communication, and more specifically, to initially access a cell-free wireless communication network.

In one ~~embodiment~~aspect, a method performed by an access point in a cell-free wireless communication network is disclosed. The cell-free wireless communication network may comprise a plurality of access points and at least one central processing unit controlling the access points. The method may include obtaining an access assisting signal in an access assisting signal set. The access assisting signal set may include a plurality of access assisting signals that enable a user equipment to initially access to the cell-free wireless communication network. The method may include broadcasting the access assisting signal. The plurality of access points broadcast respective access assisting signals at a same time.

In a second aspect, an access point in a cell-free wireless communication network is disclosed. The access point may comprise a plurality of access points and at least one central processing unit controlling the access points, the access point comprising: a memory operable to store computer-readable instructions; and a processor circuitry operable to read the computer-readable instructions, the processor circuitry when executing the computer-readable instructions is configured to: obtain an access assisting signal in an access assisting signal set, wherein the access assisting signal set comprises a plurality of access assisting signals that enable a user equipment to initially access to the cell-free wireless communication network; and broadcast the access assisting signal, wherein the plurality of access points broadcast respective access assisting signals at a same time.

In another embodiment, a device for wireless communication may include a memory storing instructions and a processing circuitry in communication with the memory. When the processing circuitry executes the instructions, the processing circuitry is configured to carry out the above methods.

In another embodiment, a computer-readable medium comprising instructions which, when executed by a computer, cause the computer to carry out the above methods.

The above and other aspects and their implementations are described in greater detail in the drawings, the descriptions, and the claims below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A-1B illustrate example diagrams of a cell-free wireless communication network in accordance with various embodiments.

FIG. 2 illustrates a flow diagram of a method for enabling access to the cell-free wireless communication network in accordance with an embodiment.

FIG. 3A-3B illustrate examples of obtaining access assisting signals for individual access points in accordance with an embodiment.

FIG. 4A-4B illustrate examples of obtaining access assisting signals for individual

CLAIMS

1. A method performed by an access point in a cell-free wireless communication network comprising a plurality of access points and at least one central processing unit controlling the access points, comprising:

obtaining an access assisting signal in an access assisting signal set, wherein the access assisting signal set comprises a plurality of access assisting signals that enable a user equipment to initially access to the cell-free wireless communication network; and

broadcasting the access assisting signal, wherein the plurality of access points broadcast respective access assisting signals at a same time.

2. The method of claim 1, wherein the obtaining the access assisting signal comprises:

obtaining the access assisting signal in the access assisting signal set based on at least one of:

an identifier of the access point,

a number of times that the access point has broadcast access assisting signals, and

a base number generated by the access point.

3. The method of claim 1, wherein the obtaining the access assisting signal comprises:

receiving an identification information identifying the access assisting signal in the access assisting signal set from a central processing unit controlling the access point or a base station of a cellular system;

obtaining the access assisting signal in the access assisting signal set based on the identification information.

4. The method of claim 3, wherein the obtaining the access assisting signal comprises:

obtaining the access assisting signal in the access assisting signal set based on the identification information and at least one of:

an identifier of the access point,

a number of times that the access point has broadcast access assisting signals, and

a base number generated by the access point.

5. The method of claim 1, wherein the obtaining the access assisting signal comprises:

obtaining the access assisting signal through a sequence generator that is capable of generating each of the access assisting signals in the access assisting signal set.

6. The method of claim 5, wherein the obtaining the access assisting signal comprises:

obtaining the access assisting signal through a sequence generator based on at least one of:

an identifier of the access point,

a number of times that the access point has broadcast access assisting signals,

a base number generated by the access point,

an identification information identifying the access assisting signal received from a central processing unit controlling the access point, and

an identification information identifying the access assisting signal received from a base station of a cellular system.

7. The method of claim 5, wherein the obtaining the access assisting signal comprises:

obtaining an initial state for the sequence generator based on at least one of:

an identifier of the access point,

a number of times that the access point has broadcast access assisting signals,

a base number generated by the access point,

an identification information identifying the access assisting signal received from a central processing unit controlling the access point, and

an identification information identifying the access assisting signal received from a base station of a cellular system; and

obtain the access assisting signal from the sequence generator which generates the access assisting signal based on the initial state.

8. The method of claim 1, wherein the access assisting signal set is stored in the access point and the obtaining the access assisting signal comprises:

obtaining the access assisting signal from the stored access assisting signal set based on at least one of:

an identifier of the access point,

a number of times that the access point has broadcast access assisting signals,

a base number generated by the access point,

an identification information identifying the access assisting signal received from a central processing unit controlling the access point, and

an identification information identifying the access assisting signal received from a base station of a cellular system.

9. The method of claim 1, wherein the obtaining the access assisting signal comprises:

obtaining multiple access assisting signals in the access assisting signal set; and

the broadcasting the access assisting signal comprises:

broadcasting the multiple access assisting signals at a same time.

10. The method of claim 9, further comprising:

determining a number of multiple access assisting signals based on at least one of:

an identifier of the access point,

a number of times that the access point has broadcast access assisting signals,

a base number generated by the access point,

an information received from a central processing unit, and

an information received from a base station of a cellular system.

11. The method of claim 10, wherein each of the multiple access assisting signals is determined by the access point independently from the access assisting signal set.

12. The method ~~of any~~ of claim~~s 2, 4, 6-8, and~~ 10, wherein the identifier of the access point comprises:

a device identifier of the access point,

a physical identifier of the access point, or

a network temporary identifier of the access point.

13. The method of ~~any of the preceding~~ claim~~s~~ 1, wherein the access assisting signal set is preconfigured in the cell-free wireless communication network, and the access assisting

signals in the access assisting signal set occupy a predetermined time frequency resource.

14. The method of claim 13, wherein the access assisting signals in the access assisting signal set are multiplexed in the predetermined time frequency resource by at least one of:

frequency division multiplexing method,

time division multiplexing method, and

code division multiplexing method.

15. The method of ~~any of the preceding~~ claim~~s~~ 1, wherein each of the access assisting signals in the access assisting signal set occupies a subcarrier of a frequency resource.

16. The method of ~~any of the preceding~~ claim~~s~~ 1, wherein the plurality of access assisting signals comprise at least one of Zadoff-Chu sequences, Walsh-Hadamard sequences, Discrete Fourier Transform sequences, m sequences, pseudo-noise sequences, Maximum Length Shift Register sequence, and Gold sequences.

17. The method of ~~any of the preceding~~ claim~~s~~ 1, wherein the plurality of access assisting signals are orthogonal to each other.

18. The method of ~~any of~~ claim~~s~~ 1 ~~to 16~~, wherein at least a portion of the plurality of access assisting signals are non-orthogonal to each other.

19. The method of ~~any of the preceding~~ claim~~s~~ 1, wherein at least a portion of the plurality of access points broadcast different number of access assisting signals at the same time.

20. ~~A device comprising a processor and a memory, wherein the processor is configured to read computer code from the memory to implement a method in any one of claims 1 to 19~~An access point in a cell-free wireless communication network comprising a plurality of access points and at least one central processing unit controlling the access points, the access point comprising:

a memory operable to store computer-readable instructions; and

a processor circuitry operable to read the computer-readable instructions, the processor circuitry when executing the computer-readable instructions is configured to:

obtain an access assisting signal in an access assisting signal set, wherein the access assisting signal set comprises a plurality of access assisting signals that enable a user equipment to initially access to the cell-free wireless communication network; and

broadcast the access assisting signal, wherein the plurality of access points broadcast respective access assisting signals at a same time.

~~21. A computer-readable medium comprising instructions which, when executed by a computer, cause the computer to carry out the method of any one of claims 1 to 19.~~