412th Test Wing

War-Winning Capabilities … On Time, On Cost

Position, Navigation, and Timing Effects in an Electronic Warfare Environment

3 Nov 2016

John Grigaliunas / Wei Lee
771st Test Squadron
661-277-2643 / 661-275-0969

Approved for public release; distribution is unlimited.
412TW-PA No.: 16482

Integrity - Service - Excellence
Introduction

• Majority of the GPS budget is through Defense Appropriations (~90%)
• I wanted to balance the civil use of GPS with a bit about what the DoD is concerned with.
Overview

• Intro to Electronic Warfare
• Air Interdiction Scenario
• Ideal Scenario Execution
• PNT Constrained Effects on Scenario
• Conclusion
Background

- Who are we?
- What is Electronic Warfare?
- What is the kill chain?
- What is the threat environment?
Who are we?

• The 771st Test Squadron conducts cost-effective electronic warfare developmental test and evaluation of Air Force and Foreign Weapons Systems.
  – We arm the tactics developers with data
What is EW?

Protect Friendly Systems

Counter Adversary Systems
What is the Kill Chain?

Breaking any link in the chain prevents a successful engagement.
What’s the Threat Environment?

Air Surveillance
Numerous Sensors (Primarily Radar) Provide Raw Target Data

Command & Control
Filter Center
Form the Air Picture & Assign Weapons

Target Acquisition
SAM Control

Air Defense Weapons Operations Center

Ground Controlled Intercept (GCI)
Fighter Control

Target Engagement
Where we Test

BAF

Open Air Ranges

DIADS
Mission Types

- Suppression of Enemy Air Defenses
- Air Interdiction
- Intelligence/Surveillance/Reconnaissance
- Offensive/Defense Counter Air
- Close Air Support

All mission types depend on sound PNT
AI in Threat Environment

- Stanford wants to drop a notional “bomb” on Cal’s campus
- Berkeley has an advanced Air Defense Network
Ideal Flow
• Turns out Cal has developed an advanced GPS denial/spoofing ability
PNT Effects
Comparison of the 2
Comparison of the 2
Questions?