

## NuStreams-P5G+ OVERVIEW

**NuStreams-P5G+** is a five-port Gigabit stand-alone **Switch/Residential Gateway (Broadband Router)** test device for testing switches and broadband routers (along with their switch ports) at wirespeed with its **1 LAN Port, 3 Switch Ports**, and **1 WAN Port**. Also, **NuStreams-P5G+** can also be connected to PC for accessing its simple and easy-to-use configuration utility.

Each of **NuStreams-P5G+**'s 3 **RUNs** contains 4 **Tasks**. These Tasks allow users to simultaneously test **10M Full/Half, 100M Full/Half** and **1000M Full** with a single button. This innovative design can greatly reduce the time consumed when performing product tests.

With 3 different Test Types (**Router, Switch, and Router + Switch**) available, **NuStreams-P5G+** can perform tests on switch/router, 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.

**NuStreams-P5G+** supports bi-direction LAN/WAN test packets with 253 IP addresses. Each IP has its own settings and transmitting/receiving counters, including independent statistics and calculations for latency and Serial Number.

Also, both DUT and **NuStreams-P5G+**'s IP addresses can be any IP of 256 IP addresses from Class C.

**NuStreams-P5G+** comes with its own utility software. **NuSet-MiniPG** allows users to set DUT test criteria, upgrading **NuStreams-P5G+** firmware/FPGA, and accessing detail test logs/statistics for further analysis.

With the ability to provide high reliable test results and the best cost/performance ratio, **NuStreams-P5G+** is the best solutions available for router and switch tests.



## NuStreams-P5G+ KEY FEATURES

- Compact, lightweight, and portable 5-port Gigabit test device for testing network switches and routers
- Flexible WAN port connection for router tests:
  - Static IP
  - DHCP (Dynamic Host Configuration Protocol)
  - PPPoE (Point-to-Point Protocol over Ethernet)
- Supporting bi-direction LAN/WAN test packets with 253 IP addresses. Each IP has its own settings and transmitting/receiving counters, including independent statistics and calculations for latency, Serial Number, and VLAN Tags
- Both DUT and NuStreams-P5G+'s IP addresses can be any IP of 256 IP addresses from Class C
- Supports and can receive packet in PPP LCP, IPCP PAP formats
- Tests are performed automatically in a step-by-step manner, which makes NuStreams-P5G+ a more productive solution than traditional PC-based solutions
- Can be connected with external bar code reader
- NuStreams-P5G+'s hardware information, such as fan speed and system temperature, is available and can be checked
- LCD screen for displaying test results and related statistics

## NuPAD OVERVIEW

Built to be light and easy-to-handle, **NuStreams-P5G+** is designed to meet the needs of production lines. However, considering the buttons on **NuStreams-P5G+** might be too small to operate, an optional keypad **NuPAD** is available to solve this inconvenience.

**NuPAD** is an optional keypad with intuitive platforms and easy-to-use buttons, and can be connected to

**NuStreams-P5G+** in mass production line.

Although possessing no configuration functions, the lighter and smaller **NuPAD** provides 3 big, durable buttons (RUN 1~3) for users to operate the test procedure easily without touching configuration buttons on the top panel of **NuStreams-P5G+**.



## NuPAD KEY FEATURES

- Simple, easy to operate, performing tests fast
- Easy for maintenance. If NuPAD malfunctions, there's no need to fix/replace the NuStreams-P5G+ connecting to it
- Intuitive Buttons for production crews to verify test results fast

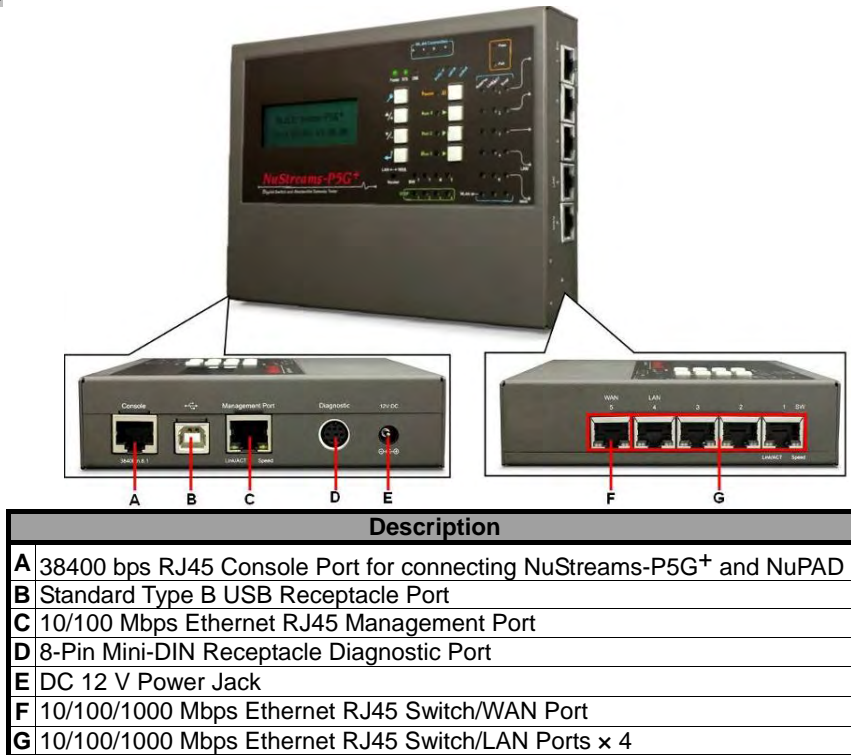
## NuStreams-P5G+ SPECIFICATIONS

NuStreams-P5G <sup>+</sup>		
Support frame format	• Ethernet II Frame	• IEEE802.3 frame
Ports & Buttons		
Ports	For Router Test	• LAN Port: 10/100/1000 Mbps Ethernet RJ45 Port × 4 • WAN Port: 10/100/1000 Mbps Ethernet RJ45 Port × 1
	For Switch Test	• Switch Port: 10/100/1000 Mbps Ethernet RJ45 Port × 5 • Management Port: 10/100 Mbps RJ45 Port × 1 • Console Port for NuPAD: 38400 bps RJ45 Port × 1 • USB Port: Standard Type B USB Port × 1
	Buttons	• 4 Configuration Buttons for Configuring Tests • 4 Operation Buttons for Controlling Tests
System Status & Testing Result Feedback Interface		
LEDs	System Status	• Power • SYS • USB
	WAN Type	• Static IP • DHCP • PPPoE
	Test Status	• Pass: DUT Test Pass • Fail: DUT Test Fail
	Test Hotkey Status	• Pause: Current running test paused • Run 1/2/3: Test Task of Run 1/2/3 is running
	LAN Ports (1~5) Status	• Reserve • Link/ACT • Error
	Router (LAN ↔ WAN)	NuStreams-P5G <sup>+</sup> is set to test <b>Broadband Router</b> .
	Switch (SW 2~5)	NuStreams-P5G <sup>+</sup> is set to test <b>Switch</b> . LED 2~5 indicates the number of ports used.
LCD	Test Step Status Test starts from step 1 to 4	1. Link Status Test 2. Auto Negotiation Connection Test 3. Test Starts 4. Test Finished
	Status Displayed by Log	• Test Start Time • Test End Time • Packets Transmitted • Packets Received • Error Packets • Test Fail/Pass • Throughput (packets/second) base on pre-defined allowable tolerance
Traffic Generation & Receiving		
Traffic Generation	• Wirespeed or Utilization • Frame length can be set as <b>Fixed, Increase, Decrease, Random</b> ➢ Frame length can be set as 64/128/256/512/768/1024/1518/1600 Bytes ➢ Frame length can also be set so it will be switching back and forth among 64 Bytes and 1518 Bytes as well • VLAN Tags can be added to test packets • Different testing time scales from 1 sec to 5 minutes • 3 individual Runs (Run1, 2, 3) for traffic generation (different Run for tests cannot run at once) • Each Run includes maximum of 4 tasks	
Traffic Receiving	User-defined or pre-defined packet Excess/Loss tolerance for identifying result as Pass/Fail	
Utility Softwares		
NuSet-MiniPG	• Test Configuration • View system info • Examine Log • Upgrading Firmware/FPGA/License	
Main Frame Spec		
Dimension	176 mm X 128 mm X 32.6 mm	
Net Weight	Approx. 727 g	
Temperature	• Operating: 0°C~ 40°C (32°F~ 104°F) • Storage: 0°C~ 50°C (32°F~ 122°F)	
Humidity	• Operating: 0% ~ 85% RH • Storage: 0% ~ 85% RH	
Power Source	External Power Adapter with Built-in battery for keeping track of date and time • Input: AC 100V~240V, 50 Hz~60 Hz • Output: DC 12 V	
NuStreams-P5G <sup>+</sup> Applications		
• Performing quality assurance/control tests for network device in production-scale during manufacturing • Performance validation of network product • Troubleshooting at service/maintenance outlets		

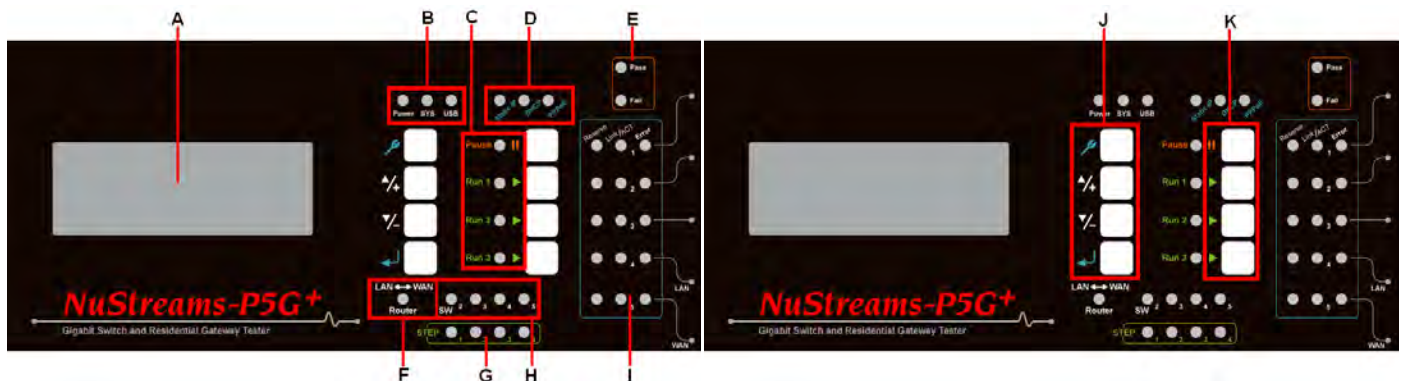
## FUNCTION DESCRIPTION OF NuStreams-P5G<sup>+</sup>

With intuitive control panel, LCD and LED-indicators, NuStreams-P5G<sup>+</sup> is easy-to-operate. Please refer to the pictures down below for more information.

### NuStreams-P5G<sup>+</sup> Ports



### NuStreams-P5G<sup>+</sup> Front Panel



Description	
A	NuStreams-P5G <sup>+</sup> LCD Display Screen
B	System Status LEDs
C	Test Hotkey Status LEDs
D	WAN Type LEDs
E	Test Status LEDs
F	Router (LAN ↔ WAN) LED
G	Test Step Status LEDs
H	Switch (SW 2~5) LEDs
I	LAN Ports (1~5) Status LEDs

Description	
J	Configuration Buttons
	Enter the Main Menu(*) or Return to the previous Menu
	Move the select cursor up
	Move the select cursor down
K	Operation Buttons
	Execute the selected selection
	Pause
	Start all tasks set in Run 1. Up to 4 tasks can be configured in Run 1 hotkey. Press this button to test <b>ALL TASKS AT ONCE</b> .
	Run1
	Run2 2 <sup>nd</sup> hotkey that works as Run 1
	Run3 3 <sup>rd</sup> hotkey that works as Run 1

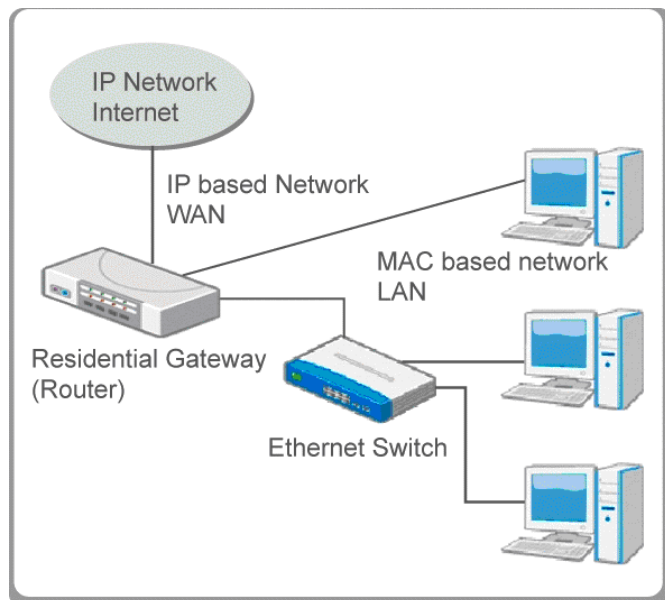
\*Menu will be displayed on the LCD screen.



## TECHNICAL TERMS

### 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-P5G<sup>+</sup> 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-P5G<sup>+</sup>, it will record these packets, and learn the routing to NuStreams-P5G<sup>+</sup>.

### 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-P5G<sup>+</sup> 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-P5G<sup>+</sup> for testing via its utility software.

#### PPPoE

PPPoE, Point-to-Point Protocol over Ethernet, is a network protocol for encapsulating Point-to-Point Protocol (PPP) frames inside Ethernet frames. It is used mainly with ADSL services where individual user connects to the ADSL transceiver (modem) over Ethernet. When performing PPPoE test with NuStreams-P5G<sup>+</sup>, it is required to input a set of account and password with NuSet-MiniPG.

## 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-P5G<sup>+</sup> will attempt to establish connection with the DUT and wait for the minimum time (seconds).

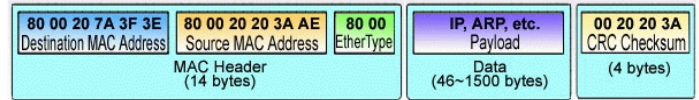
NuStreams-P5G<sup>+</sup> will keep waiting until the minimum time is met even the DUT has already responded.

### Link Wait (Time Out)

NuStreams-P5G<sup>+</sup> will attempt to establish connection with the DUT and wait for a period of time until time out (second), and NuStreams-P5G<sup>+</sup> 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:

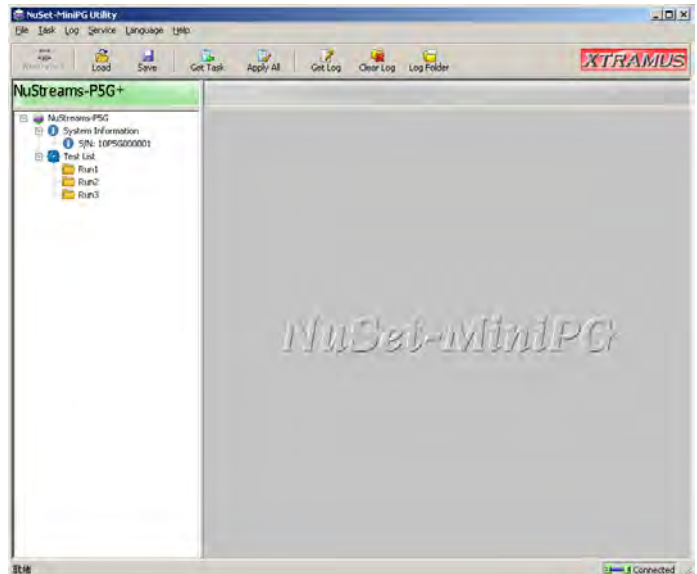
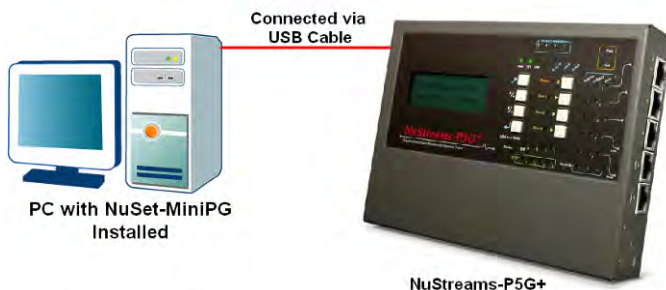


## MAKING TEST CONFIGURATIONS WITH NuSet-MiniPG

NuSet-MiniPG is a software designed for NuStreams-P5G<sup>+</sup> and runs under Windows® environment. With NuSet-MiniPG's GUI (Graphic User Interface), users can configure test parameters, access test data and upgrade system firmware/FPGA/license.

To use NuSet-MiniPG, you need connect NuStreams-P5G<sup>+</sup>'s **USB Port** with your PC via a USB cable as shown in the figure down below.

- Setting Test Criteria
- Accessing Test Results/Statistics
- Upgrading Firmware/FPGA



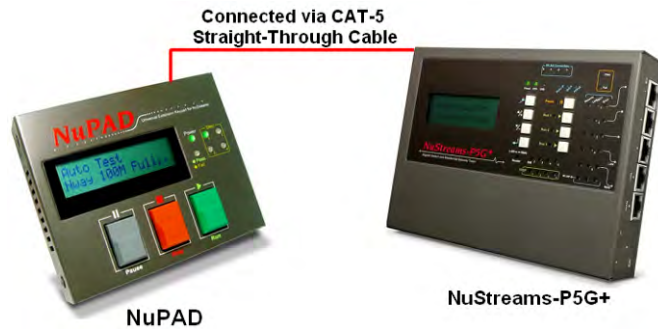
## CONTROLLING TESTS WITH NuPAD



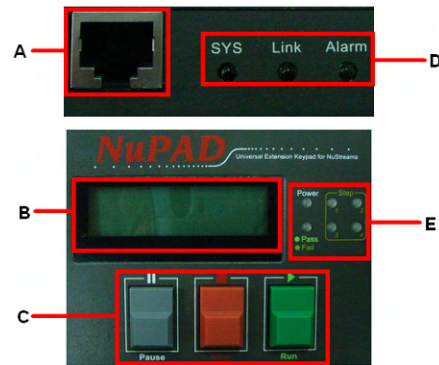
**NuPAD** is an assistant extension keypad specifically designed for running tests at mass production line. With all test parameters set and stored in **NuStreams-P5G+**, **NuPAD** allows users to perform tests without changing pre-set parameters.

Before using **NuPAD** as an assistant extension keypad, you have to connect **NuPAD's**

**Connection Port** with **NuStreams-P5G+'s** **Console Port** with a Cat-5 Straight-Through cable first as shown in the figure down below.



### NuPAD Function Overview



#### Description

<b>A</b>	Connection Port
<b>B</b>	LCD Screen
<b>C</b>	Control Buttons
<b>D/E</b>	System LEDs

NuPAD's LEDs (such as Pass/Fail LED) are all synchronized with NuStreams-P5G+'s corresponding LEDs, while its LCD screen can display test information as well.

## RELATED PRODUCTS

### NuStreams-P9A:

10/100 Mbps Network Switch and Residential Router Tester



### NuStreams-P6GW:

Wireless, 10/100/1000 Mbps Network Switch & Residential Router Tester



### NuPAD:

Extension Keypad with 3 Control Buttons



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Doc # NuStreams-P5G+\_PBF\_ENG\_Ver1.1\_20120829