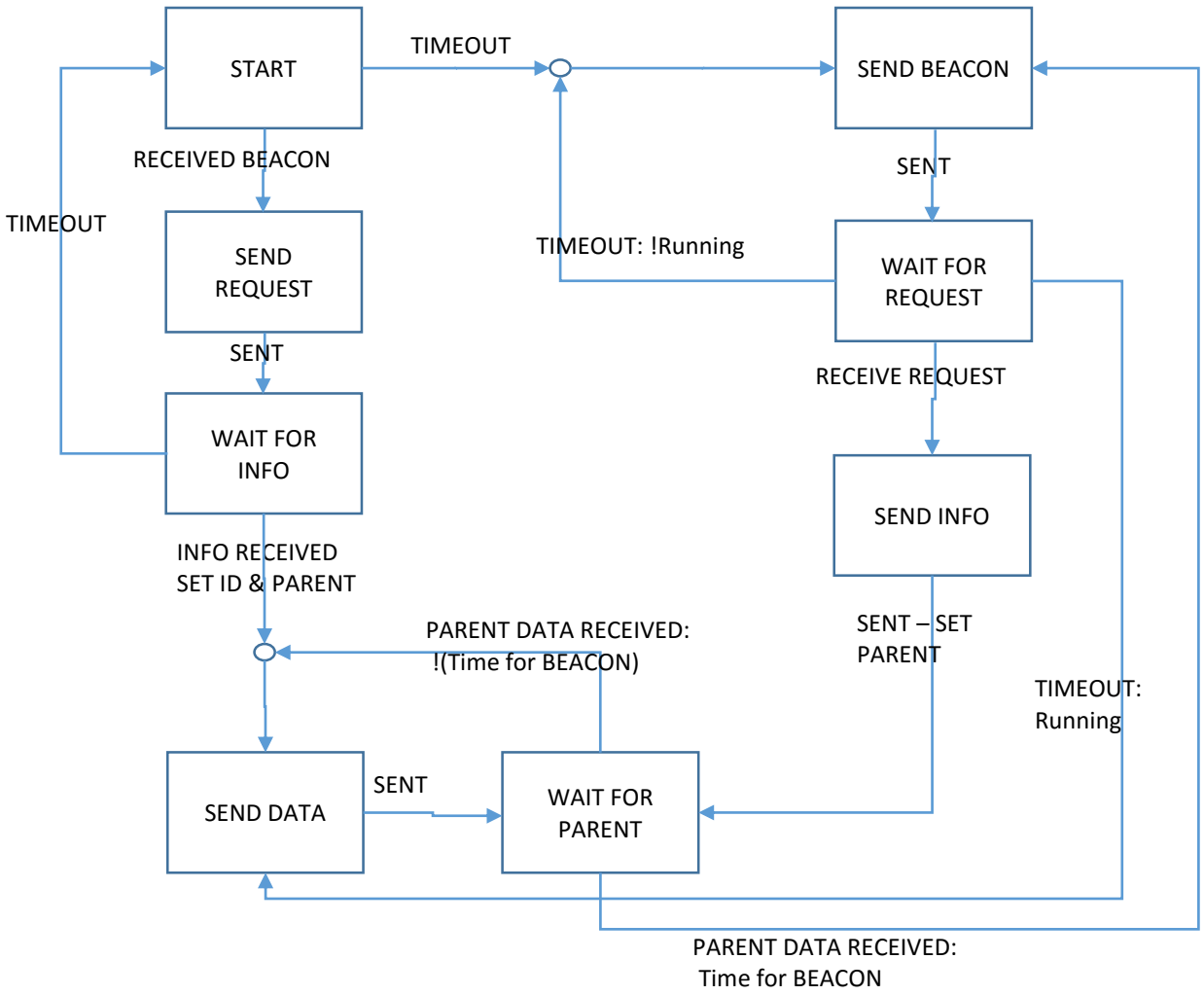
## New Portal Simplest State Machine

This applies only to joining and maintaining the communications ring.




### Internal Global Data maintained by normal data traffic:

- Max ID used – picked up by all nodes from INFO message
- Time of the next BEACON message – picked up by all nodes when they receive a BEACON message
- Running – set to false at START; set true

### Message Types

- BEACON
- REQUEST
- INFO
- DATA

## State Descriptions

Note: all three WAIT states must have timeouts. Not true yet for WAIT_FOR_PARENT state – this triggers the logic (not in the first prototype) for handling dropped nodes.

1. START state

Initial state of the machine.
Set a timer (~1ms) and listen for a BEACON message.
Set Running false
If the timer expires, go to SEND_BEACON.
If you receive a BEACON, set Running true
Go to SEND_REQUEST.

2. SEND_BEACON state

set a timer (~1ms),
Set time for next BEACON.
send a BEACON and
go to WAIT_FOR_REQUEST.

3. WAIT_FOR_REQUEST state

If the timer expires:
    If Running, go to SEND_DATA
    Otherwise go back to SEND_BEACON and wait for the second node to show up.
If you receive a REQUEST to join the network, go to SEND_INFO.

4. SEND_INFO state

Send a message with the max ID + 1 and the ID of the new node's parent. This will be either your parent if you have one, or your ID if there are just the two of you.
Set your parent to be the new node.
Go to WAIT_FOR_PARENT state

5. SEND_REQUEST state

Send a REQUEST message
Set a timer (~1ms)
Go to WAIT_FOR_INFO

6. WAIT_FOR_INFO state

If the timer expires, back to START to start again
If you receive an INFO message, set your ID and parent ID
Go to SEND_DATA

7. SEND_DATA state

Send a DATA message (empty if you have nothing to say)
Set Running true
Go to WAIT_FOR_PARENT

8. WAIT_FOR_PARENT state

If Received DATA from parent:

- if time to next BEACON, go to SEND_BEACON
- otherwise, go to SEND_DATA

## Sequence Diagram

Following Pages

| Node: | | A | | B | | C |
|---|---|---|---|---|---|---|
| **Time** | **State** | **Event** | **State** | **Event** | **State** | **Event** |
| 0 | START | TIMEOUT | | | | |
| 1 | SEND BEACON | SENT | | | | |
| 2 | WAIT FOR REQUEST | TIMEOUT | | | | |
| 3 | SEND BEACON | SENT | START | RECEIVE BEACON | | |
| 4 | WAIT FOR REQUEST | RECEIVE REQUEST | SEND REQUEST | SENT | | |
| 5 | SEND INFO | SENT | WAIT FOR INFO | INFO RECEIVED | | |
| 6 | WAIT FOR PARENT | PARENT DATA RECEIVED | SEND DATA | SENT | | |
| 7 | SEND DATA | SENT | WAIT FOR PARENT | PARENT DATA RECEIVED | | |
| 8 | WAIT FOR PARENT | PARENT DATA RECEIVED | SEND DATA | SENT | | |
| 9 | . | | | | | |
| 10 | . | | | | START | |
| 11 | . | | | | | |
| 12 | . | | | | | |
| | | | | PARENT DATA RECEIVED | | |
| 13 | SEND DATA | SENT | WAIT FOR PARENT | Time for BEACON | | |
| 14 | WAIT FOR PARENT | | SEND BEACON | SENT | | RECEIVED BEACON |
| | | | WAIT FOR | | | |
| 15 | | | REQUEST | RECEIVE REQUEST | SEND REQUEST | SENT |
| 16 | | | SEND INFO | SENT | WAIT FOR INFO | INFO RECEIVED |
| 17 | | | WAIT FOR PARENT | PARENT DATA RECEIVED | SEND DATA | SENT |
| 18 | | PARENT DATA RECEIVED | SEND DATA | SENT | WAIT FOR PARENT | |
| 19 | SEND DATA | SENT | WAIT FOR PARENT | | | PARENT DATA RECEIVED |
| 20 | WAIT FOR PARENT | | | PARENT DATA RECEIVED | SEND DATA | SENT |
| 21 | | PARENT DATA RECEIVED | SEND DATA | SENT | WAIT FOR PARENT | |
| 22 | SEND DATA | SENT | WAIT FOR PARENT | | | PARENT DATA RECEIVED |
| 23 | WAIT FOR PARENT | | | PARENT DATA RECEIVED | SEND DATA | SENT |
| | | | | | | PARENT DATA RECEIVED |
| 24 | | PARENT DATA RECEIVED | SEND DATA | SENT | WAIT FOR PARENT | Time for BEACON |
| 25 | SEND DATA | SENT | WAIT FOR PARENT | | SEND BEACON | SENT |
| | | | | | WAIT FOR | |
| 26 | WAIT FOR PARENT | | | | REQUEST | |
| 27 | . | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 28 | . | | | | | |
| 29 | . | | | | | |
| 30 | . | | | | | TIMEOUT |
| 31 | | | | PARENT DATA RECEIVED | SEND DATA | SENT |
| 32 | | PARENT DATA RECEIVED | SEND DATA | SENT | WAIT FOR PARENT | |
| 33 | SEND DATA | SENT | WAIT FOR PARENT | | | PARENT DATA RECEIVED |
| 34 | WAIT FOR PARENT | | | PARENT DATA RECEIVED | SEND DATA | SENT |
| 35 | | PARENT DATA RECEIVED | SEND DATA | SENT | WAIT FOR PARENT | |
| 36 | SEND DATA | SENT | WAIT FOR PARENT | | | |
| 37 | WAIT FOR PARENT | | | | | |
| 38 | . | | | | | |
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| | . | | | | | |