Ubiquitous Korea Project

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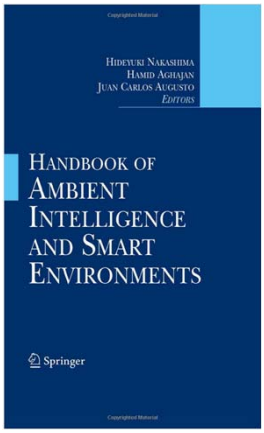
Presented by Lin Deng

About the paper

- A chapter in:
  - Book: *Handbook of Ambient Intelligence and Smart Environments, Springer*
  - Collects each aspect of ambient intelligence and smart environments
    - visual information capture
    - human/computer interaction
    - multi-agent systems
    - network use of sensor data
    - … …
  - A wide range of applications across the world
  - Amazon: $229
  - Free access from library



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Primary idea

- Introduce four ubiquitous computing projects in Korea
  - Challenges
  - Solutions

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Ubiquitous computing projects

- 1. Ubiquitous Computing Network (UCN)
- 2. Intelligent Service Robot
- 3. U-Health Projects
- 4. Ubiquitous Sensor Network (USN) Technology for Nation-wide Monitoring

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Ubiquitous Computing Network (UCN)

- Long-term: begun in 2003, last for 10 years
- Government support: $139.5 million
- Vision:
  - "realization of Ubiquitous Smart Space for life care"
- Ubiquitous Smart Space (USS):
  - technological architecture of knowledge-based u-society

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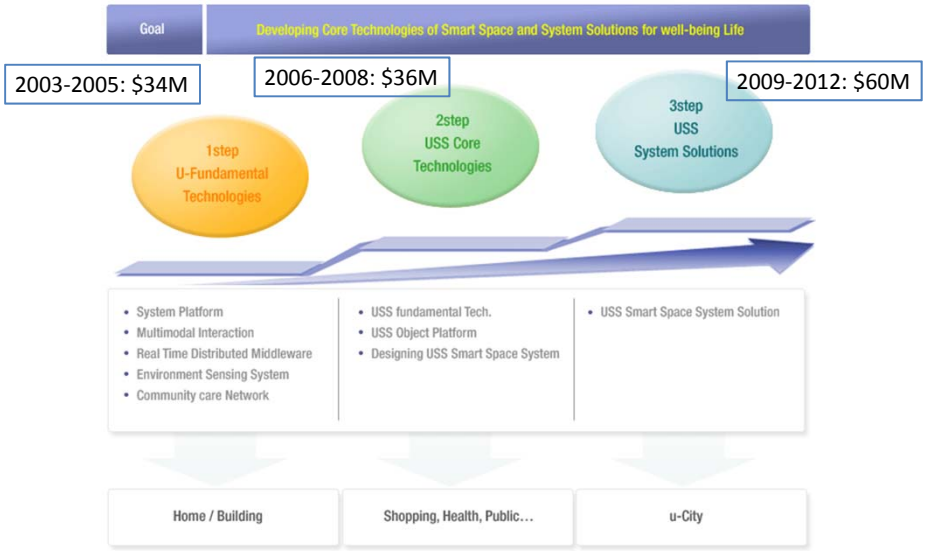
Ubiquitous Computing Network



http://ucn.re.kr/en_company/?p_url=en_company_c

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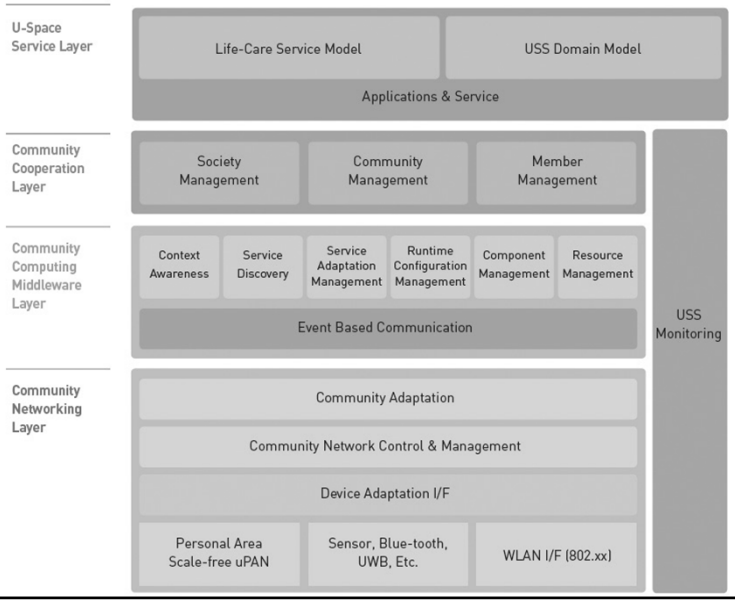
USS architecture



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UCN result

- As of 2007 it delivered:
- 489 papers,
- 235 patents(domestic and overseas),
- 7 technology transfers and 39 prototypes.

정량적 연구성과 총괄

연도별 정량적 성과달성 실적

구분	논문게재			학술발표		특허출원		특허등록		표준화	홍 보	기술이전	시 제 품
	SCI	SCIE	비SCI	국내	국외	국내	국외	국내	국외				
2006년	24	55	61	73	96	63	7	13	1	5	30	5	16
2007년	24	13	55	107	206	53	8	10	–	2	21	2	23
2008년	24	25	72	100	128	85	29	29	3	5	38	5	23
2009년	26	23	41	44	31	126	9	30	1	9	32	18	22
합계	98	116	229	324	461	327	53	82	5	21	121	30	84

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Intelligent Service Robot

- Goal: “produce household service robots with which we can live together”
- 10 year period, 3 stages
- Stage 1:
  - securing core technology
  - Building foundation e.g.

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Intelligent Service Robot

- What is it?
  - Interacts with human and environment
  - Provides services by sensors and manipulators
  - Adapts to changing environment
  - Increases quality of services over time
  - Asynchronously interacts with various elements(distributed system)
  - Consists of multiple components to provide computing power for real-time requirement
- Any challenges?
  - Overwhelming complexity requires proper organization
- Key technology: intelligence integration technology
  - Ease complexity of integrating components

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Task & Knowledge Management Framework

- Diverse functionalities:
  - Recognition, speech understanding, manipulation, expression, navigation, reasoning, decision making, planning, etc.
- The most important lesson learned:
  - significance of the framework to handle

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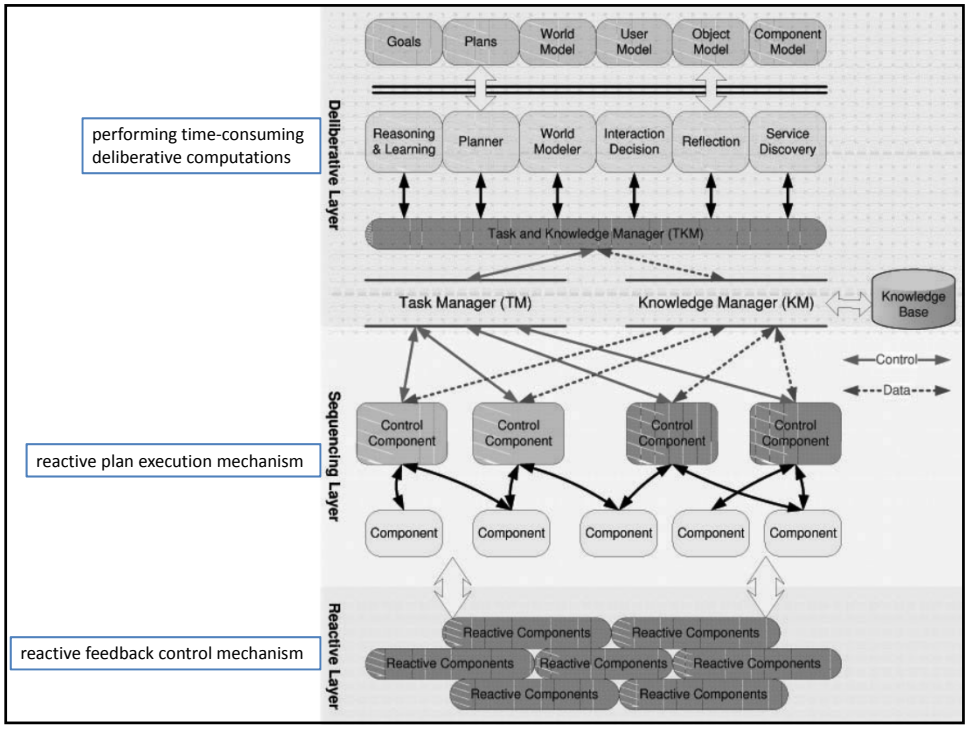
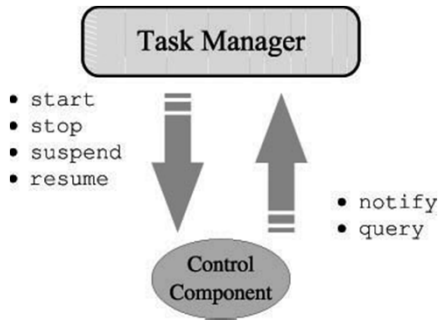


Task manager (TM)

- provides abstract control interface to the Control Components in the sequencing layer



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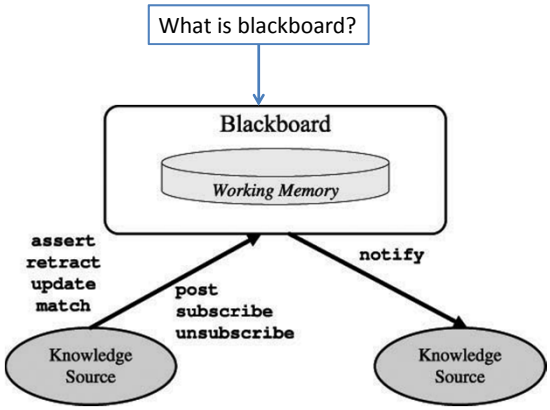
Knowledge manager (KM)

- provides a consistent and unified *data* abstraction for components.



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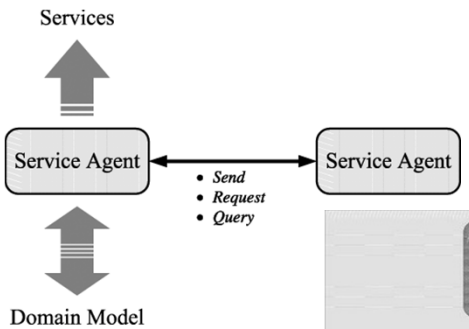
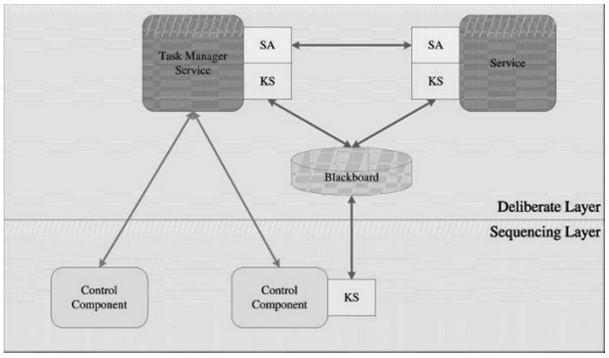
TM, KM, SA



provides data abstraction by the explicit domain model and control abstraction by agent-level interaction using an agent communication language



T-Rot bartender robot

- http://youtu.be/YiBeN8wyMJY

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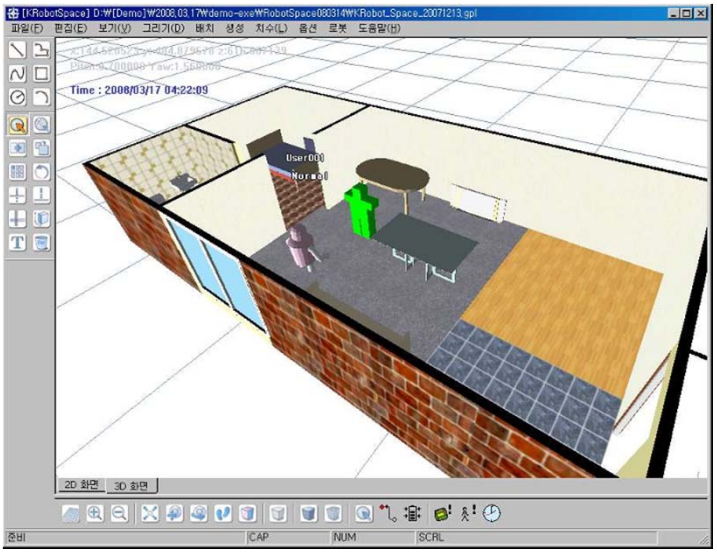
Simulator



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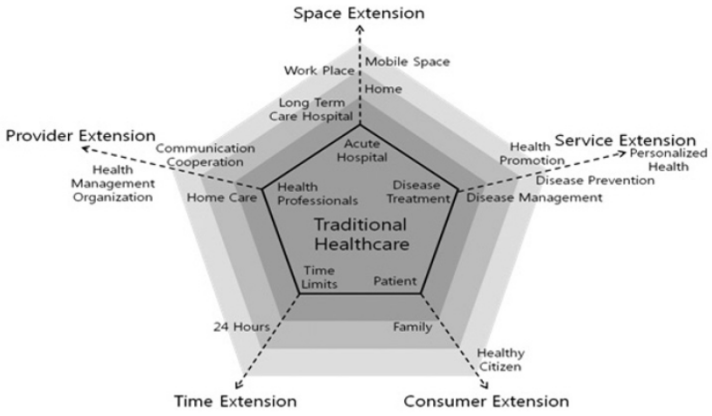
U-health

- Provide health care and services anytime and anywhere.



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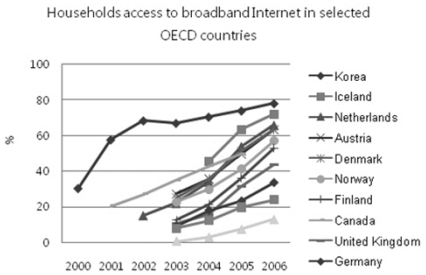
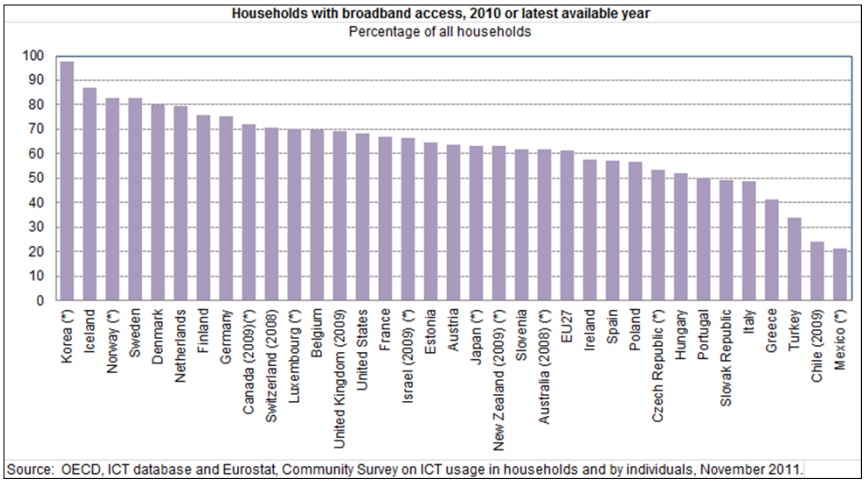
Why U-Health?

- Medical expenditure is surging
  - Health insurance reimbursements for the elder
    - 2000: 18%
    - 2006: 26.8%
    - Diabetes:
      - 2000: $168 M
      - 2005: $280 M
- Medical demand is increasing
- Good telecom Infrastructure



Why U-Health?



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U-Health Projects

- 1998-2007, 54 projects related to u-health in Korea
- 5 of them described in the paper

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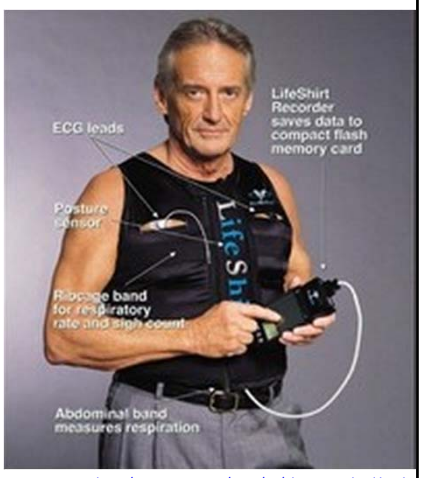
Wearable computer-based health monitoring service

- Real-time monitoring: heart rate, respiration rate, motion
- Cost: $140,000 per T-shirt



http://smarteconomy.typepad.com/smart_economy/2006/05/ubiquitous_heal.html

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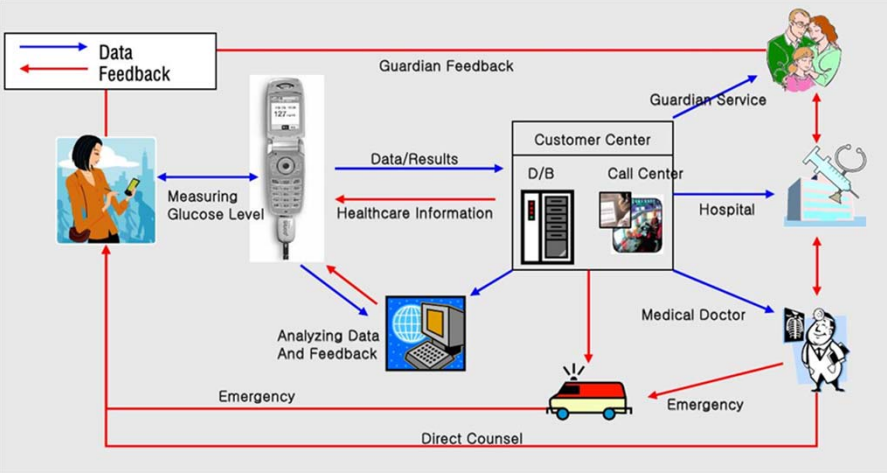
Mobile diabetes monitoring service



Mobile Diabetes Management System_ Healthpia Co., Ltd.

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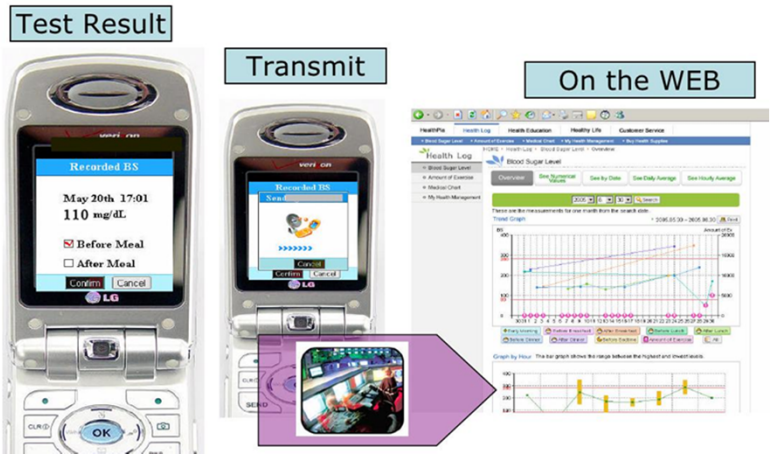
Mobile diabetes monitoring service



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RFID-based u-drug information sharing system pilot project

- Audit the entire process from manufacture and logistics to consumption in hospitals by RFID technology.
- Facilitate transparent and efficient drug logistics
- Manage medicine history, guarantee genuine products
- Prevent adverse drug events?

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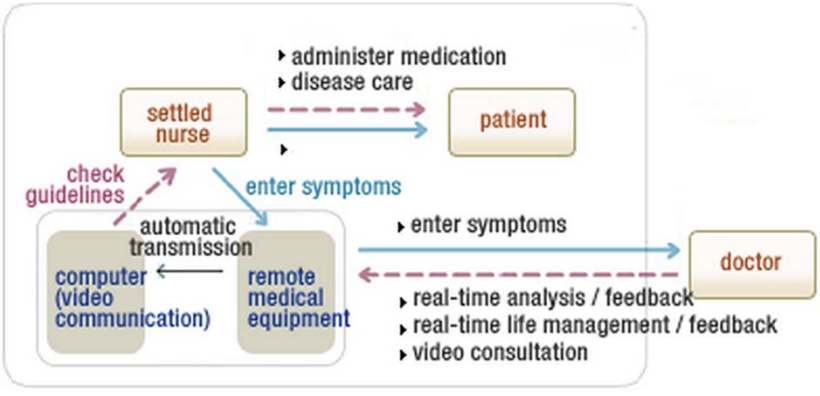
Busan City u-healthcare project for public emergency and home healthcare service



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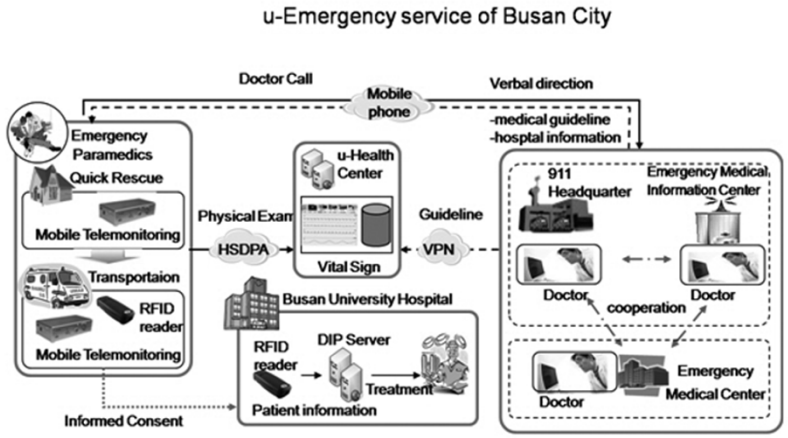
U-Emergency



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Ubiquitous Sensor Network (USN) Technology for Nation-wide Monitoring

- Goal: a new paradigm to manage Wireless Sensor Networks
- Propose: IP based Ubiquitous Sensor Network (IP-USN)
- 8 goals:
  - Scalability: handle a large number and high density of sensors
  - Limited power consumption
  - Memory and processing limitations
  - Limited bandwidth consumption
  - Adaptability: adjust to network change
  - Fault tolerant
  - Responsiveness
  - Low cost for each sensor node

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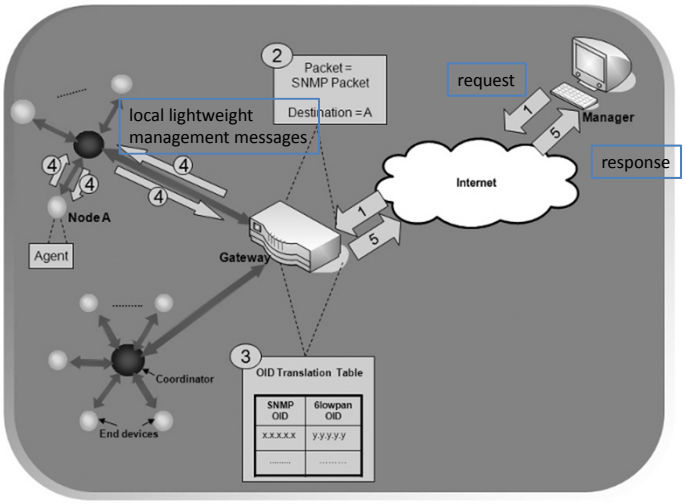
LNMP architecture



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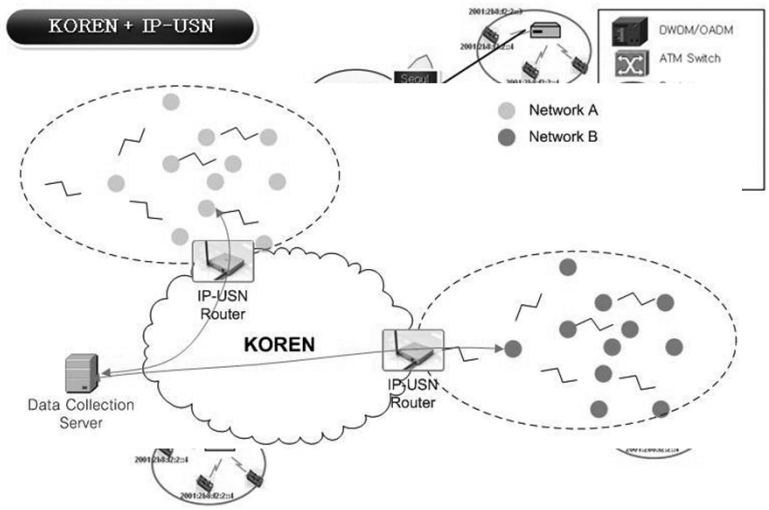
Deployment



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Personal opinions

- Good examples on ubiquitous computing
- Extending domain knowledge

- Based on network infrastructure
- Some projects are not described clearly, without references

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