HID Parser Error Checking

The following is a list of the error conditions that a version 1.1 compliant HID parser should check and report. To facilitate debugging HID devices it is important that a HID parser report the detection of any of the following Errors in detail. The checking for and reporting of Warnings is optional but recommended.

Warnings flag unused or redundant items in report descriptors

A standard format is suggested below for parsers to report these errors. This reporting format is optional for parsers.

Revision Status

Revision	Date	Remarks
1.2	2/23/00	Added Error codes.
1.1	9/16/98	Added checking for redundant Global Items.
1.0	1/30/98	First Release

Error Tables

The Error Tables are divided into 4 groups: Unknown Items, Global Items, Local Items and Main Items. These groups correspond to the errors that can be generated by the respective HID item types.

Unknown Items

Item Name	Error Tag	Errors	Error Subcode	Warnings
	00	"Unknown Item" or "Reserved Item" found -- 0xUU	0x3F	
	00		0x3E	Long Item defined

Global Items

Item Name	Error Tag	Errors	Error Subcode	Warnings
Usage Page	04	Data field must be non-Zero	0	Data field should not use reserved values
		Data field greater that 0xFFFF	1	
		Must be defined prior to any Input/Output/Feature items	2	
Logical Minimum	14	Must be within bounds of "Report Size"[1]	0	Min should be less than or equal to Max[1]
		Must be defined prior to any Input/Output/Feature items	1	
		Must equal 1 if the Array flag is set in main item	2	
Logical Maximum	24	Must be within bounds of "Report Size"[1]	0	Max should be greater than or equal to Min[1]
		Must be defined prior to any Input/Output/Feature items	1	
		Must equal the number of defined usages if the Array flag is set in main item	2	
Physical Minimum	34	Must have corresponding Physical Maximum[1]	0	Min should be less than or equal to Physical Maximum[1]
Physical Maximum	44	Must have corresponding Physical Minimum[1]	0	Max should be greater than or equal to Physical Minimum[1]
Unit Exponent	54		0	Data field reserved bits should be Zero (0)
Unit	64		0	Data field reserved bits should be Zero (0)
Report Size	74	Must be defined prior to any Input/Output/Feature items	1	
Report ID	84	Must be non-Zero	0	
		Must be less than or equal to 255 (contained by a byte)	1	
		Must be defined prior to any Input/Output/Feature items	2	
		Cannot span top level application collection boundaries	3	
		Microsoft constraint[2]: Cannot be defined outside a top level collection	4	
Report Count	94	Must be non-Zero	0	
Push	A4	Must have corresponding "Pop"	0	
		Data Field Size must be Zero (0)	1	
Pop	B4	Must have corresponding "Push"	0	
		Data Field Size must be Zero (0)	1	
General	F4	Global Item redundantly declared[3]	0	

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[1] Checked when main item encountered.

[2] Microsoft Constraint = A constraint in the HID Parser shipped with Win98, Win98 SE and Win2000.

[3] More than one global item with the same Item Tag declared between main items. Only the last global item declaration of a particular type declared prior to a main item counts, the rest are ignored and waste space in the report descriptor.

All Local item checks for errors and warnings are (except delimiters) are checked when the parser encounters the next main item. Delimiter error are checked when they are encountered.

Local Items

Item Name	Error Tag	Errors	Error Subcode	Warnings
Usage	08	Must be defined prior to any Input/Output/Feature items	0	Data field should be non-Zero
Usage Minimum	18	Must have a corresponding **Usage Maximum**	0	
		Must be less than or equal to Usage Maximum	1	
		Usage Page of an extended Usage Minimum must match the Usage Page of corresponding extended Usage Maximum	3	
Usage Maximum	28	Must have a corresponding "Usage Minimum"	0	
		Must be greater than or equal to Minimum	1	
		Usage Page of an extended Usage Maximum must match the Usage Page of corresponding extended Usage Minimum	2	
Designator Index	38			
Designator Minimum	48	Must have a corresponding **Designator Maximum**	0	
		Must be less than or equal to Maximum	1	
Designator Maximum	58	Must have a corresponding **Designator Minimum**	0	
		Must be greater than or equal to Minimum	1	
String Index	78			
String Minimum	88	Must have a corresponding **String Maximum**	0	
		Must be less than or equal to Maximum	1	
String Maximum	98	Must have a corresponding **String Minimum**	0	
		Must be greater than or equal to Minimum	1	
Delimiter	A8	Must be **Open** (0) or **Close** (1)	0	
		No Nesting of Delimited sets	1	
		Must be corresponding **Open** and **Close**	2	
		May only contain Usage, Usage Minimum and Usage Maximum local items	3	
		May not be declared for top-level application collections	4	

Main Items

Item Name	Error Tag	Errors	Error Subcode	Warnings
Input	80	Required Global/Local Items must be defined[4]	0	Data field reserved "flag" bits should be Zero (0)
		Cannot be contained within **Delimiter (Open)** and **Delimiter (Close)**	1	Local Items unused
		Logical Min/Max must be within bounds of **Report Size**[5]	2	Local Items used more than once
		Logical or Physical Maximum must be greater than respective Minimum	3	
Output	90	Required Global/Local Items must be defined[3]	0	Data field reserved "flag" bits should be Zero (0)
		Cannot be contained within **Delimiter (Open)** and **Delimiter (Close)**	1	Local Items unused
		Logical Min/Max must be within bounds of **Report Size**[4]	2	Local Items used more than once
		Logical or Physical Max must be greater than respective Min	3	
Feature	B0	Required Global/Local Items must be defined[3]	0	Data field reserved "flag" bits should be Zero (0)
		Cannot be contained within **Delimiter (Open)** and **Delimiter (Close)**	1	Local Items unused
		Logical Min/Max must be within bounds of **Report Size**[4]	2	Local Items used more than once
		Logical or Physical Max must be greater than respective Min	3	
Collection	A0	Must have a corresponding "End Collection"	0	Local Items unused
		Cannot be contained within "Set Delimiter Open" and "Set Delimiter Close"	1	Collection Type Unknown Reserved
		Application Collections can only be declared at top level	2	
End Collection	C0	Must have a corresponding "Collection"	0	Local Items unused
		Cannot be contained within "Set Delimiter Open" and "Set Delimiter Close"	1	Data size should be Zero
		Microsoft Constraint: The final size of all reports must be a multiple of 8 bits.	2	

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[4] Item Names in bold font are "required" items.

[5] The bit field declared by Report Size must be large enough to hold all values declared by Logical Minimum and Logical Maximum. This includes a sign bit if either are less than 0. Also if the Null flag is set then the field must be capable of reporting all values declared by Logical Minimum and Logical Maximum, and a null value.

HID Parser Error Code reporting

A standard method of reporting these errors and warnings as unique 16 bit error codes is:

Part **Description**

BmParserErrorCode Characteristics of this request

D15	Error Level	
	0 = Warning	
	1 = Error	
D14	Error Type	
	0 = Standard Error	
	1 = Vendor Defined Error	
D13..8	Error Subcode	
D7..0	Item Error Tag	

eg. Where the error code generated by a Report ID that Spans an application collection boundary is 0x4384:
Error Level = 1 (Error).
Error Sub Code = 0x03
Item Error Tag = 0x84