

Request for Quotation (RfQ)

For ONVIF Technical Services Committee,
Client Test Tool Working Group

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Profile D Working Group

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Profile M Working Group

Projects “Kraken” & “Luxardo”

Circulation: June 14, 2019

Quotation Due: June 28, 2019

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1. Introduction

ONVIF™ is an open industry forum for the development of a global standard for the interface of IP-based physical security products. Information about ONVIF, its objectives and members can be found on <http://www.onvif.org/>.

The ONVIF Client Test Tool will be used by ONVIF members to test conformance of IP-based physical security products with the ONVIF Test Specification, which in turn is based on the ONVIF Network Interface Specifications, the ONVIF Profile Specifications and WSDL and XML schemas, as described in the ONVIF Conformance Process Specification.

2. Abbreviations

WG	Working Group
CT WG	ONVIF Client Testing Working Group
CTT	ONVIF Client Test Tool
ODP	ONVIF Developer's Plugfest

3. Projects Purpose

The purpose of these projects is to produce two service releases of the ONVIF Client Test Tool and ONVIF Client Test Specifications for released profiles S, G, C, Q, A and T and for profiles D and M which are under development.

Two incremental service releases of the ONVIF Client Test Tool and of the ONVIF Client Test Specifications will be delivered. The first release is at the end of **Project Kraken** in December 2019 followed by second release at the end of **Project Luxardo** in June 2020.

4. Service Requested

During the two successive Scope-of-Works: **Project Kraken** and **Project Luxardo**,

- the Contractor must update and prepare the following items for public release:
 - ONVIF Client Test Specifications documents
 - ONVIF Client Test Tool software
- the Contractor must maintain up-to-date and improve the following internal items:
 - ONVIF Profiles Features Test Coverage Map document
 - ONVIF Client Test Tool internal wiki documentation
 - Automated regression testing documentation and framework
- the Contractor must handle priority changes caused by additional work items and requirements that may be identified during the projects and that will be prioritized by the ONVIF working groups.
- the Contractor must advise the ONVIF working groups and estimate the development efforts requested by the ONVIF working groups working with the **ONVIF Client Testing WG**.
- the Contractor must inform the **ONVIF Client Testing WG** in case of conflicts between development items executed in parallel. The **ONVIF Client Testing WG** will be the main point of contact to the Contractor. It is responsible for the integration and coordination of the different ONVIF working groups development requests for the ONVIF Client Test Tool and ONVIF Client Test Specifications.
- the Contractor must operate the ONVIF Client Test Tool Clinic during the ONVIF Developers' Plugfests. This includes:
 - practical field testing of the latest intermediate release of the CTT with ONVIF member client companies
 - collecting ONVIF members feedback and improvement suggestions
 - training ONVIF members on how to use the CTT for conformance testing
 - planning and executing additional tasks and priorities that the **CT WG** may determine during the weeks preceding each ODP.

For a detailed description of the service requested, see section *Description of Requested Service*.

5. Description of Requested Service

The service being requested MUST fulfill the following requirements. Requirement levels MUST be interpreted as described in RFC 2119¹ “Key words for use in RFCs to indicate requirement levels”.

1. The projects MUST be developed in accordance with the schedule outlined in Appendix A.
2. Any deviations from the schedule outlined in Appendix A MUST be approved by ONVIF.
3. The Contractor MUST handle the following responsibilities:
 - A) Project management.
 - B) Development: design and implementation of ONVIF Client Test Tool features, new test case implementation, modification of existing test cases and bug fixing, **updating the technical and architectural documentation** of the tool.
 - C) Testing: design and modification of test cases for ONVIF Client Test Specifications documents, validation of test cases, **automated** regression testing of bug fixes and modifications to existing test cases and features and technical documentation, **test reports publication** to the CT WG.
4. The projects SHOULD use the following resources (manpower equivalent) for respective projects.
 - A) Project Kraken (900 man-hours total): The project MUST include the work items outlined in Appendix D. Evolution tasks are marked “EVO” in their title and figure in appendix D. Evolution tasks are to be developed in a separate branch in the SVN repository used to host and track all Onvif development. Once an evolution task is complete, it can be merged in the next project only. A MERGE task will be created in the tracking system. This task needs to be discussed and approved by the **CT WG** first. The Contractor cannot make the decision to merge the changes until then and, upon request from the **CT WG**, MUST rollback any changes to the main branch and rearrange those changes in a separate branch at no additional charges if the merge is done without **CT WG** approval.
 - B) Project Luxardo (900 man-hours total): The project MUST include the work items outlined in Appendix E.
 - C) Service buffer (500 man-hours) - In addition to the above resources, another 500 man-hours of the resource are allocated as a service buffer. In case that the allocated resources for

¹ See: <http://www.ietf.org/rfc/rfc2119.txt>

respective projects run out and some more work items are essential to be carried out during this project, this resource should be used.

5. The CT WG can at any time decide to drop or postpone a work item and the Contractor MUST rollback the changes if any progress was made on the work item at no additional charge.
6. The scope of the projects' deliverables will be adjusted if necessary, to keep the release date of the official release (see Appendix A).
7. The projects MUST deliver an ONVIF Client Test Tool and Test Specification as outlined in Appendix B and Appendix C.
8. The projects MUST follow the technical requirements outlined in Appendix F during the ONVIF Client Test Tool development.
9. The projects MUST respect the style of the ONVIF Test Specification when updating the documents. The structure MUST be defined with the help of the **CT WG**.
10. The final deliverables MUST pass a review before the service is considered delivered; up-to 30 days might be required to complete the review. If the workgroup does not provide feedback within the 30 days period; the service will automatically be considered delivered for all payment purpose.
11. Any further maintenance and expansion work done to the ONVIF Client Test Tool and/or ONVIF Test Specification is subject to further quotations and separate contracts. A renewed cooperation of the Contractor and ONVIF for these tasks over many development steps is possible and where possible appreciated, however not guaranteed.

6. Execution of Service

The execution of the service must fulfil the following requirements:

1. The service MUST be executed by capable and qualified employees or sub-contractors under the same rules.
2. The execution MUST comply with the requirements in appendix F and G. Any divergence must be approved by **CT WG *beforehand***.
3. The Contractor MUST provide a weekly progress report to the **CT WG** outlining the tasks performed and the issues encountered. The report must be done on the internal wiki for each project. It must be maintained and show what tasks have been completed, what the next tasks for next week will be and remaining time available to approve new tasks.
4. Throughout the projects the **CT WG** might call for telephone conferences and/or face-to-face meetings with the Contractor to address any possible open questions and to review the progress. The Contractor MUST attend those requested telephone conferences and face-to-face meetings.
 - a. The Contractor MUST attend those requested telephone conferences and face-to-face meetings.
 - b. The **CT WG** MUST give the Contractor a notice of at least two months in advance if participation is required.
 - c. At least one technical resource and one manager assigned to the projects must be legally authorized to travel outside of their home country.

7. Protective Rights

1. ONVIF will hold all rights to the ONVIF Client Test Tool software (the development results), its source code, documentation, and related inventions, achieved by employees and sub-contractors of the Contractor.
2. ONVIF will obtain exclusive and discretionary rights of use without any territorial restrictions or time limits.
3. The Contractor notifies ONVIF if and where it intends to use material in the ONVIF Client Test Tool which is affecting rights of a third party.
4. The Contractor will ensure in an appropriate way that ONVIF can claim inventions made by employees and sub-contractors of the Contractor.

8. Confidentiality

1. The Contractor MUST sign a non-disclosure agreement (NDA) with ONVIF prior to the initiation of the project. This NDA is for ONVIF to share draft technical specifications as well as other necessary non-public information of ONVIF, needed to fulfil this requested service.
2. The Contractor MUST keep all development results and related documents strictly confidential and must release them only to the ONVIF office and the assigned technical contacts of ONVIF.

9. Quotation

The quotation MUST at least contain the following information:

1. Cost of requested service and all other related cost.
2. Cost of travel expenses for two representative of the Contractor at the Developers' Plugfest for "Client Test Tool Clinic".
 - a. Required travel request: Rome (Italy), 13-15 November 2019
 - b. Required travel request: Location to be determined, May or June 2020

Estimate for travel expenses for two representative of the Contractor. The Contractor may not be needed for the whole duration of the meetings.

- c. Possible travel requests for project Kraken:
 - i. Kowloon (Hong Kong) 17-20, September 2019
 - ii. Rome (Italy) 18-21, November 2019
 - d. Possible travel requests for project Luxardo:
 - i. Date and region to be determined, February or March 2020
 - ii. Date and region to be determined, May or June 2020
3. Travel arrangements should be consolidated when possible in case the Contractor is working on parallel projects for ONVIF.

10. References

The following ONVIF documents MUST be used by the Contractor as a reference for any development task done during the project. Any development MUST respect the latest versions of these specifications.

- Profile S Specification (<https://www.onvif.org/profiles/profile-s/>)
- Profile C Specification (<https://www.onvif.org/profiles/profile-c/>)
- Profile G Specification (<https://www.onvif.org/profiles/profile-g/>)
- Profile Q Specification (<https://www.onvif.org/profiles/profile-q/>)
- Profile A Specification (<https://www.onvif.org/profiles/profile-a/>)
- Profile T Specification (<https://www.onvif.org/profiles/profile-t/>)
- Profile D Specification (under development, see contacts)
- Profile M Specification (under development, see contacts)
- Network Interface Specifications (<https://www.onvif.org/profiles/specifications/>)
- Client Test Specifications (<https://www.onvif.org/profiles/conformance/client-test/>)
- Conformance Process Specification (<https://www.onvif.org/profiles/conformance/>)
- Application Programmers Guide (<https://www.onvif.org/profiles/whitepapers/>)

These documents are to be delivered together with this document or upon request by the Contractor.

These documents MAY be replaced with newer versions after the start of the project. In such a case, the **Client Test Tool WG** may inform the Contractor and discuss appropriate actions.

11. Contacts

General contact:

ONVIF

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Technical Contacts:

Technical issues and questions concerning the ONVIF specifications, schemas, and this Request for Quotation MUST be addressed to:

ONVIF TSC Client Test Tool WG

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ONVIF TSC Profile D WG

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Appendix A - Service Timeline

Due dates correspond to end of day in UTC time. See [Appendix B](#) for definition of deliverables.

- 14 Jun 2019 Circulation of this Request for Quotation
- 28 Jun 2019 Quotation must be received by the **ONVIF Office** and **Client Test Tool WG** by e-mail
- 15 Jul 2019 Contractor selected & agreement signed

Project Kraken

- 3 Sep 2019 Delivery of ONVIF Client Test Tool 1st Prototype & Test Specification 1st Draft
- 17-20 Sep 2019 F2F Meetings in Kowloon, Hong Kong
- 29 Oct 2019 Delivery of ONVIF Client Test Tool 2nd Prototype & Test Specification 2nd Draft
- 13-15 Nov 2019 Developers' Plugfest in Rome, Italy
- 18-21 Nov 2019 F2F Meetings in Rome, Italy
- 2 Dec 2019 Delivery of ONVIF Client Test Tool & Test Specification Release Candidate
- 16 Dec 2019 Delivery of Client Test Tool & Test Specification v19.12

Project Luxardo

- 17 Feb 2020 Delivery of ONVIF Client Test Tool 1st Prototype & Test Specification 1st Draft
- Feb/Mar 2020 F2F Meetings (location to be determined)
- 30 Mar 2019 Delivery of ONVIF Client Test Tool 2nd Prototype & Test Specification 2nd Draft
- 27 Apr 2019 Delivery of ONVIF Client Test Tool 3rd Prototype & Test Specification 3rd Draft
- May/June 2019 Developers' Plugfest (location to be determined in Asia)
- May/June 2019 F2F Meetings (location to be determined in Asia)
- 8 June 2019 Delivery of ONVIF Client Test Tool & Test Specification Release Candidate
- 29 June 2019 Delivery of ONVIF Client Test Tool & Test Specification v19.06

Appendix B - Definition of Deliverables

Name	Description
ONVIF Test Specification Draft	<ul style="list-style-type: none"> • Document template updated. • “Test Cases/Use-Cases” integrated into their corresponding Test Specification document in draft form. • History document must be provided for each specification document and kept up-to-date with each subsequent delivery.
ONVIF Test Specification Release Candidate	<ul style="list-style-type: none"> • Only stable “Test Cases/Use-Cases” are included in this delivery. • Total List of “Test Cases/Use-Cases” must be provided. • From that point on, only fixes requested by WG are allowed.
ONVIF Test Specification Final Release	<ul style="list-style-type: none"> • Issues identified in Release Candidate fixed or documented in release notes. • All tickets for the corresponding Milestone have been addressed or postponed.
ONVIF Client Test Tool Prototype	<ul style="list-style-type: none"> • Partial implementation of “Test Cases/Use-Cases” validation and Test Tool features. Only tested “Test Cases/Use-Cases” and features should be delivered. • List of “Test Cases/Use-Cases” and features implemented in the prototype must also be provided.
ONVIF Client Test Tool Release Candidate	<ul style="list-style-type: none"> • Only stable “Test Cases/Use-Cases” and Features are included in this delivery. • From that point on, only fixes requested by WG are allowed.
ONVIF Client Test Tool Final Release	<ul style="list-style-type: none"> • Issues identified in Release Candidate fixed or documented in release notes. • All tickets for the corresponding Milestone have been addressed or postponed.
ONVIF Profile Feature coverage map	<ul style="list-style-type: none"> • A coverage map is maintained by the Contractor. • It is reviewed by the WG members. • It must be up to date for each delivery. • It contains all ONVIF Profiles features and by which Client Test Tool tests they are covered.

Appendix C - Delivery Packages and Responsibilities

Delivery Package	Item	Target	Editing Responsibility
Client Test Specification	Internal Releases Notes	Workgroup	Contractor
	Official Release Notes	Public	Workgroup
	Core Client Test Specification	Public	Contractor
	Imaging Client Test Specification	Public	Contractor
	Audio Backchannel Client Test Specification	Public	Contractor
	Advanced Security Client Test Specification	Public	Contractor
	Analytics Client Test Specification	Public	Contractor
	Device I/O Client Test Specification	Public	Contractor
	OSD Client Test Specification	Public	Contractor
	Profile S Test Specification	Public	Contractor
	Profile G Test Specification	Public	Contractor
	Profile C Test Specification	Public	Contractor
	Profile Q Test Specification	Public	Contractor
	Profile A Test Specification	Public	Contractor
	Profile T Test Specification	Workgroup	Contractor
ONVIF Client Test Tool	Binaries	ONVIF Members	Contractor
	Source Code	Workgroup	Contractor
	Help Files	ONVIF Members	Contractor
	Installation Guide	ONVIF Members	Contractor
	Internal Release Notes	Workgroup	Contractor
	Official Release Notes	ONVIF Members	Workgroup
	Errata Document	ONVIF Members	Workgroup
Profile	Profile S Specification	Public	Device Testing WG
	Profile C Specification	Public	Device Testing WG
	Profile G Specification	Public	Device Testing WG
	Profile Q Specification	Public	Device Testing WG
	Profile A Specification	Public	Device Testing WG
	Profile T Specification	Public	Device Testing WG
	Profile D Specification	Workgroup	Profile D WG
	Profile M Specification	Workgroup	Profile M WG

Appendix D - Project Kraken – Initial Scope-of-work

The *CT WG, Profile D WG and Profile M WG* use a ticket system to manage all work items for the Contractor and for the working group. The tickets can be consulted at <https://wush.net/trac/onvif-ext3/report/3>. Only tickets targeted at the Milestone Kraken are part of this Scope-of-work. Additional tickets will be created during the project and will be prioritized by the workgroup.

The Contractor must follow the instructions detailed here https://wush.net/trac/onvif-ext3/wiki/best_practices_vendor_company when working with the tickets.

Ticket	Summary	Type	Priority
#323	Profile D Mandatory Features	New task	High
<p>Once the Profile D workgroup has agreed on a core set of Mandatory Features, those should be added to a new Profile T Client Test Specification and implemented in the Client Test Tool.</p> <p>Currently a placeholder for future scope-of-work from Profile D workgroup.</p> <p>Profile D test coverage map needs to be update as soon as a test is delivered.</p>			

Ticket	Summary	Type	Priority
#324	Profile D Conditional Features	New task	Medium
<p>Once the Profile D workgroup has agreed on a core set of Conditional Features, those should be added to a new Profile T Client Test Specification and implemented in the Client Test Tool.</p> <p>Currently a placeholder for future scope-of-work from Profile D workgroup.</p> <p>Profile D test coverage map needs to be update as soon as a test is delivered.</p>			

Ticket	Summary	Type	Priority
#325	Profile M Mandatory Features	New task	High
<p>Once the Profile M workgroup has agreed on a core set of Mandatory Features, those should be added to a new Profile M Client Test Specification and implemented in the Client Test Tool.</p> <p>Currently a placeholder for future scope-of-work from Profile M workgroup.</p> <p>Profile M test coverage map needs to be update as soon as a test is delivered.</p>			

<u>Ticket</u>	<u>Summary</u>	<u>Type</u>	<u>Priority</u>
#326	Profile M Conditional Features	New task	Medium
<p>Once the Profile M workgroup has agreed on a core set of Conditional Features, those should be added to a new Profile M Client Test Specification and implemented in the Client Test Tool.</p> <p>Currently a placeholder for future scope-of-work from Profile M workgroup.</p> <p>Profile M test coverage map needs to be updated as soon as a test is delivered.</p>			

<u>Ticket</u>	<u>Summary</u>	<u>Type</u>	<u>Priority</u>
#331	Get/Set TLS Version Tests	New task	High
<p>This was flagged as an important interface for interoperability. Cyber security is becoming increasingly important and this interface can be used by ONVIF Clients to improve security of ONVIF Devices.</p> <p>There should be an equivalent task on the DTT side. We can put the task number here when we get it.</p>			

<u>Ticket</u>	<u>Summary</u>	<u>Type</u>	<u>Priority</u>
#332	EVO - Media2 Streaming Advanced Support in CTT simulator	New task	Low
<p>The main goal is to make it easier to develop conformant Onvif clients. For this we could foresee the following requirements:</p> <ul style="list-style-type: none"> • scriptable behavior: <ul style="list-style-type: none"> • configurable numbers of VS, VSC, VEC, MC, AC, AS, ASC, AEC, AO, AOC, ADC. • configurable capabilities for these configurations. • configurable capabilities for Media2 <p>This could only be used in diagnostics! No conformance possible as these features are present on real devices.</p>			

<u>Ticket</u>	<u>Summary</u>	<u>Type</u>	<u>Priority</u>
#333	EVO - Add Backchannel Support for CTT simulator	New task	Low
<p>The main goal is to make it easier to develop conformant Onvif clients. For this we could foresee the following requirements:</p> <ul style="list-style-type: none"> • Workable single backchannel using Media2. • Scriptable in the same "way" as #332. • Basic decoding to validate that a supported codec is received by the simulator. <p>This could only be used in diagnostics! No conformance possible as this feature is present on real devices.</p>			

Ticket	Summary	Type	Priority
#334	EVO - Add Backchannel Support for CTT simulator	New task	Low
<p>The main goal is to make it easier to develop conformant ONVIF clients. For this we could foresee the following requirements:</p> <ul style="list-style-type: none"> • Workable PTZ using Media2. • Scriptable in the same "way" as #332. • PTZ current position simulation. <p>This could only be used in diagnostics! No conformance possible as this feature is present on real devices.</p>			

Ticket	Summary	Type	Priority
#335	EVO - Analytics Support in CTT simulator	New task	Low
<p>The main goal is to make it easier to develop conformant ONVIF clients. For this we could foresee the following requirements:</p> <ul style="list-style-type: none"> • Workable Analytics Service Specification implementation with Media2. • Scriptable in the same "way" as #332. • Basic analytics configuration with any kind of analytics that could be easily generated from the simulator. Example: number of packets sent and received analyzer or CPU usage analyzer. <p>This could only be used in diagnostics! No conformance possible as this feature is present on real devices.</p>			

Appendix E - Project Luxardo – Initial Scope-of-work

The **Client Test Tool WG** uses a ticket system to manage all work items for the Contractor and for the working group. The tickets can be consulted at <https://wush.net/trac/onvif-ext3/report/3>. Only tickets targeted at the Milestone Luxardo are part of this Scope-of-work. Additional tickets will be created during the project and will be prioritized by the workgroup.

The Contractor must follow the instructions detailed here https://wush.net/trac/onvif-ext3/wiki/best_practices_vendor_company when working with the tickets.

Project Luxardo will also include all items postponed from Project Kraken.

Ticket	Summary	Type	Priority
#327	Media 2 Privacy Mask tests	New task	Medium
Implement privacy mask tests. Test feature as described by the Media 2 service specification			
There should be an equivalent task for the device test tool. Once the number is known, please add the ticket number here.			

Ticket	Summary	Type	Priority
#328	Thermal Service Tests	New task	Medium
Using the Thermal Service Specification:			
<ul style="list-style-type: none"> • Produce a coverage map • Implement new tests to test the service • Update the coverage map for any new test 			
There is an equivalent task with the DTT. Please link ticket here. It would be better if both tasks are done close to each other in the development timeline.			

Ticket	Summary	Type	Priority
#329	Radiometry Events Tests	New task	Medium
This is related to ticket #328.			
Add a test in the simulator so that Onvif client can receive the radiometry events and test their implementation.			

Ticket	Summary	Type	Priority
#330	Full IPv6 Onvif Client Conformance	New task	Medium
<p>Most client conformance testing is done in IPv4. We want to be ready for IPv6.</p> <ul style="list-style-type: none"> • See current status of the CTT: Can we do a conformance in IPv6 only? • Which kinds of automated do we have in place? What's the percentage of tests already covered for IPv6 conformance in the CTT? • Create other tasks if new features need to be developed. 			

Appendix F - Technical Requirements for the ONVIF Client Test Tool

1. The ONVIF Client Test Tool v19.06 MUST be used as a base for this project.
2. The existing functionality of the ONVIF Client Test Tool v19.06 MUST NOT be altered other than to incorporate the functions and operations requested herein or where the workgroup explicitly approves the changes.
3. Development and validation of the tool MUST be done on 64-bit versions of Windows 7/Windows 10.
4. Programming language MUST be C# and target a recent .Net framework (4.5.1 and up).
5. The software source code MUST be documented in good practice in English in the standard source code comments scheme. Documentation MUST at least cover classes, methods, parameters, return values, and exceptions. Level of details of the documentation must be such that ONVIF, or a knowledgeable third party requested by ONVIF, can further develop and/or amend the software.
6. The software source code MUST be developed using the workgroup-provided Version Control System. The workgroup is currently using Subversion for version control of the Client Test Tool and Client Test Specification files.
7. All external frameworks used MUST be approved by the workgroup, actively maintained by the community and covered by an open license.
8. The executable application, the source code and the accompanying documentation MUST be delivered in electronic form to the workgroups, using the External Wiki (<https://wush.net/trac/onvif-ext3>) before the projects closure or on request by the working group.
9. The workgroups MUST report defects against the executable application, the source code and the accompanying documentation using the External Wiki (<https://wush.net/trac/onvif-ext3>).
10. User interaction during execution of tests SHOULD be avoided where possible. Introduction of user interaction MUST be approved by the **CT WG**.
11. Help pages MUST include images and text describing all operation modes of the ONVIF Client Test Tool.
12. Minimum hardware requirements: Ordinary Intel x86 architecture-based PC.
13. Software requirements
 - a. Visual Studio 2017 and WiX Toolset
 - b. Graphical User interface in US English language
14. Performance
 - a. Memory usage SHOULD stay under 32 bits addressable memory space.
 - b. Multithreading SHOULD be used when applicable.

Appendix G - Outline of Quality Related Deliverables

1. Document and execute test cases to validate the behavior of the ONVIF Client Test Tool, including but not restricted to:
 - a. Correctness of documents generated by the Tool.
 - b. Correctness of test procedure in Conformance Mode.
 - c. Execute Test Tool with sample inputs provided by members of ONVIF.
 - d. Plan and execute regression testing for each new feature added to the CTT using the automated testing tools documented in the external wush (https://wush.net/trac/onvif-ext3/wiki/ONVIF_CTT_Auto). Test reports must be provided in each wush ticket. These tests reports must be an overview of the tests that were chosen per feature under test in the CTT, their expected result and their final results. When relevant, profile conformance status must also be provided and show the expected result and the final results obtained. These tests reports are subject to improvements identified by the **CT WG** and the Contractor MUST adapt the reports once a change is required by the **CT WG**.
 - e. Generation of DoC only with full success run.
2. Report issues to the workgroup with all the necessary information to be easily reproduced, including but not restricted to:
 - a. Description of issue
 - b. Repro steps
 - c. Network traces
3. Provide a “lessons learned” document regarding any relevant problems or issues found during development, including but not restricted to:
 - a. Correctness of WSDL files.
 - b. Correctness of technical specifications.
 - c. Ambiguity or limitations of the specifications.
 - d. Process and communication with the workgroup.