

CLAIMS

What is claimed is:CLAIMS

1. A method for wireless communication at a base station, comprising:
 - identifying a plurality of indices for a plurality of physical uplink control channel (PUCCH) format to be used for a subsequent PUCCH transmission resources, each index of the plurality of indices associated with a respective PUCCH resource that has a corresponding starting symbol and duration;
 - identifying a PUCCH resource mapping rule based at least in part on ~~the PUCCH format;~~
 - determining an amount of uplink transmission resource to be used control information for a PUCCH transmission from a user equipment (UE);
 - determining, from among the subsequent plurality of PUCCH resources, a PUCCH resource for the PUCCH transmission based at least in part on using the PUCCH resource mapping rule to identify a corresponding index of the plurality of indices; and
 - transmitting a signal indicative of receiving the uplink PUCCH transmission via the PUCCH resource.
2. The method of claim 1, further comprising:
 - including in transmitting, to the signal indicative of the uplink transmission resource-UE, an explicit indication of the uplink transmission PUCCH resource to be used for the subsequent PUCCH transmission, the indication comprising a value associated with the corresponding index of the PUCCH resource.
3. The method of claim 2, wherein:
 - identifying the explicit indication of the uplink transmission PUCCH resource to be used for the subsequent PUCCH transmission mapping rule comprises an index representative of the uplink transmission resource.;
 - identifying a first resource mapping rule based at least in part on the amount of uplink control information for the PUCCH transmission being less than or equal to a threshold amount.

4. The method of claim 1, wherein identifying the PUCCH ~~format to be used for the subsequent PUCCH transmission~~ resource mapping rule comprises:

identifying a first set of PUCCH resources from among the plurality of PUCCH resources based at least in part on the amount of uplink control data information being less than or equal to a threshold amount; and

identifying a first resource mapping rule based at least in part on a number of PUCCH resources included in the subsequent PUCCH transmission.

first set being above a threshold number of PUCCH resources.

5. The method of claim 4, wherein ~~identifying the PUCCH resource mapping rule based at least in part on the PUCCH format comprises:~~ the threshold number of PUCCH resources comprises a maximum number of PUCCH resources identifiable in a downlink control information (DCI) field associated with PUCCH transmissions.

~~identifying an implicit resource mapping rule if the amount of uplink control data to be included in the subsequent PUCCH transmission is less than or equal to a threshold amount.~~

6. The method of claim ~~5~~4, wherein ~~identifying:~~ the implicit first resource mapping rule if is different than a second resource mapping rule, the second resource mapping rule for use when the amount number of uplink control data to be PUCCH resources included in the subsequent PUCCH transmission first set is less than or equal to the threshold amount number of PUCCH resources.

7. The method of claim 1, wherein identifying the PUCCH resource mapping rule comprises:

identifying a first set of uplink transmission resources second resource mapping rule based at least in part on the amount of uplink control data information for the PUCCH transmission being less than or equal to the above a threshold amount.

8. The method of claim 1, wherein identifying the first set PUCCH resource mapping rule comprises uplink transmission resources having a PUCCH format compatible with the:

identifying a first set of PUCCH resources from among the plurality of PUCCH resources based at least in part on the amount of uplink control data information being less than or equal to the threshold amount;

identifying a number of uplink transmission resources included in the first set;
and

identifying the implicit second resource mapping rule if the based at least in part on a number of uplink transmission PUCCH resources included in the first set is above being less than or equal to a threshold number of uplink transmission PUCCH resources.

79. The method of claim 68, wherein the threshold number of uplink transmission PUCCH resources comprises a maximum number of uplink transmission PUCCH resources that may be uniquely identified identifiable in a downlink control information (DCI) field associated with PUCCH transmissions.

8. — The method of claim 4, wherein identifying the PUCCH resource mapping rule based at least in part on the PUCCH format comprises:

identifying an explicit resource mapping rule if the amount of uplink control data to be included in the subsequent PUCCH transmission is above a threshold amount.

9. — The method of claim 8, wherein identifying the explicit resource mapping rule if the amount of uplink control data to be included in the subsequent PUCCH transmission is above the threshold amount comprises:

identifying a second set of uplink transmission resources based at least in part on the amount of uplink control data being above the threshold amount, wherein the second set comprises uplink transmission resources having a PUCCH format compatible with the amount of uplink control data being above the threshold amount;

identifying a number of uplink transmission resources included in the second set; and

identifying the explicit resource mapping rule if the number of uplink transmission resources included in the second set is less than or equal to a threshold number of uplink transmission resources.

10. The method of claim 9, wherein the threshold number of uplink transmission resources comprises a maximum number of uplink transmission resources that may be uniquely identified in a downlink control information (DCI) field.

~~11.~~—The method of claim 1, wherein ~~identifying the PUCCH format to be used for the subsequent PUCCH transmission comprises:~~

~~determining whether the PUCCH format is a short resource for the PUCCH format or a long PUCCH format.~~

~~12.~~—The method of claim 1, wherein:

~~the uplink transmission resource to be used for the subsequent PUCCH transmission further comprises one or more of a starting symbol, a symbol range within an uplink transmission time interval, cyclic shift, one or more resource blocks, a cyclic shift, or an orthogonal cover code.~~

~~13~~11. The method of claim 1, further comprising:

identifying a transmission time interval (TTI) mapping rule based at least in part on the PUCCH resource mapping rule;

determining a TTI in which the ~~uplink transmission~~PUCCH resource is to be used for the ~~subsequent~~ PUCCH transmission based at least in part on the TTI mapping rule; and

transmitting a signal indicative of the TTI.

~~14~~12. The method of claim ~~13~~11, further comprising:

including in the signal indicative of the TTI an explicit indication of the TTI.

~~15.~~—The method of claim ~~14~~, wherein:

~~the explicit indication of the TTI comprises an index representative of an offset relative to a current TTI used for a current PUCCH transmission.~~

~~16~~13. The method of claim ~~13~~11, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an implicit TTI mapping rule ~~if~~when the PUCCH resource mapping rule is an implicit ~~PUCCH~~a first resource mapping rule.

~~17~~14. The method of claim ~~16~~13, wherein:

the implicit TTI mapping rule comprises applying an offset relative to a current TTI used for a current PUCCH transmission.

~~18~~15. The method of claim ~~13~~11, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an explicit TTI mapping rule ~~if~~when the PUCCH resource mapping rule is ~~an explicit PUCCH~~a second resource mapping rule.

~~19~~16. The method of claim ~~13~~11, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an implicit uplink ~~transmission time interval~~TTI mapping rule ~~if~~when the PUCCH resource mapping rule is ~~an explicit PUCCH~~a second resource mapping rule.

~~20~~17. The method of claim ~~13~~11, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an explicit TTI mapping rule ~~if~~when the PUCCH resource mapping rule is ~~an implicit PUCCH~~a first resource mapping rule.

~~21~~18. The method of claim 1, wherein:

the ~~uplink transmission~~PUCCH resource comprises resources within more than one transmission time interval (TTI).

~~22~~19. The method of claim 1, wherein:

the ~~uplink transmission~~PUCCH resource comprises more than one set of resources within one transmission time interval (TTI).

20. The method of claim 1, wherein identifying the PUCCH resource mapping rule comprises:

identifying a first set of PUCCH resources from among the plurality of PUCCH resources based at least in part on the amount of uplink control information being less than or equal to a threshold amount; and

identifying an implicit resource mapping rule based at least in part on a number of PUCCH resources included in the first set being above a threshold number of PUCCH resources.

2321. A method for wireless communication, at a user equipment (UE),
comprising:

identifying a plurality of indices for a plurality of corresponding physical uplink control channel (PUCCH) format to be used for a subsequent PUCCH transmission resources, each index of the plurality of indices associated with a respective PUCCH resource that has a corresponding starting symbol and duration;

identifying a PUCCH resource mapping rule based at least in part on the PUCCH format;

receiving a signal indicative an amount of an uplink control information for a PUCCH transmission resource to be used for the subsequent PUCCH transmission;

determining, from among the uplink transmission plurality of PUCCH resources, a PUCCH resource to be used for the subsequent PUCCH transmission based at least in part on using the PUCCH resource mapping rule to identify a corresponding index of the plurality of indices; and

transmitting the subsequent PUCCH transmission via the uplink transmission PUCCH resource.

2422. The method of claim 2321, further comprising:

receiving within the signal indicative of the uplink transmission resource an explicit indication of the uplink PUCCH resource for the PUCCH transmission, the indication comprising a value associated with the corresponding index of the PUCCH resource.

23. The method of claim 21, wherein identifying the PUCCH resource mapping rule comprises:

identifying a first resource mapping rule based at least in part on the amount of uplink control information for the PUCCH transmission resource being below a threshold amount.

24. The method of claim 21, wherein identifying the PUCCH resource mapping rule comprises:

identifying a first set of PUCCH resources from among the plurality of PUCCH resources based at least in part on the amount of uplink control information being less than or equal to be used for the subsequent PUCCH transmission a threshold amount; and

identifying a first resource mapping rule based at least in part on a number of PUCCH resources included in the first set being above a threshold number of PUCCH resources.

25. The method of claim 24, wherein: the threshold number of PUCCH resources comprises a maximum number of PUCCH resources identifiable in a downlink control information (DCI) field associated with PUCCH transmissions.

~~the explicit indication of the uplink transmission resource to be used for the subsequent PUCCH transmission comprises an index representative of the uplink transmission resource.~~

26. ~~The method of claim 23~~26. The method of claim 24, wherein: the first resource mapping rule is different than a second resource mapping rule, the second resource mapping rule for use when the number of PUCCH resources included in the first set is less than or equal to the threshold number of PUCCH resources.

27. ~~The method of claim 21, wherein identifying the PUCCH format to be used for the subsequent PUCCH transmission~~resource mapping rule comprises:

identifying a second resource mapping rule based at least in part on the amount of uplink control data to be included in information for the subsequent PUCCH transmission; being above a threshold amount.

2728. The method of claim 2621, wherein identifying the PUCCH resource mapping rule ~~based at least in part on the~~comprises:

identifying a first set of PUCCH format comprises:

~~identifying an implicit resource mapping rule if~~resources from among the amount of uplink control data to be included in the subsequent PUCCH transmission is below a threshold amount.

28. ~~The method of claim 27, wherein identifying the implicit resource mapping rule if the amount~~plurality of uplink control data to be included in the subsequent PUCCH transmission is less than or equal to the threshold amount comprises:

~~identifying a first set of uplink transmission~~PUCCH resources based at least in part on the amount of uplink control datainformation being less than or equal to the threshold amount, wherein the first set comprises uplink transmission resources having a PUCCH

~~format compatible with the amount of uplink control data being less than or equal to the threshold amount; a threshold amount; and~~

~~identifying a second resource mapping rule based at least in part on a number of uplink transmissionPUCCH resources included in the first set; and being less than or equal to a threshold number of PUCCH resources.~~

~~identifying the implicit resource mapping rule if the number of uplink transmission resources included in the first set is above a threshold number of uplink transmission resources.~~

29. The method of claim 28, wherein the threshold number of ~~uplink transmission resources comprises a maximum number of uplink transmission resources that may be uniquely identified in a downlink control information (DCI) field.~~

30. — ~~The method of claim 26, wherein identifying the PUCCH resource mapping rule based at least in part on the PUCCH format comprises:~~

~~identifying an explicit resource mapping rule if the amount of uplink control data to be included in the subsequent PUCCH transmission is above a threshold amount.~~

31. — ~~The method of claim 30, wherein identifying the explicit resource mapping rule if the amount of uplink control data to be included in the subsequent PUCCH transmission is above the threshold amount comprises:~~

~~identifying a second set of uplink transmission resources based at least in part on the amount of uplink control data being above the threshold amount, wherein the second set comprises uplink transmission resources having a PUCCH format compatible with the amount of uplink control data being above the threshold amount;~~

~~identifying a number of uplink transmission resources included in the second set; and~~

~~identifying the explicit resource mapping rule if the number of uplink transmission resources included in the second set is less than or equal to a threshold number of uplink transmission resources.~~

32. — ~~The method of claim 31, wherein the threshold number of uplink transmissionPUCCH resources comprises a maximum number of uplink transmissionPUCCH resources that may be uniquely identified~~identifiable ~~in a downlink control information (DCI) field; associated with PUCCH transmissions.~~

~~3330.~~ The method of claim ~~23~~, wherein identifying the PUCCH format to be used for the subsequent PUCCH transmission comprises 21, wherein:

~~determining whether the PUCCH format is a short PUCCH format or a long PUCCH format.~~

~~34.~~ The method of claim ~~23~~, wherein:

~~the uplink transmission resource to be used for the subsequent PUCCH transmission comprises one or more of starting symbol, a symbol range within an uplink transmission time interval, a cyclic shift, one or more resource blocks, a cyclic shift, or an orthogonal cover code.~~

~~3531.~~ The method of claim ~~23~~21, further comprising:

identifying a transmission time interval (TTI) mapping rule based at least in part on the PUCCH resource mapping rule;

determining a TTI in which a ~~TTI in which the uplink transmission~~ PUCCH resource is to be used for the ~~subsequent~~ PUCCH transmission based at least in part on the TTI mapping rule; and

transmitting the ~~subsequent~~ PUCCH transmission within the TTI.

~~3632.~~ The method of claim ~~35~~31, further comprising:

receiving an explicit indication of the TTI;

~~37.~~ The method of claim ~~36~~, wherein:

~~the explicit indication of the TTI comprises an index representative of an offset relative to a current TTI used for a current PUCCH transmission.~~

~~3833.~~ The method of claim ~~35~~31, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an implicit TTI mapping rule ~~if~~ when the PUCCH resource mapping rule is an implicit PUCCH a first resource mapping rule.

~~3934.~~ The method of claim ~~38~~33, wherein:

the implicit TTI mapping rule comprises applying an offset relative to a current TTI used for a current PUCCH transmission.

~~4035.~~ The method of claim ~~3531~~, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an explicit TTI mapping rule ~~if~~when the PUCCH resource mapping rule is ~~an explicit PUCCH~~a second resource mapping rule.

~~4136.~~ The method of claim ~~3531~~, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an explicit TTI mapping rule ~~if~~when the PUCCH resource mapping rule is ~~an implicit PUCCH~~a first resource mapping rule.

~~4237.~~ The method of claim ~~3531~~, wherein identifying the TTI mapping rule based at least in part on the PUCCH resource mapping rule comprises:

identifying an implicit TTI mapping rule ~~if~~when the PUCCH resource mapping rule is ~~an explicit PUCCH~~a second resource mapping rule.

~~4338.~~ The method of claim ~~2321~~, wherein:

the ~~uplink transmission~~PUCCH resource comprises resources within more than one TTI.

~~4439.~~ The method of claim ~~2321~~, wherein:

the ~~uplink transmission~~PUCCH resource comprises more than one set of resources within one TTI.

~~45.—An apparatus for wireless communication, comprising:~~

~~means for~~40. The method of claim 21, wherein identifying a physical uplink control channel (PUCCH) format to be used for a subsequent PUCCH transmission;

~~means for identifying a~~the PUCCH resource mapping rule based at least in part on the PUCCH format;~~comprises:~~

~~means for determining an uplink transmission resource to be used for the subsequent PUCCH transmission~~identifying a first set of PUCCH resources from among the plurality of PUCCH resources based at least in part on the PUCCH amount of uplink control information being less than or equal to a threshold amount; and

identifying an implicit resource mapping rule; and based at least in part on a number of PUCCH resources included in the first set being above a threshold number of PUCCH resources.

~~means for transmitting a signal indicative of the uplink transmission resource.~~

4641. An apparatus for wireless communication at a base station, comprising:

means for identifying a plurality of indices for a plurality of physical uplink control channel (PUCCH) format to be used for a subsequent PUCCH transmission resources, each index of the plurality of indices associated with a respective PUCCH resource that has a corresponding starting symbol and duration;

_____ means for identifying a PUCCH resource mapping rule based at least in part on the PUCCH format; an amount of uplink control information for a PUCCH transmission from a user equipment (UE);

~~means for receiving a signal indicative of an uplink transmission resource to be used for~~ means for determining, from among the subsequent plurality of PUCCH transmission;

~~means for determining the uplink transmission resources, a PUCCH resource to be used for the subsequent PUCCH transmission based at least in part on using the PUCCH resource mapping rule to identify a corresponding index of the plurality of indices; and~~

means for receiving the PUCCH transmission via the PUCCH resource.

42. An apparatus for wireless communication at a user equipment (UE), comprising:

means for identifying a plurality of indices for a plurality of physical uplink control channel (PUCCH) resources, each index of the plurality of indices associated with a respective PUCCH resource that has a corresponding starting symbol and duration;

means for identifying a PUCCH resource mapping rule based at least in part on an amount of uplink control information for a PUCCH transmission;

means for determining, from among the plurality of PUCCH resources, a PUCCH resource for the PUCCH transmission based at least in part on using the PUCCH resource mapping rule to identify a corresponding index of the plurality of indices; and

~~means for transmitting the subsequent PUCCH transmission via the uplink transmission~~ PUCCH resource.

~~4743.~~ An apparatus for wireless communication at a base station, comprising:
 a processor;
 memory ~~in electronic communication~~ coupled with the processor; and
 instructions stored in the memory and operable, when executed by the
 processor, to cause the apparatus to:

identify a plurality of indices for a plurality of physical uplink control
 channel (PUCCH) format to be used for a subsequent PUCCH transmission resources,
each index of the plurality of indices associated with a respective PUCCH resource
that has a corresponding starting symbol and duration;

identify a PUCCH resource mapping rule based at least in part on ~~the~~
 PUCCH format; an amount of uplink control information for a PUCCH transmission
from a user equipment (UE);

determine ~~an uplink transmission resource to be used for,~~ from among
the ~~subsequent~~ plurality of PUCCH resources, a PUCCH resource for the PUCCH
transmission based at least in part on using the PUCCH resource mapping rule to
identify a corresponding index of the plurality of indices; and

transmit a signal indicative of ~~receive~~ the uplink PUCCH transmission
via the PUCCH resource.

44. The apparatus of claim 43, wherein, to identify the PUCCH resource
mapping rule, the instructions are operable, when executed by the processor, to cause the
apparatus to:

identify a first set of PUCCH resources from among the plurality of PUCCH
resources based at least in part on the amount of uplink control information being less than or
equal to a threshold amount; and

identify a first resource mapping rule based at least in part on a number of
PUCCH resources included in the first set being above a threshold number of PUCCH
resources.

45. The apparatus of claim 44, wherein, to identify the PUCCH resource
mapping rule, the instructions are further operable, when executed by the processor, to cause
the apparatus to:

identify a second resource mapping rule different than the first resource mapping rule based at least in part on the number of PUCCH resources included in the first set being less than or equal to the threshold number of PUCCH resources.

4846. An apparatus for wireless communication, at a user equipment (UE), comprising:

a processor;

memory ~~in electronic communication~~ coupled with the processor; and

instructions stored in the memory and operable, when executed by the processor, to cause the apparatus to:

identify a plurality of indices for a plurality of physical uplink control channel (PUCCH) format to be used for a subsequent PUCCH transmission resources, each index of the plurality of indices associated with a respective PUCCH resource that has a corresponding starting symbol and duration;

identify a PUCCH resource mapping rule based at least in part on the PUCCH format an amount of uplink control information for a PUCCH transmission;

receive a signal indicative of an uplink transmission resource to be used for determine, from among the subsequent plurality of PUCCH transmission;

determine the uplink transmission resources, a PUCCH resource to be used for the subsequent PUCCH transmission based at least in part on using the PUCCH resource mapping rule to identify a corresponding index of the plurality of indices; and

transmit the subsequent PUCCH transmission via the uplink transmission PUCCH resource.

47. The apparatus of claim 46, wherein, to identify the PUCCH resource mapping rule, the instructions are operable, when executed by the processor, to cause the apparatus to:

identify a first set of PUCCH resources from among the plurality of PUCCH resources based at least in part on the amount of uplink control information being less than or equal to a threshold amount; and

identify a first resource mapping rule based at least in part on a number of PUCCH resources included in the first set being above a threshold number of PUCCH resources.

48. The apparatus of claim 47, wherein, to identify the PUCCH resource mapping rule, the instructions are further operable, when executed by the processor, to cause the apparatus to:

identify a second resource mapping rule different than the first resource mapping rule based at least in part on the number of PUCCH resources included in the first set being less than or equal to the threshold number of PUCCH resources.

49. A non-transitory computer readable medium storing code for wireless communication at a base station, the code comprising instructions executable by a processor to:

identify a plurality of indices for a plurality of physical uplink control channel (PUCCH) format to be used for a subsequent PUCCH transmission resources, each index of the plurality of indices associated with a respective PUCCH resource that has a corresponding starting symbol and duration;

identify a PUCCH resource mapping rule based at least in part on the PUCCH format;

determine an amount of uplink transmission resource to be used control information for a PUCCH transmission from a user equipment (UE);

determine, from among the subsequent plurality of PUCCH resources, a PUCCH resource for the PUCCH transmission based at least in part on using the PUCCH resource mapping rule to identify a corresponding index of the plurality of indices; and

transmit a signal indicative of the uplink PUCCH transmission via the PUCCH resource.

50. A non-transitory computer readable medium storing code for wireless communication, at a user equipment (UE), the code comprising instructions executable by a processor to:

identify a plurality of indices for a plurality of physical uplink control channel (PUCCH) format to be used for a subsequent PUCCH transmission resources, each index of the plurality of indices associated with a respective PUCCH resource that has a corresponding starting symbol and duration;

identify a PUCCH resource mapping rule based at least in part on the PUCCH format;

~~receive a signal indicative of an~~ an amount of uplink transmission
~~resource to be used~~ control information for the subsequent a PUCCH transmission;
~~determine the uplink transmission,~~ from among the plurality of
PUCCH resources, a PUCCH resource to be used for the subsequent PUCCH
transmission based at least in part on using the PUCCH resource mapping rule to
identify a corresponding index of the plurality of indices; and
_____ transmit the subsequent PUCCH transmission via the ~~uplink~~
~~transmission~~ PUCCH resource.