

The communication system and associated devices typically operate in accordance with a given standard or specification which sets out what the various entities associated with the system are permitted to do and how that should be achieved. Communication protocols and/or parameters which shall be used for the connection are also typically defined. One example of a communications system is UTRAN (3G radio). Other examples of communication systems are the long-term evolution (LTE) of the Universal Mobile Telecommunications System (UMTS) radio-access technology and so-called 5G or New Radio (NR) networks. NR is being standardized by the 3rd Generation Partnership Project (3GPP).

Summary

In a first aspect there is provided an apparatus, said apparatus comprising at least one processor; and

at least one memory ~~storing instructions thereon that, when executed by~~~~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 perform at least:

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 the associated physical sidelink shared channel.

In an aspect, there is a user equipment for providing a unified physical sidelink channel structure, the user equipment comprising:

at least one processor; and

at least one memory ~~storing instructions thereon that, when executed by~~~~including computer program code, the at least one memory and the computer program code configured to, with~~ the at least one processor, cause the user equipment to perform at least:

providing first control information using a first sidelink control channel of the unified physical sidelink channel structure and at least second control information using a second sidelink

control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, ~~and wherein~~ the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, ~~and~~ wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is a user equipment for receiving a unified physical sidelink channel structure, the user equipment comprising:

at least one processor; and

at least one memory ~~storing instructions thereon that, when executed by~~including computer program code, ~~the at least one memory and the computer program code configured to, with~~ the at least one processor, cause the user equipment to ~~perform~~ at least:

~~receive-receiving~~ first control information using a first ~~sidelink~~ control channel of the unified physical sidelink channel structure and at least second control information using a second ~~sidelink~~ control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is a method comprising:

providing first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is a method comprising:

receiving first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated

data channel of the unified physical sidelink channel structure, wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is a non-transitory computer-readable storage medium storing program instructions for causing an apparatus to perform at least the following:

providing first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is non-transitory computer-readable storage medium storing program instructions for causing an apparatus to perform at least the following:

receiving first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, wherein the second control information comprises at least transmission format information for decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is an apparatus comprising:

at least one processor; and

at least one memory storing instructions thereon that, when executed by~~including program codes, the at least one memory and the program codes configured to, with~~ the at least one processor, cause the apparatus to perform at least:

~~provide~~providing first control information using a first control channel of a unified physical sidelink channel structure and at least second control information using a second control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, wherein the second control

information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is an apparatus comprising:

at least one processor; and

at least one memory ~~storing instructions thereon that, when executed by~~including program codes, ~~the at least one memory and the program codes configured to, with~~ the at least one processor, cause the apparatus to perform at least:

~~receive-receiving~~ first control information using a first control channel of a unified physical sidelink channel structure and at least second control information using a second control channel of the unified physical sidelink channel structure, wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, ~~and wherein~~ the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is a method comprising:

providing control information, wherein a first portion of the control information is provided using a first control channel of a unified physical sidelink channel structure and at least a second portion of the control information is provided using a second control channel of the unified physical sidelink channel structure, wherein the first portion of the control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, ~~and wherein~~ the second portion of the control information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is a method comprising:

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

sidelink control information comprises at least information for decoding of the associated ~~physical sidelink shared data~~ channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is a non-transitory computer-readable storage medium storing instructions that, when executed by at least one processor, cause an apparatus to perform at least the following:

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

In an aspect, there is a non-transitory computer-readable storage medium storing instructions that, when executed by at least one processor, cause an apparatus to perform at least the following:

receiving control information, wherein a first portion of the control information is received using a first control channel of a unified physical sidelink channel structure and at least a second portion of the control information is received using a second control channel of the unified physical sidelink channel structure, wherein the first portion of the control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure, and wherein the second portion of the control information comprises at least transmission format information for assisting data decoding of the associated data channel, and wherein the associated data channel comprises periodic or aperiodic data traffic.

In an aspect, there is an apparatus comprising:

at least one processor; and

at least one memory storing instructions thereon that, when executed by ~~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 perform at least:

~~receive~~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

Claims

What is claimed is:

1. An apparatus comprising:
 - at least one processor; and
 - at least one memory storing instructions thereon that, when executed by 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 perform at least:
 - ~~provide~~ 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 the associated physical sidelink shared channel.
2. 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.
3. 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.
4. 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.
5. The apparatus of claim 1, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with~~ when executed by the at least one processor, further cause the apparatus to perform at least:

when the associated physical sidelink shared channel comprises periodic data traffic and there is no data transmission in a current period, ~~provide~~ providing 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.

6. The apparatus of claim 1, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with~~ when executed by the at least one processor, further cause the apparatus to perform at least:

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

7. The apparatus of claim 1, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with~~ when executed by the at least one processor, further cause the apparatus to perform at least:

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

8. An apparatus comprising:

at least one processor; and

at least one memory storing instructions thereon that, when executed by 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 perform at least:

~~receive~~ 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.

9. The apparatus of claim 8, 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.

10. The apparatus of claim 8, 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.

11. The apparatus of claim 8, 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.

12. The apparatus of claim 8, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the apparatus to perform at least:

when the associated physical sidelink shared channel comprises periodic data traffic and there is no data transmission in a current period, ~~receive~~ receiving 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.

13. The apparatus of claim 8, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the apparatus to perform at least:

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

14. The apparatus of claim 8, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the apparatus to perform at least:

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

15. 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.

16. 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.

17. 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.

18. 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.

19. A user equipment for providing a unified physical sidelink channel structure, the user equipment comprising:

at least one processor; and

at least one memory storing instructions thereon that, when executed by including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the user equipment to perform at least:

provide-providing first control information using a first sidelink control channel of the unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein and the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

20. The user equipment according to claim 19, wherein the second control information comprises destination address information.

21. The user equipment according to claim 20, wherein the destination address information is at least part of a destination address to support unicast or groupcast or broadcast transmissions.

22. The user equipment according to any of claims 19-21, wherein the second control information comprises data packet retransmission information for the associated data channel.

23. The user equipment according to any of claims 19-22, wherein the first control information comprises data packet information indicating a quality of service requirement.

24. The user equipment according to claim 23, wherein the data packet information indicating a quality of service requirement indicates data packet priority.

25. The user equipment according to any of claims 19-24, wherein the first control information comprises resource reservation information.

26. The user equipment of claim 19, wherein the first control information comprises at least one of an indication of data periodicity and a quality of service requirement for the data traffic.

27. The user equipment of claim 19, wherein the second control information comprises at least one of modulation and coding scheme (MCS) information, multi-antenna transmission related information, and destination address information.

28. The user equipment of claim 19, wherein the first control information or the second control information comprises at least one of: data packet retransmission information or demodulation reference configuration information for the associated data channel.

29. The user equipment of claim 19, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the user equipment to perform at least:

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

30. The user equipment of claim 19, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the user equipment to perform at least:

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

31. The user equipment of claim 19, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with-when executed by~~ the at least one processor, further cause the user equipment to perform at least:

when the associated data channel comprises aperiodic data traffic, ~~provide-providing~~ the first sidelink control channel in time resources preceding the associated data channel.

32. A user equipment for receiving a unified physical sidelink channel structure, the user equipment comprising:

at least one processor; and

at least one memory storing instructions thereon that, when executed by including ~~computer program code, the at least one memory and the computer program code configured to, with-~~ the at least one processor, cause the user equipment to perform at least:

~~receive-receiving~~ first control information using a first ~~sidelink~~ control channel of the unified physical sidelink channel structure and at least second control information using a second ~~sidelink~~ control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

33. The user equipment according to claim 32, wherein the second control information comprises destination address information.

34. The user equipment according to claim 33, wherein the destination address information is at least part of a destination address to support unicast or groupcast or broadcast transmissions.

35. The user equipment according to any of claims 32-34, wherein the second control information comprises data packet retransmission information for the associated data channel.

36. The user equipment according to any of claims 32-35, wherein the first control information comprises data packet information indicating a quality of service requirement.

37. The user equipment according to claim 36, wherein the data packet information indicating a quality of service requirement indicates data packet priority.

38. The user equipment according to any of claims 32-37, wherein the first control information comprises resource reservation information.

39. The user equipment of claim 32, wherein the first control information comprises at least one of: an indication of data periodicity or a quality of service requirement for the data traffic.

40. The user equipment of claim 32, wherein the second control information comprises at least one of: modulation and coding scheme (MCS) information, multi-antenna transmission related information, or destination address information.

41. The user equipment of claim 32, wherein at least one of the first 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-data~~ channel.

42. The user equipment of claim 32, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the user equipment to perform at least:

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

43. The user equipment of claim 32, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the user equipment to perform at least:

when the associated ~~physical sidelink-shared-data~~ channel comprises periodic data traffic and there is data transmission in a current period, ~~receive-receiving~~ the second ~~sidelink~~-control

channel or the first ~~sidelink~~ control channel and the second ~~sidelink~~ control channel with the associated ~~physical sidelink shared data~~ channel.

44. The user equipment of claim 32, wherein the instructions stored on the at least one memory ~~and the computer program code are further configured to, with when executed by~~ the at least one processor, further cause the user equipment to perform at least:

when the associated data channel comprises aperiodic data traffic, ~~receive-receiving~~ the first ~~sidelink~~ control channel in time resources preceding the associated data channel.

45. A method comprising:

providing first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

46. A method comprising:

receiving first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

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

providing first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

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

receiving first control information using a first sidelink control channel of a unified physical sidelink channel structure and at least second control information using a second sidelink control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein the second control information comprises at least transmission format information for decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

49. An apparatus comprising:

at least one processor; and

at least one memory storing instructions thereon that, when executed by including program codes, the at least one memory and the program codes configured to, with the at least one processor, cause the apparatus to perform at least:

provide-providing first control information using a first control channel of a unified physical sidelink channel structure and at least second control information using a second control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

50. An apparatus comprising:

at least one processor; and

at least one memory ~~storing instructions thereon that, when executed by including program codes, the at least one memory and the program codes configured to, with~~ the at least one processor, cause the apparatus to perform at least:

~~receive-receiving~~ first control information using a first control channel of a unified physical sidelink channel structure and at least second control information using a second control channel of the unified physical sidelink channel structure,

wherein the first control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

~~wherein-and~~ the second control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

51. A method comprising:

providing control information, wherein a first portion of the control information is provided using a first control channel of a unified physical sidelink channel structure and at least a second portion of the control information is provided using a second control channel of the unified physical sidelink channel structure,

wherein the first portion of the control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

~~wherein-and~~ the second portion of the control information comprises at least transmission format information for assisting data decoding of the associated data channel, and

wherein the associated data channel comprises periodic or aperiodic data traffic.

52. A method comprising:

receiving control information, wherein a first portion of the control information is received using a first control channel of a unified physical sidelink channel structure and at least a second portion of the control information is received using a second control channel of the unified physical sidelink channel structure,

wherein the first portion of the control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

~~wherein data traffic is transmitted over the associated physical sidelink shared channel,~~
~~and~~ wherein the second portion of the sidelink control information comprises at least information for decoding of the associated ~~physical sidelink shared data~~ channel, ~~and~~
wherein the associated data channel comprises periodic or aperiodic data traffic.

53. A non-transitory computer-readable storage medium storing instructions that, when executed by at least one processor, cause an apparatus to perform at least the following:

providing control information, wherein a first portion of the control information is provided using a first control channel of a unified physical sidelink channel structure and at least a second portion of the control information is provided using a second control channel of the unified physical sidelink channel structure,

wherein the first portion of the control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

~~wherein data traffic is transmitted over the associated physical sidelink shared channel,~~
~~and~~ wherein the second portion of the sidelink control information comprises at least information for decoding of the associated ~~data physical sidelink shared~~ channel, ~~and~~
wherein the associated data channel comprises periodic or aperiodic data traffic.

54. A non-transitory computer-readable storage medium storing instructions that, when executed by at least one processor, cause an apparatus to perform at least the following:

receiving control information, wherein a first portion of the control information is received using a first control channel of a unified physical sidelink channel structure and at least a second portion of the control information is received using a second control channel of the unified physical sidelink channel structure,

wherein the first portion of the control information comprises at least an indication of resource allocation for an associated data channel of the unified physical sidelink channel structure,

wherein ~~and~~ the second portion of the control information comprises at least transmission format information for assisting data decoding of the associated data channel, ~~and~~
wherein the associated data channel comprises periodic or aperiodic data traffic.