

SBE Comments: RM-10836, EVSS

cause harmful interference to radio communications (bolding and italics added).

Section 333 states:

No person shall willfully or maliciously interfere with or cause interference to any radio communications of any station licensed or authorized by or under this Act or operated by the United States Government.

The ADiCorp petition acknowledges Section 333 of the Communications Act, but then goes on to argue that the plain language of Section 333 would not apply to its proposed scheme because Section 333 supposedly only applies if the use of a jamming signal is used *solely* to block the communications of others. SBE finds no such provision in the plain language of Section 333. Indeed, the language of Section 333 of the Communications Act precisely applies to the ADiCorp proposal, in SBE's view.

3. Section 2.1 of the FCC Rules defines "harmful interference" as

Interference which endangers the function of a radionavigation service or of other safety services **or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service** operating in accordance with these [International] Radio Regulations (RR) (bolding and italics added).

In SBE's opinion, the ADiCorp system, if allowed, would exactly match the definition of "harmful interference."

4. The ADiCorp petition is paradoxical: On the one hand, it states that EVSS would be secondary to broadcasting. Yet their system is premised on the interruption of broadcast signals by an over-riding co-channel signal. The meaning of "secondary" is that you cannot cause interference to, and must accept interference from, the "primary" service. This is the exact opposite of what ADiCorp proposes.

II. Flaws in the ADiCorp Proposal

5. SBE sees the following conceptual and technical flaws in the ADiCorp proposal:

5.1 ADiCorp presumes that most vehicles will have an audio system with an AM or FM receiver *and* that the audio system will be turned on *and* is being listened to at a reasonable level.

5.2 ADiCorp further presumes vehicles equipped with an audio system with an AM or FM receiver is not being used in some other mode, such as playing a CD or audio cassette, or tuned to an in-band on-channel (IBOC) signal or to a satellite radio signal.

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5.3 ADiCorp presumes that if tuned to an AM radio signal, the signal from an EVSS transmitter won't simply cause unintelligible heterodyned audio "squeals" rather than the capture¹ of the AM receiver's audio. SBE is not aware of a "capture" effect for AM radio receivers. Indeed, for this reason the FCC Rules require a more rigorous protection ratio between co-channel AM signals (26 dB)² than is required for co-channel FM signals (20 dB)³. The likelihood of audio squeals rather than "capture" is heightened since ADiCorp proposes the use of "offset carriers").⁴ Audio squeals and heterodynes will likely startle and *distract* a driver at the very time when you do not want the driver to be distracted: When an emergency vehicle is approaching.

5.4 ADiCorp presumes that if tuned to an FM broadcast signal, the receiving radio will "capture" the ADiCorp FM signal. Whether such a "capture" phenomena occurs will depend on whether the car radio receiver uses a discriminator FM detector (which does have a "capture" characteristic) or a slope-detection FM detector (which does not have a "capture" characteristic). Additionally, even if the car radio uses a discriminator detector, whether "capture" occurs will depend upon whether FM signal strength from the approaching emergency vehicle is sufficiently stronger than the signal strength from the FM broadcast station being listened to. It is not unusual for an FM broadcast station to have a signal strength of 100 dBu in a downtown area when its transmitter is located atop a tall building in the downtown area of a city. Using a rule-of-thumb that for a "foreign" FM signal to capture the reception of another FM signal the foreign signal must be at least 10 dB stronger, SBE calculates the 110 dBu contour of a 45 mW (-43.5 dBk) ADiCorp transmitter to be a mere 4.7 meters (15 feet).⁵ If the ADiCorp transmitting antenna is at the rear of a large fire truck, the front of the fire truck would have already arrived at the location of the vehicle it was trying to alert!

5.5 If one presumes a somewhat lower FM signal strength of 90 dBu for the FM broadcast signal, the distance at which a 45 mW ERP FM transmitter would create the required 10 dB stronger, or 100 dBu signal, would be 14.8 meters (49 feet). For an emergency vehicle traveling at 60 MPH, or 88 feet/second, this would give a warning time of 0.6 seconds; hardly very useful. Even if one assumes the FCC minimum city grade signal strength of 70 dBu, meaning an 80 dBu

¹ "Capture" is a term used to describe a characteristic of FM (but not AM) receivers, but only FM receivers using discriminator detection rather than slope detection of the FM signal, to receive, or "capture," the stronger of two signals. When an FM receiver captures one signal over the other, only the captured signal is heard, and the non-captured signal is ignored.

² See Section 73.37 of the FCC Rules.

³ See Section 73.215(a) of the FCC Rules.

⁴ ADiCorp petition, at Page 10,

⁵ Using the well known free space formula, $E_{dBu} = 102.8 - 20\log D_{mi} + 10\log ERP_{kw}$.

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capture field strength, the distance from a 45-mW ERP FM transmitter to the 80 dBu signal strength (based on free space, which may not always be the case), is 148 meters (487 feet). At 60 MPH for an approaching emergency vehicle that's just 5.5 seconds of warning time, which might be enough to be useful. But, how many FM broadcast station's place a far stronger strength over their principal community? Most, SBE submits.

5.6 The ADiCorp petition presumes that interruption to the listeners of AM and FM broadcasts will be only occasional, and that the right-of-way spacing of a highway will guarantee that fixed radio receivers will never be interfered with. SBE does not share this optimistic view. First, it completely ignores the common situation of multiple emergency vehicles responding to a major accident or emergency, and the likelihood of a "witch's brew" of jamming signals. Radio station listeners would be at risk of repeated interruptions if they are in a heavily populated city where dozens if not scores of responses by emergency vehicles happen every day; a "death by a thousand knife cuts" scenario. Second, it ignores the reality that while fixed radio receivers in locations adjacent to busy highways might not receive a strong enough EVSS signal to obtain the "capture" effect that ADiCorp assumes will occur, the distance at which harmful interference to those fixed receivers can be caused is much greater. For example, the Commission's NCFEM rules require a co-channel protection ratio of 20 dB. For the same example signal strength of 100 dBu for a local FM station, the interference criteria would be 80 dBu (as opposed to the 110 dBu signal capture criteria). Applying the free space formula gives the threat distance for a 45 mW FM ADiCorp transmitter gives a threat distance of 148 meters (487 feet). This is likely to exceed the right-of-way distance for many, if not most, highways. In dense urban areas, many residential dwellings are less than 15.2 meters (50 feet) from major arterial streets, intersections, and hospital emergency room entrances.

5.7 And what of foreign language radio stations? It would appear that the ADiCorp warning messages can only be generated in only one language (presumably English), yet the proposed system would then override foreign language radio broadcasts with an English language warning. If one reasonably assumes that 1) a foreign language radio station exists in a market because there are many residents there who speak that language and 2) that some of those persons may have only partial, or even no, understanding of English language broadcasts, then it would be the height of presumptiveness to assume that an overriding, English-only signal would be a good idea.

5.8 Perhaps the most dangerous flaw is that ADiCorp's premise may lull first responders into a false sense of security that could lead to more, not fewer, accidents. This danger would be

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based on the false assumption that non-emergency vehicles will not only respond, but respond in the correct manner.

5.9 There is also the reality that many mobile audio systems are listened to at very high levels, and that program interruption could cause damage to the system. Further, interruptions to fixed-location systems operating at high levels could cause damage to high-frequency drivers when there is heterodyning and the resultant clipping that would take place.

III. Other Vehicular-Based Services

6. And what of other vehicular-based radio or communication services that similarly would have the potential to distract drivers from an approaching emergency vehicle, such as IBOC, satellite radio, and cell phones? Would ADiCorp next propose that IBOC, satellite radio, 800 MHz cellular, and 1.9 GHz PCS jammers be added to emergency vehicles, as well? The premise would be identical, and equally as flawed. Indeed, at Page 9, Footnote 3 of its petition, ADiCorp suggests that it would want to capture digital IBOC signals, as well.

IV. EAS Considerations

7. ADiCorp proposes that each and every EVSS-equipped emergency vehicle will have a receiver that will monitor "primary EAS stations" (plural) so as to ensure no EVSS transmissions commence during an EAS alert. This raises at least two technical challenges, in SBE's view:

7.1. A local primary (LP) EAS station only exists for federal EAS messages; i.e., the distribution of a presidential message, or Emergency Action Notification (EAN). Virtually all of the work done by EAS is in the area of state and local messages, and weather messaging, and such messages are generally NOT delivered by just one particular broadcast station in a given area. Thus, ADiCorp's concept that it only needs to monitor the LP station is fundamentally flawed.

7.2. How can the ADiCorp technology protect an *in-progress* EAS message (including Amber alerts), when the EAS tones that often, but not always, precedes the message is the only part of the message that identifies the subsequent audio as being an EAS message?

7.3 Will the EAS receivers in ADiCorp-equipped emergency vehicles always be left on, even when the vehicle is parked and the ignition is off, to ensure that any broadcast station transmitting EAS tones at the start of an EAS or Amber alert will be properly detected? Will such vehicles always be parked in areas where good radio reception can be assured?

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7.4 Some broadcast stations do not precede local or state level EAS alerts (including Amber alerts) with the EAS tones, because of the "annoyance factor" and because transmitting the EAS tones is only mandatory for a federal-level activation of EAS, the Required Weekly Test (RWT) or Required Monthly Test (RMT). Thus, many broadcast stations voluntarily transmitting state or local level emergency messages or Amber alerts without formal EAS formatting would not even be recognized as EAS or Amber alerts by ADiCorp system.

7.5 Further, not all life-safety emergency messages broadcast are EAS in nature. The warning contained in an EAS message is generally considered to be the first chapter of an unfolding life-safety call-to-action story. Conditions during an emergency can change for the worse in a split second. Examples include:

7.5a EAS messages that ask those in danger to stand-by for detailed evacuation information, take protective action, or even to do real-time updates or add real-time support to an in-progress Amber alert.

7.5b An all-points bulletin looking for escaped prisoners who might be armed and dangerous (as occurred in the state of Texas not too long ago).

7.5c Messages broadcast during a blackout where only the radio stations work and people are in their cars or listening to portable radios for news and information.

V. RM-9719 Parallels

8. In October 1999, SBE filed in opposition to a Petition for Rulemaking by Federal Signal Corporation, RM-9719, asking the Commission to create a new Emergency Data Radio Service ("ERDS") on FM Channel 200 (87.9 MHz). Like the Federal Signal Corporation proposal, which made unsubstantiated claims such as "ERDS could save thousands of lives and billions of dollars in unnecessary health costs and property losses," the ADiCorp petition similarly makes unsubstantiated claims.

9. Two other RM-9719 parallels are that of an annoyance factor, in the event of ADiCorp-equipped emergency vehicles repeatedly arriving at a "magnet" location, such as a big-city hospital emergency room, and a startle factor for drivers intent on their main task of driving. When the program interruption takes place, the driver may at first be startled, believing that a malfunction of their radio is occurring. Then the driver may be distracted while attempting to adjust or repair the vehicle's radio while in motion. This distraction would occur at the very time

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when the driver's attention is most needed: Upon the approach of an emergency vehicle at high speed.

10. The “annoyance and confusion” factor would also apply to homeowners, broadcast station main studios and control points, and to other people or businesses who live, work or function near a main thoroughfare, arterial highway, hospital, fire station or similar places where ADiCorp-enabled vehicles would often travel and/or congregate. There is no need or excuse for disrupting fixed receivers. Indeed, excessive use of the ADiCorp system is likely to drive consumers from listening to AM or FM broadcasts to audio services not repeatedly disrupted, such as satellite radio and CD players. There may also be worsened neighborhood relations with police and other emergency services if ADiCorp transmitters in police and other emergency vehicles are synchronized with interference to radio reception.

11. SBE would also like to raise the issue of the countless service roads that run parallel to freeways or major arteries, or the case of vehicles traveling in the other direction of a divided highway. SBE submits that the ADiCorp "broadcasts" (if they worked at all) would have the effect of needlessly forcing many drivers to decide (and quickly) if they are really in the way.

VI. Likelihood of Spurious Emissions

12. SBE also has the concern that ADiCorp transmitters would likely generate out-of-band intermodulation products. SBE is assuming that ADiCorp would use some sort of "comb" frequency generator feeding a broadband power amplifier to generate its proposed FM and AM signals, as opposed to 200 separate FM transmitters feeding a 200-port combiner, or 116 separate AM transmitters feeding a 116-port combiner. If so, then when the public safety vehicle's two-way system transmits there is the potential to generate spurious signals in the aeronautical band, on other public safety or other land mobile frequencies, and to the reception of TV Channel 6.

VII. Operation in Border Areas

13. As was the case for ERDS, the ADiCorp proposal raises Mexican and Canadian considerations if ADiCorp transmitters were to operate in the border areas. Even if the Commission decides it can address these problems by establishing a keep-away zone within a specified distance of the Mexican or Canadian borders, how would this be enforced for the large number of mobile transmitters in public safety vehicles that ADiCorp envisions?

VIII. SBE Alternative

14. SBE believes that the concept of EVSS has merit; it's just that ADiCorp's implementation of such a service is a terrible one and duplicates that of others which have already been dismissed by the Commission for sound technical reasons.⁶ Rather than attempting to jam AM and FM broadcast signals, a much better approach would be for the Commission to designate a narrow band public safety channel at 150, 450 or 800 MHz for EVSS, and then to require, after some future date, that all vehicles sold in the United States include an independent receiver that will monitor this frequency any time that the vehicle's ignition is turned on. In the event a EVSS public safety signal is detected, it would then trigger an in-dash icon and a unique audio tone to alert the driving to an approaching emergency vehicle. This would completely eliminate a plethora of issues of whether the vehicle has an audio system, whether it is turned on, and whether it is in its AM or FM receiver mode. It would also eliminate the issue of whether a low power all-channels transmitter on an emergency vehicle really would be able to "capture" regular radio reception with an intelligible message, or whether such attempts would only create a nightmare of interference. Finally, such a system would not run headlong into Sections 302(a) and 333 of the Communications Act.

⁶ For example, see the July 30, 2003, SBE comments opposing the WB9XTT experimental STA of Safety Cast Corporation (OET File Number 0183-EX-ST-2003).

IX. Summary

15. The entire premise of the ADiCorp system [that willful harmful interference can be caused by one radio service (EVSS) to another radio service (broadcasting)] is seriously flawed at both the conceptual and technical levels. The FCC should not burden broadcasters with this intrusive and potentially toxic experiment on the broadcast spectrum. However, while the concept of EVSS is a logical and worthwhile endeavor, it must not be implemented as proposed by ADiCorp, or as previously sought by Safety Cast. The Commission should issue an NPRM based on the SBE alternative, which proposes that a Part 90 land mobile VHF or UHF public safety frequency be used for alerting drivers, with all vehicles equipped with an independent, mandatory receiver that monitors the EVSS channel whenever the ignition is on, triggering an unmistakable in-dash icon and independent audible alerting mechanism rather than any attempt to interrupt the vehicle's audio system.

Respectfully submitted,

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