



# Accessory test reductions in two-way radio SAR testing

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# Objective

- **Work with FCC and other stake-holders to develop a test reduction protocol suitable for two-way radio SAR testing for FCC certification**
  - Proposal aims at increasing SAR test labs operational efficiency within the framework of a conservative accessory test reduction protocol
    - **Test labs would benefit from a clearly defined protocol**
    - **All parties would benefit from more efficient certification process**
  - Selection of accessory combinations to be tested is achieved by
    - **applying SAR-based criteria**
    - **requiring concurrent sound engineering assessment**

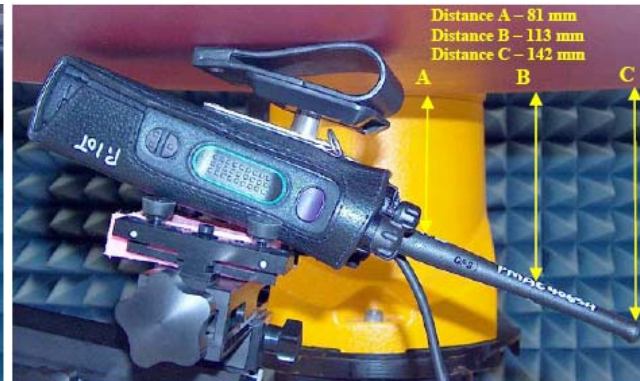
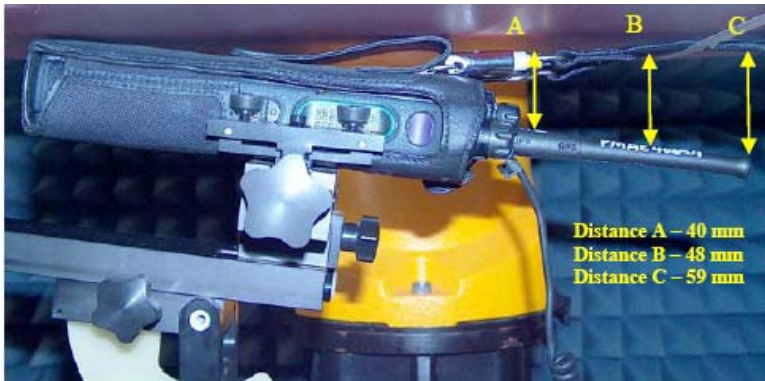
# Background

- **Two-way professional radios are frequently brought to market with several antennas, batteries, audio accessories, carry cases/holders**
  - The broad selection of available accessories is due to the wide variety of scenarios where these radios are operated by federal, military, and emergency personnel, police, firemen, and enterprise users
  - Many of these applications require mission-critical radio features using specialized, rugged accessories for the safety of users and the public. Thus, manufacturers strive to meet customer expectations in providing suitable radios and accessories



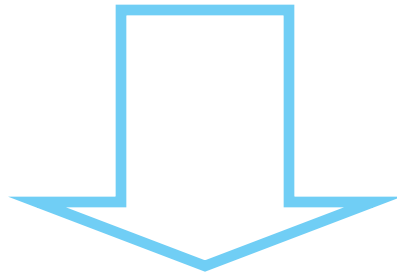
# Statement of the problem

- **SAR testing of all possible accessory combinations is unfeasible**
  - A two-way radio featuring 2 antennas, 4 batteries, 4 audios, 5 carry cases would require 192 SAR tests per frequency channel
    - **160 (= 2 x 4 x 4 x 5) tests at the body + 32 (= 2 x 4 x 4) tests at the face**
  - SAR testing of a multi-band radio would take hundreds of tests
    - **E.g., dual-band VHF/UHF radio with 10 test channels → months!**
- **Experience shows that some accessories yield consistently low(er) SAR**
  - Testing these accessories in all possible combinations would add little value
    - **E.g., thick carry cases (w/metal content)**



# Test reduction protocol & Test plan

- **Test reduction protocol:** A set of rules and predefined criteria providing guidance in the definition of a test plan for a two-way radio product and inter-compatible accessories, operating in a given frequency band in predefined intended use conditions. The test reduction protocol involves implementation of a test sequence aimed at identifying the highest SAR configuration(s) for combinations of accessories while minimizing unnecessary tests and limiting the number of test frequencies (channels).

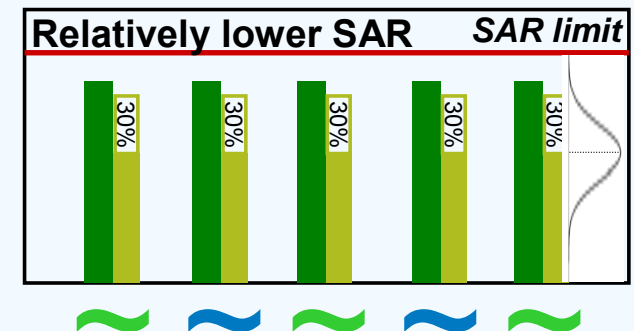
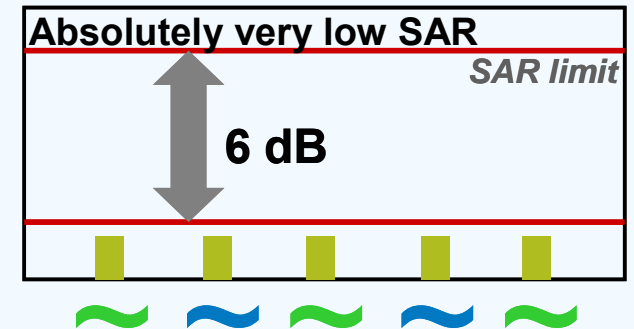
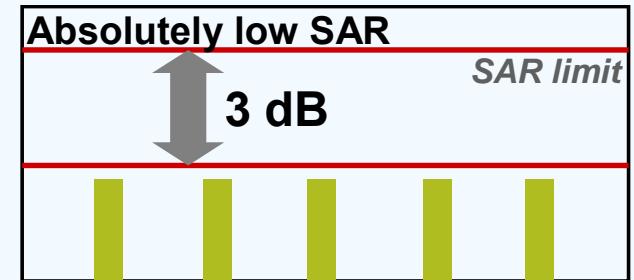


- **Test plan:** A test sequence or matrix featuring the accessory combinations that may potentially require testing according to the implementation of the test reduction protocol for a specific radio product.

# Test reduction protocol: criteria & sequence

## MOTOROLA PROPOSAL

- **Physical characteristics**
  - Similarity: e.g., aesthetic features (e.g., color)
  - Difference: e.g., thicker carry cases
- **Observed SAR levels (at all applicable test channels)**
  - Absolutely low or very low SAR (w.r.t. the SAR limit)
  - Relatively lower SAR (b/w two antennas/accessories)
- **Catch-all threshold**
  - antenna/accessory combinations yielding SAR > C.A.T. (*tbd*) are retained
- **Test plans defined in each band, separately for “body” & “face”**
  - Number of test channels defined based on IEEE 1528 formula
    - **Subset used in battery, audio & carry selection phases**
- **Antenna/accessory/channel selection phases**
  - Antennas → Batteries → Audios → Carry cases
  - Low & very low SAR channels may be partially dispensed
- **Final frequency sweep**
  - Highest SAR combination(s) tested at all channels in band
    - **All antennas are tested at this final stage**



# Next steps

- **Establish a forum for interested stake-holders to work on the issues and refine the protocol in conjunction with FCC**
- **FCC to issue the test reduction guidance with the plan to eliminate or reduce pre-certification reviews**