Project: IEEE 802.16 Broadband Wireless Access Working Group

Title: Specifying TDD for the 802.16 Air Interface Broadband Wireless Access Standard

Date
Submitted: 29 October 1999

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Re: Call for contributions for the IEEE 802.16.1 Standard

Abstract: This contribution proposes that Time Division Duplexing (TDD) be used for the IEEE 802.16 Air Interface Broadband Wireless Access Standard, based on a number of important fundamental advantages of TDD over FDD.

Purpose: To obtain the IEEE 802.16 WG's consideration of the fundamental advantages that the TDD technique offers Broadband Wireless Access over FDD

BACKGROUND

The IEEE 802.16 Work Group (WG) at its Session #3 on Broadband Wireless Access (BWA) called on all interested parties to submit initial descriptions, of complete or partial proposed solutions by the October 29 deadline, for presentation at Session #4. The initial proposals will then be evaluated, and many or all of the proposers will be invited to prepare a more detailed description of their proposed solution(s) for Session #5.
It was also noted that only contributors to Session #4 are eligible for invitation to contribute to Session #5.

PROPOSAL

This contribution proposes that Time Division Duplexing (TDD) be used for the IEEE 802.16 Air Interface Broadband Wireless Access Standard. The proposal to Session #4 is based on a number of fundamental advantages of the TDD technique over Frequency Division Duplexing (FDD).

What follows is a list of some basic TDD advantages.
At Session #5 we intend a follow-up with a detailed description, assuming the WG invites such TDD detailed contribution.

1. TDD allows simple and efficient dynamic allocation of a radio channels bandwidth to the uplink and downlink of the radio channel.

2. TDD does not require paired frequencies allocation. This results in much simpler procedures and algorithms for frequency allocation and frequency rearrangements required to overcome changes of interference with time, and taking out-of-service an access point for maintenance purposes.
Note: The probability of interference is also decreased with TDD, since it reduces the number of carrier frequencies transmitted in a given area.

3. TDD has simpler hardware since no diplexor and the additional components required by a second radio channel such as mixer, oscillator, and synchronizer are used.

4. Because of TDD reciprocity of signal paths in both traffic directions, using the same carrier frequencies particularly efficient antenna spatial diversity algorithms and implementations become available, as spatial diversity can be implemented only at Base Stations. This can very effectively reduce CPE equipment cost.

5. The reciprocity of TDD allows for channel equalization to be performed at Base Station only, resulting in a more flexible trade-off between CPE and Base Station equipment costs
6. With TDD, adaptive channel equalization combined with transmitter pre-distortion can improve resistance to multipath

7. TDD enables the use of simpler and more effective implementation of adaptive antennas.

8. The reciprocity of TDD can yield more effective power control.

9. TDD is easier to self test facilities by closing the transmit-receive loop at each modem.