**UART MONITOR** –Quick Reference

**MONITOR**

For general information see UVVM VVC Framework Essential Mechanisms located in uvvm\_vvc\_framework/doc.

UART Monitor Configuration record **´t\_uart\_monitor\_config´ **is accessible via shared variable array **shared\_uart\_monitor\_config(channel, instance)**. The UART transaction information is located in **‘t\_transaction\_group’** accessible via global signal array **global\_uart\_monitor\_transaction(channel, instance)**.

*uart\_monitor.vhd*

**t\_uart\_monitor\_config**

Record hierarchy of **‘t\_transaction\_group’ –** accessible via global\_uart\_monitor\_transaction

|  |  |
| --- | --- |
| **Record element** | **Type** |
| 🡪 bt | t\_transaction |
| 🡪 operation | t\_operation |
| 🡪 data | std\_logic\_vector |
| 🡪 vvc\_meta1 | t\_vvc\_meta |
| 🡪 transaction\_status | t\_transaction\_status |
| 🡪 error\_info | t\_error\_info |
| 🡪 parity\_bit\_error | boolean |
| 🡪 stop\_bit\_error | boolean |
| 🡪 ct | t\_transaction |
|  |  |

Message IDs for UART Monitor

|  |  |
| --- | --- |
| **Message ID** | **Description** |
| ID\_FRAME\_INITIATE | Logs start of UART frame. |
| ID\_MONITOR | Logs information about monitored transaction. |

|  |  |  |
| --- | --- | --- |
| **Record element** | **Type** | **C\_UART\_MONITOR\_CONFIG\_DEFAULT** |
| scope\_name | string |  |
| msg\_id\_panel | t\_msg\_id\_panel | C\_UART\_MONITOR\_MSG\_ID\_PANEL\_DEFAULT |
| interface\_config | t\_uart\_interface\_config | C\_UART\_MONITOR\_INTERFACE\_CONFIG\_DEFAULT |
| transaction\_display\_time | time | 0 ns |

**t\_uart\_interface\_config**

|  |  |  |
| --- | --- | --- |
| **Record element** | **Type** | **Description** |
| bit\_time | time | The time used to transfer one bit. | |
| num\_data\_bits | positive range 7 to 8 | Number of data bits. |
| parity | t\_parity | The parity used, PARITY\_ODD or PARITY\_EVEN. |
| num\_stop\_bits | t\_stop\_bits | Number of stop bits, STOP\_BITS\_ONE, STOP\_BIT\_ONE\_AND\_HALF or STOP\_BITS\_TWO. |

**t\_transaction**

|  |  |  |
| --- | --- | --- |
| **Record element** | **Type** | **Description** |
| operation | t\_operation | Operation on UART line, TRANSMIT, RECEIVE or NO\_OPERATION. | |
| data | std\_logic\_vector | UART data. | |
| vvc\_meta1 | t\_vvc\_meta | Only used by VVC. |
| transaction\_status | t\_transaction\_status | Status of transaction, SUCCEEDED, FAILED, INACTIVE or IN\_PROGRESS. |
| error\_info | t\_error\_info | Error information when failed transaction. |

**t\_error\_info**

|  |  |  |
| --- | --- | --- |
| **Record element** | **Type** | **Description** |
| parity\_bit\_error | boolean | True if parity error detected. |
| stop\_bit\_error | boolean | True if stop bit error detected. |



1vvc\_meta only applies for the VVC

Monitor entity signals

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Direction** | **Description** |
| uart\_dut\_rx | std\_logic | Input | Input of DUTs UART RX signal. |
| uart\_dut\_tx | std\_logic | Input | Input of DUTs UART TX signal. |

Monitor entity generic constants

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Default** | **Description** |
| GC\_INSTANCE\_IDX | natural | 1 | Instance number to assign the monitor. |
| GC\_MONITOR\_CONFIG | t\_uart\_monitor\_config | C\_UART\_MONITOR\_CONFIG\_DEFAULT | Configuration of the UART monitor, both channels get initiated with this configuration. |

# Use of the monitor Direct Transaction Transfer (DTT) signal

All transaction information from the UART Monitor is located in the DTT global signal **global\_uart\_monitor\_transaction(channel, instance).**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Example(s)** | **Description** |
| global\_uart\_monitor\_transaction(channel, instance\_idx) | t\_uart\_transaction\_array | global\_uart\_monitor\_transaction(RX, 1) | Global signal containing all UART Monitor transaction information. |
| channel | t\_channel | TX, RX | The interface channel of the monitor instance |
| instance\_idx | natural | 1,2, etc. | Instance number of the monitor |

An example of use of the global\_uart\_monitor\_transaction signal is seen below. A process extracts the DTT data from the global signal.

p\_monitor\_tx : process

variable v\_transaction : t\_uart\_transaction;

begin

wait until (global\_uart\_monitor\_transaction(TX, 1).bt.transaction\_status = SUCCEEDED or

global\_uart\_monitor\_transaction(TX, 1).bt.transaction\_status = FAILED);

v\_transaction := global\_uart\_monitor\_transaction(TX, 1).bt;

-- Processing received transaction

...

end process p\_monitor\_tx;

Monitor details

# Monitor Configuration

|  |  |  |  |
| --- | --- | --- | --- |
| **Record element** | **Type** | **C\_UART\_MONITOR\_CONFIG\_DEFAULT** | **Description** |
| scope\_name | string |  | A string describing the scope from which the log/alert originates. |
| msg\_id\_panel | t\_msg\_id\_panel | C\_UART\_MONITOR\_MSG\_ID\_PANEL\_DEFAULT | The message id panel used by the monitor instance. |
| interface\_config | t\_uart\_interface\_config | C\_UART\_MONITOR\_INTERFACE\_CONFIG\_DEFAULT | The configuration for the interface. |
| transaction\_display\_time | time | 0 ns | After this amount of time operation is set to NO\_OPERATION and transaction\_status is set to INACTIVE if not a new transaction is received. If set to 0 ns operation and transaction\_status will be unchanged until the next transfer is started. |

The configuration record can be accessed from the Central Testbench Sequencer through the shared variable array, e.g.:

shared\_uart\_monitor\_config(TX, 1).msg\_id\_panel := new\_msg\_id\_panel;

shared\_uart\_monitor\_config(TX, 1).interface\_config.num\_data\_bits := 8;

# Additional Documentation

Additional documentation about UVVM and its features can be found under “/uvvm\_vvc\_framework/doc/”.

For additional documentation on the UART protocol, please see the UART specification.

# Compilation

The UART Monitor must be compiled with VHDL 2008.   
It is dependent on the following libraries

* ***UVVM Utility Library (UVVM-Util), version 2.10.0 and up***
* ***UVVM VVC Framework, version 2.7.0 and up***
* ***UART BFM***

Before compiling the UART Monitor, make sure that uvvm\_vvc\_framework and uvvm\_util have been compiled.

See UVVM Essential Mechanisms located in uvvm\_vvc\_framework/doc for information about compile scripts.

**Compile order for the UART Monitor:**

|  |  |  |
| --- | --- | --- |
| **Compile to library** | **File** | **Comment** |
| bitvis\_vip\_uart | transaction\_pkg.vhd | UART transaction types |
| bitvis\_vip\_uart | uart\_bfm\_pkg.vhd | UART BFM |
| bitvis\_vip\_uart | vvc\_cmd\_pkg.vhd | UART VVC command types and operations |
| bitvis\_vip\_uart | monitor\_cmd\_pkg.vhd | UART Monitor command types and operations |
| bitvis\_vip\_uart | ../uvvm\_vvc\_framework/src\_target\_dependent/td\_target\_support\_pkg.vhd | UVVM VVC target support package, compiled into the UART VIP library. |
| bitvis\_vip\_uart | vvc\_methods\_pkg.vhd | UART VVC methods |
| bitvis\_vip\_uart | uart\_monitor.vhd | UART Monitor |

# Simulator compatibility and setup

This Monitor has been compiled and tested with Modelsim version 10.5b and Riviera-PRO version 2015.10.85.

For required simulator setup see ***UVVM-Util*** Quick reference.

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