



Consumer router IPv6 vs. IPv4 performance test report



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IPv6 vs. IPv4 performance testing



This report summarizes results of IPv6 vs. IPv4 performance measurements on consumer router equipment, type Linksys WRT54GL.

In the face of transitioning to a new generation of Internet Protocol, namely IPv6, we are currently in the phase of testing and trial deployments of IPv6-based networks and products. Much of the available vendor equipment has undergone extensive performance, conformance and functional testing so far, and first results on IPv6 Internet performance show more than satisfactory results. However, there is still some skepticism present, claiming that e2e connectivity provisioning over IPv6 might have considerable issue in home/consumer and services segments. Therefore, further testing is required to prove performance efficiency of IPv6 compared to IPv4 and therewith accelerate its global adoption and appreciation.

This test report gives an insight into router performances over IPv6 versus IPv4 for a popular and widely used consumer router equipment Linksys WRT54GL. Comparative performance testing was completed for identical test system configurations for Case 1: IPv4 configuration and Case 2: IPv6 configuration.



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IPv6 vs. IPv4 performance test specifications



Test equipment specification

Comparative performance testing was completed in the LTFE TestCenter environment under identical conditions for all test cases.

- LTFE TestCenter infrastructure
 - Spirent Test center (STC Application 3.42, HYPERMETRICS CM 10/100/1000 DUAL MEDIA 12-PORTS)
 - HP EliteBook 8730w (Core2Quad Q9000, 4GB, 320GB 7200 rpm, NVIDIA Quadro FX2700M 512 MB GDDR3, Windows 7 x64 Professional)
- Linksys WRT54GL
 - IPv4 on dd-wrt v24 sp2 mini
 - IPv6 on dd-wrt v23 sp2 standard

Test environment setup

- Three test setup cases
 - 1 – 1 router device
 - 10 – 10 router devices
 - 1 – 1 all in one device (gateway or router)
- Two configuration cases
 - Case 1: IPv4 configuration
 - Case 2: IPv6 configuration

Performance test specifications

- Performance test metrics
 - Throughput (RFC 2544)
 - Packet loss percentage (RFC 2544)
 - Average latency (RFC 2544)
- Test configuration
 - Bidirectional traffic generation on peer devices
 - Case 1: IPv4 configuration, Advanced routing: router, Security: firewall disabled
 - Case 2: IPv6 configuration, Advanced routing: router, Security: firewall disabled

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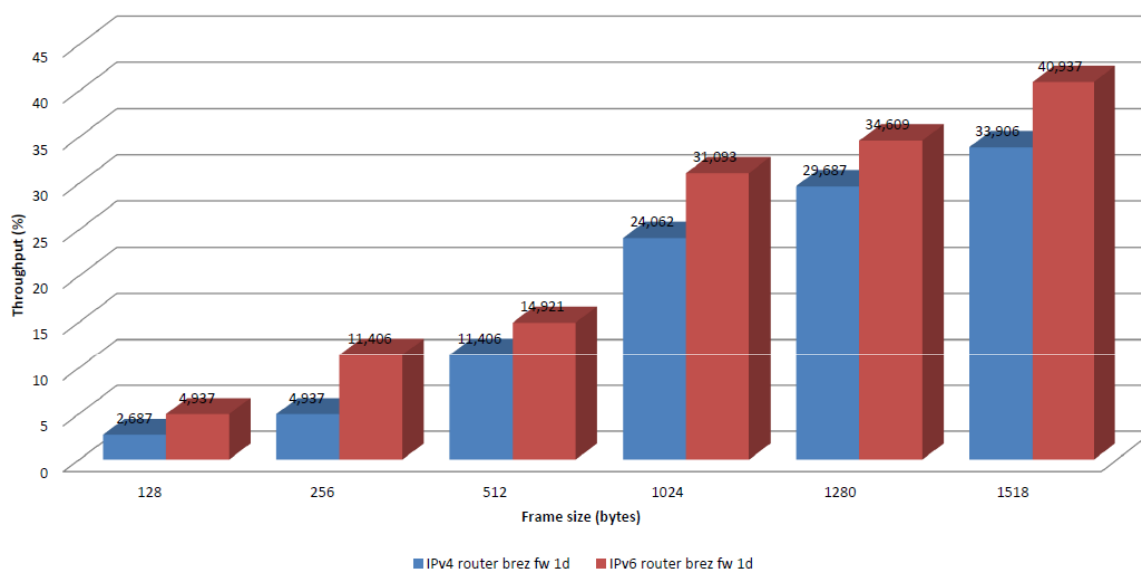
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Performance test results



Throughput IPv4 vs. IPv6

Results on comparative throughput performance over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Throughput
 - 1-1 device
 - Interval: 60s
 - Frame size: 128-1518 bytes
 - Number of tests: 1



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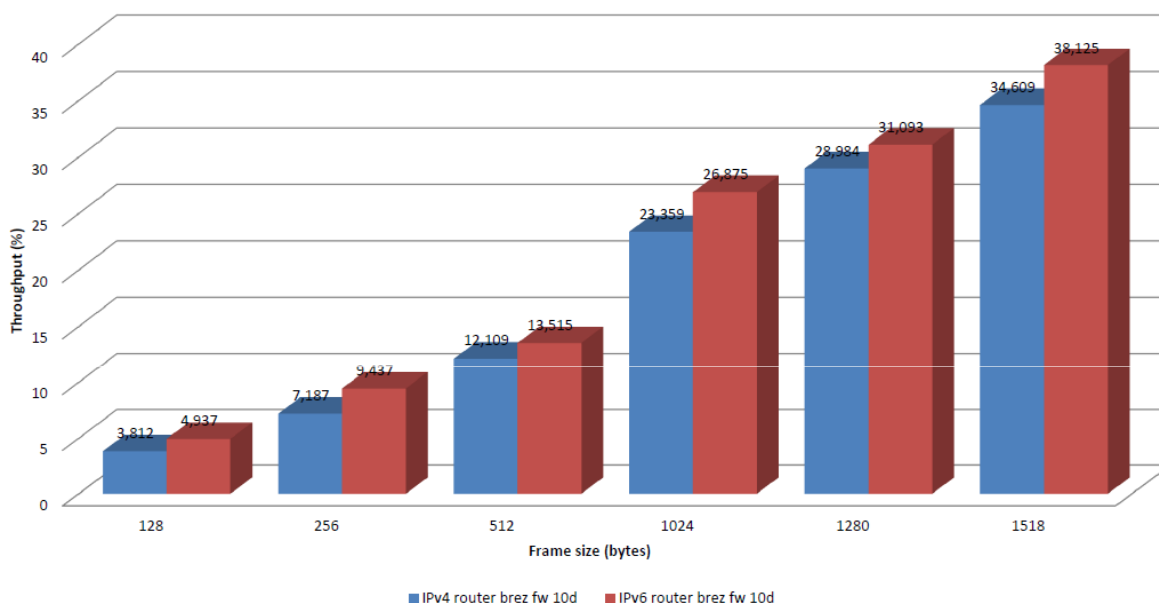
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Performance test results



Throughput IPv4 vs. IPv6

Results on comparative throughput performance over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Throughput
 - 10-10 device
 - Interval: 60s
 - Frame size: 128-1518 bytes
 - Number of tests: 1



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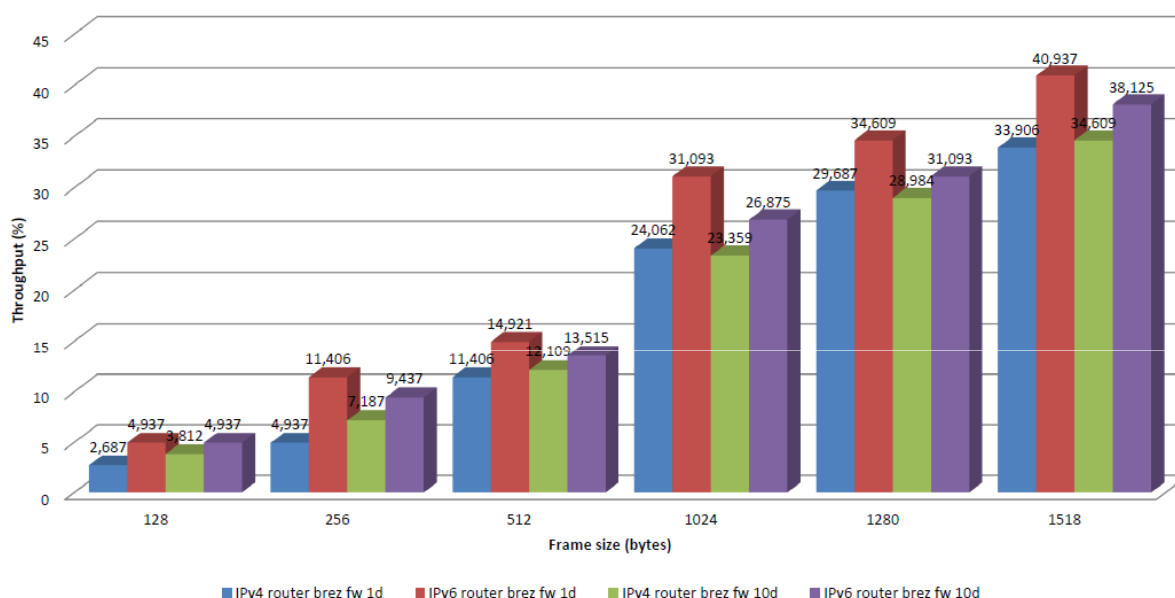
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Performance test results



Throughput IPv4 vs. IPv6

Results on comparative throughput performance over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router or gateway
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Throughput
 - All in 1
 - Interval: 60s
 - Frame size: 128-1518 bytes
 - Number of tests: 1



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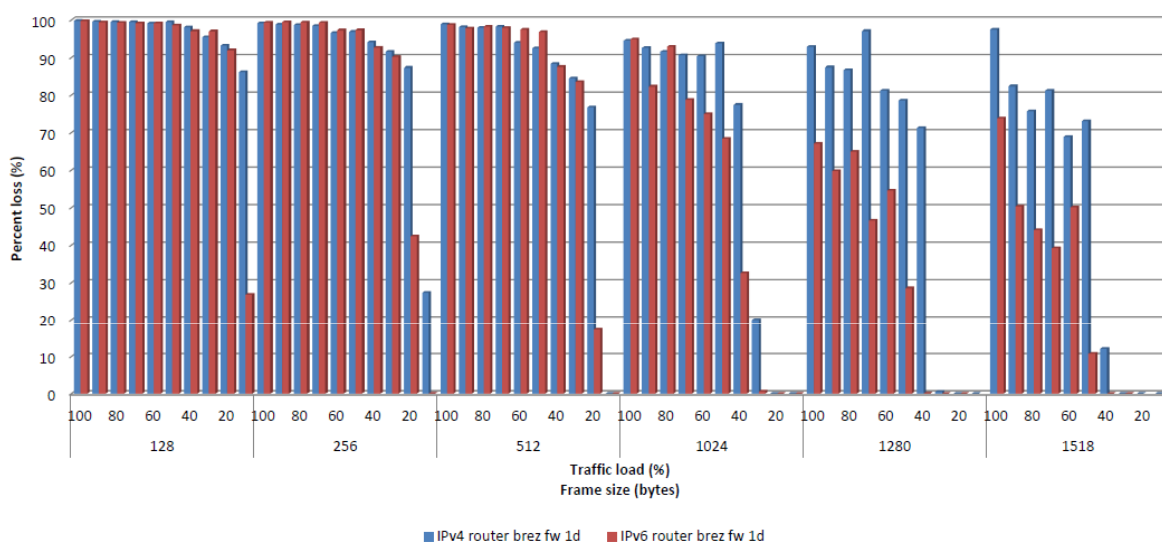
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Performance test results



Packet loss percentage over IPv4 vs. IPv6

Results on comparative packet loss percentage over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Frame loss
 - 1-1 device
 - Interval: 60s
 - Frame size: 128-1518 bytes
 - Number of tests: 1

Results are displayed for load of 100%, 90%, 20% and 10% theoretical port capacity.

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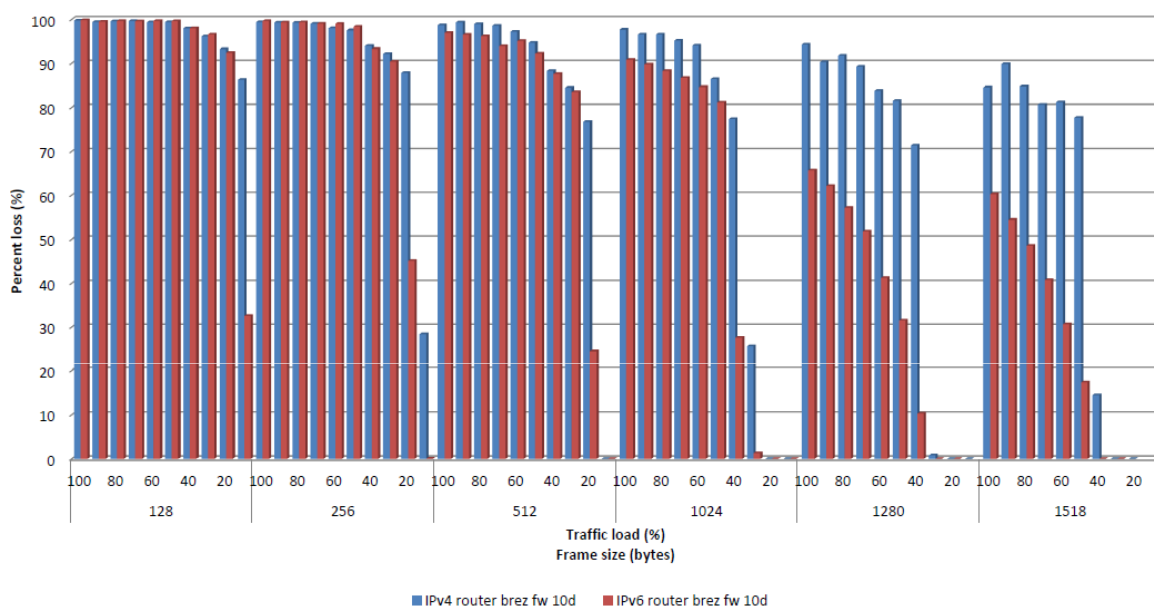
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Performance test results



Packet loss percentage over IPv4 vs. IPv6

Results on comparative packet loss percentage over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Frame loss
 - 10-10 device
 - Interval: 60s
 - Frame size: 128-1518 bytes
 - Number of tests: 1

Results are displayed for load of 100%, 90%, 20% and 10% theoretical port capacity.

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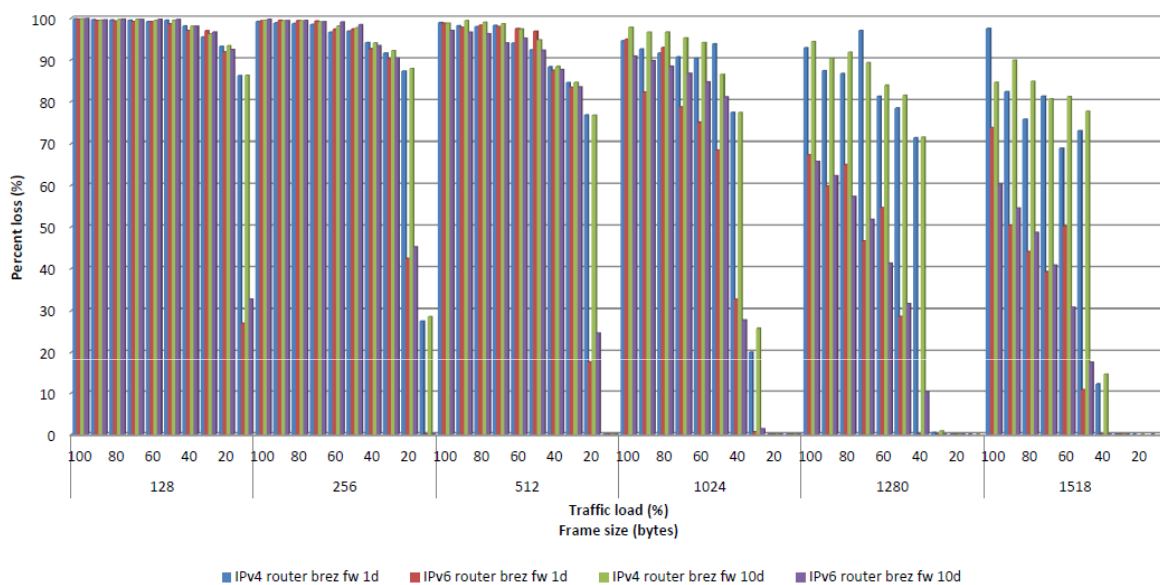
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Performance test results



Packet loss percentage over IPv4 vs. IPv6

Results on comparative packet loss percentage over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Frame loss
 - Interval: 60s
 - All in 1
 - Frame size: 128-1518 bytes
 - Number of tests: 1

Results are displayed for load of 100%, 90%, 20% and 10% theoretical port capacity.

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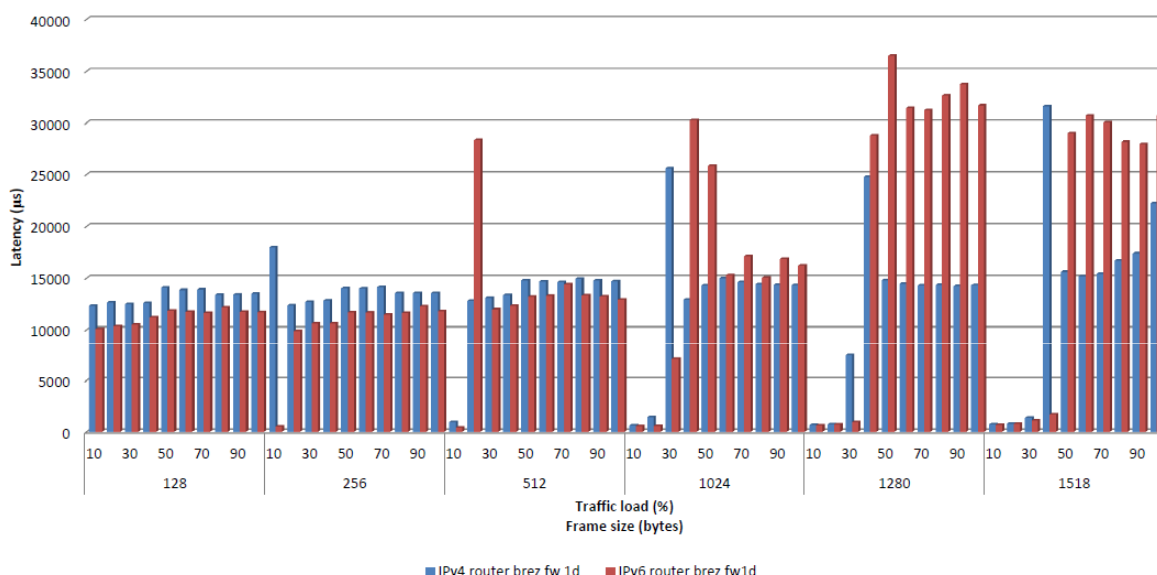
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Performance test results



Average latency over IPv4 vs. IPv6

Results on comparative average latency over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Latency
 - 1-1 device
 - Interval: 60s
 - Frame size: 128-1518 bytes
 - Number of tests: 1



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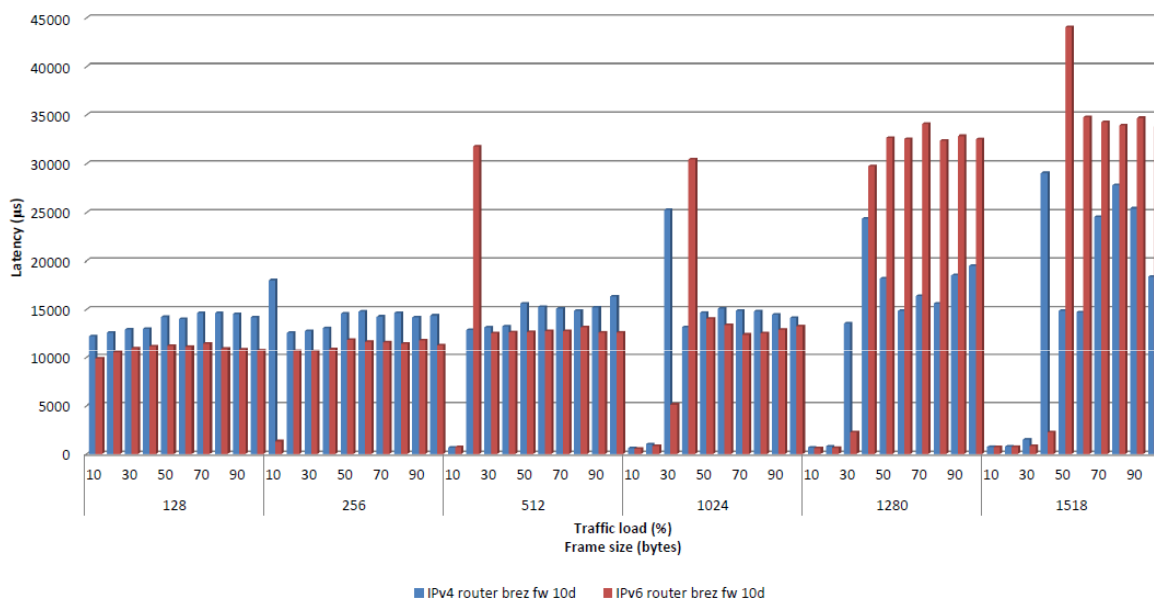
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Performance test results



Average latency over IPv4 vs. IPv6

Results on comparative average latency over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Latency
 - 10-10 device
 - Interval: 60s
 - Frame size: 128-1518 bytes
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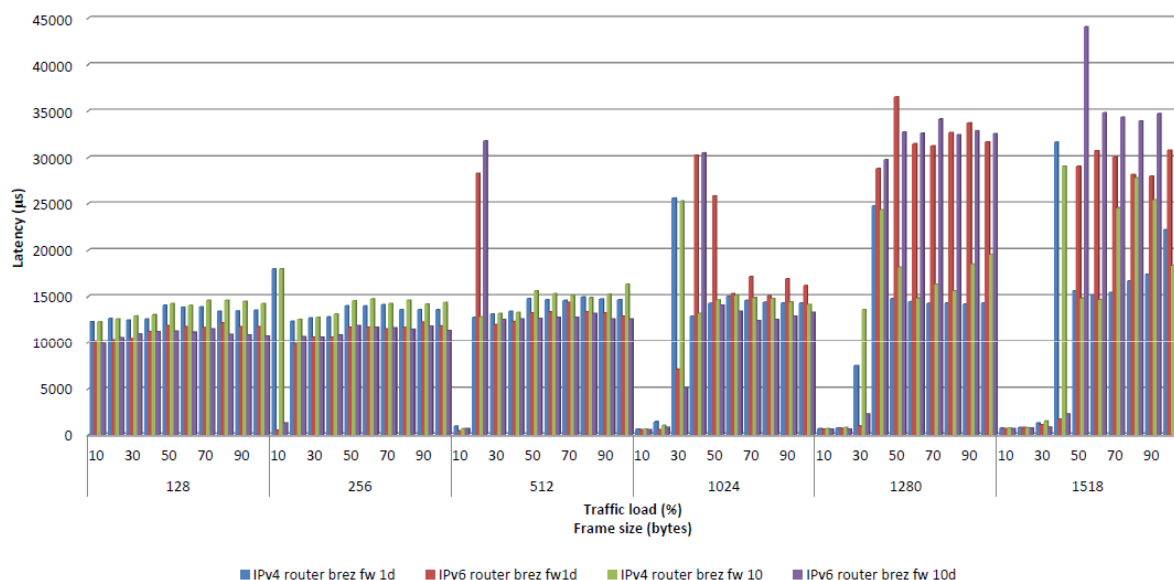
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Performance test results



Average latency over IPv4 vs. IPv6

Results on comparative average latency over IPv6 and IPv4.



Performance test configuration

- Linksys WRT54GL
 - Advanced routing: router
 - Firewall: Security -> Firewall: disable
- STC
 - RFC 2544 Latency
 - All in 1
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Performance test results



Conclusion

In this report, comparative performance test results over IPv6 vs. IPv4 were presented for a popular consumer router equipment Linksys WRT54GL. The presented results show that performances over IPv6 in general exceed performances over IPv4 considering the observed metrics, that is throughput, average latency and packet loss percentage.

Observing closely throughput results, performance is better over IPv6 compared to IPv4 in all cases. The difference in throughput percentage increases with larger frame sizes, while a slight decrease is seen with network growth.

In terms of packet loss percentage, performance is again better over IPv6 compared to IPv4 in all cases. Noticeably improved performance results are for low traffic load percentages.

In terms of latency, IPv6 is more efficient compared to IPv4 for small frame sizes while a slight increase in latency is introduced in the case of large frame sizes. The effect is specifically evident at lower traffic load percentages.



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