

Network Working Group
Internet-Draft
Updates: [5357](#) (if approved)
Intended status: Standards Track
Expires: October 2, 2010

A. Morton
AT&T Labs
M. Chiba
Cisco Systems
March 31, 2010

Individual Session Control Feature for TWAMP
draft-ietf-ippm-twamp-session-cntrl-05

Abstract

The IETF has completed its work on the core specification of TWAMP - the Two-Way Active Measurement Protocol. This memo describes an OPTIONAL feature for TWAMP, that gives the controlling host the ability to start and stop one or more individual test sessions using Session Identifiers. The base capability of the TWAMP protocol requires all test sessions previously requested and accepted to start and stop at the same time.

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 to IETF in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

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."

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/lid-abstracts.txt>.

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>.

This Internet-Draft will expire on October 2, 2010.

Internet-Draft

TWAMP Session Control

March 2010

Copyright Notice

Copyright (c) 2010 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the BSD License.

This document may contain material from IETF Documents or IETF Contributions published or made publicly available before November 10, 2008. The person(s) controlling the copyright in some of this material may not have granted the IETF Trust the right to allow modifications of such material outside the IETF Standards Process. Without obtaining an adequate license from the person(s) controlling the copyright in such materials, this document may not be modified outside the IETF Standards Process, and derivative works of it may not be created outside the IETF Standards Process, except to format it for publication as an RFC or to translate it into languages other than English.

Internet-Draft

TWAMP Session Control

March 2010

Table of Contents

1.	Introduction	3
2.	Purpose and Scope	3
3.	TWAMP Control Extensions	4
3.1.	Connection Setup with Individual Session Control	4
3.2.	Start-N-Sessions Command with Individual Session Control	5
3.3.	Start-N-Ack Command with Individual Session Control	7
3.4.	Stop-N-Sessions Command with Individual Session Control	9
3.5.	Stop-N-Ack Command with Individual Session Control	10
3.6.	SERVWAIT Timeout Operation	12
3.7.	Additional considerations	12
4.	TWAMP Test with Individual Session Control	13
4.1.	Sender Behavior	13
4.2.	Reflector Behavior	13
5.	Security Considerations	14
6.	IANA Considerations	14
6.1.	Registry Specification	14
6.2.	Registry Management	14
6.3.	Experimental Numbers	15
6.4.	Registry Contents	15
7.	Acknowledgements	16
8.	References	16
8.1.	Normative References	16
8.2.	Informative References	16
	Authors' Addresses	17

1. Introduction

The IETF has completed its work on the core specification of TWAMP - the Two-Way Active Measurement Protocol [[RFC5357](#)]. TWAMP is an extension of the One-way Active Measurement Protocol, OWAMP [[RFC4656](#)]. The TWAMP specification gathered wide review as it approached completion, and the by-products were several recommendations for new features in TWAMP. There are a growing number of TWAMP implementations at present, and wide-spread usage is expected. There are even devices that are designed to test implementations for protocol compliance.

This memo describes an OPTIONAL feature for TWAMP. TWAMP (and OWAMP) start all previously requested and accepted test sessions at once. This feature allows the Control-Client to control individual test sessions on the basis of their Session Identifier (SID). This feature permits a short duration TWAMP test to start (and/or stop) during a longer test. This feature permits a specific diagnostic test to begin if intermediate results indicate that the test is warranted, for example.

This feature requires a Mode bit position assignment and the assignment of two new TWAMP command numbers (for the augmented Start and Stop commands). This feature also specifies a new Stop-ACK Server response, to complete the symmetry of the session stopping process in the same way as the Start-ACK response.

Implementers of this feature may also wish to implement the "Reflect Octets" feature, described in [[I-D.ietf-ippm-twamp-reflect-octets](#)],

once it has been published as an RFC. This feature allows a Control-Client to insert a locally-specified request number into the Request-TW-Session command (in octets originally designated MBZ=Must Be Zero), and a compliant Server will return the request number in its reply (Accept message). The Reflect Octets feature makes multiple simultaneous session requests possible, and supports the operation of many simultaneous test sessions (similar to the goal of this memo).

This memo is intended to be an update to the TWAMP core protocol specified in [[RFC5357](#)]. It is not required to implement the feature described in this memo to claim compliance with [[RFC5357](#)].

Throughout this memo, the bits marked MBZ (Must Be Zero) MUST be set to zero by senders and MUST be ignored by receivers.

[2.](#) Purpose and Scope

The purpose of this memo is to describe an additional OPTIONAL

Morton & Chiba

Expires October 2, 2010

[Page 4]

Internet-Draft

TWAMP Session Control

March 2010

function and feature for TWAMP [[RFC5357](#)].

The scope of the memo is currently limited to specifications of the following features:

1. Extension of the modes of operation through assignment of a new value in the Mode field to communicate feature capability and use,
2. the definitions of augmented start session and stop session commands (with corresponding acknowledgements), and
3. the definition of related procedures for TWAMP entities.

The motivation for this feature is the ability to start and stop individual test sessions at will, using a single TWAMP-control connection.

When the Server and Control-Client have agreed to use the Individual Session Control mode during control connection setup, then the Control-Client, the Server, the Session-Sender, and the Session-Reflector MUST all conform to the requirements of that mode, as

identified below. The original TWAMP-Control Start and Stop commands MUST NOT be used.

3. TWAMP Control Extensions

TWAMP-Control protocol is a derivative of the OWAMP-Control protocol, and provides two-way measurement capability. TWAMP [[RFC5357](#)] uses the Modes Field to identify and select specific communication capabilities, and this field is a recognized extension mechanism. The following sections describe one such extension.

3.1. Connection Setup with Individual Session Control

TWAMP-Control connection establishment follows the procedure defined in [section 3.1 of \[RFC4656\]](#) OWAMP. The Individual Session Control mode requires one new bit position (and value) to identify the ability of the Server/Session-Reflector to start and stop specific sessions (according to their Session Identifier, or SID). This new feature requires an additional TWAMP mode bit assignment as follows:

Value	Description	Reference/Explanation
0	Reserved	
1	Unauthenticated	RFC4656, Section 3.1
2	Authenticated	RFC4656, Section 3.1
4	Encrypted	RFC4656, Section 3.1
8	Unauth. TEST protocol, Auth. CONTROL	RFC5618, Section 3.1

zzz	Individual Session Control	this memo, bit position (Z)

In the original OWAMP mode field, setting bit positions 0, 1 or 2 indicated the security mode of the Control protocol, and the Test protocol inherited the same mode (see [section 4 of \[RFC4656\]](#)). In

the [[RFC5618](#)] memo, bit position (3) allows a different security mode in the Test protocol and uses the unauthenticated test packet format.

If the Server sets the new bit position (bit position Z) in the Server Greeting message to indicate its capabilities, then the Server and Session-Reflector MUST comply with the requirements of this memo to control sessions on an individual basis if desired.

If the Control-Client intends to control sessions on an individual basis (according to the requirements in this memo), it MUST set the mode bit (Z, corresponding to the new mode) in the Setup Response message. This means that:

1. The Control-Client and the Server MUST use the start and stop commands intended for individual session control and the corresponding acknowledgements, as defined in the sections that follow.
2. The Control-Client and the Server MUST NOT use the start and stop commands (2 and 3) and the acknowledgement defined in [[RFC5357](#)].

The Control-Client MUST also set one mode bit to indicate the chosen security mode (currently bits 0, 1, 2, or 3), consistent with the modes offered by the Server. The Control-Client MAY also set Modes bit Z with other features and bit positions (such as the reflect octets feature).

[3.2.](#) Start-N-Sessions Command with Individual Session Control

Having

- o initiated Individual Session Control mode in the Setup Response,
- o requested one or more test sessions, and
- o received affirmative Accept-Session response(s),

a TWAMP Client MAY start the execution of one or more test sessions by sending a Start-N-Sessions message to the Server (note that "N"

with a zero Accept field in the Start-N-Ack response).

All SID fields are constructed as defined in the last paragraph of OWAMP [section 3.5 \[RFC4656\]](#) (and referenced in TWAMP). Note that the SID is assigned by the Server during the session request exchange.

The message is terminated with a single block HMAC, as illustrated above.

The Server MUST respond with one or more Start-N-Ack messages (which SHOULD be sent as quickly as possible). Start-N-Ack messages SHALL have the format defined in the next section.

When using Individual Session Control mode and its Start-N-Ack command as described in the next section, multiple Start-N-Sessions commands MAY be sent without waiting for acknowledgement, and the Start-N-sessions commands MAY arrive in any order.

[3.3.](#) Start-N-Ack Command with Individual Session Control

The Server responds to the Start-N-Sessions command (for one or more specific sessions referenced by their SIDs) with one or more Start-N-Ack commands with Accept fields corresponding to one or more of the SIDs. This allows for the possibility that a Server cannot immediately start one or more the sessions referenced in a particular Start-N-Sessions command, but can start one or more of the sessions.

The format of the message is as follows.

be acknowledged using the same Start-N-Ack message.

For example, say that the Server receives a Start-N-Sessions command for SIDs 1, 2, 3, and 4. The Server determines that the resources for SID=3 are temporarily unavailable. The Server responds with two Start-N-Ack commands with fields as follows:

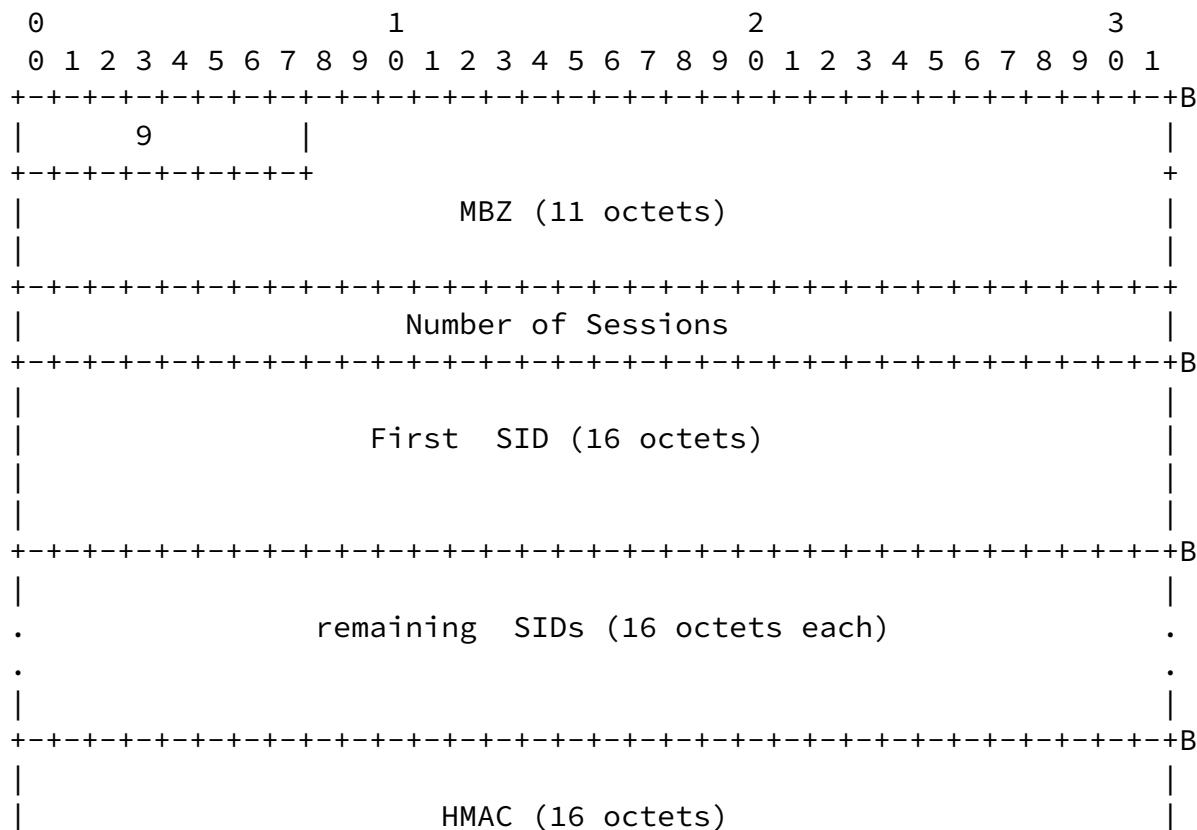
Accept = 0 Number of Sessions = 3 SIDs 1, 2, 4

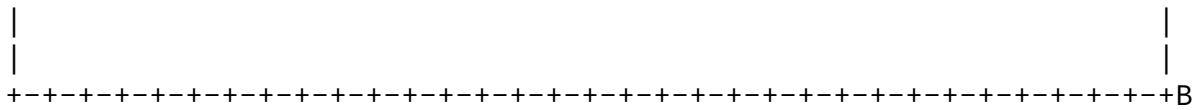
Accept = 5 Number of Sessions = 1 SID 3

3.4. Stop-N-Sessions Command with Individual Session Control

The Stop-N-Sessions command can only be issued by the Control-Client. The command MUST contain at least one SID.

The TWAMP Stop-N-Sessions command for use in Individual Session Control mode is formatted as follows:





The Command Number value of 9 indicates that this is a Stop-N-Sessions command. The Control-Client MUST compose this command, and the Server MUST interpret this command, according to the field descriptions below.

The Number of sessions field indicates the count of sessions that this Stop-N-Sessions command applies to. The SID is as defined in OWAMP (and TWAMP) [section 3.5 \[RFC4656\]](#) and the value must be one or greater. The number of SID fields that follow MUST be equal to the value in the Number of Sessions field.

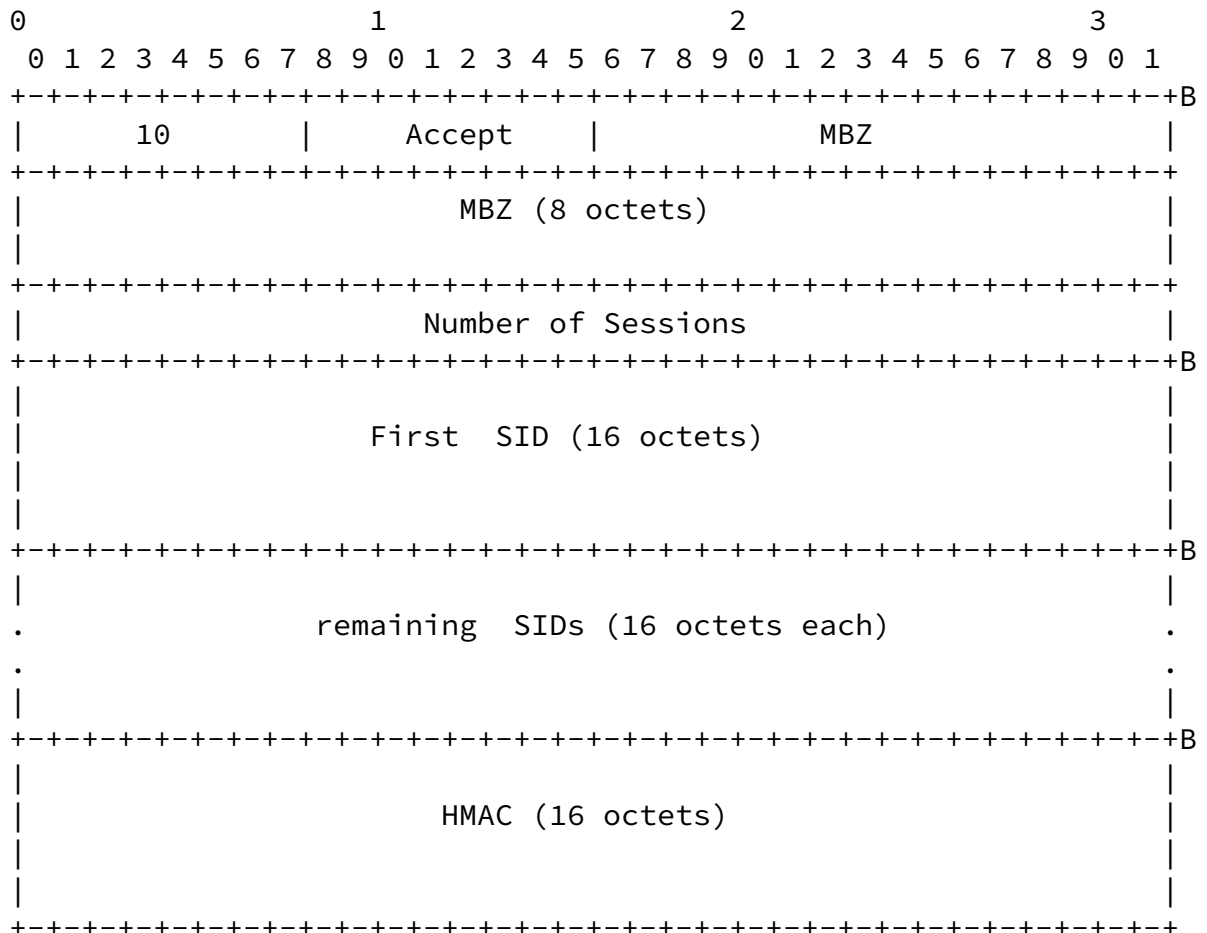
The message is terminated with a single block HMAC, as illustrated above.

The Server MUST respond with one or more Stop-N-Ack messages (which SHOULD be sent as quickly as possible). Stop-N-Ack messages SHALL have the format defined in the next section.

[3.5. Stop-N-Ack Command with Individual Session Control](#)

In response to the Stop-N-Sessions command (for one or more specific sessions referenced by their SIDs), the Server MUST reply with one or more Stop-N-Ack commands with Accept fields corresponding to one or more of the SIDs. This allows for the possibility that a Server cannot immediately stop one or more the sessions referenced in a particular Stop-N-Sessions command, but can stop one or more of the sessions.

The format for the Stop-N-Ack command is as follows:



The Command Number value of 10 indicates that this is a Stop-N-Ack message. The Server MUST compose this command, and the Control-Client MUST interpret this command, according to the field descriptions below.

The Accept Field values are defined in OWAMP [section 3.3 \[RFC4656\]](#).

The Number of Sessions field indicates the count of sessions that this Stop-N-Ack command applies to, and must be one or greater. The number of SID fields that follow MUST be equal to the value in the Number of Sessions field.

All SID fields are constructed as defined in the last paragraph of OWAMP [section 3.5 \[RFC4656\]](#) (and referenced in TWAMP). Note that the SID is assigned by the Server during the session request exchange.

The message is terminated with a single block HMAC, as illustrated above.

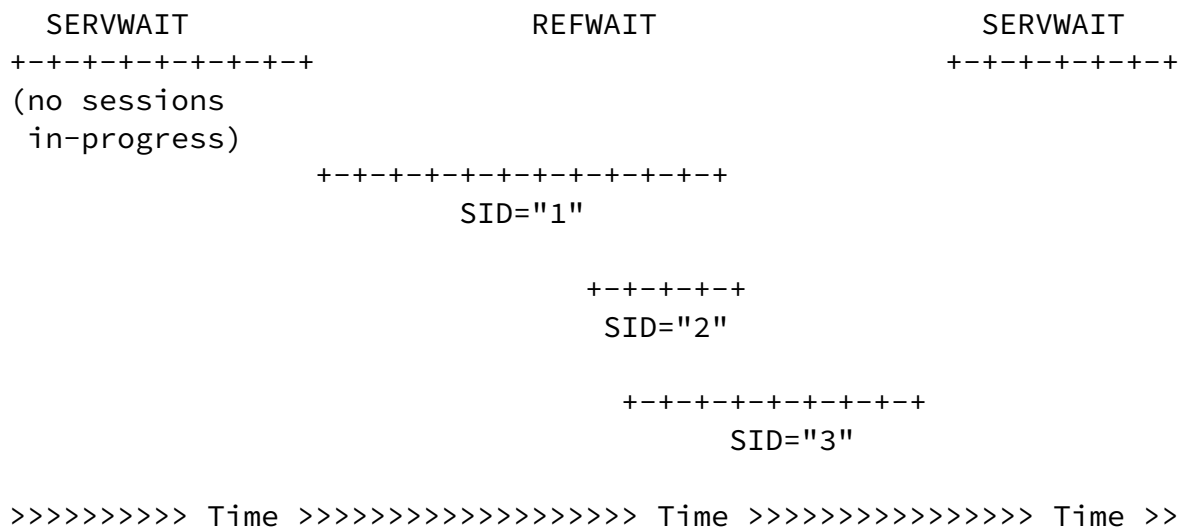
Note that the SIDs for all Sessions with the same 'Accept' code can be acknowledged using the same Stop-N-Ack message.

[3.6.](#) SERVWAIT Timeout Operation

[Section 3.1 of \[RFC5357\]](#) describes the operation of the optional SERVWAIT timer. In normal TWAMP operation, the Server suspends monitoring the SERVWAIT timer while test sessions are in progress. When the Individual Session Control feature is utilized, this suspension is extended to cover the time when ANY test session is in progress.

Thus, the Server SHALL suspend monitoring control connection activity after receiving any Start-N-Sessions command, and after receiving a Stop-N-Sessions command for all corresponding SIDs (and no test sessions are in-progress), OR when REFWAIT expires on ALL test sessions initiated by a TWAMP-Control connection, then the SERVWAIT monitoring SHALL resume (as though a Stop-N-Sessions command had been received). An implementation which supports the SERVWAIT timeout option SHOULD also implement the REFWAIT timeout option.

The diagram below illustrates the operation of timers SERVWAIT and REFWAIT.



3.7. Additional considerations

The value of the Modes field sent by the Server (in the Server Greeting message) is the bit-wise OR of the mode values that it is willing to support during this session.

With the publication of this feature, bit positions 0 through (Z=4) of the Modes 32-bit field are used. A Control-Client MAY ignore bit positions greater than 2 in the Modes Field, or it MAY support OPTIONAL features that are communicated in bit positions 3 and higher. (The unassigned bits are available for future protocol extensions.)

Other ways in which TWAMP extends OWAMP are described in [RFC5357].

4. TWAMP Test with Individual Session Control

The TWAMP test protocol is similar to the OWAMP [RFC4656] test protocol with the exception that the Session-Reflector transmits test packets to the Session-Sender in response to each test packet it receives. TWAMP [RFC5357] defines two different test packet formats, one for packets transmitted by the Session-Sender and one for packets transmitted by the Session-Reflector. As with OWAMP-Test protocol

there are three security modes: unauthenticated, authenticated, and encrypted. Unauthenticated mode has one test packet format, while authenticated and encrypted modes use another (common) format.

4.1. Sender Behavior

The individual session control feature requires that the sender **MUST** manage test sessions according to their SID. Otherwise, the sender behavior is as described in [section 4.1 of \[RFC5357\]](#).

4.2. Reflector Behavior

The TWAMP Reflector follows the procedures and guidelines in [section 4.2 of \[RFC5357\]](#), with the following additional functions required by this feature:

- o The Session-Reflector **MUST** manage all test sessions accepted according to their SID.
- o Upon receipt of a TWAMP-Control Stop-N-Sessions command referencing a specific session/SID, the Session-Reflector **MUST** ignore TWAMP-Test packets (in the same session/SID) that arrive at the current time plus the Timeout (in the Request-TW-Session command and assuming subsequent acknowledgement). The Session-Reflector **MUST NOT** generate a test packet to the Session-Sender for packets that are ignored. (Note: The Request-TW-Session command includes sender address + port and receiver address + port, and this is usually sufficient to distinguish sessions.)
- o If the RECOMMENDED REFWAIT timer is implemented, it **SHOULD** be enforced when any test session is in-progress (started and not stopped).

5. Security Considerations

The security considerations that apply to any active measurement of live networks are relevant here as well. See the security

considerations in [RFC4656] and [[RFC5357](#)].

[6.](#) IANA Considerations

This memo requests assignment of one mode bit position/value to the IANA registry for the TWAMP Mode field, and describes behavior when the new mode is used. This field is a recognized extension mechanism for TWAMP.

This memo also requests assignment of four command numbers in the TWAMP-Control Command Number registry, and describes the use of the new commands. The command number field is a recognized extension mechanism for TWAMP.

[6.1.](#) Registry Specification

IANA has created a TWAMP-Modes registry (as requested in [[RFC5618](#)]). TWAMP-Modes are specified in TWAMP Server Greeting messages and Set-up Response messages, as described in [section 3.1 of \[RFC5357\]](#), consistent with [section 3.1 of \[RFC4656\]](#), and extended by this memo. Modes are indicated by setting bits in the 32-bit Modes field that correspond to values in the Modes registry. For the TWAMP-Modes registry, we expect that new features will be assigned increasing registry values that correspond to single bit positions, unless there is a good reason to do otherwise (more complex encoding than single bit positions may be used in the future, to access the 2^{32} value space).

IANA has also created a TWAMP-Control Command Number registry. TWAMP-Control commands are specified by the first octet in TWAMP-Control messages as specified in [section 3.5 of \[RFC5357\]](#), and augmented by this memo. This registry may contain 256 possible values.

[6.2.](#) Registry Management

Because the TWAMP-Control Command Number registry can contain only 256 values and TWAMP-Modes can only contain thirty-two values, and because TWAMP is an IETF protocol, these registries must be updated only by "IETF Consensus" as specified in [[RFC5226](#)] (an RFC documenting registry use that is approved by the IESG). Management of these registries is described in [section 8.2 of \[RFC5357\]](#) and [[RFC5618](#)].

This memo proposes assignment of values 7, 8, 9 and 10 in the Command number Registry, and a Mode registry value (indicated by "zzz") corresponding to the next available bit position (indicated by "Z") in sections [3.1](#) and [3.7](#) above. Note that the "zzz" and "Z" strings should be replaced by IANA or the RFC Editor when values are assigned.

[6.3.](#) Experimental Numbers

One experimental value has been assigned in the TWAMP-Control Command Number registry.

No additional experimental values are assigned in the TWAMP-Modes registry.

[6.4.](#) Registry Contents

TWAMP-Control Command Number Registry

Value	Description	Semantics Definition
0	Reserved	
1	Forbidden	
2	Start-Sessions	RFC4656, Section 3.7
3	Stop-Sessions	RFC4656, Section 3.8
4	Reserved	
5	Request-TW-Session	RFC5357, Section 3.5
6	Experimentation	RFC5357, Section 8.3

7	Start-N-Sessions	this memo, Section 3.2
8	Start-N-Ack	this memo, Section 3.3
9	Stop-N-Sessions	this memo, Section 3.4
10	Stop-N-Ack	this memo, Section 3.5

TWAMP-Modes Registry

Internet-Draft

TWAMP Session Control

March 2010

Value	Description	Reference/Explanation
0	Reserved	
1	Unauthenticated	RFC4656, Section 3.1
2	Authenticated	RFC4656, Section 3.1
4	Encrypted	RFC4656, Section 3.1
8	Unauth. TEST protocol, Auth. CONTROL	RFC5618, Section 3.1

 zzz Individual Session Control this memo, [Section 3.1](#)
 bit position (Z)

The suggested values are:

The next value corresponding to an unused bit is zzz=16, with Z=4.

[7.](#) Acknowledgements

The authors thank everyone who provided comments on this feature.

[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.
- [RFC4656] Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)", [RFC 4656](#), September 2006.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 5226](#), May 2008.
- [RFC5357] Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)", [RFC 5357](#), October 2008.
- [RFC5618] Morton, A. and K. Hedayat, "Mixed Security Mode for the

Two-Way Active Measurement Protocol (TWAMP)", [RFC 5618](#),
August 2009.

[8.2.](#) Informative References

[I-D.ietf-ippm-twamp-reflect-octets]

Morton, A. and L. Ciavattone, "TWAMP Reflect Octets and
Symmetrical Size Features",

Morton & Chiba

Expires October 2, 2010

[Page 17]

Internet-Draft

TWAMP Session Control

March 2010

[draft-ietf-ippm-twamp-reflect-octets-04](#) (work in
progress), February 2010.

Authors' Addresses

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/>

Murtaza Chiba
Cisco Systems
170 W. Tasman Drive
San Jose, 95134
USA

Phone: +1 800 553 NETS
Fax: +1
Email: mchiba@cisco.com
URI:

Morton & Chiba

Expires October 2, 2010

[Page 18]