Network Working Group	A. Morton	
Internet-Draft	AT&T Labs	
Intended status: Standards Track	M. Chiba	
Expires: September 8, 2009	Cisco Systems	
	March 07, 2009	

Individual Session Control Feature for TWAMP
draft-ietf-ippm-twamp-session-cntrl-01

Status of this Memo

This Internet-Draft is submitted to IETF in full conformance with the provisions of BCP 78 and BCP 79. 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-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/1id-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 September 8, 2009.

Copyright Notice

Please review these documents carefully, as they describe your rights and restrictions with respect to this document.

Abstract

The IETF has completed its work on the core specification of TWAMP - the Two-Way Active Measurement Protocol. This memo describes a new 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 (Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," March 1997.) [RFC2119].

Table of Contents

1. Introduction

The IETF has completed its work on the core specification of TWAMP - the Two-Way Active Measurement Protocol [RFC5357] (Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)," October 2008.). TWAMP is an extension of the One-way Active Measurement Protocol, OWAMP [RFC4656] (Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)," September 2006.). 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 a new 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] (Morton, A. and L. Ciavattone, "TWAMP Reflect Octets and Symmetrical Size Features," April 2010.). 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).

This memo is intended to be an update to the TWAMP RFC.

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 function and feature for TWAMP [RFC5357] (Hedayat, K., Krzanowski, R., Morton, A.,

Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)," October 2008.). The feature needs a clear description so it can be discussed and (hopefully) adopted in the IP Performance Metrics Charter.

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.

---

3. TWAMP Control Extensions

TWAMP-Control protocol is a derivative of the OWAMP-Control protocol, and provides two-way measurement capability. TWAMP [RFC5357] (Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)," October 2008.) 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] (Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)," September 2006.) 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,    draft-...-more-twamp (3)
        Auth. CONTROL
        ---------------------------------------------------------
zzz     Individual Session        this memo, bit position (Z)
        Control
```

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] (Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)," September 2006.)). In the [I-D.ietf-ippm-more-twamp] (Morton, A. and K. Hedayat, "More Features for the Two-Way Active Measurement Protocol - TWAMP," May 2009.) 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] (Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)," October 2008.).

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). If the Control-Client has selected the Reflect Octets feature [I-D.ietf-ippm-twamp-reflect-octets] (Morton, A. and L. Ciavattone, "TWAMP Reflect Octets and Symmetrical Size Features," April 2010.) in

combination with the Individual Session Control feature (after the
Server identified its capability), AND utilizes the feature to insert a
locally-specified request number in the Request-TW-Session command,
THEN the Control Client MAY send more than one Request-TW-Session
command to a given Server without waiting for the corresponding Accept-
Session message. In such a case the Access-Session response reflects
the locally-specified request number. Note that when the Reflect Octets
feature is being used all Request-TW-Session command and Accept-Session
responses MUST include the locally-specified request number.

3.2. Start-N-Sessions Command with Individual Session Control

Having

*initiated Individual Session Control mode in the Setup Response,

*requested one or more test sessions, and

*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"
indicates that this command is applicable to one or more sessions, and
does not change with the number of sessions identified in the command).
The format of the Start-N-Sessions message is as follows:

```
        0                   1                   2                   3
        0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
       |      7        |                                               |
       +-+-+-+-+-+-+-+-+                                               +
       |                     MBZ (11 octets)                          |
       |                                                              |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
       |                   Number of Sessions                         |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
       |                                                              |
       |                   First  SID (16 octets)                     |
       |                                                              |
       |                                                              |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
       |                                                              |
       .                   remaining  SIDs (16 octets each)           .
       .                                                              .
       |                                                              |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
       |                                                              |
       |                   HMAC (16 octets)                           |
       |                                                              |
       |                                                              |
       +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
```

The Command Number value of 7 indicates that this is a Start-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
Start 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 (otherwise, the command MUST NOT be affirmed 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] (Shalunov, S., Teitelbaum, B., Karp, A.,
Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol
(OWAMP)," September 2006.) (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 session.
<<<<< Comment: Al thinks we don't need the limitation below now, unless
it refers to the EXISTING Start-Sessions command. The real question is,
Do we require (MUST) the use of the -N- commands in Indiv.Sess.Cntrl
mode, or allow both types??? I'm leaning toward -N- commands ONLY. >>>>

The Control Client MUST NOT send a subsequent Start Sessions command
until an outstanding message is acknowledged with a Start-Ack message.
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.

```
    0                   1                   2                   3
    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
   |      8        |    Accept    |              MBZ                |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                         MBZ (8 octets)                        |
   |                                                               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                      Number of Sessions                       |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
   |                                                               |
   |                     First  SID (16 octets)                    |
   |                                                               |
   |                                                               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
   |                                                               |
   .                 remaining  SIDs (16 octets each)              .
   .                                                               .
   |                                                               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
   |                                                               |
   |                       HMAC (16 octets)                        |
   |                                                               |
   |                                                               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

The Command Number value of 8 indicates that this is a Start-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] (Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)," September 2006.).
The Number of Sessions field indicates the count of sessions that this Start-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] (Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)," September 2006.) (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 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

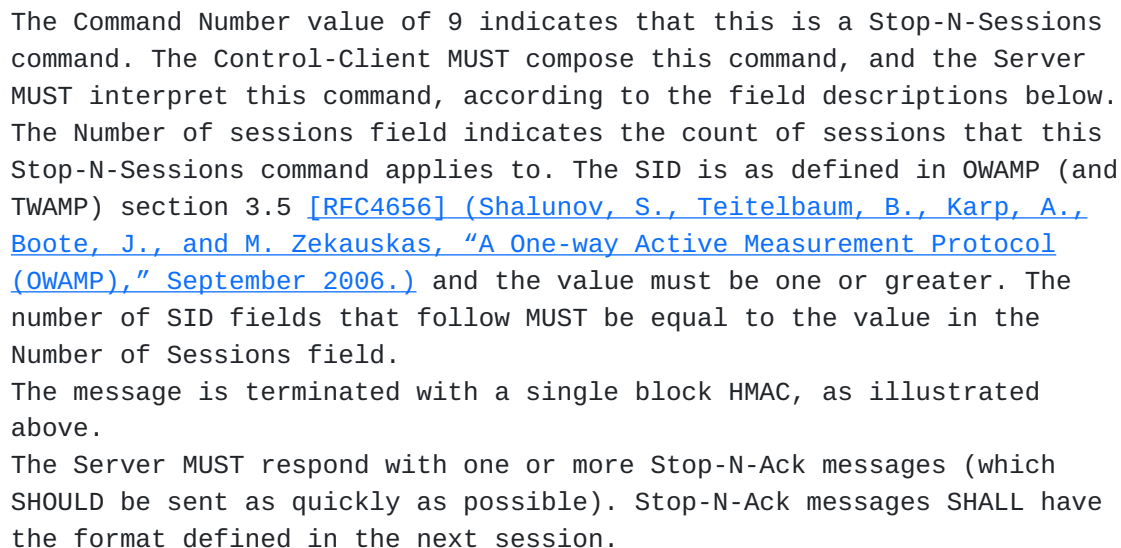
3.4. Stop-N-Sessions Command with Individual Session Control
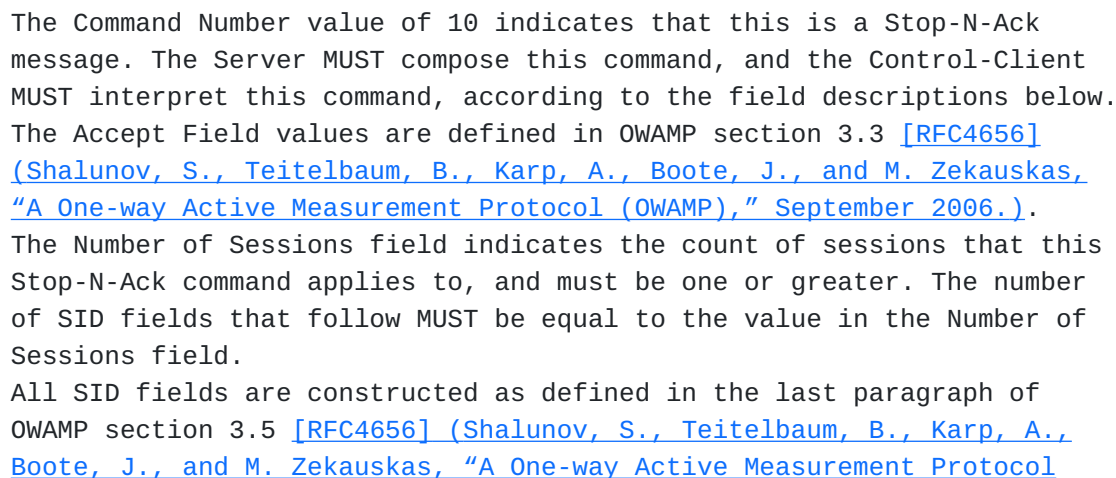
The Stop-N-Sessions command can only be issued by the Control-Client. The command MUST contain at least one SID.
The TWAMP Stop-N-Sessions command for use in Individual Session Control mode is formatted as follows:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
|      9        |                                               |
+-+-+-+-+-+-+-+-+                                               +
|                      MBZ (11 octets)                          |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                    Number of Sessions                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
|                                                               |
|                   First  SID (16 octets)                      |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
|                                                               |
.                  remaining  SIDs (16 octets each)             .
.                                                               .
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
|                                                               |
|                     HMAC (16 octets)                          |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
```

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] (Shalunov, S., Teitelbaum, B., Karp, A.,
Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol
(OWAMP)," September 2006.) 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 session.

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:

```
    0                   1                   2                   3
     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
    |     10        |    Accept     |              MBZ              |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                         MBZ (8 octets)                        |
    |                                                               |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                       Number of Sessions                      |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
    |                                                               |
    |                       First  SID (16 octets)                  |
    |                                                               |
    |                                                               |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
    |                                                               |
    .                  remaining  SIDs (16 octets each)             .
    .                                                               .
    |                                                               |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+B
    |                                                               |
    |                       HMAC (16 octets)                        |
    |                                                               |
    |                                                               |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

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]
(Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas,
"A One-way Active Measurement Protocol (OWAMP)," September 2006.).
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] (Shalunov, S., Teitelbaum, B., Karp, A.,
Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol

(OWAMP)," September 2006.) (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] (Hedayat, K., Krzanowski, R., Morton, A., Yum,
K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP),"
October 2008.) 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.

```
       SERVWAIT                      REFWAIT                      SERVWAIT
    +-+-+-+-+-+-+-+-+                                          +-+-+-+-+-+-+-+
    (no sessions                                              +-+-+-+-+-+-+-+
     in-progress)
                    +-+-+-+-+-+-+-+-+-+-+-+
                          SID="1"

                        +-+-+-+-+
                        SID="2"

                        +-+-+-+-+-+-+-+-+
                            SID="3"

    >>>>>>>>>> Time >>>>>>>>>>>>>>>>>>> Time >>>>>>>>>>>>>>>> Time >>>>>
```

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.
If this feature is adopted, the last ???? bits of the Modes 32-bit
field are used. A Control-Client MAY ignore other bit positions greater
than 2 in the Modes Field, or it MAY support other features that are
communicated in these bit positions. (The unassigned bits are available
for future protocol extensions.)
Other ways in which TWAMP extends OWAMP are described in [RFC5357]
(Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A
Two-Way Active Measurement Protocol (TWAMP)," October 2008.).

---

4. TWAMP Test with Individual Session Control   TOC

The TWAMP test protocol is similar to the OWAMP [RFC4656] (Shalunov,
S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way
Active Measurement Protocol (OWAMP)," September 2006.) 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] (Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J.
Babiarz, "A Two-Way Active Measurement Protocol (TWAMP),"
October 2008.) 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   TOC

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] (Hedayat, K.,
Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active
Measurement Protocol (TWAMP)," October 2008.).

TOC

4.2. Reflector Behavior

The TWAMP Reflector follows the procedures and guidelines in section 4.2 of [RFC5357] (Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)," October 2008.), with the following additional functions required by this feature:

*The Session-Reflector MUST manage all test sessions accepted according to their SID.

*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.

*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] (Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)," September 2006.) and [RFC5357] (Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)," October 2008.).

---

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
[I-D.ietf-ippm-more-twamp] (Morton, A. and K. Hedayat, "More Features
for the Two-Way Active Measurement Protocol - TWAMP," May 2009.)).
TWAMP-Modes are specified in TWAMP Server Greeting messages and Set-up
Response messages, as described in section 3.1 of [RFC5357] (Hedayat,
K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way
Active Measurement Protocol (TWAMP)," October 2008.), consistent with
section 3.1 of [RFC4656] (Shalunov, S., Teitelbaum, B., Karp, A.,
Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol
(OWAMP)," September 2006.), and extended by this memo. Modes are
indicated by setting bits in the 32-bit Modes field. Thus, this
registry can contain a total of 32 possible values.
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] (Hedayat, K.,
Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active
Measurement Protocol (TWAMP)," October 2008.), 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 [RFC2434] (Narten, T. and H.
Alvestrand, "Guidelines for Writing an IANA Considerations Section in
RFCs," October 1998.)(an RFC documenting registry use that is approved
by the IESG). Management of these registries is described in section
8.2 of [RFC5357] (Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and
J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP),"
October 2008.) and [I-D.ietf-ippm-more-twamp] (Morton, A. and K.
Hedayat, "More Features for the Two-Way Active Measurement Protocol -
TWAMP," May 2009.).
This memo proposes assignment of values 7, 8, 9 and 10 in the Command
number Registry, and the next available bit position (indicated by "Z")
and corresponding value (indicated by "zzz") in section 3.1 above. Note
that these values should be replaced by IANA or the RFC Editor when
assigned.

6.3. Experimental Numbers TOC

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 TOC

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

```
   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,  draft-...-more-twamp (3)
           Auth. CONTROL
   ----------------------------------------------------------
   zzz     Individual Session      this memo, Section 3.1
           Control                 bit position (Z)
```

TOC

7. Acknowledgements

The author would like to thank anyone who provides valuable comments on this feature.

8. References   [TOC](#)

8.1. Normative References

[TOC](#)

[I-D.ietf-ippm-more-twamp]	Morton, A. and K. Hedayat, "More Features for the Two-Way Active Measurement Protocol - TWAMP," draft-ietf-ippm-more-twamp-02 (work in progress), May 2009 (TXT).
[I-D.ietf-ippm-twamp-reflect-octets]	Morton, A. and L. Ciavattone, "TWAMP Reflect Octets and Symmetrical Size Features," draft-ietf-ippm-twamp-reflect-octets-05 (work in progress), April 2010 (TXT).
[RFC2119]	Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," BCP 14, RFC 2119, March 1997 (TXT, HTML, XML).
[RFC2434]	Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs," BCP 26, RFC 2434, October 1998 (TXT, HTML, XML).
[RFC4656]	Shalunov, S., Teitelbaum, B., Karp, A., Boote, J., and M. Zekauskas, "A One-way Active Measurement Protocol (OWAMP)," RFC 4656, September 2006 (TXT).
[RFC5357]	Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)," RFC 5357, October 2008 (TXT).

8.2. Informative References

[TOC](#)

| [x] | "." |

Authors' Addresses

[TOC](#)

	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:	