

## es-sends-iff<sup>11,40</sup>

with decls  $ds$   $dasends$  on  $l$  from  $e$  include  $f(e)$  and only these for tags in  $tgs$

$$\begin{aligned}
&\equiv_{\text{def}} (\forall e:\text{es-E}(es). \\
&\quad (\uparrow\text{es-isrcv}(es; e)) \\
&\quad \Rightarrow (\text{es-lnk}(es; e) = l) \\
&\quad \Rightarrow (\exists e':\text{es-E}(es) \\
&\quad\quad ((\uparrow\text{es-isrcv}(es; e')) \\
&\quad\quad \text{c} \wedge ((\text{es-lnk}(es; e') = l) \\
&\quad\quad \quad \wedge (\text{es-tag}(es; e') \in tgs) \\
&\quad\quad \quad \wedge (\text{es-sender}(es; e') = \text{es-sender}(es; e)))))) \\
&\quad \Rightarrow (\text{es-tag}(es; e) \in tgs)) \\
&\text{c} \wedge ((\forall e':\text{es-E}(es). \\
&\quad (\uparrow\text{es-isrcv}(es; e')) \\
&\quad \Rightarrow (\text{es-lnk}(es; e') = l) \\
&\quad \Rightarrow (\text{es-tag}(es; e') \in tgs) \\
&\quad \Rightarrow \text{subtype\_rel}(\text{es-valtype}(es; e'); \text{fpf-cap}(da; \text{Kind-deq}; \text{es-kind}(es; e'); \text{void}))) \\
&\quad \wedge (\forall x:\text{Id}. \text{subtype\_rel}(\text{es-vartype}(es; \text{source}(l); x); \text{fpf-cap}(ds; \text{id-deq}; x; \text{top})))) \\
&\text{c} \wedge (\text{alle-at}(es; \\
&\quad \text{source}(l); \\
&\quad e. (\forall i:\text{int\_seg}(0; \|f(e)\|). \\
&\quad \exists e':\text{es-E}(es) \\
&\quad\quad ((\uparrow\text{es-isrcv}(es; e')) \\
&\quad\quad \wedge (\text{es-lnk}(es; e') = l) \\
&\quad\quad \wedge (\text{es-tag}(es; e') \in tgs) \\
&\quad\quad \wedge (\text{es-sender}(es; e') = e) \\
&\quad\quad \wedge (\text{es-index}(es; e') = i)))))) \\
&\quad \wedge (\forall e':\text{es-E}(es). \\
&\quad (\uparrow\text{es-isrcv}(es; e')) \\
&\quad \Rightarrow (\text{es-lnk}(es; e') = l) \\
&\quad \Rightarrow (\text{es-tag}(es; e') \in tgs) \\
&\quad \Rightarrow ((\text{es-index}(es; e') < \|f(\text{es-sender}(es; e'))\|) \\
&\quad\quad \text{c} \wedge (\langle \text{es-tag}(es; e'), \text{es-val}(es; e') \rangle \\
&\quad\quad = \\
&\quad\quad f(\text{es-sender}(es; e'))[\text{es-index}(es; e')]))))
\end{aligned}$$

*clarification:*

$$\begin{aligned}
&\text{es-sends-iff}(es; l; tgs; da; ds; e. f(e)) \\
&\equiv_{\text{def}} (\forall e:\text{es-E}(es). \\
&\quad (\uparrow\text{es-isrcv}(es; e)) \\
&\quad \Rightarrow (\text{es-lnk}(es; e) = l \in \text{IdLnk}) \\
&\quad \Rightarrow (\exists e':\text{es-E}(es) \\
&\quad\quad ((\uparrow\text{es-isrcv}(es; e'))
\end{aligned}$$

$$\begin{aligned}
& c \wedge ((\text{es-lnk}(es; e') = l \in \text{IdLnk}) \\
& \quad \wedge (\text{es-tag}(es; e') \in \text{tgs} \in \text{Id}) \\
& \quad \wedge (\text{es-sender}(es; e') = \text{es-sender}(es; e) \in \text{es-E}(es)))) \\
\Rightarrow & (\text{es-tag}(es; e) \in \text{tgs} \in \text{Id}) \\
c \wedge & ((\forall e': \text{es-E}(es). \\
& (\uparrow \text{es-isrcv}(es; e')) \\
\Rightarrow & (\text{es-lnk}(es; e') = l \in \text{IdLnk}) \\
\Rightarrow & (\text{es-tag}(es; e') \in \text{tgs} \in \text{Id}) \\
\Rightarrow & \text{subtype\_rel}(\text{es-valtype}(es; e'); \text{fpf-cap}(da; \text{Kind-deq}; \text{es-kind}(es; e'); \text{void})) \\
& \wedge (\forall x: \text{Id}. \text{subtype\_rel}(\text{es-vartype}(es; \text{source}(l); x); \text{fpf-cap}(ds; \text{id-deq}; x; \text{top})))) \\
c \wedge & (\text{alle-at}(es; \\
& \quad \text{source}(l); \\
& \quad e. (\forall i: \text{int\_seg}(0; \|f(e)\|). \\
& \quad \exists e': \text{es-E}(es) \\
& \quad \quad ((\uparrow \text{es-isrcv}(es; e')) \\
& \quad \quad \wedge (\text{es-lnk}(es; e') = l \in \text{IdLnk}) \\
& \quad \quad \wedge (\text{es-tag}(es; e') \in \text{tgs} \in \text{Id}) \\
& \quad \quad \wedge (\text{es-sender}(es; e') = e \in \text{es-E}(es)) \\
& \quad \quad \wedge (\text{es-index}(es; e') = i \in \mathbb{Z})))) \\
\wedge & (\forall e': \text{es-E}(es). \\
& (\uparrow \text{es-isrcv}(es; e')) \\
\Rightarrow & (\text{es-lnk}(es; e') = l \in \text{IdLnk}) \\
\Rightarrow & (\text{es-tag}(es; e') \in \text{tgs} \in \text{Id}) \\
\Rightarrow & ((\text{es-index}(es; e') < \|f(\text{es-sender}(es; e'))\|) \\
& \quad c \wedge \langle \text{es-tag}(es; e'), \text{es-val}(es; e') \rangle \\
& \quad = \\
& \quad \quad f(\text{es-sender}(es; e'))[\text{es-index}(es; e')] \\
& \quad \quad \in (\text{tg}: \text{Id} \times \text{fpf-cap}(da; \text{Kind-deq}; \text{rcv}(l, \text{tg}); \text{void}))))))
\end{aligned}$$