[0004] Discontinuous reception (DRX) with active times and inactive times has been introduced as an enhancement for SL communication between UEs to save power. However, currently it is only specified that the physical (PHY) layer selects and reports candidate resources to higher layers wherein at least a subset of the reported candidate resources are within an indicated DRX active time of the RX UE. There is no method or detailed procedures on how the PHY layer should restrict resources to derive the candidate resources and potential issues for resource selection and reporting are not addressed leaving a void in selection and restriction procedures in SL communication.

[0005] Thus, there is a need for communication apparatuses and methods for transmitter restrictions on resource reporting for SL communication to fill the void of resource selection and restriction procedures in present SL communication and enhance a TX UE's ability to select resources within a RX UE's indicated active time. Furthermore, other desirable features and characteristics will become apparent from the subsequent detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background.

SUMMARY

[0006] One non-limiting and exemplary embodiment facilitates providing methods and communication apparatuses to select and report resources for sidelink communication.

[0006a] In a first aspect, the present disclosure provides a communication apparatus, wherein the communication apparatus is a transmitting User Equipment (UE), the communication apparatus comprising: a transceiver, which, in operation, performs a sidelink (SL) communication; and circuitry, which, in operation, determines, a set of candidate resources based on a reference signal received power (RSRP) of the SL

communication and a discontinuous reception (DRX) active time of a receiving UE; and reports the set of candidate resources to a higher layer,

wherein the set of candidate resources includes resources with a RSRP lower than a threshold related to RSRP,

in case the set of candidate resources does not meet a condition, the threshold related to RSRP is increased and the set of candidate resources includes resources with a RSRP below the increased threshold.

[0006b] In a second aspect, the present disclosure provides a method performed by a transmitting User Equipment (UE), the method comprising: performing a sidelink (SL) communication; and determining, a first set of candidate resources based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of a receiving UE; and reporting the set of candidate resources to higher layers,

wherein the set of candidate resources includes resources with a RSRP lower than a threshold related to RSRP,

in case the set of candidate resources does not meet a condition, the threshold related to RSRP is increased and the set of candidate resources includes resources with a RSRP below the increased threshold.

[0006c] In a third aspect, the present disclosure provides an integrated circuit for controlling a process of a transmitting User Equipment (UE), the process comprising: performing a sidelink (SL) communication; and determining, a set of candidate resources based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of a receiving UE; and reporting the set of candidate resources to higher layers,

wherein the set of candidate resources includes resources with a RSRP lower than a threshold related to RSRP,

in case the set of candidate resources does not meet a condition, the threshold related to RSRP is increased and the set of candidate resources includes resources with a RSRP below the increased threshold.

[0006d] In an example, the present disclosure provides a communication apparatus, wherein the communication apparatus is a receiving User Equipment (UE), the communication apparatus comprising: a transceiver, which, in operation, performs a sidelink (SL) communication; and a receiver, which, in operation, receives data from a transmitting UE based on a set of candidate resources, wherein the set of candidate resources are determined based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of the receiving UE.

[0006e] In a fifth aspect, the present disclosure provides a method performed by a receiving User Equipment (UE), the method comprising: performing a sidelink (SL) communication; and receiving data from a transmitting UE based on a set of candidate resources, wherein the set of candidate resources are determined based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of the receiving UE.

[0006f] In an example, the present disclosure provides an integrated circuit for controlling a process of a receiving User Equipment (UE), the process comprising: performing a sidelink (SL) communication; and receiving data from a transmitting UE based on a set of candidate resources, wherein the set of candidate resources are determined based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of the receiving UE.

In an example, the techniques disclosed herein feature a method of radio resource selection and reporting for a sidelink (SL) communication. The method includes determining, at a transmitting User Equipment (TX UE), a first set of candidate resources having a high priority from all resources for the SL communication. The, first set of candidate resources are determined based on at least a reference signal

CLAIMS

What is claimed is:

1. A communication apparatus, wherein the communication apparatus is a transmitting User Equipment (UE), the communication apparatus comprising:

a transceiver, which, in operation, performs a sidelink (SL) communication; and

circuitry, which, in operation, determines, a set of candidate resources based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of a receiving UE; and

reports the set of candidate resources to a higher layer,

wherein the set of candidate resources includes resources with a RSRP lower than a threshold related to RSRP,

in case the set of candidate resources does not meet a condition, the threshold related to RSRP is increased and the set of candidate resources includes resources with a RSRP below the increased threshold.

2. The communication apparatus in accordance with Claim 1, in case the set of candidate resources does not meet a condition, after determining the set of candidate resources based on the RSRP, the set of candidate resources are determined by including resources within the receiving UE DRX active time.

3. The communication apparatus in accordance with Claim 1, wherein determining the set of candidate resources comprises

indicating to a physical (PHY) layer the DRX active time of the receiving UE.

4. The communication apparatus in accordance with Claim 1, wherein, in case a number of resources in the set of candidate resources is less than a pre-configured percentage of a total number of candidate resources, the set of candidate resources is set to include all the candidate resources.

5. The communication apparatus in accordance with Claim 1, wherein, in case the set of candidate resources meets a condition, the transmitting UE excludes non-applicable resources from the candidate resources.

6. The communication apparatus in accordance with Claim 1, wherein, in case a number of the set of candidate resources is less than a preconfigured percentage of a total number of candidate resources, an exclusion to exclude resources from the candidate resources is iteratively performed based on an iteratively increased threshold related to the RSRP, so long as a number of candidate resources in the set of candidate resources is less than the pre-configured percentage of the total number of candidate resources.

7. The communication apparatus in accordance with Claim 1, wherein the set of candidate resources is determined from candidate resources within a resource selection window of the transmitting UE.

8. The communication apparatus in accordance with Claim 6, wherein the exclusion to exclude the resources is iteratively performed based on an increased threshold related to the RSRP so long as the increased threshold is less than a pre-configured maximum RSRP threshold level.

9. The communication apparatus in accordance with claim 1, wherein reporting the set of candidate resources to higher layers comprises reporting the set of candidate resources to a media access control (MAC) layer.

10. The communication apparatus in accordance with Claim 1, wherein the set of candidate resources includes a resource within the DRX active time of the receiving UE and a resource not within the DRX active time of the receiving UE.

11. The communication apparatus in accordance with Claim 1, determining the set of candidate resources comprises obtaining one or more candidate resources within the DRX active time of the receiving UE.

12. The communication apparatus in accordance with Claim 1, wherein, in case no resource is selected, resources are selected from resources in candidate resources within the DRX active time of the receiving UE.

13. The communication apparatus in accordance with Claim 1, wherein a number of resources in the set of candidate resources is different between a transmitting UE with DRX configuration and a transmitting UE without DRX configuration.

14. The communication apparatus in accordance with Claim 1, wherein the DRX active time of the receiving UE is provided by the higher layer.

15. A method performed by a transmitting User Equipment (UE), the method comprising:

performing a sidelink (SL) communication; and

determining, a first set of candidate resources based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of a receiving UE; and

reporting the set of candidate resources to higher layers,

wherein the set of candidate resources includes resources with a RSRP lower than a threshold related to RSRP,

in case the set of candidate resources does not meet a condition, the threshold related to RSRP is increased and the set of candidate resources includes resources with a RSRP below the increased threshold.

16. An integrated circuit for controlling a process of a transmitting User Equipment (UE), the process comprising:

performing a sidelink (SL) communication; and

determining, a set of candidate resources based on a reference signal received power (RSRP) of the SL communication and a discontinuous reception (DRX) active time of a receiving UE; and

reporting the set of candidate resources to higher layers,

wherein the set of candidate resources includes resources with a RSRP lower than a threshold related to RSRP,

in case the set of candidate resources does not meet a condition, the threshold related to RSRP is increased and the set of candidate resources includes resources with a RSRP below the increased threshold.