Project	**IEEE 802.20 Working Group on Mobile Broadband Wireless Access** <http://ieee802.org/20/>	
Title	**MBTDD Updates**	
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Re:	MBWA Call for Proposals	
Abstract	This contribution summarizes updates incorporated to create the MBTDD Proposal.	
Purpose	For consideration of 802.20 in its efforts to adopt a TDD proposal for MBWA.	
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MBTDD Updates

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Foreword

- Presentation lists the updates made since last submission.
- There is more detail in this presentation than the original technology presentation.
  - Should answer most of the diffs compared to earlier submission.
  - There are other minor editorial changes in the proposed specification.

Outline

- General updates
- Wideband mode updates
  - Control plane
  - MAC Layer
  - PHY Layer

General Updates

- Merged with “BestWine” proposed by Canchi, et al.
  - Wideband Mode
  - 625k-MC Mode
- Added MIBs for management.

Applicability: 625k-MC and Wideband Modes

- 625k-MC Mode:
  - 625 KHz carrier bandwidth supporting aggregation of multiple carriers
- Wideband Mode:
  - 5 to 20MHz carrier bandwidth

Updates: Wideband Mode

Session Control Sublayer

- Added messaging for attribute negotiation of non-inuse SessionConfigurationTokens.
- Added messaging for retrieving the values of attributes.

Convergence Sublayer

- Reset of seq-space in Signaling transport is made identical to Data Transport
- Added support for processing indication *FTCMAC.ForwardTrafficPacketsMissed*
- Ensured that all the attributes in the Data transport are symmetric in both FL and RL.
- Added support for QoS predefined profiles.
- The Xon/Xoff messaging is sent as in-band signaling.

Security

- Changed from SHA-1 to SHA-256 for authentication and for hash function in key exchange.
- Improved randomness of Nonce generation for key exchange.
- Entering secure mode is performed by a SessionConfigurationToken switch.

Lower MAC Control Sublayer

- Moved several parameters from OMP to ActiveSetUpdate message.
- Removed Attribute override feature for ASMP as GAUP can handle it now.
- Added EncapsulatedQuickChannelInfo message.
- Channel record definition is enhanced.
- Redirect message can force the AT to other radio access technologies.

General PHY / MAC - I

- **Additional Reverse Link packet formats**
  - added packet formats containing 64QAM

RL packet formats

Packet Format Index	Spectral efficiency on 1st trans-mission	Max number of trans-missions	Modulation order for each transmission					
			1	2	3	4	5	6
0	0.25	6	2	2	2	2	2	2
1	0.50	6	2	2	2	2	2	2
2	1.0	6	2	2	2	2	2	2
3	1.5	6	3	2	2	2	2	2
4	2.0	6	3	3	2	2	2	2
5	2.67	6	4	4	3	3	3	3
6	4.0	6	4	4	3	3	3	3
7	6.0	6	4	4	4	3	3	3
8	8.0	6	4	4	4	4	4	3
9	4.0	6	6	6	4	4	4	4
10	5.0	6	6	6	4	4	4	4
11	6.0	6	6	6	4	4	4	4
12	7.0	6	6	6	4	4	4	4
13	8.0	6	6	6	6	4	4	4
14	9.0	6	6	6	6	4	4	4

  - increased peak rate
  - improved H-ARQ performance at higher spectral efficiencies

General PHY / MAC - II

- **Low complexity symbol rate hopping mode**
  - reduces complexity of generating hopping pattern in the symbol rate hopping mode
- **Synchronized forward and reverse link**
  - added a mode that enables efficient support for beamforming
  - allows to use reverse link transmission as a reference for Forward Link beamforming
- **Different subband permutations in different sectors**
  - mapping between subband-level nodes of channel trees and physical subbands is different for different sectors
  - provides interference diversity for large bandwidth assignments in the subband hopping mode

General PHY / MAC - III

- **Precoding support for MIMO multi-codeword**
  - additional subband feedback reports (R-SFCH) capture precoding (and subband) gains per MIMO layer
- **Multiple subband and precoding reports per slot**
  - multiple subband reports (R-SFCH) and associated precoding reports (R-BFCH) enabled to improve feedback
- **Increased CRC length for traffic sub-packets**
  - 24 bit CRC instead of 16 bit CRC to improve data reliability
  -
- **Flexible MACID length**
  - MACID field length tailored to system bandwidth: allows for reduced signalling overhead in low bandwidth deployments

General PHY / MAC - IV

- **Optional smaller maximum subpacket size**
  - two values for the maximum subpacket size:
    - maximum of 8192 bits or 4096 bits per subpacket
  - performance / complexity tradeoff based on AT/AP capabilities
- **Optional reduced R-ACKCH overhead**
  - reduces the number of acknowledgeable base nodes of the channel tree

General PHY / MAC - V

- **Updated multi-codeword assignment block**
  - the first multi-codeword assignment block (MCW-FLAB1) contains 5-bit packet format field to indicate pilot format
  - the second multi-codeword assignment block (MCW-FLAB2) contains 4-bit packet format field
- **Reverse link control channels**
  - enabled optional restriction of AT control channel transmission bandwidth to a fraction of the CDM control segment bandwidth

Reverse Link Power Control - I

- **Optional open loop power adjustment**
  - AT transmit power is adjusted based on the difference between the overall receive power levels measured on consecutive superframe preambles
  - AT transmit power is adjusted with a linear ramp capping at the measured power difference; slope of the ramp is sector parameter
  - allows for improved robustness

Reverse Link Power Control - II

- **Optional power control commands**
  - enabled optional power control commands transmitted by the reverse link serving sector along with erasure indications
  - reference power adjustment is based on power control commands if present and on erasure indications otherwise
  - power control commands are I/Q multiplexed with erasure indications: no extra bandwidth overhead

Reverse Link Power Control - III

- **Optional fast other sector interference indication**
  - other sector interference indication (F-OSICH) is transmitted every superframe (~25ms)
  - added optional fast other sector interference indication (Fast OSI) every PHY Frame (~0.9ms)
  - interference indication by Fast OSI used along with interference indication by F-OSICH in the same fashion
  - allows for fast interference management
- **Updated power offset for reverse link**
  - added power offsets for R-DCH and R-ACKCH
  - offsets broadcast on pBCH1 every superframe (~25ms)

Reverse Link Power Control - IV

- **QoS based power setting for R-REQCH**
  - power offset of the physical layer request channel (R-REQCH) is set according to the QoS flow
  - tradeoff between R-REQCH performance and control segment load based on QoS flow
- **Optional centralized power control mechanisms**
  - added optional power spectral density (p.s.d.) assignment by AP
  - p.s.d. assignment part of reverse link assignment block of the shared signalling channel (F-SSCH)
  - added AP request / AT report of other sector interference indication and ChanDiff history

Handoff - I

- **Optional network initiated handoff**
  - current FL serving sector may issue a FL (RL) assignment in a different sector; the new serving sector will be pointed to by its index within the ATs active set
- **Boosting control channel power in handoff**
  - enabled boosting power level of R-CQICH (R-REQCH) when the respective channel carries FL (RL) handoff indication

Handoff - II

- **Reverse link control segment reporting**
  - different sectors in AT's active set can have different size of the reverse link CDM control segment
  - AT transmits its reverse link CDM control channels on the intersection of control segments of all sectors within active set that have the same radio frequency as the current RL serving sector

- **Optional to force the same FL/RL serving sector**
  - when the same FL/RL serving sector forced:
    - forward link serving sector always coincides with the reverse link serving sector
    - either forward or reverse link handoff request/grant mechanism can be used for handoff