Behavioral E3 Generator and Analyzer Data Sheet

Generator Features

· VHDL/Verilog component generates E3 data. Supports direct ATM cells and PLCP Applications.

· Supports 3 types of Payload - Pseudo Random Sequences - PRBS15 - $x^{15} + x^{14} + 1$, PRBS20 - $x^{20} + x^{17} + 1$ and PRBS23 - $x^{23} + x^{18} + 1$, Fixed Pattern Sequence (16-bit pattern), and Data From a File.

· Completely configurable via a command language and command interprettor.

· Ability to generate errors on a frame and sub-frame basis on any of the overhead bits.

· Ability to generate AIS frames.

· Stuff under command control on a per-frame basis.

· Generate dump and log files.

· Complies with ITU-T G.832 and ITU-T G.751.

· PLCP application complies with ETS.300.214.

Generator Entity Description

```
ENTITY e3_gen IS

  Generic(
  COMP_NO        : positive; -- component number
  Cmd_File_Name  : string;  -- command file
  Dump_File_Name : string;  -- binary data file
  Log_File_Name  : string;  -- formatted data file
  Payload_File_In : string   -- optional payload file
  );
  Port (
  clk            : IN std_logic;       -- clock
  resetn         : IN std_logic;       -- reset
  data_out       : OUT std_logic_vector;-- E3 data out
  frame_sync : OUT std_logic     -- E3 frame marker FA1
  row_sync   : OUT std_logic -- E3 M row start marker
  );
END E3_gen;
```

Analyzer Features

· Supporting analyzer will monitor E3 data.

· Built-in framer will frame on E3 signals or on an external frame sync signal.

· Detects 3 types of Payload - Pseudo Random Sequences - PRBS15, PRBS20, PRBS23, Fixed Pattern, and Data from a File.

· Ability to ignore frames to account for data delay through the device.

· Recognizes errors in all overhead bits.

· Completely configurable via a command language and command interprettor.

· Recognizes Stuff bits.

· Generate dump and log files.

· Complies with ITU-T G.832 and ITU-T G.751.

Analyzer Entity Description

```
ENTITY ds3_analyzer is

  Generic(
  COMP_NO        : positive; --component number
  Cmd_File_Name  : string;  -- command file
  Dump_File_Name : string;  -- binary data file
  Log_File_Name  : string;  -- data in formatted form
  Payload_File_In : string;   -- optional payload file
  frame_ext      : boolean; -- external frame_sync
  frame_delay    : integer  -- sync pulse to X1 bit dly.
  );
  Port (
  clk            : IN std_logic;       -- clock
  resetn         : IN std_logic;       -- reset
  data_in        : IN std_logic_vector;-- data in.
  frame_sync     : IN std_logic;       -- frame sync in.
  );
```

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GENERAL

The E3 traffic generator is a programmable non-synthe-siszeable VHDL/Verilog component that generates ETS 300.337 (ITU-T G.832) and ITU-T G.751 compliant frame structures at 34,368 kbits/s. The applications[1] supported are 1) direct ATM cells, and 2) Physical Layer Convergence Protocol.

The E3 generator supports three payload types - Pseudo-random Sequence (PRBS15, PRBS20 and PRBS23 polynomials), Fixed Pattern Sequence (16-bit pattern), and Data From a File.

The E3 generator has a built-in command interprettor and is configurable via commands from a file. Thus, it is not necessary to re-compile the VHDL/Verilog to change the behavior of the generator.

The typical way to use the generator is to specify a type of Payload (E.g. Pseudo-random data, Fixed Pattern) and any Error conditions (E.g. frame overhead bytes in error) followed by a Transmit (TRN) command. A command file may contain several TRN commands preceded by any of the payload or error commands.

The E3 traffic analyzer is a programmable non-synthe-siszeable VHDL/Verilog component that verifies received E3 data against ETS 300.337 (ITU-T G.832) compliant frame structure at 34,368 kbits/s. The E3 analyzer supports the same types of payloads as the generator. The type of payload is specified in a command file or the expected payload can be read from a file. The E3 analyzer has a built-in E3 framer, which is able to self synchronize to the received data. One can also elect to use an external frame sync, in which case the internal framer is bypassed.

There are two typical ways to use the analyzer -

One, if the expected payload is not known, the E3 analyzer will report if the traffic received consisted with the correct frame overhead bytes. In this case the payload is not checked.

Second, if the expected payload is known, it can be specified in a command file and then the incoming received paylod is also compared with the expected payload. Individual overhead bytes such as B1 and C1 can also be checked.

PLCP Application

The PLCP command specifies that the payload in the E3 frame complies with the PLCP standard. The PLCP command has to be issued before any TRN commands while operating in PLCP mode. PLCP cannot be turned on or off during simulation. Commands can be issued to control the PLCP overhead bytes, or set errors on them. Frame stuffing is also allowed, by use of the STF command after every 3 frames to align to the DS3 frame. The PLCP analyzer has a built-in PLCP framer, which is able to self synchronize to the received data by indentifying Framing Octets, i.e. A1 and A2.

Command Summary

Cmd Name	Description
#	Comment Character
-	Comment Character
*	Comment Character
dev	Specify the Device type
mod	Select the Application
ign	Ignore Frames
dmp	Dump enable
dis	Display on/off
ais	AIS
pns	Set prbs15, prbs20 or prbs23 seq.
pat	Fixed Pattern
fil	Data from a file
dly	Delay first frame by N clock cycles.
trn	Transmit
set	Set overhead bytes
reset	Reset bytes to default values
flip	Flip bits in specific bytes.
stf	Stuff DS3
trc	Set trail trace sequence bytes in G832 frames.
fase	Monitor last 16 bits of G751 frame for frame synchroniztion.
log	Turn on/off the frames to be logged.

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1. ETS 300.337 describes 2 types of E3 applications.