



700-MHz Propagation Models

Project Description

SNAPSHOT

The conversion from analog television in the United States, combined with the appeal for broadband public safety communications, has generated a lot of interest in the 700 MHz broadband spectrum. The 764- to 776-MHz and 794- to 806-MHz blocks have been dedicated to public safety while the others have been auctioned off to vendors for commercial services, and some blocks for joint use between the two.

The 700-MHz band offers excellent penetration through buildings, which is particularly useful for emergency responders and Enhanced 9-1-1 services. Favorable propagation characteristics, which extend coverage significantly for the same transmission power—translating into less infrastructure—motivates commercial investment in the 700-MHz band.

BACKGROUND

To help develop and deploy network technology in the 700-MHz band, the Public Safety Communications Research (PSCR) program has performed propagation measurements to characterize and understand the 700-MHz broadband environment in which future public safety communications will operate. In this effort we have derived propagation models from measurement campaigns conducted in the following eight environments.

1. Republic Plaza Building, Denver, CO
2. Denver Convention Center, Denver, CO
3. Hazel-Atlas subterranean mine tunnel, Antioch, CA
4. Greathouse subterranean mine tunnel, Antioch, CA
5. Horizon West apartment, Boulder, CO
6. Oil refinery, Commerce City, CO
7. NIST laboratory, Boulder, CO
8. Downtown urban canyon, Denver, CO

AN INNOVATIVE APPROACH

PSCR based its 700-MHz channel propagation models on measurements collected by the National Institute of Standards and Technology (NIST) Radio Frequency Fields Group. Details of the measurements can be found in the following reports:

- “[Attenuation of Radio Wave Signals Coupled Into Twelve Large Building Structures](#),” C.L. Holloway, W.F. Young, G. Koepke, K.A. Remley, D. Camell, Y. Becquet, NIST Note 1545, Apr. 2008.
- “[Measurements to Support Broadband Modulated-Signal Radio Transmissions for the Public-Safety Sector](#),” K.A. Remley, G. Koepke, C.L. Holloway, C. Grosvenor, D. Camell, J. Ladbury, D. Novotny, W.F. Young, G. Hough, M.D. McKinley, Y. Becquet, J. Korsnes, NIST Note 1546, Apr. 2008.
- “[Measurements to Support Public Safety Communications: Attenuation and Variability of 750 MHz Radio Wave Signals in Four Large Building Structures](#),” W.F. Young, K.A. Remley, J. Ladbury, C.L. Holloway, C. Grosvenor, G. Koepke, D. Camell, S. Floris, W. Numan, A. Garuti, NIST Note 1592, Apr. 2008

VALUE TO PUBLIC SAFETY

The PSCR program’s 700-MHz channel propagation work provides telecommunications designers working in public safety communications with models to use in simulation and testing.

RESULTS

The propagation measurements resulted in two 700-MHz channel propagation models. The reports and propagation models described here are available at: <http://www.nist.gov/itl/antd/emntg/700mhz.cfm>.

- The first model covers the first seven environments listed in Background above.
- The second model covers the urban canyon environment listed in Background above.