Computer Graphics Metafile (CGM):

Procedures for NIST CGM Validation Test Service

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ERRATUM TO NISTIR 5372

In reference to *NISTIR 5372, Computer Graphics Metafile (CGM): Procedures for NIST CGM Validation Test Service*, Section 2.3.3 Disputed and withdrawn tests, page 8, paragraph 2, should read:

"The test results are not issued by the testing laboratory until all outstanding disputes have been resolved by the Control Board. If the test is judge to be invalid, the offending test will be corrected or withdrawn, and the VSR altered to reflect the ruling."

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ABSTRACT

The Computer Graphics Metafile (CGM) standard defines a file format for describing 2-dimensional pictures in a device independent, computer readable format. As a data interchange standard, CGM is suitable for the storage and exchange of graphical data (i.e., pictures) among different computers, graphical devices, and applications.

This document provides general procedures for the National Institute of Standards and Technology's (NIST) CGM Validation Test Service. The NIST CGM Validation Test Service provides a way of determining the degree to which an implementation conforms to the CGM standard (Federal Information Processing Standard 128-1, Computer Graphics Metafile, and the Continuous Acquisition and Life-Cycle Support Application Profile, MIL-D-28003A). The goal of the NIST Test Service is to maximize the probability of successful interchange of CGMs between conforming systems.

Conformance testing is a functional and fiscal advantage to the vendor and end user. The end user will be provided with increased product confidence and expanded freedom in the market place. The vendor will benefit from the test service by providing a validated product, thus stimulating sales to both government and industry.

The document is divided into three testing programs: metafile testing, generator testing, and interpreter testing. In order to take into account the differences among the three testing programs, many procedures have been tailored to the specific testing program. The policies and procedures presented in this document are organized into five sections: an introduction, general procedures, and specific procedures for each of the three testing programs.

Keywords

v

1 Introduction

1.1 Purpose

The testing of Computer Graphics Metafiles (CGMs) to determine the degree to which they conform to the federal standards may be required by government departments and agencies in accordance with Federal Information Resources Management Regulation (FIRMR) 201-20.303, 201-20.304, 201-39.1002, the associated Federal ADP and Telecommunications Standards Index, and as specified by FIPS 128-1.

As part of its mission, the Computer Systems Laboratory (CSL) provides a validation service for Federal Information Processing Standards (FIPS) in support of government departments and agencies procurement requirements. This document provides the operating procedures for administering the CGM validation service.

The CGM validation service is divided into three testing programs: metafile testing, generator testing, and interpreter testing. In order to take into account the differences between the three testing programs, many procedures have been tailored to the specific testing program. Thus, the procedures presented in this document are organized into five sections:

—   Section 1, introduction,

—   Section 2, those that apply to the test service as a whole,

—   Section 3, those that apply to the metafile testing program,

—   Section 4, those that apply to the generator testing program, and

—   Section 5, those that apply to the interpreter testing program.

1.2 The CGM standard

The Federal Information Processing Standards (FIPS) Publication 128-1, Computer Graphics Metafile, adopts the American National Standards Institute/International Organization for Standardization (ANSI/ISO) Computer Graphics Metafile, ANSI/ISO 8632.1-4:1992. ANSI/ISO 8632.1-4:1992 defines three versions of the Computer Graphics Metafile. FIPS 128-1 adopts all three versions.

Additionally, the FIPS 128-1 requires the use of application profiles. In particular, the FIPS 128-1 requires the use of military specification MIL-D-28003, commonly known as the CALS (Continuous Acquisition and Life-Cycle Support) CGM Application Profile (AP).

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1.3 Scope of validation

Validation is the process of testing an implementation for conformance to a standard. In particular, current CGM validation is the testing of the metafile, generator, or interpreter for conformance. If compliance is demonstrated, a Certificate of Validation is issued.

The validation processes for metafiles, generators, and interpreters are three distinct processes. For metafiles, the validation focuses on testing an instance of a CGM, that is, a CGM data stream for compliance to Version 1 CGM as specified in the FIPS 128-1 and the CALS CGM AP. For generators, the validation focuses on testing the CGM generator and its operating environment for compliance to Version 1 CGM as specified in the FIPS 128-1 and the CALS CGM AP. For interpreters, the validation focuses on testing the CGM interpreter and its ability to correctly and completely parse a CGM in compliance to Version 1 CGM as specified in the FIPS 128-1 and the CALS CGM AP.

1.4 Definitions

The following terms are used throughout this document.

Certificate of Validation — a certificate that acknowledges compliance of an implementation to a FIPS.

CGM generator or generator — the program, process, or product that can write metafiles, which represent a graphical picture assembled from information gathered or calculated by the application software or calling program.

CGM interpreter or interpreter — the program, process, or product that can correctly and completely parse a CGM and produce the intended picture.

Client — anyone requesting conformance testing.

Compliance — the state of the implementation for which correct test results were obtained using the applicable version of the test suite.

Computer system environment or operating environment — the combination of computer hardware, software, graphics applications, programs, etc., used during the testing process to support the generator.

Conformance testing — the tests to evaluate the adherence or non-adherence of an implementation under test to a standard.

Control board — the body of CGM and/or validation experts who resolve disputes concerning the correctness of the test suite with respect to the CGM standard and application profile. The control board is composed of testing laboratory members.

Implementation — For metafile testing, the metafile is the implementation. For generator and interpreter testing, the generator and interpreter are the implementation.

Implementation under test (IUT) — For metafile testing, the implementation under test is the metafile being tested for conformance. For generator or interpreter testing, the implementation under test is the combination of CGM generator or interpreter, and the computer system environment required to support them.

Registered Report — the VSR, once all validation processing steps have been completed. As a Registered Report, the VSR is entered on the *Validated Products List*.

Test laboratory — the laboratory performing the validation, in this case, NIST.

Validated Products List (VPL) — the list published by NIST of computer products that have been validated for conformance to specific FIPS.

Validation — the process of testing for conformance.

Validation Summary Report (VSR) — the document which presents the test results and other information relevant to the tests.

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2 General procedures

2.1 Validation by testing

2.1.1 Overview

The process of validation by testing consists of a test laboratory conducting the conformance tests on a client's implementation and reporting the results of that testing in a Validation Summary Report (VSR). For details of the testing process see Section 3, Metafile testing program; Section 4, Generator testing program; and Section 5, Interpreter testing program.

If the validation procedures are followed and the VSR shows that the IUT demonstrated conformance to the standard and the application profile, then a certificate is issued to the client. Thus, a certificate is only issued if there are no errors detected by the validation process. A Registered Report (i.e., VSR) without a certificate will be issued for generators and interpreters that have been tested and contain errors. Generally, a client must receive a Certificate of Validation or Registered Report in order for the client's implementation to be procured by Federal agencies.

A certificate received as a result of metafile testing is valid indefinitely. A certificate received as a result of generator or interpreter testing is valid for two years. A Registered Report, without a certificate, is valid for one year.

2.1.2 Validation Test Software, Generator and Interpreter Test Suites

MetaCheck[1] with the MetaCALS Option has been designated as the official Validation Test Software. The IUT is tested using the latest version of the Validation Test Software, Generator Test Suite, or Interpreter Test Suite, whichever are applicable. New releases or versions of the test software and/or test suites will be issued to correct existing errors, enhance test routines, and reflect changes made to the FIPS or application profile.

The Generator Test Suite consists of a questionnaire, test specification, and supporting documentation that was developed at NIST. The Interpreter Test Suite consists of a collection of CGM files, operator test script, and set of reference pictures. The client must sign a site license for use of either the Generator Test Suite or the Interpreter Test Suite.

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[1]MetaCheck is a licensed product of CGM Technology Software, P.O.Box 648, Gales Ferry, CT 06335. MetaCheck with the CALS Option is referred to as MetaCALS.

2.1.3 Renewal of a Certificate of Validation

A Certificate of Validation may be renewed for additional years, if the following conditions are met:

1.   the client certifies that no changes have been made to any component of the implementation,

2.   the client certifies that any changes made in the supporting operating system do not alter the function or operation of the implementation, and

3.   the Validation Test Software, Generator and/or Interpreter Test Suites have not changed substantially since the last validation was performed.

Certificate renewal is not applicable to metafile testing, since these certificates do not expire.

2.1.4 Validation Summary Report (VSR)

The Validation Summary Report (VSR) is the test report presenting the results of the validation. The VSR contains information about the client, validation test software and test suite versions, as well as errors that may have been detected. Additionally, the VSR may contain other information gathered during the validation process, such as the profile conformance statement.

A draft VSR and Notification of Conformance form is sent to the client. The client should review the report and return the signed notification form to NIST. Once the signed notification form is received, the VSR becomes final, is designated as a Registered Report, and is entered on the *Validated Products List*.

For metafile testing, the finalized VSR is issued only for metafiles which are in compliance with the FIPS 128-1 and MIL-D-28003A. References to all non-compliant CGMs will be deleted from the VSR prior to the VSR's designation as a Registered Report.

For generator and interpreter testing, a VSR will be issued for all completed validations.

Until the VSR is finalized, all information concerning the validation is considered to be confidential. If the client does not wish to release the VSR information, the notification form should not be signed or returned to NIST. No further action regarding the validation will be taken.

2.2 Registration

2.2.1 Overview

The rationale for validation by registration is that an implementation may function identically on multiple computer system environments. As an alternative to NIST formally validating each and every environment, validation by registration allows the client to self-test implementations on additional computer system environments. Validation by registration provides the client a low cost method for testing these additional environments and registering them in the VPL.

Validation by registration is only available for clients whose generators or interpreters have been formally validated by NIST.

The process of validation by registration consists of a client conducting the conformance tests, evaluating the results, and sending the results to NIST for inspection. In order to perform the self-testing, the client must have a copy of the latest version of the appropriate test suite and test software.

If the registration criteria are met, the additional environments are added to the *Validated Products Lists* as a registered environment. For details on the registration process, see section 4.4, Registration of generator environments, and section 5.4, Registration of interpreter environments.

All self-tested environments are subject to challenge by NIST and other interested parties (such as procuring Federal agencies). If the NIST inspection reveals that a self-tested environment does not behave in accordance with the submitted validation material, all entries in the VPL for self-tested environments dependent on the formally validated implementation are stricken.

2.2.2 Eligibility for registration

The computer system environments which may be registered include:

1. other releases/versions of the same operating system,

2. different models of the same manufacturer computer family (e.g., HP 9000 series model 825, 835, 850; or IBM 43xx, 30xx, 93xx),

3. different micro-processor architectures from the same manufacturer, where binary executable compatibility has been maintained,

4. re-badged or renamed hardware (i.e., same hardware sold under a different name). Note, there will be no additional fee for registering re-badged hardware.

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2.3 Miscellaneous

2.3.1 Pricing

The CGM Test Service validations are to be performed on a cost-reimbursable basis. Pricing information can be found in the following testing program sections or may be obtained by contacting the NIST CGM Test Service.

2.3.2 Cancellation

Once the validation process has begun, the client agrees to reimburse NIST/CSL for the expenses incurred in preparation or performance of the validation. In the event that NIST/CSL cancels the validation due to nonsupport by the client or failure of the client to perform in a reasonable manner, the client agrees to pay NIST/CSL for all validation expenses.

2.3.3 Disputed and withdrawn tests

Questions regarding the interpretation of the standard and the validity of the tests should be forwarded to the testing laboratory at NIST, along with associated rationale and detailed documentation. The testing laboratory and client will attempt to resolve these issues informally. If no resolution is reached, the question is referred to the Control Board for a ruling.

All test results issued by the testing laboratory remain in force unless and until reversed by the Control Board. If the test is judged to be invalid, the offending test will be corrected or withdrawn, and the VSR altered to reflect the ruling.

2.3.4 Validated Products List

NIST publishes on a quarterly basis, a list of validated products having a current validation certificate and/or a Registered Report. The *Validated Products List* may be obtained by request from:

> National Technical Information Service
> United States Department of Commerce
> 5285 Port Royal Road
> Springfield, VA 22151
> Phone: (703) 487-4630
> Order Number: PB93937303/AS

2.3.5 Documentation

The testing laboratory will create and maintain a client file consisting of the following documents:

—   all completed forms
—   all correspondence, and
—   a log of all material events occurring during the validation.

The client file and validation materials will be retained for 6 months after the validation process is concluded. However, the VSR will be retained for a minimum of 2 years.

2.3.6 Publication

In general, NIST shall have the right to use all information gathered in the course of developing and administering a conformance testing program for any governmental purpose. Registered Reports completed by NIST shall be made available to the public upon request.

3 Metafile testing program

3.1 Objective

Metafile conformance testing focuses on testing an instance of a CGM for conformance to Version 1 CGM as specified in the FIPS 128-1 and the CALS CGM AP. If the CGM tested is in compliance with the FIPS 128-1 and the CALS CGM AP, a Certificate of Validation will be issued. The certificate is valid indefinitely, i.e., it does not expire. If a metafile is modified in any way, it will be considered a 'new' CGM and thus, not covered by the certificate.

3.2 Testing steps

There are five steps that must be followed in order for a metafile to be validated for conformance.

1.   Request for validation

      To submit CGMs for testing, the client completes the Request for Validation form and sends the request along with the CGMs to be tested and payment to NIST Computer Systems Laboratory (CSL).

      Each CGM submitted to the test service shall be uniquely named and include the metafile's size (in bytes) and date of creation. Additionally, the identity of the CGM generator as well as the hardware platform and operating system software must be provided.

      The CGM to be tested should be submitted to NIST in one of the following formats:

      -     PC-DOS format   5¼" or 3½" disks
      -     Macintosh format   3½" disks
      -     VAX/VMS backup format   1600 bpi, ½" magnetic tape
      -     UNIX- tar format   ¼" cartridge tape

      Other formats may be available upon request.

      Note — The CGM should be represented as a continuous byte stream using the binary encoding as defined in ANSI/ISO 8632 part 3.

      Upon receipt of a testing request and payment, NIST will schedule validation and notify the client.

2.   Formal validation

Formal validation takes place at NIST/CSL.

Each CGM is individually tested using the latest version of the Validation Test Software. The CGMs are tested for conformance to the FIPS 128-1 and CALS CGM AP.

3.   Draft Validation Summary Report

The test laboratory prepares a draft VSR summarizing the testing procedures and results for each IUT. In addition to general information about the IUT, the report provides a list of the tests performed and errors found. All CGM conformance violations in the IUT are identified and related back to the requirements set forth in the CGM standard and the CALS CGM AP. Finally, the report clearly indicates whether or not the IUT meets the conformance requirements of the standard.

4.   Notification of Conformance

The draft VSR along with a Notification of Conformance is sent to the client. The Notification of Conformance lists only those metafiles which are in compliance with the FIPS 128-1 and the CALS CGM AP. Moreover, these metafiles and their test results will be part of the VSR and listed on the Certificate of Validation.

The client has 30 days to review the draft VSR and notification and notify NIST/CSL in writing of any objections. If there are no objections, the client returns the signed Notification of Conformance. Receipt of this notification is required before the Certificate of Validation and finalized VSR can be issued. Note, the finalized VSR is designated as a Registered Report and issued as such.

5.   Certificate of Validation and Registered Report

The Certificate of Validation and Registered Report (i.e., finalized VSR) will be issued for metafiles which have successfully passed the conformance requirements of the FIPS 128-1 and CALS CGM AP. The Certificate of Validation and Registered Report results will be published in the *Validated Products List*.
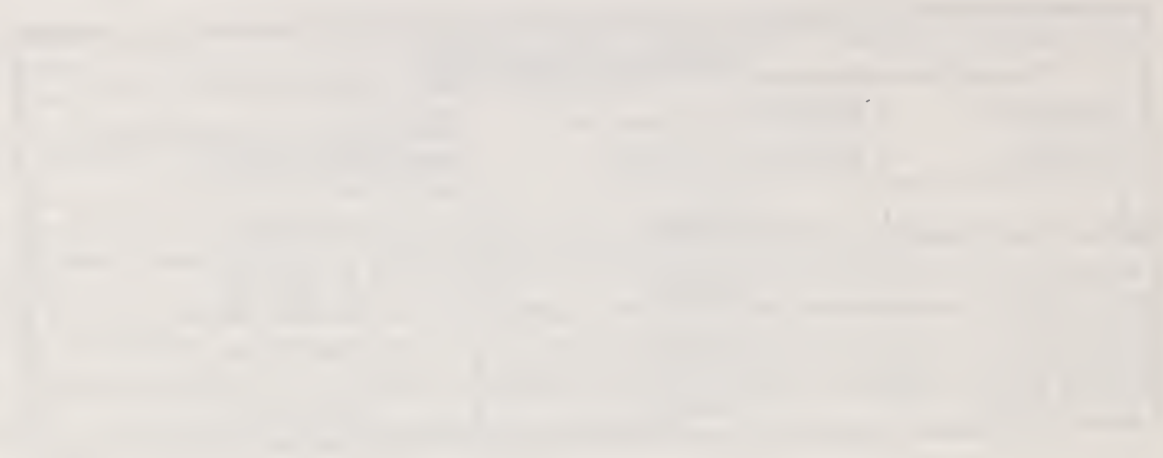
3.3 Pricing

The cost of testing CGMs is as follows:

Metafile Pricing Table		
Number of Metafiles	**PRICE** for clients with MetaCALS license	**PRICE** for clients withOUT MetaCALS license
1 - 5	$500.00	$800.00
6 - 10	$900.00	$1200.00
11 - 15	$1300.00	$1690.00
16 or more	$1800.00	$2340.00

*   If the submitted metafiles do NOT fit on a single (1) disk/tape, there is an additional charge of $50.00 for each additional disk/tape.

4 Generator testing program

4.1 Objective

Generator conformance testing focuses on testing a CGM generator for conformance to Version 1 CGM as specified in the FIPS 128-1 and the CALS CGM AP. A Validation Summary Report (VSR) will be produced at the end of the testing process. If no errors are detected by the testing process, a Certificate of Validation and VSR will be issued. The Certificate of Validation is valid for two years. If errors are detected during the validation, the Registered Report will list the errors and be issued as a Registered Report. The Registered Report is listed in the *Validated Products List* (VPL) and is valid for one year.

Generators are tested in conjunction with a specific environment. The environment consists of the computer hardware, operating system, and any graphics software and programs required to support the generator under test. The Certificate of Validation and Registered Report issued as a result of validation pertain only to the generator and environment actually tested.

4.2 Testing steps

The validation process for generator testing is a multi-step process conducted in three phases (see figure 1) that is initiated by a client's Request for Validation.

1. Information Collection

2. Prevalidation
   a. Test suite specification
   b. CGM generation

3. Formal Validation
   a. On-site validation
   b. Test report summary
   c. Notification of conformance
   d. Certificate and VSR

In order to complete the testing process, a client must have extensive knowledge of its product and use of CGM.

1.   Information Collection

The client is provided with a questionnaire regarding the functionality of the CGM generator to be tested. The completed questionnaire constitutes a profile implementation conformance statement (PICS), stating the capabilities, values, and options which have been implemented as well as the features which have been omitted.

The PICS is reviewed for consistency and violations of the FIPS 128-1 or the MIL-D-28003A. All discrepancies are documented and resolved.

2.   Prevalidation Phase

a.   Test suite specification --
Based on the PICS, a client-specific test specification is defined. The test specification consists of test scripts and test images.
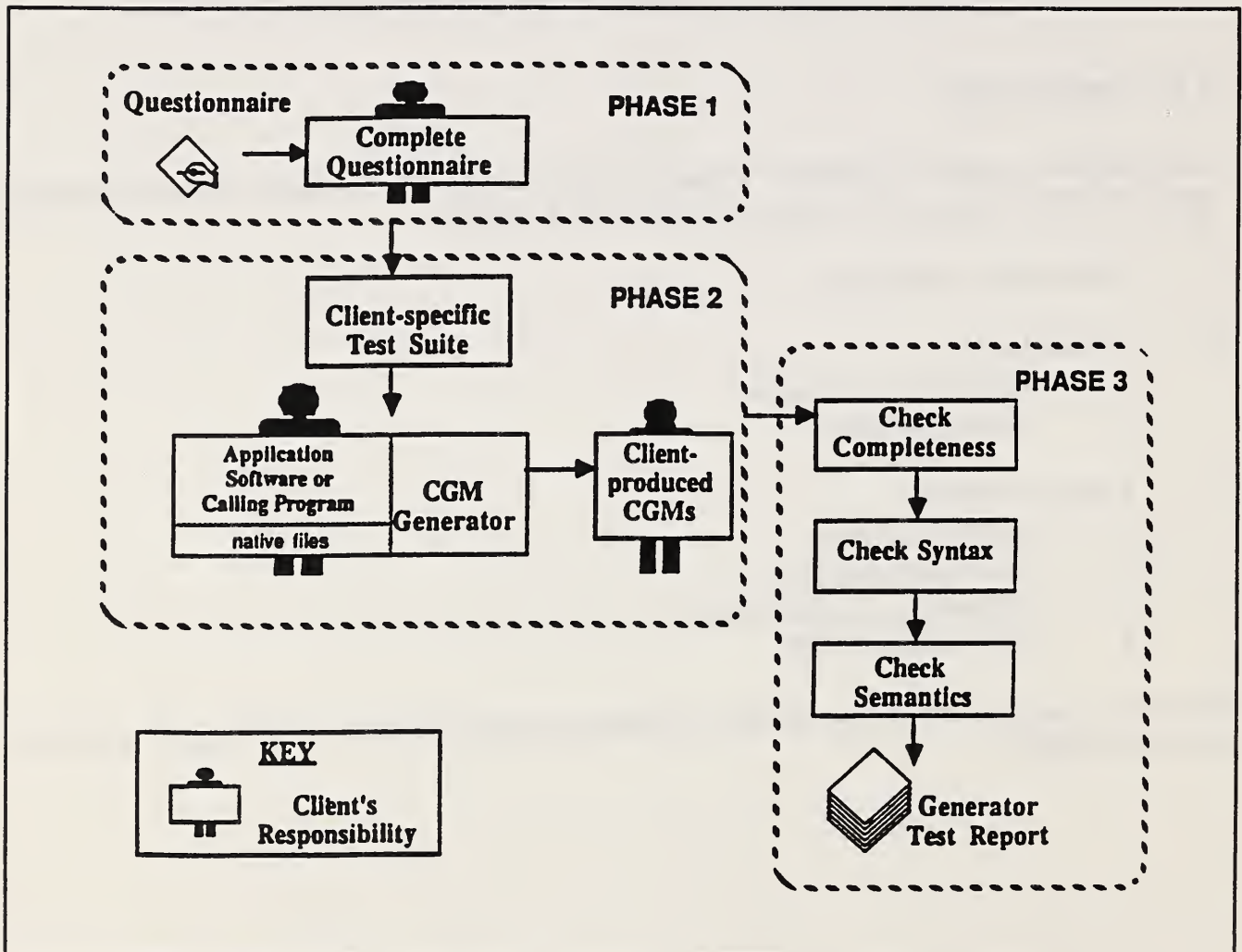

Figure 1. Testing process

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b. CGM generation --
Using the test specifications, the client produces the requisite computer graphics metafiles. Some IUTs may require modification to the test specifications. The client must submit any proposed modifications to NIST for approval. All approved modifications shall be documented.

The client submits the CGMs and supporting documentation to NIST for prevalidation inspection. Upon completion of prevalidation, the schedule and arrangements for on-site validation are confirmed.

3. Formal Validation

a. On-site validation --
The on-site validation consists of NIST personnel witnessing the creation of the CGMs from the native picture files or programs.

The CGMs are taken back to NIST, where they are checked for completeness to ensure that all the test suite requirements have been met and syntactic and semantic correctness have been achieved. The syntax is tested using the latest version of the Validation Test Software, MetaCALS.

b. Test Report Summary --
NIST/CSL prepares a draft VSR summarizing the testing procedures and results of the generator testing. The report includes information about the generator and the environment under which it was tested, the PICS, and all errors (behavior not in conformance with the standard, application profile, or PICS). Finally, the report clearly indicates whether or not the IUT meets the conformance requirements of the FIPS 128-1 and the CALS CGM AP and the functionality as claimed by the vendor in the PICS.

c. Notification of Conformance --
The draft VSR along with a Notification of Conformance is sent to the client. The Notification of Conformance lists the generator and environment for which the certificate and final VSR will be issued. Additionally, any errors and/or conditionally supported capabilities will be identified.

The client has 30 days to review the draft VSR and notification and notify NIST/CSL in writing of any objections. If there are no objections, the client returns the signed Notification of Conformance. Receipt of this notification is required before the Certificate of Validation and final VSR can be issued. Note, the finalized VSR is designated as a Registered Report and issued as such.

d. Certificate of Validation and Registered Report --
A Certificate of Validation will be issued for generators which have successfully passed the conformance requirements of both the FIPS 128-1 and CALS CGM AP, and meet the functionality as claimed in the PICS. A Registered Report, without a certificate, will be issued for generators which have been tested and contain errors. The certificate and Registered Report will be published in the *Validated Products List*.

4.3 Pricing

The cost for CGM generator testing is as follows:

Generator Pricing Table	
Validation	**Registration**
$9,000 — base price	$250 — for each environment (1 to 7)
$600 — for each additional environment	$2,000 — for 8 or more environments
$6,000 — for each additional generator	

4.4 Registration of generator environments

Clients whose generators have been formally validated by NIST can register (i.e., list in the VPL) the generator on other computer system environments based on the client's self-testing.

Registration of generator environments is applicable only if the generator, when implemented on other computer system environments, is the same executable code and uses the same application software or calling program to create input to the generator as that used for the validation by testing process.

To register a generator for processing on other computer system environments, the client must submit a request for registration. The request must be made before the generator's validation expires.

The client performs the prevalidation step described above. Prior to submitting the CGMs to NIST, the client checks that the files are semantically the same as the original IUT's CGMs and using the Validation Test Software, checks the syntax of the files. The client submits a signed

statement along with the validation results (i.e., CGMs) affirming that the CGMs are the result of executing the tests in the specified environment.

NIST inspects the validation results. If the generator, when implemented on the additional environment, is functionally equivalent to the generator implemented on the environment used during the validation by testing process, then the environment will be registered in the VPL. Additionally, the client's signed statement regarding the registered environment is added to the VSR.

5 Interpreter testing

5.1 Objective

Interpreter conformance testing focuses on testing a CGM interpreter for conformance to Version 1 CGM as specified in the FIPS 128-1 and the CALS CGM AP. A Validation Summary Report (VSR) will be produced at the end of the testing process. If no errors are detected by the testing process, a Certificate of Validation and VSR will be issued. The Certificate of Validation is valid for two years. If errors are detected during the validation, the VSR will list the errors and be issued as a Registered Report. The Registered Report is listed in the VPL and is valid for one year.

Interpreters are tested in conjunction with a specific environment. The environment consists of the computer hardware, output devices (display or printer), operating system, and any application software or programs required to support the implementation under test (IUT). The certificate and Registered Report issued as a result of validation pertain only to the interpreter and environment actually tested.

5.2 Testing steps

The validation process for interpreter testing is a multi-step process conducted in two phases that is initiated by a client's Request for Validation.

1.   Prevalidation
       a. Test Suite installation and interpretation
       b. Completion of Operator Test Script

2.   Formal Validation
       a. On-site validation
       b. Test report summary
       c. Notification of conformance
       d. Certificate and VSR

1.   Prevalidation Phase

       a.   Test Suite installation and interpretation --
             The client is provided with the Interpreter Validation Test (IVaT) suite. The IVaT suite consists of a collection of CGM files, an operator script, and a set of reference pictures. The metafiles are copied from the (NIST supplied) disk to the client's system. Each metafile must be interpreted using the IUT. The resulting

picture is then compared to the reference picture and a pass/fail decision is made based on the criteria described in the operator script.

b.　　Completion of Operator Test Script --
The client submits the completed operator test script for prevalidation inspection. Upon completion of prevalidation, the schedule and arrangements for on-site validation are confirmed.

2.　　Formal Validation Phase

a.　　On-site validation --
The on-site validation consists of the NIST personnel witnessing the installation and execution of a 'new' copy of the IVaT suite.

b.　　Draft VSR --
NIST/CSL prepares a draft VSR summarizing the testing procedures and results of the interpreter testing. The report includes information about the interpreter and the environment under which it was tested, and all errors (behavior not in conformance with the standard and application profile). Finally, the report clearly indicates whether or not the interpreter meets the conformance requirements of FIPS 128-1 and the CALS CGM AP.

c.　　Notification of Conformance --
The draft VSR along with a Notification of Conformance is sent to the client. The Notification of Conformance lists the interpreter and environment for which the Certificate and final VSR will be issued. Additionally, any errors and/or conditionally supported capabilities will be identified.

The client has 30 days to review the draft VSR and notification and to notify NIST/CSL in writing of any objections. If there are no objections, the client returns the signed Notification of Conformance. Receipt of this notification is required before the Certificate of Validation and final VSR can be issued. Note, the finalized VSR is designated as a Registered Report and issued as such.

d.　　Certificate of Validation and Registered Report --
A Certificate of Validation will be issued for interpreters which have successfully passed the conformance requirements of both the FIPS 128-1 and CALS CGM AP. A Registered Report, without a certificate, will be issued for interpreters which have been tested and contain errors. The Certificate of Validation and Registered Report will be published in the *Validated Products List*.

5.3 Pricing

The cost for CGM interpreter testing is as follows:

Interpreter Pricing Table	
Validation	**Registration**
$5,000 — base price	$250 — for each environment (1 to 7)
$1,500 — for each additional environment	$2,000 — for 8 or more environments
$1,500 — for each additional interpreter	

5.4 Registration of interpreter environments

Clients whose interpreters have been formally validated by NIST can register (i.e., list in the VPL) the interpreter on other computer system environments based on the client's self-testing.

Registration of interpreter environments is applicable only if the interpreter, when implemented on other computer system environments, is the same executable code and uses the same application software or calling programs to interpret the metafiles as that used for validation by the testing process.

To register an interpreter for processing on other computer system environments, the client must submit a request for registration. The request must be made before the interpreter's validation expires.

The client performs the prevalidation step described above. The client shall interpret each metafile, compare the resulting translation to the reference picture, and complete the operator script. The client submits a signed statement along with the operator script affirming that the validation results were obtained by executing the tests in the specified environment.

NIST inspects the validation results contained in the operator script. If the interpreter, when implemented on the additional environment, is functionally equivalent to the interpreter implemented on the environment used during the validation by testing process, then the environment will be registered in the VPL.