

WHAT IS CLAIMED AS THE INVENTION IS:

1. A wireless system that operates to monitor wireless transmissions from one or more dispensers, the system comprising:
 - a dispenser that operates to wirelessly communicate a usage event to at least one of a plurality of hubs;
 - a receiving hub, in the plurality of hubs, that operates to:
 - receive a beacon;
 - transmit a response to the beacon;
 - update a visible list of the receiving hub; and
 - an active hub, in the plurality of hubs, that operates to periodically:
 - increment a hub age of each route entry in a visible list of the active hub; and
 - broadcast the beacon comprising an active hub ID and a candidate route, wherein the candidate route has the minimum number of hops from the receiving hub to a destination if a first hop is to the active hub, and the candidate route has a hop count equal to one plus the minimum hop count in the visible list of the active hub; wherein the active hub is operable to periodically compare the hub age, of each route entry, to an age threshold and remove the route entries; from the visible list, associated with a hub age that is above the age threshold.
2. The system of claim 1, wherein the receiving hub operates to add a route entry associated with the active hub and initialize the hub age of the added route, if the visible list of the receiving hub does not comprise a route entry associated with the active hub.

3. The system of claim 1, wherein the active hub comprises at least one route entry stored in the visible list, the at least one route entry comprises a hop count less than a route threshold, and the hub age of the at least one route entry is less than an age threshold.
4. The system of claim 1, wherein the active hub is operable to receive the response to the beacon.
5. The system of claim 4, wherein the active hub is operable to reset the hub age of the route entry associated with the response to the beacon.
6. The system of claim 1, wherein the destination is a gateway.
7. The system of claim 6, wherein the gateway is operable to broadcast a beacon with a candidate route corresponding to 1 hop.
8. The system of claim 1, wherein the visible list of the receiving hub and the visible list of the active hub each comprise a fixed number of route entries associated with the smallest hop counts.
9. The system of claim 1, wherein the receiving hub will not acknowledge the active hub if the active hub is not in the visible list.
10. The system of claim 1, wherein the receiving hub is operable to update the hop count associated with the active hub if the hop count associated with the active hub is not equal to the candidate route.

11. A method for stabilizing a wireless network that operates to monitor dispenser usage in a facility, the method comprising:

periodically incrementing a hub age of each route entry in a visible list of an active hub in a plurality of hubs;

periodically broadcasting a beacon comprising an active hub ID and a candidate route, wherein the candidate route has the minimum number of hops from a receiving hub to a destination if a first hop is to the active hub, and the candidate route has a hop count equal to one plus the minimum hop count in the visible list of the active hub;

receiving a beacon at a receiving hub, in the plurality of hubs;

updating a visible list of the receiving hub according to the beacon;

transmitting a response to the beacon; and

enabling communication to a dispenser that operates to wireless communicate a usage event to at least one of a plurality of hubs;

wherein the method comprises periodically comparing the hub age, of each route entry, to an age threshold and removing the route entries, from the visible list, associated with a hub age that is above the age threshold.

12. The method of claim 11, wherein the method comprises adding a route entry associated with the active hub and initializing the hub age, if the visible list of the receiving hub does not comprise a route entry associated with the active hub.

13. The method of claim 11, wherein the active hub comprises at least one route entry stored in the visible list, the at least one route entry comprises a hop count less than a route threshold, and the hub age of the at least one route entry is less than an age threshold.

14. The method of claim 11, wherein method comprises resetting the hub age of the route entry associated with the response to the beacon.
15. The method of claim 11, wherein the destination is a gateway.
16. The method of claim 15, wherein method comprises broadcasting a beacon with a candidate route corresponding to 1 hop from the gateway.
17. The method of claim 11, wherein the visible list of the receiving hub and the visible list of the active hub each comprise a fixed number of route entries associated with the smallest hop counts.
18. The method of claim 11, wherein the method comprises updating the hop count associated with the active hub if the hop count associated with the active hub is not equal to the candidate route.

WHAT IS CLAIMED AS THE INVENTION IS:

1. A wireless system that operates to monitor wireless transmissions from one or more dispensers, the system comprising:
a dispenser that operates to wirelessly communicate a usage event to at least one of a plurality of hubs, wherein each hub in the plurality of hubs is operable as;
a receiving hub, that operates to: receive a beacon;
transmit a response to the beacon; update a visible list of the receiving hub; and
an active hub, that operates to periodically:
increment a hub age of each route entry in a visible list of the active hub; and
broadcast the beacon comprising an active hub ID and a candidate route, wherein the candidate route has the minimum number of hops from the receiving hub to a destination if a first hop is to the active hub, and the candidate route has a hop count equal to one plus the minimum hop count in the visible list of the active hub; wherein the active hub is operable to periodically compare the hub age, of each route entry, to an age threshold and remove the route entries; from the visible list, associated with a hub age that is above the age threshold.
2. The system of claim 1, wherein the receiving hub operates to add a route entry associated with the active hub and initialize the hub age of the added route, if the visible list of the receiving hub does not comprise a route entry associated with the active hub.

3. The system of claim 1, wherein the active hub comprises at least one route entry stored in the visible list, the at least one route entry comprises a hop count less than a route threshold, and the hub age of the at least one route entry is less than an age threshold.
4. The system of claim 1, wherein the active hub is operable to receive the response to the beacon.
5. The system of claim 4, wherein the active hub is operable to reset the hub age of the route entry associated with the response to the beacon.
6. The system of claim 1, wherein the destination is a gateway.
7. The system of claim 6, wherein the gateway is operable to broadcast a beacon with a candidate route corresponding to 1 hop.
8. The system of claim 1, wherein the visible list of the receiving hub and the visible list of the active hub each comprise a fixed number of route entries associated with the smallest hop counts.
9. The system of claim 1, wherein the receiving hub will not acknowledge the active hub if the active hub is not in the visible list.
10. The system of claim 1, wherein the receiving hub is operable to update the hop count associated with the active hub if the hop count associated with the active hub is not equal to the candidate route.

11. A method for stabilizing a wireless network that operates to monitor dispenser usage in a facility, the method comprising:

periodically incrementing a hub age of each route entry in a visible list of an active hub in a plurality of hubs, wherein each hub in the plurality of hubs is operable as an active hub;

periodically broadcasting a beacon comprising an active hub ID and a candidate route, wherein the candidate route has the minimum number of hops from a receiving hub to a destination if a first hop is to the active hub, and the candidate route has a hop count equal to one plus the minimum hop count in the visible list of the active hub;

receiving a beacon at a receiving hub, in the plurality of hubs, wherein each hub in the plurality of hubs is operable as a receiving hub;

updating a visible list of the receiving hub according to the beacon;

transmitting a response to the beacon; and

enabling communication to a dispenser that operates to wireless communicate a usage event to at least one of a plurality of hubs;

wherein the method comprises periodically comparing the hub age, of each route entry, to an age threshold and removing the route entries, from the visible list, associated with a hub age that is above the age threshold.

12. The method of claim 11, wherein the method comprises adding a route entry associated with the active hub and initializing the hub age, if the visible list of the receiving hub does not comprise a route entry associated with the active hub.

13. The method of claim 11, wherein the active hub comprises at least one route entry stored in the visible list, the at least one route entry comprises a hop count less than a route threshold, and the hub age of the at least one route entry is less than an age threshold.
14. The method of claim 11, wherein method comprises resetting the hub age of the route entry associated with the response to the beacon.
15. The method of claim 11, wherein the destination is a gateway.
16. The method of claim 15, wherein method comprises broadcasting a beacon with a candidate route corresponding to 1 hop from the gateway.
17. The method of claim 11, wherein the visible list of the receiving hub and the visible list of the active hub each comprise a fixed number of route entries associated with the smallest hop counts.
18. The method of claim 11, wherein the method comprises updating the hop count associated with the active hub if the hop count associated with the active hub is not equal to the candidate route.