

08/01/20

## Lumistar Dynamic Simulator (TDSIM)

### Main Setup

This is the main setup used to get the stream functioning. If this window is not opened at least once when the application starts, the stream is off. You can close the window after it has been opened, but it must have been opened once. If you change the hardware configuration of your system (i.e. changing the type of simulator cards used), then you have to re-open the setup window to turn the stream on again.

The top part of the main setup window is the same for all operational modes. The lower part depends on the operational mode, and is discussed in their respective chapters. The following sections common to all operation modes are discussed.

- **Title Bar** – Contains the Stream ID, the name of the setup file in use, the operational mode in use, and the event counter (interrupt counter). If you have your data on, and this event counter is not incrementing, then you are not getting interrupts from your card, and you need to troubleshoot your card installation. If you have edited anything without saving the setup file, the text in this title bar will be prefixed with an asterisk.
- **Menu Bar**
  - File – Save and Recall your setup.
  - Frame Dump – View the data going to the card for this stream
- There are 3 main horizontal bar sections. Each section has multiple vertical sections, which are visible depending on the operational mode you are in.
  - *Top Horizontal Section*
    - **Mode** – Select the operational mode for the simulator stream
      - **User** – Define the stream PCM frame, the initial data values, and the algorithms run on each word desired
      - **Pbk** – Initial data comes from an archive playback file, normally generated by LDPS, but can be any format. The key is that the initial data values come from the playback file, and the PCM frame is fixed to whatever the archive PCM frame is.
      - **PRN** – Generate pseudorandom data. The PCM frame is fixed, internally.
    - **Word Process** – Assign data to each word in the PCM stream
      - **Initial Wd Attrib** – Initial word attributes. Set the PCM word length, if MSB first, and the initial value of that word.

- **Frame Word Alg** - Select what algorithm to run on each word in the PCM stream. This is the grunt work location. After you have your basic frame set up, then here is where you tell it to 'move' data to your desires. When you click this button, a window will open up showing you the entire major frame. Each word in the major frame will have text in it telling you what kind of data is being inserted in that word. You can have the following types
  - Raw – The initial value of the data is used, whether it be from the Initial Word Attributes value, or if you are using a shared memory application interface, whatever that application set it to.
  - Wave – There are several canned wave forms you can use. You set the commutation you want to use and then fill in the type wave form to use, with its min and max values, and frequency (Num Word Updates To Complete Cycle).
  - Manual – You can use the manual word fader. Select the commutation desired, and the control slider number you want to affect it with.
  - Function – Choose the Function Name desired, and then follow the instructions provided for that Function. Some will have you fill in the commutation information, some will not. **VERY** important to read the instructions for that function. You can also have, in red, parens in the form (2,3), which indicate that the word is being used, and the root word (first word for that function) starts at frame 2 word 3.
  
- **Frame Process** – What kind of processing to do with the entire PCM frame
  - **Insert FSP/SFID** – Insert the FSP and SFID (if used) into the PCM frame. This will override the Frame Word Alg selection in the Word Process.
  - **Insert CRC** – This will calculate and insert the CRC based on your CRC definition, into the PCM frame, at the word location specified in the CRC definition.
  - **Shared Mem Initial Values** – This will pass the PCM frame off to your shared memory application for it to fill in the initial values, before processing any of the Frame Word Alg functions.
  - **Shared Mem Post WdAlg** – This will pass the PCM frame off to your shared memory application after all the WdAlg functions have run, for it to further manipulate the data.

- **Error Injection** – A few handy controls to let you inject errors into the stream data before it goes out.
  - **Inject Faulty Data** This allows you to insert random data at a percentage of the major frame. The slider has 3 ranges to allow you finer control of the percentage of random data. Click on the button just below the slider to select the range of the slider
    - 0 – 1 percent
    - 0 – 10 percent
    - 0 – 100 percent
  - **Set Bit Transition Density** - This allows you to set the data values such that 1 in x bits are set to a 1, where x is 2 or greater, up to 64 bits. This is good for checking if your bit sync can handle long strings of ones and zeros.
  - **FSP / SFID** - This button applies to both the Inject Faulty Data and the Set Bit Transition Density controls. If this button is depressed, then the FSP and SFID are also part of the algorithm. If not depressed, then the algorithm won't mess with the FSP/SFID, so your decom can stay locked, but the data will have errors.
  - **Clock Only** – If this button is pressed, then the major frame will contain all zeros (or all ones, depending on your option setting).

- *Middle Horizontal Section*

- **PCM Out** – Commands the stream data to go out or stop
  - **Bit Rate** – The bit rate the data goes out
  - **Output** – The PCM Output Code, if your card supports that function.
  - **Data** – Pressing this button sends the data out or turns it off (green or red).
    - If you have the option Multiple Stream Output Control option checked, then if there are multiple streams, the same command (start/stop) will go to all streams active.
    - If one stream causes the data to go off, e.g. no playback file loaded or PCM loading of setup required, then all streams will go to the off position until you fix the issue.
    - If you have the Enable button depressed on the Archive section, then the data will also be written to the archive file (packed bits)
  - **IRIG Generator** – If your card supports an IRIG generator

- **Seed Time** – Click to seed the generator to a time of your picking.
  - **Output Time** – This is the output time of the generator.
  - **Reader Time** – If the card is equipped, the IRIG Reader time.
  - **IRIG Code** – The IRIG code to use (A,B,G)
  - **Source** – The source of the time, Internal or External.
- **DQM** – A very special mode, where Data Quality Metrics are inserted into the stream when it goes out. This is only for the network output and the archive output. This DQM data does not go out the hardware yet, as this DQM is experimental, mainly with Quasonix. See the doc TMOIP\_DQM.doc in the LDPS documentation directory for how this mode is used
    - **Enable** – Enables the DQM to be inserted into the stream data going out
    - **Num Bytes** – Set the number of bytes of real PCM data to insert the DQM data.
    - **Q** – Set the Q in the DQM data to this value, a range of 0 to 12. This will correspond to the DQM value assigned (range of 0 to 65535, per the DQM specification).
  - **Aux Out** – Allows the data output to go to other than the hardware output. Note. If you are using hardware, and your options state for the hardware to use the hardware to generate the PRN and you are in PRN mode, these buttons have no affect, and no data will go out these auxiliary outputs.
    - **Fpi UDP** – The data goes out the UDP port to the UDP IP address in the UDP format specified in the Options-Network tab.
    - **Shared Mem** – The data goes out the shared memory. This is used mostly when using hardware cards that have both a decom and a simulator on them, but you can't run them from the same PC and different applications, due to the driver.
  - **Archive** – Archives the raw PCM data, no header, no trailer, no filler bits. Just the raw pcm data generated as packed bits (throughput) to a binary file. This includes the DQM data if it is enabled. The data is written to the disk if the Data Output button is pressed. The archive file is automatically named for you in the format xxxx\_yyyy\_PCM\_ARCHIVE\_STREAM\_z.BIN, where xxxx is the Julian date the file is created, yyyy is the time the file

was created in hours and minutes, and z is the stream number the file belongs to.

- **Enable** – Enable/disable archive.
  - **New** – A new archive file is created
  - **Byte Swap** – Allows you to bytes wap the desired archive
- **Pbk IRIG Sync** - If you're in playback mode, sometimes you want to attempt to get the IRIG generator synced up to the playback file (a very difficult task). This will let you attempt that.
    - **Sync IRIG** - Click the button. The system will read the time from the playback file and seed the IRIG generator with that time. The dT of the IRIG generator time and the playback file time is displayed.
- *Bottom Horizontal Section*
    - **PCM Frame Setup** – Only in User Mode
      - Set up the PCM frame as desired.
        - **Import** – Click this button to import the PCM frame setup you've defined in LDPS. Makes it really easy to get a matched set.
        - **Barker** – Click this to get the suggested Barker Frame Sync Pattern for the PCM frame defined Frame Sync Pattern Length.
      - **Load Setup** – When you edit any of the PCM frame setup parameters, you will have to load the setup information into the simulator. This button will be displayed next to the PCM Frame Setup windows if you need to load it.
    - **Archive Setup** – Only in Pbk Mode. The system uses the playback DLL you've selected in the System-Options-Directories-Special-Archive/Playback Function.
      - **PCM Frame Setup** – Only for you to look at, with the exception of Frames Per Interrupt. You can adjust this in playback mode.
      - **Load Playback File** – Select the archived project to play back.
      - **Search On Time** – If your dll supports it, click to set the time to put the file pointer at.
      - **Search On Run** – If your dll supports it, click to set the run number to put the file pointer at.
      - **Skip Frame Sync** – Certain dlls, e.g. Chapter 10, require frame syncing to occur. You can bypass that in the dll and just get the raw data by checking this box (rarely used).
      - **File Loop** – If your dll supports it, when the file reaches the end of playback, it starts over again at the beginning.

- **Loop Start** – If your dll supports it, you can loop between the loop start and loop stop time, vs. eof and bof.
- **Loop Stop** - If your dll supports it, you can loop between the loop start and loop stop time, vs. eof and bof.
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- **PRN Control** – Only in PRN Mode
  - **Force Error**
    - **Continuous** – This will continuously generate a single error in every PRN sequence going out.
    - **Single** – This will generate a single error in a single PRN pattern sequence.
  - **Pseudo Random Binary Sequence** – Select the desired PRN pattern. Normally PRN-11 or PRN-15, but you're free to use your desired pattern.