**Computer Access Technology Corporation**

2403 Walsh Avenue, Santa Clara, CA 95051-1302 Tel: +1/408.727.6600 Fax: +1/408.727.6622

# IB*Tracer*

# Verification Script Engine

# User Manual

IB*Tracer* VSE Manual Version 1.0

**For IB*Tracer* Software Version 2.2 or Higher**

1 November, 2002

# Table of Contents

## 1. Introduction

This document contains a description of the CATC's Verification Script Engine (VSE) – a new feature in the IBTracer software that allows users to create custom tests on Infiniband(IB) traffic, recorded on CATC's Infiniband protocol analyzers.

The VSE conveniently allows users to ask the IBTracer application to send some of desired "events" ( packets and some predefined notifications ) that occurred in the recorded IB trace to a special verification script written using CATC script language. The script then evaluates the sequence of events (timing, data or both) in accordance with user-defined conditions.

Using the VSE API, users can easily retrieve information about any field in IB packet headers, Link packets and MADs, make very complex timing calculations between different events in recorded trace, filter data in or out of the trace with dynamically changing filtering conditions, and display all interesting information in the special output window.

## 2. Verification Script Structure.

A varification script file should have extension *.dec, and be located in the subfolder ..\Scripts\VFScripts of the main IBTracer folder. Some other files might be included in the main script file using directive %include. (see CATC Script Language (CSL) manual for details)

The following schema can present the common structure of verification script:

```
#
#
#   VS1.dec
#
#   Verification script
#
#   Brief Description:
#   Verify something…
#


#############################################################################################
#                                        Module info
#
#############################################################################################
#       Filling of this block is necessary for proper verification script operation...
#
#############################################################################################

set ModuleType  = "Verification Script";        # Should be set for all verification scripts
set OutputType  = "VS";                         # Should be set for all verification scripts
set InputType   = "VS";                         # Should be set for all verification scripts
```

```
set DecoderType = "<Your VScript name>";        # Should be set for all verification scripts
set DecoderDesc = "<Your Verification Script description>"; # Optional

##############################################################################################
##########


#
# include main Verification Script Engine definitions
#
%include  "VSTools.inc"                        # Should be set for all verification scripts


##############################################################################################
#                              Global Variables and Constants                                #
##############################################################################################

# Define your verification script-specific global variables and constant in this section...
# (Optional)

    const MY_GLOBAL_CONSTANT = 10;
    set g_MyGlobalVariable   = 0;


##############################################################################################


##############################################################################################
#   OnStartScript()                                                                          #
##############################################################################################
#                                                                                            #
#        It is a main intialization routine for setting up all necessary                     #
#        script parameters before running the script.                                        #
#                                                                                            #
##############################################################################################


OnStartScript()
{
  ##########################################################################################
  # Specify in the body of this function initial values for global variables             #
  # and what kind of packets or trace events should be passed to the script.             #
  # ( By default, only MAD packets and Link state change events from both channels       #
  #  will be passed to the script.                                                       #
  #                                                                                      #
  #  For details - how to specify what kind of events should be passed to the script     #
  #  please see the topic 'sending functions'.                                           #
  #                                                                                      #
  #  OPTIONAL.                                                                           #
  ##########################################################################################



    # Uncomment the line below - if you want to disable output from
    # ReportText()-functions.
    #
    # DisableOutput();
}
```

```
##############################################################################
#   ProcessData()                                                            #
##############################################################################
#
#                                                                            #
##############################################################################
# It is a main script function called by the application when the next waited event  #
# occured in the evaluated trace.                                            #
#                                                                            #
# !!! REQUIRED !!! - MUST BE IMPLEMENTED IN VERIFICATION SCRIPT              #
##############################################################################
#                                                                            #
ProcessData()
{
    #
    # The function below will show specified message only one time -
    # no matter how many times ProcessData is called.
    #
    ShowStartPrompt("ShowStartPrompt\n");


    # Write the body of this function depending on your needs …


    return Complete();
}


##############################################################################
#   OnFinishScript()                                                         #
##############################################################################
#
##############################################################################
# It is a main script function called by the application when the script completed   #
# running. Specify in this function some resetting procedures for a successive run   #
# of this script.                                                            #
#                                                                            #
#  OPTIONAL.                                                                 #
##############################################################################
OnFinishScript()
{
    return 0;
}


##############################################################################



##############################################################################
#   Additional script functions.                                             #
##############################################################################
#                                                                            #
# Write your own script-specific functions here...                           #
#                                                                            #
##############################################################################
MyFunction( arg )
{
        if( arg == “Blah” ) return 1;
```

```
        return 0;
}
```

## 3. Interaction between IBTracer and verification script

The following describes how IBTracer interacts with a verification script to test an open trace:

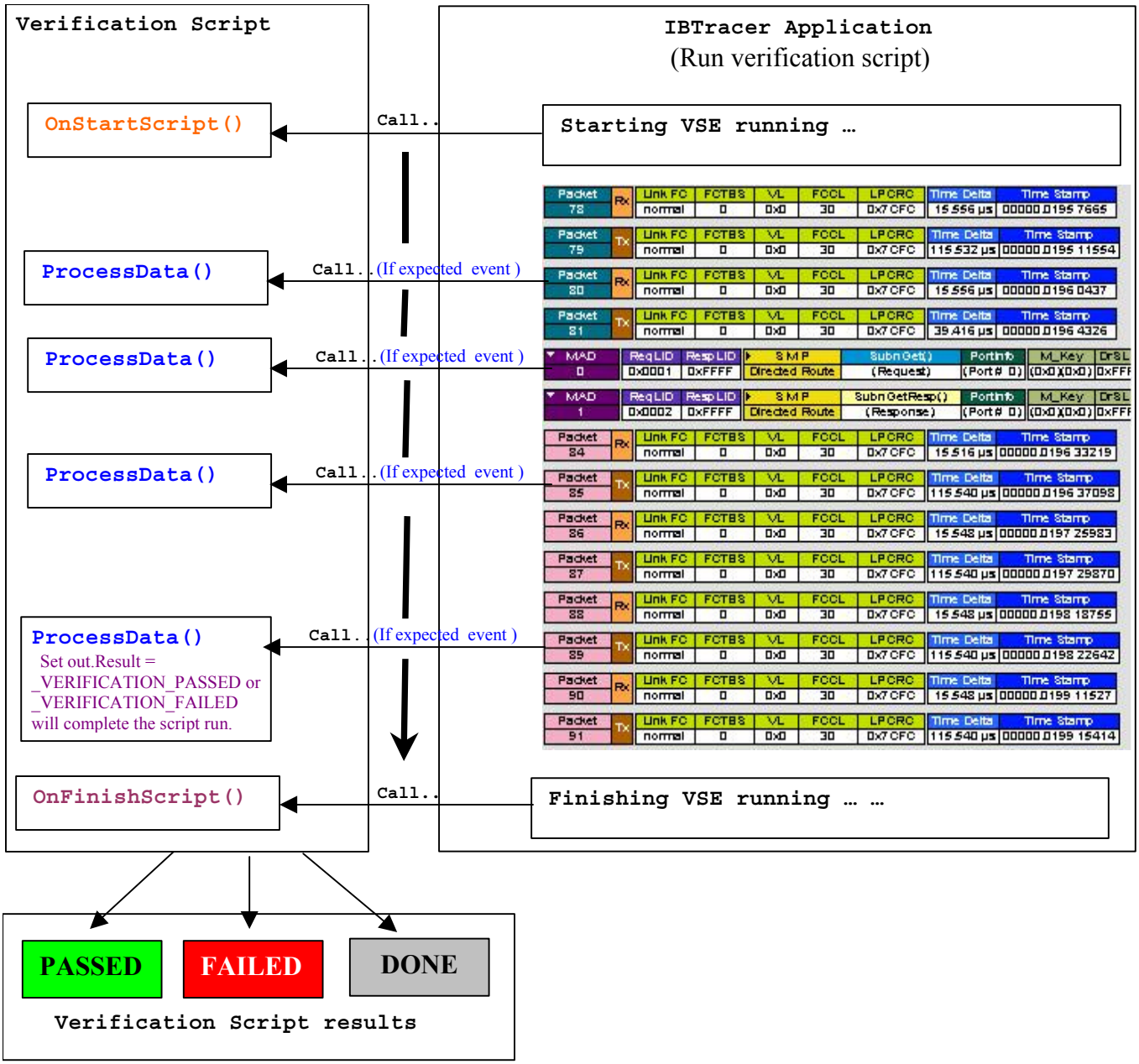
1. When a verification script is run, VSE looks for the function OnStartScript() and calls it if it is found. In the OnStartScript() function, setup routines can be created that can perform tasks such as specifying what kind of trace events should be passed to the script, and setting up initial values of global script-specific global variables.

2. VSE then goes through the recorded trace and checks if the current packet in the trace meets specified sending criteria – if the criteria are met, VSE calls the script's main processing function ProcessData() and provides input context variables to the script about the current event. (Please refer to the topic "Input context variables" below in this document for full description of verification script input context variables )

3. The ProcessData() function, which is present in all verification scripts, then processes whatever event has been sent to the script and verifies that the information in the event is appropriate for the current stage of the verification process. At the completion of each stage, the ProcessData() function determines if VSE should continue running the script or not. If the result for any given stage of the script is clear, the script tells VSE to complete execution of the script.
   The decision to terminate the test prior to evaluating the entire trace is controlled by the output context variable: out.Result = _VERIFICATION_PASSED or _VERIFICATION_FAILED.
   (Please refer to the topic "Output context variables" below in this document for full description of verification script output context variables)

4. When script running is finished, VSE looks for the function OnFinishScript() and calls it if it is found. In this function some resetting procedures can be done.

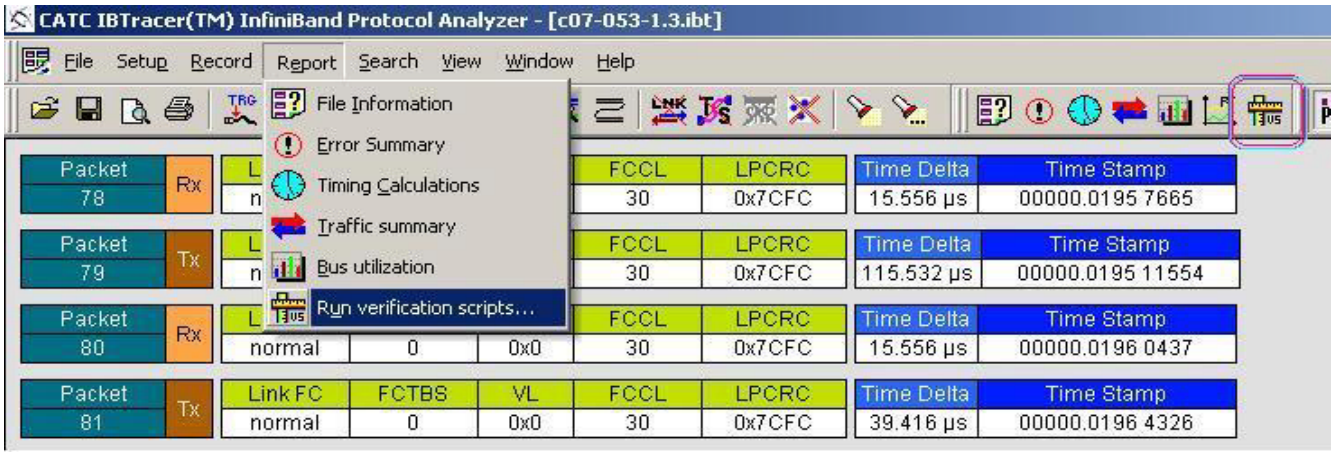
The following picture describes the interaction between the IBTracer application and the running verification script:



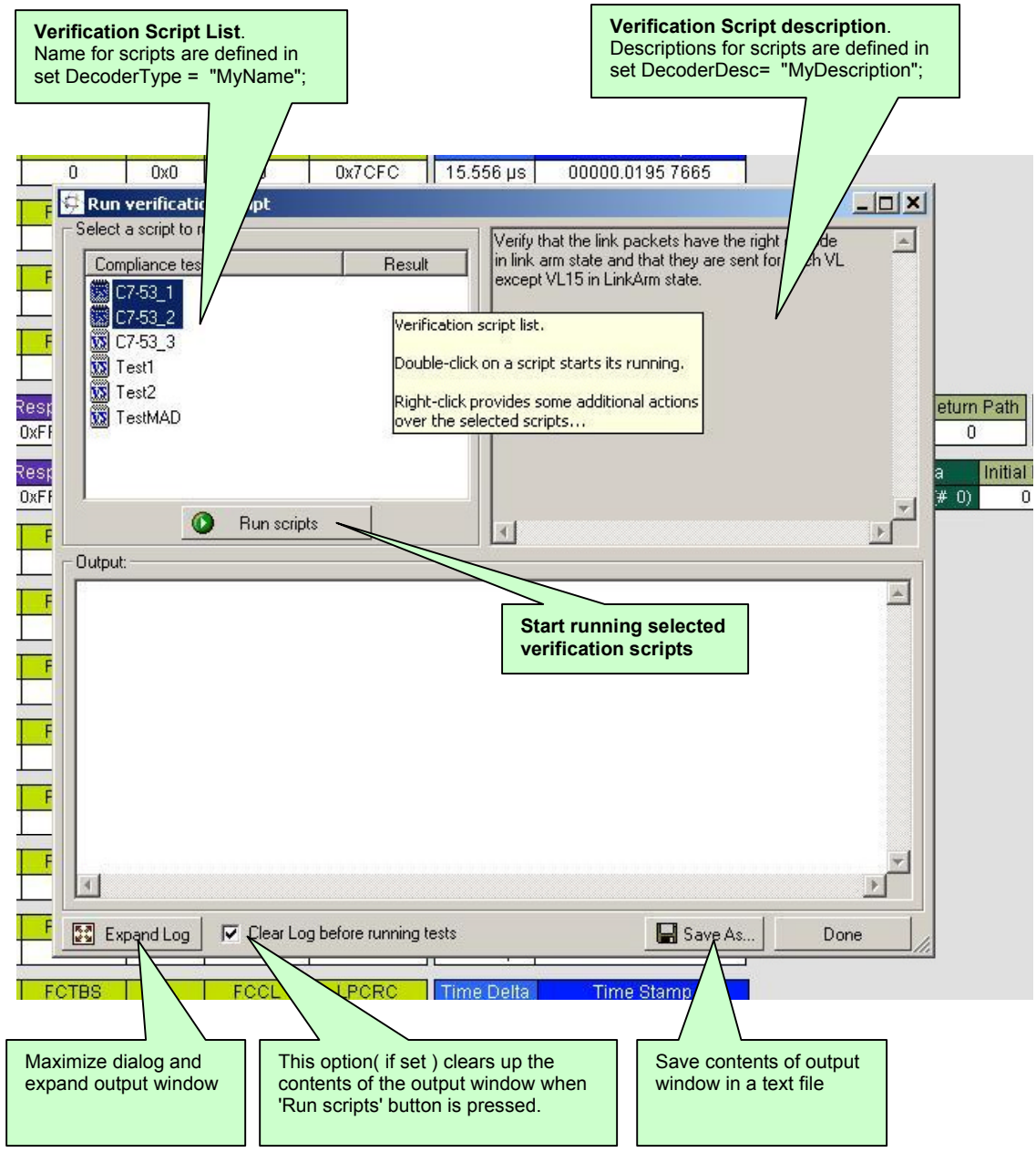

NOTE: Verification script result : <DONE> means that the script is intended solely for extracting and displaying some information from recorded traces and that the user does not care about the result . To specify that your script is intented only for the purposes of displaying information, call somewhere in your script ( in OnStartScript() - for instance ) function ScriptForDisplayOnly() )

## 4. Running verification scripts from IBTracer

To run a verification script over a trace –run the command **Report>Run verification scripts…** from the menu or push the button shown below on the main toolbar ( if it is not hidden ):

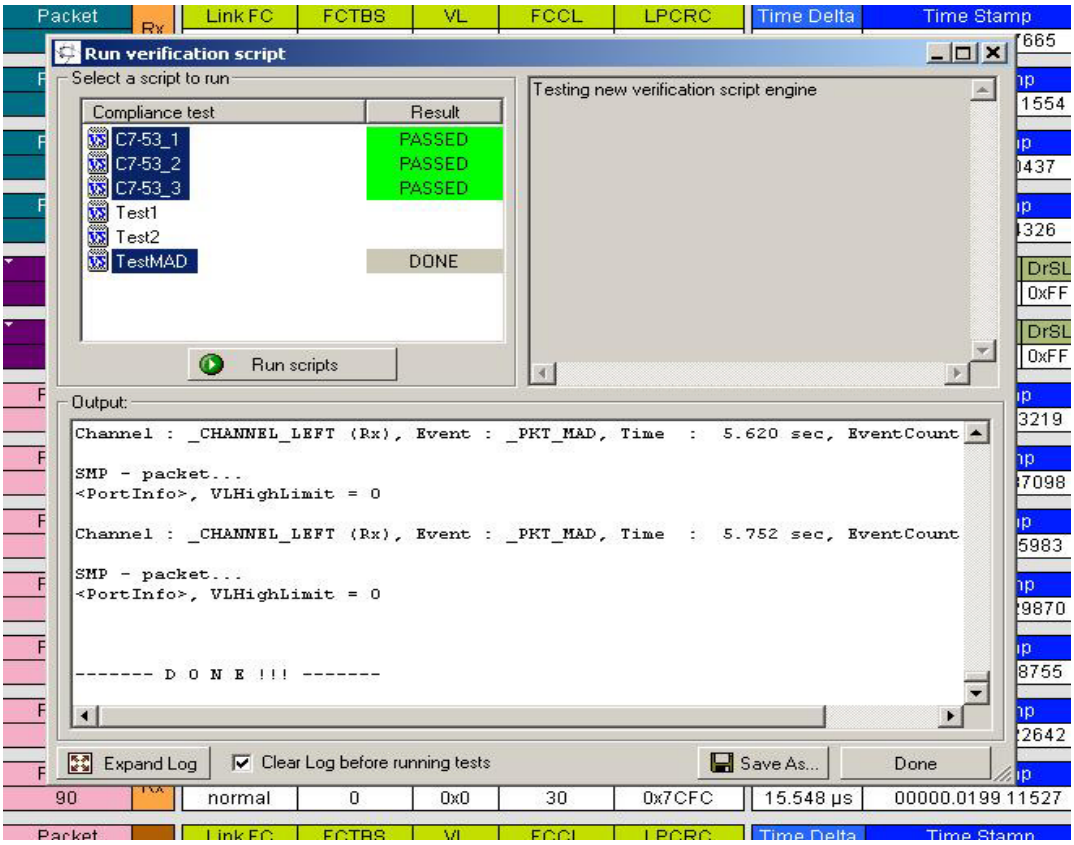



The special dialog will open inviting to choose and run one or several verification scripts:

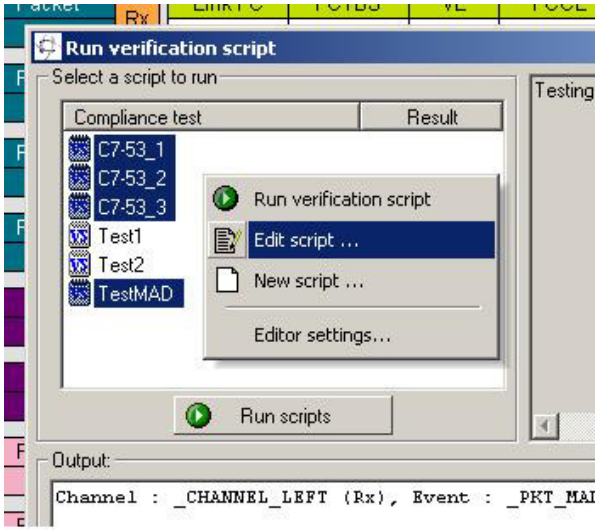



## 4.1 Running verification scripts.

Push the button ‘Run scripts’ after you selected desired scripts to run. VSE will start the selected verification scripts, show script report information in the output window and present results of verification in the script list:




Right-click in script list to open a pop-up menu with options for performing additional operations over selected scripts:



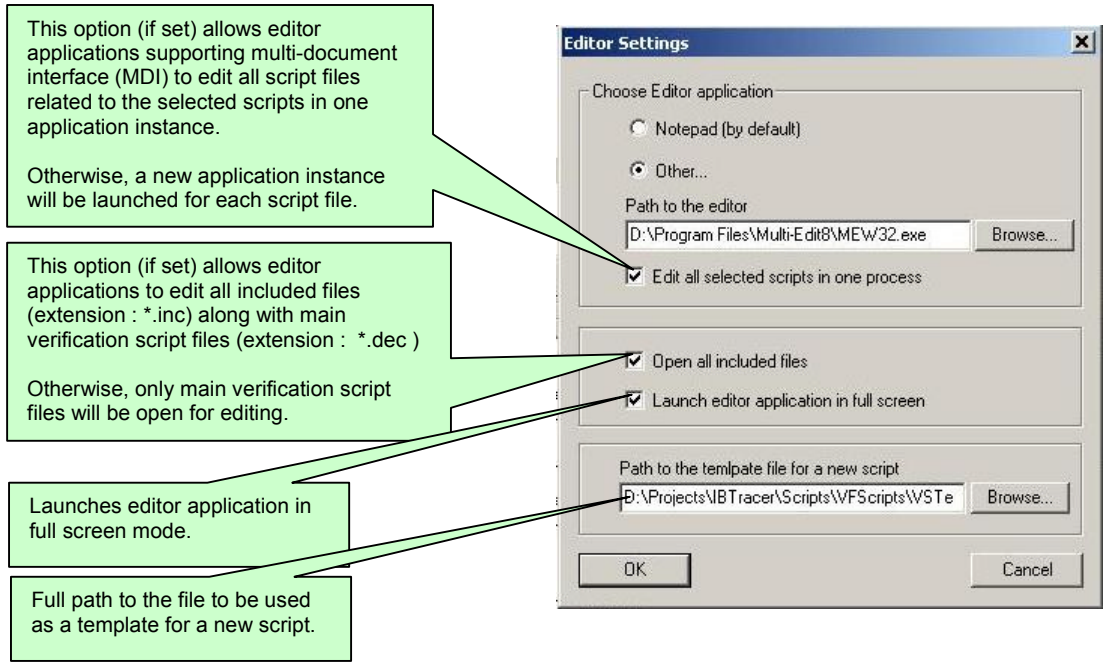

- **`Run verification script`** – starts running selected script.

- **`Edit script`** – allows you to edit selected scripts using whatever editor application has been specified in 'Editor settings'.

- **`New script`** – creates a new script file using the template specified in 'Editor settings'.
- **`Editor settings`** – allows to specify some settings for editing scripts and creating new ones.

### `4.2 Editor settings.`

After choosing 'Editor settings' the following dialog will appear:




## 5. Verification Script Engine Input Context members

All verification scripts have input contexts –special structures whose members are set by the script and can be used inside of the application. ( For more details about input contexts – please refer to the CATC Script Language(CSL) Manual ). The verification script input contexts have two sets of members:

- Trace event-independent set of members.
- Trace event -dependent set of members.

## 5.1 Trace event-independent set of members.

This set of members is defined and can be used for any event passed to script:

**in.Time** - time of the event( type : list, having format : 2 sec 125 ns -> [2 , 125])
**in.Channel** - channel where the event occured. ( can be _CHANNEL_LEFT or _CHANNEL_RIGHT indicating on which channel event occurred )
**in.TraceEvent** - type of trace events( application predefined constants are used. See list of possible events below )

## 5.2 Trace event-dependent set of members.

This set of members is defined and can be used only for a specific events or after calling some functions filling out some of variables:

### *5.2.1 All packet-specific set of members.*

( valid for any packets - but only after RetrievePktPayload()-function was called – see description of this function for details )

**in.Payload** - bit source of the packet payload ( you can extract any necessary information using GetNBits(), NextNBits() or PeekNBits() functions – please refer to CSL Manual for details about these functions )

**in.PayloadLength** - the length( in bytes of the retrieved packet payload )

### *5.2.2 Link packet-specific set of members.*

(valid for link packets only, undefined for other events )

**in.Opcode**
**in.VL**
**in.FCCL**
**in.FCTBS**
**in.LPCRC**

### *5.2.3 Link state change notification-specific set of members.*

(valid for Link State Change notifications only, undefined for other events )

**in.LinkStatePrev** - previous link state(Opcode)

`in.LinkStateCurr` - current link state(Opcode)

## 6. Verification Script Engine Output Context members

All verification scripts have output contexts –special structures whose members are set by the script and can be used inside of the application ( For more details about output contexts – please refer to the CATC Script Language(CSL) Manual ). The verification script output contexts have only one member:

`out.Result` - the result of the whole verification program defined in the verification script.

This member is supposed to have 3 values:
**_VERIFICATION_PROGRESS**,( is set by default when script starts running )
**_VERIFICATION_PASSED**,
**_VERIFICATION_FAILED**

The last two values should be set if you decide that recorded trace does ( or not ) satisfy the imposed verification conditions. In both cases the verification script will stop running.

If you don't specify any of those values - the result of script execution will be set as VERIFICATION_FAILED at exit.

## 7. Verification Script Engine events

VSE defines a large group of trace "events" – packets or special notifications – that can be passed to a verification script for evaluation or retrieving and displaying some contained information. The information about the type of event can be seen in in.TraceEvent. Please refer to the topic "Sending functions" in this manual for details about how to send events to scripts.

### 7.1 Packet events.

The table below shows current list of packet events and value of in.TraceEvent:

| Packet | in.TraceEvent |
|---|---|
| TS1 | _PKT_TS1 |
| TS2 | _PKT_TS2 |
| Link Packet | _PKT_LINK |
| MAD packets | _PKT_MAD |
| Reliable Connection packets | _PKT_RC |
| Reliable Datagram packets | _PKT_RD |
| Unreliable Connection packets | _PKT_UC |
| Unreliable Datagram packets | _PKT_UD |

| | |
|---|---|
| Skips | _PKT_SKIPS |

### 7.2 Notification events.

VSE defines a group of notification events that can be passed to a verification script for evaluation or for retrieving and displaying some contained information. The information about the type of event can be seen in in.TraceEvent. Please refer to the topic "Sending functions" in this manual for details about how to send events in scripts. The notification events are not the same as packets – they basically indicate that something changed in current stream of evaluated data.

The table below shows current list of packet events and value of in.TraceEvent:

| **Notification event** | **in.TraceEvent** |
|---|---|
| Physical link woke up from silence | _EVNT_CONNECT |
| Physical link came to silence (no physical signal) | _EVNT_DISCONNECT |
| Changing of Opcode in series of link packets | _EVNT_LINKSTATE_CHANGE |

## 8. Sending functions

This topic contains information about the special group of VSE functions designed to specify what kind of event verification script expects to receive.

### 8.1 SendChannel()

This function specifies that events occurred only on specified channel should be sent to script.

**Format** : `SendChannel( channel )`

**Parameters:** *channel* – This parameter can be one of following values:

_CHANNEL_LEFT – send events only from left channel
_CHANNEL_RIGHT – send events only from right channel
_CHANNEL_BOTH – send events from both channels

**Example:**

```
SendChannel( _CHANNEL_LEFT    ); # - send events from left channel
```

### 8.2 SendEvent ()

This function specifies what kind of events should be sent to script.

**Format** : **SendEvent( *event* )**

**Parameters:** *event* – This parameter can be combination of the following values:

| event value | Description |
|---|---|
| _PKT_TS1 | TS1 |
| _PKT_TS2 | TS2 |
| _PKT_LINK | Link Packet |
| _PKT_MAD | MAD packets |
| _PKT_RC | Reliable Connection packets |
| _PKT_RD | Reliable Datagram packets |
| _PKT_UC | Unreliable Connection packets |
| _PKT_UD | Unreliable Datagram packets |
| _PKT_SKIPS | Skips |
| _EVNT_CONNECT | Physical link woke up from silence |
| _EVNT_DISCONNECT | Physical link came to silence (no physical signal) |
| _EVNT_LINKSTATE_CHANGE | Changing of Opcode in series of link packets |

Some special values can be used covering large groups of events:

| | |
|---|---|
| _ALL_PACKETS | All possible packets |
| _ALL_EVENTS | All possible notification events |
| _ALL | All possible packets and notification events |

**Example:**

```
SendEvent( _PKT_LINK );                  # - send link packets
SendEvent( _PKT_LINK | _PKT_MAD  ); # - send link packets and MADs

SendEvent(_ALL_PACKETS | _EVNT_DISCONNECT );
# - send all possible packets and Disconnect notification
```

### 8.3 SendLinkPkt ()

This function specifies more precise tuning for sending link packets.

**Format** : `SendLinkPkt( opcode = _ALL, vl = _ALL )`

**Parameters:**

*opcode* – This parameter specifies that only link packets with this Opcode will be sent
( _ALL – means that link packets with all opcodes will be sent )

*vl* – This parameter specifies that only link packets with this VL will be sent
( _ALL – means that link packets with for all VLs will be sent )

**Example:**

```
SendLinkPkt();              # - send all link packets – equal to SendEvent( _PKT_LINK );
SendLinkPkt( 0x1 );         # - send all link packets with Opcode = 0x1
SendLinkPkt( 0x1  , 0x7 );  # - send all link packets with Opcode = 0x1 and VL = 0x7
SendLinkPkt( _ALL, 0x7 );  # - send all link packets with VL = 0x7
```

### 8.4 SendMAD ()

This function specifies more precise tuning for MAD packets.

```
Format : SendMAD( mgmtclass = _ALL,
                  attrId    = _ALL,
                  method    = _ALL,
                  field_name = "" , # means no care about field_name
                  field_value = 0 )
```

**Parameters:**

*mgmtclass* – This parameter specifies that only MADs with this management class will be sent
( _ALL – means that MADs with all management classes will be sent )

*attrId* – This parameter specifies that only MADs having AttributeId equal to *attrId* will be sent
( _ALL – means that MADs with any AttributeIds will be sent )

*method* – This parameter specifies that only MADs having Method equal to *method* will be sent
( _ALL – means that MADs with any Method will be sent )

*field_name* – This parameter specifies that only MADs having a field with *field_name* (how it is

shown in CATC trace) and value equal to *field_value* will be sent ( This field makes sense only if one of the previous parameters are not equal to _ALL )

*field_value* – This parameter specifies that only MADs having a field with *field_name* (how it is shown in CATC trace) and value equal to *field_value* will be sent ( This field makes sense only if one of the previous parameters are not equal to _ALL )

**NOTE: For fields having size more than 32 bits use raw binary values ( like : '0011223344556677FF') For more information about raw binary values please refer to CSL Manual.**

**Example:**

```
SendMAD()                                   # - send all MAD packets – equal to
                                            #  SendEvent( _PKT_MAD );

SendMAD (SMP_LIDROUTED);                    # - send SMP LID routed MADs
SendMAD ( _ALL  , PORT_INFO);               # - send PortInfo for all classes

SendMAD( SMP_DIRROUTED, PORT_INFO, GET_RESP, "GIDPrefix",
'FE80000000000000' );
#
# - send SMP Directed routed GetResp()  MADs with PortInfo: GIDPrefix =
FE80000000000000'


SendMAD (SMP_LIDROUTED, PORT_INFO, GET_RESP, “PortState”, PS_ARMED);
#
# - send SMP LID routed GetResp()  MADs with PortInfo:PortState = PS_ARMED
```

**NOTE : SMP_LIDROUTED, PORT_INFO , … are constant defined in file VS_constants.inc in ..\Scripts\VFScripts subfolder of main IBTracer folder.**

# 9. Timer functions

This group of functions covers VSE capability to work with timers -an internal routines that repeatedly measures a timing intervals between different events.

## 9.1 VSE time object

A VSE time object – is a special object that presents time intervals in verification scripts. From point of view of CSL - the verification script time object is a "list"-object of two elements : ( Please see CSL Manual for more details about CSL types )

```
[seconds, nanoseconds]
```

**NOTE: The best way to construct VSE time object is to use Time() function (see below ).**

## 9.2 SetTimer()

Starts timing calculation from the event where this function was called.

**Format** : `SendTimer( timer_id = 0)`

**Parameters:**

*timer_id* – a unique timer identifier.

**Example:**

```
SetTimer();      # - start timing for timer with id = 0;
SetTimer(23);    # - start timing for timer with id = 23;
```

**Remark :**

If this function is called second time for the same timer id – it resets timer and starts timing calculation again from the point where it was called.

## 9.3 KillTimer()

Stops timing calculation for a specific timer and frees related resources.

**Format** : `KillTimer( timer_id = 0)`

**Parameters:**

*timer_id* – a unique timer identifier.

**Example:**

```
KillTimer();        # - stop timing for timer with id = 0;
KillTimer(23);      # - stop timing for timer with id = 23;
```

### 9.4 GetTimerTime()

Retrieve timing interval from the specific timer

**Format** : `GetTimerTime ( timer_id = 0)`

**Parameters:**

*timer_id* – a unique timer identifier.

**Return values:**

Returns VSE time object from timer with id = timer_id.

**Example:**

```
GetTimerTime ();        # - Retrieve timing interval for timer with id = 0;
GetTimerTime (23);      # - Retrieve timing interval for timer with id = 23;
```

**Remark :**

This function, when called, doesn't reset timer.

## 10. Time construction functions

This group of functions is used to construct VSE time objects.

### 10.1 Time()

Constructs verification script time object.

**Format** : `Time(nanoseconds)`
`Time(seconds, nanoseconds)`

**Return values:**

First function returns *[0, nanoseconds]*, second one returns *[seconds, nanoseconds]*

**Parameters:**

*nanoseconds* – number of nanoseconds in specified time
*seconds* – number of seconds in specified time

**Example:**

```
Time ( 50 * 1000 );          # - create time object of 50 microseconds
Time (3, 100);               # - create time object of 3 seconds and 100 nanoseconds
Time( 3 * MICRO_SECS );  # - create time object of 3 microseconds
Time( 4 * MILLI_SECS    );  # - create time object of 4 milliseconds
```

**NOTE: MICRO_SECS and MILLI_SECS are constants defined in "VS_constants.inc".**

### 10.2 TimeFromSymbols()

Constructs VSE time object by integer value presenting number of IB symbols

**Format** : `TimeFromSymbols (symbols)`

**Return values:**

Returns VSE time object presenting time equal to *symbols* number of IB symbols.

**Parameters:**

*symbols* – number of IB symbols

**Example:**

```
TimeFromSymbols(300)  # - create time object equal to 300 IB symbols
```

## 11. Time calculation functions

This group of functions covers VSE capability to work with "time" – VSE time objects.

### 11.1 AddTime()

Adds two VSE time objects

**Format** : `AddTime(time1, time2)`

**Return values:**

Returns VSE time object presenting time interval equal to sum of time_1 and time_2

**Parameters:**

*time_1* - VSE time object presenting first time interval
*time_2* - VSE time object presenting second time interval

**Example:**

```
t1 = Time(100);
t2 = Time(2, 200);
t3 = AddTime( t1, t2 )  # - returns VSE time object = 2 sec 300 ns.
```

### 11.2 SubtractTime()

Subtract two VSE time objects

**Format** : `SubtractTime (time1, time2)`

**Return values:**

Returns VSE time object presenting time interval equal to subtraction of time_1 and time_2

**Parameters:**

*time_1* - VSE time object presenting first time interval
*time_2* - VSE time object presenting second time interval

**Example:**

```
t1 = Time(100);
t2 = Time(2, 200);
t3 = SubtractTime ( t2, t1 )  # - returns VSE time object = 2 sec 100 ns.
```

### 11.3 MulTimeByInt()

Multiplies VSE time object by integer value

**Format** : `MulTimeByInt (time, mult)`

**Return values:**

Returns VSE time object presenting time interval equal to time * mult

**Parameters:**

*time* - VSE time object
*mult* - multiplier, integer value

**Example:**

```
t   = Time(2, 200);
t1 = MulTimeByInt ( t, 2 )  # - returns VSE time object = 4 sec 400 ns.
```

### 11.4 DivTimeByInt()

Divides VSE time object by integer value

**Format** : `DivTimeByInt (time, div)`

**Return values:**

Returns VSE time object presenting time interval equal to time / div

**Parameters:**

*time* - VSE time object
*div* - divider, integer value

**Example:**

```
t   = Time(2, 200);
t1 = DivTimeByInt ( t, 2 )  # - returns VSE time object = 1 sec 100 ns.
```

## 12. Time logical functions

This group of functions covers VSE capability to compare VSE time objects

### 12.1 IsEqualTime()

Verifies that one VSE time object is equal to the other VSE time object

**Format** : `IsEqualTime (time1, time2)`

**Return values:**

Returns 1 if time_1 is equal to time_2,
returns 0 otherwise

**Parameters:**

*time_1* - VSE time object presenting first time interval
*time_2* - VSE time object presenting second time interval

**Example:**

```
t1 = Time(100);  t2 = Time(500);
```

```
If(  IsEqualTime( t1, t2 ) ) DoSomething();
```

### 12.2 IsLessTime()

Verifies that one VSE time object is less than the other VSE time object

**Format** : **IsLessTime (*time1, time2*)**

**Return values:**

Returns 1 if time_1 is less than time_2,
returns 0 otherwise

**Parameters:**

*time_1* - VSE time object presenting first time interval
*time_2* - VSE time object presenting second time interval

**Example:**

```
t1 = Time(100);  t2 = Time(500);
If(  IsLessTime ( t1, t2 ) ) DoSomething();
```

### 12.3 IsGreaterTime()

Verifies that one VSE time object is greater than the other VSE time object

**Format** : **IsGreaterTime (*time1, time2*)**

**Return values:**

Returns 1 if time_1 is greater than time_2,
returns 0 otherwise

**Parameters:**

*time_1* - VSE time object presenting first time interval
*time_2* - VSE time object presenting second time interval

**Example:**

```
t1 = Time(100);  t2 = Time(500);
If(  IsGreaterTime ( t1, t2 ) ) DoSomething();
```

## 13. Time text functions

This group of functions covers VSE capability to convert VSE time objects into text strings.

### 13.1 `TimeToText()`

Converts a VSE time object into text.

**Format** : `TimeToText (time)`

**Return values:**

Returns text representation of VSE time object

**Parameters:**

*time* - VSE time object

**Example:**

```
t = Time(100);
ReportText( TimeToText(t) ); # see below details for ReportText() function
```

## 14. Output functions

This group of functions covers VSE capability to present information in the output window.

### 14.1 `ReportText()`

Outputs text in the output window if output is enabled

**Format** : `ReportText (time)`

**Parameters:**

*time* - VSE time object

**Example:**

```
t = Time(100)
ReportText ( t );
```

### 14.2 EnableOutput()

Enables showing information in the output window.

**Format** : `EnableOutput ()`

**Example:**

```
EnableOutput ( );
```

### 14.3 DisableOutput()

Disables showing information in the output window.

**Format** : `DisableOutput ()`

**Example:**

```
DisableOutput ();
```

## 15. Common Retrieving functions

This group of functions covers VSE capability to retrieve information from the recorded trace.

### 15.1 RetrievePktPayload()

Retrieves the packet payload inside the script and makes valid two input context members :
in.Payload - the bit source of the packet payload and
in.PayloadLength - the length(in bytes of the retrieved packet payload)

**Format** : `RetrievePktPayload ()`

**Example:**

```
RetrievePktPayload ( );    # actualize input context packet payload related members
val = GetNBits( in.Payload, 128, 8 ); # retrieve one byte from packet payload starting
                                      # from offset 16 bytes
```

**Remark :**

Before calling this function - in.Payload and in.PayloadLength are empty but some other retrieving functions can be used to receive all information about fields in link packets, packet headers and MAD decoded fields.

### 15.2 IsMad()

Verifies that current event is MAD

**Format** : `IsMad()`

**Example:**

```
if( IsMad() )  DoSomething();
```

## 16. Packet Header retrieving functions

This group of functions covers VSE capability to extract information about IB packet header fields. If the header is not present in the packet – all of those functions will return null-value ( see CSL Manual –for details about null-value ).

### 16.1 GetLRHField()

Extracts information about LRH header field

**Format** : `GetLRHField ( lrh_fld )`

**Parameters:**

*lrh_fld* - LRH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _VL | Virtual Lane |
| _LVER | Link version |
| _SL | Service Level |
| _DLID | Destination LID |
| _SLID | Source LID |
| _PLEN | Packet length |
| _LNH | Link next header field |

**Example:**

```
val  = GetLRHField (_VL ); # extract VL field from LRH header
```

### 16.2 GetBTHField()

Extracts information about BTH header field

**Format** : `GetBTHField ( bth_fld )`

**Parameters:**

*bth_fld* - BTH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _OPCODE | Operation Code |
| _SE | Solicit Event |
| _M | Migration State |
| _PAD | Length of pad |
| _THVER | Transport version |
| _P_KEY | Partition Key |
| _DESTQP | Destination QP |
| _A | Answer bit |
| _PSN | Packet Sequence Number |

**Example:**

```
val  = GetBTHField (_DESTQP); # extract DestQP field from BTH header
```

### 16.3 GetGRHField()

Extracts information about GRH header field

**Format** : `GetGRHField ( grh_fld )`

**Parameters:**

*grh_fld* - GRH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _IPVER | IP Version |
| _TCLASS | Traffic Class |
| _FLOWLABEL | Flow Label |
| _PAYLEN | Payload length |
| _NXTHDR | Next Header |
| _HOPLMT | Hop Limit |
| _SGID_0_3 | Source GID (bytes 0-3) |
| _SGID_4_7 | Source GID (bytes 4-7) |
| _SGID_8_11 | Source GID (bytes 8-11) |
| _SGID_12_15 | Source GID (bytes 12-15) |

| | |
|---|---|
| _DGID_0_3 | Destination GID (bytes 0-3) |
| _DGID_4_7 | Destination GID (bytes 4-7) |
| _DGID_8_11 | Destination GID (bytes 8-11) |
| _DGID_12_15 | Destination GID (bytes 12-15) |

**Example:**

```
val  = GetGRHField (_IPVER  ); # extract IPVersion field from GTH header
```

### 16.4 GetDETHField()

Extracts information about DETH header field

**Format** : `GetDETHField ( deth_fld )`

**Parameters:**

*deth_fld* - DETH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _Q_KEY | Queue Key |
| _SRCQP | Source QP |

**Example:**

```
val  = GetDETHField (_Q_KEY); # extract QKey field from DETH header
```

### 16.5 GetRETHField()

Extracts information about RETH header field

**Format** : `GetRETHField ( reth_fld )`

**Parameters:**

*reth_fld* - RETH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _VA_0_3 | Virtual Address (bytes 0-3) |
| _VA_4_7 | Virtual Address (bytes 4-7) |
| _R_KEY | Remote Key |
| _DMALEN | DMA Length |

**Example:**

```
val  = GetRETHField (_DMALEN); # extract DMALen field from RETH header
```

### 16.6 GetAtomicETHField()

Extracts information about AtomicETH header field

**Format** : `GetAtomicETHField ( aeth_fld )`

**Parameters:**

*aeth_fld* - AtomicETH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _VA_0_3 | Virtual Address (bytes 0-3) |
| _VA_4_7 | Virtual Address (bytes 4-7) |
| _R_KEY | Remote Key |
| _SWAPADDDATA_0_3 | Swap (or Add) Data (bytes 0-3) |
| _SWAPADDDATA_4_7 | Swap (or Add) Data (bytes 4-7) |
| _COMPAREDATA_0_3 | Compare Data (bytes 0-3) |
| _COMPAREDATA_4_7 | Compare Data (bytes 4-7) |

**Example:**

```
val  = GetAtomicETHField (_COMPAREDATA_0_3); # extract first word of CompareData field from AtomicETH header.
```

### 16.7 GetAtomicAckETHField()

Extracts information about AtomicAckETH header field

**Format** : `GetAtomicAckETHField ( aeth_fld )`

**Parameters:**

*aeth_fld* - AtomicAckETH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _ORIGREMDATA_0_3 | Original Remote Data (bytes 0-3) |
| _ORIGREMDATA_4_7 | Original Remote Data (bytes 4-7) |

**Example:**

```
val  = GetAtomicAckETHField (_ORIGREMDATA_0_3);
```

### 16.8 GetRDETHField()

Extracts information about AtomicAckETH header field

**Format** : `GetRDETHField ( rdeth_fld )`

**Parameters:**

*rdeth_fld* - RDETH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _EECONTEXT | EE-Context |

**Example:**

```
val  = GetRDETHField ( _EECONTEXT );
```

### 16.9 GetRWHField()

Extracts information about RWH header field

**Format** : `GetRWHField ( rwh_fld )`

**Parameters:**

*rwh_fld* - RWH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _ETHERTYPE | EtherType |

**Example:**

```
val  = GetRWHField( _ETHERTYPE ); # extract EtherType field from RWH header
```

### 16.10 GetPostHdrField()

Extracts information going after headers

**Format** : `GetPostHdrField ( posthdr_fld )`

**Parameters:**

*posthdr_fld* - RWH field identifier that can be one of the following values:

| Identifier | Meaning |
|---|---|
| _IMMDT | Immediate Data |
| _VCRC | VCRC |
| _ICRC | ICRC |

**Example:**

val = GetPostHdrField (_VCRC); # extract VCRC field

NOTE : If there are some reserved fields in headers – they can be retrieved by using some special keywords in header retrieving functions :

| Keyword | Length |
|---|---|
| _RES_1 | 1 bit field |
| _RES_2 | 2 bit field |
| _RES_5 | 5 bit field |
| _RES_7 | 7 bit field |
| _RES_8 | 8 bit field |
| _RES_16 | 16 bit field |

**Example:**

val = GetLRHField ( _RES_2 ); # extract reserved 2-bit field from LRH header

## 17. MAD decoded fields retrieving functions

This group of functions covers VSE capability to extract information about MAD decoded fields.

### 17.1 GetDecodedMADField()

Extracts information about MAD decoded field how it is shown in IBTracer trace view or "View MAD" dialog.

**Format** : `GetDecodedMADField ( mad_fld_name )`

**Parameters:**

*mad_fld_name* - name of the MAD field supposedly existing in the MAD being processed:

**Return Values:**

The text value of the decoded field how it is seen in the trace if field name asked is present in current MAD, empty string otherwise.

**Example:**

```
str  = GetDecodedMADField (“PortState”); # extract the decoded value of PortState
                                          # field.
```

**Remark:**

The name of field should be exactly the same as it seen in the trace ( case included )

### 17.2 GetHexMADField()

Extracts raw hexadecimal information about MAD decoded field.

**Format** : `GetHexMADField ( mad_fld_name )`

**Parameters:**

*mad_fld_name* - name of the MAD field supposedly existing in the MAD being processed:

**Return Values:**

If the field with the name asked is present in the current MAD - function returns the hex value of the decoded field ( integer value- if the length of field is less than 32 bits or raw binary value (list of bytes) - if the length of field is greater than 32 bits ), null-value if field was not found.

**Example:**

```
val  = GetHexMADField (“PortState”); # extract the hex value of PortState field.

# extract the hex value of GIDPrefix field.
if( GetHexMADField ( "GIDPrefix" ) ==  'FE80000000000000' )
        ReportText( "GIDPrefix = FE80-0000-0000-0000");
```

**Remark:**

The name of field should be exactly the same as it seen in the trace ( case included )

# 18. Miscellaneous functions

### 18.1 ScriptForDisplayOnly()

Specifies that the script is designed for displaying information only and that its author doesn't care about verification script result. Such a script will have a result <DONE> after execution.

**Format** : `ScriptForDisplayOnly ()`

**Example:**

```
ScriptForDisplayOnly();
```

### 18.2 Sleep()

Asks VSE not to send any events to a script until the timestamp of the next event is greater than timestamp of current event plus sleeping time.

**Format** : `Sleep( time )`

**Parameters:**

*time* - VSE time object specifying sleep time

**Example:**

```
Sleep ( Time(1000) ); # Don't send any event occurred during 1 microsecond from the current event
```

**NOTE : Some other useful miscellaneous functions can be found in the file : VSTools.inc**

# 19. The VSE important script files

The VSE working files are located in ..\Scripts\VFScripts subfolder of the main IBTracer folder. The current version of VSE includes following files:

| File | Description |
|---|---|
| ***VSTools.inc*** | main VSE file containing definitions of VSE script functions |
| ***VS_constants.inc*** | file containing definitions of some important VSE global constants |
| ***VSTemplate.de_*** | template file for new verification scripts with detailed comments |
| ***VSTemplateSimple.de_*** | template file for new verification scripts with just a few comments |
| | |
| ***VSUser_globals.inc*** | file of user global variables and constants definitions |

# Appendix A
# How to Contact CATC

| **TYPE OF SERVICE** | **CONTRACT** |
|---|---|
| Call for technical support… | US and Canada: 1 (800) 909-2282<br>Worldwide: 1 (408) 727-6600 |
| Fax your questions… | Worldwide: 1 (408) 727-6622 |
| Write a letter … | Computer Access Technology Corporation<br>Customer Support<br>2403 Walsh Avenue<br>Santa Clara, CA 95051-1302 |
| Send e-mail… | support@CATC.com |
| Visit CATC's web site… | http://www.CATC.com/ |

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