

### **Engineering Statement and Interference Analysis**

This application is submitted to modify BDFCDVL-20110826ABL for KFMP-LD, Lubbock, Texas, Facility ID 129734.

This application seeks a minor modification to the digital flash cut CP of the licensed facility of KFMP-LP. The Applicant proposes to lower the ERP from 3 kW omnidirectional to 1.5 kW omnidirectional. There is no change in the transmitter site or the antenna pattern. The proposed channel 6 facility was studied using the Techware's tv\_process\_dlptv\_2010 software on a Sun Blade 1500 using the post transition data and the 2010 US Census.

#### **Secondary Nature of LPTV**

This application for a modification of an LPTV facility is made pursuant to Section 74.703 of the rules and regulations of the Federal Communications Commission, which requires the licensee to correct any condition of interference to the direct reception of the signal of other broadcast facilities.

#### **Digital TV Station Protection**

The proposed operation causes less than 0.5% interference to surrounding digital authorized facilities (i.e., "*de minimis*"). It is believed that the proposed operation is in compliance with the spirit and intent of the FCC's interference standards.

#### **Class A, Low Power TV and TV Translator Station Protection**

The proposed operation causes less than 0.5% interference to surrounding Class A authorized facilities and less than 2.0% interference to surrounding LPTV authorized facilities (i.e., "*de minimis*"). It is believed that the proposed operation is in compliance with the spirit and intent of the FCC's interference standards.

#### **FM Radio Station Protection**

The most vulnerable FM station to the proposed operation is FM station KTXT-FM at 88.1 MHz in Lubbock, Texas. It is located 4.0 miles away from KFMP-LD. The frequency separation is 340 KHz (the difference between 87.76 MHz and 88.10 MHz). However, given the 35kW ERP of KTXT-FM, it seems unlikely that adding the carrier to KFMP-LD could cause any interference to FM station KTXT-FM. This is borne out as KFMP-LP has operated on channel 6 analog with an FM aural carrier at 87.76 MHz since 2007 with no issues of interference to or from KTXT-FM ever having been reported. During this time, KFMP-LP has operated with an aural carrier with ERP as high as 3.0 kW, twice the ERP of the proposed supplementary carrier. The applicant will notify KTXT-FM prior to commencing operations with the supplementary carrier and will cooperate with KTXT-FM in investigating any suspected instances of interference.

## **Operation Pursuant to Section 74.790(i) of the Commission Rules**

The proposed modification will include a supplementary audio signal pursuant to Section 74.790(i) of the Commission's rules. Section 74.790(i) provides that “a digital LPTV station may offer services of any nature, consistent with the public interest, convenience, and necessity, on an ancillary or supplementary basis in accordance with the provisions of § 73.624(c).”

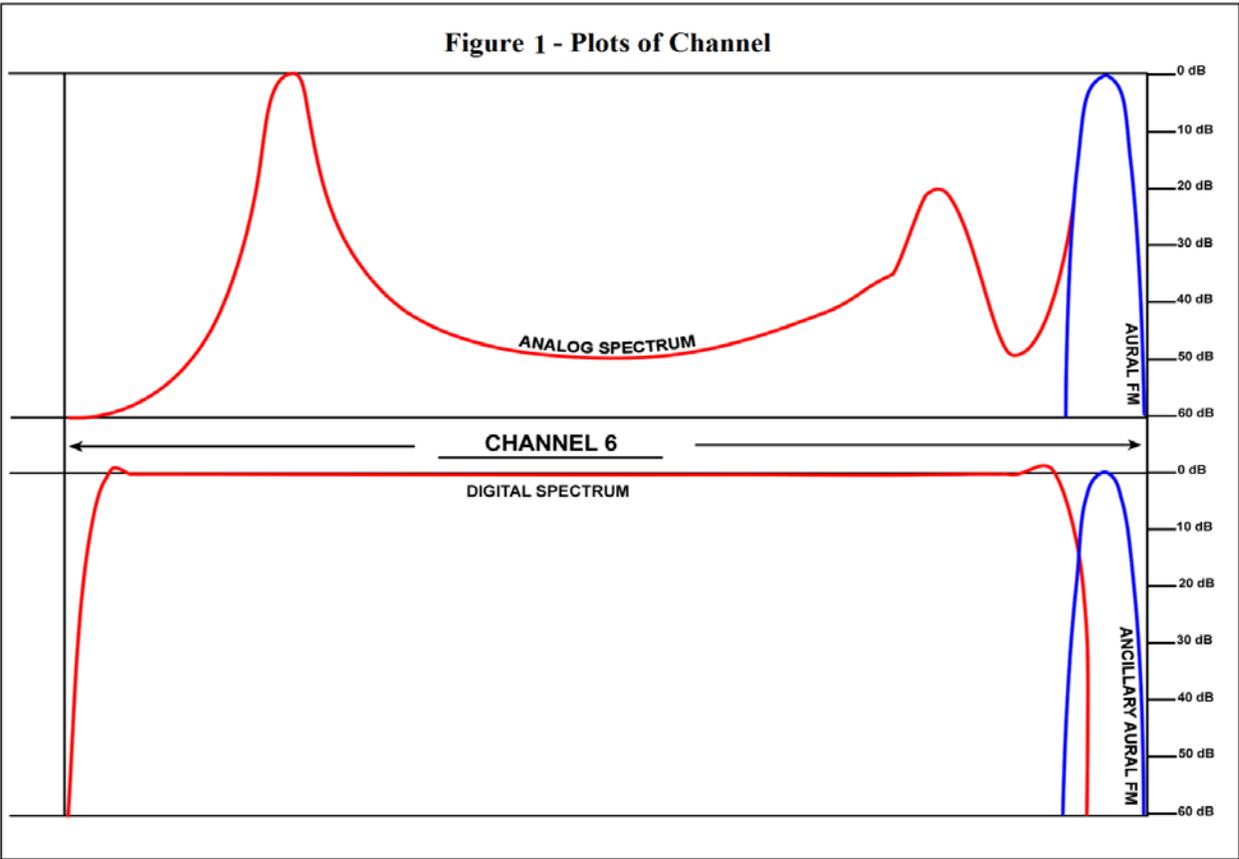
Section 73.624(c) in turn provides that “DTV broadcast stations are permitted to offer services of any nature, consistent with the public interest, convenience, and necessity, on an ancillary or **supplementary basis**. The kinds of services that may be provided include, but are not limited to computer software distribution, data transmissions, teletext, interactive materials, aural messages, paging services, **audio signals**, subscription video, and any other services that do not derogate DTV broadcast stations' obligations under paragraph (b) of this section.” [*emphasis added*]

This proposal will significantly serve the public interest, and as such has been addressed in Congress. See Attachment A for questions addressed at the House of Representatives Committee on Energy and Commerce, Subcommittee on Communications and Technology, “Oversight of the Federal Communications Commission,” hearing of December 12, 2013.

The provision of this supplementary audio signal will not compromise any part of the ATSC signal, and the ATSC signal will operate with full integrity. Digital television operations utilize 5.38 MHz of the 6.00 MHz channel assigned to a station. The operation proposed in this modification will use the currently unused 0.62 MHz bandwidth of the channel for a supplementary audio signal. The supplementary audio signal will be a separate audio service operating at 5.76 MHz of the bandwidth of the channel. In this case, as the authorized channel is on digital channel 6, the supplementary audio service will operate at 87.76 MHz.

## **Bandwidth Enhancement Technology**

The proposed modification will use Axcera's Bandwidth Enhancement Technology (BET). The Commission granted approval to use BET to licensed television stations KERA, Dallas, TX, and WMEI, Arecibo, PR. See Attachment B for Axcera whitepaper on BET. BET narrows the portion of the channel used for the over-the-air television ATSC service sufficiently to allow the ATSC digital television service to operate simultaneously with a supplementary audio signal. Figure 1 below demonstrates the complete separation of these two services.



**This System has Been Fully Tested and Proved to Meet Commission Rules**

Section 73.682(d) of the FCC rules is only applicable to this application through Section 74.795(b)(1) which requires that digital LPTV systems be “satisfactorily viewed” on consumer digital TV receivers that operate based on Section 73.682(d). The reference of Section 73.682(d) in Section 74.795(b)(1) does not require the LPTV transmission system to comply with all aspects of Section 73.682(d), only the “satisfactorily viewed” standard.

In order to demonstrate compliance with the requirements of Section 74.795(b)(1) of the Commission’s rules, extensive testing of this system has been undertaken. Provided that the Effective Radiated Power (ERP) of the audio is no greater than the ERP of the digital signal, the results demonstrate that the simultaneous operation of the channel 6 ATSC service and the supplementary 87.76 MHz audio signal does not derogate the ability of any current ATSC television receivers to decode the digital television signal.

## **There is No Interference to Any Potential Station Operating on Channel 6**

The Video Division previously considered and dismissed an application that proposed a similar auxiliary audio service. In its letter decision, dated August 2, 2012, dismissing the applications of Venture Technologies Group, LLC (“VTG”) for modification of construction permits for stations KFMP-LP (Facility ID No. 129734) and WBPA-LD (Facility ID No. 167294) (“VTG Letter Decision”), the Video Division noted that the “Commission has not adopted rules regarding engineering protection requirements for “hybrid” analog/DTV stations to other DTV stations seeking to use Channel 6.” Staff noted that there were published D/U ratios for DTV-into-DTV co-channel operation, “but there are no D/U ratios for ‘hybrid’-into-DTV operation.”

To ensure that the ability of viewers receive an over-the-air video service is not compromised and to comply with all applicable rules relating to operation of a supplementary audio signal, the proposed facility will operate with a digital ERP of 1.5 kilowatts and a FM carrier ERP of 1.5 kilowatts, for a total of 3.0 kilowatts, which complies with Commission rules governing maximum ERP. The proposed modification will comply with all applicable rules in CFR Part 73 Subpart B-FM Broadcast Stations and all rules applicable to low power television and TV translator stations.<sup>1</sup>

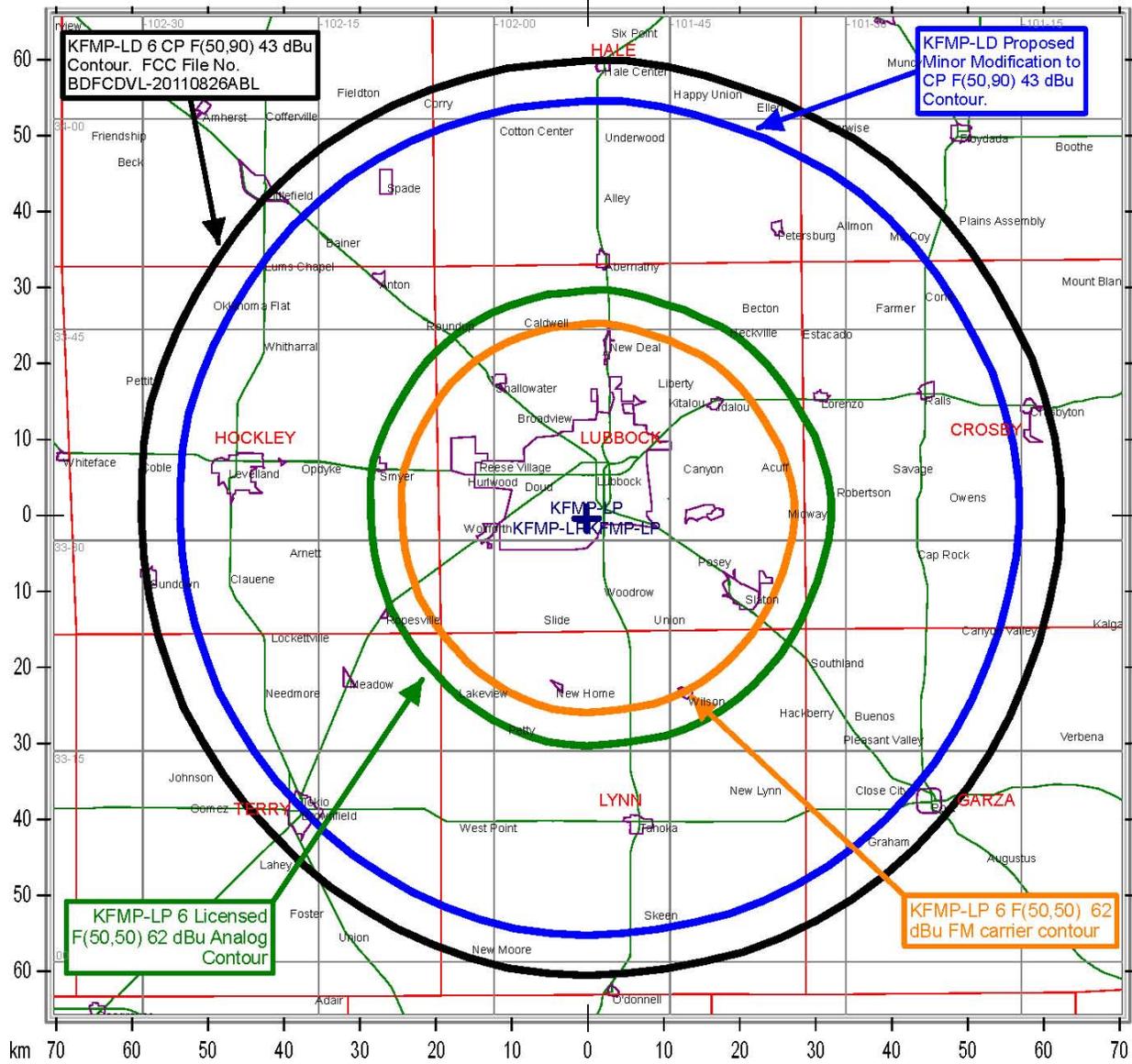
Because this existing CP for the station is for 3.0 kW ERP omnidirectional, there is already a showing that a total ERP of 3.0 kW -- 1.5 kW plus 1.5 kW -- will not cause any interference.

Figure 2 below shows the coverage contours of the licensed facility of KFMP-LP in green, the coverage contour of the existing CP in black, and the coverage contour of the proposed modification of KFMP-LD CP in blue. Additionally, the F(50,50) 62 dBu contour of the proposed FM carrier is shown in orange. It is ludicrous to believe that the facility with the blue contour and orange contour running simultaneously but without interfering with each other could cause more interference to third parties than either the licensed facility with the green contour or the permitted facility with the black contour.

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<sup>1</sup> FCC 04-220, MB Docket No. 03-185, Report & Order in the matter of Amendment of Parts 73 and 74 of the Commission’s Rules to Establish Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to Amend Rules for Digital Class A Television Stations, ¶163 (noting that “[u]nder Part 74 of the rules, LPTV and TV translator stations are not required to comply with either Section 73.682(a) or (d). The list of broadcast regulations applicable to the low power television service does not include these rules.”) *See also*, 47 C.F.R. § 74.780, [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-04-220A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-220A1.pdf).

FIGURE 2: TX LUBBOCK KFMP-LD 6 PROPOSED MODIFICATION WILL LESSEN INTERFERENCE TO THIRD PARTIES



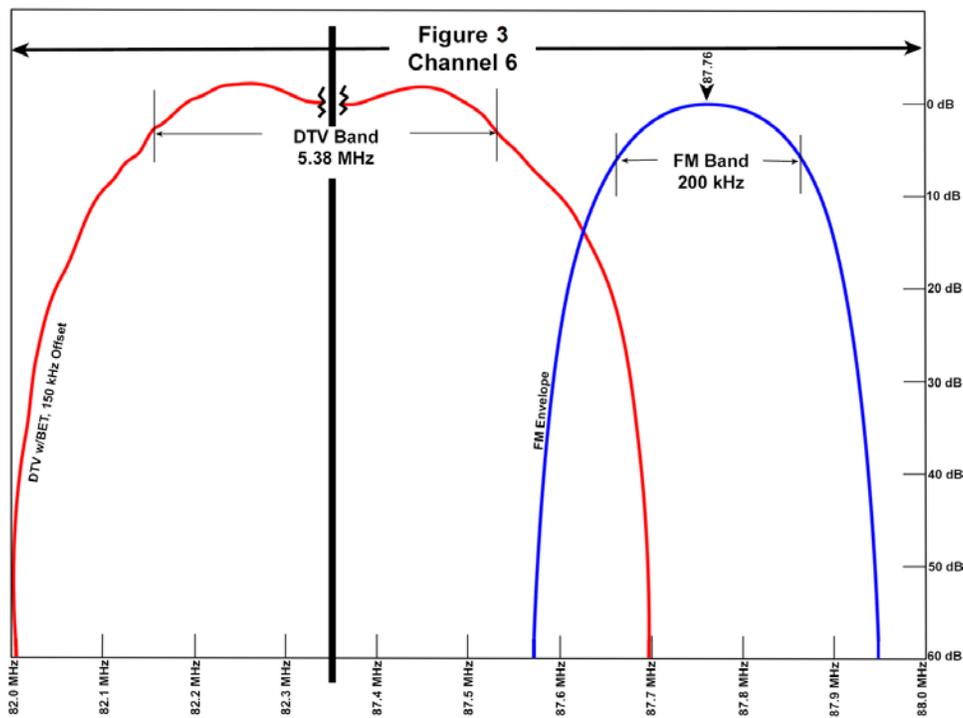
The orange contour is worst case, because it assumes signal across the entire channel.

### This Proposal Does Not Exceed the Allowable Power Limits

Specifically, the Video Division expressed concern that the facilities proposed in the VTG applications were “likely to increase the interference potential to co-channel DTV operations because VTG’s proposal would increase the total power of its channel 6 operations by 33%.”<sup>2</sup> In that case, the Applicant proposed to operate with a maximum ERP of 3.0 kW for the ATSC and 3.0 kW for the ancillary FM carrier, which would total 6.0 kW ERP.<sup>3</sup> The maximum allowable signal strength is 3.0 kW, thus this is not an issue relevant to the instant application. The concerns expressed by the Video Division in the VTG Letter Decision are not relevant to the consideration of the instant application.

### Hybrid Desired-to-Undesired Ratios Need Not be Created and Digital Desired-to-Undesired Ratios are Accurate and Applicable

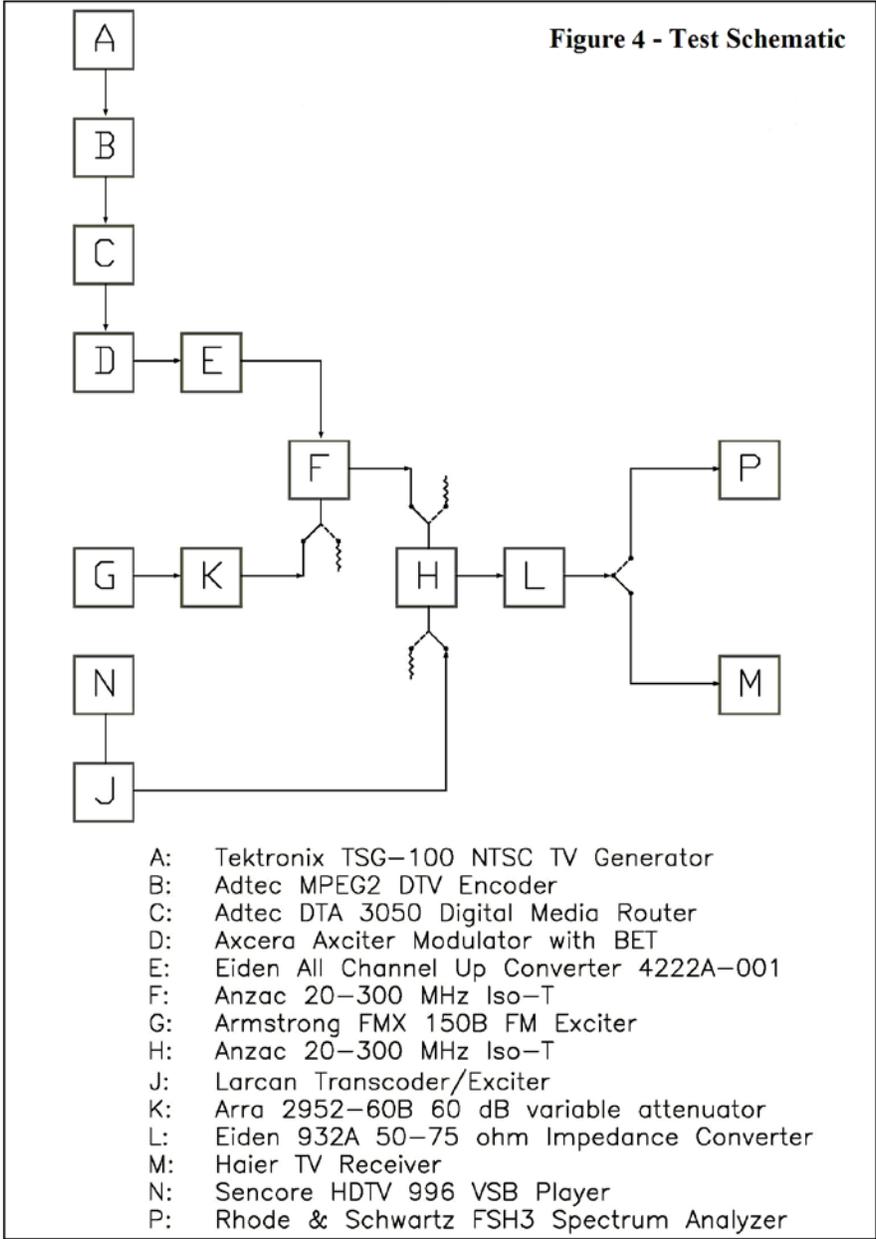
This modification application does not require the creation of a new “hybrid” D/U ratio. As explained below, the proposed modification fully complies with the published DTV into DTV D/U ratios. Figure 3 below shows the relative signals, including the BET narrowing and the 150 KHZ offset and the 0 db difference, found to be the optimum combination in tests of current TV receivers.



<sup>2</sup> Letters from Hossein Hashemzadeh dated August 2, 2012.

<sup>3</sup> In meetings with members of the OET of the FCC, it was suggested to the applicant that the auxiliary audio carrier be duplicative with the audio carrier of the video signal of the station on PSIP 6.2, because it would ensure 5% revenues earned from this service be forwarded to the U.S. Treasury.

In the application filed by WNYZ-LD (FCC File No. BMPDVL-20131119BDF) for a similar innovative service, the applicant, Island Broadcasting LLC (“Island”), explains the detailed tests conducted to ensure the proposed operation complies with the Commission’s published DTV into DTV D/U ratios. In these simulations, Island assumed the worst-case scenario of a third-party co-channel digital station with 28 dBu noise limited signal in a cell within the protected 43 dBu contour of the proposed Island facility on channel 6 and with a 43 dBu desired signal strength in that cell. This is the scenario under which the maximum allowable interference could be caused from a third party. See Figure 4 below showing this simulated condition.



Island studied various receivers to determine the amount of co-channel interference that would be acceptable to allow for full decoding of an ATSC receiver. The conditions assumed included:

- The maximum signal strength on the desired channel 6 signal was 43 dBu.
- The maximum D/U ratio of 14.0 to 15.0 db represented the maximum undesired signal acceptable without causing more than *de minimus* interference to the ability of receivers to decode and fully receivable the desired ATSC signal. The amount varied on different decoders.

To conclude the test, Island added an FM signal of the same ERP at 87.76 MHz, to the ASTC signal. Island observed and concluded from the tests that there was no measurable change in the interference caused by the undesired signal with the addition of the FM signal.

This real world simulation demonstrated that the addition of the FM signal equal to the digital signal had no effect on the D/U ratio for co-channel undesired DTV into desired DTV interference. Because these ratios of between 14.0 and 15.0 D/U dB are used to determine which cells are actually protected by co-channel interference and they remain applicable and accurate when the FM carrier is added at equal power, it is concluded that the Commission's current D/U ratios for co-channel interference are accurate and applicable even with the added FM carrier.

Because a new co-channel third-party applicant would be required to protect in accordance with the current ratios, it is concluded that the facilities of the instant application will be protected when standard Commission ratios are utilized. The application complies with the published DTV into DTV D/U ratios, as demonstrated by the above test. Therefore, because the DTV to DTV interference ratios remain accurate with the insertion of the FM carrier, the proposed modification does not require the creation of a "hybrid" ratio as suspected in the Commission Letter.

This innovative proposal will serve the public interest by bringing a supplementary audio signal to the Lubbock market, while maintaining the quality over-the-air video service that viewers currently enjoy.

### **FCC Objectives of Preservation of Complementary Services of LPTV Stations**

In the Report and Order governing the Establishment of Digital Class A and LPTV, Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to Amend Rules for Digital Class A Television Stations, MB Docket 03-185, adopted September 9, 2004 and released September 30, 2004, the FCC reported at paragraph 20, Permissible Service:

"...most [analog LPTV] stations air locally produced and/or other programming not otherwise available in their communities. We seek to preserve in the digital world the important and complementary services provided by TV translator and LPTV stations."

By using this Axcera BET technology, the Applicant will be in fact preserving a complementary service currently provided by the station.

### **FCC Requirement of Non-interference to the Reception of the Digital Service**

Because the Applicant proposes to utilize Axcera's BET technology, there will be no interference to the reception of this or any other station's DTV service. In its Report and Order the FCC concluded at para. 57 in response to its inquiry into the employment of transmission methods other than those based on DTV, that:

“digital LPTV stations should not be permitted to operate in a manner that could be likely to interfere with the reception of DTV service.”

The Commission is clear that its goal is to permit innovation but to not allow a station to operate in any manner that caused interference to the DTV reception. Our proposed utilization of the Axcera BET technology along with a frequency modulated carrier will meet Commission rules because we will be operating in a manner that could not interfere with the reception of DTV service.

### **Instant Proposal Fulfills FCC Objectives for DTV**

In the Fourth Report and Order In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, MM Docket No. 87-268, Adopted: December 24, 1996 Released: December 27, 1996, the Commission stated at Paragraph 30 regarding the digital television standard:

“In the Fifth Further Notice, we listed four objectives regarding the authorization and implementation of a DTV standard: 1) to ensure that all affected parties have sufficient confidence and certainty in order to promote the smooth introduction of a free and universally available digital broadcast television service; 2) to increase the availability of new products and services to consumers through the introduction of digital broadcasting; 3) to ensure that our rules encourage technological innovation and competition; and 4) to minimize regulation and assure that any regulations we do adopt remain in effect no longer than necessary.”

Clearly, this proposal to use the Axcera BET system furthers all four of these objectives.

### **The FCC has Allowed for a Free Market on Alternative Audio for DTV**

Regarding audio development in DTV, the Commission concluded at Paragraph 53 of the Fourth Report and Order, that:

“Although some of the DTV signal would be devoted to the audio signal specified in the DTV Standard this does provide an avenue for the introduction of a new system that might offer a substantial improvement. A sufficiently superior system has an opportunity to succeed in the marketplace. Under the rules we are adopting, such dual audio system transmissions are permitted consistent with the DTV Standard.”

This instant proposal clearly is compatible with the ATSC standard as it does not interfere with the ATSC standard and it does provide a dual digital audio signal consistent with the DTV standard.

### **The FCC has Promoted Innovation in the DTV Service**

In the Fifth Report and Order In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, MM Docket No. 87-268, adopted April 3, 1997 and released April 21, 1997, at Paragraph 29, the FCC concluded:

“The FCC wish[es] to preserve for viewers the public good of free television that is widely available today. At the same time, we recognize the benefit of permitting broadcasters the opportunity to develop additional revenue streams from innovative digital services. This will help broadcast television to remain a strong presence in the video programming market that will, in turn, help support a free programming service. Thus, we will allow broadcasters flexibility to respond to the demands of their audience by providing ancillary and supplementary services that do not derogate the mandated free, over-the-air program service. Ancillary and supplementary services could include, but are not limited to, subscription television programming, computer software distribution, data transmissions, teletext, interactive services, audio signals, and any other services that do not interfere with the required free service.”

This instant proposal meets these criteria because we will not denigrate nor interfere with the required free service on our ATSC signal.

### **FCC Flexibility in Innovation**

The Commission continues at Paragraph 30 and 31 of the Fifth Report and Order about its flexibility regarding broadcast innovation:

“30. This decision is supported by the overwhelming weight of the record. Consistent with precedent that has treated telecommunications services provided by an NTSC station other than the regular television program service as ancillary, we will consider as ancillary and supplementary any service provided on the digital channel other than free, over-the-air services. In addition, we will not impose a requirement that the ancillary and supplementary services provided by the broadcaster must be broadcast-related.”

“31. The approach we take here, of allowing broadcasters flexibility to provide ancillary and supplementary services is supported both generally and specifically by the 1996 Act, enacted after issuance of the Fourth Further Notice/Third Inquiry. In general, the 1996 Act seeks “[t]o promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.” More importantly, the 1996 Act specifically gives the Commission discretion to determine, in the public interest, whether to permit broadcasters to offer such services. Section 336(a)(2) of the

Communications Act, contained in Section 201 of the 1996 Act, provides that if the Commission issues additional licenses for advanced television services, it "shall adopt regulations that allow the holders of such licenses to offer such ancillary or supplementary services on designated frequencies as may be consistent with the public interest, convenience, and necessity."

The Commission continues at Paragraphs 32 and 33 regarding providing broadcasters flexibility to offer whatever ancillary services they choose as long as those services do not derogate any advanced television services. This instant proposal is consistent with FCC rules:

“32. Section 336(b)(2) sets out the specific parameters of our authority to permit ancillary and supplementary services, and the approach we take here fully complies with those parameters. Thus, under Section 336(b)(2), the Commission is required to limit ancillary and supplementary services to avoid derogation of any advanced television services that the Commission may require. The Commission has exercised its discretion and is requiring broadcasters to continue to provide the free over-the-air service on which the public has come to rely. We herein require that any ancillary and supplementary services broadcasters provide will not derogate that required service. Further, Section 336(b)(1) requires that the Commission may only permit broadcasters to offer ancillary or supplementary services "if the use of a designated frequency for such services is consistent with the technology or method designated by the Commission for the provision of advanced television services...."

33. ....Indeed, we believe that giving broadcasters flexibility to offer whatever ancillary and supplementary services they choose may help them attract consumers to the service, which will, in turn, hasten the transition. In addition, the flexibility we authorize should encourage entrepreneurship and innovation. For example, it may encourage the development of compression technologies that could allow even more digital capacity on a 6 MHz channel, paving the way for multiple high definition programs and more free programming than would otherwise be offered.”

This application proposes to successfully utilize its channel to serve the consumers in a manner consistent with FCC rules.