
NOMADIC COMPUTING and DEPENDABILITY

Introduction and Overview of Issues

Kent Fuchs

Nomadic Computing and Dependability

9:00 – 10:20 **Session 1 – Nomadic Devices and Dependability**

Moderator: Yoshiaki Koga

9:00 – 9:30 *Workshop Introduction and Overview of Issues*

Kent Fuchs, Cornell University, USA

9:30 – 10:20 *Cooperative Backup for Nomadic Devices*

Marc-Olivier Killijian, LAAS-CNRS, Toulouse, France

10:20 - 10:45 *Coffee Break*

10:45 – 12:30 **Session 2 – Challenges in Mobile Distributed Systems**

Moderator: Karama Kanoun

10:45 - 11:30 *Autonomous Clustering and Hierarchical Routing for Mobile Ad Hoc Net.*

Yoshiaki Kakuda, Hiroshima City University, Hiroshima, Japan

11:30 - 12:00 *The Crumbling Perimeter: Mobile Networking and Internal Security Issues*

Farnam Jahanian, Arbor Networks and University of Michigan, USA

12:00 - 12:30 *Timed Asynchronous Models for Mobile Systems*

Christof Fetzer, Dresden University of Technology, Germany

12:30 *Lunch*

15:30 – 16:45

Session 3 – Mobility and Ubiquitous Computing

Moderator: Henrique Madeira

15:30 – 16:15
Sys.

A Comprehensive Localization Framework for Self-Organizing Nomadic
Emin Gün Sirer, Cornell University, Ithaca, NY, USA

16:15 – 16:45

A Network Service Provider's View of Ubiquitous Computing
Rick Schlichting, AT&T Research, Florham Park, NJ, USA

16:45 – 17:10

Coffee

17:10 - 17:40

Session 4 – Synthesis and Wrap Up

Moderator: Kent Fuchs

- *Reports by Session Moderators*
- *Discussion on Challenges and Expectations*

Nomadic Computing

- Kleinrock (1995)

- Leonard Kleinrock – “nomadic computing” (1995)

Desirable characteristics

- Independence of location
- Of motion
- Of computing platform
- Of communication device
- Of communication bandwidth

- Mark Weiser – “ubiquitous computing” (early 1990s)

Future Impact of Technology

- The mobile *cell device*
- Cost, size, power, and personalization of communication, storage and computation
- Broadband wireless metropolitan area networks (MANs)

Precise Location Enables Wide Variety of LBS Apps

GAMING

Interactive Gaming
GeoCaching
Location aware games for individuals/groups



PERSONAL SECURITY

Roadside Assistance
Weather Warning
Child Finders
GeoFencing

ENTERPRISE

Fleet Management
Asset Monitoring
Personnel Productivity



POINTS OF INTEREST

City Guides
Mobile Yellow Pages
Navigation
Traffic reroute

PEER-TO-PEER

Buddy Groups
Dating
Geo-marked photo sharing

COMMERCE

Mobile Coupons
Customer Service



Network games in the real world: MOGI

- Uses GPS to overlay the game world on the city of Tokyo, Japan
- Object of the game is to collect items to get everything in a category
- In order to complete most collections, you must compete or trade with other players (social interaction).
- As you move through the city, if you check a map on your mobile phone screen, you'll see nearby items you can pick up and nearby players you can meet or trade with.
- It amplifies your ordinary behaviour - it changes going on an errand into a piece of a game

www.mogimogi.com



Convergence With Consumer Electronics





More nomadic and smart storage.

■ ボールペン内部に仕込まれた
カードリーダー & USB メモリ



This functional pen not only has 128 MB of *storage* but also has a *USB connection* and a *connector* for SD memory cards.

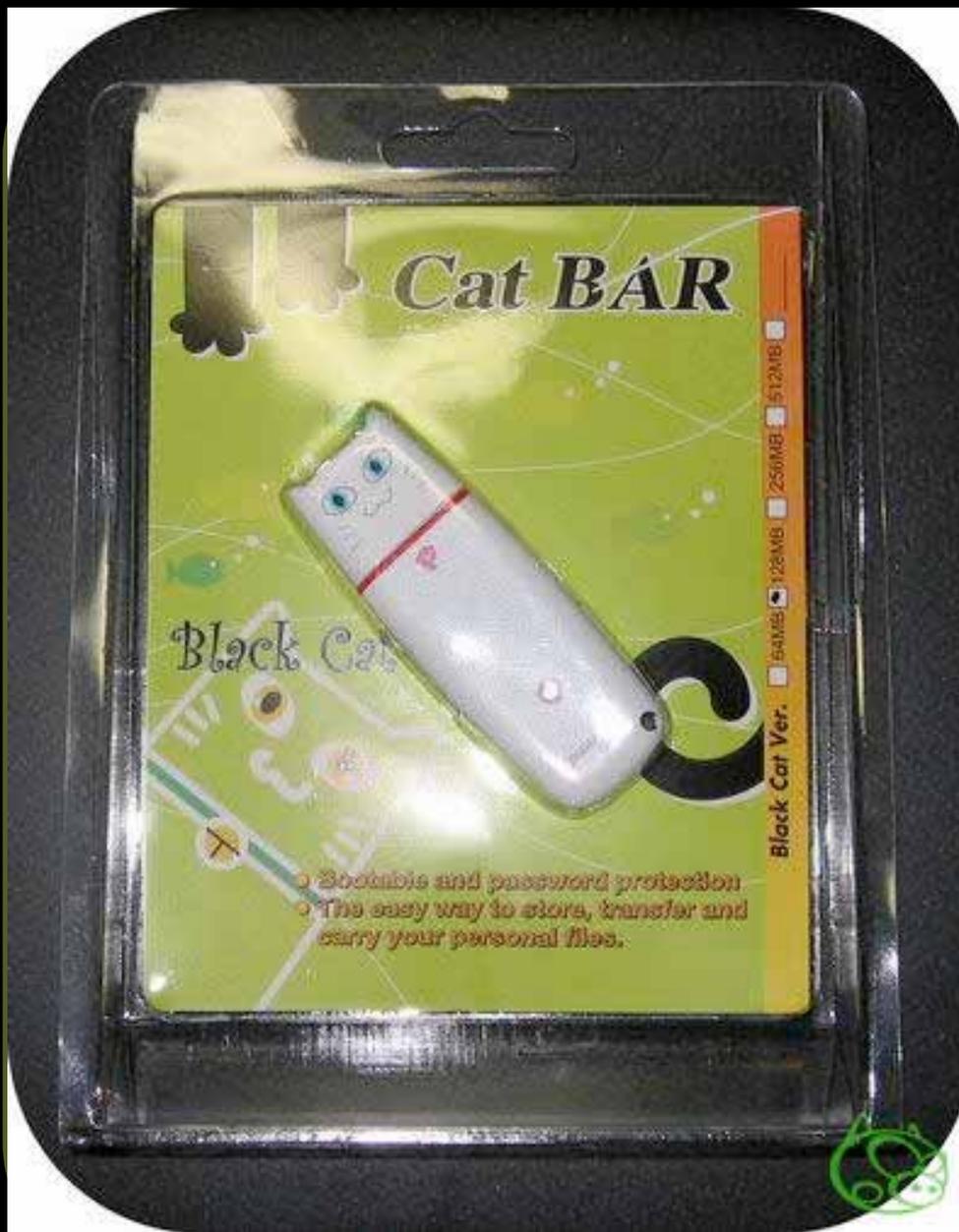
■ 超高速 USB2.0 対応



■ ボイスレコーダー付 MP3 プレーヤー



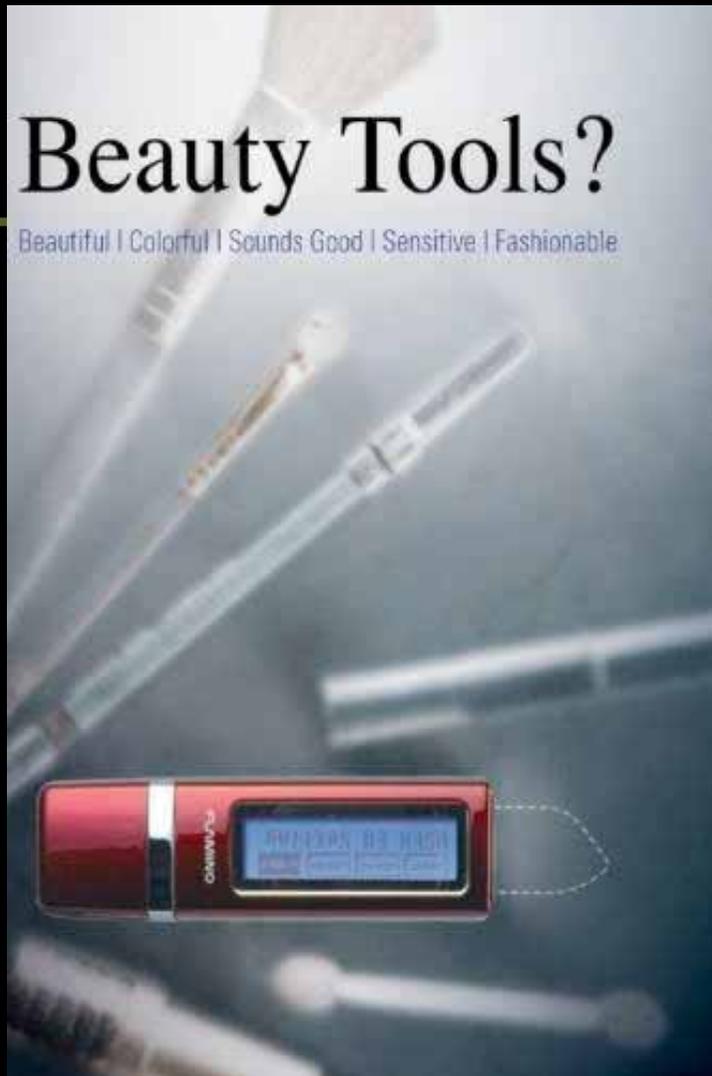
Or get the one that adds in an MP3 Player.



FLASH DRIVE  

A Fun USB Memory Stick (Portable Storage)

Based on slide from: Marcus Roesner, The Alberta Library



Personalization



Based on slide from: Marcus Roesner, The Alberta Library

Dependability for users under age 25?

1 Nomadic

information/entertainment when and where I need it. Why aren't you on my cell phone?

2 Multitasking

IM, email, and on cell phone

3 Experiential

learn by doing, navigating, exploring, trying..

4 Collaborative

Work in groups, create 'friends' quickly, know how to do this instinctually.

5 Adaptive and Direct

They demand that their needs be taken into account.

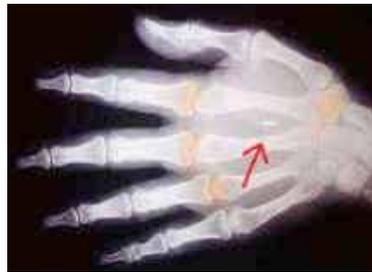


RFID and Wal-Mart

- Wal-Mart now has 100+ suppliers shipping cases and pallets with RFID tags.
- Wal-Mart is scheduled to expand its RFID initiative to 12 distribution centers and 600 stores by end of 2005.
- In January 2005, Wal-Mart has installed RFID equipment in 104 stores.
- By the beginning of 2006, Wal-Mart's top 300 suppliers will be required to tag cases and pallets of selected products with RFID tags. By the end of 2006, the retailer expects its entire supplier base (up to 20,000 suppliers) to be "engaged in RFID in some form or fashion."
- Deploying RFID equipment across 35 distribution centers and approximately 1,300 retail outlets by Fall 2005.

Issue: Privacy concerns

- Item level tagging
- Tagging people



“Mark of the Beast”

privacy.org
the site for news, information, and action

STOP
RFID

PROTECT YOUR PRIVACY
DON'T BUY ITEMS THAT CONTAIN
TRACKING DEVICES!



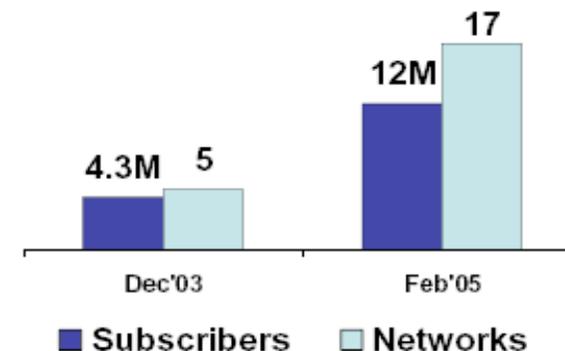
CDMA2000 1xEV-DO Wireless Broadband Expanding Rapidly Over 60 Different Commercial Devices, Over 12 Million Subscribers on 17 Networks as of February 2005

New Launches Coming Shortly

North America: ALLTEL, Sprint, Ubiquitel,
Bermuda Digital Comm.

Asia: Hutch Cat, Telkom Indonesia

South America: Bell, Alegro PCS



Based on information available at 3Gtoday.com

WiMAX Networks Phases

802.16-2004 &
802.16e

Fixed
Outdoor



Backhaul



Access Service

Data Overlay w/ Voice

- Freq up to 5.8 GHz - Lic& UnLic
- Low cost network
- RG focus

Early
802.16e

Metro Zone



Fixed
Indoor



Enterprise
Campus Piconet



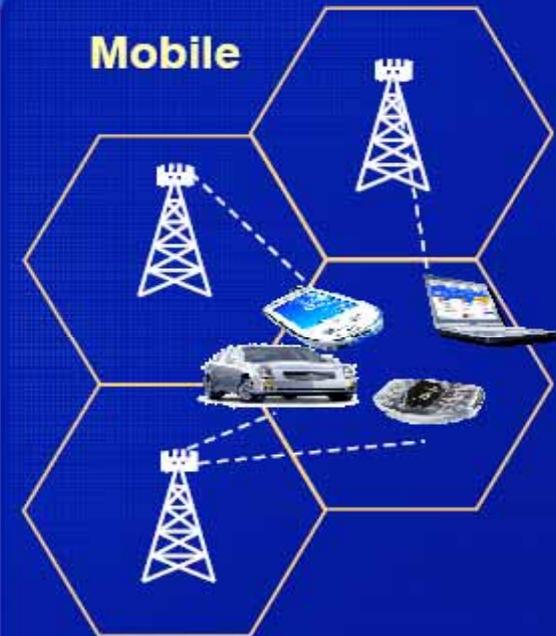
Portable Service

Cell Data Overlay Network

- Freq < 3.5G Licensed
- Low/Mid cost networks
- Notebook focus

802.16e

Mobile



Mobile Service

**Dense Cell Overlay Network
Mobile Triple Play**

- Freq < 2.5 GHz Licensed
- Mid cost networks
- Handheld & Notebook

Broadband Networks will co-exist



The Personal Server



Physically Small
Form Factor

- No display or keyboard
- The interface is only accessible via the wireless link



Personal Server: Supporting a Personal Computing Environment

