Using Mobile and Intelligent Agents to Support Nomadic Users

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presentation outline

- Introduction
- Optimizing agent communication
- Monads communication architecture
- Adaptation by learning
- Conclusions

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the nomadic environment

- A mobile computer connected to a network with a wireless connection
- The characteristics of wireless networks:
  - low throughput, highly variable delays, sudden disconnections, ...
- Nomadic users need special support
  - intelligent and adaptable applications
  - optimized communication

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let's use agents!

- Intelligent Agent:
  - "a computer system capable of flexible autonomous action in some environment"
  - reactive, pro-active, social, ...
- Mobile Agent:
  - can migrate between agent servers
- Agent communication and transportation must be optimized for wireless links

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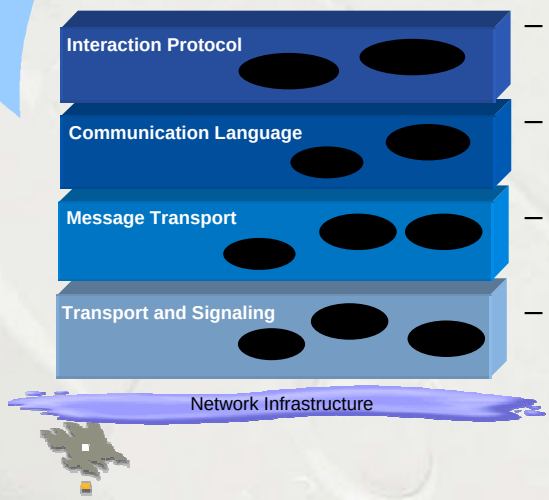
communication layers



- remove (unnecessary) round-trips
- efficient representation (ASCII vs. tokenized)
- efficient protocol, location transparency
- efficient/suitable protocol, failure transparency

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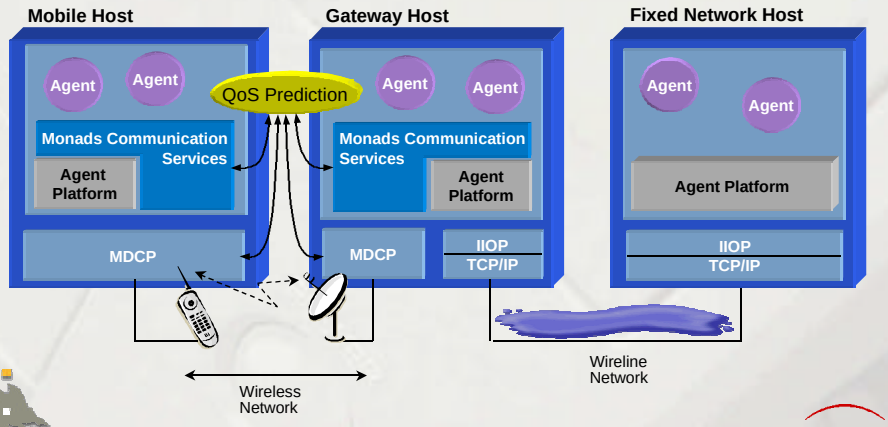
monads communication architecture



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monads communication services

- Provides:
  - communication between agents, agent systems and users
  - agent transportation between Monads agent platforms
- ACL communication between agents using bit-efficient FIPA ACL
- Optimized Java RMI

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minimal adaptation

- React to changes in the Quality-of-Service
  - abort data transmission tasks that may no longer be completed in a reasonable time
  - refuse to accept hopeless requests
  - use special data filtering and compression methods to minimize the amount of data
- Sometimes reacting is not enough
  - example: connectivity was lost
  - too slow reactions may result in ‘adaptation’ making the situation worse!

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predicting QoS

- Capability of predicting changes in the QoS is required for intelligent adaptation
- Uses for QoS predictions:
  - scheduling decisions
  - data prefetching
  - connection management
- "How much data can we transfer within the next *x* seconds with *p%* certainty?"

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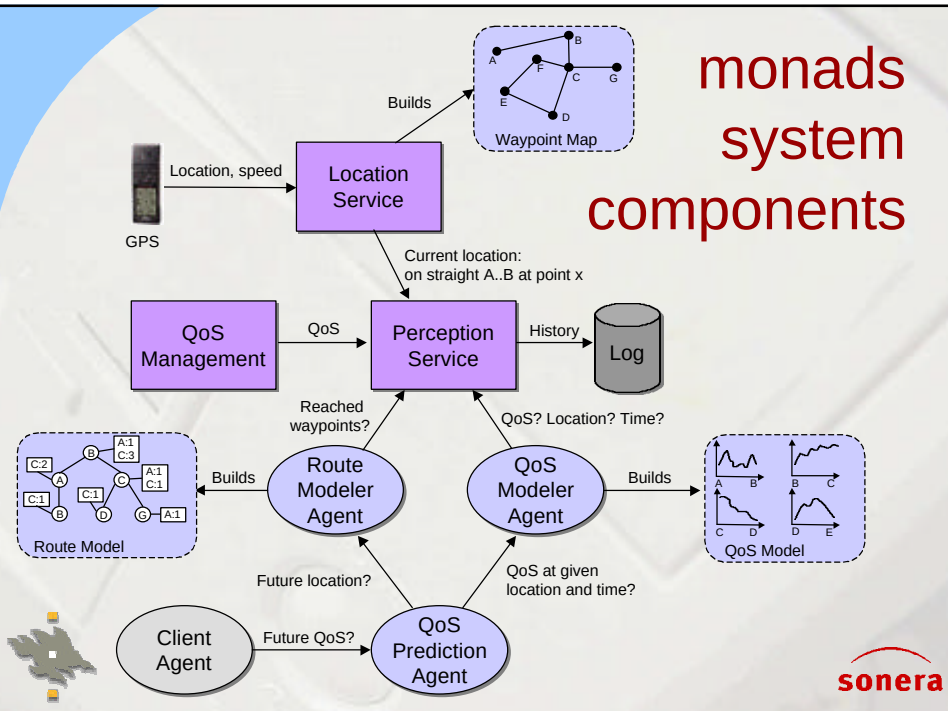
monads system components



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conclusions

- Intelligent and mobile agents can be used to support nomadic users and applications
- Communication optimization is needed in all communication layers
- Nomadic applications must be adaptive
  - reacting to changes in the QoS is not enough
  - predicting the changes is the key to intelligent adaptation
- www.cs.helsinki.fi/research/monads/

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