

Algorithm – Ballot Leader Elector

Algorithm 1 Gossip Leader Election

Implements:

BallotLeaderElector, **instance** *ble*.

Uses:

PerfectPointToPointLinks, **instance** *pp2p*.

```
1: upon event  $\langle \text{Init} \rangle$  do
2:    $\text{round} := 0$ 
3:    $\text{ballots} := \emptyset$ 
4:    $\text{ballot} := (0, \text{pid})$ 
5:    $\text{leader} := \perp$ 
6:    $\text{ballot}_{\max} := \text{ballot}$ 
7:    $\text{delay} := \Delta$ 
8:   STARTTIMER( $\text{delay}$ )
9: function CHECKLEADER
10:    $\text{top} := (\text{topProcess}, \text{topBallot}) := \text{MAXBYBALLOT}(\text{ballots} \cup \{(\text{self}, \text{ballot})\})$ 
11:   if  $\text{topBallot} < \text{ballot}_{\max}$  then
12:     while  $\text{ballot} \leq \text{ballot}_{\max}$  do
13:        $\text{ballot} := \text{INCREMENT}(\text{ballot})$ 
14:      $\text{leader} := \perp$ 
15:   else
16:     if  $\text{top} \neq \text{leader}$  then
17:        $\text{ballot}_{\max} := \text{topBallot}$ 
18:        $\text{leader} := \text{top}$ 
19:     trigger  $\langle \text{ble}, \text{Leader} \mid \text{topProcess}, \text{topBallot} \rangle$ 
20: upon event  $\langle \text{Timeout} \rangle$  do
21:   if  $\text{ballots} + 1 \geq \lceil \frac{\Pi}{2} \rceil$  then
22:     CHECKLEADER( )
23:    $\text{ballots} := \emptyset$ 
24:    $\text{round} := \text{round} + 1$ 
25:   for all  $p \in \Pi$  do
26:     if  $p \neq \text{self}$  then
27:       trigger  $\langle \text{pp2p}, \text{Send} \mid p, [\text{HEARTBEATREQUEST}, \text{round}, \text{ballot}_{\max}] \rangle$ 
28:   STARTTIMER( $\text{delay}$ )
29: upon event  $\langle \text{pp2p}, \text{Deliver} \mid p, [\text{HEARTBEATREQUEST}, r, \text{bmax}] \rangle$  do
30:   if  $\text{bmax} > \text{ballot}_{\max}$  then
31:      $\text{ballot}_{\max} := \text{bmax}$ 
32:   trigger  $\langle \text{pp2p}, \text{Send} \mid p, [\text{HEARTBEATREPLY}, r, \text{ballot}] \rangle$ 
33: upon event  $\langle \text{pp2p}, \text{Deliver} \mid p, [\text{HEARTBEATREPLY}, r, b] \rangle$  do
34:   if  $r = \text{round}$  then
35:      $\text{ballots} := \text{ballots} \cup \{(p, b)\}$ 
36:   else
37:      $\text{delay} := \text{delay} + \Delta$ 
```
