



SightLine  
APPLICATIONS

## EAN-Networking Tips

PN: EAN-Networking-Tips

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-  **CAUTION:** Alerts to a potential hazard that may result in personal injury, or an unsafe practice that causes damage to the equipment if not avoided.
-  **IMPORTANT:** Identifies specific information that will assist with setup and configuration procedures and/or prevents damage to the hardware components.



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## Summary

This engineering application note describes some of the basic network capability of the 1500-OEM operating system.

The 1500-OEM runs a version of embedded Linux on the ARM processor. A number of network related services and other network capability can be accessed. Additional network functionality (such as Ethernet to Serial pass-through) can be accomplished with VideoTrack1500.

## Terminology

<b>SLA-hardware</b>	General purpose term to describe any hardware product sold by SightLine Applications
<b>Target</b>	Typically refers to the Linux Kernel running on SLA-HARDWARE
<b>Host</b>	Typically refers to the users PC.
<b>DM-37x#</b>	Linux command prompt on TARGET
<b>\$</b>	Linux command prompt on HOST

## Feature Summary:

Feature	Description
SSH	Secure Shell – allow user to logon to TARGET and execute commands.
FTP	Allows user to move files from HOST to TARGET
SCP	Secure Copy used to transfer files from HOST to TARGET
TC	Traffic Control – used to modify the flow of Ethernet packets
VCONFIG	Create and remove virtual Ethernet devices (VLAN)
ROUTE	Used to create route tables
NETSTAT	Used to display networking information such as open ports

## 3<sup>rd</sup> Party Utilities

There may be the need to use other utilities to support your work with SLA products. You may already have applications for these functions and therefore will not require these specific programs.

**Disclaimer:** SightLine Applications offers these links as a convenience. Users that download these do so at their own risk and are bound to the usage agreements contained for each product.

<a href="#">FTP - FileZilla</a>	FTP client utility
<a href="#">PuTTY - Emulator</a>	A terminal emulator (command console)
<a href="#">Wireshark</a>	Network protocol analyzer



## User Names and Password

This document will typically use the following conventions for user names and passwords:

System	User name	Password
TARGET (SightLine Hardware)	root	root
HOST (PC)	slroot	slroot

### Changing Default Password on the Target

Change at your own risk. Some SightLine documentation and software such as Panel Plus assumes default username and password of **root**. Changing this default behavior may render some operations unavailable.

1. Use PuTTY (or similar) to SSH into the **TARGET**.

Specify the destination you want to connect to

Host Name (or IP address)	Port
root@192.168.1.183	22

Connection type:

Raw  Telnet  Rlogin  SSH  Serial

2. login using the default **root** username and **root** password
3. at the command prompt type the command **passwd**
4. Enter a new password and follow the prompts. It is recommended to use characters and numbers to create a strong password.

```
192.168.1.183 - PuTTY
Using username "root".
root@192.168.1.183's password:
DM-37x# passwd
Changing password for root
New password:
Retype password:
Password for root changed by root
DM-37x#
```



## Assigning Multiple IP Address to a single NIC

Often referred to as “multihome”.

DM-37x# ifconfig

```
COM1 - PuTTY
DM-37x# ifconfig
eth0      Link encap:Ethernet  HWaddr 12:01:90:17:01:5A
          inet addr:192.168.1.170  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:4914 errors:0 dropped:851 overruns:0 frame:0
          TX packets:86 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:376241 (367.4 KiB)  TX bytes:11584 (11.3 KiB)
          Interrupt:33

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:16 errors:0 dropped:0 overruns:0 frame:0
          TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:960 (960.0 B)  TX bytes:960 (960.0 B)

DM-37x#
```

DM-37x# ifconfig eth0:1 192.168.0.42 netmask 255.255.255.0 multicast up.

```
COM1 - PuTTY
DM-37x# ifconfig
eth0      Link encap:Ethernet  HWaddr 12:01:90:17:01:5A
          inet addr:192.168.1.170  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:5865 errors:0 dropped:1026 overruns:0 frame:0
          TX packets:86 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:447379 (436.8 KiB)  TX bytes:11584 (11.3 KiB)
          Interrupt:33

eth0:1    Link encap:Ethernet  HWaddr 12:01:90:17:01:5A
          inet addr:192.168.0.42  Bcast:192.168.0.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          Interrupt:33

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:16 errors:0 dropped:0 overruns:0 frame:0
          TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:960 (960.0 B)  TX bytes:960 (960.0 B)

DM-37x#
```

Both IP addresses (192.168.1.170 and 192.168.0.42) are accessible on your network.

NEXT: setup gateways to use an external router, or locally route packets?



## Configure VLAN

### Add VLAN

vconfig add eth0 5	add VLAN ID 5
ifconfig eth0.5	See the VLAN
ifconfig eth0.5 192.168.42.100 netmask 255.255.255.0 broadcast 192.168.42.255 up	Add an IP address for the VLAN
cat /proc/net/vlan/eth0.5	Check the status

**Note:** This can be added to the `/etc/rc.d/rc.local` or `/etc/network/interfaces`

### Remove VLAN

ifconfig eth0.5 down
vconfig rem eth0.5

## Traffic Control (tc)

This can be used to normalize the rate at which packets are transmitted preventing massive peaks when using IP radios or similar.

### Example Usage

1. Connect:

2. Set up for Network Output.



### 3. Configure H.264.

Set Ethernet Display Params (0x29)

MPEG2TS-H.264 IP Address 192 . 168 . 1 . 102 Use My IP

H264 use "udp://@<<ipaddr>>:<<port>>" Port 15004 Use Multicast

Apply

### 4. Set BitRate and click Apply.

H264 Parameters (0x23)

BitRate 2000000

I-Frame Interval 30

Disable Deblocking 0

Block Refresh Interval 0

Slice Refresh Size 0 Apply

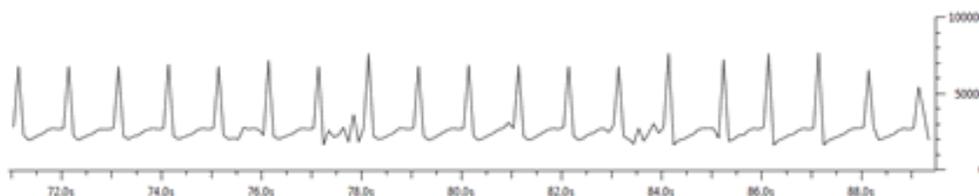
deo (kbps) 2003.6

### 5. Start WireShark. Menu → Capture → Interfaces.

### 6. Configure the scale:

Menu → Statistics → IO Graph  
 X Axis → Tick Interval = 0.1 sec  
 Y Axis → Unit: Bytes/Tick

### 7. Base line data. Observe the periodic large peaks in data.



### 8. Use PuTTY or similar (ssh root@192.168.1.131).

### 9. List running processes (ps -A).

### 10. Kill the VideoTrack1500 process (kill 597).

```

597 ?      00:03:44 VideoTrack1500
599 ?      00:00:00 DSPLINK_DPC_0
601 ?      00:00:02 DSPLINK_DPC_1
615 ?      00:00:01 DSPLINK_DPC_2
633 ?      00:00:00 dhclient
651 ?      00:00:00 kworker/0:0
653 ?      00:00:00 dropbear
654 pts/0   00:00:00 sh
666 pts/0   00:00:00 ps
DM-37x# kill 597

```



11. Configure and Run the traffic control (tc) binary. Edit parameters as necessary. (tc qdisc replace dev eth0 handle 1:0 root tbf burst 3000 limit 300k rate 2000000 peakrate 2500000 mtu 3000.)
12. Restart the application (./VideoTrack1500).
13. Using WireShark (as above) you should now see less peaks and more consistent output packet rate.

## FTP

There are many FTP client applications available. For this example we will use Windows command line. Default user name and password are **root**.

### Accessing Files

1. Connect. Upon connection, SLA-HARDWRE will place you in the **/mnt/mmcblk0p1** directory which is the directory of the **MicroSD** card (assumed to be installed).

```
Administrator: C:\Windows\system32\cmd.exe - ftp
C:\Users\jeremy>ftp
ftp> open 192.168.1.125
Connected to 192.168.1.125.
220 (vsFTPd 2.0.5)
User (192.168.1.125:(none)): root
331 Please specify the password.
Password:
230 Login successful.
```

2. List files: ftp> ls:

```
ftp> ls
200 PORT command successful. Consider using PASU.
150 Here comes the directory listing.
slaimage0.jpg
slaimage_0000.jpg
slaimage_0001.jpg
slavideo_0000.ts
226 Directory send OK.
ftp: 71 bytes received in 0.00Seconds 71000.00Kbytes/sec.
```

3. Get a file: ftp> get slaimage\_0001.jpg

```
ftp> get slaimage_0001.jpg
200 PORT command successful. Consider using PASU.
150 Opening BINARY mode data connection for slaimage_0001.jpg (34788 bytes).
226 File send OK.
ftp: 34788 bytes received in 0.00Seconds 34788000.00Kbytes/sec.
ftp>
```

4. Change directory: ftp> cd /root

```
ftp> cd /root
250 Directory successfully changed.
ftp> ls
200 PORT command successful. Consider using PASU.
150 Here comes the directory listing.
1400e013015a86d1.license
VideoTrack1500
captureSample
cmemk.ko
dsplinkk.ko
```



5. Get param file: ftp> get param51ac9a4a.txt

```
ftp> get param51ac9a4a.txt
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for param51ac9a4a.txt (11088 bytes).
226 File send OK.
ftp: 11088 bytes received in 0.00Seconds 11088000.00Kbytes/sec.
ftp>
```

6. Remove param file: ftp> del param51ac9a4a.txt

```
250 Delete operation successful.
ftp> del param51ac9a4a.txt
250 Delete operation successful.
ftp>
```

7. Upload new param file: ftp> put param51ac9a4a.txt

```
ftp> put param51ac9a4a.txt
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
ftp: 11088 bytes sent in 0.00Seconds 5544.00Kbytes/sec.
ftp>
```

## Changing the MTU

Based on radio capability or other network issues it may be necessary to reduce the Maximum Transmission Unit (MTU), or packet size.

Default MTU = 1500

```
DM-37x# ifconfig
eth0      Link encap:Ethernet  HWaddr 12:02:50:06:01:5D
          inet addr:192.168.1.136  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:7902 errors:0 dropped:1157 overruns:0 frame:0
          TX packets:513504 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:704013 (687.5 KiB)  TX bytes:482993218 (460.6 MiB)
          Interrupt:33
```

Wireshark captures:

4	0.000081000	DTS 60.273411111	PTS 60.273411111	1358 MPEG PES
5	0.000000000	192.168.1.136	PTS 60.273411111	418 MPEG PES
7	0.006182000	192.168.1.136	192.168.1.106	418 MPEG TS
8	0.000218000	192.168.1.136	192.168.1.106	1358 MPEG TS
9	0.000077000	192.168.1.136	192.168.1.106	1358 MPEG TS
10	0.000145000	192.168.1.136	192.168.1.106	1358 MPEG TS
11	0.000065000	DTS 60.306766666	PTS 60.306766666	1358 MPEG PES
12	0.000101000	192.168.1.136	PTS 60.306766666	418 MPEG PES
13	0.033176000	192.168.1.136	192.168.1.106	1358 MPEG TS
14	0.000136000	192.168.1.136	192.168.1.106	1358 MPEG TS

**Note:** Most packets are 1358 bytes.



## Change the MTU to 1360 [bytes]

```
ifconfig eth0 mtu 1360
```

```
DM-37x# ifconfig eth0 mtu 1360
DM-37x# ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 12:02:50:06:01:5D
          inet addr:192.168.1.136  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1360  Metric:1
          RX packets:8315 errors:0 dropped:1216 overruns:0 frame:0
          TX packets:535083 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:743566 (726.1 KiB)  TX bytes:506929988 (483.4 MiB)
          Interrupt:33
```

Wireshark shows no significant change in packets.

14991	0.001626000	192.168.1.136	192.168.1.106	1358 MPEG TS
14992	0.000001000	192.168.1.136	192.168.1.106	1358 MPEG TS
14993	0.000001000	192.168.1.136	192.168.1.106	1358 MPEG TS
14994	0.000541000	192.168.1.136	192.168.1.106	1358 MPEG TS
14995	0.000001000	DTS 2358.896977777	PTS 2358.896977777	418 MPEG PES
14996	0.000000000	192.168.1.136	PTS 2358.896977777	418 MPEG PES
14998	0.006304000	192.168.1.136	192.168.1.106	1358 MPEG TS
14999	0.000131000	192.168.1.136	192.168.1.106	1358 MPEG TS

## Changed the MTU to 900 [bytes]

```
ifconfig eth0 mtu 1360
```

```
DM-37x# ifconfig eth0 mtu 900
DM-37x# ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 12:02:50:06:01:5D
          inet addr:192.168.1.136  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:900  Metric:1
          RX packets:8602 errors:0 dropped:1262 overruns:0 frame:0
          TX packets:553177 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:769769 (751.7 KiB)  TX bytes:526361644 (501.9 MiB)
          Interrupt:33
DM-37x# █
```

Wireshark show significant change to the packet length.

8142	0.000000000	192.168.1.136	192.168.1.106	478 MPEG TS
8143	0.000001000	192.168.1.136	192.168.1.106	914 IPv4
8144	0.000150000	DTS 2445.005833333	PTS 2445.005833333	478 MPEG PES
8145	0.000000000	192.168.1.136	PTS 2445.005833333	418 MPEG PES
8147	0.003528000	192.168.1.136	192.168.1.106	914 IPv4
8148	0.000001000	192.168.1.136	192.168.1.106	478 MPEG TS
8149	0.000262000	192.168.1.136	192.168.1.106	914 IPv4
8150	0.000001000	192.168.1.136	192.168.1.106	478 MPEG TS
8151	0.000001000	192.168.1.136	192.168.1.106	914 IPv4
8152	0.000000000	192.168.1.136	192.168.1.106	478 MPEG TS