



# NuStreams-P9M

## NuStreams-P9M OVERVIEW

**NuStreams-P9M** is a stand-alone tester for testing switches and broadband routers (along with their switch ports) with its 8 LAN ports and 1 WAN port at wirespeed. **NuStreams-P9M's** compact, lightweight designs with built-in tasks make it an ideal solution for tests on production line, DUT performance analysis and troubleshooting at service centers or maintenance work shops as well.

**NuStreams-P9M** provides pre-defined templates containing customizable parameters including number of ports to be tested, the duration of packet transmitting, sending packets of HTTP/UDP/FTP protocols, packet length, packet loss tolerance, and etc. Configurations for tests can be done without utility softwares or any specific technical know-how.

With 3 different Test Types (Router, Switch, and Router + Switch) available, **NuStreams-P9M** can perform tests on switches/routers, or combining each of these test subjects under "**Router + Switch**" Test Type, and test a broadband router's WAN/LAN performance at the same time.

With the ability to provide high reliable test results and the best cost/performance ratio, **NuStreams-P9M** is the best solutions available for router and switch tests.



## KEY ADVANTAGES

- Multi-function tester for network devices such as network switches and broadband routers
- Reliable testing capability that can perform accurate and conclusive tests to validate DUT (device under test) functions and performance with various speeds and load conditions
- Flexible WAN port connection for router tests:
  - Static IP
  - DHCP
- Save the expense of developing and learning complicated testing utility softwares/scripts
- High throughput during DUT tests
- Tests are performed automatically in step-by-step manner, which makes NuStreams-P9M a more productive solution than other traditional PC-based solutions
- Compact, lightweight and portable



## NuPAD KEY FEATURES

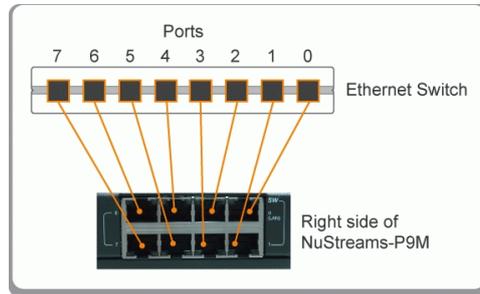
- Simple, easy to operate, performing tests fast
- Easy for maintenance. NuStreams-P9M connected to NuPAD do not need maintenance if NuPAD malfunctions
- Intuitive Buttons for production crews to verify test results fast



## APPLICATION

### Test on Switch

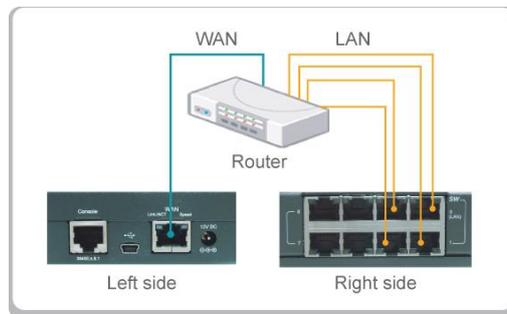
An example of performing Ethernet Switch tests with NuStreams-P9M is shown in the figure down below:



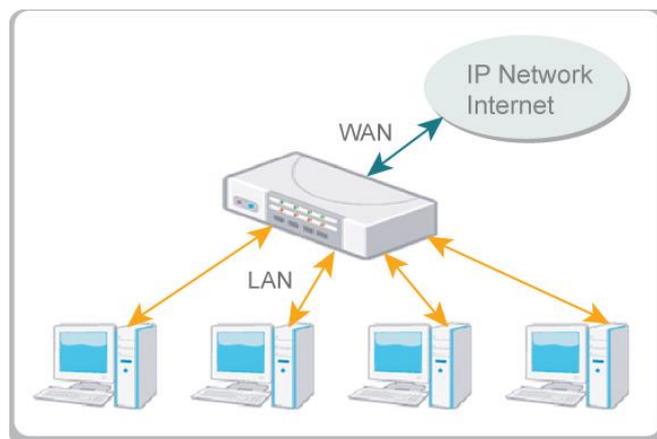
For Ethernet Switch tests, test packets will flow through all ports. The result (Pass/Fail) is shown on NuStreams-P9M's LED on its top panel. If the DUT does not have so many ports (less than 8 ports), disable NuStreams-P9M's unused test ports before testing.

### Test on Router with Switch Ports

When performing tests on routers, both WAN and LAN ports of the DUT must be connected to NuStreams-P9M as shown in the figure down below:



Generally speaking, a router, also known as an IP sharing device, is a network device used at home or office for Internet connection. When performing router tests with NuStreams-P9M, test packets will flow through all DUT's LAN ports, and test DUT's data distribution ability from WAN to LAN as well.



### Auto (AT) Test Mode:

Under this mode, all parameter values can be customized by users. Research & Development department staffs can issue a specification of a product they designed. The staffs in production factory can input the parameters base on this product specification provided by the R&D department into NuStreams-P9M, and perform tests on DUTs. Those DUTs that pass the test will meet the standard established by the R&D department and can be sold to the market, while those DUTs that fail the test will be discarded. If too many DUTs failed the test, the R&D department might have to modify their designs, or the production factory staffs should lower NuStreams-P9M's testing standard.

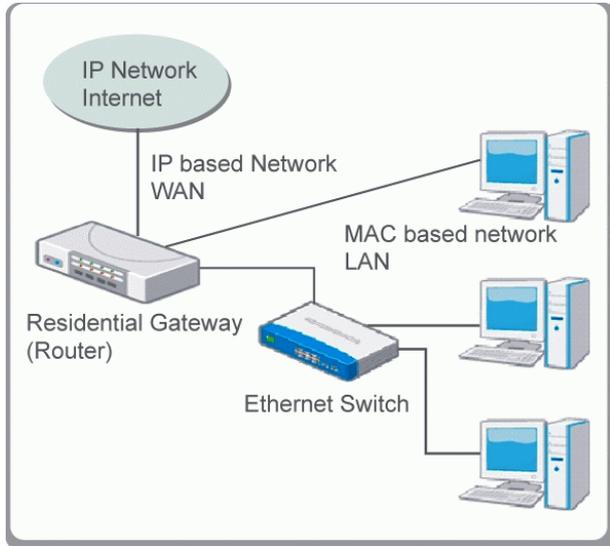




## TECHNICAL TERM

### Residential Gateway vs. Ethernet Switch

Residential Gateway, commonly known as Router, is a network device that can be purchased at general 3C or computer store. It allows the connection between LAN (connect to computer or other Ethernet Switch) and WAN (wide area network).



A router provides basic functions such as:

- IP address routing: Find the source or destination computer via routing protocol
- Network Address Translation (NAT): Translate IP addresses between WAN and LAN
- DHCP: Assign a unique IP address to LAN devices
- Firewall: Protection against attacks from WAN or LAN

Comparing to routers, Ethernet switch is simpler and configuration is not required. An Ethernet switch bridges data stream via network cable. Switch, which operates at the Media Access Control (MAC) sub-layer of the data link layer, learns each connected devices' MAC addresses.

Usually, in addition to WAN port, Residential Gateway (Router) also has LAN ports. NuStreams-P9M is able to test the Residential Gateway's switch function with all of its LAN ports, or functions that involve both DUT's WAN and LAN ports.

### Learning Time

Test starting time will be delayed after learning packets are sent. While sending learning packets (MAC address for other device to know), the test delays for a short time (from 1~10 seconds). It is quite useful while performing DUT tests in small scope or large scale of network chain with possible network device packet delays or learning delays. When a network device receives learning packets from NuStreams-P9M, it will record these packets, and learn the routing to NuStreams-P9M.

### Utilization and Packet Loss Tolerance

#### Utilization

Utilization is the traffic flow of network and presented by percentage. For example, if the connection speed is full duplex 1000 Mbps, then 80% Utilization means the traffic flow is 80% of 1000 Mbps data transmission.

#### Packet Loss Tolerance

If the traffic flow is high, it might be possible that all data transmitted is not received at destination. It is called Packet Loss, and it is calculated by number counts. For a fair network, partial packet loss is allowable, because protocol such as TCP/IP knows the packet loss happens and packet will be re-sent to make sure that there is no data loss. The parameter is about how much packets are allowed for loss in the test. This function always works with Utilization.

The more Utilization rate, the more Packet Loss happens. User can tune Utilization rate and Packet Lost Tolerance to create a set of value for your DUT/NUT.

### WAN Connection Type

#### DHCP

Commonly used on PC or network devices, DHCP server issues IP addresses to devices connect to its TCP/IP network upon receiving their requests. After DHCP server leases IP information to a specific network device, that device will apply this set of IP address, link to the network, and get network services. NuStreams-P9M will issue an IP address to the DUT when testing DHCP functions.

#### Static IP

Unlike DHCP, where a DHCP server will assign a set of IP address to a client device automatically when connected, users using Static IP as their WAN connection will have to manually input TCP/IP protocol settings (IP address, subnet mask, gateway, and DNS) provided by network administrator. Users can input a set of WAN static IP to NuStreams-P9M for testing via its utility software.



## TCP and UDP

**UDP** is a protocol used in Internet Protocol (IP). UDP uses a simple transmission model without implicit hand-shaking dialogues for guaranteeing reliability, ordering, or data integrity. Thus, UDP provides an unreliable service and datagram may arrive out of order, appear duplicated, or go missing without notice. Time-sensitive applications often use UDP because dropping packets is preferable if it is delayed. Telecom such as VoIP (voice over IP) is an example.

### TCP

If error correction facilities are needed at the network interface level, an application may use the Transmission Control Protocol (TCP) which is designed for this purpose. TCP provides reliable, ordered delivery of a stream of bytes from one program on one computer to another program on another computer. Besides the Web, other common applications of TCP include e-mail and file transfer.

## HTTP and FTP

**Hypertext Transfer Protocol (HTTP)** is a communications protocol. Its use for retrieving inter-linked text documents (hypertext) to the establishment of the World Wide Web. HTTP predominantly uses TCP, not UDP

**File Transfer Protocol (FTP)** is a network protocol used to transfer data from one computer to another through a network such as the Internet by TCP.

### Auto-negotiation

Auto-negotiation is an Ethernet procedure by which two connected devices negotiating common transmission parameters, such as speed (10M/100Mbps) and duplex mode. During the process, the connected devices first share their capabilities as for these parameters and then choose the fastest transmission mode they both support.

#### Link Wait (Minimum)

NuStreams-P9M will attempt to establish connection with the DUT and wait for the minimum time (seconds).

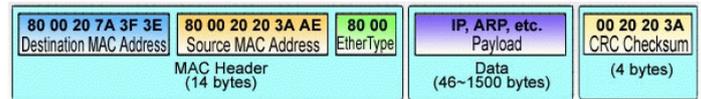
NuStreams-P9M will keep waiting until the minimum time is met even the DUT has already responded.

#### Link Wait (Time Out)

NuStreams-P9M will attempt to establish connection with the DUT and wait for a period of time until time out (second), and NuStreams-P9M will not attempt to establish connection anymore.

## Frame 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. Depends on the data a frame carries, the length (Kbytes) is varied from 64 to 1518 bytes as the figure below



## Parameter for Test on DUT

Almost any configuration can be done by buttons at top panel with instruction on LCD panel.

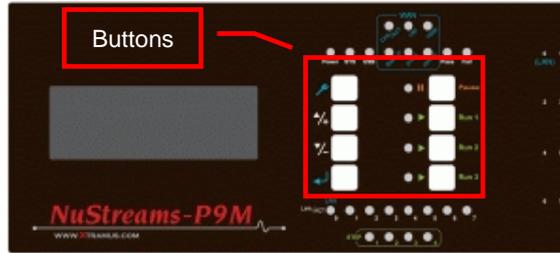
		Test Items	Parameter
Auto	Switch	Speed	10M Half/10M Full/100M Half/100M Full
		Ports	01/012/0123/01234/012345 /0123456/01234567
		Frame Length	64 / 128 / 256 / 512 / 768 / 1024 / 1280 / 1518 / 1600 bytes
		Test Time	1s-10s/30s/1min-3min/5min
		Loss/Excess	0/100/1000/3000/5000/7000/9000
		Tolerance	/9999 pkts
		Test Utilization	10/30/50/60/70/80/90/100
		Link Wait (Minimum &Time Out)	2~200s
	Router	Learning Time	1~10s
		WAN Type	DHCP/Static IP
		WAN (Static IP)	192.168. 1.254
		Media Type	10M Full / 100M Full
		Check Vendor ID	off / on
		MAC Range	00-00-00
Router	IP Type	TCP/UDP	
	TCP Type	HTTP/FTP	
	Session	1~8	
	Frame Length	64 / 128 / 256 / 512 / 768 / 1024 / 1280 / 1518 bytes	
	W-L Utilization	10/30/50/60/70/80/90/100 (WAN->LAN)	
	L-W Utilization	10/30/50/60/70/80/90/100 (LAN->WAN)	
	Test Time	1s-10s/30s/1min-3min/5min	
	Loss/Excess	0/100/1000/3000/5000/7000/9000	
Tolerance	/9999 Pkts		
Router	Link Wait (Minimum &Time Out)	2~200s	

Note: Test criteria between steps is applicable via Utility.  
For example, packet loss tolerance is tunable from 0~9999.



# OPERATION OF NuStreams-P9M

## Control via Button



Almost all function can be operated via buttons at top panel  
Buttons for Configuration (left 4 buttons)

Label	Action	Description
	Push once	Enter main menu or return to previous menu. Menu: all settings at left table
	Push once	Return for next test
▲/+	Push once	Move up one selection
▼/-	Push once	Move down one selection
	Push once	Execute the selected selection

Buttons for Operation (right 4 buttons)

Label	Action	Description
Pause	Push once	Pause current running test
▶ Run1	Push once	Start Run 1 test. Up to 4 tasks can be configured in Run 1 hotkey. Press this button to test all functions once.
▶ Run2	Push once	2 <sup>nd</sup> hotkey as above
▶ Run3	Push once	3 <sup>rd</sup> hotkey as above

## Control via NuPAD

As shown in the figure down below, NuPAD is an assistant extension keypad that is especially made for users at mass production line. For operator at product line, configures test criteria is not their duty. Supervisor can configure the settings in advance and locks the settings with password, and operator just press Start or Stop button to test and pick up faulty product.



The Console Port of NuPAD can be connected to NuStreams-P9M for remote control.

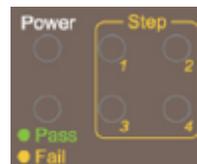


Console Port for Connecting NuPAD and NuStreams-P9M

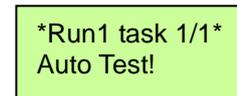
There are three buttons for control of each Run.

Label	Action	Description
Pause	Push once	Pause Test or start test again if it is paused
■ Stop	Push once	Stop Test
▶ Run	Push once	Run Test or start test again if it is paused
Pause + ■ Stop	Push at the same time	Switch around Run 1, Run 2 and Run 3

NuPAD's LEDs (such as Pass/Fail LED) are all synchronized with NuStreams-P9M's corresponding LEDs.  
NuPAD's LCD screen can display the test mode and task as well.



Status LED



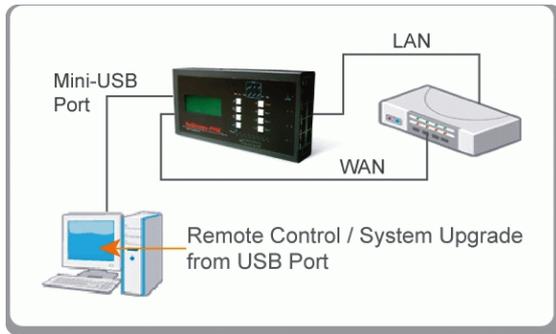
Status LCD



## Control via NuStreams-P9M Utility

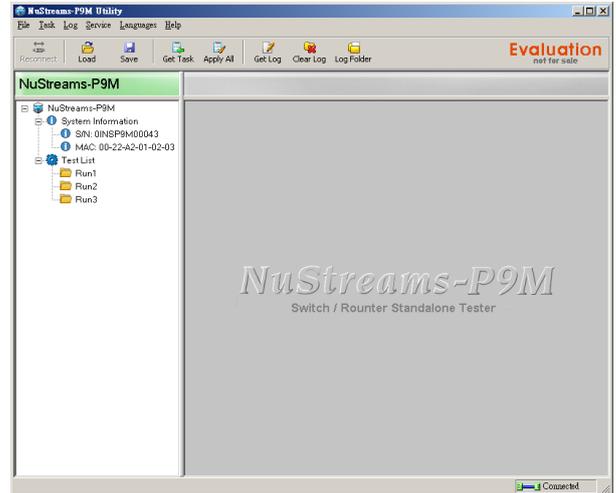
NuStreams-P9M comes with configuration utility software that runs under Microsoft Windows environment. Users can configure test parameter for NuStreams-P9M via USB port with Windows interface, collect test log and update system firmware.

Mini-USB connector cable mentioned above is an industrial standard USB cable with standard male USB connector and standard male mini-USB connector at each side.



NuStreams-P9M comes with a GUI (graphic user interface) utility for the configuration. By connecting NuStreams-P9M with PC via its Management Port, users can configure the test parameters, download testing logs and upgrade firmware.

All parameters can be configured here, including all the configurations that can be set by buttons on NuStreams-P9M's panel.



## RELATED PRODUCTS

### NuStreams-5G

5 Ports Gigabit Ethernet Switch Tester



### NuPAD:

Extension Keypad with 3 Control Buttons



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