CLAIMS

What is Claimed:

1. A method implemented by a wireless transmit/receive unit (WTRU), the method comprising:

receiving information indicating a configuration of one or more small data transmission (SDT) resources;

receiving information indicating one or more data radio bearers (DRBs) which support SDT;

receiving information indicating an inactive radio network temporary identifier (I-RNTI); and

~~determining whether uplink (~~after receiving the indicated I-RNTI and on condition that (1) a size of UL~~)~~ SDT data ~~for transmission is~~ present in a buffer of the WTRU~~; and~~

~~on condition that (1) the UL SDT data is determined to be present in the buffer, (2) a size of the UL SDT data present in the buffer~~ is less than a first threshold, ~~and (3~~(2) the UL SDT data present in the buffer is for the one or more DRBs which support SDT, and (3) a reference signal received power (RSRP) is greater than a second threshold:

~~after receiving the information indicating the I-RNTI, transmitting~~ sending a first transmission that includes at least a portion of the UL SDT data present in the buffer using a ~~SDT~~configured grant (CG) resource or a random access (RA) resource from among ~~the~~ one or more SDT resources.

2. The method of claim 1, wherein~~, on further condition that the size of the UL SDT data for transmission present in the buffer is greater than a size of the SDT resource, the transmitting of the at least the portion of the UL SDT data present in the buffer using the SDT resource further includes transmitting information indicating the size of the UL SDT present in the buffer using the same SDT resource.~~

~~3. The method of claim 2, wherein the information indicating the size of UL SDT present in the buffer is a small data buffer status report.~~

~~4. The method of claim 1, wherein the size of the UL SDT data present in the buffer is a size of all the UL SDT data present in the buffer, and~~

~~wherein the UL SDT data present in the buffer for the one or more DRBs which support SDT is all the UL SDT data present in the buffer.~~

~~5. The method of claim 1, further comprising:~~

measuring a reference signal received power (RSRP) of one or more reference signals,

wherein the transmitting of the at least the portion of the UL SDT data present in the buffer using the SDT resource is on further condition that (4) the measured RSRP is greater than or equal to a second threshold.

6. The method of claim 1, further comprising:

after the receiving of the information indicating the I-RNTI, performing a random access procedure,

wherein the SDT resource is a random access channel (RACH) resource, and

wherein the random access procedure includes the transmitting of the at least the portion of the UL SDT data present in the buffer using the RACH resource.

7. A method implemented by a wireless transmit/receive unit (WTRU), the method comprising:

receiving information indicating a configuration of one or more small data transmission (SDT)CG resources; including the CG resource.

3. The method of claim 1, wherein the receiving of the information indicating one or more data radio bearers (DRBs) which support SDT;

receiving information indicating an inactive radio network temporary identifier (I-RNTI);

determining whether uplink (UL) SDT data for transmission is present in a buffer of the WTRU; and

on condition that (1) the UL SDT data is determined to be present in the buffer, (2) a size of the UL SDT data present in the buffer is less than a first threshold, and (3) the UL SDT data present in the buffer is for the one or more DRBs which support SDT:

after receiving the information indicating the I-RNTI, transmitting the UL SDT data present in the buffer using a SDT resource from amongconfiguration of the one or more SDT resources.

8. The method of claim 7, wherein the size of the UL SDT data present in the buffer is a size of all the UL SDT data present in the buffer, and

wherein the UL SDT data present in the buffer for the one or more DRBs which support SDT is all the UL SDT data present in the buffer.

9. The method of claim 8, further comprising:

measuring a reference signal received power (RSRP) of one or more reference signals,

~~wherein the transmitting of the UL SDT data present in the buffer using the SDT resource is further on condition that (4) the measured RSRP is greater than or equal to a second threshold.~~

~~10. The method of claim 7, further comprising:~~

~~after receiving the information indicating the I-RNTI, performing a random access procedure,~~

~~wherein the SDT resource is a random access channel (RACH) resource, and~~

~~wherein the random access procedure~~ includes ~~the transmitting of the UL SDT data present in the buffer using the RACH resource.~~

~~11. The method of~~ any ~~one of claims 1 or 7, wherein the SDT resource is a configured grant (CG) resource.~~

~~12. The method of any one of claims 1 or 7, further comprising:~~

~~after the transmitting of the at least the portion of the UL SDT data present in the buffer using the SDT resource, sending a request to resume a radio resource control (RRC) connection to a radio access network (RAN).~~

~~13. A method implemented by a wireless transmit/receive unit (WTRU), the method comprising:~~

~~receiving~~of information indicating a configuration of one or more ~~small data transmission (SDT)~~RA resources~~;~~ including the RA resource, information indicating the first threshold, and/or information indicating the second threshold.

4. The method of claim 1, further comprising:

receiving information indicating ~~one or more data radio bearers (DRBs) which support~~a timer value associated with SDT~~;~~,

wherein, on condition that a first time period associated with the timer value has not expired, the sending of the first transmission uses the CG resource.

5. The method of claim 1, further comprising:

after sending the first transmission using the CG resource and on condition that a second time period associated with the first transmission has expired, resending the first transmission using one of the one or more SDT resources.

6. The method of claim 1, further comprising:

after sending the first transmission using the CG resource and on condition that a second time period associated with the first transmission has not expired, receiving scheduling information for the WTRU.

7. The method of claim 1, further comprising:

receiving information indicating ~~an inactive radio network temporary identifier (I-RNTI);~~a timer value associated with SDT,

~~determining whether uplink (UL) SDT data for transmission is present in a buffer of the WTRU; and~~

~~on condition that (1) at least a portion of the UL SDT data present in the buffer is for a DRB which does not support SDT, or (2) the UL SDT data present in the buffer is for the one or more DRBs which support SDT and a size of the UL SDT data present in the buffer is greater than or equal to a first threshold:~~

~~sending a request to resume a radio resource control (RRC) connection to a radio access network (RAN), the request to resume the RRC connection including the information indicating the I-RNTI.~~

~~14.~~ wherein, on condition that a first time period associated with the timer value has expired, the sending of the first transmission is performed using the RA resource.

8. The method of claim ~~of claim 13, wherein the size of the UL SDT data present in the buffer is a size of all the UL SDT data present in the buffer, and~~

7, wherein the ~~UL SDT data present in the buffer for the one or more DRBs which support SDT is all~~sending of the first transmission includes:

sending a preamble using the RA resource;

receiving a response message including information indicating an uplink (UL) grant; and

sending the ~~UL SDT data present in the buffer.~~

~~15. The method of claim 13, further comprising:~~

~~measuring a reference signal received power (RSRP) of one or more reference signals,~~

~~wherein on condition~~first transmission that ~~(1)~~includes the at least the portion of the UL SDT data present in the buffer ~~is for the DRB which does not support SDT, (2) the UL SDT data present in the buffer is for the one or more DRBs which support SDT and the size of the UL SDT data present in the buffer is greater than or equal to the first threshold, or (3) the measured RSRP is less than a second threshold:~~via the UL grant.

~~sending the request to resume the RRC connection.~~

~~16.~~

9. The method of claim ~~13~~1, wherein the ~~one or more SDT resources include any of a configured grant (CG) resource and/or a random access channel (RACH) resource.~~

~~17. A wireless transmit/receive unit (WTRU) comprising:~~

~~a transceiver configured to:~~

~~receive information indicating a configuration of one or more small data transmission (SDT) resources,~~

~~receive information indicating one or more data radio bearers (DRBs) which support SDT, and~~

~~receive information indicating an inactive radio network temporary identifier (I-RNTI); and~~

~~a processor configured to:~~

~~determine whether uplink (UL) SDT data for transmission is present in a buffer of the WTRU, and~~

~~wherein the transceiver is configured to:~~

~~on condition that (1) the UL SDT data is determined to be present in the buffer, (2) a size of the UL SDT data present in the buffer is less than a~~ first ~~threshold, and (3) the UL SDT data present in the buffer is for the one or more DRBs which support SDT:~~

~~after receiving the information indicating the I-RNTI, transmit at least a portion of the UL SDT data present in the buffer using a SDT resource from among the one or more SDT resources.~~

~~18. The WTRU of claim 17, wherein the transceiver is configured such that:~~

~~on further condition that the size of the UL SDT data for transmission present in the buffer is greater than a size of the SDT resource, the transmitting of the at least the portion of the UL SDT data present in the buffer includes to transmit information indicating the size of the UL SDT present in the buffer using the same SDT resource.~~

~~19. The WTRU of claim 18, wherein the information indicating the size of UL SDT present in the buffer is a small data buffer status report.~~

~~20. The WTRU of claim 17, wherein the size of the UL SDT data present in the buffer is a size of all the UL SDT data present in the buffer, and~~

wherein the UL SDT data present in the buffer for the one or more DRBs which support SDT is all the UL SDT data present in the buffer.

21. The WTRU of claim 17, wherein the processor is further configured to:

measure a reference signal received power (RSRP) of one or more reference signals, and

wherein the transceiver is further configured to:

transmit the at least the portion of the UL SDT data present in the buffer on condition that (4) the measured RSRP is greater than or equal to a second threshold.

22. The WTRU of claim 17, wherein the transceiver is further configured to:

after receiving the information indicating the I-RNTI, perform a random access procedure,

wherein the SDT resource is a random access channel (RACH) resource, and

wherein the random access procedure includes the transmitting of the at least the portion of the UL SDT data present in the buffer using the RACH resource.

23. A wireless transmit/receive unit (WTRU) comprising:

a transceiver configured to:

receive information indicating a configuration of one or more small data transmission (SDT) resources,

receive information indicating one or more data radio bearers (DRBs) which support SDT, and

receive information indicating an inactive radio network temporary identifier (I-RNTI); and

a processor configured to:

determine whether uplink (UL) SDT data for transmission is present in a buffer of the WTRU, and

wherein the transceiver is configured to:

on condition that (1) the UL SDT data is determined to be present in the buffer, (2) a size of the UL SDT data present in the buffer is less than a first threshold, and (3) the UL SDT data present in the buffer is for the one or more DRBs which support SDT:

after receiving the information indicating the I-RNTI, transmit the UL SDT data present in the buffer using a SDT resource from among the one or more SDT resources.

24. The WTRU of claim 23, wherein the size of the UL SDT data present in the buffer is a size of all the UL SDT data present in the buffer, and

wherein the UL SDT data present in the buffer for the one or more DRBs which support SDT is all the UL SDT data present in the buffer.

25. The WTRU of claim 23, wherein the processor is further configured to:

measure a reference signal received power (RSRP) of one or more reference signals, and

wherein the transceiver is further configured to:

transmit the UL SDT data present in the buffer using the SDT resource on condition that (4) the measured RSRP is greater than or equal to a second threshold.

26. The WTRU of claim 23, wherein the transceiver is configured to:

after receiving the information indicating the I-RNTI, perform a random access procedure,

wherein the SDT resource is a random access channel (RACH) resource, and

wherein the random access procedure includes the transmitting of the at least the portion of the UL SDT data present in the buffer using the RACH resourceinformation indicating the I-RNTI.

27. The WTRU of any one of claims 17 or 23, wherein the SDT resource is a configured grant (CG) resource.

28. The WTRU of any one of claims 17 or 23, wherein the transceiver is further configured to:

after the transmitting of the at least the portion of the UL SDT data present in the buffer using the SDT resource, send a request to resume a radio resource control (RRC) connection to a radio access network (RAN), the request to resume the RRC connection including the information indicating the I-RNTI.

29. 10. A wireless transmit/receive unit (WTRU) comprising:

a processor and a transceiver which are configured to:

receive information indicating a configuration of one or more small data transmission (SDT) resources,

receive information indicating one or more data radio bearers (DRBs) which support SDT, and

receive information indicating an inactive radio network temporary identifier (I-RNTI);), and

a processor configured to:

~~determine whether uplink (UL) SDT data for transmission is present in a buffer of the WTRU,~~after receiving the indicated I-RNTI and

~~wherein the transceiver is configured to:~~

on condition that (1) ~~at least~~ a ~~portion~~size of ~~the~~ UL SDT data present in ~~the~~a buffer of the WTRU is ~~for a DRB which does not support SDT, or~~less than a first threshold, (2) the UL SDT data present in the buffer is for the one or more DRBs which support SDT, and ~~a size of the UL SDT data present in the buffer is greater than or equal to a first threshold:~~

~~send a request to resume or re-establish a radio resource control (RRC) connection to a radio access network (RAN), the request to resume the RRC connection including the information indicating the I-RNTI.~~

~~30. The WTRU of claim of claim 29, wherein the size of the UL SDT data present in the buffer is a size of all the UL SDT data present in the buffer, and~~

~~wherein the UL SDT data present in the buffer for the one or more DRBs which support SDT is all the UL SDT data present in the buffer.~~

~~31. The WTRU of claim 29, wherein the processor is further configured to:~~

~~measure~~(3) a reference signal received power (RSRP) ~~of one or more reference signals, and~~

~~wherein the transceiver is further configured to:~~

~~on condition that (1) the at least the portion of the UL SDT data present in the buffer is for the DRB which does not support SDT, or (2) the UL SDT data present in the buffer is for the one or more DRBs which support SDT and the size of the UL SDT data present in the buffer~~ is greater than ~~or equal to the first threshold, or (3) the measured RSRP is less than a~~ a second threshold:

send a first transmission that includes at least a portion of the ~~request to resume~~UL SDT data present in the ~~RRC connection to the RAN.~~

~~32. The WTRU of claim 29, wherein the one or more SDT resources include any of~~buffer using a configured grant (CG) resource ~~and/~~or a random access ~~channel (RACH)~~(RA) resource from among the one or more SDT resources.

11. The WTRU of claim 10, wherein the processor and the transceiver are configured to:

receive the information indicating the I-RNTI which further includes information indicating a configuration of one or more resources including the CG resource.

12. The WTRU of claim 10, wherein the information indicating the configuration of the one or more SDT resources includes any of information indicating a configuration of one or more RA resources including the RA resource, information indicating the first threshold, and/or information indicating the second threshold.

13. The WTRU of claim 10, wherein the processor and the transceiver are configured to:

receive information indicating a timer value associated with SDT, and

wherein the processor and the transceiver are configured to, on condition that a first time period associated with the timer value has not expired, send the first transmission using the CG resource.

14. The WTRU of claim 10, wherein the processor and the transceiver are configured to:

after sending the first transmission using the CG resource and on condition that a second time period associated with the first transmission has expired, resending the first transmission using one of the one or more SDT resources.

15. The WTRU of claim 10, wherein the processor and the transceiver are configured to:

after sending the first transmission and on condition that a second time period associated with the first transmission has not expired, receiving scheduling information for the WTRU.

16. The WTRU of claim 10, wherein the processor and the transceiver are configured to:

receive information indicating a timer value associated with SDT, and

wherein the processor and the transceiver are configured to, on condition that a first time period associated with the timer value has expired, send the first transmission using the RA resource.

17. The WTRU of claim 16, wherein the processor and the transceiver are configured to send the first transmission which includes a preamble and the at least the portion of the UL SDT data present in the buffer via RA resource.

18. The WTRU of claim 16, wherein the processor and the transceiver are configured to send the first transmission which includes to:

send a preamble via the RA resource,

receive a response message including information indicating an uplink (UL) grant, and

send the first transmission that includes the at least the portion of the UL SDT data present in the buffer via the UL grant.

19. The WTRU of claim 10, wherein the first transmission includes information indicating the I-RNTI.