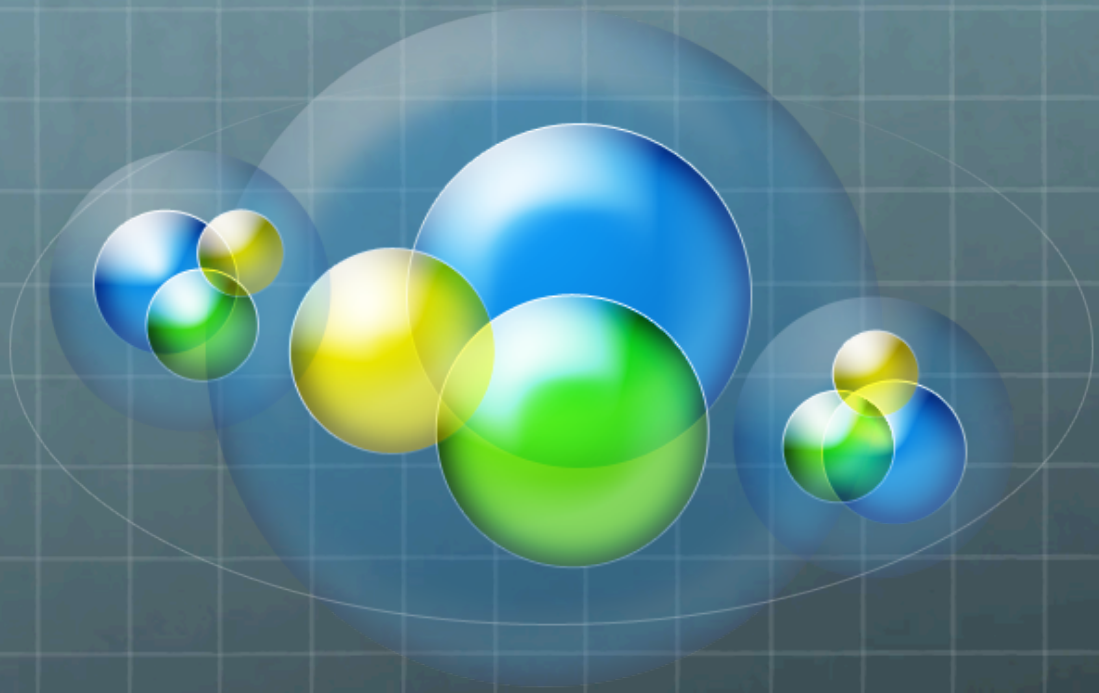


Rapid WISP deployment

Justin Wilson MTIN consulting

Focus

- Focus of this presentation will be:
  - Best practices for Rapid deployment of Mikrotik devices in an xISP environment
  - Best Practices for a uniform network
  - Some real world examples scattered throughout
  - Maximizing your resources for a happier network

Philosophy

- Network design is part philosophy. Ask 3 network engineers how to do something and you might get 5 answers
- Out of those 5 4 might be “right”
- Not here to say “this is how you do it”. Here to share what has worked for me.

About ME
aka why you should care

- Veteran of the ISP industry. Been engaged in commercial ISP ventures since 1994
- Mikrotik (MTCRE, MTCNA, MTCWE), Cisco, Juniper, NET+, MCSA certifications
- Real-world consulting experience
- Built and sold 3 WISPs
  - Last two gained 1000+ customers within the 1st year
  - Both had less than 7 employees managing the entire network
- I like bowties. Bowties are cool!

Challenges

- How do you keep on top of a rapidly expanding network that is pulling you in 10 different directions?
- How do you keep up with outages and Bears attacking your solar sites? New deployments? And existing customer issues?
- How do you manage multiple deployments in different locations?
- How do you scale the network so you are not rebuilding it 15 times during it's life?

Standards

- You want to know, without ever seeing one of your sites, what exactly is there.
- Lots of reasons why
  - No miscommunication with on-site folks
  - Know exactly what replacement parts and tools to take
  - Less spare inventory to keep in stock
  - Reduced troubleshooting time

Standards

- Standardize on things that you might not think are important
  - Buy the same type and brand of cable. Don't run to Lowes in a pinch
  - Goes for anything. Cat-5 connectors, battery backups, etc.
- Choose a standard set of hardware for Access Points, routers, and backhauls.
  - Less troubleshooting should manufacturer have a bug or bad run. Less configs and software to manage.
- Do the installs "by the book" Custom installs or "1offs" should be documented completely

Dual Mikrotik Routers

- Dual Router setup at every POP
- 1st router is what we call “backhaul router”
  - Participates in OSPF and is connected to backhauls
  - Little firewall rules. Focused on moving packets as fast as possible
  - Usually a more redundant or higher grade router such as a 493ah, rb1100, or X86 based

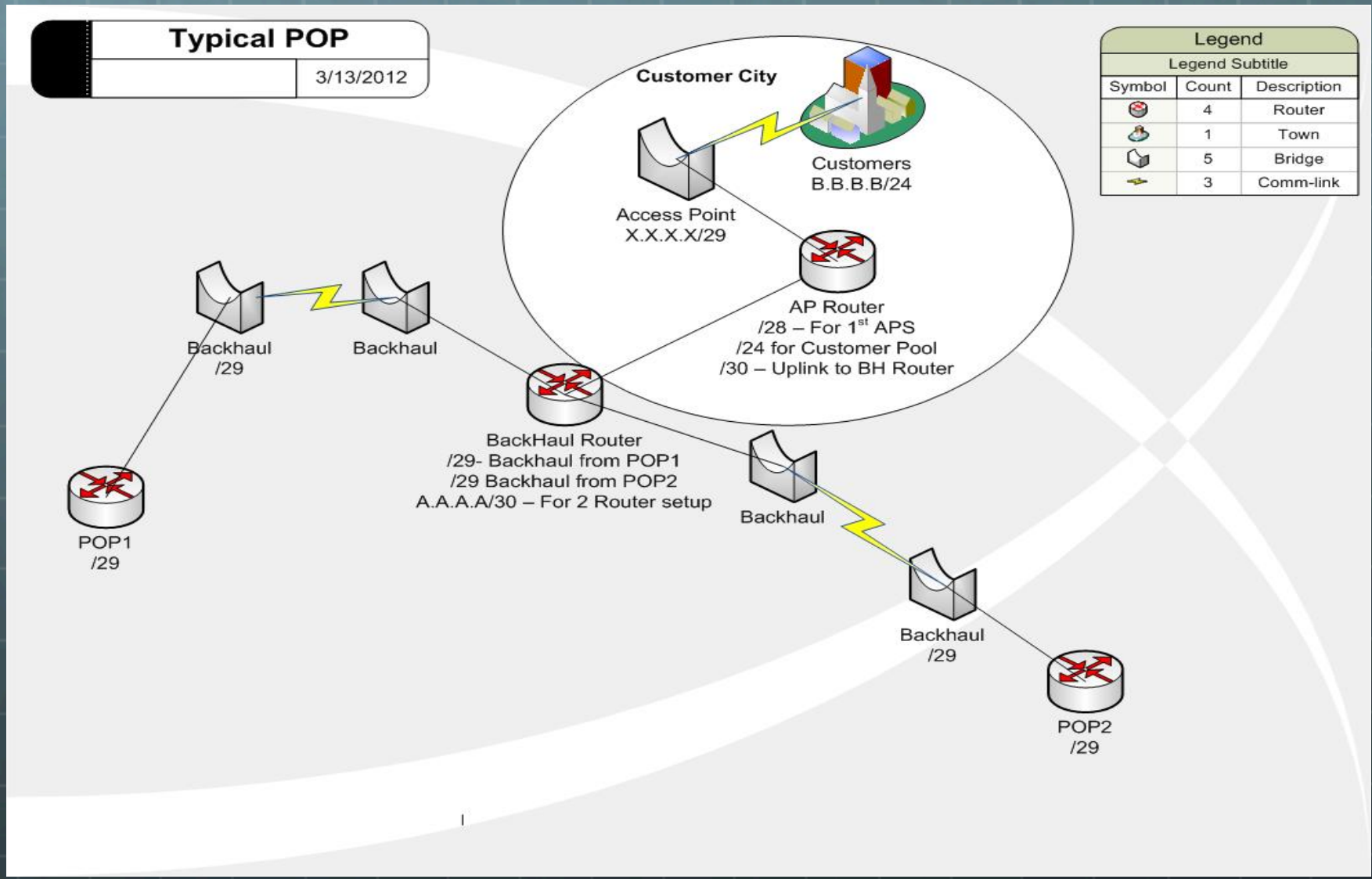
Dual Mikrotik setup

- 2nd router is the “Ap router”
  - Does not participate in OSPF. Has a default route to the Backhaul Router
  - Does customer functions such as PPPoE concentration, Ques, firewalling, etc.
  - Depending on functions can be a less “beefy” router

Why two routers?

- Allows for much easier upgrades, especially on the customer router
- Allows for less beefy hardware in many instances
- Simpler config on each router. Prevents less downtime from human error
- Can take off customer router without taking down network segments

Typical POP


Typical POP
3/13/2012
Customer City
Customers
B.B.B.B/24
Access Point
X.X.X.X/29
AP Router
/28 – For 1st APS
/24 for Customer Pool
/30 – Uplink to BH Router
Backhaul
/29
Backhaul
BackHaul Router
/29- Backhaul from POP1
/29 Backhaul from POP2
A.A.A.A/30 – For 2 Router setup
Backhaul
POP1
/29
Backhaul
/29
POP2
/29
Legend
Legend Subtitle
Symbol
Count
Description
4
Router
1
Town
5
Bridge
3
Comm-link

Typical POP IPs

- Every POP gets the following whether it is a single AP or not.
- /22 of private Ips to each tower
- Broken down into the following
  - /23 for Customer Radios
  - /24 for “restricted pools”
  - Last /24 is broken into /28’s and /30’s for infrastructure
    - Aps
    - Remote Management
    - Router to Router
    - Router to switch

Best Practices

- Keep your routers at the Same OS level. Doesn't have to be the latest greatest, just uniform. Goes for Wired routers, wireless Aps, and clients.
- Have a base-line config for every router. Same packages enabled, same services enabled, same SNMP string, etc.
- Use same ports for uplinks, same Port for AP1, etc. across your network.
- Modular design is key!

Best Practices

- Labeling both physical and in software
  - I personally use UPPERCASE for everything. That way I don't have to worry about misstyping if I have to manually enter things in
- Document as much as you can in comments
  - Circuit IDS, last time changes we made (Thanks Greg Sowell)
- Colored Cat-5 cables for certain functions
  - Router to router is Red
  - Router to switch is blue
  - To Remote Reboot or UPS is yellow

Example

	Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...
;;; IFN FIBER TO ANDERSON 102/ET/IPVINEAW06/LFTPINABW05							
R	1-Anderson	Ethernet	9014	43.6 Mbps	6.5 Mbps	5 161	3 742
;;; WINTEK FIBER TO CHERRY GROVE							
R	2-CHERRYGR...	Ethernet	9014	11.6 Mbps	1725.9 k...	1 431	1 090
R	PDS-VLAN...	VLAN	9010	523 bps	396 bps	1	1
R	SERVERVL...	VLAN	9010	0 bps	0 bps	0	0
R	WINTEK-V...	VLAN	9010	11.6 Mbps	1603.5 k...	1 430	1 089
;;; UPLINK TO COGENT 1-89824421							
R	3-COGENT	Ethernet	9014	11.8 Mbps	88.5 Mbps	7 086	9 959
;;; NEWWAYS 103/ET/CNVLINABW05/IPLVINEAW06							
R	4-NEWWAYS	Ethernet	9014	33.3 Mbps	3.7 Mbps	3 456	2 376

Best Practices

- Have a quick cheat sheet somewhere of pertinent info. Tech numbers, circuit ids, etc.
- Document the network in something
  - Most people are visual people. We can't remember everything.
  - I personally use "The DUDE" as my network map.
  - Business continuity . Think about what happens if you "get hit by a bus"
  - Saves money in training new folks

Tower Setup

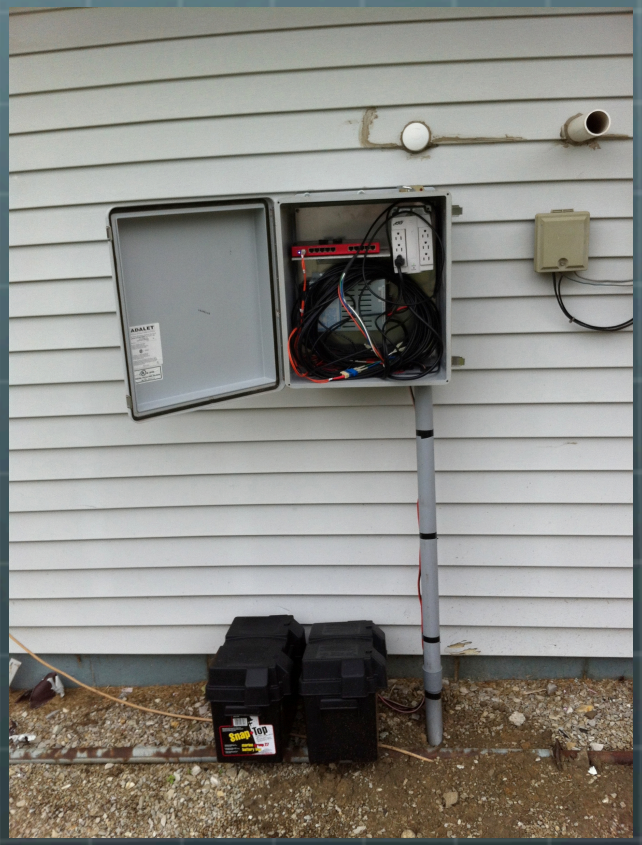
- Modular design allows different elements to not be so tied together.
- Fiber & DC up the tower
  - 3 small Cable runs just slightly bigger than heavy shielded cat-5
  - Allows for rapid expansion of the tower
  - Using RB2011's you have Gigabit capability to your devices at the top of tower
  - Not equipment specific

Zig Box

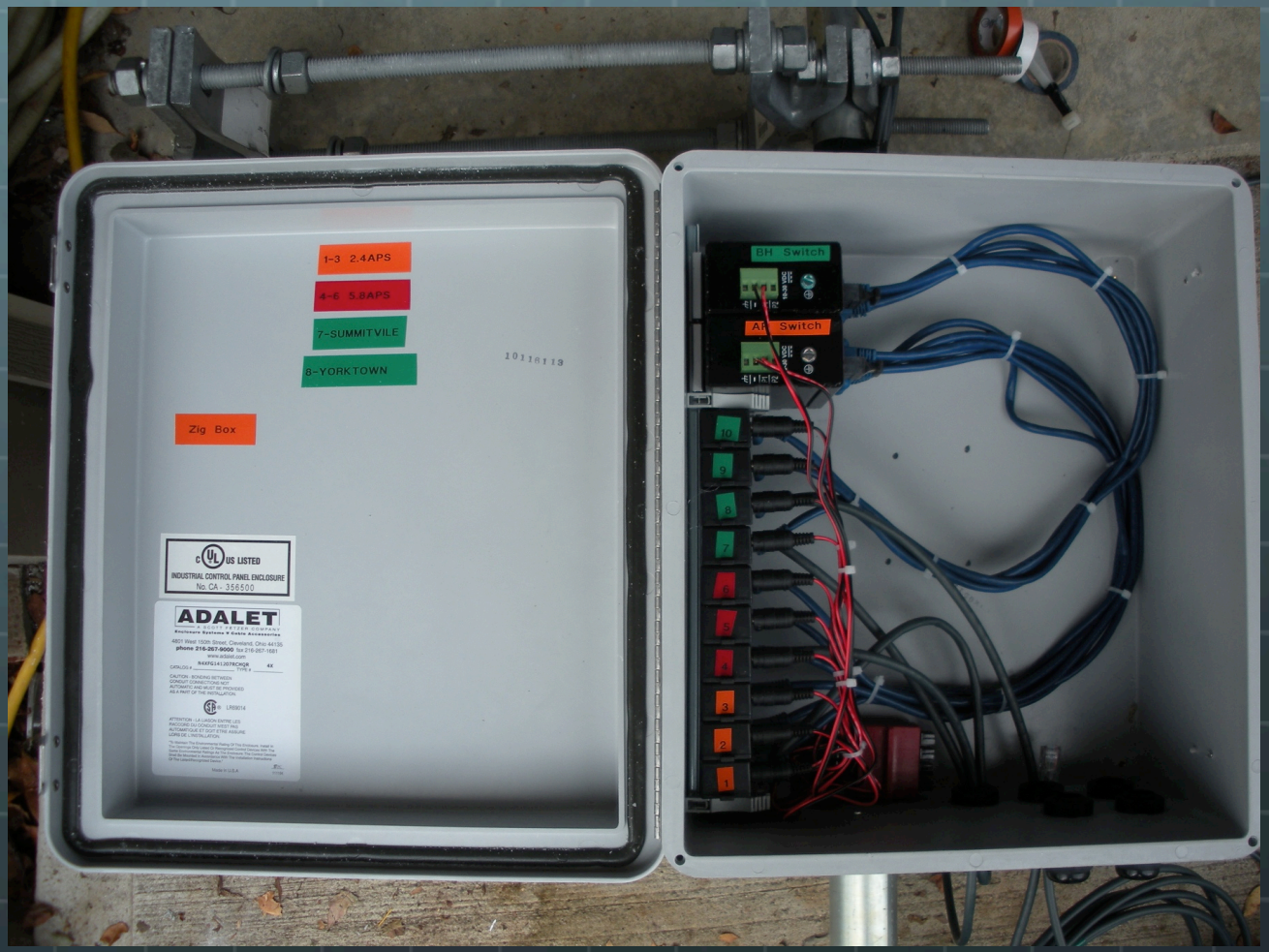
ZigBox


802.11 b/g/n
POE
GIGABIT ETHERNET
USB
PWR
ETH1
ETH2
ETH3
ETH4
ETH5
1 2 3 4 5
6 7 8 9 10

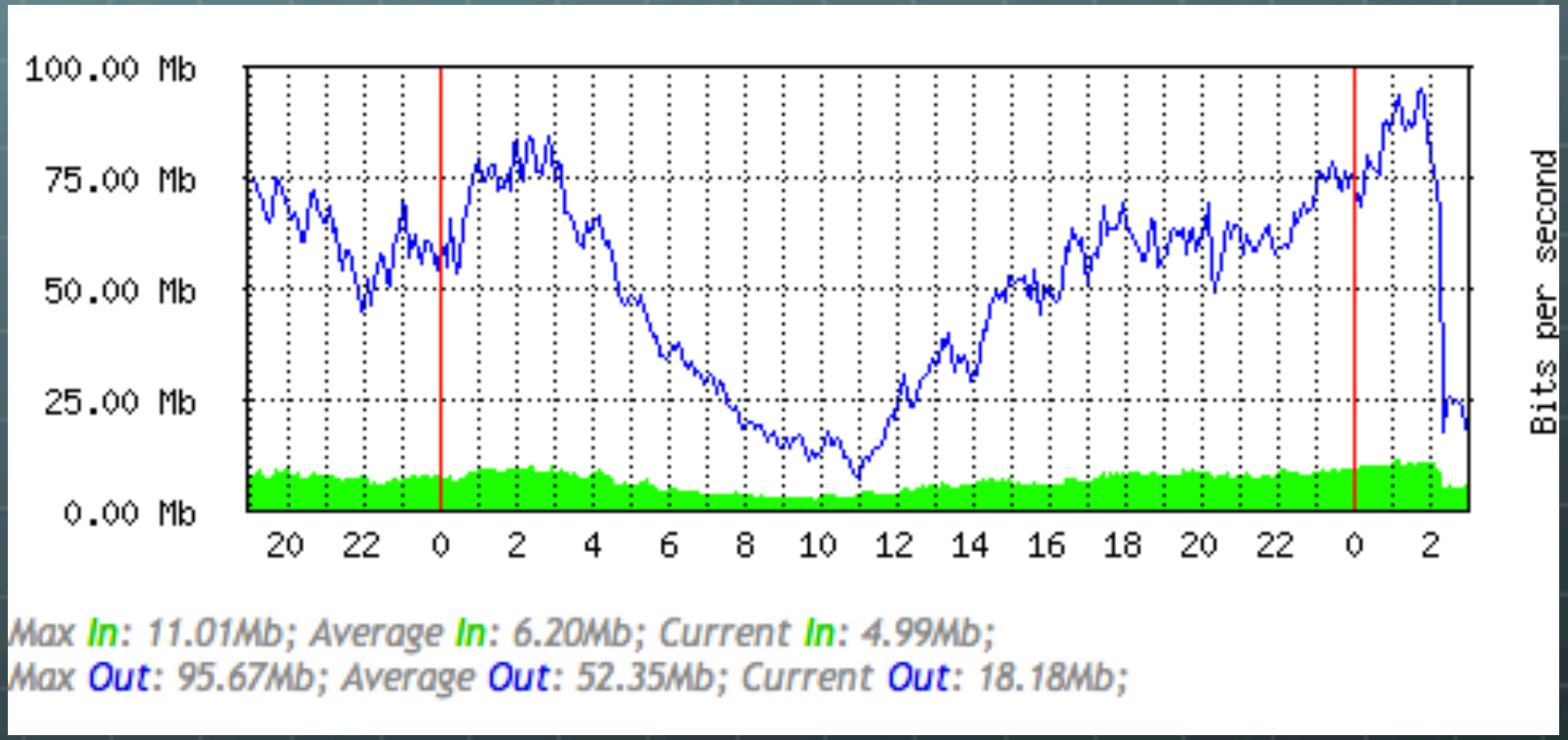
ZigBox



Upper Box


1-3 2.4APS
4-6 5.8APS
7-SUMMITVILE
8-YORKTOWN
Zig Box
BH Switch
AP Switch
ADALET

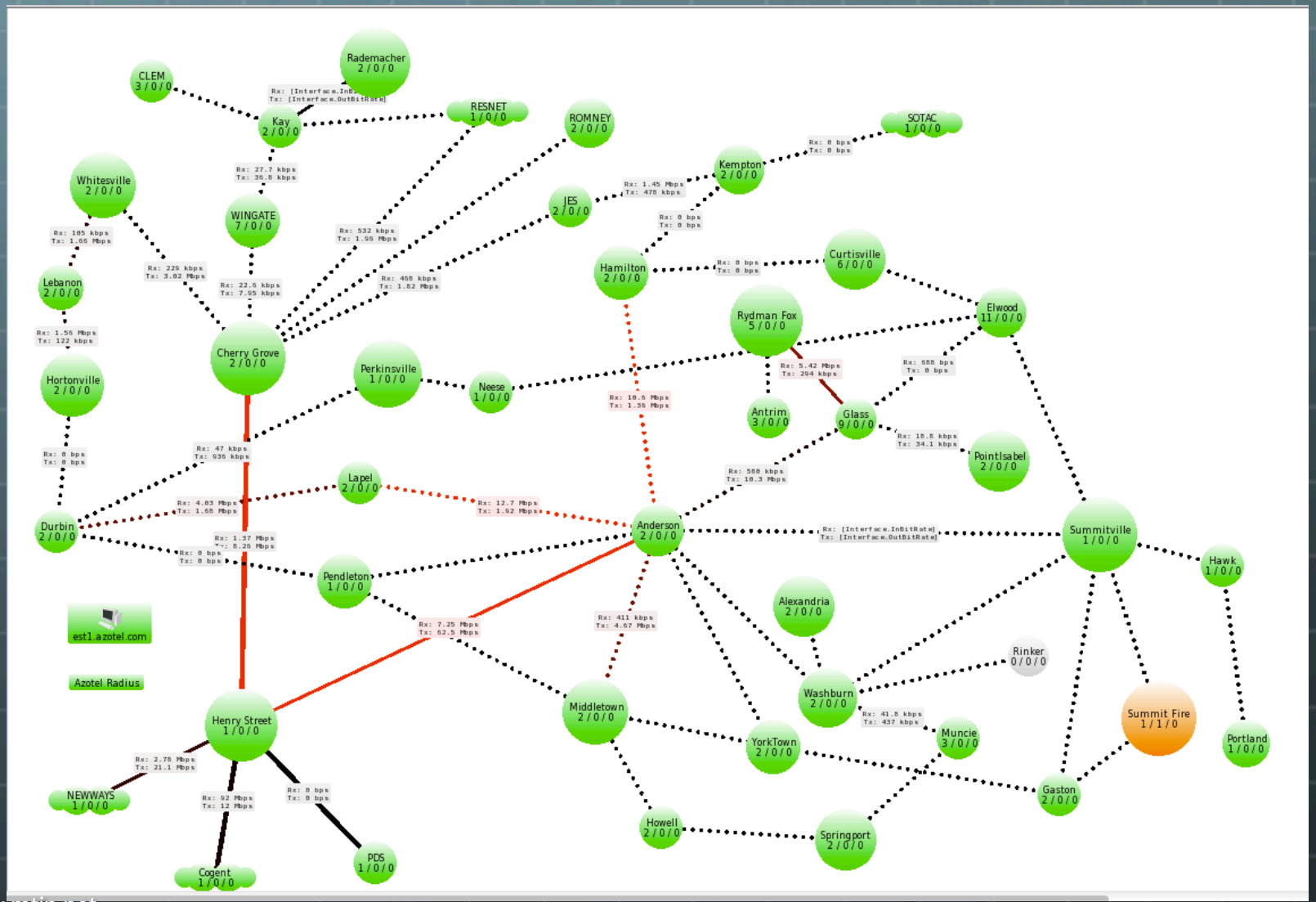
Scary?


100.00 Mb
75.00 Mb
50.00 Mb
25.00 Mb
0.00 Mb
20 22 0 2 4 6 8 10 12 14 16 18 20 22 0 2
Bits per second
Max In: 11.01Mb; Average In: 6.20Mb; Current In: 4.99Mb;
Max Out: 95.67Mb; Average Out: 52.35Mb; Current Out: 18.18Mb;

ZigWireless

- Grew from 0 customers and 1 tower to 1500 and over 40 sites in less than 2 years
- 1000 customers were reached under 1 year
- 29 sites live in less than 12 months. Averaged 3 sites a month.
- Average of 60-70 installs a month with a crew of 2-3 installers. Normally just 2 installers.
- All with 6 employees

Current Zig Network



Challenge Accepted
Where to start

- Start with backend tools or implement them ASAP
  - User Authentication
    - PPPoE, hotspot, or some other mechanism. Billing too
  - Network Monitoring
    - The Dude – Duh!
  - Standardization on everything
  - Automate as much as possible
    - Billing, CPE management, troubleshooting,etc.
  - Have a framework which allows flexibility to adjust to new product models, client needs, and external forces. Modular!
  - Change your philosophy if needed
    - Your network is there to make you money. Spend time hooking up customers instead of messing with it. K.I.S.S.

Favorite Tools

- IPPLAN – Allows you to keep track of your ip addresses
- The Dude – Great for network mapping and monitoring. Mapping is a great by-product
- Cacti – Great for historical traffic, signal, and other graphing
- Backend systems which automate as much as possible.
- Mac-Telnet. Greatest invention ever!

Some Tidbits

- Cookie Cutter networks make you worth more. Plain and simple
- Standards allow you to concentrate on generating revenue and keeping customers
- Invest in your most problematic tower/pop for immediate results
- Everything the same allow you to implement new things smoother

Contact ME

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