NuTAP-302

Gigabit Active Network TAP

KEY BENEFITS

- Supports one pair of Ethernet Gigabit combo (RJ-45/SFP) TAP port and one 10/100/1000M RJ-45 Ethernet monitor port.
- Simultaneous non-blocking forwarding of all Tx and Rx traffic, including error packets, also can redirect to monitor port.
- Network monitoring and analysis devices that provides an invisible, non-intrusive access to network without disrupting links or causing network degradation.
- Get rid of the needs for redirecting / mirroring port and avoids problems associated with using such methods for traffic monitoring.
- View real-time statistic counter on the LCD that is located at top panel
- Real-time monitoring and analyzing of network traffic.
- Compact, lightweight and highly cost effective.
- Adopt solid polymer aluminum electrolytic capacitors to keep long-term stable operation.
- Converts media between fiber and copper connection automatically.
- Utilization LED on top panel shows the real-time traffic.

MAIN APPLICATIONS

- Network monitor
- Ethernet function validation
- Troubleshooting.
- Gigabit Ethernet Media Converter between fiber and copper connections.
- Statistic counter and utilization of network.

OVERVIEW

NuTAP-302 is portable network TAP equipment that can monitor any data that flows through this equipment. TAP (Test Access Point) is the way to monitor running network without intruding the network. A good TAP equipment should have good performance that can not delay or cause any loss between the original networks.

Completely passive and non-intrusive to the network segment being monitored; NuTAP-302 provides access to all network traffic with full duplex link from both sides. Allows network monitoring or analysis tools to be dynamically inserted into the network segment without causing any disruption to the link.

NuTAP-302 can work with professional analyzers such as NuStreams-2000(i) / 600(i) from Xtramus, or third party LAN and security analyzers. Together, they provide an effective way for probing or analyzing full-duplex traffic on single or multiple network links that cannot be achieved by using traditional methods such as Hub, Port Spanning / Mirroring.

Active TAP is the advanced technology that is adopted in NuTAP-302. Traditional TAP device only duplicates the network traffic to the PC and run the PC all the time with pre-installed analysis software is required. Without extra device such as PC, NuTAP-302 can register all common counters of the network traffic flows through the machine. All common network errors such as CRC Error, Alignment Error, and network conditions such as collision, broadcast can be known instantly via LCD and/or LED indicators. Smart mechanism also compares these counters of network from both directions; hence operator can know the traffic and condition from both sides.

NuTAP-302 provides the operating mode of 10/100/1000Mbps speed that can forward any data that pass through this machine in Wirespeed, including any errors that normally are discarded by general network device, and also redirects them to monitor port for analysis purpose. We can assure you the best network connection and It will be a trustworthy network tap for your network.

5th Fl., No. 102, Lide St.,
Zhonghe City,
Taipei County 235, Taiwan
TEL: +886-2-8227-6611
FAX:+886-2-8227-6622
sales@xtramus.com

www.xtramus.com

KEY FEATURES

- Active TAP based on store-and-forward architecture, and with buffer reduces possibility of forwarding packets loss.
- Network ports:
  - 1 pair of Ethernet Gigabit combo (RJ45/SFP) uplink/downlink TAP port
  - Support both full and half-duplex modes
  - Auto network sensing and auto negotiating of speed and duplex mode
- Monitoring port:
  - One 10/100/1000Mbps RJ-45 Ethernet port
  - Support full duplex mode and half duplex mode
  - Auto HP MDI/MDI-X and auto correction of twisted-pair polarity
- On-panel LCD display for vital network status.
- System control and Firmware/FPGA upgrade via USB.
- Statistic Counter: Rx Frame, Tx Frame, Collision, CRC Error, Alignment Error, Dribble Error, Oversize, Undersize, Broadcast, Multicast, Packet size (64~1518), Pause, VLAN (256 streams), Frame Rate and other RMON counters.
- Interframe gap counters to reveal status of real-time Wirespeed transmission.

SPECIFICATIONS

- **Interfaces:**
  - Network Port: One pair of gigabit combo (RJ45/SFP) port
  - Monitoring Port: One 10/100/1000Mbps Ethernet with RJ-45 connector
  - Mini USB Port: One mini USB port (for control and upgrade)
- **LED Indicator:**

  System Status
  - Power: Power ON status
  - SYS: Ready status of this machine
  - Remote: Remote control from USB cable

  Port Status (for both A and B)
  - SFP: SFP fiber connector is connected
  - 10/100M: Speed of 10/100Mbps connection
  - 1000M: Speed of 1000Mbps connection
  - Receive: Data is received
  - Broadcast: Broadcast data is received
  - CRC Err: Frame with CRC Error is received
  - Trigger: Trigger the data flow to A and/or B is redirect to monitor port (Disabled for NuTAP-302)

  Monitor Port
  - Link: Monitor port is connected
  - Tx: Data flow to A and/or B that is redirect to monitor port
  - Buffer: Capacity status of buffer memory (Disabled for NuTAP-302)

  Utilization (%) Network Ports
  - 6 LEDs to indicate Utilization of traffic flow from 0% to 100%

  Display Page #
  - 1, 2, 3, 4, 5, 6: Indicates the page No. currently shown on LCD
  - Traffic Direction: Forward direction of TAP ports, A itself / B itself, or both ways

  Capture: Capture procedure is going on. (Disabled for NuTAP-302)
- **Power:** DC 12V
- **Power Consumption**: 5.5 Watt (Not include SFP transfer)
- **Temperature:**

  Operating: 0°C ~ 40°C

  Storage: 0°C ~ 50°C
- **Humidity (non-condensing):**

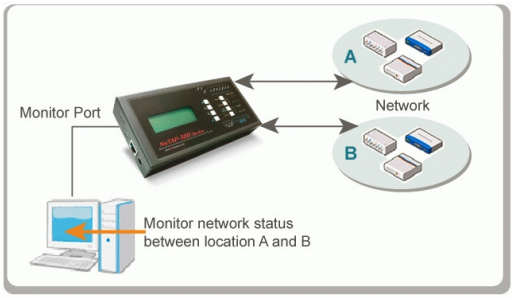
  Operating: 0% ~ 85%

  Storage: 0% ~ 85%
- **Dimension:** 175 mm x 85.9 mm x 32.6 mm
- **Net Weight:** Approx. 500g

TECHNICAL TERM and APPLICATION

Network TAP

Network TAP (Test Access Point) is a way to monitor the network without interfering the running network. All data streams between point A and B can be duplicated and sent to PC for analysis.



The third party network software such as Ethereal and software attached with NuTAP-302 can be installed on PC for network analysis.

Aggregate vs. Segregate

Aggregate is a way to collect network traffic for monitor purpose

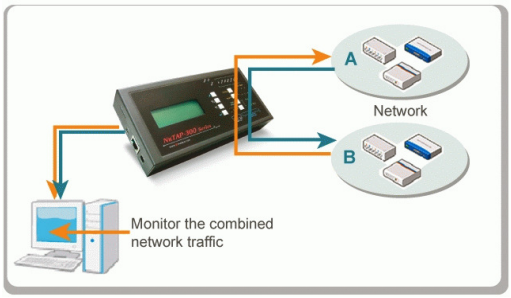


Illustration of Aggregate

The traffic flows from A to B and from B to A are combined and send to monitor port for monitor purpose. The result of counter can be analyzed by software to evaluate the total traffic flow between A and B. NuTAP-302 provides this function.

Segregate is a way to divide network traffic for monitor purpose.
Segregate network for monitor purpose needs two monitor ports. For rackmount NuTAP series that have two monitor ports can support segregate. Although NuTAP-302 has one monitor only, it has the ability to redirect uni-direction traffic flow to monitor port. Operator can select either A to B or B to A port for monitor purpose.

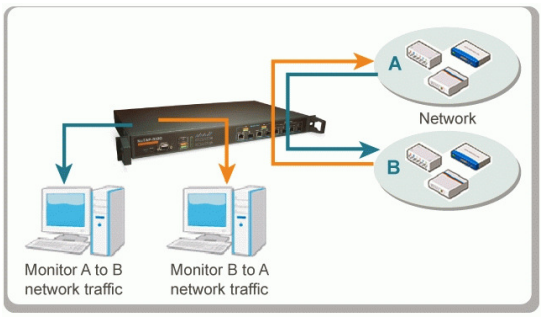
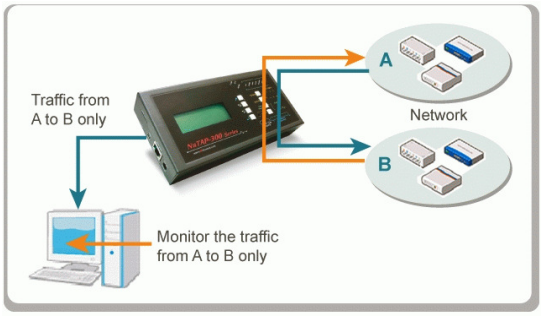


Illustration of Segregate

Active TAP

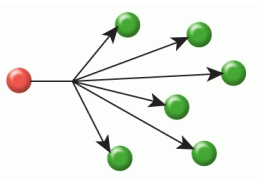
Normal TAP only redirects all traffic flow between two locations into the PC that analyze the traffic.
Active TAP deals with all packets flow through the TAP machine. NuTAP is an Active TAP machine that has

- Comprehensive real-time statistics: Frame with varied size and packets with certain errors are all registered in the real-time statistics counter.
- Contrast port counter: List the value of the same statistics counter from both directions simultaneously for analysis.
- Selectable packet redirect modes: Besides Aggregate, NuTAP also can redirect uni-directional packets to single monitor port on NuTAP. For example



Broadcast

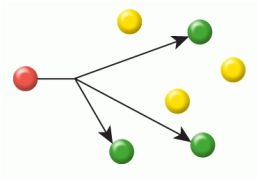
Broadcasting refers to transmitting a packet that will be received (conceptually) by every device on the network. NuTAP-302 provides this counter.



Broadcast

Multicast

Multicast is a network addressing method for the delivery of information to a group of destinations simultaneously using the most efficient strategy to deliver the messages over each link of the network only once, creating copies only when the links to the multiple destinations split. NuTAP-302 provides this counter.



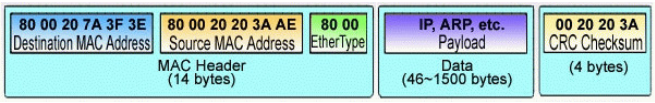
Multicast

Pause

In computer networking, flow control is the process of managing the rate of data transmission between two nodes to prevent a fast sender from over running a slower receiver. As the method of flow control, the overwhelmed network element will send a PAUSE frame, which halts the transmission of the sender for a specified period. NuTAP-302 provides this counter.

Frame (Packet) Size

A frame is a digital data transmission unit on the Layer 2 of the OSI model. It is used for data exchange between two points via a direct physical or logical link. Depending on the data a frame carries, the length (bytes) is varied from 64 to 1518 bytes as the figure below.



- ***Undersize***

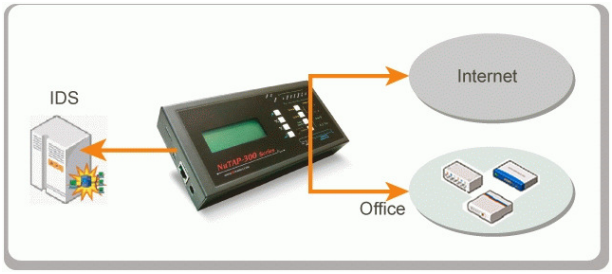
From the frame structure of Ethernet, a standard Ethernet frame size should be from 64 to 1518 bytes. If the frame received is less then 64 bytes, it is called undersize frame. Usually, under size frame is a kind of error. NuTAP-302 provides this counter.

- ***Oversize***

If the frame received is more then 1518 bytes, it is called oversize frame. Jumbo frame is a kind of oversize frame that can carry up to 9,000 bytes of payload; however, most Ethernet switches and Ethernet network interface cards support only standard-sized frames. NuTAP-302 provides this counter.

IDS

An Intrusion detection system (IDS) is software and/or hardware designed to detect unwanted attempts at accessing, manipulating, and/or disabling of computer systems, mainly through a network, such as the Internet. These attempts may take the form of attacks, as examples, by crackers, malware and/or disgruntled employees. NuTAP is effective for the application without direct attack from Internet to IDS.



Protection for IDS

Packet Loss

Ethernet is a family of frame/packet-based computer networking technologies. Frames/packets are transmitted via different devices and media. After the transmission via different media and devices, some of frames/packets might be lost.

Gigabit Ethernet is a standard for high-speed network transmission. Any less good device or media that connects between two points of Gigabit Ethernet may cause packet loss.

NuTAP-302 provides 1Gbps Wirespeed forwarding capability when network TAP is going on. It does not interfere any activity of network transmission, also has counter that calculate the packet loss from original network

Alignment Error vs. Dribble Error

A kind of error happens on Ethernet frame. All frames should end on an 8-bit boundary to present a full byte, but problems on the network could cause the number of bits to deviate from the multiple of 8. A full byte (octet) is represented by two hexadecimal digits; therefore, it is common to display a byte of information as two nibbles.

- If the frame sent or received is lack of a nibble of a full byte, it is call **Alignment Error**.
- If the frame sent or received has more one nibble of a full byte, it is called **Dribble Error**.

The problem could happen, owing to collision (CRC error together with packet short). NuTAP-302 provides counter of these errors

Collision

The situation that occurs when two or more frames are sent simultaneously on equipment that can handle only one at any given instant.

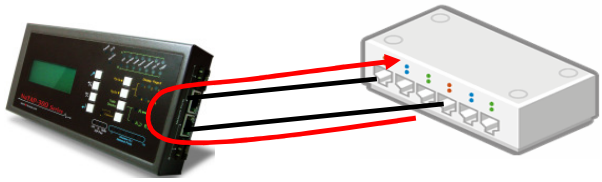
Carrier Sense Multiple Access With Collision Detection (CSMA/CD) is the way used to improve CSMA performance by terminating transmission as soon as a collision is detected, and reducing the probability of a second collision on retry.

Although collision does not affect the transmission of correct contents, because device will retry until it is successful, however, higher collision mean lower successful transmission rate that may lead to poor network performance. NuTAP-302 provides this counter.

Loopback

NuTAP-302 has loopback function for the trouble shooting of network. 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. Test equipment with this troubleshooting technique sends specific patterns, and counts any errors that come back (BERT, Bit Error Rate Test).

From the operation button or utility software at PC, user can active loopback test. When it is enabled, data stream from test equipment to the NuTAP-302 flows return to their source entity. Here it illustrates how loopback works.



Interframe Gap

Ethernet devices must allow a minimum idle period between transmission of Ethernet frames. It is called interframe gap (IFG) as the illustration below

Frame	IFG	Next Frame

A brief recovery time between frames allows devices to prepare for reception of the next frame. For the standard of Ethernet, The minimum interframe gap is 96 bits time or 12 byte time. It is the time taken for transmission of 96 bits raw data on the media. For different connection speed, there are

- 9.6 µs for 10 Mbit/s Ethernet
- 960 ns for 100 Mbit/s Ethernet
- 96 ns for 1 Gbit/s (gigabit) Ethernet
- 9.6 ns for 10 Gbit/s (10 gigabit) Ethernet

Interframe Gap Counters

From the characteristic of IFG, if the gap between two frames is the same as the minimum bits time when data transmission is going on, the transmission speed can be defined as Wirespeed transmission.

Interframe Gap Counters are several unique counters of NuTAP-302 that calculates the frame counts beyond, equal or below minimum bits time.

- Above Min. bits time: Normal transmission utilization.
- Equal to Min. bits time: Wirespeed transmission. It should be for test purpose only, otherwise, the network is fully loaded that might have problem.
- Below Min. bits time: Special device of the network that can send more frames than Ethernet standard. However, these kinds of device may cause more collision.

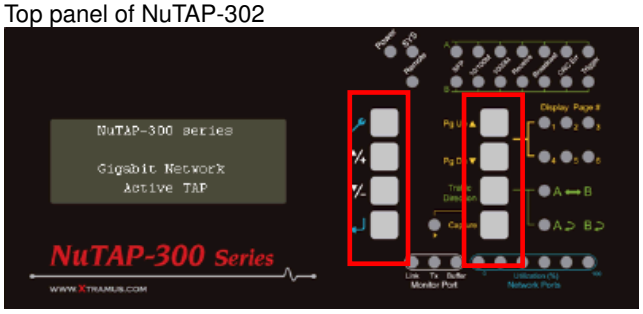
VLAN

A virtual LAN, commonly known as a VLAN, is a group of hosts with a common set of requirements that communicate as if they were attached to the Broadcast domain, regardless of their physical location. A VLAN has the same attributes as a physical LAN, but it allows for end stations to be grouped together even if they are not located on the same network switch. Network reconfiguration can be done through software instead of physically relocating devices. The protocol most commonly used today in configuring virtual LANs is IEEE 802.1Q.

VLAN frame has extra VLAN Tag that is inserted into the header of Ethernet-II frame. NuTAP-302 provides this counter.

OPERATION OF NuTAP-300 SERIES

Top panel of NuTAP-302



Control via Button

Almost all function can be operated via buttons at top panel

Buttons for common operation and configuration (left 4 buttons)

Label	Action	Description
	Push once	Enter main menu or Return to previous menu.
	Push once	Return for next test
▲/+	Push once	Move up one selection
▼/-	Push once	Move down one selection
	Push once	Execute the selected selection

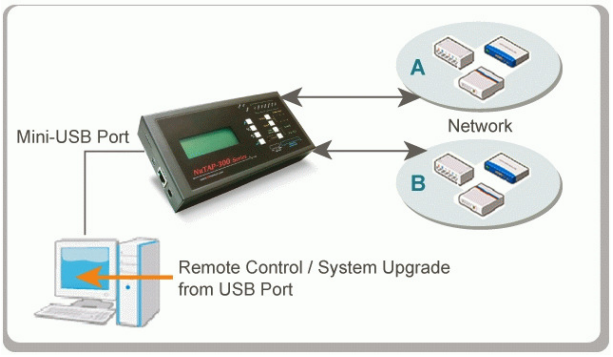
Hotkeys (right 4 buttons)

Label	Action	Description
Pg Up	Push once	Move page up for frequently used sub-menu **Contrast All Port** at LCD. It shows statistic from A to B, B to A and A+B to Monitor port.
Pg Dn	Push once	Move page down as above
Traffic Direction	Push once	Select the direction of traffic flow for monitor. A <-> B: All traffic flow between A and B are forwarded. A⊃: Traffic flow to port A is segmented for monitor B⊃: Traffic flow to port B is segmented for monitor
Capture	Push once	Disabled for NuTAP-302

Control via Utility from USB

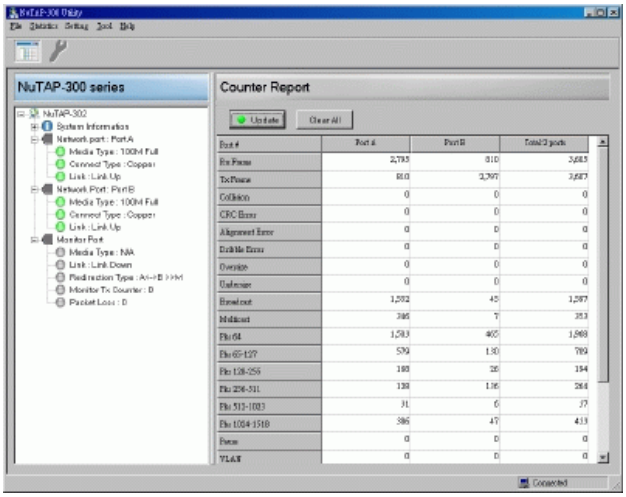
NuTAP-302 comes with a Windows utility software for controlling of this machine. Operator can operate this machine via USB port with Windows interface, collects statistic counter and also does system upgrade.

USB cable with mini-USB connector comes with the package of this machine. It is an industrial standard cable with standard male USB connector and standard male mini-USB connector at each side.



NuTAP-302 Utility Software is a Windows based software as illustrated below. It is user-friendly and easy to operate.

Main functions consist of real-time counter report that include full RMON counters, connection status and configuration of A, B and Monitor port.



RELATED PRODUCTS

NuTAP:
Wirespeed Active network TAP with 4 pairs of Ethernet 10/100M RJ45 Port.

NuTAP Rackmount:
Full-Duplex In-Line Management Network TAP

- **NuTAP-L Series:**
  - 10/100/1000M UTP Interface
- **NuTAP-R Series:**
  - 10/100/1000M Combo Interface(UTP+SFP)
- **NuTAP-A Series:**
  - 10/100/1000M Combo Interface(UTP+SFP)

CONTACT INFORMATION

Website: www.xtramus.com
E-mail: Sales@xtramus.com (for Product Inquiry)
TS@xtramus.com (for Technical Support)
TEL: +886-2-8227-6611
FAX: +886-2-8227-6622

WHAT'S IN THE BOX

- NuTAP-302 x 1
- Network cable(CAT-6) x 1
- Adapter x 1
- Power Plug Adapter x 1
- Mini USB Cable x 1
- Installation CD-ROM x 1 (Includes Bundle Software and User's manual)

