

SERVICES AND METHODS FOR OPERATING A COMMUNICATION SYSTEM

BACKGROUND

[0001] The field of the disclosure relates generally to communication systems, and more specifically, to servers and methods for operating a communication system.

[0002] At least some known communication systems include a network access point, such as a wireless access point, that enables a plurality of devices to be communicatively coupled together and/or to communicatively couple the devices to a network such as the Internet. Within a building or another location, a large number of devices, such as cellular phones, embedded controllers, computing devices of a mobile computing infrastructure, and/or other computing devices, may communicate wirelessly with each other and/or with other systems. Such devices may generate a significant amount of radio frequency signals which may cause interference to occur between the signals of the devices. Such interference may cause a reduction in an amount of bandwidth available to each device within the location. In certain circumstances, the interference may render a device unable to communicate with other devices.

BRIEF DESCRIPTION

[0003] According to one aspect, there is provided a server comprising: a memory device configured to store a plurality of computer-executable instructions; and a processor coupled to said memory device, wherein, when said processor executes the plurality of computer-executable instructions, said processor is programmed to: determine an available spectrum of frequencies within a location over time, the determination made by determining a geospatial usage of the spectrum relative to time based on an expected spectrum usage over time by at least one registered device authorized to use the spectrum, a measured or estimated usage of the spectrum over time by at least one unregistered device, and a historical usage of the

spectrum at the location; receive a request from a wireless device to access the available spectrum for a predefined duration at a first level of service; determine whether sufficient spectrum is available to enable the wireless device to operate at the first level of service; determine whether sufficient spectrum is available to enable the wireless device to operate at a second level of service that is lower quality than the first level of service upon a determination that sufficient spectrum is not available to enable the wireless device to operate at the first level of service; select a frequency band within the spectrum that is available to be used by the wireless device for the predefined duration at the first or second level of service; and transmit an authorization message commanding the wireless device to use the selected frequency band.

According to another aspect, there is provided a method of operating a communication system, said method comprising: determining an available spectrum of frequencies within a location over time, the determination made by determining a geospatial usage of the spectrum relative to time based on an expected spectrum usage over time by at least one registered device authorized to use the spectrum, a measured or estimated usage of the spectrum over time by at least one unregistered device, and a historical usage of the spectrum at the location; receiving a request from a wireless device to access the available spectrum for a predefined duration at a first level of service; determining whether sufficient spectrum is available to enable the wireless device to operate at the first level of service; determining whether sufficient spectrum is available to enable the wireless device to operate at a second level of service that is lower quality than the first level of service upon a determination that sufficient spectrum is not available to enable the wireless device to operate at the first level of service; selecting, by a processor within the communication system, a frequency band within the spectrum that is available to be used by the wireless device for the predefined duration at the first or second level of service; and transmitting an authorization message commanding the wireless device to use the selected frequency band.

In one embodiment, a server is provided that includes a memory device configured to store a plurality of computer-executable instructions, and a processor

coupled to the memory device. When the processor executes the plurality of computer-executable instructions, the processor is programmed to determine an available spectrum of frequencies within a location over time, and receive a request from a wireless device to access the available spectrum for a predefined duration. The processor is also programmed to select a frequency band within the spectrum that is available to be used by the wireless device for the predefined duration, and transmit an authorization message to the wireless device to use the selected frequency band.

CLAIMS

1. A server comprising:

a memory device configured to store a plurality of computer-executable instructions; and

a processor coupled to said memory device, wherein, when said processor executes the plurality of computer-executable instructions, said processor is programmed to:

determine an available spectrum of frequencies within a location over time, the determination made by determining a geospatial usage of the spectrum relative to time based on an expected spectrum usage over time by at least one registered device authorized to use the spectrum, a measured or estimated usage of the spectrum over time by at least one unregistered device, and a historical usage of the spectrum at the location;

receive a request from a wireless device to access the available spectrum for a predefined duration at a first level of service;

determine whether sufficient spectrum is available to enable the wireless device to operate at the first level of service;

determine whether sufficient spectrum is available to enable the wireless device to operate at a second level of service that is lower quality than the first level of service upon a determination that sufficient spectrum is not available to enable the wireless device to operate at the first level of service;

select a frequency band within the spectrum that is available to be used by the wireless device for the predefined duration at the first or second level of service; and

transmit an authorization message commanding the wireless device to use the selected frequency band.

2. A server in accordance with claim 1, wherein said processor is further programmed to receive a request from the wireless device to operate at a first level of service.

3. A server in accordance with claim 1, wherein said processor is further programmed to select the frequency band within the available spectrum that enables the wireless device to operate at the first level of service upon the determination that sufficient spectrum is available.

4. A server in accordance with claim 1, wherein, upon the determination that sufficient spectrum is not available to enable the wireless device to operate at the second level of service, said processor is further programmed to transmit an error message to the wireless device.

5. A server in accordance with claim 1, wherein said processor is further programmed to determine an available spectrum of frequencies of a television broadcast band within the location over time.

6. A server in accordance with claim 1, wherein a database is communicatively coupled to said server, said processor is further programmed to determine the spectrum that is available within the location by receiving data from the database; and update the database to reflect the selected frequency band used by the wireless device for the predefined duration.

7. A server in accordance with claim 1, wherein said processor is further programmed to determine whether the wireless device is included within a list of authorized device for at least one of the location and/or the spectrum.

8. A server in accordance with claim 1, wherein the first and second levels of service include at least one of a bandwidth, a latency, a priority level, an amount of jitter or interference, and a duration of a desired communication session.

9. A server in accordance with claim 1, wherein to determine whether sufficient spectrum is available, said processor is further programmed to determine the available spectrum based on the desired duration of a communication session and on a determination of which frequency bands are expected to be available during a time of the communication session.

10. A method of operating a communication system, said method comprising:

determining an available spectrum of frequencies within a location over time, the determination made by determining a geospatial usage of the spectrum relative to time based on an expected spectrum usage over time by at least one registered device authorized to use the spectrum, a measured or estimated usage of the spectrum over time by at least one unregistered device, and a historical usage of the spectrum at the location;

receiving a request from a wireless device to access the available spectrum for a predefined duration at a first level of service;

determining whether sufficient spectrum is available to enable the wireless device to operate at the first level of service;

determining whether sufficient spectrum is available to enable the wireless device to operate at a second level of service that is lower quality than the first level of service upon a determination that sufficient spectrum is not available to enable the wireless device to operate at the first level of service;

selecting, by a processor within the communication system, a frequency band within the spectrum that is available to be used by the wireless device for the predefined duration at the first or second level of service; and

transmitting an authorization message commanding the wireless device to use the selected frequency band.

11. A method in accordance with claim 10, further comprising receiving a request from the wireless device to operate at a first level of service.

12. A method in accordance with claim 10, further comprising selecting the frequency band within the available spectrum that enables the wireless device to operate at the first level of service upon the determination that sufficient spectrum is available.

13. A method in accordance with claim 10, wherein, upon the determination that sufficient spectrum is not available to enable the wireless device to operate at the second level of service, said method further comprises transmitting an error message to the wireless device.

14. A method in accordance with claim 10, wherein determining an available spectrum of frequencies comprises determining an available spectrum of frequencies of a television broadcast band within the location over time.

15. A method in accordance with claim 10, further comprising determining the spectrum that is available within the location by receiving data from a database.

16. A method in accordance with claim 15, further comprising updating the database to reflect the selected frequency band used by the wireless device for the predefined duration.