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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

Application of **ECHOSTAR COMMUNICATIONS CORPORATION,** **GENERAL MOTORS CORPORATION,** **HUGHES ELECTRONICS CORPORATION** Transferors, and **ECHOSTAR COMMUNICATIONS CORPORATION** Transferee, For Authority to Transfer Control	**CS Docket No. 01-348**

DECLARATION OF MR. ARNOLD FRIEDMAN ON BEHALF OF ECHOSTAR COMMUNICATIONS CORPORATION, GENERAL MOTORS CORPORATION, AND HUGHES ELECTRONICS CORPORATION

I. Qualifications

1. My name is Arnold Friedman. I have been involved in the telecommunications industry for over 20 years and am intimately familiar with the design and operation of satellite systems that operate in the Fixed Satellite Service (FSS) and the Direct Broadcast Service (DBS), as well as the use of satellite capacity to provide broadband service to businesses and residences. I hold a Bachelor of Science in Engineering from the University of Pittsburgh (1978).

2. For sixteen years, I was employed by Lockheed Martin Corporation, where I served as a Special Director, Telecommunications, and as a Chief Systems Engineer. In those capacities, I successfully directed complex projects for the development of satellite technology. I also led a team that created the Astrolink Ka band broadband satellite project. Among other things, I developed the initial architecture of the Astrolink system and determined its spectrum requirements.

3. For four years, I served as Vice President, Ventures, at Space Systems/Loral. In that capacity, I was responsible for directing the analysis of potential telecommunications investments and new services in the United States and around the world. I also was responsible for over $1 Billion in sales to telecommunications service and broadcast companies, and was instrumental in system architecture design, pricing and financing strategies.

4. More recently, I was a founder, and served as the President, of ProntoCast Services, LLC, which was formed to provide new consumer telecommunications services via satellite, including content delivery to homes and Internet devices. Currently, I am advising a number of companies on the deployment of broadband services to businesses

and consumers and on the design of their system architectures.

II. Purpose of Statement

5. I have been asked by EchoStar Communications Corporation, General Motors Corporation, and Hughes Electronics Corporation to reply to certain comments submitted to the Federal Communications Commission (FCC) in opposition to the proposed merger between EchoStar and Hughes Electronics Corporation. Among other things, I respond to the declaration submitted by Walter L. Morgan and the affidavit submitted by Roger J. Rusch.[1]

III. The Broadband Satellite Market

6. There are two U.S. companies that provide two-way satellite-based broadband services to residential consumers today through Ku-band spacecraft: Starband Communications Inc., which offers its Starband service, and Hughes Network Systems , Inc. (HNS), which offers its DIRECWAY™ service (formerly also known as DirecPC). Each company offers its consumer service through a network of distributors.

7. DIRECWAY™ and Starband have achieved a much lower broadband service residential subscriber base than cable operators or DSL operators have been able to achieve. As of January 2002, DIRECWAY™ had obtained only about 100,000 residential and small business subscribers, while Starband had obtained only about

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[1] Declaration of Walter L. Morgan, Exhibit O to Petition to Deny of the National Rural Telecommunications Cooperative, CS Docket No. 01-348 (Feb. 4, 2002) ("Morgan Decl."); Affidavit and Report of Roger J. Rusch, Attachment B to Petition to Deny of Pegasus Communications, CS Docket No. 01-348 (Feb. 4, 2002).

40,000 subscribers.[2] In contrast, at the beginning of this year, there were reported to be 11 million cable modem and DSL subscribers.[3]

8. The growth of residential subscribers to satellite broadband services has been limited by the high total cost of the satellite broadband service---the cost of equipment, the cost of installation, and the cost of monthly service. The experience of DSL and cable modem providers is similar---many residential users simply will not subscribe to a high-cost broadband solution. They will stay with dial-up Internet service instead.

9. The total cost to residential users today for satellite broadband services is higher than the total cost to residential users for cable modem or DSL service. DIRECWAY™ service now can be obtained through its distributors for a monthly service charge of $59.99, and $898.00 for equipment and installation (less a $300 rebate currently being offered with a one year service commitment).[4] Starband can be obtained for a monthly service charge of $69.99 (plus a $5 per month access fee), and $748.00 for

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[2] Starband Wraps Up 2001 as American's Leading Consumer Satellite Internet Provider, Press Release, Jan. 7, 2002 <http://www.starband.com/whoweare/pr/010702.htm; DIRECWAY Subscribers Break 100,000 Mark, Press Release, Jan. 9, 2002 <http://www.hns.com/corporate/news/pr/pr9999487460002.htm>.

[3] Morgan Stanley, "BYOB: Cable Brings Its Own Backbone to the Party, January 3, 2002. As of June 30, 2001, the FCC reported that residential and small business high-speed Internet access via cable, DSL and other wireline technologies (including ADSL) totaled 7.6 million lines. Federal Communications Commission, In the Matter of the Deployment of Advanced Telecommunications Capability, CC Docket 98-146, Third Report (released February 6, 2002) at Appendix C, Table 3.

[4] *See* http://dtv.direcway.com/home/order/order_now.html.

equipment and installation.[5] In contrast, representative costs to consumers today for cable modem service is approximately $30-60 for monthly service[6] with equipment and installation charges of approximately $69-199,[7] and representative costs to consumers today for DSL service is about $50.00 per month for monthly service, and no equipment or installation charge.[8]

10. Two-way satellite broadband services today must be professionally installed for two main reasons: (i) in order to ensure that the transmitting antenna is pointed accurately, and (ii) in order to comply with conditions that the Federal Commissions Commission has imposed in the earth station licenses that HNS and Starband use to provide service to consumers. The typical charge for professionally installing a residential Ku band antenna is $199.[9]

11. In contrast, cable modem and DSL service are moving toward a business model that allows consumers to self-install and therefore obtain broadband service at a

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[5] *See* http://www.starband.com/wheretobuy/dishsplash.htm.

[6] Comcast offers a $ 40-55 per month price range for cable modem service. *See* www.comcast.com. Cox Communications-Northern Virginia offers a high-speed Internet access service for $30-40 per month. *See* www.coxcable.com/Fairfax/ RoadRunner/rates.asp. Time Warner Cable advertises high-speed Internet access in Bergen County, New Jersey for $45-60 monthly including the cost of modem rental. *See* www.timewarnercablenj.com/road_runner/faq.html#gq13.

[7] *See, e.g.*, www.comcast.com; www.coxcable.com/Fairfax/ RoadRunner/rates.asp; www.timewarnercablenj.com/road_runner/faq.html#gq13.

[8] *See, e.g.,* Verizon, DSL Prices and Packages, www.verizon.net.pands/dsl/packages.

[9] *See* Starband, www.starband.com/whertobuy/dishsplash.htm; Valueelectronics.com, DIRECWAY offered through DIRECTV, www.vaueelectronics.com/pcsys.htm.

lower cost. For 2001, JPMorgan estimated that 70% of DSL subscribers self-installed, and 25% of cable modem subscribers self-installed.[10]

12. The high cost of Ku band satellite service is driven in part by the current configurations of Ku band spacecraft and the high cost of Ku band transponder capacity. Starband and HNS acquire the satellite capacity over which they provide broadband service by leasing transponders from Ku band satellite operators. The Ku band spacecraft that serve the U.S. are configured with individual transponders, each of which uses a discrete amount of spectrum, typically 24 or 36 MHz in each direction (uplink and downlink). Each transponder is associated with a national antenna beam pattern, many of which are designed to provide service to the 48 contiguous United States, and can also cover Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands. Ku band transponders have been designed in this manner primarily to facilitate the distribution of video, audio and data across the entire United States using antennas that range from 10 meters to 1.2 meters in diameters. Each kilobit of service used by a satellite broadband customer consumes a corresponding portion of frequencies on the transponder (typically 1.15 bits/Hertz), and therefore (in the case of a CONUS beam) prevents those same uplink and downlink frequencies from being simultaneously reused on the spacecraft anywhere else in CONUS. Thus, there are limits on the number of broadband users that can simultaneously receive broadband service on the same transponder. Moreover, there are FCC imposed power limits that are designed to avoid interference with networks

[10] JPMorgan Securities, Inc. Industry Analysis, Broadband 2002, *A Comprehensive Analysis of Demand, Supply, Economics, and Industry Dynamics in the U.S. Broadband Market*, April 2, 2002, at 69 ("JPMorgan").

operating on adjacent satellites at lower power, which also limit the use of small Ku band antennas.

13. In order to achieve certain operating and economic efficiencies, HNS and Starband each has sought to obtain groups of transponders on the same satellite, and to obtain transponders on spacecraft within a certain part of the orbital arc. This allows them to increase the amount of transponder capacity that possibly could be used by any subscriber whose antenna is pointed toward a given satellite (or satellites within a certain range), and to obtain economic and operational efficiencies with the minimum number of expensive hub earth stations that are required to provide service.

14. For more than 20 years, the Ku band FSS satellite spectrum has been used for many commercial purposes other than DIRECWAY™ and Starband broadband service. Satellite operators have already committed many Ku band transponders for such other uses, and DIRECWAY™ and Starband must compete with many other companies who need access to Ku band capacity. As a result, Ku band capacity is expensive, and often is difficult to obtain on the spacecraft where HNS and Starband have already located existing broadband subscribers. In today's market, the cost to lease a single 36 MHz transponder is approximately $2,000,000 per year. The cost of acquiring space segment capacity from third parties is a large component of the total monthly service charge for satellite broadband service. Thus, the cost of acquiring space segment capacity increases the cost to provide DIRECWAY™ and Starband service, relative to the cost to provide DSL and cable modem service.

15. In 1995, fifteen companies, including Hughes and EchoStar, applied for the first generation of FSS Ka band satellite systems to serve the United States. Many

proponents of those systems believed that they could deliver by satellite a very high speed broadband service that had never been offered before, and anticipated being able to deliver that service on a ubiquitous basis throughout the United States to business and residences alike. Unlike today's Ku band satellites that are used for a wide range of purposes, and have not been optimized for broadband service, many of these Ka band systems were designed from the outset to be dedicated almost exclusively for the provision of state-of-the-art broadband service. Among other things, the use of many small spot beams facilitates the provision of point-to-point service by many different users with a high rate of efficient frequency re-use.

16. The new Ka band systems, however, require the use of new and commercially unproven technology, the development of brand new satellite network architectures, and the infusion of billions of dollars of investment. In light of these risks, and problems raising financing, many companies have terminated, scaled back or refocused their programs. For example, the Teledesic system has been scaled back from a system with 840 Low Earth Orbit (LEO) spacecraft to 288 LEO satellites, and just last month to one with only 30 Middle Earth Orbit (MEO) spacecraft. Astrolink recently reported that it has terminated its construction contract with Lockheed Martin after having completed construction of 90% of its first spacecraft, having spent $710 million on its satellite broadband program, and finding itself unable to finance the remaining cost of implementing the Astrolink broadband system. The recent burst of the Internet bubble and the general retraction of the capital markets has exacerbated the problems already facing these ambitious satellite broadband proposals.

17. In light of the continuing challenges in the financial markets, and the demands of investors, HNS has informed me that it has focused its SPACEWAY Ka band broadband initiative on commercial customers. Targeting established customer bases, and marketing primarily to commercial users of satellite capacity who historically are not as price-sensitive as residential consumers, provides a higher level of certainty that HNS can recover the large capital costs of its SPACEWAY system. In light of similar challenges, EchoStar's current Ka band program is limited to a small number of spot beams on its Ka-band spacecraft.

18. Nevertheless, in order to offer residential subscribers a competitive alternative to terrestrial offerings such as DSL and cable modem service, and in order to be attractive to residential consumers in general, satellite-based broadband services need to reduce the total cost to the consumer of obtaining service. There are two main ways to bring the cost to the consumer down to the cost of cable modem or DSL service: reducing equipment and installation charges, and reducing monthly service charges.

19. One means of reducing the equipment and installation costs for residential subscribers is for the satellite broadband provider to subsidize the cost of the equipment and installation. This already occurs to some extent today. However, doing so requires significant cash outlays by the satellite broadband provider. These are outlays that the satellite provider, for the most part, does not need to make in order to obtain a commercial subscriber. And they are outlays that the investment community may be reluctant to fund because of high expected subscriber "churn." It is a very risky proposition for satellite broadband providers to subsidize consumer acquisition costs on a large scale, considering that cable modem and DSL service providers are starting to lock

in their market share (satellite has about 1/10 of 1% of all broadband users), the subscriber acquisition costs for DSL and cable modem subscribers are continuing to fall,[11] cable modem and DSL service providers increasingly are able to rely on customers to perform self-installations,[12] and the cost of monthly service has to be competitive with cable modem and DSL service in order to be attractive to residential consumers. This level of investment makes sense only if the cost of the subsidy is sustainable by the expected revenue stream from the residential subscriber, taking into account the expected rate of subscriber "churn."

20. The proposed merger provides another way to reduce equipment costs for the residential subscriber. Namely, the merger would allow EchoStar and Hughes to develop a single equipment standard and achieve economies of scale through the higher rate of production of a common product. As in the cable modem, DBS and cellular phone business model, this "economy of scale" savings could be passed onto consumers in the form of reduced upfront costs. By way of example, cable modem pricing was $300 at 500,000 units, and it dropped to $100 at 8.2 million units.

21. The merger also could reduce the monthly costs of service for residential satellite broadband subscribers. In addition to the cost of space segment, monthly service charges include a portion of the provider's subscriber acquisition costs—the cost of marketing and sales to new subscribers. New Echostar will be able to market and sell satellite-based broadband services to a much larger residential customer base than either

[11] JP Morgan projects that cost to acquire DSL customers will fall 37% by 2005 to $500 per subscriber. Similarly, for cable modem service, the acquisition cost per subscriber is expected to drop 10% in that same time period, to $420 per subscriber. JPMorgan at 70 (Charts 43, 44).

Hughes or EchoStar has today. The combined base of satellite video subscribers is in excess of 16 million. Current satellite video subscribers are more likely to subscribe to satellite broadband services than other households because they have already demonstrated the ability and willingness to place the necessary equipment on their houses. Moreover, they already have a clear line-of-sight to the geostationary orbital arc. Furthermore, the ability to bundle and sell a combined video and broadband service should provide the opportunity to attract entirely new customers.

22. The monthly service charge also contains elements of the cost of operating network control centers, call centers, customer service, and billing/collection. The merger would allow the combined company to consolidate the functions and facilities of what otherwise would be separate network operations, call centers, customer service, and billing/collection functions, and thereby achieve significant savings in operational expenses, and potentially in up-front capital expenditures as well. Moreover, the combined company might be able to eliminate redundant back-up satellite capabilities that ensure service continuity in the case of satellite or other network failures.

IV. Response to Mr. Walter Morgan

23. Although the new Ka-band spot beam satellites offer substantially more capacity than the leased Ku-band transponders that HNS and Starband use today, neither company acting alone would be able to serve the numbers of subscribers posited by Mr. Walter Morgan in his Declaration in support of NRTC's Petition to Deny.

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[12] *Id.*

24. Among other errors, Mr. Morgan incorrectly assumes that SPACEWAY has a full 1000 MHz of uplink and downlink capacity available to it in each orbital slot.[13] In fact, 280 MHz of this spectrum is unavailable for provision of ubiquitous broadband services because it must be shared with fixed terrestrial users, and cannot be blanket licensed the way that today's Ku band VSATs are licensed. This problem, in conjunction with the fact that the SPACEWAY design and system architecture is built around 500 MHz downlink carriers, effectively leaves SPACEWAY with only 500 MHz of usable spectrum in each direction at each of its licensed orbital locations.

25. Similarly, Mr. Morgan wrongly assumes that EchoStar has 1000 MHz available to it in each of its two orbital slots.[14] The FCC has licensed EchoStar only 500 MHz of Ka band spectrum in each direction at 83° and 121° W.L. As for EchoStar's 113° W.L. orbital location, the same problems that SPACEWAY has with terrestrial use of 280 MHz of spectrum, and the unavailability of blanket licensing in that band, limit the bandwidth available for ubiquitous consumer services.

26. Mr. Morgan makes another fundamental mistake by grossly overstating the number of subscribers that could be served in the Ka band spectrum that is available. Mr. Morgan wrongly relies on *dial-up* subscriber usage statistics.[15] These figures simply do not apply to *broadband* users, who spend substantially more time online, and are much more likely to watch movie trailers, watch streaming video, listen to streaming

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[13] *See* Morgan Decl. at 36.

[14] *Id.*

[15] *See id.* at 38.

audio and download software on demand.[16] Thus, Mr. Morgan's assumption of an "average busy hour demand" of 2.75 kbps per subscriber" is flawed. As a result of these errors and others, Mr. Morgan substantially overstates the number of broadband subscribers that each company could serve.

V. Response to Mssrs. Rusch and Morgan on Local Channel Issues

27. Finally, based upon my experience working on a variety of satellite projects at Lockheed Martin and Loral, I have reviewed the satellite design proposals of Mssrs. Rusch and Morgan that purport to identify satellites that could be feasibly deployed by either DIRECTV or EchoStar as a means of offering local channel service to every Designated Market Area in the United States. I have also reviewed the Declaration of Dr. Richard Barnett, also submitted today by the Applicants in support of the merger. I agree with Dr. Barnett's assessment that these proposals are "mere concepts and rigorous analysis of their performance is distinctly lacking," and that these proposals present very challenging technical, cost and other business issues. In my opinion, a reasonably prudent DBS operator would not assume the risk of building such a satellite in light of those problems.

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[16] *See @Home Study: Broadband Users Surf More*, SkyREPORT.com Daily E-News, Oct. 6, 2000. According to the study, broadband consumers spend 55 percent more time on line, compared to narrowband users. They are also more likely to watch movie trailers (46 percent broadband vs. 18 percent dial-up); watch streaming video (58 percent broadband vs. 31 percent dial-up); listen to streaming audio (52 percent broadband vs. 31 percent dial-up); and get software on demand (48 percent broadband vs. 30 percent dial-up).

I declare, under penalty of perjury, that the foregoing is true and correct to the best of my knowledge, information and belief.

Arnold Friedman

February 25, 2002