

B4B - *Build For Broadband* Webinar

Wired v. Wireless

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POWERFUL TECHNOLOGY SOLUTIONS
FOR THE CITY AND PUBLIC WE SERVE



Seattle
Information Technology

B4B - *Build For Broadband* Initiative

Practices that support access to competitive, high-speed broadband for the current and future connectivity needs of Seattle residents.



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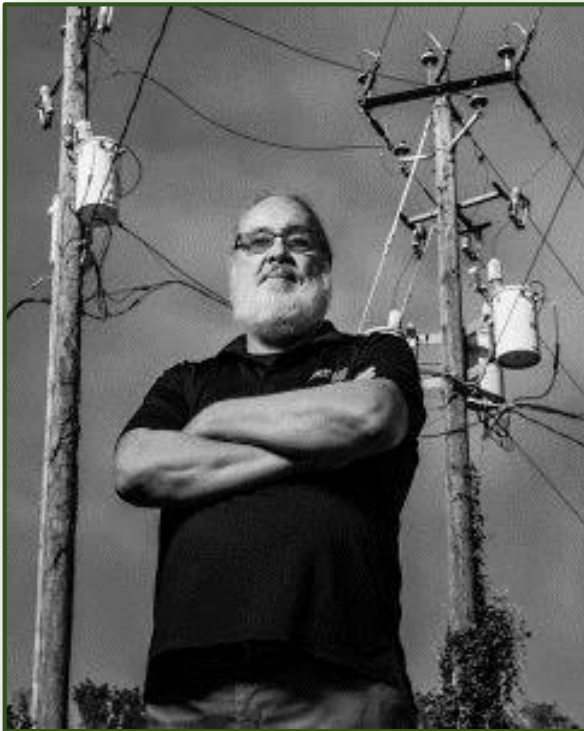
2017 MDU Study

- Significant lack of *competitive choice* compared to single family homes in terms of access to **100 Mbps+ broadband** providers
- Most critical factors in supporting multiple ISPs and 100 Mbps speeds:
 - Building age and infrastructure
 - Prioritized telecommunications planning
- Property owners/managers want a better understanding of what's possible with current technology and building for future technology

Goals

- MDU residents have access to competitive, high-speed broadband equal to that experienced by single family residents
- MDU housing is prepared for long term broadband future

About Doug Dawson



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Daily blog at <https://potsandpansbyccg.com/>

The Options



Wires



Wireless

Wired Technologies



Coaxial Cable



DSL over copper



G.Fast over copper



Fiber to the building

Wireless Technologies



Microwave to the Building



4G LTE Cellular



5G Technologies

Improved Cellular

Hot Spots

Point-to-Point

Point-to-Multipoint



WiFi

Current Technology

Upcoming Technology

WiFi / 5G Combo



Coaxial Cable – Cable Company

If wiring up to snuff, can offer speeds up to 1 Gbps

On coax can't give everybody that fast speed

DSL over Copper

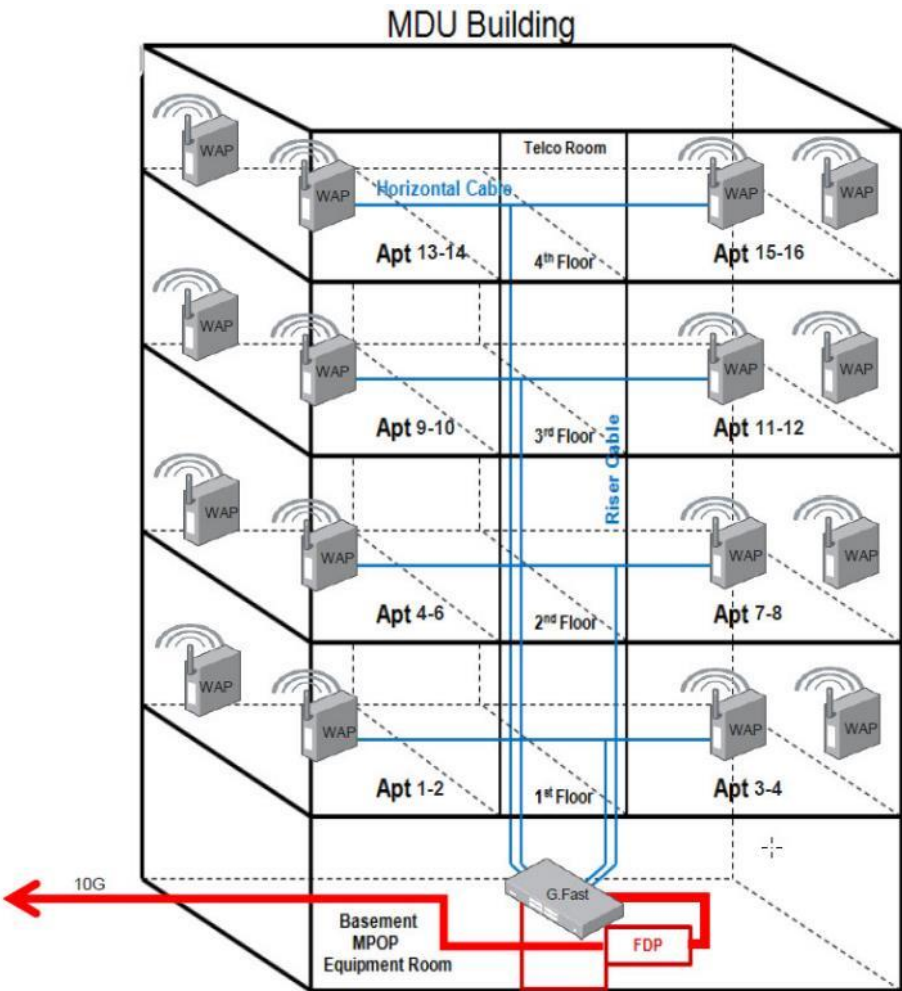
Fastest speed likely 50 Mbps

Delivers broadband and telephone over the same wire

Speeds dependent on condition of copper wiring

Available to any unit with a copper telephone wire

Requires DSL model for each customer



G. Fast over Copper

A faster version of DSL

Delivers up to 1 Gbps today for relatively short distance of 100 yards

Future speeds might hit multi gigabit

Widely used in Europe

CenturyLink trials in Las Vegas and Minneapolis

There are CLECs using the technology

Requires a G.Fast modem in the basement and one in for each customer

Fiber to the Building



Can bring speeds up to 10 Gbps

Most common configuration is to rewire buildings with fiber

Wiring issues include

- Rewiring can be costly
- Visibility of wires in hallways
- Space for fiber in risers
- Room in communications space
- Aesthetics

Can deliver speeds of 1 Gbps to everybody

Microwave to the Building



Brings big bandwidth to the roof

Challenge is getting it to units

- Run fiber first to basement and then treat like any fiber overbuild
- Somehow wire to units starting at the roof

Radios typically deliver from 500 Mbps to 2 Gbps to building

This can be traditional microwave standards or 5G

4G LTE Cellular



Speeds up to about 40 Mbps



Uses 'mid-range' spectrum

600 MHz, 700 MHz, 1700 MHz, 1900 MHz



Performance drops off inside buildings



Large buildings often get interior repeaters



Delivers the same bandwidth seen everywhere

5G Cellular



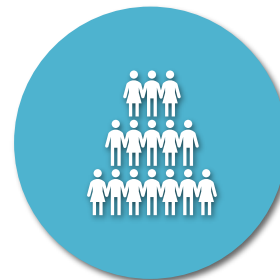
General coverage will be improved to 100 Mbps over next decade



Building repeater might be replaced with small cell



Uses the same frequencies as 4G LTE for now, may add new bands



Will be able to handle up to 100,000 devices per cell site

5G Hot Spots



Much faster with millimeter wave spectrum (10 GHz and higher)

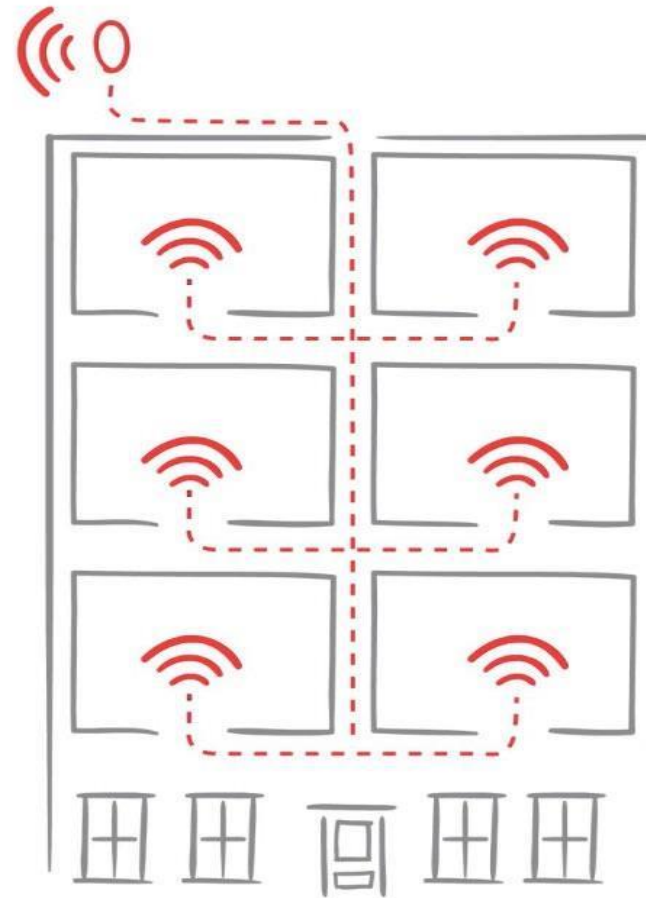
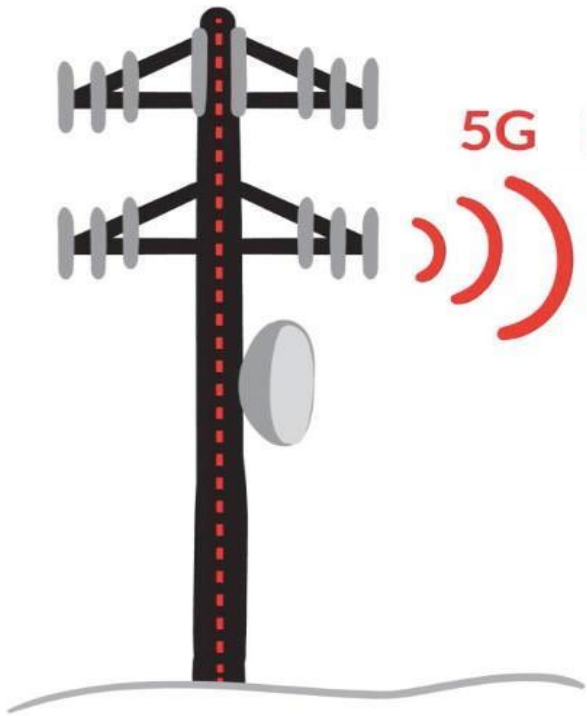
This spectrum goes for short distance and doesn't pass through anything

Will be able to offer gigabit hot spots (like in Starbucks)

- Only available to devices using the higher frequencies

This is the technology that Verizon is marketing in big cities as fast cellular

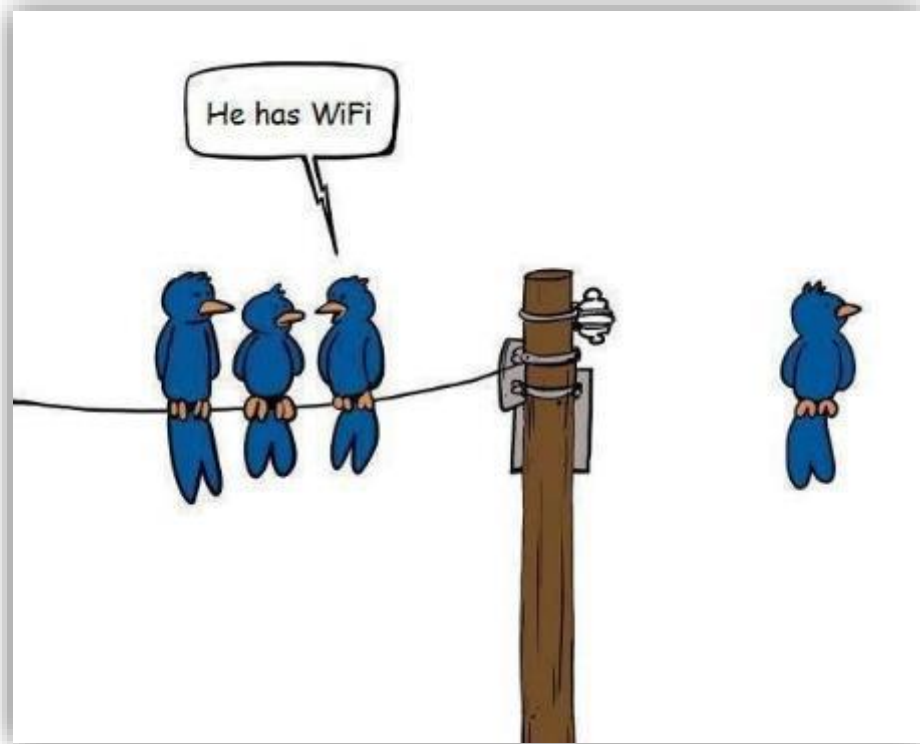
Will become available indoors



5G Point-to-Point

SAME AS MICROWAVE TO THE BUILDING

WiFi – Current Technology



WiFi 4 – 802.11n

- Uses 2.4 GHz and 5 GHz spectrum
- Theoretical speeds up to 600 Mbps
- Released 2009

WiFi 5 – 802.11ac

- Operates in 5 GHz spectrum
- Uses MIMO antenna (multiple in multiple out)
- Theoretical speeds up to 3.5 Gbps, practical speeds rarely over 1 Gbps
- Released 2013

WiFi – New Technology



WiFi 6 – 802.11ax

- Still uses 2.4 GHz and 5 GHz
- 4 times improvement in throughput
- 40% higher peak data rate
- Uses beamforming to focus on devices
- Being introduced late this year

Battle for IoT Connectivity



Who will connect your MDU sensors, indoor and outdoor?



Cellular carriers want to sell you subscriptions to 5G



WiFi 5 handles indoor connections for free



One likely solution a dual router with WiFi 6 and 5G hot spot

Wired vs. Wireless



EXPECTED FUTURE GROWTH OF
TENANT BROADBAND USAGE



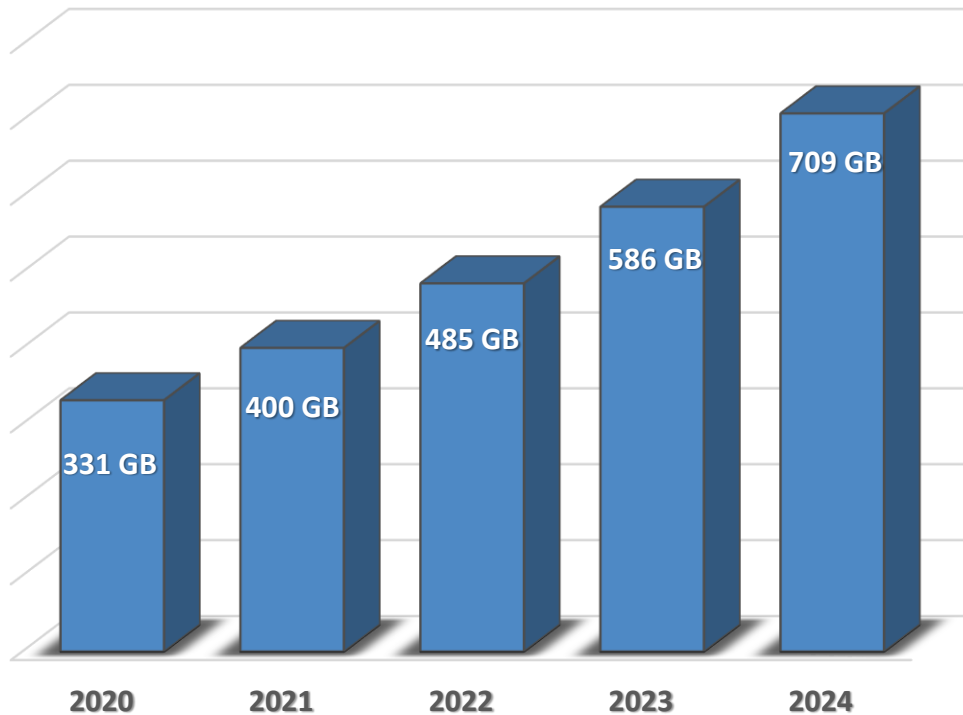
WILL BROADBAND GO
WIRELESS?



NEW BUILDINGS – USE FIBER!

Future Growth of Broadband Usage

Ave Monthly Home Usage



- Per Cisco, average residential (tenant) broadband usage is growing by *21% annually*
215.4 GB = 1Q-2018
273.5 GB = 1Q-2019
- In 2018 Comcast reported 2% of customers exceed 1 Terabyte of data per month.
That expected to be:
4% of customers in 2019
8% of customers in 2020

B4B-Build For Broadband Initiative



Building Community Awareness

- Early Telecommunication Planning
- Benefits of Infrastructure Investments

Planning problems magnified by trying to design for something that's hard to predict

Tips

Website

Webinars

www.seattle.gov/tech/initiatives/broadband/build-for-broadband

Thanks for Participating!

www.seattle.gov/tech/initiatives/broadband/build-for-broadband

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