



**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
 Marconi Communications, Germany
 ETSI TC BRAN Chairman**

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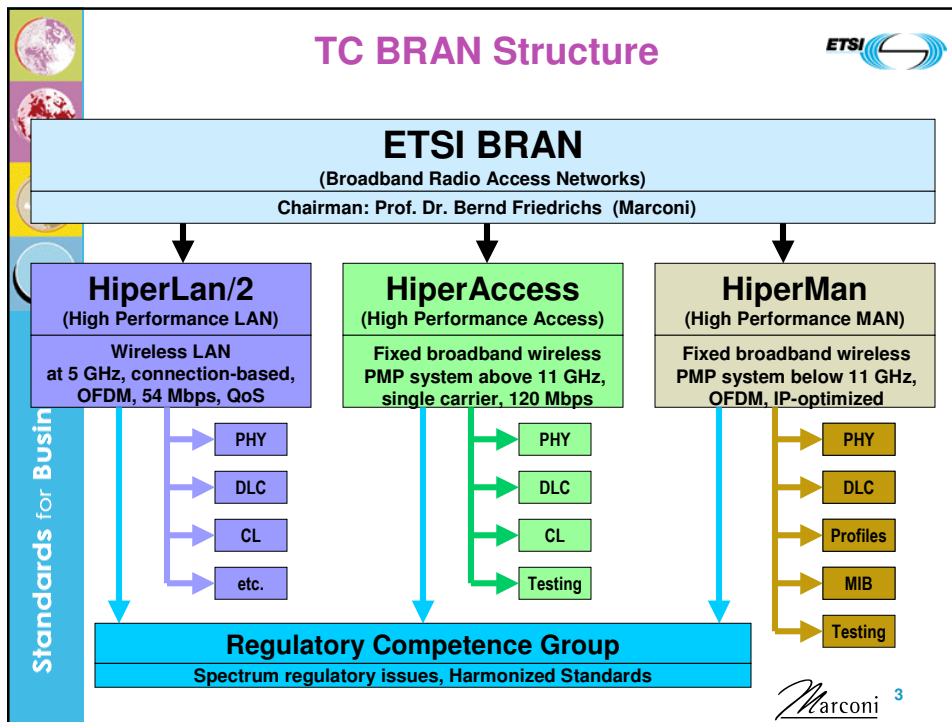


**ETSI
 (European Telecommunications
 Standards Institute)**






- ❑ ~700 member companies from 55 countries 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 - 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 Activities


- ❑ **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 Activities

- ❑ **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 independent of core network
 - Convergence sublayers for packet- and cell-based core networks

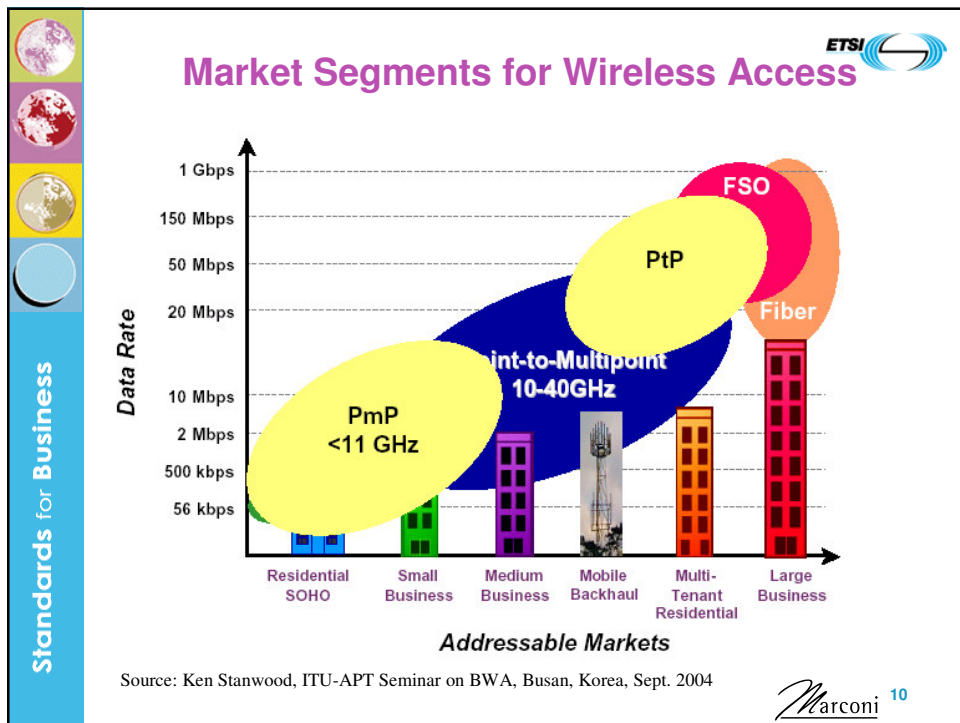
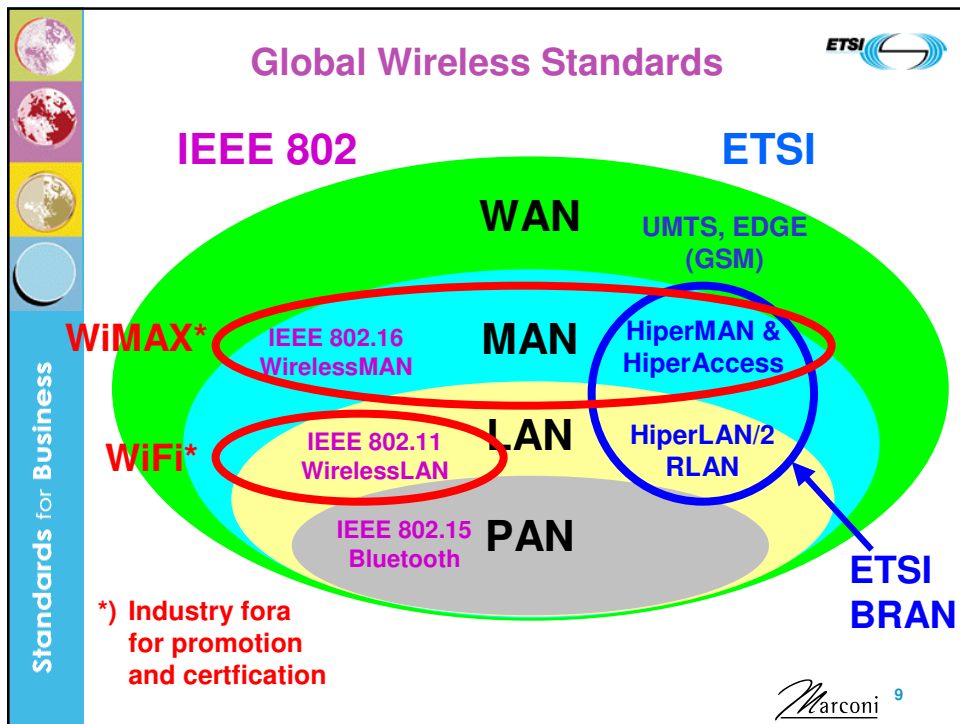
- ❑ **Base standards (network)**
 - The successful deployment of large-scale portable or mobile networks requires also the development of interfaces and protocols above the scope of the air interface
 - Work already started on MIB and management



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BRAN External Relations to Other Bodies and Forums

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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

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)



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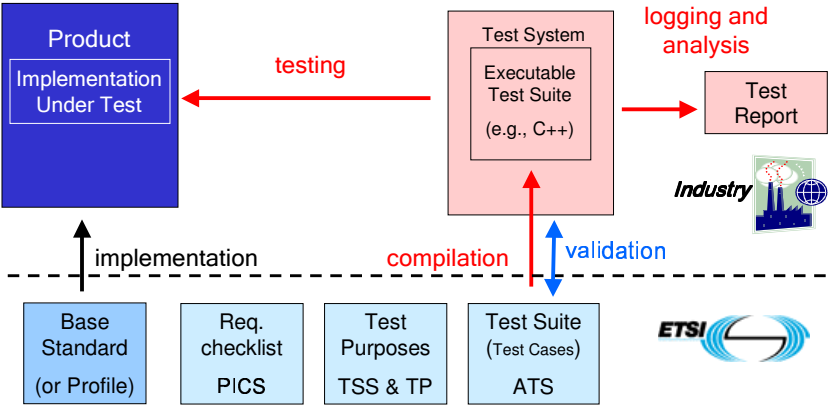
ETSI - WiMAX Cooperation Agreement

- ❑ 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 certifying 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 resources (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)



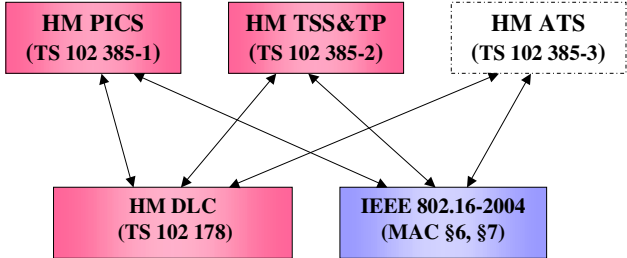
The diagram illustrates the ISO 9646 conformance testing process. It is divided into two main sections by a dashed line. Below the dashed line, four boxes represent the input artifacts: Base Standard (or Profile), Req. checklist (PICS), Test Purposes (TSS & TP), and Test Suite (Test Cases) (ATS). An arrow labeled 'implementation' points from the Base Standard to the Product Implementation Under Test. An arrow labeled 'validation' points from the Test Suite to the Test System. An arrow labeled 'compilation' points from the Test Suite to the Executable Test Suite (e.g., C++) within the Test System. An arrow labeled 'testing' points from the Test System to the Product Implementation Under Test. An arrow labeled 'logging and analysis' points from the Test System to the Test Report. The Test System is associated with the 'Industry' logo. The ETSI logo is also present.


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 

IEEE	Harmonized specifications	ETSI
IEEE 802.16-2004 System profiles §12	↔	HiperMAN (<11 GHz) System profiles TS 102 210
Common MAC Layer: MAC (§6, §7)	↔	DLC (TS 102 178)
Physical Layer (< 11 GHz): OFDM (§8.3)	↔	PHY (TS 102 177)
OFDMA (§8.4)		
SCa (§8.2)		
10-66 GHz: SC (§8.1)		
IEEE 802.16f???? MIB – for MAC (§6) and OFDM (§8.3)	↔	MIB (TS 102 389)


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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




Standards Relations (ETSI - IEEE)

IEEE 802.16-2004

Above 11GHz:
Single Carrier PHY

Below 11GHz:
Single Carrier
OFDM 256

tg 'e' Mobility:
SOFDMA
OFDMA2048



WiMAX Supported:

TODAY


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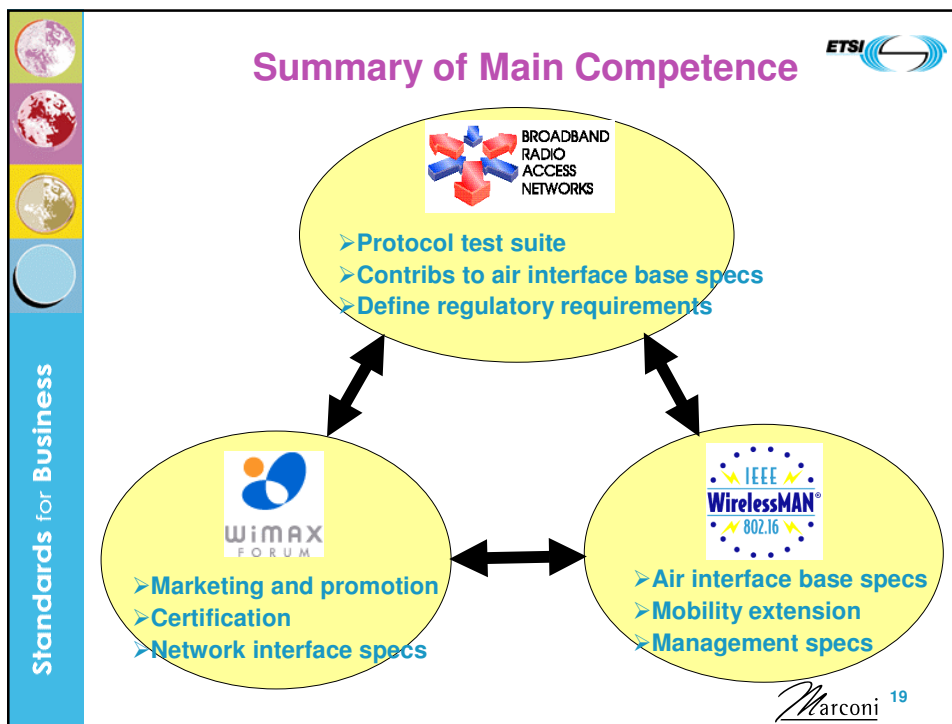
FUTURE


ETSI HiperMAN


Below 11GHz
OFDM 256

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

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- ETSI 
- ## 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

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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

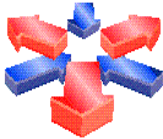
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For more information...

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



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RADIO
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