ETSI BRAN Technical Committee

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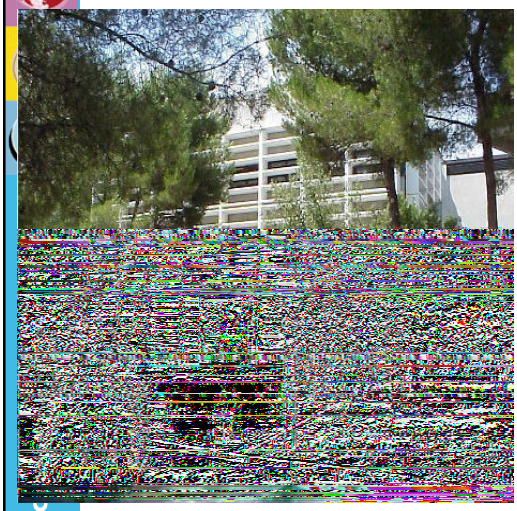
Overview

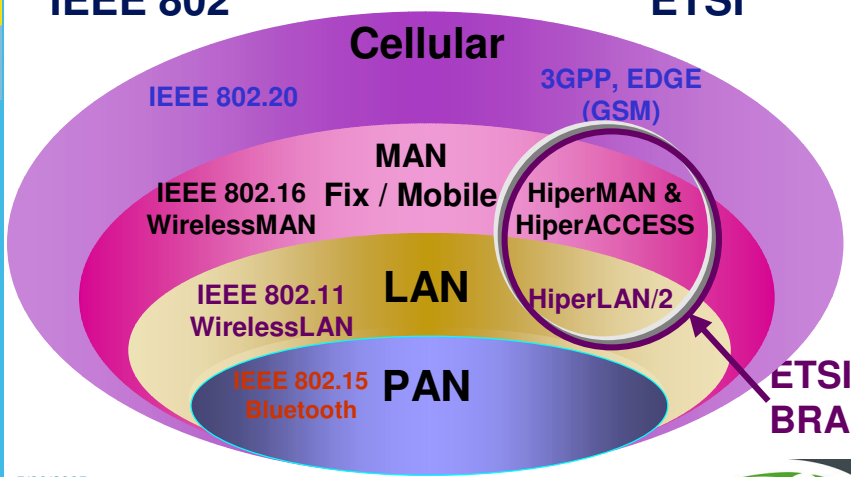
- ETSI BRAN structure
- BRAN HiperLAN,HiperAccess and HiperMAN
- Relations to standardization bodies and forums
  - Colaboration with IEEE 802.16
- Co-operation ETSI - WiMAX Forum
- Spectrum
- Drafting in IEEE 802.16
- Conclusions

European Telecommunications Standards Institute

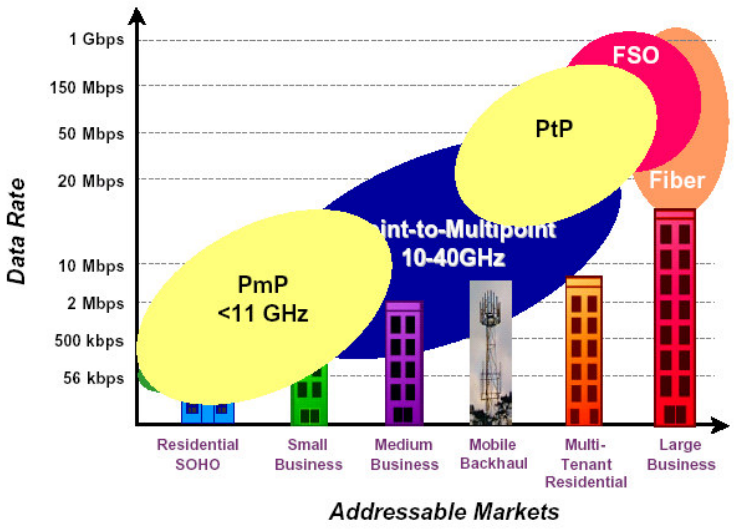


- ~700 member companies from 55 contries in 5 continents
- ~11,000 technical standards and deliverables since 1988
- ~60 co-operation agreements
- Established in 1988, based in Sophia Antipolis, Nice Cote d'Azur (France)
- www.etsi.org

Global Wireless Standards



Market Segments for Wireless Access



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

BRAN Structure

ETSI BRAN
(Broadband Radio Access Networks)
Chairman: Bernd Friedrichs (Marconi)

HiperLan/2	HiperAccess	HiperMAN
(High Performance LAN)	(High Performance Access)	(High Performance MAN)
Wireless LAN at 5 GHz, connection-based, OFDM, 54 Mbps, QoS	Fixed broadband wireless PMP system above 11 GHz, single carrier, 120 Mbps	Fixed broadband wireless PMP system below 11 GHz, OFDM, IP-optimized
PHY	PHY	PHY
DLC	DLC	DLC
CL	CL	Profiles
etc.	Testing	MIB
		Testing

Regulatory Competence Group
Spectrum regulatory issues, Harmonized Standards

BRAN Characteristics (1 of 3) General

- ETSI Experience
  - 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

BRAN Characteristics (2 of 3) Testing

- Test specifications
  - Normative part of standard
  - Controlled in the open forum in the same way as the base specs
  - Actual testing and certification is left to industry and their associations
- Test methods
  - Good results from using advanced spec methods and languages
  - For the first time, virtual protocol testing (UDP/IP based, via API) was used, showing the capability to detect and resolve potential problems in implementations before the HW becomes available

BRAN Characteristics (3 of 3) STFs

- Testing organization
  - Work is progressed through STF (Special Task Force)
  - STF funded by ETSI, operating under the guidance of BRAN
  - Supported by PTCC (Protocol and Testing Competence Center)
- BRAN STF
  - All BRAN conformance test specifications were produced in STFs
  - More than 70 documents were published in the last two years
  - About $ 2,000,000 funding was spent for BRAN STFs
  - About $ 600,000 total cost were spent for HiperMAN / WiMAX

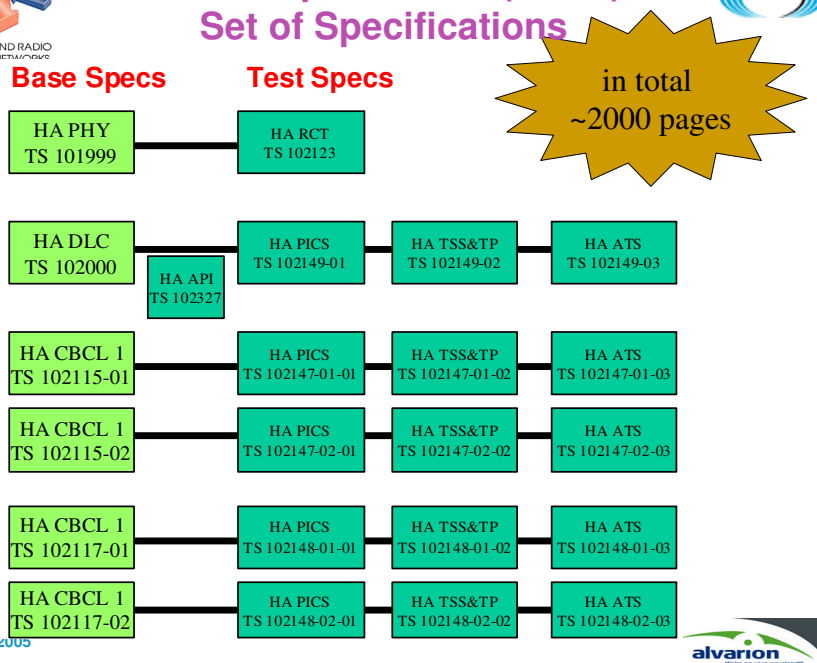
HiperLAN/2

- For corporate, public and home environments
- Wireless access to the Internet and future multimedia
- 20 technical documents published
  - PHY: ETSI TS 101 475: 20MHz channel, OFDM PHY (harmonized with IEEE 802.11)
  - DLC: ETSI TS 101 761: QoS, enabling real time video services at speeds of up to 54 Mb/s
  - Ethernet and ATM convergence layers
- Maintenance active
- Harmonization with MMAC (Mobile Multimedia Access Comm.) - Japan
- HiperLAN/2 Global Forum
  - http://www.hiperlan2.com
- More details at:
  - http://portal.etsi.org/bran/kta/Hiperlan/hiperlan2.asp

BRAN HiperAccess (1 of 3) Overview

- Main applications
  - UMTS backhauling
  - SOHO, SME
- ETSI BRAN developed protocol stack and radio specifications
- Optimized for ATM and Ethernet
- 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

BRAN HiperAccess (2 of 3) Set of Specifications



BRAN HiperAccess (3 of 3)
Basic Features PHY Layer

- Focus on frequency bands
  - 40.5 - 43.5 GHz, 31.8 - 33.4 GHz, 27.5 - 29.5 GHz, 24.5 - 26.5 GHz, etc.
- Channel size = 28 MHz, Baudrate = 22.4 MBaud
  - Paired bands (FDD mode, fixed asymmetric rates)
  - Unpaired bands (TDD mode, adaptive asymmetric rates)
- Important parameters =>
  - Frame based
    - 1 ms frames
    - Optional adaptive TDD mode (unpaired bands), H-FDD terminals, ARQ
  - Fixed length PDUs
    - Efficient support of ATM and IP, robust, high QoS, allows ARQ

	Downlink (AP → AT)	Uplink (AT → AP)
Data rates (Mbit/s)	20...120 (typically 80)	20...80 (typically 50)
Transmit power	15 dBm	14 dBm
Range	up to 12 km (hard limit from ranging, effectively depending on availability and rain zone)	

BRAN HiperMAN (1 of 3)
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

HiperMAN benefits (2 of 3)

- Defined, for FWA, just OFDM mode instead of 3 PHY modes in 802.16
- Robustness
  - Works in high multi-path environments
- Much larger cell sizes
  - At same CPE output power, up-link OFDMA / sub-channelization on FFT 256 gives 12dB more
- Lower fade margin with Space-Time Coding
  - 2 diversity antennae on Base Station give 5-7dB
- Turbo-coding
  - 2dB more
- Conclusion
  - optimal cost-performance compromise on OFDM mode
  - HiperMAN has defined the up-link sub-channelization for much higher cell-size

BRAN HiperMAN (3 of 3) Technical Specifications

- Basic standards (v1- 11.2003, v2 – 01.2005)
  - ETSI TS 102 177 PHY layer
  - ETSI TS 102 178 DLC layer
  - ETSI TS 102 210 System profiles
- Management – v1- 01.2005
  - ETSI TS 102 389 MIB
- Testing – v1 – 02.2005
  - ETSI TS 102 385-1 DLC Testing – PICS – 02.2005
  - ETSI TS 102 385-1 DLC Testing – TSS&TP – 02.2005
- Other
  - Functional Requirements
    - ETSI TR 101 856
  - System Reference Documents
    - ETSI TR 102 079 for the band 5.725 GHz to 5.875 GHz
- Drafting activity
  - Support for Fixed/Nomadic systems, based on IEEE 802.16e
  - Harmonization with WiMAX on PICS, TSS&TP
  - ATS for WiMAX/ETSI Protocol Conformance Testing

BRAN RCWG (1 of 6)
Regulatory Competence Working Group

- 5 GHz Harmonized EN (RLAN)
  - To be used 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
- 5.8 GHz Harmonized EN (FWA)
  - To be used for European type approval in 5.725 - 5.975 GHz
- Fixed-Nomadic System Reference Document (HiperMAN)
  - Fixed - Nomadic convergence of BWA systems
  - To be used by ECC for more spectrum allocation

Justification of spectrum for BWA in Fixed/Nomadic SRD (2 of 6)

- 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

Data traffic for Broadband applications (3 of 6)

- Target services: Triple play + Nomadic
  - Broadcast component
    - 25 regular video-channels, MPEG2 compressed at 2Mb/s
    - 10 HDTV channels, MPEG4 compressed at 6Mb/s
    - aggregate data rate = 110Mb/s
  - VDSL like shared component
    - Peak: 7Mb/s, UL+DL, shared between 20 users
    - VoD using MPEG2, at 2Mb/s: 20% of users
    - VoD using MPEG4, for HDTV, at 6Mb/s: 10% of users
    - 2 frequencies / cell

```
ERROR: rangecheck
OFFENDING COMMAND: .buildcmap

STACK:

-dictionary-
/WinCharSetFFFF-V2TT9BF4ACCAt
/CMap
-dictionary-
/WinCharSetFFFF-V2TT9BF4ACCAt
```