MODULE *Channel*

EXTENDS *Naturals*

CONSTANT *Data*

VARIABLE *channel*

$TypeInvariant \triangleq channel \in [val : Data,\ rdy : \{0, 1\},\ ack : \{0, 1\}]$

$$
\begin{aligned}
Init &\triangleq \land\ TypeInvariant \\
&\quad\ \land\ channel.ack = channel.rdy \\
Send(d) &\triangleq \land\ channel.rdy = channel.ack \\
&\quad\ \land\ channel' = [channel \text{ EXCEPT } !.val = d,\ !.rdy = 1 - @] \\
Rcv &\triangleq \land\ channel.rdy \neq channel.ack \\
&\quad\ \land\ channel' = [channel \text{ EXCEPT } !.ack = 1 - @] \\
Next &\triangleq (\exists\, d \in Data : Send(d)) \lor Rcv \\
Spec &\triangleq Init \land \Box[Next]_{channel}
\end{aligned}
$$

THEOREM $Spec \Rightarrow \Box\, TypeInvariant$