



University of Hamburg

Securing BIONETS:

"How can Security Infrastructures Match Autonomically Evolving Networks and Services?"

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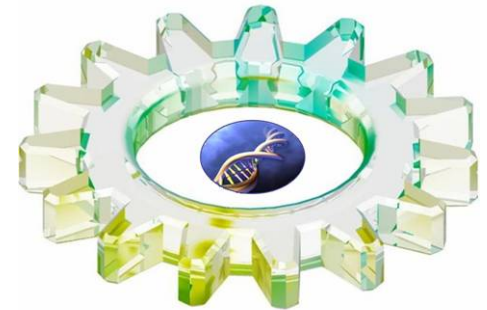
Security in Distributed Systems (SVS)

<http://www.informatik.uni-hamburg.de/SVS/>

University of Hamburg

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BIONETS



Fakultät für Mathematik, Informatik und Naturwissenschaften
Department Informatik



BIONETS

- Motivation
- Goals
- Approach

Security in BIONETS

- Traditional Security Assumptions
- Assumptions in BIONETS
- The Challenge

Services in BIONETS as an Example

- Securing a Highly Dynamic Framework
- A Vision: Evolution of Security Services



Motivation

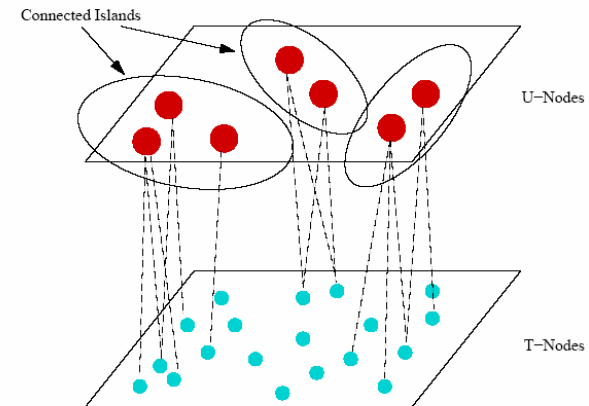
- Pervasive Computing and Communication Environments
- Deficiencies of Existing Communication Approaches
- Systems in Nature and Society with Large Populations able to
 - ◆ Develop Collaboration and Survival Strategies
 - ◆ Work in Absence of Central Control
 - ◆ Exploit Local Interaction

Main Goals

- Complement and Improve Current Networking Infrastructures
- Support Local Networks with Large Number of Heterogeneous Devices
- Design Services able to Adapt to the Environment
- Provide Situated and Autonomic Communications

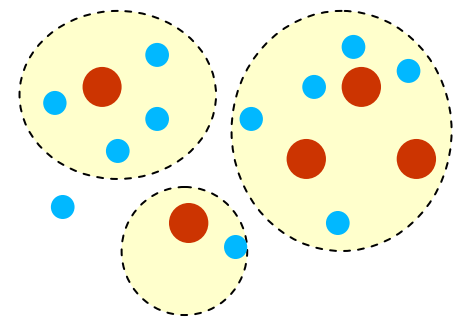
Two-Tier architecture

- T-Nodes (Tiny devices, Limited Resources, Minimum Functionality)
- U-Nodes (Rich Network/Service Functionalities)



Strong Locality

- Peer-to-Peer Communication
- One Hop Communication
- “Disappearing Network”
- Service/User Centric Approach



Biologically-Inspired

- Self-Managed Services
- Services Adapting to the Environment
- Service Evolution to Satisfy User Needs



Security Needs to Build upon Something Static, e.g.:

- Public-Key-Infrastructures
- Communication Links between Principals
- Security Modules

BIONETS Aim at the Opposite:

- Ad-Hoc Networking
- One Hop Communication
- Information Restricted in Time and Space
- No Network Management but Self-Configuration
- Service Evolution

The Challenge for Security:

- How Far can we Push Security Technology to Meet These Goals?
- Find the “**Least Securable Architecture**”: What are the Minimal Assumptions for BIONETS we can Deal with?



BIONETS are Centred Around Services

- Security Itself is Seen as a Service
- Security Needs to Consider Other Services as Principals
- Communication-Level Security Between Nodes is not Enough

Characteristics of Services in BIONETS

- New Services can be Created through Local Combination
 - ◆ Is it still Possible to Comply with Security Requirements?
- A Service may be Distributed among Several Nodes
 - ◆ What is/are the Principals and how to Secure them?
- Services Require to be Monitored
 - ◆ Can we do this Reliably in a Distributed and Disconnected Environment?



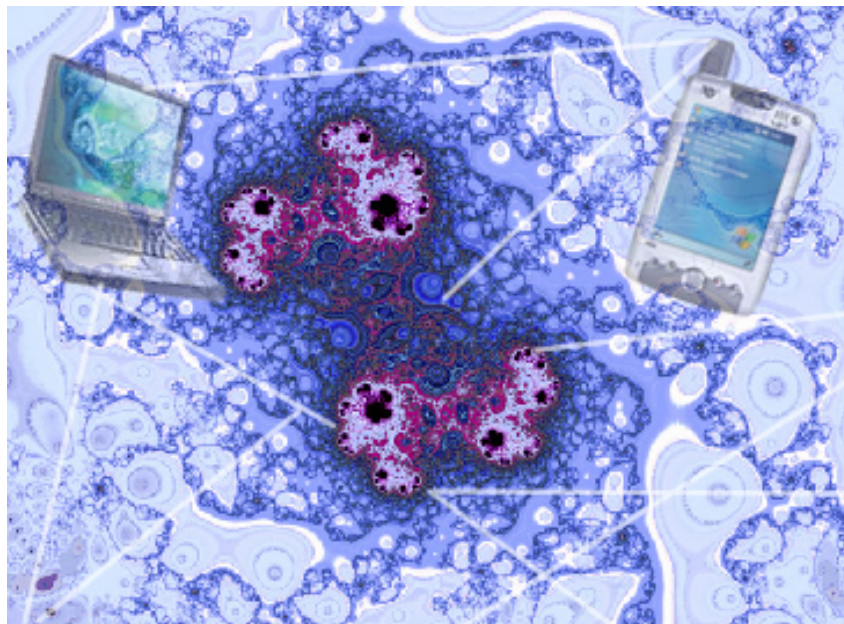
BIONETS Provides Service Evolution

- Principals Change, Disappear, or are Being Created
 - ◆ How Can we Cope with this?
- Evolving Services can have (Previously Unknown) Security Requirements
 - ◆ Can we Form Security Services that Match new Requirements?

The Vision: Evolving Security

- Since Security is Seen as a Service, it should Also Evolve
 - ◆ What could be Suitable Parameters?
 - ◆ How would a feasible Fitness Function Look Like?
 - ◆ What are the Security Primitives which should not Evolve?

Main Focus is not on how to Secure Communication but on:
**How Security Infrastructures can Match
Evolving Networks and Services!**



"the architect of the future will build inspired by nature because it is the most rational, the most durable, and the most economic of all methods."

Juan Torres (1810)



<http://www.bionets.org/>



BIONETS

adapting in the pervasive age

Thank you for your Attention!

For more information on Security in BIONETS
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