Engineering Research Center for
Collaborative Adaptive Sensing of the Atmosphere

S8: QPE using Path-Integrated Attenuation from Mountain Returns

Manuel A. Vega – Graduate Student UPRM

Ricardo Ríos – Undergraduate Student UPRM

José Padovani – Undergraduate Student UPRM

Dr. José G. Colom – Faculty Advisor

UMass Amherst | University of Oklahoma | Colorado State University | University of Puerto Rico Mayaguez

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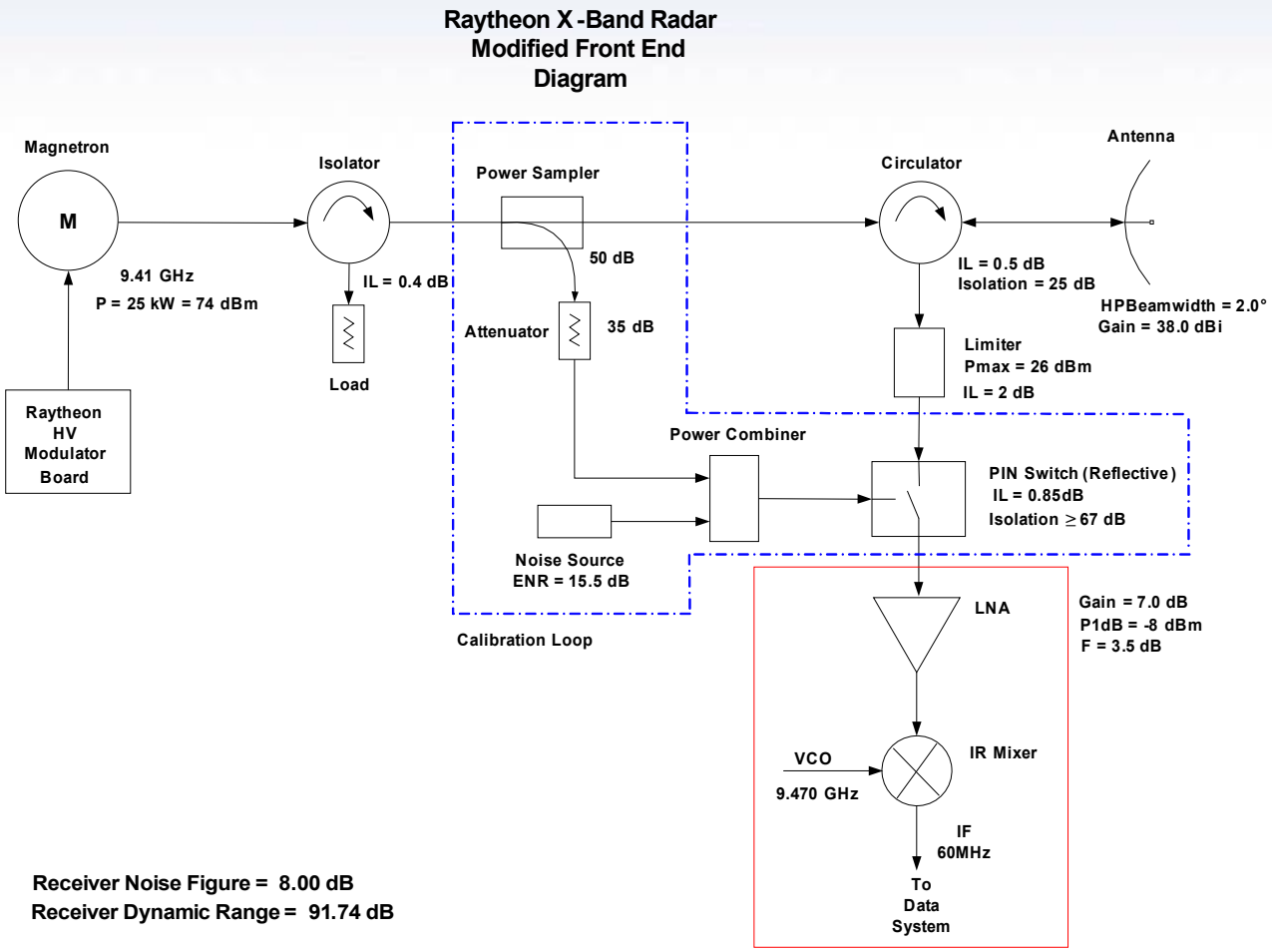
BRIEF ABSTRACT AND GOALS OF THE PROJECT:

The Student Test Bed (STB) at UPRM is currently working on the modification of the front end and on-campus site preparation for the magnetron based radar. The current site will later on serve the Off-The-Grid (OTG) radar as well. Modifications to the front end include adding an internal calibration loop. These were completed at block diagram level and are currently being implemented. Path-Integrated Attenuation (PIA) measurements using mountain returns will be performed and later used for QPE in tropical weather. Several rain rate retrieval algorithms using PIA estimations are currently being considered as well as data validation methods.

CONNECTION TO CASA'S STRATEGIC PLAN:

The project is part of the CASA Student Test Bed. A group of CASA students are working to deploy a radar network in the west area of Puerto Rico. The site preparation explained in this presentation is going to be used for the first stage of radar deployment which consists of magnetron based radars. Furthermore, the QPE in the study using PIA estimations is relevant to CASA's strategic plan since improving QPE algorithms is one of its main efforts.

TECHNICAL APPROACH:

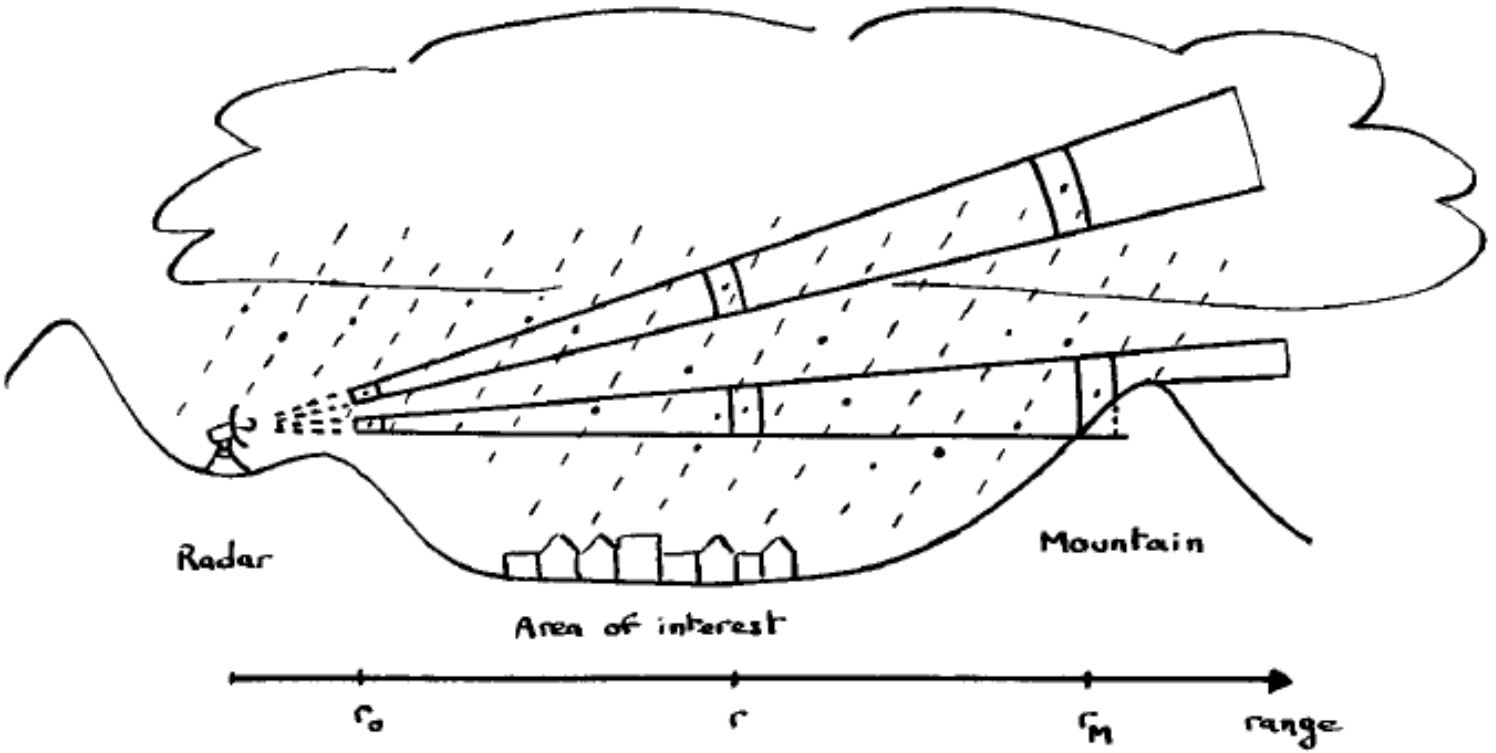


Receiver Noise Figure = 8.00 dB
Receiver Dynamic Range = 91.74 dB

MORE TECHNICAL APPROACH:

- Low elevation angle
- Identify mountain cluttered radar bins using reflectivity measurements
  - Calculate average reflectivity over cluttered bins during dry period
  - Compare to average reflectivity during rain event
- Estimate PIA from difference between dry and rainy period

MORE TECHNICAL APPROACH



ACCOMPLISHMENTS FROM INCEPTION TO DATE

- Front-end modifications at block diagram level completed.
- Component selection completed (orders in process).
- Antenna spinner modifications are being built.
- Tower already installed.
- Power outlets at radar site were installed.
- Data server location is ready.

FUTURE PLANS

- Finish front-end modifications.
- Perform system integration.
  - Antenna and Spinner
  - Transceiver
  - Data system and FPGA controller
  - Data server
- Perform PIA estimations for QPE