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ORIGINAL

July 30, 2004

Ex Parte Letter

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: Written Ex Parte submission in MB Docket 03-15, Second Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television

Dear Ms. Dortch:

On June 4, 2004 [1] Rohde & Schwarz was one of 32 organizations stating that Distributed Transmission technology is decidedly in the public interest and respectfully requesting that the Commission include rules for the routine licensing of Distributed Transmission systems in its forthcoming Report and Order.

Rohde & Schwarz is a company with an international presence in the fields of test and measurement, information technology, and communications. For 70 years, the company has been developing, producing, and marketing a wide range of electronic products. The company is headquartered in Munich, Germany, with 5900 employees worldwide and subsidiaries and representatives in over seventy countries.

Rohde & Schwarz has been supplying TV transmitters for over 40 years, and we have installed more digital transmitters worldwide than any other vendor. We are also the only supplier of a complete range of transmission, monitoring, and measurement equipment in the world. We are international leaders with regard to transmission equipment and test and measurement (T&M) systems for the new digital terrestrial transmission methods: ATSC, DVB-T, ISDB-T, and DAB.

[1] June 4, 2004, submitted by Merrill Weiss Group LLC, 32 organizations urge FCC to quickly authorize the use of Distributed Transmission techniques into DTV broadcast operations

Since the year 2000, Rohde & Schwarz Inc., has worked diligently within the Advanced Television Systems Committee (ATSC) T3/S9 Specialist Group on RF Transmission. Current activities in T3/S9 include consideration and development of compatible enhancements to VSB modulation (as standardized in ATSC A/53) that address existing and emerging requirements for DTV. The majority of the world's terrestrial digital standards listed in the preceding paragraph, namely DAB, DVB-T, and ISDB-T, all support the optional use of synchronized transmitters, or single frequency networks (SFNs), to enable the delivery to consumers of more reliable terrestrial digital services. The ATSC system is the sole exception.

The development by ATSC T3/S9 of the Synchronization Standard for Distributed Transmission (A/110)[2] now also enables for users of the ATSC A/53 Standard the option to take advantage of the proven efficacy of SFNs. This will enable (1) more uniform and higher level signals to be distributed over a wider area while causing less interference to neighboring operations, (2) gaps in coverage caused by terrain to be filled in, and (3) a variety of natural and man-made phenomena that inhibit reception of DTV signals in numerous situations to be overcome. These Distributed Transmission attributes can be viewed synergistically with the FCC "Phase-in Plan for DTV Tuners,"[3] which started July 1, 2004 and will require that all television receivers with screen sizes 13 inches or greater, manufactured after July 1, 2007, be equipped with DTV reception capability. Similarly, all television receiving equipment such as videocassette recorders (VCRs) and digital versatile disk (DVD) recorders will be required to include DTV reception capability after July 1, 2007. Furthermore, the ATSC, on June 22, 2004, approved a Recommended Practice that establishes voluntary guidelines for broadcast digital television (DTV) receiver performance.[4]

Distributed Transmission also can enhance the likelihood of indoor set top reception of DTV signals, potentially can help make possible DTV reception in pedestrian and mobile applications, and in general can reach audiences more effectively and reliably, while using spectrum more efficiently, because of the reduced interference caused outside its service area. With the aforementioned advantages and our experience implementing SFN technology worldwide, Rohde & Schwarz now reiterates its support of the ATSC Distributed Transmission Standard A/110.

Rohde & Schwarz also has expertise in T&M equipment for Broadcasting and Mobile Radio, including testing to all the latest world 3G cellular standards. Our suggestion with respect to test & measurement, as applied to Distributed Transmission is the "Transmitter Identification" technique provided in the Synchronization Standard for Distributed Transmission and referenced in the draft of proposed FCC Rules Section 73.626(i) [5] DTV Distributed Transmission. The identification technique creates an "RF

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[2] The ATSC membership , approved the Synchronization Standard for Distributed Transmission (A/110) by a letter ballot that closed on July 14, 2004.

[3] http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-02-230A1.pdf

[4] http://www.atsc.org/standards/a_74.pdf

[5] April 29, 2004, filed by Merrill Weiss Group LLC, proposed FCC Rules Section 73.626 DTV Distributed Transmission

Watermark" at the physical layer using buried spread spectrum technology.[6] Also, the ATSC document "Proposed Recommended Practice: Design of Multiple Transmitter Networks,"[7] has several sections that discuss the theory of and offer useful application examples for the RF Watermark technology.[8] The first such application is the positive identification of a transmitter that emits RF energy carrying an RF Watermark that is then received by a special T&M instrument enabled by the RF Watermark. The second example describes enhancements the RF Watermark could bring to T&M equipment, such as the Enhanced Channel Impulse Response (ECIR). This enhancement will enable broadcasters to make field measurements for verification and optimization adjustments of a Distributed Transmission Network (DTxN). The last application describes using the RF Watermark to allow measurement and positive identification of a DTV station causing co-channel interference into a neighboring DTV station's service area.

It is this last application of RF Watermark technology, namely the ability to conduct non-disruptive measurement of external DTV interference into a DTV service area along with the positive identification of the interfering transmitter, that we believe may be of interest to the Commission and will be discussed in the remainder of this letter.

In analog television broadcasting, the picture tube serves as a window into the RF world, and the existence and source of co-channel interference can be discovered visually, usually by observing the call sign of a faint image superimposed on the desired signal by the signal of an interfering station. With DTV transmission, things are quite different. The Forward Error Correction (FEC) used corrects many errors that would otherwise occur in the terrestrial transmission channel, which is its intended purpose. Receivers have a finite amount of error correction capability, and, below a certain level of channel impairment or interference, errors will be dammed up (corrected) behind the FEC and will not be visible on a DTV display device.

When the FEC capability becomes overrun by increasing errors caused by increasing channel impairments or interference, first a trickle of errors starts appearing as blocking artifacts on the DTV display; then, a flood of errors quickly follows. No pre-warning of a pending interference condition can be gleaned simply by looking at a display, as is the case with analog signals. Digital receivers react to co-channel DTV interference of a particular level relative to the desired signal, producing errors in the same way as they would in reaction to noise of the same relative level. Reception is suddenly lost, due to the "cliff effect," as the impairments or interference exceed the FEC's ability to correct them. Because there can be no visual indication of the source of co-channel interference, often the only way to confirm the source is to turn off one or both of the Transmitters, a test solution that is not desirable for either station, that can be logistically difficult, and that would normally be arranged only after catastrophic interference already has occurred.

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[6] We have expertise in Spread Spectrum technology due to the our development of T&M for all world mobile standards http://www.rsa.rohde-schwarz.com/www/web_us.nsf/document/mobile_radio.html

[7] ATSC PRP/111 "Recommended Practice Design of Multiple Transmitter Networks", approved on July 14, 2004 by T3 letter ballot for a final approval ballot of the ATSC membership.

[8] See ATSC PRP/111, pgs 73-95, for a discussion of transmitter identification and measurement tools enabled by the RF Watermark

A new RF Instrument enabled by the RF Watermark could allow the in-service automated measurement and discovery of the source of co-channel digital interference quickly, without turning off either transmitter. RF Watermark measurements could indicate the presence of co-channel interference in a portion of a service area even before it becomes a consumer problem. In such a situation, a list of candidate DTV co-channel interfering stations could be loaded from a database into the RF Watermark T&M instrument. The identification code sequences representing the candidate stations then would be scanned. If a positive result occurred with any of these code sequences, it would indicate that co-channel interference was detected at some measurable level. A database lookup would then provide the identity of the licensed interfering DTV station.[9]

Any technology can only be implemented to the extent of the capabilities of the Instruments used to measure its performance. ATSC T3/S9 has provided the necessary "hooks" in the standard for Distributed Transmission to enable new T&M equipment[10] commensurate with the technology. For these applications to become feasible, a unique RF Watermark must be assigned to each emitting DTV transmitter as suggested in the draft of proposed FCC Rules Section 73.626(h)(4) and (5). There are three types of transmitters described in the ATSC "Recommended Practice: Design of Multiple Transmitter Networks" that have the capability to insert an RF Watermark at the physical layer synchronous with the 8-VSB symbols. The Distributed Transmitter (DTxT), Distributed Translator (DTxR), and the Equalized Digital On Channel Repeater (EDOCR). Going forward, Rohde & Schwarz believes it is prudent to assign a unique identifier to all of these newly-licensed DTV transmitters.

Looking further forward to the time when re-packing of the broadcast spectrum will require all DTV stations to occupy channels 2-51, it can be anticipated that, by then, all DTV stations will have maximized their service areas through some means, perhaps by increases in the power of main transmitters or through the utilization of Distributed Transmission technology. The provisions of the latest revision of FCC OET Bulletin No.69 most likely would have been used to predict the interference environment and to show compliance with *de minimis* limits, and the like. Given the physics of real world RF propagation phenomena and even using the best propagation prediction tools, the probability of real cases of DTV co-channel interference into neighboring DTV service areas likely will increase. For these reasons, Rohde & Schwarz recommends that all transmitters, both conventional single transmitters and multiple transmitters in networks, be identified using the RF Watermark signal and a unique identifier.

Rohde & Schwarz believes it is possible, either by firmware updates or relatively straightforward field modifications, to enable all 8-VSB transmitters to emit an assigned transmitter identifier carried in an RF Watermark. This would provide the industry and the Commission with the modern RF field measurement tools to proactively determine areas of likely interference, to determine when consumer reception complaints result from interference, and to more quickly mitigate cases of real interference reported by

[9] See ATSC T3/S9-222 (Rev 11) 11.1.6 Identifying Interfering transmitters, pg 86

[10] The ATSC Synchronization Standard for Distributed Transmission (A/110) has provided for the support of specialized and automated T&M instrumentation.

consumers. It will be in the interests of the Public, the Industry, and the FCC to move quickly to mitigate reported interference. The FCC may wish to consider a goal of requiring all 8-VSB transmitters to emit an assigned transmitter identifier by the end of the DTV transition.

Respectfully submitted,

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