以太网交换机二三层吞吐量测试(基于 SmartFlow)

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1 以太网交换机二层吞吐量测试

1.1 概述

本次以 FlexHammer 5210 智能多层以太网交换机为测试对象,测试参考如下规范:

- ➢ RFC1242
- ≻ RFC2544
- ➢ RFC2285
- ≻ RFC2889

1.2 测试方案

测试项目: 二层性能测试				
测试子项目: 二层吞吐量测试				
测试原理以及	太目的分 材	F :		
参照 RFC2544	文档,测	试交换机的吞吐量。		
测试连接图:				
		被测设备		
		Port1	Port 2	
Г	2-	1 2-2		-
		测试仪表SmartBits 6	00	
预置条件:				
如图连接系统	和测试仪	义表,并建立 SmartFlow 与机箱	值的连接 。	
测试过程:				预期结果:
1. 配置 DUT	·测试设备	Z 8		
端口1与端口] 2 以 un t	tagged 方式属于同一 v I an。		
2.配置测试	仪 SMB600) 端口与流量:		
包字节长度	(Byte):(64 , 128 , 256 , 512 , 1024 , 128	30 和 1518。	
3. 在测试仪	器上发包	测试。		



测试结果与结论:

1.3 环境需求

- ➢ PC 机 (XP 操作系统) 1 台
- ➢ SMB600 机箱、SmartFlow 5.5、LAN-3101B 板卡 1 套
- ➢ FlexHammer 5210-24 智能多层以太网交换机 1 台
- ▶ 网线若干

1.4 环境搭建

1.4.1 被测设备安装

略,具体步骤参见《FlexHammer 5210系列产品用户手册》之"硬件安装"部分。

1.4.2 测试仪硬件安装及与被测设备连接

测试仪与交换机之间按"测试方案"图示连接,具体步骤参见我司文档《SmartBits硬件安装及机箱 IP 地址设置_Spirepair》或思博伦公司相关"硬件安装手册"。

1.4.3 SmartFlow 软件安装及与机箱连接

略,具体步骤参见我司文档《SmartFlow软件安装及测试仪端口间直通测试_Spirepair》 或思博伦公司相关"软件使用向导"。

1.4.4 其他

无。

1.5 详细测试步骤

测试仪器设置核心步骤如下:

- ▶ 配置端口
- ▶ 设置测试流

▶ 设置测试参数

1.5.1 被测设备配置

(1) 交换机端口配置为:100M 自协商使能。

(2) 将交换机端口 1、2 划入同一 VLAN。

具体命令参考《FlexHammer 5210 系列产品用户手册》之"软件配置"及"命令参考" 部分。

1.5.2 配置测试仪端口

(1) 保留测试仪端口:



(2) 配置测试仪端口的工作模式:

在"Card"选项卡中设置端口的速率,双工状态,自协商状态,MAC地址。在本例中端口2-1的MAC地址为00-00-01-00-00-01,端口2-2的MAC地址为00-00-02-00-00-01。

Cards IP	v4 Networks IPv6	S WAN A	TM N	ulticast	Groups SmartFlows	Test	Setup BGP	MPLS LSP	Options			
Show col	Show columns for: 🔽 Etherne: 🔽 FOS 🕼 🖾 ATM 🖾 BGP											
Port	Model	Bead State	Speed	Duplex	Auto Negotiation	å ddr	Resolution	Multiuser	106ig DIC	IP#6 Capable	Multicast	MAC Address
SMB600 2-1	LAN-6101B/3101B	Active	100 X	Full	Disable		Enabled	🔽 Reserve	Enabled	Enabled	IGMP2	00-00-01-00-00-01
SMB600 2-2	LAN-6101B/3101B	Active	100 M	Full	Disable		Enabled	🔽 Reserve	Enabled	Enabled	IGMP 2	00-00-02-00-00-01
SMB600 2-3	LAN-6101B/3101B	Active	100 M	Full	Disable		Enabled	▼ Reserve	Enabled	✓ Enabled	IGMP 2	00-00-03-00-00-01
SMB600 2-4	LAN-6101B/3101B	Active	100 M	Full	Disable		Enabled	🔽 Reserve	Enabled	🔽 Enabled	IGMP2	00-00-04-00-00-01
SMB600 2-5	LAN-6101B/3101B	Active	100M	Full	Disable		Enabled	▼ Reserve	Enabled	Enabled	IGMP 2	00-00-05-00-00-01
SMB600 2-6	LAN-6101B/3101B	Active	100 M	Full	Disable		Enabled	🔽 Reserve	Enabled	🔽 Enabled	IGMP 2	00-00-06-00-00-01

注意:由于二层交换不需要ARP地址解析 端口的Addr Resolution功能设为"Disable"。

1.5.3 设置测试数据流

在"Group"选项卡使用"Group Wizard"创建测试数据流,步骤如下:



Cards IPv4 Networks IPv6 WAN	ATM Multicast Groups SmartFlows Test Setup
Kroup Mizard.	Sorted by Group 💌 Rate 🚿 💌 Iali
📉 Add 🗙 Del	Transmitted bit rate will be lower than user-speci
	Flow Hane

(1) 在"Traffic Selection"对话框依次选择"Unicast"、"IPv4"、"Pair",进入

下一步:

Group Vizard - Traffic Se Traffic Selection: Select traffic type and pa	lection	×
Create flows with custo	m frames 🦵 Multicast	
IP Version .	C 1Pv6	
Pattern Backbone Fair Pair Pair	Fully meshed Image: Strength of the strengt of the strength of the stren	
	< 上一步 (b) 下一步 (d) > 取	消

(2)在"Traffic Configuration"对话框添加 Pairs:测试端口 2-1 和 2-2,数据流方向为"A<->B",进入下一步:



Group Wixard - Traffic Configuration									
Traffic Configuration: Configure traffic pattern:									
<u>b</u> :	2:	Tair:							
S189000 2-3 S189000 2-4 S189000 2-5 S180000 2-6	92000 2-3 320000 2-4 32000 2-5 52000 2-6	SM5600 2-1, SM5600 2-2							
∏ Qne port confi	gurati 🦵 Beverse B list								
	<u>< +</u>	ー步 ② 下一步 ③ > 取消							

(3) "Characteristics"对话框选项均使用默认配置:

vup name/Prefix 🖪	Flow A
Generate multiple grou	p IF's next protocol
C 202	
G Differen els	TCP/IDP source
C VLAN priori-	G Bandon C Specific Warr -
Rest at the	
Variables	Cloud of Sector
	W ARRON C OPPETTIC NORE
	-Custon frame
	× .
	-Frame length with CEC (bytex)
	128 Note: ATM flow has zero-byte
Note: I	MIX will be applicable only for ports which support
,	
TPast/TPast WINK stacking	1

(4)" Multiple Flows"对话框选项均使用默认配置,测试数据流设置完成。



Number of flows 1 SmartFlows Non-cyclic SmartFlows Cyclic SmartFlows Variable field C Source IP address Destination IP address Multiflow pattern G Sequential C Staggered (RFC2889)	Note Non-cyclic SmartFlows are uniquely trackable on the receiving port. Cyclic SmartFlows can produce variations of data within each transmitted flow. In SmartFlow, they are tracked as a unit on the receiving port. The number of cyclic flows varies depending on the card, protocol, i.e., IPv6 and the tractional variable fields are available on SmartFlows Tab.
Flow Generation	DHCP Configuration
C Generate long flow names	Enable DHCP on Source IP
F Generate short flow names	Enable DHCP on Destination

ATM	Multicast Groups SmartFlows Test Setup	BGP MPLS LSP Options
Sorte	d by Group 💌 Rate 🕺 💌 Calid	late Rate <u>C</u> oS Wizard PON Test Wizard
Tra	nsmitted bit rate will be lower than user-specif	ied bit rate unless port
	Flow Hame	¥ / Custon
- *	₩ 2-1->2-2	N/A
4	EX 8 2-2->2-1	N/A
	ATM Sorte Trai	ATM Multicast Groups SmartFlows Test Setup 1 Sorted by Group Rate N V (alid Transmitted bit rate will be lower than user-specif Flow Hame A 2-1->2-2 Trans A 2-2->2-1

1.5.4 设置测试参数

- (1) 在 "Test Setup "选项卡 "Test Iterations "子卡设置如下信息:
- ▶ 测试时长:30秒。
- ▶ 测试数据包长分别为:64B,128B,256B,512B,1024B,1280B,1518B。



Cards IPv4 Networks IPv6 WAN	ATM Multicast Groups Sma	rtFlows Test Setup BGP MPLS LSP Op	tions
Test Iterations Learning Individual	. Tests SmartTracker Sample I for Throughout)	teration DHCP Troffic lood (Including Throughout)	
 Step (all por 	C Custom (per port)	marrie road (increasing ma oughput)	
Min. load (%) 10	Custom Loads Per Port Table	Custom Loads Per Flow Table	
Step load (%) 10			
Max. load (%) 100		Custom Frame Sizes (all ports)	
Iterating across frame sizes		Frame sizes	
C rrame size (all flows, with	○ Custom (all flows with C	64 128	Close
Min. (bytes) 128	Custom Frame Sizes List	512	Ascending
Step (bytes) 128		1280	Descending
Max. (bytes) 1518		1518	Marra Ifr
Iteration constants			move op
• Duration	C Frame count		Move Down
Time (Sec.) 30 💼	Burst count 2500000		Remove
Burst size 1	Total frame 2500000		Diffuilt [
(Packets per	[Burst size] x [Burst count]		
Miscellaneous	Fa	Add frame size Add	
Custom Frames Table	For logging set : SmrtFlow.i		

- (2) 在"Test Setup"选项卡"Individual Tests"子卡设置如下信息:
- ▶ 最小流量比例:10%。
- ▶ 最大流量比例:100%。
- ▶ 初始流量比例:80%。

Cards IPv4 Networks IPv6 WAN	ATM Multicast	Groups SmartFlows Tes	st Setup BGP MPLS LSP
Test Iterations Learning Individual	. Tests SmartTracker	r Sample Iteration DH	CP
Latency Distribution	Throughput		
8 Intervals (uSecs)	-Test type	Search Mode	
5	Standard	Sinary	
7	🔘 Asymmetric	C Step	
20	C Upstream then Downstream	C Combo	
100		Parameters	
150			
	Initial rate	80.00000	
	Minimum rate	10.00000	
	Maximum rate (%):	100	
	Step rate (%):	1	
Latency Over Time	Resolution (%):	5.00000	
Time interval	Backoff (%)	50	
SnapShot	Acceptable	0	
Capture frames per 50	frame loss (%):		
Capture start 2			
	Continue beyond mi	n or max 🔽	
-Latency options for Non-XD TeraMetri	.cs-based modules —		
🖲 Min, Max, Sequenciz 🔐	NOTE	anna aire mill ba	
provide	g, max Latency and 2 d simultaneously on	TeraMetrics-based	
C Average, Max	XD and 10 Gig mo	dules.	

测试流基本参数配置已完成,其他的参数均使用默认配置。



1.5.5 运行测试

根据上述配置,点击软件左侧快捷栏中"Setup and Run"选项卡下



1.5.6 结果查看及数据分析

在快捷栏 "Results"选项卡中点击"Throughput"按钮查看结果:



(1) 点击屏幕下方 "Chart"选项卡, 查看以图表方式显示的测试结果。



(2) 点击屏幕下方"Summary"选项卡,查看各种包长的测试结果摘要。

	Throughput (%)							
Setup and Run Results		Righ	t click for vie	nw c				
resdits	Hame/Framesize	64	128	256	512	1024	1280	1518
	Total	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000
	A GIOQ	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000
Throughput								
View Jumbo								
Frame Loss								
Latency								
Latency Distribution								
Latency Over Time								
🛃 🖃	Chart Summ	ary 🛄 Detail	🛄 Stray Frames	Port Errors	Packet Rate			
r HaShortcut Bar							Co	nnections = 1

(3) "Detail"选项卡给出详细的测试结果。

	Throughput (%)			A Page 1	e 1 🕨	Nevt	
Setup and Run		Right click for vi	ew (- I age I o		Texc	
Results							
	Bame Time	FrameSize ILoad	TxFrames BxFra	nes LostFrames	Lost (%) T	hroughput Tx	fps Tx bps 🛛 🛛 🛧
-	Total 06/20/09 23:03:	39 64 80.00000	7142856 7142	856 0	0.00000	80.00000 23	8095 159999974
₹	A Group 06/20/09 23:03:	39 64 80.00000	7142856 7142	856 0	0.00000	80.00000 23	8095 159999974
Throughput	A 2-1->2-2 06/20/09 23:03:	39 64 80.00000	3571428 3571	428 0	0.00000	N/A 11	9048 7999987
	A 2-2->2-1 06/20/09 23:03:	39 64 80.00000	3571428 3571	428 0	0.00000	N/A 11	9048 79999987
de.	Total 06/20/09 23:04:	19 64 90.00000	8035714 8035	714 0	0.00000	90.00000 26	7857 179999994
	A Group 06/20/09 23:04:	19 64 90.00000	8035714 8035	714 0	0.00000	90.00000 26	7857 179999994
Tumbo	A 2-1->2-2 06/20/09 23:04:	19 64 90.00000	4017857 4017	857 0	0.00000	N/A 13	3929 89999997
3 0000	A 2-2->2-1 06/20/09 23:04:	19 64 90.00000	4017857 4017	857 0	0.00000	N/A 13	3929 89999997
	Total 06/20/09 23:04:	59 64 95.00000	8482142 8482	142 0	0.00000	95.00000 28	2738 189999981
★	A Group 06/20/09 23:04:	59 64 95.00000	8482142 8482	142 0	0.00000	95.00000 28	2738 189999981
Russa Long	A 2-1->2-2 06/20/09 23:04:	59 64 95.00000	4241071 4241	071 0	0.00000	N/A 14	1369 94999990
Frame Loss	A 2-2->2-1 06/20/09 23:04:	59 64 95.00000	4241071 4241	071 0	0.00000	N/A 14	1369 94999990
<u>_</u>	Total 06/20/09 23:05:	39 64 100.0000	8928570 8928	570 0	0.00000	100.00000 29	7619 199999968
(••)	A Group 06/20/09 23:05:	39 64 100.0000	8928570 8928	570 0	0.00000	100.00000 29	7619 199999968
	A 2-1->2-2 06/20/09 23:05:	39 64 100.0000	4464285 4464	285 0	0.00000	N/A 14	8810 99999984
Latency	A 2-2->2-1 06/20/09 23:05:	39 64 100.0000	4464285 4464	285 0	0.00000	N/A 14	8810 99999984
	Total 06/20/09 23:06:	19 128 80.00000	4054054 4054	054 0	0.00000	80.00000 13	5135 15999998
Y 🖃	A Group 06/20/09 23:06:	19 128 80.00000	4054054 4054	054 0	0.00000	80.00000 13	5135 15999998
•••••	A 2-1->2-2 06/20/09 23:06:	19 128 80.00000	2027027 2027	027 0	0.00000	N/A E	7568 79999999
Latency Distribution	A 2-2->2-1 06/20/09 23:06:	19 128 80.00000	2027027 2027	027 0	0.00000	N/A E	7568 79999999
	Total 06/20/09 23:06:	59 128 90.00000	4560810 4560	810 0	0.00000	90.00000 15	2027 179999968
	A Group 06/20/09 23:06:	59 128 90.00000	4560810 4560	810 0	0.00000	90.00000 15	2027 179999968
())	A 2-1->2-2 06/20/09 23:06:	59 128 90.00000	2280405 2280	405 0	0.00000	N/A 7	6014 89999984
Later an Onen Time	A 2-2->2-1 06/20/09 23:06:	59 128 90.00000	2280405 2280	405 0	0.00000	N/A 7	6014 89999984
Latency over lime	Total 06/20/09 23:07:	39 128 95.00000	4814188 4814	188 0	0.00000	95.00000 16	0473 189999953 🗡
	<						>
🛃 🗖	Chart 🛄 Summary	Detail Stray Frames	Port Errors	Packet Rate			
For Help, press F1						C	onnections = 1 🥝

(4) 被测设备两个端口之间的二层转发吞吐量为 100Mbps。

1.5.7 保存测试仪配置与测试结果

(1)保存流量配置:





(2) 导出测试结果:



2 以太网交换机三层吞吐量测试

2.1 概述

本次以 FlexHammer 5210-24 智能多层以太网交换机为测试对象,测试参考如下规范:

- ➢ RFC1242
- ≻ RFC2544
- ➢ RFC2285
- ≻ RFC2889

2.2 测试方案

测试项目:	三层性能测试		
测试子项目:	三层吞吐量测试		
测试原理以及目的分析	f :		
参照 RFC2544 文档,测	则试交换机的吞吐量。		
测试连接图:			
		流复	≥发生器 SMB600
	port1	port 2-1	
	192. 168. 1. 1/24	192.168.1.2	
	port2	port 2-2	
	192.168.2.1/24	192. 168. 2. 2	
•			
预置条件:			
如图连接系统和测试(义表		
测试过程:			预期结果:
1.配置 DUT 测试设备	:		
Port 1:配置 IP 地址	192.168.1.1/24		
Port 2:配置 IP 地址	192.168.2.1/24		
2.配置测试仪 SMB600)		



包字节长度(Byte):64,128,256,512,1024,1280 和 1518。	
3.在测试仪器上发包测试。	
测试结果与结论:	

2.3 环境需求

- ➤ PC 机 (XP 操作系统) 1台
- ➢ SMB600 机箱、SmartFlow 5.5、LAN-3101B 板卡 1 套
- ➢ FlexHammer 5210-24 智能多层以太网交换机 1 台
- ▶ 网线若干

2.4 环境搭建

2.4.1 被测设备安装

略,具体步骤参见《FlexHammer 5210系列产品用户手册》之"硬件安装"部分。

2.4.2 测试仪硬件安装及与被测设备连接

测试仪与交换机之间按"测试方案"图示连接,具体步骤参见我司文档《SmartBits硬件安装及机箱 IP 地址设置_Spirepair》或思博伦公司相关"硬件安装手册"。

2.4.3 SmartFlow 软件安装及与机箱连接

略,具体步骤参见我司文档《SmartFlow软件安装及测试仪端口间直通测试_Spirepair》 或思博伦公司相关"软件使用向导"。

2.4.4 其他

无。

2.5 详细测试步骤

测试仪器设置核心步骤如下:



- ▶ 配置端口
- ▶ 设置测试流
- ▶ 设置测试参数

2.5.1 被测设备配置

- (1) 交换机端口配置为:100M 自协商使能。
- (2) 配置交换机端口1和2的 IP 地址:
- ▶ 端口1的IP地址:192.168.1.1/24
- ➢ 端口 2 的 IP 地址: 192.168.2.1/24

具体命令参考《FlexHammer 5210 系列产品用户手册》之"软件配置"及"命令参考" 部分。

2.5.2 配置测试仪端口

(1) 保留测试仪端口:

🤞 无标题 - SmartFlow	i -								
<u>File Edit View Action Setup Run T</u> ools Res <u>u</u> lts <u>H</u> elp									
Setun and Run	Cards IPv	v4 Networks IPv€	3 WAN	ATM Mu					
	Show colu	umns for: 🔽 Eth	erne 🔽 POS	s 🔽 At					
	Port	Nodel	Multiuser	106ig DIC					
e.	Port SMB600 2-1	Nodel LAN-6101B/3101B	Multiuser ▼ Reserve	10Gig DIC Enabled					
Thr oughput	Port SMB600 2-1 SMB600 2-2	Nodel LAN-6101B/3101B LAN-6101B/3101B	Multiuser Reserve Reserve	10Gig DIC Enabled Enabled					
Throughput	Port SMB600 2-1 SMB600 2-2 SMB600 2-3	Nodel LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B	Kultiuser ▼ Reserve ▼ Reserve ▼ Reserve	10Gig DIC Enabled Enabled Enabled					
Throughput	Port SMB600 2-1 SMB600 2-2 SMB600 2-3 SMB600 2-4	Nodel LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B	Kultiuser ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve	10Cig DIC Enabled Enabled Enabled Enabled					
Throughput	Port SMB600 2-1 SMB600 2-2 SMB600 2-3 SMB600 2-4 SMB600 2-5	Nodel LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B	Multiuser Reserve Reserve Reserve Reserve Reserve Reserve	105ig DIC Enabled Enabled Enabled Enabled Enabled					
Throughput Jumbo	Port SMB600 2-1 SMB600 2-2 SMB600 2-3 SMB600 2-4 SMB600 2-5 SMB600 2-5 SMB600 2-6	Nodel LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B	Kultiuser ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve	10Gig DIC Enabled Enabled Enabled Enabled Enabled Enabled					
Throughput Throughput Jumbo	Port SMB600 2-1 SMB600 2-2 SMB600 2-3 SMB600 2-4 SMB600 2-5 SMB600 2-5 SMB600 2-6	Nodel LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B LAN-6101B/3101B	Xultiuser ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve ✓ Reserve	10Gig DIC Enabled Enabled Enabled Enabled Enabled Enabled					

(2) 配置测试仪端口的工作模式:

在"Card"选项卡中设置端口的速率,双工状态,自协商状态,MAC地址。在本例中端口 2-1的 MAC 地址为 00-00-01-00-00-01,端口 2-2的 MAC 地址为 00-00-02-00-00-01。 端口的 Addr Resolution 功能设为"Enable"。



Cards IP	v4 Networks IPv6	S WAN A	.TM MT.	hulticast	Groups SmartFlows	Test	Setup BGP	MPLS LSP	Options				
Show col	umns for: 🔽 Eth	erne 🔽 POS		ATM	₩ BGP								
Port	No de l	Bead State	Speed	Duplex	Auto Negotiation	å ddr	Resolution	Multiuser	106ig DIC	IPv6 (Capable	Multicast	MAC Address
SMB600 2-1	LAN-6101B/3101B	Active	100 X	Full	Disable		Enabled	🔽 Reserve	Enabled	E E	nabled	IGMP 2	00-00-01-00-00-01
SMB600 2-2	LAN-6101B/3101B	Active	100M	Full	Disable		Enabled	🔽 Reserve	Enabled	E E	nabled	IGMP 2	00-00-02-00-00-01
SMB600 2-3	LAN-6101B/3101B	Active	100 M	Full	Disable		Enabled	▼ Reserve	□ Enabled	V E	nabled	IGMP 2	00-00-03-00-00-01
SMB600 2-4	LAN-6101B/3101B	Active	100 M	Full	Disable		Enabled	🔽 Reserve	Enabled	🔽 E	nabled	IGMP2	00-00-04-00-00-01
SMB600 2-5	LAN-6101B/3101B	Active	100M	Full	Disable		Enabled	▼ Reserve	Enabled	E E	nabled	IGMP 2	00-00-05-00-00-01
SMB600 2-6	LAN-6101B/3101B	Active	100M	Full	Disable		Enabled	🔽 Reserve	Enabled	E E	nabled	IGMP 2	00-00-06-00-00-01

(3) 配置测试仪端口 IP 地址:

在 IPv4 Networks 页面配置测试仪端口 2-1 的 IP 地址为 192.168.1.2,网关地址为

192.168.1.1,测试仪端口 2-2 的 IP 地址为 192.168.2.2, 网关地址为 192.168.2.1。

Cards	IPv4 Ne	tworks	IPv6	YAN	ATM	Mu	lticas	t Gr	oups	Smart	Flows	Tes	t Set	աթ	BGP	i M
Ri ght	Right-click on port or highlighted column for Network															
Po	ort	Port I	P Addre	lle	twork		Gat	eway		Subr	iet ∎a	sk	Tiza	r d	IP .	A d dr
SMB60	00 2-1	192.168	. 001. 002	192.16	3.001.00	00 1	92.168	. 001. (001	255.25	5.255.	000	192.1	.68.	001.	003
SMB60	00 2-2	192.168	. 002. 002	192, 16	3.002.00	00 1	92, 168	.002.0	001	255, 25	5.255.	000	192.1	68.	002.	003
SMB60	00 2-3	192.085	. 003. 002	192.08	5.003.00	00 1	92.085	. 003. (001	255.25	5.255.	000	192.0)85.	003.	003
SMB60	00 2-4	192.085	. 004. 002	192.08	5.004.00	00 1	92.085	. 004. (001	255, 25	5.255.	000	192.0)85.	004.	003
SMB60	00 2-5	192.085	. 005. 002	192.08	5.005.00	00 1	92.085	.005.0	001	255.25	5.255.	000	192.0)85.	005.	003
SMB60	00 2-6	192.085	. 006. 002	192.08	5.006.00	00 1	92, 085	.006.0	001	255, 25	5.255.	000	192.0)85.	006.	003

2.5.3 设置测试数据流

在"Group"选项卡使用"Group Wizard"创建测试数据流,步骤如下:

Cards IPv4 Networks IPv6 WAN	ATM Multicast Groups SmartFlows Test Setup
MIX Editor	Sorted by Group Rate X (ali Transmitted bit rate will be lower than user-species)
	Flow Hane

(1) 在"Traffic Selection"对话框依次选择"Unicast"、"IPv4"、"Pair",进入下一步:



Group Vizard - Traffic Selection	×
Traffic Selection : Select traffic type and pattern:	
Create flows with custom frames	
Type Unicast	C Multicast
IP Version	
(• IPv4	C IPv6
Pattern	
C Backbone	Fully meshed
	C Waterfall
	<上一步 (B) 下一步 (Q) > 取消

(2) 在 "Traffic Configuration"对话框添加 Pairs:测试端口 2-1 和 2-2,数据流方向为 "A<->B",进入下一步:

Group Wixard - Traf	fic Configuration		×
Traffic Configuration Configure traffic p	en: attern:		
δ: 5388600 2-3 5388600 2-5 5388600 2-6 Qne port configurati	2: SHE600 2-3 SHE600 2-4 SHE000 2-6 SHE000 2-6 SHE000 2-6 SHE000 2-6 SHE000 2-6 SHE000 2-6 SHE000 2-6 SHE000 2-5 SHE000 2-6 SHE000 2-5 SHE000 2-5 SHE00	<pre>Exir: ●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●</pre>	
	<u><</u> ±	步图 下一步级 > 取消	

(3) "Characteristics"对话框选项均使用默认配置:





up name/Prefix M	Flow
Generate sultiple group	P IF's next protocol
	NON2 V
C TOS precedence	
@ Diffserv cla	TCP/UDP source
C VLAN priori	C Randos C Specific NONE v 0
Variablez	TCP/UDP_destination
	G Randon C Specific NONE V
	-Custon frame
	×
	- Examp length with CBC (buter)
	128 Note: ATM flow has zero-byte
IMIX flow	
- Note: IM	IX will be applicable only for ports which support

(4)" Multiple Flows"对话框选项均使用默认配置,测试数据流设置完成。

Number of flows 1 SmartFlows © Non-cyclic SmartFlows © Cyclic SmartFlows Variable field © Source IP address © Destination IP address Multiflow pattern © Staggered (RFC2889) Electronic Stagered (RFC2889)	Note Non-cyclic SmartFlows are uniquely trackable on the receiving port. Cyclic SmartFlows can produce variations of data within each transmitted flow. In SmartFlow, they are tracked as a unit on the receiving port. The number of cyclic flows varies depending on the card, protocol, i.e., IPvb and the ditional variable fields are available on SmartFlows Tab.
Flow Generation C Generate long flow names Generate short flow names	DHCP Configuration



ATM Multicast Groups SmartFlows Test Setup BGP MPLS LSP	Options
orted by Group - Rate 🕱 - Cos Wir	card PON Test Wizard
Transmitted bit rate will be lower than user-specified bit rate unl	ess port
Flow Hane X / Custon	
★ ▼ A 2-1->2-2 N/A	
s.	ATM Multicast Groups SmartFlows Test Setup BGP MPLS LSP Sorted by Group ▼ Rate % ▼ falidate Rat. CoS Wiz Transmitted bit rate will be lower than user-specified bit rate unl Flow Hame ¥ / Custom ★ ✓ A 2-1->2-2 N/A

2.5.4 设置测试参数

- (1) 在 "Test Setup "选项卡 "Test Iterations "子卡设置如下信息:
- ▶ 测试时长:30秒。
- ▶ 测试数据包长分别为:64B,128B,256B,512B,1024B,1280B,1518B。

Cards	IPv4 Networ	ks IPv t	S WAN	ATM	Multicast	Groups	Smax	tFlows	Test Setu	P BGP	MPLS LSP	Options		
Test Iterations Learning Individual Tests SmartTracker Sample I Iterating across traffic load (Not for Throughput) C Custom (per port) Min. load (%) 10 Lustom Loads Per Port Table								teration DHCP Traffic load (Including Throughput) <u>Sustom Loads Per Flow Table</u>						
	Max. load	(%) 10	0				_	Custor	n Frane	Sizes	(all port	:s)		
♥ 1 C Iter ©	terating acr rrane size (all flows, Min. Gyt Step (byt Max. Gyt ation consta Duration Time (Sec. Burst siz 2004 of acr	vith vith as) 12 es) 12 es) 12 ints) 30 e 1	ne sizes	C In Cus C In Burst Total	astom (all f stom Frame S rame count t count L frame	Elows 11 Sizes Li: 2500000	st	64 128 256 512 1024 1280 1518				Close Ascending Descending Move Up Move Down Remove Default		
Mise	cellaneous Custom Fram	es Table		For 1	ontinuous lo logging set	oping : SmrtFl	Low. i	Add fr	ame size –	A	dd			

(2) 在"Test Setup"选项卡"Learning"子卡配置地址解析参数:



Cards IPv4 Networks IPv6 WAN ATM	Multicast Groups SmartFlows Test Setu
Test Iterations Learning Individual Tes	sts SmartTracker Sample Iteration DHCP
Rate (Packets/Sec) 100	Wait time before learning 0
Learning Learning options Partial OV Learning packets sent per SRC (Set to maximum variable count value if using cyclic flows.) Note: L2 learning option 'None' applies to L3 Address Resolution as well. In this case port will still do the Tx side learning. Frame Size Same as flow Fixed	<pre>Address Resolution frequency Address Resolution frequency Between load iterations Between frame size iterati Use Tx and Rx addresses Use Rx addresses only Keply with unique MAL address @o not use for online testing) Address Resolution Delay (Sec.) Delay per test 0 (20 Sec. for approx. >= 1200 Cyclic delay : 0 (30 Sec. for approx. >= 10K Note: Address Resolution means ARP for</pre>
	TR C

- (3) 在"Test Setup"选项卡"Individual Tests"子卡设置如下信息:
- ▶ 最小流量比例:10%。
- ▶ 最大流量比例:100%。
- ▶ 初始流量比例:80%。

Latency Distribution 8 Intervals (mSecs) 5 7 10 20 50 50 50 50 50 50 5	Throughput Test type Standard Asymmetric Upstream then Downstream									
100 150 300	Initial rate Minimum rate	80.00000 10.00000								
Latency Over Time	Maximum rate (%): Step rate (%): Resolution (%):	100 1 5.00000								
Time interval 1 SnapShot Capture frames per 50 Capture start 2	Backoff (%) Acceptable frame loss (%):	50								
Continue beyond min or max Latency options for Non-XD TeraMetrics-based modules Min, Max, Sequencir Average, Max NOTE Min, Avg, Max Latency and Sequencing will be provided simultaneously on TeraMetrics-based XD and IO Gig modules.										

测试流基本参数配置已完成,其他的参数均使用默认配置。

2.5.5 运行测试

根据上述配置,点击软件左侧快捷栏中"Setup and Run"选项卡下

测试。



2.5.6 结果查看及数据分析

在快捷栏 "Results"选项卡中点击 "Throughput" 按钮查看结果:

(1) 点击屏幕下方 "Chart"选项卡, 查看以图表方式显示的测试结果。





(2) 点击屏幕下方 "Summary" 选项卡, 查看各种包长的测试结果摘要。

	Throughput (%)									
Setup and Run	Right click for view (
Results	Hame/Framesize	64	128	256	512	1024	1280	1518		
	Total	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000		
	A Group	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000	100.00000		
Throughput										
esta Jumbo										
Frame Loss										
D Latency										
Latency Distribution										
Latency Over Time										
	Chart 🔛 Summa	ry 🛄 Detail	Stray Frames	Port Errors	Packet Rate					
or HaShortcut Bar							Co	nnections = 1 🥝		

(3) "Detail"选项卡给出详细的测试结果。

Octors and Dur	Throughput (%)			A Page 1	of 1 🕨	Nex:		
Setup and Run		Right click for vie	wc	0				
Results								
	Hame Time	FrameSize ILoad	TxFrames BxFram	es LostFrames	Lost (%)	Throughput	fx fps Tx	bps
<u></u>	Total 06/20/09 23:03:3	9 64 80.00000	7142856 7142	856 0	0.00000	80.00000	238095	123333344
	A Group 06/20/09 23:03:3	9 64 80.00000	(142856 (142	896 0	0.00000	80.00000	238095	1599999974
Throughput	A 2-1-32-2 06/20/09 23:03:31	9 64 80.00000	3571428 3571	428 0	0.00000	N/R	119048	79999987
	x 2-2->2-1 06/20/09 23:03:3	9 64 80.00000	35/1428 35/1	428 0	0.00000	N/ N	119048	19999981
AL.	10tal 06/20/09 23:04:11	9 64 90.00000	8035714 8035	714 0	0.00000	90.00000	267857	179999994
* ``	x Group 06/20/09 23:04:11	9 64 90.00000	8035714 8035	0	0.00000	90.00000	261851	173333334
Jumbo	A 2-2-32-2 06/20/09 23:04:11	9 64 90.00000	4017857 4017	857 0	0.00000	N/R	133929	89999997
-	A 2-2-32-1 06/20/09 23:04:11	9 64 90.00000	4017857 4017	857 0	0.00000	N/A	133929	89999991
	10tal 06/20/09 23:04:5	9 64 95,00000	8482142 8482	142 0	0.00000	95.00000	282138	1899999981
★	A GYOUD 06/20/09 23:04:5	9 64 95.00000	8482142 8482	142 0	0.00000	95.00000	282738	189999981
Frame Loss	A 2-1-32-2 06/20/09 23:04:5	9 64 95.00000	4241071 4241	071 0	0.00000	N/ R	141369	94999990
	R 2-2-32-1 06/20/09 23:04:5	9 64 95.00000	4241071 4241	0/1 0	0.00000	N/R	141369	94999990
	Total 06/20/09 23:05:3	9 64 100,0000	8928570 8928	570 0	0.00000	100.00000	297619	1 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
	A GYOUD 06/20/09 23:05:3	9 64 100.0000	8928570 8928	57U U	0.00000	100.00000	297619	199999998
Latency	A 2-1-32-2 06/20/09 23:05:34	9 64 100.0000	4464285 4464	285 0	0.00000	N/ A	148810	99999984
Datency	A 2-2->2-1 06/20/09 23:05:3	9 64 100.0000	4464285 4464	285 0	0.00000	N/A	148810	99999984
	Total 06/20/09 23:06:11	9 128 80.00000	4054054 4054	054 0	0.00000	80.00000	135135	123333338
	A Group 06/20/09 23:06:11	9 128 80.00000	4054054 4054	054 0	0.00000	80.00000	135135	1233333338
Lataner Distribution	A 2-1-32-2 06/20/09 23:06:11	9 128 80.00000	2027027 2027	027 0	0.00000	N/R	67368	19999999
Latency Distribution	A 2-2-32-1 06/20/09 23:06:11	9 128 80.00000	2027027 2027	027 0	0.00000	N/A	67568	19999999
	10tal 06/20/09/23:06:5	9 128 90.00000	4560810 4560	810 0	0.00000	90.00000	152027	119999998
	A Group 06/20/09 23:06:5	9 128 90.00000	4560810 4560	810 0	0.00000	90.00000	152027	179999968
	A 2-1->2-2 06/20/09 23:06:5	9 128 90.00000	2280405 2280	405 0	0.00000	N/A	76014	89999984
Latency Over Time	A 2-2-32-1 06/20/09 23:06:5	9 128 90.00000	2280405 2280	405 0	0.00000	N/R	76014	89999984
	Total 06/20/09/23:07:3	9 128 95.00000	4814188 4814	188 0	0.00000	95.00000	160473	189999923
								2
	🥖 Chart 🛛 🥅 Summary	Detail 🛄 Stray Frames	Port Errors	Packet Rate				
Rev Mala avera Ri							Constantin	

(4) 被测设备两个端口之间的三层转发吞吐量为 100Mbps。



2.5.7 保存测试仪配置与测试结果

(1) 保存流量配置:



(2) 导出测试结果:



3 参考资料

- (1) 思博伦《FT_SmartBits_Applications_Overview.ppt》
- (2) 思博伦《SmartBits Dual Media Ethernet Modules SmartMetrics/TeraMetrics

XD》

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