The Wireless World Research Forum

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www.wireless-world-research.org
Outline

- Trends in mobile communications towards systems beyond IMT-2000
- WWRF objectives, scope and activities
- WWRF structure and membership
- WWRF vision and approach
- Conclusions
Trends in mobile communications towards systems beyond IMT-2000
The major trends at a glance

- Advance of the Internet
  The Internet became a mass medium and IP the leading network protocol.

- Advance of mobile communication
  Communication via mobile radio networks is increasing enormously.

- Bandwidth evolution
  The available bandwidth in backbone and access is exploding and the prices for bandwidth decrease dramatically.

- Advance of e-commerce
  E-commerce changes and amend business processes tremendously.

- Deregulation and globalization
  The I&C markets move fast. Competition and differentiation are driven by deregulation and globalization.

- Services are key
  The end user is interested in services only, the underlying technology is not relevant to him.

- Reduced cost/bit

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WWRF objectives, scope and activities
Evolution of mobile communication systems

- Long cycles for:
  - research and development of new radio systems
  - identification of new frequency spectrum bands
  - spectrum availability
  - international standardization

- Research has to start now to be prepared for 2010+
- Cooperation in research in early stage eases global harmonization and consensus building
**WWRF - Objectives and scope**

- **Major objectives**
  - to develop and maintain a consistent vision of the Wireless World
  - to generate, identify, and promote research areas and technical and society trends for mobile and wireless systems towards a Wireless World
  - to identify and assess the potential of new technologies and trends for the Wireless World
  - to contribute to the definition of international and national research programs

- **Scope**
  - concentrate on the definition of research items relevant to the future of mobile and wireless communications, including pre-regulatory impact assessments
  - invite world-wide participation and is open to all actors

- WWRF provides a global platform for discussion of results, exchange of views to initiate global cooperation towards systems beyond 3G

Source: WWRF
Our Goal and our strategy

- Our goal is to contribute to making the wireless market a vibrant growing global market, providing new opportunities for success for all sector actors.

- Our long-term strategy is to ease future standardization and hence develop global markets for products & services, through:
  - harmonizing views on future market requirements, at the research stage of the process of investigating topics for future systems and services.
  - building collaboration between academia and industry and between converging industry sectors.
  - jointly developing commonly agreed research priorities.
  - disseminate and input results to standardization bodies.

Source: WWRF
WWRF - Important questions

- WWRF intends to answer these questions:
  - How can advances in technologies be combined consistently in future systems?
  - What essential demand (user needs and market requirements) will a Wireless World address?
  - How can wireless communications become universally available for both people and devices/machines?
  - What business models will drive the Wireless World (what are the fundamental laws)?

Source: WWRF
Introduction with user-centered “MultiSphere Model” and Building Blocks of the Wireless World

3 major parts

1. “Visions and Issues” of particular subject areas
2. “Research Tasks” that address the issues from Section 1
3. “Contributions received during 2001”

New edition of the “Book of Visions” under preparation
Preparation of White Papers

- **WG1**
  - Scenarios and analysis
  - Reference model
  - UI technologies and techniques
  - UCD process

- **WG2**
  - Terminology (basic terms for WG2)
  - Business Model
  - Personalization
  - Ambient Awareness
  - Adaptability
  - Generic Service Elements
  - Enabling Technologies

- **WG3**
  - Vision and roadmap
  - Research challenges and priorities
  - Architectural Principles
  - Network Component Technologies for Cooperative Networks
  - E2E Reconfigurability

- **WG4**
  - Smart Antennas, MIMO systems
  - Ultra Wideband
  - New Air Interface (3 in this area)
    - Requirements and Technologies
    - Broadband Multicarrier
    - Mixed OFDM plus single-carrier
  - Ad Hoc Networking
  - Short Range Communications
  - Relay-based Deployment Concepts for Wireless and Mobile Broadband Cellular Radio
  - Wireless Internet

Source: WWRF
International relations

- Liaison agreements with
  - UMTS Forum, signed on January 30, 2003
  - mITF, Japan, signed on May 30, 2003
  - IEEE ComSoc in preparation

Source: WWRF
WWRF structure and membership
WWWRF - Organizational set-up

Main research tasks:
- Understanding the user
- New generic application elements
- New interaction techniques

Main research tasks:
- Business models
- Personalisation
- Adaptability
- Generic service elements
- Enabling technologies
- Context awareness and ubiquitous computing

Main research tasks:
- Wireless World networking architecture
- IP mobility architecture
- QoS architecture
- IP Multicast architecture
- Transport protocols
- SDR

Main research tasks:
- Spectrum issues
- Antenna arrays and related techniques
- New air interfaces
- Ad hoc networks

Source: WWWRF
Revised structure

Source: WWRF
Status of membership development, June 2003

- About 140 members from the
  - manufacturer domain
  - network operator domain
  - R&D centers and
  - academic domain

- from the four continents
  - America
  - Asia
  - Australia
  - Europe

Source: WWRF
# WWRF Steering Board

## Steering Board members:

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Source: WWRF

Status June 2003
WWRF vision and approach
MultiSphere Level Concept

Systems beyond 3G will cover different communication relations

1. The PAN
2. The Immediate Environment
3. Instant Partners
4. Radio Accesses
5. Interconnectivity
6. CyberWorld

Source: IST WSI Project
Vision of wireless communications beyond 3G
Seamless network of complementary access systems

Building Blocks of the Wireless World

- E2E Security & Privacy
- Semantics aware Services
- Augmented Reality / Cyberworld
- Heterogeneous Ad-hoc
- Peer Discovery
- 4G Radio Interfaces
- Co-operative Networks & Terminals
- Smart Antennas & Basestations
- Software Defined Radio

Source: WWRF
## The Global Context

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### WWRF Milestones & Activities for 2001 and Beyond

1. Preparation of the BoV 2001
2. System Concept & Reference Model Definition
3. Definition of Research & Communication Framework / Identification of Interfaces
4. Further activities are to be defined …

### Tentative milestones for 2003

1. BoV 2001 published
2. Initial system concept & reference model established for research + publication of specific topic reports
3. Initial WWRF research framework established and communicated to national & international research programs and relevant standardization bodies + Publication of specific topic reports
4. Work program and milestones for 2003 are fixed
5. More detailed work on system concepts + publication of specific topic reports (White papers)
6. Continuation of effort towards globalization (permanent effort)

Source: WWRF

◆ = Milestone


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Phases and expected timelines for future development of 3G and beyond

- Voting at ITU-R Radio Assembly, Geneva, June 2 to 6, 2003
- Fixing of Agenda Item 1.22 expected at WRC 2003, Geneva, June 9 to July 4, 2003

The sloped dotted lines indicate that the exact starting point of the particular subject can not yet be fixed.

- : Expected spectrum identification at WRC07
- * : possible wide deployment around the year 2015 in some countries

The global research context

- Bodies and activities, focusing on entire system
  - ITU-R WP8F, ITU-T SSG
  - FuTURE Project in the Research Program 863 in China
  - mITF – Mobile IT Forum in Japan under the umbrella of MPHPT
  - 4G Committee in Korea
  - Framework 5 and 6 in the European Union
  - Research activities in major companies in the Americas
  - WWRF
  - ...

- Bodies, focusing on particular technologies (examples)
  - IEEE bodies
  - SDR Forum
  - OFDM Forum
  - IPv6 Forum
  - ASMS (Advanced Satellite Mobile Systems)
  - IETF
  - OMA
  - ...

Source: WWRF
Conclusions
Conclusions

- WWRF is contributing to
  - the development of a global vision on systems beyond IMT-2000,
  - the identification of the necessary research areas and
  - the investigation of technology and society trends

- WWRF will help to continue the success story of mobile and wireless communications

- Liaison agreements established with other bodies to globalize activities

- Research activities on systems beyond 3G started in different regions

- Bodies such as ITU-R and WRC setting conditions for future development

- Due to long cycles for research, standardization and frequency assignment, research on systems beyond IMT-2000 has to start now

- WWRF provides a global platform for discussion of results, exchange of views to initiate global cooperation towards systems beyond IMT-2000

- International consensus building should be supported in all levels
Background information
## WWRF actual membership
### Status 06/2003

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**SMEs, R&D Centers and Universities**

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<td>LOUGHBOURGH UNIVERSITY</td>
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</table>

**WWRF actual membership**

**Europe**

- Aachen University of Technology (RWTH)
- Aalborg University
- ACTICOM
- CEA LETI
- Centre for Usability Research & Engineering
- Chalmers University of Technology
- CSEM
- Deutsche Telecom
- Dresden University of Technology
- ETH Zurich, Integrated Systems Laboratory
- Forschungszentrum Telecom
- Fraunhofer Gesellschaft
- German Aerospace Center (DLR)
- Groups des Ecoles des Telecom
- Helsinki Institute for Information Technology
- HERMES Partnership
- IAMS R
- IEIT CNR
- IKOM
- IMEC
- IMST GmbH
- Independent Consultant (Royal Holloway)
- Institute for Communications and Info Engineering
- Instituto Telecom
- International University of Bremen
- King’s College London
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**America**

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**Asia**

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### WWRF actual membership

**Status 06/2003**

**SMEs, R&D Centers and Universities**

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<th>Country</th>
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<td>CCL/ITRI</td>
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<td>National Chiao Tung University</td>
<td>Taiwan</td>
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<td>Shanghai Institute</td>
<td>China</td>
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</table>

**Regions**

- **Europe**
- **America**
- **Asia**
- **Australia**
WWRF Legal Arrangements

- WWRF established
  - as a non-profit association
  - under Swiss law (article 60 ss. of Swiss Civil Code)
  - as an open and independent organization
- The WWRF is domiciled at Interhold AG, Zurich, Switzerland
- The following WWRF representatives were elected
  - Chair: Dr. Werner Mohr (Siemens, Germany)
  - Vice Chair: Dr. David Borth (Motorola, US)
  - Treasurer: Dr. Fiona Williams (Ericsson, Germany)

Source: WWRF
Any legal established corporation and individual firm, partnership, university and research institute, governmental body or international organization supporting the purpose of the WWRF may apply for membership.

There are Founding Members, Sponsor Member, and Full Members. All members are entitled:
- to send representatives to all Working Groups and the General Assembly
- to one vote at the General Assembly
- to nominate candidates as Executive Board Members of the Steering Board
- to access all registered working documents, meeting minutes, etc., including full access to the Members Only area of the WWRF web-site

Each Founding Member appoints a Non-Executive Board Member of the Steering Board.

Each Sponsor Member is eligible for election to the Steering Board to serve as Non-Executive Board Member.

Source: WWRF
There is an annual membership fee

- Fees and terms of payment are fixed annually by the General Assembly, based on a proposal by the Treasurer
  - Sponsor Members: € 10,000
  - Full Members: € 1,000

WWRF bank account opened with Credit Suisse, Zurich, Switzerland

Membership (status beginning of June 2003)

- 139 members including 18 sponsor members
- 37 manufacturers
- 19 operators
- 83 universities, Research Centers and SMEs

Source: WWRF
Main responsibilities of the General Assembly are to
- decide on membership issues
- approve the work program
- approve proposals for R&D issues
- review the work done by the other groups
- approve budget and membership fees
- approve the auditor’s report
- approve reports, opinions, etc. intended for outside organizations

Convened by the Chair, who is elected for one year

Decision basis generally is ‘by consensus’
- otherwise by simple majority in ordinary cases, or
- by a two-third majority in severe cases, such as dissolution of the Forum or revisions of the Articles of Association

Source: WWRF
Main responsibilities of the Steering Board are to
- act on decisions of the General Assembly and represent WWRF
- address matters of the administration, management, and scheduling
- process member applications and refer them to the General Assembly
- establish / re-organize / dissolve Working Groups and monitor their work
- initiate the development of proposals for R&D issues in the Working Groups
- prepare the balance sheet for approval by the General Assembly

Composed of:
- Executive Board Members:
  Chair / Vice Chairs / Treasurer and Working Group chairs
- Non-Executive Board Members (up to 15):
  Nominated representatives from the Founding Members and elected representatives from the Sponsor Members

Decision basis is ‘by consensus’