

# LTE153-6000

Externally Modulated Laser Transmitter 1550 nm **Product User Manual** 



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# **Product User Manual**

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# Contents

1 Sa	afety Information	. 5
1.1	Power Requirements	. 5
1.2	Safety Instructions	. 5
1.3	Safety Symbols	. 5
2 G	etting Started	. 6
2.1	Before Initializing and Operating the Unit	. 6
2.2	Keep the packaging	. 6
2.3	Operating Environment	. 6
2.4	Humidity	. 6
3 In	troduction	. 8
3.1	Overview	. 8
3.2	Features	. 8
3.3	Specifications	. 9
3.4	Transmitter Dimensions	10
3.5	Models and Options	11
4 Tr	ansmitter Controls and Indicators	12
4.1	Front Panel Layout	12
4.2	Rear Panel Layout	12
4.3	Show Parameters	13
4.4	Display Warnings/Alarm Parameters	17
4.5	Remote Monitoring: SNMP	18
4.6	Connecting to the RS232 interface	18
4.7	Reading the parameter values of the unit via the RS232 interface	20
4.8	MIBs	22
5 Tr	ansmitter Setup Tips For SBS adjustability	25
5.1	Setting SBS level to correct value for your optical network	25
6 Te	echnical Description	26
7 M	odule Configuration & Alarms	27
7.1	Login to System Management Web Page	27
7.2	Power Supply and Alarms Monitoring	28
7.3	Event Log Management	29
7.4	Front Panel LED Status Monitoring	29
7.5	Transmitter Data Monitoring	30
7.6	SNMP Configuration Monitoring	30
7.7	Transmitter Data Configuration	31
7.8	Temperature, Voltage and Basic Level Alarms Management	32
7.9	Restore Factory Reset	32
7.10	Restart configuration	33

7	7.11	Change User Password	33
7	7.12	Display Options	34
8	Pro	duct Warranty	35
9	Dec	laration of Conformity	36

# 1 Safety Information

# **1.1 Power Requirements**

The system can operate from an AC power source that supplies 100 V AC to 240 V AC 47-63 Hz or a DC power source that supplies 36 to 72 V DC.

# 1.2 Safety Instructions

The following safety instructions must be observed whenever the unit is operated, serviced, or repaired. Failure to comply with any of these instructions or with any precaution or warning contained in the user's manual is in direct violation of the standards of design, manufacture, and intended use of the unit. PBN assumes no liability for the customer's failure to comply with any of these safety requirements.

#### Before Initializing and Operating the Unit

Inspect the unit for any signs of damage, and read the user's manual thoroughly.

Install the unit as specified in the Getting Started section.

Ensure that the unit and any devices or cords connected to it are properly grounded.

# 1.3 Safety Symbols

The following symbols and messages can be marked on the unit (Table 1). Observe all safety instructions that are associated with a symbol.

#### Table 1: Safety Symbols

Symbol	Description		
	Laser safety. See the user's manual for instructions on handling and operating the unit safely.		
	See the user's manual for instructions on handling and operating the unit safely.		
	Electrostatic discharge (ESD). See the user's manual for instructions on handling and operating the unit safely.		
	Frame or chassis terminal for electrical grounding within the unit.		
	Protective conductor terminal for electrical grounding to the earth.		
WARNING	The procedure can result in serious injury or loss of life if not carried out in proper compliance with all safety instructions. Ensure that all conditions necessary for safe handling and operation are met before proceeding.		
CAUTION	The procedure can result in serious damage to or destruction of the unit if not carried out in compliance with all instructions for proper use. Ensure that all conditions necessary for safe handling		

and operation are met before proceeding.

# 2 Getting Started

### 2.1 Before Initializing and Operating the Unit

- 1. Inspect the transmitter for any signs of damage, and read the User's Manual thoroughly.
- 2. Install the transmitter as specified in the Getting Started section.
- 3. Ensure that the transmitter and any devices or cords connected to it are properly grounded.
- 4. Become familiar with all safety symbols and instructions to ensure that the transmitter is operated and maintained safely.

#### Initial Inspection

#### WARNING!

To avoid electrical shock, do not initialize or operate the unit if it bears any sign of damage to any portion of its exterior surface, such as the outer cover or panels.

#### Check that the unit and contents are complete:

- 1. Wear an anti-static wrist strap and work in an electrostatic discharge (ESD) controlled area.
- 2. Inspect the shipping container for any indication of excessive shock to the contents, and inspect the contents to ensure that the shipment is complete.
- 3. Inspect the unit for structural damage that can have occurred during shipping.

# 2.2 Keep the packaging.

Immediately inform PBN and, if necessary, the carrier if the contents of the shipment are incomplete, if the unit or any of its components are damaged or defective, or if the unit does not pass the initial inspection.

# 2.3 Operating Environment

In order for the unit to meet the warranted specifications, the operating environment must meet the following conditions for temperature and humidity.

#### Temperature

The unit can be operated in the temperature range of 0 to 50°C (standard).

# 2.4 Humidity

The transmitter can be operated in environments with up to 85% humidity, non-condensing (0°C to 50°C). Do not expose it to any environmental conditions or changes to environmental conditions that can cause condensation to form inside the transmitter.

#### WARNING!

#### $1_{\times}$ Do not use the unit outdoors.

2. To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.

#### **Storing and Shipping**

To maintain optimum operating reliability, do not store the unit in locations where the temperature falls below -40°C or rises above 85°C. Avoid any environmental condition that can result in internal condensation. Ensure that these temperature and humidity requirements can also be met whenever the unit is shipped.

#### Claims and Repackaging

Immediately inform PBN and, if necessary, the carrier, if

- The contents of the shipment are incomplete
- The unit or any of its components are damaged or defective
- The unit does not pass the initial inspection

In the event of carrier responsibility, PBN will allow for the repair or replacement of the unit while a claim against the carrier is being processed.

#### Unpacking

- 1. Inspect the shipping boxes for any obvious damage.
- 2、 Unpack the unit from all packaging boxes.
- 3. Inspect the appearance of the unit for any shipping damage.
- 4. In case of damage, document and inform the shipping company and your local representative.
- 5. Save the shipping boxes and their inserts for any future reshipment for upgrade or repair.

**NOTE:** In the event of a reshipment back to the manufacturer, any additional damage caused by not using the original boxes will be considered the responsibility of the customer.

#### **Transmitter Mounting and Power Connection**

- 1. Mount the unit into a 19-inch wide rack or cabinet (or 23-inch with optional mounting kit).
- 2. Turn the unit power supply switch located on the rear panel off.
- 3、Turn the key switch located on the front panel to the OFF position.
- 4、For dual AC powered models: Plug the two power cords supplied with the transmitter into the three-prong connectors on the rear panel of the transmitter and plug the other ends of the two power cords into a 100-240 VAC, 47-63 Hz power source (e.g. wall socket).
- 5. For DC powered models: Connect wires DC+, DC-, and GND to the pluggable terminal block that is connected to the DC input of the power supply. The DC power source must be 36 – 72VDC and wires used must handle 65VA.
- 6、Turn the unit power switch to the ON position.

Note: The transmitter can operate with a single power supply and/or from two different power sources.

# **3** Introduction

### 3.1 Overview

The LTE153-6000 is designed to deliver optimum performance on long-haul fiber with low dispersion shifted to 1550 nm. It is the ideal solution when the network requires long distance transmission.

The LTE153-6000 provides a low chirp mode of operation with a very narrow optical line width. This allows the use of any 1550nm DWDM wavelength for the transmission of broadband CATV, whilst maintaining excellent CNR, CSO and CTB performance throughout the network.

The LTE153-6000 is packaged in a compact 19" sub-rack housing of 1RU, with dual redundant and hot-swappable power supply modules.

The transmitter features adjustable dispersion compensation to maximize performance for the channel plan in use.

### 3.2 Features

- RF pre-distortion circuit for excellent CSO and CTB performance together with low distortion parameters
- Versions for long-haul applications, as well as for short-haul FTTH customer access networks
- Optimized models for 60 PAL channels, 89 PAL channels, 80 NTSC channels or 110 NTSC channels. Flat response for 45~1003 MHz
- Dual redundant hot-swappable power supplies for universal mains or for telecom battery
- Field-adjustable Stimulated Brillouin Scattering (SBS) suppression for optimized CSO to suit 14~18 dBm fiber line drive levels.
- Front-panel LCD for local monitoring of transmitter status. Integrated SNMP agent with RJ45 Ethernet port for remote monitoring
- Front Panel RF Test Point for easy access



# 3.3 Specifications

Link Performance**						
	S-Type(6000-SA)					
Specified Link Length (km)	65	65	65	65	65	
Channel Plan	NTSC 80	PAL 60	NTSC 110	PAL 89	42 CENELEC	
Optical Output	7.0/ 7.0(Min Higher	7.0/ 7.0(Min Higher	7.0/ 7.0(Min Higher	7.0/ 7.0(Min Higher	7.0/ 7.0(Min Higher	
Power(dBm)	Powers Available)	Powers Available)	Powers Available)	Powers Available)	Powers Available)	
Noise Bandwidth(MHz)	4	5	4	5	5	
SBS Suppression (dBm)	16.0(Min.)	16.0(Min.)	16.0(Min.)	16.0(Min.)	16.0(Min.)	
CNR (dB)	53.0/ 53.0(Min.)	53.0/ 53.0(Min.)	53.0/ 53.0(Min.)	53.0/ 53.0(Min.)	53.0/ 53.0(Min.)	
CSO (dBc)	-65/-65(Max.)	-65/-65(Max.)	-65/-65(Max.)	-65/-65(Max.)	-65/-65(Max.)	
CTB(dBc)	-65(Max.@25℃)	-65(Max.@25℃)	-65(Max.@25℃)	-65(Max.@25℃)	-65(Max.@25℃)	
CTB(dBc)	-64(Max.@0- 50℃)	-64(Max.@0- 50℃)	-64(Max.@0-50℃)	-64(Max.@0- 50℃)	-64(Max.@0-50℃)	
RF Performar	nce					
RF bandwidth		45 ~ 1003 MHz				
RF flatness		± 0.75 dB @ 45 ~ 1003 MHz				
RF input return lo	ss	≥ 16 dB				
RF input impedan	се	75 Ω				
Front Panel RF test point		-20 dB ± 1 dB do	wn from RF input			
TV channel plan		60 or 89 PAL channels; 80 or 110 NTSC channels				
RF connector		SCTE F-Type				
Nominal RF input level per TV channel		CW/Video mode		Manual mode		
PAL 60 ch		20 ± 2 dBmV/ch		18 ± 1 dBmV/ch		
PAL 8	9 ch	18 ± 2 dBmV/ch		16 ± 1 dBmV/ch		
NTSC	80 ch	19 ± 2 dBmV/ch		17 ± 1 dBmV/ch		
NTSC 1	10 ch	17 ± 2 dBmV/ch 15 ± 1 dBmV/ch				
SNMP Manag	gement	1				
Network Port		RJ45-10/100baseTx				
МІВ		SCTE MIB for HFC optical transmitters, and associated MIBs				
General		1				
Power supplies		2 slots for redundant and hot-swappable units, AC or DC:AC: 90~265 Vac 50~60 Hz; DC:36~72 Vdc				
Power consumption		Maximum 65 Watt				
Operating temper	ature	0 ℃ to +45 ℃				
Storage temperate	ure	-20 °C to +70 °C				
Dimensions (H x \	ensions (H x W x D) 44 x 485 x 381 mm(width includes 19" front panel ears, depth includes connectors, fans & front panel)		depth includes,			
Shipping size (H >	(W x D)	80 x 600 x 670 m	m (107 dm <sup>3</sup> )			

Weight	6.0 kg
Shipping weight	6.5 kg

Note: 1. Set each channel to the correct RF level. This is dependent on the operating mode.

2、Connect the RF (CATV) channels to the F connector labeled "CATV IN".

# 3.4 Transmitter Dimensions





# 3.5 Models and Options

### LTE153-6000-[VW]-[XYZ]

Laser transmitter, externally modulated, 19" 1 RU sub-rack, with SNMP.

#### **Options:**

- V Link type
  - **S** 65km
- W Output power
  - A 7.0/7.0 for S type
  - D 10.0/10.0 for S type (Note: Applicable for S link type. CSO port 2 degraded by 1dB for Channel Loads 1 and 2, CSO port 2 degraded by 2dBfor Channel. Loads 3 and 4. Channel load 1-2 = 80NTSC – 60PAL Channel load 3-4 = 110NTSC and 80 Pal)
- X Optical connectors
  - 1 SC/APC optical angle polished connectors
- Y Optical Wavelength
  - 01 Standard 1550 ±5 nm
  - ## ITU DWDM grid channel 18~40 (refer to relevant ITU DWDM standards)
- **Z** Power supply options.
  - AC = 90~265 Vac 50~60 Hz, DC = 36~72 Vdc
  - **3** Dual: AC primary, AC secondary
  - 4 Dual: AC primary, DC secondary
  - 5 Dual: DC primary, DC secondary

#### Example:

#### LTE153-6000-SA-1013

Laser transmitter, in stand-alone 19" sub rack, 1 RU, externally modulated, optimized for 65 km line length, 1550 nm  $\pm$  5 nm, 2 x 7 dBm outputs with SC/APC connectors. Dual redundant universal mains AC power supplies. Integrated SNMP.

# **4** Transmitter Controls and Indicators

# 4.1 Front Panel Layout



No.	Description
1	RF Inputs and Test Port Output (-20dB from RF Input)
2	Laser LED (Red=OFF, Green=ON), Status LED, COMM LED
3	VFD- Vacuum Florescence Display (Shows parameters, status, and alarms)
4	Control Buttons (up, down, left, and right)
5	Laser control Key Lock switch

# 4.2 Rear Panel Layout



No.	Description	
1	AC Power Supply (can be installed in any location)	
2	Field Replaceable Fan Assemblies	
3	Laser ON LED (Optical Power is present when lit)	
4	Ethernet Interface Connector, RS-232 interface connector	
5	RF Inputs Ports	
6	Optical Output connectors (may only be one depending on model)	

#### Note:

Product appearance may vary with model options.

### 4.3 Show Parameters

#### **Show Parameters**

Press right arrow button on front panel at the display shown after power on

#### Menu #1 – Model Number

This is a read only menu, which tells the operator what type of transmitter they are operating – Default "LTE153-6000-xxxx-xxxxx".

#### Menu #2 – Serial Number:

This is a read only menu, which tells the operator the production serial number of the unit in operation – set by factory

#### Menu #3 – Date Code:

This is a read only menu, which tells the operator the date the Tx was manufactured – set by factory

#### Menu #4 - FW revision

This is a read only menu, which tells the operator the version of the FW installed in unit

#### **Menu #5** – SBS Suppression:

This menu is where the SBS level of the Tx would be tuned to match the launch power

#### Menu #6 – Fiber dispersion Control:

This menu allows the user to enable or disable Electronic Fiber Dispersion Compensation. This function would be used if the user would like to improve the CSO performance of a point-to-point link. The following three settings (Menus 8,9 and 10) allows the user to fine tune the level of dispersion compensating CSO products. This is used to negate the CSO produced by non-linear fiber effects such as Chromatic Dispersion and Self Phase modulation.

**Menu #7** – Fiber Dispersion Gain: Allow the user to vary the amount of Fiber Dispersion Gain in 0.1 Volt increments.

**Menu #8** – Fiber Dispersion Phase: Allow the user to vary the amount of phase in 0.1 Volt increments.

#### Menu #9 – CATV AGC Mode:

Use this menu to select between manual, CW or Video AGC modes.

Manual mode – The AGC has no effect at this setting and therefore if the RF input changes then so does the end of line link performance.

CW mode – The AGC controls and maintains the factory setting for the OMI of the Tx. If the RF input is lowered or raised within the specified range then the end of line link performance will still be held constant.

Video mode – Functions identically to the CW mode with the exception that it sets the OMI to a 3dB lower level to compensate for modulated carriers.

**Menu #10** – CATV OMI Setting / RF attenuation AGC – Mode selective Menu If the Tx has been put in CW or Video mode this menu will display " OMI Setting" This control allows the user to adjust the factory set OMI AGC point in 0.1 dB steps. -4 to +2 dB range. If the Tx has been put in MANUAL mode this menu will display "RF attenuation AGC" This control allows the user to adjust the factory set RF attenuator setting in 0.1 dB steps. -4 to +2 dB range.

**Menu #11** – System Temp – This is a read only menu, this parameter tells the user the temperature of the Tx module itself.

**Menu #12** – Laser Current – This is a read only menu, which tells the operator the current of the DFB laser in mA.

**Menu #13** – Laser Temp – This is a read only menu, which tells the operator the temperature setting on the DFB laser. Generally this is how the wavelength is set on a particular Tx.

**Menu #14** – TEC current – This is a read-only menu; this is the current setting for the thermoelectric cooler device used to keep the DFB laser temperature constant.

**Menu #15** – Optical Power Port 1 – This is a read-only menu; reported in dBm to the nearest 0.1dB.

**Menu #16** – Optical power port 2 - This is a read-only menu; reported in dBm to the nearest 0.1dB.

**Menu #17** – CATV Input RF – This menu indicates the relative RF composite input power from the factory nominal setting in dB.

#### Menu #18 – CATV Composite RF:

This menu shows a relative value of the actual RF input power compared to the factory set desired RF input power. For both AGC modes CW and Video this should be 0.0 because this is set by the control circuitry. For manual mode this will depend on the amount and RF level of the channels present at the input of the Tx.

#### Show Alarms

Press left arrow button on front panel at the display shown after power on

#### Alarm #1 – Laser Temp:

This alarm is triggered when the temperature of the laser deviates from it's factory setting.

#### Alarm #2 – Laser Current:

This alarm is triggered when the current of the laser deviates from it's factory setting.

Alarm #3 – Input RF level:

The RF low/high alarm is triggered when either the RF power at the input of the Tx is away from the original nominal input set at the factory. This nominal value is directly dependent on RF level per CW carrier.

#### Alarm #3 – Comp RF level:

The RF low/high alarm is triggered when either the total RF power at the input of the Tx is away from the original nominal input set at the factory. This nominal value is directly dependent on channel loading and RF level per CW carrier.

#### Alarm #4 – 2 GHz and 6 GHz:

These alarm(s) are triggered when the power of one or both of the SBS tones decreases below initial factory setting.

#### Alarm #5 – System Temp:

This alarm is triggered when the module temp reaches 70 deg C(High) or respectively the module temp reaches 0 deg C(Low).

#### Alarm #6 – TEC Alarm:

This alarm is triggered only when the current on the TEC reaches a value of 1500 mA.

#### Alarm #7 - +5v power supply:

This alarm is triggered if the voltage exceeds preset limits. Also if either condition is met the microprocessor resets due to the fact that this is a critical voltage supplied to the chip.

#### Alarm #8 - -5v power supply:

This alarm is triggered if the supply exceeds preset limits.

#### Alarm #9 - +12v power supply:

This alarm is triggered if the supply exceeds preset limits.

#### Alarm #10 - -12v power supply:

This alarm is triggered if the supply exceeds preset limits.

#### Alarm #11 - +24v power supply:

This alarm is triggered if the supply exceeds preset limits.

#### Alarm #13 – Optical Power, Port 1 or 2:

This alarm is independent for each port. It is generated when the optical power reaches either <5.0 dBm (low) or > 14 dBm (high).

#### Alarm #15 - Keyswitch ON/OFF:

This alarm is generated when the key is on the OFF position.

#### Alarm #16 - Remote Keyswitch ON/OFF:

This alarm is generated when the key switch is remotely programmed to the OFF position via SNMP command.

#### Alarm #18 – Cooling Fan A Failure

This alarm is generated when rear panel cooling fan failure is detected.

#### Alarm #19 – Cooling Fan B Failure

This alarm is generated when rear panel cooling fan failure is detected.

#### Alarm #20 – Power Supply A Failure

This alarm is generated when a failure is detected with one or more power supply DC voltage outputs.

#### Alarm #21 - Power Supply B Failure

This alarm is generated when a failure is detected with one or more power supply DC voltage outputs.

Warning/Alarm Description	Warning Alarm Limit	VFD Display
RF Alarms		
RF input level	-6.0 dB	Input RF Level HI
(Manual mode only)	2.5 dB	Input RF Level LO
AGC Control Loop	+/- 1.25 dB from	AGC Unlocked
Unlocked (AGC mode only)	OMI set point	
Optical Output Power Alarms	14 dBm	Optical Power Output HI
	5 dBm	Optical Power Output LO
Laser Bias Current Alarms	100ma	Laser Current LO
	450ma	Laser Current HI
Laser Temperature Alarms	16 deg C	Laser Temp LO
	35 deg C	Laser Current HI
Laser TEC Failure Alarm	+/- 1.5 amp	TEC Current HI
Unit Internal Temperature	0 deg C	System Temp LO
Alarm	70 deg C	System Temp HI
Cooling Fan Failure Alarm	< 50 mA	Fan Current LO
	> 200 mA	Fan Current HI
Power Supply Alarm	+5VDC	Plus 5V Supply HI /LO
	-5VDC	Minus 5V Supply HI / LO
	+12VDC	Plus 12V Supply HI / LO
	-12VDC	Minus 12V Supply HI / LO
SBS Suppression Failure	0.1 Volts	2 GHz SBS Power LO
Alarm	0.1 Volts	6 GHz SBS Power LO
Key Switch Position		Keyswitch OFF
Remote Key Switch		Remote Keyswitch OFF
Internal Communication		Communication Failure
Modulator Bias	+/- 4.5 Volts	Mod Bias HI / LO

# 4.4 Display Warnings/Alarm Parameters

### 4.5 Remote Monitoring: SNMP

#### General Background of SNMP

*Simple Network Management Protocol (SNMP)* is an application layer protocol that facilitates the exchange of management information between network devices. It is part of the Transmission

Control Protocol/Internet Protocol (TCP/IP) protocol suite. SNMP enables end users to manage network performance, find and solve network problems, and plan for future network growth.

*Management Information Base (MIB)* is a collection of information that is organized hierarchically, and these MIBs are accessed using SNMP. They are comprised of managed objects and are identified by object identifiers

#### SNMP

The transmitter provides a serial communications interface that conforms to the IEEE-802.3 physical layer specifications. This interface supports connections to proprietary element and network management systems. This interface assumes a master/slave type of relationship between EMS/NMS and transmitter. The host computer system is capable of querying connected equipment for status as well as sending control information through SNMP. The physical interface is a two-wire (and ground) multi-drop bus. The communications channel is half-duplex.

#### **Configuring the Transmitter for Network Communication**

When the transmitter is operated initially, the SNMP Agent and IP Address are in a default state that needs to be configured. This initial configuration is supported via the RS-232 interface.

### 4.6 Connecting to the RS232 interface

1. With the transmitter power **OFF**, connect a THRU DE9 (also known as DB9) cable between a personal computer and the transmitter's RS232 DE9 connector on the back.

2. Power up the transmitter.

3. Invoke a terminal emulation program on the PC such as Microsoft HyperTerminal (used in this example).

A connection-description window will appear, asking for a name for the connection you are about to establish, also displaying a choice of icons.

4. Type in a name, select an icon and click **OK**.

5. Configure the communication channel (in this example **COM1**) with 9,600 bits per second, 8 data bits, no parity, one stop bit and no flow control (see screenshot below).

OM1 Properties		?
Port Settings		
Bits per second:	9600	~
Data bits:	8	~
Parity:	None	~
Stop bits:	1	~
Flow control:	None	~
	Restore De	Apply

6. Click **Apply** then **OK**.

7. Under the **File** drop-down menu in HyperTerminal, select **Properties** and click on the **Settings** tab.

8. Ensure that the settings match those shown in the screenshot below.

test Properties	? 🗙
Connect To Settings	
Function, arrow, and ctrl keys act as	
O <u>W</u> indows keys	
Backspace key sends           Image: Constraint of the sender of the send	
Emulation:	
Auto detect 🛛 🖌 Terminal Setup	
Tel <u>n</u> et terminal ID: ANSI	
Backscroll buffer lines: 500	
Play sound when connecting or disconnecting	
Input Translation ASCII Setup	
ОК	Cancel

9. Click **OK**. The device should now be connected.

# 4.7 Reading the parameter values of the unit via the RS232 interface

After successfully completing the steps in **Section 5.4.3**:

1. Under the **File** drop-down menu in HyperTerminal, select **Properties** and click on the **Settings** tab.

- 2. Click ASCII Setup...
- 3. Make sure that the settings match those shown in the screenshot below.

ASCII Setup
ASCII Sending          Send line ends with line feeds         Echo typed characters locally         Line delay:       milliseconds.
Character delay: 0 milliseconds.
<ul> <li>Append line feeds to incoming line ends</li> <li>Force incoming data to 7-bit ASCII</li> <li>Wrap lines that exceed terminal width</li> </ul>
OK Cancel

#### Note:

Selecting the **Echo typed characters locally** option will enable typed commands to appear in the command window as you type.

#### 4. Click **OK**.

5. Type **READ** (must be in uppercase letters) at the command prompt and press **Enter**.

A list of all the LTE153-6000's parameters will appear, together with the current values and settings (see the screenshot on the following page).





### 4.8 MIBs

A complete set of SNMP MIB's is included with the transmitter on a CD-ROM. All OID's support SNMP GET. The OID's with an [S] support SNMP SET as well:

tagID [S] (ASCII string up to 16 characters) modelNumber mfgDate serialNum firmwareRev engRev systemTemp laserCurrent laserTemperature inputRFLevel compositeRFLevel opticalPowerOut1 opticalPowerOut2 tecCurrent attenuation Set [S] (-7.0 to +3.0 dB in 0.1 dB steps, manual AGC mode) omi Setpoint [S] (-3.0 to +3.0 dB in 0.1 dB steps, CW or Video AGC mode) agcMode [S] (Manual, CW or Video enumeration) sbsSuppression [S] (13.0 to 19.0 dBm) fiberDispersion [S] (On or Off enumeration to enable or disable fiber dispersion compensation) fiberDispersionGain [S] (-2.000 to +2.000 in 0.025 steps) laserOnOff key switch remote Laser Control [S] (On or Off enumeration to turn laser On or Off) reset Cause reset Control [S] (Force software reset by writing a value of 1) sbs2GHzPower sbs6GhzPower monitor5v monitor12v monitor24v monitorM5v monitorM12v unitStatusEnable [S] (Selective enable or disable of alarms by writing an encoded 16 bit value) unitStatusMajor unitStatusMinor unitStatusHistory [S] (Clear alarm history by writing a value of 0) miscStatusEnable [S] (Selective enable or disable of alarms by writing an encoded 16 bit value) miscStatusMajor miscStatusMinor miscStatusHistory [S] (Clear alarm history by writing a value of 0) **fontPanelLEDStatus** upTime Unique notification objects for each power supply and cooling fan is included.

The power supply MIB is located under the PBN. Products node separately, as it is a common element for other products. Notification objects will be declared in the MIB to handle specific power supply alarms as well as entry into the SCTE alarm log if these events occur.

#### Unit Alarms (enabled through unitStatusEnable OID bits)

systemTempHigh(0) systemTempLow(1) laserCurrentHigh(2) laserCurrentLow(3) laserTempHigh(4) laserTempLow(5) inputRFHigh(6) inputRFLow(7) opticalPowerHigh(8) opticalPowerLow(9) tecCurrentHigh(10) agcUnlock(11) keyInOffPosition(12) remoteOffModeSet(13)

#### Miscellaneous Alarms (enabled through miscStatusEnable OID bits)

sbs2GHzPowerHigh(0) sbs2GHzPowerLow(1) sbs6GHzPowerHigh(2) sbs6GHzPowerLow(3) system5VPowerHigh(4) system5VPowerLow(5) system12VPowerHigh(6) system12VPowerLow(7) system24VPowerHigh(8) system24VPowerLow(9) systemM5VPowerHigh(10) systemM5VPowerLow(11) systemM12VPowerHigh(12) systemM12VPowerLow(13) communicationFailure(14) powerSupplyAFailure(16) powerSupplyAFailure(17) coolingFanAFailure(18) coolingFanBFailure(19)

#### SCTE MIB support

SCTE head-end MIB support includes alarmsIdent, propertyIdent and commonIdent nodes

#### SNMPv2 Traps

transmitterNoAlarmsPresent transmitterSystemTemperatureHigh transmitterSystemTemperatureLow transmitterLaserCurrentHigh transmitterLaserCurrentLow transmitterLaserTemperatureHigh transmitterLaserTemperatureLow transmitterInputRFLevelHigh transmitterInputRFLevelLow transmitterOpticalPowerOutputHigh transmitterOpticalPowerOutputLow transmitterTECCurrentHigh transmitterAGCUnlocked transmitterKeySwitchOffPosition transmitterRemoteLaserOffModeSet transmitter2GHzSBSPowerHigh transmitter2GHzSBSPowerLow transmitter6GHzSBSPowerHigh transmitter6GHzSBSPowerLow transmitterSystem5VPowerHigh transmitterSystem5VPowerLow transmitterSystem12VPowerHigh transmitterSystem12VPowerLow transmitterSystem24VPowerHigh transmitterSystem24VPowerLow transmitterSystemM5VPowerHigh transmitterSystemM5VPowerLow transmitterSystemM12VPowerHigh transmitterSystemM12VPowerLow transmitterCommunicationFailure transmitterPowerSupplyAFailure transmitterPowerSupplyBFailure transmitterCoolingFanAFailure transmitterCoolingFanBFailure

# **5** Transmitter Setup Tips For SBS adjustability

This section of the manual will give an overview of how to use and setup the transmitter you're your particular network deployment. Refer back to this manual to select the proper menu to perform some of the functions described below.

# 5.1 Setting SBS level to correct value for your optical network

Follow the steps below to determine correct SBS value for you optical network:

1. Look at the network design that the Tx will be used in and determine the highest optical power launched into the actual transmission fiber. Keep in mind this in not necessarily the launch power out of the EDFA or the power into the passive devices that may be place ahead of the fiber. possible measure the actual power that will be launched into the transmission fiber.

2. After determining the highest value of optical launch power in the network record this value.

3. Now using the SBS adjust menu on the front panel set the SBS threshold to this value you have recorded in step 2. Your system is now at its optimized operating point for both CNR (low frequencies) and CSO (high frequencies)

4. If this value is higher than +18 dBm then you will have add loss to your optical network at this point, the transmitter does not support a SBS level higher than this.

 $5_{x}$  If the value is lower than +14 dBm then set the Tx to this minimum setting and the your network will be at its optimized operating point.

6. To verify that you are not beyond the SBS threshold or that the Tx SBS setting is correct you can measure the CNR at the lowest frequency channel in your system. If the CNR is within specification then you do not have any SBS setting issues.

# **6** Technical Description

The following block diagram outlines the essential elements of the transmitter.



The RF signal enters the transmitter through the F-type connector on the rear panel, which feeds the AGC and RF sections of the transmitter. The RF section minimizes the CTB by producing CTB products of the same amplitude, but 180° out of phase with the CTB produced later in the modulator.

The RF signal then is input to the external optical modulator and modulated onto the light passing through the modulator.

Controlling the operating point of the modulator minimizes CSO. The light source is a DFB laser spliced to the optical modulator.

The SBS circuit is also connected to the modulator. This circuit compensates for any non-linear effects due to Stimulated Brillouin Scattering (SBS), which occur in optical fibres carrying optical signals launched at high powers.

A microprocessor controls and monitors the operation of the transmitter's internal circuits.

# 7 Module Configuration & Alarms

The module configuration setting uses Web pages and NMS. This manual only provides the Web page configuration method. For NMS configuration methods, please refer to the NMS network management software operation manual.

# 7.1 Login to System Management Web Page

Using the network port to connect the LTE153-6000 module:

Please enter the IP address (can be changed), Default IP address: 192.168.25.168

The IP address of connecting computer must be in the same network segment with operating module.

Default user name: admin

Default password: PBN





# 7.2 Power Supply and Alarms Monitoring

If a power alarm occurs, you can view the associated pages to find more detailed alarm information.

Click the View/Power Supply tab on the menu bar to display an overview of the power supply/alarm status of the operating module as shown in picture below.

User: admin View Configure Logout Help Power Supply Type DualRedundant 5V,12V,24V Power Supply Temperature 42.7 *C OK
Name         Value         Status           Power Supply         Dual/Redundant 5V,12V,2V         Yet           Power Supply Tope         Dual/Redundant 5V,12V,2V         OK
Partic Blocked Mixiona         User: admin           View         Configure         Logout         Help           Power Supply         Name         Value         Status           Power Supply Type         Dual/Redundant 5/,122/24/         Power Supply         Power Supply
View         Configure         Logout         Help           Power Supply Type         Value         Status           Power Supply Type         Dual/Redundant 5V, 12V, 24V         Power Supply Temperature         42.7 °C         OK
Name         Value         Status           Power Supply Type         Dual/Redundant 5V, 12V, 24V         42.7 °C         OK
Name         Value         Status           Power Supply Type         Dual/Redundant 5V,12V,2V/            Power Supply Temperature         42.7 *C         OK
Name         Value         Status           Power Supply Type         Dual/Redundant 5V,12V,24V            Power Supply Temperature         42.7 °C         OK
Power Supply Type         Dual/Redundant 5V,12V,24V           Power Supply Temperature         42.7 °C         OK
Power Supply Temperature 42.7 °C OK
Power Supply Status A OK
Power Supply Status B OK
Cooling Fan A OK
Cooling Fan B OK
Cooling Fan B OK

If any alarm occurs, you can view the detailed alarm information via Click the View /Alarms tab on the menu bar. After this action, the Web page will display all of alarm information about the operating module like the following picture.

	View	Configure			Logout			Help
	Alarm Status							
		Enable	ніні	н	HI	10	1010	LO
		HI LO			History			History
	System Temperature	• •						
	Laser Current	••						
	Laser Temperature	••						
	Optical Power	••						
	CATV Input RF	••						
	CATV Composite RF	••						
	TEC Current	••						
	SBS 2GHz Power	••						
	SBS 6GHz Power	••						
	System 5V Power	••						
	System 12V Power	• •						
	System 24V Power	• •						
	System -5V Power	• •						
V	System -12V Power	••						
	Discrete Alarm	Enable	Act	ive	History			
	Power Supply A Failure	•						
	Power Supply B Failure	•						
	Cooling Fan A Failure	•						
	Cooling Fan B Failure	•						
	Key In Off Position	•			•			
	Remote Off Mode Set	•						

# 7.3 Event Log Management

The operator can view all the alarm histories of the module on the Event Log Management page. Click Event Log to enter the Event Log Management page. Refer to Figure below:

works		1	User: ad			
View		Configure	Logout		Help	
Event	Log					
			-			
Logging N	lode:	🔍 Disable 🛛 🔍 Ena	ble (Clear &	Regenerate	Change Mode	
Index	Time			Event		
42	2013年7月13	2日 17:19:24	1	Notification hm	sColdStart	
41	2013年7月13	2日 17:17:52	1	arm NOMINA	L, catvCompositeRFLevel, value	=0.0 dB
40	2013年7月13	2日 17:17:52	1	arm NOMINA	L, catvinputRFLevel, value=-2.6 c	B
39	2013年7月13	2日 17:17:47	1	larm HIHI, cat	CompositeRFLevel, value=2.4	IB
38	2000年1月1	8:00:15	1	larm Discrete	Major, powerSupplyStatusA	
37	2000年1月1	8:00:15	1	larm LOLO, ca	atvCompositeRFLevel, value=-20	.4 dB
36	2000年1月1	8:00:15	1	larm LOLO, ca	atvinputRFLevel, value=-14.1 dB	
35	2000年1月1日	8:00:15	1	Notification hm	sColdStart	
34	2000年1月1	8:30:19	1	larm LOLO, la	serCurrent, value=21 mA	
33	2000年1月1	8:30:16	1	larm Discrete	Major, keyswitch, value=OFF	
32	2000年1月1日	8:30:15	1	larm LOLO, op	oticalPowerOut1, value=-99.9 dB	m
31	2000年1月1	8:30:04	1	larm LOLO, ca	atvCompositeRFLevel, value=-20	.3 dB
30	2000年1月1	8:30:03	1	larm LOLO, ca	atvinputRFLevel, value=-13.5 dB	
29	2000年1月1	8:23:11	1	larm NOMINA	L, keyswitch, value=ON	
28	2000年1月1	8:23:11	1	arm NOMINA	L, opticalPowerOut1, value=5.1 o	IBm
27	2000年1月1	8:23:11	1	arm NOMINA	L, laserCurrent, value=263 mA	
26	2000年1月1	8:23:02	1	Varm Discrete	Major, keyswitch, value=OFF	
25	2000年1月1	8:23:02	1	larm LOLO, op	pticalPowerOut1, value=-99.9 dB	m
24	2000年1月1	8:23:02	1	larm LOLO, la	serCurrent, value=26 mA	
23	2000年1月1	8:11:06	1	larm NOMINA	L, catvCompositeRFLevel, value	=0.0 dB
22	2000年1月1	8:11:02	(	Configure catvA	lgcMode, value=CW	
21	2000年1月1	8:11:02	1	larm HI, catvC	ompositeRFLevel, value=0.2 dB	
20	2000年1月1月	8:09:38	1	larm NOMINA	L, opticalPowerOut1, value=6.2 o	IBm
19	2000年1月1日	8:09:38	,	arm NOMINA	L, laserCurrent, value=312 mA	
18	2000年1月1	8:09:33	1	arm NOMINA	L, keyswitch, value=ON	
17	2000年1月1月	8:09:30	1	larm NOMINA	L, cat/inputRFLevel, value=1.4 d	3
16	2000年1月1	8:09:05	1	larm Discrete	Major, keyswitch, value=OFF	
15	2000年1月1	8:09:05	1	larm LOLO, op	pticalPowerOut1, value=-99.9 dB	m
14	2000年1月18	H 8:09:05	/	larm LOLO, la	serCurrent, value=33 mA	

# 7.4 Front Panel LED Status Monitoring

The operator can view all the front panel LED status on this page like the picture below.

User: admin View Configure Logeut Help Front Panel LED Status Laser On Laser On Ninor Alarm Active Laser On Rear Panel Laser O
User: admin View Configure Lopput Help Front Panel LED Status Laser On Laser On Subus Olay Major Alarm Active Minor Alarm Active Laser On Rear Panel
User: admin View Configure Lopout Help Front Panel LED Status Laser On Status Oray Major Alarm Active Major Alarm Active Laser On Rear Panel
Mew     Configure     Logent     Help       Front Panel LED Status     Status     Laser On     Configure       Laser Onf     Image: Altern Active     Image: Altern Active     Image: Altern Active       Minor Alarm Active     Image: Alarm Active     Image: Alarm Active       Laser On Rear Panel     Image: Alarm Active     Image: Alarm Active
Front Panel LED Status Front Panel LED Status Laser On Laser OT Najor Alam Active Najor Alam Active Laser OR Rear Panel
Front Panel LED Status Front Panel LED Status Laser On Status Okay Major Alarm Active Laser On Rear Panel
Front Panel LED     Status       Laser On     Image: Comparison of the second
Laser On Caser On Cas
Laber Off Laber Off Status Okay Major Alarm Active Laser On Rear Panel
Label Oray Status Oray Major Alarm Active Minor Alarm Active Laser On Rear Panel
Laser On Rear Panel
Allinor Alarm Adhe Laser On Rear Panel
Laser On Rear Panel

# 7.5 Transmitter Data Monitoring

All the unit data and their alarm status are shown on the following page.

<b>EPBN</b>		Leon admin	
Pacific Broadband Networks	0	User: admin	11-1-
view	Configure	Logout	нер
Transmitter Data			
Name	Value	Alarm	
	0-	status	
Laser On/OII	00		
Repair Cause	Bawagua		
Front Panol Edit Control	Fowerup		
Tag ID	L TE153-6000		
Inventory Liser Data	212105 0000		
System Temperature	42.8 °C	OK	
Loser Current	42.0 0 321 má	OK	
Laser Temperature	24.2 *C	OK	
TEC Current	-261 mA	OK	
CATV RE Input	-2.6 dB	OK	
CATV Composite RE Level	0 dB	OK	
CATV Composite OMI Level	18.6 %		
CATV Attenuation Set	0 dB		
CATV OMI Set Point	0 dB		
CATV AGC Mode	CW		
Optical Power Out 1	7.6 dBm	ОК	
Optical Power Out 2	7.7 dBm	ОК	
SBS Suppression	16 dBm		
Fiber Dispersion Cntl	On		
Fiber Dispersion Gain	0 V		
Fiber Dispersion Phase	0 V		
SBS 2GHz Power	18.3 %	ОК	
SBS 6GHz Power	26.4 %	ОК	

# 7.6 SNMP Configuration Monitoring

Click the **Configuration-SNMP** to review SNMP configuration like the picture below.



view		Configure	Logout	He
SNM	' Confi	guration		
sysloc	ation	Company locatio	n	
syscor	itact	Sys Contact		
sysser	vices	76		
rocom	munity	public		
rwcom	munity	private		
trapeo	minumy	public		
Trap#	Enable	IP Address	Community	Port
1		0.0.0.0	public	162
2		0.0.0.0	public	162
3		0.0.0.0	public	162
4		0.0.0.0	public	162
5		0.0.0.0	public	162
6		0.0.0.0	public	162
(		0.0.0.0	public	162
8		0.0.0.0	public Submit Chr	162

# 7.7 Transmitter Data Configuration

On the page below , the operator can view and set the configuration parameters according to the actual demands.

Front Panel Edit Control: enable or disable the control buttons on the front panel.

Tag ID: user can change the Tag ID which display on the screen on front panel.

**CATV Attenuation Set:** can be set in the Manual mode only, it sets the RF level before driving the laser of model.

**CATV OMI Set Point:** can be set in the CW and Video mode only, it controls the OMI Point of laser. **SBS Suppression:** change the SBS suppression data.

**Fiber Dispersion Cntl:** on or off the fiber dispersion control, if you want to set the fiber dispersion data, please switch on the ON position.

Fiber Dispersion Gain: change the gain value of the fiber dispersion with actual requirement.

Fiber Dispersion Phase: change the phase value of the fiber dispersion with actual requirement.

Ape			
Pacific Broadb	and Networks	User: admin	
	View Configure	Logout	Help
	Transmitter Data		
	Name	Value	Alarm Status
	Laser On/Off	On	
	Keyswitch	On	
	Reset Cause	Powerup	
	Front Panel Edit Control	Enabled 💌	
	Tag ID	LTE153-6000	
	Inventory User Data		
	System Temperature	42.9 °C	ОК
	Laser Current	321 mA	ОК
	Laser Temperature	24.2 °C	ОК
efresh	TEC Current	-263 mA	ОК
s 🔻	CATV RF Input	-2.6 dB	ОК
	CATV Composite RF Level	0 dB	ОК
	CATV Composite OMI Level	18.7 %	
	CATV Attenuation Set	0 dB	
	CATV OMI Set Point	0 dB	
	CATV AGC Mode	CW 💌	
	Optical Power Out 1	7.6 dBm	ОК
	Optical Power Out 2	7.7 dBm	ОК
	SBS Suppression	16 dBm	
	Fiber Dispersion Cntl	Off 👻	
	Fiber Dispersion Gain	0 V	
	Fiber Dispersion Phase	0 V	
	SBS 2GHz Power	18.3 %	ок
	SBS 6GHz Power	26.4 %	ОК
	Monitor 5v	5.1 V	ОК
	Monitor 12v	12.4 V	ОК

# 7.8 Temperature, Voltage and Basic Level Alarms Management

Temperature, voltage and basic level alarms are all set as following picture, and operator can change the configurations not show gray

View	Configure	Logout		Help					
Alarm Threshold	is & Enabl	es							
Alarm	HI + HIHI Enable	LO + LOLO Enable	ніні	н	LO	LOLO	Units		
System Temp	1	1	80	70	0	-10	°C		
Laser Current	1	1	500	450	200	100	mA		
Laser Temperature	1	1	42	40	16	15	°C		
Optical Power Out 1	1	1	15	14	5	4	dBm		
CATV Input RF Level	1	1	6	5	-6	-7	dB		
CATV Composite RF Level	1	1					dB		
TEC Current	1	1	1200	1000	-1000	-1200	mA		
SBS 2GHz Power	1	1	100	100	10		%		
SBS 6GHz Power	1	1	100	100	10		%		
5 V	1	1	5.7	5.5	4.7	4.5	v		
12 V	1	1	15	14	10.5	10	v		
24 V	1	1	27	26.5	21.5	21	v		
-5 V	4	1	-4.3	-4.5	-5.5	-5.7	v		
-12 V	4	1	-10	-10.5	-14	-15	v		
	Enable								
Power Supply A Failure	1								
Power Supply B Failure	4								
Cooling Fan A Failure	1								
Cooling Fan B Failure	4								
Keyswitch	2								
Remote Control	1								

# 7.9 Restore Factory Reset

Loading factory reset can restore the device to the factory default setting.

Click **Factory Reset** and a **Confirm Factory Reset dialog** box will pop up, then click Apply button when finished, the device configuration will be reset.

1 Networks	0.6	User: adm	IIN	1				
view	Configure	Logout		Help				
Alarm Thresho	Network							
-	SINMP	+1010						
Alarm	Alarma	Enable	ніні	н	LO	LOLO	Units	
System Temp	Factory Pacet		80	70	0	-10	°C	
Laser Current	Pactor	Ø	500	450	200	100	mA	
Laser Temperature	Change Password	•	42	40	16	15	°C	
Optical Power Out 1	Display Options		15	14	5	4	dBm	
CATV Input RF Level		9	6	5	-6	-7	dB	
CATV Composite RF Level	2	☑ 来自网	顶的消息					<b>—</b> ×
TEC Current	1	I						
SBS 2GHz Power	$\checkmark$	E (	Confir	m Factor	ry Reset			
SBS 6GHz Power	1		Warni	no: Thie	oneratio	n will int	errunt c	enice
5 V	1				operate		cirupes	cruce.
12 V	1	E.						
24 V	$\checkmark$	2				确定		取消
-5 V	1							
-12 V	1	1	-10	-10.5	-14	-15	٧	
	Enable							
Power Supply A Failure	<b></b>							
Power Supply B Failure								
Cooling Fan A Failure								
Cooling Fan B Failure Kewewiteb								
D MAN WITH TH								
Remote Control	121							

# 7.10 Restart configuration

The module including Network/SNMP/TX/ALL can be made to restart remotely, shown in Figure below. After this operation, the option part will automatically restart without losing its original configurations

etworks	0	User, aun		1.1.1.1.					
view	Configure	Logout		нер					
Alarm Thresho	ENIND CONTR	-							
	Transmitter	+ LOLO							
Alarm	Alarms	Enable	ніні	HI	LO	LOLO	Units		
System Temp	Factory Reset	2	80	70	0	-10	°C		
Laser Current	► Restart	Restart N	etwork	450	200	100	mA		
Laser Temperature	Change Password	Restart SI	NMP	40	16	15	*C		
Optical Power Out 1	Display Options	Restart T	<	14	5	4	dBm		
CATV Input RF Level	L.	Restart Al		5	-6	-7	dB		
CATV Composite RF Leve	I 🗹	2		0	0	0	dB		
TEC Current	1	$\checkmark$	1200	1000	-1000	-1200	mA		
SBS 2GHz Power	1	$\checkmark$	100	100		10	%		
SBS 6GHz Power	1	1	100	100		10	96		
5 V	1	~	5.7	5.5	4.7	4.5	V		
12 V	$\checkmark$	$\checkmark$		14	10.5		v		
24 V	1	$\checkmark$		26.5			v		
-5 V	1	~	-4.3	-4.5	-5.5	-5.7	v		
-12 V	$\checkmark$	¥			-14	-15	v		
	Enable								
Power Supply A Failure	1								
Power Supply B Failure	4								
Cooling Fan A Failure	4								
Cooling Fan B Failure	1								
Keyswitch	Image: A start and a start								
Remote Control	<								

# 7.11 Change User Password

After click **Change Password**, the operator can change the IP and password from factory default to manage and control conveniently

281		
Naturalia	User: admin	
View Configure	Longut	Help
view	Logour	rieip
Change User Password		
Change User FassWord		
User Id	admin	
Current Password for 'admin'		
Guitent i associa for admin		
New Password		
New Password		
	Submit Cancel	

# 7.12 Display Options

Click the **Display Options**, the operator can choose two display styles with personal preferences, one displaying form with grid and another without it.

<b>DRN</b> <sup>®</sup>	Ð			
Pacific Broadband Networks			User: admin	
View	v	Configure	Logout	Help
Cha	ngo lleor P	Network		
Cita	inge user i	SNMP		
User	rld	Transmitter		
Curr	rent Password f	Alarms Eactory Report		
New	/ Password	Restart		
New	/ Password	Change Password		
		Display Options	Grid off	
	-		Grid on	
			-	

# 8 **Product Warranty**

Pacific Broadband Networks warrants its equipment to be free of manufacturing defects in material and workmanship for a period of one year from date of shipment, provided it is installed and operated in accordance with factory recommendations.

The liability of Pacific Broadband Networks under this warranty is solely limited to repairing; replacing or issuing credit provided that:

- 1. The warranty registration has been completed and received by Pacific Broadband Networks.
- 2. Pacific Broadband Networks' helpdesk is promptly notified in writing or by telephone that a failure or defect has occurred.
- 3. A return authorisation number is obtained from Pacific Broadband Networks' helpdesk and clearly marked on the outside of the shipping container and all documents.
- 4. Customer is responsible for all shipping and handling charges. C.O.D. and freight collect will not be accepted without prior approval from Pacific Broadband Networks' helpdesk.
- 5. The equipment (in PBN's sole discretion) has not been abused, misused or operated under conditions outside manufacturer's specifications.

#### The warranty does not cover the following:

- 1. Products purchased from someone other than an authorised Pacific Broadband Networks dealer.
- 2. Damage caused by accident, negligence, misuse, abuse, improper operation or failure to operate the equipment within the manufacturer's specifications.
- 3. Damage caused by fluctuation in electrical current, lightning, power surges, etc.
- 4. Damage resulting from overhaul, repair or attempt to repair caused by someone other than Pacific Broadband Networks' qualified service personnel.
- 5. Any product, in which the serial number has been defaced, modified or removed.
- 6. Any product that has been opened or modified without prior written permission from PBN.
- 7. Replacement of parts necessitated by normal wear and tear.
- 8. Any consequential or implied damages.
- 9. Pacific Broadband Networks will not be liable for DFB Laser failure after 90 days from receipt of item. Any claim for DFB Lasers will be presented to the laser vendor for replacement. Pacific Broadband Networks will make every effort to replace faulty lasers although ultimate judgement is at the laser vendor's discretion. Pacific Broadband Networks will provide all labour costs associated with the replacement of the laser within the one-year warranty period.

# **9** Declaration of Conformity

#### According to ISO/IEC Guide 22 and EN45014

Manufacturer's Name:	Pacific Broadband Networks
Manufacturer's Address:	8-10 Keith Campbell Court, Scoresby, Victoria 3179, Australia
Declares, that the product Product Name:	LTE153-6000 – 1550 nm Externally Modulated Laser Transmitter
Conforms to the following standards:	
Safety:	EN 80083-1, EN 60950, IEC 950, AS/NZS 3260:1993, EN-60825-1, IEC 825-1, AS/NZS 2211.1 Laser Safety
EMC:	EN 50083-2, EN-55022:1994, IEC/CISPR 22:1993, AS/NZS CISPR 22:2006
CATV/HFC:	EN-50083

#### Supplementary Information:

#### CE

This is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

The product herewith complies with the requirements of the following directives and carries the CE-marking accordingly:

CE

- The EMC Directive 89/336/EEC
- The Low Voltage Directive 73/23/EEC

The product was tested in a typical configuration with Pacific Broadband Networks.

#### **FCC WARNING**

This equipment has been tested and found to comply with the limits for class A device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency and, if not installed in and used in accordance with the instructions, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at the user's own expense.

#### For Compliance Information ONLY, contact:

Australia:	Pacific Broadband Networks
	8-10 Keith Campbell Court, Scoresby,
	Victoria 3179, Australia
	Phone:+61-3-9780-5100, Fax +61-3-9763-5522
	Email: sales@pbn.com.au
Europe:	Pacific Broadband Networks
	Phone: +31-36-536-8011, Fax: +31-36-536-4367
	Email: sales@pbneurope.eu
China:	Pacific Broadband Networks
	Phone: +86-10-5791-0655, Fax: +86-10-5791-0855
	Email: office@pbn.com.cn
Americas:	Pacific Broadband Networks Americas LLC
	Phone: +1-703-579-6777 x 567, Fax: +1-703-935-4506
	Email: sales@pbnamericas.com





#### Offices:

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