Market based policies for channel access coexistence in 802.16 LE

IEEE 802.16 Presentation Submission Template (Rev. 8.3)

Document Number: IEEE C802.16h-05/010

Date Submitted: 2005-04-28

Source:

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Venue:

Meeting #37, 2-5 May, 2005

Base Document:

Purpose:

Discuss market based policies for channel access coexistence in 802.16 LE

Introduction

- Fairness criteria have been discussed (IEEE 802.16-05/010)
  - Guaranteed radio resource
    - Guaranteed minimum access time (same for all networks)
    - Interference free period
  - Power control
  - Mutual tolerance
    - Slave and master networks can coexist at the same time on the same band in the same location
    - A slave network may operate during interference free periods of master networks
- Mutual tolerance
  - Requirements of the slave networks towards the master networks
  - Requirements of the master networks towards the slave networks

General issues

- Requirements of the slave networks towards the master networks
  - "Zero" interference tolerance
    - Admissible interference level set to an interference level equal with the noise level
  - "Soft" interference tolerance
    - Additional spectrum sharing opportunities
    - Admissible interference level set to an interference level higher than the noise level (corresponding to a agreed degraded QoS)
- Requirements of the master networks towards the slave networks
  - No QoS guarantee (best effort like) for slave networks (admissible interference level for the slave network is not limited)
  - QoS guarantee for slave networks (admissible interference level for the slave network is limited)
- How can a master network "rule" the access to its interference free periods to slave networks when several/many competing slave networks are candidate to use them?

Market based policies for channel access

- The master network can negotiate with the slave networks the access of its interference free periods based on real time market mechanisms (e.g. brokerage)

- The real time negotiation can specify the SLA in term of:
  - The interference free periods the slave network is allowed to use
  - The admissible interference level for the master network
  - The admissible interference level for the slave network
  - The pricing the slave network has to pay to get permission to transmit on the agreed interference free periods of the master networks

Master and slave networks roles

- The master network plays the role of:
  - Advertising the free interference periods open for an additional usage
  - Fixing the initial price
  - Collecting the interests issued from the slave networks
  - Designating the slave networks winners and setting up the final pricing

- The slave network plays the role of:
  - Listening to the master network's advertising
  - Pre-selecting a list of possible interference free periods he is interested in
  - Bidding given the initial proposed price
  - Accepting or rejecting the final price proposed by the master network

Brokerage based bandwidth request mechanisms

- Brokerage based bandwidth requests (BrBR) by the slave networks could be done per connection (BrBR-C) or per SS (BrBR-SS)
- BrBR-C:
  - Each connection bids individually
  - Each connection pays individually
- BrBR-SS:
  - All connection requests are collected by the SS
  - The SS bids globally on the basis of each connection bid
  - SS is in charge of redistributing the resources accordingly to each individual bid