

Claims

What is claimed is:

1. An apparatus comprising:
at least one processor; and
at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to at least:
provide first sidelink control information using a first sidelink control channel and at least second sidelink control information using a second sidelink control channel, wherein the first sidelink control information comprises at least an indication of resource allocation for an associated physical sidelink shared channel, wherein data traffic is transmitted over the associated physical sidelink shared channel, and wherein the second sidelink control information comprises at least information for decoding the associated physical sidelink shared channel.
2. The apparatus of claim 1, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:
provide the first sidelink control information and the second sidelink control information using the second sidelink control channel.
3. The apparatus of claim 1, wherein the associated physical sidelink shared channel comprises periodic or aperiodic data traffic, and wherein the first sidelink control information comprises at least one of an indication of data periodicity and a quality of service requirement.
4. The apparatus of claim 1, wherein the second sidelink control information comprises at least one of modulation and coding scheme (MCS) information, multi-antenna transmission related information, and destination address information.
5. The apparatus of claim 1, wherein at least one of the first sidelink control information and the second sidelink control information comprises at least one of data packet retransmission information and demodulation reference configuration information for the associated physical sidelink shared channel.

6. The apparatus of claim 1, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:

when the associated physical sidelink shared channel comprises periodic data traffic and there is no data transmission in a current period, provide first sidelink control information using the first control channel, wherein the first sidelink control information comprises an indication of the absence of data transmission in the current period.

7. The apparatus of claim 1, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:

when the associated physical sidelink shared channel comprises periodic data traffic and there is data transmission in a current period, provide the second control channel or the first control channel and the second control channel with the associated physical sidelink shared channel.

8. The apparatus of claim 1, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:

when the associated physical sidelink shared channel comprises aperiodic data traffic, provide the first control channel in time resources preceding the associated physical sidelink shared channel.

9. An apparatus comprising:

at least one processor; and

at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus to at least:

receive first sidelink control information using a first sidelink control channel and at least second sidelink control information using a second sidelink control channel, wherein the first sidelink control information comprises at least an indication of resource allocation for an associated physical sidelink shared channel, wherein data traffic is transmitted over the associated physical sidelink shared channel, and wherein the second sidelink control information comprises at least information for decoding of the associated physical sidelink shared channel.

10. The apparatus of claim 9, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:
receive the first sidelink control information and the second sidelink control information using the second control channel.
11. The apparatus of claim 9, wherein the associated physical sidelink shared channel comprises periodic or aperiodic data traffic, and wherein the first sidelink control information comprises at least one of an indication of data periodicity and a quality of service requirement.
12. The apparatus of claim 9, wherein the second sidelink control information comprises at least one of modulation and coding scheme (MCS) information, multi-antenna transmission related information, and destination address information.
13. The apparatus of claim 9, wherein at least one of the first sidelink control information and the second sidelink control information comprises at least one of data packet retransmission information and demodulation reference configuration information for the associated physical sidelink shared channel.
14. The apparatus of claim 9, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:
when the associated physical sidelink shared channel comprises periodic data traffic and there is no data transmission in a current period, receive the first sidelink control information using the first sidelink control channel, wherein the first sidelink control information comprises an indication of the absence of data transmission in the current period.
15. The apparatus of claim 9, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:
when the associated physical sidelink shared channel comprises periodic data traffic and there is data transmission in a current period, receive the second sidelink control channel or the first sidelink control channel and the second sidelink control channel with the associated physical sidelink shared channel.

16. The apparatus of claim 9, wherein the at least one memory and the computer program code are further configured to, with the at least one processor, cause the apparatus to at least:

when the associated physical sidelink shared channel comprises aperiodic data traffic, receive the first control channel in time resources preceding the associated physical sidelink shared channel.

17. A method comprising:

providing first sidelink control information using a first sidelink control channel and at least second sidelink control information using a second sidelink control channel, wherein the first sidelink control information comprises at least an indication of resource allocation for an associated physical sidelink shared channel, wherein data traffic is transmitted over the associated physical sidelink shared channel, and wherein the second sidelink control information comprises at least information for decoding of the associated physical sidelink shared channel.

18. A method comprising:

receiving first sidelink control information using a first sidelink control channel and at least second sidelink control information using a second sidelink control channel, wherein the first sidelink control information comprises at least an indication of resource allocation for an associated physical sidelink shared channel, wherein data traffic is transmitted over the associated physical sidelink shared channel, and wherein the second sidelink control information comprises at least information for decoding of the associated physical sidelink shared channel.

19. A non-transitory computer-readable storage medium storing program instructions for causing an apparatus to perform at least the following:

providing first sidelink control information using a first sidelink control channel and at least second sidelink control information using a second sidelink control channel, wherein the first sidelink control information comprises at least an indication of resource allocation for an associated physical sidelink shared channel, wherein data traffic is transmitted over the associated physical sidelink shared channel, and wherein the second sidelink control information comprises at least information for decoding of the associated physical sidelink shared channel.

20. A non-transitory computer-readable storage medium storing program instructions for causing an apparatus to perform at least the following:

receiving first sidelink control information using a first sidelink control channel and at least second sidelink control information using a second sidelink control channel, wherein the first sidelink control information comprises at least an indication of resource allocation for an associated physical sidelink shared channel, wherein data traffic is transmitted over the associated physical sidelink shared channel, and wherein the second sidelink control information comprises at least information for decoding of the associated physical sidelink shared channel.