

DESCRIPTION OF SUPPLEMENTAL EXPERIMENTAL PROGRAM

I. Overview:

Clarity Media Systems, LLC (“Clarity”) is, through this application, seeking experimental authority under Part 5 of the Commission’s Rules to supplement the program of experimentation it conducted under Call Sign WD2XPK in 2005.¹ A new authorization is needed, as Clarity’s license under Call Sign WD2XPK expired in July of this year.

This application stems from requests and statements that members of the Commission’s Media Bureau and Office of Engineering and Technology (“OET”) made to the parties who filed technical statements in the Commission’s Clarity licensing proceeding, DA 07-1946, regarding additional technical information that the Commission would like to have in the record in order to render an informed decision on Clarity’s pending Application for Review in that proceeding. Specifically, on October 5, 2007, the Media Bureau convened a meeting among its staff members, OET staff members, and the parties who had filed technical statements in the Clarity licensing proceeding, for the purpose, as stated in the Bureau’s agenda for the meeting, to “focus on the technical issues of Clarity’s proposal.” During the meeting, the Senior Deputy Chief of the Media Bureau asked Clarity and the opposing parties to work together to agree on a technical standard for determining whether Clarity’s transmissions cause harmful interference to systems broadcasters use for electronic news gathering (“ENG”) activities in the broadcast auxiliary service (“BAS”), and to conduct joint testing of Clarity’s system and report to the Commission. He stated that having the information and test results would enable the Commission to review the issues involved in Clarity’s Application for Review in full context. The OET Chief, having heard broadcast participants acknowledge that during the previous experimental operations observations were made of the reception of BAS signals at an ENG truck located approximately 1.5 miles away on direct line of sight from Clarity transmissions at 1 Watt per channel, and that Clarity’s signal did not cause harmful interference to those BAS signals, stated that he would like to see measurements showing signal loss from the fence line of Clarity’s travel plaza to a distance of 1.5 miles, and for the parties to supplement the record of the previous experimental operations with a mutually agreed upon minimum desired-to-undesired (D/U) signal criterion and data reflecting its application to Clarity’s transmissions.

In the 2005 experimental program under Call Sign WD2XPK, Clarity set out to assess and evaluate the technical equipment that Clarity will use for a new ultra-low power, short-range multichannel television distribution system. It outfitted each of three antenna sites with a single omnidirectional transmitting antenna in the 2025-2109 MHz band that transmitted up to 1 Watt of power on each of 14 6-MHz channels to produce a signal that was designed to be received by antennas located from 50 to 900 feet away from the transmitting antenna. The received signal was downconverted and fed into a digital set-top box that was connected to a standard television

¹ At the time of the initial experimental authorization in 2005, Clarity was known as Clarity Broadcasting Systems, LLC.

receiver. Clarity's receiver unit (consisting of an antenna, the set-top box, and a coaxial cable that connects the set-top box to a television's antenna input jack) was designed to be installed exclusively in transportation vehicles such as the cabs of commercial trucks, and the link would be closed only when those vehicles are stationary (i.e., parked) within the very short range of one of the transmitters.

In its 2005 experimental authorization under Call Sign WD2XPK, OET ordered Clarity to coordinate operation of the experimental facilities with the Society of Broadcast Engineers, Inc. ("SBE"), which had interposed an informal objection to Clarity's application (as Clarity sought to conduct its experiments in frequency bands some broadcasters use for ENG activities). As a result, SBE and other broadcasters were on hand for the operations Clarity conducted at three sites in September/October 2005, and participated in the conduct of some of the operations performed. *See Six Month Progress Report of Clarity Broadcasting Systems, LLC Pursuant to Experimental Radio Service License Call Sign WD2XPK*, File No. 0046-EX-PL-2005 (filed Dec. 22, 2005) ("*Six Month Progress Report*").

In this Supplemental Program, Clarity seeks to conduct a series of additional measurements of the signal strength of Clarity's proposed short-range signal. Its objective is to confirm and corroborate the analytical results and previous empirical field test results that together demonstrate that Clarity's system will not cause harmful interference to any authorized primary users of the 2025-2109 MHz band.

Under its Supplemental Program, Clarity will:

1. Determine the minimum signal level at the fence line (~400' to ~900' from the Clarity transmitter, depending on the Flying J Travel Plaza) at which Clarity can provide its required signal quality to parked tractor trailers without suffering the negative effects of multipath distortions.
 - a. For this program, Clarity intends to introduce and use a sectorized directional antenna that will concentrate radiation to only a portion of the polar circle around the headend, and substantially reduce or eliminate emissions in the remaining portion of the polar circle. A directional antenna will have a higher antenna gain and thereby require a lower transmitter output power per channel than the previously-tested omnidirectional antenna.
 - b. The maximum transmit power per channel to be tested will be 50 mW.
 - c. Various power level/directionality combinations (again, with 50 mW being the maximum transmitter power per channel) may be tested in determining the required minimum signal strength level at the FL.
2. Take signal strength measurements from a Clarity transmitter operating at the minimum signal level (determined per No. 1 above) at the Flying J Travel Plaza fence line (FL); on the same azimuth at the FL+300 meters; at the FL+600 meters; at the FL+1200 meters; and at the FL+2400 meters.

- a. Measurements are to be taken on suitable number of azimuths to enable an accurate conclusion about the overall signal strength pattern to be drawn. For the sectorized directional antenna that Clarity will test under this Supplemental Program, measurements will be taken on at least 8 azimuths (i.e., every 45 degrees around the compass).
 - b. The signal strength measurements taken will be used to determine whether Clarity's transmission system meets the minimum desired-to-undesired (D/U) signal ratio of 8 dB for the digital ENG equipment that is now transitioning to the 2025-2110 MHz band. Only at points, if any, where the D/U ratio is not 8 dB or greater will Clarity's system be capable of causing harmful interference to an ENG system.
3. If broadcasters elect to participate with Clarity in the conduct of supplemental experimental operations, as the Commission has encouraged them to do, Clarity will gather data necessary to:
 - a. Determine whether ENG transmissions that originate on or near a Flying J Travel Plaza with a Clarity system can successfully connect to central ENG receive sites located in direct line of sight to Clarity's headends while transmissions are occurring.
 - b. Determine whether, and under what alignment conditions, an ENG transmitter located at or near a Flying J Travel Plaza with a Clarity system can successfully relay signals a short distance (tens of feet) to an ENG truck equipped with an ENG receiver.

The stakes for Clarity in successfully conducting the proposed supplemental operations as expeditiously and thoroughly as possible are high. If, as Clarity expects, the supplemental operations will allow Clarity to generate signal strength measurement data that shows that the D/U value for ENG receive equipment in the 2025-2109 MHz band is not exceeded while Clarity transmission systems are operating, Clarity will have proven for once and for all that its system will not cause harmful interference to ENG operators.

II. Background:

In consideration of the results of the 2005 experimental operations under Call Sign WD2XPK, Clarity applied for authority under Part 78 of the Commission's Rules to operate its short-range, ultra low power transmission systems at nearly 250 travel plaza parking lots at mostly rural locations around the country. Although Clarity had reported accurately that broadcasters cooperating in the tests had successfully established ENG links to and from locations on or near the travel plazas where Clarity experimental operations were being conducted, and that no harmful interference to the ENG signals or stations was observed at power levels as high as 1 Watt per channel (up to 100 times the per-channel power Clarity will now test), the Media Bureau denied Clarity's applications in a May 2007 order that is currently the subject of the Clarity Application for Review. According to the Media Bureau, Clarity failed to demonstrate that its proposed system will not cause harmful interference to BAS/ENG operations, and "Clarity's tests were not adequate." *Waiver Requests By Clarity Media Systems,*

LLC To Operate CARS Stations At Flying J Travel Plazas, DA 07-1946, slip op. at ¶ 10 (Media Bureau, released May 3, 2007) (footnotes omitted), *application for review pending* (“Order”).

Following the submission of Clarity’s Application for Review challenging the Bureau’s conclusions, a number of discussions with Commission staff have led to a refinement of the nature of the information the Commission believes should be included in the record of the ongoing proceeding in DA 07-1946. At the October 5, 2007 meeting of the parties to the Clarity licensing proceeding, the OET Chief and the Media Bureau invited and encouraged the participants to supplement the record of the previous experimental operations with a mutually agreed upon D/U signal criterion and data reflecting the application of that criterion to Clarity’s transmissions.

Clarity has accepted the requests of the Media Bureau and OET officials to cooperate with its opponents to reach an agreed-upon D/U signal technical standard and to conduct joint testing under that standard. In fact, as evidenced by several recent filings in DA 07-1946, it is clear that both Clarity and the broadcast community agree that 8 dB is the minimum D/U value for digital ENG systems. See Clarity Presentation in DA 07-1946 (September 6, 2007), at 3; Association of Maximum Service Television Presentation in DA 07-1946 (November 8, 2007), at Engineering Statement, Attachment, p. 7.

The Supplemental Program, which would benefit from cooperation by broadcasters but which is not dependent upon such cooperation, is described in detail below. As of the date of this application, Clarity has yet to be informed that any broadcasters or broadcaster industry groups have consented to cooperate in joint testing.

III. Program of Research and Experimentation:

A. Description of Equipment and Theory of Operation:

Clarity will transmit within the band 2025-2109 MHz. Using a 5:1 digital video compression ratio over 14 channels of 6 MHz each, this 84 MHz of total bandwidth will provide 70 channels of live or pre-recorded television programs into the television receivers that are connected to Clarity’s in-vehicle receiving system. The use of digital technology reduces both the potential for interference and the amount of spectrum Clarity requires. Emissions would be 6M00D7W for QAM.

Clarity will design and fabricate transmitters, receivers and antennas as follows:

1. The transmitter will be broadband and ultra low in power output per channel. Power output per six megahertz channel will be no more than 50 mW during any phase of the testing, and will often be substantially less.
2. The receiving down-converter will have a low noise figure and sufficient gain to provide clear reception throughout an area that extends from 50 to 900 feet from the headend (different size coverage areas will be tested).
3. A sectorized directional antenna will be used during testing, which will reduce the per-channel transmitter output power level due to higher antenna gain, and will diminish or nearly eliminate the production of signal in most directions from the transmitter.

4. The transmit antenna will include the following features as a minimum:
 - a. The horizontal radiation pattern will be established so that all drivers parked in the travel plaza will have access to the transmissions.
 - b. The peak of the pattern gain will be 12 dBi. This modest gain will produce a wide, half-power, vertical beamwidth and the result will be uniform signal coverage from the headend out to the fence line distance being tested (from ~400 feet to ~900 feet).
 - c. Four degrees of electrical and up to 30 degrees of mechanical beam down-tilt to direct the transmitted signal to the coverage area while, at the same time, limiting signal transmission toward the horizon. This down-tilt would further enhance uniform illumination of the parking plaza, and it would limit potential harmful interference to primary users of the 2025-2109 MHz band.
 - d. Vertical polarization so as to benefit from the small aperture and highly reliable and highly predictable dipole array design technology.
5. The receive antenna will necessarily be small in aperture for convenience and durability. Reasonable gain for such a small size is limited to about 11 dBi.

Clarity's transmission signal is very unusual in two respects. First, Clarity is engaged in what could be characterized as "microcasting." It has developed a signal that is designed to cover only the area of a travel plaza where trucks equipped with the reception system are capable of parking. For the Flying J Travel Plazas where Clarity is seeking to deploy the system, the distance from the transmitter to the fence line that marks the end of the parking area ranges from around 400 feet to approximately 900 feet. Because users will be concentrated on the parking areas, and nowhere else, Clarity has designed its transmission system to have the signal decay very rapidly beyond the fence line – a fact that is also in keeping with its proposed secondary status and its obligation not to cause harmful interference to primary users of the 2025-2109 MHz band. Second, the signal will be no stronger than is absolutely necessary to ensure that any truck parked on the subject plaza (whether at the far end of the parking area or in close proximity to the headend) will receive a quality signal. To this end, and in part on the basis of data collected in 2005 under Call Sign WD2XPK, Clarity now believes that it can accomplish its service objectives by using a sectorized directional antenna that concentrates signal in one area and reduces or nearly eliminates signal produced in other directions.

The primary questions to be answered through the Supplemental Program are: i) what is the minimum signal strength Clarity requires to provide its desired services to trucks parked on a travel plaza at transmission distances of up to 900 feet?; and ii) when the minimum signal strength required at the fence line is provided by a Clarity transmitter, at what point beyond the fence line, if any, does the signal strength from Clarity's transmitter exceed the minimum D/U value of 8 dB for a digital ENG receiver (i.e., what is the potential zone for harmful interference to ENG signals)?

B. Proposed Method of Operation

In this Supplemental Program, Clarity seeks authorization for a sectorized-directional antenna that will be operated at a variety of per-channel output power levels from 10 mW to no more than 50 mW. The headend will be installed for testing purposes at Flying J Travel Plazas in Winslow, AZ and North Salt Lake, UT. Winslow was selected because it is one of the larger plaza parking areas in the Flying J system, while North Salt Lake was selected because it is one of the smaller plazas and because it has direct line-of-sight to a central ENG receive site in downtown Salt Lake City, UT just several kilometers away. Despite the fact that two sites are proposed, testing in the Supplemental Program will occur at only one site at a time.

In performing the tests, Clarity will accept the manufacturer's specifications and range data for the transmitting antenna. At each location, the sectorized directional transmit antenna will be installed at a height above ground of 10 meters.

Once the test transmitting antenna is installed, Clarity will first validate that the transmitter is installed correctly. This requires Clarity to take four measurements (one on each 90° azimuth starting with the azimuth for the peak of pattern).

After confirming through the validation measurements that the transmitting antenna is installed correctly, Clarity will begin testing to determine the minimum signal strength it requires to meet its service objectives. Using a sectorized directional transmitting antenna, with a half power beamwidth of 120 degrees, Clarity intends to take measurements on a total of eight azimuths: one at the peak of the pattern, and additional azimuths spaced every 45 degrees around the compass dial. On each of these azimuths, Clarity will take signal strength measurements at the fence line, and at distances on that same azimuth of 300 meters, 600 meters, 1200 meters and 2400 meters beyond the fence line. Measurements could be taken at additional intervals and/or azimuths if indicated. This will provide data out to the 1.5 mile distance the Chief of OET requested during the October 5, 2007 meeting, and will also enable Clarity to confirm its expectation that use of a sectorized directional antenna will confine signal principally or totally to the desired direction, and minimize or nearly eliminate signal that is produced in unwanted directions.

The signal strength data Clarity generates through the tests it has just described will be sufficient to enable a determination to be made as to whether the 8 dB minimum D/U value for digital ENG receivers is achieved in the presence of Clarity transmissions. If there are some points beyond the fence line where the D/U value is not met, and harmful interference to ENG receivers could be caused, Clarity's Supplemental Program will identify the existence and extent of such points as well. Either way, and even without tests involving broadcaster-supplied ENG equipment, Clarity's signal strength measurements will answer the question of whether, and if so to what extent, Clarity's transmission system can cause harmful interference to digital ENG systems. The record will be sufficient to enable the Commission to act favorably on Clarity's pending Application for Review of the Media Bureau's *Order*.

If broadcasters participate in the tests at Winslow and/or North Salt Lake, and provide digital ENG equipment that can be operated in coordination with Clarity's transmissions, additional results would be provided. In particular, Clarity would be able to confirm the extent to which an ENG transmission made from on or near a Flying J Travel Plaza during Clarity

transmissions can be received by a central ENG receive site with line-of-sight visibility to both the Clarity and ENG transmitters. Some results of this type involving more sensitive analog ENG receive equipment were generated during Clarity's initial round of operational testing under Call Sign WD2XPK, but have yet to be credited by the Commission as supporting Clarity's non-harmful interference obligation.

Clarity is also prepared to test the ability of digital ENG mobile receive units located near a Flying J Travel Plaza during Clarity transmissions to receive transmissions without suffering harmful interference. If these results can be obtained, it would help focus the debate on the relative burdens and effectiveness of the extraordinary shut-down protocol Clarity has developed in DA 07-1946 as a fail-safe mechanism to protect ENG operations.

For either of the cases where actual ENG equipment is provided by broadcasters or broadcast industry groups for assessment, Clarity is committed to working with the participants to develop a mutually agreeable test plan. Clearly, good faith cooperation on both sides to determine the potential for Clarity's transmissions, despite the precautions taken by Clarity in the design phase, to cause harmful interference to ENG systems will facilitate the prompt and sufficient conclusion to the proceedings in DA 07-1946. Cooperation will promote spectrum efficiency and flexibility with a view toward maximizing service to the public in cases where such service involves no harm to the public or other users of the spectrum with superior rights. These are undoubtedly the goals that OET and the Media Bureau had in mind when they requested such cooperation just over two months ago.

IV. Request for Expedited Consideration/Reporting Conditions:

Clarity requests expedited consideration of this request, in order that it may begin arranging the experimental operations at the earliest possible date. The public interest considerations underlying Clarity's Part 78 applications are profound, and millions of Americans will be forced to remain without a first local television service until the results of Clarity's Supplemental Program are documented and considered by the Commission in DA 07-1946.

No matter what they show, Clarity intends to provide a full report containing the results of its measurements and further testing promptly upon conclusion of the experimental operations. The Commission can include in the authorization requested here a condition requiring Clarity to submit a six-month progress report if it likes, but Clarity will most certainly be providing the results of the Supplemental Program into the record both of its new experimental license and the Part 78 application proceedings.

V. Conclusion:

Clarity's Supplemental Program, as proposed in this application, is to document the power levels that will be observed at and beyond the fence lines of Flying J Travel Plazas where the system will be deployed to bring a first local television service to millions of professional truck drivers. Clarity's objective is to confirm that Clarity's short-range, ultra low power transmissions do not cause and will not cause harmful interference to existing or future ENG operations in the 2025-2109 MHz band.