Traffic data are essential for public agencies to monitor the traffic condition of the roadway network in real-time. Recently, public agencies have implemented Bluetooth Detection Systems (BDS) on arterials to collect traffic data and purchased data directly from private sector vendors. However, the quality and reliability of the aforementioned two data sources are subject to rigorous evaluation. The thesis presents a study utilizing high-resolution GPS trajectories to evaluate data from HERE, one of the private sector data vendors, and BDS of arterial corridors in Orlando, Florida. The results showed that the accuracy and reliability of BDS data are better than private sector data, which might be credited to a better presentation of the bimodal traffic flow pattern on signalized arterials. In addition, another preliminary study aiming at improving the quality of private sector data was also demonstrated. Information about bimodal traffic flow extracted by a finite mixture model from historical BDS is employed to augment real-time private sector data by a Bayesian inference framework. The evaluation of the augmented data showed that the augmentation framework is effective for the most part of the studied corridor except for segments highly influenced by traffic from or to the expressway ramps where evaluation datasets might have some bias.