15 May 2001

Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Ref: Comments with Respect to "*The MITRE Corporation Report on Technical Analysis of Potential Harmful Interference to DBS from Proposed Terrestrial Services in the 12.2 – 12.7 GHz Band*"
(ET Docket 98-206)

Honorable Commission Members:

We have watched with great interest the evolution of the dilemma now before the Commission with respect to the requested sharing of the 12.2-12.7 GHz frequency bandwidth by both the MVDDS and DBS user communities and have reviewed the FCC (MITRE) report recently released on this specific subject. We recognize the difficulty of the decision(s) before you as well as your collective responsibility to fully consider all "reasonable" propositions that might serve to enable the requested bandwidth sharing without sacrificing the unfettered availability, nor compromising the quality of service deservedly enjoyed (and expected) by ALL spectrum users, both now and in the future. Such "reasonable" solutions, if they do in fact exist, must not impose unfair or unreasonable economic hardship on either the MVDDS or DBS industrial or user communities. We believe we have identified a simple, effective, and economical method (heretofore unrecognized) which may represent just such a "reasonable" solution and wish to present and propose it for your consideration.

Our company, ThinKom Solutions, Incorporated, founded in May of 2000, is focused on the design and production of innovative antenna solutions in support of a diverse range of broadband wireless access and satellite communication implementations and customers. These diverse applications include: integrated multi-band cellular handset antennas; MMDS, LMDS, PTP, and PTMP antennas and terminals; both mobile (comm-on-the-move) and fixed NGSO, Stratospheric, and GEO tracking antennas; and even large Gateway antennas. We believe (and more importantly, our customers concur) that we offer a unique value-proposition in terms of performance AND low cost as compared to competing antenna technologies in this area.

While our company is new and our applications diverse, the primary technology basis for our offerings, the "*Continuous Transverse Stub (CTS) array*" is both <u>established</u> and <u>proven</u>, …yet little known. Originally invented at Hughes Aircraft in 1991, the CTS antenna has been successfully demonstrated in over 30 different military and commercial embodiments to date, including those which are currently in full-scale commercial production. The CTS antenna technology is currently protected by numerous US and Foreign patents* (to which ThinKom holds a non-exclusive license), even as we continue to innovate and patent new improvements. Outside Classified and strict Proprietary domains, publications related to this technology has been intentionally limited and it is only since our incorporation that we, the original inventors and developers of this technology, are intellectually, organizationally, and legally empowered to aggressively and publicly pursue and openly describe the commercial applications of this "mature" antenna technology.

Relevant to the specific DBS/MVDDS spectrum-sharing issue, CTS is a flat-plate antenna array technology which exhibits superior sidelobes (and backlobes) as compared to competing dish and alternative flat-plate approaches. What makes CTS very unusual, particularly as compared to competing flat-plate antenna technologies is that the cross-polarization isolation (interference suppression,) peak and RMS sidelobes (interference suppression,) efficiency (array size versus gain), and ohmic losses (G/T) of the CTS array are dramatically superior in all categories. As an example, as compared to a 17"

x 17 FORTEL flat-plate antenna (like that recently tested by MITRE), a 17" x 17" CTS array exhibits 15 dB better X-pol isolation, 12 dB lower peak sidelobes, 10 dB lower RMS sidelobes, and 2.5 dB higher G/T. This latter metric, the G/T, means that the CTS array requires 44% less aperture area (or equivalently less transmit power/EIRP) than the FORTEL antenna in order to achieve the same receive performance.

It's important to note that the aforementioned interoperability and efficiency performance benefits are realized in an antenna that is projected to be 50% to 75% lower in cost (depending on quantity) as compared to the FORTEL antenna and (more importantly) these performance and cost metrics are PROVEN....not merely "conjectured." In fact, in 1993, the ChannelMaster Corporation (makers of the "RCA" 18" DirecTV dish antenna) commissioned the eventual co-founders of ThinKom (then at Hughes Aircraft Company) to design a CTS-based flat-plate antenna as a (potential) replacement for their own 18" dish design. Several prototypes of these antennas were successfully designed, built, and ultimately tested by Hughes Aircraft and ChannelMaster and were found, in fact, to have superior cross-polarization isolation, lower sidelobes, lower (no) backlobes, and higher (+1 dB) G/T than the dish they were designed to replace. Estimated manufacturing cost for this 19" x 19" x 1" flat-plat antenna (in 1994) was estimated at approximately $40 per unit, too high (in ChannelMaster's judgment) to justify OEM replacement of the dish design, and the project was ultimately “scrapped.” However, in the 7 years subsequent to that final decision, we (unbeknownst to ChannelMaster) have identified and investigated numerous improvements to this original design (via improved manufacturing and design expertise) in terms of both manufacturing cost (now 30% to 50% lower) and efficiency (now 30% smaller aperture area) than the 1994 version of this design. CTS arrays are currently in full-scale production (via a restricted license to Harris Corporation) for 23, 26, and 38 GHz Point-to-Point Radios and were competitively chosen (by Harris) for their SUPERIOR PERFORMANCE (10 to 15 dB lower sidelobes and 1 dB higher gain) AND LOWER-COST (50% to 70% less expensive) as compared to the dish-based designs (Andrew, Gabriel, EndWave, etc.) that they replace.

As an antenna subsystem provider, we choose to provide this public comment regarding our specific antenna technology in the context of a heretofore "*unknown*" or at least “*unidentified*,” yet mature, proven, affordable, and effective candidate method for mitigating the interference issues and concerns raised in MITRE's recent report, and to otherwise accommodate and perhaps enable your approval of the proposed bandwidth sharing proposal while effectively addressing ALL of the concerns of ALL of the various parties involved in your deliberations.

While we fully recognize and make no effort to hide the fact that our company would stand to achieve significant financial benefit from the application of the CTS antenna as a solution to the apparent interoperability issues, both recognized and perceived, we sincerely and objectively believe that this unique antenna technology, applied as a low-cost, higher-gain, and lower-sidelobe substitute for the MVDDS community's current horn-based solutions would represent a more conformal and aesthetically-pleasing package that could easily and effectively mitigate the cited concerns of the DBS community. Alternatively, a CTS-based flat-plate DBS antenna (unlike similar "flat-plate" antenna options) would actually provide, at an equivalent cost, BETTER performance than the incumbent (typical) 18" dish, thereby removing the "cost" and "performance" concerns recently voiced by representatives of the DBS community with respect to their (we believe, “limited”) knowledge with respect to currently available "flat-plate" antenna solutions. While we believe that ThinKom is uniquely positioned to provide the aforementioned CTS-based antenna solution(s) at the most affordable price, rights to the “basic” intellectual property (IP) for this technology* are, in fact, shared by others and, to the extent that we (exclusively) possess additional “advanced” IP related to the manufacturing of CTS arrays, we would be willing to consider licensing this IP to others (i.e. our competitors) for their limited use, specific to DBS and/or MVDDS applications.

We provide for your inspection (via attachment) a file containing some general technical background, examples, and history of the described Continuous Transverse Stub (CTS) antenna technology and we stand ready to provide further technical data (including representative hardware, photographs, details, and measured antenna patterns) and recurring cost estimates (including actual costs for similar CTS production programs) to the Government, your consultants, and/or interested representatives of the MVDDS and DBS communities. We believe that the CTS antenna may in fact represent a significant enabler for realistically and reliably providing the desired "win-win" solution the commission seeks and we look forward to the opportunity to further assist the commission in its diligent exploration, evaluation, and ultimate ruling(s) with respect to this issue.

Thank you for your consideration in this matter,

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Attachment: "*Theory and Application of the Continuous Transverse Stub (CTS) Array in Commercial and Military Applications*" (CTSbackground.pdf)

* Applicable US Patents include: 5,266,961, 5,483,248, 5,583,524, 5,412,394, 5,349,363, and 5,361,076.