

Moonv6 Test Suite
QoS for IPv6
Interoperability Test Suite

Technical Document
Revision 0.2



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MODIFICATION RECORD

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Susumu Yamamoto NTT Corporation

INTRODUCTION

Acronyms

RUT: Router Under Test

DiffServ: Differentiated Services

EF: Expedited Forwarding

AF: Assured Forwarding

REFERENCES

The following documents are referenced in this text:

- K. Nichols, S. Blake, F. Baker, D. Black, Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers, RFC 2474, December 1998.
- J. Heinanen, F. Baker, W. Weiss, J. Wroclawski, Assured Forwarding PHB Group, RFC2597, June, 1999
- V. Jacobson, K. Nichols, K. Poduri, An Expedited Forwarding PHB, RFC2598, June, 1999
- IEEE802.3d, Media Access Control (MAC) Bridge, 1998

GROUP 1: DiffServ

Scope:

These tests are designed to verify conformance with DiffServ code mapping on routers in IPv4 & IPv6 dual stack network.

Overview:

DiffServ routers can classify the certain packets and assign them the value of TOS/Traffic Class field according to their QoS Classes.

Test QoS.1.1: L3 and L4 header Mapping

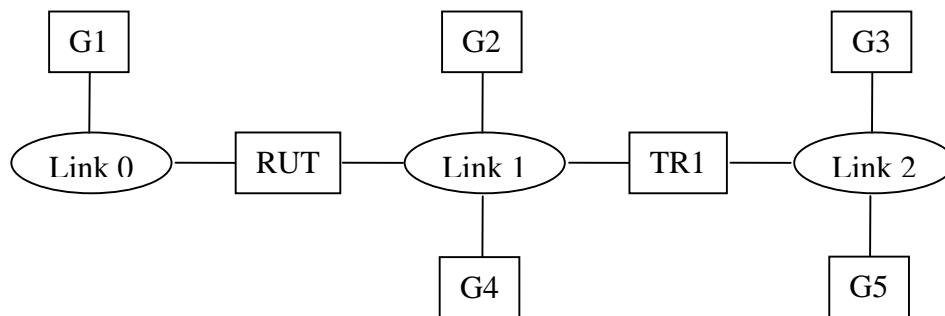
Purpose: To verify that routers mapping behavior based on destination IP or the combination of Source/Destination address and Source/Destination port.

References:

Last Modification: February 22, 2004

Discussion:

Test Setup:



Procedure:

Part A: Destination Mapping

1. Configure the RUT, TR1, G1, G2, G3, G4 and G5 appropriately according to the above setup.
2. Setup 8 streams (IPv4 and IPv6 dual stack) of traffic (Class-Av4/6, Bv4/6, Cv4/6, Dv4/6) at G1 having same source IP address and destined for G2, G3, G4 and G5 respectively as follows;
 - a. Class-Av4 & Av6: From G1 to G2
 - b. Class-Bv4 & Bv6: From G1 to G3
 - c. Class-Cv4 & Cv6: From G1 to G4
 - d. Class-Dv4 & Dv6: From G1 to G5
3. Setup the RUT such that it maps the traffic streams as follows;
 - a. Class-Av4/6 → DSCP 000000 (Best Effort)
 - b. Class-Bv4/6 → DSCP 001010 (AF11)
 - c. Class-Cv4/6 → DSCP 010010 (AF21)
 - d. Class-Dv4/6 → DSCP 101110 (EF)
4. Start transmitting all traffic streams.
5. Observe the mapping at the RUT.

Part B: Source/Destination address and Source/Destination port Mapping

6. Configure the RUT, TR1, G1, G2, G3, G4 and G5 appropriately according to the above setup.
7. Setup 4 streams of traffic (Class-Av4/6, Bv4/6, Cv4/6, Dv4/6) at G1 having same source IP address and destined for G2, G3, G4 and G5 respectively as follows;

- a. Class-Av4 & Av6: From G1 to G3, Application: streaming 1
 - b. Class-Bv4 & Bv6: From G1 to G3, Application: streaming 2
 - c. Class-Cv4 & Cv6: From G1 to G3, Application: FTP
 - d. Class-Dv4 & Dv6: From G1 to G3, Application: WWW or e-mail
8. setup the RUT such that it maps the traffic streams as follows;
 - a. Class-Av4/6 → DSCP 000000 (Best Effort)
 - b. Class-Bv4/6 → DSCP 001010 (AF11)
 - c. Class-Cv4/6 → DSCP 010010 (AF21)
 - d. Class-Dv4/6 → DSCP 101110 (EF)
 9. Start transmitting all traffic streams.
 10. Observe the mapping at the RUT.

Observable Results:

- In Part A, check for the packet stream mapping on destination IP address into correct DSCP value.
- In Part B, check for the packet stream mapping on the combination of source/destination IP address and source/destination port into correct DSCP value.

Possible Problems: None

Test QoS.1.2: DSCP Mapping

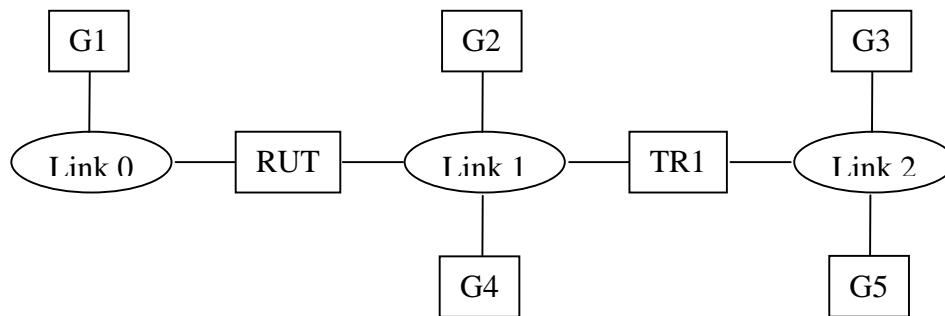
Purpose: To verify that routers mapping behavior based on DSCP code.

References:

Last Modification: February 22, 2004

Discussion:

Test Setup:



Procedure:

1. Configure the RUT, TR1, G1, G2, G3, G4 and G5 appropriately according to the above setup.
2. Setup 8 streams (IPv4 and IPv6 dual stack) of traffic (Class-Av4/6, Bv4/6, Cv4/6, Dv4/6) at G1 having DSCP code and destined for G2, G3, G4 and G5 respectively as follows;
 - a. Class-Av4 & Av6: From G1 to G2, DSCP 000000 (Best Effort)
 - b. Class-Bv4 & Bv6: From G1 to G3, DSCP 001010 (AF11)
 - c. Class-Cv4 & Cv6: From G1 to G4, DSCP 010010 (AF21)
 - d. Class-Dv4 & Dv6: From G1 to G5, DSCP 101110 (EF)
3. Setup the RUT such that it maps the traffic streams as follows;
 - e. Class-Av4/6 (000000) → DSCP 101110 (EF)
 - f. Class-Bv4/6 (001010) → DSCP 000000 (Best Effort)
 - g. Class-Cv4/6 (010010) → DSCP 001010 (AF11)
 - h. Class-Dv4/6 (101110) → DSCP 000000 (Best Effort)
4. Start transmitting all traffic streams.
5. Observe the mapping at the RUT.

Observable Results:

- Check for the packet stream mapping on diffserv DSCP code into correct DSCP value.

Possible Problems: None

Test QoS.1.3: User Priority Bit (VLAN) Mapping <optional>

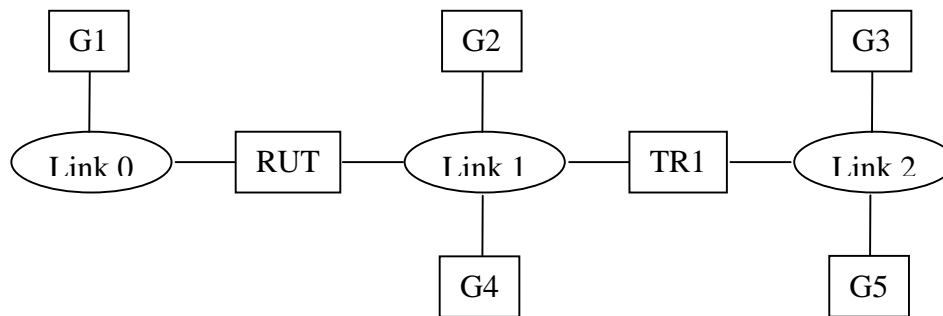
Purpose: To verify that routers mapping behavior based on User Priority Bit code.

References:

Last Modification: February 22, 2004

Discussion:

Test Setup:



Procedure:

1. Configure the RUT, TR1, G1, G2, G3, G4 and G5 appropriately according to the above setup.
2. Setup 8 streams (IPv4 and IPv6 dual stack) of traffic (Class-Av4/6, Bv4/6, Cv4/6, Dv4/6) at G1 having DSCP code and destined for G2, G3, G4 and G5 respectively as follows;
 - a. Class-Av4 & Av6: From G1 to G2, user priority 5
 - b. Class-Bv4 & Bv6: From G1 to G3, user priority 4
 - c. Class-Cv4 & Cv6: From G1 to G4, user priority 3
 - d. Class-Dv4 & Dv6: From G1 to G5, user priority 0
3. Setup the RUT such that it maps the traffic streams as follows;
 - e. Class-Av4/6 (user priority 5) → DSCP 101110 (EF)
 - f. Class-Bv4/6 (user priority 4) → DSCP 001010 (AF21)
 - g. Class-Cv4/6 (user priority 3) → DSCP 001010 (AF11)
 - h. Class-Dv4/6 (user priority 0) → DSCP 000000 (Best Effort)
4. Start transmitting all traffic streams.
5. Observe the mapping at the RUT.

Observable Results:

- Check for the packet stream mapping on User Priority bit code on VLAN header into correct DSCP value.

Possible Problems: This test could be verified on only Ethernet.

GROUP 2: QoS traffic

Scope:

These tests are designed to verify the function of end-to-end QoS.

Overview:

The routers with QoS function can transmit packets with high priority packets under heavy load.

Test QoS.2.1: Traffic Queuing

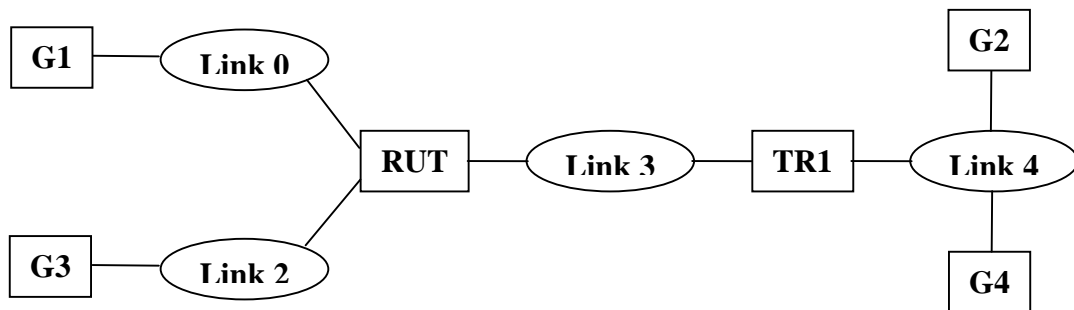
Purpose: To verify that routers can transmit premium packets with priority queuing.

References: [RFC2597]

Last Modification: February 22, 2004

Discussion:

Test Setup:



Procedure:

1. Configure the RUT, TR1, G1, G2, G3 and G4 appropriately according to the above setup.
2. Setup 2 streams of traffic (Class-Av4/v6) at G1 and 2 streams of traffic (Class-Bv4/v6) at G3. They are defined as follows;
 - a. Class-Av4/v6: From G1 to G2, DSCP: 101110 (EF), Application: streaming, Traffic rate: IPv4 and IPv6 streams setup 20%, 20% bandwidth of Link 3 respectively
 - b. Class-Bv4/6: From G3 to G4, DSCP: 000000 (Best Effort): FTP etc., Traffic rate: IPv4 and IPv6 streams setup 35%, 35% of Link 3 respectively
3. Setup the RUT and TR1 such that it maps the traffic streams as follows;
 - a. Class-Av4/v6 → Priority queue
 - b. Class-Bv4/v6 → Best Effort queue
4. Setup transmitting all traffic streams.
5. Observe the image quality of those streams.

Observable Results:

- Check for the image quality of Class-A streams which have no influence against BE traffic.

Possible Problems: None.