



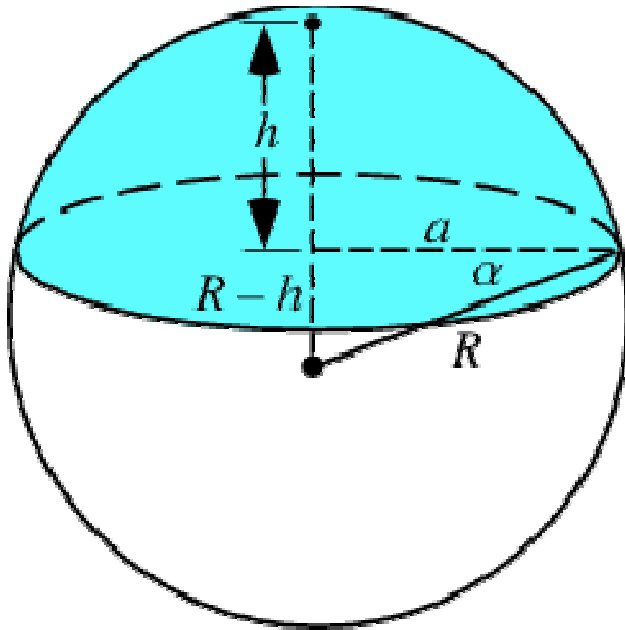
International Committee on  
Global Navigation Satellite Systems

# Proliferation of GPS/GNSS Jammer Devices

## Disclaimer

*The views and opinions expressed herein do not necessarily reflect the official policy or position of any government agency*

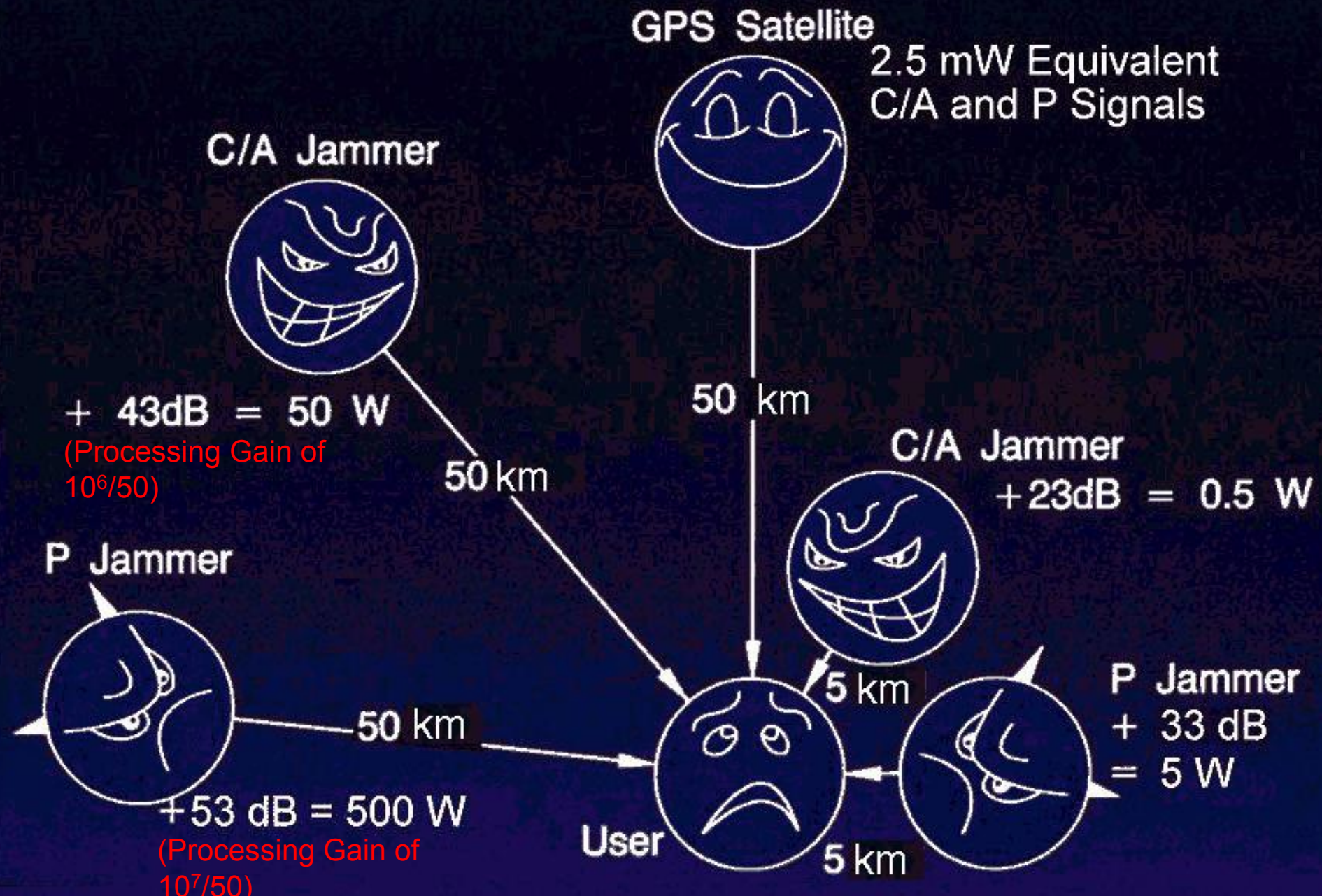
# Why Received GPS Signals are Weak



GPS defines the minimum C/A “open sky” signal power to be -158.5 dBW, 11 times weaker than calculated here

- Signals from each GPS satellite cover 38% of the earth or 194,244,017 sq km
- A 50 watt GPS transmitter thus provides  $\sim 2.6 \times 10^{-13}$  Watts per square meter on the earth
- A hemispheric L1 antenna “capture area” is  $\sim 0.006$  m
- Received signal power thus is  $\sim 1.5 \times 10^{-15}$  Watts (-148 dBW) or  $\sim 1.5 \times 10^{-12}$  mW (-118 dBm)
- Very weak signals!!!

# The Near/Far Problem



# Jamming vs. Spoofing

- Jamming is intended to prevent a receiver from acquiring, tracking, or navigating with GNSS signals
- Spoofing is intended to fool a receiver so it provides false position, navigation, and/or time (PNT)
  - Thus allowing the Spoofer to control the victim's PNT
- Smart-Jamming is intended to cause receivers to acquire false signals, which either:
  - Prevents navigation (*with less power than for jamming*),
  - Or, causes false (*but uncontrolled*) PNT results



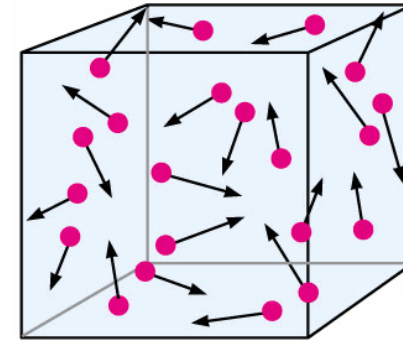
# Jamming Sources

- Thrill seekers – interrupt GPS “for the fun of it”
- “Privacy” jammers, e.g., cigarette lighter devices
- Criminals
- Terrorists
- Government authorized services
  - Powerful adjacent channel signals causing overload
  - Higher order intermodulation products, e.g.,  $2f_1 - f_2$



# Receiver Noise Floor (1 of 2)

- Due to Brownian motion, all things with a temperature above absolute zero produce “noise”
- The noise power from a passive device =  $kTB$ 
  - $k$  is Boltzmann’s Constant ( $1.38 \times 10^{-23}$  Joules/ $\Delta K$ )
  - $T$  is temperature in degrees Kelvin
  - $B$  is noise bandwidth in Hz
  - At  $\sim$  room temperature ( $290^0$  Kelvin), the noise power density is  $-204$  dBW/Hz or  $-174$  dBm/Hz
- If the receiver “noise figure” is 3 dB, its noise floor is  $-201$  dBW/Hz or  $-171$  dBm/Hz



# Available GPS Jammers

MP4 File



# Jammers for Sale

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**Categories**

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# Jammer Selection Advice

## GPS Blocker Selection

Selecting the correct [gps jammer](#) can be easily done by determining your usage parameters. For vehicle tracking system protection, the small [vehicle adapter gps jammer](#) is best. For protecting your person *and* vehicle, the portable models offer take-with-you portability and tracking device countersurveillance protection. Our [combination models](#) offer both cellular and GPS jamming coverage.



Thank You

Questions?