

A collaborative approach to license-exempt operation

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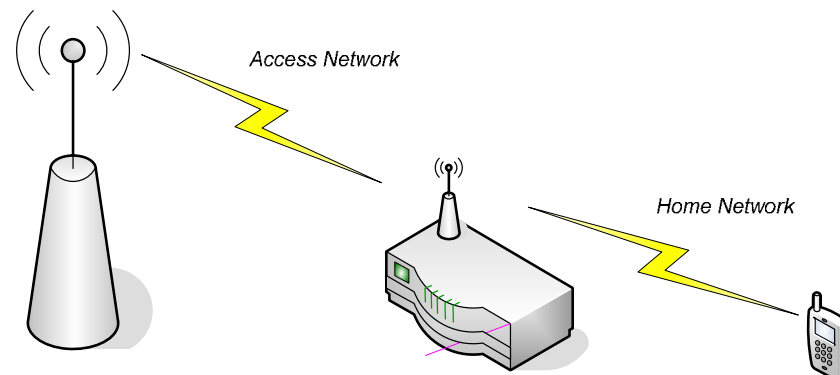
A collaborative approach to LE operation

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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*



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?

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

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

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

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

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?