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- MODULE Southbound -
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Instance Naturals
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INSTANCE FiniteSets

LOCAL INSTANCE TLC

```
An empty constant Constant Nil The set of all nodes Constant Node
```

Target is the set of all targets and their possible paths and values.

```
Example: Target \triangleq \\ [target1 \mapsto \\ [persistent \mapsto \text{FALSE}, values \mapsto [\\ path1 \mapsto \{\text{``value1''}, \text{``value2''}\},\\ path2 \mapsto \{\text{``value2''}, \text{``value3''}\}]],\\ target2 \mapsto \\ [persistent \mapsto \text{TRUE}, values \mapsto [\\ path2 \mapsto \{\text{``value3''}, \text{``value4''}\},\\ path3 \mapsto \{\text{``value4''}, \text{``value5''}\}]]]]\\ \text{CONSTANT } Target\\ \text{A record of target states}\\ \text{VARIABLE } target\\ \text{A record of target masterships}
```

VARIABLE mastership

This section models *mastership* for the configuration service.

Mastership is used primarily to track the lifecycle of individual configuration targets and react to state changes on the southbound. Each target is assigned a master from the Node set, and masters can be unset when the target disconnects.

```
\land mastership' = [mastership \ Except \ ![t].master = Nil]
    \land UNCHANGED \langle target \rangle
Formal specification, constraints, and theorems.
InitSouthbound \triangleq
    \land target = [t \in DOMAIN \ Target \mapsto
                      [path \in \{\} \mapsto
                         [value \mapsto Nil]]
    \land mastership = [t \in DOMAIN \ Target \mapsto [master \mapsto Nil, \ term \mapsto 0]]
NextSouthbound \triangleq
    \vee \exists n \in Node:
         \exists t \in \text{DOMAIN } Target :
            SetMaster(n, t)
      \lor \exists t \in \text{DOMAIN } Target :
          UnsetMaster(t)
ASSUME \land IsFiniteSet(Node)
             \land \forall n \in Node:
                   \land n \notin \text{DOMAIN } Target
                   \land n \in \text{STRING}
Assume \land \forall t \in \text{domain } Target :
                   \land \ t \not\in \mathit{Node}
                   \land\ t\in\operatorname{string}
                   \land \ Target[t].persistent \in {\tt BOOLEAN}
                   \land \forall p \in \text{DOMAIN } Target[t].values :
                        IsFiniteSet(Target[t].values[p])
```

 $\land mastership[t].master \neq Nil$

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