EGOA

Enhanced General Aviation Operations by ADS-B

Disposition

- Objectives
- Expected benefits
- Operational and Environment Description
- Equipment
- Data collection
- Validation
- Experiences so far…
- Questions

Objectives

- Project objectives
  - A validation and pre-implementation testbed to evaluate the possibilities using ADS-B and Flight Information Service Broadcast (FIS-B)
  - To integrate ADS-B experience in the day-to-day work for both Air Traffic Controllers and GA pilots by upgrading ATC equipment and equipping a large number of GA aircraft within a well-defined area (Östgöta TMA)

  - ...after the end of the EGOA project the developed airborne and ground infrastructure will continue to serve the GA part of CRISTAL Sweden. The testbed will also be available for other ADS-B and FIS-B related projects.

Expected benefits

- Evaluate ADS-B for
  - Maintained and improved safety
  - Access to controlled airspace for General Aviation (GA)
  - Improved Search and Rescue (SAR)
  - Cost efficiency

Operational and Environment Description

- One low-price airline airport with international traffic and GA (Stockholm-Skavsta)

- Two regional airports with mixed domestic and international traffic and GA (Norrköping airport and Linköping-SAAB airport)

- One military airport with military traffic daytime and GA traffic evenings and week-ends (Linköping-Malmen airport)

- A number of small GA/Flying clubs airfields

Operational and Environment Description

Stockholm-Skavsta

Norrköping

Linköping-SAAB

Linköping-Malmen

⬤ International

⬤ Regional

⬤ Military

★ Flying Club / GA

Operational and Environment Description

- Problems faced
  - Controlled airspace changing over time makes it hard for not-everyday-pilots to get a clear view of the airspace.
  - Many GA aircraft (gliders, experimental, ultra light) without SSR transponder.
  - Radar coverage only partly available at lower altitudes, complicating Air Traffic Control as well as Search and Rescue
  - One ATC Tower sometimes controls two airports (Linköping-SAAB and Linköping-Malmen)

Operational and Environment Description

- Problems faced (continued)
  - ATC unable to see non-SSR equipped GA, causing blocking of entire sectors. Alternative: GA denied access to controlled airspace.

Equipment

- Airborne transceivers
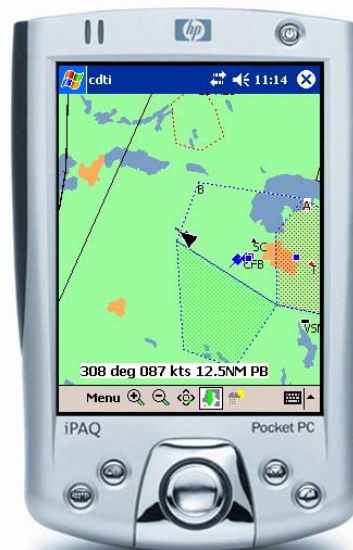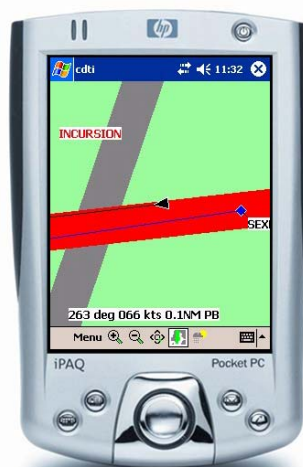 - VDL Mode 4 transceiver, CNS Systems VDL4000/GA

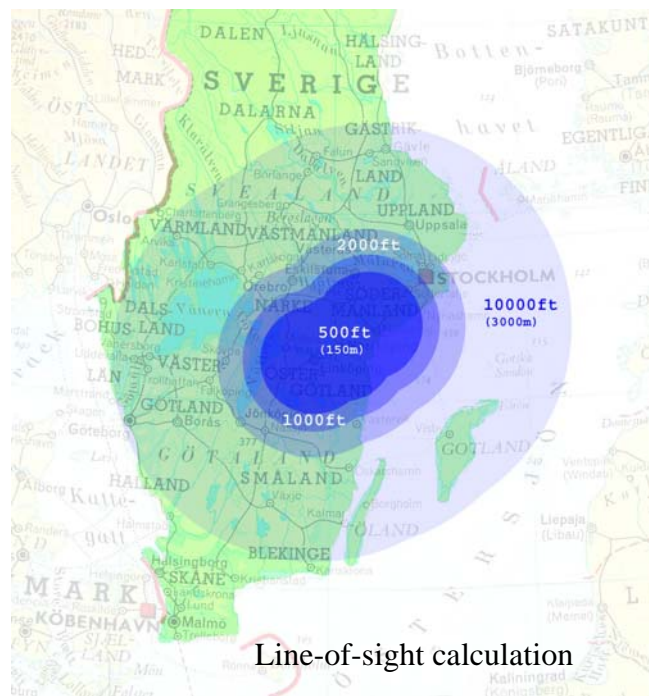 - Combined 8.33 kHz Voice COM and VDL Mode 4 transceiver, RTX6040

Equipment

- Cockpit Display of Traffic Information (CDTI)
  - PDA based CDTI (also available in a PC based version)

Equipment

- VDL Mode 4 ground stations placed at four airports:
  - Linköping-SAAB
  - Linköping Malmen
  - Norrköping
  - Stockholm-Skavsta

Line-of-sight calculation

Equipment

- ATC Surveillance Presentation Equipment
  - RPU at Östgöta Control Centre
  - RDP at Linköping-SAAB TWR and Stockholm-Skavsta TWR
  - All presentation equipment are stand-alone, not operational displays, placed aside from ordinary Controller Working Postition

Equipment

- Flying Club "Fleet Management"
  – PC based software with real-time presentation and logging functionality
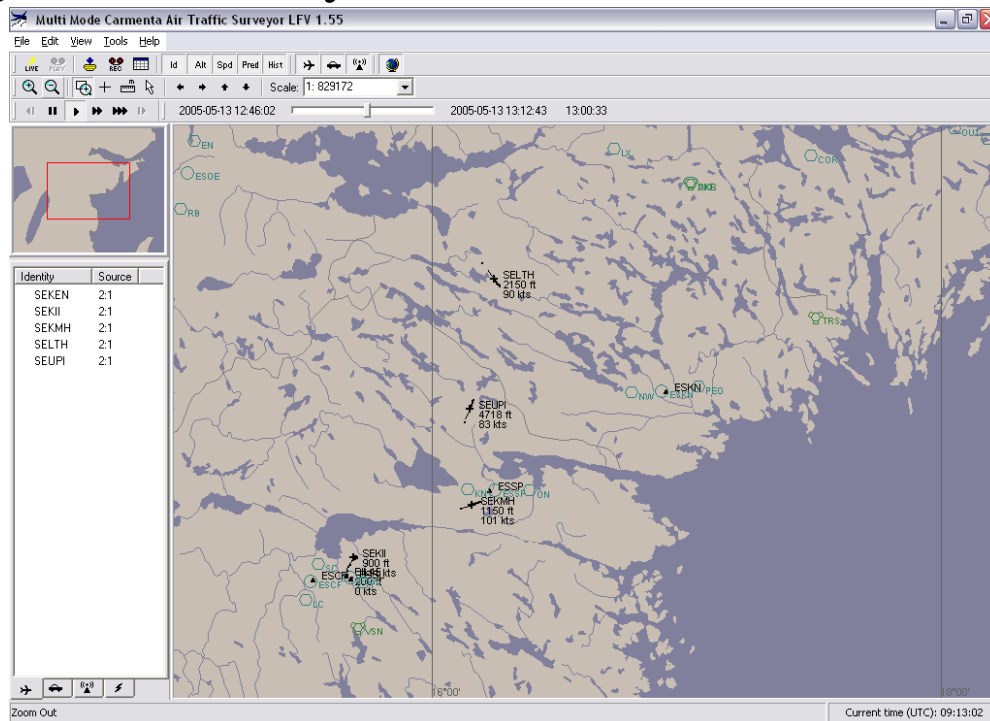
Data collection

- Logging in aircraft
  - Logging functionality in PDA

- Logging on ground
  - Logging both ADS-B and SSR data in the ground network

- Fill-in forms
  - Questionnaires to pilots and controllers

Validation

- Direct, ad hoc, feedback from participants (both operational and technical issues)
  - Airborne perspective:
    - CDTI (regarding hardware and software, HMI, functionality ADS-B and FIS-B etc)
    - ADS-B/VDL4 radios (performance, HMI, installations etc)
  - Ground perspective
    - ATC presentation (procedures, equipment)
    - Flying Club presentation equipment (serving as a "user monitoring tool" for the airborne equipment)
    - Input from technical personnel at airports

Validation

- Interviews
  - with pilots and controllers
- Analysis of logged data
  - Availability
  - Accuracy
  - Coverage
  - Comparison with SSR data

Experiences so far…

- Input from GA community:
  - Big commitment from GA
  - Multimode radio the preferred way to go…
  - CDTI concept with ADS-B and FIS-B appreciated – but comments on PDA hardware
  - Fleet Management possibilities "killer application" for flying clubs with many aircraft

Experiences so far…

- Input from ATC:
  - ADS-B providing big benefits for surface movement surveillance compared to today
  - No big changes in methodology compared to SSR
  - Input regarding HMI
  - Issues directly connected to GA. For example fusion of SSR and ADS-B data when many aircraft use a common "flying club" Mode A code
  - Diffuculties with "every-day-evaluation" when the equipment is "stand-alone"

Experiences so far…

- Input from other contributors
  - Civil Aviation Authority involved throughout the project
  - Air Rescue Coordination Center showing great interest for using the system for Search and Rescue purposes

Experiences so far…

- Conclusions:
  - Valuable and encouraging input from all user groups
  - System performing as intended
  - However, more evaluation and work needed before full acceptance from the users.

Questions