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(54) Title: CONTROLLING TRANSMISSIONS ON COMPOSITE CARRIERS

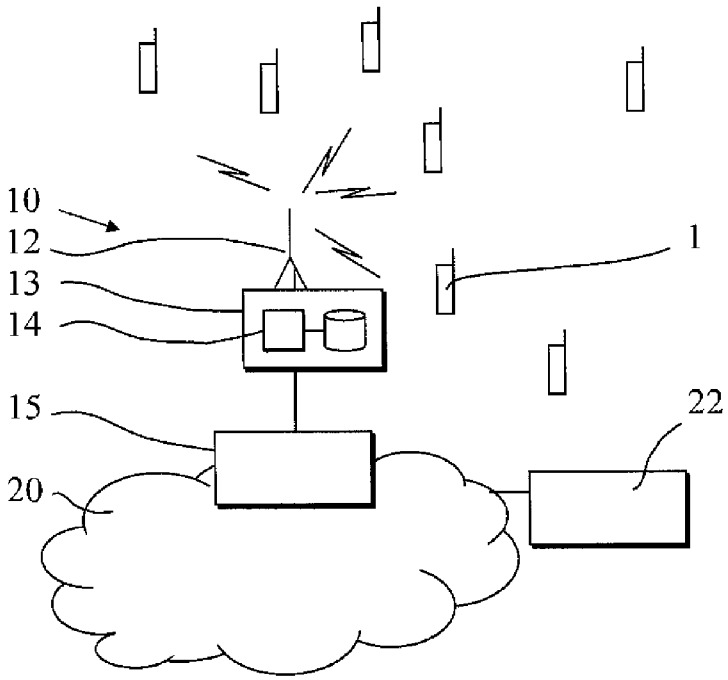

Fig. 1

(57) Abstract: Transmissions on a composite carrier comprising at least two component carriers can be controlled by means of a message by the provider of the carrier. The provider may receive a message from a device attempting to transmit on the composite carrier, and include in a response thereof an indication of at least one component carrier to be used by the device for a subsequent transmission. The device then received the message from the provider, and can determine based thereon at least one component carrier to be used by the device for at least one subsequent transmission, and transmit on the determined at least one component carrier.

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Controlling transmissions on composite carriers

The invention relates to relay a communication system, and more particularly to controlling transmissions on composite carriers.

A communication system can be seen as a facility that enables communication sessions between two or more entities such as mobile communication devices and/or other stations. The communications may comprise, for example, communication of data for carrying communications such as voice, electronic mail (email), text message, multimedia and so on. Users may thus be offered and provided numerous services via their communication devices. Non-limiting examples of these services include two-way or multi-way calls, data communication or multimedia services or simply an access to a data communications network system, such as the Internet. User may also be provided broadcast or multicast content. Non-limiting examples of the content include downloads, television and radio programs, videos, advertisements, various alerts and other information.

A communication system can be provided for example by means of a communication network and one or more compatible communication devices. The communication system and associated devices typically operate in accordance with a given standard or specification which sets out what the various entities associated with the system are permitted to do and how that should be achieved. For example, the standard or specification may define if a communication device is provided with a circuit switched carrier service or a packet switched carrier service or both, and how the carriers are configured. Communication protocols and/or parameters which shah be used for the connection are also typically defined. For example, the manner how the communication device can access resources provided by the communication system and how communication shall be implemented between communicating

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devices, the elements of the communication network and/or other communication devices is typically based on predefined communication protocols.

In a wireless communication system at least a part of communications between at least two stations occurs over a wireless link. Examples of wireless systems include public land mobile networks (PLMN), satellite based communication systems and different wireless local networks, for example wireless local area networks (WLAN). The wireless systems can typically be divided into cells, and are therefore often referred to as cellular systems.

A user can access the communication system by means of an appropriate communication device. A communication device of a user is often referred to as user equipment (UE). A communication device is provided with an appropriate signal receiving and transmitting apparatus for enabling communications, for example enabling access to a communication network or communications directly with other users. The communication device may access a carrier provided by a station, for example a base station of a cell, and transmit and/or receive communications on the carrier.

A carrier may comprise a composite carrier, i.e. a carrier that is provided by a plurality of sub or component carriers. Composite carriers may be provided by utilising what is known as carrier aggregation. In carrier aggregation a plurality of carriers are aggregated to increase bandwidth. Such carriers are known as aggregated carriers, each aggregated carrier comprising a plurality of component carriers.

The popularity of communication devices or user equipment (UE) has increased considerably in the recent years and the number of user devices in active use is believed to increase even further in the future. Thus the number of users who may want to access a communication system at substantially the same time is also believed to increase. The available bandwidth provided by the communications systems has also been increased, to provide more capacity to

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meet the increased demand. This has resulted in a situation where it is possible that a large number of user devices perform random access in a system, and more particularly, a carrier provided by the system.

An example of a modern communication system that is attempting to solve the problems associated with the increased demands for capacity is an architecture that is known as the long-term evolution (LTE) of the Universal Mobile Telecommunications System (UMTS) radio-access technology and that is being standardized by the 3rd Generation Partnership Project (3GPP). The various development stages of the 3GPP LTE specifications are referred to as releases. The aim of the standardization is to achieve a communication system with, inter alia, reduced latency, higher user data rates, improved system capacity and coverage, and reduced cost for the operator. A further development of the LTE is referred to as LTE-Advanced. The LTE-Advanced aims to provide further enhanced services by means of even higher data rates and lower latency with reduced cost. A feature of the LTE-Advanced is that it is capable of providing aggregated carriers.

In systems where composite or aggregated carriers are available a problem is that the communication devices accessing the system are limited into the original component carrier they are assigned to. For example, the design of random access procedure in the medium access control (MAC) layer in LTE-A may become problematic. An approach inherited directly from the earlier versions of the 3GPP, in particular from Release 8 of the LTE, is to execute the whole random access process from preamble transmission to contention resolution within a single component carrier. However, as the number of communication devices that want to access the system is increased at the same time as the bandwidth provided in LTE-A is also increased, there is possibility that a large number of communication devices perform random access in one carrier. Because of this, and the nature of the carrier assignment by the random access procedure, preamble collisions can become more likely. Also, use of the same

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