RJ45/SFP Ports Ethernet & POF Port Fast Ethernet Test Modules

Saving valuable time and expenses while testing for network product designs and quality control in mass-production scale, XM-RM series modules provide a flexible, reliable, and high-precision solution.

Specifically designed for NuStreams chassis (such as NuStreams-2000i and Nustreams-600i), XM-RM series modules supports hot swap, multi-user operation, and Rapid-Matrix, a technology that can generate multi-stream traffic simultaneously with different kinds of frames/packets with almost any required protocol headers, tags and payload for each port.

XM-RM series can be divided into Standard and Professional types. Having similar features like Professional XM-RM series with less capture buffer and fewer sets of SDFR, Standard XM-RM series provide reliable DUT test results at mass-production line with relatively lower costs.

NuStreams-2000i and NuStreams-600i chassis with XM-RM Series test module cards can perform synchronized tests to ensure the test precision. Also, the time consumed for all DUTs' multi-task testing will be shortened dramatically.
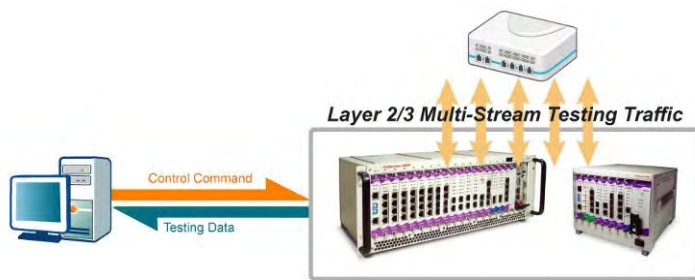
Along with the advanced technology mentioned above, Xtramus also provides several software applications, such as NuWIN-RM, APMPT-4, and other ongoing softwares complied with RFC-2544, RFC-2889 and etc. XM-RM series can test the network equipments in conformance, performance and stress tests.
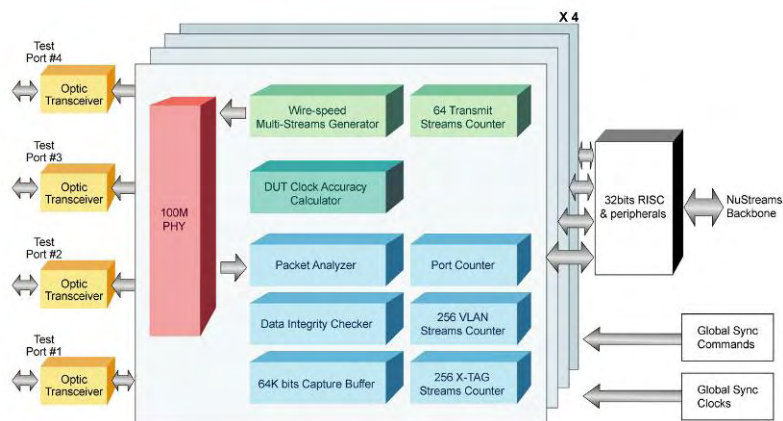

KEY FEATURES

➢ Supports 10/100 Mbps Ethernet test equipment

➢ Wirespeed hardware based traffic generation and analysis

➢ High test performance with low-cost testing ports

➢ Stream based wire speed layer2~3 traffic load generation

➢ RFC 2544/2889 test suite

➢ Wirespeed traffic capture with programmable filter and trigger criteria

➢ High-precision performance measurement of throughput, latency, loss, sequence and mis-ordering error

➢ Remote management of testpoints

➢ Validation with negative and abnormal test conditions per packet byte

➢ Real-time statistics for each port, including transmitted/ received frames for VLAN, IPv4, IPv4 fragment, IPv4 extension , ICMP, ARP, total bytes/packets, CRC, IPCS error and over-and-under size frames
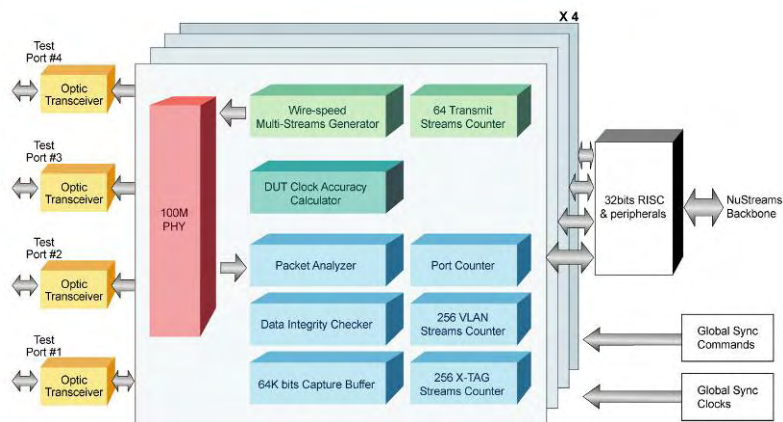
MAIN APPLICATIONS

➢ Test modules for Ethernet device.

➢ Test modules for network device quality control in mass production line.

➢ Test modules for network product new-designed by R&D laboratory that needs report with precise statistics and result.

➢ Can be applied to Telecommunication room, R&D laboratory, Data center, and etc.
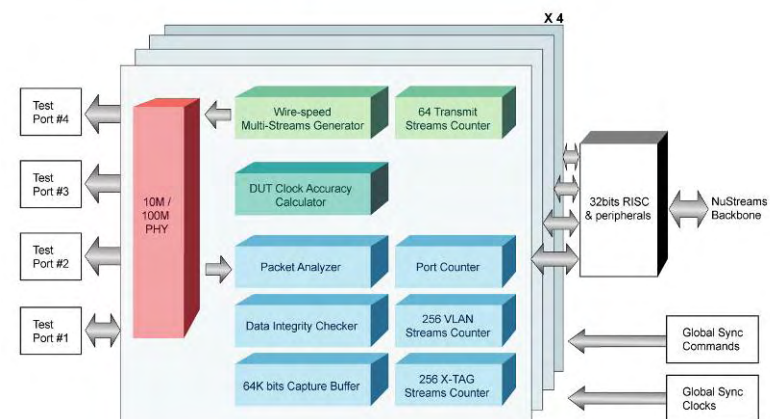
XM-RM661 block diagram

XM-RM671 block diagram

XM-RM681 block diagram

SPECIFICATION

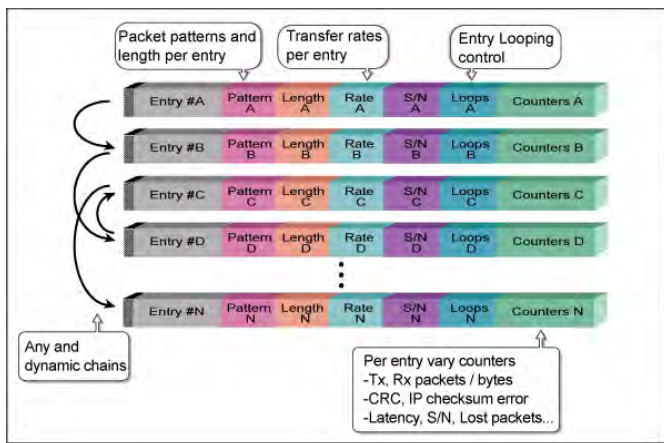| Model	XM-RM661	XM-RM671	XM-RM681
Interface	100M Ethernet SFP Port x 4	100 M Ethernet POF Port x 4	10M/100M Ethernet RJ45 port x 4
LED Indicator	SYS, L/A (Link/Active): 1, 2, 3, 4		
Speed & Mode	Auto Negotiation mode for SFP port, 100 Mbps Full Duplex	Auto Negotiation mode for POF port 100 Mbps Half / Full Duplex	Auto Negotiation/Force Mode for RJ45 ports, 10/100 Mbps Half/Full Duplex
Frame Length	Tx Packet Length: 48 ~ 9Kbytes		
Payload	• Burst Mode: User-defined pattern, User-defined raw data, Random • Rapid-Matrix Mode: User-defined pattern: Byte Increase/Decrease, Word Increase/Decrease, 8'0 8'1, 16'0 16'1, 32'0 32'1, 64'0 64'1, Random. (Bit is presented by 0 or 1. 8'0 means 8 bits 0, 8'1 means 8 bits 1)		
Data Integrity/ Sequence	• 2nd level CRC check function independent from standard CRC • Sequence miss check and frame loss check by X-TAG		
BERT Test	Support Layer 2 BERT Test		
Error Packet Generation	CRC (Good/Bad/None), Undersize, Oversize, Alignment Error, Dribble Error, IP Checksum Error		
Hardware Counters	Port-based Statistics Counters • **Tx Counters per Port:** Frame Count, Byte Count, Pause Frame Count, Collisions, Single Collision, Multiple Collision, Excess Collision, Tx ARP/ICMP Request/Reply • **Rx Counters per Port:** Valid Rx Frame Count, Valid Rx Byte Count, Broadcast Frame Count, Multicast Frame Count, Unicast Frame Count, Pause Frame Count, VLAN Tagged Frame Count, IPv4 Frame Count, Rx ARP/ICMP Request/Reply, RMON counters, Alignment Error, Dribble Error, Undersize, Oversize, CRC Error, Data Integrity Error, IP Checksum Errors • **Tx/Rx Rate Counter:** Tx/Rx Packet Rate, Tx/Rx Line Rate, Tx/Rx Utilization		
Streams Counter	Advanced Stream-based Statistics Counters • **Tx Stream Counter Set:** 64 sets by Rapid Matrix (supports up to 64 streams) • **Tx Counters per Stream:** Frame Count, Byte Count • **Rx Stream Counter Set:** 256 sets by X-TAG Stream Counter (supports up to 256 streams) • **Rx Counters per Stream:** Frame Count, Byte Count, Frame Loss, Sequence Miss, IP Checksum Error, Latency USC (Universal Stream Counter) are packet filtering rules based on: ➢ DA (Destination Address) ➢ MPLS ➢ D Port (Destination Port) ➢ SA (Source Address) ➢ DIP (Destination IP) ➢ S Port (Source Port) ➢ VID (VLAN ID) ➢ SIP (Source IP) ➢ VLAN CoS (Class of Service)		
Capture Criteria	SDFR (self-discover filtering rules) technique is able to capture packets by different criteria in either a unique value or a range of values by user-friendly UI. • MAC Layer Event • SDFR Pattern (set) • Network Layer Event • 2nd level CRC		
Transmit Mode	• **Single Mode** • **Burst Mode** • **Continuous Mode** • **Transmitting-by-time Mode**		
Software Support	• **NuWIN-RM:** Virtual Control Suit for NuStreams Chassis • **APMPT-4:** Advanced All Purpose Mass Production Test • **NuApps-2544-RM:** Test Suit Based on RFC 2544 and RFC 1242 • **NuApps-2889-RM:** Test Suit Based on RFC 2889 and RFC 2285 • **NuApps-IGMP-RM:** Test Suit Based on RFC 2432 and RFC 3918 (IGMP, Internet Group Management Protocol) • **NuCommander:** Hardware Control (voltage, fan speed, and temperature) of NuStreams Chassis		
Miscellaneous	• Support Cross-Module Latency test • Support Global Command • Different ports can be shared by different users • Support Jumbo Frame • Support Hot Swap		

TECHNICAL TERMS

Rapid-Matrix

Rapid-Matrix, specifically designed for generating multi-streams traffic per port simultaneously, is used to verify functions and performance of Ethernet devices/solutions /networks.

Features & Advantages

- **Generate up to 64 Streams Per Port**

Rapid-Matrix consists of 64 individual entries for each port. Each entry has independent settings for a unique data stream. Multiple entries can be correlated to compose a complicated data streams.

- **Flexible/Versatile Protocol Support**

Rapid-Matrix supports various network protocol headers/ tags defined based on testing requirements in order to create multi-streams testing traffic.

- **Flexible Packet Length and User Define Pattern**

In order to meet advanced/complex testing requirements, jumbo frames are also supported by Rapid-Matrix for packet generation.

The packet length generated by the same Rapid-Matrix entry can range from 48 bytes to 2K bytes. Other than defined headers/ tags, the rest of packet is filled up with selected patterns based on testing requirements.

- **Configuring Settings Online Dynamically**

All settings regarding to Rapid-Matrix entries can be changed under Rapid-Matrix's transmission mode. Therefore, it is possible to modify bandwidth and traffic simultaneously during transmitting.

- **Dynamic Multi-streams Traffic Generation**

In real network traffic, different data streams' packet sequence is changing dynamically. In other words, each data stream's loading is a very important factor to be managed in order to verify the function/ performance of DUT. The module card generates dynamic variations of test traffic, and each stream's bandwidth can be controlled individually based on testing requirements.

- **Transmission Statistics per Entry**

For generating multi-streams traffic, information regarding to statistics in every stream is very important. Rapid-Matrix supports the following statistics functions per entry:

- Total transmitted packet count
- Total transmitted byte
- Transmitting packet rate (packets/sec.)
- Transmitting byte rate (bytes/sec.)

Comparing statistics regarding to packets generated by Rapid-Matrix and statistics from receiving ports can help users analyzing how DUT handles the multi-streams traffic.
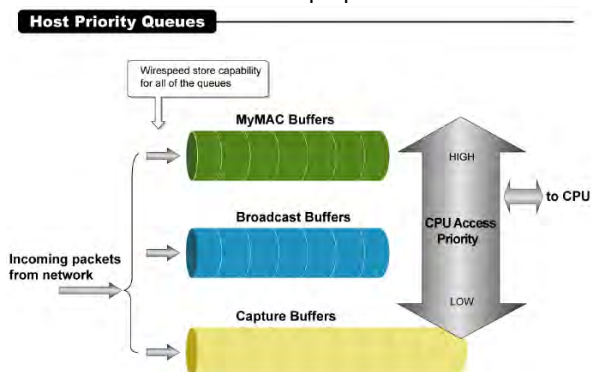
SDFR

SDFR (Self-Discover Filtering Rules) is a technology that makes capturing or filtering over Ethernet easy and convenient.

- User- friendly interface that display values such as source IP, destination IP and other criteria for filtering. All these values can be input directly without calculating mask.
- SDFR value for capture or filter includes several network protocols (such as TCP, UDP, FTP, OSFP…), various frame length (oversize, undersize), and various frame/packet types (CRC error, IP checksum error…).
- SDFR values can be a single value or a range of values between specified values. All packets that fit the value will be captured.
- Multiple filter condition can be activated easily simply by clicking different options.
- Displaying captured packet in real-time while the network is still running.
- Value of SDFR and filter condition can be changed dynamically during capture procedure.
- Displaying captured packet in real-time while the network is still running.

RxHost

RxHost: Smart Function for receiving packet.

- ➢ Received packets are divided into different priorities for different buffers. MyMAC packets with destination addresses have higher priority on the receiving side.
- ➢ Incoming packets are stored in separated buffer so the system can keep receiving important packets (such as ARP, Ping, and etc.) even the buffer itself is overflowed with broadcast packets.
- ➢ Received packets can be captured for applications or stored in buffer for other purposes at the same time.

USC

Universal Streams Counter

When monitoring data flows in a network environment with Network TAP devices, it is common to use packet analyzers (or sniffers) for capturing and analyzing packet frames. However, information acquired this way may be too vast and complicated for pinpointing the possible cause of network/product problems.

Unlike these common packet analyzers or sniffers mentioned above, Universal Stream Counter (USC) offers real-time statistics of network events during packet monitoring and capturing.

Based on X-TAG and VLAN for each ports and system, the streams counter shows its related counters (such as Packet counts, Bytes, S/N Error, Packet Loss, Latency and Transmission Rate in Mbps) as illustrated below.

Transmitting Side

Transmit Streams	Packets	Bytes
N'	2,445	500,991
N'+1	90,343	7,103,151
N'+2	88,672	8,092,043
....		

Receiving side

Received Streams	Packets	Bytes	S/N Error	Packet Loss	Source port information	Latency	Rate (Mbps)
N'	9,320	710,573	13	0	Slot=2 Port=1	3.2 us	1.3
N'+1	41,117	5,900,988	3	1	Slot=8 Port=1	4.5 us	17.2
N'+2	15,095	18,678,003	87	21	Slot=9 Port=2	4.4 us	25.8
....							

X-TAG Streams Counter

Features & Advantages of USC

➢ **Wirespeed Performance:**
The performance of Multi-stream Counter can support up to wirespeed (100% utilization of Gigabit Ethernet traffic). Receiving frames are processed in real time.

➢ **Flexible Protocol Support:**
Several often-used protocols (like IPv4) are served as pre-defined patterns for Multi-stream Counter's trigger conditions. Multi-stream Counter also supports user-defined patterns by SDFR. Proprietary protocols or private headers/ tags can also be triggered by Multi-stream Counter based on user- SDFR.

➢ **Pre-filtering to Trigger Designated Packets:**
Multi-stream Counter can correlate with filtering. Incoming packets will be filtered first. Only packets meet filtering criteria are forwarded to Multi-stream Counter. Filtering options are very flexible in order to meet different testing requirements. Several default parameters are available for frequently-used protocols such as IPv4 and etc. User defined triggers are also supported for custom testing requirements.

➢ **Real-Time Hardware-generated Statistics:**
All statistics are provided by hardware instead of software, making real-time network statistics possible.

➢ **Real-time Statistics for Individual Stream:**
The information provided by USC is real-time statistics for the target data streams. Instead of getting the final statistics at the end of the test, USC is capable of providing real-time statistics of individual stream for each port in every second during testing process. This feature helps when analyzing any dynamic changes of target data streams.

➢ **Sequence Miss and Packet Loss Check:**
Sequence number is embedded in X-TAG generated by Rapid-Matrix. USC uses this to check any sequence miss or packet loss occurrences for each individual stream.

➢ **Latency Measurement:**
USC can analyze data carried by X-TAG in the receiving frames of designated data streams for Latency Measurement.

REQUIREMENTS

The XM-RM series modules are specifically built to support NuStreams-2000i and NuStreams-600i.

NuStreams-600i Chassis
- **Slot:**
  7 slot for test modules
- **Connectors:**
  Power: AC 90~240V
  Ethernet: RJ-45 10/100 Mbps
- **Dimensions:**
  237 mm x 220 mm x 192 mm

NuStreams-2000i Chassis
- **Slot:**
  16 slot for test modules, plus installed IPC
- **Connectors (on IPC):**
  Power: AC 90~240V
  Keyboard / Mouse: PS/2 combo port
  Monitor: HD-DB15 VGA port
  Ethernet: RJ-45 Gigabit port x 2
  Serial: RS-232 port x 2
  USB 2.0 port x 2
- **Dimensions:**
  295 mm x 485 mm x 196 mm

RELATED PRODUCTS

Module Name	Type	Description	Chassis Supported
XM-RM731	Professional	2 Combo Gigabit SFP & 10/100/1000 Mbps RJ45 Rapid-Matrix Ethernet Test Module	NuStreams-2000i, 600i
XM-RM751	Standard	2 x Gigabit Rapid-Matrix SFP + 2 x 10/100/1000 Mbps Rapid-Matrix RJ45 Ethernet Test Module	NuStreams-2000i, 600i
XM-RM761	Standard	4 x Gigabit Rapid-Matrix SFP Ethernet Test Module	NuStreams-2000i, 600i
XM-RM781	Standard	4 x 10/100/1000 Mbps Rapid-Matrix RJ45 Ethernet Test Module	NuStreams-2000i, 600i
XM-RM821	Professional	2 x 10 Gigabit Rapid-Matrix RJ45 Ethernet Test Module	NuStreams-2000i, 600i
XM-RM881	Standard	4 x 10 Gigabit Rapid-Matrix SFP$^+$ Ethernet Test Module	NuStreams-2000i, 600i
XM-RM891	Standard	1 x 10Gbps Rapid-Matrix XFP Ethernet Test Module	NuStreams-2000i, 600i

ORDER INFORMATION

Standard Type Modules:
- XM-RM661 module card
- XM-RM671 module card
- XM-RM681 module card
- XM-RM751 module card
- XM-RM761 module card
- XM-RM781 module card

NuStreams-2000i or NuStreams-600i Chassis

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