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Deep Dive into FCC Licensing

By David Buchanan

Eligibility

- Rule section 90.20
- Describe activity - IN ACCORDANCE WITH SECTION 90.20 OF THE FCC RULES
- 700 MHz Eligibility - 47 CFR 90.523

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Miscellaneous Application items

- Item 7 major or minor most applications are major if they are new applications or change technical parameters for modifications - https://www.ecfr.gov/current/title-47/section-1.929
- Applications that do not need Frequency Coordination - 47 CFR 90.175(j)

FCC Rules for Applications

- Part 1 Subpart F
- https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-1/subpart-F?toc=1

Waivers of the rules

- Item 11a asks if the application includes a request for waiver of the rules.
- An example - I had a site I need to protect incumbents to the south, and I wanted more ERP than allowed for the HAAT at the north to better cover mountainous terrain to the north.
- https://www.ecfr.gov/current/title-47/part-1/section-1.925#p-1.925(b)(2)

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Waivers of the rules

- The Commission may grant a request for waiver if it is shown that:
- (i) The underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the requested waiver would be in the public interest; or
- (ii) In view of unique or unusual factual circumstances of the instant case, application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative.

Grandfathered Privileges

- Some Licenses may have “Grandfathered Privileges”
- These licenses may have a reference in the license copy from ULS.
- Example under special conditions: AUTHORIZED IN ACCORDANCE WITH WAIVER OF RULES 90.615, 90.621, AND 90.617, GRANTED OCTOBER 20, 1987.
- It doesn’t need to only be a waiver but also old licenses that that do not have an ERP listed. Best not to add frequencies to these licenses as you can end up stuck with the safe harbor ERP.

Email Address

- DO NOT use an individual's address. People quit, retire or get fired. The email address is canceled by the IT department, and the FCC can't send you very important notices about your license. Then YOUR LICENCE GETS CANCELED. That is a very bad thing to happen.
- Get your IT folks to create a group address that goes to at least 3 people. When someone leaves have policy to update the people in the group.
- Example address FCC Licensing@agency.gov

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Who can sign an application?

- 1.917 (5) by the trustee if the applicant is an amateur radio service club. Applications, amendments, and related statements of fact filed on behalf of eligible government entities such as states and territories of the United States, their political subdivisions, the District of Columbia, and units of local government, including unincorporated municipalities, must be signed by a duly elected or appointed official who is authorized to do so under the laws of the applicable jurisdiction.

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Slow Growth and Associated Call Signs

- Item 8 - If there is any question about constructing a new station within a year of license grant, submit a slow growth plan.
- Item 9 - Associated call signs – list all call signs associated with the application. As an example, mobile and control stations are many times on a separate call sign. Also, multi-site trunking or simulcast systems are on different call signs.
- For VHF repeaters it is important for coordination to be able to determine the MO input frequency. Remember – VHF is not paired.

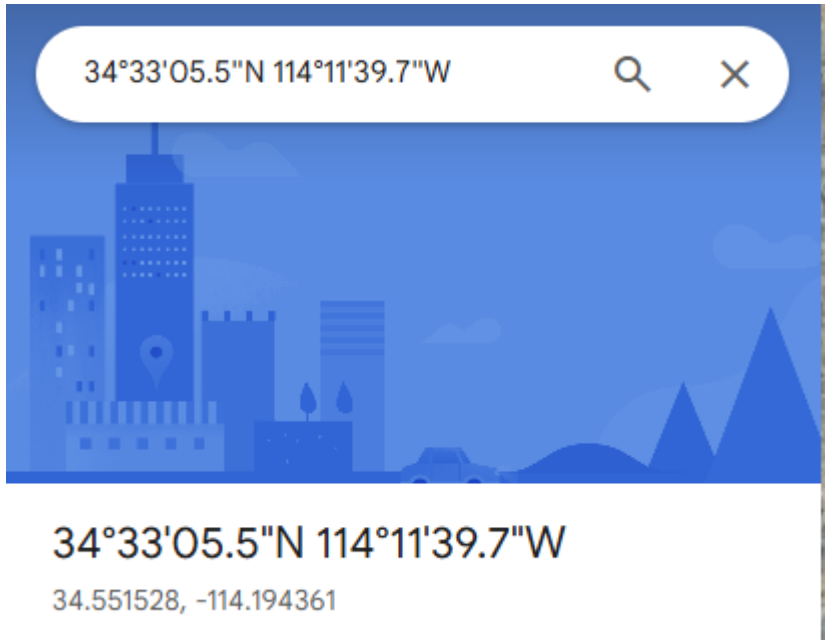
Slow Growth Rules

- 47 CFR 90.629 Extended implementation period.
- 47 CFR 90.629(a) - The applicant must justify an extended implementation period. The justification must describe the proposed system, state the amount of time necessary to construct and place the system in operation, identify the number of base stations to be constructed and placed in operation during each year of the extended construction period, and show that:
- (1) The proposed system will require longer than twelve (12) months to construct and place in operation because of its purpose, size, or complexity; or
- (2) The proposed system is to be part of a coordinated or integrated wide-area system which will require more than twelve (12) months to plan, approve, fund, purchase, construct, and place in operation; or
- (3) The applicant is required by law to follow a multi-year cycle for planning, approval, funding, and purchasing the proposed system.

Coordinates & Elevation

- The FCC requires the coordinates for a base station location – 1.923(c) … Geographical coordinates, referenced to NAD83, must be specified in degrees, minutes, and seconds to the nearest second of latitude and longitude.
- Suggest using Google Maps to verify your coordinates are correct.
- Incorrect coordinates are the most frequent errors I see on applications. Elevation is neck and neck with coordinates for mistakes.
- For elevation and HAAT, I suggest using Spectrum E.

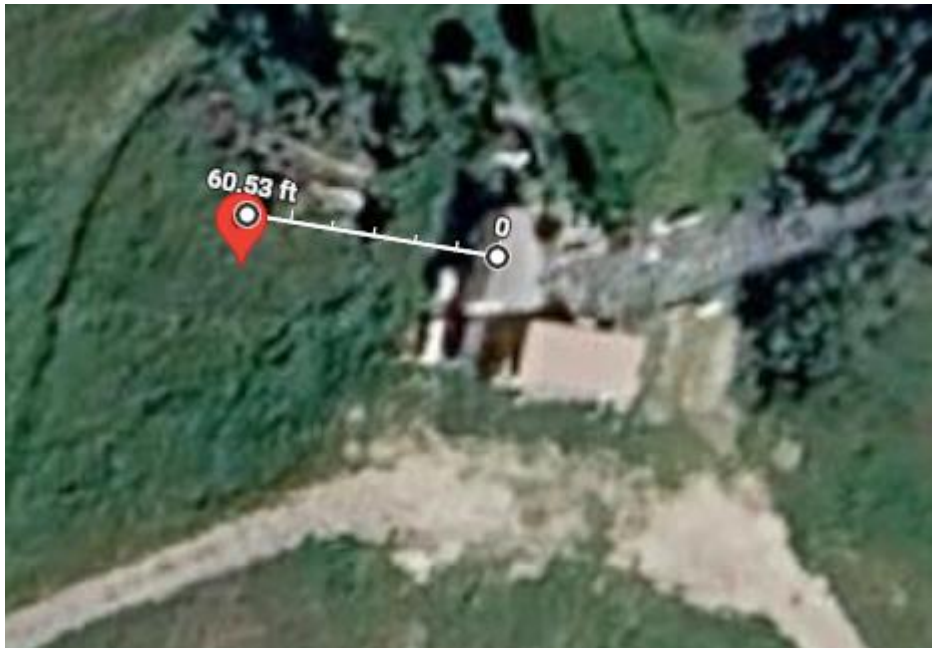
Just enter the coordinates with spaces:
34 33 5.5N 114 11 39.7W





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Coordinate Errors



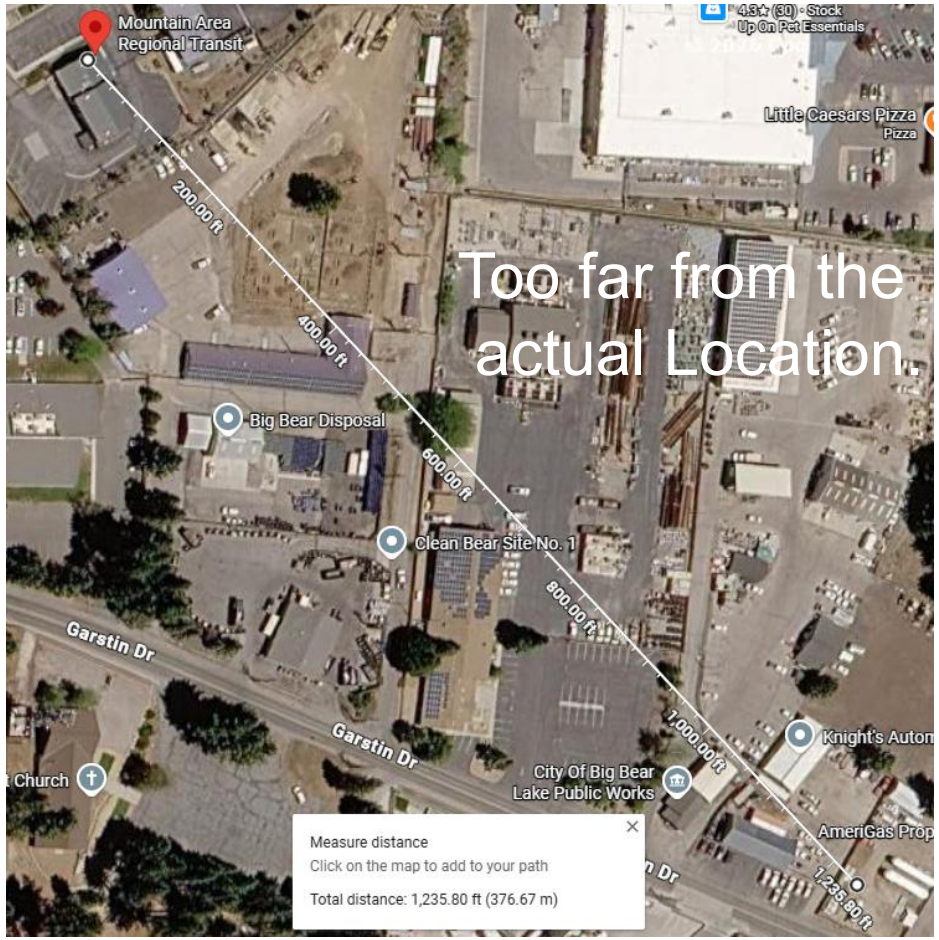
Error is OK as it is less than 100ft



Error greater than 100ft

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Errors I Worry About



Too far from the actual Location.



While only < 1” error, it is below the peak and any interference studies would not be accurate.

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Other Location Data

- Mobile Location
  - Coordinate point and radius Code A – km around a fixed point or P – center point and radius
  - County wide - C
  - Statewide - S
  - Other - FCC is now pushing back on this designation. Cities should use A – fixed point and radius or P center point and radius. Alternately use R for rectangle. Counties should use C.

AZ, Beamwidth, Polarization and Gain

- While these are not required if you are using an omni antenna, it is very helpful to include in the application. When running interference studies having this info (especially antenna gain) makes the studies more accurate.
- For omni antennas, AZ and Beamwidth would be 360 degrees. Beamwidth is the horizontal beamwidth of the antenna. Polarization is normally V, vertical but for FXO systems may be H, horizontal.
- Gain should be dBd (referenced to dipole gain) not dBi.
- Also add a note with the application if using down tilt and include the antenna model. Always include the antenna model if using a patterned antenna.

Station Class

- 47 CFR 90.7 “Base station” - A station at a specified site authorized to communicate with mobile stations. (FB)
- 47 CFR 90.7 “Mobile relay station” - A base station in the mobile service authorized to retransmit automatically on a mobile service frequency communications which originate on the transmitting frequency of the mobile station. (FB2)
- 47 CFR 90.7 “Control station” - An Operational Fixed Station, the transmissions of which are used to control automatically the emissions or operation of another radio station at a specified location. (FX1)
- 47 CFR 90.7 “Operational fixed station” - A fixed station, not open to public correspondence, operated by, and for the sole use of those agencies operating their own radiocommunication facilities in the Public Safety, Industrial, Land Transportation, Marine, or Aviation Radio Services. (This includes all stations in the fixed service under this part.) (FX0)

Emissions

- 90.207(b) Authorizations to use A3E, F3E, or G3E emission also include the use of emissions for tone signals or signaling devices whose sole functions are to establish and to maintain communications, to provide automatic station identification, and for operations in the Public Safety Pool, to activate emergency warning devices used solely for the purpose of advising the general public or emergency personnel of an impending emergency situation.
- 90.207 (l) For stations in the Public Safety and Industrial/Business Pools utilizing digital voice modulation, in either the scrambled or unscrambled mode, F1E or G1E emission will be authorized. Authorization to use digital voice emissions is construed to include the use of F1D, F2D, G1D, or G2D emission subject to the provisions of § 90.233.

Common Emissions Designators

- Analog Voice Deviation–
  - 2.5 kHz -11K0F3E (below 512 MHz)
  - 4.0 kHz -14K0F3E (800 MHz NPSPAC)
  - 5.0 kHz -16K0F3E (800 Non-NPAPAC old systems only)
  - Carson's rule for FM deviation BW = $2(\Delta f+F_m)$
- From TSB-88.1(F)

Common Emissions Designators

- Digital Modulation –
  - P25 FDMA -8K10F1E (mobiles always use this modulation base stations also use this modulation if not using LSM)
  - P25 LSM -8K70D1W (base station only not for mobile use)
  - ETSI DMR 2-slot TDMA -7K60FXE Voice 7K60FXD Data
  - P25 2-slot TDMA -8K10F1W (uplink MO only)
  - P25 2-slot TDMA -9K80D7W (downlink base station only)
- From TSB-88.1(F)

Emissions Designators Examples

- Below 512 MHz analog no mobile data:
  - FB/FB2/MO – 11K0F3E (exception is T-Band where 5kHz deviation is ok. Then it would be 16K0F3E) All new T-band must be narrow deviation.
- P25 FDMA :
  - FB/FB2/MO - 8K10F1E (FB/FB2 only if non-LSM)
  - FB/FB2 LSM simulcast - 8K70D1W
- P25 TDMA –
  - MO - 8K10F1W FB/FB2 - 9K80D7W

Interference Criteria for Coordination (Simple)

- VHF – The proposed incumbent interference contour (F50/10 – 19dBu) must not overlap the incumbent stations coverage contour (F50/50 – 37dBu). VHF spacing is every 7.5 kHz, and any adjacent incumbents are protected by a derating table that depends on modulation.
- UHF excepting T-Band – Same as VHF but interference value is 21 dBu and coverage value is 39 dBu. The normal channels are spaced 12.5 kHz and with narrow emissions, the adjacent channels are not considered in the coordination process. The adjacent channel protection with 12.5 kHz spacing is over 70 dB.
- T-Band - T-Band uses milage separation (64 km) plus for adjacent channel protection uses a TSB-88 SARD study. So very important to use correct emission designators. Also, if you have wideband 20K0 emission on your license please delete it if you are not using 5 kHz deviation equipment. Wideband 16K0 or 20K0 are protected for adjacent channels using SARD.

Interference Criteria for Coordination (Simple)

- Mobile protection – Normally mobile area of operations are protected with the associated Base Station contour. For Mobile only operation, no base station, mobiles are protected by their AOP on the license or for countywide AOP the boundaries of the County.
- For mobile AOP greater than 80 km, the mobiles are only protected to 80 km.

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Safe Harbor Considerations

- 47 CFR 90.205 is the rule section for Safe Harbor ERP limits
- These limits are based on HAAT and service area. Service area of 32 km can be requested without justification. Service areas greater than 40 up to 80 km max require a justification and can have more ERP for a given HAAT. However, the service contour (F50/50) must fit within the AOP radius.
- The coordinators also use 80 km as the maximum protected area for MO only use. Normal MO protection is the same as the service contour of the associated base station.
- Note for 700/800 MHz – the ERP limits only considers HAAT.

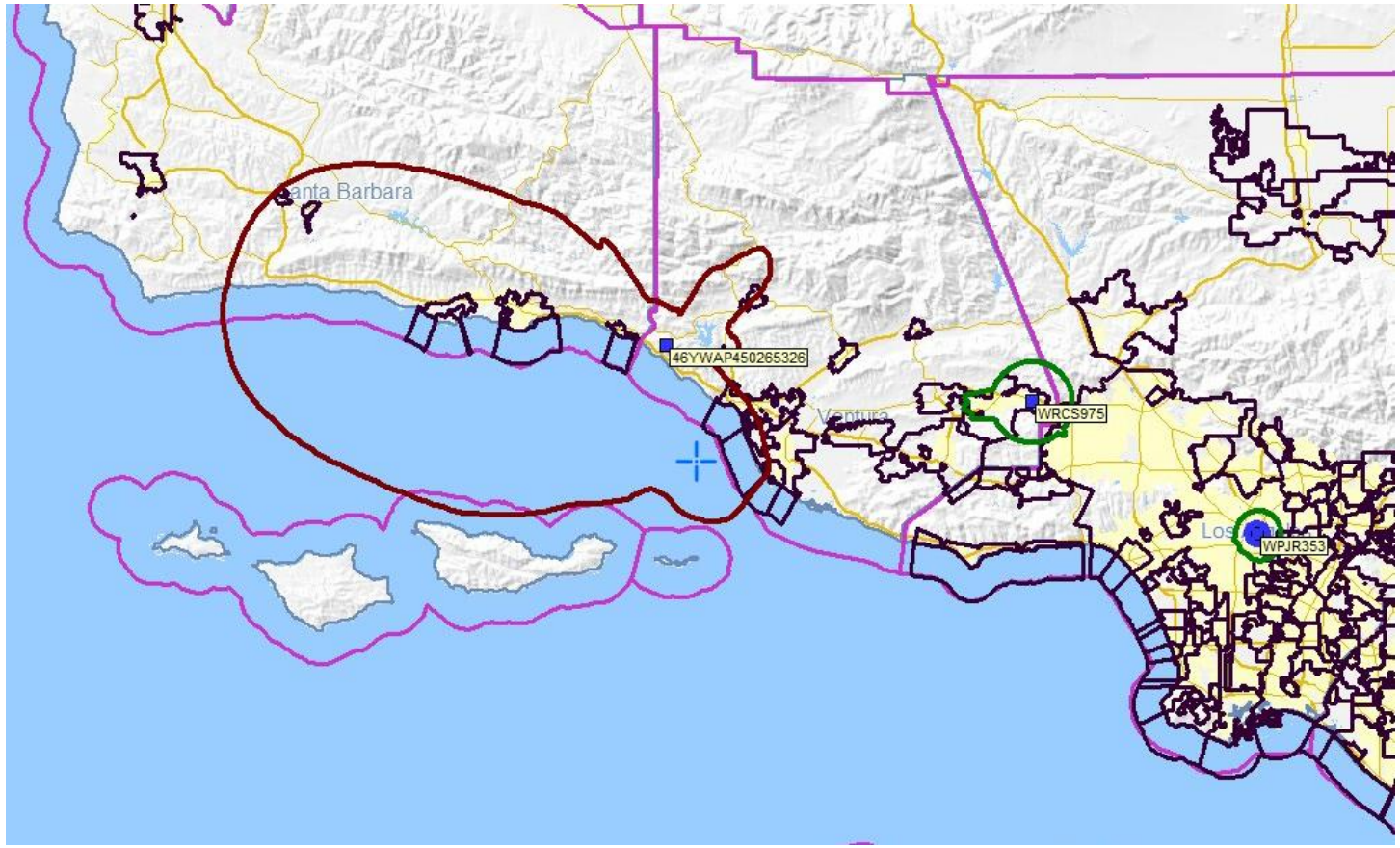
Interference Criteria for Coordination (Simple)

- 800 MHz (Non-NPSPAC) – For co-channel it is milage based 113 km to nearest station(s). Some high sites in California are given extra milage protection.
- Stations can be licensed co-channel between 88 to 113 km by using a short spacing DHAAT test. Refer to 90.621 for details.
- Existing Stations that later had a station licensed co-channel using DHAAT has special protection to move the site or increase power with limitations:
- A station located closer than the distances provided in this section to a co-channel station that was authorized as short-spaced under paragraph (b)(4) of this section shall be permitted to modify its facilities as long as the station does not extend its 22 dBu contour beyond its maximum 22 dBu contour (i.e., the 22 dBu contour calculated using the station's maximum power and antenna height at its original location) in the direction of the short-spaced station.

Special Conditions

- Sometimes, to pass interference criteria, a special condition must be placed on a license.
- Example – to eliminate a contour overlap, a specific patterned antenna is required. The AZ and beamwidth is on the main part of the license, but a special condition is added to specify a make and model of the antenna plus confirming the AZ.
- Example wording - Location 1 will use a Sinclair SE414-SWBPALDF_130D or similar antenna with a 279-degree azimuth.

Contour Example



Example of non-overlapping contours. Note the patterned antenna.
The antenna make and model would be a special condition on the license.

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Questions?

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