proximity-based
THE RISE OF COMMUNICATION!

Beginning to become a key player in financial payments

Breathtaking applications in healthcare industry - heart monitors, pacemakers

GOALS/CONTRIBUTIONS

Limitations of malware propagation research

Conventional infection models assume even contact rate! Most do not consider mobility or give limited consideration

UNDERSTAND RELATION BETWEEN INFECTION SPREAD AND MOBILITY MODEL

• Does the infection spread faster or slower in realistic mobility models?
• What insights does it provide into designing countermeasures?

DESIGN EFFECTIVE COUNTERMEASURES TO MALWARE SPREAD

• What kind of healing mechanisms can be designed?
• Can we design optimal solutions that minimize time and energy?

IMPLEMENTATION AND VERIFICATION OF COUNTERMEASURES

• How should healers communicate with each other? How to place them?
• Do deterministic healers pose advantages over probabilistic healers?

PROOFS AND MECHANISMS

INFECTION DYNAMICS

Spatial distribution reveals non-homogeneous distribution of node mobility

Slower infection rate in realistic mobility models!

SOLUTION BLUEPRINT

Build Oracle Healer?
• Formulate as T-Cover
• Reduce to minimum set cover
• Prove NP-hardness

Build Approximations?
• Greedy approximation for oracle
• Effective healer placement
• Family of healers

RANDOMIZED HEALERS

Profile-based healers
• Intelligent decision making through profile building
• Utilize less patches!
• Beneficial in an energy-constrained system

Randomized healers
• DO NOT rely on system feedback
• DO NOT have to estimate node arrival distributions
• Utilize more patches!
• Beneficial in a time-constrained system

PERFORMANCE RESULTS

Evaluation Methodology

Healer placement through Poisson Disk Sampling
• Simulate 100-300 nodes in a 1000x1000 field
• Random Waypoint vs. Truncated Levy Walk
• Varying number of static healers
• Different healer strategies
• Optimizing number of patches and recovery time