

```

|----- MODULE SEC -----|
|
| EXTENDS Naturals
|
|-----|
|
| VARIABLES
|   updateset,
|   last_updateset
|
| SECvars  $\triangleq$   $\langle updateset, last\_updateset \rangle$ 
|
|-----|
|
| CONSTANTS
|   Replica
|
|-----|
|
| Update  $\triangleq$   $[r : Replica, seq : Nat]$ 
|
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|
| OpUpdate(r)  $\triangleq$  updateset[r] \ last_updateset[r] for op-based CRDT
| StateUpdate(r)  $\triangleq$  updateset[r] for state-based CRDT
|
|-----|
|
| SECInit  $\triangleq$ 
|    $\wedge updateset = [r \in Replica \mapsto \{\}]$ 
|    $\wedge last\_updateset = [r \in Replica \mapsto \{\}]$ 
|
| SECUpdate(r, seq)  $\triangleq$ 
|    $\wedge updateset' = [updateset \text{ EXCEPT } ![r] = @ \cup \{[r \mapsto r, seq \mapsto seq]\}]$ 
|    $\wedge \text{UNCHANGED } \langle last\_updateset \rangle$ 
|
| SECSend(r)  $\triangleq$ 
|    $\wedge last\_updateset' = [last\_updateset \text{ EXCEPT } ![r] = updateset[r]]$ 
|    $\wedge \text{UNCHANGED } \langle updateset \rangle$ 
|
| SECDeliver(r, m)  $\triangleq$ 
|    $\wedge updateset' = [updateset \text{ EXCEPT } ![r] = @ \cup m.update]$ 
|    $\wedge last\_updateset' = [last\_updateset \text{ EXCEPT } ![r] = @ \cup m.update]$ 
|
|-----|
|
| Sameupdate(r1, r2)  $\triangleq$ 
|   updateset[r1] = updateset[r2]
|
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|
| \ * Modification History
| \ * Last modified Mon May 06 16:50:42 CST 2019 by jywellin
| \ * Created Sun May 05 15:42:13 CST 2019 by jywellin

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