FILE HISTORY

US 6,816,464

PATENT:	6,816,464
INVENTORS:	SCOTT MARK D CHENG ANITA T
TITLE:	Method, system, and computer program product for route quality checking and management
APPLICATION NO:	US2000660920A
FILED:	13 SEP 2000
ISSUED:	09 NOV 2004
COMPILED:	06 OCT 2020

jc525 U.S. PTO
09/660920
09/13/00

ISSUE CLASSIFICATION		
370	Class	
252	Subclass	

BEST COPY

PATENT NUMBER
6816464
6816464

U.S. **UTILITY** Patent Application

O.I.P.E.	PATENT DATE
SCANNED TM4 Q.A. MT	NOV 09 2004

APPLICATION NO.	CONT/PRIOR	CLASS	SUBCLASS	ART UNIT	EXAMINER
09/660920		370	252	~~2664~~ 2665	Pham, Man

APPLICANTS
Mark Scott
Anita Cheng

TITLE
Method, system, and computer program product for route quality checking and management

PTO-2040
12/99

ISSUING CLASSIFICATION

ORIGINAL CLASS	ORIGINAL SUBCLASS	CROSS REFERENCE(S) CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					
370	252	370	238	351	401			

INTERNATIONAL CLASSIFICATION	
H04L	12/26
H04J	1/16
G08C	15/00
G06F	11/00
G01R	31/08

☐ Continued on Issue Slip Inside File Jacket

9/24/04 Formal Drawings (8 shts) set 1 9/13/00

☐ **TERMINAL DISCLAIMER**

☐ The term of this patent subsequent to _____ (date) has been disclaimed.

☐ The term of this patent shall not extend beyond the expiration date of U.S Patent. No. _____

☐ The terminal ____months of this patent have been disclaimed.

DRAWINGS			CLAIMS ALLOWED	
Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims	Print Claim for O.G.
8	8	1	23	1

_____ (Assistant Examiner) _____ (Date)

MAN PHAN
PATENT EXAMINER

Man u. phan (Primary Examiner) 6/10/04 (Date)

M. Gordon (Legal Instruments Examiner) 6/16/04 (Date)

NOTICE OF ALLOWANCE MAILED 6/15/04

ISSUE FEE NA

Amount Due	Date Paid
1330.00	9/15/04

ISSUE BATCH NUMBER

WARNING:
The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368. Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.

Form **PTO-436A**
(Rev. 6/99)

FILED WITH: ☐ DISK (CRF) ☐ FICHE ☐ CD-ROM
(Attached in pocket on right inside flap)

ISSUE FEE IN FILE

(FACE)

6,816,464

METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT

Transaction History

Date	Transaction Description
09-13-2000	Initial Exam Team nn
10-04-2000	IFW Scan & PACR Auto Security Review
10-25-2000	Correspondence Address Change
11-02-2000	Application Dispatched from OIPE
11-14-2000	Case Docketed to Examiner in GAU
03-12-2002	Case Docketed to Examiner in GAU
03-21-2002	Information Disclosure Statement (IDS) Filed
03-21-2002	Information Disclosure Statement (IDS) Filed
12-01-2003	Case Docketed to Examiner in GAU
12-15-2003	Non-Final Rejection
12-19-2003	Mail Non-Final Rejection
04-19-2004	Response after Non-Final Action
04-19-2004	Request for Extension of Time - Granted
04-19-2004	Workflow incoming amendment IFW
04-27-2004	Date Forwarded to Examiner
06-14-2004	Notice of Allowance Data Verification Completed
06-14-2004	Examiner's Amendment Communication
06-15-2004	Mail Notice of Allowance
06-15-2004	Mail Examiner's Amendment
06-23-2004	Dispatch to Publications
06-24-2004	Workflow - File Sent to Contractor
06-24-2004	Receipt into Pubs
06-28-2004	Receipt into Pubs
08-09-2004	Receipt into Pubs
09-15-2004	Issue Fee Payment Verified
09-15-2004	Issue Fee Payment Received
09-24-2004	Dispatch to FDC
09-24-2004	Application Is Considered Ready for Issue
09-28-2004	Receipt into Pubs
10-21-2004	Issue Notification Mailed
11-09-2004	Recordation of Patent Grant Mailed
11-09-2004	Patent Issue Date Used in PTA Calculation
12-27-2011	Applicant Has Filed a Verified Statement of Small Entity Status in Compliance with 37 CFR 1.27
02-23-2012	Change in Power of Attorney (May Include Associate POA)
10-20-2015	ENTITY STATUS SET TO UNDISCOUNTED (INITIAL DEFAULT SETTING OR STATUS CHANGE)

PATENT APPLICATION

09660920

jc525 U.S. PTO
09/660920
09/13/00

SEP 28 00 16
INITIALS

CONTENTS

	Date Received (Incl. C. of M.) or Date Mailed
1. Application _____ papers.	
2. IDS W/REF.	3-21-02
3. C.O.A	8.2.02
12/23/03 4. Ref (3)	12/19/03
5. EOT (1)	4-19-04
6. Amdt A	4-19-04
6/14/04 7. Allowance/B	6/15/04
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	
21.	
22.	
23.	
24.	
25.	
26.	
27.	
28.	
29.	
30.	
31.	
32.	
33.	
34.	
35.	
36.	
37.	
38.	
39.	
40.	
41.	

	Date Received (Incl. C. of M.) or Date Mailed
42.	
43.	
44.	
45.	
46.	
47.	
48.	
49.	
50.	
51.	
52.	
53.	
54.	
55.	
56.	
57.	
58.	
59.	
60.	
61.	
62.	
63.	
64.	
65.	
66.	
67.	
68.	
69.	
70.	
71.	
72.	
73.	
74.	
75.	
76.	
77.	
78.	
79.	
80.	
81.	
82.	

(LEFT OUTSIDE)

ISSUE SLIP STAPLE AREA (for additional cross references)

POSITION	INITIALS	ID NO.	DATE
FEE DETERMINATION			
O.I.P.E. CLASSIFIER		59	9/28
FORMALITY REVIEW	ll	823	10/25
RESPONSE FORMALITY REVIEW			

INDEX OF CLAIMS

✔	Rejected	N	Non-elected
=	Allowed	I	Interference
—	(Through numeral)... Canceled	A	Appeal
÷	Restricted	O	Objected

Claim		Date											
Final	Original	12/12/03	6/8/04										
1	1	✔	=										
2	2	✔	=										
3	3	✔	=										
4	4	✔	=										
5	5	✔	=										
6	6	O	=										
7	7	✔	=										
8	8	✔	=										
9	9	✔	=										
10	10	✔	=										
11	11	✔	=										
12	12	O	=										
13	13	✔	=										
14	14	✔	=										
15	15	✔	=										
16	16	✔	=										
17	17	✔	=										
18	18	O	=										
19	19		=										
20	20		=										
21	21		=										
22	22		=										
23	23		=										
	24												
	25												
	26												
	27												
	28												
	29												
	30												
	31												
	32												
	33												
	34												
	35												
	36												
	37												
	38												
	39												
	40												
	41												
	42												
	43												
	44												
	45												
	46												
	47												
	48												
	49												
	50												

Claim		Date											
Final	Original												
	51												
	52												
	53												
	54												
	55												
	56												
	57												
	58												
	59												
	60												
	61												
	62												
	63												
	64												
	65												
	66												
	67												
	68												
	69												
	70												
	71												
	72												
	73												
	74												
	75												
	76												
	77												
	78												
	79												
	80												
	81												
	82												
	83												
	84												
	85												
	86												
	87												
	88												
	89												
	90												
	91												
	92												
	93												
	94												
	95												
	96												
	97												
	98												
	99												
	100												

Claim		Date											
Final	Original												
	101												
	102												
	103												
	104												
	105												
	106												
	107												
	108												
	109												
	110												
	111												
	112												
	113												
	114												
	115												
	116												
	117												
	118												
	119												
	120												
	121												
	122												
	123												
	124												
	125												
	126												
	127												
	128												
	129												
	130												
	131												
	132												
	133												
	134												
	135												
	136												
	137												
	138												
	139												
	140												
	141												
	142												
	143												
	144												
	145												
	146												
	147												
	148												
	149												
	150												

If more than 150 claims or 10 actions staple additional sheet here

(LEFT INSIDE)

SEARCHED

Class	Sub.	Date	Exmr.
370	238	12/10/03	MP
	252		
	352		
	353		
	356		
	401		
	355		
	468		
709	238	12/11/03	MP
	241		
	245		
	218		
	227		
search	updated	6/8/04	MP

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
370	238	6/10/04	MP
	351	|	|
	401	|	|

SEARCH NOTES
(INCLUDING SEARCH STRATEGY)

	Date	Exmr.
EAST / WEST search (search 370, 709 classes)	12/10/03	MP

(RIGHT OUTSIDE)

CHECK LIST

Rule 47	Continuing Data	PCT	Disclaimer
No	No	No	No

Microfiche Appendix	CPA tag
No	No

Foreign Priority Claimed: No
Acknowledged: No

State Code: VA **Country Code:**

Text Endorsement: 09660920.091300

==========

JACKET

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GAU
09/660,920	09/13/00	370	252	2665

FOREIGN PRIORITY

Country	Document Number	Date

DISCLAIMER

/ /

TITLE

Method, system, and computer program product for route quality checking and management

MICROFICHE APPENDIX

ASSISTANT EXAMINER: First:	Middle:	Last:

PRIMARY EXAMINER: First:	Middle:	Last:
Man		Phan

CLAIMS ALLOWED

Total	Print
23	1

DRAWINGS

Sheets	Figures	Print
8	8	Y

==========

BLUE SLIP INFORMATION

SERIAL NUMBER	CLASS	SUBCLASS	GAU
09/660,920	370	252	2665

INDEP. CLAIMS	TOTAL CLAIMS
1,7,13,21,22,23	23

==========

BLUE SLIP (Page 1)

INTERNATIONAL CLASSIFICATION

Class	SubClass
H04L	12/26
H04J	1/16
G08C	13/00
G06F	11/00
G01R	31/08

CROSS-REFERENCES

Class	SubClass
370	238;351;401

==========

TERM EXTENSION

735

FIELD OF SEARCH

Class	SubClass
370	238;252;352;353;356;401;355;468
709	238;241;245;218;207

==========

OATH

INVENTOR NAME First:	Middle:	Last:	Signed:
Mark	D.	Scott	Yes

City: Ashburn

State: VA ZIP Code: Country: Foreign ZIP:

INVENTOR NAME First:	Middle:	Last:	Signed:
Anita	T.	Cheng	Yes

City: Ashburn

State: VA ZIP Code: Country: Foreign ZIP:

==========

PCT INFO

==========

CONTINUING DATA (Page 1)

LINE	CODE	SERIAL NUMBER	FILING DATE	STATUS	DOCUMENT NO.	ISSUE DATE

==========

REFERENCES (Page 1) SERIAL NUMBER: 09/660,920
FORM 892

U.S. REFERENCES

U.S. Pat No.	Date	Patentee	Class	SubClass
*6,483,808	11/2002	Rochberger et al.	370	238

No issue date available.

*6,597,684 07/2003 Gulati et al. 370 351
No issue date available.

FOREIGN REFERENCES

Foreign Doc No.	Date	Country	Class	SubClass

OTHER REFERENCE CITATIONS (incl. Author, Title, Date, Pertinent Pages, etc.)

==========

REFERENCES (Page 2) SERIAL NUMBER: 09/660,920
FORM 892

U.S. REFERENCES

U.S. Pat No.	Date	Patentee	Class	SubClass
*6,426,955	07/2002	Dalton, Jr. et al.	370	401
No issue date available.				
*6,356,545	03/2002	Vargo et al.	370	355
No issue date available.				
*6,600,738	07/2003	Alperovich et al.	370	352
No issue date available.				
*6,584,110	06/2003	Mizuta et al.	370	401
No issue date available.				
*6,529,499	03/2003	Doshi et al.	370	352
No issue date available.				
*6,363,065	03/2002	Thornton et al.	370	352
No issue date available.				
5,452,294	09/1995	Natarajan	370	351
*6,363,319	03/2002	Hsu	701	202
No issue date available.				
*6,366,560	04/2002	Ohiwane et al.	370	238
No issue date available.				
*6,385,193	05/2002	Civanlar et al.	370	352
No issue date available.				
*6,404,746	06/2002	Cave et al.	370	262
No issue date available.				
*6,614,765	09/2003	Bruno et al.	370	255

No issue date available.

*6,487,172 11/2002 Zonoun 370 238
No issue date available.

FOREIGN REFERENCES
Foreign Doc No. Date Country Class SubClass

OTHER REFERENCE CITATIONS (incl. Author, Title, Date, Pertinent Pages, etc.)

==========

REFERENCES (Page 3) SERIAL NUMBER: 09/660,920
FORM 1449

U.S. REFERENCES

U.S. Pat No.	Date	Patentee	Class	SubClass
5,621,727	04/1997	Vaudreuil	370	60
5,742,596	04/1998	Baratz et al.	370	356
5,757,871	05/1998	Furukawa et al.	375	372
5,790,538	08/1998	Sugar	370	352
5,790,543	08/1998	Cloutier	370	395
5,805,602	09/1998	Cloutier et al.	370	516
5,812,840	09/1998	Shwartz	395	604
5,870,464	02/1999	Brewster et al.	379	219
5,892,822	04/1999	Gottlieb et al.	379	220
5,897,613	04/1999	Chan	704	210
5,900,000	05/1999	Korenshtein	707	200

FOREIGN REFERENCES

Foreign Doc No.	Date	Country	Class	SubClass
WO 97/14238 A1	04/1997	WOX	H04L	12/46
WO 97/23078 A1	06/1997	WOX	H04L	12/56
WO 97/27692 A1	07/1997	WOX	H04L	12/56
WO 97/28628 A1	08/1997	WOX	H04L	12/56

OTHER REFERENCE CITATIONS (incl. Author, Title, Date, Pertinent Pages, etc.)

Anquetil, L-P. et al., [37 Media Gateway Control Protocol And Voice Over IP Gateways,[38 [0 [i Alcatel Telecommunications Review[1 , pp. 151-157 (Apr.-Jun. 1999).

[i Array Series 3000 Users Manual[1 , Array Telecom Corp, Entire Manual (Aug. 27, 1999).

[i ctvoice IP Telephony[1 , Product Brochure, Comdial, 6 pages (Copy obtained Aug. 1999).

REFERENCES (Page 4) SERIAL NUMBER: 09/660,920
FORM 1449

U.S. REFERENCES

U.S. Pat No.	Date	Patentee	Class	SubClass
5,940,479	08/1999	Guy et al.	379	93.01
5,940,827	08/1999	Hapner et al.	707	8
5,940,829	08/1999	Tsuiki et al.	707	10
5,940,832	08/1999	Hamada et al.	707	100
5,953,405	09/1999	Miloslavsky	379	265

FOREIGN REFERENCES

Foreign Doc No.	Date	Country	Class	SubClass

OTHER REFERENCE CITATIONS (incl. Author, Title, Date, Pertinent Pages, etc.)

[i ctvoice System User[3 s Manual[1 , Comdial, Entire Manual (Jun. 1998).

Held, G., [i Voice Over Data Networks[1 , McGraw-Hill, Entire Book (1998).

McConnel, B., [i How to Build an Internet PBX Ahmed Borg[1 , at http://www.google.com . . . , 13 pages, (Apr. 1997).

==========

REFERENCES (Page 5) SERIAL NUMBER: 09/660,920
FORM 1449

U.S. REFERENCES

U.S. Pat No.	Date	Patentee	Class	SubClass

FOREIGN REFERENCES

Foreign Doc No.	Date	Country	Class	SubClass

OTHER REFERENCE CITATIONS (incl. Author, Title, Date, Pertinent Pages, etc.)

Prosise, J., [37 Programming Windows 95 with MFC, Part VIII: The Document/View Architecture,[38 [0 [i Microsoft Systems Journal[1 , Miller Freeman, 35 pages (Feb. 1996).

- -

Sheldon, T., [i Encyclopedia of Networking, Electronic Edition[1 , McGraw-Hill, pp. 1043-1050 (1998).

- -

Yang, C., [i INETPhone: Telephone Services and Servers on Internet[1 , at http://www.ds.internic.net/rfc/rfc1789.txt, 6 pages, (Apr. 1995).

==========

****

VALID

Pat. No. 05971755 - 3 Group ID: E Page 1
Issue Date: 06/21/04 User ID: Rxcapu KS: 2,562

Warning [Pages Of US References:]
page 5 has no references
Warning [Pages Of Foreign References:]
page 1 has no references
page 2 has no references
page 4 has no references
page 5 has no references
Warning [Pages Of Other References:]
page 1 has no references
page 2 has no references

E

US 31
F 4
0/2 9

44

US006816464B1

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

(10) **Patent No.: US 6,816,464 B1**
(45) **Date of Patent: Nov. 9, 2004**

(54) **METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT**

(75) Inventors: **Mark D. Scott**, Ashburn, VA (US); **Anita T. Cheng**, Ashburn, VA (US)

(73) Assignee: **Array Telecom Corporation**, Herndon, VA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 735 days.

(21) Appl. No.: **09/660,920**

(22) Filed: **Sep. 13, 2000**

(51) **Int. Cl.**[7] **H04L 12/26**; H04J 1/16; G08C 13/00; G06F 11/00; G01R 31/08

(52) **U.S. Cl.** **370/252**; 370/238; 370/351; 370/401

(58) **Field of Search** 370/238, 252, 370/352, 353, 356, 401, 355, 468; 709/238, 241, 245, 218, 227

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,452,294	A *	9/1995	Natarajan	370/351
5,621,727	A	4/1997	Vaudreuil	370/60

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

WO	WO 97/14238 A1	4/1997	H04L/12/46
WO	WO 97/23078 A1	6/1997	H04L/12/56
WO	WO 97/27692 A1	7/1997	H04L/12/56
WO	WO 97/28628 A1	8/1997	H04L/12/56

OTHER PUBLICATIONS

Anquetil, L–P. et al., "Media Gateway Control Protocol And Voice Over IP Gateways," *Alcatel Telecommunications Review*, pp. 151–157 (Apr.–Jun. 1999).

Array Series 3000 Users Manual, Array Telecom Corp, Entire Manual (Aug. 27, 1999).

ctvoice IP Telephony, Product Brochure, Comdial, 6 pages (Copy obtained Aug. 1999).

ctvoice System User's Manual, Comdial, Entire Manual (Jun. 1998).

Held, G., *Voice Over Data Networks*, McGraw–Hill, Entire Book (1998).

McConnell, B., *How to Build an Internet PBX Ahmed Borg*, at http://www.google.com . . . , 13 pages, (Apr. 1997).

Prosise, J., "Programming Windows 95 with MFC, Part VII: The Document/View Architecture," *Microsoft Systems Journal*, Miller Freeman, 35 pages (Feb. 1996).

Sheldon, T., *Encyclopedia of Networking, Electronic Edition*, McGraw–Hill, pp. 1043–1050 (1998).

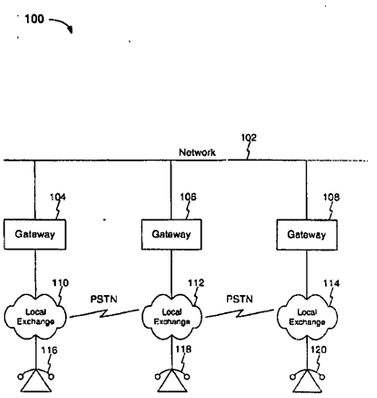
Yang, C., *INETPhone: Telephone Services and Servers on Internet*, at http://www.ds.internic.net/rfc/rfc1789.txt, 6 pages, (Apr. 1995).

Primary Examiner—Man Phan
(74) *Attorney, Agent, or Firm*—Sterne, Kessler, Goldstein & Fox P.L.L.C.

(57) **ABSTRACT**

A method, system and computer program product for route checking and management is described herein. In a voice over internet protocol environment, the invention allows for the testing of routes among various gateways. In one embodiment, gateways include routing managers for checking and storing route information. The method of the invention includes checking candidate routes for the level of quality, location and cost levels. Further, users can prioritize routes based on these criteria.

23 Claims, 8 Drawing Sheets



U.S. PATENT DOCUMENTS

5,742,596	A	4/1998	Baratz et al.	370/356
5,757,871	A	5/1998	Furukawa et al.	375/372
5,790,538	A	8/1998	Sugar	370/352
5,790,543	A	8/1998	Cloutier	370/395
5,805,602	A	9/1998	Cloutier et al.	370/516
5,812,840	A	9/1998	Shwartz	395/604
5,870,464	A	2/1999	Brewster et al.	379/219
5,892,822	A	4/1999	Gottlieb et al.	379/220
5,897,613	A	4/1999	Chan	704/210
5,900,000	A	5/1999	Korenshtein	707/200
5,940,479	A	8/1999	Guy et al.	379/93.01
5,940,827	A	8/1999	Hapner et al.	707/8
5,940,829	A	8/1999	Tsuiki et al.	707/10
5,940,832	A	8/1999	Hamada et al.	707/100
5,953,405	A	9/1999	Miloslavsky	379/265
6,356,545	B1 *	3/2002	Vargo et al.	370/355
6,363,065	B1 *	3/2002	Thornton et al.	370/352
6,363,319	B1 *	3/2002	Hsu	701/202
6,366,560	B1 *	4/2002	Ohiwane et al.	370/238
6,385,193	B1 *	5/2002	Civanlar et al.	370/352
6,404,746	B1 *	6/2002	Cave et al.	370/262
6,426,955	B1 *	7/2002	Dalton, Jr. et al.	370/401
6,483,808	B1 *	11/2002	Rochberger et al.	370/238
6,487,172	B1 *	11/2002	Zonoun	370/238
6,529,499	B1 *	3/2003	Doshi et al.	370/352
6,584,110	B1 *	6/2003	Mizuta et al.	370/401
6,597,684	B1 *	7/2003	Gulati et al.	370/351
6,600,738	B1 *	7/2003	Alperovich et al.	370/352
6,614,765	B1 *	9/2003	Bruno et al.	370/255

* cited by examiner

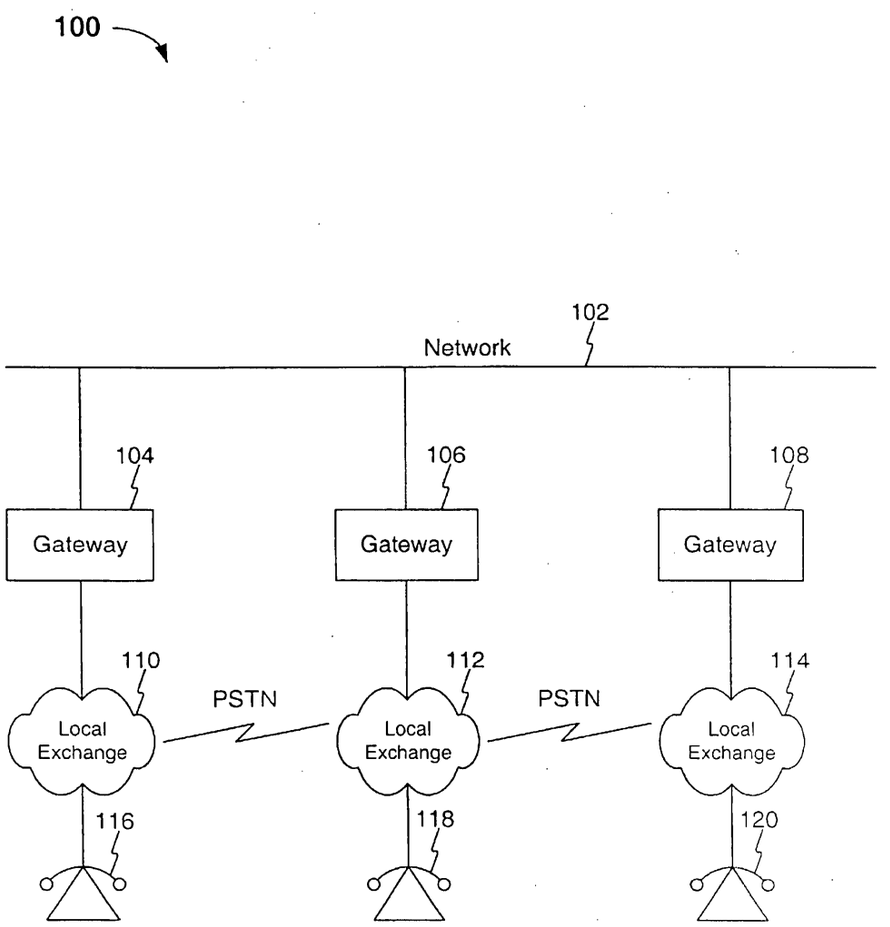

100
102
Network
104
106
108
Gateway
Gateway
Gateway
110
112
114
PSTN
PSTN
Local Exchange
Local Exchange
Local Exchange
116
118
120

FIG. 1

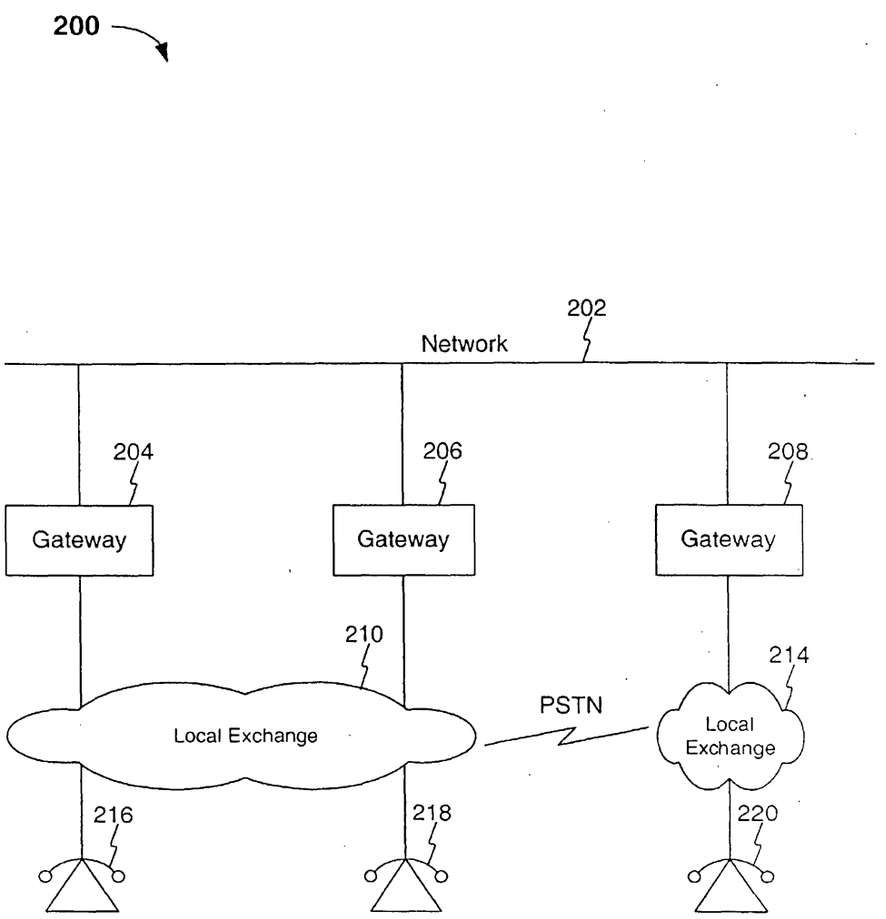

200
202
Network
204
206
208
Gateway
Gateway
Gateway
210
214
PSTN
Local Exchange
Local Exchange
216
218
220

FIG. 2

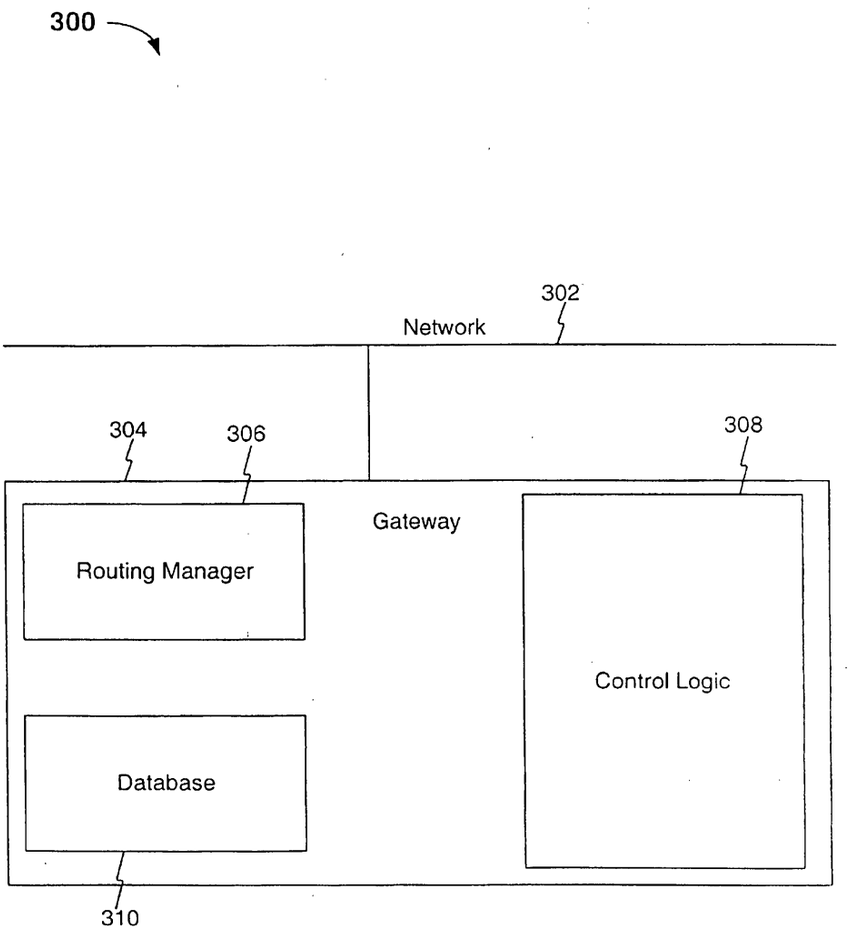

300
302
Network
304
306
308
Gateway
Routing Manager
Control Logic
Database
310

FIG. 3

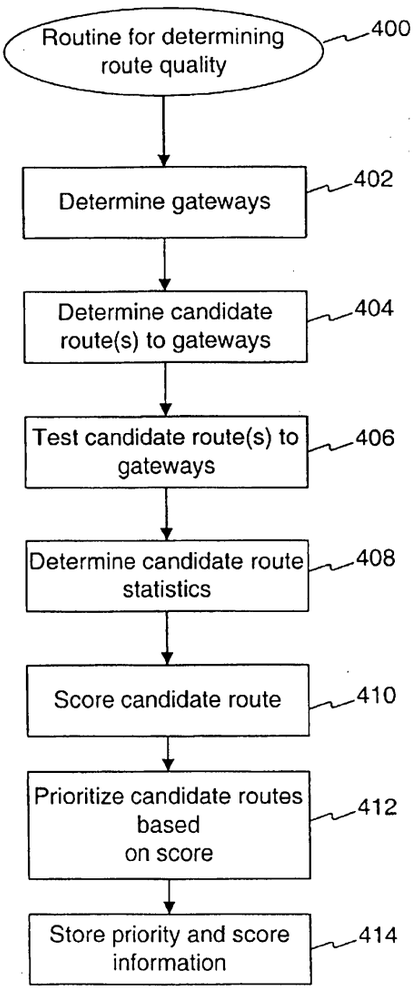

Routine for determining route quality
400
Determine gateways
402
Determine candidate route(s) to gateways
404
Test candidate route(s) to gateways
406
Determine candidate route statistics
408
Score candidate route
410
Prioritize candidate routes based on score
412
Store priority and score information
414

FIG. 4

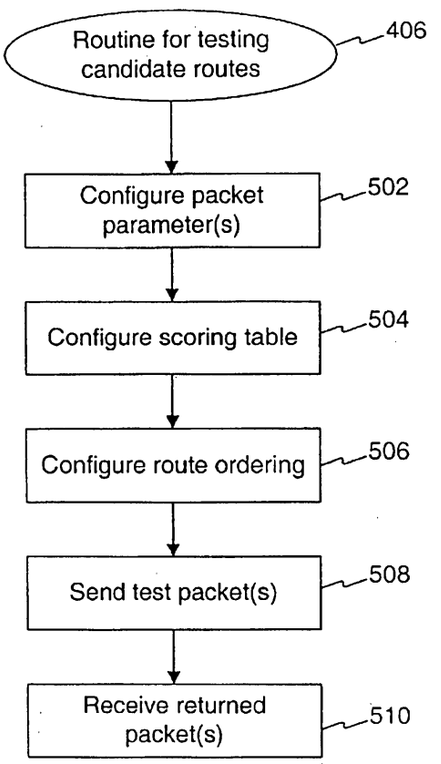

Routine for testing candidate routes
406
Configure packet parameter(s)
502
Configure scoring table
504
Configure route ordering
506
Send test packet(s)
508
Receive returned packet(s)
510

FIG. 5

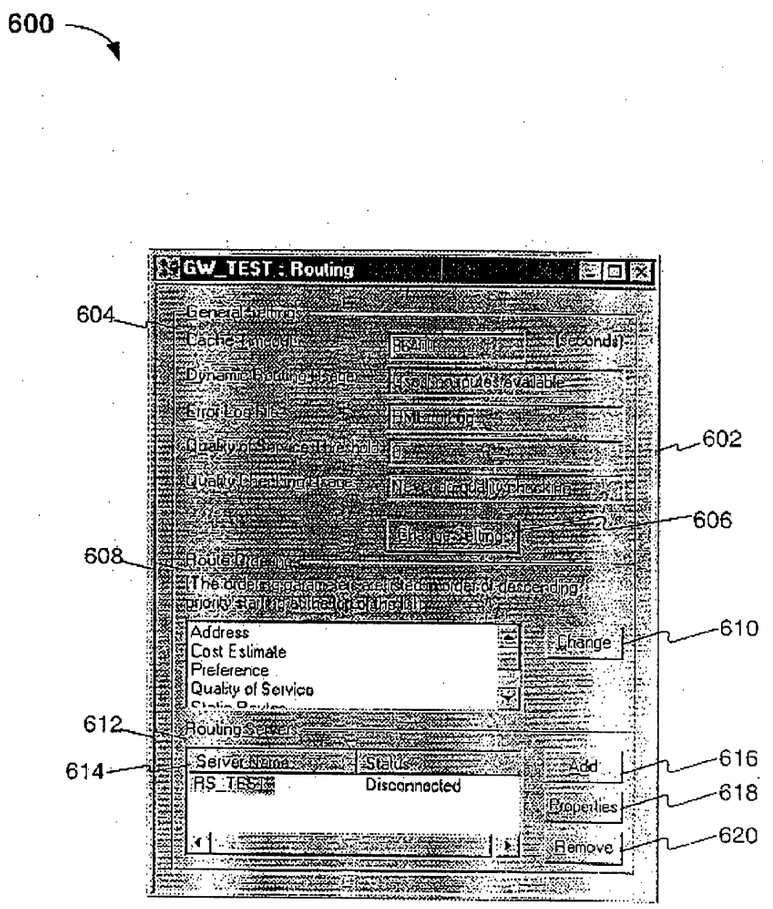

600
GW_TEST : Routing
604
602
606
608
Address
Cost Estimate
Preference
Quality of Service
610
612
614
Server Name
Status
RS_TEST
Disconnected
Add
616
Properties
618
Remove
620

FIG. 6

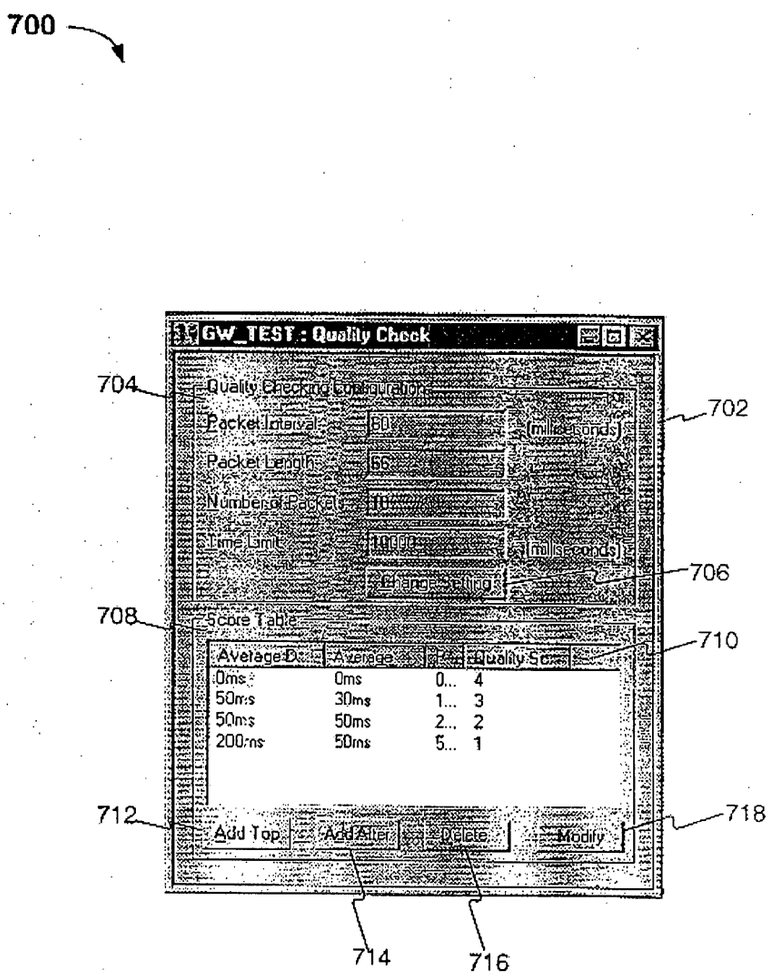

700
GW_TEST : Quality Check
Quality Checking Configuration
Packet Interval
60
milliseconds
Packet Length
66
Number of Packets
10
Time Limit
10000
milliseconds
Change Setting
Score Table
Average D...
Average ...
Quality Sc...
0ms 0ms 0... 4
50ms 30ms 1... 3
50ms 50ms 2... 2
200ms 50ms 5... 1
Add Top
Add After
Delete
Modify
702
704
706
708
710
712
714
716
718

FIG. 7

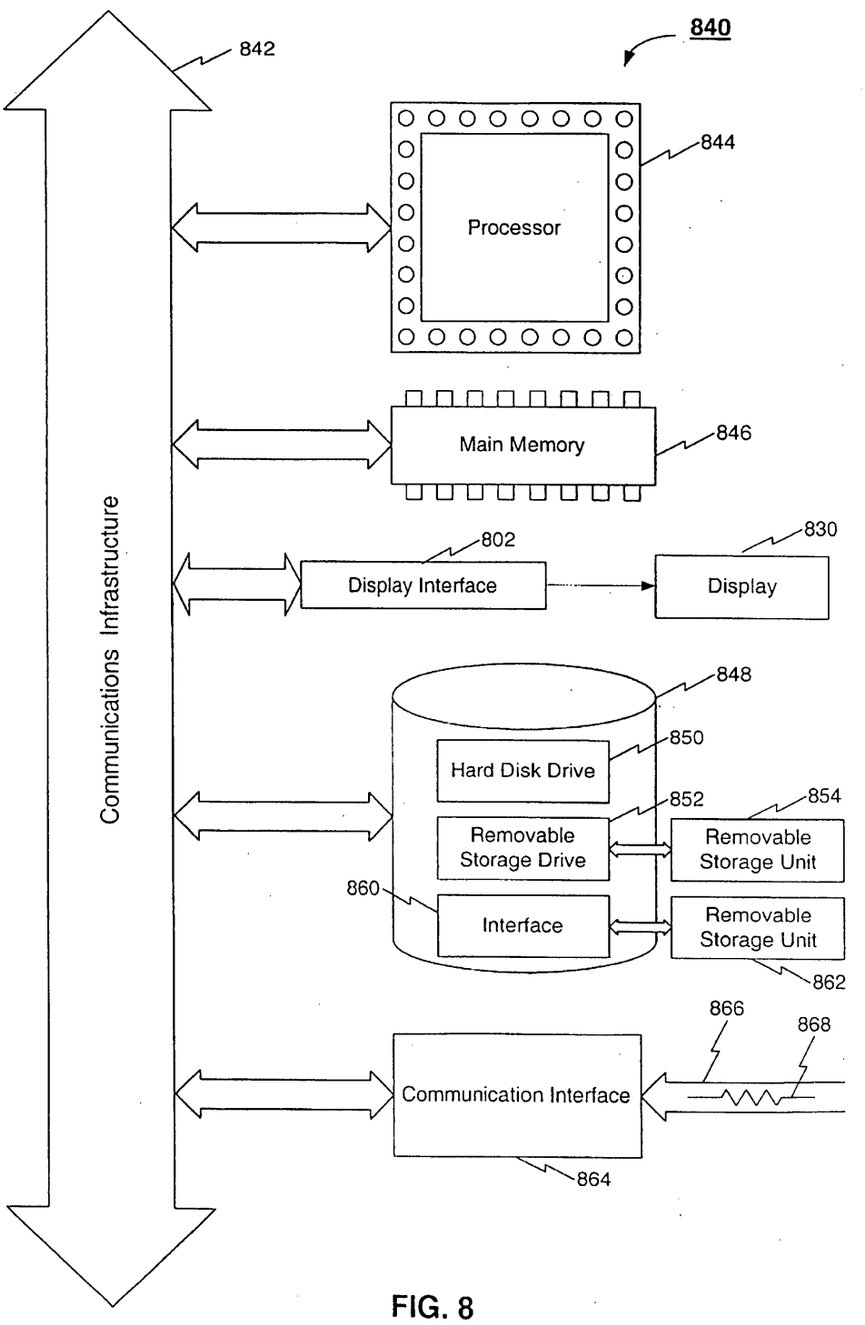

840
842
844
Processor
Main Memory
846
Communications Infrastructure
802
Display Interface
830
Display
848
850
Hard Disk Drive
852
854
Removable Storage Drive
Removable Storage Unit
860
Interface
Removable Storage Unit
862
866
868
Communication Interface
864

FIG. 8

METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to the field of voice over Internet protocol technology. More particularly, the invention relates to route testing and selection over packet-switched networks.

2. Related Art

Voice over Internet protocol (VoIP) communications services provide telephony services over packet-switched networks, like the Internet. In order to maintain call quality. VoIP services are concerned with route quality. High route quality makes for more reliable and clearer conversations. Route checking and selection over the packet switched network (like the Internet) is necessary to ensure quality of service.

Unlike typical data, voice data is extremely time dependent. Transmission delays and variations in the transmission rate alter the voice data received by the destination.

In a packet-switched network, latency and jitter are measurable qualities of network performance. Latency is the amount of time it takes a packet to reach its destination. Jitter is the variation in latency. The route is the path in the network from the origin of a packet or packets to their destination. A route can be a direct end-to-end connection path, or it can consist of a path linked by any number of routers, switches, gateways, gatekeepers, etc.

Latency and jitter can degrade the communication path between any two points on a packet-switched network, like the Internet. In a VoIP environment, latency will be perceived by the end users as a delay in the response of the remote site (or other user). Furthermore, jitter is the variation in latency from one packet to another which can be perceived as a stammering in the conversation.

Latency and jitter each impact communication differently. For example, if packets always arrived 50 milliseconds (ms) after being transmitted, then there would be a 50 ms latency and no jitter. In another example, however, if packet #1 arrived 100 ms after transmission, packet #2 arrived 50 ms after transmission, and packet #3 arrived 150 ms after transmission, there would be an average jitter of +/−33 ms. In VoIP applications, jitter is often more critical than latency. Jitter can cause a packet to arrive too late to be useful. The effect is that the packet may be delayed enough that the end user will hear a pause in the voice that is talking to them, which is very unnatural if it occurs during the middle of a word or sentence.

Jitter typically occurs when the network utilization is too high, and packets are being queued by gateways, switches, routers or other similar devices, causing delivery times to become unpredictable. The Internet, because of its complex structure, is often subject to varying degrees of jitter. Jitter variation can occur at different locations and at different times depending upon network traffic and other conditions.

Conventional techniques can calculate the jitter and latency present in a route. Some VoIP systems can select routes based on the lowest jitter and/or latency. Other systems can include management of the route selection process in response to network conditions.

However, these techniques are not conducive to rapidly changing network conditions and do not provide real-time route checking and selection. Additionally, these techniques do not take into account the costs of switching from the packet switched network to the public switched telephone network (PSTN) in order to maintain quality of service.

Furthermore, conventional systems do not allow calling parties to make route selections on a per call basis.

Still further, conventional systems do not allow users to supply their own criteria used in the checking and selection of routes.

Therefore, in view of the above, what is needed is a system, method and computer program product for route quality checking and management. Further, what is needed is a system, method and computer program product that can test and score routes on a network based on criteria provided by a user. Such a system would provide the optimal route for a call based on the provided criteria. Furthermore, what is needed is a system, method and computer program product that enables users to access the route quality checking and management system and provide individual or group routing preferences and/or other route information so that the system can select the proper route for that individual or group.

SUMMARY OF THE INVENTION

The invention is directed to a system, method and computer program product for a route quality checking and management system that satisfies the above-stated needs. The method of the present invention involves a routing manager or a route management module implemented at a gateway for determining which other gateways are available to it. A gateway can be any server enabled for routing voice data packets. The method involves the gateway determining the candidate routes to the other gateways, testing those candidate routes, determining candidate route statistics, scoring each candidate route tested, prioritizing each scored route and storing this priority and score information. In one embodiment, a routing manager on a gateway tests the routes to other gateways so that it can use the proper routes based on the preferences of users.

The method of the invention for checking a network route includes a routing manager determining a gateway available for routing, where the gateway is capable of responding to a request on the communications network. The routing manager determines a candidate route to the gateway, where the candidate route is within the communications network.

Routing manager tests the candidate route to a gateway using quality measurement packets, where the quality measurement packets include route information. From the route information, the routing manager determines route statistics, where the route statistics are based on routing information contained within said quality measurement packets. The routing manager score the candidate route based on the route statistics.

In an embodiment, the method of the invention is implemented in a communications network that includes a packet-switched network, such as frame relay or the Internet. Furthermore, in other embodiments, the method of the invention is implemented in a communications network that includes a public switched telephone network (PSTN) or a combination of a PSTN and a packet-switched network.

The route information utilized by the invention includes the latency, time jitter, and lost packet information.

In an embodiment, the method of the invention includes functionality for the routing manager to prioritize the candidate route among other tested routes based on the score obtained for that candidate route. In other embodiments, the

routing manager has access to a database for storing score information related to the candidate route(s) for use in route selection.

In one embodiment, the testing functions of the method of the invention include configuring the parameters for quality measurement packets to be sent to a gateway where the parameters include the packet interval, packet length, number of packets, and time limit. The routing manager includes a graphical user interface (GUI) for configuring these parameters.

Additionally, the routing manager includes a GUI for configuring the scoring table of the invention. Thus, the routing manager configures the scoring table for use in scoring candidate routes where the table includes a quality score, packet loss, average delay, and average jitter. In other embodiments, the routing manager includes a GUI for configuring the route ordering applied for a gateway, where the route ordering includes file logging information, quality of service threshold, and timeout amount.

According to embodiments of the invention, the routing manager forwards quality measurement packets to a gateway, where the quality measurement packets include routing information; and the routing manager receives returned quality measurement packets from a gateway, where the returned quality measurement packets include routing information.

The method of the invention for checking a network route includes a routing manager that determines an available gateway for routing, where the gateway is capable of responding to a request on the communications network. The routing manager determines a candidate route to the gateway, where the candidate route is within the communications network.

The routing manager tests the candidate route to a gateway using quality measurement packets, where the quality measurement packets include route information. From the route information, the routing manager determines route statistics, where the route statistics are based on routing information contained within said quality measurement packets. The routing manager score the candidate route based on the route statistics.

In an embodiment, the method of the invention is implemented in a communications network that includes a packet-switched network, such as frame relay or the Internet. Furthermore, in other embodiments, the method of the invention is implemented in a communications network that includes a public switched telephone network (PSTN) or a combination of a PSTN and a packet switched network.

The route information utilized by the invention includes the latency, time jitter, and lost packet information.

In an embodiment, the method of the invention includes functionality for the routing manager to prioritize the candidate route among other tested routes based on the score obtained for that candidate route. In other embodiments, the routing manager has access to a database for storing score information related to the candidate route(s) for use in route selection.

In one embodiment, the testing functions of the method of the invention include configuring the parameters for quality measurement packets to be sent to a gateway where the parameters include the packet interval, packet length, number of packets, and time limit. The routing manager includes a graphical user interface (GUI) for configuring these parameters.

Additionally, the routing manager includes a GUI for configuring the scoring table of the invention. Thus, the routing manager configures the scoring table for use in scoring candidate routes where the table includes a quality score, packet loss, average delay, and average jitter. In other embodiments, the routing manager includes a GUI for configuring the route ordering applied for a gateway, where the route ordering includes file logging information, quality of service threshold, and timeout amount.

According to embodiments of the invention, the routing manager forwards quality measurement packets to a gateway, where the quality measurement packets include routing information; and the routing manager receives returned quality measurement packets from a gateway, where the returned quality measurement packets include routing information.

The system and computer program product of the present invention includes a routing manager within a gateway coupled to both a network, such as the Internet, and the PSTN, via a local exchange, through which users can access the gateway either over the network or from a device connected to the local exchange. In one embodiment, the system contains numerous modules operating either in a redundant or distributed manner, as well as in a serial or parallel manner. In another embodiment, the gateway includes a database to store information collected by the routing manager.

In one embodiment of the invention, a gateway is located in a different local exchange from other gateways to provide access to specific geographical locations from the network. In another embodiment, more than one gateway can be connected to any given local exchange. In this embodiment, other gateways can prioritize route selection based on the utilization of any one of the gateways located in a given local exchange.

The computer program product of the present invention further includes a graphical user interface (GUI) for entering the specific criteria used by the method of the present invention for checking and selecting routes.

The method of the present invention includes a route testing routine. In one embodiment, the testing routine configures packet parameter(s), configures a scoring table, and configures a route order. The method of the present invention includes a testing routine where test packet(s) are sent and received for scoring and determination of route quality.

The route checking and management system supplies route information that describes the route. Furthermore, the route checking and management system includes the functionality, in hardware or software or a combination of hardware and software, for performing the methods described herein.

While the invention is described in terms of the above embodiments, this is for convenience only and is not intended to limit its application. In fact, after reading the following description, it will be apparent to one skilled in the relevant art(s), based on the teachings herein, how to implement the invention in alternative embodiments (e.g., using gateways in neighboring local exchanges, and/or stacking gateways in a single local exchange).

Furthermore, while the following description refers to the global Internet, it is not intended to limit the application of the invention. It will be apparent to one skilled in the relevant art how to implement the following invention, in any computer network, combination of networks or other alternative embodiments. For example, other Voice over Packet (VoP) networks include frame relay and asynchronous transfer mode (ATM) enabled networks.

One advantage of the invention is that a user can select the routes to other gateways to be tested.

Another advantage of the invention is that a user can select the criteria applied to candidate routes so that the proper route is selected.

Yet another advantage of the invention is that the system can test routes as the call is being placed and select the best route for that particular call. Furthermore, a user attempting to place a call where the level of quality is below a determined level can have the call routed to the nearest gateway with an acceptable level of quality.

Further features and advantages of the invention as well as the structure and operation of various embodiments of the invention are described in detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

The accompanying drawings, which are incorporated herein and form a part of the specification, illustrate the invention and, together with the description, further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention. In the drawings:

FIG. **1** is a block diagram showing an example system architecture, according to an embodiment of the invention, showing network connectivity among various components;

FIG. **2** is a block diagram showing an alternative example system architecture, according to an embodiment of the invention, showing network connectivity among the various components;

FIG. **3** is a block diagram showing a gateway that includes a routing manager, according to an embodiment of the invention;

FIG. **4** is a flowchart illustrating a routine for determining route quality according to an embodiment of the invention;

FIG. **5** is a flowchart illustrating a routine for candidate route testing according to an embodiment of the invention;

FIG. **6** is an exemplary route testing configuration screen according to an embodiment of the invention;

FIG. **7** is an exemplary route scoring configuration screen according to an embodiment of the invention; and

FIG. **8** is an example computer system in one example implementation of the present invention.

The invention will now be described with reference to the accompanying drawings. In the drawings, like reference numbers indicate identical or functionally similar elements. Additionally, the left-most digit(s) of a reference number identifies the drawing in which the reference number first appears.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In summary, the routing manager of the invention connects to other modules of the gateway to access information about other gateways and candidate routes to those gateways. In an alternative embodiment, the routing manager is able to perform tracing operations to determine the candidate routes to gateways. Once candidate routes are obtained, the routing manager tests the routes to determine their quality of service.

Candidate routes are assigned scores (also known as a level). The routing manager can be pre-set with various levels. Additionally, the routing manager can be pre-set with route ordering levels which prioritize the various aspects of a route. These aspects can include the level assigned to a tested route, but this is optional. In other embodiments, aspects include the address of the destination gateway, the cost involved to route to that gateway, etc.

In an embodiment, the routing manager provides the ordered routes before a user places a call. In another embodiment, the routing manager is configured to test candidate routes to a designation gateway whenever a user requests a connection to a call that may utilize that destination gateway.

In brief, a user of the invention is a caller known to the VoIP system. When the system receives a call request from the user, the system accesses user specific information (route ordering) and the destination address (i.e., the number being called/requested) to determine the candidate routes to use in connecting the call. The system tests the candidate routes to ensure call quality. The system may use route quality statistics, along with user specific information, to determine the proper route. These and additional embodiments and examples of the invention are now discussed in greater detail.

FIG. **1** is a block diagram showing an example VoIP system **100**, according to an embodiment of the invention, showing the network connectivity among the various components. It should be understood that the particular example VoIP system **100** in FIG. **1** is shown for illustrative purposes only and does not limit the invention.

The VoIP system **100** includes a network **102** which connects gateways **104**, **106**, and **108**. Network **102** is a packet-switched network capable of serving as an intranet, internet, and/or connecting to the global Internet. Gateways **104**, **106**, and **108** can be physically located anywhere that allows connectivity with network **102**.

Each of gateways **104**, **106**, and **108** are connected to a local exchange. As shown in FIG. **1**, gateway **102** is connected to local exchange **110**; gateway **106** is connected to local exchange **112**; gateway **108** is connected to local exchange **114**.

Local exchanges **110**, **112**, and **114** are each connected to the PSTN.

Telephones **116**, **118**, and **120** are each connected to a local exchange. Telephone **116** is connected to local exchange **110**. Telephone **118** is connected to local exchange **112**. Telephone **120** is connected to local exchange **114**.

Telephones **116**, **118**, and **120** are representative of any number of telephones connected to a given local exchange. Typically, calls within a local exchange are toll-free or "local" calls. Calls from a telephone in one local exchange to a telephone in another local exchange are typically considered toll calls or long distance calls.

FIG. **2** is a block diagram showing an example VoIP system **200**, according to an alternative embodiment of the invention, showing the network connectivity among the various components. It should be understood that the particular example VoIP system **200** in FIG. **2** is shown for illustrative purposes only and does not limit the invention.

VoIP system **200** has substantially similar components to VoIP system **100**. VoIP system **200** differs from VoIP system **100** in that gateways **204** and **206** are connected to the same local exchange, local exchange **210**. The purpose of illustrating this difference is to illustrate a feature of embodiments of the invention. It is a feature of the invention that routing decisions can take into account the physical locations of local exchanges when determining the route to use when placing a call over the VoIP systems of the invention.

Referring to FIG. **3**, a block diagram **300**, according to an embodiment of the invention, is shown.

Block diagram **300** shows a network **302** connected to gateway **304**. Gateway **304** contains routing manager **306**, control logic **308**, and database **310**. Routing manager **306** provides route checking and selection routines as described herein. Routing manager **306** can be implemented in hardware or software or some combination of hardware and software. Control logic **308** provides additional functionality for voice coding and decoding, user logging, and other VoIP features. Database **310** stores, among other things, the results of route tests, route checking parameters, and route information as described herein. Database **310** can store additional instructions for routing manager **306** to perform.

Referring to FIG. **4**, a flowchart **400** of routine for determining route quality, according to an embodiment of the invention, is shown.

In step **402**, the routing manager **306** determines which other gateways are available to route calls. In one embodiment, routing manager **306** can obtain this information from database **310**. In another embodiment, a separate routing server (not shown) can provide information about available gateways. The database **310** and routing server are described in detail in a commonly-owned U.S. patent application Ser. No. 09/527,920, entitled "Method, System, and Computer Program Product for Managing Routing Servers and Services," incorporated herein by reference in its entirety.

In step **404**, the routing manager **306** determines the candidate route(s) to the gateways that were determined in step **402**. In one embodiment, candidate route(s) are determined by a tracing operation which determines the physical network route to a gateway. In another embodiment, database **310** provides one or more candidate route(s) for each gateway from each other gateway. Candidate routes can include transitions from network **102** to the PSTN via a local exchange, such as local exchange **112**. In one embodiment, routing manager **306** determines the availability of candidate routes to each of gateways **204**, **206**, and **208**.

In step **406**, the routing manager **306** tests the candidate route(s) to the gateways. An embodiment of step **406** is discussed further detail in FIG. **5**. In an embodiment, routing manager **306** is able to determine information about each gateway tested, such as, but not limited to, the local exchange of each gateway, and services supported by each gateway.

In step **408**, the routing manager **306** determines the candidate route statistics based on the information returned in testing step **406**. For example, routing manager **306** determines the latency between its gateway and the other tested gateways. Additional details and embodiments are discussed with respect to FIG. **5**.

In step **410**, the routing manager **306** scores the candidate route(s) based on the statistics determined in step **408**. In one embodiment, the routing manager **306** scores candidate route(s) based on both the statistics determined in step **408** and stored information from previous tests. In another embodiment, routing manager **306** scores routes based on an averaging of the statistics either determined or stored or a combination of both.

In step **412**, the routing manager **306** prioritizes candidate routes based on their score and the requirements of user. In one embodiment, the candidate routes are prioritized at the time a user places a call that utilizes a gateway.

In one embodiment, a user can priorite routes for overall voice quality. For example, in FIG. **2**, a user can select criteria which allows the system to select routes in conformance to those criteria. For instance, in the case for high voice quality, routes are selected which meet high voice quality standards, and where such network routes are unavailable, the PSTN routes are substituted. This routing can be more expensive than routing entirely on network **102** because the PSTN is accessed whenever voice quality would suffer, but such alternate routing is possible because the user is able to select and prioritize the criteria for their call.

In an further embodiment, gateway **104** may be in Albany, N.Y.; gateway **108** may be in Manhattan, N.Y.; and gateway **106** may be in Chicago, Ill. If the user is calling from a local exchange with an orginating gateway in London, England, then the least expensive call to Chicago, Ill. is over network **102** to gateway **106**. However, if the call quality is below a preset level, then the call is routed alternatively. If routing to gateway **104** provides high enough call quality, then the remainder of the call is routed over the PSTN to local exchange **112** via local exchange **110**. Therefore, while some PSTN costs may be incurred, the overall costs are still much lower than calling directly from London to Chicago over the PSTN. Furthermore, voice quality is maintained.

In an alterative embodiment, gateways may be connected to the same local exchange as other gateways, as shown in FIG. **2**. Thus, voice quality can be maintained without increases in cost by routing to an alternative gateway in the same local exchange. This embodiment has a further advantage of allowing for network traffic management.

In step **414**, the routing manager **306** stores the priority and score information. In an embodiment, this information is stored in database **310**.

Referring to FIG. **5**, a flowchart **500** of routine for testing candidate routes, according to an embodiment of the invention, is shown.

In step **502**, the routing manager **306** configures the packet parameters. In one embodiment, packets can be set to specific size. Packets can also be sent in groups (numbers of packets). Further, packets can be scheduled to be sent prior to a call or they can be scheduled at regular intervals.

In step **504**, the routing manager **306** configures a scoring table. In one embodiment, a scoring table consists of heirarchical levels assigned to specific values for the parameters being tested. An example scoring table is shown in FIG. **7** as score table panel **708**. The results (latency, jitter, etc.) of the candidate route testing (see below) are then compared to the values assigned to the levels of the scoring table. Candidate routes are assigned a score based on the level that matches their results.

In step **506**, the routing manager **306** configures the route ordering. Each route is assigned a level (or score) in step **504**. The route ordering is determined by user set values, which order or prioritize routes based on factors that include a route's level. In one embodiment, the system can order the routes based on their network address (IP address), cost estimate (the estimated cost for using the route), preference (general user preference), quality of service (the route's score), and static routes (whether the route is static or unchanging and therefore likely to be more reliable).

While the actual scoring and ordering of routes occurs after the testing steps of testing step **406**, the levels of routes and route level ordering can be determined prior to actual testing.

In step **508**, the routing manager **306** sends test packet(s). In one embodiment, the routing manager **306** first creates a user datagram protocol (UDP) socket used for sending and receiving quality measurement packets; then automatically

responds to requests on the socket without any delay; and finally sends messages to the corresponding socket on other gateways to measure the quality of server to those other gateways. In the above-described step UDP packets are used. However, as one skilled in the relevant art will recognize other protocols can be used (for example, TCP).

In step **510**, the routing manager **306** receives returned test packet(s). In an embodiment, the destination gateways receive a quality measurement packet from another gateway and return a packet back to the originating gateway as soon as possible. The returned packet includes information about the packet that was received by the destination gateway.

As described above, the routing manager **306** measures the returned packets and determines a score for the route(s).

Measurement and Scoring Embodiments

In embodiments, the measurement and scoring processes of the invention include determining the packet trip time of candidate route, calculating the average variation in the trip time of a measurement packet, and determining the packet loss by counting the number of packets that were not returned.

For example, table 1 shows example results from the above-described testing process.

TABLE 1

Pkt	Send Time	Receive Time	Delay	Jitter
n	x	y	y-x	|(y-x)-(y-x)ave|
1	0 ms	45 ms	45 ms	0 ms
2	60 ms	110 ms	50 ms	5 ms
3	120 ms	160 ms	40 ms	5 ms

From these results the average delay, average jitter, and packet loss can be calculated, as shows for one candidate route in table 2 below for the three packets shown in table 1.

TABLE 2

Average Delay	Average Jitter	Packet Loss
45 ms	3 ms	0%

The packet loss percentage becomes more important even at low levels. Five (5) per-cent packet loss may be entirely unacceptable to a user. These figures can be used to score a candidate route as in step **410** by assigning a score to the route based on the results of the tests shown above. In this way, the invention can automatically select the proper route for a call.

Furthermore, as one skilled in the relevant art(s) based on the teachings described herein would recognize, these embodiments can be implemented with any of the methods discussed herein, where the routing manager of the invention is determining and/or testing candidate routes.

The above-mentioned figures are exemplary illustrations of features of the present invention and are not intended to limit the present invention in any way. All the embodiments described herein can be combined with each other to form alternative processes of using the invention. Specifically, several features of the invention can be implemented in combination with other features of the invention to form further embodiments. For example, steps **508** and **510** of FIG. **5** can be repeated for each call received by the gateway **304**, while the other steps shown in FIG. **5** would only be performed if the particular user required a modification.

Graphical User Interface

In one embodiment of the invention, the routing manager **306** provides input (GUI) screens. The gateway **304** (as shown in FIG. **3**) allows users to view and add configuration information for routing manager **306**.

As will be apparent to one skilled in the relevant art(s), the GUI allows users of routing manager **306** to specify all inputs (e.g., general settings, route ordering, and routing servers) and options (e.g., packet settings, and scoring tables) described herein.

FIGS. **6**, and **7** show example interface screens of the present invention.

These screens are exemplary and for illustrative purposes only, as the present invention is sufficiently flexible to allow different screen designs. It should be noted that the particular information appearing in input screens of the routing manager **306**, result from the information entered by the user. Thus, it will be apparent to one skilled in the relevant art(s) that the configuration defined in steps **502**, **504**, and **506** utilize the information that will be entered in the screens during operation of the routing manager **306**.

Referring to FIG. **6**, a routing configuration screen **602** for entering and modifying routing manager **306** settings is shown.

Screen **602** includes a general settings panel **604**, a route ordering panel **608**, and a routing servers panel **612**.

General settings panel **604** includes a change settings link **606** to add, modify, and/or delete the settings displayed in general settings panel **604**. As shown in FIG. **6**, some settings are cache timeout in seconds, dynamic routing usage, error log file name, quality of service threshold, and quality checking usage. Cache timeout refers to the amount of time (here set to 86,400 seconds or 24 hours) that the cache of stored candidate route scores are stored. In other words, according to one embodiment, each candidate route is tested once every 24 hours and given a new score. Dynamic routing usage refers to the use of alternative routes obtains dynamically from other gateways, as described in detail in a previously cited, commonly-owned U.S. patent application Ser. No. 09/527,920 incorporated herein by reference in its entirety. Error log file provides the name of a file to which error or condition messages may be saved. Quality of service threshold refers to the minimum value that a route can have and still be stored for use by the system of the invention. Quality checking usage refers to enabling the use of route quality checking. For example, according to embodiments of the invention, route testing can be disabled, and route ordering will still take place, albeit without the benefit of quality of service information. These settings can be altered to activate or deactivate the usage of route quality checking. Additionally, a quality of service threshold can be set to determine when route quality checking should be activated automatically.

Route ordering panel **608** includes a change link **610** to add, modify, and/or delete the settings displayed in route ordering panel **608**. As shown in FIG. **6**, some settings are address (i.e domain name or IP address), cost estimate, preference, quality of service, and static routes (truncated in the panel's window). In this way, a user can prioritize the parameters with which routes are selected. In a broad application, cost estimate can be highly prioritized to limit the range of routes includes in subsequent selections. Quality of service can be similarly applied.

Routing servers panel **612** includes listings window **614**, an add link **616**, a properties link **618** and a remove link **620**. Listings window **614** presents the entered servers and their status. In one embodiment, these servers are used to provide candidate routes for testing. Add link **616** allows a user to

add additional servers. Properties link **618** allows a user to configure the properties of a server displayed in listings window **614**. Remove link **620** deleted a server from listings window **614**.

Referring to FIG. **7**, a quality testing configuration screen **702** for entering and modifying routing manager **306** settings is shown.

Screen **702** includes quality checking configuration panel **704**, and score table panel **708**.

Quality checking configuration panel **704** includes a change setting link **706** for modifying the packet parameters shown in panel **704**. Packet parameters include, but are not limited to those shown, such as packet interval, which is the rate at which packets are sent, packet length, the number of packets, and the time limit over which packets are to be sent.

Score table panel **708** includes listings window **710**, add top link **712**, add after link **714**, delete link **716**, and modify link **718**. Links **712**, **714**, **716**, and **718** allow a user to maintain, update and reset the scoring levels shown in listings window **710**. Specifically, add top link **712** allows a user to add a score level to the top of the list of score levels. Similarly, add after link **714** allows a user to add a score level below a selected score level. In an embodiment, the scoring table is read from top to bottom and levels assigned to candidate routes based on the first conforming score level.

Listings windows **710** displays the parameters used to score routes. As shown in FIG. **7**, these can include average delay, average jitter, packet loss, and quality score (some partially truncated). The average delay, average jitter, and packet loss are determined by the testing methods disclosed herein. For each user defined level of average delay, average jitter and packet loss is also assigned a quality score. The quality score is assigned to a route that is scored as having met the other criteria entered in listings window **710**.

Description of the example screens in these terms is provided for convenience only. It is not intended that the invention be limited to application in these example screens. In fact, after reading the description contained herein, it will become apparent to a person skilled in the relevant art(s) how to implement the invention with alternative screens.

Example Computer System

An example of a computer system **840** is shown in FIG. **8**. The computer system **840** represents any single or multiprocessor computer. In conjunction, single-threaded and multi-threaded applications can be used. Unified or distributed memory systems can be used.

Computer system **840** includes one or more processors, such as processor **844**. One or more processors **844** can execute software implementing routines **300**, and **400** as described above. Each processor **844** is connected to a communication infrastructure **842** (e.g., a communications bus, cross-bar, or network). Various software embodiments are described in terms of this exemplary computer system. After reading this description, it will become apparent to a person skilled in the relevant art how to implement the invention using other computer systems and/or computer architectures.

Computer system **840** can include a display interface **802** that forwards graphics, text, and other data from the communication infrastructure **842** (or from a frame buffer not shown) for display on the display unit **830**.

Computer system **840** also includes a main memory **846**, preferably random access memory (RAM), and can also include a secondary memory **848**. The secondary memory **848** can include, for example, a hard disk drive **850** and/or a removable storage drive **852**, representing a floppy disk drive, a magnetic tape drive, an optical disk drive, etc. The removable storage drive **852** reads from and/or writes to a removable storage unit **854** in a well known manner. Removable storage unit **854** represents a floppy disk, magnetic tape, optical disk, etc., which is read by and written to by removable storage drive **852**. As will be appreciated, the removable storage unit **854** includes a computer usable storage medium having stored therein computer software and/or data.

In alternative embodiments, secondary memory **848** may include other similar means for allowing computer programs or other instructions to be loaded into computer system **840**. Such means can include, for example, a removable storage unit **862** and an interface **860**. Examples can include a program cartridge and cartridge interface (such as that found in video game devices), a removable memory chip (such as an EPROM, or PROM) and associated socket, and other removable storage units **862** and interfaces **860** which allow software and data to be transferred from the removable storage unit **862** to computer system **840**.

Computer system **1040** can also include a communications interface **864**. Communications interface **864** allows software and data to be transferred between computer system **840** and external devices via communications path **866**. Examples of communications interface **864** can include a modem, a network interface (such as Ethernet card), a communications port, etc. Software and data transferred via communications interface **864** are in the form of signals which can be electronic, electromagnetic, optical or other signals capable of being received by communications interface **864**, via communications path **866**. Note that communications interface **864** provides a means by which computer system **840** can interface to a network such as the Internet.

In this document, the term "computer program product" is used to generally refer to removable storage unit **854**, a hard disk installed in hard disk drive **850**, or a carrier wave carrying software over a communication path **866** (wireless link or cable) to communication interface **864**. A computer useable medium can include magnetic media, optical media, or other recordable media, or media that transmits a carrier wave or other signal. These computer program products are means for providing software to computer system **840**.

Computer programs (also called computer control logic) are stored in main memory **846** and/or secondary memory **848**. Computer programs can also be received via communications interface **854**. Such computer programs, when executed, enable the computer system **840** to perform the features of the present invention as discussed herein. In particular, the computer programs, when executed, enable the processor **844** to perform the features of the present invention. Accordingly, such computer programs represent controllers of the computer system **840**.

The present invention can be implemented as control logic in software, firmware, hardware or any combination thereof. In an embodiment where the invention is implemented using software, the software may be stored in a computer program product and loaded into computer system **840** using removable storage drive **852**, hard drive **850**, or interface **860**. Alternatively, the computer program product may be downloaded to computer system **840** over communications path **866**. The control logic (software), when executed by the one or more processors **844**, causes the processor(s) **844** to perform the functions of the invention as described herein.

In another embodiment, the invention is implemented primarily in firmware and/or hardware using, for example, hardware components such as application specific integrated circuits (ASICs). Implementation of a hardware state

machine so as to perform the functions described herein will be apparent to persons skilled in the relevant art(s).

Conclusion

While various embodiments of the invention have been described above, it should be understood that they have been presented by way of example, and not limitation. It will be apparent to persons skilled in the relevant art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention. This is especially true in light of technology and terms within the relevant art(s) that may be later developed. Thus the invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A method for assessing network routes for use in establishing a communications link within a communications network, comprising the steps of:

(1) identifying a plurality of candidate routes that can be used to establish said communication link, wherein a terminating gateway associated with each of said plurality of candidate routes is identified;

(2) transmitting quality measurement packets for each of said candidate routes, wherein said quality measurement packets can be used to determine at least one route quality metric;

(3) receiving returned quality measurement packets for each of said candidate routes, wherein said returned quality measurement packets can be used to determine route statistics;

(4) determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets;

(5) configuring a route ordering schedule based on user set levels of route characteristics; and

(6) scoring each of said candidate routes based on route statistics and said route ordering schedule, wherein a scoring table is configured that includes a quality score and one or more of packet loss, average delay, and average jitter.

2. A method of claim 1, wherein said communications network includes a packet-switched network.

3. A method of claim 1, wherein said communications network includes a public switched telephone network (PSTN).

4. A method of claim 1, wherein said at least one quality metric includes one or more of latency, time jitter, and lost packet information.

5. A method of claim 1, further comprising the steps of:

(7) prioritizing each of said candidate routes among other tested routes based on a score obtained in said step of scoring; and

(8) storing said score related to each of said candidate routes for use in route selection.

6. A method of claim 1, wherein step (2) parameters within quality measurement packets include one or more of packet interval, packet length, number of packets, and time limit.

7. A system for assessing network routes for use in establishing a communications link within a communications network, comprising:

(1) means for identifying a plurality of candidate routes that can be used to establish said communications link, wherein a terminating gateway associated with each of said plurality of candidate routes is identified;

(2) means for transmitting quality measurement packets for each of said candidate routes, wherein said quality measurement packets can be used to determine at least one route quality metric;

(3) means for receiving returned quality measurement packets for each of said candidate routes, wherein said returned quality measurement packets can be used to determine route statistics;

(4) means for determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets;

(5) means for configuring a route ordering schedule based on user set levels of route characteristics; and

(6) means for scoring each of said candidate routes based on route statistics, wherein a scoring table is configured that includes a quality score and one or more of packet loss, average delay, and average jitter.

8. A system of claim 7, wherein said communications network includes a packet-switched network.

9. A system of claim 7, wherein said communications network includes a public switched telephone network (PSTN).

10. A system of claim 7, wherein said at least one quality metric includes one or more of latency, time jitter, and lost packet information.

11. A system of claim 7, further comprising:

(7) means for prioritizing each of said candidates route among other tested routes based on a score obtained in said step of scoring; and

(8) means for storing said score related to each of said candidate routes for use in route selection.

12. A system of claim 7, wherein testing means comprises:

means for configuring parameters for said quality measurement packets, wherein said parameters include one or more of packet interval, packet length, number of packets, and time limit.

13. A computer program product comprising a computer usable medium having computer readable program code means embodied in said medium for causing an application program to execute on a computer that a assesses network routes for use in establishing a communications link within a communications network, said computer readable program code means comprising:

a first computer readable program code means for causing the computer to identify a plurality of candidate routes that can be used to establish said communications link, wherein a terminating gateway associated with each of said plurality of candidate routes is identified;

a second computer readable program code means for causing the computer to transmitting quality measurement packets for each of said candidate routes, wherein said quality measurement packets can be used to determine at least one route quality metric;

a third computer readable program code means for causing the computer to receive returned quality measurement packets for each of said candidate routes, wherein said returned quality measurement packets can be used to determine route statistics;

a fourth computer readable program code means for causing the computer to determine route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets;

a fifth computer readable program code means for causing the computer to configure a route ordering schedule based on user set levels of route characteristics; and

a sixth computer readable program code means for causing the computer to score each of said candidate routes based on route statistics and said route ordering schedule, wherein a scoring table is configured that includes a quality score and one or more of packet loss, average delay, and average jitter.

14. A computer program product of claim **13**, wherein said communications network includes a packet-switched network.

15. A computer program product of claim **13**, wherein said communications network includes a public switched telephone network (PSTN).

16. A computer program product of claim **13**, wherein said at least one quality metric includes one or more of latency, time jitter, and lost packet information.

17. A computer program product of claim **13**, further comprising:

a seventh computer readable program means for causing the computer to prioritize each of said candidate routes among other tested routes based on a score obtained in said step of scoring; and

an eighth computer readable program code means for causing the computer to store said score related to each of said candidate routes for use in route selection.

18. A computer program product of claim **13**, wherein the third computer readable program code means comprises:

a ninth computer readable program code means for causing the computer to configure parameters for said quality measurement packets, wherein said parameters include one or more of packet interval, packet length, number of packets, and time limit.

19. A method of claim **1**, wherein step (5) further comprises configuring a scoring table that includes a quality score, packet loss, average delay, and average jitter.

20. A method of claim **1**, wherein said communications link establishes a VOIP connection.

21. A method for assessing network routes for use in establishing a communications link within a communications network, comprising the steps of:

(1) determining a gateway available for routing, wherein said gateway is capable of responding to a request on said communications network;

(2) determining a candidate route to said gateway, wherein said candidate route is within said communications network;

(3) testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information, wherein said testing comprises:

(a) configuring parameters for said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

(b) configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

(c) configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

(d) forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

(e) receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information;

(4) determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

(5) scoring said candidate routes with said route statistics.

22. A system for assessing network routes for use in establishing a communications link within a communications network, comprising the steps of:

(1) first means for determining a gateway available for routing, wherein said gateway is capable of responding to a request on said communications network;

(2) second means for determining a candidate route to said gateway, wherein said candidate route is within said communications network;

(3) means for testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information, wherein said testing means comprises:

(a) first means for configuring parameters for said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

(b) second means for configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

(c) third means for configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

(d) means for forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

(e) means for receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information;

(4) third means for determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

(5) means for scoring said candidate routes with said route statistics.

23. A computer program product comprising a computer usable medium having computer readable program code means embodied in said medium for causing an application program to execute on a computer that assesses network routes for use in establishing a communications link within a communications network, comprising the steps of:

(1) a first computer readable program code means for causing the computer to determine a gateway available for routing, wherein said gateway is capable of responding to a request on said communications network;

(2) a second computer readable program code means for causing the computer to determine a candidate route to said gateway, wherein said candidate route is within said communications network;

(3) a third computer readable program code means for causing the computer to test said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information, wherein said third computer readable program code means comprises:

(a) a sixth computer readable program code means for causing the computer to configure parameters for

said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

(b) a seventh computer readable program code means for causing the computer to configure a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

(c) an eighth computer readable program code means for causing the computer means to configure a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

(d) a ninth computer readable program code means for causing the computer to forward quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

(e) a tenth computer readable program code means for causing the computer to receive returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information;

(4) a fourth computer readable program code means for causing the computer to determine route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

(5) a fifth computer readable program code means for causing the computer to score said candidate routes with said route statistics.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

Bib Data Sheet

SERIAL NUMBER	FILING DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
09/660,920	09/13/2000 RULE _	370	2664	1848.0100000

APPLICANTS

Mark D. Scott, Ashburn, VA ;
Anita T. Cheng, Ashburn, VA ;

** CONTINUING DATA **********

** FOREIGN APPLICATIONS **********

IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 10/25/2000

Foreign Priority claimed	35 USC 119 (a-d) conditions met	Verified and Acknowledged	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☑ no	☐ yes ☐ no ☐ Met after Allowance	Examiner's Signature Initials	VA	8	18	3

ADDRESS

Sterne Kessler Goldstein & Fox PLLC
Suite 600
1100 New York Avenue NW
Washington ,DC 20005-3934

TITLE

Method, system, and computer program product for route quality checking and management

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
690	No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

09/22/2000 MPEOPLES 00000012 09660920
01 FC:101 690.00 OP

PTO-1556
(5/87)

*U.S. GPO: 1999-459-082/19144

Please type a sign(+) inside this box → ⊞

PTO/SB/05 (2/98)

Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR § 1.53(b))

Attorney Docket No.	*1848.0100000*
First Inventor or Application Identifier	*Mark D. SCOTT*
Title	*A Method, System, and Computer Program Product for Route Quality Checking and Management*
Express Mail Label No.	

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☒ * Fee Transmittal Form (*e.g.*, PTO/SB/17)
(Submit an original, and a duplicate for fee processing)

2. ☒ Specification [Total Pages 29]
(preferred arrangement set forth below)
- Descriptive title of the Invention
- Cross References to Related Applications
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings *(if filed)*
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 8]

4. ☒ Oath or Declaration [Total Pages 2]

a. ☒ Newly executed (original or copy)

b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional with Box 17 completed)*
[Note Box 5 below]

i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR §§ 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference *(useable if Box 4b is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program *(Appendix)*

7. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*

a. ☐ Computer Readable Copy

b. ☐ Paper Copy (identical to computer copy)

c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers (cover sheet & document(s))

9. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney (when there is an assignee)

10. ☐ English Translation Document *(if applicable)*

11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)

14. ☐ *Small Entity Statement(s) *(PTO/SB/09-12)* ☐ Statement filed in prior application, Status still proper and desired

15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)

16. ☒ Other: 37 C.F.R. § 1.136(a)(3) Authorization

☐ Other:

**NOTE FOR ITEMS 1 & 14: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. §1.28).*

17. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment:*

☐ Continuation ☐ Divisional ☐ Continuation-in-Part (CIP) of prior application No: ____/_____

Prior application information: Examiner _____ *Group/Art Unit:* _____

18. CORRESPONDENCE ADDRESS

☐ ***Customer Number or Bar Code Label*** *(Insert Customer No. or Attach bar code label here)* ***or*** ☒ ***Correspondence address below***

NAME	STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.				
	Attorneys at Law				
ADDRESS	Suite 600, 1100 New York Avenue, N.W.				
CITY	Washington	*STATE*	DC	*ZIP CODE*	20005-3934
COUNTRY	USA	*TELEPHONE*	(202) 371-2600	*FAX*	(202) 371-2540

NAME (Print/Type)	**Michael V. Messinger**	*Registration No. (Attorney/Agent)*	**37,575**
SIGNATURE		*Date* 9/13/00	

Burden Hour Statement: this form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

SKGF Rev 6/3/98 mac

0100000.sb05

PTO/SB/17 (12/99)
Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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.

FEE TRANSMITTAL
for FY 2000

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT	($)730.00

Complete if Known	
Application Number	To be assigned
Filing Date	September 13, 2000
First Named Inventor	Mark D. SCOTT
Examiner Name	To be assigned
Group / Art Unit	To be assigned
Attorney Docket Number	1848.0100000

jc525 U.S. PTO 09/660940 09/13/00

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayment to:

Deposit Account Number: 19-0036
Deposit Account Name: Sterne, Kessler, Goldstein & Fox P.L.L.C.

☐ Charge Any Additional Fee Required Under 37 CFR §§ 1.16 and 1.17

2. ☒ Payment Enclosed: ☒ Check ☐ Money Order ☒ Other*
*Charge any deficiencies or credit any overpayments in the fees or fee calculations of Parts 1, 2 and 3 below to Deposit Account No. 19-0036. Check No. 28718

FEE CALCULATION

1. BASIC FILING FEE

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
101	690	201	345	Utility filing fee	690.00
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	334	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 690.00

2. EXTRA CLAIM FEES

	Extra	Fee from below		Fee Paid
Total Claims 18 - 20** =	0	X	=	0
Indep. Claims 3 - 3** =	0	X	=	0
Multiple Dependent			=	0

** or number previously paid, if greater; For Reissues, see below

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple dependent claim
108	78	209	39	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

FEE CALCULATION (continued)

3. ADDITIONAL FEES

DUPLICATE

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1,360	218	680	Extension for reply within fourth month	
128	1,850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	40.00
146	690	246	345	Filing a submission after final rejection (37 CFR 1.129(a))	
149	690	249	345	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) :
Other fee (specify) :
*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 40.00

SUBMITTED BY				Complete (if applicable)	
Typed or Printed Name	Michael V. Messinger			Reg. Number	37,575
Signature		Date	9/13/00	Deposit Acct. User ID	19-0036

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.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.
SKGF Rev. 5/11/00 mac

0100000.sb17

PTO/SB/17 (12/99)

App [illegible] or use through 09/30/2000. OMB 0651-0032
Patent and Trad[illegible] Office: U.S. DEPARTMENT OF COMMERCE

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.

FEE TRANSMITTAL

for FY 2000

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT	($)730.00

Complete if Known	
Application Number	To be assigned
Filing Date	September 13, 2000
First Named Inventor	Mark D. SCOTT
Examiner Name	To be assigned
Group / Art Unit	To be assigned
Attorney Docket Number	1848.0100000

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayment to:

Deposit Account Number	19-0036
Deposit Account Name	Sterne, Kessler, Goldstein & Fox P.L.L.C.

☐ Charge Any Additional Fee Required Under 37 CFR §§ 1.16 and 1.17

2. ☒ Payment Enclosed: ☒ Check ☐ Money Order ☒ Other*
*Charge any deficiencies or credit any overpayments in the fees or fee calculations of Parts 1, 2 and 3 below to Deposit Account No. 19-0036. **Check No.** 28718

FEE CALCULATION

1. BASIC FILING FEE

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
101	690	201	345	Utility filing fee	690.00
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	334	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 690.00

2. EXTRA CLAIM FEES

	Extra	Fee from below	Fee Paid
Total Claims 18 - 20** =	0	X	= 0
Indep. Claims 3 - 3** =	0	X	= 0
Multiple Dependent			= 0

** *or number previously paid, if greater; For Reissues, see below*

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple dependent claim
108	78	209	39	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1,360	218	680	Extension for reply within fourth month	
128	1,850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	40.00
146	690	246	345	Filing a submission after final rejection (37 CFR 1.129(a))	
149	690	249	345	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) :

Other fee (specify) :

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 40.00

SUBMITTED BY				Complete (*if applicable*)	
Typed or Printed Name	Michael V. Messinger			Reg. Number	37,575
Signature		Date	9/13/00	Deposit Acct. User ID	19-0036

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.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

SKGF Rev. 5/11/00 mac

0100000.sb17

A Method, System, and Computer Program Product for Route Quality Checking and Management

Inventors: Mark D. Scott
Anita T. Cheng

Background of the Invention

Field of the Invention

The invention relates generally to the field of voice over Internet protocol technology. More particularly, the invention relates to route testing and selection over packet-switched networks.

Related Art

Voice over Internet protocol (VoIP) communications services provide telephony services over packet-switched networks, like the Internet. In order to maintain call quality, VoIP services are concerned with route quality. High route quality makes for more reliable and clearer conversations. Route checking and selection over the packet switched network (like the Internet) is necessary to ensure quality of service.

Unlike typical data, voice data is extremely time dependent. Transmission delays and variations in the transmission rate alter the voice data received by the destination.

In a packet-switched network, latency and jitter are measurable qualities of network performance. Latency is the amount of time it takes a packet to reach its destination. Jitter is the variation in latency. The route is the path in the network from the origin of a packet or packets to their destination. A route can be a direct end-to-end connection path, or it can consist of a path linked by any number of routers, switches, gateways, gatekeepers, etc.

Latency and jitter can degrade the communication path between any two points on a packet-switched network, like the Internet. In a VoIP environment, latency will be perceived by the end users as a delay in the response of the remote

site (or other user). Furthermore, jitter is the variation in latency from one packet to another which can be perceived as a stammering in the conversation.

Latency and jitter each impact communication differently. For example, if packets always arrived 50 milliseconds (ms) after being transmitted, then there would be a 50ms latency and no jitter. In another example, however, if packet # 1 arrived 100ms after transmission, packet # 2 arrived 50ms after transmission, and packet # 3 arrived 150ms after transmission, there would be an average jitter of +/- 33ms. In VoIP applications, jitter is often more critical than latency. Jitter can cause a packet to arrive too late to be useful. The effect is that the packet may be delayed enough that the end user will hear a pause in the voice that is talking to them, which is very unnatural if it occurs during the middle of a word or sentence.

Jitter typically occurs when the network utilization is too high, and packets are being queued by gateways, switches, routers or other similar devices, causing delivery times to become unpredictable. The Internet, because of its complex structure, is often subject to varying degrees of jitter. Jitter variation can occur at different locations and at different times depending upon network traffic and other conditions.

Conventional techniques can calculate the jitter and latency present in a route. Some VoIP systems can select routes based on the lowest jitter and/or latency. Other systems can include management of the route selection process in response to network conditions.

However, these techniques are not conducive to rapidly changing network conditions and do not provide real-time route checking and selection. Additionally, these techniques do not take into account the costs of switching from the packet switched network to the public switched telephone network (PSTN) in order to maintain quality of service.

Furthermore, conventional systems do not allow calling parties to make route selections on a per call basis.

Still further, conventional systems do not allow users to supply their own criteria used in the checking and selection of routes.

Therefore, in view of the above, what is needed is a system, method and computer program product for route quality checking and management. Further, what is needed is a system, method and computer program product that can test and score routes on a network based on criteria provided by a user. Such a system would provide the optimal route for a call based on the provided criteria. Furthermore, what is needed is a system, method and computer program product that enables users to access the route quality checking and management system and provide individual or group routing preferences and/or other route information so that the system can select the proper route for that individual or group.

Summary of the Invention

The invention is directed to a system, method and computer program product for a route quality checking and management system that satisfies the above-stated needs. The method of the present invention involves a routing manager or a route management module implemented at a gateway for determining which other gateways are available to it. A gateway can be any server enabled for routing voice data packets. The method involves the gateway determining the candidate routes to the other gateways, testing those candidate routes, determining candidate route statistics, scoring each candidate route tested, prioritizing each scored route and storing this priority and score information. In one embodiment, a routing manager on a gateway tests the routes to other gateways so that it can use the proper routes based on the preferences of users.

The method of the invention for checking a network route includes a routing manager determining a gateway available for routing, where the gateway

is capable of responding to a request on the communications network. The routing manager determines a candidate route to the gateway, where the candidate route is within the communications network.

Routing manager tests the candidate route to a gateway using quality measurement packets, where the quality measurement packets include route information. From the route information, the routing manager determines route statistics, where the route statistics are based on routing information contained within said quality measurement packets. The routing manager score the candidate route based on the route statistics.

In an embodiment, the method of the invention is implemented in a communications network that includes a packet-switched network, such as frame relay or the Internet. Furthermore, in other embodiments, the method of the invention is implemented in a communications network that includes a public switched telephone network (PSTN) or a combination of a PSTN and a packet-switched network.

The route information utilized by the invention includes the latency, time jitter, and lost packet information.

In an embodiment, the method of the invention includes functionality for the routing manager to prioritize the candidate route among other tested routes based on the score obtained for that candidate route. In other embodiments, the routing manager has access to a database for storing score information related to the candidate route(s) for use in route selection.

In one embodiment, the testing functions of the method of the invention include configuring the parameters for quality measurement packets to be sent to a gateway where the parameters include the packet interval, packet length, number of packets, and time limit. The routing manager includes a graphical user interface (GUI) for configuring these parameters.

Additionally, the routing manager includes a GUI for configuring the scoring table of the invention. Thus, the routing manager configures the scoring table for use in scoring candidate routes where the table includes a quality score,

packet loss, average delay, and average jitter. In other embodiments, the routing manager includes a GUI for configuring the route ordering applied for a gateway, where the route ordering includes file logging information, quality of service threshold, and timeout amount.

According to embodiments of the invention, the routing manager forwards quality measurement packets to a gateway, where the quality measurement packets include routing information; and the routing manager receives returned quality measurement packets from a gateway, where the returned quality measurement packets include routing information.

The method of the invention for checking a network route includes a routing manager that determines an available gateway for routing, where the gateway is capable of responding to a request on the communications network. The routing manager determines a candidate route to the gateway, where the candidate route is within the communications network.

The routing manager tests the candidate route to a gateway using quality measurement packets, where the quality measurement packets include route information. From the route information, the routing manager determines route statistics, where the route statistics are based on routing information contained within said quality measurement packets. The routing manager score the candidate route based on the route statistics.

In an embodiment, the method of the invention is implemented in a communications network that includes a packet-switched network, such as frame relay or the Internet. Furthermore, in other embodiments, the method of the invention is implemented in a communications network that includes a public switched telephone network (PSTN) or a combination of a PSTN and a packet-switched network.

The route information utilized by the invention includes the latency, time jitter, and lost packet information.

In an embodiment, the method of the invention includes functionality for the routing manager to prioritize the candidate route among other tested routes based on the score obtained for that candidate route. In other embodiments, the routing manager has access to a database for storing score information related to the candidate route(s) for use in route selection.

In one embodiment, the testing functions of the method of the invention include configuring the parameters for quality measurement packets to be sent to a gateway where the parameters include the packet interval, packet length, number of packets, and time limit. The routing manager includes a graphical user interface (GUI) for configuring these parameters.

Additionally, the routing manager includes a GUI for configuring the scoring table of the invention. Thus, the routing manager configures the scoring table for use in scoring candidate routes where the table includes a quality score, packet loss, average delay, and average jitter. In other embodiments, the routing manager includes a GUI for configuring the route ordering applied for a gateway, where the route ordering includes file logging information, quality of service threshold, and timeout amount.

According to embodiments of the invention, the routing manager forwards quality measurement packets to a gateway, where the quality measurement packets include routing information; and the routing manager receives returned quality measurement packets from a gateway, where the returned quality measurement packets include routing information.

The system and computer program product of the present invention includes a routing manager within a gateway coupled to both a network, such as the Internet, and the PSTN, via a local exchange, through which users can access the gateway either over the network or from a device connected to the local exchange. In one embodiment, the system contains numerous modules operating either in a redundant or distributed manner, as well as in a serial or parallel

7

manner. In another embodiment, the gateway includes a database to store information collected by the routing manager.

In one embodiment of the invention, a gateway is located in a different local exchange from other gateways to provide access to specific geographical locations from the network. In another embodiment, more than one gateway can be connected to any given local exchange. In this embodiment, other gateways can prioritize route selection based on the utilization of any one of the gateways located in a given local exchange.

The computer program product of the present invention further includes a graphical user interface (GUI) for entering the specific criteria used by the method of the present invention for checking and selecting routes.

The method of the present invention includes a route testing routine. In one embodiment, the testing routine configures packet parameter(s), configures a scoring table, and configures a route order. The method of the present invention includes a testing routine where test packet(s) are sent and received for scoring and determination of route quality.

The route checking and management system supplies route information that describes the route. Furthermore, the route checking and management system includes the functionality, in hardware or software or a combination of hardware and software, for performing the methods described herein.

While the invention is described in terms of the above embodiments, this is for convenience only and is not intended to limit its application. In fact, after reading the following description, it will be apparent to one skilled in the relevant art(s), based on the teachings herein, how to implement the invention in alternative embodiments (e.g., using gateways in neighboring local exchanges, and/or stacking gateways in a single local exchange).

Furthermore, while the following description refers to the global Internet, it is not intended to limit the application of the invention. It will be apparent to one skilled in the relevant art how to implement the following invention, in any

computer network, combination of networks or other alternative embodiments. For example, other Voice over Packet (VoP) networks include frame relay and asynchronous transfer mode (ATM) enabled networks.

One advantage of the invention is that a user can select the routes to other gateways to be tested.

Another advantage of the invention is that a user can select the criteria applied to candidate routes so that the proper route is selected.

Yet another advantage of the invention is that the system can test routes as the call is being placed and select the best route for that particular call. Furthermore, a user attempting to place a call where the level of quality is below a determined level can have the call routed to the nearest gateway with an acceptable level of quality.

Further features and advantages of the invention as well as the structure and operation of various embodiments of the invention are described in detail below with reference to the accompanying drawings.

Brief Description of the Figures

The accompanying drawings, which are incorporated herein and form a part of the specification, illustrate the invention and, together with the description, further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention.

In the drawings:

FIG. 1 is a block diagram showing an example system architecture, according to an embodiment of the invention, showing network connectivity among various components;

9

FIG. 2 is a block diagram showing an alternative example system architecture, according to an embodiment of the invention, showing network connectivity among the various components;

FIG. 3 is a block diagram showing a gateway that includes a routing manager, according to an embodiment of the invention;

FIG. 4 is a flowchart illustrating a routine for determining route quality according to an embodiment of the invention;

FIG. 5 is a flowchart illustrating a routine for candidate route testing according to an embodiment of the invention;

FIG. 6 is an exemplary route testing configuration screen according to an embodiment of the invention;

FIG. 7 is an exemplary route scoring configuration screen according to an embodiment of the invention; and

FIG. 8 is an example computer system in one example implementation of the present invention.

The invention will now be described with reference to the accompanying drawings. In the drawings, like reference numbers indicate identical or functionally similar elements. Additionally, the left-most digit(s) of a reference number identifies the drawing in which the reference number first appears.

Detailed Description of the Preferred Embodiments

In summary, the routing manager of the invention connects to other modules of the gateway to access information about other gateways and candidate routes to those gateways. In an alternative embodiment, the routing manager is able to perform tracing operations to determine the candidate routes to gateways. Once candidate routes are obtained, the routing manager tests the routes to determine their quality of service.

Candidate routes are assigned scores (also known as a level). The routing manager can be pre-set with various levels. Additionally, the routing manager can be pre-set with route ordering levels which prioritize the various aspects of a route. These aspects can include the level assigned to a tested route, but this is optional. In other embodiments, aspects include the address of the destination gateway, the cost involved to route to that gateway, etc.

In an embodiment, the routing manager provides the ordered routes before a user places a call. In another embodiment, the routing manager is configured to test candidate routes to a desination gateway whenever a user requests a connection to a call that may utilize that destination gateway.

In brief, a user of the invention is a caller known to the VoIP system. When the system receives a call request from the user, the system accesses user specific information (route ordering) and the destination address (i.e., the number being called/requested) to determine the candidate routes to use in connecting the call. The system tests the candidate routes to ensure call quality. The system may use route quality statistics, along with user specific information, to determine the proper route. These and additional embodiments and examples of the invention are now discussed in greater detail.

FIG. 1 is a block diagram showing an example VoIP system 100, according to an embodiment of the invention, showing the network connectivity among the various components. It should be understood that the particular example VoIP system 100 in FIG. 1 is shown for illustrative purposes only and does not limit the invention.

The VoIP system 100 includes a network 102 which connects gateways 104, 106, and 108. Network 102 is a packet-switched network capable of serving as an intranet, internet, and/or connecting to the global Internet. Gateways 104, 106, and 108 can be physically located anywhere that allows connectivity with network 102.

Each of gateways 104, 106, and 108 are connected to a local exchange. As shown in FIG. 1, gateway 102 is connected to local exchange 110; gateway 106 is connected to local exchange 112; gateway 108 is connected to local exchange 114.

Local exchanges 110, 112, and 114 are each connected to the PSTN.

Telephones 116, 118, and 120 are each connected to a local exchange. Telephone 116 is connected to local exchange 110. Telephone 118 is connected to local exchange 112. Telephone 120 is connected to local exchange 114.

Telephones 116, 118, and 120 are representative of any number of telephones connected to a given local exchange. Typically, calls within a local exchange are toll-free or "local" calls. Calls from a telephone in one local exchange to a telephone in another local exchange are typically considered toll calls or long distance calls.

FIG. 2 is a block diagram showing an example VoIP system 200, according to an alternative embodiment of the invention, showing the network connectivity among the various components. It should be understood that the particular example VoIP system 200 in FIG. 2 is shown for illustrative purposes only and does not limit the invention.

VoIP system 200 has substantially similar components to VoIP system 100. VoIP system 200 differs from VoIP system 100 in that gateways 204 and 206 are connected to the same local exchange, local exchange 210. The purpose of illustrating this difference is to illustrate a feature of embodiments of the invention. It is a feature of the invention that routing decisions can take into account the physical locations of local exchanges when determining the route to use when placing a call over the VoIP systems of the invention.

Referring to FIG. 3, a block diagram 300, according to an embodiment of the invention, is shown.

Block diagram 300 shows a network 302 connected to gateway 304. Gateway 304 contains routing manager 306, control logic 308, and database 310.

Routing manager 306 provides route checking and selection routines as described herein. Routing manager 306 can be implemented in hardware or software or some combination of hardware and software. Control logic 308 provides additional functionality for voice coding and decoding, user logging, and other VoIP features. Database 310 stores, among other things, the results of route tests, route checking parameters, and route information as described herein. Database 310 can store additional instructions for routing manager 306 to perform.

Referring to FIG. 4, a flowchart 400 of routine for determining route quality, according to an embodiment of the invention, is shown.

In step 402, the routing manager 306 determines which other gateways are available to route calls. In one embodiment, routing manager 306 can obtain this information from database 310. In another embodiment, a separate routing server (not shown) can provide information about available gateways. The database 310 and routing server are described in detail in a commonly-owned U.S. Patent Application No. 09/527,920, entitled "Method, System, and Computer Program Product for Managing Routing Servers and Services," incorporated herein by reference in its entirety.

In step 404, the routing manager 306 determines the candidate route(s) to the gateways that were determined in step 402. In one embodiment, candidate route(s) are determined by a tracing operation which determines the physical network route to a gateway. In another embodiment, database 310 provides one or more candidate route(s) for each gateway from each other gateway. Candidate routes can include transitions from network 102 to the PSTN via a local exchange, such as local exchange 112. In one embodiment, routing manager 306 determines the availability of candidate routes to each of gateways 204, 206, and 208.

In step 406, the routing manager 306 tests the candidate route(s) to the gateways. An embodiment of step 406 is discussed further detail in FIG. 5. In an embodiment, routing manager 306 is able to determine information about each

gateway tested, such as, but not limited to, the local exchange of each gateway, and services supported by each gateway.

In step 408, the routing manager 306 determines the candidate route statistics based on the information returned in testing step 406. For example, routing manager 306 determines the latency between its gateway and the other tested gateways. Additional details and embodiments are discussed with respect to FIG. 5.

In step 410, the routing manager 306 scores the candidate route(s) based on the statistics determined in step 408. In one embodiment, the routing manager 306 scores candidate route(s) based on both the statistics determined in step 408 and stored information from previous tests. In another embodiment, routing manager 306 scores routes based on an averaging of the statistics either determined or stored or a combination of both.

In step 412, the routing manager 306 prioritizes candidate routes based on their score and the requirements of user. In one embodiment, the candidate routes are prioritized at the time a user places a call that utilizes a gateway.

In one embodiment, a user can priorite routes for overall voice quality. For example, in FIG. 2, a user can select criteria which allows the system to select routes in conformance to those criteria. For instance, in the case for high voice quality, routes are selected which meet high voice quality standards, and where such network routes are unavailable, the PSTN routes are substituted. This routing can be more expensive than routing entirely on network 102 because the PSTN is accessed whenever voice quality would suffer, but such alternate routing is possible because the user is able to select and prioritize the criteria for their call.

In an further embodiment, gateway 104 may be in Albany, NY; gateway 108 may be in Manhattan, NY; and gateway 106 may be in Chicago, IL. If the user is calling from a local exchange with an orginating gateway in London, England, then the least expensive call to Chicago, IL is over network 102 to

gateway 106. However, if the call quality is below a preset level, then the call is routed alternatively. If routing to gateway 104 provides high enough call quality, then the remainder of the call is routed over the PSTN to local exchange 112 via local exchange 110. Therefore, while some PSTN costs may be incurred, the overall costs are still much lower than calling directly from London to Chicago over the PSTN. Furthermore, voice quality is maintained.

In an alterative embodiment, gateways may be connected to the same local exchange as other gateways, as shown in FIG. 2. Thus, voice quality can be maintained without increases in cost by routing to an alternative gateway in the same local exchange. This embodiment has a further advantage of allowing for network traffic management.

In step 414, the routing manager 306 stores the priority and score information. In an embodiment, this information is stored in database 310.

Referring to FIG. 5, a flowchart 500 of routine for testing candidate routes, according to an embodiment of the invention, is shown.

In step 502, the routing manager 306 configures the packet parameters. In one embodiment, packets can be set to specific size. Packets can also be sent in groups (numbers of packets). Further, packets can be scheduled to be sent prior to a call or they can be scheduled at regular intervals.

In step 504, the routing manager 306 configures a scoring table. In one embodiment, a scoring table consists of heirarchical levels assigned to specific values for the parameters being tested. An example scoring table is shown in FIG. 7 as score table panel 708. The results (latency, jitter, etc.) of the candidate route testing (see below) are then compared to the values assigned to the levels of the scoring table. Candidate routes are assigned a score based on the level that matches their results.

In step 506, the routing manager 306 configures the route ordering. Each route is assigned a level (or score) in step 504. The route ordering is determined by user set values, which order or prioritize routes based on factors that include

a route's level. In one embodiment, the system can order the routes based on their network address (IP address), cost estimate (the estimated cost for using the route), preference (general user preference), quality of service (the route's score), and static routes (whether the route is static or unchanging and therefore likely to be more reliable).

While the actual scoring and ordering of routes occurs after the testing steps of testing step 406, the levels of routes and route level ordering can be determined prior to actual testing.

In step 508, the routing manager 306 sends test packet(s). In one embodiment, the routing manager 306 first creates a user datagram protocol (UDP) socket used for sending and receiving quality measurement packets; then automatically responds to requests on the socket without any delay; and finally sends messages to the corresponding socket on other gateways to measure the quality of server to those other gateways. In the above-described step UDP packets are used. However, as one skilled in the relevant art will recognize other protocols can be used (for example, TCP).

In step 510, the routing manager 306 receives returned test packet(s). In an embodiment, the destination gateways receive a quality measurement packet from another gateway and return a packet back to the originating gateway as soon as possible. The returned packet includes information about the packet that was received by the destination gateway.

As described above, the routing manager 306 measures the returned packets and determines a score for the route(s).

Measurement and Scoring Embodiments

In embodiments, the measurement and scoring processes of the invention include determining the packet trip time of candidate route, calculating the average variation in the trip time of a measurement packet, and determining the packet loss by counting the number of packets that were not returned.

For example, table 1 shows example results from the above-described testing process.

Table 1

Pkt	Send Time	Receive Time	Delay	Jitter
n	x	y	y - x	|(y-x)-(y-x)ave|
1	0ms	45ms	45ms	0ms
2	60ms	110ms	50ms	5ms
3	120ms	160ms	40ms	5ms

From these results the average delay, average jitter, and packet loss can be calculated, as shown for one candidate route in table 2 below for the three packets shown in table1.

Table 2

Average Delay	Average Jitter	Packet Loss
45ms	3ms	0%

The packet loss percentage becomes more important even at low levels. Five (5) per-cent packet loss may be entirely unacceptable to a user. These figures can be used to score a candidate route as in step 410 by assigning a score to the route based on the results of the tests shown above. In this way, the invention can automatically select the proper route for a call.

Furthermore, as one skilled in the relevant art(s) based on the teachings described herein would recognize, these embodiments can be implemented with any of the methods discussed herein, where the routing manager of the invention is determining and/or testing candidate routes.

The above-mentioned figures are exemplary illustrations of features of the present invention and are not intended to limit the present invention in any way. All the embodiments described herein can be combined with each other to form alternative processes of using the invention. Specifically, several features of the

invention can be implemented in combination with other features of the invention to form further embodiments. For example, steps 508 and 510 of FIG. 5 can be repeated for each call received by the gateway 304, while the other steps shown in FIG. 5 would only be performed if the particular user required a modification.

Graphical User Interface

In one embodiment of the invention, the routing manager 306 provides input (GUI) screens. The gateway 304 (as shown in FIG. 3) allows users to view and add configuration information for routing manager 306.

As will be apparent to one skilled in the relevant art(s), the GUI allows users of routing manager 306 to specify all inputs (e.g., general settings, route ordering, and routing servers) and options (e.g., packet settings, and scoring tables) described herein.

FIGS. 6, and 7 show example interface screens of the present invention.

These screens are exemplary and for illustrative purposes only, as the present invention is sufficiently flexible to allow different screen designs. It should be noted that the particular information appearing in input screens of the routing manager 306, result from the information entered by the user. Thus, it will be apparent to one skilled in the relevant art(s) that the configuration defined in steps 502, 504, and 506 utilize the information that will be entered in the screens during operation of the routing manager 306.

Referring to FIG. 6, a routing configuration screen 602 for entering and modifying routing manager 306 settings is shown.

Screen 602 includes a general settings panel 604, a route ordering panel 608, and a routing servers panel 612.

General settings panel 604 includes a change settings link 606 to add, modify, and/or delete the settings displayed in general settings panel 604. As shown in FIG. 6, some settings are cache timeout in seconds, dynamic routing usage, error log file name, quality of service threshold, and quality checking

usage. Cache timeout refers to the amount of time (here set to 86,400 seconds or 24 hours) that the cache of stored candidate route scores are stored. In other words, according to one embodiment, each candidate route is tested once every 24 hours and given a new score. Dynamic routing usage refers to the use of alternative routes obtains dynamically from other gateways, as described in detail in a previously cited, commonly-owned U.S. Patent Application No. 09/527,920 incorporated herein by reference in its entirety. Error log file provides the name of a file to which error or condition messages may be saved. Quality of service threshold refers to the minimum value that a route can have and still be stored for use by the system of the invention. Quality checking usage refers to enabling the use of route quality checking. For example, according to embodiments of the invention, route testing can be disabled, and route ordering will still take place, albeit without the benefit of quality of service information. These settings can be altered to activate or deactivate the usage of route quality checking. Additionally, a quality of service threshold can be set to determine when route quality checking should be activated automatically.

Route ordering panel 608 includes a change link 610 to add, modify, and/or delete the settings displayed in route ordering panel 608. As shown in FIG. 6, some settings are address (i.e., domain name or IP address), cost estimate, preference, quality of service, and static routes (truncated in the panel's window). In this way, a user can prioritize the parameters with which routes are selected. In a broad application, cost estimate can be highly prioritized to limit the range of routes includes in subsequent selections. Quality of service can be similarly applied.

Routing servers panel 612 includes listings window 614, an add link 616, a properties link 618 and a remove link 620. Listings window 614 presents the entered servers and their status. In one embodiment, these servers are used to provide candidate routes for testing. Add link 616 allows a user to add additional servers. Properties link 618 allows a user to configure the properties of a server

displayed in listings window 614. Remove link 620 deleted a server from listings window 614.

Referring to FIG. 7, a quality testing configuration screen 702 for entering and modifying routing manager 306 settings is shown.

Screen 702 includes quality checking configuration panel 704, and score table panel 708.

Quality checking configuration panel 704 includes a change setting link 706 for modifying the packet parameters shown in panel 704. Packet parameters include, but are not limited to those shown, such as packet interval, which is the rate at which packets are sent, packet length, the number of packets, and the time limit over which packets are to be sent.

Score table panel 708 includes listings window 710, add top link 712, add after link 714, delete link 716, and modify link 718. Links 712, 714, 716, and 718 allow a user to maintain, update and reset the scoring levels shown in listings window 710. Specifically, add top link 712 allows a user to add a score level to the top of the list of score levels. Similarly, add after link 714 allows a user to add a score level below a selected score level. In an embodiment, the scoring table is read from top to bottom and levels assigned to candidate routes based on the first conforming score level.

Listings windows 710 displays the parameters used to score routes. As shown in FIG. 7, these can include average delay, average jitter, packet loss, and quality score (some partially truncated). The average delay, average jitter, and packet loss are determined by the testing methods disclosed herein. For each user defined level of average delay, average jitter and packet loss is also assigned a quality score. The quality score is assigned to a route that is scored as having met the other criteria entered in listings window 710.

Description of the example screens in these terms is provided for convenience only. It is not intended that the invention be limited to application in these example screens. In fact, after reading the description contained herein,

it will become apparent to a person skilled in the relevant art(s) how to implement the invention with alternative screens.

Example Computer System

An example of a computer system 840 is shown in FIG. 8. The computer system 840 represents any single or multi-processor computer. In conjunction, single-threaded and multi-threaded applications can be used. Unified or distributed memory systems can be used.

Computer system 840 includes one or more processors, such as processor 844. One or more processors 844 can execute software implementing routines 300, and 400 as described above. Each processor 844 is connected to a communication infrastructure 842 (e.g., a communications bus, cross-bar, or network). Various software embodiments are described in terms of this exemplary computer system. After reading this description, it will become apparent to a person skilled in the relevant art how to implement the invention using other computer systems and/or computer architectures.

Computer system 840 can include a display interface 802 that forwards graphics, text, and other data from the communication infrastructure 842 (or from a frame buffer not shown) for display on the display unit 830.

Computer system 840 also includes a main memory 846, preferably random access memory (RAM), and can also include a secondary memory 848. The secondary memory 848 can include, for example, a hard disk drive 850 and/or a removable storage drive 852, representing a floppy disk drive, a magnetic tape drive, an optical disk drive, etc. The removable storage drive 852 reads from and/or writes to a removable storage unit 854 in a well known manner. Removable storage unit 854 represents a floppy disk, magnetic tape, optical disk, etc., which is read by and written to by removable storage drive 852. As will be appreciated, the removable storage unit 854 includes a computer usable storage medium having stored therein computer software and/or data.

In alternative embodiments, secondary memory 848 may include other similar means for allowing computer programs or other instructions to be loaded into computer system 840. Such means can include, for example, a removable storage unit 862 and an interface 860. Examples can include a program cartridge and cartridge interface (such as that found in video game devices), a removable memory chip (such as an EPROM, or PROM) and associated socket, and other removable storage units 862 and interfaces 860 which allow software and data to be transferred from the removable storage unit 862 to computer system 840.

Computer system 1040 can also include a communications interface 864. Communications interface 864 allows software and data to be transferred between computer system 840 and external devices via communications path 866. Examples of communications interface 864 can include a modem, a network interface (such as Ethernet card), a communications port, etc. Software and data transferred via communications interface 864 are in the form of signals which can be electronic, electromagnetic, optical or other signals capable of being received by communications interface 864, via communications path 866. Note that communications interface 864 provides a means by which computer system 840 can interface to a network such as the Internet.

In this document, the term "computer program product" is used to generally refer to removable storage unit 854, a hard disk installed in hard disk drive 850, or a carrier wave carrying software over a communication path 866 (wireless link or cable) to communication interface 864. A computer useable medium can include magnetic media, optical media, or other recordable media, or media that transmits a carrier wave or other signal. These computer program products are means for providing software to computer system 840.

Computer programs (also called computer control logic) are stored in main memory 846 and/or secondary memory 848. Computer programs can also be received via communications interface 854. Such computer programs, when executed, enable the computer system 840 to perform the features of the present

invention as discussed herein. In particular, the computer programs, when executed, enable the processor 844 to perform the features of the present invention. Accordingly, such computer programs represent controllers of the computer system 840.

The present invention can be implemented as control logic in software, firmware, hardware or any combination thereof. In an embodiment where the invention is implemented using software, the software may be stored in a computer program product and loaded into computer system 840 using removable storage drive 852, hard drive 850, or interface 860. Alternatively, the computer program product may be downloaded to computer system 840 over communications path 866. The control logic (software), when executed by the one or more processors 844, causes the processor(s) 844 to perform the functions of the invention as described herein.

In another embodiment, the invention is implemented primarily in firmware and/or hardware using, for example, hardware components such as application specific integrated circuits (ASICs). Implementation of a hardware state machine so as to perform the functions described herein will be apparent to persons skilled in the relevant art(s).

Conclusion

While various embodiments of the invention have been described above, it should be understood that they have been presented by way of example, and not limitation. It will be apparent to persons skilled in the relevant art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention. This is especially true in light of technology and terms within the relevant art(s) that may be later developed. Thus the invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What Is Claimed Is:

1. A method for checking a network route, comprising the steps of:

(1) determining a gateway available for routing, wherein said gateway is capable of responding to a request on the communications network;

(2) determining a candidate route to said gateway, wherein said candidate route is within said communications network;

(3) testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information;

(4) determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

(5) scoring said candidate route with said route statistics.

2. A method of claim 1, wherein said communications network includes a packet-switched network.

3. A method of claim 1, wherein said communications network includes a public switched telephone network (PSTN).

4. A method of claim 1, wherein said route information include latency, time jitter, and lost packet information.

5. A method of claim 1, further comprising the steps of:

(6) prioritizing said candidate route among other tested routes based on a score obtained in said step of scoring; and

(7) storing said score related to said candidate route for use in route selection.

6. A method of claim 1, wherein step (3) comprises the steps of:

(a) configuring parameters for said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

(b) configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

(c) configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

(d) forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

(e) receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information.

7. A system for checking a network route, comprising:

first means for determining a gateway available for routing, wherein said gateway is capable of responding to a request on the communications network;

second means for determining a candidate route to said gateway, wherein said candidate route is within said communications network;

means for testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information;

third means for determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

means for scoring said candidate route with said route statistics.

8. A system of claim 7, wherein said communications network includes a packet-switched network.

9. A system of claim 7, wherein said communications network includes a public switched telephone network (PSTN).

10. A system of claim 7, wherein said route information include latency, time jitter, and lost packet information.

11. A method of claim 7, further comprising:

(6) prioritizing said candidate route among other tested routes based on a score obtained in said step of scoring; and

(7) storing said score related to said candidate route for use in route selection.

12. A system of claim 7, wherein testing means comprises:

first means for configuring parameters for said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

second means for configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

third means for configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

means for forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

means for receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information.

13. A computer program product comprising a computer usable medium having computer readable program code means embodied in said medium for causing an application program to execute on a computer that checks a network route, said computer readable program code means comprising:

a first computer readable program code means for causing the computer to determine a gateway available for routing, wherein said gateway is capable of responding to a request on the communications network;

a second computer readable program code means for causing the computer to determine a candidate route to said gateway, wherein said candidate route is within said communications network;

a third computer readable program code means for causing the computer to test said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information;

a fourth computer readable program code means for causing the computer to determine route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

a fifth computer readable program code means for causing the computer to score said candidate route with said route statistics.

14. A computer program product of claim 13, wherein said communications network includes a packet-switched network.

15. A computer program product of claim 13, wherein said communications network includes a public switched telephone network (PSTN).

16. A computer program product of claim 13, wherein said route information include latency, time jitter, and lost packet information.

17. A computer program product of claim 13, further comprising:

a sixth computer readable program code means for causing the computer to prioritize said candidate route among other tested routes based on a score obtained in said step of scoring; and

a seventh computer readable program code means for causing the computer to store said score related to said candidate route for use in route selection.

18. A computer program product of claim 13, wherein third computer readable program code means comprises:

an eighth computer readable program code means for causing the computer to configure parameters for said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

a ninth computer readable program code means for causing the computer to configure a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

a tenth computer readable program code means for causing the computer to configure a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

an eleventh computer readable program code means for causing the computer to forward quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

a twelfth computer readable program code means for causing the computer to receive returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information.

add A1

A Method, System, and Computer Program Product for Route Quality Checking and Management

Abstract

A method, system and computer program product for route checking and management is described herein. In a voice over internet protocol environment, the invention allows for the testing of routes among various gateways. In one embodiment, gateways include routing managers for checking and storing route information. The method of the invention includes checking candidate routes for the level of quality, location and cost levels. Further, users can prioritize routes based on these criteria.

A278-58.wpd

PRINT OF DRAWINGS
AS ORIGINALLY FIL

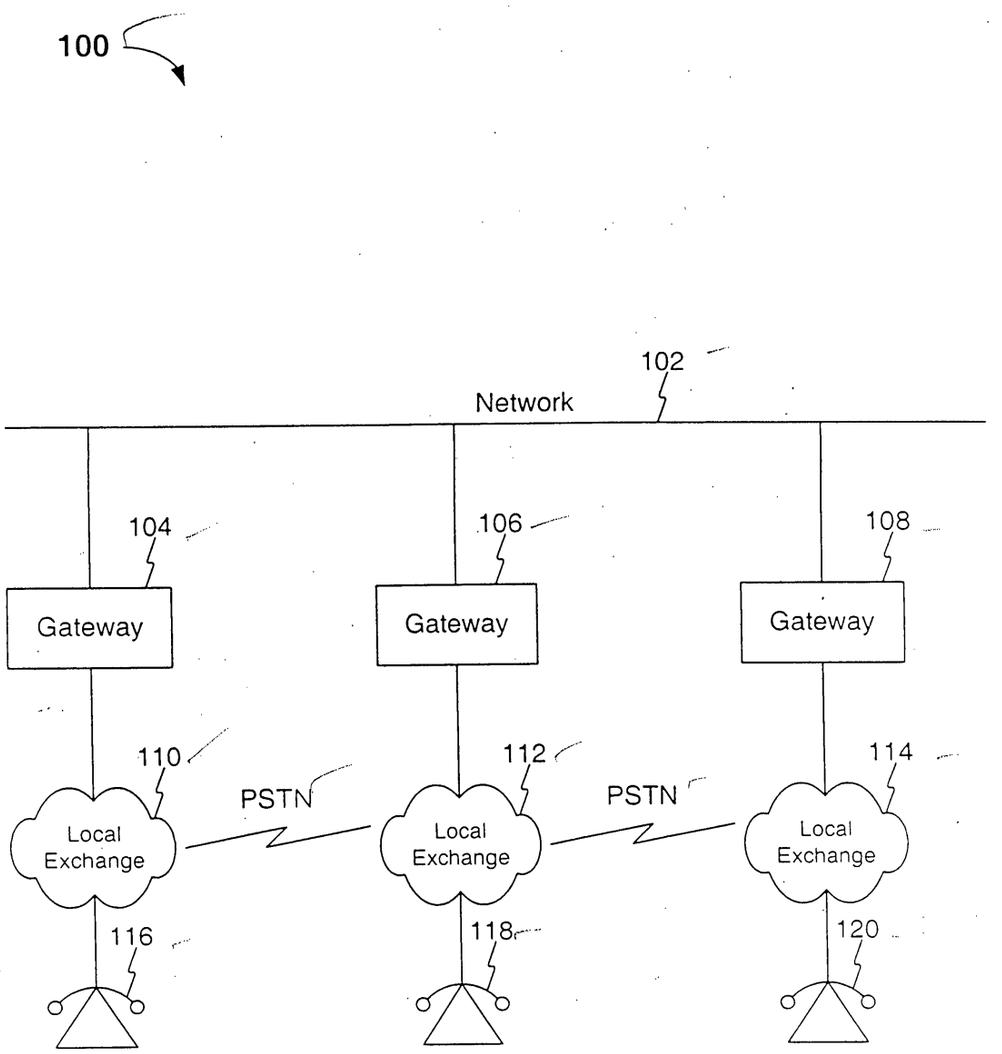


FIG. 1

0002-88.vsd/1

PRINT OF DRAWINGS
AS ORIGINALLY FILED

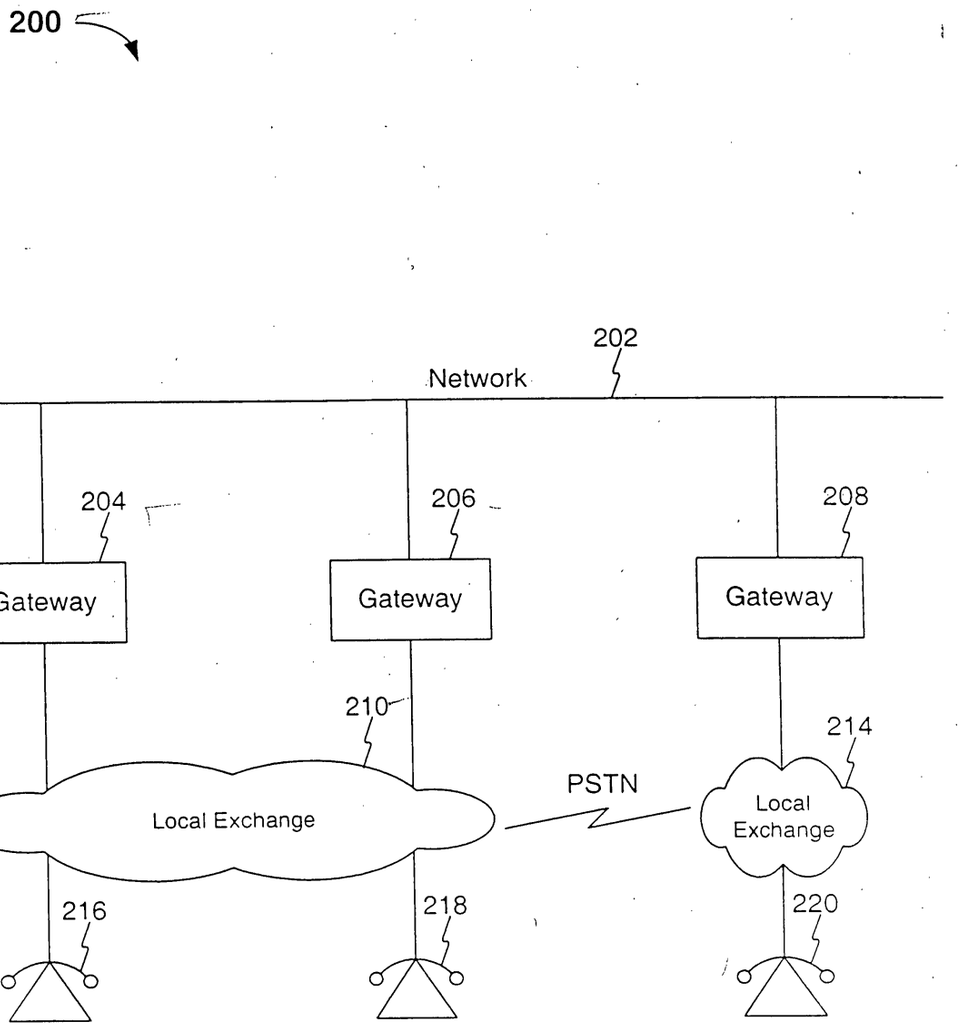


FIG. 2

0002-88.vsd/2

PRINT OF DRAWINGS
AS ORIGINALLY FILED

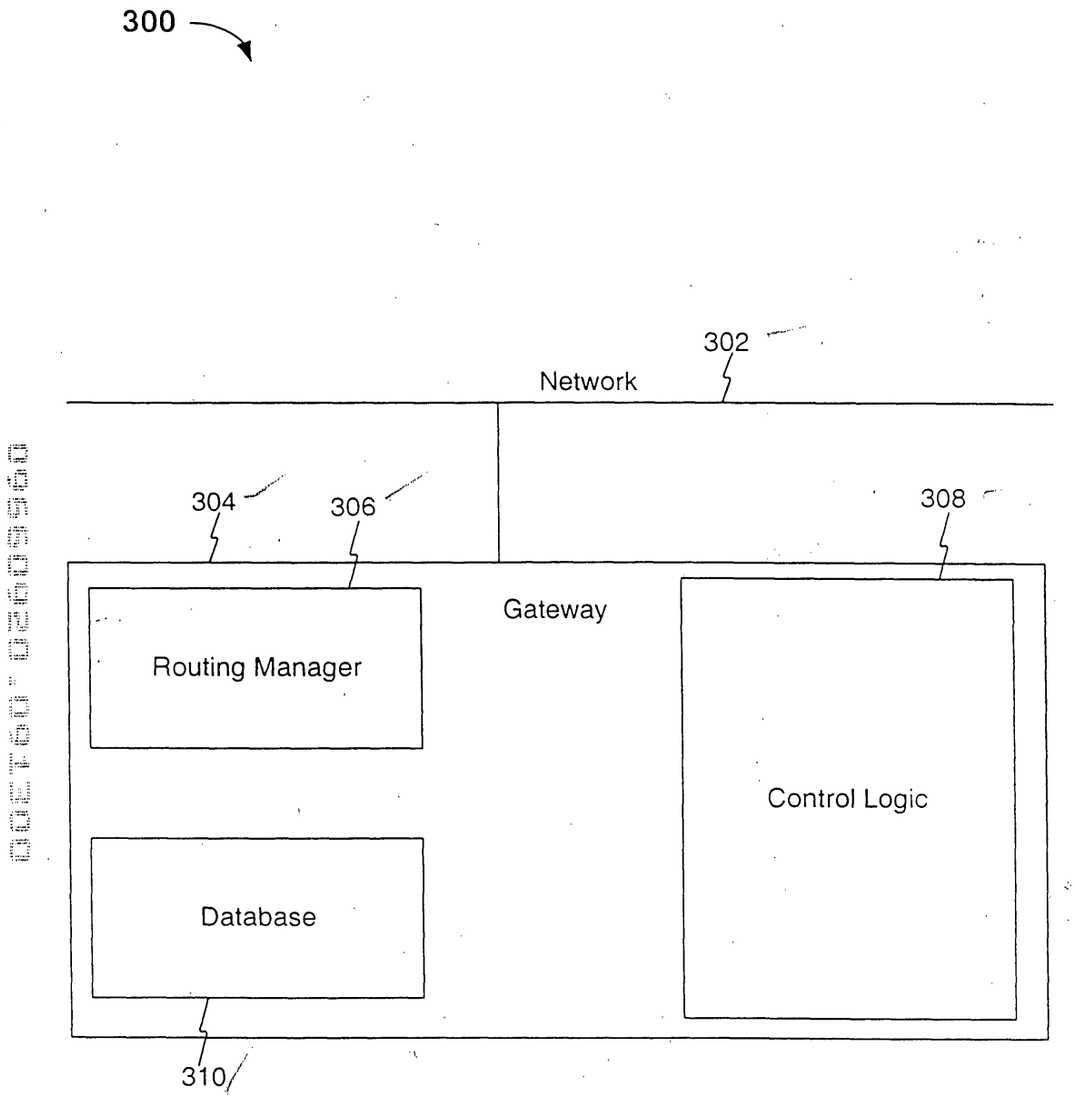


FIG. 3

0002-88.vsd/3

PRINT OF DRAWINGS
AS ORIGINALLY FILED

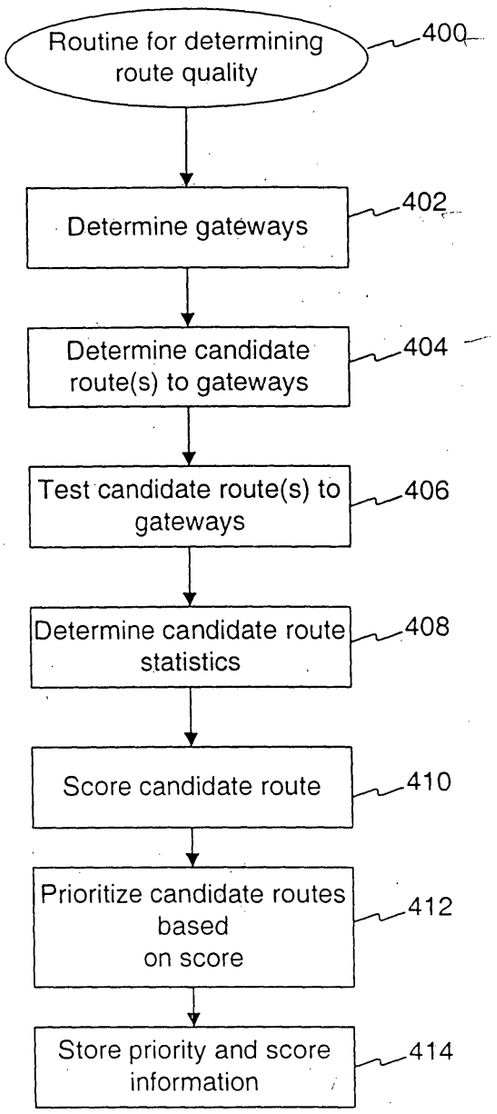


FIG. 4

0002-88.vsd/4

PRINT OF DRAWINGS
AS ORIGINALLY FILE

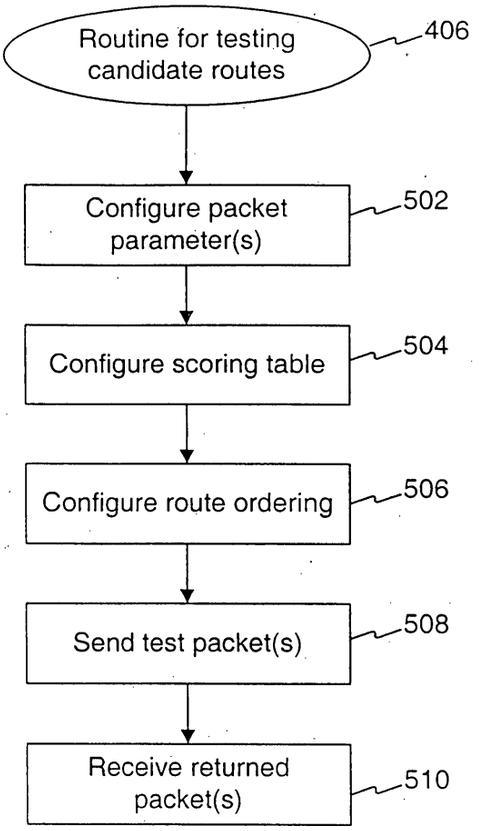


FIG. 5

0002-88.vsd/5

PRINT OF DRAWINGS
AS ORIGINALLY FILED

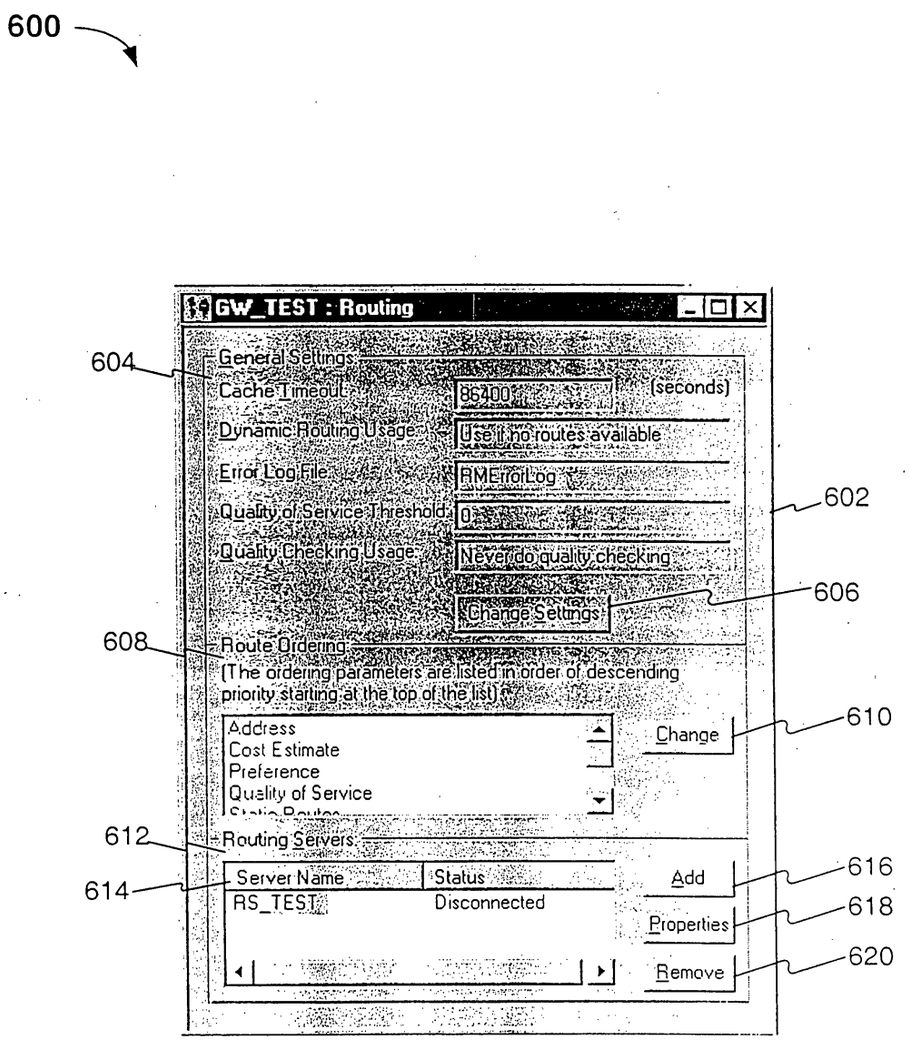


FIG. 6

0002-88.vsd/6

PRINT OF DRAWINGS
AS ORIGINALLY FILED

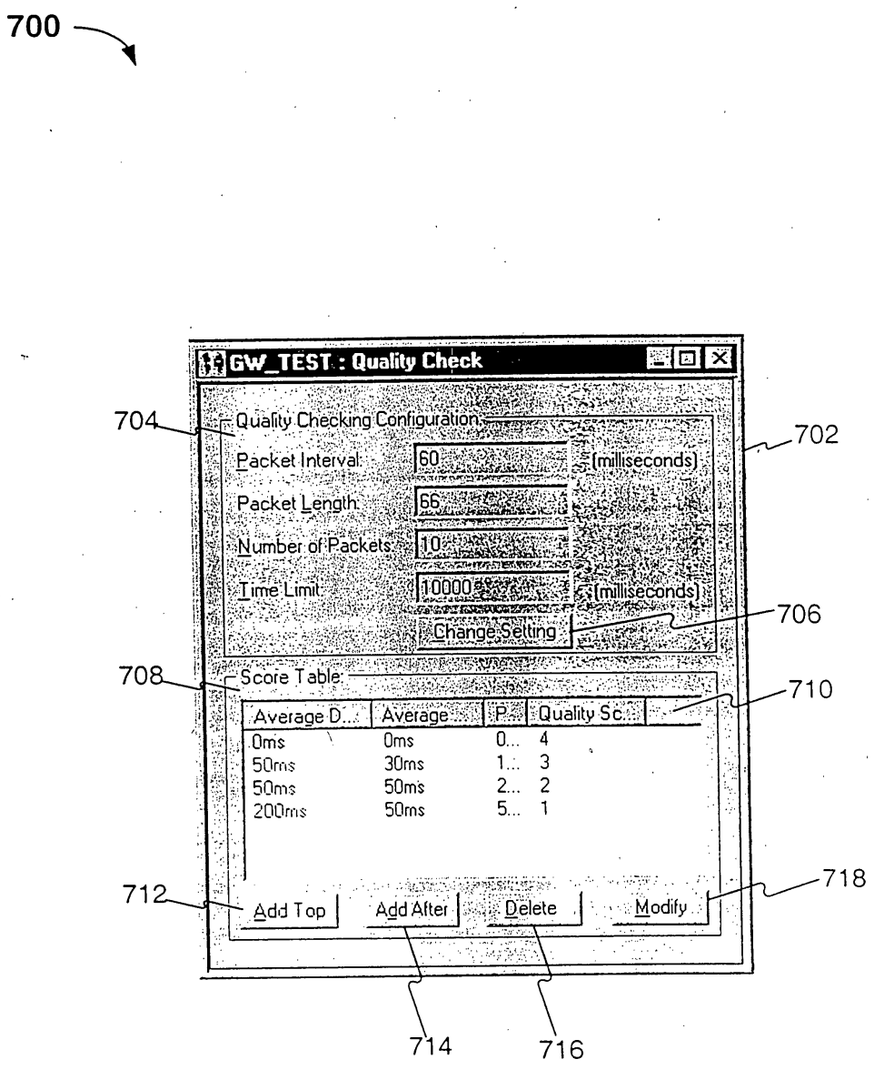


FIG. 7

0002-88.vsd/7

PRINT OF DRAWINGS
AS ORIGINALLY FILED

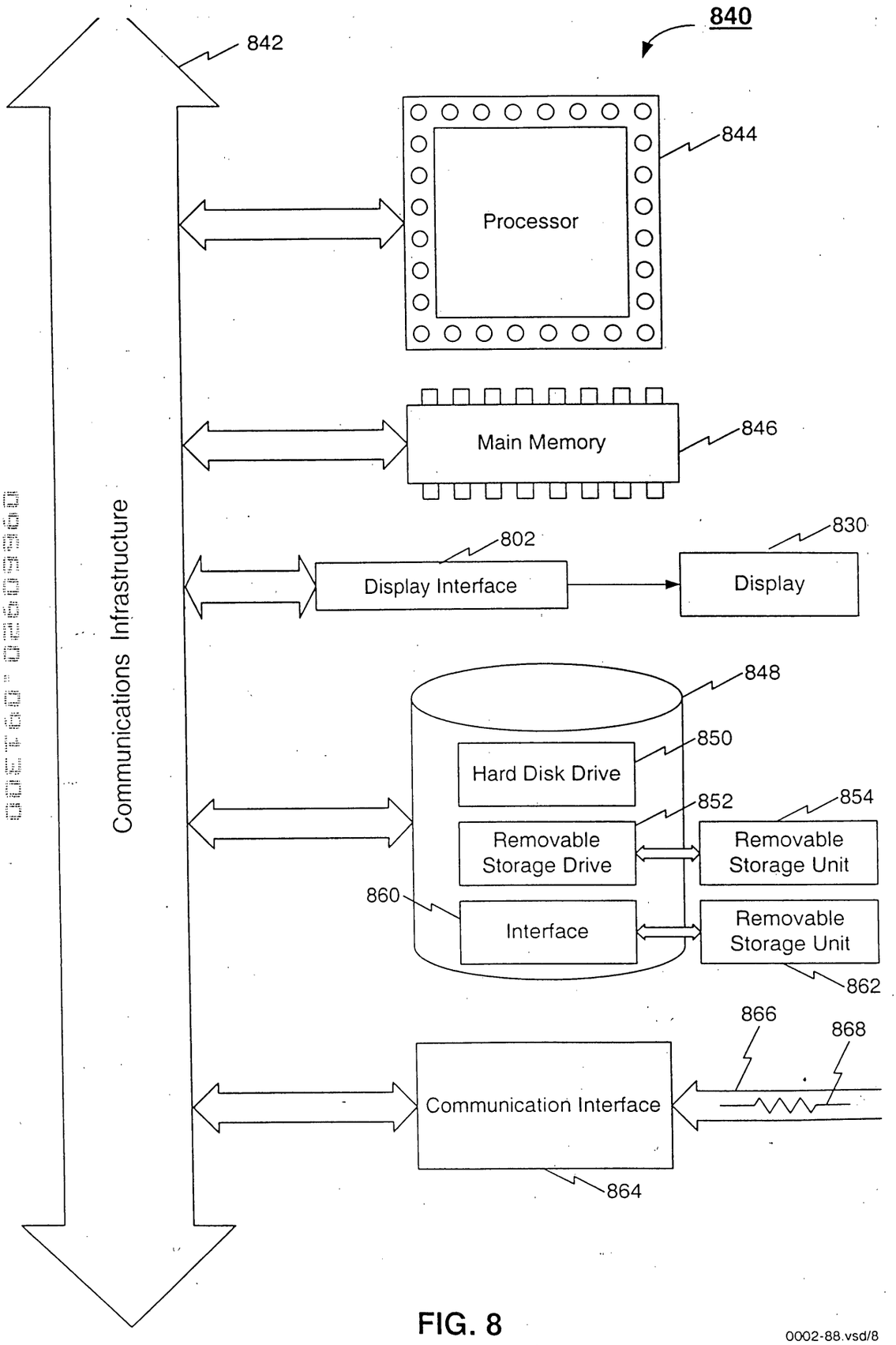


FIG. 8

0002-88.vsd/8

PRINT OF DRAWINGS
AS ORIGINALLY FILED

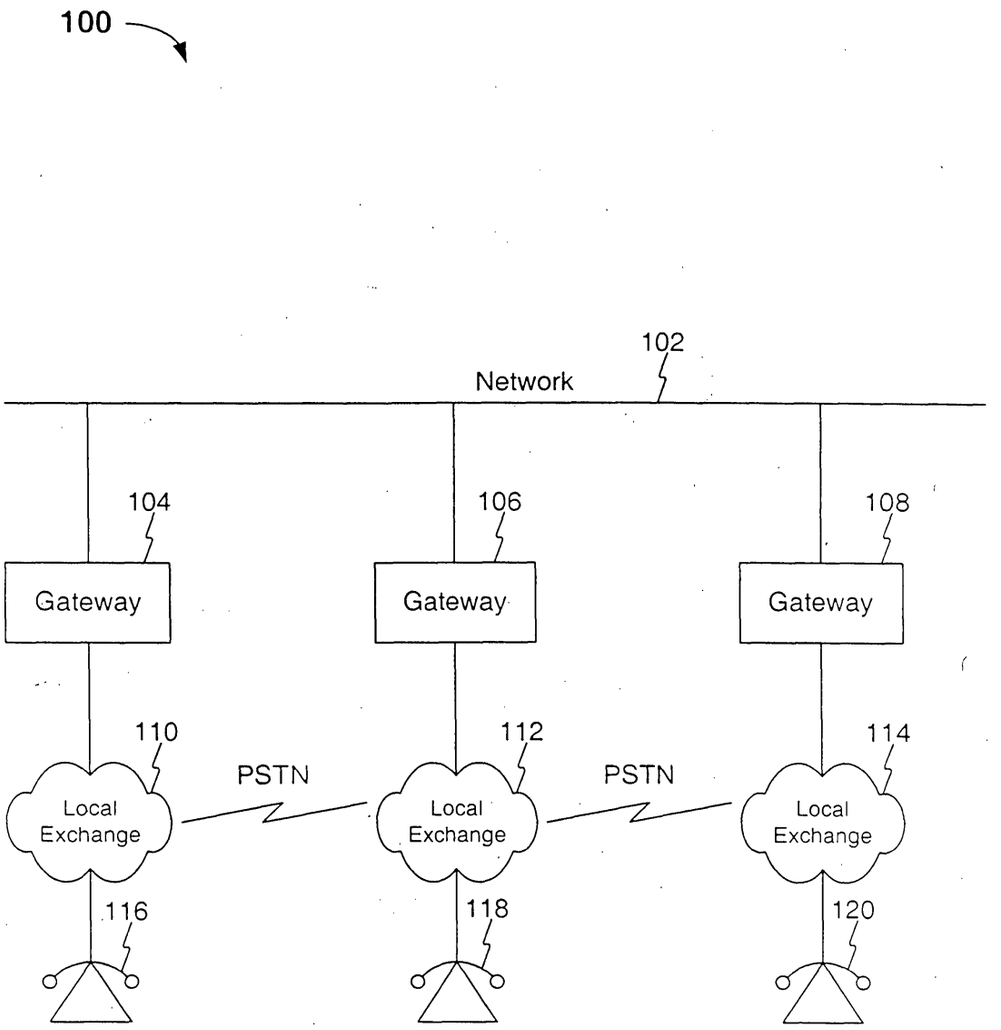


FIG. 1

0002-88.vsd/1

PRINT OF DRAWINGS
AS ORIGINALLY FILED

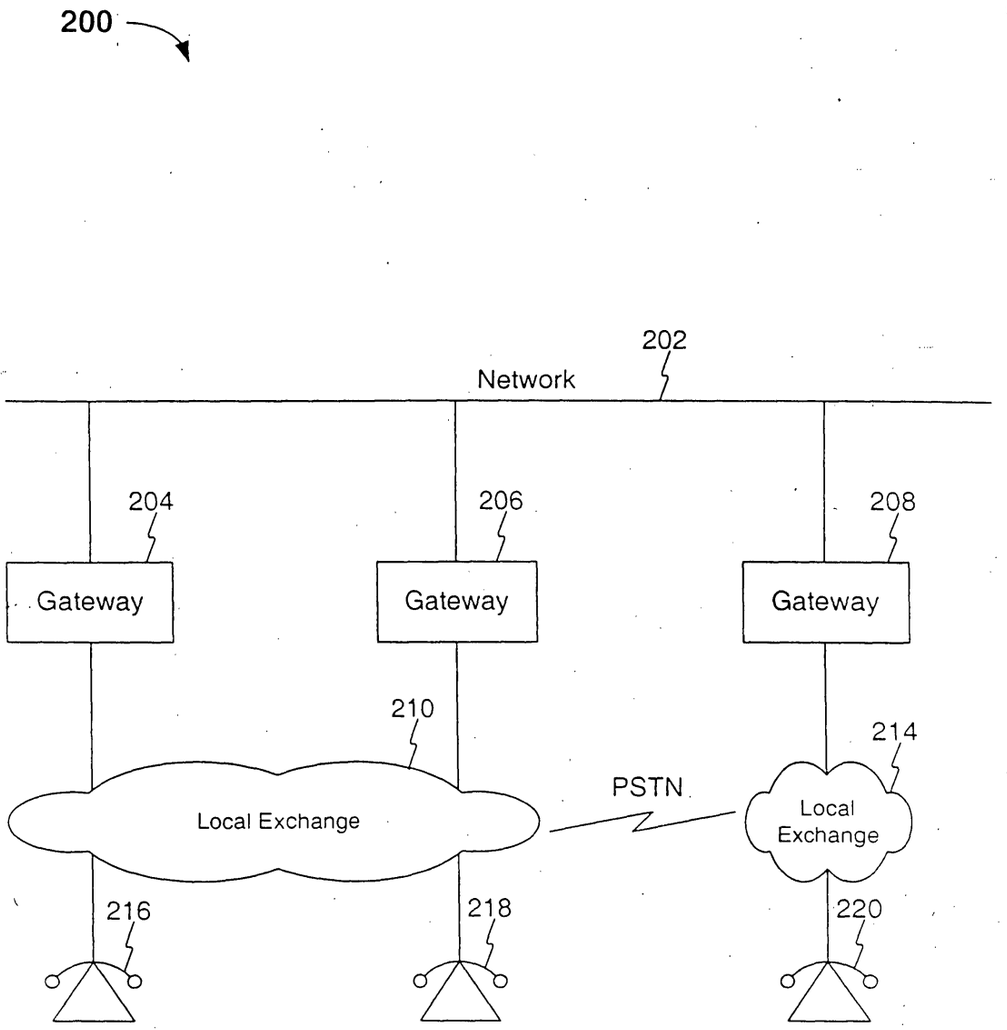


FIG. 2

0002-88.vsd/2

PRINT OF DRAWINGS
AS ORIGINALLY FILE

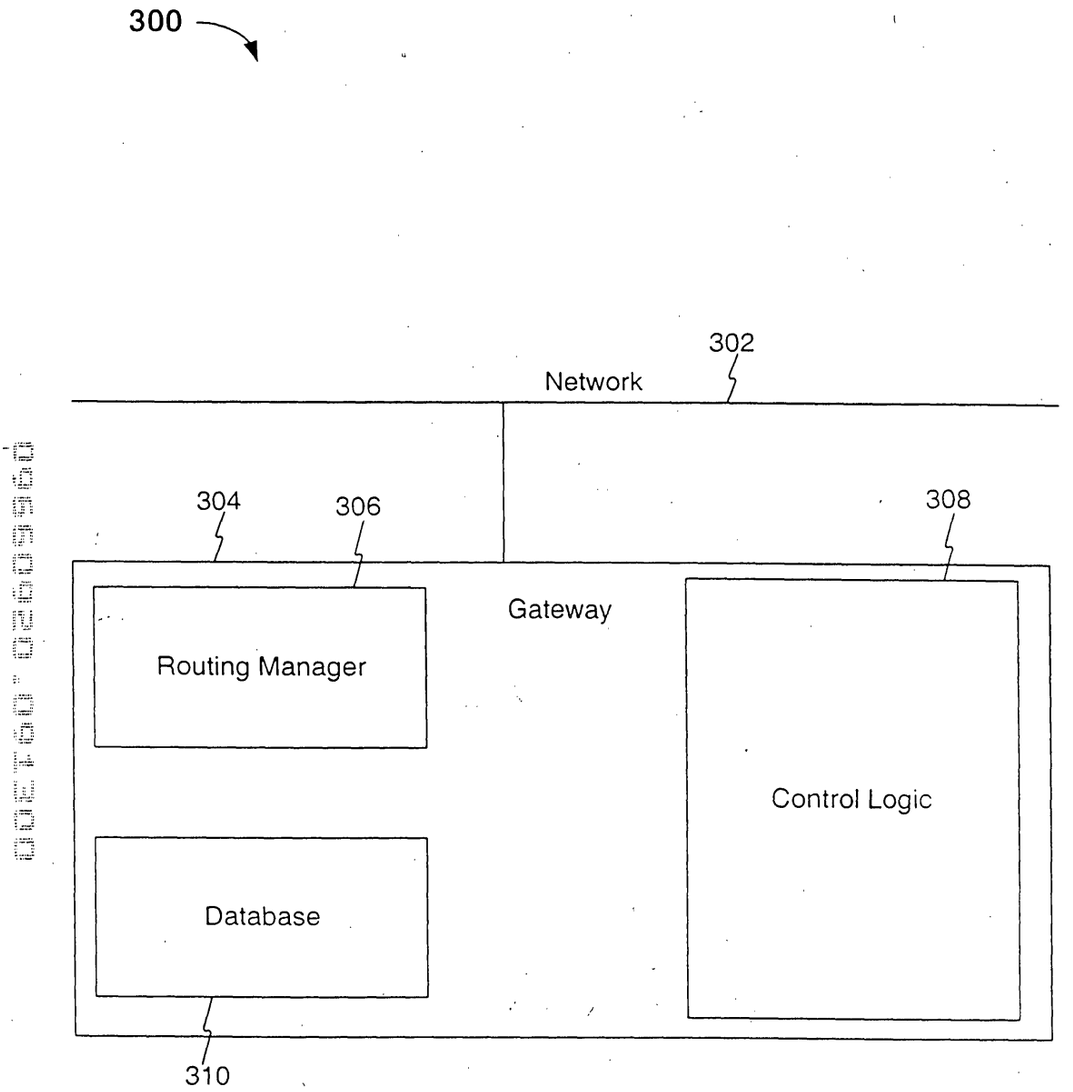


FIG. 3

0002-88.vsd/3

PRINT OF DRAWINGS
AS ORIGINALLY FILED

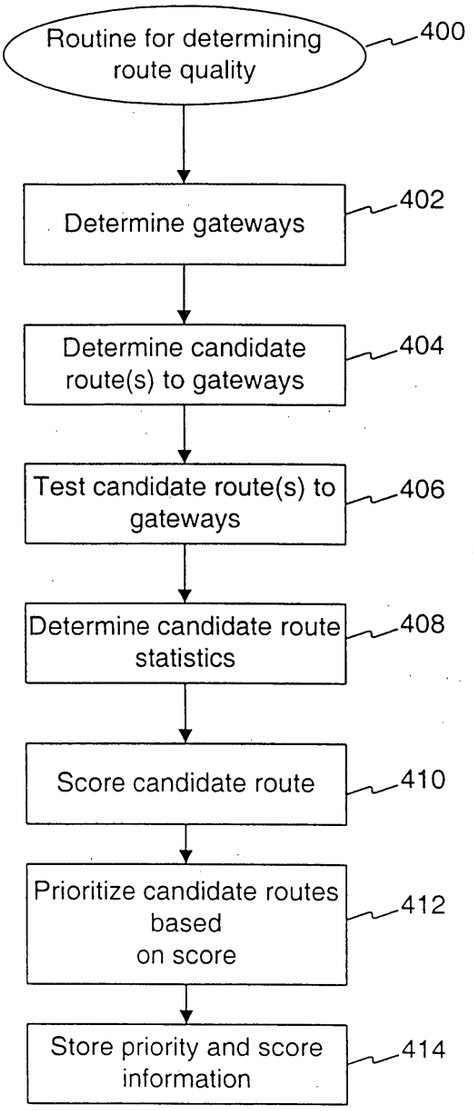


FIG. 4

0002-88.vsd/4

PRINT OF DRAWINGS
AS ORIGINALLY FILED

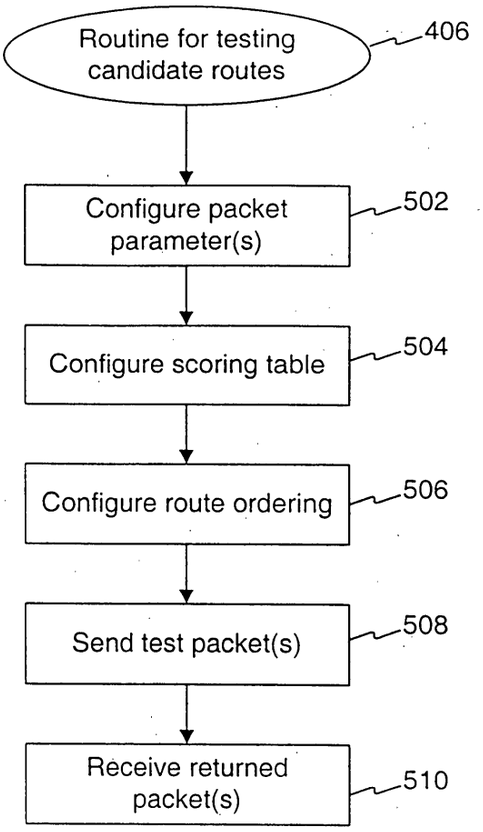


FIG. 5

0002-88.vsd/5

PRINT OF DRAWINGS
AS ORIGINALLY FILED

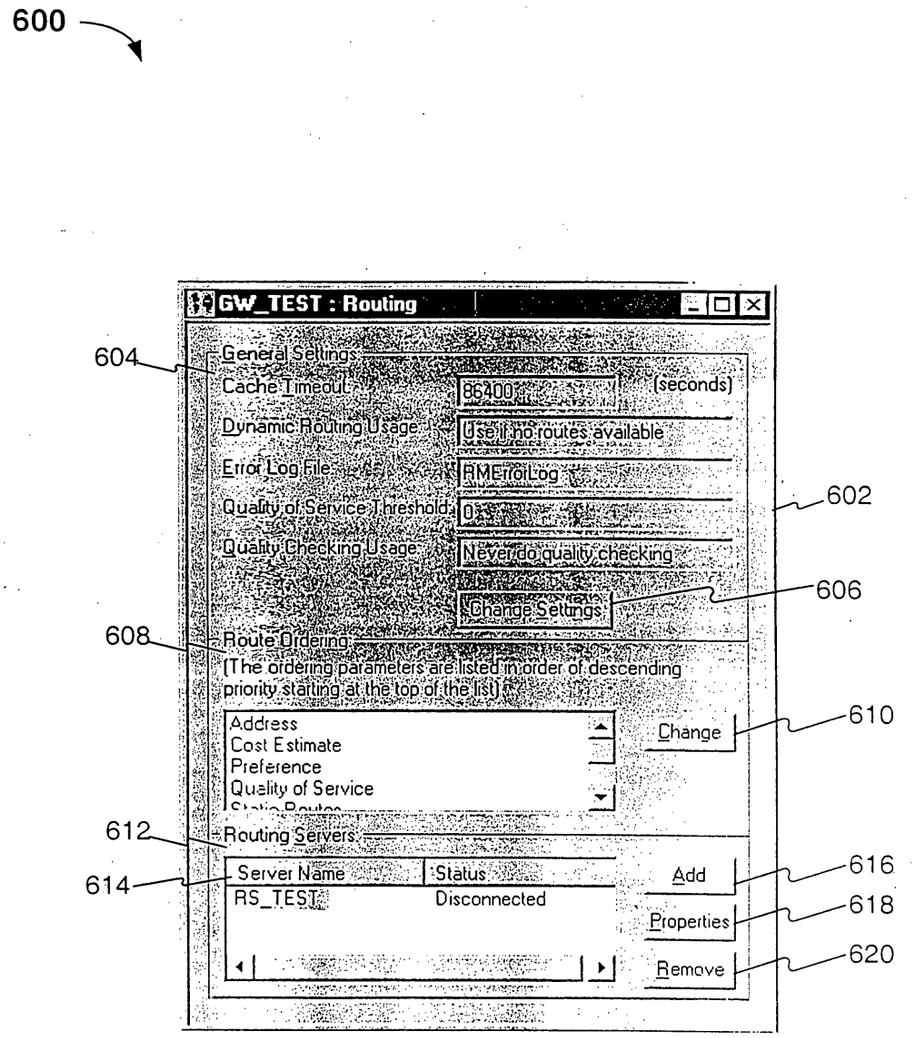


FIG. 6

0002-88.vsd/6

PRINT OF DRAWINGS
AS ORIGINALLY FILED

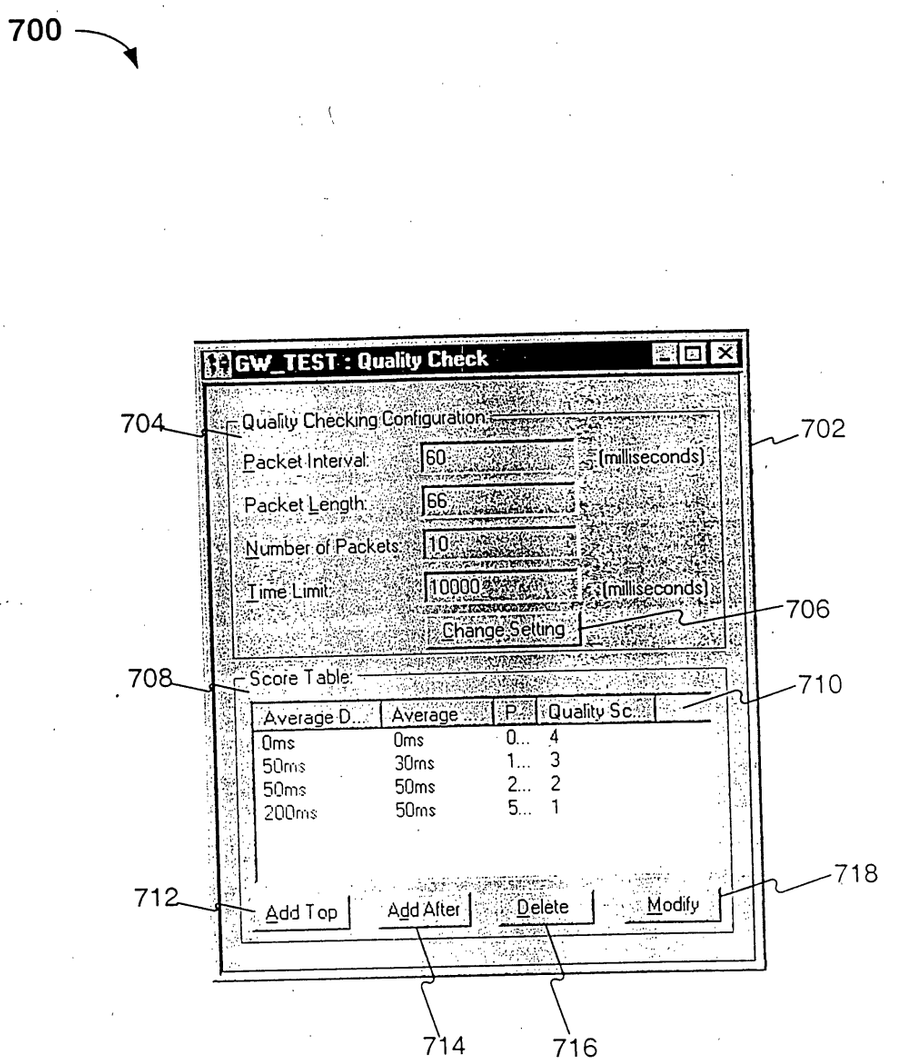


FIG. 7

0002-88.vsd/7

PRINT OF DRAWINGS
AS ORIGINALLY FILED

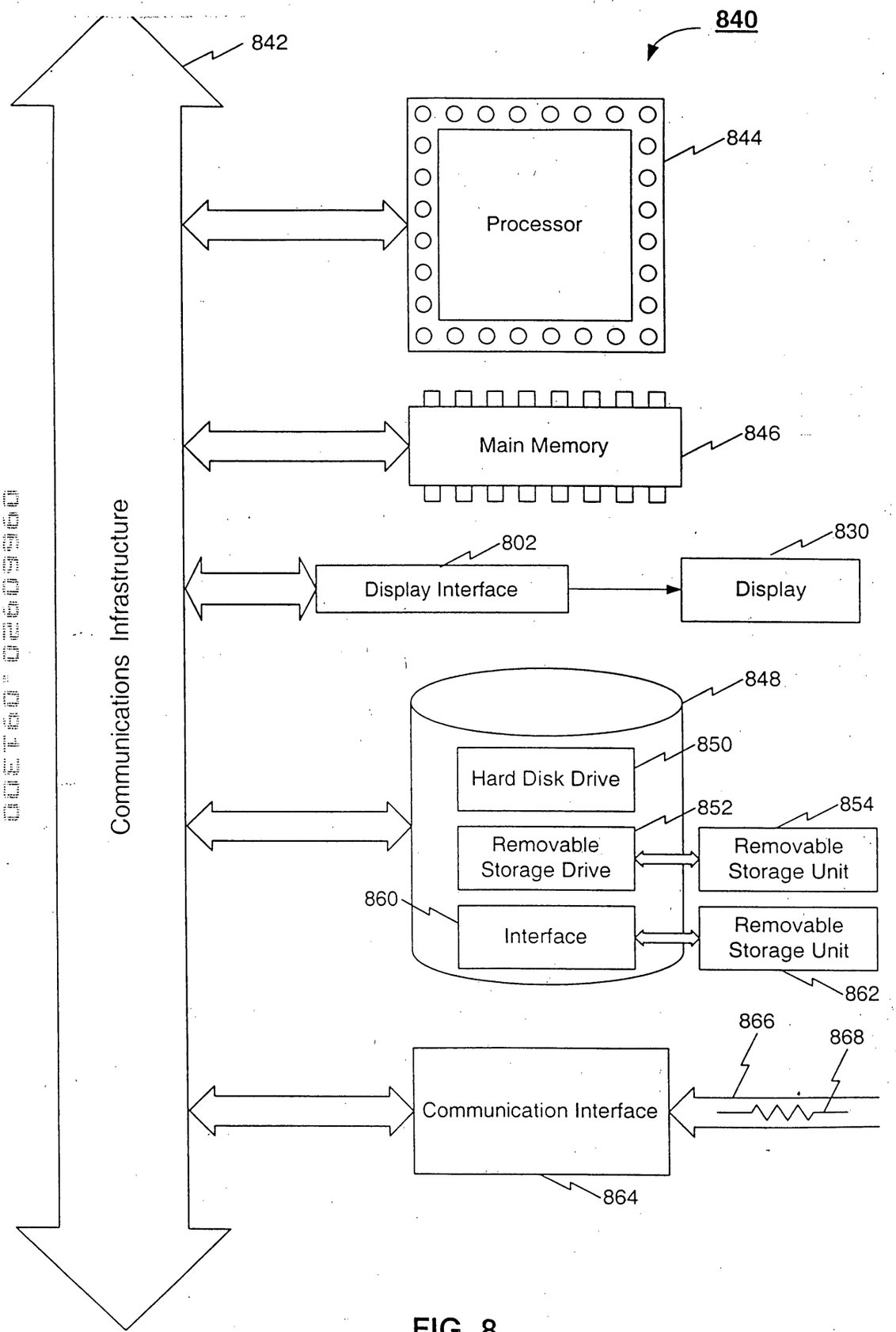


FIG. 8

0002-88.vsd/8

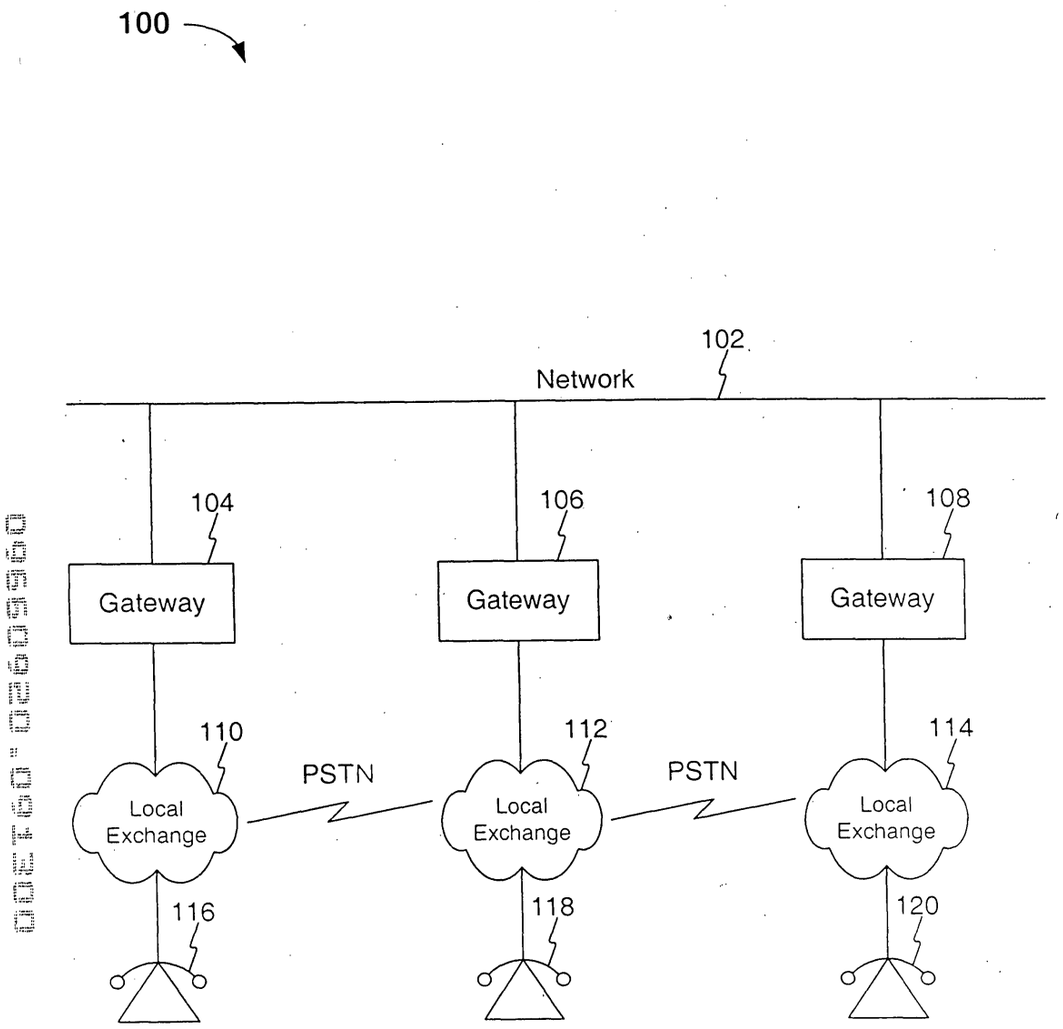


FIG. 1

0002-88.vsd/1

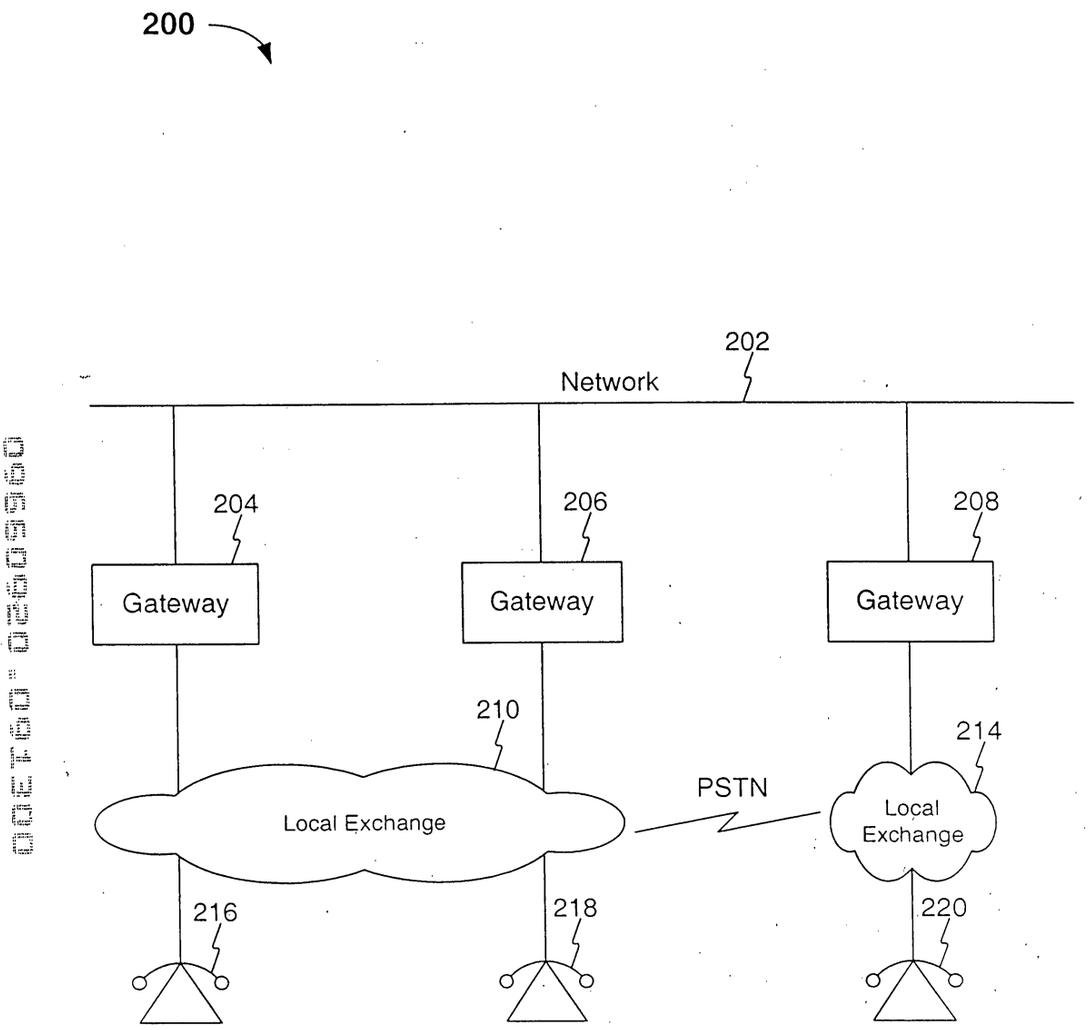


FIG. 2

0002-88.vsd/2

2

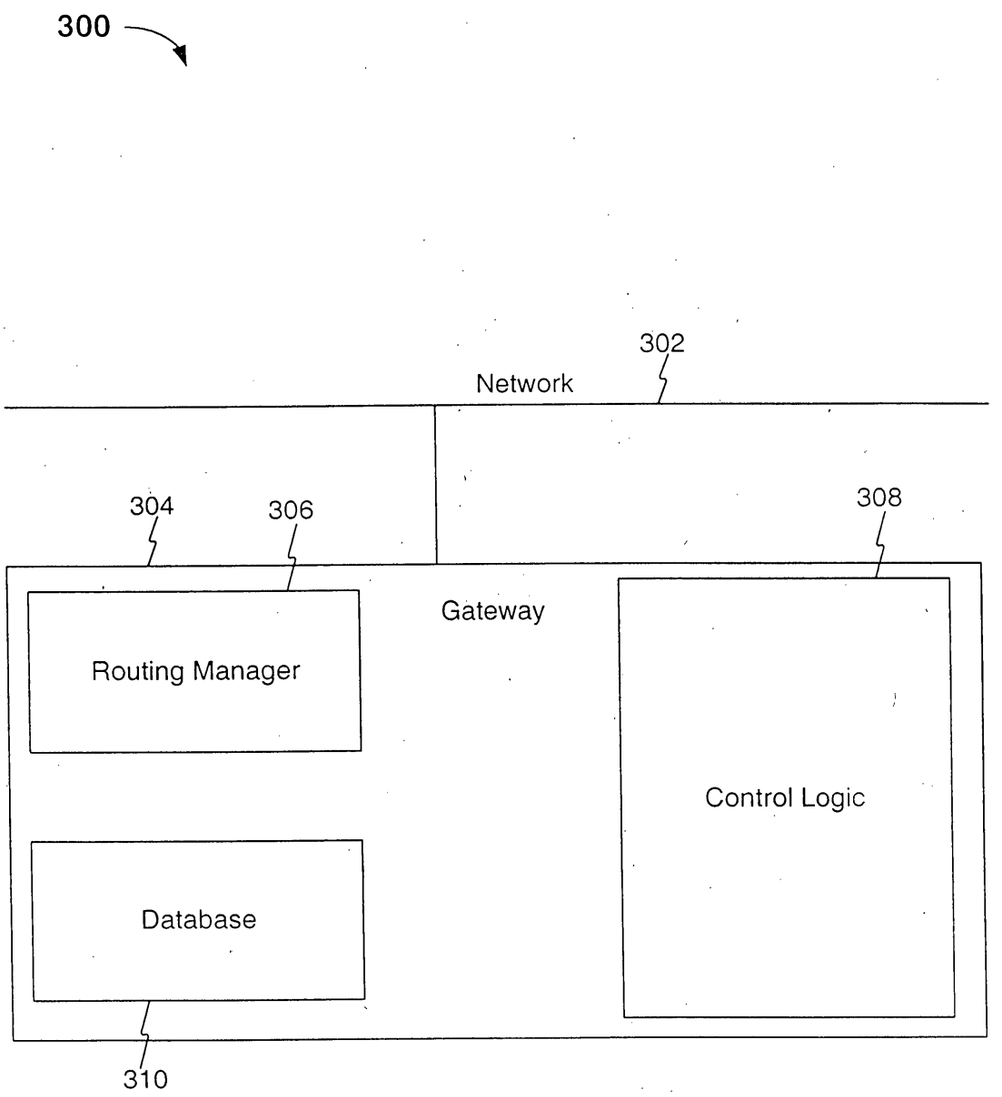


FIG. 3

0002-88.vsd/3

3

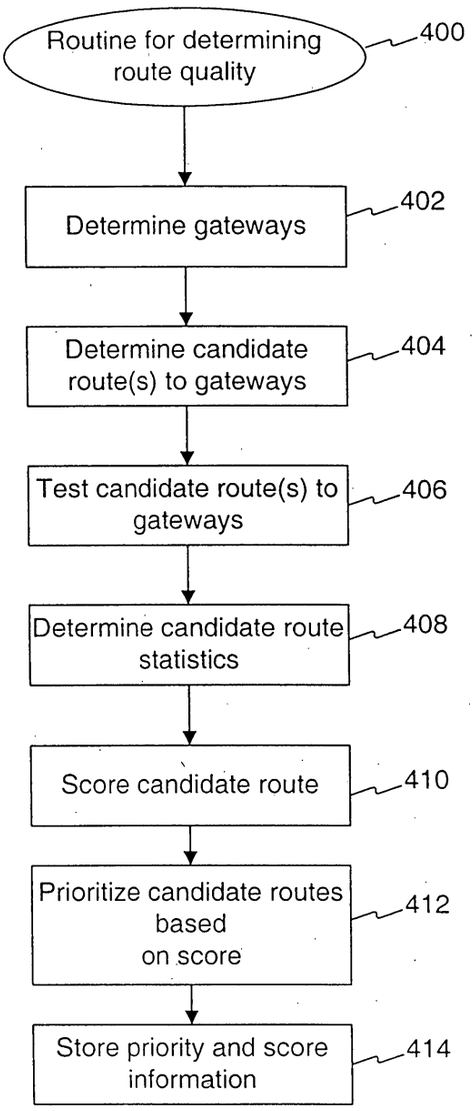


FIG. 4

0002-88.vsd/4

4

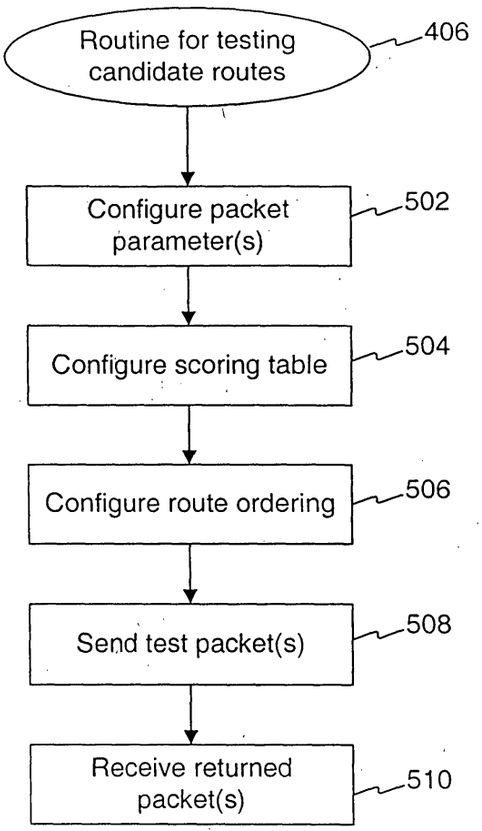


FIG. 5

0002-88.vsd/5

5

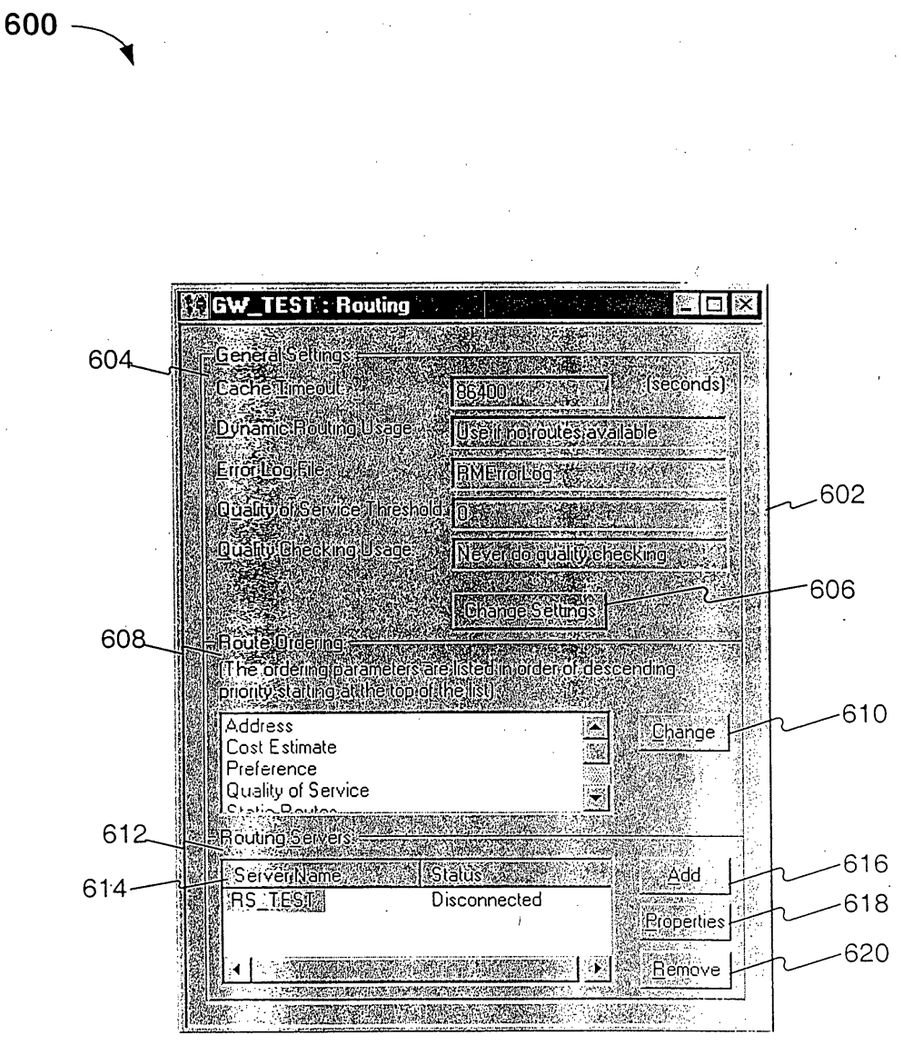


FIG. 6

0002-88.vsd/6

6

700

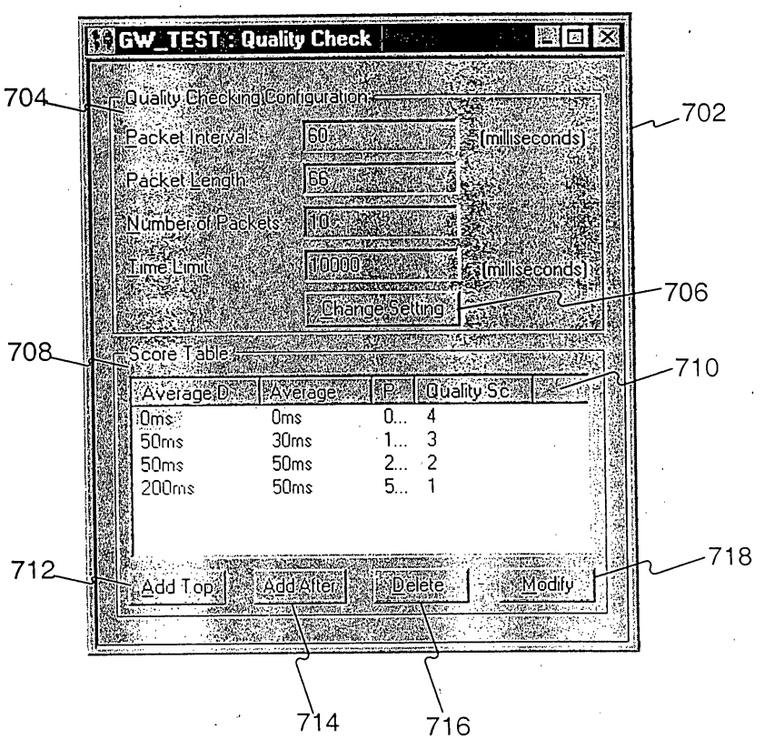


FIG. 7

0002-88.vsd/7

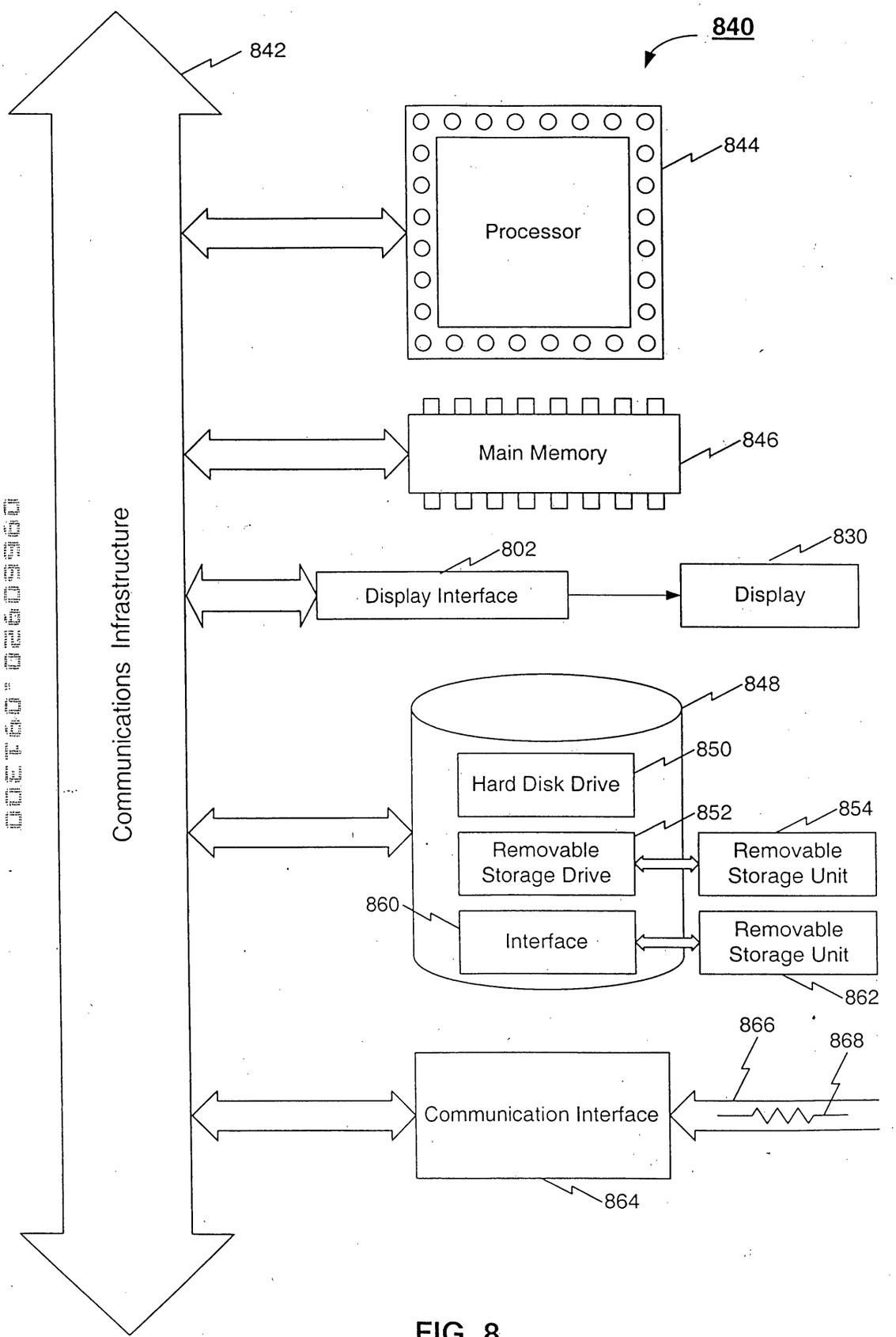


FIG. 8

0002-88.vsd/8

8

Declaration for Patent Application

Docket Number: **1848.01000000**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed and for which a patent is sought on the invention entitled **A Method, System, and Computer Program Product for Route Quality Checking and Management**, the specification of which is attached hereto unless the following box is checked:

☐ was filed on _____;
as United States Application Number or PCT International Application Number _____; and
was amended on _____ (if applicable).

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.

I acknowledge the duty to disclose information that is material to patentability as defined in 37 C.F.R. § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT international application, which designated at least one country other than the United States listed below, and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Claimed
_____ (Application No.)	_____ (Country)	_____ (Day/Month/Year Filed)	☐ Yes ☐ No
_____ (Application No.)	_____ (Country)	_____ (Day/Month/Year Filed)	☐ Yes ☐ No

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

_____ (Application No.)	_____ (Filing Date)
_____ (Application No.)	_____ (Filing Date)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or under § 365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information that is material to patentability as defined in 37 C.F.R. § 1.56 that became available between the filing date of the prior application and the national or PCT international filing date of this application.

_____ (Application No.)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)
_____ (Application No.)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)

Appl. No. **To be assigned**
Docket No. **1848.0100000**

Send Correspondence to:

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934

Direct Telephone Calls to:

(202) 371-2600

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, 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 or any patent issued thereon.

Full name of sole or first inventor **Mark D. SCOTT**	
Signature of sole or first inventor × Mark Scott	× Sept 7, 2000 Date
Residence **Ashburn, VA**	
Citizenship **Canadian**	
Post Office Address **43757 Raleigh Place, Ashburn, VA 20147**	
Full name of second inventor **Anita T. CHENG**	
Signature of second inventor × Anita C Cheng	× Sept. 7, 2000 Date
Residence **Ashburn, VA**	
Citizenship **Canadian**	
Post Office Address **43757 Raleigh Place, Ashburn, VA 20147**	

P:\USERS\VBLADES\Russ Swindell\1848\0100000.dec
SKGF Rev. 9/2/98 mac

(Supply similar information and signature for subsequent joint inventors, if any)

Application Assignment Record

According to the application transmittal letter, an assignment recording ownership was filed with this application; however, a copy of this record was not located in the original file history record obtained from the United States Patent and Trademark Office. Upon your request, we will attempt to obtain the assignment documents from the Assignment Recordation Branch of of the United States Patent and Trademark Office or from a related application case (if applicable). Please note that additional charges will apply for this service.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	
Scott *et al.*	Art Unit: To be assigned
Appl. No. To be assigned	Examiner: To be assigned
Filed: September 13, 2000	Atty. Docket: 1848.0100000
For: **A Method, System, and Computer Program Product for Route Quality Checking and Management**	

Authorization To Treat A Reply As Incorporating An Extension Of Time Under 37 C.F.R. § 1.136(a)(3)

Commissioner for Patents
Washington, D.C. 20231

Sir:

The U.S. Patent and Trademark Office is hereby authorized to treat any concurrent or future reply that requires a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. The U.S. Patent and Trademark Office is hereby authorized to charge all required extension of time fees to our Deposit Account No. 19-0036, if such fees are not otherwise provided for in such reply. A duplicate copy of this authorization is enclosed.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael V. Messinger
Attorney for Applicants
Registration No. 37,575

Date: 9/13/00

1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

0100000.aut

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Scott *et al.*

Appl. No. To be assigned

Filed: September 13, 2000

For: **A Method, System, and Computer Program Product for Route Quality Checking and Management**

Art Unit: To be assigned

Examiner: To be assigned

Atty. Docket: 1848.0100000

DUPLICATE

Authorization To Treat A Reply As Incorporating An Extension Of Time Under 37 C.F.R. § 1.136(a)(3)

Commissioner for Patents
Washington, D.C. 20231

Sir:

The U.S. Patent and Trademark Office is hereby authorized to treat any concurrent or future reply that requires a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. The U.S. Patent and Trademark Office is hereby authorized to charge all required extension of time fees to our Deposit Account No. 19-0036, if such fees are not otherwise provided for in such reply. A duplicate copy of this authorization is enclosed.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael V. Messinger
Attorney for Applicants
Registration No. 37,575

Date: 9/13/00

1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

0100000.aut

File History Content Report

The following content is missing from the original file history record obtained from the United States Patent and Trademark Office. No additional information is available.

Document Date - 2000-10-25

Document Title - USPTO Communication Re: Change of Address

Sterne Kessler Goldstein Fox
ATTORNEYS AT LAW

Robert Greene Sterne
Edward J. Kessler
Jorge A. Goldstein
David K.S. Cornwell
Robert W. Esmond
Tracy-Gene G. Durkin
Michele A. Cimbala
Michael B. Ray
Robert E. Sokohl
Eric K. Steffe
Michael Q. Lee
Steven R. Ludwig
John M. Covert
Linda E. Alcorn
Robert C. Millonig
Lawrence B. Bugaisky
Donald J. Featherstone
Michael V. Messinger

Judith U. Kim
Timothy J. Shea, Jr.
Patrick E. Garrett
Jeffery T. Helvey▲
Heidi L. Kraus
Crystal D. Sayles
Edward W. Yee
Albert L. Ferro*
Donald R. Banowit
Peter A. Jackman
Molly A. McCall
Teresa U. Medler
Jeffrey S. Weaver
Kendrick P. Patterson
Vincent L. Capuano
Albert J. Fasulo II*
Eldora Ellison Floyd
W. Russell Swindell

Thomas C. Fiala
Brian J. Del Buono*
Virgil Lee Beaston*
Reginald D. Lucas*
Kimberly N. Reddick
Theodore A. Wood
Elizabeth J. Haanes
Bruce E. Chalker
Joseph S. Ostroff
Frank R. Cottingham*
Christine M. Lhulier
Rae Lynn Prengaman*
Jane Shershenovich*
Lawrence J. Carroll*

Senior Counsel
Samuel L. Fox
Kenneth C. Bass III

Registered Patent Agents
Karen R. Markowicz
Andrea J. Kamage
Nancy J. Leith
Joseph M. Conrad III
Ann E. Summerfield
Helene C. Carlson
Gaby L. Longsworth
Matthew J. Dowd
Aaron L. Schwartz
Angelique G. Uy
Boris A. Matvenko
Mary B. Tung

*Admitted only in Maryland
* Admitted only in Virginia
▲Admitted only in Texas

March 21, 2002

WRITER'S DIRECT NUMBER:
(202) 371-2667
INTERNET ADDRESS:
MIKEM@SKGF.COM

Commissioner for Patents
Washington, D.C. 20231

Re: U.S. Utility Patent Application
Appl. No. 09/660,920; Filed: September 13, 2000
For: **A Method, System, and Computer Program Product for Route Quality Checking and Management**
Inventors: Scott *et al.*
Our Ref: 1848.0100000

Sir:

Transmitted herewith for appropriate action are the following documents:

1. Information Disclosure Statement;

2. Copy of the International Preliminary Examination Report in related PCT Application No. PCT/US00/00009;

3. Copy of the International Preliminary Examination Report in related PCT Application No. PCT/US00/02330;

4. Three (3) sheets of Form PTO-1449 listing twenty-nine (29) reference documents;

5. One (1) copy each of referenced documents AA1-AK1, AL1-AO1, AR1-AT1, AA2-AE2, AR2-AT2, and AR3-AT3; and

6. One (1) return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our courier. In the event that extensions of time are necessary to prevent abandonment of this patent application, then such extensions of time are hereby petitioned.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael V. Messinger
Attorney for Applicant
Registration No. 37,575

MVM/RDL:mlb
Enclosures

P:\USERS\mbennett\rLucas\1848\0100000 skgf lds

#RS
2

3-26-02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Scott *et al.*
Appl. No. 09/660,920
Filed: September 13, 2000
For: **A Method, System, and Computer Program Product for Route Quality Checking and Management**

Art Unit: 2662
Examiner: Ho, Duc
Atty. Docket: 1848.0100000

Information Disclosure Statement

Commissioner for Patents
Washington, D.C. 20231

Sir:

Listed on accompanying Form PTO-1449 are documents that may be considered material to the examination of this application, in compliance with the duty of disclosure requirements of 37 C.F.R. §§ 1.56, 1.97 and 1.98.

Where the publication date of a listed document does not provide a month of publication, the year of publication of the listed document is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the month of publication is not in issue. Applicants have listed publication dates on the attached PTO-1449 based on information presently available to the undersigned. However, the listed publication dates should not be construed as an admission that the information was actually published on the date indicated.

Applicants reserve the right to establish the patentability of the claimed invention over any of the information provided herewith, and/or to prove that this information may

not be prior art, and/or to prove that this information may not be enabling for the teachings purportedly offered.

Applicants provide the following comments regarding the documents:

Documents AA1, AL1 and AN1 were cited in an International Preliminary Examination Report in related PCT Application No. PCT/US00/00009, filed January 10, 2000, entitled "System for Managing Router Servers and Services," directed to related subject matter. A copy of the IPER is enclosed for the convenience of the Examiner.

Documents AD1 and AR1 were cited in an International Preliminary Examination Report in related PCT Application No. PCT/US00/02330, filed February 1, 2000, entitled "Method, System and Computer Program Product For Managing Jitter," directed to related subject matter. A copy of the IPER is enclosed for the convenience of the Examiner.

This statement should not be construed as a representation that a search has been made, or that information more material to the examination of the present patent application does not exist. The Examiner is specifically requested not to rely solely on the material submitted herewith.

Applicants have checked the appropriate boxes below.

■ 1. This Information Disclosure Statement is being filed before the mailing date of a first Office Action on the merits. No statement or fee is required.

□ 2. This Information Disclosure Statement is being filed more than three months after the U.S. filing date AND after the mailing date of the first Office Action on the merits, but before the mailing date of a Final Rejection, or Notice of Allowance, or an action that otherwise closes prosecution in the application.

□ a. I hereby state that each item of information contained in this 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 this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(1).

□ b. I hereby state that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(2).

□ c. Attached is our Check No. _____ in the amount of $ _____ in payment of the fee under 37 C.F.R. § 1.17(p).

□ 3. This Information Disclosure Statement is being filed more than three months after the U.S. filing date and after the mailing date of a Final Rejection or Notice of Allowance, but before payment of the Issue Fee. Enclosed find our Check No. _____ in the amount of $ _____ in payment of the fee under 37 C.F.R. § 1.17(p); in addition:

□ a. I hereby state that each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(1).

□ b. I hereby state that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to

the filing of this Information Disclosure Statement. 37 C.F.R. § 1.97(e)(2).

□ 4. The document(s) was/were cited in a search report by a foreign patent office in a counterpart foreign application. Submission of an English language version of the search report that indicates the degree of relevance found by the foreign office is provided in satisfaction of the requirement for a concise explanation of relevance. 1138 OG 37, 38.

□ 5. A concise explanation of the relevance of the non-English language document(s) appears below:

□ 6. Copies of the documents were cited by or submitted to the Office in an IDS that complies with 37 C.F.R. § 1.98(a)-(c) in Application No. __________, filed _________, which is relied upon for an earlier filing date under 35 U.S.C. § 120. Thus, copies of these documents are not attached. 37 C.F.R. § 1.98(d).

It is respectfully requested that the Examiner initial and return a copy of the enclosed PTO-1449, and indicate in the official file wrapper of this patent application that the documents have been considered.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael V. Messinger
Attorney for Applicants
Registration No. 37,575

Date: March 21, 2002

1100 New York Avenue, N.W., Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

FORM PTO-1449 INFORMATION DISCLOSURE STATEMENT	ATTY. DOCKET NO. 1848.0100000	APPLICATION NO. 09/660,920
	APPLICANT Scott *et al.*	
	FILING DATE September 13, 2000	GROUP 2662

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE
MP	AA1	5,621,727	04/1997	Vaudreuil	370	60	
	AB1	5,742,596	04/1998	Baratz *et al.*	370	356	
	AC1	5,757,871	05/1998	Furukawa *et al.*	375	372	
	AD1	5,790,538	08/1998	Sugar	370	352	
	AE1	5,790,543	08/1998	Cloutier	370	395	
	AF1	5,805,602	09/1998	Cloutier *et al.*	370	516	
	AG1	5,812,840	09/1998	Shwartz	395	604	
	AH1	5,870,464	02/1999	Brewster *et al.*	379	219	
	AI1	5,892,822	04/1999	Gottlieb *et al.*	379	220	
	AJ1	5,897,613	04/1999	Chan	704	210	
MP	AK1	5,900,000	05/1999	Korenshtein	707	200	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
MP	AL1	WO 97/14238 A1	04/1997	PCT	H04L	12/46	N/A
	AM1	WO 97/23078 A1	06/1997	PCT	H04L	12/56	N/A
	AN1	WO 97/27692 A1	07/1997	PCT	H04L	12/56	N/A
	AO1	WO 97/28628 A1	08/1997	PCT	H04L	12/56	N/A
MP	AP1						Yes No

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

MP	AR	1	Anquetil, L-P. *et al.*, "Media Gateway Control Protocol And Voice Over IP Gateways," *Alcatel Telecommunications Review*, pp. 151-157 (April-June 1999).
	AS	1	*Array Series 3000 Users Manual*, Array Telecom Corp, Entire Manual (August 27, 1999).
MP	AT	1	*ctvoice IP Telephony*, Product Brochure, Comdial, 6 Pages (Copy obtained August 1999).

EXAMINER	Mary G. Steelman	DATE CONSIDERED	12/10/07

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

P:\USERS\JASONG\1848\010-0_1449.wpd

SKGF Rev. 1/95

FORM PTO-1449 INFORMATION DISCLOSURE STATEMENT	ATTY. DOCKET NO. 1848.0100000	APPLICATION NO. 09/660,920
	APPLICANT Scott *et al.*	
	FILING DATE September 13, 2000	GROUP 2662

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE
	AA2	5,940,479	08/1999	Guy *et al.*	379	93.01	
	AB2	5,940,827	08/1999	Hapner *et al.*	707	8	
	AC2	5,940,829	08/1999	Tsuiki *et al.*	707	10	
	AD2	5,940,832	08/1999	Hamada *et al.*	707	100	
	AE2	5,953,405	09/1999	Miloslavsky	379	265	
	AF2						
	AG2						
	AH2						
	AI2						
	AJ2						
	AK2						

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AL2						Yes No
	AM2						Yes No
	AN2						Yes No
	AO2						Yes No
	AP2						Yes No

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

	AR	2	*ctvoice System User's Manual*, Comdial, Entire Manual (June 1998).
	AS	2	Held, G., *Voice Over Data Networks*, McGraw-Hill, Entire Book (1998).
	AT	2	McConnell, B., *How to Build an Internet PBX AHMED BORG, at* http://www.google.com..., 13 pages, (April 1997).

EXAMINER	DATE CONSIDERED 12/10/07

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

P:\USERS\JASONG\1848\010-0_1449.wpd

SKGF Rev. 1/95

FORM PTO-1449 INFORMATION DISCLOSURE STATEMENT	ATTY. DOCKET NO. 1848.0100000	APPLICATION NO. 09/660,920
	APPLICANT Scott *et al.*	
	FILING DATE September 13, 2000	GROUP ~~2662~~ 2665

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB-CLASS	FILING DATE
	AA3						
	AB3						
	AC3						
	AD3						
	AE3						
	AF3						
	AG3						
	AH3						
	AI3						
	AJ3						
	AK3						

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUB-CLASS	TRANSLATION
	AL3						Yes No
	AM3						Yes No
	AN3						Yes No
	AO3						Yes No
	AP3						Yes No

OTHER (Including Author, Title, Date, Pertinent Pages, etc.)

MP	AR	3	Prosise, J., "Programming Windows 95 with MFC, Part VII: The Document/View Architecture," *Microsoft Systems Journal*, Miller Freeman, 35 pages (February 1996).
	AS	3	Sheldon, T., *Encyclopedia of Networking, Electronic Edition*, McGraw-Hill, pp. 1043-1050 (1998).
MP	AT	3	Yang, C., *INETPhone: Telephone Services and Servers on Internet*, at http://www.ds.internic.net/rfc/rfc1789.txt, 6 pages, (April 1995).

EXAMINER	Marc A. Pais	DATE CONSIDERED	12/10/03

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant.

P:\USERS\JASONG\1848\010-0_1449.wpd

SKGF Rev. 1/95

Other Prior Art

According to the information contained in form PTO-1449 or PTO-892, there are one or more other prior art/non-patent literature documents missing from the original file history record obtained from the United States Patent and Trademark Office. Upon your request we will attempt to obtain these documents from alternative resources. Please note that additional charges will apply for this service.

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

#3

CHANGE OF ADDRESS/POWER OF ATTORNEY

FILE LOCATION 26C1 SERIAL NUMBER 09660920 PATENT NUMBER

THE CORRESPONDENCE ADDRESS HAS BEEN CHANGED TO CUSTOMER # 26111

THE PRACTITIONERS OF RECORD HAVE BEEN CHANGED TO CUSTOMER # 26111

THE FEE ADDRESS HAS BEEN CHANGED TO CUSTOMER # 26111

ON 07/18/02 THE ADDRESS OF RECORD FOR CUSTOMER NUMBER 26111 IS:

STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W., SUITE 600
WASHINGTON DC 20005-3934

AND THE PRACTITIONERS OF RECORD FOR CUSTOMER NUMBER 26111 ARE:

25688	28912	29021	30353	31944	32831	32893	33851	33876	33997
34395	35086	35239	36013	36203	36351	36688	37575	38759	39588
39967	39987	40679	40940	41306	41481	42289	42385	42473	42613
43447	43607	43610	43703	43730	44318	44679	44757	44933	45309
45321	45608	45986	46126	46883	47133	47294	47355	47415	47473
47480	47534	47756	50007						

RECEIVED
AUG 0 2 2002
Technology Center 2600

PTO INSTRUCTIONS: PLEASE TAKE THE FOLLOWING ACTION WHEN THE CORRESPONDENCE ADDRESS HAS BEEN CHANGED TO CUSTOMER NUMBER: RECORD, ON THE NEXT AVAILABLE CONTENTS LINE OF THE FILE JACKET, 'ADDRESS CHANGE TO CUSTOMER NUMBER'. LINE THROUGH THE OLD ADDRESS ON THE FILE JACKET LABEL AND ENTER ONLY THE 'CUSTOMER NUMBER' AS THE NEW ADDRESS. FILE THIS LETTER IN THE FILE JACKET. WHEN ABOVE CHANGES ARE ONLY TO FEE ADDRESS AND/OR PRACTITIONERS OF RECORD, FILE LETTER IN THE FILE JACKET.
THIS FILE IS ASSIGNED TO GAU 2665.

PTO-FMD
TALBOT-1/97

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.
09/660,920	09/13/2000	Mark D. Scott	1848.0100000	7463

26111 7590 12/19/2003

STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER	
PHAN, MAN U	

ART UNIT	PAPER NUMBER
2665	4

DATE MAILED: 12/19/2003

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

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 09/660,920	Applicant(s) Scott et al.
	Examiner Man Phan	Art Unit 2665

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Sep 13, 2000*

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideratio

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-5, 7-11, and 13-17* is/are rejected.

7) ☒ Claim(s) *6, 12, and 18* is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examine

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

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

a) ☐ All b) ☐ Some* c) ☐ None of:

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)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. The application of Scott et al. for a "Method, system, and computer program product for route quality checking and management" filed 09/13/2000 has been examined. Claim 1-18 are pending in the application.

Claim Objections

2. Claims 1, 7 and 13 are objected to because of the following informalities:

The claims contain the phrase "capable of". It has been held that the recitation that an element is "capable of" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchison, 69 USPQ 138.* Appropriate correction is required.

Claim Rejections - 35 USC § 103

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

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-5, 7-11 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al. (US#6,426,955) in view of Vargo et al. (US#6,356,545).

In So far as understood, with respect to claims 7-11, both Dalton, Jr. et al. (US#6,426,955) and Vargo et al. (US#6,356,545) disclose a novel method and system of selecting a route for transmitting over packet-switched network according to the essential features of the claims. Dalton, Jr. provides a routing engine to assist in the routing of voice over IP communications from a source gateway to a destination gateway. The novel routing engine provides a source gateway with a prioritized list of destination gateways that are eligible to terminate a voice telephone call. The routing engine locates eligible destination gateways by gathering and matching information relating to "preferences" from various gateway operators *(Determining a gateway available for routing)* (Col. 2; lines 2 plus). Fig. 1 illustrated an network architecture that serves as an

exemplary operating environment for the routing engine (*routing manager*), in which the service point 112 communicates with gateways over the Internet 102 and generally provides *routing information* to the source gateway 108. Given a destination phone number and other requirements, the service point 112, through the routing engine 110, identifies at least one appropriate destination gateway 114 to handle the telephone call (*determining a candidate route*) (Col. 4, lines 36 plus). Furthermore Dalton, Jr. teaches in Fig. 2 an overview of an IP telephone call, in which at step 201, an Internet telephony call is initiated when the calling party 104 dials a telephone number, which is transmitted to the source gateway 108 for processing. The goal of the source gateway 108 is to locate a destination gateway 114a-c that is able to terminate the phone call. The source gateway 108 relies on the service point 112 for routing assistance. At step 202, the source gateway 108 makes an authorization request to a service point 112. The authorization request indicates, among other things, the telephone number of the called party 118. At the service point 112, the routing engine 110 uses information in the authorization request, as well as preferences established for the source gateway's 108 cost and quality requirements, to determine which of the destination gateways 114a-c are eligible to complete the call (Col. 5, lines 3 plus and Col. 23, lines 53 plus).

In the same field of endeavor, Vargo et al. (US#6,356,545) provides for a VoIP system architecture operating over a PSTN utilizing the process of choosing from a plurality of codecs in an Internet telephony system based on the quality measurement packet. The architecture enables a dynamic change of codec from packet to packet in the same voice data stream in order to adapt to changing network conditions. The change of

codec operates concurrently with a change in other factors including the level of redundancy of the error correction, the packet size and packet bundling. The architecture thereby seeks to attain the best speech quality and lowest latency given the level of data loss over the Internet detected by the system. Vargo discloses a software system for choosing from a plurality of codecs in an Internet telephone system, comprising: a gateway server for receiving a plurality of self-describing data packets in a voice data stream on a receiving end; and a voice port in the gateway server for acquiring a *voice quality measurement* from the self-describing data packets received by the gateway server, and dynamically changing codec algorithms in response to the *voice quality measurement on a packet-to-packet basis* for each packet in the plurality of self-describing data packets for optimizing the voice quality of the information contained in each packet (See Fig. 2 and Col. 2; lines 49 plus and Col. 12, lines 15 plus).

Regarding Claims 1-5, they are method claims corresponding to the apparatus claims 7-11 above. Therefore, claims 1-5 are analyzed and rejected as previously discussed with respect to claims 7-11.

With respect to claims 13-17, These claims differ from claims Dalton, Jr. in view of Vargo et al. in that the claims recited a computer program product for performing the same basis of steps and apparatus of the prior arts as discussed in the rejection of claims 1-5 and 7-11. It would have been obvious to a person of ordinary skill in the art to implement a computer program product in Dalton, Jr. et al. in view of Vargo for performing the steps and apparatus as recited in the claims with the motivation being to provide the efficient enhancement to a route selection for the level of quality, location and

cost level, and easy to maintenance, upgrade.

One skilled in the art would have recognized the need for effectively and efficiently determining a gateway available for routing in VoIP, and would have applied Vargo's novel use of the routing packets with voice quality measurements into Dalton, Jr.'s teaching of the routing engine for assisting gateways in making routing decisions. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to apply Vargo's Internet telephone system with dynamically varying codec into Dalton, Jr.'s Internet telephony call routing engine with the motivation being to provide a method and system for route quality checking and management in VoIP

Allowable Subject Matter

4. Claims 6, 12 and 18 are objected to as being dependent upon the rejected base claims, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

6. The following is an examiner's statement of reasons for the indication of allowable subject matter: The closest prior art of record fails to disclose or suggest the steps of configuring parameters for the quality measurement packets to be sent to the gateway, wherein the parameters include the packet interval, packet length, number of packets, and time limit; configuring a scoring table for use in scoring the candidate routes, wherein the

table includes a quality score, packet loss. Average delay, and average jitter; configuring a route ordering applied for the gateway, wherein the route ordering includes file logging information, quality of service threshold, and time out amount; forwarding quality measurement packets to the gateway, wherein the quality measurement packets include routing information and receiving returned quality measurement packets from the gateway, wherein the returned quality measurement packets include routing information, as specifically recited in claims 6, 12 and 18.

6. 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

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The Alperovich et al. (US#6,600,738) is cited to show the routing in an IP network based on codec availability and subscriber preference.

The Mizuta et al. (US#6,584,110) is cited to show the voice gateway and route selection.

The Doshi et al. (US#6,529,499) is cited to show the method for providing quality

of service for delay sensitive traffic over IP network.

The Thornton et al. (US#6,363,065) is cited to show the apparatus for a voice over IP telephony gateway and method for use therein.

The Natarajan (US#5,452,294) is cited to show the method and apparatus for adaptive route selection in communication networks

The Hsu (US#6,363,319) is cited to show the constraint-based route selection using biased cost.

The Ohiwane et al. (US#6,366,560) is cited to show the route selection service control system.

The Civanlar et al. (US#6,385,193) is cited to show the WAN-based gateway

The Cave et al. (US#6,404,746) is cited to show the system and method for packet network media redirection.

The Bruno et al. (US#6,614,765) is cited to show the methods and systems for dynamically managing the routing of information over an integrated global communication network.

The Zonoun (US#6,487,172) is cited to show the packet network route selection method and apparatus using a bidding algorithm.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Phan whose telephone number is (703)305-1029. The examiner can normally be reached on Mon - Fri from 6:30 to 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Huy Vu, can be reached on (703) 308-6602. The fax phone number for the organization where this application or proceeding is assigned is (703)305-3988.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

9. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to: (703) 872-9314, (for formal communications intended for entry)

Or: (703) 305-3988 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Mphan

12/12/2003.

Man U. Phan

Notice of References Cited	Application/Control No. 09/660,920	Applicant(s)/Patent Under Reexam Scott et al.	
	Examiner Man Phan	Art Unit 2665	Page 1 of 1

U.S. PATENT DOCUMENTS

		Document Number Country Code-Number-Kind Code	Date MM-YYYY[1]	Name	Classification[2]	
	A	6,426,955	6/2002	Dalton, Jr. et al.	370	401
	B	6,356,545	3/2002	Vargo et al.	370	355
	C	6,600,738	7/2003	Alperovich et al.	370	352
	D	6,584,110	6/2003	Mizuta et al.	370	401
	E	6,529,499	3/2003	Doshi et al.	370	352
	F	6,363,065	3/2002	Thornton et al.	370	352
	G	5,454,294	9/1995	Natarajan	370	351
	H	6,363,319	3/2002	Hsu	701	202
	I	6,366,560	4/2002	Ohiwane et al.	370	238
	J	6,385,193	5/2002	Civanlar et al.	370	352
	K	6,404,746	6/2002	Cave et al.	370	262
	L	6,614,765	9/2003	Bruno et al.	370	255
	M	6,487,172	11/2002	Zonoun	370	238

FOREIGN PATENT DOCUMENTS

		Document Number Country Code-Number-Kind Code	Date MM-YYYY[1]	Country	Name	Classification[2]	
	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). [1] Dates in MM-YYYY format are publication dates. [2] Classifications may be U.S. or foreign.

Sterne Kessler Goldstein Fox
ATTORNEYS AT LAW

Robert Greene Sterne
Edward J. Kessler
Jorge A. Goldstein
David K.S. Cornwell
Robert W. Esmond
Tracy-Gene G. Durkin
Michele A. Cimbala
Michael B. Ray
Robert E. Sokohl
Eric K. Steffe
Michael Q. Lee
Steven R. Ludwig
John M. Covert
Linda E. Alcorn
Robert C. Millonig
Donald J. Featherstone
Lawrence B. Bugaisky
Michael V. Messinger

Judith U. Kim
Timothy J. Shea, Jr.
Patrick E. Garrett
Heidi L. Kraus
Edward W. Yee
Albert L. Ferro*
Donald R. Banowit
Peter A. Jackman
Teresa U. Medler
Jeffrey S. Weaver
Kendrick P. Patterson
Vincent L. Capuano
Eldora Ellison Floyd
Thomas C. Fiala
Brian J. Del Buono
Virgil Lee Beaston
Kimberly N. Reddick
Theodore A. Wood

Elizabeth J. Haanes
Joseph S. Ostroff
Frank R. Cottingham
Christine M. Lhulier
Rae Lynn Prengaman
Jane Shershenovich*
George S. Bardmesser
Daniel A. Klein*
Jason D. Eisenberg
Michael D. Specht
Andrea J. Kamage
Tracy L. Muller*
LuAnne M. DeSantis
John J. Figueroa
Ann E. Summerfield
Tiera S. Coston
Aric W. Ledford*
Jessica L. Parezo

Timothy A. Doyle*
Gaby L. Longsworth*
Nicole D. Dretar*
Ted J. Ebersole
Jyoti C. Iyer*

Registered Patent Agents•
Karen R. Markowicz
Nancy J. Leith
Helene C. Carlson
Matthew J. Dowd
Aaron L. Schwartz
Katrina Y. Pei Quach
Bryan L. Skelton
Robert A. Schwartzman
Teresa A. Colella
Jeffrey S. Lundgren
Victoria S. Rutherford

Eric D. Hayes
Michelle K. Holoubek
Robert H. DeSelms
Simon J. Elliott
Julie A. Heider
Mita Mukherjee
Scott M. Woodhouse

Of Counsel
Kenneth C. Bass III
Evan R. Smith
Marvin C. Guthrie

*Admitted only in Maryland
+ Admitted only in Virginia
•Practice Limited to Federal Agencies

April 19, 2004

WRITER'S DIRECT NUMBER:
(202) 772-8756
INTERNET ADDRESS:
MSPECHT@SKGF.COM

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Art Unit 2665

Re: U.S. Utility Patent Application
Application No. 09/660,920; Filed: September 13, 2000
For: **A Method, System, and Computer Program Product for Route Quality Checking and Management**
Inventors: Scott *et al.*
Our Ref: 1848.0100000

Sir:

Transmitted herewith for appropriate action are the following documents:

1. Fee Transmittal Form (PTO/SB/17);
2. Credit Card Payment Form (PTO-2038);
3. Petition for Extension of Time under 37 C.F.R. 1.136(a) (PTO/SB/22);
4. Amendment and Reply under 37 C.F.R. 1.111; and
5. One (1) return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our courier. In the event that extensions of time are necessary to prevent abandonment of this patent application, then such extensions of time are hereby petitioned.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael D. Specht
Attorney for Applicants
Registration No. 54,463

MVM/MDS/mlb
Enclosures
254452_1.DOC

PTO/SB/17 (10-03)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 422.00

Complete if Known	
Application Number	09/660,920
Filing Date	September 13, 2000
First Named Inventor	Scott et al
Examiner Name	Phan, Man U.
Art Unit	2665
Attorney Docket No.	1848.0100000

METHOD OF PAYMENT *(check all that apply)*

☐ Check ☒ Credit card ☐ Money Order ☒ Other** ☐ None

☒ Deposit Account: ***Charge any deficiencies or credit any overpayments in the fees to Deposit Acct. No. 19-0036.*

Deposit Account Number: 19-0036

Deposit Account Name: Sterne Kessler, Goldstein & Fox P.L.L.C.

The Director is authorized to: *(check all that apply)*

☐ Charge fee(s) indicated below ☐ Credit any overpayments

☐ Charge any additional fee(s) or any underpayment of fee(s)

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($) 0.00

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims	Fee from below	Fee Paid
Total Claims	23 - 20 ** =	3	X 18.00	= 54.00
Independent Claims	6 - 3 ** =	3	X 86.00	= 258.00
Multiple Dependent				=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 312.00

***or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	110.00
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($) 110.00

SUBMITTED BY				(Complete *(if applicable)*)	
Name (Print/Type)	Michael D. Specht	*Registration No. (Attorney/Agent)*	54,463	*Telephone*	(202) 371-2600
Signature				*Date*	4/19/04

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.

This collection of information is required by 37 CFR 1.17 and 1.27. 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.

A5

PTO/SB/22 (08-03)
Approved for use through 7/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE
Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless if displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) 1848.0100000

In re Application of	Scott *et al.*		
Application Number	09/660,920	Filed	September 13, 2000
For	A Method, System, and Computer Program Product for Route Quality Checking and Management		
Art Unit	2665	Examiner	Phan, Man U.

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 appropriate non-small-entity fee are as follows (check time period desired):

- [X] One month (37 CFR 1.17(a)(1)) $ 110.00
- [ ] Two months (37 CFR 1.17(a)(2)) $ _____
- [ ] Three months (37 CFR 1.17(a)(3)) $ _____
- [ ] Four months (37 CFR 1.17(a)(4)) $ _____
- [ ] Five months (37 CFR 1.17(a)(5)) $ _____

- [ ] Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: $ _____.
- [ ] A check in the amount of the fee is enclosed.
- [X] 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 19-0036.

I have enclosed a duplicate copy of this sheet.

I am the
- [ ] applicant/inventor.
- [ ] assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).
- [ ] attorney or agent of record. Registration Number n/a
- [X] attorney or agent under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) 54,463

RECEIVED
APR 23 2004
Technology Center 2600

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.

4/19/04
Date

Michael D. Specht
Signature

(202) 371-2600
Telephone Number

Michael D. Specht
Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

[X] Total of 1 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 1.14. 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: 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.

04/21/2004 ABERHE 00000042 09660920
110.00 OP
03 FC:1251

2665 64 $ 4/27/04 mg

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Confirmation No.: 7463
Scott *et al.*	Art Unit: 2665
Appl. No.: 09/660,920	Examiner: Phan, Man U.
Filed: September 13, 2000	Atty. Docket: 1848.0100000
For: **A Method, System , and Computer Program Product for Route Quality Checking and Management**	

Amendment and Reply under 37 C.F.R. § 1.111

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In reply to the Office Action dated December 19, 2003, (PTO Prosecution File Wrapper Paper No. 4), Applicants submit the following Amendment and Remarks. This Amendment is provided in the following format:

(A) Each section begins on a separate sheet;

(B) Starting on a separate sheet, amendments to the specification by presenting replacement paragraphs marked up to show changes made;

(C) Starting on a separate sheet, a complete listing of all of the claims:

- in ascending order;
- with status identifiers; and
- with markings in the currently amended claims;

(D) Starting on a separate sheet, the Remarks.

It is not believed that extensions of time or fees for net addition of claims are required beyond those that may otherwise be provided for in documents accompanying this paper. However, if additional extensions of time are necessary to prevent

abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefor (including fees for net addition of claims) are hereby authorized to be charged to our Deposit Account No. 19-0036.

Amendments to the Claims

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

1. (currently amended) A method for ~~checking a~~ assessing network routes for use in establishing a communications link within a communications network, comprising the steps of:

~~(1) determining a gateway available for routing, wherein said gateway is capable of responding to a request on the communications network;~~

~~(2) determining a candidate route to a said gateway, wherein said candidate route is within said communications network;~~

~~(3) testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information;~~

(1) identifying a plurality of candidate routes that can be used to establish said communication link, wherein a terminating gateway associated with each of said plurality of candidate routes is identified;

(2) transmitting quality measurement packets for each of said candidate routes, wherein said quality measurement packets can be used to determine at least one route quality metric;

(3) receiving returned quality measurement packets for each of said candidate routes, wherein said returned quality measurement packets can be used to determine route statistics;

(4) determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; ~~and~~

(5) configuring a route ordering schedule based on user set levels of route characteristics; and

(~~6~~5) scoring each of said candidate routes ~~with said~~ based on route statistics and said route ordering schedule, wherein a scoring table is configured that includes a quality score and one or more of packet loss, average delay, and average jitter.

A1 cont.

2. (original) A method of claim 1, wherein said communications network includes a packet-switched network.

3. (original) A method of claim 1, wherein said communications network includes a public switched telephone network (PSTN).

4. (currently ~~amended~~) A method of claim 1, wherein said ~~route information~~ at least one quality metric includes one or more of latency, time jitter, and lost packet information.

5. (currently ~~amended~~) A method of claim 1, further comprising the steps of:

(~~6~~7) prioritizing each of said candidate routes among other tested routes based on a score obtained in said step of scoring; and

26

(~~7~~8) storing said score related to each of said candidate routes for use in route selection.

6. (currently amended) A method of claim 1, wherein step (2~~3~~) ~~comprises the steps of:~~

~~(a) configuring parameters for said quality measurement packets to be sent to said gateway, wherein said~~ parameters within quality measurement packets include one or more of ~~include the~~ packet interval, packet length, number of packets, and time limit.~~;~~

~~(b) configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;~~

~~(c) configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;~~

~~(d) forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and~~

~~(e) receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information.~~

A1 cont.

7. (currently amended) A system for ~~checking a~~ assessing network routes for use in establishing a communications link within a communications network, comprising:

B (1) ~~first~~ means for identifying a plurality of candidate routes that can be used to establish said communications link, wherein a terminating gateway associated with each of said plurality of candidate routes is identified; ~~determining a gateway available for routing, wherein said gateway is capable of responding to a request on the communications network~~;

B (2) ~~second~~ means for transmitting quality measurement packets for each of said candidate routes, wherein said quality measurement packets can be used to determine at least one route quality metric; ~~determining a candidate route to said gateway, wherein said candidate route is within said communications network~~;

A1 cont. B (3) means for receiving returned quality measurement packets for each of said candidate routes, wherein said returned quality measurement packets can be used to determine route statistics ~~testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information~~;

B (4) ~~third~~ means for determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; ~~and~~

B (5) means for configuring a route ordering schedule based on user set levels of route characteristics; and

B (6) means for scoring each of said candidate routes ~~with said~~ based on route statistics, wherein a scoring table is configured that includes a

28

quality score and one or more of packet loss, average delay, and average jitter.

8. (original) A system of claim 7, wherein said communications network includes a packet-switched network.

9. (original) A system of claim 7, wherein said communications network includes a public switched telephone network (PSTN).

10. (currently amended) A system of claim 7, wherein said ~~route information~~ at least one quality metric includes one or more of latency, time jitter, and lost packet information.

A1 cont.

11. (currently amended) A ~~method~~ system of claim 7, further comprising:

(~~6~~7) means for prioritizing each of said candidates route among other tested routes based on a score obtained in said step of scoring; and

(~~7~~8) means for storing said score related to each of said candidate routes for use in route selection.

12. (currently amended) A system of claim 7, wherein testing means comprises:

~~first~~ means for configuring parameters for said quality measurement packets ~~to be sent to said gateway~~, wherein said parameters

29

include one or more of ~~the~~ packet interval, packet length, number of packets, and time limit.~~;~~

~~second means for configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;~~

~~third means for configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;~~

~~means for forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and~~

~~means for receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information.~~

A1 cont.

13. (currently ~~amended~~) A computer program product comprising a computer usable medium having computer readable program code means embodied in said medium for causing an application program to execute on a computer that ~~checks a~~ assesses network routes for use in establishing a communications link within a communications network, said computer readable program code means comprising:

a first computer readable program code means for causing the computer to identify a plurality of candidate routes that can be used to establish said communications link, wherein a terminating gateway

30

associated with each of said plurality of candidate routes is identified; ~~determine a gateway available for routing, wherein said gateway is capable of responding to a request on the communications network;~~

a second computer readable program code means for causing the computer to transmitting quality measurement packets for each of said candidate routes, wherein said quality measurement packets can be used to determine at least one route quality metric; ~~determine a candidate route to said gateway, wherein said candidate route is within said communications network;~~

a third computer readable program code means for causing the computer to receive returned quality measurement packets for each of said candidate routes, wherein said returned quality measurement packets can be used to determine route statistics; ~~test said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information;~~

A1 cont.

a fourth computer readable program code means for causing the computer to determine route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; ~~and~~

a fifth computer readable program code means for causing the computer to configure a route ordering schedule based on user set levels of route characteristics; and

a ~~fifth~~ sixth computer readable program code means for causing the computer to score each of said candidate routes ~~with said~~ based on

31

route statistics and said route ordering schedule, wherein a scoring table is configured that includes a quality score and one or more of packet loss, average delay, and average jitter.

14. (original) A computer program product of claim 13, wherein said communications network includes a packet-switched network.

15. (original) A computer program product of claim 13, wherein said communications network includes a public switched telephone network (PSTN).

16. (currently amended) A computer program product of claim 13, wherein ~~said route information~~ said at least one quality metric includes one or more of latency, time jitter, and lost packet information.

A1 cont.

17. (currently amended) A computer program product of claim 13, further comprising:

a ~~sixth~~ seventh computer readable program means for causing the computer to prioritize each of said candidate routes among other tested routes based on a score obtained in said step of scoring; and

an ~~seventh~~ eighth computer readable program code means for causing the computer to store said score related to each of said candidate routes for use in route selection.

32

18. (currently ~~amended~~) A computer program product of claim 13, wherein the third computer readable program code means comprises:

~~an eighth~~ ninth computer readable program code means for causing the computer to configure parameters for said quality measurement packets ~~to be sent to said gateway~~, wherein said parameters include one or more of ~~the~~ packet interval, packet length, number of packets, and time limit.~~;~~

~~a ninth computer readable program code means for causing the computer to configure a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;~~

~~a tenth computer readable program code means for causing the computer to configure a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;~~

~~an eleventh computer readable program code means for causing the computer to forward quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and~~

~~a twelfth computer readable program code means for causing the computer to receive returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information.~~

A1 cont.

33

19. (~~new~~) A method of claim 1, wherein step (5) further comprises configuring a scoring table that includes a quality score, packet loss, average delay, and average jitter.

20. (new) A method of claim 1, wherein said communications link establishes a VOIP connection.

21. (new) A method for assessing network routes for use in establishing a communications link within a communications network, comprising the steps of:

(1) determining a gateway available for routing, wherein said gateway is capable of responding to a request on said communications network;

(2) determining a candidate route to said gateway, wherein said candidate route is within said communications network;

(3) testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information, wherein said testing comprises:

(a) configuring parameters for said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

A1 cont.

34

(b) configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

(c) configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

(d) forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

(e) receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information;

A1 cont

(4) determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

(5) scoring said candidate routes with said route statistics.

22. (new) A system for assessing network routes for use in establishing a communications link within a communications network, comprising the steps of:

(1) first means for determining a gateway available for routing, wherein said gateway is capable of responding to a request on said communications network;

35

(2) second means for determining a candidate route to said gateway, wherein said candidate route is within said communications network;

(3) means for testing said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information, wherein said testing means comprises:

(a) first means for configuring parameters for said quality measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

A1 cont.

(b) second means for configuring a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

(c) third means for configuring a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

(d) means for forwarding quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

(e) means for receiving returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information;

36

(4) third means for determining route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

(5) means for scoring said candidate routes with said route statistics.

23. (new) A computer program product comprising a computer usable medium having computer readable program code means embodied in said medium for causing an application program to execute on a computer that assesses network routes for use in establishing a communications link within a communications network, comprising the steps of:

(1) a first computer readable program code means for causing the computer to determine a gateway available for routing, wherein said gateway is capable of responding to a request on said communications network;

(2) a second computer readable program code means for causing the computer to determine a candidate route to said gateway, wherein said candidate route is within said communications network;

(3) a third computer readable program code means for causing the computer to test said candidate route to said gateway using quality measurement packets, wherein said quality measurement packets include route information, wherein said third computer readable program code means comprises:

(a) a sixth computer readable program code means for causing the computer to configure parameters for said quality

A1 cont.

37

measurement packets to be sent to said gateway, wherein said parameters include the packet interval, packet length, number of packets, and time limit;

(b) a seventh computer readable program code means for causing the computer to configure a scoring table for use in scoring said candidate routes, wherein said table includes a quality score, packet loss, average delay, and average jitter;

(c) an eighth computer readable program code means for causing the computer means to configure a route ordering applied for said gateway, wherein said route ordering includes file logging information, quality of service threshold, and timeout amount;

A1 cont.

(d) a ninth computer readable program code means for causing the computer to forward quality measurement packets to said gateway, wherein said quality measurement packets include routing information; and

(e) a tenth computer readable program code means for causing the computer to receive returned quality measurement packets from said gateway, wherein said returned quality measurement packets include routing information;

(4) a fourth computer readable program code means for causing the computer to determine route statistics, wherein said route statistics are based on routing information contained within said quality measurement packets; and

38

A cont.

(5) a fifth computer readable program code means for causing the computer to score said candidate routes with said route statistics.

39

Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-23 are pending in the application, with claims 1, 7, and 13 being the independent claims. No claims are sought to be cancelled. New claims 19 through 23 are sought to be added. Claims 1, 4-7, 10-13, 16-18 have been amended. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Claim Objections

Claims 1, 7, and 13 have been objected to because of minor informalities. Specifically, the Examiner objected to the use of the phrase "capable of." The Examiner stated that "[i]t has been held that the recitation that an element is "capable of" perform[ing] a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense." Office Action at 2.

Claims 1, 7 and 13 have been amended to remove the phrase "capable of." Applicants submit that these amendments do not constitute narrowing amendments. Withdrawal of these objections and reconsideration of claims 1, 7 and 13, as modified herein is respectfully requested.

Rejections under 35 U.S.C. § 103

Claims 1-5, 7-11 and 13-17 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Dalton, Jr. et al, U.S. Patent No. 6,426,955 ("Dalton Patent") in view of Vargo et al, U.S. Patent No. 6,356,545 ("Vargo Patent"). Claims 6, 12, and 18 have been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claims and intervening claims.

Claim 1 and aspects of claim 6 have been combined to create amended claim 1. Amended claim 1 includes the steps of configuring a route ordering schedule and scoring each of the candidate routes. Neither the Dalton Patent or Vargo Patent disclose or suggest configuring a route ordering schedule or scoring each of the candidate routes

using a scoring table that includes a quality score and one or more of packet loss, average delay, and average jitter.

For at least these reasons, Claim 1 as amended is patentable. Claims 2-6, 19 and 20 depend upon claim 1. Because each dependent claim incorporates all of the elements of the independent claim from which it depends, as well as additional features, the above arguments made with respect to claim 1, apply *a fortiori* to the dependent claims. Thus, claims 2-6, 19 and 20 are also patentable over the Dalton and Vargo Patents.

Claim 7 and aspects of claim 12 and have been combined to create amended claim 7. Amended claim 7 includes a means for configuring a route ordering schedule, and a means for scoring each of the candidate routes. Neither the Dalton Patent or Vargo Patent disclose or suggest a means for configuring a route ordering schedule or a means for scoring each of the candidate routes using a scoring table that includes a quality score and one or more of packet loss, average delay, and average jitter.

For at least these reasons, Claim 7 as amended is patentable. Claims 8-12 depend upon claim 7. Because each dependent claim incorporates all of the elements of the independent claim from which it depends, as well as additional features, the above arguments apply *a fortiori* to the dependent claims. Thus, claims 8-12 are also patentable over the Dalton and Vargo Patents.

Claim 13 and aspects of claim 18 and have been combined to create amended claim 13. Amended claim 13 includes a computer program product means for configuring a route ordering schedule, and a computer program product means for scoring each of the candidate routes. Neither the Dalton Patent or Vargo Patent disclose or suggest a computer program product means for configuring a route ordering schedule or a computer program product means for scoring each of the candidate routes using a

scoring table that includes a quality score and one or more of packet loss, average delay, and average jitter.

For at least these reasons, Claim 13 as amended is patentable. Claims 14-18 depend upon claim 13. Because each dependent claim incorporates all of the elements of the independent claim from which it depends, as well as additional features, the above the above arguments apply *a fortiori* to the dependent claims. Thus, claims 14-18 are also patentable over the Dalton and Vargo Patents.

Claims 21 - 23 have been added. Claim 21 corresponds to original claim 6 written in independent form including all of the limitations of the base claim 1. Claim 22 corresponds to original claim 12 written in independent form including all of the limitations of the base claim 7. Claim 23 corresponds to original claim 18 written in independent form including all of the limitations of the base claim 13.

The Examiner indicated in the Office Action that claims 6, 12 and 18 are objected to as being dependent upon the rejected base claims, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. Claims 21-23 rewrite claims 6, 12, and 18 in independent form as suggested. Applicants therefore respectfully submit that claims 21-23 are therefore patentable.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the

outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael D. Specht
Attorney for Applicants
Registration No. 54,463

Date: 4/19/04

1100 New York Avenue, N.W.
Washington, D.C. 20005-3934
(202) 371-2600
235818_1.DOC

Transaction History Date 2004-06-15
Date information retrieved from USPTO Patent Application Information Retrieval (PAIR) system records at www.uspto.gov

Notice of Allowability	Application No.	Applicant(s)	
	09/660,920	SCOTT ET AL.	
	Examiner	Art Unit	
	Man Phan	2665	

-- 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 *the amendment filed 04/19/2004*.
2. ☒ The allowed claim(s) is/are *1-23*.
3. ☒ The drawings filed on *13 September 2000* are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   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. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ 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).
7. ☐ 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)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

7B
6-14-04
MG

Reasons for allowance

1. This communication is in response to applicant's 04/19/2004 Amendment in the application of Scott et al. for a "Method, system, and computer program product for route quality checking and management" filed 09/13/2000. The proposed amendments have been entered and made of record. The claims have been amended to more particularly point out and distinctly claim the invention.

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

3. The application has been amended as follows:

IN THE CLAIMS:

Claim 7: Line 4, insert "(1)" in front of "means for identifying...."

Line 10, insert "(2)" in front of "means for transmitting..."

Line 15, insert "(3)" in front of "means for receiving..."

Line 20, insert "(4)" in front of "means for determining..."

Line 23, insert "(5)" in front of "means for configuring..."

Line 25, insert "(6)" in front of "means for scoring..."

4. Claims 1-23 are allowable as evident by applicant's amendment.

5. The following is an examiner's statement of reasons for the indication of allowable subject matter: The instant application is deemed to be directed to a nonobvious improvement over the closest prior art of record. The improvement comprises the steps of configuring parameters for the quality measurement packets to be sent to the gateway, wherein the parameters include the packet interval, packet length, number of packets, and time limit; configuring a scoring table for use in scoring the candidate routes, wherein the table includes a quality score, packet loss, average delay, and average jitter; configuring a route ordering applied for the gateway, wherein the route ordering includes file logging information, quality of service threshold, and time out amount; forwarding quality measurement packets to the gateway, wherein the quality measurement packets include routing information and receiving returned quality measurement packets from the gateway, wherein the returned quality measurement packets include routing information, as specifically recited in claims

6. 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

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The Rochberger et al. (US#6,483,808) is cited to show the method of optimizing routing decisions over multiple parameters utilizing fuzzy logic.

The Gulati et al. (US#6,597,684) is cited to show the distributed architecture and associated protocols for efficient quality of service-based route computation.

8. ***Any response to this action should be mailed to:***

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 308-9051, (for formal communications intended for entry)

Or:

(703) 305-3988 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Man U. Phan whose telephone number is (703) 305-1029. The examiner can normally be reached Monday through Friday from 6:30 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703)308-6602. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-3800/4700.

MPhan

06/10/2004

Man U. Phan

MAN PHAN
PATENT EXAMINER

Notice of References Cited	Application/Control No. 09/660,920	Applicant(s)/Patent Under Reexamination SCOTT ET AL.	
	Examiner Man Phan	Art Unit 2665	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,483,808	11-2002	Rochberger et al.	370/238
	B	US-6,597,684	07-2003	Gulati et al.	370/351
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	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.

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

26111 7590 06/15/2004

STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER	
PHAN, MAN U	
ART UNIT	**PAPER NUMBER**
2665	7

DATE MAILED: 06/15/2004

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,920	09/13/2000	Mark D. Scott	1848.0100000	7463

TITLE OF INVENTION: METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$0	$1330	09/15/2004

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 REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:
A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. 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.

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: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (703) 746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 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: Legibly mark-up with any corrections or use Block 1)

26111 7590 06/15/2004

STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

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 facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,920	09/13/2000	Mark D. Scott	1848.0100000	7463

TITLE OF INVENTION: METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$0	$1330	09/15/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAN, MAN U	2665	370-252000

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 03-02 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 _____

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. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. 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. The following fee(s) are enclosed:

❑ Issue Fee

❑ Publication Fee

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s):

❑ A check in the amount of the fee(s) is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

(Authorized Signature) (Date)

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

This collection of information 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 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, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, 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.

TRANSMIT THIS FORM WITH FEE(S)

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.
09/660,920	09/13/2000	Mark D. Scott	1848.0100000	7463

26111 7590 06/15/2004

STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER	
PHAN, MAN U	

ART UNIT	PAPER NUMBER
2665	

DATE MAILED: 06/15/2004

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

The Patent Term Adjustment to date is 735 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 735 day(s).

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) system (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 (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

PTOL-85 (Rev. 11/03) Approved for use through 04/30/2004.

Steme Kessler Goldstein Fox
ATTORNEYS AT LAW

September 15, 2004

WRITER'S DIRECT NUMBER:
(202) 772-8756
INTERNET ADDRESS:
MSPECHT@SKGF.COM

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Mail Stop Issue Fee

Re: U.S. Allowed Utility Patent Application
Appl. No. 09/660,920; Filed: September 13, 2000
For: **A Method, System, and Computer Program Product for Route Quality Checking and Management**
Inventors: Scott *et al.*
Our Ref: 1848.0100000

Sir:

In response to the **Notice of Allowance and Issue Fee Due** dated June 15, 2004, the following documents are forwarded for appropriate action by the U.S. Patent and Trademark Office:

1. Fee Transmittal Form (PTO/SB/17);
2. Credit Card Payment Form (PTO-2038);
3. Issue Fee Transmittal Form (PTOL-85);
4. One (1) return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our courier.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036. If extensions of time under 37 C.F.R. § 1.136 other than those otherwise provided for herewith are required to prevent abandonment of the

present patent application, then such extensions of time are hereby petitioned, and any fees therefor are hereby authorized to be charged to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael D. Specht
Attorney for Applicants
Registration No. 54,463

MVM/MDS/mlb
Enclosures
311307_1.DOC

PTO/SB/17 (10-03)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 1360.00

Complete if Known	
Application Number	09/660,920
Filing Date	September 13, 2000
First Named Inventor	Scott et al.
Examiner Name	Phan, Man U.
Art Unit	2665
Attorney Docket No.	1848.0100000

METHOD OF PAYMENT *(check all that apply)*

☐ Check ☒ Credit card ☐ Money Order ☒ Other** ☐ None

☒ **Deposit Account: *Charge any deficiencies or credit any overpayments in the fees to Deposit Acct. No. 19-0036.*

Deposit Account Number: 19-0036

Deposit Account Name: Sterne Kessler, Goldstein & Fox P.L.L.C.

The Director is authorized to: *(check all that apply)*

☐ Charge fee(s) indicated below ☐ Credit any overpayments

☐ Charge any additional fee(s) or any underpayment of fee(s)

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($) 0.00

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims		Fee from below		Fee Paid
Total Claims	- 20 ** =		X		=	
Independent Claims	- 3 ** =		X		=	
Multiple Dependent					=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0.00

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	1330.00
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	
Other fee (specify) Ten (10) Advance Copies of Patent					30.00

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) ($)

SUBMITTED BY				(Complete *(if applicable)*)	
Name (Print/Type)	Michael D. Specht	*Registration No. (Attorney/Agent)*	54,463	*Telephone*	(202) 371-2600
Signature	Michael D Specht			*Date*	9/15/04

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.

This collection of information is required by 37 CFR 1.17 and 1.27. 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.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (703) 746-4000

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 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: Legibly mark-up with any corrections or use Block 1)

26111 7590 06/15/2004

STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

OIPE JC25 SEP 15 2004 PATENT & TRADEMARK OFFICE

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 facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,920	09/13/2000	Mark D. Scott	1848.0100000	7463

TITLE OF INVENTION: METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1330	$0	$1330	09/15/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAN, MAN U	2665	370-252000

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 03-02 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 Sterne, Kessler,
2 Goldstein & Fox P.L.L.C.
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. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Array Telecom Corporation Herndon, VA

Please check the appropriate assignee category or categories (will not be printed on the patent); ☐ individual ☒ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

☒ Issue Fee
☐ Publication Fee
☒ Advance Order - # of Copies Ten (10)

4b. Payment of Fee(s):

☐ A check in the amount of the fee(s) is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 19-0036 (enclose an extra copy of this form).

Director for Patents is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.

Michael D. Specht 9/15/04
(Authorized Signature) (Date)

Michael D. Specht, Reg. No. 54,463

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

09/16/2004 EABUBAK2 00000151 09660920

01 FC:1501 1330.00 OP
02 FC:8001 30.00 OP

This collection of information 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 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, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, 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.

TRANSMIT THIS FORM WITH FEE(S)

File History Content Report

The following content is missing from the original file history record obtained from the United States Patent and Trademark Office. No additional information is available.

Document Date - 2004-11-09

Document Title - USPTO Grant

File History Content Report

The following content is missing from the original file history record obtained from the United States Patent and Trademark Office. No additional information is available.

Document Date - 2011-12-27

Document Title - Applicant Communication Re: Verified Statement of Small Entity Status in Compliance with 37 CFR 1.27

PTO/SB/80 (01-06)
Approved for use through 12/31/2008. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

[X] Practitioners associated with the Customer Number: **26111**

OR

[ ] Practitioner(s) named below (If more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number		Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

[X] The address associated with Customer Number: **26111**

OR

[ ] Firm or Individual Name

Address					
City		State		Zip	
Country		Telephone		Email	

Assignee Name and Address:

Mist Silicon Limited Liability Company
2711 Centerville Road
Suite 400
Wilmington, DE 19808

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	1/9/2012
Name	Peter Kwon	Telephone	
Title	Authorized Person for Mist Silicon Limited Liability Company		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 3 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.

DECLARATION REGARDING AUTHORITY TO SIGN
ON BEHALF OF A LEGAL ENTITY
37 C.F.R. 3.73(b)(2)(i)

I, Peter Kwon (whose title is supplied below), hereby declare that I am authorized to sign documents on behalf of Mist Silicon Limited Liability Company.

Peter Kwon
Authorized Person for Mist Silicon Limited Liability Company

1/9/2012
Date

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
09/660,920	09/13/2000	Mark D. Scott	1848.0100000

CONFIRMATION NO. 7463

POA ACCEPTANCE LETTER

26111
STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

Date Mailed: 02/23/2012

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/08/2012.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/dtvernon/

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent of:	Confirmation No.: 7463
SCOTT *et al.*	Art Unit: 2665
Patent. No.: 6,816,464	Examiner: PHAN, Man U.
Issued: November 9, 2004	Atty. Docket: 3222.7020000
For: **METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT**	

Correction of Entity Status Under 37 C.F.R. § 1.28(c) When Small Entity Status Was Established in Error and Payment of Fees Under 37 C.F.R. § 1.28(c)(2)

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Commissioner:

Small entity status was established in the above-captioned patent in good faith. However, it has now been discovered that small entity status was established in error.

The deficiency owed is calculated as follows:

	Type of Fee	Fee Paid	Date Paid	Fee Owed	Difference
1.	7.5 Year Patent Maintenance Fee	1,425.00	12/20/2011	2,850.00	1,425.00

Total Owed: $1,425.00

Payment of these deficiencies based on a previous erroneous payment of a small entity fee is to be treated under 37 C.F.R. § 1.27(g)(2) as a notification of loss of entitlement to small entity status. 37 C.F.R. § 1.28(d).

The undersigned respectfully requests that the United States Patent and Trademark Office excuse this error and correct the entity status to be that of a large entity. Early notice to this effect is respectfully requested.

The Commissioner is authorized to charge any deficiencies or credit any overpayments to our Deposit Account No. 19-0036.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

/Jason D. Eisenberg #43447/

Jason D. Eisenberg
Attorney for Patentees
Registration No. 43,447

Date: March 8, 20112

1100 New York Avenue, N.W.
Washington, D.C. 20005-3934
(202) 371-2600

1494326_1.DOCX

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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY.DOCKET NO./TITLE	REQUEST ID
09/660,920	09/13/2000	Mark D. Scott	3222.7020000	6039

Acknowledgement of Loss of Entitlement to Entity Status Discount

The entity status change request below filed through Private PAIR on 10/20/2015 has been accepted.

CERTIFICATIONS:

Change of Entity Status:

X Applicant changing to regular undiscounted fee status.

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

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Signature:	/Jason D. Eisenberg #43447/
Name:	Jason D. Eisenberg
Registration Number:	43447

1713

PATENT APPLICATION FEE DETERMINATION RECORD
Effective December 29, 1999

Application or Docket Number

CLAIMS AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA
BASIC FEE		
TOTAL CLAIMS	18 minus 20=	*
INDEPENDENT CLAIMS	3 minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT		

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
	345.00	OR		690.00
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL		OR	TOTAL	690

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

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 23	Minus	** 20	= 3
Independent	* 6	Minus	*** 3	= 3
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	54
X39=		OR	~~X78=~~ 66	258
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	312

Pd

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 23	Minus	** 23	=
Independent	* 6	Minus	*** 6	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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 number found in the appropriate box in column 1.

FORM **PTO-875**
(Rev. 12/99)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

Derwent Innovation Patent Export, 2020-10-06 16:33:43 +0000

Search results for: PNS=(US6816464);
Collections searched: DWPI; ARIPO grant; Argentina UM; Argentina app; Armenia grant; Australia UM; Australia app; Australia grant; Austria UM; Austria app; Austria grant; Belarus UM; Belarus grant; Belgium app; Belgium grant; Brazil UM; Brazil app; Brazil grant; Bulgaria UM; Bulgaria app; Bulgaria grant; Canada app; Canada grant; China, Mainland UM; China, Mainland app; China, Mainland grant; Colombia app; Costa Rica UM; Costa Rica app; Croatia UM; Croatia app; Croatia grant; Cuba app; Cuba grant; Czech Republic UM; Czech Republic app; Czech Republic grant; Czechoslovakia grant; Denmark UM; Denmark app; Denmark grant; Estonia UM; Estonia app; Estonia grant; Eurasian (EAPO) grant; Europe (EP) app; Europe (EP) grant; Finland app; Finland grant; France app; France grant; Georgia grant; German Democratic Republic app; German Democratic Republic grant; Germany UM; Germany app; Germany grant; Greece app; Greece grant; Gulf Cooperation Council grant; Hong Kong UM; Hong Kong app; Hong Kong grant; Hungary grant; Iceland grant; India app; India grant; Indonesia UM; Indonesia app; Ireland UM; Ireland app; Ireland grant; Israel grant; Italy grant; Italy grant; Italy grant; Italy grant; Japan UM; Japan app; Japan grant; Korea UM; Korea app; Korea grant; Latvia grant; Lithuania grant; Luxembourgh app; Luxembourgh grant; Malaysia grant; Mexico app; Mexico grant; Moldova UM; Moldova grant; Monaco grant; Mongolia UM; Mongolia grant; Morocco app; Morocco grant; Netherlands app; Netherlands grant; New Zealand grant; Norway app; Norway grant; OAPI grant; PCT (WO) app; Philippines app; Philippines grant; Poland UM; Poland grant; Portugal UM; Portugal app; Portugal grant; Romania UM; Romania app; Romania granted; Russia UM; Russia app; Russia grant; Serbia UM; Serbia app; Serbia grant; Singapore app; Singapore grant; Slovakia UM; Slovakia app; Slovakia grant; Slovenia UM; Slovenia grant; South Africa app; Spain UM; Spain app; Spain grant; Sweden app; Sweden grant; Switzerland app; Switzerland grant; Taiwan UM; Taiwan appl; Taiwan grant; Thailand grant; Tunisia app; Turkey UM; Turkey app; UK app; UK grant; USSR grant; Ukraine UM; Ukraine grant; United States app; United States grant; Uruguay app; Vietnam app; Vietnam grant; Other

Table of Contents

Family 1/1

1 record(s) per family

Record 1/1 US6816464B1 Method, system, and computer program product for route quality checking and management

Title: Method, system, and computer program product for route quality checking and management
Title - DWPI: Network route assessing method in communication network, involves scoring routes based on route statistics determined from transmitted quality measurement packet of candidate routes, and route ordering schedule
Priority Number: US2000660920A
Priority Date: 2000-09-13
Application Number: US2000660920A
Application Date: 2000-09-13
Publication Date: 2004-11-09
IPC Class Table:

IPC	Section	Class	Subclass	Class Group	Subgroup
H04L001224	H	H04	H04L	H04L0012	H04L001224

IPC Class Table - DWPI:

IPC - DWPI	Section - DWPI	Class - DWPI	Subclass - DWPI	Class Group - DWPI	Subgroup - DWPI
H04L001226 (IPC 1-7)	H	H04	H04L	H04L0012	H04L001226 (IPC 1-7)
G01R003108 (IPC 1-7)	G	G01	G01R	G01R0031	G01R003108 (IPC 1-7)
G06F001100 (IPC 1-7)	G	G06	G06F	G06F0011	G06F001100 (IPC 1-7)
G08C001300 (IPC 1-7)	G	G08	G08C	G08C0013	G08C001300 (IPC 1-7)
H04J000116 (IPC 1-7)	H	H04	H04J	H04J0001	H04J000116 (IPC 1-7)

Assignee/Applicant: Array Telecom Corporation,Herndon,VA
JP F Terms:

JP FI Codes:

Assignee - Original: Array Telecom Corporation

Any CPC Table:

Type	Invention	Additional	Version	Office
Current	**H04L 41/142**	H04L 43/0829	20130101	EP
Current	H04L 41/22	H04L 43/0852	20130101	EP
Current	H04L 41/5009	H04L 43/087	20130101	EP
Current	H04L 43/50		20130101	EP
Current	H04L 45/70		20130101	EP

ECLA: H04L001226T | H04L004114A | H04L004122 | H04L004150A2 | H04L004350 | H04L004570

Abstract:

A method, system and computer program product for route checking and management is described herein. In a voice over internet protocol environment, the invention allows for the testing of routes among various gateways. In one embodiment, gateways include routing managers for checking and storing route information. The method of the invention includes checking candidate routes for the level of quality, location and cost levels. Further, users can prioritize routes based on these criteria.

Language of Publication: EN

INPADOC Legal Status Table:

Gazette Date	Code	INPADOC Legal Status Impact
2020-03-11	AS	-
Description: ASSIGNMENT INTELLECTUAL VENTURES II LLC, DELAWARE ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:CHEMTRON RESEARCH LLC; REEL/FRAME:052088/0054 2020-03-11		
2016-04-25	FPAY	+
Description: FEE PAYMENT FEE PAYMENT YEAR 12		
2015-12-11	AS	-
Description: ASSIGNMENT CHEMTRON RESEARCH LLC, DELAWARE MERGER; ASSIGNOR:MIST SILICON LIMITED LIABILITY COMPANY; REEL/FRAME:037271/0722 2015-08-26		
2012-01-25	AS	-

Description: ASSIGNMENT MIST SILICON LIMITED LIABILITY COMPANY, DELAWARE ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:DIGITAL RESOURCE PARTNERS LLC; REEL/FRAME:027593/0640 2011-11-22		
2012-01-25	AS	-
Description: ASSIGNMENT VERTICAL COMMUNICATIONS ACQUISITION CORP., CALIFOR RELEASE BY SECURED PARTY; ASSIGNORS:COLUMBIA PARTNERS, L.L.C. INVESTMENT MANAGEMENT; NEIPF, L.P.; REEL/FRAME:027593/0833 2011-12-23		
2012-01-25	AS	-
Description: ASSIGNMENT VERTICAL COMMUNICATIONS, INC., CALIFORNIA RELEASE BY SECURED PARTY; ASSIGNORS:COLUMBIA PARTNERS, L.L.C. INVESTMENT MANAGEMENT; NEIPF, L.P.; REEL/FRAME:027593/0833 2011-12-23		
2011-12-28	AS	-
Description: ASSIGNMENT DIGITAL RESOURCE PARTNERS LLC, DELAWARE ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:VERTICAL COMMUNICATIONS ACQUISITION CORP.; REEL/FRAME:027451/0457 2011-11-10		
2011-12-20	FPAY	+
Description: FEE PAYMENT FEE PAYMENT YEAR 8		
2008-06-02	AS	-
Description: ASSIGNMENT VERTICAL COMMUNICATIONS ACQUISITION CORP., FLORIDA ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNOR:ARRAY TELECOM CORPORATION; REEL/FRAME:021018/0745 2005-09-27		
2008-05-07	FPAY	+
Description: FEE PAYMENT FEE PAYMENT YEAR 4		
2006-10-20	AS	-
Description: ASSIGNMENT COLUMBIA PARTNERS, L.L.C. INVESTMENT MANAGEMENT, A SECURITY AGREEMENT; ASSIGNORS:VERTICAL COMMUNICATIONS, INC.; VERTICAL COMMUNICATIONS ACQUISITION CORP.; REEL/FRAME:018407/0598 2006-10-19		
2004-10-21	STCF	-
Description: INFORMATION ON STATUS: PATENT GRANT PATENTED CASE		
2004-05-10	AS	-
Description: ASSIGNMENT SILICON VALLEY BANK, CALIFORNIA SECURITY INTEREST; ASSIGNOR:COMDIAL CORPORATION; REEL/FRAME:014615/0102 2004-04-28		
2004-05-10	AS	-

Description: ASSIGNMENT SILICON VALLEY BANK, CALIFORNIA SECURITY INTEREST; ASSIGNOR:COMDIAL CORPORATION; REEL/FRAME:014615/0087 2004-04-28		
2000-09-13	AS	-
Description: ASSIGNMENT ARRAY TELECOM CORPORATION, VIRGINIA ASSIGNMENT OF ASSIGNORS INTEREST; ASSIGNORS:SCOTT, MARK D.; CHENG, ANITA T.; REEL/FRAME:011099/0755 2000-09-07		

Post-Issuance (US):

Reassignment (US) Table:

Assignee	Assignor	Date Signed	Reel/Frame	Date
INTELLECTUAL VENTURES II LLC,WILMINGTON,DE,US	CHEMTRON RESEARCH LLC	2020-03-11	052088/0054	2020-03-11
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: INTELLECTUAL VENTURES MANAGEMENT- IP LEGAL 3150 139TH AVENUE SE BUILDING 4, FLOOR 3 BELLEVUE, WA 98005				
CHEMTRON RESEARCH LLC,DOVER,DE,US	MIST SILICON LIMITED LIABILITY COMPANY	2015-08-26	037271/0722	2015-12-11
Conveyance: MERGER (SEE DOCUMENT FOR DETAILS).				
Corresponent: STERNE, KESSLER, GOLDSTEIN, & FOX 1100 NEW YORK AVENUE, NW WASHINGTON, DC 20005				
VERTICAL COMMUNICATIONS INC.,SANTA CLARA,CA,US	COLUMBIA PARTNERS, L.L.C. INVESTMENT MANAGEMENT	2011-12-23	027593/0833	2012-01-25
VERTICAL COMMUNICATIONS ACQUISITION CORP.,SANTA CLARA,CA,US	NEIPF, L.P.	2011-12-23	-	-
Conveyance: RELEASE BY SECURED PARTY (SEE DOCUMENT FOR DETAILS). | RELEASE BY SECURED PARTY (SEE DOCUMENT FOR DETAILS).				
Corresponent: STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C 1100 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005 | STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C 1100 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005				
MIST SILICON LIMITED LIABILITY COMPANY,WILMINGTON,DE,US	DIGITAL RESOURCE PARTNERS LLC	2011-11-22	027593/0640	2012-01-25
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				

Corresponent: STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C 1100 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005				
DIGITAL RESOURCE PARTNERS LLC,WILMINGTON,DE,US	VERTICAL COMMUNICATIONS ACQUISITION CORP.	2011-11-10	027451/0457	2011-12-28
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C 1100 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005				
COLUMBIA PARTNERS L.L.C. INVESTMENT MANAGEMENT AS AGENT AND INVESTMENT MANAGER FOR THE BENEFIT OF ITSELF AND NEIPF L.P.,WASHINGTON,DC,US	VERTICAL COMMUNICATIONS, INC.	2006-10-19	018407/0598	2006-10-20
	VERTICAL COMMUNICATIONS ACQUISITION CORP.	2006-10-19	-	-
Conveyance: SECURITY AGREEMENT				
Corresponent: DIANA SANCHEZ BENTZ COOLEY GODWARD KRONISH LLP 5 PALO ALTO SQUARE, 3000 EL CAMINO REAL PALO ALTO, CA 94306				
VERTICAL COMMUNICATIONS ACQUISITION CORP.,SARASOTA,FL,US	ARRAY TELECOM CORPORATION	2005-09-27	021018/0745	2008-06-02
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C 1100 NEW YORK AVENUE NW WASHINGTON, DC 20005				
SILICON VALLEY BANK,SANTA CLARA,CA,US	COMDIAL CORPORATION	2004-04-28	014615/0102	2004-05-10
Conveyance: SECURITY INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: TROUTMAN SANGERS LLP JAMES HUNT YANCEY, JR. 600 PEACHTREE STREET, NE, SUITE 5200 BANK OF AMERIA PLAZA ATLANTA, GA 30308-2216				
SILICON VALLEY BANK,SANTA CLARA,CA,US	COMDIAL CORPORATION	2004-04-28	014615/0087	2004-05-10
Conveyance: SECURITY INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: TROUTMAN SANDERS LLP JAMES HUNT YANCEY, JR. BANK OF AMERICA PLAZA 600 PEACHTREE STREET, N.E., SUITE 5200 ATLANTA, GA 30308-2216				

ARRAY TELECOM CORPORATION,HERNDON, VA,US	SCOTT, MARK D.	2000-09-07	011099/0755	2000-09-13
	CHENG, ANITA T.	2000-09-07	-	-
Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).				
Corresponent: STERNE, KESSLER, GOLDSTEIN & FOX PLLC MICHAEL V. MESSINGER 1100 NEW YORK AVE., N.W. SUITE 600 WASHINGTON, D.C. 20005-3934				

Maintenance Status (US):

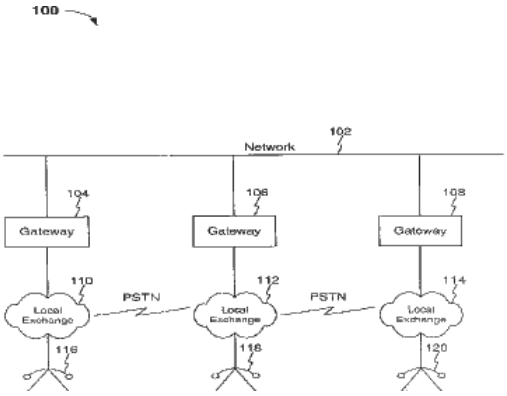
Litigation (US): 2020-04-30 2020 Intellectual Ventures II LLC VMware, Inc. W.D. Texas 1:20cv00457 | 2020-03-25 2020 Intellectual Ventures II LLC VMware, Inc. W.D. Texas 6:20cv00220

Opposition (EP):

License (EP):

EPO Procedural Status:

Front Page Drawing:



Assignee - Current US: INTELLECTUAL VENTURES II LLC

United States Patent and Trademark Office
Office of the Commissioner for Patents

METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ROUTE QUALITY CHECKING AND MANAGEMENT

PATENT #	APPLICATION #	FILING DATE	ISSUE DATE
6816464	09660920	09/13/2000	11/09/2004

Payment Window Status

No maintenance fees are due.

WINDOW	STATUS	FEES
11.5 Year	Closed	Paid

Window	First Day to Pay	Surcharge Starts	Last Day to Pay	Status	Fees
3.5 Year	11/09/2007	05/10/2008	11/10/2008	Closed	Paid
7.5 Year	11/09/2011	05/10/2012	11/09/2012	Closed	Paid
11.5 Year	11/09/2015	05/10/2016	11/09/2016	Closed	Paid

Patent Holder Information

Customer # 26111

Entity Status UNDISCOUNTED

Phone Number 2023712600

Address STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005
UNITED STATES