

Project	IEEE 802.20 Working Group on Mobile Broadband Wireless Access < http://grouper.ieee.org/groups/802/20/ >	
Title	Suggestions on improvements for Letter Ballot 1 comment resolution results	
Date Submitted	2006-05-05	
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Re:	802.20 Session#20	
Abstract	Some further comments and suggestions on the letter ballot comment resolution results are discussed in this contribution.	
Purpose	To suggest improvements on the comment resolutions for IEEE 802.20.	
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Introduction

A few initial suggestions on the improvement of the resolution results [1] have been described briefly in an email that was sent to the reflector on May 4 - deadline for submission of suggestions. This contribution provides further explanations and rationales of the suggested improvements for discussions during the Interim meeting in May. The original comment, recommended change by the commenter, the resolution results as quoted from the spreadsheet are also included in the following.

List of comments with suggestions

1) Comment/Explanation (#14, Yaghoobi ; #15, Huo) [1]

The lack of support for 1.25 MHz channelization is inconsistent with the 802.20 PAR.

Recommended Change:

Include support for 1.25 MHz channelization.

Editors Comment/Resolution:

Declined: the scope of the PAR does not specify any particular bandwidth, item 18 of the PAR then provides 1.25 and 5 MHz as possible examples. There is and has not been a normative requirement in any 802.20 document to support 1.25 MHz channels. The referenced e-mail makes the point that channels as low as 1.25 MHz were within the scope of 802.20 not that support of this channel bandwidth was mandatory. The referenced 802.16 document actually deals with the issue of 16e supporting channel bandwidth below 5 MHz and not with a requirement for 802.20 to support a 1.25 MHz channel bandwidth.

Suggestion on Improvement:

As PAR has included this as an example, the 802.20 standards draft should be able to address this scenario. It would be beneficial to increase the flexibility of the standard. See also the suggested improvements for Comment #426.

2) Comment/Explanation (#20, Lee H)

DiversityHoppingModeOFF is suitable for low speed mobile since this makes it possible to exploit multiuser diversity in frequency domain. On the other hand, we cannot exploit multiuser diversity in frequency domain for high speed mobile due to rapid channel variation. For high speed mobile, it is beneficial to use DiversityHoppingModeON to increase link reliability. MBFDD/TDD can use only one mode in a carrier. In case of MulticarrierOFF mode, therefore, there should be only one mode in the system. If the system uses DiversityHoppingModeON, there are limits for increasing the capacity of the system because we cannot exploit multiuser diversity in frequency domain. In case of DiversityHoppingModeOFF, high-speed mobiles have unreliable links and hence the performance can be degraded.

Recommended Change:

MBFDD/TDD should make it possible to use DiversityHoppingModeOFF type channel and DiversityHoppingModeON type channel simultaneously in a superframe.

Editors Comment/Resolution:

Declined: There is no value in enabling both channelization modes simultaneously.

The main advantage of DiversityHoppingModeON is low overhead of common pilot while DiversityHoppingModeOFF allows for performance gains through e.g. sub-band scheduling, interference estimation per tile (tile = 16 contiguous tones over PHY Frame), as well as efficient channel estimation with precoding/beamforming, SDMA and power control. The choice between DiversityHoppingModeOFF and DiversityHoppingModeON depends on the availability of performance gains achievable with DiversityHoppingModeOFF which is deployment specific (e.g. synchronous versus asynchronous, use of advanced multi-antenna techniques). Hence, there is no value in enabling both channelization modes simultaneously.

Suggestion on Improvement:

The original comment has the advantage of providing the most beneficial mode of operation to various users in a cell site. Depending on the specific channel condition, a user may not be able to benefit from sub-band scheduling. An example is the scenario when a user is located at the cell edge. The signal-to-interference ratio (C/I) of this user may be relatively weak that the user will not have any benefit from sub-band scheduling. On the other hand, diversity hopping may reduce the intercell interference that is experienced by this user at the cell edge, which could be more beneficial to this cell edge user, as well as the cell edge users in the adjacent sectors/cells.

Thus, the feature of DiversityHoppingModeON/OFF should not be limited to the deployment scenario. It would be more optimized to be able to track the dynamics in the cell site, and allowed users with various channel conditions to operate in different modes.

3) Comment/Explanation (#22, Lee H):

Uplink PAPR is more important than downlink in the sense of coverage and cost of user equipment. There is, however, no effort to reduce PAPR of uplink transmitted signal in MBFDD and MBTDD. This causes unbalanced uplink shorter coverage and/or expensive user equipment due to expensive RF power amplifier.

Recommended Change:

'I recommend use of transmission method with inherent low PAPR characteristic such as DFT spread OFDM, or adoption of some PAPR reduction algorithm for OFDM.'

Editors Comment/Resolution:

Clarification of existing capability: The draft standard supports PAPR reduction techniques like clipping and filtering which do not have an impact on the air interface itself.

Several concerns have been expressed with respect to DFT spread OFDM. Some examples are channel estimation accuracy with the interleaved approach; and channel and interference diversity with the localized approach. It is also not clear if there are any significant details in the presence of control channels.

Suggestion on Improvement:

The issue of uplink PAPR is very important for mobile terminals. Clipping and filtering will result in side-effects such as out-of-band spectral re-growth and in-band signal distortion. The consequence of spectral re-growth is the possible violation of spectral mask requirements and increased adjacent channel interference. To ensure the regulatory spectral mask requirements can be met, and to reduce adjacent channel interference, one may have to increase the number of guard subcarriers, or increase the backoff at the power amplifier. In-band signal distortion as a result of clipping leads to degradation of the error rate performance.

Both the increase in the number of guard subcarriers and the degradation in error rate performance will lead to a lower spectral efficiency as compared to the values shown in the simulation reports.

The resolution also stated the concerns about DFT spread OFDM. It shows that insufficient study has been done by the proponents to compare between the two waveform designs. For example, the tradeoff between the drawbacks with the use of clipping and filtering in association with OFDM waveform, and that of DFT spread OFDM is not clearly identified. Thus, the choice of OFDM waveform for the uplink may not be optimal.

Suggestion here is to have a more detail and thorough comparison between the two waveforms to identify the most optimal design. This would be beneficial to the eventual success of the 802.20 standard.

4) Comment/Explanation (#49, Tee):

Transmitter and receiver specifications as required by the 802.20 systems requirements document are not available. Therefore the proposed technology in the standards draft v1.0 is non-compliant, based on the definition in the technology selection process (TSP) document IEEE 802.20-PD10.

Recommended Change:

Withdrawn the current WG letter ballot, amend the original proposal with transmitter and receiver specifications, while allowing an open process for proposal submission from other WG members. Re-start the process of technology selection, comparison and merging.

Editors Comment/Resolution:

This comment is out of the scope of the letter ballot. The comment is not addressable by the Ballot Comment Resolution Committee.

Suggestion on Improvement:

This comment is not out-of-scope, as transmitter and receiver specifications are stated as part of the 802.20 system requirements. The suggestion is to have the WG start to work on the specifications for inclusion into the standards draft. Further details of the suggestion can be found in a separate contribution for May meeting [2].

5) Comment/Explanation (#426, Tee):

Multicarrier "on" mode support only cases of 2, 4 carriers

Recommended Change:

Further clarify the feature, e.g., operation scenarios etc.

Editors Comment/Resolution:

Clarification of existing capabilities/text: The MultiCarrierOn mode is used when a large amount of bandwidth is deployed, eg 20 MHz, but the operator wants to enable terminals that are capable of demodulating only 5MHz. It is true that only 2 or 4 carriers are supported, this is because the permissible FFT sizes in the system are 1024 and 2048, while the number of subcarriers in a single carrier is 512.

Therefore, this mode supports terminals who are capable of demodulating upto 1/4 of the total bandwidth.

Suggestion on Improvement:

The multicarrier scenario is not very flexible, as this mode supports terminals that can operate in 5 MHz, 10 MHz or 20 MHz bandwidth only. It would be more flexible if the standard can also support mobile terminals that operate in 1.25 MHz bandwidth, or other bandwidths that are between 5 and 10 MHz, or between 10 and 20 MHz.

6) Comment/Explanation (#428, Tee)

Number of quasi-guard subcarriers not specified

Recommended Change:

Specify the number of required guard or quasi-guard subcarriers

Editors Comment/Resolution:

Clarification of existing capabilities/text: The set of quasi-guard subcarriers is specified in lines 22-23. The number of quasi-guard subcarriers is equal to the number of guard subcarriers.

Suggestion on Improvement:

Because of the possible differences in the number of guard subcarriers required for the edge of a spectral block and that between adjacent carriers in the multicarrier mode, the number of quasi-guard subcarriers should be allowed to be different from guard subcarriers, to optimize spectral efficiency.

References

- [1] '802.20 official ballot comment repository for Letter Ballot 1', April 28, 2006
- [2] 'Suggestion on a remedy for the missing transmitter and receiver requirements specification in 802.20 standard draft V 1.0', C802.20-06/x, May 5, 2006