A key insight of our approach is how the invariants that the MS-queue maintains can be expressed in terms of which nodes are *reachable* from other nodes. Reachability is expressed with an inductive predicate:

$$\ell_n \rightsquigarrow \ell_m \triangleq \exists \ell_{n\rightarrow}, v. \, \ell_n \hookrightarrow_i^\square \text{some}(v, \ell_{n\rightarrow}) *$$
$$(\ell_n = \ell_m \vee \exists \ell_p. \, \ell_{n\rightarrow} \hookrightarrow_i^\square \ell_p * \ell_p \rightsquigarrow \ell_m)$$