A collaborative approach to license-exempt operation

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Contribution to discussion on document 802.16h/014

A collaborative approach to LE operation

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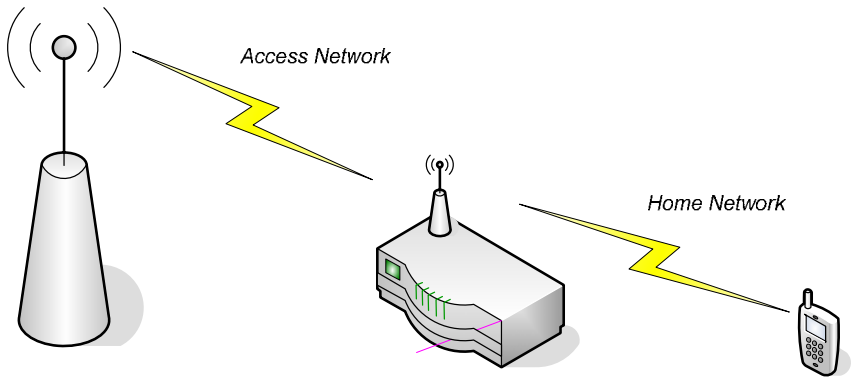
Motivation

- Low cost solutions are synonymous with license-exempt operation
- Minimize infrastructure costs for LE operation
- Minimize impact on the base standard, in terms of frame structure changes
- Optimal trade-off for *equipment/device* and *service provider* requirements:
  - *Complication of equipment requirements reduces network-level planning requirements*
  - *Complication of network-level planning reduces equipment requirements*
- BS may not be a macro BS but a pico BS or AP-type device and may need to be considered in a different manner
- A service provider may be responsible for deploying devices in LE spectrum – this needs to be considered in LE operation
- Collaboration provides for coexistence rules applied with local sensing capabilities – *working within an interference limited environment*



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Motivating questions…

- Is it strictly necessary to change the air interface structure to achieve LE operation? *Perhaps use schemes already proposed that don't modify the air interface*
- Are large support systems for data bases required to achieve LE operation?
- Is the LE approach different when considering APs or pico BS rather than the current macro BS model?

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Possible collaborative approach

- Planning/coordination
  - Supports long term requirements in QoS
  - Minimizes exchange of sensitive information between providers
- Monitoring
  - Real time assessment and backup options in terms of interference free resources
- Combination/collaboration
  - Reduces cost impact on equipment requirements and planning

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Planning/coordination

- Provide guidelines for deployment
  - High level planning approach, basis for orthogonality between systems – channel, timeslot
  - Coordination/coexistence guidelines – depending on proximity of systems
- Finding a solution: what defines the inputs and outputs to this process?
  - Handling co-located or neighbouring systems and minimum separation
  - Considering different air interfaces and their interference profile
  - What happens if 16h is not mandated but deployed by some operators? Some service providers may be placed at a disadvantage

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Monitoring

- ACS-style of operation – similar to section 6.3.15 of 802.16-2004 + Cor1: *Procedures for shared frequency band usage*
- Provide real time updates based on a predetermined set of parameters or procedures:
  - *Scheduling and testing channels*
  - *Requesting and reporting of measurements*
  - *Detecting interference*
  - *Discontinuing operations after interference is detected*
  - *Selecting and advertising a new resource to preserve QoS*

- A decentralized approach
- New resources based on: frequency (channel or sub-channel), time or space domain
- Can use a ‘configuration’ of the current frame structure
- Issues with: network stability, signaling overhead and imposed RF implementation

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Combination/Collaboration

- Periodic network optimization based on prevailing information between networks
- Monitoring of agreed QoS parameters; for example:
  - Channel occupancy
  - Interference neighbourhoods
  - Interference across the band
  - Assessment of fair access across networks
  - Sensing intervals

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Looking forward…

- Investigate the possibility of optionally using a reduced functionality database approach - perhaps use a database in certain deployments only
- What information needs to be provided or exchanged?
- How can options for 16h be arranged to ensure coexistence between 16h systems?
- What is likely to be covered in a recommended practice or coexistence document?
- BS to BS communications may require tunneling through 802.16 air interfaces?

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