

NAME

vnaerr_error_fn_t – vector network analyzer library error reporting

SYNOPSIS

```
#include <vnaerr.h>

typedef enum vnaerr_category {
    VNAERR_SYSTEM,
    VNAERR_USAGE,
    VNAERR_VERSION,
    VNAERR_SYNTAX,
    VNAERR_WARNING,
    VNAERR_MATH,
    VNAERR_INTERNAL
} vnaerr_category_t;

typedef void vnaerr_error_fn_t(const char *message, void *error_arg, vnaerr_category_t category);
```

DESCRIPTION

Several vnacal library functions including **vnacal_create()**, **vnacal_load()**, and **vnadata_alloc()** take an optional function pointer, *error_fn*, which the library calls to report detailed error messages.

The *message* argument is a one-line error message without a newline character. Messages have some structure depending on the category, e.g. VNAERR_USAGE messages always begin with the name of the libvna function that failed followed by a colon. Similarly, VNAERR_SYNTAX messages always begin with the filename and line number where the syntax error was found. In general, though, messages are meant to be more human readable than machine parsible. Errors in the categories VNAERR_USAGE and VNAERR_INTERNAL indicate software bugs, thus their primary audience is code developers. These messages display the name of the function and debug data intended to help find the problem. Errors in other categories, however, indicate system errors or syntax errors in parsed files, etc., and are intended more for end users. These messages may still mention system functions such as malloc, but avoid giving library function names and other details meaningful only to someone looking at source code.

The **error_arg** argument is a pointer to arbitrary user data passed through to the error function. This is useful to pass context information to the error handler without having to use global variables.

The *category* argument to *error_fn()* provides a broad categorization of the error. It can be any of the following values:

VNAERR_SYSTEM

A library function such as **malloc()** or **fopen()** failed. The message begins with the name of the function that failed, any necessary context information such as a filename, and the system error message. Example:

```
“fopen: testdata.s2p: No such file or directory”
```

VNAERR_USAGE

A libvna function was called with an invalid argument or invalid combination of arguments. The message begins with the name of the libvna function followed by a description of the problem. Example:

```
“vnadata_set_file_type: -7: invalid type”
```

VNAERR_VERSION

A file given to **vnacal_load()** or **vnadata_load()** has a version number unknown to the library. Example:

```
mycalfile.vnacal (line 1) error: unsupported version 9.0
```

VNAERR_SYNTAX

A file given to **vnacal_load()** or **vnadata_load()** contains a syntax error, has missing or conflicting information, or is otherwise not well-formed. Example:

“data.s2p (line 70) error: expected 9 fields; found 10”

VNAERR_WARNING

The library detected something unexpected but not serious enough to report failure. Example:

“myfile.ts (line 1) warning: file contains dubious [Version] 1.0 line”

VNAERR_MATH

The library detected a singular matrix or a numerical solution did not converge. Example:

“vnacal_new_add_double_reflect: 'a' matrix is singular at frequency index 5”

VNAERR_INTERNAL

The library detected an internal inconsistency. The message starts with the internal function that failed followed by details useful to a developer to find and fix the problem. Example:

“_add_properties: vnproperty_list_get: mycal.vnacal: Invalid argument”

Whether or not a non-NULL *error_fn* argument was supplied, the library functions set **errno** before returning failure as shown in the following table:

Category	errno
VNAERR_SYSTEM	system errno
VNAERR_USAGE	EINVAL
VNAERR_VERSION	ENOPROTOOPT
VNAERR_SYNTAX	EBADMSG
VNAERR_WARNING	0
VNAERR_MATH	EDOM
VNAERR_INTERNAL	ENOSYS

The library sets **errno** before calling *error_fn* and again before returning failure from a library function.

SEE ALSO

vnacal(3), **vnadata(3)**, **vnacal_property(3)**