Future Research Directions on Energy-Aware Security Mechanisms

draft-soares-nmrg-green-security-00

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Agenda

- Introduction
- Energy-Aware Security Mechanisms
- Outlook

Introduction

- Escalation of climate emergency
  - Carbon footprint reassessment across industries
- Computer networking and the Internet
  - No exception to the necessity of reducing carbon footprint
- Easier to add sustainability considerations at the design phase of new protocols
  - Standardization bodies

Introduction

- IETF/IRTF
  - Green Networking topic → increased discussion
    - IAB workshop → e-Impact
      - Environmental Impacts of Internet Tech [RFC9547]
    - Getting Ready for Energy-Efficient Networking (green)
      - Requirements, terminology, metrics, models
    - Sustainability and the Internet (sustain) RG
      - HotRFC, IRTF Open Meeting

Introduction

- IETF/IRTF
  - Green Networking topic → increased discussion
    - NMRG
      - Challenges and opportunities in management [draft-irtf-nmrg-green-ps-03]
      - Intents [draft-contreras-nmrg-green-intent-00]

Introduction

- IETF/IRTF
  - Some insights
    - Focus on improving energy-efficiency and carbon footprint
    - Alternate high link utilization with power-saving modes
    - **Measurement and related metrics → necessary**

Introduction

- IETF/IRTF
  - Measurements and related metrics
    - Power consumption, energy efficiency, carbon footprint → under various loads
    - Associated with networks, equipments, individual paths, and services
  - Metrics must be taken in combination with others

Energy-Aware Security Mechanisms

- Discussion still needs to be expanded to adjoined areas → **Network Security**
  - Security protocols expensive → likely top consumers of energy resources
- Usage of appropriate security mechanisms
  - Avoid either over-provisioning or failing to allocate enough resources

Energy-Aware Security Mechanisms

- **So far:** Considerations about the attack surface from the energy measurement tools
  - Put resources to sleep in critical moments
  - Energy drain for overheating and battery loss
  - Tamper with the energy measurement
- Security risks for energy-saving mechanisms, not energy-saving techniques for security mechanisms

Energy-Aware Security Mechanisms

- Research Challenges
  - Measurement of energy consumption in existing network security mechanisms
  - Metrics up for industry-wide standardization
    - Security protocols have greater costs if compared with other networking protocols
    - Energy consumption metrics should take functionality into account to avoid harming security properties

Energy-Aware Security Mechanisms

- Research Challenges
  - Cost-benefit analysis between security performance and energy usage
    - Save energy with little harm to safety and functionality
  - Compare security mechanisms to assess which one is best for a task, energy-wise

Outlook

- First version
- Is this the right place? Or should we move to another RG?
- If this is the right place, is there interest/contributors?

Thank you.

Questions?