An Air Traffic Management System for Remotely Piloted Aircraft System

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Booming Drone Industry

• The drone will likely more than double in size over the next 5 years, from the present 1.1 million units to over 2.4 million units.

Source: FAA Aerospace Forecasts 2018-38
Mini Air Traffic Management System (miniATMS)
Outline

• Introduction to miniATMS
  – Properties
  – Architecture
• Modules in miniATMS
• Conclusions
• Future Work
miniATMS Properties

• Three advantages:
  – Current main ATMS would not be interfered
  – The miniATMS is able to support the controlled airspace and the non-controlled airspace
  – The miniATMS is capable of being the main ATMS backup

• Three modules:
  – Geographic information system (GIS)
  – Radar information
  – Vehicle
miniATMS Architecture

Vehicle Module

ADS-B Antenna

GIS Module

Radar Module

miniATMS

WAN/LAN data communications servers

Surveillance radar

weather
GIS Module

- A data storage format for storing the location, shape, and attributes of geographic features
- Flight information region, coastline, runway, and county area
Radar Module

- ATMS server supported
- Convective weather awareness

NCR
KHR
OLR
TDT
HLT
SDC

miniATMS

Local Internet

Communication Server

HDLC Protocol
ASTERIX Protocol
Weather Information
High-Level Data Link Control (HDLC) Protocol

- Flag
  
  01111110 | HDLC frame | 01111110

- Abort

  01111110 | HDLC frame | 01111111 | 11111111

- Zero-bit insertion

  01110111 | 11110010

  01110111 | 11011001 | 0
**ASTERIX CAT008**

ASTERIX : All Purpose STructured Eurocontrol SuRveillance Information EXchange

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Radar Module Verifications

Date: 11-16-2012  Time: ~20:20Z

miniATMS

Java-based Multidimensional Display System (JMDS)

: airport

- 30~41 dBZ
- 18~30 dBZ

10 n.m.
Vehicle Module

1090 MHz ADS-B Signal (ID, position, speed ...)

telescopic antenna

MCX connector

R820T Tuner chip

DVB-T TV Tuner Dongle

Receiver

miniATMS

dump1090

Vehicle Module

DF17

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Vehicle Module Verifications
Mini Air Traffic Management System (miniATMS)
Conclusions

• This work develops the miniATMS that is capable to monitor the RPAS on the GIS over the controlled airspace.

• miniATMS provides the information of the convective weather and aircraft for the air traffic controllers and RPAS operators.

• miniATMS is independent to the online ATMS but compatible to it based on the ADS-B supporting and the radar server connection.
Future Work: RAIM Prediction
Thank You for Your Attentions,
Any Question?