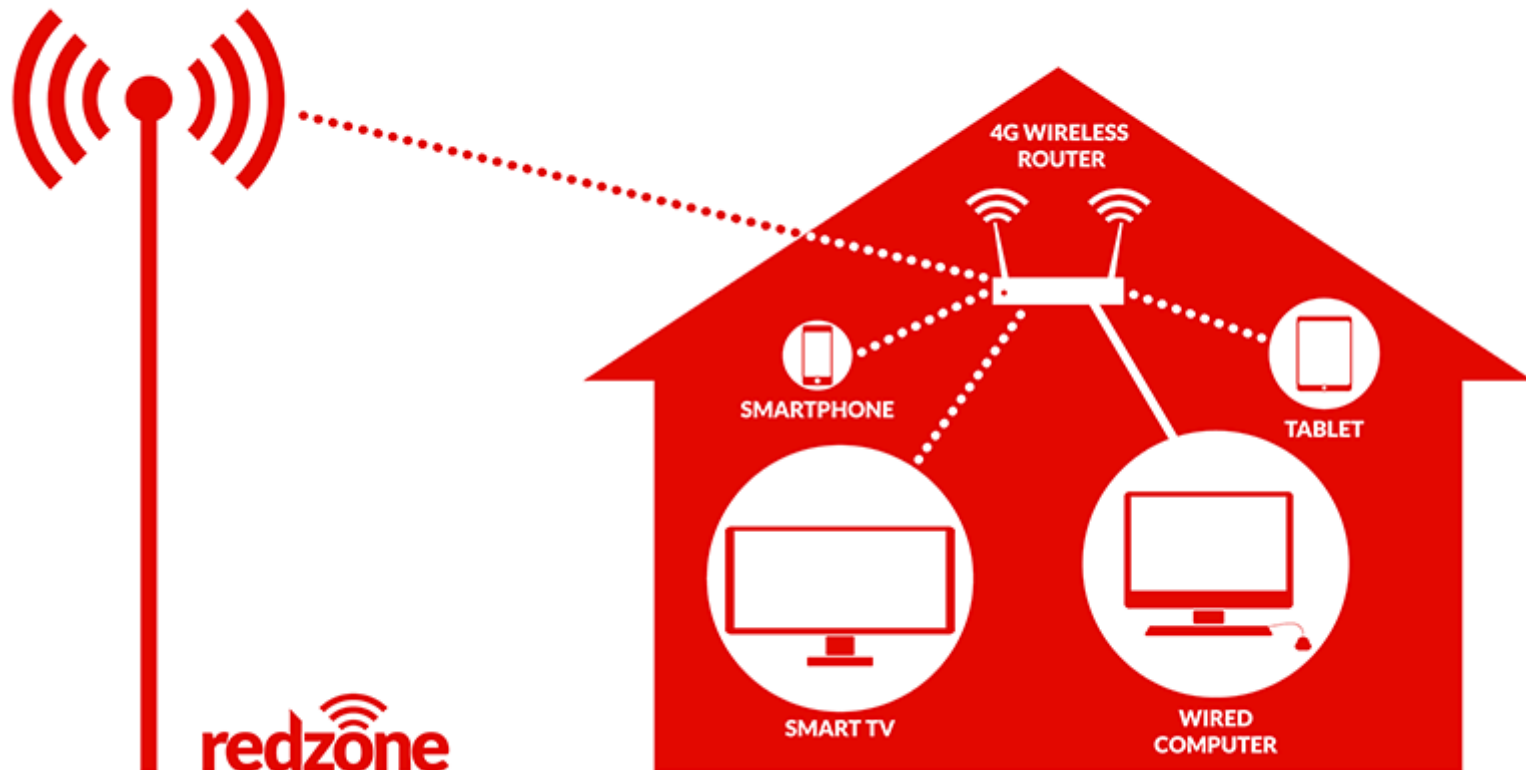


# Wireless Fiber for Oregon

5G “Wireless Fiber” goal  
100 Mbps for \$20/mo

FIXED 4G LTE ADVANCED HIGH-SPEED WIRELESS INTERNET



# Wireless Fiber Ready in 2017

## Why Wireless Fiber?

- 100 Mbps at \$20/mo or 10 Mbps at \$10/mo.
- Lower Columbia River and Oregon Coast are underserved
- Free (shared) spectrum at 3.5 GHz using LTE & unlicensed band for better range/reliability
- Shared radios, shared infrastructure, multiple providers, cloud-based radio network.
- Google using it for Wireless Fiber today

# Wireless Fiber Transformational

## 5G is transformational

- **The 3.5 Band is free. Like Wifi.**
- **Delivers 100 Mbps for 1/10th the cost.**
- **150 Mhz of bandwidth at 3.5 GHz - more than the total of Verizon, AT&T or T-Mobile.**
- **Shared spectrum & radios. “Open” LTE supported by many operators & vendors.**

# Wireless Fiber Available Now

## LTE Pro Benefits



Delivering essential services Day 1



Gigabit LTE  
and LAA



Voice  
(VoLTE)



LTE  
IoT



Cellular V2X  
(C-V2X)



Ultra-low  
latency

Also digital TV, public safety, drone communication, and more...

# Wireless Fiber *Lte Fixed*

## **LTE Fixed Broadband Benefits**

- **Unlicensed Fixed AND Licensed Mobile**
- **Roaming and Handoff to cellular**
- **Better Range, Reliability & Speed**
- **More Features: IoT, LTE Broadcast, etc.**
- **Global standard: many vendors**

# Wireless Fiber Inexpensive

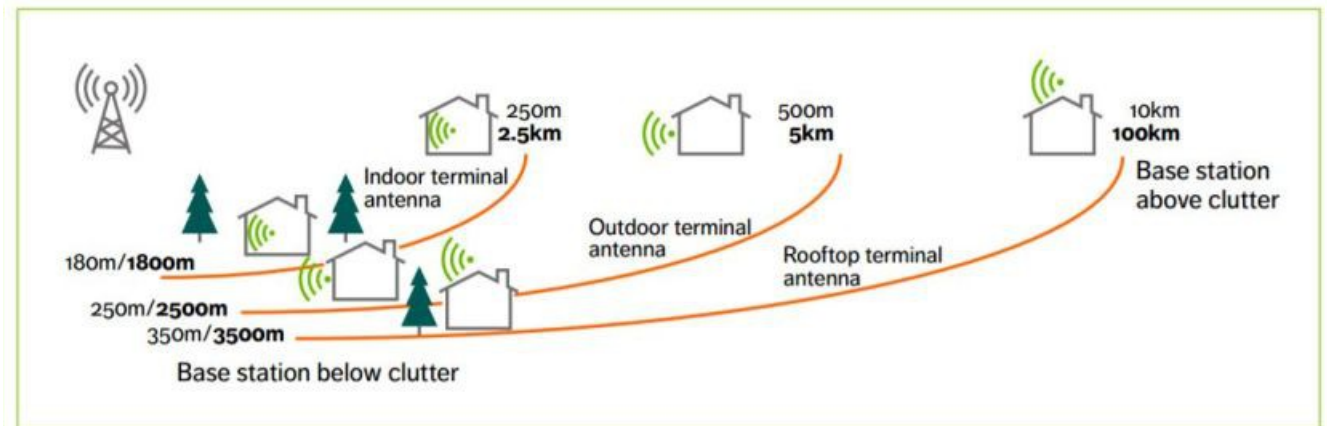
## Affordable

- **Free Spectrum** – And lots of it
- **Shared LTE radios** – Like WiFi
- **Public infrastructure** – Lightpoles & Watertowers, not tower leases
- **Neutral host** – Equal Access for all
- **Cloud Control** – Basestation in datacenter

# Wireless Fiber MIMO

## Multiple Input/Output Antennas

**Multiple Beams: Better range,  
more capacity, less interference**



**Figure 7** Key findings on FWA feasibility for different scenarios and frequencies  
(3.5GHz cell ranges appear in bold text and 28GHz cell ranges in plain text)

# Wireless Fiber Shared Spectrum

## One Radio: Many Providers

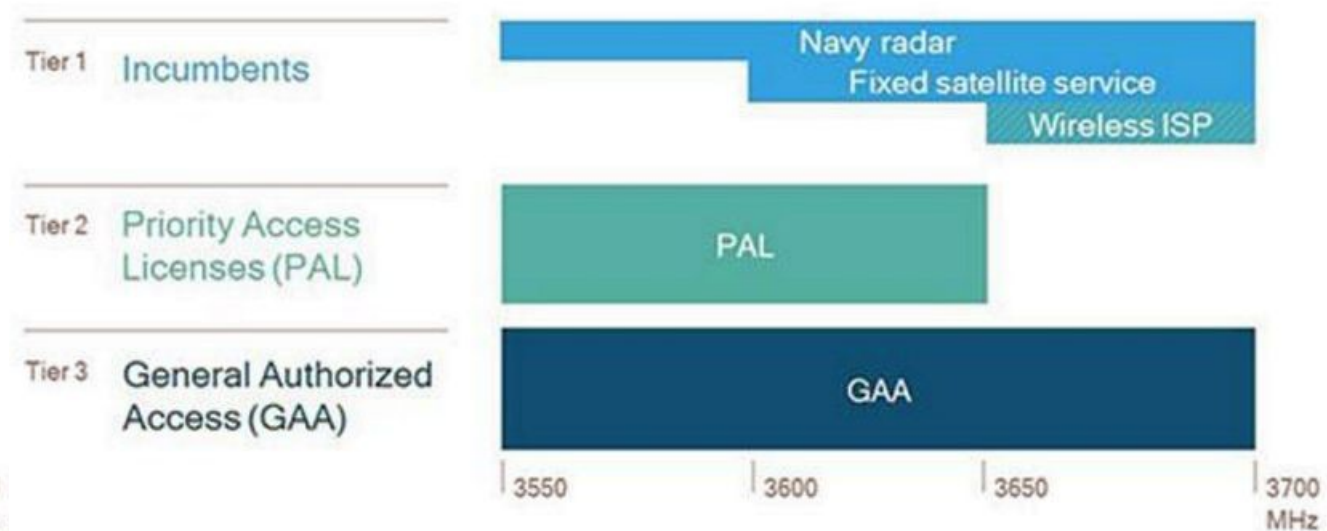
- **Shared Spectrum** – Listen before talk
- **Shared Radios.** Multiple operators, 1 radio
- **Available this year** – Google testing for FTTH
- **Fast & Mobile** – Get 30-100Mbps, Wirelessly
- **Good Range** - .5 – 5 miles



# Wireless Fiber Control

## You Control the Spectrum

- Shared Spectrum, Shared Cost
- Fixed AND Mobile
- Priority Access if you need it
- 5G at 100 Mbps speeds, 5 mi range



# Wireless Fiber Cloud Managed

## Cloud Managed Spectrum

- Google and Federated Wireless dynamically allocate and manage spectrum in cloud
- Different operators can share spectrum
- First “sniffs” spectrum to sense interference, then assigns frequency block.
- Can obtain “Priority Access” if needed

# Wireless Fiber *Multefire*

## MuLTEfire: LTE on Unlicensed Bands

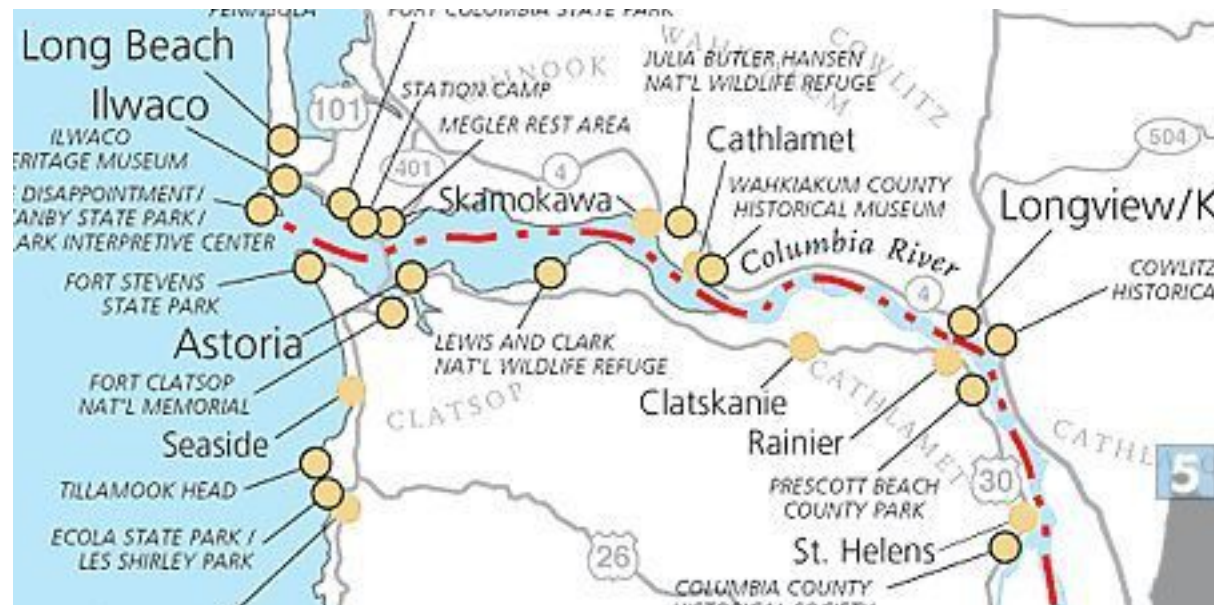
- LTE on WiFi (5 GHz) or LTE on the Citizens Broadband Radio Service (3.5 GHz)
- MuLTEfire: Range & connectivity better than WiFi
- Devices have WiFi now, soon with 3.5 GHz



# Wireless Fiber Columbia River

## Columbia River: 100 Mile Corridor

**Lower Columbia Ports** include Ilwaco, Chinook, Astoria, Longview, Kalama, Woodland, St. Helens, Ridgefield, Vancouver and Portland.



# Wireless Fiber Railroad Access

## Fiber strung along RR Tracks

- Fiber follows Portland & Western RR tracks
- State has right-of-way from Wauna to Astoria
- Passive Optical split available in Communities



# Wireless Fiber Relay Nodes

## Inexpensive Repeaters

- Small Cells repeat/translate weak signals
- No backhaul required, solar powered
- Installed high on Washington side



# Wireless Fiber Television

## TV: Over The Top

- Packages with AMC, Discovery, Disney, Fox, NBCUniversal, Viacom, Turner, Univisión, and others available starting at \$20/month.
- Internet streaming cable packages include AT&T's DirecTV Now, Dish Networks' SlingTV, Sony's PlayStation Vue, Hulu, Google, in addition to Netflix and Amazon Prime.
- HD needs 8 Mbps, 4K requires 15-30 Mbps
- All you need is a good broadband connection

# Wireless Fiber 5g Innovations

## 5G Innovations

- **LTE Broadcast.** Point-to-multipoint broadcast can deliver audio, video or data broadcasts to thousands of mobile phones, simultaneously.
- **Device to device.** Communicates locally, directly between devices even if the network has failed – like after a disaster for first responders. Plus Push-to-Talk and VoLTE.
- **Narrowband IoT.** Reduces device complexity, enables multiyear battery life, and provides deeper coverage for meter reading, etc.



# Wireless Fiber Stakeholders

## Wireless Fiber Stakeholders

- **City and county governments, first responders, schools, utilities, PUDs, BPA, ODOT, Ports, railroads, cell and cable cos**
- **Governments, schools and parks get 100 Mbps free in exchange for infrastructure**
- **Matching state and federal funds available with a joint, public service, neutral operator**

# Wireless Fiber Community Kiosks

## Community Kiosks

**Display community information and double as hubs, distributing free local broadband using cloud-controlled Open Mesh WiFi**

### Key Features

1. 24/7 free Internet access with up to gigabit speeds
2. Integrated lighting
3. Digital displays to provide insight-driven and intelligently programmed advertising & public service announcements
4. Android tablet with touch screen display, directional speaker & microphone
5. Tactile keypad & Braille lettering, dedicated 911 button, USB charger, headphone jack
6. Iconic and durable aluminum construction designed and built in NYC
7. Sleek design and decreased footprint to restore sidewalk space and improve visual continuity



# Wireless Fiber Summary

## Wireless Fiber is Transformational

- ***Fixed Wireless Access and Mobile Broad Band***
- ***Shared radios, free spectrum, low cost infrastructure, LTE on Unlicensed Band***
- ***IoT support for new applications***
- ***PTT & LTE Broadcast for 1st Responders***
- ***Voice over LTE and TV for everyone***
- ***No truck roll Starting 2H 2017***

# Wireless Fiber for Oregon

## Questions?

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[www.hayden-island.com/gigabit](http://www.hayden-island.com/gigabit)

