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Application Number: 15908108

Document Date: 02/28/2018

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		
<p>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.</p> <p>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.</p>			

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				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Francis		DACOSTA	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Santa Clara	State/Province	CA	Country of Residence ⁱ US
Mailing Address of Inventor:				
Address 1		3355 Benton Street		
Address 2				
City	Santa Clara	State/Province	CA	
Postal Code	95051	Country ⁱ	US	
Inventor 2				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Vivek		Gupta	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Bangalore	Country of Residence ⁱ	IN	
Mailing Address of Inventor:				
Address 1		3355 Benton Street		
Address 2				
City	Santa Clara	State/Province	CA	
Postal Code	95051	Country ⁱ	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. <div style="text-align: right;"> <input type="button" value="Add"/> </div>				

Correspondence Information:

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	0357-03363
		Application Number	
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Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

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

Customer Number	27197		
Email Address		<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	Evolutionary Wireless Networks		
Attorney Docket Number	0357-03363	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	27	Suggested Figure for Publication (if any)	16

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	27197		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0357-03363	
		Application Number		
Title of Invention	Evolutionary Wireless Networks			

Prefix	Given Name	Middle Name	Family Name	Suffix	<input type="button" value="Remove"/>
Registration Number					
Prefix	Given Name	Middle Name	Family Name	Suffix	<input type="button" value="Remove"/>
Registration Number					

Additional Representative Information blocks may be generated within this form by selecting the **Add** button.

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	Pending		<input type="button" value="Remove"/>		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation in part of	15728863	2017-10-10		

Prior Application Status	Pending		<input type="button" value="Remove"/>		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Claims benefit of provisional	62465526	2017-03-01		

Prior Application Status	Patented		<input type="button" value="Remove"/>		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15728863	Continuation of	14740062	2015-06-15	9819747	2017-11-14

Prior Application Status	Pending		<input type="button" value="Remove"/>		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
14740062	Claims benefit of provisional	62012196	2014-06-13		

Prior Application Status	Patented		<input type="button" value="Remove"/>		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14740062	Continuation in part of	13764008	2013-02-11	9363651	2016-06-07

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		

Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13764008	Continuation in part of	13627883	2012-09-26	8923186	2014-12-30
Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13627883	Claims benefit of provisional	61615802	2012-03-26		
Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13627883	Claims benefit of provisional	61555400	2011-11-03		
Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13627883	Claims benefit of provisional	61621926	2012-04-09		
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14740062	Continuation in part of	13571294	2012-08-09	9172738	2015-10-27
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13571294	Continuation in part of	12696947	2010-01-29	8520691	2013-08-27
Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12696947	Claims benefit of provisional	61148803	2009-01-30		
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13571294	Continuation in part of	12352457	2009-01-12	8477762	2013-07-02

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	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		

Prior Application Status		Abandoned		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
14740062	Continuation in part of	13541446	2012-07-03		
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14740062	Continuation in part of	14523778	2014-10-24	9730100	2017-08-08
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14523778	Continuation of	12625365	2009-11-24	8514852	2013-08-20
Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12625365	Claims benefit of provisional	61117502	2008-11-24		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

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) 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)	Access Code ⁱ (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		

☐ 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.

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	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		

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	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		

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

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. ☒

Organization Name MeshDynamics

Mailing Address Information For Applicant:

Address 1	3355 Benton Street		
Address 2			
City	Santa Clara	State/Province	CA
Country ⁱ	US	Postal Code	95051
Phone Number		Fax Number	
Email Address			

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

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	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		

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.

Assignee 1				
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.				
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.				

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	0357-03363
		Application Number	
Title of Invention	Evolutionary Wireless Networks		

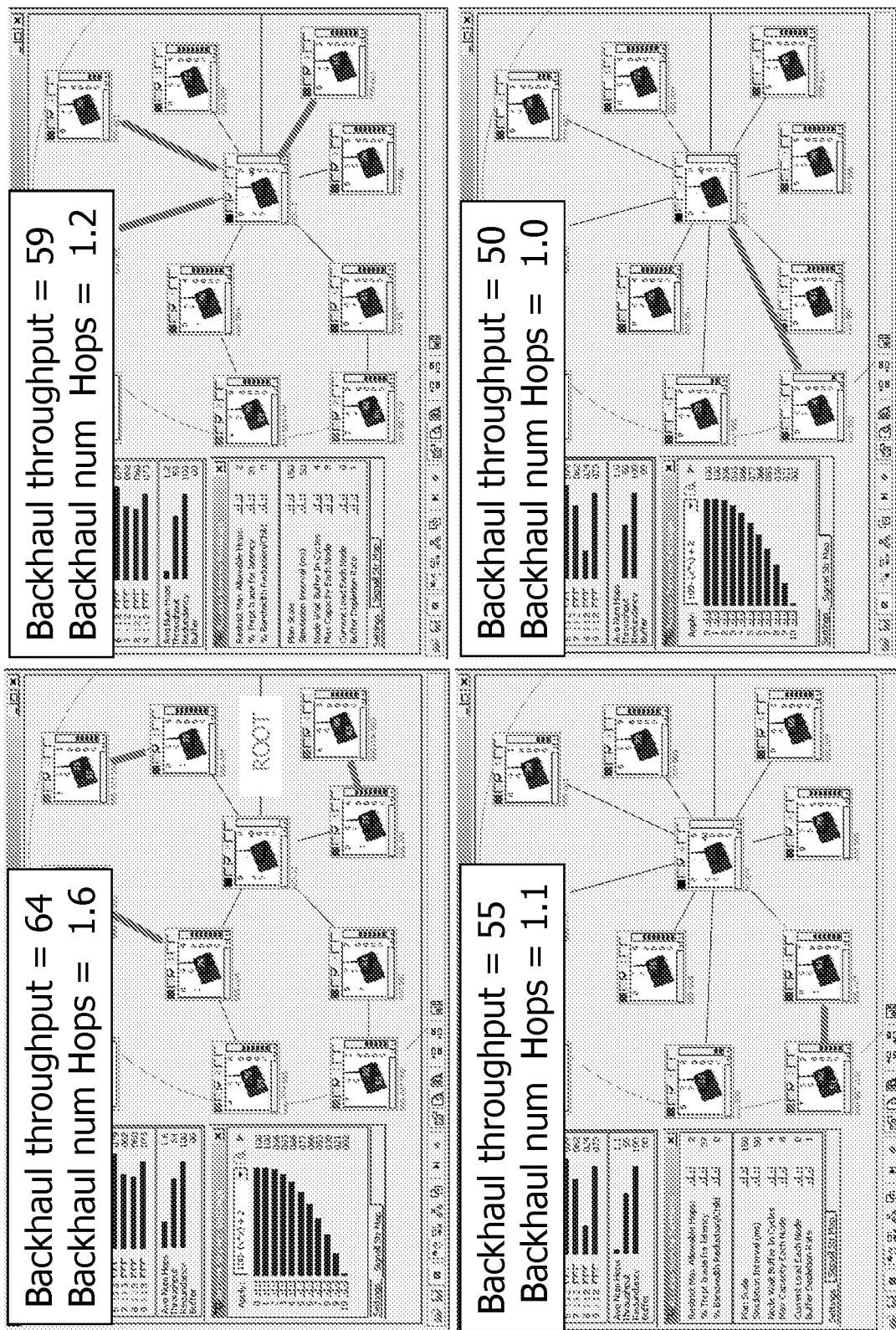
Signature:

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	/Szymon M. Gurda/			Date (YYYY-MM-DD)	
First Name	Szymon	Last Name	Gurda	Registration Number	58451
Additional Signature may be generated within this form by selecting the Add button.					



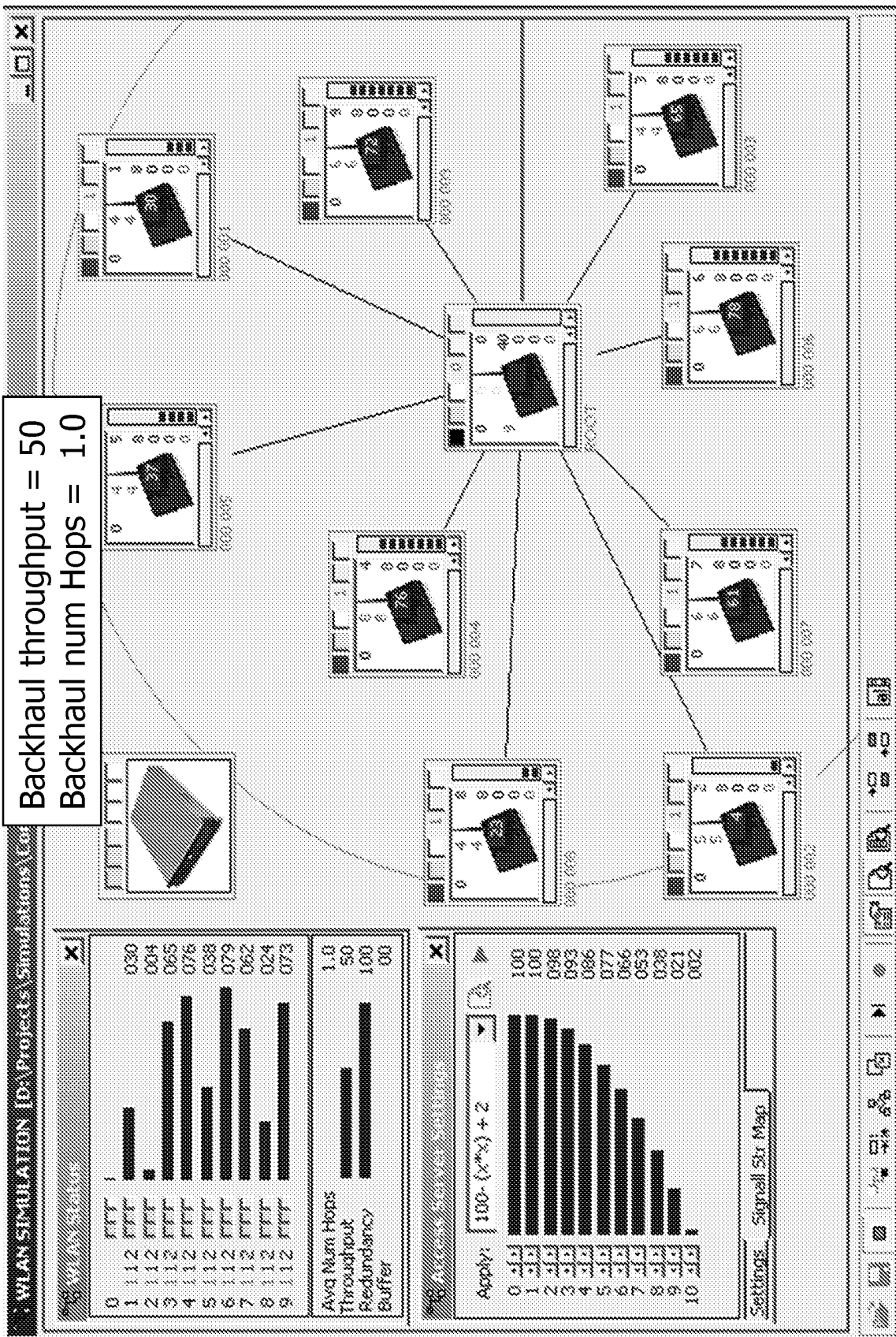


Figure 2

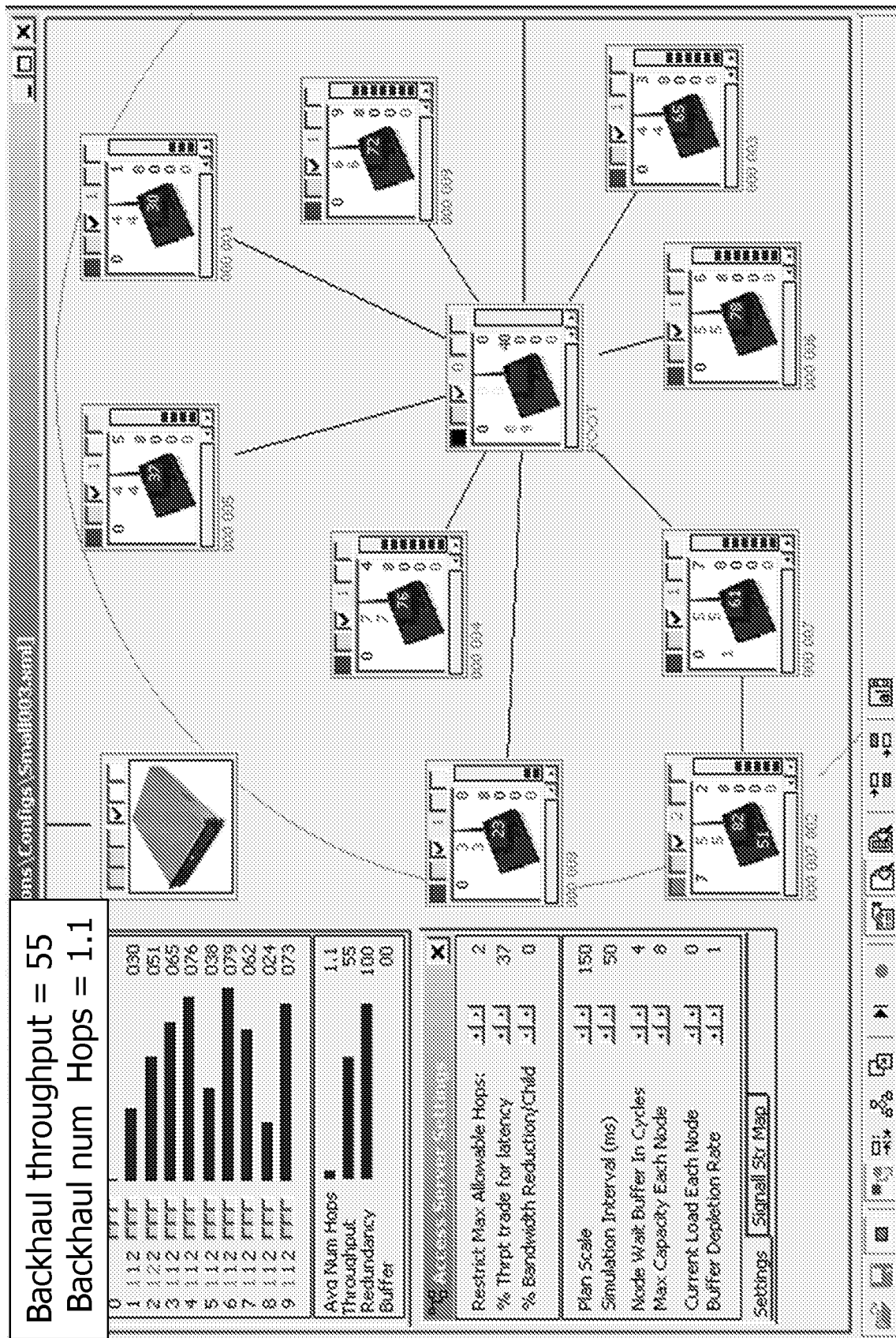


Figure 3

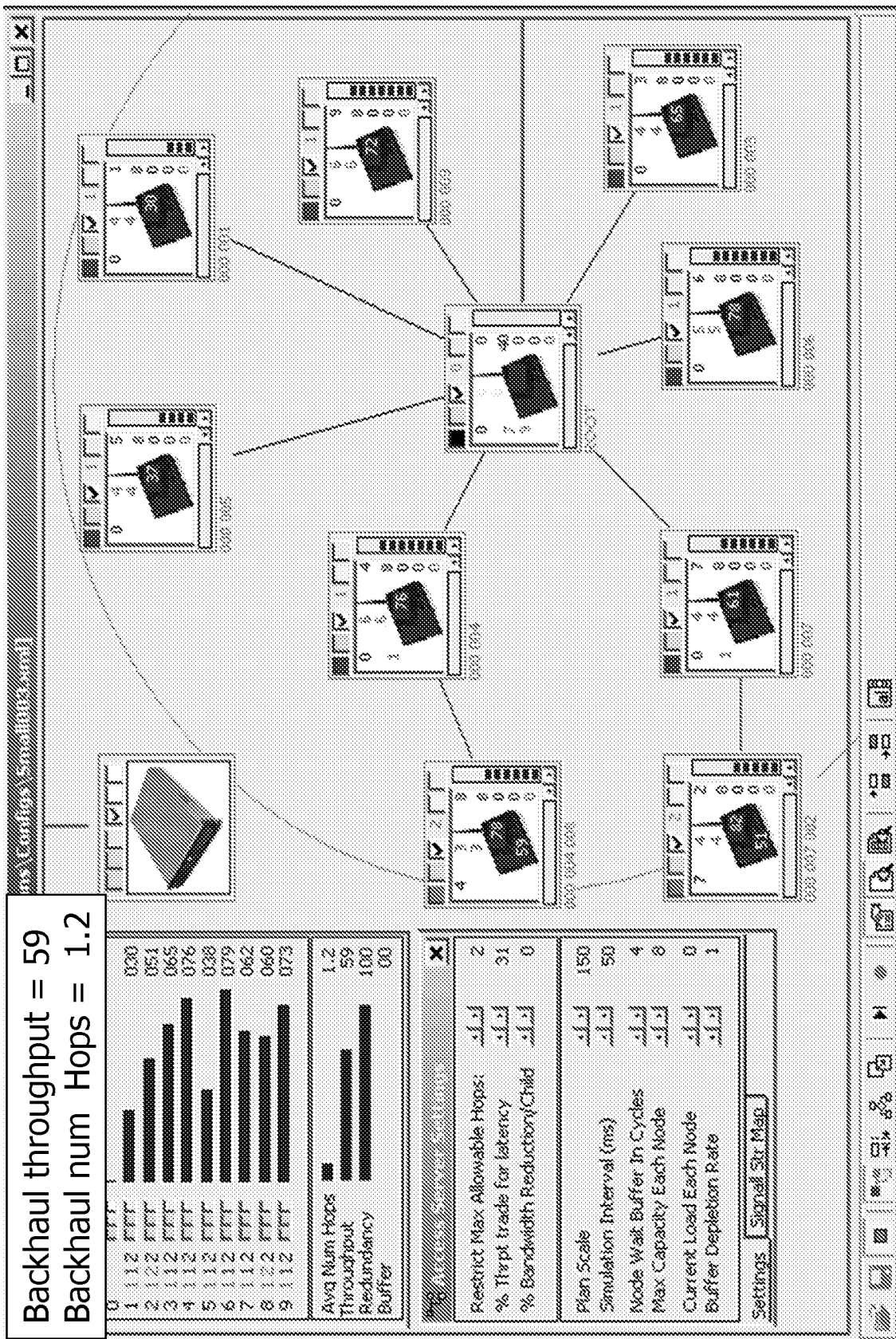


Figure 4

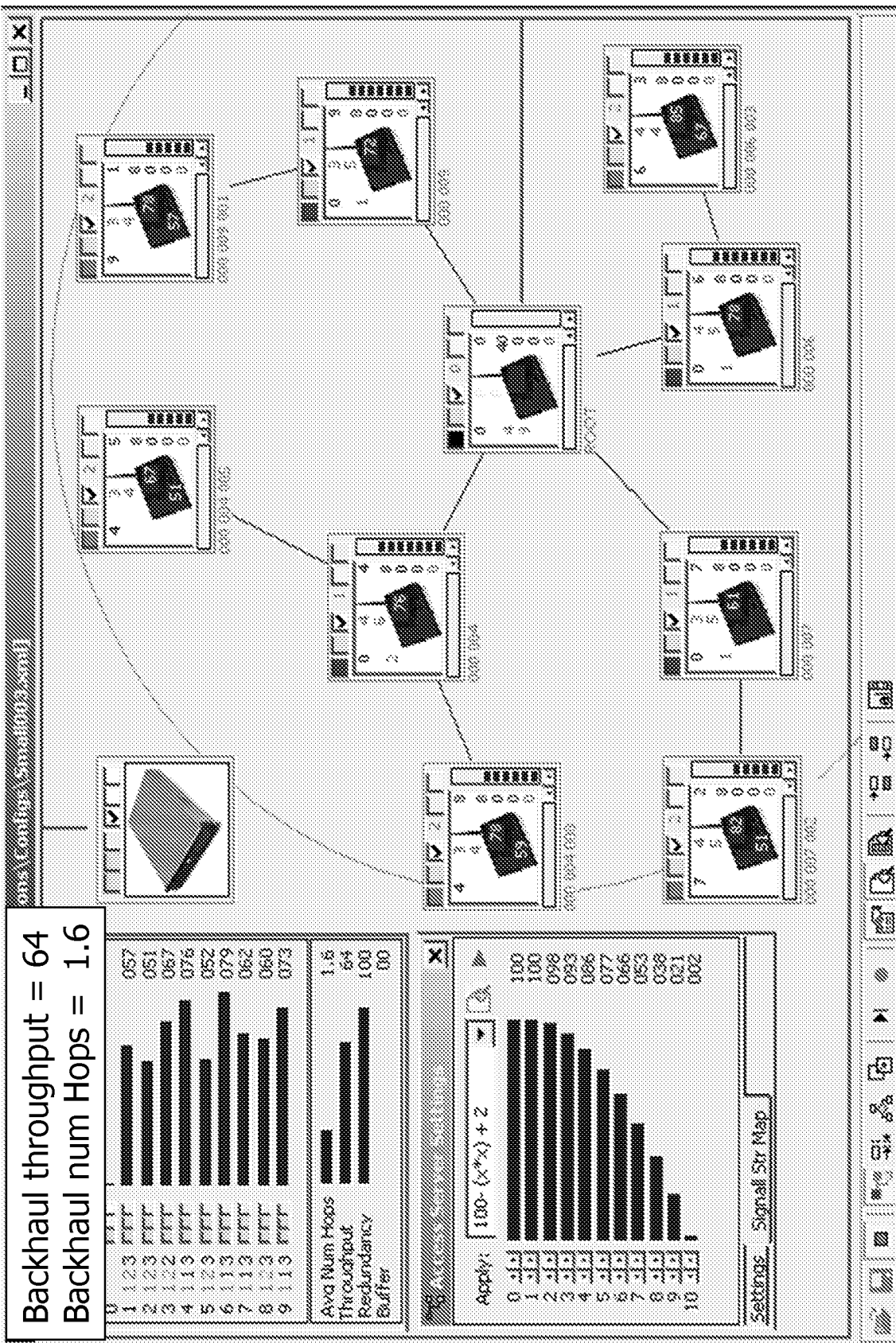
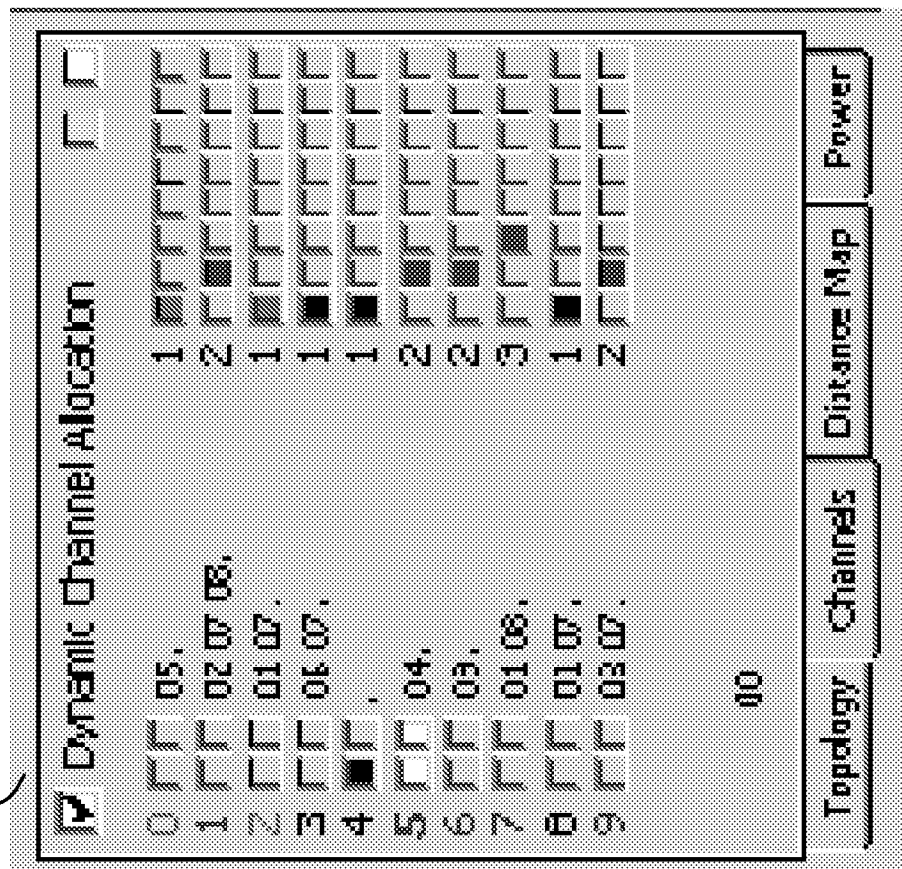


Figure 5

601



602

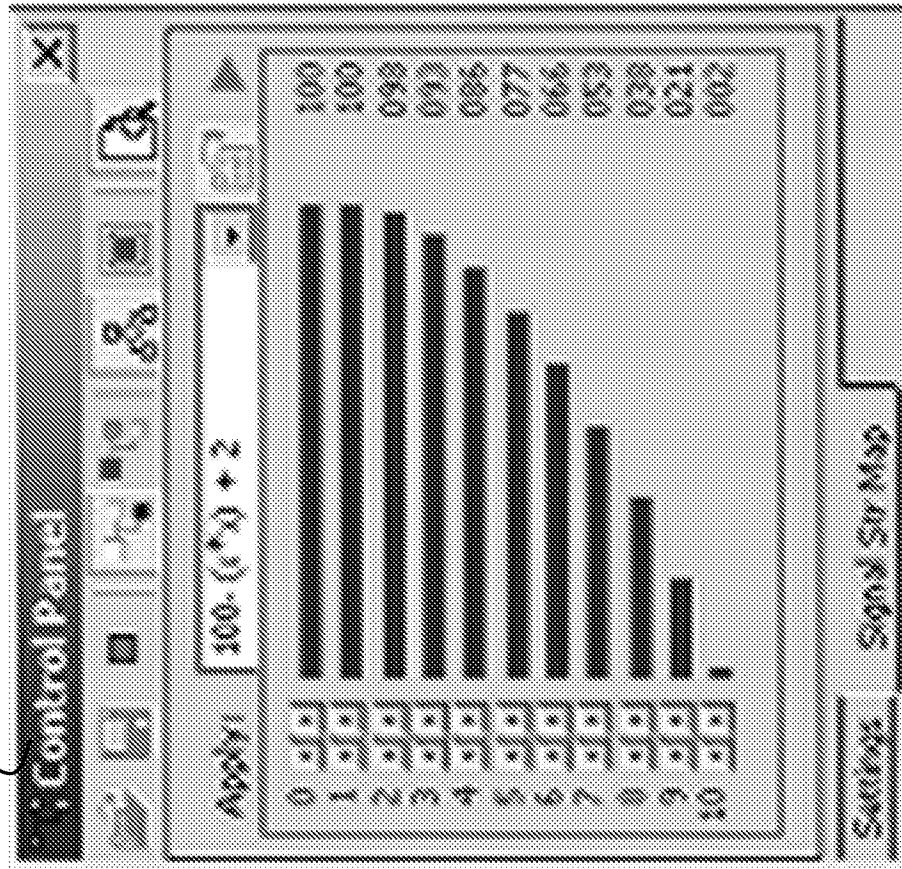
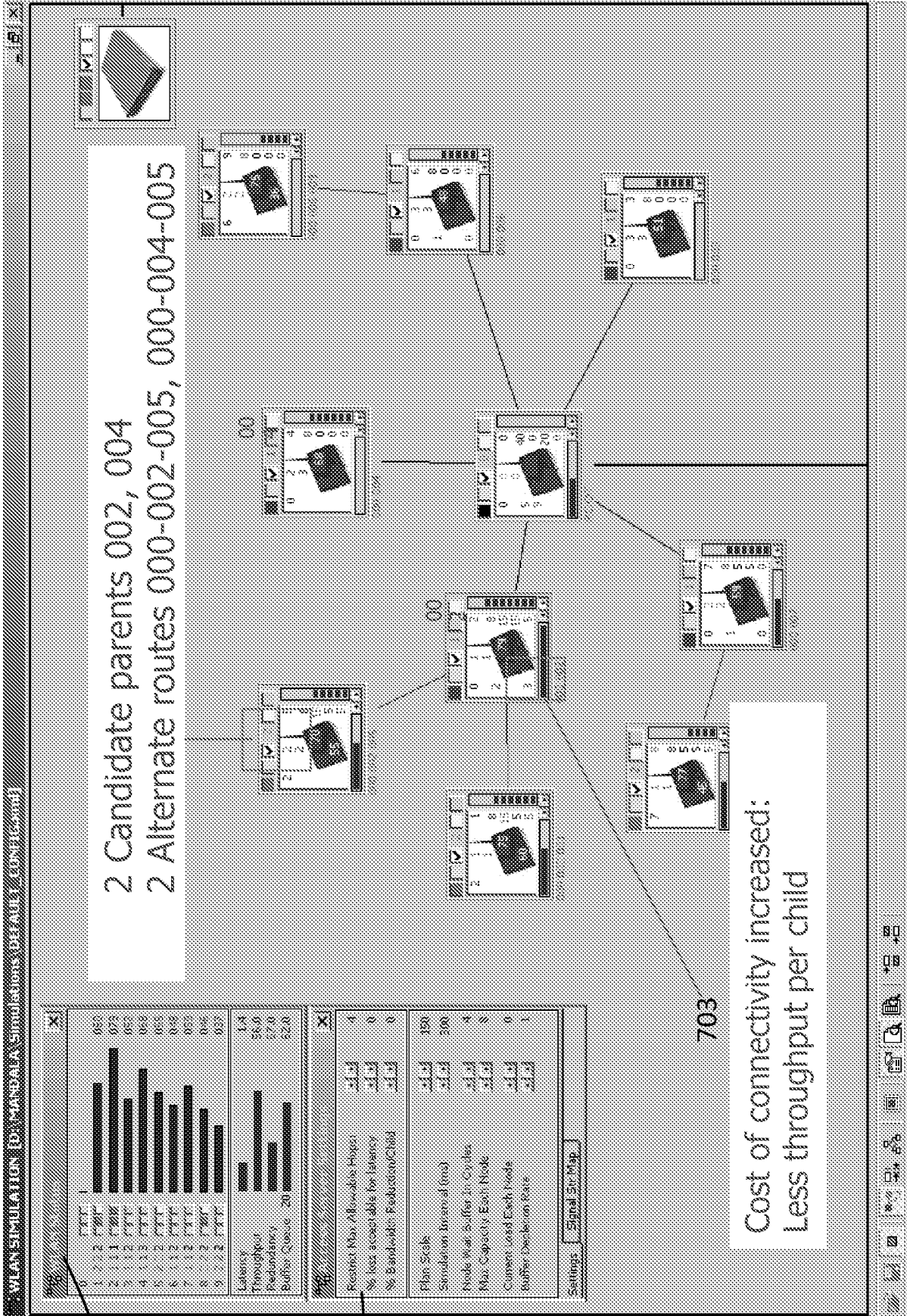


Figure 6



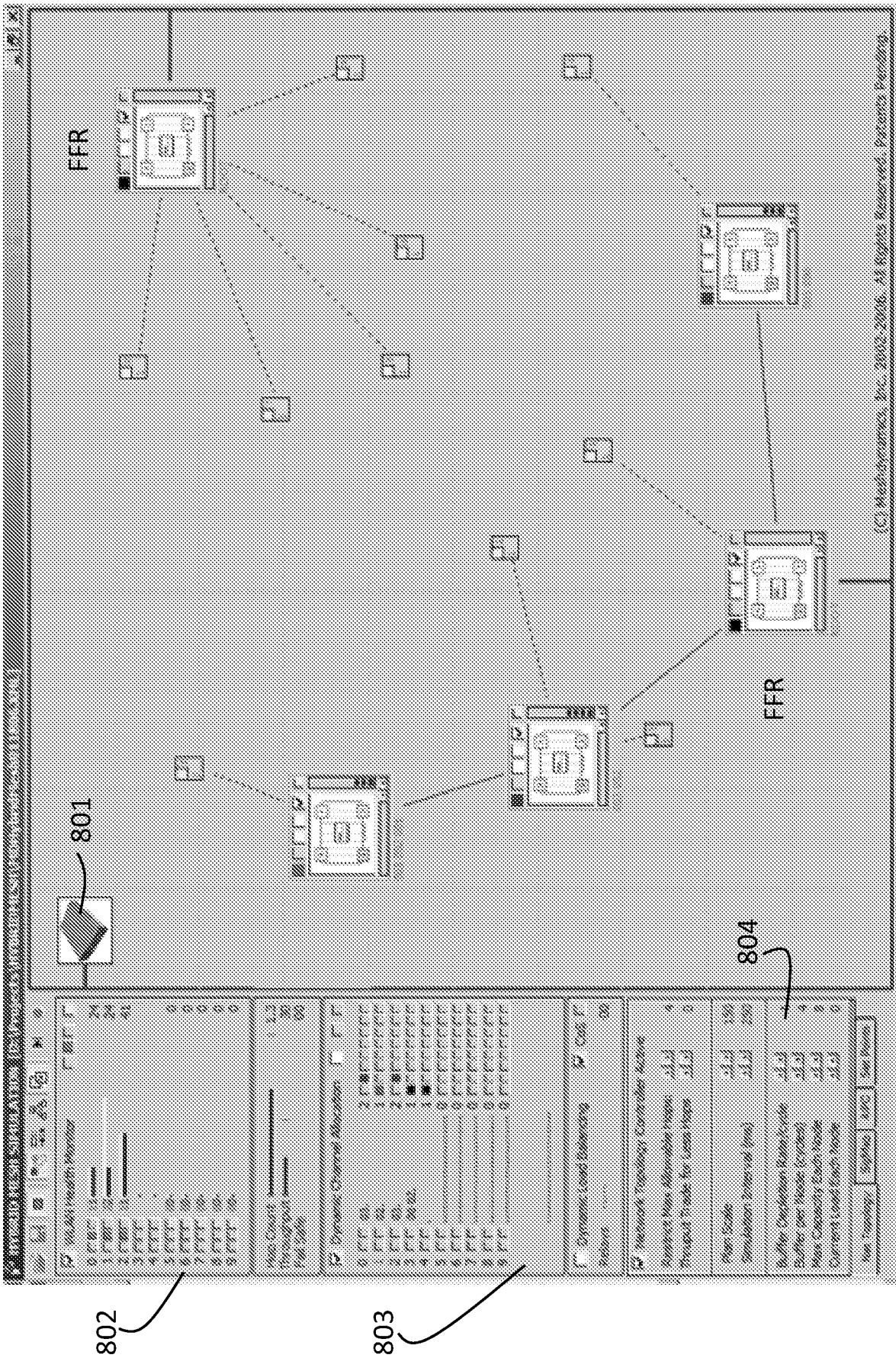


Figure 8

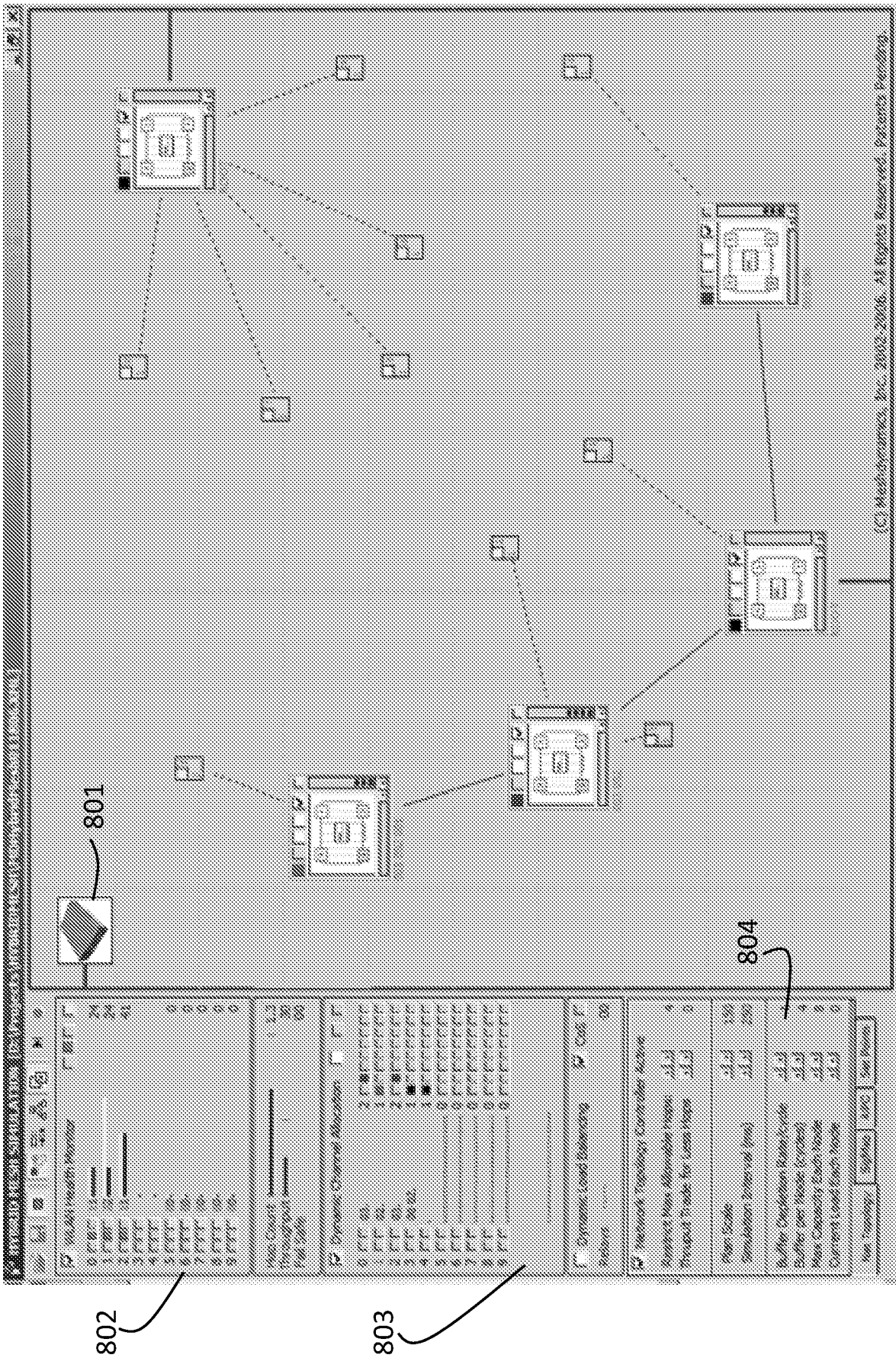


Figure 9

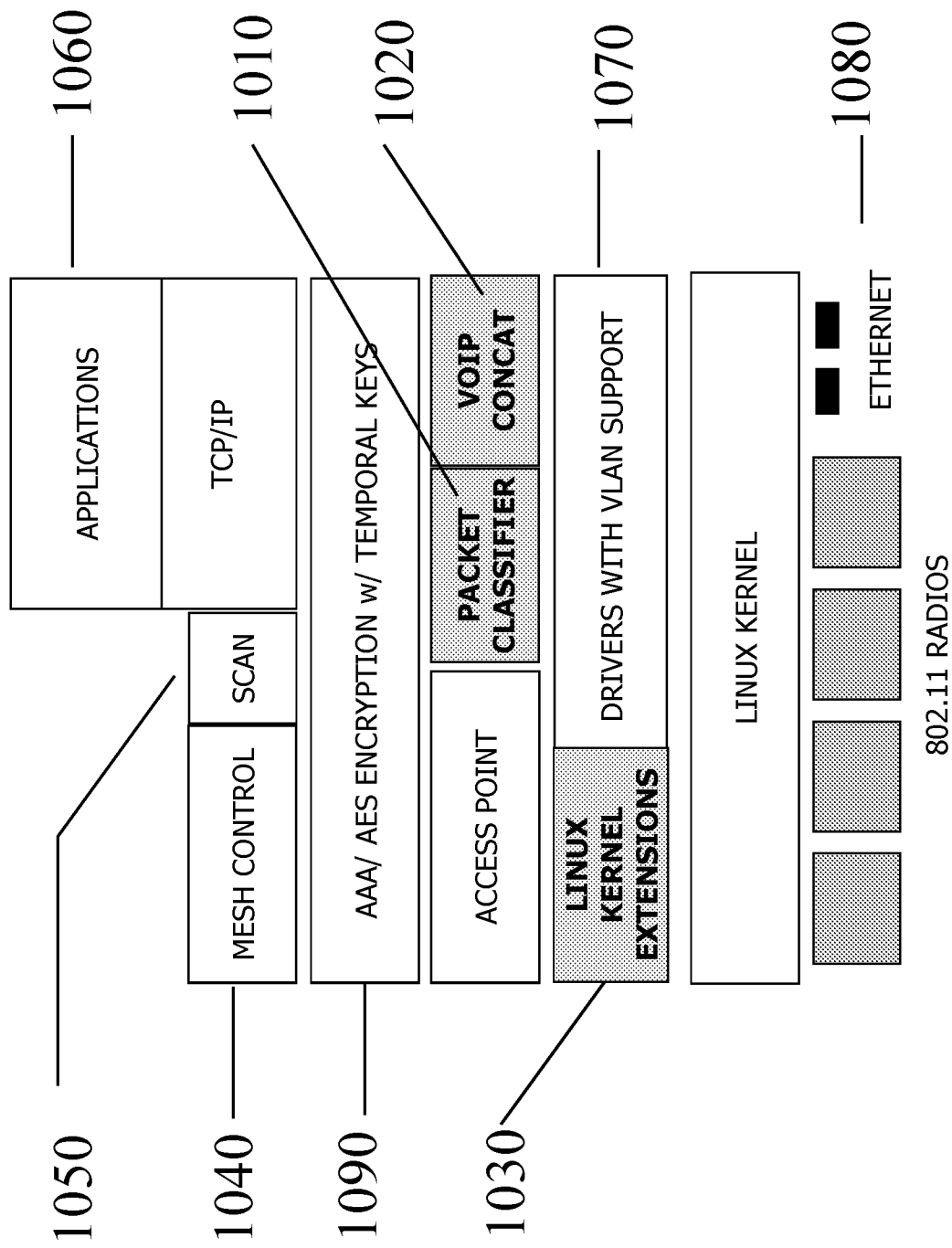
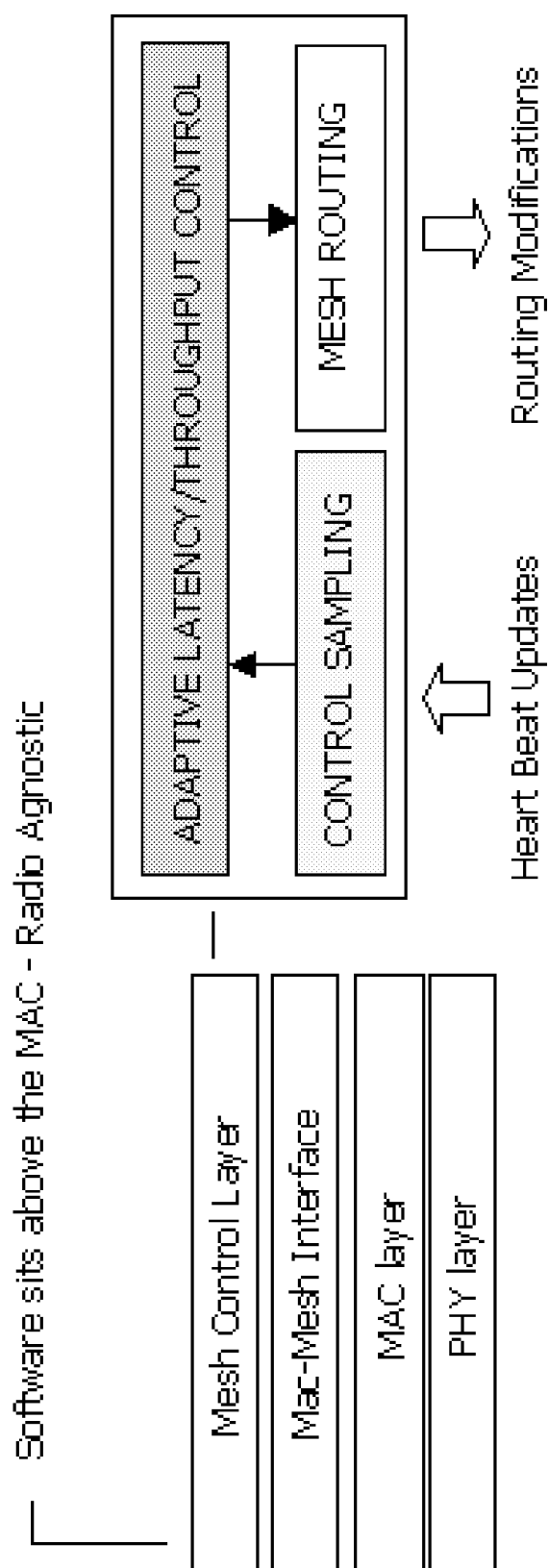


Figure 10



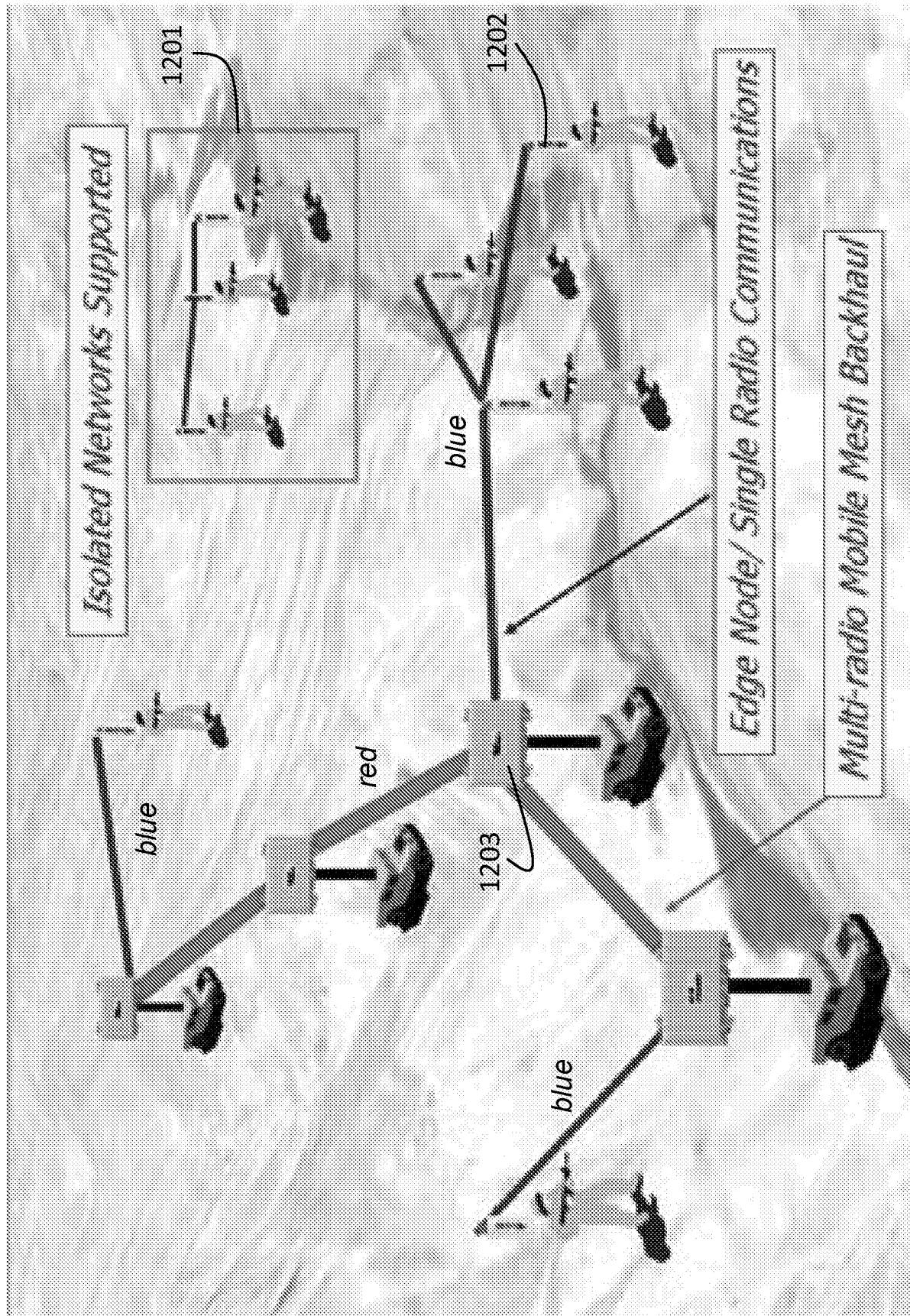
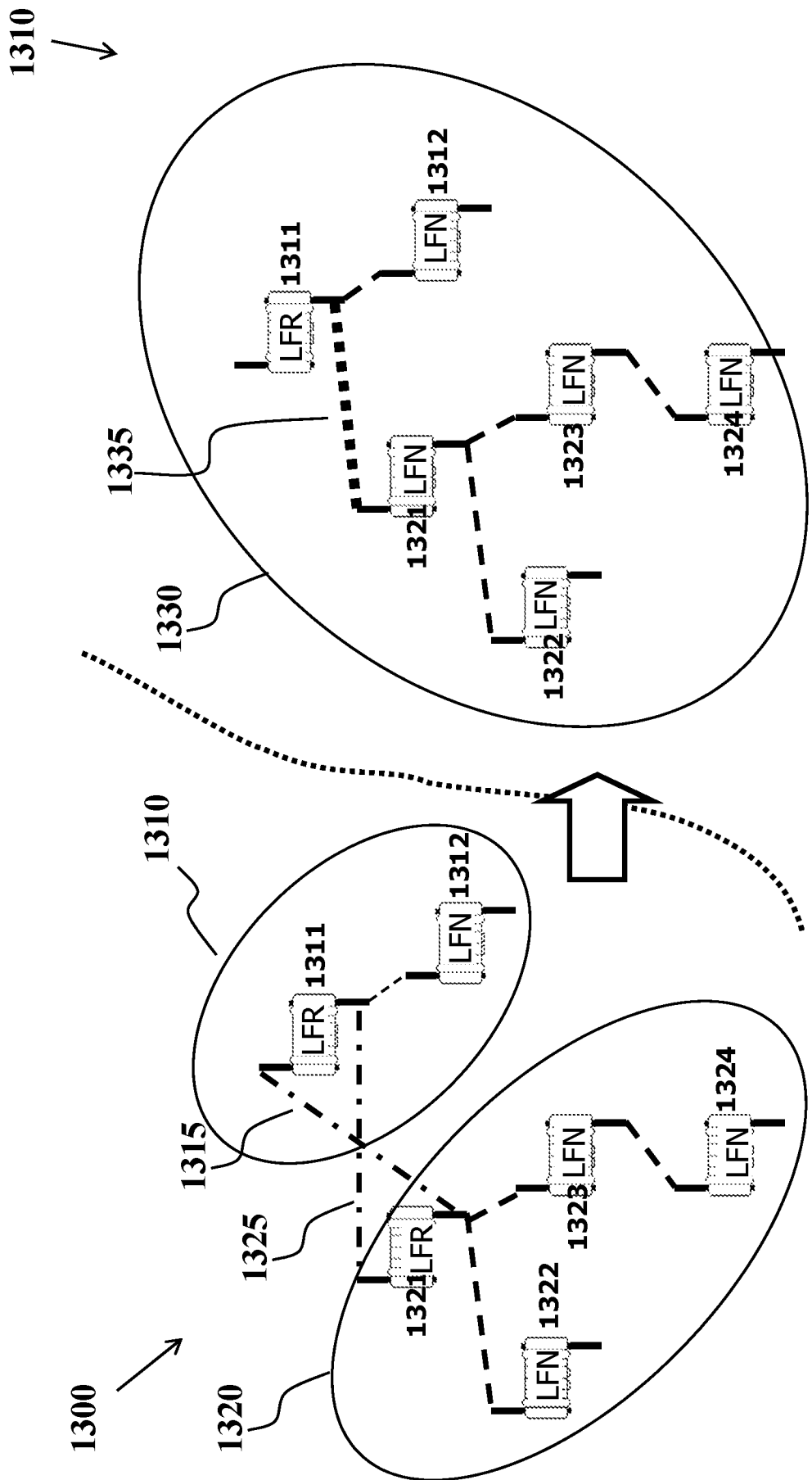


Figure 12



- When two LFRs see each other, one becomes LFN and joins the other
- A Tie Breaker Function (TBF) decides which one becomes an LFN

Figure 13

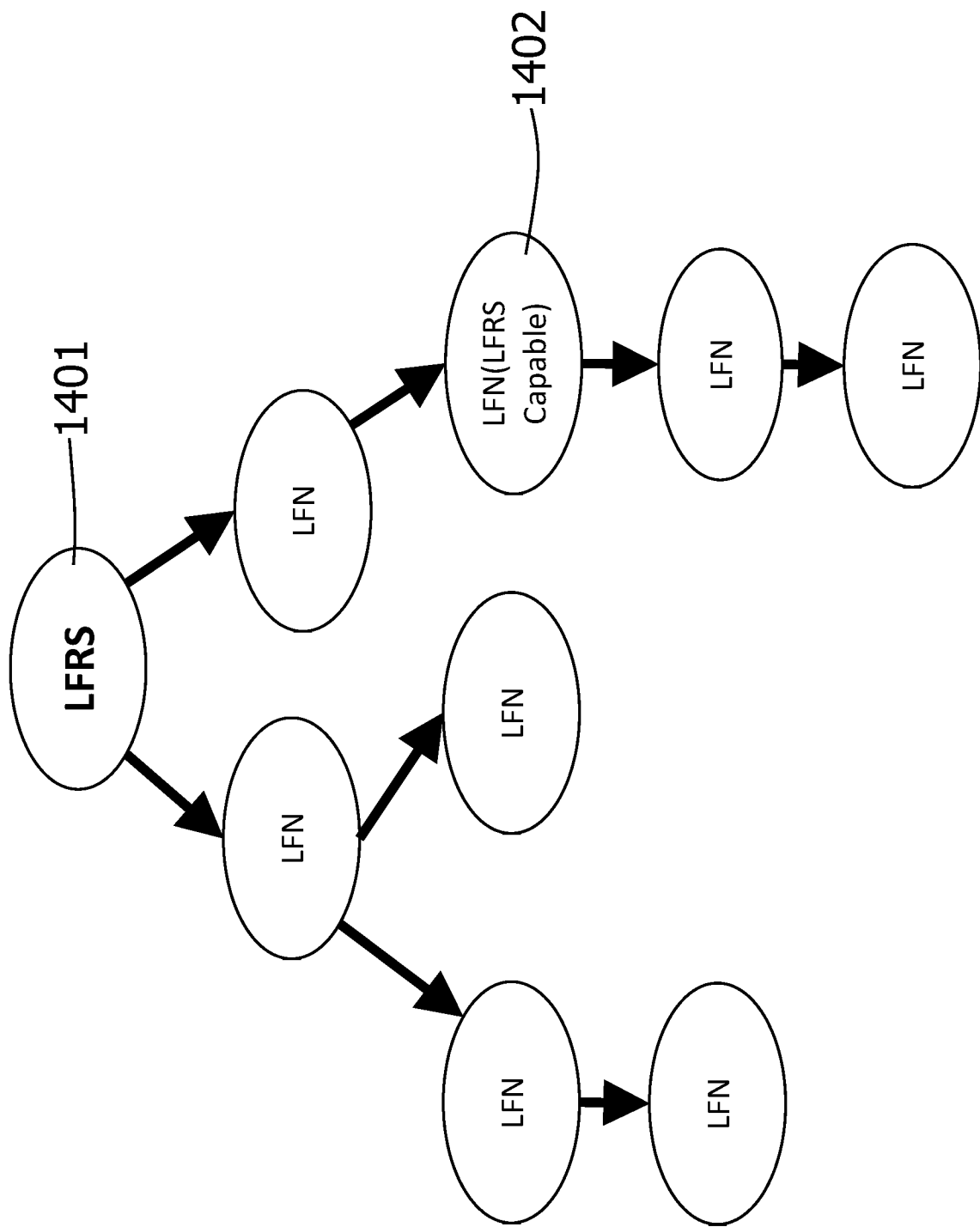


Figure 14

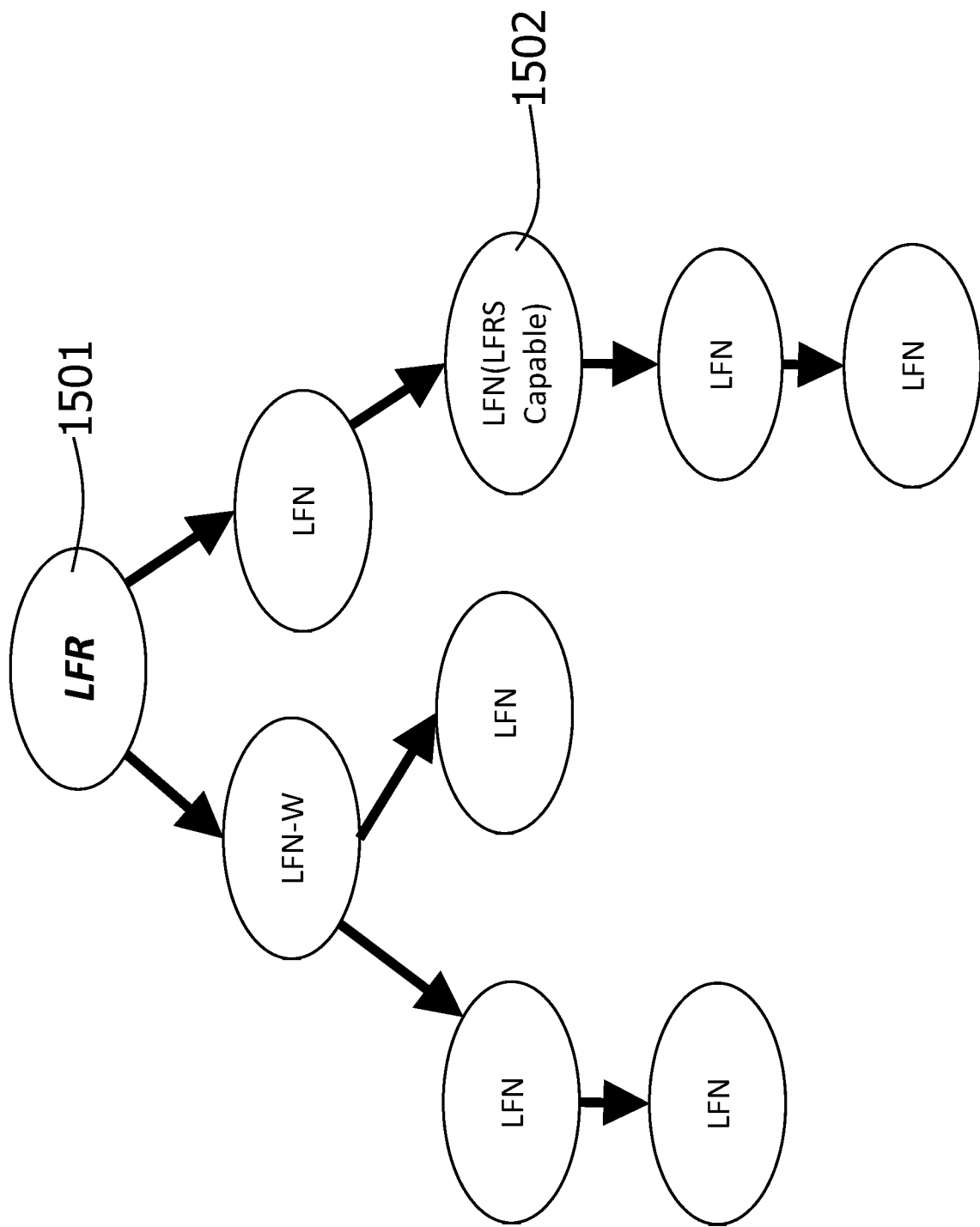


Figure 15

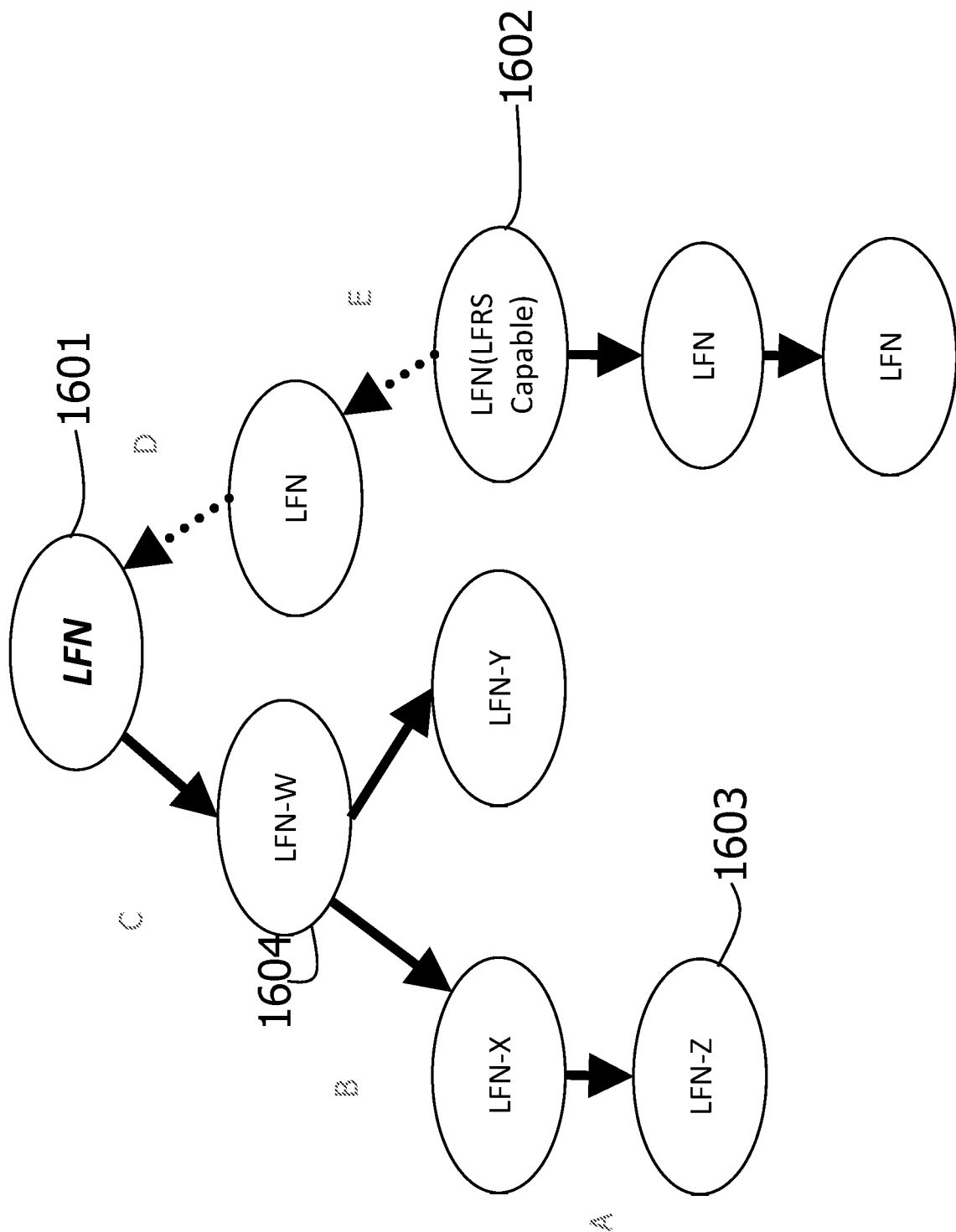
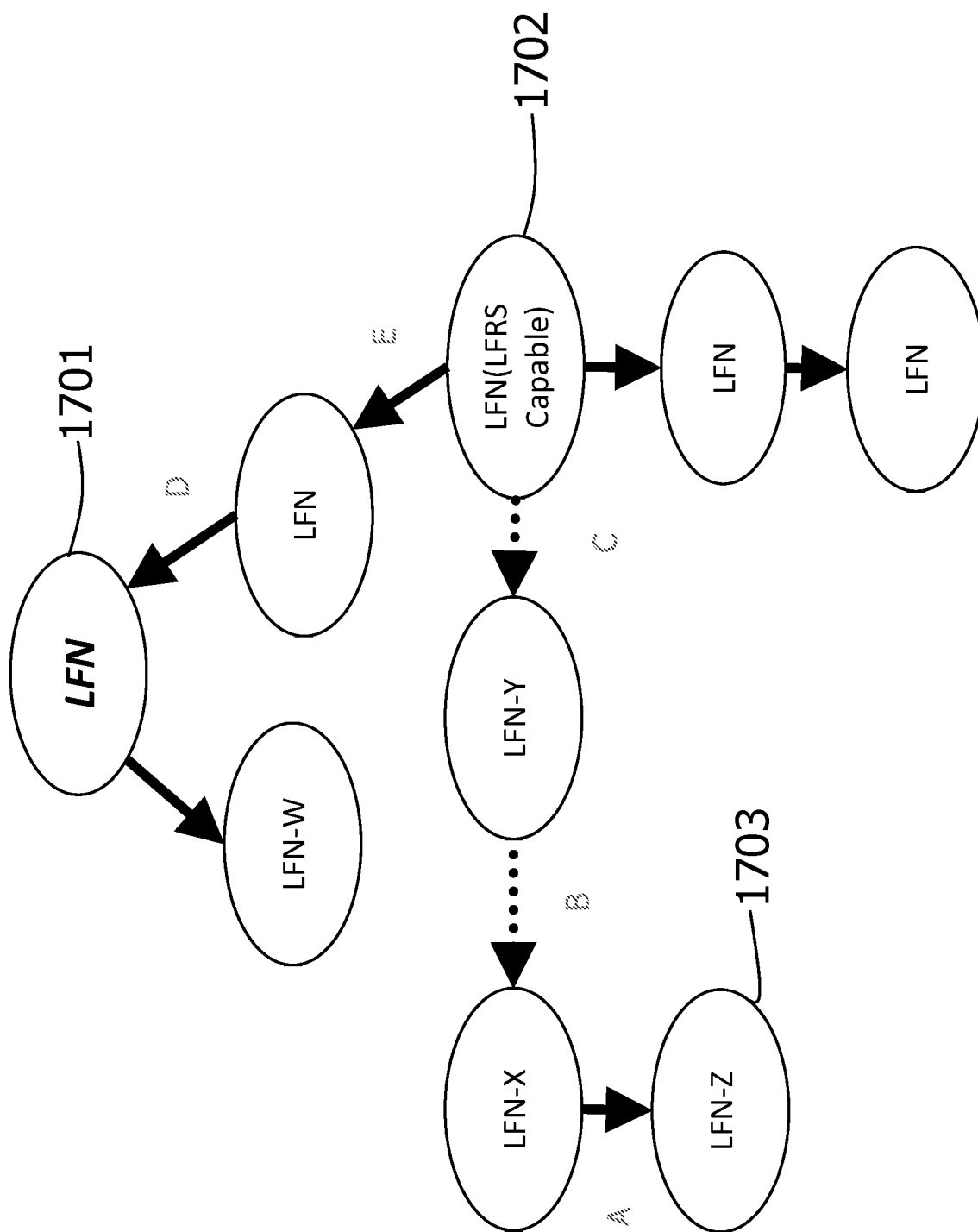


Figure 16



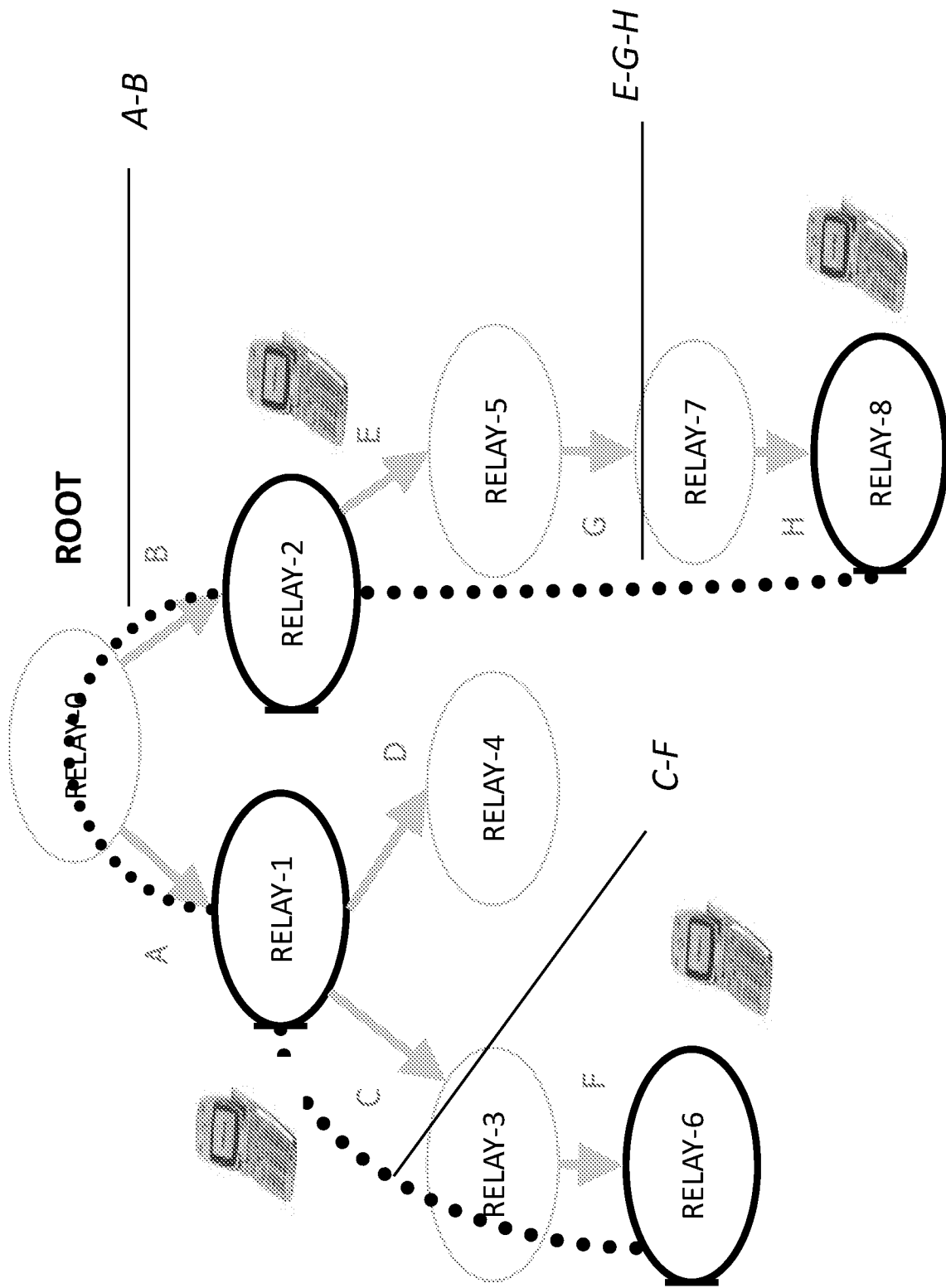


Figure 18

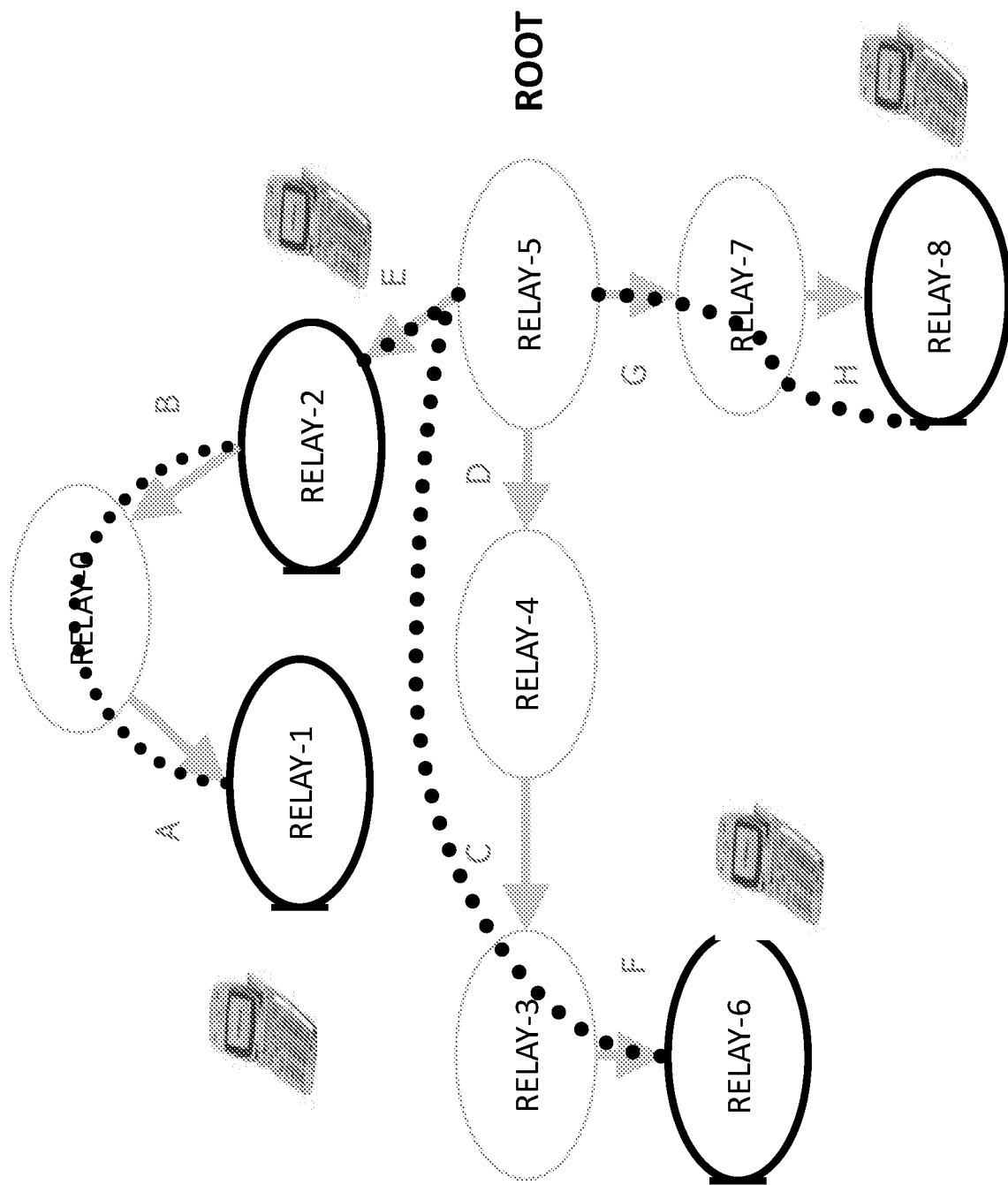


Figure 19

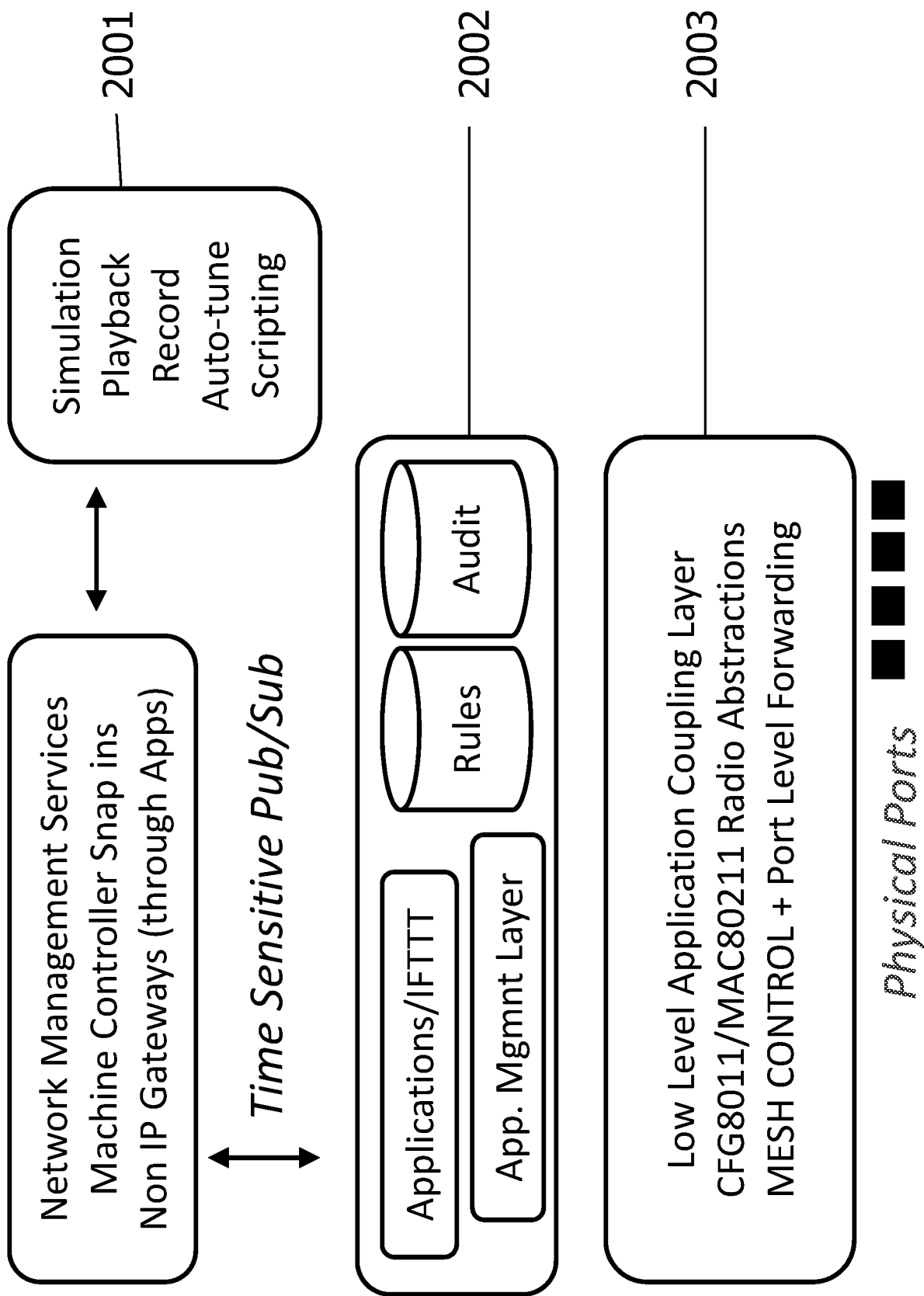


Figure 20

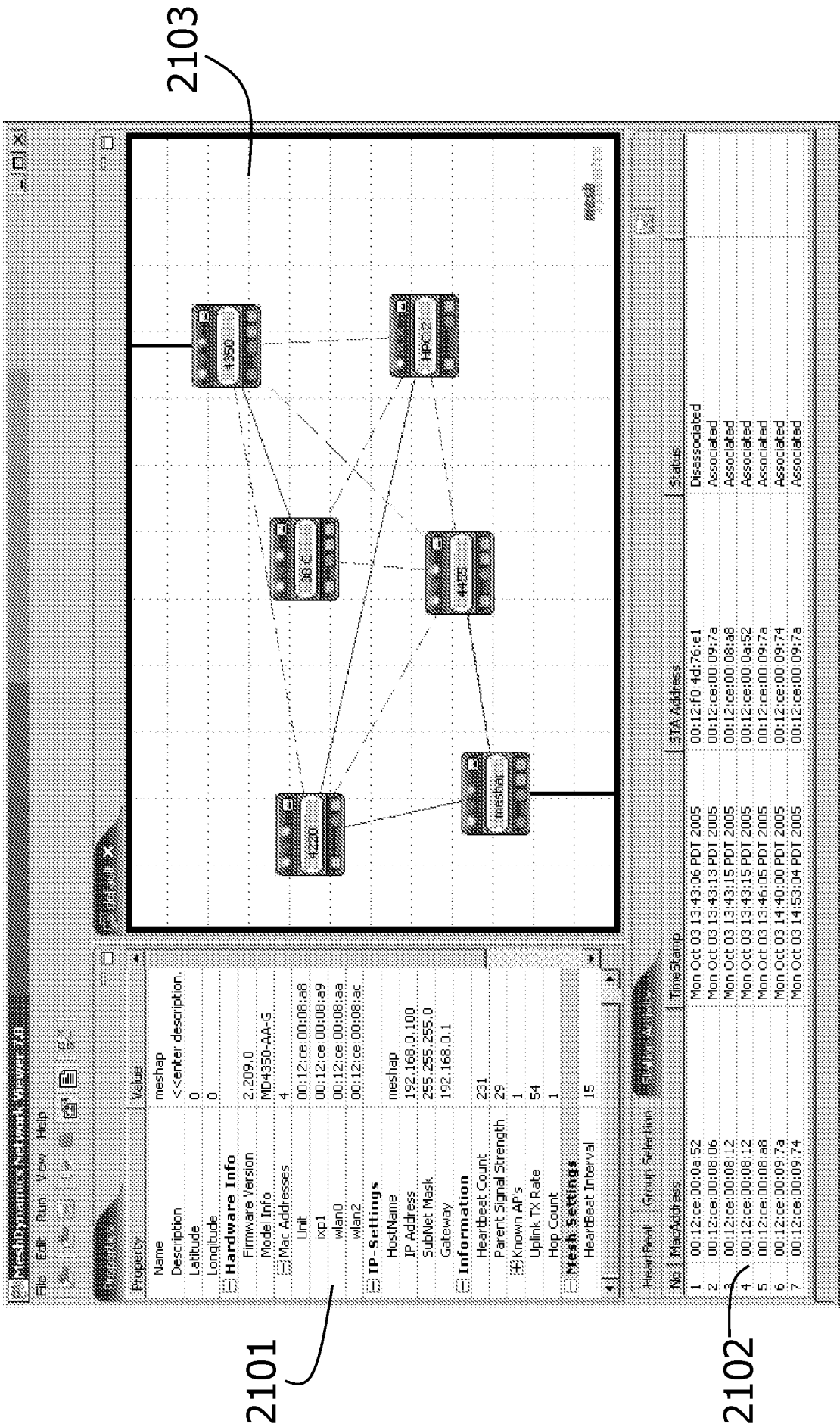


Figure 21

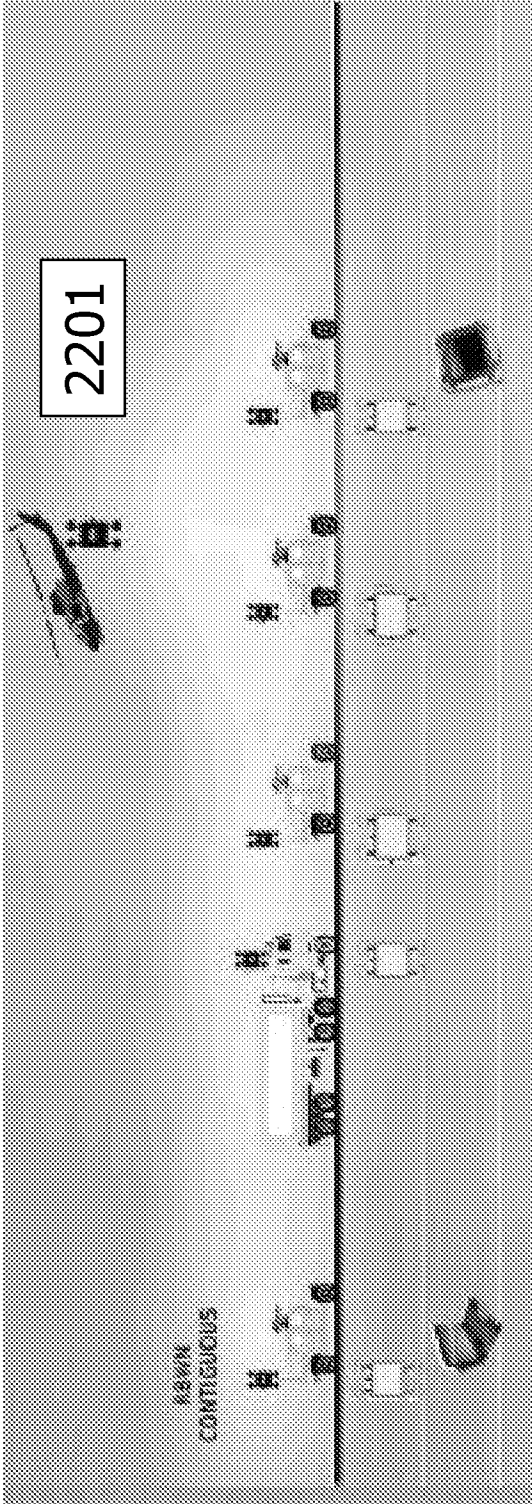
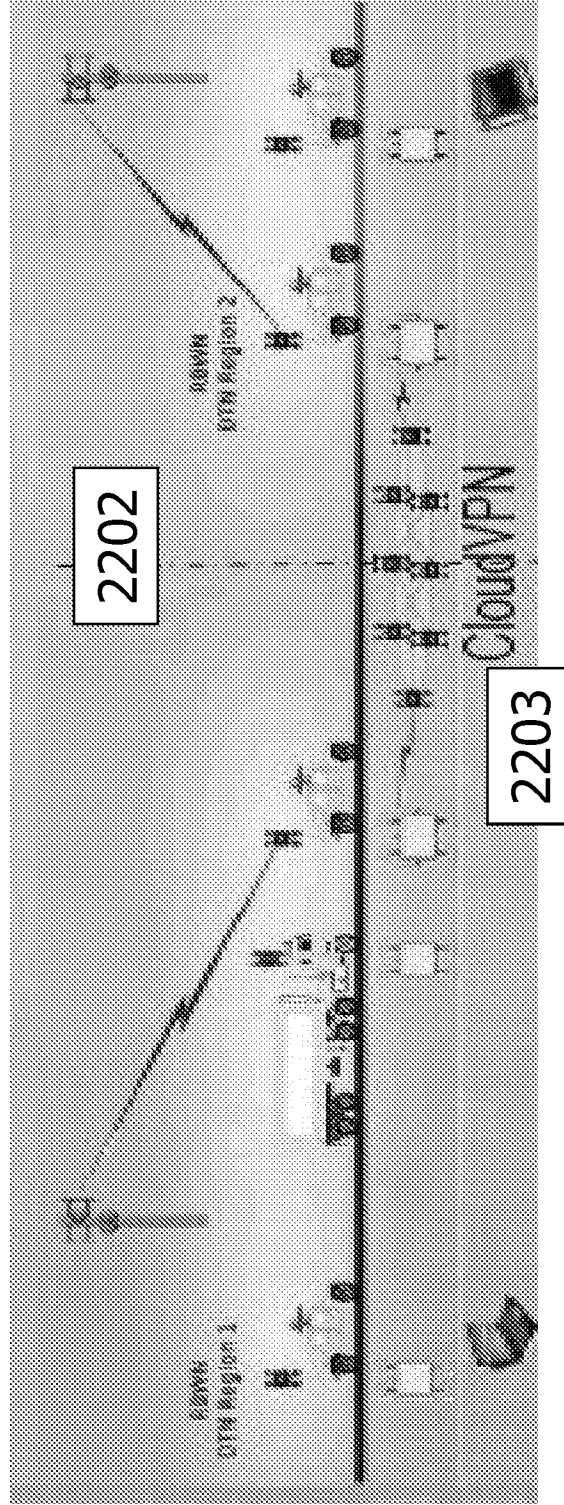


Figure 22

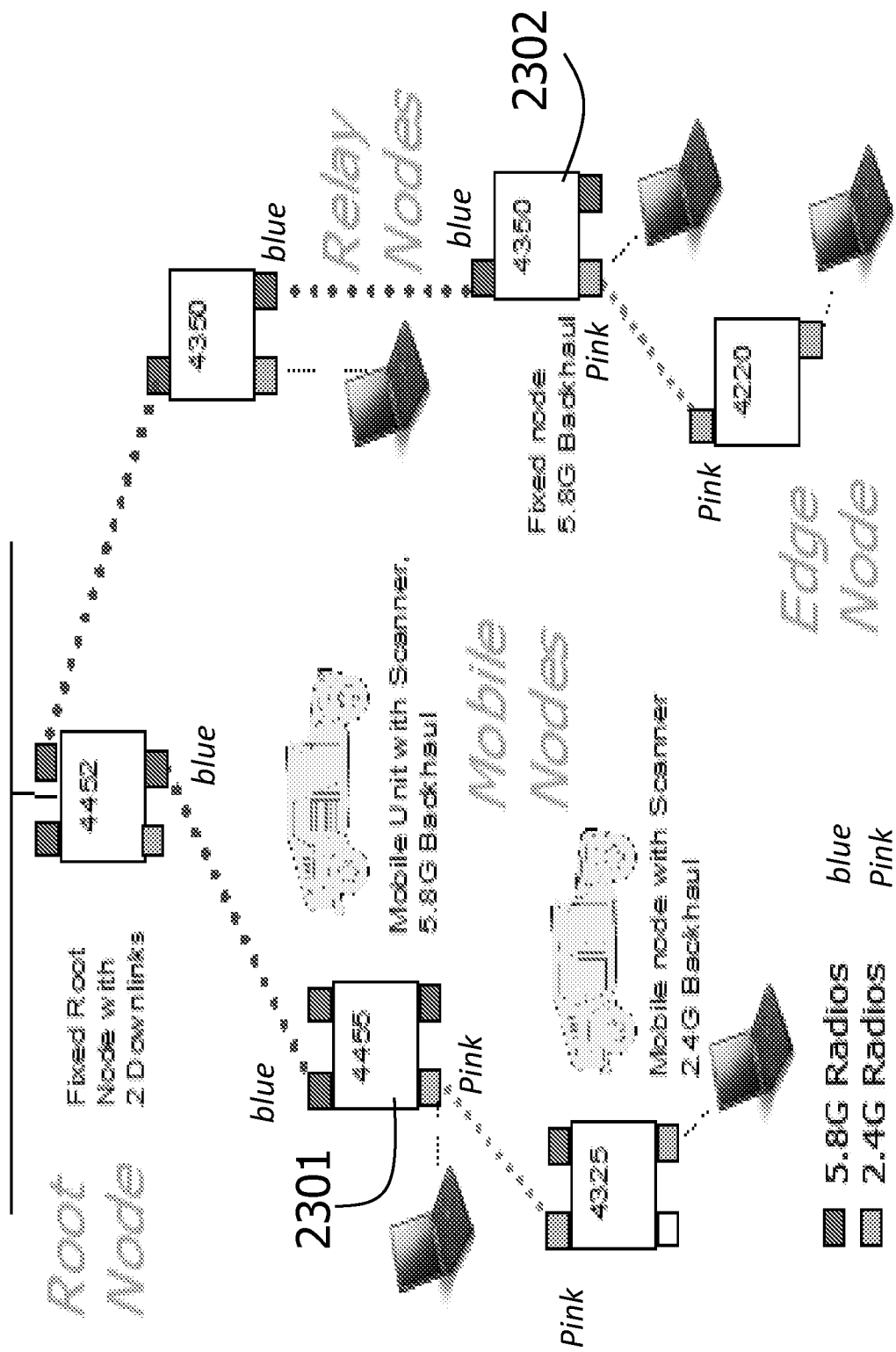


Figure 23

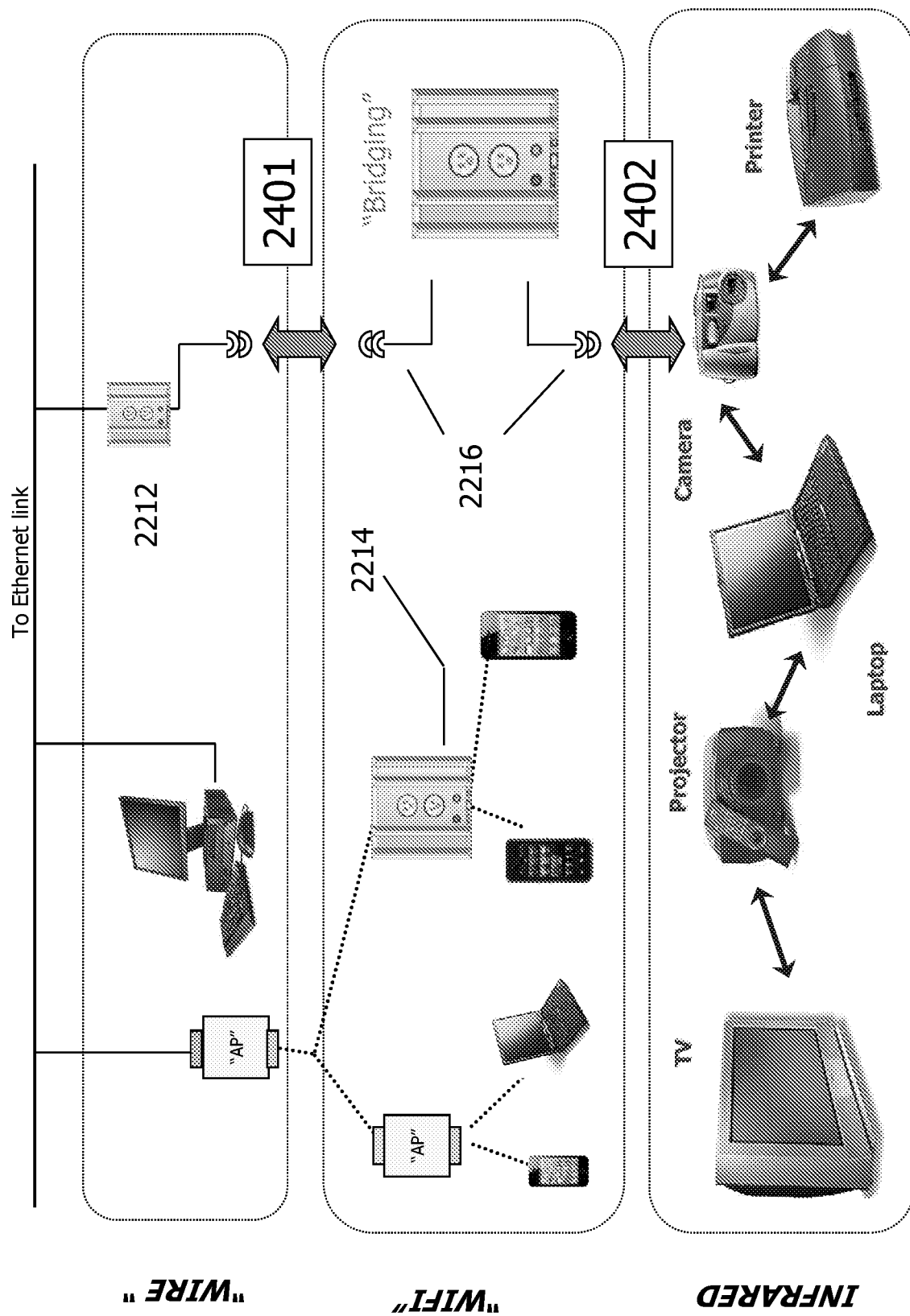


Figure 24

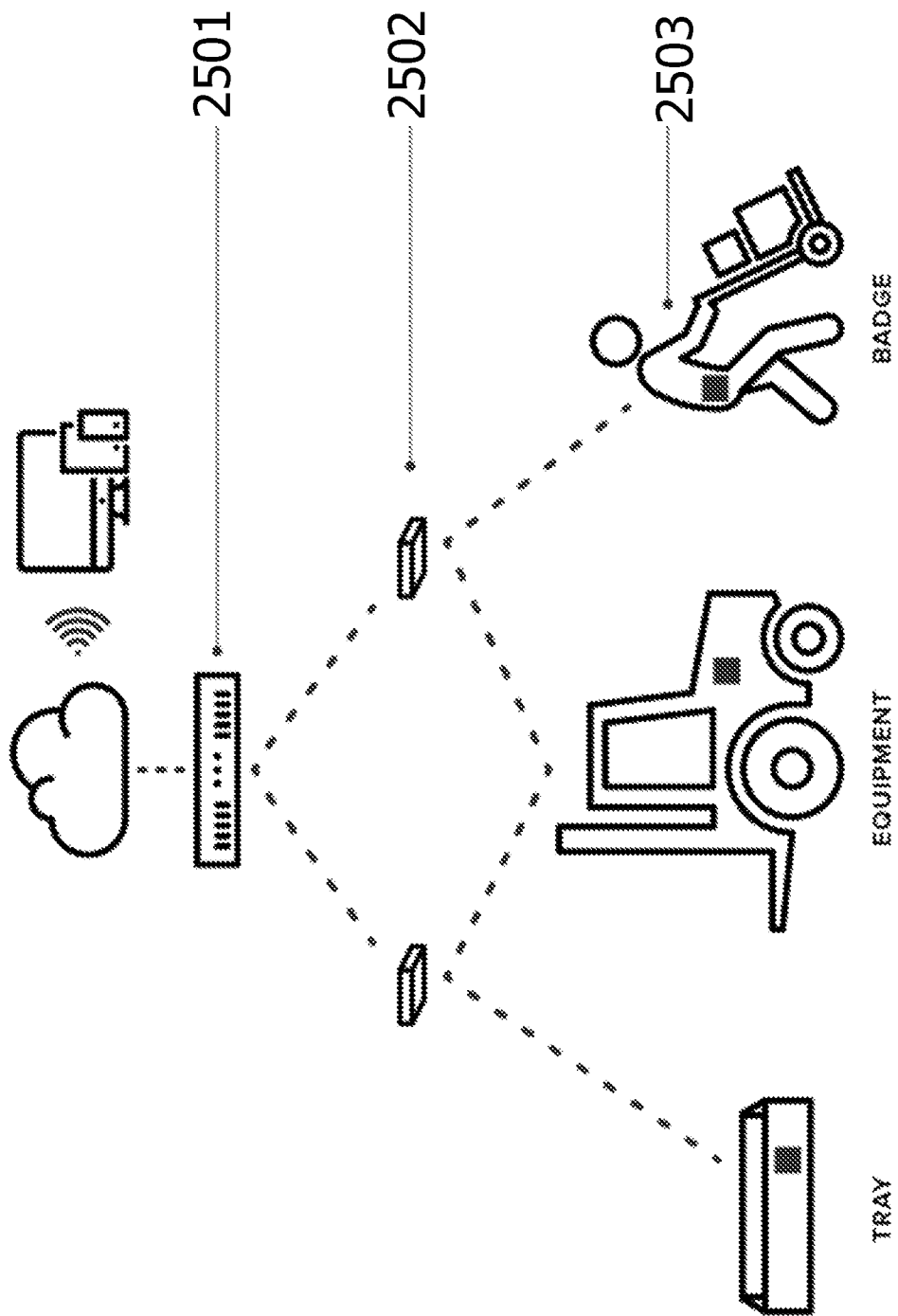
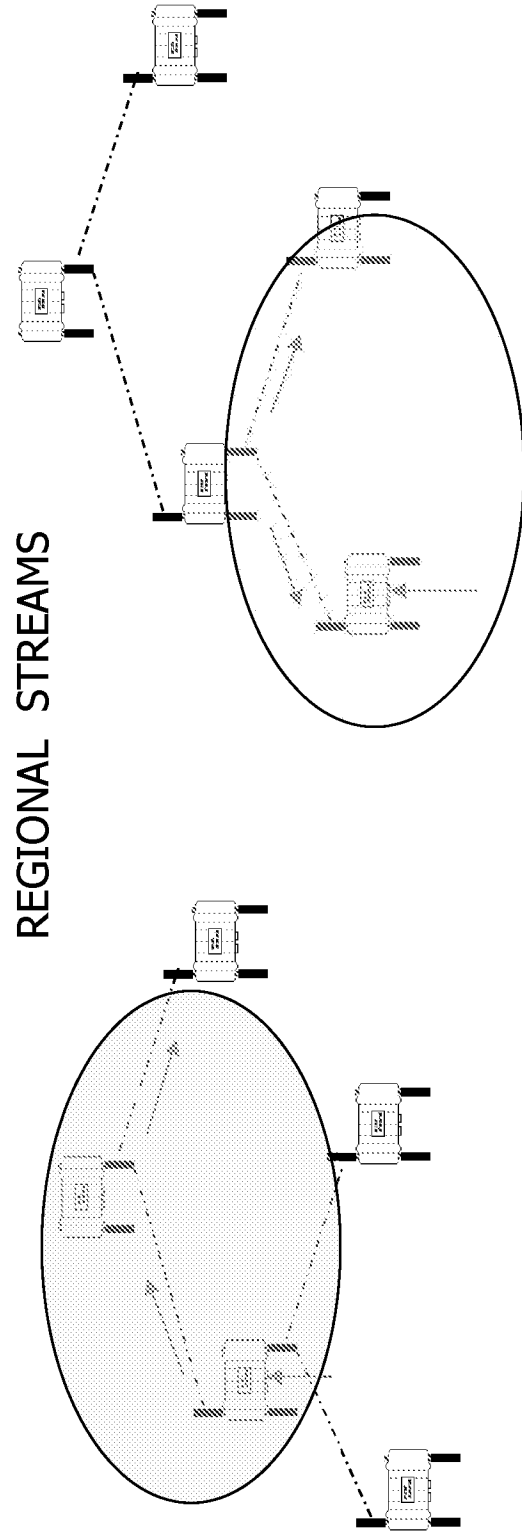


Figure 25



- REGIONAL STREAMS TRAVERSE ONLY THE SPECIFIED DIRECTIONS AND/OR REGION
 - REGIONS CAN BE GPS BOUNDARIES, OR NUMBER OF HOPS / SUBTREES
 - DIRECTIONS CAN BE a) UP OR DOWN OR b) TURN-BY-TURN etc.
 - RELEVANT FOR DATA IMPORTANT LOCALLY ONLY (e.g. Sibling Devices)
 - DOES NOT AFFECT BACKHAUL BANDWIDTH OUTSIDE SPECIFIED REGION

Figure 26

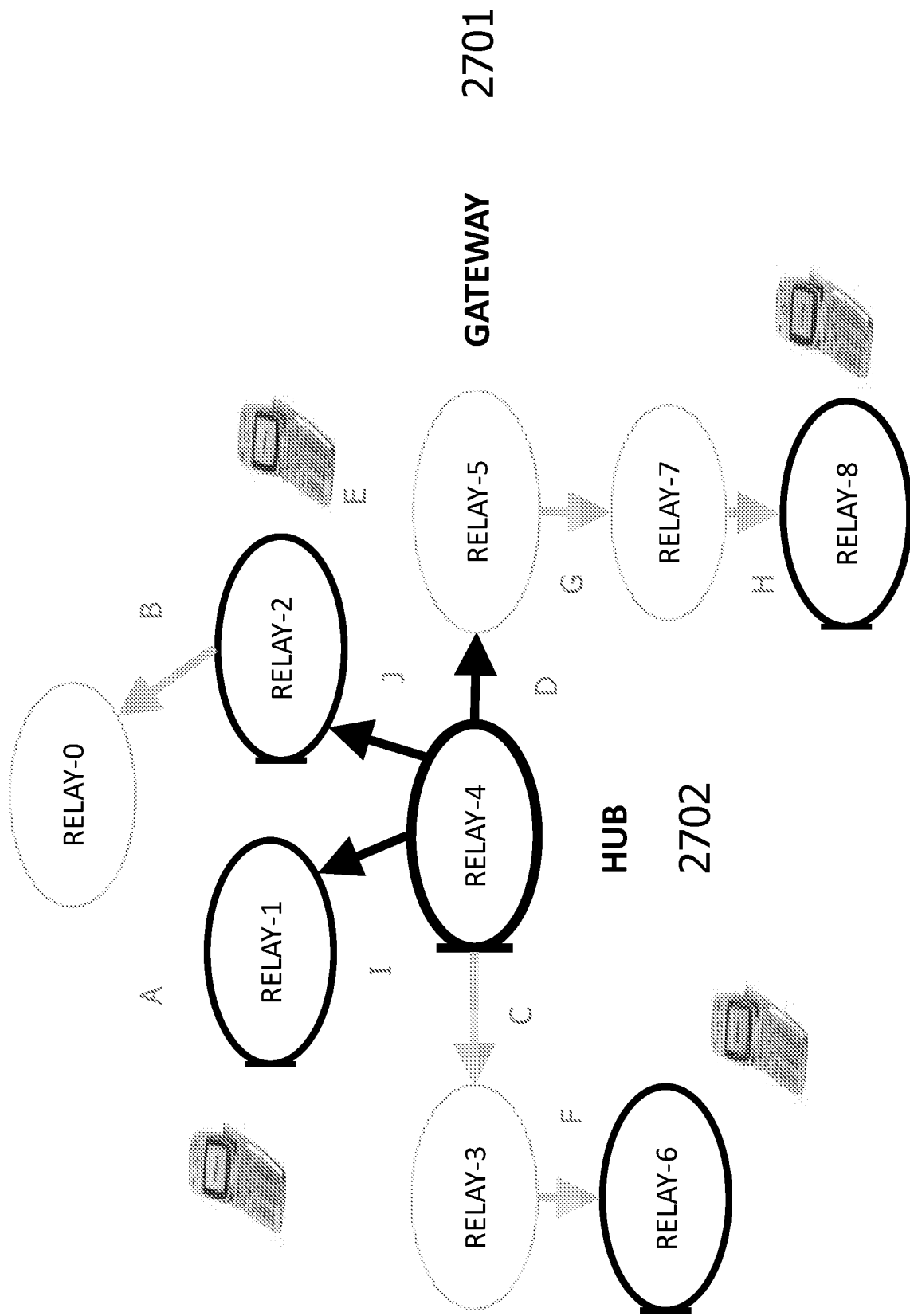


Figure 27

Title: EVOLUTIONARY WIRELESS NETWORKS

Inventors: Francis daCosta, Vivek Gupta

Applicant: MeshDynamics

CROSS REFERENCES

This application claims priority as a non-provisional of U.S. Provisional Application 62/465,526 filed on March 1, 2017, presently pending, the contents of which are incorporated by reference.

The instant application claims is a continuation in part of U.S. Application 15/728,863, filed on Oct. 10, 2017, presently pending, which in turn claimed as a continuation of U.S. Application 14/740,062, filed on June 15, 2015, patented as U.S. Patent 9,819,747 on November 14, 2017, which in turn claimed priority as a non-provisional of U.S. Provisional Application Serial Number 62/012,196, filed on June 13, 2015, presently expired, the contents of each are hereby incorporated by reference.

U.S. Application 15/728,863 is also continuation in part of U.S. Utility Application Serial Number 13/764,008, filed on Feb. 11, 2013, which is issued as U.S. Patent 9,363,651 on June 7, 2016, which in turn claimed priority as a continuation in part of U.S. Utility Application Serial Number 13/627,883, filed on September 26, 2012, and issued as U.S. Patent No. 8,923,186 on Dec. 30, 2014, which in turn claimed priority as a non-provisional utility application of Provisional U.S. Patent Application Serial Number 61/555,400 filed on November 3, 2011, currently expired, and Provisional U.S. Patent Application Serial Number 61/615,802, filed on March 26, 2012, presently expired, and Provisional U.S. Patent Application Serial Number 61/621,926, filed on April 9, 2012, presently expired, the contents of which are hereby incorporated by reference.

U.S. Application 15/728,863 is also continuation in part of U.S. Patent Application Serial Number 13/571,294, filed on August 9, 2012, issued as U.S. Patent 9,172,738 on Oct. 27, 2015, which in turn claimed priority to U.S. Patent Application Serial Number 12/696,947, filed on January 29, 2010, issued as U.S. Patent 8,520,691 which issued on August 27, 2013, which in turn claimed priority as a non-provisional of U.S. application serial number 61/148,803, filed on January 30, 2009, presently expired, the contents of each prior application is hereby incorporated by

reference. Application 13/571,294 also claimed priority as a continuation in part of U.S. Utility Application No. 12/352,457, filed on January 12, 2009, and issued as U.S. Patent 8,477,762 on June 2, 2013, the contents of each prior application is hereby incorporated by reference.

U.S. Application 15/728,863 is also continuation in part of U.S. Application 13/541,446 filed on July 3, 2012, presently abandoned, the contents of which are hereby incorporated by reference.

U.S. Application 15/728,863 is also continuation in part of U.S. Utility Application 14/523,778, filed on February 12, 2015, which issued as U.S. Patent 9,730,100 on August 8, 2017, which in turn claims priority to U.S. Utility Application No. 12/625,365, filed on November 24, 2009, issued as U.S. Patent 8,514,852 on August 20, 2013, which in turn claimed priority to U.S. application 61/117,502, filed on Nov. 24, 2008, presently expired, which are hereby incorporated by reference.

The contents of each application is hereby incorporated by reference.

FIELD OF THE INVENTION

The field of the invention is advanced network design and implementation, capable of handling multiple types of network traffic simultaneously.

BACKGROUND OF THE INVENTION

Convergent Networks: There is increasing demand within the industrial enterprise, the smart home, car and cities to employ one wireless network to support both voice, video and data applications. The “voice” network, e.g.: the telephone system, is often separate from the “data” network. Convergence is, as the name implies, the ability to converge these two networks into one network, servicing diverse performance (throughput, jitter, latency) requirements demanded by the applications running within one wireless network.

Rapid Re-routing: The challenge lies in providing--within the same wireless network--the ability to address potentially conflicting latency and throughput needs of diverse applications. For example, voice traffic needs to be transmitted with low delay (latency). Conversely, data transmissions mandate reliable delivery of all packets and while low latency is desirable, low latency is not essential. Wireless network topologies should ideally be driven by the needs of application processes, see figs. 1-4. When traffic requirements cannot be accommodated, the switch over to another routing path (“topology”) should be seamless and transparent to the end user applications with minimal data loss during the transitions.

Self-Tuning: Large network deployments, operating over multiple radio protocols and

hardware, require a device abstracted framework that incorporates machine learning to predict and avoid network bottlenecks by changing the network properties, such as routing paths, before network bottlenecks occur. Learnt behaviors may first be validated in a simulation environment with representative test cases and then tested in the real world. Real world data is gathered and refines and evolves the simulation models -- which in turn refine the rules or parameters settings for the network. These networks are disruption tolerant by design: for example, connectivity with “cloud” servers is intermittent at best. The framework must therefore support isolated networks, often mobile, that coalesce with other trusted networks to form larger “logical” networks see figs. 22-25.

SUMMARY OF THE INVENTION

This disclosure addresses multiple embodiments. The methods taught address a variety of networking challenges, specifically for mobile, temporal, or isolated networks, as can occur when a collection of wireless nodes is moving, such as the solutions shown in Figs. 12-13, 22, 23-25 and discussed below. Last mile connectivity to edge devices are particularly affected. These methods teach means to manage the logical topology of large networks within an application-aware framework.

One objective of this invention is to allow the characteristics of the network to be set by a cloud server, which learns and “tunes” the characteristics of the network, such as focusing on low-latency, high throughput, guaranteed delivery times, and other network characteristics, based on the needs of applications running in the enterprise.

Another objective is to support disruption tolerance, as shown in Fig. 22, and the use of multiple wireless protocols or communication hardware within one “logical” abstracted framework that can identify traffic congestion patterns emerging and address them proactively. These learning systems may operate concurrently on sections of the multiple sections of the network, as shown in Figs. 8 and 9.

Another objective is to define an automated process to model, simulate, deploy and self-tune large networks of networks, as discussed in Figs. 22-25. The automated process operates within a framework taught in Figs. 20-21, comprised of simulation, automation scripting, deployment, and adaptive topology management. The framework is intentionally radio protocol and hardware abstracted. Communication links are represented as Logical Radios, capable of bridging across diverse protocols and channel frequency bands. The logical links form a tree (directed acyclical graph) and the routing of packets across the tree is modeled as the aggregated time from source to destination.

As an analogy, consider the total time for a passenger to travel from London to Singapore. The journey includes multiple aircraft changes (“hops”) with delays in deplaning, lay over and re-boarding. This is referred to as bridge latency, and occurs with predictable variability at each hop. Poor airport design can affect bridging especially if the terminals are remote and passengers need to be shuttled between remote hubs (e.g. international terminals connected to local ones). For this reason airlines actively compete for valuable high quality gates at terminals.

This application discusses methods to proactively modify the data flow within a network. In light of the analogy, packets are passengers and aircraft changes are transmissions between different network infrastructure elements, such as nodes in a wireless network or interconnected switches and routers. Just as airport layout is optimized so passenger bridging time is minimized, the connections and other properties of the network infrastructure are optimized for a particular application.

BRIEF DESCRIPTION OF DRAWINGS

In order to more fully describe embodiments of the present invention, reference is made to the accompanying drawings. These drawings are not to be considered limitations in the scope of the invention, but are merely illustrative.

Fig. 1 depicts a network topology diagram over time, pursuant to one embodiment of the invention;

Fig. 2 depicts performance characteristics of a network in time, pursuant to one embodiment of the invention;

Fig. 3 depicts performance characteristics of a network in a further time period, pursuant to one embodiment of the invention;

Fig. 4 depicts performance characteristics of a network in yet a different time period, pursuant to one embodiment of the invention;

Fig. 5 depicts performance characteristics of a network in yet a different time period, pursuant to one embodiment of the invention;

Fig. 6 depicts performance characteristics of a network elements, pursuant to one embodiment of the invention;

Fig. 7 depicts simulation results for a network in a time period, pursuant to one embodiment of the invention;

Fig. 8 depicts simulation results for a reconfigured network in a different time period, pursuant to one embodiment of the invention;

Fig. 9 depicts simulation results for a network in yet another time period, pursuant to one

embodiment of the invention;

Fig. 10 depicts a schematic of network components, pursuant to one embodiment of the invention;

Fig. 11 depicts a logical schematic of network elements, pursuant to one embodiment of the invention;

Fig. 12 depicts a view of network participants, pursuant to one embodiment of the invention;

Fig. 13 depicts methods of network joining, pursuant to one embodiment of the invention;

Fig. 14 depicts a logical tree layout of the network components, pursuant to one embodiment of the invention;

Fig. 15 depicts another logical tree layout of the network components, pursuant to one embodiment of the invention;

Fig. 16 depicts another logical tree layout of the network components, pursuant to one embodiment of the invention;

Fig. 17 depicts a reconfigured logical tree layout of the network components, pursuant to one embodiment of the invention;

Fig. 18 depicts another logical tree layout of the network components, pursuant to one embodiment of the invention;

Fig. 19 depicts another logical tree layout of the network components, pursuant to one embodiment of the invention;

Fig. 20 depicts a schematic of control for network devices, pursuant to one embodiment of the invention;

Fig. 21 depicts results of a simulation of one logical network, pursuant to one embodiment of the invention;

Fig. 22 depicts a schematic of implemented networks, pursuant to one embodiment of the invention;

Fig. 23 depicts another logical tree layout of the network components, pursuant to one embodiment of the invention;

Fig. 24 depicts communications between various network components, pursuant to one embodiment of the invention;

Fig. 25 depicts another set of communications links between network components, pursuant to one embodiment of the invention;

Fig. 26 depicts isolated networks providing services, pursuant to one embodiment of the invention; and

Fig. 27 depicts several wireless network participants, pursuant to one embodiment of the invention.

DETAILED DESCRIPTION

Overview of the Figures

FIG. 1 illustrates how the network topology is changed by selecting a different back-haul in a two-radio system, with one link to the back-haul AP and the other link servicing the child AP. It depicts four network topologies. Each of the four network topologies provides a different set of performance in terms of latency and throughput. The mesh control software adjusts the latency and throughput parameters to meet voice/video or data performance requirements in terms of latency and bandwidth.

FIG. 2 illustrates a wireless network, first in a star configuration, with low latency but poor throughput according to an embodiment of the present invention. An inverse square law model is applied, which is user definable to emulate specific radio and antenna link qualities. The simulation environment includes a WLAN Health Monitor that ensures all nodes have a redundant path, in case of node failure.

FIG. 3 shows a network routing path change for one node, based on a change on policy administration. The parameter “Restrict Max Allowable Hops” has been changed from 1 (for a star configuration) to 2.

FIG. 4 shows the result of how wireless network self configures to meet a latency/throughput trade-off from 37% in Fig. 3 to 31% in Fig. 4. The percentage is indicated in the field “% Thrpt trade for latency.” Low latency drives lower hops or relays from the root node. Nodes far from the root node have poor connectivity when connected directly. Further they suffer from the “hidden node” problem. Intermediary nodes thus improve overall throughput of the network but at the cost of more latency (hops) for some routing paths.

FIG. 5 shows the new topology when the throughput/latency ratio is further reduced. Note that another approach to improving throughput without affecting latency may be to switch to more powerful radios for parts of the remote network. This may be simulated also via the Signal to Map Table.

FIG. 6, shows the results 601 of Dynamic Channel Allocation (DCA) being automatically selected by the simulation engine, based on the DCA algorithms taught in referenced applications. The path is based on the routing path e.g. for Node 1 it is shown in table 6-02—7-06, three hops from the root node 4. Three colors are used to denote the three non overlapping channels selected by

DCA.

The table 602 depicts the signal strength map degradation over distance from the transmitter. An inverse square law is depicted. Values may be also changed manually. This information is used by the simulation to compute the RF throughput between a physical radio transmitter and physical radio receiver link. Logical radio links are covered later.

FIG. 7 shows one embodiment of the simulation environment, part of the framework described in Fig. 12. A signal strength map has been supplied for each radio link shown in network tree depicted. For each node a “health index” is tabulated, based on the signal strength from its parent down-link, the number of alternate candidate parents available in case fail over is needed, the congestion and burst-nature of clients and applications that move traffic through the node etc. In the chart 701, some nodes are shown as unhealthy (red) and sub tree that those nodes are part of may be affected. Routing paths within the sub tree may need to be re examined or applications running on those nodes be shifted to other nodes. Rules governing network topology are shown in the setting selector 702. Of special importance in this application is the Latency-Throughput trade-off ratio. Other non dimensional ratios include RF throughput efficiency (measured against a theoretical max), jitter and latency for each segment of a routing path compared against estimates etc. Data specific to the node is shown in the node display 703. The model is periodically refined against the real world field tests.

FIGS. 8 and 9 depict a fail-over when one of two root nodes ceases to function. A policy server 801 defines the rules and parameters, such as the values set in table 804. The DCA Channel Allocation is depicted in the chart 803. The node table 802 depicts the health index for nodes before the fail-over. The connections in Fig. 9 are achieved not through mesh nodes but single radio clients running the single radio version of the mesh software.

FIG. 10 is one embodiment of the mesh node network stack. Application driven rules and Scripts are resident in device abstracted APPLICATION layer library 1060, a supervisory control layer above three lower control layer modules: TCP/IP, MESH CONTROL 1040 and SCAN 1050. Direct Machine to Machine (M2M) communications are controlled by APPLICATION over the Software MAC layer. The Software MAC Layer is typically running at the Kernel level of the software platform, requiring LINUX KERNEL EXTENSION 1030. These extensions enable low level, fast applications/algorithms, operating at close to port forwarding tables, operating at (Kernel level) Drivers for Ports, such as ETHERNET. The APPLICATION layer is analogous to the Control Plane in the SDN paradigm. Also shown are the HARDWARE DRIVERS WITH VLAN SUPPORT 1070 as well as PACKET CLASSIFIER 1010 and VOIP CONCATENATION 1020. Security

features are also provided, including encryption provided by the AAA/ AES ENCRYPTION w/ TEMPORAL KEYS layer 1090.

FIG. 11 is a control loop depiction of MESH-CONTROL. Heart beats provide information on neighboring nodes and policy changes, directed by changes in the physical topology or the logical topologies of applications running on the nodes. Change in mesh routing is then executed by kernel level tasks and coordinated with other nodes in its community.

FIG. 12 depicts a mobile multi-radio back-haul 1203. Isolated networks 1202 may later merge, see 1201. Note that the red and blue depict different channel frequency bands (5.8GHz, 2.4GHz, 900MHz) and protocols (Blue-tooth, Wi-Fi). DCA algorithms, Signal Strength Maps and Latency/Throughput characteristics are computed/estimated for the composite network of 1202 and 1203 in order to determine the total time of travel from source to destination.

FIG. 13 reiterates the methods taught in US8976733 B2, “Persistent mesh for isolated mobile and temporal networking“ which are extended to support a generic topology management approach for both physical links (radio to radio) and logical links (application to application). This figure sets context for Figs. 14-19. In isolated area 1300 two isolated sub trees have found each other and are ready to coalesce to area 1310. There are two roots for each sub tree, LFR 1311 and LFR 1321. In general the “smaller” tree is attached to the larger one, however link quality metrics may dictate otherwise. As shown in 1311 LFR 1311 was chosen. The routing tables are then changed. The hierarchy preference was FFR-FFN-LFR-LFN

FIGS. 14-16 apply Fig 13 for new additions to hierarchy preferences to include a new mode LFRS. In Fig 14, the root node 1401 is shown as a LFRS root node, which is a node capable of satellite communications (LFR-Satellite) and therefore shown active in a mobile isolated tree comprising of another inactive Satellite capable LFRS mesh node, 1402, currently dormant and operating in LFN mode.

In Fig. 15 the root node 1501 and the LFRS root node loses its connectivity. This demotes it to LFR status thereby preserving the network topology and routing links. No routing paths are changed. A notification is sent to wake up LFRS capable node 1502. When the satellite connection is active, the topology controller is informed.

In Fig. 16, the LFRS fail-over node has an active satellite link. The topology controller, changes the direction of routing links D and E between 1601 and 1603, see dotted arrows. No other routing paths are affected. Also shown is node LFN-W 1604. Further, since topology controller is coordinating this across the network, packets affected by routing path changes are buffered and sent after the routing is completed. Hence from a client application perspective, the topology change is

transparent and disruption free. The topology has self healed with minimal disruption. But it is not optimal. Leaf node LFN 1603 has a circuitous path back to the new “root” node 1602 see A-B-C-D-E. This may trigger a latency/throughput ratio “rule” firing resulting in changes shown in Fig. 17.

In Fig. 17, a section of the sub tree is modified by the topology controller to reduce the number of hops for LFN 1703 to A-B-C. Note this change was foreseen in Transition Figs. 14-15-16, but was not executed till the fail-over LFRS root node was established Fig 1602. Routing table changes in relevant sub trees are now coordinated through messaging across the nodes to ensure minimal disruption. Further, reduced buffering between transitions also improves link latency. Also shown in Fig. 17 are nodes LFN 1701 and LFRS capable node 1702.

FIG. 18 and 19 teach a simplified equivalent to multi-casting for applications running on the mesh nodes that communicate with each other by subscribing to Topics filters. A topic subscription is illustrated in a conference phone call - a multi-cast, time sensitive message sharing scheme.

Recall this is an instance of a pub-sub framework operating within the mesh nodes comprising a layer II scalable $O(n \log n)$ tree based mesh network. Note that Node resident applications, that are connecting the phones shown, are treated as a variant of clients, complete with authenticated and registered MAC-ID level identification, no different from authenticated client stations, e.g. phones. The Application Routing Tables are an overlay on top of a physical tree based communication links. Logical links are bound to nodes running application interested in the same topic(s). Since applications both publish and subscribe, Relay-1, Relay-2, Relay-6, Relay-8 ideally share information/messages speedily and with minimum overhead. Dotted lines show the path Relay-1 would take to communicate with any of the conference call members. For example Relay-1 must send messages to Relays-2,6,8 using the routing paths available e.g. A-B, C-F, A-B-E-G-H.

A departure from conventional IP multi-cast is proposed where duplication of unicast message is performed at Relay-1 and then forwarded to paths C-F and A-B. At Relay-2 it is further duplicated and passed on to Relay-8 via path E-F-H resulting in a total of three unicast messages : A-B, C-F and E-G-H with one duplication at B intended for path E-G-H.

In conventional multi-cast, Relay-1 would publish to the multi-cast "hub" typically located at the root node for highest visibility. The "hub" would then send duplicated packets to the members of the multi-cast list. Relay-1 first sends to root (hub) = A then the multi-cast engine, using IP multi-casting, operating at root node Relay-0, will generate paths A-B, B-E-G-H, A-C-F to Relays 2,6,8.

FIG. 19 shows how the routing change for Relay-1 to continue to communicate with others with minimal disruption. It is a reprint of Fig 17 with the new root being old Relay-5. At Relay-2 the packet is duplicated and forwarded to Relays 6, 8 via path E-G-H and E-D-C-F. The three unicast

messages are A-B, E-G-H and E-D-C-F

The Application layer generates the port forwarding rules so relevant nodes forward at the port level operating within an Open Flow SDN paradigm, as described in referenced work. This is also referenced as Kernel level extensions, Fig 1030 in referenced work. As physical routing paths become larger, the jitter and latency of the messaging system may increase, requiring a modification to the affected sub tree by the topology controller operating in conjunction with the MESH CONTROL module Fig 1040 and Fig. 2103. Note that applications have different priorities and policy directives may be biased to service them at different times of the day. For example, while the voice application is active, the topology may remain sticky, if no other applications are being adversely affected. When conflicts do occur, the application management layer is the first to know, since it monitors and forwards application heart beats and it privy to jitter/latency over the trunk lines overlays employed, see dotted lines.

The application layer must ensure that the logical community of applications and their clients (both other applications and devices like phones) is serviced with minimal disruption and side effect to other applications and clients operating in a multi-tenant community that includes diverse radios and protocols. It provides the multi-cast function with lower overhead and coordinates its efforts in conjunction and coordination with lower level topology management layers that drive changes in physical mesh topology.

Fig. 20 is a depiction of the network stack of Fig 10, highlighting the features provided at three levels/layers of the framework. At the application coupling level 2003, cloud connectivity services include Network Management, Tunnels for Machine controllers and non-IP (“chirp”) devices to communicate using Native Machine/Chirp protocols devices operating at the edge of the network. Simulated Movies are generated by simulation models, see Figs. 1-5, to cover known test cases, using automated scripting tools to playback and record a story board script of initial conditions, Fig. 14, intermediate processes Figs. 15, 16 to terminating condition, Fig.17. Converging time from Figs. 14 through 17 is measured against repeating the same test cases in the real world. A feedback loop between model and reality is thus established to refine the simulation models for subsequent iterations. The refined model includes rule generation and predictive pattern recognition to better predict when the topology controller needs to kick in, or whether the application management layer is capable of addressing the change in RF conditions, client and node movement etc.

The Application Layer 2002 is also shown in Fig. 20. It is the intermediate level. Applications, such as the LFRS parent selection process, or the conference call applications, Fig. 18-

19, provide their requirements to the Application Management Layer. This then sets up the port forwarding rules and flow constructs through an application coupling layer 2003. Rules and biases, are stored in the rules database. Application and Mesh node Heart beats are monitored and logged by the Audit database. These logs are retrieved when cloud connectivity is available. The simulation and network management layer 2001 is also shown in Fig. 20.

Node Resident applications have access to lower level functions. For example, the LFRS application Figs 14-17 operates at both the Application and Kernel Level. At the application level, it monitors application heart beats and mesh node heart beats. Jitter and latency of both physical and logical links are derived from Audit log trails and help identify potential topology driven bottlenecks. For example see routing path A-B-C-D-E for LFN 1603 reduced to routing path A-B-C for LFN 1703. The logical routing for affected application messaging application is shown in Figs. 18, 19. A change requested by one application may affect another and hence some form of adult supervision, conflict resolution is supplied at the application management layer, that controls the lower level kernel functions. Recall MESH CONTROL 1050, sits below the APPLICATIONS layer 1060 and above the LINUX KERNEL EXTENSIONS 1030. MESH CONTROL is radio protocol agnostic. Its main objective is to manage channel interference and overall mesh topology per policy directives see Figs. 1-9, 11. Lower level services perform protocol translations and low level port forwarding rules. Device abstracted network topologies are mapped to the appropriate MAC80211 radio protocol handlers for a diverse and growing set of standards: 80211ac, 80211abgm, Blue-tooth, Cellular, Zig-bee etc.

The framework, Figs. 10, 11, 20, is thus logical (hardware and protocol abstracted). From the perspective of the network topology management, Figs. 11, 14-19, algorithms operate on logical link characteristics: throughput, jitter, latency etc. Example: military radios operate in 900 MHz, 2.4 GHz and 5.8GHz ISM Bands, 4.9 GHz public safety bands etc. Each of these radio + antenna links have differing channel mappings, link quality, antennas etc. To perform the topology changes in Figs 14-15-16, the Kernel Level has to modify routing table entries by reversing directions of the logical links. Down-link and up-link port functions are reversed and lower level port interfaces to radios notified. Complexity of routing moves up to application management, enabling a smaller footprint for emerging low power, simpler edge devices.

FIG. 21 depicts one embodiment of the common Network Management System. It is written in Java and open standard Eclipse GUI and therefore designed to run on all desktop operating systems. The dialog box 2101 is refreshed to show the properties of a node clicked in the network topology window 1603. Applications are treated as clients, complete with a unique MAC-ID and so

show up on the property list for any node. Both Application and Mesh Heart Beats may be displayed in the heart beat status updates see 2102. The NMS is used by both simulation and real mesh nodes. Data logs may be replayed, as a movie, to see the transitions in Window 2103. Solid lines depict current active connections. Dashed lines are alternate, fail over paths, derived from adjacency lists and verified/discovered by the SCAN agent abstractions Fig 1050. Each link has throughput and jitter/latency audit trails and these are available by clicking on a link in the window.

FIG. 22 demonstrates how Disruption Tolerant Networking (DTN) is actualized in a battlefield scenario. In 2201, there is a chopper connecting two parts of the convoy, which gets broken, 2202 when the chopper leaves. This is akin to Fig. 14, losing the satellite link. Two separate trees are established via LFRS links. Both trees have Internet connectivity. Through the cloud these two trees are no longer isolated. This is referred to as Cloud VPN see 2203.

FIG. 23 demonstrates how bridging between radio frequency bands enables more devices to operate effectively in crowded RF environments. Non-Interfering RF Channels are limited in each frequency band so bridging across frequency bands effectively adds more channels to the logical channel list see Figs 1-9. In Fig. 23, Node 4455, 2301 and Node 4350, 2302 bridge 5.8 GHz (blue) and 2.4 GHz (pink) (logical), two ISM frequency bands. Logical Channel diversity thus expands the available spectrum available to the composite logical network. From the perspective of root node 4452, the mobile nodes are two logical radio hops away. Jitter/latency data from the physical radios drives the aggregated jitter/latency of logical links see Fig.18-19. This may drive further physical topology changes see Figs 14-19.

Note: Radio cards are now available that support concurrent operations in blue and pink frequency bands, Figs 23. They may therefore be used in lower cost portable hand held units see Fig 12-01, 12-02. The blue to pink bridging will result in alternating blue and pink links see Figs 23-01 and 23-02.

Fig. 24 is another instance of logically composite networks with two instances of bridging, see 2401, 2402.

Fig. 25 is another instance of a composite network with bridging between IP Gateways 2501 and RFID Blasters and Readers, 2502. The location of RFID tagged warehouse items is trays, being moved by Fork Lifts and people, 2503. Machine controller applications are managed by the nodes so communications between the layers is coordinated to provide near isochronous performance for time for machine controllers. Details provided in Provisional Application 62/465,526, the contents of which are hereby incorporated by reference. The framework supporting these machine controllers

and cloud management is described in Figs 20, 21.

Fig 26, originally from the set of figures in US9019956 B2 (Self-Forming VOIP networks), incorporated herein by reference, first taught methods applicable to supporting voice communications within an isolated network and is revisited in Figs. 18, 19, 27. The methods were further extended to include regional and global streams, see Figs 46 through 49 in US15/0304879A1 (Chirp Networks). Fig 26 is included here for readability.

Fig 27 is a redraw of Fig 19, with a REGIONAL stream bias driving the topology controller to change the root node temporarily to Relay-5 2702 HUB. The Gateway continues to provide internet connectivity. Note that the physical location of nodes has not changed from Figs 19 and Fig. 27. However the network topology is now more application aware and configured correctly.

Details of Specific Embodiments

The description above and below and the drawings of the present document focus on one or more currently embodiments of the present invention and also describe some exemplary optional features and/or alternative embodiments. The description and drawings are for the purpose of illustration and not limitation. Those of ordinary skill in the art would recognize variations, modifications, and alternatives. Such variations, modifications, and alternatives are also within the scope of the present invention. Section titles are terse and are for convenience only.

In the general case, there are multiple variables in wireless transmissions during parent-child link communications e.g. routing paths A, B, C, Figs 16-19.

o transmitters can “speak” simultaneously if they are far apart so neither transmission affects the clarity of the other. Hidden node problems do exist but in general the further apart the simultaneous transmissions, the better, see Figs. 1-10.

-- RF Channel Separation: Two transmitters can speak simultaneously if they are operating on separate, non interfering channels. This requires some intelligence at the machine controller level to direct devices to use allocated channels to avoid interference. Channel separation reduces adjacent and co channel interference and engenders simultaneous transmissions within physical proximity, see Figs. 06-01 et al.

-- RF Frequency Band Separation: Two transmitters can speak simultaneously if they are operating on separate, non interfering channels. This requires some intelligence at the machine controller level to direct devices to use allocated channels to avoid interference. Channel frequency band separation engenders simultaneous transmissions within physical proximity, with no channel (co-channel or adjacent-channel) interference, see Figs 12, 23, 24, 25.

-- RF Timing and Synchronization. Packets may be delayed or prioritized, using Quasi-TDMA time slicing and time sensitive mass-transit shuttle services. The RF medium congestion is thus addressed through variants of time slicing, see US7583648B2 through provisional 62/465,526, incorporated herein, by reference.

The above methods taught refer to efficient transmission from a parent downlink logical radio to a child uplink radio, in compliance with the tree-based switch stack paradigm. This application focuses the the logical link topologies, see Figs 1-9 and Figs 14-19. Our intention is to modify the current network topology to suit the requirement of multiple applications being serviced. These include fail over strategies, efficient voice multicasting, Internet of Things edge device management etc.

Methods taught in US8976733 B2, "Persistent mesh for isolated mobile and temporal networking," the contents of which are incorporated herein by reference, are reviewed. Those methods teach the "rules" under which an isolated cluster of nodes, splits and merges with other clusters, FIG 13, reprinted from that application. Two root like nodes are depicted LFR 1311 and LFR 1321 in isolated clusters 1310 and 1320. A merged cluster 1330 is formed with LFR 1311 retaining its title and LFR 1321 being demoted to LFN 1321.

These methods taught operate on logical links and hence support a generic, radio and protocol abstracted logical network topology controller, applicable to both physical links (e.g radio to radio) and virtual links (e.g application to application).

US8976733, the contents of which are incorporated by reference, teaches methods, trademarked as P3M technology, to enable a node or set of nodes to remain functional without the presence of a wired root node see Fig. 12. Note that is Figs 8-9 there was a fall back wired path to connect to. There is no wired link in Fig 12. Typically, when a wired mesh network loses contact with its root node, all connections within the network are broken. Clients within the mesh no longer transfer data to and from other clients. In disruption tolerant applications DTN) Figs. 12,22, we wish to retain client-to-client connections -- even when the presence of a wired root node is lost. P3M technology allows a wireless mesh network to remain intact in such an event and keep internal communications alive while each node scans and searches for wired (e.g. Internet) connectivity.

US8976733 also teaches how, when a root node is lost, The "branches" or islands of nodes left in the absence of a root node will form their own mesh network, see Fig 13. Clients within these individual mesh networks will retain connections with each other. In each of the new "P3M" meshes, a node is designated as the root node for that particular mesh. This node will have the same functionality as a wired root node with respect to passing network traffic between its child nodes via

its down-link radios but no Internet connectivity. This was defined as a LFR or Limited-Functionality-Root. Meanwhile, the up-link of a P3M root node will scan for wired mesh networks, or other P3M mesh networks. When one is found, the arbitration repeats. One intent is to recruit as many scanning nodes as possible, in the hope of finding a wired connection (Internet connectivity) sooner. Another intent may be to build a more contiguous network so isolated networks are now sharing voice and data internally with each other, if not with the outside world.

US8976733 also describes methods to select which of multiple LFR nodes should be chosen to "lead" the merged tree. The other LFR nodes are automatically demoted to LFN see Fig. 13. and per "rules" This is performed by the MESH CONTROL Fig. 10, 21, which subsequently reorders the routing paths to ensure the network remains contiguous, see Fig 13, 8100, and Fig 22-03. The configurable preference list - deciding which node leads -- is taught as FFR-FFN-LFR-LFN where:

1. FFR (Fully-Functioning Root) A node with a wired network connection. See Figs 1-9.
2. FFN (Fully-Functioning Node) A node that is part of a mesh which is rooted by an FFR. See Figs 1-9.
3. LFR (Limited-Functioning Root) A rooting node, but does not have an actual wired network connection. LFR Root nodes are shown in Figs.12, element 1203 and 1311, 1321.
4. LFN (Limited-Functioning Node) A node that is part of a mesh which is rooted by an LFR. LFN nodes are shown in Figs.12, 13.

RF Power Levels and Proximity

Illustrative rules of merging clusters, Fig. 13, operating on the preference list FFR-FFN-LFR-LFN, are summarized below:

- A. If up-link of an LFR receives the beacon from an FFR or an FFN, it will associate, becoming an FFN.
- B. If up-link of an LFR receives the beacon from an FFR or an FFN, it will associate, becoming an FFN.
- C. If up-link of an LFR receives the beacon from an LFR or LFN of a different P3M mesh network, it will associate, becoming an LFN.
- D. If up-link of an LFN receives the beacon from an LFR or LFN of a different P3M mesh network, it will ignore the beacon and remain part of its own P3M mesh.

Operating on Dynamic Hierarchy Lists

The SCAN function, Fig 10 attempt to find a parent so its node moves up the hierarchy

ladder towards FFR. Being closer to root nodes engenders better throughput with internet services, operating on the Northward bound side of the node tree. It also has reduced latency (fewer hops to the cloud). The hierarchy/preference FFR-FFN-LFR-LFN thus favors applications that need cloud connectivity. Another set of applications, see Figs 18-19, shown a smaller trusted community within a local mesh tree, see phones connected through trusted applications operating on multi-cast subscription list e.g. Phone conferencing. The topology controller then operates on restricted Hierarchy e.g. LFR-LFN with further restrictions to limited trusted nodes and networks managed by the Application layer see Fig 20.

Regardless of the number of modes in the hierarchy list, the Core P3M formation rules should apply since they all operate on a preferences list and logical linked trees. Changing the preferences simply changes the list of options available for P3M formation. Modes of operation may be added., modified or removed. Some nodes may have additional functionality. This hybrid and heterogeneous interoperability provides more connectivity options and is desirable, see Fig 23 where models with different radio links, and number of radios is shown, see root model 4452, connected to models 4350, 4455 etc., pink and blue links and differing number of radios.

Consider a new proposed model supporting a new mode of operation: LFRS (Limited-Functioning Root-Satellite) mode, Figs 14-17. A LFRS node is shown rooting a P3M mesh, but does not have an actual wired network connection as in Figs 1-5. However, one of its 4 slots is capable of providing internet connectivity via satellite. albeit at a lower throughput than a wired connection supplied by an FFR. In the hierarchy of preferences, a scanning (unconnected) node may prefer: FFR FFN LFRS LFR LFN.

Fail-over between two LFRS nodes

This example illustrates disruption-free topology changes.

FIG. 14-16 illustrate application of Fig 13 for new additions to hierarchy preferences to include a new mode, LFRS. In Fig 14, the root node 1401 is shown as a LFRS node, which is a node capable of satellite communications (LFR-Satellite) and therefore shown active in a mobile isolated tree comprising of another inactive, redundant/fail over Satellite capable LFRS 1402, mesh node currently operating dormant and in LFN mode. In Fig 15 the LFRS root node 1501 loses it Satellite connectivity. This demotes it to LFR status thereby preserving the network topology and routing links. No routing paths are changed. A notification is sent to wake up LFRS capable node 1502. When the satellite connection is active, the topology controller is informed.

In Fig. 16, the LFRS fail-over 1602 node has an active satellite link. The topology controller,

operating within MESH CONTROL, changes direction of routing links D and E between 1601 and 1603, see dotted arrows. The routing path changes are localized and the entire tree is not affected. Further, since topology controller is coordinating this across the network, packets affected by routing path changes are buffered and sent after the routing is completed. No packet loss occurs.

Hence, from a application perspective, change is transparent and disruption free. The topology has self healed with minimal disruption. But it is not optimal. Leaf node LFN 16-03 has a circuitous path back to the new “root” node 1602 see A-B-C-D-E. This may trigger a latency/throughput ratio “rule” firing resulting in changes shown in Fig. 17. In Fig 17, a section of the sub tree is modified by the topology controller to reduce the number of hops for LFN 1703 to A-B-C. Note this change was foreseen in Transition Figs. 14-15-16, but was not executed till the fail-over LFRS root node was established 1602. Routing table changes in relevant sub trees are now coordinated through messaging across the nodes to ensure minimal disruption.

Multi-cast routing simplified for application aware pub-sub framework

FIG. 18 and 19 teach a simplified equivalent to multi-casting for node-resident applications that communicate with each other by subscribing to Pub-Sub Topics filters. One such topic subscription is illustrated as a conference phone call - a multi-cast, time sensitive messaging scheme connecting physical edge devices (phones). The devices are being serviced by applications on the connected nodes in this example. As the client/station/device moves, applications would typically "move" with it, actively tracking the movements of the client so as to remain connected. The application then moves from one node to another, if needed, to ensure that the virtual pub-sub communication network remains healthy. This is a variant of mobile temporal networking Fig 12, 22, 23, where the client stations are moving and the mesh nodes and their applications need to track them, to service them and is described in references.

In Figs 18, Relay-1, Relay-2, Relay-6, Relay-8 ideally share information/messages speedily and with minimum overhead. Dotted lines show the path Relay-1 would take to communicate with any of the conference call members. For example Relay-1 must send messages to Relays-2,6,8 using the routing paths available e.g A-B, C-F, A-B-E-G-H, see arrows. A departure from conventional multi-casting is proposed where duplication of unicast message is performed at junctures, with lower overhead.

In Fig 18, Relay-1 forwards to paths C-F and A-B. At Relay-2 it is further duplicated and passed on to Relay-8 via path E-F-H resulting in a total of three unicast messages : A-B, C-F and E-G-H with one duplication at B intended for path E-G-H.

FIG. 19 shows how the routing change for Relay-1 to continue to communicate with others with minimal disruption. It is a reprint of Fig 17 with the new root being old Relay-5. At Relay-2 the packet is duplicated and forwarded to Relays 6, 8 via path E-G-H and E-D-C-F. The three unicast messages are A-B, E-G-H and E-D-C-F.

By contrast, in conventional multi-cast, Relay-1 may publish to the multi-cast "hub" located at the root node for highest visibility. The "hub" then sends duplicated packets to the members of the multi-cast list. Thus, Relay-1 sends to root (hub), path A. The multi-cast engine, at root node Relay-0, generates paths A-B, B-E-G-H, A-C-F to Relays 2,6,8. There is more duplication and hops in this conventional approach.

Note that the applications operating on the mesh nodes are treated as special clients with access to lower level transport functions, see Application Management Layer, Fig 20, 21. Lower level port forwarding rules may be generated automatically, so duplication of paths and routing takes place at the mesh node kernel and costly routing table looking overhead is eliminated. By contrast, IP Multi-casting has to operate at the IP level and cannot access lower level port forwarding easily. Time sensitive, latency aware, Application level, Pub-sub messaging becomes feasible, at lower overhead and higher effectiveness for low cost edge devices.

Testbed Framework for Self-tuning networks.

Fig 20 is a depiction of the network stack of Fig 10, highlighting the features provided at three levels/layers of framework, developed to design, prototype, deploy and refine mesh networking strategies for large industrial enterprise networks that are:

1. Disruption Tolerant - multiple applications are running, both resident on nodes and on client stations (e.g. phones, laptops) must be serviced to support a contiguous connectivity while transitions are occurring. The conference call, Figs 18-19 should ideally not be affected. The application management layer 2003 should ensure that the packets are buffered while routing paths are changed. No packet loss becomes especially relevant for remote machine controllers communicating with edge machines over near isochronous links. Time sensitive messaging may also require time stamps and time synchronization between mesh nodes for accurate audit trails.

2. Channel-Diverse. The Logical Radio concept is based on logical link values and logical channels, Figs 1-9. The actual RF channel frequency used for an up-link-to-down-link link is Dependent on the radio type (WiFi, Satellite, Cellular) and the Frequency Band it operates in. Within that Frequency band, multiple channel options exist with varying interference with adjacent channels of nearby radios or external RF interference. This is addressed by Dynamics Channel Management,

see Figs 1-9.

Large scale networks must deal with Channel congestion and its detrimental side effects to throughput, retries (latency) etc. Hence Channel Diversity is encouraged. In Fig 12, two frequency bands, Red and Blue are used to segment the RF collision domain and dynamically manage co-channel and adjacent-channel interferences. Similarly in Fig 23, the bridging is alternately Blue-pink for a two hop path from root to mobile relay 23-01, 23-02.

3. Tree Based. Large scale networks follow Nature's examples and are logical tree based. Trees based logical radio routing scales as $O(n \log n)$ for scalability and the future proof design. Subtrees within the logical tree may operate in differing preference lists and profiles. The topology management of these sub trees may use a different hierarchy list (e.g. LFR-LFN only). When the entire industrial network is modeled as a merging and splitting of trees, see Fig 13, each sub tree may have its own profile for the current use case and be modeled correctly within the framework. Recall applications running within those sub trees, service a local community, using Pub-sub, for example, and may form their own virtual sub trees. The topology management and self tuning algorithms can thus operate on both real and virtual logical sub trees concurrently, with boundaries defining the range of its operation.

4. Evolutionary: Topology and Channel changes are endemic to large scale networks. Application and clients must be serviced with minimal disruption while transitions occur Figs 14-19. Self-tuning becomes more complex as more applications operate within the multi-tenant environment. RF space may become congested in some areas, caused by client congestion. That forces more clients on a single channel and channel thickness must now be increased (bonding channels). But this reduces the available channels for Dynamic Channel Management to work with. The side effects must thus be modeled and rules/scripts generated and tested through continuous learning - starting with rough simulation models, refining them through real world data etc. At some stage of the refinement/iteration, the simulation model and real world model are running concurrently, sharing information when possible. We call this an evolutionary system - the simulation model is running what-if scenarios and pattern matching to "evolve" the current physical network to its next generation of more advanced scripting rules etc.

The framework Fig 20 supports design, prototype/simulate of network models, then refine the models with real world data to provide continuous what-if scenario analysis and crisis prevention. At the top level 20-03, cloud connectivity services: Network Management, Tunnels for Machine controllers for edge devices and applications resident on those devices or the mesh node

inf. 2003 provides the capability to generate movies/playback what-if scenarios of transition changes, derived from heartbeat and audit logs 20-02 for all applications and their clients (e.g. phones, laptops) Figs 22, 23, 24, 25.

Simulated Movies are generated by simulation models, see Figs 1-5, to cover known test cases, using automated scripting tools to playback and record a story board script that covers the following states of the finite state machine (FSM): initial conditions, Fig 14, intermediate processes Fig 15,16, terminating conditions, Fig.17. Consider transitions depicted Figs 14 through 19. Figs 14-17 depict the mesh topology changes needed to re-establish satellite connectivity, see Fig 22. In the hierarchy list FFR FFN LFRS LFR LFN, this ranks pretty high. However, while these transitions occur active application services are affected, see Figs 18, 19, 24, 25. In Fig 18, the multi-cast equivalent routing scheme generated forwarding table rules for A-B, C-F, Duplicate at B, Forward to E-G-H, see dotted lines. This changes in Fig. 19 to A-B (no change) then E-D-C-F and E-G-H. The aggregated latency at each hop of the routing path e.g. E-D-C-F must be evaluated vs When topology changes are proposed. Simulation models thus operate on insights gained from real world validations and derived from app and station heartbeats and audit logs 2002.

The physical network may ask of its cloud clone - what should I do? and then receive a script/rules update/directive. Unfortunately, this requires cloud connectivity which is not assured in disruption tolerant environments, see Fig 22. Therefore the wisdom should have been downloaded before. This requires that the cloud clone sees ahead, and using pattern recognition from past history and makes probability assessment of potential changes needed by all affected nodes, their application, and their clients. It then runs a movie, showing the network changes, see Figs 1-9. A visual tool to depict all this information is shown in Fig 21.

On approval the appropriate script is downloaded. When run, the audit logs refine those IF-THEN (IFTT) rules sent 2002. As models refine, the real world and simulated models converge and the network can function with intermittent connectivity for longer periods, since the rules have evolved to include more use cases and therefore more look ahead. Decision Trees are developed through this process and the rules generated may be customized for diverse use cases.

In Fig 20, element 2002 depicts the intermediate (Application) level that runs on rules for LFRS parent selection or multicast conferencing. Applications provide their requirements to the Application Management Layer that sets up port forwarding rules and flow constructs through an application coupling layer see 2003. Rules and biases are stored in the rules database, pertinent to the current use case profiles. Application and Mesh node Heart beats are monitored and logged by the Audit database. These logs are retrieved when cloud connectivity is available to drive the rule

generation process offline.

FIG 22 demonstrates how Disruption Tolerant Networking (DTN) is actualized in a battlefield scenario. In 2201, there is a chopper connecting two parts of the convoy, which gets broken, 2202 when the chopper leaves. This is akin to Fig 14, losing the satellite link. Two separate trees are established via LFRS links. Now both trees have Internet connectivity and through the cloud can talk to each other. This is referred to as Cloud VPN see 2203. Phone conferencing is an example application that may be active while a DTN event shown is occurring. The objective of the Framework is to learn to self-tune its topology, with the help of a cloud based clone, to predict and pro-actively change its topology with minimal changes to routing paths or services using those paths.

Driving Self tuning through Generic Guidelines

Consider a policy directive that has been set for the network shown in Figs 14-16. The rule states that the maximum number of hops from a root node not to exceed 3 hops, The topology controller then notes that LFN 1603 has a hop cost of 5: see Path A-B-C-D-E to new root node 1602. Further the sub tree it belongs to includes an ancestor 16-04 with the maximum allowable hops of 3: C-D-E. The Subtree 1604 needs attention.

Nodes LFN-X, LFN-Y and LFN-Z all violate the max allowable hops setting = 3 similar to Figs. 1-9. They need to find parents with hops 2 or less. Fig. 17 depicts the solution determined through evaluating alternate routing for LFN-X, LFN-Y, LFN-Z based on current RF conditions and the location of nearby nodes to serve as parents. As noted above, the simulation model uses recent link quality and node placement (e.g GPS location) to updated the virtual clone of the real world physical network. Hence, the simulation model can now propose topology changes, see also Figs 1-9.

Similarly policy directives may be set for overlay networks e.g. application messaging, running on top of the physical level. The application community Figs 18-19 may specify that the overall jitter/latency from any member of the community cannot exceed 20 ms, for VOIP. If the current latency is 5 ms per physical link hop then the max hops is set at 4 physical hops away, when application is active in teleconferencing /multi-cast mode.

In Fig. 18 the path from Relay-1 to Relay-6 is C-F. This degrades to A-B-E-D-C-F in Fig 19. A preference of maintaining hops not to exceed 3 will drive Fig 16 towards Fig 17. But before it is executed, the system will check where the applications are residing on the affected nodes LFN-X, LFN-Y and LFN-Z, Fig. 16. It is noted that the change will affect the application on Relay-6 adversely.

Here is where the application management and arbitration layer steps in. If the teleconferencing session is active, the topology may be directed to remain sticky till it is completed and options are reevaluated. As an example, when the tele-conferencing session is over, the topology changes from Fig 18 to Fig 19. The teleconferencing applications on Relays are no longer active clients. Other applications, that had lower priority, now demand a topology change from Fig 16 to Fig 17. When the teleconferencing applications become active again, a topology reversal from Fig 17 back to Fig. 16 is requested.

With the ability to rapidly re-route, in place, rules are generated that state:

1. When VOIP teleconferencing is active, it has priority over other applications in the relevant sub tree.
2. Review current throughput/jitter/latency data for the links A, B, etc.
3. Derive the current jitter/latency between servicing applications. e.g Relay-2 to Relay-6.
4. Determine if in compliance with Application specification in stipulated Service Level Agreements.
5. Move the applications over to the mesh nodes, if that alleviates problems, else
6. Request a physical topology change from Fig 17 back to Fig. 16.
7. Retain stickiness, in effect delaying topology change back to Fig 17, while application active.
8. Release control for other applications to drive topology changes.

Note that from Step 7 to Step 8, there may be no clients/applications requiring a topology change. Another rule could be to remain in the current state, encouraging less switching back and forth. Thus the rule decision tree "grows" and is customizable for diverse extensions derived from example decision trees. A library of decision strategies maintain the ancestry of decision trees, so the system can fall back to a previously tested process flow.

Over time, it is noted, from audit logs, that phone conferences take place every Wed morning 7-9 am. This information may also be manually entered as a rule. The Network topology can thus run on schedules, rapidly changing topologies between 7-9 am on Wednesdays to favor VOIP for phones connected. Note that both the location of the applications (on the nodes) and client phones may have changed but generalized setting of jitter/latency still drive the hop count latency rules operating on a logical model of the network. The decision tree may also include conditionally sequenced operations in the form of automated scripts, see sequence Figs 14->15->16.

GLOBAL and REGIONAL streams biases revisited

US9019956 B2 (Self-Forming VOIP networks) first taught methods applicable to supporting voice communications within an isolated network and is revisited in Figs. 18, 19, 26, 27. The methods were further extended to include regional and global streams, see Figs 46 through 49 in US15/0304879A1 (Chirp Networks). Fig 26 is included here for readability.

At the core of both regional and global streams is the question - where are the subscribers/clients?

When the subscribers are on both sides of the network -- that is root downward and root upward, then a GLOBAL stream overhead is justified. An example would be the VOIP phones connected to each other (in a rooted sub tree) but also have conferencing with phones on the other side, beyond the root node to the cloud via internet gateways north of the root node. In Fig. 22-03, for example, the CloudVPN is connecting phones and devices on two different Satellite-aware root nodes to the cloud.

When the bias is towards GLOBAL connectivity then the parent selection algorithm prefers a parent closest to the root. This is good for both throughput and latency of northbound, internet dependent, traffic. Hence the heirarchy list FFR FFN LFRS LFR LFN. The bias towards being as close as possible to an internet gateway is clear for GLOBAL streams.

The power of an application framework, Fig. 20, is that through simulation we can experiment (and learn) other biases, more suitable to the clients using the multi-tenant network infrastructure and proactively change the network topology accordingly.

Figs 18, 19 are REGIONAL streams but the gateway bias is in effect increasing latency for the voice conferencing application. In Fig 27, the network reforms with an affinity around Relay-4 HUB. 27-02 as a temporary root node. Note that the (old) root node, RELAY-5, 27-01 is still active as a gateway. Routing paths have changed but internet connectivity is still active.

RELAY-5 was chosen as the HUB (temporary root) in this example because it is nearest the centriod of the REGIONAL streams boundaries. Further, new routing paths I and J are introduced and D direction is reversed. The old paths are not forgotten and when the voice calls are over, the network may revert back to a northbound gateway bias.

Algorithmically, a regional stream asserts a topology change request of the system to disengage from a default gateway bias and select a root node closest to all the nodes- a regional bias. The topology controller then evaluates (first in simulation and next in real world) the what-if scenarios of rerouting if nodes within the REGION boundaries are selected as HUB. Relay-5 is selected because it has the least disruption in routing paths and/or bridge latencies. Note that nodes have not changed in physical positions during these exercises. Only the routing has changed and it

can rapidly switch to another predefined bias when requested.

This is a multi-tenant environment with multiple applications and diverse gateway/hub biases. Multiple hubs will be proposed. The most sought after (e.g. within the top three choices for all active tenant applications) is voted most-popular HUB candidate. This is an extension and re-use of the mobility SCAN agent, Fig. 10 with a different set of metrics.

Summary

As disclosed, the system is concerned with several issues.

Convergence: There is increasing demand within the industrial enterprise, the smart home, car and cities to employ one wireless network to support both voice, video and data applications. The "voice" network, e.g. the telephone system, is often separate from the "data" network. Convergence is, as the name implies, the ability to converge these two networks into one network, servicing diverse performance (throughput, jitter, latency) requirements demanded by the applications running within one network, Fig 22.

Rapid Re-routing: The challenge lies in providing--within the same wireless network--the ability to address potentially conflicting latency and throughput needs of diverse applications. For example, voice needs to be transmitted with low delay (latency). Occasional voice packet loss is assumed. Conversely, data transmissions mandate delivery of all packets and while low latency is desirable it is not essential. Wireless network topologies should ideally be driven by the needs of application processes, see Figs 1-4. When not possible, switch over to another routing path ("topology") should be transparent to end user applications.

Self-Tuning: Large network deployments, operating over multiple radio protocols and hardware, require an device abstracted framework that incorporates machine learning to predict and avoid network bottlenecks by changing routing paths etc., before network bottlenecks occur. Learnt behaviors may first be validated in a simulation environment with representative test cases and then tested in the real world. Real world data is gathered and refines and evolves the simulation models -- which in turn refine the rules or parameters settings for the network. These networks are disruption tolerant by design: Connectivity with "cloud" servers is intermittent at best. The framework must therefore support isolated networks, often mobile, that coalesce with other trusted networks to form larger "logical" networks see Figs. 21-25.

CLAIMS

1. A multilayer architecture for supporting variable networks comprising:
an application layer in communication with a simulation and network management layer; and
a coupling layer;
wherein said coupling layer interfaces with physical connections within a network device and
the remaining layers; and wherein the simulation and network management layer sets one or
more network parameters within the application layer.
2. The multilayer architecture of claim 1 wherein said application layer comprises a store of
rules for network performance.
3. The multilayer architecture of claim 1 wherein said application layer comprises a store of
audit tools for network performance.
4. The multilayer architecture of claim 1 wherein said application layer further comprises an
interface for an application.
5. The multilayer architecture of claim 1 wherein said application layer comprises an
application management layer.
6. The multilayer architecture of claim 1 wherein said communication messages between the
simulation and network management layer and the application layer are time sensitive.
7. The multilayer architecture of claim 6 wherein said time sensitive communication messages
between the simulation and network management layer comprise publisher and subscribe
messages.
8. The multilayer architecture of claim 1 wherein said simulation and network management
layer determines the optimum layout for a tree-based network.

ABSTRACT

A multilayer architecture for supporting variable networks is discussed. The architecture includes an application layer in communication with a simulation and network management layer and a coupling layer. The coupling layer interfaces with physical connections within a network device and the remaining layers; and wherein the simulation and network management layer sets one or more network parameters within the application layer.

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Basic Filing:				
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UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	183360	no	10
			6fa738180dac3e074145f26c97bac5f1c7153345		
Warnings:					
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2	Drawings-only black and white line drawings	Drawings.pdf	5711680	no	27
			8ca358bf3ecf3f60a39ee897c5a391e7ceae5800		
Warnings:					
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3		Specification.pdf	220829	yes	26
			b085d89f0fa645bdf9b28f785d599f3a771ae120		
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	Specification		1	24	
	Claims		25	25	
	Abstract		26	26	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	36820	no	2
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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.

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PATENT ASSIGNMENT COVER SHEET

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RECEIVING PARTY DATA	
Name:	MESH DYNAMICS
Street Address:	3355 BENTON STREET
City:	SANTA CLARA
State/Country:	CALIFORNIA
Postal Code:	95051
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15908108
CORRESPONDENCE DATA	
Fax Number:	(312)621-0088
<i>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.</i>	
Phone:	3126211330
Email:	mail@cherskov.com
Correspondent Name:	SZYMON GURDA
Address Line 1:	123 WEST MADISON ST.
Address Line 2:	SUITE 400
Address Line 4:	CHICAGO, ILLINOIS 60602
ATTORNEY DOCKET NUMBER:	0357-03363
NAME OF SUBMITTER:	SZYMON M. GURDA
SIGNATURE:	/Szymon M. Gurda/
DATE SIGNED:	03/12/2018
This document serves as an Oath/Declaration (37 CFR 1.63).	
Total Attachments: 2	
source=03363#page1.tif	
source=03363#page2.tif	

COMBINED DECLARATION AND ASSIGNMENT

As a below named inventor, I hereby declare that:

I believe I am the original inventor or an original joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled "EVOLUTIONARY WIRELESS NETWORKS" (Attorney Ref. No. 0357-03363), the specification of which

(Check one) ☐ was filed herewith.
☒ was filed on Feb. 28, 2018
with serial number 15/908,108

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above and that the above-identified application was made or authorized to be made by me.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 (a).

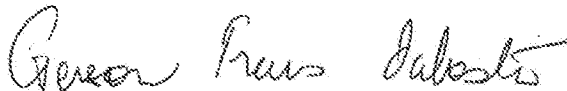
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment of not more than 5 years, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Further, the undersigned, for good and valuable considerations to me in hand paid, the receipt and sufficiency whereof is hereby acknowledged, have sold, assigned, conveyed and set over, and do hereby sell, assign, convey and set over unto Dynamic Mesh Networks, Inc. DBA MeshDynamics ("MESHDYNAMICS"), a California Corporation having an address of 3355 Benton Street, Santa Clara, CA 95051, and existing under laws of the state of California, its successors and assigns, the entire right title and interest in and to all subject matter invented or designed by me and disclosed in the above identified patent application, and executed by me on the date hereinafter set forth, and any divisions and continuations thereof that may be obtained therefor, and the right, where such right can be legally exercised in its own name to apply for and obtain Letters Patent, Inventor's Certificates, Utility Models and Designs, in countries foreign to the United States, including the full right to claim for any such application the benefits of the International Convention as fully and entirely as could have done if the application had been in the undersigned's name, and the entire interest in any Letters Patent, Inventor's Certificate, Utility Model or Design which may be granted on any such application in such foreign country; and the undersigned hereby authorize and request the Commissioner of Patents and Trademarks of the United States, and any official of any country or countries foreign to the United States whose duty it is to issue Letters Patent, Inventor's Certificates, Utility Models and Designs that may be granted for said invention to said MESHDYNAMICS, its successors and assigns.

And for the above-named considerations the undersigned hereby agree that the undersigned will without additional compensation but without cost, promptly communicate to MESH DYNAMICS, its successors and assigns, any facts known to me respecting said invention whenever requested, and testify in any legal proceedings, sign all lawful papers, execute all divisional, continuing and reissue applications for Letters Patent, Inventor's Certificates, Utility Models and Designs and assignments thereof, make all rightful oaths and generally do everything possible to aid said assignee, its successors and assigns, as and when requested by them, in obtaining and enforcing proper Letters Patents, Inventor's Certificate, Utility Model and Design protection for said invention or inventions and improvements, in the United States and in all other countries.

Full name of first inventor: Francis daCosta

City of Residence: Santa Clara, California



Inventor's Signature: _____

Date: Feb 28 2018

Full name of second inventor: Vivek Gupta

City of Residence: Bangalore, India

Inventor's Signature: Vivek Gupta

Date: Feb 28 2018



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/908,108	02/28/2018	2123	865	0357-03363	8	1

CONFIRMATION NO. 4709

FILING RECEIPT



0000000098309714

27197
MICHAEL J. CHERSKOV
123 WEST MADISON STREET
SUITE 400
CHICAGO, IL 60602

Date Mailed: 03/27/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Francis DACOSTA, Santa Clara, CA;
Vivek Gupta, Bangalore, INDIA;

Applicant(s)

MeshDynamics, Santa Clara, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CIP of 15/728,863 10/10/2017
and claims benefit of 62/465,526 03/01/2017
and said 15/728,863 10/10/2017
is a CON of 14/740,062 06/15/2015 PAT 9819747
which claims benefit of 62/012,196 06/13/2014
and is a CIP of 13/764,008 02/11/2013 PAT 9363651
which is a CIP of 13/627,883 09/26/2012 PAT 8923186
which claims benefit of 61/615,802 03/26/2012
and claims benefit of 61/555,400 11/03/2011
and claims benefit of 61/621,926 04/09/2012
and said 14/740,062 06/15/2015
is a CIP of 13/571,294 08/09/2012 PAT 9172738
which is a CIP of 12/696,947 01/29/2010 PAT 8520691
which claims benefit of 61/148,803 01/30/2009
and said 13/571,294 08/09/2012
is a CIP of 12/352,457 01/12/2009 PAT 8477762
and said 14/740,062 06/15/2015
is a CIP of 13/541,446 07/03/2012 ABN

and is a CIP of 14/523,778 10/24/2014 PAT 9730100
which is a CON of 12/625,365 11/24/2009 PAT 8514852
which claims benefit of 61/117,502 11/24/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 03/23/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/908,108**

Projected Publication Date: 07/05/2018

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Evolutionary Wireless Networks

Preliminary Class

703

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application

serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number
15/908,108

APPLICATION AS FILED - PART I

(Column 1)		(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(j))	8	minus 20 = *	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
			TOTAL	785		TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15908108
	Filing Date		2018-02-28
	First Named Inventor	daCosta, Francis	
	Art Unit	2123	
	Examiner Name		
	Attorney Docket Number	0357-03363	

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6912373	B2	2005-06-28	Lee	
	2	6799045	B1	2004-09-28	Brouwer	
	3	7200130		2007-04-03	Forstadius et al	
	4	6046992		2000-04-04	Meier et al.	
	5	7190960		2007-03-13	Tuomela et al.	
	6	6909705		2005-06-21	Lee et al.	
	7	7058050		2006-06-06	Johansson et al.	
	8	7164667	B2	2007-01-16	Rayment et al.	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
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Application Number		15908108
Filing Date		2018-02-28
First Named Inventor	daCosta, Francis	
Art Unit		2123
Examiner Name		
Attorney Docket Number		0357-03363

9	7428300	B1	2008-09-23	Drew	
10	6363062	B1	2002-03-26	Aaronson	
11	7420952	B2	2008-09-02	daCosta	
12	7583648	B2	2009-09-01	daCosta	
13	7738402	B2	2010-06-15	Feldman	
14	7649852	B2	2010-01-19	Thubert	
15	8589247	B2	2013-11-19	Mesaros	
16	6912204	B2	2005-06-28	Kossi	
17	8060395	B1	2011-11-15	Frasher	
18	5818830		1998-10-06	Daane	
19	7085292	B1	2006-08-01	Grayson	

**INFORMATION DISCLOSURE
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Examiner Name		
Attorney Docket Number	0357-03363	

20	9258765	B1	2016-02-09	daCosta	
21	8923186	B1	2014-12-30	daCosta	
22	9363651	B1	2016-06-07	daCosta	
23	5935268		1999-08-10	Weaver	
24	8144637	B2	2012-03-27	Goldberg	
25	7408928	B2	2008-08-05	Bradd	
26	7443842	B2	2008-10-28	Miyamoto	
27	5546391		1996-08-13	Mahany	
28	6982960	B2	2006-01-03	Lee	
29	5867785		1999-02-02	Averbuch	
30	7103371	B1	2006-09-05	Liu	

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Attorney Docket Number	0357-03363

31	6393261	2002-05-21	Lewis
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	1	20020159409	A1	2002-10-31	Wolfe et al.	
	2	20020085719	A1	2002-07-04	Crosbie	
	3	20020055978	A1	2002-05-09	Jonn-Bo et al.	
	4	20030012193	A1	2003-01-06	Novaes	
	5	20070174875	A1	2001-12-13	Yang	
	6	20120202514	A1	2012-08-09	Kadirkamathan	
	7	20100150170	A1	2010-06-17	Lee	
	8	20020176390	A1	2002-11-28	Sparr	

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Application Number		15908108
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Art Unit		2123
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Attorney Docket Number		0357-03363

9	20150036649	A1	2015-02-05	Chen	
10	20130343430	A1	2013-12-26	Bettendorff	
11	20070183346	A1	2007-08-09	Thubert	
12	20040100929	A1	2004-05-27	Garcia-Luna-Aceves	
13	20090304381	A1	2009-12-10	Muppidi	
14	20040095900	A1	2004-05-20	Siegel	
15	20020191573	A1	2002-12-19	Whitehill	
16	20020137459	A1	2002-09-26	Ebata	
17	20030115282	A1	2003-06-19	Rose	
18	20110225293	A1	2011-09-15	Rathod	
19	20110208822	A1	2011-08-25	Rathod	

**INFORMATION DISCLOSURE
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Attorney Docket Number		0357-03363

20	20110276396	A1	2011-11-10	Rathod	
21	20100223581	A1	2010-09-02	Manolescu	
22	20090311658	A1	2009-12-17	Polivka	
23	20110276628	A1	2011-11-10	Pell	
24	20080214175	A1	2008-09-04	Papadoglou	
25	20070204021	A1	2007-08-30	Ekl	
26	20020082035	A1	2002-06-27	Aihara	
27	20080320148	A1	2008-12-25	Capuozzo	
28	20100115107	A1	2010-05-06	Mitsubishi	
29	20080063001	A1	2008-03-13	Tanimoto	
30	20050237992	A1	2005-10-27	Mishra	

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31	20050286464	A1	2005-12-29	Saadawi	
32	20040058678	A1	2004-03-25	deTorbal	
33	20040137877	A1	2004-06-15	Crowhurst	
34	20030147424	A1	2003-08-07	Famolari	
35	20030012168	A1	2003-01-16	Elson	
36	20050153725	A1	2005-07-14	Naghian	
37	20110231321	A1	2011-09-22	Milne	
38	20040203787	A1	2004-10-14	Naghian	
39	20060193325	A1	2008-08-31	Takagi	
40	20070144618	A1	2007-06-28	Adar	
41	20070174875	A1	2007-07-26	Medford	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

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Attorney Docket Number	0357-03363

42	20020062388	A1	2002-05-23	Ogier
43	20100036690	A1	2010-02-11	Chafle
44	20070282651	A1	2007-12-06	Naik
45	20070136118	A1	2007-06-14	Gerlach
46	20060200374	A1	2006-09-07	Nelken
47	20030200185	A1	2003-10-23	Huerta

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

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Art Unit	2123
Examiner Name	
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
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Art Unit	2123
Examiner Name	
Attorney Docket Number	0357-03363

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Szymon M. Gurda/	Date (YYYY-MM-DD)	2018-06-04
Name/Print	Szymon M. Gurda	Registration Number	58451

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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. **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.

Electronic Acknowledgement Receipt

EFS ID:	32800510
Application Number:	15908108
International Application Number:	
Confirmation Number:	4709
Title of Invention:	Evolutionary Wireless Networks
First Named Inventor/Applicant Name:	Francis DACOSTA
Customer Number:	27197
Filer:	Szymon Maciej Gurda
Filer Authorized By:	
Attorney Docket Number:	0357-03363
Receipt Date:	04-JUN-2018
Filing Date:	28-FEB-2018
Time Stamp:	18:01:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	TransmittalLetter.pdf	65294	no	1
			8a875db1a483409a9ee5ab449ad140838d78de5		

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	1037358	no	11
			227173ab3395495f910c780523ceacb353209ffe		
Warnings:					
Information:					
Total Files Size (in bytes):				1102652	
<p>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.</p> <p><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.</p> <p><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.</p> <p><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.</p>					

UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): MeshDynamics
Title: EVOLUTIONARY WELLNESS NETWORKS
Serial Number: 15/908,108
Filing Date: February 28, 2018
Attny Docket: 0357-03363

Sent via EFS-WEB on June 4, 2018.

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

123 West Madison Street, Suite 400
Chicago, Illinois 60602
(312) 621-1330

DISCLOSURE STATEMENT PER 37 C.F.R. § 1.97 & § 1.98

Sir:

The citations listed on accompanying form PTO PTO/SB/08a and PTO/SB/08b are submitted in compliance with the duty of disclosure defined in 37 C.F.R. §§ 1.97 and 1.98. Copies of non-U.S. Patent references are enclosed.

This Disclosure Submission Statement is not to be construed as a representation that a search has been made, that additional matter material to the examination of this application does not exist, or that any one or more of these citations constitutes prior art under 35 U.S.C. 102.

Respectfully submitted,
CHERSKOV FLAYNIK & GURDA, LLC

BY /Szymon M. Gurda /
Szymon M. Gurda (Reg. No. 58451)



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/908,108	02/28/2018	Francis DACOSTA	0357-03363

CONFIRMATION NO. 4709

PUBLICATION NOTICE



OC000000100758550

27197
MICHAEL J. CHERSKOV
123 WEST MADISON STREET
SUITE 400
CHICAGO, IL 60602

Title:Evolutionary Wireless Networks

Publication No.US-2018-0191836-A1

Publication Date:07/05/2018

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <https://portal.uspto.gov/pair/PublicPair>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/908,108	02/28/2018	Francis DACOSTA	0357-03363	4709
27197	7590	03/07/2019		
MICHAEL J. CHERSKOV 123 WEST MADISON STREET SUITE 400 CHICAGO, IL 60602			EXAMINER FOUD, HICHAM B	
			ART UNIT	PAPER NUMBER
			2467	
			NOTIFICATION DATE	DELIVERY MODE
			03/07/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

akeith@cherskov.com
mail@cherskov.com
sgurda@cherskov.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):

(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-8 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Claims 1-8 are vague and indefinite because it is unclear whether the claims are drawn to a method or a system. Moreover, the claims recites a plurality of layers: “application layer”, “simulation and network management layer” and “coupling layer” which are vague and indefinite because the protocol layers are just parts of system models such as an Open Systems Interconnection model (OSI model) which is a conceptual model that characterizes and standardizes the communication functions of a telecommunication or computing system without regard to its underlying internal structure and technology. Its goal is the interoperability of diverse communication systems with standard protocols. The model partitions a communication system into abstraction layers (wikipedia). Therefore, it is not clear how the abstraction layers are

being implemented in the claimed invention. It is well-known in the art that network equipment such as a router can be mapped to protocol layers such application layer (OSI) for easy understanding and wherein components of the router such as processor and memory are behind its functionalities. Thus, it is not known the metes and the bounds of the claimed invention.

Claim 1 recites the limitation "the remaining layers" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim 6 recites the limitation "said communication messages" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

3. Claims 1-5 are rejected under 35 U.S.C. 102a1 as being anticipated by Chung (US 2010/0005166).

For claim 1, Chung discloses a multilayer architecture for supporting variable networks (see at least Fig.2) comprising: an application layer (see at least Fig.2; at least application layer 60) in communication with a simulation and network management layer (see at least Fig.2; at least parameter management 100 and network layer 70); and a coupling layer (see at least Fig.2; at least physical layer 90); wherein said coupling layer interfaces with physical connections within a network device and the remaining layers (see at least Fig.2; at least physical layer 90 that interfaces with connections via respective protocol such as RF and with other layers); and wherein the simulation and network management layer sets one or more network parameters within the application layer (see at least [0049]; at least management 100 sets network parameter(s) within the application layer).

For claim 2, Chung further discloses wherein said application layer comprises a store of rules for network performance (see at least Fig.2; at least network management function within application layer 60).

For claim 3, Chung further discloses wherein said application layer comprises a store of audit tools for network performance (see at least Fig.2; at least network management function within application layer 60).

For claim 4, Chung further discloses wherein said application layer further comprises an interface for an application (see at least Fig.2; AL-SAP interface).

For claim 5, Chung further discloses wherein said application layer comprises an application management layer (see at least Fig.2; application sublayer 63).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 6-7 are rejected under 35 U.S.C. 103 as being unpatentable over Chung in view of Moeller et al (US 2006/0069702).

For claim 6-7, Chung further discloses wherein said communication messages between the simulation and network management layer and the application layer are communication messages (see at least [0056]; at least data/primitives) and wherein it is well-known in the art that data/messages are transferred via the layers when exchanging traffic with the network. Chung discloses all the claimed subject matter with the exception of explicitly disclosing that the messages are time sensitive communication messages that comprise publisher and subscribe messages. However, Moeller discloses the use of publish/subscribe messages (see at least [0007]). Thus, it would have been obvious to the one ordinary skill in the art before the effective filing date of the claimed invention to use the teaching of Moeller into the method/system of Chung for the purpose of at least allowing direct data communication to be passively received by interested consumers (push technology).

5. Claim 8 is rejected under 35 U.S.C. 103 as being unpatentable over Chung in view of Lapuh et al (US 2009/0092043).

For claim 8, Chung discloses all the claimed subject matter with the exception of explicitly disclosing wherein said simulation and network management layer determines the optimum layout for a tree-based network. However, Lapuh discloses that at least the network layer (claimed layer) is responsible for implementing appropriate routing protocol (OSPF, RIP...) such as at least calculating a shortest path tree (claimed optimum layout) (see at least [0033]) . Thus, it would have been obvious to the one ordinary skill in the art before the effective filing date of the claimed invention to use the teaching of Lapuh into the method/system of Chung for the purpose of at least finding best routes for data transfer in tree-based network.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HICHAM B FOUAD whose telephone number is (571)270-1463. The examiner can normally be reached on Monday-Friday, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Phillips can be reached on 571-272-3940. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HICHAM B FOUAD/
Primary Examiner, Art Unit 2467

Notice of References Cited	Application/Control No. 15/908,108		Applicant(s)/Patent Under Reexamination DACOSTA et al.	
	Examiner HICHAM B FOUD		Art Unit 2467	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20130238404-A1	09-2013	ELIAS; Fernando Alba	G06Q10/06398	705/7.42
*	B	US-20180110040-A1	04-2018	Chamarti; Aravind	H04W4/60	1/1
*	C	US-20170046127-A1	02-2017	Fletcher; Tristan Antonio	G06F7/10	1/1
*	D	US-20120023545-A1	01-2012	QU; Yujang	H04L45/04	726/1
*	E	US-20060069702-A1	03-2006	Moeller; Tyler	G06F9/542	1/1
*	F	US-20120163520-A1	06-2012	Liu; Shao	G01S5/0018	375/356
*	G	US-20100064007-A1	03-2010	Randall; Stephen	G06Q30/02	709/204
*	H	US-20170310605-A1	10-2017	Garcia; Roger	H04L47/822	1/1
*	I	US-9256761-B1	02-2016	Sahu; Sudheer	G06F16/21	1/1
*	J	US-20140105035-A1	04-2014	LAM; Maria G.	H04W28/22	370/252
*	K	US-20090007156-A1	01-2009	Baek; Seung-Myun	H04L12/2803	719/328
*	L	US-20100005166-A1	01-2010	Chung; Jong-Hoon	H04L12/2803	709/224
*	M	US-20090092043-A1	04-2009	Lapuh; Roger	H04L49/552	370/228

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)

Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Search Notes</i> 	Application/Control No. 15/908,108	Applicant(s)/Patent Under Reexamination DACOSTA et al.
	Examiner HICHAM B FOUD	Art Unit 2467

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
(H04L12/4625 OR H04L45/02 OR H04L45/48 OR H04L67/10 OR H04L67/145 OR H04W40/248 OR H04W4/14 OR H04W80/12 OR H04W84/18)	03/03/2019	hf

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventorship search	03/03/2019	hf
Limited text search	03/03/2019	hf

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/HICHAM B FOUD/ Primary Examiner, Art Unit 2467	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	1	15/908108 and layer	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 18:16
S3	428	((("DACOSTA") near3 ("Francis"))) OR ((("GUPTA") near3 ("Vivek"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/03/02 23:28
S4	1	((application adj1 layer) with simulation same (coupling adj1 layer)).clm.	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 23:37
S5	1	((application adj1 layer) with simulation same (coupling adj1 layer))	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 23:39
S6	1	S3 and S5	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 23:39
S7	21	((application adj1 layer) same (coupling adj1 layer))	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 23:40
S8	1	S3 and S7	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 23:40
S9	64329	((H04L12/4625 OR H04L45/02 OR H04L45/48 OR H04L67/10 OR H04L67/145 OR H04W40/248 OR H04W4/14 OR H04W80/12 OR H04W84/18).CPC.)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 23:47
S10	1	S7 and S9	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/02 23:47
S11	36	(multilayer adj2 architecture).clm.	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 11:55
S12	1	15/908108	US-PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 12:18
S13	1	S12 and software	US-PGPUB;	OR	ON	2019/03/03 12:18

			USPAT; USOCR			
S14	0	multilayer with application same network same pphysical	US- PGPUB; USPAT; USOCR	OR	ON	2019/03/03 12:59
S15	0	architecture with application same network same pphysical	US- PGPUB; USPAT; USOCR	OR	ON	2019/03/03 13:00
S16	4310	architecture with application same network same physical	US- PGPUB; USPAT; USOCR	OR	ON	2019/03/03 13:01
S17	1	15/908108	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 13:01
S18	64329	((H04L12/4625 OR H04L45/02 OR H04L45/48 OR H04L67/10 OR H04L67/145 OR H04W40/248 OR H04W4/14 OR H04W80/12 OR H04W84/18).CPC.)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 13:02
S19	353	S16 and S18	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 13:02
S20	28	S16 and S18 and simulation	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 13:02
S21	321	(store with rules with audit)	US- PGPUB; USPAT	OR	ON	2019/03/03 14:34
S22	407	((store storing) with rules with audit)	US- PGPUB; USPAT	OR	ON	2019/03/03 14:35
S23	4	S22 and S18	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 14:35
S24	0	(publisher with subscribe) same (simulation adj3 layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:15
S25	0	(publisher with subscribe) same (layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:19
S26	53	(publisher with subscribe) same (layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:19
S27	53	(publisher with subscribe) same (layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:19
S28	1	(publisher with subscribe) same	US-	OR	OFF	2019/03/03

		(simulation adj3 layer)	PGPUB; USPAT; USOCR			15:20
S29	8	S27 and S18	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:23
S30	0	(publisher with subscribe) same (application adj3 layer) same (network adj1 layer) same ((data physical) adj2 network)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:36
S31	0	(publisher with subscribe) same (application adj3 layer) same ((data physical) adj2 network)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:36
S32	0	(publisher with subscribe) same (application adj3 layer) same ((data physical) adj2 lauer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:37
S33	0	(publisher with subscribe) same (application adj3 layer) same ((data physical) adj2 layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:37
S34	7	(publisher with subscribe) same (application adj3 layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:42
S35	0	S22 and S34	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 15:43
S36	1399	(management adj2 layer) same (application adj3 layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 16:01
S37	460	(management adj2 layer) same (application adj3 layer) same ((data physical) adj3 layer)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 16:02
S38	15	(management adj2 layer) same (application adj3 layer) same ((data physical) adj3 layer) and (publisher subscribe)	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 16:02
S39	1	(management adj2 layer) same (application adj3 layer) same ((data physical) adj3 layer) same simulation	US- PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 16:10
S40	77	("20020055978" "20020062388" "20020082035" "20020085719" "20020137459" "20020159409" "20020176390" "20020191573" "20030012168" "20030012193" "20030115282" "20030147424" "20030200185" "20040058678" "20040095900" "20040100929" "20040137877" "20040203787" "20050153725" "20050237992" "20050286464" "20060193325" "20060200374" "20070136118" "20070144618" "20070174875"	US- PGPUB; USPAT	OR	OFF	2019/03/03 17:16

		"20070183346" "20070204021" "20070282651" "20080063001" "20080214175" "20080320148" "20090304381" "20090311658" "20100036690" "20100115107" "20100150170" "20100223581" "20110208822" "20110225293" "20110231321" "20110276396" "20110276628" "20120202514" "20130343430" "20150036649" "5546391" "5818830" "5867785" "5935268" "6046992" "6363062" "6393261" "6799045" "6909705" "6912204" "6912373" "6982960" "7058050" "7085292" "7103371" "7164667" "7190960" "7200130" "7408928" "7420952" "7428300" "7443842" "7583648" "7649852" "7738402" "8060395" "8144637" "8589247" "8923186" "9258765" "9363651").PN.				
S41	39	multilayer with application same network same physical	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 17:23
S42	0	S40 and S41	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 17:23
S43	140955	application same network same physical	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 17:23
S44	140955	application same network same physical	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 17:23
S45	11	S40 and S44	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 17:23
S46	26932	multilayer with application	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 17:34
S47	0	S40 and S46	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 17:34
S48	1	15/908108	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 18:43
S49	24631	layer with interface same performance	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 19:03
S50	0	layer with interface same rules with tools same (network adj1 performance)	US-PGPUB; USPAT;	OR	ON	2019/03/03 19:04

			USOCR			
S51	0	layer with interface same rules same tools same (network adj1 performance)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 19:04
S52	330	layer with interface same (network adj1 performance)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 19:04
S53	0	layer with interface same (network adj1 performance) same simulation	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 19:04
S54	42	layer same (network adj1 performance) same simulation	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 19:04
S55	6986	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 19:41
S56	151	(publisher with subscribe) and S55	US-PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 19:42
S57	9	(publisher with subscribe) and S55 and tree adj1 based	US-PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 19:42
S58	0	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer) same (tree adj1 based)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 22:32
S59	134	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer) same (tree)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 22:32
S60	64329	((H04L12/4625 OR H04L45/02 OR H04L45/48 OR H04L67/10 OR H04L67/145 OR H04W40/248 OR H04W4/14 OR H04W80/12 OR H04W84/18).CPC.)	US-PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 22:33
S61	24	S59 and S60	US-PGPUB; USPAT; USOCR	OR	OFF	2019/03/03 22:33
S62	173	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer) and publisher and subscribe	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 23:01
S63	6986	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 23:16
S64	36	(application adj1 layer) same (network adj1 layer) with (routing adj1 table) same (physical adj1 layer)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 23:17

S65	7	(application adj1 layer) same (network adj1 layer) with (routing adj1 table) same (physical adj1 layer) and tree	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/03 23:18
S66	52	(application adj1 layer) with parameter with (network adj1 layer) same (physical adj1 layer)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/04 00:10
S67	0	(application adj1 layer) with parameter with (network adj1 layer) same (physical adj1 layer) and publisher and subscribe	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/04 00:44
S68	164	(application adj1 layer) with (network adj1 layer) same (physical adj1 layer) and publisher and subscribe	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/04 00:47
S69	3	(application adj1 layer) with parameter with (network adj1 layer) same (physical adj1 layer) and tree	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/04 00:48
S70	0	(management adj1 layer) with (shortest near5 tree)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/04 01:00
S71	108	(layer) with (shortest near5 tree)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/04 01:00
S72	33	(layer adj1 "3") with (shortest near5 tree)	US-PGPUB; USPAT; USOCR	OR	ON	2019/03/04 01:07

EAST Search History (Interference)

< This search history is empty >

3/ 4/ 2019 3:26:51 AM
C:\ Users\ hfoud\ Documents\ EAST\ Workspaces\ 15908108.wsp

Bibliographic Data

Application No: 15/908,108

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged:
Examiner's Signature Initials

Title:

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
02/28/2018	370	2467	0357-03363
RULE			

APPLICANTS

MeshDynamics, Santa Clara, CA,

INVENTORS

Francis DACOSTA Santa Clara, CA, UNITED STATES

Vivek Gupta Bangalore, INDIA

CONTINUING DATA

This application is a CIP of 15728863 10/10/2017

This application has PRO of 62465526 03/01/2017

15728863 is a CON of 14740062 06/15/2015 PAT 9819747

14740062 is a CIP of 14523778 10/24/2014 PAT 9730100

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13627883 has PRO of 61621926 04/09/2012

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13571294 is a CIP of 12696947 01/29/2010 PAT 8520691

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FOREIGN APPLICATIONS

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PTO/SB/08a (03-15)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2016. OMB 0651-0031

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number	15908108
Filing Date	2018-02-28
First Named Inventor	daCosta, Francis
Art Unit	2123
Examiner Name	
Attorney Docket Number	0357-03363

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	6912373	B2	2005-06-28	Lee	
	2	6799045	B1	2004-09-28	Brouwer	
	3	7200130		2007-04-03	Forstadius et al	
	4	6046992		2000-04-04	Meier et al.	
	5	7190960		2007-03-13	Tuomela et al.	
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Attorney Docket Number	0357-03363

9	7428300	B1	2008-09-23	Drew	
10	6363062	B1	2002-03-26	Aaronson	
11	7420952	B2	2008-09-02	daCosta	
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20	9258765	B1	2016-02-09	daCosta
21	8923186	B1	2014-12-30	daCosta
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	31	6393261	2002-05-21	Lewis
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First Named Inventor	daCosta, Francis
Art Unit	2123
Examiner Name	
Attorney Docket Number	0357-03363

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Attorney Docket Number	0357-03363

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First Named Inventor	daCosta, Francis
Art Unit	2123
Examiner Name	
Attorney Docket Number	0357-03363

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

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Application Number	15908108	
Filing Date	2018-02-28	
First Named Inventor	daCosta, Francis	
Art Unit	2123	
Examiner Name		
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Examiner Signature	/HICHAM B FOUD/	Date Considered	03/03/2019
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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Application Number	15908108
Filing Date	2018-02-28
First Named Inventor	daCosta, Francis
Art Unit	2123
Examiner Name	
Attorney Docket Number	0357-03363

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Szymon M. Gurda/	Date (YYYY-MM-DD)	2018-06-04
Name/Print	Szymon M. Gurda	Registration Number	58451

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PATENT

Confirmation No. 4709

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Francis Dacosta
Title: Evolutionary Wireless Networks
Serial No.: 15/908,108
Filing Date: Feb. 28, 2018
Examiner: Hicham Foud
Art Unit: 4709
Atty. Docket: 0357-03363

Submitted via EFS-Web on July 8, 2019.

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RESPONSE TO NON-FINAL OFFICE ACTION

Dear Sir:

In response to the March 7, 2019 Non-Final Office Action, the Applicant submits the following amendments and remarks:

Amendments to the Claims begin on page two of this document.

Remarks/Arguments begin on page of this document.

Electronic Patent Application Fee Transmittal

Application Number:	15908108			
Filing Date:	28-Feb-2018			
Title of Invention:	Evolutionary Wireless Networks			
First Named Inventor/Applicant Name:	Francis DACOSTA			
Filer:	Szymon Maciej Gurda			
Attorney Docket Number:	0357-03363			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 1 month with \$0 paid	2251	1	100	100
Miscellaneous:				
Total in USD (\$)				100

Electronic Acknowledgement Receipt

EFS ID:	36520485
Application Number:	15908108
International Application Number:	
Confirmation Number:	4709
Title of Invention:	Evolutionary Wireless Networks
First Named Inventor/Applicant Name:	Francis DACOSTA
Customer Number:	27197
Filer:	Szymon Maciej Gurda
Filer Authorized By:	
Attorney Docket Number:	0357-03363
Receipt Date:	08-JUL-2019
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Time Stamp:	16:50:48
Application Type:	Utility under 35 USC 111(a)

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	ext.pdf	140858	no	2
			62bd676da24dd1cd96c0c4e3c0a2c15a2f28159b		
Warnings:					
Information:					
2		Response.pdf	139500	yes	6
			80e2061c7043b3383949f43e47bd1dae58b127ce		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Applicant Arguments/Remarks Made in an Amendment		4	6	
	Claims		2	3	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30522	no	2
			66de8a1dadbbe62b7e8750671c9a3e6e0f5ed59b		
Warnings:					
Information:					
Total Files Size (in bytes):			310880		

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New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 0357-03363
Application Number 15/908,108	Filed Feb. 28, 2019	
For Evolutionary Wireless Networks		
Art Unit 2467	Examiner Hicham B. Foud	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	Fee	Small Entity Fee	Micro Entity Fee	
☒ One month (37 CFR 1.17(a)(1))	\$200	\$100	\$50	\$ <u>100</u>
☐ Two months (37 CFR 1.17(a)(2))	\$600	\$300	\$150	\$ _____
☐ Three months (37 CFR 1.17(a)(3))	\$1,400	\$700	\$350	\$ _____
☐ Four months (37 CFR 1.17(a)(4))	\$2,200	\$1,100	\$550	\$ _____
☐ Five months (37 CFR 1.17(a)(5))	\$3,000	\$1,500	\$750	\$ _____

☒ Applicant asserts small entity status. See 37 CFR 1.27.
☐ Applicant certifies micro entity status. See 37 CFR 1.29.
 Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.
☐ A check in the amount of the fee is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to
 Deposit Account Number 501709.
☒ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant.
☒ attorney or agent of record. Registration number 58451.
☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Szymon M. Gurda/

Signature

July 8, 2019

Date

Szymon M. Gurda

Typed or printed name

(312) 621-1330

Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 minutes 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. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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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.
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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.

Applicant's Remarks

In the Official Action dated March 7, 2019, the Examiner rejected claims 1-8 under 35 U.S.C. § 112 for being indefinite. Claims 1-8 were rejected under 35 U.S.C. § 103 as being unpatentable in light of prior art.

Indefiniteness

The Examiner rejected claim 1 and remaining claims for indefiniteness, as it was unclear if the claims were drawn to a method or a system. Applicant has amended the claims to clarify that they are more than an abstract recitation of network protocol layers. Instead, the claims have been amended to clarify that the claimed process relates to the layers within a wireless mesh network node. Support for the claim amendments are found in Fig. 10, which shows the components of a packet processed within the wireless mesh node:

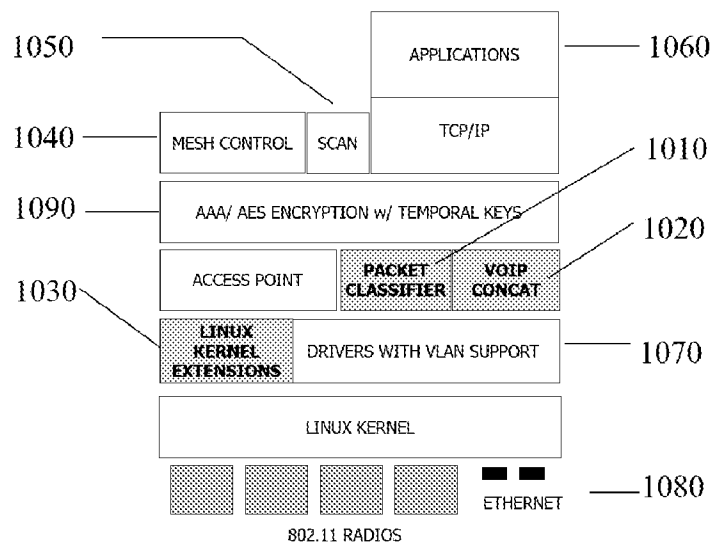


Figure 10

Examiner indicated that there was insufficient antecedent basis for “the remaining layers” in claim 1 and “said communication message” in claim 6. These issues have been addressed.

Obviousness

Claims 1 to 5 are rejected as anticipated by Chung (U.S. Publication 2010/0005166). Claims 6 and 7 are rejected in light of Chung as combined with Moeller (U.S. Publication

2006/0069702). Claim 8 is rejected in light of Chung and Lapuh (U.S. Publication 2009/0092043).

Applicant has amended the independent claim 1 to require that the configuration of the wireless mesh nodes is updated in response to changes in the network topology. Support for this claim limitation is found on page 7, lines 19-23, which reads:

FIGS. 8 and 9 depict a fail-over when one of two root nodes ceases to function. A policy server 801 defines the rules and parameters, such as the values set in table 804. The DCA Channel Allocation is depicted in the chart 803. The node table 802 depicts the health index for nodes before the fail-over. The connections in Fig. 9 are achieved not through mesh nodes but single radio clients running the single radio version of the mesh software.

Applicant submits that the primary reference, Chung, does not show a system that is capable of real-time updates to the network settings in light of changes to the network topology. Chung does not describe a system that is proactively responding to changes and self-tuning, one of the objectives of the instant invention. Instead, Chung is concerned with adding as little overhead as possible.

While the instant application creates some overhead, as presently claimed, Chung was an attempt to create a software-defined network that added as little data to the transmissions as possible. Thus, Chung shifts the failure detection and handling to the application using the system, which has to handle data failures. For example, Chung Table 17 shows the messages in the application layer which are exchanged when network communications are down:

Failure	uchar	When ALResult is SERVICE_FAILED,
reason code	ALFailCode	classified value of reason of failure

In the claimed invention, changes to the network topology, such as ones caused by failed nodes, are handled by the nodes instead of throwing failure messages to be handled by the client application.

Given the different approaches of Chung and the instant invention, where some overhead is acceptable, Chung fails to suggest the claimed elements requiring reconfiguration of the

network topology.

Moller and Lapuh fail to show the claimed reconfiguration limitation. Moller shows a system of data objects exchanged over a packet-based network. There is no suggestion of reconfiguration of the network in light of failures. Lapuh shows a switch with several fail-over ports, with updates to the internal data tables in the switch in light of port failures. There is no suggestion of updating switch settings in light of detected topology changes, as required by the presently-pending claims.

Applicant has made an earnest attempt to respond to the Office Action. No new matter was added by this amendment. Applicant contends that that the Application is in condition for allowance and the same is respectfully requested. If a telephonic interview would expedite examination of the Application, the Examiner is urged to contact the undersigned. Claims 1-8 are pending.

Respectfully submitted,

CHERSKOV FLAYNIK & GURDA, LLC

/Szymon M. Gurda/

Szymon M. Gurda (58,451)

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application.

1. (Currently Amended) A multilayer architecture used in a mesh node for supporting variable networks comprising:
processing a network packet in the mesh node having data representing an application layer in communication with a simulation and network management layer by sending one or more communication messages between the simulation and management layer; and a coupling layer;
wherein said coupling layer interfaces with physical connections within a network device and ~~the~~ remaining layers; and wherein the simulation and network management layer sets one or more network parameters within the application layer; wherein said mesh node parameters are updated in light of changes to network topology.
2. (Original) The multilayer architecture of claim 1 wherein said application layer comprises a store of rules for network performance.
3. (Original) The multilayer architecture of claim 1 wherein said application layer comprises a store of audit tools for network performance.
4. (Original) The multilayer architecture of claim 1 wherein said application layer further comprises an interface for an application.
5. (Original) The multilayer architecture of claim 1 wherein said application layer comprises an application management layer.
6. (Currently Amended) The multilayer architecture of claim 1 wherein said at least one communication messages between the simulation and network management layer and the application layer are time sensitive.
7. (Original) The multilayer architecture of claim 6 wherein said time sensitive communication messages between the simulation and network management layer

comprise publisher and subscribe messages.

8. (Original) The multilayer architecture of claim 1 wherein said simulation and network management layer determines the optimum layout for a tree-based network.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/908,108	02/28/2018	Francis DACOSTA	0357-03363	4709
27197	7590	10/15/2019		
MICHAEL J. CHERSKOV 123 WEST MADISON STREET SUITE 400 CHICAGO, IL 60602			EXAMINER FOUD, HICHAM B	
			ART UNIT	PAPER NUMBER
			2467	
			NOTIFICATION DATE	DELIVERY MODE
			10/15/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

akeith@cherskov.com
mail@cherskov.com
sgurda@cherskov.com

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Response to Amendment

2. The amendment filed on 07-08-2019 has been entered and considered.

Claims 1-8 are pending in this application.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):

(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-8 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Claims 1-8 are vague and indefinite because it recites “a multilayer architecture” which is unclear whether the claims are drawn to a method or a system. Moreover, the claims recites a plurality of layers: “application layer”, “simulation and network management layer” and “coupling layer” which are vague and indefinite since the protocol layers are just parts of system models such as an Open Systems Interconnection model (OSI model) which is a conceptual model that characterizes and standardizes the communication functions of a telecommunication or computing system

without regard to its underlying internal structure and technology. Its goal is the interoperability of diverse communication systems with standard protocols. The model partitions a communication system into abstraction layers (wikipedia). Therefore, it is not clear how the abstraction layers are being implemented in the claimed invention. It is well-known in the art that network equipment such as a router can be mapped to protocol layers such application layer (OSI) for easy understanding and wherein components of the router such as processor and memory are behind its functionalities. Thus, it is not known the metes and the bounds of the claimed invention.

Claim 1 recites the limitation "said mesh node parameters" in line 9. There is insufficient antecedent basis for this limitation in the claim. Moreover, the terms "management layer" and "network management layer" are not known if they are used interchangeably (same element) or different layers. In additions, the term "a network device" in line 7 is vague and indefinite because it is not known if it refers to the claimed mesh node or another node/device. Furthermore, it is not known the relationship between the claimed "network packet" and "one or more communication messages". Similar issue(s) occur in claim 6. Thus, it is not known the metes and the bounds of the claimed invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5 are rejected under 35 U.S.C. 103 as being unpatentable over Chung (US 2010/0005166) in view of Romohr (US 5,596,723).

For claim 1, Chung discloses a multilayer architecture used in a mesh node for supporting variable networks (see at least Fig.2) comprising: processing a network packet in the mesh node having data representing an application layer (see at least Fig.2; at least application layer 60 and/or abstract; processing a message (network packet) having data representing the application layer since it is processed by the layer) in communication with a simulation and network management layer (see at least Fig.2; at least parameter management 100 and network layer 70) by sending one or more communication messages between the simulation and management layer (see at least Fig.11; sending one or more communication messages between the layers 100 and 70); and a coupling layer (see at least Fig.2; at least physical layer 90); wherein said coupling layer interfaces with physical connections within a network device and remaining layers (see at least Fig.2; at least physical layer 90 that interfaces with connections via respective protocol such as RF and with other layers); and wherein the simulation and network management layer sets one or more network parameters within the application layer (see at least [0049]; at least management 100 sets network parameter(s) within the application layer). Chung further discloses the network layer for at least performing network related processing such as address management and transmission/reception control of the network devices for reliable network connection of devices that are based on at least network topology (see at least [0049]) and/or performing at least routing control function (see at least [0105]). Chung discloses all the claimed subject matter with the exception of explicitly disclosing wherein said mesh

node parameters are updated in light of changes to network topology. However, Romohr discloses wherein said mesh node parameters are updated in light of changes to network topology (see at least Fig.9 (network layer) and/or col.17 lines 45-52; the network layer uses at least routing update protocol that is used to distribute network topology information (parameters updates) and/or noting changes (updating of parameters) in network topology). Thus, it would have been obvious to the one ordinary skill in the art before the effective filing date of the claimed invention to use the teaching of Romohr into the method/system of Chung for the purpose of at least updating network parameters based on changes of network topology.

For claim 2, Chung further discloses wherein said application layer comprises a store of rules for network performance (see at least Fig.2; at least network management function within application layer 60).

For claim 3, Chung further discloses wherein said application layer comprises a store of audit tools for network performance (see at least Fig.2; at least network management function within application layer 60).

For claim 4, Chung further discloses wherein said application layer further comprises an interface for an application (see at least Fig.2; AL-SAP interface).

For claim 5, Chung further discloses wherein said application layer comprises an application management layer (see at least Fig.2; application sublayer 63).

5. Claims 6-7 are rejected under 35 U.S.C. 103 as being unpatentable over Chung in view of Romohr and further in view of Moeller et al (US 2006/0069702).

For claim 6-7, Chung further discloses wherein said at least one communication messages between the simulation and network management layer and the application

layer are communication messages (see at least Fig.11 and/or [0056]; at least data/primitives) and wherein it is well-known in the art that data/messages are transferred via the layers when exchanging traffic with the network. Chung in view of Romohr discloses all the claimed subject matter with the exception of explicitly disclosing that the messages are time sensitive communication messages that comprise publisher and subscribe messages. However, Moeller discloses the use of publish/subscribe messages (see at least [0007]). Thus, it would have been obvious to the one ordinary skill in the art before the effective filing date of the claimed invention to use the teaching of Moeller into the method/system of Chung in view of Romohr for the purpose of at least allowing direct data communication to be passively received by interested consumers (push technology).

6. Claim 8 is rejected under 35 U.S.C. 103 as being unpatentable over Chung in view of Romohr and further in view of Lapuh et al (US 2009/0092043).

For claim 8, Chung in view of Romohr discloses all the claimed subject matter with the exception of explicitly disclosing wherein said simulation and network management layer determines the optimum layout for a tree-based network. However, Lapuh discloses that at least the network layer (claimed layer) is responsible for implementing appropriate routing protocol (OSPF, RIP...) such as at least calculating a shortest path tree (claimed optimum layout) (see at least [0033]). Thus, it would have been obvious to the one ordinary skill in the art before the effective filing date of the claimed invention to use the teaching of Lapuh into the method/system of Chung in view of Romohr for the purpose of at least finding best routes for data transfer in tree-based network.

Response to Argument

7. In regard of 112 rejection, Applicant's arguments filed have been fully considered but they are not persuasive. The claims still vague and indefinite because they recite at least layers that are not elements (see the rejection above). Thus, the rejection is maintained.

8. In regard of prior art, Applicant's arguments with respect to the claims have been considered but are moot because the arguments do not apply to the new combination of the references being used in the current rejection in regard of the introduction of Romohr.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HICHAM B FOUD whose telephone number is (571)270-1463. The examiner can normally be reached on Monday-Friday, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Phillips can be reached on 571-272-3940. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HICHAM B FOUD/
Primary Examiner, Art Unit 2467

<i>Notice of References Cited</i>	Application/Control No. 15/908,108		Applicant(s)/Patent Under Reexamination DACOSTA et al.	
	Examiner HICHAM B FOUD		Art Unit 2467	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5596723-A	01-1997	Romohr; Steven D.	H04L29/06	709/222
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
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	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
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	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Search Notes</i> 	Application/Control No. 15/908,108	Applicant(s)/Patent Under Reexamination DACOSTA et al.
	Examiner HICHAM B FOUD	Art Unit 2467

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
(H04L12/4625 OR H04L45/02 OR H04L45/48 OR H04L67/10 OR H04L67/145 OR H04W40/248 OR H04W4/14 OR H04W80/12 OR H04W84/18)	10/03/2019	hf

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventorship search	10/03/2019	hf
Limited text search	10/03/2019	hf
Limited text search	10/09/2019	hf

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/HICHAM B FOUD/ Primary Examiner, Art Unit 2467	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	31	(network adj2 layer) with updat\$3 with topology	US-PGPUB; USPAT	OR	ON	2019/10/09 13:23
L3	5	1 and (@ad< "20081124" @rlad< "20081124")	USPAT	OR	OFF	2019/10/09 13:26
L4	7	1 and (@ad< "20081124" @rlad< "20081124")	US-PGPUB; USPAT; USOCR	OR	OFF	2019/10/09 13:26
L5	18	(network adj1 layer) with updat\$3 with topology	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/09 13:30
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S73	1	15/908108 and layer	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S74	459	((("DACOSTA") near3 ("Francis")) OR ((("GUPTA") near3 ("Vivek")))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2019/10/03 09:45
S75	1	((application adj1 layer) with simulation same (coupling adj1 layer)).clm.	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
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			USPAT; USOCR			
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S83	1	15/908108	US- PGPUB; USPAT; USOCR	OR	OFF	2019/10/03 09:45
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S92	344	(store with rules with audit)	US- PGPUB; USPAT	OR	ON	2019/10/03 09:45

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S112	41	multilayer with application same network same physical	US- PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
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S114	153125	application same network same physical	US- PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S115	153125	application same network same physical	US- PGPUB; USPAT;	OR	ON	2019/10/03 09:45

			USOCR			
S116	11	S111 and S115	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S117	28075	multilayer with application	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S118	0	S111 and S117	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S119	1	15/908108	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S120	25934	layer with interface same performance	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S121	0	layer with interface same rules with tools same (network adj1 performance)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S122	0	layer with interface same rules same tools same (network adj1 performance)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S123	344	layer with interface same (network adj1 performance)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S124	0	layer with interface same (network adj1 performance) same simulation	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
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S127	197	(publisher with subscribe) and S126	US-PGPUB; USPAT; USOCR	OR	OFF	2019/10/03 09:45
S128	10	(publisher with subscribe) and S126 and tree adj1 based	US-PGPUB; USPAT; USOCR	OR	OFF	2019/10/03 09:45
S129	0	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer) same (tree adj1 based)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S130	162	(application adj1 layer) same (network	US-	OR	ON	2019/10/03

		adj1 layer) same (physical adj1 layer) same (tree)	PGPUB; USPAT; USOCR			09:45
S131	69877	((H04L12/4625 OR H04L45/02 OR H04L45/48 OR H04L67/10 OR H04L67/145 OR H04W40/248 OR H04W4/14 OR H04W80/12 OR H04W84/18).CPC.)	US-PGPUB; USPAT; USOCR	OR	OFF	2019/10/03 09:45
S132	28	S130 and S131	US-PGPUB; USPAT; USOCR	OR	OFF	2019/10/03 09:45
S133	234	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer) and publisher and subscribe	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S134	7363	(application adj1 layer) same (network adj1 layer) same (physical adj1 layer)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S135	36	(application adj1 layer) same (network adj1 layer) with (routing adj1 table) same (physical adj1 layer)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
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S137	55	(application adj1 layer) with parameter with (network adj1 layer) same (physical adj1 layer)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S138	0	(application adj1 layer) with parameter with (network adj1 layer) same (physical adj1 layer) and publisher and subscribe	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
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S141	0	(management adj1 layer) with (shortest near5 tree)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S142	114	(layer) with (shortest near5 tree)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45
S143	33	(layer adj1 "3") with (shortest near5 tree)	US-PGPUB; USPAT; USOCR	OR	ON	2019/10/03 09:45

EAST Search History (I nterference)

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10/ 9/ 2019 2:58:02 PM

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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)

Application Number	15908108	Filing Date	2018-02-28	Docket Number (if applicable)	0357-03663	Art Unit	4709
First Named Inventor	Francis DaCosta			Examiner Name	Hicham Foud		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to
Deposit Account No 501709

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	/Szymon M. Gurda/	Date (YYYY-MM-DD)	2020-04-15
Name	Szymon M. Gurda	Registration Number	58451

This collection of information is required by 37 CFR 1.114. 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 12 minutes 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.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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.

PATENT

Confirmation No. 4709

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Francis Dacosta
Title: Evolutionary Wireless Networks
Serial No.: 15/908,108
Filing Date: Feb. 28, 2018
Examiner: Hicham Foud
Art Unit: 4709
Atty. Docket: 0357-03363

Submitted via EFS-Web on April 15, 2020.

Mail Stop: Amendment
COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

123 West Madison Street
Suite 400
Chicago, Illinois 60602
(312) 621-1330

RESPONSE TO OFFICE ACTION

Dear Sir:

In response to the October 15, 2019 Office Action, the Applicant submits the following:

Amendments to the Claims;

Remarks/Arguments;

Request for Continued Examination.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application.

1. (Currently Amended) A system for managing communications in ~~multilayer architecture~~
~~used in~~ a mesh node for supporting variable networks comprising:
processing a network packet in the mesh node having data from non-IP chirp devices
wherein at least some of the non-IP chirp device communications are directly sent to
recipients in communication with said node; ~~representing an application layer in~~
~~communication with a simulation and network management layer by sending one or more~~
~~communication messages between the simulation and management layer;~~ and a coupling
layer;
modeling at least one simulation of network conditions in communications with said
node;
setting up forwarding rules and packet flow paths for each data packet and storing said
rules in a rules database ~~wherein said coupling layer interfaces~~
interfacing with physical connections within said mesh node ~~a network device and~~
~~remaining layers;~~ and wherein the simulation ~~and network management layer~~ sets one or
more network mesh node parameters used by the mesh node ~~within the application layer;~~
wherein said one or more mesh node parameters are updated in light of changes to
network topology.
2. (Currently Amended) The mesh node ~~multilayer architecture~~ of claim 1 wherein said
~~application layer comprises~~ forwarding rules comprise a store of rules for network
performance.
3. (Currently Amended) The mesh node ~~multilayer architecture~~ of claim 1 further
comprising ~~wherein said application layer comprises~~ a store of audit tools for network
performance.
4. (Cancelled)

5. (Currently Amended) The mesh node ~~multilayer architecture~~ of claim 1 ~~wherein said application layer comprises~~ further comprising an application management layer.
6. (Currently Amended) The mesh node ~~multilayer architecture~~ of claim 1 wherein said at least one communication ~~packet comprises a message that is messages between the simulation and network management layer and the application layer~~ are time sensitive.
7. (Currently Amended) The mesh node ~~multilayer architecture~~ of claim 6 wherein said time sensitive communication messages between ~~the simulation and network management layer~~ comprise publisher and subscribe messages.
8. (Currently Amended) The mesh node ~~multilayer architecture~~ claim 1 wherein said simulation created by said mesh node ~~simulation and network management layer~~ determines the optimum layout for a tree-based network where said mesh node participates.

Applicant's Remarks

In the Official Action dated October 15, 2019, the Examiner rejected claims 1-8 under 35 U.S.C. § 112 for being indefinite. All of the claims were also rejected as obvious in light of cited prior art.

Indefiniteness

The Examiner objected to the claim limitation “multilayer architecture” as being unclear whether the claims are drawn to a method or system. The claims have been amended to clarify that the claims relate to a system.

The Examiner objected to the recitation of layers as attempts at claiming vague protocol layers. Applicant has amended the claims to use functional language instead of reciting abstract layers. Support for the amendments is found in Fig. 20 and the Specification discussing the figure, namely the following paragraphs on pages 10 and 11:

Fig. 20 is a depiction of the network stack of Fig 10, highlighting the features provided at three levels/layers of the framework. At the application coupling level 2003, cloud connectivity services include Network Management, Tunnels for Machine controllers and non-IP (“chirp”) devices to communicate using Native Machine/Chirp protocols devices operating at the edge of the network. A feedback loop between model and reality is thus established to refine the simulation models for subsequent iterations. The refined model includes rule generation and predictive pattern recognition to better predict when the topology controller needs to kick in, or whether the application management layer is capable of addressing the change in RF conditions, client and node movement etc.

The Application Layer 2002 is also shown in Fig. 20. It is the intermediate level. Applications, such as the LFRS parent selection process, or the conference call applications, Fig. 18-19, provide their requirements to the Application Management Layer. This then sets up the port forwarding rules and flow constructs through an application coupling layer 2003. Rules and biases, are stored in the rules database. Application and Mesh node Heart beats are monitored and logged by the Audit database. These logs are retrieved when cloud connectivity is available. The

simulation and network management layer 2001 is also shown in Fig. 20.

Node Resident applications have access to lower level functions. For example, the LFRS application Figs 14-17 operates at both the Application and Kernel Level. It the application level, it monitors application heart beats and mesh node heart beats. Jitter and latency of both physical and logical links are derived from Audit log trails and help identify potential topology driven bottlenecks. For example see routing path A-B-C-D-E for LFN 1603 reduced to routing path A-B-C for LFN 1703. The logical routing for affected application messaging application is shown in Figs. 18, 19. A change requested by one application may affect another and hence some form of adult supervision, conflict resolution is supplied at the application management layer, that controls the lower level kernel functions. Recall MESH CONTROL 1050, sits below the APPLICATIONS layer 1060 and above the LINUX KERNEL EXTENSIONS 1030. MESH CONTROL is radio protocol agnostic. Its main objective is to manage channel interference and overall mesh topology per policy directives see Figs. 1-9, 11. Lower level services perform protocol translations and low level port forwarding rules. Device abstracted network topologies are mapped to the appropriate MAC80211 radio protocol handlers for a diverse and growing set of standards: 80211ac, 80211abgm, Blue-tooth, Cellular, Zig-bee etc.

The Examiner indicated that there is no support for the limitation “mesh node parameters.” These claim limitations have been amended.

Obviousness

Claims 1-5 were rejected under 35 U.S.C. § 103 as being unpatentable in light of Chung (U.S. Publication 2010/0005166) and Romohr (US 5,596,723). Claims 6-7 were rejected in light of Chung and Romohr as well as Moeller (U.S. Publication 2006/0069702). Claim 8 was rejected in light of Chung and Romohr as well as Lapuh (U.S. Publication 2009/0092043).

Applicant respectfully submits that the references are moot in light of the claim amendments, which require a mesh node to undertake specific functions not found in the prior art.

For example, the Examiner cited Chung, U.S. Publication 2010/0005166. This reference discusses a home network system protocol. By design, a home network does not address scalability. As required by the claims, there is no discussion of mesh nodes undertaking the actions as required by the current claims. Further the Chung system is not application aware—the cited mesh topology is not driven dynamically as now required by the claims which require the node to undertake simulation and performance analysis.

As presently claimed, the network is fault tolerant, includes management features, and allows nodes to change network topology.

The multi-layer control as shown in Chung is TCP/IP Network Layer based. The approach taken in the claims is not. As claimed, the system requires publisher and subscriber model for some communications which results in stringent latency and jitter requirements for real time messaging by clients, including for communications within a node. By using a publisher/subscriber model the hierarchical control of network, the present claims teach away from the modified stack in Chung.

Romohr is cited for its discussion of changes to the network topology. Again, Romohr does not show a mesh node simulating and reconfiguring in response to changes as required by the present claims. Instead, Romohr Col. 17 discusses accepting updates using the Routing Update Protocol. In Romohr the network device only receives updates about changes using RTP, it does not change the network as the present claims require.

Applicant respectfully submits that none of the remaining prior art references include the required claim elements.

Applicant has made an earnest attempt to respond to the Office Action. No new matter was added by this amendment. Applicant contends that that the Application is in condition for allowance and the same is respectfully requested. If a telephonic interview would expedite examination of the Application, the Examiner is urged to contact the undersigned.

Respectfully submitted,

CHERSKOV FLAYNIK & GURDA, LLC

/Szymon M. Gurda/
Szymon M. Gurda (58,451)

Electronic Patent Application Fee Transmittal

Application Number:	15908108			
Filing Date:	28-Feb-2018			
Title of Invention:	Evolutionary Wireless Networks			
First Named Inventor/Applicant Name:	Francis DACOSTA			
Filer:	Szymon Maciej Gurda			
Attorney Docket Number:	0357-03363			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	2253	1	700	700
Miscellaneous:				
RCE- 1ST REQUEST	2801	1	650	650
Total in USD (\$)				1350

Electronic Acknowledgement Receipt

EFS ID:	39171599
Application Number:	15908108
International Application Number:	
Confirmation Number:	4709
Title of Invention:	Evolutionary Wireless Networks
First Named Inventor/Applicant Name:	Francis DACOSTA
Customer Number:	27197
Filer:	Szymon Maciej Gurda
Filer Authorized By:	
Attorney Docket Number:	0357-03363
Receipt Date:	15-APR-2020
Filing Date:	28-FEB-2018
Time Stamp:	19:26:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1350
RAM confirmation Number	E20204EJ27060919
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	Extension.pdf	91234	no	1
			e77eab83d819b42faaef4b084e28ece5d934e4f1		
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	RCE.pdf	1349882	no	3
			405e5f2e44aa693ebdbcc2b63681af71227f1dade		
Warnings:					
Information:					
3		Response.pdf	116746	yes	6
			5b67f6fd73050c421683e47921f61ac5ed850b45		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment Submitted/Entered with Filing of CPA/RCE		1	1	
	Claims		2	3	
	Applicant Arguments/Remarks Made in an Amendment		4	6	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32322	no	2
			f1d940f2e5b9c4c0338b14100ec15fd5831f33f1		
Warnings:					
Information:					
Total Files Size (in bytes):			1590184		

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.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

PATENT

Confirmation No. 4709

UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Francis Dacosta
Title: Evolutionary Wireless Networks
Serial No.: 15/908,108
Filing Date: Feb. 28, 2018
Examiner: Hicham Foud
Art Unit: 4709
Atty. Docket: 0357-03363

Submitted via EFS-Web on April 15, 2020.

Mail Stop: Amendment
COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

123 West Madison Street
Suite 400
Chicago, Illinois 60602
(312) 621-1330

EXTENSION OF TIME

Dear Sir or Madam:

It is respectfully requested that the time for response to the Official Action dated October 15, 2019 in the above-referenced patent application be extended three months to April 15, 2020.

The extension of time fee is being paid through EFS-Web. The Office is authorized to charge any deficiency or credit any overpayment to the undersigned's Deposit Account No. 501709.

Respectfully Submitted,

/Szymon M. Gurda/

Szymon M. Gurda

Reg. No. 58,451

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/908,108		Filing Date 02/28/2018		☐ To be Mailed		
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO										
APPLICATION AS FILED - PART I										
		(Column 1)	(Column 2)							
FOR		NUMBER FILED	NUMBER EXTRA	RATE (\$)		FEE (\$)				
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A	N/A						
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A	N/A	N/A						
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A	N/A						
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =	*	x \$50 =						
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*	x \$230 =						
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL						
APPLICATION AS AMENDED - PART II										
		(Column 1)		(Column 2)	(Column 3)					
AMENDMENT	04/15/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	* 7	Minus	** 20	= 0	x \$50 =		0		
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0	x \$230 =		0		
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE		0		
		(Column 1)		(Column 2)	(Column 3)					
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	x \$0 =				
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$0 =				
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE				
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						LIE				
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/VIOLA D ROGERS/				
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".										
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

This collection of information is required by 37 CFR 1.16. 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 12 minutes 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. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

27197 7590 05/15/2020
MICHAEL J. CHERSKOV
123 WEST MADISON STREET
SUITE 400
CHICAGO, IL 60602

EXAMINER

BLANTON, JOHN D

ART UNIT

PAPER NUMBER

2466

DATE MAILED: 05/15/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/908,108	02/28/2018	Francis DACOSTA	0357-03363	4709

TITLE OF INVENTION: EVOLUTIONARY WIRELESS NETWORKS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	08/17/2020

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

27197 7590 05/15/2020
MICHAEL J. CHERSKOV
123 WEST MADISON STREET
SUITE 400
CHICAGO, IL 60602

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/908,108	02/28/2018	Francis DACOSTA	0357-03363	4709

TITLE OF INVENTION: EVOLUTIONARY WIRELESS NETWORKS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	08/17/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
BLANTON, JOHN D	2466	370-236000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

1 _____

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/908,108	02/28/2018	Francis DACOSTA	0357-03363	4709
27197	7590	05/15/2020	EXAMINER	
MICHAEL J. CHERSKOV 123 WEST MADISON STREET SUITE 400 CHICAGO, IL 60602			BLANTON, JOHN D	
			ART UNIT	PAPER NUMBER
			2466	

DATE MAILED: 05/15/2020

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. 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 30 minutes 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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.

Notice of Allowability	Application No. 15/908,108	Applicant(s) DACOSTA et al.	
	Examiner JOHN D BLANTON	Art Unit 2466	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed 4/15/2020.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are See Continuation Sheet. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)	5. ☐ Examiner's Amendment/Comment
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/JOHN D BLANTON/ Primary Examiner, Art Unit 2466	
---	--

Continuation of 3. The allowed claim(s) is/are: 1-3,5-8 (renumbered 1-7, respectively)

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance: The invention as set forth in claim 1 differs from the inventions disclosed in the prior art in that "processing a network packet in the mesh node having data from non-IP chirp devices wherein at least some of the non-IP chirp device communications are directly sent to recipients in communication with said node; modeling at least one simulation of network conditions in communications with said node; setting up forwarding rules and packet flow paths for each data packet and storing said rules in a rules database interfacing with physical connections within said mesh node". This difference would not have been obvious to a person skilled in the art having regard to the cited documents and in light of the entirety of the claim language. Thus, claim 1 is novel.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN D BLANTON whose telephone number is (571)270-3933. The examiner can normally be reached on 7am-6pm EST, Mon-Thu.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Faruk Hamza can be reached on 571-272-7969. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOHN D BLANTON/
Primary Examiner, Art Unit 2466

<i>Search Notes</i> 	Application/Control No. 15/908,108	Applicant(s)/Patent Under Reexamination DACOSTA et al.
	Examiner JOHN D BLANTON	Art Unit 2466

CPC - Searched*		
Symbol	Date	Examiner
h04l67/145	05/10/2020	jb

CPC Combination Sets - Searched*		
Symbol	Date	Examiner
(H04L12/4625 OR H04L45/02 OR H04L45/48 OR H04L67/10 OR H04L67/145 OR H04W40/248 OR H04W4/14 OR H04W80/12 OR H04W84/18)	10/03/2019	hf

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventorship search	10/03/2019	hf
Limited text search	10/03/2019	hf
Limited text search	10/09/2019	hf
NPL search google	05/10/2020	jb
east search h04l67/145 (text, PGPub and USPat)	05/10/2020	jb

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	interference search in east report	05/10/2020	jb

/HICHAM B FOUD/ Primary Examiner, Art Unit 2467	
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<p><i>Search Notes</i></p> 	<p>Application/Control No.</p> <p>15/908,108</p>	<p>Applicant(s)/Patent Under Reexamination</p> <p>DACOSTA et al.</p>
	<p>Examiner</p> <p>JOHN D BLANTON</p>	<p>Art Unit</p> <p>2466</p>

<p>/HICHAM B FOUD/ Primary Examiner, Art Unit 2467</p>	
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Issue Classification 	Application/Control No. 15/908,108	Applicant(s)/Patent Under Reexamination DACOSTA et al.
	Examiner JOHN D BLANTON	Art Unit 2466

CPC						
Symbol					Type	Version
H04L	/	67	/	145	F	2013-01-01
H04W	/	4	/	14	I	2013-01-01
H04L	/	12	/	4625	I	2013-01-01
H04L	/	45	/	48	I	2013-01-01
H04W	/	40	/	248	I	2013-01-01
H04L	/	45	/	02	I	2013-01-01
H04L	/	67	/	10	I	2013-01-01
H04W	/	80	/	12	I	2013-01-01
H04W	/	84	/	18	A	2013-01-01

CPC Combination Sets					
Symbol				Type	Set
	/		/		

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 7	
/JOHN D BLANTON/ Primary Examiner, Art Unit 2466 (Primary Examiner) _____ (Date) _____		10 May 2020 (Date)	O.G. Print Claim(s) 1
			O.G. Print Figure 27

Issue Classification 	Application/Control No. 15/908,108	Applicant(s)/Patent Under Reexamination DACOSTA et al.
	Examiner JOHN D BLANTON	Art Unit 2466

INTERNATIONAL CLASSIFICATION			
CLAIMED			
H04L	/	29	/ 08
NON-CLAIMED			
/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	7	
/JOHN D BLANTON/ Primary Examiner, Art Unit 2466	10 May 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	27

<i>Issue Classification</i> 	Application/Control No. 15/908,108	Applicant(s)/Patent Under Reexamination DACOSTA et al.
	Examiner JOHN D BLANTON	Art Unit 2466

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1														
2	2														
3	3														
	4														
4	5														
5	6														
6	7														
7	8														

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 7	
/JOHN D BLANTON/ Primary Examiner, Art Unit 2466 (Primary Examiner) _____ (Date) 10 May 2020		O.G. Print Claim(s) 1	O.G. Print Figure 27

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	130	(mesh with simulation with (rule parameter)) and (@rlad<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/10 14:41
S1	1	"15908108"	US-PGPUB; USPAT	OR	ON	2020/05/09 19:02
S2	392	h04l67/145	US-PGPUB; USPAT	OR	ON	2020/05/09 19:05
S3	0	(mesh with chirp with device) and (simulation with condition) and (@rlad<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:24
S4	8	(mesh with chirp with device) and (simulation) and (@rlad<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:25
S5	4	(mesh with chirp with device) and (network with simulation) and (@rlad<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:25
S6	1	"20100005166".did.	US-PGPUB; USPAT	OR	ON	2020/05/09 21:27
S7	1	"5596723".did.	US-PGPUB; USPAT	OR	ON	2020/05/09 21:27
S8	1	"20090092043".did.	US-PGPUB; USPAT	OR	ON	2020/05/09 21:28
S9	1	"20060069702".did.	US-PGPUB; USPAT	OR	ON	2020/05/09 21:28

S10	0	((non-ip adj chirp) with device) same (forwarding near3 rule) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:33
S11	1	((non-ip adj chirp) with device) and (forwarding near3 rule) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:33
S12	1	((non-ip adj chirp) with device) and (database near3 rule) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:34
S13	1	((non-ip adj chirp) with device) same (topology) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:34
S14	0	(mesh with simulation with (rule parameter)) same (network with topology) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:36
S15	27	(mesh with simulation) same (network with topology) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:36
S16	134	(mesh with simulation) and (network with topology) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:36
S17	20	("2010/0005166").URPN.	USPAT	OR	ON	2020/05/09 21:40
S18	9	(mesh with simulation with mobil\$3) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/09 21:42
S20	0	(mesh with simulation with (optimiz\$5)) with (network with topology) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/10 12:45
S21	0	(mesh with simulation) same ((optimiz\$5)) with (network with topology) and (@rld<="20081124" @prad<="20081124" @ad<="20081124")	US-PGPUB; USPAT	OR	ON	2020/05/10 12:45

S22	7	(mesh with simulation) and ((optimiz\$5)) with (network with topology) and (@rlad<="20081124" @prad<="20081124" @ad<="20081124")	US- PGPUB; USPAT	OR	ON	2020/05/10 12:45
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5/10/2020 2:50:10 PM

C:\Users\jblanton\Documents\EAST\Workspaces\15908108.wsp

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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27197 7590 05/15/2020
MICHAEL J. CHERSKOV
123 WEST MADISON STREET
SUITE 400
CHICAGO, IL 60602



Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Szymon M. Gurda	(Typed or printed name)
	(Signature)
Aug. 17, 2020	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/908.108	02/28/2018	Francis DACOSTA	0357-03363	4709

TITLE OF INVENTION: EVOLUTIONARY WIRELESS NETWORKS

APPLX. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	08/17/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
BLANTON, JOHN D	2466	370-236000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47: Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Cherskov Flaynik &
Gurda, LLC

2

3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☒ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 501709

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29☐ Applicant asserting small entity status. See 37 CFR 1.27☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature

Szymon M. Gurda

Date August 14, 2020

Typed or printed name

Registration No. 58,451



United States Patent and Trademark Office

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Document Code:WFEE

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Sale Accounting Date:08/21/2020

Sale Item Reference Number

15908108

Effective Date

08/21/2020

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20208KD20405901	2501	UTILITY APPL ISSUE FEE	\$500.00	Check

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15908108
Filing Date	2018-02-28
First Named Inventor	daCosta, Francis
Art Unit	2123
Examiner Name	
Attorney Docket Number	0357-03363

31	20050286464	A1	2005-12-29	Saadawi	
32	20040058678	A1	2004-03-25	deTorbal	
33	20040137877	A1	2004-06-15	Crowhurst	
34	20030147424	A1	2003-08-07	Famolari	
35	20030012168	A1	2003-01-16	Elson	
36	20050153725	A1	2005-07-14	Naghian	
37	20110231321	A1	2011-09-22	Milne	
38	20040203787	A1	2004-10-14	Naghian	
39	20060193325	A1	2006 2006-08-31	Takagi	
40	20070144618	A1	2007-06-28	Adar	
41	20070174875	A1	2007-07-26	Medford	

Change(s) applied
to document,
/D.M./
7/15/2020

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number	15908108
Filing Date	2018-02-28
First Named Inventor	daCosta, Francis
Art Unit	2123
Examiner Name	
Attorney Docket Number	0357-03363

	31	6393261	2002-05-21	Lewis
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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20020159409	A1	2002-10-31	Wolfe et al.	
	2	20020085719	A1	2002-07-04	Crosbie	
	3	20020055978	A1	2002-05-09	Jonn-Bo et al.	
	4	20030012193	A1	2003-01-06	Novaes	
Change(s) applied to document, /T.W./ 9/1/2020	5	20070174875	A1	2001-12-13 07/2007	Yang Medford et al.	
	6	20120202514	A1	2012-08-09	Kadirkamathan	
	7	20100150170	A1	2010-06-17	Lee	
	8	20020176390	A1	2002-11-28	Sparr	



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/908,108	09/22/2020	10785316	0357-03363	4709

27197 7590 09/02/2020

MICHAEL J. CHERSKOV
123 WEST MADISON STREET
SUITE 400
CHICAGO, IL 60602

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

MeshDynamics, Santa Clara, CA;
Francis DACOSTA, Santa Clara, CA;
Vivek Gupta, Bangalore, INDIA;

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