

CLAIMS

1. A method for wireless communication at a user equipment (UE), comprising:
 - receiving, from a network device, a combined slot allocation for physical uplink control channel (PUCCH) transmissions to different transmission reception points (TRPs) of a plurality of TRPs associated with the network device, wherein the combined slot allocation identifies:
 - a first slot that is allocated for PUCCH transmissions to a first TRP of the plurality of TRPs, and
 - a second slot that is allocated for PUCCH transmissions to a second TRP of the plurality of TRPs, and
 - wherein each slot identified in the combined slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs; and
 - transmitting hybrid automatic repeat request (HARQ) acknowledgement feedback to the first TRP using the first slot identified by the combined slot allocation as allotted for PUCCH transmissions to the first TRP and using one or more TRP-specific uplink parameters.
2. The method of claim 1, wherein receiving the combined slot allocation comprises:
 - receiving a combined_allocation of slots from the network device for PUCCH transmissions to different TRPs of the plurality of TRPs, wherein the slots are allocated asymmetrically between the plurality of TRPs.
3. The method of claim 1, further comprising:
 - determining a TRP-specific HARQ acknowledgement codebook based at least in part on at least one TRP-specific parameter that is semi-statically received.
4. The method of claim 3, wherein the at least one TRP-specific parameter is one or more of a number of cells supported by a TRP for carrier aggregation, a cell-specific uplink-downlink configuration associated with a cell of a TRP, a per-bandwidth part table of time-domain resource allocation for physical downlink shared channels for a TRP, a per-

bandwidth part set of parameters defining physical downlink shared channel to feedback timing for a TRP, or a per-bandwidth part physical downlink shared channel repetition factor for a TRP.

5. The method of claim 1, further comprising:

identifying only one physical downlink shared channel reception opportunity per slot per cell from the first TRP for time-domain resource allocations that overlap in time; and

receiving one physical downlink shared channel transmission from the first TRP associated with the identified physical downlink shared channel reception opportunity, wherein the HARQ acknowledgement feedback transmitted in the first slot includes feedback information pertaining to the one physical downlink shared channel reception opportunity or the one physical downlink shared channel transmission.

6. The method of claim 5, further comprising:

receiving, from the second TRP, an additional physical downlink shared channel transmission, the additional physical downlink shared channel transmission having a time-domain resource allocation in a same component carrier that overlaps with the one physical downlink shared channel transmission received from the first TRP; and

transmitting a second HARQ acknowledgement feedback to the second TRP in the second slot identified by the combined_slot allocation as allocated for PUCCH transmission to the second TRP.

7. The method of claim 1, further comprising:

comparing the combined_slot allocation with a cell-specific uplink-downlink configuration associated with a cell of the first TRP, wherein the HARQ acknowledgement feedback is transmitted to the first TRP using the first slot only if symbols of the first slot are also allocated for uplink transmissions by the cell-specific uplink-downlink configuration.

8. The method of claim 1, further comprising:

transmitting additional information to the first TRP using the first slot identified by the combined_slot allocation.

9. The method of claim 8, wherein the additional information is in a form of

a physical uplink shared channel payload, a scheduling request, or a channel state information

report, and wherein the HARQ acknowledgement feedback is combined with the additional information on a single uplink channel.

10. The method of claim 1, wherein transmitting the HARQ acknowledgement feedback to the first TRP using the first slot comprises:

transmitting the HARQ acknowledgement feedback via at least one of a physical uplink control channel or as piggybacked uplink control information via a physical uplink shared channel.

11. The method of claim 1, further comprising:

determining the one or more TRP-specific uplink parameters, wherein the one or more TRP-specific uplink parameters are for PUCCH transmissions to the first TRP, and

wherein the determining comprises:

identifying that quasi co-location (QCL) information is configured for physical uplink control channel transmissions; and

identifying TRP-specific QCL information for the first TRP for the first slot.

12. The method of claim 1, further comprising:

determining the one or more TRP-specific uplink parameters, wherein the one or more TRP-specific uplink parameters are for PUCCH transmissions to the first TRP, and

wherein the determining comprises:

identifying TRP-specific power control parameters for transmissions to the first TRP for the first slot.

13. The method of claim 12, wherein the TRP-specific power control parameters comprise at least one of an open-loop power control parameter and a closed-loop power control parameter.

14. The method of claim 1, further comprising:

determining the one or more TRP-specific uplink parameters, wherein the one or more TRP-specific uplink parameters are for PUCCH transmissions to the first TRP, and

wherein the determining comprises:

identifying TRP-specific timing advance parameters for transmissions to the first TRP for the first slot.

15. The method of claim 1, wherein receiving the combined slot allocation comprises:

receiving the combined_slot allocation via radio resource control (RRC) signaling.

16. The method of claim 1, further comprising:
determining to transmit a plurality of HARQ acknowledgement feedback messages to the first TRP;

identifying a plurality of slots based at least in part on the combined_slot allocation to transmit the plurality of HARQ acknowledgement feedback messages to the first TRP; and

transmitting the plurality of HARQ acknowledgement feedback messages to the first TRP in the identified plurality of slots.

17. The method of claim 16, wherein the plurality of slots comprises slots allocated only to the first TRP, a number of consecutive slots allocated to any of the plurality of TRPs, a number of consecutive slots allocated to the first TRP, or a combination thereof.

18. A method for wireless communication at a first transmission reception point (TRP) of a plurality of TRPs associated with a network device, comprising:

identifying, at the first TRP, a combined slot allocation of at least one slot to be used by a user equipment (UE) for physical uplink control channel (PUCCH) transmissions to different TRPs of the plurality of TRPs, the plurality of TRPs further comprising a second TRP, wherein the combined slot allocation identifies:

a first slot that is allocated for PUCCH transmissions to the first TRP, and

a second slot that is allocated for PUCCH transmissions to the second

TRP, and

wherein each slot identified in the combined slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs;

transmitting a downlink message to the UE;

transmitting an indication that the UE is to provide PUCCH transmissions to the different TRPs using the at least one slot identified by the combined_slot allocation for each of the different TRPs; and

receiving, from the UE and on the first slot identified by the combined_slot allocation as allocated for PUCCH transmissions to the first TRP, hybrid automatic repeat request (HARQ) acknowledgement feedback pertaining to the downlink message.

19. The method of claim 18, further comprising:

transmitting the combined_slot allocation to one or more other TRPs in communication with the UE to facilitate slot allocation coordination between the first TRP and the one or more other TRPs;

receiving, from the one or more other TRPs, additional slot allocations identifying slots to be used by the UE for PUCCH transmissions to the one or more other TRPs, wherein each slot identified in the combined_slot allocation and the additional slot allocations is allocated for PUCCH transmissions by the UE to only one TRP;

or a combination thereof.

20. The method of claim 18, wherein slots of the combined slot allocation are allocated asymmetrically between the plurality of TRPs.

21. The method of claim 18, wherein transmitting the indication comprises: transmitting the indication via a downlink control information message.

22. The method of claim 18, further comprising:

transmitting at least one semi-static TRP-specific parameter to the UE.

23. The method of claim 22, wherein the at least one semi-static TRP-specific parameter is one or more of a number of cells supported by the first TRP for carrier aggregation, a cell-specific uplink-downlink configuration associated with a cell of the first TRP, a per-bandwidth part table of time-domain resource allocation for physical downlink shared channels for the first TRP, a per-bandwidth part set of parameters defining physical downlink shared channel to feedback timing for the first TRP, or a per-bandwidth part physical downlink shared channel repetition factor for the first TRP.

24. The method of claim 18, wherein receiving the HARQ acknowledgement feedback pertaining to the downlink message comprises:

receiving the HARQ acknowledgement feedback on the first slot identified by the combined_slot allocation only if the first slot is identified as an uplink slot by a cell-specific uplink-downlink configuration associated with the first TRP.

25. The method of claim 18, wherein receiving the HARQ acknowledgement feedback pertaining to the downlink message comprises:

receiving the HARQ acknowledgement feedback on symbols of the first slot identified by the combined_slot allocation only if the symbols of the first slot are allocated for uplink transmissions by a cell-specific uplink-downlink configuration associated with the first TRP.

26. The method of claim 18, further comprising:

receiving additional information from the UE using the first slot identified by the combined_slot allocation.

27. The method of claim 26, wherein the additional information is in a form of a physical uplink shared channel payload, a scheduling request, or a channel state information report, and wherein the HARQ acknowledgement feedback pertaining to the downlink message is combined with the additional information on a single uplink channel.

28. The method of claim 18, wherein receiving the HARQ acknowledgement feedback pertaining to the downlink message comprises:

receiving the HARQ acknowledgement feedback via at least one of a physical uplink control channel or as piggybacked uplink control information via a physical uplink shared channel.

29. The method of claim 18, further comprising:

transmitting TRP-specific quasi co-location (QCL) information to the UE.

30. The method of claim 18, further comprising:

transmitting TRP-specific power control parameters to the UE for transmissions to the first TRP during the first slot.

31. The method of claim 18, further comprising:
transmitting TRP-specific timing advance parameters to the UE for transmissions to the first TRP during the first slot.

32. The method of claim 18, further comprising:
transmitting the combined_slot allocation via radio resource control (RRC) signaling.

33. An apparatus for wireless communication at a user equipment (UE), comprising:
a processor;
memory coupled with the processor; and
instructions stored in the memory and executable by the processor to cause the apparatus to:

receive, from a network device, a combined_slot allocation for physical uplink control channel (PUCCH) transmissions to different transmission reception points (TRPs) of a plurality of TRPs associated with the network device, wherein the combined slot allocation identifies:

a first slot that is allocated for PUCCH transmissions to a first TRP of the plurality of TRPs, and

a second slot that is allocated for PUCCH transmissions to a second TRP of the plurality of TRPs, and

wherein each slot identified in the combined_slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs; and

transmit hybrid automatic repeat request (HARQ) acknowledgement feedback to the first TRP using the first slot identified by the combined_slot allocation as allocated for PUCCH transmissions to the first TRP and using one or more TRP-specific uplink parameters.

34. The apparatus of claim 33, wherein the instructions to receive the combined slot allocation are executable by the processor to cause the apparatus to:

receive a combined allocation of slots for PUCCH transmissions to different TRPs of the plurality of TRPs, wherein the slots are allocated asymmetrically between the plurality of TRPs.

35. The apparatus of claim 33, wherein the instructions are further executable by the processor to cause the apparatus to:

determine a TRP-specific HARQ acknowledgement codebook based at least in part on at least one TRP-specific parameter that is semi-statically received.

36. The apparatus of claim 33, wherein the instructions are further executable by the processor to cause the apparatus to:

identify only one physical downlink shared channel reception opportunity per slot per cell from the first TRP for time-domain resource allocations that overlap in time; and

receive one physical downlink shared channel transmission from the first TRP associated with the identified physical downlink shared channel reception opportunity, wherein the HARQ acknowledgement feedback transmitted in the first slot includes feedback information pertaining to the one physical downlink shared channel reception opportunity or the one physical downlink shared channel transmission.

37. The apparatus of claim 36, wherein the instructions are further executable by the processor to cause the apparatus to:

receive, from the second TRP, an additional physical downlink shared channel transmission, the additional physical downlink shared channel transmission having a time-domain resource allocation in a same component carrier that overlaps with the one physical downlink shared channel transmission received from the first TRP; and

transmit a second HARQ acknowledgement feedback to the second TRP in the second slot identified by the combined_slot allocation as allocated for PUCCH transmissions to the second TRP.

38. The apparatus of claim 33, wherein the instructions to transmit the HARQ acknowledgement feedback to the first TRP using the first slot are executable by the processor to cause the apparatus to:

transmit the HARQ acknowledgement feedback via at least one of a physical uplink control channel or as piggybacked uplink control information via a physical uplink shared channel.

39. The apparatus of claim 33, wherein the instructions are further executable by the processor to cause the apparatus to:

determine the one or more TRP-specific uplink parameters, wherein the one or more TRP-specific uplink parameters are for HARQ acknowledgement feedback PUCCH transmissions to the first TRP, and

wherein the instructions to determine the one or more TRP-specific uplink parameters are executable by the processor to cause the apparatus to:

identify TRP-specific power control parameters for transmissions to the first TRP for the first slot.

40. The apparatus of claim 33, wherein the instructions are further executable by the processor to cause the apparatus to:

determine to transmit a plurality of HARQ acknowledgement feedback messages to the first TRP;

identify a plurality of slots based at least in part on the combined_slot allocation to transmit the plurality of HARQ acknowledgement feedback messages to the first TRP; and

transmit the plurality of HARQ acknowledgement feedback messages to the first TRP in the identified plurality of slots.

41. An apparatus for wireless communication at a first transmission reception point (TRP) of a plurality of TRPs associated with a network device, comprising:

a processor;

memory coupled with the processor; and

instructions stored in the memory and executable by the processor to cause the apparatus to:

identify, at the first TRP, a combined slot allocation of at least one slot to be used by a user equipment (UE) for physical uplink control channel (PUCCH)

transmissions to different TRPs of the plurality of TRPs, the plurality of TRPs further comprising a second TRP, wherein the combined slot allocation identifies:

a first slot that is allocated for PUCCH transmissions to the first TRP, and

a second slot that is allocated for PUCCH transmissions to the second TRP, and

wherein each slot identified in the combined_slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs;

transmit a downlink message to the UE;

transmit an indication that the UE is to provide PUCCH transmissions to the different TRPs using the at least one slot identified by the combined_slot allocation for each of the different TRPs; and

receive, from the UE and on the first slot identified by the combined_slot allocation as allocated for PUCCH transmissions to the first TRP, hybrid automatic repeat request (HARQ) acknowledgement feedback pertaining to the downlink message.

42. The apparatus of claim 41, wherein the instructions are further executable by the processor to cause the apparatus to:

transmit the combined_slot allocation to one or more other TRPs in communication with the UE to facilitate slot allocation coordination between the first TRP and the one or more other TRPs; and

receive, from the one or more other TRPs, additional slot allocations identifying slots to be used by the UE for PUCCH transmissions to the one or more other TRPs, wherein each slot identified in the combined_slot allocation and the additional slot allocations is allocated for PUCCH transmissions by the UE to only one TRP.

43. The apparatus of claim 41, wherein slots of the combined slot allocation are allocated asymmetrically between the plurality of TRPs.

44. The apparatus of claim 41, wherein the instructions to transmit the indication are executable by the processor to cause the apparatus to:

transmit the indication via a downlink control information message.

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

means for receiving, from a network device, a combined_slot allocation for physical uplink control channel (PUCCH) transmissions to different transmission reception points (TRPs) of a plurality of TRPs associated with the network device, wherein the combined slot allocation identifies:

a first slot that is allocated for PUCCH transmissions to a first TRP of the plurality of TRPs, and

a second slot that is allocated for PUCCH transmissions to a second TRP of the plurality of TRPs, and

wherein each slot identified in the combined_slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs; and

means for transmitting hybrid automatic repeat request (HARQ) acknowledgement feedback to the first TRP using the first slot identified by the combined_slot allocation as allocated for PUCCH transmissions to the first TRP and using one or more TRP-specific uplink parameters.

46. An apparatus for wireless communication at a first transmission reception point (TRP) of a plurality of TRPs associated with a network device, comprising:

means for identifying, at the first TRP, a combined slot allocation of at least one slot to be used by a user equipment (UE) for physical uplink control channel (PUCCH) transmissions to different TRPs of the plurality of TRPs, the plurality of TRPs further comprising a second TRP, wherein the slot combined allocation identifies:

a first slot that is allocated for PUCCH transmissions to the first TRP, and

a second slot that is allocated for PUCCH transmissions to the second TRP, and

wherein each slot identified in the combined_slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs;

means for transmitting the combined_slot allocation to one or more other TRPs in communication with the UE to facilitate slot allocation coordination between the first TRP and the one or more other TRPs;

means for transmitting a downlink message to the UE;

means for transmitting an indication that the UE is to provide PUCCH transmissions to the different TRPs using the at least one slot identified by the combined_slot allocation for each of the different TRPs; and

means for receiving, from the UE and on the first slot identified by the combined slot allocation as allocated for PUCCH transmissions to the first TRP, hybrid automatic repeat request (HARQ) acknowledgement feedback pertaining to the downlink message.

47. 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:

receive, from a network device, a combined slot allocation for physical uplink control channel (PUCCH) transmissions to different transmission reception points (TRPs) of a plurality of TRPs associated with a network device, wherein the combined slot allocation identifies:

a first slot that is allocated for PUCCH transmissions to a first TRP of the plurality of TRPs, and

a second slot that is allocated for PUCCH transmissions to a second TRP of the plurality of TRPs, and

wherein each slot identified in the combined slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs; and

transmit hybrid automatic repeat request (HARQ) acknowledgement feedback to the first TRP using the first slot identified by the combined slot allocation as allocated for PUCCH transmissions to the first TRP and using one or more TRP-specific uplink parameters.

48. A non-transitory, computer-readable medium storing code for wireless communication at a first transmission reception point (TRP) of a plurality of TRPs associated with a network device, the code comprising instructions executable by a processor to:

identify, at the first TRP, a combined slot allocation of at least one slot to be used by a user equipment (UE) for physical uplink control channel (PUCCH) transmissions to different TRPs of the plurality of TRPs, the plurality of TRPs further comprising a second TRP, wherein the combined slot allocation identifies:

a first slot that is allocated for PUCCH transmissions to the first TRP, and

a second slot that is allocated for PUCCH transmissions to the second TRP, and

wherein each slot identified in the combined slot allocation is allocated for PUCCH transmissions by the UE to only one TRP of the plurality of TRPs;

transmit the combined slot allocation to one or more other TRPs in communication with the UE to facilitate slot allocation coordination between the first TRP and the one or more other TRPs;

transmit a downlink message to the UE;

transmit an indication that the UE is to provide PUCCH transmissions to the different TRPs using the at least one slot identified by the combined slot allocation for each of the different TRPs; and

receive, from the UE and on the first slot identified by the combined slot allocation as allocated for PUCCH transmissions to the first TRP, hybrid automatic repeat request (HARQ) acknowledgement feedback pertaining to the downlink message.