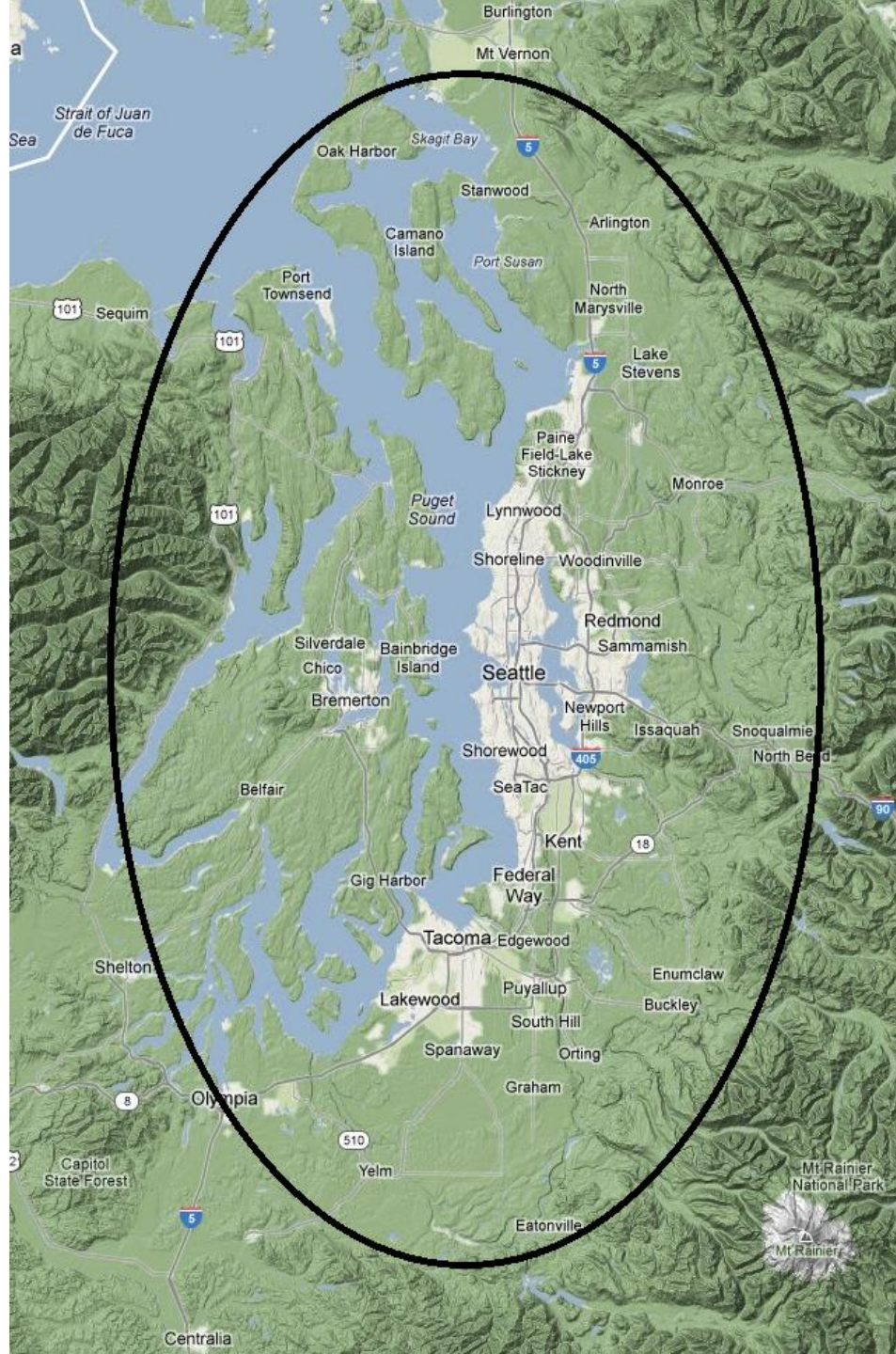


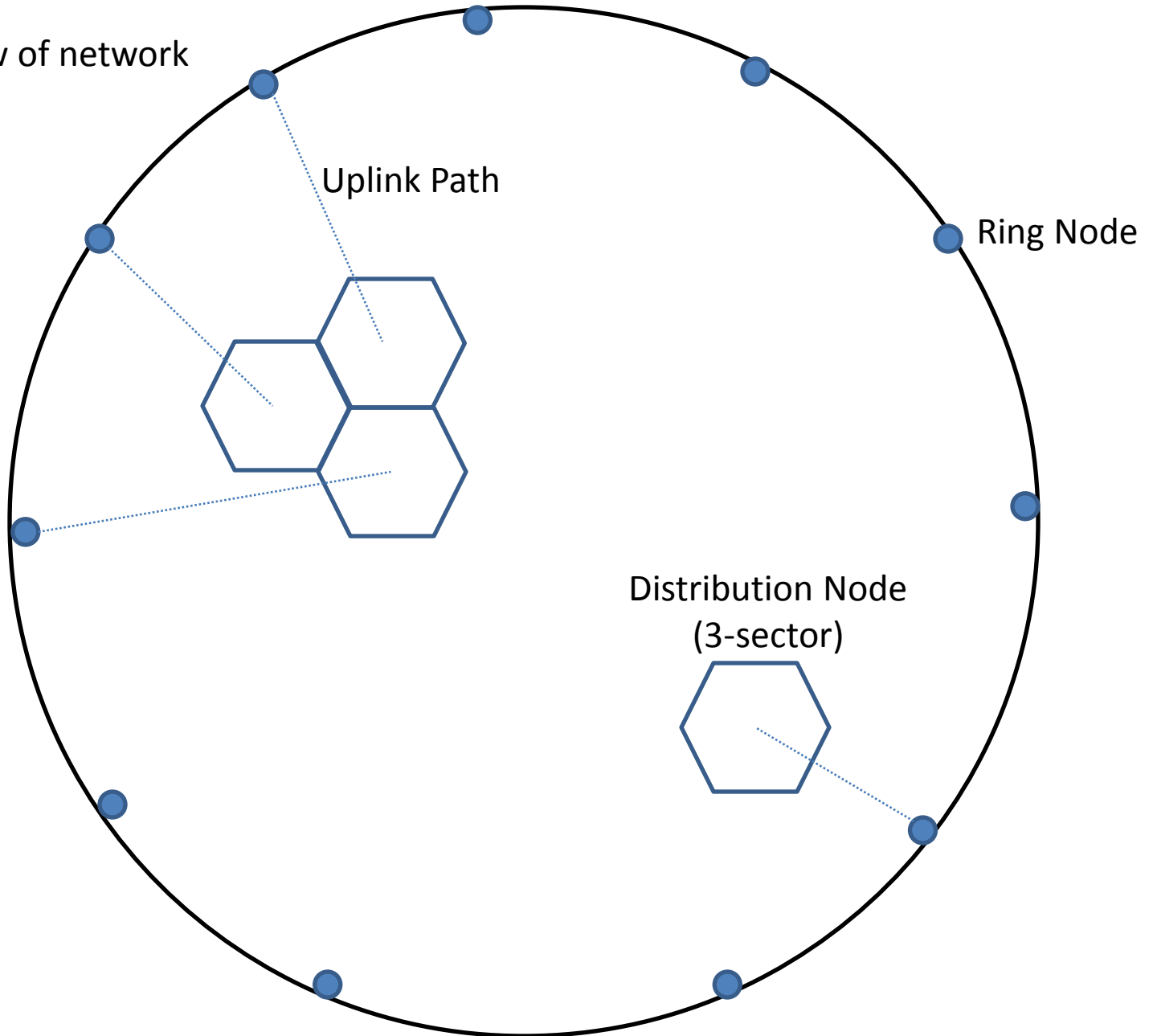
Puget Sound Data Ring

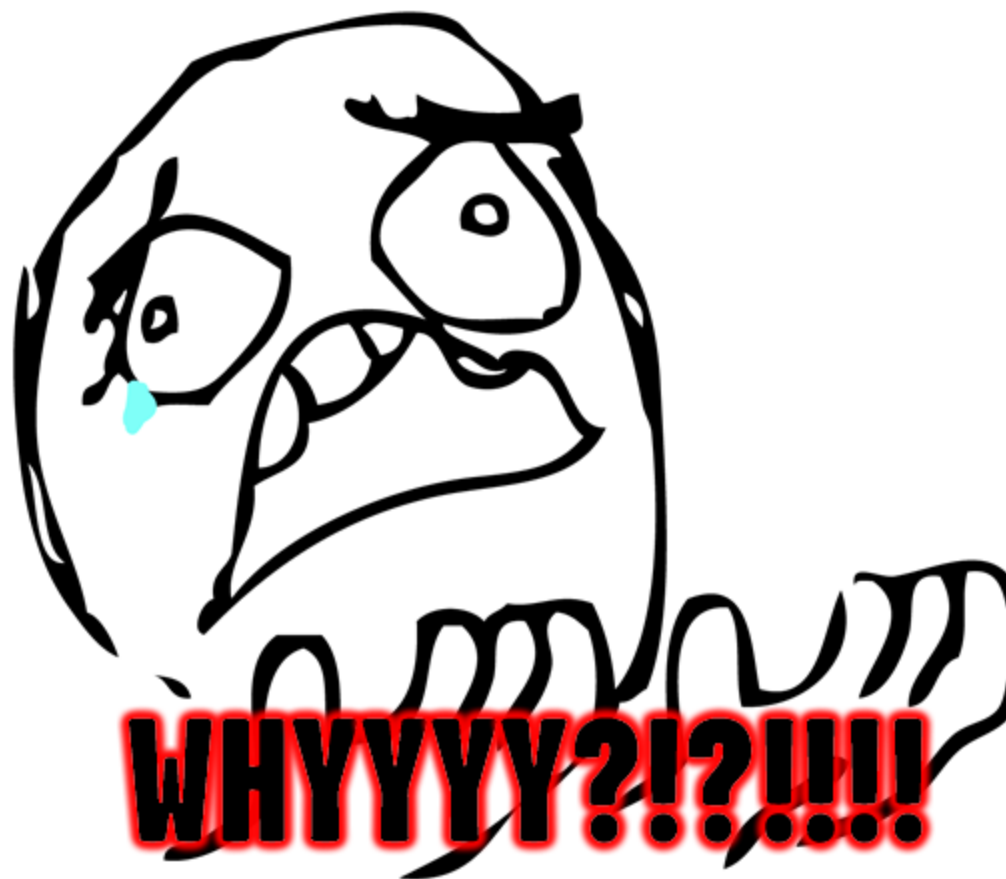
Bart Kus – AE7SJ - me@bartk.us

HamWAN.org



Logical view of network





Why?

- Why do you use FM repeaters when you have a cell phone with you?
 - They connect you to a different community
 - In a lower pressure way
 - Do not require contracts or corporations
 - It's interesting to play with their features
 - They're available when other services fail
 - Those who build them love the challenge

Why?

- Life has advanced into the digital domain
- Amateur Radio should be leading technology, not lagging! Remember the early days?
- Do I really need to convey the value of all the IP-based software out there?
 - Telephony
 - Text messaging
 - File sharing and everything else!

Why?

- Amateurs are in a uniquely good position to be successful at pulling this off!
 - Leverage existing repeater sites
 - Existing club infrastructure to rally for the cause
 - Some existing financial systems to fund it
 - Access to non-ISM frequencies
 - Existing expertise in running radio systems
 - A pool of tech-savvy early adopters / beta testers

Why?

Here's the future of radio communications, and amateurs can be on the other end of that device



How?

- 5GHz band
 - Plenty of spectrum
 - Easy to achieve spatial diversity
 - Low atmospheric attenuation
 - Cheap and available hardware
- The Puget Sound has a unique geometry
- By using a ring design, coverage comes from all angles – obstacles less of a problem

How?

- MikroTik - Metal 5SHPn
- Up to 115Mbit aggregate
- Up to 1.3W transmitter
- Solves hidden node problem
- Only 11.5W consumption
- Only \$99
- Serious features



A Sweet Control UI

admin@00:0C:42:13:E1:3A (wifi-gw1-modem) - WinBox v5.18 on RB411A (mipsbe)

Safe Mode

Hide Passwords

Quick Set

Interfaces

Wireless

Bridge

PPP

Switch

Mesh

IP

MPLS

Routing

System

Queues

Files

Log

Radius

Tools

New Terminal

MetaROUTER

Make Supout.tif

Manual

Exit

RouterOS WinBox

Bridge

Bridge Ports Filters NAT

Interface / Bridge

Log

Wireless Tables

Interfaces Nstreme Dual Access List Registration Connect List Security Profiles

Find

Radio Name	MAC Address	Interface	Uptime	AP	W...	Last Activ...	Tx/Rx Signal ...	Tx/Rx Rate
00:15:00:27:0D:5F	wlan1.1	00:51:05	no	no	0.980	-89	9.0Mbps/...	

4 items

Interface List

Interface Ethernet EoIP Tunnel IP Tunnel GRE Tunnel VLAN VRRP Bonding LTE

Find

Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	Tx Drops	Rx Drops	Tx Errors	Rx Errors
br_closed	Bridge	1522	44.5 kbps	1440 bps	5	2	0	0	0	0
br_open	Bridge	1522	0 bps	0 bps	0	0	0	0	0	0
ether1	Ethernet	1526	44.6 kbps	1728 bps	5	2	0	0	0	0
vlan1	VLAN	1522	44.6 kbps	1504 bps	5	2	0	0	0	0
vlan4	VLAN	1522	0 bps	0 bps	0	0	0	0	0	0
wlan1	Wireless (Atheros AR5...	2290	0 bps	0 bps	0	0	0	0	0	0
wlan1.1	VirtualAP	2290	0 bps	0 bps	0	0	0	0	0	0

7 items

Log

Sep/07/2012 15:19:17 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/07/2012 15:36:31 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/07/2012 15:36:32 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/07/2012 15:40:22 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/07/2012 15:40:24 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/07/2012 15:54:25 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/07/2012 15:54:26 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/07/2012 15:54:27 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/07/2012 15:54:29 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/07/2012 16:01:26 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/07/2012 16:01:27 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/07/2012 23:24:54 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/07/2012 23:29:08 system info account user admin logged in via winbox

Sep/07/2012 23:46:05 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/07/2012 23:46:06 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

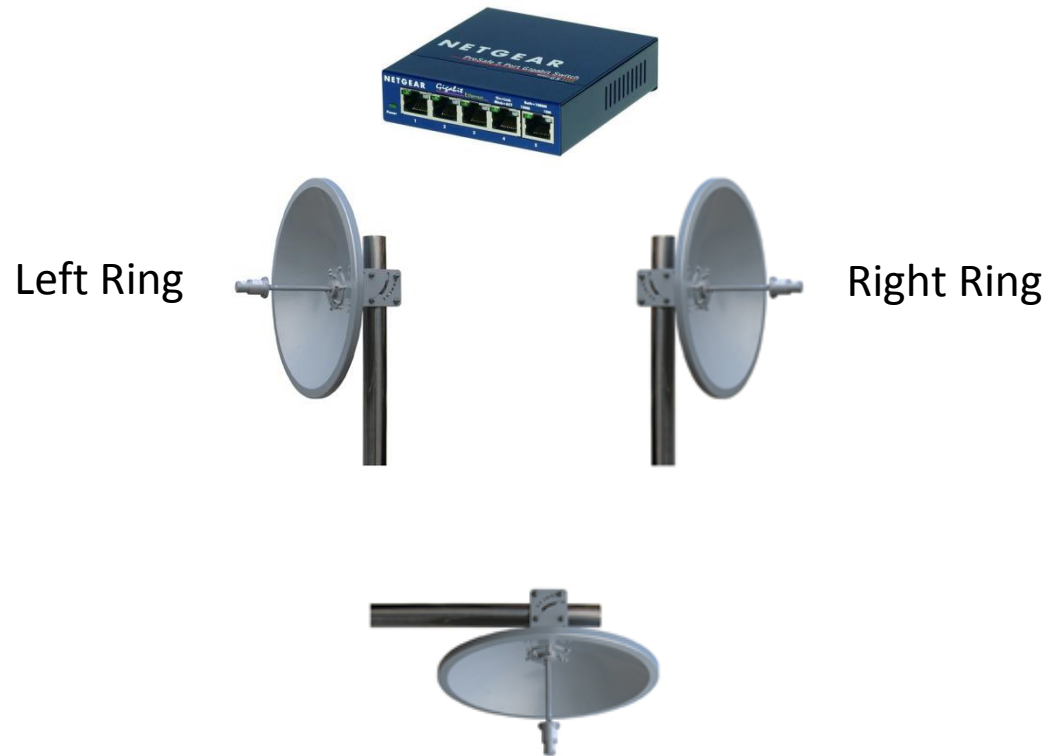
Sep/07/2012 23:53:02 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/07/2012 23:53:04 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

Sep/08/2012 00:00:00 wireless info 00:15:00:27:0D:5F@wlan1.1: disconnected, received disassoc: unspecified (1)

Sep/08/2012 00:00:01 wireless info 00:15:00:27:0D:5F@wlan1.1: connected

A Typical Ring Node Design



Downlink to Distribution Node
And / Or
Sector Antenna

A Typical Distribution Node Design

Ring Uplink



Three 120deg
access sectors



A Typical Client Node Design

Distribution Uplink



A Typical Ring Node Cost

Description	Price	Quantity	Cost
Metal 5SHPn	\$99	3	\$297
5GHz 28dBi Dish	\$75	3	\$225
5-port GigE Switch	\$40	1	\$40
Networked PDU	~\$150	1	\$150
CAT5 Cabling	~\$50	1	\$50
		TOTAL	\$762

A Typical Distribution Node Cost

Description	Price	Quantity	Cost
Metal 5SHPn	\$99	4	\$396
5GHz 28dBi Dish	\$75	1	\$75
120deg Sector	\$180	3	\$540
5-port GigE Switch	\$40	1	\$40
Networked PDU	~\$150	1	\$150
CAT5 Cabling	~\$50	1	\$50
		TOTAL	\$1251

A Typical Client Node Cost

Description	Price	Quantity	Cost
Metal 5SHPn	\$99	1	\$99
5GHz 21dBi Dish	\$45	1	\$45
CAT5 Cabling	~\$10	1	\$10
		TOTAL	\$154

Other units exist: 16dBi dish integrated with 1.25W TX for \$94. Just add CAT5!



3 Node Ring + Distribution Cost

Description	Price	Quantity	Cost
Ring Node	\$762	3	\$2286
Distribution Node	\$1251	3	\$3753
		TOTAL	\$6039

That's less than a single IC-7700 →
And you get to bootstrap the future!



DO YOU
CARE?

I Want YOU To Help

- Scout sites
- Donate money
- Raise money
- Talk to your radio club
- Volunteer your expertise
- Help deploy equipment
- Educate those new to IP

