ITU Regional Seminar on Broadband Wireless Access (BWA) for rural and remote areas for the Asia-Pacific Region
Shenzhen (P.R. China)
1-2 September 2005

# ETSI Technical Committee BRAN (Broadband Radio Access Networks)

Bernd Friedrichs
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# ETSI
# (European Telecommunications Standards Institute)

- ~700 member companies from 55 contries in 5 continents
- ~11,000 technical standards and deliverables since 1988
- ~60 co-operation agreements
- Established in 1988, based in Sophia Antipolis, Nice Cote d'Azur (France)
- www.etsi.org

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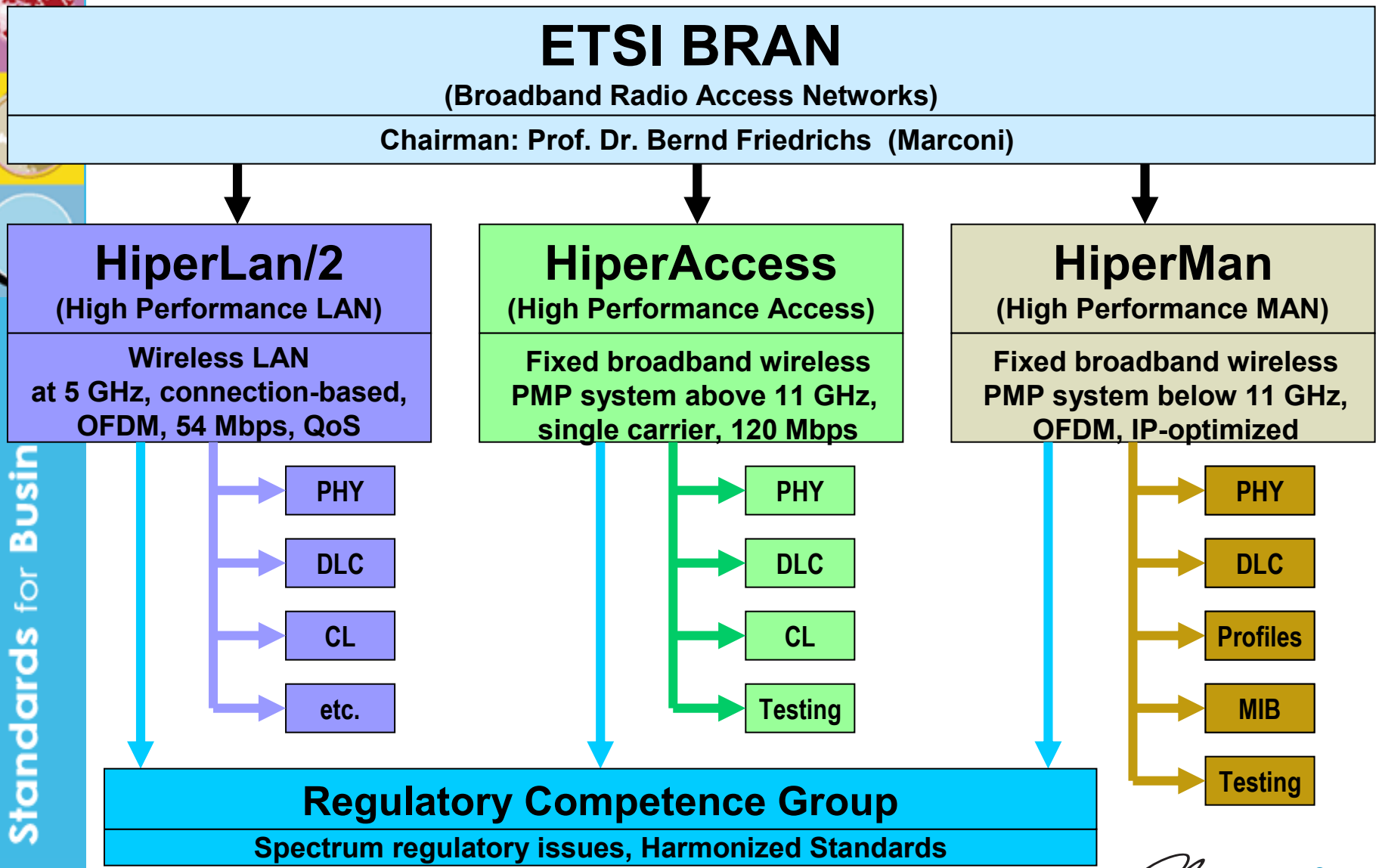
# TC BRAN Structure

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# TC BRAN - Main Areas of Activity

- Interoperable systems for Broadband Wireless Access
  - HiperAccess (for cellular and hotspot backhauling)
  - HiperMAN (fixed/nomadic wireless-DSL like system)
    - Interoperable standards
    - Point-to-Multipoint architecture
    - Base specifications (PHY layer, DLC layer, management)
    - Test specifications (radio and protocol conformance)
    - Harmonization with IEEE 802.16
    - Co-operation with WiMAX Forum
    - First publications in 2002 (HA) and 2004 (HM)

- Regulatory competence group
  - Development of Harmonised Standards covering essential requirements under article 3.2 of the R&TTE directive
  - Assistance to regulatory bodies to define spectrum requirements and radio conformance specifications for new broadband radio networks

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# TC BRAN - New and Finished Actvities

- New activities under discussion
  - Grid computing
  - Gigabit RLANs
  - WiMAX networking aspects
- Finished activities
  - HiperLAN/2 (comparable to IEEE 802.11a/h)
- Currently no activities
  - Interoperable specs for new gen. of RLANs (like IEEE 802.11n)
  - Ad-hoc networking
  - Personal wireless networking (like IEEE 802.15)
  - UWB
  - User aspects

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# TC BRAN Testing Actvities

- Test specifications
  - Normative part of standard
  - Controlled in the open forum in the same way as base specs
  - Actual testing and certification is left to industry and their associations
- Test methods
  - Good results from using advanced spec methods and languages
- Testing organization
  - Work is progressed through STF (Special Task Force)
  - STF funded by ETSI, operating under the guidance of BRAN
  - Supported by ETSI PTCC
  - All BRAN conformance test specs were produced in STFs
  - More than 70 docs were published in the last two years

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# TC BRAN Characteristics

- Benefitting from ETSI Experience with interoperable standards
  - GSM, DECT, 3G, Tetra, etc.
  - The working methods and approaches have given very good results in terms of interoperability
  - 3G considers the test specs „very good value for money“
- Base standards (air interface)
  - PHY and DLC layers independet of core network
  - Convergence sublayers for packet- and cell-base core networks
- Base standards (network)
  - The successful deployment of large-scale portable or mobile networks requires also the development of interfaces and protocols above the scope of the air interface
  - Work already started on MIB and management

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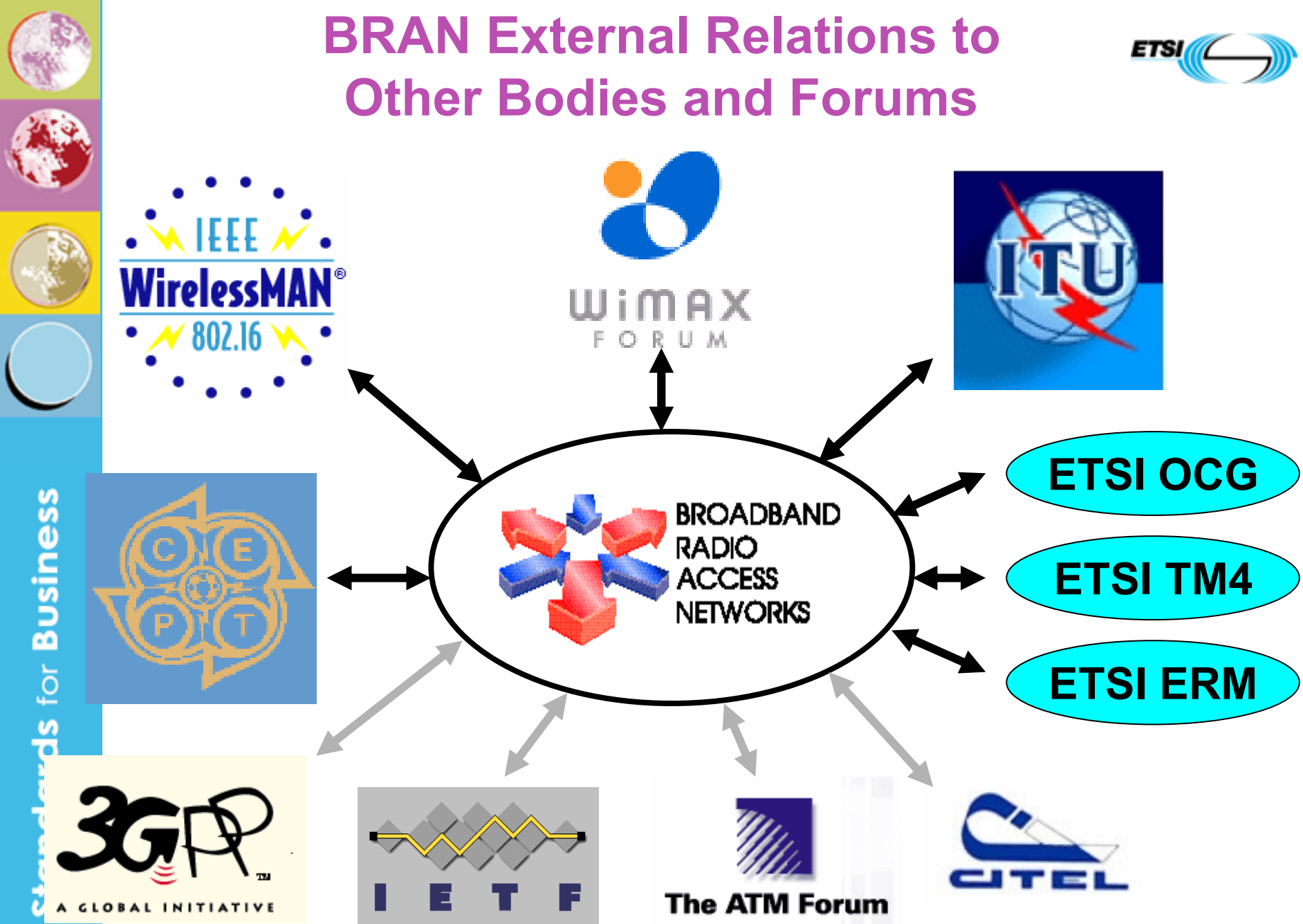
# BRAN External Relations to Other Bodies and Forums

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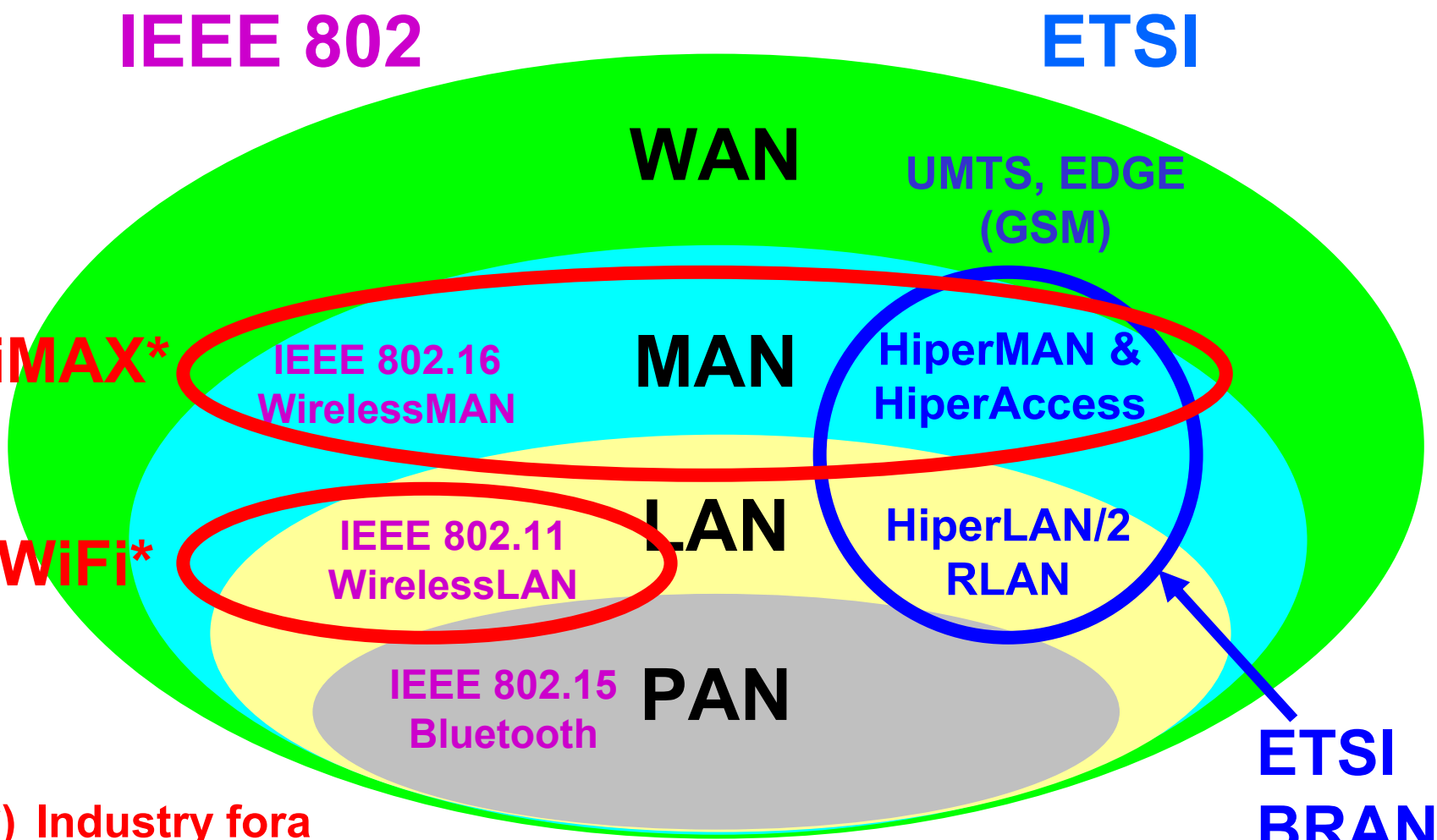
# Global Wireless Standards




*) Industry fora for promotion and certfication

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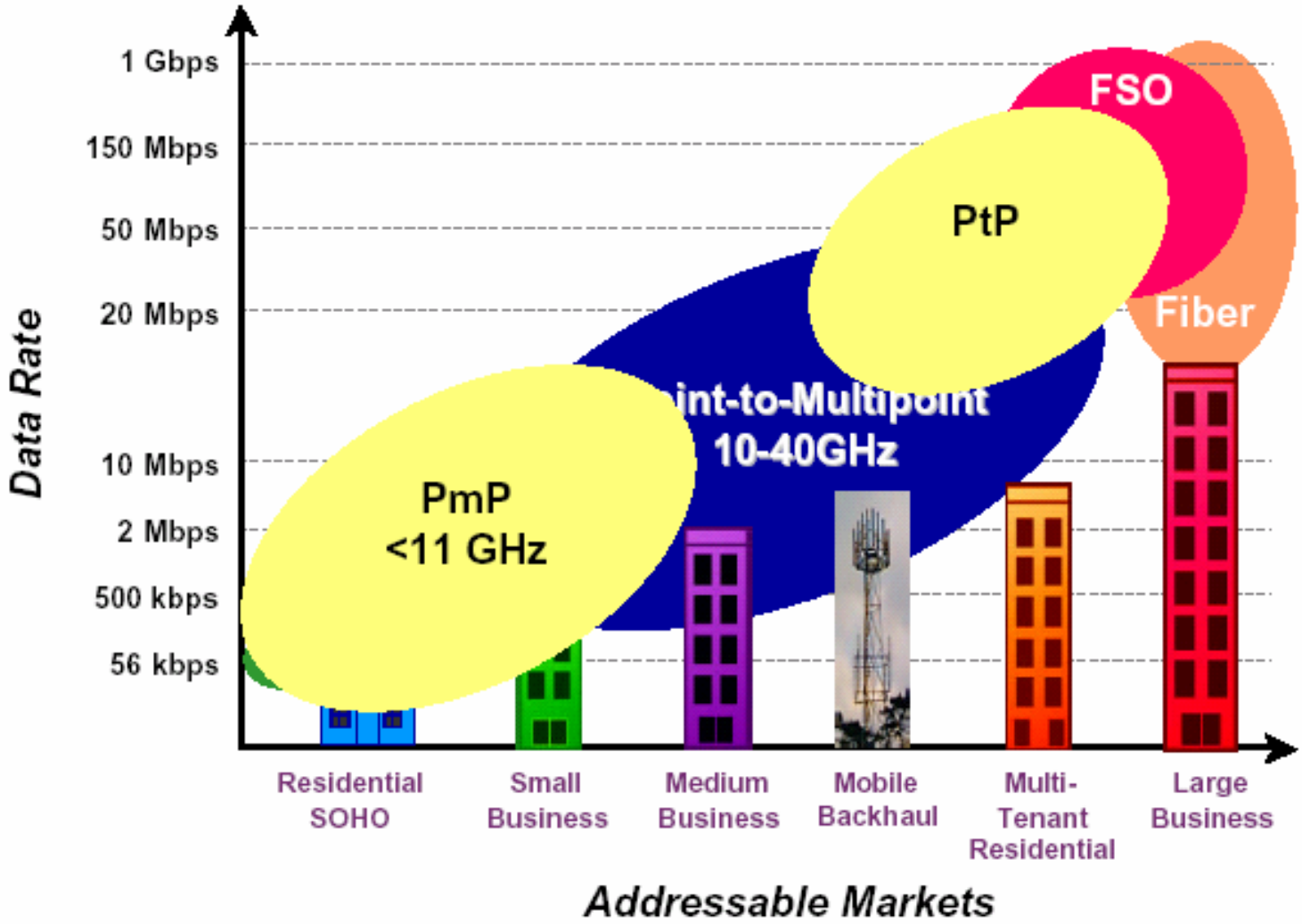
# Market Segments for Wireless Access




Source: Ken Stanwood, ITU-APT Seminar on BWA, Busan, Korea, Sept. 2004

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# HiperAccess Overview

- **Main applications**
  - UMTS backhauling
  - SOHO, SME
  - Typically too expensive for residential access (not intended as WLL or LMDS-type system)
- **Main technical features**
  - Optimized for ATM and Ethernet
  - Frequencies above 11 GHz, paired and unpaired bands
  - Based on single-carrier transmission
  - Data rates up to 120 Mbit/s
  - Range up to 12 km
- **Commercial roll-out**
  - First BRAN-compliant product was rolled-out in December 2004 (Point-to-Point derivative of HA)
  - Full HiperAccess-compliant products will be available in 2005
  - High interest from numerous operators

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# HiperMAN Overview

- **Main applications**
  - First release: FWA below 11 GHz
  - Residential (self installation), SOHO, SME (wireless DSL)
  - Mesh radio networks (radio based routers)

- **Features (100% selected by WiMAX Forum)**
  - Optimized for IP traffic, full QoS support
  - Both FDD and TDD, including H-FDD CPE
  - High spectral efficiency and data rates, up to 25 Mbit/s in 7 MHz
  - Adaptive modulation (from QPSK to 64-QAM)
  - Interoperability profiles for 1.75, 3.5, 7 and 10MHz
  - Uplink OFDMA (high cell radius possible, up to 50 km in PMP with directive antenna)
  - Support of advanced antenna systems (AAS)
  - High security TEK encryption algorithms
  - Works in high-multipath environments
  - Additional features (turbo and space-time coding)

# ETSI - WiMAX Cooperation Agreement

- Signed in April 2005
- ETSI and WiMAX have a common interest
  - to perform and promote standardization towards a global market
- ETSI and WiMAX co-operate for
  - Testing and certificating of HiperMAN
  - Standards development
  - Regulatory activities to provide the necessary spectrum
- WiMAX Forum
  - set up the certification scheme to assure interoperability
  - control all aspects of certification
- ETSI
  - is harmonizing and developing HiperMAN test specs (PICS, TSS&TP, ATS) that could be used for certification
  - offers unique resouces (TC MTS, PTCC, ETSI Plugtest Service)
  - has proven expertise in testing matters and track record of working with industry fora like WiMAX

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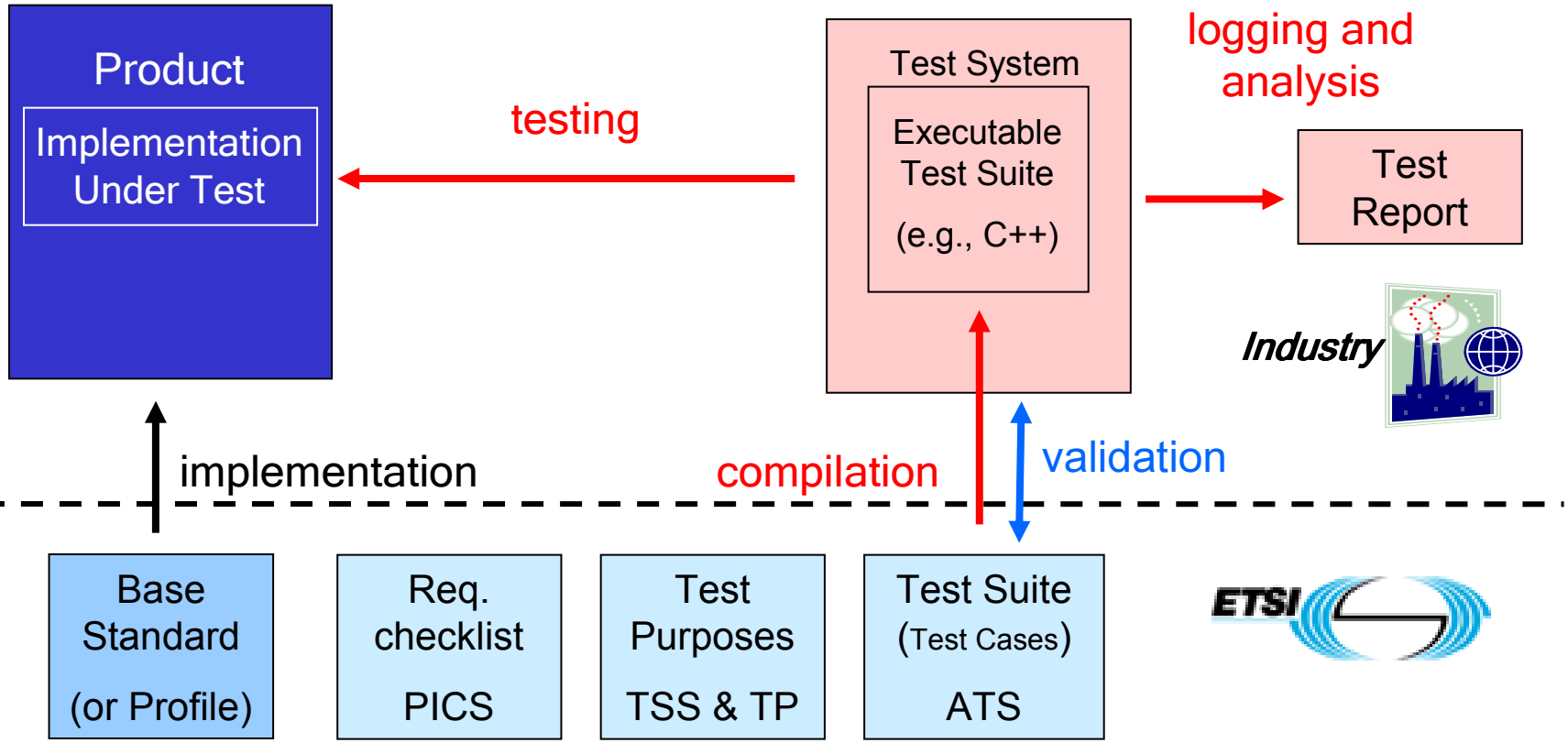
# ETSI - WiMAX Cooperation (3 of 3)
# Conformance Testing (ISO 9646 Scheme)




Continuous interaction between all partners is essential for the process
(WiMAX, BRAN, PTCC, STF, test house, test tool vendors, manufacturers)

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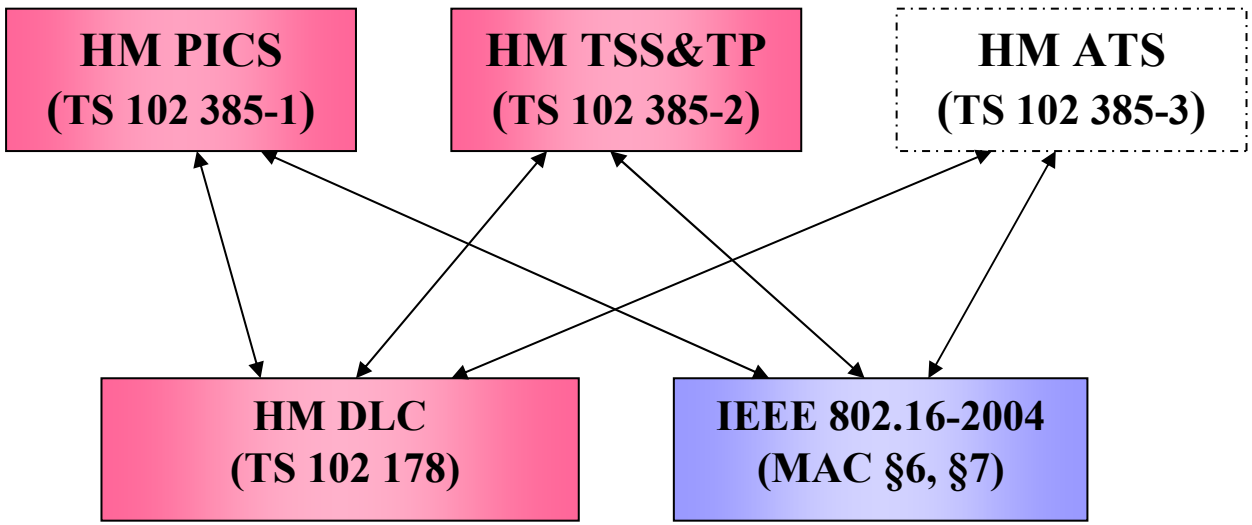
# HiperMAN – 802.16 Interoperability Protocol Testing

- Harmonization with WiMAX Conformance Testing
  - Common funding of ETSI STF-252
- IEEE 802.16-conf04 includes ETSI PICS as normative reference

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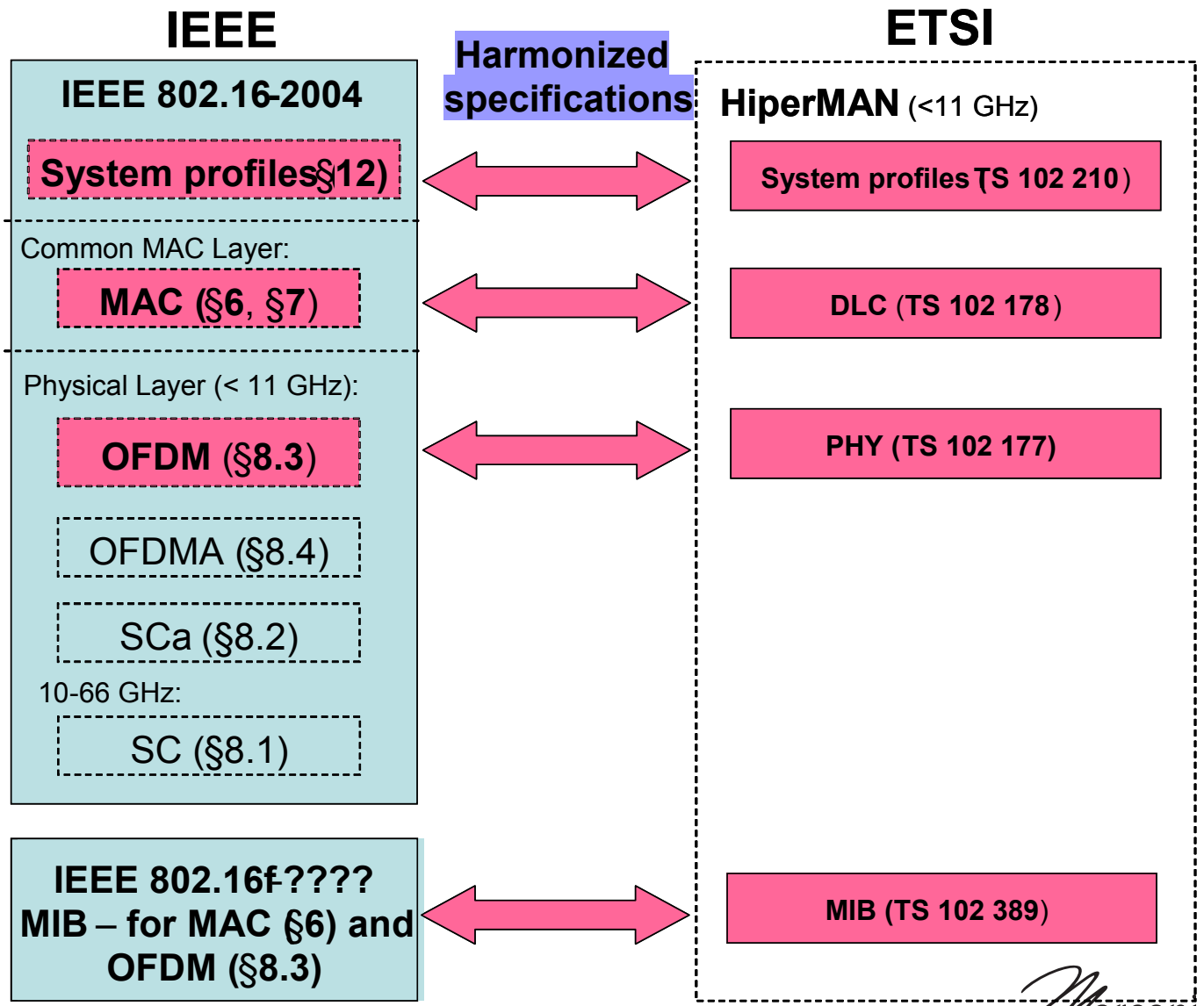
# ETSI HiperMAN and IEEE 802.16-2004 Interoperability



# ETSI HiperMAN and IEEE 802.16e

- Support of Fixed / Nomadic users
  - Terms of Reference limitation
  - IEEE 802.16e supports full mobility at hundreds km/h
  - HiperMAN will select the best cost-performance variant
    - The direction is to add the OFDMA PHY to the existing OFDM PHY
- Harmonization started
  - OFDMA PHY
    - Reuse 1 with omni-directional antenna
    - Rate multiplication with MIMO
    - SOFDMA = scalable with channel bandwidth
  - MAC functions
    - Power saving
    - Load balancing
    - PHY support
  - Encryption
- To finish end 2005

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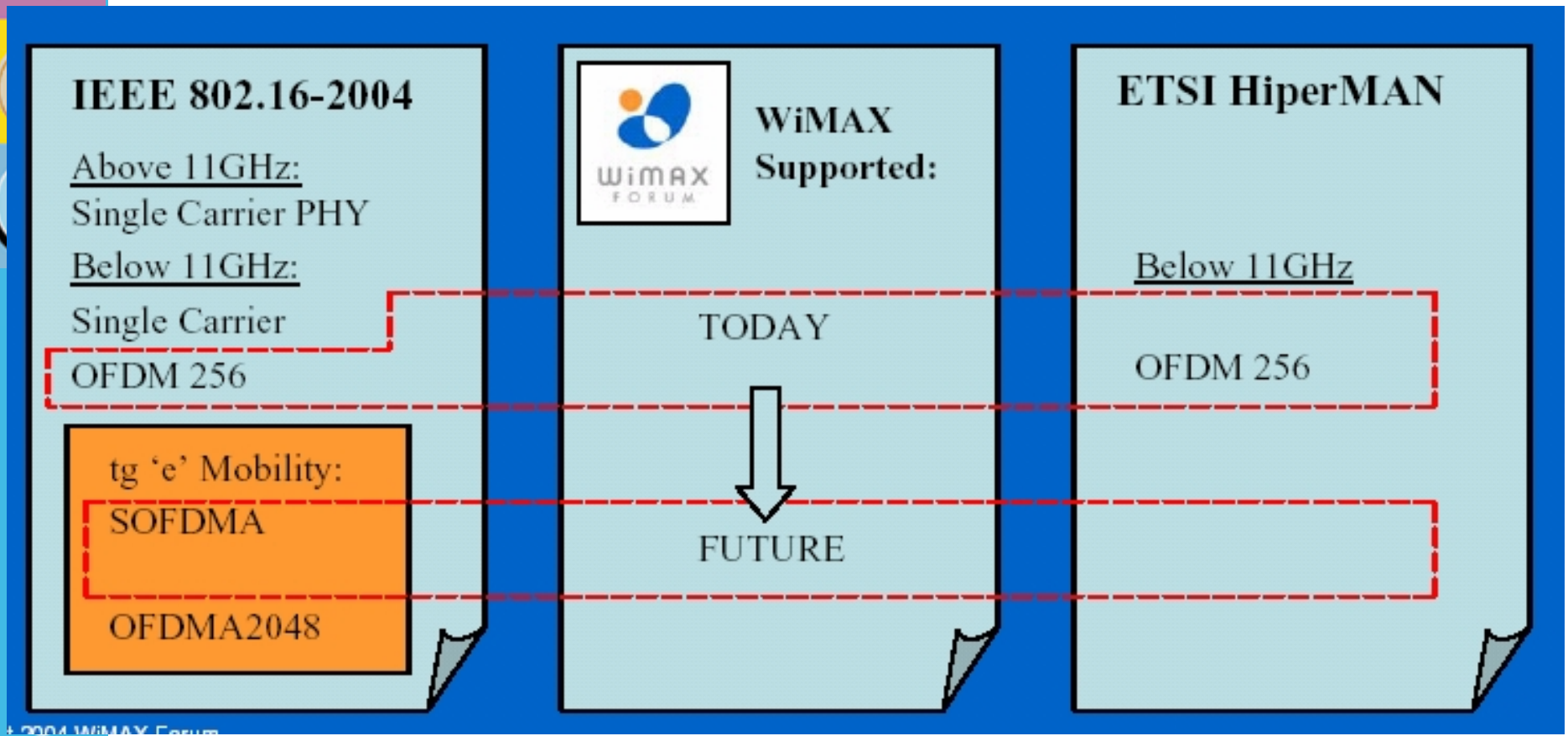
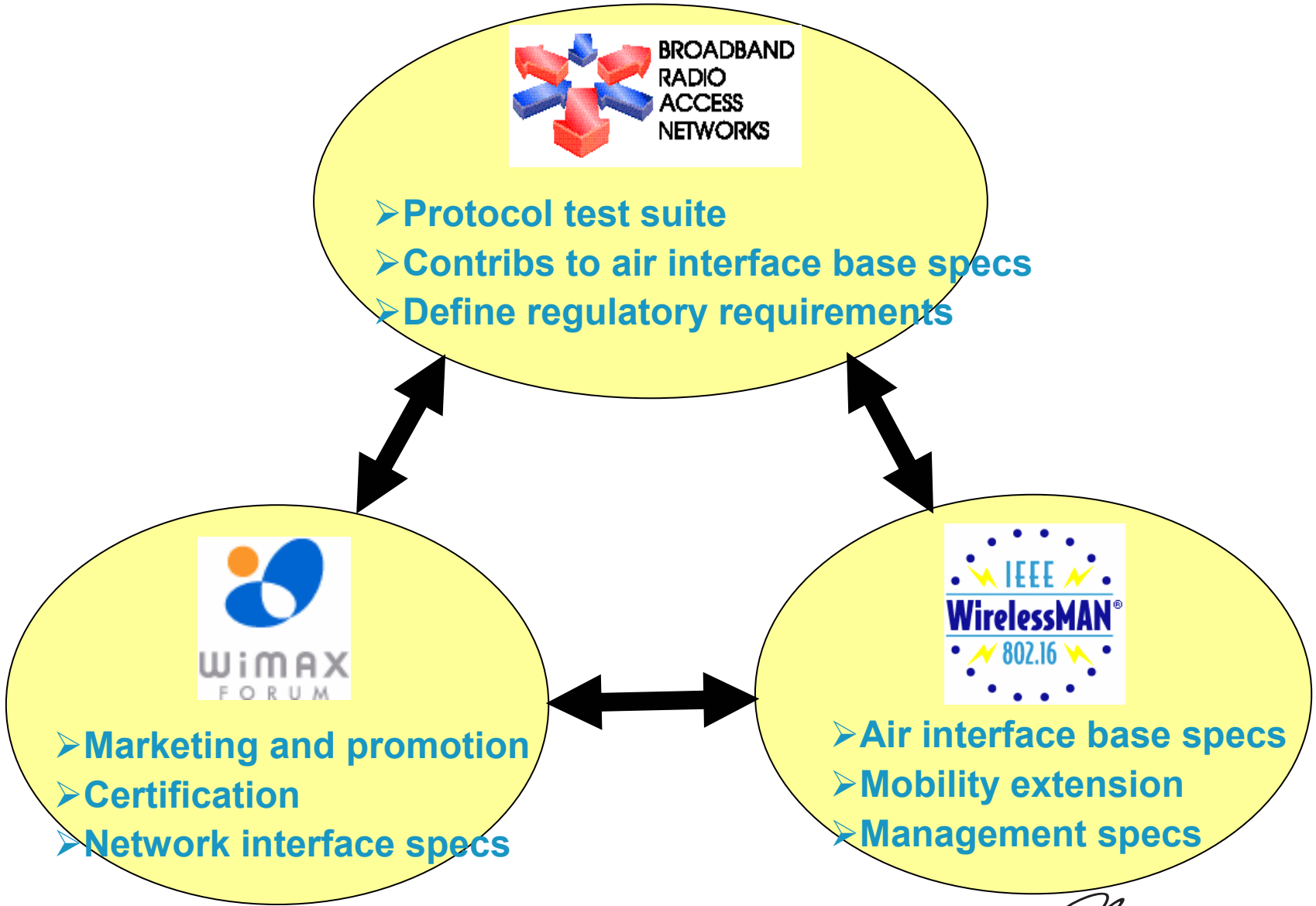
# Standards Relations (ETSI - IEEE)




Source: Barry Lewis: WiMAX Forum RWG Initial Profiles and Goals, July 2005

# Summary of Main Competence



# BRAN RCWG
# Regulatory Competence Working Group

- 5 GHz Harmonized EN (RLAN)
  - For European type approval in < 5.725 GHz
  - ETSI EN 301 893 v1.2.3 - 5 GHz high performance RLAN; Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
  - OAP closed in July 2005
- 5.8 GHz Harmonized EN (FWA)
  - For European type approval in 5.725 - 5.875 GHz
  - ETSI EN 302 502 v1.1.1 - 5.8 GHz fixed broadband data transmitting systems; Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive
  - PE-TAP started in August 2005
- Fixed-Nomadic System Reference Document (HiperMAN)
  - Fixed - Nomadic convergence of BWA systems
  - To be used by ECC for more spectrum allocation, will be considered in JPT BFWA

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# Justification of spectrum for BWA in Fixed/Nomadic SRD

- **Broadband for ALL**
  - "borderless European information space" including an "internal market for electronic communication and digital services“
  - The aim is to steer the convergence between internet, telephone and TV through increased competition in key "enabling" services such as high-speed broadband connections
  - "The use of the internet to provide voice telephony (VoIP) and television will revolutionise the way in which we communicate”
- **Digital divide**
  - Eastern Europe
    - Less than 1% penetration
  - Developed countries
    - Uncovered areas, mainly rural

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# Regulatory implications of new OFDM/OFDMA/802.16h technologies

- 12..15dB more in up-link
- 2dB better Noise Figure for BS
- BS power = CPE power + 14..17dB
  - CPE power = 20dBm
  - BS power = 34..37dBm!
- Beam forming: very high equivalent eirp
- Licensing rules shall allow BS eirp of 60dBm
  - Dual masks
    - Tight masks if no coexistence protocol is used
    - Relaxed masks if an inter-system coexistence protocol is used
- Light-licensing
  - Allow high Base Station powers
  - Ask for a inter-system coexistence protocol
    - Allow spectrum sharing in both frequency and time domains

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# Harmonized allocation of spectrum

- WiMAX, ETSI BRAN and IEEE collaborate in
  - ITU-R SG9 – Fixed
  - ETSI BRAN RCWG
    - SRD Fixed-Nomadic
- ECC has created the JTG for 3.4-3.8GHz and 5.8GHz
  - To identify the industry needs
  - Works in collaboration with ETSI BRAN and ETSI TM4
- Spectrum liberalization is promoted by UK and Norway only
  - No restrictions to Fixed, Mobile, Nomadic use

# License Exempt Spectrum

- Big users
  - Wireless ISP
  - Municipalities
  - Vertical applications
- Europe
  - 2.4GHz is power limited
    - Not usable for WDSL
  - 5GHz is power limited
    - May be used for backhauling

**No suitable LE spectrum exist!**

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# Conclusions

- Wireless BROADBAND industry needs GLOBAL standards
  - Drive costs down!!!
- ETSI BRAN supports harmonization efforts with other parallel standardization bodies
- IEEE 802.16 - BRAN co-operation shows
  - What can be achieved
  - How standard bodies can contribute to each other
- WiMAX Forum – ETSI BRAN co-operation
  - Important signal to the market
  - ETSI benefits from WiMAX marketing and certification
  - WiMAX Forum benefits from ETSI Testing
- Regulatory aspects not resolved
  - Spectrum availability, for both Licensed and LE
  - Spectrum liberalization: Fixed, Nomadic, Mobile use
  - Spectrum attributes: high BS power allowance

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# For more information…

- http://portal.etsi.org/bran
  (ETSI portal)
- http://www.etsi.org/ptcc
  (ETSI PTCC and testing issues)
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- marianna.goldhammer@alvarion.com
  (HiperMAN Chairman, BRAN Vice-Chairman)

BROADBAND RADIO ACCESS NETWORKS

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