

EXTENDS *AJupiter*

We have omitted the history variables for recording operation contexts.

VARIABLES *c2ss*, *s2ss**InitImpl*  $\triangleq$   $\wedge$  *Init* $\wedge$  on history variables for operation contexts $\wedge c2ss = [c \in \textit{Client} \mapsto \textit{EmptyGraph}]$  $\wedge s2ss = [c \in \textit{Client} \mapsto \textit{EmptyGraph}]$ *DoImpl*(*c*, *op*)  $\triangleq$   $\wedge$  *Do*(*c*, *op*) $\wedge$  on history variables for operation contexts $\wedge \text{LET } cop \triangleq [op \mapsto op, oid \mapsto [c \mapsto c, seq \mapsto cseq[c]], ctx \mapsto ds[c]]$ IN  $c2ss' = [c2ss \text{ EXCEPT } ![c] =$  $@ \oplus [node \mapsto \{ds'[c]\},$  $edge \mapsto \{[from \mapsto ds[c], to \mapsto ds'[c], cop \mapsto cop]\}]$ *RevImpl*(*c*, *m*)  $\triangleq$   $\wedge$  *Rev*(*c*, *m*) $\wedge$  on history variables for operation contexts $\wedge \text{LET } xform \triangleq xFormCopCopsShift(m.cop, cbuf[c], m.ack)$ IN  $c2ss' = [c2ss \text{ EXCEPT } ![c] = @ \oplus xform.xg]$ *SRevImpl*(*m*)  $\triangleq$   $\wedge$  *SRev*(*m*) $\wedge$  on history variables for operation contexts $\wedge \text{LET } c \triangleq \textit{ClientOf}(m.cop)$  $xform \triangleq xFormCopCopsShift(m.cop, sbuf[c], m.ack)$ IN  $s2ss' = [cl \in \textit{Client} \mapsto \text{IF } cl = c \text{ THEN } s2ss[cl] \oplus xform.xg$   
ELSE  $s2ss[cl] \oplus xform.lg]$ *XJ*  $\triangleq$  INSTANCE *XJupiter* WITH  $c2ss \leftarrow c2ss, s2ss \leftarrow s2ss$