

CLAIMS

What is claimed is:CLAIMS

1. A method for wireless communication at a user equipment (UE), comprising:
 - receiving, based at least in part on an occurrence of a triggering event associated with at least a secondary cell activation for the UE, a trigger signal that identifies resources to be used for transmission of an aperiodic tracking reference signal (TRS); ~~and~~ triggering the secondary cell activation for the UE;
 - receiving the aperiodic TRS based at least in part on the trigger signal and the identified resources; and
 - performing at least one of a tracking function, or a synchronization function, or an alignment function, or a combination thereof, in response to the occurrence of the triggering event and based at least in part on the aperiodic TRS.
2. The method of claim 1, wherein the aperiodic TRS comprises a channel state information reference signal (CSI-RS) for tracking that is separate from an aperiodic CSI-RS for channel estimation.
3. The method of claim 1, wherein the ~~trigger signal is received in a downlink control indicator (DCI).~~
- ~~4. The method of claim 3, wherein the trigger signal carries at least one of a field indicating that the aperiodic TRS is triggered or a field indicating the triggering event, wherein the indication of the triggering event comprises the indication that the aperiodic TRS is triggered.~~
- ~~5. The method of claim 3, wherein the triggering event comprises at least one of athe secondary cell activation event, or a bandwidth part switching event, or a beam change event, or a connected mode discontinuous reception event, or an idle mode discontinuous reception event, or a combination thereof.~~
- ~~6. The method of claim 3, further comprising: receiving a synchronization signal block (SSB) transmission prior to the triggering event occurring.~~
- ~~7. The method of claim 3, further comprising:~~

receiving an uplink grant DCI that identifies the resources to be used for transmission of the aperiodic TRS.

8. — The method of claim 7, further comprising:

decoding the uplink grant DCI to identify additional resources to be used for transmission of a channel state information reference signal.

9. — The method of claim 3, further comprising:

receiving a downlink grant DCI that identifies the resources to be used for transmission of the aperiodic TRS.

10. — The method of claim 9, further comprising:

decoding a first portion of bits of a downlink grant field of the downlink grant DCI to identify a zero grant or invalid grant; and

decoding a second portion bits of a second field to identify the indication that the aperiodic TRS has been triggered, the second field being different from the first portion of bits of the downlink grant field.

11. — The method of claim 10, wherein the bits of the second field indicates that the triggering event has occurred, and the indication of the triggering event further indicates that the aperiodic TRS is triggered.

12. — The method of claim 3, further comprising:

receiving the DCI in a same slot as the aperiodic TRS is received in.

13. — The method of claim 3, further comprising:

receiving the DCI in a different slot from slot that the aperiodic TRS is received in.

14. — The method of claim 3, wherein the DCI comprises at least one of a fallback DCI format or a non-fallback DCI format.

15. — The method of claim 3, wherein the DCI comprises an indication of a transmission timing parameter associated with the aperiodic TRS.

16. — The method of claim 1, wherein the trigger signal is received in a medium access control (MAC) control element (CE).

17. — The method of claim 16, further comprising:

determining that a secondary cell has been activated based at least in part on the MAC CE.

18. — The method of claim 17, wherein the aperiodic TRS is received a defined waiting period after the MAC CE.

19. — The method of claim 16, further comprising:

determining that a beam change event has occurred based at least in part on the MAC CE.

~~20. The method of claim 16, wherein the triggering event comprises at least one of a secondary cell activation event, or a bandwidth part switching event, or a beam change event, or a connected mode discontinuous reception event, or an idle mode discontinuous reception event, or a combination thereof.~~

21. The method of claim 1, wherein the triggering event comprises a triggering event comprises the secondary cell activation, further comprising:

receiving the trigger signal from an active cell of the UE; and

receiving the aperiodic TRS from the secondary cell being activated in the secondary cell activation, wherein the resources identified in the trigger signal comprise secondary cell resources used for transmission of the aperiodic TRS.

~~225.~~ The method of claim 1, wherein the triggering event comprises a bandwidth part switching event, further comprising:

receiving the trigger signal over an active bandwidth part of the UE; and

receiving the aperiodic TRS over a bandwidth part being activated in the bandwidth part switching event, wherein the activated bandwidth part is different from the active bandwidth part and wherein the resources identified in the trigger signal comprise activated bandwidth part resources used for transmission of the aperiodic TRS over the activated bandwidth part.

~~236.~~ The method of claim 1, wherein the triggering event comprises a beam change event, further comprising:

receiving the trigger signal over an active beam of the UE; and

receiving the aperiodic TRS over a beam being activated in the beam change event, wherein the activated beam is different from the active beam and wherein the resources identified in the trigger signal comprise activated beam resources used for transmission of the aperiodic TRS over the activated beam.

~~24. A7. The method for wireless communication at a user equipment (UE), comprising:~~

~~receiving a configuration of claim 1, wherein the trigger signal that identifies one or more resources for transmission of an aperiodic tracking reference signal (TRS);~~

~~determining that a triggering event associated with the UE has occurred; and~~

receiving the aperiodic TRS based at least ~~is received~~ in part on the determining and according to the one or more resources, a medium access control (MAC) control element (CE).

258. The method of claim 247, further comprising:

~~receiving the aperiodic TRS during a paging occasion for the UE while the UE is operating in an idle mode discontinuous reception state, wherein occurrence of the paging occasion comprises the triggering event.~~

determining that a secondary cell has been activated based at least in part on the MAC CE.

269. The method of claim 24, ~~further comprising:~~

~~receiving the aperiodic TRS before an on duration of a connected mode discontinuous reception state;~~

~~determining, based at least in part on receiving the aperiodic TRS, that data is to be communicated to the UE; and~~

~~transitioning to an active state from the discontinuous reception state for the data communication.~~

27. — ~~The method of claim 248, wherein the one or more resources comprise a transmission timing parameter, the transmission timing parameter comprising a relative timing parameter for transmission of the aperiodic TRS~~ aperiodic TRS is received a defined waiting period after occurrence of the triggering event the MAC CE.

10. The method of claim 1, further comprising:

determining that a beam change event has occurred based at least in part on the MAC CE.

2811. The method of claim 24, ~~wherein the triggering event comprises at least one of a secondary cell activation event, or a bandwidth part switching event, or a beam change event, or a connected mode discontinuous reception event, or an idle mode discontinuous reception event, or a combination thereof.~~

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

~~means for receiving, based at least in part on an occurrence of a triggering event associated with the UE, a trigger signal that identifies resources to be used for transmission of an aperiodic tracking reference signal (TRS);~~

~~means for receiving the aperiodic TRS based at least in part on the trigger signal and the identified resources; and~~

~~means for performing at least one of a tracking function, or a synchronization function, or an alignment function, or a combination thereof, in response to the occurrence of the triggering event and based at least in part on the aperiodic TRS.~~

30. — The apparatus of claim 29, wherein the aperiodic TRS comprises a channel state information reference signal (CSI-RS) for tracking that is separate from an aperiodic CSI-RS.

31. — The apparatus of claim 29, wherein the trigger signal is received in a downlink control indicator (DCI).

32. The apparatus of claim 31, wherein the trigger signal carries at least one of a field indicating that the aperiodic TRS is triggered or a field indicating the triggering event, wherein the indication of the triggering event comprises the indication that the aperiodic TRS is triggered.

33. The apparatus of claim 31, wherein the triggering event comprises at least one of a secondary cell activation event, or a bandwidth part switching event, or a beam change event, or a connected mode discontinuous reception event, or an idle mode discontinuous reception event, or a combination thereof.

34. The apparatus of claim 31, further comprising:
~~means for receiving a synchronization signal block (SSB) transmission prior to the triggering event occurring.~~

35. The apparatus of claim 31, further comprising:
~~means for receiving an uplink grant DCI that identifies the resources to be used for transmission of the aperiodic TRS.~~

16. The method of claim 15, further comprising:
decoding the uplink grant DCI to identify additional resources to be used for transmission of a channel state information reference signal.

17. The method of claim 11, further comprising:
receiving a downlink grant DCI that identifies the resources to be used for the
aperiodic TRS.

18. The method of claim 17, further comprising:
decoding a first portion of bits of a downlink grant field of the downlink grant
DCI to identify a zero grant or invalid grant; and
decoding a second portion bits of a second field to identify the indication that
the aperiodic TRS has been triggered, the second field being different from the first portion of
bits of the downlink grant field.

19. The method of claim 18, wherein the bits of the second field indicates
that the triggering event has occurred, and the indication of the triggering event further
indicates that the aperiodic TRS is triggered.

20. The method of claim 11, further comprising:
receiving the DCI in a same slot as the aperiodic TRS is received in.

21. The method of claim 11, further comprising:
receiving the DCI in a different slot from slot that the aperiodic TRS is
received in.

22. The method of claim 11, wherein the DCI comprises at least one of a
fallback DCI format or a non-fallback DCI format.

23. The method of claim 11, wherein the DCI comprises an indication of a
transmission timing parameter associated with the aperiodic TRS.

24. An apparatus for wireless communication at a user equipment (UE),
comprising: a processor, memory in electronic communication with the processor; and
instructions stored in the memory and executable by the processor to cause the apparatus to:
receive, based at least in part on an occurrence of a triggering event associated
with at least a secondary cell activation for the UE, a trigger signal that identifies resources to
be used for transmission of an aperiodic tracking reference signal (TRS) and triggering the
secondary cell activation for the UE;

receive the aperiodic TRS based at least in part on the trigger signal and the identified resources; and

perform at least one of a tracking function, or a synchronization function, or an alignment function, or a combination thereof, in response to the occurrence of the triggering event and based at least in part on the aperiodic TRS.

25. The apparatus of claim 24, wherein the aperiodic TRS comprises a channel state information reference signal (CSI-RS) for tracking that is separate from an aperiodic CSI-RS for channel estimation.

26. The apparatus of claim 24, wherein the trigger signal is received in a downlink control indicator (DCI).

27. The apparatus of claim 26, wherein the trigger signal carries at least one of a field indicating that the aperiodic TRS is triggered or a field indicating the triggering event, wherein the indication of the triggering event comprises the indication that the aperiodic TRS is triggered.

28. The apparatus of claim 26, wherein the triggering event comprises at least one of the secondary cell activation, or a bandwidth part switching event, or a beam change event, or a connected mode discontinuous reception event, or an idle mode discontinuous reception event, or a combination thereof.

29. The apparatus of claim 26, wherein the instructions are further executable by the processor to cause the apparatus to:

receive a synchronization signal block (SSB) transmission prior to the triggering event occurring.

30. The apparatus of claim 26, wherein the instructions are further executable by the processor to cause the apparatus to:

receive an uplink grant DCI that identifies the resources to be used for transmission of the aperiodic TRS.

~~36~~31. The apparatus of claim ~~35~~30, wherein the instructions are further comprising executable by the processor to cause the apparatus to:

~~means for decoding~~decode the uplink grant DCI to identify additional resources to be used for transmission of a channel state information reference signal.

~~37~~32. The apparatus of claim ~~31~~26, wherein the instructions are further comprising executable by the processor to cause the apparatus to:

~~means for receiving~~receive a downlink grant DCI that identifies the resources to be used for ~~transmission of~~ the aperiodic TRS.

~~38~~33. The apparatus of claim ~~37~~32, wherein the instructions are further comprising executable by the processor to cause the apparatus to:

~~means for decoding~~decode a first portion of bits of a downlink grant field of the downlink grant DCI to identify a zero grant or invalid grant; and

~~means for decoding~~decode a second portion bits of a second field to identify the indication that the aperiodic TRS has been triggered, the second field being different from the first portion of bits of the downlink grant field.

~~39~~34. The apparatus of claim ~~38~~33, wherein the bits of the second field indicates that the triggering event has occurred, and the indication of the triggering event further indicates that the aperiodic TRS is triggered.

~~40~~35. The apparatus of claim ~~31~~26, wherein the instructions are further comprising executable by the processor to cause the apparatus to:

~~means for receiving~~receive the DCI in a same slot as the aperiodic TRS is received in.

~~41~~36. The apparatus of claim ~~31~~26, wherein the instructions are further comprising executable by the processor to cause the apparatus to:

~~means for receiving~~receive the DCI in a different slot from slot that the aperiodic TRS is received in.

~~42~~37. The apparatus of claim ~~31~~26, wherein the DCI comprises at least one of a fallback DCI format or a non-fallback DCI format.

~~4338.~~ The apparatus of claim ~~3126~~, wherein the DCI comprises an indication of a transmission timing parameter associated with the aperiodic TRS.

~~4439.~~ The apparatus of claim ~~2924~~, wherein the trigger signal is received in a medium access control (MAC) control element (CE).

~~4540.~~ The apparatus of claim ~~4439~~, wherein the instructions are further comprising executable by the processor to cause the apparatus to:
~~means for determining~~determine that a secondary cell has been activated based at least in part on the MAC CE.

~~4641.~~ The apparatus of claim ~~4540~~, wherein the aperiodic TRS is received a defined waiting period after the MAC CE.

~~4742.~~ An apparatus for wireless communication at a user equipment (UE), comprising:
~~means for receiving a configuration, based at least in part on an occurrence of~~
a triggering event associated with at least a secondary cell activation for the UE, a
trigger signal that identifies one or more resources to be used for transmission of an aperiodic tracking reference signal (TRS);
~~means for determining that a triggering event associated with the UE has occurred;~~ and triggering the secondary cell activation for the UE;
~~means for receiving the aperiodic TRS based at least in part on the~~
~~determining trigger signal and according to the identified resources; and~~
means for performing at least one of a tracking function, or a synchronization function, or an alignment function, or a combination thereof, in response to the occurrence of the triggering event and based at least in part on the aperiodic TRS.

43. The apparatus of claim 42, wherein the aperiodic TRS comprises a channel state information reference signal (CSI-RS) for tracking that is separate from an aperiodic CSI-RS for channel estimation.

44. The apparatus of claim 42, wherein the triggering event comprises at least one or more resources of the secondary cell activation, or a bandwidth part switching

event, or a beam change event, or a connected mode discontinuous reception event, or an idle mode discontinuous reception event, or a combination thereof.

4845. The apparatus of claim 4742, wherein the triggering event comprises the secondary cell activation, further comprising:

means for receiving the trigger signal from an active cell of the UE; and

means for receiving the aperiodic TRS ~~during a paging occasion~~ from the secondary cell being activated in the secondary cell activation, wherein the resources identified in the trigger signal comprise secondary cell resources used for the transmission of the aperiodic TRS.

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

receive, based at least in part on an occurrence of a triggering event associated with at least a secondary cell activation for the UE, a trigger signal that identifies resources to be used for transmission of an aperiodic tracking reference signal (TRS) and triggering the secondary cell activation for the UE;

receive the aperiodic TRS based at least in part on the trigger signal and the identified resources; and

perform at least one of a tracking function, or a synchronization function, or an alignment function, or a combination thereof, in response to the occurrence of the triggering event and based at least in part on the aperiodic TRS.

47. The non-transitory computer-readable medium of claim 46, wherein the aperiodic TRS comprises a channel state information reference signal (CSI-RS) for tracking that is ~~operating in~~ separate from an aperiodic CSI-RS for channel estimation.

48. The non-transitory computer-readable medium of claim 46, wherein the triggering event comprises at least one of the secondary cell activation, or a bandwidth part switching event, or a beam change event, or a connected mode discontinuous reception event, or an idle mode discontinuous reception state, ~~wherein occurrence of the paging occasion comprises the triggering event.~~event, or a combination thereof.