

WE CLAIM:

1. A method, comprising:

indicating a control channel search space by a pair of parameters, wherein the pair of
5 parameters includes a physical resource block index and an explicit control channel element
index, wherein the explicit control channel element index identifies a specific control channel
element associated with a physical resource block corresponding to the physical resource
block index; and

transmitting on the control channel within the search space.

2. A method, comprising:

processing a received indication of a control channel search space by a pair of
parameters, wherein the pair of parameters includes a physical resource block index and an
explicit control channel element index, wherein the explicit control channel element index
15 identifies a specific control channel element associated with a physical resource block
corresponding to the physical resource block index; and

attempting ~~blind decoding of~~ to decode the control channel using a search strategy based on the received indication.

5 3. The method of claim 2, wherein the processing the received indication comprises processing a starting index, wherein the starting index is configured to inform a user equipment as to which control channel element index the user equipment is to use as a reference.

10 4. The method of claim 3, wherein the processing the starting index comprises processing a physical resource block index and offset.

5. The method of claim 2, further comprising:

processing an indication of a physical resource block that has no search positions but is to be punctured out.

15

6. The method of any of claims 2-5, further comprising:

limiting candidate physical resource blocks used in the search strategy to a predetermined number of physical resource blocks that is less than a total number of available physical resource blocks.

20

7. An apparatus, comprising:

at least one processor; and

at least one memory including computer program code,

25 wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to

indicate a control channel search space by a pair of parameters, wherein the pair of parameters includes a physical resource block index and an explicit control channel element index, wherein the explicit control channel element index identifies a specific control channel element associated with a physical resource block corresponding to the physical resource block index; and

transmit on the control channel within the search space.

8. An apparatus, comprising:

at least one processor; and

at least one memory including computer program code,

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

process a received indication of a control channel search space by a pair of parameters, wherein the pair of parameters includes a physical resource block index and an explicit control channel element index, wherein the explicit control channel element index identifies a specific control channel element associated with a physical resource block corresponding to the physical resource block index; and

~~attempt blind decoding of~~ to decode the control channel using ~~a search strategy based~~ on the received indication.

9. The apparatus of claim 8, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to process a starting index, wherein the starting index is configured to inform a user equipment as to which control channel element index the user equipment is to use as a reference.

10. The apparatus of claim 9, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to process a physical resource block index and offset.

11. The apparatus of claim 8, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to process an indication of a physical resource block that has no search positions but is to be punctured out.

12. The apparatus of any of claims 8-11, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to limit candidate physical resource blocks used in the search strategy to a predetermined number of physical resource blocks that is less than a total number of available physical resource blocks.

13. A method, comprising:

5 deriving a control channel search space based on a set pair of physical resource blocks block index and a control channel element identifier, wherein the explicit control channel element identifier identifies a specific control channel element associated with a physical resource block corresponding to the physical resource block index,

wherein the control channel search space allows the control channel to be transmitted with different code rates, or transmitted in different physical resource blocks or localized into one physical resource block, or distributed into multiple physical resource blocks.

10

14. An apparatus, comprising:

at least one processor; and

at least one memory including computer program code,

15 wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus at least to

derive a control channel search space based on a set pair of physical resource blocks block index and a control channel element identifier, wherein the explicit control channel element identifier identifies a specific control channel element associated with a physical resource block corresponding to the physical resource block index,

20

wherein the control channel search space allows the control channel to be transmitted with different code rates, or transmitted in different physical resource blocks, or localized into one physical resource block, or distributed into multiple physical resource blocks.

25

15. An apparatus, comprising:

indicating means for indicating a control channel search space by a pair of parameters, wherein the pair of parameters includes a physical resource block index and an explicit control channel element index, wherein the explicit control channel element index identifies a specific control channel element associated with a physical resource block corresponding to the physical resource block index; and

transmitting means for transmitting on the control channel within the search space.

16. An apparatus, comprising:

processing means for processing a received indication of a control channel search space by a pair of parameters, wherein the pair of parameters includes a physical resource block index and an explicit control channel element index, wherein the explicit control channel element index identifies a specific control channel element associated with a physical resource block corresponding to the physical resource block index; and

~~attempting means for attempting blind decoding of~~ attempting to decode the control channel using ~~a search strategy based on the received indication.~~

17. An apparatus, comprising:

deriving means for deriving a control channel search space based on a ~~set-pair of~~ physical resource blocks-block index and a control channel element identifier, wherein the explicit control channel element identifier identifies a specific control channel element associated with a physical resource block corresponding to the physical resource block index,

wherein the control channel search space allows the control channel to be transmitted with different code rates, or transmitted in different physical resource blocks,

or localized into one physical resource block, or distributed into multiple physical resource blocks.

- 5 18. A non-transitory computer-readable medium encoded with instructions that, when executed in hardware, perform a process, the process comprising the method of any of claims 2-6 ~~or 8-12~~.