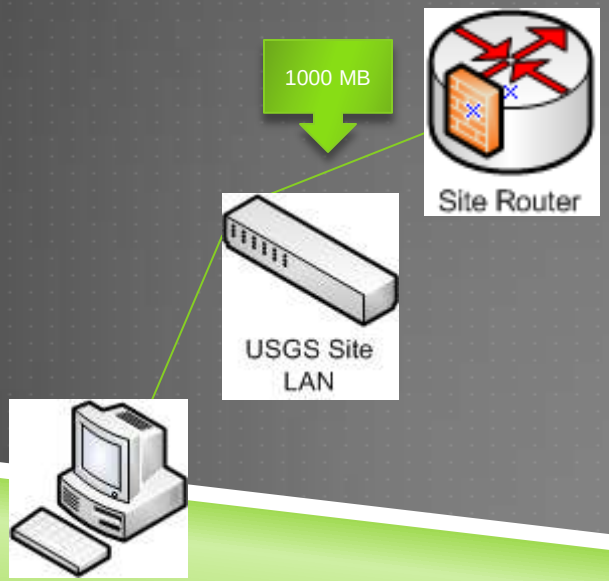
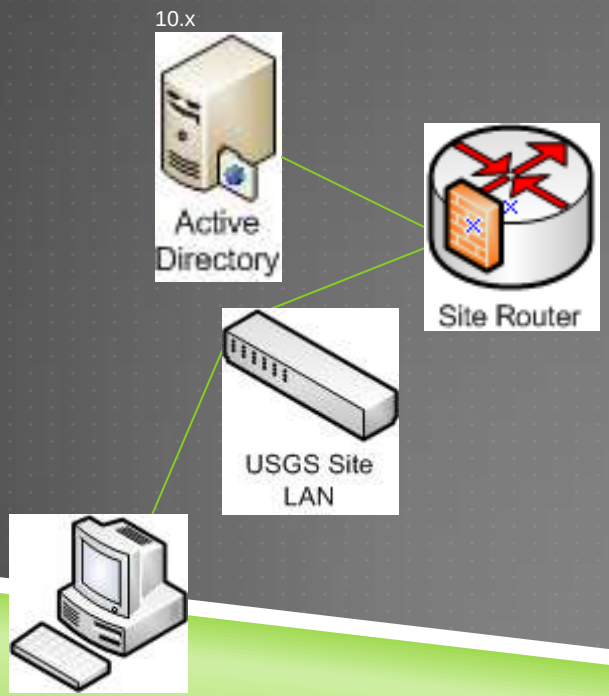
TIMOTHY LEE – USGS SITE & ESN NETWORK

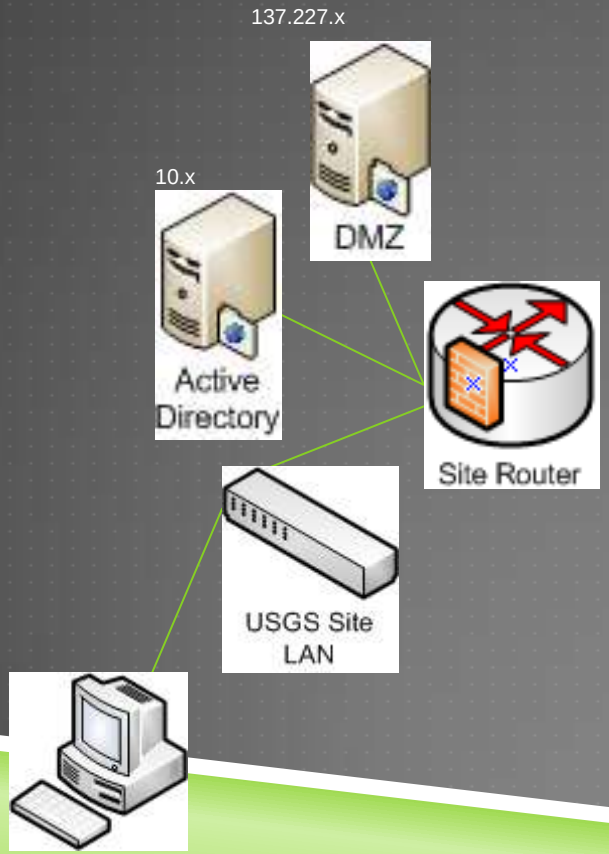
USGS SITE & ESN NETWORK



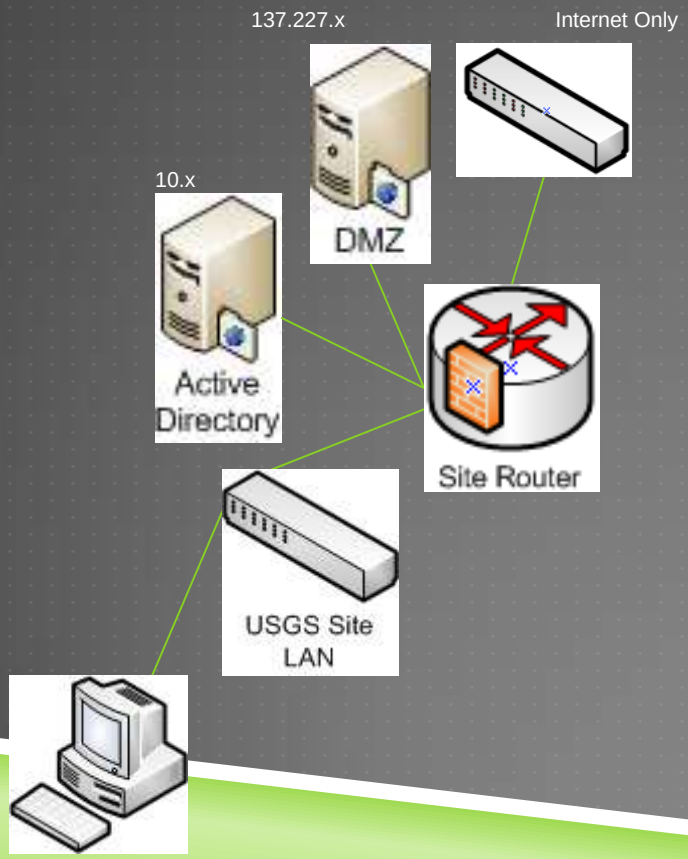
USGS SITE & ESN NETWORK



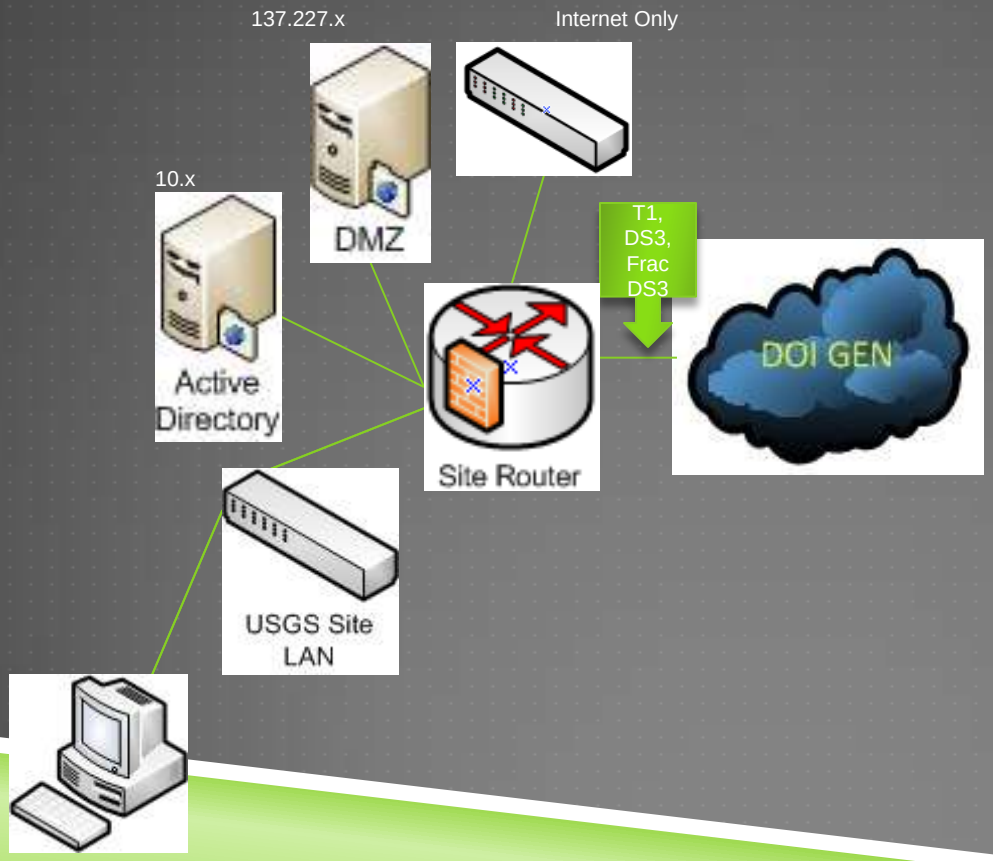
USGS SITE & ESN NETWORK



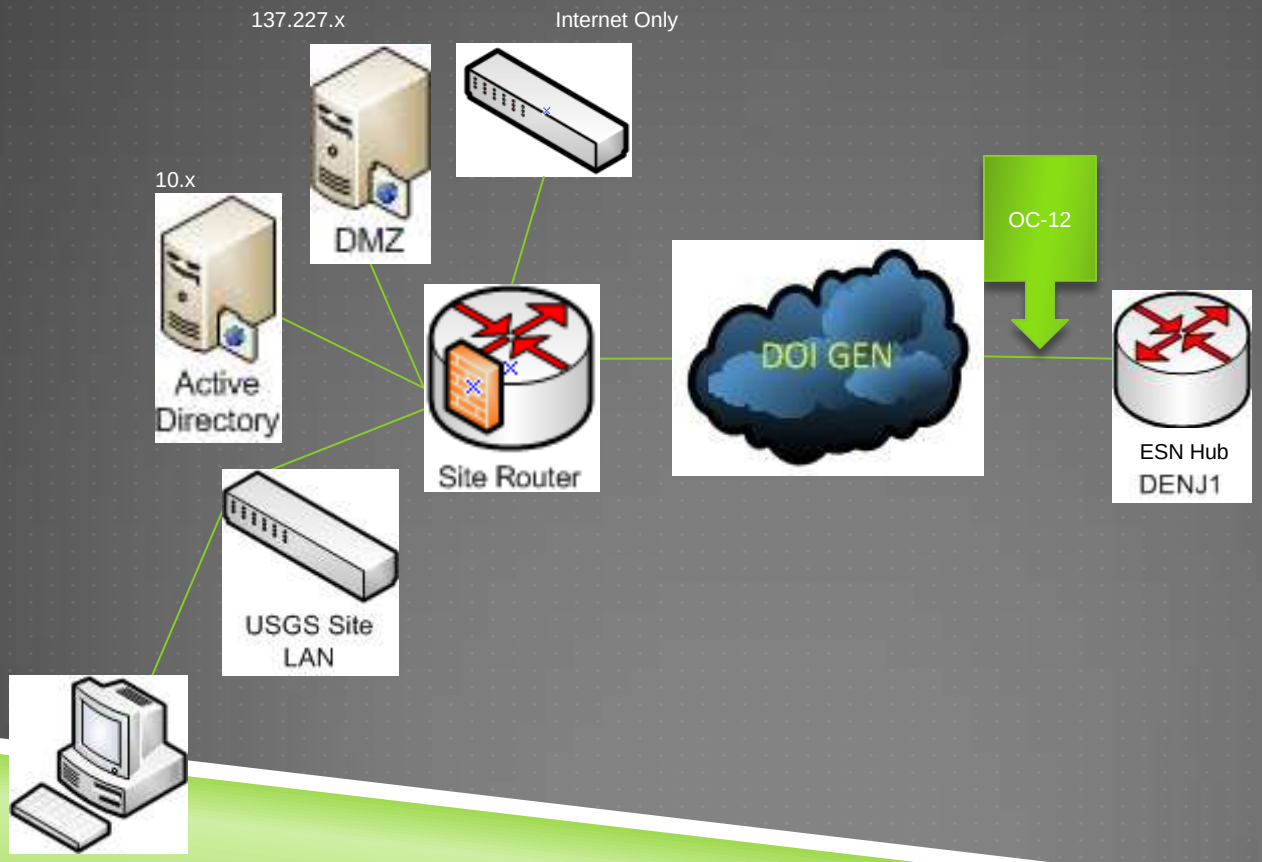
USGS SITE & ESN NETWORK



USGS SITE & ESN NETWORK

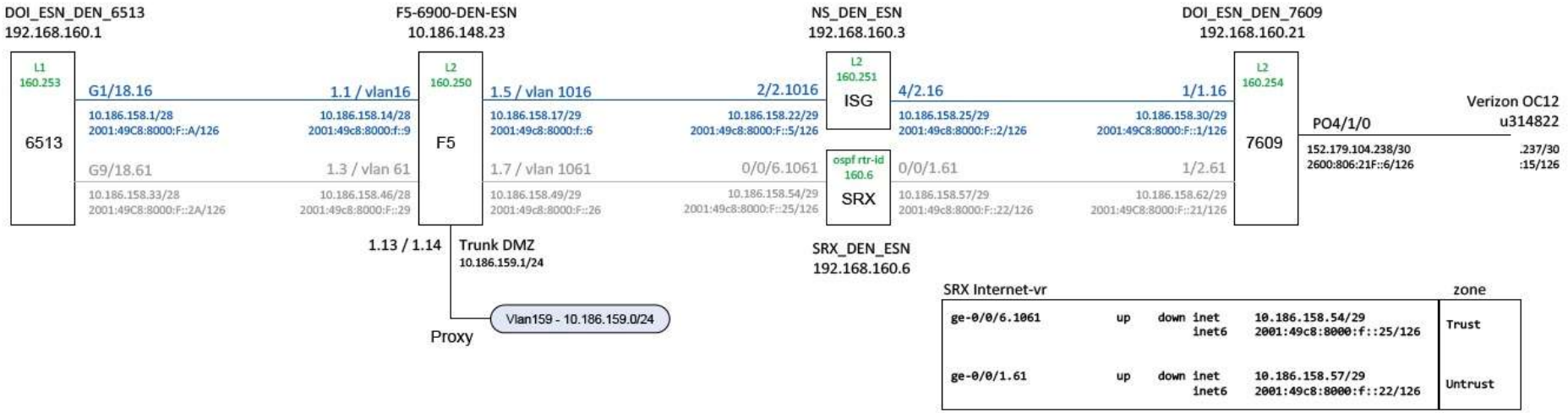


USGS SITE & ESN NETWORK



USGS SITE & ESN NETWORK

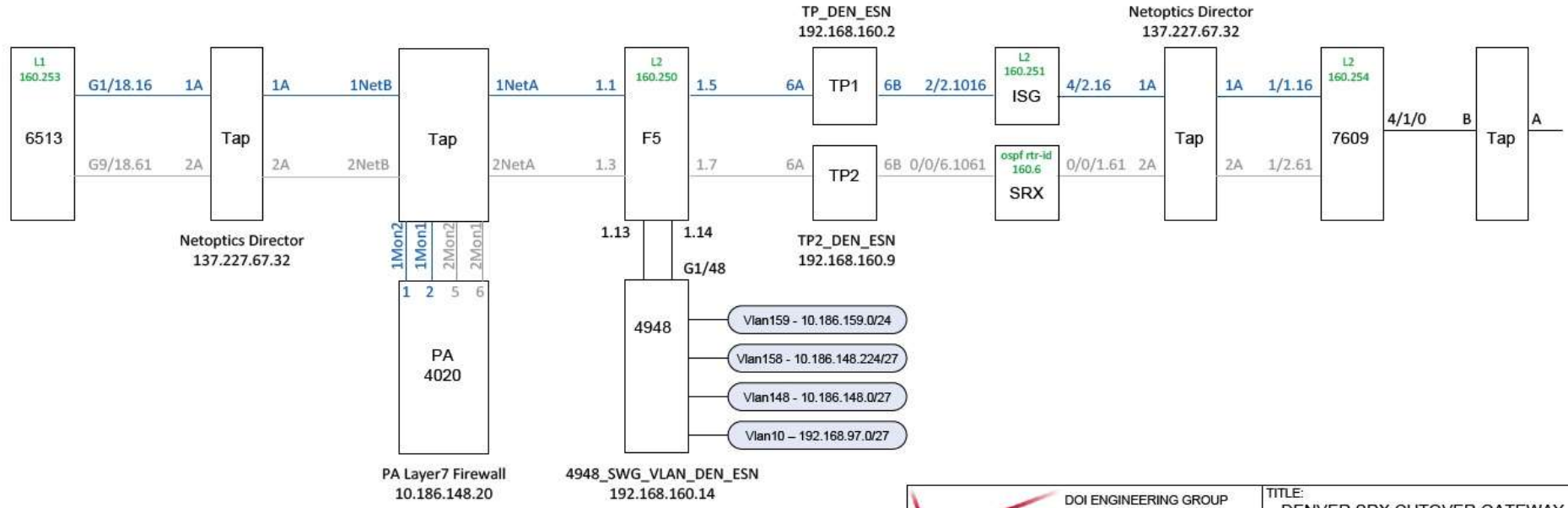
SRX Cutover - Denver VIRTUAL GATEWAY 1 – Layer3



SRX Internet-vr

					zone
ge-0/0/6.1061	up	down	inet inet6	10.186.158.54/29 2001:49c8:8000:f::25/126	Trust
ge-0/0/1.61	up	down	inet inet6	10.186.158.57/29 2001:49c8:8000:f::22/126	Untrust

SRX Cutover - Denver VIRTUAL GATEWAY 1 – Layer1/2

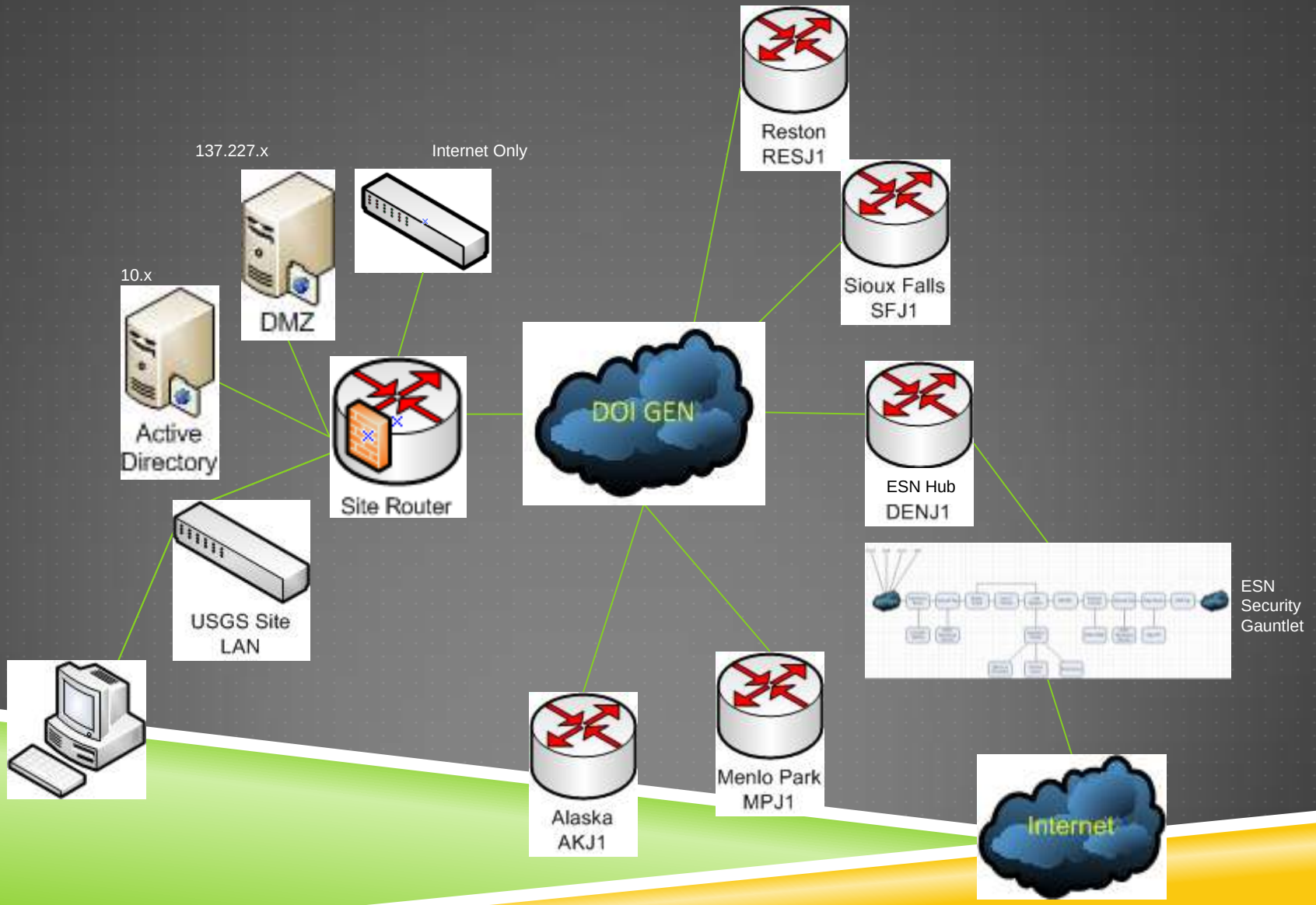


verizon
DOI ENGINEERING GROUP
22001 LOUDOUN CTY PARKWAY
ASHBURN, VA 20147
PH: (703) 886-4851
FAX: (703) 738-7687

TITLE:
DENVER SRX CUTOVER GATEWAY
DIAGRAMS V2B IP ADDRESSING - 25
MARCH 2013 - AS BUILT.VSD

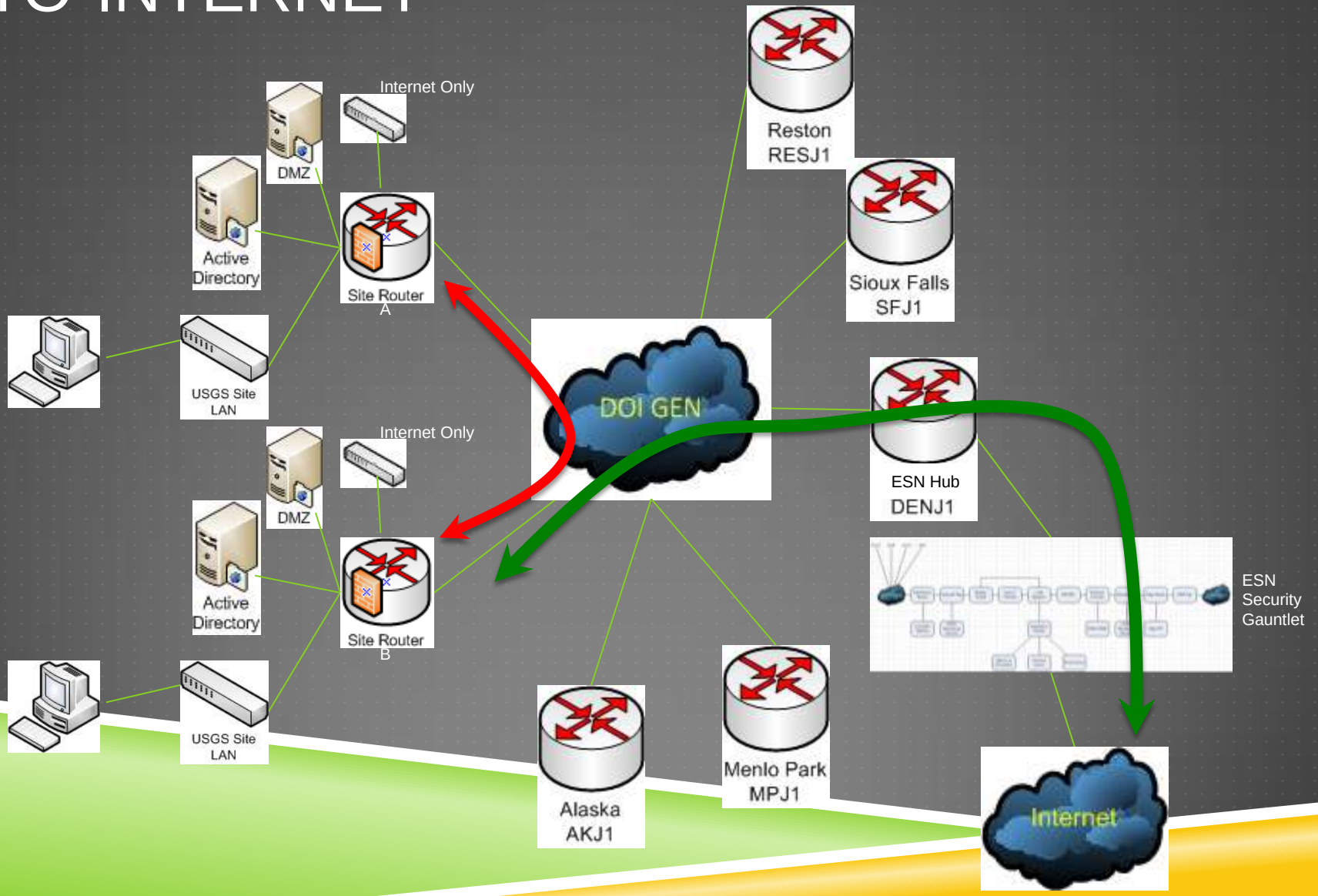
DRAWN BY: J.D. SHARP	DATE: 4/25/2013	SIZE	DWG #: DENVER	REV.	2
PROJECT ENGINEER: J.D. SHARP		B			
PROJECT MANAGER: N/A			DO NOT SCALE DRAWING	SHEET 2 OF 4	

USGS SITE & ESN NETWORK

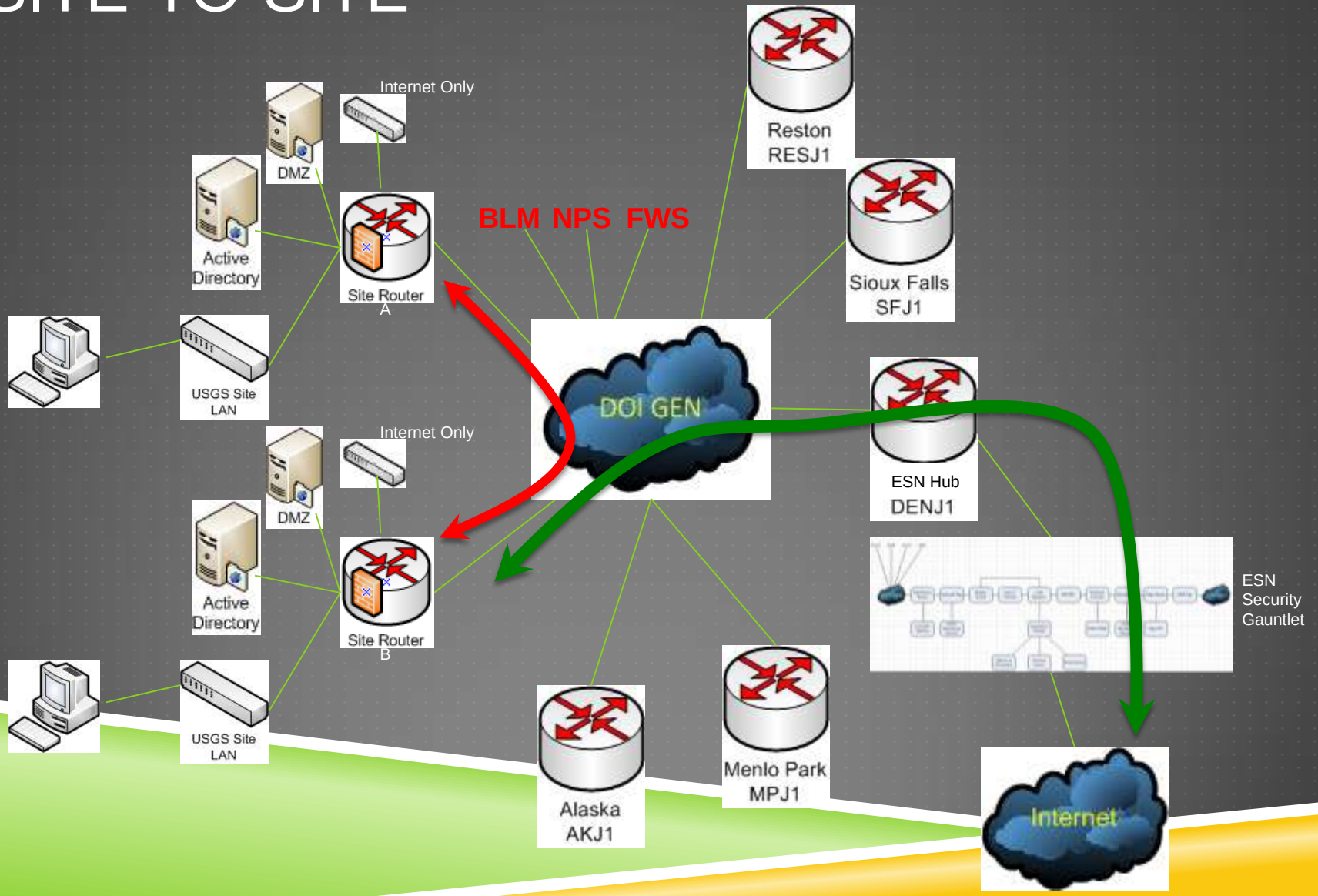


USGS SITE & ESN NETWORK – USGS SITE-TO-SITE

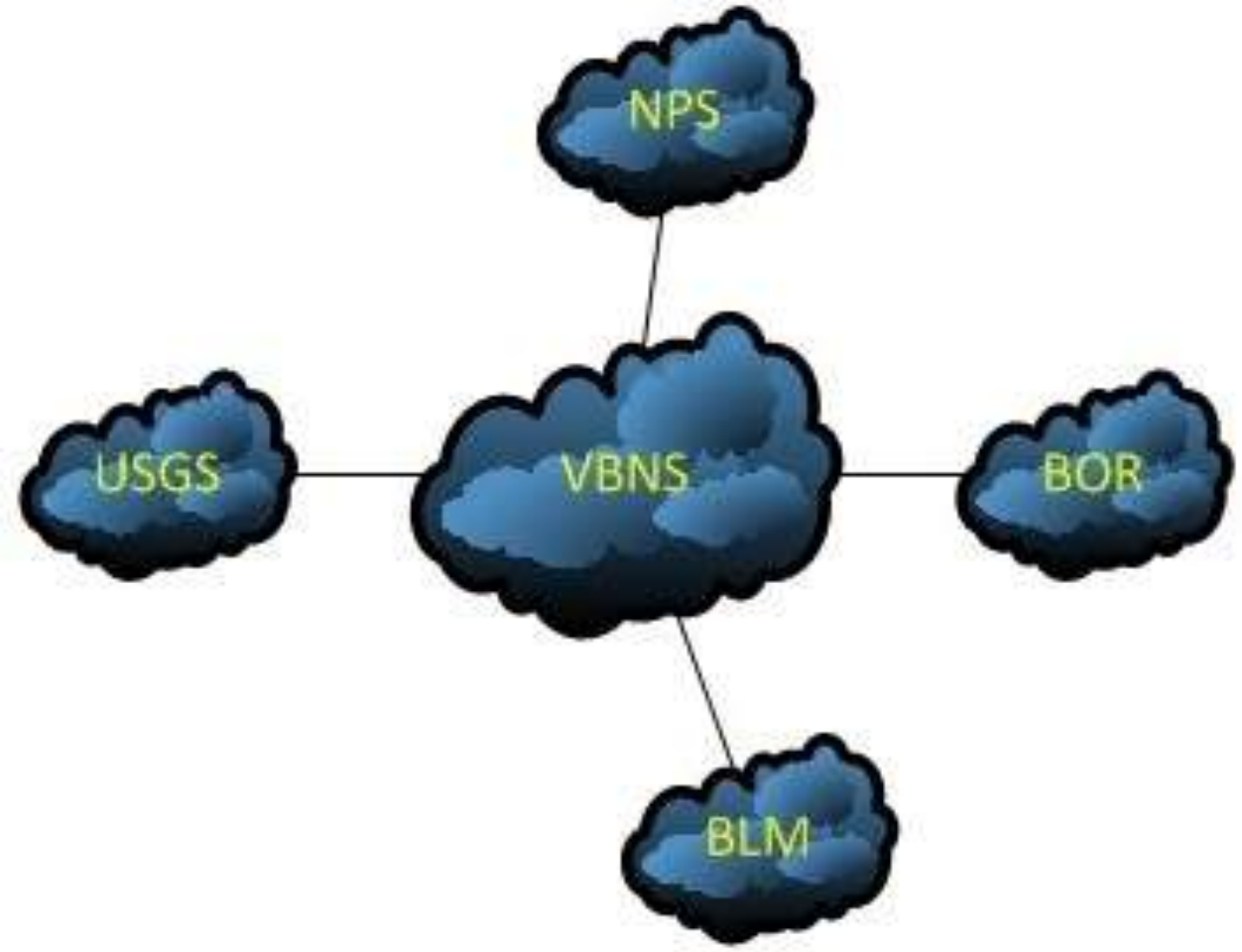
USGS SITE & ESN NETWORK – SITE-TO-INTERNET



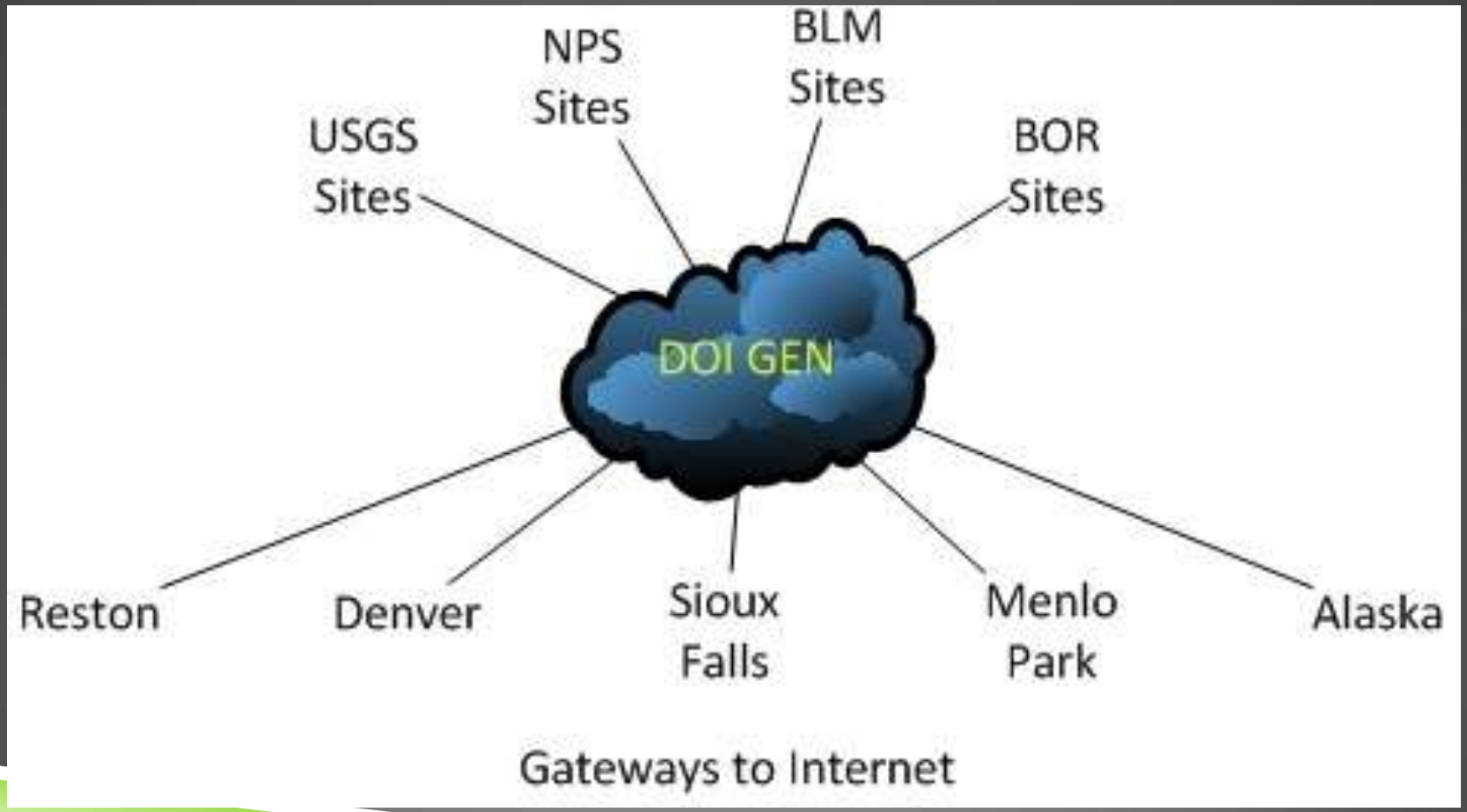
USGS SITE & ESN NETWORK – DOI SITE-TO-SITE



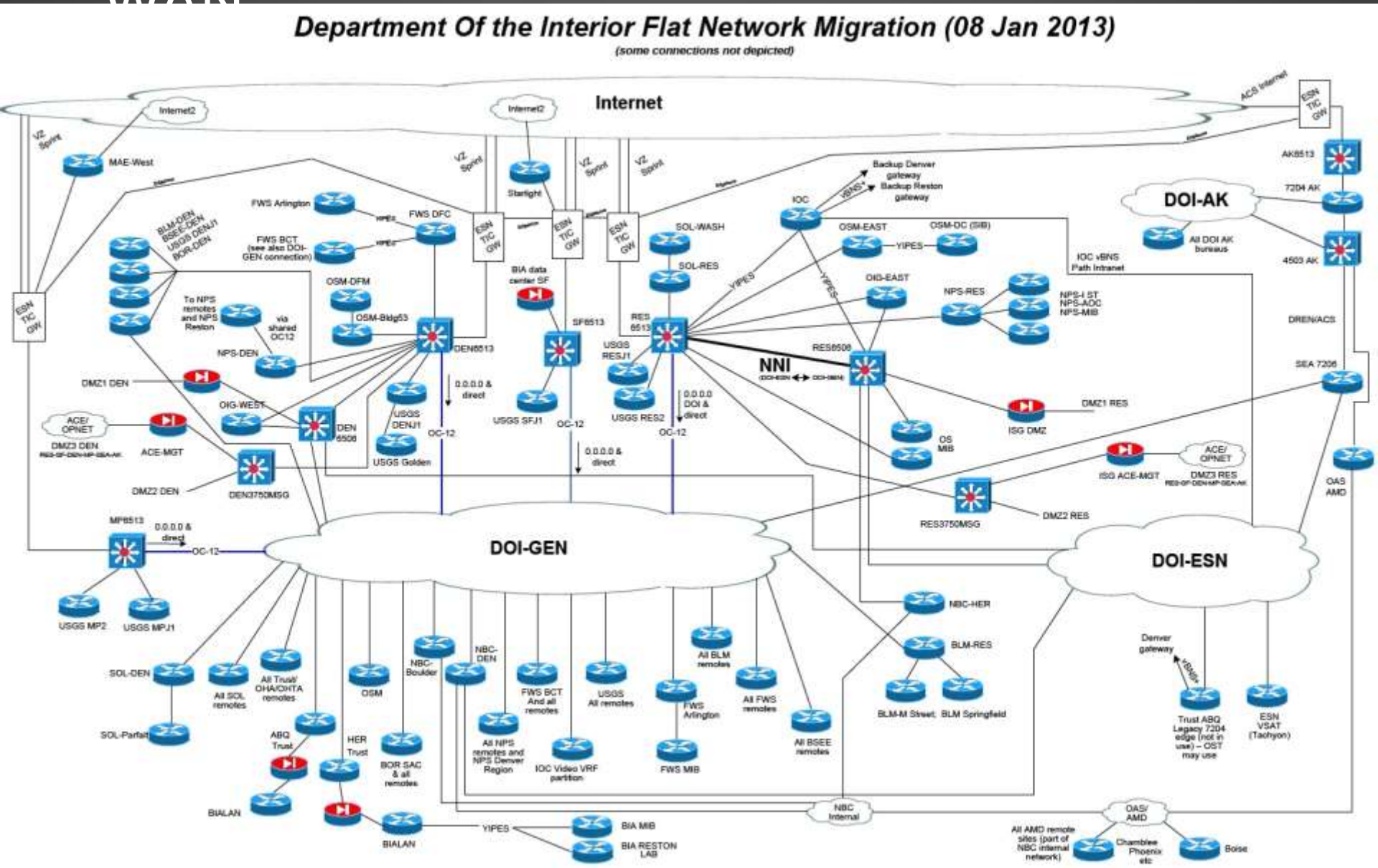
USGS SITE & ESN NETWORK – VBNS OLD TOPOLOGY



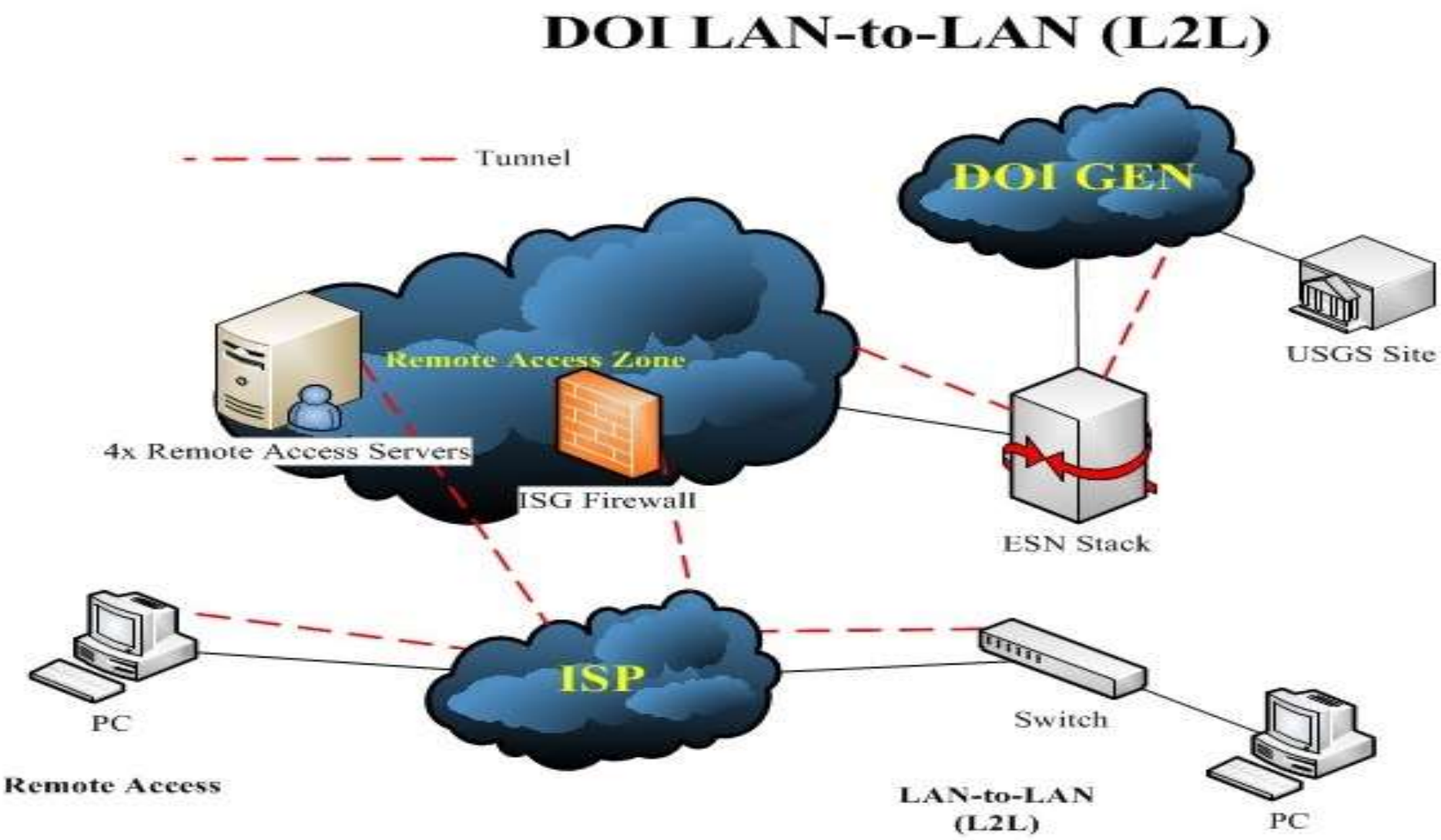
USGS SITE & ESN NETWORK – DOI GEN CURRENT TOPOLOGY



USGS SITE & ESN NETWORK – DOI WAN



USGS SITE & ESN NETWORK – LAN-TO-LAN (L2L)



USGS SITE & ESN NETWORK – Q&A

BUSTER KEATON – USGS WIRELESS

WIRELESS – OVERVIEW

- Deployed at 4 major USGS sites
- What to expect when visiting those sites
- Aruba Solution
- Wireless BPA
- Q&A

WIRELESS – 4 SITES

- Deployed at 4 major USGS sites
  - Reston – Basement and Floors 1, 2, 3, 4, 5, 6, and 7
  - Denver – All occupied USGS buildings on the Denver Federal Center
  - Menlo Park – Buildings 2, 3 (1st and 2nd floor OITS Suite), 3A, 4, 9G, 11, 15, and 16
  - Sacramento – Floors 1 (conference rooms), 2, 3, and 4

WIRELESS – WHAT TO EXPECT?

- Two Networks (Internet Only)
  - **IGSWlan** - For use by USGS personnel with GFE equipment
  - **IGSVisitor** - For temporary use by a non-USGS visitor or non-GFE equipment.
- Active Directory Authentication with AES encryption
- Service Desk support
  - IGSVisitor account creation,
  - Remedy ticketing,
  - Troubleshooting connectivity, etc…

WIRELESS – ARUBA SOLUTION

- All 4 sites are using an Aruba Solution
  - Provides wireless and wired connectivity
  - 3600 controller
  - AP-105 and AP-125 deployed
  - Airwave monitoring solution
    - RF Mapping
    - Rouge AP identification
    - Dashboard
- Remote Access Points

WIRELESS – BPA

- Aruba products
- COR - Kevin Clark (Reston, VA)
- CO - Jeff Caravelli (Sacramento, CA)
- Companies:
  - LGS Innovation
  - Sterling Computers

WIRELESS – Q&A

- Wireless Dropbox:
  - GS_Wireless_LAN_Requests@usgs.gov
  - https://insight.usgs.gov/telecom/data/wireless/default.aspx

THOMAS VAN DRESER – DIAGNOSING NETWORK PROBLEMS

DIAGNOSING NETWORK PROBLEMS – OVERVIEW

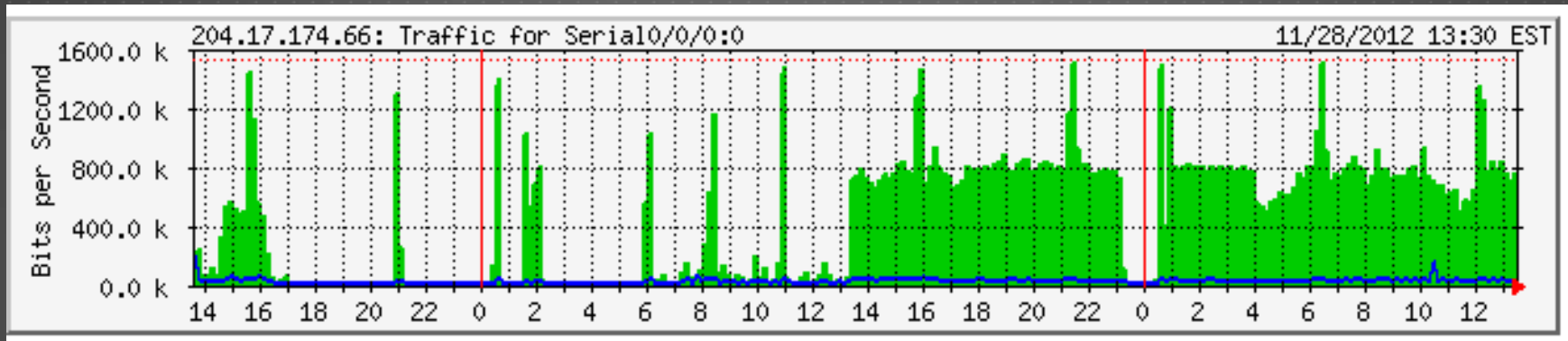
- Brief overview of tools and links to tools I use while network troubleshooting

DIAGNOSING NETWORK PROBLEMS – MRTG GRAPHS

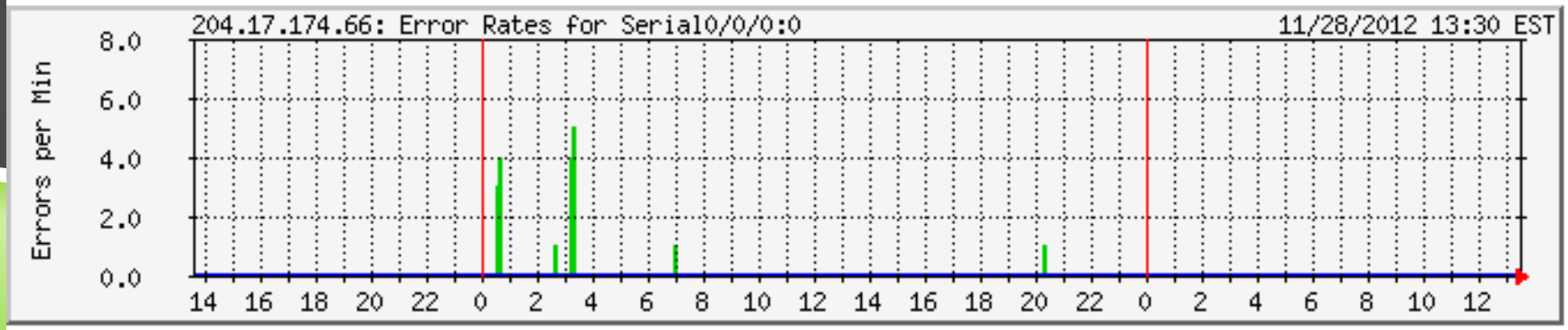
- The USGS MRTG graphs
  - Keep an eye on your sites MRTG graphs.
  - At a glance they can give you a clue to how much bandwidth the office is using and if the router is taking any errors.
  - You can find the MRTG graphs at http://gsnet.er.usgs.gov/mrtg/

DIAGNOSING NETWORK PROBLEMS – MRTG GRAPHS

- Example of a MRTG Graph



Error Rates



DIAGNOSING NETWORK PROBLEMS - PING

- Good tool to tell if a host or network is up.
- Good tool to tell is packets are being dropped in transit.
- Good tool to infer if there is a network bottle neck along the path.

DIAGNOSING NETWORK PROBLEMS - PING

```
PING 159.189.215.1 (159.189.215.1) 56(84) bytes of data.
64 bytes from 159.189.215.1: icmp_seq=1 ttl=247 time=195 ms
64 bytes from 159.189.215.1: icmp_seq=2 ttl=247 time=192 ms
64 bytes from 159.189.215.1: icmp_seq=3 ttl=247 time=204 ms
64 bytes from 159.189.215.1: icmp_seq=4 ttl=247 time=197 ms
64 bytes from 159.189.215.1: icmp_seq=5 ttl=247 time=212 ms

--- 159.189.215.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4712ms
rtt min/avg/max/mdev = 192.906/200.583/212.177/6.914 ms
#
```

DIAGNOSING NETWORK PROBLEMS – TRACEROUTE (AKA TRACERT)

- Good tool to use to tell if a host or network is up.
- Good tool to tell where packets are being held up possibly.
- Good tool for identifying path a packet is taking.
- For Unix boxes use the –I option (capital i) for better results. This sets traceroute to use ICMP instead of UDP packets giving the tool a better chance of making it through firewalls.
- If ever a ticket needs to be open with the ESN NOSC, one of the first things they will ask for is a traceroute report.
- Ideally they will like two traceroute reports, one in each direction if possible.

DIAGNOSING NETWORK PROBLEMS - TRACEROUTE

```
traceroute to gsnet.er.usgs.gov (130.11.58.58), 30 hops max, 60 byte packets
 1  136.177.3.1 (136.177.3.1)  0.214 ms  0.205 ms  0.319 ms
 2  136.177.6.1 (136.177.6.1)  0.916 ms  0.912 ms  0.902 ms
 3  204.68.149.113 (204.68.149.113)  40.505 ms  40.540 ms  40.778 ms
 4  10.186.100.21 (10.186.100.21)  6.760 ms  6.757 ms  6.749 ms
 5  10.6.100.21 (10.6.100.21)  44.651 ms  44.649 ms  44.789 ms
 6  10.6.100.22 (10.6.100.22)  133.757 ms  133.230 ms  132.899 ms
 7  204.68.149.98 (204.68.149.98)  133.501 ms  133.500 ms  133.852 ms
 8  res-ns1.er.usgs.gov (130.11.7.241)  134.196 ms  136.185 ms  136.177 ms
 9  gsnet.er.usgs.gov (130.11.58.58)  136.195 ms  130.577 ms  130.305 ms
#
```

DIAGNOSING NETWORK PROBLEMS – NETFLOW AND USGS OR ESN

- Currently I pull reports from the USGS Netflow sensor, but with the DOI Network optimization, the reports will become less representative of the actual data as more USGS intra-net traffic will NOT need to pass through one of the five USGS gateway routers where the sensors reside.
- ESN Netflow is in even worse shape because ESN appears not to be collecting netflow data by default any longer, but we can request that they enable it on a case by case basis. Unfortunately don't expect any quick response.

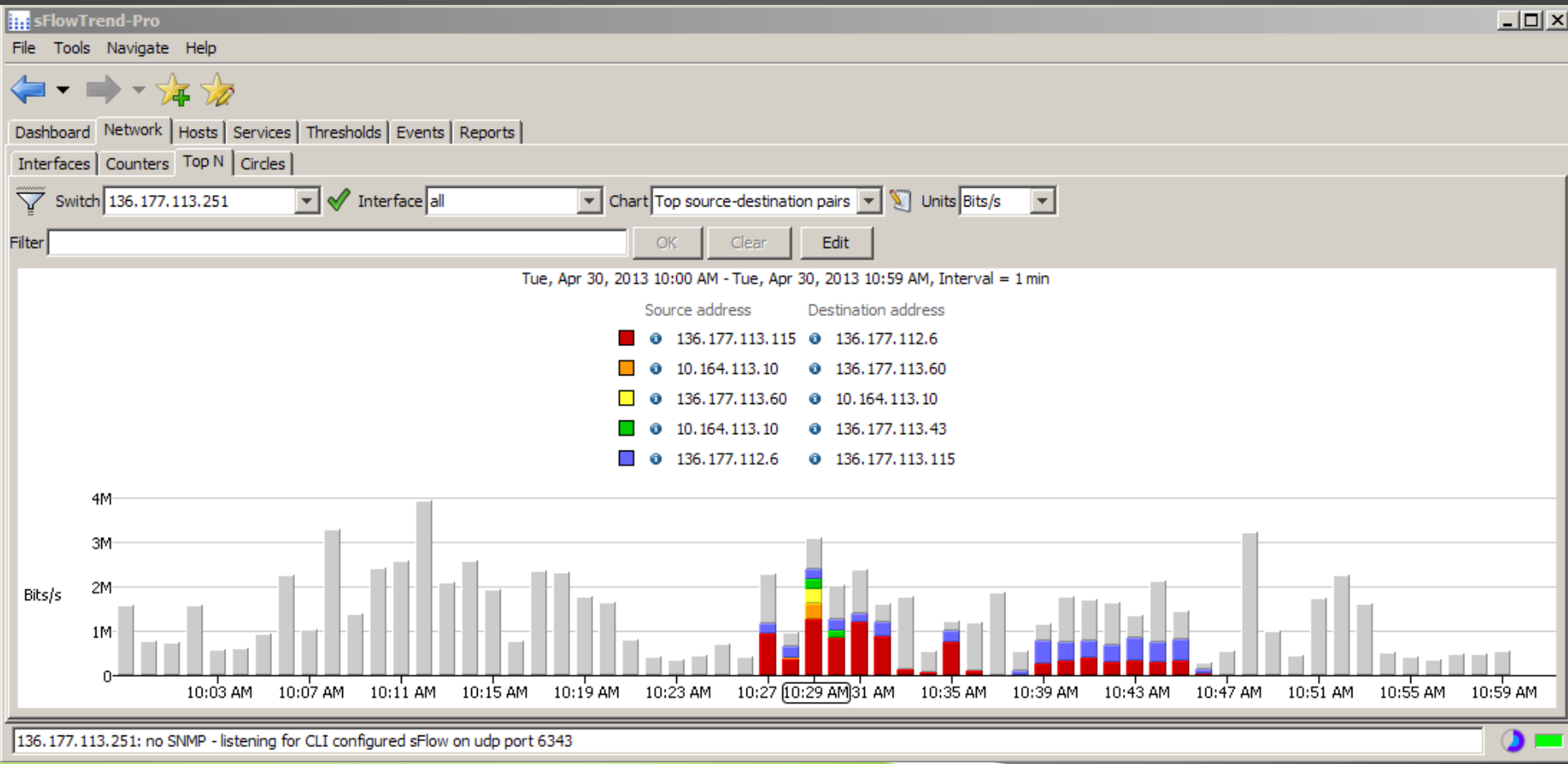
DIAGNOSING NETWORK PROBLEMS – NETFLOW AND REMOTE OFFICES

- So as the usefulness of USGS and ESN Netflow sensors fade into apparent oblivion, I have been investigating various Sflow/Netflow viewer applications, that can listen for data sent from office switches if configured appropriately
- I have been investigating SflowTrend and PRTG, Sflow viewer. Both are free if used with 10 or fewer sensors. http://www.paessler.com/prtg http://www.inmon.com/products/sFlowTrend.php

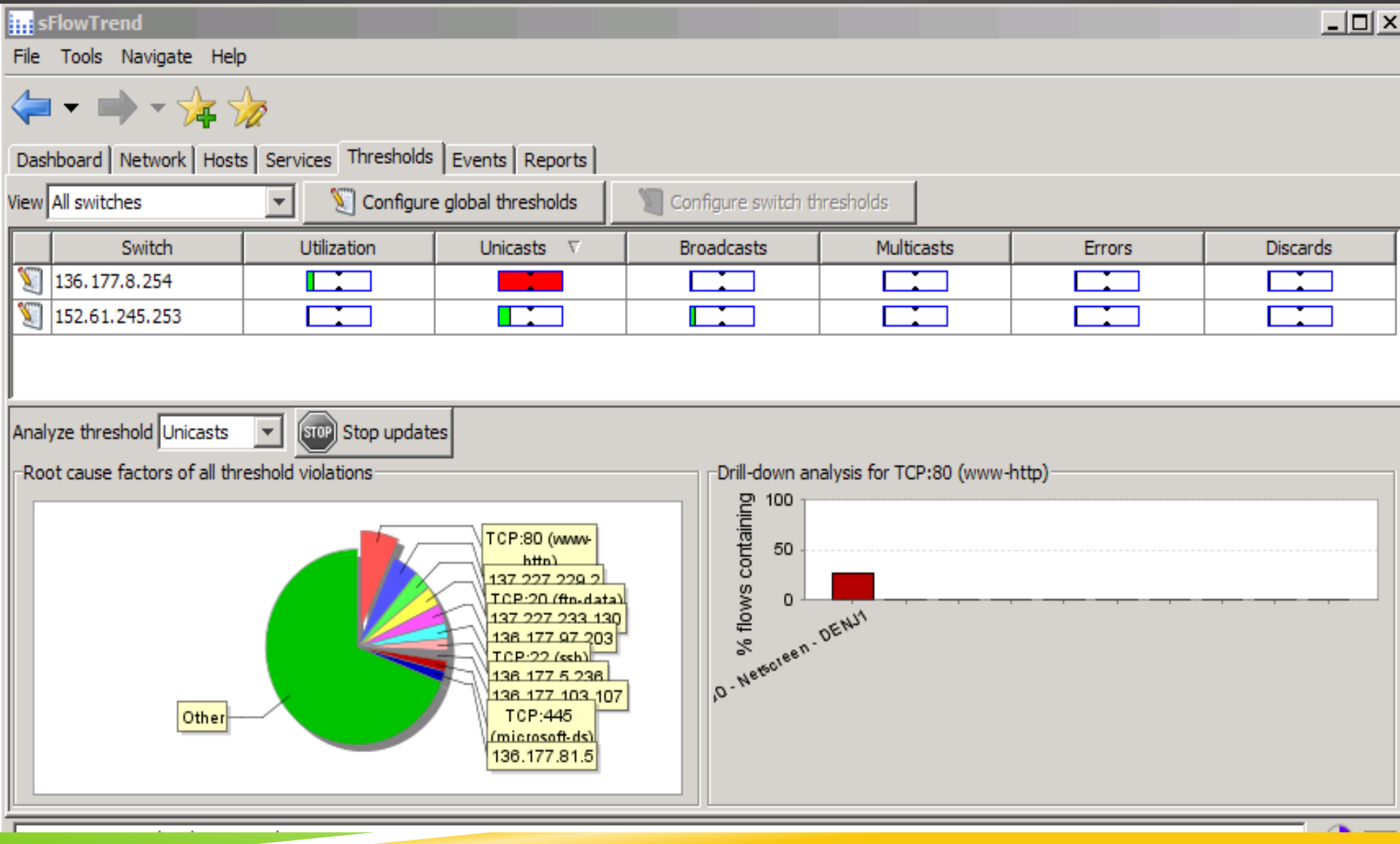
DIAGNOSING NETWORK PROBLEMS – SFLOW

- SolarWinds has some free Sflow/Netflow tools, but most appear to be time limited or free demos.
- All the applications mentioned require enabling Sflow on the office LAN switches, which on current HP Procurve switches is an easy thing to do and depending on your comfort level you can point the SFlow agent towards one of my computer or set up your own SFlow viewer or both.

DIAGNOSING NETWORK PROBLEMS – SFLOW



DIAGNOSING NETWORK PROBLEMS – SFLOW

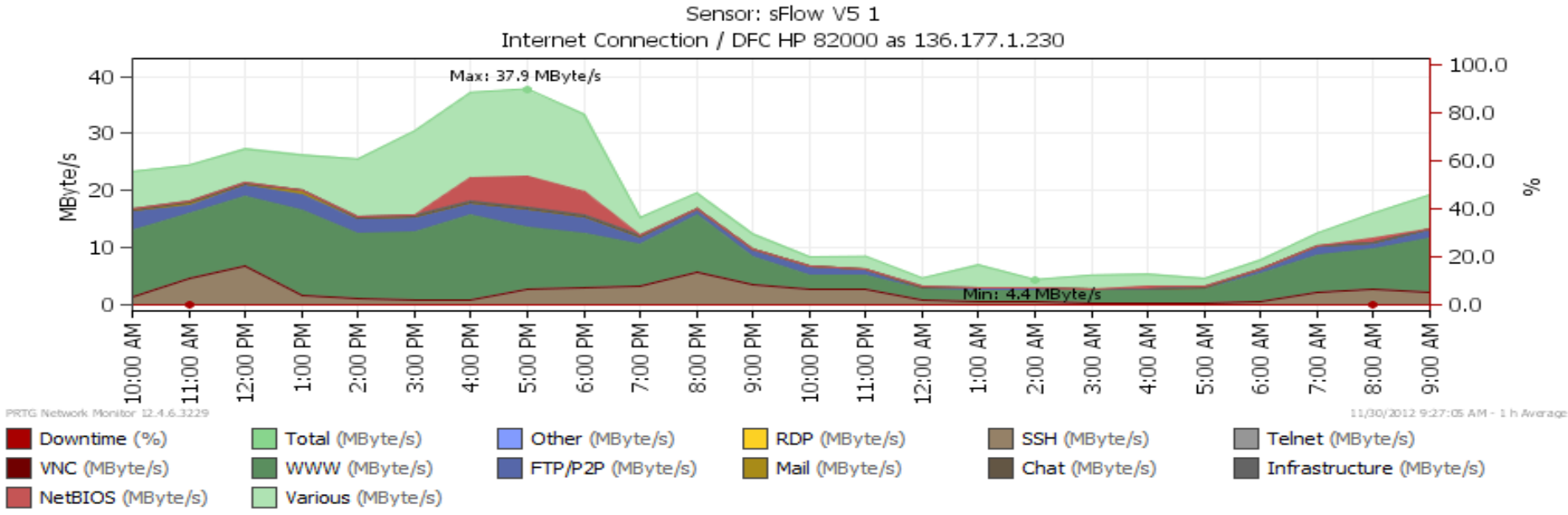


DIAGNOSING NETWORK PROBLEMS – SFLOW

PAESSLER — PRTG Network Monitor

Report for **sFlow V5 1**

Report Time Span:	11/29/2012 9:27:00 AM - 11/30/2012 9:24:00 AM					
Sensor Type:	sFlow (60 s Interval)					
Probe, Group, Device:	Local probe > Internet Connection > DFC HP 82000 as 136.177.1.230					
Uptime Stats:	Up:	100 %	[23h56m0s]	Down:	0 %	[0s]
Request Stats:	Good:	100 %	[1437]	Failed:	0 %	[0]
Average (Total):	17 MByte/s					
Total (Total):	1,463,572 MByte					



DIAGNOSING NETWORK PROBLEMS – IPERF

- Good tool for gauging the actual available bandwidth.
- It requires the installation of software on a local host, then you test against various Iperf servers hosted by Geonet or ITSOT.
- You can find Iperf at http://sourceforge.net/projects/iperf
- May require firewall modification to allow Iperf traffic.
- Use the tool in UDP mode for best results.

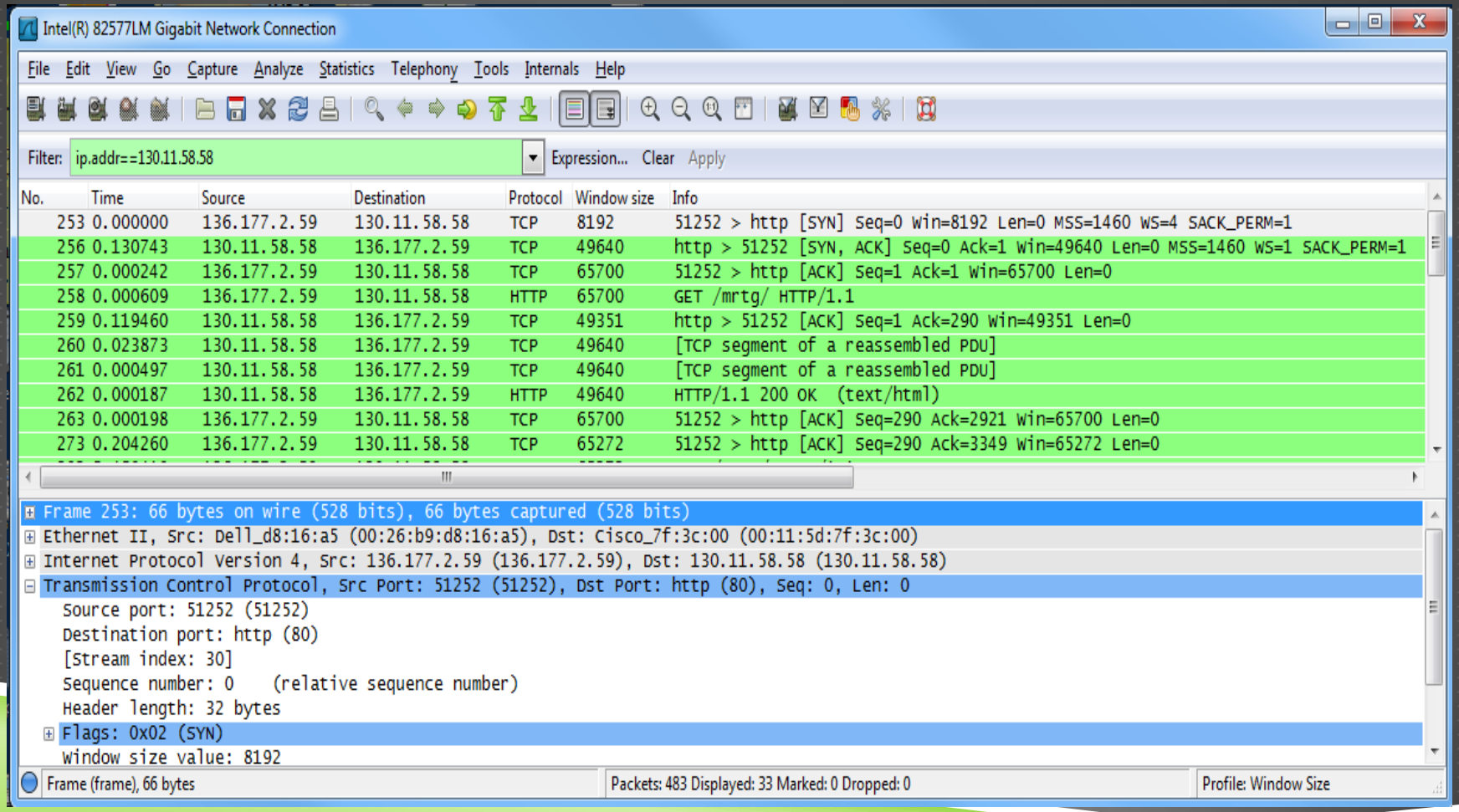
DIAGNOSING NETWORK PROBLEMS – IPERF

```
iperf -c 136.177.3.6 -i2 -b 100M
WARNING: option -b implies udp testing
------------------------------------------------------------
Client connecting to 136.177.3.6, UDP port 5001
Sending 1470 byte datagrams
UDP buffer size:  110 KByte (default)
------------------------------------------------------------
[  3] local 130.118.12.26 port 34316 connected with 136.177.3.6 port 5001
[ ID] Interval       Transfer     Bandwidth
[  3]  0.0- 2.0 sec  24.0 MBytes   101 Mbits/sec
[  3]  2.0- 4.0 sec  24.0 MBytes   101 Mbits/sec
[  3]  4.0- 6.0 sec  24.0 MBytes   101 Mbits/sec
[  3]  6.0- 8.0 sec  24.0 MBytes   101 Mbits/sec
[  3]  8.0-10.0 sec  24.0 MBytes   101 Mbits/sec
[  3]  0.0-10.0 sec   120 MBytes   101 Mbits/sec
[  3] Sent 85471 datagrams
[  3] Server Report:
[  3]  0.0-10.8 sec   110 MBytes  85.7 Mbits/sec   0.046 ms 7054/85470 (8.3%)
[  3]  0.0-10.8 sec  2 datagrams received out-of-order
```

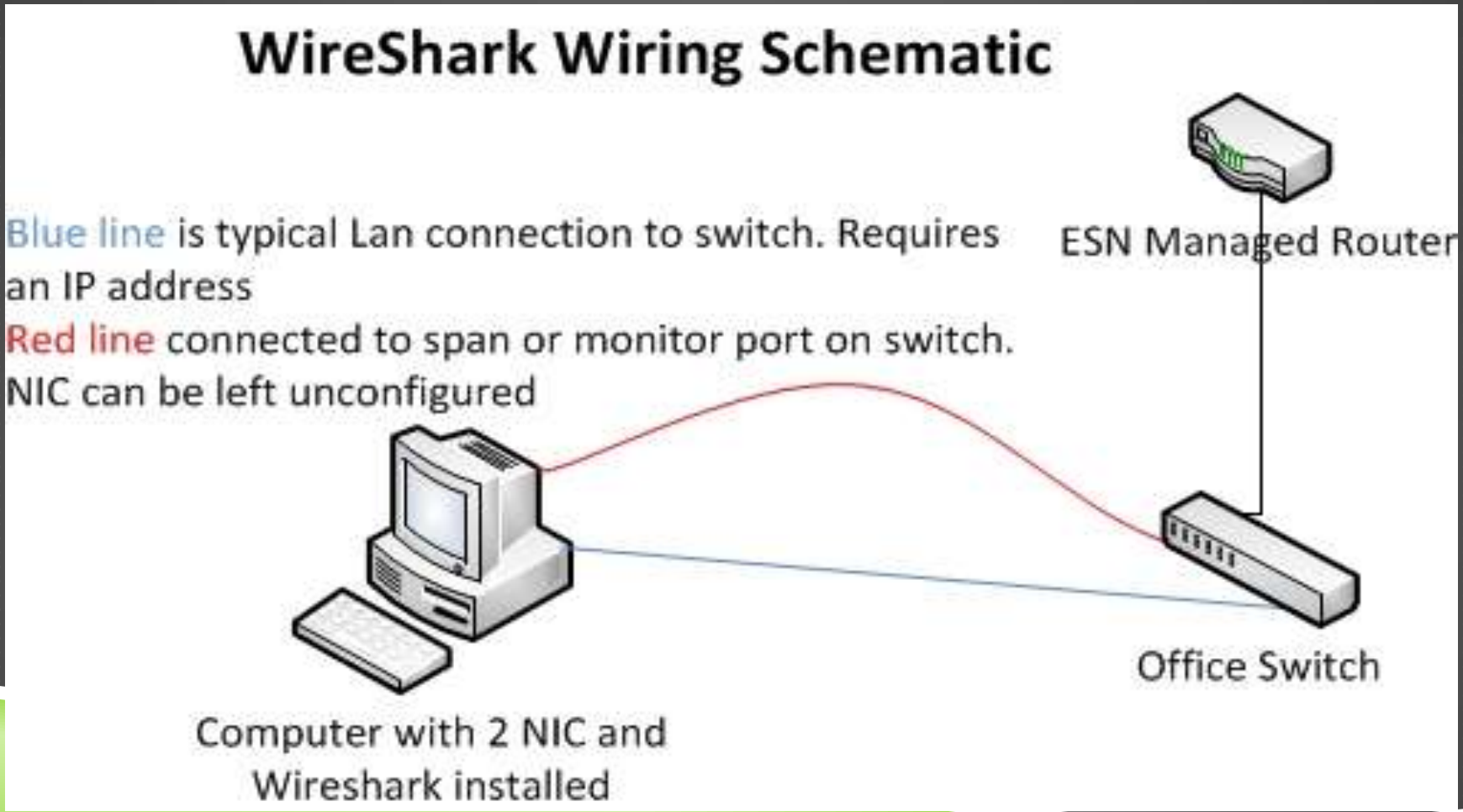
DIAGNOSING NETWORK PROBLEMS – WIRESHARK

- Great tool for seeing the gory or beautiful details of network traffic packet by packet.
- Can be overwhelming with the amount of information it presents.
- As one Wireshark instructor said, think of it as a block of clay. You can do a lot with it but it takes some shaping.
- To monitor the traffic at the WAN interface of the LAN switch, the office switch must be a managed switch configured with port monitoring. Also you will need a computer configured with 2 NICs, one for the LAN and one attached to the monitor port of the switch. The second NIC does NOT need to be configured with an IP address as it's the interface Wireshark will monitor.
- You can find Wireshark at http://www.wireshark.org/

DIAGNOSING NETWORK PROBLEMS – WIRESHARK



DIAGNOSING NETWORK PROBLEMS – WIRESHARK



DIAGNOSING NETWORK PROBLEMS – ADDITIONAL TROUBLESHOOTING IDEAS

- Review your syslogs
- Review your application logs
- Keep an eye on the health of the office switches.

DIAGNOSING NETWORK PROBLEMS – Q&A

ROLE BASED SECURITY TRAINING: RBST

- To receive RBST credit in the area of ‘System Application/Security Management’, one person from each location should collect names and email addresses for those in attendance today and send them to Gary Krammes (gkrammes@usgs.gov) with a cc to their supervisor. WebEx registrations will not be used to assign RBST credit.

- If the presentation is being used to satisfy RBST after the presentation has already been given, the individual wanting RBST credit must use the SF-182 form available in DOI LEARN.