

## Claims

### **Claim 1:**

A method for a user equipment (UE) for performing an early data transmission, the method comprising:

- transmitting a random access message 1 (Msg1) via a physical random access channel (PRACH);

- receiving a random access response message which includes an uplink grant for a random access message 3 (Msg3) physical uplink shared channel (PUSCH), the uplink grant including first information indicating resource allocation for the Msg3 PUSCH and second information indicating a first repetition number corresponding to a maximum transmission block size (TBS);

- receiving a broadcast message, the broadcast message including third information indicating the maximum TBS which is pre-associated with a group of candidate TBSs equal to or smaller than the maximum TBS for the UE to perform the early data transmission in the Msg3 PUSCH;

- determining a TBS and a second repetition number used for the early data transmission in the Msg3 PUSCH; and

- transmitting the early data transmission in the Msg3 PUSCH using the TBS and the second repetition number, wherein:

  - the TBS is determined from the group of candidate TBSs pre-associated with the maximum TBS, and

  - the second repetition number is determined based on the first repetition number and a ratio of the TBS to the maximum TBS.

### **Claim 2:**

A method for a base station for performing an early data transmission, the method comprising:

- receiving a random access message 1 (Msg1) via a physical random access channel (PRACH);

- transmitting a random access response message which includes an uplink grant for a random access message 3 (Msg3) physical uplink shared channel (PUSCH), the uplink grant including first information indicating resource allocation for the Msg3 PUSCH and second information indicating a first repetition number corresponding to a maximum transmission block size (TBS);

- transmitting a broadcast message, the broadcast message including third information indicating the maximum TBS which is pre-associated with a group of candidate TBSs equal to or smaller than the maximum TBS for a user equipment to perform the early data transmission in the Msg3 PUSCH;

- determining a TBS and a second repetition number used for the early data transmission in the Msg3 PUSCH; and

- receiving the early data transmission in the Msg3 PUSCH using the TBS and the second repetition number, wherein:

  - the TBS is determined from the group of candidate TBSs pre-associated with the maximum

TBS, and

the second repetition number is determined based on the first repetition number and a ratio of the TBS to the maximum TBS.

**Claim 3:**

A user equipment (UE) for performing an early data transmission, the UE comprising:  
one or more non-transitory computer-readable media having computer-executable instructions embodied thereon; and

at least one processor coupled to the one or more non-transitory computer-readable media, the at least one processor is configured to execute the computer-executable instructions to:

transmit a random access message 1 (Msg1) via a physical random access channel (PRACH);

receive a random access response message which includes an uplink grant for a random access message 3 (Msg3) physical uplink shared channel (PUSCH), the uplink grant including first information indicating resource allocation for the Msg3 PUSCH and second information indicating a first repetition number corresponding to a maximum transmission block size (TBS);

receive a broadcast message, the broadcast message including third information indicating the maximum TBS which is pre-associated with a group of candidate TBSs equal to or smaller than the maximum TBS for the UE to perform the early data transmission in the Msg3 PUSCH;

determine a TBS and a second repetition number used for the early data transmission in the Msg3 PUSCH; and

transmit the early data transmission in the Msg3 PUSCH using the TBS and the second repetition number, wherein:

the TBS is determined from the group of candidate TBSs pre-associated with the maximum TBS, and

the second repetition number is determined based on the first repetition number and a ratio of the TBS to the maximum TBS.

**Claim 4:**

A base station (BS) for performing an early data transmission, the BS comprising:  
one or more non-transitory computer-readable media having computer-executable instructions embodied thereon; and

at least one processor coupled to the one or more non-transitory computer-readable media, the at least one processor is configured to execute the computer-executable instructions to:

receive a random access message 1 (Msg1) via a physical random access channel (PRACH);

transmit a random access response message which includes an uplink grant for a

random access message 3 (Msg3) physical uplink shared channel (PUSCH), the uplink grant including first information indicating resource allocation for the Msg3 PUSCH and second information indicating a first repetition number corresponding to a maximum transmission block size (TBS);

transmit a broadcast message, the broadcast message including third information indicating the maximum TBS which is pre-associated with a group of candidate TBSs equal to or smaller than the maximum TBS for a user equipment to perform the early data transmission in the Msg3 PUSCH;

determine a TBS and a second repetition number used for the early data transmission in the Msg3 PUSCH; and

receive the early data transmission in the Msg3 PUSCH using the TBS and the second repetition number, wherein:

the TBS is determined from the group of candidate TBSs pre-associated with the maximum TBS, and

the second repetition number is determined based on the first repetition number and a ratio of the TBS to the maximum TBS.