Towards a Global Network Reputation System: A Mechanism Design Approach

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Team Profile

• University of Michigan
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Customer Need

• Risk management
  – A systematic way to quantify and measure security risks at an organizational level
  – A set of risk-aware policies

• Incentive design
  – Incentive mechanisms to induce desirable security investment and behavior
Approach

• To establish a network reputation system
  – Reputation at an appropriate level of abstraction/aggregation
  – Large scale data analysis and modeling
  – Predictive measure leading to proactive policies

• Mechanism design
  – Incentive mechanisms to encourage data input leading to more accurate reputation assessment
  – Incentive mechanisms to induce desirable security investment and behavior
Benefits

• Risk management
  – Better understanding and assessment of security risks
  – More systematic and predictive risk management
  – Proactive and risk-aware policies

• Incentive design
  – Better understanding of the needed incentive structure for security investment
  – Policy guidance and recommendations
Competition

• Risk management
  – Reputation at the host level
  – Reactive policies

• Incentive design
  – Unregulated interdependent security games (IDS)
  – Price of anarchy
  – Does security need to be mandated?
Current Status

• Network reputation
  – Preliminary data analysis and aggregation on a set of host reputation lists

• Mechanism design
  – A crowd-sourcing reputation mechanism to collect data input
  – A positive externality mechanism to incentivize investment in non-excludable public goods
  – Issue of voluntary participation
Next Steps

• Year 1
  – Data analysis
  – Reputation mechanism and implementation
• Year 2
  – Completion of data analysis
  – Risk-aware policy design
• Year 3
  – Incentive mechanism using reputation assessment
  – Policy implementation
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