OWAMP (One-Way Active Measurement Protocol)

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Network Performance Workshop

05-Apr-2006

What is it?

OWD or One-Way PING

- A control protocol
- A test protocol
- A sample implementation of both

Why the OWAMP protocol?

- Find problems in the network
  - Congestion usually happens in one direction first…
  - Routing (asymmetric, or just changes)
  - SNMP polling intervals mask high queue levels that active probes can show
- There have been many implementations to do One-Way delay over the years (Surveyor, Ripe…)
  - The problem has been interoperability.
  - http://www.ietf.org/internet-drafts/draft-ietf-ippm-owdp-014.txt

OWAMP Control protocol

- Supports authentication and authorization
- Used to configure tests
  - Endpoint controlled port numbers
  - Extremely configurable send schedule
  - Configurable packet sizes
- Used to start/stop tests
- Used to retrieve results
  - Provisions for dealing with partial session results

OWAMP Test protocol

- Packets can be “open”, “authenticated”, or “encrypted”

Sample Implementation

Applications

- owampd daemon
- owping client

Built upon protocol abstraction library

- Supports one-off applications
- Allows authentication/policy hooks to be incorporated

Functionality (owping client)

- owping client requests OWD tests from an OWAMP server
- Client can be sender or reciever
- Communication can be “open”, “authenticated”, or “encrypted”
- Supports the setup of many tests concurrently
- Supports the buffering of results on the server for later retrieval

Functionality (owampd)

owampd

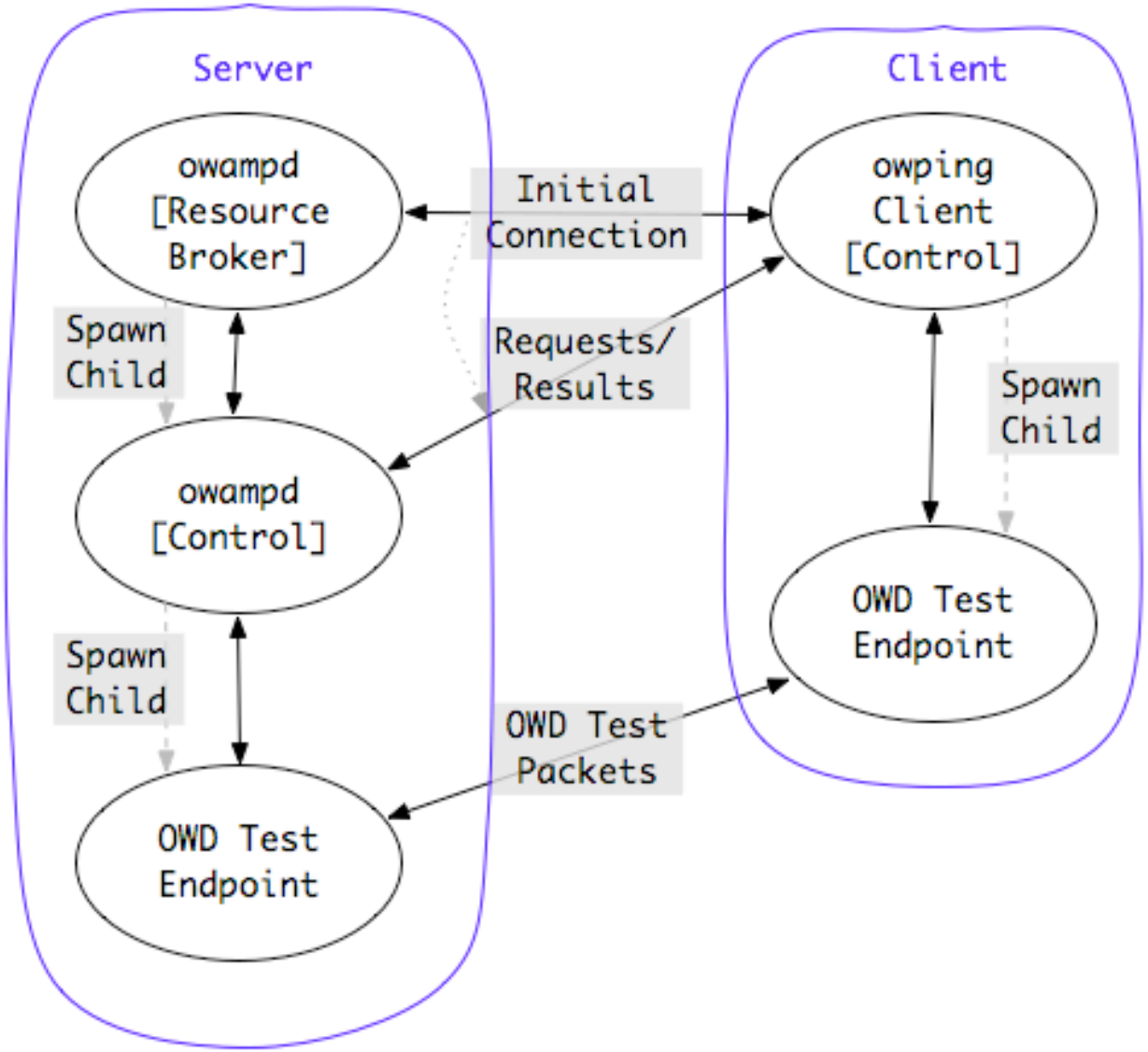
- Accepts requests for OWD tests
- Responds with accepted/denied
- Tests are formally started with a StartSessions message from the client.
- Runs tests
- Sessions with packets received at the server are buffered for later retrieval

Resource Allocation

- Each connection is “classified” (authentication)
- Each classification is associated with a set of hierarchical limits
  - Bandwidth (bandwidth)
  - Session buffer (disk)
  - Data retention (delete_on_fetch)
  - Connection policy (allow_open_mode)

(no time dependent dimension to resource allocation in owampd)

Architecture



General Requirements

- NTP (ntpd) synchronized clock on the local system
  - Specific configuration requirements as specified in NTP talk…
  - Strictly speaking, owamp will work without ntp. However, your results will be meaningless in many cases
- gnumake for build process

Supported Systems

- FreeBSD 4.7+, 5.x, 6.0 (64-bit)
- Linux 2.4, 2.6 (64-bit)
- MacOS X 10.4.5
- Solaris 10.4.5
- (Most recent versions of UNIX should work)

Recommended Hardware

- Stable System Clock
  - Temperature controlled environment
  - No power management of CPU
- No strict requirements for CPU, Memory, Bus speed
  - More tasking schedules will require more capable hardware

Example Hardware

- Intel SCB2 motherboard
  - 2 x 1.266 GHz PIII, 512 KB L2 cache, 133 MHz FSB
  - 2 x 512 MB ECC registered RAM (one/slot to enable interleaving)
  - 2 x Seagate 18 GB SCSI (ST318406LC) Inter Ethernet Pro
  - 10/100+ (i82555) (on-motherboard)

We use these systems to support more than 44 concurrent streams of 10 packets/second

Operational concerns

Time:

- NTP issues predominate the problems
- Determining an accurate timestamp “error” is in many ways more difficult than getting a “very good” timestamp
- Working as an “open” server requires UTC time source (For predefined test peers, other options available)

Firewalls:

- Port filter trade-off
  - Administrators like pre-defined port numbers
  - Vendor manufactures would probably like to “prioritize” test traffic
  - Owampd allows a range of ports to be specified for the reciever

Policy/Security Considerations

- Third-Party DoS source
- DoS target
- Resource consumption
  - Memory (primary and secondary)
  - Network bandwidth

Policy Recommendations

- Restrict overall bandwidth to something relatively small
  - Most OWAMP sessions do not require much
- Limit “open” tests to ensure they do not interfere with precision of other tests

Methodological Errors

Our tests indicate a methodological error of 73 usec *

- Experiments with two systems connected via cross-over cable
- Two concurrent sessions (send,recv)
- 10 packets/second
  - Intel SCB2 motherboard
  - 2x512 MB ECC registered RAM
  - Intel PRO/100+ integrated NIC

* 95% confidence level (RFC 2679)

* Error is specific to this hardware/intensity level

* Old version of owamp, should be even better now.

Availability

- Currently available

  http://e2epi.internet2.edu/owamp/

Mail lists:

- owamp-users@internet2.edu
- owamp-announce@internet2.edu

https://mail.internet2.edu/wws/lists/engineering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Precision Related Context Switches