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
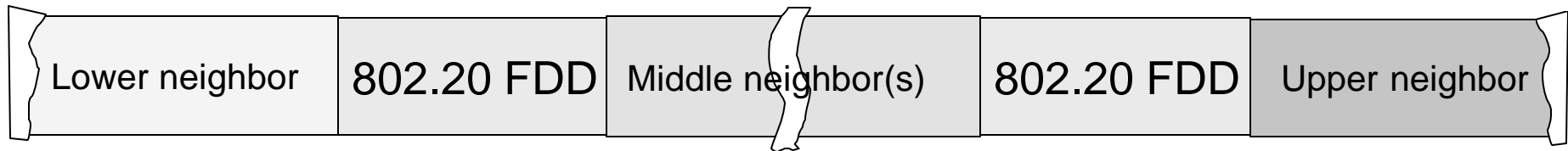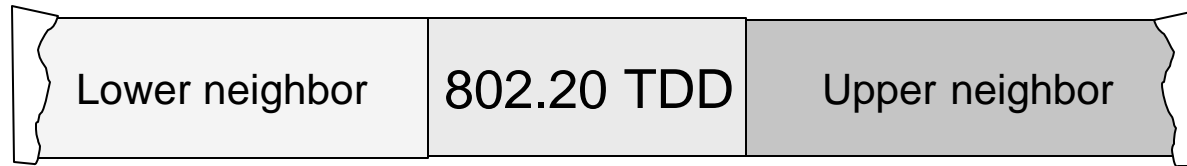
802.20 Deployment Scenarios

◉ 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

Lower neighbor	802.20 TDD	Upper neighbor

Lower neighbor	802.20 FDD	Middle neighbor(s)	802.20 FDD	Upper neighbor

◙ 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
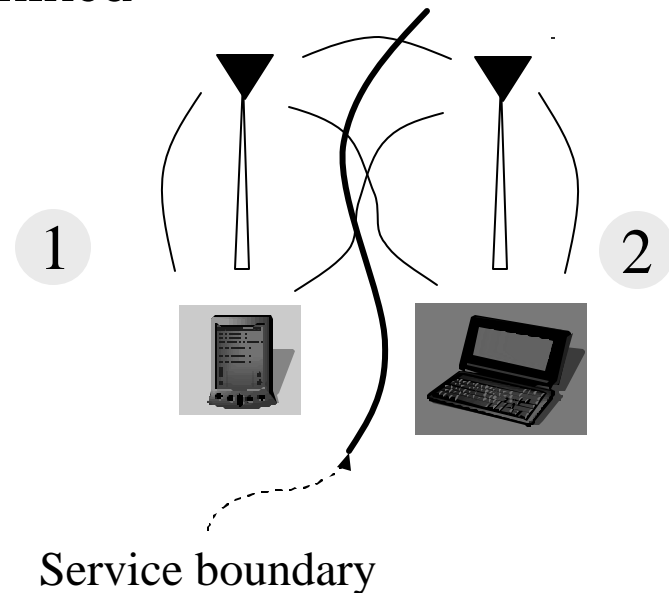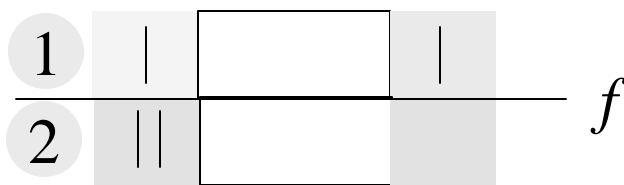
Service boundary

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 pervious 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