



Wireless installations and IP streaming

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Bulleri Internet



- Began in 2004 to bring wireless high speed Internet to the Greater Prescott Area
- Today we cover more than 175 square miles in Yavapai county in the state of Arizona
- We now have more than 1000 wireless internet subscribers
- Our NOC is in Prescott AZ

About Bulleri Internet

- We are 100% Mikrotik APs and about 50% Mikrotik CPEs
- Most back hauls are Mikrotik with nStream
- Our high capacity backhauls are Exalt radios
- We have over 20 hotspot locations and will add up to 60 more in the next 6 months



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- They needed:
- VPN services
- Backhaul services
- Streaming sites
- General networking and remote control

How we got started together

- Bulleri needed tower space
- HRG needed Routable IPs to control and monitor remote locations
- Once they saw that we could give them access on remote locations it spread to new ideas

What that turned into

- Providing for digital remotes via streaming hardware
- VoIP services to allow older radio control systems to call their network engineer
- Digital streaming of the stations to the internet
- Digital streaming to new towers instead of conventional radio backhaul

Radio streaming equipment used

- Barix Instreamer 100 encoder
 - <http://www.barix.com/Instreamer/301/>
- Barix Exstreamer 100 decoder
 - http://www.barix.com/Exstreamer_100/431/
- Comrex access pair
 - <http://comrex.com/products/access.htm>
- Static routable IPs on each device

Issues that came up

- With the flexibility and simplicity of adding these links, we went from 2 to 7 in a short period of time
- Each connection requires approximately 128 kbps of dedicated upload
- With 7 of these connections this added up to 896 kbps of sustained upload from the station

Issues that Came up

- With their Internet and VPN traffic, this quickly outpaced there wireless T1 that we were providing
- Also the small consistent packets caused degradation of the connected sector they were attached to with them and for other customers that were connected to that sector

Solution

- To resolve this we set up a Mikrotik nStreme PTP to there location from the tower
- After that they could pull a minimum of 10 Mbps up and down to the Internet UNQUEed
- This also gives them 10 Mbps anywhere in our network to each broadcast tower

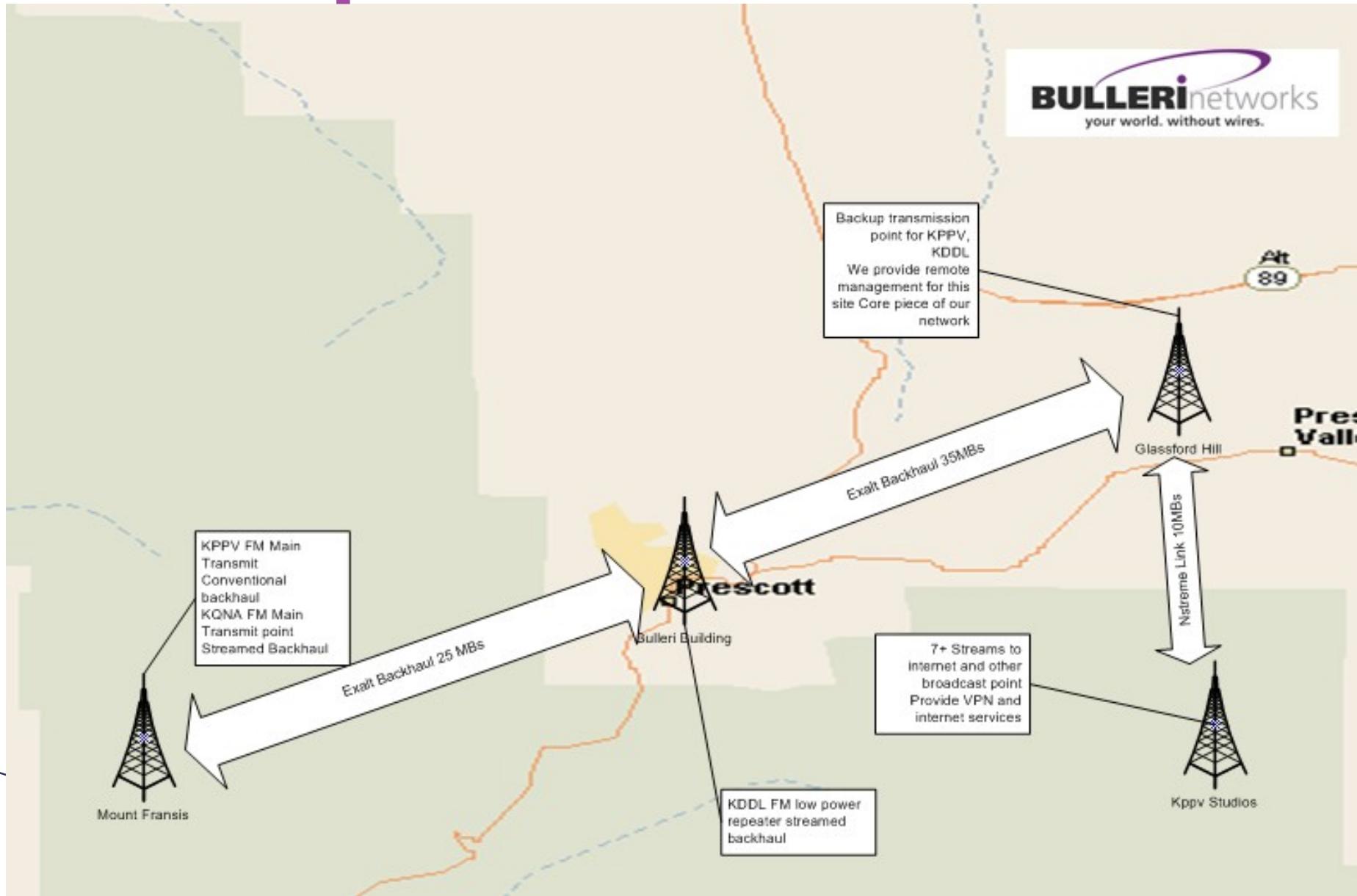
Other Issue

- On Mount Francis we are not located on the same building or tower
- To get from one to other we ran a shielded cable to a second building.
- We recommended that they use an Ethernet grounding device on his end just as we did on our end
- They lost 2 Barix boxes before he bought a ground box from us

Picture of Barix Devices



Map of Partial network



More Information

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- See Radio world article
<http://www.nxtbook.com/nxtbooks/newbay/rw>

Thank you



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