Today: (1) Fade Level, (2) Line Crossing Detection

1 Fade Level

1.1 Hande paper

Simulated Pedestrian fading: When no pedestrian is nearby, the link has a static “undisturbed fade” value, $E[t_0]$. The person is an infinitely high cylinder. When the person is at a position, any ray now going through the cylinder is modeled to have:

1. attenuation proportional to the “penetration depth”, at most 10 dB.
2. the phase changes due to the additional path length

Other model assumptions: There is no LOS in this model – he assumes all multipath are one-bounce, using a scatterer-cluster model, with Poisson distributed clusters, and again, a Poisson distribution of scatterers within the cluster.

Hande discussion questions:

1. What was the main contribution of Hande’s paper?
2. What additional work could be with Hande’s simulation/model?
3. What are the good and problematic assumptions in Hande’s work?

1.2 Wilson 2012 paper

Wilson discussion questions:

1. What was the main contribution of Wilson’s 2012 paper?
2. How does one calculate the fading level of a link?
3. How many parameters does a skew-laplace distribution have?
   Wha is the parameter $\psi$?
2 Line Crossing Detection

2.1 Youssef 2007 paper:

1. Figure 1 and Sections 4.1 and 4.2 describe the experiment of Youssef et. al. Notably, there are “a total of ten events that can be detected.” [Youssef 2007].

2. RSSI is positive! There is probably some offset, or the RSSI is scaled in some other way.

3. Two methods are introduced for detection: The “Moving average” method looks for a percentage change in short-term windowed average compared to a long-term windowed average. When the percentage change is over a threshold, an alarm is raised. The “Moving variance” keeps track of the variance in a short window. When the variance goes \( r \) standard deviations above its average (both calculated using a empty-room period) an alarm is raised.

4. A link crossing detection only occurs if there are \( N \) alarms in a short window \( b \).

2.2 Kaltiokallio 2011 paper

The “moving variance” idea of Youssef requires a empty room calibration in order to set the threshold as described in their method. The Kaltiokallio paper calculates a long term variance (LTV) during normal real-time operation. The short term variance (STV) is compared to the long-term variance – any STV more than \( T \) times the LTV sets off the trigger.

2.3 Discussion

- What are some limitations of both line crossing method detectors?
- What calibration is needed in each method?
- What other line crossing detectors are possible?
- What type of environments do you think each method would work well or poorly in?