Challenges in Mobile Distributed Systems

- *Autonomous Clustering and Hierarchical Routing for Mobile Ad Hoc Networks*

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- *The Crumbling Perimeter: Mobile Networking and Internal Security Issues*

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- *Timed Asynchronous System Models for Dependable Mobile/Pervasive Systems*

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Challenging Issues in Routing for Mobile Ad Hoc Networks
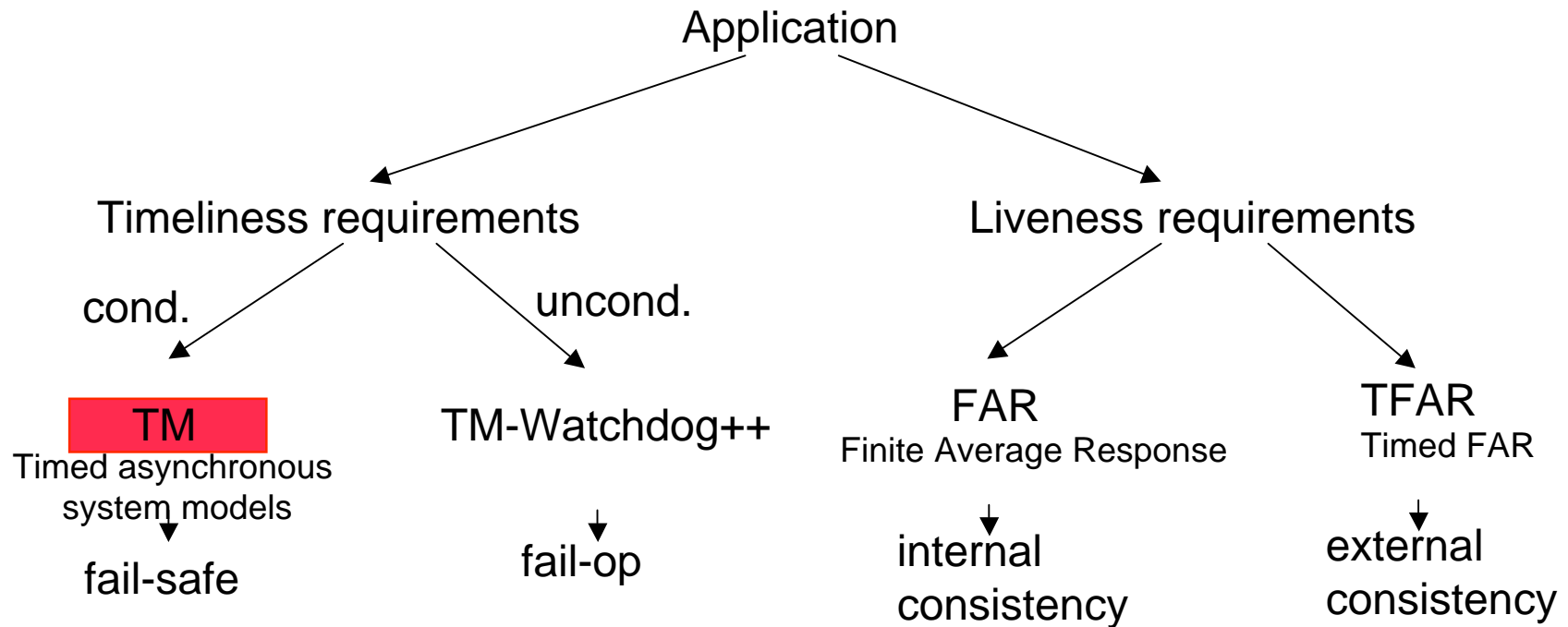
- Routing for large-scale networks

  → protocols based on hierarchical routing and autonomous clustering

- Routing for asymmetric (heterogeneous) networks

- Location-based routing

- Energy efficient routing

- Secure routing

- QoS routing (several levels)

Farnam Jahanian

- **Trends in threats / attacks** (nature / rates / impact / protection solutions)
  - Nature :
    - Past: availability attacks (infrastructure disruption)
    - New attacks directly target people (ID theft, phishing)

- **Rethink the protection solutions**

- **Internal Security Challenge**

  - Evolving Threat models

  - Evolving Trust model

  - Evolving Business model

- No solution proposed ... But several questions!

- What if we expand the pool of bots and botnets to include 2+Billion smart phones and PDAs?

- How to protect against DoS attacks from a massive number of widely-distributed wireless devices?

- How to protect against millions of persistent infected mobile devices?

- Can traffic analysis techniques be applied to wireless networks and mobile applications?

- How to apply anomaly detection?

- How to secure a broad rage of new mobile platforms and applications? How to protect sensitive data on mobile devices?

- Where is the perimeter? What is the deployment model for security devices such as firewall, IDS, IPS? Where do you analyze, detect and stop potentially malicious traffic?

- Can the routing infrastructure be secured?

- How would convergence of networking platforms and security devices in the wired world affect mobile computing?

Christof Fetzer

Application

Timeliness requirements → cond. → **TM** (Timed asynchronous system models) → fail-safe

Timeliness requirements → uncond. → TM-Watchdog++ → fail-op

Liveness requirements → FAR (Finite Average Response) → internal consistency

Liveness requirements → TFAR (Timed FAR) → external consistency

- Mobile / pervasive: TM
- Model assumptions: simplify protocol development & correctness proof
- Mobile: communication assumptions are very weak

  Assumption about response time

  Average transmission delay is finite