

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

EPAS ID: PAT5055042

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	SUPPLEMENTAL SECURITY AGREEMENT
<b>SEQUENCE:</b>	3

**CONVEYING PARTY DATA**

Name	Execution Date
CHARTER COMMUNICATIONS OPERATING, LLC	07/03/2018

**RECEIVING PARTY DATA**

<b>Name:</b>	BANK OF AMERICA, N.A.
<b>Street Address:</b>	ONE BRYANT PARK
<b>City:</b>	NEW YORK
<b>State/Country:</b>	NEW YORK
<b>Postal Code:</b>	10036

**PROPERTY NUMBERS Total: 17**

Property Type	Number
Patent Number:	9456240
Patent Number:	9674566
Patent Number:	9749302
Patent Number:	9955233
Patent Number:	9923279
Patent Number:	9639714
Application Number:	14942814
Application Number:	15183161
Application Number:	15239238
Application Number:	15250098
Application Number:	15347665
Application Number:	15396599
Application Number:	15426017
Application Number:	15488170
Application Number:	15204460
Application Number:	15222198
Application Number:	15427610

**CORRESPONDENCE DATA**

**Fax Number:** (202)408-3141

***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:** 2024083141

**Email:** jean.paterson@cscglobal.com

**Correspondent Name:** CSC

**Address Line 1:** 1090 VERMONT AVENUE, NW

**Address Line 4:** WASHINGTON, D.C. 20005

<b>ATTORNEY DOCKET NUMBER:</b>	304332-15
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<b>NAME OF SUBMITTER:</b>	JEAN PATERSON
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<b>SIGNATURE:</b>	/jep/
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<b>DATE SIGNED:</b>	07/18/2018
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**Total Attachments: 5**

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**Supplemental Patent Security Agreement**

**Supplemental Patent Security Agreement**, dated as of July 3, 2018, by CHARTER COMMUNICATIONS OPERATING, LLC (the "Grantor"), in favor of BANK OF AMERICA, N.A., in its capacity as collateral agent pursuant to the Credit Agreement (in such capacity, the "Administrative Agent").

WITNESSETH:

WHEREAS, the Grantor is party to the Amended and Restated Guarantee and Collateral Agreement, dated as of May 18, 2016 (as further amended, amended and restated, supplemented or otherwise modified from time to time, the "Guarantee and Collateral Agreement") in favor of the Administrative Agent pursuant to which the Grantor is required to execute and deliver this Supplemental Patent Security Agreement;

WHEREAS, pursuant to the Guarantee and Collateral Agreement, that certain Patent Security Agreement, dated as of May 18, 2016, was recorded with the U.S. Patent and Trademark Office on May 18, 2016 at Reel/Frame 038747/0507; and

NOW, THEREFORE, in consideration of the premises and to induce the Administrative Agent, for the benefit of the Secured Parties, to enter into the Credit Agreement, the Grantor hereby agrees with the Administrative Agent as follows:

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

SECTION 2. Grant of Security Interest in Patent Collateral. The Grantor hereby pledges and grants to the Administrative 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 Collateral of the Grantor (subject to the last paragraph of Section 3 of the Guarantee and Collateral Agreement, collectively, the "Patent Collateral"):

- (a) Patents of the Grantor, including those listed on Schedule I attached hereto;
- and
- (b) all Proceeds of any and all of the foregoing.

SECTION 3. Guarantee and Collateral Agreement. The security interest granted pursuant to this Supplemental Patent Security Agreement is granted in conjunction with the security interest granted to the Administrative Agent pursuant to the Guarantee and Collateral Agreement and the Grantor hereby acknowledges and affirms that the rights and remedies of the Administrative Agent with respect to the security interest in the Patent Collateral made and granted hereby are more fully set forth in the Guarantee and Collateral 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 Supplemental Patent Security Agreement is deemed to conflict with the

Guarantee and Collateral Agreement, the provisions of the Guarantee and Collateral Agreement shall control.

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

SECTION 5. Counterparts. This Supplemental 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 Supplemental Patent Security Agreement by signing and delivering one or more counterparts.

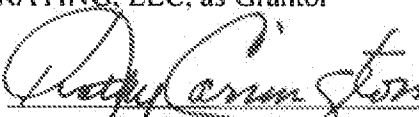
SECTION 6. Governing Law. This Supplemental Patent Security Agreement and the transactions contemplated hereby, and all disputes between the parties under or relating to this Supplemental Patent Security Agreement or the facts or circumstances leading to its execution, whether in contract, tort or otherwise, 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 Grantor has caused this Supplemental Patent Security Agreement to be executed and delivered by its duly authorized officer as of the date first set forth above.

Very truly yours,

CHARTER COMMUNICATIONS  
OPERATING, LLC, as Grantor

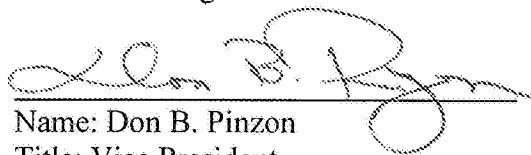
By:   
Name: Kathy Carrington  
Title: SVP, Corporate Services

[Signature Page to Supplemental Patent Security Agreement]

Accepted and Agreed:

BANK OF AMERICA, N.A.,  
as Administrative Agent

By:

A handwritten signature in black ink, appearing to read "Don B. Pinzon", written over a horizontal line.

Name: Don B. Pinzon

Title: Vice President

**SCHEDULE I**  
**to**  
**SUPPLEMENTAL PATENT SECURITY AGREEMENT**  
**PATENT REGISTRATIONS AND PATENT APPLICATIONS**

**Patent Registrations:**

	<b>Owner</b>	<b>Patent Title</b>	<b>Appl. No. Filing Date</b>	<b>Patent No. Issue Date</b>
1.	Charter Communications Operating, LLC	System And Method Bridging Cloud Based User Interfaces	15012261 02/01/2016	9456240 09/27/2016
2.	Charter Communications Operating, LLC	Unique Grouping Of Communication Sources	14634040 02/27/2015	9674566 06/06/2017
3.	Charter Communications Operating, LLC	Secure Collection Of Sensitive Data	15288307 10/07/2016	9749302 08/29/2017
4.	Charter Communications Operating, LLC	Methods And Apparatus For Providing Cloud Services To Customer Premise Devices	15594596 05/13/2017	9955233 04/24/2018
5.	Charter Communications Operating, LLC	Antenna System with Small Multi-Band Antennas	13585652 08/14/2012	9923279 03/20/2018
6.	Charter Communications Operating, LLC	Secure Transmission of Sensitive Data	15288297 10/07/2016	9639714 05/02/2017

**Patent Applications:**

	<b>Owner</b>	<b>Patent Title</b>	<b>Appl. No. Filing Date</b>
1.	Charter Communications Operating, LLC	Clientless Method For Context Driven Wireless Interactions	14942814 11/16/2015
2.	Charter Communications Operating, LLC	Routing IPV6 Packets Between Autonomous Systems	15183161 06/15/2016
3.	Charter Communications Operating, LLC and Nuovo Solutions LLC	System And Method Of Remotely Determining QoE	15239238 08/17/2016
4.	Charter Communications Operating, LLC	System And Method Of Cloud-Based Manifest Processing	15250098 08/29/2016
5.	Charter Communications Operating, LLC	Apparatus And Methods For Selective Secondary Content Insertion In A Digital Network	15347665 11/09/2016
6.	Charter Communications Operating, LLC	Last Played Bar With Video-On-Demand (VOD) And Digital Video Recorder (DVR) Options	15396599 12/31/2016
7.	Charter Communications Operating, LLC	System And Method Of Analyzing Cmts Data Streams	15426017 02/06/2017
8.	Charter Communications Operating, LLC	System And Method For Authenticating Local Cpe	15488170 04/14/2017
9.	Charter Communications Operating, LLC	System and Method of Monitoring DNS Services	15204460 07/07/2016
10.	Charter Communications Operating, LLC	Automatic provisioning of customer premises equipment	15222198 07/28/2016
11.	Charter Communications Operating, LLC	Apparatus and method for increasing upstream capacity in a broadband communications system	15427610 02/08/2017

**PATENT**

**RECORDED: 07/18/2018**

**REEL: 046570 FRAME: 0422**