Amateur Radio Technician Exam Preparation Course

ARRL
The National Association for Amateur Radio®

Plan for Today

- Licensing Regulations
- Call Signs
- Operating Regulations

FCC Registration Number (FRN)

- Identifies you to the FCC
- You need one of these to get a license
  - If you already have an FCC license (e.g. GMRS), you have an FRN!
- Most ham test providers require you to provide your FRN
- Sign up for an FRN in the FCC's CORES web application

What is Amateur Radio? (review)

- Amateur “ham” radio: a personal radio service authorized by the FCC
  - Other personal radio services: FRS, GMRS, CB, MURS
- Purposes:
  - Encourage advancement in the art and science of radio
  - To promote the development of emergency communication capability to assist communities when needed
  - To develop a pool of trained radio operators
  - To promote international goodwill by connecting private citizens in countries around the globe

Licensing Authority

- Federal Communications Commission (FCC)
- Amateur radio regulations are covered by FCC Rules
  - Published in Part 97 of Title 47, Code of Federal Regulations (“Part 97”)
- Other sections of the code cover other services
  - Part 90 (commercial radio)
  - Part 95 (CB, FRS, MURS)
  - Part 15 (WiFi, low-power, anything that radiates RF)

The Amateur License

- No age limit or citizenship restrictions
  - One exception: no foreign representatives
- License is composed of 2 parts:
  - Operator license
  - Station license (the Call Sign)
- There are 3 levels of operator privileges
  - Technician (this class!)
  - General (more bands)
  - Amateur extra (slightly more spectrum, higher power limits)

The Exam

- All questions are multiple-choice
- The question pool is different for each licensing level
- You can take multiple exams on the same day
- Exams are run by Volunteer Exam Coordinators (VECs)
  - At least 3 Volunteer Examiners (Ves) of a higher class will be present
- Fees to take the test:
  - Exam fee: usually $15, varies by VEC to cover costs of offering the exam
  - FCC application fee: $35 once you pass
- You can operate when your Call Sign appears in the FCC's database
  - www.wireless.fcc.gov/uls
  - Usually takes a couple days

License Term

- License costs $35, valid for 10 years
  - You can renew within 90 days of the expiration date
  - If you fail to renew in time, 2 year grace period
- Some personally identifiable information is required
  - Tax ID (Social Security Number)
  - Current mailing address
  - FCC Registration Number (FRN)

Your 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 on request
- You are the “control operator”
  - Responsible for making sure FCC rules are followed
  - The “control point”: wherever the control operator operates the transmitter
    - May be remotely located, connected by phone, internet or radio links
  - You may allow another amateur to use your station (“guest operator”)
    - They can use your privileges if you are present

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
  - Use the minimum power necessary
  - Use accepted frequencies appropriately (band plans, etc.)
  - No encryption allowed
    - Only allowed in *very* specific cases
  - Amateur radio is basically self-regulated

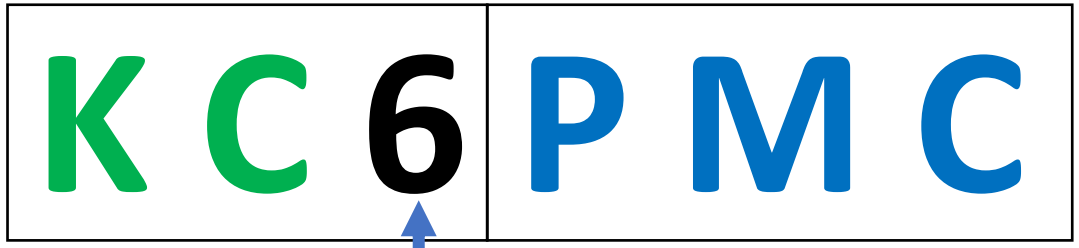
Manners on the Air

- Speak clearly and distinctly
- Radio is a giant party line – choose topics accordingly
- We all share the same frequencies
- Use phonetics where it makes sense to
- ID your station every 10 minutes
- Sign off (73, clear, etc.)

Prohibited Transmissions

- 4 types of prohibited transmissions:
  1. Unidentified transmissions (no call sign)
  2. False or deceptive transmissions (using someone else's call sign)
  3. False distress or emergency signals
  4. Obscene or indecent speech
- Communications in return for some kind of compensation
  - Exception: teachers can use ham radio in classroom instruction
- Regular communications that could be performed through some other radio service
  - Example: directing boat traffic should be on marine VHF channels

Call Signs: Info about your license class



Prefix: 1-2 letters and a number

In the US, first letter is K, W, N, or A

Digit:
Where in the US your call sign originated

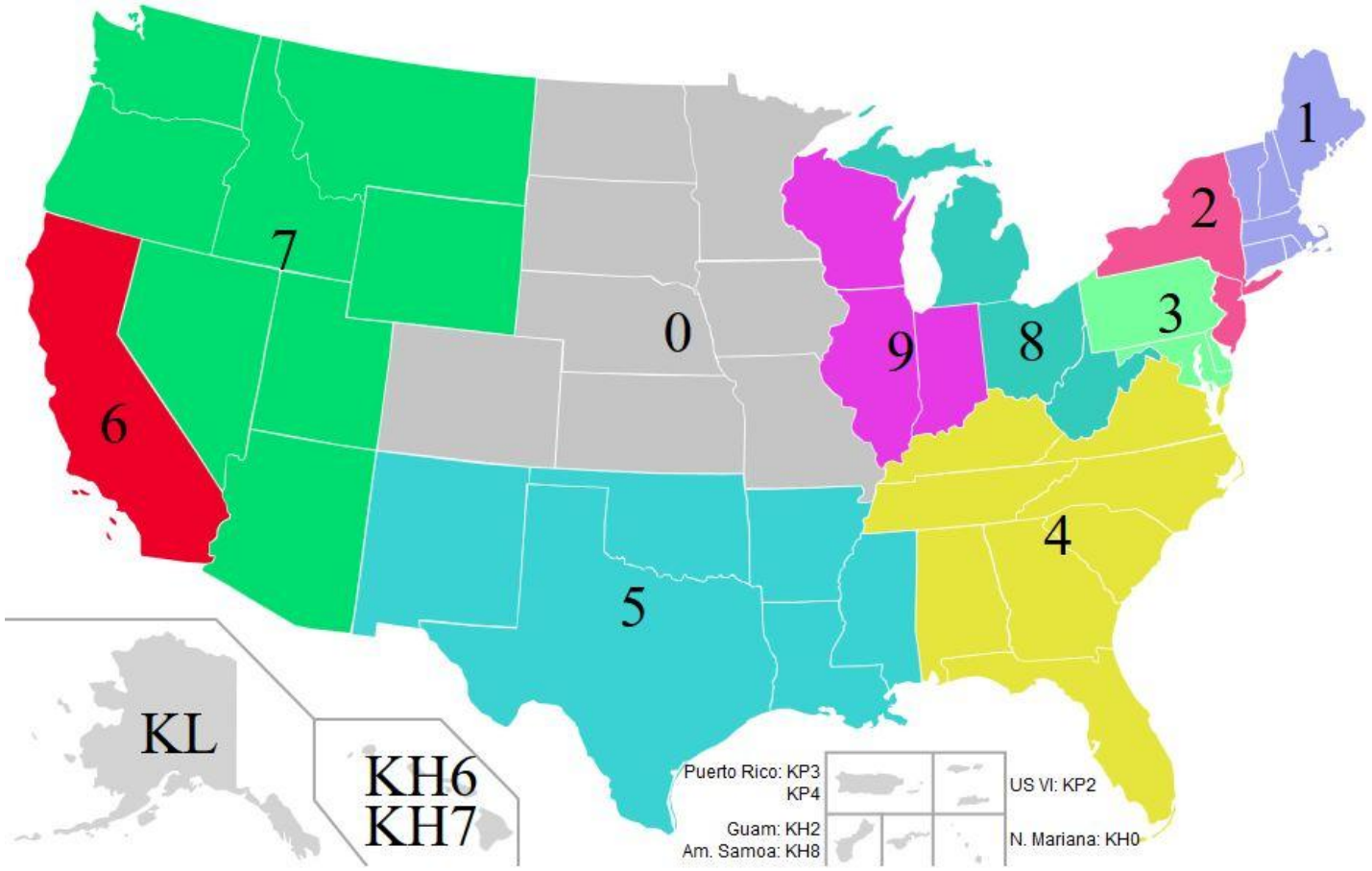
Suffix: 1-3 letters

Identifies you and your license

US Call Districts

You are assigned the numeral part of your call by the FCC, based upon where you live. If you move, this number stays with you. HOWEVER, you may request (and obtain) a vanity call outside your district!

US Call Sign Districts



Special-Case Callsigns

- Tactical call signs sometimes used for emergency/public service operations (e.g. “Rover 1”)
  - Still need to identify using your FCC callsign
- Self-assigned indicators
  - Can add indicators before or after your call sign
  - Indicators must not conflict
    - Country prefixes
    - Other indicator in the FCC rules (e.g. /KT, /AG, /AE = upgraded license class)
  - Separate with “/”, “stroke”
  - Examples: W3/KC6PMC or KC6PMC/W3

Examples of Typical Call Signs

- Recent Technician class (2x3, Group D)
  - KK6ABC
- Recent Extra class (2x2, Group A)
  - AG6WH
- Vanity call signs
  - Many 2x2 (group B) and 1x3 (Group C) callsigns available
  - 1x2 and 2x1 callsigns are harder to come by
- Special events have 1x1 callsigns

Group	*License Class*	*Format*
Group A	Amateur Extra	Prefix K, N or W with two-letter suffix (1×2), or two-letter prefix beginning with A, N, K or W and one-letter suffix (2×1), or two-letter prefix beginning with A and a two-letter suffix (2×2)
Group B	Advanced	Two-letter prefix beginning with K, N or W and a two-letter suffix (2×2)
Group C	General, Technician	One-letter prefix beginning with K, N or W and a three-letter suffix (1×3)
Group D	Technician, Novice, and Club	Two-letter prefix beginning with K or W and a three-letter suffix (2×3)

Vanity Call Signs

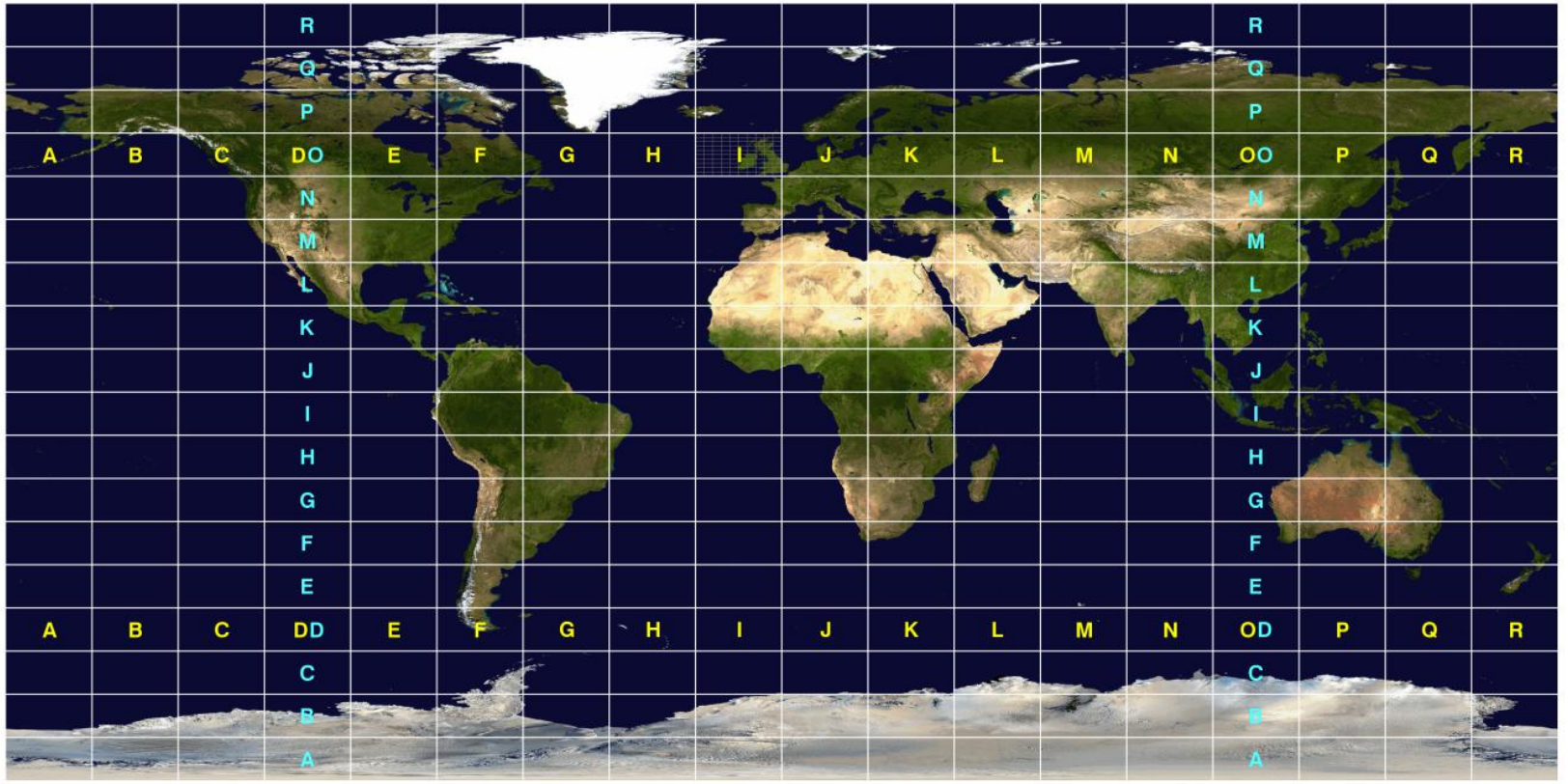
- You can make up your own callsign
  - Can use any US district number
  - Websites can help you find an available vanity callsign
- Apply on the FCC website, for free
- A couple examples derived from people's names
  - Harry Guy – N6GUY
  - Art Whipple – WA3AW

A little more about making contacts

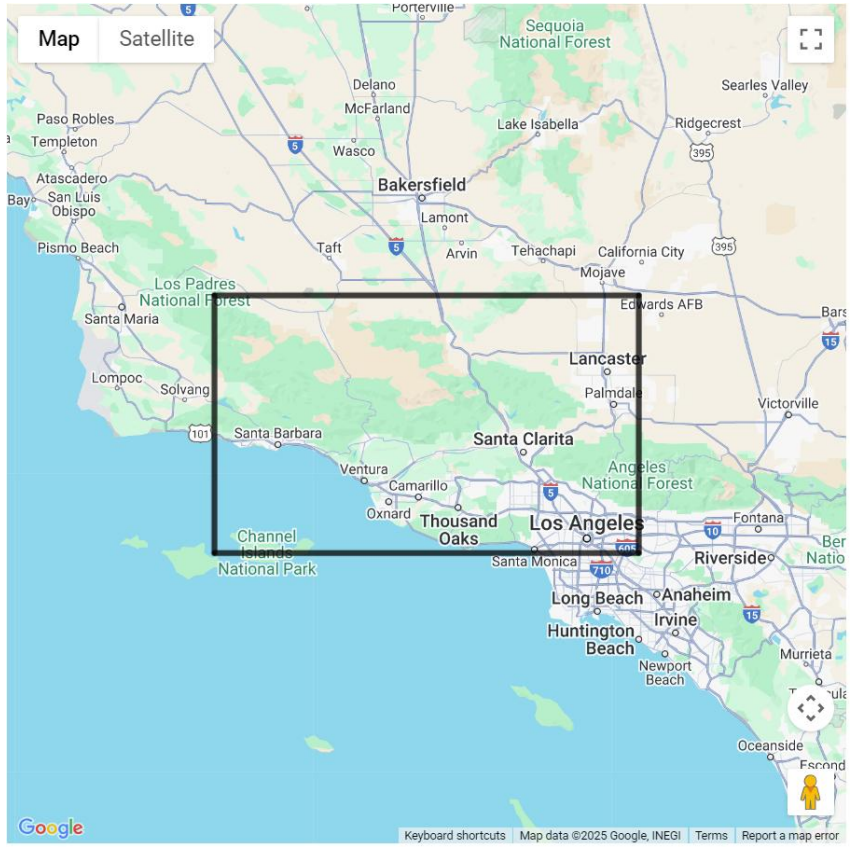
- Call signs can tell you something about location
- Recall signal quality reports
  - RST system – Readability (1-5), Signal Strength (1-9), Tone (1-9, for CW only)
- Location can also be identified by grid squares
  - “Maidenhead System”

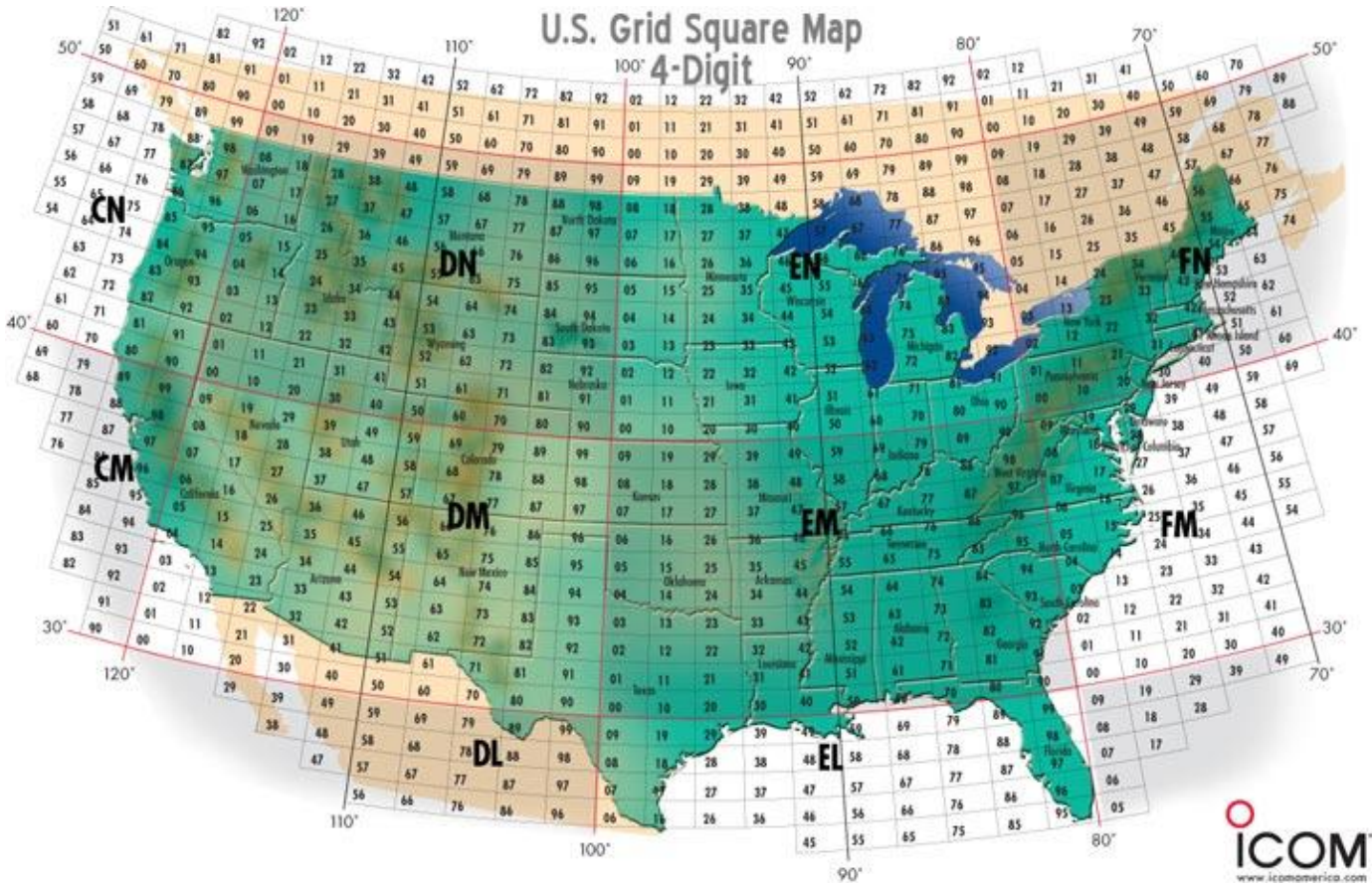
Grid Locator: DM

- Shorthand for Latitude and Longitude (we are in DM)



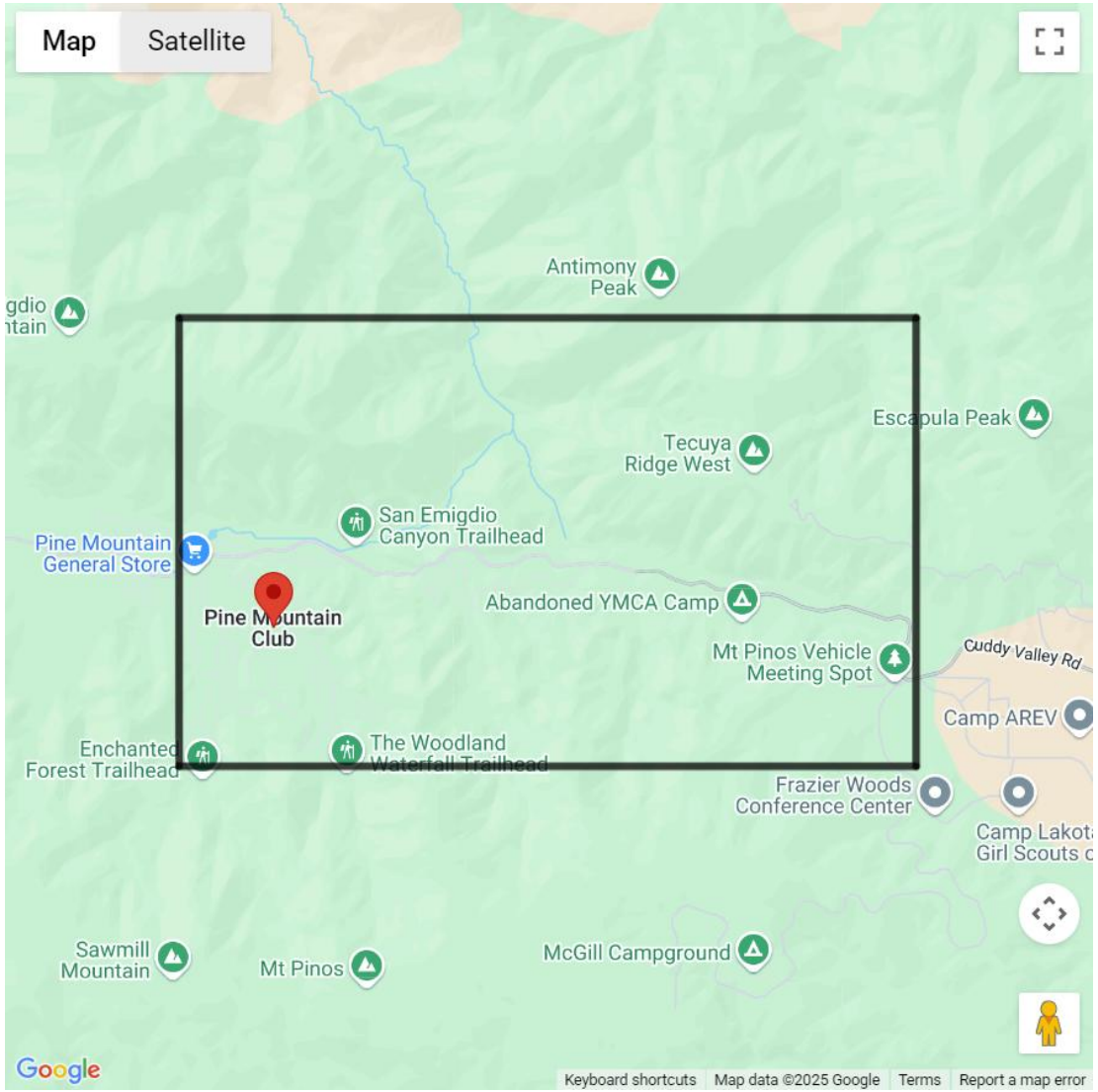
Grid Square Locator: DM04





Grid Square Locator: DM04ku

- Grid squares can be further subdivided
- We are in DM04ku
- Calculators online can help you find this information
- Some hams try to make contacts in all grid squares



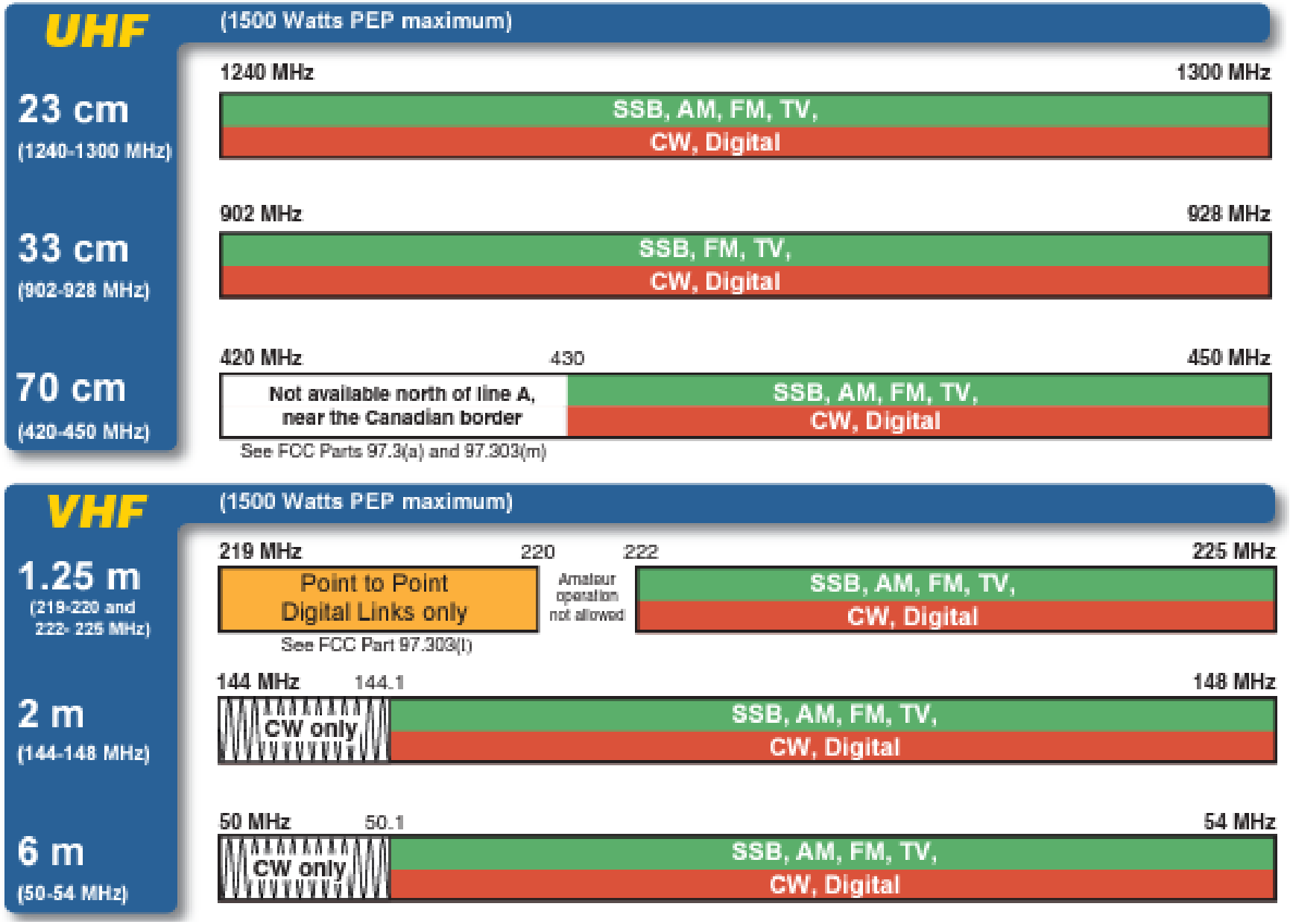
Technician Power Levels

- Remember: use the minimum power to get the job done
- Allowed: up to 1500 Watts peak envelope power (PEP)
  - Specifics depend on the band and licensing level
  - Usually needs an external amplifier to reach these power levels
- PEP restricted in some cases:
  - Band restrictions
    - 50W PEP on 219-220 MHz
  - Geographical restrictions
    - Near military bases, near Canada

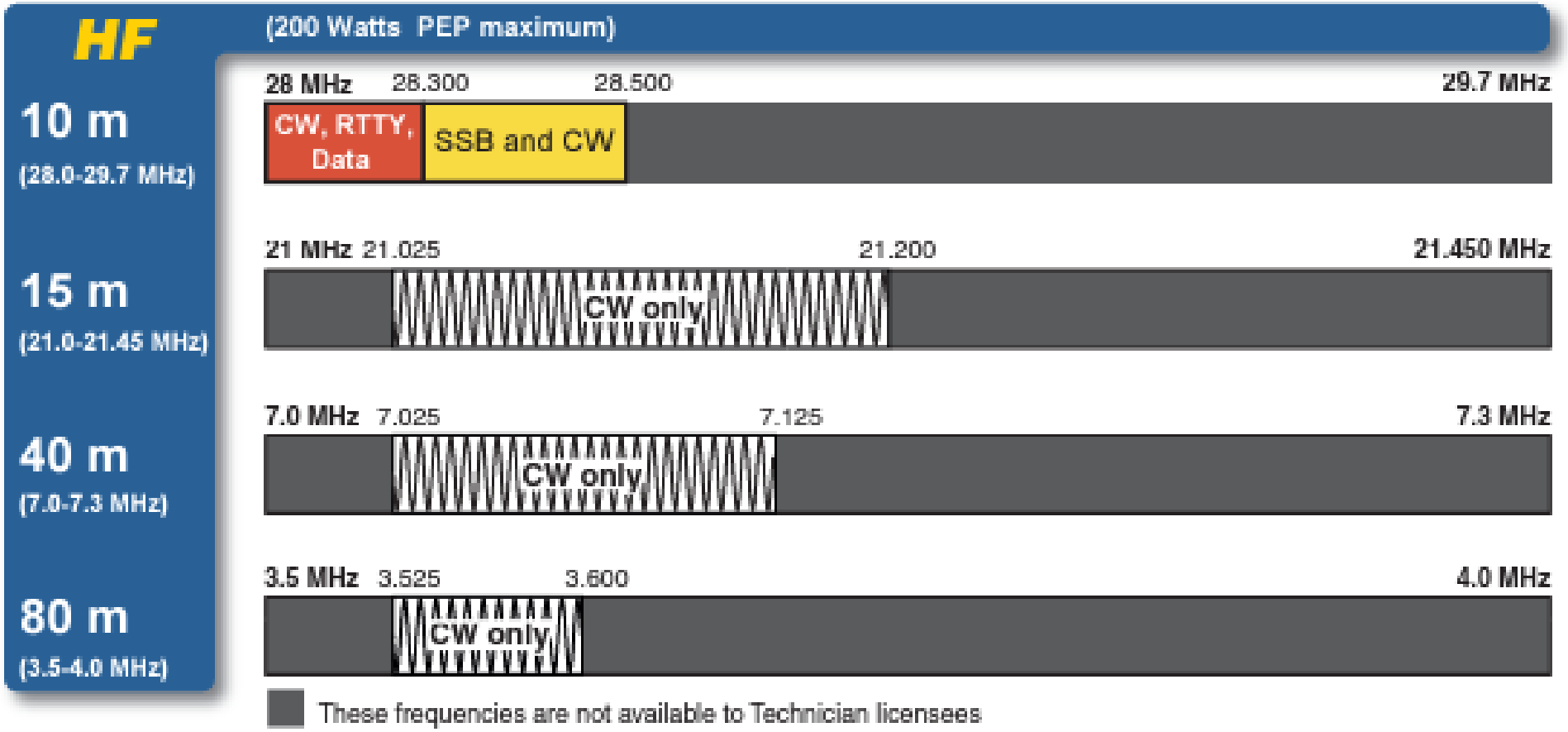
Bands and Privileges

- Hundreds of bands and dozens of different types of radio users
- The frequency privileges are called *allocations*
- Most common bands used by Technicians …
  - 6 meters (50 – 54 MHz)
  - 2 meters (144 – 148 MHz)
  - 70 cm (420 – 450 MHz)
  - See Table 7.2, Table 7.3, and Figure 7.3 in your text
- Technician privileges at …
  - http://www.arrl.org/files/file/Tech%20Band%20Chart/US%20Amateur%20Radio%20Technician%20Privileges.pdf

Technician Privileges



Technician Privileges



Primary and Secondary Allocations

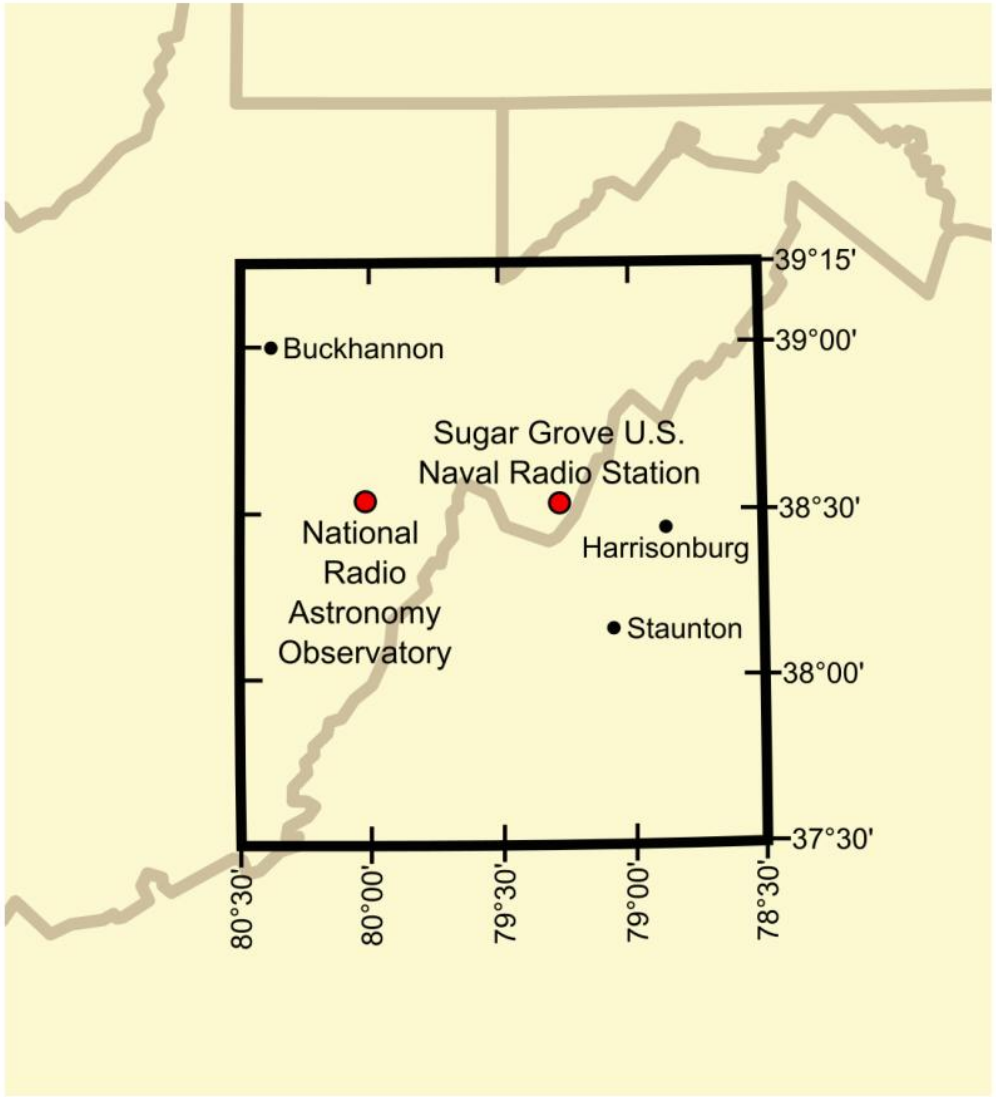
- Many bands are allocated to more than 1 service
  - “Primary Allocation”: priority service
  - “Secondary Allocation”: can’t interfere with a primary user (and must accept interference from them)
- Some bands are primary for amateur radio
- Most bands UHF and above are secondary for amateur radio
- 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 cannot be used within 50 miles of the Canadian Border
- GMRS also restricted in this area

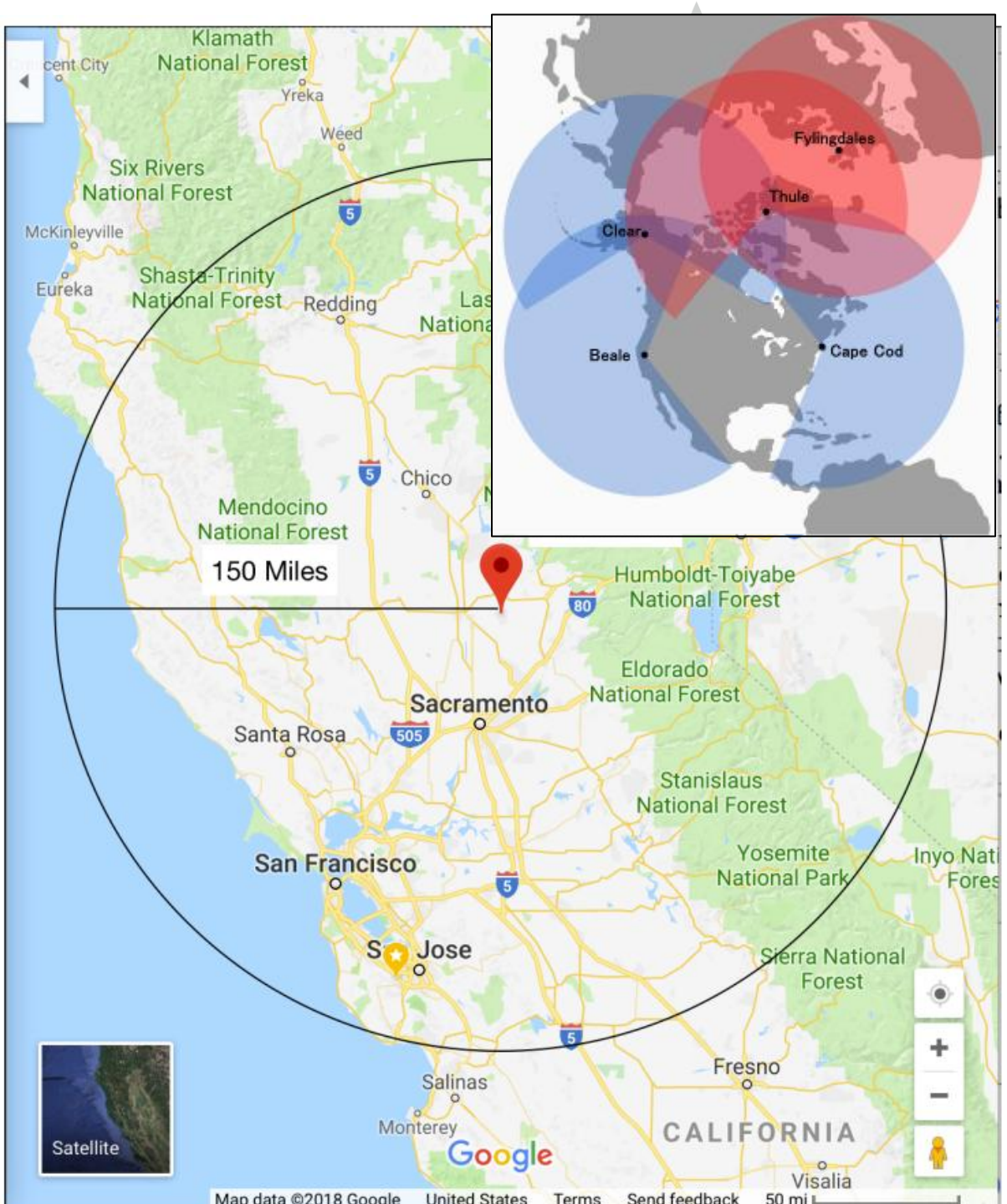
National Radio Quiet Zone

- All RF tightly regulated in this rectangle
- Most restrictive within 10 miles of Green Bank (National Radio Astronomy Observatory)
- Be aware of this if operating in VA or WV



PAVE PAWS

- Huge radar system for tracking ICBMs coming into CA
- Uses UHF band 420-450 MHz
  - This is a primary allocation
  - Amateur users are a secondary allocation
- Amateurs must use less than 50W in the Central Valley
  - 150 mile radius from Beal Air Force Base
  - Other radars on Cape Cod and in Alaska



International Operating Rules

- Governed by the International Telecommunication Union (ITU)
  - Founded as a UN agency in 1949
- Global regions 1, 2, 3
  - We are in region 2
- Reciprocal operating authorizations
  - Restrict some countries we can contact
- International communications permitted:
  - “communications incidental to the purposes of the amateur service and remarks of a personal character”

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 bring your license papers
  - Example:
    - New Zealand – KC6PMC/ZL (“/” pronounced “Stroke”)
- IARP – International Amateur Radio Permit
  - Issued by the ARRL in US, allows you to operate in some N and S American countries. Extra (class 1), Technician (class 2)
- CEPT – Agreement with European countries.
  - You need your license, passport and CEPT notice.
  - Same classes as IARP

Know the Rules Before You Go: Example

- Some countries require special permits
- Example: China
  - No reciprocal operating agreement with the US
  - Permit required to operate
  - You can’t operate your own station
  - Can operate a Chinese ham’s station under their supervision
  - Chinese rules differ from US rules
    - Allowed power outputs
      - Less than 25W PEP on VHF, UHF
      - Less than 1000W PEP on HF
    - Amateur operation allowed on specific frequency ranges

Next Time: Final Class!

- Safety
- Preparing for the Exam
- We decided we'll meet at noon again for the final class