

req-sent-before-ack^{11,40}

$\forall es:ES, ff:FIFO, is_req, is_ack:(E \rightarrow \mathbb{P}), awaiting, owes_ack:(Id \rightarrow Id \rightarrow Id).$
 $(ff.C \subseteq_r Id)$
 $\Rightarrow (\forall i, j:ff.C. @i(awaiting(i,j):\mathbb{B}) \ \& \ @i(owes_ack(i,j):\mathbb{B}))$
 $\Rightarrow (\forall i:ff.C, e:E. (ff.R(i,e)) \Rightarrow (loc(e) = i \in Id))$
 $\Rightarrow (\forall e:E. Dec(is_req(e)) \ \& \ Dec(is_ack(e)))$
 $\Rightarrow (\forall i, j:ff.C, e:E. Dec(ff.S(i,j,e)))$
 $\Rightarrow (\forall i, j:ff.C, e:E. (ff.S(i,j,e)) \Rightarrow (loc(e) = i \in Id))$
 $\Rightarrow \text{plus-ify}\{i:1\}(es;ff;is_req;is_ack;awaiting;owes_ack)$
 $\Rightarrow (\forall sndr, rcvr:ff.C, e:E.$
 $\quad [e: rcvr \dashrightarrow is_ack \rightarrow sndr] \Rightarrow (\exists x:E. ((x < e) \ \& \ [x: sndr \dashrightarrow is_req \rightarrow rcvr])))$