

(12) **United States Patent**  
**Young**(10) **Patent No.:** **US 6,643,522 B1**  
(45) **Date of Patent:** **Nov. 4, 2003**(54) **METHOD AND APPARATUS PROVIDING  
SIMULTANEOUS DUAL MODE  
OPERATIONS FOR RADIOS IN THE  
SHARED SPECTRUM**(75) Inventor: **Song-Lin Young**, Vancouver, WA (US)(73) Assignee: **Sharp Laboratories of America, Inc.**,  
Camas, WA (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.: **09/536,212**(22) Filed: **Mar. 27, 2000**(51) Int. Cl.<sup>7</sup> ..... **H04M 1/00**(52) U.S. Cl. .... **455/552.1; 455/90.2; 455/422.1;  
455/41.2**(58) **Field of Search** ..... 455/552, 553,  
455/575, 550, 73, 422, 41, 78, 552.1, 90.2,  
442.1, 41.2; 370/441, 442, 464, 335, 342,  
344, 296, 465; 375/133, 141(56) **References Cited****U.S. PATENT DOCUMENTS**

5,390,345 A	2/1995	Wada et al.	
5,392,300 A	2/1995	Borth et al.	
5,630,224 A	5/1997	Swail	
5,710,986 A	1/1998	Obayashi et al.	
5,765,113 A	6/1998	Russo et al.	
5,794,159 A *	8/1998	Portin	455/553

5,884,189 A	3/1999	Yamazaki et al.	
6,058,137 A *	5/2000	Partyka	375/131
6,108,313 A *	8/2000	Lee et al.	370/294

\* cited by examiner

*Primary Examiner*—Edward F. Urban*Assistant Examiner*—Sonny Trinh(74) *Attorney, Agent, or Firm*—Robert D. Varitz, P.C.(57) **ABSTRACT**

A dual mode RF radio includes a first transceiver operating under a first transmitter/receiver protocol, and having a first receiver portion and a first transmitter portion therein; and a second transceiver operating under a second transmitter/receiver protocol, and having a second receiver portion and a second transmitter portion therein; wherein both transmitter/receiver protocols are spread spectrum protocols; a shared antenna operatively connected to both said first transceiver and said second transceiver; and an isolation mechanism for isolating said first and second receiver portions from a transmitter portion while said transmitter portion is transmitting. A method of simultaneously operating a dual mode RF radio includes operating a first transceiver under a first transmitter/receiver protocol; operating a second transceiver under a second transmitter/receiver protocol, wherein both transmitter/receiver protocols are spread spectrum protocols; sharing an antenna between the first transceiver and the second transceiver; and isolating the receiver portions of the transceivers from the transmitter portion of the transceivers while a transmitter portion is transmitting, including providing a circulator for connecting the receiver portions and the transmitter portions to the shared antenna.

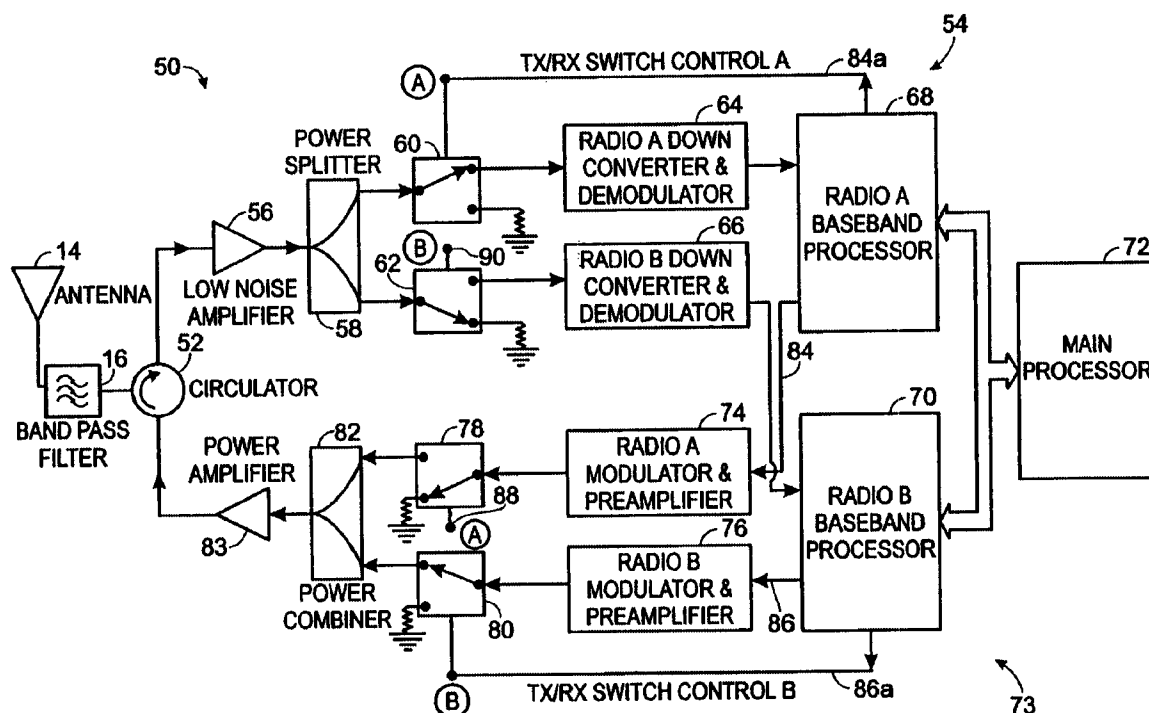
**10 Claims, 6 Drawing Sheets**

Fig. 1

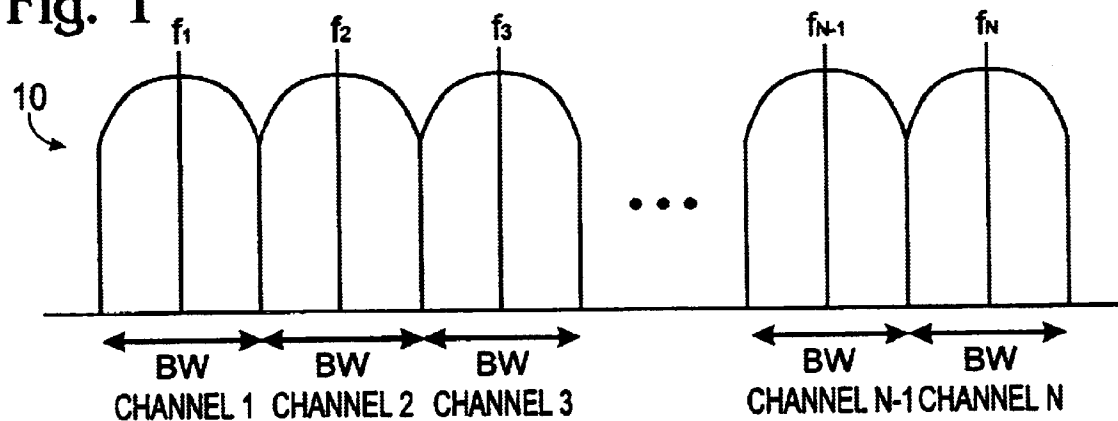


Fig. 2

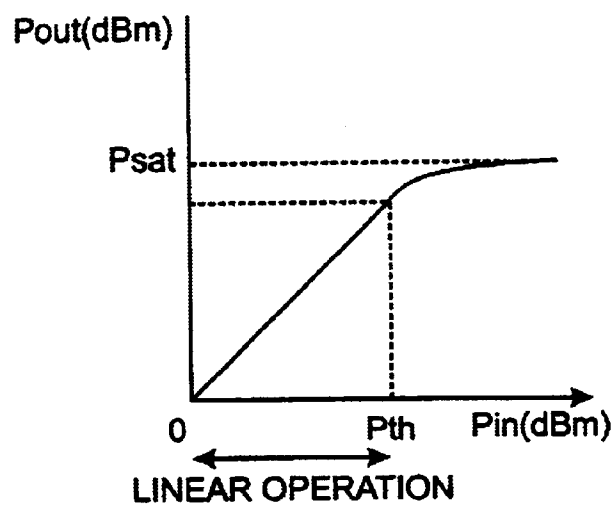
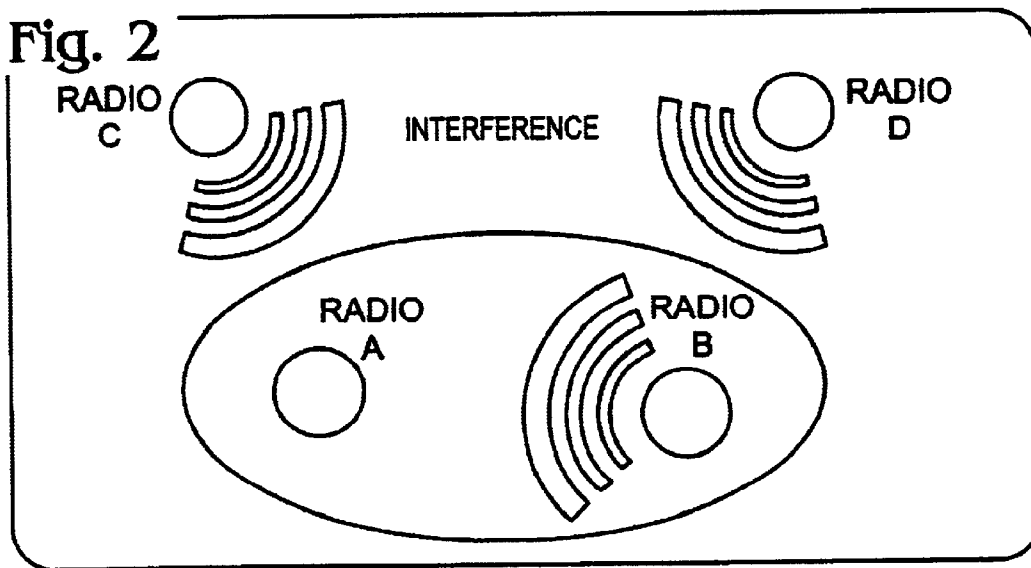
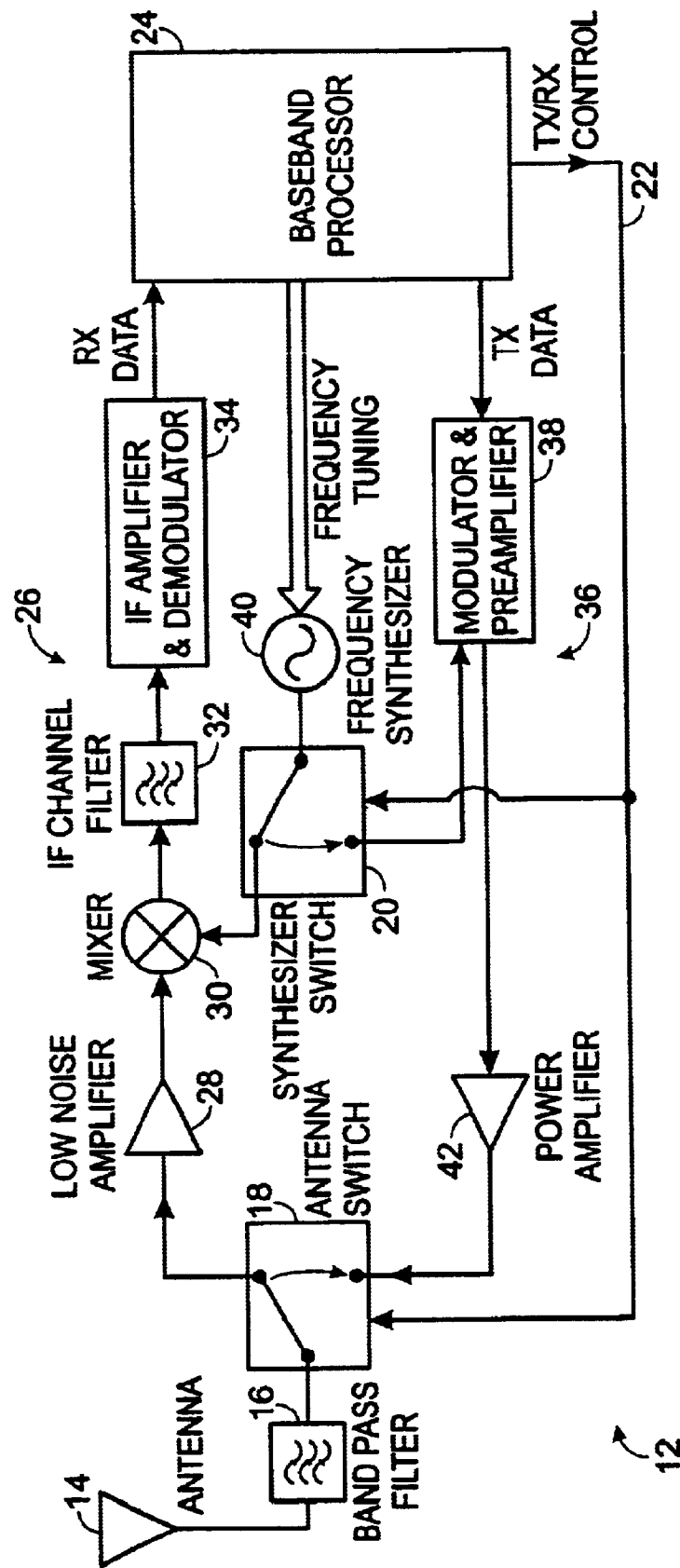


Fig. 3

Fig. 4  
(PRIOR ART)



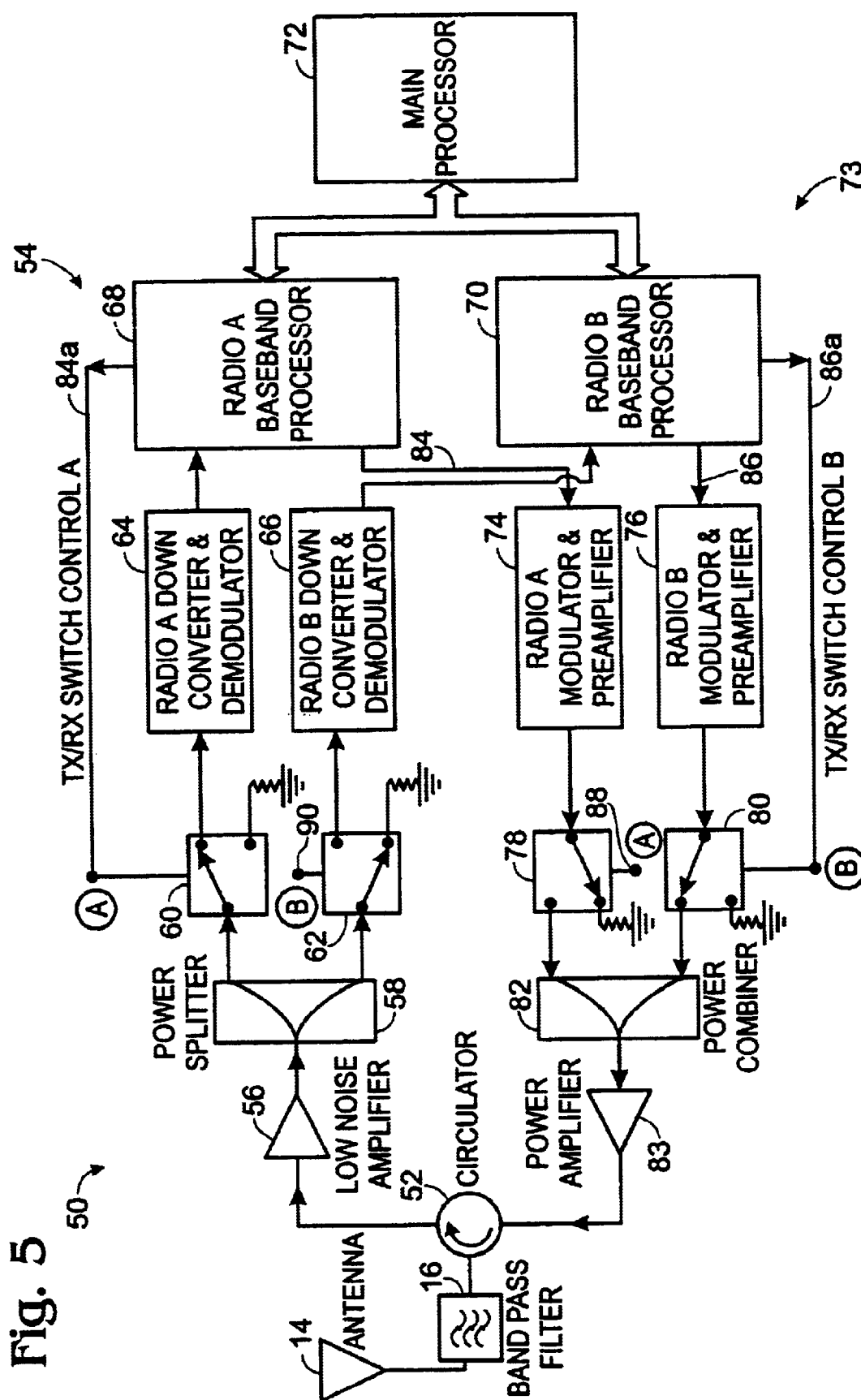


Fig. 6

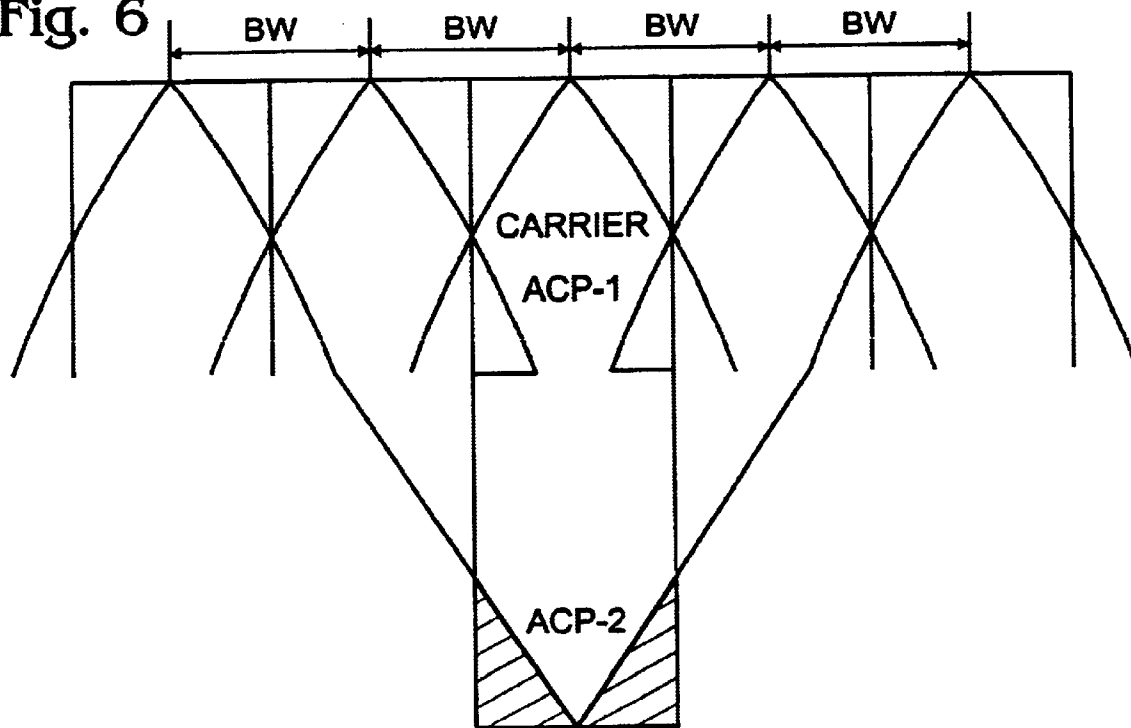
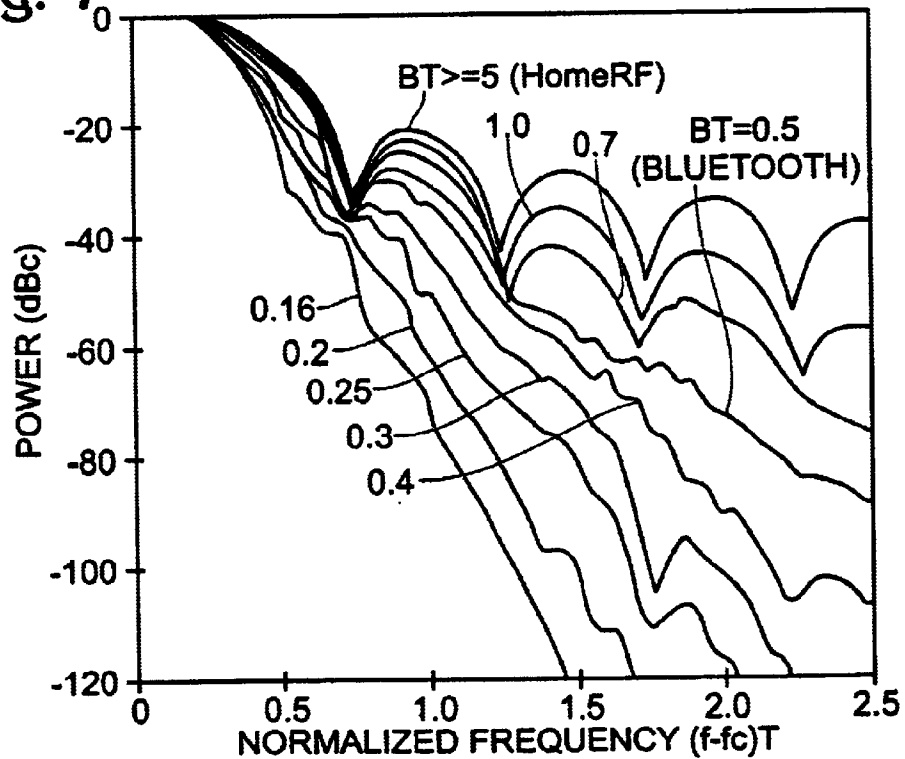


Fig. 7



# 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.