$\overline{\qquad\qquad \text{MODULE } vchan \qquad\qquad}$

EXTENDS $Naturals,\ Sequences$
CONSTANT $BufferSize$
$Byte \triangleq 0\ .\ .\ 255$
$MSG \triangleq Seq(Byte)$

$Take(m,\ i) \triangleq SubSeq(m,\ 1,\ i)$
$Drop(m,\ i) \triangleq SubSeq(m,\ i+1,\ Len(m))$

VARIABLES $Got,\ Buffer,\ Sent$
$vars \triangleq \langle Got,\ Buffer,\ Sent \rangle$

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$Integrity \qquad\quad \triangleq Take(Sent,\ Len(Got)) = Got$

$AvailabilityNat \triangleq Nat$
$Availability \qquad \triangleq \forall\, x \in AvailabilityNat :$
$\qquad\qquad\qquad\quad Len(Sent) = x \rightsquigarrow Len(Got) \geq x$

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$Read \triangleq \exists\, n \in 1\ .\ .\ Len(Buffer) :$
$\qquad\quad \land\ Got' = Got \circ Take(Buffer,\ n)$
$\qquad\quad \land\ Buffer' = Drop(Buffer,\ n)$
$\qquad\quad \land\ \text{UNCHANGED } Sent$

$Write \triangleq \exists\, m \in MSG :$
$\qquad\quad \land\ Buffer' = Buffer \circ m$
$\qquad\quad \land\ Len(Buffer') \leq BufferSize$
$\qquad\quad \land\ Sent' = Sent \circ m$
$\qquad\quad \land\ \text{UNCHANGED } Got$

$Next \triangleq Read \lor Write$

$Init \triangleq\ \land\ Sent \quad = \langle\rangle$
$\qquad\quad\ \land\ Buffer = \langle\rangle$
$\qquad\quad\ \land\ Got \quad\ = \langle\rangle$

$Spec \triangleq Init \land \Box[Next]_{vars} \land \text{WF}_{vars}(Read)$

$BufferOK \triangleq Len(Buffer) \leq BufferSize$

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$MSG\_SEQ(max) \triangleq \{[x \in 1\ .\ .\ N \mapsto Len(Sent) + x] : N \in 1\ .\ .\ max\}$

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