CSMAC Measurement/Quantification Subcommittee
Use of General Occupancy Measurements
And
Quantification of Federal Spectrum Use

CSMAC Presentation

February 18, 2015

Question 1

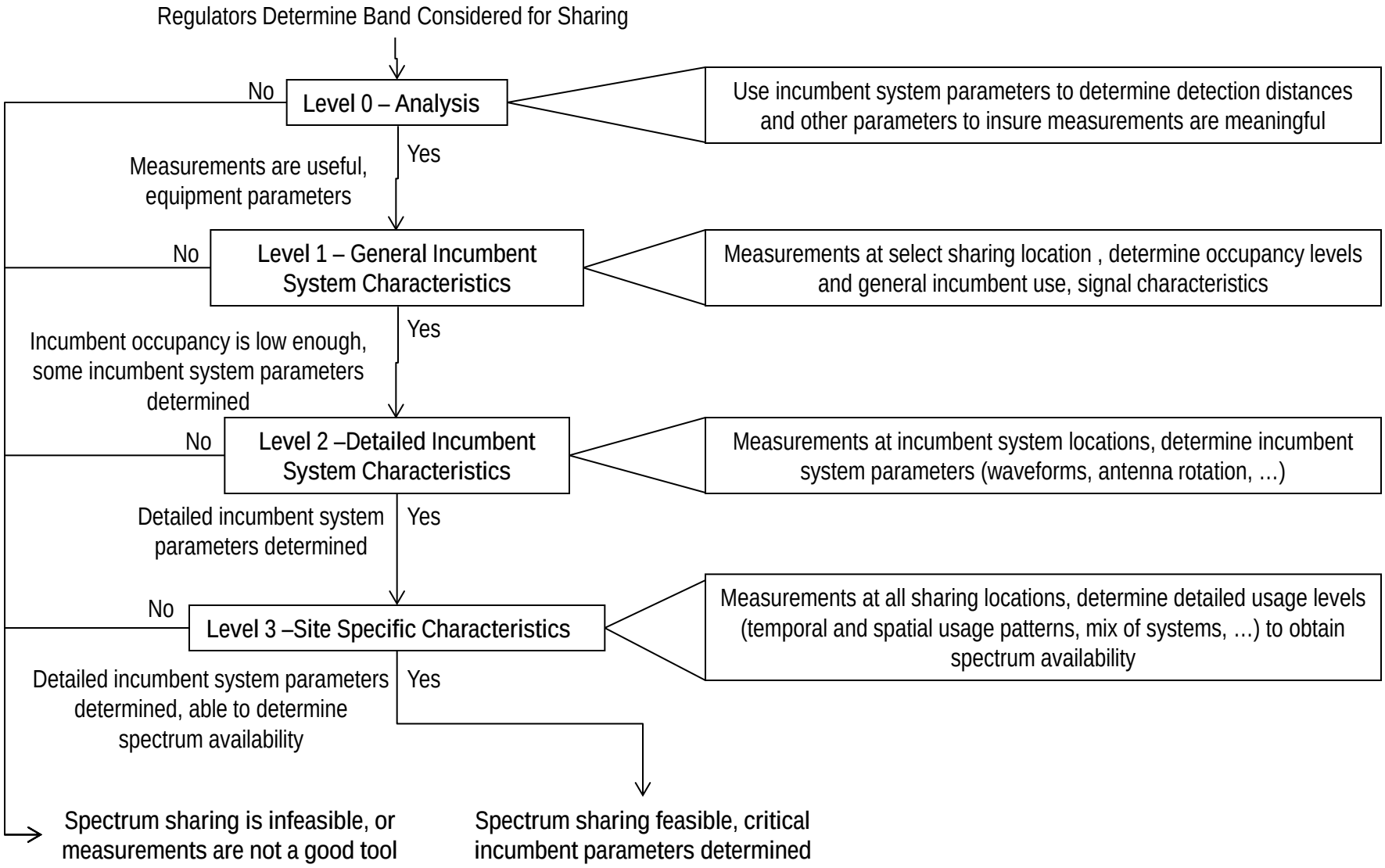
How may general occupancy measurements be performed to reflect or validate actual federal spectrum use (particularly radars and intermittent operations) in a way that can support spectrum management decisions regarding relocation or sharing of spectrum?

(See 6/14/13 Executive Memorandum at Sec. 3(c) and NTIA 8/19/13 Notice of Inquiry)

Question 1 – Draft Response

The general occupancy measurement objective should be to determine how much spectrum could be shared with incumbent systems. The measurements would approximately determine the number of transmitters, locations, number of channels used, modes typically in use, time-of-day use, etc. However, the measurement process needs to recognize and indicate where there are receive only uses, and other low duty cycle transmissions that would not be adequately reflected in the measurement results, e.g., where there are receive only radars, or missile destruct signals; current analytic techniques are more appropriate for such situations as measurements would be potentially misleading.

Question 1 – Measurement Approach



Question 1 – Draft Response

The general occupancy measurements should be made incrementally to support different phases of the spectrum management decision-making process. The duration and the geographic scope of the measurements should increase if the process for a given set of frequencies moves forward.

The purpose/triggers for measurement activity are:

Level 0

Prior to making any determination to undertake any occupancy measurements, NTIA should analyze the various federal uses and specific service characteristics (e.g., radar, earth observation systems, deep space exploration) in bands of potential interest, to determine if those bands could serve as potential candidates for next level measurement activity.

Question 1 – Draft Response

Level 1

To inform the process of identifying and prioritizing bands for potential relocation or sharing. These measurements would be conducted for a period of time and in places, appropriate for the incumbent operations in the band.

Level 2

For targeted bands, to determine the scope and technical feasibility of transitional or long-term sharing.

Level 3

For bands identified for relocation or sharing, to inform commercial users (auction bidders). These measurements would be made in all high priority Protection Zones at multiple locations (5 to 10) over long periods (3 to 6 months) to provide a comprehensive and detailed estimate of the existing transmitter's spatial and temporal characteristics.

Question 1 – Draft Response

The NTIA should develop a multi-tier approach to release share the data that accommodates security concerns. The detailed measurement data should be released to a limited group that are actively considering providing service in the specific areas. NTIA should investigate data processing methods to 'hide' critical measurement features (i.e. waveform type, specific frequencies, etc) and maintaining received power level, approximate location and time of day to enable public releasable data. For example, the amplitude probability distribution of received power in 4 hours blocks over frequency range blocks could be provided, along with annotation that the source was an airborne transmitter, which would provide significant information for spectrum sharing analysis, but would reveal much less about the DoD systems.

Question 1 – Draft Response

The NTIA should analyze the measurement data to extrapolate the usage in the future, which can inform whether there is a potential for sharing or relocation. However, measurement characteristics alone are not sufficient to determine future usage, but the spectrum needs of existing authorized, but not yet deployed, programs need also be reflected in future usage analysis, as well as any planned growth in current systems.

Question 2

Recognizing resource limitations and the lack of real-time reporting of use built within the federal radio infrastructure, how should actual federal spectrum use be quantified with or without supplemental occupancy measurements?

(See 6/14/13 PM Sec. 3(a) and (d))

Question 2 – Draft Response

The CSMAC recommends that the NTIA use spectrum measurements to selectively validate analytic spectrum interference prediction models.[1] These interference models effectively describe federal spectrum use because the prediction models are a fundamental tool used to limit entrant spectrum use. Measurements are critical to interference models because the models have many assumptions on propagation models, clutter levels, transmit power levels, transmitter locations, transmission statistics, and other parameters. The measurements should determine the incumbent and/or entrant received power level distribution functions at specific locations. By directly comparing these measurements with model predictions, the interference models are validated.

Note 1: For example the approach described in 'Fourth Interim Progress Report on the Ten-Year Plan and Timetable and Plan for Quantitative Assessments of Spectrum Usage', U.S. Department of Commerce Report, Appendix A

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