Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In the Matter of:	)	
	)	
Amendment of Section 74.1231(i) of	)	MB Docket No. 20-401
the Commission's Rules on FM Broadcast	)	MB Docket No. 17-105
Booster Stations	)	RM-11854
	)	
Modernization of Media Initiative	)	

To: Office of the Secretary

Electronic Filing

CONSOLIDATED REPLY COMMENTS

The instant Consolidated Reply Comments are hereby submitted on behalf of The Evans Broadcast Company, Inc.; Ashley County Broadcasters, Inc.; Best Media, Inc.; Boswell Media, LLC; BroadSouth Communications, Inc.; Southwestern Diabetic Foundation, Inc., d/b/a Camp Sweeney; Center Broadcasting Company, Inc.; Cheyenne Mountain Public Broadcast House, Inc.; Country Gold Broadcasting, Inc.; Datatech Digital LLC; Dockins Broadcast Group, LLC; Dockins Communications, Inc.; Double-R Communications, LLC; Educational Communications of Colorado Springs, Inc.; Evans Broadcasting, Inc.; Ashley Communications, Inc.; Falls Media, LLC; Hazard Broadcasting, Inc.; Flagstaff Radio, Inc.; HubCast Broadcasting, Inc.; Johnny Boswell Radio LLC; Kath Broadcasting Co., LLC; Keyhole Broadcasting, LLC; KM Broadcasting of Guam, L.L.C.; KM Communications, Inc.; KM Radio of Atlanta, L.L.C.; KM Radio of Breese, L.L.C.; KM Radio of Earlville, L.L.C.; KM Radio of Independence, L.L.C.; KM Radio of Lovelady LLC; KM Radio of St. Johns, L.L.C.; Lake Broadcasting, Inc.; Lazo Media LLC; Leslie County Broadcasting, Inc.; LHTC Media of West Virginia, Inc.; M & M Broadcasting; Marshall University Board of Governors; Monticello-Wayne County Media, Inc.;

Mountain Broadcasting Service, Inc.; Peak Radio, LLC; Phillips Broadcasting Company, Inc.; Pikes Peak Community College; Q Media Group, LLC; Q Media Properties, LLC; R&M Broadcasting; Ranchland Broadcasting Company, Inc.; Sky Media, LLC; Southark Broadcasters, Inc.; Southwest Media, Inc.; Truckee Tahoe Radio, LLC; Two Black Cadillacs, Inc.; and Yeary Broadcasting, Inc. (the "Licensees").

The instant Reply Comments are in reply to the Comments filed by National Public Radio, Inc. ("NPR"), the National Association of Broadcasters ("NAB"), Xperi Holdings Corporation ("Xperi"), Press Communications, LLC ("Press") and Joint Comments of Audacy, Inc., Beasley Media Group, LLC, Cumulus Media New Holdings, Inc., iHeart Communications, Inc., New York Public Radio and Salem Media Group, Inc. ("Joint Comments").

NPR and NAB Comments

NPR, in its Comments, argues that the ZoneCasting technology will impose substantial interference on certain listeners near "zone transition regions." NPR also argues that the technology threatens a widespread harm to the fidelity of the FM dial generally, as listeners of stations using ZoneCasting become frustrated by the interference and move towards non-broadcast alternatives. Finally, NPR argues that there is a concern from FEMA that ZoneCasting would interfere with the Emergency Alert System ("EAS") and other emergency warnings. NPR states that the GeoBroadcast Solutions LLC ("GBS") technical reports partially illustrate the interference, and that the reports are incomplete, and tested only in "ideal circumstances in an unrealistically small co-channel interference region." NPR relies heavily on an engineering report authored by John Kean.

The NAB comments also oppose the GBS proposal, saying that it will have a potential harmful effect on listeners. Specifically, "permitting ZoneCasting's operation will almost certainly drive listeners away from terrestrial radio and put listeners' safety at risk." NAB also relies on the engineering statement submitted by John Kean, Senior Engineer at Cavell, Mertz & Associates, Inc.

Attached to the instant Reply Comments is a 2013 excerpt from the National Academies Press referencing that NPR Labs, which is wholly owned by NPR, partnered with GeoBroadcast Solutions, to examine the performance and use of GBS technology known as ZoneCasting. None other than John Kean is mentioned, and Mr. Kean discusses that the technology:

> "....extends the reach of radio alerts to communities currently poorly served by single radio transmitters; and, second, by supporting distinct programming by different nodes, they enable geotargeting of alert and warning messages." (*See* Attachment A.)

Also attached is a draft prepared by John Kean for NPR Labs for testing the compatibility of GeoBroadcast Solutions ZoneCasting with primary FM broadcasting. Contained therein is, *inter alia*, the following:

> "Interference between the ZoneCast network and the primary transmitter signal occurs when a boundary area around the ZoneCast signal or the primary transmitter signal exceeds a specific interference ratio. While this boundary interference cannot be eliminated, experimental designs for the networks indicate that this residual interference can be reduced by lowering the power and height of each node and increasing the number of nodes within the desired zone area. These results suggest that the area of residential interference may be acceptably small, in comparison with the benefits of ZoneCasting." (*See* Attachment B.)

It is obvious that Mr. Kean in this document does not envision any significant interference problem. A fair reading of the report is that Mr. Kean was a proponent of the technology.

Xperi Holding Corporation Comments

The Xperi Comments seem to be, at some point, favorable to GBS. However, on page 6, it states as follows:

> "Xperi's test results demonstrate that if main and zone boosters are not properly synchronized, disruptive digital audio outages ranging in duration from a few seconds to one minute are possible. The existence of digital dead zones underscores the importance of establishing and maintaining proper synchronization of the HD Radio boosters. Additionally, digital co-channel interference between zones reduced the detection margin of the digital signal, weakening its ability to withstand channel impairments such as signal fading, shadowing, and interference. Finally, Xperi's field tests demonstrated that rapid analog and digital audio transitions will occur on roads that intersect transition areas. If the intersected distance is significant, extended periods of frequent and disruptive switching between main and zone audio programs will only serve to irritate the listener, leading to increased dissatisfaction with broadcast radio services."

Xperi is correct that if the system is not properly built and maintained, there could be problems. There is little dispute on that assertion. But that is no different than if a broadcaster does not maintain its equipment or over or under modulates its signal. A broadcaster has every incentive to keep its listeners. No broadcaster wants to have a "frustrated" audience. No broadcaster would intentionally do something to lose its audience. Furthermore, it must be assumed that no licensee would intentionally cause its signal to be degraded so that audience share would be lost.

Press Communications, LLC Comments

Press makes an alarming argument that the GBS proposal would create an unnecessary imposition on the radio industry and would present a significant financial threat to an industry

already beleaguered by other competitive actions that have been allowed to take root. Press states as follows:

> "…Press believes that the most recent inquiry relative to the FM Booster and Geo-Targeting of Content submitted by GBS, creates an existential threat to life and sustainability of the radio broadcasting industry that far outweighs the speculative benefits proffered by GBS."

Press goes on to state that adoption of the GBS proposal will devastate local radio marketplace revenues across the U.S. and:

> "This will directly lower advertising rates and undeniably suppress spot rates even lower than what has resulted from years of intrusion and fractionalization from platforms such as translators, low power FM's, social and direct digital media, satellite and more."

Licensees believe it is shocking that Press would make such an argument. The radio industry has been suffering for many years. The GBS proposal would allow targeted messaging so that, yes, rates could be lowered, but, at the same time, struggling radio stations could increase their revenues. For example, an automobile dealer who is paying $500 for a 30-second spot, if it could geotarget its spot, could probably cut that advertising cost in half to $250. The radio station, at the same time, could concurrently sell three other geotargeted spots for $250 each. Thus, the radio station would double its revenues, the advertiser would decrease its advertising costs by 50%, and, in all likelihood, the consumer would reap the benefit of that savings. It is a proverbial win-win for everyone.

Joint Comments

The Joint Comments argue that the technology would result in destructive interference to listeners.

Attached to the instant submission is an Engineering Statement prepared by Ryan Wilhour, Consulting Engineer with the firm of Kessler & Gehman Associates, Inc. (*See* Attachment C.) Mr. Wilhour states, *inter alia*, the following:

> "Many of the reply comments in opposition to the geo-targeted technology focus on interference the geo-targeted technology would cause. The Commission and commenters recognize that FM boosters inherently cause self-induced co-channel interference and therefore must be utilized appropriately to be effective. The Commission regularly grants FM booster applications without burden of proof of how much self-induced co-channel interference the applicant may cause to their own facility. The Commission recognizes that a poorly designed booster is self-defeating and interference mitigation is up to the applicant to resolve. 47 CFR Section 74.1203 specifies that an authorized FM booster station will not be permitted to continue to operate if it causes any actual interference to other broadcast facilities direct reception by the public of the off-the-air signals of any full-service station or previously authorized secondary station. Interference will be considered to occur whenever reception of a regularly used signal is impaired by the signals radiated by the FM booster station, regardless of the channel on which the protected signal is transmitted. It is clear that FM boosters and FM boosters with geo-targeted technology will not be allowed to cause real interference to other facilities and thus the scope of interference caused is only self-induced interference."

and:

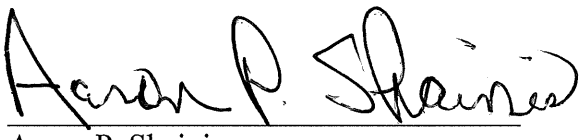
> "A poorly designed geo-targeted booster would cause no worse self-inflicted interference than a poorly designed booster with improper placement and wildly out-of-sync retransmission delay. In that respect, arguments against geo-targeted boosters are no different than arguments against long-established FM boosters which have no codified *de minimis* interference standard and thus is a moot argument."

and:

> "Furthermore, commenters against FM boosters and geo-targeted FM boosters must assume that there will never be a population distribution example which is compatible with the technology which is an unreasonable assumption."

The interference issue is clearly a non-issue. It should not be a reason to fail to move forward with the adoption of the rulemaking. The instant Consolidated Reply demonstrates that the "issues" raised are non-issues. The Commenters seek to muddy the waters to preserve their own self-interests. The public interest is clearly best served by ignoring the fabricated arguments of NPR, NAB, Xperi, Press and Joint Comments.

Respectfully submitted,



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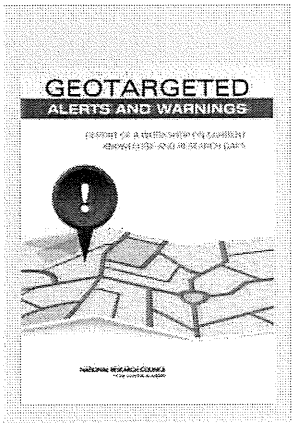
ATTACHMENT A



Geotargeted Alerts and Warnings: Report of a Workshop on Current Knowledge and Research Gaps (2013)

DETAILS

78 pages | 6 x 9 | HARDBACK

ISBN 978-0-309-38687-6 | DOI 10.17226/18414

CONTRIBUTORS

Committee on Geotargeted Disaster Alerts and Warnings: A Workshop on Current Knowledge and Research Gaps; Computer Science and Telecommunications Board; Division on Engineering and Physical Sciences; National Research Council

SUGGESTED CITATION

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GEOTARGETED ALERTS AND WARNINGS

REPORT OF A WORKSHOP ON CURRENT KNOWLEDGE AND RESEARCH GAPS

Committee on Geotargeted Disaster Alerts and Warnings:
A Workshop on Current Knowledge and Research Gaps

Computer Science and Telecommunications Board

Division on Engineering and Physical Sciences

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reach mobile devices, but this requires subscribers to register their phone numbers. Despite communities aggressively encouraging people to register, registration rates for mobile subscribers across the country are still well below 10 percent.

- Reverse-dialing systems are not particularly effective at delivering messages to those with disabilities.
- Reverse-dialing systems are expensive, and local jurisdictions may not be in a position to purchase or modernize a system.

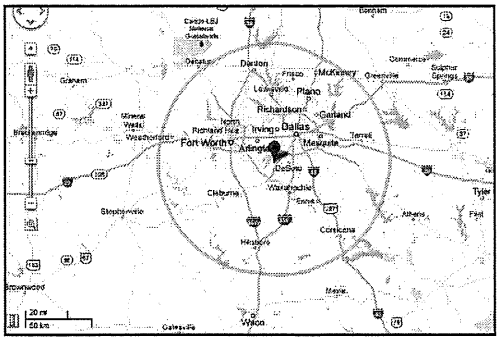
Radio Broadcast Technologies

NPR Labs, a small, self-supported broadcast technology research and development outfit operated by National Public Radio, is currently examining the use of two new technologies that may benefit alerting: broadcast repeaters and the use of the radio broadcast system (RBDS).

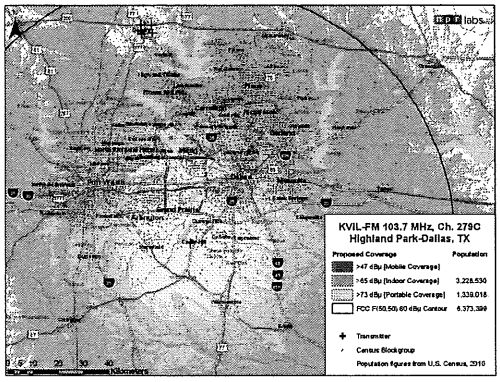
NPR Labs partnered with Geo-Broadcast Solutions (GBS) to examine the performance and use of GBS technologies known as ZoneCasting and MaxCasting. In both technologies, a group of synchronous repeaters repeats the signal of the primary station using lower power and transmitter heights. In MaxCasting, the nodes are time-aligned to the primary transmitter to reinforce or extend coverage. In ZoneCasting, the individual nodes can be used to send distinct programming to different locations. Figure 2.1 demonstrates how these tools can expand coverage of a radio station and also provide separate coverage by zone.

John Kean discussed how both tools support alerting: first, they extend the reach of radio alerts to communities currently poorly served by single radio transmitters; and, second, by supporting distinct programming by different nodes, they enable geotargeting of alert and warning messages. Although they require new equipment on the part of the broadcaster, they have the advantage of requiring no new equipment for the public.

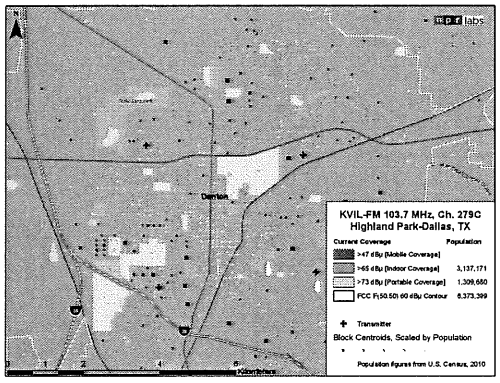
NPR Labs is also working to demonstrate the use of RBDS to reach at-risk populations, including those with hearing impairments. RBDS is a standard to embed small amounts of digital information in conventional radio broadcasts that almost all FM stations are capable of supporting. It is currently used most often to transmit and display song or other program information and is commonly found in automobile radios. One of the objectives of the NPR Lab project is to experiment with using RBDS to send text information using household receivers to people with hearing impairments to explore how effectively this technology would reach this large segment of the public.



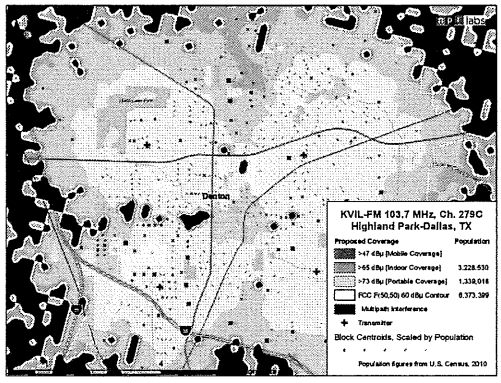
(a) KVIL-FM is a class C FM station, the largest classification for stations. The station has coverage of approximately 24,000 square miles (with a coverage radius of 88 kilometers). A smooth circle usually represents this coverage; however, coverage is not that consistent. Circle added by NPR Labs, map copyright 2013 Google.



(b) Broadcast is a terrestrial signal, so the signal strength is impacted by terrain. Coverage is also lost due to less efficient antennas and building penetration. For this station, coverage should be approximately 6,373,000 people. When terrain sensitivity and indoor penetration are factored in, coverage shrinks to about 3,173,000 people.



(c) Denton, Texas, falls within the station's coverage area; however, almost the entire town sits within an area where there is little to no coverage.



(d) When ZoneCast nodes are added to Denton, the signal can reach indoors and also allows for special announcements to separate areas.

FIGURE 2.1 Radio broadcast coverage of KVIL-FM, Dallas, Texas.
NOTE: Radio coverage in images b-d is indicated by shading; darker areas have basic coverage, and lighter areas have increased coverage, including indoors and in previously terrain-blocked areas. SOURCE: John Kean, NPR Labs, presentation at the Workshop on Geotargeted Alerts and Warnings, Washington, D.C., February 2013.

ATTACHMENT B

Plan for Testing the Compatibility of Geo-Broadcast Solutions "ZoneCasting" With Primary FM Broadcasting (DRAFT)

John Kean, Senior Technologist

5 August 2013

(DRAFT)

Plan for Testing the Compatibility of Geo-Broadcast Solutions "ZoneCasting" With Primary FM Broadcasting

Geo Broadcast Solutions, LLC,("GBS") has developed optimal transmission parameters for a network of synchronous FM boosters to originate programming separate from a primary FM station – a system known as "ZoneCasting". This technology uses low-power, low-height FM transmitters operating on the same frequency, and within the service contour, of a primary FM station transmitter.[1] This test plan is intended to determine the compatibility of ZoneCasting with standard FM broadcast stations.

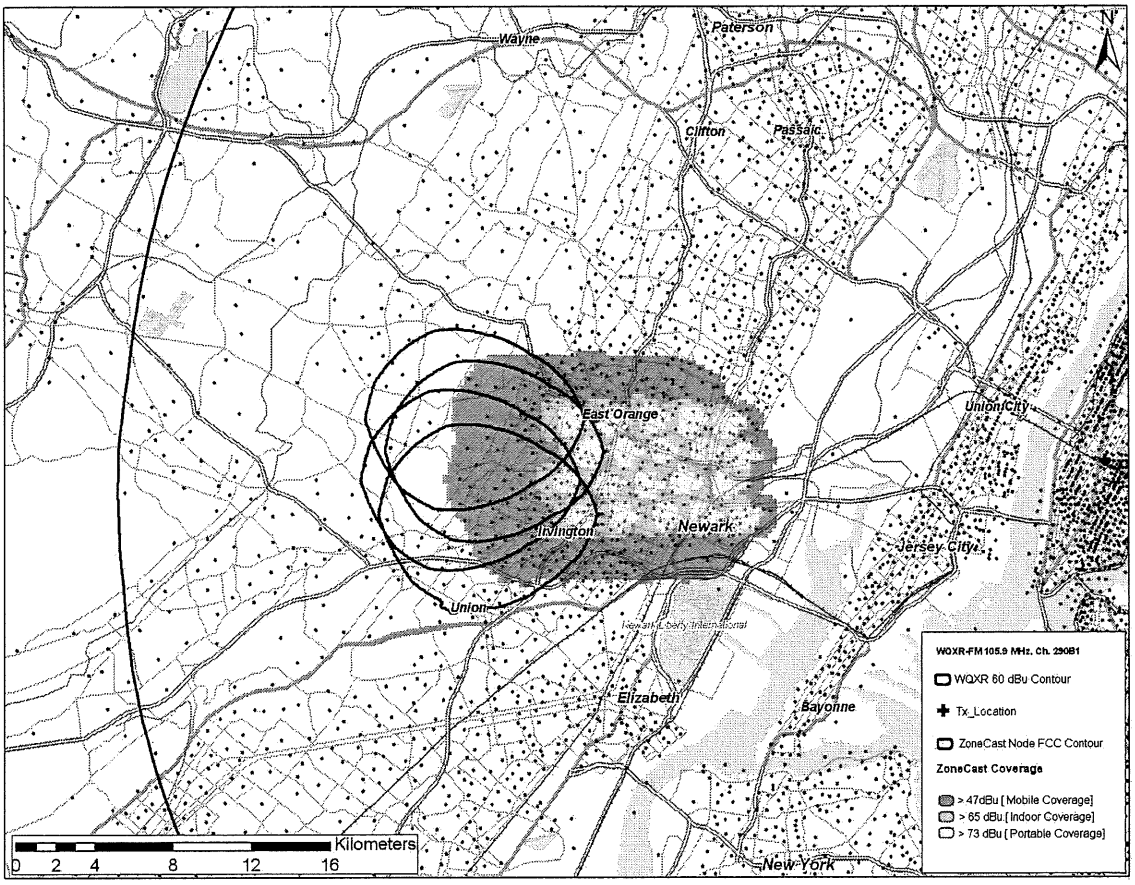


Figure 1 - Example of 20-node network in New Jersey; service contours of some nodes are shown with primary transmitter located in New York City; shading shows predicted signal without consideration for interference

GBS has funded research to determine the parameters for interference with a ZoneCast network, which are to be applied in several field trials for evaluation. The parameters are derived from accurate simulations of transmitted FM signals at NPR Labs, which were evaluated by a large group of listeners in controlled subjective testing at Towson

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[1] GBS filed a petition for rulemaking with the FCC in early 2012 (*RM 11659*), proposing a network of synchronous FM transmitters that operate within the service contour of an FM station, but originate programming separate from the primary transmitter. Technically, this system is proposed to operate under the same rules as current FM boosters.

University.[2] For ZoneCasting, these parameters define the RF interference (C/I) ratios in both stereophonic and monophonic FM transmission, for fixed and mobile reception.

ZoneCast Design

Extensive network design work at NPR Labs has identified the best power and height for the ZoneCast nodes under a variety of primary station types and terrain conditions. Using appropriate parameters for these nodes, we predict that interference *within the target area of the zone* can be effectively eliminated. This requires a sufficient density of nodes (per square kilometer) to provide field strengths at all locations across the target area to overcome the primary transmitter's signal by a prescribed interference ratio.

Interference between the ZoneCast network and the primary transmitter's signal occurs in a boundary area around the zone where neither the ZoneCast signal or the primary transmitter signal exceeds a specific interference ratio. While this boundary interference cannot be eliminated, experimental designs for the networks indicate that this residual interference can be reduced by lowering the power and height of each node, and increasing the number of nodes within the desired zone area. These results suggest that the area of residual interference may be acceptably small, in comparison with the benefits of ZoneCasting.

The best field strength prediction models available can only approximate signal levels from the primary station and the nodes. The path from the primary transmitter would be large in comparison with the distance from the nodes, which involves the consideration of terrain as well as local clutter attenuation. For these studies, we chose the TIREM (Terrain Integrated Rough Earth Model) using the SRTM (Shuttle Radar Topography Mission) 90-meter digital terrain elevation data, with adjustment to path loss using a land classification database specially-developed for NPR Labs by the U.S.G.S. from Landsat 7 satellite data.

The nodes will operate at very low heights, barely above rooftop in most cases, for which few models exist, and little field verification is available. Considering the ratio of both signals doubles the potential inaccuracies. In addition, the ZoneCast origination is intended to operate for only minutes per hour, during programming breaks. The impact on listeners of interference for this small interval is not considered in our models, but it is likely to reduce the annoyance of such interference.

Based on what is known, from calibrated listener testing, and what is less known about FM signal prediction in low-height paths, this test is designed to:

- Verify the listener-derived signal ratio at which interference occurs between the ZoneCast nodes and primary transmitter;
- For a given design, measure the physical size of the interference boundary;
- Verify the signal prediction model for the interference boundary and adjust the model to measured results.

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[2] The methodology for laboratory and listener testing of both ZoneCasting and MaxxCasting is described in "Design Parameters for FM Signal Repeaters Based on Listener Testing", Dr. Ellyn Sheffield, Melinda Hines and John Kean, NAB 2013 Broadcast Engineering Conference Proceedings

Test Procedures

- Select test stations for the following transmission conditions:

Geographic Environment	Primary Field Strength In ZoneCast Test Area
Flat	55-65 dBu
Moderately Rough	65-75 dBu
Hilly	any

- Using a defined method for predicting field strength and interference, design a ZoneCast system and prepare maps showing the interference-free coverage for the primary and ZoneCast signals.
- Construct a ZoneCast network according to the design parameters.
- Collect mobile signal measurements in and around the ZoneCast area, to gauge the amount of interference between the ZoneCast network and the primary transmitter, using the following operating conditions:

Stereo	Primary Transmitter	ZoneCast Network	Field Strength Map	Objective Signal Quality Measurement	Audio Recordings	Notes
-	ON	OFF	√			Establishes coverage before the ZoneCast network
-	ON	ON	√			Measures combined coverage if operated in synchronous repeater mode with primary
-	OFF*	ON	√			Measures coverage of only the ZoneCast network
OFF	ON	OFF		√	√	Baseline for primary signal quality without ZoneCast network
OFF	ON	ON		√	√	Determining areas of acceptable and unacceptable interference during ZoneCast operation (standard mode is mono/mono)
ON	ON	OFF		√	√	Baseline repeat with stereo
ON	ON	ON		√	√	Repeat of interference test in stereo on primary transmitter

*Subject to the approval and with assistance of the primary station management
Note: field strength and audio quality measurements are shown separately for clarity, but may be combined

- Maps will be prepared showing the field strength in each condition described above, including the route measurements in dot-overlay
- Objective signal quality would be determined objectively, using a reception quality metric such as the Audemat® "Goldenear" software in association with the FM-FM3 portable receiver (additional data processing for more accurate or thorough measurement of reception quality may be devised)
- Collect audio recordings of the FM reception, while traveling the same routes used above
    - Continuous audio program transmission on the ZoneCast and primary transmitter during audio quality testing
    - Sections of the recorded audio files will be labelled and identified by map markers to show where the received audio was collected
    - The audio recordings will indicate the combinations of primary and ZoneCast modes listed above

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John Kean, Senior Technologist

5 August 2013

npr labs

(DRAFT)

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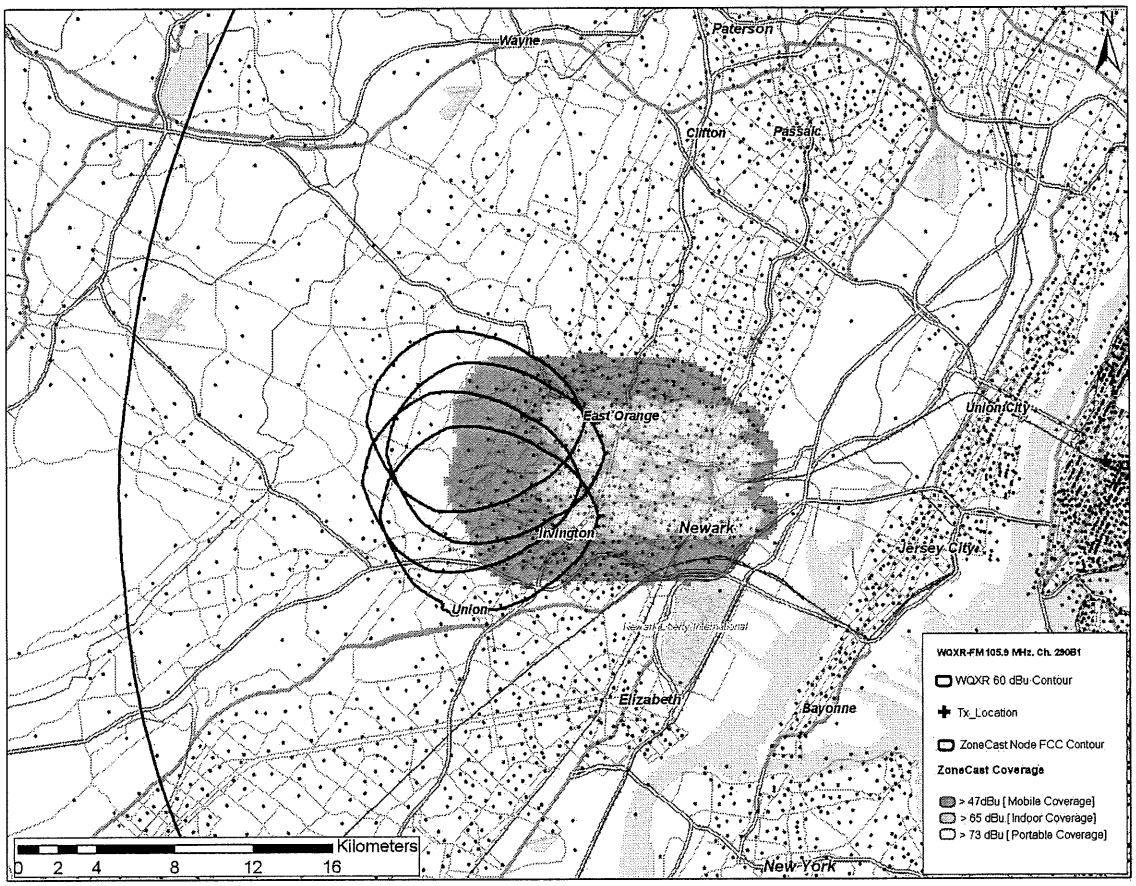

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ATTACHMENT C

Kessler and Gehman Associates, Inc.
Consultants • Broadcast • Wireless

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ENGINEERING

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June 20, 2022

Technical Statement in Support of the Use
of FM Boosters for Geo-Targeted Content

The following statement was prepared by Ryan Wilhour who has a Bachelor of Science degree in electrical engineering from The University of Florida and has worked in the broadcast engineering field for 25 years. Kessler and Gehman Associates is a professional telecommunications consulting engineering firm specializing in all phases of communications since 1967 and has represented countless FM broadcasting clients before the FCC.

The Media Bureau published a Public Notice in the Federal Register on May 5, 2022[1] seeking comment on the proposed use of FM booster stations to allow geo-targeted content.[2] Many of the reply comments in opposition to the geo-targeted technology focus on interference the geo-targeted

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[1] *Media Bureau Seeks Comment on Recent Filings Concerning Use of FM Boosters for Geo-Targeted Content,* 87 Fed. Reg. 26758 (May 5, 2022).

[2] *Amendment of Section 74.1231(i) of the Commission's Rules on FM Broadcast Booster Stations*, Notice of Proposed Rulemaking, 35 FCC Rcd 14213 (2020) (NPRM) (Geo-targeted content is that which can be heard only within that portion of an FM station's total service area covered by the signal of a co-channel FM booster station.); Comment and Reply Comment Dates Set for FM Broadcast Booster Stations NPRM, Public Notice, 36 FCC Rcd 30 (2021).

technology would cause. The Commission and commenters recognize that FM boosters inherently cause self-induced co-channel interference and therefore must be utilized appropriately to be effective. The Commission regularly grants FM booster applications without burden of proof of how much self-induced co-channel interference the applicant may cause to their own facility. The Commission recognizes that a poorly designed booster is self-defeating and interference mitigation is up to the applicant to resolve. 47 CFR Section 74.1203 specifies that an authorized FM booster station will not be permitted to continue to operate if it causes any actual interference to other broadcast facilities direct reception by the public of the off-the-air signals of any full-service station or previously authorized secondary station. Interference will be considered to occur whenever reception of a regularly used signal is impaired by the signals radiated by the FM booster station, regardless of the channel on which the protected signal is transmitted. It is clear that FM boosters and FM boosters with geo-targeted technology will not be allowed to cause real interference to other facilities and thus the scope of interference caused is only self-induced interference.

A poorly designed geo-targeted booster would cause no worse self-inflicted interference than a poorly designed booster with improper placement and a wildly out of sync retransmission delay. In that respect arguments against geo-targeted boosters are no different than arguments against long established FM boosters which have no codified *de minimis* self-induced interference standard and thus is a moot argument. It is curious that commentors who object to geo-targeted booster technology categorically want to dismiss the technology for those who believe it may fit their unique business model. Furthermore, commenters against FM boosters and geo-targeted FM boosters must assume that there will never be a population distribution example which is compatible with the technology which is an unreasonable assumption.

It is my opinion there is no technical reason that the geo-position zone broadcasting petition before the FCC should not be adopted and used in carefully controlled scenarios no different than FM boosters are currently used.

Respectfully Submitted,

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Consulting Engineer

CERTIFICATE OF SERVICE

I, Malinda Markland, do hereby certify that copies of the foregoing "Consolidated Reply Comments" were sent this 21st day of June, 2022, via U.S. Mail, to the following:

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