

## Resets (Based on P1800-2008-draft3a)

Two new property operators `accept_on` and `reject_on` are introduced.

### Modify Syntax 16-14

```

...
property_expr ::=
    sequence_expr
    | ( property_expr )
    | not property_expr
    | property_expr or property_expr
    | property_expr and property_expr
    | sequence_expr l-> property_expr
    | sequence_expr l=> property_expr
    | if ( expression_or_dist ) property_expr [ else property_expr ]
    | property_instance
    | clocking_event property_expr
    | accept_on (expression_or_dist ) property_expr
    | reject_on (expression_or_dist ) property_expr
...

```

### 16.11, Table 16-25

#### Replace

Sequence operators	Property operators	Associativity
[*], [=], [->]		—
##		Left
<b>throughout</b>		Right
<b>within</b>		Left
<b>intersect</b>		Left
	<b>not</b>	—
<b>and</b>	<b>and</b>	Left
<b>or</b>	<b>or</b>	Left
	->, <->	Right
	<b>if...else</b>	Right
	l->, l=>	Right

#### With

Sequence operators	Property operators	Associativity
[*], [=], [->]		—
##		Left
<b>throughout</b>		Right
<b>within</b>		Left
<b>intersect</b>		Left
	<b>not</b>	—
<b>and</b>	<b>and</b>	Left

<b>or</b>	<b>or</b>	Left
	->, <->	Right
	<b>if...else</b>	Right
	->,  =>	Right
	<b>reject_on, accept_on</b>	—

## At 16.12 just before the itemized list.

### Replace

The result of property evaluation is either true or false. There are seven kinds of property: sequence, negation, disjunction, conjunction, if-else, implication, and instantiation.

### with

The result of property evaluation is either true or false. There are several kinds of property: sequence, negation, disjunction, conjunction, if-else, implication, reset, and instantiation.

### pp 340, add after g)

h) Property resets are

```

accept_on(expression_or_dist) property_expr
and
reject_on(expression_or_dist) property_expr
where the expression_or_dist is called the reset expression.

```

For an evaluation of **accept\_on**(*expression\_or\_dist*) *property\_expr*, there is an evaluation of the underlying *property\_expr*. If prior to the completion of that evaluation the reset expression becomes true, then the overall evaluation of the property results in *true*. Otherwise, the overall evaluation of the property is equal to the evaluation of the *property\_expr*.

For an evaluation of **reject\_on**(*expression\_or\_dist*) *property\_expr*, there is an evaluation of the underlying *property\_expr*. If prior to the completion of that evaluation the reset expression becomes true, then the overall evaluation of the property results in *false*. Otherwise, the overall evaluation of the property is equal to the evaluation of the *property\_expr*.

The meaning of **accept\_on** and **reject\_on** is further discussed in 16.12.3.

### Insert 16.12.3

(Note to the editor: shift clause numbering)

The operators **accept\_on** and **reject\_on** are evaluated at the granularity of the simulation time step like **disable iff** but they use the sampled value of their argument (i.e., **accept\_on**(*b*) and **reject\_on**(*b*) use the value `$sampled(b)`). They represent asynchronous resets.

The semantics of `accept_on` is similar to `disable iff`, except that it operates at the property level rather than the verification statement level, it uses sampled values and it affects the truth of a property in its scope. The semantics of `reject_on(expression) property` are the same as `not(accept_on(expression) not(property))`.

Any nesting of `accept_on` and `reject_on` operators is allowed.

For example, whenever `go` is high, followed by two occurrences of `get` being high, then `stop` cannot be high before `put` is asserted twice (not necessarily consecutive).

```
assert property (go ##1 get[*2] |-> reject_on(stop) put[->2]);
```

When the reset condition occurs at the same time step where the evaluation of the `property_expr` ends, the reset condition takes precedence. In particular, when `reject_on` ( or `accept_on`) appears in nested properties, the outer most reset condition takes precedence over inner reset conditions.

For example,

```
property p; (accept_on(a) p1) and (reject_on(b) p2); endproperty
```

If `a` becomes true before the evaluation of `p1` is completed and the second term of the `and` operation completed evaluation, the truth of `p1` is ignored in deciding the truth of `p`. On the other hand, if `b` becomes true before the evaluation of `p2` is completed then `p` evaluates to false.

```
property p; (accept_on(a) p1) or (reject_on(b) p2); endproperty
```

If `a` becomes true before the evaluation of `p1` is completed then `p` evaluates to true. On the other hand, if `b` becomes true before the evaluation of `p2` is completed and the first term completed evaluation then the second term is ignored in deciding the truth of `p`.

```
property p; not (accept_on(a) p1); endproperty
```

`not` inverts the effect of the reset operator. Therefore, if `a` becomes true while evaluating `p1`, property `p` evaluates to false.

Nested `reject_on` and `accept_on` operators are evaluated in the lexical order (left to right). Therefore, if two nested operators conditions become true in the same time step before the completion of the argument property, then the outermost operator takes precedence. For example,

```
property p; accept_on(a) reject_on(b) p1; endproperty
```

if `a` becomes true in the same time step as `b` and before `p1` completes, then `p` succeeds in that time step. If `b` becomes true before `a` and before `p1` completes then `p` fails.

Like `disable iff`, `reject_on` and `accept_on` expressions can contain the sequence boolean method `triggered` and sampled value functions (see 16.13.6). In the latter case, the clock argument can be explicitly specified or inferred from the clock flow. The expressions must not contain any reference to local variables and the sequence methods `ended` and `matched`.

## Insert on pp 349 before "recursive properties can represent complicated requirements..."

The operators `accept_on` and `reject_on` may be used inside a recursive property. For example, the following uses of `accept_on` and `reject_on` property are legal:

```

property p1(p, bit b, abort);
    accept_on(b) (p and (1'b1 | => reject_on(abort) p1(p, b, abort)));
endproperty

property p2(s, p, bit b, abort);
    s |-> p1(p, b, abort);
endproperty

```

The following recursive property declaration illustrates legal usage of the `accept_on` and `reject_on` constructs:

```

property p3(p, bit b, abort);
    (p and (1'b1 | => p4(p, b, abort)));
endproperty

property p4(p, bit b, abort);
    accept_on(b) reject_on(abort) p3(p, b, abort);
endproperty

```

## In A.2.10

### Replace

```

property_expr ::=
    sequence_expr
    | ( property_expr )
    | not property_expr
    | property_expr or property_expr
    | property_expr and property_expr
    | sequence_expr |-> property_expr
    | sequence_expr | => property_expr
    | if ( expression_or_dist ) property_expr [ else property_expr ]
    | property_instance
    | clocking_event property_expr

```

### With

```

property_expr ::=
    sequence_expr
    | ( property_expr )
    | not property_expr
    | property_expr or property_expr
    | property_expr and property_expr
    | sequence_expr |-> property_expr
    | sequence_expr | => property_expr
    | if ( expression_or_dist ) property_expr [ else property_expr ]
    | property_instance
    | clocking_event property_expr
    | accept_on (expression_or_dist) property_expr
    | reject_on (expression_or_dist) property_expr

```

## Annex B

## add the keywords

`accept_on`  
`reject_on`

### Annex F.2.1

#### Replace

The abstract grammar for unlocked properties is

```
P ::= R // "sequence" form
      | (P) // "parenthesis" form
      | not P // "negation" form
      | (P or P) // "or" form
      | (P and P) // "and" form
      | (R |→ P) // "implication" form
      | disable iff (b) P // "reset" form
```

#### With

The abstract grammar for unlocked properties is

```
P ::= R // "sequence" form
      | (P) // "parenthesis" form
      | not P // "negation" form
      | (P or P) // "or" form
      | (P and P) // "and" form
      | (R |→ P) // "implication" form
      | disable iff (b) P // "global reset" form
      | accept_on (b) P // "property accept" form
      | reject_on (b) P // "property reject" form
```

#### Replace

The abstract grammar for clocked properties is

```
Q ::= @( b ) P // "clock" form
      | S // "sequence" form
      | (Q) // "parenthesis" form
      | not Q // "negation" form
      | (Q or Q) // "or" form
      | (Q and Q) // "and" form
      | (S |→ Q) // "implication" form
      | disable iff (b) Q // "reset" form
```

#### With

The abstract grammar for clocked properties is

```
Q ::= @( b ) P // "clock" form
      | S // "sequence" form
      | (Q) // "parenthesis" form
```

```

| not  $Q$  // "negation" form
| (  $Q$  or  $Q$  ) // "or" form
| (  $Q$  and  $Q$  ) // "and" form
| (  $S$   $\mid\rightarrow$   $Q$  ) // "implication" form
| disable iff (  $b$  )  $Q$  // "reset" form
| accept_on (  $b$  )  $Q$  // "property accept" form
| reject_on (  $b$  )  $Q$  // "property reject" form

```

## Annex F.3.1

### Replace

...

- $\text{@}(c)$  **disable iff** (  $b$  )  $P$   $\alpha$  **disable iff** (  $b$  )  $\text{@}(c)$   $P$ .
- $\text{@}(c)$  **not**  $P$   $\alpha$  **not**  $\text{@}(c)$   $P$ .
- $\text{@}(c)$  (  $R$   $\mid\rightarrow$   $P$  )  $\alpha$  (  $\text{@}(c)$   $R$   $\mid\rightarrow$   $\text{@}(c)$   $P$  ) .
- $\text{@}(c)$  (  $P1$  **or**  $P2$  )  $\alpha$  (  $\text{@}(c)$   $P1$  **or**  $\text{@}(c)$   $P2$  ) .
- $\text{@}(c)$  (  $P1$  **and**  $P2$  )  $\alpha$  (  $\text{@}(c)$   $P1$  **and**  $\text{@}(c)$   $P2$  ) .

### With

...

- $\text{@}(c)$  **disable iff** (  $b$  )  $P$   $\alpha$  **disable iff** (  $b$  )  $\text{@}(c)$   $P$ .
- $\text{@}(c)$  **accept\_on** (  $b$  )  $P$   $\alpha$  **accept\_on** (  $b$  )  $\text{@}(c)$   $P$ .
- $\text{@}(c)$  **reject\_on** (  $b$  )  $P$   $\alpha$  **reject\_on** (  $b$  )  $\text{@}(c)$   $P$ .
- $\text{@}(c)$  **not**  $P$   $\alpha$  **not**  $\text{@}(c)$   $P$ .
- $\text{@}(c)$  (  $R$   $\mid\rightarrow$   $P$  )  $\alpha$  (  $\text{@}(c)$   $R$   $\mid\rightarrow$   $\text{@}(c)$   $P$  ) .
- $\text{@}(c)$  (  $P1$  **or**  $P2$  )  $\alpha$  (  $\text{@}(c)$   $P1$  **or**  $\text{@}(c)$   $P2$  ) .
- $\text{@}(c)$  (  $P1$  **and**  $P2$  )  $\alpha$  (  $\text{@}(c)$   $P1$  **and**  $\text{@}(c)$   $P2$  ) .

## Annex F.3.3.1

### Replace

...

- $w \sqsubseteq (P1 \text{ and } P2)$  iff  $w \sqsubseteq P1$  and  $w \sqsubseteq P2$ .

Remark: Because  $w$  is nonempty, it can be proved that  $w \sqsubseteq \text{not } b$  iff  $w \sqsubseteq !b$ .

### With

- $w \sqsubseteq (P1 \text{ and } P2)$  iff  $w \sqsubseteq P1$  and  $w \sqsubseteq P2$ .
- $w \sqsubseteq \text{accept\_on}(b) P$  iff either  $w \sqsubseteq P$ , or some letter  $i$  of  $w$  satisfies  $b$  and  $w^{0, i-1} \sqsubseteq^\omega P$   
for  $i$  the least index such that  $w^i \sqsubseteq b$ ,  $0 < i < |w|$ .
- $w \sqsubseteq \text{reject\_on}(b) P$  iff  $w \sqsubseteq P$  and if there is a  $k$ ,  $0 \leq k < |w|$ , such that  $w^k \sqsubseteq b$  then the following must hold  $w^{0, k-1} \perp^\omega P$ .  
 $w^{0, -1}$  denotes the empty word.

A word satisfies property **accept\_on**( $b$ )  $P$  if and only if  $P$  succeeds or prior to the completion of the evaluation of  $P$  the expression  $b$  evaluates to true.

The operator **reject\_on** has the dual semantics. A word  $w$  satisfies property **reject\_on**( $b$ )  $P$  if and only if  $w$  satisfies  $P$  and if  $b$  happens first time at the position  $i$  then  $P$  must have evaluated to true before that  $b$  is encountered.

Remark: Because  $w$  is nonempty, it can be proved that  $w \sqsubseteq \text{not } b$  iff  $w \sqsubseteq !b$ .

## Annex F.3.6.1

### Replace

...

—  $w, L_0 \sqsubseteq (P_1 \text{ and } P_2)$  iff  $w, L_0 \sqsubseteq P_1$  and  $w, L_0 \sqsubseteq P_2$ .

### With

...

—  $w, L_0 \sqsubseteq (P_1 \text{ and } P_2)$  iff  $w, L_0 \sqsubseteq P_1$  and  $w, L_0 \sqsubseteq P_2$ .

—  $w, L_0 \sqsubseteq \text{reject\_on}(b) P$  iff  $w, L_0 \sqsubseteq P$  and if there is a  $k, 0 \leq k < |w|$ , such that  $w^k, L_0 \sqsubseteq b$  then the following must hold  $w^{0,k-1} \perp^\omega, L_0 \sqsubseteq P$ .

$w^{0,-1}$  denotes the empty word.

—  $w, L_0 \sqsubseteq \text{accept\_on}(b) P$  iff either  $w, L_0 \sqsubseteq P$ , or some letter  $i$  of  $w$  satisfies  $b$  and  $w^{0,i-1}, L_0 \sqsubseteq^\omega P$  for  $i$  the least index such that  $w^i \sqsubseteq b, 0 < i < |w|$ .