



NuStreams-600i/2000i

User's Manual



Foreword

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Contact Information

Xtramus Technologies

E-mail: sales@xtramus.com

Website: www.xtramus.com

Tel: +886-2-8227-6611

Fax: +886-2-8227-6622



Revision History

Date	Version	History
2013/1/15	1.0	First draft version
2024/7/8	1.1	Add XM-RM882. Modify Software description.



Table of Contents

Foreword.....	2
Revision History	3
1. NuStreams-600i/2000i Overview.....	5
1.1. NuStreams-600i/2000i General Description	5
1.2. Key Features of NuStreams-600i/2000i	6
1.3. Main Applications	6
2. NuStreams-600i Functions and Structure Overview	8
3. NuStreams-2000i Functions and Structure Overview	9
4. NuStreams-600i/2000i Installation.....	10
4.1. Choices of UTP Cable and Optical fiber	10
4.1.1. 10GBASE-T (Copper Wire)	10
4.1.2. 10GBASE-R (Optical Fiber)	11
4.2. Hardware Installation	13
4.2.1. Bracket installation.....	13
4.2.2. Module Cards Installation	15
5. NuStreams-600i/2000i's Module Cards	17
5.1. System Module Cards	18
A. XM-2S19.....	18
B. XM-2S10.....	19
C. XM-60PW	20
5.2. Measuring Module Cards	21
A. XM-RM661.....	21
B. XM-RM671.....	22
C. XM-RM681.....	23
D. XM-RM731.....	24
E. XM-RM751.....	25
F. XM-RM761	26
G. XM-RM781	27
H. XM-RM881.....	28
I. XM-RM882	29
6. Example of suitable software for NuStreams-600i/2000i	30
6.1. NuWIN-RM.....	30
6.2. NuApps-2544-RM	31
6.3. NuApps-MultiUnits-RM.....	33
7. Appendix – Other Utility Softwares for NuStreams-600i/2000i	34



1. NuStreams-600i/2000i Overview

1.1. NuStreams-600i/2000i General Description

Built on open software platform and a highly scalable architecture, **NuStreams-600i/2000i** is highly flexible and its functionality and applications can be enhanced by applying software upgrade or adopting new test modules.



NuWIN-RM, a powerful MS-Windows XP based GUI, provides an easy way to configure and control **NuStreams-600i/2000i** for different tests and to monitor and gather test statistics. Users may generate customized traffic patterns using packet streams and easily configure packets with incrementing, decrementing, or random MAC addresses and through user-defined fields. Protocol editors are available for IP, UDP, IPX, TCP, IGMP, MPLS, VLAN, and OSPF. Each port can generate ARP requests and Ping requests and response to such messages.

For switching device tests, users may use NuApps-2889-RM, an application software suite based on RFC 2889 and 2285, or NuApps-2544-RM, another suite based on RFC 1242 and 2544, to perform tests on **NuStreams-600i/2000i**.

In addition to the software suites provided by Xtramus, users may develop customized application programs to take full advantage of **NuStreams-600i/2000i** by using the NuStreams API. Customized mass production test programs are also available to apply.

X-trailer, a feature for verifying the integrity of the embedded memory of a switch controller by checking an unique tag attached to each packet sent from **NuStreams-600i/2000i** is supported by all test modules.

Intelligence chassis with enhanced fan development makes **NuStreams-600i/2000i** even more stable and reliable. Chassis temperature and voltage are also measurable at all times.

NuStreams-600i/2000i is the most cost-effective, efficient and professional network performance testing and analysis solution available on the market. The combination of high performance, multi-port traffic generation and analysis functions, test modules, and reasonable pricing makes it the ideal solution for R&D and Mass Production Test applications.



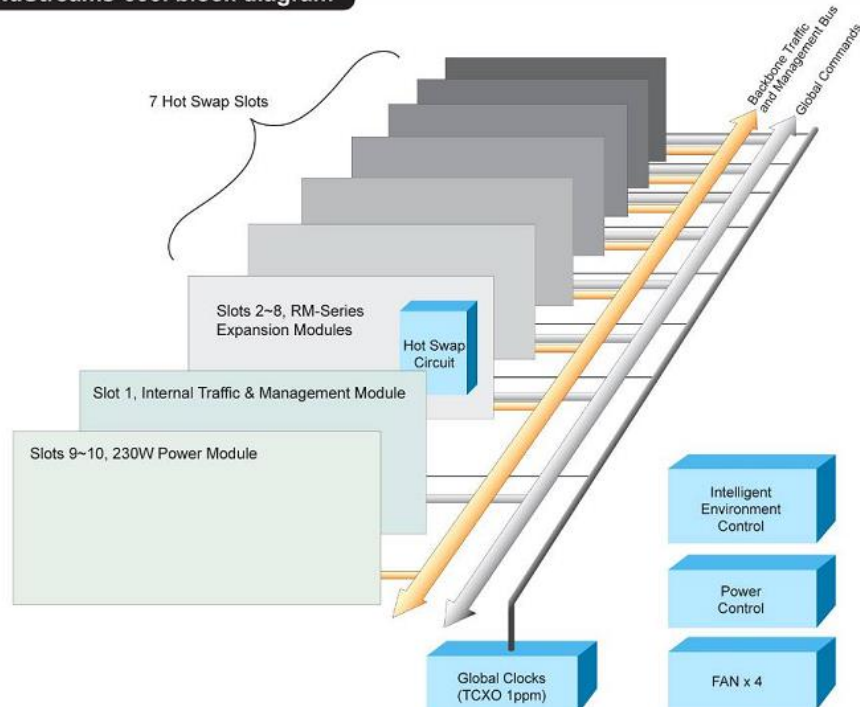
1.2. Key Features of NuStreams-600i/2000i

- Intuitive utility software for monitoring system temperature and the fan speed
- All slots support hot-swapping
- Performing synchronized tests between module cards
- Multi-user function for module cards that can provide greater hardware-efficiency
- Utility softwares provided by Xtramus Technologies which can analyze the test results and DUT performance with intuitive GUI interface.
- Module cards that work as management interfaces of NuStreams-2000i/600i are available and support different Ethernet transferring rate.
- Simple and easy-to-understand system status LEDs
- Replaceable fan tray
- Utility softwares that complied with RFC-2544 and RFC-2889

1.3. Main Applications

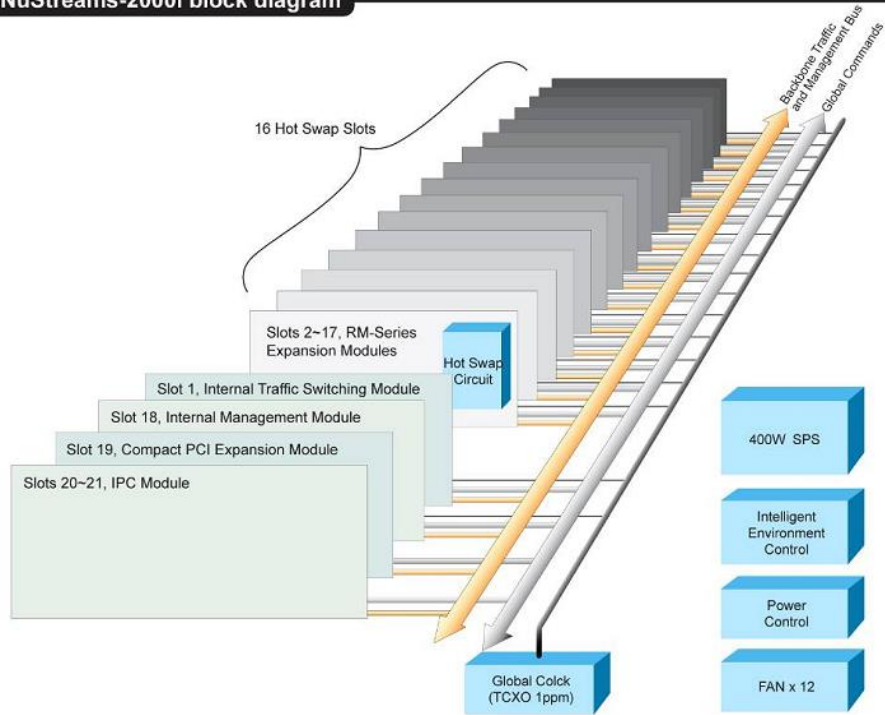
- Performance validation and analysis of DUT in mass production line
- Troubleshooting of DUT in the lab
- Production testing and quality assurance during manufacturing process of network products

NuStreams-600i block diagram



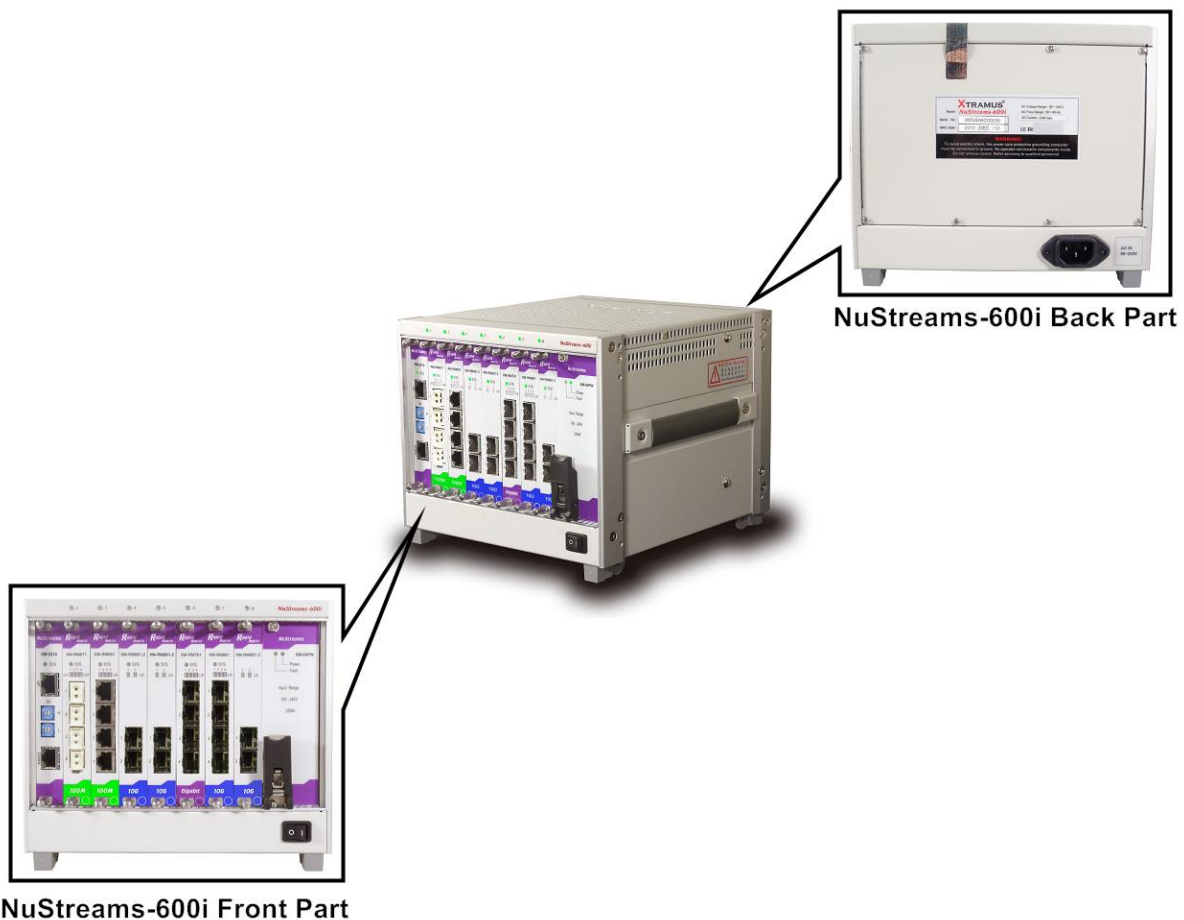


NuStreams-2000i block diagram





2. NuStreams-600i Functions and Structure Overview

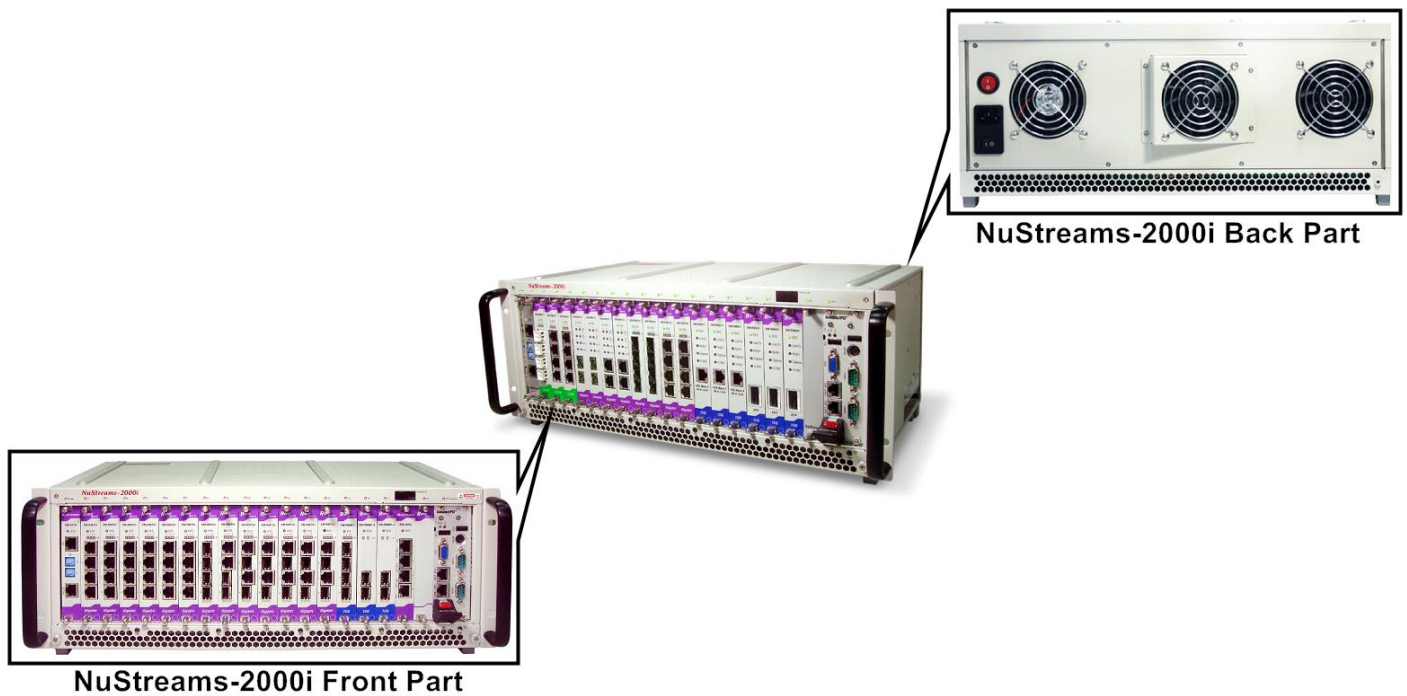


NuStreams-600i's outer case consists of: **Front Part**, **Back Part** and **Side Part**. The figure above shows the outer case of NuStreams-600i.

NuStreams-600i Outer Case Overview	
Front Part	NuStreams-600i has 7 slots for installation of module cards, where each module card provides streams generating platforms for different types of media. Besides, the Front Part includes 2 slots with System and Power module card installed, which should not be withdrawn.
Back Part	NuStreams-600i's back part includes a back platform which should not be withdrawn and a power plug-in.
Side Part	NuStreams-600i's each side part includes a handle for carrying use, and numerous cooling holes.



3. NuStreams-2000i Functions and Structure Overview



NuStreams-2000i's outer case consists of: **Front Part**, **Back Part**. The figure above shows the outer case of NuStreams-2000i.

NuStreams-2000i Outer Case Overview	
Front Part	NuStreams-2000i has 18 slots for installation of module cards, where each module card provides streams generating platforms for different types of media. Besides, the Front Part includes 1 far right slot with System module card installed, which should not be withdrawn. On each end right and end left side includes a handle for carrying use.
Back Part	NuStreams-2000i's back part includes a back platform with power module with Fan device which should not be withdrawn and a power plug-in.



4. NuStreams-600i/2000i Installation

As cited above, NuStreams-600i is a chassis with 7 slots and NuStreams-2000i is a chassis with 18 slots for installation of module cards. Installing NuStreams-600i/2000i is very easy and simple: all you have to do is to plug the proper fiber/UTP cables into NuStreams-600i/2000i ports. Selecting the proper physical media and applications in your network environment is crucial when installing NuStreams-600i/2000i. Besides, using the proper method for installing module cards into NuStreams-600i/2000i' slots is also crucial for the proper functionality of NuStreams-600i/2000i. Please see the sections down below for detailed information regarding to physical media types and the proper method for installing a module card.

4.1. Choices of UTP Cable and Optical fiber

4.1.1. 10GBASE-T (Copper Wire)

10GBASE-T, or IEEE 802.3an-2006, is a standard released in 2006 to provide 10 gigabit/second connections over unshielded or shielded twisted pair cables and over distances up to 100 meters (330 ft). 10GBASE-T cable infrastructure can also be used for 1000BASE-T, allowing a gradual upgrade from 1000BASE-T, and auto-negotiation to select which speed to use.

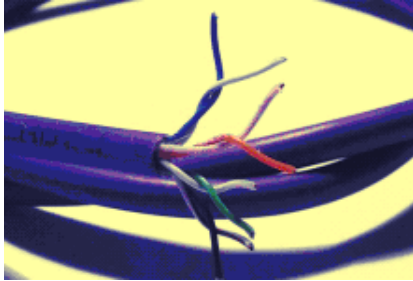
10GBASE-T Connectors

10GBASE-T uses 650 MHz versions of the venerable IEC 60603-7 8P8C (RJ-45) connectors, which is already widely used in Ethernet.

10GBASE-T Cables

10GBASE-T works up to 55 m (180 ft) with existing Category 6 cabling. In order to allow deployment at the usual 100 m (330 ft), the standard uses a new partitioned Category 6a cable specification, designed to reduce crosstalk between UTP cables.

The table down below is a reference regarding to UTP cable categories.

UTP Cable Categories References	
Cat 5	Provides performance of up to 100 MHz, and was frequently used on 100 Mbps Ethernet networks. Cat 5 may not be suitable for 1000BASE-T gigabit Ethernet.
Cat 5e	Provides performance of up to 100 MHz, and is frequently used for both 100 Mbps and Gigabit Ethernet networks.
Cat 6	Provides performance of up to 250 MHz, more than double of category 5 and 5e. It works up to 55 m (180 ft) for 10Gbps Ethernet.
Cat 6a	Provides performance of up to 500 MHz. It is suitable for 10GBASE-T and works up to 100 m (330 ft) for 10Gbps Ethernet. All the cables mentioned above do not have individually- shielded pairs as the picture here, including Cat 6a. 
Cat 7	This standard specifies four individually-shielded pairs (STP) inside an overall shield. Designed for transmission at frequencies up to 600 MHz. It has better performance than Cat 6a.



4.1.2. 10GBASE-R (Optical Fiber)

10GBASE-R is 10Gbps Ethernet connection that based on IEEE802.3ae. It uses fiber as transmission media with different specification of fiber, connector and transceiver. MCS-2160 uses two standards, 10GBASE-LR and 10GBASE-SR.

10GBASE-SR

10GBASE-SR ("Short Range") uses 64B/66B encoding and 850 nm wavelength lasers. It is designed to support short distances over deployed multi-mode fiber cabling, it has a range of between 26 meters (85 ft) and 82 meters (270 ft) depending on cable type. It also supports 300 meters (980 ft) operation over new, 50 μ m 2000 MHz-km OM3 multi-mode fiber (MMF).

The transmitter can be implemented with a VCSEL (Vertical Cavity Surface Emitting Laser) which is low cost and low power. MMF has the advantage of having lower cost connectors than SMF (single-mode fiber) due to its wider core.

10GBASE-SR delivers the lowest cost, lowest power and smallest form factor optical modules.

10GBASE-LR

10GBASE-LR ("Long Range") is a Long Range Optical technology delivering serialized 10 gigabit Ethernet over a laser with 1310 nm wavelength connection on single-mode fiber via IEEE 802.3 Clause 49 64B-66B Physical Coding Sub layer (PCS) using a line rate of 10.3125.

Single-mode optical cabling is used to interconnect transceivers at a distance spaced at 10 kilometers (6.2 mi), but it can often reach distances of up to 25 kilometers (16 mi) with no data loss.

Fabry–Pérot lasers are commonly used in 10GBASE-LR optical modules. Fabry–Pérot lasers are more expensive than VCSELs (mentioned above) but their high power and focused beam allow efficient coupling into the small core of single mode fiber.

Fiber Specification

Fibers which support many propagation paths or transverse modes are called multi-mode fibers (MMF). Fibers which can only support a single mode are called single-mode fibers (SMF). Multi-mode fibers generally have a larger core diameter, and are used for short-distance communication links and for applications where high power must be transmitted. Single-mode fibers are used for most communication links longer than 200 meters.

Fiber Buffer/Jacket Color	Meaning
Yellow	Single-mode optical fiber, long distance connection
Orange	Multi-mode optical fiber, short distance connection



Optical Fiber

As mentioned above, there are Single-mode and Multi-mode optical fiber. Both of them can be used for XC media converter module series.

Fiber Connector

Optical fiber connector contains two ends of fibers and can attach to SFP+ transceivers. There are two ports for one SFP+ transceiver: one fiber is for receiving and one fiber is for transmitting. The picture here is called LC connector that can attach to SFP+ transceiver.



Transceiver (Connector)

SFP+/XFP Transceivers can be plugged into XC media converter module's SFP+/XFP Ports. SFP+/XFP Transceivers are active components that consume power from XC media converter module and are capable of converting signals between optical data flow and electronic data flow.

For different transmission purpose, the component inside SFP+ form factor can be 10BASE-LR or 10BASE-SR mode.



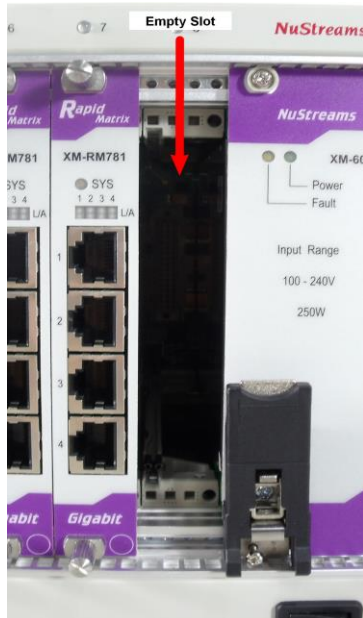


4.2. Hardware Installation

Please follow the steps shown below for a better understanding on how to install hardware in NuStreams-600i/2000i.

4.2.1. Bracket installation

Steps for installing a Bracket in NuStreams-600i/2000i



First of all, you must have an Empty Slot for the Installation of a Bracket.



Attach the Bracket's screw end on the internal Chassis' screw holes, and lock the screw on the screw hole.

Note: we advise to use brackets to close the unused slots of the NuStreams-600i/2000i for internal protection.





4.2.2. Module Cards Installation

Steps for installing a XM-RM Module Card in NuStreams-600i/2000i



Aim the border side of a XM-RM Module Card with the NuStreams-600i/2000i internal slide road, and push this Module Card into the NuStreams-600i/2000i.



Please, make sure if the XM-RM Module Card is well fixed into NuStreams-600i/2000i by pushing the bracket of the XM-RM Module Card into NuStreams-600i/2000i.





5. NuStreams-600i/2000i's Module Cards

NuStreams-600i/2000i's module cards can be divided into two categories: **System Module Cards** and **Measuring Module Cards**.

Module Card Type	Module Card	Description
System Module Cards	<ul style="list-style-type: none">• XM-2S19• XM-2S10• XM-60PW	<p>The XM-2S10 is the system module of NuStreams-600i and XM-2S19 is the system module of NuStreams-2000i. The XM-60PW is the power module of NuStreams-600i. The power module of NuStreams-2000i is installed to its rear side.</p> <p>Please note that System Module Cards do not support hot-swap, and must be installed to their designated slots on NuStreams-600i/2000i chassis.</p>
Measuring Module Cards	<ul style="list-style-type: none">• XM-RM881• XM-RM731• XM-RM751• XM-RM761• XM-RM781• XM-RM661• XM-RM671• XM-RM681	<p>Measuring Module cards for Packets sending/receiving. These Measuring Module cards can be installed in NuStreams-600i/2000i support hot-swap.</p>

Please see the sections down below for more detail information regarding to NuStreams-600i/2000i Module Cards.



5.1. System Module Cards

A. XM-2S19



The **XM-2S19** comes with your NuStreams-2000i chassis, and shall be installed on the slot located on the far left side of NuStreams-2000i chassis. This module card allows you to connect your NuStreams-2000i to your PC.

Interface Ports		
2x RJ45 Port		It consists of one Up port and one Down port.
ID		This is adjustment for cascade mode between more than one NuStreams-600i/2000i for network connection. Adjust the H/L ID to distinct more than one NuStreams-600i/2000i during network operation.
LED		
Sys	Yellow ON	XM-2S19 is booting and preparing for test
	Green ON	XM-2S19 is booting properly and is ready for test
	Green OFF	XM-2S19 is power off

*Note: Please do not draw the XM-2S19 module card from NuStreams-2000i chassis when the system is power on.



The **XM-2S10** comes with your NuStreams-600i chassis, and shall be installed on the slot located on the far left side of NuStreams-600i chassis. This module card allows you to connect your NuStreams-600i to your PC.

Interface Ports		
2x RJ45 Port	It consists of one Up port and one Down port.	
ID	This is adjustment for cascade mode between more than one NuStreams-600i/2000i for network connection. Adjust the H/L ID to distinct more than one NuStreams-600i/2000i during network operation.	
LED		
Sys	Yellow ON	XM-2S10 is booting and preparing for test
	Green ON	XM-2S10 is booting properly and is ready for test
	Green OFF	XM-2S10 is power off

***Note:** Please do not draw the XM-2S10 module card from NuStreams-600i chassis when the system is power on.



The **XM-60PW** comes with your NuStreams-600i chassis, and shall be installed on the slot located on the far left side of NuStreams-600i chassis.

Handle		
Located on the left down side of the bracket of the XM-60PW. Push down to draw the XM-60PW.		
LED		
Power	Green ON	XM-60PW is power on
	Green OFF	XM-60PW is power off
Fault	Yellow ON	XM-60PW is booting and preparing for test, or is power on but not operating properly
	Yellow OFF	XM-60PW is OFF or is operating

***Note:** Please do not draw the XM-60PW module card from NuStreams-600i chassis when the system is power on.



5.2. Measuring Module Cards

A. XM-RM661



XM-RM661 Front Panel Specification		
Interface	Port 1	SFP
	Port 2	SFP
	Port 3	SFP
	Port 4	SFP
Data Transfer Rate		100 Mbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.



B. XM-RM671



XM-RM671 Front Panel Specification		
Interface	Port 1	POF
	Port 2	POF
	Port 3	POF
	Port 4	POF
Data Transfer Rate		100 Mbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.



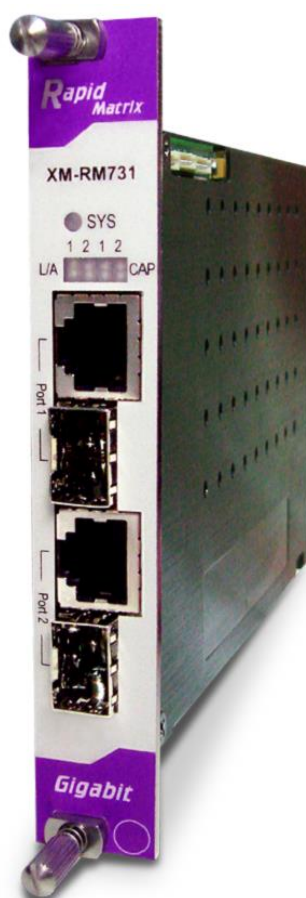
C. XM-RM681



XM-RM681 Front Panel Specification		
Interface	Port 1	RJ45
	Port 2	RJ45
	Port 3	RJ45
	Port 4	RJ45
Data Transfer Rate		100 Mbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.



D. XM-RM731



XM-RM731 Front Panel Specification		
Interface	Port 1	RJ45 + SFP
	Port 2	RJ45 + SFP
Data Transfer Rate		1000 Mbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.
CAP	Green ON	The port is capturing data.



XM-RM751 Front Panel Specification		
Interface	Port 1	RJ45
	Port 2	RJ45
	Port 3	SFP
	Port 4	SFP
Data Transfer Rate		1000 Mbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.



XM-RM761 Front Panel Specification		
Interface	Port 1	SFP
	Port 2	SFP
	Port 3	SFP
	Port 4	SFP
Data Transfer Rate		1000 Mbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.



G. XM-RM781



XM-RM-781 Front Panel Specification		
Interface	Port 1	RJ45
	Port 2	RJ45
	Port 3	RJ45
	Port 4	RJ45
Data Transfer Rate		1000 Mbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.



H. XM-RM881



XM-RM881 Front Panel Specification		
Interface	Port 1	SFP+
	Port 2	SFP+
	Port 3	SFP+
	Port 4	SFP+
Data Transfer Rate		10 Gbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.



XM-RM882 Front Panel Specification		
Interface	Port 1	SFP+
	Port 2	SFP+
	Port 3	SFP+
	Port 4	SFP+
Data Transfer Rate		10 Gbps
LED Status		
SYS	Green ON	The module card is operating
	Yellow ON (Blinking)	The module card is updating the Firmware
	Yellow/Green ON (Blinking)	The module card is booting and preparing for test
L/A	Green ON	The port is currently linked
	Green OFF	The port is currently link down
	Green Blinking	The port is transmitting/receiving data.

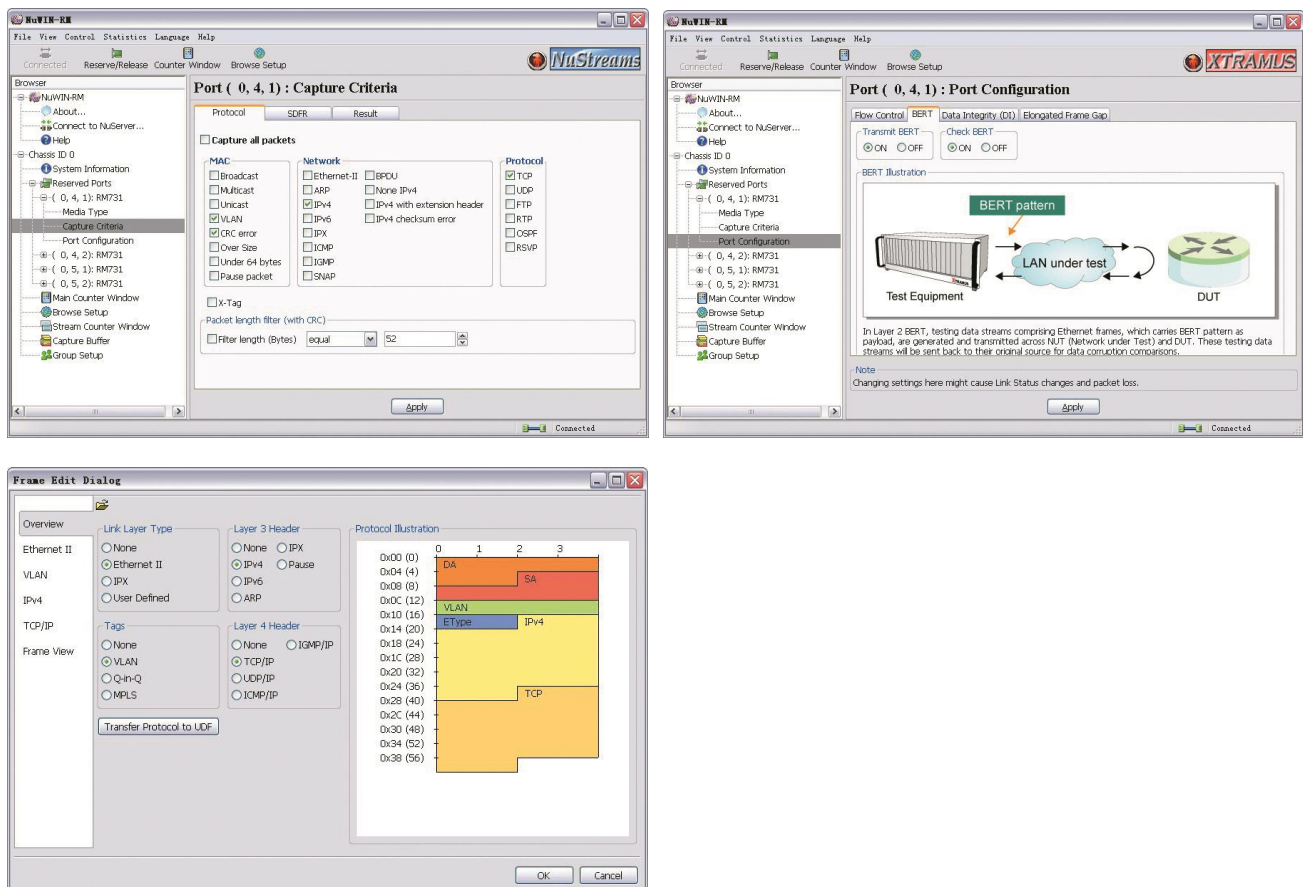


6. Example of suitable software for NuStreams-600i/2000i

Some software suitable for NuStreams-600i/2000i are showed below, please note that the software showed below don't include all software suitable for NuStreams-600i/2000i, for more information regarding the others software, please contact our account managers.

6.1. NuWIN-RM

NuWIN-RM is a powerful and sophisticated virtual control suite for managing NuStreams-600i/2000i chassis. Each test port can be configured separately with different parameters that define streams, filters, and capture capabilities. With its comprehensive statistics reports, *NuWIN-RM* is the best solution for performing in-depth analysis of DUT performance.



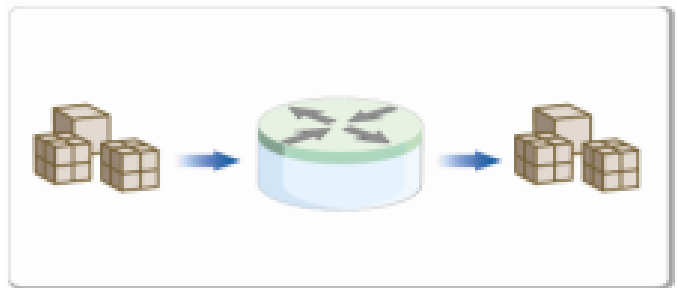
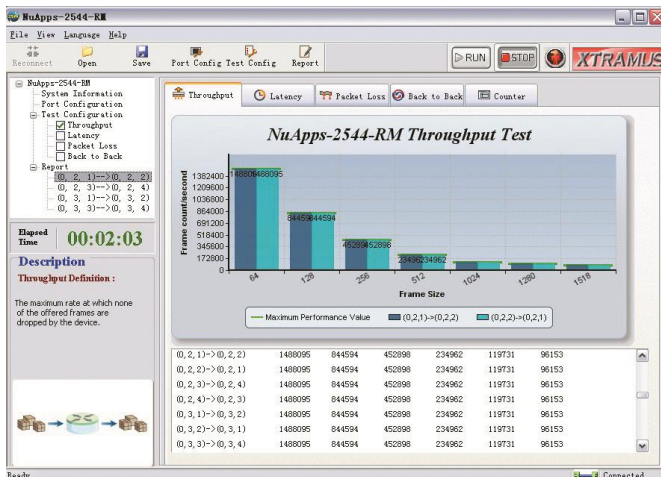
NuWIN-RM has a flexible and intuitive interface to control test modules in a single or multiple chassis through a click of the mouse. Any combination of test modules can be inserted into NuStreams chassis and be instantly identified.



6.2. NuApps-2544-RM

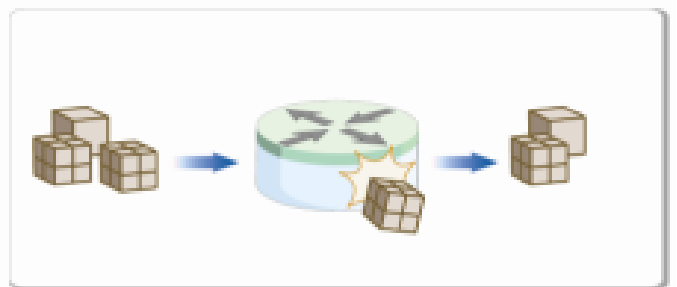
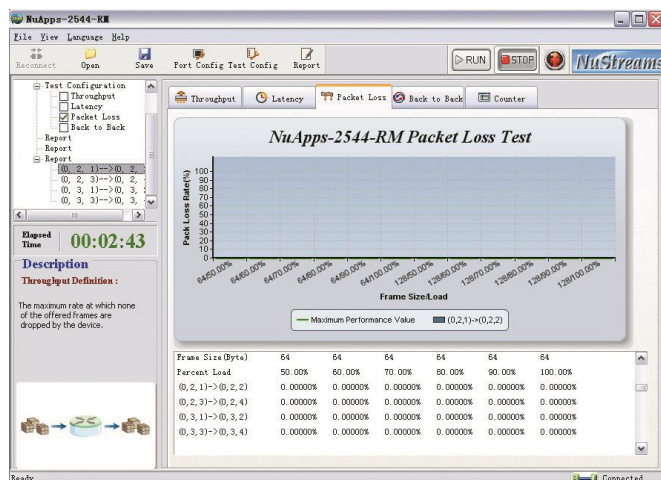
Designed for Xtramus Technologies XM-RM series module cards, *NuApps-2544-RM* is an application designed based on RFC 2544 for analyzing Ethernet switches, bridges, and routers, *NuApps-2544-RM*'s load-generating capabilities provide an effective way to evaluate DUT Throughput, Latency, Packet Loss, and Back to Back under different modes such as One-to-One, One-to-Many, and Many-to-One.

• Throughput



The maximum rate at which none of the offered frames are dropped by the device.

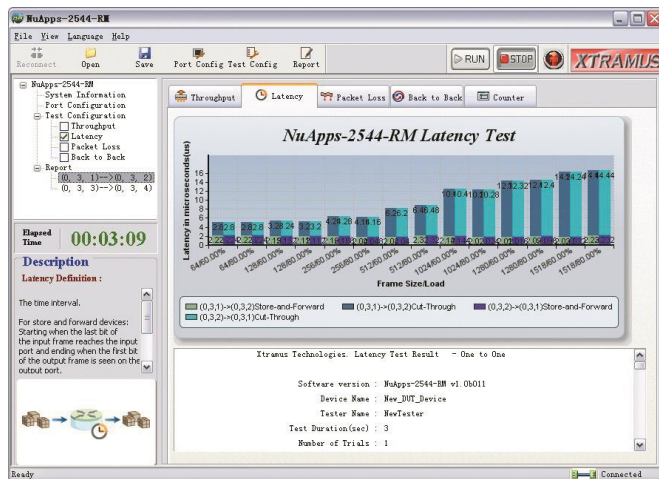
• Packet Loss



Percentage for frames that should have been forwarded by a network device under steady state (constant) load that were not forwarded due to lack of resources.



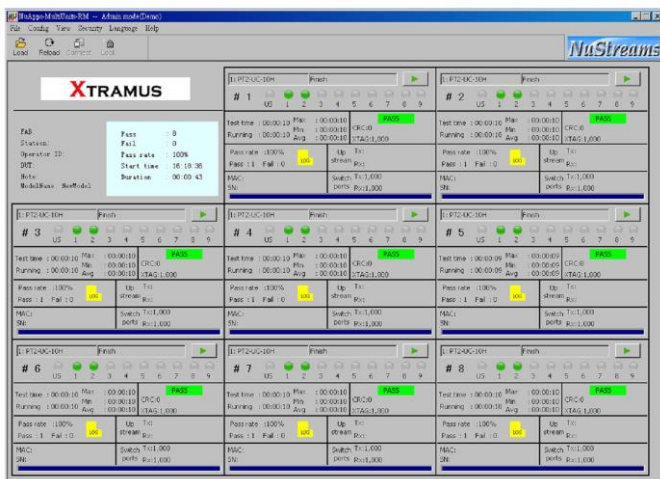
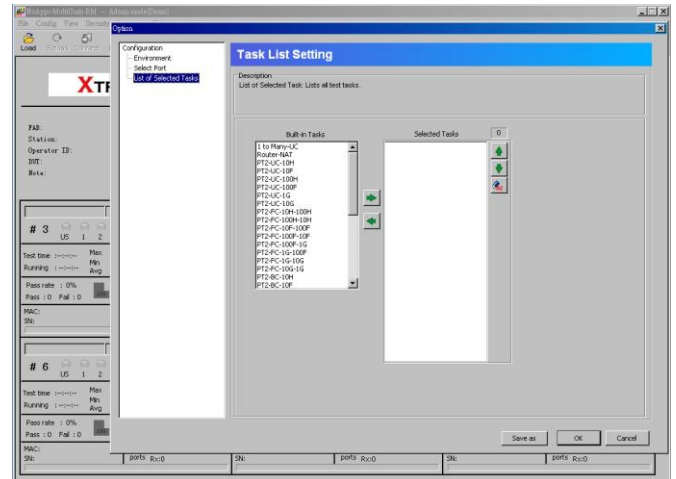
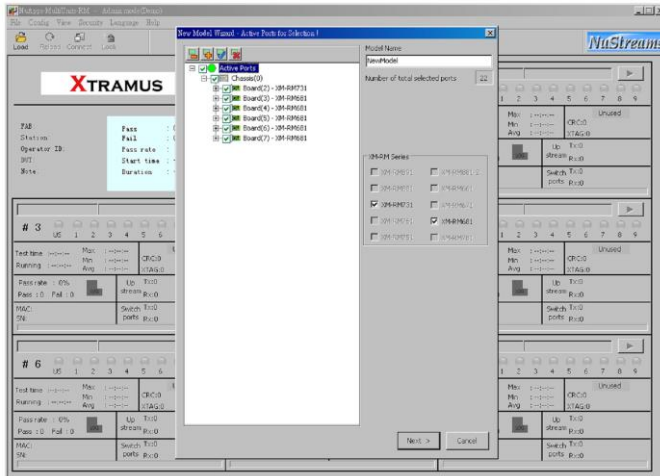
- Latency





6.3. NuApps-MultiUnits-RM

NuApps-MultiUnits-RM is a utility software that displays up to 8 independent windows in 1 user interface, where each window can run different settings with an independent DUT (Device Under Test). The *NuApps-MultiUnits-RM* supports all XM-RM module cards and can reserve the XM-RM module card's ports on each testing window, where the testing result of each window can be showed separately on a log file.



The *NuApps-MultiUnits-RM* not only economizes the resource to accomplish the mass production, but also allows to input the MAC serial number of the device under test, as also detects the link status for auto tests and many others functions.



7. Appendix – Other Utility Softwares for NuStreams-600i/2000i

There are several other optional utility softwares for NuStreams-600i/2000i for different kinds of test requirements. The following section contains brief descriptions of these utility softwares.

NuApps-2889-RM: RFC 2889 Benchmark Test Utility

Designed for Xtramus Technologies XM-RM series module cards, *NuApps-2889-RM* is an application that's designed base on RFC 2889 for analyzing Ethernet switches, bridges, and routers.

NuApps-2889-RM's multiple topologies and the load-generating capabilities provide an effective way to evaluate DUT's on subjects such as Error Filtering, Forwarding, Broadcast Forwarding, Broadcast Latency, Forward Pressure, Address Learning, Address Caching and Congestion Control. With its real-time display of test results and various customizable report formats that allow users to view the test data and organize them into an appropriate form for debug, report, and record, *NuApps-2889-RM* is the best solution for RFC 2889 Benchmarking Methodology.

NuApps-IGMP-RM: Test Suite for Multicast Group Test

NuApps-IGMP-RM is the professional testing software for internet Group Management Protocol (IGMP), a communication protocol designed to manage the membership of internet Protocol multicast groups. IGMP establishes multicast group memberships by connecting IP hosts and adjacent multicast group memberships by connecting IP hosts and adjacent multicast routers. It will be an important protocol when multicast-enabled application such as webinars, Internet radio/TV, and video/audio conferences are now being used widely over the Internet.