

CLAIMS

1. — A method, comprising:

transmitting, according to a schedule, a broadcast transmission to a plurality of devices
at a first event start time offset from among a plurality of event start time offsets indicated by
5 — the schedule;

transmitting, according to the schedule, a first unicast transmission to a device from among
the plurality of devices at a second time indicated by a second event start time offset from among
the plurality of event start time offsets indicated by the schedule; and

transmitting a plurality of unicast transmissions to the plurality of devices, wherein the
10 transmitting is performed according to the schedule, and wherein a distribution of numbers
of devices associated with event start time offsets dedicated to unicast transmissions is substantially
uniform.

2. — The method of claim 1, additionally comprising:

15 assigning devices to event start time offsets such that a variance of the distribution of
numbers of devices associated with each of the plurality of event start time offsets is under a
threshold value.

3. — The method of claim 1, additionally comprising:

20 assigning devices to event start time offsets within the schedule such that a difference
between a number of devices assigned to a third event start time offset and a number of devices
assigned to a fourth event start time offset is within a threshold value.

4. — The method of claim 1, additionally comprising:

25 assigning devices to event start time offsets within the schedule in a manner that results
in each event start time offset being associated with "n" number of devices or "n" plus 1 number
of devices, wherein "n" is an integer that is zero or greater.

5. ~~_____ The method of claim 1, wherein a number of event start time offsets defined within the schedule is based at least in part on one or more factors, comprising:~~

~~a number of battery-powered devices expected to communicate with a mains power device;~~

5 ~~an expected message length used in communications between the battery-powered devices and the mains-powered device;~~

~~an expected data rate used by the battery-powered devices and the mains-powered device.~~

10 6. ~~_____ The method of claim 1, additionally comprising:~~

~~transmitting, according to the schedule, a multicast transmission to at least two devices, wherein the multicast transmission is sent at a third time indicated by a third event start time offset from among the plurality of event start time offsets.~~

15 7. ~~_____ The method of claim 1, additionally comprising:~~

~~detecting that a first device from among the plurality of devices has left a network including the plurality of devices; and~~

~~changing an event start time offset of a second device from among the plurality of devices that is not leaving the network to an event start time offset previously used by the~~

20 ~~first device.~~

8. ~~_____ The method of claim 1, additionally comprising:~~

~~receiving a request from a device to join a network of the plurality of devices; and~~

~~assigning the device to an event start time offset such that a number of devices~~

25 ~~assigned to each event start time offset is substantially uniform.~~

9. — ~~The method of claim 1, additionally comprising:~~
~~receiving requests from additional devices to join a network;~~
~~assigning the additional devices to event start time offsets within the schedule in a~~
~~manner that results in each event start time offset being associated with "n" number of devices~~
5 ~~or "n" plus 1 number of devices, wherein "n" is an integer that is zero or greater.~~

10. — ~~The method of claim 1, wherein:~~
~~a device transmitting according to the schedule is a mains-powered device (MPD); and~~
~~devices of the plurality of devices are battery-powered devices (BPDs).~~

10

11. — ~~The method of claim 1, additionally comprising:~~
~~transmitting a preamble of a packet of the first unicast transmission at the first event~~
~~start time offset associated with a first battery-powered device; and~~
~~transmitting portions of the packet other than the preamble of the packet after the~~
15 ~~second event start time offset associated with a second battery-powered device.~~

12. — ~~The method of claim 1, additionally comprising:~~
~~sending a second unicast transmission to a second device at a time indicated by a third~~
~~event start time offset;~~
20 ~~wherein a radio frequency of the second unicast transmission is based at least in part~~
~~on a media access control (MAC) address of the third device.~~

13. — ~~The method of claim 1, additionally comprising:~~
~~transmitting to a first battery-powered device from among the plurality of devices~~
25 ~~according to a first event start time offset of the schedule during a high-power use period of~~
~~the first battery-powered device; and~~

~~transmitting to a second battery-powered device from among the plurality of devices according to a second event start time offset of the schedule during a low power use period of the first battery-powered device.~~

5 14. A method, comprising:

~~receiving a broadcast transmission at each of two or more devices according to a first event start time offset indicated by a schedule;~~

~~receiving data in a first unicast transmission at a first device from among the two or more devices according to a second event start time offset indicated by the schedule; and~~

-10 ~~receiving data in a second unicast transmission at a second device from among the two or more devices according to a third event start time offset indicated by the schedule; wherein the schedule associates numbers of devices to event start time offsets dedicated to unicast transmissions in a substantially uniform manner.~~

-15 15. The method of claim 14, wherein:

~~a battery-powered device from among the two or more devices communicates according to an event start time offset of the schedule during a high power use period of the battery-powered device; and~~

~~the battery-powered device alternates high power use periods and low power use~~
-20 ~~periods according event start time offsets.~~

16. The method of claim 14, wherein:

~~at least two battery-powered devices, from among the two or more devices, are associated with a same event start time offset within the schedule; and~~

-25 ~~at the same event start time offset, each of the at least two battery-powered devices determine if a message is available.~~

17.—~~The method of claim 14, additionally comprising:~~

~~changing the schedule to move one of the two or more devices from a first event start time offset to a second event start time offset;~~

~~wherein the changing of the schedule reduces a variance of the distribution of numbers of devices associated with each of a plurality of event start time offsets.~~

18.—~~A method, comprising:~~

~~receiving a request to add a device to a network;~~

~~selecting an event start time offset for assignment to the device, wherein the selected event start time offset is selected such that such that a distribution of numbers of devices associated with each of a plurality of event start time offsets is substantially uniform;~~

~~instructing the device to transmit and/or receive data according to a schedule based at least in part on the selected event start time offset, wherein the schedule associates numbers of devices on the network to event start time offsets dedicated to unicast transmissions in a substantially uniform manner; and~~

~~sending a unicast message to the device at a time indicated by the schedule.~~

19.—~~The method of claim 18, wherein the device is a first device, the method additionally comprising:~~

~~receiving a second request to add a second device to the network; and~~

~~selecting the event start time offset, already assigned to the first device for assignment to the second device.~~

~~20. The method of claim 18, wherein the device is a first device, and the method additionally comprises:~~

~~determining that the first device has left the network; and
reassigning the selected event start time offset to a second device that is part of the network;~~

~~wherein the reassigning is performed such that the distribution of numbers of devices associated with each of the plurality of event start time offsets used by devices connected to the network has a variance that is less than a threshold value.~~

1. A method, comprising:

transmitting, according to a schedule, a broadcast transmission to a plurality of devices at a first event start-time offset from among a plurality of event start-time offsets indicated by the schedule;

transmitting, according to the schedule, a first unicast transmission to a device of the plurality of devices at a second time indicated by a second event start-time offset from among the plurality of event start-time offsets indicated by the schedule; transmitting a plurality of unicast transmissions to the plurality of devices, wherein the transmitting is performed according to the schedule, and wherein a distribution of numbers of devices associated with event start-time offsets dedicated to unicast transmissions is substantially uniform;

detecting that a first device of the plurality of devices has left a network of the plurality of devices; and

changing an event start-time offset of a second device of the plurality of devices that is not leaving the network to an event start-time offset previously used by the first device.

2. The method of claim 1, additionally comprising:

assigning devices of the plurality of devices to event start-time offsets such that a variance of the distribution of numbers of devices associated with each of the plurality of event start-time offsets is under a threshold value.

3. The method of claim 1, additionally comprising:

assigning devices of the plurality of devices to event start-time offsets within the schedule such that a difference between a number of devices assigned to a third event start-time offset and a number of devices assigned to a fourth event start-time offset is within a threshold value.

4. The method of claim 1, additionally comprising:

assigning devices of the plurality of devices to event start-time offsets within the schedule in a manner that results in each event start-time offset being associated with “n” number of devices or “n” plus 1 number of devices, wherein “n” is an integer that is zero or greater.

5. The method of claim 1, wherein a number of event start-time offsets defined within the schedule is based at least in part on one or more factors, comprising:

a number of battery-powered devices expected to communicate with a mains-powered device;

an expected message length used in communications between the battery-powered devices and the mains-powered device;

an expected data rate used by the battery-powered devices and the mains-powered device.

6. The method of claim 1, additionally comprising:

transmitting, according to the schedule, a multicast transmission to at least two devices of the plurality of devices, wherein the multicast transmission is sent at a third time indicated by a third event start-time offset from among the plurality of event start-time offsets.

7. The method of claim 1, additionally comprising:
receiving a request from a device to join the network; and
assigning the device requesting to join the network to an event start-time offset such that a
number of devices assigned to each event start-time offset is substantially uniform.

8. The method of claim 1, additionally comprising:
receiving requests from additional devices to join the network;
assigning the additional devices to event start-time offsets within the schedule in a manner
that results in each event start-time offset being associated with “n” number of devices or “n” plus
1 number of devices, wherein “n” is an integer that is zero or greater.

9. The method of claim 1, wherein:
a device transmitting according to the schedule is a mains-powered device (MPD); and
devices of the plurality of devices are battery-powered devices (BPDs).

10. The method of claim 1, additionally comprising:
transmitting a preamble of a packet of the first unicast transmission at the first event start-
time offset associated with a first battery-powered device of the plurality of devices; and
transmitting portions of the packet other than the preamble of the packet after the second
event start-time offset associated with a second battery-powered device of the plurality of devices.

11. The method of claim 1, additionally comprising:
sending a second unicast transmission to another device of the plurality of devices at a time
indicated by a third event start-time offset;
wherein a radio frequency of the second unicast transmission is based at least in part on a
media access control (MAC) address of the third device.

12. The method of claim 1, additionally comprising:

transmitting to a first battery-powered device of the plurality of devices according to a first event start-time offset of the schedule during a high-power-use period of the first battery-powered device; and

transmitting to a second battery-powered device of the plurality of devices according to a second event start-time offset of the schedule during a low-power-use period of the first battery-powered device.

13. A method, comprising:

receiving a broadcast transmission at each of two or more devices according to a first event start-time offset indicated by a schedule;

receiving data in a first unicast transmission at a first device of the two or more devices according to a second event start-time offset indicated by the schedule; and

receiving data in a second unicast transmission at a second device of the two or more devices according to a third event start-time offset indicated by the schedule;

wherein:

the schedule associates numbers of devices to event start-time offsets dedicated to unicast transmissions in a substantially uniform manner,

a battery-powered device of the two or more devices communicates according to an event start-time offset of the schedule during a high-power-use period of the battery-powered device, and

the battery-powered device alternates high-power-use periods and low-power-use periods according to event start-time offsets.

14. The method of claim 13, wherein:

at least two battery-powered devices of the two or more devices are associated with a same event start-time offset within the schedule; and

at the same event start-time offset, each of the at least two battery-powered devices determines if a message is available.

15. The method of claim 13, additionally comprising:

changing the schedule to move one of the two or more devices from the first event start-time offset to the second event start-time offset;

wherein the changing of the schedule reduces a variance of the distribution of numbers of devices associated with each of a plurality of event start-time offsets.

16. A method, comprising:

receiving a request to add a first device to a network;

selecting an event start-time offset for assignment to the first device, wherein the selected event start-time offset is selected such that a distribution of numbers of devices associated with each of a plurality of event start-time offsets is substantially uniform;

instructing the first device to transmit and/or receive data according to a schedule based at least in part on the selected event start-time offset, wherein the schedule associates numbers of devices on the network to event start-time offsets dedicated to unicast transmissions in a substantially uniform manner;

sending a unicast message to the first device at a time indicated by the schedule;

determining that the first device has left the network; and

reassigning the selected event start-time offset to a second device that is part of the network,

wherein the reassigning is performed such that the distribution of numbers of devices associated with each of the plurality of event start-time offsets used by devices connected to the network has a variance that is less than a threshold value.

17. The method of claim 16, additionally comprising:

prior to reassigning the selected event start-time offset to the second device, receiving a second request to add the second device to the network,

wherein the selected event start-time offset is the event start-time offset already assigned to the first device.

18. The method of claim 1, additionally comprising:

prior to changing the event start-time offset of the second device, receiving a request to join the network from the second device.

19. The method of claim 13, wherein receiving the broadcast transmission at each of two or more devices according to the first event start-time offset indicated by the schedule includes receiving the broadcast transmission from a mains-powered device.

20. The method of claim 16, wherein the first device and the second device are battery-powered devices.