

Exostiv Blade Client

User's Guide

Rev. 1.0.2 - March 13, 2025

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Revision History

Revision	Modifications
1.0.0	<ul style="list-style-type: none">Initial revision
1.0.1	<ul style="list-style-type: none">Minor corrections
1.0.2	<ul style="list-style-type: none">Added client controls overview for extended width IP

Introduction - Requirements for using the Exostiv Blade Client

The Exostiv Blade Client is the interface used to capture and analyze data from a running FPGA with Exostiv Blade, which is available in various form factors.



The Exostiv Blade Client window is configured to match the objects and settings defined with the Exostiv IP generation and insertion. These settings are defined (and the IP generated) with the Exostiv Core Inserter application. Using these settings simply consists in loading the same .bpf project file into the Exostiv Blade Client application. Each Exostiv Blade Client application controls one IP instance inserted into the target system. Advanced synchronization of multiple Exostiv Blade Clients can be done with the programmable Python API. This document details the functionalities and controls provided by the Exostiv Blade Client in its graphical user interface (GUI).

Each Exostiv IP that was generated with the Exostiv Core Inserter has got a unique identification number. This ID is used when connecting the Exostiv Blade to the target FPGA to check if the project that is loaded in the Exostiv Blade Client software corresponds to the Exostiv IP loaded in the target FPGA.

The functionalities provided by the Exostiv Blade Client depend on the generated IP – as controls depend on the IP features. Consequently, as more IP types are provided with the Exostiv Core Inserter, new control types will be provided in the Exostiv Blade Client.

Here are the cases when Exostiv Blade Client **will not be usable**:

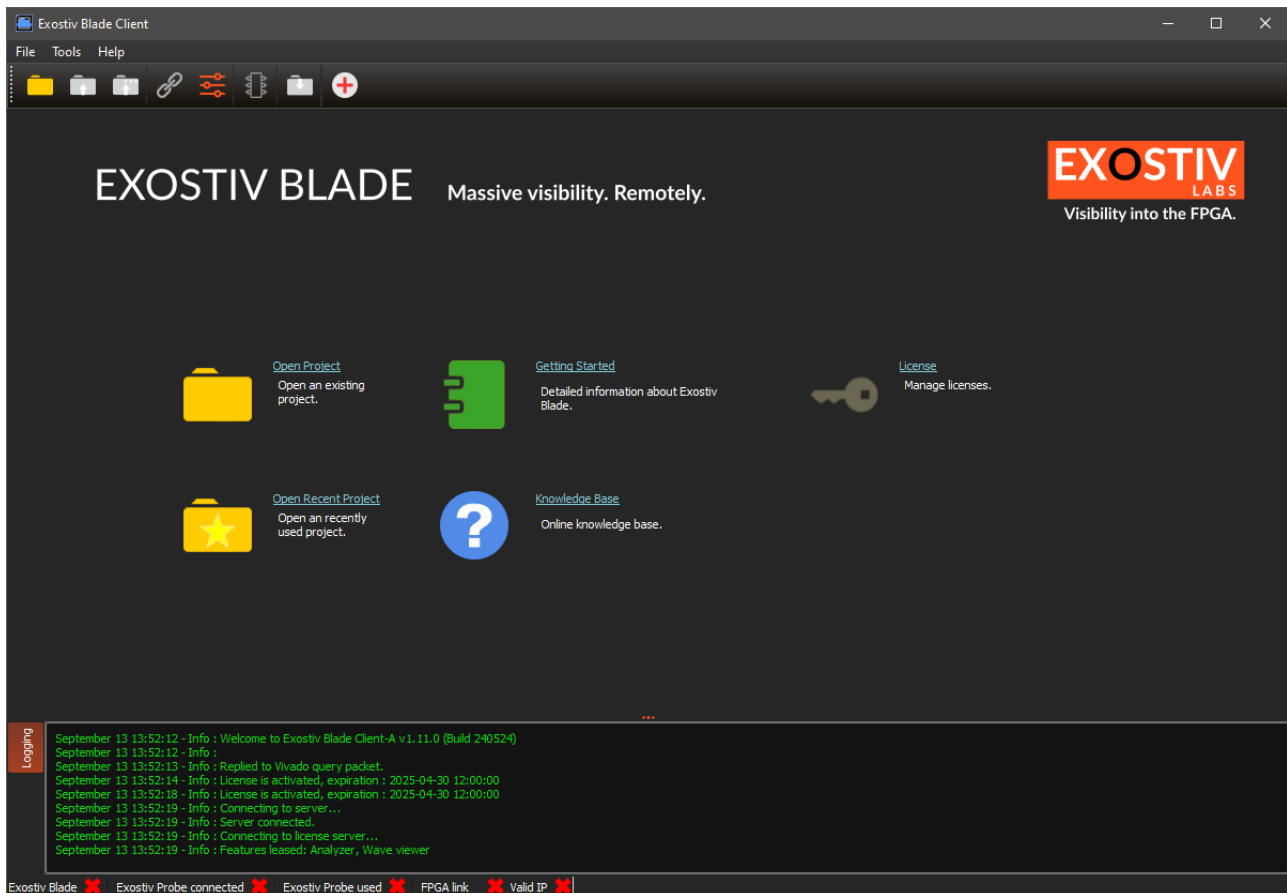
- **There is no 'project' defined:** in such a case, there is Exostiv IP defined and hence, the probe cannot be connected to the target FPGA. Exostiv Blade Client does not have any valid setting about the capture units and data sets of the target design.
- **The Exostiv IP core has not been synthesized nor implemented in the target FPGA:** in such a case, there may exist some projects settings, but there is no implementation of the target design instrumented with the Exostiv IP. Exostiv Blade won't be able to connect.
- **The project settings have been modified but the Exostiv IP core has not been synthesized or there is no implementation of the newly instrumented target FPGA:** in such a case, the project does not match the settings of the IP core that is loaded in the FPGA (if any). Exostiv Blade won't be able to connect.

➔ ***Check the documentation about the Exostiv Core Inserter application to know how to synthesize Exostiv IP and implement the instrumented design.***

- **The project that's loaded in Exostiv Blade Client does not match the Exostiv IP loaded in the target FPGA:** in such a case, the projects settings do not match the IP settings and the Probe won't connect. Therefore, the Exostiv Blade Client won't be usable.

➔ ***Please load the target FPGA with the configuration file that corresponds to the active project in Exostiv Blade Client.***

Exostiv Blade Client – Welcome screen



From the welcome screen, a project file can be loaded (Open Project > file with extension .bpf). Project files are created with the Exostiv Core Inserter application.

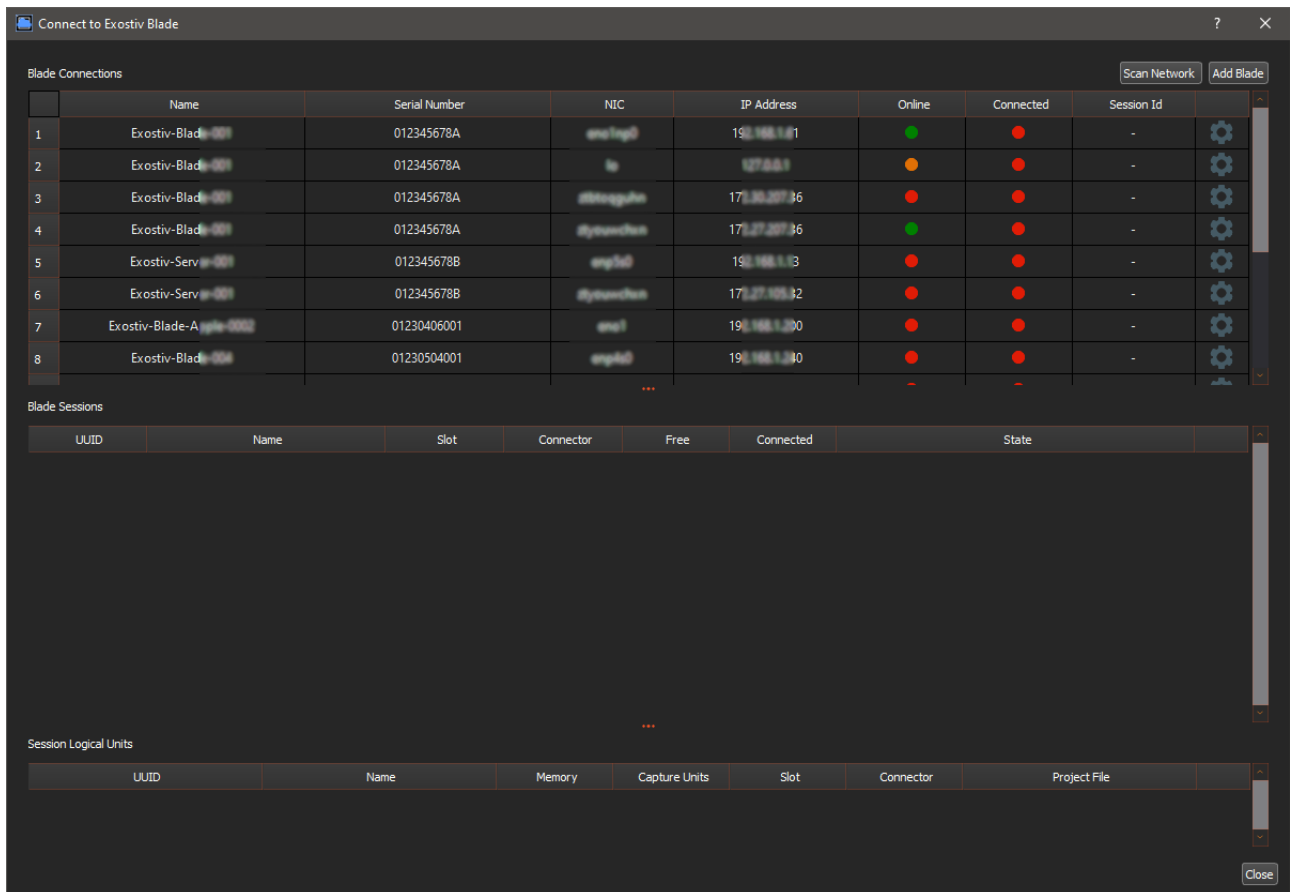
The main tool bar is available at the top of the window. Some functionalities are not available until there is a connection with an Exostiv Blade unit.

Connection with Blade

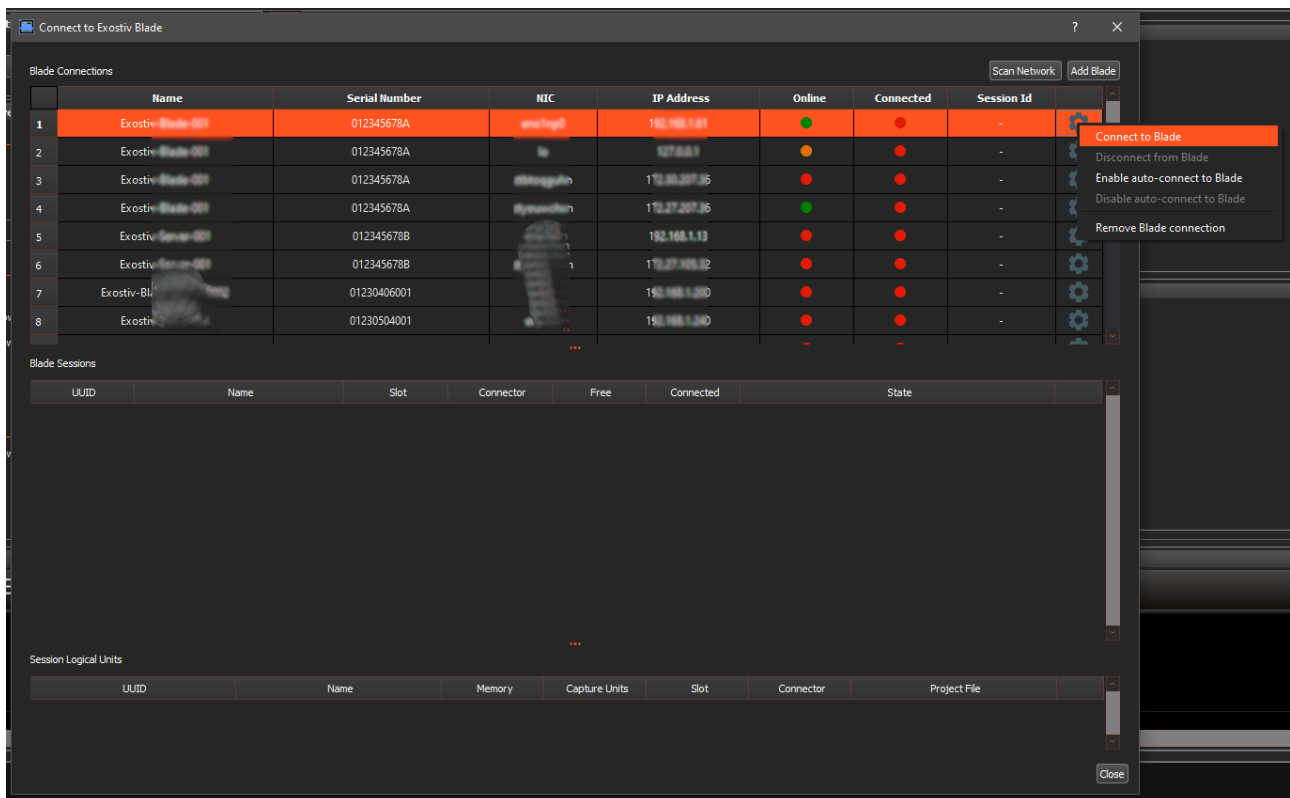
The connection button located in the toolbar opens the probe connection controls:



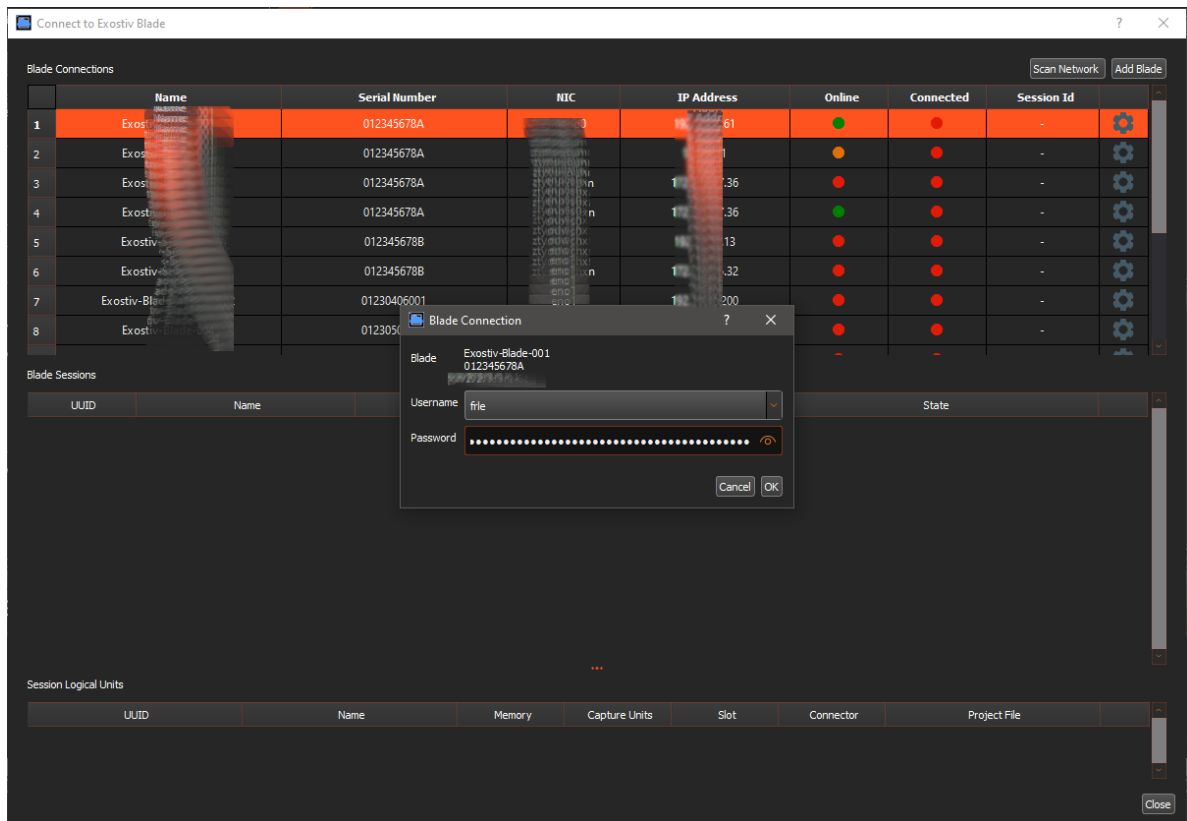
It opens the Exostiv Blade Client connection window:



Right-click on the wheel next to the Exostiv Blade you'd like to access and select 'Connect to Blade' from the menu.



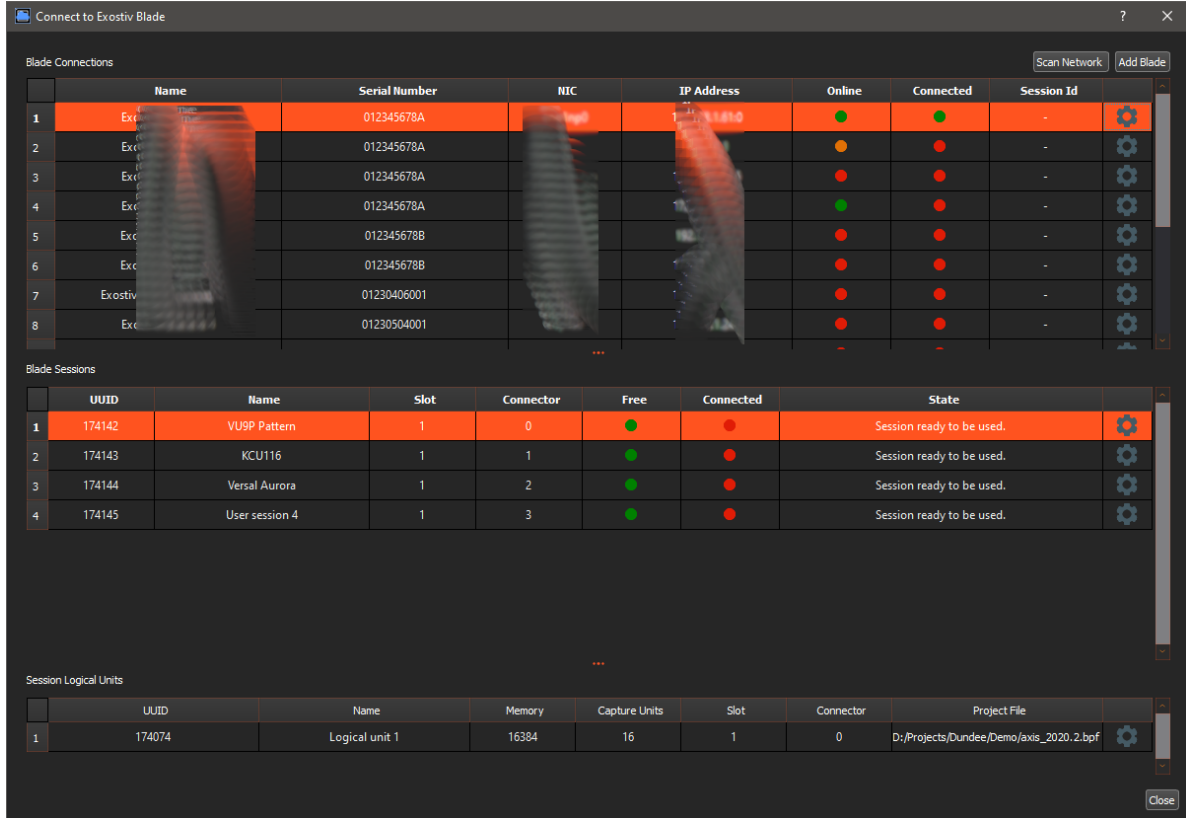
This opens the 'Blade Connection' window in which you have to enter your user credentials (username and password). New users and credentials can be added by an Administrator – see 'In with these controls, you can



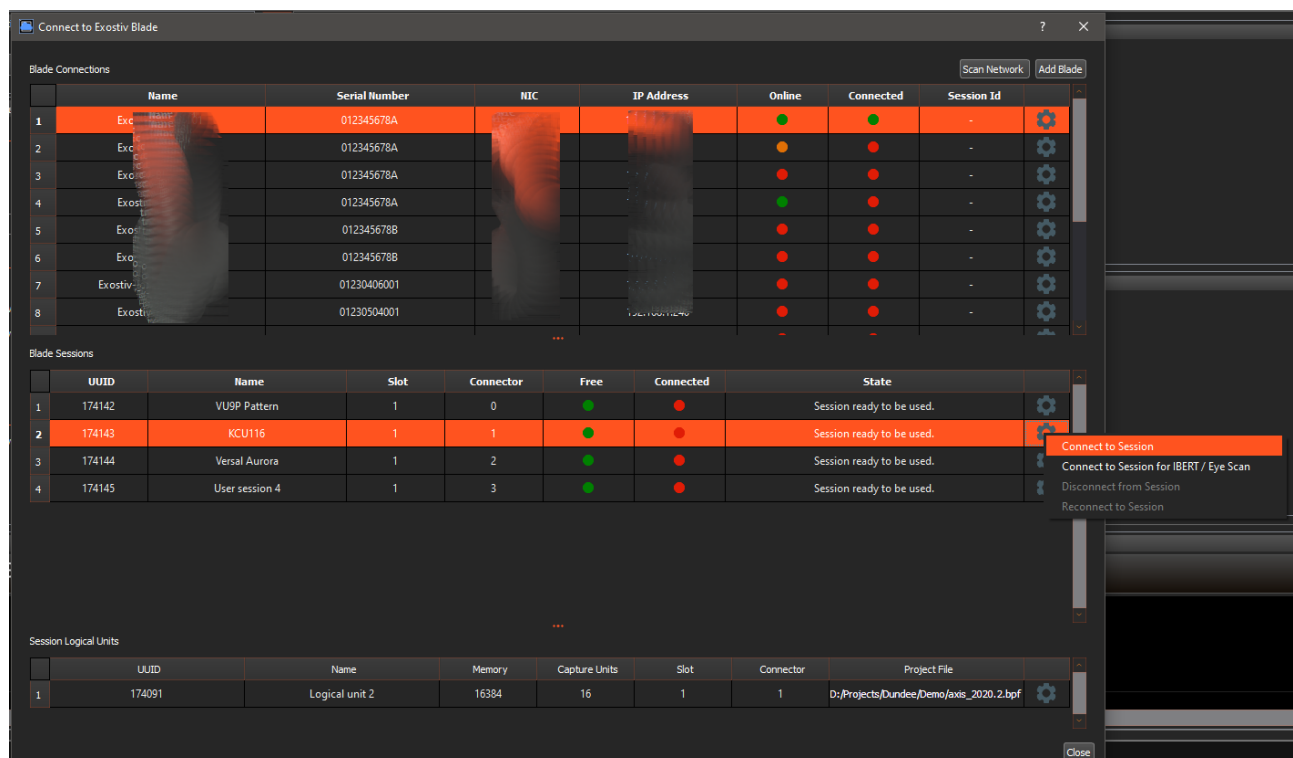
restart, reboot and/or shut down a Blade unit located on your network (requires Administrator privileges).

Exostiv Blade Client Administrator Panel’ at the end of this document.

Once connected to the Exostiv Blade unit, the panel at the bottom of the window gets populated with the available sessions.



Right-click on the wheel next to the session you’d like to use and select ‘Connect to Session’ from the menu.



It results in the following situation: you are now connected to the chosen Exostiv Blade unit and to the desired session. Click on 'Close' to shut down this window and initiate the connection process.

Connect to Exostiv Blade

Blade Connections

Scan Network

Add Blade

	Name	Serial Number	NIC	IP Address	Online	Connected	Session Id	
1	Exc	012345678A					174143	
2	Exc	012345678A					-	
3	Exc	012345678A					-	
4	Exc	012345678A					-	
5	Exc	012345678B					-	
6	Exc	012345678B					-	
7	Exostiv	01230406001					-	
8	Exc	01230504001					-	

Blade Sessions

	UUID	Name	Slot	Connector	Free	Connected	State	
1	174142	VU9P Pattern	1	0			Session ready to be used.	
2	174143	KCU116	1	1			User file is connected from this client.	
3	174144	Versal Aurora	1	2			Session ready to be used.	
4	174145	User session 4	1	3			Session ready to be used.	

Session Logical Units

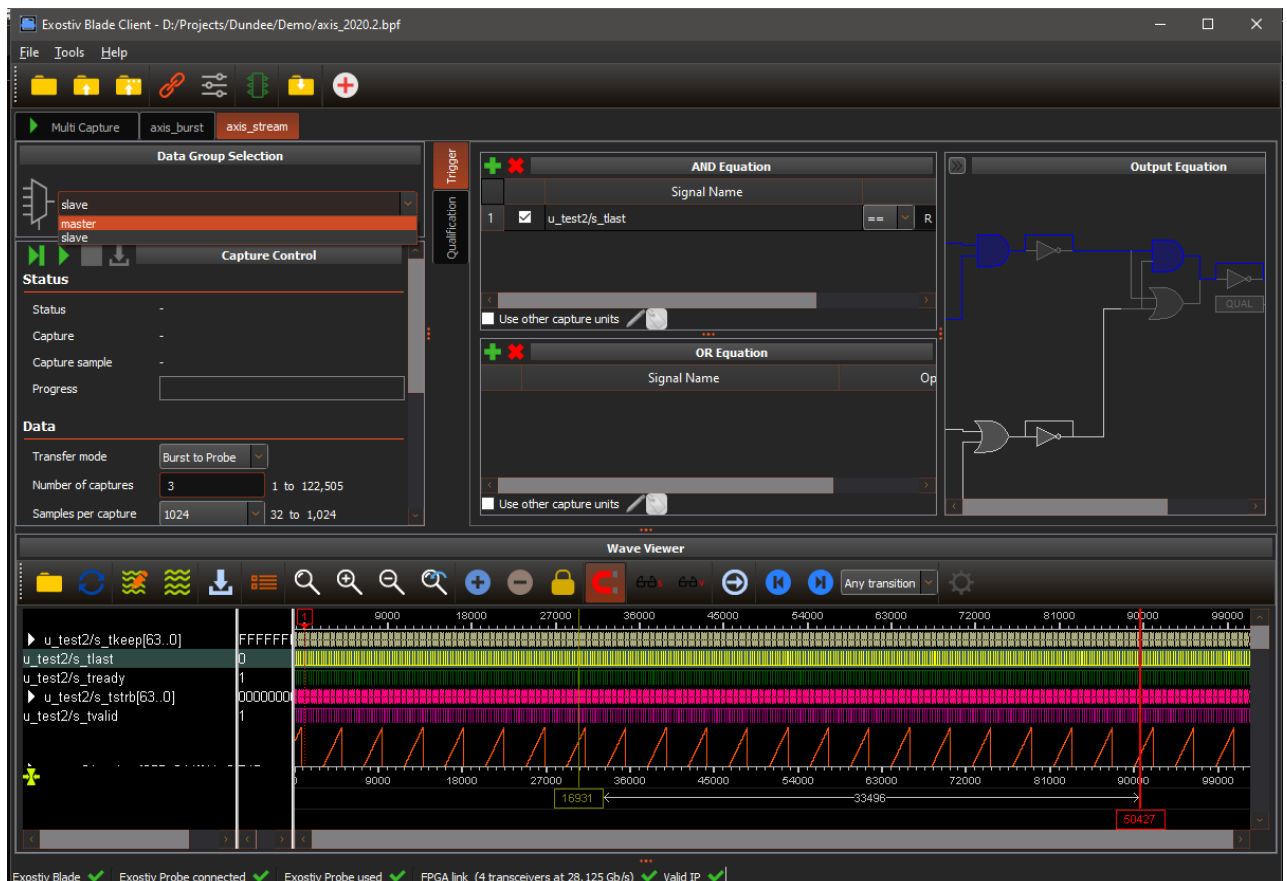
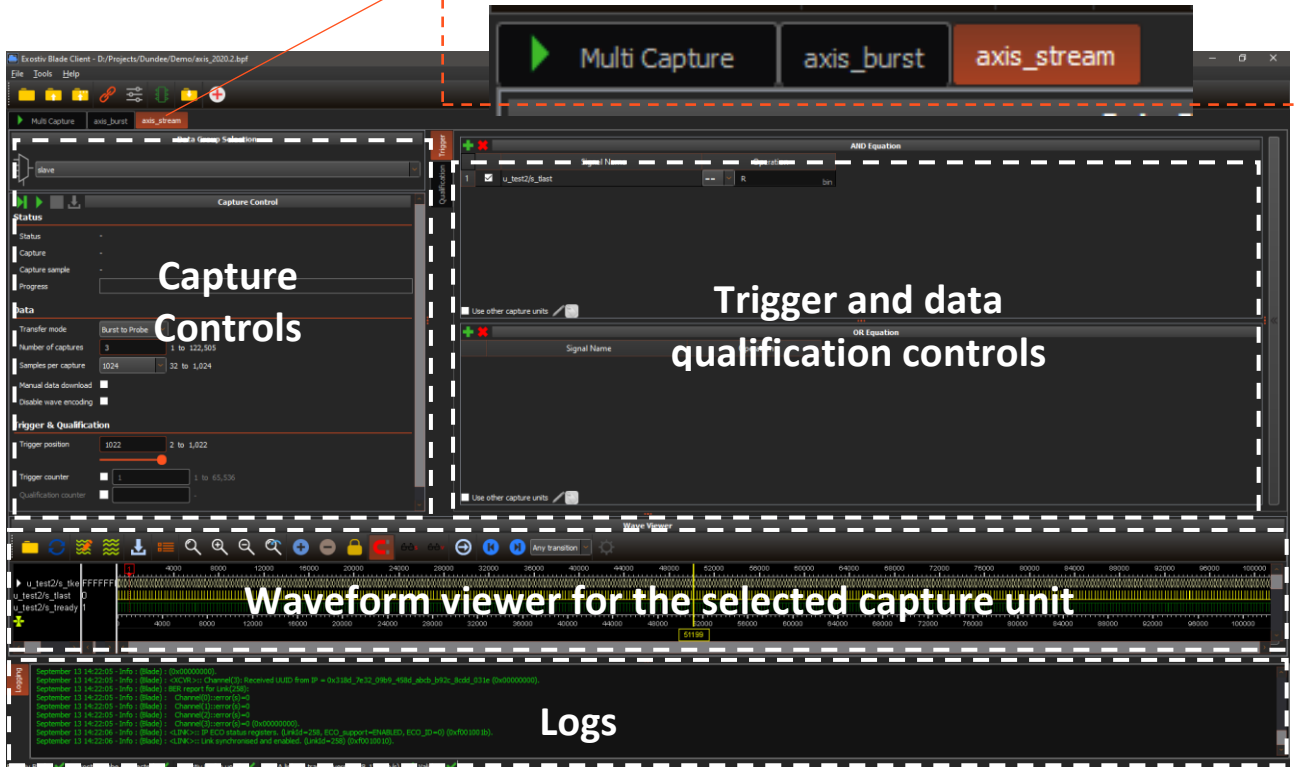
	UUID	Name	Memory	Capture Units	Slot	Connector	Project File	
1	174091	Logical unit 2	16384	16	1	1	D:\Projects\Dundee/Demo/axis_2020.2.bpf	

Close

Exostiv Blade Client – Overview

Exostiv Blade Client main window for 'Standard IP'. Its panels can be adjusted.

Capture unit selection



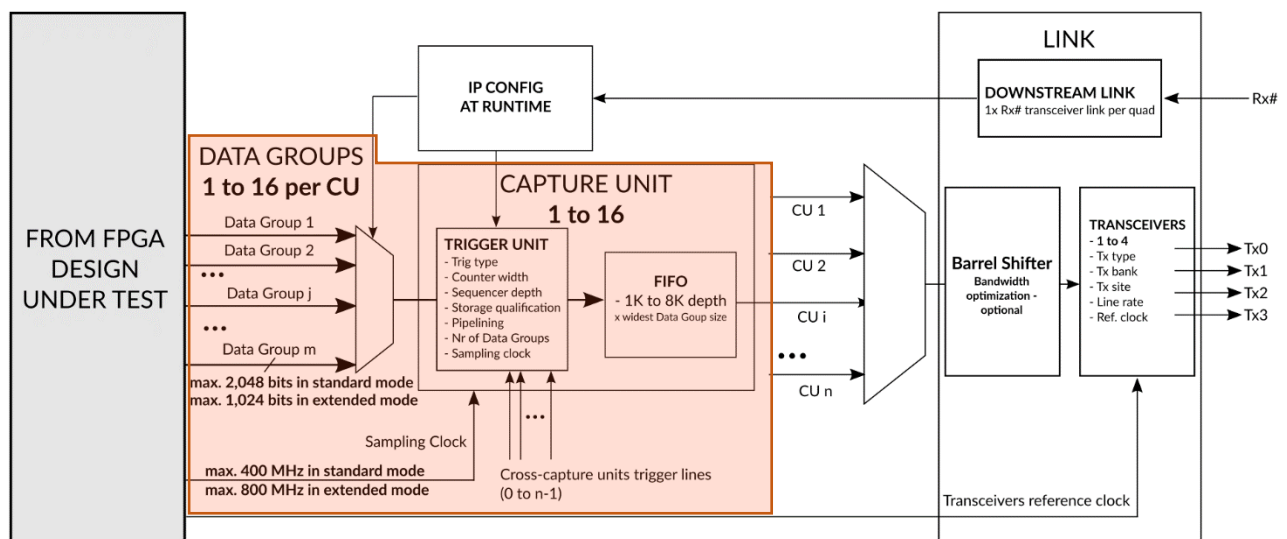
Exostiv Blade Client provides controls grouped by capture unit. Each Capture Unit has got its own 'tab'. An extra 'Multi-Capture' tab is also available to control captures from multiple capture units at once.

A capture unit is a functional entity inserted in the Exostiv IP that connects to up to 16 multiplexed 'data groups'.

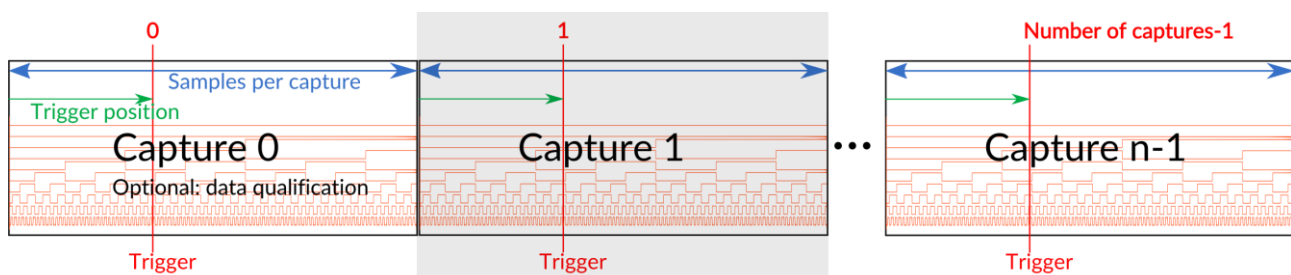
Each data group can count 2,048 connections to logic nodes of the target FPGA.

Each capture unit contains logic for defining trigger conditions and – optionally – data qualification conditions. It also contains a memory buffer used as a FIFO.

The figure below shows a general view on Exostiv IP ('Standard IP'). The colored area shows what is controlled from the Dashboard Exostiv Blade Client at runtime. The other parts are used automatically by the Dashboard software and the probe to change the IP settings and access the captured data at run-time.



Capturing data – overview

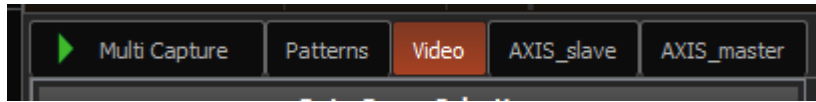


Typically, capturing data involves defining the following:

- A 'trigger' condition, which is used to detect a logic condition based on the connected FPGA nodes, which defines when data must be recorded.
- A 'Samples per capture' value, which defines the number of samples to be recorded once a trigger condition is detected.
- A 'trigger position' in the capture: it defines the position of the trigger condition in the 'Capture'.
- A 'Number of Captures', which defines the number of such trigger conditions that must be detected to end the capture process. A 'capture' ends once it has recorded the required number of samples. Then the capture unit waits until the trigger condition is met again and records a new capture. The process repeats until the specified number of captures is collected.
- Optionally, a 'data qualification' condition can be defined to filter the captured data. This condition is built as a logic condition on the target FPGA signals connected to the selected capture unit.

Capture Unit Selection - Tab organization.

Each capture unit can be controlled from its own tab. Click on the capture unit tab that you want to control and use.



Except for the 'Multi Capture tab', each tab provides the following controls, for **one single capture unit**.

- **Data Group Selection:** defines the data group to be observed from the selected capture unit.
- **Capture Control:** defines the way data is captured, the number of samples to capture, the trigger position in the capture and provides status about a running capture. This area also contains the '**START/STOP**' buttons used to control a capture and the controls for automatically exporting the waves.
- **Trigger and Data Qualification:** this whole area is used to define trigger and data qualification conditions for the capture.
- **Waveform Viewer:** each capture unit tab includes its own waveform viewer to visualize, format and export the captured data.

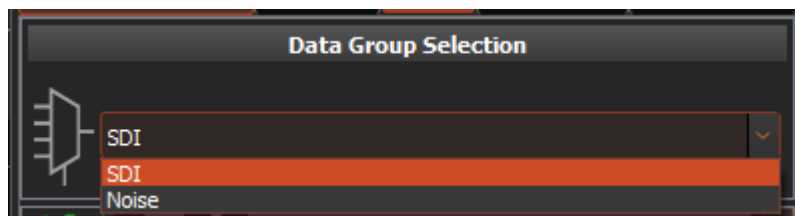
The settings for one single capture unit are defined from the corresponding tab. To capture data from more than one capture unit, please check 'Multiple Capture Control'.

Data Group Selection

Each Capture Unit can be connected to up to 16 data groups. The **Data Group Selection** drop-down list shows the data groups as defined in the project when setting up Exostiv IP with the Core Inserter.

This control changes the settings of the IP in the target FPGA so data from the selected data group of the selected capture unit can be captured. The selection can be done for each capture unit.


In RTL flow, the 'Data Group Selection' area features an additional button 'Edit Probes' (see picture below).






Capture Control

Multi Capture
Patterns
Video
AXIS_slave
AXIS_master

Data Group Selection


SDI




Capture Control

Status

Status -
Capture -
Capture sample -
Progress

Data

Transfer mode

Stream to Probe

Number of captures

500

 1 to 16,380
Samples per capture

20480

 2,048 to 714,496
Manual data download ☐
Disable wave encoding ☐

Trigger & Qualification

Trigger position

11192

 2 to 20,478







Trigger counter ☐

1

 1 to 4,096
Qualification counter ☐

1

 1 to 4,096

Control		Effect / Action
 Run with trigger	Runs the capture taking all the defined settings into account: transfer mode, number of captures, samples per capture, trigger position, trigger & data qualification conditions.	
 Run immediately	Runs a single capture of the length defined by the 'samples per capture'. The trigger and data qualification settings are ignored.	
 Stop	Stops a running capture. When stopped, the data that has been already captured are uploaded and displayed for processing.	
 Connect Probe	Attempts to detect and connect to an Exostiv Blade present on the network.	
 Manual data download	Available when the 'manual data download' option tick box is selected. Enables the user to download of data from the probe memory to the PC.	
<u>Status</u> : progress bars with the number of captures and the collected samples in the running capture.		
<u>Data</u>		
Transfer mode	Burst to Probe	In this mode, data is transferred by bursts whose size do not exceed the size of the FIFO implemented in the capture unit. This mode does not involve 'streaming' data to the Exostiv Blade. Single or multiple burst can be sent.
	Stream to Probe	In this mode, data is transferred by bursts whose size is bigger than the size of the FIFO implemented in the capture unit. This mode involves 'streaming' data over the transceivers. Hence, it could generate 'overflows' if the bandwidth required to stream the data exceeds what's available on the gigabit transceivers.
Number of captures	1 to a maximum computed automatically.	Defines the number of captures of size defined by the 'Samples per capture'. The range next to the control helps compute the possible values. This range is based on the total memory available in the probe, the transfer mode and the number of defined capture units and the number of samples per capture.
Samples per capture (top control – drop down list)	32 to the capture unit's FIFO length by steps of power of 2.	Defines the size of each capture in 'Burst to Probe' mode. The range next to the control helps compute the possible values.
Samples per capture (bottom control)	Capture unit's FIFO length to a maximum computed automatically, by steps of 512 (auto rounded to closest upper value).	Defines the size of each capture in 'Streaming to Probe' mode. The range next to the control helps compute the possible values.
Manual data download	Tick box	When selected, this option disables the automatic transfer of data from the probe memory to the PC. Only the data transferred manually by clicking onto the  button is transferred to the PC.
Disable wave encoding	Tick box	When selected, the captured data is not encoded as waveform for the waveform viewer. The display in the waveform viewer is not refreshed. In this case, only the raw data is available.
<u>Trigger & Qualification</u>		
Trigger position	2 to Samples per capture-2	Defines the position of the trigger in each capture. The value specifies a sample number.

Control	Effect / Action	
Trigger counter	1 to max value of the counter	Allows triggering on specific (counted) trigger events only. Requires the insertion of the trigger counter during the core insertion.
Qualification counter	1 to max value of the counter	Allows triggering on specific (counted) qualification events only. Requires the insertion of the trigger counter during the core insertion.

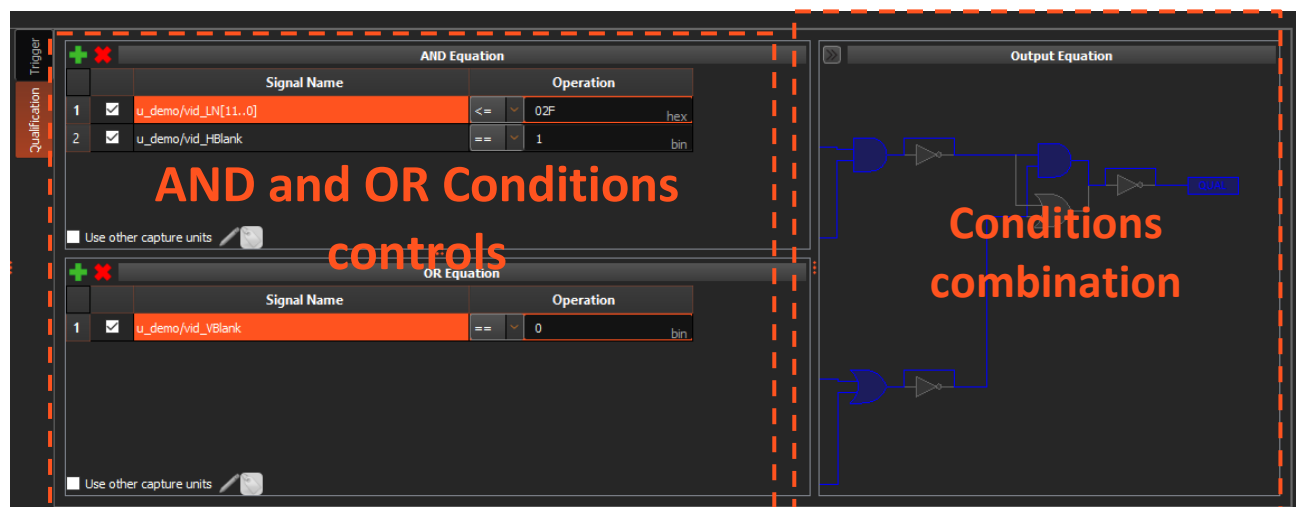
Trigger & Data Qualification

Trigger & Data Qualification: overview

The trigger & data qualification controls are split into 2 areas, as described in the figure below.

The trigger and the data qualification conditions are based on the definition of the following:

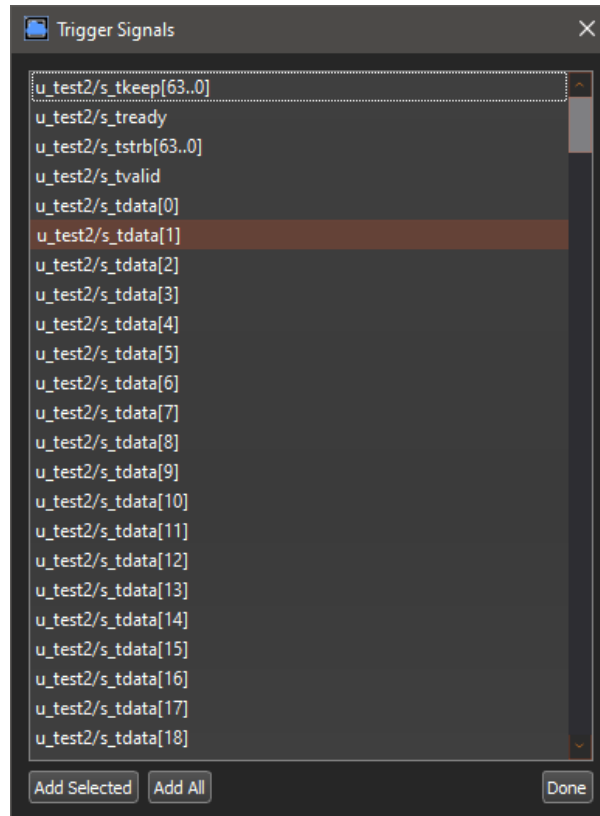
- One AND equation: it specifies a set of conditions on the capture unit's signals combined as a logic AND.
- One OR equation: it specifies a set of conditions on the capture unit's signals combined as a logic OR.
- Each equation can use a combination of conditions local to the selected capture unit and the result of the trigger or data qualification from another capture unit.
- The AND and the OR equations described above are combined to form the trigger or the data qualification unit. This combination is defined with the right-hand, as a graphical combination. Please refer to the figure below for an overview of the available paths.



Defining Trigger & Data Qualification: usage and rules

Suppose you'd like to modify the AND Equation of the trigger. Please proceed as follows:

1. To add a condition to the list, click on the '+' sign at the top. This opens a window called 'Trigger Signals'.

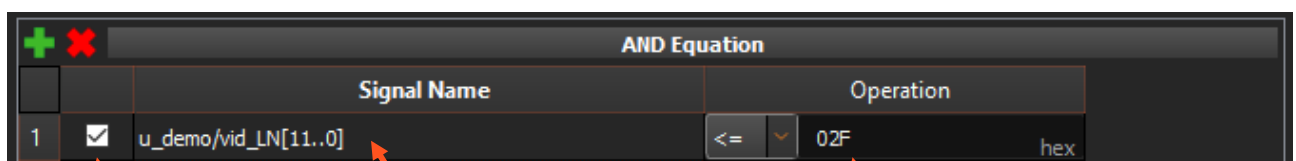


In this window you can find the list of the signals still available to add a condition to the AND equation.



This list is composed of the signals from the selected data group connected to the selected capture unit, that are not already used in either the AND or the OR equation. So each signal that is marked as 'trigger' during core insertion can be used once in the equations defining the triggers.

2. Select the desired signals and click on 'Add Selected'. Or 'Add All'. Then, click on 'Done'. The added signals disappear from the list.
3. The AND equation window is completed with the signals we have added:
4. Each of the lines in the Equation window is formatted as follows:

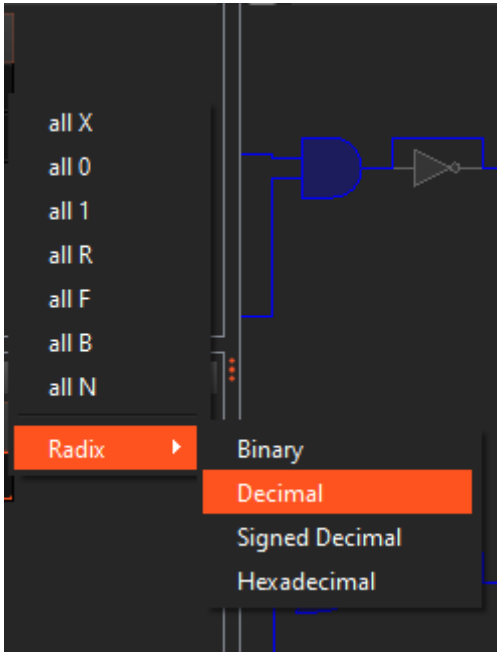


Enable or disable condition Signal name

Operator

Value

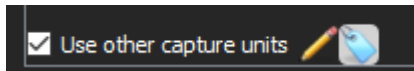
Radix

Control	Description
Enable / Disable condition	Select to enable condition. Unselect to disable condition.
Operator	<p>Drop-down list with the available operators:</p> <p>Always available:</p> <p>== : equality</p> <p>!= : inequality</p> <p>Only available if Levels/Edges/Comparisons was chosen as an option for 'Trigger unit type' at Core Insertion.</p> <p>> : greater than</p> <p>< : smaller than</p> <p>>= : greater or equal to</p> <p><= : smaller or equal to</p> <p>[...] : in range</p> <p>![...] : out of range</p>
Value	<p>Value for combination. Right-click on the fields shows some of the options at bit level.</p> <p>Bit level (binary) possible values:</p> <p>X : don' care</p> <p>0 : logic 0</p> <p>1 : logic 1</p> <p>R : rising edge</p> <p>F : falling edge</p> <p>B : any edge</p> <p>N : no edge</p> <p>Hexadecimal or Decimal values can also be entered if the corresponding radix is chosen (see below).</p>
Radix	<p>Radix for 'Value'. Right-click to open the menu to change this:</p>  <p>bin : Binary</p> <p>dec: Decimal</p> <p>hex: Hexadecimal</p>

Cross-capture unit trigger

By default, it is possible to use the result of a trigger condition from one capture unit as a source trigger condition for another capture unit. Because capture units are not always located in the same clock domain, some options are available.

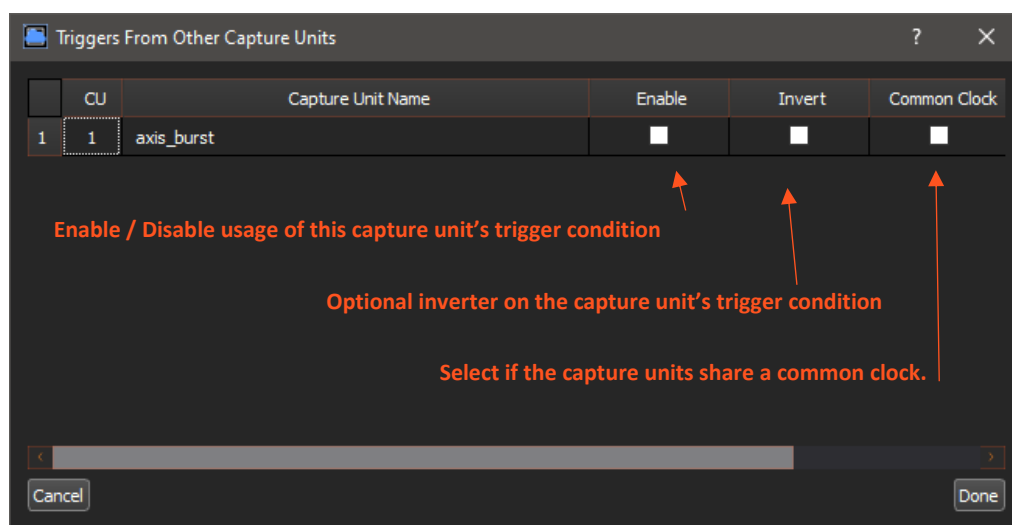
At the bottom of each (AND or OR) equation window, locate the following control 'Use other capture units'. Select tick box to enable it.



Click on the 'pencil icon' to edit the options:



A window opens, with the list of the available capture units (different from the active CU):



Click on 'Done' once set up.

The 'label icon' allows defining a custom logic name for the condition.



Remark about cross-capture unit triggering with multiple clock domains:

When the same sampling clock is used for the capture units, the event sent from the source capture unit to the destination CU is fully synchronous and the detection thereof is immediate. In such a case, it is advised to select the option 'Common clock' so everything remains synchronous.

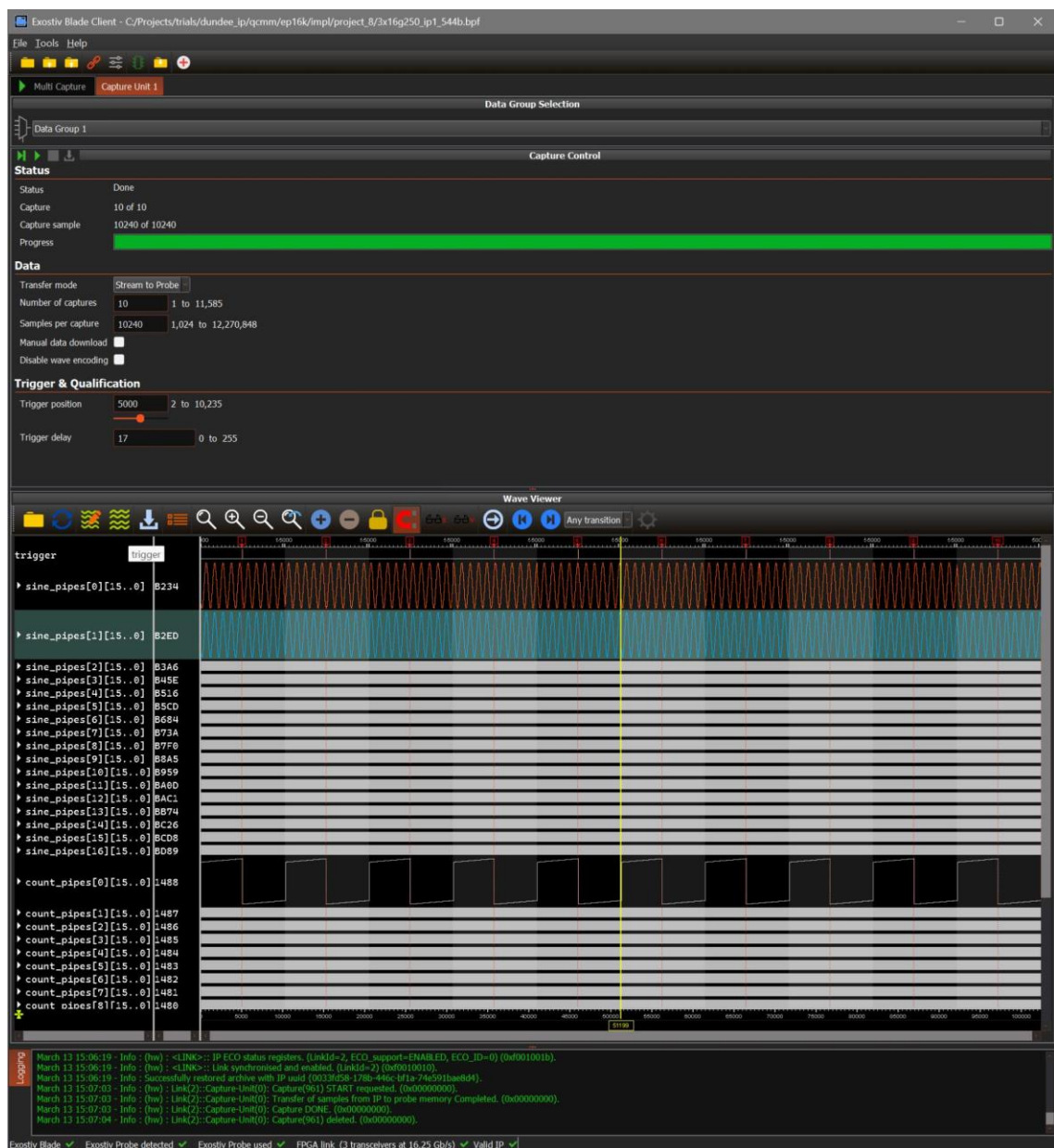
When the source and destination capture units do not use the same clock the source trigger event is latched into the destination capture unit. Once the event is seen at the output of the latch, the latch is reset. It is important to note that there will be an undefined time between the generation of the source event and its detection at the destination capture unit.

Exostiv Blade Client – Overview for the ‘Extended width IP’

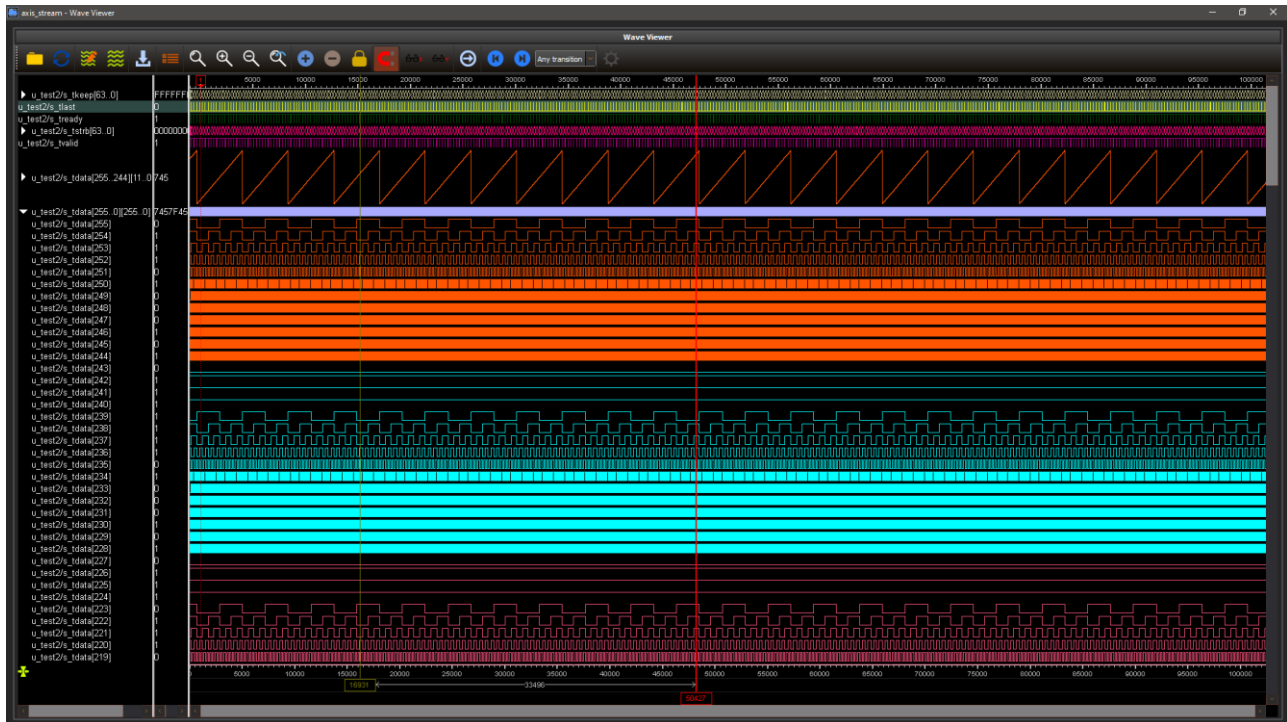
The ‘Extended width IP’ being a simplified version of the ‘Standard IP’, the provided controls are a subset of these of the ‘Standard IP’:

- No tabs for capture units, and no data group selection: this IP has only 1 CU and 1 data group.
- No advanced trigger controls: the trigger is a single line, and the capture is sensitive to the rising edge of this trigger.
- No data qualification controls.
- Additional ‘trigger delay’ controls: this value introduces a delay of 0 to 255 sampling clock cycles on the input trigger signal.

The other features, like trigger positioning and the waveform viewer are identical to the ‘Standard IP’ controls.



Waveform viewer (MYRIAD™)



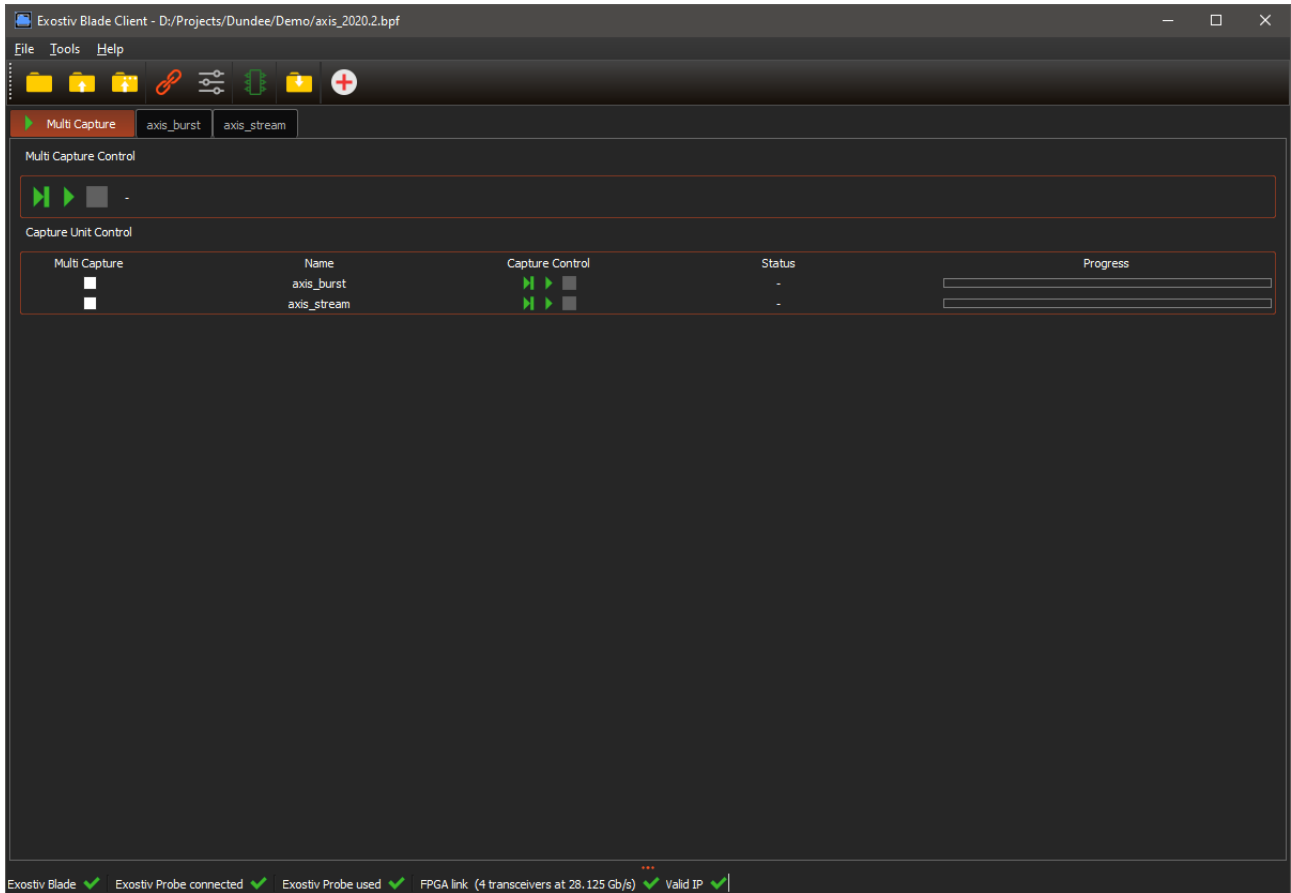
Features – Overview:

- Dock/Undock window (double-click in title);
- Gigabyte-capable waveform viewer;
- Wave database save / export (CSV, binary, VCD);
- Waves formatting (color, size) – Analog or digital display – binary, hexadecimal, unsigned;
- Formatting save / recall;
- Flexible and fast zoom, even on very large databases;
- Multi-marker;
- Event and value search;
- Multi-burst display (background color change)
- Burst numbering / special trigger display
- Multi-scale sample count (absolute or within each burst).

Multiple Capture Tab

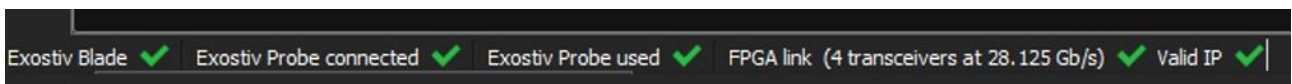
The left-hand tab is used to control captures from multiple capture units at the same time.

The capture settings must be defined for each capture unit separately.



Select the tick box corresponding to the desired Capture Units and use the run with trigger or run controls.

Status bar



The Status bar returns the connection status of:

- Exostiv Blade: whether is it connected and detected over the network port.
- Exostiv Blade usage: whether it is used by the application.
- FPGA Link: whether there is a valid connection with the target design IP. In addition, the number of used transceivers at their speed is provided.
- Valid IP: whether the IP that is detected in the target design is valid and corresponds to the project settings.

Memory allocation



When connected to a Blade unit, the 'Memory allocation' icon in the top toolbar opens the memory allocation controls:

These advanced controls allow defining / redistributing the Exostiv Blade memory allocated to each capture unit (by default, the memory is equally allocated to all CUs).

Memory Allocation

Status

Total memory : 16384 MBytes

Free memory : 1 MByte

axis_burst

axis_stream

	Capture Unit	Nr of Probes	Size in MBytes	Max. nr of Samples
1	axis_burst	643	9919	129403736
2	axis_stream	419	6464	129412797

Actions

Distribute

Resize

Save Configuration

Load Configuration

Cancel

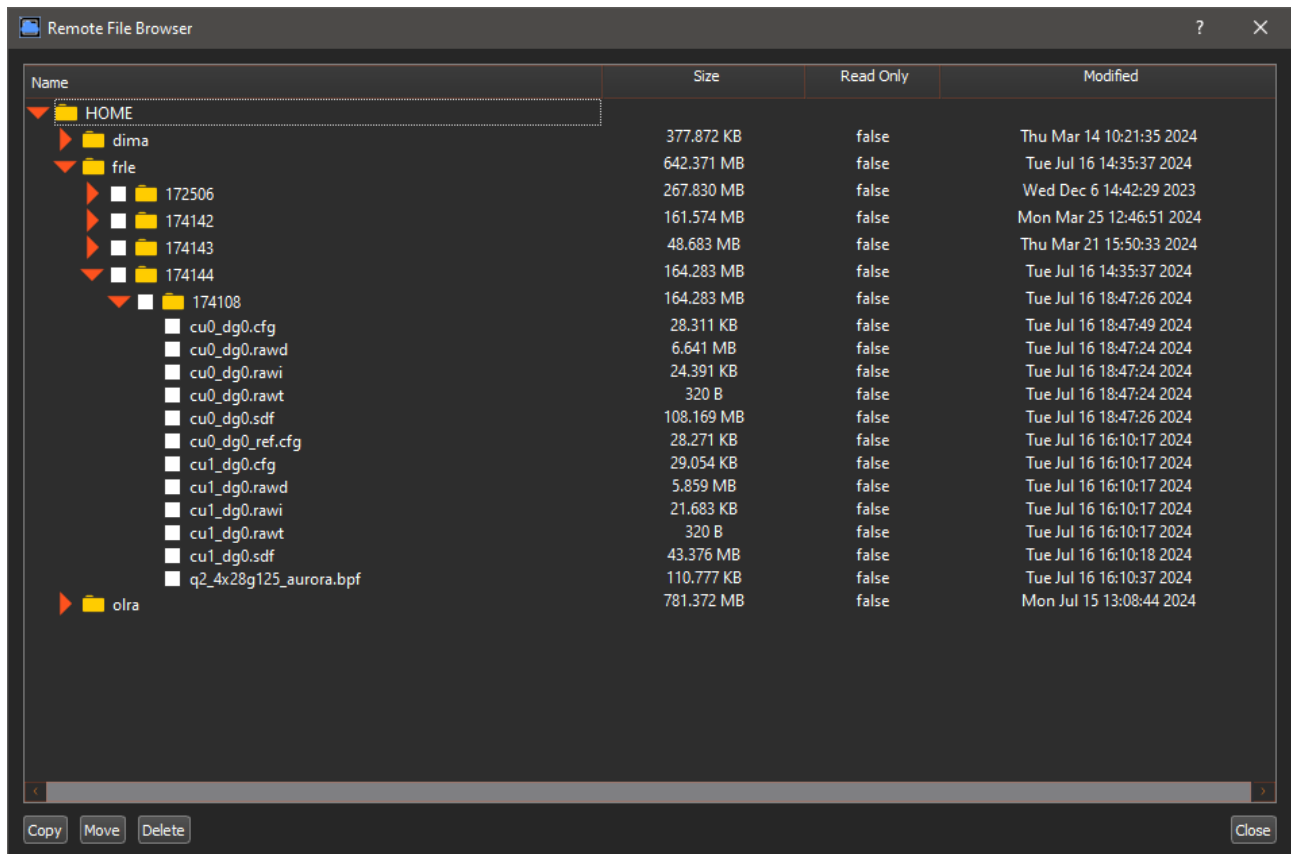
Apply

Exostiv Blade Client Remote File Browser

Click on the 'Remote file browser icon' in the main tool bar to open it.



The 'Remote File Browser' allows browsing the captured data stored on the connected Blade unit. The captures are organized by user, logical unit and session number.



Each session contains the following files:

- *.bpf file : a remote copy of the project used for the session.

Files with name: **cu<i>_dg<j>.***, with i and j the capture unit number and data group number respectively.

- *.sdf : captures encoded as '.sdf' file format, that is the format used for the Myriad waveform viewer.
- *.cfg : waves configuration file.
- *.rawd : captured data encoded as raw binary files (raw samples).
- *.rawi : xml file containing the signals list with additional capture information.
- *.rawt : binary file with timing information, for internal use.

The files can be selected and copied, moved or deleted with the control button under the browser.

Exostiv Blade Client ‘recovery’



Click on the ‘Blade recovery’ icon in the main tool bar to open the corresponding controls.

Blade Recovery

Add BladeRemove Blade

Scan Network

RestartRebootShut Down

	Name	Serial Number	IP Address	Online	Notes
1	Exos95087A	012345678A	192.168.1.1	●	Not found
2	Exos95087A	012345678A	192.168.1.2	●	Not found
3	Exos95087A	012345678A	192.168.1.3	●	Not found
4	Exos95087A	012345678A	192.168.1.4	●	Found
5	Exos95087B	012345678B	192.168.1.5	●	Not found
6	Exos95087B	012345678B	192.168.1.6	●	Not found
7	Exostiv-1	01230406001	192.168.1.7	●	Not found

September 13 14:29:27 - Info : Scanning network for known Blades...

September 13 14:29:36 - Info : Scan finished.

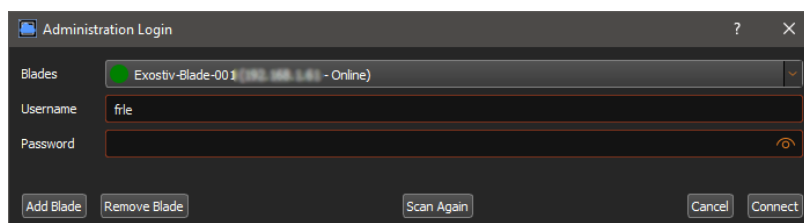
Close

In with these controls, you can restart, reboot and/or shut down a Blade unit located on your network (requires Administrator privileges).

Exostiv Blade Client Administrator Panel

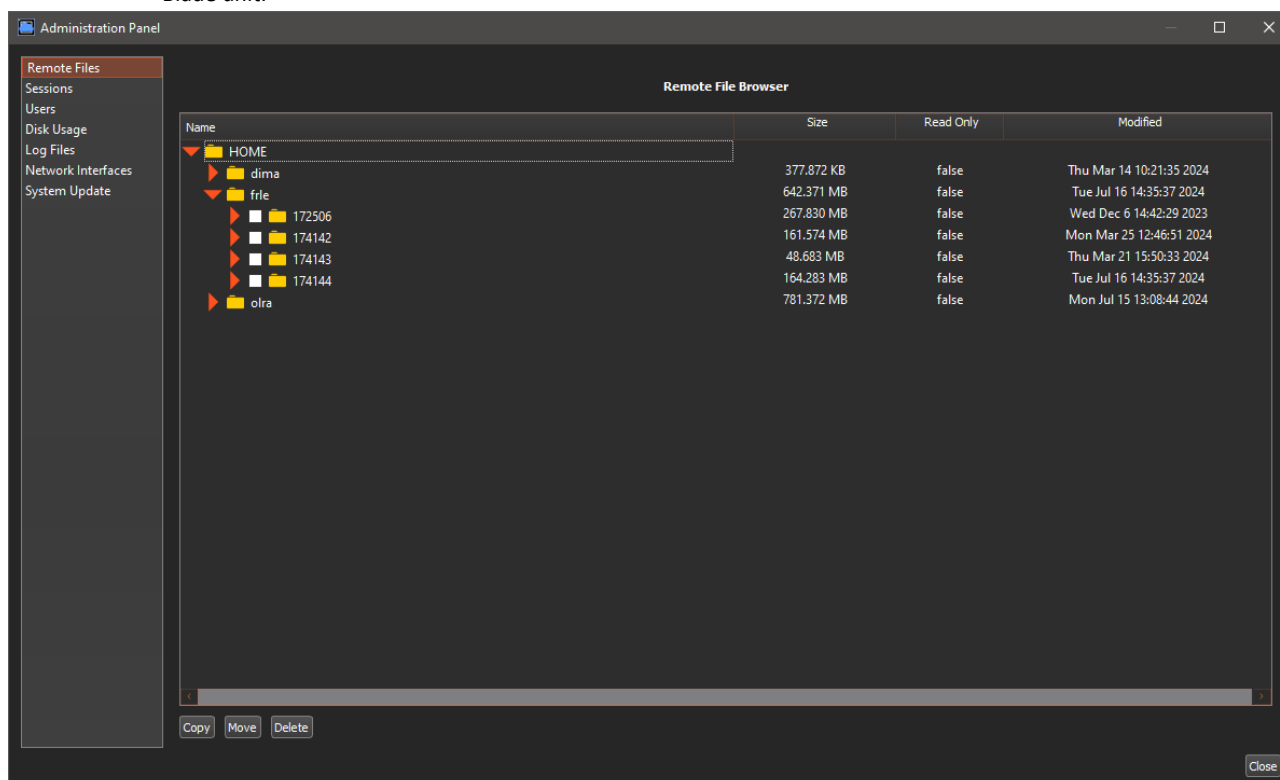


The 'Administrator Panel' is open by clicking on its icon in the main tool bar: This icon is available only when no project is loaded. To access the administrator panel, the target Blade unit has to be selected, and the user's credentials are requested. Only registered administrators have access to this panel.

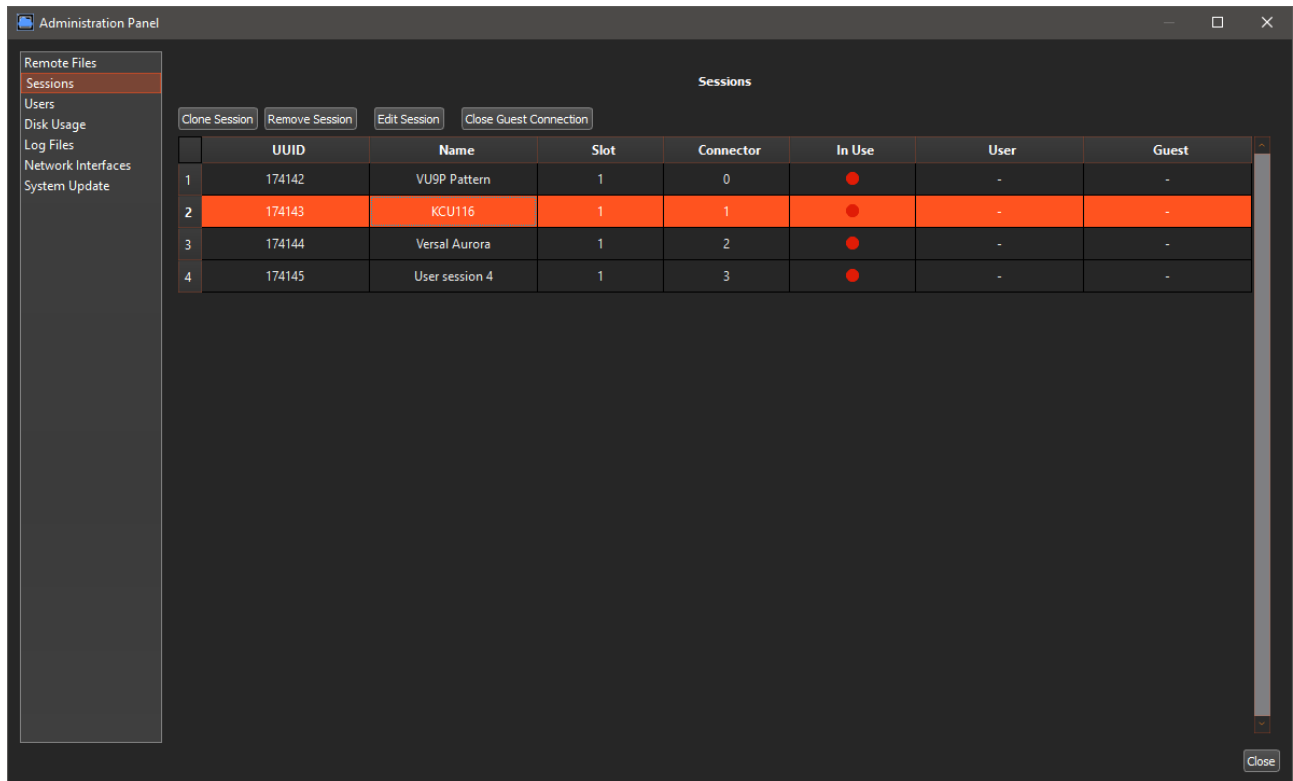


The 'Administrator Panel' provides the following tools and settings:

- **A remote file browser:** enables browsing, copying, moving and deleting the capture files located on the connected Blade unit.

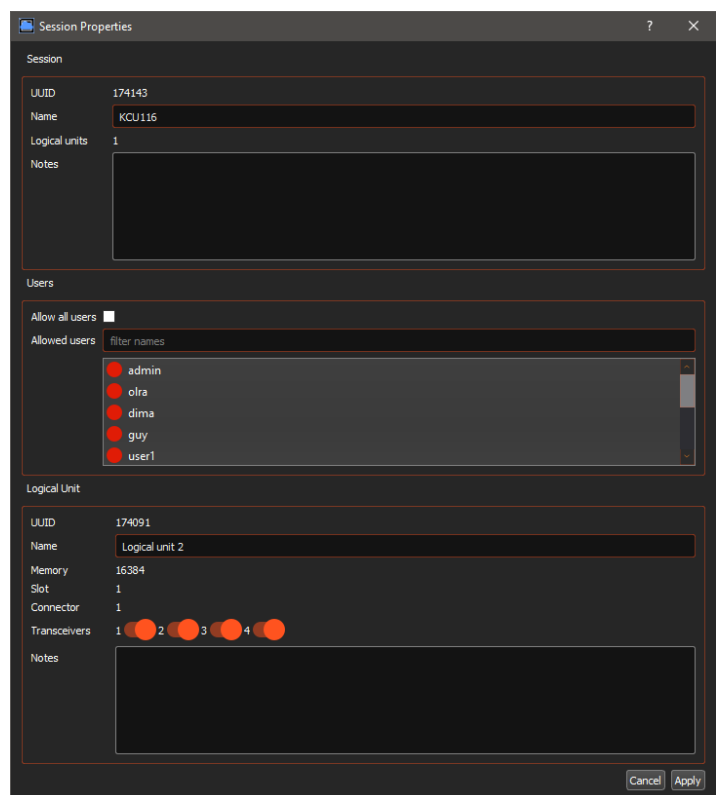


- **A session setup utility:** it is used to define the characteristics of a 'session', that is the allocation of a specific connector on the target Blade unit.



Session settings include:

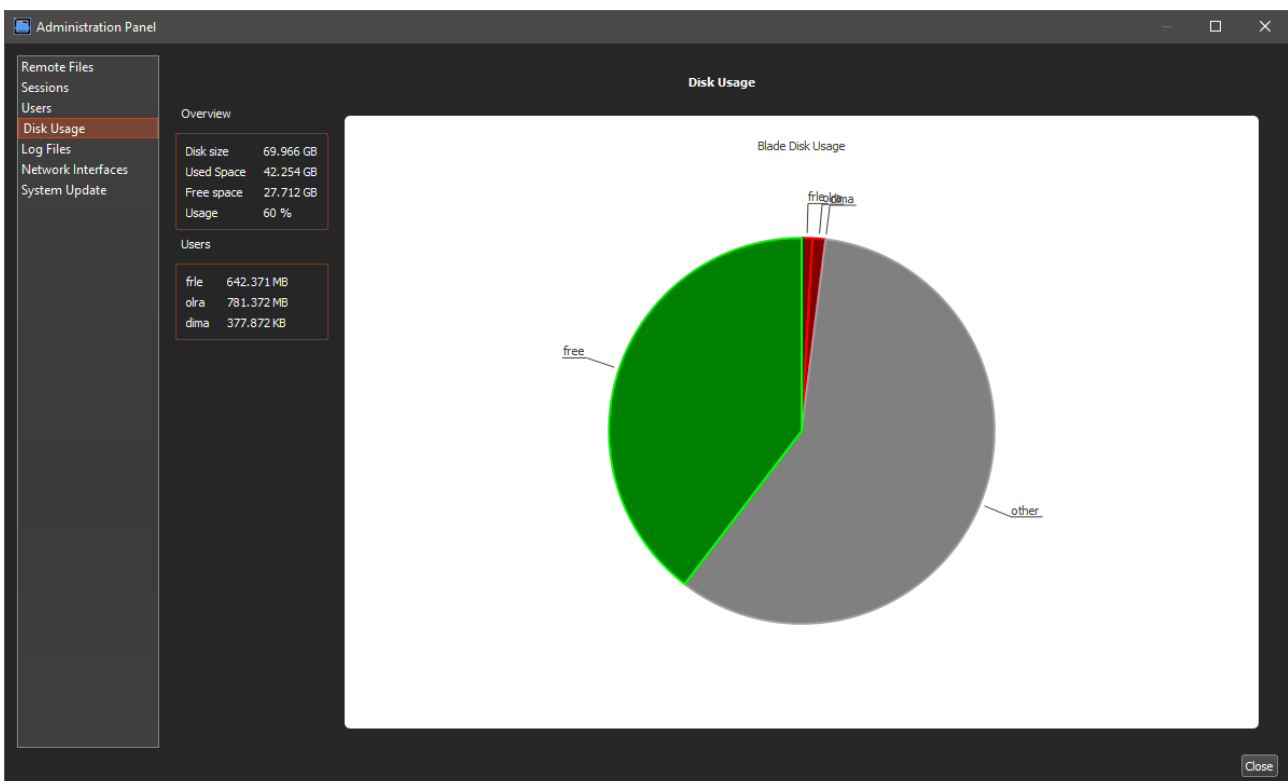
- Session name
- Designation of the users who have access to it.
- Definition of a 'logical unit' – name, and available transceivers (1 to 4).



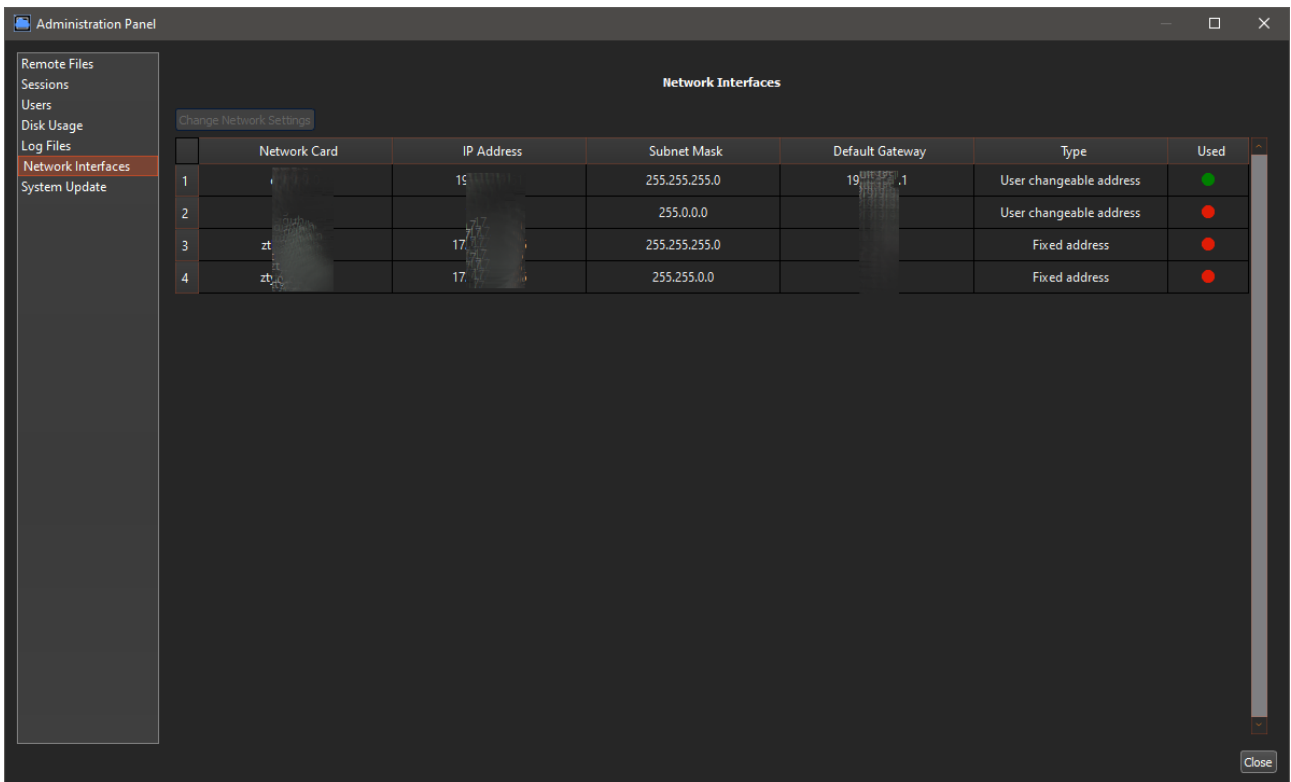
- A user definition utility allows defining new users and their credentials.



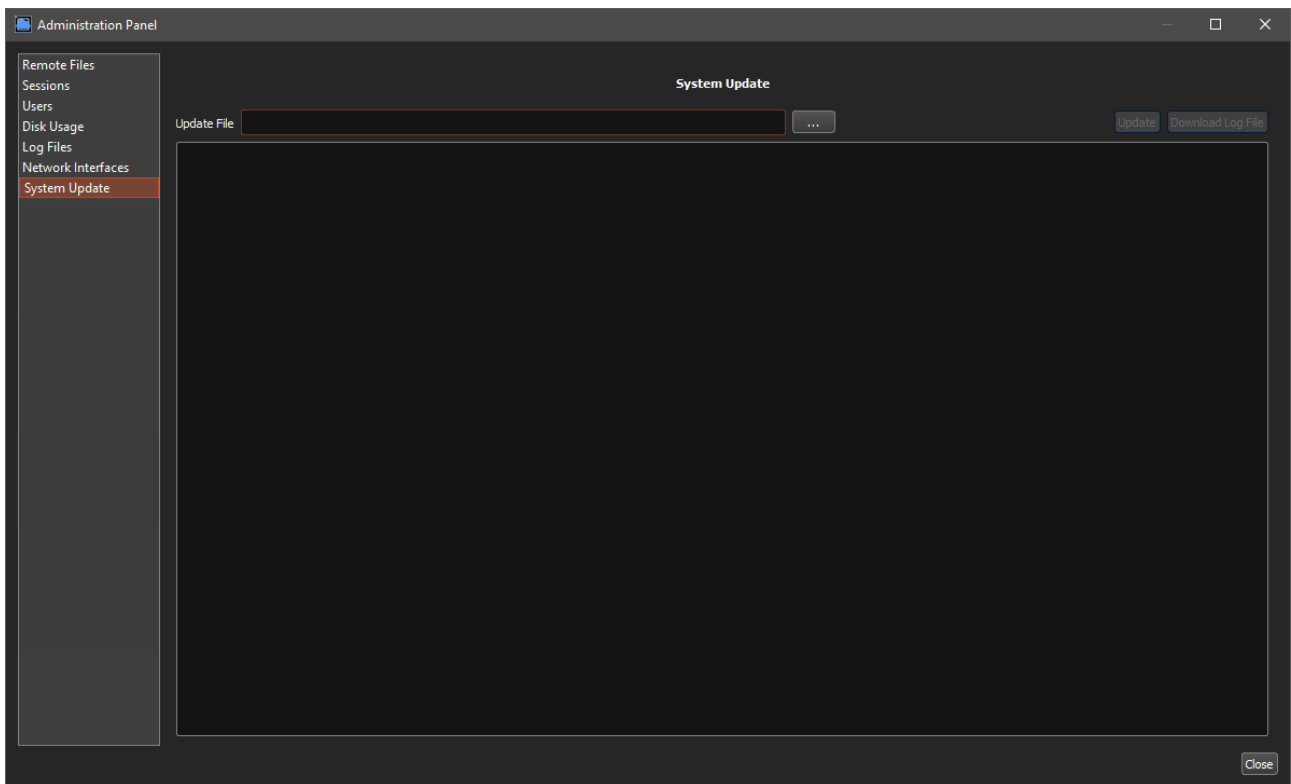
- A disk usage utility. Statistics about disk usages. Depends on the structure of each blade and their number of drives.



- A network interface configuration utility.



- A system update utility, used when the Blade unit is updated.



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