

If this is your First-Time-Use of IPLinkSimTM 1G (IPN510), then we recommend you follow all the steps explained in IPLinkSim-1G10G-IPN510-Quick-Install-Guide before proceeding with the steps below.

Quick Checkout

The IPLinkSim[™] 1G functional verification can be performed using a single IPLinkSim[™] 1G/10G hardware unit.

'IPLinkSim' test scenario is demonstrated on PacketExpertTM10G hardware unit and a Test PC, where Ethernet port of IPLinkSimTM PC is connected to Port 1 (1G) of PacketExpertTM hardware unit and Ethernet port of PC2 is connected to Port 2 (1G) of PacketExpertTM hardware unit using Ethernet CAT5 cables, as shown in the figure.



The test requires $IPLinkSim^{TM}$ (IPN510) license to be installed on PC1. After successful software installation, plug in the hardware unit to USB 2.0 port on PC1 as indicated in the figure above

Before we perform the actual test, perform the following changes in both the IPLinkSim PC and PC2. Disconnect PCs from the public or private networks and create a small isolated network. Turn-off windows firewall for both private and public networks on each PC. Assign Static IP address to each PC, subnet masks, and default gateway addresses.

*The IPLinkSim*TM acts as a transparent bi-directional link between PC1 and PC2, and they work as if connected directly, back-to-back.

This is the simplest possible network configuration, and helps configuring WAN conditions in a simple lab setup, emulating real world conditions without any elaborate setup.

We will conduct a simple Ping test between IPLinkSim[™] PC1 and Test -PC2, and verify the WAN Emulation functionality.

<u>Note:</u> To use LC optical cables (for Optical Interface) in the following test, requires NIC card with optical ports on the PC.

Step 1: Note down the IP Addresses

Note down the IP addresses of PC1 and PC2 to conduct Ping test. Ensure that IP address of PC and Hardware are in the same subnet. In this example, we consider the PC IP Addresses as:

- ➢ PC1 − 192.168.1.43
- ➢ PC2 − 192.168.1.127



Step 2: Connect the cables

Perform Test on Port 1 and Port 2 (Electrical or Optical Interface)

- For Electrical Interface type, connect Port1 to PC1 using Ethernet cable as shown in the figure. Connect Port2 to PC2 using Ethernet cable
- For Optical Interface type, plug-in SFP Transceivers to the optical ports and connect Port1 and PC1, and connect Port2 and PC2 using LC optical cable (refer to figure).

Note: Make sure SFP is properly locked and the optical cable is properly plugged-in



Step 3: Launch IPLinkSim 1G Application

Right-click on the IPLinkSim 1G shortcut icon examples on the desktop and select "Run as administrator" to launch IPLinkSim 1G application.

Note: The application may take some time to get started due to hardware and software initializations.

Step 4: Verify Links

• Verify that the Link Status is UP on both ports, that is, the LHS tree should display port 1 and port 2 with green LEDs link status (refer to figure). If the LED shows red (refer to the figure), then link is down. If links are not up, refer to the next section on how to bring the links up.



Step 5: Configure Interface parameters

From IPLinkSim function tree, double click on the **Interface** option, to open **"Interface"** in one of the window on the RHS panes, select the ports from the **Port Selection** drop-down list and do the following for Port1 and Port2:

- Interface Type = **Electrical (for Electrical test, else Optical)**
- Link Speed = Auto
- Click on the **Apply** button (this will set the Interface Type in the hardware)
- Wait for some time as the port auto-negotiates with its link partner. Verify the following:
- Link LED shows Green, indicating link is up
- Auto Negotiation Status = Complete
- Speed = 1000 Mbps (if connected PC's NIC card operates in 1G mode, else 100 Mbps or 10 Mbps)



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Step 6: Link Configuration

On the RHS side, double click on **Link Configuration** to check the Impairments. Initially impairments are not configured, and the screen appears as shown here.

19 IPLinkSim1G						
Ele <u>V</u> iew <u>S</u> ystem <u>W</u> indows <u>H</u> elp						
Application: IPLinkSim						
IPLinkSim	IPLinkSim Link Configuration					
Port 1 Interface Statistics Port 2	WAN Stream Type 📀	Symmetrical 🔿 A	symmetrical Status	ŕ		
Interface	Parameters	P1 -> P2	P1 -> P2 Manual	P2 -> P1	P2 -> P1 Manual	
Statistics	Traffic Bandwidth	1000.00 Mbps		1000.00 Mbps		
Link Configuration	Background Traffic Ba	None		None		
Link Statistics	Latency	None		None		
Graph	Packet Loss	None	Drop	None	Drop	
	Packet Reordering	None	Reorder	None	Reorder	
	Packet Duplication	None	Duplicate	None	Duplicate	
	Logic Error Insertion	None	Insert	None	Insert	
	FCS Error Insertion	None		None		
	P1 -> P2 Traffic Bandwidth		-			
	1000,000000	Mbps 💌				

Step 7: Start IPLinkSim

• Click **Start** button available in the Function tree and start the **IPLinkSim** application.

Step 8: Conduct Ping Test (without impairments)

- On PC1, open a command prompt, and Ping PC2's IP Address, as shown in the figure.
- Verify that Ping works fine.

Note that all 4 Ping trials have succeeded, with no impairments. Note that the Round trip time average is around 2 milliseconds.

C:\WINDOWS\system32\cmd.exe	- 🗆 ×
C:\Users>ping 192.168.1.127	^
Pinging 192.168.1.127 with 32 bytes of data: Reply from 192.168.1.127: bytes=32 time=3ms TTL=128 Reply from 192.168.1.127: bytes=32 time=2ms TTL=128 Reply from 192.168.1.127: bytes=32 time=2ms TTL=128	
Reply from 192.168.1.127: bytes=32 time=3ms TTL=128 Ping statistics for 192.168.1.127:	
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 2ms, Maximum = 3ms, Average = 2ms	
C:\Users>	

• From IPLinkSim function tree, double click on the **Link Statistics** option, to open "Link Statistics" in one of the window on the RHS panes. Verify that no impairments have been introduced.

IPLinkSim	Link Statistics				
Port 1					
Interface	Statistic	Value P1->P2	Percent P1->P2	Value P2->P1	Percent P2->P1
Statistics	TxBytes	6 352	NA	9 249	NA
Port 2	10 Sec Average Throughput	0.003	NA	0.006	NA
Interface	1 Min Average Throughput	0.000	NA	0.000	NA
Statistics	10 Min Average Throughput	0.000	NA	0.000	NA
Stausucs					
Link Configuration	RxFrames	92	NA	61	NA
Link Statistics	TxFrames	92	NA	61	NA
Graph					
	Dropped Frames(Bandwidth Control	0	0.000	0	0.000
	No of Packets With Errors	0	0.000	0	0.000
	Dropped Packets (Packet Loss)	0	0.000	0	0.000
	Duplicated Packets	0	0.000	0	0.000
	Reordered Packets	0	0.000	0	0.000
	Inserted Bursts for BKG Traffic	0.00 bps	NA	0.00 bps	NA

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Step 9: Configure Impairments – 1000ms Latency in one direction (P1 \rightarrow P2) and 250 msec in the reverse direction (P2 \rightarrow P1)

- Stop IPLinkSim by clicking on the **Stop** button.
- From IPLinkSim function tree, double click on the Link Configuration option, to open "Link Configuration" in one of the window on the RHS panes.
- Select Asymmetrical WAN Stream Type, select Latency in the Parameters list. Enter the value of '1000msec' in the "Latency" edit box at the bottom, below "P1 → P2". This means that in the P1 → P2 direction, every packet is delayed by 1000 msec. Similarly, enter "250 msec" in the "Latency" edit box at the bottom, below "P2 → P1". This means that in the P2 → P1 direction, every packet is delayed by 250 msec. So, total Round Trip delay for the ping packet should be around 1000 msec (P1 → P2 delay) + 250 msec (P2 → P1 delay) + normal Ping delay of 1 to 2 msec = 1251 to 1252 msec.

IPLinkSim	Link Configuration				
Port 1 Interface Statistics Port 2	WAN Stream Type 🔿	Symmetrical 💿 Asymmetrical	Status 🔺		
Interface	Parameters	P1->P2	P1 -> P2 Manual	P2 -> P1	P2 -> P1 Manual
Statistics	Traffic Bandwidth	1000.00 Mbps		1000.00 Mbps	
Link Configuration	Background Traffic Ba	None		None	
Link Statistics	Latency	Single Delay, 1000 ms		Single Delay, 250 ms	
Graph	Packet Loss	None	Drop	None	Drop
	Packet Reordering	None	Reorder	None	Reorder
	Packet Duplication	None	Duplicate	None	Duplicate
	Logic Error Insertion	None	Insert	None	Insert
	FCS Error Insertion	None		None	
	P1 -> P2 Latency ③ Single Delay	Min 1000	P2 -> Laten	P1 cy igle Delay	Min 250 msec
	O Uniform Distribution	on Max 8000 tial Distribution	msec OUn ORa	iform Distribution ndom Exponential Distribution	Max 8000 msec

• Click "Start" again to restart IPLinkSim with impairments.

Step 10: Conduct Ping Test (with Impairments – 1250 msec Round Trip Latency)

• On PC1, conduct the Ping test again, and verify that this time, the results shows 1251 - 1252ms delay.

This shows that the 1250 msec delay impairment introduced between PC1 and PC2 and reflects how IPLinkSim can be used to introduce impairments between two end points. of the network.

C:\WINDOWS\system32\cmd.exe
C:\Users>ping 192.168.1.127
Pinging 192.168.1.127 with 32 bytes of data: Reply from 192.168.1.127: bytes=32 time=1251ms TTL=128 Reply from 192.168.1.127: bytes=32 time=1251ms TTL=128 Reply from 192.168.1.127: bytes=32 time=1251ms TTL=128 Reply from 192.168.1.127: bytes=32 time=1251ms TTL=128
<pre>Ping statistics for 192.168.1.127: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 1251ms, Maximum = 1251ms, Average = 1251ms</pre>
C:\Users>