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(54) **METHOD AND SYSTEM FOR IDENTIFYING AND PROCESSING CHANGES TO A NETWORK TOPOLOGY**

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 H04L 12/28 (2006.01)

(52) **U.S. Cl.** **370/254**; 370/403; 370/402; 370/351; 714/717; 709/223; 709/224

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 See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,644,532	A	*	2/1987	George et al. 370/255
5,023,873	A	*	6/1991	Stevenson et al. 714/4
5,727,157	A	*	3/1998	Orr et al. 709/224
5,729,685	A	*	3/1998	Chatwani et al. 709/224
5,732,086	A	*	3/1998	Liang et al. 370/410
5,740,346	A	*	4/1998	Wicki et al. 714/22
5,886,643	A		3/1999	Diebboll et al.
6,108,702	A	*	8/2000	Wood 709/224
6,160,796	A	*	12/2000	Zou 370/257
6,295,541	B1	*	9/2001	Bodnar et al. 707/203
6,347,336	B1	*	2/2002	Song et al. 709/223
6,405,248	B1	*	6/2002	Wood 709/223
6,636,981	B1	*	10/2003	Barnett et al. 714/4
6,791,948	B1	*	9/2004	Desnoyers et al. 370/254
6,885,644	B1	*	4/2005	Knop et al. 370/254

FOREIGN PATENT DOCUMENTS

EP	830047 A2	3/1998
JP	2000-76209	3/2000
WO	WO98/44400	10/1998

* cited by examiner

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(57) **ABSTRACT**

A method and system are disclosed for mapping the topology of a network having interconnected nodes by identifying changes in the network and updating a stored network topology based on the changes. The nodal connections are represented by data tuples that store information such as a host identifier, a connector interface, and a port specification for each connection. A topology database stores an existing topology of a network. A topology converter accesses the topology database and converts the existing topology into a list of current tuples. A connection calculator calculates tuples to represent connections in the new topology. The topology converter receives the new tuples, identifies changes to the topology, and updates the topology database using the new tuples. The topology converter identifies duplicate tuples that appear in both the new tuples and the existing tuples and marks the duplicate tuples to reflect that no change has occurred to these connections. The topology converter attempts to resolve swapped port conditions and searches for new singly-heard and multi-heard host link tuples in the list of existing tuples. The topology converter also searches for new conflict link tuples in the existing tuples. The topology converter updates the topology database with the new topology.

18 Claims, 26 Drawing Sheets
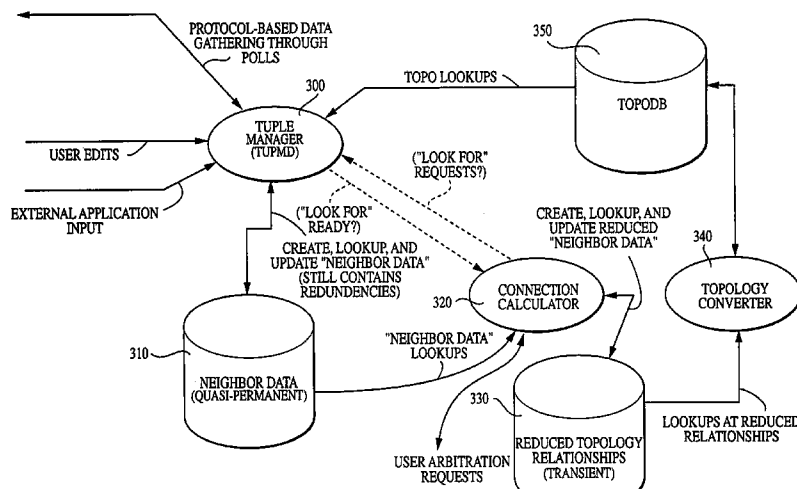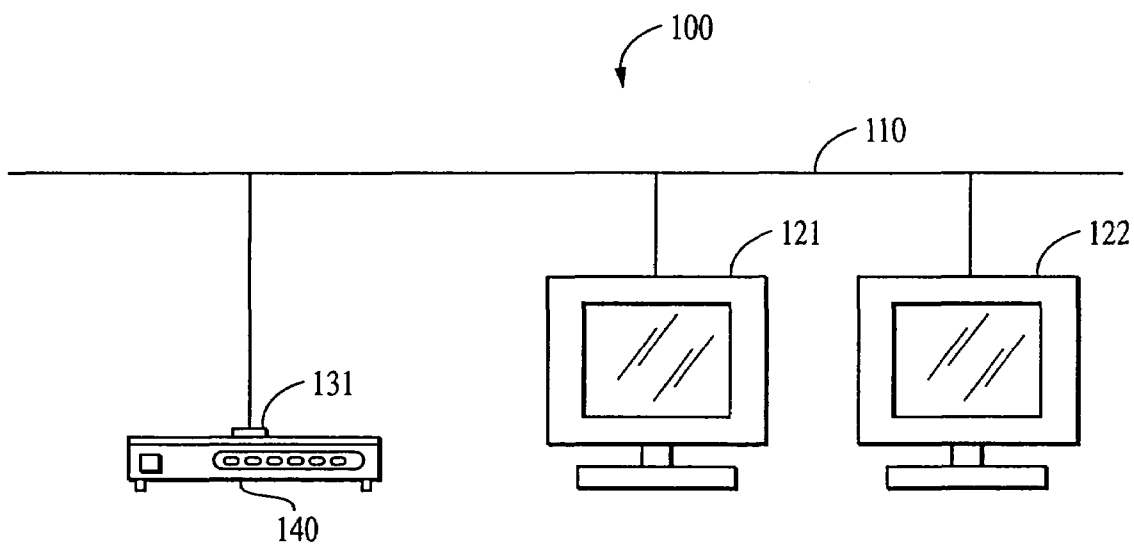
FIG. 1

FIG. 2

FIG. 3

FIG. 4

DOCKET ALARM
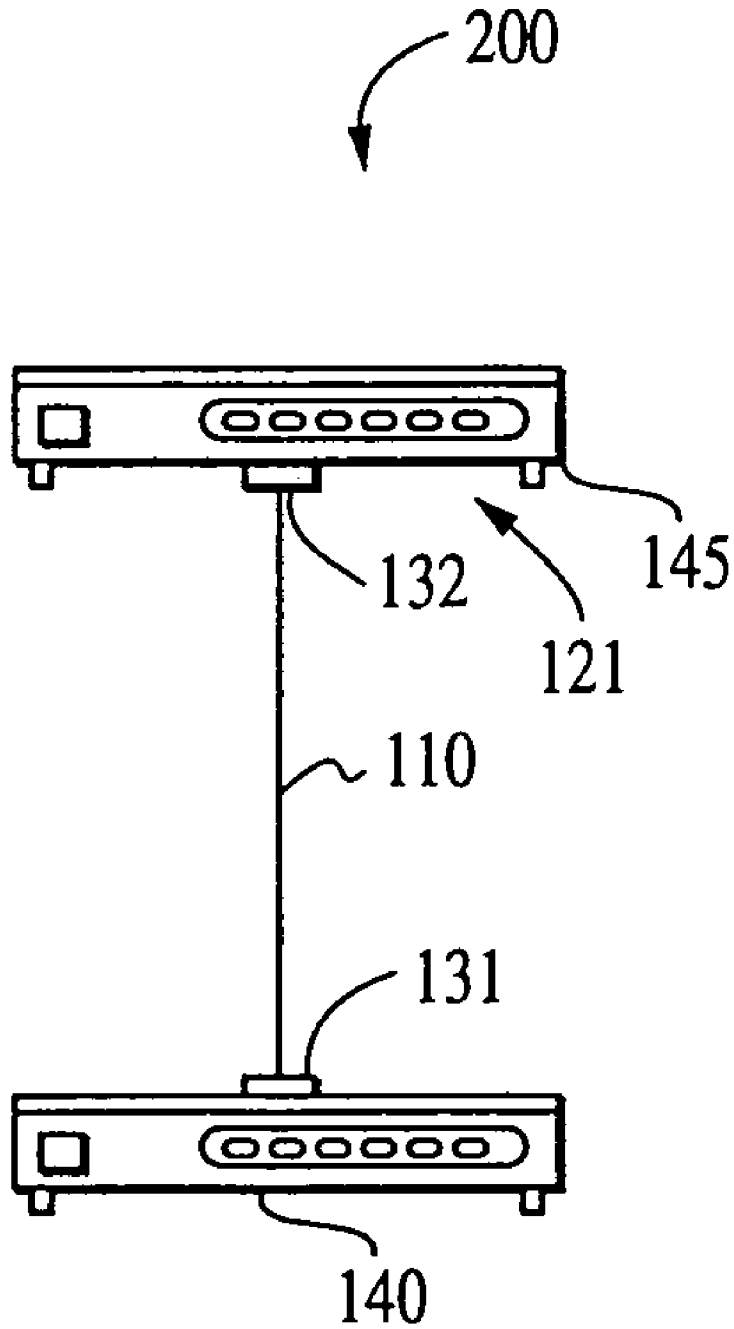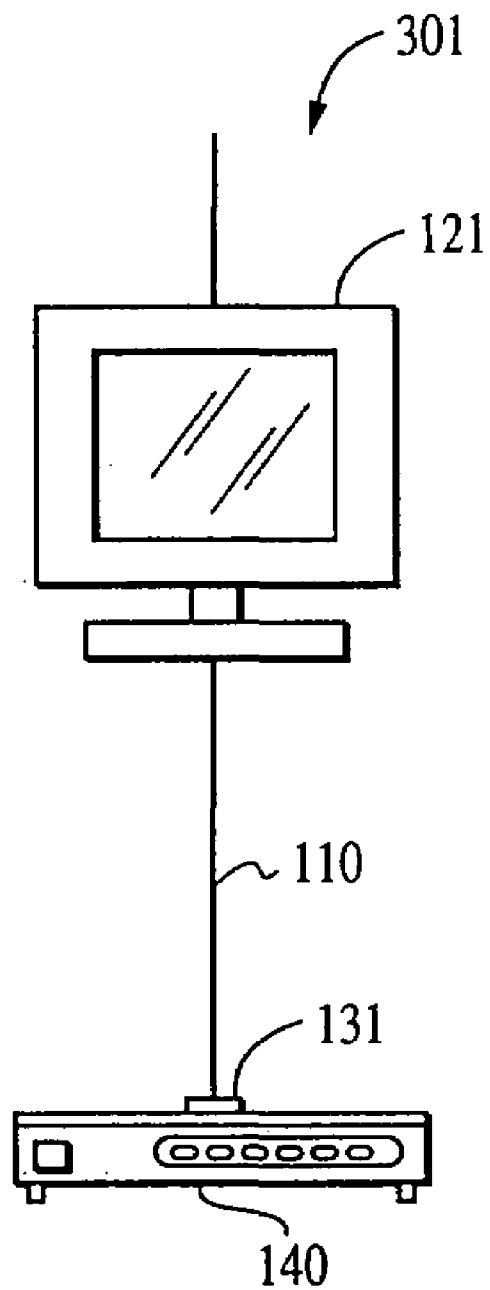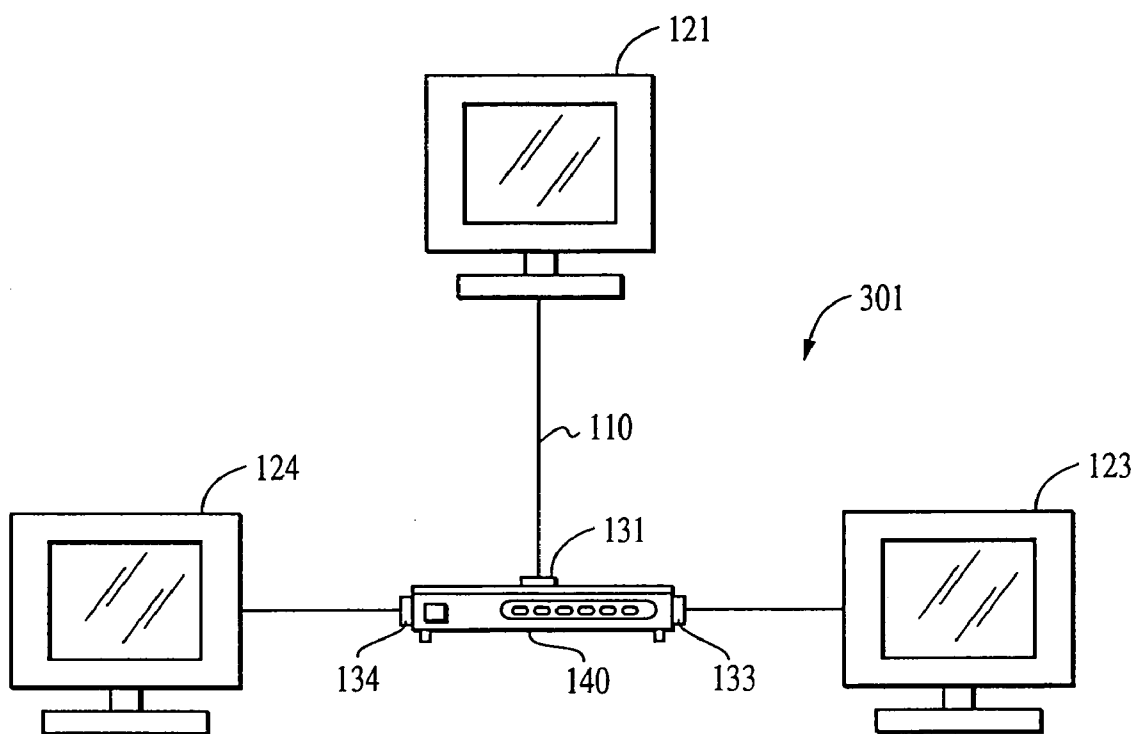
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