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FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554

Before the  
Federal Communications Commission  
Washington, D.C. 20554

In the Matter of

Applications of )  
Satellite CD Radio Inc. )  
for Authority to Construct )  
Launch and Operate a )  
Digital Audio Radio )  
Satellite System )

File No. 49/50-DSS-P/LA-90

AMENDMENT OF APPLICATION TO REDUCE  
FREQUENCIES REQUIRED FOR BROADCASTING  
SATELLITE (SOUND) SERVICE AND TO ADD GENERIC  
MOBILE SATELLITE SERVICE FREQUENCIES TO  
PROVIDE SUBSCRIPTION DIGITAL RADIO SERVICE

Satellite CD Radio Inc. ("CD Radio") hereby amends its above-referenced Digital Audio Radio Service application to reduce its broadcasting satellite sound service (BSS-Sound) frequency request and to add a generic mobile satellite service (MSS) frequency request to provide a Subscription Digital Radio Service (SDRS). There is no change in CD Radio's legal, technical nor financial qualifications, and no change to its system description other than a substitution of some proposed generic MSS spectrum for some generic BSS-Sound spectrum, and a request to provide Subscription Digital Radio Service (SDRS) in addition to DAR service. In addition, CD Radio has been able to reduce its total frequency request from 60 MHz to only 50 MHz, thereby freeing up demand on vital spectrum. The specific frequency bands now requested are:

1493-1525 MHz = BSS(Sound) Spectrum for DAR [32 MHz total]

1626.5-1644.5 MHz = MSS Spectrum for SDRS [18 MHz total]

## I. REASONS FOR THE AMENDMENT

Since filing its Application for Digital Audio Radio Service on May 18, 1990, CD Radio has made repeated efforts to enhance spectrum efficiency in the 1500 MHz region by demonstrating its ability to share with existing users of the spectrum. CD Radio has filed with the Commission demonstrations that it could share co-channel with existing 1500 MHz frequency users (See Petition of Satellite CD Radio Inc., May 18, 1990, Exhibit A.) CD Radio has also filed with the Commission quantitative analyses demonstrating that existing 1500 MHz frequency users could occupy half their spectrum at no additional cost and with no loss of operational flexibility. Notwithstanding these proofs, CD Radio appreciates that it is extremely difficult for the Commission to enforce sharing in a shared Government/Non-Government frequency band such as 1500 MHz. Hence the Commission's WARC-92 proposal for Digital Audio Radio in the 1500 MHz band contemplates sharing of only 32 MHz of spectrum, from 1493-1525 MHz, well under the 60 MHz of bandwidth requested by CD Radio.

Since the time of the Commission's WARC-92 proposals, CD Radio has undertaken further extensive technical analyses and market research to determine the feasibility of a reduced bandwidth allocation to Digital Audio Radio. One of the results of these studies

was evidence of a large market demand for a non-broadcast Subscription Digital Radio Service (SDRS). In this service, customers pay a monthly and/or data fee to access a point-to-multipoint stream of premium digital radio services. Among the SDRS services CD Radio hereby requests authority to provide are:

- Intelligent Vehicle Highway System (IVHS) data regarding travel conditions, geo-coded digital mobile yellow pages updates, and regularly revised optimal routing software for vehicle navigation systems (ten 256 kb/s channels; 3 MHz);
- Continuing Education Service in which professional update information for a variety of disciplines will be transmitted to mobile, fixed and portable radio receivers for real-time or delayed access (six 256 kb/s channels; 2 MHz);
- Electronic Magazine Services in which weekly or monthly electronic editions of data for new personal electronics products such as the Sony CD Watchman, and advanced electronic notebooks will be delivered (three 256 kb/s channels; 1 MHz);
- Premium Audio Services in which persons with intense preferences for certain audio preferences are willing to pay a monthly fee in order to receive selections (ten 256 kb/s channels; 3 MHz).

For example, as General Motors noted in their Comments in support of DAR:

While the public discussion to date on DAR has obviously concentrated on delivery of aural broadcast channels, the digital nature of DAR can, with proper foresight, also be used to meet other information needs of the modern driver. DAR sub-channels will likely prove to be a valuable way to disseminate update information to users of the "Intelligent Vehicle Highway Systems" (IVHS). For example, a sub-channel on the DAR system could be used to provide Real Time Traffic information ("RTTI") to help alleviate congestion. Using the inherent point-to-multipoint dissemination characteristics of DAR may allow a significant reduction in the need for two-way communications to implement IVHS services.

CD Radio's financial and business models demonstrated that the above-described subscription digital radio services would contribute an equivalent amount of revenue and earnings as would the sale of digital radio channels to "spacecasters" i.e., to those programming for a general audience. Furthermore, the technical characteristics of the above-described subscription digital radio service channels are no different from CD Radio's DAR channels in terms of power,

channel speed, and modulation. Because the above-described subscriber channels are consistent with the Commission's "generic" approach to defining Mobile Satellite Service, CD Radio believes it can meet a substantial amount of its spectrum requirements from frequencies proposed to be allocated to the new general Mobile Satellite Service. Accordingly, CD Radio is able to reduce its request for proposed BSS-Sound spectrum from 1470-1530 MHz [60 MHz] to the 1493-1525 MHz band [32 MHz] proposed by the Commission, by amending its application to also add to its spacecraft the 1626.5-1644.5 [18 MHz] MHz band proposed by the Commission for generic MSS. The net result is a reduction from 60 MHz to 50 MHz [32 + 18 MHz] in demand for bandwidth in the L band region.

In summary, pressed by the vigorous opposition of existing 1500 MHz band occupants to sharing 60 MHz of spectrum as originally applied for by CD Radio, we have decided to ameliorate this situation by reducing our 1500 MHz band request to only the 32 MHz proposed by the FCC, and partially compensating with 18 MHz of L-band spectrum above 1626.5 MHz. Concomitantly, the CD Radio spacecraft will now provide a hybrid mix of digital services with Digital Audio Radio Service channels being sold in the BSS-Sound frequencies, and Subscription Digital Radio Service channels being sold in the generic MSS frequencies. In essence, CD Radio's satellites will have hybrid BSS-Sound/generic MSS capabilities.

## II. TECHNICAL FEASIBILITY OF THE AMENDMENT

As demonstrated in the Technical Annex hereto, the CD Radio amendment will not cause harmful interference to any currently authorized systems. Indeed, the CD Radio system will increase orbit/spectrum efficiency substantially by reusing over the United States the frequencies used by the Inmarsat System. As the FCC has already proposed in its pending RM-6459:

"We believe that the provision of MSS in this band could lead to more efficient orbit and spectrum utilization. In particular, any spectrum that becomes available domestically may be used to offer satellite service providers the opportunity to provide the public with new and unique services." FCC 90-63 at ¶ 23.

The reason that CD Radio will not cause harmful interference in the 1626.5-1644.5 MHz band is that CD Radio will downlink in this band, while the only other licensed satellite operator, Inmarsat, is uplinking in this band. Hence, the only interference possibilities are from the CD Radio satellite into Inmarsat satellites, and from Inmarsat user terminals into CD Radio user terminals. As the Technical Annex shows, the CD Radio satellite transmitters, operating at 30 watts with highly shaped beams, have no possibility of causing interference into co-channel receivers on Inmarsat satellites as close as 10 degrees away, or on the opposite side of the earth. The Technical Annex also explains that since Inmarsat user

terminals receive at 1530-1545 MHz, and the CD Radio satellite transmits at 1626.5-1644.5 MHz, there is no possibility of CD Radio interfering with reception of any Inmarsat signals by any Inmarsat user terminal. Finally, although the Technical Annex does indicate that side lobes from Inmarsat user terminals can cause harmful interference to CD Radio user terminals, since the Inmarsat user terminals transmit at the same 1626.5-1644.5 MHz band that CD Radio user terminals receive, CD Radio believes such interference cases will be limited, and hereby states its agreement to accept and not complain of any such interference.

CD Radio understands that its proposal operates an MSS link with the opposite directionality as specified in the Table of Allocations, but we believe the Commission should revisit this issue and revise its previous reluctance to permit generic directionality. As explained above, the CD Radio proposal causes no interference with Inmarsat. Concern for interference was the reason the FCC proposed to reject the request of Geostar Messaging Corporation for bi-directionality in the Mobile Satellite Service. Since CD Radio does not present the interference problems posed by GMC's proposed use of the 1530 MHz band for a user terminal uplink, there is no reason for the Commission to not approve CD Radio's use of the 1626.5-1644.5 MHz band for a satellite downlink. Indeed, the CD Radio proposal adds substantially to orbit/spectrum efficiency without any countervailing increase in harmful interference to Inmarsat.

A further benefit of the CD Radio amendment is that it frees up the Inmarsat pair, that of 1530-1545 MHz for bi-directional use by Iridium. As the Commission is aware, the Iridium System, like the CD Radio system, does not require paired bands between satellites and user terminals. As such, both of these systems are much more orbit/spectrum efficient than the AMSC system. Indeed, co-authorization of CD Radio and Iridium is readily possible since each system requires only one link of the currently unassigned two links of Inmarsat bandwidth over land areas.

### **III. REASONS WHY AMSC DOES NOT SATISFY THE NEEDS FOR SUBSCRIPTION DIGITAL RADIO SERVICES**

The United States is vitally in need of a competitive alternative to AMSC's monopoly on MSS in the 1645.5-1660.0 and 1545-1560 MHz bands. As the Commission has long been aware, the absence of vigorous competition breeds disregard for the public interest. The Commission noted in its Notice of Proposed Rulemaking to establish generic MSS in the band CD Radio is applying for hereby that: "a generic MSS allocation will provide flexibility to new satellite service providers in developing systems to meet the needs of all mobile users." FCC 90-63 at ¶ 24. CD Radio is a new satellite service provider, as compared to AMSC, that has been organized to meet the needs of point-to-multipoint mobile users not well-covered, or covered at-all, by the switched point-to-point architecture of the AMSC system.



CD Radio initially applied to construct, launch and operate a new design Digital Audio Radio Satellite System because no other satellite system in orbit or planned, including that of AMSC, was capable technically or economically of providing 256 kb/s channels, to omnidirectional antennas, at the market-driven lease rate of \$100 per hour. As CD Radio has previously pointed out to the FCC, and never been challenged by AMSC, at the publicized rates of AMSC -- which vary from \$1/minute to \$10/minute for 4800 bps channels -- it would cost a programmer from \$3,000 per hour to \$30,000 per hour to offer the same service that CD Radio can provide for \$100 per hour. Furthermore, CD Radio has also demonstrated that very few programmers could afford to pay anything near AMSC's rates and that, indeed, the industry average is very close to CD Radio's rate of \$100 per hour. The reason for this is a fundamental difference in satellite design and business philosophies between CD Radio and AMSC, plus perhaps the current monopoly position of AMSC. Consequently, it is obvious that there is a need for a generic mobile satellite service alternative to AMSC at least in the area of point-to-multipoint satellite services.

The Commission's experience with cellular competition, albeit limited to two providers, has shown clearly the benefits to the consumer of direct competition. CD Radio respectfully urges the Commission to consider this favorable experience in authorizing CD Radio to compete with AMSC in providing point-to-multipoint subscriber digital radio services. The public will end up the winner, as always has been the case, when competition stimulates creative

energy and business incentives. In this case, however, the need for competition is prima facie since AMSC is apparently not technically or economically capable of serving the market need for 256 kb/s mobile point-to-multipoint digital channels at rates in the range of \$100 per hour.

In this regard, it should also be pointed out that AMSC does not require the Inmarsat bandwidth at 1626.5 MHz. Recent studies of the FCC IAC and the CCIR have shown that existing MSS allocations and generic RDSS allocations would provide 87% of the bandwidth the MSS industry itself projects to the year 2010, excluding demand compensated for with Qualcomm-type Ku-band systems, Orbcom-type VHF LEO systems, and ACTS Mobile Terminal-type Ka-band systems. Considering that most LMSS today is provided at Ku-band by Qualcomm -- and that further reductions in Ku-band mobile equipment and service costs are expected, the industry's own MSS requirements forecast to the year 2010 is satisfied many times over (there is 500 MHz of Ku-band capacity every 2 degrees, reusable in each polarization). When one adds the mobile voice capability of Ka band, and the 1 GHz of bandwidth allocated there, plus the enormous spectrum efficiencies of Iridium-type systems, it becomes evident that there is no shortage of bandwidth for AMSC to expand into.

#### IV. SUMMARY OF TECHNICAL IMPACT OF AMENDMENT

This Amendment has only a incidental impact CD Radio's System Design other than the reduction in total bandwidth transmitted from 60 to 50 MHz, and a substitution of frequencies above 1626.5 MHz for those previously requested below 1493 MHz. The key changes are as follows:

- All CD Radio receivers will tune to 1493-1525 MHz, 1626.6-1644.5 MHz, plus any terrestrial digital audio radio band allocated by the FCC;
- As originally applied, all CD Radio receivers will be "smart electronics" devices, capable of locking onto whichever carrier is being received, and displaying the appropriate information for that carrier;
- CD Radio receivers will now also include unique ID codes enabling the Subscription Digital Radio services to address only those radios which are paying for the services;
- Although there will be a slight increase in satellite power associated with transmitting 1626.5 MHz frequencies as opposed to lower 1400 MHz band frequencies, this power increase is more than offset by the 18% reduction in bandwidth transmitted from 60 MHz to 50 MHz.

- There will also be a corresponding reduction in feeder link requirements at Ka band from 60 MHz to only 50 MHz.
- CD Radio will continue to operate as a private carrier, selling a portion of its capacity to general audience programmers (those frequencies below 1525 MHz) and the balance of its capacity to subscription digital radio services (those frequencies above 1626.5 MHz).

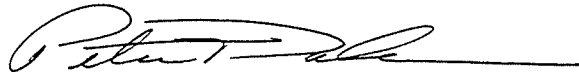
## V. CERTIFICATIONS

Should the Commission determine that CD Radio must be licensed as a common carrier or any other regulatory classification, CD Radio agrees to accept licensing under such conditions.

Should the Commission ultimately adopt rules for the 1626.5-1644.5 MHz band different from those requested in this Application, CD Radio agrees to comply with whichever rules the Commission does, in fact, finally adopt.

CD Radio waives all claim of right to the frequencies requested herein as opposed to the regulatory power of the United States, including the Federal Communications Commission.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Peter J. Dolan", with a long horizontal line extending to the right.

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