

<b>PATENT ASSIGNMENT COVER SHEET</b>
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Electronic Version v1.1  
 Stylesheet Version v1.2

EPAS ID: PAT7289374

<b>SUBMISSION TYPE:</b>	CORRECTIVE ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	Corrective Assignment to correct the CONVEYING PARTY DATA AND RECEIVING PARTY DATA previously recorded on Reel 053840 Frame 0679. Assignor(s) hereby confirms the ASSIGNMENT.

**CONVEYING PARTY DATA**

Name	Execution Date
ORBITAL SCIENCES LLC	08/31/2020

**RECEIVING PARTY DATA**

<b>Name:</b>	NORTHROP GUMMAN INNOVATION SYSTEMS LLC
<b>Street Address:</b>	4700 NATHAN LANE
<b>City:</b>	PLYMOUTH
<b>State/Country:</b>	MINNESOTA
<b>Postal Code:</b>	55442

**PROPERTY NUMBERS Total: 22**

Property Type	Number
Patent Number:	8483888
Patent Number:	9214736
Patent Number:	9853356
Patent Number:	10770788
Patent Number:	8573124
Patent Number:	9297627
Patent Number:	8355359
Patent Number:	9231691
Patent Number:	9686008
Patent Number:	10419105
Patent Number:	9650995
Patent Number:	7369624
Patent Number:	9203156
Patent Number:	9673522
Patent Number:	10553942
Patent Number:	9960301
Patent Number:	6597258
Patent Number:	6707350
Patent Number:	6771222

PATENT

Property Type	Number
Patent Number:	6667713
Patent Number:	8479557
Patent Number:	10020576

**CORRESPONDENCE DATA**

**Fax Number:** (612)315-4321

*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.*

**Phone:** 612-315-4100

**Email:** skloss@cf-d-ip.com

**Correspondent Name:** CHRISTENSEN, FONDER, DARDI & HERBERT PLLC

**Address Line 1:** 11322 86TH AVENUE NORTH

**Address Line 4:** MAPLE GROVE, MINNESOTA 55369

**ATTORNEY DOCKET NUMBER:** 5053.00000001

**NAME OF SUBMITTER:** SHARI KLOSS

**SIGNATURE:** /Shari Kloss/

**DATE SIGNED:** 04/20/2022

**Total Attachments: 7**

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<b>PATENT ASSIGNMENT COVER SHEET</b>
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Electronic Version v1.1  
 Stylesheet Version v1.2

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	ASSIGNMENT
<b>CONVEYING PARTY DATA</b>	
<b>Name</b>	<b>Execution Date</b>
ORBITAL SCIENCES CORPORATION	08/31/2020
<b>RECEIVING PARTY DATA</b>	
<b>Name:</b>	NORTHROP GRUMMAN INNOVATION SYSTEMS, INC.
<b>Street Address:</b>	4700 NATHAN LANE
<b>City:</b>	PLYMOUTH
<b>State/Country:</b>	MINNESOTA
<b>Postal Code:</b>	55442
<b>PROPERTY NUMBERS Total: 24</b>	
<b>Property Type</b>	<b>Number</b>
<b>Patent Number:</b>	8483888
<b>Patent Number:</b>	9214736
<b>Patent Number:</b>	9853356
<b>Patent Number:</b>	10770788
<b>Patent Number:</b>	8573124
<b>Patent Number:</b>	9297627
<b>Patent Number:</b>	8355359
<b>Patent Number:</b>	9231691
<b>Patent Number:</b>	9686008
<b>Patent Number:</b>	10419105
<b>Application Number:</b>	16556592
<b>Patent Number:</b>	9650995
<b>Patent Number:</b>	7369624
<b>Patent Number:</b>	9203156
<b>Patent Number:</b>	9673522
<b>Patent Number:</b>	10020576

**PATENT**  
**REEL: 059712 FRAME: 0528**

<b>Patent Number:</b>	10553942
<b>Patent Number:</b>	9960301
<b>Patent Number:</b>	6597258
<b>Patent Number:</b>	6707350
<b>Patent Number:</b>	6771222
<b>Patent Number:</b>	5907582
<b>Patent Number:</b>	6667713
<b>Patent Number:</b>	8479557

**CORRESPONDENCE DATA**

**Fax Number:** (612)315-4321

**Phone:** 612-315-4100

**Email:** skloss@cfid-ip.com

*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.*

**Correspondent Name:** CHRISTENSEN, FONDER, DARDI & HERBERT PLLC

**Address Line 1:** 11322 86TH AVE. N.

**Address Line 4:** MAPLE GROVE, MINNESOTA 55369

**ATTORNEY DOCKET NUMBER:**

5052.0000001

**NAME OF SUBMITTER:**

SHARI KLOSS

**Signature:**

/Shari Kloss/

**Date:**

09/22/2020

**Total Attachments: 5**

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**RECEIPT INFORMATION**

**EPAS ID:** PAT6310354

**Receipt Date:** 09/22/2020

BCA  
APR 2, 2021  
ASSIGNMENT  
LLC

WHEREAS, Orbital Sciences Corporation, Inc. ("Assignor"), a business entity organized and existing under the laws of the State of Delaware, and having its principal offices at 45101 Warp Drive, Dulles, VA 20166, is owner of the patents and patent applications listed on Schedule A attached hereto (which is incorporated into and a part of this Assignment).

LLC BCA APR 2, 2021

WHEREAS, Northrop Grumman Innovation Systems, Inc. ("Assignee"), a business entity organized and existing under the laws of the State of Delaware, and having its principal offices at 4700 Nathan Lane, Plymouth, MN 55442, is desirous of acquiring the entire right, title and interest in and to the patents and patent applications listed on Schedule A.

Now, therefore, for good and valuable consideration, the receipt of which is hereby acknowledged, we have sold, assigned and transferred, and by these presents do hereby sell, assign and transfer unto the said Assignee, its successors and assigns, our entire right, title and interest in and to said patents and patent applications listed on Schedule A, all applications claiming priority to said applications including all divisions, continuations or renewals thereof, and the Letters Patent, both foreign and domestic, that may or shall issue therefrom, including all reissues or extensions of such patents including all of our rights under the International Convention and further including the right to sue, counterclaim and recover for past, present and future infringement of the rights assigned or to be assigned, as fully and entirely as the same would have been held by the Assignor if this assignment had not been made, and we do hereby authorize and request the Commissioner of Patents to issue said Letters Patent to the above mentioned Assignee in accordance herewith.

Upon said consideration Assignor does hereby covenant and agree with the said Assignee, its successors and assigns, that Assignor will not execute in writing or do any act whatsoever conflicting with these presents, and that Assignor or its executors or administrators will at any time upon request, without further or additional consideration, but at the expense of the said Assignee, its successors and assigns, execute such additional writings and do such additional acts as said Assignee, its successors and assigns, may deem necessary or desirable to perfect the Assignee's enjoyment of this grant, and render all necessary assistance in making application for and obtaining original, divisional, reissued or extended Letters Patent of the United States, or of any and all foreign countries on said inventions, and in enforcing any rights occurring as a result of such applications or patents, by giving testimony in any proceedings or transactions involving such applications or patents.

BCA  
APR 2, 2021  
LLC

ASSIGNOR: Orbital Sciences Corporation

Date: August 31, 2020

  
Signature

Bruce C. Anderson  
Name Printed or Typed

Assistant Secretary  
Title

**Schedule A  
Assigned IP**

<b>Title</b>	<b>Country</b>	<b>Application Number</b>	<b>Patent Number</b>	<b>Date Filed</b>	<b>Issue Date</b>
EMERGENCY COMMUNICATIONS CHANNEL SYSTEMS AND METHODS FOR SATELLITE COMMAND	United States of America	13/438,377	8,483,888	03-Apr-2012	7/9/2013
EMERGENCY COMMUNICATIONS CHANNEL SYSTEMS AND METHODS FOR SATELLITE COMMAND	Germany	12714481.4	2694374	04-Apr-2012	1/15/2015
EMERGENCY COMMUNICATIONS CHANNEL SYSTEMS AND METHODS FOR SATELLITE COMMAND	Spain	12714481.4	2694374	04-Apr-2012	1/15/2015
EMERGENCY COMMUNICATIONS CHANNEL SYSTEMS AND METHODS FOR SATELLITE COMMAND	France	12714481.4	2694374	04-Apr-2012	1/15/2015
EMERGENCY COMMUNICATIONS CHANNEL SYSTEMS AND METHODS FOR SATELLITE COMMAND	United Kingdom	12714481.4	2694374	04-Apr-2012	1/15/2015
EMERGENCY COMMUNICATIONS CHANNEL SYSTEMS AND METHODS FOR SATELLITE COMMAND	Japan	2014-503939	6054372	04-Apr-2012	12/9/2016
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	United States of America	13/558,080	9,214,736	25-Jul-2012	12/15/2015
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	Germany	13745522.6	2878039	23-Jul-2013	4/17/2012
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	Spain	13745522.6	2878039	23-Jul-2013	4/17/2012
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	France	13745522.6	2878039	23-Jul-2013	4/17/2012
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	United Kingdom	13745522.6	2878039	23-Jul-2013	4/17/2012
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	Italy	13745522.6	2878039	23-Jul-2013	4/17/2012
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	Japan	2015-524375	6218829	23-Jul-2013	10/25/2017
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	Israel	236811	236811	23-Jul-2013	3/29/2018
SYSTEMS AND METHODS FOR MITIGATING DISTURBANCES IN A DUAL GRIDDED REFLECTOR ANTENNA	Russian Federation	2015106145	2640099	23-Jul-2013	12/26/2017

**Schedule A  
Assigned IP**

<b>Title</b>	<b>Country</b>	<b>Application Number</b>	<b>Patent Number</b>	<b>Date Filed</b>	<b>Issue Date</b>
GROUND-BASED SATELLITE ANTENNA POINTING SYSTEM	United States of America	14/496,071	9,853,356	25-Sep-2014	26-Dec-2017
GROUND-BASED SATELLITE ANTENNA POINTING SYSTEM	United States of America	15/853,441		22-Dec-2017	
GROUND-BASED SATELLITE ANTENNA POINTING SYSTEM	European Patent Convention	14851452.4		26-Sep-2014	
GROUND-BASED SATELLITE ANTENNA POINTING SYSTEM	India	201617012119		26-Sep-2014	
GROUND-BASED SATELLITE ANTENNA POINTING SYSTEM	Japan	2016-517525		26-Sep-2014	
GROUND-BASED SATELLITE ANTENNA POINTING SYSTEM	Israel	244754		26-Sep-2014	
GROUND-BASED SATELLITE ANTENNA POINTING SYSTEM	Canada	2,925,575		26-Sep-2014	
ELECTRONIC SAFE/ARM SYSTEM AND METHODS OF USE THEREOF	United States of America	12/778,046	8,573,124	11-May-2010	11/5/2013
ELECTRONIC SAFE/ARM SYSTEM AND METHODS OF USE THEREOF	United States of America	13/858,438	9,297,627	08-Apr-2013	3/29/2016
SECONDARY PAYLOAD INTERFACE	United States of America	12/185,717	8,355,359	04-Aug-2008	1/15/2013
SECONDARY PAYLOAD INTERFACE	United States of America	13/740,672	9,231,691	14-Jan-2013	1/5/2016
SECONDARY PAYLOAD INTERFACE	Belgium	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Switzerland	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Germany	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Denmark	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Spain	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	France	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	United Kingdom	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Italy	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Luxembourg	09251841.4	2151930	22-Jul-2009	5/1/2019

**Schedule A  
Assigned IP**

<b>Title</b>	<b>Country</b>	<b>Application Number</b>	<b>Patent Number</b>	<b>Date Filed</b>	<b>Issue Date</b>
SECONDARY PAYLOAD INTERFACE	Netherlands	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Norway	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Sweden	09251841.4	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Japan	2009-0178372	2151930	22-Jul-2009	5/1/2019
SECONDARY PAYLOAD INTERFACE	Japan	2013-106106	5507739	30-Jul-2009	5/28/2014
SECONDARY PAYLOAD INTERFACE	Japan	2014-0056357	5676031	30-Jul-2009	2/25/2015
PROTECTION OF COMMERCIAL COMMUNICATIONS	United States of America	14/211,271	9,686,008	14-Mar-2014	20-Jun-2017
PROTECTION OF COMMERCIAL COMMUNICATIONS	United States of America	15/626,852	10,419,105	19-Jun-2017	9/17/2019
PROTECTION OF COMMERCIAL COMMUNICATIONS	United States of America	16/556,592		30-Aug-2019	
PROTECTION OF COMMERCIAL COMMUNICATIONS	European Patent Convention	14724854.6		14-Mar-2014	
HYBRID-CYCLE LIQUID PROPELLANT ROCKET ENGINE	United States of America	14/212,397	9,650,995	14-Mar-2014	16-May-2017
HYBRID-CYCLE LIQUID PROPELLANT ROCKET ENGINE	European Patent Convention	14721125.4		14-Mar-2014	
CARRIER SUPPRESSION TYPE MODULATOR WITH ENCODED MODULATING SIGNALS	United States of America	10/856,801	7,369,624	01-Jun-2014	5/6/2008
CARRIER SUPPRESSION TYPE MODULATOR WITH ENCODED MODULATING SIGNALS	France	505483	2871010	31-May-2005	7/10/2009
CARRIER SUPPRESSION TYPE MODULATOR WITH ENCODED MODULATING SIGNALS	United Kingdom	511099.4	2414877	31-May-2005	7/26/2006
CARRIER SUPPRESSION TYPE MODULATOR WITH ENCODED MODULATING SIGNALS	Japan	2005-161041	5010812	01-Jun-2005	8/9/2012
CARRIER SUPPRESSION TYPE MODULATOR WITH ENCODED MODULATING SIGNALS	Japan	2011-276721	5404757	01-Jun-2005	2/5/2014



**Schedule A  
Assigned IP**

<b>Title</b>	<b>Country</b>	<b>Application Number</b>	<b>Patent Number</b>	<b>Date Filed</b>	<b>Issue Date</b>
SYSTEMS AND METHODS FOR RECONFIGURABLE FACETED REFLECTOR ANTENNAS	United States of America	13/834,214	9,203,156	13-May-2013	12/1/2015
SYSTEMS AND METHODS FOR RECONFIGURABLE FACETED REFLECTOR ANTENNAS	United States of America	14/925,291	9,673,522	28-Oct-2015	06-Jun-2017
SYSTEMS AND METHODS FOR RECONFIGURABLE FACETED REFLECTOR ANTENNAS	United States of America	15/615,563	10,020,576	06-Jun-2017	10-Jul-2018
SYSTEMS AND METHODS FOR RECONFIGURABLE FACETED REFLECTOR ANTENNAS	United States of America	16/031,499	10,553,942	10-Jul-2018	04-Feb-2020
SYSTEMS AND METHODS FOR RECONFIGURABLE FACETED REFLECTOR ANTENNAS	European Patent Convention	14711404.5		04-Mar-2014	
SYSTEMS AND METHODS FOR RECONFIGURABLE FACETED REFLECTOR ANTENNAS	Russian Federation	2015139703	2650841	04-Mar-2014	17-Apr-2018
METHOD OF MANUFACTURING FLEXIBLE, LIGHTWEIGHT PHOTOVOLTAIC ARRAY	United States of America	15/076,081	9,960,301	21-Mar-2016	01-May-2018
PCB TRACE-FORMED HIGH PERFORMANCE FREQUENCY DIPLEXER AND METHOD	United States of America	09/944,781	6,597,258	30-Aug-2001	7/22/2003
DISTRIBUTIVE MULTIPLEXER FOR SPACE APPLICATIONS	United States of America	10/456,317	6,707,350	06-Jun-2003	3/16/2004
PHASE-ARRAY ANTENNA DIPLEXING	United States of America	10/456,760	6,771,222	06-Jun-2003	8/3/2004
SYSTEM FOR TURBO-CODED SATELLITE DIGITAL AUDIO BROADCASTING	United States of America	08/908,045	5,907,582	11-Aug-1997	5/25/1999
SELF-MONITORING SATELLITE SYSTEM	United States of America	09/938,983	6,667,713	24-Aug-2011	12/23/2003
SHOCK SIMULATION METHOD AND APPARATUS	United States of America	12/874,211	8,479,557	1-Sep-2010	7/9/2013