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A Self-organizing Network Management Concept to Capture User Perceived Service Quality

Perspectives Workshop: Autonomic Networking
Dagstuhl Seminar 06011
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Project Partners

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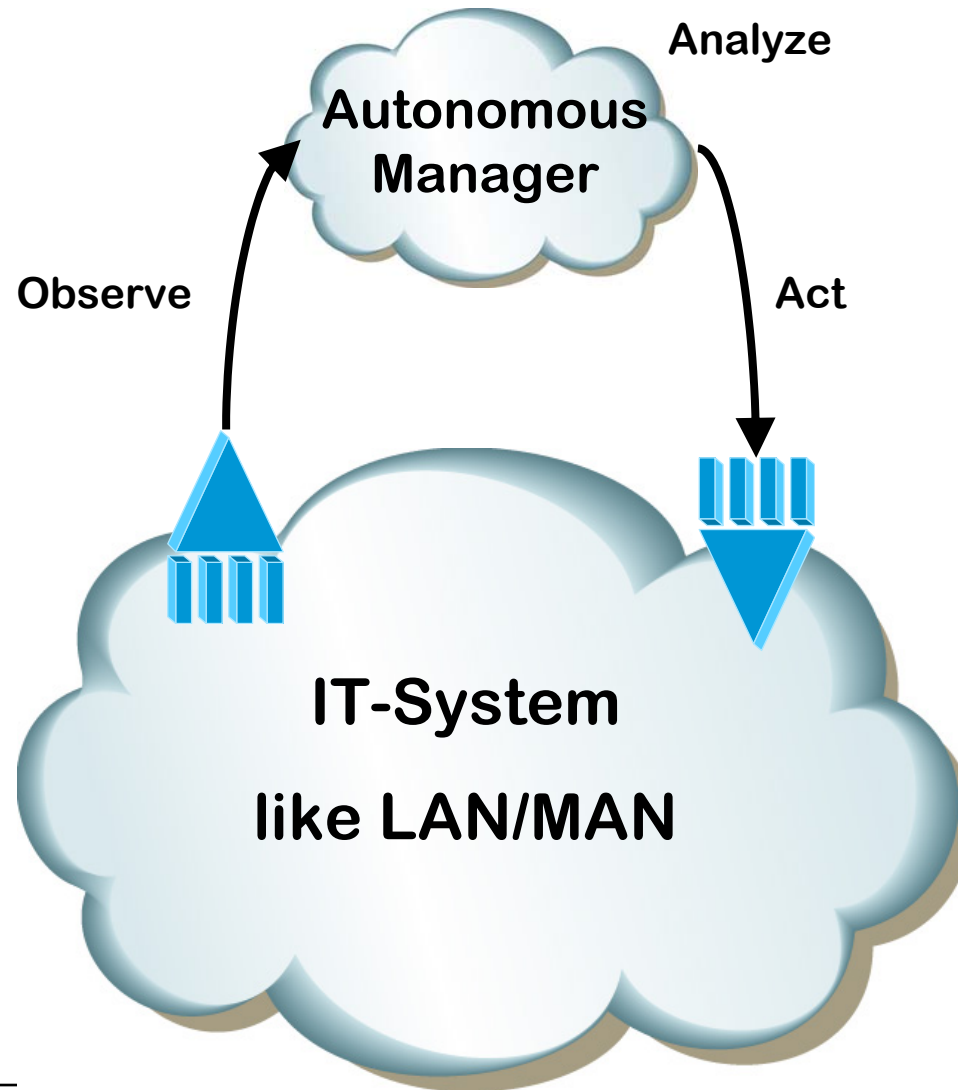
- ▷ Infosim, Germany
 - Matthias Schmid

- ▷ University of Würzburg, Germany
 - Kurt Tutschku
 - Andreas Binzenhöfer

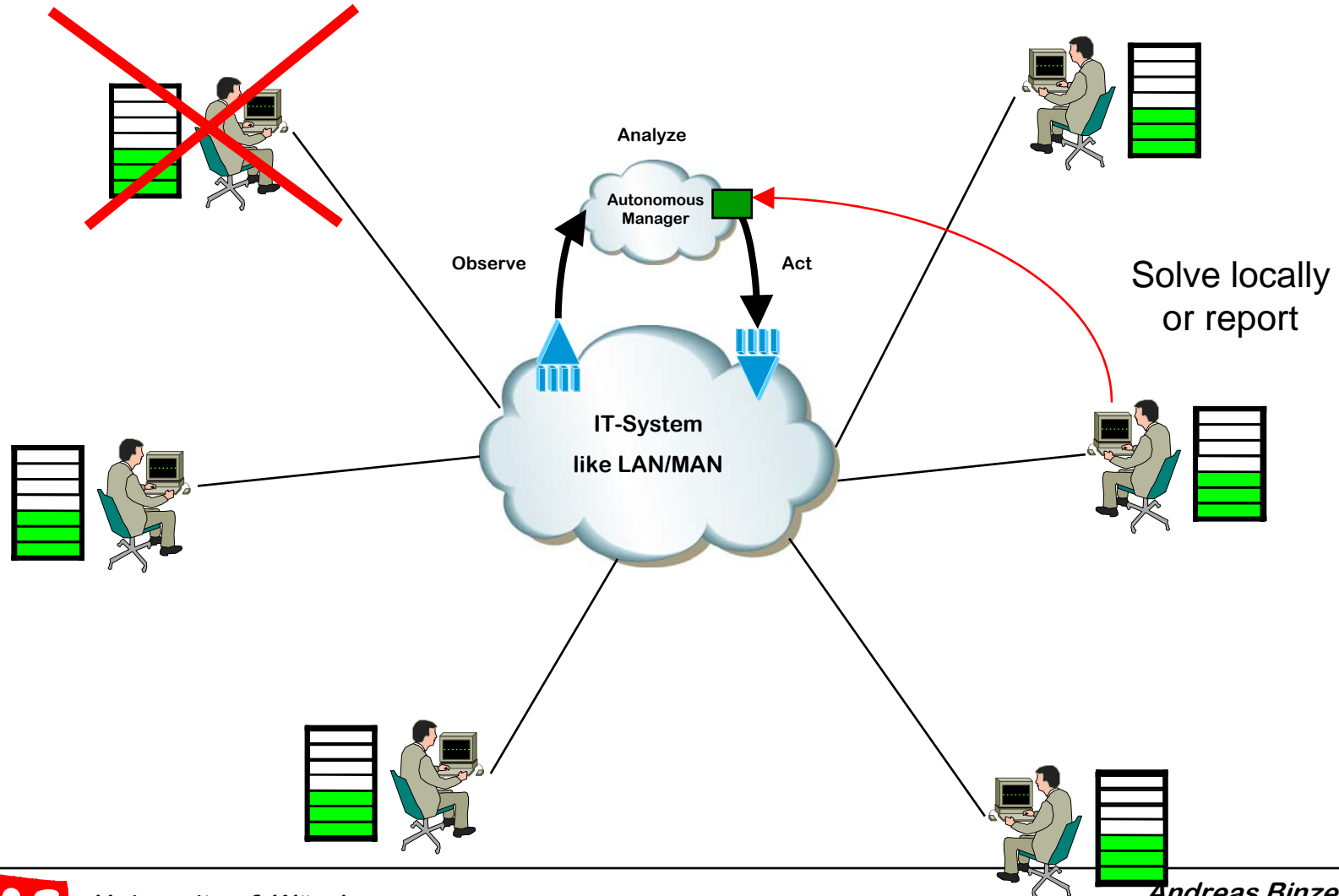
- ▷ Prototype
 - DNA: Universities + Datev (Industrial Cooperation)
 - AutoMon-Module: EuroNGI



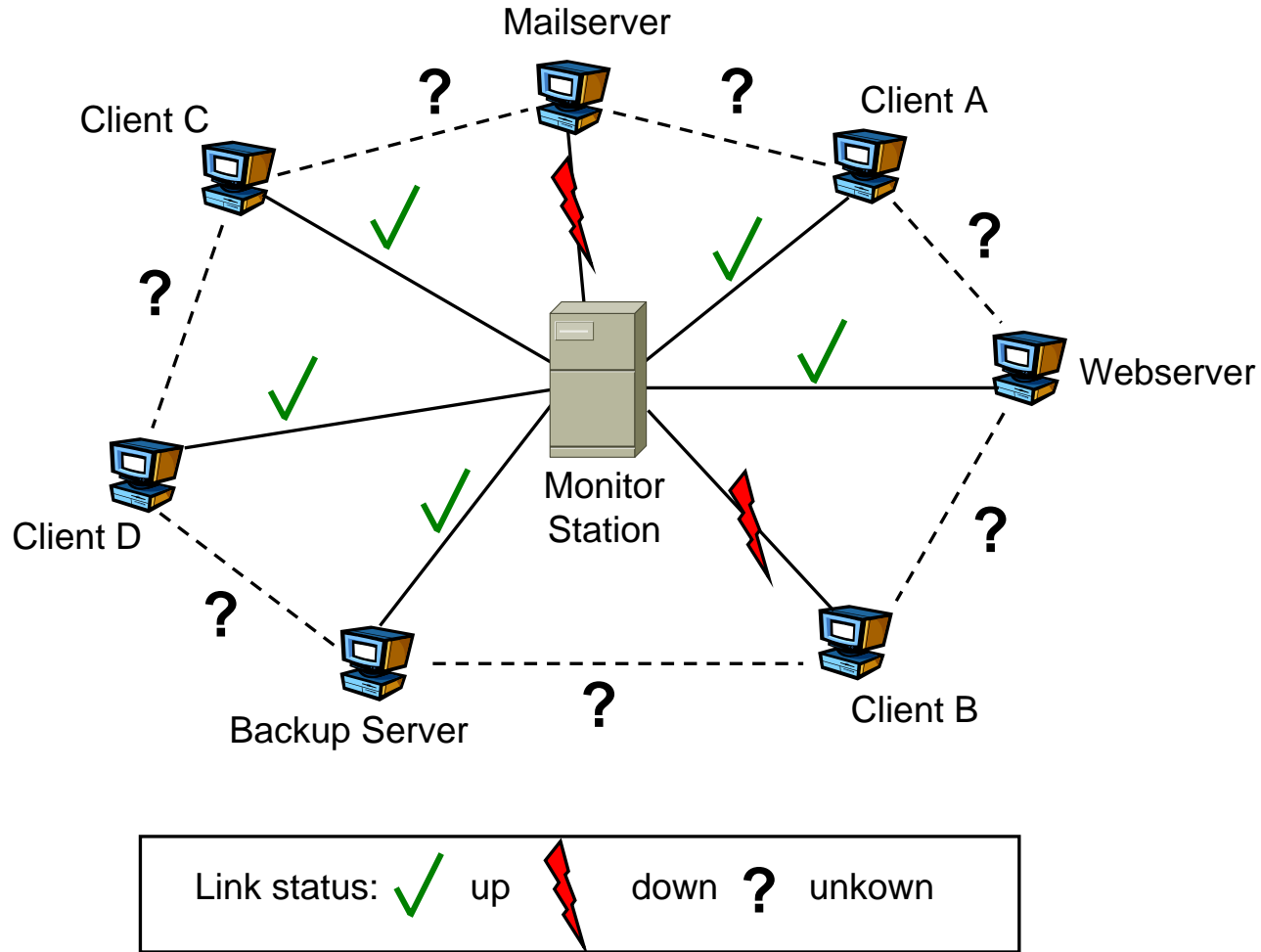
Simplified Vision of „Autonomic Computing“



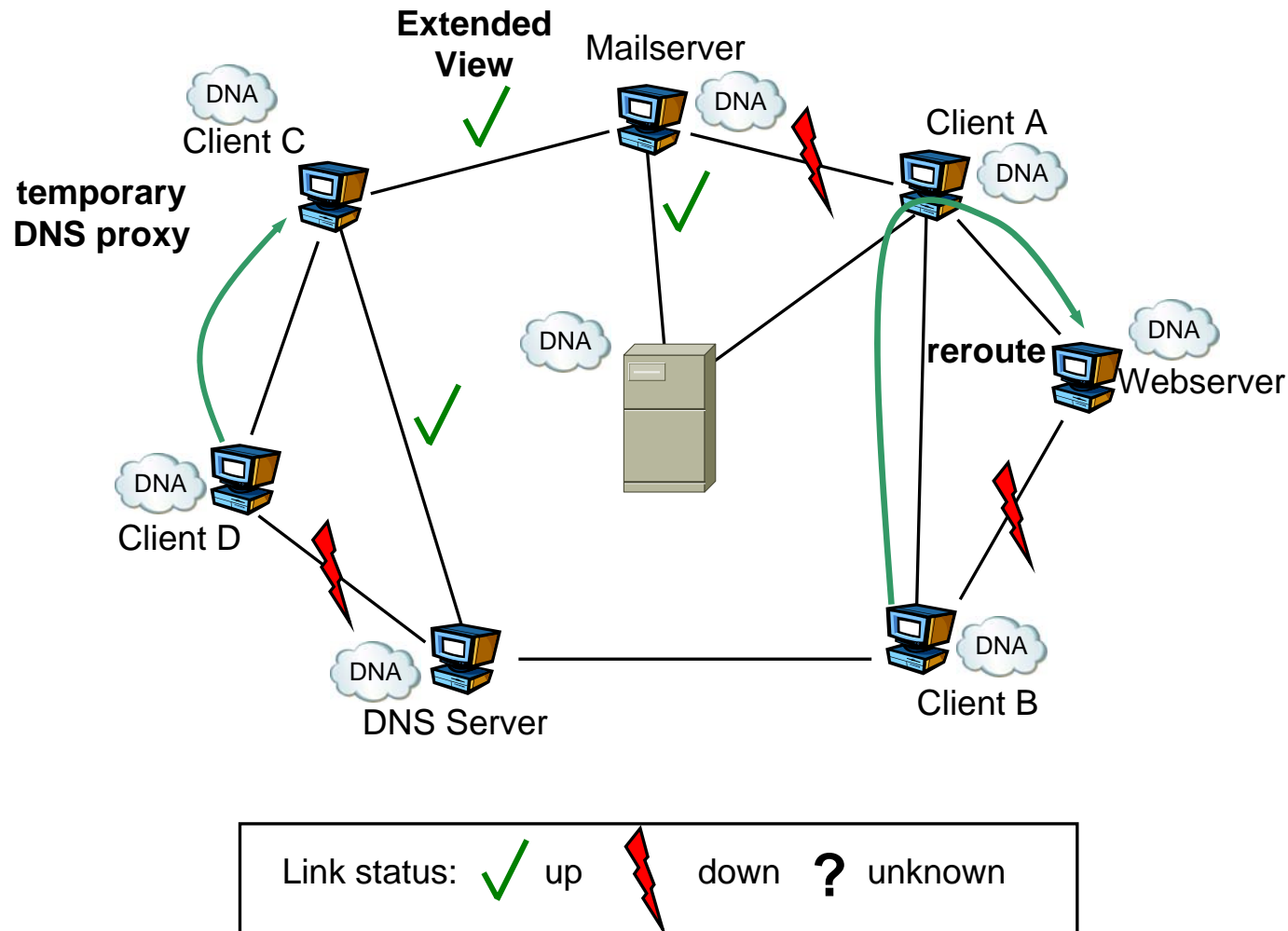
Our Vision: „Autonomic Networks“



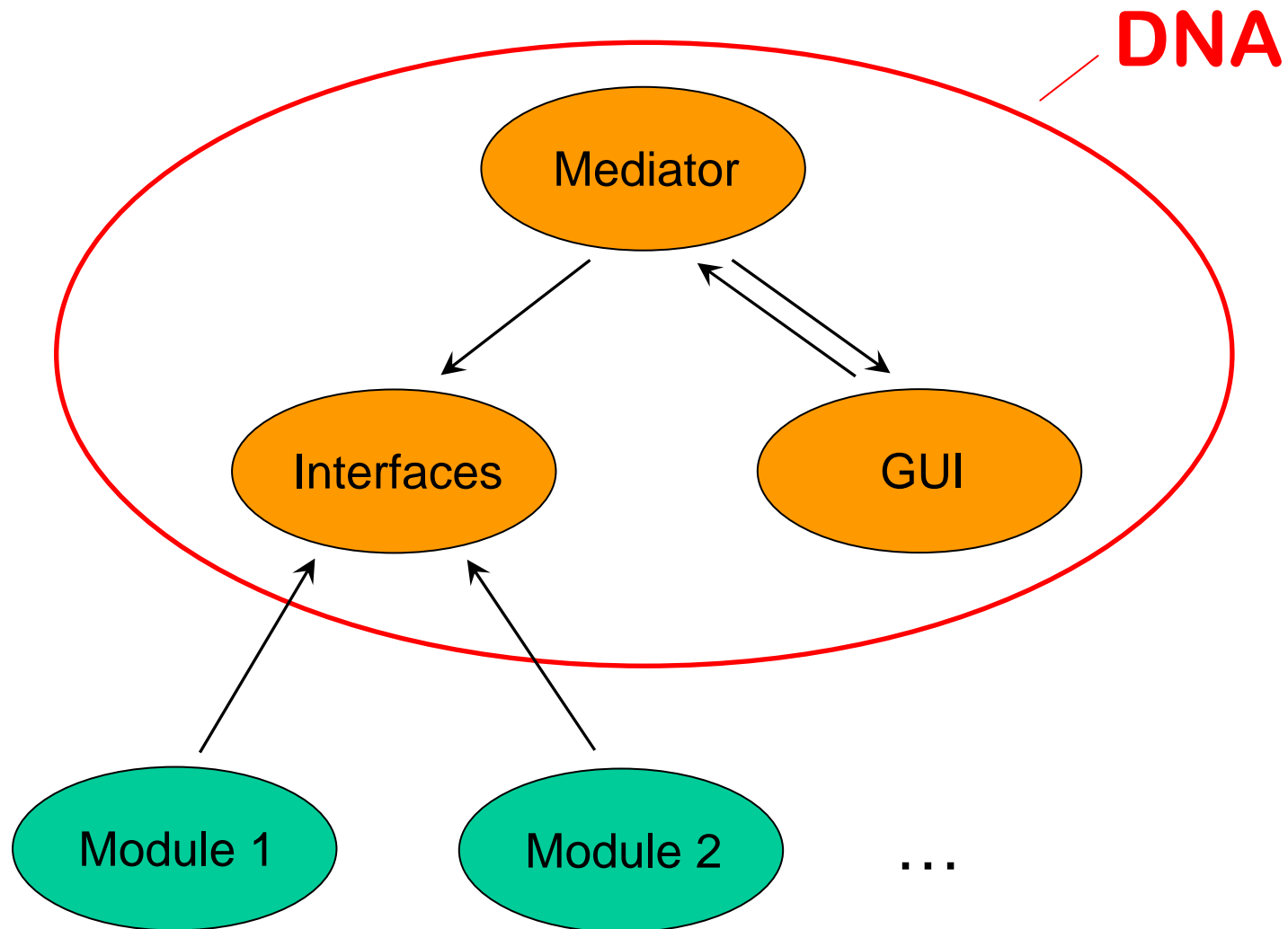
Disadvantages of a central monitor station



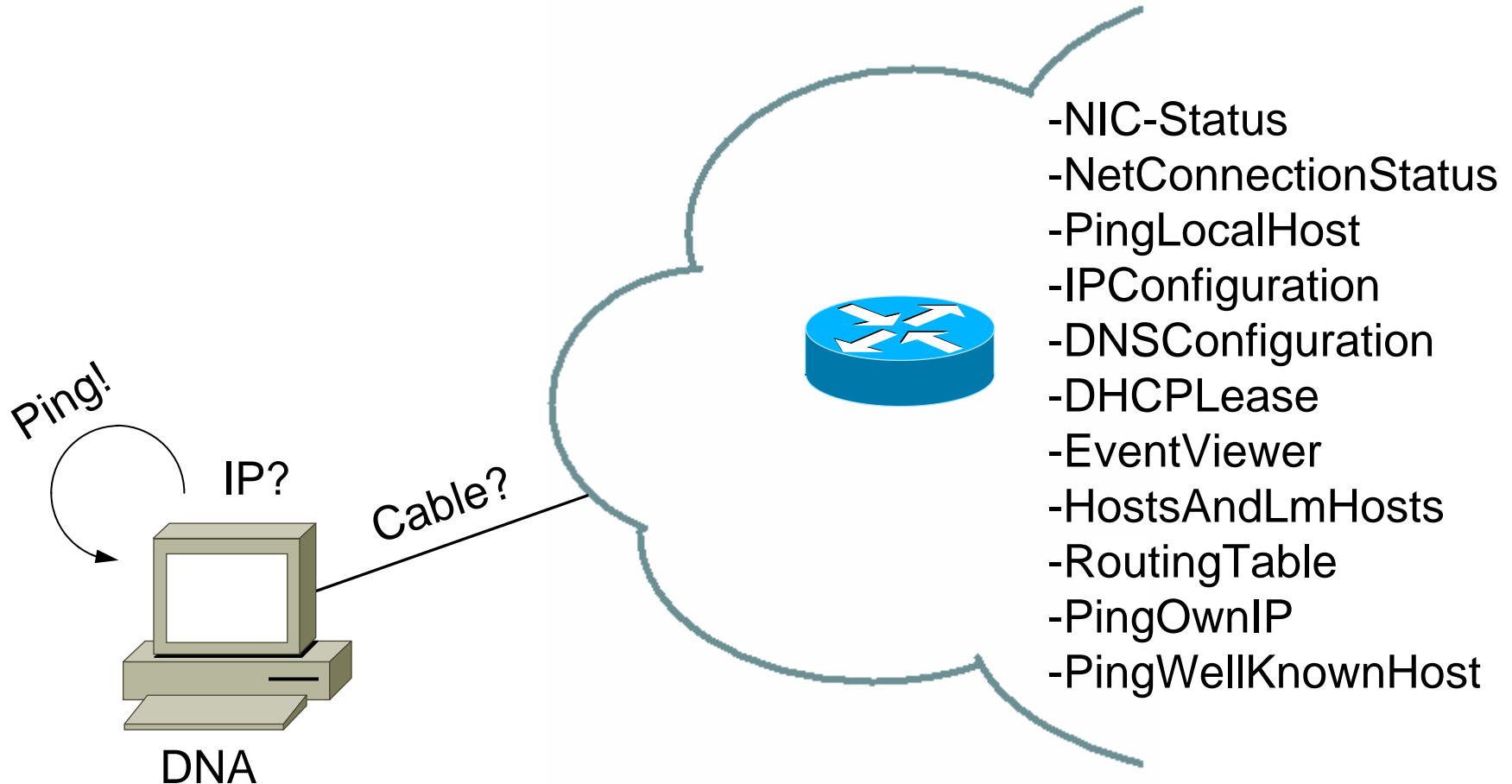
Advantages of Distributed Network Monitoring



The Distributed Network Agent Framework



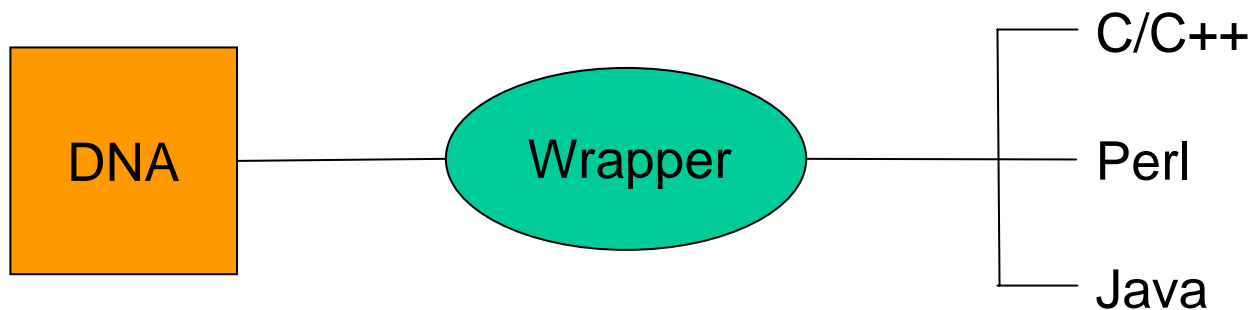
DNA Phase 1: Local Tests



Areas of application and extensibility

- ▷ Application areas of the DNA:
 - Automation of daily routines
 - Pinpointing network failures
 - Distributed Performance Tests
 - Throughput Tests
 - Distributed Network Management

- ▷ Wrapper – Module:

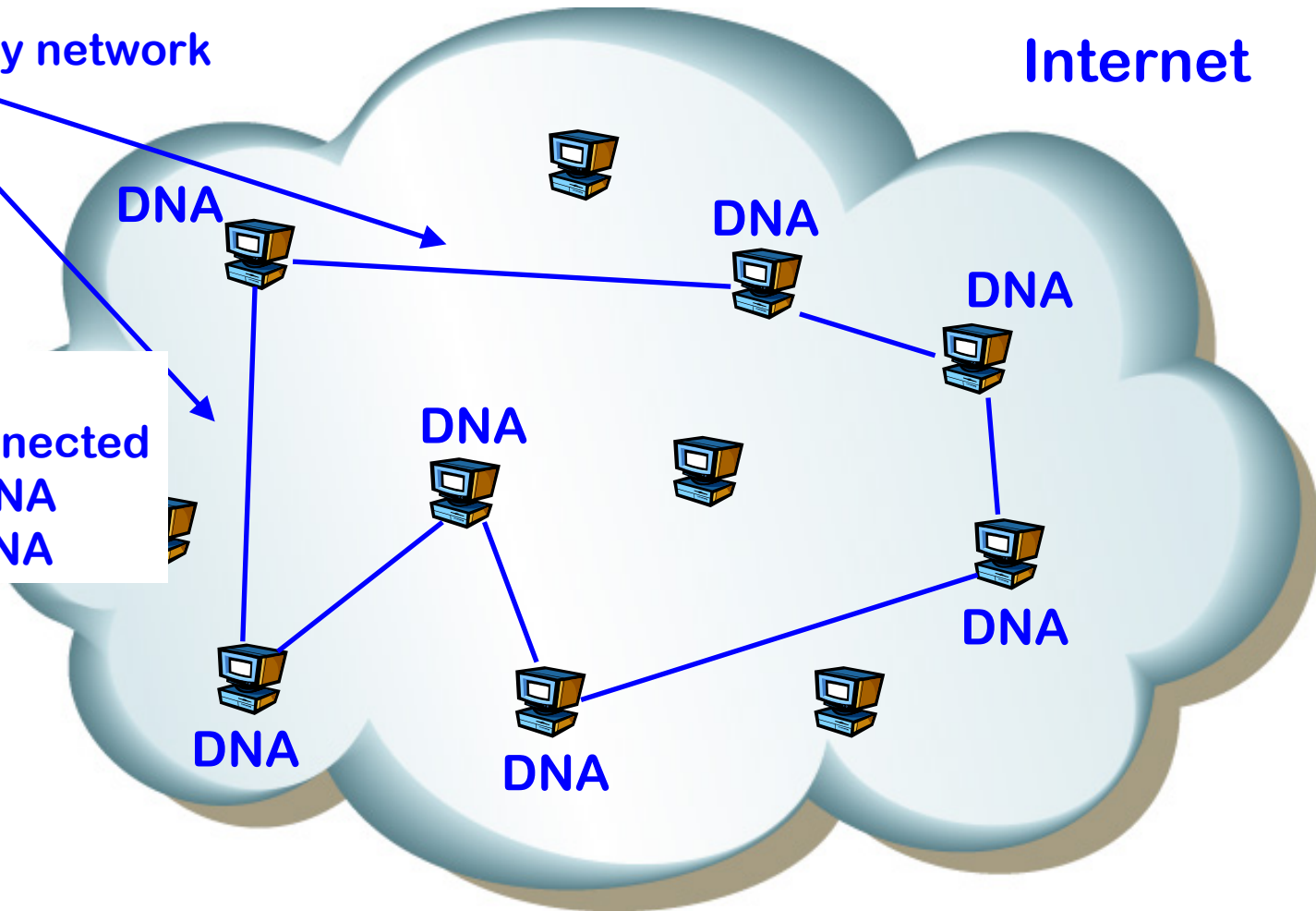


The DNA Overlay Network

P2P overlay network

Internet

Challenges:
-keep overlay connected
-locate specific DNA
-locate random DNA



Use of a Kademlia-based overlay network



Why Kademlia?

- ▷ Symmetric overlay network
- ▷ Unidirectional XOR metric
- ▷ Parallel queries possible
- ▷ Freedom in choosing overlay neighbors
- ▷ Less periodic traffic as compared to other DHTs
- ▷ Modifications
 - No documents [$id = hash(nickname)$]
 - Faster searches for random peers



A Module for the DNA

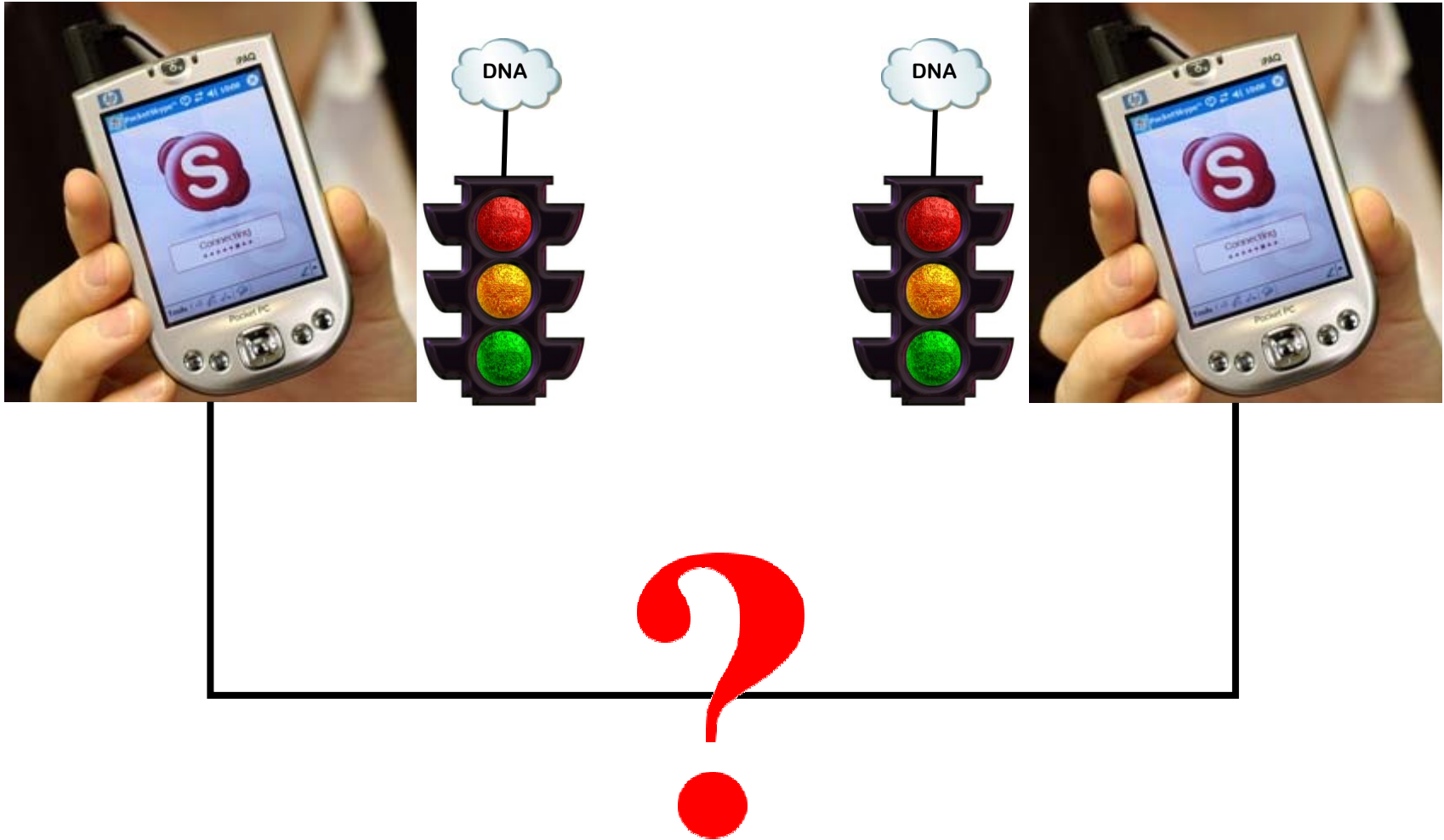


Design and Evaluation of Distributed, Self-Organized QoS
Monitoring for Autonomous Network Operation

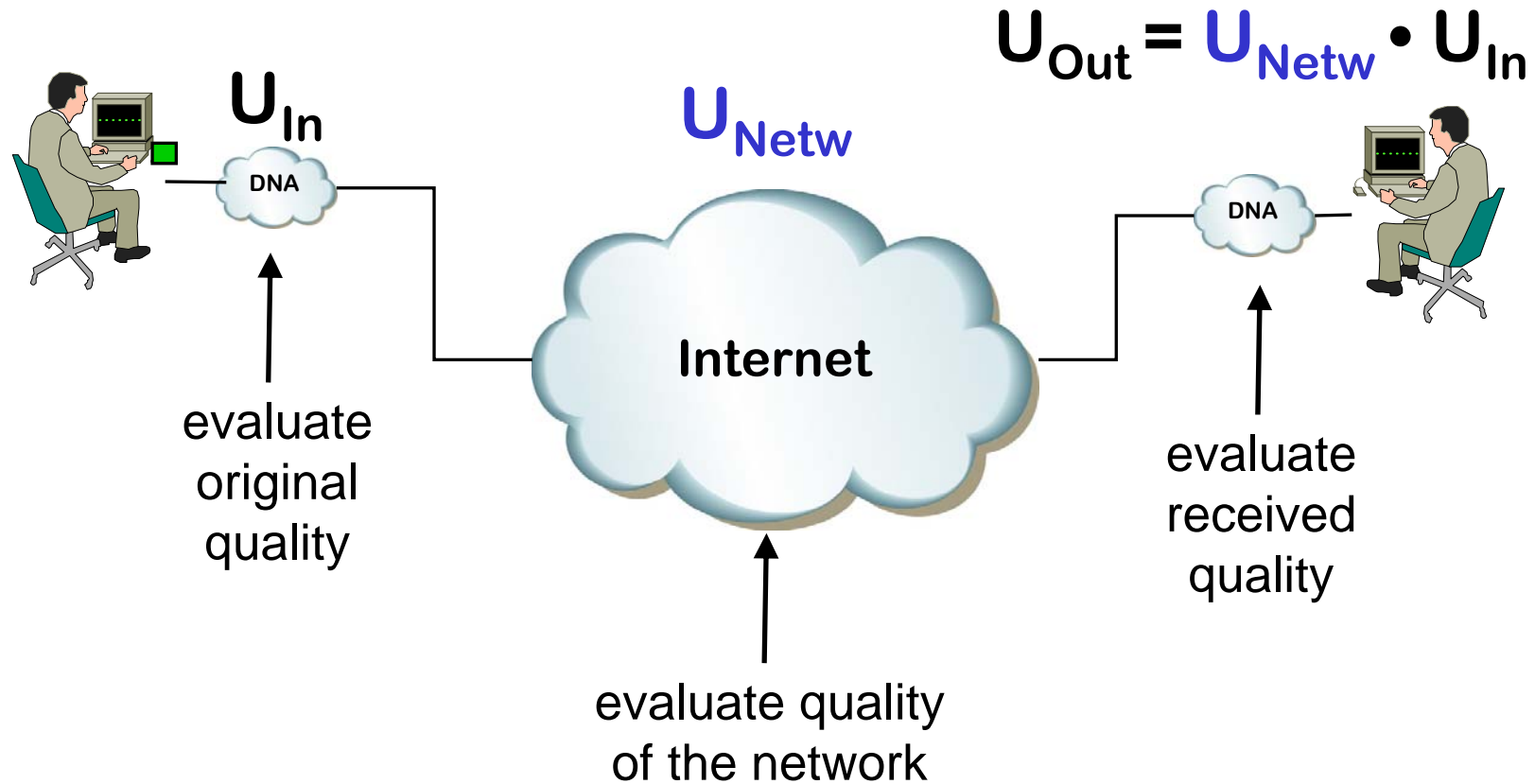
– AutoMon –



Evaluation of User Perceived VoIP Quality



Network Utility Function



Network Utility Function (NUF)

$$U_{\text{out}} = U_{\text{Netw}} \cdot U_{\text{in}}$$

- ▷ Range of U : 0 (worst) ... 100 % (best) – intuitive for
 - Users
 - Providers
 - Operators
- ▷ Captures performance-damping effect of the network
 - $U_{\text{Netw}} = 1$: Network transparent w.r.t. service quality
- ▷ Bad service perception ($U_{\text{out}} \rightarrow 0$) can have its roots in
 - Badly performing network ($U_{\text{Netw}} \rightarrow 0$)
 - Badly performing application ($U_{\text{in}} \rightarrow 0$)

Screenshot of the prototype of the module



The screenshot displays the 'Agent' software interface with four main panels:

- RawSocket Sniffer:** Shows the interface set to '132.187.106.161'. It lists captured packets with details like Source-IP:Port, PacketLength, and Protocol. The interface includes 'Stop' and 'Clear' buttons.
- FilterIP:** Shows an IP-Filter set to '132.187.106.161' and a Port-Filter set to 'SkypePort' (16163). It displays a list of filtered packets with details like Source-IP:Port, PacketLength, and Protocol. It includes a 'Clear' button.
- Statistics Bandwidth:** Displays bandwidth statistics: Packets: 102, Pckts/s: 4, Bytes: 6316, Bytes/s: 276. A green box highlights the statistics, and a message 'CHART missing' is visible. A 'Clear' button is present.
- TCP Connection:** Shows a TCP Connection to IP: 132.187.106.161 on Port: 8001. It includes a 'Connect' button and a text input field containing 'Hello World!'. A 'Send' button is also visible.



Thank you

Q&A

