

OpenSG Edge/Enterprise Conformance Task Group

Certification Process Reference Manual

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December-February 1644, 20110

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Disclaimer

68 This document should be considered as a living document. It is anticipated that there will be
 69 updates resulting from further work within OpenSG and the work of the NIST SGIP Test and
 70 Certification [Committee](#) (SGTCC).

71

Change History

73

Date	Rev	Change	By
August 25, 2010	R9: work in progress	Added this Change History Table	Phil Beecher
		Generalized references to “products” (previously devices and systems)	
		Added Context for OpenSG Conformance Program	
		Reorganized acronyms and definitions	
		Inserted system component overview diagram	
		Merged sections describing Approved Device Certification Lab and Approved System Certification Lab	
December 11, 2010	V0.9	Added line numbers, Revised version number ready for comment and voting	Phil Beecher
January 28, 2011	V0.9 Draft pre-D2 wip	Applied changes as described in comment spreadsheet r02	Phil Beecher
Feb 3, 2011	V0.9 Draft preD2	Applied changes as described in comment spreadsheet r03	Phil Beecher
Feb 16, 2011	V0.9 Draft D2	Release for recirculation ballot	Phil Beecher

74

75 **1. Introduction**

76 The electric energy utility industry has sponsored the work of the Open Smart Grid (OpenSG)
77 Conformity Working Group organization, Edge Conformance Task Group (OpenSG Edge TG),
78 under the auspices of the Utility Common Architecture Group (UCA Group). This OpenSG
79 Edge TG is tasked with the job of defining the necessary requirements for assuring
80 conformance and interoperability of various devices, systems and technologies in Enterprise
81 Systems, OpenHAN, OpenADR, and OpenADE specifications.

82
83 The GridWise Council, sponsored by NIST, also address issues of interoperability and testing.
84 This document aims to be inclusive of the GridWise Council work products, while maintaining a
85 clear focus on utility infrastructure and industry requirements.

86 **1.1. Purpose**

87 This document describes the Interoperability and Conformance Program (ICP) required by
88 OpenSG. The purpose of this document is to promote industry-centered robust product and
89 system certification programs to test for the stringent requirements from AMI-Enterprise,
90 OpenHAN, OpenADR, and OpenADE. It is the intent of this document to become the basic
91 foundation of standards organization testing and certification programs that would be deemed
92 acceptable to the utility industry and the smart grid industry community at large.

93 **1.2. Scope**

94 This document covers the entire framework description of the ICP. The ICP follows the
95 OpenSG Edge Conformity WG Guiding Principles. This document is issued by the OpenSG
96 Edge and Enterprise Conformance Task Groups, and implements the following key policy
97 factors:

- 98
- 99 • Testing and certification experiences of communication protocol stacks following
100 Best Practice for testing as described in the Guiding Principles document.
- 101 • The importance of accumulated experience of testing institutions is recognized. Of
102 particular importance are: coexistence with interferers, interoperability at application
103 layers but with various physical layers and interconnections thereof, and
104 enforcement of standards based interoperability.
- 105 • Systems represented in the OpenSG community are covered, including AMI-
106 Enterprise Systems, OpenHAN, OpenADE and OpenADR interoperability and
107 conformance.
- 108

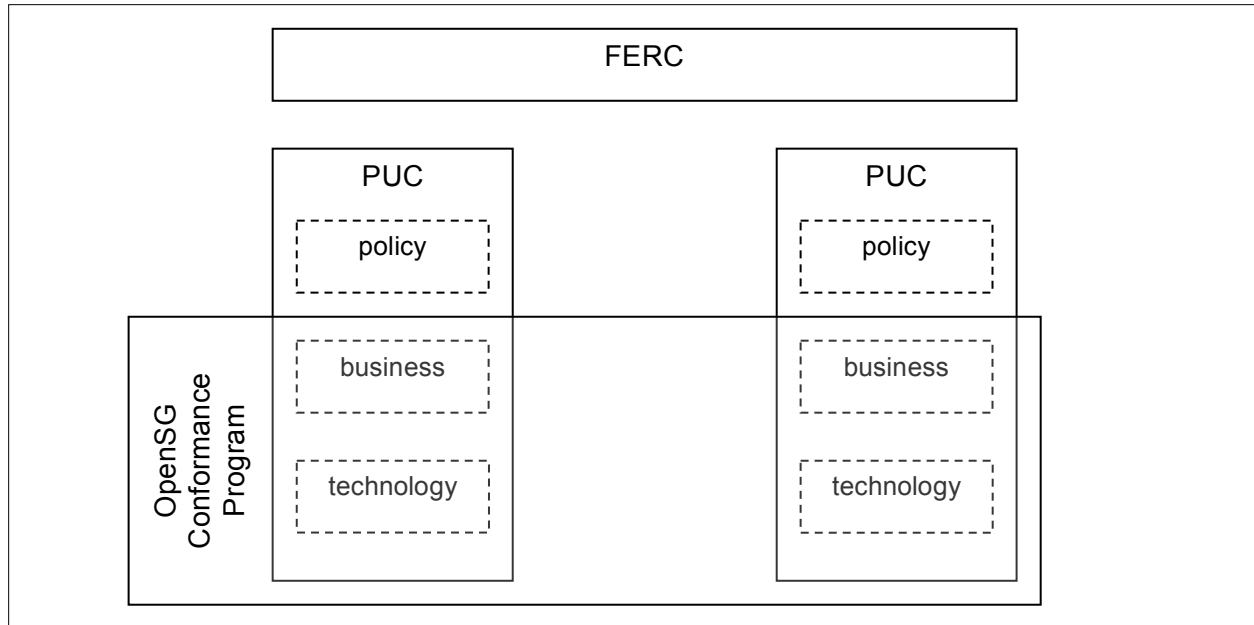


Figure 1: Context for OpenSG Conformance Program

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Figure 1 shows the context for the OpenSG Conformance and Interoperability program. Each electric utility operates their smart grid within a technical, informational, and business environment different for every PUC and interested party jurisdiction. As such, the smart grid technologies will be installed in different regulatory and infrastructure environments. The CPRM shares a common purpose with NIST SGIP TCC Interoperability Process Reference Manual, which should be read as a companion document. However, this CPRM specifically describes the model implementation for informational and technical layers of the GWAC stack.

In general, the ICP framework shall consist of a basic two parts, with one part being the ICP Program Operations and Administration, while the other is the ICP Requirements & Policy. An Interoperability ~~Program—Management—Organization~~ Testing and Certification Authority (IPMOITCA) shall oversee the entire program and liaise with OpenSG on the suitability of the specific ICP Program.



Figure-2: Organization

126
127
128
129

130 1.3. Acronyms and Abbreviations

131 **AMI:** Advanced Metering Infrastructure refers to systems that measure, collect and analyze
132 energy usage, and interact with advanced devices such as electricity meters, gas meters, heat
133 meters, and water meters, through various communication media either on request (on-
134 demand) or on pre-defined schedules.

135
136
137 **APCB:** Approved Product Certification Body - Qualified organisation responsible to manage a
138 certification process for a particular product, and independent from test laboratory. The product
139 may be either a device or module incorporating hardware and software, or a software only
140 system / sub-system~~Qualified person responsible to manage a certification process for a~~
141 ~~particular device, and independent from test laboratory or manufacturer.~~

142
143 **APCL:** Approved ~~Device-Product~~ Certification Laboratory - Testing organization tasked to
144 evaluate device-product for compliance and interoperability. The product may be either a device
145 or module incorporating hardware and software, or a software only system / sub-system

146
147 ~~**APCB:** Approved Product Certification Body - Qualified organisation responsible to manage a~~
148 ~~certification process for a particular product, and independent from test laboratory. The product~~
149 ~~may be either a device or module incorporating hardware and software, or a software only~~
150 ~~system / sub-system~~

151
152 **API:** Application Program Interface

153

154 | **CA:** Certificate Authority - Body responsible for digital certificate issuance of certified products
155 | and systems. This includes embedded devices, as well as browsers conforming to ZigBee SE
156 | Security (ECC) and X.509 security schemes.

157 |
158 | **CCB:** Change Control Board - A Change Control Board is used to control identified system
159 | changes, review impacts, and grant approvals as part of the change management function. The
160 | CCB is typically comprised of members from the participating organizations shown in

161 |
162 | **CIS:** Customer Information System

163 |
164 | **CPM:** Certification Program Manager - Person tasked by the SSO/SDO to administer the test
165 | and certification program

166 |
167 | **CRSL:** Certification Reference Status List - List of test cases that are draft, active, deprecated,
168 | and planned in the certification program.

169 |
170 | **CVS:** Concurrent Versions System – a version control system often used for software
171 | development

172 |
173 | **DER:** Distributed Energy Resources

174 |
175 | **EMS:** Energy Management System

176 |
177 | **ESI:** Energy Services Interface

178 |
179 | **Gauge R & R:** is a Measurement Systems Analysis technique which uses Analysis of Variance
180 | (ANOVA) random effects model to assess a measurement system. There are two important
181 | aspects of a Gauge R&R. First, **Repeatability:** the variation in measurements taken by a single
182 | person or instrument on the same item and under the same conditions, and second,
183 | **Reproducibility:** the variability induced by the operators. It is the variation induced when
184 | different operators (or different laboratories) measure the same part.

185 |
186 | **HAN:** Home Automation Network

187 |
188 | **IUT:** Implementation Under Test

189 |
190 | **ICP:** Interoperability and Conformance Program

191 |
192 | **ITCAPMO:** Interoperability ~~Program Management Organization~~Test and Certification Authority -
193 | An administrative organization vested with the responsibility of operating and maintaining a
194 | testing and certification program for smart grid technology, and responsible to maintain its
195 | efficacy per the OpenSG requirements.

196 |
197 | **LL:** Lead Lab - Central technical authority for testing and testing technology

198 |
199 | **MDMS:** Meter Data Management System

200 |
201 | **OSI:** The Open System Interconnection Reference Model or OSI Reference Model is a
202 | conceptual description for layered communications network protocol design.

203 |

204 | **PICS:** Protocol Implementation Conformance Statement

205

206 | **PIXIT:** Protocol Implementation Extra Information for Testing

207

208 | **REST:** Representational State Transfer (REST) is a style of software architecture for distributed

209 | hypermedia systems such as the World Wide Web. REST-style architectures consist of clients

210 | and servers. Clients initiate requests to servers; servers process requests and return

211 | appropriate responses. Requests and responses are built around the transfer of representations

212 | of resources.

213

214 | **SOAP:** originally defined as **Simple Object Access Protocol**, is a protocol specification for

215 | exchanging structured information in the implementation of Web Services in computer networks.

216

217 | **SSO:** Standards Setting Organisation— - An organisation which sets standards

218

219 | **SRS:** System Requirements Specification

220

221 | **SUT:** System Under Test

222

223 | **SVN:** Subversion – a version control system often used for software development

224

225 | **TAB:** Technical Advisory Board - a working group consisting of representatives of test labs,

226 | certification bodies, and SSO/SDO administration; facilitates in the operation of the testing and

227 | certification program, and discuss timely and critical issues facing the whole process.

228

229 | 1.4. Terminology

230 | **AMI-Ent:** The AMI Enterprise Task Force defines requirements, policies, and services, based

231 | on utility industry standards such as the Common Information Model (CIM), required for

232 | information exchange and control between the AMI Head-Ends, MDMS or MDUS and enterprise

233 | back office systems.

234

235 | **Certification Tool:** A certification tool is a readily accessible and open online tool for industry to

236 | submit evidence of products for certification

237

238 | **Compliance:** A system is said to be “complying” when it is subjectively judged to be functioning

239 | according to specifications. The judgment is subjective by nature, as it is not

240 | evaluated by a third party. Hence compliance is a weaker adherence to specification when

241 | compared with conformance

242

243 | **Conformance:** A system “conforms” with a specification when it is objectively judged to be

244 | functioning according to specifications. The judgment is both rigorous/objective, based on

245 | technical and qualitative measures.-

246

247 | **Conformance Testing:** Determines whether an implementation conforms to the standard as

248 | written, usually by exercising the implementation with a test environment. Conformance testing

249 | is often also referred to as Verification testing. However, for consistency, the term

250 | “Conformance” is used exclusively in this document.

251

252 **Compliant Portion:** is defined as the part of a specific hardware and firmware/software
253 configuration which behaves consistently according to the spec. The compliant portion may be
254 compromised of individual hardware or firmware/software components, which when combined,
255 become the compliant portion

256
257 **Device:** A device is a product which incorporates hardware, typically including communications
258 hardware which is included as part of the compliant portion. A device will usually be deployed at
259 the edge of the utility network.

260
261 **Enterprise System:** large-scale, integrated application-software package(s) that use the
262 computational, data storage, and data transmission power of modern information technology to
263 support business processes, information flows, reporting, and data analytics within and between
264 complex organizations.

265
266 **Equivalence:** An evaluation of a system against another system instantiation, whereby
267 features/functions are compared and contrasted; when all such features/functions are identical,
268 the system is judged to be in "equivalence".

269
270 **Instantiation:** An implementation of a system, either compliant or conforming. --- Example:
271 compiling, etc.

272
273 **OpenADE:** The OpenADE Task Force is a group of smart energy management vendors,
274 utilities, and consumer interests developing recommendations toward building interoperable
275 data exchanges that will allow customer authorization and sharing of utility consumption
276 information with 3rd party service providers.

277
278 **OpenADR:** Open Automated Demand Response

279
280 **OpenHAN:** OpenHAN Home Area Network Device Communication, Measurement, and Control
281 focuses on the consumer interface task defined by UtilityAMI.

282
283 **Reference System:** ~~A system created as a complying instantiation.~~

284
285 **Prototype System:** A system created as a conforming instantiation.

286
287 **Reference System:** A system created as a complying instantiation.

288
289 **Primary Test Categories:** Canonical Baseline Test Types - tests categories that are deemed
290 to be minimum required for an acceptable and effective testing program.

291
292 **Signed Certification Mark License Agreement** – ~~[defn-required]~~A licence agreement between
293 the ITCA and the applicant for a Certification Mark

294
295 **System:** Part or whole instance of product functionality, usually associated with software portion
296 of product

297
298 **Product:** Hardware and/or software implementation to be tested for compliance /
299 interoperability

300
301 **Module:** Hardware and software implementation that incorporates a compliant portion
302

303 **Component:** piece of software that together with another piece of software or hardware form a
304 Compliant Portion

305
306 **Interoperability:** Communication and functionality achieved by multiple conforming systems. A
307 ~~correspondance~~correspondence of interfaces between two abstract functional units.

308
309 **Interoperability Testing:** connects two or more implementations together and determines
310 whether they can successfully communicate. Significantly different from conformance testing
311 because it is often possible for two systems that conform to the standard to be unable to
312 communicate. If they can communicate, it is possible that they cannot perform any useful
313 applications. These situations can arise because the implementations have conflicting
314 interpretations of the specification or because they have chosen conflicting options within the
315 standard. A particular form of interoperability testing is application testing in which there is a
316 specification for the particular use of a standard that can be tested

317
318 **Security Testing:** Analyzes whether the implementation correctly makes use of any security
319 features from the standard or other security features available in the device or computer system
320 housing the implementation. This is the most difficult type of testing program because it must
321 evaluate whether the system has vulnerabilities, which are not always obvious.

322
323 **Validation Testing:** Validation testing ensures that a system meets the needs of its users and
324 stakeholders. System end-to-end tests are examples of validation tests.

325

326 1.5. Other Considerations and References

327 It is the intention of this group to work with other organisations to reduce duplication of effort and
328 leverage other activities and expertise. The OpenSG Conformity Task Forces will interface with
329 the following organizations such as:

330

- 331 • NIST
- 332 • SGIP TCC
- 333 • ZigBee Alliance
- 334 • HomePlug Alliance
- 335 • Wi-Fi Alliance
- 336 • CIMug
- 337 • Others

338

339 Formal liaisons will be established as required. This will be dependent on level of accreditation.
340 It may also be dependent on the use of a logo.

341

342 Requirements and contributions from Utilities, Vendors and others will be captured through the
343 contributors' participation in OpenSG.

344

345 1.6. Overview

346 The scope of the design of the program described in this document is to certify products and
347 systems to

- 348
- 349 • relevant mandatory and optional conformance feature sets of the communication
350 stack physical layer
- 351 • relevant mandatory and optional conformance feature set of the communication
352 protocol stack
- 353 • interoperability of devices within the device class, and service level and application
354 interfaces relevant to the application profiles
- 355 • interoperability with applications and service level interfaces from other network
356 domains within the smart grid communication infrastructure
- 357 • conformance to metrics for product and system performance as specified by
358 business, regulatory, and user requirements per the GWAC stack framework
- 359

360 The relevant PICS documents are required to incorporate the SRS documents from AMI-
361 Enterprise System, OpenHAN, OpenADR, and OpenADE as appropriate. Product and System
362 Certification shall require applicants to sign a Declaration of Conformity (DoC) document prior to
363 a Certification by the relevant organization.

364

365 The product certification process applies to deployable end products and reference designs
366 such as, but not limited to, Smart Meters, Energy Service Interfaces and [OpenHAN](#) compliant
367 Smart Energy 2.x~~0~~ device implementations (PCT, IHD, LCD, etc.). The certification process
368 also addresses complete radio, PLC, wireline, and/or radio-PLC-wireline modules and reference
369 designs which may be integrated into other end products, typically without further modification,
370 and therefore without further certification (See section Inheritance). Re-certification of certified
371 device versions (evolving devices) and variants (adaptations) are also addressed (Section:
372 Revisions). The certification program does not certify incomplete implementations (SW/HW
373 components, subcomponents, subunits) of devices and applications, for example an
374 implementation of part of the protocol stack.

375

376 The certification process is also applied to application software and systems consuming
377 services at interfaces with AMI and smart grid communication infrastructure, to define the
378 system certification process. These may include OpenADR and OpenADE client / server
379 services, including Demand Response Automated Server (DRAS), Demand Response Client,
380 portal services and AMI-Enterprise services. Re-certification of certified application software
381 and system versions and variants are also addressed (Section: Revision). The certification
382 program does not certify incomplete implementations that do not implement [a](#) mandatory set of
383 features.


384

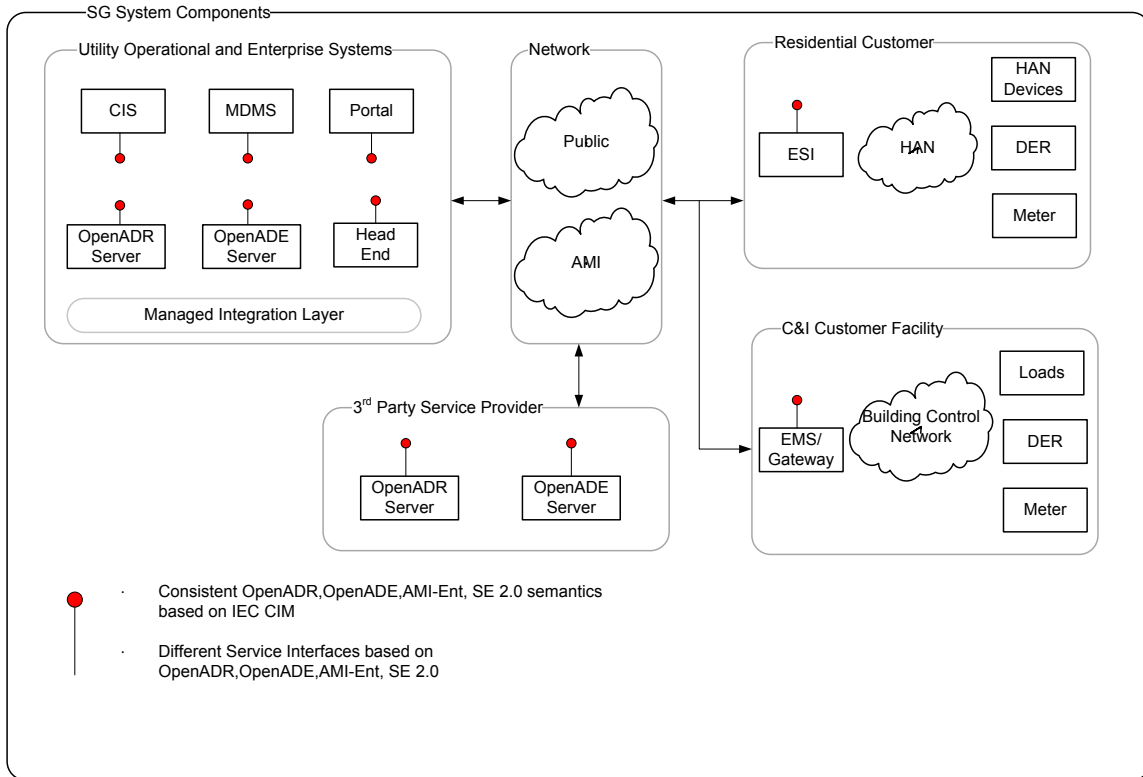
385 In the event of discrepancies or errors in the Requirements, Standard, Specifications or
386 Certification testing of products or systems, an industry Lead Laboratory (LL) will notify all
387 affected parties regarding needed remediation activities. In the event of an invalid test
388 specification or requirement, an industry WG shall review the test result and procedures
389 followed. If corrective action is needed the industry WG in cooperation with the LL will
390 determine the course of action and notify all affected companies of its determination.

391

392 If a product or system is certified and later the registered company is no longer a viable entity,
 393 the ~~certificate~~-certification remains active but use of relevant logo stops and the listing is
 394 removed.

395
 396 Figure 2Figure-3 shows an Overview of the System Components to be considered by OpenSG

397 Edge /Enterprise Conformity Task Groups. The service interfaces are shown as .



399
 400

Figure 2: System Component Overview

401 2. Overall Description

402 2.1. Guiding Principles

403 The SG Conformity Task Forces shall define Policy, Process and Procedures required to
404 implement testing and certification programs.

405
406 For both systems and devices that incorporate a hardware portion, existing Best Practice
407 Structure shall be utilized. The importance of accumulated experience of testing institutions is
408 also recognized. The following points must be considered in the ~~IPMO~~-ITCA when creating and
409 maintaining a testing and certification program.

410 2.1.1. Open standards based

411 A public specification that is maintained by an open, public consensus process to accommodate
412 new technology over time and that is consistent with standards. Open standards lower total
413 cost of ownership and provide an open platform that encourages innovation.

414 2.1.2. Robust and comprehensive certification process

415 Robust certification processes are needed to guarantee a seamless user experience that
416 minimizes support calls and builds confidence in the maturity of the smart grid technologies.

417 2.1.3. Clean, layered architecture

418 Adherence to industry best practices for software and systems development is a guiding
419 principle. Specifically, the system designs shall follow a clean, layered OSI architecture model.
420 This allows standardization of the higher levels of the stack to provide modularity and use of
421 multiple transport layers.

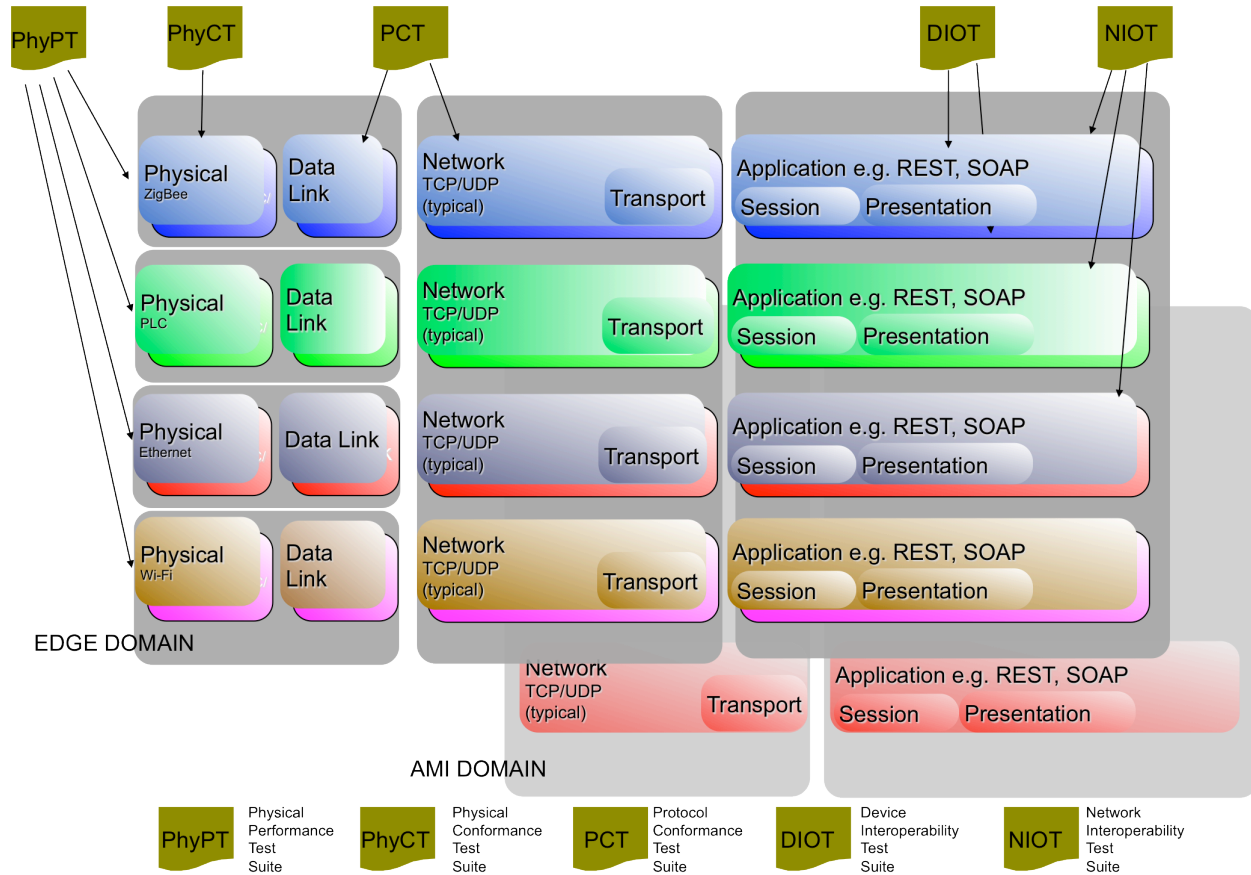
422 2.1.4. Focus

423 The focus for devices and systems should be on the application programming interfaces and not
424 specific applications. Identifying the interfaces between applications and the core information
425 sets available provides a minimum set of attributes to enable the required functionality. This
426 enables a platform for innovation upon which a wide range of applications can be designed and
427 built to suit users' requirements and preferences while maintaining adherence to the open
428 standard.

429 2.2. End to End System Interoperability

430 The Smart Grid communication infrastructure can be described by the OSI-7 layer model, but
431 with added description of multiple domains of network (Edge and AMI). Conformance tests
432 evaluate a unit or system under test for its adherence to a specification, whereas an
433 interoperability test verifies the ability of a device to intercommunicate within its domain with
434 peer layers of the OSI-stack. Further, the performance tests evaluate a unit or system under
435 test for its fitness of use in deployment scenarios under business requirements. [Figure 3](#)
436 [Figure 4](#) shows how individual test suites relate to the complete system. In the Edge Domain, products
437 may incorporate hardware portions, e.g. radio devices or PLC. [Where a product incorporates](#)

438 | one or more hardware portions, e.g. a ZigBee Programmable Thermostat In this case, Physical
 439 | Performance and Physical Conformance Test Suites as well as Protocol Conformance Test
 440 | suites for the Data Link Layers are required. However, where a product is a software system,
 441 | e.g. a 3rd party OpenADE server, application layer testing only is required.
 442 |



443 | **Figure 3: Context of individual test suites related to the total system**
 444 |
 445 |

446 | [Figure 4: ZigBee SE2.0 Certification Scheme](#) shows an example certification scheme as proposed for ZigBee Alliance Smart Energy Profile
 447 | 2.0. The Certification Test Cases has been divided in 4 main sets: IEEE 802.15.4-2006, Stack,
 448 | Platform and Device Type Certification. The coverage of each set of tests is shown in the figure.
 449 |
 450 |

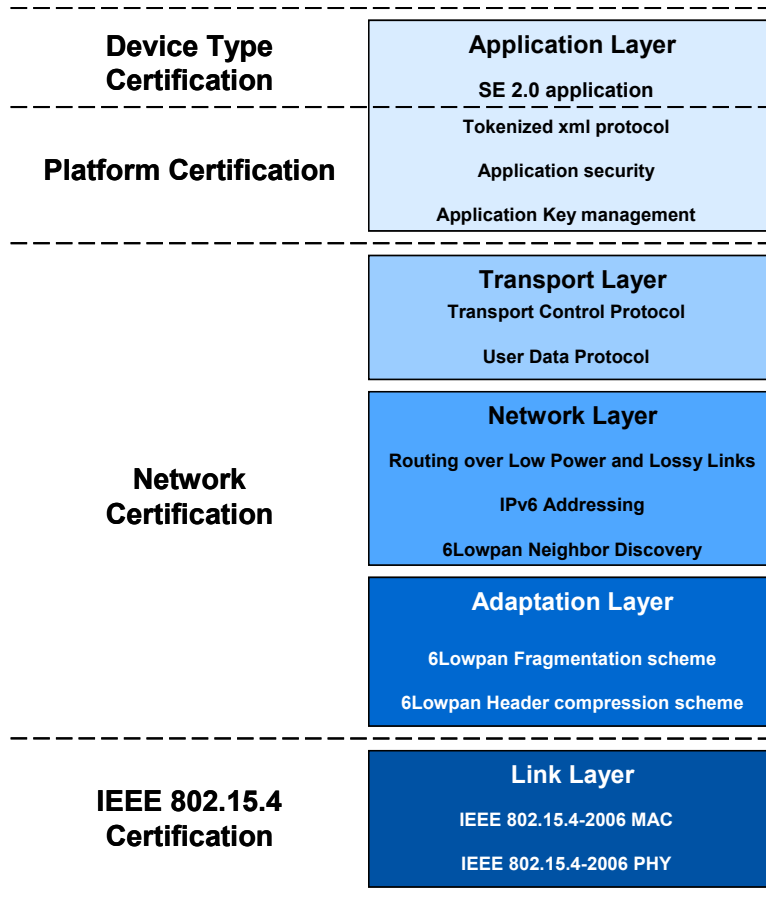


Figure 4: ZigBee SE2.0 Certification Scheme

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452
453

2.3. Economic Viability

The ~~IPMO-ITCA~~ shall design a testing and certification program that is economically viable for industry participants, including utilities, device and software vendors, and test laboratories.

2.4. Minimize Test Organization

The following statements describes the foundation of the testing program to establish rapidly maturing interoperable products and interfaces between products based on designated specifications relevant to the Edge.

2.5. Coexistence

A mass, scalable deployment of communication technology requires “robustness”, and in particular, coexistence with other technologies already in the field. These technologies may be wireline, such as DSL, or non-standard PLC technologies, or wireless, such as Bluetooth and Wi-Fi. Previously, the newer of installed technologies may or may not have impacted legacy devices; however, with SE 2.0, wireline and wireless technologies may have mutual interference effects that need to be mitigated for successful deployment.

468

469 2.6. Interoperability

470 Certified products should interoperate at all layers. For mature technologies with proven
471 certification programs, adoption should be straightforward. In recognition of various physical
472 communication and protocol layers (OSI layers 1-4) that may be deployed at any time by the
473 adopters of SEP, applications need to interoperate independent of the physical, MAC, link, and
474 transport layer selection.

475

476 2.7. Standardization Efforts

477 Industry, nation and worldwide efforts are underway to define specifications not only of
478 technology but also of interoperability itself. As such the Edge/Enterprise product testing and
479 certification program shall continually monitor these standard developments (such as IEEE-SA
480 P2030) and maintain compatibility with specified standards.

481

482 2.8. Architectural Considerations

483 The Gridwise Architecture Stack (GWAC) stack is shown below in Figure 5. The stack
484 adequately describes the scope of the interoperability topic at hand, and serves as a starting
485 point for the discussion on architectural considerations for the testing and certification program
486 | required from [IPMOs/ITCAs](#).

487

488 Briefly, the three domains of Technical, Informational, and Organization blocks of the GWAC
489 | stack cover distinct ~~by-but~~ very relevant end-to-end system and cross business interoperability
490 requirements.

491

492 | It is recognized here that [IPMOs-ITCAs](#) may scope activities that are subsets of the GWAC
493 stack, and may concentrate its efforts mostly on the *Technical block*. The OpenSG Edge
494 | Conformity requires that the [IPMO-ITCA](#) bring into consideration the interdependencies of the
495 | other GWAC stack blocks that are not specifically addressed by the [IPMO-ITCA](#) itself, and to
496 | maintain sufficient mechanism to address characteristics and limitations of the [IPMO's-ITCA's](#)
497 | portion of the total end-to-end system architectural issues.

498

499 | As such, the [IPMO-ITCA](#) shall take steps to establish needed formal liaison relationships with
500 | customer and SSO, to assure that end-to-end system requirements are adequately included in
501 | the [IPMO-ITCA](#) established program.

502

503 | As a general requirement for a qualified [IPMO-ITCA](#) following this OpenSG document, that
504 | [IPMO-ITCA](#) shall implement a formalized market and technical requirements derivation process,
505 | and include end-to-end system needs through utilization of SRS from OpenSG.

506

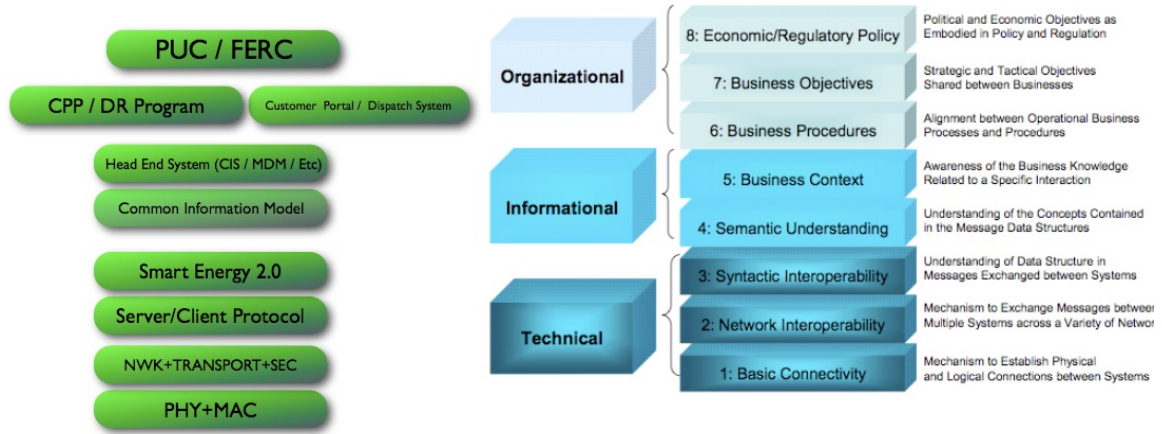


Figure 5: GWAC Stack

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509

3. Organizational Requirements

3.1. Governance

Figure 6 shows a suitable organizational structure for the management of a certification program. The IPMO-ITCA shall structure the testing and certification program with the following specific elements described below; to ensure that industry best practices are installed.

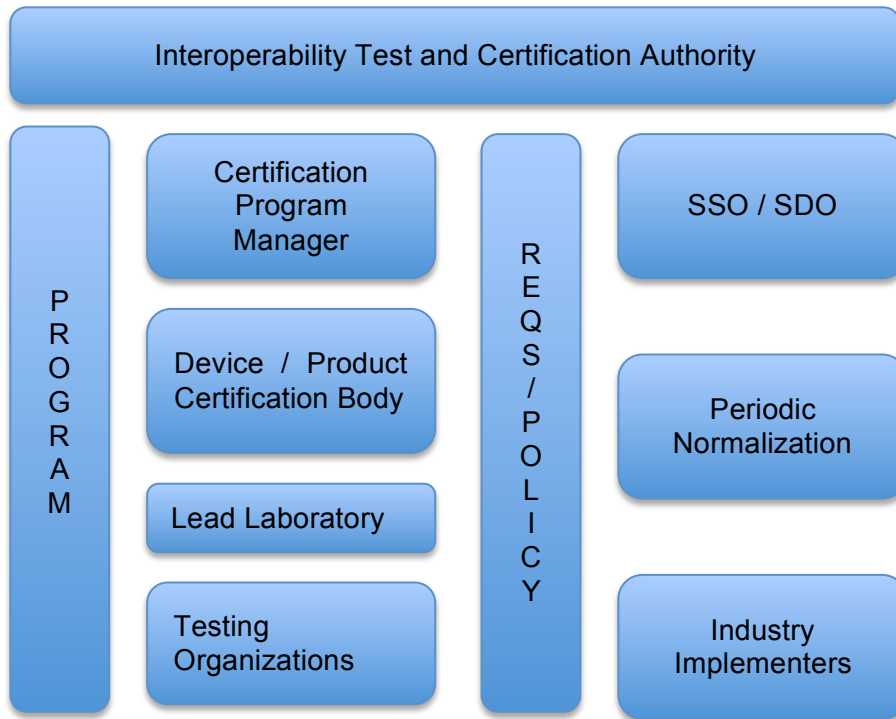


Figure 6: Organization

3.1.1. Certification Program Manager (CPM)

The CPM is an individual appointed by the industry program to act as the administrator of the ~~Logo~~ Certification Program. His/her task is to oversee the day-to-day operations and needs of the certification program, and act as the interface between the industry and the program. His/her tasks involve:

3.1.1.1. Chairing the Technical Advisory Board (TAB)

- Coordinating problem resolution in the ~~Logo~~ Certification Program
- Communicating important items to the industry
- Signing off on the ~~Logo~~ Certifications

3.1.1.2. Administering the Testing and Certification Program

t.b.d.

528 **3.1.1.3. Administering the Interoperability Test Events**

529 t.b.d.

530 **3.1.2. Approved Product Certification Body (APCB)**

531 | The APCB is an organisation of qualified personnel installed by the ~~lege-Certification~~ program,
532 and part of the Approved Product Certification Program. Each appointed APCB is entrusted
533 with the authority to submit products as Certified, without further review. This special trust
534 depends upon both the competence and the integrity of each APCB. The APCB appointment is
535 renewed yearly by the APCB contingent upon the following yearly recognition maintenance
536 | requirements and any additional requirements the ~~lege-certification~~ program deems necessary.
537 The APCB may seek monetary compensation to clients for services rendered to clients and
538 | organizations as part of ~~the~~ sanctioned APCB function.

539 **3.1.2.1. Definition**

540 | The APCB comprises individuals appointed by the ~~lege-certification~~ program to certify that an
541 End Product or module satisfies all certification criteria to be a Certified Product. An APCB
542 | member is an individual who is typically, but not necessarily, affiliated with an APCL(s). ~~The~~
543 APCB shall not be both a) responsible for performing tests, generating and/or signing off on a
544 test report for a specific certification project, and b) responsible for assessing and certifying the
545 | results for submittal as a ~~-Certified Product~~, for the same specific certification project. In other
546 words, ~~the~~ APCB may test for projects he/she is not responsible for certifying.
547

548 **3.1.2.2. Sanctioned Activities and Responsibilities**

549 | ~~The~~ APCB submits product listings through the Certification Tool to the Certification Program
550 Manager for listing Certified Products, after a review of the Compliance Folder and other
551 | documents by checking completeness, correctness, and consistency of the materials. ~~The~~
552 APCB may assist the Member to determine tests required through the use of the Test Plan
553 Generator, preparing documentation, and completing all requirements for the listing. At the time
554 of completion of the certification assessment, the APCB shall deliver a Certified Product Notice
555 certifying that product has satisfied all Certification Criteria and is ready for listing. This
556 notification will be generated by the Cert system when the APCB updates the status of the
557 corresponding certification project.
558

559 The APCB is knowledgeable about the application profile and its certification criteria. The
560 APCB notifies the industry WG Program manager when all listing requirements are met, and
561 gives a certification date and a member defined listing date of the product with the express
562 permission of the Member. The APCB enters the product information on the Certified Products
563 List when authorized by the Member for a specific listing date.
564

565 | Confidentiality is a key part of the APCB activity. For this reason, the APCB will operated under
566 | ~~the~~ ~~a Non Disclosure Agreement (NDA)~~. The APCB is responsible for verifying the authenticity
567 of documents submitted and used in Product Certification.
568

569 | With respect to the Certification program, the APCB serves under ~~priviledgeprivilege~~ granted by
570 | the ~~lege-certification~~ program, and hence answers foremost to the Program Manager above any
571 immediate management authority the APCB may be operating under. Any deviation is grounds
572 for withdrawal of APCB status.
573

574 3.1.2.3. Qualifications: Recognition Process for APCB

575 The APCB holds a position of high trust. Recognition as APCB is therefore both subjective and
576 revocable. APCB recognition is based upon an applicant's compliance with criteria listed on this
577 CPRM as well as additional information gained by ~~logo-certification~~ program throughout the
578 applicant evaluation process.

579
580 Applications for APCB recognition shall be submitted to the Certification Program Manager.
581 The applicants shall directly address each requirement listed below in a manner that allows the
582 responses to be easily compared with each requirement. The Certification Program Manager
583 will forward completed APCB applications to the ~~certification logo~~ program for consideration.
584 The ~~certification logo~~ program will determine whether additional evidence or interview(s) are
585 needed and will instruct the Certification Program Manager to so notify the applicant.
586

587 3.1.2.4. APCB Requirements

588 The APCB shall have the following minimum qualifications

- 589
- 590 • at least 3 years relevant professional work experience
 - 591 • at least 2 years of relevant engineering related work experience in at least one of the
592 following areas
 - 593
 - 594 - product planning and project management
 - 595 - product design in physical, protocol, or application layers
 - 596 - product evaluation and testing
 - 597 - product regulatory testing
 - 598 - product regulatory certification
 - 599
 - 600 • where the APCB is part of a larger organization, the organizational arrangements
601 should be such that departments having conflicting interests, such as production,
602 commercial marketing, or financing do not adversely influence APCB compliance
603 with the requirements of the Certification Program
 - 604 • The APCB shall have arrangements that ensure that APCB is free from any internal
605 or external commercial, financial, or other pressures and influences that may
606 adversely affect the quality of work
 - 607 • authority to reject test results based on non-conformance
 - 608 • capable of maintaining confidential information
 - 609 • at least 1 year of active participation in a related technical or qualification working
610 group
 - 611 • relevant degree in engineering or sciences, or equivalent
 - 612 • ability to speak, read, write English at college level
 - 613 • ability to compose a logical non-technical position and argument based on technical
614 issues
 - 615 • be available for participation in industry WG participation
 - 616 • complete a Certification Program / APCB introductory course session held by the
617 CPM
 - 618 • complete, with satisfactory results, the application and questionnaire for APCB
619 recognition
 - 620 • complete an interview with the -CPM and ~~certification logo~~ program, or proxy thereof,
621 for APCB recognition

- 622 • participate in Technical Advisory Board (TAB) once recognized as APCB

623

624 Furthermore, each APCB applicant acknowledges that continued recognition is contingent upon
 625 the applicant's maintaining both the complete trust of the program and the original APCB
 626 requirements met by the applicant. The ~~certification logo~~ program reserves the right to suspend
 627 any APCB recognition at any time, without warning. This includes, but is not limited to, changes
 628 in employment status and failure to maintain competence in the applicable ~~-~~specifications, test
 629 specifications, and certification policies. It is not necessary for the program to provide any
 630 specific reason for withdrawal of APCB privileges.

631

632 The APCB shall annually declare in writing to the program:

633

- 634 • that no changes in the APCB's conformance with the recognition requirements have
- 635 occurred,
- 636 • how the APCB continues as an active participant in the certification program, and
- 637 • how the APCB maintains competence in the SE specifications, and SE certification
- 638 policies

639

640 Note that APCB appointment does not guarantee the validity of the APCB's action (~~certification~~
 641 ~~logo~~ program cannot be held liable for any claims against an APCB).

642

643 3.1.3. Technical Advisory Board (TAB)

644 3.1.3.1. Definition

645 The TAB consists of Certification Program Manager, APCBs, APCL representatives, Lead
 646 Laboratory representative, in addition to other relevant technical experts from manufacturers.
 647 The TAB exists as an ongoing operations entity separate from the industry WG such as
 648 OpenHAN, OpenADR, OpenADE, Enterprise System. The TAB provides specific informational
 649 and operational recommendations to the program. Its function is advisory for feedback and
 650 improvements of the process of Certification program through the Program Manager. The -TAB
 651 shall seek to enhance the expertise and technical competence of its members in matters
 652 relating to edge product and system certification and testing.

653 3.1.3.2. Activities

654 The typical purposes of the TAB include:

655

- 656 • to address technical issues relating to conformance and interoperability testing of
- 657 End Products and modules; including issues relating to test
- 658 ~~specificaitonsspecifications~~, test requirements, test procedures, validated test
- 659 equipment and validated test cases.
- 660 • to produce advisory notes for use by APCBs covering aspects related to test cases,
- 661 guidance on test configurations, ~~applicability~~applicability of test cases especially
- 662 during transitional periods, and new testing ~~techniquetechniques~~ in order to
- 663 ~~iproveimprove~~ the practical implementations of the certification process.
- 664 • to review and decide on Test Case Waiver submissions, subject to review by the
- 665 Lead Laboratory
- 666 • to provide a forum for free discussion of new ideas, developments, and advanced
- 667 testing techniques relating to test requirements, methods, and equipment

- 668 • to provide an environment that will improve the practical and theoretical knowledge
669 of members relating to the testing of End products and modules.

670
671 | The primary function of the TAB is to advise and counsel the certification logo-program in
672 | matters relating to product certification requirements and testing, including ~~problems~~
673 | relating to test specifications, procedures, and equipment. A secondary function is the free
674 | exchange of knowledge among members. To help these functions the TAB will act as the input
675 | and source of knowledge on problems to the testing of End products and modules and on the
676 | certification process for the benefit of the entire -Certification Program and the Lead Laboratory.

677

678 3.1.4. Lead Laboratory (LL)

679 3.1.4.1. Definition

680 The Lead Laboratory is appointed by the ICP as the operational arm of technical development,
681 resolution, and ongoing repository of competence for the entire Certification Program. The LL is
682 a test laboratory charged with the investigation of test methods, test equipment, and inputs from
683 the TAB. The purpose of the LL is to maintain a center of core competence to uphold a robust
684 Certification Program, and to normalize the trustworthiness of test results from the various
685 APCLs.
686

687 3.1.4.2. Activities

688 The following activities are included in the LL scope of activities:

- 689 • Evaluation of test procedures, test cases, and test suites proposed by the industry
- 690 SSO/ WG before final approval
- 691 • Coordinating and managing interoperability events for development, and certification
- 692 readiness of upcoming specifications and products
- 693 • Evaluation and development of test systems (e.g. reference systems) used by the
- 694 APCL and industry at large
- 695 • Proxy as technical operations arm of the Certification Program manager and
- 696 program
- 697 • Evaluation of APCL for continued competence in testing for End Products and
- 698 modules
- 699 • Coordinating and facilitating the output of TAB and resulting requests and
- 700 requirements from the Certification Program Manager and/or program
- 701 • Serve as the operational arm of technical issues resolution, as necessary, for issues
- 702 forwarded by TAB, and WG.
- 703 • In general to function as a center of excellence in technical matters related to the
- 704 Certification Program, and to deploy that competence to the APCL
- 705 • The LL shall not ~~commercially~~ commercially compete with an existing APCL for
- 706 testing and certification services.
- 707 • The LL ~~shall~~ shall be capable of performing all tests required of the ICP
- 708

709 3.1.4.3. Selection

710 The LL is selected and its appointments renewed or revoked at the discretion of the SSO/SDO.
711

712 3.1.5. Approved Product Certified Laboratory (APCL)

713 3.1.5.1. Definition

714 The Approved Product Certified Laboratory (APCL) is a commercial or non-commercial testing
715 laboratory focussed on delivering testing services as part of the ~~Logo~~-Certification Program.
716 The APCL is charged with the responsibility of serving the ~~logo~~-program companies, to provide
717 a clear and concise pass / fail result for ~~Logo-certification~~ Testing based on the CRSL and the
718 applicable test and technical specifications. The APCL status is granted by the ~~logo~~
719 certification program based on recommendation from the SSO/SDO. The APCL designation is

720 | a privilege which can be revoked at any time by the certification logo-program based on defined
721 | process of removal. Appointments are subject to evaluation and renewed biannually.
722 |

723 | **3.1.5.2. Activities**

724 | The following activities are included in the APCL scope of activities:
725 |

- 726 | • timely implementation and maintenance of test procedures and test systems used in
727 | certification logo-testing program
- 728 | • participation and active contribution to industry WG and TAB
- 729 | • provide testing services in accordance with the CRSL to the certification logo
730 | program member companies
- 731 | • promptly address any issues identified by member companies, LL, TAB, WG, or
732 | certification logo-program
- 733 | • maintain competent personnel
- 734 | • abide by the Service Level Agreement (SLA) defined with the certification logo
735 | program, and in force between the APCL, member companies, and the certification
736 | logo-program
737 |

738 | **3.1.5.3. Selection**

739 | It is the intent of the WG to make selection recommendations based on the following:
740 |

- 741 | • Overall result of both evaluation and audits of candidate APCL
- 742 | • Geographic diversity of APCL locations in the -Certification Program
- 743 | • Fostering competition for service and technical excellence
- 744 | • Basic organizational and technical strength
- 745 | • Good management practices
- 746 | • Recognized accreditations, including ISO Guide 17025 from an internationally
747 | recognized accreditation body under the ISO/IEC standardizationstandardization
748 | structure
- 749 | • Facilitating baseline business viability
- 750 | • Commitment and ability to add value to the certification logo-program organization
751 | through technical participation in working groups and advisory boards
- 752 | • Experience in similar services
- 753 | • Competent personnel
- 754 | • Value brought to the certification logo-program in general
- 755 | • Work with the APCB and submit to the APCB the results for review
- 756 | • Capability or readiness to implement the following, both technically and budgetarily
 - 757 | - product physical layer conformance testing (if applicable)
 - 758 | - product protocol layer conformance testing
 - 759 | - product interoperability testing
 - 760 | - product network testing
 - 761 | - product physical layer performance testing (if applicable)
 - 762 | - network interoperability testing (if applicable)
 - 763 | - product functional testing (if applicable)

764 |
765 |

766 The industry SSO/SDO will develop a complete evaluation procedure and documentation to
767 assist APCL selection according to the above set of criteria.
768

769 **3.1.6. Certificate Authority (CA)**

770 **3.1.6.1. Definition**

771 The Certificate Authority (CA) is a commercial or non-commercial organization focussing on
772 issuing the digital certificates for the ~~Logo~~-Certified Products. The CA is charged with the
773 responsibility of serving the program member companies, to provide digital certificates to be
774 embedded in-to "Eedge" products. The CA status is granted by the certification logo-program.
775 The CA designation is a privilege which can be revoked at any time by the certification logo
776 program based on defined process of removal. Appointments are subject to evaluation and
777 renewed biannually.

778 **3.1.6.2. Activities**

779 The following activities are included in the CA scope of activities:

- 780
- 781 • timely issuance of digital certificates to ~~Logo~~-certified products
- 782 • management and control of digital certificate issuance system
- 783 • ensuring that the digital certificates issued are current and valid
- 784 • maintain competent personnel
- 785 • abide by the Service Level Agreement (SLA) defined with the ICP, and in force between
- 786 the CA, member companies, and ICP.
- 787

788 **3.2. Qualification of Laboratories**

789 Laboratory Qualification is expected to be compatible with SGIP TCC guidelines / requirements.

790 **3.3. Design of ICP**

791 **3.3.1. Process**

792 A ~~new~~ device or system industry manufacturer seeking an OpenSG compliant test and certification,
793 such as ZigBee Smart Energy 2.x (ZEP2.x)/OpenADE/OpenADR, etc , of a new solution first
794 completes an application for Certification (see Annex for details; a new device may be an End
795 Product or a Module). This member selects an Approved Device-Product Certification
796 Laboratory (APCL) ~~or Approved System Certification Laboratory (ASCL)~~. The member seeking
797 certification for a product, module or software system shall contract with the APCL as
798 appropriate and when required, an Appointed Product Certification Body (APCB) for evaluation,
799 testing, and certification services. The application process is the first step in the booking
800 process. **It shall not be possible to test and obtain a certification at the LL.**

801
802 The instance of the OpenHAN technology, such as ZEP2.x, provides a PICS proforma including
803 all the features (Mandatory and Optional) that a certified product or module may support.

804 **3.3.1.1. ~~Products and Devices~~ Products incorporating a hardware portion**

805 The applicant supplies:

- 806
- 807
- 808
- 809
- 810
- 811
- 812
- 813
- 814
- 815
- 816
- 817
- 818
- 819
- 820
- 821
- 822
- Two product or module samples with supporting components (i.e. batteries, cables, chargers, notebook computers and associate hardware/software, etc. as needed to facilitate the evaluation)
 - Signed and dated Laboratory Nondisclosure Agreement and Information Pack (soft copies preferred)
 - User documentation
 - Completed PICS proforma.
 - Completed PIXIT proforma. The PIXIT proforma will be provided by APCL at the beginning of the testing project
 - Completed Declaration of Conformity - this must be finalized prior to certification but after testing is completed.
 - Test reports for category C tests - supplied as available prior to certification
 - A completed Signed Certification Mark License Agreement to permit use of ~~the a Logo or similar mark logo~~ upon successful completion of Certification - to be completed prior to certification.

823 Where applicant seeks to certify more than one bill of material, product/module samples for
824 each bill of material shall be provided. Based on a review of the differences between bill of
825 materials, the APCL may waive this requirement.

826

827 The APCL with the APCB reviews the application, and determines test requirements based on
828 the supplied PICS according to the current Certification Requirements Status List (CRSL).

829

830 The Compliant Portion of the proposed Certified Device shall be described precisely so that
831 subsequent product change applications can determine whether a product/module change is
832 Class I (outside Compliant Portion) or Class II (within Compliant Portion). When feasible,
833 product model number, hardware version number and software version number shall be
834 associated with the Compliant Portion rather than a higher level assembly. If the Compliant
835 Portion is to be integrated into another end product, or if other Class I change is envisioned, the
836 application shall describe the applicable hardware and software environment of the Compliant
837 Portion sufficiently so that compliance can be ensured.

838

839 Certification Testing ensures that a IUT meets all Certification Criteria according to the vendors
840 submitted PICS which determines through a mapping table which specific test cases in the
841 currently applicable CRSL form the test plan that must be passed in accordance with the
842 categories defined in the Certification Requirements Status List (CRSL, [3.3.6](#)—[3.1.10](#)). The
843 whole process shall be guided by a APCL. Tests include the following “Primary Test
844 Categories” as shown in [Figure 3](#) ~~Figure 2~~:

845

846 PhyCT- Physical Conformance Testing

847 PCT-Protocol Conformance Testing

848 DIOT-Device Interoperability Testing

849 NIOT-Network Interoperability Testing

850 PhyPT-Physical Device Performance Testing

851

852 Testing requirements for a particular device are determined by the PICS and the applicable
853 CRSL which identifies the current status of each applicable test and certification requirement. A
854 PIXIT proforma is used to configure the implementation under test (IUT) in the test bed properly
855 in order to run the test plan. Applicable tests shall be performed and results documented as

856 | required by their category. Test categories are defined in section 3.3.6.33.1.10. During the
857 | testing process each vendor has restricted access to the APCL's web site for tracking and
858 | monitoring the progress of the testing of their equipment.

859 |
860 | The APCL shall ensure that all testing requirements are satisfied by the particular hardware and
861 | software version certified. In general, no product change is permitted during certification,
862 | except as expressly required by a Test Procedure within an ~~applicable~~ applicable test case. The
863 | APCL may permit certain limited change if the APCL (a) has high confidence that such a
864 | change will not compromise the integrity of prior test results, or (b) repeats all test cases which
865 | might be impacted. Any product/module change introduced during certification shall be
866 | documented and strictly managed by the APCL. See section 4.1.63.3.8.7 guidelines on
867 | determining required retesting based on product changes.

868 |
869 | When a product successfully completes all the required testing, test reports are assembled into
870 | a Compliance Folder. See section 4.1.23.3.8.2 for Compliance Folder details.

871 |
872 | The APCB shall review the application and relevant certification documentation, including PICS,
873 | to determine that

- 874 |
- 875 | • the vendor supplied product satisfies all current certification requirements;
 - 876 | • all mandatory PICS items are supported;
 - 877 | • the entire Compliant Portion is contained within the elements described;
 - 878 | • the hardware and software environment containing the Compliant Portion is sufficiently
 - 879 | described to ensure compliance is maintained in that environment; and
 - 880 | • the Declaration of Conformity is complete and accurate.

881 |
882 | After the APCB has determined that all necessary certification requirements are satisfied and
883 | the certification listing fee is paid, the APCB shall submit the Compliant Portion to the Certified
884 | Product/Module List along with necessary supporting information (section 4.1.2) and shall add
885 | the product/module in which the Compliant Portion was evaluated to the End Product List.

886 |
887 | Any deviation of the Compliant Portion thereof represents a Class I or Class II change. For
888 | example, a Device Module may be a ~~an~~ Compliant Portion, as well as a particular microcontroller
889 | model with a specific firmware build.

890 |
891 | Once the product or module is certified, the Certificate Authority (CA) issues a digital certificate
892 | to be programmed into the devices, for use in joining a utility smart grid network.

893 | **3.3.1.2. Software Products/Systems**

894 |
895 | The Product Certification Program aims to achieve compliance and interoperability of all
896 | instances of OpenADR and OpenADE systems. The Product Certification Program is
897 | sponsored by a SSO, and accredited by the OpenSG.

898 |
899 | An OpenADR and OpenADE instantiations seeking Certification from the Program sponsor shall
900 | submit an application and an instance for evaluation by the Appointed Product Certification
901 | Laboratory (APCL) for compliance and interoperability.

902 |
903 | The Compliant Portion of the proposed software product / system shall be described precisely
904 | so that system can state supported feature set. All changes shall undergo regression testing.

905
906 Certification Testing ensures that the System meets all Certification Criteria according to
907 submitted PICS, which determines through a mapping table the specific test cases in the
908 currently applicable CRSL that form the test plan the system must pass. The whole process
909 shall be done through an APCL. The Tests include the following Primary Test Categories:

910
911
912 | A/E -: Authentication and Encryption
913 | PCT -: Protocol Conformance
914 | NIOT: Network Interoperability
915 | FUNC: Functional Testing

916
917 Testing requirements for a particular system is determined by the PICS and the applicable
918 CRSL. A PIXIT is used to configure the test set-up in order to run the test plan. Applicable
919 tests shall be performed and results documented as required by their category. During the
920 | testing process each vendor has restricted access to the APSCL's web site for tracking and
921 monitoring the progress of the testing.

922
923 When a system successfully completes all the required testing, test reports are assembled into
924 a Compliance Folder.

925
926 The qualified person from the sponsoring SSO/SDO shall review the application and relevant
927 certification documentation, including PICS, to determine that the system supplier satisfies all
928 current certification requirements;

929
930 All mandatory PICS items are supported;
931 Compliant Portion is clearly defined;
932 the Declaration of Conformity is complete and accurate
933

934 **3.3.2. Program and Program Version**

935 The Testing and Certification Program set up by the SSO/SDO shall have a well defined release
936 version number, to designate the policy and procedures in effect at any time during the program
937 implementation.

938 **3.3.2.1. Product and Module**

939 940 **A. General**

941
942 A product or module shall have a certified Compliant Portion. The listing member company may
943 intend to apply the certified Compliant Portion to a family of similar end product models or
944 modules, either initially or subsequent to the initial listing.

945
946 Furthermore, the member company is allowed to sell the Compliant Portion for integration,
947 resulting in end products offered by another member company if the Compliant Portion is listed
948 | as a Certified Module (See 3.3.8.9section 4.1.7).

949
950 Performance may be impacted by integration of a Compliant Portion into a different end product,
951 and testing will typically be required when the end product differs or when the end product

952 | ~~manufacturer~~ **manufacturer** (integrator) is different from the Compliant Portion manufacturer
953 | according to Class I, Class II, or Class III change rules by an an APCB.

954 |
955 | Every End Product shall be listed on the End Product List.
956 |

957 | Integration of a Compliant Portion into an end product different from the end product in which it
958 | was certified, may impact the performance, for example if the antenna placement or
959 | environment changes, or if the host environment is otherwise different. Such integration shall
960 | be considered within the Class I, Class II change rules by an an APCB.

961 |
962 | A member seeking to list a End Product shall complete an online application for Certification.
963 | An End Product application shall reference the Module or Compliant Portion of a Certified
964 | Product integrated into the End Product if the member wishes to claim abbreviated certification
965 | process.
966 |

967 | When integrating a Module, an application for End Product certification shall declare that the
968 | hardware and firmware/software environment containing the module complies fully with that
969 | required by the Module, and provide supporting documentation as needed. Such integration
970 | shall be considered within the Class I, Class II change rules by an an APCB.

971 |
972 | When integrating a Compliant Portion that is not a Module, an application for End Product
973 | certifition shall describe any variation form the specific End Product in which the applicable
974 | Compliant Portion was certified. Such integration shall be considered within the Class I, Class II,
975 | and Class III change rules by an an APCB.
976 |

977 | An End Product application may cover a family of end product models, provided the compliant
978 | portion is identical, and the application shall describe the end product family in a sufficient
979 | detail to permit evaluation of potential impact of product family variations on performance including
980 | radiated performance.

981 |
982 | A End Product application is reviewed by APCB to determine testing requirements with
983 | reference to CSRL and ~~section 4.1.6, "Certification Program Class I/II/III Change~~
984 | ~~Guidelines"~~ 3.3.8.6. Indicated testing shall be performed and documented in the End Product
985 | Compliance Folder. After the APCB has determined that all necessary certification
986 | requirements have been met and ~~the logo~~ any appropriate -fee is paid, the APCB shall submit
987 | the end product into the End Product List along with necessary supporting documentation.
988 |

989 | It is allowed to start certification testing for an end product before the initial product completes
990 | its certification, on condition that the end product does not complete certification before the
991 | initial product completes and obtains its certificate. In all cases the end product must follow the
992 | rules and policies as defined in ~~section 3.1.1.3~~ section 3.3.1.1

993 |
994 | A certificate is issued for each End Product and Module Listing.
995 |

996 | **B. Change to End Product or Module**

997 |
998 | A change to an End Product or Module shall be reviewed by an an APCB. When a listed product is
999 | changed, the member responsible for the listing shall complete an application for Certification
1000 | Change online.
1001 |

1002 A Change application shall include the following:
1003

- 1004 • identify pertinent End Product or Module record,
 - 1005 • amended Compliant Portion or End Product / Module description as applicable
 - 1006 • amended PICS if applicable
 - 1007 • product change description, and
 - 1008 • executed revised Declaration of Conformity
- 1009

1010 The product/module change description shall be sufficient to determine the scope of testing
1011 required to determine that the change device is compliant.
1012

1013 The APCB may request additional information as needed to complete the review. The APCB
1014 shall determine additional testing as deemed required.
1015

1016 **C. Device Certification Requirements** 1017

1018 Product/module certification is associated with (a) a category (such as a device class as defined
1019 by the SSO/SDO), (b) a particular System Profile Release number and version and (c) one or
1020 more Certification Profile(s). To certify a product/module, a vendor completes the applicable
1021 PICS forms.
1022

1023 In the PICS, the vendor states the functions supported by the product/module to be certified.
1024 The completed PICS is used to generate a list of applicable Test Cases based on the test case
1025 mapping table (contact the APCB for a copy) within the online certification system.
1026

1027 The list of applicable test cases is used in conjunction with the current CRSL to determine which
1028 test cases shall be performed. See section [3.3.6](#) ~~3.4.10~~ for detailed information on the CRSL.
1029

1030 **3.3.2.2. Software Systems** 1031

1032 A certified system for OpenADR or OpenADE consists of a Compliant Portion that implements
1033 features according to requirements for their server and/or client system.
1034

1035 A vendor system is evaluated and judged to be a Certified System when found to be in
1036 compliance by an APSCL; evaluation is performed against Reference System for
1037 interoperability, when available, and test suites derived from abstract test suites from OpenADR
1038 and OpenADE as relevant. It is not necessary to attain an equivalence with the reference
1039 system, i.e. all feature sets are functionally identical, but that those features sets represented in
1040 the vendor system be evaluated to be equivalent to the reference system implementation.
1041

1042 An instantiation of the reference system itself is not considered to inherit any Compliant Portion;
1043 that instantiation must be evaluated and judged as any vendor system for equivalent portions.
1044

1045 **Reference Systems** 1046

1047 Reference system(s) is(are) defined to be compliant implementation of the specification either
1048 by evaluation or by definition by the sponsoring SSO. The reference system, as a rule, need to
1049 be subject to direct implementation by instantiation by participants of the SSO. Therefore, an
implementation cannot be a “reference system” if it is an “equivalent” system.

1050 **Candidate Reference Systems**

1051 Candidate reference system(s) is(are) defined to be a conforming implementation of the
1052 specification. Candidate reference systems are by definition not reference systems, though
1053 they may be evaluated for equivalence to reference systems, and compliance to requirements
1054 of OpenADR or OpenADE.
1055

1056 **Changes to Certified System**

1057 | Any change to the System shall be reviewed by [APSCB](#). When a listed system is changed, the
1058 vendor responsible for the listing shall complete an application for Certification Change online.
1059

1060 A Change application shall include the following:

- 1061 • Identify pertinent System record
- 1062 • amended Compliant Portion description as applicable
- 1063 • system change description
- 1064 • amended PICS as applicable
- 1065 • executed revised Declaration of Conformity

1066 | Unless member is willing to perform code review with the [APSC](#), changes to System shall
1067 require complete regression testing of the certification tests cases.
1068
1069

1070 **System Certification Requirements**

1071 System certification is associated with a server or a client implementation of OpenADR or
1072 OpenADE or AMI-ENT requirement.
1073

1074 In the PICS, the vendor stipulates the functions supported by the system to be certified. The
1075 completed PICS is used to generate a list of applicable Test Cases based on the test case
1076 mapping table within the online Certification System. The list of applicable test cases is used in
1077 conjunction with the current CRSL to determine which test cases shall be performed.
1078

1079 **3.3.3. Self Testing and Certification**

1080 To be determined once the third party testing and certification system is sufficiently mature and
1081 products and systems objectively show an acceptable degree of interoperability throughout the
1082 program over extended periods of time.
1083

1084 **3.3.4. Device Compliant Portion Testing**

1085 The End Product or Module is subject to testing for its proposed compliant portion. The testing
1086 involves layers, from the physical all the way to the network interfaces.

1087 **3.3.4.1. Physical Conformance (PhyCT): Radio, PLC, wireline**

1088 Physical Conformance Testing assesses the compliance of the physical layers of an
1089 implementation seeking certification to the applicable base or core specification of the
1090 | mandatory and optional features of the physical transport layer PHY (IEEE 802.15.4, IEEE
1091 802.11, etc), as applicable to the type of End Product or module.
1092

1093 Typically, Physical (RF, wireline, or PLC) Conformance Testing is not concerned with and does
1094 not cover assessment of performance, reliability or robustness of the entity under test, unless
1095 explicitly stated as a conformance requirement in the conformance testing specification.

1096
1097 Physical Conformance Testing does not add constraints to those stated in the core
1098 specifications and consists of a series of tests against the physical conformance requirements
1099 stated in the applicable radio/plc/wireline conformance testing specification.

1100
1101 A radio/plc conformance requirement is an elementary piece of the core specification stating
1102 what a SE implementation seeking certification is required to do or not to do.

1103
1104 An implementation is found as conformant with the physical layer core specifications when it
1105 satisfies all the selected physical layer conformance requirements contained in the CRSL based
1106 upon completing the required tests and executing the DoC.

1107
1108 For example, the radio physical layer conformance requirements of ZigBee devices are derived
1109 from the basic IEEE802.15.4 radio layer specification over the operational temperature and
1110 humidity range of the device as declared in the PIXIT, and include: power spectral mask and
1111 density, center frequency and tolerance, sensitivity/packet error rate, modulation/demodulation,
1112 error vector magnitude, adjacent and alternate channel rejection, turnaround time, clear channel
1113 assessment, energy detection, and link quality indication.

1114
1115 An implementation is found as conformant with the physical conformance related core
1116 specifications when it satisfies all the selected physical conformance requirements contained in
1117 the CRSL based upon completing the required tests and executing the DoC.

1118 **3.3.4.2. Protocol Conformance Testing (PCT)**

1119 Protocol Conformance Testing assesses the compliance of the protocols implementing the MAC
1120 layer and Network Layer of the implementation seeking certification to the applicable base and
1121 core specification (IEEE802.15.4:2006 and ZigBee IP for ZigBee, HomePlug SE Specification
1122 for HomePlug, IEEE802.11b/g for Wi-Fi).

1123
1124 Protocol Conformance Testing does not add constraints to those stated in the core
1125 specifications and consist of a series of tests against the protocol conformance requirements
1126 stated in the applicable protocol conformance testing specification.

1127
1128 A protocol conformance requirement defines the core specification stating what an
1129 implementation seeking certification is required or not to support.

1130
1131 For example, The ZigBee-related protocol conformance requirements are derived from the
1132 IEEE802.15.4 MAC layer and ZigBee IP specification along with the PICS and PIXIT documents
1133 relating to those MAC and NWK layers.

1134
1135 An implementation is found as conformant with the protocol-related core specifications when it
1136 satisfies all the selected protocol conformance requirements contained in the CRSL based upon
1137 completing the required tests and executing the DoC.

1138 **3.3.4.3. Interoperability Testing (IOT)**

1139 Interoperability is key to customer acceptance. Interoperability testing for ~~Logo~~-Certification
1140 requires a minimum of three different golden unit vendor devices. The interoperability

1141 configuration scenario must include at least two different physical layer chipset vendors. Each
1142 end product/module must demonstrate interoperability with at least three different certified
1143 Energy Service Interface (ESI) if it is not an ESI; if an ESI, it shall demonstrate interoperability
1144 with at least three different PCT and IHD combination. This enables the basic network
1145 interoperability.

1146
1147 Additional to the above requirement, each product/module must demonstrate interoperability
1148 with at least two different certified end product/module (from at least two vendors) and at least
1149 one device should be the reference unit selected by industry WG. This enables general market
1150 device interoperability.

1151
1152 Interoperability testing is enhanced as more vendor equipment is made available from different
1153 vendors.

1154
1155 The interoperability certification test bed shall be available at each APCL for all currently
1156 required interoperability tests. The tests shall include all relevant profile device roles and
1157 application functionality declared in the PICS and PIXIT, and test for: trust center policy,
1158 network management policy, commissioning and installation, power failure/start-up, use cases,
1159 stress cases, over-the-physical media download.

1160
1161 A implementation is found as conformant with the interoperability core specifications when it
1162 satisfies all the selected interoperability requirements contained in the CRSL based upon
1163 completing the required tests and executing the DoC.

1164 **3.3.4.4. Physical Performance Testing (PhyPT)**

1165 Physical Performance Testing (PhyPT) requirements provide physical layer performance
1166 metrics intended to determine the limits of performance of End Products and modules, for
1167 example in an over-the-air (RF) environment. In such case, tests are intended to determine the
1168 transmitter and receiver performance and sensitivity in normal operation in the presence of far-
1169 field (for RF case) interferers causing transceiver desensitivity. PhyPT tests are critical in that
1170 they provide necessary information on the radiation pattern of the device as used, and the
1171 effect of interaction factors between the radiated field and the circuitry of the device.

1172
1173 The PhyPT shall include the following based on the PIXIT and PICS declarations: range and
1174 directionality (link budget and sensitivity verification), and immunity/desensitivity to known
1175 interferers.

1176
1177 PhyPT is required for the Certification of End Product/module. The test report will be included in
1178 the Compliance Folder and test results become part of the Compliant Portion of the end
1179 product/module. It is the intent of industry WG to conduct a regression analysis across the
1180 applicable Certification profiles on data collected during PhyPT. Industry WG will then request
1181 an approval of a-baseline criteria for example, Smart Energy 2.0 for future PhyPT testing.

1182

1183 **3.3.4.5. Network Conformance Testing (NCT)**

1184 Network Conformance Testing (NCT) complements PhyCT, PCT, IOT as a system level
1185 conformance testing for end-to-end from the utility head end to the HAN network.

1186

1187 NCT ensures that compatible state machines and protocols are employed at the product level,
1188 as with the utility head end. This includes frame compatibility with communication between the
1189 servers and client applications.

1190 Network Conformance Testing does not add constraints to those stated in the core
1191 specifications and consist of a series of tests against the network conformance requirements
1192 stated in the applicable network conformance testing specification.

1193
1194 A network conformance requirement defines the core specification stating what an
1195 implementation seeking certification is required or not to support.

1196
1197 For example, The ZigBee-related network conformance requirements are derived from the
1198 ZigBee IP and SE 2.0 application protocol specification along with the PICS and PIXIT
1199 documents.

1200
1201 An implementation is found as conformant with the network-related core specifications when it
1202 satisfies all the selected network conformance requirements contained in the CRSL based upon
1203 completing the required tests and executing the DoC.

1204

1205 **3.3.5. Software System Compliant Portion Testing**

1206 The system is subject to testing for its proposed compliant portion. The testing involves the
1207 entire set of use case tests as derived from relevant abstract test suites.

1208 **3.3.5.1. Authentication and Encryption**

1209 The system is subject to testing the mechanism for establishing secure sessions. Testing
1210 involves negotiating key, access level, and establishing a session for a specific account.

1211 **3.3.5.2. Protocol Conformance**

1212 Verify that the system implements methods, data frames, and interfaces of the prescribed in the
1213 communication method.

1214 **3.3.5.3. Network Interoperability**

1215 Communication between Server to Client reference systems. Network API shall be consistent
1216 with ~~SE-2.x~~appropriate application layer implementations and shall ~~either comply with~~
1217 appropriate transport protocol e.g. ~~be~~ RESTful or SOAP but not both.

1218 **3.3.5.4. System Functional Testing**

1219 | Verification of state machine according to requirements of OpenADR, ~~or~~ OpenADE or AMI-
1220 ENT. The testing shall be based on defined test cases derived from abstract test case
1221 scenarios of the System Requirements from OpenSG. Use cases shall be derived from the
1222 various functional requirements as stipulated by the abstract test cases, and such testing shall
1223 be performed using a Reference System or a validated Test Harness agreed by the SSO.

1224

1225 **3.3.6. Certification Requirements Status List (CRSL)**

1226 **3.3.6.1. Definition**

1227 | The ~~Logo~~ Certification Program currently certifies devices on 3 levels of conformance and
1228 interoperability test specifications. The corresponding PICS documents specify the mandatory

1229 and optional requirements for all the test specification documents. The Certification
 1230 Requirements Status List (CRSL) specify the testing requirements at any given time, and gives
 1231 guidance to [the](#) APCL and APCB on testing and recommendation for certifications. The CRSL
 1232 is maintained by the LL.

1233
 1234 CRSL versions include changes to the test requirements and test specifications. Requirements
 1235 for certification are set by the CRSL version effective on the date that the device is certified.

1236
 1237 A CRSL Interim Release includes the results of the CCB process, and introduces new
 1238 requirements that will become active in future CRSL Major Releases. A (x.0.0) of the CRSL
 1239 shall occur twice annually. A public interim release of the CRSL (x.y.0) shall occur no more
 1240 frequently than once per month.

1241
 1242 Requirements upgraded in Major Release (x.0.0) shall be available in an interim release of the
 1243 Major Release (x-1.y.0) effective 45 days prior to Major Release (x.0.0). Vendors have 90 days
 1244 to submit their equipment for certification to be tested against this major release.

1245
 1246 [An](#) IUT undergoing certification testing when the next major release becomes effective have 45
 1247 days to complete testing. Test requirements are defined by the major release under which the
 1248 IUT is submitted. Test cases which become active after the next major release are not required.

1249 **3.3.6.2. CRSL Structure**

1250 The CRSL defines the current status of each test case in a list. The list contains the following
 1251 information:

1252
 1253 Designator - test case identifier
 1254 Name - descriptive text from the test specification
 1255 Current [specification](#) requirement – [document, version and requirement](#)
 1256 Test specification number and version
 1257 Test Case Category
 1258 Available date: date at which the test case may be used as the indicated Test Case Category
 1259 Active date: date at which the test case shall be used at the indicated Test Case Category
 1260 Associated notes
 1261 Previously published [specification](#) requirements¹
 1262 -Test specification number and version
 1263 -Test Case Category
 1264 -Status
 1265 -Active date
 1266 -Associated notes
 1267 Informative
 1268 -Test Case Priority
 1269 -Test Platform: Validated test platforms for both the current and previous test case

1270
 1271
 1272 The following applies for each test case requirement:
 1273 • Prior to the Available date of the current [specification](#) requirement, the previously
 1274 published [specification](#) requirement shall apply.

¹ [Included to ensure backward compatibility](#)

1275 • From the Available date until the active date of the current specification requirement, the
1276 vendor shall choose to apply either the previously published specification requirement or
1277 the current specification requirement.

1278 • From the Active date, the current specification requirement shall apply.

1279 • Products will support previous, current and future versions. Products that are not
1280 forwardly compatible will NOT be considered for testing under the CPRM program.

1281 Issue of an update to the CRSL is managed and approved by the industry WG. Updates to the
1282 CRSL include changes to test case categories to reflect the addition of new validated test
1283 cases, the downgrade of previous validated test cases, and the revalidation of downgraded test
1284 cases. The LL shall implement the CRSL updates.
1285

1286 3.3.6.3. Test Case Categories

1287 The ~~Logo~~-Certification Program assigns each test case from the test specification a Test Case
1288 Category. A test case is validated when a validated test platform is available, and required for
1289 implementation.

1290 Category A

1291 The device shall pass each Category A test case at the APCL on a validated test platform.
1292 These are the validated test cases. A test report shall be generated according to ISO Guide
1293 17025.
1294

1295 Category B

1296 The device shall pass each Category B test case at the APCL. Pass/Fail verdict is assigned
1297 and the test reported generated according to ISO Guide 17025. These are typically test cases
1298 that have been verified and can be executed with unambiguous results, but for which test case
1299 validation is incomplete.
1300

1301 Category C

1302 The device shall pass each Category C test case either at the manufacturer or the APCL. In
1303 case the test is ~~performed~~ by the manufacturer, a test report shall be submitted to the
1304 APCL. Pass/Fail verdict shall be assigned.
1305

1306 Category D

1307 Test cases may be downgraded from A or B or C by the LL, but must be revalidated and
1308 reinstated to its prior status without delay, upon resolution of any issues.
1309

1310 Category E

1311 The device shall perform Category D tests at the APCL and a test report generated. However
1312 there is no Pass/Fail verdict assigned.
1313

1314 Category I

1315 Test cases planned for further development and listed for informational purpose.
1316

1317 **Category P**

1318 Test case planned for validation or awaiting approval but currently listed for informational
1319 purposes.

1320

1321 **3.3.6.4. Test Case Category Transition**

1322

1323 | A Test Case Category for -a test case may or may not change over time. Test Case Status is
1324 communicated using the CRSL Interim and Major release. The following list describes, in part,
1325 the typical assignment and re-assignment of test case categories:

1326

1327 • All test cases start as Category I.
1328 • Test cases selected from development are moved to Category P in the next major
1329 release.

1330 • If a test case upgrade proposal from Category B to Category A is accepted for inclusion
1331 in the next Interim Release of the CRSL, the following rule shall apply

1332 • The upgrade is effective immediately

1333 • Testing underway may (test start date prior to upgrade) may continue their certification
1334 testing without regression testing.

1335 • The initial Available Date shall not precede the CRSL publication date. Test cases may
1336 be immediately downgraded temporarily to Category D in specific circumstances under
1337 the authority of LL and reinstated without delay, maintaining the original active date if the
1338 reinstatement does not occur past the original active date. Test cases are not
1339 necessarily downgraded due to a single test platform losing validated status.

1340 | • All other category transitions (upgrades) are effective at the next Major Release of the
1341 CRSL.

1342

1343 **3.3.7. Testing and Interoperability Principles**

1344 The ultimate goal of the ICP is an eco-system of *interoperable* devices and systems. For the
1345 purpose of this discussion, interoperability may be loosely defined as a correspondance of
1346 interfaces between two abstract functional units, of which communication is possible.

1347

1348 | To this end, it is important for the certification program to assure a well--defined minimum
1349 interoperable set of features, whether it be functionality, user interface, or application interface.

1350 **3.3.7.1. Non-overlapping Feature Set**

1351 | A simple set of best practice principles helps facilitate a robust interoperable interface. These
1352 are:

1353

1354 a) a specific set of functions shall be defined into "profiles". A profile is a finite set, or grouping,
1355 of functionality.

1356

1357 | b) any function belonging to a profile shall be reproduced by implementing the entire profile of
1358 mandatory functions by another device sharing that function. In other words, profiles are
1359 exclusionary of other like functions. For example, a mandatory function A, belonging to a profile
1360 X can be implemented in another device via the entire profile X, and never a partial
1361 implementation of X. A device adopting profile X must therefore implement the whole
1362 mandatory function set that includes function A.

1363
 1364 | c) A function in profile X shall not be duplicative of another function in profile Y, if that function is
 1365 already existing in profile Y.

1366
 1367 The above principles dictate that extreme care must be taken to design profiles; in other words,
 1368 profiles need to be designed to coexist with other profiles; functions within profiles X and Y need
 1369 to be exclusionary yet complimentary, but never overlapping.

1370
 1371 Test suites shall evaluate individual profiles, with test cases addressing functions of said profile.

1372
 1373 | The non-overlapping feature set may be coupled with a branding or Logo program. However,
 1374 there is no mandatory requirement for a Logo program.

1375

1376 **3.3.8. Certified Product Listing**

1377 | When the ~~Logo~~-Certification criteria are satisfied, and with the agreement of the vendor, the
 1378 APCB shall post the product / module onto the ~~Logo~~-Certified Product registry with the following
 1379 information:

1380

1381 Product Name

1382 Certified Product Type

1383 Certification Number

1384 Date of Certification

1385 CRSL date

1386 CRSL associated version number

1387 Detailed product information in text form (not more than 200 words)

1388 Product image in jpg format no larger than 300 x 300 pixels

1389 Company logo in jpg format no larger than 300 x 300 pixels

1390

1391 The APCB shall ensure, prior to completing the product certification process, that the equipment
 1392 vendor is still a member in good standing with the ~~logo-certification~~ program, and that the
 1393 certification testing fee and ~~certification~~certification logo fee (if appropriate) are collected per
 1394 certification. With the explicit agreement of the applicant, the APCB will enter the data into the
 1395 ~~Logo~~-Certified Product registry and create an electronic ~~Logo~~-Certification Certificate from this
 1396 data.

1397

1398 **3.3.8.1. Digital Certificates**

1399 | Once a product enters the ~~Logo~~-Certified Product registry, the CA shall generate a digital
 1400 certificate for that product and issue it to the applicant.

1401 **3.3.8.2. Compliance Folder**

1402 The Compliance Folder shall provide the actual Record of Work for conformance to the
 1403 certification process. The minimum required information is listed below. For additional
 1404 information, see Annex.

1405

1406 Minimum contents in the Compliance Folder:

1407

1408 Member name

1409 Exact model number

- 1410 Exact kit number if applicable (i.e. variant number)
- 1411 Hardware version and change history
- 1412 Software version and change history
- 1413 CRSL version number
- 1414 PICS
- 1415 PIXIT
- 1416 Test Report
- 1417 Applicable waivers and their descriptions and reasons, and any change requests
- 1418 Declaration of Conformance

1419
1420 All vendors shall maintain a duplicate set of Compliance Folder for their certified product. The
1421 ~~logo-certification~~ program, at its discretion, may order additional reviews of the Compliance
1422 Folder. Any such additional Compliance Folder reviews shall be at the expense of the ~~logo~~
1423 ~~certification~~ program and be conducted by a mutually agreeable third party contractor that is not
1424 an employee of another manufacturer.
1425

1426 **3.3.8.3. ~~Logo~~ Certificate**

1427 After the ~~Logo~~-Certified product is listed in the ~~Logo~~-Certified Product List, the Certification
1428 Program Manager shall issue a hard copy of the Certification to the vendor with special heavy
1429 stock paper.
1430

1431 **3.3.8.4. Removal of Products from Certified Product List**

1432 The primary contact for the particular product posted on the ~~Logo~~-Certified Product List may
1433 request that the product be removed from public view anytime. The removal request should be
1434 sent to the Certification Program Manager. This action only affects the public view of the
1435 product on the List.
1436

1437 **3.3.8.5. Changes to Certified Products**

1438 Any change to a certified product falls under one of two classes: Class I or Class II.
1439

1440 **3.3.8.6. Determining Class of Change**

1441 All devices put on the market shall meet the requirements for which the product has been
1442 certified. The ~~Logo~~-Certified Product List registers products/modules having a specific hardware
1443 and software version. The product manufacturer is responsible to ensure that the Compliant
1444 Portion of all production units are identical to the certified version in all material aspects.
1445

1446 Any change to the Compliant Portion of the ~~Logo~~-Certified Product shall be documented in the
1447 Compliance Folder of the manufacturer, and the manufacturer shall notify the APCB of those
1448 changes. The manufacturer may initially classify the class of change; however the classification
1449 noted by the APCB shall be the class of record. The APCB shall determine what additional
1450 testing is required, according to the Annex guidelines and documentation provided.

1451 **Class I Changes**

1452 A Class I change is a product change that has no impact to the hardware or software within the
1453 Compliant Portion and no change to the declared functionality in the PICS.
1454

1455 For Class I change, no testing is required. For any change in the product name or product
 1456 version, the Compliant Folder will be revised to reflect the change, and the APCB is responsible
 1457 to effect the change in the ~~Logo~~-Certified Product List.

1458 **Class II Changes**

1459 A Class II change is a software or hardware change to the Compliant Portion or to the
 1460 functionality declared in the PICS.

1461
 1462 The member shall supply the APCB with the detailed change description, and estimated impact
 1463 to the results of the tests implemented according to the CRSL in effect at the time of the
 1464 certification testing at the APCL. The member may add a proposal on the scope of required re-
 1465 testing.

1466
 1467 The recertification testing is done by the APCL using the current CRSL. Based on the technical
 1468 evaluation of the supplied change documentation, the APCB may determine that certain prior
 1469 test results may be reused.

1470
 1471 The test requirements shall be determined by the APCB based on the current CRSL. Test
 1472 reports from the former certification testing may be reused in portions or in its entirety
 1473 depending on the test requirements and judgement of the APCL.

1474
 1475 Based on the review of product change documentation, the APCB shall determine e test cases to
 1476 be conducted on the product.

1477
 1478 The APCB may require additional information as necessary to determine test cases to be
 1479 conducted.

1480 **3.3.8.7. Re-certification versus Change to Certification**

1481 The change classification to a certified product is determined by the impact of that change on
 1482 the Compliant Portion as shown in the table below.

1483

Class Category	Definition	Re-certification	Responsibilities
I	Software and/or Hardware change outside the Compliant Portion	No	Manufacturer is responsible for any testing, and informational changes and any test results are recorded in the Compliance Folder.

II	Software and/or Hardware change affecting the Compliant Portion	Yes	Any and all tests are to be performed by the APCL. Changes and test results need to be recorded in the Compliance Folder
----	---	-----	--

1484
1485
1486
1487
1488
1489

For Class I changes, any testing are responsibility of the member, and testing can be conducted by the manufacturer, or by APCL. Test results shall be recorded in the Compliance Folder. For Class II changes, any and all tests are to be performed by the APCL.

1490 **3.3.8.8. Module Policy**

1491 A ~~Logo~~-Certified Product may be designated as a Module at the option of the member
1492 responsible for the listing. Designating the ~~Logo~~-Certified Product as a Module facilitates the
1493 reuse of the Module in a broader range of ~~End~~ Products. Certification requirements for the
1494 Module include all requirements for the ~~Logo~~-Certified Product, and additionally information
1495 described in this section.

1496
1497 A Module is a hardware and software combination that constitutes a Compliant Portion when
1498 installed within a specified hardware and software environment. Typically, a Module will include
1499 a software driver, hardware module, and, for radio based products, an -antenna. The Annex
1500 gives an informative guideline on Modules.

1501
1502 The description of the Module on the ~~Logo~~-Certified Product List shall identify:

- 1503 • hardware and software comprising the entire Compliant Portion,
- 1504 • description essential to operation of the module,
- 1505 • hardware and software versions certified.

1506
1507
1508 To certify a Module, the APCB shall determine that

- 1509 • the vendor supplied product satisfies all current certification requirements,
- 1510 • the entire Compliant Portion is contained within the Module,
- 1511 • the hardware and software environment required for the Module is sufficiently specified
1512 to ensure adherence of the Compliant Portion to the certified conditions.

1513
1514
1515 The same Product change rules apply to Modules.

1516
1517 **3.3.8.9. Inheritance of Compliant Portion of Modules**

1518 When a certified Module is incorporated into a product, the integrator may, for example, change
1519 the antenna front end to the module. The integrated product may be certified as an End
1520 Product when the APCB determines that an APCL RPT test yields results with acceptable
1521 outcomes. An eException applies when there are no changes to the antenna front end,
1522 housing, or any characteristics impacting the Compliant Portion.

1523
 1524 An example for a streamlined process for OEMs using a previously certified Module is shown in
 1525 the table below as a guide.
 1526

Vendor	Scenario	Required Testing	Approximate Cost	Documents
Module Vendor	Initial Certification	PhyCT, RCT, IOT, PhyPT, NCT	Full certification testing cost and logo fee	All test reports and Compliance Folder
End Product Vendor	Initial Certification using a certified Module	PhyPT	PhyPT test cost and logo fee	PhyPT test report and Compliance Folder, plus a reference to Compliance Folder of Module

1527

1528 3.3.8.10. Integrated Products and Re-Branded Products

1529
 1530 During its life cycle in the market, certified products may at times be integrated into larger
 1531 systems, or re-branded without the Compliant Portion undergoing any material change. In order
 1532 to maintain traceability of the certified product through the market place, and to ensure that
 1533 Compliant Portion certified status is indeed maintained, it is necessary to manage the
 1534 integration and re-branding processes.

1535
 1536 Using a new brand name for a previously certified product is allowed without additional logo fee
 1537 if a new listing is not requested. However, in such cases, the product shall bare clearly the
 1538 original certification ID. If a new listing is requested, a ~~logo~~-listing fee shall be charged, and a
 1539 replica record created in the ~~Logo~~-Certified Product list with the new brand information.

1540
 1541 Additionally, original design manufacturers (ODM) may design, manufacture, and certify a
 1542 product or module for a second client company. In such cases, the client company is
 1543 responsible to create a new listing request for the product to be ~~Logo~~-Certified Product under
 1544 the client company.

1545
 1546 Any change in the Compliant Portion shall be processed under the change classifications
 1547 scheme.
 1548

1549 3.3.9. Certified System Listing

1550 When the ~~Logo~~-Certification criteria are satisfied, and with the agreement of the vendor, the
 1551 ~~AP~~SCL shall post the system onto the ~~Logo~~-Certified System registry with the following
 1552 information:

1553
 1554 System Name
 1555 Name of each System Component
 1556 Version, release and variant identifier for each System Component
 1557 Certified Feature Set
 1558 Date of Certification
 1559 CRSL date
 1560 CRSL associated version number
 1561 Detailed system information in text form
 1562 Company logo in jpg format
 1563

1564 The APSCB shall ensure, prior to completing the system certification process, that the system
 1565 vendor is still a member in good standing with the ~~logo-certification~~ program, and that the
 1566 certification testing fee and any appropriate certification logo fee are collected per certification.
 1567 With the explicit agreement of the applicant, the APSCB will enter the data into the ~~Logo~~
 1568 Certified System registry and create an electronic ~~Logo~~-Certification Certificate from this data.

1569 3.3.9.1. Compliance Folder

1570 The Compliance Folder shall provide the actual Record of Work for conformance to the
 1571 certification process. The minimum required information is listed below.

1572
 1573 Minimum contents in the Compliance Folder:

1574
 1575 -Member name
 1576 -System name
 1577 Name of each System Component
 1578 -Software execution environment
 1579 -Software version and change history including MD5 Hash
 1580 Version, release and variant identifier for each System Component
 1581 -CRSL version
 1582 -PICS
 1583 -PIXIT
 1584 -Test Report
 1585 -Applicable waivers and their description and reasons, and any change requests
 1586 -Declaration of Conformance
 1587

1588 All vendors shall maintain a duplicate set of Compliance Folder for their certified system. The
 1589 ~~logo-certification~~ program, at its discretion, may order additional reviews of the Compliance
 1590 Folder. Any such additional Compliance Folder reviews shall be at the expense of the
 1591 ~~certification logo~~ program and be conducted by mutually agreeable third party contractor that is
 1592 neither an employee of another vendor.

1593 3.3.9.2. ~~Logo~~-Certificate

1594 After the ~~Logo~~-Certified system is listed in the ~~Logo~~-Certified System List, the Certification
 1595 Program Manager shall issue a hard copy of the Certification to the vendor with special heavy
 1596 stock paper.

1597 3.3.9.3. Removal of Systems from Certified List

1598 The primary contact for the particular system posted on the ~~Logo~~-Certified System List may
 1599 request the system be removed from public view any time. The removal request should be sent

1600 to the Certification Program Manager. This action only affects the public view of the system on
1601 the List.

1602 **3.3.9.4. Changes to Certified System**

1603 Any change to the system shall require regression testing as a rule, unless deemed
1604 unnecessary by the APSCB.

1605 **3.3.9.5. Reference System Instantiations**

1606 Vendor systems derived from Reference System is considered an instantiation of the Reference
1607 System and not the Reference itself. As such, the practical status of instantiated reference
1608 system is the same as any system claiming conformance to specification.

1609 **3.3.9.6. Equivalent Clean Room Implementations**

1610 Vendor systems implementing a parallel Reference System is the same as any system claiming
1611 conformance to the specification.

1612 **3.3.9.7. Candidate Reference Implementations**

1613 Vendor systems implementing a Candidate Reference System is the same as any system
1614 claiming conformance to the specification.

1615 **3.3.10. Validation of Test Harness for Device Testing**

1616 **3.3.10.1. Submittal Process**

1617
1618 A test harness subject to consideration as part or whole of a validated test system for Logo
1619 Certification shall satisfy the following submittal criteria:

- 1620
- 1621 a) Bbe available for commercial purchase by testing laboratories and Member
1622 companies or be available publically through free and open source agreements.
 - 1623 b) Ssupport the Test Control Interface (TCI) for relevant Primary Test Categories and
1624 protocol layers
 - 1625 c) Include scripting capability for automated test runs
 - 1626 d) Supply test cases in accordance with the CRSL; implementation must be at least
1627 one complete test category out of five Primary Test Categories¹
 - 1628 e) as appropriate, subject to calibration cycles
- 1629

1630 The CPM shall review the test harness submittal for the above minimum submittal criteria (may
1631 be outsourced to LL), to be an eligible candidate system of detailed evaluation for
1632 validation as an official Logo-Certification Test Harness.
1633

1634 **3.3.10.2. Evaluation Process**

1635
1636 A test harness, accepted for consideration as part or whole of a validated test system for Logo
1637 Certification, shall undergo technical evaluation by the LL, and the LL is responsible to sign-off
1638 on the technical viability of the system as a test harness for the industry.
1639

¹ The test harness shall provide a full implementation of any claimed supported protocol, as described in the corresponding test plan, which in turn has been derived from the PICS.

1640 The validation process shall at minimum involve the following steps:

- 1641
- 1642 1. Execution of the relevant CRSL scope, through a Test Control Interface (TCI), as
- 1643 implemented for the Primary Test Category of the test harness, and obtaining the
- 1644 expected results that include the use of the Golden Units designated by the CPM for
- 1645 the Product ~~Logo~~-Certification Program.
- 1646 2. Examination of the upper tester and lower tester logs, along with the over-the-
- 1647 air/physical media results, to determine the proper recording and evaluation of the
- 1648 test results.
- 1649 3. Test harness shall exhibit a Gauge R&R of relevant reference Primary Test
- 1650 Category tests of less than 5%.
- 1651 4. Test harness shall exhibit a Gauge R&R of relevant reference Primary Test
- 1652 Category tests of less than 10% between homogenous and heterogenous test
- 1653 harness set-ups at different laboratory locations (i.e. in APCLs).
- 1654

1655 Note that the procedure to perform the Gauge R&R using the reference Primary Test Category

1656 tests are the responsibility of the LL.

1657

1658 3.3.11. Validation of Test Harness for System Testing

1659 In order to institute a stable ~~Logo~~-Certification Program, a reliable testing program is essential.

1660 One basis of such a program is the use of well defined “test harness”. Any such test harness

1661 shall be officially “validated” by the CPM as capable of performing the required testing. All

1662 APSCLs are required to have access to and use a reference system or validated test harness to

1663 perform ~~Logo~~-Certification testing for relevant test categories.

1664

1665 System tests are required for the following:

1666

1667 A/E : Authentication and Encryption

1668 PCT : Protocol Conformance

1669 NIOT: Network Interoperability

1670 FUNC: Functional Testing

1671

1672 All test harnesses tasked to perform the test need to be able to complete the entire set of tests

1673 as described in the applicable CRSL for at least one primary test category.

1674

1675 Once a test harness(es) is validated to perform the CRSL tests, all such instances of the test

1676 harness at or accessed by the APSCL need to be monitored for continual validity of the entire

1677 ~~Logo~~-Certification Program. Therefore, -it is critical that tests be repeatable and reproducible,

1678 i.e. repeated measurement results are consistent, and that those measurements are

1679 reproducible by other laboratories that may be using different instances of the validated test

1680 harnesses. The Certification Program shall maintain a specific level of software version for all

1681 testing. The representative tests (reference primary category tests) shall be selected by the LL

1682 on an ongoing basis, and verification performed across the APSCL at least once a year.

1683

1684 3.3.11.1. Submittal Process

1685

1686 A test harness subject to consideration as part or whole of a validated test system for ~~Logo~~

1687 Certification shall satisfy the following submittal criteria:

- 1688
 1689 A. be available for commercial purchase by testing laboratories and Member
 1690 companies
 1691 B. support the Test Control Interface (TCI) for relevant Primary Test Categories
 1692 and protocol layers
 1693 C. supply test cases in accordance with the CRSL; implementation must be at least
 1694 one complete test category out of Primary Test Categories
 1695 D. maintain strict version control ~~through using a version control tool such as~~ CVS
 1696 or SVN
 1697

1698 The CPM shall review the test harness submittal for the above minimum submittal criteria, to be
 1699 an eligible candidate system of detailed evaluation for validation as an official ~~Logo~~-Certification
 1700 Test Harness.
 1701

1702 3.4. Improvement and Corrective Action / Feedback

1703 3.4.1. Certification Process Exceptions

1704 While the present Certification Program Reference Manual attempts to cover all contingencies
 1705 that may occur during the Certification Program, inevitably, new needs and issues continually
 1706 arise, and the program shall install processes to enable a flexibility in the program for continual
 1707 improvement.
 1708

1709 In general contingencies will occur that interrupt the planned certification process. These
 1710 contingencies may occur at various steps along the device testing and certification process, and
 1711 can generally be categorized into two characters:
 1712

1713 Problems arising in the course of executing the certification process: Process Problem
 1714 Problems arising due to strong and quantifiable objection by members: Disputes
 1715

1716 The following describes the nominal process to handle such contingencies.
 1717

1718 3.4.1.1. Process Problem Resolution

1719 There can arise many potential problems within the ~~Logo~~-Certification Process that can cause
 1720 significant delays in certification of a vendor's product. These problems include, but are not
 1721 limited to
 1722

- 1723 • Test Harness issues,
- 1724 • Interoperability issues between optional or conditional features of vendor devices
 1725 and implementations
- 1726 • Specification issues, etc.
 1727

1728 The following creates a process framework to provide at a minimum, a predictable path to
 1729 resolution for any potential problem that may arise.
 1730

1731 Change Request Process

1732 In order to provide a solution to a problematic component of the certification process, the
 1733 program provides its members the possibility to go through the Certification Change Request
 1734 process (CCR). The CCR process is based on three steps: generation, evaluation, and
 1735 resolution.

- 1736
- 1737 1. CCR generation: Vendor issues a CCR describing the problem and the test cases,
 1738 PICS, specifications affected by this problem to the APCB. The APCB is responsible
 1739 to review the CCR and consult with the LL.
 - 1740 2. CCR evaluation: The LL, along with the APCB evaluates the CCR and endorses or
 1741 rejects the CCR. In the case of endorsing the CCR, the LL shall recommend a
 1742 resolution. The endorsement is forwarded to the TAB. The process shall take place
 1743 within 5 business days from reception of the CCR.
 - 1744 3. CCR resolution: The LL has further 5 business days to implement any technical
 1745 resolution to the CCR under the LL's direct control and implement any necessary
 1746 CRSL revisions. The TAB shall locate, as necessary a sponsor within the industry
 1747 WG to affect any change in the technical specifications by the CCB process to
 1748 institute a permanent fix to the problem.

1749 **CCR**

1750 | The SSO and CPM must implement ~~a~~ the submittal and template for the Certification Change
 1751 Request (CCR).
 1752

1753 **3.4.1.2. Process Dispute Resolution**

1754 | All disputes relating to product certification shall be resolved by the following process:-

1755 **Overview**

1756 Disputes not immediately affecting the certification process, but nonetheless are deemed
 1757 serious enough for a vendor to raise, can be processed in a procedural way. The following is
 1758 | essentially a formalized dispute resolution, when other alternatives methods of are not
 1759 available.

1760 **Binding Resolution**

1761 | t.b.d.

1762 **3.4.1.3. Jurisdiction**

1763 A vendor may initiate a dispute resolution proceeding in accordance with this section for a
 1764 dispute that relates to a certified feature or aspect of a Certified Product.
 1765

1766 **Informal Dispute Resolution**

1767 | Prior to initiating a formal dispute resolution the member ~~-~~ shall seek in good faith to resolve
 1768 disputes informally.
 1769

1770 **A. Dispute Resolution Demand**

1771 If parties are unable to resolve the dispute within 30 days after the parties commenced informal
 1772 efforts to resolve the dispute, either party may demand formal dispute resolution
 1773 by delivering a demand in writing to the other party and to the Certification
 1774 Program Manager.

1775

B. Hearing by Dispute Resolution Committee

1777 Each dispute brought pursuant to this section shall be heard by a dispute resolution committee
1778 defined by these rules. The decision ~~of~~ the Dispute Resolution Committee
1779 shall be final and binding to both parties with respect to all certification matters.
1780 The Dispute Resolution Committee is formed by the Certification Program
1781 Manager at his/her discretion.
1782

C. Dispute Resolution Fee

1783
1784 Before the Dispute Resolution Committee considers the dispute, the party demanding
1785 adjudication of the dispute shall pay a non-refundable processing fee. The
1786 Certification Program Manager and the Dispute Resolution Committee shall not
1787 act unless the fee has been paid. Where the final decision is deemed favorable
1788 to the party demanding adjudication, the fee shall be reimbursed.
1789

D. Hearing Schedule

1791 Upon receipt of the demand notice for the dispute resolution and payment of the processing fee,
1792 the Certification Program Manager shall promptly set up the Dispute Resolution
1793 Committee and send a copy of notice to parties involved via email with
1794 acknowledgement. This notice shall define a "Notice Date" for purpose of
1795 calculating all further actions in the dispute resolution process.
1796

1797 If the decision for the Dispute Resolution Committee requires action by a product manufacturer
1798 in order to bring a Certified Product into conformity with applicable certification
1799 requirements, the manufacturer shall either implement those changes with in
1800 ninety days of the Notice Date, or submit a schedule that is deemed acceptable
1801 by the Dispute Resolution Committee and commence diligent efforts to
1802 implement the change in accordance with the imposed or submitted timeline.
1803

E. Revocation of Certification

1804
1805 If the Dispute Resolution Committee deems that a manufacturer has failed to implement
1806 corrections as required by the binding resolution within the imposed or submitted
1807 timeline, and the Committee determines that no viable corrective action plan is in
1808 progress to resolve the dispute, the Dispute Resolution Committee can
1809 recommend to the Certification Program Manager that the product in question
1810 may be removed from the ~~Logo~~-Certified Product List. The Certification Program
1811 Manager may then remove the product from the ~~Logo~~-Certified Product List until
1812 the Dispute Resolution Committee deems that the manufacturer has rectified the
1813 problem.
1814

Dispute Resolution Committee**A. Composition**

1817 The Dispute Resolution Committee shall have the following composition:
1818 - Lead Lab Representative

- 1819 | - APSCL Representatives
 1820 | - SSO/SDO Representative
 1821

1822 | **B. Committee Actions**

1823 | In considering a dispute, the Dispute Resolution Committee shall consider the materials
 1824 | presented by each party involved to the dispute, and may in addition consider
 1825 | such other materials and information as it deems appropriate to settle the
 1826 | dispute.

1827
 1828 | A copy of all associated documents used in resolving the dispute shall be maintained by the
 1829 | vendor and APCB in the Compliance Folder.

1830 | **(C) Committee Decisions**

1831 | The Dispute Resolution Committee shall decide on matters by a majority vote.
 1832

1833 | **(D) Role of Certification Working Group**

1834 | All decisions of the Dispute Resolution Committee shall be binding and final upon the parties,
 1835 | provided however that it becomes evident that the dispute may be related to a
 1836 | flaw in the certification test or the certification process. In that case, the Dispute
 1837 | Resolution Committee or either party in the dispute may request that the matter
 1838 | be transferred to the industry WG for consideration.

1839 | **3.4.2. Certification Requirement Waiver Process**

1840 | The waiver process allows a manufacturer to apply for a dispensation (exception) from a
 1841 | specific certification requirement that the manufacturer is unable to meet and that will prevent or
 1842 | delay certification. The waiver process is intended to be used in cases where a manufacturer
 1843 | believes it has a justifiable reason that a waiver should be granted. The waiver process is not
 1844 | intended to deal with test harness or test case problems that are preventing a device from
 1845 | achieving certification. Such issues are dealt with using the CCR process.

1846
 1847 | Waiver requests are reviewed by an independent body, the Waiver Review Board (WRB) which
 1848 | reviews and takes decisions on waiver requests. This body must be independent of the
 1849 | manufacturer submitting the waiver request, and have no conflict of interest with respect to the
 1850 | waiver request application for the device. Waiver requests are confidential and are not shared
 1851 | between manufacturers.

1852
 1853 | Waiver requests are submitted to the Certification Program Manager through the APCB, using
 1854 | ~~the a suitable~~ Waiver Template. ~~(see Annex A2.4)~~. The Program Manager forwards the request
 1855 | to the Waiver Review Board for consideration. Waivers are reviewed on a ~~case-by-case~~
 1856 | ~~by-case~~ basis. Submission of a waiver request does not guarantee consideration ~~nor~~ approval
 1857 | of the waiver request by the WRB. A waiver request can be submitted at any time in the
 1858 | certification testing process and the process can be applied for during both initial and re-
 1859 | certification of ~~Logo~~-Certified Products.

1860 **3.4.3. Surveillance of Certified Product Validity**

1861 | The ICP is responsible to ensure the continued validity of certified products, modules and
1862 | software systems in the market.

1863
1864 | The ICP is responsible to compile an ongoing verification record of certified products out in the
1865 | market.

1866
1867 | [The](#) CPM is responsible to take mitigative, corrective and preventive action to the non-compliant
1868 | Member, [the](#) APCB, and the APCL involved using the following procedure outlined, upon
1869 | discovery of a certified product that breaches the original certified condition of the product.

1870
1871

1872 **3.4.3.1. Corrective and Preventive Action**

1873 | [The](#) CPM shall discuss with the involved APCB & APCL the issuance in writing of the Mitigation,
1874 | Corrective, and Preventive Action Request (MCPAR), to the APCB & APCL, the non-compliant
1875 | Member and the APCL. The MCPAR shall indicate the following:

- 1876
1877 |
- Detail on the observed breach of certification requirements
 - Assigns APCB & APCL as party responsible to close the open action item identified on the MCPAR
 - Orders Member to account for units already in the market
 - Orders APCB, APCL Member to institute corrective action of this event and preventive action of similar events
 - Order APCB, APCL to work with Member to mitigate the impact of released devices
 - Order APCB, APCL to institute corrective action for this event, and preventive action to forestall future similar events
 - After set date, obtain the report on the corrective and preventive action from Member, APCB, APCL
 - [The](#) CPM shall evaluate validity and effectiveness of the response.

1888 |
1889
1890 | [The](#) APCB & APCL shall monitor the corrective and preventive action after a set time indicated
1891 | by response on the MCPAR. When subsequent verification determines that corrective and
1892 | preventive actions are effective, [the](#) APCB & APCL shall report to [the](#) CPM, and the case can
1893 | be closed; if it is found to be insufficient, [the](#) CPM shall initiate [a](#) complete review of [the](#) APCB,
1894 | APCL appointed status.

1895

1896 **3.5. Security Considerations**

1897 | t.b.d.

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1916 **4. ANNEX**

1917 **4.1. Summary Matrix**

Requirement	OpenHAN	OpenADR	OpenADE
Program Version	Yes	Yes	Yes
Lead Laboratory	Yes	Yes	Yes
Appointed Labs	Yes	Yes	Yes
Certification Body	Yes	No	No
Program Manager	Yes	Yes	Yes
Test Harness	Yes	Yes*	Yes*
Reference System	No	Yes*	Yes*
Technical Advisory Board	Yes	Yes	Yes
Test Case Reference List	Yes	Yes	Yes
Compliance Folder	Yes	Yes	Yes

1918
 1919 * Either Test Harness or Reference System may be used
 1920