it to start the procedure configured in Rotary Function Switch. The procedure will stop automatically when it meets terminated condition of the procedure or the duration configured at Rotary Test Duration Switch here.

Force to stop running procedure by pressing it again. For most of test procedures, they will stop automatically. Force to stop these tests cause failed result.

### Tx test key ( ▶t button)

Transmit 10 broadcast short packets by 2 different MAC address One MAC address is for the transmission of management parameter and the other MAC address is for the test packets.

## Application software

GIGATEST is a GUI (graphic user interface) application software for GIGATEST, which is for controlling, configuration, counters data collecting and system upgrade of this machine. Convenient USB port of GIGATEST can connect PC easily.
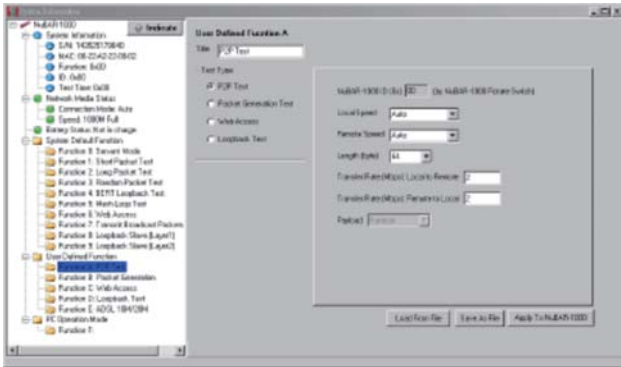
USB cable with mini–USB connector comes with the package of this machine. In addition to control the GIGATEST, the cable also charges the built–in battery.
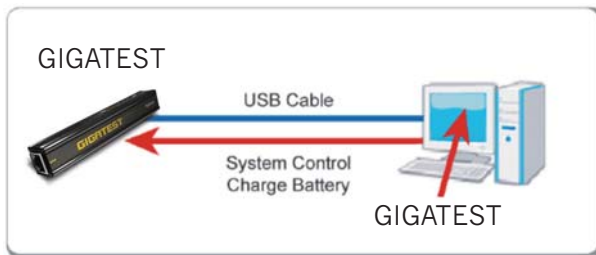


(GIGATEST works with PC)

# Configuration

A GUI shows the system information of GIGATEST. All settings except pre–defined functions can be configured base on test requirements.



# Packet generation and receiving

By the support of GIGATEST application, packet generation patterns are not constrained to pre–defined pattern of rotary function switch.

GIGATEST can generate packets with variety of Packet Length, Transfer Rate, Payload, VLAN tag attached, and IP packet with different test duration. The receiving counter also able to identify common error packets such as CRC error, Dribble error and other received packet counts, including Total, Broadcast, Multicast, Unicast, Pause, VLAN, and IPv4..etc.
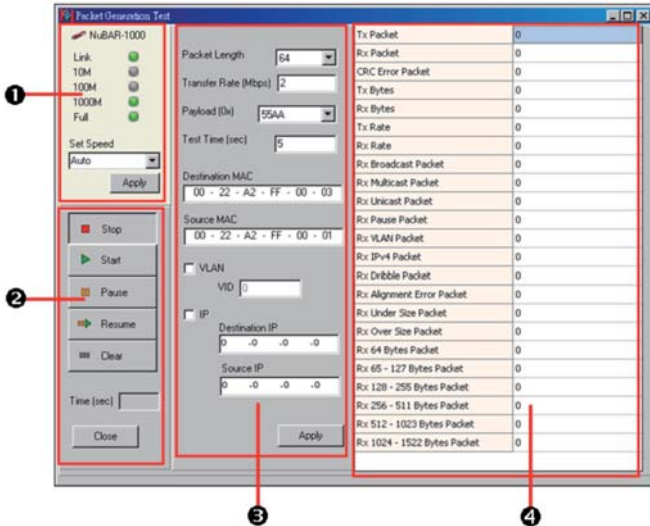
1. Link status

2. Test control button

3. Generation parameter

4. Generation & receiving counter

## Symmetric loop test

As the description above, scale 1, 2, 3 of rotary functional switch is for pre–defined bi–directional symmetric loop test.

In addition to the pre–defined function, operators can have their own settings for symmetrical loop test, including configuration of transmission Speed and Mode (Auto or Force 10Mbps Full Duplex), Packet Length, Transfer Rate and Test duration.
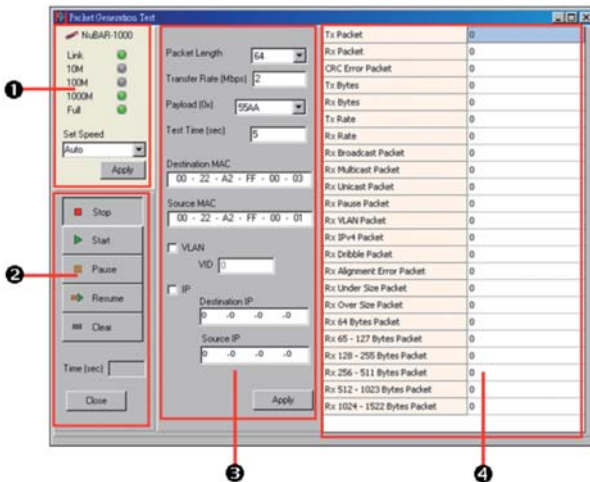


1. Match pair

2. Local Tx counter

3. Local Rx counter

4. Loop parameter

5. Test control buttons

6. Remote Rx counter

7. Remote Tx counter

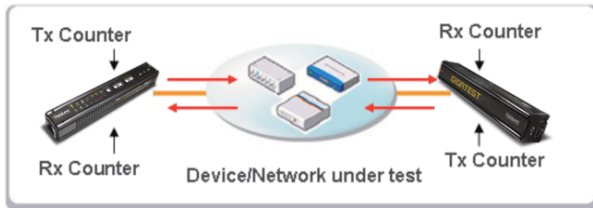Packet counts at each step are all registered as illustration below.



Illustration of Symmetric Loop Test

## Asymmetric loop test

For the symmetrical loop test above, Lord and Servant send symmetrical test stream to each other for the test.

For this Asymmetric Loop Test here, the configuration of transmission Speed and Mode (Auto or Force 10Mbps Full Duplex), Packet Length, Transfer Rate (Mbps) can be configured different for Lord and Servant sides. With different user defined Transfer Rate (Mbps), the transmission speeds of both directions traffic can be different.
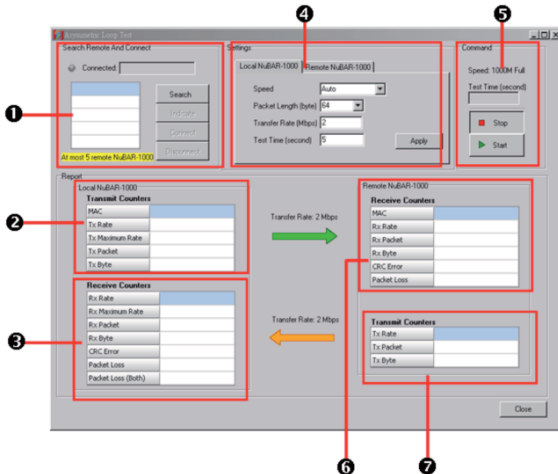
1. Match pair

2. Local Tx counter

3. Local Rx counter

4. Loop parameter

5. Test control buttons

6. Remote Rx counter

7. Remote Tx counter

8. Has independent transmission parameter for local and remoter GIGATEST

This advantage also supports custom settings (Rotary Function Switch A~E) with different network configurations for Asymmetric Loop Test. It is quite useful for testing of asymmetric network such as ADSL as illustration below.
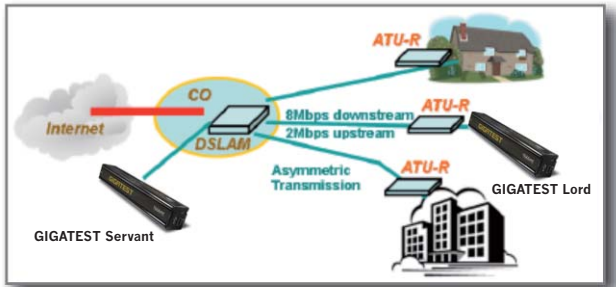


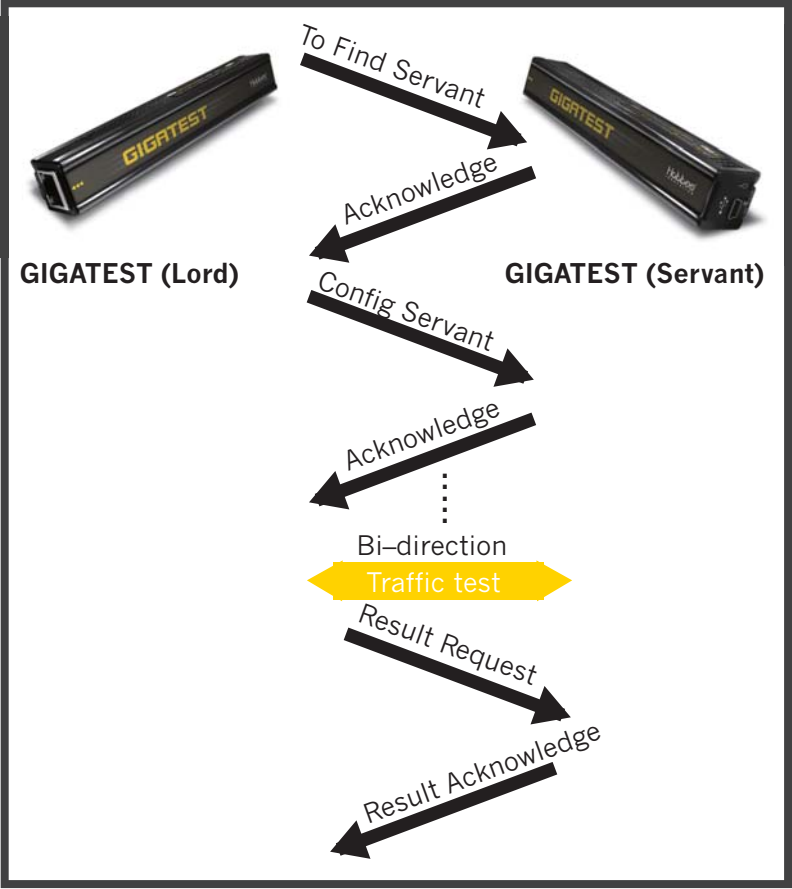## Technical terms and application
## lord and servant

This is a unique feature of GIGATEST. For network test, GIGATEST has to work by pair (2 sets) at different locations between DUT/NUT (Device/Network under test). One of the GIGATEST acts as Lord that control the test procedure and the other one acts as Servant. Two GIGATEST are all packet generators that do bi–directional symmetric transmission test, and also synchronizes the test result when test is done.

GIGATEST has test result of routing in two directions, which is much better than general loopback.

General loopback test has one result only for performance across round–trip (the routing forth and back); therefore,

operator is unable to know which direction goes wrong if problem happens.



To Find Servant

Acknowledge

**GIGATEST (Lord)**          **GIGATEST (Servant)**

Config Servant

Acknowledge

Bi–direction

Traffic test

Result Request

Result Acknowledge

## Get IP

A status LED of GIGATEST. When there is a DHCP server that is activated in the Ethernet network, the GIGATEST is able to get the IP address that is assigned by the DHCP server. By getting the IP information of the network, GIGATEST can join the running network for testing in real environment. When the status is OK, GIGATEST is able to test the route to Internet by Web Access command that is described later.

## Mesh loop
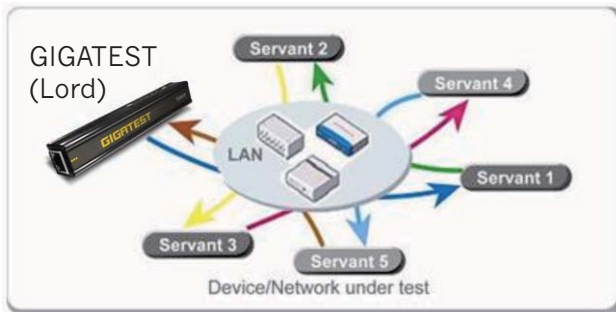


For general network test, there are two nodes join the test. GIGATEST is able to do the mesh loop test. The Lord requests connection to any Servant in the network, maximum 5 of GIGATEST Servant can join the test.

When test starts, Lord sends test packets to the first Servant, then the first Servant sends packets to the second Servant. Procedure is repeated until the final Servant returns packets to Lord.

When test is done, all of them synchronize the test result and saved at Lord GIGATEST.
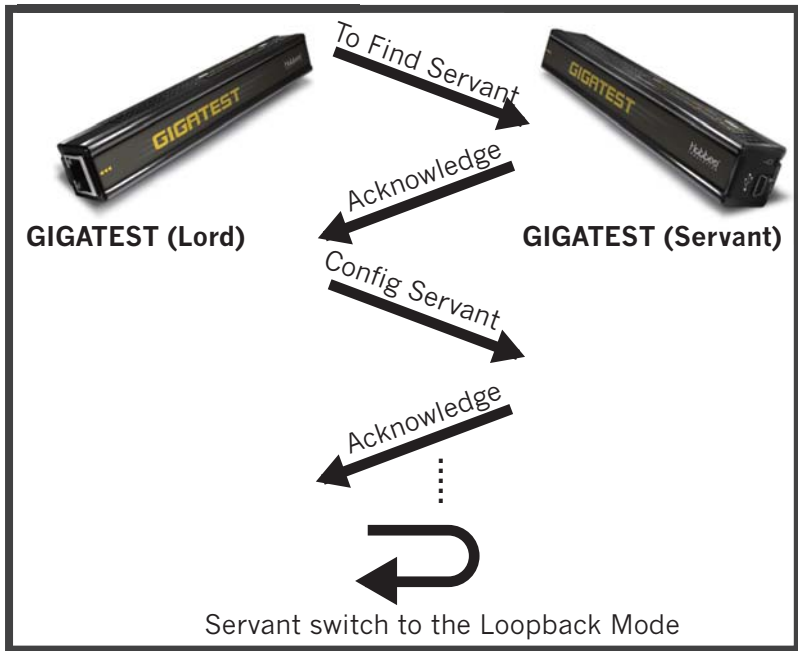
## Web access

Web Access is an unique test capability to validate Internet accessibility at CPE by using GIGATEST only, without PC or notebook. GIGATEST gets DHCP, DNS transactions and downloads data via HTTP protocol for validating availability of Internet service.
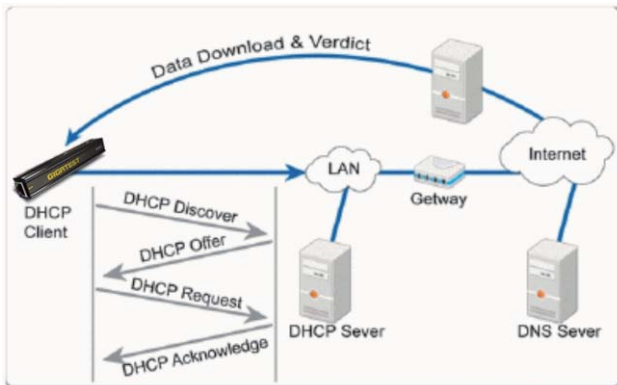


## BERT loopback

Loopback test is the method to send out signal and quickly back to the same source entity to test the transmission and route problem of infrastructure. This technique sends BERT (Bit Error Rate Test) patterns, and counts any data integrity errors that come back.

GIGATEST (Lord)          GIGATEST (Servant)

To Find Servant

Acknowledge

Config Servant

Acknowledge

Servant switch to the Loopback Mode

## Loopback (layer 1 or layer 2)

At loopback mode, GIGATEST resend incoming test frames from other non–GIGATEST device to its received port.

· Layer 1 loopback: Filters out broadcast, multicast and null DA (destination address) packets of incoming data streams, and then resends the rest of incoming data streams back to the same connected port.

· Layer 2 loopback: Filters out broadcast, multicast and null DA (destination address) packets of incoming data streams, and then resends the rest of incoming data streams back to the same connected port with swapped DA/SA (destination/source MAC address) and recalculated CRC.
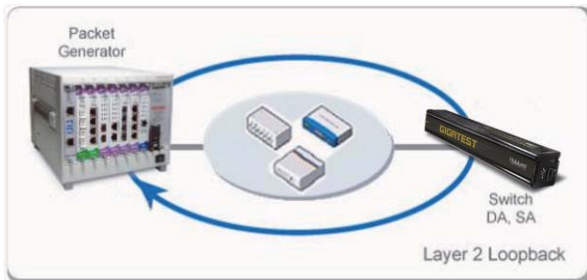


## Gigabit ethernet

Gigabit Ethernet (GbE or 1 GigE) is a term that transmits Ethernet frames at a rate of a gigabit per second. GIGATEST is a Gigabit packets generator and network test equipment.

## CRC error

At the tail of a frame/packet, it keeps a checksum value to verify the integrity of the frame when it is received. If the checksum value is not correct that can verify the correctness of the frame, we call it CRC Error frame. Poor network transmission can cause this kind of error. GIGATEST is able to detect this kind of error and show result after test.

## Packet loss

Ethernet is a kind of packet switching network technologies. Frames are transmitted via different devices and media. After the transmission via different media and devices, some of frames are lost. GIGATEST is able to detect this kind of error and show result after test.

## Tx loss and Rx loss

They are unique error counters of GIGATEST. When bi–directional symmetric/asymmetric transmission is done by a pair of GIGATEST, Tx Loss or Rx Loss at Lord or Servant indicates pack loss in different directions.

## Broadcast

Broadcasting refers to transmitting a packet that will be received (conceptually) by every device on the LAN.

GIGATEST can generate broadcast frames 60 packets per second with frame length from 64~1518 bytes.
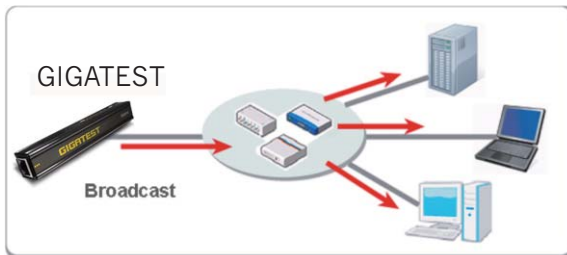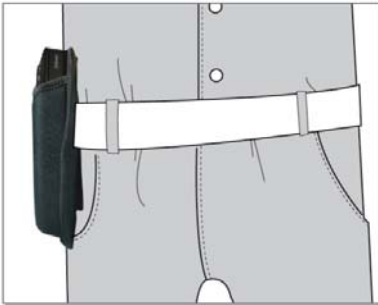
## Accessory kit

Being a very delicate device, GIGATEST would suffer damages on the outer casing or inner components if it is dropped from high places and hits the ground. The leather cover comes with GIGATEST is designed for avoiding situations mentioned above from happening as well as protecting GIGATEST.

Sometimes technicians need to use a ladder to climb up to high places for wiring on the ceiling or in high places. Under these circumstances, it would be convenient to have an accessory kit as this for holding and protecting GIGATEST.

Please refer to the picture on right side for more information regarding how to wear this leather cover properly.

Hobbes®
INNOVATION