



Research Consortium in Speckled Computing

Communication Protocol with 2-hop Interference Prevention

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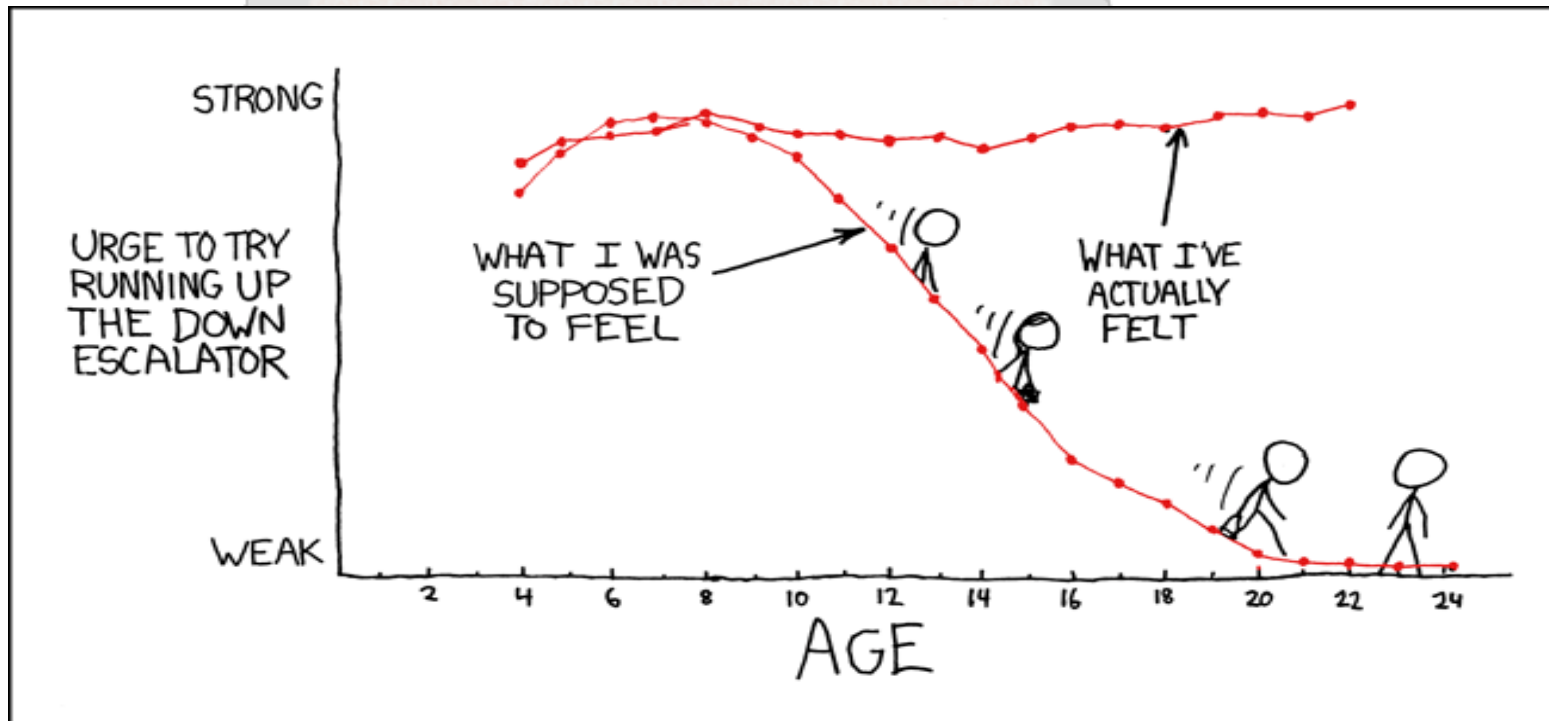
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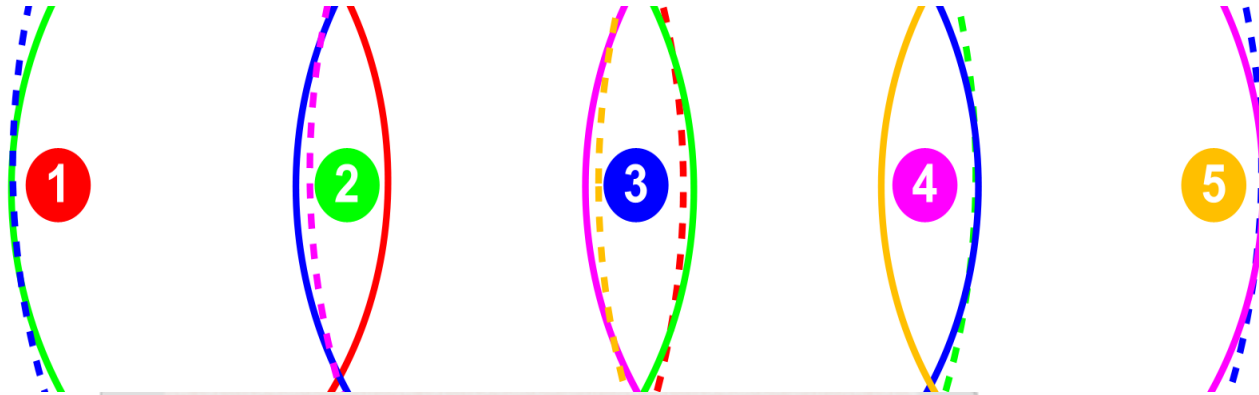
Scenario

- Data Aggregation in WSN / Specknet
- Optimising use of Channel while minimising Energy usage



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2-hop Interference



- Nodes may receive interference from nodes that are out of communication range
- By passing on aggregate information nodes can gain knowledge of hidden interferers

Aggregating Interference Information

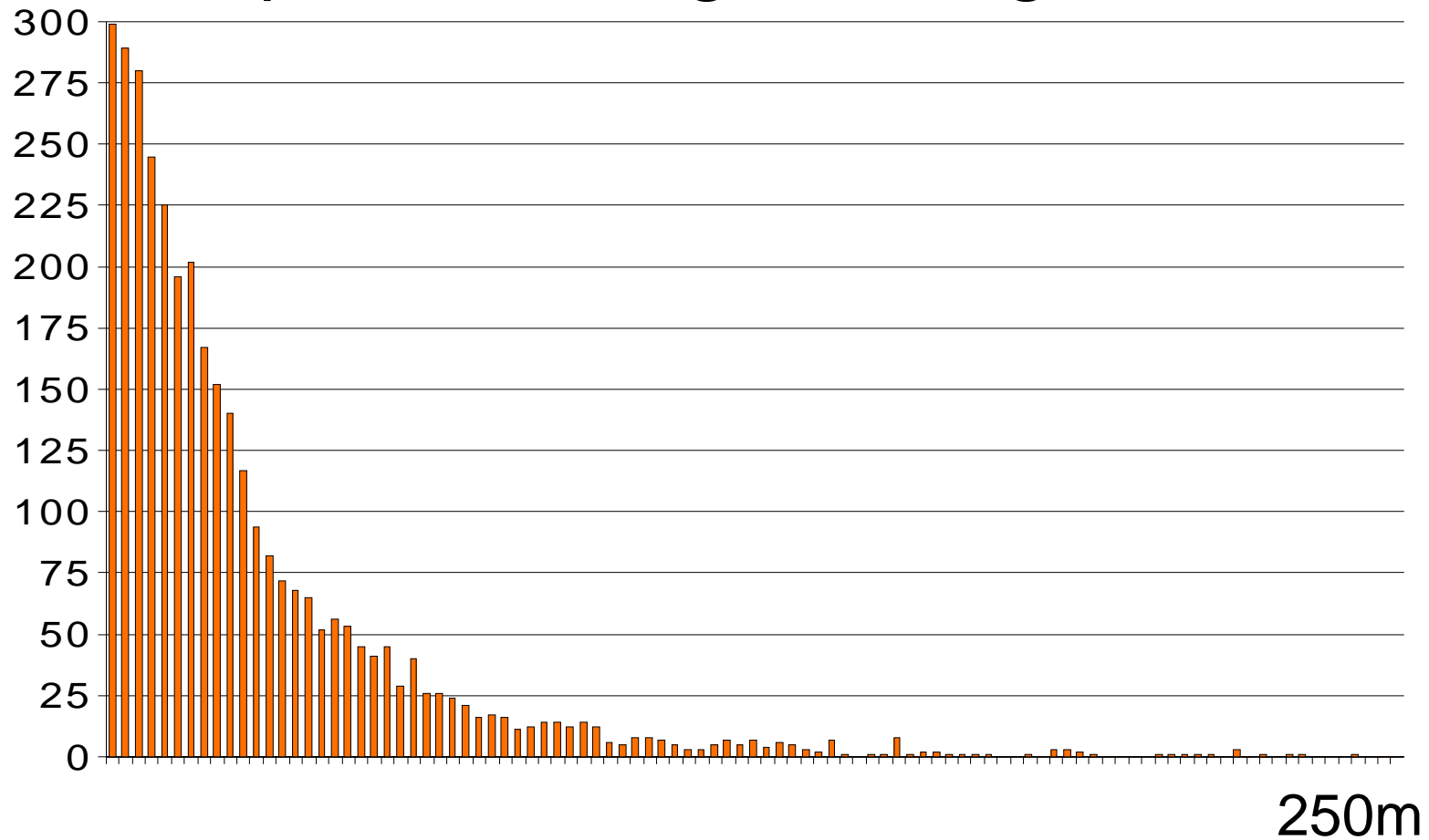
- Need to collect information about possible interference from nodes 2 hops away
- Bitmaps indexed by slot number provide a space-efficient representation

1	2	3	4	5	6	7	8	9	10	11
1	0	1	1	1	0	0	1	0	1	1

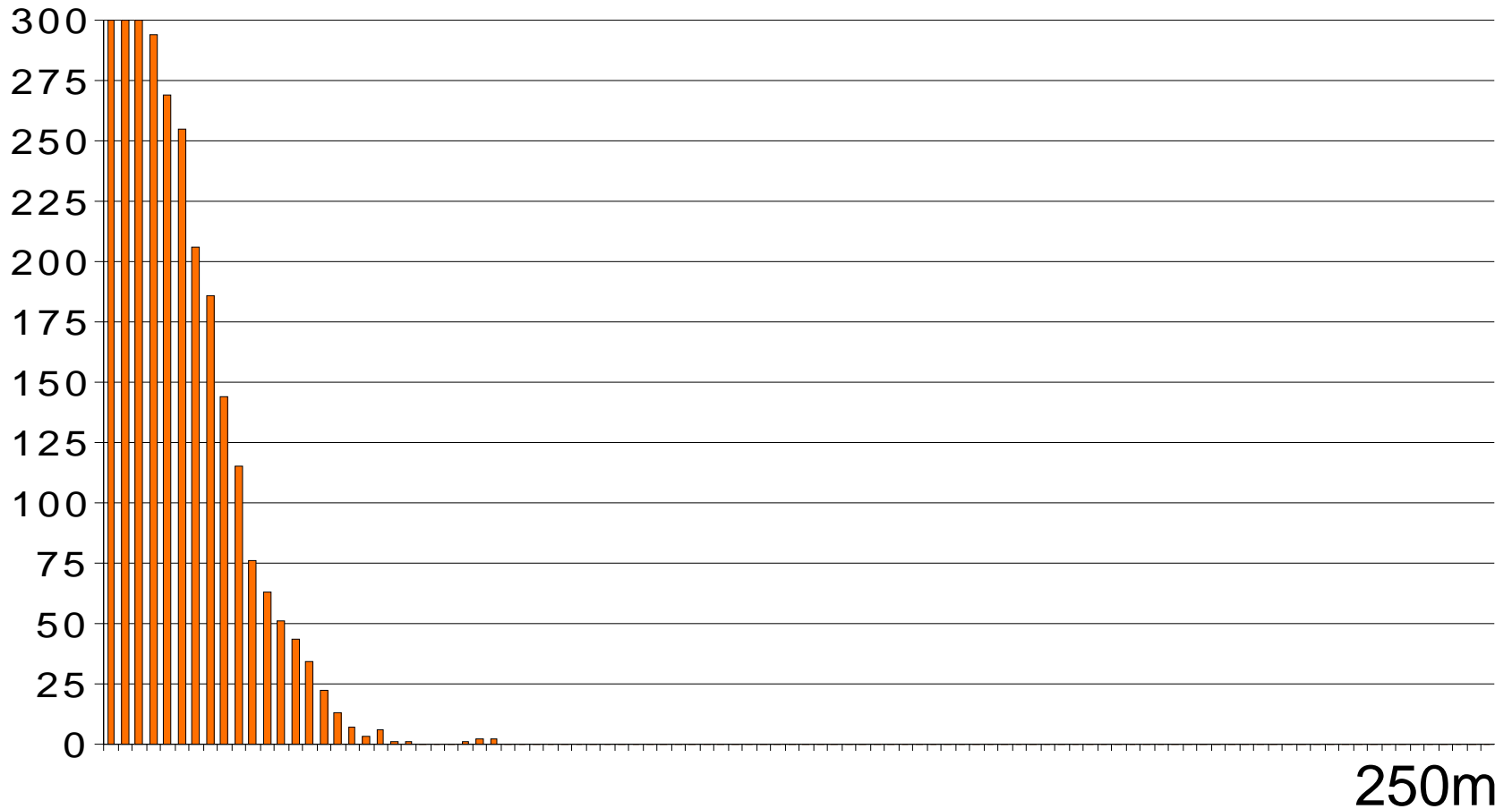
Channel Model

- Based on results by Zuniga et al, extended in Castalia (Pham et al)
- Reimplemented as python module
- Log-normal shadowing path loss model
- SNR calculated based on path loss model, interference and noise floor
- Packet Receive Rate calculated on basis of SNR and modulation scheme
- Further extended to favour bi-directional links

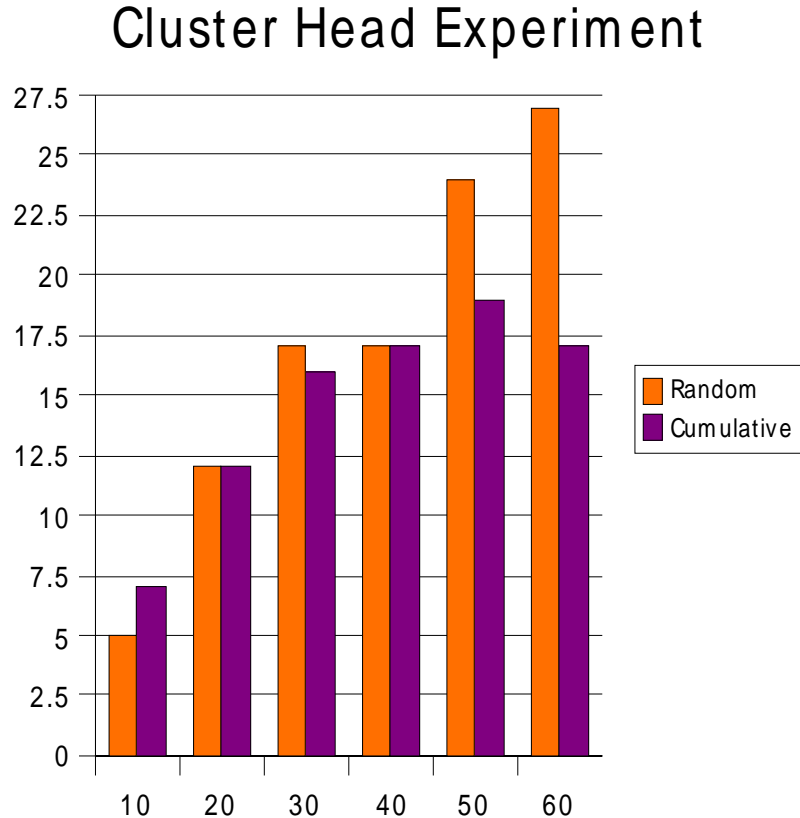
Reception Histogram, $\sigma = 8$



Reception Histogram, $\sigma = 0$



Cluster Head Experiment



- 200 nodes overall, out of which 10-60 cluster heads
- sparse network
- 5 cluster slots
- random slot assignment vs cumulative interference

Issues

- Selecting slots based on cumulative interference information tends to favour some slots over others, leading to “clumping”
- Need to investigate methods for avoiding “clumping”