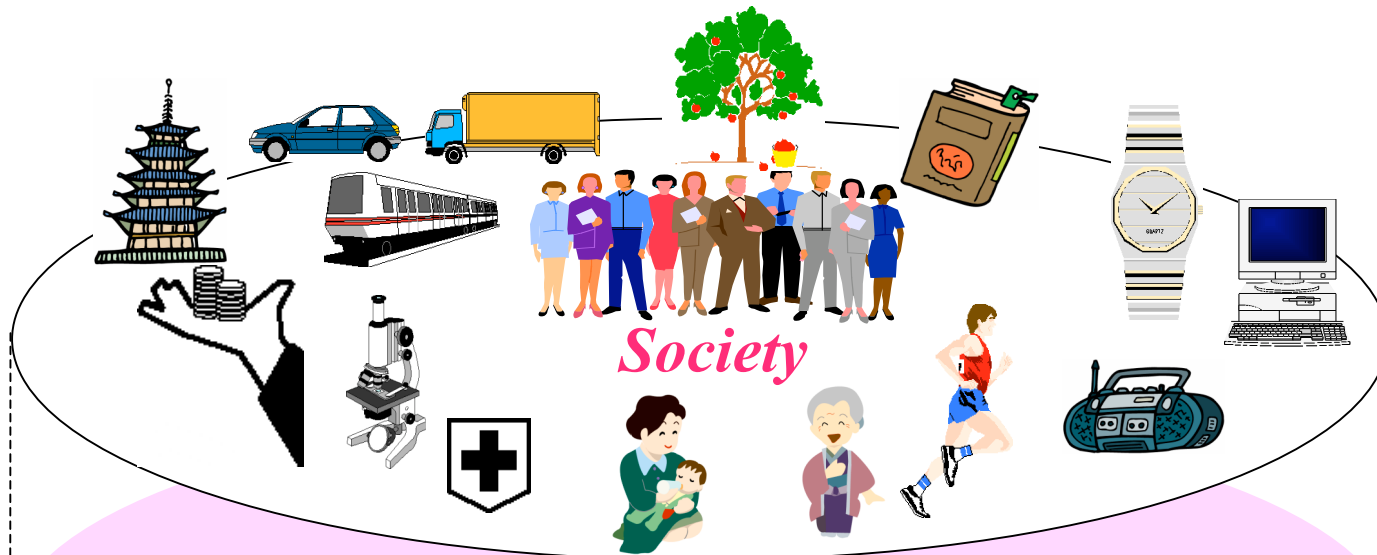


Mobility Activity in WIDE

Ryuji Wakikawa
Keio University/WIDE

Unwired World



IPv6

AAA

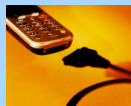
IP dynamic network: MANET

IP Telephony: *Internet Technology*
VoIP, SIP, ENUM

IP Mobility: MIP, NEMO



Satellite



Cell Phone: W-CDMA,
CDMA2000, 1x EVDO, HSDPA



Communication Technology



WLAN: 802.11a/b/g

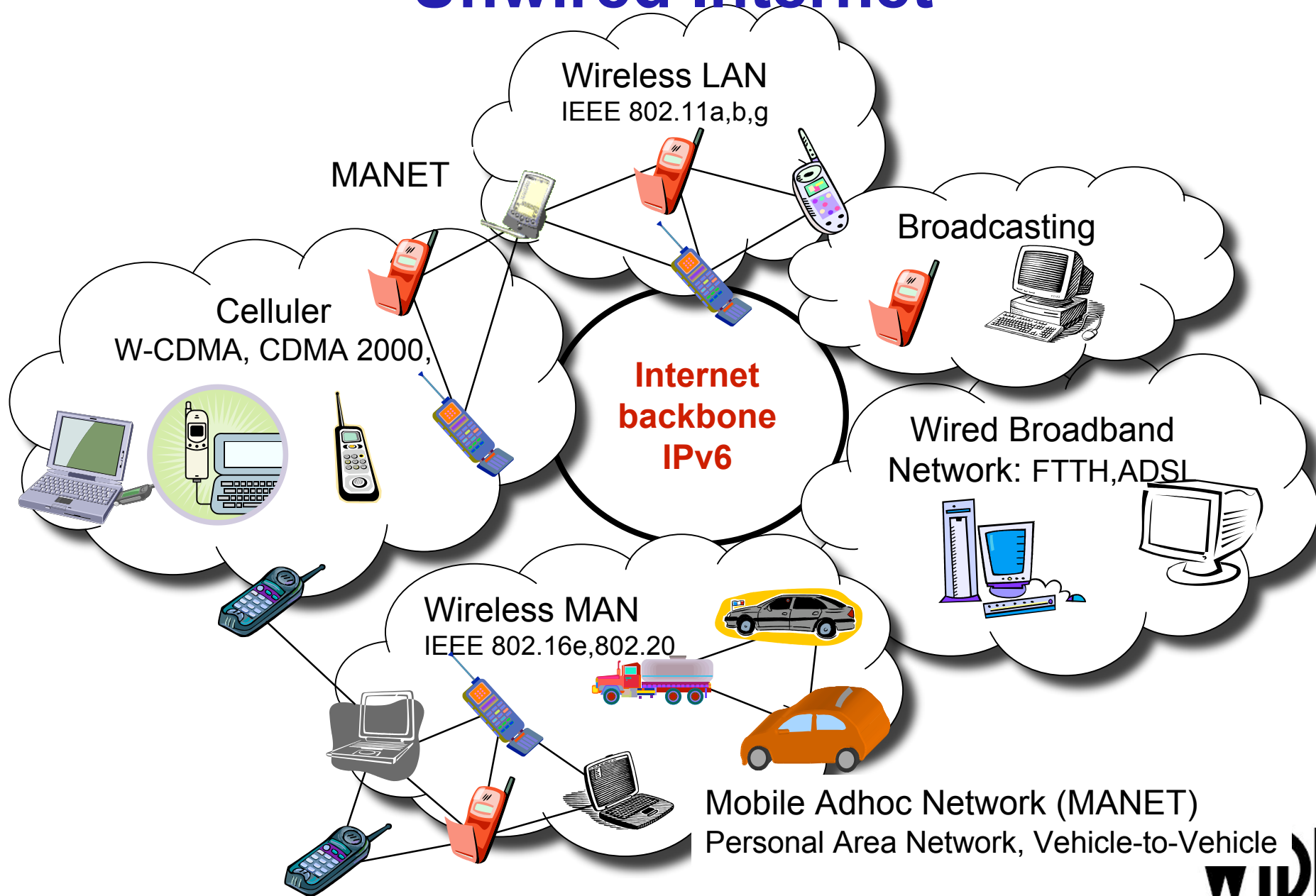
WMAN: 802.16, 802.20

WPAN: 802.15.3, zigbee, bluetooth



Mobility is not only for mobile phones

Unwired Internet



Unwired Internet and WIDE

- "Unwired Internet"
 - It provides always-on Internet connectivity and mobility support to all "unwired nodes" on diversity of wireless environments
- "Diverse Wireless Environment"
 - WIDE abstracts those diversity at the IP layer and provide a universal infrastructure for mobile services and terminals.
- Standardization/Research/Development/Demonstration/Experimentation
- Some Projects
 - Internet CAR project
 - Providing a network to vehicle with Internet connectivity
 - Nautilus6 Project
 - Mobility deployment
 - KAME Project
 - Mobile IPv6 and NEMO implementations

Mobile IPv6/NEMO Related Activity

- The Base Protocol (Mobile IPv6/NEMO)
 - USAGI for Linux
 - SHISA(KAME) for BSD
 - TAHI for conformance testing tools
- IPv4 Traversal
 - IPv4 Care-of Address Registration
- Route Optimization support for NEMO
 - Inter-Home Agents Protocol (HAHA)
 - Virtual Mobility Control Domain (VMCD)
 - Optimizing Route Cache Protocol (ORC)
 - Optimizing NEMO for nested mobility (ONEMO)
- Protocol Redundancy
 - Inter-Home Agents Protocol (HAHA)
 - Multiple Mobile Router managements
- End Multihoming
 - Multiple Care-of Address Registration
 - Policy based Routing
 - Policy Exchange between MR - HA/CN
- Seamless/Fast Handover
 - Fast MIP (implementation on SHISA)
 - LIES (Inter Layer Control Information Exchange)
 - PANA+FMIP integration

MANET ACTIVITY

- Internet Connectivity
- MANET protocols for IPv6
 - Addressing arrangement
 - OLSR6 implementation
 - OLSRv2 protocols (a member of Design Team)
- Network Emulator for MANET experimentation

- Multiple MANET protocols
 - Running OLSR and AODV simultaneously
- Wireless Connectivity Extension
 - Using MANET to enlarge wireless coverage area
- Policy Based Routing for efficient integration of NEMO and MANET

Development Activity

SHISA: MIP/NEMO

- RFC3775 (Mobility Support for IPv6)
 - MIP6 Working group
- RFC3963 (Network Mobility Basic Support)
 - NEMO working group
- draft-ietf-mip6-mipext-advapi
 - MIP6 working group
- draft-wakikawa-mobileip-multiplecoa
 - MIP6 working group
- Interoperability confirmation
 - Connectathon, ETSI, TAHI



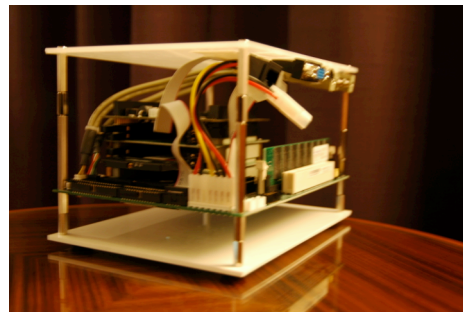
WIDEOLSR

- GNU Zebra
- RFC3626.txt (OLSRv2)
 - MANET Working Group
- Only IPv6 Support
- will support
 - address autoconfiguration
 - global connectivity
- The next step will be OLSRv2 implementation (Fall 2005)
- Interoperability Confirmation
 - OLSR Workshop/interop

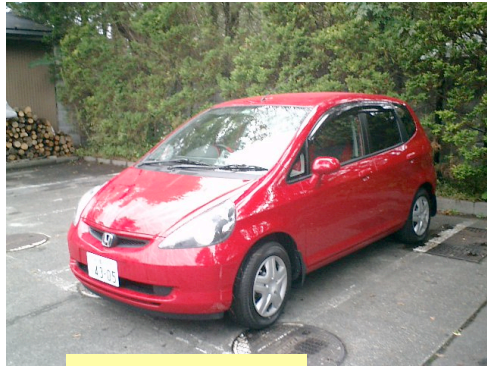


WIDE

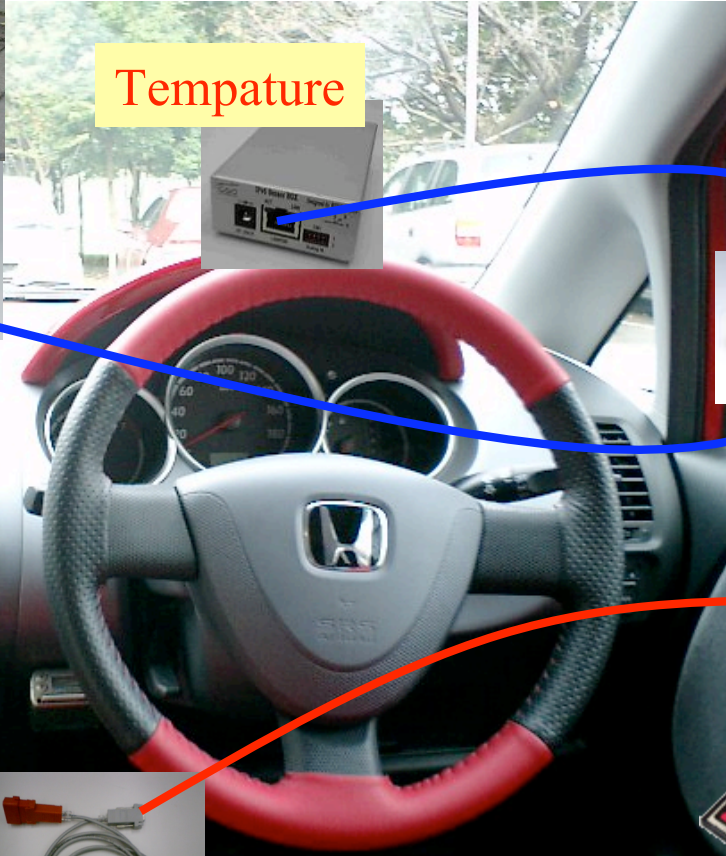
Demonstration Platform



Vehicle Network Environment



WebCam



Temperature



GPS



Mobile Router



WiFi



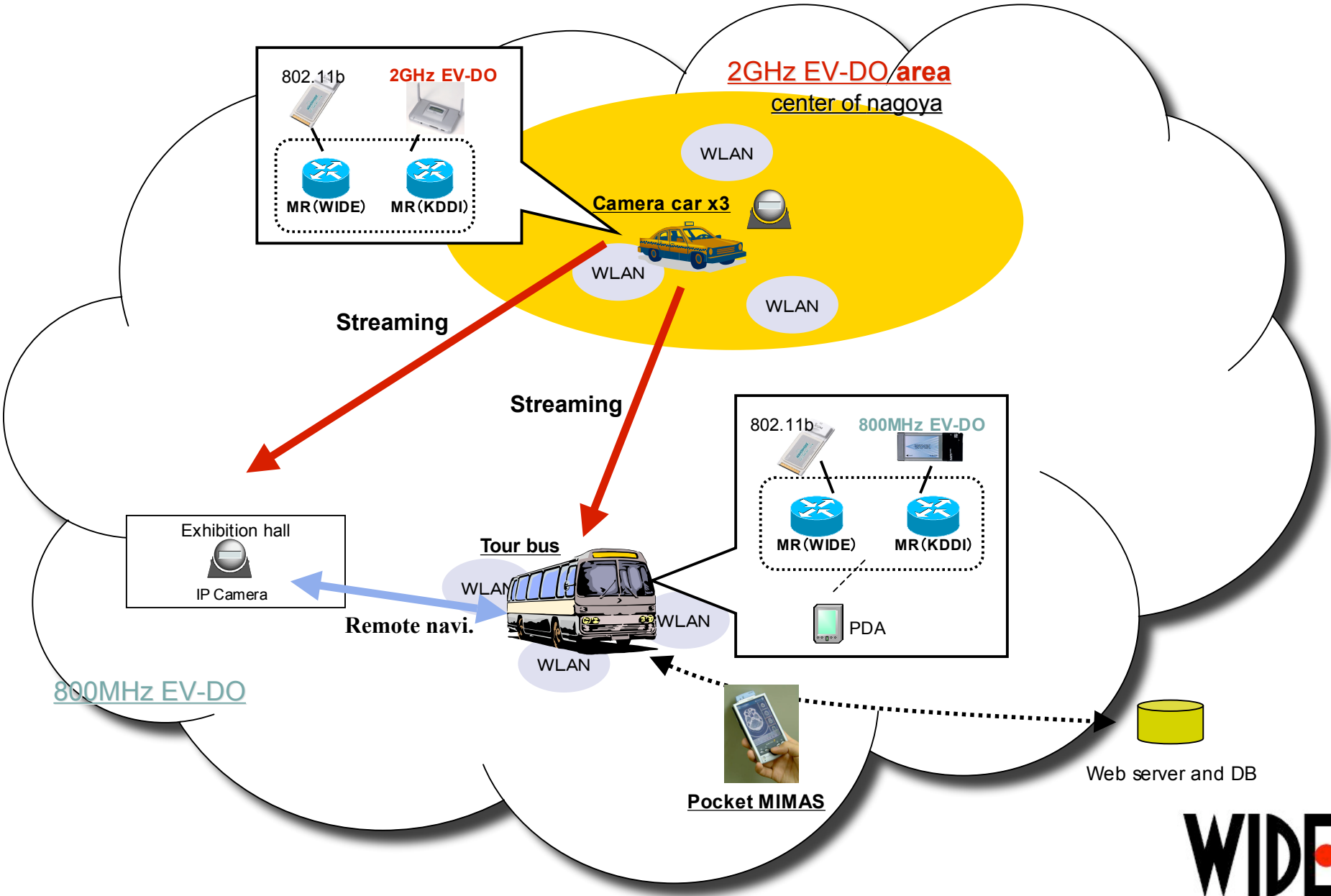
AirH''



OBD-II

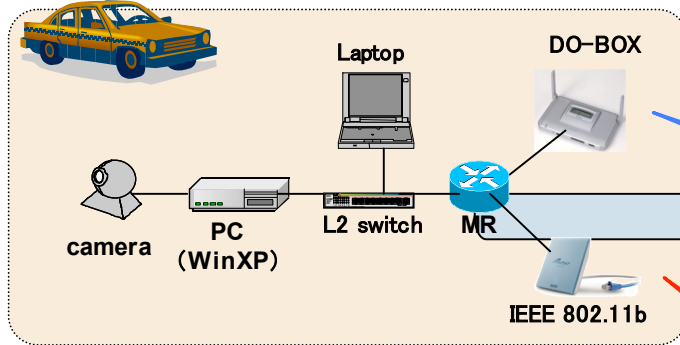


2004 Nagoya ITS world congress

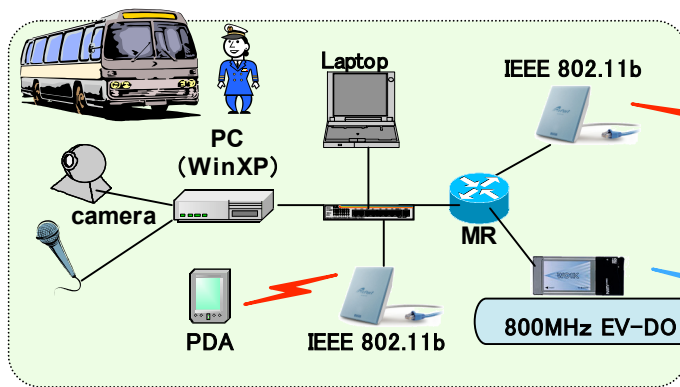


2004 Nagoya ITS World Congress System Overview

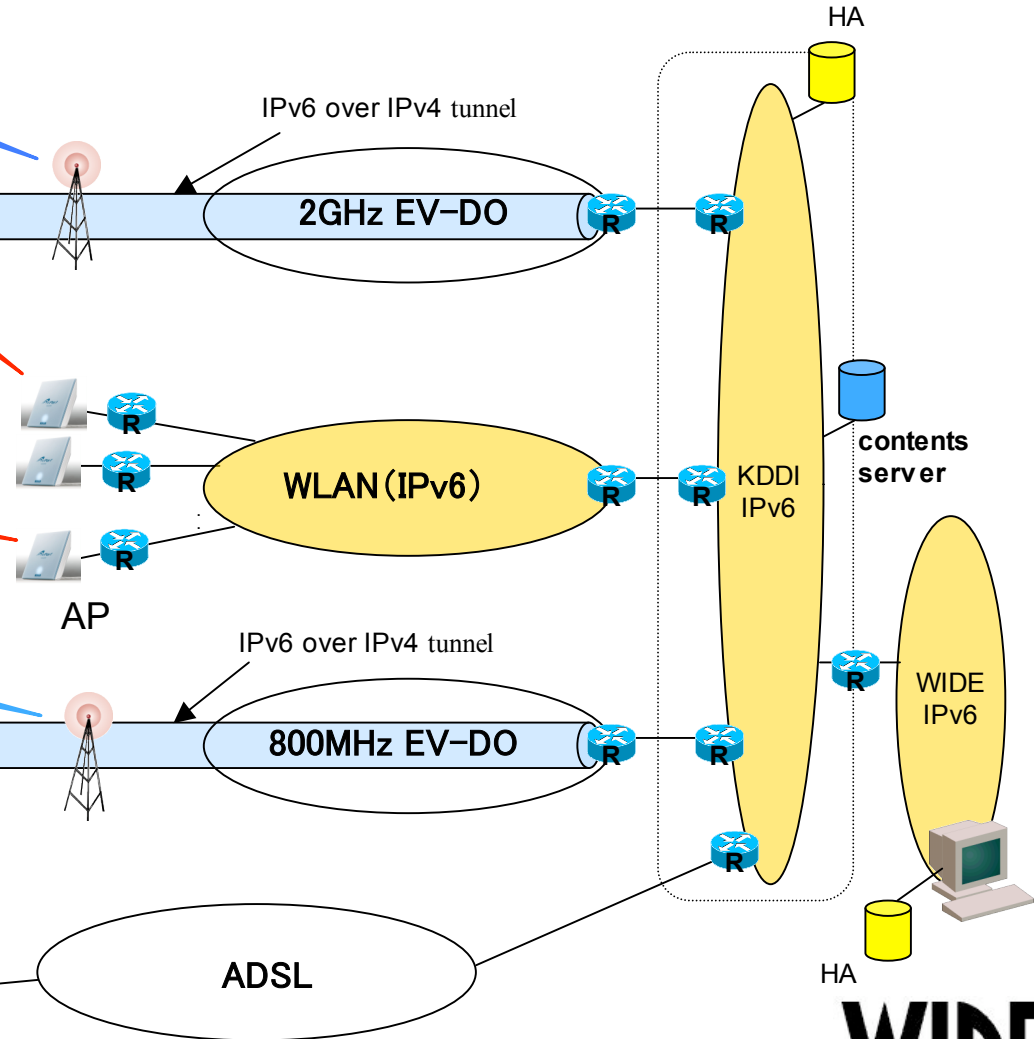
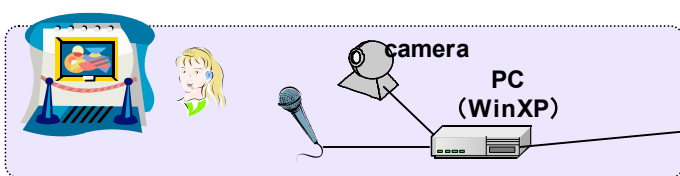
Camera Car x3



Tour bus x1



Exhibition hall





Nautilus: e-bicycle

- e-bicycle: for sport and tourism
 - Sport training: monitoring of the performance / health condition of the cyclist
 - Tourism: assist people in visiting cities (e.g. Bicycle rental at Kamakura) with navigation, historical guidance, etc
 - Sport competition / rallyes: live monitoring of progress, keep the cyclist informed (VoIP)



WIDE

Captured Picture on CN

Mon Nemo


Sensors display in real time! Session n°1: "Permanent demonstration"

	Local time	Demo time (CMT+9)
Current time	4:00:35 PM	4:00:35 PM
Last update	4:00:35 PM	4:00:35 PM

Last ping: < 1 ms
Status: Ongoing
Connected users: 3

Chat

Zoom in Scale: 1/25000 Zoom out



Latitude: 35° 32' 46.564
Longitude: 139° 40' 18.808
Last update: 4:00:36 PM

Temperature: 26.9 °C

Humidity: 14.8 %

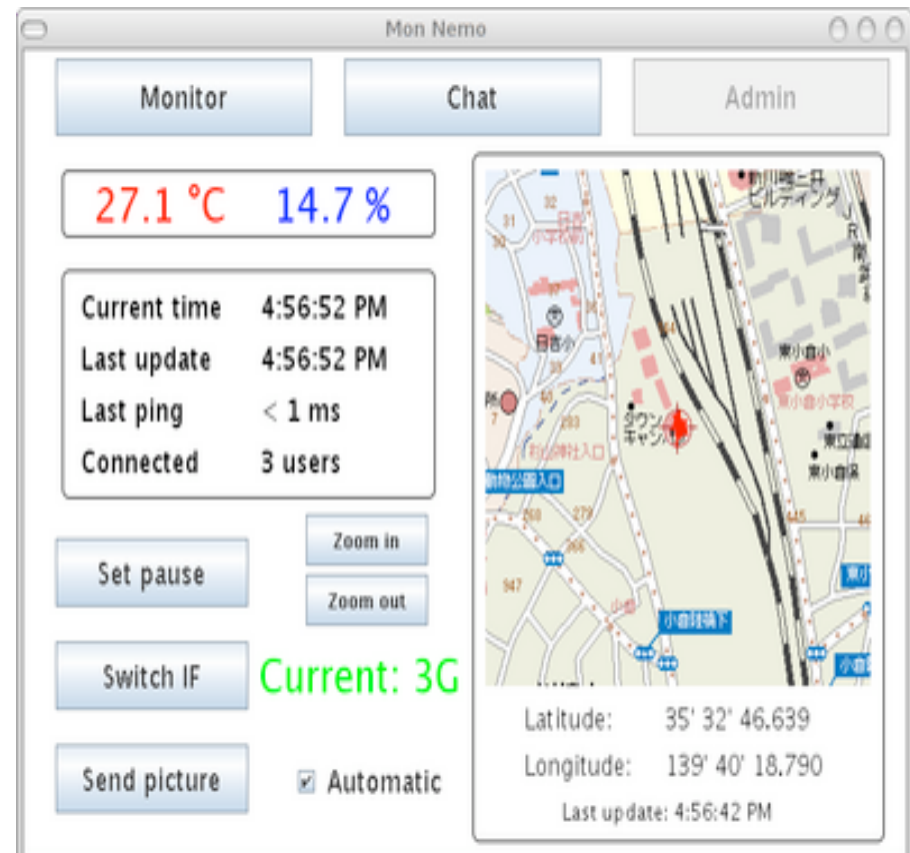
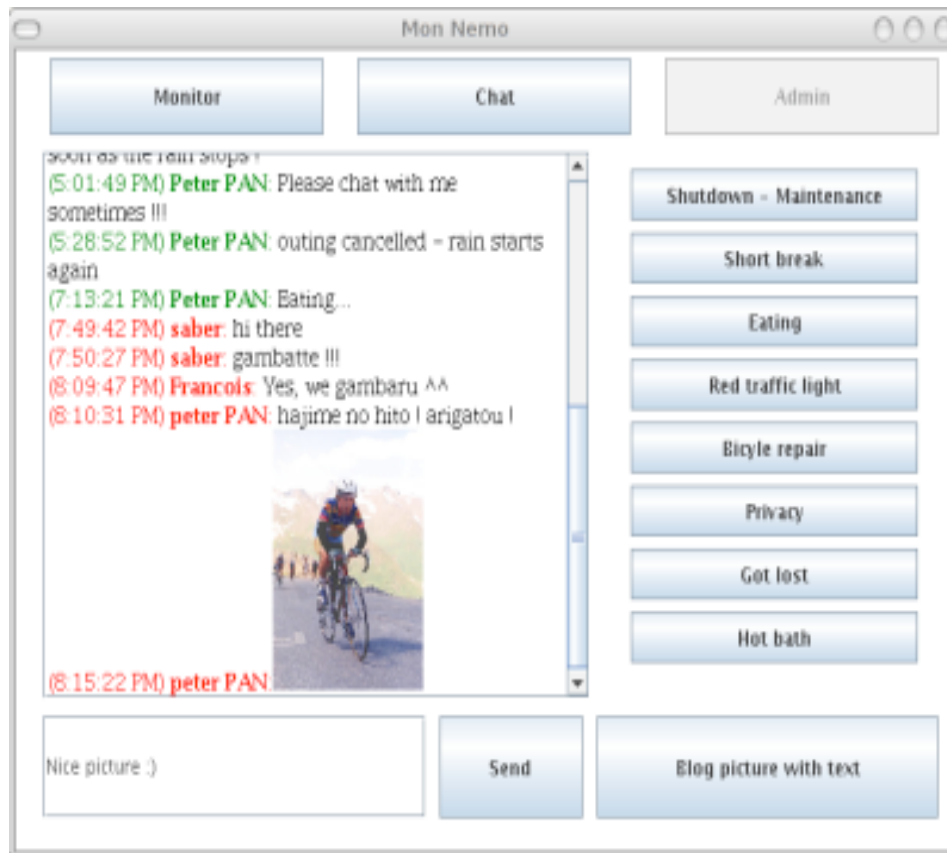
AccelerationX: 0.0 m.s⁻²
AccelerationY: 0.0 m.s⁻²

204°

<http://demo.nautilus6.org> 2005/03/21 snapshot

Captured Picture on MNN

- Follow and participate to next live session
 - <http://demo.nautilus6.org>



Some References

- URL
 - WIDE project
 - <http://www.wide.ad.jp>
 - Nautilus project
 - <http://www.nautilus6.org>
 - Keio Internet CAR project
 - <http://www.sfc.wide.ad.jp/InternetCAR>
 - SHISA Mobile IPv6/NEMO Stack implementation
 - <http://www.mobileip.jp> or <http://www.kame.net>
- Full compliant implementation of NEMO Basic Support Protocol and extension of multiple care-of address registration
 - SHISA for BSD
 - USAGI for Linux
- Conformance Testing Tools
 - TAHI (v6logo)
- ISO/TC204/WG16
- IETF Documentations
 - RFC 3963
 - draft-wakikawa-mip6-nemo-mcoa-04.txt
 - draft-wakikawa-mip6-nemo-haha-spec-00.txt
 - draft-montavont-mobileip-multihoming-pb-statement-04.txt
 - draft-multihoming-generic-goals-and-benefits-01.txt
 - draft-clausen-manet-olsrv2-00.txt
 - draft-shima-nemo-v4prefix-00.txt
 - draft-wakikawa-manet-globalv6-04.txt
 - draft-wakikawa-nemo-orc-01.txt
 - many others.
- IETF Activity
 - Monami6 BOF @ IETF 63
 - DT of OLSRV2 @ MANET WG
 - DT of mip6trans @ MIP6/NEMO WG
 - DT of Route Optimization PS@NEMO WG