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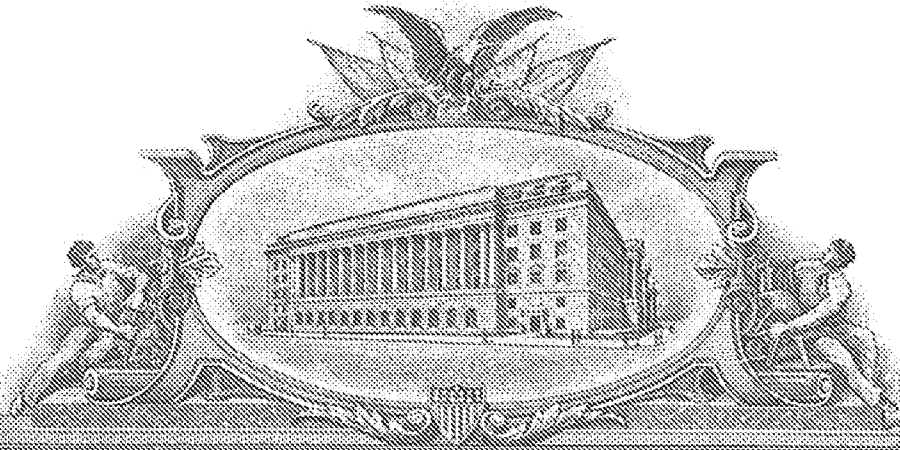
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Application Number	
Filing Date	July 17, 2019
First Named Inventor	Kevin Ross
Title	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS
Art Unit	TBA
Examiner Name	TBA
Attorney Docket Number	Welink-00030

SIGNATURE of Applicant or Patent Practitioner

Signature	/Jaeyoung Pak/	Date (Optional)	2019-07-17
Name	Jaeyoung Pak	Registration Number	72428
Title (if Applicant is a juristic entity)	Attorney of Record		
Applicant Name (if Applicant is a juristic entity)			

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SIGNATURE of Applicant for Patent

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Date (Optional)

Name

Kevin Ross

Title

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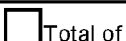
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Signature	Ahsan Naim	Date (Optional)	12/05/2016
Name	Muhammad Ahsan Naim		
Title			

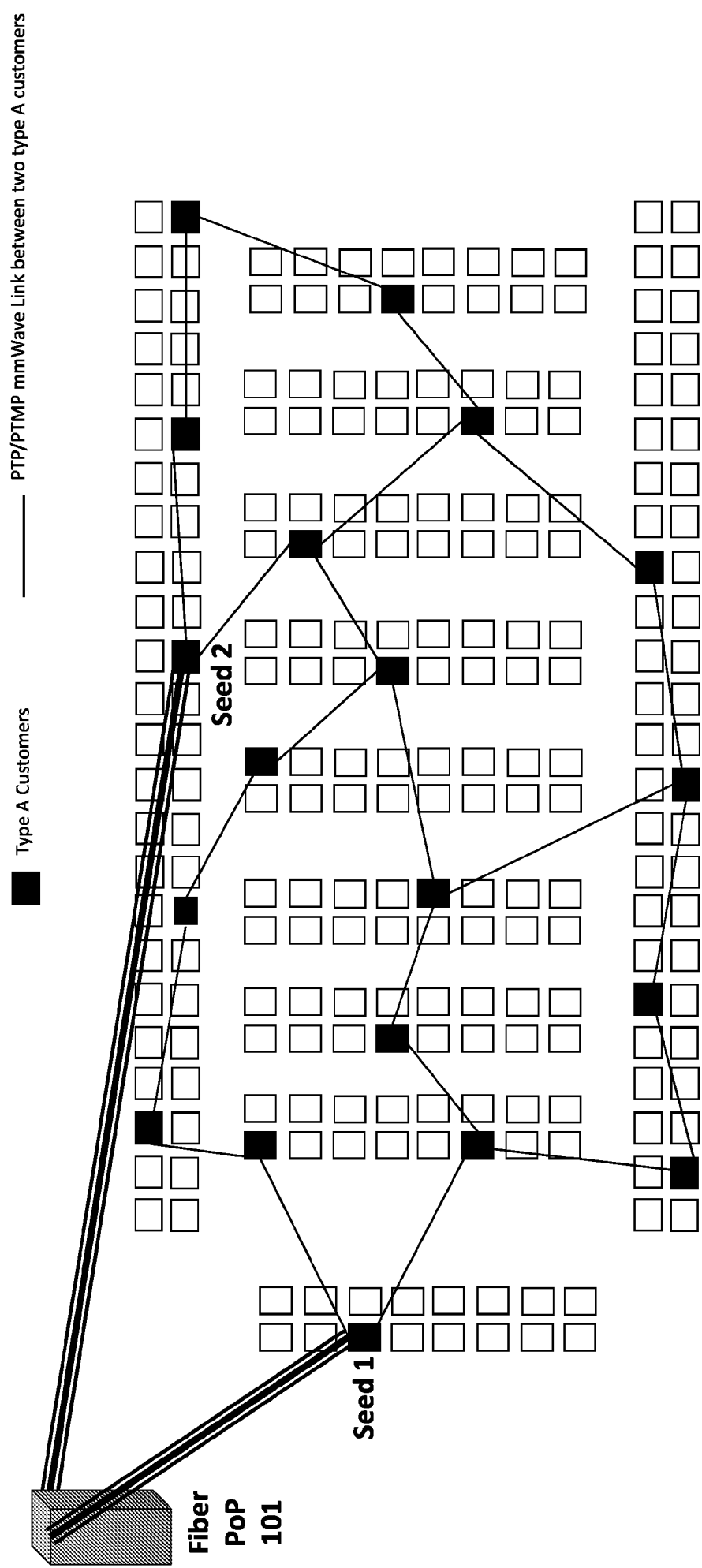
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Communication network 100

Figure 1

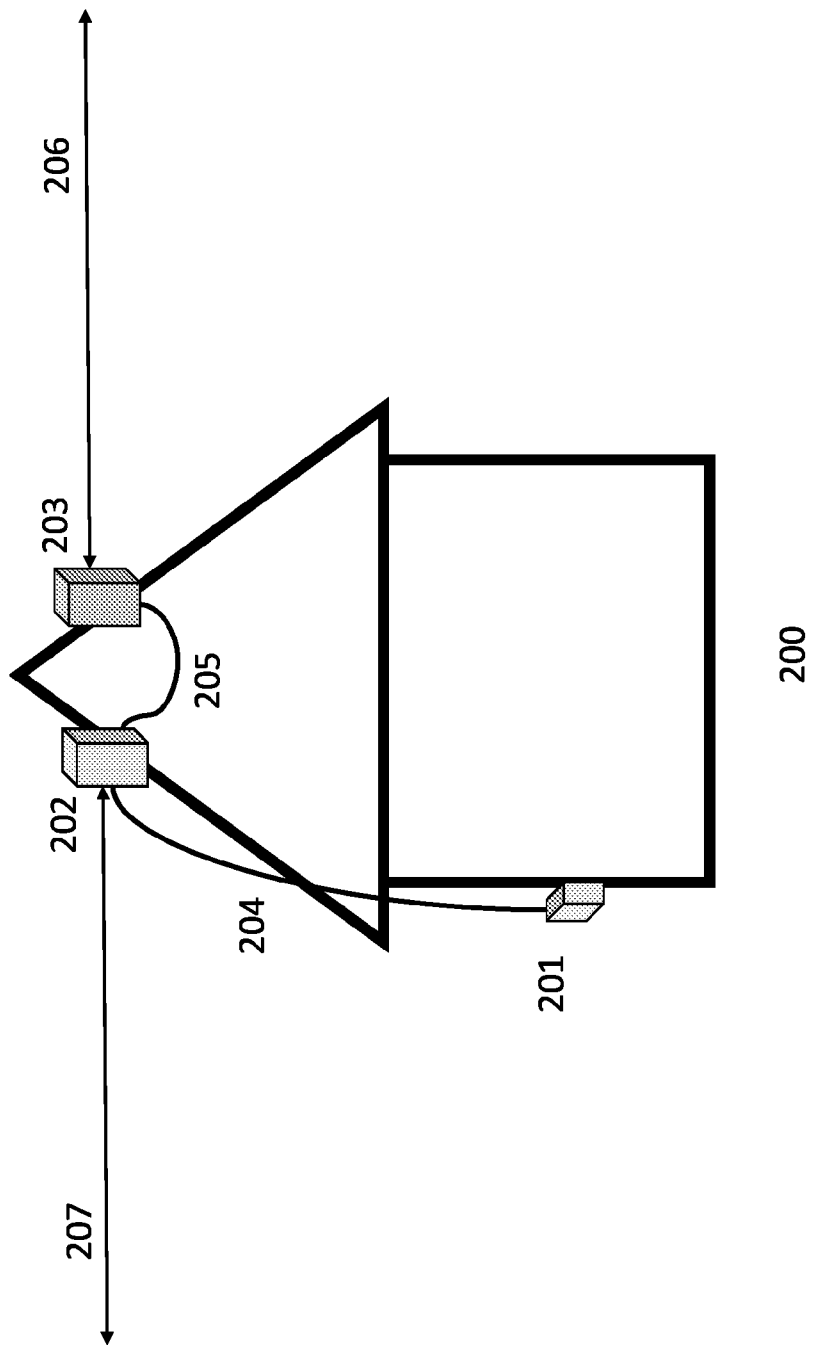


Figure 2

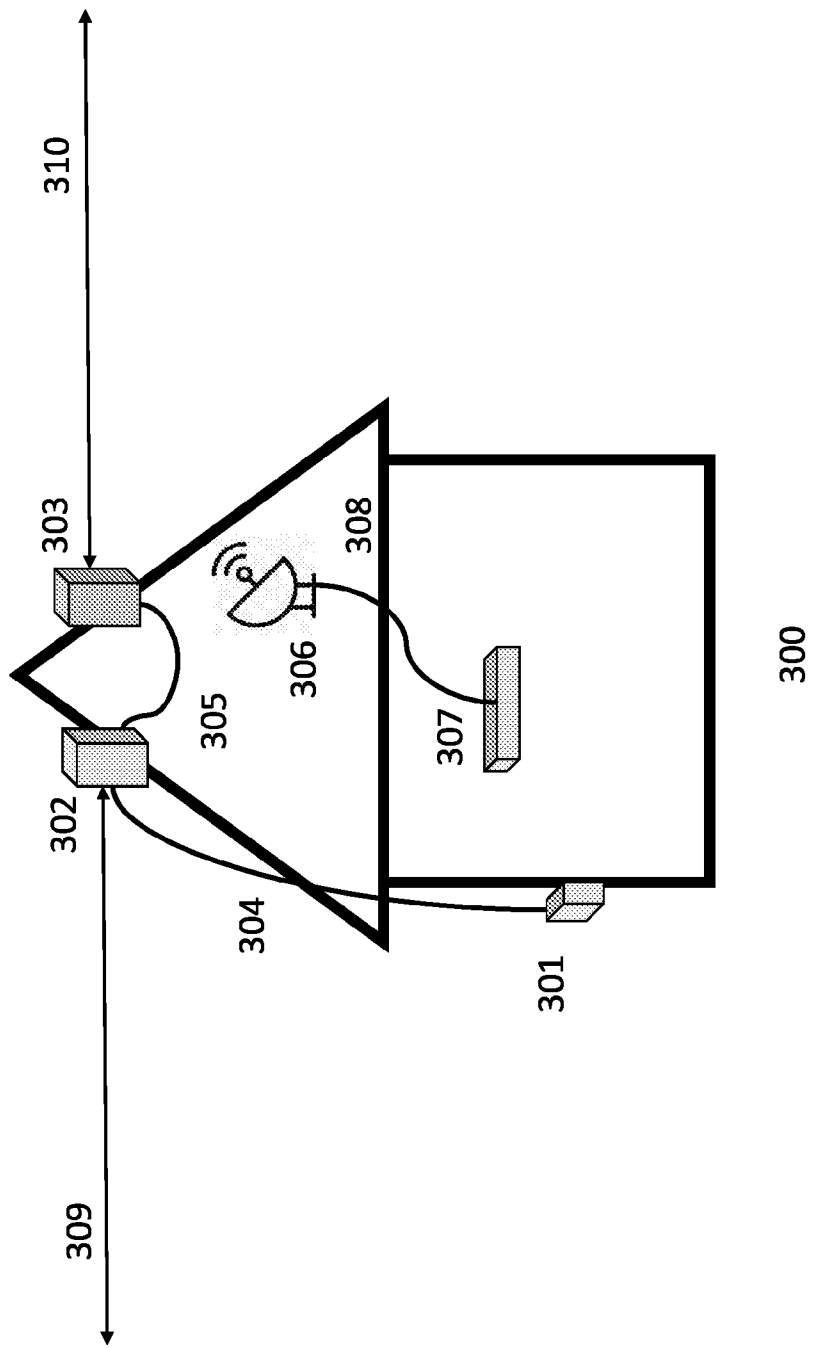


Figure 3

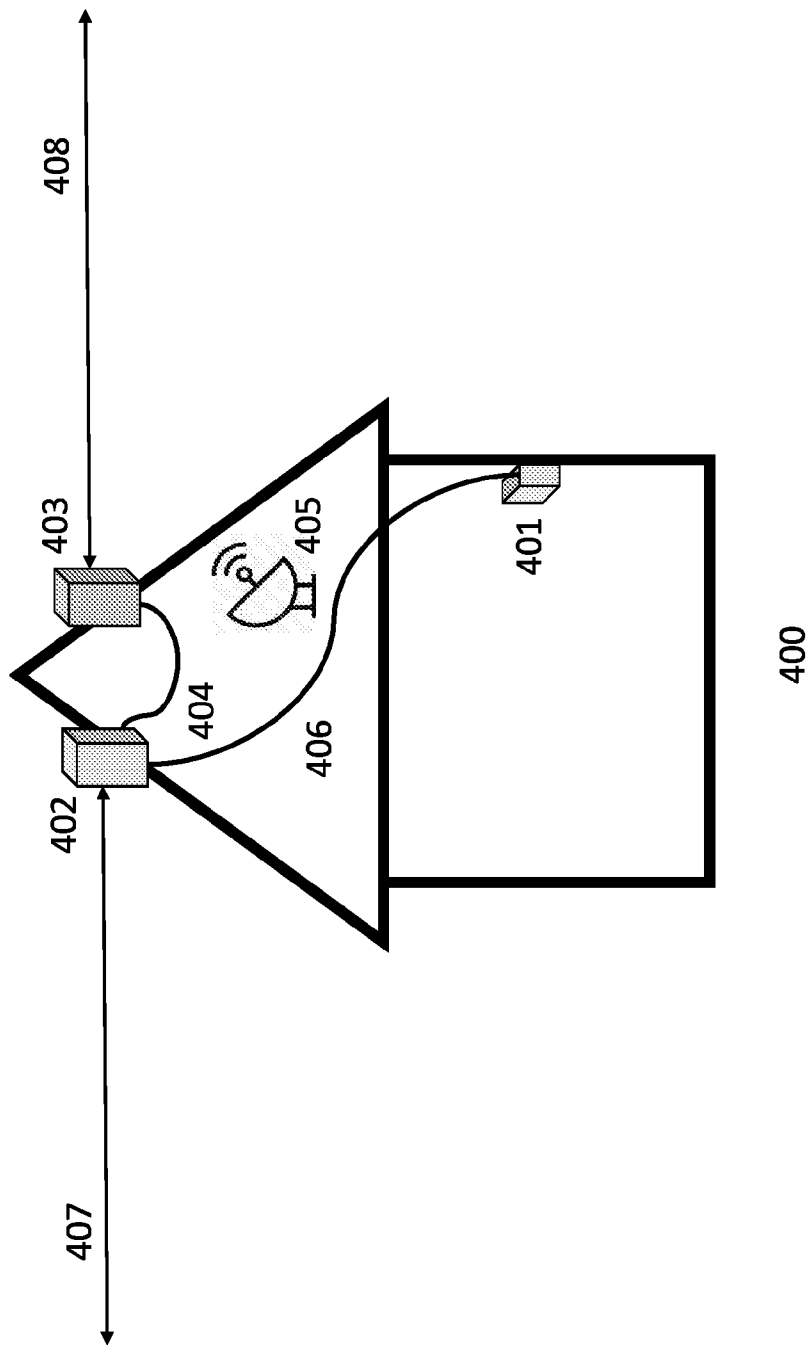


Figure 4

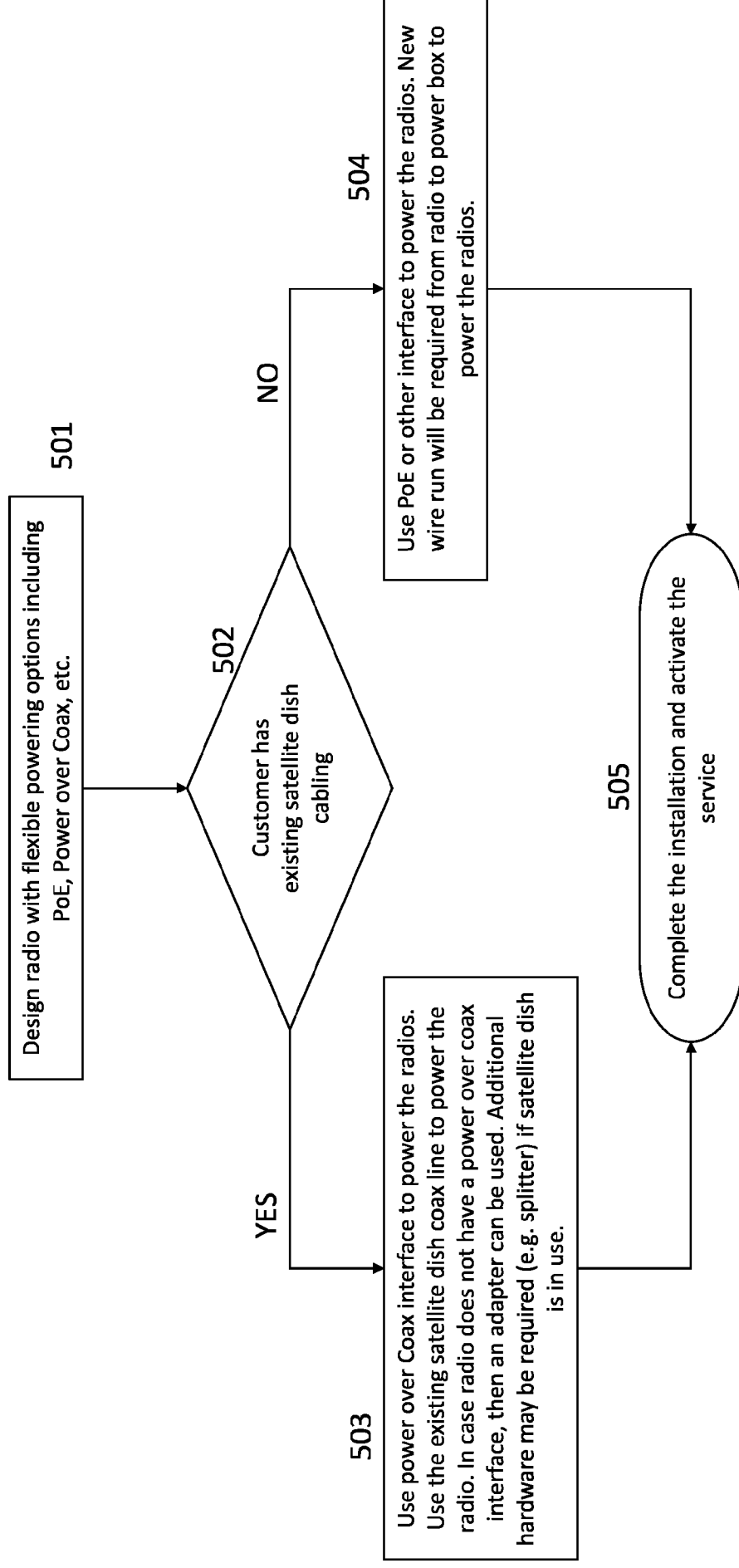


Figure 5

ABSTRACT

Methods, apparatuses, and systems relating to narrow beam communications and wireless networking are disclosed. Specifically, ways to power the wireless mesh network node radios via an existing satellite dish cable or other compatible existing cable is described that can make the process of building wireless mesh network node more efficient.

Provisional Application for United States Patent

TITLE: METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS

INVENTOR(S): Kevin Ross, Lehi, UT 84043

Muhammad A. Naim, South Jordan, UT 84095

BACKGROUND

[0001] The present disclosure, for example, relates to wireless networks and communications including, but not limited to, broadband internet services to end user, security and/or automation systems, and more particularly to narrow beam mesh networking and related operations and techniques.

[0002] Wired and wireless networking and communications systems are widely deployed to provide various types of communication and functional features, including but not limited to those for security and automation, and/or others. These systems may be capable of supporting communication with a user through a communication connection or a system management action.

[0003] Current wireless mesh networks design approaches face many challenges. Due to relatively short length of a wireless link mainly due to use of millimeter wave (mmWave) spectrum, a large number of hops of point-to-point (ptp) or point-to-multipoint (ptmp) links are required to connect end customer to the core network or data center. This results in requirement of large number of wireless mesh network nodes to cover a medium to large size coverage area. Each wireless mesh network node hosting a single or multiple ptp/ptmp

mm Wave communication equipment requires uninterrupted supply of power for operations. Almost every wireless mesh network node not only carries data of its own end user (customer at the node location) but also carries data of other wireless mesh network nodes. Hence interruption in power supply to one wireless mesh network node can impact multiple wireless mesh network nodes. This requires backup power supply and cable run from radios to the power supply unit for every key node of the wireless mesh network. Using an existing cable to power the wireless mesh network radios can result in CAPEX savings for the wireless mesh network operator due to reduction in installation time and cost. Thus, there exists multiple needs in the art for improved systems and methods relating to wireless communication mesh network design.

OVERVIEW

[0004] The present system and methods relate to narrow beam mesh networks, associated systems, and operations relating to network communication, including, in some embodiments, adjustments and modifications. The present systems and methods may facilitate designing, operating and/or adjusting/modifying wireless networking communications. In some embodiments, the present systems and methods relate to and account for wireless communication nodes with capability of establishing point-to-point extremely narrow beam communication link, point-to-point steerable extremely narrow beam communication link, point-to-point multiple extremely narrow beam communication link, point-to-multipoint narrow beam communication links, ultra-wide-band point-to-point communication link and combination of point-to-point and point-to-multipoint communication links, among other things.

[0005] In one embodiment, after identification of the location of a wireless communication mesh network node, the construction of the actual site/wireless mesh network node may involve installation of the antenna mounts, installation of multiple ptp/ptmp or other types of radios on the rooftop (outdoor) of the building, running electric cable from the radios to the power supply box, installing power supply box, alignment of the radios antennas to ensure line-of-sight (if applicable), and other electrical work, indoor router installation and setup, etc. These steps can be performed in multiple different orders.

[0006] In one embodiment, in case the site or the building has an existing satellite dish that may or may not be operational, then instead of running a new electric cable to power the radios, the existing coaxial cable can be used to power the radios if radios are designed to have a coaxial interface for supply power. In case the radio does not have coaxial interface to power the radio over the existing coaxial cable of the satellite dish then an adaptor can be used that can covert the interface used by the radio for getting electric power to coaxial or a satellite dish cable compatible interface. This can save installation time for the wireless mesh network node and can result in OPEX savings for wireless mesh network operator.

[0007] The foregoing has outlined rather broadly the features and technical advantages of examples according to this disclosure so that the following detailed description may be better understood. Additional features and advantages will be described below. The conception and specific examples disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same procedures of the present disclosure. Characteristics of the concepts disclosed herein including their organization and method of operation together with associated advantages will be better understood from the following description when considered in connection with the accompanying figures. Each of the

figures in provided for the purpose of illustration and description only, and not as a definition of the limits of the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] A further understanding of the nature and advantages the present disclosure may be realized by reference to the following drawings.

[0009] **Figure 1.** Figure 1 shows a diagram relating to wireless networking and communication systems, in accordance with various aspects of this disclosure;

[00010] **Figure 2.** Figure 2 shows designs illustrating exemplary methods relating to wireless networking and communication systems, in accordance with various aspects of this disclosure;

[00011] **Figure 3.** Figure 3 shows designs illustrating exemplary methods relating to wireless networking and communication systems, in accordance with various aspects of this disclosure;

[00012] **Figure 4.** Figure 4 shows designs illustrating exemplary methods relating to wireless networking and communication systems, in accordance with various aspects of this disclosure;

[00013] **Figure 5.** Figure 5 shows designs illustrating exemplary methods relating to wireless networking and communication systems, in accordance with various aspects of this disclosure;

DETAILED DESCRIPTION

[00014] Current wireless mesh networks design approaches face many challenges. Due to relatively short length of a wireless link mainly due to use of mmWave spectrum, a large number of hops of ptp or ptmp links are required to connect end customer to the core network or data center. This results in requirement of large number of wireless mesh network nodes to cover a medium to large size coverage area. Each wireless mesh network node hosting a single or multiple ptp/ptmp mm Wave communication equipment requires uninterrupted supply of power for operations. Almost every wireless mesh network node not only carries data of its own end user (customer at the node location) but also carries data of other wireless mesh network nodes. Hence, as a part of site installation, an electrical cable line is run from radios (mounted on the customer's roof top) to the power supply box installed at the customer location. In case of an existing cable line (e.g. due to an existing satellite dish), running a new cable line can be avoided. Thus, there exists multiple needs in the art for improved systems and methods relating to wireless communication mesh network design.

[00015] Referring to Figure 1, the communication network 100 based on ptp/ptmp wireless mesh links is shown. Communication network 100 has fiber PoP (point of presence) 101 that represents a location with the availability of fiber/dark fiber or very high capacity backbone links to the CORE network or data center. Another consideration in the selection of site 101 is the height of the building and typically multistory buildings that provide line-of-sight to a large surrounding area are selected. Figure 1 also shows that fiber PoP 101 has two high capacity narrow beam width nodes that provide capability of establishing two ptp/ptmp high capacity bi-directional links between fiber PoP 101 and

seed nodes 1 and 2. All wireless mesh network nodes are represented by solid black squares and white squares represent those homes in the neighborhood that are not selected (at least initially) to be part of wireless mesh communication network 100. Seed nodes 1 and 2 are special wireless mesh network nodes. Seed nodes 1 and 2 host two types of communication equipment: 1) for supporting ptp/ptmp mmWave wireless links, represented in figure 1 with thin black line, with other regular wireless mesh network nodes called type A customer nodes and/or seed homes and 2) for supporting high capacity ptp/ptmp mmWave links, represented in figure 1 with triple compound lines, with the fiber PoP node to provide connectivity to the CORE network. Communication network 100 of figure 1 shows two seed homes and two high capacity ptp/ptmp mmWave connecting these two seeds homes to the fiber PoP 101. However, in general, the communication network 100 can consist of any positive integer number of seed homes and corresponding number of links for connectivity to fiber PoP 101 or multiple fiber PoPs. Figure 1 also shows seventeen type A customers and two seed home nodes in the communication network 100. However, in general, communication network 100 can have any positive integer number of wireless mesh network nodes including seed homes can type A customers.

[00016] The wireless mesh network communication equipment (antennas, RF and digital circuitry, routers, switches, etc.) deployed on the type A customer nodes and seed homes are typically powered using the same power source that provides power to the home hosting the wireless mesh network node. Moreover, there is also a back up power supply that can provide power for some time (usually 1~2 hours) in an event of power outage to the home hosting a wireless mesh network node.

[00017] Referring to Figure 2, a type A customer node 200 is shown. In one embodiment, installation of a type A customer node 200 may involve doing the site survey for checking the line-of-sight profile between type A customer node 200 and a second neighbor customer node (not shown in the Figure 2) in the direction represented by the bi-directional arrow 207, for checking the line-of sight profile between type A customer node 200 and a third neighbor customer node (not shown in the Figure 2) in the direction represented by the bi-directional arrow 206, installing/mounting the radios 202 and 203, interconnecting the radios 202 and 203 via cable 205, powering the radio 202 from power supply box 201 via the cable 204, indoor part of the installation, etc. It should be noted that Figure 2 shows a simplified picture of the type A customer node. In other embodiments, type A customer node 200 can have more than 2 ptp/ptmp links, more than two radios and a different number of cables interconnecting and powering the radios. As shown in Figure 2, powering the radio 202 involves running a cable from radio 202 installed on the customer rooftop to the power supply box installed and attached to the outside of the exterior wall or inside the exterior wall of the customer building. Depending on the distance between the power supply box, the radio installed on the rooftop and other constraints, this step may represent a noticeable part of the site installation. It should be noted that customer node 2 in Figure 2 is described as a type A anchor home. However, in other embodiments, 200 can represent a seed home or any other private infrastructure where wireless mesh network node radios are installed.

[00018] Referring to Figure 3, a wireless mesh communication node 300 is shown that is similar to the wireless mesh communication node 200 of Figure 2. In one embodiment, installation of a wireless customer node 300 may involve doing the site

survey for checking the line-of-sight profile between wireless mesh communication node 300 and a second neighbor customer node (not shown in the Figure 3) in the direction represented by the bi-directional arrow 309, for checking the line-of sight profile between wireless communication node 300 and a third neighbor customer node (not shown in the Figure 3) in the direction represented by the bi-directional arrow 310, installing/mounting the radios 302 and 303, interconnecting the radios 302 and 303 via cable 305, powering the radio 302 from power supply box 301 via the cable 204, indoor part of the installation, etc. In addition, the wireless mesh network node also has an independent satellite dish 306 and a coaxial cable (or other satellite dish compatible cable) 308 that is connected to set top box 307 that provides power to the LNB (low noise block down-converter) of the satellite dish. In the context of Figure 3, the radios for building the wireless mesh network node are installed independent of the any other types of radios such as satellite dish that are already present on the roof top of the customer before the installation of the wireless mesh network nodes. In such cases, cables used for the satellite dish can be utilized for installation of the wireless mesh nodes as discussed in the paragraphs below.

[00019] Referring to Figure 4, a wireless mesh network node 400 is shown that is similar to the wireless mesh network node 300 described in Figure 3. However, instead of performing a completely independent installation of the wireless mesh network node, an existing cable (e.g. coax) from a satellite dish or other existing radio is used to connect radios to the power supply. Figure 4 shows that in one embodiment, installation of a wireless customer node 400 may involve doing the site survey for checking the line-of-sight profile between wireless mesh communication node 400 and a second neighbor customer node (not shown in the Figure 4) in the direction represented by the bi-directional

arrow 407, for checking the line-of sight profile between wireless communication node 400 and a third neighbor customer node (not shown in the Figure 4) in the direction represented by the bi-directional arrow 408, installing/mounting the radios 402 and 403, interconnecting the radios 402 and 403 via cable 404. However, the cable 406 originally used to connect the set top box to the satellite dish (or for powering a different existing radio) is used to power the radio 402 which is the primary radio of the wireless mesh network node 400 and the radio 402 via daisy chain cabling powers the secondary radio 403. The coaxial (or other satellite dish compatible cable) cable 406 is then connected to the power supply box 401 and the cable 406 is used to not only provide power the primary radio 402 but also to provide data connectivity to the end customer. In the indoor part of the installation, another cable can be used to connect the indoor router to the power supply box to indirectly connect the router to the coaxial cable carrying data for the end user along with providing power to the wireless mesh network radios. The figure shows that existing satellite cable 406 is used to carry power and data for the radio 402 only. In a different embodiment, cable 406 can provide power to both primary and secondary radios by using splitter/switch. A splitter/switch can also be used if the existing satellite dish is in used. In Figure 4, the radios 402 and 403 have coaxial interface that is used to provide power via existing satellite cable 406. However, in case the radios do not have coaxial port/interface, then an adaptor can be used to convert the power supply port/interface of the wireless mesh network radios to the existing satellite dish/ radio compatible port/interface. Figure 4 shows only 2 wireless mesh network radios and a single existing satellite dish on the wireless mesh network node 400. However, in general, the wireless mesh network node can house

N number of wireless mesh network radios and M number of existing satellite/ radios along with their cables where M and N are integers greater than zero.

[00020] Referring to Figure 5, a flow chart of the process involving the use of existing cable from satellite dish or other radio during the wireless mesh network node installation is described. The process starts with the step 501 which involves adding a coaxial port/interface to the wireless mesh network radios, in order to enable the wireless mesh network node radios to be powered via a coaxial cable or other compatible cable, in addition to the regular port or interface such as PoE/USB, etc. that is typically used to provide power to the wireless mesh network radios. Next, in step 502, it is determined that whether the customer location selected for the construction of the wireless mesh network node has an existing satellite dish along with cable or any other existing radio cable that can be used to power the wireless mesh network radios or not. In case there exist a satellite dish/cable or other radio cable the process moves to step 503. In step 503, existing cable used originally for the satellite dish installation or other existing radio is used to power the wireless mesh network radio by connecting the existing cable to the power input port of the wireless mesh network radio. In case, more than one wireless mesh network radios are required to be powered, then a splitter or other devices can be used. Moreover, if the existing satellite dish is not in use, then the existing satellite dish or radio can be left unplugged. However, if the satellite dish is in used then Multimedia over Coax Alliance (MoCA) switches or other coaxial cable compatible switches can be used to simultaneously power the wireless mesh network radios along with satellite dish and carry data between the end user and the wireless mesh network or satellite dish network. In case the radio does not have coaxial interface to power the radio over the existing coaxial cable

of the satellite dish then an adaptor can be used that can convert the interface used by the radio for getting electric power to coaxial or a satellite dish cable compatible interface. This can save installation time for the wireless mesh network node and can result in OPEX savings for wireless mesh network operator. In case of absence of an existing satellite dish or radio, the process moves from step 502 to 504 where the new cable is run to power the radios and provide data connectivity between the wireless mesh network and the end user. Last step 505 involves completing the installation by connecting the cables to the power supply box and turning on the service inside the home by connecting the routers with mesh network and configuration of the routers. In Figure 5, the process flow involves a number of steps in a specific order. However, in different embodiment, the steps described in Figure 5 and earlier in this disclosure can occur in a different order and the process may also involve certain other steps that are not described in this current disclosure.

[00021] The concepts disclosed herein have been described in an illustrative manner, and it is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation. Obviously, many modifications and variations of the disclosed concepts are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the claims (to be added later), the disclosed concepts may be practiced otherwise than as specifically described.

Electronic Acknowledgement Receipt

EFS ID:	36616563
Application Number:	62875391
International Application Number:	
Confirmation Number:	1056
Title of Invention:	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS
First Named Inventor/Applicant Name:	Kevin Ross
Customer Number:	130085
Filer:	Jaeyoung Pak
Filer Authorized By:	
Attorney Docket Number:	Welink-00030
Receipt Date:	17-JUL-2019
Filing Date:	
Time Stamp:	18:32:06
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 140
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Information:					
3	Power of Attorney	WeLink-00030_POA_ForFiling.pdf	840097	no	3
			8ece3bd0012d3dca14842fc15f7b643c629a0330c		
Warnings:					
Information:					
4	Drawings-only black and white line drawings	WeLink-00030_Figures_21stPatent_ForFiling.pdf	212435	no	5
			2b2af62986195dea99dc2e27c1c245935b05c688		
Warnings:					
Information:					
5		Welink-00030_WeLink_21stProvisional_Patent_Final.pdf	147573	yes	12
			46c7a61972f47e6e290461904c6a78973c1f448d9		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Abstract		12	12	
	Specification		1	11	
Warnings:					
Information:					

6	Fee Worksheet (SB06)	fee-info.pdf	29558 2f1b364e0717cb42ffd91ef15b7b5efd5de77ef6	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			4517783		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	Welink-00030
		Application Number	
Title of Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Kevin		Ross			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
City	Lehi	State/Province	UT	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	4186 N Red Maple Ct					
Address 2						
City	Lehi	State/Province	UT			
Postal Code	84043	Country	US			
Inventor	2				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Muhammad	Ahsan	Naim			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
City	South Jordan	State/Province	UT	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	2676 West Constance Way					
Address 2						
City	South Jordan	State/Province	UT			
Postal Code	84095	Country	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.						

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).
--

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	Welink-00030
		Application Number	
Title of Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		

☐ An Address is being provided for the correspondence information of this application.

Customer Number	130085		
Email Address	ls3_docketing@cardinal-ip.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		
Attorney Docket Number	Welink-00030	Small Entity Status Claimed ☒	
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	5	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:
☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	130085		

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	Welink-00030
		Application Number	
Title of Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status		Remove
Application Number	Continuity Type	Prior Application Number
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.		Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Remove
			Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. ☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.
--

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	Welink-00030
		Application Number	
Title of Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	Welink-00030
		Application Number	
Title of Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1 Remove			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear				
Assignee	Legal Representative under 35 U.S.C. 117		Joint Inventor	
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest		
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:				
Name of the Deceased or Legally Incapacitated Inventor:				
If the Applicant is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Applicant:				
Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Applicant Data may be generated within this form by selecting the Add button.				Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	Welink-00030
		Application Number	
Title of Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		

Assignee	1
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Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Jaeyoung Pak/		Date (YYYY-MM-DD)	2019-07-17
First Name	Jaeyoung	Last Name	Pak	Registration Number
				72428

Additional Signature may be generated within this form by selecting the Add button.

Add

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	Welink-00030
		Application Number	
Title of Invention	METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

Remove

Given Name

Middle Name

Family Name

City

State

Country j

Kevin

Ross

Lehi

UT

US

Inventor 2

Remove

Given Name

Middle Name

Family Name

City

State

Country j

Muhammad

Ahsan

Naim

South Jordan

UT

US

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

Add

Title of Invention

METHODS FOR PROVIDING POWER TO WIRELESS MESH NETWORK RADIOS

Attorney Docket Number (if applicable)

Welink-00030

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number

☐ Firm or Individual Name

Customer Number

130085

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:

Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

Entity Status**Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29**

- ☒ Applicant asserts small entity status under 37 CFR 1.27
- ☐ Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
- ☐ No

Warning

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	Jaeyoung Pak/		Date (YYYY-MM-DD)	2019-07-17
First Name	Jaeyoung	Last Name	Pak	Registration Number (If appropriate)
				72428

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that : (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.