Report NO: 18I010001

FWS-2272

INTEL Apollo Lake
4 LANs Network Appliance

Firewall Product
P5
Compatibility Test Report

Summary	☐ Pass ☐ Fail ☒ Pass with Deviation Comment: 1. Mini card slot was not compatible with PCIe x1 bear card; we used PCIe x16 bear card to measure PCIe x1 /GEN2 function correctly. 2. LAN4 (via bridge) bandwidth and throughput are lower than LAN1~3, other functions are working normally. 3. LAN endurance test passed with 98% loading.

Test Results Category				
	Critical	Major	Minor	Enhancement
Defect Found	0	0	0	0
Defect Unsolved	0	0	0	0

Issue date	QE Manager	Test Engineer
2018-01-19	KJ Wang	Louie Lee

Version Released Records

Date	Version	Change History	Note
01/27/2016	A0	1. First release	
01/06/2017	A1	1. Add NIM card compatibility test. 2. Add 10G、40G LAN function test. 3. Update BIOS test plan. 4. Update Stability test item. 5. Add 10G, 40G Throughput performance test.	
07/17/2017	A2	1. Add Linux Burnintest 2. Add PCIe GEN3 bear card test	

Note :

For all test items in this report, 3 results have been defined and described as following:

Pass: Functionality work perfectly
Fail: Functionality failed and must be resolved in the next version
N/A: Functionality Not Applicable or Not Available

This test report would be updated when re-test completed in product next change version.

Specification Validation

Main Specification

Item	Specification	Result			Note
		Pass	Fail	N/A	
Form Factor	Desktop 4-port Network Appliance	☒	☐	☐	
Processor	Onboard Intel Apollo Lake SoC	☒	☐	☐	
System Memory	On-board LPDDR4 1GB, co-lay 1 x 204-pin DDR3L 1866MHz SODIMM, Up to 8GB	☒	☐	☐	
Graphics controller	Intel Integrated	☒	☐	☐	
Ethernet	INTEL i211 (Co-lay with INTEL i210), Gigabit Ethernet x 4	☒	☐	☐	
Bypass	N/A	☐	☐	☒	
BIOS	AMI BIOS ROM	☒	☐	☐	
Storage	1 x SATA III port on board	☒	☐	☐	
	On-board 8GB/16GB eMMC	☒	☐	☐	
Serial Port	RJ45 console	☒	☐	☐	
Keyboard and Mouse	Reserve pin-header	☐	☐	☒	
Universal Serial Bus	2 x USB 3.0 Type A on I/O side	☒	☐	☐	
Expansion Interface	Mini-Card socket (full-size, PCIe+USB) with SIM socket x 1	☒	☐	☐	
RTC	Internal RTC	☒	☐	☐	
TPM	BOM Optional TPM2.0 9665	☒	☐	☐	
Display	Micro HDMI x 1	☒	☐	☐	
Watchdog Timer	1~255 step by software programmable	☒	☐	☐	
GPIO	Reserve internal pin header 8-bit Digital I/O interface (4-in /4-out) .	☒	☐	☐	
Power Requirement	1 x 12V DC power in connector / 40W Power Adapter 4-pin DC power out connector for SATA device	☒	☐	☐	
Front I/O panel	1 x Power LED 1 x Status LED 1 x HDD Active LED 8 X LAN LEDs	☒	☐	☐	
Rear I/O panel	2 x USB 3.0 Ports 4 x RJ-45 Ports with LEDs 1 x RJ-45 Console 1 x 12V DC Power Input 1 x Software Programmable button 1 x Power button 2 x Antenna hole	☒	☐	☐	

O.S. Support

Item	Specification	Result			Note
		Pass	Fail	N/A	
Microsoft Windows	Windows 10 64 bits	☐	☐	☒	
Linux	Cent OS 5.2 or above	☒	☐	☐	
	Linux Kernel 4.1 above	☒	☐	☐	
	Yocto* Tool based Embedded Linux	☐	☐	☒	

Platform Information

Item	Device Information	Note
Product of department	NSD	
System Model	FWS-2272	
PCB Model / Version	NMB-2272 A1.0	
BIOS / Version	FWS-2272 R1.4(K272AM14) (12/14/2017)	
Driver folder	\\nas3\SAP-BETA\Products\FWS-2272\20170223	
CPU Type	Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz	
Memory Type	InnoDisk DDR3L-1600 8GB(SEC K4B4G0846E)	
	Onboard LPDDR4 2GB	
	Onboard LPDDR4 1GB	
SATA HDD	Innodisk SATADOM-SH 3ME3 32GB (DESSH-32GD09BC1SC-26A)	
USB DVD-ROM	ASUS SBW-06D2X	
VGA Monitor	N/A	
HMDI Monitor	Philips 288P / Dell U2713HM / ASUS VE288	
eMMC	Onboard eMMC KingSton 16GB / 8GB	
CFast	N/A	
mSATA	N/A	
Daughter Board	N/A	
	N/A	
NIM Card	N/A	
	N/A	
Operating System	☒ CentOS7 kernel:3.10.0-514.el7.x86_64	
	☒ Ubuntu16.04.2 kernel 4.8.0-36-generic x86_64	
	☐ Windows 10 Enterprise 64bit English version	
Adapter	FSP040-RHAN2 12V 3.33A	
	FSP060-DIBAN2 12V 5A	
Battery Model	N/A	
Chipset Information		
Chip	Intel Apollo Lake	
Super IO Chipset	ITE IT8728F	
Ethernet Chipset	INTEL i211 , Gigabit Copper Ethernet x 4	

Summary Table of contents:

1. Hardware Compatibility Test

1.1. CPU Compatibility Test

Procedure:

Step1. Check CPU information and frequency should show correct value during POST screen and O.S.
<Linux CPU info # dmidecode -t processor|grep "Version:">

Step2. CPU supported must meet specification.

Test Result:

Test item	Result			Note
	Pass	Fail	N/A	
Below CPU information and frequency should show correct value				
Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz	☒	☐	☐	

1.2. Memory Compatibility Test

Procedure:

Step1. Boot up function test

Step2. Check Memory frequency should show correct value during POST screen and O.S.
<<Linux Memory info # dmidecode -t memory|grep "Size:">

Step3. Memory supported must meet specification.

Test Result:

Test item	AAEON P/N	Result			Note
		Pass	Fail	N/A	
a. Boot up normal. b. Below Memory Information and frequency should show correct value.					
Onboard LPDDR4 1GB	N/A	☒	☐	☐	Memtest
Onboard LPDDR4 2GB	N/A	☒	☐	☐	Memtest
Transcend DDR3L-1600 2GB(SEC 501 BYMA K4B2G0846Q)	AP-DR968D3002GK	☒	☐	☐	
Transcend DDR3L-1600 4GB(SEC 446 XYKO K4B4G0846D)	AP-DR968D3004G6	☒	☐	☐	
Transcend DDR3L-1600 8GB(SEC 443 BYKO K4B4G0846D)	968D3008G7	☒	☐	☐	
InnoDisk DDR3L-1600 2GB(SEC 434 BYKO K4B2G0846Q)	AP-DR968D3002GX	☒	☐	☐	
InnoDisk DDR3L-1600 4GB(SEC K4B4G0846E)	968D3004GZ	☒	☐	☐	
InnoDisk DDR3L-1600 8GB(SEC K4B4G0846E)	968D3008GW	☒	☐	☐	
DSL DDR3L 2GB (Hynix H5TC2G83EFR PBA 247EA)	N/A	☒	☐	☐	
KingSton DDR3L 1600 4GB D5128ED1FPGGBU	N/A	☒	☐	☐	
ADATA DDR3L-1600 4GB(Micro 3YE77 D9QBJ)	N/A	☒	☐	☐	
Innodisk DDR3L 1333 2GB Hynix H5TC2G83EFR	N/A	☒	☐	☐	
DSL DDR3L 1333 4GB Hynix H5TC4G83AFR	N/A	☒	☐	☐	
Innodisk DDR3L 1333 8GB H5TC4G83AFR	N/A	☒	☐	☐	

1.3. SATA Compatibility Test

1.3.1 SATA AHCI Mode

Procedure:

Step1. BIOS select AHCI mode, check SATA devices information/ size should show correct value in BIOS setup.

Step2. Boot into OS, check SATA devices information/size should show correct value.

OS: CentOS7 kernel:3.10.0-514.el7.x86_64

Test Result:

Test item		Result			Note
		Pass	Fail	N/A	
Below SATA devices information and size should show correct value with AHCI mode.					
SATAII	ATP IG SATADOM 8GB AF8GSSEI-LE1	☒	☐	☐	R/W 109/48MB/s
SATAII	Innodisk SATADOMD150SH-L 8GB (DESBD-08GJ30AWCDS-D57)	☒	☐	☐	R/W 63/40MB/s
SATAIII	Innodisk SATADOM-SH 3ME3 32GB (DESSH-32GD09BC1SC-26A)	☒	☐	☐	R/W 128/42MB/s

2. Basic Function Test

2.1. CPU Function Test

Configuration:

CPU: Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz
Memory: InnoDisk DDR3L-1600 8GB(SEC K4B4G0846E)

Procedure:

Step1. Connected CPU with product specification max supported.
Step2. Boot into BIOS manual and check CPU information is correct.
Step3. Confirm CPU max speed can meet CPU specification in OS environment.
<#watch –n 1 “cat /proc/cpuinfo | grep MHz”>
Step5. Install and execute benchmark AP “sysbench”, recode the benchmark.
<1 thread #sysbench --test=cpu --cpu-max-prime=20000 run>
<2 threads #sysbench --test=cpu --cpu-max-prime=20000 --num-threads=2 run>

Test result:

No.	Test item			Result			Note
				Pass	Fail	N/A	
1	System can boot properly			☒	☐	☐	
2	BIOS\CPU information is correct.			☒	☐	☐	
3	CPU speed should meet specification			☒	☐	☐	2.39GHz
4	Recode CPU Benchmark	Intel 2.39G	1 thread	21.0447ss			
			2 threads	11.0575s			

2.2. Memory Function Test

Configuration:

CPU: Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz
Memory: InnoDisk DDR3L-1600 8GB(SEC K4B4G0846E)

Procedure:

Step1. Connected memory with product specification max supported.
Step2. Boot into BIOS manual and check memory information is correct.
Step3. Slot test.
Step4. Execute benchmark AP” sysbench”, recode the benchmark.
<read # sysbench --test=memory --memory-block-size=8K --memory-total-size=1G
--memory-oper=read run >
<write # sysbench --test=memory --memory-block-size=8K --memory-total-size=1G run >

Test result:

No.	Test item		Result			Note
			Pass	Fail	N/A	
1	System should boot properly.		☒	☐	☐	
2	BIOS\Memory information is correct.		☒	☐	☐	
3	Slot 1	System should boot up properly.	☒	☐	☐	
	Slot 2		☐	☐	☒	
	Slot 3		☐	☐	☒	
	Slot 4		☐	☐	☒	
	Slot 1 + 3		☐	☐	☒	
	Slot 2 + 4		☐	☐	☒	
	Slot 1+2+3+4		☐	☐	☒	

4.	Recode Memory Benchmark	read	Transferred:26276.61MB/s Total time:0.039 s	
		write	Transferred:4892.19B/s Total time:0.2093s	

2.3. SATA / eMMC Function Test

Configuration:

SATA DOM: Innodisk 3ME3 32GB SATA DOM /
eMMC: onboard eMMC 16GB / 8GB

Procedure:

Step1. Connect SATA HDD / SSD and CF.
Step2. Boot into BIOS manual and check SATA and eMMC information are correct.
Step3. Install Linux OS with SATA storage / eMMC.
Step4. Check SATA/eMMC read/write speed can meet the specification.
<Ubuntu tool: Disk Benchmark>

Test result:

No.	Test item	Result			Note
		Pass	Fail	N/A	
1	SATA storage and CF information should correct during POST and OS.	☒	☐	☐	
2	SATA ports speed should meet specification. (SATAII max read speed > 150MB/s) (SATAIII max read speed> 300MB/s)	☒	☐	☐	SATA port Read:100MB/s Write:42.3 MB/s
3	eMMC R/W speed should meet specification.	☒	☐	☐	eMMC 16GB Read:282MB/s Write:74MB/s
4		☒	☐	☐	eMMC 8GB Read:253MB/s Write:41MB/s

2.4. Video Function Test

Procedure:

Step1. Connect VGA monitor.
Step2. Install Linux OS to DUT system.
Step3. After installation and boot to Linux OS for test X-windows mode and Text mode.
Step4. Check EDID function if kernel supported.

Test result:

No.	Test item		Result			Note
			Pass	Fail	N/A	
1	Display shouldn't loss during OS installation.	VGA	☐	☐	☒	
		HDMI	☒	☐	☐	
2	Display shouldn't flicker during POST and OS.	VGA	☐	☐	☒	
		HDMI	☒	☐	☐	
3	VGA should display normal with x-window and text mode.		☐	☐	☒	
4	HDMI should display normal with x-window and text mode.		☒	☐	☐	HDMI Audio passed

5.	VGA EDID should function properly	☐	☐	☒	
6	HDMI EDID should function properly	☒	☐	☐	

2.5 Console Function Test

Procedure:

Step1. Execute “Hyper-Terminal” in HOST PC.
Step2. Boot up DUT system and press ESC key of HOST keyboard to boot into BIOS manual.
Step3. To check HOST keyboard can control properly in BIOS manual.
Step4. DUT boot to UEFI shell (USB flash) and check console redirection work properly.
Step5. Under Linux OS, install minicom AP and check console transmission.

Test Result:

No.	Test item	Result			Note
		Pass	Fail	N/A	
1	Console support BIOS display and control.	☒	☐	☐	Test with 9600/38400/115200
2	Console support UEFI shell display and command typing.	☒	☐	☐	Test with 9600/38400/115200
3	Under Linux OS, console support minicom transmission.	☒	☐	☐	Test with 9600/38400/115200 ttyS0

2.6 USB ports Function Test

2.6.1 USB basic function test

Procedure:

Step1. Connect USB keyboard and check it works properly under BIOS/DOS/Linux.
Step2. Connect USB DVD ROM, check system can boot from USB DVD ROM and USB DVD ROM can work properly under Linux OS.
Step3. Connect USB2.0/3.0 Flash, check system can boot from USB flash and USB flash can work properly under Linux OS.
Step4. Check USB2.0/3.0 flash read speed can meet the Flash specification.
<Read command#: hdparm -t /dev/sdaX>

Test Result:

No.	Test item	Result			Note
		Pass	Fail	N/A	
1	Boot from USB DVD ROM and drive should work properly.	☒	☐	☐	USB1/2
2	USB 1.1 / 2.0 /3.0 devices (Flash, keyboard, mouse, DVD ROM) can work properly on USB 3.0 ports.	☒	☐	☐	USB1/2
3	USB2.0 R/W speed should meet specification.	☐	☐	☒	
4	USB3.0 R/W speed should meet specification.	☒	☐	☐	USB1/2 Read:104 MB/s Write: 67MB/s

2.6.2 USB compatibility test

Procedure:

Step1. Insert USB device to USB2.0 / 3.0 ports.
Step2. Test each USB device function.

Test Result

Test Item		Result			Note
		Pass	Fail	N/A	
USB devices function should work properly.					
keyboard	Logitech K200	☒	☐	☐	
Mouse	Logitech M-U0003	☒	☐	☐	
DVD ROM	ASUS SBW-06D2X-U	☒	☐	☐	
HUB	Mini 4ports HUB High speed USB2.0	☒	☐	☐	
HDD	Transcend TS500GSJ25D3 USB3.0 500GB	☒	☐	☐	
USB2.0 Flash	Sandisk cruzer 8GB	☒	☐	☐	
	Transcend16GB	☒	☐	☐	
USB3.0 Flash	Kingston Ultimate G2 16GB	☒	☐	☐	
	Transcend 32GB	☒	☐	☐	
	PNY 128GB	☒	☐	☐	

2.7 LED / LCM / Button Function Test

Procedure:

Step1. Check power LED when system power on.
Step2. Check HDD LED blinks when install OS to HDD/CF.
Step3. Check Bypass LED when AAEON Test AP set Bypass status.
Step4. Check Test AP resume are correct which press LCM function button.
(Up/Down/ESC/Enter)
Step5. Check Test AP resume is correct which press program reset button.
SDK: Button <1.#make clean 2# make 3# ./button>
Step6. Check status LED action same with Test AP setting.
Step7. To check Ethernet LED status can follow below methods.
A. Use LAN cable to connect 1GB switch between Server PC and DUT, transmit some packets between Server PC and DUT.
B. Use LAN cable to connect 100MB switch between Server PC and DUT, transmit some packets between Server PC and DUT.
C. Use LAN cable to connect 10MB switch between Server PC and DUT, transmit some packets between Server PC and DUT.

	Speed LED
40GB/s	Color Blue
10GB/s	Color Blue
1GB/s	Color Orange
100MB/s	Color Green
10MB/s	Color Blank

	Link/Act LED
Un-Linked	Blank
Linked	TBD
Transmit	LED Blink

Result:

No.	Test item	Result			Remark
		Pass	Fail	N/A	

1	Power LED should turn on when system power on.	☒	☐	☐	
2	HDD LED should blinks when install OS to HDD and CF.	☒	☐	☐	eMMC is not support HDD LED
3	Bypass LED should turn on when SDK set bypass status.	☐	☐	☒	
4	Status LED color and action should same with SDK setting.	☒	☐	☐	SDK: LED
5	Reset value of SDK should show high when press the program reset button.	☒	☐	☐	Open: show high Press: show low
6	LCM value of SDK should show correct when press LCM function button.	☐	☐	☒	SDK: LCM ./lcm –getkey return ./lcm –lcmon ./lcm –lcmoff ./lcm –set String
7	10G connection LAN LED action as below: Speed LED: Green Link LED: Blue / Blinking	☐	☐	☒	Not support 10G
8	1000M connection LAN LED action as below: Speed LED: Orange Link LED: Green / Blinking	☒	☐	☐	
9	100M connection LAN LED action as below: Speed LED: Green Link LED: Green / Blinking	☒	☐	☐	
10	10M connection LAN LED action as below: Speed LED: blank Link LED: Green / Blinking	☒	☐	☐	

2.8. LAN Function Test

Configuration:

1G switch: D-Link DGS-1210-16
100M switch D-Link DES-1008A
10M HUB SVEC FD916H
100 meters CAT6 cable

Procedure:

Step1. Each LAN port connect DHCP server. ; 10G & 40G LAN port connect to Host PC
Step2. Connect internet and ping Google (8.8.8.8) ; 10G & 40G ping Host PC.
Step3. Each LAN port connect host PXE PC and DUT BIOS enable PXE function.
Step4. BIOS select boot from LAN.
Step5. Test each LAN port WOL function properly which from OS shutdown.
Step6. Client PC to install and execute iperf and host PC execute iperf –s
Step7. Iperf test with 1G, 100M, 10M switch/Hub. ; 10G & 40G iperf test with Host PC.
<#yum install iperf>
<#iperf –c 192.168.3.58 –w 100M –t 60 –i 1>

Test result:

Test item	LAN 1~2 1G			LAN 3~4 1G			Note
	Pass	Fail	N/A	Pass	Fail	N/A	
Internet Browser (DHCP Server) Ping website(8.8.8.8) should work	☒	☐	☐	☒	☐	☐	

properly							
10G / 40G ping Host PC Ping Host PC should work properly	☐	☐	☒	☐	☐	☒	
LAN Boot (PXE) Boot from LAN should work properly	☒	☐	☐	☒	☐	☐	LAN1/2/3/4
Wake On LAN WOL should work properly when resume from S5	☒	☐	☐	☒	☐	☐	
40Gbps connection Iperf test result should not loss and max bandwidth must be in 20Gbps or more.	☐	☐	☒	☐	☐	☒	
10Gbps connection Iperf test result should not loss and max bandwidth must be in 9Gbps or more.	☐	☐	☒	☐	☐	☒	
1Gbps connection Iperf test result should not loss and max bandwidth must be in 900Mbps or more.	☒	☐	☐	☒	☐	☐	LAN4 With PCIe bridge: 808 Mb/s <Pass with deviation> Without PCIe bridge 913 Mb/s
100Mbps connection Iperf test result should not loss and max bandwidth must be in 90Mbps or more.	☒	☐	☐	☒	☐	☐	
10Mbps connection Iperf test result should not loss and max bandwidth must be in 9Mbps or more.	☒	☐	☐	☒	☐	☐	

2.9. TPM2.0 Function Test

Procedure:

Step1. Enable BIOS\TPM device and status.

Step2. $ wget https://drive.google.com/open?id=0B2qBRy2H60mEaF9NTG5tWWVIRzA
<#get eltt2 >

Step3. $ unzip ELTT2_v1.0_Released.zip.

Step4. $ dmesg | grep －i tpm
<#to check if tpm module has been loaded during boot process>

Step5. Do the following command to rebuild the tool:
a. $ cd ./eltt2/eltt2/
b. $ make clean
c. $ make

Step6. $ sudo ./eltt2 －g
#to read the tpm information:

Step7. $ ls /dev/tpm*
check if the tpm device has been included in the system devices

Step8. $ sudo ./eltt2 －a 61
encrypt ascii 61 with sha-1 algorithm

Test result:

No.	Test item	Result			Remark
		Pass	Fail	N/A	
1	TPM 2.0 information should show correct.	☒	☐	☐	
2	“hash value extracted from tpm response” should show correct.	☒	☐	☐	

2.10. Digital IO Function Test

Procedure:

Step1. Use SDK to set DIO high/low output.
Step2. Use meter to measure DIO output value.

Test result:

No.	Test item	Result			Remark
		Pass	Fail	N/A	
1	DIO ports should be controlled correct by SDK.	☒	☐	☐	

2.11. Jumper and connector Function Test

Configuration:

Procedure:

Step1. Test power button function under BIOS and OS environment.
Step2. Test PS/2 keyboard / mouse under BIOS and OS environment.
Step3. Connect PWB/Reset/HDD LED/PWR LED cable to FP1, check if each function can work properly
Step4. Set keyboard lock jumper to close and check PS/2 keyboard function.
Step5. Set “auto power on” jumper” to enable & disable and test auto power on feature.
Step6. Use meter to measure the CFD voltage.
Step7. Connect IPMI module and open JP3, check if IPMI function can work properly.
Step8. Remove AC cable and CMOS jumper set 2-3 close, check if CMOS all data will be cleaned.

Test result:

No.	Test item		Result			Remark
			Pass	Fail	N/A	
1	Power switch	System on /off under BIOS.	☒	☐	☐	
		System shutdown or suspend when press PWB under OS.	☒	☐	☐	
		System force shutdown when press PWB > 4SEC under OS.	☒	☐	☐	Shutdown behavior will refer to BIOS\AC loss setting.
2	PS/2 Keyboard, mouse.		☐	☐	☒	
3	FP1 1-2 Power Button / 5-6 PWR LED 3-4 Reset / 7-8 PWR LED		☐	☐	☒	

4	FP2 2-4 PS/2 keyboard lock	Close: keyboard should not work.	☐	☐	☒	
5	Auto power 1-2 disable 2-3 enable		☐	☐	☒	Not support
6	CFD voltage 1-2 5V 2-3 3.3V		☐	☐	☒	
7	IPMI PWRBTN close with IPMI Open W/O IPMI		☐	☐	☒	
8	Clear CMOS 1-3 2-4 Normal 3-5 4-6 Clear CMOS		☒	☐	☐	

3. Expansion card and Application Test

3.1. PCI-Express Bear Card Test:

Procedure:

Step1. Connect PCIe bear card and boot into DOS or Windows.

Step2. Execute test command for PCIe MLW test.

OS: UEFI Windows10 Enterprise 64bit or DOS

Test result:

Test Item		Result			Remark
		Pass	Fail	N/A	
Mini PCIe	1.5V, 3.3V, reset power LED check	☒	☐	☐	
	Wake# function	☒	☐	☐	
	PCIe x1 / GEN2	☒	☐	☐	

Remark: GENx by specification supported.

3.2. Mini PCIe Compatibility Test:

Procedure:

Step1. Connect Mini PCIe device and boot into OS.

Step2. Test PCI-e card basic function.

OS: Ubuntu16.04.2 x86_64 kernel 4.10.0-27-generic x86_64

Test result:

Test Item	Result			Remark
	Pass	Fail	N/A	
Function should work properly as below item				
AAEON PER-V09V	☐	☐	☒	Not support Legacy
AAEON PER-C11L Intel 82574 Gigabit LAN card + USB port	☒	☐	☐	
AAEON PER-C41C-A10 4 port RS-232	☒	☐	☐	lspci dmesg |grep ttyS*
AzureWave AW-NB159H 802.11b/g/n RTL8723BE combo module	☒	☐	☐	
AzureWave AW-CB161H 802.11a/b/g/n/ac(PCI-e Wireless+ USB Bluetooth) Realtek RTL8821AE	☒	☐	☐	
Bointec DPE909-AA WIFI	☒	☐	☐	
Quectel UC20 3G Card (USB interface)	☒	☐	☐	
Sierra Wireless AirPrime MC7304 Qualcomm 4G	☒	☐	☐	1. Ping 168.95.1.1 for 1000 clcyes, loss<2 times. 2. Download 1GB file from website.

3.3. Expansion Card Integration Test

Procedure:

Step1. Connect devices to all of expansion slots.

Step2. Install OS.

Step3. Test expansion cards basic function.

OS: Ubuntu16.04.2 kernel:4.10.0-27-generic x86_64

Test Item		Result			Remark
		Pass	Fail	N/A	
OS installation	No error during OS and driver installation	☒	☐	☐	

Expansion function	All of expansion cards should work normal.	☒	☐	☐	

4. Time Accuracy Test

4.1. System Clock & RTC Clock Test

Procedure:

Step1. Check RTC time deviation after 24 hrs at power on status.
Step2. Check RTC time deviation after 24 hrs at power off status.
Step3. Press power button to check system with “beep” sound.
Step4. Run watchdog timer test with last version SDK.
<#./wdt -t 10> to set time for 10sec, 60sec, 255sec

Test Result:
Under Room Temperature: 26 ºC

No.	Test item	Actual		Result			Remark
				Pass	Fail	N/A	
1	RTC Clock in Power On less 2 sec deviation	-2	Sec	☒	☐	☐	
2	RTC Clock in Power Off less 2 sec deviation	+1	Sec	☒	☐	☐	
3	System boot on in 60 sec	8	Sec	☒	☐	☐	
4	Watch dog time in 6+/-10% sec	10.47	Sec	☒	☐	☐	
5	Watch dog time in 60+/-10% sec	61	Sec	☒	☐	☐	
6	Watch dog time in 255+/-10% sec	260	sec	☒	☐	☐	

5. Power Consumption Test

Configuration	
CPU	Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz
Memory	Transcend DDR3L-1600 8GB(SEC 443 BYKO K4B4G0846D)
Storage	Innodisk 3ME3 32GB SATA DOM+ onboard eMMC 16GB
O.S	Ubuntu16.04.2 kernel 4.8.0-36-generic x86_64

5.1. Power Consumption

Test Equipment				
Equipment	Digital Multimeter			
Manufacturer	HOLA			
Model name	DM-1240			
Test Environment				
DC adapter	FSP040-RHAN2 12V3.33A			
USB keyboard /mouse	Microsoft 1366 / 1113			
Power Supply		**P**		**Note**
Full Loading Mode Test AP: Stress Test	+12V	9.6	W	# stress –c 2 (CPU total cores)
Win. Idle mode: Measure the current value when system in windows mode and without running any program	+12V	6.36	W	
S5 mode: Measure the current value when system in S5 mode of windows and without running any	+12V	0.96	W	

5.2. PC Health Status

Procedure:

Step1. Use meter to measure each voltage of H/W monitor supported.
Step2. Use thermometer to measure each Temp of H/W monitor supported.
Step3. Use Tachometer to measure each FAN speed of H/W monitor supported.

Test Result:

H/W monitor	Result			BIOS		Actual		Note
	Pass	Fail	N/A					
(+) Vcore Actual and monitor must be ±5%	☒	☐	☐	1.16	V	1.13	V	
(+) VMEM Actual and monitor must be ±5%	☒	☐	☐	1.36	V	1.36	V	
(+) 12V Actual and monitor must be ±5%	☒	☐	☐	12.24	V	12.1	V	
(+) 5V Actual and monitor must be ±5%	☒	☐	☐	5.02	V	5.02	V	
(+) 5VDual Actual and monitor must be ±5%	☒	☐	☐	5.04	V	5.02	V	
VBAT Actual and monitor must be ±5%	☒	☐	☐	3.26	V	3.1	V	
Chassis FAN Speed	☐	☐	☒		rp		rpm	

Actual and monitor must be ±10%					m			
CPU Temp Actual and monitor must be ±15℃	☒	☐	☐	50	℃	47	℃	
System Temp Actual and monitor must be ±5℃	☒	☐	☐	54	℃	50	℃	

5.3. CMOS Battery Test

Procedure:

Step1. DUT AC loss, use meter to measure voltage of CMOS battery

Step2. Use ammeter to measure current of CMOS battery.

Test Result:

(Calculate result=225mAh/measured current / 365days/24hours)

Check item	Measured Voltage		Measured Current		Calculate Result		Result			Note
							Pass	Fail	N/A	
Battery leakage 1. Voltage should be >3V. 2. Calculated result should be > 5 years.	3.16	V	5	uA	5.1	years	☒	☐	☐	

6. O.S Compatibility Test

6.1. Linux OS Compatibility Test

Procedure:

Step1. Install Linux x86 & x64 serial from USB DVD ROM.
Step2. Install all required driver to system.
Step3. Execute the following command to test LAN basic control.
Step 5.1 Force speed
(1) Execute command “ethtool –s ethx autoneg off speed 1000” ,link cable to confirm speed light is orange
(2) Execute command “ethtool –s ethx autoneg off speed 100” ,link cable to confirm speed light is green
(3) Execute command “ethtool –s ethx autoneg off speed 10” ,link cable to confirm speed light is blank
Step 5.2 ifconfig Ethernet
(1) Execute command “ifdown ethx” close ethernet interface
(2) Execute command “ifup ethx” start ethernet interface
Step 5.3 Jumbo Frame
Setting #ifconfig LAN mtu 9000
Check #ifconfig LAN (mtu will change from 1500 to 9000)
Step 6 Enter ping Google command (ping 8.8.8.8) or HOST PC, test networks function are whether normal
Step.7 Test USB R/W, check USB ports function.
Step.8 Execute “minicom” to test COM ports function.
Step 9 Execute command “init 0” or “shutdown –h” to shutdown system.
Step 10 Execute command “init 6” or “reboot” to reset system.
Step 11 Execute command “systemctl suspend –i” to suspend system.

Test result:

6.1.1 CentOS7 kernel:3.10.0-514.el7.x86_64

Test Item		Result			Note
		Pass	Fail	N/A	
System should not any error during install process.		☒	☐	☐	
System should not error during LAN driver installation.		☒	☐	☐	igb-5.3.5.4.tar.gz
Force speed	LAN connection speed should show 1000Mb when execute command “ ethtool –s ethx autoneg off speed 1000”	☒	☐	☐	
	LAN connection speed should show 100Mb when execute command “ ethtool –s ethx autoneg off speed 100”	☒	☐	☐	
	LAN connection speed should show 10Mb when execute command “ ethtool –s ethx autoneg off speed 10”	☒	☐	☐	
Ifconfig	Ethernet interface should be closed when execute command ““ifdown ethx”	☒	☐	☐	
	Ethernet interface should be started when execute command ““ifup ethx”	☒	☐	☐	
Jumbo	Jumbo function should work properly	☒	☐	☐	
Connected internet and ping	Onboard port1~4	☒	☐	☐	

the website should work properly. (Google: 8.8.8.8)					
USB2.0 /3.0 function should work properly		☒	☐	☐	
COM ports function should work properly.		☒	☐	☐	Console port
Shutdown	System should be shutdown when execute command "init 0"	☒	☐	☐	
Reboot	System should be reset when execute command "init 6"	☒	☐	☐	
suspend	1. System should be suspend when execute command “systemctl suspend –I”. 2. Resume from suspend should work properly	☐	☐	☒	Kernel is not support.

6.1.2 Ubuntu16.04.2 x86_64 kernel 4.8.0-36-generic x86_64

Test Item			Result			Note
			Pass	Fail	N/A	
System should not any error during install process.			☒	☐	☐	
System should not error during LAN driver installation.			☒	☐	☐	igb-5.3.5.12.tar.gz
Force speed	LAN connection speed should show 1000Mb when execute command “ ethtool –s ethx autoneg off speed 1000”		☒	☐	☐	
	LAN connection speed should show 100Mb when execute command “ ethtool –s ethx autoneg off speed 100”		☒	☐	☐	
	LAN connection speed should show 10Mb when execute command “ ethtool –s ethx autoneg off speed 10”		☒	☐	☐	
Ifconfig	Ethernet interface should be closed when execute command ““sudo nmcli networking off”		☒	☐	☐	Ubuntu16.04 is not support ifdown ethx ; ifup ethx command
	Ethernet interface should be started when execute command ““sudo nmcli networking on”		☒	☐	☐	
Jumbo	Jumbo function should work properly		☒	☐	☐	
Connected internet and ping the website should work properly. (Google: 8.8.8.8)		Onboard port1~4	☒	☐	☐	
		NIM module: port 1~8 <NIM-C13B>	☐	☐	☒	
Ping the HOST PC should work properly.		10G NIM module: port 1~4 <NIM-S26C>	☐	☐	☒	
Ping the HOST PC should work properly.		40G NIM module: port 1~2 <NIM-S26B>	☐	☐	☒	
USB2.0 /3.0 function should work properly			☒	☐	☐	USB3.0 x2
COM ports function should work properly.			☒	☐	☐	Console port
Shutdown	System should be shutdown when execute command "init 0"		☒	☐	☐	
Reboot	System should be reset when execute command "init 6"		☒	☐	☐	
Suspend	Suspend and resume function should work normal		☒	☐	☐	

7. BIOS Function Test

Procedure:

Step1. Flash BIOS process will complete and run correctly
Step2. Press Keyboard " DEL" Key into BIOS.
Step3. To ensure the BIOS setting can be controlled correctly.
Step4. Please add or del test item from your test BIOS Version.

Test Result:

7.1. Flash BIOS

Test Item (Following item should work properly)	Result			Note
	Pass	Fail	N/A	
*Execute Go.bat for flash BIOS	☒	☐	☐	
*Press keyboard Del into BIOS setup	☒	☐	☐	

7.2. Advanced Test

Test Item (Following item should work properly)			Result			Note
			Pass	Fail	N/A	
CPU Configuration	CPU info.		☒	☐	☐	
	Virtualization		☒	☐	☐	#sudo apt-get install libvirt-bin #virt-host-validate
	EIST		☒	☐	☐	Default disable, fix on 2.4GHz
Trusted Computing	security device support		☒	☐	☐	Enable Disable
	Clear TPM		☒	☐	☐	
SATA Configuration	SATA info.		☒	☐	☐	
	SATA controller		☒	☐	☐	
USB configuration	Legacy USB support		☒	☐	☐	
SIO configuration	Serial Port 1		☒	☐	☐	
HW Monitor	Temp / voltage Value		☒	☐	☐	
DIO			☒	☐	☐	0~7
Power manager	Power Mode	AT	☒	☐	☐	
		ATX	☒	☐	☐	
	AC power loss	Power on	☒	☐	☐	
		Power off	☒	☐	☐	
		Last state	☒	☐	☐	
	RTC wake system from S5	Fixed Time	☒	☐	☐	
		Dynamic Time	☒	☐	☐	
Status LED	Status LED		☒	☐	☐	LED off/RED on/RED Blink/RED Fast Blink/Green on/Green Blink/Green Fast blink
Serial port console redirection	Enable / disable		☒	☐	☐	
	Baud rate: 9600/38400/115200		☒	☐	☐	

7.3.Chipset Test

Test Item (Following item should work properly)			Result			Note
			Pass	Fail	N/A	
North Bridge	Memory Configuration		☒	☐	☐	
	Graphics Configuration	Primary Display	☒	☐	☐	IGD
		IGFX boot display	☒	☐	☐	HDMI
South Bridge	SCC	Enable/disable	☒	☐	☐	
		HS400	☒	☐	☐	Read/Write: 282/74 MB/s
		HS200	☒	☐	☐	Read/Write: 162/74 MB/s
		DDR50	☒	☐	☐	Read/Write: 101/42 MB/s

7.4. Boot Test

Test Item (Following item should work properly)	Result			Note
	Pass	Fail	N/A	
Quiet Boot	☒	☐	☐	
CSM support	☒	☐	☐	**Enable** / Disable
Launch PXE ROM	☒	☐	☐	Legacy, support LAN1 / 2
Network Stack	☒	☐	☐	UEFI, Support LAN1 ~4
Boot From Hard Disk	☒	☐	☐	
Boot From USB HDD	☒	☐	☐	
Boot From USB CD-ROM	☒	☐	☐	
Boot from LAN	☒	☐	☐	
Disable	☒	☐	☐	

7.5. Clear CMOS and Load Default Test

Test Item (Following item should work properly)		Result			Note
		Pass	Fail	N/A	
Clear CMOS by jumper (under G3 status)		☒	☐	☐	Clear date, time, setting, password
Clear CMOS by remove battery(under G3 status)		☒	☐	☐	Clear date, time, setting, password
Load default	Date, time, password should be kept	☒	☐	☐	
	BIOS setting should be restored to default.	☒	☐	☐	
	Boot option priorities should restore from disable to default.	☒	☐	☐	

7.6. AAEON Tag Check Utility

Test Item	Result	Note

(Following item should work properly)	Pass	Fail	N/A	
Check AAEON BIOS OK	☐	☐	☒	AONCHECK.EXE Not support DOS

7.7. Supervisor / User Password Test

Test Item (Following item should work properly)	Result			Note
	Pass	Fail	N/A	
Administrator Password	☒	☐	☐	
User Password	☒	☐	☐	

7.8. Negative Test

7.8.1 USB Keyboard Negative Test

Methods	Result			Note
	Pass	Fail	N/A	
1. Boot into BIOS setup manual. 2. Press NumLock or ScrLk and press arrow key. 3. confirm arrow key function are normally	☒	☐	☐	

7.8.2 UEFI Mode Negative Test

Methods	Result			Note
	Pass	Fail	N/A	
1. Install Windows with UEFI mode. 2. Clear CMOS. 3. Confirm BIOS\Boot device was not loss “Windows boot manager” and should boot into Windows properly.	☒	☐	☐	

9. Stability Test

9.1. Run in Test

Configuration:

CPU: Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz
RAM: Innodisk DDR3L 1600 8GB SEC K4B4G0846D
Storage: Innodisk 3ME3 32GB SATA DOM / onboard eMMC 8GB
Graphics: Onboard Graphics
OS: Ubuntu16.04.2 Kernel 4.8.0-36-generic x86_64

Procedure:

Step1. Install test AP : Burnintest Linux V3.4.
Step2. Select test item: CPU, RAM, COM, 2D, 3D, Disk, Network / loading select 100%.
.

Test Result:

Test Item			Result			Note
			Pass	Fail	N/A	
Burn In Test Linux V3.4 Duty: 100 Time: over 12 hours <System should not error or hang during testing.>	CPU		☒	☐	☐	
	RAM		☒	☐	☐	
	COM		☒	☐	☐	ttyS0
	2D		☒	☐	☐	
	3D		☒	☐	☐	
	Disk	SATA	☒	☐	☐	
		eMMC	☒	☐	☐	
	Sound		☐	☐	☒	
	Network <default>		☒	☐	☐	

Note: COM PORT Speed Set [cycle to 115200].

9.2. Cold Boot Test

9.2.1 ACPI G3 Cold Boot Test

Configuration:

CPU: Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz
RAM: Onboard LPDDR4 2GB
Storage: Transcend USB3.0 Flash 8GB
Graphics: Onboard Graphics
OS: UEFI

Procedure:

Step1. Set auto power on jumper for enable or set BIOS\restore AC loss for always on.
Step2. Set power on with 90 second and power off with 20 second.
Step3. Run the on/off test over 1000 cycles to test system boot up stability at room temp.
Step4. Set H/W auto power on.
Step5. Set power on with 60 second and power off with 5 second.
Step6. Run the on/off test over 20 cycles to test system AC power restored in short time

Test Result:

Test item	Result			Note
	Pass	Fail	N/A	

AC loss cold boot over 1000 cycles <loss rate: 0 /1000 times>	☒	☐	☐	☐Jumper set auto power button ☒BIOS select " power on"
G3(AC loss) cold boot over 20 cycles Setting: Power on- 60sec ; Power off- 5sec. <loss rate: 0 /20 times>	☐	☐	☒	☒Jumper set auto power button

9.2.2 Power Button Cold Boot Test

Configuration:

CPU: Intel® Celeron® Processor N3350 2M Cache, up to 2.4 GHz
RAM: Onboard LPDDR4 2GB
Storage: Transcend USB3.0 Flash 8GB
Graphics: Onboard Graphics
OS: UEFI

Procedure:

Step1. Set auto power on jumper for disable.
Step2. Set each ON/OFF cycle with 180 second.
Step3. Run the power button on/off test over 500 cycles to test system boot up stability at room temp.

Test Result:

Test item	Result			Note
	Pass	Fail	N/A	
Power button boot over 500 cycles <loss rate: 0 /500 times>	☒	☐	☐	

9.3. Memory Test

Configuration:
OS: UEFI
Tool: Passmark Memtest version7.4 UEFI
Memory information: Onboard LPDDR4 1GB
Onboard LPDDR4 2GB
Transcend DDR3L-1600 8GB(SEC 443 BYKO K4B4G0846D).

Test item	Result			Note
	Pass	Fail	N/A	
Memory Test for 3 loops. < Memtest result should not error or hang..>	☒	☐	☐	

10. Mechanism Construction Test

10.1. Mechanism construction check

Procedure:
Step1. Insert NIM, CF and expansion card.
Step2. Check the symbol of front and rear I/O

Test result:

No.	Test item	Result			Remark
		Pass	Fail	N/A	
1	System case shouldn't interfere with assembly	☒	☐	☐	
2	NIM slot shouldn't interfere with assembly	☐	☐	☒	
3	CF slot shouldn't interfere with assembly	☐	☐	☒	
4	Expansion slot shouldn't interfere with assembly	☒	☐	☐	
5	I/O symbol should correct.	☒	☐	☐	

11. 1G LAN Performance Test

11.1. DUT and Test Equipment

11.1.1. DUT Specification

Hardware:

- Model name: FWS-2272 (FWB-2272 A1.0)
- CPU: Intel Celeron N3350 1.1GHz (BIOS fix on 2.4GHz)
- RAM: Onboard LPDDR4 2GB
- HDD: Innodisk SSD 3MG2-P 32GB

Software:

- BIOS: FWS-2272 R0.5 (K272AM05)
- Operating System: CentOS7 kernel 3.10.0-229.el7.x86_64
- LAN driver: igb5.3.2 Intel Gigabit Ethernet Network Driver

11.1.2. Test Equipment Specification

SPIRENT Smartbits

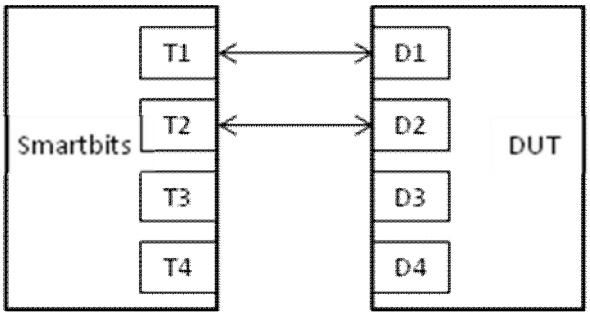
- Chassis: SPIRENT Smartbits 600B
- Chassis Version: 2.80.003 (Cur) 2.50.000
- Chassis Serial #: 06014047
- Library: 6.00-29
- API: 5.50.42.01
- File: 0550042
- Module: 2 * LAN-3324A SmartMetrics XD 4-Port 10/100/1000Base-T Gigabit Ethernet
- Test Software: SmartFlow5.50.42.1

11.2. RFC-2544 performance test (2 port)

11.2.1. Throughput test (2 port)

Test Description:

1. In DUT System, set routing function enabled.
   <# echo 1 > /proc/sys/net/ipv4/ip_forward>
2. Test Configuration as below Figure.

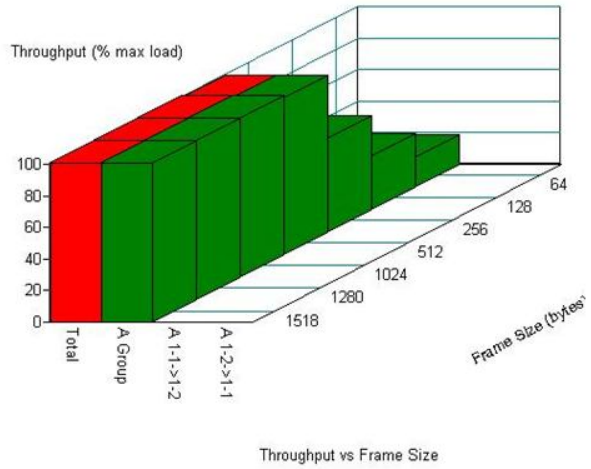


3. Smartflow\Test Group to add port1<->port2 with Bi-directional,
4. The tester set loading traffic from 1% to 100% and the traffic step is 50%.
5. Interaction Constants Duration Time Set to 60 Sec.
6. Test all LAN ports performance.

Test Result:

Test Group: <LAN1-LAN2 bi-directional>

Speed: 1000_Full	Frame Size(bytes)						
LAN ports	64	128	256	512	1024	1280	1518
1-2	18.79	33.48	59.01	99.23	100.00	100.00	100.00
3-4	17.24	30.39	54.37	86.08	96.91	100.00	100.00



Throughput vs Frame Size

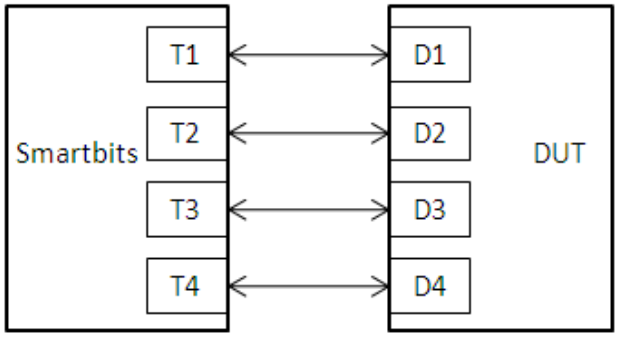
Name/Framesize	64	128	256	512	1024	1280	1518
Total	18.7890625	33.484375	59.0078125	99.2265625	100	100	100
A Group	18.7890625	33.484375	59.0078125	99.2265625	100	100	100
A 1-1->1-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A 1-2->1-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11.3. RFC-2544 performance test (4 ports)

11.3.1. Throughput test

Test Description:

1. In DUT System, set routing function enabled.
   <# echo 1 > /proc/sys/net/ipv4/ip_forward>
2. Test Configuration as below Figure.

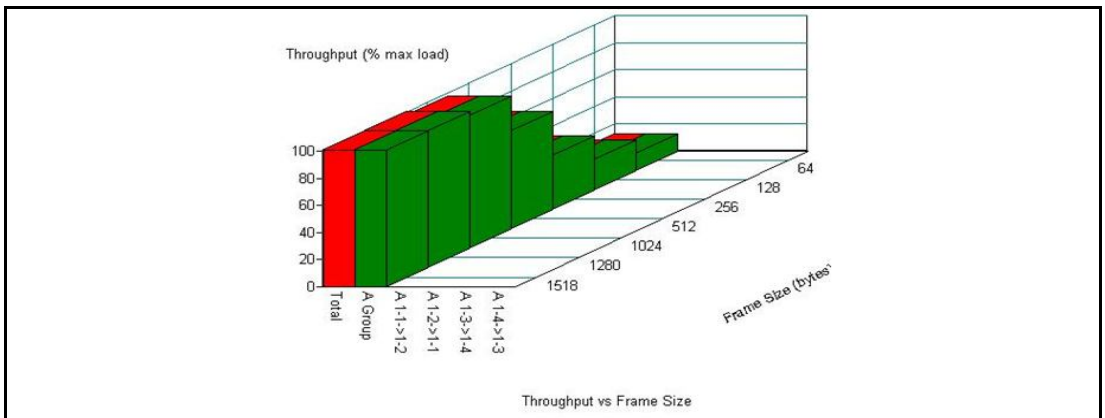


3. Smartflow\Test Group to add port1<->port2 with Bi-directional, port3<->port4 with Bi-directional.
4. The tester set loading traffic from 1% to 100% and the traffic step is 50%.
5. Interaction Constants Duration Time Set to 60 Sec.
6. Test all LAN ports performance.

Test Result:

Test Group: <LAN1-LAN2 bi-directional> ; <LAN3-LAN4 bi-directional>

Speed: 1000_Full	Frame Size(bytes)						
LAN ports	64	128	256	512	1024	1280	1518
1 ~4	12.60	21.88	39.67	72.16	97.68	100.00	100.00



Name/Framesize	64	128	256	512	1024	1280	1518
Total	12.6015625	21.8828125	39.671875	72.15625	97.6796875	100	100
A Group	12.6015625	21.8828125	39.671875	72.15625	97.6796875	100	100
A 1-1->1-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A 1-2->1-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A 1-3->1-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A 1-4->1-3	N/A	N/A	N/A	N/A	N/A	N/A	N/A

11.4. LAN Endurance Test

Configuration:

CPU: Intel Celeron N3350 1.1GHz (BIOS fix on 2.4GHz)
RAM: Onboard LPDDR4 2GB
Storage: Innodisk SSD 3MG2-P 32GB
OS: CentOS7 kernel 3.10.0-229.el7.x86_64
LAN: Intel I211AT x4

Procedure:

Step1. Use SmartBits to test LAN endurance.
Step2. Test Group: <LAN1-LAN2 bi-directional> ; <LAN3-LAN4 bi-directional>
Step3. To set Frame size=1518 / loading=98 / time=43200sec

Test Result:

Test item	Result			Note
	Pass	Fail	N/A	
Onboard LAN1~4 Endurance Test <Test result should not frame loss.>	☒	☐	☐	Pass with deviation

Throughput Detail Report

Summary Report Stray Frames Report Port Errors Report Packet Rate Report

Name	Time	FrameSize	ILoad	TxFrames	RxFrames	LostFrames	Lost (%)	Throughput	Tx fps	Tx L2 bps	Rx fps	Rx L3 bps	Rx L2 bps
Total	07/27/17 08:28:38	1518	98.00000	16057216320	16057216320	0	0.00000	98.00000	318596	3919999794	318596	3823146743	3919999794
A Group	07/27/17 08:28:38	1518	98.00000	16057216320	16057216320	0	0.00000	98.00000	318596	3919999794	318596	3823146743	3919999794
A 1->1->2	07/27/17 08:28:38	1518	98.00000	4014304080	4014304080	0	0.00000	N/A	79649	979999948	79649	955786686	979999948
A 1->2->1	07/27/17 08:28:38	1518	98.00000	4014304080	4014304080	0	0.00000	N/A	79649	979999948	79649	955786686	979999948
A 1->3->1	07/27/17 08:28:38	1518	98.00000	4014304080	4014304080	0	0.00000	N/A	79649	979999948	79649	955786686	979999948
A 1->4->1	07/27/17 08:28:38	1518	98.00000	4014304080	4014304080	0	0.00000	N/A	79649	979999948	79649	955786686	979999948