$\mathtt{AVR} = AV$ request has arrived at HN
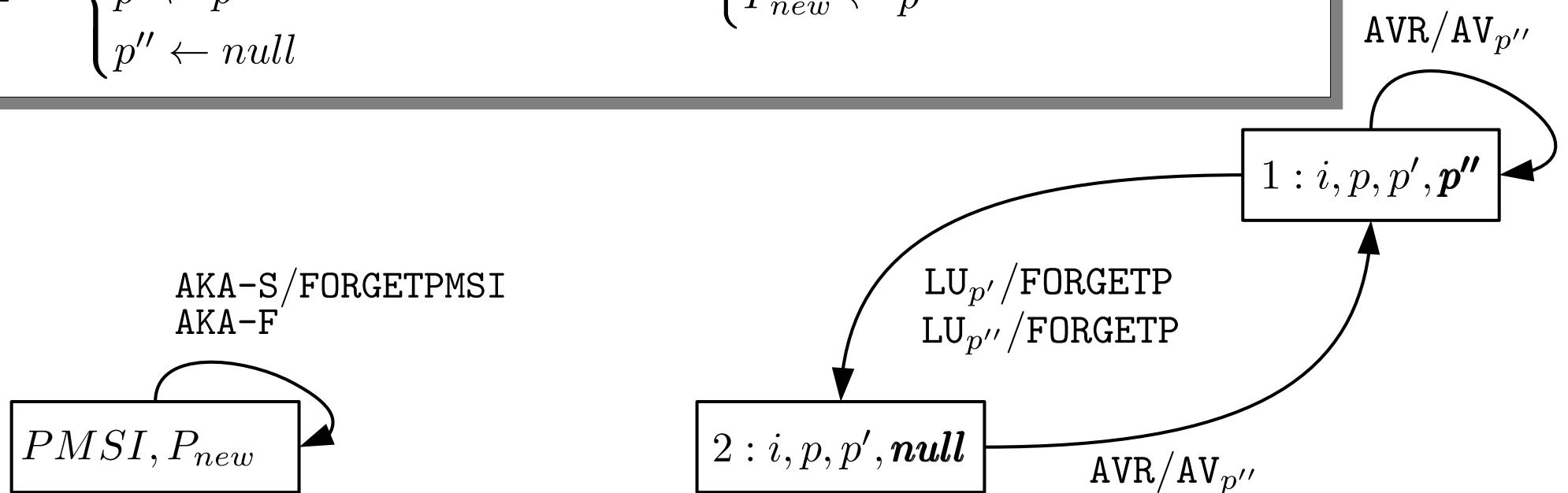
$\mathtt{AV}_x = $ HN has sent an AV to the SN with x in $RAND$

$\mathtt{LU}_x = $ Location update for x has arrived at HN

$\mathtt{AKA\text{-}S}, \mathtt{AKA\text{-}F} = $ AKA has been successful or failed respectively at UE
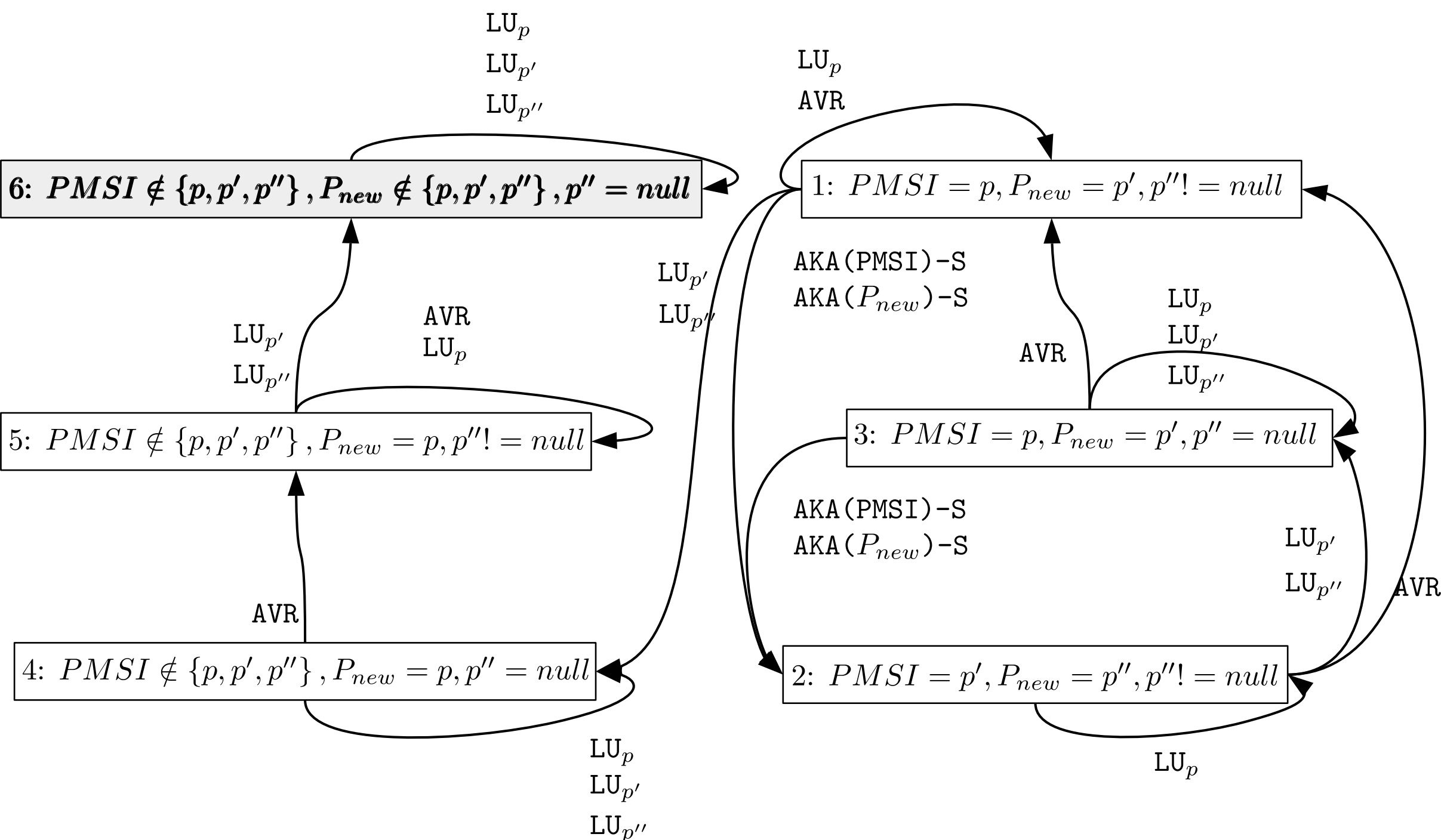
$\mathtt{AKA}(x)\mathtt{\text{-}S} = $ UE was identified with x and the AKA was successful

$$\mathtt{FORGETP} = \begin{cases} p \leftarrow p' \\ p' \leftarrow p'' \\ p'' \leftarrow null \end{cases} \qquad \mathtt{FORGETPMSI} = \begin{cases} PMSI \leftarrow P_{new} \\ P_{new} \leftarrow p'' \end{cases}$$

$\mathtt{AVR}/\mathtt{AV}_{p''}$

$1 : i, p, p', \boldsymbol{p''}$

$\mathtt{AKA\text{-}S}/\mathtt{FORGETPMSI}$
$\mathtt{AKA\text{-}F}$

$\mathtt{LU}_{p'}/\mathtt{FORGETP}$
$\mathtt{LU}_{p''}/\mathtt{FORGETP}$

$PMSI, P_{new}$

$2 : i, p, p', \boldsymbol{null}$

$\mathtt{AVR}/\mathtt{AV}_{p''}$

The single state in a UE

States in the HN

$\mathtt{LU}_p$
$\mathtt{LU}_{p'}$
$\mathtt{LU}_{p''}$

$\mathtt{LU}_p$
$\mathtt{AVR}$

$6: \boldsymbol{PMSI \notin \{p, p', p''\}, P_{new} \notin \{p, p', p''\}, p'' = null}$

$1: PMSI = p, P_{new} = p', p''! = null$

$\mathtt{LU}_{p'}$
$\mathtt{LU}_{p''}$

$\mathtt{AKA}(PMSI)\mathtt{\text{-}S}$
$\mathtt{AKA}(P_{new})\mathtt{\text{-}S}$

$\mathtt{AVR}$
$\mathtt{LU}_p$

$\mathtt{AVR}$

$\mathtt{LU}_p$
$\mathtt{LU}_{p'}$
$\mathtt{LU}_{p''}$

$\mathtt{LU}_{p'}$
$\mathtt{LU}_{p''}$

$5: PMSI \notin \{p, p', p''\}, P_{new} = p, p''! = null$

$3: PMSI = p, P_{new} = p', p'' = null$

$\mathtt{AKA}(PMSI)\mathtt{\text{-}S}$
$\mathtt{AKA}(P_{new})\mathtt{\text{-}S}$

$\mathtt{LU}_{p'}$
$\mathtt{LU}_{p''}$

$\mathtt{AVR}$

$\mathtt{AVR}$

$4: PMSI \notin \{p, p', p''\}, P_{new} = p, p'' = null$

$2: PMSI = p', P_{new} = p'', p''! = null$

$\mathtt{LU}_p$

$\mathtt{LU}_p$
$\mathtt{LU}_{p'}$
$\mathtt{LU}_{p''}$

States of the solution. Only a partial representation