Juniper NetScreen SSG320 VPN 性能测试报告

Reistlin.Com（2009.04）

1. 测试目的：

为正式部署生产网硬件 VPN 平台（IPSec Full Mesh）进行性能综合性评估。

生产网 VPN 系统主要为运维，管理人员提供可靠的 VPN 加密隧道，保证运维人员可以通过任何网络安全的访问服务器和内部网络资源。同时，提供各个数据中心之间的数据同步，监控系统和日志审核的加密安全通道。

通过部署全网冗余 VPN 系统，可以简化应用和配置复杂度，方便管理，更好的安全细粒度控制，更完善的审计功能，为统一认证身份管理平台提供支撑。

2. 产品介绍：

Juniper Network（瞻博）网络提供广泛的产品和技术组合，包括路由、交换、安全、应用加速、身份识别策略和控制，以及管理产品。收购 NetScreen 公司的主要产品 SSG 硬件防火墙系列，在安全业界享有非常高的评价。NetScreen 采用了 ASIC Based 的 Fast Path(NetScreen GigaScreen ASIC Series)与传统 CPU 担任 Slow Path(NetScreen ScreenOS)相结合的系统体系结构。这种”Seperation of Fast Path from Slow Path"的体系结构，使 NetScreen 在技术路线上获得了巨大的成功，在高端 Firewall/VPN 市场上，NetScreen 的产品稳定在第一领先地位。

SSG320 产品介绍：

4 x 10/100/1000 以太网接口，1GB 物理内存。

ScreenOS 版本：ScreenOS 6.2

防火墙性能（大型数据包）：450+ Mbps

防火墙性能(IMIX)：400 Mbps

每秒处理的防火墙数据包数量：175,000 PPS

3DES+SHA-1 VPN 性能：175 Mbps (*)

并发 VPN 隧道数：500

最大并发会话数：64,000

新会话/秒：8,000

最大安全策略数：1,000

最大安全区数量：40

最大虚拟局域网数量：125

3. 测试方法：

使用两台 Juniper SSG320 硬件防火墙进行 IPSec VPN 互联，分别使用两种 VPN 加密方法：

a， IPSec Full Mesh VPN 全网状冗余 VPN 系统高强度加密测试：
Phase 1：3DES+SHA1 DH2 (1024bit)
Phase 2：3DES+SHA PFS (1024bit)

b，IPSec Full Mesh VPN 全网状冗余 VPN 系统中强度加密测试：
Phase 1：DES+MD5 DH1 (768bit)
Phase 2：DES+MD5 NoPFS (768bit)

测试两台 Juniper SSG320 硬件防火墙使用已经建立的 VPN Tunnel 传输数据。

监视和记录数据传输速度，带宽，网络丢包率，物理接口状态，系统负载等等。

测试协议：TCP、UDP，测试应用包含：HTTP，FTP，CIFS。

测试工具：**iperf** v1.7 for win32；**SolarWinds** v9；

3. 测试环境：

PC-A -> Juniper-SSG-A -> Switch <- Juniper-SSG-B <- PC-B

两台 Juniper-SSG 硬件 VPN 防火墙使用一个二层交换机互联（使用防火墙的 WAN 口），每台防火墙后面均有一台 Windows 测试客户端（使用防火墙的 LAN 口）。

Juniper-SSG-A WAN IP 地址：200.0.0.1

Juniper-SSG-A LAN IP 地址：192.168.1.1

PC-A LAN IP 地址：192.168.1.2

Juniper-SSG-B WAN IP 地址：200.0.0.2

Juniper-SSG-B LAN IP 地址：192.168.2.1

PC-B LAN IP 地址：192.168.2.2

4. 测试步骤：

A，配置 Juniper-SSG-A 强加密 VPN 模式：

Phase 1：3DES+SHA1 DH2 (1024bit) ； Phase 2：3DES+SHA PFS (1024bit)

```
set ike gateway "To_B" address 200.0.0.2 Aggr outgoing-interface "ethernet0/2" preshare "vpn@reistlin" proposal "pre-g2-3des-sha"
set vpn "A_To_B" gateway "To_B" replay tunnel idletime 0 proposal "g2-esp-3des-sha"
set vpn "A_To_B" monitor optimized rekey

set address "Trust" "192.168.1.0/24" 192.168.1.0 255.255.255.0
set address "Untrust" "192.168.2.0/24" 192.168.2.0 255.255.255.0

set policy id 1 name "vpn_a_to_b" from "Trust" to "Untrust"  "192.168.1.0/24" "192.168.2.0/24" "ANY" tunnel vpn "A_To_B" id 0x1 pair-policy 2 log
set policy id 1
exit

set policy id 2 name "vpn_a_to_b" from "Untrust" to "Trust"  "192.168.2.0/24" "192.168.1.0/24" "ANY" tunnel vpn "A_To_B" id 0x1 pair-policy 1 log
set policy id 2
exit
```

B，配置 Juniper-SSG-B 强加密 VPN 模式：

Phase 1：3DES+SHA1 DH2 (1024bit) ； Phase 2：3DES+SHA PFS (1024bit)

```
set ike gateway "To_A" address 200.0.0.1 Aggr outgoing-interface "ethernet0/2" preshare "vpn@reistlin" proposal "pre-g2-3des-sha"
set vpn "B_To_A" gateway "To_A" replay tunnel idletime 0 proposal "g2-esp-3des-sha"
set vpn "B_To_A" monitor optimized rekey

set address "Trust" "192.168.2.0/24" 192.168.2.0 255.255.255.0
set address "Untrust" "192.168.1.0/24" 192.168.1.0 255.255.255.0

set policy id 1 name "vpn_b_to_a" from "Trust" to "Untrust"  "192.168.2.0/24" "192.168.1.0/24" "ANY" tunnel vpn "B_To_A" id 0x1 pair-policy 2 log
set policy id 1
exit

set policy id 2 name "vpn_b_to_a" from "Untrust" to "Trust"  "192.168.1.0/24" "192.168.2.0/24" "ANY" tunnel vpn "B_To_A" id 0x1 pair-policy 1 log
set policy id 2
exit
```

C，测试本地测试客户端网络速率：2.08Gbit/秒

```
C:\Users\Administrator>iperf -c 192.168.2.2 （Localhost）
------------------------------------------------------------
Client connecting to 192.168.2.2, TCP port 5001
TCP window size: 8.00 KByte (default)
------------------------------------------------------------
[108] local 192.168.2.2 port 50899 connected with 192.168.2.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[108]  0.0-10.0 sec  2.43 GBytes  2.08 Gbits/sec
```

附注：使用 iperf 工具进行本地测试，确定 iperf 工作正常。

D，启动 iperf 测试服务器端（服务器端：192.168.2.2）

```
C:\Users\Administrator>iperf -s -m -i 1
```

附注：使用 iperf 工具启动一个服务器进程，等待连接，每 1 秒刷新一次。

E，启动 iperf 测试客户端（客户端：192.168.1.2）进行 10 次 TCP 连接

测试结果：TCP Bandwidth **51 Mbits/sec**

```
C:\Users\Administrator>iperf -s （TCP 10 次）
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size: 8.00 KByte (default)
------------------------------------------------------------
[136] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1387
[ ID] Interval       Transfer     Bandwidth
[136]  0.0-10.0 sec  59.9 MBytes  50.2 Mbits/sec
[160] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1389
[ ID] Interval       Transfer     Bandwidth
[160]  0.0-10.0 sec  60.1 MBytes  50.4 Mbits/sec
[164] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1391
[ ID] Interval       Transfer     Bandwidth
[164]  0.0-10.0 sec  61.8 MBytes  51.8 Mbits/sec
[152] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1392
[ ID] Interval       Transfer     Bandwidth
[152]  0.0-10.0 sec  61.0 MBytes  51.1 Mbits/sec
[144] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1394
```

```
[ ID] Interval       Transfer     Bandwidth
[144]  0.0-10.0 sec  55.6 MBytes  46.6 Mbits/sec
[164] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1395
[ ID] Interval       Transfer     Bandwidth
[164]  0.0-10.0 sec  60.9 MBytes  51.0 Mbits/sec
[160] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1396
[ ID] Interval       Transfer     Bandwidth
[160]  0.0-10.0 sec  60.4 MBytes  50.6 Mbits/sec
[156] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1397
[ ID] Interval       Transfer     Bandwidth
[156]  0.0-10.0 sec  60.3 MBytes  50.5 Mbits/sec
[148] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1398
[ ID] Interval       Transfer     Bandwidth
[148]  0.0-10.0 sec  61.3 MBytes  51.4 Mbits/sec
[160] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1399
[ ID] Interval       Transfer     Bandwidth
[160]  0.0-10.0 sec  60.6 MBytes  50.8 Mbits/sec
```

F，启动 iperf 测试客户端（客户端：192.168.1.2）进行 10 次 UDP 连接

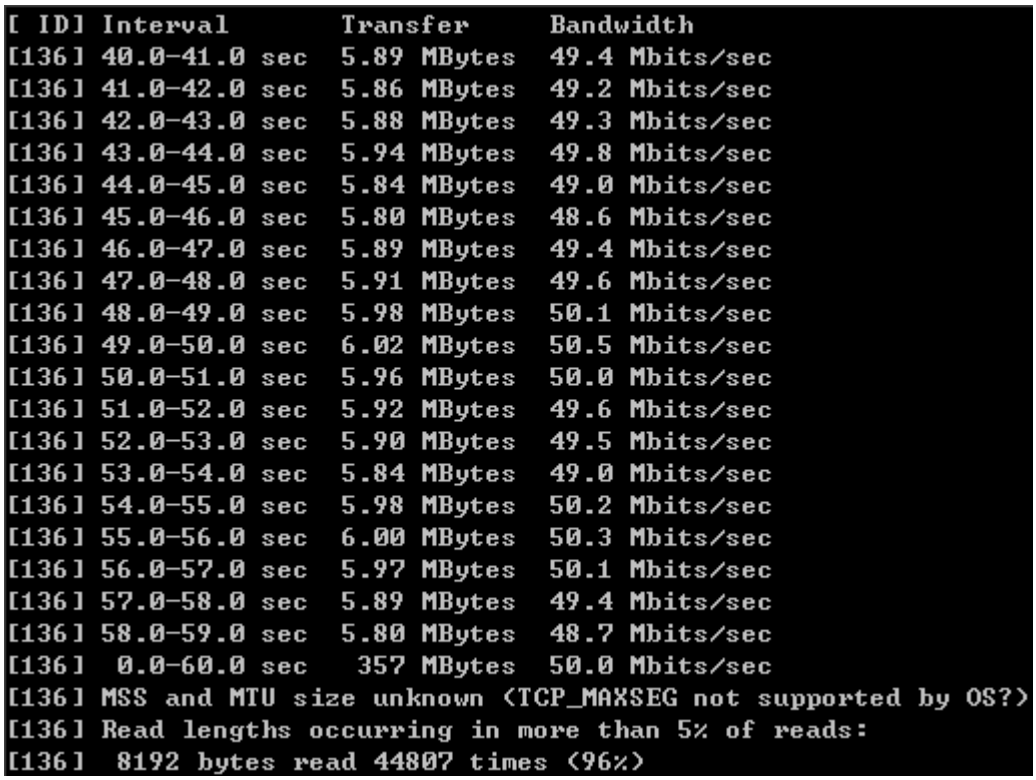
测试结果：UDP Bandwidth **1.05 Mbits/sec**

```
C:\Users\Administrator>iperf -s -u （UDP 10 次）
------------------------------------------------------------
Server listening on UDP port 5001
Receiving 1470 byte datagrams
UDP buffer size: 8.00 KByte (default)
------------------------------------------------------------
[ 92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1412
[ ID] Interval       Transfer     Bandwidth        Jitter   Lost/Total Datagrams
[ 92]  0.0-10.0 sec  1.25 MBytes  1.05 Mbits/sec   0.395 ms    0/  893 (0%)
[ 92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1413
[ ID] Interval       Transfer     Bandwidth        Jitter   Lost/Total Datagrams
[ 92]  0.0- 9.0 sec  1.13 MBytes  1.05 Mbits/sec   0.400 ms   90/  893 (10%)
[ 92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1415
[ ID] Interval       Transfer     Bandwidth        Jitter   Lost/Total Datagrams
[ 92]  0.0- 9.0 sec  1.13 MBytes  1.05 Mbits/sec   0.504 ms   88/  893 (9.9%)
[ 92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1417
[ ID] Interval       Transfer     Bandwidth        Jitter   Lost/Total Datagrams
[ 92]  0.0- 9.0 sec  1.13 MBytes  1.05 Mbits/sec   0.409 ms   88/  893 (9.9%)
[ 92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1419
[ ID] Interval       Transfer     Bandwidth        Jitter   Lost/Total Datagrams
[ 92]  0.0- 9.0 sec  1.13 MBytes  1.05 Mbits/sec   0.461 ms   88/  893 (9.9%)
[ 92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1421
```

[ID] Interval	Transfer	Bandwidth	Jitter	Lost/Total Datagrams
[92] 0.0- 9.0 sec	1.13 MBytes	1.05 Mbits/sec	0.492 ms	88/ 893 (9.9%)
[92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1423				
[ID] Interval	Transfer	Bandwidth	Jitter	Lost/Total Datagrams
[92] 0.0- 9.0 sec	1.13 MBytes	1.05 Mbits/sec	0.527 ms	88/ 893 (9.9%)
[92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1425				
[ID] Interval	Transfer	Bandwidth	Jitter	Lost/Total Datagrams
[92] 0.0- 9.0 sec	1.13 MBytes	1.05 Mbits/sec	0.496 ms	88/ 893 (9.9%)
[92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1427				
[ID] Interval	Transfer	Bandwidth	Jitter	Lost/Total Datagrams
[92] 0.0- 9.0 sec	1.13 MBytes	1.05 Mbits/sec	0.431 ms	88/ 893 (9.9%)
[92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1428				
[ID] Interval	Transfer	Bandwidth	Jitter	Lost/Total Datagrams
[92] 0.0- 9.0 sec	1.13 MBytes	1.05 Mbits/sec	0.460 ms	88/ 893 (9.9%)

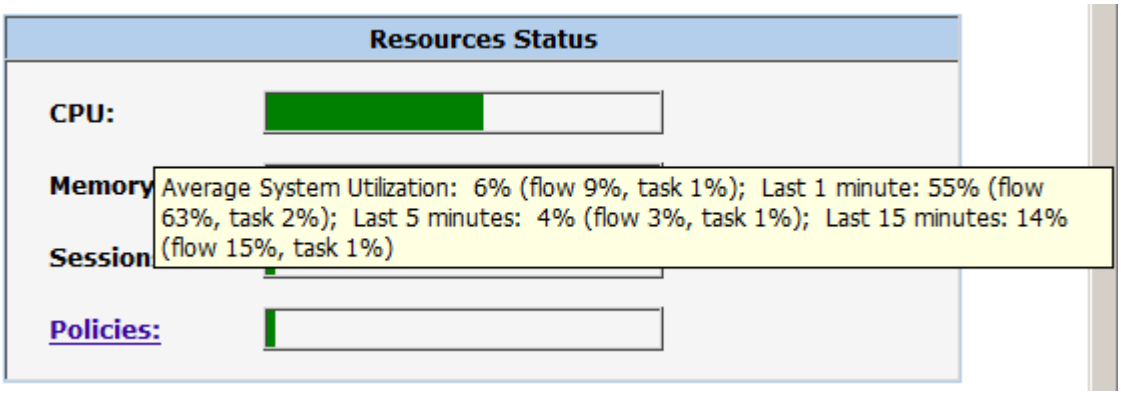
G，启动 iperf 测试客户端（客户端：192.168.1.2）进行持续 60 秒 TCP 连接

测试结果：TCP Bandwidth **50.5 Mbits/sec**

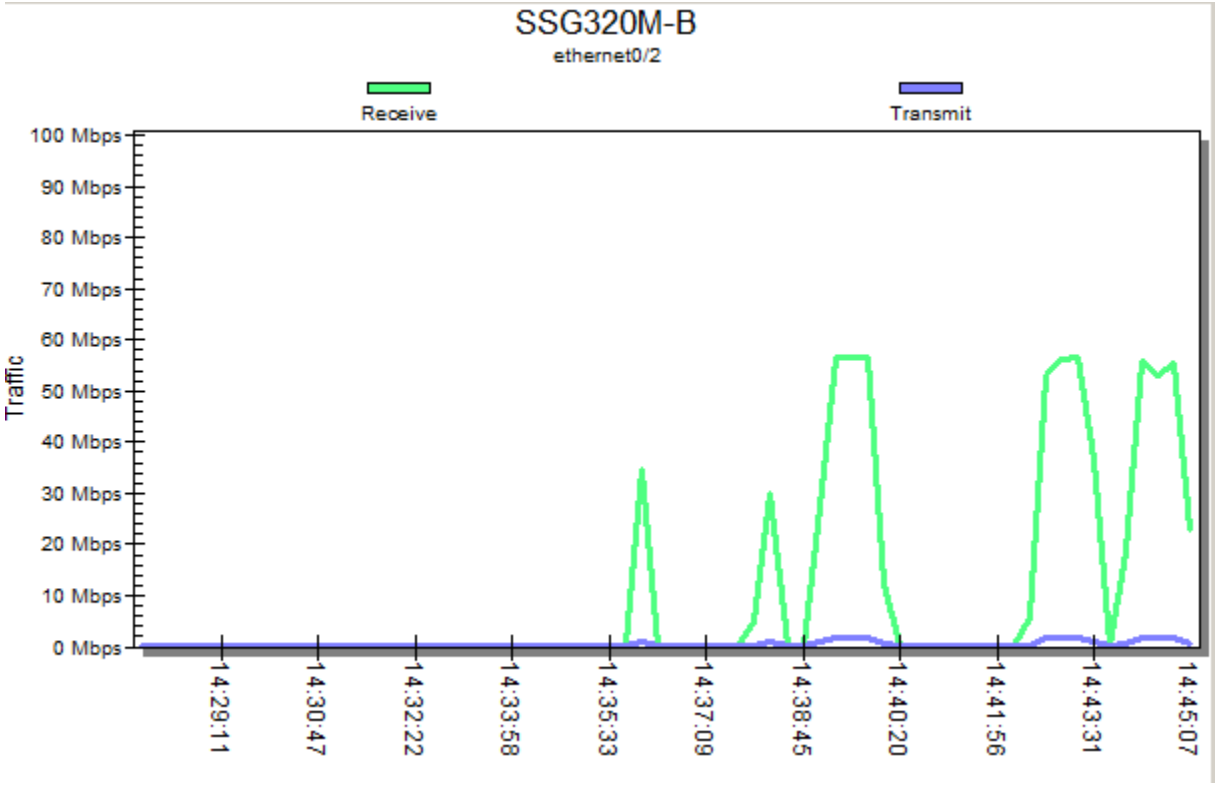


[ID] Interval	Transfer	Bandwidth
[136] 40.0-41.0 sec	5.89 MBytes	49.4 Mbits/sec
[136] 41.0-42.0 sec	5.86 MBytes	49.2 Mbits/sec
[136] 42.0-43.0 sec	5.88 MBytes	49.3 Mbits/sec
[136] 43.0-44.0 sec	5.94 MBytes	49.8 Mbits/sec
[136] 44.0-45.0 sec	5.84 MBytes	49.0 Mbits/sec
[136] 45.0-46.0 sec	5.80 MBytes	48.6 Mbits/sec
[136] 46.0-47.0 sec	5.89 MBytes	49.4 Mbits/sec
[136] 47.0-48.0 sec	5.91 MBytes	49.6 Mbits/sec
[136] 48.0-49.0 sec	5.98 MBytes	50.1 Mbits/sec
[136] 49.0-50.0 sec	6.02 MBytes	50.5 Mbits/sec
[136] 50.0-51.0 sec	5.96 MBytes	50.0 Mbits/sec
[136] 51.0-52.0 sec	5.92 MBytes	49.6 Mbits/sec
[136] 52.0-53.0 sec	5.90 MBytes	49.5 Mbits/sec
[136] 53.0-54.0 sec	5.84 MBytes	49.0 Mbits/sec
[136] 54.0-55.0 sec	5.98 MBytes	50.2 Mbits/sec
[136] 55.0-56.0 sec	6.00 MBytes	50.3 Mbits/sec
[136] 56.0-57.0 sec	5.97 MBytes	50.1 Mbits/sec
[136] 57.0-58.0 sec	5.89 MBytes	49.4 Mbits/sec
[136] 58.0-59.0 sec	5.80 MBytes	48.7 Mbits/sec
[136] 0.0-60.0 sec	357 MBytes	50.0 Mbits/sec

[136] MSS and MTU size unknown (TCP_MAXSEG not supported by OS?)
[136] Read lengths occurring in more than 5% of reads:
[136] 8192 bytes read 44807 times (96%)



防火墙 CPU 占用率：55% - 63%



C:\Users\Administrator>iperf -s -d -m -i 1 （TCP 持续 60 秒）

Server listening on TCP port 5001

TCP window size: 8.00 KByte (default)

---

[136] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1942

[ID]	Interval	Transfer	Bandwidth
[136]	0.0- 1.0 sec	6.13 MBytes	51.4 Mbits/sec
[136]	1.0- 2.0 sec	5.96 MBytes	50.0 Mbits/sec
[136]	2.0- 3.0 sec	6.09 MBytes	51.1 Mbits/sec
[136]	3.0- 4.0 sec	5.98 MBytes	50.2 Mbits/sec
[136]	4.0- 5.0 sec	5.91 MBytes	49.5 Mbits/sec

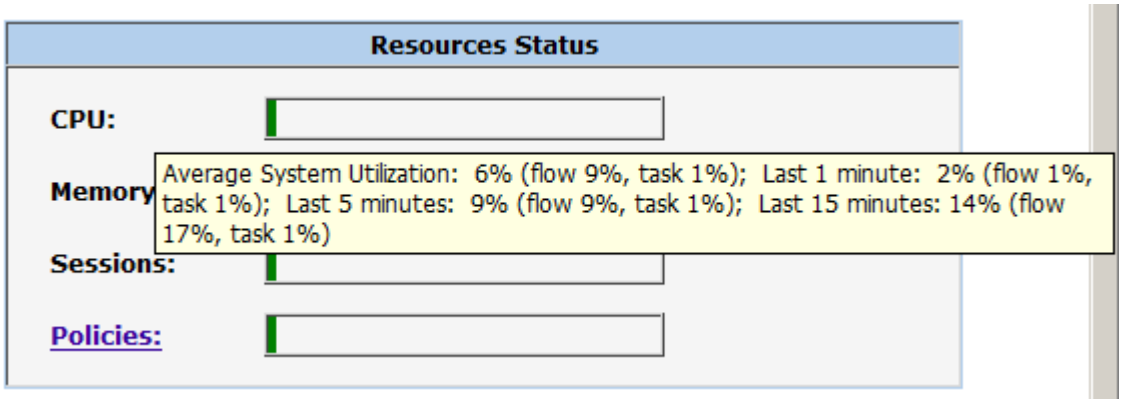
[136]	5.0- 6.0 sec	6.01 MBytes	50.4 Mbits/sec
[136]	6.0- 7.0 sec	6.03 MBytes	50.6 Mbits/sec
[136]	7.0- 8.0 sec	5.95 MBytes	49.9 Mbits/sec
[136]	8.0- 9.0 sec	5.94 MBytes	49.8 Mbits/sec
[136]	9.0-10.0 sec	5.98 MBytes	50.2 Mbits/sec
[136]	10.0-11.0 sec	5.99 MBytes	50.3 Mbits/sec
[136]	11.0-12.0 sec	5.91 MBytes	49.6 Mbits/sec
[136]	12.0-13.0 sec	6.02 MBytes	50.5 Mbits/sec
[136]	13.0-14.0 sec	6.02 MBytes	50.5 Mbits/sec
[136]	14.0-15.0 sec	6.06 MBytes	50.9 Mbits/sec
[136]	15.0-16.0 sec	6.05 MBytes	50.8 Mbits/sec
[136]	16.0-17.0 sec	5.93 MBytes	49.7 Mbits/sec
[136]	17.0-18.0 sec	5.93 MBytes	49.7 Mbits/sec
[136]	18.0-19.0 sec	5.90 MBytes	49.5 Mbits/sec
[136]	19.0-20.0 sec	6.01 MBytes	50.4 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[136]	20.0-21.0 sec	6.01 MBytes	50.4 Mbits/sec
[136]	21.0-22.0 sec	5.98 MBytes	50.1 Mbits/sec
[136]	22.0-23.0 sec	5.94 MBytes	49.8 Mbits/sec
[136]	23.0-24.0 sec	6.03 MBytes	50.6 Mbits/sec
[136]	24.0-25.0 sec	5.86 MBytes	49.2 Mbits/sec
[136]	25.0-26.0 sec	6.00 MBytes	50.3 Mbits/sec
[136]	26.0-27.0 sec	5.99 MBytes	50.3 Mbits/sec
[136]	27.0-28.0 sec	5.96 MBytes	50.0 Mbits/sec
[136]	28.0-29.0 sec	5.98 MBytes	50.1 Mbits/sec
[136]	29.0-30.0 sec	5.76 MBytes	48.3 Mbits/sec
[136]	30.0-31.0 sec	5.95 MBytes	49.9 Mbits/sec
[136]	31.0-32.0 sec	6.00 MBytes	50.3 Mbits/sec
[136]	32.0-33.0 sec	6.09 MBytes	51.1 Mbits/sec
[136]	33.0-34.0 sec	5.94 MBytes	49.8 Mbits/sec
[136]	34.0-35.0 sec	6.01 MBytes	50.4 Mbits/sec
[136]	35.0-36.0 sec	6.06 MBytes	50.9 Mbits/sec
[136]	36.0-37.0 sec	5.96 MBytes	50.0 Mbits/sec
[136]	37.0-38.0 sec	6.00 MBytes	50.3 Mbits/sec
[136]	38.0-39.0 sec	5.98 MBytes	50.2 Mbits/sec
[136]	39.0-40.0 sec	5.84 MBytes	49.0 Mbits/sec
[ID]	Interval	Transfer	Bandwidth
[136]	40.0-41.0 sec	5.89 MBytes	49.4 Mbits/sec
[136]	41.0-42.0 sec	5.86 MBytes	49.2 Mbits/sec
[136]	42.0-43.0 sec	5.88 MBytes	49.3 Mbits/sec
[136]	43.0-44.0 sec	5.94 MBytes	49.8 Mbits/sec
[136]	44.0-45.0 sec	5.84 MBytes	49.0 Mbits/sec
[136]	45.0-46.0 sec	5.80 MBytes	48.6 Mbits/sec
[136]	46.0-47.0 sec	5.89 MBytes	49.4 Mbits/sec

```
[136] 47.0-48.0 sec    5.91 MBytes    49.6 Mbits/sec
[136] 48.0-49.0 sec    5.98 MBytes    50.1 Mbits/sec
[136] 49.0-50.0 sec    6.02 MBytes    50.5 Mbits/sec
[136] 50.0-51.0 sec    5.96 MBytes    50.0 Mbits/sec
[136] 51.0-52.0 sec    5.92 MBytes    49.6 Mbits/sec
[136] 52.0-53.0 sec    5.90 MBytes    49.5 Mbits/sec
[136] 53.0-54.0 sec    5.84 MBytes    49.0 Mbits/sec
[136] 54.0-55.0 sec    5.98 MBytes    50.2 Mbits/sec
[136] 55.0-56.0 sec    6.00 MBytes    50.3 Mbits/sec
[136] 56.0-57.0 sec    5.97 MBytes    50.1 Mbits/sec
[136] 57.0-58.0 sec    5.89 MBytes    49.4 Mbits/sec
[136] 58.0-59.0 sec    5.80 MBytes    48.7 Mbits/sec
[136]    0.0-60.0 sec     357 MBytes    50.0 Mbits/sec
[136] MSS and MTU size unknown (TCP_MAXSEG not supported by OS?)
[136] Read lengths occurring in more than 5% of reads:
[136]    8192 bytes read 44807 times (96%)
```

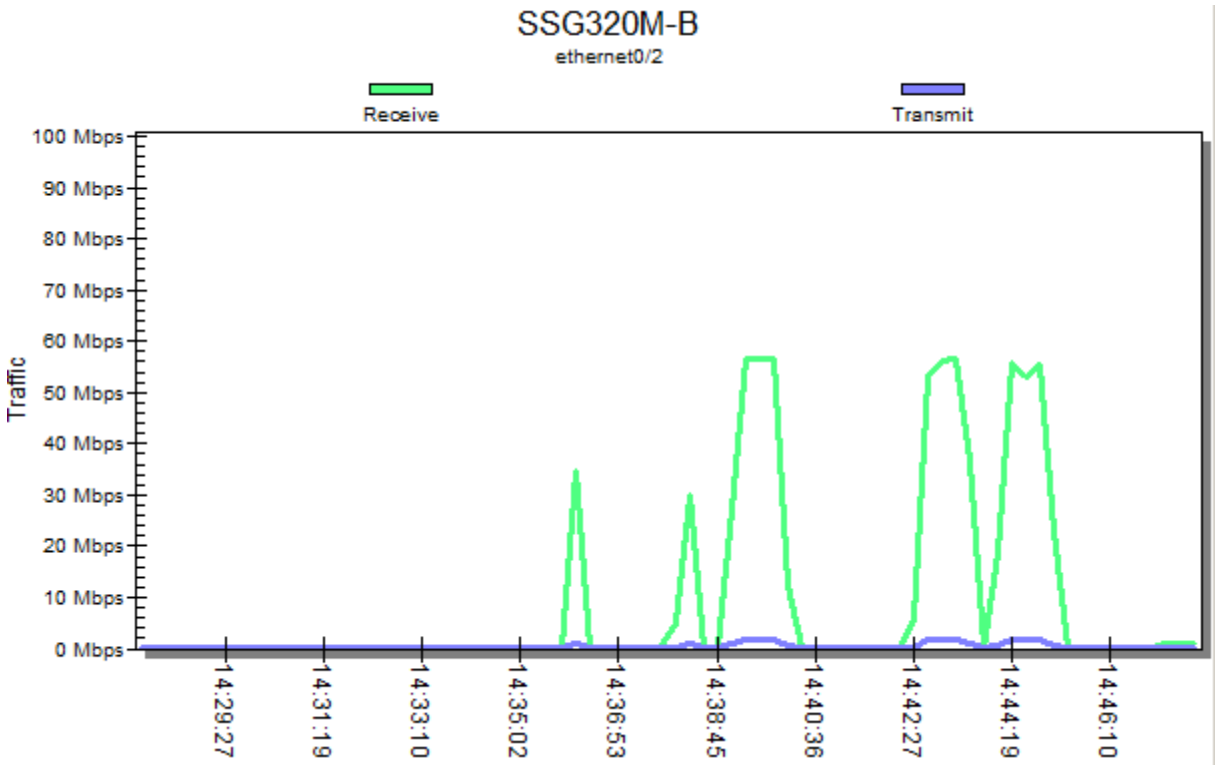
H，启动 iperf 测试客户端（客户端：192.168.1.2）进行持续 60 秒 UDP 连接

测试结果：UDP Bandwidth **1.05 Mbits/sec**

```
[ 92] 30.0-31.0 sec   129 KBytes  1.06 Mbits/sec  0.397 ms    0/   90 (0%)
[ 92] 31.0-32.0 sec   128 KBytes  1.05 Mbits/sec  0.467 ms    0/   89 (0%)
[ 92] 32.0-33.0 sec   128 KBytes  1.05 Mbits/sec  0.423 ms    0/   89 (0%)
[ 92] 33.0-34.0 sec   129 KBytes  1.06 Mbits/sec  0.438 ms    0/   90 (0%)
[ 92] 34.0-35.0 sec   128 KBytes  1.05 Mbits/sec  0.340 ms    0/   89 (0%)
[ 92] 35.0-36.0 sec   128 KBytes  1.05 Mbits/sec  0.371 ms    0/   89 (0%)
[ 92] 36.0-37.0 sec   128 KBytes  1.05 Mbits/sec  0.341 ms    0/   89 (0%)
[ 92] 37.0-38.0 sec   128 KBytes  1.05 Mbits/sec  0.344 ms    0/   89 (0%)
[ 92] 38.0-39.0 sec   128 KBytes  1.05 Mbits/sec  0.409 ms    0/   89 (0%)
[ 92] 39.0-40.0 sec   129 KBytes  1.06 Mbits/sec  0.445 ms    0/   90 (0%)
[ ID] Interval       Transfer     Bandwidth       Jitter   Lost/Total Datagrams
[ 92] 40.0-41.0 sec   128 KBytes  1.05 Mbits/sec  0.357 ms    0/   89 (0%)
[ 92] 41.0-42.0 sec   128 KBytes  1.05 Mbits/sec  0.418 ms    0/   89 (0%)
[ 92] 42.0-43.0 sec   128 KBytes  1.05 Mbits/sec  0.460 ms    0/   89 (0%)
[ 92] 43.0-44.0 sec   128 KBytes  1.05 Mbits/sec  0.396 ms    0/   89 (0%)
[ 92] 44.0-45.0 sec   128 KBytes  1.05 Mbits/sec  1.954 ms    0/   89 (0%)
[ 92] 45.0-46.0 sec   129 KBytes  1.06 Mbits/sec  0.358 ms    0/   90 (0%)
[ 92] 46.0-47.0 sec   128 KBytes  1.05 Mbits/sec  0.355 ms    0/   89 (0%)
[ 92] 47.0-48.0 sec   128 KBytes  1.05 Mbits/sec  0.339 ms    0/   89 (0%)
[ 92] 48.0-49.0 sec   128 KBytes  1.05 Mbits/sec  0.337 ms    0/   89 (0%)
[ 92] 49.0-50.0 sec   128 KBytes  1.05 Mbits/sec  0.380 ms    0/   89 (0%)
[ 92] 50.0-51.0 sec   128 KBytes  1.05 Mbits/sec  0.464 ms    0/   89 (0%)
[ 92] 51.0-52.0 sec   129 KBytes  1.06 Mbits/sec  0.353 ms    0/   90 (0%)
[ 92] 52.0-53.0 sec   128 KBytes  1.05 Mbits/sec  0.429 ms    0/   89 (0%)
```



防火墙 CPU 占用率：1% - 6%



C:\Users\Administrator>iperf -u -s -d -m -i 1 -o （UDP 持续 60 秒）

iperf: option requires an argument -- o

Server listening on UDP port 5001

Receiving 1470 byte datagrams

UDP buffer size: 8.00 KByte (default)

---

[92] local 192.168.2.2 port 5001 connected with 192.168.1.2 port 1950

[ID] Interval Transfer Bandwidth Jitter Lost/Total Datagrams

[92] 0.0- 1.0 sec 128 KBytes 1.05 Mbits/sec 0.432 ms 1547322427/ 89 (1.7 e+009%)

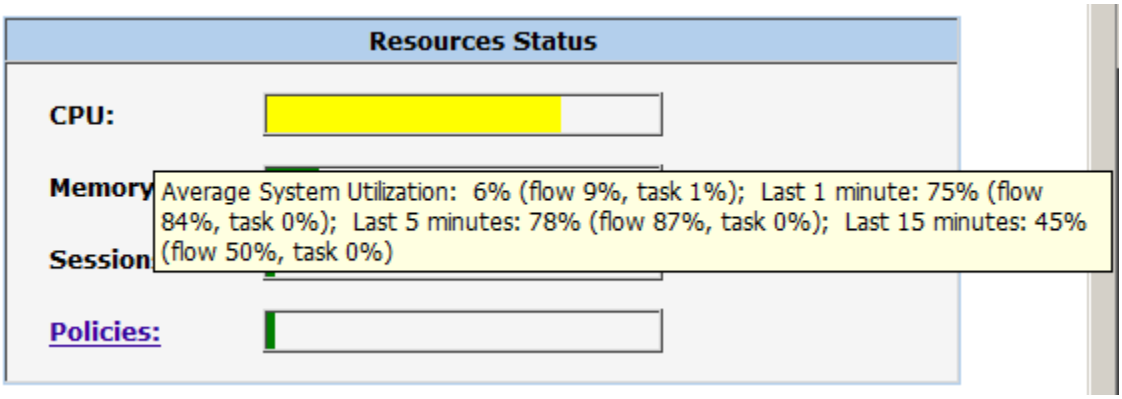
[92] 1.0- 2.0 sec 128 KBytes 1.05 Mbits/sec 0.399 ms 0/ 89 (0%)

[92]	2.0- 3.0 sec	128 KBytes	1.05 Mbits/sec	0.390 ms	0/	89 (0%)
[92]	3.0- 4.0 sec	128 KBytes	1.05 Mbits/sec	0.449 ms	0/	89 (0%)
[92]	4.0- 5.0 sec	128 KBytes	1.05 Mbits/sec	0.389 ms	0/	89 (0%)
[92]	5.0- 6.0 sec	128 KBytes	1.05 Mbits/sec	0.384 ms	0/	89 (0%)
[92]	6.0- 7.0 sec	129 KBytes	1.06 Mbits/sec	0.353 ms	0/	90 (0%)
[92]	7.0- 8.0 sec	128 KBytes	1.05 Mbits/sec	0.340 ms	0/	89 (0%)
[92]	8.0- 9.0 sec	128 KBytes	1.05 Mbits/sec	0.412 ms	0/	89 (0%)
[92]	9.0-10.0 sec	128 KBytes	1.05 Mbits/sec	0.394 ms	0/	89 (0%)
[92]	10.0-11.0 sec	128 KBytes	1.05 Mbits/sec	0.383 ms	0/	89 (0%)
[92]	11.0-12.0 sec	128 KBytes	1.05 Mbits/sec	0.488 ms	0/	89 (0%)
[92]	12.0-13.0 sec	129 KBytes	1.06 Mbits/sec	0.486 ms	0/	90 (0%)
[92]	13.0-14.0 sec	128 KBytes	1.05 Mbits/sec	0.415 ms	0/	89 (0%)
[92]	14.0-15.0 sec	128 KBytes	1.05 Mbits/sec	0.407 ms	0/	89 (0%)
[92]	15.0-16.0 sec	128 KBytes	1.05 Mbits/sec	0.348 ms	0/	89 (0%)
[92]	16.0-17.0 sec	128 KBytes	1.05 Mbits/sec	0.386 ms	0/	89 (0%)
[92]	17.0-18.0 sec	128 KBytes	1.05 Mbits/sec	0.361 ms	0/	89 (0%)
[92]	18.0-19.0 sec	129 KBytes	1.06 Mbits/sec	0.339 ms	0/	90 (0%)
[92]	19.0-20.0 sec	128 KBytes	1.05 Mbits/sec	0.396 ms	0/	89 (0%)
[ID]	Interval	Transfer	Bandwidth	Jitter	Lost/Total Datagrams	
[92]	20.0-21.0 sec	128 KBytes	1.05 Mbits/sec	0.407 ms	0/	89 (0%)
[92]	21.0-22.0 sec	128 KBytes	1.05 Mbits/sec	0.465 ms	0/	89 (0%)
[92]	22.0-23.0 sec	128 KBytes	1.05 Mbits/sec	0.413 ms	0/	89 (0%)
[92]	23.0-24.0 sec	128 KBytes	1.05 Mbits/sec	0.442 ms	0/	89 (0%)
[92]	24.0-25.0 sec	131 KBytes	1.07 Mbits/sec	0.380 ms	0/	91 (0%)
[92]	25.0-26.0 sec	128 KBytes	1.05 Mbits/sec	0.352 ms	0/	89 (0%)
[92]	26.0-27.0 sec	128 KBytes	1.05 Mbits/sec	0.363 ms	0/	89 (0%)
[92]	27.0-28.0 sec	128 KBytes	1.05 Mbits/sec	0.356 ms	0/	89 (0%)
[92]	28.0-29.0 sec	129 KBytes	1.06 Mbits/sec	0.397 ms	0/	90 (0%)
[92]	29.0-30.0 sec	126 KBytes	1.03 Mbits/sec	0.405 ms	0/	88 (0%)
[92]	30.0-31.0 sec	129 KBytes	1.06 Mbits/sec	0.397 ms	0/	90 (0%)
[92]	31.0-32.0 sec	128 KBytes	1.05 Mbits/sec	0.467 ms	0/	89 (0%)
[92]	32.0-33.0 sec	128 KBytes	1.05 Mbits/sec	0.423 ms	0/	89 (0%)
[92]	33.0-34.0 sec	129 KBytes	1.06 Mbits/sec	0.438 ms	0/	90 (0%)
[92]	34.0-35.0 sec	128 KBytes	1.05 Mbits/sec	0.340 ms	0/	89 (0%)
[92]	35.0-36.0 sec	128 KBytes	1.05 Mbits/sec	0.371 ms	0/	89 (0%)
[92]	36.0-37.0 sec	128 KBytes	1.05 Mbits/sec	0.341 ms	0/	89 (0%)
[92]	37.0-38.0 sec	128 KBytes	1.05 Mbits/sec	0.344 ms	0/	89 (0%)
[92]	38.0-39.0 sec	128 KBytes	1.05 Mbits/sec	0.409 ms	0/	89 (0%)
[92]	39.0-40.0 sec	129 KBytes	1.06 Mbits/sec	0.445 ms	0/	90 (0%)
[ID]	Interval	Transfer	Bandwidth	Jitter	Lost/Total Datagrams	
[92]	40.0-41.0 sec	128 KBytes	1.05 Mbits/sec	0.357 ms	0/	89 (0%)
[92]	41.0-42.0 sec	128 KBytes	1.05 Mbits/sec	0.418 ms	0/	89 (0%)
[92]	42.0-43.0 sec	128 KBytes	1.05 Mbits/sec	0.460 ms	0/	89 (0%)
[92]	43.0-44.0 sec	128 KBytes	1.05 Mbits/sec	0.396 ms	0/	89 (0%)

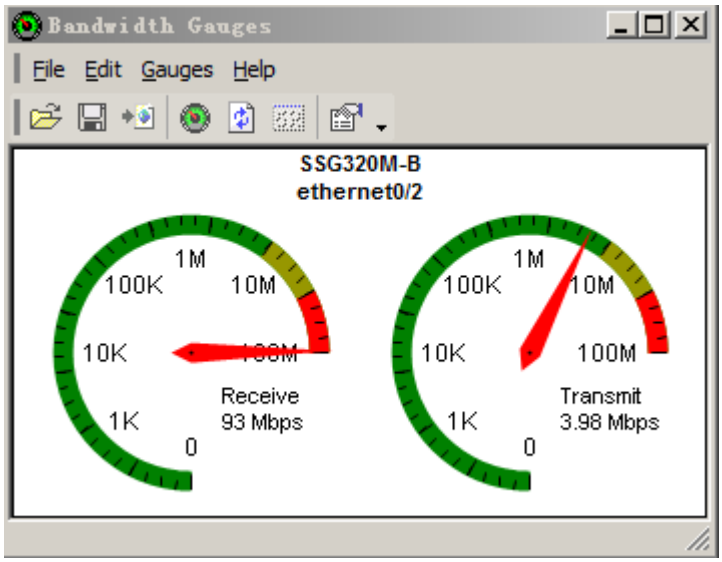
[92] 44.0-45.0 sec	128 KBytes	1.05 Mbits/sec	1.954 ms	0/	89 (0%)
[92] 45.0-46.0 sec	129 KBytes	1.06 Mbits/sec	0.358 ms	0/	90 (0%)
[92] 46.0-47.0 sec	128 KBytes	1.05 Mbits/sec	0.355 ms	0/	89 (0%)
[92] 47.0-48.0 sec	128 KBytes	1.05 Mbits/sec	0.339 ms	0/	89 (0%)
[92] 48.0-49.0 sec	128 KBytes	1.05 Mbits/sec	0.337 ms	0/	89 (0%)
[92] 49.0-50.0 sec	128 KBytes	1.05 Mbits/sec	0.380 ms	0/	89 (0%)
[92] 50.0-51.0 sec	128 KBytes	1.05 Mbits/sec	0.464 ms	0/	89 (0%)
[92] 51.0-52.0 sec	129 KBytes	1.06 Mbits/sec	0.353 ms	0/	90 (0%)
[92] 52.0-53.0 sec	128 KBytes	1.05 Mbits/sec	0.429 ms	0/	89 (0%)
[92] 53.0-54.0 sec	128 KBytes	1.05 Mbits/sec	0.369 ms	0/	89 (0%)
[92] 54.0-55.0 sec	128 KBytes	1.05 Mbits/sec	0.347 ms	0/	89 (0%)
[92] 55.0-56.0 sec	128 KBytes	1.05 Mbits/sec	0.353 ms	0/	89 (0%)
[92] 56.0-57.0 sec	128 KBytes	1.05 Mbits/sec	0.371 ms	0/	89 (0%)
[92] 57.0-58.0 sec	129 KBytes	1.06 Mbits/sec	0.392 ms	0/	90 (0%)
[92] 58.0-59.0 sec	128 KBytes	1.05 Mbits/sec	0.334 ms	0/	89 (0%)
[92] 0.0-60.0 sec	7.50 MBytes	1.05 Mbits/sec	0.595 ms	0/ 5351	(0%)

I，（100Mbit 环境）250 个压力测试进程 TCP 持续 10 分钟测试：

```
[344] 362.0-363.0 sec   101 KBytes   829 Kbits/sec
[2796] 39.0-40.0 sec  31.4 KBytes   258 Kbits/sec
[2236] 52.0-53.0 sec  21.1 KBytes   173 Kbits/sec
[2140] 54.0-55.0 sec  60.3 KBytes   494 Kbits/sec
[1464] 315.0-316.0 sec  63.7 KBytes   522 Kbits/sec
[2716] 41.0-42.0 sec  57.0 KBytes   467 Kbits/sec
[2252] 52.0-53.0 sec  81.3 KBytes   666 Kbits/sec
[1768] 61.0-62.0 sec  64.0 KBytes   524 Kbits/sec
[1192] 323.0-324.0 sec  31.4 KBytes   257 Kbits/sec
[184] 382.0-383.0 sec  22.7 KBytes   186 Kbits/sec
[2460] 47.0-48.0 sec  6.65 KBytes  54.5 Kbits/sec
[2460] 48.0-49.0 sec  0.00 Bytes  0.00 bits/sec
[ ID] Interval       Transfer     Bandwidth
[1976] 57.0-58.0 sec  87.8 KBytes   719 Kbits/sec
[1272] 321.0-322.0 sec  80.0 KBytes   655 Kbits/sec
[1288] 321.0-322.0 sec  55.5 KBytes   455 Kbits/sec
[1400] 317.0-318.0 sec  47.8 KBytes   391 Kbits/sec
[2092] 55.0-56.0 sec  53.4 KBytes   437 Kbits/sec
[1736] 308.0-309.0 sec  62.6 KBytes   513 Kbits/sec
[1304] 320.0-321.0 sec  55.8 KBytes   457 Kbits/sec
[1320] 320.0-321.0 sec  25.2 KBytes   206 Kbits/sec
[264] 379.0-380.0 sec  80.0 KBytes   655 Kbits/sec
[840] 346.0-347.0 sec  54.9 KBytes   450 Kbits/sec
[424] 359.0-360.0 sec   160 KBytes  1.31 Mbits/sec
```



防火墙 CPU 占用率：75% - 84%

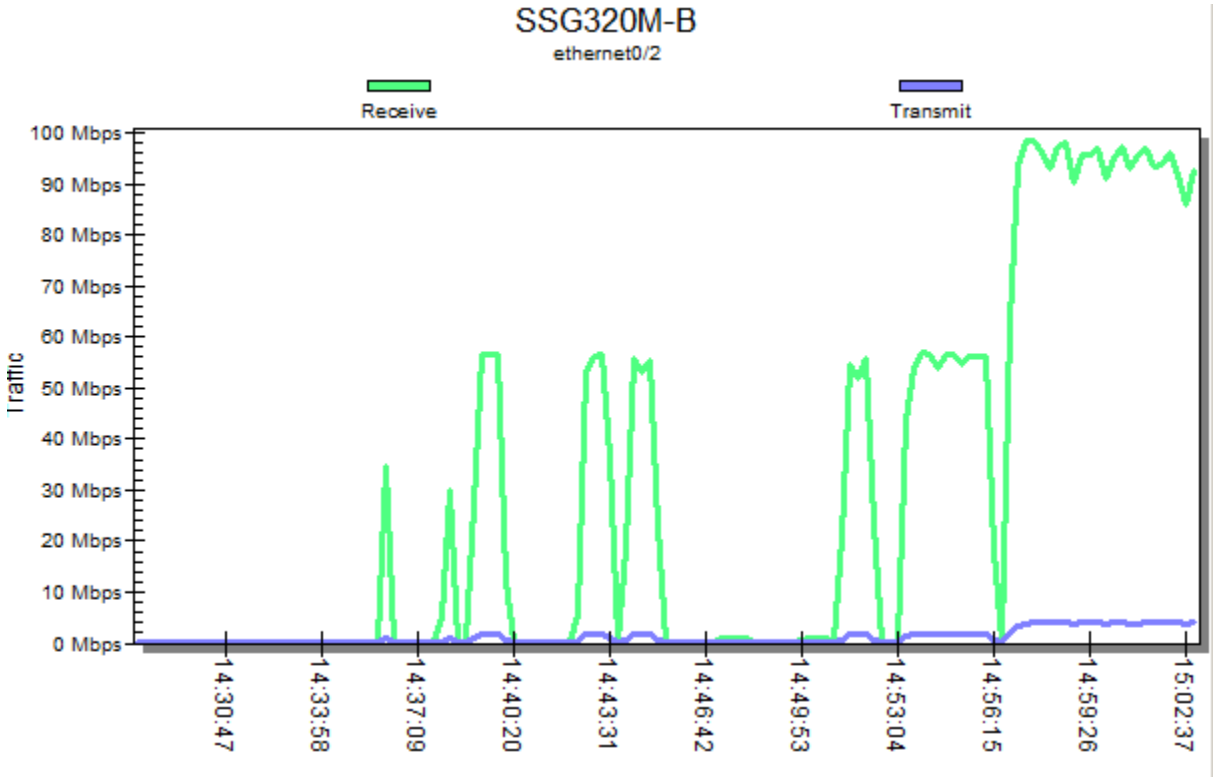


物理接口使用率（WAN 口）：93Mbps

SSG320M-B NetScreen Technologies, Inc.

Status	Interface	Type	Type	Speed	Bytes Received	Receive Percent Utilization	Transmit Percent Utilization	Bytes Transmitted	Receive Errors	Transmit Errors
●	ethernet0/0		Ethernet	1.0 Gbps	2.10 Mbps	0.21 %	8.40 %	84 Mbps	0 pps	0 pps
●	ethernet0/1		Ethernet	1.0 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps
●	ethernet0/2		Ethernet	100 Mbps	91 Mbps	90.64 %	3.91 %	3.92 Mbps	0 pps	0 pps
●	ethernet0/3		Ethernet	1.0 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps
●	vlan1		Ethernet	4.3 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps

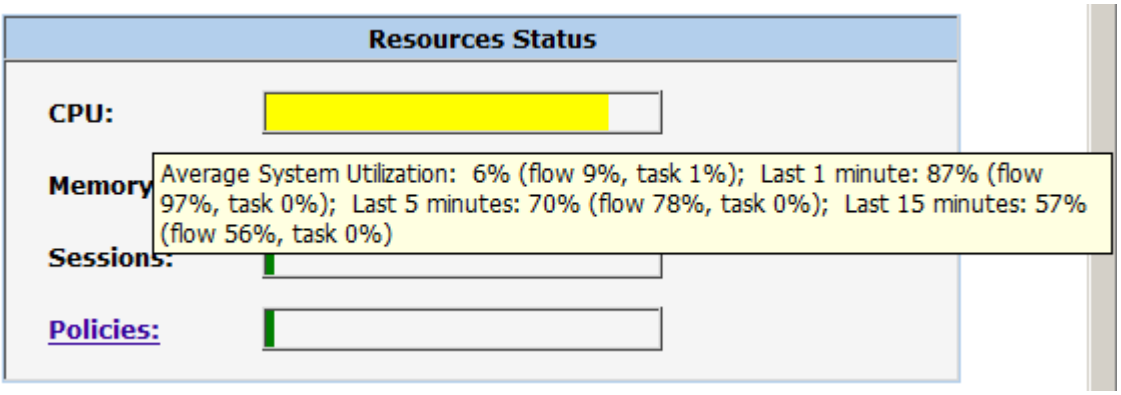
网络通讯正常，没有丢包，没有错误包。



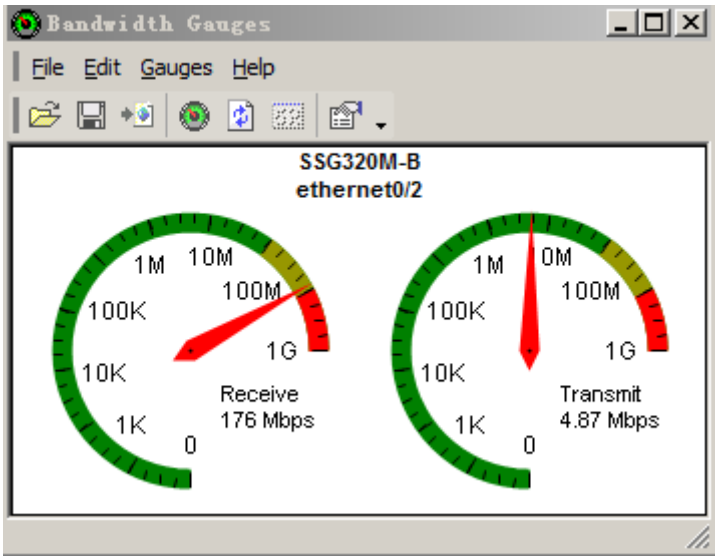
100Mbit 环境流量曲线图

J，（1000Mbit 环境）250 个压力测试进程 TCP 持续 10 分钟测试：

```
[756] 256.0-257.0 sec   104 KBytes   852 Kbits/sec
[212] 272.0-273.0 sec   128 KBytes  1.05 Mbits/sec
[1364] 239.0-240.0 sec  88.0 KBytes   721 Kbits/sec
[2888] 86.0-87.0 sec   104 KBytes   852 Kbits/sec
[1668] 231.0-232.0 sec   112 KBytes   918 Kbits/sec
[1140] 245.0-246.0 sec   112 KBytes   918 Kbits/sec
[ ID] Interval       Transfer     Bandwidth
[2792] 90.0-91.0 sec   104 KBytes   852 Kbits/sec
[3144] 78.0-79.0 sec   112 KBytes   918 Kbits/sec
[2920] 85.0-86.0 sec  88.0 KBytes   721 Kbits/sec
[932] 251.0-252.0 sec   120 KBytes   983 Kbits/sec
[452] 265.0-266.0 sec  96.0 KBytes   786 Kbits/sec
[2088] 181.0-182.0 sec  96.0 KBytes   786 Kbits/sec
[1252] 242.0-243.0 sec  96.0 KBytes   786 Kbits/sec
[868] 253.0-254.0 sec   112 KBytes   918 Kbits/sec
[2744] 92.0-93.0 sec   104 KBytes   852 Kbits/sec
[2056] 182.0-183.0 sec   104 KBytes   852 Kbits/sec
[724] 257.0-258.0 sec   104 KBytes   852 Kbits/sec
[964] 250.0-251.0 sec  88.0 KBytes   721 Kbits/sec
[1556] 234.0-235.0 sec   104 KBytes   852 Kbits/sec
[1332] 240.0-241.0 sec   120 KBytes   983 Kbits/sec
[2840] 88.0-89.0 sec   112 KBytes   918 Kbits/sec
[420] 266.0-267.0 sec   104 KBytes   852 Kbits/sec
[2584] 97.0-98.0 sec  96.0 KBytes   786 Kbits/sec
```



防火墙 CPU 占用率：87% - 97%

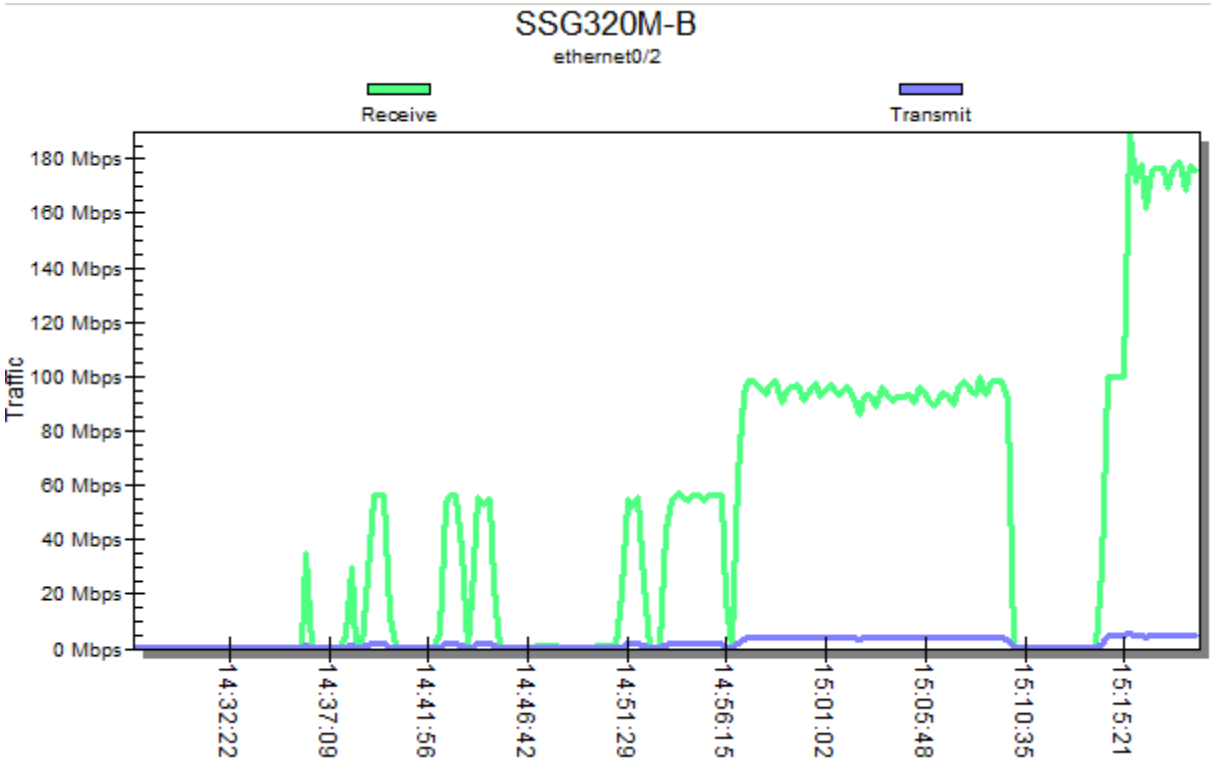


物理接口使用率（WAN 口）：176Mbps

SSG320M-B NetScreen Technologies, Inc.

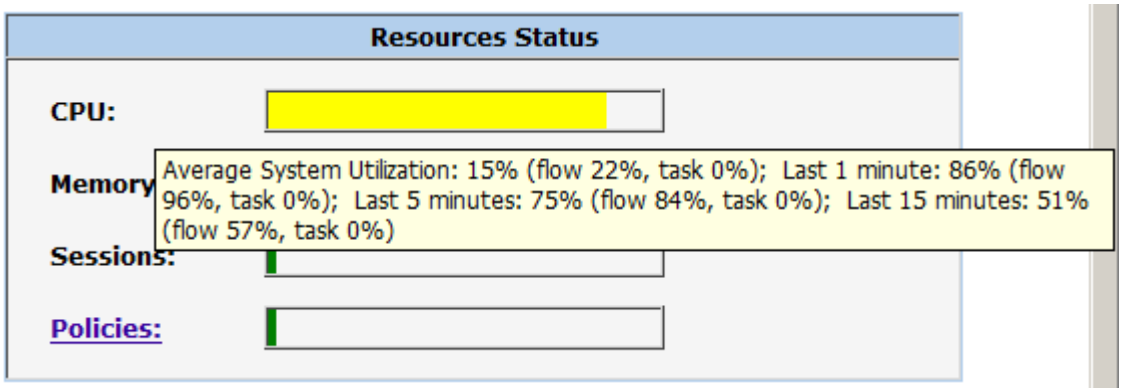
Status	Interface	Type	Type	Speed	Bytes Received	Receive Percent Utilization	Transmit Percent Utilization	Bytes Transmitted	Receive Errors	Transmit Errors
●	ethernet0/0		Ethernet	1.0 Gbps	2.60 Mbps	0.26 %	17.06 %	171 Mbps	0 pps	0 pps
●	ethernet0/1		Ethernet	1.0 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps
●	ethernet0/2		Ethernet	1.0 Gbps	180 Mbps	17.99 %	0.49 %	4.92 Mbps	0 pps	0 pps
●	ethernet0/3		Ethernet	1.0 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps
●	vlan1		Ethernet	4.3 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps

网络通讯正常，没有丢包，没有错误包。



1000Mbit 环境流量曲线图

K，（1000Mbit 环境）500 个压力测试进程 10 分钟测试：

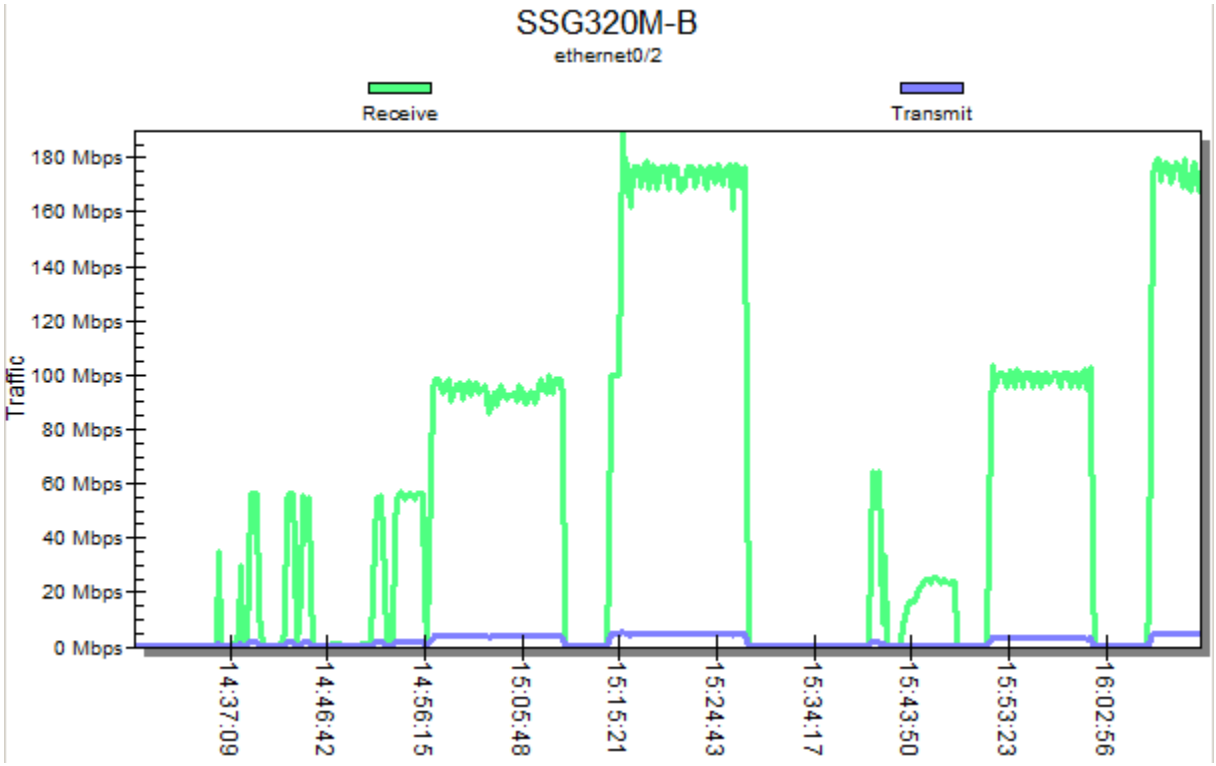


防火墙 CPU 占用率极限值：86% - 96%

SSG320M-B NetScreen Technologies, Inc.

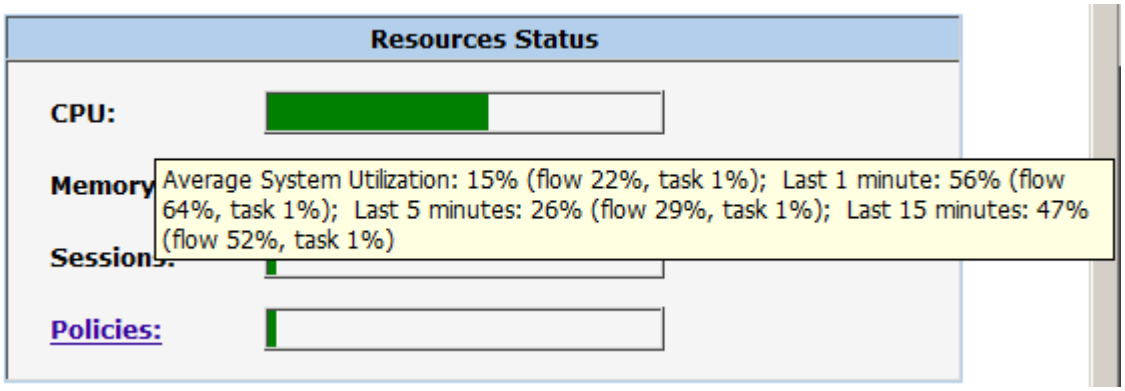
Status	Interface	Type	Type	Speed	Bytes Received	Receive Percent Utilization	Transmit Percent Utilization	Bytes Transmitted	Receive Errors	Transmit Errors
●	ethernet0/0		Ethernet	1.0 Gbps	2.71 Mbps	0.27 %	17.02 %	170 Mbps	0 pps	0 pps
●	ethernet0/1		Ethernet	1.0 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps
●	ethernet0/2		Ethernet	1.0 Gbps	180 Mbps	17.99 %	0.51 %	5.10 Mbps	0 pps	0 pps
●	ethernet0/3		Ethernet	1.0 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps
●	vlan1		Ethernet	4.3 Gbps	0 bps	0.00 %	0.00 %	0 bps	0 pps	0 pps

防火墙 VPN 吞吐率极限值：180 Mbps



防火墙 VPN 吞吐率极限值：180 Mbps

L，（1000Mbit 环境）传输 1GB 文件测试：耗时 115.7 秒，最大带宽 70.8 Mbits/秒



防火墙 CPU 占用率：56% - 64%

```
C:\Documents and Settings\Administrator>iperf -c 192.168.2.2 -n 1024000000
------------------------------------------------------------
Client connecting to 192.168.2.2, TCP port 5001
TCP window size: 8.00 KByte (default)
------------------------------------------------------------
[1912] local 192.168.1.2 port 2619 connected with 192.168.2.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[1912]  0.0-115.7 sec  977 MBytes  70.8 Mbits/sec
```

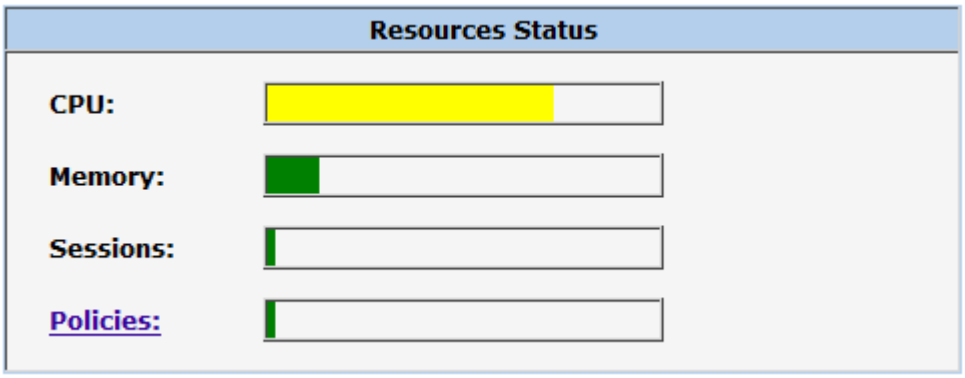
M，（1000Mbit 环境）传输 100M 文件测试：耗时 11.5 秒，最大带宽 71.4 Mbits/秒

```
C:\Documents and Settings\Administrator>iperf -c 192.168.2.2 -n 102400000
------------------------------------------------------------
Client connecting to 192.168.2.2, TCP port 5001
TCP window size: 8.00 KByte (default)
------------------------------------------------------------
[1912] local 192.168.1.2 port 2624 connected with 192.168.2.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[1912]  0.0-11.5 sec  97.7 MBytes  71.4 Mbits/sec
```

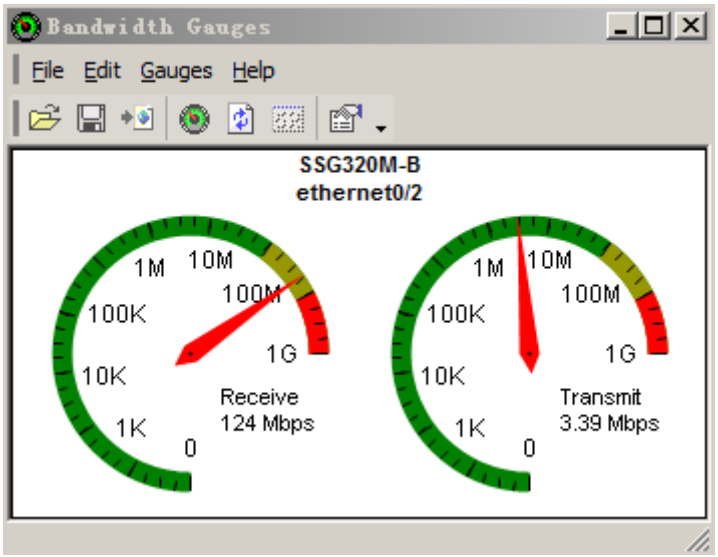
N，（1000Mbit 环境）传输 10M 文件测试：耗时 1.2 秒，最大带宽 68.1 Mbits/秒

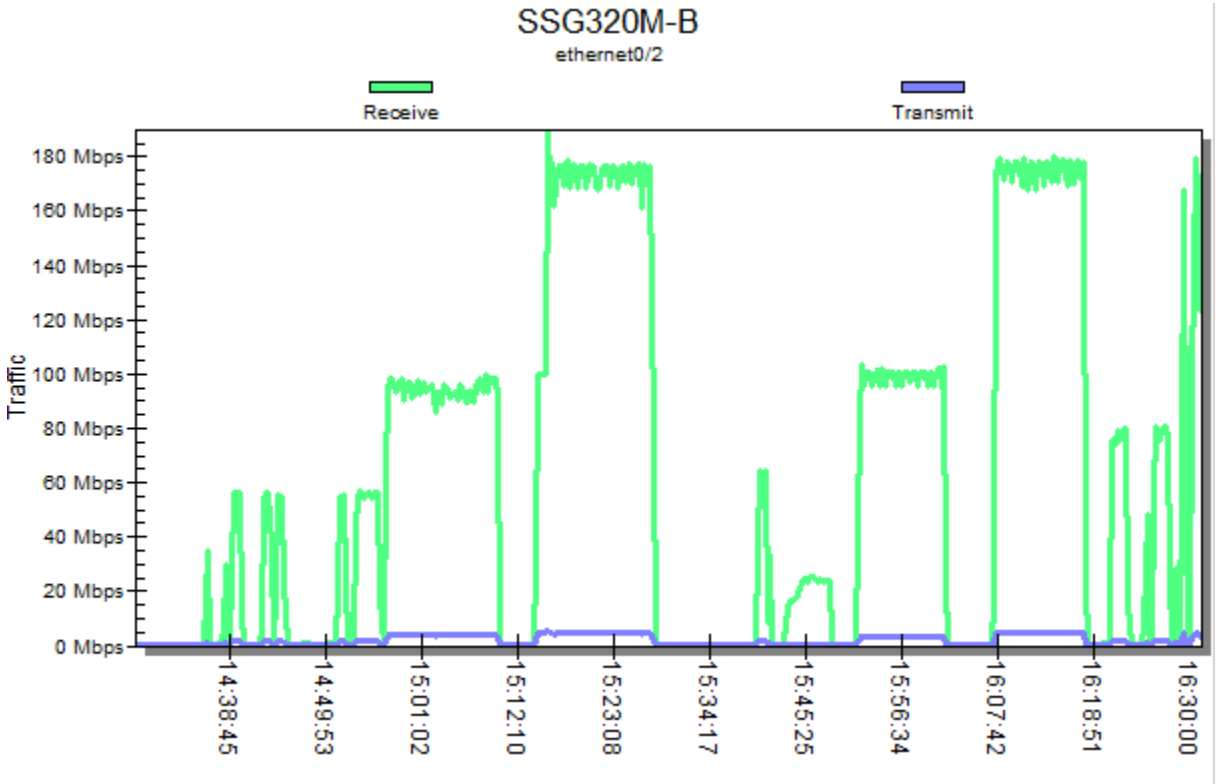
```
C:\Documents and Settings\Administrator>iperf -c 192.168.2.2 -n 10240000
------------------------------------------------------------
Client connecting to 192.168.2.2, TCP port 5001
TCP window size: 8.00 KByte (default)
------------------------------------------------------------
[1912] local 192.168.1.2 port 2627 connected with 192.168.2.2 port 5001
[ ID] Interval       Transfer     Bandwidth
[1912]  0.0- 1.2 sec  9.77 MBytes  68.1 Mbits/sec
```

O，（1000Mbit 环境）传输 10M 文件，同时传 10 份文件测试：



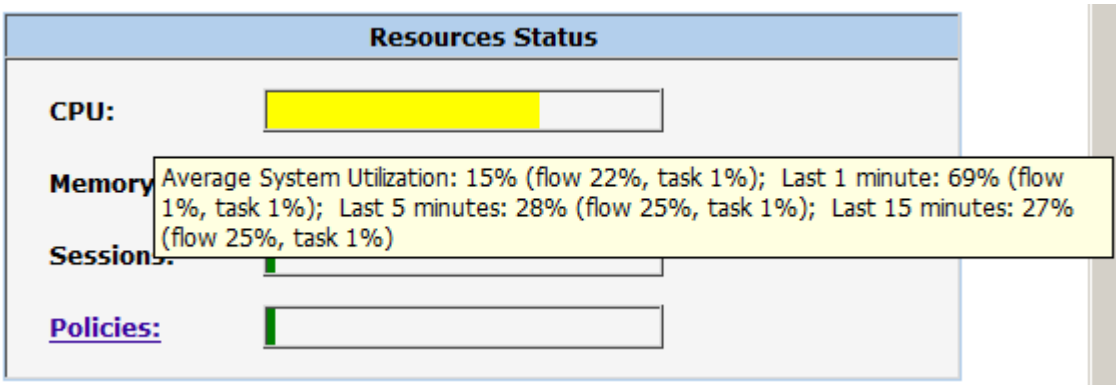
防火墙 CPU 占用率：80%+

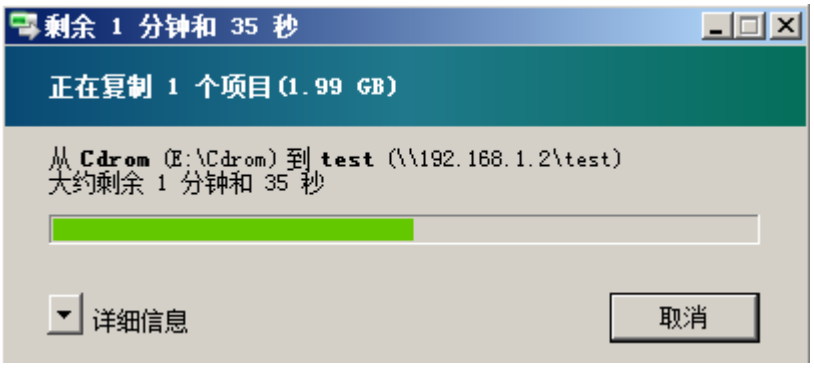


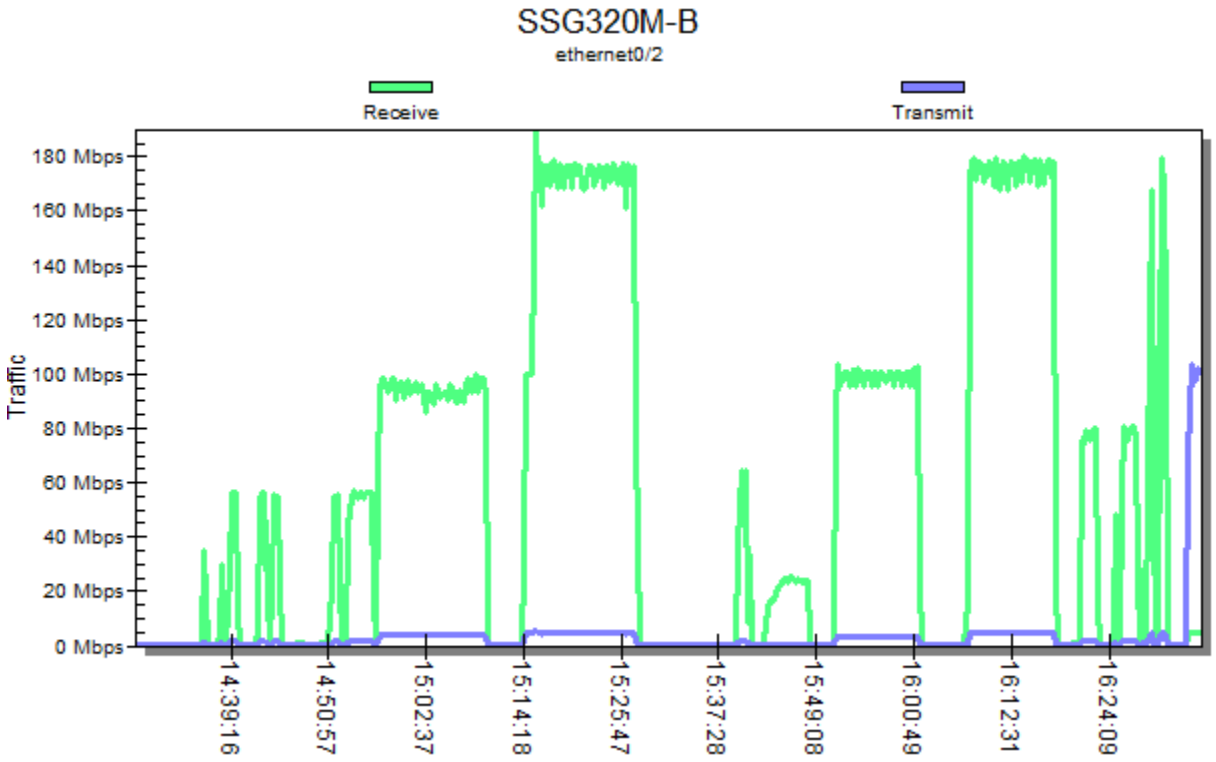


同时传输 10M 文件 x 10 份流量曲线图

P，（1000Mbit 环境）Windows 共享 CIFS 测试：







5. 测试结论：

Juniper SSG320 实际性能参数与官方数据值非常接近，完全可以满足目前生产网及后续一年的网络运维、管理 VPN 硬件防火墙的正常性能要求。

A，Juniper SSG320 硬件防火墙在 100Mbit 环境下单一 TCP 会话的 VPN 吞吐率为 50+ Mbit/s

B，Juniper SSG320 硬件防火墙在 100Mbit 环境下单一 UDP 会话的 VPN 吞吐率为 1.05+ Mbit/s

C，Juniper SSG320 硬件防火墙在 100Mbit 环境下单一 TCP 会话（持续 60 秒）的 CPU 占用率为 < 50% 左右。

D，Juniper SSG320 硬件防火墙在 100Mbit 环境下单一 UDP 会话（持续 60 秒）的 CPU 占用率为 > 5% 左右。

E，Juniper SSG320 在 100Mbit 环境下的 VPN 吞吐率最大值为 100Mbit，CPU 占用率 60%-85%，丢包率 > 1%，延迟有所增加，维持在 50ms 之内。

F，Juniper SSG320 在 1000Mbit 环境下的 VPN 吞吐率最大值为 180Mbit，CPU 占用率 85%-95%+，丢包率 > 5%，延迟有所增加，维持在 100ms 之内。

G，其他说明：

持续的 TCP 会话会影响设备的 CPU 占用率，正常的 HTTP，FTP，CIFS 通过 VPN Tunnel 传输时对整体性能没有太大影响。多连接且重复的网络应用会造成设备负载的增加，单一连接持续传输的应用较少与前者。符合 TCP 标准的应用均在正常的性能范围波动。