Errata: Evading Data Monitoring with Human Movement Networks

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In *Evading Cellular Data Monitoring with Human Movement Networks* [1], an error in simulation led to the presentation of inaccurate results in Figure 3, *left* and *center*. The results for 5% probabilistic random walk were depressed by the error, and *although* HUMANET *still outperforms random walk with a corrected simulator under the parameters described, a 5% random walk performs much better than reported.*

After identifying and correcting the error, further analysis of the routing model for random walk led us to conclude that a 5% exchange rate for random walk is a poor point of comparison for HUMANET. Specifically, a 5% exchange rate is more than double the probability of a message exchange for HUMANET. In the results below, we performed a more fair comparison using a 2% probability of exchange. In Figure 1, the difference in exchange rate between HUMANET, 2% and 5% random walk is presented. Additionally, we found that local timeouts can skew results upwards for HUMANET. Instead, a *first-pass always* condition was employed where the message originator will always pass the message without checks.

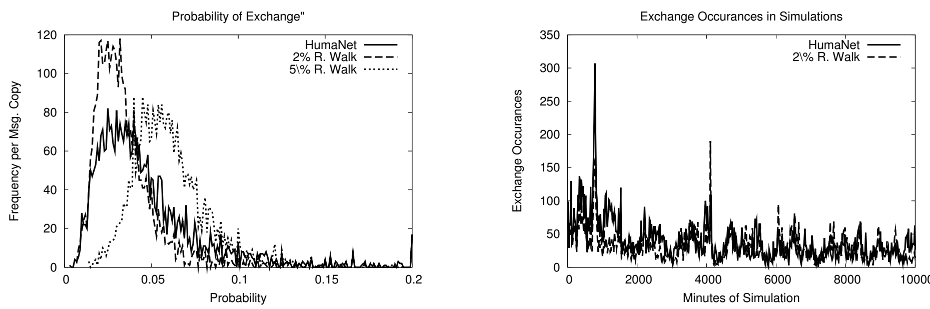

Figure 1: left: *The probability of exchange comparison for 2% and 5% random walk with* HUMANET*;* right: *Comparison with number of exchanges for 2% random walk and* HUMANET*.*

The experiments in [1] were reevaluated using the corrected simulator, and HUMANET is compared to a 2% probabilistic random walk and, as a baseline, to a *never-pass* walk where no message hand-offs occur after the initial exchange from the message originator. As described, a first-pass always condition is used instead of a local timeout for all algorithms. The global timeout of a message is set to one week, and 14 different time slices are used for simulation. We also use a conservative measure of a contact: two node's timestamps must be within 10 seconds and their distance must be no more than 10 meters. As before, 300 independent runs of the simulator with unique sender/receiver pairs are used. All simulations were run using the *cabspotting* mobility data set [2].

The results of the experiments are presented in Fig. 2. The delivery rate (Fig. 2, *left*) of HUMANET and 2% random walk are similar, but in all but two of the time slices, HUMANET out performs random walk. The average delivery rate for HUMANET is 78% compared to 76.5% for random walk. Similar results are seen for message latency (Fig. 2, *right*); the average latency for HUMANET is 63 versus 66 hours for random walk. In summary, HUMANET generally outperforms random walk which demonstrates the benefits of using movement profiles.

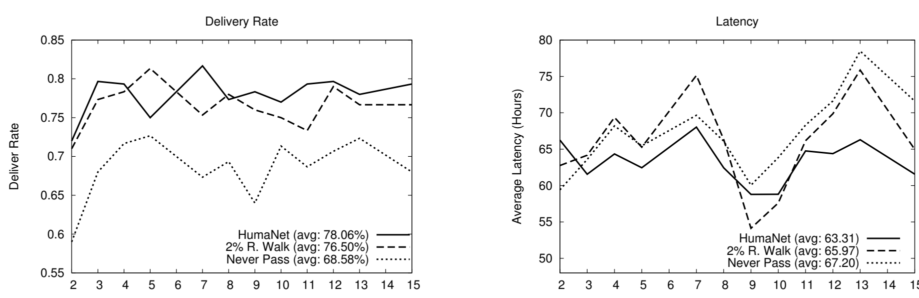

Figure 2: *Comparison of delivery rate (*left*) and average latency (*right*) for* HUMANET*, 2% Random Walk and Never-Pass Walk. The delay relates to the number of days in simulation time before message exchanges start. Inset is the average delivery rate and latency across all simulation runs.*

References

[1] A. J. Aviv, M. Sherr, M. Blaze, and J. M. Smith. Evading Data Monitoring with Human Movement Networks. In *HotSec*, 2010.

[2] M. Piorkowski, N. Sarafijanovoc-Djukic, and M. Grossglauser. A Parsimonious Model of Mobile Partitioned Networks with Clustering. In *COMSNETS*, 2009.