

1090 MOPS SUPPORT FOR TIS-B

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1090 MHz TIS-B

- **Op Eval 3 to take place in Memphis in late 2001**
 - **Emphasis will be on surface and approach applications**
- **Principal surveillance sensor for Op Eval 3 will be ADSE X**
 - **X-Band primary radar and Sensis multilateration system**
 - **Sensis system will also receive extended squitter**
- **TIS-B service on 1090 MHz needed to provide surveillance on aircraft not equipped for 1090 MHz ADS-B**
- **For completeness TIS-B must handle**
 - **Surface surveillance**
 - **Airborne surveillance based on ASDE-X quality data**
 - **Airborne surveillance based on ASR quality data**



Topics

- **Approach for Incorporating Formats**
- **TIS-B Formats**
 - **Based on ASR quality surveillance**
 - **Based on ASDE-X quality surveillance**
- **Interrogation rates**



Format Approach

- **MOPS currently defines DF=18 squitter for non-transponder devices**

10010	NT:3	AA:24	ME:56	PI:24
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- **NT Field current definition**
 - **NT=0 indicates standard extended squitter formats from a non-transponder device**
 - **NT=1 to 7 undefined**
- **Propose definition of additional NT field codes as follows:**
 - **NT=1: Coarse TIS-B based on ASR**
 - **NT=2: Fine TIS-B based on high accuracy surveillance (e.g., ASDE-X)**



Coarse TIS-B Format

- Define TIS-B format that contains info on one aircraft per squitter and that provides lat/lon, altitude, velocity and 24-bit address for Mode S, and Mode A and track number for ATCRBS aircraft
- Define 56-bit ME field to contain:
 - Site ID : 4 bits (to identify source of surveillance data)
 - Lat/lon 12 bits each
 - Same as CPR for regular position squitter but rounded to 12 bits
 - Resulting LSB =160 m adequate for accuracy from beacon radar
 - Even/odd format: 1 bit
 - Altitude: 12 bits
 - Velocity: 13 bits
 - Emergency 1 bit
 - Control: 1 bit - Indicates Mode S or ATCRBS
 - AA field contains
 - Mode S: 24-bit address
 - ATCRBS : 12 bit Mode A code (plus 10 bit track number & 2 spare bits)



Fine TIS-B Formats

- **Identified as TIS-B by DF and NT fields**
- **Same formats as defined for transponder-based extended squitter for position, velocity and identity**
 - **except revision made to indicate Mode S or ATCRBS coding as for coarse TIS-B.**



Detailed Formats

- **TIS-B Coarse Airborne**
- **TIS-B Fine Airborne**
 - **Position, velocity and identification**
- **TIS-B fine Surface**



Transmission Rates

- **Coarse TIS-B Transmission rates**
 - **Twice per radar scan after measurement**
 - Twice per 4.8 sec for terminal sensor
 - Twice per 10 to 12 seconds for en route sensor
 - **Less than one per 2 seconds per aircraft**
- **Fine Mode TIS-B Transmission rates**
 - **Twice per second for each format (s/a normal squitter)**
- **Ground will suppress TIS-B for extended squitter equipped aircraft**
- **Total squitter broadcasts no more than if reported aircraft were all squitter equipped**