

WHAT IS CLAIMED IS:

1. A method, comprising:

 sending, by a base station (BS), information indicating a first contention transmission unit (CTU) in a high-level signaling to a user equipment (UE);

 receiving, by the BS, a first uplink data transmission from the UE without allocating resources to the UE according to a request/grant mechanism, wherein the first uplink data transmission is transmitted using the first CTU of a plurality of CTUs in a first time frequency region, and the first CTU being a combination of time, frequency and pilot; and

 decoding, by the BS, the first uplink data transmission.
2. The method of claim 1, wherein the first CTU has a pre-defined mapping relationship with the UE.
3. The method of claim 1, before receiving the first uplink transmission, further comprising: sending, by the BS, message indicating to enable and configure grant-free transmissions in a high level signaling.
4. The method of claim 1, wherein the first time frequency region being used for contention transmissions by a plurality of UEs.
5. The method of claim 1, before receiving the first uplink transmission, further comprising: sending, by the BS, a first CTU index to the UE, wherein the first CTU index uniquely identifies the first CTU in the plurality of CTUs.
6. The method of claim 1, wherein each of the plurality of CTUs is assigned a unique and identifying CTU index.

7. The method of claim 1, further comprising:

sending, by the BS, an uplink grant indicating an unused second CTU in the plurality of CTUs to a second UE for grant scheme transmissions of the second UE when receiving a scheduling request from the second UE.

8. The method of claim 1, wherein the plurality of CTUs are categorized according to types of services to be provided by the BS.

9. The method of claim 1, wherein a size of a time-frequency region occupied by the plurality of CTUs is determined according to a number of UEs to be served by the BS.

10. The method of claim 1, wherein each of the plurality of CTUs is a combination of time, frequency, pilot and signature.

11. A base station, BS, comprising:

a processor; and

a computer readable storage medium storing programming for execution by the processor, the programming including instruction to:

send information indicating a first contention transmission unit (CTU) in a high-level signaling to a user equipment (UE);

receive a first uplink data transmission from the UE without allocating resources to the UE according to a request/grant mechanism, wherein the first uplink data transmission is transmitted using the first CTU of a plurality of CTUs in a first time frequency region, the first CTU being a combination of time, frequency and pilot; and

decode the first uplink data transmission.

12. The BS of claim 11, wherein the first CTU has a pre-defined mapping relationship with the UE.

13. The BS of claim 11, the BS further comprising instruction to: send message indicating to enable and configure grant-free transmissions in a high level signaling the UE.

14. The BS of claim 11, wherein the first time frequency region being used for contention transmissions by a plurality of UEs.

15. The BS of claim 11, the BS further comprising instruction to: send a first CTU index to the UE, wherein the first CTU index uniquely identifies the first CTU in the plurality of CTUs.

16. The BS of claim 11, wherein each of the plurality of CTUs is assigned a unique and identifying CTU index.

17. The BS of claim 11, the BS further comprising instruction to: send an uplink grant indicating an unused second CTU in the plurality of CTUs to a second UE for grant scheme transmissions of the second UE when receiving a scheduling request from the second UE.

18. The BS of claim 11, wherein the plurality of CTUs are categorized according to types of services to be provided by the BS.

19. The BS of claim 11, wherein a size of a time-frequency region occupied by the plurality of CTUs is determined according to a number of UEs to be served by the BS.

20. The BS of claim 11, wherein each of the plurality of CTUs is a combination of time, frequency, pilot and signature.

21. A method, comprising:

receiving, by an user equipment (UE), information indicating a first contention transmission unit (CTU) in a high-level signaling;

sending, by the UE, a first uplink data transmission to a base station (BS), without receiving resources from the BS according to a request/grant mechanism, wherein the first uplink data transmission is transmitted using the first CTU of a plurality of CTUs in a first time frequency region, and the first CTU being a combination of time, frequency and pilot.

22. The method of claim 21, wherein the first CTU has a pre-defined mapping relationship with the UE.

23. The method of claim 21, before sending the first uplink transmission, further comprising:

receiving, by the UE, message indicating to enable and configure grant-free transmissions in a high level signaling.

24. The method of claim 21, wherein the first time frequency region being used for contention transmissions by a plurality of UEs.

25. The method of claim 21, further comprising: receiving, by the UE, a first CTU index from the BS, wherein the first CTU index uniquely identifies the first CTU in the plurality of CTUs.

26. The method of claim 21, wherein each of the plurality of CTUs is assigned a unique and identifying CTU index.

27. The method of claim 21, wherein the plurality of CTUs are categorized according to types of services to be provided by the BS.

28. The method of claim 21, wherein a size of a time-frequency region occupied by the plurality of CTUs is determined according to a number of UEs to be served by the BS.

29. The method of claim 21, wherein each of the plurality of CTUs is a combination of time, frequency, pilot and signature.

30. A user equipment (UE), comprising:

a processor and

a computer readable storage medium storing programming for execution by the processor, the programming including instruction to:

receive information indicating a first contention transmission unit (CTU) in a high-level signaling; and

send a first uplink data transmission to a base station (BS), without receiving resources from the BS according to a request/grant mechanism, wherein the first uplink data transmission is transmitted using the first CTU of a plurality of CTUs in a first time frequency region, and the first CTU being a combination of time, frequency and pilot.

31. The UE of claim 30, wherein the first CTU has a pre-defined mapping relationship with the UE.

32. The UE of claim 30, the UE further comprising instruction to: receive message indicating to enable and configure grant-free transmissions in a high level signaling.

33. The UE of claim 30, wherein the first time frequency region being used for contention transmissions by a plurality of UEs.

34. The UE of claim 30, the UE further comprising instruction to: receive a first CTU index from the BS, wherein the first CTU index uniquely identifies the first CTU in the plurality of CTUs.

35. The UE of claim 30, wherein each of the plurality of CTUs is assigned a unique and identifying CTU index.

36. The UE of claim 30, wherein the plurality of CTUs are categorized according to types of services to be provided by the BS.

37. The UE of claim 30, wherein a size of a time-frequency region occupied by the plurality of CTUs is determined according to a number of UEs to be served by the BS.

38. The UE of claim 30, wherein each of the plurality of CTUs is a combination of time, frequency, pilot and signature.