Reserved Parameter Format (with some minor consistency changes, but other inconsistencies maintained, and some version information. Since this is Version 5.1 baseline, the word 'Format' is NOW removed from nearly all examples). Single Quotes replace double quotes for entered values 'True' instead of "True".

Adds

Descriptors

Indentation of 'Descriptors'

Add Description as a Descriptor'

Definition instead of Description

<Boolean_literal> instead of <value>

Single quote for enumeration

Added AMI_Version BIRD126 a new reserved parameter per BIRD126 (but adapted it to the template

(Documented Use_Init_Output, but documented its deprecation per BIRD120.1, for AMI Version 5.1

Removed 'Format' in examples unless for Version 5.0 only (as with Use_Init_Output

---

Pending Bird 127.2 or above change for reference

```
|*              All parameters must be in the following format:
|*
|*              (parameter_name (Usage <usage>)
|*                              (Type <data_type>)
|*                              ({Format} <data_format> <data>)
|*                              (Default <value>)
|*                              (Description <string>))
|*
|*              Notes:
|*              1) The order of the entries is not important.
|*              2) The word Format is optional as indicated by the curly
|*                 braces "{" and "}" and may be ignored by the EDA tools.
|*                 (The examples do not show the word Format).
|*              3) Certain reserved parameter names allow only certain
|*                 <data_format> selections, as described below.
|*              4) The <data_format> selection of Value and Default are
|*                 always mutually exclusive.  Certain parameters may require
|*                 Value or Default, but Value and Default are not allowed to
|*                  be present together for the same parameter.
|*              5) <data_format> is always required for selections other
|*                 than Value.
|*              6) Default is optional for <data_format> Range, List, Corner,
|*                 Increment and Steps.
|*              7) Default is not allowed for <data_format> Table, Gaussian,
|*                 Dual-Dirac and DjRj.
```

```
|**             8) Additional rules apply when <data_format> is Table. The
|**                format for <data> describes a set of rows containing data
|**                values. Each row has its set of column data values enclosed
|**                by parentheses '(' and ')'.  Each row contains the same
|**                number of column values. Any or all of these columns may
|**                have different data types.  For this case the <data_type>
|**                argument is a either a list of a data types (one for each
|**                column), or a single data type.  If it is a single data
|**                type then this type shall be applied to all of the columns
|**                in each row.

---------------
The remainder of this section is a re-mapping of Section 6c Reserved_Parameters
section from pages 144 to 147 plus AMI_Version.  Some of the text still
requires changes for pending BIRDs, such a more detailed examples and
explanation for Table format choices.  Much of the existing text is retained,
but will be modified with other pending BIRDs
--------------------------------------------------------------------------------
```

Init_Returns_Impulse, Use_Init_Output, GetWave_Exists, Max_Init_Aggressors and Ignore_Bits

The Model parameter file must have a sub-tree with the heading ‘Reserved_Parameters’. This sub-tree shall contain all the reserved parameters for the model.

The following reserved parameters are used by the EDA tool and are required if the [Algorithmic Model] keyword is present. The entries following the reserved parameters points to its usage, type and default value. All reserved parameters must be in the following format:

```
(parameter_name (Usage <usage>) (Type <data_type>) (Default <values>)
(Description <string>))
```

Parameter: **AMI_Version**

Required: Yes for AMI_Version 5.1 and above, illegal before AMI_Version 5.1

Descriptors:

Usage: Info

Type: String

Format: Value

Default: <string_literal> *(Illegal with Value)*

Description: <string_literal>

Definition: Tells EDA platform what version of the AMI modeling language is supported.

Usage Rules: AMI_Version is required in the .ami parameter files of AMI models which are written in compliance with the IBIS Version 5.1 or later specification(s), but it is not allowed in the .ami parameter files of AMI models which are written in compliance with the IBIS Version 5.0

specification. When required, this parameter must be the first parameter defined in the Reserved_Parameters branch of the .ami file.

The value of this parameter shall be '5.1' or greater for AMI models written in compliance with the IBIS Version 5.1 or later specifications. The absence of AMI_version indicates that the AMI model was written in compliance with the IBIS Version 5.0 specification.

The version numbers of .ibs files and AMI models do not have to match. The EDA tool is expected to execute the AMI model according to the rules of the specification which corresponds to its version number.

Other Notes: For AMI_Version 5.1, either Value or Default (but not both) are required.

Throughout this document, the shorthand, AMI_Version <version_number>, is used to indicate the minimum AMI_Version level that is supported. If the AMI_Version is not used, then the AMI model is processed at the level defined in [IBIS Ver] 5.0. In some cases, it will be noted that a rule has changed, has become more restrictive or more relaxed for a specified AMI_Version level.

Examples:

```
(AMI_Version (Usage Info)(Type String)(Value "5.1")
      (Description "Valid for AMI_Version 5.1 and above")
)
(AMI_Version (Usage Info)(Type String)(Default "5.1")
      (Description "Valid for AMI_Version 5.1 and above")
)
```

Parameter: **Init_Returns_Impulse**

Required: Yes

Descriptors:

Usage: Info

Type: Boolean

Format: Value (*Illegal before IBIS_AMI Version 5.1)*

Default: <Boolean_literal> *(Required before AMI_Version 5.1)*

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tells EDA platform whether the AMI_Init function returns a modified impulse response.

Usage Rules: When the Boolean_literal value is set to 'True', the model returns the convolution of the impulse response with the impulse response of the equalization.

Other Notes: When reserved parameter AMI_Version is not used, Default is required and Format Value is illegal. For AMI_Version 5.1, either Value or Default (but not both) are required.

Examples:

```
(Init_Returns_Impulse (Usage Info)(Type Boolean)(Default True)
      (Description "Valid for all AMI_Version levels")
)
```

```
(Init_Returns_Impulse (Usage Info)(Type Boolean)(Value True)
      (Description "Either Value or Default can be used, but not both
            for AMI_Version 5.1")
)
```

Parameter: **GetWave_Exists**

Required: Yes

Descriptors:

Usage: Info

Type: Boolean

Format: Value *(Illegal before IBIS_AMI version 5.1)*

Default: <Boolean_literal> *(Required before AMI_Version 5.1)*

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tells EDA platform whether the AMI_GetWave is implemented in this model

Usage Rules: Note that if Init_Returns_Impulse is set to 'False', then GetWave_Exists MUST be set to 'True'.

Other Notes: When reserved parameter AMI_Version is not used, Default is required and Format Value is illegal. For AMI_Version 5.1, either Value or Default (but not both) are required.

Examples:

```
(GetWave_Exists (Usage Info)(Type Boolean)(Default True)
      (Description "Valid for all AMI_Version levels")
)

(GetWave_Exists (Usage Info)(Type Boolean)(Value True)
      (Description "Either Value or Default can be used, but not both
            for AMI_Version 5.1")
)
```

Parameter: **Use_Init_Output**

Required: No, and legal only before AMI_Version 5.1

Descriptors:

Usage: Info

Type: Boolean

Format: *(Illegal)*

Default: <Boolean_literal> *(Required before AMI_Version 5.1)*

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tells EDA platform whether the AMI_GetWave is implemented in this model

Usage Rules: When Use_Init_Output is set to 'True', the EDA tool is instructed to use the output impulse response from the AMI_Init function when creating the input waveform presented to the AMI_GetWave function.

If the Reserved Parameter, Use_Init_Output, is set to ‘False’, EDA tools will use the original (unfiltered) impulse response of the channel when creating the input waveform presented to the AMI_GetWave function.

The algorithmic model is expected to modify the waveform in place.

Use_Init_Output is optional. The default value for this parameter is ‘True’.

If Use_Init_Output is ‘False’, GetWave_Exists must be ‘True’.

Other Notes: Format Value is illegal.

Examples:

```
(Use_Init_Output (Usage Info)(Type Boolean)(Default True)
     (Description "Use_Init_Output is valid only when AMI_Version is not used")
)
```

The following reserved parameters are optional. If the following parameters are not present, the values are assumed as ‘0’.

Parameter: **Max_Init_Aggressors**

Required: No

Descriptors:

Usage: Info

Type: Integer

Format: Value *(Illegal before AMI_Version 5.1)*

Default: <numeric_literal>

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tells the EDA platform how many aggressor Impulse Responses the AMI_Init function is capable of processing.

Usage Rules: Its value is assumed ‘0’ if Max_Init_Aggressors is not present.

Other Notes: When reserved parameter AMI_Version is not used, Default is required and Format Value is illegal. For AMI_Version 5.1, either Value or Default (but not both) are required.

Examples:

```
(Max_Init_Aggressors (Usage Info)(Type Integer)(Default 5)
      (Description "Valid for all AMI_Version levels")
)

(Max_Init_Aggressors (Usage Info)(Type Integer)(Value 5)
      (Description "Either Value or Default can be used, but not both
            for AMI_Version 5.1")
)
```

Parameter: **Ignore_Bits**

Required: No

Descriptors:

Usage: Info

Type: Integer

Format: Value *(Illegal before AMI_Version 5.1)*

Default: <numeric_literal>

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tells the EDA platform how long the time variant model takes to complete initialization.

Usage Rules: This parameter is meant for AMI_GetWave functions that model how equalization adapts to the input stream. The value in this field tells the EDA platform how many bits of the AMI_GetWave output should be ignored.

Its value is assumed '0' if Ignore_Bits is not present.

Other Notes: When reserved parameter AMI_Version is not used, Default is required and Format Value is illegal. For AMI_Version 5.1, either Value or Default (but not both) are required.

Examples:

```
(Ignore_Bits (Usage Info)(Type Integer)(Default 1000)
      (Description "Valid for all AMI_Version levels")
)

(Ignore_Bits (Usage Info)(Type Integer)(Format Value 1000)
      (Description "Either Value or Default can be used, but not both
            for AMI_Version 5.1")
)
```

Tx-only reserved parameters: Tx_Jitter and Tx_DCD

The following reserved parameters provide textual description to the user defined parameters.

These reserved parameters only apply to Tx models. There parameters are optional. If these parameters are not specified the values default to no jitter specified in the model ("0" jitter). If specified, they must be in the following format:

```
(parameter_name (Usage <usage>) (Type <data_type>) (Format <data_format>)
(Default <values>) (Description <string>))
```

Parameter: **Tx_Jitter**

Required: No

Descriptors:

Usage: Info, Out

Type: Float, UI

Format: Gaussian, Dual-Dirac, DjRj, Table

Default: <numeric_literal> *(Optional for value pair or triple, illegal forAMI_Version 5.1)*

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tells EDA platform how much jitter exists at the input to the transmitter's analog output buffer.

Usage Rules:

Other Notes: Default is not shown in the examples.

Examples:

```
(Tx_Jitter (Usage Info)(Type Float)(Gaussian 1e-9 1e-12)
      (Description "Gaussian <mean> <sigma>")
)

(Tx_Jitter (Usage Info)(Type Float)(Dual-Dirac 1e-9 2e-9 1e-12)
      (Description "Dual-Dirac <mean> <mean> <sigma>")
)

(Tx_Jitter (Usage Info)(Type Float)(1e-9 2e-9 10e-12)
      (Description "DjRj <MinDj> <MaxDj> <sigma>")
)

(Tx_Jitter (Usage Info)(Type Float)
      (Table
      (Labels  "Row_No" Time" "Probability")
                  (-5  -5e-12  1e-10)
                  (-4  -4e-12  3e-7)
                  (-3  -3e-12  1e-4)
                  (-2  -2e-12  1e-2)
                  (-1  -1e-12  0.29)
                  (0    0      0.4)
                  (1    1e-12  0.29)
                  (2    2e-12  1e-2)
                  (3    3e-12  1e-4)
                  (4    4e-12  3e-7)
                  (5    5e-12  1e-10)
      )
)
```

Parameter: **Tx_DCD**

Required: No

Descriptors:

Usage: Info, Out

Type: Float, UI

Format: Value, Range, Corner

Default: <numeric_literal> *(Illegal with Value for AMI_Version 5.1)*

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tx_DCD (Transmit Duty Cycle Distortion) tells the EDA platform the maximum percentage deviation of the duration of a transmitted pulse from the nominal pulse width.

Usage Rules:

Other Notes:

Examples:

```
(Tx_DCD (Usage Info)(Type Float)(Range 2 0 5)
      (Description "Range <typ> <min> <max>")
)
```

Rx-only reserved parameters: Rx_Clock_PDF and Rx_Receiver_Sensitivity

These reserved parameters only apply to Rx model. These parameters are optional. If the parameters are not specified, the values default to '0'. If specified, they must be in the following format:

```
(parameter_name (Usage <usage>) (Type <data_type>) (Format <data_format>)
(Default <values>) (Description <string>))
```

Parameter: **Rx_Clock_PDF**

Required: No

Descriptors:

Usage: Info, Out

Type: Float, UI

Format: Gaussian, Dual-Dirac, DjRj, Table

Default: <numeric_literal> *(Optional for value pair or triple, illegal for AMI_Version 5.1)*

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Definition: Tells EDA platform the probability density function of the recovered clock.

Usage Rules:

Other Notes: (Default is not shown in the examples.)

Examples:

```
(Rx_Clock_PDF (Usage Info)(Type Float)(Gaussian 1e-9 1e-12)
      (Description "Gaussian <mean> <sigma>")
)

(Rx_Clock_PDF (Usage Info)(Type Float)(Dual-Dirac 1e-9 2e-9 1e-12)
      (Description "Dual-Dirac <mean> <mean> <sigma>")
)

(Rx_Clock_PDF (Usage Info)(Type Float)(DjRj 1e-9 2e-9 10e-12)
      (Description "DjRj <MinDj> <MaxDj> <sigma>")
)

(Rx_Clock_PDF (Usage Info)(Type Float)
      (Format Table
      (Labels  "Row_No" Time" "Probability")
                  (-5  -5e-12  1e-10)
                  (-4  -4e-12  3e-7)
```

```
                    (-3  -3e-12  1e-4)
                    (-2  -2e-12  1e-2)
                    (-1  -1e-12  0.29)
                    (0    0      0.4)
                    (1    1e-12  0.29)
                    (2    2e-12  1e-2)
                    (3    3e-12  1e-4)
                    (4    4e-12  3e-7)
                    (5    5e-12  1e-10)
      )
)
```

Parameter: **Rx_Receiver_Sensitivity**

Required: No

Descriptors:

Usage: Info, Out

Type: Float, UI

Format: Value, Range, Corner

Default: <numeric_literal> *(Illegal with Value for AMI_Version 5.1)*

Description: <string_literal> *(Required, before AMI_Version 5.1)*

Description: Tells the EDA platform the voltage needed at the receiver data decision point to ensure proper sampling of the equalized signal.

Usage Rules:

Other Notes:

Examples:

In the example below, 100 mV (above +100 mV or below -100 mV is needed to ensure the signal is sampled correctly).

```
(Rx_Receiver_Sensitivity (Usage Info)(Type Float)(Value 0.1)
      (Description "Single Value choice, Default is optional")
)

(Rx_Receiver_Sensitivity (Usage Info)(Type Float)(Default 0.1)
      (Description "Default replaces Format Value for AMI_Version 5.1")
)

(Rx_Receiver_Sensitivity (Usage Info)(Type Float)(Range 1.0 -0.1 1.0)
      (Default 0.05)
      (Description "Range <typ> <min> <max>")
)

(Rx_Receiver_Sensitivity (Usage Info)(Type Float)(Corner 0.0 0.1 -0.1)
      (Default 0.05)
      (Description "Corner <typ> <min> <max>")
)
```