Network Working Group
Internet-Draft
Intended status: Informational
Expires: April 9, 2011

A. Morton
AT&T Labs

October 6, 2010

IMIX Genome: Specification of variable packet sizes for additional testing
draft-morton-bmwg-imix-genome-00

Abstract

Benchmarking Methodologies have always relied on test conditions with constant packet sizes, with the goal of understanding what network device capability has been tested. Constant packets sizes differ significantly from the conditions encountered in operational deployment, and so additional tests are sometimes conducted with a mixture of packet sizes, or "IMIX". The mixture of sizes a networking device will encounter is highly variable and depends on many factors. An IMIX suited for one networking device and deployment will not be appropriate for another. However, the mix of sizes may be known and the tester may be asked to augment the fixed size tests. To address this need, and the additional goal of repeatable test conditions, this draft proposes a way to specify the exact repeating sequence of packet sizes from the usual set of fixed sizes.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at http://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on April 9, 2011.

Table of Contents

1. Introduction 4
1.1. First Draft 4
2. Scope and Goals 4
3. Specification of the IMIX Genome 5
4. Reporting Long or Pseudo-Random Packet Sequences 6
5. Security Considerations 6
6. IANA Considerations 7
7. Acknowledgements 7
8. References 7
8.1. Normative References 7
8.2. Informative References 7
Author's Address 7

1. Introduction

This memo defines a method to unambiguously specify the sequence of packet sizes used in a load test.

Benchmarking Methodologies [RFC2544] have always relied on test conditions with constant packet sizes, with the goal of understanding what network device capability has been tested. Tests with the smallest size stress the header processing capacity, and tests with the largest size stress the overall bit processing capacity. Tests with sizes in-between may determine the transition between these two capacities.

Constant packets sizes differ significantly from the conditions encountered in operational deployment, and so additional tests are sometimes conducted with a mixture of packet sizes. The set of sizes used is often called an Internet Mix, or "IMIX" [Spirent], [IXIA], [Agilent].

The mixture of sizes a networking device will encounter is highly variable and depends on many factors. An IMIX suited for one networking device and deployment will not be appropriate for another. However, the mix of sizes may be known and the tester may be asked to augment the fixed size tests.

To address this need, and the additional goal of repeatable test conditions, this draft proposes a way to specify the exact repeating sequence of packet sizes from the usual set of fixed sizes: the IMIX Genome.

1.1. First Draft

In this first draft, some section are very short or to-be-provided (TBP), and there are several questions identified for further discussion.

2. Scope and Goals

This memo defines a method to unambiguously specify the sequence of packet sizes that have been used in a load test, assuming that a relevant mix of sizes is known to the tester and the length of the repeating sequence is not very long (<30 packets).

The IMIX Genome will allow an exact sequence of packet sizes to be communicated as a single-line name, resolving the current ambiguity with results that simply refer to "IMIX".

While documentation of the exact sequence is ideal, the memo also covers the case where the sequence of sizes is very long or may be generated by a pseudo-random process.

It is a colossal non-goal to standardize one or more versions of the IMIX. This topic has been discussed on many occasions on the bmwg-list[IMIXonList]. The goal is to enable customization with minimal constraints while fostering repeatable testing once the fixed size testing is complete.

3. Specification of the IMIX Genome

The IMIX Genome is specified in the following format:

IMIX - 123456...x

where each number is replaced by the letter corresponding to the packet size of the packet at that position in the sequence. The following table gives the letter encoding for the [RFC2544] standard sizes (64, 128, 256, 512, 1024, 1280, and 1518 bytes).

Size, bytes	Genome Code Letter
64	a
128	b
256	c
512	d
1024	e
1280	f
1518	g
MTU ??	h

For example: a five packet sequence with sizes 64,64,64,1280,1518 would be designated:

IMIX - aaafg

While this approach allows some flexibility, there are also constraints.

- Non-RFC2544 packet sizes would need to be approximated by those available in the table.
- The Genome for very long sequences can become undecipherable by humans.

- o Whether h=MTU is useful/desirable is TBD.

- o Whether more tabulated packet sizes would be useful is TBD.

Some open issues with this format are:

1. Multiple Source-Destination Address Pairs: is the IMIX sequence applicable to each pair, across multiple pairs in sets, or across all pairs?

2. Multiple Tester Ports:is the IMIX sequence applicable to each port, across multiple ports in sets, or across all ports?

4. Reporting Long or Pseudo-Random Packet Sequences

When the IMIX-Genome cannot be used (when the sheer length of the sequence would make the genome unmanageable) or when the sequence is designed to vary within some proportional constraints, a table is necessary.

IP Length	Percentage of Total	Other Length(s)
64	23	82
128	67	146
1000	10	1018

Note that this approach also allows non-standard packet sizes, but trades the short genome specification and ability to specify the exact sequence for other flexibilities.

>>> Specification for psuedo-random size generation here? <<<

5. Security Considerations

Benchmarking activities as described in this memo are limited to technology characterization using controlled stimuli in a laboratory environment, with dedicated address space and the other constraints [RFC2544].

The benchmarking network topology will be an independent test setup and MUST NOT be connected to devices that may forward the test traffic into a production network, or misroute traffic to the test management network.

Further, benchmarking is performed on a "black-box" basis, relying solely on measurements observable external to the DUT/SUT.

Special capabilities SHOULD NOT exist in the DUT/SUT specifically for benchmarking purposes. Any implications for network security arising from the DUT/SUT SHOULD be identical in the lab and in production networks.

6. IANA Considerations

This memo makes no requests of IANA, and hopes that IANA will leave it alone as well.

7. Acknowledgements

8. References

8.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2544] Bradner, S. and J. McQuaid, "Benchmarking Methodology for Network Interconnect Devices", RFC 2544, March 1999.

8.2. Informative References

[Agilent] http://www.ixiacom.com/pdfs/test_plans/agilent_journal_of_internet_test_methodologies.pdf, "The Journal of Internet Test Methodologies", 2007.

[IMIXonList] http://www.ietf.org/mail-archive/web/bmwg/current/msg00691.html, "Discussion on IMIX", 2003.

[IXIA] http://www.ixiacom.com/library/test_plans/display?skey=testing_pppox, "Library: Test Plans", 2010.

[Spirent] http://gospirent.com/whitepaper/IMIX%20Test%20Methodolgy%20Journal.pdf, "Test Methodology Journal: IMIX (Internet Mix) Journal", 2006.

Author's Address

Al Morton
AT&T Labs
200 Laurel Avenue South
Middletown,, NJ 07748
USA

Phone: +1 732 420 1571
Fax: +1 732 368 1192
Email: acmorton@att.com
URI: http://home.comcast.net/~acmacm/