



(12) **United States Patent**  
**Walke et al.**

(10) **Patent No.:** **US 7,016,676 B2**  
(45) **Date of Patent:** **Mar. 21, 2006**

(54) **METHOD, NETWORK AND CONTROL STATION FOR THE TWO-WAY ALTERNATE CONTROL OF RADIO SYSTEMS OF DIFFERENT STANDARDS IN THE SAME FREQUENCY BAND**

(58) **Field of Classification Search** ..... 455/434, 455/435.2, 438, 414.4, 432.2, 207, 553.1, 455/22, 314; 370/464-469, 395.5, 395.52, 370/395.53  
See application file for complete search history.

(75) **Inventors:** **Bernhard Walke**, Wuerselen (DE);  
**Stefan Mangold**, Aachen (DE)

(56) **References Cited**

(73) **Assignee:** **Koninklijke Philips Electronics N.V.**,  
Eindhoven (NL)

**U.S. PATENT DOCUMENTS**

(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 411 days.

5,239,662	A *	8/1993	Danielson et al.	709/246
5,710,766	A	1/1998	Schwendeman	370/329
6,052,594	A *	4/2000	Chuang et al.	455/450
6,310,866	B1 *	10/2001	Kronstedt et al.	370/330
6,377,782	B1 *	4/2002	Bishop et al.	455/3.01
6,501,741	B1 *	12/2002	Mikkonen et al.	370/310
6,580,700	B1 *	6/2003	Pinard et al.	370/332
6,587,680	B1 *	7/2003	Ala-Laurila et al.	455/411
6,631,259	B1 *	10/2003	Pecen et al.	455/426.1
6,687,243	B1 *	2/2004	Sayers et al.	370/356
6,728,244	B1 *	4/2004	Takabatake	370/392
6,735,452	B1 *	5/2004	Foster et al.	455/562.1
6,754,200	B1 *	6/2004	Nishimura et al.	370/349
6,792,286	B1 *	9/2004	Bharath et al.	455/554.2

(21) **Appl. No.:** **10/089,959**

**FOREIGN PATENT DOCUMENTS**

(22) **PCT Filed:** **Aug. 8, 2001**

EP	1119137	A1	1/2000
WO	WO9923790		10/1998

(86) **PCT No.:** **PCT/EP01/09258**

\* cited by examiner

§ 371 (c)(1),  
(2), (4) **Date:** **Apr. 4, 2002**

*Primary Examiner*—Cong Van Tran

(87) **PCT Pub. No.:** **WO02/13457**

**PCT Pub. Date:** **Feb. 14, 2002**

(57) **ABSTRACT**

(65) **Prior Publication Data**

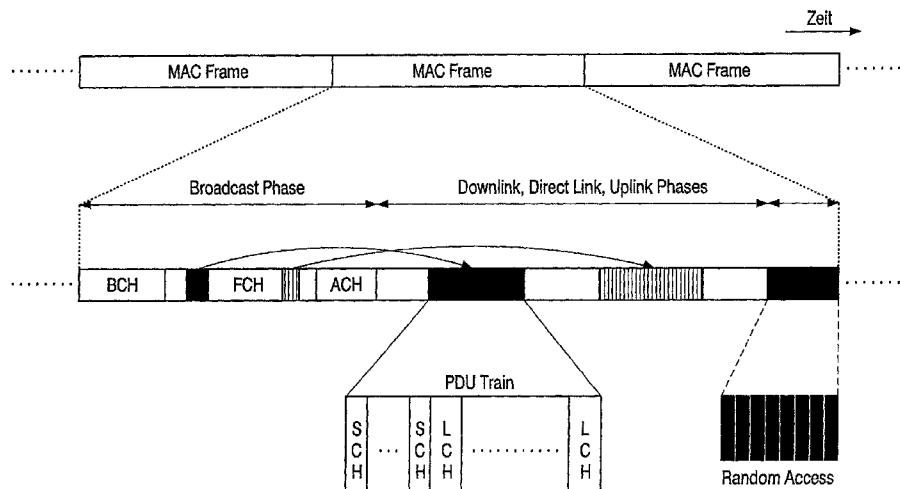
US 2002/0168979 A1 Nov. 14, 2002

The invention relates to an interface-control protocol method for a radio system, which has at least one frequency band provided for the two-way alternate utilization of a first and a second radio interface standard. The radio system comprises a number of stations, which each function in accordance with a first radio interface standard and/or in accordance with a second radio interface standard, in which a control station is provided that controls the two-way alternate utilization of the frequency band.

(51) **Int. Cl.**  
**H04Q 7/20** (2006.01)

(52) **U.S. Cl.** ..... **455/434; 455/553.1; 455/434.2; 370/466; 370/467**

**9 Claims, 3 Drawing Sheets**



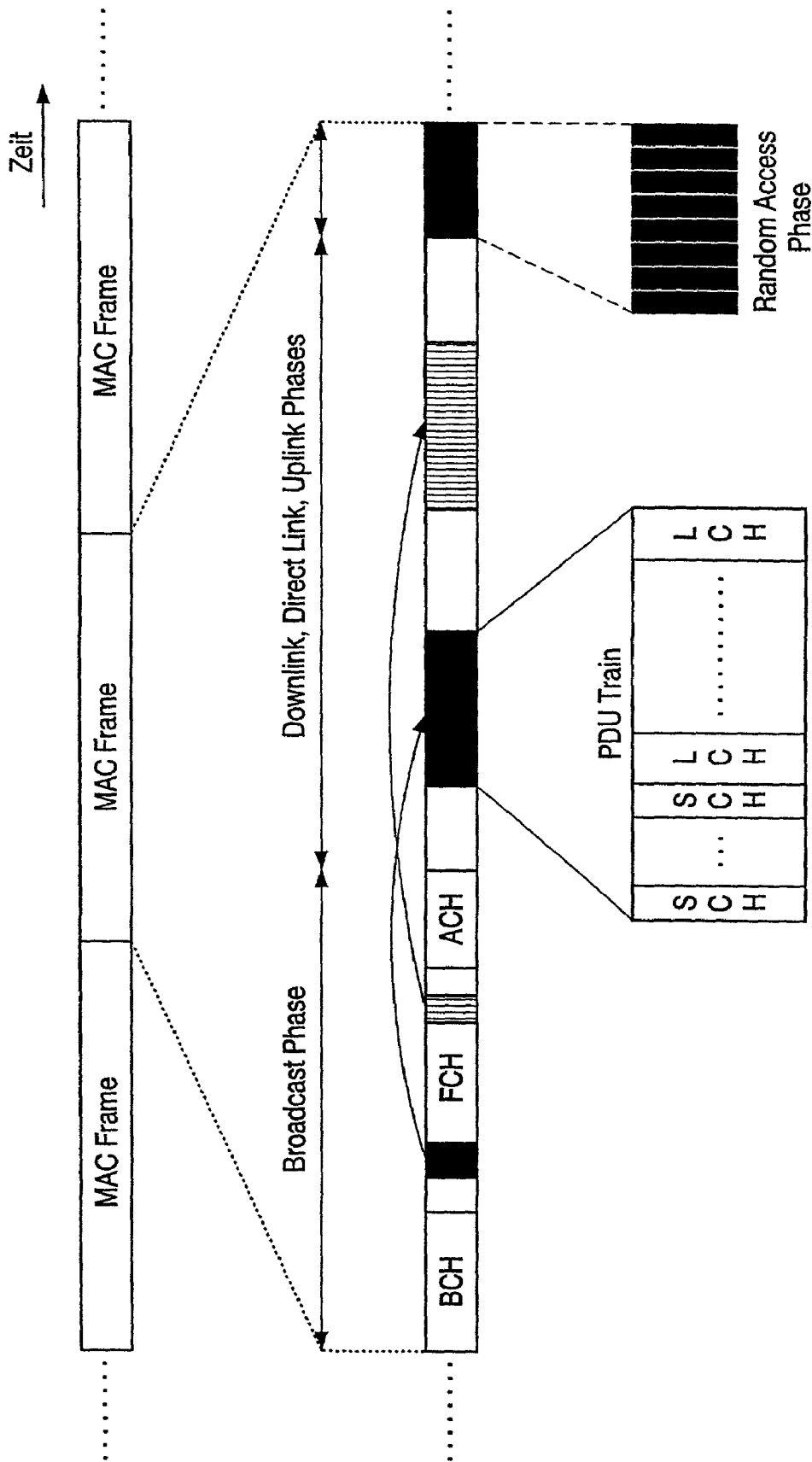


FIG. 1

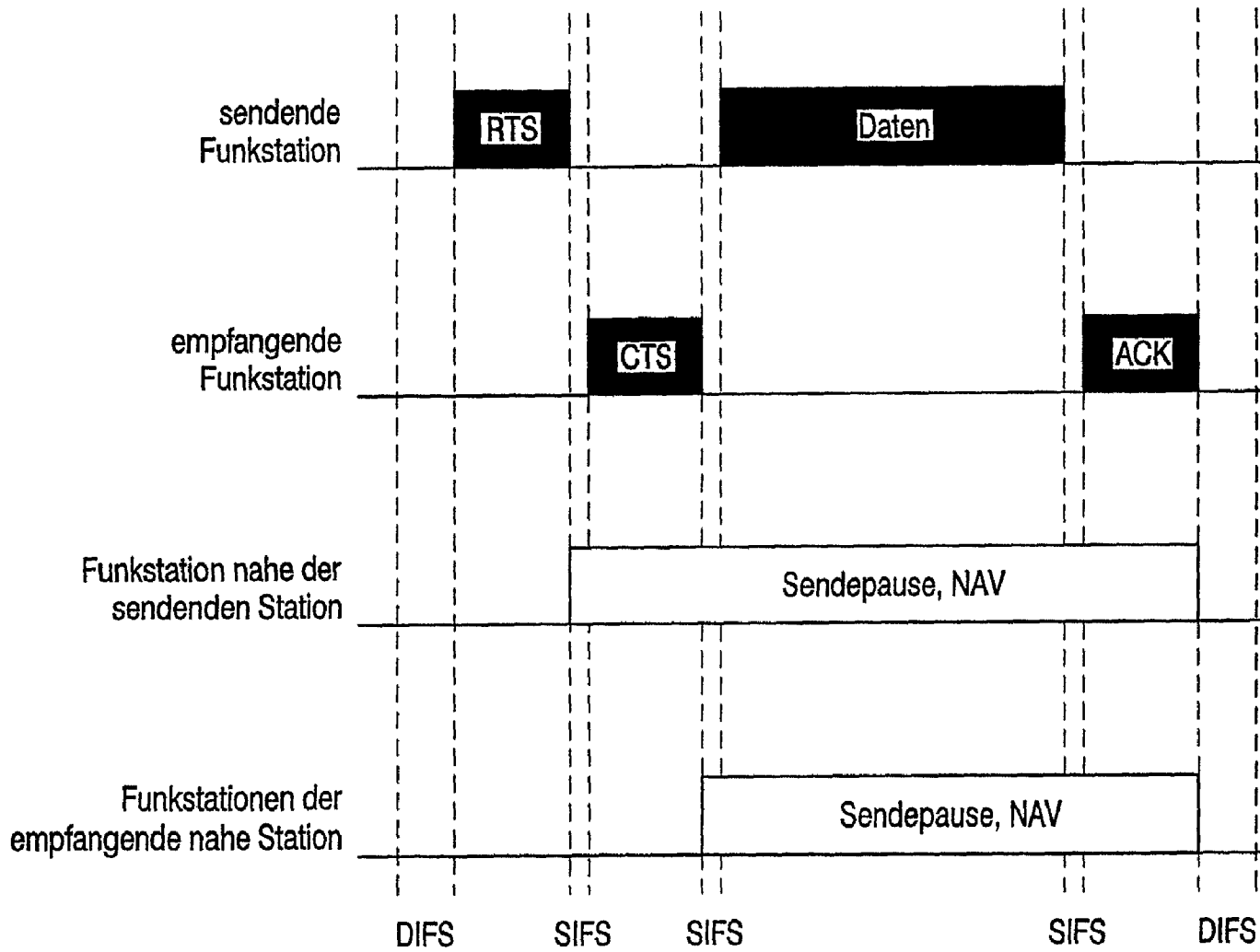


FIG. 2

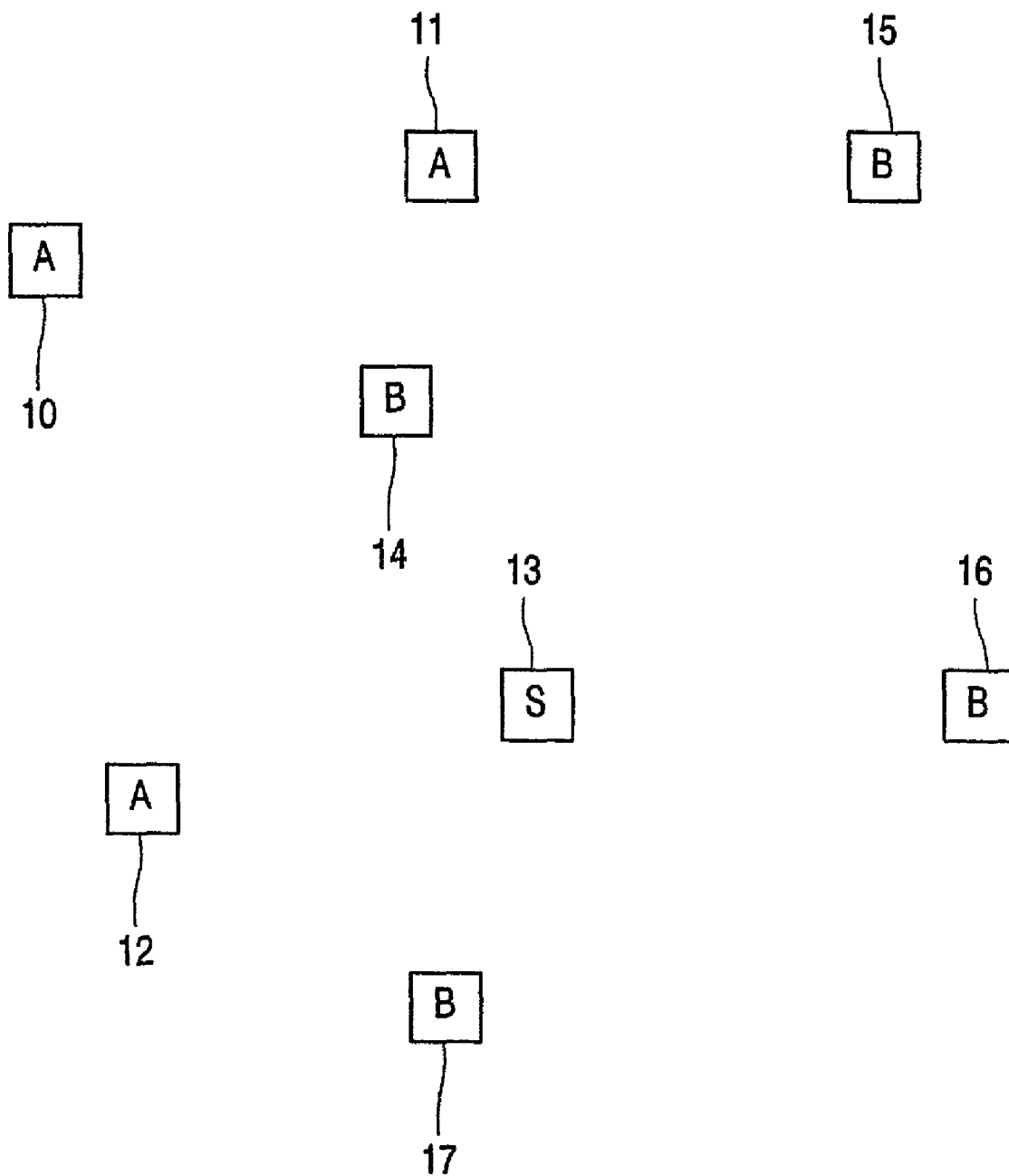


FIG. 3

1

**METHOD, NETWORK AND CONTROL  
STATION FOR THE TWO-WAY ALTERNATE  
CONTROL OF RADIO SYSTEMS OF  
DIFFERENT STANDARDS IN THE SAME  
FREQUENCY BAND**

The invention relates to a method of alternate control of radio systems of different standards in the same frequency band.

A radio system for wireless transmission of information is allowed to use transmission power only in accordance with standards. The national regulation authority determines on what frequencies with what transmission power and in accordance with what radio interface standard a radio system is allowed to transmit. For this purpose there is provided for so-termed ISM frequency bands (Industrial Scientific Medical) that radio systems transmit in the same frequency band in accordance with different radio interface standards. An example of this is the US radio system IEEE802.11a and the European ETSI BRAN HiperLAN/2. The two radio systems transmit in the same frequency bands between 5.5 GHz and 5.875 GHz with approximately the same radio transmission method, but different transmission protocols.

In the event of interference, method were standardized for an active switching to another frequency within the permitted frequency band, for controlling transmission power and for the adaptive coding and modulation to reduce interference. Radio systems of wideband LANs of the radio interface standards ETSI BRAN HiperLAN/2 and IEEE802.11a utilize the same radio transmission method, a 64-carrier OFDM method and an adaptive modulation and coding. About the same modulation and coding methods (Link Adaptation, LA) are defined for the two standards.

The Medium Access Control (MAC) of the two systems is totally different. ETSI BRAN HiperLAN/2 utilizes a centrally controlled reservation-based method in which a radio station takes over the role of a central instance coordinating the radio resources. This central radio station (Access Point, AP) which may be an access point to the wide area network, periodically signals every 2 ms the MAC frame structure from the AP and the associated stations if required.

The IEEE802.11a standard describes a CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance) method not based on reservations, in which all the radio stations listen in on the medium and assume that the channel is unused for a minimum duration (Short InterFrame Space, SIFS) before 802.11a-MAC frames, thus user data packets, are transmitted if necessary. The method is highly suitable for self-organizing ad hoc networks, but requires positive acknowledgements of all the packets. Measures supporting service quality (Point Coordination Function PCF) in addition allow the support of multimedia applications. FIG. 2 shows by way of example the sequence for media access in accordance with IEEE802.11a. In accordance with a variant of the standard a station is to then transmit an RTS packet (Ready To Send) and wait for a CTS packet (Clear To Send) from the addressed station before it is allowed to transmit user data. All the other stations in the radio coverage area set a time monitoring (Network Allocation Vector, NAV) and do not transmit until the addressed station has sent an acknowledgement (ACKnowledge, ACK).

Wideband LANs in accordance with the HiperLAN/2 and 802.11a standards will operate in the same frequency band in the future between 5.15 and 5.825 GHz. The wideband

2

Dynamic Frequency Selection (DFS) to minimize the alternating interfering effects, these methods, however, do not make optimum use and spreading possible of the radio channels over the stations which transmit in accordance with different standards. The guarantee of the service quality necessary for the multimedia applications is impossible in the case of interference caused by their own stations or stations of outside systems. In case of alternating interference, systems do not work efficiently and occupy a frequency channel even at low transmission rates.

It is an object of the invention to provide a method, a wireless network and a control station which make efficient use of radio transmission channels possible.

This object is achieved for the method in accordance with the invention by an interface control protocol method for a radio system, which system comprises at least a frequency band provided for the alternate use of a first and a second radio interface standard, the radio system comprising stations which operate in accordance with a first radio interface standard and/or a second radio interface standard, respectively, a control station being provided which controls the alternate use of the frequency band.

The invention is based on the idea of providing a comprehensive standard exchange of implicit or explicit control information in systems that have the same radio transmission methods but different radio transmission protocols. This makes a simple and efficient use possible of a radio channel via a plurality of radio interface standards.

The radio system comprises one or more stations. The stations may be, for example, computers of a wireless local area network. These stations may be arranged, for example, only for operation in accordance with a first or second radio interface standard. But it is also possible for stations to operate in accordance with both the first and the second radio interface standard.

A first number of stations preferably forms a wireless local area network in accordance with a first radio interface standard and a second number of stations forms a wireless network in accordance with a second radio interface standard. The first radio interface standard may be, for example, the HiperLAN/2 standard and the second radio interface standard may be the IEEE802.11a standard.

For these two standards is reserved the frequency band from 5.15 GHz to 5.825 GHz.

In accordance with the invention a control station is provided which controls the alternate use of the common frequency band of the two radio interface standards.

The control station is preferably a station that may operate in accordance with both the first and the second radio interface standard.

The control of the alternate use of the common frequency band may be effected in various ways. For example, it is possible to provide certain predefinable time intervals for the use of the first and second radio interface standard and allocate the frequency band alternately to the first radio interface standard and then to the second radio interface standard in a kind of time-division multiplex mode.

However, it is advantageous to effect the allocation by means of adaptive protocols. The common radio channel can then be utilized more effectively particularly when the demand for transmission capacity in accordance with the first and the second radio interface standard varies.

In the advantageous embodiment of the invention as claimed in claim 2, the control station is provided, on the one hand, for controlling the access to the frequency band for

# 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.