US005331637A

United States Patent [19]

Francis et al.

[11] Patent Number: 5,331,637

[45] Date of Patent: Jul. 19, 1994

[54] **MULTICAST ROUTING USING CORE BASED TREES**

[75] Inventors: **Paul T. Francis**, Morristown, N.J.; **Anthony J. Ballardie**, Alstonefield; **Jonathan A. Crowcroft**, London, both of England

[73] Assignee: **Bell Communications Research, Inc.**, Livingston, N.J.

[21] Appl. No.: **100,634**

[22] Filed: **Jul. 30, 1993**

[51] **Int. Cl.**[5] **H04L 12/44**; H04J 3/08

[52] **U.S. Cl.** **370/54**; 370/60; 370/94.3

[58] **Field of Search** 370/94.1, 94.3, 60, 370/54, 16; 340/827

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,740,954	4/1988	Cotton et al.	370/60
5,095,480	3/1992	Fenner	370/94.1
5,103,444	4/1992	Leung et al.	370/60

OTHER PUBLICATIONS

Deering, S., "Multicast Routing in Internetworks and Extended LANs" ACM Symposium on Communication Architectures and Protocols, ACM SIGCOMM, pp. 55-64 Aug. 1988.

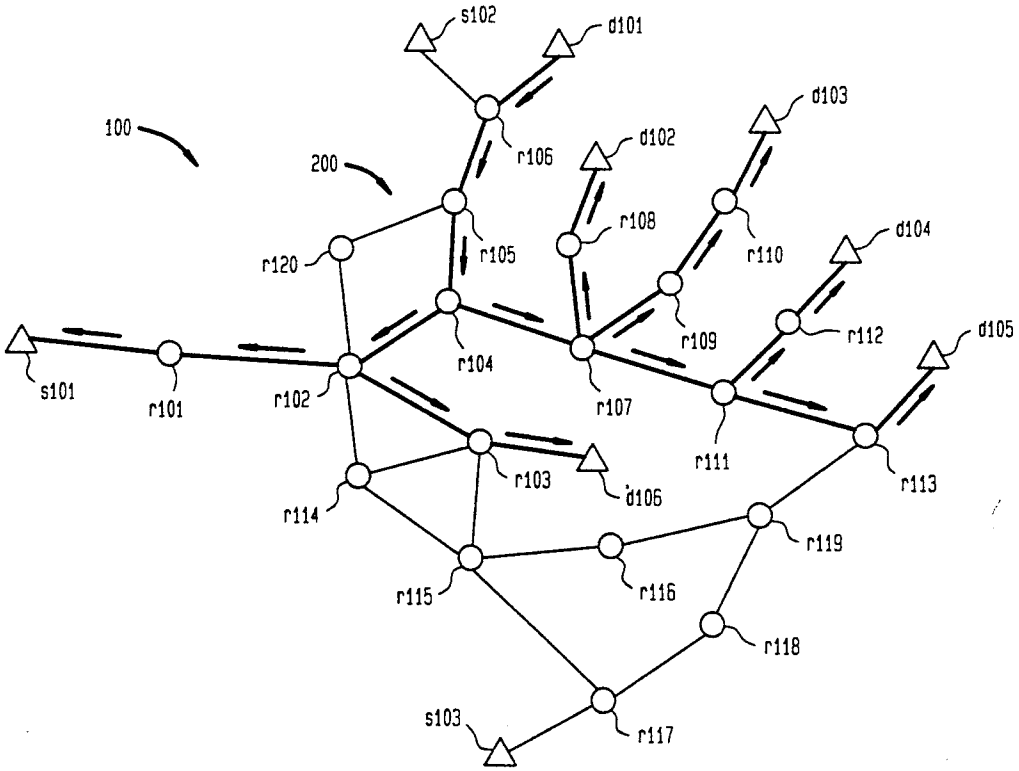
Wall, D., "Mechanism for Broadcast and Selective Broadcast," Jun. 1980 (PhD) thesis, Stamford University.

Primary Examiner—Douglas W. Olms
Assistant Examiner—Min Jung
Attorney, Agent, or Firm—Leonard C. Suchyta; James W. Falk

[57] **ABSTRACT**

A method for routing multicast packets in a network is disclosed. A node **s101** wishing to join a particular multicast group transmits a packet via a sequence of nodes (**r101, r102, r104, r107**) including a core node **r107** on the multicast tree corresponding to the particular multicast group which the node wishes to join. The packet contains a request to join the particular multicast group and the multicast address of the core node **r107** of the multicast tree corresponding to the particular multicast group. The packet is received at each node **r101, r102, r104, r107** of the sequence of nodes. Each node **r101, r102, r104, r107** which receives the packet writes an address of the node **s101, r101, r102, r104** from which the packet was received in an entry of a multicast forwarding table maintained thereat which entry is indexed by the multicast address of the core node **r107.** If the node **r101, r102, r104** which received the packet is not on the multicast tree of the particular multicast group, the node **r101, r102, r104** writes an address of the next node **r102, r104, r107** of the sequence of nodes in the multicast forwarding table entry indexed by the multicast address of the core node **r107.** The packet is then retransmitted to the next node **r102, r104, r107** of the sequence of nodes.

16 Claims, 8 Drawing Sheets



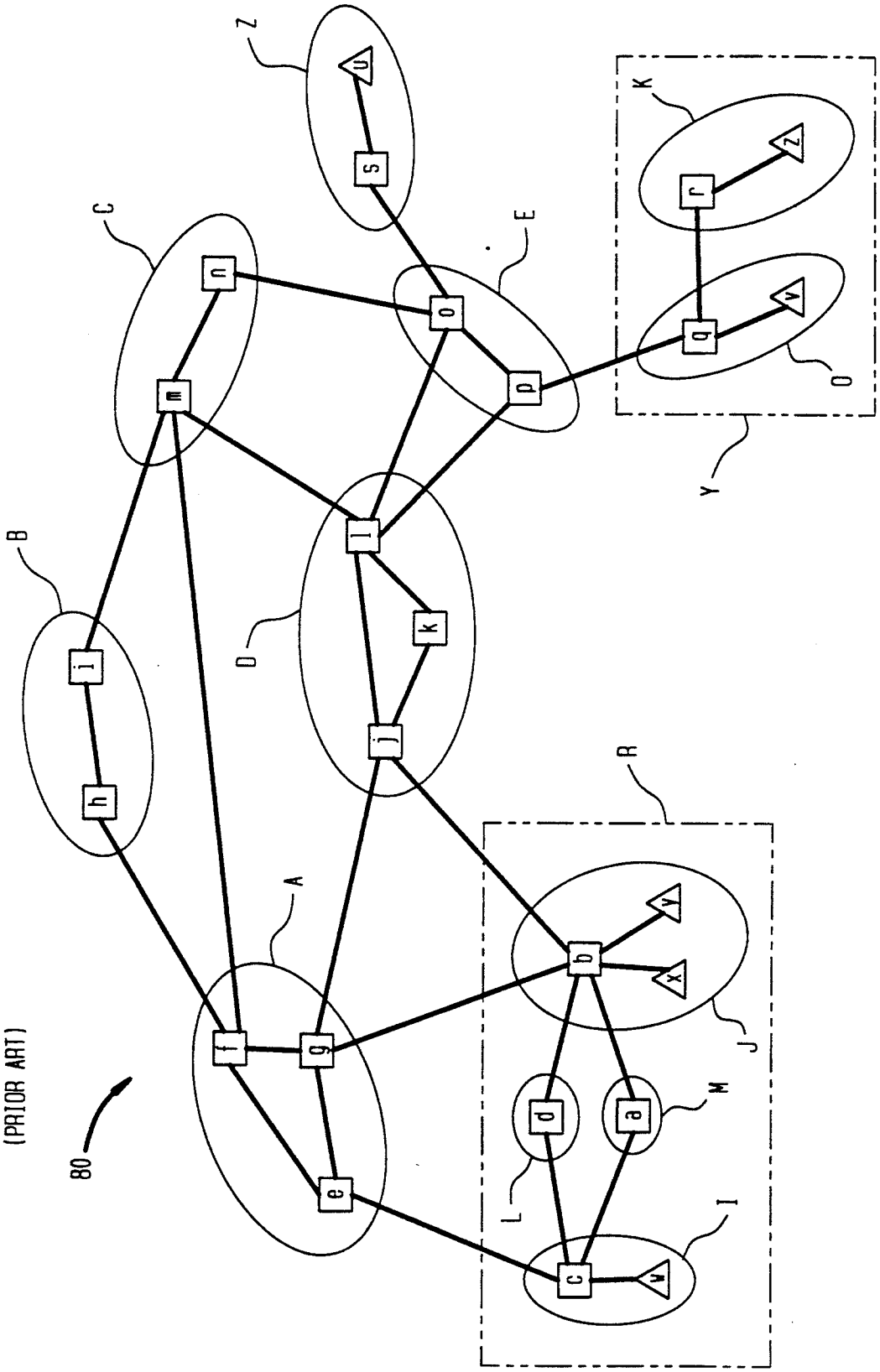


FIG. 1
(PRIOR ART)

FIG. 2
(PRIOR ART)

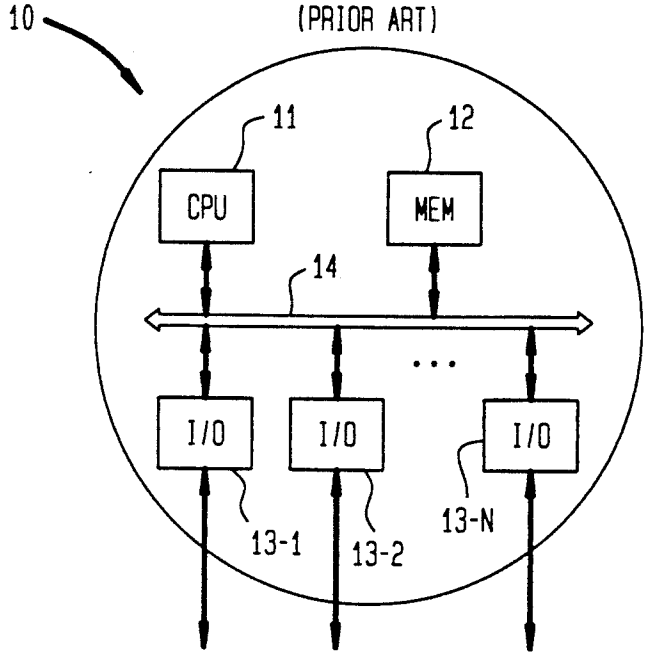


FIG. 3
(PRIOR ART)

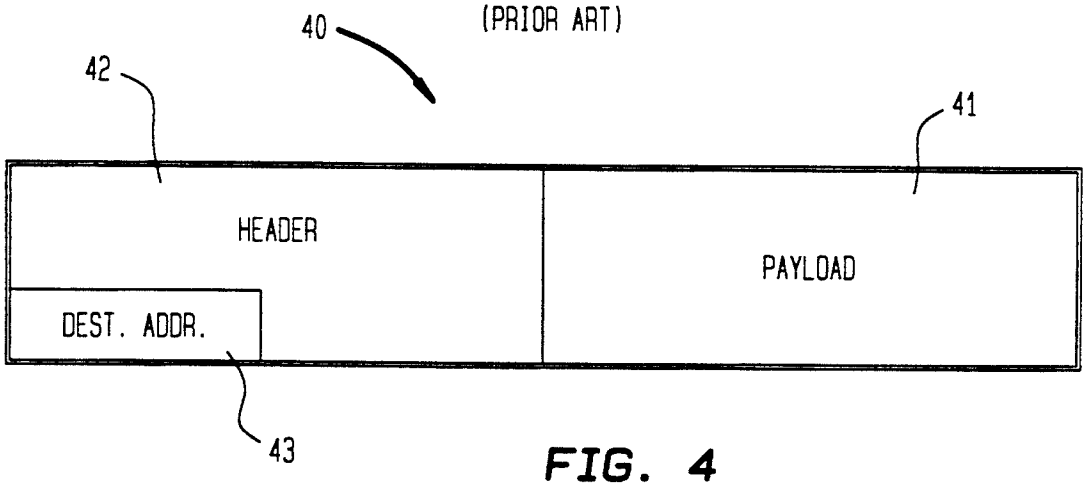


FIG. 4
(PRIOR ART)

50

51

INDEX	NEXT NODE
w	c
x	b
y	b
v	b
z	b

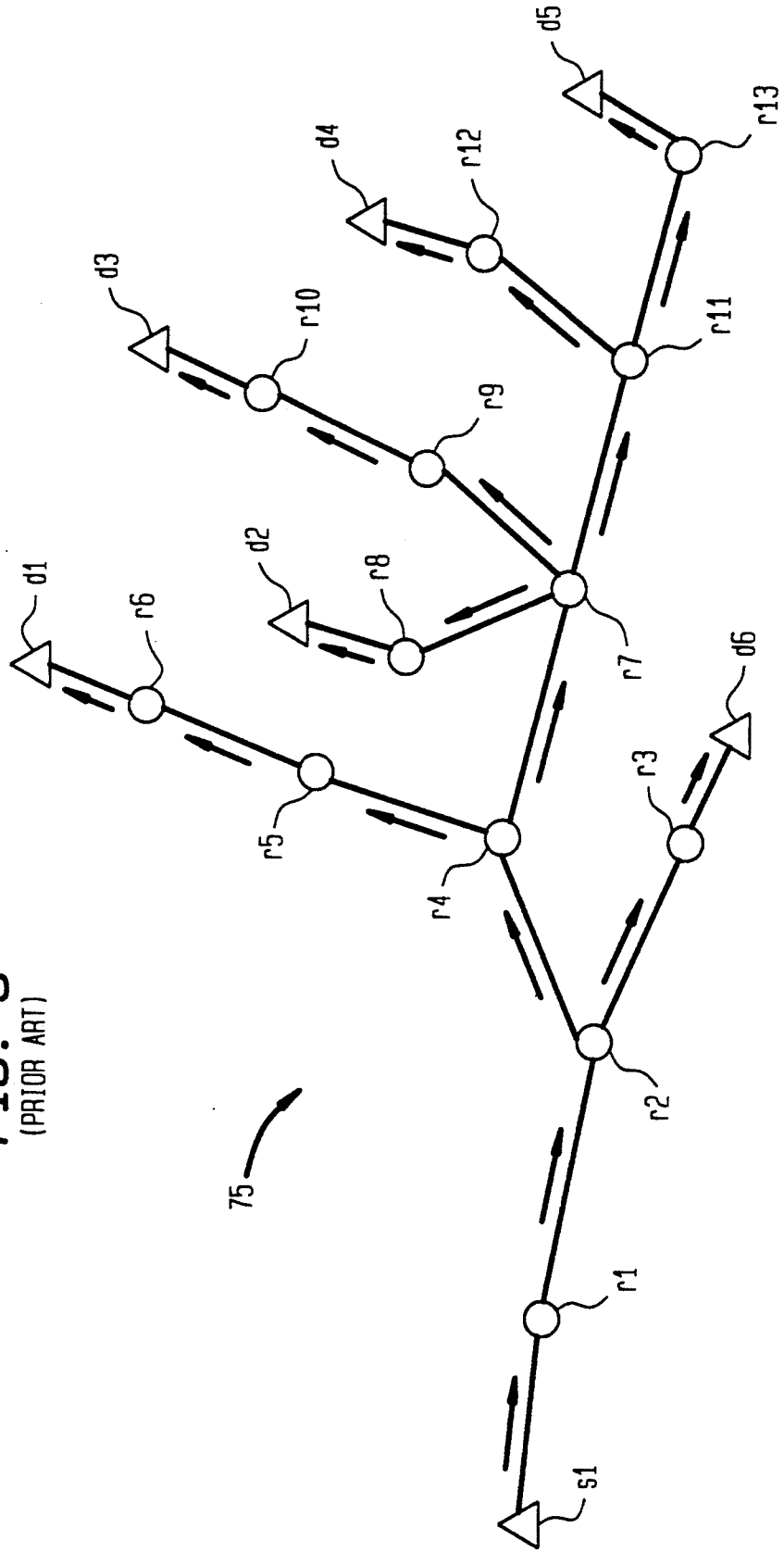


FIG. 5
(PRIOR ART)

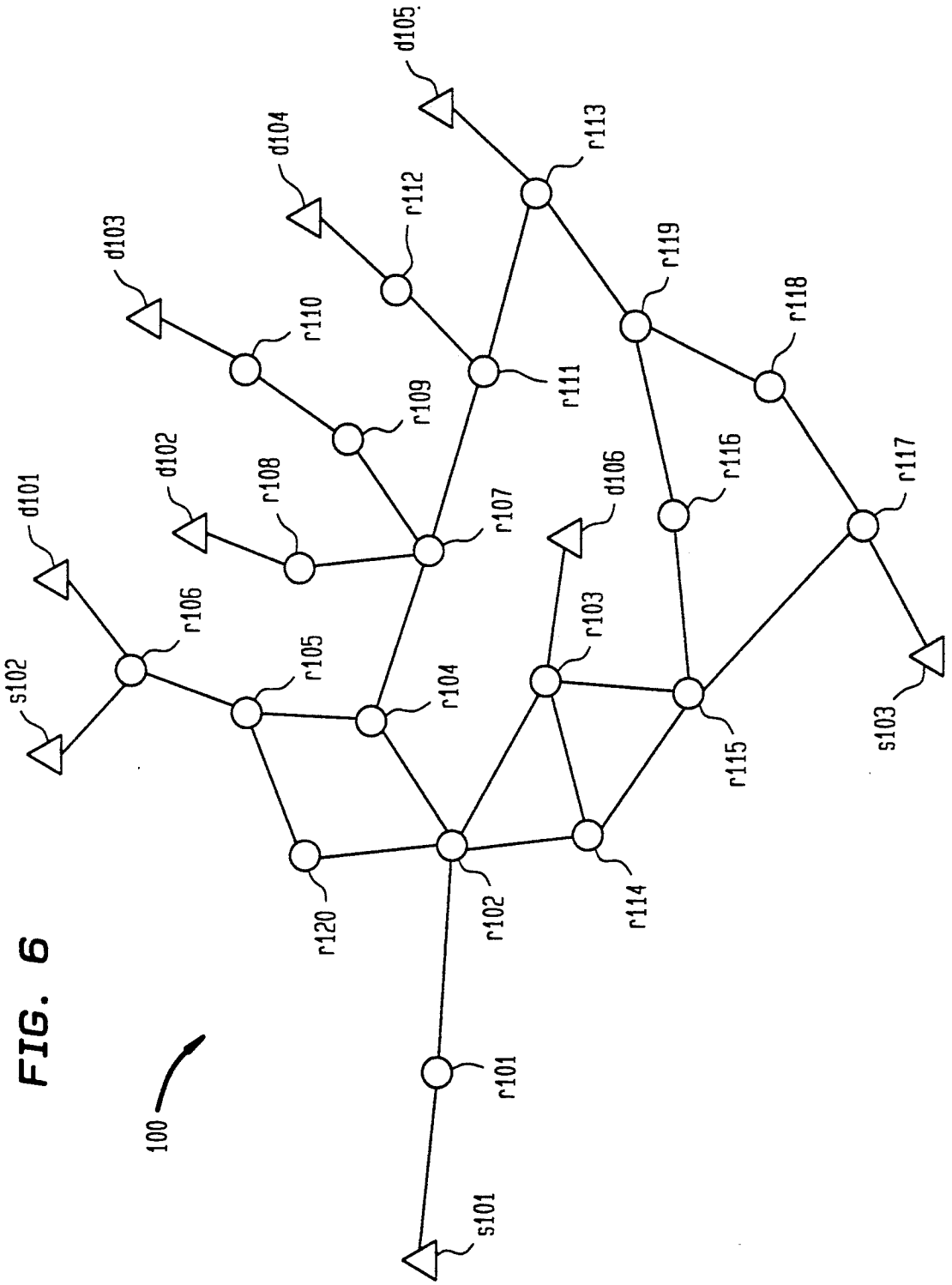


FIG. 6

DOCKET ALARM

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.