IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF FLORIDA
WEST PALM BEACH DIVISION

LINEX TECHNOLOGIES, INC.	§	
	§	
Plaintiff,	§	05-80300
vs.	§	
	§	
MOTOROLA, INC., NORTEL NETWORKS, INC., TROPOS NETWORKS, INC., FIRETIDE, INC., STRIX SYSTEMS, INC., and BELAIR NETWORKS INC.,	§	JURY TRIAL DEMANDED
	§	CIV-MARRA
	§	
	§	MAGISTRATE JUDGE SELTZER
Defendants.	§	

COMPLAINT

Plaintiff, Linex Technologies, Inc. ("Linex"), brings this action against the Defendants Motorola, Inc. ("Motorola"), Nortel Networks, Inc. ("Nortel"), Tropos Networks, Inc. ("Tropos"), Firetide, Inc. ("Firetide"), Strix Systems, Inc. ("Strix"), and BelAir Networks Inc. ("BelAir"), and for its cause of action alleges:

The Parties

1. Linex is a corporation organized and existing under the laws of the State of Delaware, with its principal place of business at 187 Highway 36, West Long Branch, New Jersey 07764.

2. Upon information and belief, Motorola is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Motorola may be served with process by serving its registered agent, CT Corporation System, 1200 S. Pine Island Road, Plantation, Florida 33324.

3. Upon information and belief, Nortel is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Nortel may be served with process by serving its registered agent, CT Corporation System, 1200 S. Pine Island Road, Plantation, Florida 33324.

4. Upon information and belief, Tropos is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Tropos may be served with process by serving its registered agent, Mike Taylor, 1730 S. Amphlett Blvd., Suite 304, San Mateo, California 94402.

5. Upon information and belief, Firetide is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Firetide may be served with process by serving its registered agent, Bo Larsson, 16795 Lark Ave., Suite 200, Los Gatos, California 95032.

6. Upon information and belief, Strix is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Strix may be served with process by serving its registered agent, Bruce W. Brown, 2610 Agoura Road, Suite 110, Calabasas, California 91302.

7. Upon information and belief, BelAir is a corporation organized and existing under the laws of Canada and is doing business in this judicial district and elsewhere. BelAir has a principal place of business at 603 March Road, Kanata, Ontario, Canada, K2K 2M5, and may be served with process in accordance with the Hague Convention by making a request for service to the Ministry of the Attorney General for Ontario, Reciprocity Office: Civil Law Division, 18 King Street East, Toronto, Ontario, Canada, M5C 1C5.

3. Upon information and belief, Nortel is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Nortel may be served with process by serving its registered agent, CT Corporation System, 1200 S. Pine Island Road, Plantation, Florida 33324.

4. Upon information and belief, Tropos is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Tropos may be served with process by serving its registered agent, Mike Taylor, 1730 S. Amphlett Blvd., Suite 304, San Mateo, California 94402.

5. Upon information and belief, Firetide is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Firetide may be served with process by serving its registered agent, Bo Larsson, 16795 Lark Ave., Suite 200, Los Gatos, California 95032.

6. Upon information and belief, Strix is a corporation organized and existing under the laws of the State of Delaware and is doing business in this judicial district and elsewhere. Strix may be served with process by serving its registered agent, Bruce W. Brown, 2610 Agoura Road, Suite 110, Calabasas, California 91302.

7. Upon information and belief, BelAir is a corporation organized and existing under the laws of Canada and is doing business in this judicial district and elsewhere. BelAir has a principal place of business at 603 March Road, Kanata, Ontario, Canada, K2K 2M5, and may be served with process in accordance with the Hague Convention by making a request for service to the Ministry of the Attorney General for Ontario, Reciprocity Office: Civil Law Division, 18 King Street East, Toronto, Ontario, Canada, M5C 1C5.

Jurisdiction and Venue

8. This action arises under the patent laws of the United States, Title 35 United States Code, particularly §§ 271 and 281 and Title 28 United States Code, particularly § 1338(a). Venue is proper in this Court under Title 28 United States Code §§ 1391(b) and (c) and 1400(b).

Claims For Patent Infringement

9. On December 10, 2002, U.S. Patent No. 6,493,377 ("the '377 patent") was duly and legally issued for a "Distributed Network, Spread-Spectrum System". A copy of the '377 patent is attached as Exhibit A and is made a part hereof. The '377 patent, in general, relates to distributed networks having a plurality of remote stations and plurality of nodes, and often referred to as "mesh" networks. By assignment, Linex is the sole owner of the '377 patent and has the exclusive right to enforce the '377 patent and collect damages for all relevant times.

10. Motorola manufactures and sells mesh networks and mesh network components, including but not limited to the MeshNetworks Enabled Architecture (MEA). By manufacturing and selling such products, Motorola has in the past and continues to infringe directly, contribute to the infringement of, or induce the infringement of claims of the '377 patent, including but not limited to claims 32 and 33.

11. Nortel manufactures and sells mesh networks and mesh network components, including but not limited to the Wireless Access Point 7220, Wireless Gateway 7250, and the Optivity Network Management System. By manufacturing and selling such products, Motorola has in the past and continues to infringe directly, contribute to the infringement of, or induce the infringement of claims of the '377 patent, including but not limited to claims 32 and 33.

12. Tropos manufactures and sells mesh networks and mesh network components, including but not limited to the Tropos 3110 Indoor Wi-Fi Cell, Tropos 5110 Outdoor Wi-Fi Cell, and the Tropos Control Element Management System. By manufacturing and selling such products, Tropos has in the past and continues to infringe directly, contribute to the infringement of, or induce the infringement of claims of the '377 patent, including but not limited to claims 32 and 33.

13. Firetide manufactures and sells mesh networks and mesh network components, including but not limited to the HotPort 3103 Indoor Mesh Node, HotPort 3203 Outdoor Mesh Node, HotPoint 1500R Outdoor Mesh Network Node, HotPoint 1500S Indoor Mesh Network Node, HotPoint 1000R Outdoor Mesh Network Node, and the HotPoint 1000S Indoor Mesh Network Node. By manufacturing and selling such products, Firetide has in the past and continues to infringe directly, contribute to the infringement of, or induce the infringement of claims of the '377 patent, including but not limited to claims 32 and 33.

14. Strix manufactures and sells mesh networks and mesh network components, including but not limited to the Access/One Network IWS and the Access/One Network OWS. By manufacturing and selling such products, Strix has in the past and continues to infringe directly, contribute to the infringement of, or induce the infringement of claims of the '377 patent, including but not limited to claims 32 and 33.

15. BelAir manufactures and sells mesh networks and mesh network components, including but not limited to the BelAir200 and the BelAir100. By manufacturing and selling such products, BelAir has in the past and continues to infringe directly, contribute to the infringement of, or induce the infringement of claims of the '377 patent, including but not limited to claims 32 and 33.

16. As a result of the Defendants' infringing conduct, the Defendants have damaged Linex. The Defendants are liable to Linex in an amount that adequately compensates Linex for the Defendants' infringement, which by law in no event can be less than a reasonable royalty.

Demand for Jury Trial

17. Linex demands a jury trial on all claims and issues triable of right by a jury.

Prayer for Relief

WHEREFORE, Linex prays for entry of judgment:

A. That U.S. Patent 6,493,377 and specifically claims 32 and 33 thereof have been infringed by the Defendants and by others whose infringement has been contributed to or induced by Defendants;

B. That Defendants account for and pay to Linex all damages and costs caused by Defendants' activities complained of herein;

C. That Linex be granted pre-judgment and post-judgment interest on the damages caused by reason of Defendants' activities complained of herein;

D. That this be considered an exceptional case;

E. That Linex be granted its attorneys' fees in this action;

F. That costs be awarded to Linex;

G. That Linex be granted such other and further relief that is just and proper under the circumstances.

Dated: April 5, 2005

Willie E. Gary
Madison McClellan
GARY, WILLIAMS, PARENTI, FINNEY, LEWIS, McMANUS, WATSON & SPERANDO
221 East Osceola Street
Stuart, FL 34994-2175
Tel: (561) 283-8260
Fax: (561) 781-1487

ATTORNEYS FOR PLAINTIFF

Of Counsel

Edward W. Goldstein
Corby R. Vowell
GOLDSTEIN & FAUCETT, LLP
1177 West Loop South, Suite 400
Houston, TX 77027
Tel: (713) 877-1515
Fax: (713) 877-1737

EXHIBIT
A

[redacted]

US006493377B2

(12) **United States Patent**
Schilling et al.

(10) **Patent No.: US 6,493,377 B2**
(45) **Date of Patent: Dec. 10, 2002**

(54) **DISTRIBUTED NETWORK, SPREAD-SPECTRUM SYSTEM**

(75) Inventors: **Donald L. Schilling**, Palm Beach Gardens, FL (US); **Joseph Garodnick**, Centerville, MA (US)

(73) Assignee: **Linex Technologies, Inc.**, West Long Branch, NJ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 62 days.

(21) Appl. No.: **09/729,911**

(22) Filed: **Dec. 6, 2000**

(65) **Prior Publication Data**

US 2002/0067756 A1 Jun. 6, 2002

(51) **Int. Cl.**[7] **H04B 1/69**

(52) **U.S. Cl.** **375/130**; 370/342; 370/353; 370/441

(58) **Field of Search** 375/130; 370/320, 370/335, 342, 441, 352, 353, 354, 355, 356

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,455,865 A * 10/1995 Perlman 370/445
5,604,869 A * 2/1997 Mincher et al. 370/280
5,742,593 A * 4/1998 Sharony et al. 370/280
6,301,239 B1 * 10/2001 Chuprun et al. 370/342

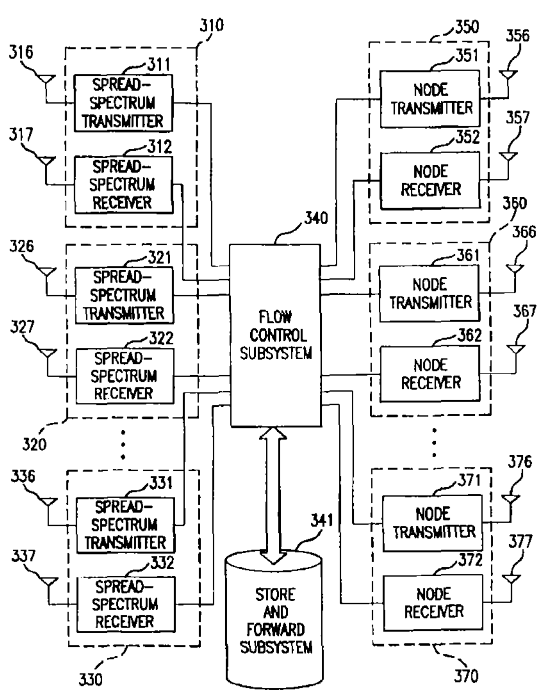
* cited by examiner

Primary Examiner—Don N. Vo
(74) *Attorney, Agent, or Firm*—David Newman Chartered

(57) **ABSTRACT**

A distributed network, spread-spectrum system comprising a plurality of remote stations and a plurality of nodes. One or more hub node(s) connect(s) to a central telephone office. A node's spread-spectrum transceiver communicates, using packets having spread-spectrum modulation, over radio waves, with the plurality of remote stations. Each packet has a source address and a destination address, and may have other information such as a header, start of message, end of message, flow-control information, forward error correction, and message data. A store-and-forward subsystem stores and forwards one or more packets to and from the remote station. The store-and-forward subsystem stores and forwards the one or more packets to and from another node in the plurality of nodes. A flow-control subsystem controls the store-and-forward subsystem, to store each packet arriving at the spread-spectrum transceiver. The flow-control subsystem communicates traffic information between each of the nodes in the plurality of nodes. The flow-control subsystem routes the packet through appropriate nodes to the hub node from a remote station. Based on the traffic at each node, the flow-control subsystem transmits the packet from the hub node to an appropriate node, and routes the packet to a recipient remote station. The flow-control subsystem routes the plurality of packets through a path in the plurality of nodes to ensure that the plurality of packets arrive sequentially for voice or video packets.

37 Claims, 6 Drawing Sheets



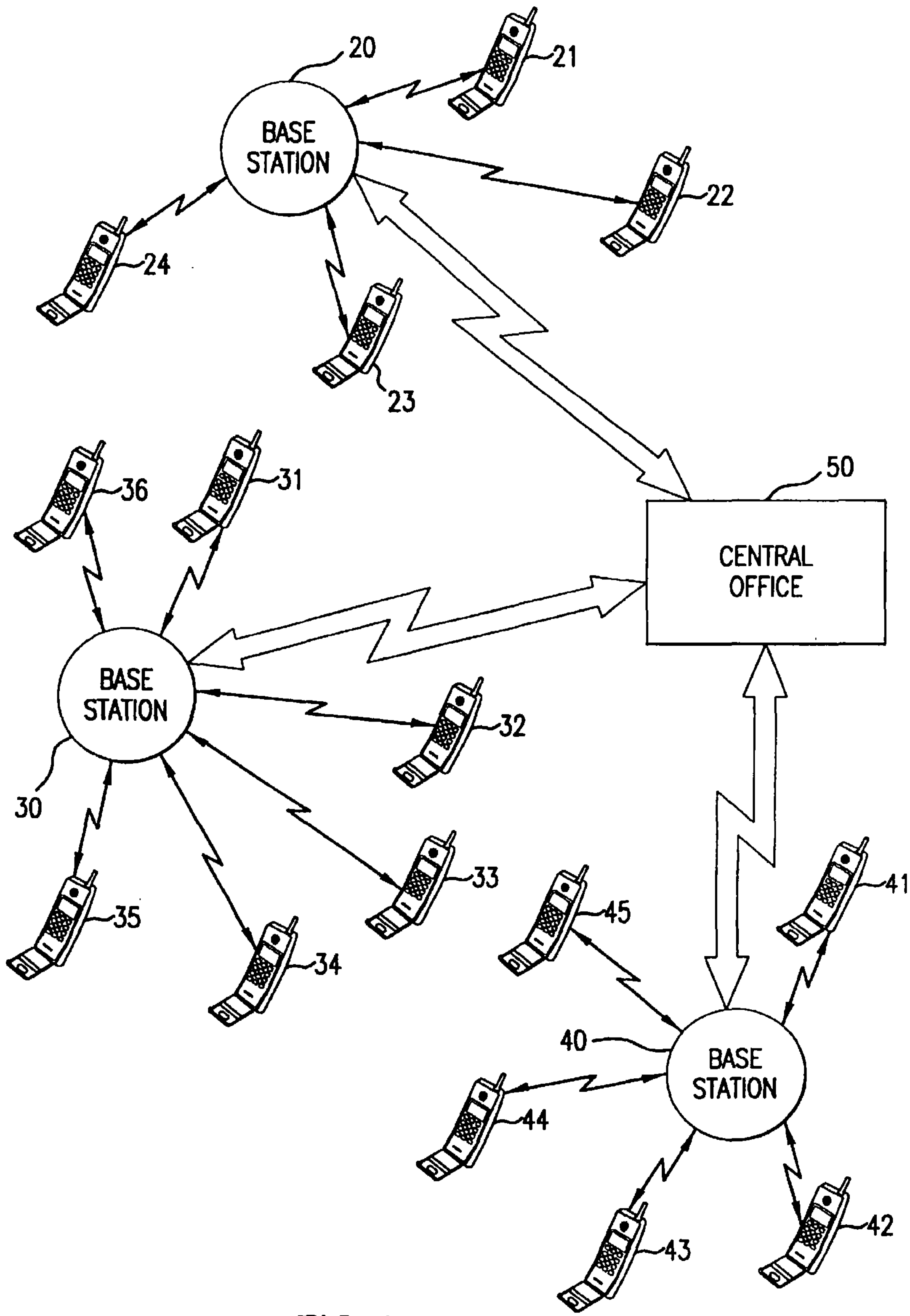


FIG. 1 PRIOR ART

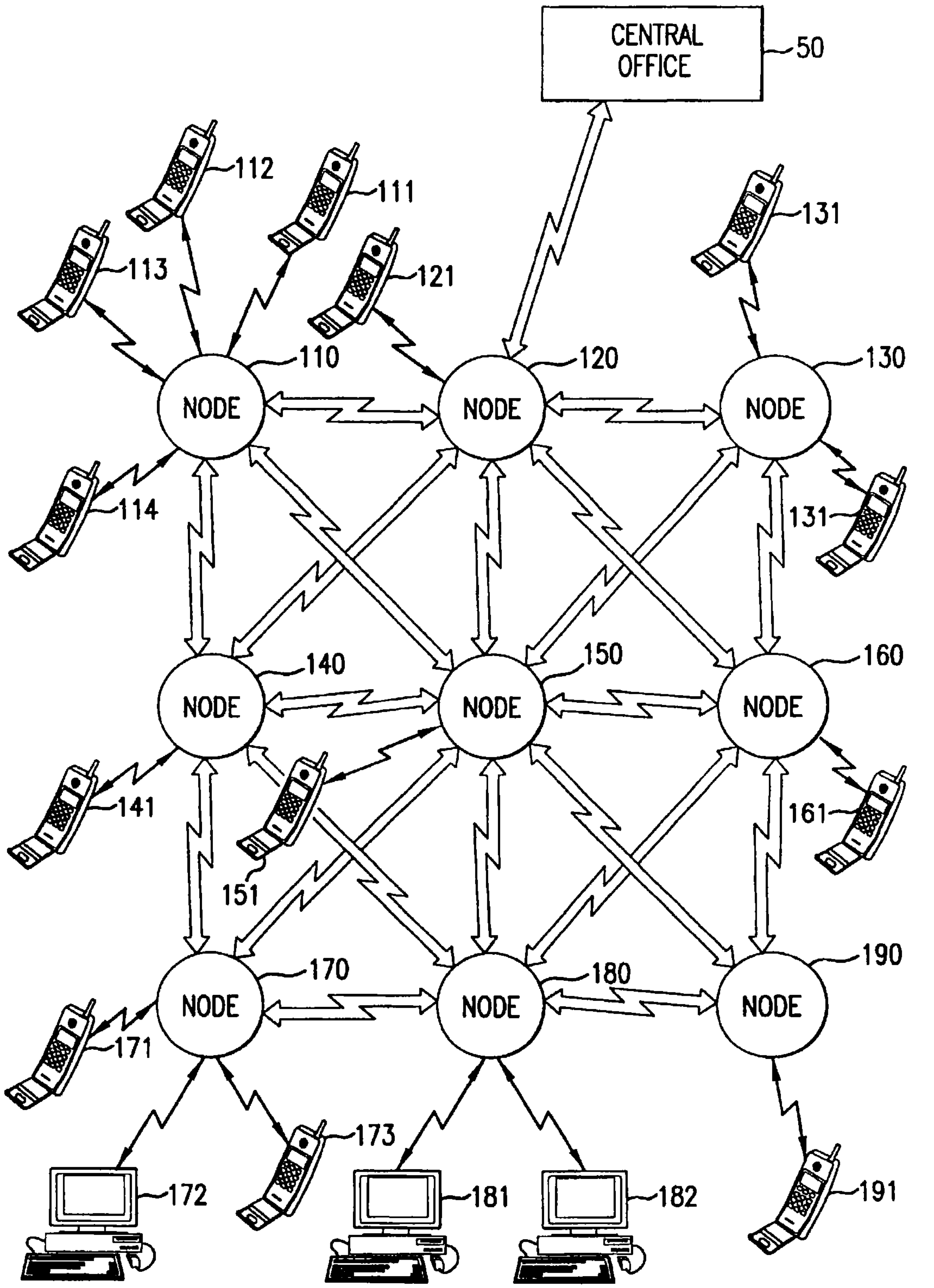

CENTRAL OFFICE
50
112
111
113
121
131
110
120
130
NODE
NODE
NODE
114
131
140
150
160
NODE
NODE
NODE
141
161
151
170
180
190
NODE
NODE
NODE
171
173
172
181
182
191

FIG.2

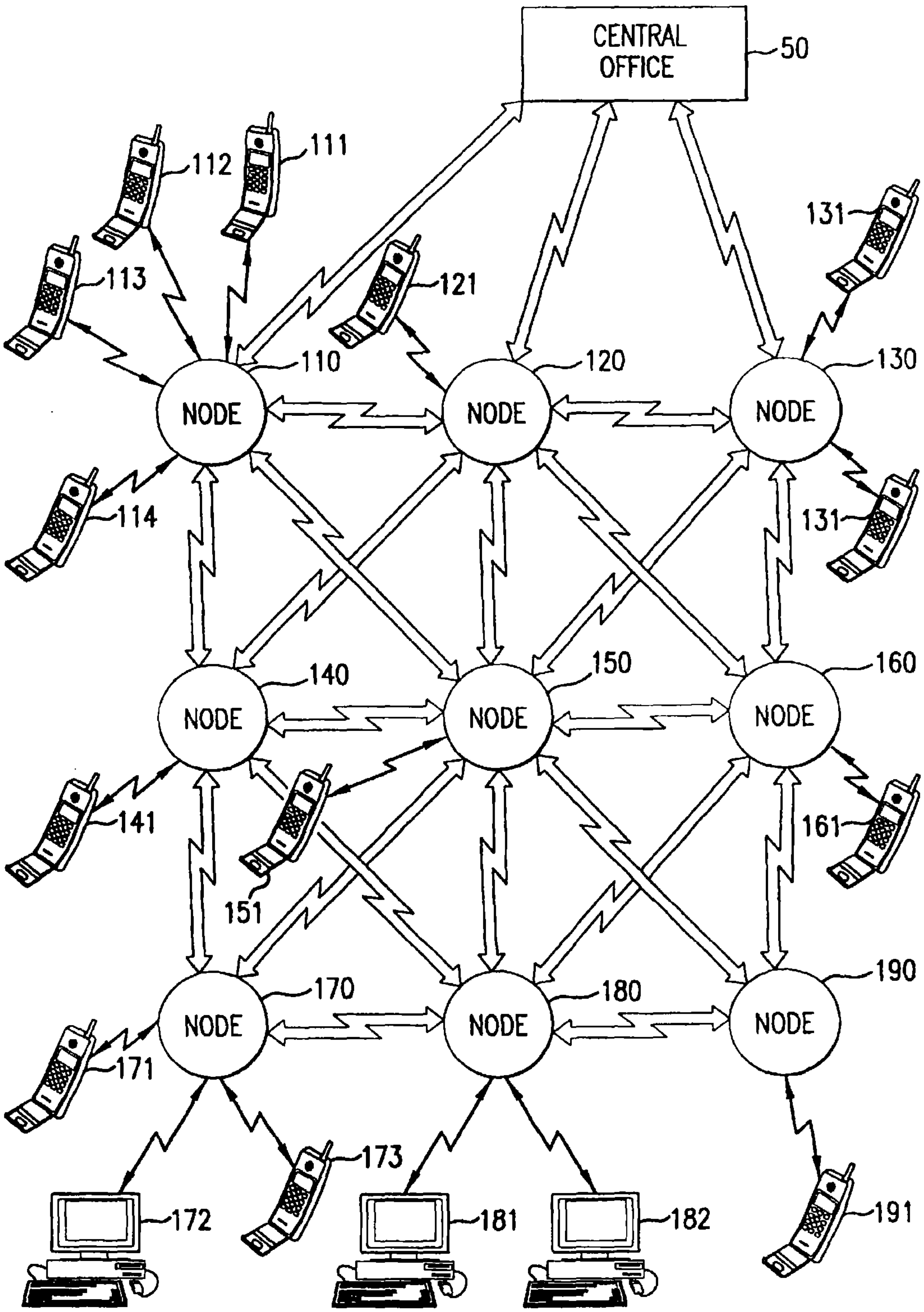

CENTRAL OFFICE
50
111
112
113
114
121
131
131
110
120
130
NODE
NODE
NODE
140
150
160
NODE
NODE
NODE
141
151
161
170
180
190
NODE
NODE
NODE
171
172
173
181
182
191

FIG.3

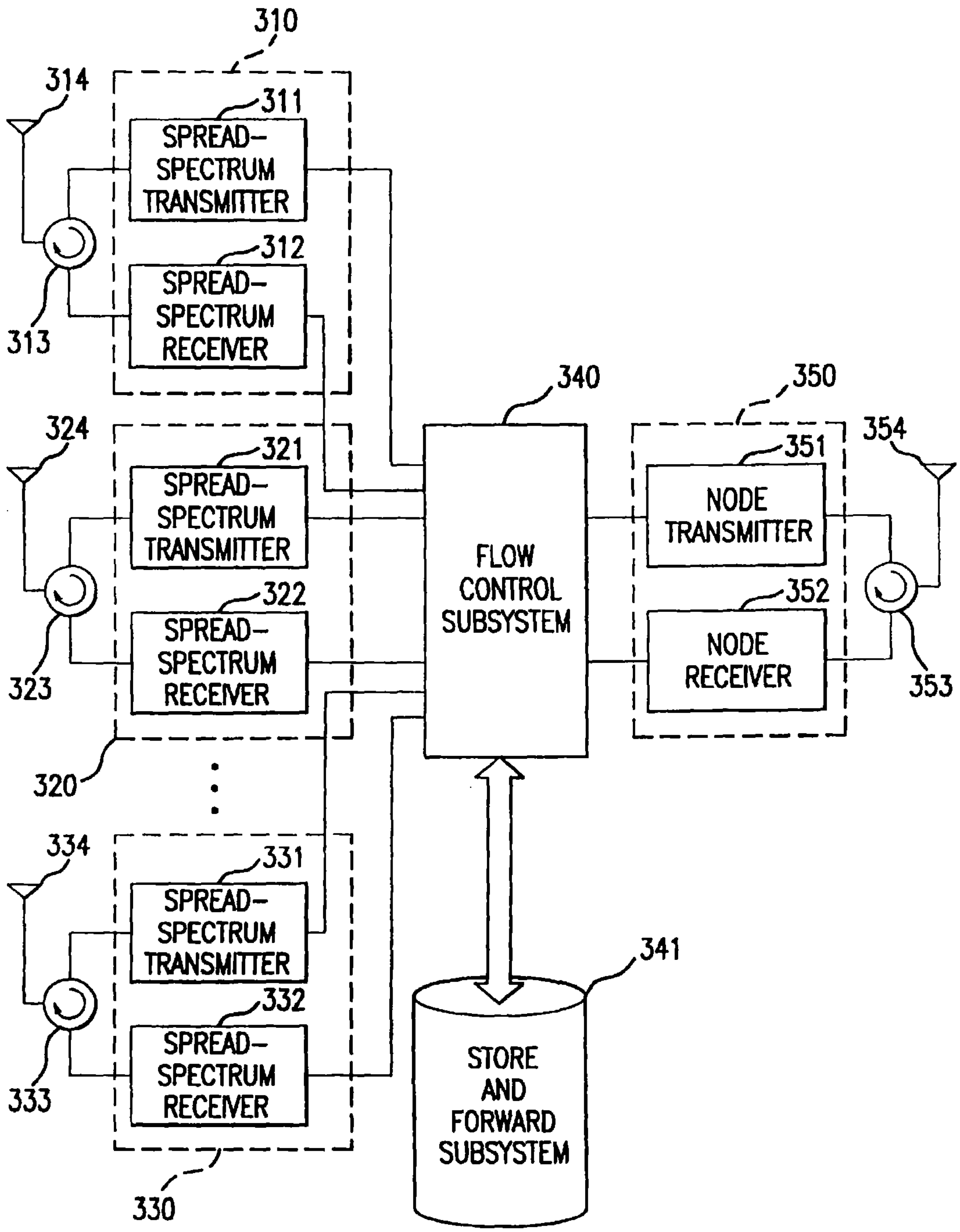

310
314
311
SPREAD-SPECTRUM TRANSMITTER
312
SPREAD-SPECTRUM RECEIVER
313
340
350
324
321
SPREAD-SPECTRUM TRANSMITTER
322
SPREAD-SPECTRUM RECEIVER
323
FLOW CONTROL SUBSYSTEM
351
NODE TRANSMITTER
352
NODE RECEIVER
354
353
320
334
331
SPREAD-SPECTRUM TRANSMITTER
332
SPREAD-SPECTRUM RECEIVER
333
341
STORE AND FORWARD SUBSYSTEM
330

FIG.4

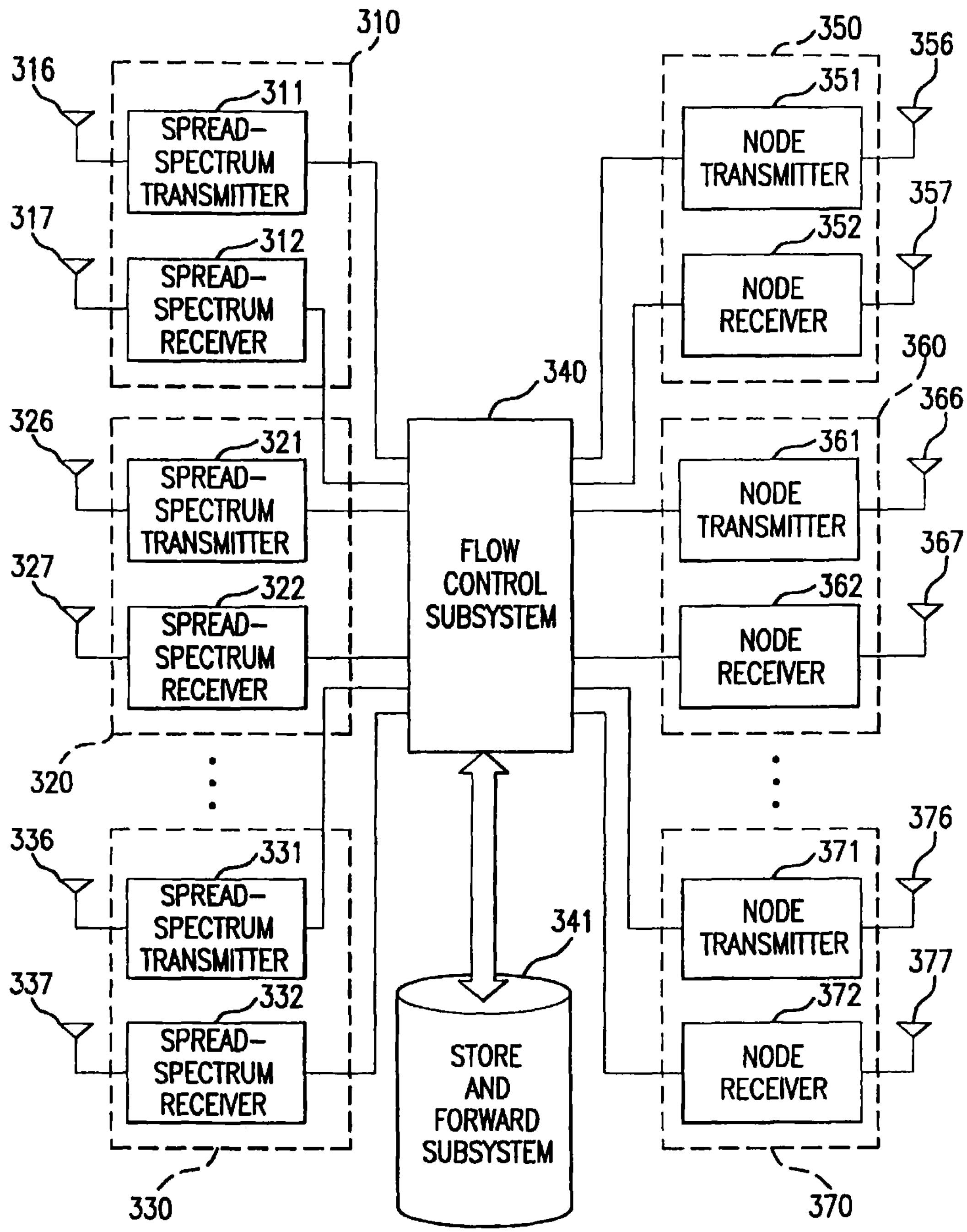

310
311
SPREAD-SPECTRUM TRANSMITTER
312
SPREAD-SPECTRUM RECEIVER
316
317
320
321
SPREAD-SPECTRUM TRANSMITTER
322
SPREAD-SPECTRUM RECEIVER
326
327
330
331
SPREAD-SPECTRUM TRANSMITTER
332
SPREAD-SPECTRUM RECEIVER
336
337
340
FLOW CONTROL SUBSYSTEM
341
STORE AND FORWARD SUBSYSTEM
350
351
NODE TRANSMITTER
352
NODE RECEIVER
356
357
360
361
NODE TRANSMITTER
362
NODE RECEIVER
366
367
370
371
NODE TRANSMITTER
372
NODE RECEIVER
376
377

FIG.5

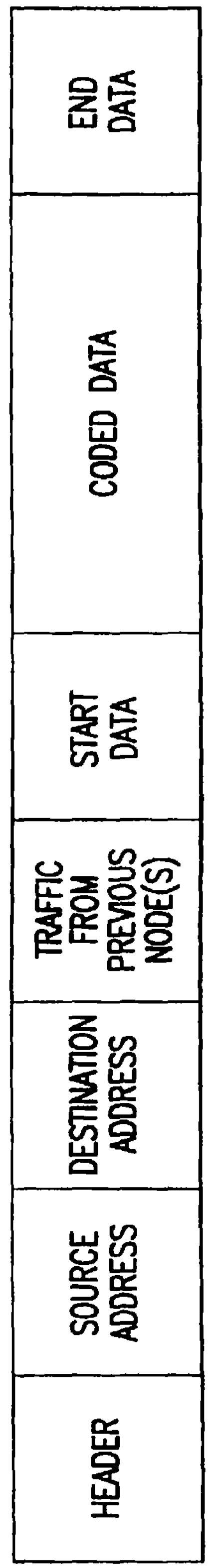

HEADER
SOURCE ADDRESS
DESTINATION ADDRESS
TRAFFIC FROM PREVIOUS NODE(S)
START DATA
CODED DATA
END DATA

FIG.6

DISTRIBUTED NETWORK, SPREAD-SPECTRUM SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to spread-spectrum communications, and more particularly to a wireless distributed network for reducing power and power variations, when transmitting packets having spread-spectrum modulation.

DESCRIPTION OF THE RELEVANT ART

As the data rate increases, the power transmitted by a cellular "telephone" and by the cellular base station (BS) must also increase to ensure a low probability of error. As illustratively shown in FIG. **1**, a star network, as is presently used for cellular networks, is used to communicate data between a central office **50** and a plurality of remote stations (RS). A plurality of base stations **20**, **30**, **40**, communicate directly with the central office **50**. A first base station **20** communicates data between a first plurality of remote stations **21**, **22**, **23**, **24**. A second base station **30** communicates data between a second plurality of remote stations **31**, **32**, **33**, **34**, **35**, **36**. A third base station **40** communicates data between a third plurality of remote stations **41**, **42**, **43**, **44**, **45**.

In the star network of FIG. **1**, data, in general, are not communicated directly between base stations, but through the central office **50**. The routing of data is a fixed communication path, from a remote station through a base station to the central office, and vice versa. Data generally are not routed, with dynamically changing paths, between remote stations which communicate with a base station, and data are not routed between remote stations directly through base stations, without passing through the central office **50**. Also, data are not routed to the central office **50**, using communications paths which dynamically vary between base stations, depending upon availability.

The power transmitted by the base station and the remote stations, and the ability to properly control the power, are problems which are growing in importance with the start of third generation (3G) wireless systems, which stresses data transmission which requires low error rates and Internet access.

Previously, a user could transmit data at the rate of 9.6 kilobit per second (Kb/s). Now, with 3G wireless systems, this rate is increasing to 384 kb/s and higher. For the increased data rates, the power must increase by a factor of 40 or more to ensure no degradation of performance.

A proposed solution to this problem is to install additional base stations, or towers. This is a very costly solution since some base stations will be overloaded with traffic and other base stations underutilized. This solution, however, certainly will reduce the power transmitted. Users who are distant from the base station still will be required to transmit significantly larger power than users located near the base station, to alleviate the near-far power problem. This very significant difference in distance and therefore in transmitted power, requires very accurate power control, which is a limiting feature in the current, standardized, 3G system. For example, consider acquisition: One limitation is effective packet size; that is, it takes significant time for the base station to help the user adjust its transmit power to the correct level. As more time is required, the packet will, in effect, increase in length, using time which could be allocated for data transmission or the transmission of additional

data packets. This "ramp up" time could exceed the duration of the data portion of the packet itself. As another example, during power control adjustment, a user transmitting with too much power can increase the error rate of a user transmitting at the proper power level.

The present base station multi-access scheme currently in use is not a preferred system approach.

SUMMARY OF THE INVENTION

A general object of the invention is to increase capacity of data from remote stations to a central office.

Another object of the invention is to reduce power levels and power level variations required for transmitting from remote stations and from the base stations.

An additional object of the invention is a more flexible network, which dynamically adapts to changing data requirements between remote stations and a central office.

According to the present invention, as embodied and broadly described herein, a distributed network, spread-spectrum system is provided, comprising a plurality of remote stations and a plurality of nodes. The plurality of nodes forms the distributed network. The distributed network plus the plurality of remote stations form the distributed system. In the plurality of nodes, one or more nodes are hub nodes, which connect to a central telephone office. The plurality of nodes covers a geographic area. Each node covers a micro-cell having a radius, which, typically, is less than one mile. Each node includes a plurality of spread-spectrum transceivers, or, equivalently, a plurality of spread-spectrum transmitters and a plurality of spread-spectrum receivers. Each node also includes a store-and-forward subsystem, and a flow-control subsystem, at least one node transmitter, and more typically a plurality of node transmitters, and at least one node receiver and more typically a plurality of node receivers.

Transmission between the remote station and a node is through the use of CDMA modulation, although any other modulation technique may be employed. Transmitting between nodes may be by cable, fiber optic cable, or microwave link, using any of a variety of modulation techniques. Steerable antennas may be employed. Such modulation and communications channels are well-known in the art.

Each node's spread-spectrum transceiver communicates, using packets having spread-spectrum modulation, over radio waves, with a plurality of remote stations. Each packet has a source address and a destination address, and may contain other information such as flow-control information, forward error correction, and message data. The store-and-forward subsystem stores and forwards one or more packets to and/or from the remote station. The store-and-forward subsystem stores and forwards the one or more packets to and from another node in the plurality of nodes.

A node transmitter communicates with a node receiver located at a different node from the transmitting node.

The flow-control subsystem in the distributed network controls the store-and-forward subsystem, to store each packet arriving at the spread-spectrum transceiver. The flow-control subsystem communicates traffic information between each of the nodes in the plurality of nodes. The traffic information typically includes traffic density at each of the nodes and node-memory availability. Using the traffic information, and in response to a packet having the destination address to the hub node, the flow-control subsystem routes the packet through appropriate nodes to the hub node or, in the case of a "local call", to the remote user directly. A "local call" is defined as a call between remote stations located within (i.e., accessing) the same distributed network. For the local call, the central office connection is not required.

Based on the traffic at each node, and each packet having a destination address to a remote station, the flow-control subsystem transmits the packet from a central office to an appropriate hub node to an appropriate node, and routes the packet to the next recipient node. Each packet in a message may traverse a different route. In response to a plurality of packets having voice data, the flow-control subsystem routes the plurality of packets through the same path in the plurality of nodes to ensure that the plurality of packets arrive sequentially. The flow control procedure balances the activity in each node relative to other nodes in the distributed network.

When an information packet(s) arrives from a remote station, the node routes the packet(s) to an appropriate second recipient node on the way to an intended hub node and central office, toward the destination address.

Additional objects and advantages of the invention are set forth in part in the description which follows, and in part are obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention also may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate preferred embodiments of the invention, and together with the description serve to explain the principles of the invention.

FIG. **1** is a block diagram of a current cellular spread-spectrum system, showing all base stations communicating with a central office;

FIG. **2** is a block diagram of a distributed network, spread-spectrum system;

FIG. **3** is a block diagram of a distributed network, spread-spectrum system;

FIG. **4** is a block diagram illustrating key elements of a node with a central office communicating with a set of a plurality of nodes;

FIG. **5** is an alternative block diagram illustrating key elements of a node; and

FIG. **6** shows a representative example of a packet.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference now is made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals indicate like elements throughout the several views.

As illustratively shown in FIG. **2**, a distributed network, spread-spectrum system is provided, comprising a plurality of remote stations and a plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170 180**, **190**. The plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170 180**, **190** forms the distributed network. The distributed network plus the plurality of remote stations form the distributed system. The plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170 180**, **190** of FIG. **2**, depicts, by way of example, a first node **110**, a second node, **120**, a third node **130**, a fourth node **140**, a fifth node **150**, a sixth node **160**, a seventh node **170**, an eighth node **180** and a ninth node **190**.

In the plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170 180**, **190**, one node, the second node **120**, is a hub node, which communicates to a central telephone office **50**. Thus, there may be a plurality of hubs. In an alternative embodiment, as shown in FIG. **3**, a set of the plurality of nodes (hubs) communicates to the central office **50**. The set of the plurality of nodes (hubs), may include the entire plurality of nodes.

The plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170 180**, **190** covers a geographic area. Each node in the plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170 180**, **190** covers a micro-cell having a radius much less than one mile.

FIGS. **4** and **5** illustratively show an example of what might be at each node. For communicating between nodes, in FIG. **4**, for example, there is a node transceiver **350**, or equivalently, a node transmitter **351** and a node receiver **352**. The node transmitter **351** and the node receiver **352** are coupled through a node isolator **353** to a node antenna **354**. Transceiver **350** can be at microwave frequencies or connect to a fiber optic link or any other channel capable of handling the traffic between nodes.

FIG. **5** shows an example of a plurality of node transceivers **350**, **360** and **370**, or equivalently, a plurality of node transmitters **351**, **361**, **371** and a plurality of node receivers **352**, **362**, **372**. In place of using a single antenna and an isolator, the first node transmitter **351** is coupled to a first node-transmitter antenna **356**, and the first node receiver **352** is coupled to the first node-receiver antenna **357**. Similarly, the second node transmitter **361** is coupled to a second node-transmitter antenna **366** and the second node receiver **362** is coupled to the second node-receiver antenna **367**, and the third node transmitter **371** is coupled to the third node-transmitter antenna **376** and the third node receiver **372** is coupled to the third node-receiver antenna **377**. The antennas could be omnidirectional, sectored, or steerable (smart) antennas.

With each node using the node transmitter **351** and the node receiver **352**, of FIG. **4**, or the plurality of node transmitters **351**, **361**, **371** and the plurality of node receivers, **352**, **362**, **372** of FIG. **5**, a node communicates with a different node having a node transmitter and node receiver node receiver. Thus, in the plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170 180**, **190**, the first node **110** communicates with the second node **120**, the fourth node **140** and the fifth node **150**. The second node **120** communicates with the first node **110**, the third node **130**, the fourth node **140**, the fifth node **150** and the sixth node **160**. The third node communicates with the second node **120**, the fifth node **150** and the sixth node **160**. The fourth node communicates with the first node **110**, the second node **120**, the fifth node **150**, the seventh node **170** and the eighth node **180**. The fifth node communicates with the first node **110**, the second node **120**, the third node **130**, the fourth node **140**, the sixth node **160**, the seventh node **170**, the eighth node **180** and the ninth node **190**. The sixth node **160** communicates with the second node **120**, the third node **130**, the fifth node **150**, the eighth node **180** and the ninth node **190**. The seventh node **170** communicates with the fourth node **140**, the fifth node **150** and the eighth node **180**. The eighth node **180** communicates with the fourth node **140**, the fifth node **150**, the sixth node **160**, the seventh node **170** and the ninth node **190**. The ninth node communicates with the fifth node **150**, the sixth node **160** and the eighth node **180**.

Each node may include a plurality of spread-spectrum transceivers **310**, **320**, **330**, or, equivalently, a plurality of spread-spectrum transmitters **311**, **321**, **331** and a plurality of spread-spectrum receivers **312**, **322**, **332**, a store-and-forward subsystem **341**, and a flow-control subsystem **340**. The flow-control subsystem **340** typically would include a processor or computer. The store-and-forward subsystem **341** typically would include memory and the memory may be part of the computer embodying the processor for the flow-control subsystem **340**. The memory may be random access memory (RAM) or hard drive, or other volatile or non-volatile memory and memory storage device. Other devices are well-known in the art, and include hard drives, magnetic tapes, compact disk (CD), and other laser/optical memories and bubble memory devices. The particular flow-control subsystem **340** and the store-and-forward subsystem **341** would be specified by a particular system requirements and design criteria.

Each node in the plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170** **180**, **190** also includes at least one node transmitter **351**, and more typically a plurality of node transmitters **351**, **361**, **371** and at least one node receiver **352** and more typically a plurality of node receivers **352**, **362**, **372**.

The store-and-forward subsystem **341** is coupled to and controlled by the flow-control subsystem **340**. The plurality of spread-spectrum transmitters **311**, **321**, **331**, are coupled between a plurality of spread-spectrum antennas **316**, **326**, **336** and the flow-control subsystem **340**. The plurality of spread-spectrum receivers **312**, **322**, **332** are coupled between a plurality of receiver antennas **317**, **327**, **337** and the flow-control subsystem **340**. FIGS. **2** and **3** show the first node **110** communicating with a first plurality of remote stations **111**, **112**, **113**, **114**. The second node **120** communicates with a second plurality of remote stations, with FIGS. **2** and **3** showing a first remote station **121** of the second plurality of remote stations. The third node **130** communicates with a third plurality of remote stations **131**, **132** and the fourth node **140**, the fifth node **150** and the sixth node **160** communicate with a fourth plurality of remote stations, a fifth plurality of remote stations, and a sixth plurality of remote stations, respectively. FIGS. **2** and **3** show the fourth node **140** communicating with a first remote station **141** of the fourth plurality of remote stations, the fifth node **150** communicating with a first remote station **151** of the fifth plurality of remote stations, and the sixth node **160** communicating with a first remote station **161** of the sixth plurality of remote stations. The seventh node **170** and the eighth node **180** are shown communicating with a seventh plurality of remote stations **171**, **172**, **173** and an eighth plurality of remote stations **181**, **182**, respectively. The ninth node **190** communicates with a ninth plurality of remote stations, and FIGS. **2** and **3** show the ninth node **190** communicating with a first remote station **191** of the ninth plurality of remote stations.

Each node's spread-spectrum transceiver, or equivalently spread-spectrum transmitter and spread-spectrum receiver, communicates, using packets having spread-spectrum modulation, over radio waves, with the plurality of remote stations. Each packet has a source address and a destination address, and may have header, start of data, end of data, and other information such as flow-control information, forward error correction, and message data. FIG. **6** shows, by way of example, one way a packet may be structured.

The store-and-forward subsystem **341** stores and forwards one or more packets to and from the remote station. The store-and-forward subsystem **341** stores and forwards the one or more packets to and from another node in the plurality of nodes **110**, **120**, **130**, **140**, **150**, **160**, **170** **180**, **190**.

The flow-control subsystem **340** in the distributed network controls the store-and-forward subsystem, to store each packet arriving at the spread-spectrum transceiver. In a preferred embodiment, the flow-control subsystem **340** also is distributed throughout the network, with a flow-control subsystem **340** resident at each node. It is possible, of course, to have a central flow-control system. The flow-control subsystem **340** communicates traffic information between each of the nodes in the plurality of nodes. The traffic information typically includes traffic density at each of the nodes and memory availability. Using the traffic information and in response to a packet having the destination address to the hub node, the flow-control subsystem **340** routes the packet through appropriate nodes to the appropriate hub node. Based on the traffic at each node, and each packet having a destination address to either the hub or a remote station, the flow-control subsystem **340** transmits the packet from the hub node to an appropriate node, and routes the packet to the first recipient node. Each packet may traverse a different route en route to the remote station.

In response to the traffic congestion and to a plurality of packets having voice data, the flow-control subsystem routes the plurality of packets through a path in the plurality of nodes to ensure that the plurality of packets arrive sequentially. The flow control procedure balances the activity in each node relative to other nodes in the distributed network.

When an information packet arrives from a central office, the hub node routes the information packet to an appropriate second recipient node on the way to an intended remote station destination address.

Consider, by way of example, FIG. **3**, with calls from the central office **50** to remote stations. There is a set of nodes (hubs) **110**, **120** **130** who tell the central office **50** of the availability of each hub node **110**, **120**, **130**. By having a set of hub nodes, the central office has redundancy, in case of hub node failure, for sending and receiving packets to and from remote stations. Based on availability of a hub node, a packet is sent to a particular hub node, which is available. If two or more hub nodes are available, any of the available hub nodes can be the recipient of the packet.

Each hub keeps track of the traffic flow, memory availability, of many nodes. The first nodes of which are kept track, include the closest surrounding nodes, as defined by design criteria. The next set of node(s) where the hub keeps information might be the next layer of closest nodes.

When sending a packet from a hub to a remote station, the path routing the packet through various nodes is not known, a priori, except maybe for voice. Typically, a packet is forwarded from the hub to a node, which is on the particular path to the remote user. Nodes chosen for a particular path have available capacity and storage, and can forward the packet to a subsequent node. This ability is called "look ahead".

The packet passes through various nodes, until the packet reaches the remote station. Since the path is not predefined, and not necessarily a direct part "as the crow flies", paths for several packet for the same remote station can be different.

For packets passing from a remote station to the central office **50**, the remote station accesses the nearest node. The packet is forwarded, node to node, until the packet arrives at the hub. Paths for packets are not predefined, and can be different for different packets from the remote station to the hub.

For local calls within the distributed network, there is no need for packets going to a hub or central office. Instead, if the data are sent to another remote station located within the distributed network, the packet enters the distributed network through a node near the remote station sending the packet, and exits the distributed network from a node near the recipient remote station. The packet does not travel a predefined path, and different packets from the sending remote station can travel different paths to the recipient remote station. This depends on the destination address as in a phone system.

An advantage of the present invention is that the nodes and the connected remote stations form micro-cells. Thus, low power can be used by the remote stations, and by nodes (base stations), reducing the potential of radio frequency effects on the user of the remote station, such as RF burns, brain tumors, etc. Handoff for a remote station traveling between nodes can be done in any of the standard ways available for packet communications and base stations. One such technique is for the remote station to monitor the control signals from several of the strongest nodes (base stations). When the signal strength from the node (base station) being used by the remote station falls below a threshold, then the remote station transmits the next packet to a node having the largest signal strength being monitored by the remote station.

Each node is small and can be mounted on telephone poles, building, etc. The nodes require little space and low amounts of power.

It will be apparent to those skilled in the art that various modifications can be made to the distributed network, spread-spectrum system of the instant invention without departing from the scope or spirit of the invention, and it is intended that the present invention cover modifications and variations of the distributed network, spread-spectrum system provided they come within the scope of the appended claims and their equivalents.

We claim:

1. A distributed network, spread-spectrum system, comprising:

a plurality of remote stations;

a plurality of nodes for covering a geographic area, the plurality of nodes including a hub node, each node covering a micro-cell having a radius less than one mile, each node including,

a spread-spectrum transceiver for communicating, using packets having spread-spectrum modulation, over radio waves, with the plurality of remote stations, each packet having a source address and a destination address;

a store-and-forward subsystem, coupled to the spread-spectrum transceiver, for storing and forwarding one or more packets to and from the remote station, and for storing and forwarding the one or more packets to and from another node in the plurality of nodes;

a flow-control subsystem, coupled to the store-and-forward subsystem, for controlling the store-and-forward subsystem, to store each packet arriving at the spread-spectrum transceiver, said flow-control subsystem communicating traffic information between each of the nodes in the plurality of nodes, with the traffic information including traffic density at each of the nodes, said flow-control subsystem, responsive to the traffic information and to a packet having the destination address to the hub node, for routing the packet through appropriate nodes to the hub node, said flow-control subsystem, responsive to the traffic at each node, each packet having a destination address to a first recipient node, for transmitting the packet from the hub node to an appropriate node, routing the packet to the first recipient node, said flow-control subsystem, responsive to the traffic congestion and to a plurality of packets having voice data, for routing the plurality of packets through a path in the plurality of nodes to ensure that the plurality of packets arrive sequentially; and

said hub node, responsive to an information packet arriving from a central office, for routing the information packet to a second recipient node.

2. A distributed network, spread-spectrum system, comprising:

a plurality of remote stations;

a plurality of nodes for covering a geographic area, the plurality of nodes including a set of hub nodes, each node covering a micro-cell having a radius less than one mile, each node including,

a spread-spectrum transceiver for communicating, using packets having spread-spectrum modulation, over radio waves, with the plurality of remote stations, each packet having a source address and a destination address;

a store-and-forward subsystem, coupled to the spread-spectrum transceiver, for storing and forwarding one or more packets to and from the remote station, and for storing and forwarding the one or more packets to and from another node in the plurality of nodes;

a flow-control subsystem, coupled to the store-and-forward subsystem, for controlling the store-and-forward subsystem, to store each packet arriving at the spread-spectrum transceiver, said flow-control subsystem communicating traffic information between each of the nodes in the plurality of nodes, with the traffic information including traffic density at each of the nodes, said flow-control subsystem, responsive to the traffic information and to a packet having the destination address to a particular hub node, for routing the packet through appropriate nodes to the particular hub node, said flow-control subsystem, responsive to the traffic at each node, each packet having a destination address to a first recipient node, for transmitting the packet from the particular hub node to an appropriate node, routing the packet to the first recipient node, said flow-control subsystem, responsive to the traffic congestion and to a plurality of packets having voice data, for routing the plurality of packets through a path in the plurality of nodes to ensure that the plurality of packets arrive sequentially; and

said particular hub node, responsive to an information packet arriving from a central office, for routing the information packet to a second recipient node.

3. A distributed network, spread-spectrum method, for a plurality of remote stations and a plurality of nodes for covering a geographic area, the plurality of nodes including a hub node, each node covering a micro-cell having a radius less than one mile, comprising the steps of:

communicating, using packets having spread-spectrum modulation, over radio waves, with the plurality of remote stations, each packet having a source address and a destination address;

storing and forwarding one or more packets to and from the remote station;

storing and forwarding the one or more packets to and from another node in the plurality of nodes;

controlling the steps of storing and forwarding, to store each packet arriving at the spread-spectrum transceiver;

communicating traffic information between each of the nodes in the plurality of nodes, with the traffic information including traffic density at each of the nodes;

routing, in response to the traffic information and to a packet having the destination address to the hub node, the packet through appropriate nodes to the hub node;

transmitting, in response to the traffic at each node, each packet having a destination address to a first recipient node;

transmitting the packet from the hub node to an appropriate node;

routing the packet to the first recipient node;

routing, in response to the traffic congestion and to a plurality of packets having voice data, the plurality of packets through a path in the plurality of nodes to ensure that the plurality of packets arrive sequentially; and

routing, in response to an information packet arriving from a central office, the information packet to a second recipient node.

4. A distributed network, spread-spectrum system, comprising:

a plurality of remote stations;

a plurality of nodes for covering a geographic area, each node in the plurality of nodes for communicating, with one or more remote stations of the plurality of remote stations, using packets having a destination address and modulated with spread-spectrum modulation, with each packet transmitted between a respective node and remote station using radio waves; and

flow-control means for communicating traffic information between a first multiplicity of neighboring nodes of a first node of the plurality of nodes, with the first node capable of communicating a respective packet to a node in the first multiplicity of neighboring nodes, with the traffic information including traffic density at each of the first multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information and to the respective packet, from the first node, having a respective destination address of a respective destination node of the plurality of nodes, for selecting a second node of the first multiplicity of neighboring nodes, said flow-control means for routing, responsive to the traffic information, the respective packet through the second node to the respective destination node.

5. The distributed network, as set forth in claim 4, with said flow-control means for communicating traffic information between a second multiplicity of neighboring nodes of the second node, with the second node capable of communication the respective packet to a node in the second multiplicity of neighboring nodes, with the traffic information including traffic density at each of the second multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information and to the respective packet, from the second node, having the respective destination address of the respective destination node, for selecting a third node of the second multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information, for routing the respective packet through the third node to the respective destination node.

6. The distributed network, as set forth in claim 5, with said flow-control means for communicating traffic information between a third multiplicity of neighboring nodes of the third node, with the third node capable of communicating the respective packet to a node in the third multiplicity of neighboring nodes, with the traffic information including traffic density at each of the third multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information and to the respective packet, from the third node, having the respective destination address of the respective destination node, for selecting a fourth node of the third multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information, for routing the respective packet through the fourth node to the respective destination node.

7. The distributed network, as set forth in claim 6, with said flow-control means for communicating traffic information between a fourth multiplicity of neighboring nodes of the fourth node, with the fourth node capable of communicating the respective packet to a node in the fourth multiplicity of neighboring nodes, with the traffic information including traffic density at each of the fourth multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information and to the respective packet, from the fourth node, having the respective destination address of the respective destination node, for selecting a fifth node of the fourth multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information, for routing the respective packet through the fifth node to the respective destination node.

8. The distributed network, as set forth in claim 7, with said flow-control means for communicating traffic information between a fifth multiplicity of neighboring nodes of the fifth node, with the fifth node capable of communicating the respective packet to a node in the fifth multiplicity of neighboring nodes, with the traffic information including traffic density at each of the fifth multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information and to the respective packet, from the fifth node, having the respective destination address of the respective destination node, for selecting a sixth node of the fifth multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information, for routing the respective packet through the sixth node to the respective destination node.

9. The distributed network, as set forth in claim 8, with said flow-control means for communicating traffic information between a sixth multiplicity of neighboring nodes of the sixth node, with the sixth node capable of communicating a respective packet to a node in the sixth multiplicity of neighboring nodes, with the traffic information including traffic density at each of the sixth multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information and to the respective packet, from the sixth node, having the respective destination address of the respective destination node, for selecting a seventh node of the sixth multiplicity of neighboring nodes, said flow-control means, responsive to the traffic information, for routing the respective packet through the seventh node to the respective destination node.

10. A distributed network, spread-spectrum system, comprising:

a plurality of remote stations;

a plurality of nodes for covering a geographic area, each node in the plurality of nodes for communicating, with one or more remote stations of the plurality of remote stations, using packets having a destination address and modulated with spread-spectrum modulation, with each packet transmitted between a respective node and remote station using radio waves; and flow-control means for communicating first traffic information between a first multiplicity of neighboring nodes of a first node of the plurality of nodes, with the first node capable of communicating a respective packet to a node in the first multiplicity of neighboring nodes, with the first traffic information including traffic density at each of the first multiplicity of neighboring nodes, said flow-control means, responsive to the first traffic information and to the respective packet, from the first node, having a respective destination address of a respective destination node of the plurality of nodes, for selecting a second node of the first multiplicity of neighboring nodes, said flow-control means for responsive to the first traffic information, the respective packet through the second node to the respective destination node.

11. The distributed network, as set forth in claim **10**, with said flow-control means for communicating second traffic information between a second multiplicity of neighboring nodes of the second node, with the second node capable of communicating a respective packet to a node in the second multiplicity of neighboring nodes, with the second traffic information including traffic density at each of the second multiplicity of neighboring nodes, said flow-control means, responsive to the second traffic information and to the respective packet, from the second node, having the respective destination address of the respective destination node, for selecting a third node of the second multiplicity of neighboring nodes, said flow-control means, responsive to the second traffic information, for routing the respective packet through the third node to the respective destination node.

12. The distributed network, as set forth in claim **11**, with said flow-control means for communicating third traffic information between a third multiplicity of neighboring nodes of the third node, with the third node capable of communicating a respective packet to a node in the third multiplicity of neighboring nodes, with the third traffic information including traffic density at each of the third multiplicity of neighboring nodes, said flow-control means, responsive to the third traffic information and to the respective packet, from the third node, having the respective destination address of the respective destination node, for selecting a fourth node of the third multiplicity of neighboring nodes, said flow-control means, responsive to the third traffic information, for routing the respective packet through the fourth node to the respective destination node.

13. The distributed network, as set forth in claim **12**, with said flow-control means for communicating fourth traffic information between a fourth multiplicity of neighboring nodes of the fourth node, with the fourth node capable of communicating a respective packet to a node in the fourth multiplicity of neighboring nodes, with the fourth traffic information including traffic density at each of the fourth multiplicity of neighboring nodes, said flow-control means, responsive to the fourth traffic information and to the respective packet, from the fourth node, having the respective destination address of the respective destination node, for selecting a fifth node of the fourth multiplicity of neighboring nodes, said flow-control means, responsive to the fourth traffic information, for routing the respective packet through the fifth node to the respective destination node.

14. The distributed network, as set forth in claim **13**, with said flow-control means for communicating fifth traffic information between a fifth multiplicity of neighboring nodes of the fifth node, with the fifth node capable of communicating a respective packet to a node in the fifth

multiplicity of neighboring nodes, with the fifth traffic information including traffic density at each of the fifth multiplicity of neighboring nodes, said flow-control means, responsive to the fifth traffic information and to the respective packet, from the fifth node, having the respective destination address of the respective destination node, for selecting a sixth node of the fifth multiplicity of neighboring nodes, said flow-control means, responsive to the fifth traffic information, for routing the respective packet through the sixth node to the respective destination node.

15. The distributed network, as set forth in claim **14**, with said flow-control means for communicating sixth traffic information between a sixth multiplicity of neighboring nodes of the sixth node, with the sixth node capable of communicating a respective packet to a node in the sixth multiplicity of neighboring nodes, with the sixth traffic information including traffic density at each of the sixth multiplicity of neighboring nodes, said flow-control means, responsive to the sixth traffic information and to the respective packet, from the sixth node, having the respective destination address of the respective destination node, for selecting a seventh node of the sixth multiplicity of neighboring nodes, said flow-control means, responsive to the sixth traffic information, for routing the respective packet through the seventh node to the respective destination node.

16. A distributed network, spread-spectrum method, having a plurality of remote stations and a plurality of nodes for covering a geographic area, comprising the steps of:

communicating, between a node of the plurality of nodes and one or more remote stations of the plurality of remote stations, using packets having a destination address and modulated with spread-spectrum modulation, with each packet transmitted between a respective node and remote station using radio waves;

communicating traffic information between a first multiplicity of neighboring nodes of a first node of the plurality of nodes, with the first node capable of communicating a respective packet to a node in the first multiplicity of neighboring nodes, with the traffic information including traffic density at each of the first multiplicity of neighboring nodes;

selecting, responsive to the traffic information and to the respective packet, from the first node, having a respective destination address of a respective destination node of the plurality of nodes, a second node of the first multiplicity of neighboring nodes; and

routing, responsive to the traffic information, the respective packet through the second node to the respective destination node.

17. The distributed network, spread-spectrum method, as set forth in claim **16**, further comprising the steps:

communicating traffic information between a second multiplicity of neighboring nodes of the second node, with the second node capable of communication the respective packet to a node in the second multiplicity of neighboring nodes, with the traffic information including traffic density at each of the second multiplicity of neighboring nodes;

selecting, responsive to the traffic information and to the respective packet, from the second node, having the respective destination address of the respective destination node, a third node of the second multiplicity of neighboring nodes; and

routing, responsive to the traffic information, the respective packet through the third node to the respective destination node.

18. The distributed network, spread-spectrum method, as set forth in claim 17, further comprising the steps:

communicating traffic information between a third multiplicity of neighboring nodes of the third node, with the third node capable of communicating the respective packet to a node in the third multiplicity of neighboring nodes, with the traffic information including traffic density at each of the third multiplicity of neighboring nodes;

selecting, responsive to the traffic information and to the respective packet, from the third node, having the respective destination address of the respective destination node, a fourth node of the third multiplicity of neighboring nodes; and

routing, responsive to the traffic information, the respective packet through the fourth node to the respective destination node.

19. The distributed network, spread-spectrum method, as set forth in claim 18, further comprising the steps:

communicating traffic information between a fourth multiplicity of neighboring nodes of the fourth node, with the fourth node capable of communicating the respective packet to a node in the fourth multiplicity of neighboring nodes, with the traffic information including traffic density at each of the fourth multiplicity of neighboring nodes;

selecting, responsive to the traffic information and to the respective packet, from the fourth node, having the respective destination address of the respective destination node, a fifth node of the fourth multiplicity of neighboring nodes; and

routing, responsive to the traffic information, the respective packet through the fifth node to the respective destination node.

20. The distributed network, spread-spectrum method, as set forth in claim 19, further comprising the steps:

communicating traffic information between a fifth multiplicity of neighboring nodes of the fifth node, with the fifth node capable of communicating the respective packet to a node in the fifth multiplicity of neighboring nodes, with the traffic information including traffic density at each of the fifth multiplicity of neighboring nodes;

selecting, responsive to the traffic information and to the respective packet, from the fifth node, having the respective destination address of the respective destination node, a sixth node of the fifth multiplicity of neighboring nodes; and

routing, responsive to the traffic information, the respective packet through the sixth node to the respective destination node.

21. The distributed network, spread-spectrum method, as set forth in claim 20, further comprising the steps:

communicating traffic information between a sixth multiplicity of neighboring nodes of the sixth node, with the sixth node capable of communicating a respective packet to a node in the sixth multiplicity of neighboring nodes, with the traffic information including traffic density at each of the sixth multiplicity of neighboring nodes;

selecting, responsive to the traffic information and to the respective packet, from the sixth node, having the respective destination address of the respective destination node, for selecting a seventh node of the sixth multiplicity of neighboring nodes; and

routing, responsive to the traffic information, the respective packet through the seventh node to the respective destination node.

22. A distributed network, spread-spectrum method, having a plurality of remote stations and a plurality of nodes for covering a geographic area, comprising the steps of:

communicating, between a node of the plurality of nodes and one or more remote stations of the plurality of remote stations, using packets having a destination address and modulated with spread-spectrum modulation, with each packet transmitted between a respective node and remote station using radio waves;

communicating first traffic information between a first multiplicity of neighboring nodes of a first node of the plurality of nodes, with the first node capable of communicating a respective packet to a node in the first multiplicity of neighboring nodes, with the first traffic information including traffic density at each of the first multiplicity of neighboring nodes;

selecting, responsive to the first traffic information and to the respective packet, from the first node, having a respective destination address of a respective destination node of the plurality of nodes, a second node of the first multiplicity of neighboring nodes; and

routing, responsive to the first traffic information, the respective packet through the second node to the respective destination node.

23. The distributed network, spread-spectrum method, as set forth in claim 22, further comprising the steps:,

communicating second traffic information between a second multiplicity of neighboring nodes of the second node, with the second node capable of communicating a respective packet to a node in the second multiplicity of neighboring nodes, with the second traffic information including traffic density at each of the second multiplicity of neighboring nodes;

selecting, responsive to the second traffic information and to the respective packet, from the second node, having the respective destination address of the respective destination node, a third node of the second multiplicity of neighboring nodes; and

routing, responsive to the second traffic information, the respective packet through the third node to the respective destination node.

24. The distributed network, spread-spectrum method, as set forth in claim 23, further comprising the steps:

communicating third traffic information between a third multiplicity of neighboring nodes of the third node, with the third node capable of communicating a respective packet to a node in the third multiplicity of neighboring nodes, with the third traffic information including traffic density at each of the third multiplicity of neighboring nodes;

selecting, responsive to the third traffic information and to the respective packet, from the third node, having the respective destination address of the respective destination node, a fourth node of the third multiplicity of neighboring nodes; and

routing, responsive to the third traffic information, the respective packet through the fourth node to the respective destination node.

25. The distributed network, spread-spectrum method, as set forth in claim 24, further comprising the steps:

communicating fourth traffic information between a fourth multiplicity of neighboring nodes of the fourth node, with the fourth node capable of communicating a respective packet to a node in the fourth multiplicity of neighboring nodes, with the fourth traffic information including traffic density at each of the fourth multiplicity of neighboring nodes;

selecting, responsive to the fourth traffic information and to the respective packet, from the fourth node, having the respective destination address of the respective destination node, a fifth node of the fourth multiplicity of neighboring nodes; and

routing, responsive to the fourth traffic information, the respective packet through the fifth node to the respective destination node.

26. The distributed network, spread-spectrum method, as set forth in claim **25**, further comprising the steps:

communicating fifth traffic information between a fifth multiplicity of neighboring nodes of the fifth node, with the fifth node capable of communicating a respective packet to a node in the fifth multiplicity of neighboring nodes, with the fifth traffic information including traffic density at each of the fifth multiplicity of neighboring nodes;l

selecting, responsive to the fifth traffic information and to the respective packet, from the fifth node, having the respective destination address of the respective destination node, a sixth node of the fifth multiplicity of neighboring nodes; and

routing, responsive to the fifth traffic information, the respective packet through the sixth node to the respective destination node.

27. The distributed network, spread-spectrum method, as set forth in claim **26**, further comprising the steps:

communicating sixth traffic information between a sixth multiplicity of neighboring nodes of the sixth node, with the sixth node capable of communicating a respective packet to a node in the sixth multiplicity of neighboring nodes, with the sixth traffic information including traffic density at each of the sixth multiplicity of neighboring nodes;

selecting, responsive to the sixth traffic information and to the respective packet, from the sixth node, having the respective destination address of the respective destination node, a seventh node of the sixth multiplicity of neighboring nodes; and

routing, responsive to the sixth traffic information, the respective packet through the seventh node to the respective destination node.

28. The distributed network as set for in claim **4**, **5**, **6**, **7**, **8**, **9**, **10**, **11**, **12**, **13**, **14** or **15**, with said flow-control means including means for communicating with radio waves.

29. The distributed network as set for in claim **4**, **5**, **6**, **7**, **8**, **9**, **10**, **11**, **12**, **13**, **14** or **15**, with said flow-control means including means for communicating with spread-spectrum modulation using radio waves.

30. The distributed-network, spread-spectrum method as set forth in claim **16**, **17**, **18**, **19**, **20**, **21**, **22**, **23**, **24**, **25**, **26** or **27**, with the routing step including the step of modulating the packet with spread-spectrum modulation.

31. The distributed-network, spread-spectrum method as set forth in claim **16**, **17**, **18**, **19**, **20**, **21**, **22**, **23**, **24**, **25**, **26** or **27**, with the routing step including the step of transmitting, using radio waves, the packet with spread-spectrum modulation.

32. A distributed network, spread-spectrum system, comprising:

a plurality of remote stations;

a plurality of nodes for covering a geographic area, each node in the plurality of nodes for communicating, with one or more remote stations of the plurality of remote stations, using packets having a destination address and modulated with spread-spectrum modulation, with each packet transmitted between a respective node and remote station using radio waves; and

flow-control means for communicating traffic information between the plurality of nodes, with the traffic information including traffic density at each of the plurality of nodes, said flow-control means, responsive to the traffic information and to a respective packet, from a first node, having a respective destination address of a respective destination node of the plurality of nodes, for selecting a path of a multiplicity of nodes through the plurality of nodes to the destination node, said flow-control means for routing, responsive to the traffic information, the respective packet through the path of the multiplicity of nodes to the respective destination node.

33. A distributed network, spread-spectrum method, having a plurality of nodes, comprising the steps of:

communicating, to a respective node of the plurality of nodes, with one or more remote stations of a plurality of remote stations, using packets having a destination address and modulated with spread-spectrum modulation, with each packet transmitted between the respective node and remote station using radio waves;

communicating traffic information between the plurality of nodes, with the traffic information including traffic density at each of the plurality of nodes;

selecting, responsive to the traffic information and to a respective packet, from the respective node, having a respective destination address of a respective destination node of the plurality of nodes, a path of a multiplicity of nodes through the plurality of nodes to the destination node; and

routing, responsive to the traffic information, the respective packet through the path of the multiplicity of nodes to the respective destination node.

34. The distributed network as set for in claim **32**, with said flow-control means including means for communicating with radio waves.

35. The distributed network as set for in claim **32**, with said flow-control means including means for communicating with spread-spectrum modulation using radio waves.

36. The distributed-network, spread-spectrum method as set forth in claim **33**, with the routing step including the step of modulating the packet with spread-spectrum modulation.

37. The distributed-network, spread-spectrum method as set forth in claim **33**, with the routing step including the step of transmitting, using radio waves, the packet with spread-spectrum modulation.

* * * * *

JS 44 (Rev. 11/04)

CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I. (a) PLAINTIFFS
Linex Technologies, Inc.

CIV - MARRA

(b) County of Residence of First Listed Plaintiff
(EXCEPT IN U.S. PLAINTIFF CASES)

05-80300

(c) Attorney's (Firm Name, Address, and Telephone Number)
Gary, Williams, Parenti, Finney, Lewis, et al.
221 E. Osceola Street, Stuart, FL 34994 (772) 283-8260

DEFENDANTS
Motorola, Inc., Nortel Networks, Inc., Tropos Networks, Inc., Firetide, Inc., Strix Systems, Inc. and Belair Networks, Inc.

County of Residence of First Listed Defendant Broward County, FL
(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE LAND INVOLVED.

Attorneys (If Known)

MAGISTRATE JUDGE SELTZER

II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

Marra-Seltzer

Palm Beach 9:05CV80300

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant) (For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business In This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business In Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT
- ☐ 110 Insurance
- ☐ 120 Marine
- ☐ 130 Miller Act
- ☐ 140 Negotiable Instrument
- ☐ 150 Recovery of Overpayment & Enforcement of Judgment
- ☐ 151 Medicare Act
- ☐ 152 Recovery of Defaulted Student Loans (Excl. Veterans)
- ☐ 153 Recovery of Overpayment of Veteran's Benefits
- ☐ 160 Stockholders' Suits
- ☐ 190 Other Contract
- ☐ 195 Contract Product Liability
- ☐ 196 Franchise

REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury - Med. Malpractice
- ☐ 365 Personal Injury - Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 445 Amer. w/Disabilities - Employment
- ☐ 446 Amer. w/Disabilities - Other
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

Habeas Corpus:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 R.R. & Truck
- ☐ 650 Airline Regs.
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt. Relations
- ☐ 730 Labor/Mgmt.Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl. Ret. Inc. Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS—Third Party 26 USC 7609

OTHER STATUTES
- ☐ 400 State Reapportionment
- ☐ 410 Antitrust
- ☐ 430 Banks and Banking
- ☐ 450 Commerce
- ☐ 460 Deportation
- ☐ 470 Racketeer Influenced and Corrupt Organizations
- ☐ 480 Consumer Credit
- ☐ 490 Cable/Sat TV
- ☐ 810 Selective Service
- ☐ 850 Securities/Commodities/ Exchange
- ☐ 875 Customer Challenge 12 USC 3410
- ☐ 890 Other Statutory Actions
- ☐ 891 Agricultural Acts
- ☐ 892 Economic Stabilization Act
- ☐ 893 Environmental Matters
- ☐ 894 Energy Allocation Act
- ☐ 895 Freedom of Information Act
- ☐ 900Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes

V. ORIGIN (Place an "X" in One Box Only)

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

Cite the U.S. Civil Statute under which you are filing (**Do not cite jurisdictional statutes unless diversity**):
Title 35, U.S.C. §271 and §281; Title 28, U.S.C. § 1338(a)

Brief description of cause:
Patent infringement.

VII. REQUESTED IN COMPLAINT: ☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23 **DEMAND $**

CHECK YES only if demanded in complaint: **JURY DEMAND:** ☒ Yes ☐ No

VIII. RELATED CASE(S) IF ANY (See instructions): JUDGE DOCKET NUMBER

DATE 4/5/05 SIGNATURE OF ATTORNEY OF RECORD

FOR OFFICE USE ONLY

RECEIPT # 533794 AMOUNT 250.00 APPLYING IFP JUDGE MAG. JUDGE