

**CORPORATION FOR PUBLIC BROADCASTING**  
**Request for Proposals for a Digital Radio Coverage**  
**and Interference Analysis Project**  
**RFP Release Date: April 18, 2006**  
**Deadline for Response: May 30, 2006**

**RFP AT A GLANCE**

This project is a technical analysis of public radio HD radio coverage problems and the loss of analog and digital coverage due to the interference caused by co and adjacent channel HD stations. The purpose of this research study is to determine the longer-term implications for public radio and the potential impact on listeners due to the introduction of HD radio. CPB is concerned with the disenfranchisement of listeners due to the loss of services public radio currently provides to them and the underperformance or lack of HD service (i.e., technical availability) when the conversion of public radio stations to HD is complete. The project is expected to be complete in one year.

**BACKGROUND**

Early studies have determined that a station transmitting HD radio has a significantly smaller coverage area than its counterpart analog station. The potential also exists for increased interference by digital signals to existing analog service and new digital services CPB has received reports that existing analog listeners have lost reception of their favorite public radio station when new HD signals have gone on the air. Based on these experiences and expanding into the future, to what extent will increased interference be evident? What impact does this have on current analog listeners and will it have on the new digital listeners?

**KEY CONCERNS**

This project has two key concerns: loss of service to existing listeners and the potential for new service to listeners by HD radio.

**1. Analog (current) Listeners:**

Many public radio FM listeners<sup>1</sup> receive an analog signal that is free from interference within the 50 dBu signal contour. To what extent will these listeners lose analog radio reception due to interference by new HD transmissions on co and adjacent channels? Where are these disenfranchised listeners located?

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<sup>1</sup> For purposes of this study, listeners or public radio listeners means the number of people in the general population, as determined by predictive methods as derived from the U.S. Census, year 2000, using current Census Bureau estimates, within a station's coverage contour for each identified dBu level.

**2. HD (potential) Listeners:**

**A. Coverage Issues:** Early studies have determined that an average 66 dBu signal strength is required in various markets for an FM band HD radio signal to be properly decoded.<sup>2</sup> This average is 6 dB above the 60 dBu coverage area contour of analog FM stations normally protected by the Federal Communications Commission through its allocation program. How many, and where are, the current analog public radio listeners who will not be able to receive the HD radio signal of the public radio station they listen to because they are outside the minimal threshold for reception but above the 50 dBu level (considered to be the limit for reception)?

**B. Interference issues:** What is the impact on public radio HD listeners when most or all FM stations begin transmitting HD radio? To what extent will interference caused by adjacent channels limit reception of HD radio? What is the overall impact of interference to reception of HD radio when considered with the coverage problems detailed in A. above?

**TWO PART PROJECT**

There are two parts to this research project. Applicants are requested to submit individual price quotes for each part. A brief description of each part follows:

**Part 1: Coverage**

Study at least 50 of the largest public radio markets in the U.S. and 25 smaller markets where significant service is provided by public radio stations located outside or at the periphery of the market. The service to locations within these markets will be provided by transmitters where the signal strength is above 50 dBu and at or below 66 dBu. For the markets selected, provide individual public radio station coverage analysis. Develop conclusions, backed by research, as to the extent of public radio audience coverage difficulties on a nation-wide basis. Provide practical technical solutions, including that which could help extend the HD signal range to that of the current analog coverage.

**Part 2: Interference**

Calculate the impact on public radio listeners of a robust HD radio environment. How many existing public radio analog listeners will lose analog service because of interference caused by HD radio? What, if any, are the common distinguishing factors of the disenfranchised listeners? What markets and stations are most vulnerable? Considering our existing NCE allocation system, what will be the interference impact on HD coverage of the eventual lighting up of HD carriers on all (or most) NCE stations? What are the service implications of public radio analog translators in an HD environment where reception must come cleanly from primary stations located at great distances and where the transmitter output powers are small? How does the level of anticipated HD interference in the non-commercial educational FM band differ from that expected in the commercial FM band (where the allocation system differs)? What

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<sup>2</sup> Tomorrow Radio(SM) Field Testing in the Washington, D.C., New York City, San Francisco, and Los Angeles (Long Beach) Radio Markets, National Public Radio, January 6, 2004

is the long-term impact of continued urbanization on the HD signal? How does the problem differ between fixed and vehicular listening?

### **CONSIDERATIONS FOR SOLUTIONS**

The following options are examples of potential solutions areas for exploration by this project.

- Would a possible solution to this problem be the use of HD only boosters? iBiquity's HD technology employs the use of OFDM carriers and it is known that these carriers can be synchronized, therefore it should be possible to use small, on-channel boosters, or single frequency networks, to provide fill-in coverage in low signal pockets so that listeners will experience drop-out free reception of the HD signal. To date, working models of synchronized HD boosters have not been developed and there has been little or no research in the U.S. in applying synchronizing techniques to HD transmissions.
- Is another option to improve the sensitivity of HD receivers, allowing better coverage of lower-level HD signals or is HD receiver technology at its apex?
- Without causing more interference, could the ratio of digital power to analog power be increased for HD transmissions, thereby increasing the HD coverage range?
- Are there other options to improving HD coverage available including, but not limited to, technical adjustments to the iBiquity methodology?

### **PROJECT ACTIVITIES**

#### **PART 1: COVERAGE**

##### **A. Affected Population**

Using professional level predictive computer software, calculate the affected population within the identified coverage areas of each of the markets defined above. Provide individual reports and a consolidated report.

##### **B. HD Receiver Laboratory Studies**

Perform HD receiver laboratory studies of all first and available second generation IBOC receivers to determine the signal level required for reliable reception of HD and secondary audio signals. Factor these studies into HD receiver categories which should include high end receivers, table models and portable receivers and automobile receivers. Consider the impact on reception of the various types of antennas commonly used by consumers. Provide individual and consolidated reports on the receivers.

##### **C. Field Measurements**

Select an adequate sampling (to be approved by CPB) of the identified markets giving consideration to differentiating transmission factors such as antenna heights and

power, terrain and existing interference levels. Carry out actual field measurements. Compare the measured results to software predicted results, factoring in laboratory measured receiver characteristics and actual market signal strength measurements. Adjust service predictions of the identified stations. Calculate total area and population of those listeners who, based on the analysis, will not receive HD service. (The 50 dBu and above, interference-free analog coverage area population should be used as the base for these calculations, see B2 below.) Provide a detailed report.

#### **D. Recommend Solutions**

Based on the laboratory studies and additional research, recommend receiver improvement technology, HD booster technology and possible changes to the iBiquity standard or other options that could improve HD coverage. Determine what policy, standards or rule changes would be required. Provide an estimated timeline for the development of this technology. Prepare a report with cost estimates and an implementation plan.

#### **E. Coverage Reports**

Prepare and submit a mid-project progress report that presents early findings and the progress as of the report's date. Prepare and submit a final report that provides a detailed analysis of the extent of the problems on a nationwide basis and that recommends a detailed course of action and a timeline.

The reports should address pertinent questions raised in this RFP and include important new issues, if any, that were not specifically raised. These reports should consider information gleaned from the interference portion of this project as detailed below.

### **PART 2: INTERFERENCE**

#### **A. Receiver Laboratory Interference Studies**

Perform laboratory studies of first and available second generation IBOC receivers. Through the measurement process, determine the channel relationship based undesired to desired (U/D) ratios required for interference free HD reception. Factor these studies into HD receiver categories which should include high end receivers, table models and portable receivers and automobile receivers. Consider the impact on receiver interference of the various types of antennas commonly used by consumers. Provide individual and consolidated reports on the receivers. If these studies differ widely from the FCC's existing analog ratios, recommend U/D ratios that should be used to predict interference for HD radio.

#### **B. Identify Existing Interference-Free Analog Reception.**

From the markets identified above, identify the markets and the areas where significant public radio analog listeners are provided *interference-free* reception at or above the 50 dBu contour of public radio stations. Calculate the total population within these areas above the 50 dBu and 60 dBu separately.

**C. Identify Interference Areas and Populations**

From the areas and baseline populations identified above, and by applying the relevant laboratory determined U/D ratios, determine which stations will suffer analog and/or digital interference, and consequent coverage loss, caused by new co-channel or adjacent channel HD transmitters. Determine if any of the new interference areas could fall within the traditionally protected 60 dBu contour. Calculate the predicted population lost to analog listening and digital listening separately. Determine if there are commonalities among these disenfranchised listeners. Extrapolate the results to determine the nationwide impact. Provide a detailed report on the findings concerning the issues raised in this paragraph.

**D. Translator Interference Analysis**

Using an appropriate numerical sampling (to be approved by CPB) of licensed public radio translators; determine the interference impact of HD radio on public radio translators by calculating the number of translators that would receive interference from co or adjacent channels transmitting HD. Examine both input and output frequencies for potential interference. Calculate individual translator populations affected. Extrapolate the results to determine the impact on a nationwide basis. Calculate total population estimated to be affected. Provide a detailed report on the findings concerning the issues raised in this paragraph.

**E. Interference Reports**

Prepare and submit a mid-project report that presents early findings and the progress as of the report's date. Prepare and submit a final report for this option that provides a detailed analysis of the extent of the identified problems and that recommends a detailed course of action and a timeline. The report should address all pertinent questions raised in this RFP and include important new issues, if any, that were not specifically raised. This report shall include pertinent information developed under part A of this project.

CPB may agree to the consolidation of mid-project and final projects into a combined mid-project and final report for both Parts 1 and 2 of these studies. The project is expected to be complete in one year.

**PRICE QUOTATION**

Please provide costs for Parts 1 and 2 separately as well as a complete project budget.

**Option:** As an option, assuming full HD adoption but excluding translators, bid the cost to use industry standard, professional computer analysis to study the coverage and interference implications of all of the existing CPB qualified public radio analog stations and projected companion HD stations. Provide individual reports to be shared with these stations. The reports will provide maps that identify predicted coverage areas and interference areas including population within the Longley-Rice interference-free 50 dBu for both analog and the digital services.

**PROPOSED RFP TIMELINE**

April 18, 2006	RFP posted
May 8, 2006	Questions on RFP due
May 16, 2006	RFP resubmitted with answers to questions
May 30, 2006	Deadline for proposals
June 15, 2006	Project award (approximate date)

**SUBMISSION REQUIREMENTS**

In your proposal, please provide as much specific and detailed information as possible regarding each of the items below:

- Relevant experience
- Description of project activities
- Timeline for the project (one year maximum)
- Project budget, as described above
- Resumés of key project personnel

**EVALUATION CRITERIA**

- Relevant qualifications and experience of the firm and individuals directing the project
- Clarity of response to the individual elements within the RFP
- Precision and detail in defining the final deliverables
- Price
- Integration of laboratory capability including available equipment for the requested measurements
- Timeline must fit within the year maximum period for the project
- Experience of any subcontractors to be used
- History of similar projects

**REFERENCES**

Please provide three references, with contact information, and a brief description of relevant experience. References for firms being considered *will* be contacted by CPB

**QUESTIONS AND SUBMISSION OF PROPOSALS**

CPB welcomes your questions or requests for clarification. Please submit any questions by 5 PM Eastern time on May 8, 2006 to the contact listed below. We will republish the RFP with answers to relevant questions on May 16, 2006.

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Phone: (202) 879-9690

**APPLICATION PROCEDURES**

[Complete the online application form](#). Applications must be submitted electronically.

Applications must consist of:

- [Application Form](#), filled out in its entirety.
  
- Project Narrative**, a written (maximum of ten pages) description of the project that clearly articulates:
  - project activities,
  - how the activities relate to the priorities of this RFP,
  - project timeline
  - project deliverables
  
- Itemized Project Budget**, the financial plan for the project presented in spreadsheet format, tailored to the request, and identifying how each line amount was calculated.

The acceptable file format for RFP responses is Adobe Acrobat PDF.

Supplements to RFP responses and reports prepared during the project may contain elements using the following file formats:

Microsoft Word  
Microsoft Excel  
Microsoft PowerPoint  
Microsoft Project

Applicants are responsible for providing all required materials. CPB may, at its discretion, initiate discussion with any Applicant to obtain clarification or additional information.

Proposals must be submitted electronically. Do not submit proposals by fax or mail. They will not be accepted.

Any submission to CPB will become the property of CPB (not including any intellectual property rights contained in such submission).

Each Applicant guarantees that the full and complete rights to all information and materials have been secured. Each Applicant also guarantees that all such materials are not defamatory and do not infringe upon or violate the privacy rights, copyrights, or other proprietary rights of any third party. CPB is not responsible for any violation of copyright, trademark, patent, trade secret, or other rights that may result from disclosure made by response to this RFP.

By submitting a proposal in response to this RFP, each Applicant grants to CPB the right to duplicate, use, disclose, and distribute all of the submitted materials for purposes of evaluation, review, and research. CPB will not consider the proposal or any of its supporting materials to be confidential. CPB intends to disclose the materials to various employees and possibly to experts outside CPB's employ to determine the merits of the proposal. It is understood that no confidential relationship is entered into by reason of CPB's consideration of the proposal or any of the materials.

CPB is not responsible for loss or damage to the materials submitted to CPB, or for any unauthorized use or misuse of the submitted materials by any third party.

CPB is not required to return any submitted materials to any Applicant.

Applicants may withdraw a proposal at any time by written notice to CPB.

Solicitation of proposals by CPB does not constitute an agreement by CPB to extend funding to any party under this RFP. CPB may, in its sole discretion, elect not to pursue projects under this RFP in any manner.

#### **DEADLINE**

Applications must be submitted electronically. Applications must be received by 5PM Eastern time, on Tuesday, May 30, 2006.

#### **REVIEW AND SELECTION**

The process will begin with CPB staff review, after which Applicants may be invited to submit additional detail, if appropriate. CPB may forward such additional materials to outside experts, who will advise CPB regarding each proposal's merits. While we may seek outside input and advice, funding decisions are CPB's alone.

#### **OTHER**

Projects selected for funding may receive requests for additional detail, including project timeline and cash flow projections. CPB may ask Applicants to work with other individuals or institutions to achieve proposed outcomes. Applicants may neither begin work nor announce funding before a grant document or contract has been executed.

When CPB selects a project, CPB will require the Applicant to sign a binding CPB grant document or contract containing terms acceptable to CPB. Until a grant document or contract is signed by both the Applicant and CPB, CPB makes no express or implied commitment to support a project financially. CPB cannot authorize Applicants to commence work on a project until the grant document or contract is fully executed. If an Applicant opts to commence work, it will be at the Applicant's own financial risk, and CPB will not reimburse any expenses if CPB elects not to enter into a contractual relationship with the Applicant. No oral or written statements other

than the signed, written grant document or contract will govern or modify the relationship.

Those receiving funds from CPB must be able to comply with a number of requirements that will be included in the operative agreement. All Applicants are advised to familiarize themselves with these CPB [Grant Requirements](#) before applying.