LORAN Modernization Program Status

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Introduction

- Loran Today
- Loran Modernization – Achievements
  - Lorsta & Consta Electronics Recapitalization
  - Differential Loran
  - Loran Data Channel (LDC)
- Loran Modernization – Expectations
  - Remaining Recapitalization
  - Differential Loran & Loran Data Channel
  - Loran Timing Test Beds

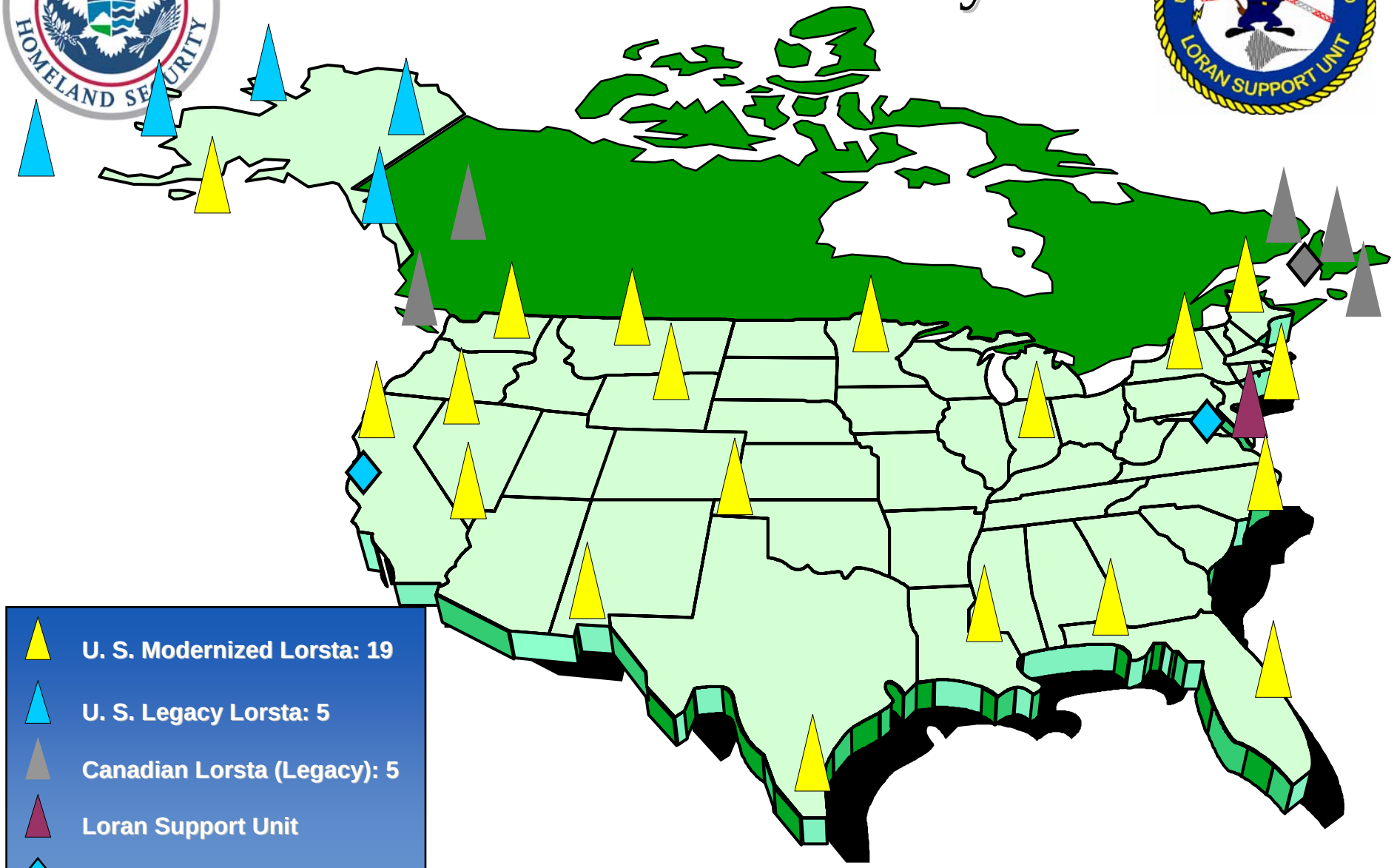
LORAN-C Today

- 100 kHz, ground wave, high-power (400-1600 kW)
- Delivers timing info & 2-D position
- Affected by propagation path and weather
- Manual steering to 100-ns of UTC
- Not yet “All that it can be”
  - Discontinuities (time steps)
  - Chains & SAM control (does not enable all-in-view receivers)
  - 500-meter horizontal system
  - Few receiver manufacturers (lack gov’t statement, TOT control)

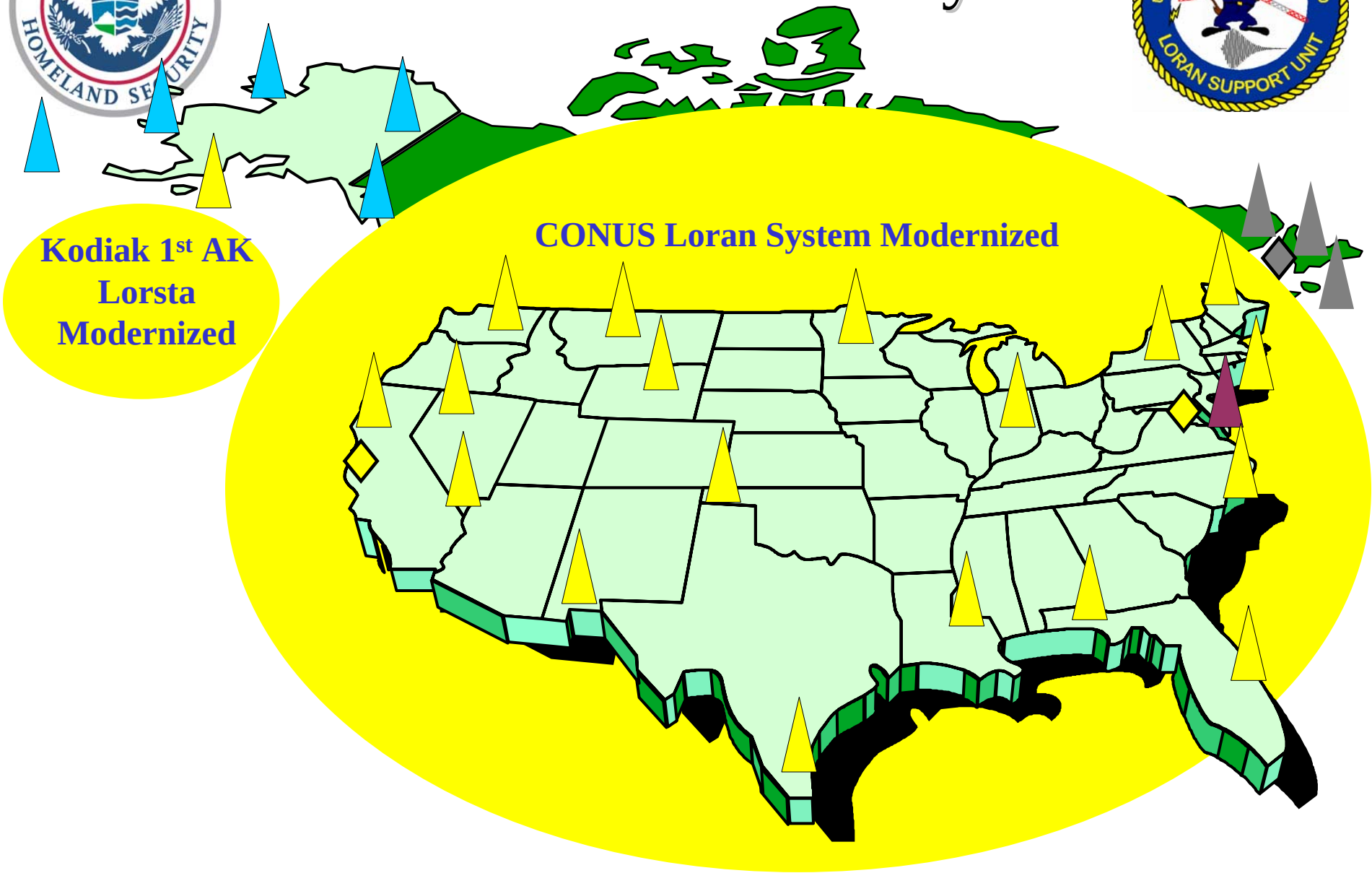
LSU's Role & Responsibilities

- System Mgmt & Engineering Facility (SMEF)
- Diverse Workforce (65 active duty, civilian, contractor)
- Variety of engineering projects
  - LDC
  - Differential Loran
  - LICOS, LEMS
- System Support Agent (SSA)
  - Configuration Mgmt
  - Help Desk
  - Grooms, on-site CASREP support

North American Loran System



North American Loran System



New Loran-Station Electronics

New Solid State Transmitter (NSSX)

New Timing & Frequency Equipment (NTFE)

NSSX Building Construction

Facilities Installation

Building HVAC

Exterior fuel tank/GENSET

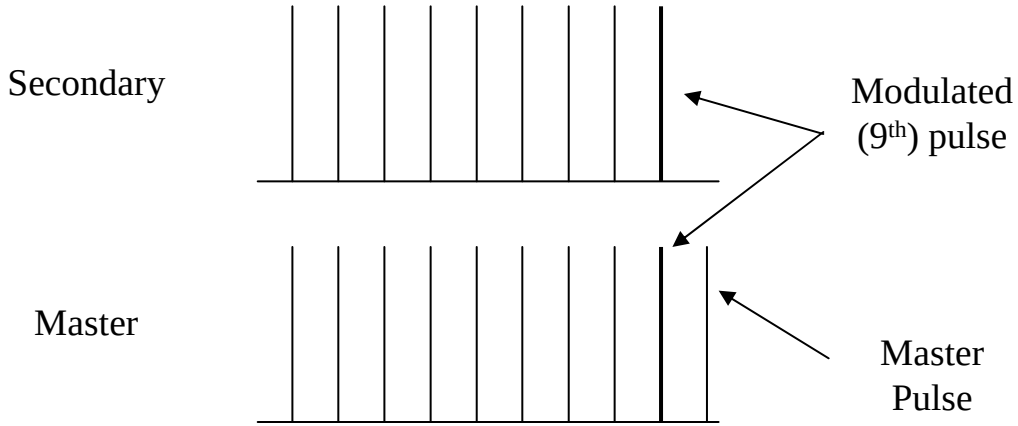
Finished Product (Lorsta George)

New Control-Station

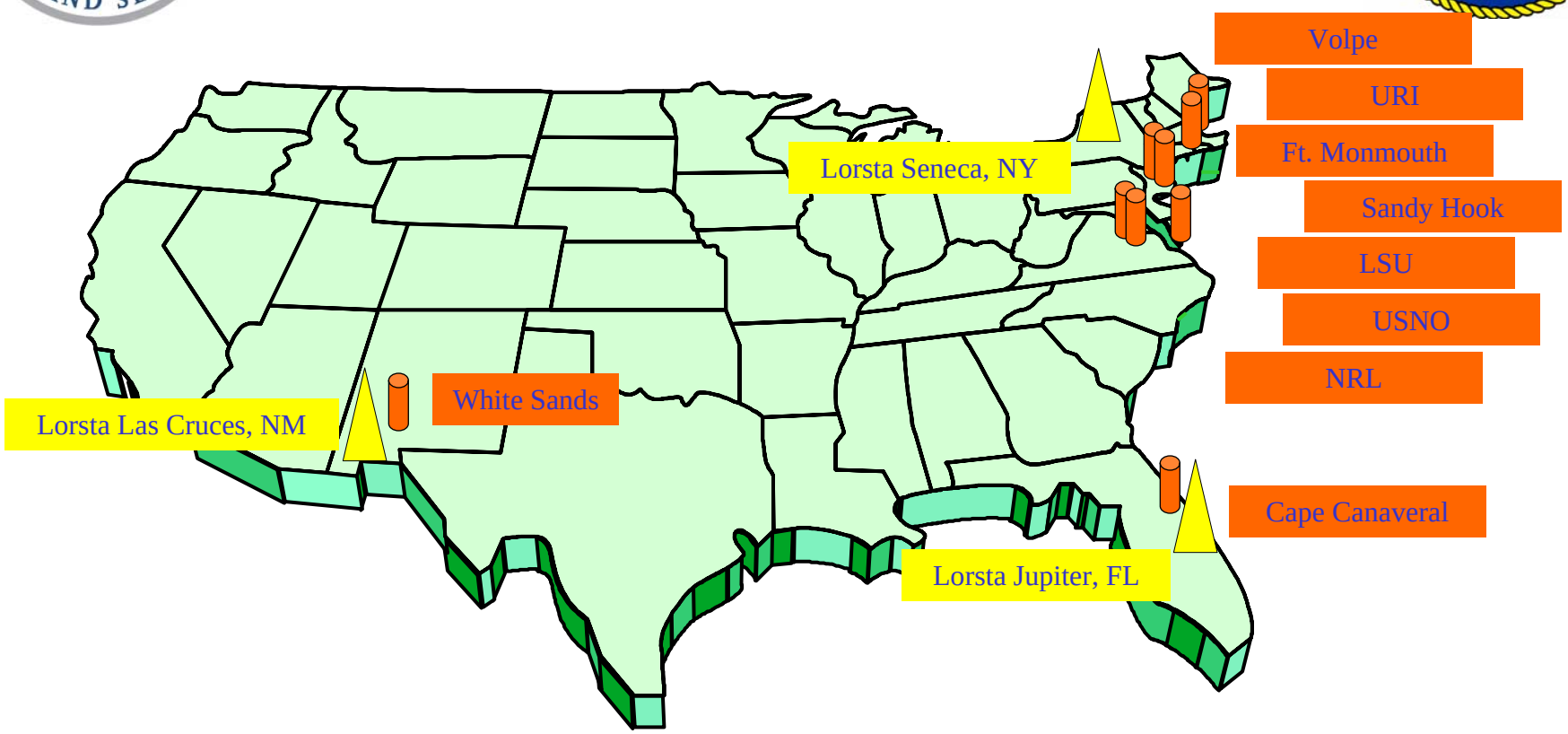
New Loran Consolidated Control System
(NLCCS)

Loran Data Channel

- Information modulated on a 9th Pulse
- Preserves navigation information on pulses 1-8
- Feasibility proven with solid-state transmitters
- Demo'd early Oct for DOD Range Commanders
- On air at Lorsta's Jupiter, Las Cruces, & Seneca
- Differential corrections from monitors



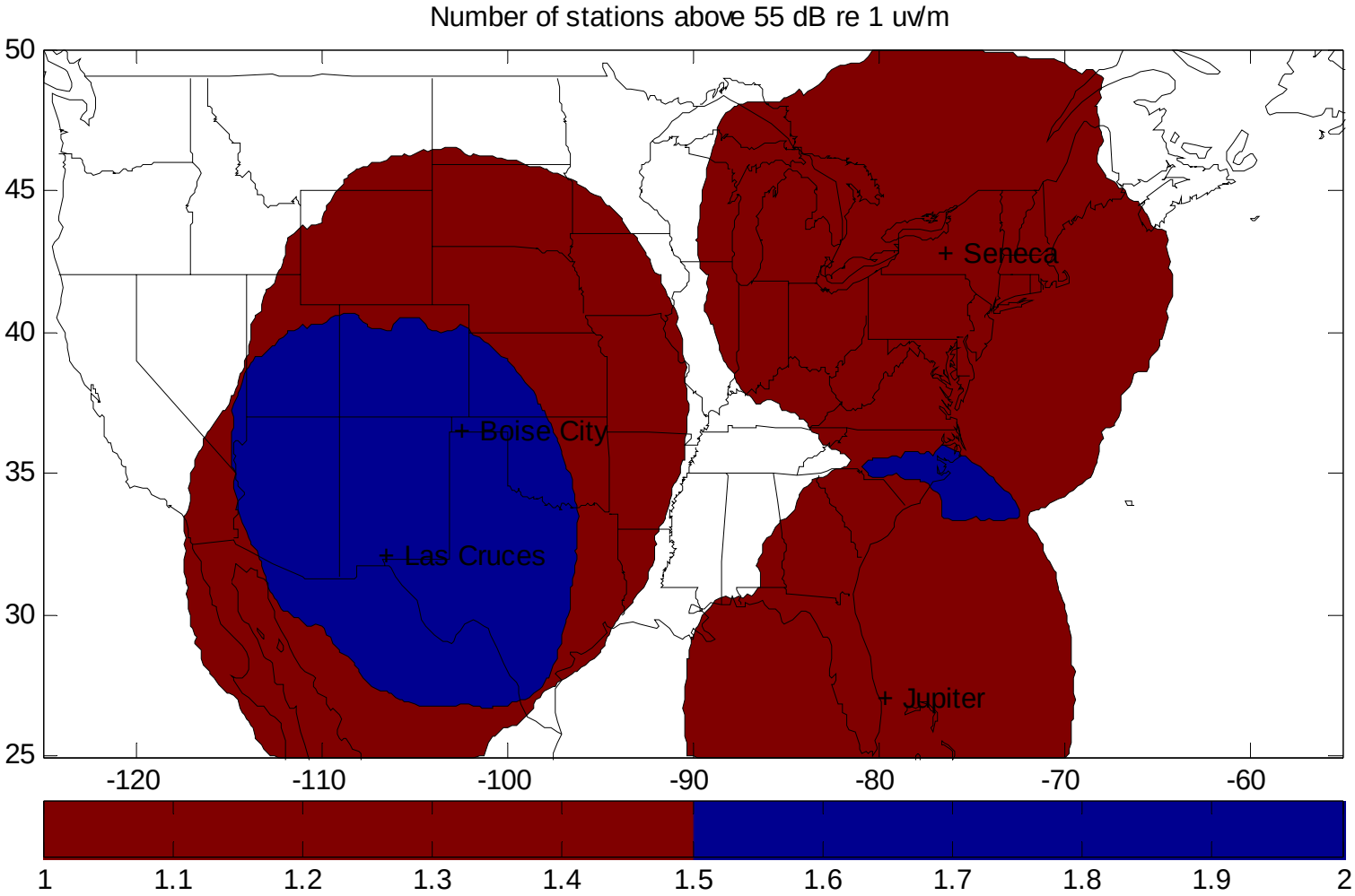
Enhanced Loran Timing Test Beds



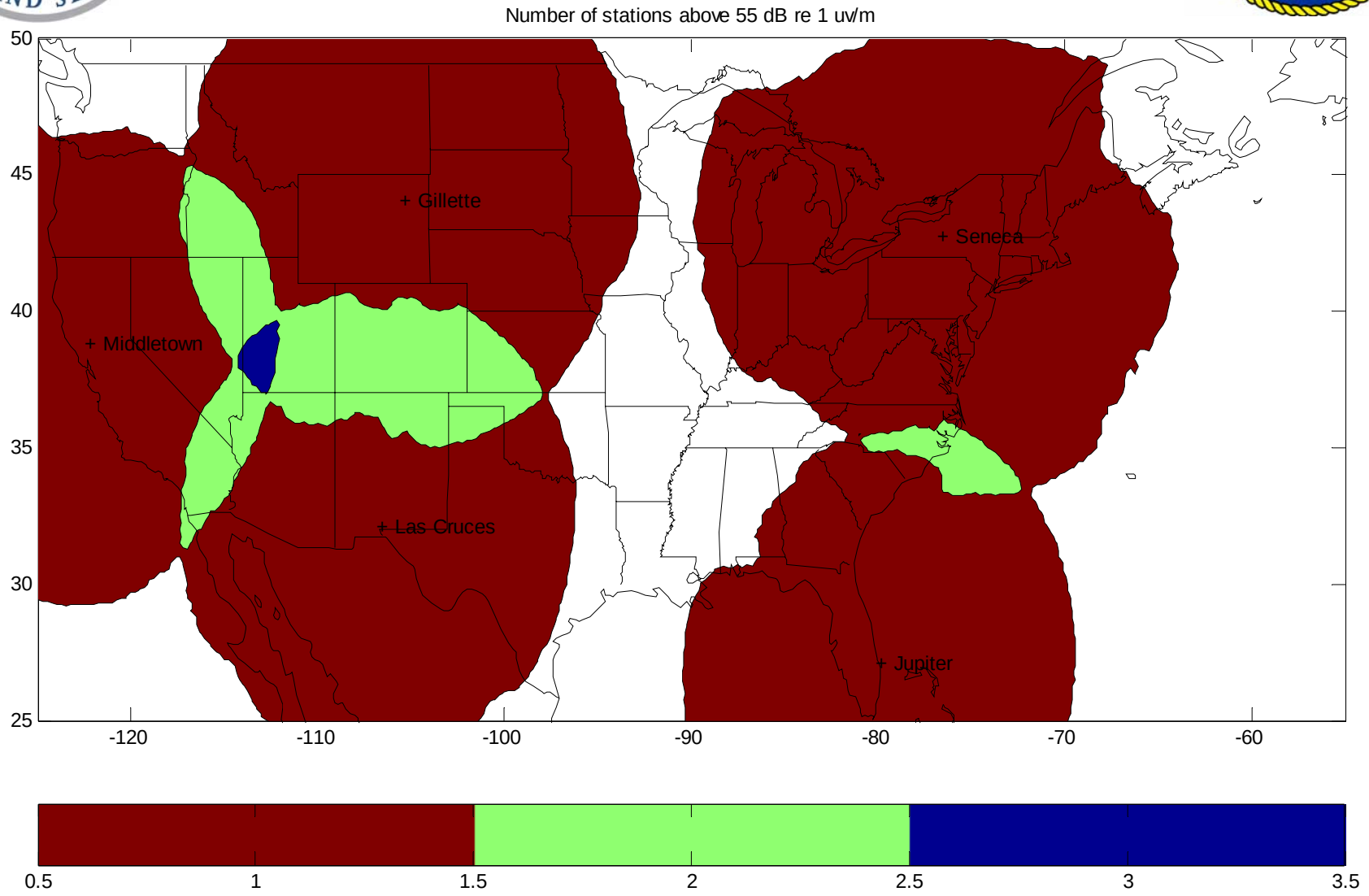
LDC Broadcast Lorstas: 3

Enhanced-Loran monitors: 9

Coverage of Loran Data Channel Testing



Coverage of Loran Data Channel Testing

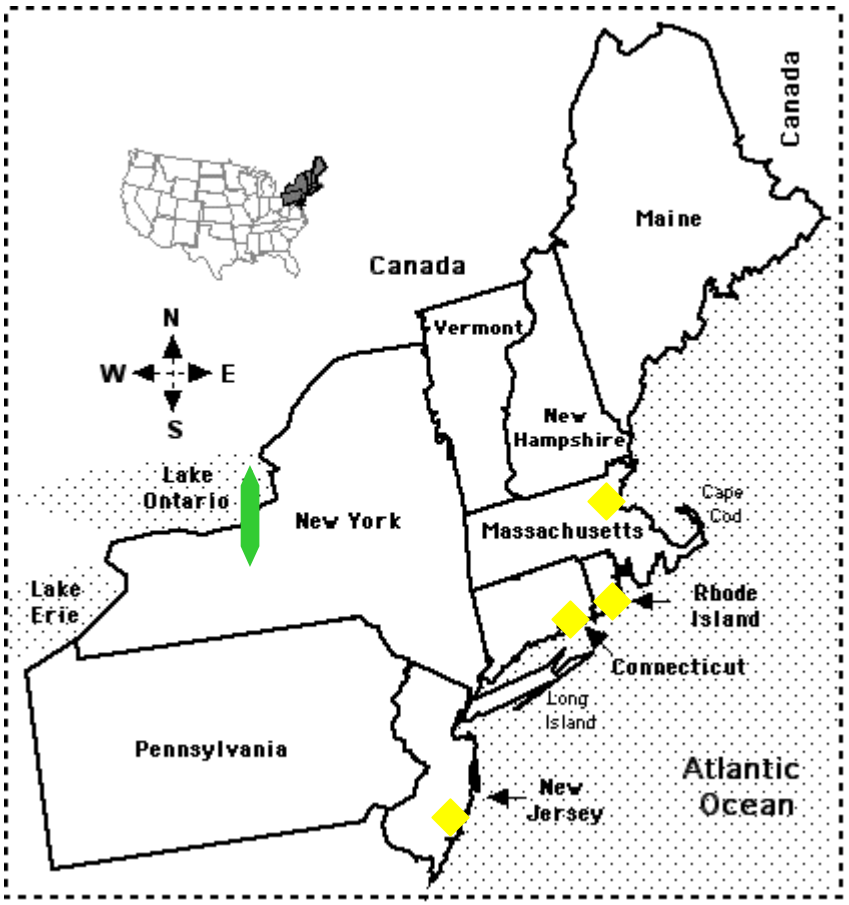


Differential Loran

- Land-path signal delays (spatial)
  - Land propagation path introduces signal delays called “additional secondary factors (ASF)”
  - Provider needs to survey each waterway for ASFs beforehand
  - User receiver stores waterway’s spatial ASFs beforehand
- Weather-path signal delays (temporal)
  - Provider’s shore-side monitor calculates corrections in real-time
- Loran Data Channel “9th Pulse Comms”
  - Provider modulates monitor info onto Loran signal & sends to user
- Differential-Loran user receiver
  - User’s receiver applies spatial ASFs
  - User’s receiver demodulates & applies temporal corrections
  - Differential-Loran improves position accuracy significantly
- It works!

Differential Loran (cont'd)

- Differential Corrections
  - LORSTA Seneca, NY
  - 4 monitor sites (USCGA, Volpe, URI, FAA Tech Center Atlantic City)
- LDC Format
  - Comms Ver 1.3 mod 1
- New London Demo (Dec '06)

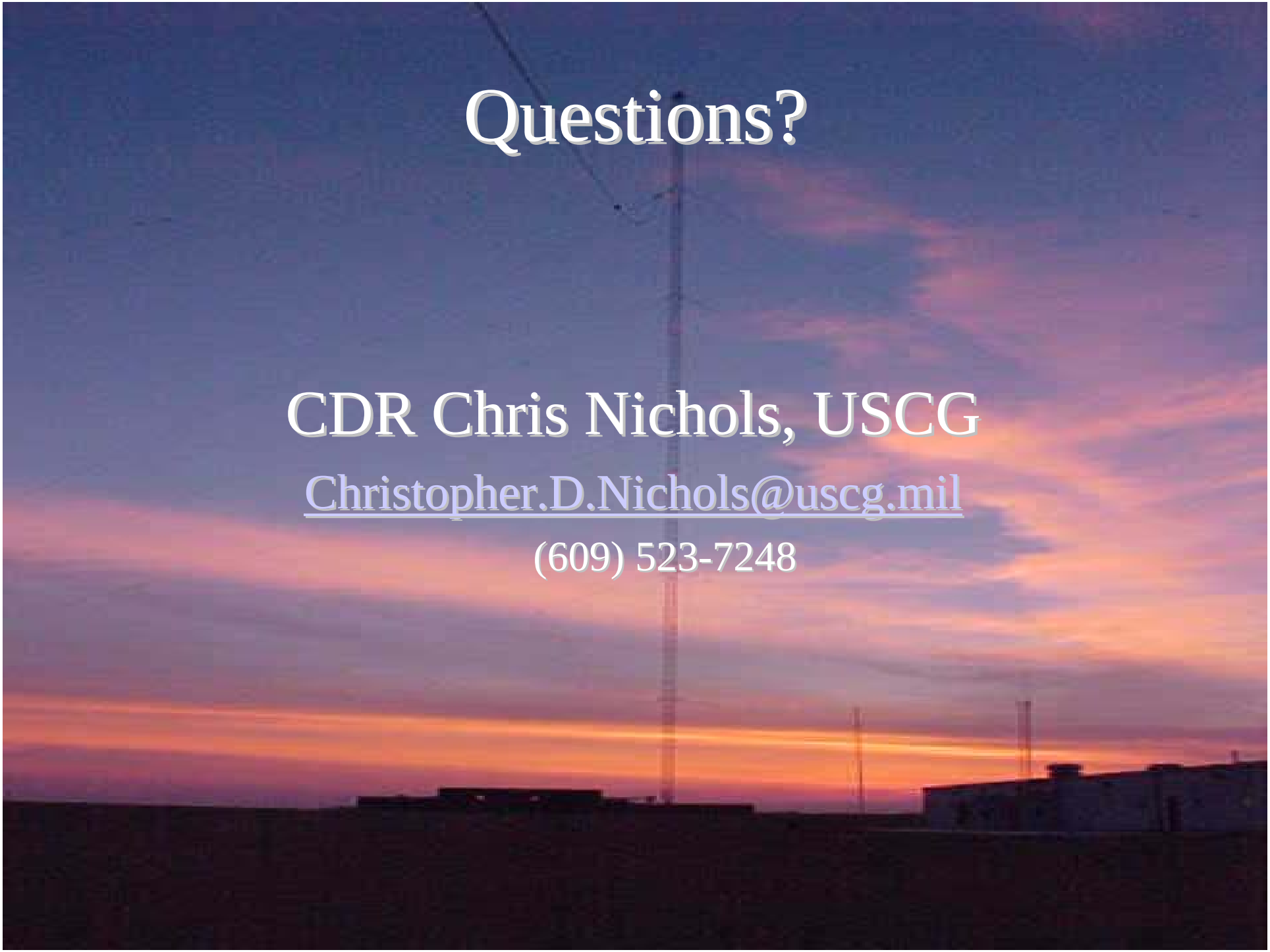


http://www.navcen.uscg.gov/loran/9th-pulse-modulation-ldc.html

Summary

- Achievements
  - All CONUS Lorstas and Control Centers modernized
    - New Timing & Frequency Equipment at 11 Lorstas
  - 1st AK recapitalization completed
  - Differential Loran & 9th Pulse have been proven in real time
  - SW for TOT Control tested & fielded Summer ‘06
- Next Steps
  - AK modernizations
  - LDC research and broadcasts continue
  - Automation

The views expressed in this briefing are those of the author and are not to be construed as official or reflecting the views of the U. S. Coast Guard, the Department of Homeland Security, or the U. S. Government.


Questions?
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