Claims:

1. A first user equipment, UE, comprising:

at least one memory; and

at least one processor coupled with the at least one memory and configured to cause the first UE to:

obtain a configuration message indicating that at least one sidelink radio bearer, SLRB, associated with a second UE is configured with a packet data convergence protocol, PDCP, duplication;

determine a start time for the PDCP duplication of the at least one SLRB; and

activate or enable the PDCP duplication for the at least one SLRB from the start time.

2. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to:

determine the start time based on:

a first time when a carrier coordination between the first UE and the second UE is finished, and

a second time when receiving a capability message from the second UE, wherein the capability message indicates that the second UE supports a PDCP duplication.

3. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to:

determine the start time based on a transmission time of an earliest PC5 message between the first UE and the second UE, wherein the earliest PC5 message is optionally associated with the at least one SLRB.

4. The first UE of claim 3, wherein the start time is determined based on a determination that a service associated with a unicast link between the first UE and the second UE indicates that a carrier aggregation, CA, or a PDCP duplication is supported.

5. The first UE of claim 1, wherein the at least one SLRB comprises at least one sidelink signalling radio bearer, SL-SRB, and wherein the at least one processor is configured to cause the first UE to:

in accordance with a determination that the PDCP duplication is activated or enabled for at least one sidelink data radio bearer, SL-DRB, activate or enable the PDCP duplication for the at least one SL-SRB.

6. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to:

activate or enable the PDCP duplication for partial or all messages associated with the at least one SLRB; optionally wherein the partial or all messages are on a same sidelink control channel, SCCH, or on a same SL-SRB.

7. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to:

determine the start time based on a time when one of following conditions fulfills:

a timer T400 is still running and a remaining time length of the timer T400 is shorter than a time length threshold,

a first index of a channel quality indication, CQI, is lower than a CQI threshold being indicated in a sidelink channel state information, SL-CSI, report,

a first reference signal received power, RSRP, of the sidelink determined by the second UE is lower than a power threshold,

a consecutive discontinuous transmission, DTX, number is larger than a DTX threshold,

a received negative acknowledgement, NACK, number is larger than a NACK threshold, or

a sum of a DTX number and a received NACK number is larger than a number threshold;

wherein the at least one processor is optionally configured to cause the first UE to:

determine an end time based on a time when one of following conditions fulfills:

a second index of a CQI is not lower than the CQI threshold in the SL-CSI report,

a second RSRP of the sidelink is not lower than the power threshold,

a measured channel busy rate, CBR, is not lower than a CBR threshold, or

all SL RBs associated with the sidelink have deactivated the PDCP duplication; and

deactivate or disable the PDCP duplication for the at least one SLRB from the end time.

8. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to: in accordance with a determination that a sidelink resource between the first UE and the second UE is scheduled by a base station, determine the start time based on a reception of an indication from the base station, wherein the indication indicates activating or enabling the PDCP duplication for the at least one SLRB;

optionally wherein the at least one processor is configured to cause the first UE to:

receive, from the second UE, capability information of the second UE, wherein the capability information of the second UE indicates that the second UE supports PDCP duplication;

transmit, to the base station, the capability information of the second UE; and

receive, from the base station, the indication.

9. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to:

in accordance with a determination that the at least one SLRB is to be transmitted on one or more unlicensed band carriers, determine the start time based on a time when one of the following conditions fulfills:

one or more indications of listen before talk, LBT, failure for the at least one SLRB are received,

a consecutive LBT failure occurs for a resource block, RB, set the at least one SLRB transmits,

a number of RB sets for which a consecutive LBT failure occurs is larger than a threshold,

a resource reselection is triggered by a consecutive LBT failure, or

a number of conditional primary secondary cell, PSCell, addition or change, CPAC, of the at least one SLRB is larger than a further threshold.

10. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to:

in accordance with a determination that the at least one SLRB is to be transmitted on one or more carriers with frequency range 2, FR2, determine the start time based on a time when one of the following conditions fulfills:

a number of received beam failure indications is larger than a threshold value,

or

a beam failure associated with the at least one SLRB is detected.

11. The first UE of claim 1, wherein the at least one processor is configured to cause the first UE to:

transmit, to a base station, capability information of the first UE indicating one of:

whether the first UE supports PDCP duplication,

at least one band or carrier supporting the PDCP duplication, or

a number of carriers supporting the PDCP duplication.

12. A base station comprising:

at least one memory; and

at least one processor coupled with the at least one memory and configured to cause the base station to:

transmit, to a first user equipment, UE, a configuration message indicating that at least one sidelink radio bearer, SLRB, associated with a second UE is configured with a packet data convergence protocol, PDCP, duplication;

receive, from the first UE, information about the first UE and the second UE; and

transmit, to the first UE, an indication indicating to the first UE to activate or enable the PDCP duplication for the at least one SLRB.

13. The base station of claim 12, wherein the information comprises one of:

capability information of the second UE, wherein the capability information of the second UE indicates that the second UE supports PDCP duplication,

capability information of the first UE indicating one of: whether the first UE supports PDCP duplication, at least one band or carrier supporting the PDCP duplication, or a number of carriers supporting the PDCP duplication,

an index of a channel quality indication, CQI,

a reference signal received power, RSRP, of the sidelink determined by the second UE,

a consecutive discontinuous transmission, DTX, number, or

a received negative acknowledgement, NACK, number.

14. A method performed by a first user equipment, UE, comprising:

obtaining a configuration message indicating that at least one sidelink radio bearer, SLRB, associated with a second UE is configured with a packet data convergence protocol, PDCP, duplication;

determining a start time for the PDCP duplication of the at least one SLRB; and

activating or enabling the PDCP duplication for the at least one SLRB from the start time.

15. A method performed by a base station, comprising:

transmitting, to a first user equipment, UE, a configuration message indicating that at least one sidelink radio bearer, SLRB, associated with a second UE is configured with a packet data convergence protocol, PDCP, duplication;

receiving, from the first UE, information about the first UE and the second UE; and

transmitting, to the first UE, an indication indicating to the first UE to activate or enable the PDCP duplication for the at least one SLRB.