modifications to the disclosed embodiments can be made while remaining within the scope of the invention.

In ~~one embodiment~~a first aspect, a method performed by a wireless communication node is disclosed. The method includes: transmitting first information to a wireless communication device; receiving a first message from the wireless communication device for an access of the wireless communication device to the wireless communication node; and transmitting a second message to the wireless communication device in response to the first message. The first information comprises information about a time offset for the wireless communication device to start monitoring for the second message after the time offset from an end of a transmission of the first message.

In ~~another embodiment~~a second aspect, a method performed by a wireless communication device is disclosed. The method includes: receiving first information from a wireless communication node via at least one of: system information, or a Radio Resource Control (RRC) message; transmitting a first message to the wireless communication node for an access of the wireless communication device to the wireless communication node; and receiving, from the wireless communication node, a second message in response to the first message. The first information comprises information about a time offset for the wireless communication device to start monitoring for the second message after the time offset from an end of transmitting the first message.

In a third aspect, a wireless communication node is disclosed. The wireless communication node includes a memory for storing computer instructions and a processor in communication with the memory, wherein, when the processor executes the computer instructions, the processor is configured to cause the wireless communication node to: transmit first information

to a wireless communication device; receive a first message from the wireless communication device for an access of the wireless communication device to the wireless communication node; and transmit a second message to the wireless communication device in response to the first message, wherein the first information comprises information about a time offset for the wireless communication device to start monitoring for the second message after the time offset from an end of a transmission of the first message.

Yet in another embodiment, a computing device comprising at least one processor and a memory coupled to the processor, the at least one processor configured to carry out any method disclosed herein. Yet, in another embodiment, a non-transitory computer-readable medium having stored thereon computer-executable instructions for carrying out any method disclosed herein.

BRIEF DESCRIPTION OF THE DRAWINGS

1. A method performed by a wireless communication node, comprising:

transmitting first information to a wireless communication device;

receiving a first message from the wireless communication device for an access of the wireless communication device to the wireless communication node; and

transmitting a second message to the wireless communication device in response to the first message,

wherein the first information comprises information about a time offset for the wireless communication device to start monitoring for the second message after the time offset from an end of a transmission of the first message.

2. The method of claim 1, wherein the first information further comprises information about a time window configured for the wireless communication device to monitor for the second message within the time window, wherein the time window starts after the time offset from the end of the transmission of the first message; and

the first information is transmitted in at least one of the following: a system information message or a Radio Resource Control (RRC) message.

~~3. The method of claim 1, wherein the first information is transmitted in at least one of the following: system information and a Radio Resource Control (RRC) message.~~

~~4~~3. The method of claim 1, wherein the second message comprises information related to a System Frame Number (SFN) of a system frame used for transmitting the first message by the wireless communication device.

~~5~~4. The method of claim ~~4~~3, wherein the second message comprises at least one of:

one or more least significant bits of the SFN for indicating the SFN for transmitting the first message; or

a remainder of the SFN when divided by N for indicating the SFN, wherein N is a positive integer.

~~6. The method of claim 4, wherein the second message comprises a remainder of the SFN when divided by N for indicating the SFN, wherein N is a positive integer.~~

~~7. The method of claim 6, wherein N is equal to a positive power of 2.~~

~~8. The method of claim 4, wherein the SFN is indicated to the wireless communication device via at least one of the following: a Media Access Control (MAC) Random Access Response and Downlink Control Information (DCI) in the second message.~~

~~9~~5. The method of claim ~~4~~3, further comprising configuring the time offset for the wireless communication device after determining that a quantity of bits needed for indicating the SFN is larger than a pre-determined threshold.

~~10~~6. The method of claim 1, further comprising configuring the time offset for the wireless communication device after determining that a desired time window is longer than a pre-determined threshold.

~~11~~7. The method of claim ~~10~~6, wherein:

the desired time window is a time window desired to be configured for the wireless communication device to monitor for the second message within the desired time window starting from the end of the transmission of the first message, without a configuration of the time offset;

the desired time window is determined at least partially based on at least one of the following:

a first delay related to the transmission of the first message; and

a second delay related to processing the first message; and

the time offset is determined at least partially based on at least one of the following:

the desired time window;

a first delay related to the transmission of the first message; and

a second delay related to processing the first message..

~~12. The method of claim 10, wherein the desired time window is determined at least partially based on at least one of the following:~~

~~a first delay related to the transmission of the first message; and~~

~~a second delay related to processing the first message.~~

~~13. The method of claim 10, wherein the time offset is determined at least partially based on at least one of the following:~~

~~the desired time window;~~

~~a first delay related to the transmission of the first message; and~~

~~a second delay related to processing the first message.~~

~~14. The method of claim 1, wherein the second message indicates whether the second message is for a 2-step random access or a 4-step random access.~~

~~15~~8. A method performed by a wireless communication device, comprising:

receiving first information from a wireless communication node via at least one of: system information, or a Radio Resource Control (RRC) message;

transmitting a first message to the wireless communication node for an access of the wireless communication device to the wireless communication node; and

receiving, from the wireless communication node, a second message in response to the first message,

wherein the first information comprises information about a time offset for the wireless communication device to start monitoring for the second message after the time offset from an end of transmitting the first message.

~~16~~9. The method of claim ~~15~~8, further comprising:

monitoring for the second message within a time window, wherein the time window is indicated in the first information and starts after the time offset from the end of transmitting the first message.

~~17. The method of claim 15, wherein the first information is received in at least one of the following: system information and a Radio Resource Control (RRC) message.~~

~~18~~10. The method of claim ~~15~~8, wherein the second message comprises information related to a System Frame Number (SFN) of a system frame used for transmitting the first message to the wireless communication node.

~~19~~11. The method of claim ~~18~~10, wherein the second message comprises at least one of:

one or more least significant bits of the SFN for indicating the SFN; or

a remainder of the SFN when divided by N for indicating the SFN, wherein N is a positive integer.

~~20. The method of claim 18, wherein the second message comprises a remainder of the SFN when divided by N for indicating the SFN, wherein N is a positive integer.~~

~~21. The method of claim 20, wherein N is equal to a positive power of 2.~~

~~22. The method of claim 18, wherein the SFN is indicated via at least one of the following: a Media Access Control (MAC) Random Access Response and Downlink Control Information (DCI) in the second message.~~

~~23. The method of claim 18, wherein the time offset is configured for the wireless communication device based on a determination that a quantity of bits needed for indicating the SFN is larger than a pre-determined threshold.~~

~~24~~12. The method of claim ~~15~~8, wherein:

the time offset is configured for the wireless communication device based on a determination that a desired time window is longer than a pre-determined threshold:

the desired time window is a time window desired to be configured for the wireless communication device to monitor for the second message within the desired time window starting from the end of transmitting the first message, without a configuration of the time offset;

the desired time window is determined at least partially based on at least one of the following:

a first delay related to the transmission of the first message; or

a second delay related to processing the first message; and

the time offset is determined at least partially based on at least one of the following:

the desired time window;

a first delay related to the transmission of the first message; or

a second delay related to processing the first message.

~~25. The method of claim 24, wherein the desired time window is a time window desired to be configured for the wireless communication device to monitor for the second message within the desired time window starting from the end of transmitting the first message, without a configuration of the time offset.~~

~~26. The method of claim 24, wherein the desired time window is determined at least partially based on at least one of the following:~~

~~a first delay related to the transmission of the first message; and~~

~~a second delay related to processing the first message.~~

~~27. The method of claim 24, wherein the time offset is determined at least partially based on at least one of the following:~~

~~the desired time window;~~

~~a first delay related to the transmission of the first message; and~~

~~a second delay related to processing the first message.~~

~~28. The method of claim 15, wherein the second message indicates whether the second message is for a 2-step random access or a 4-step random access.~~

~~29. A computing device comprising at least one processor and a memory coupled to the processor, the at least one processor configured to carry out the method of any one of claims 1 through 28.~~

~~30. A non-transitory computer-readable medium having stored thereon computer-executable instructions for carrying out the method of any one of claims 1 through 28.~~

13. A wireless communication node comprising a memory for storing computer instructions and a processor in communication with the memory, wherein, when the processor executes the computer instructions, the processor is configured to cause the wireless communication node to:

transmit first information to a wireless communication device;

receive a first message from the wireless communication device for an access of the wireless communication device to the wireless communication node; and

transmit a second message to the wireless communication device in response to the first message,

wherein the first information comprises information about a time offset for the wireless communication device to start monitoring for the second message after the time offset from an end of a transmission of the first message.

14. The wireless communication node of claim 13, wherein:

the first information further comprises information about a time window configured for the wireless communication device to monitor for the second message within the time window, wherein the time window starts after the time offset from the end of the transmission of the first message; and

the first information is transmitted in at least one of the following: a system information message or a Radio Resource Control (RRC) message.

15. The wireless communication node of claim 13, wherein the second message comprises information related to a System Frame Number (SFN) of a system frame used for transmitting the first message by the wireless communication device.

16. The wireless communication node of claim 15, wherein the second message comprises at least one of:

one or more least significant bits of the SFN for indicating the SFN for transmitting the first message; or

a remainder of the SFN when divided by N for indicating the SFN, wherein N is a positive integer.

17. The wireless communication node of claim 15, wherein, when the processor executes the computer instructions, the processor is configured to further cause the wireless communication node to:

configure the time offset for the wireless communication device after determining that a quantity of bits needed for indicating the SFN is larger than a pre-determined threshold.

18. The wireless communication node of claim 13, wherein, when the processor executes the computer instructions, the processor is configured to further cause the wireless communication node to:

configure the time offset for the wireless communication device after determining that a desired time window is longer than a pre-determined threshold.

19. The wireless communication node of claim 18, wherein:

the desired time window is a time window desired to be configured for the wireless communication device to monitor for the second message within the desired time window starting from the end of the transmission of the first message, without a configuration of the time offset;

the desired time window is determined at least partially based on at least one of the following:

a first delay related to the transmission of the first message; and

a second delay related to processing the first message; and

the time offset is determined at least partially based on at least one of the following:

the desired time window;

a first delay related to the transmission of the first message; and

a second delay related to processing the first message.

20. A device comprising a memory for storing computer instructions and a processor in communication with the memory, wherein the processor, when executing the computer instructions, is configured to implement a method of claim 8.