US007587207B2

(54) **DATA DELIVERY THROUGH BEACONS**

(75) Inventors: **Robert J. Davies**, Horley (GB); **Saul R. Dooley**, Reigate (GB)

(73) Assignee: **IPG Electronics 503 Limited**, St. Peter Port (GG)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1859 days.

(21) Appl. No.: **09/876,515**

(22) Filed: **Jun. 7, 2001**

(65) **Prior Publication Data**

US 2002/0002034 A1   Jan. 3, 2002

(30) **Foreign Application Priority Data**

| Jun. 26, 2000 | (GB) | .... | 0015454.2 |
| Aug. 15, 2000 | (GB) | .... | 0020073.3 |

(51) **Int. Cl.**
    H04W 24/00   (2006.01)
(52) **U.S. Cl.** **455/456.1**; 455/456.5; 455/457
(58) **Field of Classification Search** 455/457, 455/456.1, 456.5
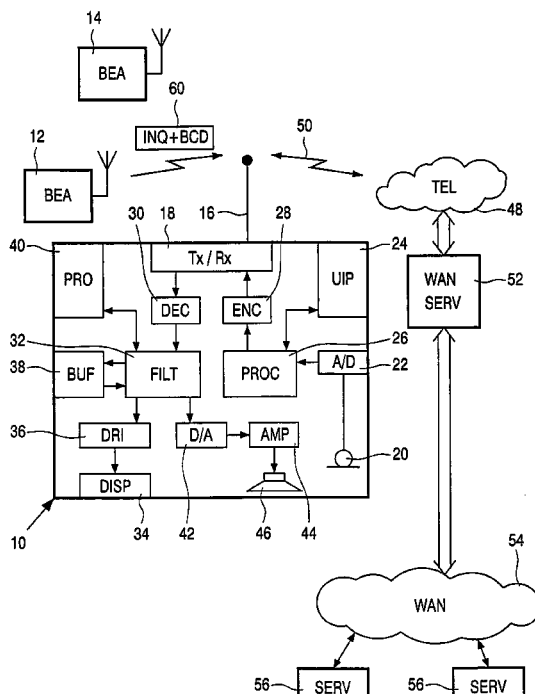   See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,835,861 A * 11/1998 Whiteside 455/466

6,169,498 B1 * 1/2001 King et al. 340/686.1
6,311,060 B1 * 10/2001 Evans et al. 455/426.1
6,782,253 B1 * 8/2004 Shteyn et al. 455/414.1

FOREIGN PATENT DOCUMENTS

| EP | 0752793 | A2 | 8/1997 |
| EP | 1006684 | A2 | 7/2000 |

* cited by examiner

Primary Examiner—Quoc D Tran
Assistant Examiner—Karen L Le
(74) *Attorney, Agent, or Firm*—Volpe and Koenig, P.C.

(57)   **ABSTRACT**

A communications system comprises at least one beacon device capable of wireless message transmission and at least one portable device capable of receiving such a message transmission. The beacon is arranged to broadcast a series of inquiry messages each in the form of a plurality of predetermined data fields arranged according to a first communications protocol, such as Bluetooth. For the delivery of additional data via broadcast, and in particular data including location information, the beacon adds to each inquiry message prior to transmission an additional data field carrying broadcast data, with the portable device receiving the transmitted inquiry messages including the location data and reading the broadcast data from the additional data field.

11 Claims, 3 Drawing Sheets

Fig.1

Fig.2

Fig.3

A		A	
	B		B

10.24s

Fig.4

ID packet	CA data		
Slot boundary		Half-slot boundary	

Fig.5

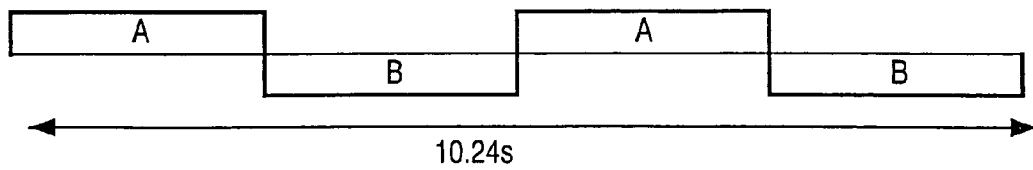| A		A	
	B		B
clock	clock	data_A	data_B

10.24s

Fig.6

A		A	
	B		B
clock	data_A 1	clock	data_B 1	data_A 2	data_A 1	data_B 2	data_B 1
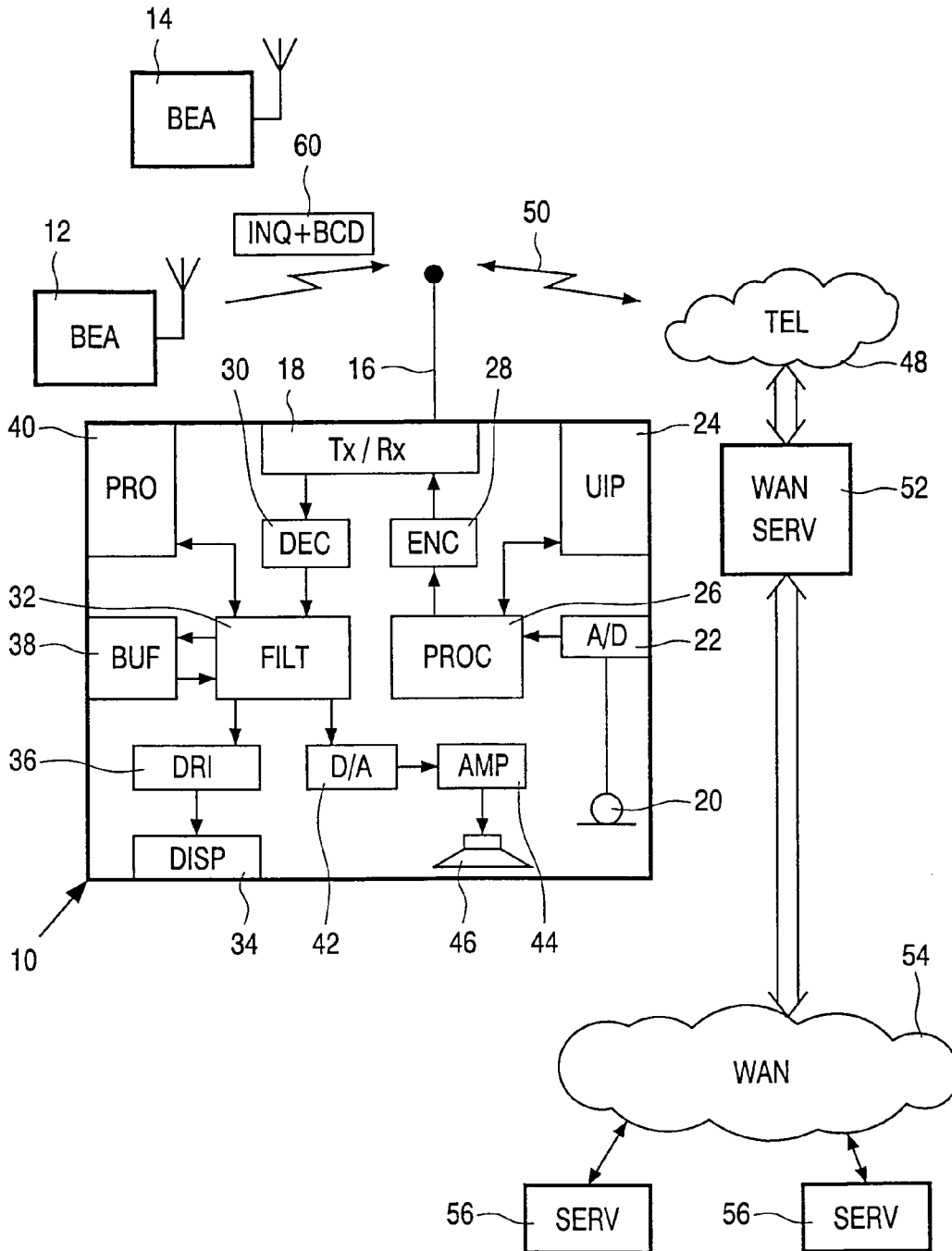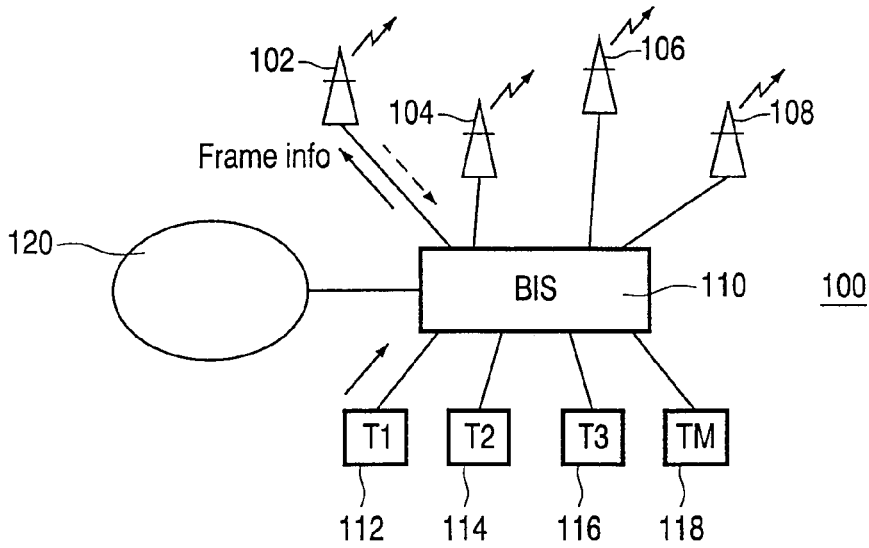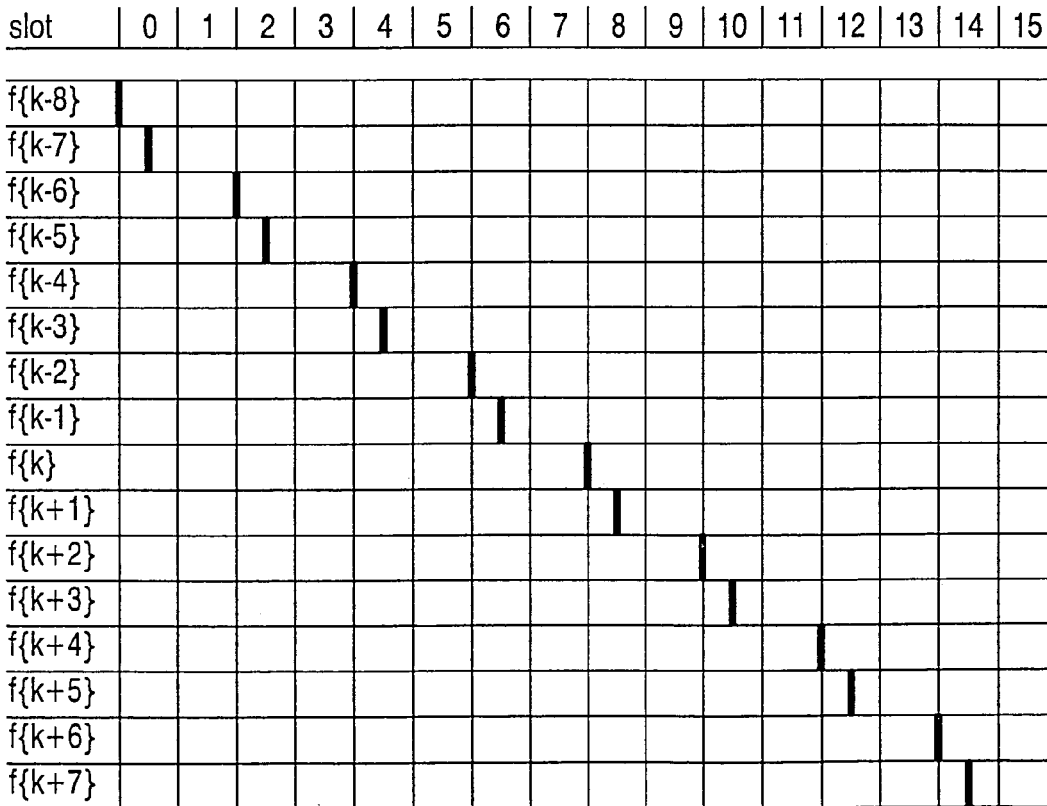
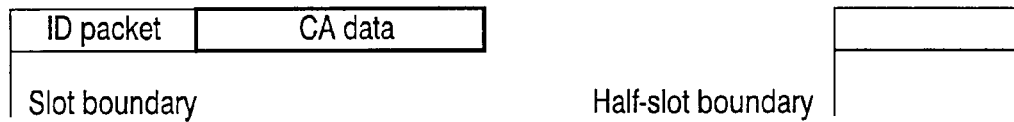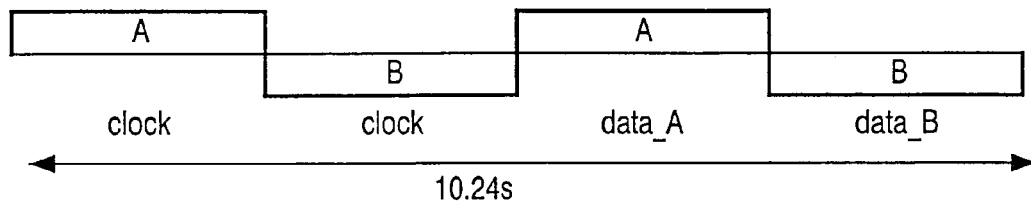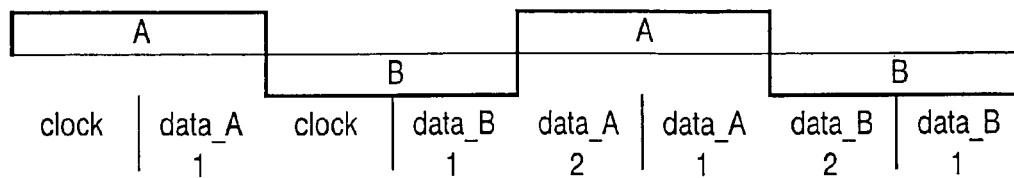## Fig.7

DATA DELIVERY THROUGH BEACONS

The present invention relates to services offered to users of electronic equipment, especially but not exclusively to users of mobile communications devices such as portable telephones and suitably equipped PDA's (personal digital assistants). The invention further relates to means for delivery of such services, and to portable devices for receiving them.

Recent years have seen a great increase in subscribers world-wide to mobile telephone networks and, through advances in technology and the addition of functionalities, cellular telephones have become personal, trusted devices. A result of this is that a mobile information society is developing, with personalised and localised services becoming increasingly more important. Such "Context-Aware" (CA) mobile telephones are used with low power, short range base stations in places like shopping malls to provide location-specific information. This information might include local maps, information on nearby shops and restaurants and so on. The user's CA terminal may be equipped to filter the information received according to pre-stored user preferences and the user is only alerted if an item of data of particular interest has been received.

An example of a CA terminal is given in U.S. Pat. No. 5,835,861 which discloses the use of wireless telephones within the context of advertisement billboards. The user of a wireless telephone obtains the telephone number of a vendor by activating his/her wireless telephone to transmit a prompt signal to an active advertisement source and to receive from the advertisement source a response signal containing the telephone number of the advertising vendor. The telephone number can then be used to automatically place a call to that vendor via the public switched telephone network. Alternatively, the telephone number can be stored for use later on. This arrangement can be used to place a call to a vendor without having to either memorise the telephone number or to write it down. The signals between the billboard and the caller can be transmitted as modulated infrared (IR) signals.

In another example, Hewlett-Packard has posted a publication on the Web at <http://www.cooltown.hp.com/papers/webpres/WebPresence.htm> about their "Cooltown" project. The convergence of Web technology, wireless networks and portable client devices provides design opportunities for computer/communications systems. In the Cooltown project, systems that are location-aware can be created using URL's for addressing, physical URL's for delivery via beacons and sensing of URL's for discovery, and localised web servers for directories. The systems are ubiquitous to support nomadic users. On top of this infrastructure the Internet connectivity can be leveraged to support communications services. Web presence bridges the World Wide Web and the physical world inhabited by the users, providing a model for supporting nomadic users without a central control point.

The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store.

It will be recognised that an important requirement for CA

such as staying close to a beacon whilst contact is established between portable device and beacon, nor having to specifically initiate interaction (as is the case with the above-mentioned system in U.S. Pat. No. 5,835,861). A further requirement is that the portable device should be kept relatively simple insofar as the data gathering from beacons is concerned: in the Cooltown system, a full web browser and display capability is required to support user navigation within the web page indicated by the URL being broadcast.

It is therefore an object of the invention to provide a system for the delivery of data via beacons whereby the amount of dedicated circuitry and operating procedure are kept to low levels.

In accordance with a first aspect of the present invention there is provided a communications system comprising at least one beacon device capable of wireless message transmission and at least one portable device capable of receiving such a message transmission, wherein the beacon is arranged to broadcast a series of inquiry messages each in the form of a plurality of predetermined data fields arranged according to a first communications protocol, wherein the beacon is further arranged to add to each inquiry message prior to transmission an additional data field, and wherein the at least one portable device is arranged to receive the transmitted inquiry messages and read data from said additional data field, the additional data field including location information. By adding the additional field (suitably at the end of a respective inquiry message), data broadcast may be carried on top of an existing inquiry process, such that the usual delays while such a process is carried out prior to data transfer are avoided. Furthermore, by placing the additional field at the end of those sent according to the communications protocol (preferably but not essentially Bluetooth), those protocol-compatible devices not intended for reception of beacon signals can simply ignore the additional data without compromising operation according to protocol.

Where the protocol is Bluetooth (or a similar frequency hopping arrangement) the beacon may be configured to broadcast a series of inquiry messages on a predetermined clocked succession or sequence of frequencies, with clock information for the beacon being carried by the additional data field. In one arrangement, the additional data field may carry at least 64 bits of data. As will be described in greater detail hereinafter with respect to embodiments of the invention, this can improve the inquiry performance of a Bluetooth system, shortening the time to establish a connection for data exchange.

The beacon may be arranged to include an indication in one of said predetermined data fields (suitably in a currently unused or unassigned field), said indication denoting the presence of said additional data field, such that devices configured for reception of beacon data may be triggered to read from the additional data field.

Where the first communications protocol comprises Bluetooth messaging, a special Dedicated Enquiry Access Code (DIAC) may be used to indicate the presence of location information in the additional data field.

The presence of location information in the additional data field may be indicated by header information appearing in the additional data field.

The communications system may perform wireless message transmission and reception using a scheme which employs frequency hopping. In this case, location data may be sent on each frequency used for inquiry message broadcasts.

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.

fastcase®
Smarter legal research.