Claims

1. A border router, comprising:

a plurality of border router radios each configured for communicating with one or more endpoints, the plurality of border router radios forming a single personal area network (PAN); and

a border router component connected to each of the plurality of border router radios, the border router component configured for:

selecting one of the plurality of border router radios as a master radio; and

assigning channel offset parameters for each of the plurality of border router radios;

wherein the master radio is configured for:

broadcasting synchronization beacons; and

communicating with the one or more endpoints associated with the master radio according to a channel hopping pattern modified by applying a channel offset determined based on the channel offset parameters assigned to the master radio; and

wherein each of non-master radios of the plurality of border router radios is configured for:

synchronizing with the master radio based on the synchronization beacons; and

communicating with the one or more endpoints associated with the non-master radio according to the channel hopping pattern modified by applying another channel offset determined based on the channel offset parameters assigned to the non-master radio.

2. The border router of claim 1, wherein:

the channel offset parameters for the border router radio comprise an ordinal number of the border router radio and a total number of border router radios associated with the border router, and

the channel offset for the border router radio is determined based on the ordinal number of the border router radio, the total number of border router radios, and a total number of channels available at the border router radio.

3. The border router of claim 1, wherein the channel offset parameters for the border router radio comprise the channel offset of the border router radio and is transmitted to the border router radio by the border router component.

4. The border router of claim 1, wherein the plurality of border router radios are further configured to transmit data to the border router component in a same timeslot.

5. The border router of claim 1, wherein communicating with the one or more endpoints associated with a border router radio according to the channel hopping pattern modified by applying a channel offset comprises communicating with one of the one or more endpoints on a channel at a given timeslot, wherein a channel number of the channel is determined as a channel number specified in the channel hopping pattern for the given timeslot adjusted by the channel offset.

6. The border router of claim 1, wherein the channel offset for each of the plurality of border router radios is different.

7. The border router of claim 1, wherein the master radio is further configured to determine the channel hopping pattern according to a time-slotted channel hopping (TSCH) protocol.

8. The border router of claim 1, wherein said each of the plurality of border router radios is configured to perform clear channel assessment before transmitting on a channel determined according to the channel hopping pattern and the channel offset for the border router radio.

9. A method, comprising:

selecting, by a border router, one of a plurality of border router radios of the border router as a master radio;

assigning, by the border router, channel offset parameters for each of the plurality of border router radios;

broadcasting, by the master radio of the border router, synchronization beacons;

synchronizing, by non-master radios of the plurality of border router radios of the border router, with the master radio based on the synchronization beacons; and

communicating, by each of the plurality of border router radios of the border router, with one or more endpoints associated with the border router radio according to a channel hopping pattern and a channel offset determined based on the channel offset parameters assigned to the border router radio,

wherein the plurality of border router radios form a single personal area network (PAN).

10. The method of claim 9, wherein:

the channel offset parameters for the border router radio comprise an ordinal number of the border router radio and a total number of border router radios associated with the border router, and

the channel offset for the border router radio is determined based on the ordinal number of the border router radio, the total number of border router radios, and a total number of channels available at the border router radio.

11. The method of claim 9, wherein the plurality of border router radios are further configured to transmit data to the border router in a same timeslot.

12. The method of claim 9, wherein communicating with one or more endpoints associated with the border router radio according to a channel hopping pattern and a channel offset comprises communicating with one of the one or more endpoints on a channel at a given timeslot, wherein a channel number of the channel is determined as a

channel number specified in the channel hopping pattern for the given timeslot adjusted by the channel offset.

13. The method of claim 9, wherein the channel offset for each of the plurality of border router radios are different.

14. The method of claim 9, further comprising:

performing, by each of the plurality of border router radios, clear channel assessment before transmitting on a channel determined according to the channel hopping pattern and the channel offset for the border router radio.

15. A border router component connected to a plurality of border router radios, the border router component comprising:

a processor configured to execute computer-readable instructions; and

a memory configured to store the computer-readable instructions that, when executed by the processor, cause the processor to perform operations comprising:

configuring the plurality of border router radios to form a single personal area network (PAN);

selecting one of the plurality of border router radios as a master radio and remaining border router radios of the plurality of border router radios as non-master radios;

determining channel offset parameters for each of the plurality of border router radios;

causing an identity of the master radio and the channel offset parameters to be transmitted to a respective border router radio of the plurality of border router radios, wherein the channel offset parameters cause each of the plurality of border router radios to communicate with one or more endpoints associated with the border router radio according to a channel hopping pattern modified by applying a channel offset, the channel offset being determined based on the channel offset parameters for the border router radio;

configuring the non-master radios to synchronize with the master radio;

receiving, during a same timeslot, data from two or more of the plurality of border router radios, the data being received by the two or more border router radios from the one or more endpoints associated with the respective border router radios; and

causing the received data to be transmitted to a headend system.

16. The border router component of claim 15, wherein

the channel offset parameters for the border router radio comprise an ordinal number of the border router radio and a total number of border router radios connected to the border router component; and

the channel offset for the border router radio is determined by the border router radio based on the ordinal number of the border router radio, the total number of border router radios, and a total number of channels available for communication at the border router radio.

17. The border router component of claim 15, wherein the channel offset parameters for the border router radio comprise the channel offset of the border router radio and is transmitted to the border router radio through an administrative command.

18. The border router component of claim 15, wherein the channel offsets for the plurality of border router radios are different.