Statistical Modeling of USC Wireless Network

Abstract
An experiment was conducted in which 170 data samples where used. The aim of the experiment was to determine whether a Statistical Model can be generated to determine the Data Transfer Rate between a Client on USC Wireless Network and a Server on the Internet.
Based on this the following Multiple Regression Model was generated
$$E(y) = 3.067 + 0.190x_1 - +0.491x_2 - 0.367x_3 - 0.110x_4 - 0.470x_5 + 0.136x_6 - 0.147x_7$$

With emerging technologies like Webcasting and VOIP, determining the Data Transfer Rate is quite useful. Added to this, the dynamically changing Wireless Networks, makes it hard to estimate this parameter.
Therefore a sincere attempt was made to generate such model. Data of fixed size was transmitted between a Client and a Server and the Time Taken for this transfer was determined.
Hence Data Transfer Rate = Data Transferred / Time Taken
Following variables where chosen intuitively
X1: Day of the Week
X2: Time of the Day
X3: Location (The Wireless Access Point to which the client is connected
X4: Square of the Time
X5: Signal Strength
X6: Uploading or Downloading
X7: Server (Located at different hops)

While modeling, these 13 independent variables where taken, and then merged into a single variable
X1: = 1 if Location = WPH; 0 otherwise
X2: = 1 if Location = LVY; 0 otherwise
X3: = 1 if Location = OHE; 0 otherwise
X4: Day (1 Mon, 2 Tue, 3 Wed and so on)
X5: Time (in minutes from 12:00 midnight)
X6: Signal Strength (1 being Poor and 5 being Excellent)
X7: = 1 if Server 1; 0 otherwise
X8: = 1 if Server 2; 0 otherwise
X9: = 1 if Server 3; 0 otherwise
X10: = 1 if Server 4; 0 otherwise
X11: = 1 if Server 5; 0 otherwise
X12: = 1 if Download; 0 otherwise
X13: = 1 if Upload; 0 otherwise
X14: Time – Square