HSMM-MESH(tm) Update

Ham-Com 2010

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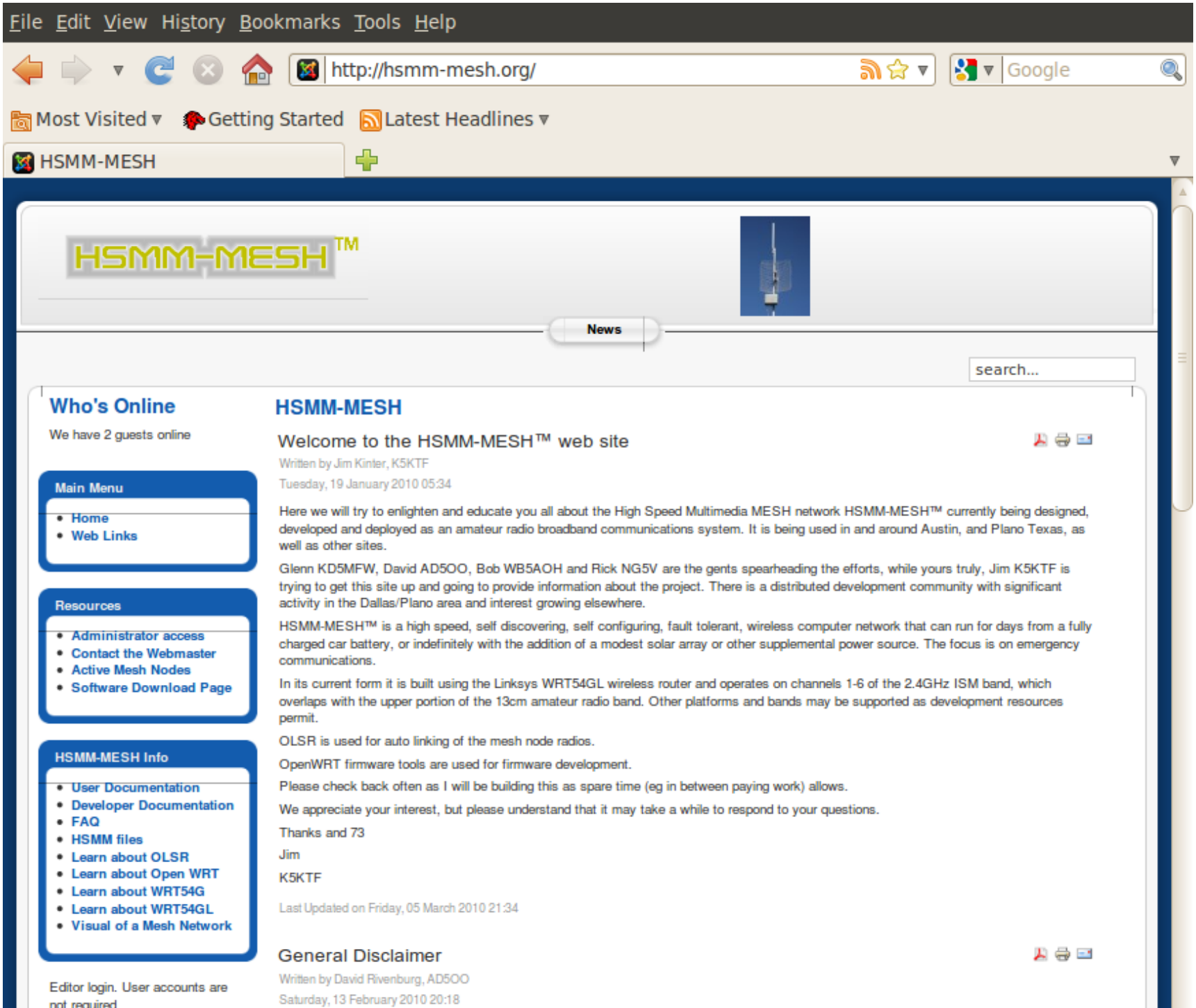
hsmm-mesh.org

Photo: David Rivenberg, AD5OO

hsmm-mesh.org web site



Feedback from HSMM-MESH(tm) users

Frequently Asked Questions:

What is the deal with the name change?

ARRL has legal rights to the acronym “ARES” so we changed the project name from ***ARES-MESH*** to ***HSMM-MESH(tm)***

We are trademarking the name so it will mean something.
a HSMM-MESH(tm) system will link with other HSMM-MESH(tm) systems.

The firmware will remain free. If you develop your own mesh system, please do not call it “HSMM-MESH”. Call it something else, and avoid name clashes.

Be sure to check the website: ***hsmm-mesh.org***

Feedback from HSMM-MESH(tm) users

Frequently Asked Questions:

How do I do ____ with HSMM-MESH(tm)?

HSMM-MESH(tm) provides a robust wireless TCP/IP network.
Application software that runs on a TCP/IP network can be used on HSMM-MESH(tm) to provide services like:

- VoIP
- Web pages
- IP-Video
- Etc.

These software applications run “on top” of HSMM-MESH(tm).
Consult the documentation for each application to learn how they work.

Be sure to check the website: ***hsmm-mesh.org***

Feedback from HSMM-MESH(tm) users

Frequently Asked Questions:

The ***ONLY*** use for HSMM-MESH(tm) is to connect to the Internet, right?

No
No
No

Being able to connect to the Internet is ONE FEATURE, of HSMM-MESH(tm) HSMM-MESH(tm) is very versatile. It can work well as a stand alone network, having no connection to the Internet.

Be sure to check the website: ***hsmm-mesh.org***

Feedback from HSMM-MESH(tm) users

Frequently Asked Questions

What is this “High Speed” business?
There have been millions of > 10 Mb / sec. RF devices sold in the last 10 years!
The 802.11g radios can do 54 Mb / sec. and you can get them for $20.00 at Fry's!
The 802.11n gear can do twice that! “Normal” is 54 Mb / sec. or more!
-*New Ham*

Feedback from HSMM-MESH(tm) users

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-*New Ham*

I use 1200 bps packet radio every day for APRS. On UHF, you even have the bandwidth to go 9600 bps if you can get it to work! I don't do a lot with computers. I hear they are supposed to be fast but I never really took a close look at what they call fast. Besides, I don't feel computers and all this digital stuff is REAL ham radio!
-Average Ham

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Frequently Asked Questions

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-Average Ham

We have an almost 100% clean miss of a view of current RF communications, between these two groups. They know so little about the others view of electronic communications, that they can't even begin to understand what the other considers “normal”. They simply talk “past” each other, when they talk.

We need to get hams on the same page.

New HSMM-MESH(tm) Firmware Features

We will take a quick look at some features of the latest HSMM-MESH(tm) Firmware.

What follows are some screen captures of the Graphical User Interface provided on a WRT54G wireless router, running HSMM-MESH(tm) firmware version 0.3.3.

You view this interface using a web browser on your computer.

Mozilla Firefox or Internet Explorer will work. Macs can be used as well.

KD5MFW-051

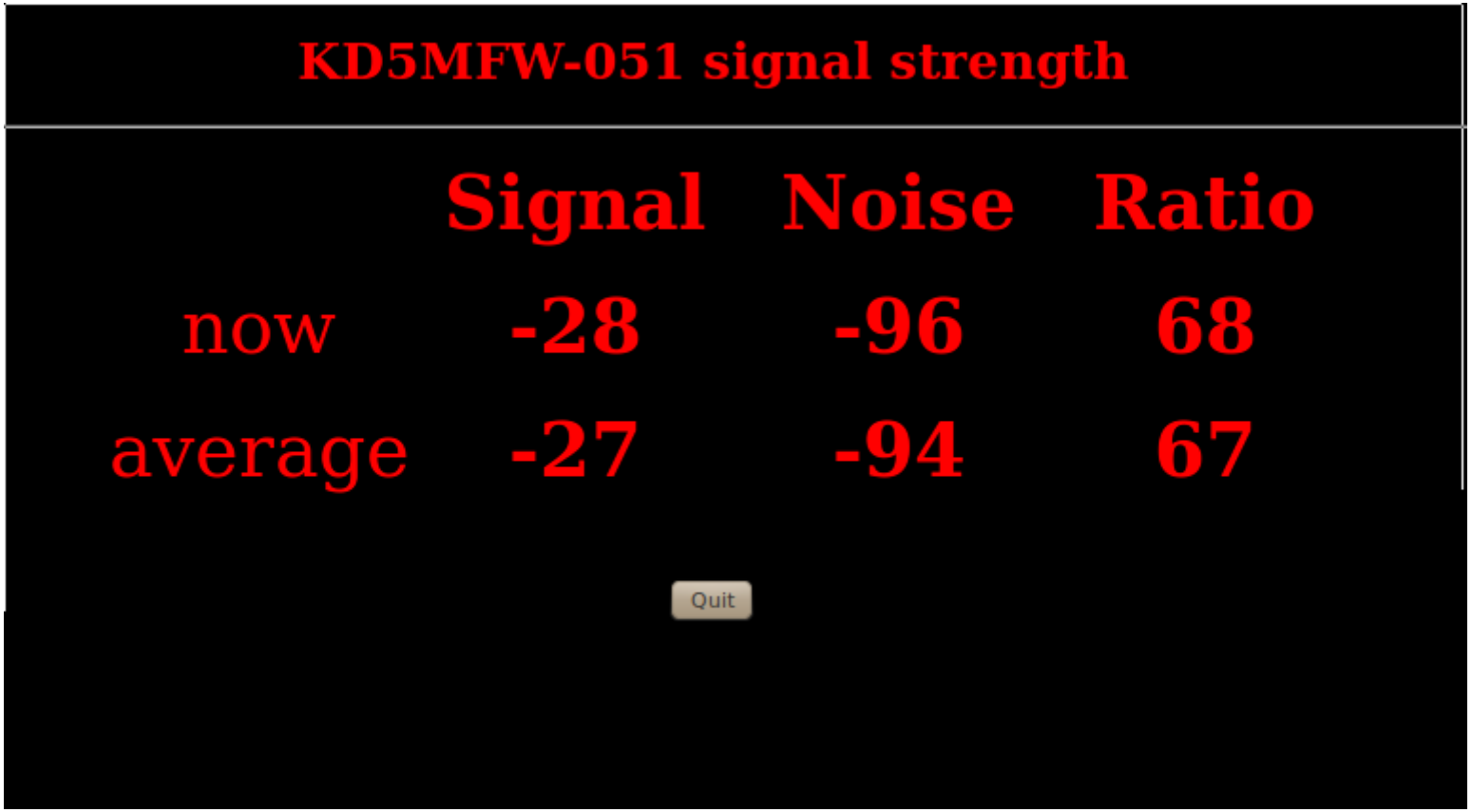
Refresh | OLSR Status | WiFi Scan | Setup | ☐ Night Mode

Signal/Noise/Ratio	**-25 / -96 / 71 dB** Auto
firmware version	0.3.3
configuration	mesh
WiFi address	10.149.19.93 fe80::213:10ff:fe95:135d Link
LAN address	172.27.0.1 fe80::213:10ff:fe95:135b Link
WAN address	none fe80::213:10ff:fe95:135b Link
default gateway	none
system time	Sun Jan 2 03:43:53 UTC 2000
uptime	1 day, 3:43, load average: 0.31, 0.16, 0.15
free space	flash=824.0k /tmp=6.9M memory=2312k

KD5MFW-051

Refresh | OLSR Status | WiFi Scan | Setup | Night Mode

Signal/Noise/Ratio	**-29 / -93 / 64 dB** Auto
firmware version	0.3.3
configuration	mesh
WiFi address	10.149.19.93 fe80::213:10ff:fe95:135d Link
LAN address	172.27.0.1 fe80::213:10ff:fe95:135b Link
WAN address	none fe80::213:10ff:fe95:135b Link
default gateway	none
system time	Sun Jan 2 03:45:10 UTC 2000
uptime	1 day, 3:45, load average: 0.46, 0.22, 0.17
free space	flash=824.0k /tmp=6.9M memory=2356k


KD5MFW-051 signal strength
Signal
Noise
Ratio
now
-28
-96
68
average
-27
-94
67
Quit

KD5MFW-051 WiFi scan

Stop Quit

Sig	Chan	Enc	SSID	MAC	Vendor
-31	1		HSMM-MESH	92DDDE:26F636	Ad-Hoc
-74	5	*	2wire237	005018:554651	
-78	11	*	2WIRE139	001D5A:DD9B49	2Wire
-79	6	*		001D5A:FAD891	2Wire
-79	9	*	2WIRE567	0022A4:794F89	2Wire
-88	10	*	2WIRE962	001D5A:6BCF21	2Wire

daemon

Configuration | Routes | Links/Topology | All | About | Node Status

OS: GNU/Linux
System time: *Sun, 02 Jan 2000 03:48:03*
Olsrd uptime: *1 day(s) 03 hours 47 minutes 36 seconds*
HTTP stats(ok/dyn/error/illegal): *0/0/0/0*

Variables

Main address: **10.149.19.93**	IP version: 4	Debug level: 0
Pollrate: 0.05	TC redundancy: 2	MPR coverage: 3
Fisheye: Disabled	TOS: 0x0010	Willingness: 3
Hysteresis: Disabled	Hyst scaling: 0.50	Hyst lower/upper: 0.30/0.80
LQ extention: Enabled	LQ level: 2	LQ winsize: 10

Interfaces

wl0

IP: 10.149.19.93	MASK: 255.0.0.0	BCAST: 10.255.255.255
MTU: 1472	WLAN: Yes	STATUS: UP

Olsrd is configured to run even if no interfaces are available

Plugins

Name	Parameters
olsrd_nameservice.so.0.2	KEY, VALUE
olsrd_dot_draw.so.0.3	KEY, VALUE
olsrd_httpinfo.so.0.1	KEY, VALUE

daemon 

Configuration | **Routes** | Links/Topology | All | About | Node Status

OLSR routes in kernel

Destination	Gateway	Metric	ETX	Interface	Type
10.83.168.33 KD5MFW-003	10.83.168.33 KD5MFW-003	1	1.25	wl0	HOST
10.135.110.3 KD5MFW-091	10.135.110.3 KD5MFW-091	1	1.00	wl0	HOST
10.122.139.230 KD5MFW-016	10.122.139.230 KD5MFW-016	1	1.00	wl0	HOST
10.181.35.210 KD5MFW-401	10.181.35.210 KD5MFW-401	1	1.00	wl0	HOST
10.230.123.18 KD5MFW-009	10.230.123.18 KD5MFW-009	1	1.00	wl0	HOST
10.159.26.149 KD5MFW-380	10.159.26.149 KD5MFW-380	1	1.11	wl0	HOST
10.50.73.215 KD5MFW-368	10.50.73.215 KD5MFW-368	1	1.00	wl0	HOST

daemon

Configuration | Routes | Links/Topology | All | About | Node Status

Links

Local IP	remote IP	Hysteresis	LinkQuality	lost	total	NLQ	ETX
10.149.19.93 KD5MFW-051	10.83.168.33 KD5MFW-003	0.00	0.90	1	10	0.60	1.85
10.149.19.93 KD5MFW-051	10.181.35.210 KD5MFW-401	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.135.110.3 KD5MFW-091	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.122.139.230 KD5MFW-016	0.00	0.90	1	10	1.00	1.11
10.149.19.93 KD5MFW-051	10.159.26.149 KD5MFW-380	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.50.73.215 KD5MFW-368	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.230.123.18 KD5MFW-009	0.00	1.00	0	10	1.00	1.00

Neighbors

IP address	SYM	MPR	MPRS	Willingness	2 Hop Neighbors
10.83.168.33 KD5MFW-003	YES	NO	NO	3	IP ADDRESS ▼ (5)
10.135.110.3 KD5MFW-091	YES	NO	YES	3	IP ADDRESS ▼ (6)
10.122.139.230 KD5MFW-016	YES	YES	YES	3	IP ADDRESS ▼ (6)
10.181.35.210 KD5MFW-401	YES	YES	YES	3	IP ADDRESS ▼ (5)
10.230.123.18 KD5MFW-009	YES	YES	YES	3	IP ADDRESS ▼ (6)
10.159.26.149 KD5MFW-380	YES	YES	YES	3	IP ADDRESS ▼ (6)
10.50.73.215 KD5MFW-368	YES	YES	YES	3	IP ADDRESS ▼ (6)

Topology entries

Destination IP	Last hop IP	LQ	ILQ	ETX
10.135.110.3 KD5MFW-091	10.83.168.33 KD5MFW-003	0.80	0.70	1.79
10.122.139.230 KD5MFW-016	10.83.168.33 KD5MFW-003	1.00	1.00	1.00
10.230.123.18 KD5MFW-009	10.83.168.33 KD5MFW-003	1.00	1.00	1.00
10.159.26.149 KD5MFW-380	10.83.168.33 KD5MFW-003	0.90	1.00	1.11
10.50.73.215 KD5MFW-368	10.83.168.33 KD5MFW-003	1.00	1.00	1.00
10.149.19.93 KD5MFW-051	10.83.168.33 KD5MFW-003	1.00	0.50	2.01
10.83.168.33 KD5MFW-003	10.135.110.3 KD5MFW-091	0.60	0.80	2.08

Configuration | Routes | Links/Topology | All | About | Node Status

Links

Local IP	remote IP	Hysteresis	LinkQuality	lost	total	NLQ	ETX
10.149.19.93 KD5MFW-051	10.83.168.33 KD5MFW-003	0.00	0.90	1	10	0.60	1.85
10.149.19.93 KD5MFW-051	10.181.35.210 KD5MFW-401	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.135.110.3 KD5MFW-091	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.122.139.230 KD5MFW-016	0.00	0.90	1	10	1.00	1.11
10.149.19.93 KD5MFW-051	10.159.26.149 KD5MFW-380	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.50.73.215 KD5MFW-368	0.00	1.00	0	10	1.00	1.00
10.149.19.93 KD5MFW-051	10.230.123.18 KD5MFW-009	0.00	1.00	0	10	1.00	1.00

Neighbors

IP address	SYM	MPR	MPRS	Willingness	2 Hop Neighbors
10.83.168.33 KD5MFW-003	YES	NO	NO	3	IP ADDRESS (5)
10.135.110.3 KD5MFW-091	YES	NO	YES	3	IP ADDRESS (6)
10.122.139.230 KD5MFW-016	YES	YES	YES	3	IP ADDRESS (6)
10.181.35.210 KD5MFW-401	YES	YES	YES	3	IP ADDRESS (5)
10.230.123.18 KD5MFW-009	YES	YES	YES	3	IP ADDRESS (6)
10.159.26.149 KD5MFW-380	YES	YES	YES	3	IP ADDRESS (6)
10.50.73.215 KD5MFW-368	YES	YES	YES	3	IP ADDRESS (6)

Topology entries

Destination IP	Last hop IP	LQ	ILQ	ETX
10.135.110.3 KD5MFW-091	10.83.168.33 KD5MFW-003	0.80	0.70	1.79
10.122.139.230 KD5MFW-016	10.83.168.33 KD5MFW-003	1.00	1.00	1.00
10.230.123.18 KD5MFW-009	10.83.168.33 KD5MFW-003	1.00	1.00	1.00
10.159.26.149 KD5MFW-380	10.83.168.33 KD5MFW-003	0.90	1.00	1.11
10.50.73.215 KD5MFW-368	10.83.168.33 KD5MFW-003	1.00	1.00	1.00
10.149.19.93 KD5MFW-051	10.83.168.33 KD5MFW-003	1.00	0.50	2.01
10.83.168.33 KD5MFW-003	10.135.110.3 KD5MFW-091	0.60	0.80	2.08
10.122.139.230 KD5MFW-016	10.135.110.3 KD5MFW-091	1.00	1.00	1.00
10.181.35.210 KD5MFW-401	10.135.110.3 KD5MFW-091	1.00	1.00	1.00
10.230.123.18 KD5MFW-009	10.135.110.3 KD5MFW-091	1.00	1.00	1.00
10.159.26.149 KD5MFW-380	10.135.110.3 KD5MFW-091	1.00	1.00	1.00
10.50.73.215 KD5MFW-368	10.135.110.3 KD5MFW-091	1.00	1.00	1.00
10.149.19.93 KD5MFW-051	10.135.110.3 KD5MFW-091	1.00	1.00	1.00
10.83.168.33 KD5MFW-003	10.122.139.230 KD5MFW-016	1.00	1.00	1.00
10.135.110.3 KD5MFW-091	10.122.139.230 KD5MFW-016	1.00	1.00	1.00
10.181.35.210 KD5MFW-401	10.122.139.230 KD5MFW-016	1.00	1.00	1.00
10.230.123.18 KD5MFW-009	10.122.139.230 KD5MFW-016	1.00	1.00	1.00
10.159.26.149 KD5MFW-380	10.122.139.230 KD5MFW-016	1.00	0.90	1.11
10.50.73.215 KD5MFW-368	10.122.139.230 KD5MFW-016	1.00	1.00	1.00
10.149.19.93 KD5MFW-051	10.122.139.230 KD5MFW-016	1.00	1.00	1.00
10.135.110.3 KD5MFW-091	10.181.35.210 KD5MFW-401	1.00	1.00	1.00
10.122.139.230 KD5MFW-016	10.181.35.210 KD5MFW-401	1.00	0.90	1.11
10.230.123.18 KD5MFW-009	10.181.35.210 KD5MFW-401	1.00	0.80	1.25
10.159.26.149 KD5MFW-380	10.181.35.210 KD5MFW-401	1.00	1.00	1.00
10.50.73.215 KD5MFW-368	10.181.35.210 KD5MFW-401	1.00	1.00	1.00
10.149.19.93 KD5MFW-051	10.181.35.210 KD5MFW-401	1.00	1.00	1.00
10.83.168.33 KD5MFW-003	10.230.123.18 KD5MFW-009	1.00	0.90	1.11
10.135.110.3 KD5MFW-091	10.230.123.18 KD5MFW-009	1.00	1.00	1.00
10.122.139.230 KD5MFW-016	10.230.123.18 KD5MFW-009	1.00	1.00	1.00
10.181.35.210 KD5MFW-401	10.230.123.18 KD5MFW-009	1.00	1.00	1.00
10.159.26.149 KD5MFW-380	10.230.123.18 KD5MFW-009	1.00	0.80	1.25
10.50.73.215 KD5MFW-368	10.230.123.18 KD5MFW-009	1.00	1.00	1.00
10.149.19.93 KD5MFW-051	10.230.123.18 KD5MFW-009	1.00	1.00	1.00
10.83.168.33 KD5MFW-003	10.159.26.149 KD5MFW-380	1.00	0.80	1.25
10.135.110.3 KD5MFW-091	10.159.26.149 KD5MFW-380	1.00	1.00	1.00
10.122.139.230 KD5MFW-016	10.159.26.149 KD5MFW-380	0.90	1.00	1.11
10.181.35.210 KD5MFW-401	10.159.26.149 KD5MFW-380	1.00	1.00	1.00
10.230.123.18 KD5MFW-009	10.159.26.149 KD5MFW-380	0.90	1.00	1.11
10.50.73.215 KD5MFW-368	10.159.26.149 KD5MFW-380	0.90	1.00	1.11
10.149.19.93 KD5MFW-051	10.159.26.149 KD5MFW-380	1.00	1.00	1.00
10.83.168.33 KD5MFW-003	10.50.73.215 KD5MFW-368	1.00	1.00	1.00
10.135.110.3 KD5MFW-091	10.50.73.215 KD5MFW-368	1.00	1.00	1.00
10.122.139.230 KD5MFW-016	10.50.73.215 KD5MFW-368	1.00	1.00	1.00
10.181.35.210 KD5MFW-401	10.50.73.215 KD5MFW-368	1.00	1.00	1.00
10.230.123.18 KD5MFW-009	10.50.73.215 KD5MFW-368	1.00	1.00	1.00
10.159.26.149 KD5MFW-380	10.50.73.215 KD5MFW-368	1.00	0.90	1.11
10.149.19.93 KD5MFW-051	10.50.73.215 KD5MFW-368	1.00	1.00	1.00

Configuration | Routes | Links/Topology | **All** | About | Node Status

OS: GNU/Linux
System time: *Sun, 02 Jan 2000 03:52:11*
Olsrd uptime: *1 day(s) 03 hours 51 minutes 44 seconds*
HTTP stats(ok/dyn/error/illegal): *19/0/0/0*

Variables

Main address: **10.149.19.93**	IP version: 4	Debug level: 0
Pollrate: 0.05	TC redundancy: 2	MPR coverage: 3
Fisheye: Disabled	TOS: 0x0010	Willingness: 3
Hysteresis: Disabled	Hyst scaling: 0.50	Hyst lower/upper: 0.30/0.80
LQ extention: Enabled	LQ level: 2	LQ winsize: 10

Interfaces

wl0

IP: 10.149.19.93	MASK: 255.0.0.0	BCAST: 10.255.255.255
MTU: 1472	WLAN: Yes	STATUS: UP

Olsrd is configured to run even if no interfaces are available

Plugins

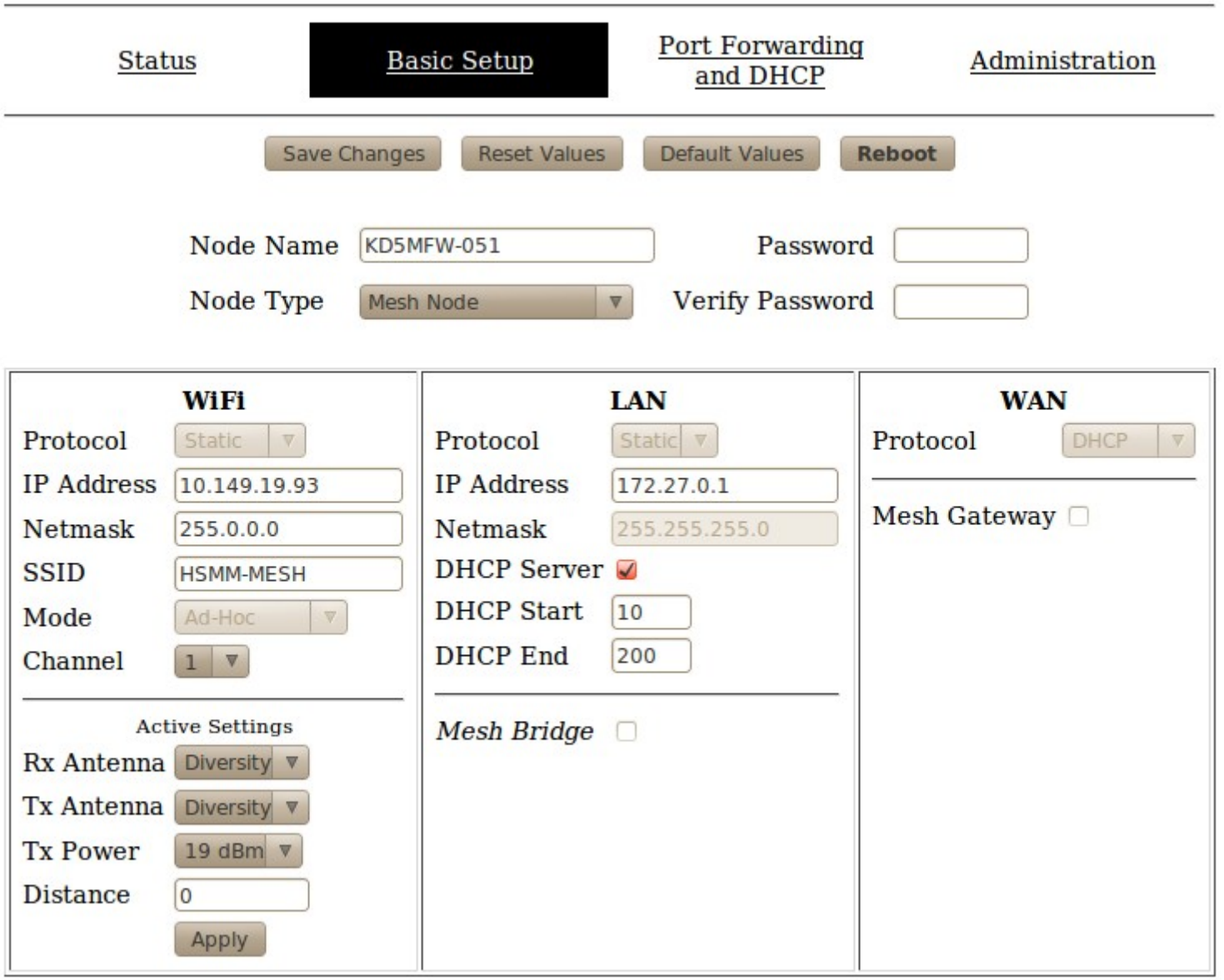
Name	Parameters
olsrd_nameservice.so.0.2	KEY, VALUE
olsrd_dot_draw.so.0.3	KEY, VALUE
olsrd_httpinfo.so.0.1	KEY, VALUE

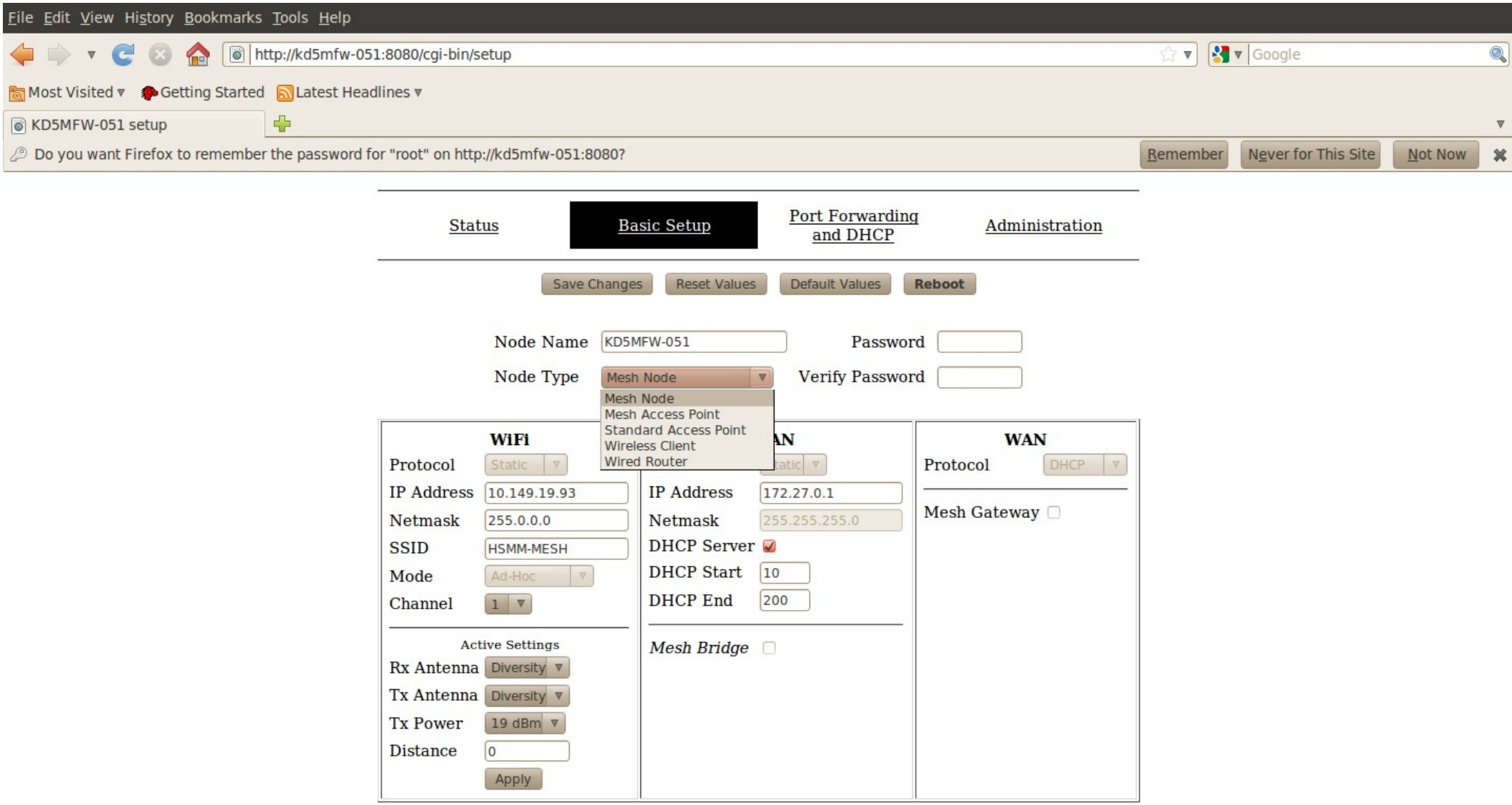
OLSR routes in kernel

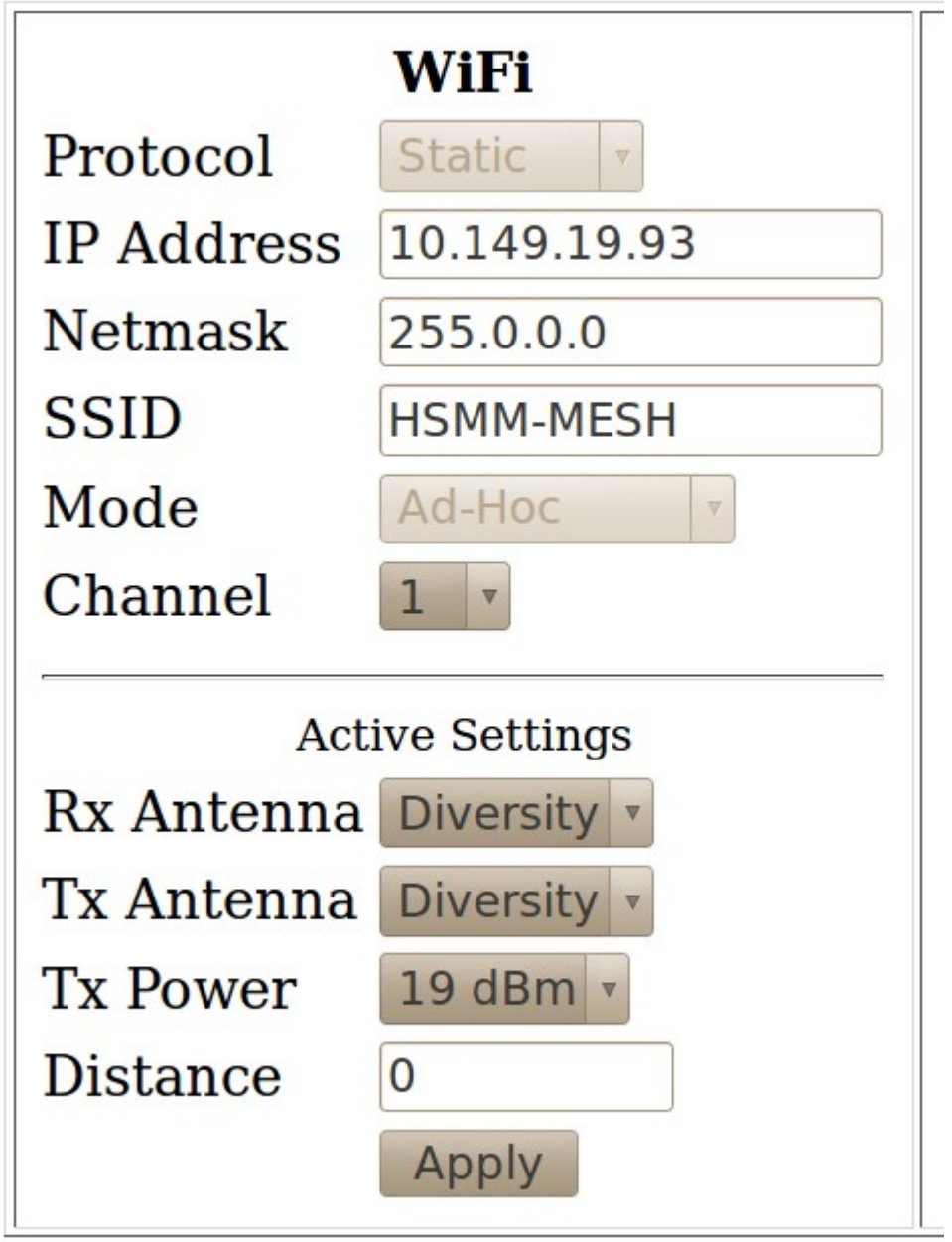
Destination	Gateway	Metric	ETX	Interface	Type
10.83.168.33 KD5MFW-003	10.83.168.33 KD5MFW-003	1	1.11	wl0	HOST
10.135.110.3 KD5MFW-091	10.135.110.3 KD5MFW-091	1	1.00	wl0	HOST
10.122.139.230 KD5MFW-016	10.122.139.230 KD5MFW-016	1	1.00	wl0	HOST
10.181.35.210 KD5MFW-401	10.181.35.210 KD5MFW-401	1	1.25	wl0	HOST
10.230.123.18 KD5MFW-009	10.230.123.18 KD5MFW-009	1	1.00	wl0	HOST

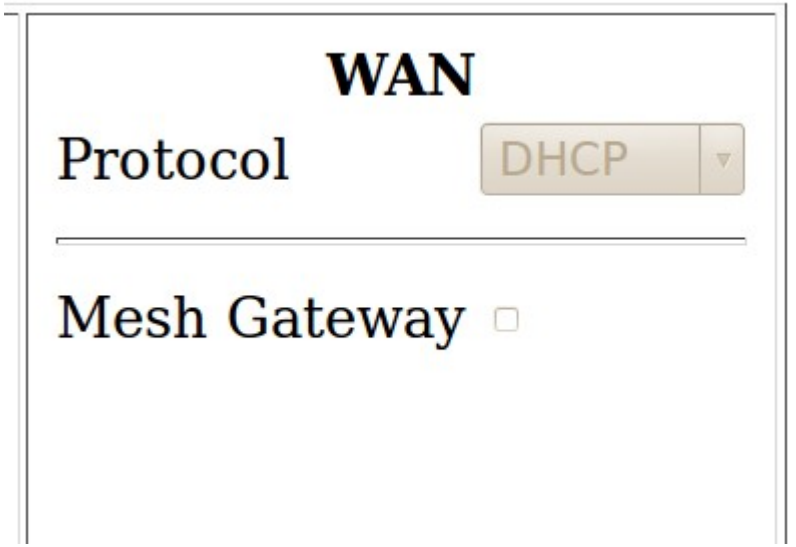
Plugins

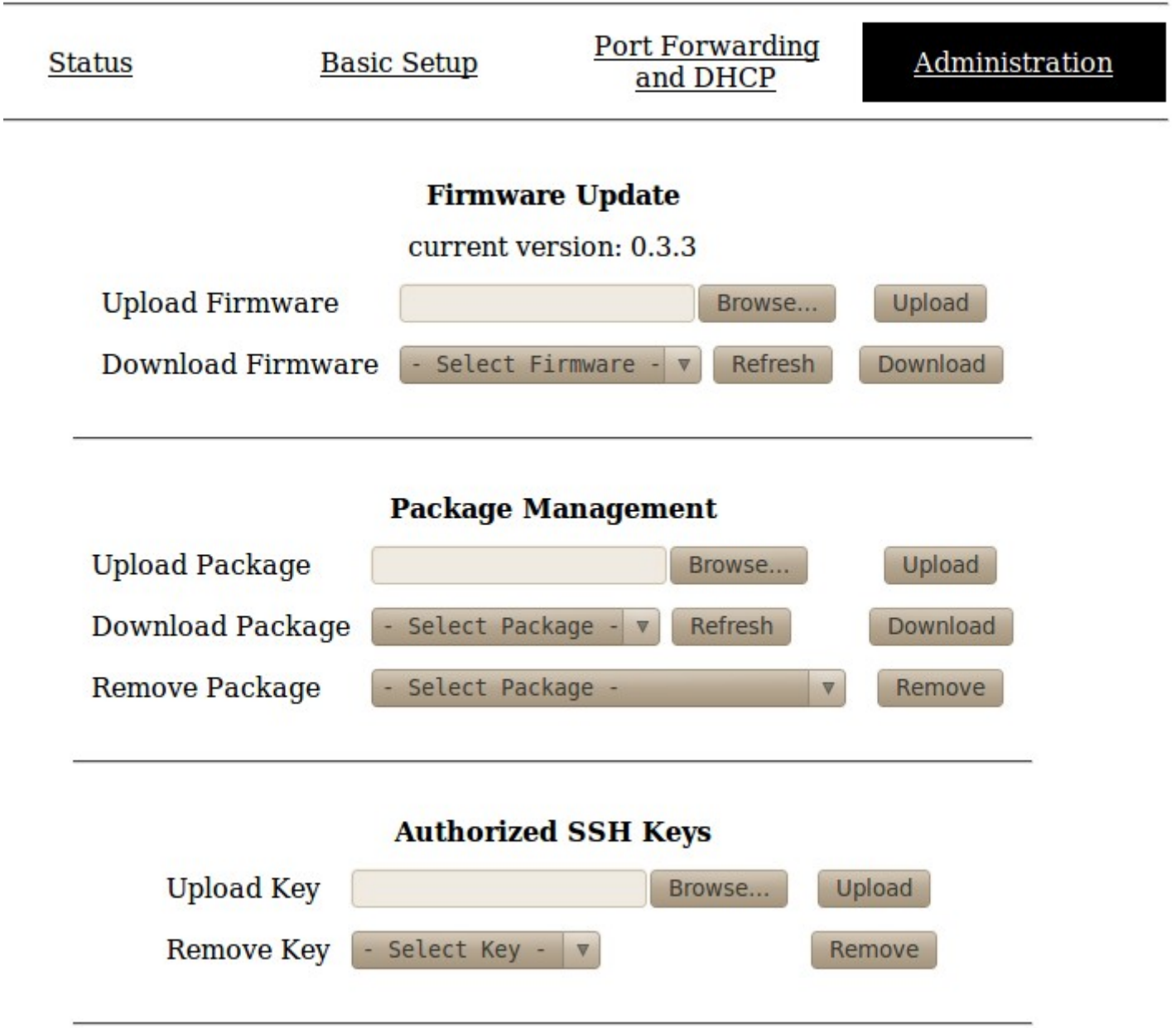
Name	Parameters
olsrd_nameservice.so.0.2	KEY, VALUE
olsrd_dot_draw.so.0.3	KEY, VALUE
olsrd_httpinfo.so.0.1	KEY, VALUE

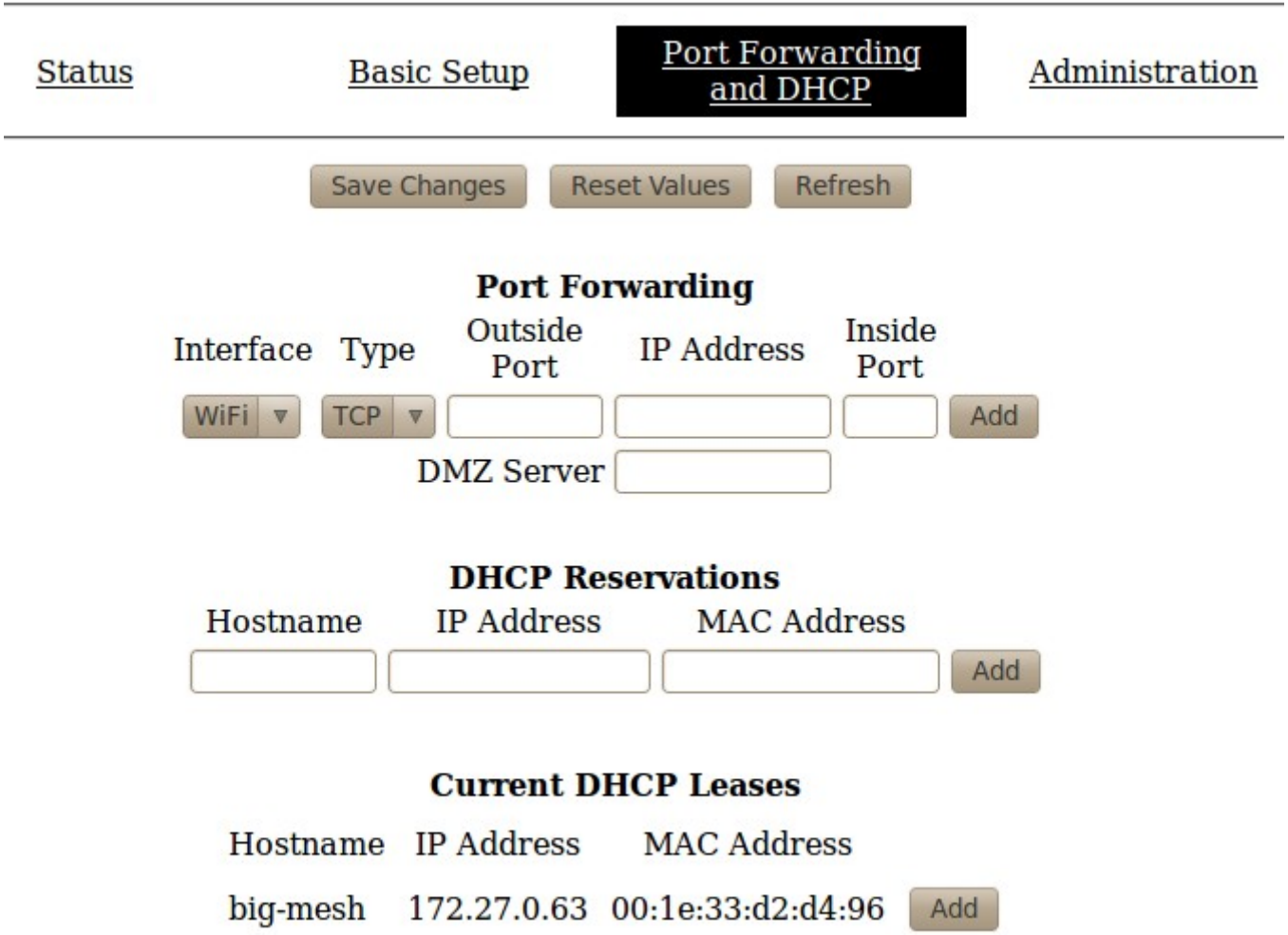

Status
Basic Setup
Port Forwarding and DHCP
Administration
Save Changes
Reset Values
Default Values
Reboot
Node Name
KD5MFW-051
Password
Node Type
Mesh Node
Verify Password
WiFi
Protocol
Static
IP Address
10.149.19.93
Netmask
255.0.0.0
SSID
HSMM-MESH
Mode
Ad-Hoc
Channel
1
Active Settings
Rx Antenna
Diversity
Tx Antenna
Diversity
Tx Power
19 dBm
Distance
0
Apply
LAN
Protocol
Static
IP Address
172.27.0.1
Netmask
255.255.255.0
DHCP Server
DHCP Start
10
DHCP End
200
Mesh Bridge
WAN
Protocol
DHCP
Mesh Gateway


File Edit View History Bookmarks Tools Help
http://kd5mfw-051:8080/cgi-bin/setup
Google
Most Visited
Getting Started
Latest Headlines
KD5MFW-051 setup
Do you want Firefox to remember the password for "root" on http://kd5mfw-051:8080?
Remember
Never for This Site
Not Now
Status
Basic Setup
Port Forwarding and DHCP
Administration
Save Changes
Reset Values
Default Values
Reboot
Node Name
KD5MFW-051
Password
Node Type
Mesh Node
Verify Password
Mesh Node
Mesh Access Point
Standard Access Point
Wireless Client
Wired Router
WiFi
Protocol
Static
IP Address
10.149.19.93
Netmask
255.0.0.0
SSID
HSMM-MESH
Mode
Ad-Hoc
Channel
1
Active Settings
Rx Antenna
Diversity
Tx Antenna
Diversity
Tx Power
19 dBm
Distance
0
Apply
AN
IP Address
172.27.0.1
Netmask
255.255.255.0
DHCP Server
DHCP Start
10
DHCP End
200
Mesh Bridge
WAN
Protocol
DHCP
Mesh Gateway

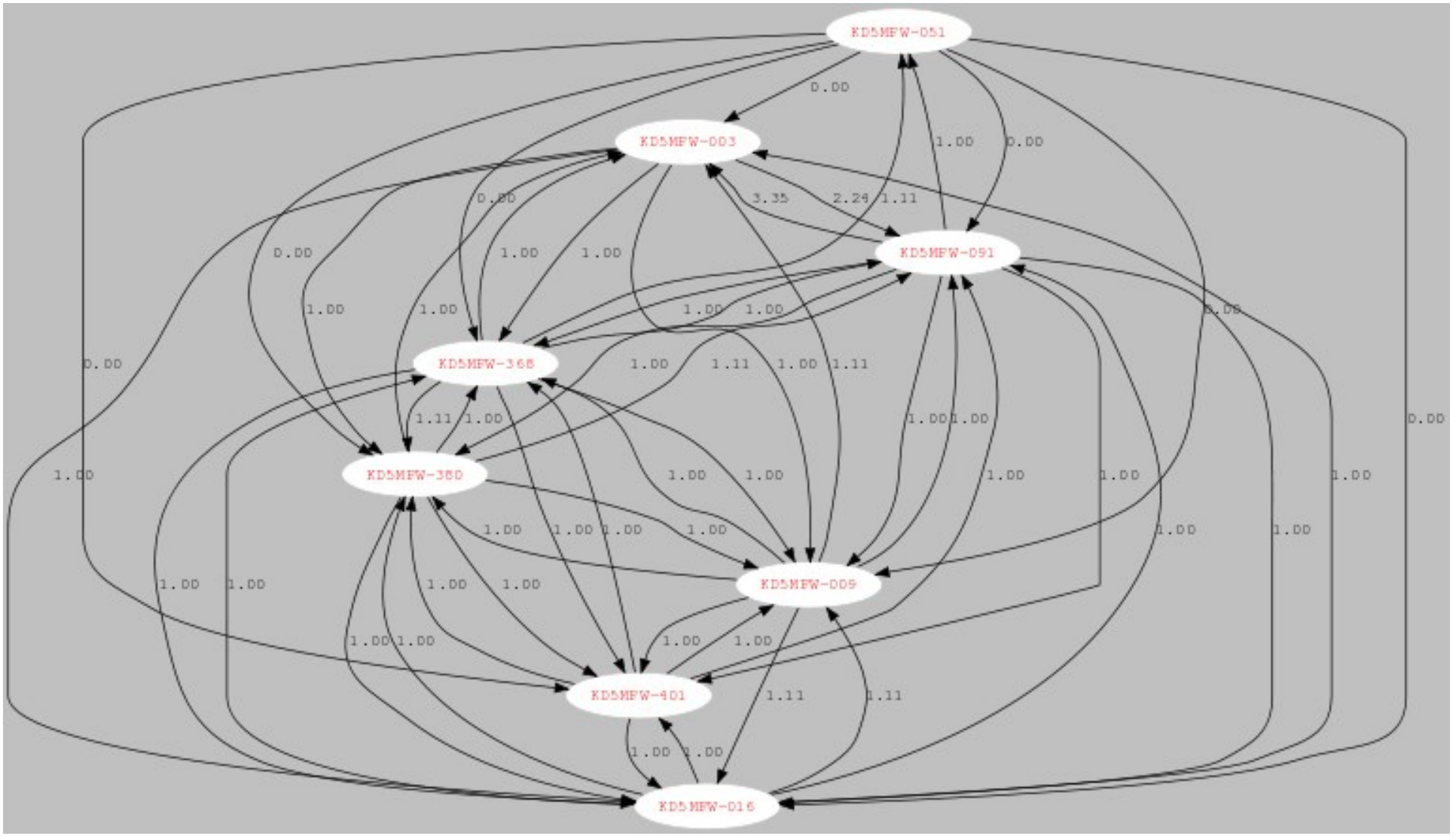

WiFi
Protocol
Static
IP Address
10.149.19.93
Netmask
255.0.0.0
SSID
HSMM-MESH
Mode
Ad-Hoc
Channel
1
Active Settings
Rx Antenna
Diversity
Tx Antenna
Diversity
Tx Power
19 dBm
Distance
0
Apply


WAN
Protocol
DHCP
Mesh Gateway


Status
Basic Setup
Port Forwarding and DHCP
Administration
Firmware Update
current version: 0.3.3
Upload Firmware
Browse...
Upload
Download Firmware
- Select Firmware -
Refresh
Download
Package Management
Upload Package
Browse...
Upload
Download Package
- Select Package -
Refresh
Download
Remove Package
- Select Package -
Remove
Authorized SSH Keys
Upload Key
Browse...
Upload
Remove Key
- Select Key -
Remove


Status
Basic Setup
Port Forwarding and DHCP
Administration
Save Changes
Reset Values
Refresh
Port Forwarding
Interface
Type
Outside Port
IP Address
Inside Port
WiFi
TCP
Add
DMZ Server
DHCP Reservations
Hostname
IP Address
MAC Address
Add
Current DHCP Leases
Hostname
IP Address
MAC Address
big-mesh
172.27.0.63
00:1e:33:d2:d4:96
Add

Live “dot-draw” graph of current mesh network, added to HSMM-MESH(tm) firmware.



The graph is displayed by running the “dot-draw” utility on a Linux computer attached to one of the mesh nodes in the network. The nodes provide the raw data for the map.

Where do the HSMM-MESH(tm) developers get their feature ideas from?

Where do the HSMM-MESH(tm) developers get their feature ideas from?

The Defense Advanced Research Projects Agency develops high tech devices For use use by *government agencies and the military*.

The ARPA Net was a project they sponsored, to allow university researchers doing ARPA sponsored research, to more easily share information.

The ARPANET turned into the Internet.

They are developing mesh networks for use by the military to provide pervasive broadband communications on the battlefield.

Those deploying communications technology in *developing countries* are deploying Systems in areas where there is little or no infrastructure...

- much the same as after a natural disaster

They are using wireless mesh systems for much of their infrastructure.

When you have no infrastructure due to disaster, natural or otherwise, Wireless mesh networks are being deployed.

DARPA Miniature Local Area Network Droid

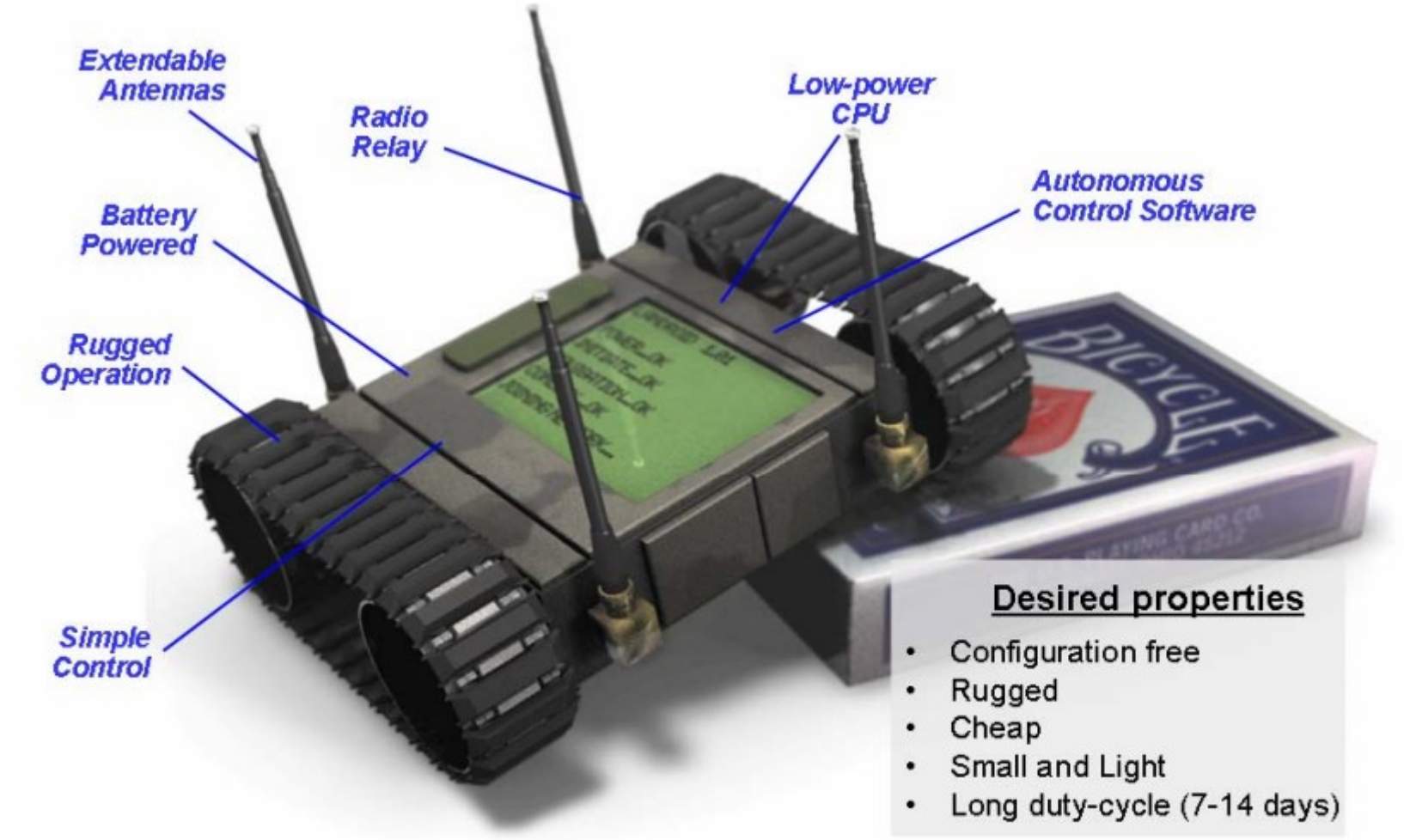


Figure 1 – Notional LANdroid

(DARPA photo)

DARPA Miniature Local Area Network Droid

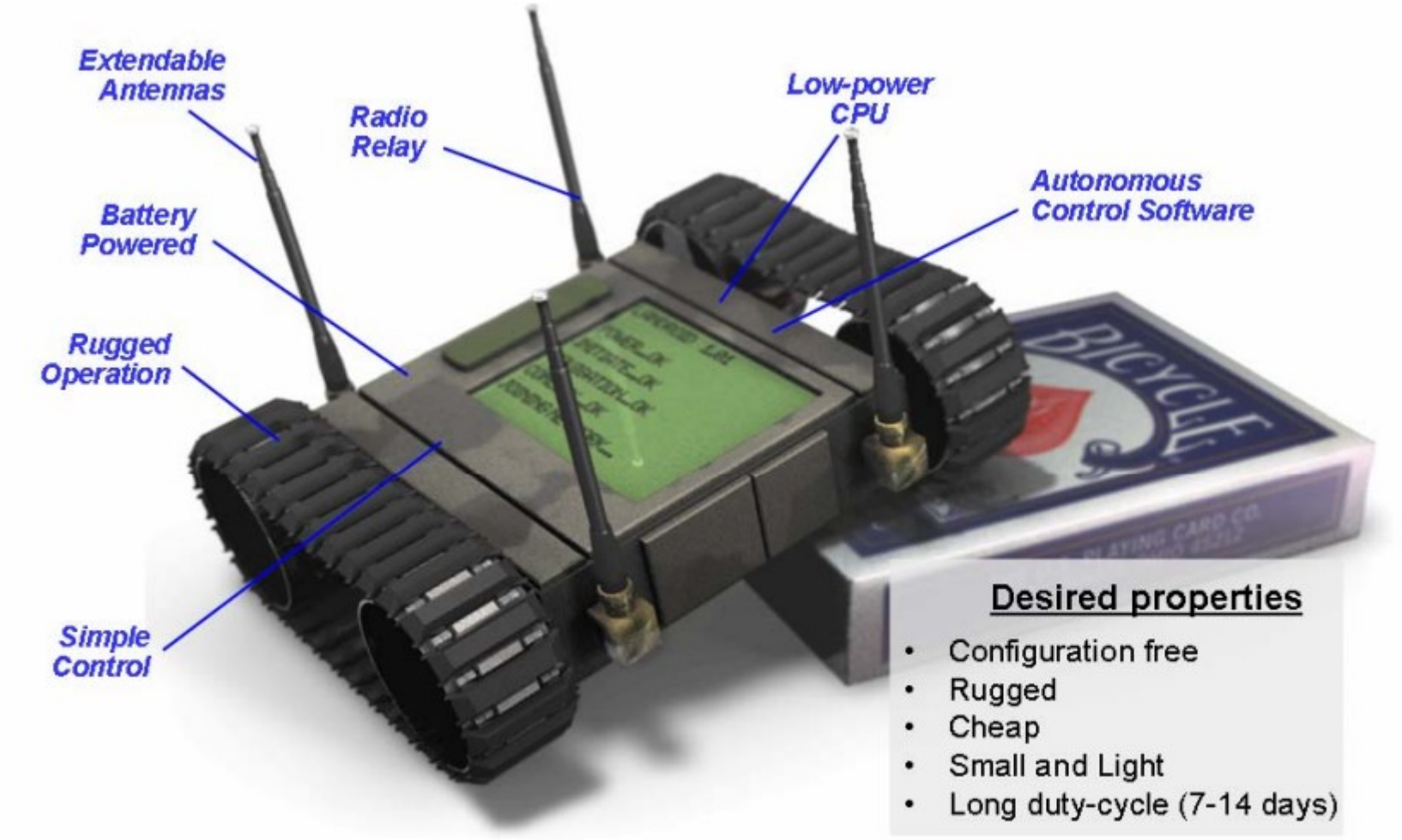


Figure 1 – Notional LANdroid

Dropped over a battlefield shortly before troops move in.

(DARPA photo)

Figure 2 – LANdroids (Green Dots) Will Be Deployed as The Warfighters Deploy

(DARPA photo)

Figure 3 –Self-Configuring Multi-path, Multi-hop Mesh Network Routes Packets (Yellow Dots)

(DARPA photo)

Figure 2 – LANdroids (Green Dots) Will Be Deployed as The Warfighters Deploy

(DARPA photo)

An organization called “Inveneo works to bring communications infrastructure
To under developed countries.

They use Wi-Fi (802.11) wireless broadband equipment for much of their work.

They set up Wi-Fi communications links and add their own resources including small web servers and end user net top computers so people can send email and check websites for emergency information.

Inveneo deploys to Haiti after the recent earthquake.

Inveno Photo

Inveneo deploys to Haiti after the recent earthquake.

The got in fast with gear and two man teams.

Inveno Photo

Inveno staff contacted a satellite based ISP in Haiti before deploying...

The ISP agreed to work with Inveneo – Inveneo had a plan that made sense.

Inveno Photo

Inveneo installed a Wide Area Network using Wi-Fi type equipment.

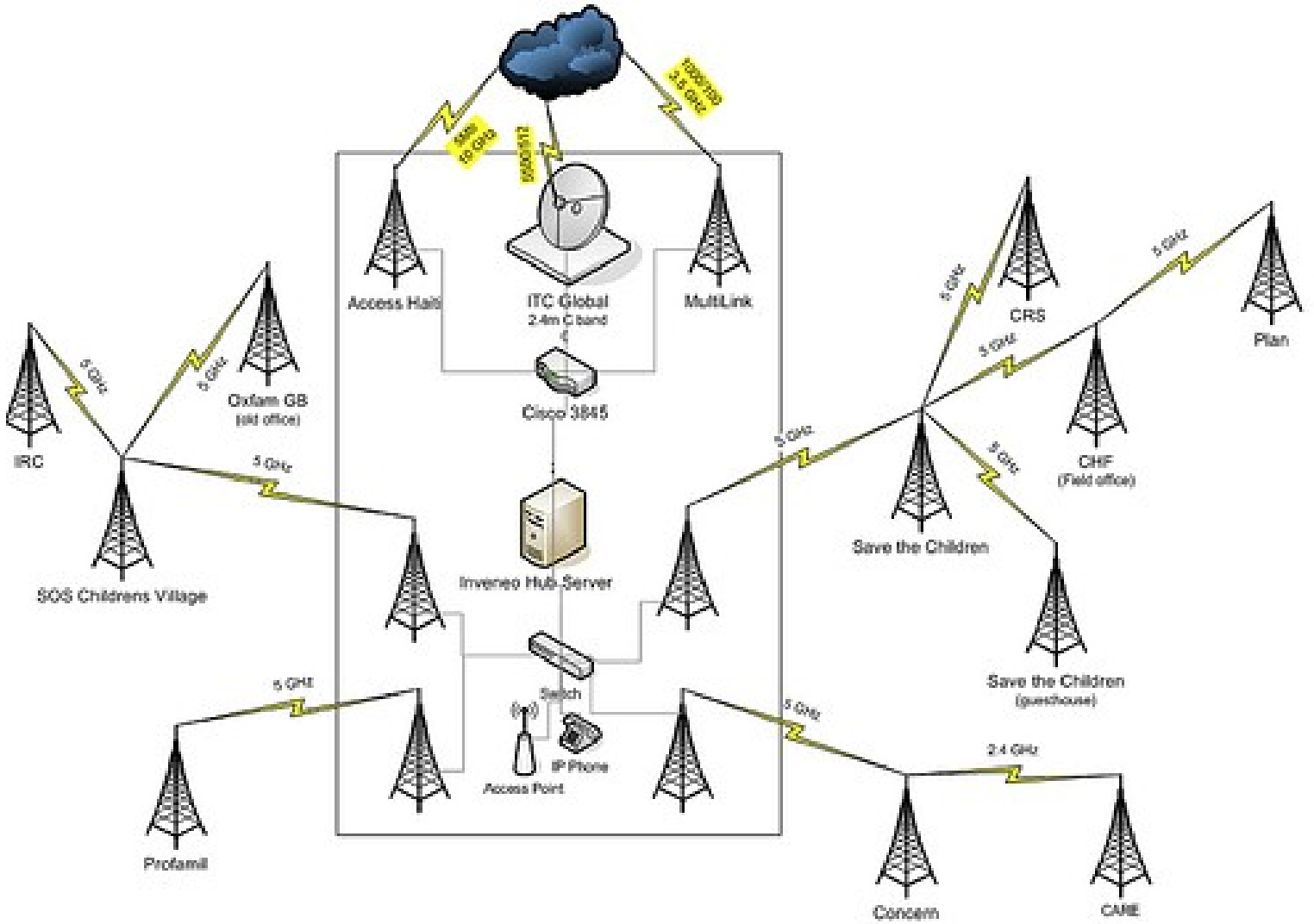
Inveno Photo

Inveneo installed a Wide Area Network using Wi-Fi type equipment.

Many agencies began to use the Internet connections provided.

Inveno Photo

Inveneo quickly deployed an emergency network that served many agencies...



Inveno Photo

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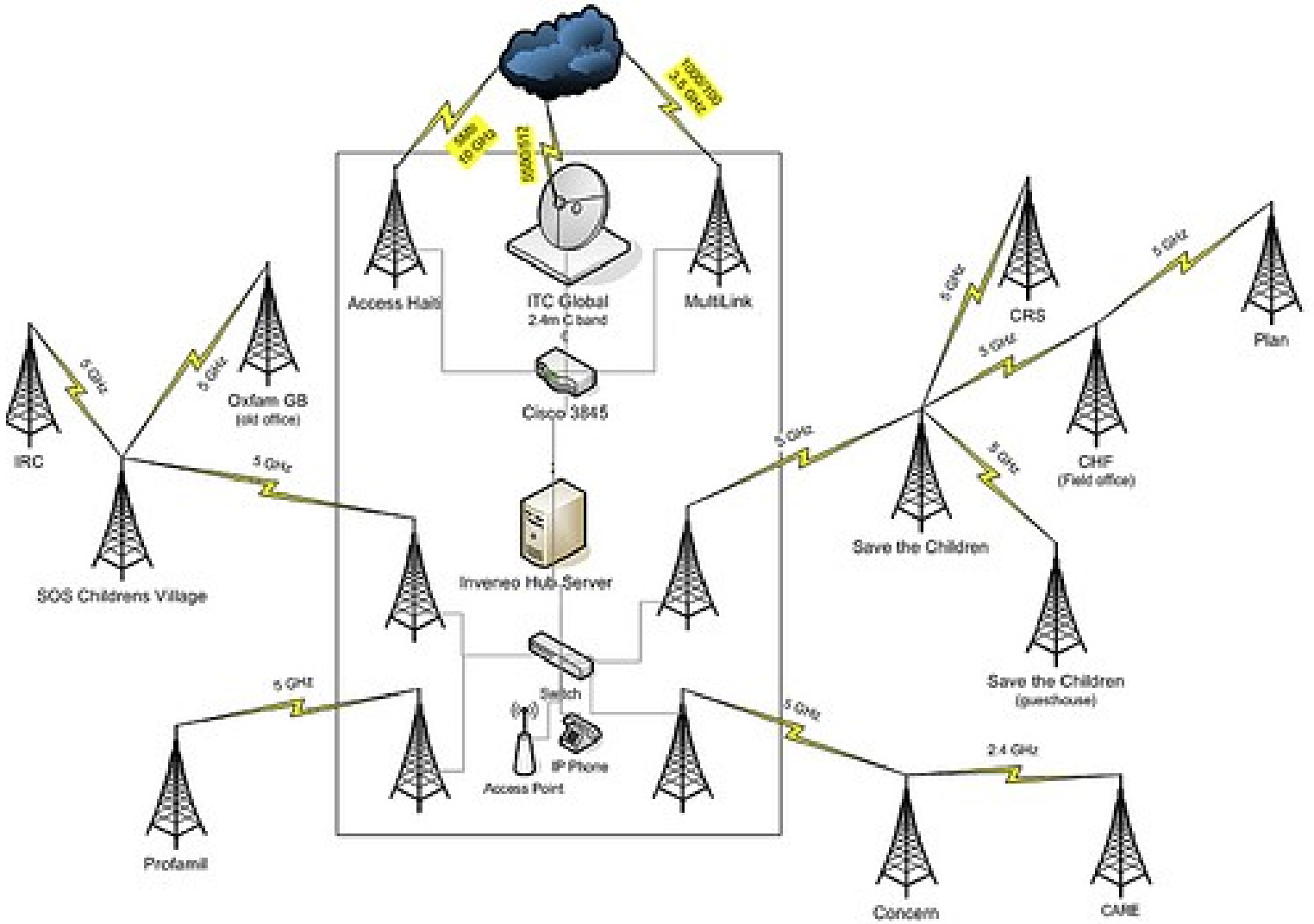

Their network is STILL passing traffic!

Inveno Photo

Amateur radio passed some traffic in the aftermath of the recent Haiti earthquake. I have read the reports on the Internet and in the printed amateur radio magazines. Hats off to all the hams that pitched in and helped strangers in a bad situation.

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It is known that the network deployed by Inveneo passed
THOUSANDS OF MESSAGES
For multiple agencies, and their networks continue to pass traffic.

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Hams can step up to the plate get into broadband, or they can leave it to groups like Inveneo and Part-15.org to provide emergency communications, in the ham bands.

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See the April / March QEX article:

The Integration of Amateur Radio and 802.11
Amateur Radio and 802.11 wireless networking —
a good fit for emergency message delivery.

Roderick D. Mitchell, KL1Y

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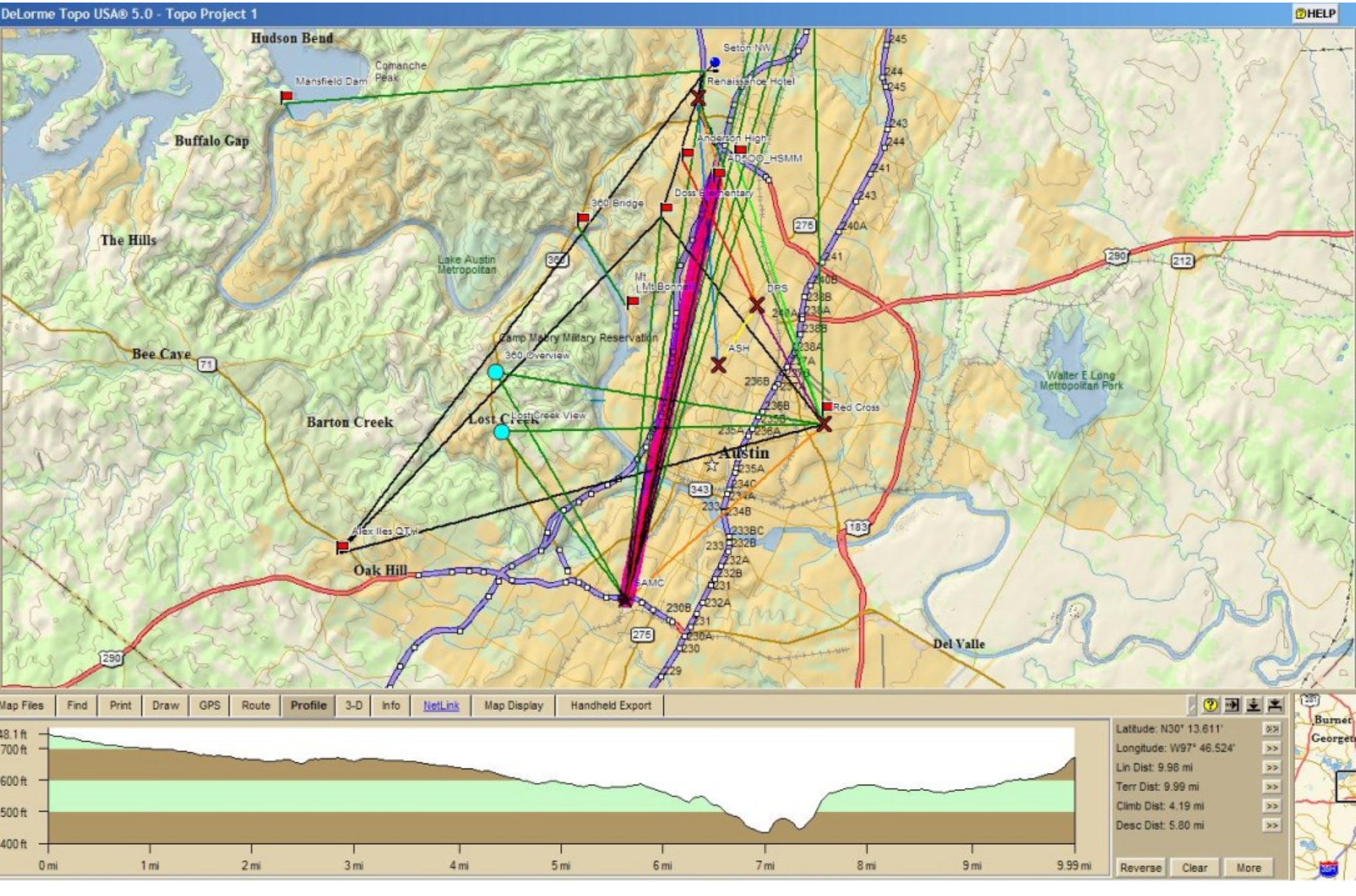
Roderick D. Mitchell, KL1Y

This is not “pie in the sky”, KL1Y shows how he did it.

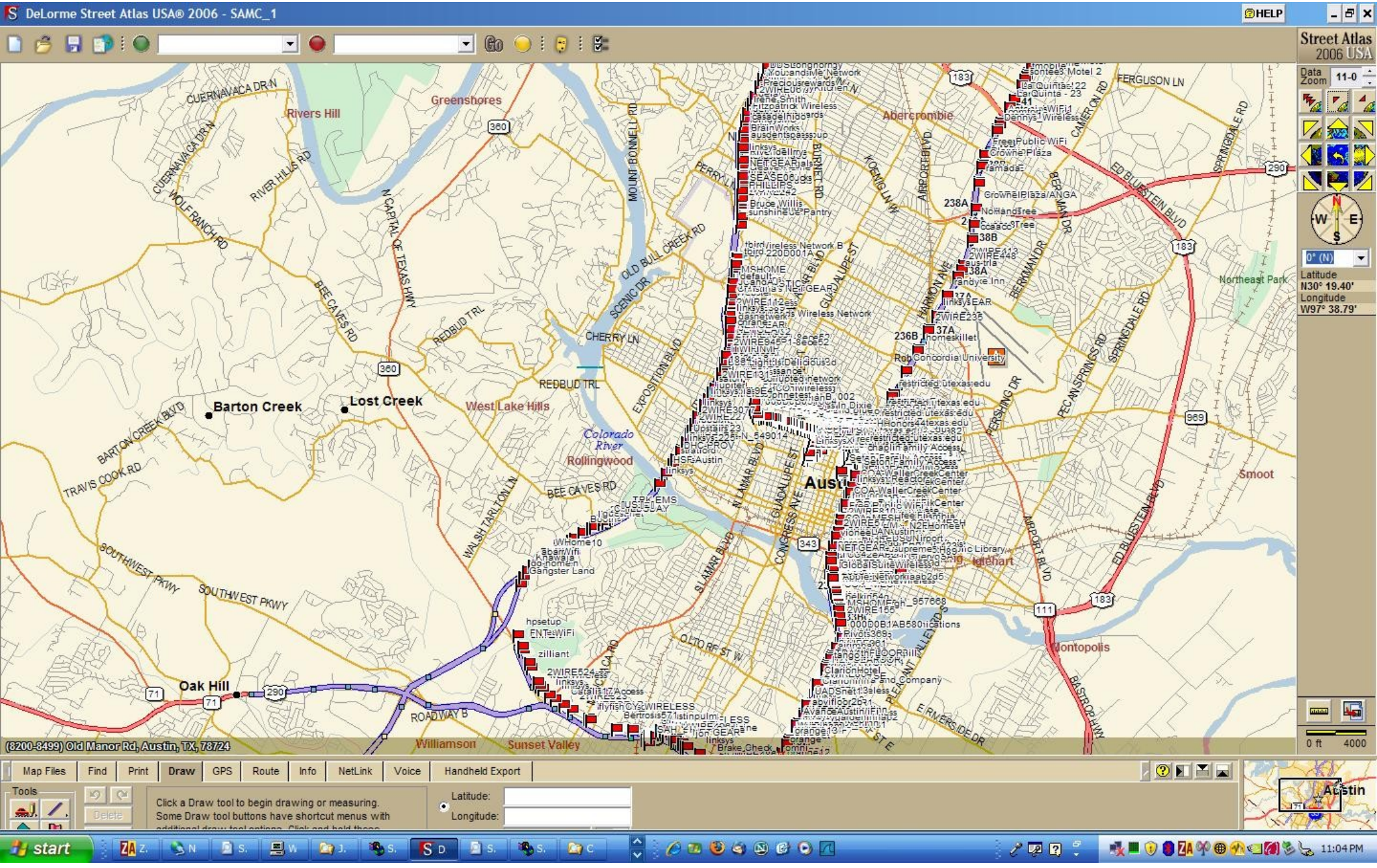
Some examples of field work:

We use the WRT54GL for most of our work – other hardware will run HSMM-MESH(tm)

Ten mile link across downtown Austin with the WRT54G and good antennas – no amps.



Ten mile link across downtown Austin with the WRT54T and good antennas – no amps.
There are thousands of Part-15 Access Points on the path, plus microwave ovens etc.



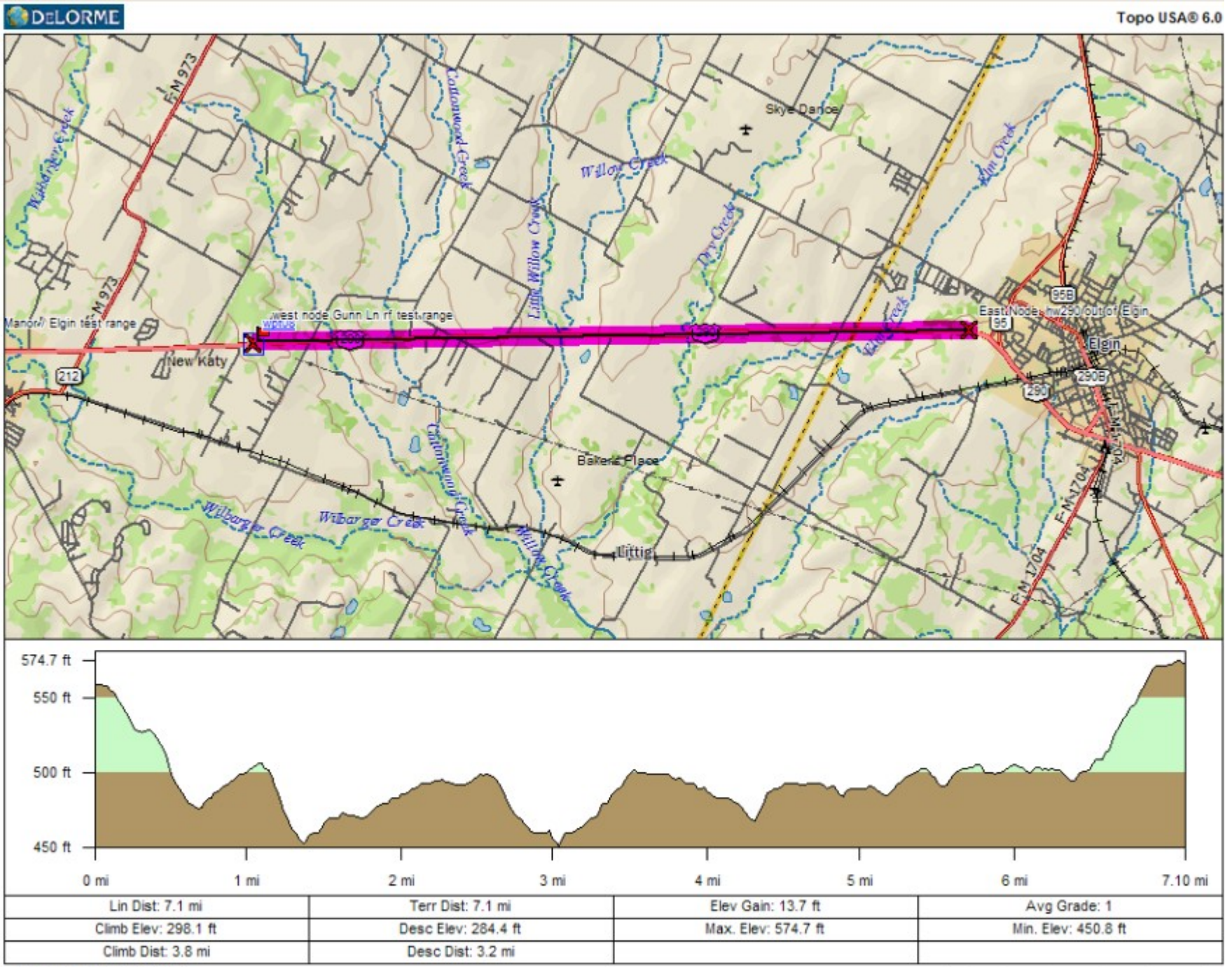
Ten mile link across downtown Austin with the WRT54T and good antennas – no amps.

KD5MFW aimed north with 24 dB dish.

Ten mile link across downtown Austin with the WRT54T and good antennas – no amps.

AD5OO aimed south with 14 dB Yagi.

Seven (7) mile link with WRT54G mesh nodes, 11dB omni antennas – no amps.



Seven mile link using portable mesh nodes on tripods.
Antennas are 11 dB omni.
No amplifiers used.

This should be considered “ideal conditions”,
Line Of Sight path,
Low RF noise.

This “test range” is a straight section of highway 290 between Austin and Elgin, Texas.

Photo and mesh node by AD500

WRT54G crystal change to be “Ham Only” and invisible to standard 802.11 radios.

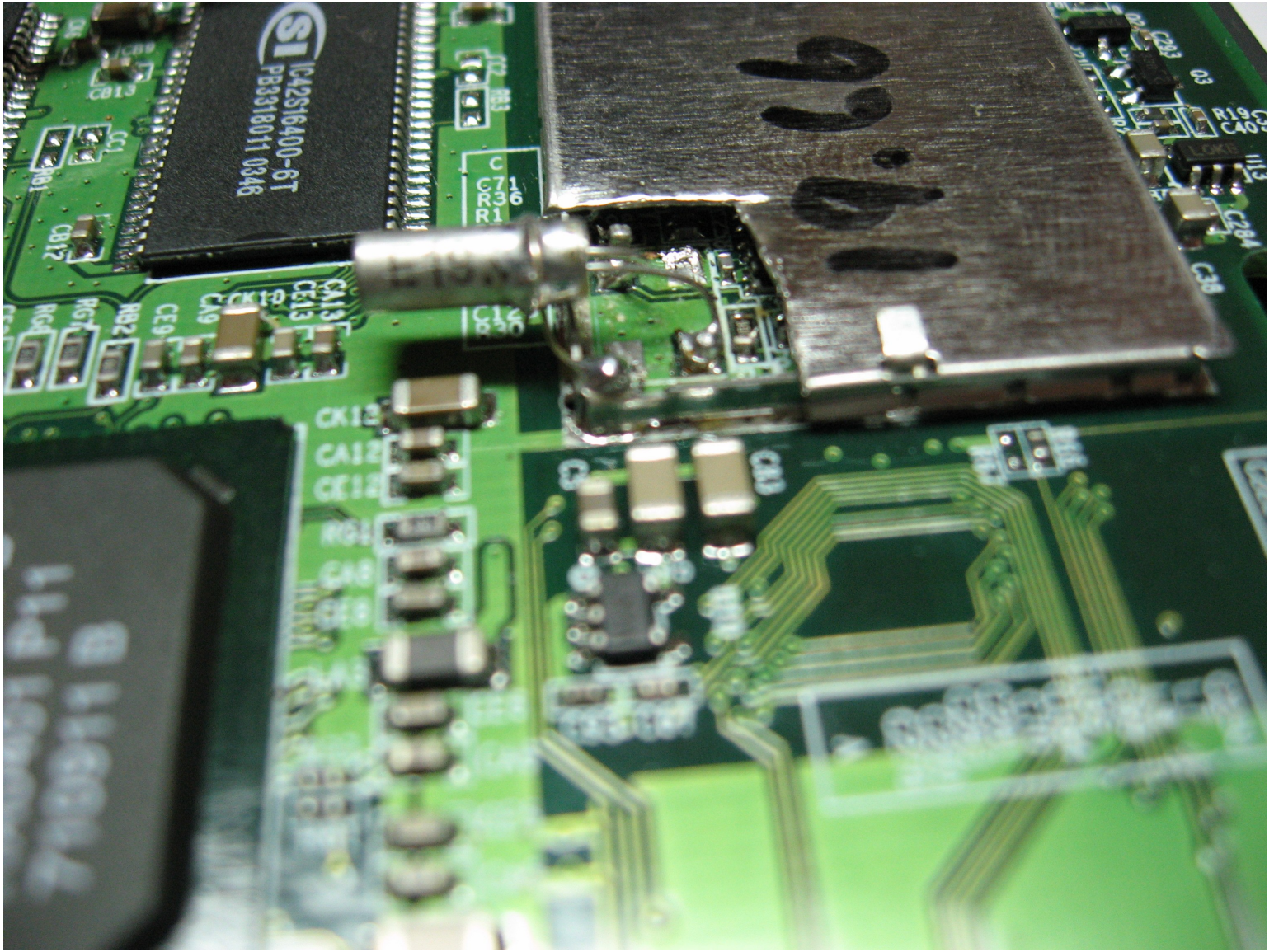
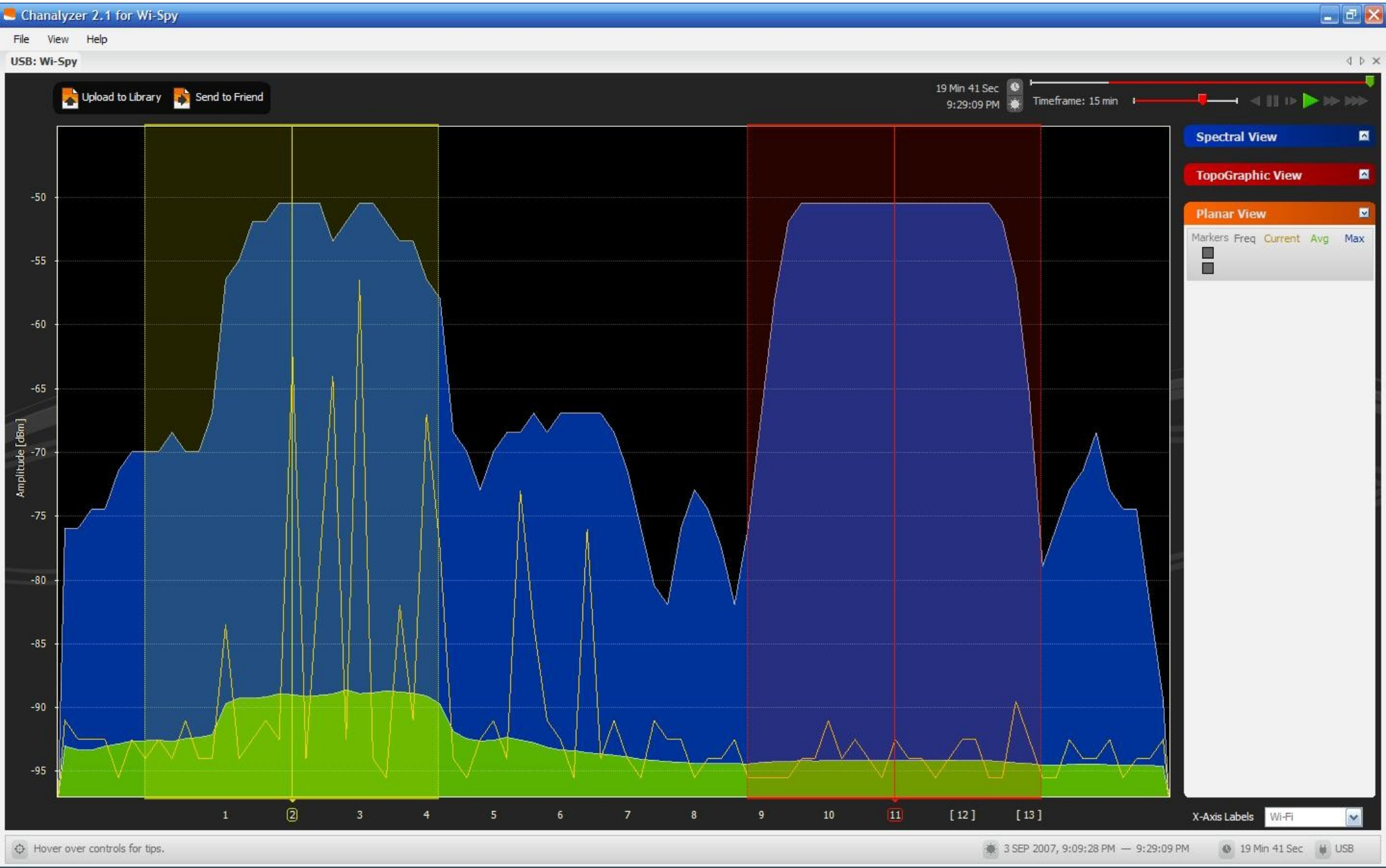
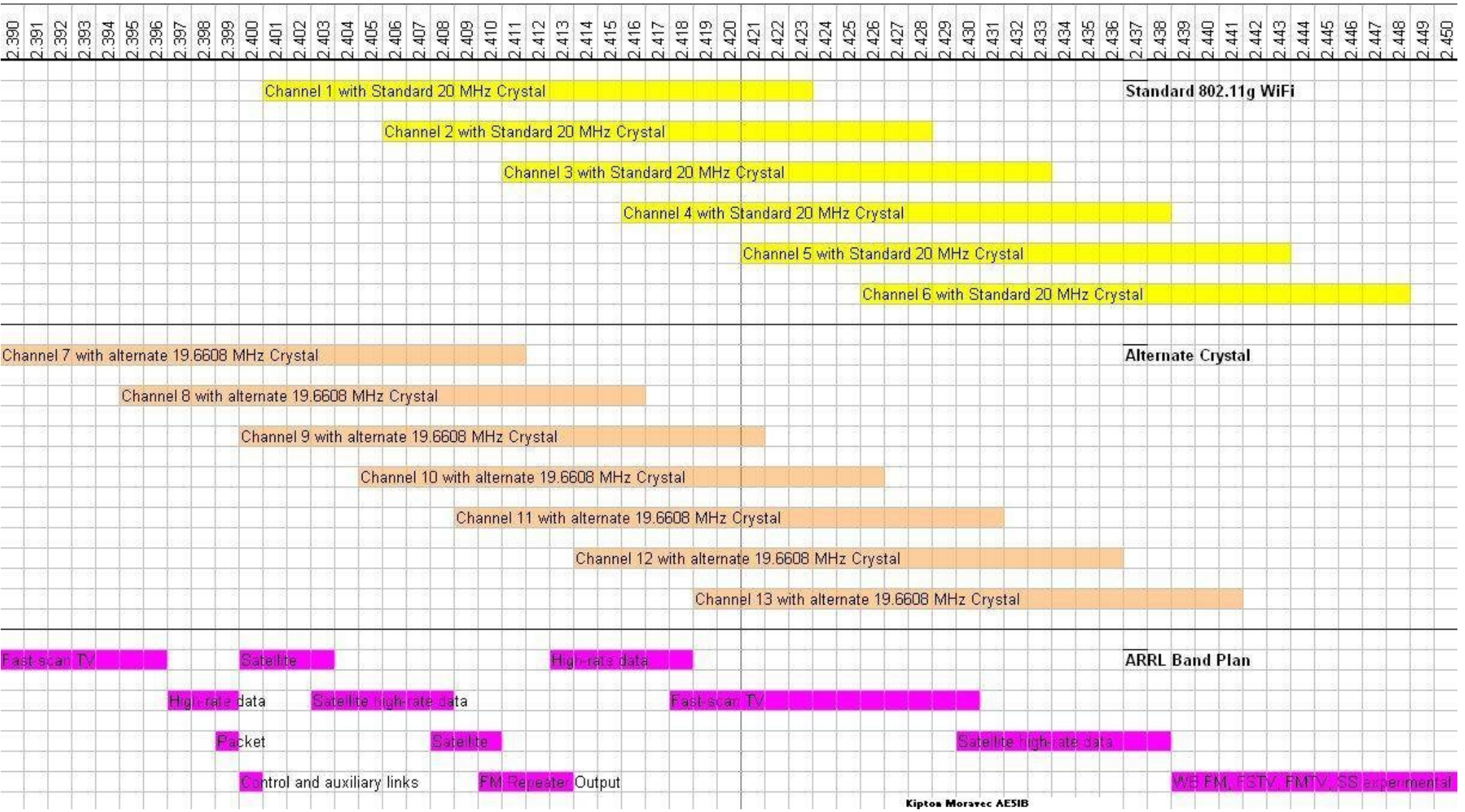


Photo by WB5AOH, Bob Morgan

20 MHz. Factory xtal changed to 19.6608 MHz. It was less than 20 MHz. And cheap
Because it is used as a crystal for RS-232 timing and HDMI timing. Mass produced.
Cost - 54 cents + solder
Scan made using “Wi-SPY by Metageek - KD5MFW

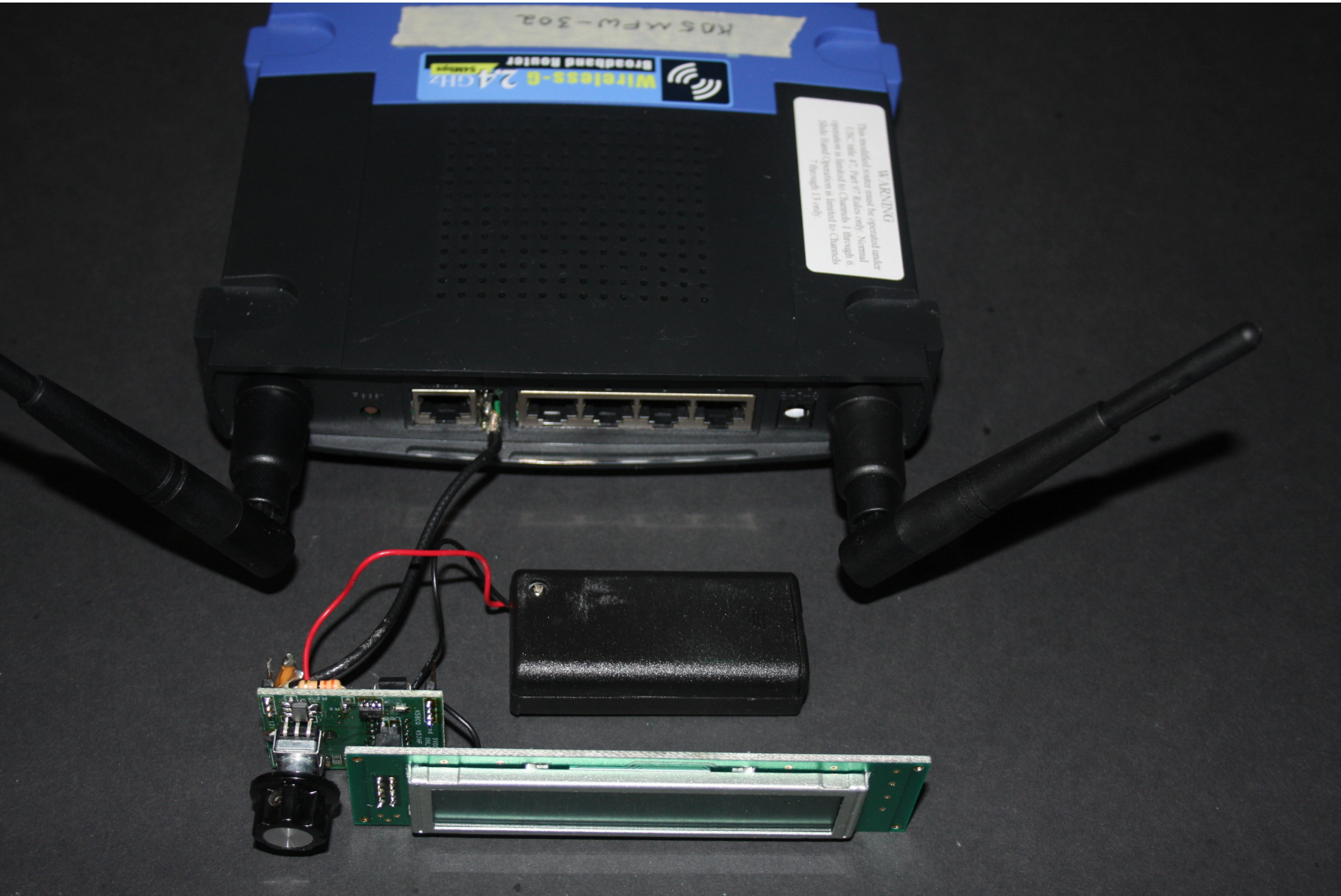


Single Slide Band Mesh Node Chart by Kipton Moravec AE5IB



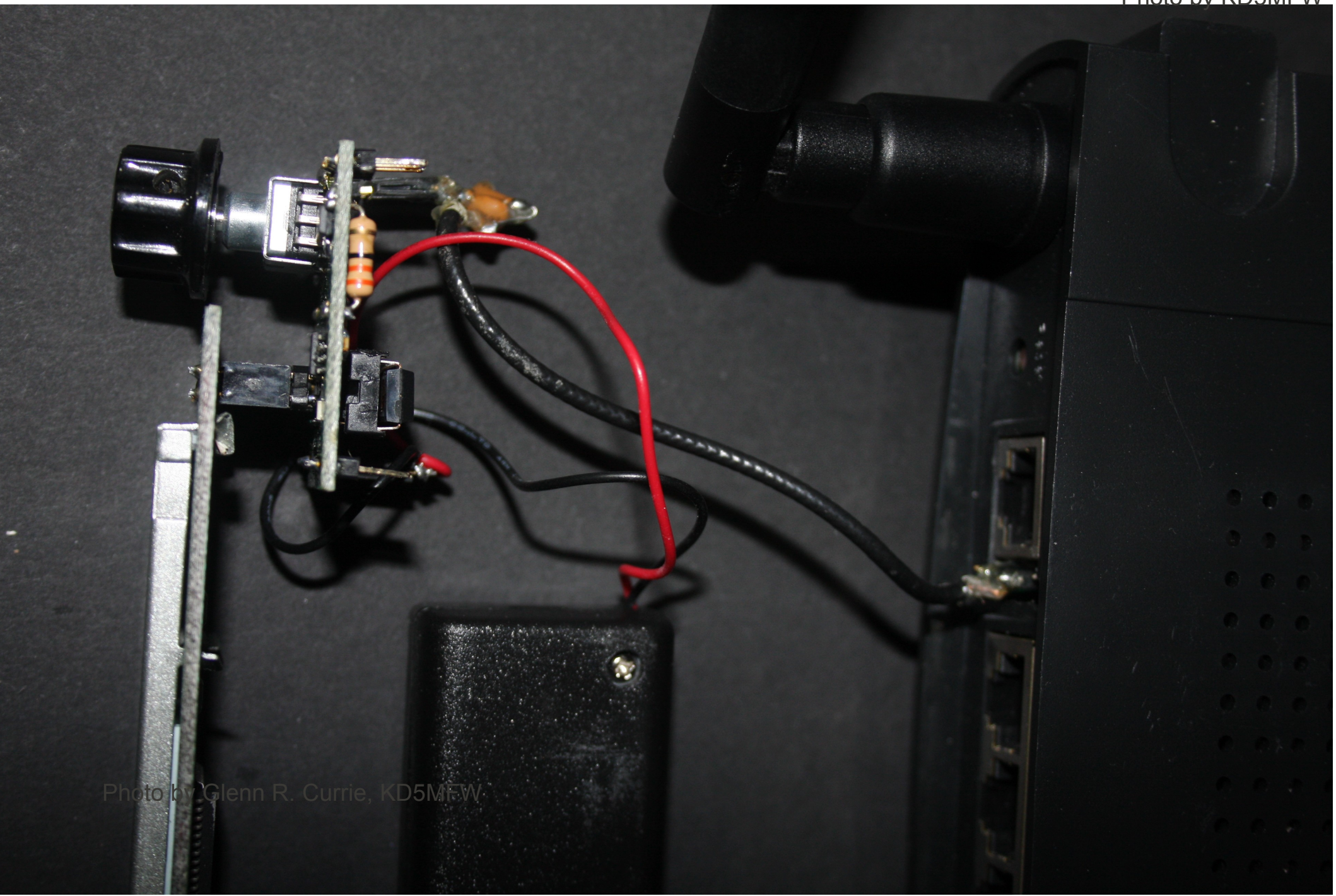
Si570 VFO – Slide Band Mesh node – frequency is software controlled via I2C bus.
Photo by KD5MFW, Glenn R. Currie

Austin QRP group developed an “adjustable crystal”. Austin HSMM SIG has 4 working units.
The Mesh Node VFO work was done by N5GDB, Lloyd Crawford, suggested by KD5MFW.



“”Magic cable” by N5GDB, with consulting from the Roadrunner Microwave Group.

Photo by KD5MFW



Early HSMM work included adding data entry workers, across the street from the Austin Chapter of the American Red Cross. Being able to get “across the street” was a HUGE HELP! During Katrina, a mesh node went on the roof, under a bucket!

Red Cross “portable” mesh node – under a bucket on the Red Cross roof extended the Red Cross network to the church across the street

During Katrina .... - we have LINK!

Photo by Glenn R. Currie, KD5MFW

The future....

Lots of field work with a “portable flag pole”

Photo by KD5MFW, Glenn R. Currie

Moby Dick, the great white radio van,
On a New Years Day Austin HSMM
SIG Field Day in the Austin area.

Photo by Glenn R. Currie, KD5MFW

AD5OO Voice Over IP two way television TV amateur radio equipment.
Austin HSMM SIG meeting HSMM-MESH(tm) VoIP demo.
AD5OO de WB5AOH

Photo by KD5MFW, Glenn R. Currie

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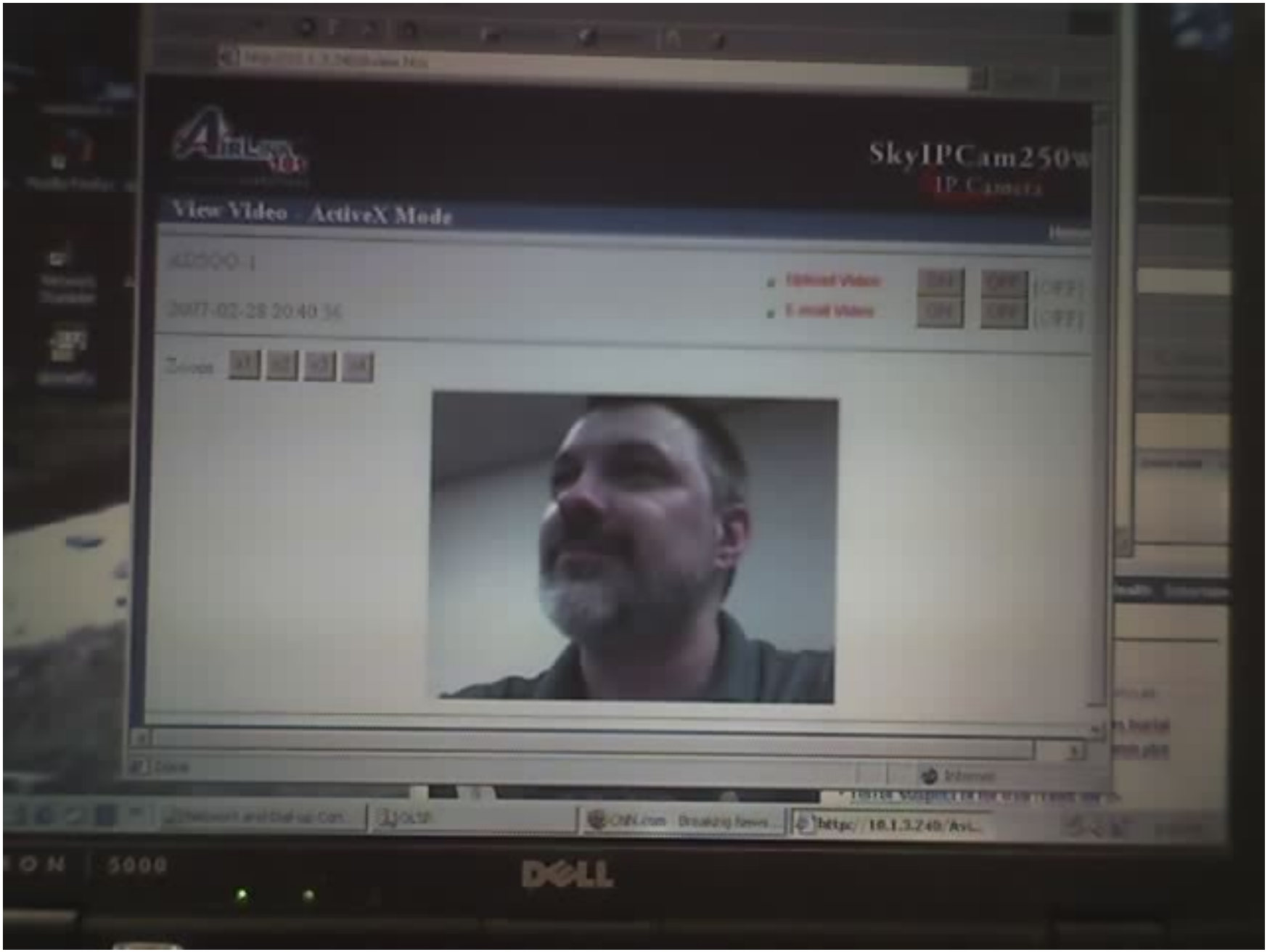

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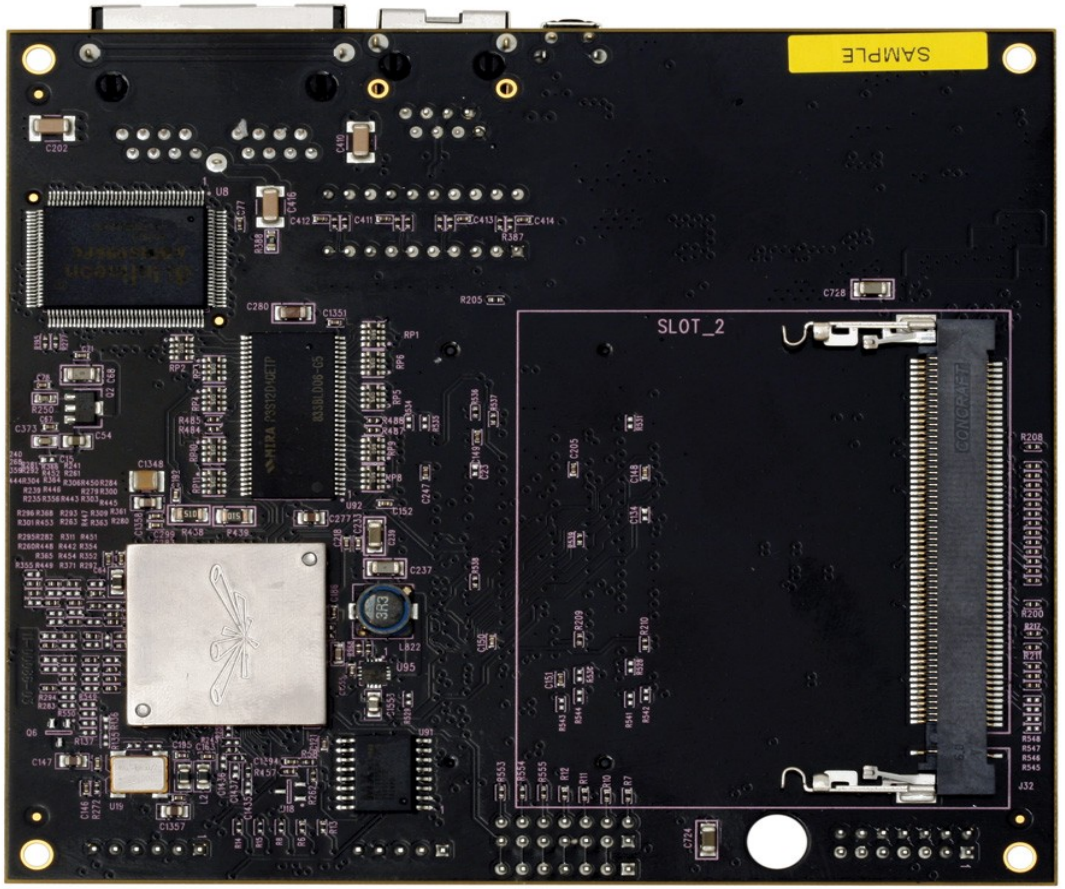
Photo by Glenn R. Currie, KD5MFW

Other Router Hardware

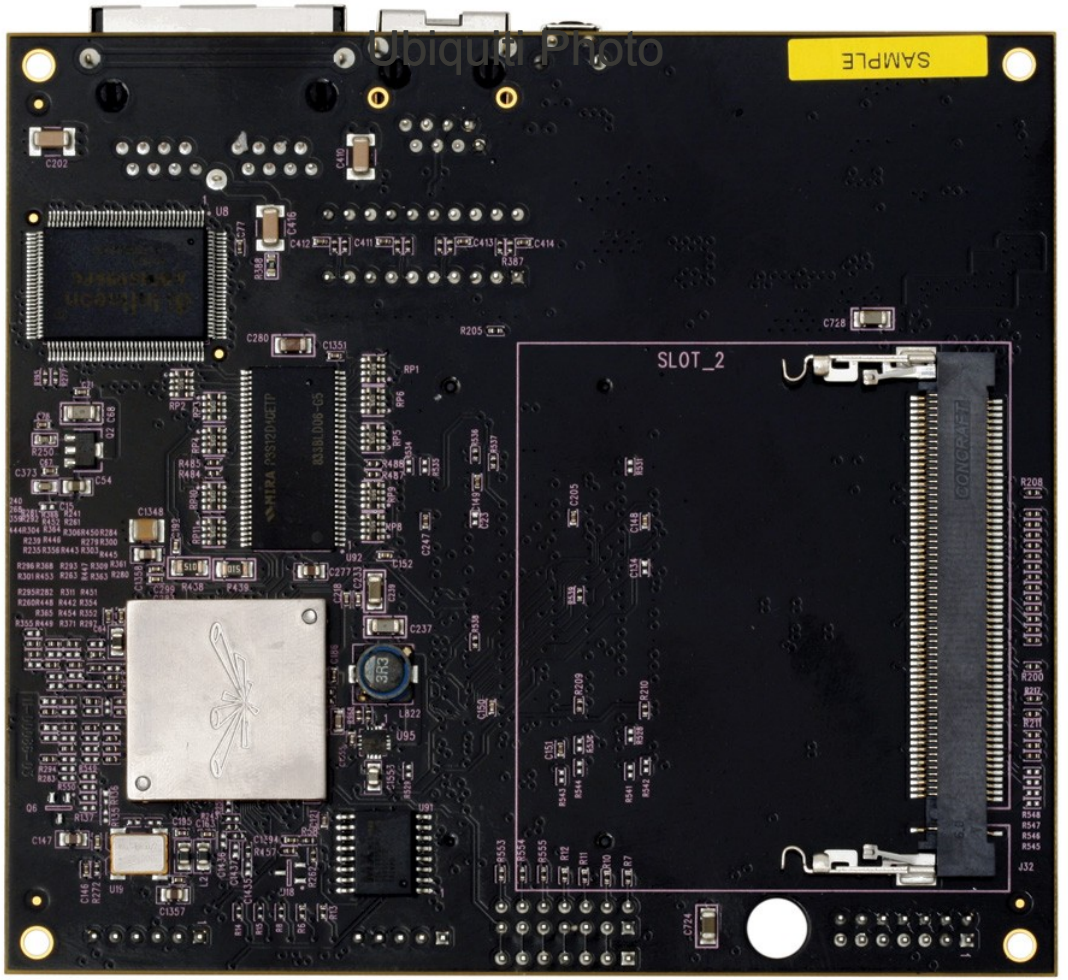
Ubiquiti Networks equipment used by Inveno in Haiti. HSMM-MESH(tm) developers are Working with this equipment as resources allow. HSMM-MESH(tm) will run on this gear. This hardware is similar to the WRT54G but with more resources and modular radios.

Ubiquiti Photo



Router board had slots for 3 radios. So a 3 band mesh node is possible.
Board is ~ $70.00, radios about $80.00 each.

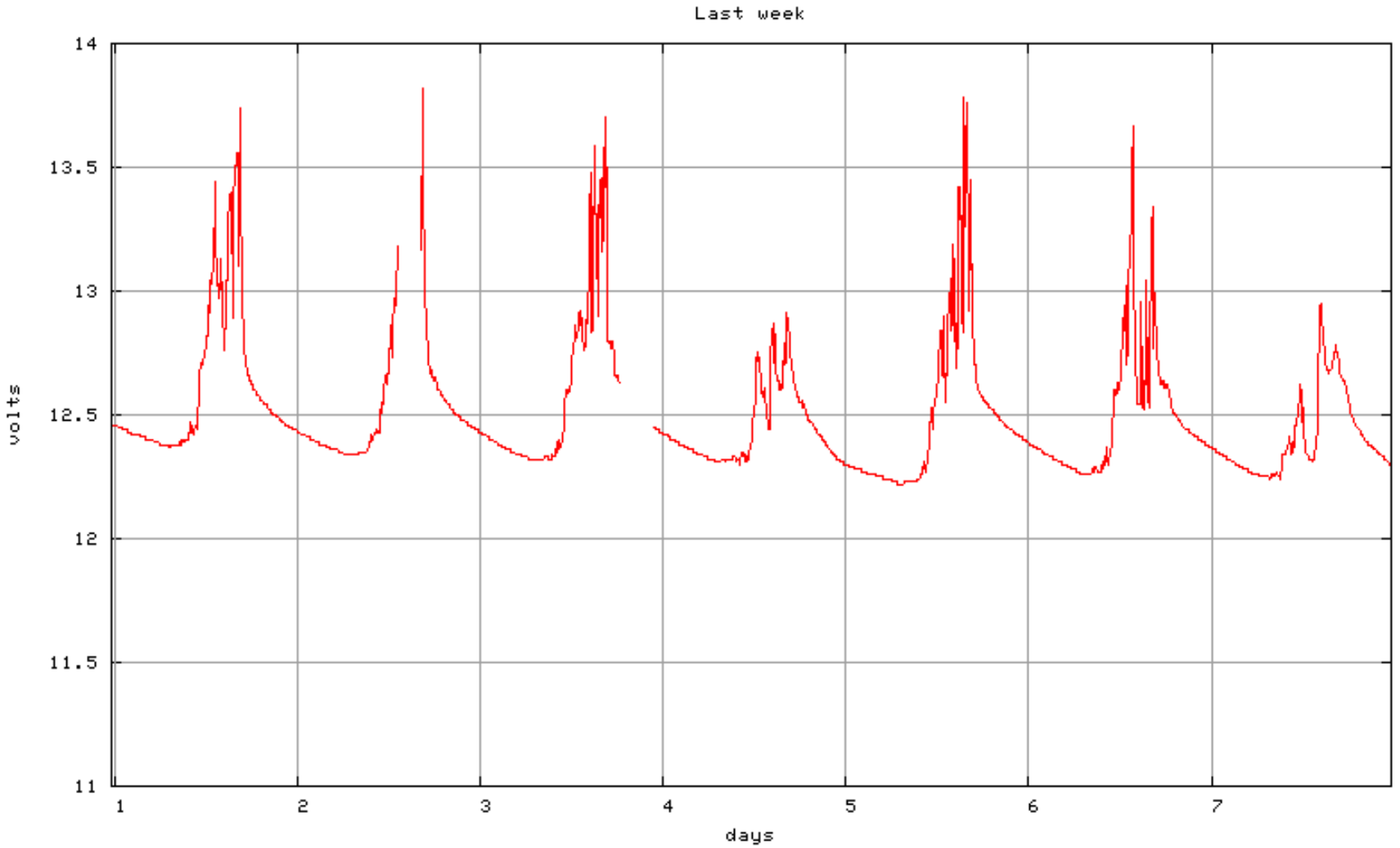
Ubiquiti Photo



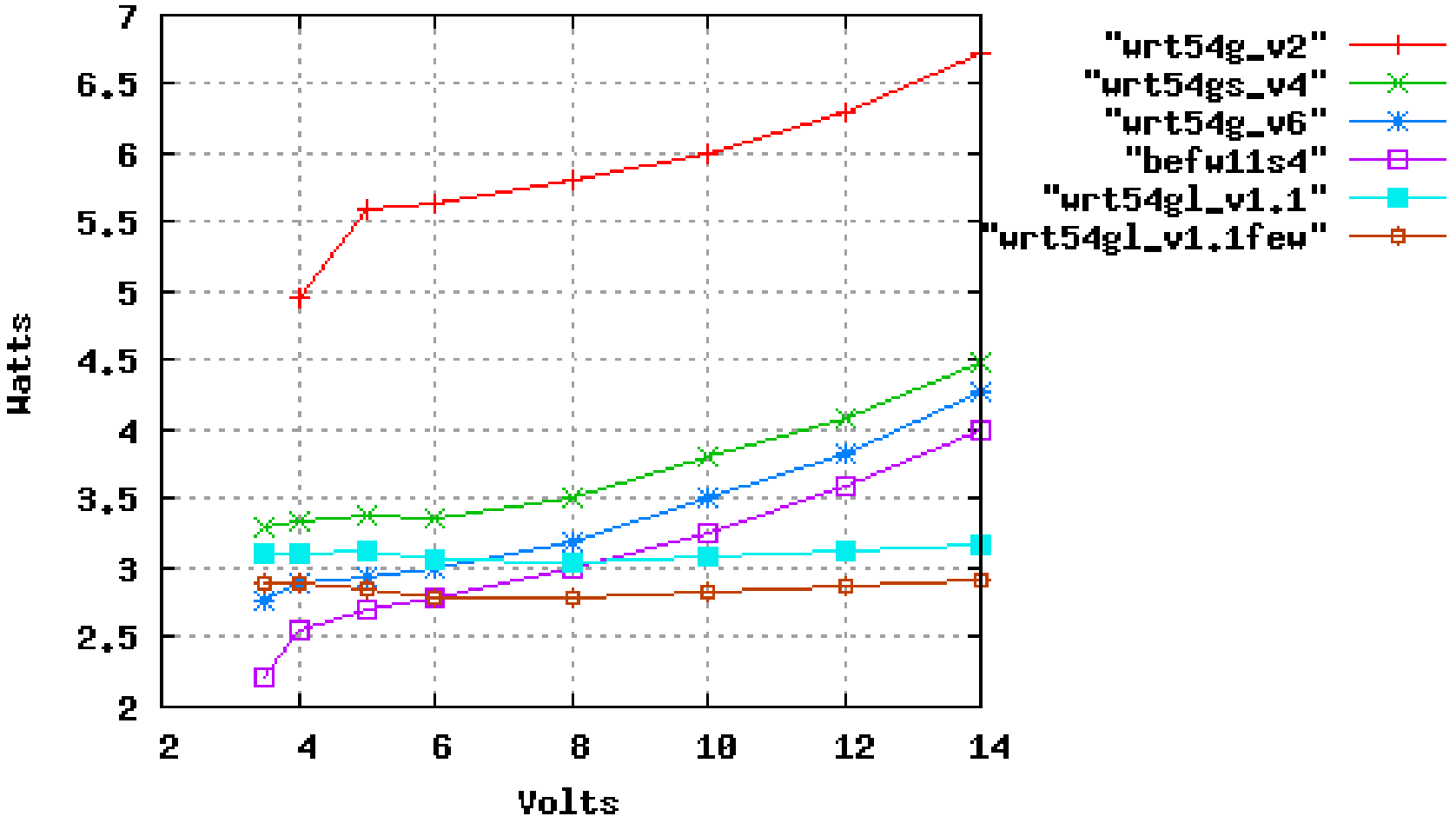
A WRT54GL based mesh node will run indefinitely in central Texas on a 45 watt solar Array, with a 55 Ah gel cell battery. Test done with $169.00 Harbor Freight Solar Array.

Photo by Harbor Freight

AD5OO data for mesh node on Harbor Freight Solar Array.
Mesh node based on Linksys WRT54GL.



The late mode WRT54GL requires less current and operates from 4 – 18 VDC
Has the most flexible and forgiving power subsystem of all the similar models.



Data an Plot by AD500, David Rivenberg

Bi-Directional 2.4GHz RF amplifier – 500mw provides about 10dB gain TX and RX and Noise

Photo by KD5MFW, Glenn R. Currie

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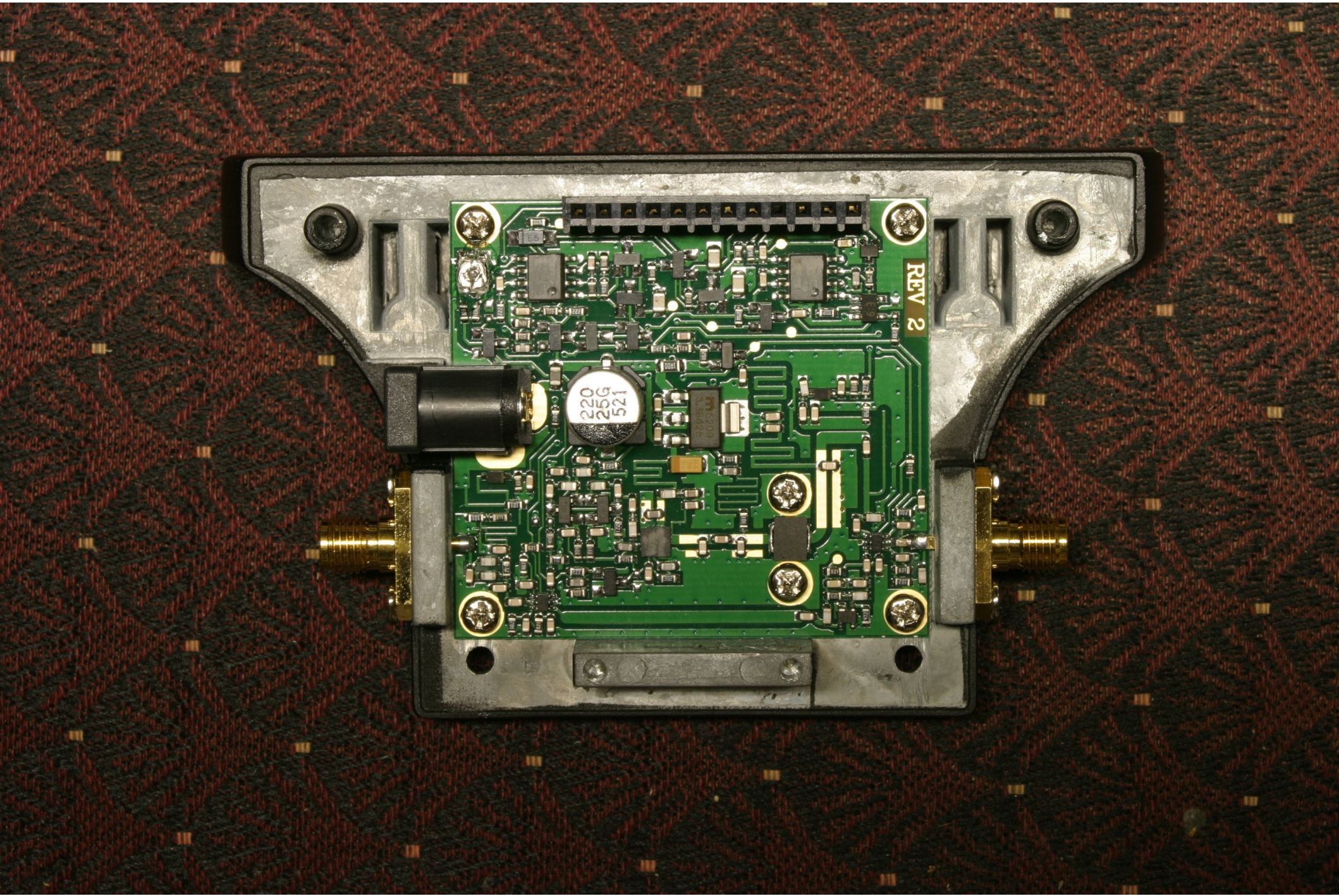
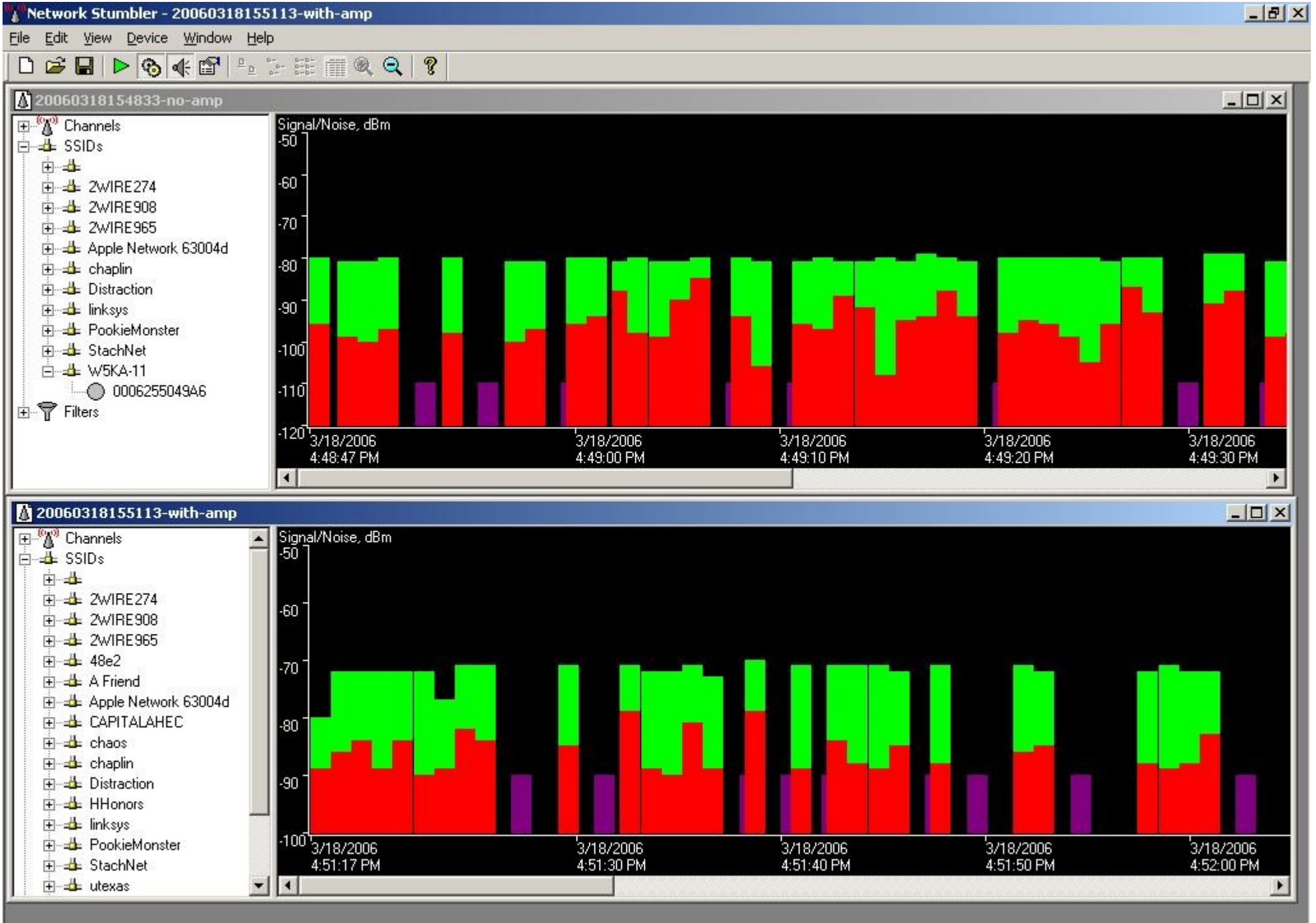
Photo by AD5OO, David Rivenberg

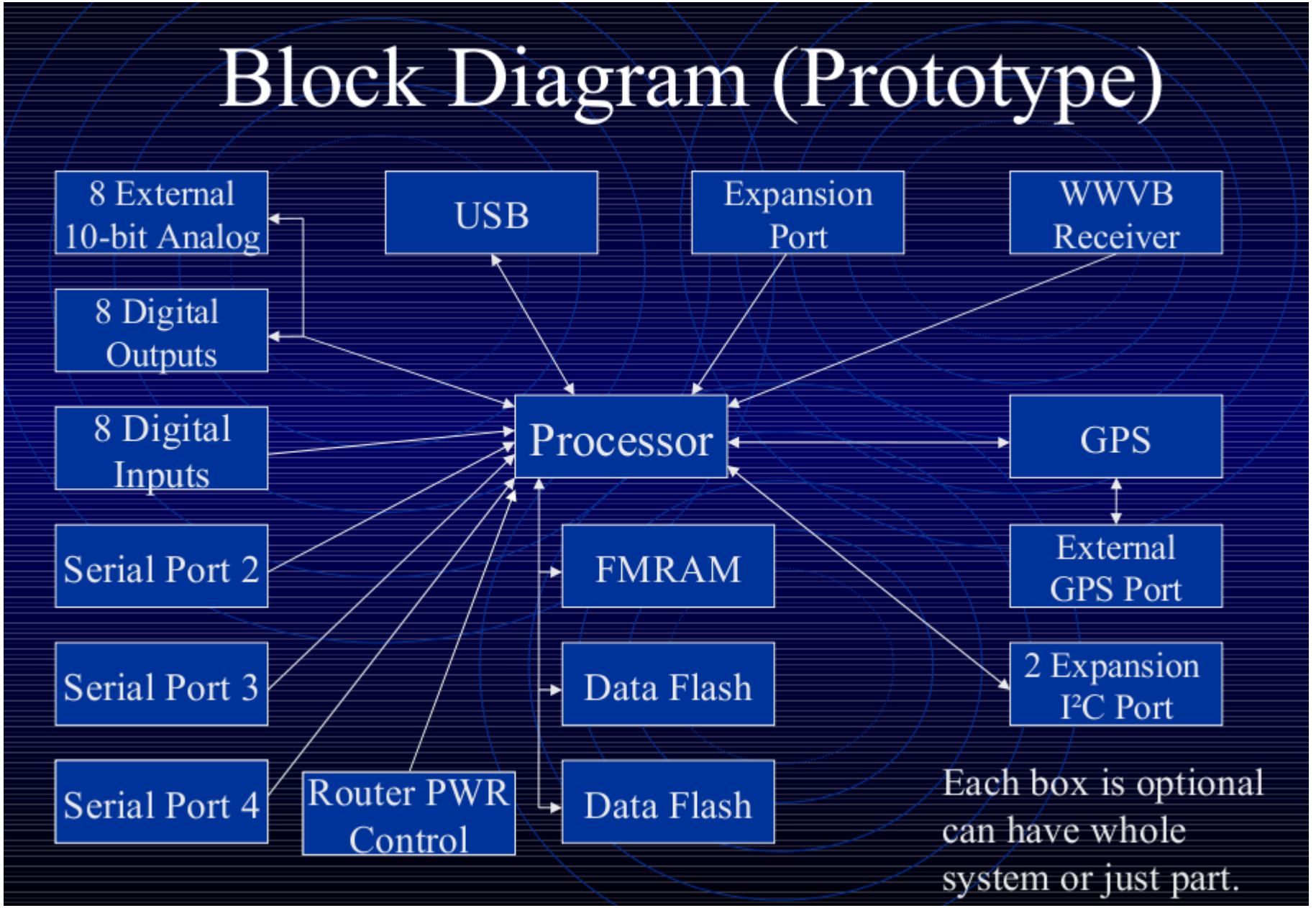


Bi-Directional 2.4GHz RF amplifier – 500mw provides about 10dB gain TX and RX and Noise

Data collected by KD5MFW, Glenn R. Currie using NetStumbler



Supplemental Service Processor to add power control, weather sensors and additional I/O



Block diagram by AB5IE, Kipton Moravec

The Service Processor will allow for battery monitoring and sophisticated power Control of a mesh node.

Battery level and other telemetry can be shared on the mesh network.

The super low power Service Processor microprocessor can turn off the massive 4 watt load of a mesh node to save the battery.

The mesh node could be commanded to power up every 15 minutes and check for A change of status, then go back to sleep. This would greatly extend the battery Life for a node.

Remember that the entire ARRL handbook can be passed in well under one minute With a good link, so a node that is only on part time can still pass massive date With well organized data and smart power management.

A GPS will provide location information for nodes. This can be used to aid in Automatic antenna aiming. The GPS also provides a precision clock that can Be used for a number of interesting things.

The Service processor is still in the prototype stage.

Block diagram by AB5IE

Wireless Mesh Networks Related topics to “Google” for and research

Disruption Tolerant Networks

Data Mules

Mobile HSMM

A wide area wireless ham network?

How many hams are in your grid square?

In many areas there are plenty of hams to set up a large mesh network.

Going Mobile with HSMM-MESH(tm)

AD5OO Mobile HSMM-MESH(tm) with live IP-Video

Photo by AD500, David Rivenberg

KD5MFW Mobile HSMM-MESH(tm) with live IP-Video

Photo by AD500, David Rivenberg

Show HSMM-MESH(tm) mobile IP-Video

Videos by KD5MFW, Glenn R. Currie

AD5OO and KD5MFW, I-10 West Texas
Returning From The Texas Star Party