CBRS

Broadband Communities Summit

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CBRS – Citizens Broadband Radio System: Agenda

- CBRS as defined by the FCC
- CBRS as defined by the Industry
- Frequency Band Refresher
- CBRS in the Frequency Spectrum
- Why the Interest

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CBRS as defined by the FCC

- Spectrum originally allocated for Military land and ship based radar and Satellite Base Stations
- 20 FCC Rcd 6502 (2005) provided for limited terrestrial use of 3.65 to 3.70 GHz
- FCC 15-47 Docket 12-354 Final NPR Adopted April 15, 2015 Expanded frequency range 3.55 to 3.70 GHz
  - Also known as the 3.5 GHz Order
  - PALS: 3 year Term with one right to renew
  - PAL License Area: 1 Census Tract (73,057 Census Tracts or 500,000 PALs)
- FCC DA 16-946 Docket No. 12-354 Released 8/19/2016 selects the two-pronged approach to protect grandfathered licensed systems until 2020
- FCC 18-149 Docket No. 17-258 Report and Order Released 10/24/2018 Discusses:
  - FCC Recognizes that 3.55 to 3.70 GHz band is being adopted as an international frequency band
  - PAL License Area: County (Approximately 3200 License Areas)
  - 10 Year License with first rights for renewal
  - Adopted End-of Term Performance Requirements
  - Safe Harbor

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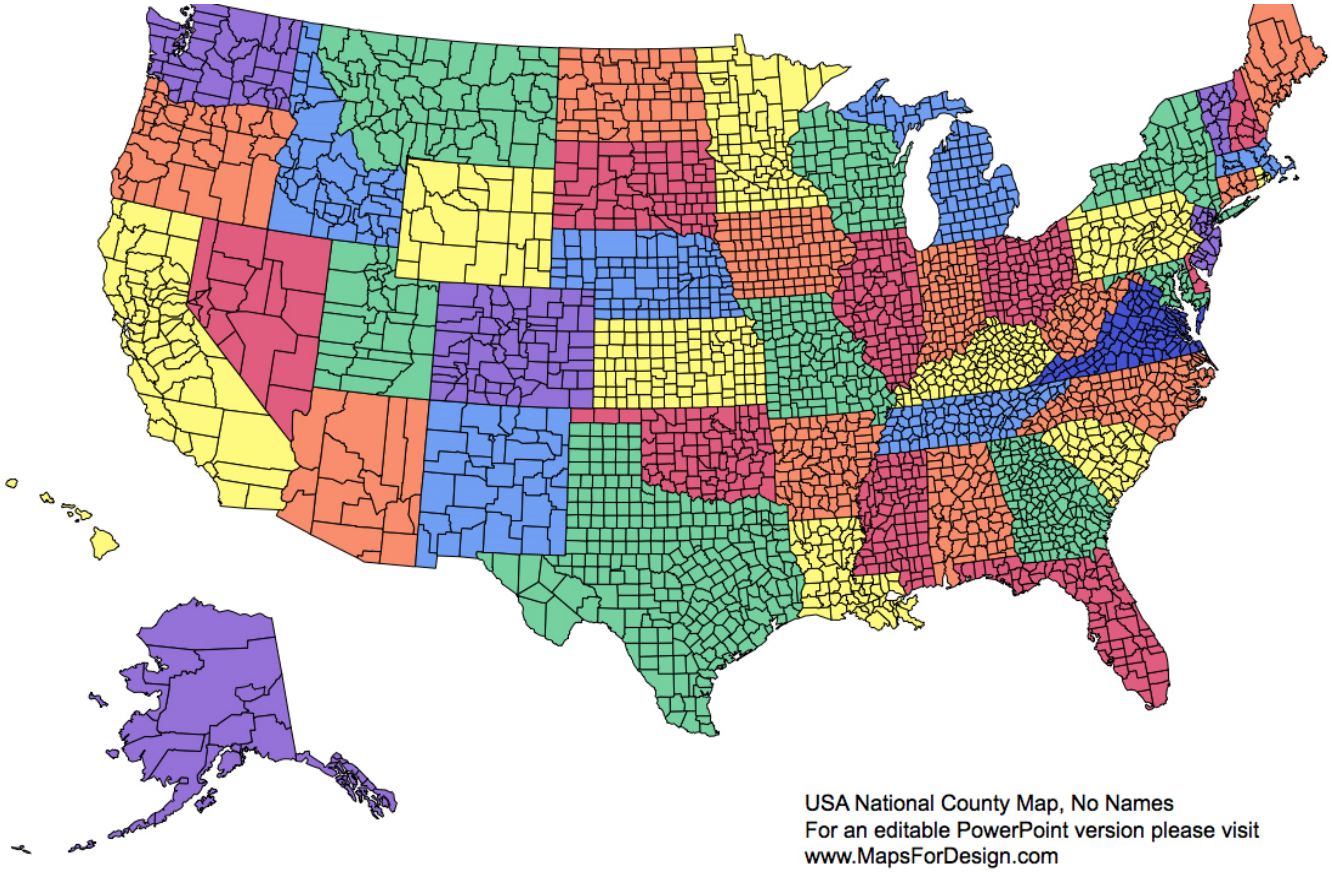
CBRS as defined by the FCC

https://www.mapsfordesign.com/site/wp-content/uploads/bj_USNationalCountyR_Free.jpg

- FCC 18-149 Released 10/24/2018
  - Allows partitioning of a county
  - FCC will allow discussion in the bidding process that may allow a single bid across multiple areas
  - Reminds us that there will still be 80 MHz of spectrum within each County that will not require a license



USA National County Map, No Names
For an editable PowerPoint version please visit
www.MapsForDesign.com

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CBRS as defined by the Industry

- Championed by the CBRS Alliance
  - Comprised of more than 85 Members

- Service has been branded as OnGo
  - Doesn't sound as techy as CBRS – Just like WiFi became the public ID for the 802.11 series
- The proposed spectrum is considered an international spectrum
  - Wide scale adoption – driving down cost
  - Customer devices will be readily available as early as this year
- Designed for both indoor and outdoor applications

https://www.cbrsalliance.org/

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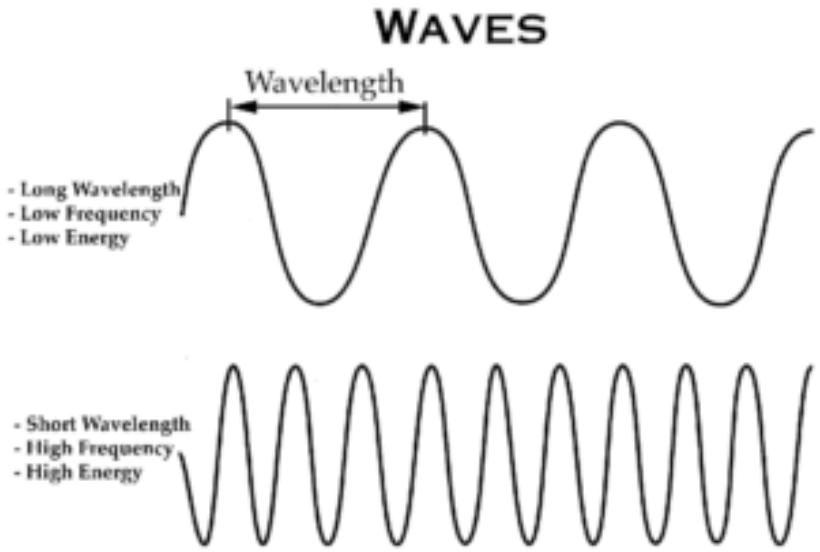
Frequency Band Refresher



Channel Capacity C is a function of the channel bandwidth and noise

$C = B \cdot \log_2(1 + S/N)$ bits/sec

Shannon-Hartley Theorem

Frequency ↑

Potential Throughput ↑

Distance & LOS ↓

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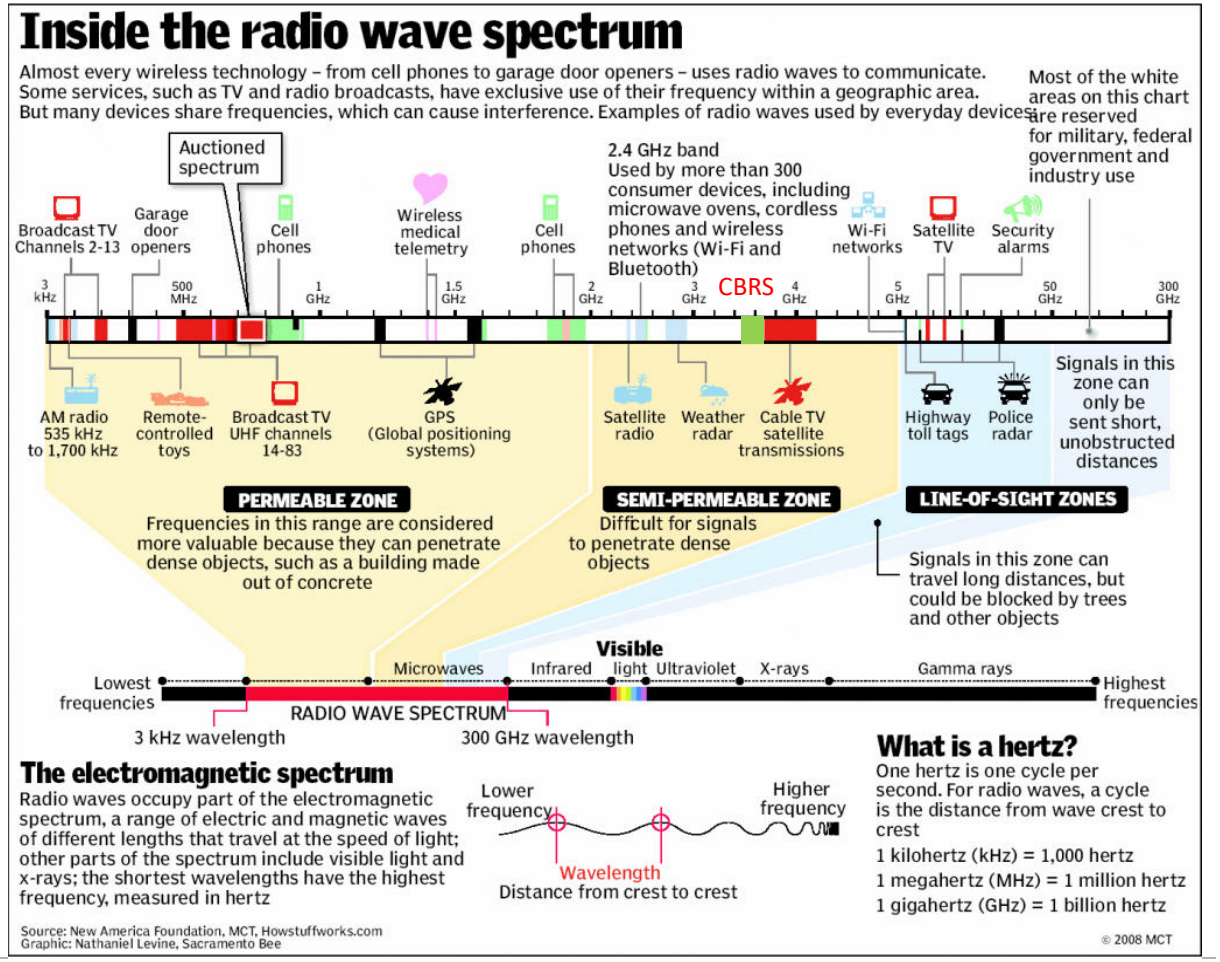
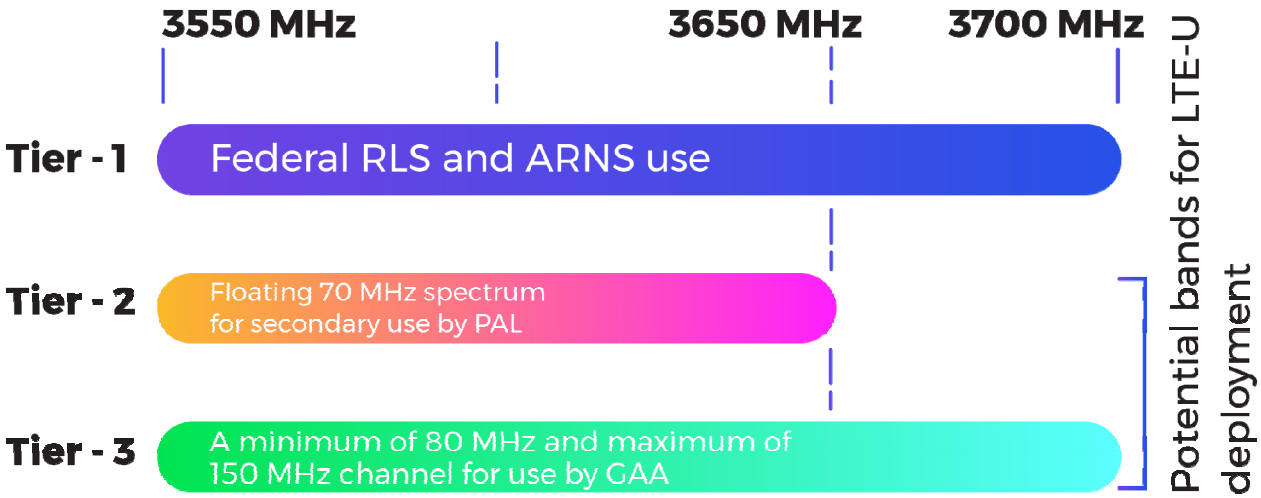
CBRS in the Frequency Spectrum

- Sits between WiFi 2.4 GHz and 5.0 GHz
- Better Propagation than WiFi 5 GHz
- Slightly higher powers than WiFi
- Uncluttered spectrum



CBRS – Citizens Broadband Radio System

- LTE Based
- 3.55-3.70 GHz = 150Mhz
- Spectrum Allocation Service (SAS) will dictate spectrum usage for all
- 3 levels of access FCC 15-47
  - Tier 1 Incumbent – Military, Government, protected by Priority Access License (PAL)
  - Tier 2 Priority (PAL) – Up to seven 10MHz Channels auction to highest bidder per census tract (limit 4 blocks/License)
  - Tier 3 General Authorized Access (GAA) – At least 80 M Hz No license required, some regulation



Hwang, Y (2017, June 9) What is CBRS? Retrieved from www.leverage.com

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CBRS – Citizens Broadband Radio System

- Category A Base Station: Low power indoor system 24 dBm and a maximum EIRP of 30 dBm in 10 megahertz
- Category B Base Station: High power outdoor unit
  - Non-rural Areas: 24 dBm and a maximum EIRP of 40 dBm in 10 megahertz
  - Rural Areas: 30dBm per 10 MHz and EIRP to 47 dBm EIRP per 10 MHz
  - Safe Harbor:
    - County Population ≤ 135k: Need to cover 50% of population or 4 Point-to-Point Links operational
    - County Population > 135k: Need to cover 50% of the population or have a number of Point-to-Point links calculated by the following equation: Round(Population/33,500,0)
- Spectrum Access Server (SAS)
  - Detects Incumbent systems and automatically moves everyone else to another frequency
  - Trial Systems operational
  - Estimates the service will cost several dollars per month per end point

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Questions??

Thank you!
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