Broadband-Hamnet

HSMM MESH

broadband-hamnet.org

HSMM ?

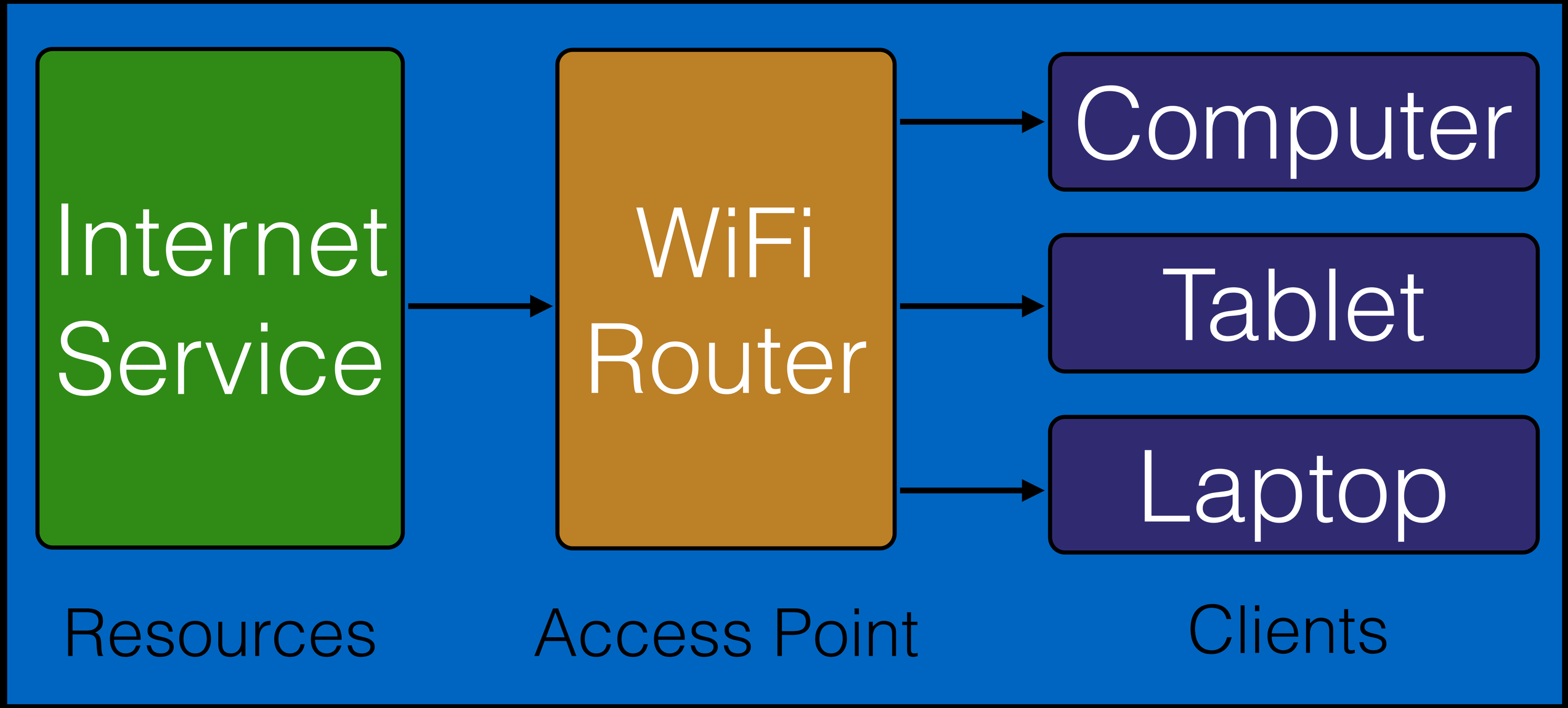
High Speed

1-10 MegaBits / sec

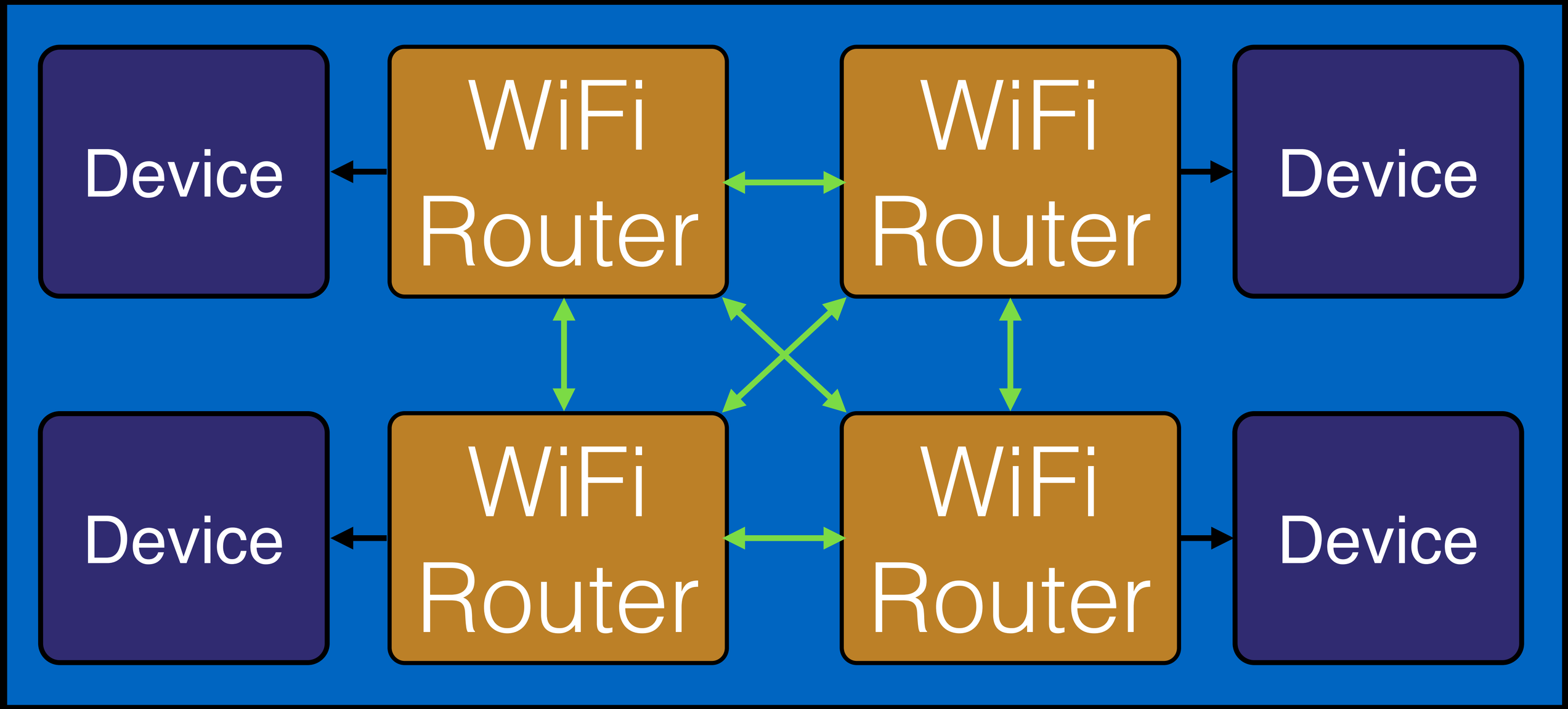
Multi-Media

Images,Video, Files, VOIP, etc.

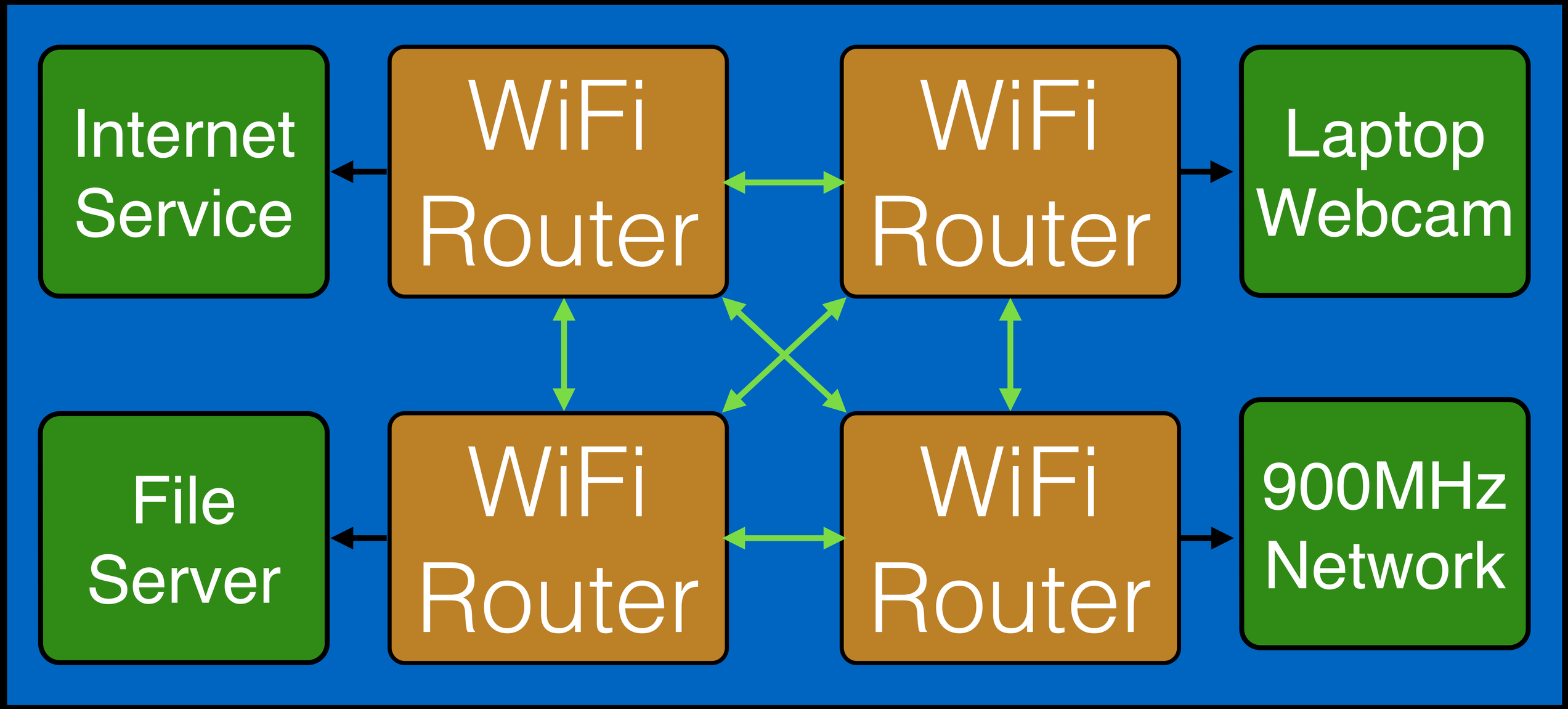
Home Network



Mesh Network



Mesh Network



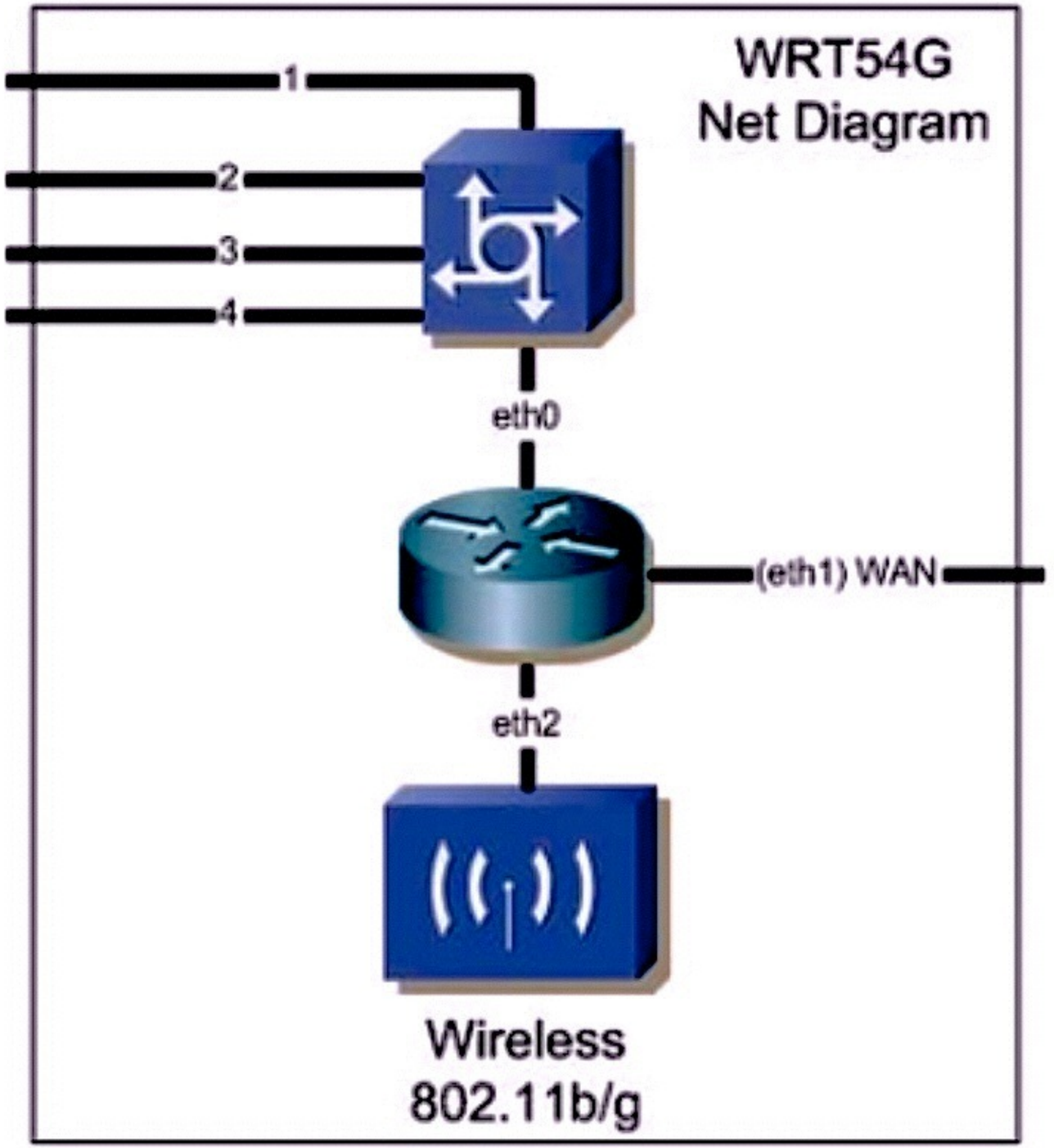
What's in a router ?

Processor w/ memory & storage

Ethernet ports

  WAN (internet) & LAN (home)

Radio (2.401 - 2.473 GHz)


WRT54G
Net Diagram
1
2
3
4
eth0
(eth1) WAN
eth2
Wireless
802.11b/g

Linksys Hardware

Linksys WRT54G **only vers 1-4**

Linksys WRT54GL all versions

Linksys WRT54GS **only vers 1-4**

Check before you buy

Ubiquiti Hardware

Ubiquiti Rocket M2

Ubiquiti Bullet & AirGrid M2 HP

Ubiquiti NanoStation

Check before you buy

Other Hardware

Motorola WR850G

may have some issues

Raspberry Pi - some development

Software is Firmware

Not an application or program but firmware and must be ‘flashed’ into the router’s storage.

Software Files

Different routers require different binary files.

Download files from

http://broadband-hamnet.org/

Software Ingredients

OpenWRT - router control

OLSR - mesh routing

DNS - domain name service

Perl - webpage glue

K7IOW-M1 mesh status

Stop Quit

Local Hosts	Services
K7IOW-M1	

Remote Nodes	ETX	Services
none		

Current Neighbors	LQ	Services
K7IOW-HH	70%	HH-Server
K7IOW-RS	83%	

Previous Neighbors	When
none	

K7IOW-M1 signal strength

Quit

	Signal	Noise	Ratio
now	-24	-87	63
average	-24	-85	61
n = 20/20	max: -21 min: -31	max: -83 min: -88	max: 66 min: 54

K7IOW-M1 WiFi scan

Stop Quit

Sig	Chan	Enc	SSID	MAC	Vendor
-24	1		BroadbandHamnet-v1	EA905A:F1522B	Ad-Hoc
-59	11	*	775L34AJ	001E2A:517DDC	Netgear
-73	6	*	07B4048124	B88D12:64125B	
-85	6	*	barbs wireless	E0469A:C97DF4	

K7IOW-M1 WiFi scan

Stop Quit

Sig	Chan	Enc	SSID	MAC	Vendor
-25	1		BroadbandHamnet-v1	EA905A:F1522B	Ad-Hoc
-63	11	*	775L34AJ	001E2A:517DDC	Netgear
-73	6	*	07B4048124	B88D12:64125B	
-84	6	*	10FX10038474	0CD502:2DE46B	

Node Status | **Basic Setup** | Port Forwarding, DHCP, and Services | Administration

Help | Save Changes | Reset Values | Default Values | Reboot

Node Name: K7IOW-M1 Password:

Node Type: Mesh Node Verify Password:

WiFi

Protocol: Static
IP Address: 10.146.96.11
Netmask: 255.255.0.0
SSID: BroadbandHamnet-
Mode: Ad-Hoc
Channel: 1

Active Settings

Rx Antenna: Right
Tx Antenna: Right
Tx Power: 19 dBm
Distance: 0

Apply

LAN

LAN Mode: NAT
IP Address: 172.27.0.1
Netmask: 255.255.255.0
Gateway: 172.27.0.1
DHCP Server: ☑
DHCP Start: 5
DHCP End: 25

WAN

Protocol: disabled
DNS 1: 8.8.8.8
DNS 2: 8.8.4.4

Mesh Gateway: ☐

Part 15 Device Certification

No Hardware Modifications

No Amplifier

No Antenna changes

Linksys used Linux (GNU GPL)

Part 97 Provisions

Covers Channels 1-6 of 11

Hardware Modifications

Add an Amplifier

Change Antenna

Part 97 Limitations

You are Responsible for Content

Your Call Sign is used

Must not cause interference

Responsible for RF Exposure

Good News

High Speed = images & files

Low Cost

Readily Available

Low Power < 1W

Bad News

CLOS - clear line of sight

Interference from local WiFi

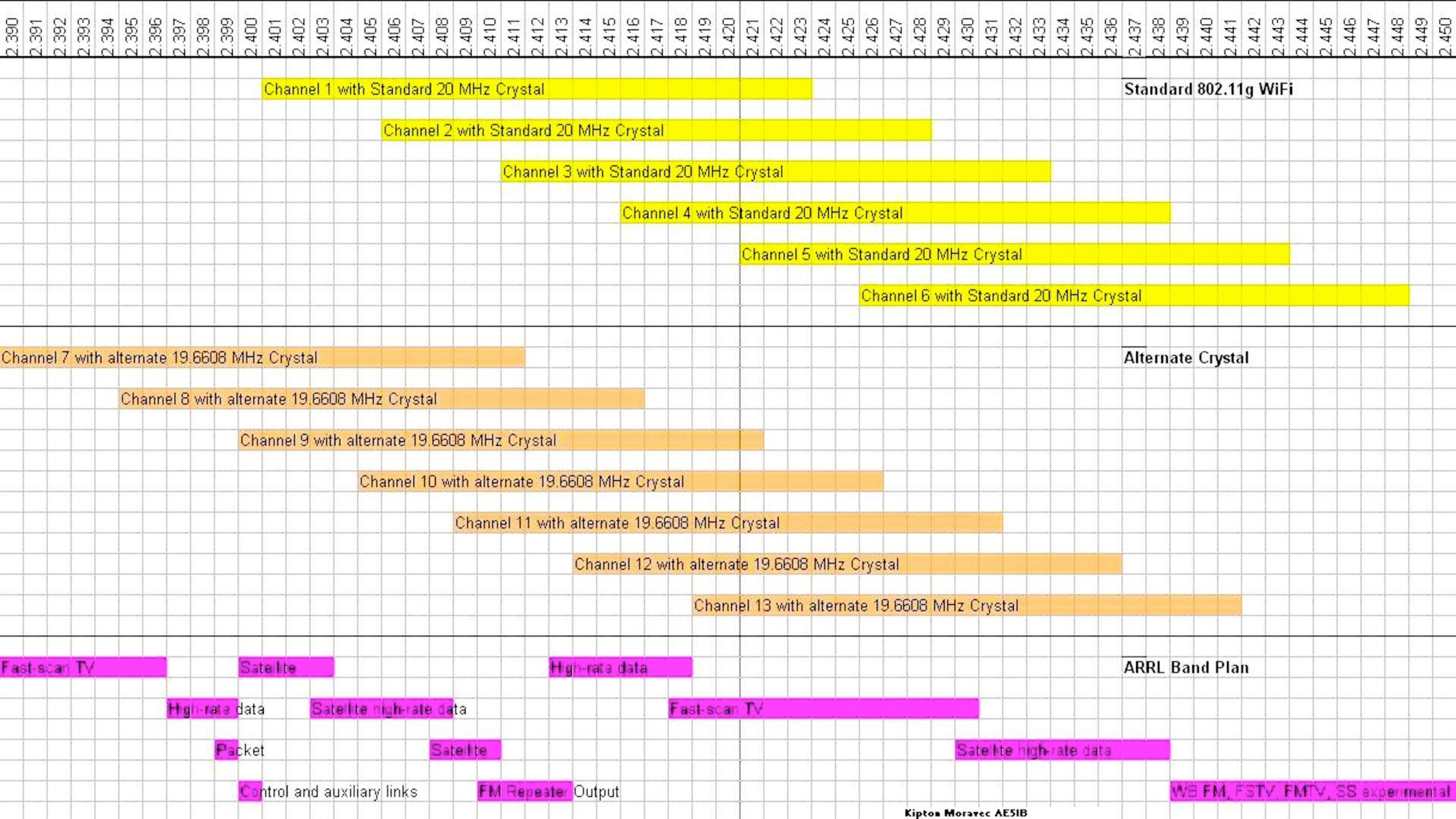
Part 97 - only channels 1-6

Non-Overlapping Channels for 2.4 GHz WLAN

802.11b (DSSS) channel width 22 MHz

BROADCOM
Hynix
HY5DU561622DT-J
C106
C82
CE2
CA2
CE1
CA1
CK1
CK2


C83
C95
C200
C142
C7
C269
C261
C98
R29
RB3
105


2.390 2.391 2.392 2.393 2.394 2.395 2.396 2.397 2.398 2.399 2.400 2.401 2.402 2.403 2.404 2.405 2.406 2.407 2.408 2.409 2.410 2.411 2.412 2.413 2.414 2.415 2.416 2.417 2.418 2.419 2.420 2.421 2.422 2.423 2.424 2.425 2.426 2.427 2.428 2.429 2.430 2.431 2.432 2.433 2.434 2.435 2.436 2.437 2.438 2.439 2.440 2.441 2.442 2.443 2.444 2.445 2.446 2.447 2.448 2.449 2.450
Channel 1 with Standard 20 MHz Crystal
Channel 2 with Standard 20 MHz Crystal
Channel 3 with Standard 20 MHz Crystal
Channel 4 with Standard 20 MHz Crystal
Channel 5 with Standard 20 MHz Crystal
Channel 6 with Standard 20 MHz Crystal
Standard 802.11g WiFi
Channel 7 with alternate 19.6608 MHz Crystal
Channel 8 with alternate 19.6608 MHz Crystal
Channel 9 with alternate 19.6608 MHz Crystal
Channel 10 with alternate 19.6608 MHz Crystal
Channel 11 with alternate 19.6608 MHz Crystal
Channel 12 with alternate 19.6608 MHz Crystal
Channel 13 with alternate 19.6608 MHz Crystal
Alternate Crystal
Fast-scan TV
Satellite
High-rate data
High-rate data
Satellite high-rate data
Fast-scan TV
Packet
Satellite
Satellite high-rate data
Control and auxiliary links
FM Repeater Output
WB FM, FSTV, FMTV, SS experimental
ARRL Band Plan
Kipton Moravec AE5IB

ARRL Band Plan - 13 cm

2300 2303	Analog & Digital, including full duplex; paired with 2390 - 2393
2305 2310	Analog & Digital, paired with 2395 - 2400
2390 2393	Analog & Digital, including full duplex; paired with 2300 - 2303
2395 2400	Analog & Digital, including full duplex; paired with 2305 - 2310

ARRL Band Plan - 33 cm

909 to 915	Broadband multimedia including ATV, DATV and SS
915 to 921	Broadband multimedia including ATV, DATV and SS
921 to 927	Broadband multimedia including ATV, DATV and SS

TELETRONICS
INTERNATIONAL INC.

Focusing On Your Needs

UDC900 1W

902-928 MHz

The Up/Down Converter 900 1W

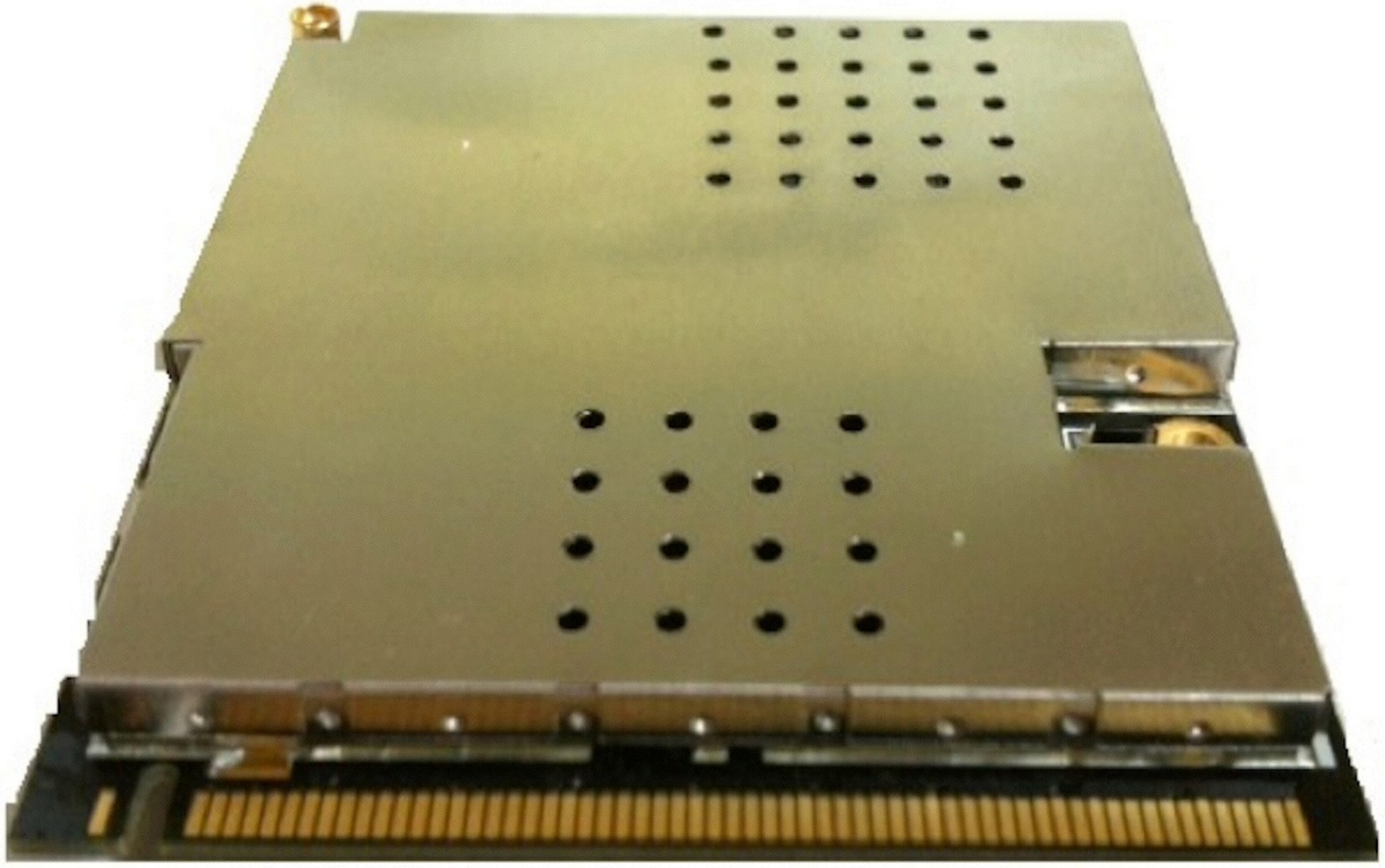
A highly linear product that delivers 1Watt of 900 MHz signal for long range applications. Outdoor unit delivers full power right at the antenna feed. Works with all brands of 2.4GHz radios without any adjustments, including Direct Sequence (DSSS).

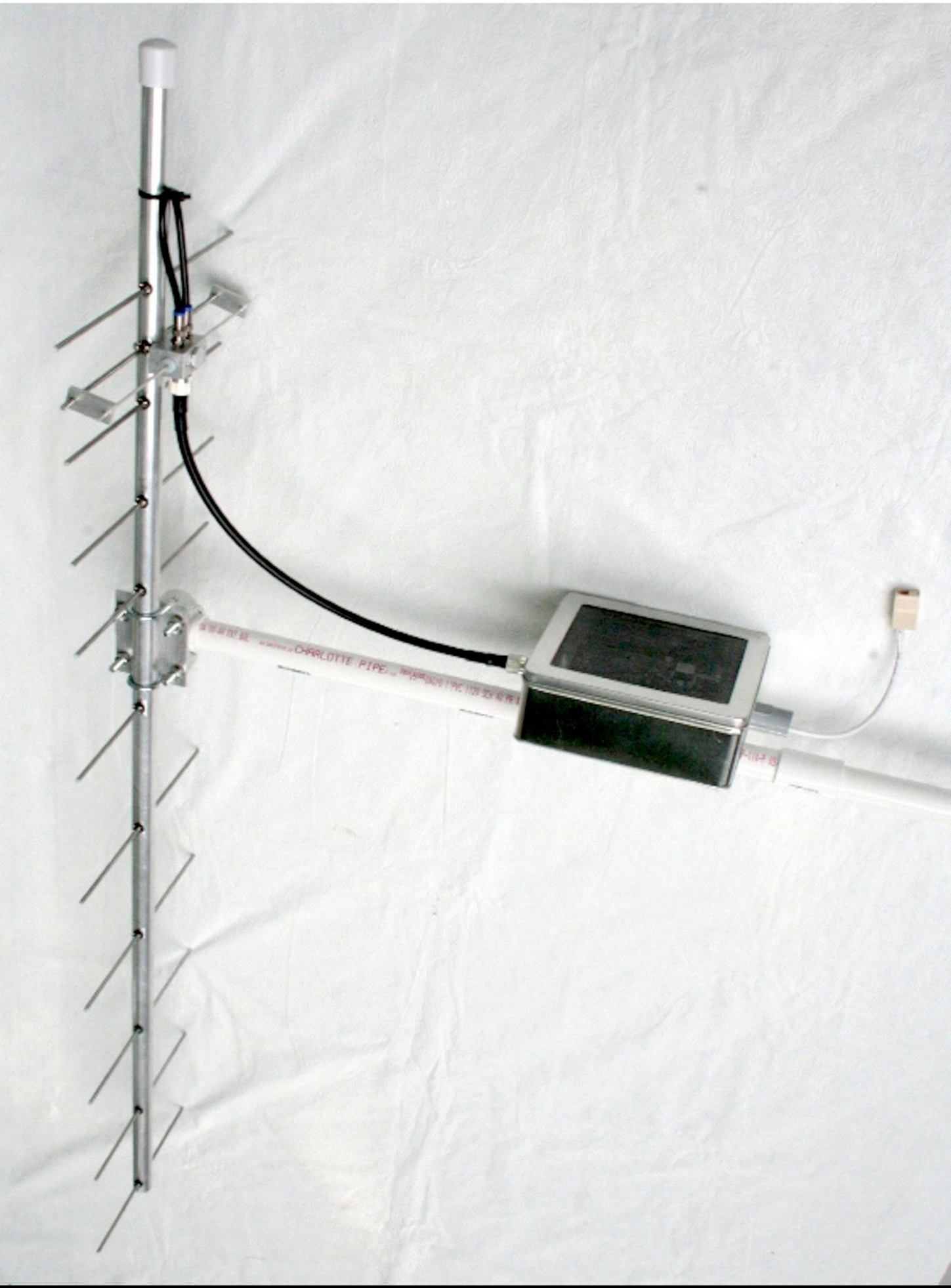
902-928 MHz 1W

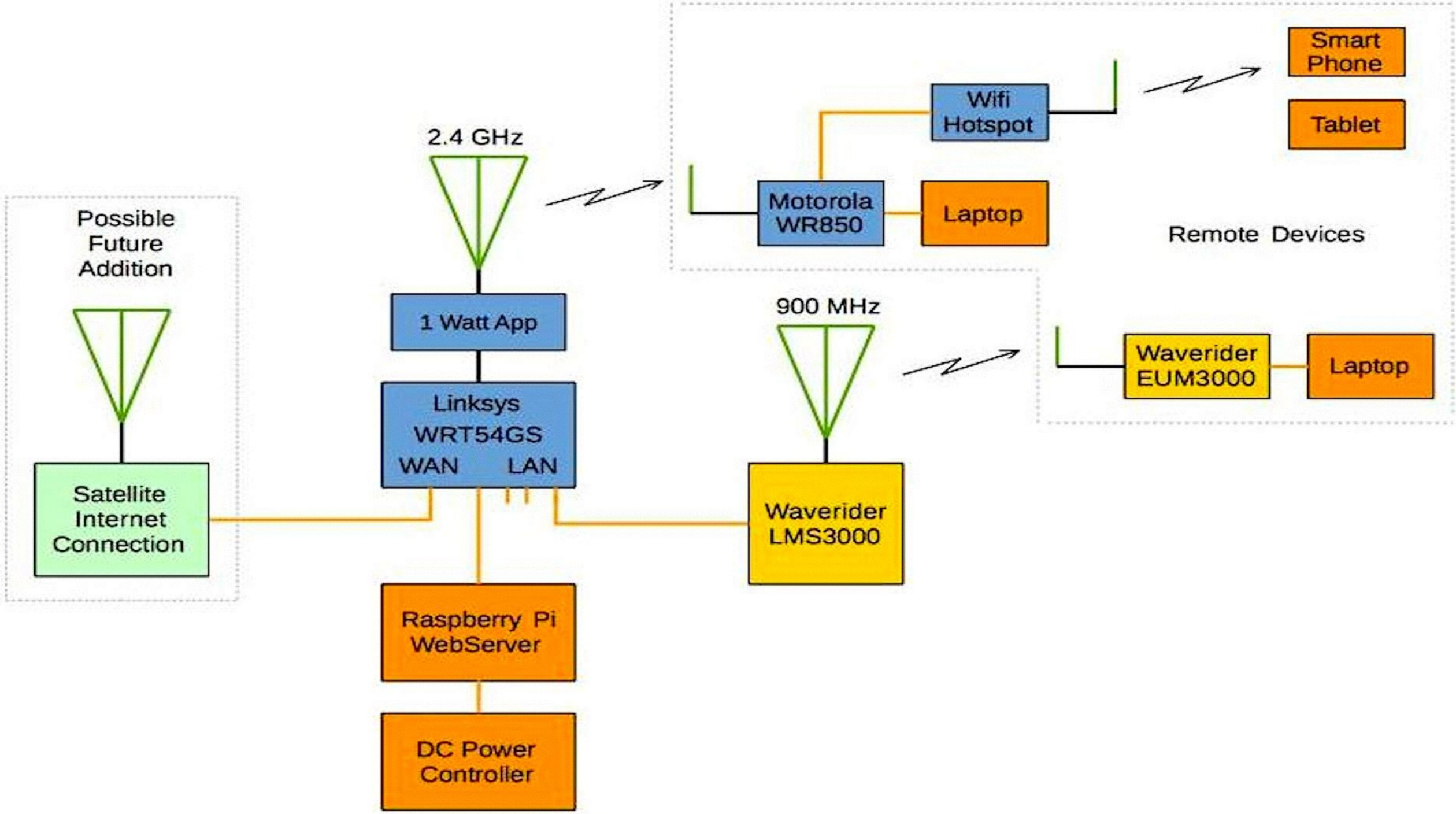
ARRL Band Plan - 70 cm

420 to 426	ATV repeater or simplex with 421.25 MHz video carrier control links and experimental
426 to 432	ATV simplex with 427.250-MHz video carrier frequency

1000mW miniPCI




CHARLOTTE PIPE


Smart Phone
Wifi Hotspot
Tablet
2.4 GHz
Motorola WR850
Laptop
Remote Devices
Possible Future Addition
1 Watt App
900 MHz
Linksys WRT54GS
WAN LAN
Waverider EUM3000
Laptop
Satellite Internet Connection
Waverider LMS3000
Raspberry Pi WebServer
DC Power Controller

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QST

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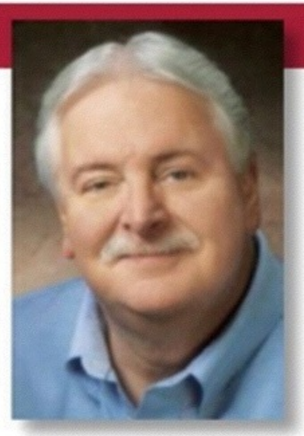
DEVOTED ENTIRELY TO AMATEUR RADIO

May 2014 WWW.ARRL.ORG

Take Amateur Radio Outside and On the Road!

QST reviews:

- Palstar HF-Auto Automatic Antenna Tuner
- iPortable iP60Z Antenna Analyzer



Steve Ford, WB8IMY, wb8imy@arrl.org

High-Speed Multimedia Goes Beyond the Linksys WRT54G

In the finest tradition of Amateur Radio, hams have been "hacking" the Linksys WRT54G series of inexpensive consumer Wi-Fi routers and turning them into 2.4 GHz high-speed data transceivers. These routers operate on a number of channel frequencies that are well within our 2.4 GHz ham allocation, meaning that we can legally do fun things such as attaching them to high-gain antennas and RF power amplifiers. The result has been the development of Amateur Radio High-Speed Multimedia (HSMM) networks in several locations around the country.

The development of mesh technology has made it ridiculously easy to set up highly redundant HSMM networks. Mesh-enabled

overreliance on the WRT54G series. Being dependent on a single brand of hardware is never a good idea. Designs can suddenly change, or the manufacturer may decide to discontinue the product completely.

That's why the Broadband-Hamnet™ project (**www.broadband-hamnet.org**) has been working to expand the HSMM hardware universe. In February they announced that they had released new firmware that enables Ubiquiti 2.4GHz devices to join the mesh.

The popular Linksys WRT54G router has been the workhorse of Amateur Radio High-Speed Multimedia networking for several years.

According to Jim Kinter, K5KTF, the list of Ubiquiti devices supported by the new firm-

The End