

GuangDong Telecom Research Institute Data Network Division

Test Report

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Project/Product name: ZTE core router

Module No.: P1280 (ZTE's name for Hyperchip PBR-1280)

Manufacture: ZTE Corp.

Submit Unit: ZTE Corp.

Test based on: ZTE core router test plan

Date of test being conducted: From 2004.4.29 to 2004.5.10

Test environment: Temperature: 22C
Humidity: 60%

Test Conclusion: Refer to the test results. The results are tight to the equipments shown in the topology.

Testers: Wang Subin, Zhu Yongqing, Shao Jun(ZTE) (signature of Shao, Zhu and Wang)

Verified by: Fan Yongbing (signature of Fan) 2005.4.29

Approved by: Xu Jianfeng

This test is a single vendor test of ZXR10 P1280. The test lasted for two weeks, from the equipment entered the lab till all tests were finished. The following items are being tested: POS OC-192, POS OC-48 packets forwarding performance; routing protocols; QoS assurance; MPLS/VPN; traffic engineering; routing protocol stability and reliability, etc. Equipments involved in the tests include ZXR10 P1280 and T128. Refer to detail test cases for network topology being used. Test results are associated with the equipments appear in the network topology of each test case.

(Signature of Wang Subin, Zhu Yongqing and Shao Jun)

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I. Test Environment

1 Test Tools

Test equipments module list:

Test Equipment	Module Name	Qty.
Smartbits 6000/6000B	Single-port OC-48 card	2
RouterTester	Dual-ports OC-48 card	1
	Quad-ports GE card	2
AX4000	Single-port OC-192 card	2
	Single-port GE card	3

SmartBits software module: SmartFlow, SmartWindow, TeraRouting Tester

AX/4000 software module: AX/4000 Controller Software, Router Performance Tester

Router Tester software module: RouterTester QA Robot

2 Major Network Topology

Each test case has its own corresponding topology, refer to each test case. All testing network topologies are listed in the test cases.

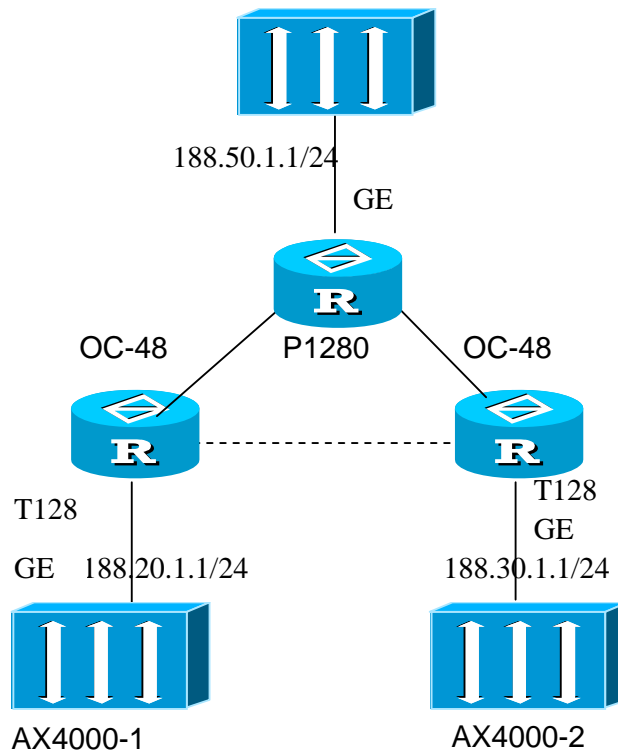


Figure1: Testing Topology

(Signature of Wang, Zhu and Shao)

3 Device Under Test List and Software

Device Under Test: **ZXR10-P1280**

Software version:

Device Name	Configuration	Qty.
ZXR10-P1280	Pos 192	2
	Pos 48	3
	GE	1
	Control Card	3
	Matrix Card	8
ZXR10-T128	Pos 48	3
	GE	2

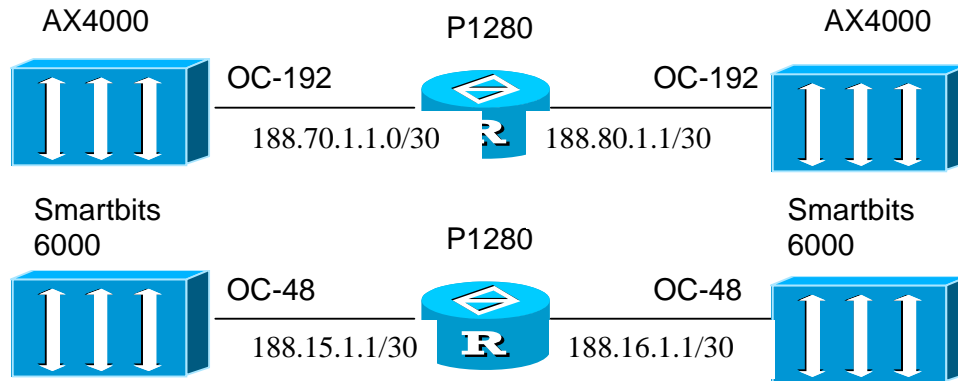
II. Software Version Being Tested

DUT Software Version	
ZXR10-P1280	R11_SI01_16_1H_ZTE_NDO2

III. Contents of Test Cases

1. Port Performance

Testing Network Topology:



1.1 OC192 Port Test

1.1.1 Normal Packet Size Test

Group: Single device test
Item: Core Router Single Port Throughput
Reference: RFC 1242, RFC 2544
Objectives: Measure single port forwarding speed, latency and packet loss rate under different packet size
Steps: <ol style="list-style-type: none"> 1 . Setup the connection as shown in the topology 2 . Configure IP addresses on test equipment and DUT. Configure full duplex. 3 . Generate traffic streams from test equipments using the following packet size, 64byte, 128byte, 256byte, 512byte and 1518byte. 4 . Send these streams, measure forwarding speed, latency and packet loss rate for each packet size. 5 . Send three traffic streams with 3.3G each, measure the out-of-order rate. 6 . Record the testing results.
Expecting result: Achieve the performance target vendor claims
Testing Preparation: DUT, Test equipments
Illustration:

Results :

Packet size	Throughput	Latency (us)	Packet Loss	Out-of-Order
64	100%	19.90	0	0
128	100%	22.89	0	0
256	100%	20.15	0	0
512	100%	19.17	0	0
1518	100%	20.22	0	0

1.1.2 Special Packet Size Test

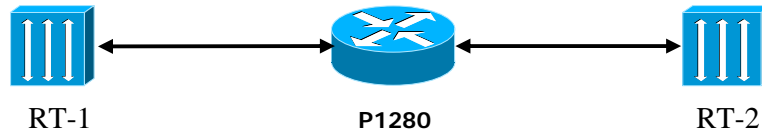
Group: Single device test				
Item: Core Router Single Port Throughput				
Reference: RFC 1242, RFC 2544				
Objectives: Measure single port forwarding speed, latency and packet loss rate under different packet size				
Steps:				
1 . Setup the connection as shown in the topology				
2 . Configure IP addresses on test equipment and DUT. Configure full duplex.				
3 . Generate traffic streams from test equipments using the following packet size, 40byte, 65byte, 129byte, 480byte and 1800byte.				
4 . Send these streams, measure forwarding speed, latency and packet loss rate for each packet size.				
5 . Send three traffic streams with 3.3G each, measure the out-of-order rate.				
6 . Record the testing results.				
Expecting result: Achieve the performance target vendor claims				
Testing Preparation: DUT, Test equipments				
Illustration:				
Results :				
Packet size	Throughput	Latency (us)	Packet Loss	Out-of-Order
40	100%	28.83	0	0
65	100%	24.20	0	0
129	100%	19.17	0	0
480	100%	22.27	0	0
1800	100%	22.22	0	0

9. Unique Feature Test

9.1 Chassis Scalability Test

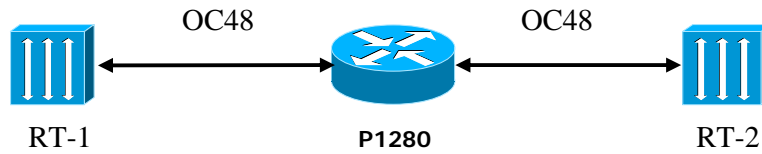
Group: Scalability test
Item: Chassis scalability test
Reference:
Objectives: Verify the router's scalability
Steps: Scale two single chassis into one chassis, per the following steps: <ol style="list-style-type: none"> 1. Connect the OIMs on two chassis with fibers 2. Insert two control cards in chassis 0, chassis 1 does not have control card 3. Insert one OC-48 line card in chassis 0 and one in chassis 1. Configure the interfaces. 4. Send traffic streams from test equipments go through two OC48 line cards. Examine the packet statistics information 5. Verify the configuration of the chassis
Expecting result: <ol style="list-style-type: none"> 1. Can achieve line rate forwarding performance between chassis. 2. Configuration shows the Pos48 cards are in chassis 0 and chassis 1 (interface numbering scheme m/n/p, and m is chassis number.)
Testing Preparation: DUT running ok, Router Testers as routing simulator and traffic generator
Illustration: Can scale up to 8 chassis without separate switching chassis. Can scale up to 64K ports with switching chassis. The total switching capacity is proportional to the number of chassis.
Results: Can achieve line rate forwarding performance Configuration shows the Pos48 cards are in chassis 0 and chassis 1.

9.2 Software Module Resiliency Test



Group: Scalability test
Item: Put active ISIS, OSPF, BGP and RTM on different control cards, so that can sufficiently utilize the control card processing capability.
Reference:
Objectives: Verify active ISIS, OSPF, BGP and RTM can be established on different control cards, so that can sufficiently utilize the control card processing capability.
Steps: <ol style="list-style-type: none"> 1. Configure active ISIS on control card 1, backup on control card 2 and establish adjacencies with RTs. 2. Configure multiple BGP peers on different control cards and establish neighbors with RTs. 3. Configure active OSPF on control card 2, backup on control card 1 and establish adjacencies with RTs. 4. Configure active RTM on control card 1, backup on control card 2.
Expecting result: Each routing module runs normally on multiple control cards, routing table should be correct.
Testing Preparation: DUT running ok, Router Testers as routing simulator and traffic generator
Results: Each routing module runs on multiple control cards as configured, routing table is correct.

9.3 Non-stop Packet Forwarding (OSPF)



Group: OSPF
Item: During active and backup OSPF routing module switchover, the adjacencies should not be lost (no forwarding packets loss).
Reference:
Objectives: Verify during the switchover of active and backup OSPF routing module, whether the adjacencies can be maintained, so that to achieve no forwarding packets loss.
Steps: <ol style="list-style-type: none"> 1. Configure OSPF tasks on both control cards, one as active and the other as backup. 2. Configure interface IP addresses on P1280 and test equipments. 3. Configure RT-1 and RT-2 to simulate the adjacencies and generate 1000 routes on each. 4. Configure 1000 traffic streams on each test equipment and the target addresses are the 1000 routes announced from the other side. 5. Do active and backup switchover on P1280. Verify the adjacencies and traffic.
Expecting result: Adjacencies should not be broken and no traffic loss.
Testing Preparation: DUT running ok, Router Testers as routing simulator and traffic generator
Results: Adjacencies maintained and no traffic loss.