

## MBWA – How and Where?

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Purpose:

This submission is intended to guide the MBWA SG in the way forward towards a PAR and Five Criteria. The slide set is intended to be presented in the SG meeting and to be discussed when appropriate.

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# **MBWA – How and Where?**

# Introduction

- Similarity of MBWA and 802.16 'scope':
  - Definition of Mobile Broadband Wireless Access systems:
    - Cellular fixed access infrastructure ...
    - providing broadband wireless access to services ...
    - for SSs moving with vehicular speed (and less) inside and between cells.
  - Current standardization activity of IEEE 802.16 - Defining an interoperable air interface (PHY & MAC) for a
    - cellular fixed access infrastructure ...
    - providing broadband wireless access to services ...
    - for SSs statically located within a cell
- Main questions to be studied and resolved by SG:
  - Can the 802.16 MAC evolve to efficiently support mobile SSs?
  - Can any of the 802.16a PHYs evolve to efficiently support mobile SSs?
  - What are the performance targets?

# Suitability of 802.16 MAC for MBWA

- Given the IEEE 802.16 MAC characteristics
  - Tailored for point-to-multipoint BWA
  - Defines centralized controller
    - which provides for a connection to network services
    - which is in charge of the QoS control
    - which can effectively administer connections and service parameters
  - Uses advanced and flexible message and frame structure
    - Generic MAC PDUs are flexible in size and set a solid basis for further extensions
  - Designed both for TDD and FDD
  - Multiple bandwidth allocation and request mechanisms
  - Provides robustness through ARQ.
  - Provides IP (packet) convergence sublayer
    - which performs functions like PDU classification, payload header suppression and rebuilding
- and considering that the mobility support additions would be predominantly in higher layers and mobility management
- there seem to be no initial show-stoppers to extend the IEEE 802.16 MAC to facilitate mobility support.

# Suitability of 802.16 PHYs for MBWA

- Few OFDM based PHY modes are being developed in TGA and may provide useful basis for MBWA PHY.
- However, a number of issues needs to be studied. For example:
  - Ranging:
    - Is the initial ranging followed by occasional maintenance ranging sufficient to support vehicular speed mobility?
  - Synchronization:
    - Are the current synchronization mechanisms adequate?
  - Channel estimation:
    - Is the preamble/pilot structure adequate to track possibly rapidly changing channels?
  - Power control:
    - Is the available power control fast and stringent enough?
  - Spectrum efficiency:
    - Is the spectral efficiency high enough to provide the desired capacity?
- Based on the results to the above questions, it can be decided whether a new PHY is needed, or the existing ones can be modified.
- (Note that these study efforts would not cause any delay in specification, as the answers would be needed to define the specification anyway.)

# What are the performance targets?

- The performance targets need to be clear upfront, as they decide the suitability of the existing PHY/MAC.
- The performance targets and use scenarios have to be clarified for the Five Criteria
- The performance targets and their achievability hence need to be carefully studied.

# Proposal

- Study the performance targets (and their achievability) for the intended system.
- Study carefully the applicability of the 802.16 MAC as the basis of a MBWA system
- If no insurmountable problems appear, identify new MAC features needed to support vehicular mobility.
- Evaluate OFDM PHYs under development in 802.16a and analyze possibility to elaborate them for MBWA purposes
- Prepare carefully both the PAR and the Five Criteria based on the conclusions of the above studies.