Mini-DLT wireless radio transceiver

Operation and Maintenance Manual

Lexycom Technologies, Inc.
425 South Bowen Street, Unit 1
Longmont CO 80501
info@lexycominc.com

November 2010, Ver 1.2

Table of Contents

1. About Mini-DLT's Debug Screen

The following information is a summary description of the Mini-DLT's Debug Screen.

The Part2 of this document contains identification and a short description of the parameter fields on the Mini-DLT Debug Screen.

The Par3 of this document contains identification and a short description of keyboard controls supported by the Mini-DLT Debug Screen.

2. Mini-DLT Debug Screen fields

The Mini-DLT's debug screen is shown on the Figure 1 below.

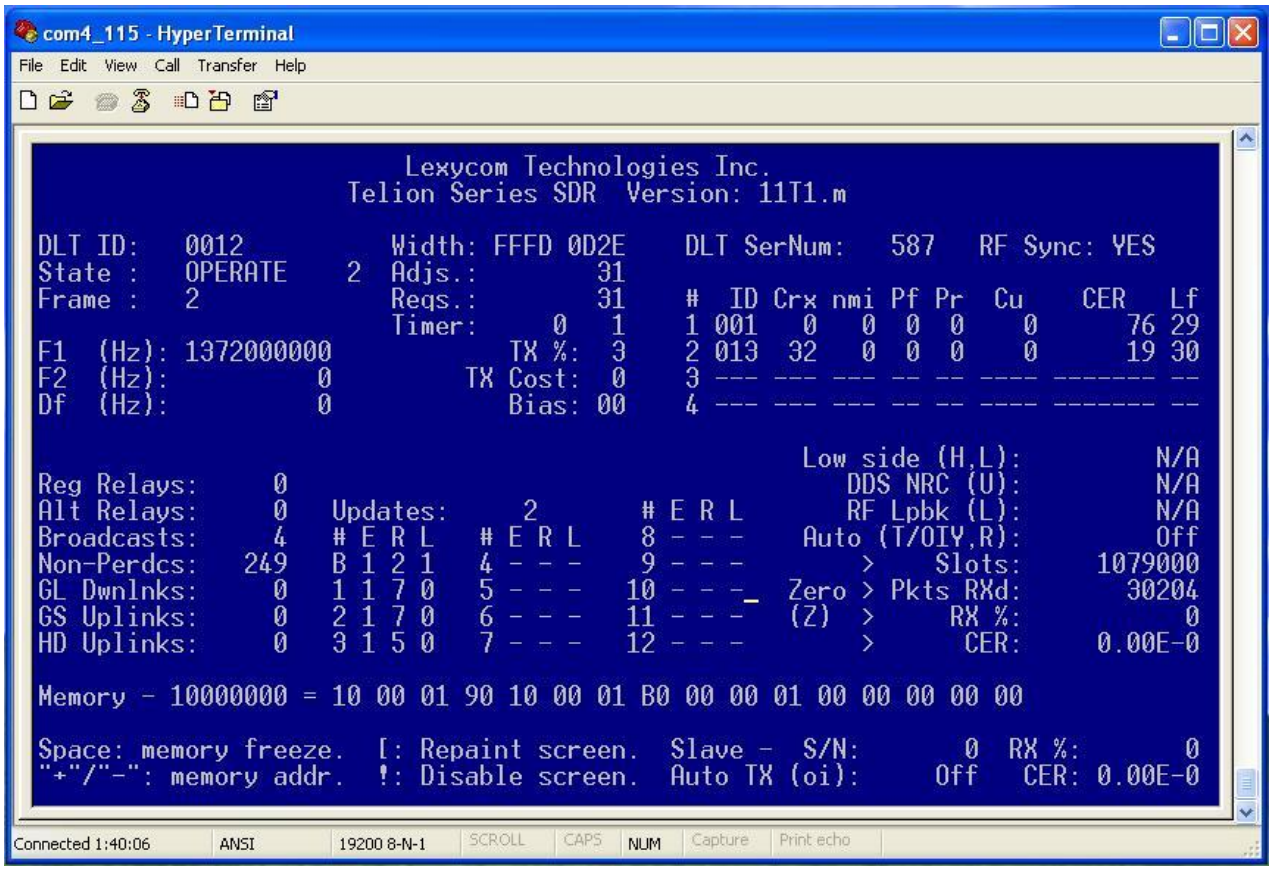

Figure1. The Mini-DLT's Debug Screen.

Below is the definition of the fields used on the screen.

2.1. DLT ID

This value represents the Mini-DLT identification serial number (shown in hexadecimal format).

2.2. State

This value represents the current state of the Mini-DLT.

The states consist of:

- INIT,
- NERO,
- NEFTA,
- OPERATE

The number to the right of the state represents the total number of State changes.

2.3. Frame

This value represents the current frame count. The Mini-DLT displays the current frame ranging from 0 to nine (0 … 9).

2.4. Width

The Width is represented with two 16-bit words shown in hexadecimal format. The value represents the slot width with respect to a ‘original’ Beacon (as opposed to ‘echoed’ Beacon) received from a MRGS.

The Mini-DLT adjusts Slot Width to stay aligned with the MRGS’ Beacons.

2.5. Adjs

This value represents the number of Slot Width adjustments for this Mini-DLT. Each time the Slot Width changes this value is incremented.

2.6. Reqs

This value represents the number of request made for a Slot Width adjustment. Generally, this value is equal to ‘Adjs’.

2.7. Timer

The two values displayed represent the number of Frames in a Superframe detected by this Mini-DLT. Generally, this value is equal to ‘Frame’ value and gets reset to ‘0’ every time Mini-DLT receives its Beacon echoed by the MRGS it is associated with.

Thus, ‘Timer’ value greater than 9 indicates that the Mini-DLT missed its echoed Beacon or MRGS did not send the echoed Beacon to the Mini-DLT.

2.8. F1 (Hz)

This is the frequency the Mini-DLT currently operates on. The frequency is given in ‘Hz’. The valid values are between 1350000000 and 1390000000 in 25 kHz steps.

2.9. F2 (Hz)

The Mini-DLT does not use F2. Hence, this value is hard-coded to be ‘0’ all the time.

2.10. Df (Hz)

The Mini-DLT does not support ‘Default frequency’. Hence, this value is hard-coded to be ‘0’ all the time.

2.11. TX %

This value represents the transmission duty cycle of the Mini-DLT. The resolution of this value is 1%.

2.12. TX Cost

This value represents the Mini-DLT’s transmission cost. For the Participant mode, this value is hard-coded to be 32 decimal.

2.13. Bias

This value represents the Mini-DLT’s transmission cost bias value. The mini-DLT’s transmission cost is hard-coded to be ‘0’.

2.14. Neighbor Table fields

The Mini-DLT’s Neighbor Table portion of the Debug Screen includes four rows representing information from four DLTs with the lowest DLT_ID numbers in the Mini-DLT’s Emitters List.

2.14.1. # column

The ‘#’ column indicates four entries of this table ranging from 1 to 4.

2.14.2. ID column

This value is a hexadecimal number representing neighbor DLTs Identification Number (DLT ID). The same format is used to show Ground Stations and Participants.

2.14.3. Crx column

This value represents the neighbor DLT's cost to receive. The Mini-DLT extracts this value from the 'Cost' fields of the RF packets received from a particular DLT.

2.14.4. Nmi column

This value represents the range in nautical miles to a neighbor DLT.

2.14.5. Pf column

Part of the numbers used to do cost and routing operations. With the revision mn11T2a of the Mini-DLT's firmware, this value is hard-coded to be '0' all the time.

2.14.6. Pr column

Part of the numbers used to do cost and routing operations. With the revision mn11T2a of the Mini-DLT's firmware, this value is hard-coded to be '0' all the time.

2.14.7. Cu column

This value represents a neighbor DLT current lowest cost to use, which includes the bias cost. With the revision mn11T2a of the Mini-DLT's firmware, this value is hard-coded to be '0' all the time.

2.14.8. CER column

This value represents Corrected Error Rate of this neighbor. The Mini-DLT extracts this value from the 'CER' field of the 'original' Beacons received from this DLT.

2.14.9. Lf column

The 'Life count' of the neighboring DLT. The Mini-DLT resets this value to '30' every time it receives a RF packet from this DLT.

This number will decrement to 0 by counts of 1 if Mini-DLT stops receiving RF packets from this DLT.

2.15. Reg Relays

This value represents the number of Relays assigned/allowed by the Ground Station. The Mini-DLT extracts this number from the 'Number of Relays Used' field of the 'original' Beacon received from this DLT.

2.16. Alt Relays

This value represents the number of Alternate Relays assigned/allowed by the Ground Station. With the revision mn11T2a of the Mini-DLT's firmware, this value stays at '0' all the time.

2.17. Broadcasts

This value represents the number of messages Mini-DLT received that were send by other DLTs as Broadcast messages. Such messages would have bit3 of WORD01 of the RF packet Header set (equal to '1').

2.18. Non-Perdcs

This value represents the number of messages Mini-DLT received that were sent by other DLTs as Normal messages (as opposed to Broadcast). Such messages would have the bit3 of WORD01 of the RF packet Header cleared (equal to '0').

2.19. GL Dwnlnks

Since the Mini-DLT does not support Ground Station mode of operation, this value will always be '0' on the Debug Screen.

2.20. GS Uplinks

Since the Mini-DLT does not support Ground Station mode of operation, this value will always be '0' on the Debug Screen.

2.21. HD Uplinks

This value represents the number of uplink messages Mini-DLT receives addressed to it directly (DLT-specific uplink messages) or broadcast.

2.22. Update Table fields

The 'Updates' table of the Debug Screen reflects the changes Mini-DLT makes to its FrameTable based on the Commands (Msg258) received from MRGS Mini-DLT is associated with.

2.22.1. 'B' row

This row represents the updates to the Mini-DLT's Beacon assignment received within the last Command (Msg258) from the MRGS Mini-DLT is associated with.

2.22.2. '1 through 12' rows

These rows represent the updates to the Mini-DLT's FrameTable assignment. Each row represents corresponding AssignmentBlock within the latest Command (Msg258) received by the Mini-DLT from MRGS it is associated with.

2.22.3. 'E' column

This value represents the current number of matching assignment Entries found.

2.22.4. 'R' column

This value represents the Rate. The Mini-DLT extracts this value from the 'Rate' field of the corresponding Assignment block of the latest Command (Msg258) received by the Mini-DLT from MRGS it is associated with.

2.22.4. 'L' column

This value represents the current relay Lifetime. With the revision mn11T2a of the Mini-DLT's firmware, this value stays at '1' for the Beacon row of the Table and at '0' for the rest of the entries in the Table.

2.23. Low side (H, L)

This value is not applicable to the Mini-DLT.

2.24. DDS NRC (U)

This value is not applicable to the Mini-DLT.

2.25. RF Lpbk (L)

This value is not applicable to the Mini-DLT.

2.26. Auto (T/OIY,R)

This value represents the number of Slots the Mini-DLT is forced to transmit on in terms of duty cycle percentage. The percentage is calculated with respect to the SuperFrame duration (3300 Slots).

The transmission values can be modified by the operator pressing the following keys:

"T" to place the DLT in one of three transmission modes:

a) Full,
b) Sweep, or
c) CW.

"R" to place the DLT in receive only mode.

"O" and "I" to increase or decrease the transmit duty cycle. Ten increments are available as follow:

- 1 transmit per second - 0.3%
- 2 transmits per second - 0.6%
- 3 transmits per second - 0.9%
- 10 transmits per second - 3%
- 22 transmits per second - 6.7%
- 33 transmits per second - 10%
- 66 transmits per second - 20%
- 66 transmits per second - 25%
- 165 transmits per second - 50%
- 330 transmits per second - 100%

When Mini-DLT is forced into the Transmit mode using 'Auto (T/OIY,R)' option, the Mini-DLT will populate its FrameTable with scheduled transmissions of Beacon-like messages. One can think of such Beacons as "Debug Beacon".

The Mini-DLT does such scheduling starting at Slot #17. The step size used by the Mini-DLT to populate its FrameTable depends on the chosen transmit duty cycle.

For instance, if user selects 0.6% duty cycle, then Slots#17(decimal) and Slot#182(decimal) will be scheduled for Debug Beacon transmission.

Similarly, selecting 10% duty cycle will result in Mini-DLT's will transmit Debug Beacon on every tenth Slot starting from Slot#17(decimal).

If Mini-DLT had another message scheduled during one of the Slots affected by Debug Beacons, the Debug Beacon transmission will take precedence.

2.27. Slots / Sent

When the debug transmit mode is Off, this field will read ‘Slots’. The ‘Slots’ value represents the number of Slots the Mini-DLT executed since the last power up. This value increments in step of 1000 Slots.

When the Mini-DLT is in the debug transmit mode, this field of the Debug Screen will read ‘Sent’. The ‘Sent’ value represents the total number of RF packets the Mini-DLT transmitted since the last power up.

2.28. Packets RXd / Misses

When the debug transmit mode is Off, this field will read ‘Packets RXd’. The “packets RXd’ represents the number of Rf packets the Mini-DLT received (packets that passed CRC check).

When the Mini-DLT is in the debug transmit mode, this field of the Debug Screen will read ‘Misses’. This value represents the number of packets missed.

2.29. RX % / Bad Pkts

When the debug transmit mode is Off, this field will read ‘RX %’. The ‘RX %’ value represents the the number of Slots during which the Mini-DLT received RF packets measured inpersentage with respect to the SuperFrame duration (3300 Slots).

The Mini-DLT’s firmware version mn11T2a will always read ‘0’ at this location.

When the Mini-DLT is in the debug transmit mode, this field of the Debug Screen will read ‘Bad Pkts’. The ‘Bad Pkts’ value represents the total number of RF packets the Mini-DLT received that did not pass CRC check.

2.30. CER

This value reflects a calculated Channel Error Rate based on the number of RF packets and the number of channel errors.

The Mini-DLT's firmware version mn11T2a will always read '0.00E-0' at this location.

2.31. Memory

This line of data shows the contents of the Mini-DLT RAM.

The following keys can be used to navigate through the Mini-DLTs Ram display:

"+" and "-" keys will increment/decrement address by 0x10;
"~" and "?" keys will increment/decrement address by 0x100;
"A" and "S" keys will increment/decrement address by 0x1000.

2.32. Space

The <Space> key will freeze or unfreeze the entire Debug Screen.

2.33. Repaint screen

The "[" key will repaint the entire Debug Screen.

2.34. Disable screen

Hit "!" key to exit the Debug Screen.

2.35. Slave – S/N

This value is fixed to '0' in the Mini'DLT's mn11T2a firmware level.

2.36. RX %

This value is fixed to ‘0’ in the Mini’DLT’s mn11T2a firmware level.

2.37. Auto TX (oi)

This value is fixed to ‘Off’ in the Mini’DLT’s mn11T2a firmware level.

2.38. CER

This value is fixed to ‘0.00E-0’ in the Mini’DLT’s mn11T2a firmware level.

3. Mini-DLT Debug Screen controls

DEBUG TERMINAL INPUT CHARACTERS:

“[“	Repaint the Debug Screen
“!”	Exit from the Debug Screen
“+”	Increments RAM address offset by 0x10
“-”	Decrements RAM address offset by 0x10
“~” or “`”	Increments RAM address offset by 0x100
“?” or “/”	Decrements RAM address offset by 0x100
“A” or “a”	Increments RAM address offset by 0x1000
“S” or “s”	Decrements RAM address offset by 0x1000
<Space>	Toggles the freeze state of the Debug Screen
“T”	Toggles the auto transmit state
“O”	Increases the auto transmit duty cycle
“I”	Decreases the auto transmit duty cycle
“R”	Toggles the auto receive state
“Z”	Zeroes the RF auto TX/RX counts.
“D”	Fills in all DataPort Frame Slots with msg17, msg18, msg19, and msg20 downlink requests. The Mini-DLT will place mentioned downlink message

requests sequentially at the consecutive Slots starting from Slot4. Hence, after the key "D" was pressed, the Mini-DLT's DataPort Frame Table will have the following contents:

Slot0 … Slot3	content of these Slots will remain unchanged from before "D" was pressed
Slot4	the originally schedule downlink message request will be overwritten with msg17 request
Slot5	the originally schedule downlink message request will be overwritten with msg18 request
Slot6	the originally schedule downlink message request will be overwritten with msg19 request;
Slot7	the originally schedule downlink message request will be overwritten with msg20 request;
Slot8	the originally schedule downlink message request will be overwritten with msg17 request
Slot8	the originally schedule downlink message request will be overwritten with msg18 request
Slot8	the originally schedule downlink message request will be overwritten with msg19 request

and so forth.

"F" Erases (completely) the contents of the Mini-DLT's DataPort Frame Table.

"G" Resets the Sent/Received counters for the downlink message requests (msg17, msg18, msg19, and msg20 only). Also, resets the SDLC error frame counter.

Appendix A.

The memory map of the Mini-DLT (RAM locations)

Address	Variable Name	Notes
$10000D40	RF Rx buffer, allocated 128 bytes	
$100018B0	Counter indicating the number of Msg17 requests sent to the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$100018B2	Counter indicating the number of Msg17 received by the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$100018B4	Counter indicating the number of Msg18 requests sent to the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$100018B6	Counter indicating the number of Msg18 received by the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$100018B8	Counter indicating the number of Msg19 requests sent to the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$100018BA	Counter indicating the number of Msg19 received by the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$100018BC	Counter indicating the number of Msg20 requests sent to the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$100018BE	Counter indicating the number of Msg20 received by the Mini-DLT's data port (works equally in SDLC or Serial mode), 1 word.	
$10001A48	Counter indicating a number of SDLC frames received with error (any error), long word.	

$10002AC0	Start Address of the DataPort Frame Table. Total of 3300 entries, each entry is 1 byte.	
$10008300	Message6 template, allocated 128 bytes	
$10008500	Message256 template, allocated 128 bytes	
$10008580	Message257 template, allocated 128 bytes	
$10008880	Message17 template, allocated 128 bytes	
$10008900	Message18 template, allocated 128 bytes	
$10008980	Message19 template, allocated 128 bytes	
$10008A00	Message20 template, allocated 128 bytes	
$10008A80	Message21 template, allocated 128 bytes	
$10008B00	Message22 template, allocated 128 bytes	
$10008B80	Message23 template, allocated 128 bytes	
$10008C00	Message24 template, allocated 128 bytes	
$10008C80	Message25 template, allocated 128 bytes	
$10008D80	Message27 template, allocated 128 bytes	
$10008E80	Message29 template, allocated 128 bytes	
$10008F80	Message31 template, allocated 128 bytes	
$10009180	Start Address of the RF Frame Table. Total of 3300 entries, each entry is 1 word.	