

What is claimed is:

1. A method performed by a user equipment, the method comprising:
selecting, while the user equipment is in an inactive or idle state, one of
5 multiple uplink transmission schemes to be used to transmit uplink data, wherein
the multiple uplink transmission schemes comprise a random access channel,
RACH, procedure based small data transmission scheme, and a preconfigured grant
based uplink transmission scheme, and wherein,
when the UE is configured with the preconfigured grant based uplink
10 transmission scheme and the RACH procedure based small data transmission
scheme, selecting comprises selecting the preconfigured grant based uplink
transmission scheme over the RACH procedure based small data transmission
scheme; and
performing the selected uplink transmission scheme to transmit the uplink
15 data.
2. The method according to claim 1, wherein the multiple uplink transmission
schemes further comprise an uplink transmission scheme performed via a radio
resource control, RRC, setup or resume procedure.
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3. The method according to claim 1 or 2, wherein the selecting is based on a
received data amount threshold for the preconfigured grant based uplink
transmission scheme and the RACH procedure based small data transmission
scheme.
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4. The method according to any one of claims 1 to 3, wherein one of the
preconfigured grant based uplink transmission scheme or the RACH procedure
based small data transmission scheme is selected and transmission is performed
using the selected one of the preconfigured grant based uplink transmission scheme
30 or the RACH procedure based small data transmission scheme, and the method
further comprises releasing by the user equipment configuration for the one of the
preconfigured grant based uplink transmission scheme or the RACH procedure
based small data transmission scheme that was not selected.

5. The method according to any one of claims 1 to 4, wherein a small data transmission is performed using an early data transmission that uses a RACH procedure.
- 5 6. The method according to any one of claims 2 to 5, wherein the RRC setup or resume procedure comprises one or more of the following: a radio resource control connection setup procedure; a radio resource control connection resume procedure; or a radio resource control connection re-establishment procedure.
- 10 7. The method according to any one of claims 1 to 6, wherein the uplink data is an amount of data that is determined to be small based on implementation in the user equipment or the received threshold based on which the user equipment evaluates to determine whether the amount of data is small.
- 15 8. The method according to any one of claims 1 to 7, wherein the selecting is based on received information, and the received information comprises one or both of data amount or time thresholds for one or more of the multiple uplink transmission schemes.
- 20 9. The method according to claim 8, wherein the method further comprises receiving the received information via one or both of dedicated signaling or broadcast signaling.
10. The method according to claim 9, wherein the dedicated signaling comprises
25 one or more radio resource control release messages or the broadcast signaling comprises system information block signaling.
11. A method performed by a network node, the method comprising:
sending, to a user equipment, UE, information configured to allow the UE,
30 while the UE is in an inactive or idle state, to select one of multiple uplink transmission schemes to be used to transmit uplink data, wherein
the multiple uplink transmission schemes comprise a random access channel, RACH, procedure based small data transmission and a preconfigured grant based uplink transmission scheme, and wherein,

when the UE is configured with the preconfigured grant based uplink transmission scheme and the RACH procedure based small data transmission scheme, the UE selects the preconfigured grant based uplink transmission scheme over the RACH procedure based small data transmission scheme; and

5 receiving the uplink data transmitted by the UE using the selected uplink transmission scheme.

12. The method according to claim 11, wherein the multiple uplink transmission schemes further comprise an uplink transmission scheme performed via a radio resource control, RRC, setup or resume procedure.

13. The method according to claim 11 or 12, wherein the UE selects one of the multiple uplink transmission schemes based on a received data amount threshold for the preconfigured grant based uplink transmission scheme and the RACH procedure based small data transmission scheme.

14. The method according to any one of claims 11 to 13, wherein receiving comprises receiving a small data transmission that uses an early data transmission that uses a RACH procedure.

15. The method according to any one of claims 12 to 14, wherein the RRC setup or resume procedure comprises one or more of the following: a radio resource control connection setup procedure; a radio resource control connection resume procedure; or a radio resource control connection re-establishment procedure.

16. The method according to any one of claims 12 to 15, wherein the sent information comprises one or both of data amount or time threshold for one or more of the multiple uplink transmission schemes.

17. The method according to claim 16, wherein sending the information further comprises sending the information via one or both of dedicated signaling or broadcast signaling.

18. The method according to claim 17, wherein the dedicated signaling comprises one or more radio resource control release messages or the broadcast signaling comprises system information block signaling.

5 19. A user equipment, UE, comprising:

one or more processors; and

one or more memories including computer program code,

wherein the one or more memories and the computer program code are configured, with the one or more processors, to cause the user equipment to:

10 select, while the user equipment is in an inactive or idle state, one of multiple uplink transmission schemes to be used to transmit uplink data, wherein

the multiple uplink transmission schemes comprise a random access channel, RACH, procedure based small data transmission scheme and a preconfigured grant based data transmission scheme, and wherein,

15 when the UE is configured with the preconfigured grant based uplink transmission scheme and the RACH procedure based small data transmission scheme, the UE selects the preconfigured grant based uplink transmission scheme over the RACH procedure based small data transmission scheme; and
perform the selected uplink transmission scheme to transmit the uplink data.

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20. The user equipment of claim 19, wherein the multiple uplink transmission schemes further comprise an uplink transmission scheme performed via a radio resource control, RRC, setup or resume procedure.

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21. The user equipment of claim 19 or 20, wherein the user equipment selects the one of the multiple uplink transmission schemes based on a received data amount threshold for the preconfigured grant based uplink transmission scheme and the RACH procedure based small data transmission scheme.

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22. The user equipment according to any one of claim 19 to 21, wherein one of the preconfigured grant based uplink transmission scheme or the RACH procedure based small data transmission scheme is selected and transmission is performed

using the selected one of the preconfigured grant based uplink transmission scheme or the RACH procedure based small data transmission scheme, and

the one or more memories and the computer program code are configured, with the one or more processors, to further cause the user equipment to release
5 configuration for the one of the preconfigured grant based uplink transmission scheme or the RACH procedure based small data transmission scheme that was not selected.

23. The user equipment according to any one of claims 19 to 23, wherein a small
10 data transmission is performed using an early data transmission that uses a RACH procedure.

24. The user equipment according to any one of claims 20 to 23, wherein the RRC
15 setup or resume procedure comprises one or more of the following: a radio resource control connection setup procedure; a radio resource control connection resume procedure; or a radio resource control connection re-establishment procedure.

25. The user equipment according to claim 24, wherein neither the preconfigured
20 grant based uplink transmission scheme nor the RACH procedure based small data transmission scheme is configured for the user equipment, and wherein:
selecting further comprises selecting the RRC setup or resume procedure and
performing the selected uplink transmission scheme further comprises performing the RRC setup or resume procedure to transmit the uplink data.

25 26. The user equipment according to claim 20, wherein the preconfigured grant
based uplink transmission scheme is configured for the user equipment but the
RACH procedure based small data transmission scheme is not configured for the
user equipment, and wherein:
selecting further comprises selecting the RRC setup or resume procedure in
30 response to a grant occasion for the preconfigured grant based uplink transmission
scheme being more than a time threshold ahead and performing the selected uplink
transmission scheme further comprises performing the RRC setup or resume
procedure to transmit the uplink data; or

selecting further comprises selecting the preconfigured grant based uplink transmission scheme in response to a grant occasion for the preconfigured grant based uplink transmission scheme being less than a time threshold ahead and performing the selected uplink transmission scheme further comprises performing the preconfigured grant based uplink transmission scheme using the grant occasion to transmit the uplink data.

27. The user equipment according to any one of claims 19 to 26, wherein the UE selects the one of the multiple uplink transmission schemes based on received information, and the received information comprises one or both of data amount or time thresholds for one or more of the multiple uplink transmission schemes, wherein the one or more memories and the computer program code are configured, with the one or more processors, to cause the user equipment to receive the received information via one or both of dedicated signaling or broadcast signaling.

28. The user equipment according to claim 27, wherein the dedicated signaling comprises one or more radio resource control release messages or the broadcast signaling comprises system information block signaling.