# 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

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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.

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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

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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> *(Illegal with Value)*

*Description:* <string>

*Definition:* Tells EDA platform what (minimal) 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\_Verision.

*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> *(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> *(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> *(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:* <value>

*Description:* <string> *(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:* <value>

*Description:* <String> *(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:* <value> *(Optional for value pair or triple, illegal for AMI\_Version 5.1)*

*Description:* <string> *(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:* <value*> (Illegal with Value for AMI\_Version 5.1)*

*Description:* <string> *(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:* <value> *(Optional for value pair or triple, illegal for AMI\_Version 5.1)*

*Description:* <string> *(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:* <value*> (Illegal with Value for AMI\_Version 5.1)*

*Description:* <string> *(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:* In the example below, 100 mV (above +100 mV or below -100 mV is needed to ensure the signal is sampled correctly

*Other Notes:*

*Examples:*

(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>”)

)