EXTENDS *Integers*

$a \oplus b \;\triangleq\; (a + b)\%2$

```
*************************************************************************

--algorithm Handshake{

    variables p = 0, c = 0;
    process ( Producer = 0 )
      { pe: while ( TRUE )
              {        await p = c;
                put: skip;
                px:  p := p ⊕ 1    }
        }

    process ( Consumer = 1 )
      { ce: while ( TRUE )
              {        await p ≠ c;
                get: skip;
                cx:  c := c ⊕ 1  }
        }
 }
*************************************************************************
```

BEGIN TRANSLATION

VARIABLES p, c, pc

$vars \;\triangleq\; \langle p,\, c,\, pc \rangle$

$ProcSet \;\triangleq\; \{0\} \cup \{1\}$

$Init \;\triangleq\;$ Global variables
$\qquad\;\; \land\; p = 0$
$\qquad\;\; \land\; c = 0$
$\qquad\;\; \land\; pc = [self \in ProcSet \mapsto \text{CASE } self = 0 \rightarrow \text{"pe"}$
$\qquad\qquad\qquad\qquad\qquad\qquad\quad \square \quad self = 1 \rightarrow \text{"ce"}]$

$pe \;\triangleq\; \land\; pc[0] = \text{"pe"}$
$\qquad\; \land\; p = c$
$\qquad\; \land\; pc' = [pc \text{ EXCEPT } ![0] = \text{"put"}]$
$\qquad\; \land\; \text{UNCHANGED } \langle p,\, c \rangle$

$put \;\triangleq\; \land\; pc[0] = \text{"put"}$
$\qquad\quad \land\; \text{TRUE}$
$\qquad\quad \land\; pc' = [pc \text{ EXCEPT } ![0] = \text{"px"}]$
$\qquad\quad \land\; \text{UNCHANGED } \langle p,\, c \rangle$

$px \;\triangleq\; \land\; pc[0] = \text{"px"}$

$$\land\ p' = p \oplus 1$$
$$\land\ pc' = [pc \text{ EXCEPT } ![0] = \text{``pe''}]$$
$$\land\ c' = c$$

$Producer \triangleq pe \lor put \lor px$

$ce \triangleq\ \land\ pc[1] = \text{``ce''}$
$\qquad\ \land\ p \neq c$
$\qquad\ \land\ pc' = [pc \text{ EXCEPT } ![1] = \text{``get''}]$
$\qquad\ \land\ \text{UNCHANGED } \langle p,\ c \rangle$

$get \triangleq\ \land\ pc[1] = \text{``get''}$
$\qquad\ \land\ \text{TRUE}$
$\qquad\ \land\ pc' = [pc \text{ EXCEPT } ![1] = \text{``cx''}]$
$\qquad\ \land\ \text{UNCHANGED } \langle p,\ c \rangle$

$cx \triangleq\ \land\ pc[1] = \text{``cx''}$
$\qquad\ \land\ c' = c \oplus 1$
$\qquad\ \land\ pc' = [pc \text{ EXCEPT } ![1] = \text{``ce''}]$
$\qquad\ \land\ p' = p$

$Consumer \triangleq ce \lor get \lor cx$

$Next \triangleq Producer \lor Consumer$

$Spec \triangleq Init \land \Box[Next]_{vars}$

END TRANSLATION

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