XTRAMUS

NuTEA-551
User's Manual

USM Ver 1.1

Foreword

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Contact Information

Xtramus Technologies

E-mail: sales@xtramus.com

Website: www.xtramus.com

Tel: +886-2-8227-6611

Fax: +886-2-8227-6622

Revision History

Date	Version	AP Version	History
2011/01/25	1.0		First version
2011/06/22	1.1	Ver 1.3b007	1. Change manual template. 2. Page 3, change Revision History format. 3. Page 21, add OS warning messages. 4. Page 36, change parameter settings figure. 5. Page 37, change Impairment Parameter figure. 6. Page 38, re-write Packet Jitter descriptions, and add Sustained Cycle of Jitter descriptions. 7. Page 38, add Packet Insertion descriptions. 8. Page 43, remove SDFR descriptions and add session filter descriptions.
2011/06/23	1.2	Ver 1.3b007	1. Remove Preliminary watermark. 2. Page 38, rephrase descriptions regarding to Sustained Cycle of Jitter.
2011/9/14	1.2	Ver 1.3b007	1. Page 12, correcting figures of one way and two way impairments.

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1. NuTEA-551 Overview

1.1. NuTEA-551 General Description

NuTEA-551 is a network impairment device that impairs Ethernet network to emulate unstable network conditions, especially networks with complex topology, such as Internet in public network.

It is a compact, lightweight, and highly cost-effective device that provides the function to simulate Ethernet traffic impairment situation, such as CRC Error Packet, Packet Corruption, Packet Drop, Packet Order Exchanging (Re-order), Packet Duplicate, Delay, Jitter, and Limiting Packet Transferring Rate. Variables regarding to these impairments can be set with accurate high-precision and apply for all kinds of Devices under Test (DUTs).

With functions mentioned above, NuTEA-551 is capable of emulating almost any possible error that could happen in real-world network environments. While developing network products, it is crucial to understand how these under developing products would perform or react when network errors occur. NuTEA-551's impairment emulating capabilities allow manufacturers to perform tests with their products in labs. Also, NuTEA-551 can emulate packet delay and packet jitter as well, and the packet delay/jitter time can be set in milliseconds (ms) or microseconds (μs).

NuTEA-551 provides a controllable blemish network environment for manufacturers to test their products' performances within lab network environments. With NuTEA-551's capability to set and change network impairment settings dynamically, it is easy for users to build a customized network environment for product demo or testing product's specific function.

Embedded with Voltage-Controlled Crystal Oscillator (VCXO), NuTEA-551 can be adjusted to match/jitter its PHY chip's frequency within the range of ±100 ppm via utility software.

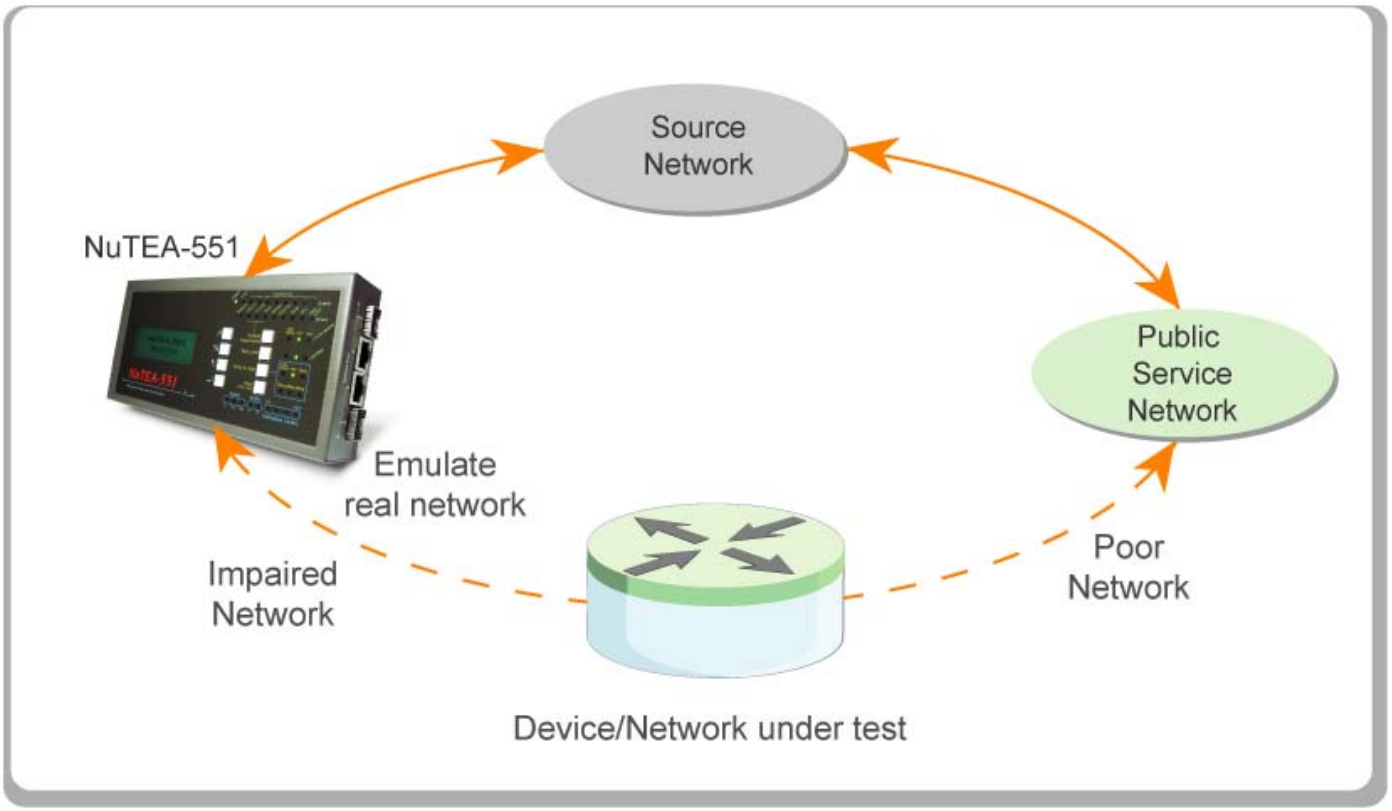
Also, NuTEA-551 supports Maximum Impairment Limit, which allows users to set the number of times for error emulations with NuTEA-551's utility software.

1.2. Key Benefits of NuTEA-551

- Emulate network impairment situations for testing DUTs while building small network environment for users
- Testing DUT performance with impairment packet procession and validates packet completeness
- Reduce manufacturer's product developing and researching cost with less debugging time
- High performance with useful tool for checking product quality during production
- Emulate real network impairment situations such as:
  - Packet CRC Error
  - Packet Corrupt
  - Packet Drop
  - Packet Order Exchanging (Re-order)
  - Packet Duplicate
  - Packet Delay & Jitter
  - Data Transferring with Limited Rate
- Packet-base Impairment which uses the amount of packets as account standard
- Follow G.1050, the Network Model for Evaluating Multimedia Transmission Performance over Internet Protocol
- Utility software with setting options that allows users to set:
  - SDFR (Self-Discover Filtering Rules), a set of filtering rules including Destination Address, Source Address, VLAN, Destination IP, Source IP, Destination Port, and Source Port
  - 2 sets of Session Filter including Port A → Port B and Port B → Port A
- Embedded with Two RJ-45 & Fiber Combo Ports
- Supports RMON Counters
- Performing Configurations with Front Panel Buttons
- Utility software that runs under Windows® environment. When connecting NuTEA-551 with your PC via a Mini USB cable, it allows users to:
  - Setting NuTEA-551's impairment parameters
  - View counter reports and statistics chart
  - Upgrading NuTEA-551's firmware and FPGA

1.3. Main Applications of NuTEA-551

- DUT Performance Testing and Analyzing
  - Conducting DUT Performance Tests in Emulated Network Environment
  - Various Embedded Packet Counters of NuTEA-551 for Checking DUT Counters' Reliability
- DUT Troubleshooting. With network which emulates public network with poor bandwidth, users can examine and see if the DUT has good network disaster recovery ability
- Validate and check if other test devices in mass production line are working properly or having the right settings, and capable of picking up faulty DUTs
- Emulating and building a real-world network environment for demonstration purposes
- Products aiming for Telecommunication Service Provider can use NuTEA-551 for functions examining and testing



1.4. Impairment Overview of NuTEA-551

NuTEA-551 can simulate different Ethernet traffic impairment situations, including:

CRC Error Packet

At the tail of a packet, it keeps a checksum value to verify the correctness of the packet when it is received. If the checksum value is not correct that can verify the correctness of the packet, we call it CRC Error Packet.

Packet Corruption

For some reason intentionally or unintentionally, the content of packet is modified, owing to poor transmission or manual interference.

Drop Packet

Ethernet is a family of frame-based computer networking technologies. Frames are transmitted via different devices and media. After the transmission via different media and devices, some of frames might be lost. For layer 2 switching mode of OSI model, packet is the same as frame.

Packet Re-Order

All of frame/packet should be transmitted sequentially, and it is able to reunite to complete data at destination device. If the frame/packet sent goes different routes, it might be possible that later packet arriving destination earlier, so the sequence of packet is changed, owing to poor device or manual interference.

Packet Duplication

Packet is transmitted one by one via network device. For some reason, the destination had received the packet, however the sending side does not received the acknowledgement, so packet is resent and duplicated packet is generated.

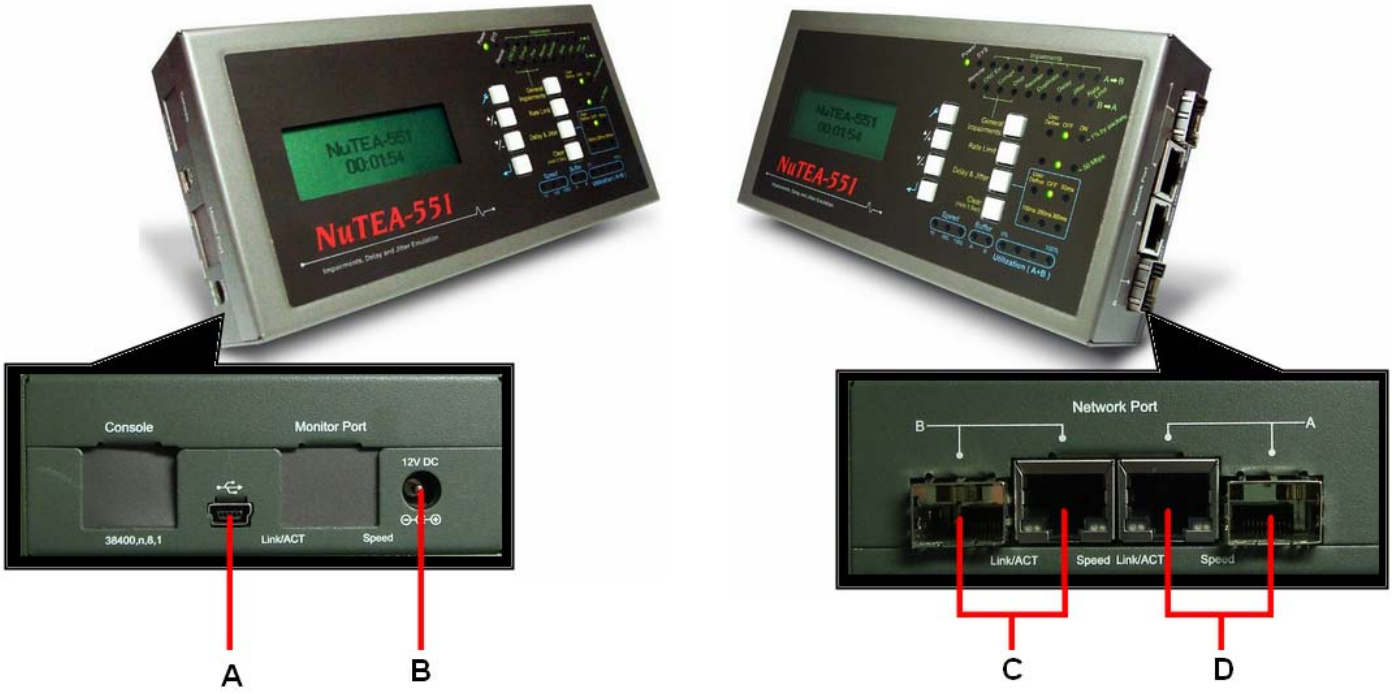
Packet Delay & Jitter

Delays may occur during packet/frame transmission in real world network environments. Also, these time periods of data transmission delays may vary, and are usually referred as jitters.

For more information regarding how to configure these Ethernet traffic impairment situations, please refer to **5.4. NuTEA-551 Parameter Settings**.

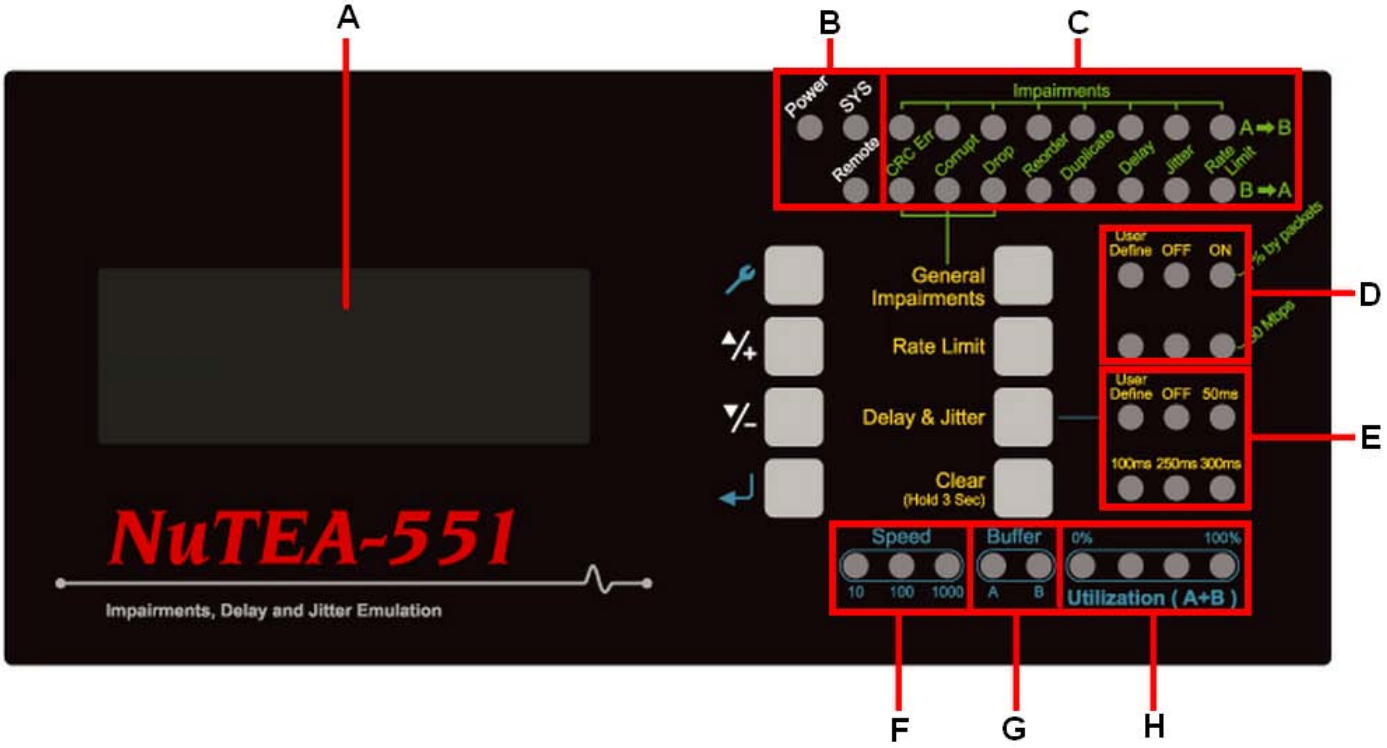
2. NuTEA-551 Function Overview

2.1. NuTEA-551 Ports



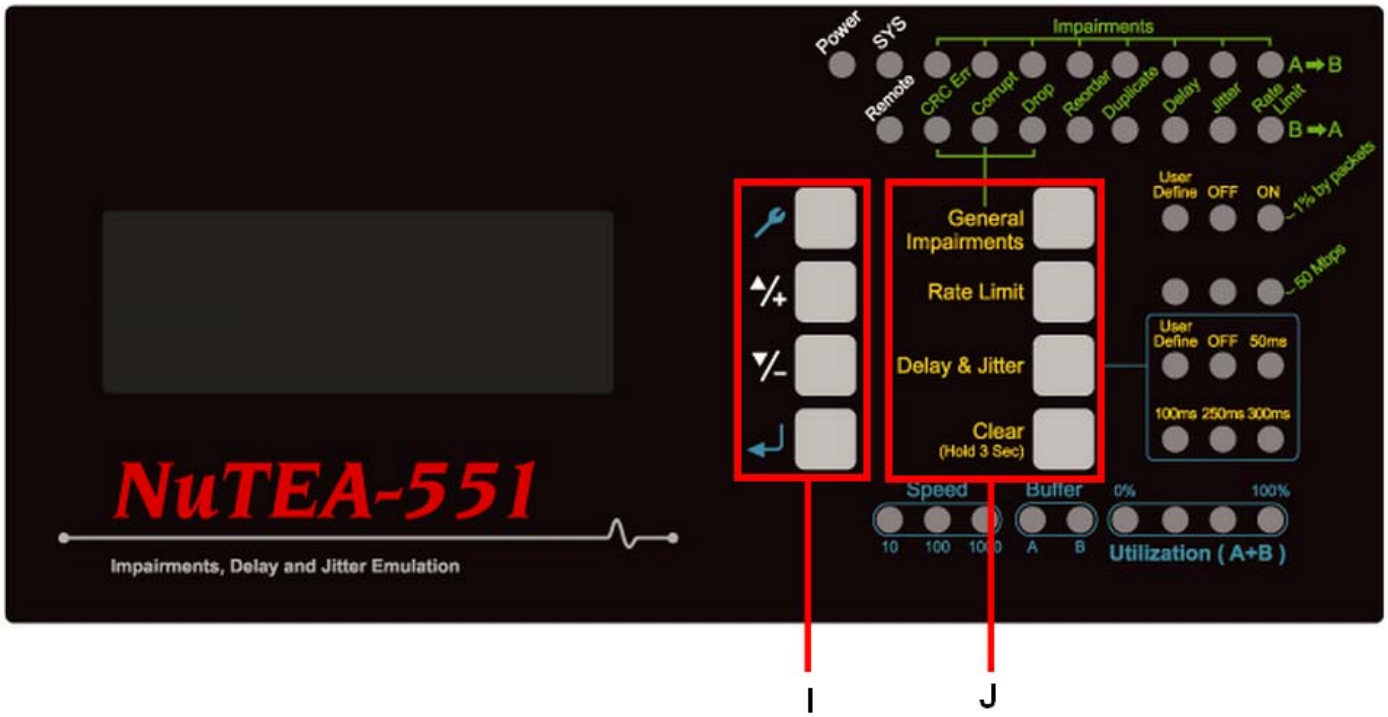
Ports Description				
A	**Mini-USB Port**	Mini USB Port for Firmware/FPGA Upgrading		
B	**Power Jack**	DC 12 V Power Jack		
C	**Network Port**	**Network Port A**	➢ RJ45 Port × 1	➢ SFP Port × 1
D		**Network Port B**	➢ RJ45 Port × 1	➢ SFP Port × 1

2.2. NuTEA-551 Front Panel – LCD & LEDs



LCD & LEDs Descriptions				
LCD (A)	**4 × 20 (Characters) LCD Screen**			
	Impair Parameters	➢ CRC Error ➢ Packet Delay ➢ Packet Reorder	➢ Packet Duplication ➢ Packet Drop ➢ Rate Limit	➢ Packet Corruption ➢ Packet Jitter
	Statistic Counters	➢ Port A	➢ Port B	➢ Port A and B
	Media Setting	➢ Auto All	➢ Force 100M Full	➢ Force 10M Full
	Filter Setting	➢ Port A to B	➢ Port B to A	➢ Port A to/from B
	System Setting	NuTEA-551 Buzzer ON/OFF		
	System Information	Displaying NuTEA-551's System Information including **Temperature** and **Fan RPM**		
	Restore Defaults	Restore All Settings of NuTEA-551 to Default Value		
LEDs (B~H)	**General System Information (B)**			
	➢ Power	➢ SYS	➢ Remote	
	Impairments (C)			
	A → B **B → A**	➢ CRC Error ➢ Corrupt	➢ Drop ➢ Reorder	➢ Duplicate ➢ Delay	➢ Jitter ➢ Rate Limit
	1% by Packets (D)			
	➢ User Define	➢ Off	➢ On	
	50 Mbps (D)			
	➢ User Define	➢ Off	➢ On	
	Delay & Jitter (E)			
	➢ User Define ➢ Off	➢ 50 ms ➢ 100 ms	➢ 250 ms ➢ 300 ms	
	Speed (F)			
	➢ 10 Mbps	➢ 100 Mbps	➢ 1000Mbps	
	Buffer (G)			
	➢ A	➢ B		
	Utilization (A+B) (H)			
	Utilization (A+B) is displayed via **4** LEDs, ranging from 0% to 100%			

2.3. NuTEA-551 Front Panel – Buttons



Buttons Descriptions			
I	Operation Buttons		Enter the Main Menu(*) or return to the previous Menu
			Move the select cursor up
			Move the select cursor down
			Execute the selected selection
J	Configuration Buttons	**General Impairments**	Enable general impairments including CRC Error, Packet Corrupt, and Packet Drop. You can apply your settings too.
		Rate Limit	Set packet transferring rate limit
		Delay & Jitter	Set delay and jitter time
		Clear	Press this button and hold it for 3 seconds to clear all statistic counters stored in NuTEA-551

***Menu will be displayed on the LCD screen.**

3. Making Settings with NuTEA-551's Front Panel

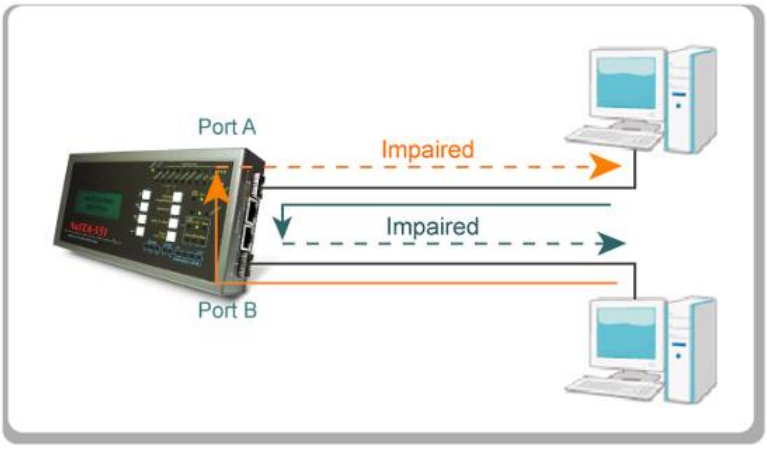
NuTEA-551's LCD screen can display information and contain select options such as **Impair Parameters**, **Statistic Counters**, **Media Setting**, **Filter Setting**, **System Setting**, **System Information**, and **Restore Defaults**.

3.1. Connecting NuTEA-551 to Your Network

NuTEA-551 must be installed to your networks properly. The following section contains examples for connecting NuTEA-551 to your network.

Two Ways Impairment (Default)

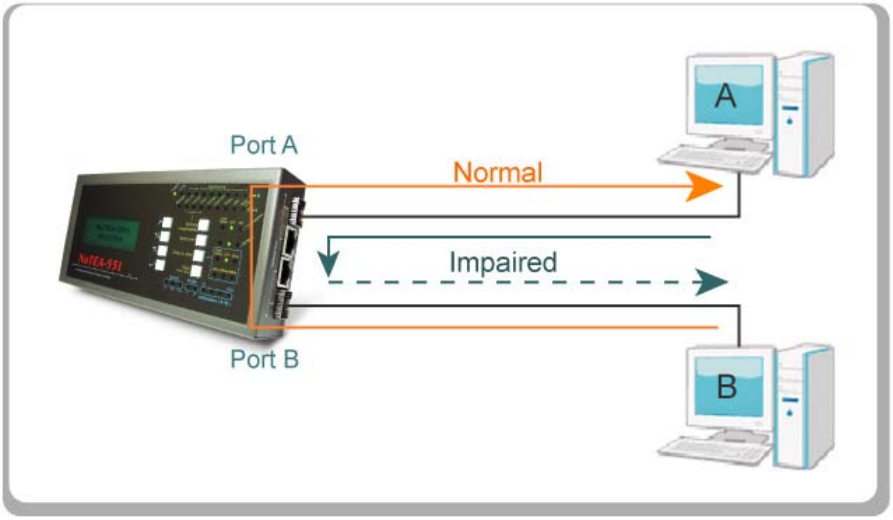
The illustration below shows the concept of impaired network. It is an example that normal network is impaired.



Data streams both way that flow through this machine is impaired.

One Way Impairment (User Define)

The illustration below impairs network flow from port A to B only. There is no influence on the network from port B to A



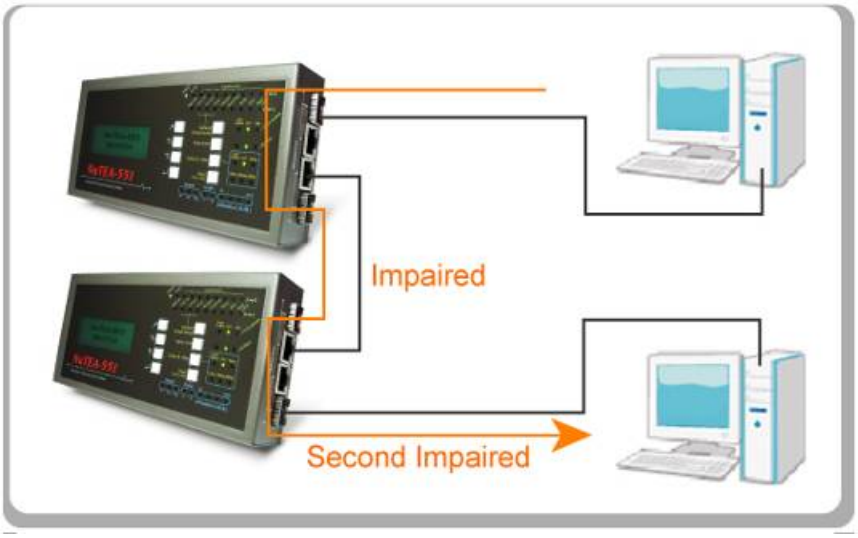
Users can activate impairment by button with user define selections

Impairment from Multiple Devices

If a single unit of this machine is not enough to generate the impairment environment required, you can connect it in serial or in parallel to create any kinds of possible impairment structure.

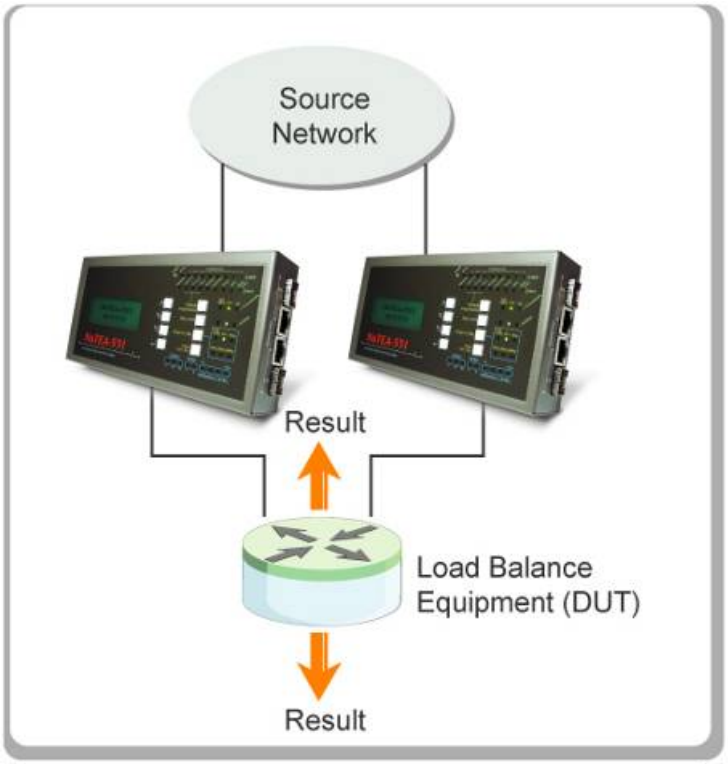
In Serial

NuTEA-551 can be cascaded for multiple impairments.



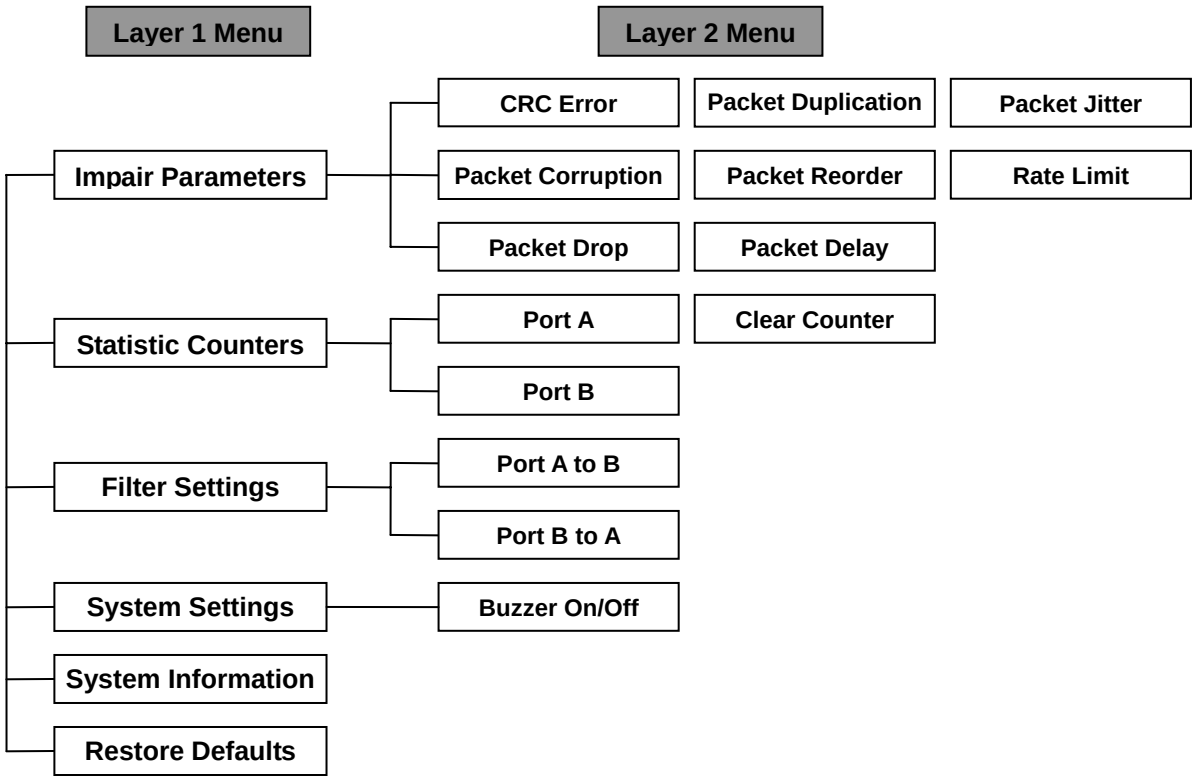
In Parallel

NuTEA-551 can be connected in parallel to emulate impairment from different source network.



3.2. NuTEA-551 Setting Options Overview

All configuration options and system information can be viewed via NuTEA-551's LCD screen. All options and their functions contained in the menu are listed down below:

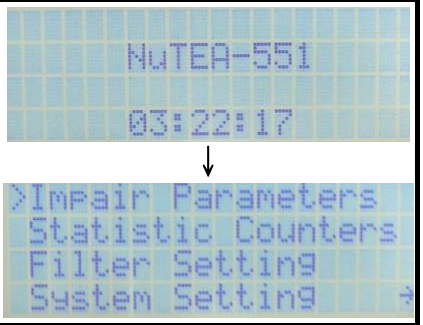
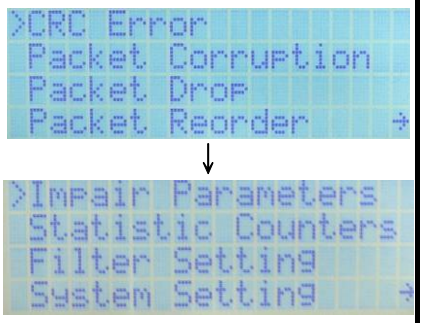
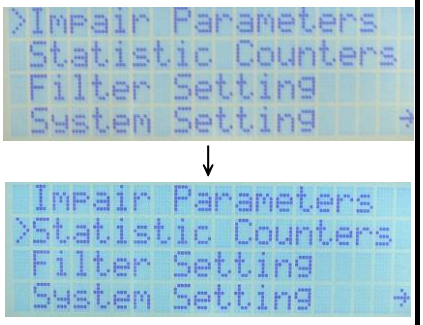
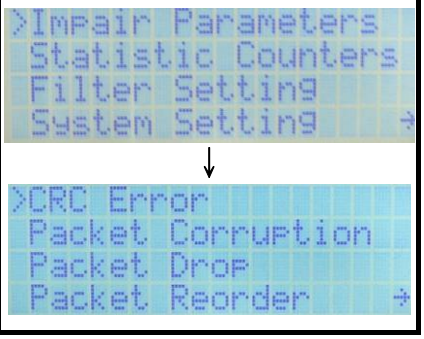


Layer 1 Menu	Layer 2 Menu	Description
Impair Parameters	CRC Error	View CRC Error impairment for Port A and Port B
	Packet Corruption	View Packet Corruption impairment for Port A and Port B
	Packet Drop	View Packet Drop impairment for Port A and Port B
	Packet Reorder	View Packet reorder impairment for Port A and Port B
	Packet Duplication	View Packet Duplication impairment for Port A and Port B
	Packet Delay	View Packet Delay impairment for Port A and Port B
	Packet Jitter	View Packet Jitter impairment for Port A and Port B
	Rate Limit	View Rate Limit impairment for Port A and Port B
Statistic Counters	Port A	View packet counters and statistics for Port A
	Port B	View packet counters and statistics for Port B
	Clear Counter	Clear all counters and statistics
Filter Setting	Port A to B	View SDFR filter for packets flow from Port A to Port B
	Port B to A	View SDFR filter for packets flow from Port B to Port A
System Setting	Buzzer On/Off	If enabled, system will buzz whenever a button is pressed
System Information	N/A	Display detailed system information
Restore Defaults	N/A	Reset all NuTEA-551's settings and parameters to default value

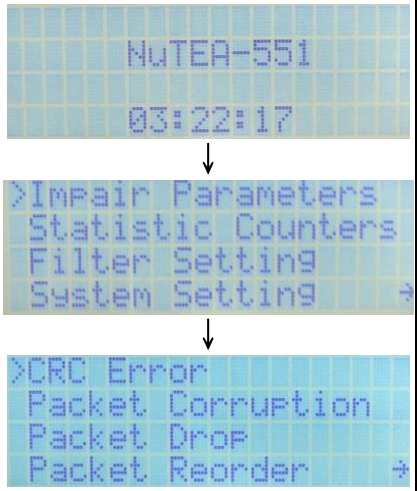
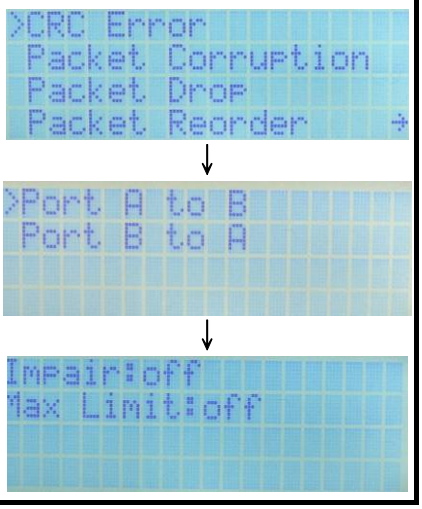
3.3. NuTEA-551 Front Panel Functions – Basic Controls

The following section lists some basic setting controls for making configurations with NuTEA-551's front panel buttons.

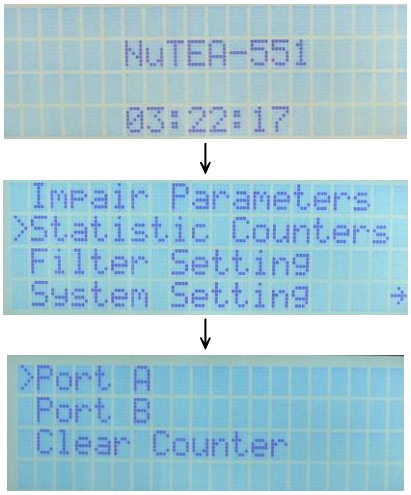
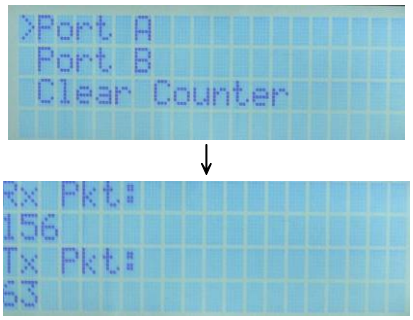
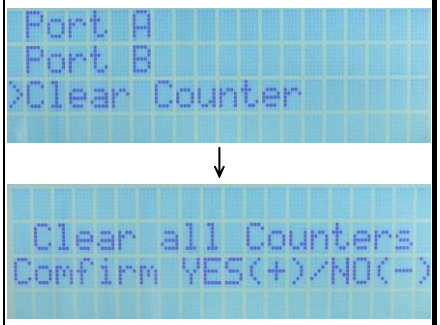
Basic Setting Controls

Function	Control Button Action	LCD Display
Entering Main Menu	Press button to enter NuTEA-551's main menu.	
Back to Previous Menu	Press button to go back to the previous menu.	
Moving Selection Cursor	Press to move the selection cursor up, or press to move the selection cursor down.	
Entering Selected Option	Press button to enter the menu option you chose.	

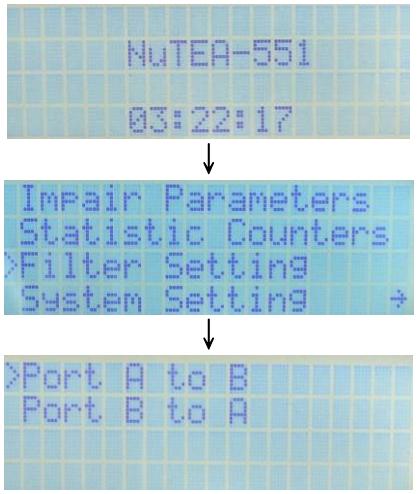
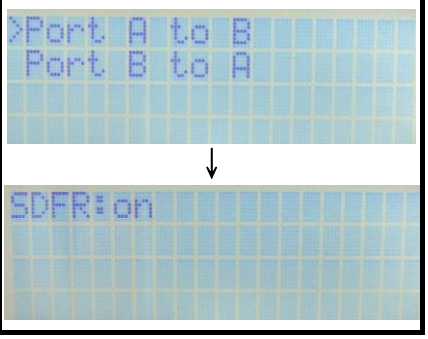
3.4. NuTEA-551 Front Panel Functions – Impair Parameters

Function	Control Button Action	LCD Display
Entering Impair Parameters Menu	Press button to enter NuTEA-551's main menu, and press button to enter NuTEA-551's Impair Parameters menu. Configuration options such as **Impair Parameters**, **Statistic Counters**, **Media Setting**, **Filter Setting**, **System Setting**, **System Information**, and **Restore Defaults** are available and can be viewed here.	
View Impairment Parameters	When you're in NuTEA-551's Impair Parameters menu, press or button to choose the impairment you would like to view and press the button. You can view impairment parameters for packets from **Port A to B**, or packets from **Port B to A**. Press again to view the impairment parameters.	

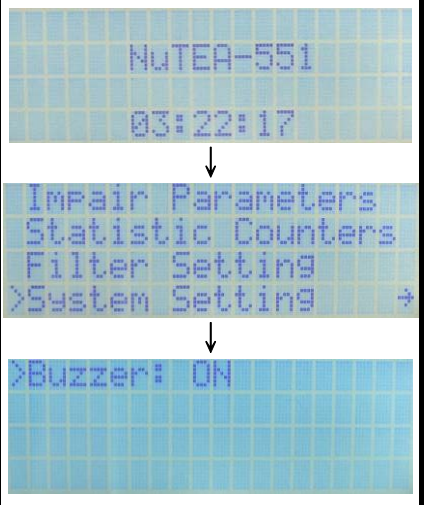
3.5. NuTEA-551 Front Panel Functions – Statistic Counters

Function	Control Button Action	LCD Display
Entering Statistic Counter Menu	Press button to enter NuTEA-551's main menu, choose **Statistic Counters** from the main menu, and press button to enter NuTEA-551's Statistic Counters menu. You can view statistics and counters for Port A and Port B. Also, you can clear both Port A and Port B's counters here.	
View Counter	When you're in NuTEA-551's Statistic Counter menu, press or button to choose the Port you would like to view and press the button. You can view counter reports for the port you've chose.	
Clear Counter	Choose **Clear Counter** from **Statistic Counter** menu, and press the button. NuTEA-551 will prompt and ask if you're sure to clear all counters. Press button to clear all counters, or press button to cancel.	

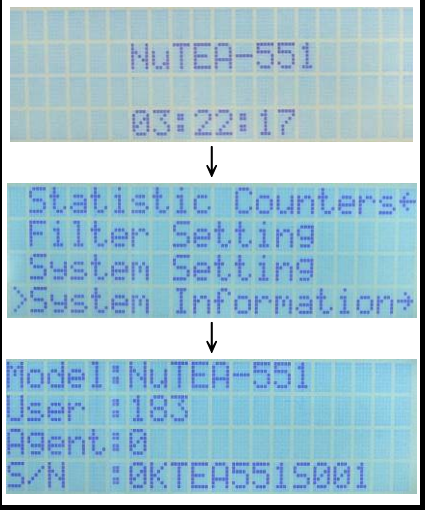
3.6. NuTEA-551 Front Panel Functions – Filter Setting

Function	Control Button Action	LCD Display
Entering Filter Setting Menu	Press button to enter NuTEA-551's main menu, choose **Filter Setting** from the main menu, and press button to enter NuTEA-551's Filter Setting menu. You can view SDFR status for Port A and Port B here.	
View SDFR Status	When you're in NuTEA-551's Filter Setting menu, press or button to choose the SDFR status you would like to view (**Port A to B** or **Port B to A**) and press the button. The LCD screen will display the SDFR status (On/Off).	

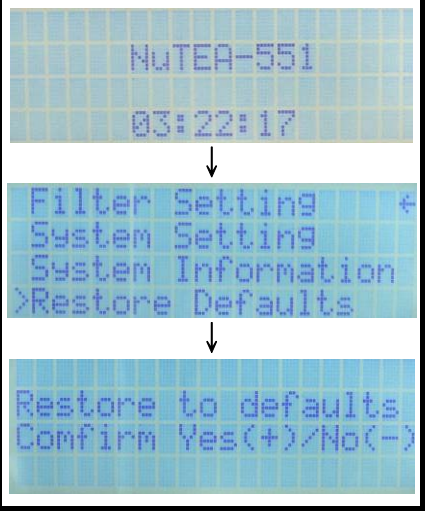
3.7. NuTEA-551 Front Panel Functions – System Setting

Function	Control Button Action	LCD Display
Entering System Setting Menu	Press button to enter NuTEA-551's main menu, choose **System Setting** from the main menu, and press button to enter NuTEA-551's System Setting menu. You can turn ON/OFF NuTEA-551's buzzer here. To turn ON/Off NuTEA-551's buzzer, press button.	

3.8. NuTEA-551 Front Panel Functions – System Information

Function	Control Button Action	LCD Display
Entering System Information Menu	Press button to enter NuTEA-551's main menu, choose **System Information** from the main menu, and press button to enter NuTEA-551's System Information menu. You can view NuTEA-551's system information here. Press or button to view all NuTEA-551's system information.	

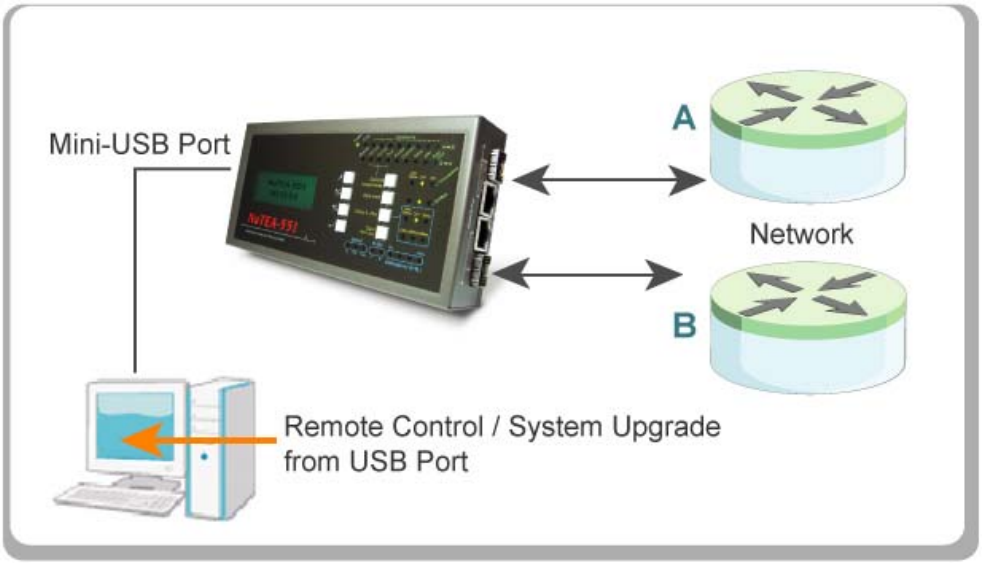
3.9. NuTEA-551 Front Panel Functions – Restore Defaults

Function	Control Button Action	LCD Display
Entering Restore Default Menu	Press button to enter NuTEA-551's main menu, choose **Restore Defaults** from the main menu, and press button to enter NuTEA-551's Restore Defaults menu. Press button to reset all NuTEA-551's setting to default value, or press button to cancel.	

4. NuTEA-551 Utility

NuTEA-551 comes with a utility software that runs under Microsoft Windows environment.

By connecting NuTEA-551 with PC via a USB cable as shown in the figure down below, you can configure test parameters, download testing logs and upgrade firmware.



NuTEA-551 Utility Software System Requirement	
OS	Microsoft Windows 2000/XP/Vista/7
CPU	Pentium 1.3GHz or Higher
RAM	1.0GB of RAM
HDD	10GB of Available Hard Disk Space

All test parameters can be configured with NuTEA-551 utility software, including all the configurations that can be set by buttons located on NuTEA-551's panel.

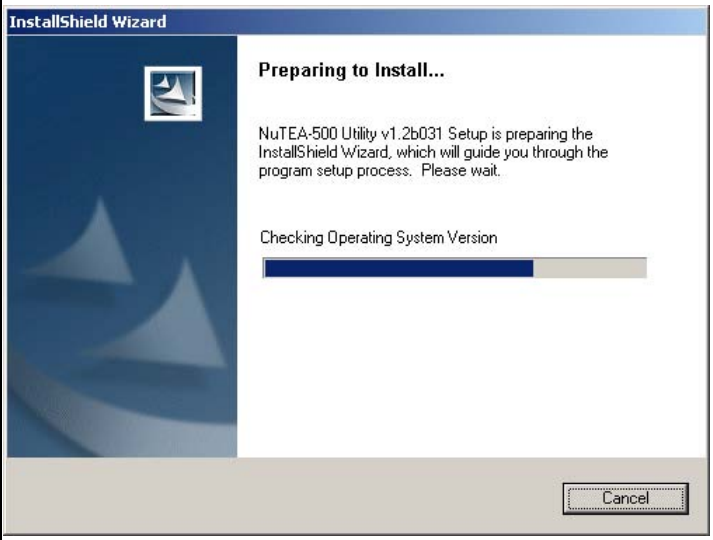
Please note that you have to install NuTEA-551 utility software and hardware driver on your PC first. After installing NuTEA-551 utility software, NuTEA-551's driver will be installed automatically.

4.1. Installing/Uninstalling NuTEA-551

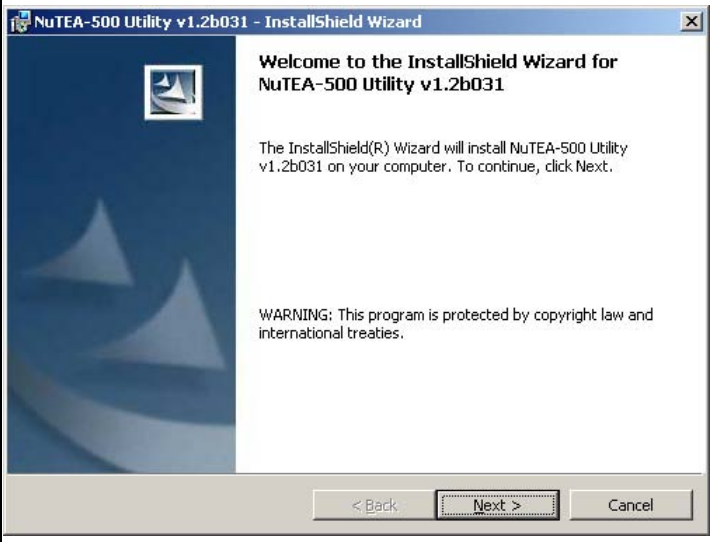
Please follow the steps down below to install NuTEA-551 utility software.

Installing NuTEA-551 Utility Software

1. Double-click NuTEA-551 utility software installation program and start the installation process*.



2. InstallShield Wizard is starting to install NuTEA-551 utility software. If you would like to cancel installation, click "**Cancel**".

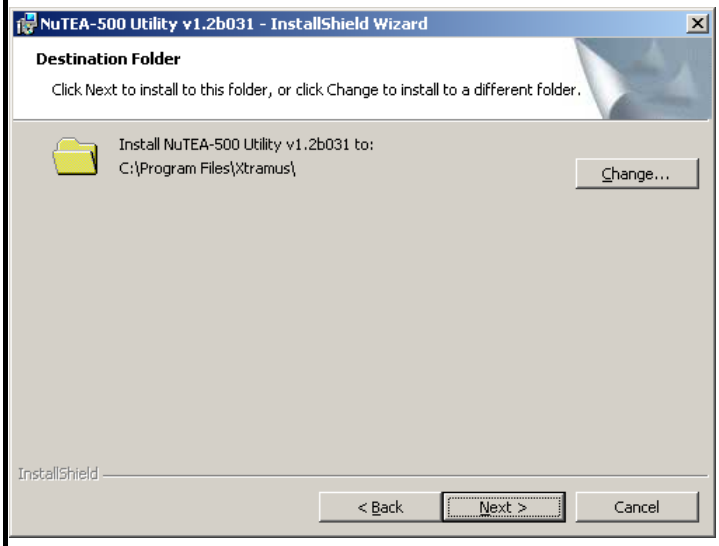


3. Click "**Next**" to continue installation.

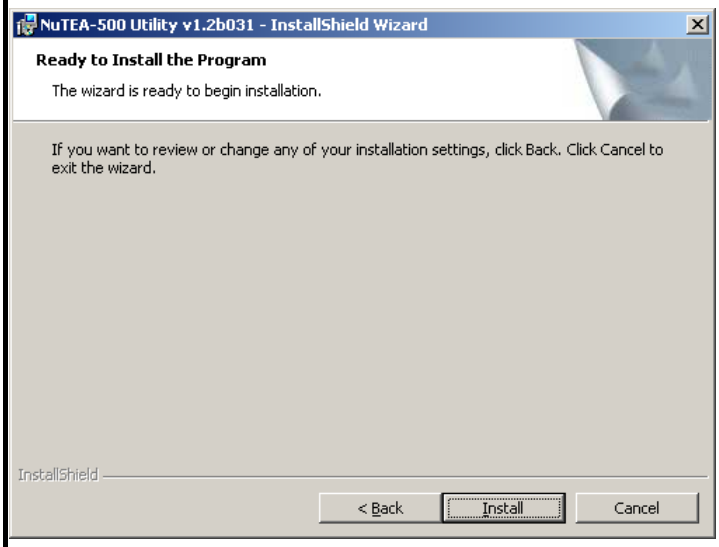
***Note:** Due to different Operating Systems or system settings, warning messages might pop up when installing NuTEA-551 Utility or driver for your device. When this occurs, please choose the options on these pop-up warning messages that allow you to continue installing NuTEA-551 Utility or device driver.

Installing NuTEA-551 Utility Software

4. Click "**I accept the terms in the license agreement**", and click "**Next**" to continue.

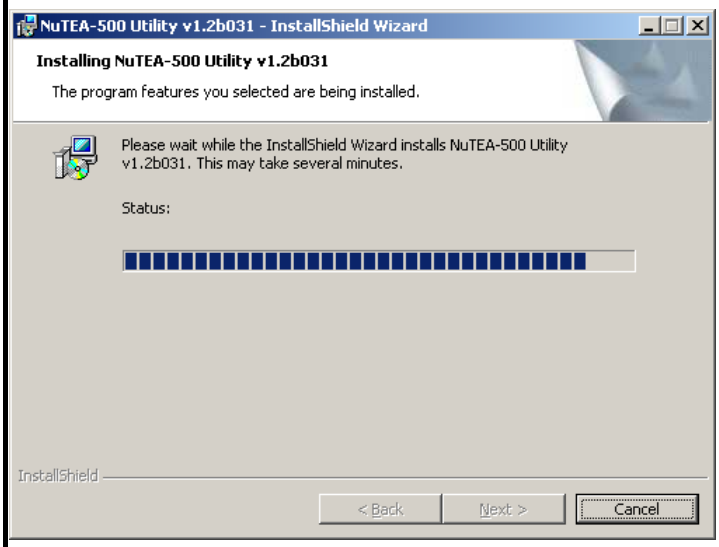


5. Click the **Change…** button to install the program to another folder, or click **Next** button to install the program into the default destination folder, and then continue next step. Click **Back** button to go back to the previous step to modify.

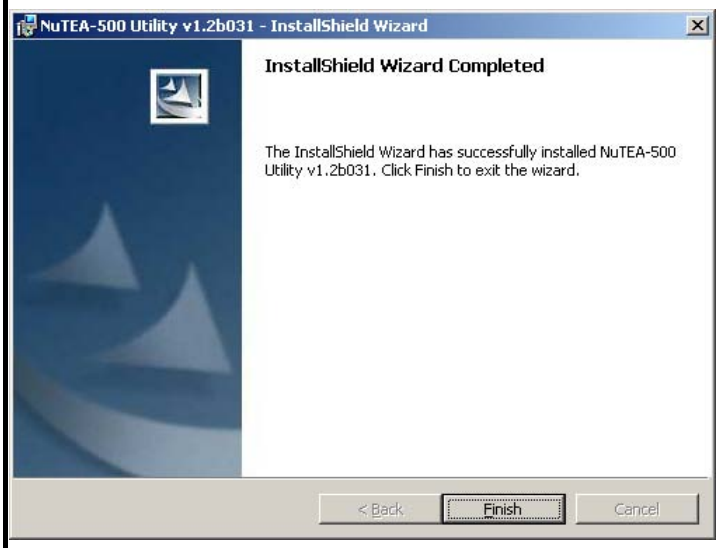


6. NuTEA-551 utility software InstallShield Wizard will start installing momentarily. Click **Install** button to start installation.

Installing NuTEA-551 Utility Software



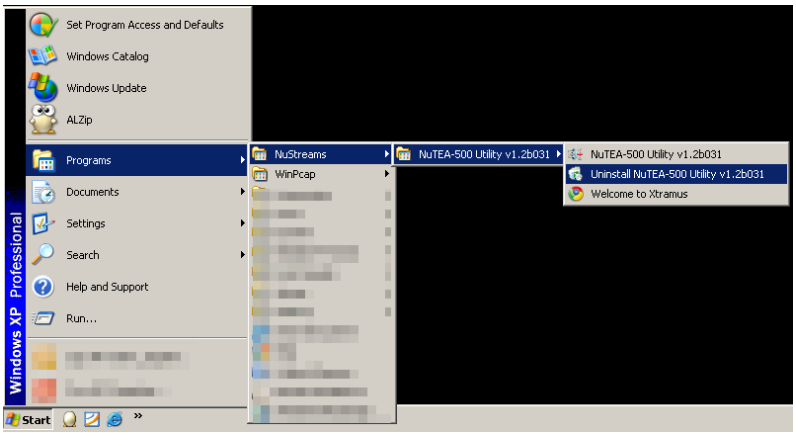
7. InstallShield Wizard is installing NuTEA-551 utility software.



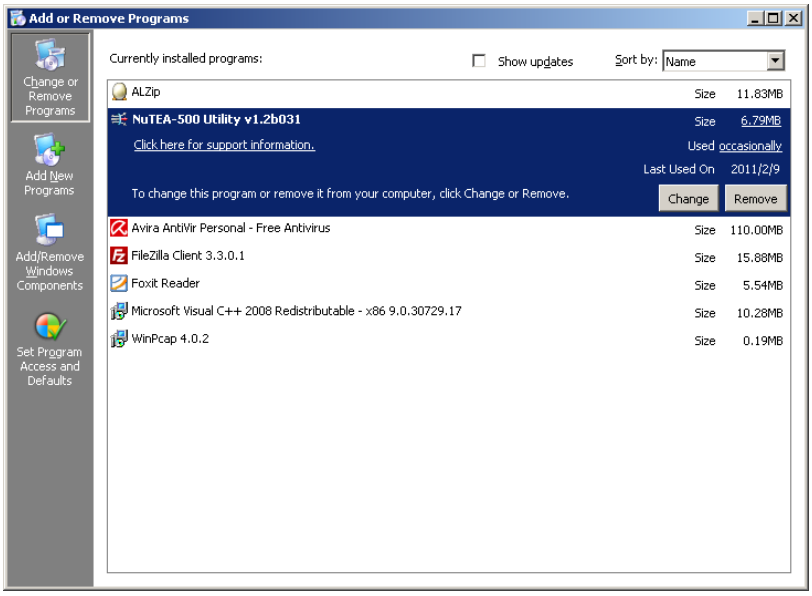
8. NuTEA-551 utility software installation completes. Click **Finish** button to exit.

To uninstall NuTEA-551 utility software, you can:

Uninstalling NuTEA-551 Utility Software



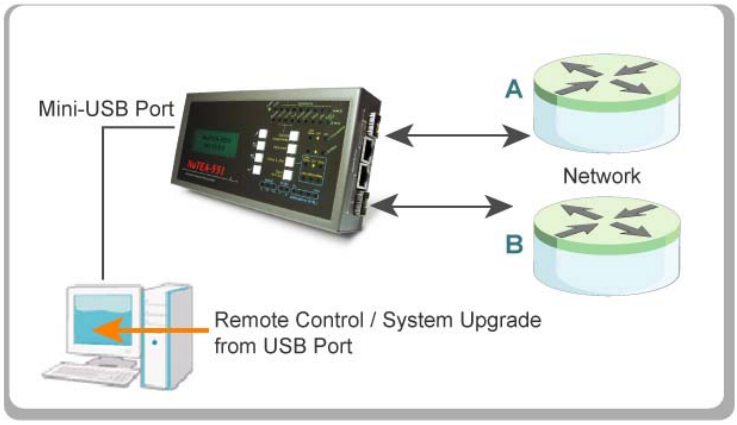
- Click **Start → Programs → NuStreams → NuTEA-500 Utility → Uninstall NuTEA-500 Utility**.

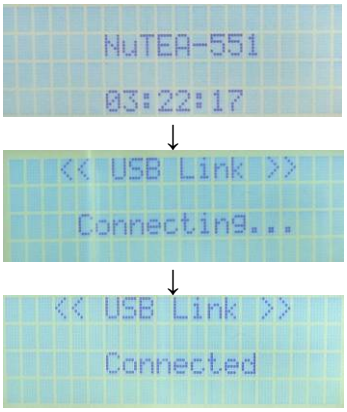


- Go to the **Control Panel**, choose **NuTEA-500 Utility** from installed program list, and click "**Remove**" to uninstall.

4.2. Starting NuTEA-551 Utility Software & Demo Mode

Before starting NuTEA-551 utility software, please be sure that your NuTEA-551 is properly connected to your PC. The figure down below is an example for connecting NuTEA-551 to PC via an USB cable.

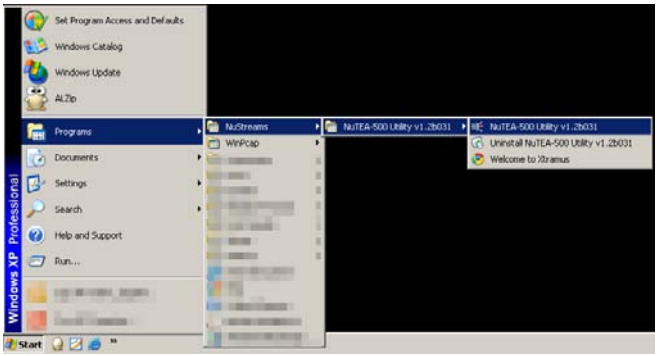




Before connecting NuTEA-551 with your PC via a USB cable, please be sure that NuTEA-551 should be in the most outer layer of its menu, which displays only the model name (NuTEA-551) and its cumulative running time.

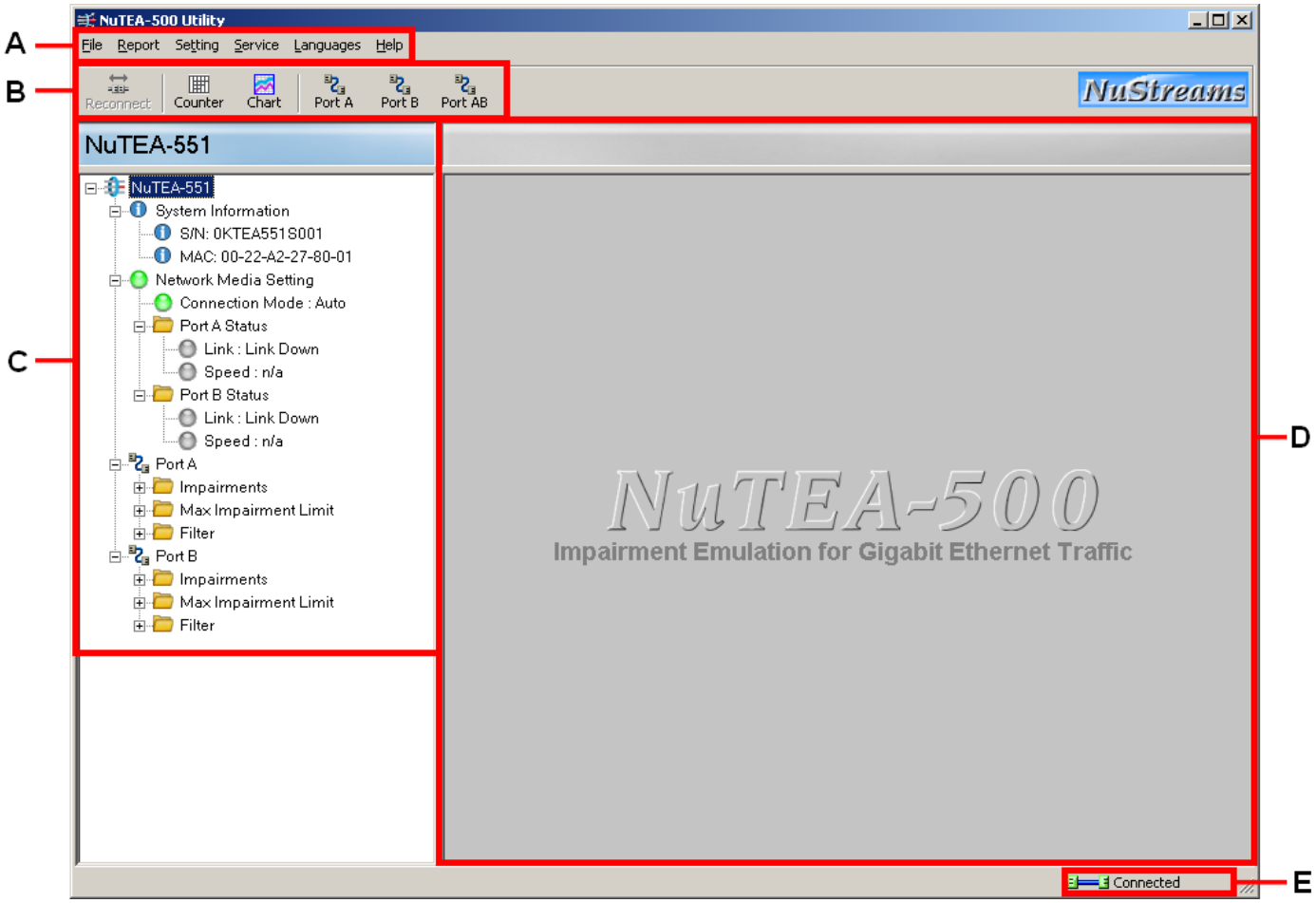
When connected properly, NuTEA-551's LCD screen will display a message "**USB Link Connected**" as shown in the figures on the left hand.

You can start NuTEA-551 utility software by:

Starting NuTEA-551 Utility Software	
	➢ Double-click NuTEA-551 utility icon located on your PC's desktop
	➢ Click **Start → Programs → NuStreams → NuTEA-500 Utility → NuTEA-551 Utility**.

If your PC is not connected with NuTEA-551, you can still run NuTEA-551 utility software under **Demo Mode**. Almost all functions are available under **Demo Mode**. However, please note that **Demo Mode is for system demo purposes only**, and does not serve any testing purposes at all.

4.3. NuTEA-551 Utility Software Main Window Overview

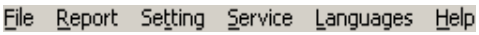


Function Descriptions		
A	**Menu Bar**	The Menu Bar allows you to load/save configuration files, view counters/charts, make impairment settings, perform system maintenance and view system information.
B	**Quick Launch Buttons**	With a simple click of these Quick Launch Buttons, you can reconnect your PC with NuTEA-551, view counters/charts, and make impairment settings.
C	**Info/Setting Select List**	This section contains a selectable list of NuTEA-551's detailed system information and impairment settings.
D	**Main Display Window**	This section displays detailed system information or all impairment parameters you can configure.
E	**USB Connection Status**	This icon shows the connection status between your PC and NuTEA-551.

For more detail descriptions regarding to NuTEA-551 utility software, please refer to **Chapter 5** down below.

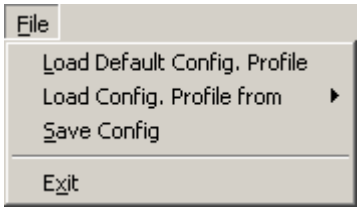
5. NuTEA-551 Utility Software Function

5.1. NuTEA-551 Utility Software Function – Menu Bar



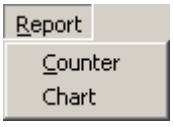
The **Menu Bar** includes configuration options such as **File**, **Report**, **Setting**, **Service**, **Languages**, and **Help**. Please see the sections down below for more detailed information.

5.1.1. Menu Bar – File



File	
Load Default Config. Profile	NuTEA-551 utility software will load the default settings. All impairment parameters will be set to default value.
Load Config. Profile From	You can choose to load test settings either from **Existing Files**. • **Existing Files:** NuTEA-551 utility software will load test settings which you saved previously.
Save Config	You can save all impairment parameters you made to your PC. The files will be in the format of "***.cfg**".
Exit	Exit NuTEA-551 utility software.

5.1.2. Menu Bar – Report



Report		
Counter	When choosing **Counter** from the **Menu Bar**, a **Counter Window** will pop up and show system statistics of NuTEA-551's Port A, Port B, and both Port A/B. You can make settings for the Counter Window via its **Control Buttons** located on the upper part of the Counter Window. 	
	Button	**Description**
		The **Save** button allows you to save the current counter reports to Microsoft Excel ® format files.
		Click the **Click** button allows the Counter Window to start updating current statistics dynamically. Click the **Click** button again will stop updating.
		The **Clear All** button allows you to clear all statistics displayed in the **Counter Window**.
		The **Hide** button allows you to hide some of the statistics, as well as fold all tree style tab statistics in the **Counter Window**.
		The **Show** button allows you to show all statistics, as well as unfold all tree style tab statistics in the **Counter Window**.

Report

Chart

When choosing **Chart** from the **Menu Bar**, a **Chart Window** will pop up and display system statistics in the form of graphic charts. Two different charts are available here: **Line**, and **Bar**.

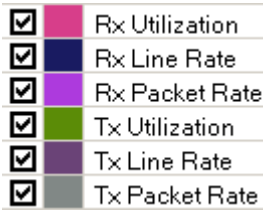
- **Line:** Displays statistics including **Rx/Tx Utilization**, **Rx/Tx Line Rate**, and **Rx/Tx Packet Rate**.
- **Bar:** Displays statistics including **Packet CRC Error**, **Packet Corrupt**, **Packet Drop**, **Packet Reorder**, and **Packet Duplicate**.

You can adjust the chart the **Control Buttons** located on the upper part of the Chart Window.

Button	Description
Update	Click the **Click** button allows the Chart Window to start updating the chart dynamically. Click the **Click** button again will stop updating.
Line	Click the **Line** button allows the Chart window to display the chart in **Line** mode.
Bar	Click the **Bar** button allows the Chart window to display the chart in **Bar** mode.

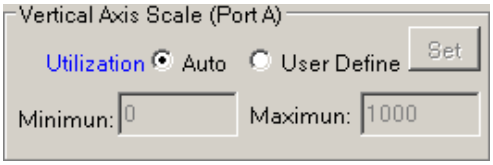
Also, you can adjust how charts are displayed in the Chart Window:

Line



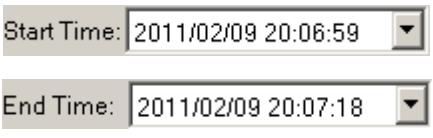
You can set the information you would like to display/hide on the Chart Window. Click the check box in front of the information you would like to display/hide here.

As mentioned above, under **Line** mode, the Chart Window displays statistics including **Rx/Tx Utilization**, **Rx/Tx Line Rate**, and **Rx/Tx Packet Rate**. All of them are represented by lines in different colors.



You can set chart's Y-Axis (Vertical Axis) display scale for Port A, Port B, or both Port A & B here. Two different modes of scale can be selected here: **Auto**, and **User Define.**

- **Auto:** The Chart Window will adjust the display range of Y-Axis automatically.
- **User Define:** You can set the display range of Y-Axis by yourself. Input the minimum and maximum range for the Y-Axis in the corresponding fields, and click the **Set** button to apply the settings you've made.



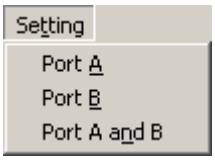
The **Time Scale** allows you to view charts in a specific period of time. Click the **Start Time** scroll-down menu to choose the starting time, and click the **End Time** scroll-down menu to choose the ending time. All statistics between **Start Time** and **End Time** will be displayed in the chart.

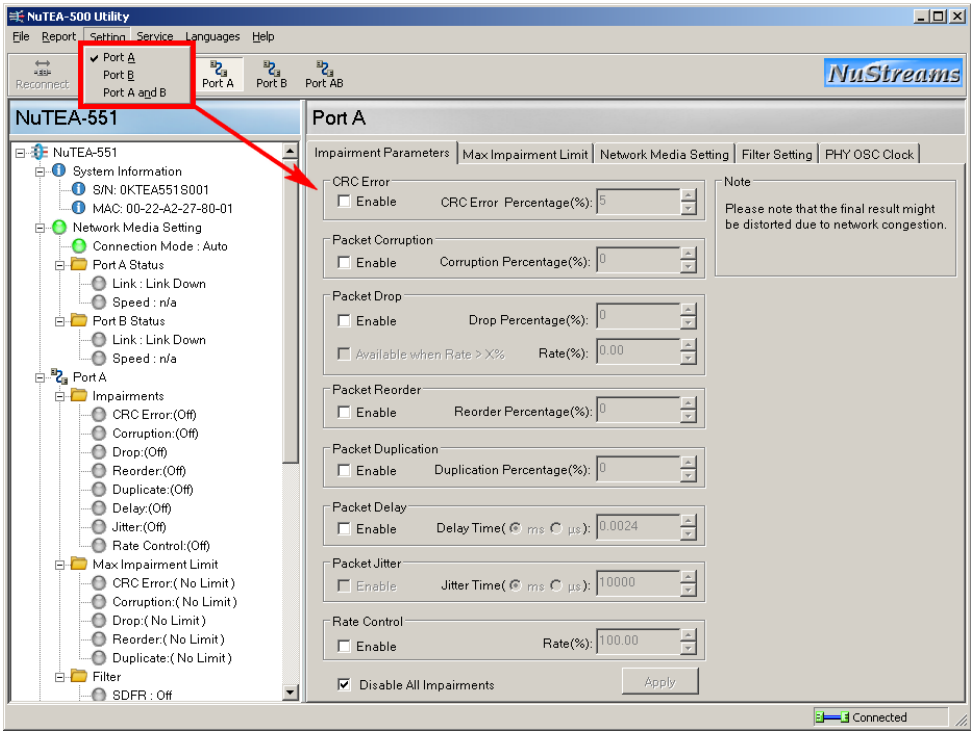
Bar

As mentioned above, under **Bar** mode, the Chart Window displays statistics including **Packet CRC Error**, **Packet Corrupt**, **Packet Drop**, **Packet Reorder**, and **Packet Duplicate**. All of them are represented by bars in different colors.

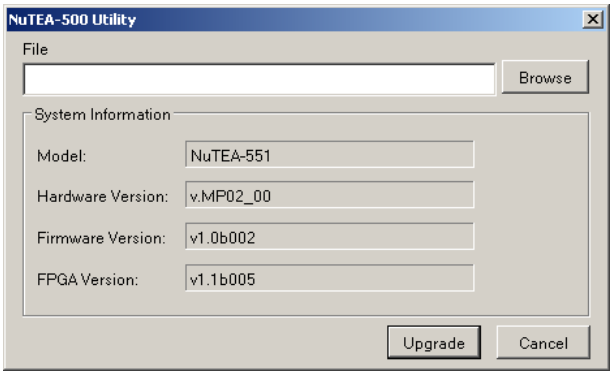
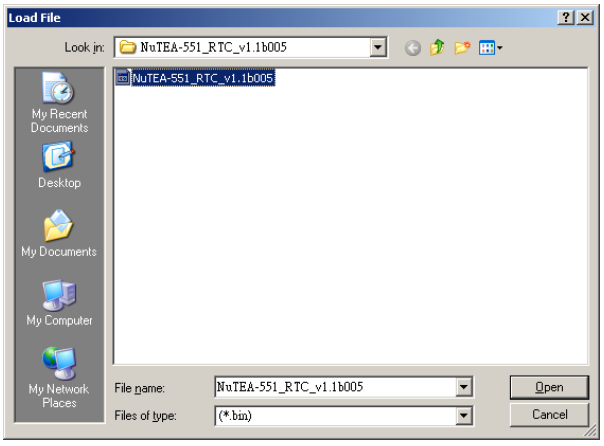
You can only adjust the **Time Scale** under **Bar** mode.

5.1.3. Menu Bar – Setting



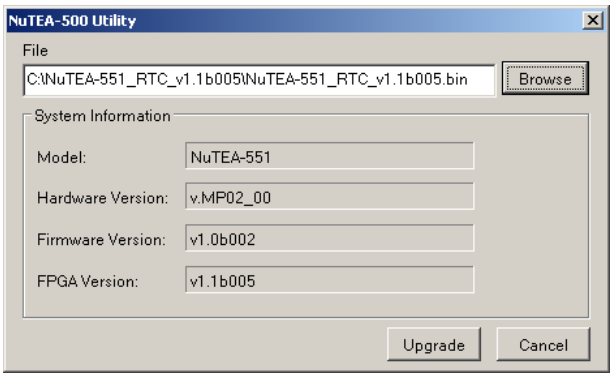
Setting	
Port A **Port B** **Port A and B**	The **Setting** on the **Menu Bar** allows you to make configurations for NuTEA-551's Port A, Port B, and both Port A & B. Configuration options contain here include the following categories: ➢ **Impairment Parameters:** You can set NuTEA-551's impairment parameters here. ➢ **Max Impairment Limit:** This configuration option allows you to set impairment parameters' limit. ➢ **Network Media Setting:** You can set both Port A and Port B's media type (Half/Full) here. ➢ **Filter Setting:** The **Filter Setting** configuration option allows you to set SDFR and Session filters. ➢ **PHY OSC Clock:** NuTEA-551 is embedded with Voltage-Controlled Crystal Oscillator (VCXO), allowing users to adjust to match/jitter its PHY chip's frequency within the range of ±100 ppm. All the configuration options can be viewed and adjusted on NuTEA-551 utility software's **Main Display Window**, as shown in the figure down below.  For more detailed information regarding to setting Port A, Port B, and Port A & B's configuration settings and parameters, please refer to **5.4. NuTEA-551 Parameter Settings**.

5.1.4. Menu Bar – Service (Firmware/FPGA Upgrading)

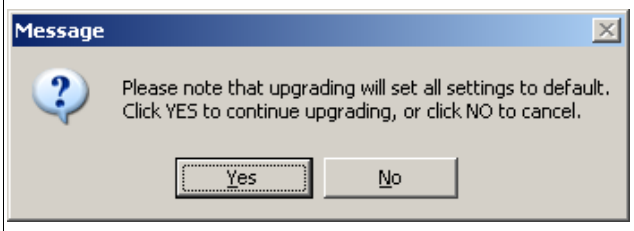
Service	
System Upgrade	The **System Upgrade** function located on the **Menu Bar** allows you to upgrade NuTEA-551's firmware and FPGA. The following section will demonstrate how to upgrade NuTEA-551's firmware. Please note NuTEA-551 must be power-on and connected to your PC all the time when upgrading its firmware/FPGA. Please refer to **4.2. Starting NuTEA-551 Utility Software & Demo Mode** for more information regarding to connect NuTEA-551 and your PC. The following section will show you how to upgrade NuTEA-551's firmware. The processes for upgrading firmware and FPGA are quite the same and can be related. 1. Please click **Service → System Upgrade → Firmware Upgrade** on the **Menu Bar**. If you want to upgrade FPGA, please choose **FPGA Upgrade**.  2. A **NuSet-MiniTAP** window will pop up. Please click the **Browse** button.  3. A **Load File** window will pop up. Please choose the firmware file saved on your PC. The firmware/FPGA file should be in the format of "**∗.bin**". Click **Open** after you've chosen the file.

Service

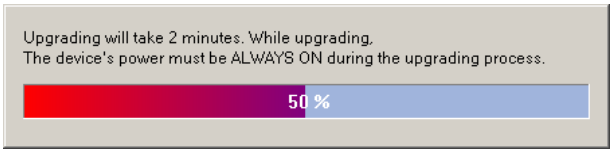
System Upgrade (Continued)



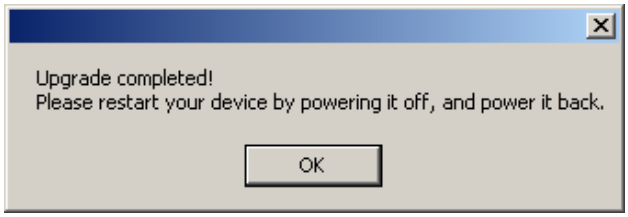
4. Click **Upgrade** button to start upgrading NuTEA-551's firmware.

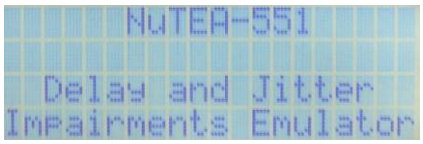


5. Please note that the upgrading process will set all settings to default. Click **YES** to continue the upgrading process.



6. NuTEA-551 utility software will start upgrading firmware. Please note that during this process, NuTEA-551's power must be ALWAYS on.



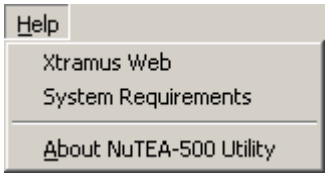


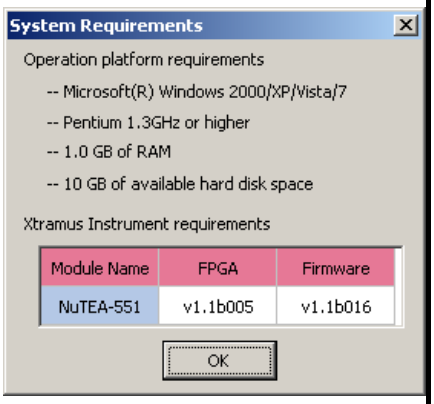
7. Upgrade complete! NuTEA-551 will reboot after upgrading firmware. Also, the connection between NuTEA-551 and your PC will be severed. Please reconnect NuTEA-551 with your PC by clicking the **Reconnect** button on the **Quick Launch Buttons**.

5.1.5. Menu Bar – Languages

Languages	
English & Simplified Chinese	NuTEA-551 utility software has **2** different languages for its UI available. You can set the language of UI to either **English** or **Simplified Chinese**.

5.1.6. Menu Bar – Help

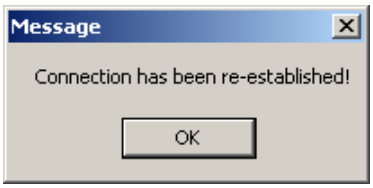


Help		
Xtramus Web	Access Xtramus Website (www.xtramus.com).	
System Requirements	A **System Requirements** window will pop up, showing you NuTEA-551 utility software's minimum system requirement. Also, this pop-up window will show you the required firmware/FPGA version as well.	
About NuTEA-551 Utility	An "**About**" window will pop up and show detailed system information.	

5.2. NuTEA-551 Utility Software Function – Quick Launch Buttons

These Quick Launch Buttons allow you to reconnect NuTEA-551, access Counter Reports and Charts, or configure NuTEA-551's Port A, Port B, and Port A & B.

5.2.1. Quick Launch Buttons – Reconnect

Reconnect	
Reconnect 	If the USB connection between your PC and NuTEA-551 is down, a "**Disconnected**" icon will be shown in "**USB Connection Status**". Press **Reconnect** button to re-establish the connection between your PC and NuTEA-551. If the connection has been established successfully, a message window will pop up, and the "**USB Connection Status**" will be shown as "**Connected**". 

5.2.2. Quick Launch Buttons – Counter & Chart

Counter & Chart	
 	The **Counter** and **Chart** buttons located on the **Quick Launch Buttons** allows you to view counter reports and statistics chart. For more detailed information, please refer to **5.1.2. Report**.

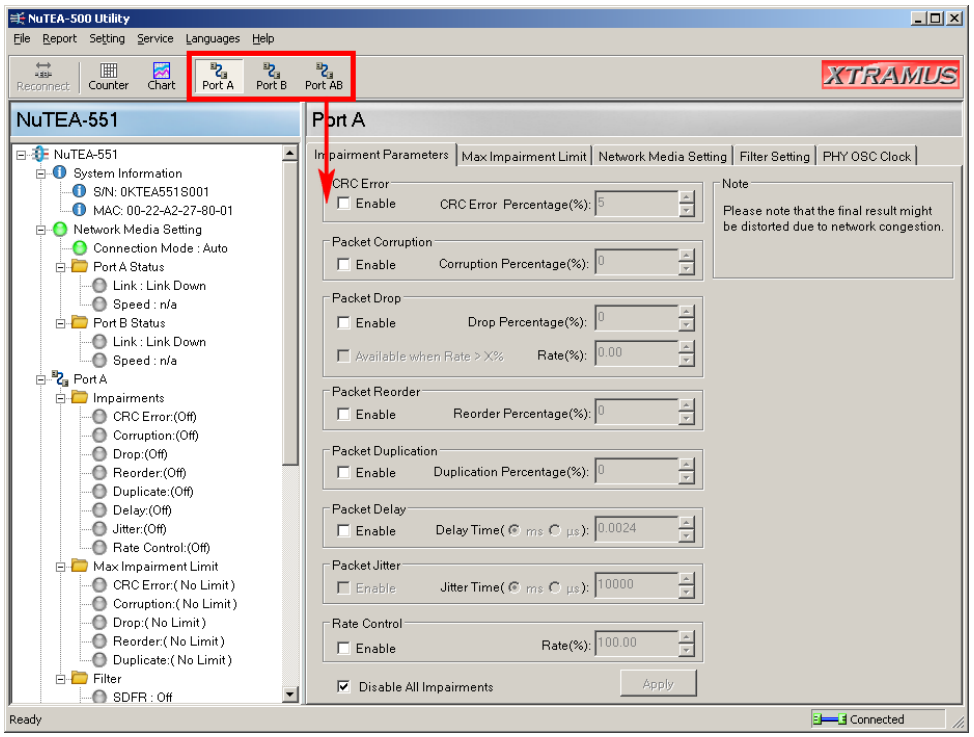
5.2.3. Quick Launch Buttons – Port A, Port B, Port AB

Reconnect

The **Port A**, **Port B**, and **Port AB** buttons on the **Quick Launch Buttons** allow you to make configurations for NuTEA-551's Port A, Port B, and both Port A & B. Configuration options contain here include the following categories:

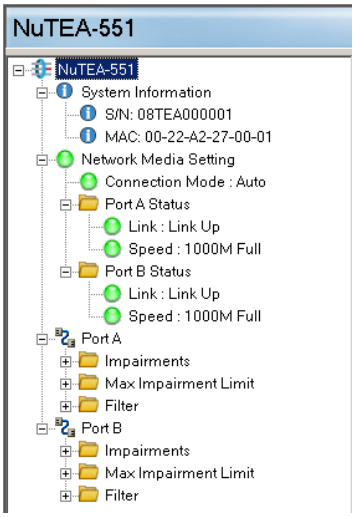
- **Impairment Parameters:** You can set NuTEA-551's impairment parameters here.
- **Max Impairment Limit:** This configuration option allows you to set impairment parameters' limit.
- **Network Media Setting:** You can set both Port A and Port B's media type (Half/Full) here.
- **Filter Setting:** The **Filter Setting** configuration option allows you to set SDFR and Session filters.
- **PHY OSC Clock:** NuTEA-551 is embedded with Voltage-Controlled Crystal Oscillator (VCXO), allowing users to adjust to match/jitter its PHY chip's frequency within the range of ±100 ppm.

All the configuration options can be viewed and adjusted on NuTEA-551 utility software's **Main Display Window**, as shown in the figure down below.



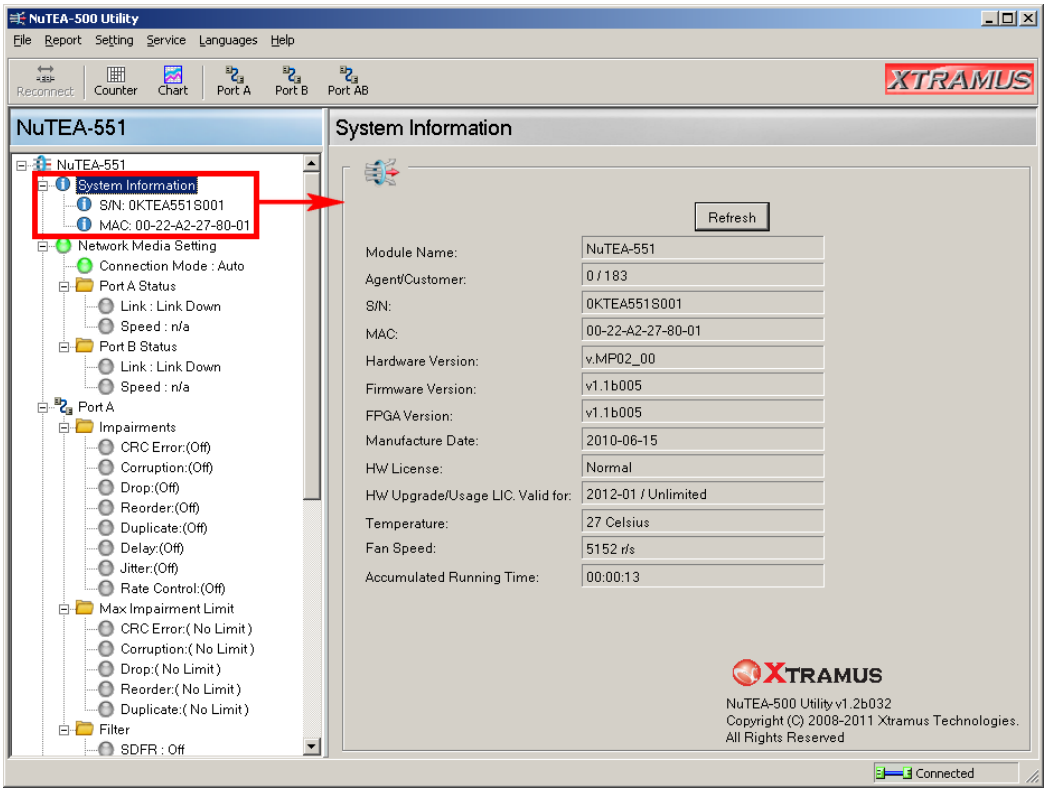
For more detailed information regarding to setting Port A, Port B, and Port A & B's configuration settings and parameters, please refer to **5.4. NuTEA-551 Parameter Settings**.

5.3 NuTEA-551 Function – Info/Setting Select List



The **Info/Setting Select List** contains a list of selectable options. When selected, the **Main Display Window** will show NuTEA-551's system information or allow you to access NuTEA-551 system settings.

To show NuTEA-551's detailed system information, click "**System Information**" on the **Info/Setting Select List**. A detailed System Information will display on the **Main Display Window** located in the **right side** of the **Info/Setting Select List** as shown in the figure down below.



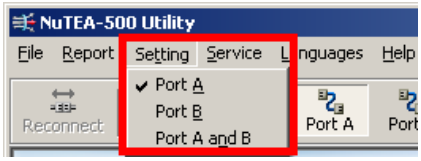
- **Refresh:** Update the latest system information and status, press this button.

You can also access NuTEA-551's parameter configuration page by clicking relating options on the **Info/Setting Select List**. For more information, please refer to **5.4. NuTEA-551 Parameter Settings**.

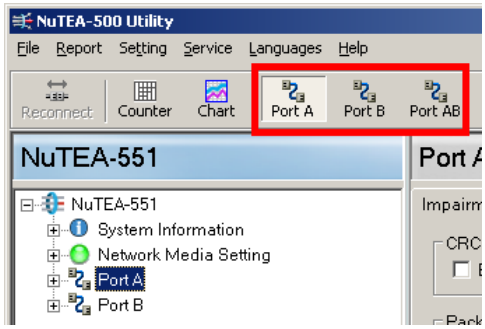
5.4. NuTEA-551 Parameter Settings

You can make parameter configurations for NuTEA-551's Port A, Port B, and both Port A & B. You can access NuTEA-551's Parameter Settings by:

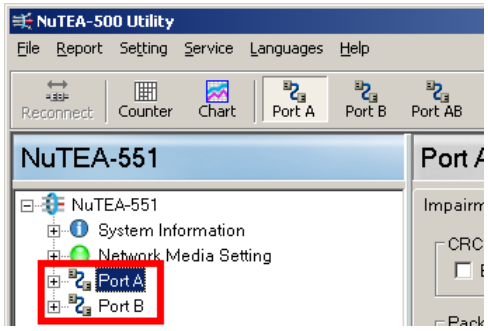
Accessing Parameter Settings



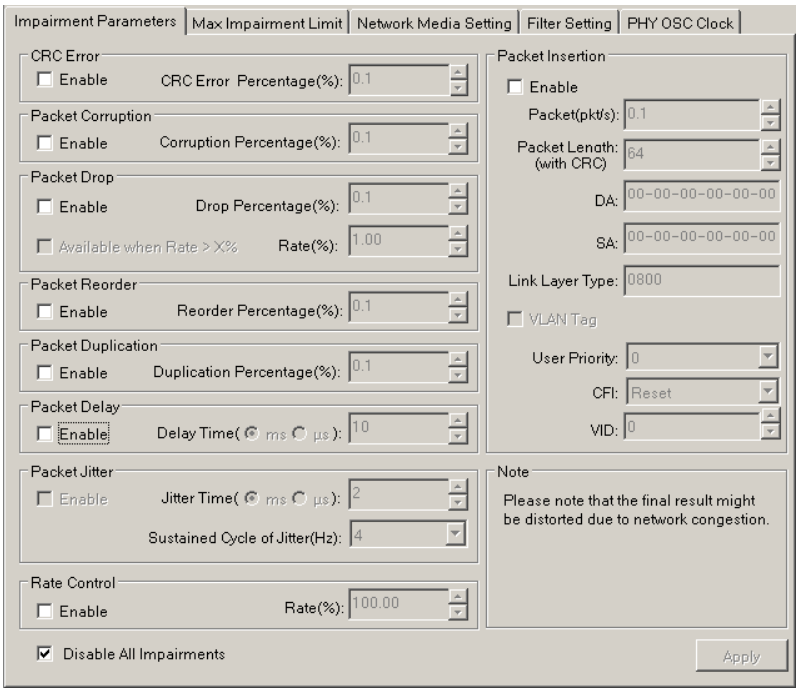
➢ Click **Setting** on the **Menu Bar**, and choose the port (Port A, Port B, or Port A and B) you would like to configure.



➢ Click one of the **Port A**, **Port B**, or **Port AB** buttons located on the **Quick Launch Buttons**.



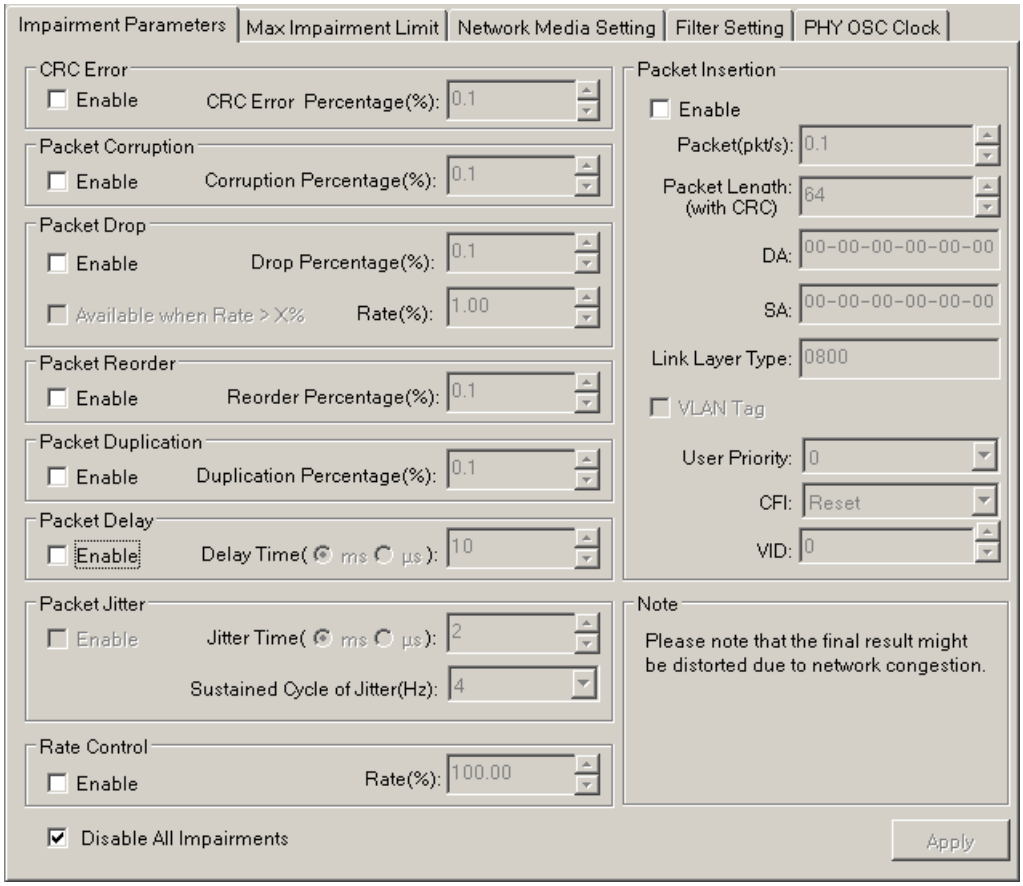
➢ Click **Port A** or **Port B** located on the **Info/Setting Select List**



Parameter Settings displayed on the **Main Display Window** contain different configurations including **Impairment Parameters**, **Max Impairment Limit**, **Network Media Setting**, **Filter Setting**, and **PHY OSC Clock**. Please refer to the sections down below for more detailed information.

5.4.1. Impairment Parameters

Parameter Settings – Impairment Parameters



CRC Error

You can enable CRC Error impairment and set its parameters here.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's CRC Error impairment.
- **CRC Error Percentage (%):** You can set the percentage of packets with CRC Error here in this field. The range of the CRC Error Percentage (%) is from **0.00001%** to **50%**.

Packet Corruption

You can enable Packet Corruption impairment and set its parameters here.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's Packet Corruption impairment.
- **Corruption Percentage (%):** You can set the percentage of packets with Packet Corruption here in this field. The range of the Corruption Percentage (%) is from **0.00001%** to **50%**.

Packet Drop

You can enable Packet Drop impairment and set its parameters here.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's Packet Drop impairment.
- **Drop Percentage (%):** You can set the percentage of packets with Packet Drop here in this field. The range of the Drop Percentage (%) is from **0.00001%** to **50%**.
- **Available when Rate > X%:** If enabled, Packet Drop impairment will be triggered when the line rate reach the set percentage.
- **Rate (%):** You can set the triggering line rate here in this field. The range of the Rate (%) is from **1%** to **100%**.

Packet Reorder

You can enable Packet Reorder impairment and set its parameters here.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's Packet Reorder impairment.
- **Reorder Percentage (%):** You can set the percentage of packets with Packet Reorder here in this field. The range of the reorder Percentage (%) is from **0.00001%** to **50%**.

Packet Duplication

You can enable Packet Duplication impairment and set its parameters here.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's Packet Duplication impairment.
- **Reorder Percentage (%):** You can set the percentage of packets with Packet Reorder here in this field. The range of the reorder Percentage (%) is from **0.00001%** to **50%**.

Packet Delay

You can enable Packet Delay impairment and set its parameters here.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's Packet Delay impairment.
- **Delay Time (ms, µs):** You can set the Packet Delay time here in this field. The delay time can be set as milliseconds (ms) or microseconds (µs). The range of the Packet Delay is from **0.0024ms (2.4µs)** to **10,000ms (10,000,000µs)**.

Packet Jitter

You can enable Packet Jitter impairment and set its parameters here. Please note that you have to enable **Packet Delay** first to enable this function.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's Packet Jitter impairment.
- **Jitter Time (ms, µs):** You can set the delay time for Packet jitter here in this field. The jitter time can be set as milliseconds (ms) or microseconds (µs). The range of the Packet Delay is from **0.0024ms (2.4µs)** to **10,000ms (10,000,000µs)**. For example, if you set the Jitter Time as 2ms, the delay time of the transmitting packets will be set to a random time between +1ms and -1ms.
- **Sustained Cycle of Jitter (Hz):** The Sustained Cycle of Jitter scroll-down menu allows you to set the frequency of the packet jitter occurrence. The value of the jitter time is generated randomly in every cycle, and will not change during the cycle. You can set the Sustained Cycle of Jitter (Hz) as **0.25** (Jitter Time changes 1 time in every 4 seconds), **0.5** (Jitter Time changes 1 time in every 2 seconds), **1** (Jitter Time changes 1 time in every 1 second), **4** (Jitter Time changes 4 times in 1 second) , **16** (Jitter Time changes 16 times in 1 second) , **64** (Jitter Time changes 64 times in 1 second) , **256** (Jitter Time changes 256 times in 1 second) , and **1024** (Jitter Time changes 1024 times in 1 second).

Packet Insertion

The **Packet Insertion** function allows you to insert packets with specific frame contents you set here.

- **Enable:** Click the **Enable** check box to enable NuTEA-551's Packet Insertion function.
- **Packets (pkt/s):** You can set how many packets that will be inserted to the data stream per second. The range of the Packets (pkt/s) is from **0.1pkt/s** to **16 pkt/s**.
- **Packet Length (with CRC):** You can set the packet length (with CRC) for packet insertion in this field. The range of the Packet Length (with CRC) is from **64** to **1518**.
- **DA/SA:** You can input the DA (Destination MAC Address) and the SA (Source MAC Address) of the inserting packets here in these two fields.
- **Link Layer Type:** You can input the **EtherType** for the inserting packets here in this field. EtherType is a two-octet field in an Ethernet frame, used to indicate which protocol is encapsulated in the PayLoad of an Ethernet Frame. For example, EtherType **0800** indicates IPv4 protocol.
- **VLAN Tag:** Click the **VLAN Tag** check box to enable the VLAN Tag for the inserting packets.
- **User Priority:** Click the User Priority scroll-down menu to set the VLAN priority.
- **CFI:** CFI stands for **Canonical Format Indicator**, a 1-bit field of the Ethernet frame that indicates if the packets' MAC addresses are non-canonical format or canonical format. To set the inserting packets as non-canonical format, please click the scroll-down menu and choose **Set**, and vice versa.
- **VID:** You can set the VLAN ID for the inserting packets here in this field.

Rate Control

You can enable the Rate Control function and set its parameters here.

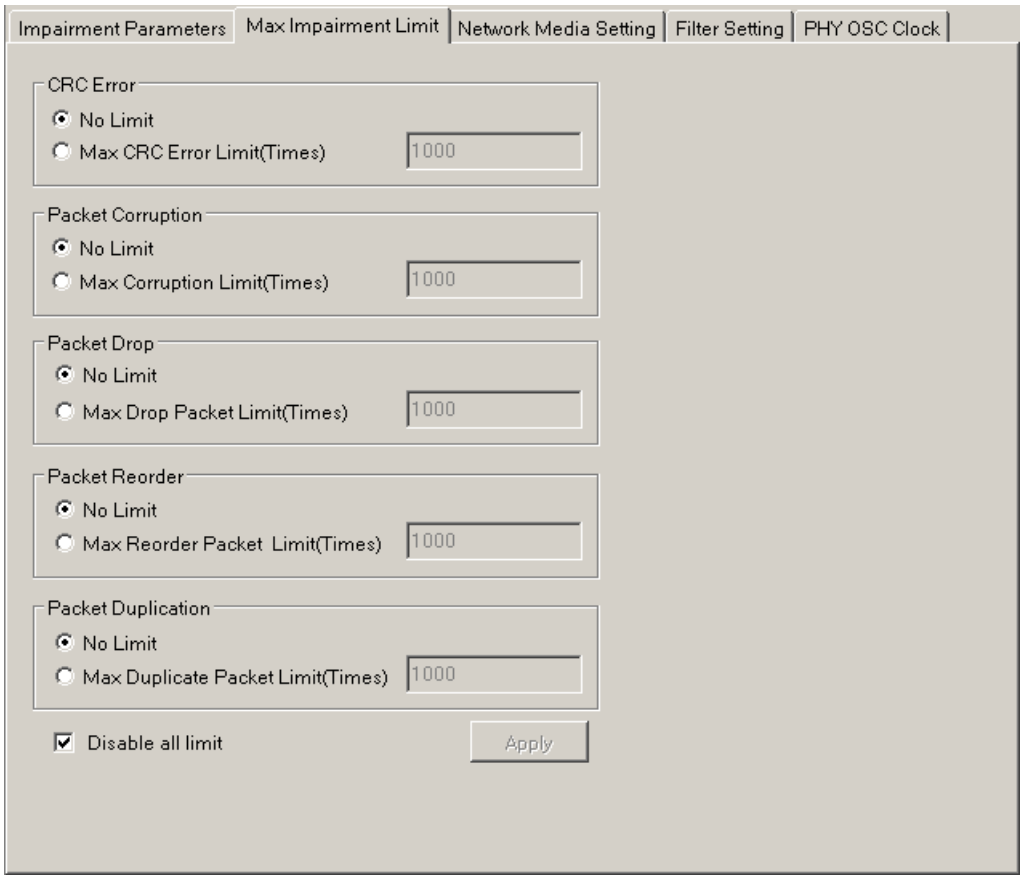
- **Enable:** Click the **Enable** check box to enable Rate Control function.
- **Rate (%):** You can set the triggering line rate here in this field. The range of the Rate (%) is from **1%** to **100%**.

Other Settings

- **Disable All Impairments:** Click the **Disable All Impairments** check box to disable all impairments.
- **Apply:** Click this button to apply all the changes you made here and save these settings to NuTEA-551.

5.4.2. Max Impairment Limit

Parameter Settings – Max Impairment Limit



CRC Error

You can enable the max limit of times for CRC Error impairments and set the number of times here.

- **No Limit:** No max limit of times will be applied for CRC Error impairments.
- **Max CRC Error Limit (Times):** You can set the max number of times for CRC Error impairments here. The range of the Max CRC Error Limits (Times) is from **1** to **65535**.

Packet Corruption

You can enable the max limit of times for Packet Corruption impairments and set the number of times here.

- **No Limit:** No max limit of times will be applied for Packet Corruption impairments.
- **Max Corruption Limit (Times):** You can set the max number of times for Packet Corruption impairments here. The range of the Max Packet Corruption Limits (Times) is from **1** to **65535**.

Packet Drop

You can enable the max limit of times for Packet Drop impairments and set the number of times here.

- **No Limit:** No max limit of times will be applied for Packet Drop impairments.
- **Max Drop Packet Limit (Times):** You can set the max number of times for Packet Drop impairments here. The range of the Max Packet Drop Limits (Times) is from **1** to **65535**.

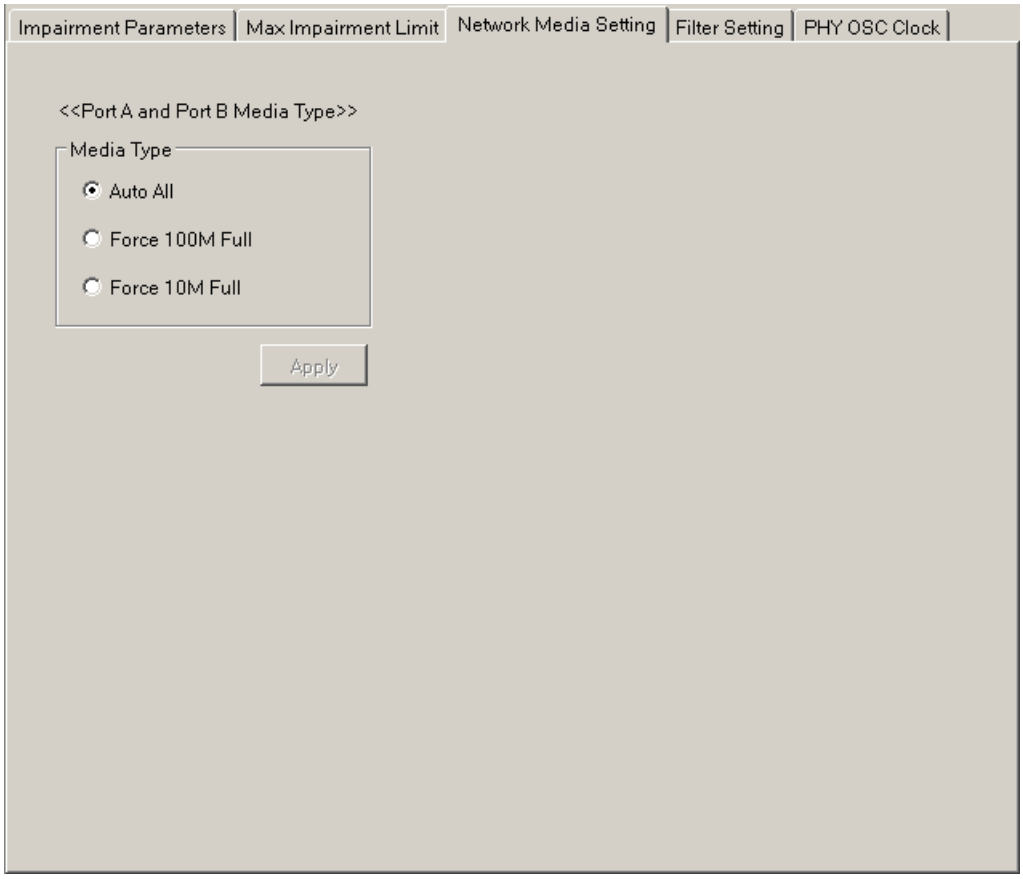
Packet Reorder

You can enable the max limit of times for Packet Reorder impairments and set the number of times here.

- **No Limit:** No max limit of times will be applied for Packet Reorder impairments.
- **Max Reorder Packet Limit (Times):** You can set the max number of times for Packet Reorder impairments here. The range of the Max Packet Reorder Limits (Times) is from **1** to **65535**.

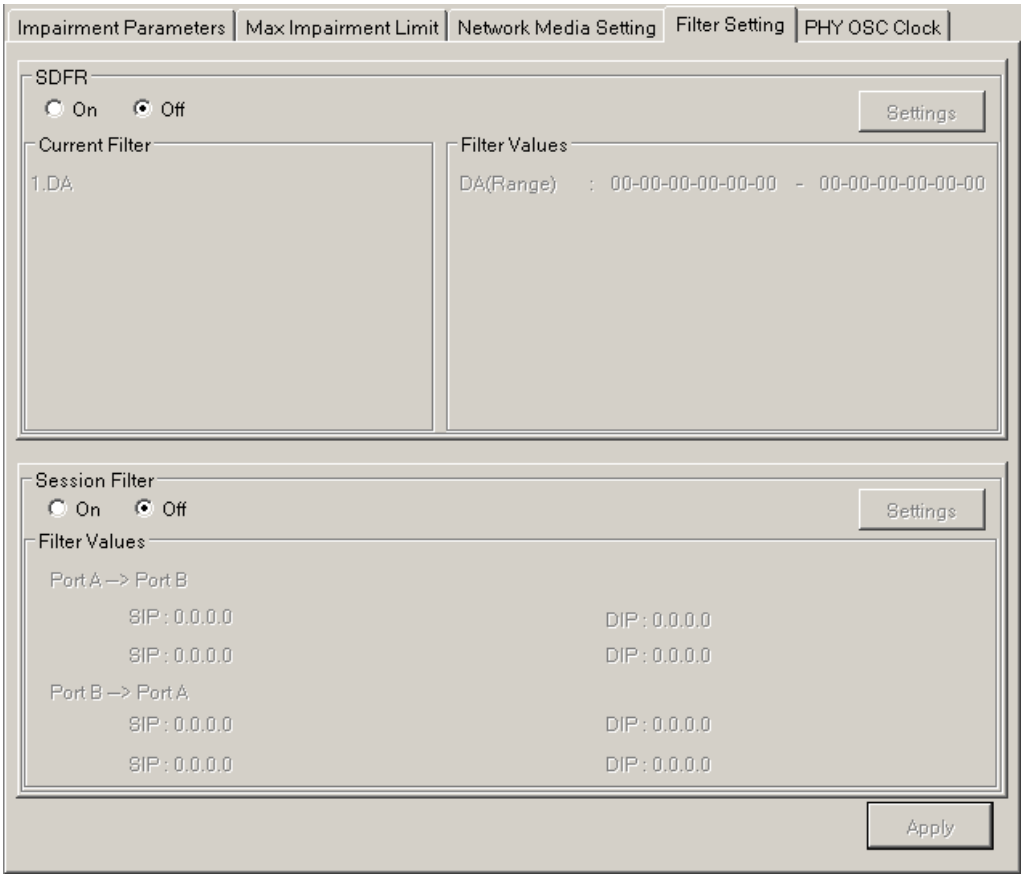
Packet Duplication
You can enable the max limit of times for Packet Duplication impairments and set the number of times here. ➢ **No Limit:** No max limit of times will be applied for Packet Duplication impairments. ➢ **Max Duplicate Packet Limit (Times):** You can set the max number of times for Packet Duplication impairments here. The range of the Max Packet Duplication Limits (Times) is from **1** to **65535**.
Other Settings
➢ **Disable All Limits:** Click the **Disable All Limit** check box to disable all limits. ➢ **Apply:** Click this button to apply all the changes you made here and save these settings to NuTEA-551.

5.4.3. Network Media Setting

Parameter Settings – Network Media Setting

Media Type
You can set the media type for NuTEA-551's Port A and Port B here. ➢ **Auto All:** Both NuTEA-551's Port A and Port B will be set to auto. ➢ **Force 100M Full:** Both NuTEA-551's Port A and Port B will be set to force 100M Full. ➢ **Force 10M Full:** Both NuTEA-551's Port A and Port B will be set to force 10M Full.
Other Settings
➢ **Apply:** Click this button to apply all the changes you made here and save these settings to NuTEA-551.

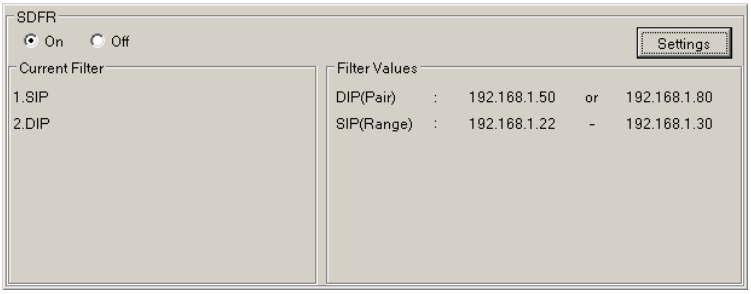
5.4.4. Filter Setting

Parameter Settings – Filter Setting



SDFR Overview

SDFR (Self-Discover Filtering Rules) is a technology that makes packet capturing/filtering over Ethernet easy and convenient. Each filter is independent and can be activated in any combinations.



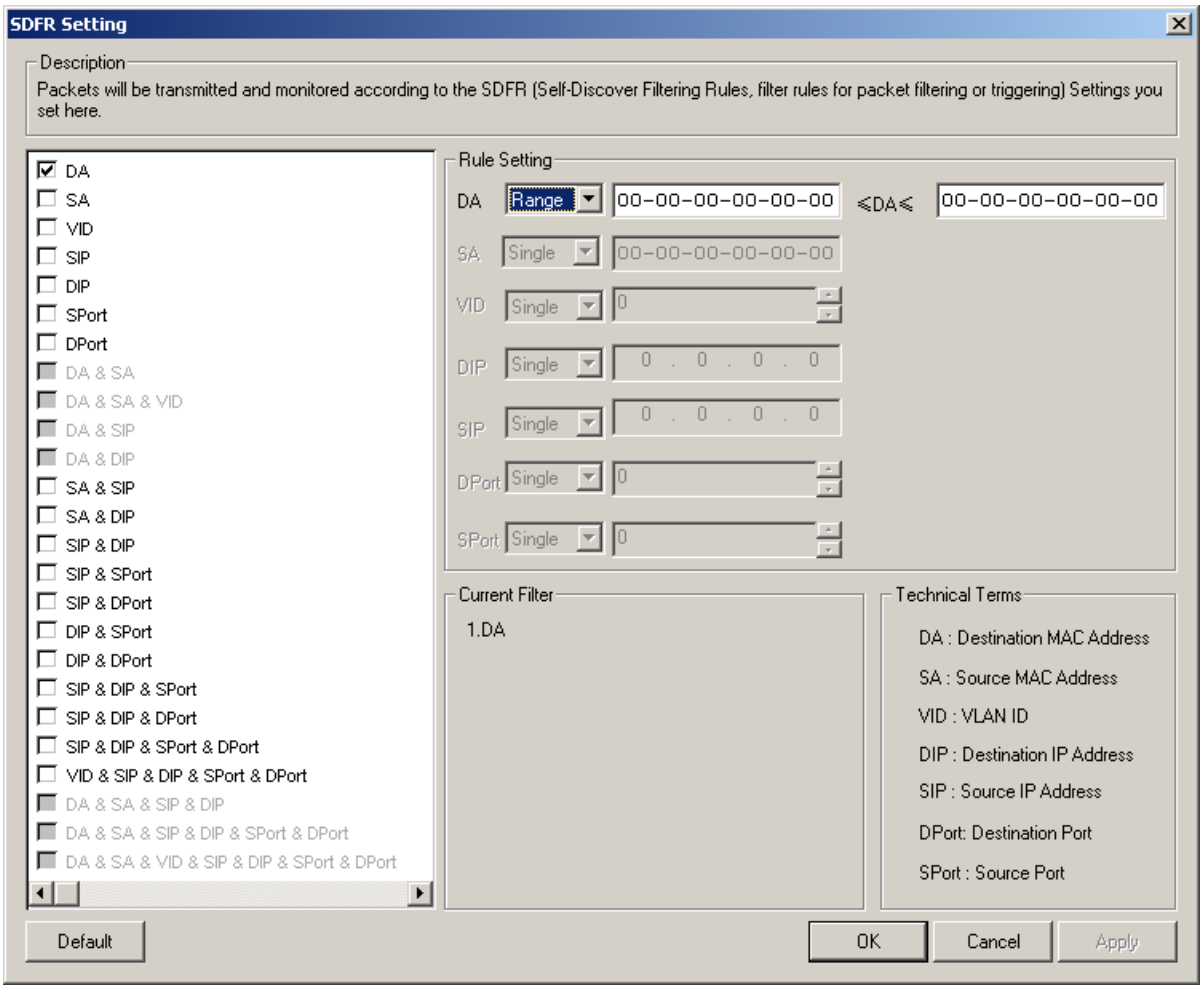
All SDFR you've set can be view in the **Current Filter** field. Also, you can view parameters and values for these SDFR in the **Filter Values** field, as shown in the figure above.

To access SDFR settings, please choose **On** in the SDFR field, and click the **Settings** button located on the right side as shown in the figure down below.

A **SDFR Setting** window will pop up, allowing you to configure SDFR. Please refer to the section down below for more detail information regarding to SDFR configurations.

To apply all the changes you made here and save these settings to NuTEA-551, please click the **Apply** button located in the lower-right part of Filter Setting page.

SDFR Setting



You can choose the criteria with the check boxes. The SDFR parameters available here includes:

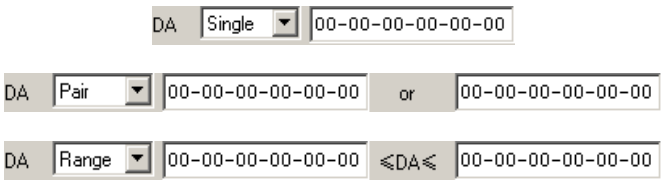
- **DA:** Destination MAC Address
- **SA:** Source MAC Address
- **VID:** VLAN ID
- **DIP:** Destination IP Address
- **SIP:** Source IP Address
- **DPort:** Destination Port
- **SPort:** Source Port

As mentioned above, each parameter is independent and can be activated in any combinations. To activate the parameter (or combinations of parameters), please click the check box.

Rule Setting

The **Rule Setting** field allows you to set and input the value of **DA**, **SA**, **VID**, **DIP**, **SIP**, **DPort** and **SPort**. The value of SDFR parameters can be set as **Single**, **Pair**, and **Range**. The following descriptions will us **DA** as example.

- **Single:** A single value will be used as SDFR parameter.
- **Pair:** Two values will be used as SDFR parameters.
- **Range:** Values within the range of the two values set here will be used as SDFR parameters.



Current Filter/Technical Terms

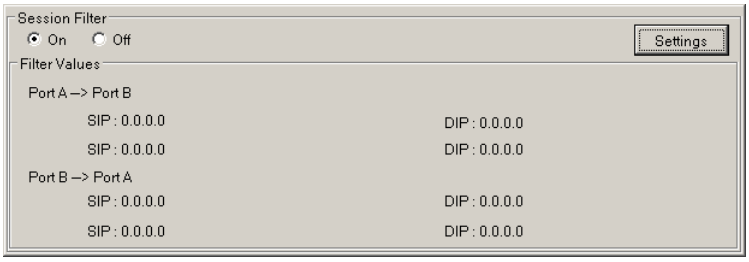
The **Current Filter** field displays the settings you've made, while the **Technical Terms** field displays the explanations for **DA**, **SA**, **VID**, **DIP**, **SIP**, **DPort**, and **SPort**.

Buttons

- **OK:** Apply all the changes you've made and exit **SDFR Setting** window.
- **Cancel:** Cancel all the changes you've made and exit **SDFR Setting** window.
- **Apply:** Apply all the changes you've made without existing **SDFR Setting** window.

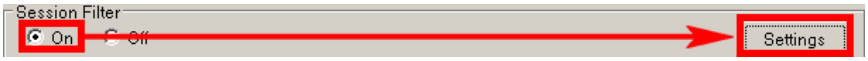
Session Filter Overview

Packets will be transmitted and monitored according to the Session Filter you've set here.



All parameters and values for these Session Filters can be viewed in the **Filter Values** field, as shown in the figure above.

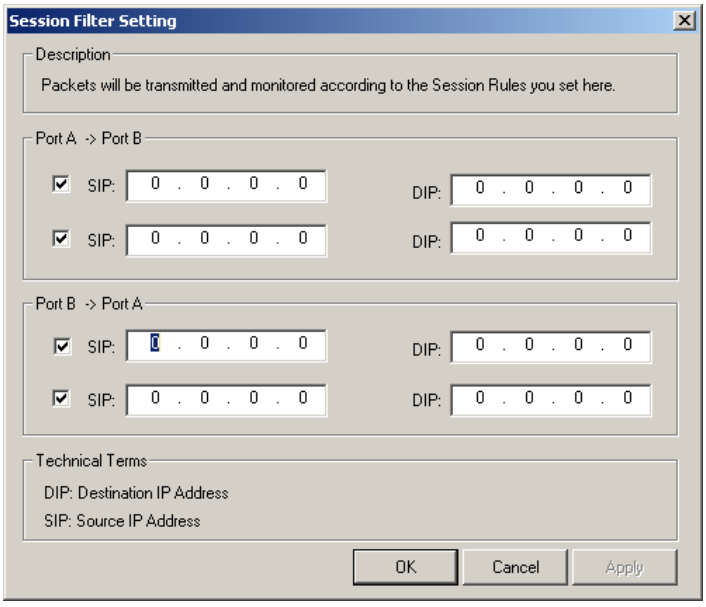
To access Session Filter settings, please choose **On** in the Session Filter field, and click the **Settings** button located on the right side as shown in the figure down below.



A **Session Filter Setting** window will pop up, allowing you to configure Session Filter. Please refer to the section down below for more detail information regarding to Session Filter configurations.

To apply all the changes you made here and save these settings to NuTEA-551, please click the **Apply** button located in the lower-right part of Filter Setting page.

Session Filter Setting



Port A → Port B & Port B → Port A

NuTEA-551 utility software supports **two Session Filters** for **Port A** and **Port B**. Each **Session Filter** allows you to set the packets flow from the SIP (Source IP Address) to the DIP (Destination IP Address). The IP addresses that serve as SIP and DIP will be switched (Previous SIP → Current DIP, Previous DIP → Current SIP) afterward.

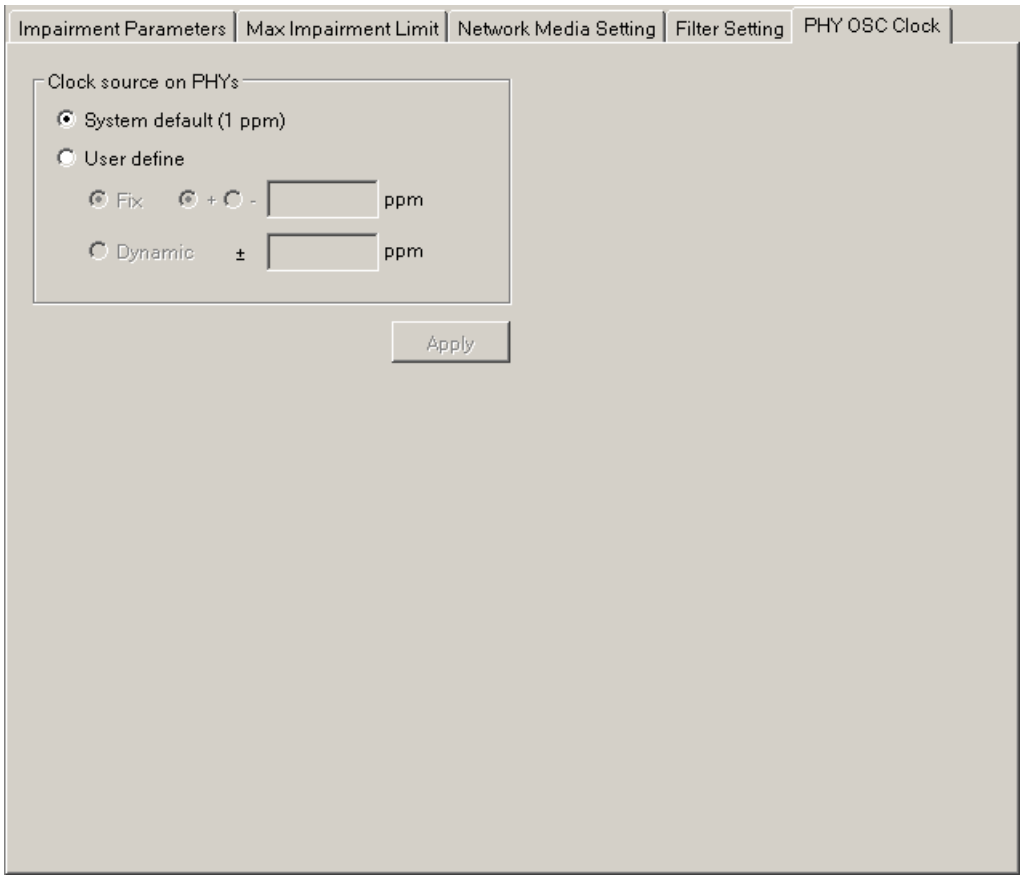
To set the **Session Filters**, please check the check box and input the SIP and DIP accordingly.

Buttons

- **OK:** Apply all the changes you've made and exit **SDFR Setting** window.
- **Cancel:** Cancel all the changes you've made and exit **SDFR Setting** window.
- **Apply:** Apply all the changes you've made without existing **SDFR Setting** window.

5.4.5. PHY OSC Clock

Parameter Settings – PHY OSC Clock



Clock Source on PHYs

Embedded with Voltage-Controlled Crystal Oscillator (VCXO), NuTEA-551 can be adjusted to match/jitter its PHY chip's frequency within the range of **±100** ppm via NuTEA-551 utility software. NuTEA-551's PHY chip frequency can be set as the following:

- **System Default:** NuTEA-551 PHY OSC Clock's frequency is set to 1 ppm.
- **User Define (Fix):** NuTEA-551 PHY OSC Clock's frequency will be set to the frequency you've set here.
- **User Define (Dynamic):** NuTEA-551 PHY OSC Clock's frequency will jitter within the range set here.

Other Settings

- **Apply:** Click this button to apply all the changes you made here and save these settings to NuTEA-551.

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