

RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS

Meeting #4

**Modifications to UAT Receiver Model
Used in UAT Network Model**

Presented by Al Muaddi, JHU-APL

| SUMMARY |
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Modifications to UAT Receiver Model Used in UAT Network Model

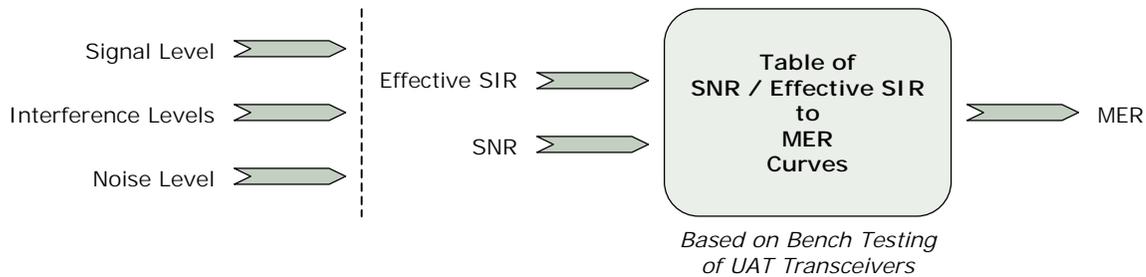
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UAT MOPS Working Group



Existing UAT Receiver Model (used for TLAT)

- Necessary to modify TLAT UAT receiver model
 - Enhanced Reed-Solomon coding
 - Narrower receiver bandwidth
 - JTIDS burst interference
- Operation of TLAT UAT model





Proposed Modifications

- SNR/Effective SIR-to-MER curves obtained via bench testing and multiple-interferer combining algorithm are based on full-overlap conditions. Therefore, we assume that bit errors for these curves are independent and identically distributed (i.i.d.).
- We can, therefore, map an MER (old UAT) performance curve to a BER performance curve.
 - Simulate transmission of RS(41,35)-encoded messages over BSC.
 - Declare message errors when number of symbol errors exceeds 3.
 - Determine BER that corresponds to MER (old UAT).
- We can compute MER (enhanced UAT).
 - For each bit received...
 - Determine noise level and effective interference level.
 - Compute SNR and Effective SIR and use original curve to obtain MER (old UAT).
 - Map MER (old UAT) to BER using above technique.
 - Simulate to estimate probability of synch error and probability of RS block failing to decode.
 - Compute MER (enhanced UAT)

$$P(\text{Message Error}) = 1 - (1 - P(\text{Synch Error})) (1 - P(\text{RS Decode Error}))$$



Comparison of Old and New Models

