CAREER #0644450

Securing Broadband Cellular Data Networks

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Problem: unique vulnerabilities in cellular data networks

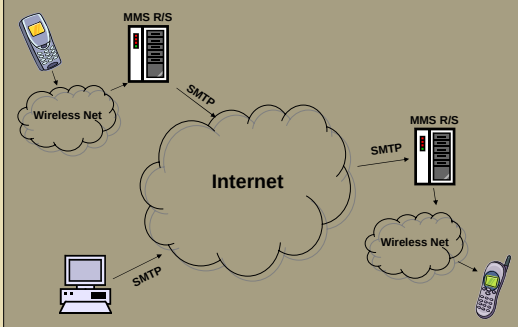
- Scarce battery power in mobile devices
- Expensive network bandwidth
- Scarce shared network resources

Project goals

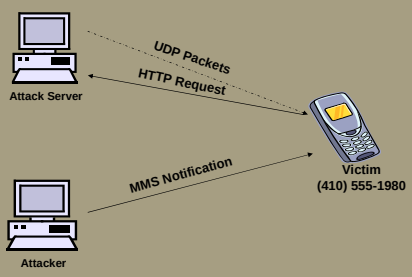
- Discover unique vulnerabilities in cellular networks & mobile devices
- Evaluate impact of attacks
- Explore defense mechanisms
- Propose securer designs

Real World Applications

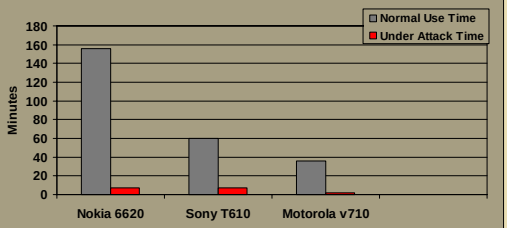
- Discovered vulnerabilities in MMS
  - Unauthenticated MMS messages
  - Unauthenticated Relay/Server -- allowing billing circumvention
  - Disclosure of critical information -- allowing hit list creation
- Discovered attacks on mobile devices' battery power
  - Preventing devices from sleeping
  - Depleting batteries up to 22 time faster
  - Surreptitious attack
    - Victim was unaware of the attack
    - Triggered NO network alert



MMS Architecture



Attack on Battery Power



Attack Impact

Approach and Impact

New Approaches

- Access control on power-intensive operations
- Device-configurable firewalls: specification, validation, and integration
- Secure network resource sharing schemes

Research Impact

- Secure cellular network infrastructure proactively before attacks
- Develop new simulation and experimental techniques and tools for cellular network security research

National Science Foundation
WHERE DISCOVERIES BEGIN

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