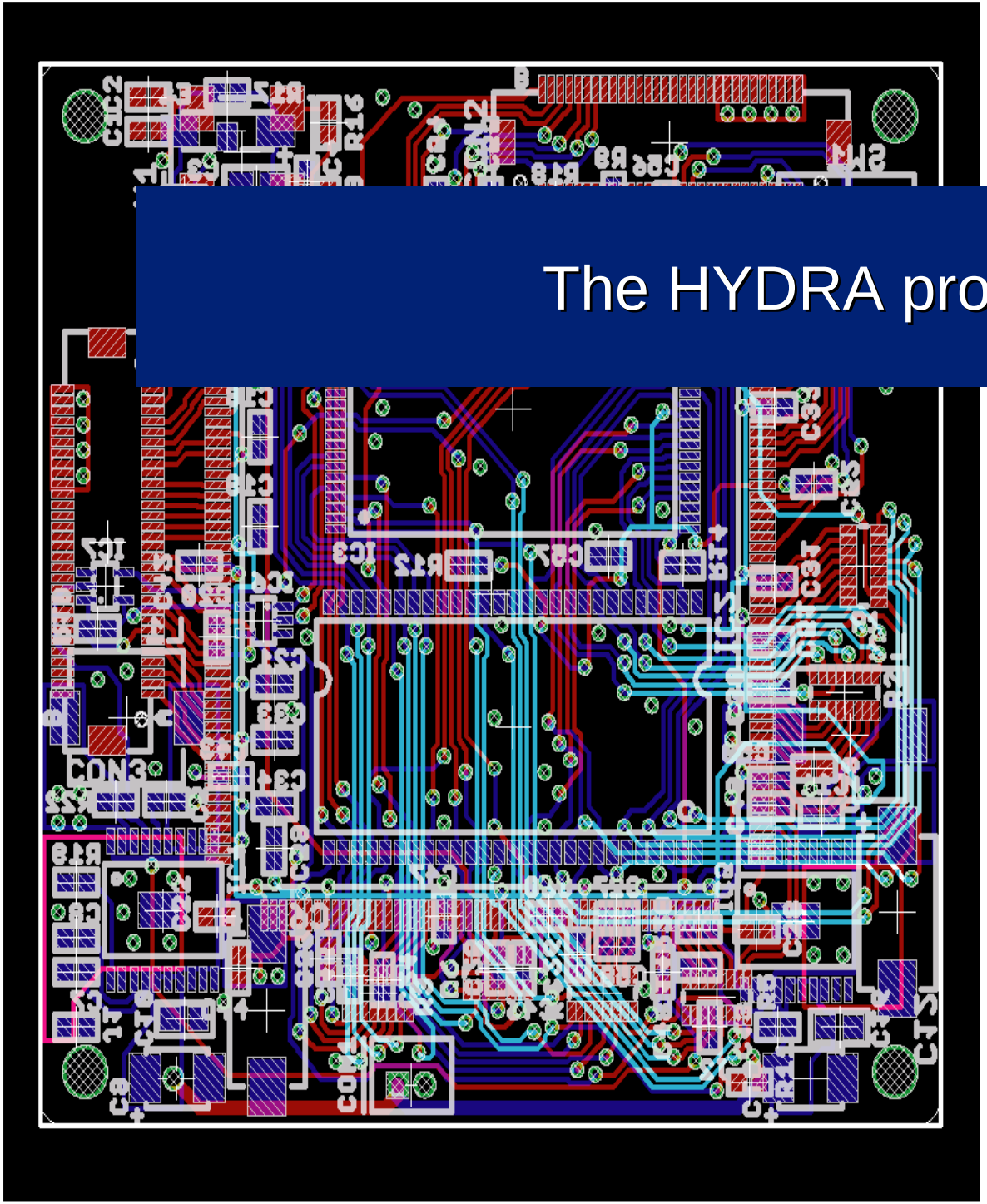


The HYDRA project

HYDRA

Vision and objectives

J. Thestrup

IST-2005-034891

Information Society Technologies

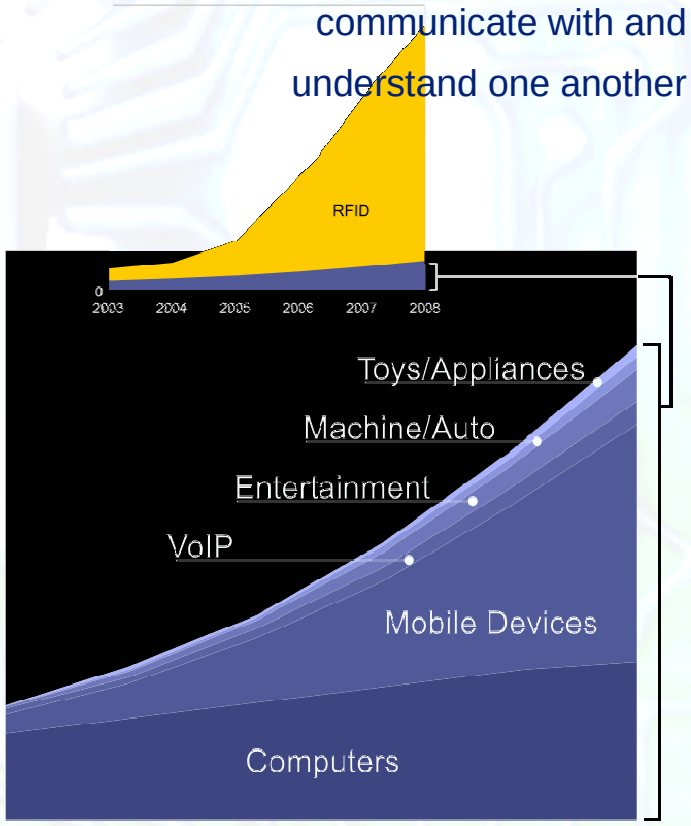
Agenda

- From Embedded Systems to …
  NETWORKED Embedded Systems
- Challenges in Networked Embedded Systems
- The Hydra Vision
- Creating lateral solutions

The internet of “things”

The number of communicating data devices will grow from 2.4 billion to 23 billion in 2008 and one trillion by 2012

All devices can communicate with and understand one another



Source: Krishna Nathan. IBM Research, 2004

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Technology - business opportunities

Pervasive On Demand era

- Real time response
- Connect people, data and processes on demand
- Decision making and communication without human intervention (autonomic computing, ambient intelligence)

e-Business era

- Improve productivity
- Streamline business processes
- Introduced new business models

Pervasive Revolution

Internet Revolution

PC Revolution

Mainframe Revolution

1960's 1970's 1980's 1990's Today

Source: Krishna Nathan. IBM Research, 2004

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Challenges: Reliability & Openness

- Systems will communicate and interact in ways that were unforeseen during their design
- Third parties will contribute components and subsystems
- During the system lifetime, parts of the software will be changed and unknown software will be downloaded

Source: Martin Rem, Embedded Systems Institute, 2004

Our Future

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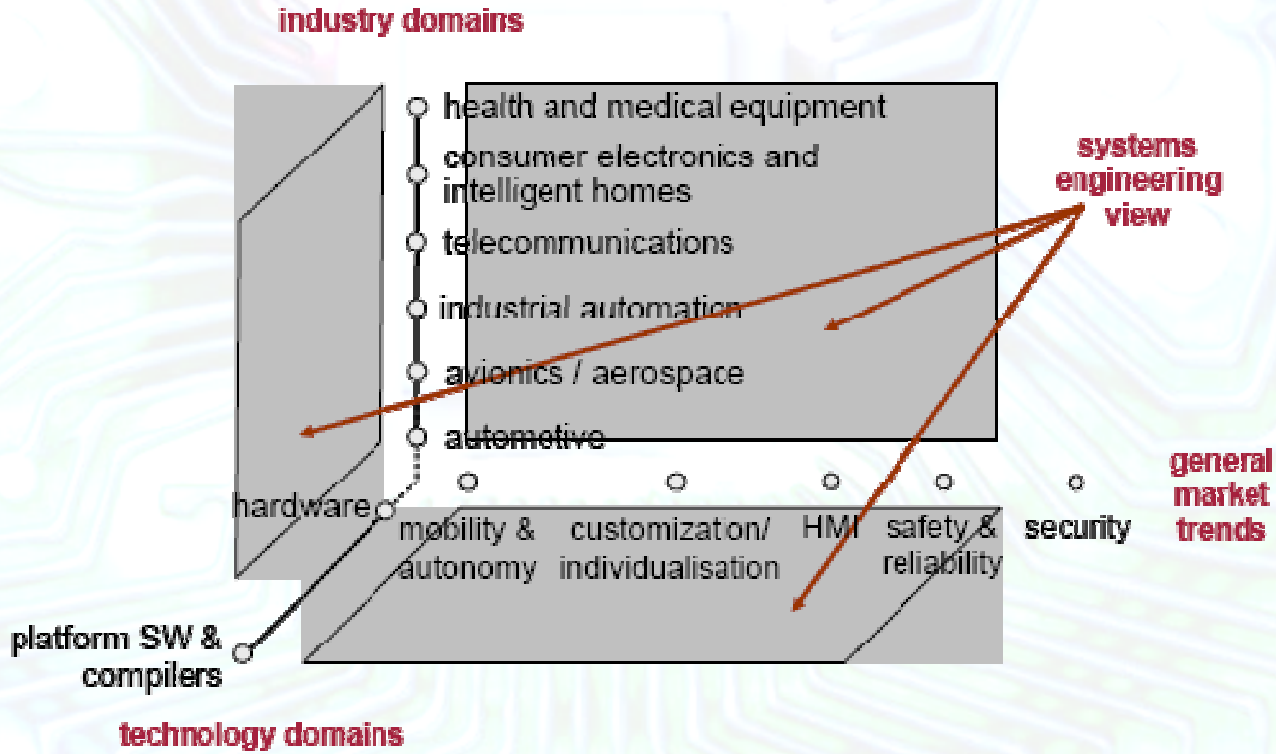
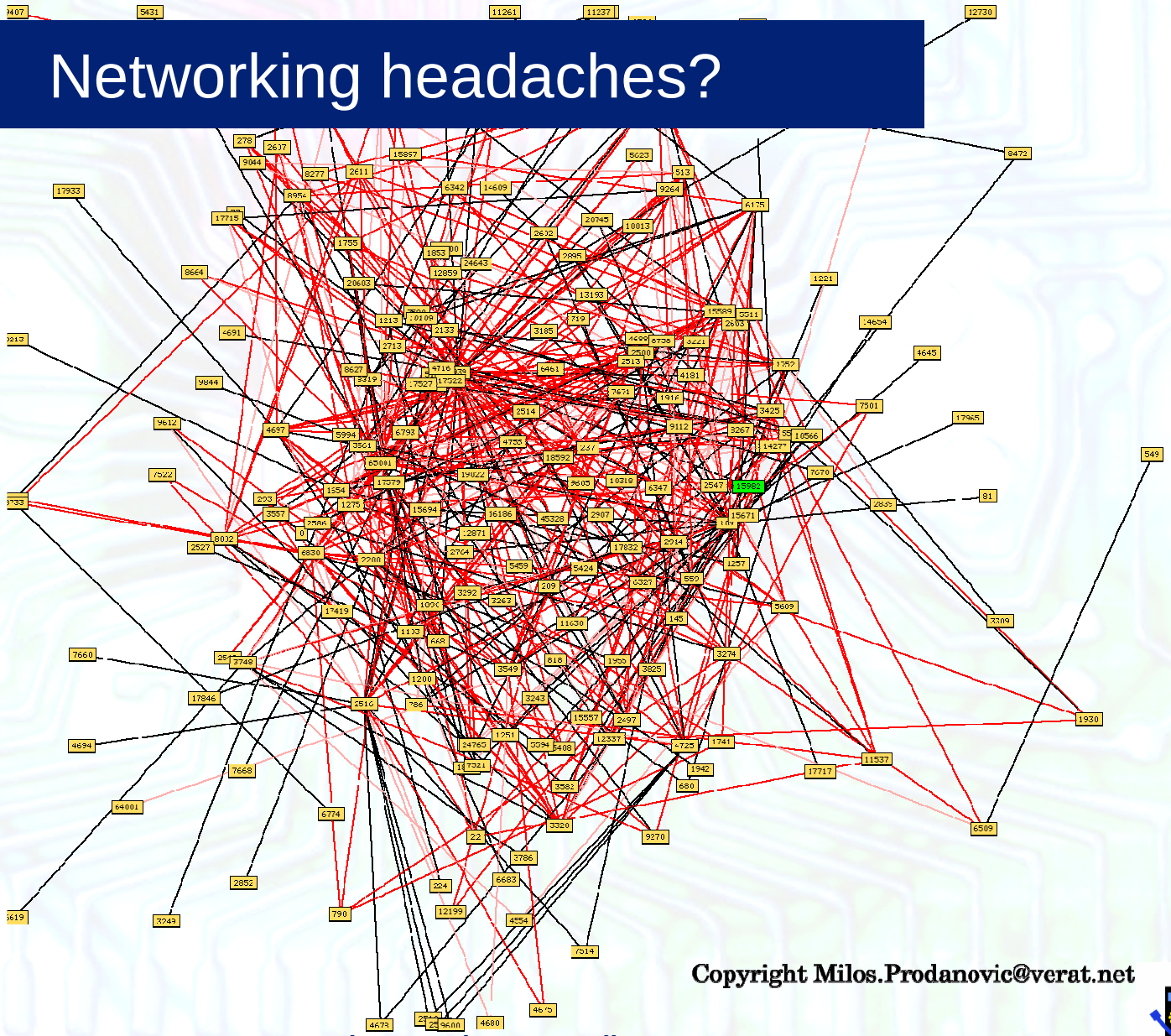
Imagine…

Networked Embedded Systems



Source: FAST, 2005

Networking headaches?



Limited computing power

- Despite Moore's law, intelligence does require a great deal of computing power
- Analysis shows that less than 10% of the intelligence resides in devices
- Power supply becomes critical
- Cost is an issue
- Useful only as extremely thin clients

Limits to miniaturization

Wearable Computing Lab.
ETH Zürich

Source: Michael Lawo, Wear-it@Work, 2005

UMIT
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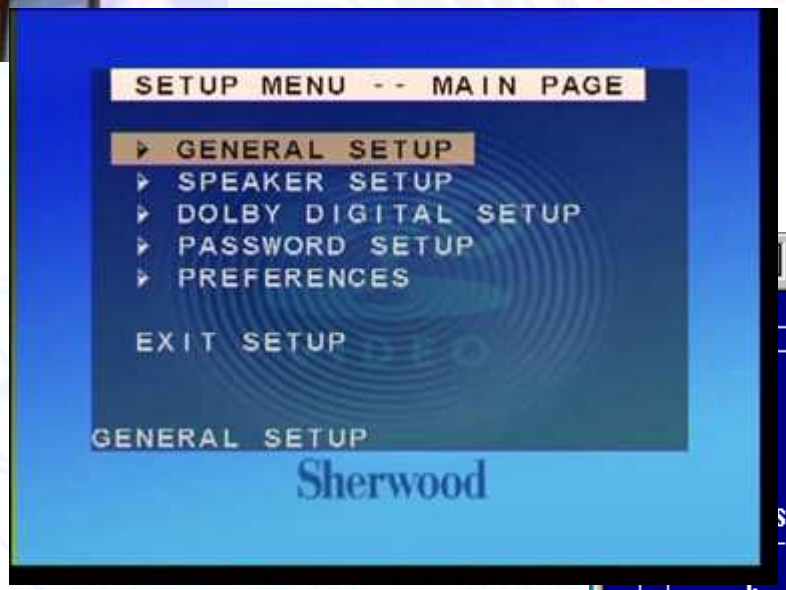
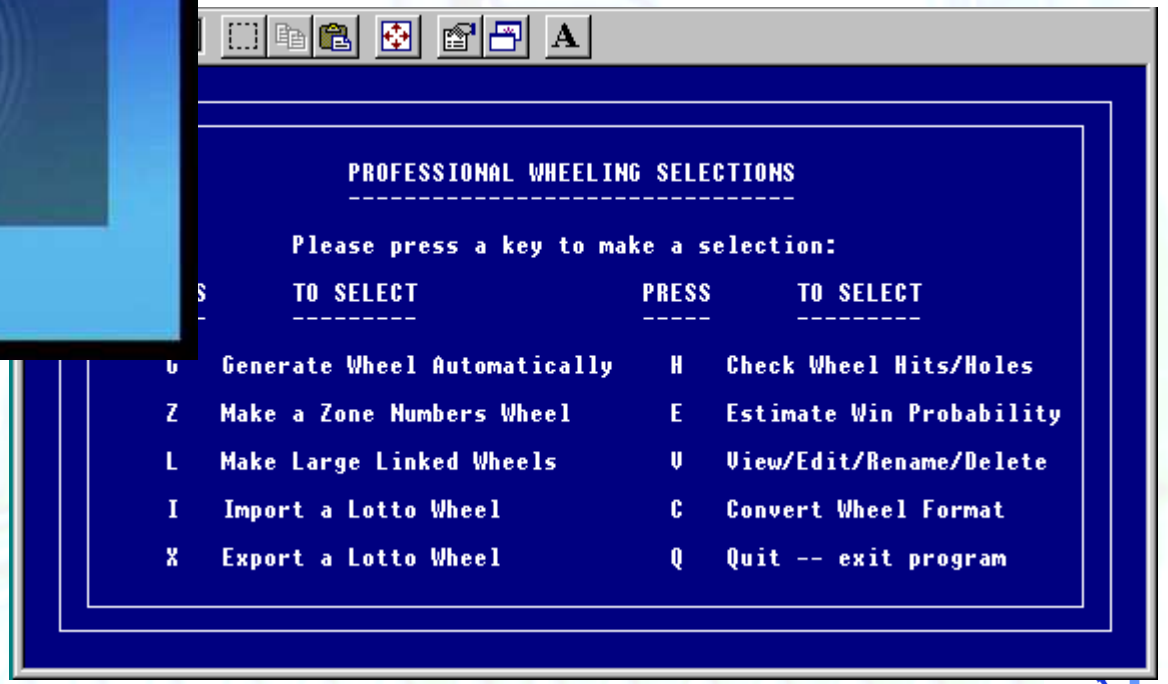
Rudimentary HMI

- Low processing power
- Low security
- Inhibits inclusion





Design for mobility

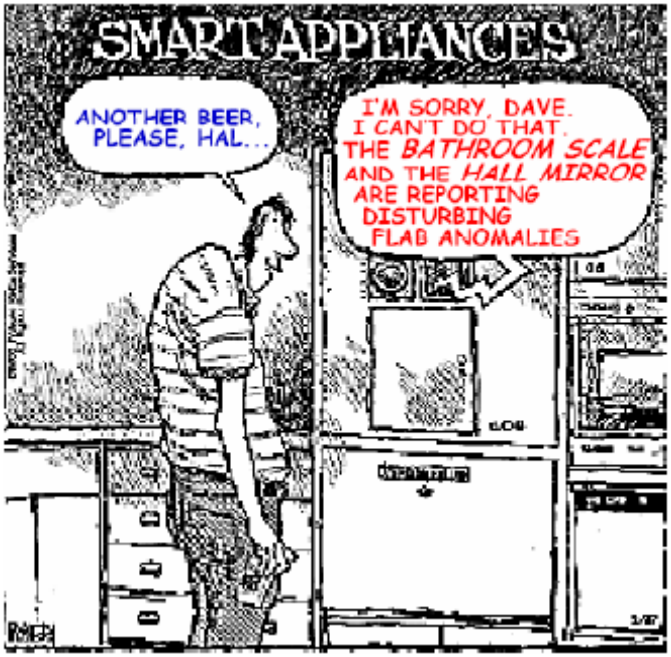
- Portability
- Accessibility
- Connectability
- Applicability

known at the design stage?

Source: Michael Lawo, Wear-it@Work, 2005

No security model – no privacy?

- Collection Scale
  - To what extent is my life visible to others?
    - Who can view my data?
- Collection Manner
  - How obviously is data collected?
- Collection type
  - What type of data is recorded?
- Motivation
  - What are the driving forces?
- Accessibility
  - How does one find anything in this data?



Cartoon by Jeff MacNelly

Source: SWAMI, 2005

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Lack of sustainable business models

- Who needs to talk to a coffee machine?
- Where and how is value created?
- How do we support dynamic constellation and delivery of micro-values

Samples of development routes to these address challenges

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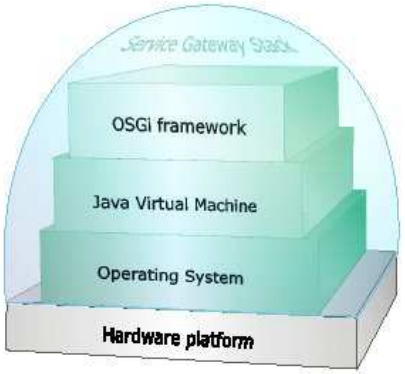
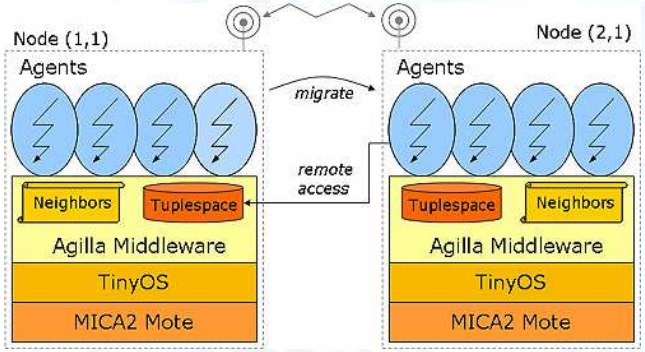
Domain specific embedded systems

Interoperability & networking standards

As described e.g. in D3.1 and D5.1



OSGi



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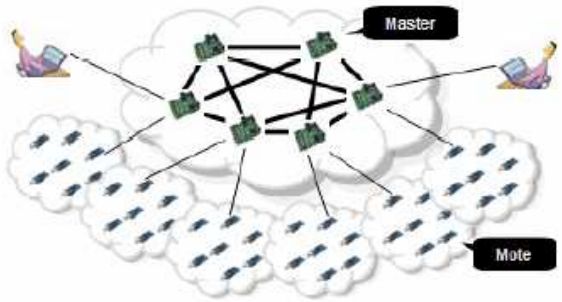
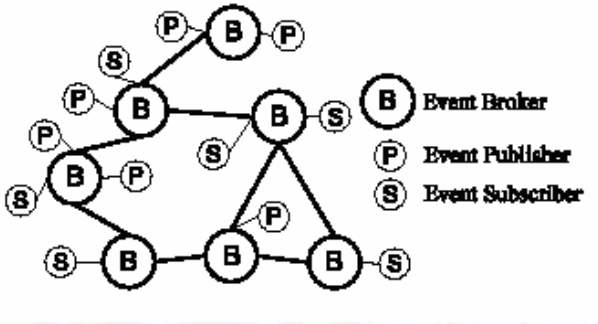
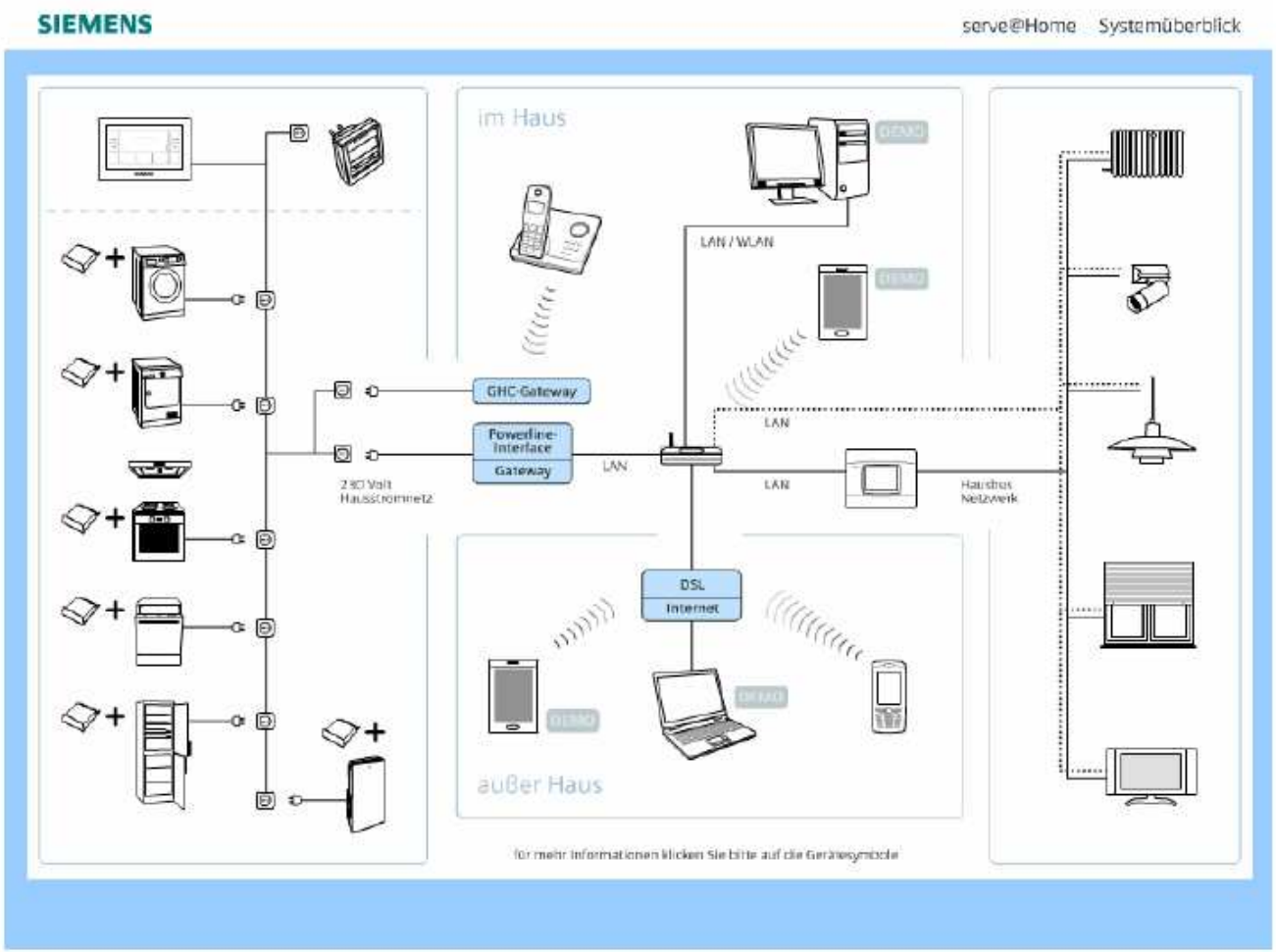


Tenet

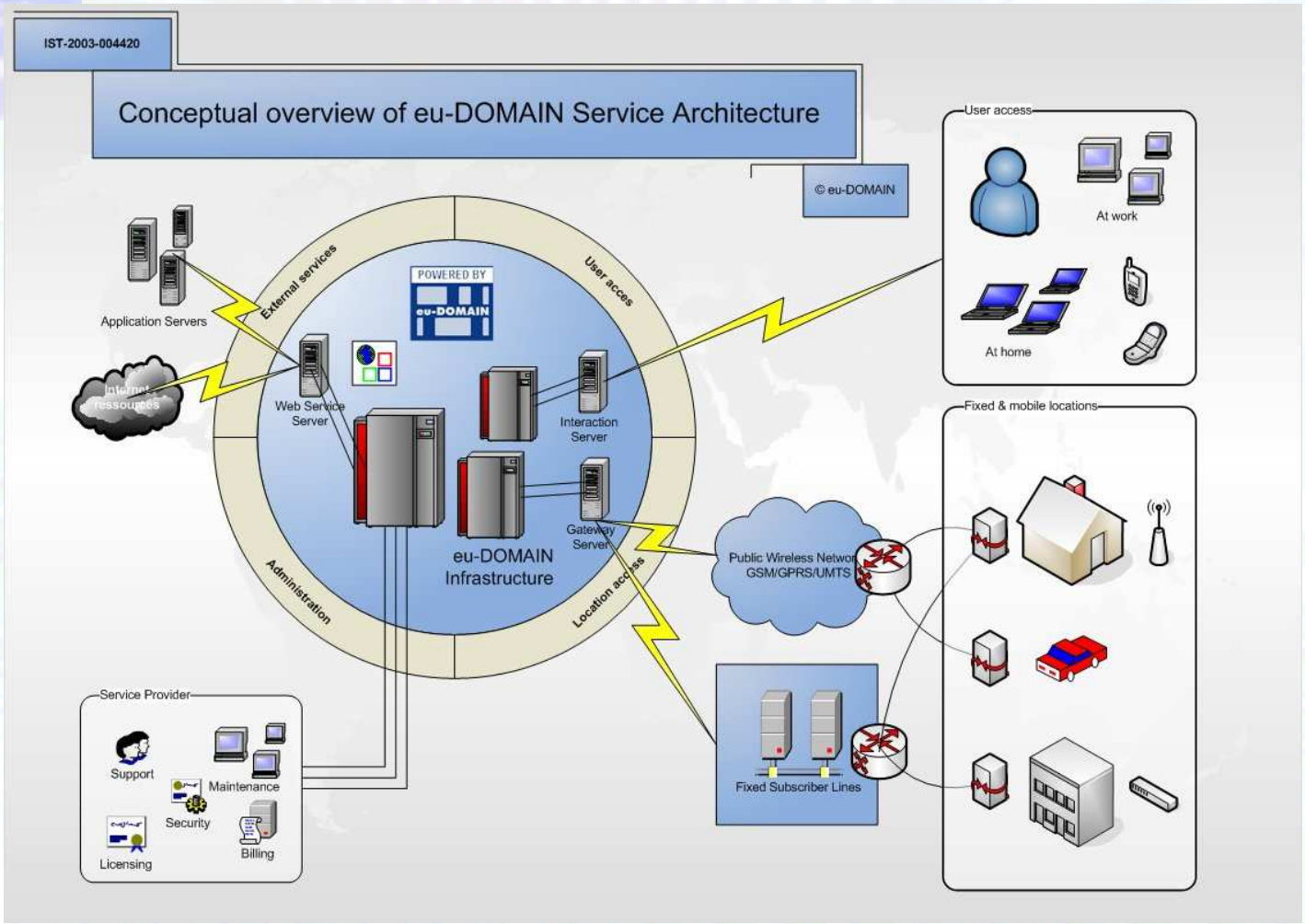


HERMES

Proprietary networking platforms



Open networking platforms



The Hydra project vision

The vision of the HYDRA project is to create

the most widely deployed middleware for intelligent networked embedded systems

that will

allow producers to develop cost-effective and innovative embedded applications

for new and already existing devices.

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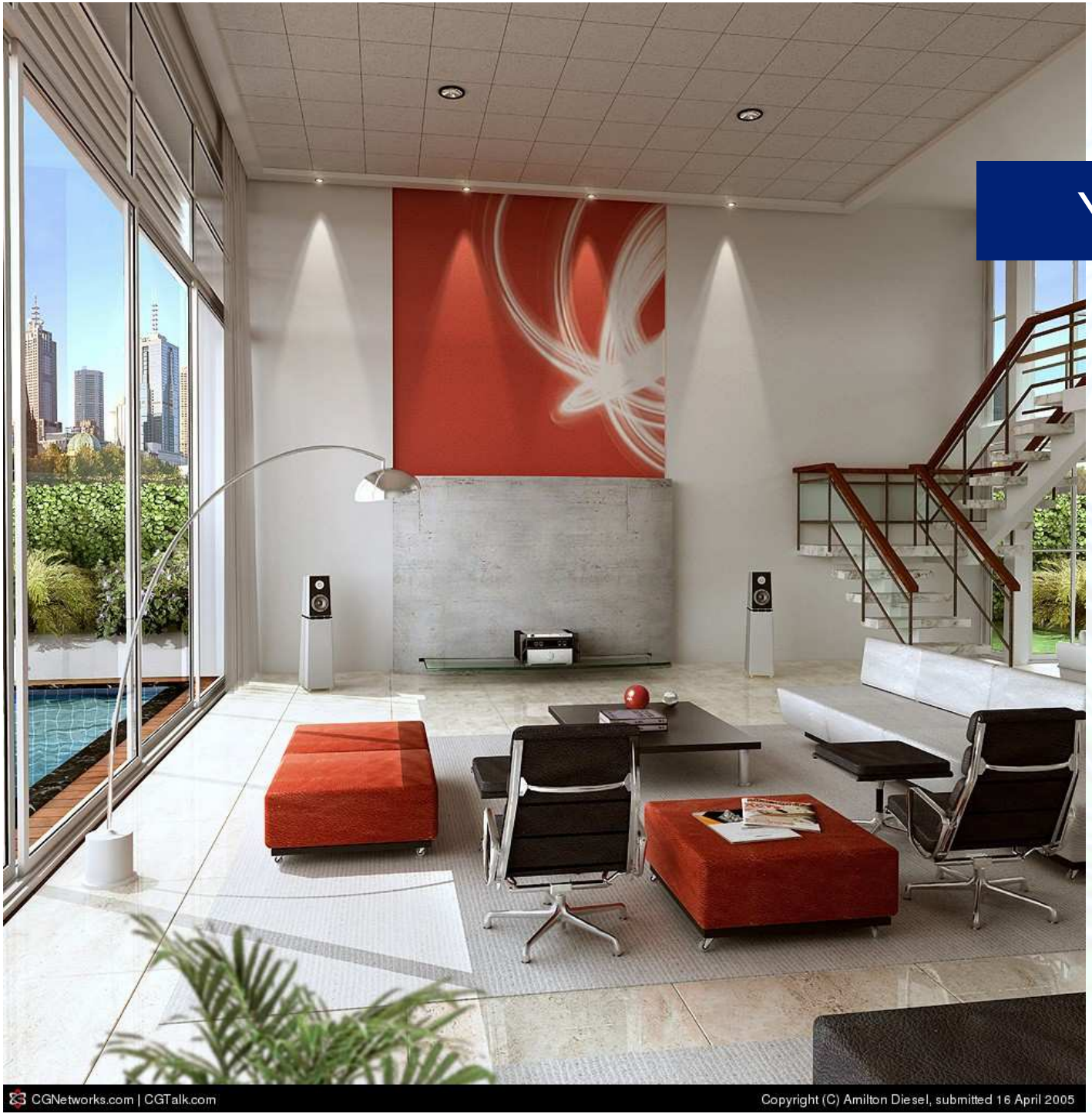
Your Future



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