

## 1.1 Access to gated clocked variables

This proposal provides for the need to access past values of a variable that is modelled with a gated clock. In the case where an assert uses a normal clock, while the variables are assigned with a gated clock, it requires a significant effort in modelling past gated values of such variables. For example,

```
always @(posedge clk)
    if (enable) q <= d;

always @(posedge clk)
    assert (done | => {out == $past(q, 2)}) ;
```

In this example, the value of q returned by \$past is the value of q at the second clock tick in the past. However, the value of q intended is the value at the second update of q in the past. The user must write additional code to keep track of the enabled updated values of q.

The proposal extends the \$past function by providing for an optional argument that specifies the enabling condition.

### 1.1.1 Syntax of extended \$past

past\_function ::=

```
$past ( expression1[ , number_of_ticks] [ , expression2] ) ;
```

expression1 can be any expression allowed in assertions. expression1 refers to the expression whose past value is needed.

number\_of\_ticks refers to a non-negative integral value.

expression2 refers to the enabling expression.

The default for omitting number\_of\_ticks is 1. The default for omitting expression2 is true.

Both, number\_of\_ticks and expression2 are optional. If expression2 is specified, but number\_of\_ticks is omitted, then a must be specified for the empty argument, such as

```
$past(in1, , enable);
```

In this example, number\_of\_ticks is 1.

### 1.1.2 Semantics of \$past

When expression2 is not specified, the semantics of \$past is unchanged. If expression2 is specified, the sampling of expression is performed based on its clock gated with expression2. For example,

```
always @(posedge clk)
    if (enable) q <= d;

always @(posedge clk)
    assert (done | => {out == $past(q, 2,enable)}) ;
```

In this example, the sampling of q for evaluating \$past is based on the clocking  
posedge clk iff enable