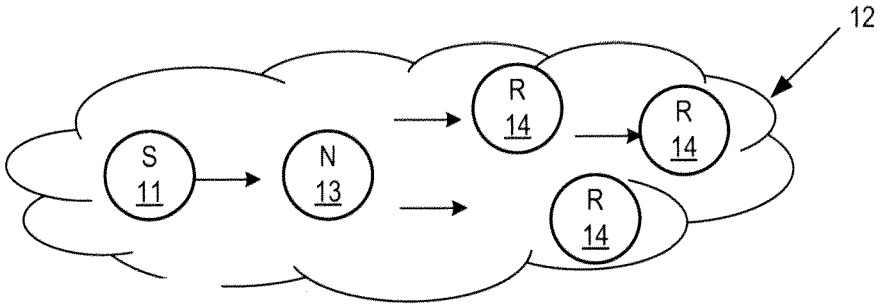


FIG. 1A

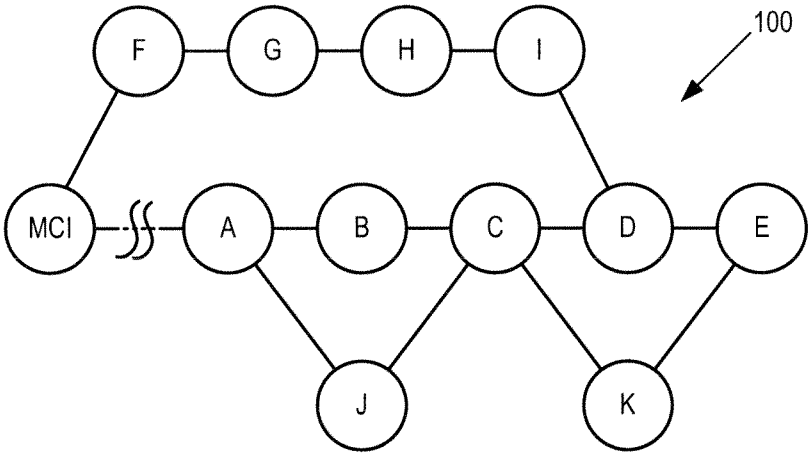


FIG. 1B

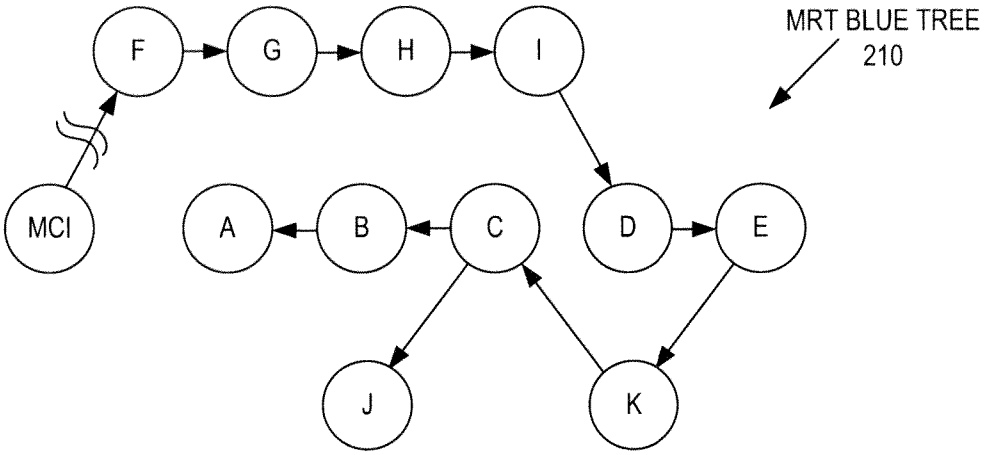

MRT BLUE TREE
210
F
G
H
I
MCI
A
B
C
D
E
J
K

FIG. 2A

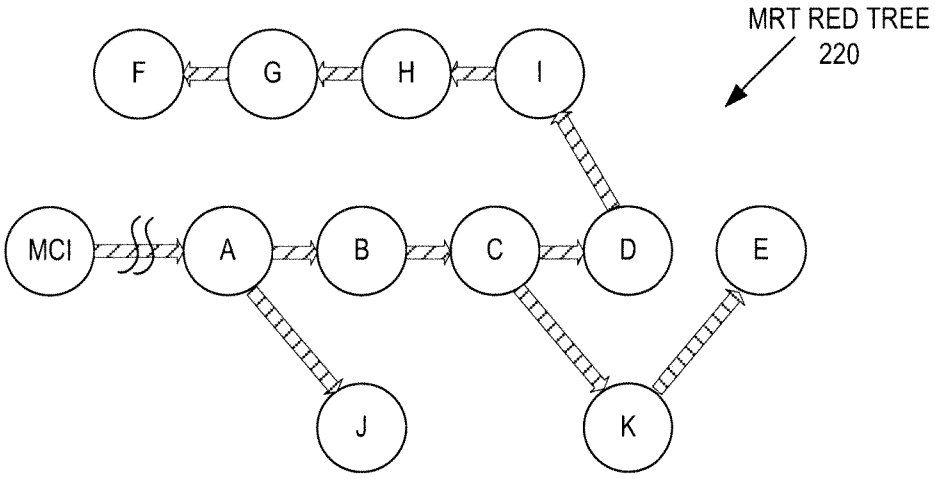

MRT RED TREE
220
F
G
H
I
MCI
A
B
C
D
E
J
K

FIG. 2B

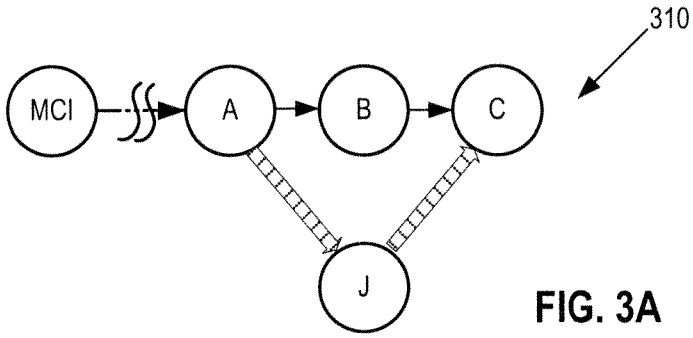


FIG. 3A

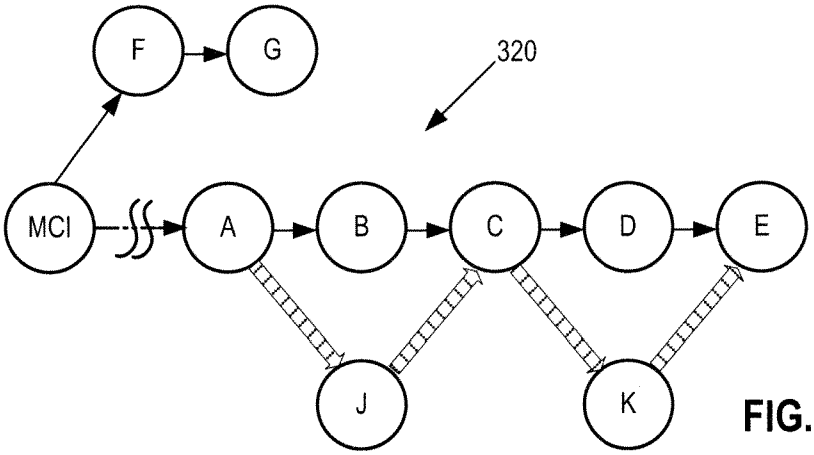


FIG. 3B

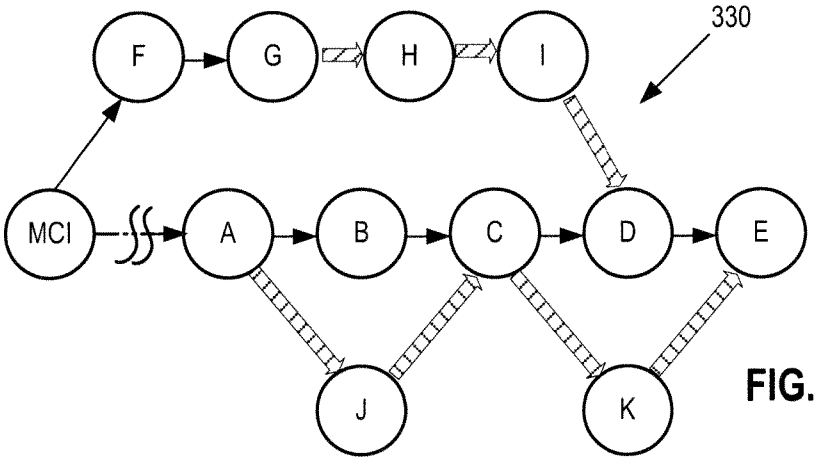


FIG. 3C

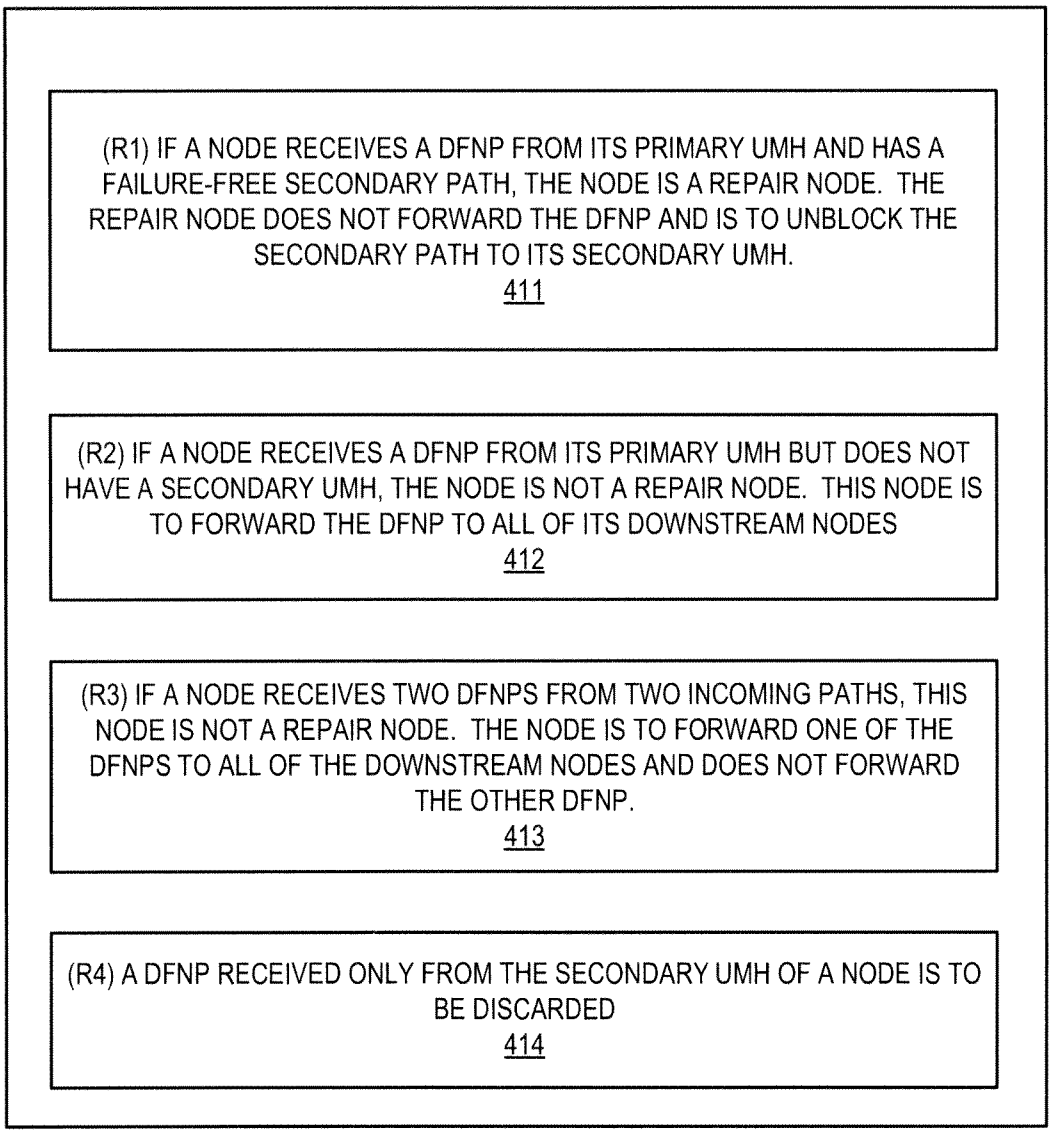

(R1) IF A NODE RECEIVES A DFNP FROM ITS PRIMARY UMH AND HAS A FAILURE-FREE SECONDARY PATH, THE NODE IS A REPAIR NODE. THE REPAIR NODE DOES NOT FORWARD THE DFNP AND IS TO UNBLOCK THE SECONDARY PATH TO ITS SECONDARY UMH.
411
(R2) IF A NODE RECEIVES A DFNP FROM ITS PRIMARY UMH BUT DOES NOT HAVE A SECONDARY UMH, THE NODE IS NOT A REPAIR NODE. THIS NODE IS TO FORWARD THE DFNP TO ALL OF ITS DOWNSTREAM NODES
412
(R3) IF A NODE RECEIVES TWO DFNPS FROM TWO INCOMING PATHS, THIS NODE IS NOT A REPAIR NODE. THE NODE IS TO FORWARD ONE OF THE DFNPS TO ALL OF THE DOWNSTREAM NODES AND DOES NOT FORWARD THE OTHER DFNP.
413
(R4) A DFNP RECEIVED ONLY FROM THE SECONDARY UMH OF A NODE IS TO BE DISCARDED
414

FIG. 4A

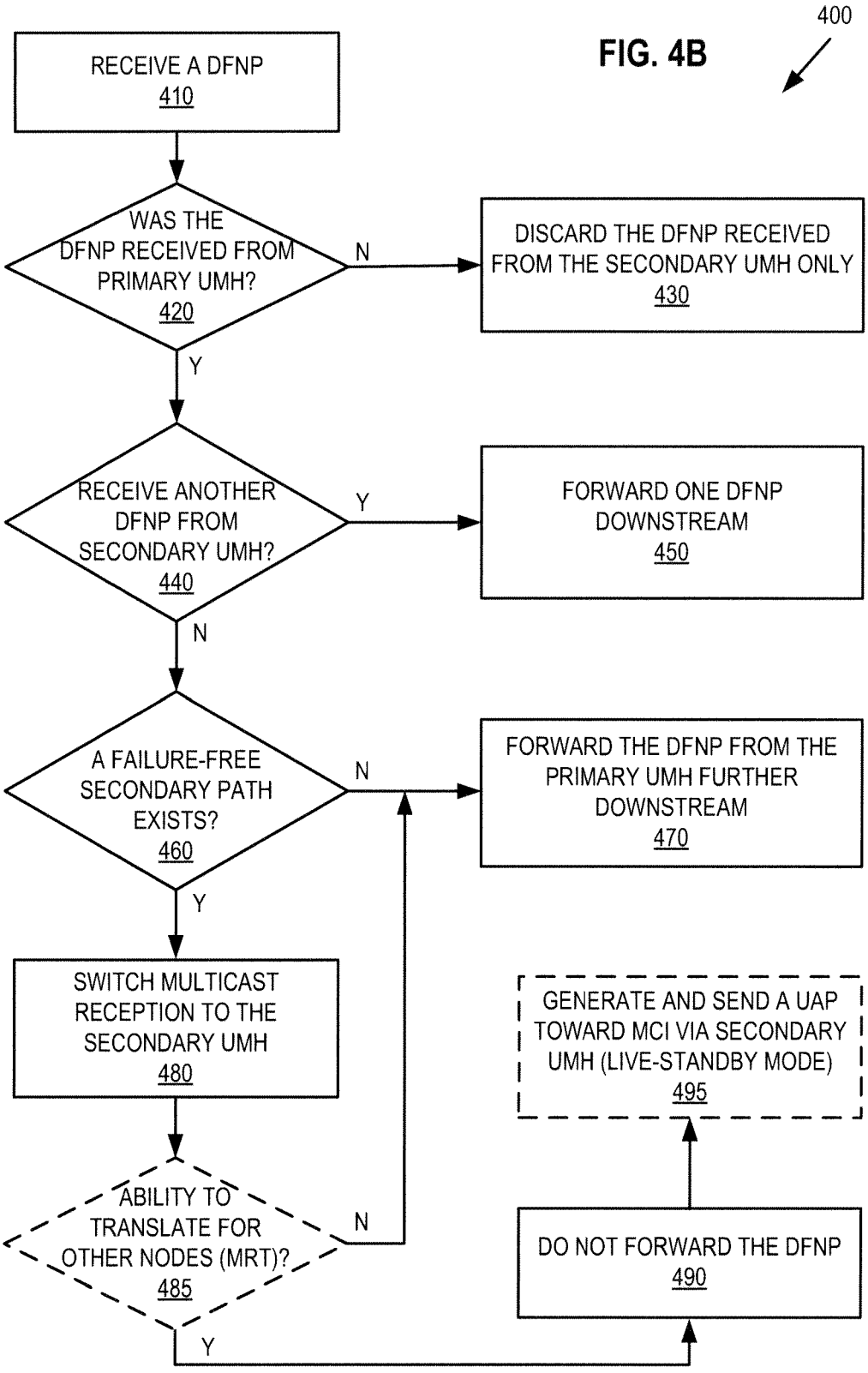

400
RECEIVE A DFNP
410
WAS THE DFNP RECEIVED FROM PRIMARY UMH?
420
N
DISCARD THE DFNP RECEIVED FROM THE SECONDARY UMH ONLY
430
Y
RECEIVE ANOTHER DFNP FROM SECONDARY UMH?
440
Y
FORWARD ONE DFNP DOWNSTREAM
450
N
A FAILURE-FREE SECONDARY PATH EXISTS?
460
N
FORWARD THE DFNP FROM THE PRIMARY UMH FURTHER DOWNSTREAM
470
Y
SWITCH MULTICAST RECEPTION TO THE SECONDARY UMH
480
GENERATE AND SEND A UAP TOWARD MCI VIA SECONDARY UMH (LIVE-STANDBY MODE)
495
ABILITY TO TRANSLATE FOR OTHER NODES (MRT)?
485
N
DO NOT FORWARD THE DFNP
490
Y

FIG. 4B

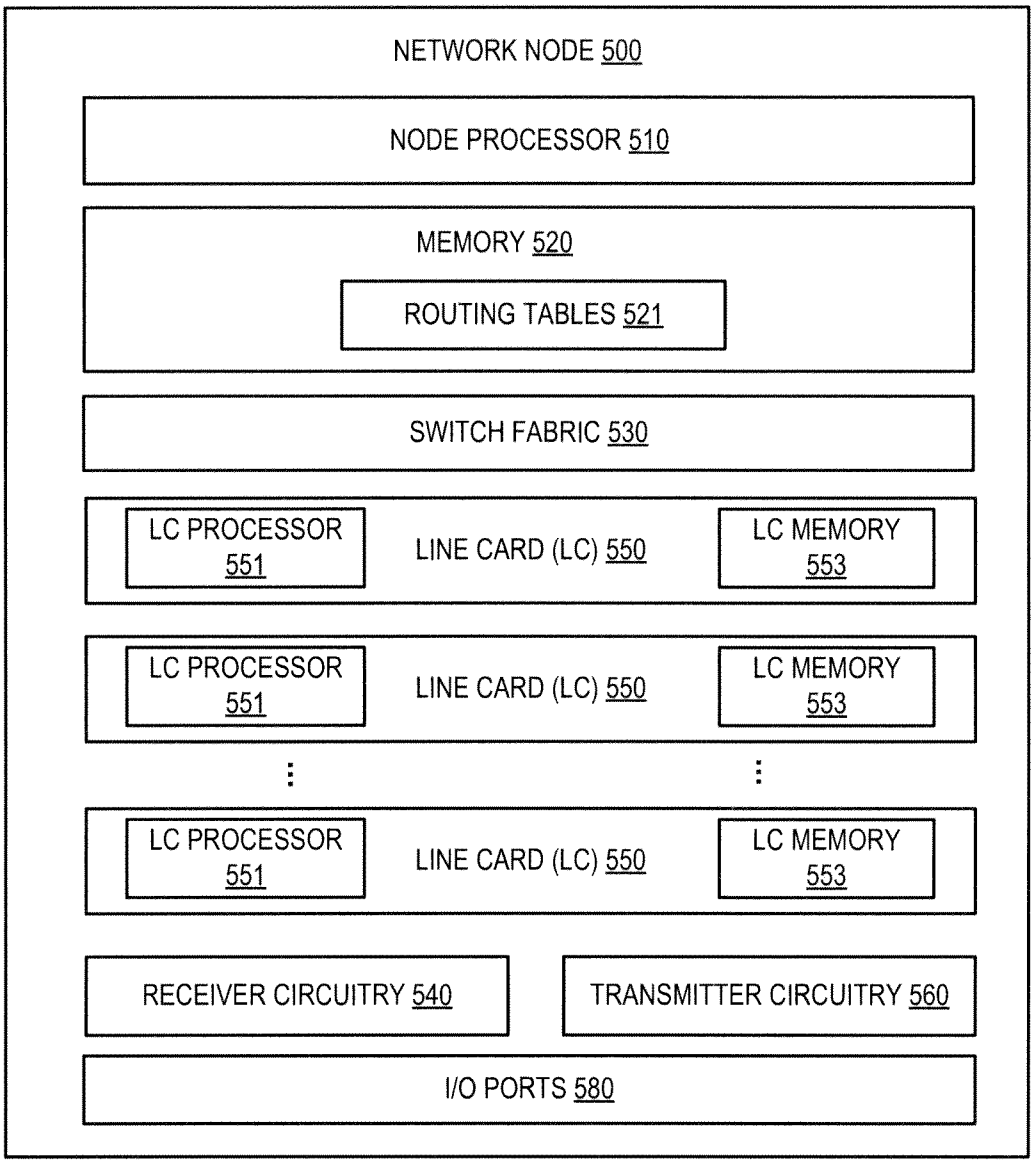

NETWORK NODE 500
NODE PROCESSOR 510
MEMORY 520
ROUTING TABLES 521
SWITCH FABRIC 530
LC PROCESSOR 551
LINE CARD (LC) 550
LC MEMORY 553
LC PROCESSOR 551
LINE CARD (LC) 550
LC MEMORY 553
LC PROCESSOR 551
LINE CARD (LC) 550
LC MEMORY 553
RECEIVER CIRCUITRY 540
TRANSMITTER CIRCUITRY 560
I/O PORTS 580

FIG. 5A

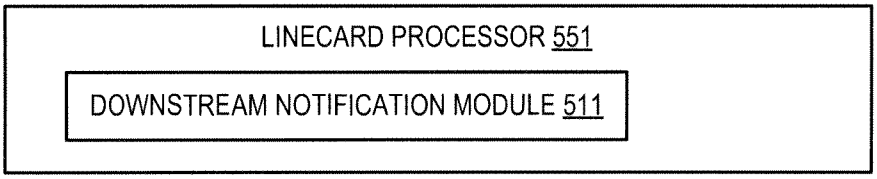

LINECARD PROCESSOR 551
DOWNSTREAM NOTIFICATION MODULE 511

FIG. 5B

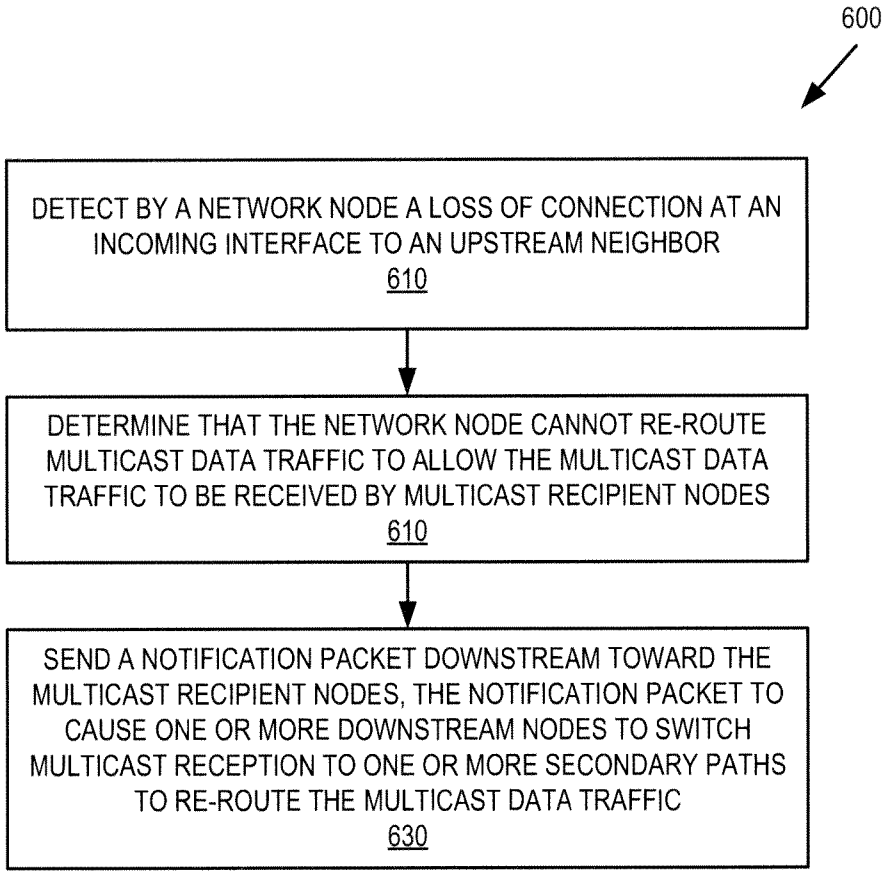

600
DETECT BY A NETWORK NODE A LOSS OF CONNECTION AT AN INCOMING INTERFACE TO AN UPSTREAM NEIGHBOR
610
DETERMINE THAT THE NETWORK NODE CANNOT RE-ROUTE MULTICAST DATA TRAFFIC TO ALLOW THE MULTICAST DATA TRAFFIC TO BE RECEIVED BY MULTICAST RECIPIENT NODES
610
SEND A NOTIFICATION PACKET DOWNSTREAM TOWARD THE MULTICAST RECIPIENT NODES, THE NOTIFICATION PACKET TO CAUSE ONE OR MORE DOWNSTREAM NODES TO SWITCH MULTICAST RECEPTION TO ONE OR MORE SECONDARY PATHS TO RE-ROUTE THE MULTICAST DATA TRAFFIC
630

FIG. 6

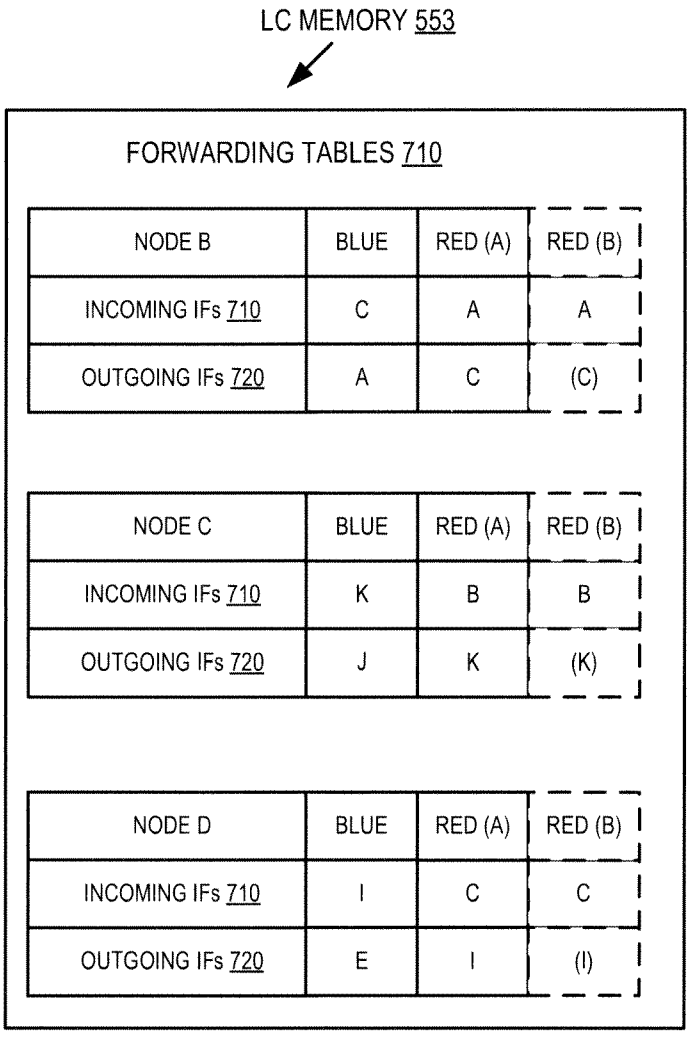

LC MEMORY 553
FORWARDING TABLES 710
NODE B | BLUE | RED (A) | RED (B)
INCOMING IFs 710 | C | A | A
OUTGOING IFs 720 | A | C | (C)
NODE C | BLUE | RED (A) | RED (B)
INCOMING IFs 710 | K | B | B
OUTGOING IFs 720 | J | K | (K)
NODE D | BLUE | RED (A) | RED (B)
INCOMING IFs 710 | I | C | C
OUTGOING IFs 720 | E | I | (I)

FIG. 7A

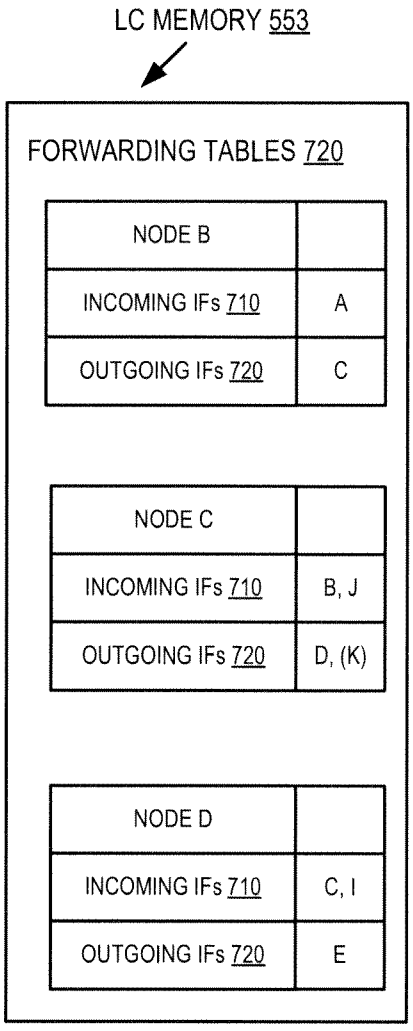

LC MEMORY 553
FORWARDING TABLES 720
NODE B |
INCOMING IFs 710 | A
OUTGOING IFs 720 | C
NODE C |
INCOMING IFs 710 | B, J
OUTGOING IFs 720 | D, (K)
NODE D |
INCOMING IFs 710 | C, I
OUTGOING IFs 720 | E

FIG. 7B

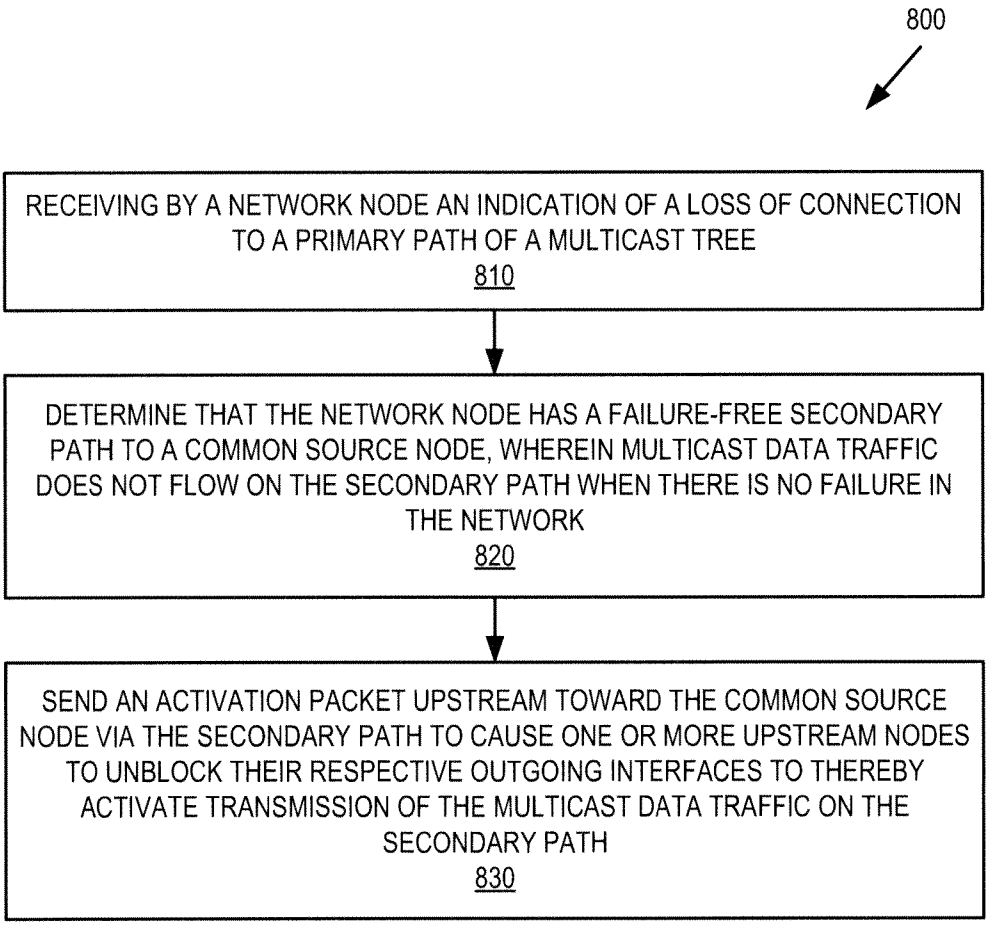

800
RECEIVING BY A NETWORK NODE AN INDICATION OF A LOSS OF CONNECTION TO A PRIMARY PATH OF A MULTICAST TREE
810
DETERMINE THAT THE NETWORK NODE HAS A FAILURE-FREE SECONDARY PATH TO A COMMON SOURCE NODE, WHEREIN MULTICAST DATA TRAFFIC DOES NOT FLOW ON THE SECONDARY PATH WHEN THERE IS NO FAILURE IN THE NETWORK
820
SEND AN ACTIVATION PACKET UPSTREAM TOWARD THE COMMON SOURCE NODE VIA THE SECONDARY PATH TO CAUSE ONE OR MORE UPSTREAM NODES TO UNBLOCK THEIR RESPECTIVE OUTGOING INTERFACES TO THEREBY ACTIVATE TRANSMISSION OF THE MULTICAST DATA TRAFFIC ON THE SECONDARY PATH
830

FIG. 8

s

FORM 1 THE PATENTS ACT 1970 (39 of 1970) & The Patents [Amendment] Rules, 2006 APPLICATION FOR GRANT OF PATENT (See section 7, 54 & 135 and rule 20 (1))	(FOR OFFICE USE ONLY) Application No: Filing Date: Amount of Fee Paid: CBR No: Signature:

1. APPLICANT:

Name	Nationality	Address
Telefonaktiebolaget LM Ericsson (Publ)	SE	SE-164 83 Stockholm (SE)

2. INVENTORS:

Name	Nationality	Address
CSÁSZÁR, András	HU	Vadrózsa u. 28, H-2089 Telki (HU)
TANTSURA, Evgeny	NL	779 La Para Ave., Palo Alto, California 94306, USA
ENYEDI, Gabor Sandor	HU	Berkenye sétány 3., 8/52 1201 Budapest (HU)

3. TITLE OF THE INVENTION:

Enhancements Of The Protocol Independent Multicast (PIM) Fast Re-Route Methodology With Downstream Notification Packets

4. ADDRESS FOR CORRESPONDENCE OF APPLICANT/AUTHORIZED PATENT AGENT IN INDIA LEX ORBIS 709/710, Tolstoy House 15 – 17, Tolstoy Marg New Delhi – 110 001	 Telephone No. 91 11 2371 6565 Fax: 91 11 2371 6556 Email: mail@lexorbis.com

5. PRIORITY PARTICULARS OF THE APPLICATION FILED IN CONVENTION COUNTRY:

Country	Application Number	Filing Date	Name of the Applicant	Title of the Invention
USA	13/486,472	June 1, 2012	1) CSÁSZÁR, András; 2) TANTSURA, Evgeny; 3) ENYEDI, Gabor Sandor	Enhancements To PIM Fast Re-Route With Downstream Notification Packets

6. PARTICULARS FOR FILING PATENT COOPERATION TREATY (PCT) NATIONAL PHASE

APPLICATION:

International application number	International filing date as allotted by the receiving office
PCT/IB2013/053723	May 8, 2013

7. PARTICULARS FOR FILING DIVISIONAL APPLICATION:

Original (first) application number	Date of filing of Original (first) application
Not Applicable	

8. PARTICULARS FOR FILING PATENT OF ADDITION:

Main application/Patent Number.	Date of filing of main application
Not Applicable	

9. DECLARATIONS:

(i) Declaration by the inventors:

We, the above named inventors, are the true & first inventors for this invention and declare that the applicant herein is our assignee.

Date_____

_____

CSÁSZÁR, András

Date_____

_____

TANTSURA, Evgeny

Date_____

_____

ENYEDI, Gabor Sandor

(ii) Declaration by the applicant in the convention country:

Not Applicable

(iii) DECLARATION BY THE APPLICANT:

We, the applicant, hereby declare that:

(√) We are in possession of the above-mentioned invention.

(√) The complete specification relating to the invention is filed with this application.

(X) The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by us before the grant of patent to us.

(√) There is no lawful ground of objection to the grant of the patent to us.

(√) We are the assignee of true & first inventors.

(√) The application or each of the applications, particulars of which are given in Para-5 was the first application in convention country in respect of our invention.

(√) We claim the priority from the above mentioned application filed in convention country and state that no application for protection in respect of the invention had been made in a convention country before that date by us or by any person from which we derive the title.

(√) Our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Para-6.

(X) The application is divided out of our application particulars of which is given in Para-7 and prays that this application may be treated as deemed to have been filed on _____ under Sec. 16 of the Act.

(X) The said invention is an improvement in or modification of the invention particulars of which are given in Para-8.

10. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION:

a) Form 2 - Complete specification in conformation with the International application, No. of pages: 31; No. of claims: 26;
b) Drawings in conformation with the international application, No. of pages: 09;
c) Statement and Undertaking under Section 8 on Form – 3;
d) Declaration as to inventorship on Form – 5;
e) An attested copy of the General Power of Authority [Form 26] – originally filed with respect to Indian application no. 3656/DELNP/2004;
f) A copy of US recorded assignment from inventors to “Telefonaktiebolaget LM Ericsson (Publ)” filed in respect of US Application No. 13/486,472;
g) A copy of International Application Published with International Search Report under PCT vide Publication No. WO 2013/179162 A1 dated December 5, 2013;
h) Official Fee of Rs. 41, 600/- via wire transfer dated December 3, 2014.

We hereby declare that to the best of our knowledge, information and belief the fact and matters stated herein are correct and we request that a patent may be granted to us for the said invention.

Dated this 3rd day of December, 2014

Manisha Singh
Agent for the Applicant [IN/PA-740]
LEXORBIS

To,
The Controller of Patents
The Patent Office
At New Delhi

FORM 5
THE PATENTS ACT, 1970
(39 OF 1970)
&
THE PATENTS [AMENDMENT] RULES, 2006
DECLARATION AS TO INVENTORSHIP
[See Section 10(6) and rule 13(6)]

1. NAME OF APPLICANT	Telefonaktiebolaget LM Ericsson (Publ)

hereby declare that the true and first inventors of the invention disclosed in the complete specification filed in pursuance of our application numbered 10289/DELNP/2014 dated December 3, 2014 are:

2. INVENTORS:

(a) NAME : CSÁSZÁR, András
(b) NATIONALITY : HU
(c) ADDRESS : Vadrózsa u. 28, H-2089 Telki (HU)

(a) NAME : TANTSURA, Evgeny
(b) NATIONALITY : NL
(c) ADDRESS : 779 La Para Ave., Palo Alto, California 94306, USA

(a) NAME : ENYEDI, Gabor Sandor
(b) NATIONALITY : HU
(c) ADDRESS : Berkenye sétány 3., 8/52 1201 Budapest (HU)

Dated this 3rd day of December, 2014

Manisha Singh
Agent for the Applicant [IN/PA-740]
LEXORBIS

To,
The Controller of Patents
The Patent Office
At New Delhi