Data in Brief 17 (2018) 1062–1073

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Path loss dataset for modeling radio wave propagation in smart campus environment

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ARTICLE INFO

Article history:
Received 20 January 2018
Received in revised form
6 February 2018
Accepted 12 February 2018
Available online 16 February 2018

Keywords:
Path loss
Radio propagation
Wireless communications
GSM networks
Smart campus

ABSTRACT

Path loss models are often used by radio network engineers to predict signal coverage, optimize limited network resources, and perform interference feasibility studies. However, the propagation mechanisms of electromagnetic waves depend on the physical characteristics of the wireless channel. Therefore, efficient radio network planning and optimization requires detailed information about the specific propagation environment. In this data article, the path loss data and the corresponding information that are needed for modeling radio wave propagation in smart campus environment are presented and analyzed. Extensive drive test measurements are performed along three different routes (X, Y, and Z) within Covenant University, Ota, Ogun State, Nigeria (Latitude 6°40′30.3″N, Longitude 3°09′46.3″E) to record path loss data as the mobile receiver moves away from each of the three 1800 MHz base station transmitters involved. Also, the longitude, latitude, elevation, altitude, clutter height, and the distance information, which describes the smart campus environment, are obtained from Digital Terrain Map (DTM) in ATOLL radio network planning tool. Results of the first-order descriptive statistics and the frequency distributions of all the seven parameters are presented in tables and graphs respectively. In addition, correlation analyses are performed to understand the relationships between the network parameters and the terrain information. For ease of reuse, the comprehensive data are prepared in Microsoft Excel spreadsheet and attached to this data article. In essence, the

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https://doi.org/10.1016/j.dib.2018.02.026

availability of these data will facilitate the development of path loss models for efficient radio network planning and optimization in smart campus environment.

Specifications Table

Subject area	*Engineering*
More specific subject area	*Telecommunication Engineering*
Type of data	*Tables, graphs, figures, and spreadsheet file*
How data was acquired	*Measurement campaigns were carried out to obtain path loss data between GSM mobile station and three 1800 MHz base station transmitters along three different routes within Covenant University, Ota, Ogun State, Nigeria (Latitude 6° 40′30.3″N, Longitude 3°09′46.3″E). The data collection was performed using drive test approach.*
Data format	*Raw, analyzed*
Experimental factors	*Radio signal measurement and data collection processes were limited to the coverage areas of the directional transmitter antennas*
Experimental features	*Results of the first-order descriptive statistics and the frequency distributions of the network and terrain parameters are presented in tables and graphs respectively. In addition, correlation analyses are performed to understand the relationships between the network parameters and the terrain information*
Data source location	*Extensive drive test measurements are carried out along three different routes (X, Y, and Z) within Covenant University, Ota, Ogun State, Nigeria (Latitude 6°40′ 30.3″N, Longitude 3°09′46.3″E)*
Data accessibility	*The dataset on path loss and terrain information along the three survey routes are attached to this data article*

Value of the data

- Availability of the data in this data article will facilitate the development of path loss models for efficient radio network planning and optimization in smart campus environment [1–6].
- Path loss data and terrain information provided in this article will aid comparative analysis and evaluation of existing and new empirical models [7–10].
- In order to accurately account for the peculiarity of smart campus environment, existing path loss models may be tuned or re-calibrated using the data obtained from real scenarios [11–13].
- Achieving accurate path loss prediction within smart campus context will guarantee better Quality of Service (QoS) for smart applications [14,15].
- The results of the correlation analyses will give better understanding about the relationships between the network parameters and the terrain information [16].
- The local content of the data may open doors of new research collaborations toward the development of a robust regional path loss model for wider coverage.

1. Data

In the present Information Age, high proliferation of smart devices that have in-built sensors and capabilities for Wireless Fidelity (Wi-Fi) and cellular wireless connectivity is fast changing the way