Configuring Flow Control on ApexPlus and GigaPlus

Overview

As the ingress Ethernet traffic approaches the link RF capacity, or in cases where traffic is very bursty from the attached switch, it may be necessary to implement flow control inside the Trango radio. The flow control will send a pause frame back to the switch when the internal buffer is nearly full, giving the radio time to empty the buffer through the radio interface which has a lower capacity than 1 Gbps switch port. If not used, packet loss may occur in the switch portion of the radio or IDU.

System Setup

Note: Run on both sides of link

1) Make sure the firmware version is the latest available from **support.trangosys.com.** Upgrade each radio first if not, starting with the far end.

2) Enable pause frames on the port being used by running the following command:

   eth port x pause enable *(where x is the port number used)*

3) Set the egress margin to -12 to force effective use of the internal buffer in the radio for all packet sizes. If left at the default of 0, there still may be some minor packet loss for mixed packet size traffic.

   egress_margin -12

4) Run the ***config save*** command to save the settings to permanent memory.

5) Enable TX and RX pause on the connected switch equipment to ensure that the pause behavior is implemented. This is switch specific so check with the equipment manufacturer to enable properly.
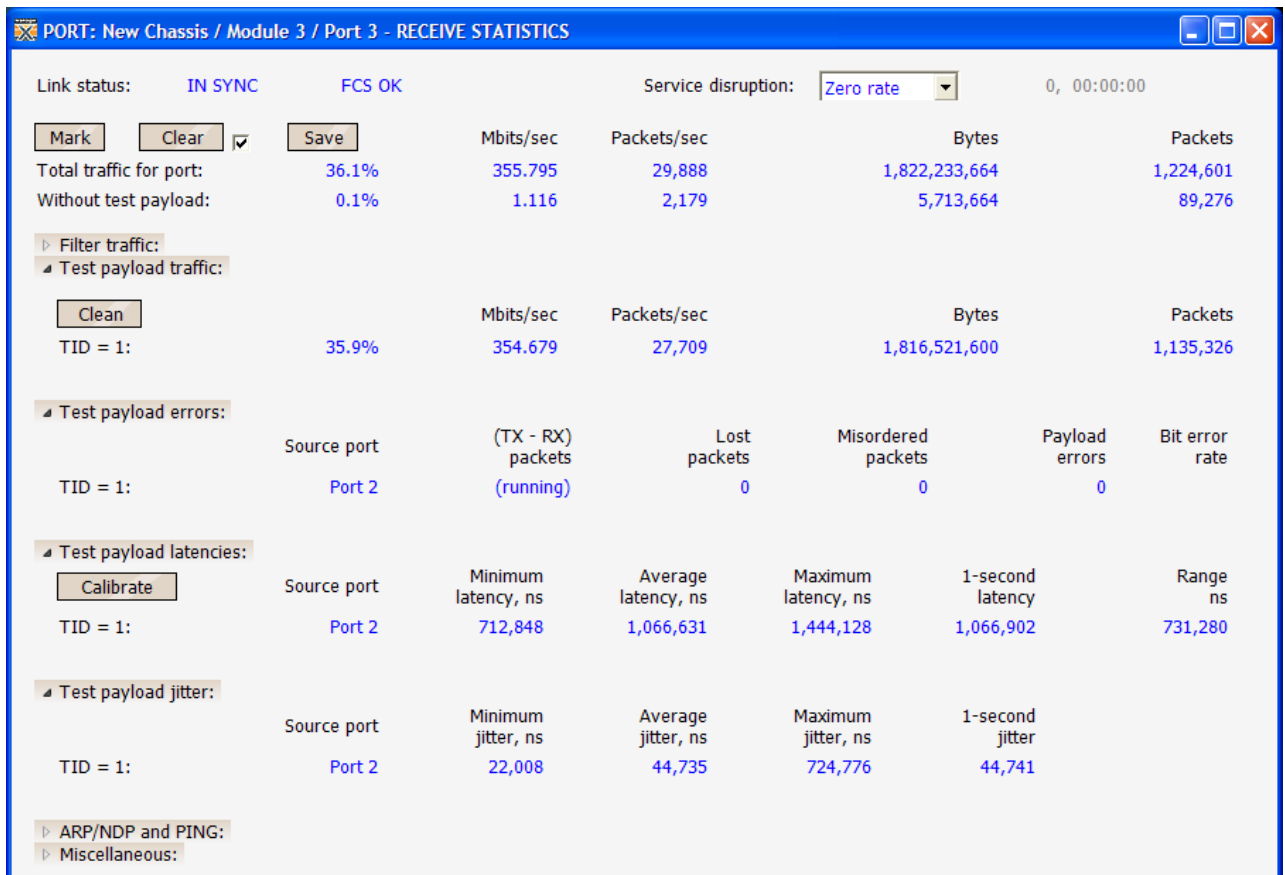
After these commands have been executed there should be proper throttling of the traffic out of the connected switch into the Trango radio and no traffic should be lost over the link. Note that as a side effect, the latency may increase for bursty traffic up to several milliseconds.

The recommended settings above will work for all traffic combinations and packet seizes from 64 to 1600 bytes.

In **Figure 1** below, a Xena traffic generator is sending bidirectional traffic over an ApexPlus linked at 256QAM / 56 MHz channel. The test generator is generating full Gigabit traffic of 1600 bytes, but the generator reacts to the pause frames sent by the Trango ApexPlus and only sends the amount of traffic that can be handled by the air interface, which is 355 Mbps.

Of note particular note are :

1) There are no packet drops and 355 Mbps of Test Stream 1 (TID 1) is passing.
2) The latency maximum is 1.44 mSec which represents the delay in the transmit buffer in the radio. Normally with non-bursty traffic this latency will be < 0.2 mSec.
3) The port is receiving about 2179 pause frames (Start and stop) per second from the test equipment. This is the extreme case since we are attempting to send 1 Gbps through the link. The number of frames per second will drop significantly if the traffic is only bursty or the total attempted rate is just over the actual radio capacity.

PORT: New Chassis / Module 3 / Port 3 - RECEIVE STATISTICS

Link status:	IN SYNC	FCS OK		Service disruption:	Zero rate ▾		0, 00:00:00

			Mbits/sec	Packets/sec	Bytes	Packets
Total traffic for port:	36.1%		355.795	29,888	1,822,233,664	1,224,601
Without test payload:	0.1%		1.116	2,179	5,713,664	89,276

▷ Filter traffic:
◢ Test payload traffic:

Clean			Mbits/sec	Packets/sec	Bytes	Packets
TID = 1:	35.9%		354.679	27,709	1,816,521,600	1,135,326

◢ Test payload errors:

	Source port	(TX - RX) packets	Lost packets	Misordered packets	Payload errors	Bit error rate
TID = 1:	Port 2	(running)	0	0	0	

◢ Test payload latencies:

Calibrate	Source port	Minimum latency, ns	Average latency, ns	Maximum latency, ns	1-second latency	Range ns
TID = 1:	Port 2	712,848	1,066,631	1,444,128	1,066,902	731,280

◢ Test payload jitter:

	Source port	Minimum jitter, ns	Average jitter, ns	Maximum jitter, ns	1-second jitter	
TID = 1:	Port 2	22,008	44,735	724,776	44,741	

▷ ARP/NDP and PING:
▷ Miscellaneous:

FIGURE 1

Summary

Flow Control can improve packet performance in heavily congested networks, and is recommended as network traffic levels approach the link maximum or if traffic is bursty.

For more information contact Trango Systems or visit our web site at www.trangosys.com.

About Trango Systems, Inc.

Trango Systems, Inc., was founded in 1996 and is headquartered in San Diego County, California. The company designs and manufactures innovative licensed and unlicensed microwave backhaul equipment for customers in over 70 countries and is ISO 9001:2008 certified.