



IBIS Parser Update

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(presented by Anders Ekholm, Ericsson)

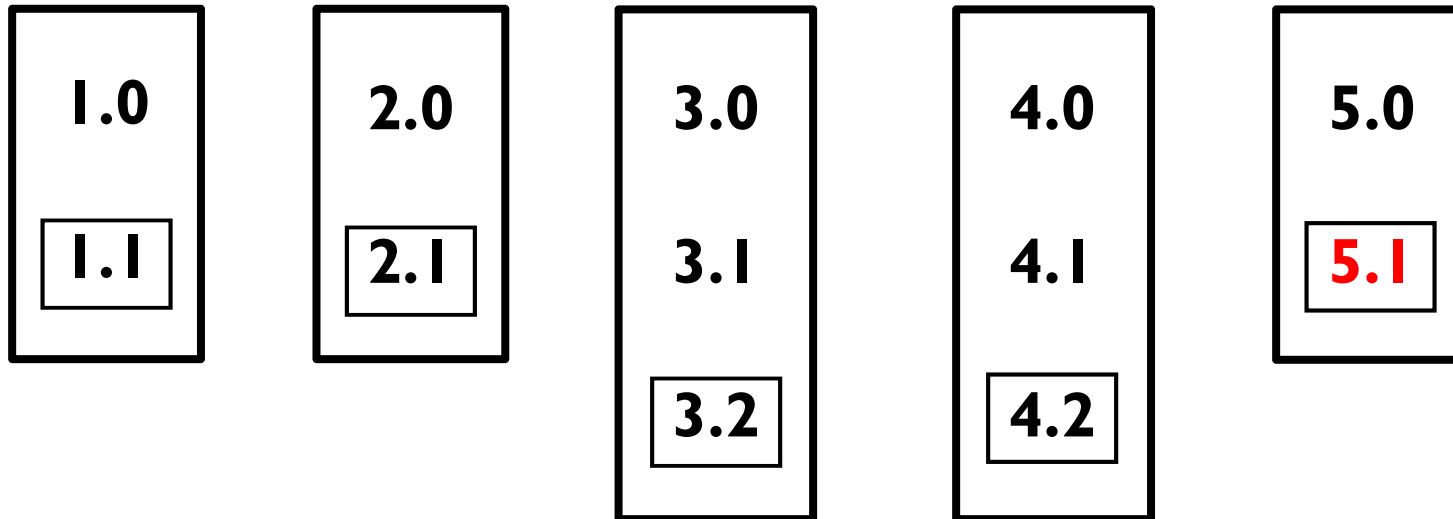


Outline, Specifications and Parsers

- IBIS through Version 5.1
 - **ibischk5**
- Touchstone Version 2.0
 - **tschk2**
- Conclusions



Valid IBIS Versions and Latest ibischk Versions



ibis_chk **ibischk2** **ibischk3** **ibischk4** **ibischk5**

V1.1a **V2.1.17** **V3.2.9** **V4.2.2** **V5.1.2**



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IBIS Parser Major Version Logic

- Subversions upgraded to **last** major version
 - **V5.1** upgrades V5.0
 - **V4.2** upgraded V4.0 and V4.1
 - **V3.2** upgraded V3.0 and V3.1
 - **V2.1** upgraded V2.0
 - **V1.1** upgraded V1.0
- **V5.1** checks **V1.1**, **V2.1**, **V3.2**, **V4.2**, and **V5.1** levels for features and corrections



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Downward Compatibility

- Current IBIS **downward compatible** with all earlier features and syntax
 - Prior EDA implementations supported
 - Existing models remain valid
 - Specification includes all features
 - Earlier specification mistakes corrected
- Specification well tested and corrected



IBIS-AMI Version Exception

- IBIS-AMI subversions supported by the **.ami** format
- **AMI_Version** required for “5.1” files and **later**
 - First Reserved Parameter
 - Use_Init_Output **not legal**
- **Omission of AMI_Version implies “5.0” level**
 - Use_Init_Output **legal**
 - **All other AMI_Version “5.1” rules apply**
- Later AMI_Version levels will have more features and possible deprecation at the subversion level
- Later Specification will track all subversion changes



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“ibischk5” Parser

- Ibischk5, Version 5.1.2
 - Free executables:
<http://www.eda.org/ibis/ibischk5/>
 - Bug reports:
<http://www.eda.org/ibis/bugs/ibischk/>
- Checks all [IBIS Ver]s of IBIS files
- Over \$117,000 of contracted work since 1993
- Supports .ibs, .pkg, .ebd, and .ami formats
 - directly or through higher level linkages



Flags in ibischk5

```
Usage: ibischk5      <IBS filename>
      : ibischk5  -ebd <EBD filename>
      : ibischk5  -pkg <PKG filename>
      : ibischk5  -ami <AMI filename>
Usage: ibischk5  -caution -numbered      <IBS filename>
      : ibischk5  -caution -numbered -ebd <EBD filename>
      : ibischk5  -caution -numbered -pkg <PKG filename>
      : ibischk5  -caution -numbered -ami <AMI filename>
```

The flags prior to the file name can be in any order,
and the -caution and/or -numbered flags are optional.

- **-ami** for <file_name>.ami (algorithmic model interface control file)
- **-numbered** for numbered **E**rror, **W**arning, **N**otes and **C**autions messages



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ibischk5 {-numbered} -ami file4.ami

```
Checking file4.ami for IBIS 5.0 Compatibility...
```

```
ERROR - Illegal Usage value A specified for Param1  
ERROR - Illegal Type value B specified for Param1  
ERROR - Illegal Format value C specified for Param1  
ERROR - No Reserved_Parameters found
```

```
Errors : 4
```

```
File Failed
```

```
Checking file4.ami for IBIS 5.0 Compatibility...
```

```
E4627 - Illegal Usage value A specified for Param1  
E4627 - Illegal Type value B specified for Param1  
E4627 - Illegal Format value C specified for Param1  
E4622 - No Reserved_Parameters found
```

```
Errors : 4
```

```
File Failed
```



Message Number File Being Updated (Over 1150 unique message strings)

1	Number	Symbol in Code	Message string	Parameters	Comment	Category	Classification
2	100	MDL_ERR_0	Unable to Allocate Memory: %s %d	filename, line number	The code failed to allocate memory in <filename> at <linenumber>	Internal Error	E
3	101	MDL_ERR_1	Unable to get IBIS structure		Program data structures are corrupt	Internal Error	E
4	102	MDL_ERR_2	Orphan Model keyword.		Model keyword found but not within a Model declaration	Error with IBIS file Line number	E
5	103	MDL_ERR_3	Illegal Digital Port <%s> (not allowed in SPICE Ports section)	portname	Improper use of Digital port <portname>	Error with IBIS file Line number	E
6	104	MDL_ERR_4	D_switch not allowed with (D_drive,D_receive,or D_enable) in		Improper use of D_switch	Error with IBIS file Line number	E
7	105	MDL_ERR_5	%s not allowed with D_switch in Ports/A2D/D2A Section			Error with IBIS file Line number	E
8	106	MDL_ERR_6	Reserved Digital Port <%s> used as	portname	Improper use of Reserved Digital port <portname>	Error with IBIS file Line number	E
9	107	MDL_ERR_7	Orphan data line keyword.		A Model related data line was found where none was expected	Error with IBIS file Line number	E
10	108	MDL_ERR_8	TTgnd Typical value should be > 0		Improper TTgnd typical value	Error with IBIS file Line number	E
11	109	MDL_ERR_9	TTgnd Min value should be > 0		Improper TTgnd minimum value	Error with IBIS file Line number	E
12	110	MDL_ERR_10	TTgnd Max value should be > 0		Improper TTgnd maximum value	Error with IBIS file Line number	E
13	111	MDL_ERR_11	TTgnd typ value is not in between		Improper range for TTgnd	Warning	W
14	112	MDL_ERR_12	TTpower Typical value should be > 0		Improper TTPower typical value	Error with IBIS file Line number	E
15	113	MDL_ERR_13	TTpower Min value should be > 0		Improper TTPower minimum value	Error with IBIS file Line number	E
16	114	MDL_ERR_14	TTpower Max value should be > 0		Improper TTPower maximum value	Error with IBIS file Line number	E
17	115	MDL_ERR_15	TTpower typ value is not in between		Improper range for TTPower	Warning	W
18	116	MDL_ERR_16	[Model Spec] should be specified immediately after all the subparameters of a model and		Improper positioning of [Model Spec]	Error with IBIS file Line number	
19	117	MDL_ERR_17	[Receiver Thresholds] should not be specified for model type %s	modeltype	Receiver thresholds are not allowed for a <modeltype> which is not an Input or I/O model type	Warning with IBIS file Line number	W
20	118	MDL_ERR_18	[Add Submodel] should be specified before other keywords for a model		Improper positioning of [Ad Submodel]	Error with IBIS file Line number	E
21	119	MDL_ERR_19	%s Already Defined For Model '%s'	sub parameter/keyword, modelName	A model <sub-parameter or keyword> was already defined for <modelName>	Error with IBIS file Line number	E
22	120	MDL_ERR_20	[Receiver Thresholds] should be specified immediately after all the subparameters of a model and before the other keywords of a		Improper positioning of [Receiver Thresholds] keyword	Error with IBIS file Line number	E
23	121	MDL_ERR_21	Expecting Keyword. Invalid Line		An invalid line was found where a keyword was expected	Error with IBIS file Line number	E

Recent ibischk5 Version 5.1.2

- Major IBIS-AMI syntax implementation
 - IBIS Version 5.1 – rules clarified and CHECKED
 - Table-syntax defined and now parsed
 - **Major Errors now detected** (versus not being checked in the older Version 5.0.7)
- 23 BIRDs on IBIS and IBIS-AMI syntax
- 13 BUG reports on file testing for specification compliance closed through BUG138
- Source code checked with 44 new test files since V5.0.7
- Unfortunately, some new BUGs may be discovered with more usage



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“tschk2” Parser

- Checks Touchstone Version 1.0 (TS1) and Version 2.0 (TS2)
 - Error and Warning numbers
 - Free executables: <http://www.eda.org/ibis/tschk2/>
- Converts TS1 to TS2, TS2 to TS1 where practical with **-canonical*** flags
- Provides comment headers and real, imaginary format (RI) with **-describe** flag
- Source code package includes 440+ test cases
- C++, well documented
- Only one mixed mode BUG found so far



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tschk2 {-canonical*} FILE

- **{-canonical | -canonical-v2}**
 - **TS1, TS2 → TS2**
 - Provides number of ports, frequencies and other information
 - Un-normalizes TS1 Y-, Z-, G- and H-parameters and effective noise resistance
- **{-canonical-v1}**
 - **TS1, TS2 → TS1** where practical
 - Applies column formatting rules and 2-port 2I_I2 ordering
 - Normalizes TS2 Y-, Z-, G- and H-parameters and effective noise resistance
 - No mixed mode or selectable reference resistance processing



7 | tschk2 Messages

Touchstone2: Notes on error and warning messages - Mozilla Firefox

File Edit View History Bookmarks Tools Help

file:///C:/Users/bob/Desktop/asian_ross_present/touchstone2-2.0.0/doc/cxx_classes/messages.html

Most Visited Getting Started Latest Headlines

Touchstone2: Notes on error and wa...

Main Page Related Pages Namespaces Classes Files

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Notes on error and warning messages

FILE_ERROR_CATEGORY (1000)

Errors in opening or reading the Touchstone file.

- FILE_NOT_FOUND (1001) - Raised when the file cannot be opened through the path provided. Also raised when the filename is empty.
- UNREADABLE_FILE (1002) - Raised when the file is found, but cannot be opened for reading.
- EMPTY_FILE (1003) - Raised when the file is found to be empty.

FORMAT_ERROR_CATEGORY (2000)

Errors in the structure of the Touchstone file format.

- NO_USEFUL_CONTENT (2001) - Raised when the file is found to contain only comments and blank lines.
- NOT_A_TOUCHSTONE_FILE (2002) - Raised when the file does not start in either the Touchstone v1 format or the Touchstone v2 format.
- INVALID_CHARACTER (2003) - Raised when an invalid character is found in the file.
- EXPECTED_NEWLINE (2004) - Raised when an end-of-line termination is expected.
- EXPECTED_NEWLINE_BEFORE_EOF (2005) - Warning raised when the last line of the file is found to lack an end-of-line termination.
- EXPECTED_WHITESPACE (2006) - Raised when a space or tab is expected.
- EXPECTED_NUMERIC_DATA (2007) - Raised when a real number is expected.
- EXPECTED_INTEGER (2008) - Raised when an integer is expected.
- KEYWORD_NOT_AT_FIRST_COLUMN (2009) - Raised when whitespace is found on a line preceding a keyword.
- HASH_MARK_NOT_AT_FIRST_COLUMN (2010) - Raised when whitespace is found on a line preceding a # mark.
- FREQUENCY_NOT_AT_FIRST_COLUMN (2011) - Raised when whitespace is found on a line preceding a frequency value.
- UNTERMINATED_KEYWORD (2012) - Raised when a keyword is missing the closing bracket.
- UNSUPPORTED_VERSION (2013) - Raised when an unsupported argument is found for the [Version] keyword.
- UNRECOGNIZED_KEYWORD (2014) - Raised when an unrecognized keyword is found.
- INVALID_KEYWORD_IN_V1_FILE (2015) - Raised when a keyword is found in a Touchstone v1 file.
- INVALID_NUMBER_OF_PORTS (2016) - Raised when the [Number of Ports] argument is not a positive integer.
- INVALID_TWO_PORT_DATA_ORDER_KEYWORD (2017) - Raised when the [Two-Port Data Order] keyword is given for a file that does not describe 2-port data.
- MISSING_TWO_PORT_DATA_ORDER_KEYWORD (2018) - Raised when the [Two-Port Data Order] keyword is not found in a file that describes 2-port data.
- EXPECTED_TWO_PORT_DATA_ORDER (2019) - Raised when an unrecognized argument is found for the [Two-Port Data Order] keyword.
- INVALID_NUMBER_OF_FREQUENCIES (2020) - Raised when the [Number of Frequencies] argument is not a positive integer.
- INVALID_NUMBER_OF_NOISE_FREQUENCIES (2021) - Raised when the [Number of Noise Frequencies] argument is not a positive integer.
- WRONG_NUMBER_OF_REFERENCE_IMPEDANCES (2022) - Raised when the number of reference impedances does not match the number of ports.
- EXPECTED_MATRIX_FORMAT (2023) - Raised when an unrecognized argument is found for the [Matrix Format] keyword.
- EXPECTED_MIXED_MODE_DESCRIPTOR (2024) - Raised when an invalid mixed-mode port descriptor is found.
- MIXED_MODE_ONLY_FOR_SYZ_PARAMETERS (2025) - Raised when mixed-mode data is given for G- or H-parameter data.
- G_PARAMETERS_ONLY_DEFINED_FOR_TWO_PORTS (2026) - Raised when G-parameters are given for a file that does not describe 2-port data.
- H_PARAMETERS_ONLY_DEFINED_FOR_TWO_PORTS (2027) - Raised when H-parameters are given for a file that does not describe 2-port data.
- NOISE_DATA_ADVERTISED (2028) - Raised when [Number of Noise Frequencies] is given but no [Noise Data] is found.
- NOISE_FREQUENCY_EXCEEDS_RANGE (2029) - Raised when the first noise-data frequency is greater than the largest network-data frequency.
- FOUND_EXTRA_LINES_AT_END (2030) - Raised when extra lines are found at the end of the file.

OPTIONS_FORMAT_ERROR_CATEGORY (2100)

Errors in Touchstone options line.

Conclusions

- ibischk5 and tschk2 parsers - **officially** check files for specification compliance
- Parsers helps test specification rules for clarity and accuracy
- BUG process continues to improve the parsers and eliminate mistakes
- **Parsers are critical to IBIS success**

Useful Links Under IBIS

Home Page: www.eda.org/ibis/

[ver5.1/](#)
[ibischk5/](#)

IBIS Version 5.1 (August 24, 2012)
ibischk5 Version 5.1.2 (October 2012)

[touchstone_ver2.0/](#)
[tschk2/](#)

Touchstone Version 2.0 (April 24, 2009)
tschk2 Version 2.0.0 (December 2009)

[quality_ver2.0/](#)
[ibis-iss_ver1.0/](#)

IBIS Quality Specification (Oct. 30, 2009)
Interconnect SPICE Subcircuit Specification
Version 1.0 (October 7, 2011)

[editorial_wip/](#)
[interconnect_wip/](#)
[macromodel_wip/](#)
[quality_wip/](#)

Editorial Task Group (wip)
Interconnect Task Group (wip)
Advanced Technology Task Group (wip)
Quality Task Group (wip)

(wip: work in progress)

