Advanced Command Destruct System (ACDS) Enhanced Flight Termination System (EFTS)

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Agenda

- Program Overview / Background
- Current Operating Capability: Implementation and Integration
- Future Operating Capability
- Testing
- Operational Usage
- Questions

NASA DFRC EFTS Background

- Current Operating Capability (COC) - NASA DFRC started working towards single vehicle EFTS system January 2008
- Future Operating Capability (FOC) - NASA DFRC and Air Force Flight Test Center (AFFTC) combined effort working towards multiple vehicle and multiple missions simultaneously – effort to be completed by December 2010, with integration at NASA DFRC between December 2010 and February 2011
- Current users – Global Observer, Blended Wing Body – both unmanned aerial vehicles (UAVs)

Current Operating Capability

- Developed to support one vehicle per mission
- Developed to support one frequency per mission
- Supports UAVs at NASA DFRC and AFFTC
- Started development in January 2008
- Completed 95% of design and hardware builds by May 2008
- NASA DFRC software safety change of scope/ requirements caused delays after May 2008 to date
- COC accepted as “Operational” ready by NASA DFRC and AFFTC

COC Cont.

- **Development included:**
  - Command / interface panel (updated development)
  - Command controller (CC) (updated development)
  - Encoder (existed under EFTS)
  - Monitor (existed under EFTS)
  - Triple Data Encryption Standard (DES) Unit (TDU) (existed under EFTS)
  - Configuration software (updated development)
  - Logging software (updated development)
  - Test equipment (new development)
  - Existing transmit equipment (no development)

Future Operating Capability

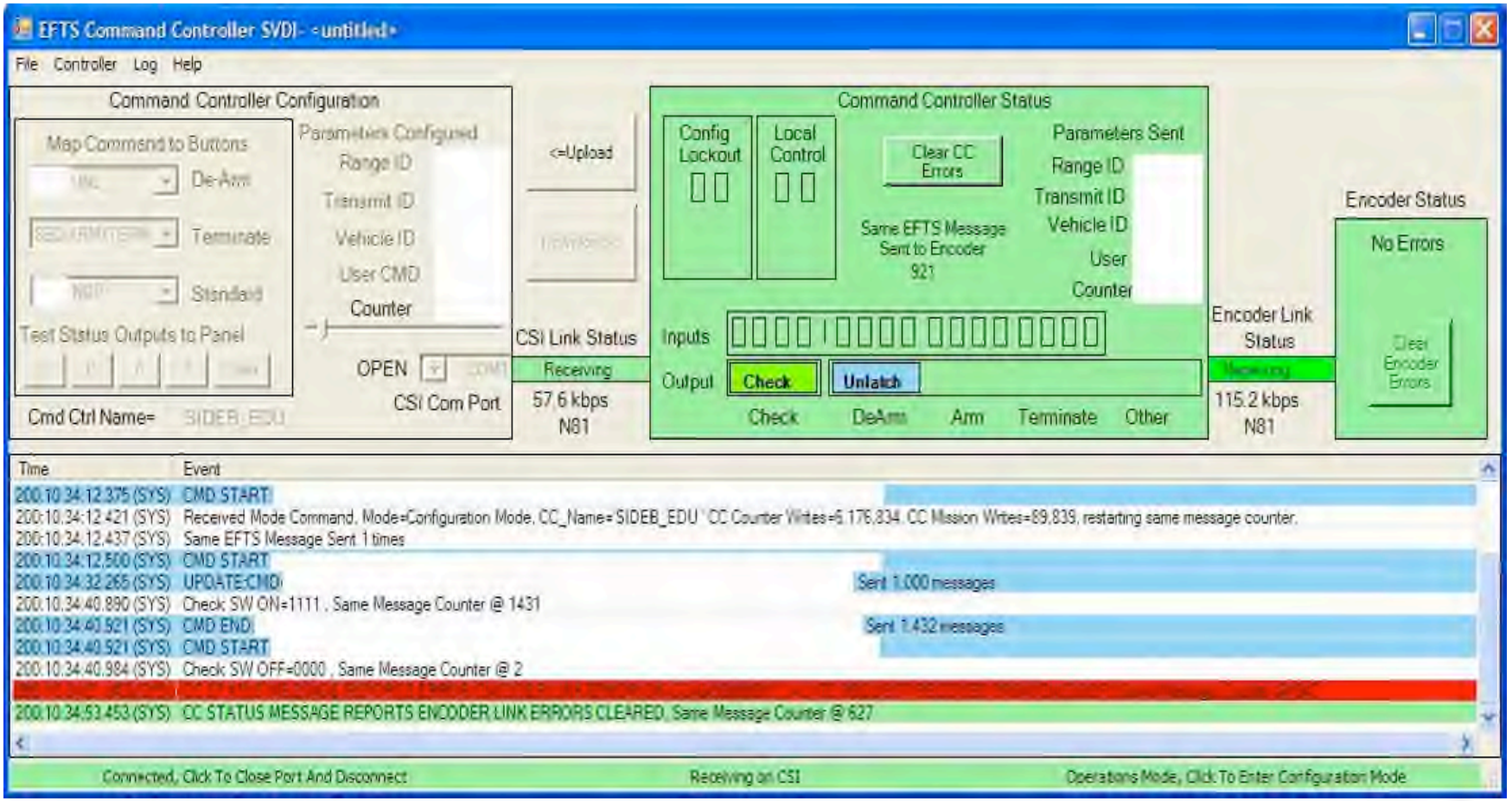
- Request for proposal for full integration – won by WV Communications
- Supports NASA DFRC and AFFTC FTS missions
- FOC development work and requirements based upon the work done on the COC
- Expected operational in early CY2011

COC Pictures - Command Panel

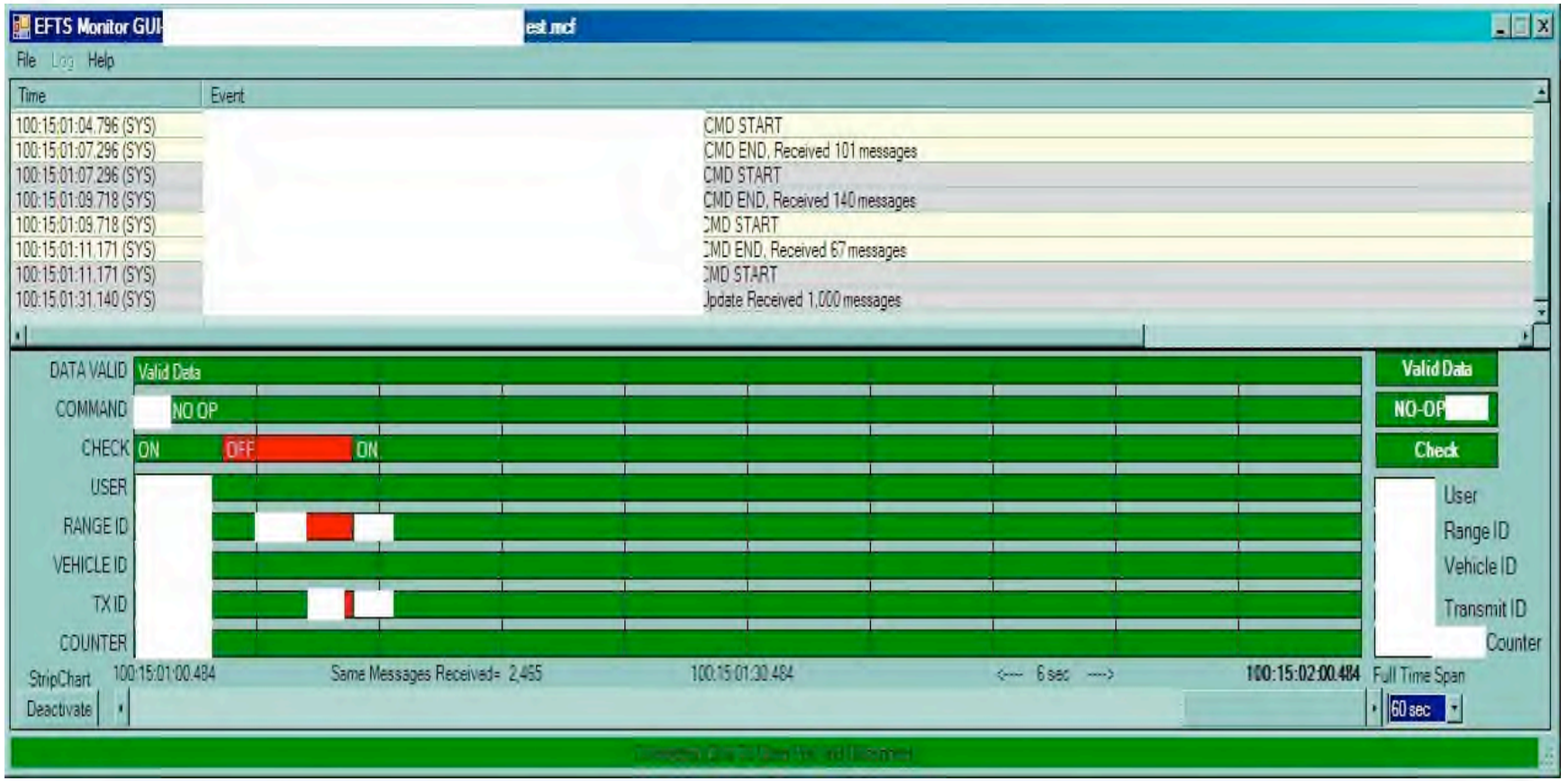
COC Pictures - CC

COC Pictures – Enc/Mon/ TDU

COC Picture – EFTS CC Software



COC Picture – EFTS Monitor Software



COC Testing

- **Component level testing**
  - Fully tested each individual command path component
  - Exercised every possible error mode that could be thought of
  - Exercised every known and expected function
  - Test procedures
  - Recorded data – electronically and manually
- **System level testing**
  - End to end testing – open loop and closed loop – see next slide

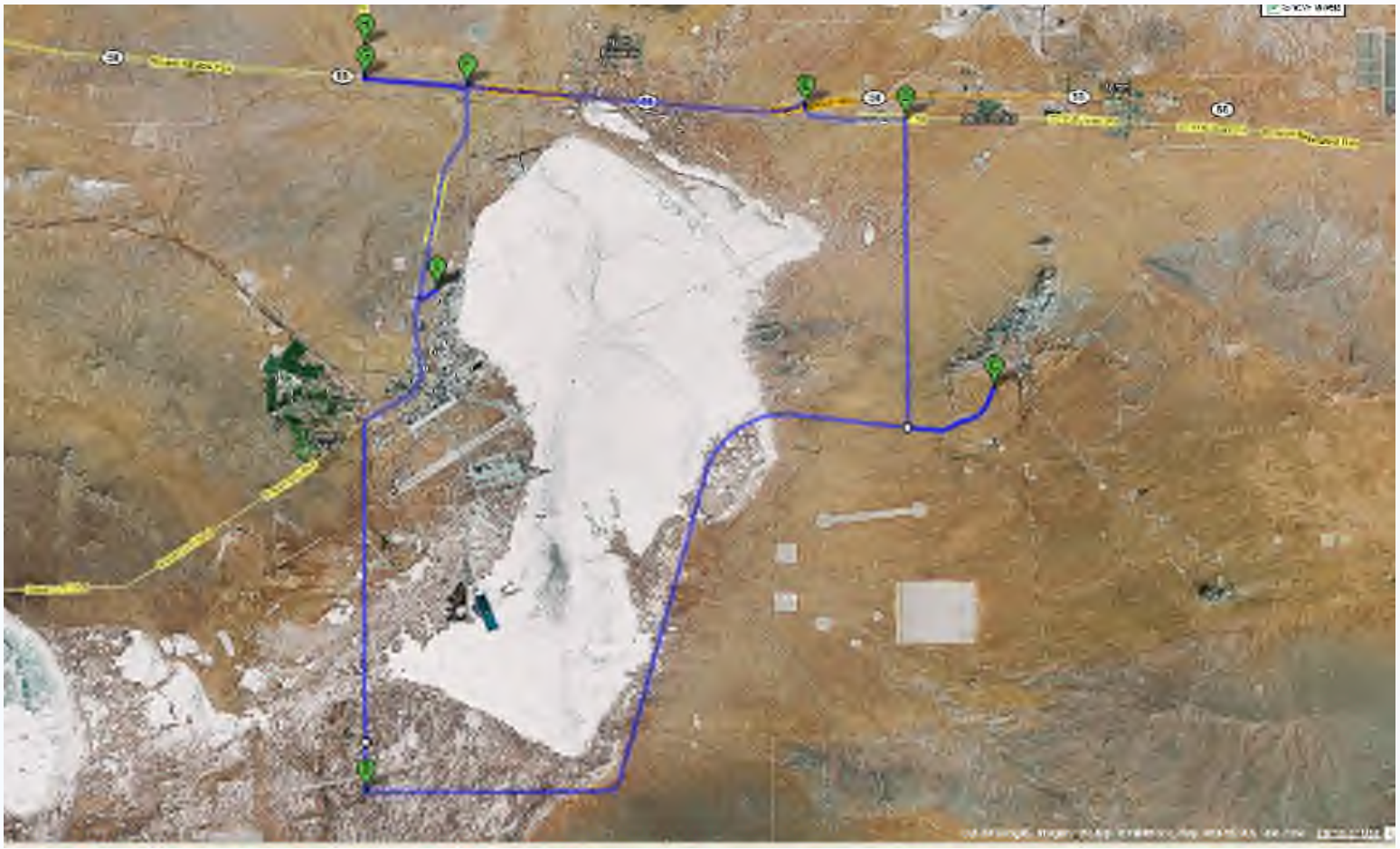
COC Testing cont.

- **Full end-to-end system testing completed**
  - Included exercising of Range Safety Officer (RSO) command panel through entire FTS network; transmitted out and fed into monitoring device to verify properly transmitted FTS commands
    - Viewed EFTS command signal response via the EFTS flight termination receiver (FTR) and EFTS Monitor
- **Test item testing**
  - Portable EFTS Transmitter System (PETS) – full functionality
  - EFTS FTR Test Case (EFTC) – full functionality
  - End to end testing with test items – output of PETS; into EFTC; verified with EFTS Monitor simultaneously

COC Testing cont.

- **Component Testing**
  - Duration Testing – 48 hours
- **Full End-to-End System Testing**
  - Duration Testing – 48 hours
- **Location Testing – Two Drives Tests on Base**
  - Around Edwards Air Force Base (EAFB) – 6/18/2009
  - On the EAFB Flightline – 7/1/2009
- **Acceptance Testing Completed – 8/26/2009**

COC Testing Locations
(Google Map Image)



COC Testing cont.

- **Full End-to-End System Testing**
  - Tested for durations of 48 hours
  - Utilized full system from BWB ground station and RSO command panel in the BWB ground station to the FTS transmitter site
  - Conducted successful transmissions from activation of RSO commands (Arm, Terminate, etc.) from BWB ground station to EFTS ground system to transmission out to reception back at EFTS ground system

COC Pictures – Portable EFTS Transmitter System

COC Pictures – EFTS FTR Test Case

Operational Usage

- **Two operational projects:**
  - Global Observer (GO)
  - Blended Wing Body (BWB)
- **GO – successfully activated aircraft termination sequence repeatedly while on ground**
- **BWB – successfully transmitted to EFTS flight termination receiver on multiple frequencies utilizing same FTS aircraft receiving antenna**
- **Successful recertification of EFTS flight termination receivers (FTRs)**
  - Recertification done manually
  - Certified two EFTS FTRs
  - Manual recertification took about two hours per receiver per temperature

Questions??


NASA