MODULE *Southbound*

EXTENDS *Target*

INSTANCE *Naturals*

INSTANCE *FiniteSets*

LOCAL INSTANCE *TLC*

The set of all nodes
CONSTANT *Node*

A connected state
CONSTANT *Connected*

A disconnected state
CONSTANT *Disconnected*

The state of the connection to the target
VARIABLE *conn*

This section models target states.

$$
\begin{aligned}
&Connect(n) \triangleq \\
&\quad \land\ conn[n].state \neq Connected \\
&\quad \land\ target.state = Alive \\
&\quad \land\ conn' = [conn \text{ EXCEPT } ![n].id \quad = conn[n].id + 1, \\
&\qquad\qquad\qquad\qquad\quad ![n].state = Connected] \\
&\quad \land \text{ UNCHANGED } \langle target \rangle
\end{aligned}
$$

$$
\begin{aligned}
&Disconnect(n) \triangleq \\
&\quad \land\ conn[n].state = Connected \\
&\quad \land\ conn' = [conn \text{ EXCEPT } ![n].state = Disconnected] \\
&\quad \land \text{ UNCHANGED } \langle target \rangle
\end{aligned}
$$

$$
\begin{aligned}
&InitSouthbound \triangleq \\
&\quad \land\ conn = [n \in Node \mapsto [id \mapsto 0,\ state \mapsto Disconnected]]
\end{aligned}
$$

$$
\begin{aligned}
&NextSouthbound \triangleq \\
&\quad \lor \exists\, n \in Node : Connect(n) \\
&\quad \lor \exists\, n \in Node : Disconnect(n)
\end{aligned}
$$

ASSUME $\land IsFiniteSet(Node)$
$\land \forall\, n \in Node :$
$\land\, n \in$ STRING

* Modification History
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