JOINT POSITIONING USING DOWNLINK AND SIDELINK MEASUREMENTS

TECHNICAL FIELD

[1] This disclosure is directed generally to wireless communications.

BACKGROUND

[2] Wireless communication technologies are moving the world toward an increasingly connected and networked society. The rapid growth of wireless communications and advances in technology has led to greater demand for capacity and connectivity as well as wireless device location information. Other aspects, such as energy consumption, device cost, spectral efficiency, and latency are also important to meeting the needs of various communication scenarios. In comparison with the existing wireless networks, next generation systems and wireless communication techniques need to provide support for an increased number of users and devices, as well as support an increasingly mobile society which includes location information.

SUMMARY

[3] Downlink time difference of arrival (DL-TDOA) is a method for positioning where multiple transmission-reception points (TRPs) transmit downlink positioning reference signals (DL-PRS) to a target wireless communication device. The disclosed DL-TDOA based joint positioning also uses sidelinks.

[4] In one aspect, a method of wireless communication is disclosed. The method includes transmitting, by a first wireless communication device or a first network node, a Uu based information, a sidelink based information, and a cross information of Uu and sidelink.

[5] In one aspect, a method of wireless communication is disclosed. The method includes receiving, by a first wireless communication device or a first network node, a Uu based information, a sidelink based information, and a cross information of Uu and sidelink.

[6] In another aspect, an apparatus is disclosed. The apparatus includes a processor configured to implement the above-described method.

[7] In yet another aspect, a computer readable medium is disclosed. The computer readable medium stores code, which, upon execution by a processor, causes the processor to implement a method described herein.

[8] These, and other, aspects are described throughout the present document.

CLAIMS

1. A method of wireless communication, comprising:

transmitting, by a first wireless communication device or a first network node, a Uu based information, a sidelink based information, and a cross information of Uu and sidelink.

2. A method of wireless communication, comprising:

receiving, by a first wireless communication device or a first network node, a Uu based information, a sidelink based information, and a cross information of Uu and sidelink.

3. The method of claim 1 or 2, wherein the sidelink based information comprises:

sidelink assistance data, a sidelink reference node related information that is configured or preconfigured by the first network node or the first wireless communication device, sidelink measurement related information, and a location information of the first wireless communication device.

4. The method of claim 3, wherein the location information of the first wireless communication device includes one or more of:

a location of the first wireless communication device;

a downlink measurement related information; or

the sidelink measurement related information.

5. The method of claim 3, wherein the sidelink assistance data includes one or more of:

sidelink positioning reference signal (SL-PRS) related information;

location related information of a second wireless communication device in a group of wireless communication devices that excludes the first wireless communication device;

identifier information for the second wireless communication device;

an SL-PRS transmission instant; or

information about selected wireless communication devices in the group of wireless communication devices, the information including one or more of:

IDs of the selected wireless communication devices,

locations of the selected wireless communication devices, or

a corresponding SL-PRS resource set identifier and a SL-PRS resource identifier of the selected wireless communication devices.

6. The method of claim 5, wherein a sidelink reference node is a same node as a downlink reference node;

wherein the sidelink reference node and the downlink reference node correspond to a second network node in a group of network nodes that excludes the first network node or a wireless communication device in the group of wireless communication devices;

wherein the sidelink reference node related information includes one or more of:

an information element indicating type of the sidelink reference node,

an information element indicating identifier of the sidelink reference node, or

corresponding positioning reference signal related information; and

wherein, in a case that the sidelink reference node related information is absent, downlink reference node related information is used as the sidelink reference node related information.

7. The method of claim 3, wherein the sidelink measurement related information includes one or more of:

the sidelink reference node related information;

a sidelink time difference of arrival (SL-TDOA) measurement list containing multiple SL-TDOA measurement elements, wherein each SL-TDOA measurement element includes one or more of:

a sidelink positioning reference signal (SL-PRS) related information;

an identifier of a second wireless communication device in a group of wireless communication devices that excludes the first wireless communication device; or

a sidelink reference signal time difference (SL RSTD), wherein the SL RSTD represents sidelink measurement based on a TDOA method obtained by calculating relative timing difference between the second wireless communication device and a sidelink reference node.

8. The method of claim 1 or 2, further comprising:

receiving, by the first wireless communication device or the first network node, a system frame number (SFN) initialization time of a second wireless communication device in a group of wireless communication devices that excludes the first wireless communication device.

9. The method of claim 5, wherein the sidelink assistance data further includes one or more of:

an identifier of a sidelink reference node;

a system frame number information of the sidelink reference node; or

time synchronization related information of the second wireless communication device, which includes one or more of:

an ID of the second wireless communication device, or

a subframe offset related information indicating a subframe boundary offset between the sidelink reference node and the second wireless communication device.

10. The method of claim 3, wherein a sidelink reference node is different from a downlink reference node, wherein the sidelink reference node is a wireless communication device in a group of wireless communication devices that excludes the first wireless communication device, and wherein the downlink reference node is a network node in a group of network nodes that excludes the first network node.

11. The method of claim 1 or 2, wherein the cross information of Uu and sidelink comprises:

time synchronization information between a downlink reference node and a sidelink reference node that includes one or more of:

an ID of the sidelink reference node,

an ID of the downlink reference node,

a subframe offset related information indicating a subframe boundary offset between the sidelink reference node and the downlink reference node; and/or

a list of cross reference signal time difference (RSTD) that includes one or more of:

RSTD between the sidelink reference node and the downlink reference node,

RSTD between a second wireless communication device in a group of wireless communication devices that excludes the first wireless communication device and a second network node in a group of network nodes that excludes the first network node,

RSTD between the second network node and the sidelink reference node, or

RSTD between the second wireless communication device and the downlink reference node.

12. The method of claim 6, 10, or 11, wherein each network node in the group of network nodes is a base station, a transmission-reception point (TRP), or a Next Generation Node B (gNB).

13. The method of any of claims 5 to 12, wherein each wireless communication device in the group of wireless communication devices is an anchor user equipment (UE) or a reference UE.

14. The method of any of claims 1 to 13, wherein the first network node is a location management function (LMF), and wherein the first wireless communication device is a target user equipment (UE).

15. A communication apparatus comprising a processor configured to implement the method recited in any one or more of claims 1 to 14.