Amateur Radio License

Regulations and Operations

FCC Registration Number (FRN)

- Identifies you to the FCC
- You need one to get a license
- You can take the test without it (SS number works), but it is good to have, particularly if you don't have a SS number or taxpayer ID
- Google "FRN FCC", and the top link will get you there.

Todays Topics

- Basic Regulations
- Radio Signals and Fundamentals
- Basic Operations

Basic Regulations

Amateur Radio (Official)

- Amateur (or Ham) Radio is a personal radio service authorized by the Federal Communications Commission (FCC).
    - To encourage the advancement of the art and science of radio.
    - To promote the development of an emergency communication capability to assist communities when needed.
    - To develop a pool of trained radio operators.
    - To promote international good will by connecting private citizens in countries around the globe.

Licensing Authority

- Federal Communications Commission (FCC)
- Amateur Radio operations covered by FCC rules published in Part 97 of Title 47 – Code of Federal Regulations.
  - Use “Part 97” for short
- Others are Part 90 (commercial), Part 95 (CB, MURS, FRS), and Part 15 (WiFi, low power, anything that radiates RF).

The Amateur License

- No age limit or citizenship restrictions.
  - One exception – foreign representatives.
- License actually contains two parts.
  - Operator License.
  - Station License (the Call Sign).
- Three levels of operator privileges:
  Technician, General, Amateur Extra.

Exam

- Multiple choice, multiple exams, multiple levels
- Run by Volunteer Exam Coordinators (VEC)
  - At least 3 Volunteer Examiners (VE's) of higher class
- You can operate when your call sign appears in the FCC data base (www.wireless.fcc.gov/uls) and you have your call sign. Usually just a few days.

License Term

- The license is free and good for 10 years.
    - Renewable within 90 days of the expiration date (2 year grace period).
- Some personal identification information is required.
    - Tax ID (Social Security number).
    - Current Mailing Address.
    - Federal Registration Number (FRN).

Responsibilities

- Prevent unauthorized operation of your station.
- Provide personal information as required – keep a current mailing address on file.
- Make your station available for FCC inspection upon request.

Basic Principles

- You can’t make money from transmitting on amateur radio frequencies
  - Limited ads, no music, etc
- You should be polite and cooperate with others
  - Minimum power necessary
  - Use accepted frequencies appropriately
  - No encryption
  - Amateur radio is basically self regulated

Which of the following is a purpose of the Amateur Radio Service as stated in the FCC rules and regulations (T1A01)

A. Providing personal radio communications for as many citizens as possible.

B. Providing communications for international non-profit organizations

C. Advancing skills in the technical and communications phases of the radio art

D. All of these choices are correct

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A. FEMA

B. The ITU

C. The FCC

D. Homeland Security

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A. In all circumstances

B. Broadcasting

C. International Morse Code Practice

D. Telecommand or transmissions of telemetry

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A. When incidental to an authorized retransmission of manned spacecraft communications

B. When the music produces no spurious emissions

C. When the transmissions are limited to three minutes per hour

D. When the music is transmitted above 1280 MHz

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In which of the following circumstances may the control operator of an amateur station receive compensation for operating that station? (T1D04)

A. When the communication is related to the sale of amateur equipment by the control operator's employer

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C. When the communication is made to obtain emergency information for a local broadcast station

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Radio Signal Fundamentals

Finding Where You are on the Radio Dial

- Described as Band, Frequency, or Wavelength
- Bands: HF, UHF, VHF
- Frequency: 50 MHz, 144 MHz, 440 MHz
- Wavelength: 6 m, 2 m, 70 cm
- Wavelength (in m) = 300 / (frequency in MHz)

Amateur Bands

Technician VHF/UHF Frequencies

- Recall that

$$\lambda = 300 / f$$

where f is in MHz, and λ is in m

Table 5-2
VHF and UHF Technician Amateur Bands
ITU Region 2

Band (Wavelength)	*Frequency Limits*
VHF Range	
6 meters	50 - 54 MHz
2 meters	144 - 148 MHz
1.25 meters	219 - 220 MHz
1.25 meters	222 - 225 MHz
UHF Range	
70 centimeters	420 - 450 MHz
33 centimeters	902 - 928 MHz
23 centimeters	1240 - 1300 MHz
13 centimeters	2300 - 2310 MHz
13 centimeters	2390 - 2450 MHz

Technician HF Frequencies

- 200 W PEP
- Mostly CW

Band	Freq	Mode
80 m	3.525-3.6 MHz	CW
40 m	7.025-7.125 MHz	CW
15 m	21.025-21.200 MHz	CW
10 m	28.000-28.300	CW, RTTY, Data
	28.300-28.500	CW, SSB

Typical Questions

- Unit of frequency
- Speed of light
- What happens to wavelength as frequency increases
- What are the limits of the VHF spectrum (remember that the band edges are all factors of 10, measured in meters).

Bands / Frequencies

- What is the wavelength of the 144 MHz band? 30 MHz? 50 MHz?

- What are the limits of the amateur VHF band? UHF band? 220 MHz?

- What are the frequencies of the 70 cm band? 1.25 m? 6 m? 10 m?

Radio Manners

- Speak clearly and distinctly
- Giant party line – choose topics accordingly
- Shared use of frequencies
- Use phonetics
- Station identification (FCC 10 minute rule)
- Sign off (Final, 73, clear)

Call Signs

- 1-2 letters, a digit, followed by 1-3 letters
  - Tells a little about your license class
  - For the US, the first letter is K,W, or N, or A.
  - Digit tells where in the US your call sign originated
  - Last 1-3 letters identify you

Typical Call Signs

- Recent Technician class (2x3, Group D)
  - KK6GAF
- Recent Extra class (2x2, Group A)
  - AG6WH
- Vanity call signs
  - Many 2x2's (Group B) and 1x3's (Group C) available
  - 1x2's and 2x1's are harder to come by
- Special events have 1x1's

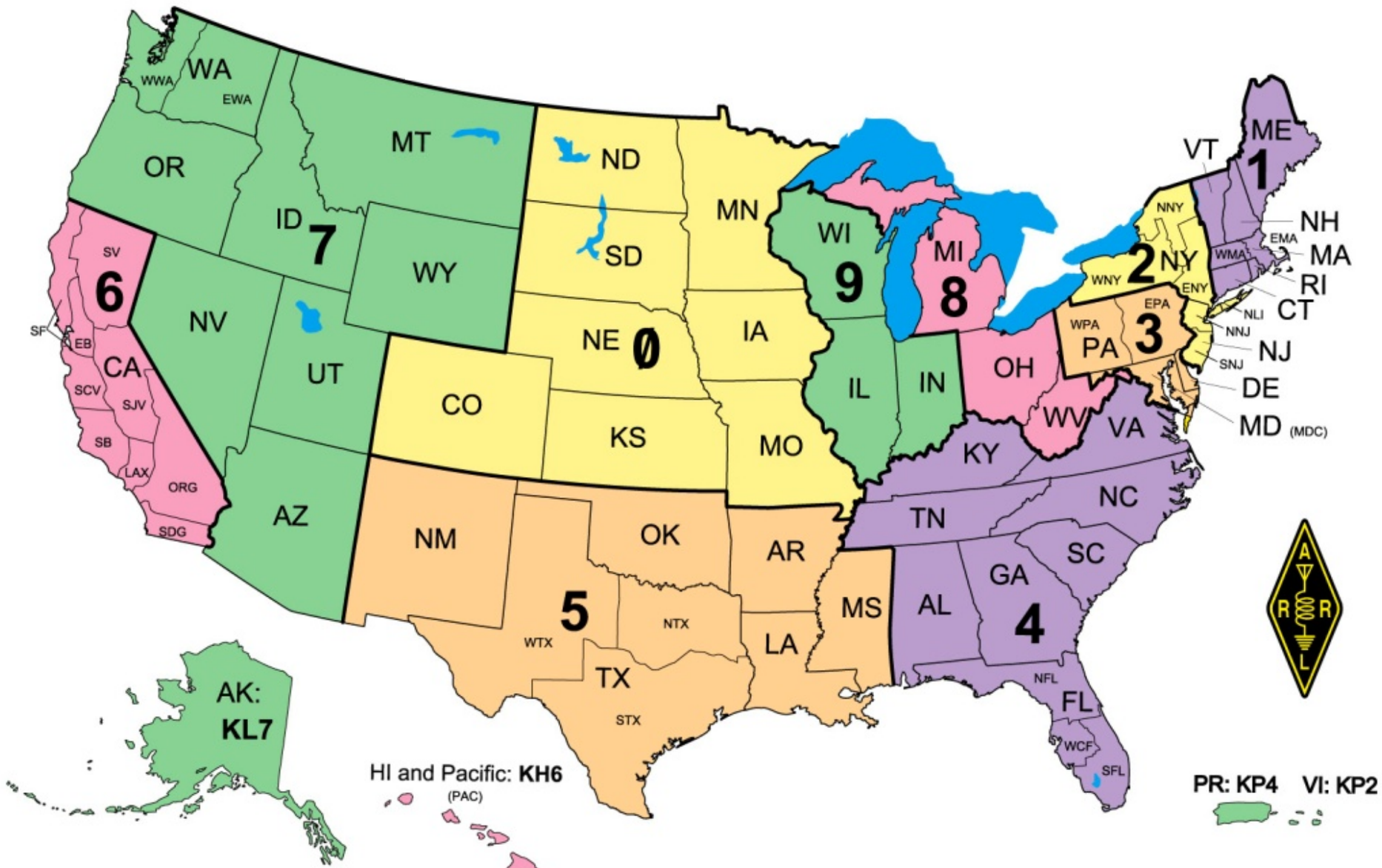
Phonetics

Letter	Word	Letter	Word	Letter	Word
A	Alpha	J	Juliet	S	Sierra
B	Bravo	K	Kilo	T	Tango
C	Charlie	L	Lima	U	Uniform
D	Delta	M	Mike	V	Victor
E	Echo	N	November	W	Whisky
F	Foxtrot	O	Oscar	X	X-Ray
G	Golf	P	Papa	Y	Yankee
H	Hotel	Q	Quebec	Z	Zulu
I	India	R	Romeo		

AG6WH : Alpha Golf Six Whiskey Hotel

Call Signs

Middle digit tells you where the call sign was issued



Signal Report

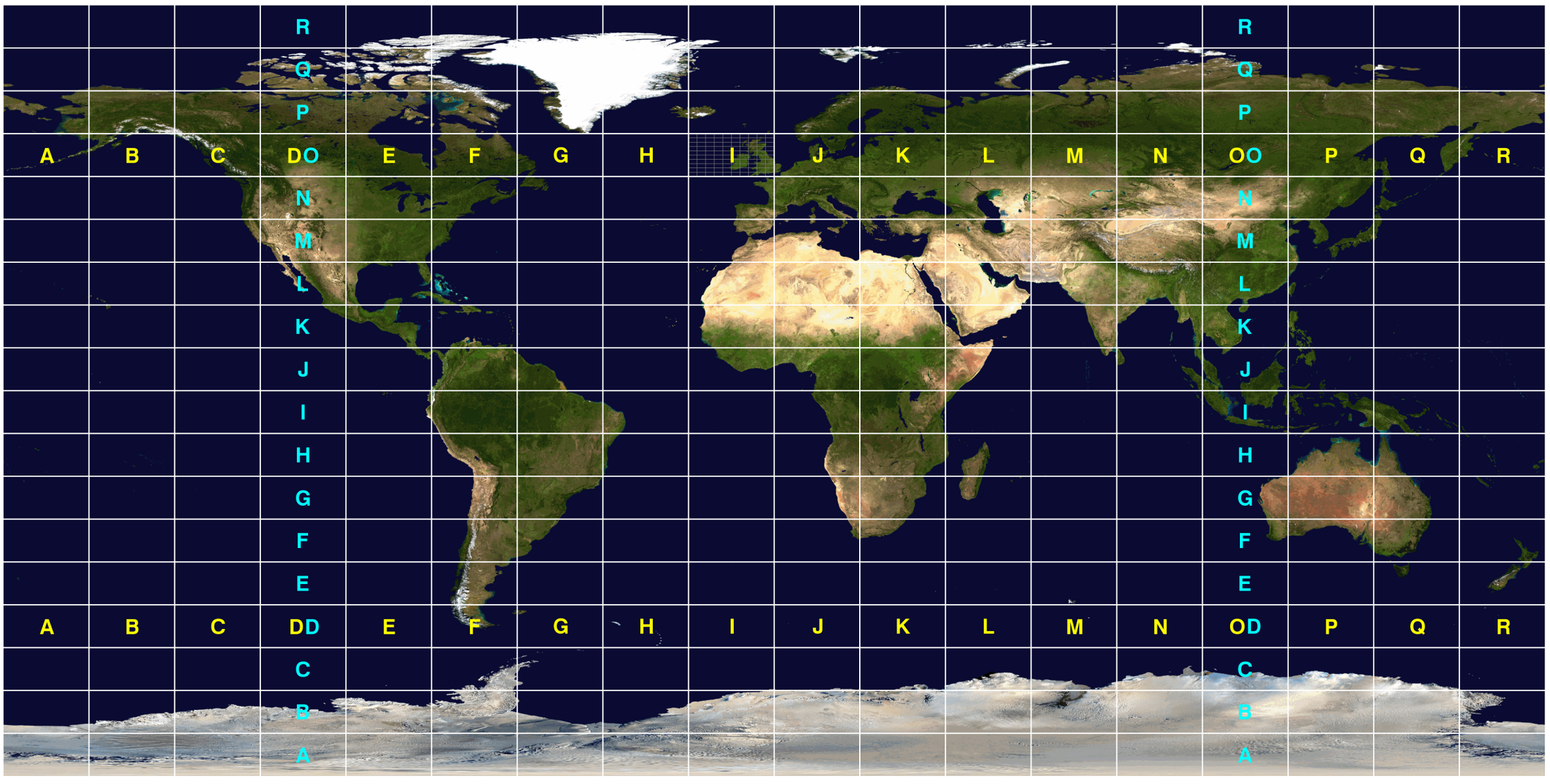
- RST : Three numbers
  - Readability 1-5
  - Signal Strength : 1-9
  - Tone : 1-9 (for CW)
  - Best is 599
- “Q” System
  - Barely understandable (1) to perfectly readable (5)

Q Signals

- QRM : interference
- QRN : noise
- QSL : acknowledge receipt (cards are called this)
- QSO : contact
- QSY : change frequency
- QRP : decrease power (also, low power mode)
- QTH : your location
- QRZ : who are you?
- Many others, but there are only a few on the test.

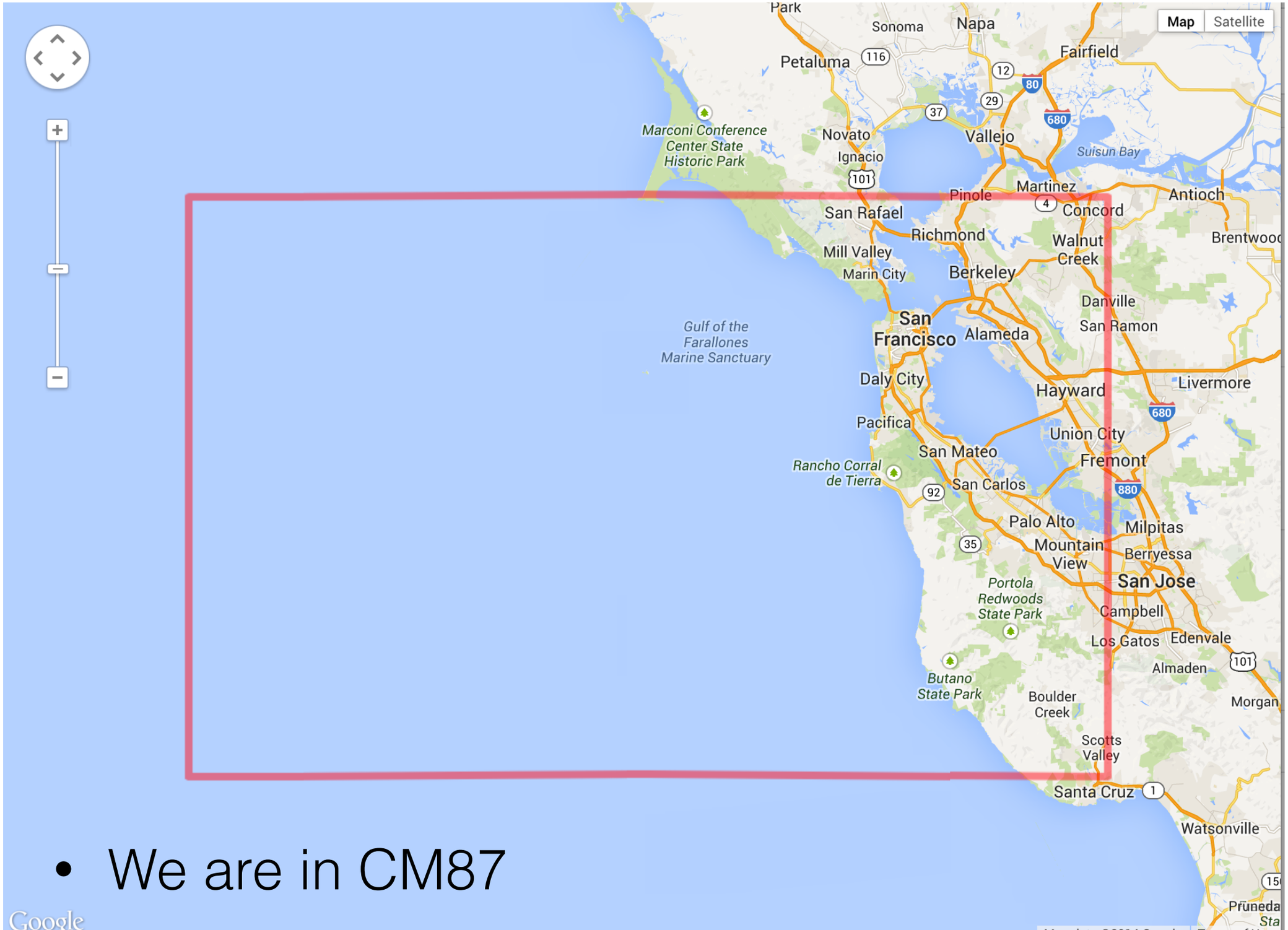
Grid Locator

- Shorthand for latitude and longitude



We are in CM

Grid Square Locator



- We are in CM87

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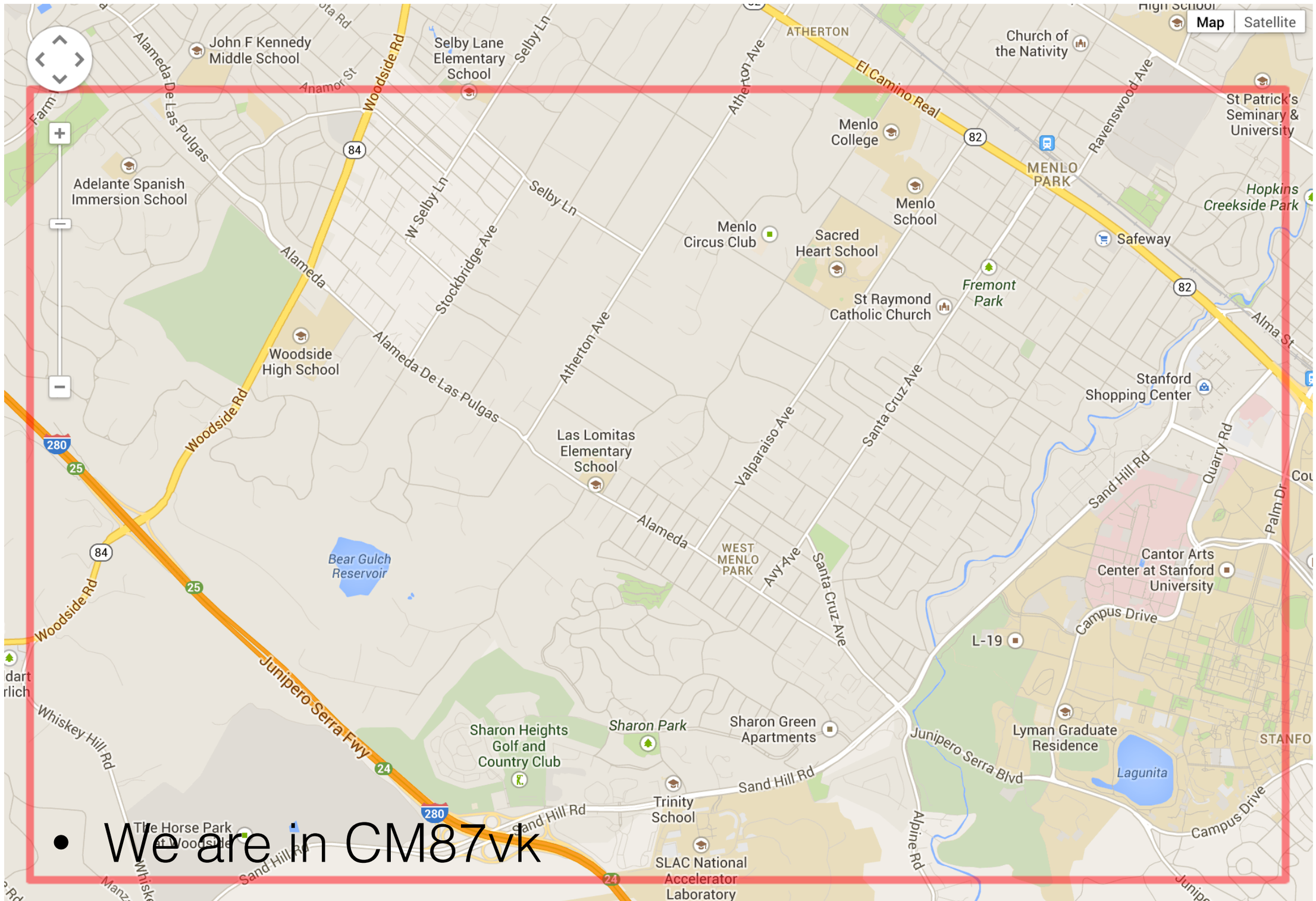

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Technician Power Levels

- Use the minimum power required to get the job done.
- Up to 1500 watts peak envelope power (PEP).
  - Will generally require an external amplifier to achieve these power levels.
  - Some special cases where power is restricted.
- Some limited bands
  - 50 W PEP on 219-220 MHz
  - Geographical restrictions (Military bases, near Canada)

Primary and Secondary Allocations

- Many bands allocated to more than one service
  - Primary allocation : priority service
  - Secondary allocation : can’t interfere with primary user (and must accept interference from them)
- Some bands are primary for amateur radio
- Most bands UHF and above are secondary
- Bands are allocated differently in different countries

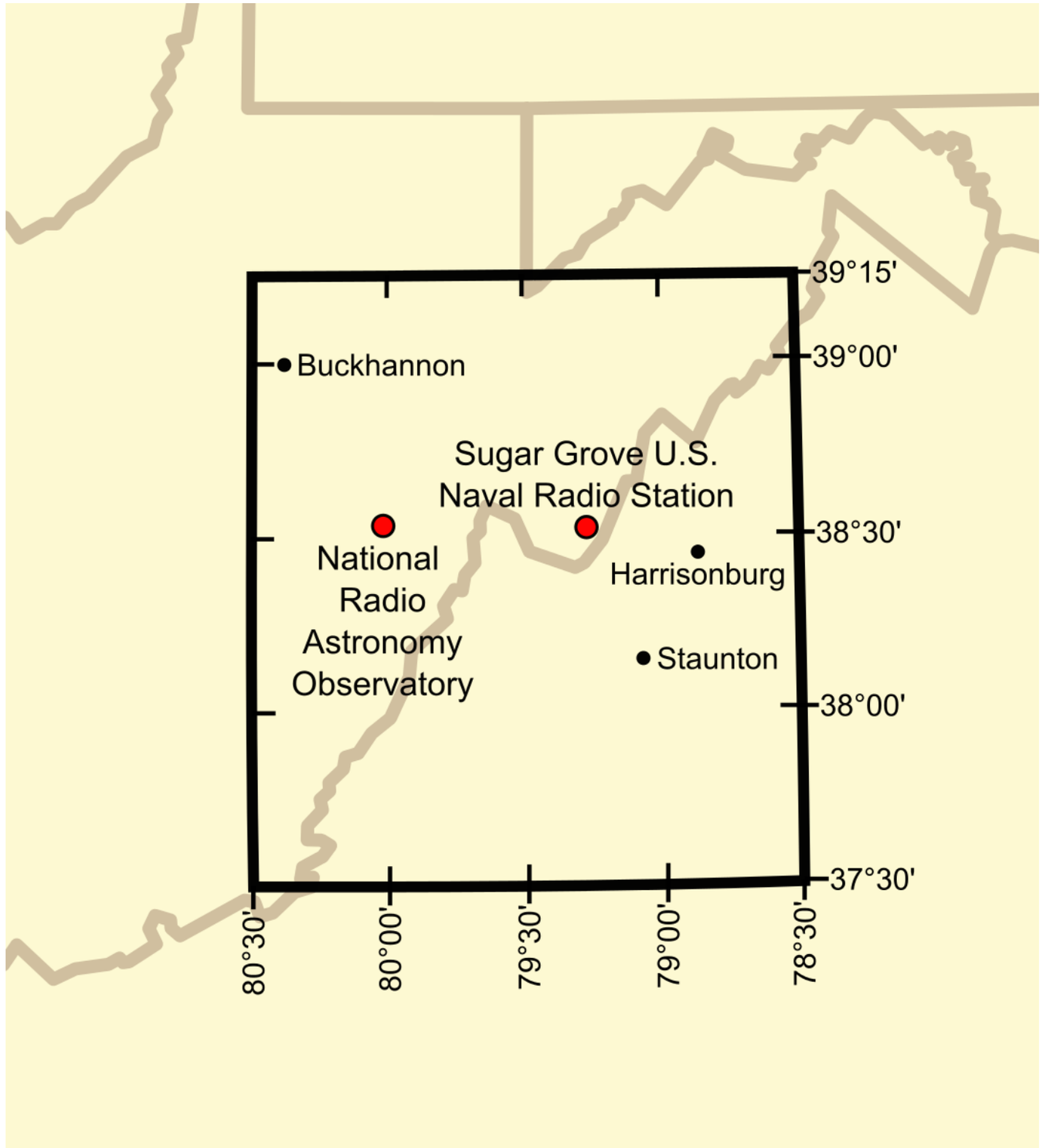
Line A

- Canada uses 420-430 MHz for radio location

- US users are secondary, and should not interfere. This band can’t be used within 50 miles of the Canadian Border

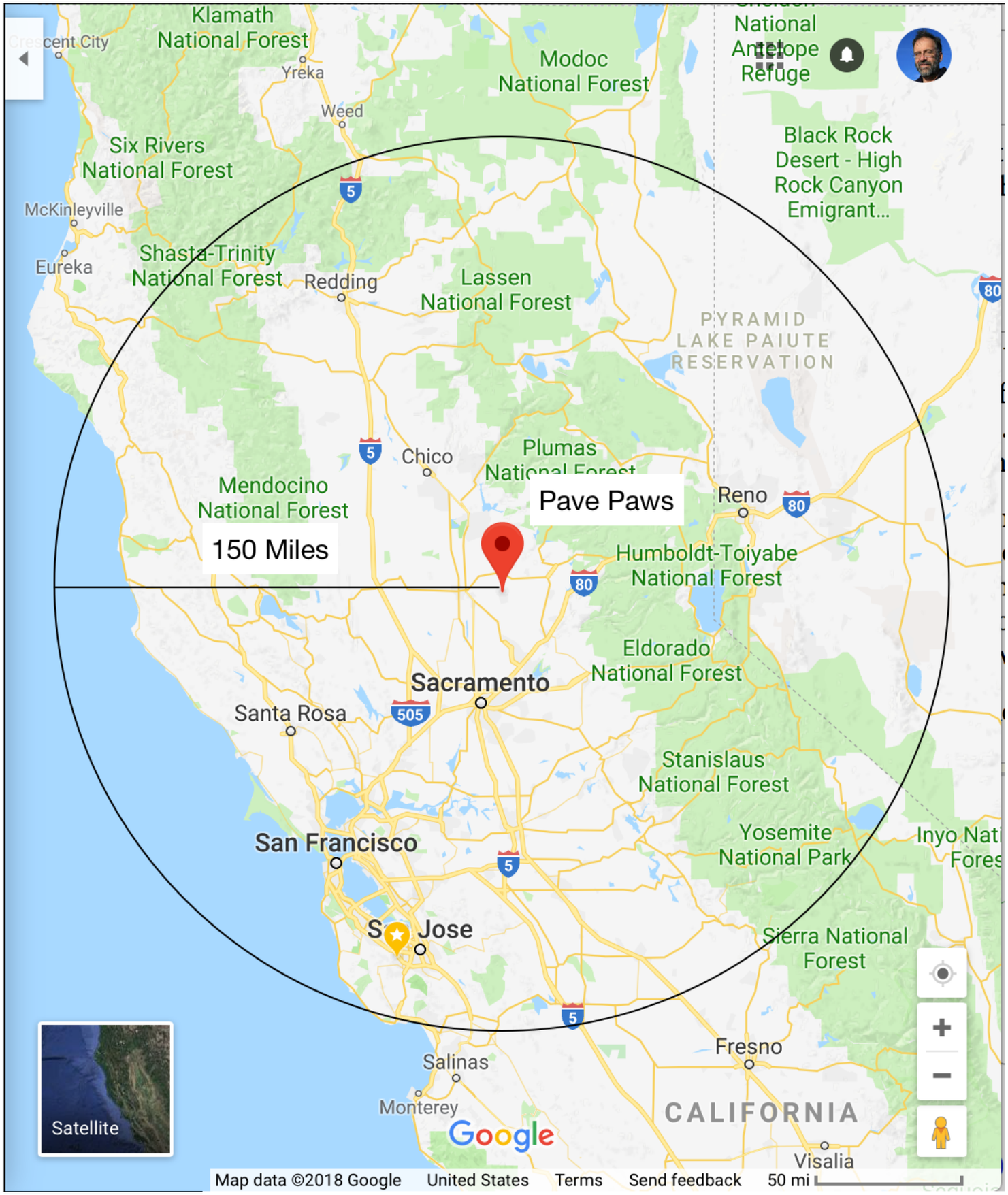
National Radio Quiet Zone

- All RF tightly regulated in rectangle
- Most restrictive within 10 miles of Green Bank (NRAO)



Pave Paws

- Huge radar for tracking ICBM’s coming into California.
- Uses UHF band 420-450 MHz
- Amateur’s must use less than 50W in the Central Valley



Pave Paws

- 50 W limit
- 150 mile radius from Beal AFB
- Other radars on Cape Cod, and in Alaska

International Rules

- International Telecommunication Union (ITU)
  - Founded as a UN agency in 1949
- Regions 1, 2 and 3.
  - We are region 2
- Reciprocal operating authorizations.
- These restrict some countries that we can contact.

ITU Regions

Operating in Other Countries

- You must follow the regulations for the ITU region you are in
- You can operate from a US flagged vessel
- Reciprocal operating authority : many countries have agreements with the US, just take your license
- International Amateur Radio Permit (IARP) : issued by ARRL here, allows you to operate in some North and South American countries. Extra (class 1) and Technician (class 2).
- CEPT : Agreement with European countries. You need your license, passport, and CEPT Notice. Same classes as IARP.

What types of international communications are permitted by an FCC-licensed amateur station? (T1C03)

A. Communications incidental to the purposes of the amateur service and remarks of a personal character

B. Communications incidental to conducting business or remarks of a personal nature

C. Only communications incidental to contest exchanges, all other communications are prohibited

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A. Any country whose administration has notified the International Telecommunications Union (ITU) that it objects to such communications

B. Any country whose administration has notified the American Radio Relay League (ARRL) that it objects to such communications

C. Any country banned from such communications by the International Amateur Radio Union (IARU)

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