

efficient information transmission which is easy to use for the wireless devices.

PRIOR ART DOCUMENT

NON-PATENT DOCUMENT

[0005] Non-Patent Document 1: Kentaro Ishizu, and four others, "Design of spectrum sharing type cognitive radio system with out-band pilot channel", The Institute of Electronics, Information and Communication Engineers, Technical Committee on Software Radio, March, 2010, vol. 109, No. 442, pages 37 to 44

Non-Patent Document 2: Kentaro Ishizu, and three others, "Out-band pilot channel for notification of regulatory information and terminals' sharing of environmental information", The Institute of Electronics, Information and Communication Engineers, Technical Committee on Software Radio, May, 2010, vol. 110, No. 41, pages 57 to 64

Non-Patent Document 3: Kentaro Ishizu, and two others, "Prototyping and evaluation of out-band pilot channel mechanism for spectrum sharing type cognitive radio system", The Institute of Electronics, Information and Communication Engineers, Technical Committee on Software Radio, January, 2011, vol. 110, No. 398, SR2010-81, pages 73 to 80

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0006] ~~The~~Embodiments of the present invention ~~has an object to~~ provide an information transmission device and an information transmission method capable of allowing a wireless device intended to newly start an operation in a white space to efficiently perform its preparatory operation.

MEANS FOR SOLVING THE PROBLEMS

[0007] ~~In order to solve the above-described problems,~~According to a first aspect of this invention, there is provided an information transmission device ~~being one aspect of the present invention includes~~ including: a first retainer configured to retain first information including at least a list of channels available in each of first-type partial areas obtained when dividing an area at a first fineness being a predetermined fineness; a second retainer configured to retain second information including at least a list of channels available in

each of second-type partial areas obtained when dividing the area at a second fineness finer than the first fineness; a generator configured to generate multiplexed information including the first information and the second information so that the first information and the second information are repeated at equal frequencies in a time axis direction, or the first information is repeated at a frequency higher than that of the second information in the time axis direction; and a transmitter configured to wirelessly transmit the multiplexed information.

[0008] Namely, the information transmitted from this information transmission device results from multiplexing the information of channels available in each of the partial areas which are geographical divisions in a coarse manner, and the information of channels available in each of the partial areas which are geographical divisions in a manner finer than the above case. Further, the former is set to be repeatedly transmitted at a frequency same as or higher than that of the latter. The former has relatively small amount of information, and the latter has relatively large amount of information.

[0009] A wireless device after receiving the information from this information transmission device can first obtain, based on its positional information, the information of available channels in comparison with the former information. This only requires simple processing which takes a short period of time. Even in a case where the former information does not indicate an available channel, since there is a possibility that the indication is made, with a margin, regarding the partial areas which are geographical divisions in a coarse manner, the side of the wireless device can further obtain the information of available channels in comparison with the latter information as needed. This requires processing which relatively takes a long time and which is relatively not simple, but, the processing is not always conducted. As a whole, the wireless device can efficiently perform its preparatory operation.

[0010] ~~Further, According to a second aspect, there is provided~~ an information transmission method ~~being another aspect of the present invention includes~~ including: retaining first information including at least a list of channels available in each of first-type partial areas obtained when dividing an area at a first fineness being a predetermined fineness; retaining second information including at least a list of channels available in each of second-type partial areas obtained when dividing the area at a second

fineness finer than the first fineness; generating multiplexed information including the first information and the second information so that the first information and the second information are repeated at equal frequencies in a time axis direction, or the first information is repeated at a frequency higher than that of the second information in the time axis direction; and wirelessly transmitting the multiplexed information.

[0011] This information transmission method is a method capable of being performed by corresponding to the configuration of the above-described information transmission device.

EFFECT OF THE INVENTION

[0012] According to the embodiments of the present invention, it is possible to provide an information transmission device and an information transmission method capable of allowing a wireless device intended to newly start an operation in a white space to efficiently perform its preparatory operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a functional block diagram illustrating a configuration of an information transmission device being one embodiment of the present invention.

FIG. 2 is an explanatory diagram illustrating a configuration example of information retained by an information retaining unit 11 illustrated in FIG. 1.

FIG. 3 is an explanatory diagram illustrating a configuration example of information retained by the information retaining unit 11 illustrated in FIG. 1, in addition to the configuration example of information illustrated in FIG. 2.

FIG. 4A is an explanatory diagram illustrating one example of form of multiplexing performed by a multiplexed information generating unit 12 illustrated in FIG. 1.

FIG. 4B is an explanatory diagram illustrating another example of form of multiplexing performed by the multiplexed information generating unit 12 illustrated in FIG. 1.

FIG. 4C is an explanatory diagram illustrating still another example of form of multiplexing performed by the multiplexed information generating unit 12 illustrated in FIG. 1.

FIG. 5 is an explanatory diagram illustrating a configuration example of information