CSMAC Spectrum Sharing Sub-Committee

Discussion Materials Nov 2011

This material is preliminary and for discussion purposes only. None of the material here is a final recommendation or conclusion from the sub-committee.

Questions we are working on

First question we have chosen to work on: (Question 4d in original NTIA list)

"How do we setup sharing arrangements, when the primary service may continue or has the right to continue to evolve?"

Secondary or follow-on question: (Question 4a in original NTIA list)

"What kinds of sharing are workable for the industry in the long term?"

More Specifically: What kinds of sharing arrangements would the industry consider as workable as part of the 500MHz plan.

Method:

- Have split the work into two thread Technical Recommendation and Process recommendations

NOTE:

a) We do NOT expect to recommend a one size fits all spectrum sharing technique or policy that allows total flexibility of incumbents to change doing anything they want and still makes the band attractive to industry at large as part of the 500MHz plan.

b) Developing specific sharing systems would be done on a band and entrant specific basis.

Technology Update

Three analysis have been conducted to date:

1. **Impact of incumbent use changes under various sharing scenarios** (presented last time)- *Preliminary Conclusion*: many use cases changes can be accommodated based on sharing approach.
2. **Isolation Analysis** – *Preliminary Conclusion:* sharing based on minimal knowledge of incumbent location and operating frequency large exclusion zones and is not going to be efficient.
3. **Sharing approaches** – *Preliminary Conclusion:* there are multiple promising sharing approaches where incumbent location and/or operating frequency can be determined and used to obtain efficient spectrum sharing. *Preliminary Conclusion:* there is no one size fits all approach . The details need to be adjusted to incumbent and entrant system technical parameters and the type of entrant commons vs exclusive use shared use.

Potential NTIA Recommendations: NTIA should analyze the CSMAC's suggested spectrum sharing approaches for the different bands and work with the CSMAC, industry and incumbents to further define the technical details and the incumbent/entrant rights/protocols.

Working Group Next Steps: Further develop the spectrum sharing approaches for presentation at the post Nov CSMAC meeting.

Need for process recommendation

What kinds of sharing are workable for the industry in the long term?

- Have spent some time discussing what would be workable for commercial carriers.
- Commercial carriers have strong desire for cleared spectrum as do incumbent users.
- While strong desire for more spectrum to be made available via sharing, there is a desire not to compromise the request for cleared spectrum.
- This makes engaging detailed technical discussions of how to share in abstract difficult.
- Insight is that there needs to be a process to engage sharing in a more specific manner and address information challenges.
- Sub-committee is looking at set of process recommendations- a sub group of the committee has developed an initial paper that the group will refine for next meeting

Preliminary Recommendations on Process

Disclaimer: These are a preliminary summary and to not reflect approval, consensus or even reflect the input of the entire sub-committee

- Where spectrum cannot be fully cleared, an analysis should be undertaken to determine what impact those federal systems that remain in the band would have on future commercial uses, and what sharing conditions are required to protect incumbent systems.
- This analysis could best be accomplished through the establishment of a joint government-industry technical committee to address a specific opportunity.
- Establishment of a government-industry advisory does not have to be overly burdensome and can be created in a way that will protect sensitive information. The parties involved in the discussion can be limited to a focused group of experts and may even include non-disclosure agreements to protect sensitive information (although this would be insufficient to protect classified information) and to facilitate an exchange of information and ideas leading to a preferred solution for all parties.
- Any rules or final decisions would be subject to a fully open and public rulemaking process.

Next Steps

Goal of the sub-committee is to bring recommendations to answer these questions for vote next meeting. We are working on “a” recommendation in each of the following areas

1) Technology
2) Process

Appendix

List of incumbent use changes with preliminary evaluation of ability to accommodate (3 most difficult)

Incumbent Change in Use	Impact to Geolocation-Based Entrant Only	Impact to Sensing-Based Entrant Only	Impact to Both Entrant Types	Method to Provide Certainty to Entrant
Waveform Type - modulation type, signal bandwidth or MAC	None	Must have enough waveform information to design classifier(3)	None	To enable sensing approach classifier design relative to entrant waveform, incumbent provides waveform information to limit waveform parameters.
Mix Waveform Types Within a Band	Adjust exclusion zone(1)	Implement multi-detector/classifier system(2)	None	Incumbent provides waveform types in the band
Withhold Transceiver Location Information	Approach not feasible(3)	None	None	Incumbent agrees to not change Transceiver Location Information policy
Transmit Power Level	None	Change detection thresholds(1)	Decreases amount of available spectrum if sharing based on interference to entrant.	Incumbent agrees to limiting min and max transmit power level.
Transmit Mask Shape	Adjust exclusion zone if based on entrant interference(1)	Change detection thresholds(1)	Decreases amount of available spectrum if sharing based on interference to entrant.	Incumbent agrees to limiting min and max transmit mask.
Desired Interference To Noise Level	Adjust exclusion zone size(1)	Change detection thresholds (1)	Decreases amount of available spectrum.	Incumbent agrees to limiting interference level.
Number of transceivers or TX duty cycle	Provide waveform information and equipment description.(1)	None	Decreases amount of available spectrum	Incumbent agrees to limiting number of TX duty cycle within each operating area.
Provide Entrant Advanced Warning of Transceiver Operation	Assume 100% duty cycle and reduces amount of available of spectrum, (2)	None	None	Incumbent agrees to not change advanced warning plan.
Receiver Selectivity	Adjust exclusion zone size(1)	Change detection thresholds(1)	Decreases amount of available spectrum	Incumbent agrees to limiting adjacent channel rejection level.
Antenna heights or antenna gain values	Adjust exclusion zone size(1)	None	Decreases amount of available spectrum	
Mobility - Fixed to mobile to airborne transmitters	Obtain real-time transceiver location information, use large exclusion zones, or approach not feasible(3)	None	None	Incumbent agrees to not change mobility, or to provide transceivers info in real-time to enable geolocation approach.
Link Type – Duplex vs telemetry vs f1/f2	Adjust exclusion zone size(1)	Telemetry links require lower detection thresholds and reduces amount of available of spectrum. f1/f2 requires frequency plan information.(3)	None	Incumbent agrees to provide link type information.

Isolation Required to Avoid Interference to Entrant (Licensed and Unlicensed) Caused by Incumbent (Telemetry)

Unlicensed to Telemetry = -108.1 dB

Telemetry to Unlicensed = -114 dB

Unlicensed to Radar = -120.8 dB

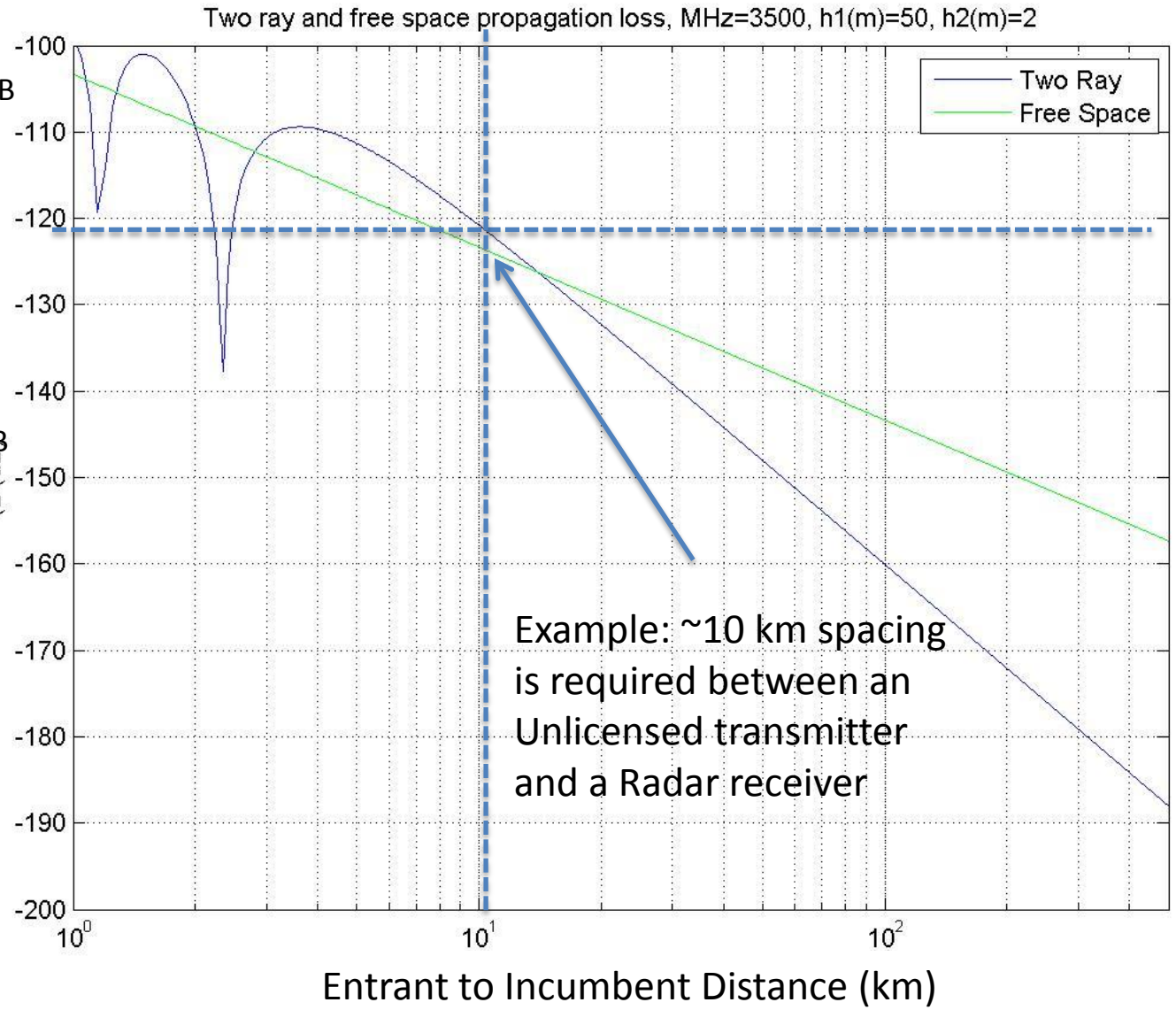
Licensed to Telemetry = -137.1 dB

Telemetry to Licensed = -140 dB

Licensed to Radar = -149.8 dB

Radar to Unlicensed = -154 dB

Radar to Licensed = -180 dB



This is an initial analysis subject to refinement