

# The Wireless World Research Forum



The **W**ireless **W**orld **R**esearch **F**orum



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[www.wireless-world-research.org](http://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

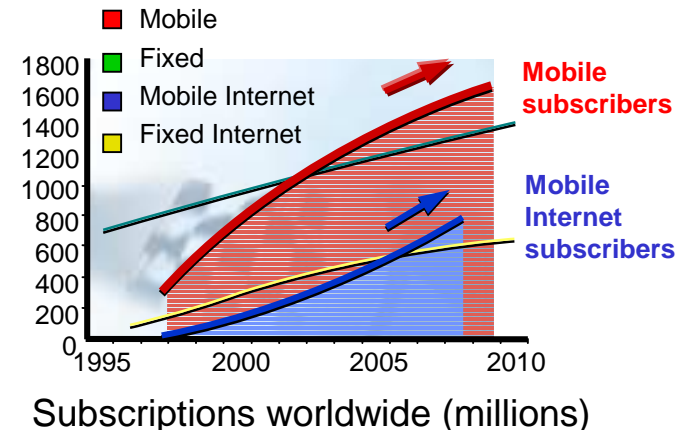
The I&C markets move fast.

Competition and differentiation are driven by deregulation and globalization.

## □ Services are key

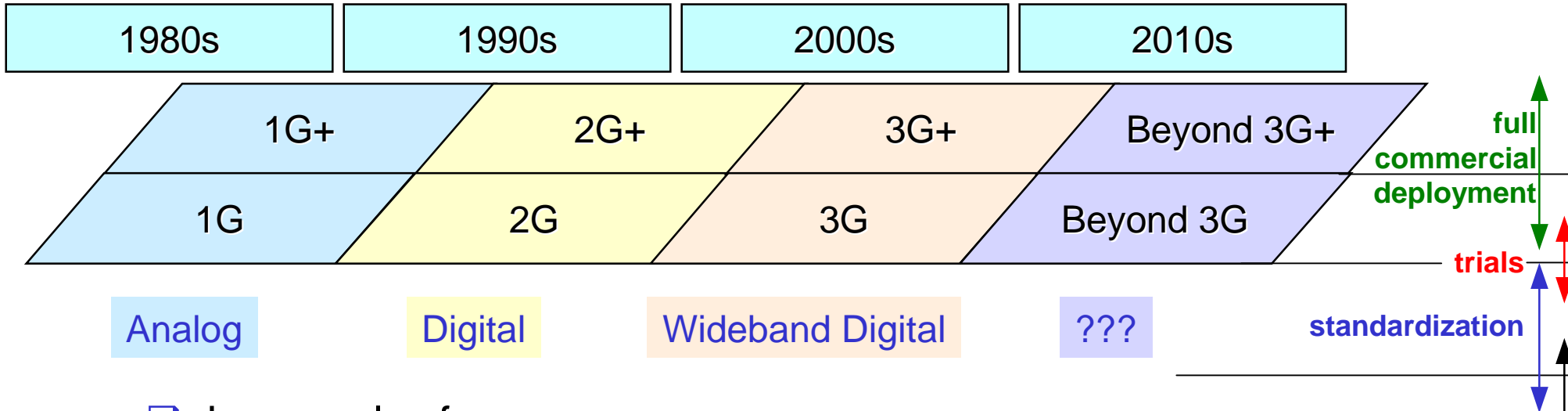
The end user is interested in services only, the underlying technology is not relevant to him.

## ☞ Reduced cost/bit



# **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

# 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



# 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)?

# Book of Visions 2001 Structure

- 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

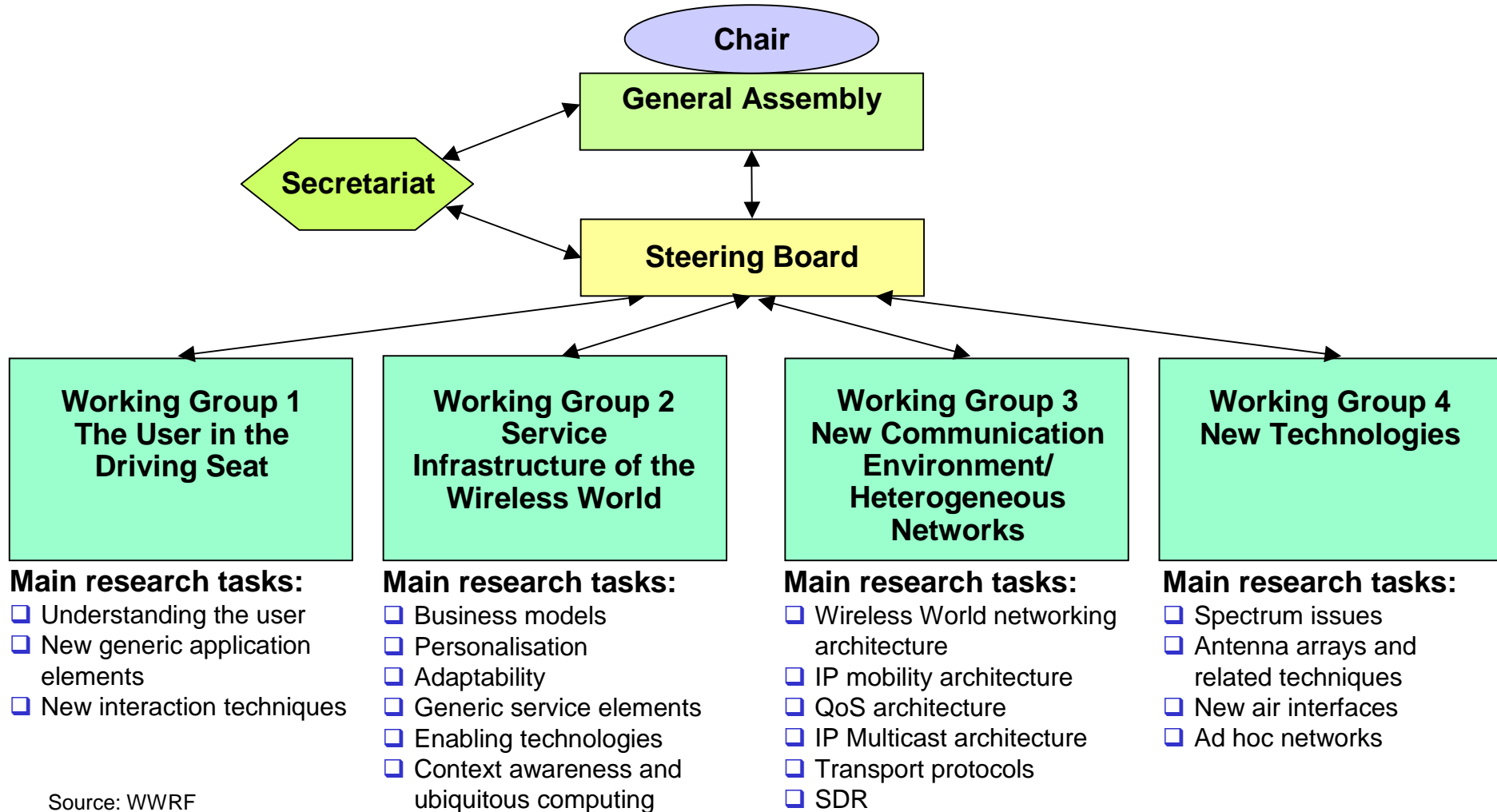
- Smart Antennas, MIMO systems
- Ultra Wideband
- New Air Interface (3 in this area)
  - Requirements and Technologies
  - Broadband Multicarrier
  - Mixed OFDM plus single-carrier
- Ad Hoc Networking
- Short Range Communications
- Relay-based Deployment Concepts for Wireless and Mobile Broadband Cellular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

# International relations

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

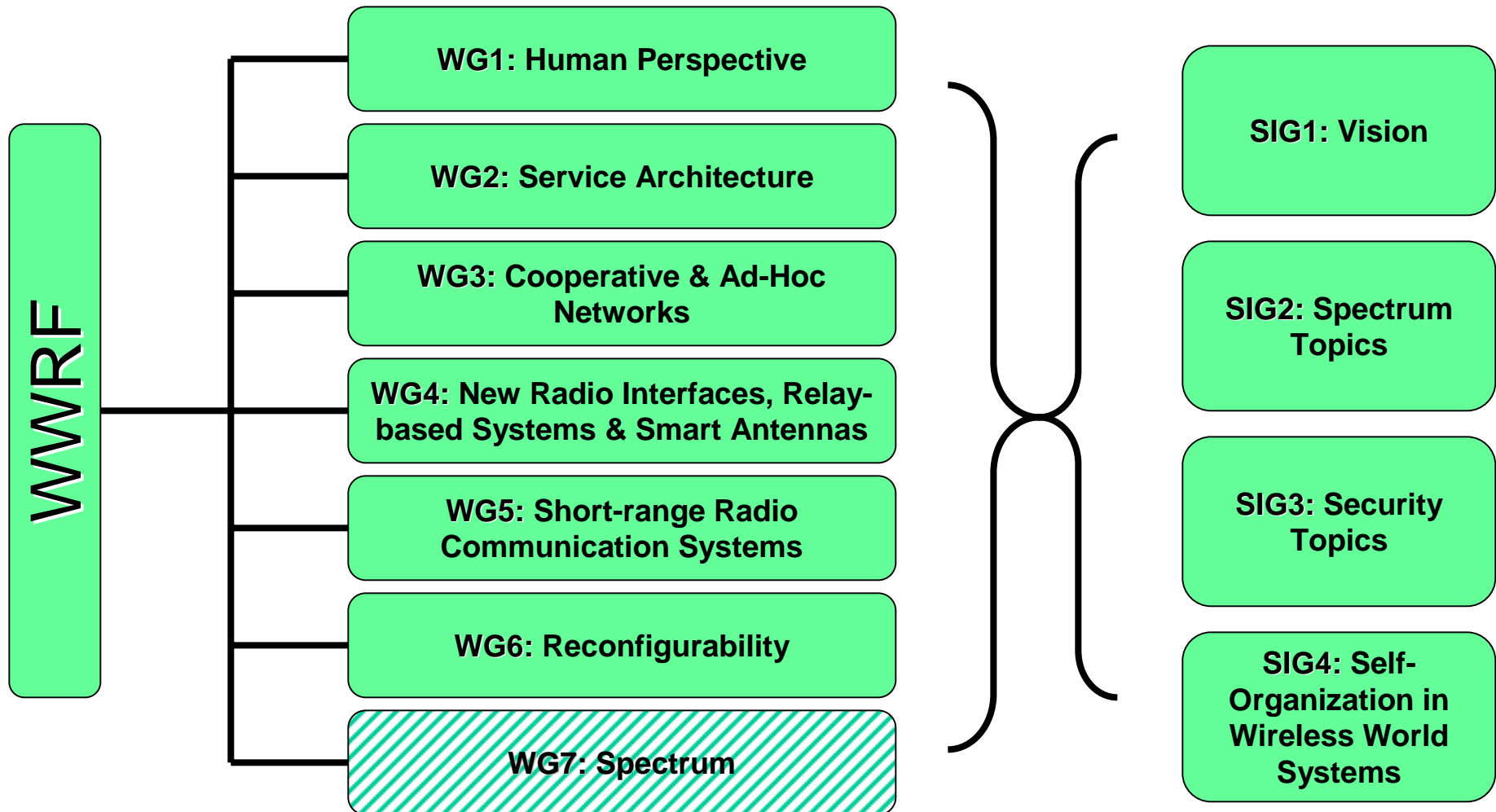
# WWRF structure and membership

# WWRF - Organizational set-up



Source: WWRF

# 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



# WWRF Steering Board

## Steering Board members:

<input type="checkbox"/> Alcatel	France	<input type="checkbox"/> Nortel	Canada
<input type="checkbox"/> Ericsson	Sweden	<input type="checkbox"/> Philips	UK
<input type="checkbox"/> EURESCOM	Germany	<input type="checkbox"/> Raytheon	USA
<input type="checkbox"/> IBM	USA	<input type="checkbox"/> Samsung	Korea
<input type="checkbox"/> Lucent	USA	<input type="checkbox"/> Siemens	Germany
<input type="checkbox"/> Motorola	USA	<input type="checkbox"/> Sony	Germany
<input type="checkbox"/> NEC	Germany	<input type="checkbox"/> Vodafone	UK
<input type="checkbox"/> Nokia	Finland		

## Working Group Chairs

<input type="checkbox"/> WG1: Motorola	US
<input type="checkbox"/> WG2: Fraunhofer Fokus	Germany
<input type="checkbox"/> WG3: University of Surrey	UK
<input type="checkbox"/> WG4: RWTH Aachen	Germany

Status June 2003

Source: WWRF

# 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



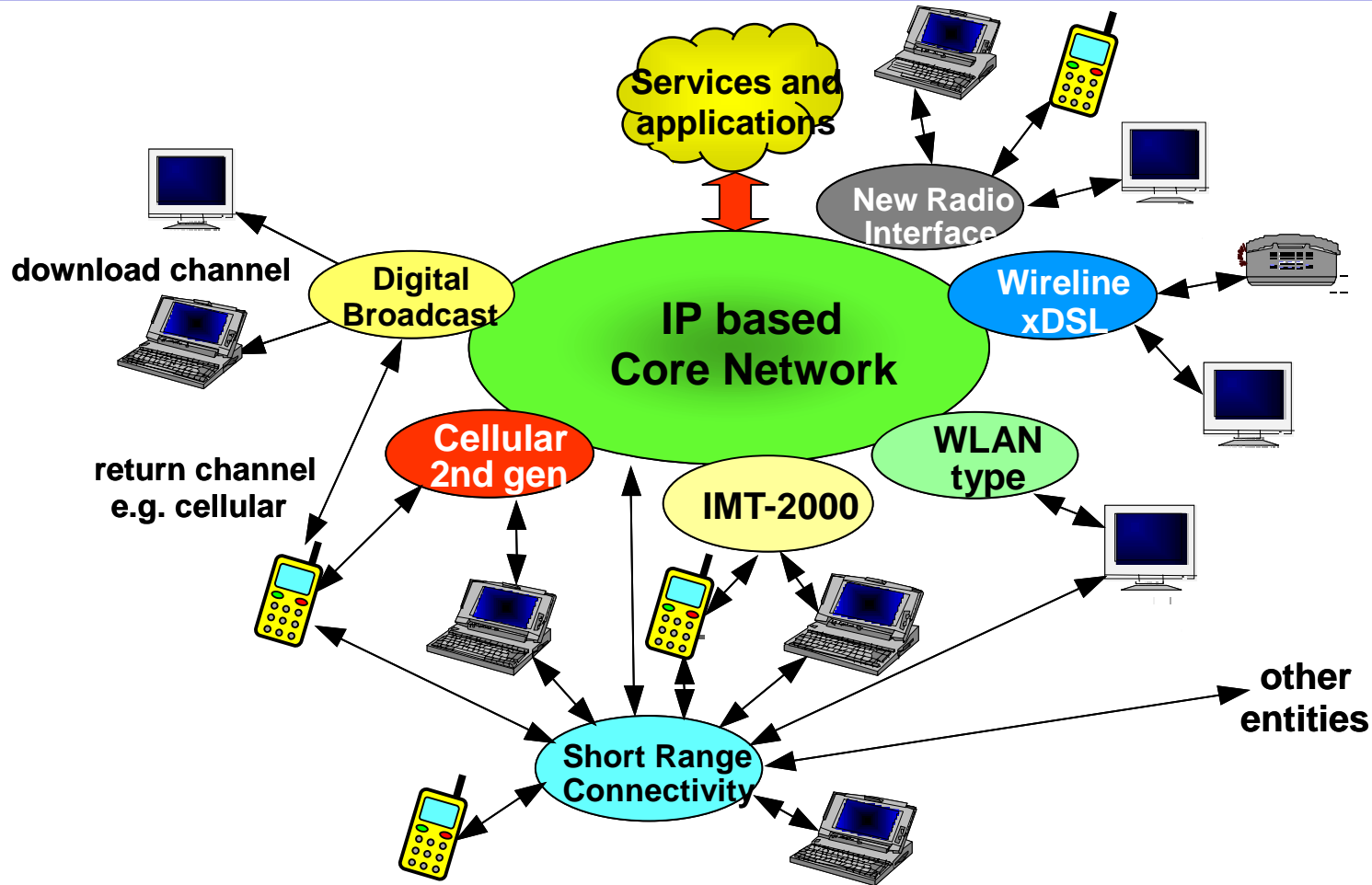
⑥ CyberWorld



Source: IST WSI Project

# Vision of wireless communications beyond 3G

## Seamless network of complementary access systems



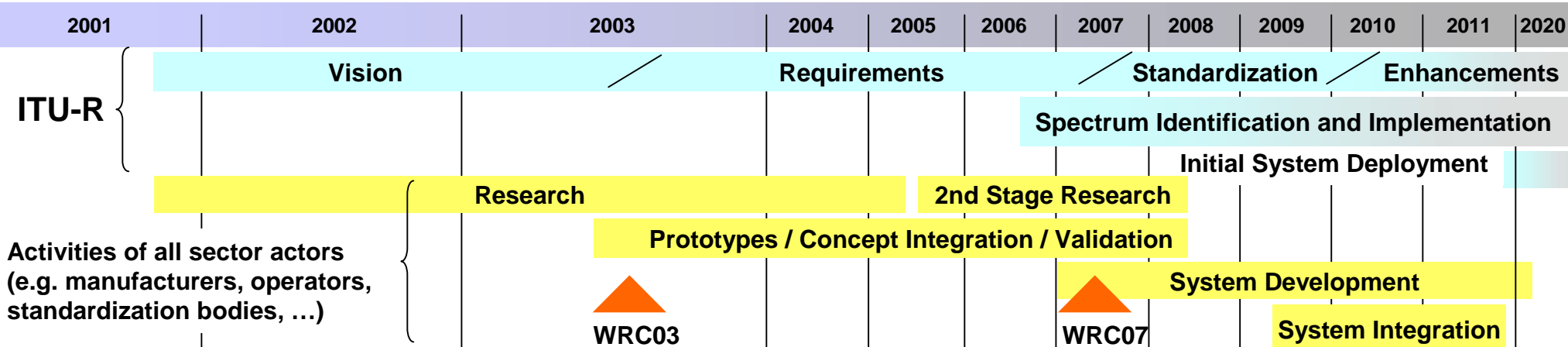
Source: ITU-R, 9<sup>th</sup> Meeting of Working Party 8F, Geneva, 25 September – 2 October 2002

# Building Blocks of the Wireless World

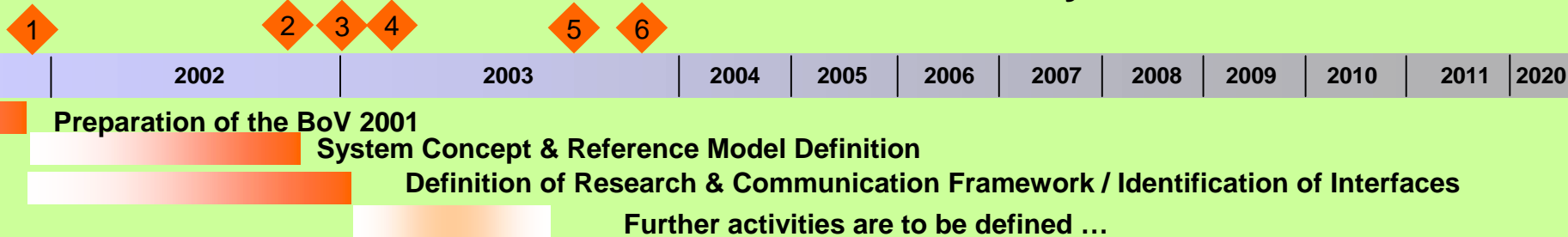


Source: WWRF

# The Global Context



## WWRF Milestones & Activities for 2001 and Beyond



- 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

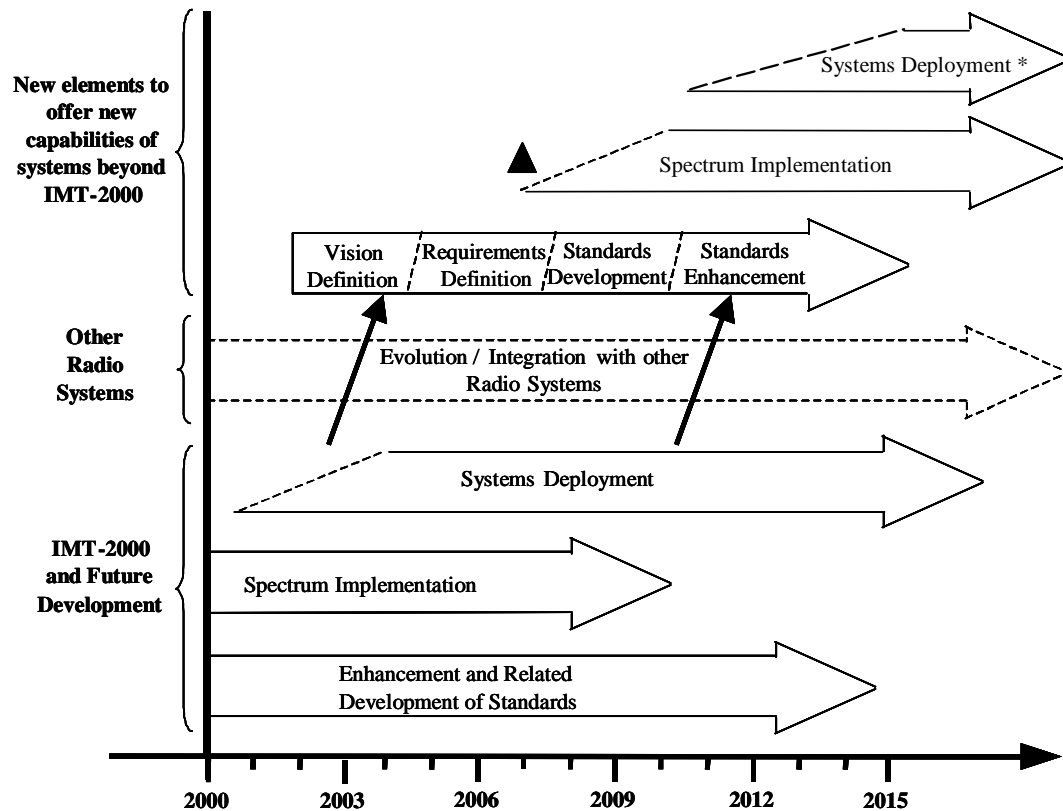
### Tentative milestones for 2003

- 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

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



- Initial time plan approved at ITU-R, 9<sup>th</sup> Meeting of WP8F, Geneva, 25 September – 2 October 2002
- Some changes at ITU-R, Radio Communication SG 8, Geneva, February 4 and 5, 2003
- 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

Source: ITU-R, Radio Communication Study Group 8, (Drafting Group Revision, not yet approved), Geneva, February 4 and 5, 2003

# The global research context

- Bodies and activities, focussing 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, focussing 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

### Manufacturers

Alcatel	France
ASCOM SYSTEC AR&T	Switzerland
Cybelius Software	Finland
EADS	France
Elektrobit GmbH	Germany
Ericsson	Sweden
Fujitsu Labs.	UK
HW Communications	UK
Infineon Technologies	Germany
Intracom	Greece
Italtel	Italy
Lucent Technologies	UK
Mitsubishi Electric	France
NEC Europe	Germany
NOKIA	Finland
Panasonic	UK
Qualcomm Europe	France
Royal Philips Electronics	UK
Siemens AG	Germany
Sony Europe GmbH	Germany
ST Microelectronics	Switzerland
Thales Communications	France
Toshiba Research Europe Ltd	UK

### Operators

BT Exact	UK
Crown Castle International	UK
Elisa Communications	Finland
EURESCOM	Germany
FINNET Group	Finland
France Telecom R&D	France
NTT Data Corporation	UK
Portugal Telecom	Portugal
Sonera Corporation	Finland
Telecom Italy S-p.A.	Italy
Telefonica	Spain
Telenor	Norway
Telia Research	Sweden
VODAFONE Group Services Ltd	UK
AT&T Wireless Services	USA
Bell Canada	Canada
CELLCOM Israel Ltd	Israel
NTT DoCoMo Eurolab	Germany/Japan
Australian Telecom	Australia

**Europe**  
**America**  
**Asia**  
**Australia**



# WWRF actual membership Status 06/2003

## Manufacturers

Agere System	USA
Broadstorm	USA
Hughes Software Systems	USA
IBM	USA
Intel	USA
Motorola	USA
Nortel Networks	Canada
Quicksilver Technology	USA
RAYTHEON	USA
Watercove Networks	USA
Chungwa Telecom Laboratories	Taiwan
LG Electronics	Korea
Mostly TEK	Israel
Samsung Electronics	Korea

## Operators

**Europe**  
**America**  
**Asia**  
**Australia**



# WWRF actual membership

## Status 06/2003

### SMEs, R&D Centers and Universities

Aachen University of Technology (RWTH)	Germany	Lulea University	Sweden
Aalborg University	Denmark	Middlesex University	UK
ACTICOM	Germany	Mobile VCE	UK
CEA LETI	France	National centre of Competence in Research on Mobile	Switzerland
Centre for Usability Research & Engineering	Austria	National Technical University of Athens	Greece
Chalmers University of Technology	Sweden	Nera Research	Norway
CSEM	Switzerland	R & D Corporation	Italy
Deutsche Telecom	Germany	RESIT	Greece
Dresden University of Technology	Germany	Robotiker Foundation	Spain
ETH Zurich, Integrated Systems Laboratory	Switzerland	SUPELEC	France
Forschungszentrum Telecom	Austria	Swedish Institute of Computer Science (SICS)	Sweden
Fraunhofer Gesellschaft	Germany	Technical University of Berlin	Germany
German Aerospace Center (DLR)	Germany	Technical University of Catalonia	Spain
Groups des Ecoles des Telecom	France	Technical University of Delft	The Netherlands
Helsinki Institute for Information Technology	Finland	Telecommunication Technological Center of Catalonia	Spain
HERMES Partnership	Belgium	Telematica Institut	The Netherlands
IAMSR	Finland	TNO	The Netherlands
IEIIT CNR	Italy	Technical University of München	Germany
IKOM	Germany	University of Art Helsinki	Finland
IMEC	Belgium	University of Athens	Greece
IMST GmbH	Germany	University of Bologna	Italy
Independent Consultant (Royal Holloway)	UK	University of Bradford	UK
Institute for Communications and Info Engineering	Austria	University of Bremen, BIBA	Germany
Instituto Telecom	Portugal	University of Bristol	UK
International University of Bremen	Germany	University of Dortmund	Germany
King's College London	UK	University of Edinburgh	UK
KTH Stockholm, Center for Wireless	Sweden	University of Ferrara	Italy
Lesprojekt Sluzby	Czech Republic		
Loughborough University	UK		

Europe  
America  
Asia  
Australia



# WWRF actual membership Status 06/2003

## SMEs, R&D Centers and Universities

University of Florence  
 University of Helsinki  
 University of Ilmenau  
 University of Karlsruhe  
 University of Kassel  
 University of Kent  
 University of London  
 University of Oulu  
 University of Rome  
 University of Strathclyde  
 University of Surrey  
 University of Twente  
 University of Westminster  
 Uppsala University  
 VTT Electronics

Italy  
 Finland  
 Germany  
 Germany  
 Germany  
 UK  
 UK  
 Finland  
 Italy  
 UK  
 UK  
 The Netherlands  
 UK  
 Sweden  
 Finland

Carlton University  
 Rice University  
 Southern Methodist University  
 University of Texas  
 University of Toronto  
 University of Waterloo

Canada  
 USA  
 USA  
 USA  
 Canada  
 Canada

Beijing University for Post and Telecommunications  
 CCL/ITRI  
 Center for Wireless Communications  
 ETRI  
 National Chiao Tung University  
 Shanghai Institute

China  
 Taiwan  
 Singapore  
 Korea  
 Taiwan  
 China

**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)



# WWRF Membership I

- 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

# WWRF

## Membership II

- 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

# The General Assembly is the Governing Body

- 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

# The Steering Board is the Executing Body

- ❑ 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'