

```

1  |----- MODULE XJupiterImplCJupiter -----|
2  EXTENDS XJupiterExtended
3  |-----|
4  VARIABLES
5      op2ss,    a function from an operation (identifier)
6                  to the part of 2D state space produced while the operation is transformed
7      c2ssX    c2ssX[c]: redundant (eXtra) 2D state space maintained for client c ∈ Client

9  varsImpl ≜ ⟨varsEx, op2ss, c2ssX⟩
10 |-----|
11 TypeOKImpl ≜
12   ∧ TypeOKEx
13   ∧ ∀ oid ∈ DOMAIN op2ss : oid ∈ Oid ∧ IsSS(op2ss[oid])
14   ∧ ∀ c ∈ Client : IsSS(c2ssX[c])

16 InitImpl ≜
17   ∧ InitEx
18   ∧ op2ss = ⟨⟩
19   ∧ c2ssX = [c ∈ Client ↦ EmptySS]

21 DoImpl(c) ≜
22   ∧ DoEx(c)
23   ∧ UNCHANGED ⟨op2ss, c2ssX⟩

25 RevImpl(c) ≜
26   ∧ RevEx(c)
27   ∧ LET cop ≜ Head(cincoming[c])
28     IN c2ssX' = [c2ssX EXCEPT ![c] = @ ⊕ op2ss[cop.oid]]
29   ∧ UNCHANGED op2ss

31 SRevImpl ≜
32   ∧ SRevEx
33   ∧ LET cop ≜ Head(sincoming)
34     c ≜ ClientOf(cop)
35     xform ≜ xForm(NextEdge, Server, cop, s2ss[c])  TODO: performance!!!
36     ss ≜ xform.xss
37     IN op2ss' = op2ss @@ (cop.oid :> [node ↦ ss.node, edge ↦ ss.edge])
38   ∧ UNCHANGED c2ssX
39 |-----|
40 NextImpl ≜
41   ∨ ∃ c ∈ Client : DoImpl(c) ∨ RevImpl(c)
42   ∨ SRevImpl

44 FairnessImpl ≜
45   WFvarsImpl(SRevImpl ∨ ∃ c ∈ Client : RevImpl(c))

47 SpecImpl ≜ InitImpl ∧ □[NextImpl]varsImpl ∧ FairnessImpl

```

```

48 |-----|
49  $CJ \triangleq$  INSTANCE  $CJupiter$ 
50     WITH  $cincoming \leftarrow cincomingCJ$ ,  $sincoming$  needs no substitution
51      $css \leftarrow [r \in Replica \mapsto \text{IF } r = Server$ 
52                                     THEN  $SetReduce(\oplus, Range(s2ss), EmptySS)$ 
53                                     ELSE  $c2ss[r] \oplus c2ssX[r]]$ 
55 THEOREM  $SpecImpl \Rightarrow CJ!Spec$ 
56 |-----|
    \ * Modification History
    \ * Last modified Thu Jan 17 20:20:52 CST 2019 by hengxin
    \ * Created Fri Oct 26 15:00:19 CST 2018 by hengxin

```