─────────── MODULE *ReliableCausalNetwork* ───────────

EXTENDS *CausalNetwork*

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$RCNCausallyReady(r, m) \triangleq$ whether m is causally ready to be delivered by $r \in Replica$
    LET $mr \triangleq sender(m)$
    IN $\land ts(m)[mr] = vc[r][mr] + 1$ no message duplication
          $\land \forall s \in Replica \setminus \{mr\} : ts(m)[s] \leq vc[r][s]$

$RCNDeliver(r) \triangleq$
    $\land incoming[r] \neq \{\}$
    $\land \exists m \in incoming[r] :$
        $\land RCNCausallyReady(r, m)$
        $\land$ LET $mr \triangleq sender(m)$
          IN $vc' = [vc$ EXCEPT $![r][mr] = ts(m)[mr]]$ update $vc[r]$
        $\land lmsg' = [lmsg$ EXCEPT $![r] = m]$
        $\land incoming' = [incoming$ EXCEPT $![r] = @ \setminus \{m\}]$ delete m

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