

(12) **United States Patent**  
**Steele, Jr. et al.**

(10) **Patent No.:** **US 6,603,742 B1**  
 (45) **Date of Patent:** **Aug. 5, 2003**

(54) **NETWORK RECONFIGURATION**

(75) Inventors: **Guy L. Steele, Jr.**, Lexington, MA (US); **Steven K. Heller**, Chelmsford, MA (US); **Daniel Cassidy**, Topsfield, MA (US); **Jon Wade**, Wellesley, MA (US)

(73) Assignee: **Sun Microsystems, Inc.**, Santa Clara, CA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/323,962**

(22) Filed: **Jun. 2, 1999**

(51) Int. Cl.<sup>7</sup> ..... **H04L 12/28**

(52) U.S. Cl. .... **370/254; 370/400**

(58) Field of Search ..... 370/351, 242, 370/408, 402, 400, 254; 709/238, 293, 242, 246, 258

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,128,932 A	7/1992	Li	
5,453,978 A	9/1995	Sethu et al.	
5,602,839 A	2/1997	Annapareddy et al.	
5,680,116 A	10/1997	Hashimoto et al.	
5,721,819 A	2/1998	Galles et al.	
5,740,346 A	4/1998	Wicki et al.	
5,751,710 A *	5/1998	Crowther et al.	370/423
5,751,967 A	5/1998	Raab et al.	
5,768,501 A	6/1998	Lewis	
5,781,546 A	7/1998	Sethu	
5,812,549 A	9/1998	Sethu	
5,859,981 A	1/1999	Levin et al.	
5,874,964 A	2/1999	Gille	
5,884,047 A	3/1999	Aikawa et al.	
5,914,953 A	6/1999	Krause et al.	
5,970,232 A *	10/1999	Passint et al.	395/200.68

6,005,860 A	12/1999	Anderson et al.
6,031,835 A	2/2000	Abali et al.
6,055,618 A	4/2000	Thorson
6,064,671 A	5/2000	Killian
6,097,718 A	8/2000	Bion
6,137,781 A	10/2000	Goto et al.
6,230,252 B1	5/2001	Passint et al.
6,243,760 B1	6/2001	Armbruster et al.
6,256,295 B1	7/2001	Callon
6,295,573 B1	9/2001	Bailey et al.
6,437,804 B1	8/2002	Ibe et al.

**FOREIGN PATENT DOCUMENTS**

EP 817097 A2 1/1998

**OTHER PUBLICATIONS**

Whay C. Lee, "Topology Aggregation for Hierarchical Routing in ATM Networks." Apr. 1, 1995, pp. 82-92, Computer-Communication Review.

(List continued on next page.)

*Primary Examiner*—Wellington Chin

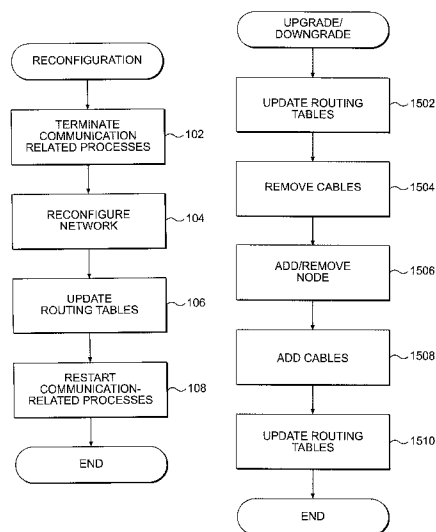
*Assistant Examiner*—Brenda Pham

(74) *Attorney, Agent, or Firm*—Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.

(57) **ABSTRACT**

In accordance with methods and systems consistent with the present invention, an improved technique for reconfiguring networks is provided. By using this technique, a network administrator can reconfigure their network while it remains operational. As a result, users can continue to utilize the network during reconfiguration. Additionally, in accordance with methods and systems consistent with the present invention, a number of network topologies are provided that are designed to facilitate reconfiguration. When using one of these topologies, the network can be reconfigured with a minimal amount of recabling, thus reducing the amount of time required for reconfiguration.

**86 Claims, 15 Drawing Sheets**



OTHER PUBLICATIONS

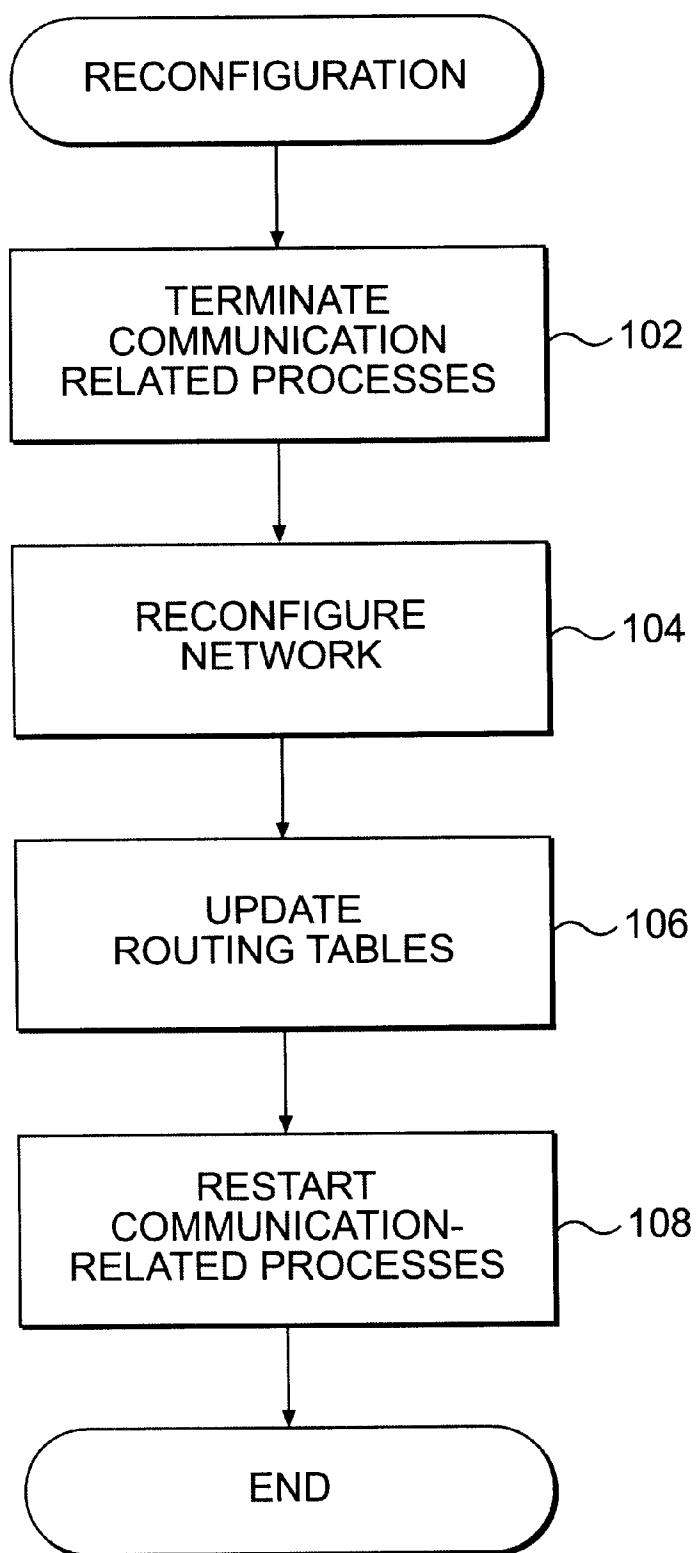
IBM, "Clustering Algorithm for Computer Network Management Graphics", Jun. 1988, pp. 71-79, IBM Technical Disclosure Bulletin, vol. 31, No. 1.

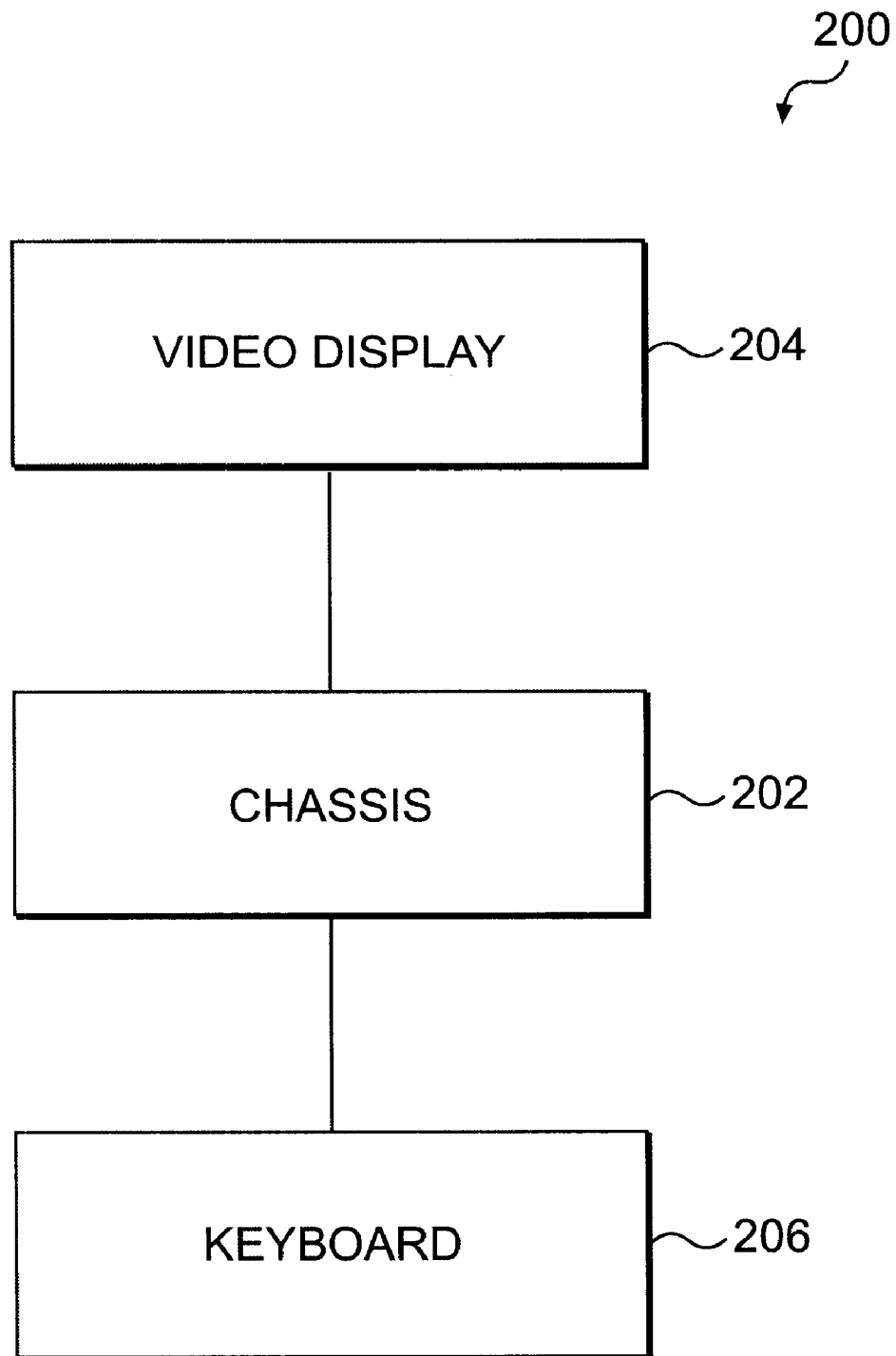
Percy, M. et al., "Distributed Algorithms for Shortest-Path, Deadlock-Free Routing and Broadcasting in Arbitrarily Faulty Hypercubes," International Symposium on Fault Tolerant Computing Systems (FTCS), US, Los Alamitos, IEEE Comp. Soc. Press, vol. Symp. 20, Jun, 26, 1990, pp. 218-225.

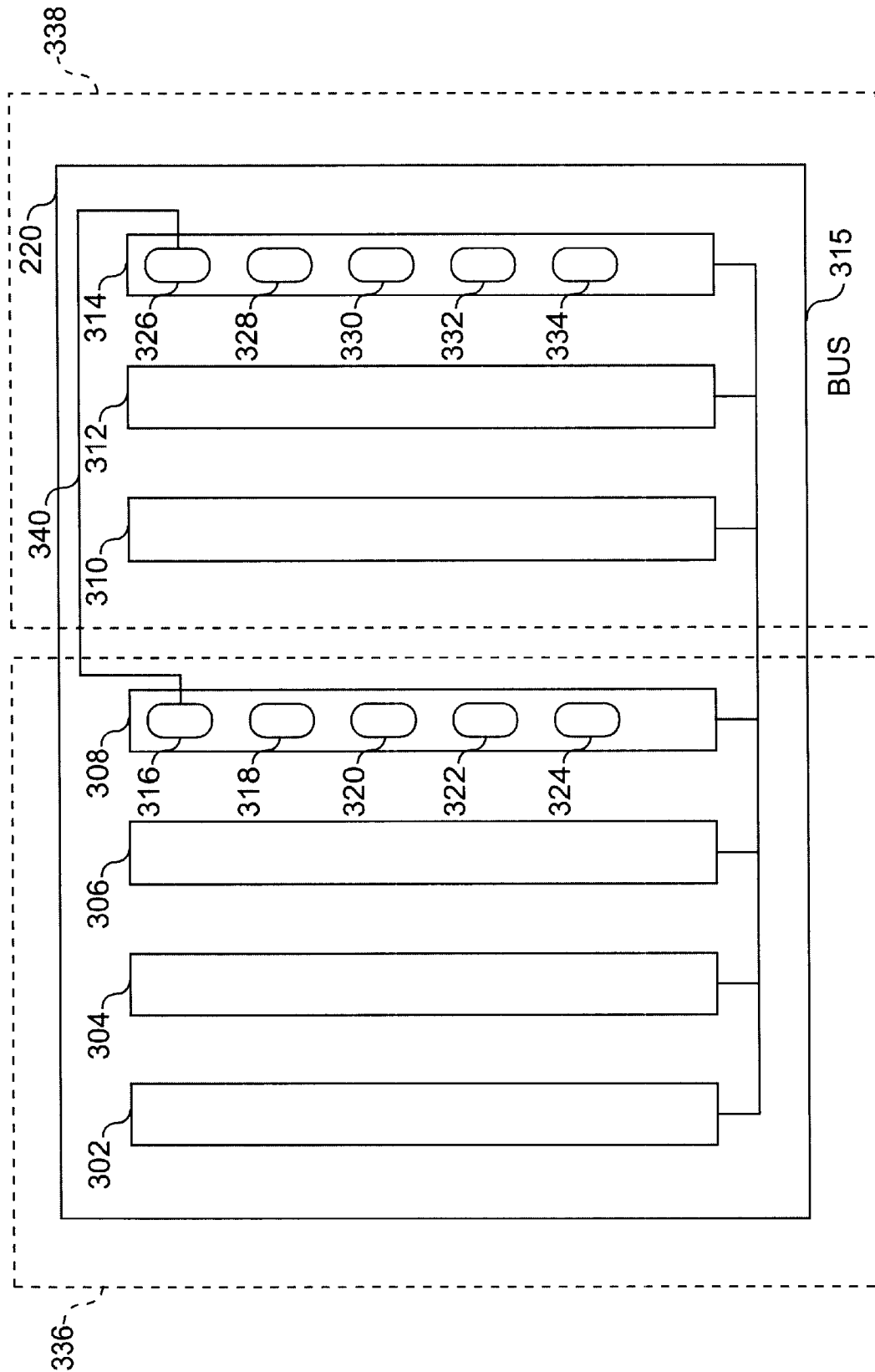
Fleury, E. et al., "A General Theory for Deadlock Avoidance in Wormhole-Routed Networks," IEEE Trans. on Parallel and Distributed Systems, IEEE Inc., NY, vol. 9, No. 7, Jul. 1, 1998, pp. 626-638.

Pifarre G. D. et al., "Adaptive Deadlock-and Livestock-Free Routing in the Hypercube Network," IEEE Trans. on Parallel and Distributed Systems, IEEE Inc., NY, vol. 5, No. 11, Nov. 1, 1994, pp. 1121-1138.

\* cited by examiner

**FIG. 1**

**FIG. 2**



**FIG. 3**

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.