Fixed Wireless

THE MORE THINGS CHANGE, THE MORE THEY STAY THE SAME

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A brief overview

- PACNOG 3, 2007 – Deploying an island-wide fixed wireless network
- PACNOG 29, 2021 – Fixed Wireless (again)
- The bad
- The good
- What have we learned?

2007

Bluesky

- Mobile
  - Voice
  - Data (2.5G EDGE 128kbps)
- ISP
  - Fixed Wireless
    - 128kbps/64kbps standard plans
  - FTTB/IPLC/IPLE
    - 1Mbps - 5Mbps standard plans
    - T1
    - L2 Transport over Ethernet

Major Changes

2009

Submarine cable in American Samoa (ASH)

- Significant off-island bandwidth increase

Pacific Island Cable

- TV services

2011

Mobile 3G/HSPA+

- HSPA 21Mbps/7Mbps
- 3G 3Mbps

DOCSIS CMTS

- Cable Modem (1Mbps/128kbps)

Digital TV

- Channel bonding
- Digital delivery

2016

Mobile LTE

- 150Mbps
- 2G network retired

IPTV

- Digital Delivery plus Digital Control Plane
- Multicast

MPLS

- 10Gbps backbone
- L2VPN/XCONNECT

2021

Bluesky

- ▶ Mobile
  - ▶ Voice
  - ▶ Data (3G/LTE)
- ▶ ISP
  - ▶ LTE
    - ▶ Mobile Mifi Routers
    - ▶ Home Wifi Routers
  - ▶ Fixed Wireless (2020)
    - ▶ 30Mbps/10Mbps
  - ▶ DOCSIS 3.0
    - ▶ 8Mbps/1Mbps
  - ▶ FTTB/IPLC/IPLE
    - ▶ 50Mbps - 100Mbps+ standard plans
    - ▶ T1 (still)
    - ▶ L2 Transport over Ethernet
    - ▶ MPLS

What's changed?

- From 2011 to 2016
  - Mobile Wireless eclipsed fixed Home Wireless in throughput (for Bluesky)
  - Existing infrastructure for TV delivery was leveraged to provide internet access
  - Fixed wireless fell by the wayside
- From 2017 to 2021
  - LTE Network no longer sufficient for today's internet
  - Existing TV plant is near the end of its useful life and maintenance costs increasing faster
  - Fixed wireless back on the table

The Internet Itself has changed

Social Media

2007

2021

Multimedia

2007

2021

Disadvantages Comparison

2007

- Use of the unlicensed band presents issues
- Radio frequency interference is always a concern
- Line-of-sight is almost always required

2021

- Using a licensed band has solved some of these issues but presented its own challenges
- Line-of-sight is now near-line-of-sight, only a slight improvement
- Multicast delivery over wireless is painful

The bad

- Wireless technology still has the same physical limitations
  - Near line-of-sight
  - Frequency planning
- The licensed band solves some issues but also presents its own
  - Requires at least one staff member to be a Certified Professional Installer
  - Authorization via a 3rd party server
    - We lost access to 1/3 of our spectrum for a month
  - APs must have access to this server to operate at all
- Multicast over wireless has growing pains
  - Multicast control plane for TV Set-Top-Boxes loses sync
  - Balancing unicast and multicast delivery even with QoS is finicky

The good

- Wireless technology has improved
  - MU-MIMO
  - 500Mbps+ throughput per 20Mhz channel
  - Licensed band (CBRS*)
- Multicast Support
  - IPTV
- CPE has more features
  - DTA ISDN Adapter for phone services
  - Centralized management and provisioning (SM + CPE)

*https://www.cambiumnetworks.com/deploying-cbrs-wireless-broadband/

Advantages Comparison

2007

- Requires relatively less infrastructure
- Lack of outside plant maintenance
- Comparatively quick rollout
- Modular equipment
- Simple installation

2021

- The same plus:
    - Higher throughput per $$$ than other last-mile technologies
    - Integration into existing billing and provisioning systems
    - Existing core competencies in wireless systems
    - Much higher throughput
    - More customers per Access Point

What have we learned?
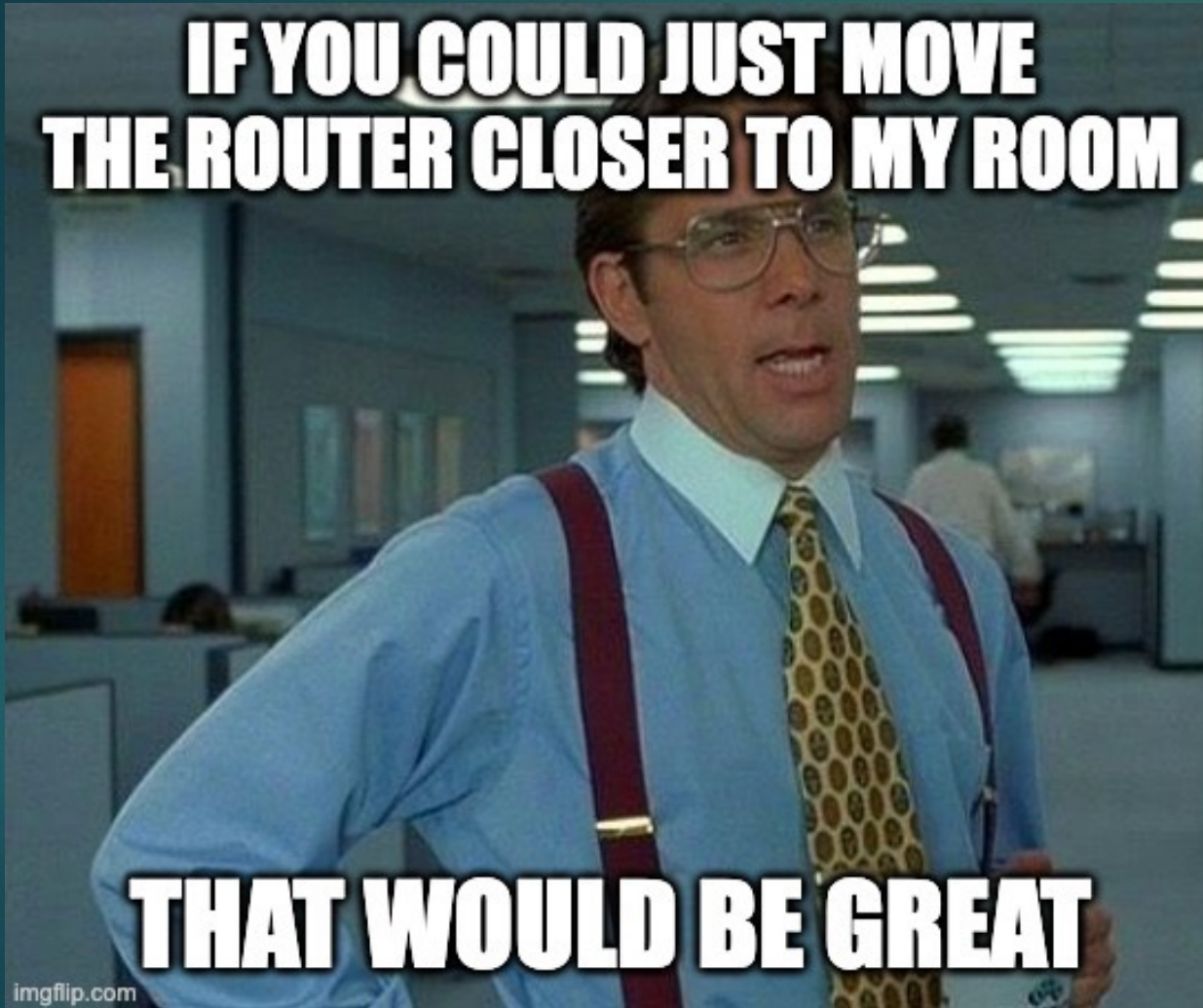
2021

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A Cohesive Approach

- ▶ Diversify last mile delivery as much as possible
  - ▶ More options, more flexibility
- ▶ All technologies have tradeoffs
  - ▶ Be aware of what they are
  - ▶ Keep in mind the value proposition
- ▶ Bandwidth grows to fill the available throughput
  - ▶ This is good, it means you're making use of the infrastructure you paid for
  - ▶ This is bad, customers will complain
  - ▶ But, there is a level above which improvements are less noticeable
  - ▶ Try to stay ahead of the curve

#1 customer complaint 2007-2021

Thank you