What is Claimed:

1. A method for providing physical layer resources to a plurality of medium access control (MAC) instances that are independently scheduled, the method comprising:

utilizing a first physical layer configuration for transmissions associated with a first MAC instance;

utilizing a second physical layer configuration for transmissions associated with a second MAC instance; and

coordinate transmission power to be allocated for a transmission via the first MAC instance and a transmission via the second MAC instance, wherein at least a portion of the transmission power is allocated between the first MAC instance the second MAC instance based on a type of MAC instance corresponding to each of the first and second MAC instances and a type of physical channel to be used for the transmissions associated with each of the first and second MAC instances.

2. The method as in claim 1, wherein allocating at least the portion of the transmission power based on the type of physical channel to be used comprises allocating at least the portion of the transmission power based on whether the type of transmission is on a physical uplink control channel (PUCCH) or a physical uplink shared channel (PUSCH).

3. The method as in claim 2, wherein a PUCCH type transmission is prioritized for power allocation over a PUSCH type transmission.

4. The method as in claim 2, wherein a first hybrid automatic repeat request (HARQ) feedback timing relationship is applied for transmissions sent using the first MAC instance and a second HARQ timing relationship is applied for transmission sent using the second MAC instance.

5. The method as in claim 1, wherein frequency segregation is utilized, the WTRU transmits using a first carrier when sending transmission associated with the first MAC instance, and the WTRU transmits using a second carrier when sending transmission associated with the second MAC instance.

6. The method as in claim 5, wherein the WTRU is configured with a maximum transmit power for each MAC instance.

7. The method as in claim 1, wherein frequency segregation is utilized, and the WTRU is configured with a maximum transmit power for transmitting to one or more of the first MAC instance or the second MAC instance.

8. The method as in claim 7, further comprising determining that transmitting according to a first received uplink grant for the first MAC instance and transmitting according to a second uplink grant for the second MAC instance would result in the WTRU exceeding the maximum transmit power.

9. The method as in claim 8, further comprising scaling one or more of a transmission to the first MAC instance or a transmission to the second MAC instance based on determining that transmitting according to the first received uplink grant for the first MAC instance and transmitting according to the second uplink grant for the second MAC instance would result in the WTRU exceeding the maximum transmit power.

10. The method as in claim 9, wherein scaling one or more of a transmission to the first MAC instance or a transmission to the second MAC instance comprises allocating power first to a physical uplink control channel (PUCCH) transmission, and allocating remaining power up to the maximum transmit power to one or more physical uplink shared channel (PUSCH) transmissions.

11. The method as in claim 9, further comprising including an indication that a transmissions has been scaled due to power constraints in one or more of the transmission via the first MAC instance or the transmission via the second MAC instance.

12. The method as in claim 9, further comprising determining which transmission to scale based on a priority of data to be transmitted to the first MAC instance and a priority of data to be transmitted to the second MAC instance.

13. A wireless transmit receive unit (WTRU) comprising:

a plurality of medium access control (MAC) instances, wherein each MAC instance is associated with independently scheduled transmissions;

a physical layer entity configured to:

operate using a first physical layer configuration for transmitting with a first MAC instance,

operate using a second physical layer configuration for transmitting with a second MAC instance, and

coordinate transmission power to be allocated for a transmission via the first MAC instance and a transmission via the second MAC instance, wherein the physical layer entity is configured to allocate at least a portion of the transmission power between the first MAC instance and the second MAC instance based on a type of MAC instance corresponding to each of the first and second MAC instances and a type of physical channel to be used for the transmissions associated with each of the first and second MAC instances.

14. The WTRU as in claim 13, wherein the physical layer entity is configured to allocate the transmission power based on the type of physical channel by allocating at least the portion of the transmission power based on whether the type of transmission is on a physical uplink control channel (PUCCH) or a physical uplink shared channel (PUSCH).

15. The WTRU as in claim 14, wherein a PUCCH type transmission is prioritized for power allocation over a PUSCH type transmission.

16. The WTRU as in claim 15, wherein the first MAC instance has a higher priority than the second MAC instance for a same type for transmission.

17. The WTRU as in claim 13, wherein the physical layer is further configured to transmit a quality of service (QoS) status report (QSR) for one or more of the first MAC instance or the second MAC instance, and the QSR is transmitted based on determining that a QoS requirement for at least one radio bearer is not being met.

18. The WTRU as in claim 13, wherein the physical layer entity is configured to determine a relative priority between a first uplink grant associated with the first MAC instance

and a second uplink grant associated with the second MAC instance based on explicit indications regarding priority received from a network entity.

19. The WTRU as in claim 13, wherein the physical layer entity is configured to report power headroom information for each of transmissions associated with the MAC instance and transmissions associated with the second MAC instance via the first MAC instance.

20. The WTRU as in claim 19, wherein the physical layer entity is configured to report power headroom information for each of transmissions associated with the MAC instance and transmissions associated with the second MAC instance via the first MAC instance based on determining to scale at least one transmission to one or more of the first MAC instance or the second MAC instance.

What is claimed:

1. A method for providing physical layer resources to a plurality of medium access control (MAC) instances that are independently scheduled, the method comprising:

a wireless transmit/receive unit (WTRU) utilizing a first physical layer configuration for transmissions associated with a first MAC instance;

the WTRU utilizing a second physical layer configuration for transmissions associated with a second MAC instance; and

the WTRU coordinating transmission power to be allocated for a first transmission sent via the first MAC instance and a second transmission sent via the second MAC instance, wherein at least a portion of the transmission power is allocated between the first MAC instance for the first transmission the second MAC instance for the second transmission based on based on a type of uplink control information, if any, that are included in one or more of the first transmission or the second transmission and based on a type of MAC instance corresponding to each of the first and second MAC instances.

2. The method as in claim 1, wherein the WTRU determines that the first transmission includes first uplink control information, the WTRU determines that the that the second transmission does not include uplink control information, and the WTRU determines that the first transmission is prioritized over the second transmission when allocating at least the portion of the transmission power.

3. The method as in claim 1, wherein the WTRU prioritizes a first type of uplink control information over a second type of uplink control information when allocating at least the portion of the transmission power.

4. The method as in claim 1, wherein a first hybrid automatic repeat request (HARQ) feedback timing relationship is applied for transmissions sent using the first MAC instance and a second HARQ timing relationship is applied for transmission sent using the second MAC instance.

5. The method as in claim 1, wherein the WTRU receives a configuration comprising a maximum transmit power level for transmission sent via the first MAC instance and via the second MAC instance.

6. The method as in claim 5, further comprising the WTRU determining that transmitting according to a first received uplink grant associated with the first transmission sent via the first MAC instance and transmitting according to a second uplink grant associated with the second transmission sent via the second MAC instance would result in the WTRU exceeding the maximum transmit power level.

7. The method as in claim 6, wherein the WTRU coordinating transmission power to be allocated for the first transmission sent via the first MAC instance and the second transmission sent via the second MAC instance comprises the WTRU scaling the second transmission based on the second transmission including lower priority uplink control information than is included in the first transmission.

8. The method as in claim 7, further comprising the WTRU including an indication that the second transmission has been scaled due to power constraints in one or more of the first transmission or the second transmission.

9. A wireless transmit receive unit (WTRU) comprising:

a plurality of medium access control (MAC) instances, wherein each MAC instance is associated with independently scheduled transmissions;

a physical layer entity configured to:

operate using a first physical layer configuration for transmitting with a first MAC instance,

operate using a second physical layer configuration for transmitting with a second MAC instance, and

transmission power to be allocated for a first transmission sent via the first MAC instance and a second transmission sent via the second MAC instance, wherein the physical layer entity is

configured to allocate at least a portion of the transmission power between the first MAC instance for the first transmission the second MAC instance for the second transmission based on based on a type of uplink control information, if any, that are present in one or more of the first transmission or the second transmission and based on a type of MAC instance corresponding to each of the first and second MAC instances.

10. The WTRU as in claim 9, wherein the first MAC instance has a higher priority than the second MAC instance for a same type for transmission.

11. The WTRU as in claim 9, wherein the physical layer entity is configured to determine a relative priority between a first uplink grant associated with the first MAC instance and a second uplink grant associated with the second MAC instance based on explicit indications regarding priority received from a network entity.

12. The WTRU as in claim 9, wherein the physical layer entity is configured to report power headroom information for each of transmissions associated with the MAC instance and transmissions associated with the second MAC instance via the first MAC instance.

13. The WTRU as in claim 9, wherein the physical layer entity is configured to prioritize a first type of uplink control information over a second type of uplink control information when allocating at least the portion of the transmission power.

14. The WTRU as in claim 13, wherein the first type of uplink control information corresponds to hybrid automatic repeat request (HARQ) feedback and the second type of uplink control information corresponds to channel quality indicator (CQI) feedback.

15. The WTRU as in claim 9, wherein the physical layer entity is configured to allocate at least a first minimum guaranteed power level configured for first MAC instance to the first transmission

and at least a second minimum guaranteed power level configured for second MAC instance to the second transmission.