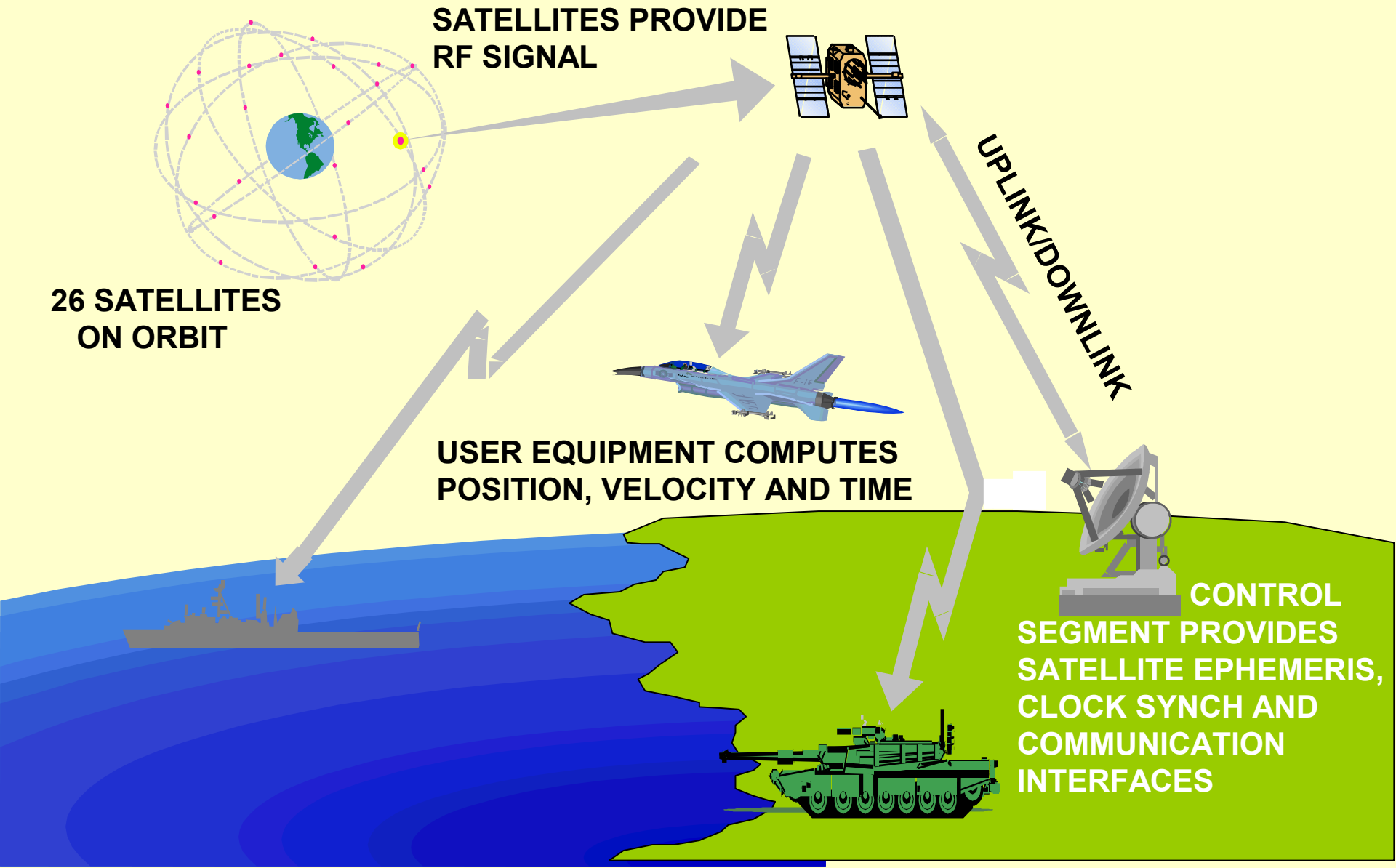


GPS Vulnerability

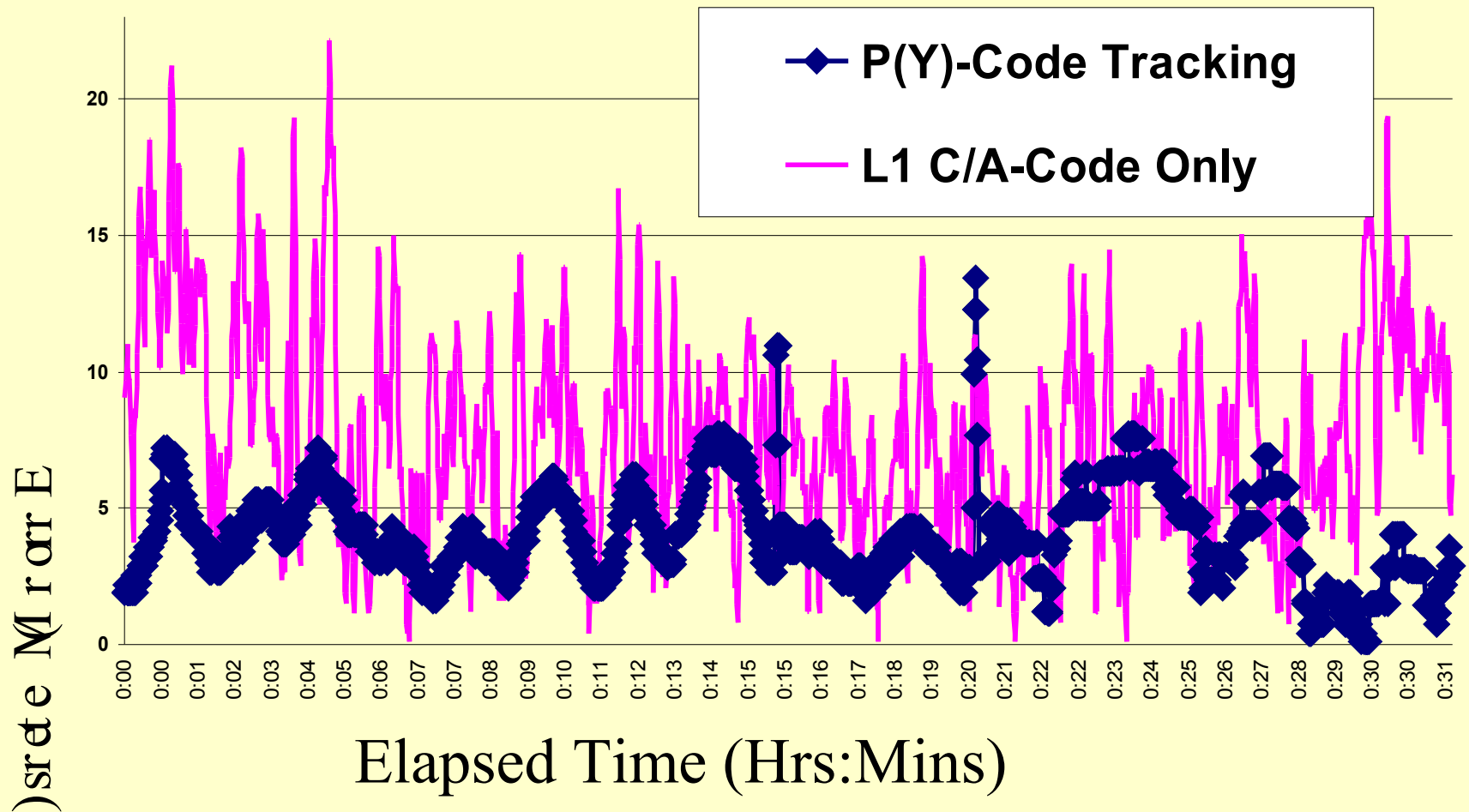
***GPS Users Conference
02 November 2000***

**LCDR Drew Williams
SSC-SD, Code D315
GPS Division**



GPS Position Error

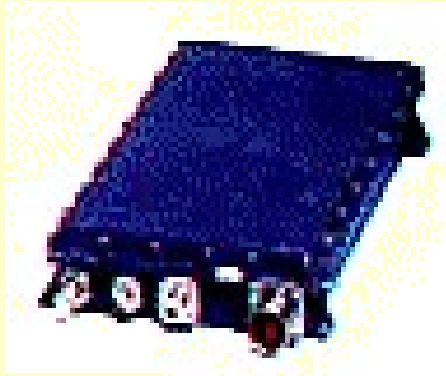
2-D Error





Antenna

Antenna Electronics



GPS Receiver



Position

Velocity

Time

The TOP 3 Reasons for GPS Vulnerability:

#1 REASON: *Signal Interference*

- Threat
- Blue-on-Blue
- Unintentional/Foreign Frequency Allocations

#2 REASON: *C/A-Code Signal Spoofing*

#3 REASON: *Growing Dependency on GPS*

	POWER	RANGE	ACCURACY
ARC-182/210	20 W	300 NM	N/a
JTIDS/MIDS	200 W	300 NM	30-90 Meters
GPS	60 W	10,980 NM	8 Meters

•Received Power at Earth's Surface:

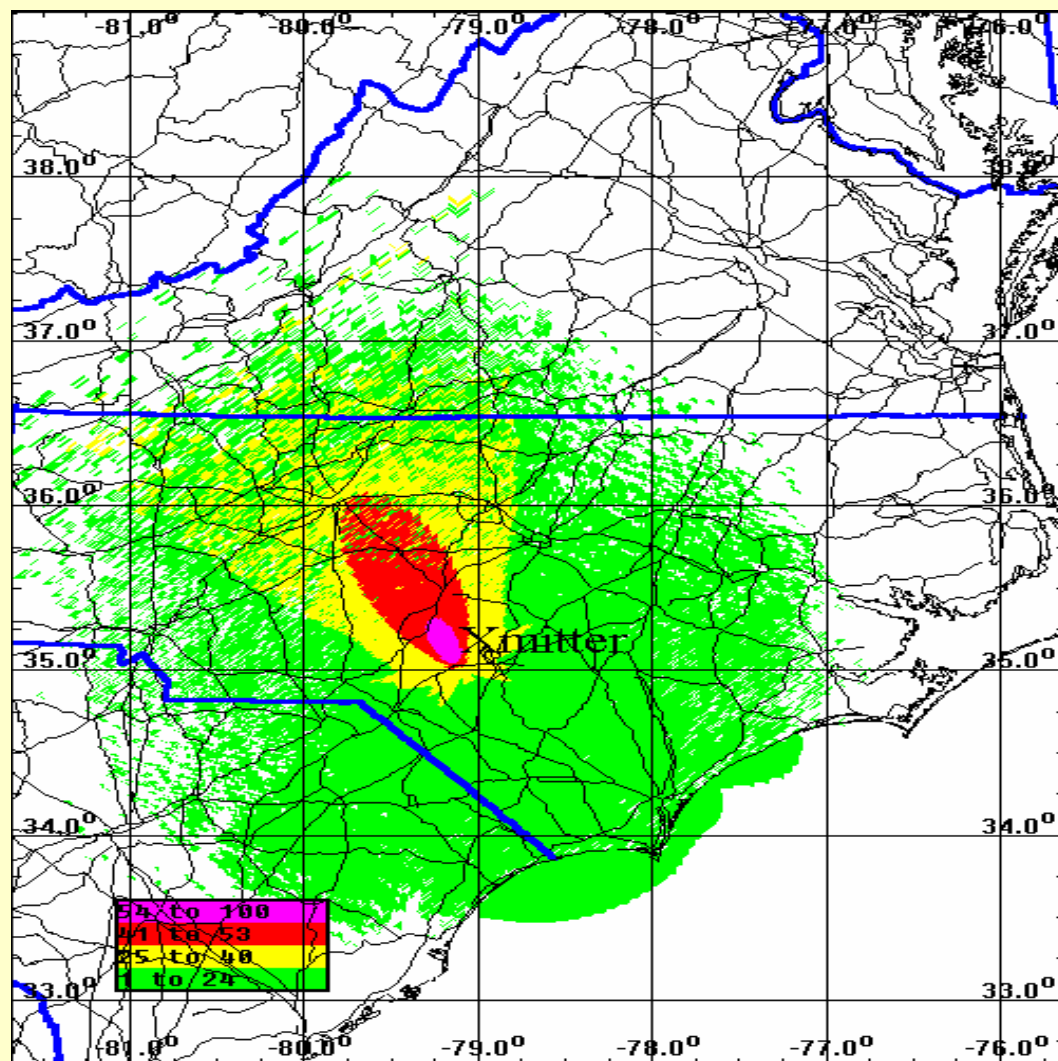
0.00000000000000000001 Watts (10^{-16} W)

➤Signal below Thermal Noise Threshold by 15 dBW

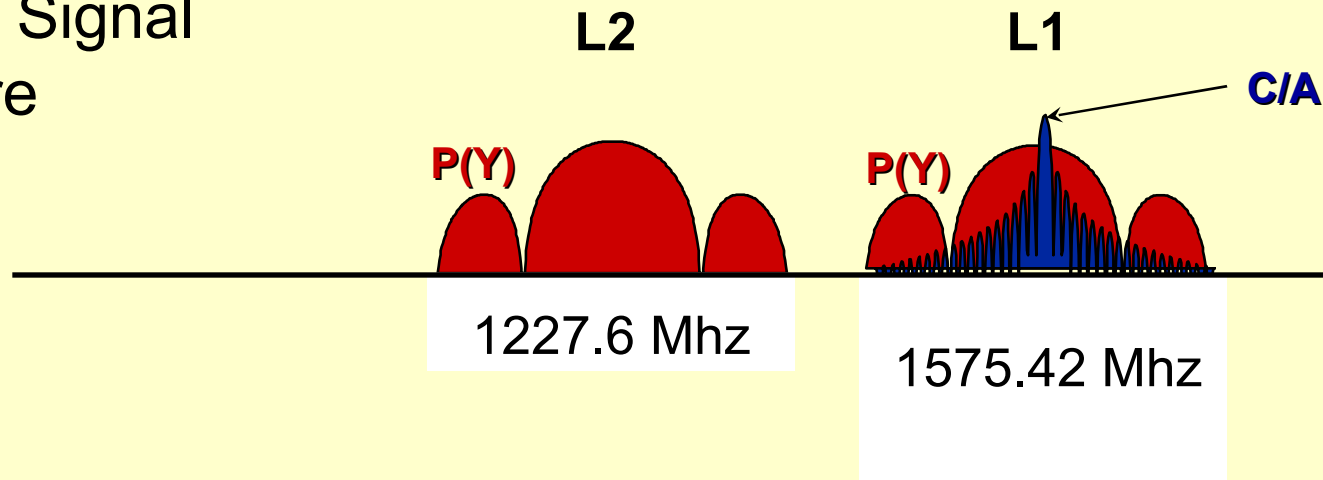
**NKC-135 at 10,000 ft.
Target at Ground Level
Power: 400W**

Location: Fort Bragg, N.C.

- Green Civil Receivers Affected
- Yellow Civil Receivers Denied
- Red Military Receivers Affected
- Purple Military Receivers Denied

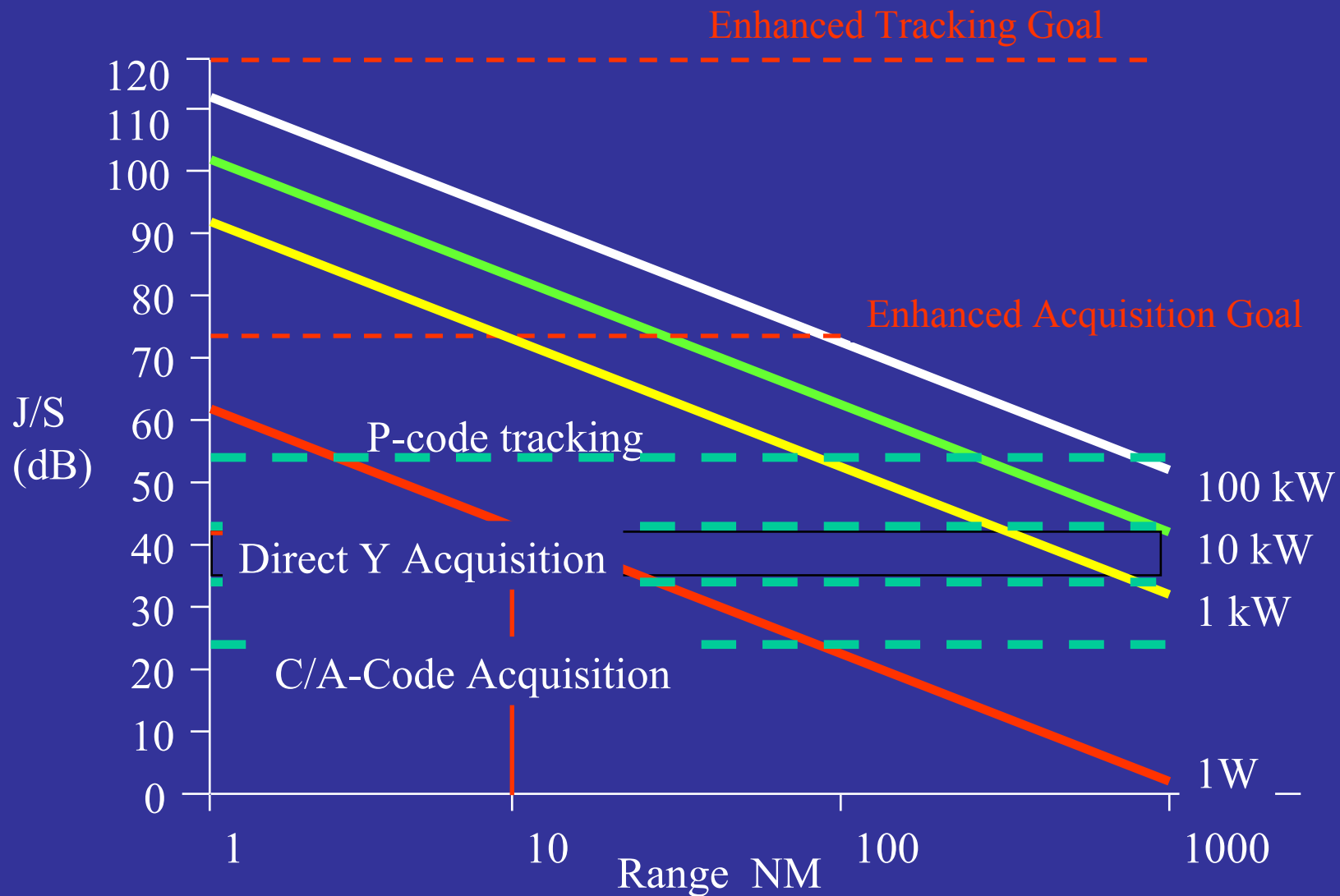


Present Signal
Structure



- Must Acquire P(Y) Code through C/A Code First
- C/A & P Codes are Published in Open Literature, Worldwide

GPS Jamming Environment



REASON #1:

-Low power signal can be easily jammed when acquiring GPS

REASON #2:

-Military GPS receivers are Spoof Resistant once tracking Y-Code

REASON #3:

-Do NOT become a GPS cripple

***ALWAYS OPERATE IN
THE “KEYED” MODE!***



Navy GPS

Questions?

