MECHANISM FOR TRANSITION TO ANOTHER CELL WITHOUT HANDOVER IN A NON-TERRESTRIAL NETWORK

FIELDS

[0001] Various example embodiments of the present disclosure generally relate to the field of telecommunication and in particular, to methods, devices, apparatuses and computer readable storage medium for transition to another cell without handover in non-terrestrial network (NTN).

BACKGROUND

[0002] The Third Generation Partnership Project (3GPP) has initiated a discussion on NTN. For example, feasibility of using fifth generation (5G) new radio (NR) standards to support non-terrestrial networks has been studied during 3GPP releases 15 and 16. In particular, user equipments (UEs) supporting NTN are assumed to have Global Navigation Satellite System (GNSS) capability. In an NTN system, 5G base stations (gNB) or gNB functionality are deployed on board satellites or relayed by satellites in a transparent way to provide communication coverage over a very large area that may be otherwise unreachable by cellular networks. Such functionality can be used to connect internet of thing (IoT) devices globally as well as provide personal communication in remote areas.

SUMMARY

[0003] In a first aspect of the present disclosure, there is provided a first apparatus. The first apparatus comprises at least one processor; and at least one memory storing instructions that, when executed by the at least one processor, cause the first apparatus to: receive, from a second apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and cause a hybrid automatic repeat request, HARQ, buffer be maintained for the switching without the physical cell identity change.

[0004] In a second aspect of the present disclosure, there is provided a second apparatus. The second apparatus comprises at least one processor; and at least one memory storing

instructions that, when executed by the at least one processor, cause the second apparatus to: transmit, to a first apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and cause at least a hybrid automatic repeat request, HARQ, buffer to be maintained for the switching without the physical cell identity change.

[0005] In a third aspect of the present disclosure, there is provided a method. The method comprises: receiving, from a second apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and causing at least a hybrid automatic repeat request, HARQ, buffer to be maintained for the switching without the physical cell identity change.

[0006] In a fourth aspect of the present disclosure, there is provided a method. The method comprises: transmitting, to a first apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and causing at least a hybrid automatic repeat request, HARQ, buffer to be maintained for the switching without the physical cell identity change.

[0007] In an example of the present disclosure, there is provided a first apparatus. The first apparatus comprises means for receiving, from a second apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication about a cell identity change associated with the switching; and means for causing at least one of the following to be maintained for a plurality of alternatives of the indication: a hybrid automatic repeat request, HARQ, buffer, a security key for radio communication, or a cell configuration.

[0008] In an example of the present disclosure, there is provided a second apparatus. The second apparatus comprises means for transmitting, to a first apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication about a cell identity

change associated with the switching; and means for causing at least one of the following to be maintained for a plurality of alternatives of the indication: a hybrid automatic repeat request, HARQ, buffer, or a security key for radio communication, or a cell configuration.

[0009] In a fifth aspect of the present disclosure, there is provided a computer readable medium. The computer readable medium comprises instructions stored thereon for causing an apparatus to perform at least the method according to the third aspect.

[0010] In a sixth aspect of the present disclosure, there is provided a computer readable medium. The computer readable medium comprises instructions stored thereon for causing an apparatus to perform at least the method according to the fourth aspect.

[0011] It is to be understood that the Summary section is not intended to identify key or essential features of embodiments of the present disclosure, nor is it intended to be used to limit the scope of the present disclosure. Other features of the present disclosure will become easily comprehensible through the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Some example embodiments will now be described with reference to the accompanying drawings, where:

[0013] FIG. 1 illustrates an example communication environment in which example embodiments of the present disclosure can be implemented;

[0014] FIG. 2 illustrates a signaling chart of transition to another cell without handover in NTN in which example embodiments of the present disclosure can be implemented;

[0015] FIG. 3 illustrates a flowchart of a method of transition to another cell without handover in NTN according to some example embodiments of the present disclosure;

[0016] FIG. 4 illustrates a flowchart of a method implemented at a first device according to some example embodiments of the present disclosure;

[0017] FIG. 5 illustrates a flowchart of a method implemented at a second device according to some example embodiments of the present disclosure;

[0018] FIG. 6 illustrates a simplified block diagram of a device that is suitable for implementing example embodiments of the present disclosure; and

[0019] FIG. 7 illustrates a block diagram of an example computer readable medium in

CLAIMS

1. A first apparatus comprising:

at least one processor; and

at least one memory storing instructions that, when executed by the at least one processor, cause the first apparatus to:

receive, from a second apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and

cause at least a hybrid automatic repeat request, HARQ, buffer to be maintained for the switching without the physical cell identity change.

2. The first apparatus of claim 1, wherein the first apparatus is further caused to:

determine that the indication indicates the switching without the physical cell identity change;

maintain the physical cell identity of a serving cell to be unchanged; and

maintain at least one of: a security key, or a cell configuration.

3. The first apparatus of any of claim 1-2, wherein the first apparatus is further caused to:

maintain at least one of: a control plane configuration and a user plane configuration.

4. The first apparatus of any of claim 1-3, wherein the first apparatus is caused to:

perform a resynchronization with the target non-terrestrial device.

5. The first apparatus of any of claims 1-4, wherein the assistance information further comprises at least one of:

a reference time when the assistance information is valid,

ephemeris information of the target non-terrestrial device, or

a common delay associated with target non-terrestrial device.

6. The first apparatus of any of claims 1-5, wherein the first apparatus comprises a terminal device, and the second apparatus comprises a network device.

7. A second apparatus comprising:

at least one processor; and

at least one memory storing instructions that, when executed by the at least one processor, cause the second apparatus to:

transmit, to a first apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and

causing at least a hybrid automatic repeat request, HARQ, buffer to be maintained for the switching without the physical cell identity change.

8. The second apparatus of claim 7, wherein the second apparatus is further caused to:

determine that the indication indicates the switching without the physical cell identity change;

maintain the physical cell identity of a serving cell to be unchanged; and

maintain at least one of: a security key, or a cell configuration.

9. The second apparatus of any of claim 7-8, wherein the second apparatus is caused to:

maintain at least one of: a control plane configuration and a user plane configuration.

10. The second apparatus of any of claim 7-9, wherein the second apparatus is caused to:

maintain at least one of the following states:

a physical entity state,

a medium access control entity state,

a radio link control entity state,

a packet data convergence protocol entity state, or

a radio resource control entity state.

11. The second apparatus of any of claims 7-10, wherein the assistance information further comprises at least one of:

a reference time when the assistance information is valid,

ephemeris information of the target non-terrestrial device, or

a common delay associated with target non-terrestrial device.

12. The second apparatus of any of claims 7-11, wherein the first apparatus comprises a terminal device, and the second apparatus comprises a network device.

13. A method comprising:

receiving, at a first apparatus and from a second apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and

causing at least a hybrid automatic repeat request, HARQ, buffer to be maintained for the switching without the physical cell identity change.

14. The method of claim 13, further comprising by the first apparatus:

determining that the indication indicates the switching without the physical cell identity change;

maintaining the physical cell identity of a serving cell to be unchanged; and

maintaining at least one of: a security key, or a cell configuration.

15. The method of any of claim 13-14, further comprising by the first apparatus:

maintaining at least one of: a control plane configuration and a user plane configuration.

16. The method of any of claim 13-15, further comprising by the first apparatus:

performing a resynchronization with the target non-terrestrial device.

17. The method of any of claims 13-16, wherein the assistance information further comprises at least one of:

a reference time when the assistance information is valid,

ephemeris information of the target non-terrestrial device, or

a common delay associated with target non-terrestrial device.

18. The method of any of claims 13-17, wherein the first apparatus comprises a terminal device, and the second apparatus comprises a network device.

19. A method comprising:

transmitting, at a second apparatus and to a first apparatus, assistance information for switching from a source non-terrestrial device to a target non-terrestrial device, wherein the assistance information comprises an indication that the switching is without a physical cell identity change; and

causing at least a hybrid automatic repeat request, HARQ, buffer to be maintained for the switching without the physical cell identity change.

20. The method of claim 19, further comprising by the second apparatus:

determining that the indication indicates the switching without the physical cell identity change;

maintaining the physical cell identity of a serving cell to be unchanged; and

maintaining at least one of: a security key, or a cell configuration.

21. The method of any of claims 19-20, further comprising by the second apparatus:

maintaining at least one of: a control plane configuration and a user plane configuration.

22. The method of any of claims 19 to 21, further comprising by the second apparatus:

maintaining at least one of the following states:

a physical entity state,

a medium access control entity state,

a radio link control entity state,

a packet data convergence protocol entity state, or

a radio resource control entity state.

23. The method of any of claims 19 to 22, wherein the assistance information further comprises at least one of:

a reference time when the assistance information is valid,

ephemeris information of the target non-terrestrial device, or

a common delay associated with target non-terrestrial device.

24. The method of any of claims 19 to 23, wherein the first apparatus comprises a terminal device, and the second apparatus comprises a network device.

25. A computer readable medium comprising instructions stored thereon for causing an apparatus at least to perform the method of any of claims 13 to 24.

5