

message-automata^{11,40}

ABS: $\text{Msg}(da)$ **ma-Msg**

STM: ma-Msg_wf

ABS: MsgA **msga**

STM: msga_wf

ABS: $\text{ds}(M)$ **ma_ds**

STM: ma_ds_wf

ABS: $\text{da}(M)$ **ma_da**

STM: ma_da_wf

ABS: $M.\text{ds}(x)$ **ma-ds**

STM: ma-ds_wf

ABS: $M.\text{da}(a)$ **ma-da**

ABS: a declared in M **ma-decla**

STM: ma-decla_wf

ABS: $\text{rcv}(l, tg)$ declared in M **ma-declm**

STM: ma-declm_wf

STM: ma-da_wf

ABS: $M.\text{din}(l, tg)$ **ma-din**

STM: ma-din_wf

ABS: $M.\text{dout}(l, tg)$ **ma-dout**

STM: ma-dout_wf

ABS: $M.\text{init}(x, v)$ **ma-init**

STM: ma-init_wf

ABS: $\text{ma-init-const}(M; x)$ **ma-init-const**

STM: ma-init-const_wf

ABS: $M.\text{init}(x)?v$ **ma-init-val**

STM: ma-init-val_wf
 ABS: $M.state$ **ma-st**
 STM: ma-st_wf
 ABS: $M.(timed)state$ **ma-tst**
 STM: ma-tst_wf
 ABS: read-state(s) **read-state**
 STM: read-state_wf
 STM: read-state_wf2
 ABS: shift-state(s) **shift-state**
 STM: shift-state_wf
 STM: shift-state_wf2
 ABS: $M.Msg$ **ma-msg**
 STM: ma-msg_wf
 ABS: $M.V(k)$ **ma-v**
 STM: ma-v_wf
 ABS: unsolvable $M.pre(a,s)$ **ma-npre**
 STM: ma-npre_wf
 ABS: $M.pre(a,s)$ **ma-pre**
 STM: ma-pre_wf
 ABS: a in $\text{dom}(M.pre)$ **ma-has-pre**
 STM: ma-has-pre_wf
 STM: decidable_ma-has-pre
 ABS: $M.ef(k,x,s,v,w)$ **ma-ef**
 STM: ma-ef_wf
 ABS: ma-ef-const($M;k;x;s;v$) **ma-ef-const**
 STM: ma-ef-const_wf
 ABS: $M.ef(k,x,s,v)?w$ **ma-ef-val**

STM: `ma-ef-val_wf`
 ABS: $M.\text{send}(k;l;s;v;ms;i)$ **ma-send**
 STM: `ma-send_wf`
 ABS: $M.\text{sends}(k,s,v)$ **ma-send-val**
 STM: `ma-send-val_wf`
 ABS: M sends on link l **ma-sends-on**
 STM: `ma-sends-on_wf`
 ABS: $M.\text{dout2}(l;tg)$ **ma-dout2**
 STM: `ma-dout2_wf`
 ABS: $M.\text{frame}(k \text{ affects } x)$ **ma-frame**
 STM: `ma-frame_wf`
 ABS: $M.\text{sframe}(k \text{ sends } \langle l,tg \rangle)$ **ma-sframe**
 STM: `ma-sframe_wf`
 ABS: $M.\text{aframe}(k \text{ affects } x)$ **ma-aframe**
 STM: `ma-aframe_wf`
 ABS: $M.\text{bframe}(k \text{ sends on } l)$ **ma-bframe**
 STM: `ma-bframe_wf`
 ABS: $M.\text{rframe}(k \text{ reads } x)$ **ma-rframe**
 STM: `ma-rframe_wf`
 ABS: $M:k$ may not read x **ma-no-read**
 STM: `ma-no-read_wf`
 STM: `assert-ma-no-read`
 ABS: $(s_1 \equiv s_2 \text{ mod } x)$ **ma-x-equiv**
 STM: `ma-x-equiv_wf`
 ABS: $\text{ma-x-tequiv}(M;x;s_1;s_2)$ **ma-x-tequiv**
 STM: `ma-x-tequiv_wf`
 STM: `ma-x-tequiv-shift-state`

STM: $\text{ma-x-equiv-read-state}$

ABS: $M.\text{rframe}(A.\text{pre } p \text{ for } a)$ **ma-rframe-pre**

ABS: $M.\text{rframe}(A.\text{effect } f \text{ of } k \text{ on } y)$ **ma-rframe-ef**

ABS: $M.\text{rframe}(A.\text{sends } tfL \text{ of } k \text{ on } l)$ **ma-rframe-send**

ABS: $\text{ma-prob}(M;b)$ **ma-prob**

STM: ma-prob_wf

ABS: $b \in \text{dom}(M.\text{prob})$ **ma-prob-dom**

STM: ma-prob-dom_wf

ABS: $\text{ma-prob-da-dom}(M;b)$ **ma-prob-da-dom**

STM: ma-prob-da-dom_wf

ABS: $\text{ma-random}(M;T;v;i;a;n)$ **ma-random**

STM: ma-random_wf

ABS: $M_1 \subseteq M_2$ **ma-sub**

STM: ma-sub_wf

STM: ma-sub_weakening

ABS: $\text{ma}\{$
 $ds;$
 $da;$
 $init;$
 $pre;$
 $ef;$
 $send;$
 $frame;$
 $sframe;$
 $aframe;$
 $bframe;$
 $rframe;$
 $prob\}$

mk-ma

STM: mk-ma_wf

ABS: **ma-empty**

STM: ma-empty_wf

ABS: $M_1 \parallel \text{decl } M_2$ **ma-compatible-decls**
 ABS: $M_1 \oplus M_2$ **ma-join**
 STM: ma-join_wf
 STM: ma-join-sends-on
 STM: ma-sub-join-left
 ABS: $M_1 \parallel M_2$ **ma-compatible**
 STM: ma-compatible_wf
 STM: ma-compatible-symmetry
 STM: ma-compatible-self
 STM: ma-sub-join-right
 STM: ma-empty-compatible-left
 STM: ma-empty-compatible-right
 ABS: $x : t$ initially $x = v$ **ma-single-init**
 STM: ma-single-init_wf
 ABS: only members of L affect $x : t$ **ma-single-frame**
 STM: ma-single-frame_wf
 ABS: only L sends on $(l \text{ with } tg)$ **ma-single-sframe**
 STM: ma-single-sframe_wf
 ABS: k affects only members of L **ma-single-afame**
 STM: ma-single-afame_wf
 ABS: k sends only on links in L **ma-single-bframe**
 STM: ma-single-bframe_wf
 ABS: only members of L read x **ma-single-rframe**
 STM: ma-single-rframe_wf
 ABS: with declarations $ds:dsda:dae$ effect of $k(v)$ is $x := f \text{ s } v$ **ma-single-effect**
 STM: ma-single-effect_wf
 ABS: with declarations $ds:dsda:da$ $k(v)$ sends $f \text{ s } v$ on link l **ma-single-sends**

STM: ma-single-sends_wf

ABS: (precondition $a:\text{Outcome}(p)$ is $P:\text{State}(ds) \rightarrow \text{Bool}$) **ma-single-pre**

STM: ma-single-pre_wf

ABS: ma-frame-compat($A;B$) **ma-frame-compat**

STM: ma-frame-compat_wf

STM: ma-join-frame-compat

STM: ma-join-frame-compat2

ABS: ma-frame-compatible($A;B$) **ma-frame-compatible**

STM: ma-frame-compatible_wf

ABS: ma-prob-da(M) **ma-prob-da**

STM: ma-prob-da_wf

ABS: Feasible(M) **ma-feasible**

STM: ma-feasible_wf

STM: ma-feasible-ma-no-read

STM: ma-feasible-rframe-ef

STM: ma-feasible-rframe-send

STM: ma-empty-feasible

STM: ma-frame-compatible_symmetry

STM: ma-empty-frame-compatible-left

STM: ma-empty-frame-compatible-right

STM: ma-join-compatible

ABS: $A \parallel B$ **ma-compat**

STM: ma-compat_wf

STM: ma-compat-symmetry

STM: ma-compat_weakening

STM: ma-empty-compat-left

STM: ma-empty-compat-right

STM: ma-join-feasible
STM: ma-compatible-join
STM: ma-compatible-join2
STM: ma-send-send-val
STM: ma-send-val-nil
STM: ma-send-val-nil2
STM: ma-feasible-bframe
STM: w-withlnk_wf_ma
STM: ma-init-const-join
STM: ma-ef-const-join