

[*NAME*]

[*SURNAME*]

[*TELEPHONE*]

<i>TelephoneDirectory</i>
$persons : NAME \rightarrow SURNAME$
$phoneNumbers : NAME \rightarrow TELEPHONE$
$\text{dom } phoneNumbers = \text{dom } persons$

<i>InitTelephoneDirectory</i>
<i>TelephoneDirectory'</i>
$phoneNumbers' = \{\} \text{ persons}' = \{\}$

<i>AddPerson</i>
<i>TheTelephoneDirectory</i>
$name? : NAME$
$surname? : SURNAME \text{ phone?} : TELEPHONE$
$name? \mapsto surname? \notin persons$
$phoneNumbers' = phoneNumbers \cup \{name? \mapsto phone?\}$

<i>AddNumber</i>
$\Delta TelephoneDirectory$
$n? : NAME$
$s? : SURNAME \text{ p?} : TELEPHONE$
$n \mapsto s \in persons$
$p? \notin \text{ran } phoneNumbers$
$phoneNumbers' = phoneNumbers \cup \{n \mapsto phone?\}$

<i>RemovePerson</i>
$\Delta TelephoneDirectory$
$n? : NAME$
$s? : SURNAME \text{ p?} : TELEPHONE$
$n? \mapsto s? \in persons$
$n? \mapsto p? \notin phoneNumbers$
$persons' = persons \setminus \{n? \mapsto s?\}$

$OUTPUT ::= success \mid alreadyInDirectory \mid notInDirectory \mid numberInUse$

$Success$	
$message! : OUTPUT$	
$message! = success$	

$AlreadyInDirectory$	
$message! : OUTPUT$	
$n? : NAME$	
$s? : SURNAME$	
$n? \mapsto s \in persons$	
$message! = alreadyInDirectory$	

$NameNotInDirectory$	
$message! : OUTPUT$	
$n? : NAME$	
$s? : SURNAME$	
$n? \mapsto s? \notin persons$	
$message! = NamenotInDirectory$	

$NumberInUse$	
$message! : OUTPUT$	
$p? : TELEPHONE$	
$p? \in \text{ran } phoneNumbers$	
$message! = numberInUse$	

$TotalAddPerson \hat{=} (AddPerson \wedge Success) \vee AlreadyInDirectory$

$TotalRemovePerson \hat{=} (RemovePerson \wedge Success) \vee NameNotInDirectory$

$TotalAddNumber \hat{=} (AddNumber \wedge Success) \vee NameNotInDirectory \vee NumberInUse$