

**ITU/BDT Regional Seminar on Broadband Wireless Access
for Rural and Remote Areas for Africa
Yaoundé (Cameroon), 18-21 September 2006**

BWA Standards Developed by ETSI BRAN

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**TC BRAN - Main Areas (1 of 3)
Interoperable Systems**

- Interoperable systems for Broadband Wireless Access (BWA)
 - HiperAccess (for cellular and hotspot backhauling)
 - HiperMAN (fixed/nomadic wireless-DSL like system, also appropriate for rural and remote areas)
- Base specifications (PHY layer, DLC layer, management)
- Test specifications (radio and protocol conformance)
- International cooperation
 - Harmonization with IEEE 802.16
 - Co-operation with WiMAX Forum
- First publications in 2002 (HA) and 2004 (HM)

Definition of „Interoperability“: to ensure communication between devices (base stations, terminals) from different vendors


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TC BRAN - Main Areas (2 of 3) Regulatory Activities

- ❑ **Regulatory competence working group (RCWG)**
 - Established in 2004, as „horizontal“ group
 - Coordination of all spectrum related and regulatory issues
 - Assistance to regulatory bodies to define spectrum requirements and radio conformance specifications for new broadband radio networks
- ❑ **Deliverables**
 - Development of Harmonised Standards covering essential requirements under article 3.2 of the R&TTE directive (HEN)
 - System Reference Documents (SRDoc)


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TC BRAN - Main Areas (3 of 3) Testing

- ❑ **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
 - More than 80 docs were published in the last three years
- ❑ **Cooperation with Industry Forums (WiMAX)**
 - Development of protocol conformance test specs for HiperMAN, co-funded by WiMAX Forum


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HiperAccess - Overview

- ❑ **Main applications**
 - UMTS backhauling
 - SOHO, SME
 - Typically too expensive for residential access / WLL / LMDS
- ❑ **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**
 - HiperAccess-compliant products available since in 2005
 - High interest from numerous operators

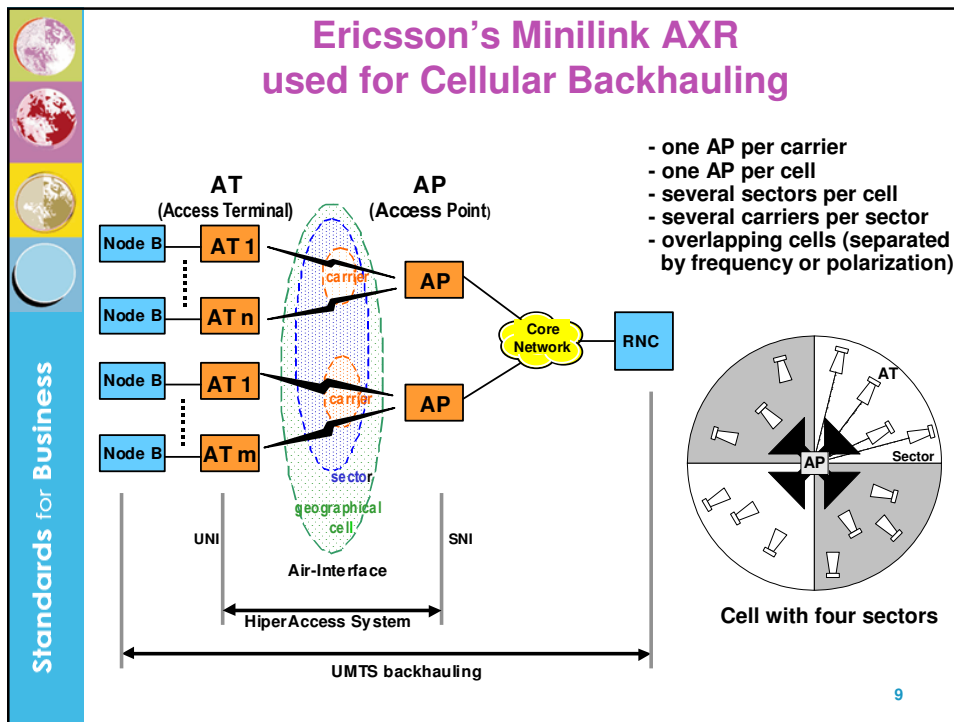
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Ericsson's Minilink AXR (Access Radio) Product Line ... based on ETSI HiperAccess

- ❑ **AXR enables operators to...**
 - benefit from packet/cell-based radio system
 - support cellular backhauling networks (2G, 3G, WiFi, WiMAX,...)
 - support broadband applications for business customers
- ❑ **AXR delivers distributed intelligence**
 - Any radio access node supports broadband multiservice
 - Embedded switching and traffic shaping
 - Wide range of traffic interfaces
- ❑ **AXR is topology-agnostic, supported topologies are...**
 - Point-to-Point, Point-to-Multipoint, Mesh...
 - leading to capex and opex savings due to reduced product variety
- ❑ **AXR key differentiator**
 - Adaptive operation to changing propagation and traffic patterns for maximum transmission capacity in any situation
 - Link range can be optimized versus capacity
 - Support of ATM PNNI (facilitating E2E connection setup, dynamic routing, resilience in suitable networks)

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- ### HiperMAN (1 of 3) Basic Features
- HiperMAN 1.2.1 - for fixed (FWA) use
 - HiperMAN 1.3.2 - for Fixed / Nomadic (FWA/NWA) use
 - PMP and Mesh architecture
 - Optimized for...
 - frequency bands below 11 GHz without LOS
 - IP traffic
 - FDD and TDD
 - Existing profiles: 1.75, 3.5, 7 and 10 MHz bandwidth
 - Can be extended up to 28MHz
 - Fully harmonized with IEEE 802.16-2004 and 802.16e-2005, for OFDM/OFDMA PHY modes
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HiperMAN (2 of 3) Advanced Features

- ❑ OFDM and SOFDMA PHY modes, for both Fixed/Nomadic applications
- ❑ Large cell size, suitable for Rural/Remote applications
 - Up to 50 km with directive antennas
 - Robust (against high multi-path and interference environments)
 - Support of advanced antenna systems (AAS)
 - Space-Time coding (2 diversity antennas on BS give 5-7dB)
 - Turbo-coding (2.5 dB more)
 - MIMO (4*4 quadruples efficiency, 2*2 is more economical and gives 7 bit/s/Hz)
 - Low power consumption (allows solar batteries)
- ❑ Adaptive modulation and coding (from QPSK to 64-QAM)
- ❑ Achieves 12...18 dB more system gain for same CPE TX power
- ❑ High security TEK encryption algorithms
- ❑ Load balancing between Base Stations

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HiperMAN (3 of 3) Technical Specifications

- ❑ Base standards (fixed/nomadic – v1.3.1)
 - ETSI TS 102 177 PHY layer
 - ETSI TS 102 178 DLC layer
- ❑ System Profile (v1.2.1 - 01.2005)
 - ETSI TS 102 210 System profiles
- ❑ DLC Conformance Testing (fixed) (v2.1.2–03.2006)
 - ETSI TS 102 385-1 PICS
 - ETSI TS 102 385-2 TSS&TP
 - ETSI TS 102 385-3 ATS
- ❑ DLC Conformance Testing (v1.3.1)
 - expected mid 2006, ATS architecture in Feb.06
- ❑ Management (v1.1.1 – 01.2005)
 - ETSI TS 102 389 MIB

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Alvarion's BreezeMAX Product Line
 ... based on ETSI HiperMAN / IEEE 802.16

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802.16
Small / Large Enterprise

NLOS

NMS

Data Network

PSN

802.16

Hotspots

802.16

Residential WiFi & Home Networking


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Alvarion's BreezeMAX

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- ❑ Designed for WiMAX fixed, portable and mobile deployment scenarios
- ❑ Tested and approved by major operators all over the world
- ❑ Over 100 installations worldwide (commercial deployments and trials)
- ❑ Scalable, high capacity base station architecture
 - Macro and micro base station architectures
 - Advanced diversity and smart antenna techniques
- ❑ Rich CPE portfolio
 - Indoor self install and outdoor CPE options with embedded Intel PRO/Wireless 5116 (WiMAX chip)
 - Data, voice and WiFi network interface
- ❑ Excellent coverage
 - Proven NLOS performance using OFDM/OFDMA radio technology
 - Diversity and smart antenna techniques
- ❑ Flexible deployment configurations
 - Various operating frequencies (1.5 - 6GHz) and duplexing (FDD, TDD)
 - Adaptable channel bandwidth 1.75-14MHz
- ❑ All Applications, All Markets, Anywhere!
 - Residential & enterprises, high density and rural zones
 - Triple play: voice, data, video, QoS supporting simultaneous multiple applications
- ❑ Carrier-grade NMS

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ETSI - WiMAX Cooperation Agreement

- ❑ **Status**
 - The initial version of the agreement was signed in April 2005
 - It contained the annex specifying the work planned for 2005
 - New amendment covering work agreed for 2006 was signed in February 2006
- ❑ **ETSI and WiMAX confirmed their common interest**
 - to perform and promote standardization towards a global market
- ❑ **ETSI and WiMAX co-operate for**
 - Testing and certification 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 further developing HiperMAN/WiMAX test specs (PICS, TSS&TP, ATS) that are being used for certification
 - Contributes to the validation effort together with test tool developers and certification laboratory

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HiperMAN testing (1 of 3) Achievements in 2005

- ❑ Growing understanding and collaborative spirit
- ❑ Mailing list with 160 members from ~100 companies
- ❑ The first release of jointly developed HiperMAN/WiMAX test specifications approved in October and published in December 2005
 - PICS – Protocol Implementation Conformance Statement
 - TSS&TP – Test Suite Structure and Test Purposes
 - ATS – Abstract Test Suite, including TTCN-3 code for test cases
- ❑ The tests (close to 60 test cases) are implemented and ready for use in the first wave of WiMAX certification

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HiperMAN testing (2 of 3) Plans and first results for 2006

- ❑ **Plans**
 - Two phases, covering HiperMAN/802.16 corrigenda and amendments
 - Close to 500 k€ devoted to test development in STF252, co-funding (50% ETSI, 50% WiMAX Forum)
 - Detailed planning available but also constantly evolving
- ❑ **Certification start achieved**
 - January 19th 2006 WiMAX Forum™ Announced First WiMAX Forum Certified™ Products
 - In the announcement Ron Resnick, president of the WiMAX Forum said: “The achievement of Certification is a result of the successful collaboration of our Certification Working Group, ETSI, Cetecom Spain and WiMAX system suppliers.”
- ❑ **Second release of HiperMAN/WiMAX test specs**
 - approved in April 2006 and expecting publication
 - Start of WiMAX wave 2 certification expected during the spring 2006

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HiperMAN testing (3 of 3) Plans for 2007

- ❑ Further work on test specifications is expected and planned for 2007
- ❑ Detailed plans will be elaborated for discussion at BRAN meeting in July 2006
- ❑ During the summer, the plans will be further refined and submitted to the Boards of ETSI and WiMAX Forum for their approval
- ❑ Expecting that the plans will receive the required support, the update of the co-operation agreement will be prepared for signature towards the end of 2006


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HiperAccess testing Achievements in 2005

- ❑ The Hiperaccess test specifications were updated and aligned with the latest changes in the Hiperaccess DLC and PHY standards
- ❑ A degree of test case validation was achieved
- ❑ Validation was done
 - Against the test tool simulating the opposite peer entity
 - Against the SDL model simulating the opposite peer entity
- ❑ The communication between peer entities was done using the UDP/IP transport
- ❑ This innovative method can be very useful in situations where real radio based test tools are not available

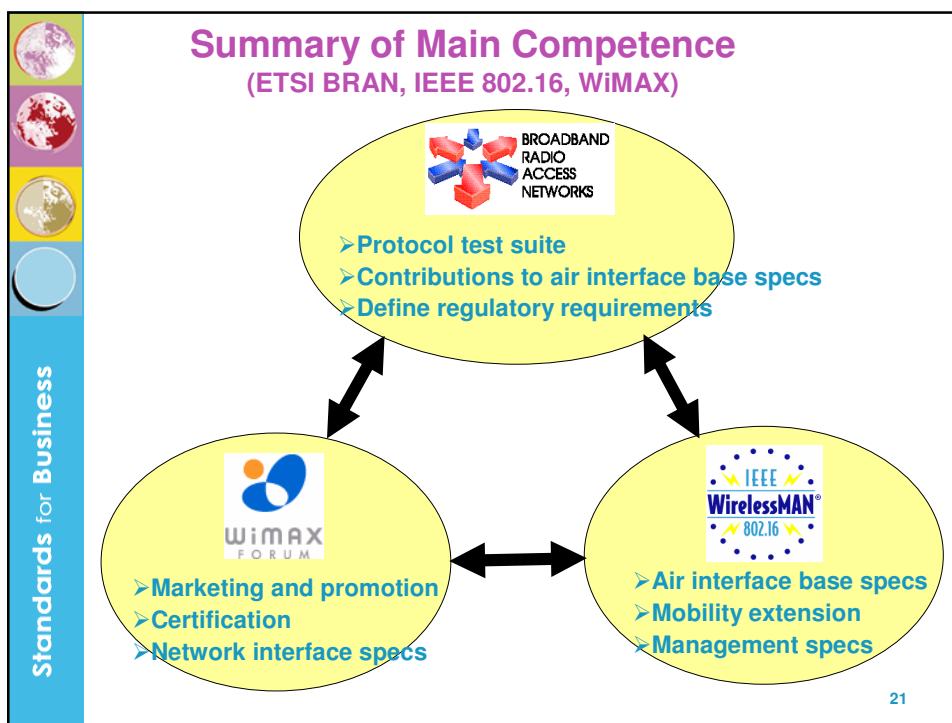
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RCWG Overview

- ❑ 5 GHz Harmonized EN 301 893 (RLAN)
 - To be used for European type approval in < 5.725 GHz
 - Version 1.3.1 to be published in OJEC
 - Revisions for higher throughput technologies (MIMO, bonding)
- ❑ 5.8 GHz Harmonized EN 302 502 (FWA)
 - To be used for European type approval in 5.725 - 5.875 GHz
 - Currently resolution activities to resolve comments from PE
- ❑ 2.6 GHz Harmonized EN (Personal broadband systems - WiMAX)
 - Respecting ECC Dec(05)05
 - Coordination with ERM/MSG TFES (EN 301 908)
- ❑ SRDoc TR 102 453 (Converged Fixed-Nomadic BWA)
 - To be used by ECC for more spectrum allocation
 - Split in Part 1 (3.4 to 3.8 GHz) and Part 2 (< 3.4 GHz)
- ❑ SRdoc on Wireless Gigabit Systems @ 60 GHz

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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 - BRAN co-operation**
 - Important signal to the market
 - ETSI benefits from WiMAX marketing and certification
 - WiMAX Forum benefits from ETSI experience and work approach
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Thank You!

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