

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT5962421

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	SECURITY INTEREST
CONVEYING PARTY DATA	
Name	Execution Date
HUGHES NETWORK SYSTEMS LLC	02/13/2020
RECEIVING PARTY DATA	
Name:	U.S. BANK NATIONAL ASSOCIATION
Street Address:	60 LIVINGSTON AVE
City:	ST PAUL
State/Country:	MINNESOTA
Postal Code:	55107
PROPERTY NUMBERS Total: 45	
Property Type	Number
Patent Number:	10447385
Patent Number:	10454804
Patent Number:	10476585
Patent Number:	10432299
Patent Number:	10499256
Patent Number:	10511071
Patent Number:	10440596
Patent Number:	10499279
Patent Number:	10432298
Patent Number:	10433208
Patent Number:	10447380
Patent Number:	10461841
Patent Number:	10498636
Patent Number:	10321340
Patent Number:	9755731
Application Number:	16698086
Application Number:	16589555
Application Number:	16719748
Application Number:	16657949
Application Number:	16685986

Property Type	Number
Application Number:	16694104
Application Number:	16731539
Application Number:	16660403
Application Number:	16732182
Application Number:	16716026
Application Number:	16732233
Application Number:	16715529
Application Number:	16729348
Application Number:	16732115
Application Number:	16692249
Application Number:	16724723
Application Number:	29719113
Application Number:	16709816
Application Number:	16727819
Application Number:	16732265
Application Number:	16718303
Application Number:	16730254
Application Number:	16731706
Application Number:	16729870
Application Number:	16732252
Application Number:	16731473
Application Number:	16728260
Application Number:	16732186
Application Number:	16730896
Application Number:	16730692

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Email: cory.myers@echostar.com

Correspondent Name: CORY MYERS

Address Line 1: 11717 EXPLORATION DRIVE

Address Line 4: GERMANTOWN, MARYLAND 20876

NAME OF SUBMITTER: CORY L. MYERS

SIGNATURE: /Cory L. Myers/

DATE SIGNED: 02/13/2020

Total Attachments: 7

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Patent Security Agreement

Patent Security Agreement, dated as of February 13, 2020, by Hughes Network Systems, LLC, a Delaware limited liability company (the "Pledgor"), in favor of U.S. Bank National Association, in its capacity as collateral agent (the "Collateral Agent") pursuant to that certain Secured Indenture dated as of July 27, 2016, by and among Hughes Satellite Systems Corporation, the guarantors party thereto, and the Collateral Agent as collateral agent and trustee (as supplemented, the "2016 Indenture").

WITNESSETH:

WHEREAS, the Pledgor is a party to a Security Agreement dated as of June 8, 2011 as supplemented by the Joinder Agreement, dated as of March 28, 2014, the Additional Secured Party Joinder, dated as of July 27, 2016 and the Joinder Agreements dated as of March 23, 2017, August 10, 2017 and June 12, 2019 (as amended, amended and restated, supplemented or otherwise modified from time to time, the "Security Agreement") in favor of the Collateral Agent pursuant to which the Pledgor is required to execute and deliver this Patent Security Agreement;

NOW, THEREFORE, in consideration of the premises and to induce the Collateral Agent, for the benefit of the Secured Parties, to enter into each Indenture, the Pledgor hereby agrees with the Collateral Agent as follows:

SECTION 1. Defined Terms. Unless otherwise defined herein, terms defined in the Security Agreement and used herein have the meaning given to them in the Security Agreement.

SECTION 2. Grant of Security Interest in Patent Collateral. The Pledgor hereby pledges and grants to the Collateral Agent for the benefit of the Secured Parties a lien on and security interest in and to all of its right, title and interest in, to and under all the following Pledged Collateral of the Pledgor:

- (a) Patents of the Pledgor listed on Schedule I attached hereto; and
- (b) all Proceeds of any and all of the foregoing (other than Excluded Property).

SECTION 3. Security Agreement. The security interest granted pursuant to this Patent Security Agreement is granted pursuant to the security interest granted to the Collateral Agent under the Security Agreement and the Pledgor hereby acknowledges and affirms that the rights and remedies of the Collateral Agent with respect to the security interest in the Patents made and granted hereby are more fully set forth in the Security Agreement, the terms and provisions of which are incorporated by reference herein as if fully set forth herein. In the event that any provision of this Patent Security Agreement is deemed to conflict with the Security Agreement, the provisions of the Security Agreement shall control unless the Collateral Agent shall otherwise determine.

SECTION 4. Termination. Upon the payment in full of the Secured Obligations and termination of the Security Agreement, the Collateral Agent shall execute, acknowledge, and deliver to the Pledgor an instrument in writing in recordable form releasing the collateral pledge, grant, assignment, lien and security interest in the Patents under this Patent Security Agreement.

SECTION 5. Counterparts. This Patent Security Agreement may be executed in any number of counterparts, all of which shall constitute one and the same instrument, and any party hereto may execute this Patent Security Agreement by signing and delivering one or more counterparts.

SECTION 6. Governing Law. This Patent Security Agreement and the transactions contemplated hereby, and all disputes between the parties under or relating to this Patent Security Agreement or the facts or circumstances leading to its execution, whether in contract, tort or otherwise, shall be construed in accordance with and governed by the laws (including statutes of limitation) of the State of New York, without regard to conflicts of law principles that would require the application of the laws of another jurisdiction.

[signature page follows]

IN WITNESS WHEREOF, the Pledgor and the Collateral Agent have caused this Patent Security Agreement to be duly executed and delivered by their duly authorized officer as of the date first set forth above.

HUGHES NETWORK SYSTEMS, LLC,
as Pledgor

By: 

Name: Dean A. Manson

Title: Executive Vice President, General Counsel
and Secretary

U.S. BANK NATIONAL ASSOCIATION,
as Collateral Agent

By: 

Name: Richard Prokosch

Title: Vice President

PATENT

REEL: 051812 FRAME: 0565

SCHEDULE I
to
PATENT SECURITY AGREEMENT
PATENT REGISTRATIONS AND PATENT APPLICATIONS

United States Patent Registrations:

Company	Patent No.	Patent Name
Hughes Network Systems, LLC	10,447,385	APPROACHES FOR ACHIEVING IMPROVED CAPACITY PLANS FOR A SATELLITE COMMUNICATIONS SYSTEM VIA INTERLEAVED BEAMS FROM MULTIPLE SATELLITES
Hughes Network Systems, LLC	10,454,804	APPLICATION CHARACTERIZATION USING TRANSPORT PROTOCOL ANALYSIS
Hughes Network Systems, LLC	10,476,585	DISTRIBUTED NETWORK NODE LOCATIONS IN A MOBILE NODE NETWORK
Hughes Network Systems, LLC	10,432,299	HYBRID SATELLITE SYSTEMS FOR ENHANCED PERFORMANCE AND ENHANCED QUALITY OF SERVICE BROADBAND COMMUNICATIONS
Hughes Network Systems, LLC	10,499,256	APPROACHES FOR INCREASING COVERAGE OF SPOT BEAMS IN A WIRELESS COMMUNICATIONS SYSTEM
Hughes Network Systems, LLC	10,511,071	LOW-LOSS, LOW-PROFILE DIGITAL-ANALOG PHASE SHIFTER
Hughes Network Systems, LLC	10,440,596	MEASURING AND MONITORING BEAM PERFORMANCE IN MOBILE SATELLITE SYSTEM
Hughes Network Systems, LLC	10,499,279	METHOD AND APPARATUS FOR DYNAMIC ASSOCIATION OF TERMINAL NODES WITH AGGREGATION NODES AND LOAD BALANCING
Hughes Network Systems, LLC	10,432,298	METHOD AND APPARATUS FOR DYNAMIC LOAD BALANCING OF COMMUNICATIONS CHANNELS FOR CONTROLLING TRAFFIC LOAD IN A COMMUNICATIONS SYSTEM
Hughes Network Systems, LLC	10,433,208	MULTI-MODEM USER TERMINAL AND POLICY-BASED MANAGEMENT FOR SATELLITE TRANSPORT RESILIENCY
Hughes Network Systems, LLC	10,447,380	PHASED ARRAY WITH INDEPENDENTLY STEERABLE BEAMS
Hughes Network Systems, LLC	10,461,841	SATELLITE COMMUNICATION NETWORK

Company	Patent No.	Patent Name
		TERMINAL INSTALLATION METHOD AND SYSTEM
Hughes Network Systems, LLC	10,498,636	VERY SMALL APERTURE TERMINAL INCLUDING CELL SITE COMPONENTS, AND A SYSTEM
Hughes Network Systems, LLC	10,321,340	COMMUNICATION NETWORK SERVICE CONDITION DETECTION
Hughes Network Systems, LLC	9,755,731	HARDWARE TCP ACCELERATOR

Applications:¹

Company	Application No.	Application Name
Hughes Network Systems, LLC	16/698,086	COMMUNICATION THROUGHPUT DESPITE PERIODIC BLOCKAGES
Hughes Network Systems, LLC	16/589,555	EFFICIENT ADAPTIVE CODING AND MODULATION
Hughes Network Systems, LLC	16/719,748	SYSTEMS FOR MITIGATING SERVICE INTERRUPTS IN SATELLITE SYSTEMS
Hughes Network Systems, LLC	16/657,949	SYSTEM AND METHOD FOR LOW-RATE HIGH-RATE COUPLED ACQUISITION AND TRACKING OF HIGH SYMBOL RATE IN ROUTES
Hughes Network Systems, LLC	16/685,986	LOW COST, LOW LOSS MATERIAL FOR MICROWAVE OR ANTENNA PRINTED CIRCUIT BOARD
Hughes Network Systems, LLC	16/694,104	USING IU-CS OVER IP FOR 2G VOICE SERVICES
Hughes Network Systems, LLC	16/731,539	COMPENSATING FOR FREQUENCY-DEPENDENT I-Q PHASE IMBALANCE
Hughes Network Systems, LLC	16/660,403	SATELLITE NETWORK ACCELERATION AND OPTIMIZATION
Hughes Network Systems, LLC	16/732,182	DVB-S2 DOWNLINK ACM ALGORITHM ENHANCEMENT TO IMPROVE DATA THROUGHPUT
Hughes Network Systems, LLC	16/716,026	WIDE FREQUENCY RANGE DUAL POLARIZED RADIATING ELEMENT WITH INTEGRATED RADOME
Hughes Network Systems, LLC	16/732,233	SYSTEM AND METHOD FOR EFFICIENT

¹ List excludes unpublished applications.

Company	Application No.	Application Name
		AND SCALABLE VSAT REAL-TIME MONITORING (VRTM)
Hughes Network Systems, LLC	16/715,529	SATELLITE COMMUNICATION SYSTEM AND SATELLITE COMMUNICATION METHOD
Hughes Network Systems, LLC	16/729,348	SYSTEM AND METHOD OF TRAFFIC-BASED CLASSIFICATION OF IoT DEVICES AND DYNAMIC ALLOCATION OF LINK RESOURCES TO IoT DEVICES
Hughes Network Systems, LLC	16/732,115	MANAGING INTERNET OF THINGS NETWORK TRAFFIC USING FEDERATED MACHINE LEARNING
Hughes Network Systems, LLC	16/692,249	DYNAMIC RESIZING OF A SATELLITE LINK OUTROUTE OR FORWARD CHANNEL
Hughes Network Systems, LLC	16/724,723	OVERLAPPED TDM/TDMA SATELLITE RETURN COMMUNICATIONS
Hughes Network Systems, LLC	29/719,113	S-BAND UNIVERSAL TERMINAL
Hughes Network Systems, LLC	16/709,816	INTELLIGENT CONVERSION OF INTERNET DOMAIN NAMES TO VECTOR EMBEDDINGS
Hughes Network Systems, LLC	16/727,819	METHOD FOR ESTIMATION OF QUALITY OF EXPERIENCE (QOE) METRICS FOR VIDEO STREAMING USING PASSIVE MEASUREMENTS
Hughes Network Systems, LLC	16/732,265	ESTIMATING TERMINAL LOCATION IN A SATELLITE COMMUNICATION SYSTEM
Hughes Network Systems, LLC	16/718,303	SATELLITE BLOCKAGE TOLERANT COMMUNICATION
Hughes Network Systems, LLC	16/730,254	METHOD OF HIGH SPEED AND DYNAMIC CONFIGURATION OF A TRANSCEIVER SYSTEM
Hughes Network Systems, LLC	16/731,706	COMMUNICATION SYSTEM AND COMMUNICATION METHOD
Hughes Network Systems, LLC	16/729,870	VARIABLE STAYOUT DISTANCE FOR BEAMHOPPING SATELLITE
Hughes Network Systems, LLC	16/732,252	BANDWIDTH ALLOCATION USING MACHINE LEARNING
Hughes Network Systems, LLC	16/731,473	HIERARCHICAL MULTI-TIER THROUGHPUT ASSIGNMENT FOR A SHARED THROUGHPUT SATELLITE NETWORK
Hughes Network Systems, LLC	16/728,260	SATELLITE BEAM DETERMINATION
Hughes Network Systems, LLC	16/732,186	INTERCONNECTED NETWORK DESIGN

Company	Application No.	Application Name
		FOR A SATELLITE SYSTEM
Hughes Network Systems, LLC	16/730,896	HANDOVER IN CONNECTED MODE BETWEEN NON-TERRESTRIAL-NETWORK AND TERRESTRIAL NETWORK
Hughes Network Systems, LLC	16/730,692	SATELLITE FORWARD LINK NON-LINEAR NOISE AND APSK I/Q IMBALANCE ERROR CANCELLATION USING ARTIFICIAL INTELLIGENCE