Coexistence Studies in 802.20

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Definition of Coexistence

- **P802.15.2**
  - The ability of one system to perform a task in a given shared environment where other systems may or may not be using the same set of rules (doc. 99-134r2)
  - Quite general but was written in dot15 context

- **P802.16.2**
  - No definition of coexistence is provided

- **802.19 TAG**
  - The ability of one system to perform a task in a given shared environment where other systems have an ability to perform their tasks and may or may not be using the same set of rules (doc. COEX-02020r1, Sydney meeting)

- ITU-R usually refers to it as “Sharing”
Coexistence Studies

- 802.19 addresses unlicensed bands coexistence within 802 wireless projects
- Coexistence with geographical and/or spectral neighbors is key to successful 802.20 deployments in licensed bands
- Objective is to create guidelines for preventing from harmful interference by determining levels of permissible, or acceptable, interference
- Interference environment varies with deployment scenarios
802.20 Deployment Scenarios

- PAR mandates licensed spectrum below 3.5 GHz allocated to the Mobile Service

- Deployments under nation-wide licenses are likely to have:
  - Multiple operators in the same service area
  - Adjacent service areas (domestic as well as international)

- Deployments in or adjacent to bands already used for commercial wide area services are also likely

- No shared environment
  - Co-channel in adjacent areas, or
  - Adjacent channel in same area, but
  - No co-channel in same area
Specifics

- From regulatory point-of-view, licensed co-channel operation in the same geographical area would not be allowed.

Possibilities

- Co-channel across service boundary: geographical neighbors
- Adjacent channel within same service/geographic area: spectral neighbors
- Neighbor could be non-802.20 or another 802.20 of a different duplex
- It could be assumed that 802.20 geographical and spectral neighbors of the same duplex have much easier time coexisting with each other with reasonable coordination:
  - frame synchronization, power at service boundary, etc.
Spectral Neighbors, Same Area

- 802.20 systems may need to coordinate with spectral neighbors

The number and the nature of spectral neighbors TDD and FDD systems may need to coordinate with are not necessarily the same.
Geographical Neighbors, Same Frequency

- Service areas for spectrum currently licensed to the Mobile Service below 3.5 GHz typically don’t overlap
  - Protection is typically through power limit at service boundary, which may or may not be sufficient

- For TDD-FDD case:
  - Safe distance needs to be determined
Service Rules

- For each band, out-of-band emissions and service boundary levels are specified by regulatory authorities as Service Rules.
  - Implementations of 802.20 in each band should adopt these values to comply with the rules unless shown to be inappropriate, where more stringent levels should be used.
    - Example, service providers are voluntarily using tighter specifications than the rules require in the PCS band.

- Receiver performance, including filters, are typically not specified by the regulators.
Recommended Practice

- A Coexistence Task Group could study the coexistence issues of 802.20 deployments in licensed bands below 3.5 GHz
  - 802.20 TDD with 802.20 FDD, probably the more challenging
  - 802.20 with non-802.20
- This TG will produce a “Recommended Practice” document that gives guidelines and recommends best practices to minimize harmful interference among neighbors
- Examples of previous such activity:
  - IEEE 802: 802.16.2 and 802.16.2a
  - ITU-R, WP8F: DNR [IMT.COEXT]
Procedure

- Identify bands of interest
  - Pick a few “primary candidate” bands
- Perform simulations using typical equipment specifications
  - Requires feedback from the WG on parameters such as TX power, RX threshold, ACS, ACLR, etc.
- If service rules are not adequate, then recommend new guidelines through:
  - For a given band, determine “safe” geographical and/or spectral distance between the two potentially interfering systems
  - “Safe” needs to be quantified, example, I/ N = - 6 dB
Proposal

- Form an ad hoc group to work on a Coexistence PAR

- Finalize the PAR by September meeting and submit to SEC for approval in November