

Report of the First Megaco/H.248 Interop Event

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1. Abstract

An interoperability test of the Megaco ([RFC2885](#)/6) protocol was held on August 28-31 in Durham, NH. An excellent turnout of many different independently developed implementations were present, and a great many of the tests were quite successful, including media flow in many cases, and several cases of testing a Media Gateway controller from one organization with two Media Gateways from different organizations.

The primary purpose of the event was to assess the ability of independent development teams to create interoperable devices from the recent Proposed Standard RFCs 2885 [1] and 2886 [2]. While several discrepancies were found that resulted from differing interpretations of the documents, the level of compatibility exhibited at this first test was excellent. A secondary purpose of the event was to begin the process of moving the RFCs to draft standard status, which requires documentation of at least two implementations of each protocol element/feature. While this first event only used a subset of the protocol, quite a few of the

elements and features were demonstrated by all implementations.

This I-D describes the event and summarized the results.

Report of the First Megaco/H.248 Interop Event Oct. 2000

2. Description of the Event

18 institutions participated in the event, with 49 registered attendees, and several staff. There were a total of 6 independently developed MGCs, and 11 MGs, plus three network analyzers. Elements to be tested were connected to a LAN. MGs and MGCs were paired for tests, which was conducted as described in the test profile provided to all participants [3]. The profile provided a number of test scenarios that involved placing calls between two nodes of a single gateway as well as between nodes on separate gateways. There were NOT specific Megaco message sequences provided. Success of a test was defined as correct completion of the message sequences as determined by both ends. All tests included tests of media flow. Most implementations used RTP on the Ethernet LAN, but one of the MG implementations had an ATM network for media.

Participants included:

T!Semantics,Inc
Marconi Communications
RadiSys Corporation
Hughes Software Systems

Broadcom
Alcatel
CCL/ITRI
Ericsson Computer Science Laboratory
GN Nettest
Excitele
ipDialog, Inc.
RADCOM Equipment, Inc.

Agilent Technologies
ipGen Inc.
Nortel Networks
Pernix
Radvision

3. Test Results

Four of the MGs had significant problems that prevented most testing. One was only able to encode Megaco with binary, and only one of the MGCs was able to talk to it. Two implementations had great difficulty getting their transports to work, and no significant testing was completed. One institution had both an MG and MGC, but only two staff, and decided to concentrate on their MGC after a single successful test of their MG.

Report of the First Megaco/H.248 Interop Event Oct. 2000

Of the remaining 6 x 8 matrix, 5 cases were those of an MG and MGC from the same institution, and were not tested. We conducted 32 pair trials, according to the test. Each test was scored by what level they successfully completed (minor errors were not counted). There were 5 tests that were scored as Failures. Primarily, these occurred because of incomplete implementations, or bugs that were not fixable at the event. For example some implementations assumed inappropriate case sensitivity and were not able to be reprogrammed to work around the problem. 5 of the tests were scored Level 1. Of these, 3 of them were by the same MG, which was not able to support any higher level testing. All of the rest achieved L3 or L4 testing (which was essential equivalent, L3 using an analog line, and L4 using a digital line). There were a few successful trials of MGC failover, and several successful trials of 2 MGs, including cases of all three elements from different institutions!

There were also three protocol analyzers which _sniffed_ data from tests and attempted to decode and _pretty print_ the message traffic.

3. Documentation discrepancies noted

1. There was confusion over what to implement of TPKT. Consensus is that the 4 byte header (3 0 <16 bit message length>) was all that was required.
2. It was not clear what the MGC sends in a ServiceChange reply?

The text currently states:

Upon a cold start of the MG, it will issue a ServiceChange command with a "Restart" method, on the Root

Termination to its primary MGC. If the MGC accepts the MG, it will send a Transaction Accept, with the ServiceChangeMgcId set to itself.

Note that this implies ServiceChangeMgcId is not optional.

There is, as of this writing, continuing discussion of this issue on the list, but at the least ServiceChangeMgcId will be optional, and the text will need to be changed.

3. There was confusion on case sensitivity. Consensus is that the Megaco language, including tokens, event names, signal names, parameter names, enumeration values, etc. are NOT case sensitive. Attention was noted that values in quotations may be case sensitive, and that SDP is case sensitive in most circumstances.

Report of the First Megaco/H.248 Interop Event Oct. 2000

4. Is it REQUIRED that the MGC send a media descriptor to a PHYSICAL termination in order to get media to flow?

There are two questions actually:

- 1) Is there a default state of MODE (text is silent)
- 2) Should the MG demand a media descriptor before allowing media flow?

Consensus is that:

- 1) The default for MODE is Inactive
- 2) MGCs should always send a media descriptor, with at least a MODE setting
- 3) MGs should not depend on 2)

5. There is an error in the text in [section 10.2](#) Interim AH scheme in the sentence:

.....To retain the same functionality, the ICV

calculation should be performed across the entire transaction prepended by a synthesized IP header consisting of a 32 bit source IP address, a 32 bit destination address and a 16 bit UDP destination port encoded as 10 hex digits.

The error is "10 hex digits". It should be 20 hex digits, representing 10 bytes (4 source, 4 dest, 2 port).

6. An MG should always accept a command which has no descriptors, assuming that the contextId and the terminationIds are legal. It's a NOP, but it's legal. Someone tried to send Context= - {Subtract=*{}}. That's not legal (can't subtract from null context).

7. In the protocol, [Appendix A](#), in the first example, step 3

```
Local {  
v=0  
c=IN IP4 $  
m=audio $ RTP/AVP 0  
a=fmtp:PCMU VAD=X-NNVAD ; special voice activity  
                        ; detection algorithm
```

1) There is no IP address. Choose is really wrong, especially because the response doesn't return an address
2) the m line is incorrect, it's not RTP

3) the a line has some sense, but it really would make more sense to have this be a parameter defined in the al package.

Clearly, if you send SDP, you need a c and an m line, but using IP is just wrong.

Report of the First Megaco/H.248 Interop Event Oct. 2000

We can either make them parameters, and then SDP wouldn't be used in most cases, or we can extend SDP to have a more sane c and m line.

At the very least, the c line should specify a legal IP address, and not choose.

8. If you repeat a modify, what happens?

Other than subtract or add, it's a NOP.
Add/Subtract is an error.

The specific command set MODE to the same value it was.
Might unnecessarily consume cycles, but should be legal.

9. Suppose all you want to specify in a ServiceChangeAddress is a port number, that is, the IP address doesn't change, but the port does.

The ABNF states:
serviceChangeAddress = ServiceChangeAddressToken EQUAL VALUE

This is because it could be IP, ATM, FR, MPLS....

The example shows just a port number.

Should that be legal? Should you have to specify the IP address as x.x.x.x:p?

10. While it was legal, it was a surprise to some that

Media=termId{Local....

Is legal and you don't have to say
Media=termId{Stream=1{Local...

ABNF clearly allows this. There was an MGC implementation that did this, and an MG that got confused.

4. Protocol elements tested

No detailed examination of the message sequences was made, however, the following Megaco elements were tested:

Commands

- ServiceChange
- Add
- Subtract
- Modify
- AuditValue
- AuditCapability
- Notify

Descriptors

- Media

Report of the First Megaco/H.248 Interop Event Oct. 2000

- Local
- Remote
- TerminationState
- LocalControl
- ServiceChange
- Audit
- DigitMap
- Events
- Signals

Transport

- UDP
- TCP (with TPKT)

Features

- Registration
- Failover
- Ephemeral termination creation and destruction
- Context creation and destruction
- Unnamed digitmaps
- Parameters to Events
- Parameters to Signals

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5. References

- 1 Rosen, et al. _Megaco Protocol version 0.8_, [RFC 2885](#), August, 2000
- 3 Rosen, B., _Interoperability Test Profile_, [draft-rosen-test-profile-00.txt](#), August 2000

6. Acknowledgments

Marconi was the host of this event. Jennifer Mendola of Marconi provided the bulk of the logistical support. The event was co-sponsored by the Multiservice Switching Forum and the International Softswitch Consortium. Alysia Johnson and Carol Waller of the MSF as well as Paul Ritchie and Micaela Giehat of ISC were very helpful to us.

The event was held at the University of New Hampshire's Interoperability Lab. Dr. William Lenharth is the director of the lab, and was instrumental in arranging the facility made available for this event. Ben Schultz and Ray LaRocca of the IOL staff provided leadership in setting up the test area, and the network used by the participants.

11. Author's Addresses

Report of the First Megaco/H.248 Interop Event Oct. 2000

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