



GMSEC Compliance Test Suite Overview

March 13, 2006

Prepared by



320 Adams Street • P.O. Box 2720 • Fairmont, WV 26555-2720 • 304.368.9300 • fax 304.368.9314

Table of Contents

1	Certification Levels.....	1
1.1	Level Definitions	1
1.1.1	Level 1	1
1.1.2	Level 2	2
1.1.3	Level 3	2
1.1.4	Level 4	3
2	Certification Process	3
2.1.1	Prepare Configuration Information.....	3
2.1.2	Launch Corresponding Level Tests	3
2.1.3	Examine Results.....	3
2.1.4	Correct Errors and Retest.....	4
3	Support.....	4

Overview

GMSEC compliance certification implies a reasonable level of assurance that an application will interact both properly and efficiently with other applications sharing the GMSEC bus. The Institute for Scientific Research (ISR) is in the process of developing a suite of tools that will enable verification and validation of candidate applications wishing to comply with these standards. Using these tools, an application can be rigorously tested to measure its level of compliance to various GMSEC capabilities. Ideally, testing for higher levels will be performed at ISR's facility utilizing this comprehensive suite of tools.

Since the GMSEC architecture is designed to allow maximum flexibility in message structure, certification is an important step in the software development process. While the flexibility afforded by the GMSEC architecture is very useful, it can be detrimental to the seamless integration of GMSEC applications if too much deviation from the standard message structure occurs. GMSEC does not enforce that programs publish messages in compliance with the GMSEC Interface Specification Document (ISDⁱ). However, if an application chooses not to follow the guidelines set forth in the GMSEC ISD, complications arise in the universal interaction and generic interoperability between GMSEC labeled applications. Therefore, certification provides a mechanism by which applications can be checked for interoperability and conformance to GMSEC ISD standards. Most importantly, it affords those who may be considering implementing a product the peace of mind that the software they are considering will interact correctly and efficiently with other applications on the bus.

1 Certification Levels

There are multiple levels of compliance for which a candidate application can apply. Each level builds on its predecessor to provide a greater degree of confidence by enforcing increasingly stringent requirements. Certification can be granted at any level, provided the candidate application passes that level's test and qualifies for certification at all levels beneath the applied level. More information about GMSEC Compliance Levels can be obtained via the GMSEC Compliance Levels Document (CLDⁱⁱ).

1.1 Level Definitions

1.1.1 Level 1

GMSEC Level 1 compliance is the most rudimentary level of assurance that an application meets the basic requirements of the GMSEC messaging standard. At this level no attempt is made to validate any fields which are not defined in the GMSEC ISD.

To test compliance at this level, the candidate application can be run against ISR's Compliance Test Suite (CTSⁱⁱⁱ). The CTS has been developed to assist in measuring an application's conformance to GMSEC ISD specifications. The basic, free version of CTS included with distributions of the GMSEC API consists of a *MessageValidator* and a *MessagePublisher*.

MessageValidator connects to the GMSEC bus and listens for messages with predefined subjects. When messages are transmitted across the bus, they are received by *MessageValidator* and validated against an XML schema which corresponds to the given message type. If any warnings or errors are detected in the structure of the message, they are logged and made available to the user either via the application's results section or in a printable, hard-copy format. Ideally the user will run the candidate application on the bus to populate it with all the messages necessary to perform the certification. However, while testing at this level the user may opt to use the provided *MessagePublisher* application to generate messages. Since Level 1 certification is only concerned with message structure and not the application's method of interaction with the GMSEC bus (i.e. publishing intervals, message sequence, and functionality), the source of the message stimulus is not significant.

1.1.2 Level 2

GMSEC Level 2 compliance extends Level 1 compliance by requiring that all fields be defined by the user. Any fields not included in the GMSEC ISD must be accompanied with a corresponding schema describing their structure. This user supplied XML schema will also be checked to ensure compliance with the GMSEC XML message schema format before being used for validation.

Testing compliance at this level is very similar to testing at Level 1, but requires the certification be performed by ISR, who has designed a more comprehensive analysis suite. This version will be capable of ingesting XML schemas describing user defined fields. Once ingested, the default baseline schemas will reflect all user field modifications and testing can progress as outlined in Level 1 above.

1.1.3 Level 3

GMSEC Level 3 compliance builds upon Level 2 compliance requirements and adds constraints to ensure an application meets the fundamental GMSEC network interaction requirements. Level 3 certification will assure that applications can connect to the GMSEC bus and correctly interact with the GMSEC environment. It is now necessary for an application to demonstrate its ability to send and respond to messages in the GMSEC environment as defined by the GMSEC ISD. (i.e. generating log messages and heartbeat messages at appropriate intervals)

ISR's comprehensive CTS package will be capable of generating or ingesting a scenario configuration file which defines specific timing events and functional restraints for the candidate application. At this level it is no longer acceptable to use *MessagePublisher* to generate messages across the GMSEC bus. *MessagePublisher* is designed to publish an individual message, or set of messages, and is not capable of demonstrating the candidate application's functionality as is needed for Level 3 certification and beyond.

1.1.4 Level 4

Level 4 compliance requires testing of each message classification's functionality. Each classification has separate functional requirements. Candidate applications must first be certified as Level 3 compliant to be considered for this level of testing.

The only difference between testing at this level and that of Level 3 is that the CTS application will now have to listen to and validate messages on appropriate intervals and also publish messages and verify that valid and appropriate responses are made to these actions. Proper response to stimulus and proper timing are under scrutiny at this level.

2 Certification Process

The candidate application may apply for certification at any level provided that it is capable of passing all level tests up to, and including, the level for which the application has applied. Although different levels require different testing scenarios and input, they all follow a similar process. The following sections describe the process flow for certification of a typical application.

2.1.1 Prepare Configuration Information

The certification process begins in a similar fashion for all levels. The user will be responsible for obtaining all GMSEC bus connection values. The user must also describe each of the subjects being validated. If the user is to utilize *MessagePublisher*, they must provide a configuration containing each of the messages to be sent via the *MessagePublisher* during the tests.

Once this information is available, it is then possible to continue the validation process. All information that pertains to a level test configuration can be entered either via configuration file(s) or entered directly in the graphical user interface of *MessageValidator*. The configuration files used by *MessageValidator* and *MessagePublisher* are in XML format. The connection configuration files conform to the GMSEC configuration file format.

2.1.2 Launch Corresponding Level Tests

Once the connection information has been entered and the appropriate tool has been started, the user can then proceed to run the candidate application on the bus until at least one of each message type being tested has been intercepted or the entire scenario configuration is completed. The user may also choose to publish some or all messages via the *MessagePublisher*—where applicable.

2.1.3 Examine Results

The results are updated in real-time as the test commences and can be viewed at anytime throughout the testing process via the results panel in *MessageValidator*. After completion of all level tests, the user will need to review the results to ensure that *no* messages contain errors and that all warnings are expected. At this

point the user can choose to print a summary report or a detailed report listing the specific information about the offending messages and their errors/warnings.

2.1.4 Correct Errors and Retest

After reviewing the results, the user will need to make any modifications and/or corrections to their application and rerun the tests. This process should be repeated until all errors have been mitigated.

3 Support

For questions or help with GMSEC CTS please contact the Institute for Scientific Research, Inc.

compliance.support@isr.us

Notes

i [GMSEC Interface Specification Document](#)

ii [GMSEC Compliance Levels Document](#)

iii [GMSEC Compliance Test Suite](#)