

OpenSG Edge/Enterprise Conformance Task Group

Certification Process Reference Manual

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December-February 244, 2011

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65

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Disclaimer

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

70

Change History

72

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

73

74 **1. Introduction**

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

81
82 The GridWise Council, sponsored by NIST, also address issues of interoperability and testing.
83 This document aims to be inclusive of the GridWise Council work products, while maintaining a
84 clear focus on utility infrastructure and industry requirements.

85 **1.1. Purpose**

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

92 **1.2. Scope**

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

- 97
- 98 • Testing and certification experiences of communication protocol stacks following
99 Best Practice for testing as described in the Guiding Principles document.
 - 100 • The importance of accumulated experience of testing institutions is recognized. Of
101 particular importance are: coexistence with interferers, interoperability at application
102 layers but with various physical layers and interconnections thereof, and
103 enforcement of standards based interoperability.
 - 104 • Systems represented in the OpenSG community are covered, including AMI-
105 Enterprise Systems, OpenHAN, OpenADE and OpenADR interoperability and
106 conformance.
- 107

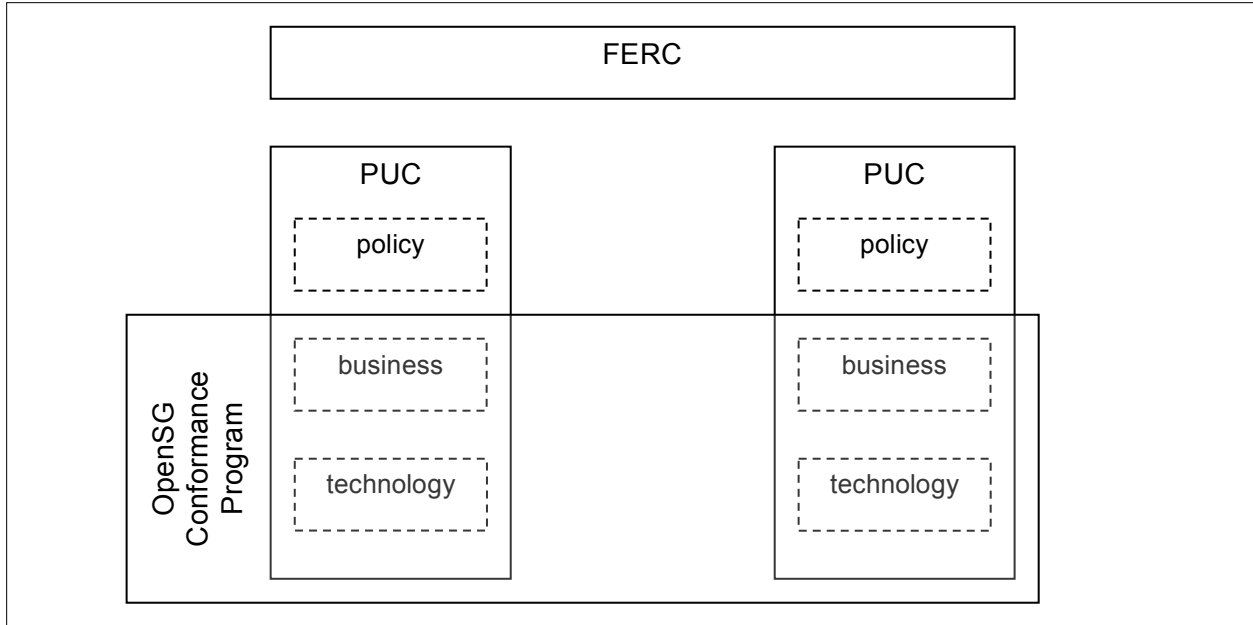


Figure 1: Context for OpenSG Conformance Program

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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.

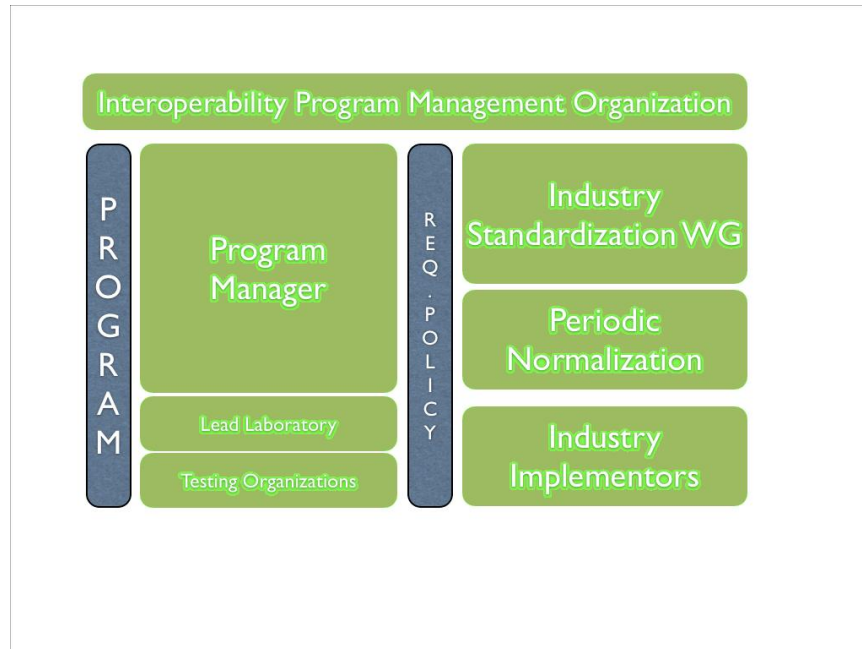


Figure 2: Organization

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129 1.3. Acronyms and Abbreviations

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

134
135
136 **APCB:** Approved Product Certification Body - Qualified organisation responsible to manage a
137 certification process for a particular product, and independent from test laboratory. The product
138 may be either a device or module incorporating hardware and software, or a software only
139 system / sub-system~~Qualified person responsible to manage a certification process for a~~
140 ~~particular device, and independent from test laboratory or manufacturer.~~

141
142 **APCL:** Approved ~~Device-Product~~ Certification Laboratory - Testing organization tasked to
143 evaluate ~~device-product~~ for compliance and interoperability. The product may be either a device
144 or module incorporating hardware and software, or a software only system / sub-system

145
146 ~~**APCB:** Approved Product Certification Body - Qualified organisation responsible to manage a~~
147 ~~certification process for a particular product, and independent from test laboratory. The product~~
148 ~~may be either a device or module incorporating hardware and software, or a software only~~
149 ~~system / sub-system~~

150
151 **API:** Application Program Interface

152

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

156 |
157 | CCB: Change Control Board - A Change Control Board is used to control identified system
158 | changes, review impacts, and grant approvals as part of the change management function. The
159 | CCB is typically comprised of members from the participating organizations shown in Figure 2

160 |
161 | CIS: Customer Information System

162 |
163 | **CPM:** Certification Program Manager - Person tasked by the SSO/SDO to administer the test
164 | and certification program

165 |
166 | **CRSL:** Certification Reference Status List - List of test cases that are draft, active, deprecated,
167 | and planned in the certification program.

168 |
169 | CVS: Concurrent Versions System – a version control system often used for software
170 | development

171 |
172 | DER: Distributed Energy Resources

173 |
174 | EMS: Energy Management System

175 |
176 | ESI: Energy Services Interface

177 |
178 | Gauge R & R: is a Measurement Systems Analysis technique which uses Analysis of Variance
179 | (ANOVA) random effects model to assess a measurement system. There are two important
180 | aspects of a Gauge R&R. First, **Repeatability**: the variation in measurements taken by a single
181 | person or instrument on the same item and under the same conditions, and second,
182 | **Reproducibility**: the variability induced by the operators. It is the variation induced when
183 | different operators (or different laboratories) measure the same part.

184 |
185 | HAN: Home Automation Network

186 |
187 | **IUT:** Implementation Under Test

188 |
189 | **ICP:** Interoperability and Conformance Program

190 |
191 | ~~ITCAPMO: Interoperability Program Management Organization~~ **ITCAPMO: Interoperability Test and Certification Authority** -
192 | An administrative organization vested with the responsibility of operating and maintaining a
193 | testing and certification program for smart grid technology, and responsible to maintain its
194 | efficacy per the OpenSG requirements.

195 |
196 | **LL:** Lead Lab - Central technical authority for testing and testing technology

197 |
198 | MDMS: Meter Data Management System

199 |
200 | OSI: The Open System Interconnection Reference Model or OSI Reference Model is a
201 | conceptual description for layered communications network protocol design.

202 |

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

204

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

206

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

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

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

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

211 | of resources.

212

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

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

215

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

217

218 | **SRS:** System Requirements Specification

219

220 | **SUT:** System Under Test

221

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

223

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

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

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

227

228 | 1.4. Terminology

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

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

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

232 | back office systems.

233

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

235 | submit evidence of products for certification

236

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

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

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

240 | compared with conformance

241

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

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

244 | technical and qualitative measures.-

245

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

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

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

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

250

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

255
256 **Device:** A device is a product which incorporates hardware, typically including communications
257 hardware which is included as part of the compliant portion. A device will usually be deployed at
258 the edge of the utility network.

259
260 **Enterprise System:** large-scale, integrated application-software package(s) that use the
261 computational, data storage, and data transmission power of modern information technology to
262 support business processes, information flows, reporting, and data analytics within and between
263 complex organizations.

264
265 **Equivalence:** An evaluation of a system against another system instantiation, whereby
266 features/functions are compared and contrasted; when all such features/functions are identical,
267 the system is judged to be in "equivalence".

268
269 **Instantiation:** An implementation of a system, either compliant or conforming. --- Example:
270 compiling, etc.

271
272 **OpenADE:** The OpenADE Task Force is a group of smart energy management vendors,
273 utilities, and consumer interests developing recommendations toward building interoperable
274 data exchanges that will allow customer authorization and sharing of utility consumption
275 information with 3rd party service providers.

276
277 **OpenADR:** Open Automated Demand Response

278
279 **OpenHAN:** OpenHAN Home Area Network Device Communication, Measurement, and Control
280 focuses on the consumer interface task defined by UtilityAMI.

281
282 **Reference System:** A system created as a complying instantiation.

283
284 **Prototype System:** A system created as a conforming instantiation.

285
286 **Reference System:** A system created as a complying instantiation.

287
288 **Primary Test Categories:** Canonical Baseline Test Types - tests categories that are deemed
289 to be minimum required for an acceptable and effective testing program.

290
291 **Signed Certification Mark License Agreement** – [defn-required]A licence agreement between
292 the ITCA and the applicant for a Certification Mark

293
294 **System:** Part or whole instance of product functionality, usually associated with software portion
295 of product

296
297 **Product:** Hardware and/or software implementation to be tested for compliance /
298 interoperability

299
300 **Module:** Hardware and software implementation that incorporates a compliant portion

301

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

304
305 **Interoperability:** Communication and functionality achieved by multiple conforming systems. A
306 ~~correspondance~~correspondence of interfaces between two abstract functional units.

307
308 **Interoperability Testing:** connects two or more implementations together and determines
309 whether they can successfully communicate. Significantly different from conformance testing
310 because it is often possible for two systems that conform to the standard to be unable to
311 communicate. If they can communicate, it is possible that they cannot perform any useful
312 applications. These situations can arise because the implementations have conflicting
313 interpretations of the specification or because they have chosen conflicting options within the
314 standard. A particular form of interoperability testing is application testing in which there is a
315 specification for the particular use of a standard that can be tested

316
317 **Security Testing:** Analyzes whether the implementation correctly makes use of any security
318 features from the standard or other security features available in the device or computer system
319 housing the implementation. This is the most difficult type of testing program because it must
320 evaluate whether the system has vulnerabilities, which are not always obvious.

321
322 **Validation Testing:** Validation testing ensures that a system meets the needs of its users and
323 stakeholders. System end-to-end tests are examples of validation tests.

324

325 1.5. Other Considerations and References

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

329

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

337

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

340

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

343

344 1.6. Overview

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

- 347
- 348 • relevant mandatory and optional conformance feature sets of the communication
349 stack physical layer
- 350 • relevant mandatory and optional conformance feature set of the communication
351 protocol stack
- 352 • interoperability of devices within the device class, and service level and application
353 interfaces relevant to the application profiles
- 354 • interoperability with applications and service level interfaces from other network
355 domains within the smart grid communication infrastructure
- 356 • conformance to metrics for product and system performance as specified by
357 business, regulatory, and user requirements per the GWAC stack framework
358


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

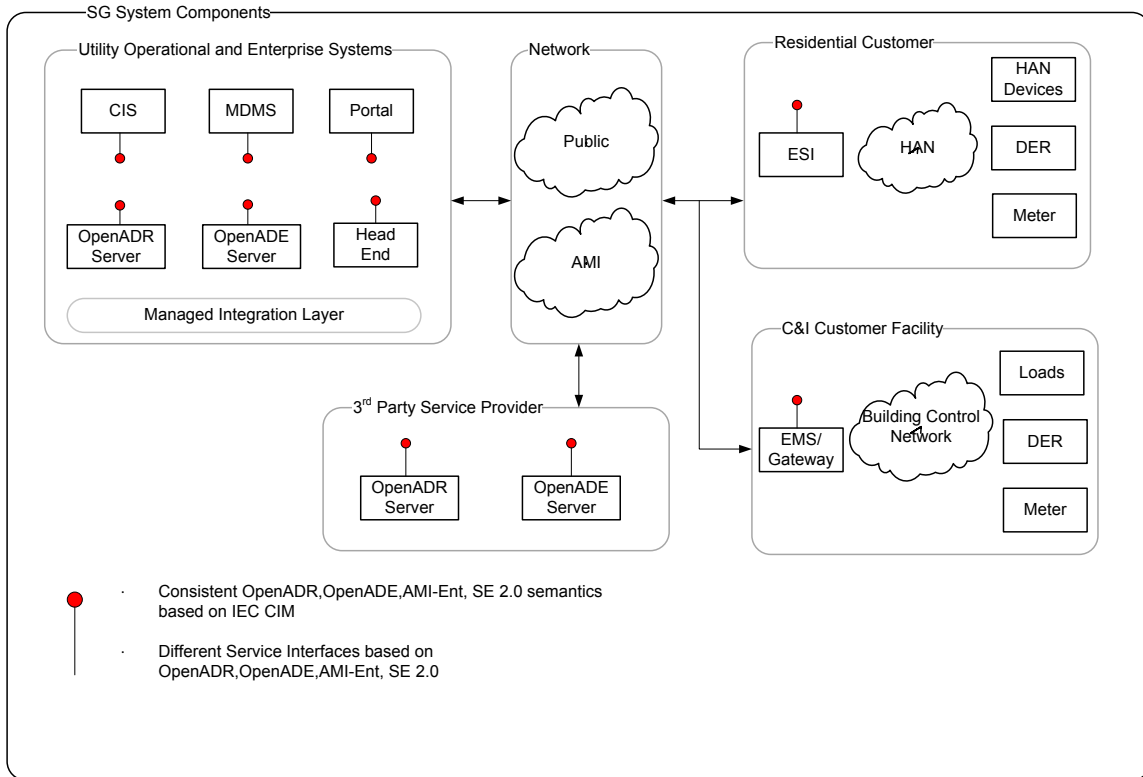
364 The product certification process applies to deployable end products and reference designs
365 such as, but not limited to, Smart Meters, Energy Service Interfaces and OpenHAN compliant
366 Smart Energy 2.x~~0~~ device implementations (PCT, IHD, LCD, etc.). The certification process
367 also addresses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

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

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

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

394
 395 Figure 3 shows an Overview of the System Components to be considered by OpenSG Edge
 396 /Enterprise Conformity Task Groups. The service interfaces are shown as .



398
 399

Figure 3: System Component Overview

400 2. Overall Description

401 2.1. Guiding Principles

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

404
405 For both systems and devices that incorporate a hardware portion, existing Best Practice
406 Structure shall be utilized. The importance of accumulated experience of testing institutions is
407 also recognized. The following points must be considered in the ~~IPMO-ITCA~~ when creating and
408 maintaining a testing and certification program.

409 2.1.1. Open standards based

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

413 2.1.2. Robust and comprehensive certification process

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

416 2.1.3. Clean, layered architecture

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

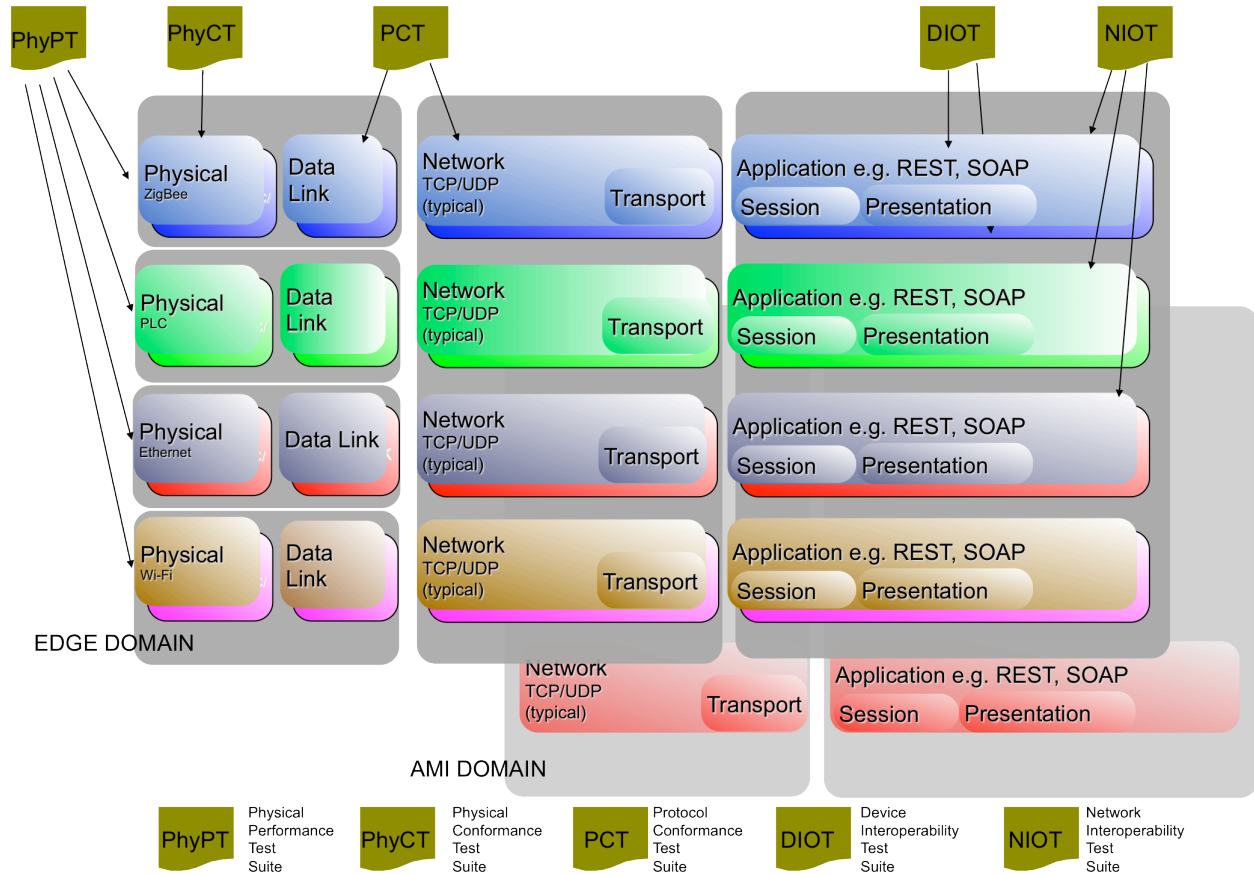
421 2.1.4. Focus

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

428 2.2. End to End System Interoperability

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

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



442 | **Figure 4: Context of individual test suites related to the total system**
 443 |
 444 |

445 | Figure 5: ZigBee SE2.0 Certification Scheme
 446 | 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 |

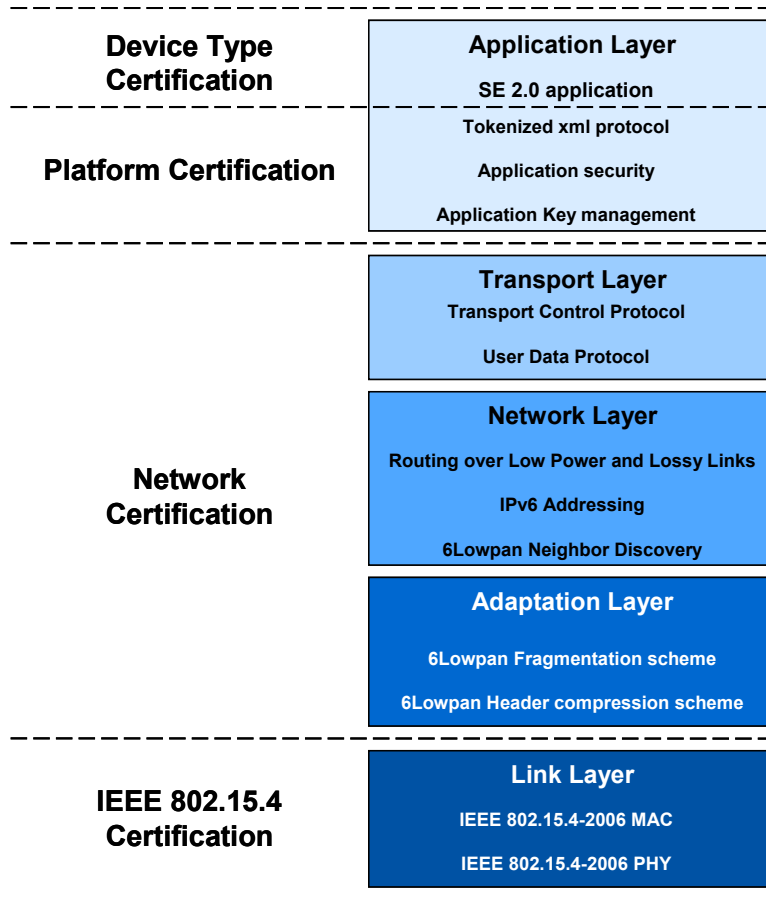


Figure 5: ZigBee SE2.0 Certification Scheme

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451
452

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.

467

468 2.6. Interoperability

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

474

475 2.7. Standardization Efforts

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

480

481 2.8. Architectural Considerations

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

486

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

490

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

497

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

501

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

505

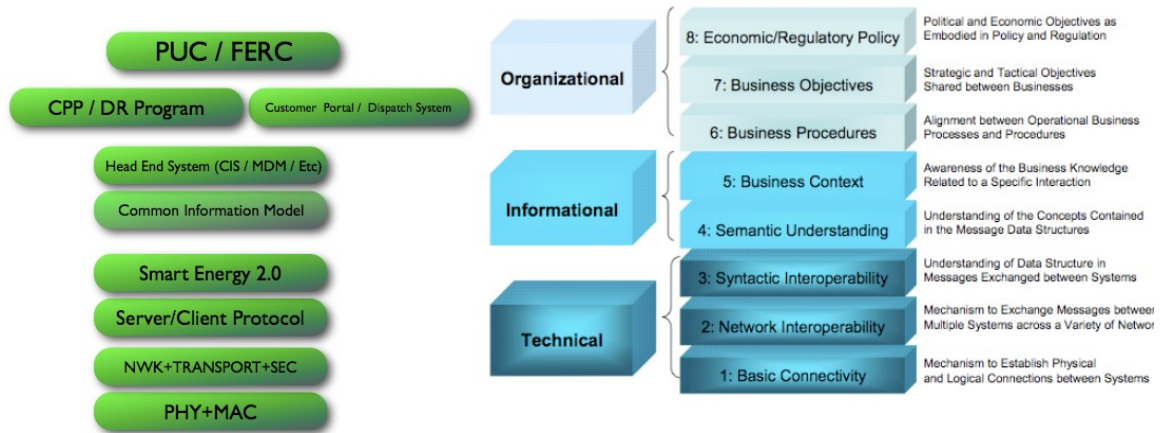


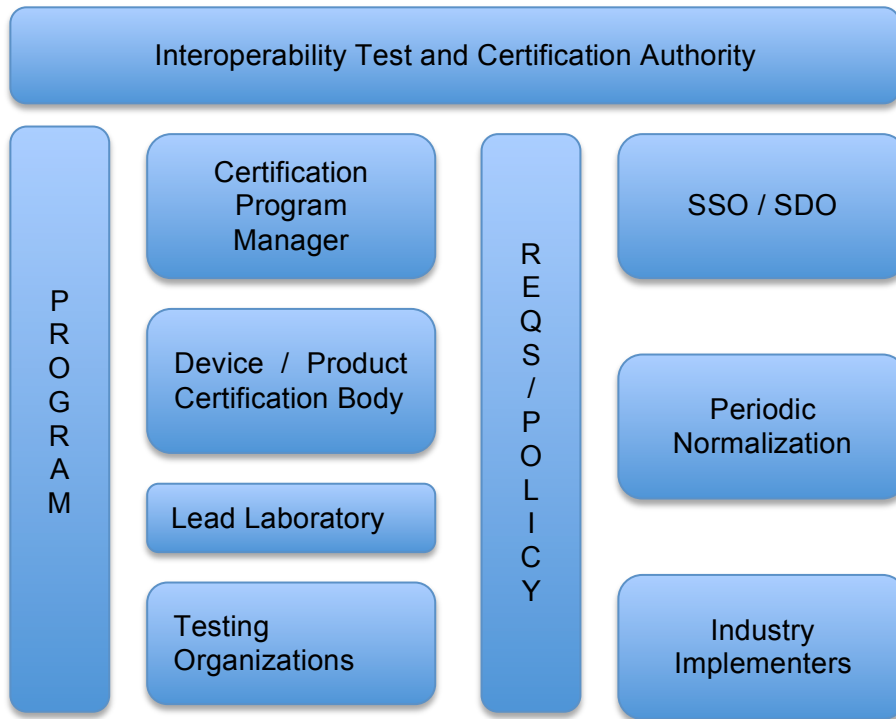
Figure 6: GWAC Stack

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507
508

509 **3. Organizational Requirements**

510 **3.1. Governance**

511 Figure 7 shows a suitable organizational structure for the management of a certification
 512 program. The ~~IPMO-ITCA~~ shall structure the testing and certification program with the following
 513 specific elements described below; to ensure that industry best practices are installed.



514
 515 **Figure 7: Organization**

516 **3.1.1. Certification Program Manager (CPM)**

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

521 **3.1.1.1. Chairing the Technical Advisory Board (TAB)**

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

525 **3.1.1.2. Administering the Testing and Certification Program**

526 t.b.d.

527 **3.1.1.3. Administering the Interoperability Test Events**

528 t.b.d.

529 **3.1.2. Approved Product Certification Body (APCB)**

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

538 **3.1.2.1. Definition**

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

547 **3.1.2.2. Sanctioned Activities and Responsibilities**

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

557
558 The APCB is knowledgeable about the application profile and its certification criteria. The
559 APCB notifies the industry WG Program manager when all listing requirements are met, and
560 gives a certification date and a member defined listing date of the product with the express
561 permission of the Member. The APCB enters the product information on the Certified Products
562 List when authorized by the Member for a specific listing date.

563
564 | Confidentiality is a key part of the APCB activity. For this reason, the APCB will operated under
565 the-a Non Disclosure Agreement (NDA). The APCB is responsible for verifying the authenticity
566 of documents submitted and used in Product Certification.

567
568 | With respect to the Certification program, the APCB serves under priviledgeprivilege granted by
569 the lege-certification program, and hence answers foremost to the Program Manager above any
570 immediate management authority the APCB may be operating under. Any deviation is grounds
571 for withdrawal of APCB status.
572

573 3.1.2.3. Qualifications: Recognition Process for APCB

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

578
579 Applications for APCB recognition shall be submitted to the Certification Program Manager.
580 The applicants shall directly address each requirement listed below in a manner that allows the
581 responses to be easily compared with each requirement. The Certification Program Manager
582 will forward completed APCB applications to the ~~certification logo~~-program for consideration.
583 The ~~certification logo~~-program will determine whether additional evidence or interview(s) are
584 needed and will instruct the Certification Program Manager to so notify the applicant.
585

586 3.1.2.4. APCB Requirements

587 The APCB shall have the following minimum qualifications

- 588
- 589 • at least 3 years relevant professional work experience
 - 590 • at least 2 years of relevant engineering related work experience in at least one of the
591 following areas
 - 592 - product planning and project management
 - 593 - product design in physical, protocol, or application layers
 - 594 - product evaluation and testing
 - 595 - product regulatory testing
 - 596 - product regulatory certification
 - 597
 - 598
 - 599 • where the APCB is part of a larger organization, the organizational arrangements
600 should be such that departments having conflicting interests, such as production,
601 commercial marketing, or financing do not adversely influence APCB compliance
602 with the requirements of the Certification Program
 - 603 • The APCB shall have arrangements that ensure that APCB is free from any internal
604 or external commercial, financial, or other pressures and influences that may
605 adversely affect the quality of work
 - 606 • authority to reject test results based on non-conformance
 - 607 • capable of maintaining confidential information
 - 608 • at least 1 year of active participation in a related technical or qualification working
609 group
 - 610 • relevant degree in engineering or sciences, or equivalent
 - 611 • ability to speak, read, write English at college level
 - 612 • ability to compose a logical non-technical position and argument based on technical
613 issues
 - 614 • be available for participation in industry WG participation
 - 615 • complete a Certification Program / APCB introductory course session held by the
616 CPM
 - 617 • complete, with satisfactory results, the application and questionnaire for APCB
618 recognition
 - 619 • complete an interview with the -CPM and ~~certification logo~~-program, or proxy thereof,
620 for APCB recognition

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

622
623 Furthermore, each APCB applicant acknowledges that continued recognition is contingent upon
624 the applicant's maintaining both the complete trust of the program and the original APCB
625 requirements met by the applicant. The ~~certification logo~~ program reserves the right to suspend
626 any APCB recognition at any time, without warning. This includes, but is not limited to, changes
627 in employment status and failure to maintain competence in the applicable ~~-~~specifications, test
628 specifications, and certification policies. It is not necessary for the program to provide any
629 specific reason for withdrawal of APCB privileges.

630
631 The APCB shall annually declare in writing to the program:

- 632
633 • that no changes in the APCB's conformance with the recognition requirements have
634 occurred,
635 • how the APCB continues as an active participant in the certification program, and
636 • how the APCB maintains competence in the SE specifications, and SE certification
637 policies

638
639 Note that APCB appointment does not guarantee the validity of the APCB's action (~~certification~~
640 ~~logo~~ program cannot be held liable for any claims against an APCB).

641

642 3.1.3. Technical Advisory Board (TAB)

643 3.1.3.1. Definition

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

652 3.1.3.2. Activities

653 The typical purposes of the TAB include:

- 654
655 • to address technical issues relating to conformance and interoperability testing of
656 End Products and modules; including issues relating to test
657 ~~specifications~~ specifications, test requirements, test procedures, validated test
658 equipment and validated test cases.
659 • to produce advisory notes for use by APCBs covering aspects related to test cases,
660 guidance on test configurations, ~~applicability~~ applicability of test cases especially
661 during transitional periods, and new testing ~~techniques~~ techniques in order to
662 ~~improve~~ improve the practical implementations of the certification process.
663 • to review and decide on Test Case Waiver submissions, subject to review by the
664 Lead Laboratory
665 • to provide a forum for free discussion of new ideas, developments, and advanced
666 testing techniques relating to test requirements, methods, and equipment

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

669
670 | The primary function of the TAB is to advise and counsel the certification logo-program in
671 | matters relating to product certification requirements and testing, including problems
672 | relating to test specifications, procedures, and equipment. A secondary function is the free
673 | exchange of knowledge among members. To help these functions the TAB will act as the input
674 | and source of knowledge on problems to the testing of End products and modules and on the
675 | certification process for the benefit of the entire -Certification Program and the Lead Laboratory.
676

677 Lead Laboratory (LL)

678 **3.1.3.3. Definition**

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

686 **3.1.3.4. Activities**

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

- 688
- 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 **3.1.3.5. Selection**

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

711 **3.1.4. Approved Product Certified Laboratory (APCL)**

712 **3.1.4.1. Definition**

713 The Approved Product Certified Laboratory (APCL) is a commercial or non-commercial testing
714 laboratory focussed on delivering testing services as part of the ~~Logo~~-Certification Program.
715 The APCL is charged with the responsibility of serving the ~~logo~~-program companies, to provide
716 a clear and concise pass / fail result for ~~Logo~~-certification Testing based on the CRSL and the
717 applicable test and technical specifications. The APCL status is granted by the ~~logo~~
718 certification program based on recommendation from the SSO/SDO. The APCL designation is
719 a privilege which can be revoked at any time by the ~~certification logo~~-program based on defined
720 process of removal. Appointments are subject to evaluation and renewed biannually.

721

722 **3.1.4.2. Activities**

723 The following activities are included in the APCL scope of activities:

724

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

737 **3.1.4.3. Selection**

738 It is the intent of the WG to make selection recommendations based on the following:

739

- 740 • Overall result of both evaluation and audits of candidate APCL
- 741 | • Geographic diversity of APCL locations in the -Certification Program
- 742 • Fostering competition for service and technical excellence
- 743 • Basic organizational and technical strength
- 744 • Good management practices
- 745 • Recognized accreditations, including ISO Guide 17025 from an internationally
- 746 | recognized accreditation body under the ISO/IEC ~~standardization~~standardization
- 747 | structure
- 748 • Facilitating baseline business viability
- 749 | • Commitment and ability to add value to the certification logo-program organization
- 750 | through technical participation in working groups and advisory boards
- 751 • Experience in similar services
- 752 • Competent personnel
- 753 | • Value brought to the certification logo-program in general
- 754 | • Work with the APCB and submit to the APCB the results for review
- 755 • Capability or readiness to implement the following, both technically and budgetarily
- 756 | - product physical layer conformance testing (if applicable)
- 757 | - product protocol layer conformance testing
- 758 | - product interoperability testing
- 759 | - product network testing
- 760 | - product physical layer performance testing (if applicable)
- 761 | - network interoperability testing (if applicable)
- 762 | - product functional testing (if applicable)
- 763
- 764

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

767

768 3.1.5. Certificate Authority (CA)

769 3.1.5.1. Definition

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

777 3.1.5.2. Activities

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

- 779
- 780 | • timely issuance of digital certificates to ~~Logo~~-certified products
- 781 | • management and control of digital certificate issuance system
- 782 | • ensuring that the digital certificates issued are current and valid
- 783 | • maintain competent personnel
- 784 | • abide by the Service Level Agreement (SLA) defined with the ICP, and in force between
- 785 | the CA, member companies, and ICP.
- 786

787 3.2. Qualification of Laboratories

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

789 3.3. Design of ICP

790 3.3.1. Process

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

800

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

803 3.3.1.1. ~~Products and Devices~~ and Products incorporating a hardware portion

804 The applicant supplies:

805

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

821
822 Where applicant seeks to certify more than one bill of material, product/module samples for
823 each bill of material shall be provided. Based on a review of the differences between bill of
824 materials, the APCL may waive this requirement.

825
826 The APCL with the APCB reviews the application, and determines test requirements based on
827 the supplied PICS according to the current Certification Requirements Status List (CRSL).

828
829 The Compliant Portion of the proposed Certified Device shall be described precisely so that
830 subsequent product change applications can determine whether a product/module change is
831 Class I (outside Compliant Portion) or Class II (within Compliant Portion). When feasible,
832 product model number, hardware version number and software version number shall be
833 associated with the Compliant Portion rather than a higher level assembly. If the Compliant
834 Portion is to be integrated into another end product, or if other Class I change is envisioned, the
835 application shall describe the applicable hardware and software environment of the Compliant
836 Portion sufficiently so that compliance can be ensured.

837
838 Certification Testing ensures that a IUT meets all Certification Criteria according to the vendors
839 submitted PICS which determines through a mapping table which specific test cases in the
840 currently applicable CRSL form the test plan that must be passed in accordance with the
841 categories defined in the Certification Requirements Status List (CRSL, ~~3.3.6—3.1.10~~). The
842 whole process shall be guided by a APCL. Tests include the following “Primary Test
843 Categories” as shown in Figure 4~~Figure 2~~:

844
845 PhyCT- Physical Conformance Testing
846 PCT-Protocol Conformance Testing
847 DIOT-Device Interoperability Testing
848 NIOT-Network Interoperability Testing
849 PhyPT-Physical Device Performance Testing

850
851 Testing requirements for a particular device are determined by the PICS and the applicable
852 CRSL which identifies the current status of each applicable test and certification requirement. A
853 PIXIT proforma is used to configure the implementation under test (IUT) in the test bed properly
854 in order to run the test plan. Applicable tests shall be performed and results documented as
855 required by their category. Test categories are defined in section ~~3.3.6.33-1.10~~. During the

856 testing process each vendor has restricted access to the APCL's web site for tracking and
857 monitoring the progress of the testing of their equipment.

858
859 The APCL shall ensure that all testing requirements are satisfied by the particular hardware and
860 software version certified. In general, no product change is permitted during certification,
861 except as expressly required by a Test Procedure within an ~~applicable~~ applicable test case. The
862 APCL may permit certain limited change if the APCL (a) has high confidence that such a
863 change will not compromise the integrity of prior test results, or (b) repeats all test cases which
864 might be impacted. Any product/module change introduced during certification shall be
865 documented and strictly managed by the APCL. See section ~~4.1.63.3.8.7~~ 4.1.2-3.3.8.7 guidelines on
866 determining required retesting based on product changes.

867
868 When a product successfully completes all the required testing, test reports are assembled into
869 a Compliance Folder. See section ~~4.1.2-3.3.8.2~~ 4.1.2-3.3.8.2 for Compliance Folder details.

870
871 The APCB shall review the application and relevant certification documentation, including PICS,
872 to determine that

- 873
- 874 • the vendor supplied product satisfies all current certification requirements;
 - 875 • all mandatory PICS items are supported;
 - 876 • the entire Compliant Portion is contained within the elements described;
 - 877 • the hardware and software environment containing the Compliant Portion is sufficiently
 - 878 described to ensure compliance is maintained in that environment; and
 - 879 • the Declaration of Conformity is complete and accurate.

880
881 After the APCB has determined that all necessary certification requirements are satisfied and
882 the certification listing fee is paid, the APCB shall submit the Compliant Portion to the Certified
883 Product/Module List along with necessary supporting information (section 4.1.2) and shall add
884 the product/module in which the Compliant Portion was evaluated to the End Product List.

885
886 Any deviation of the Compliant Portion thereof represents a Class I or Class II change. For
887 example, a Device Module may be a Compliant Portion, as well as a particular microcontroller
888 model with a specific firmware build.

889
890 Once the product or module is certified, the Certificate Authority (CA) issues a digital certificate
891 to be programmed into the devices, for use in joining a utility smart grid network.

892 **3.3.1.2. Software Products/Systems**

893
894 The Product Certification Program aims to achieve compliance and interoperability of all
895 instances of OpenADR and OpenADE systems. The Product Certification Program is
896 sponsored by a SSO, and accredited by the OpenSG.

897
898 An OpenADR and OpenADE instantiations seeking Certification from the Program sponsor shall
899 submit an application and an instance for evaluation by the Appointed Product Certification
900 Laboratory (APCL) for compliance and interoperability.

901
902 The Compliant Portion of the proposed software product / system shall be described precisely
903 so that system can state supported feature set. All changes shall undergo regression testing.

904

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

909
910
911 | A/E -: Authentication and Encryption
912 | PCT -: Protocol Conformance
913 | NIOT: Network Interoperability
914 | FUNC: Functional Testing

915
916 Testing requirements for a particular system is determined by the PICS and the applicable
917 CRSL. A PIXIT is used to configure the test set-up in order to run the test plan. Applicable
918 tests shall be performed and results documented as required by their category. During the
919 | testing process each vendor has restricted access to the [APSCL](#)'s web site for tracking and
920 monitoring the progress of the testing.

921
922 When a system successfully completes all the required testing, test reports are assembled into
923 a Compliance Folder.

924
925 The qualified person from the sponsoring SSO/SDO shall review the application and relevant
926 certification documentation, including PICS, to determine that the system supplier satisfies all
927 current certification requirements;

928
929 All mandatory PICS items are supported;
930 Compliant Portion is clearly defined;
931 the Declaration of Conformity is complete and accurate
932

933 **3.3.2. Program and Program Version**

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

937 **3.3.2.1. Product and Module**

938 939 **A. General**

940
941 A product or module shall have a certified Compliant Portion. The listing member company may
942 intend to apply the certified Compliant Portion to a family of similar end product models or
943 modules, either initially or subsequent to the initial listing.

944
945 Furthermore, the member company is allowed to sell the Compliant Portion for integration,
946 resulting in end products offered by another member company if the Compliant Portion is listed
947 | as a Certified Module (See [3.3.8.9section 4.1.7](#)).

948
949 Performance may be impacted by integration of a Compliant Portion into a different end product,
950 and testing will typically be required when the end product differs or when the end product

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

953
954 | Every End Product shall be listed on the End Product List.

955
956 | Integration of a Compliant Portion into an end product different from the end product in which it
957 | was certified, may impact the performance, for example if the antenna placement or
958 | environment changes, or if the host environment is otherwise different. Such integration shall
959 | be considered within the Class I, Class II change rules by an an APCB.

960
961 | A member seeking to list a End Product shall complete an online application for Certification.
962 | An End Product application shall reference the Module or Compliant Portion of a Certified
963 | Product integrated into the End Product if the member wishes to claim abbreviated certification
964 | process.

965
966 | When integrating a Module, an application for End Product certification shall declare that the
967 | hardware and firmware/software environment containing the module complies fully with that
968 | required by the Module, and provide supporting documentation as needed. Such integration
969 | shall be considered within the Class I, Class II change rules by an an APCB.

970
971 | When integrating a Compliant Portion that is not a Module, an application for End Product
972 | certifition shall describe any variation form the specific End Product in which the applicable
973 | Compliant Portion was certified. Such integration shall be considered within the Class I, Class II,
974 | and Class III change rules by an an APCB.

975
976 | An End Product application may cover a family of end product models, provided the compliant
977 | portion is identical, and the application shall describe the end product family in a sufficientl detail
978 | to permit evaluation of potential impact of product family variations on performance including
979 | radiated performance.

980
981 | A End Product application is reviewed by APCB to determine testing requirements with
982 | reference to CSRL and ~~section 4.1.6, "Certification Program Class I/II/III Change~~
983 | ~~Guidelines" 3.3.8.6.~~ Indicated testing shall be performed and documented in the End Product
984 | Compliance Folder. After the APCB has determined that all necessary certification
985 | requirements have been met and ~~the logo~~ any appropriate -fee is paid, the APCB shall submit
986 | the end product into the End Product List along with necessary supporting documentation.

987
988 | It is allowed to start certification testing for an end product before the initial product completes
989 | its certification, on condition that the end product does not complete certification before the
990 | initial product completes and obtains its certificate. In all cases the end product must follow the
991 | rules and policies as defined in ~~section 3.1.1.3~~ section 3.3.1.1

992
993 | A certificate is issued for each End Product and Module Listing.

994 995 | **B. Change to End Product or Module**

996
997 | A change to an End Product or Module shall be reviewed by an an APCB. When a listed product is
998 | changed, the member responsible for the listing shall complete an application for Certification
999 | Change online.

1000

1001 A Change application shall include the following:
1002

- 1003 • identify pertinent End Product or Module record,
 - 1004 • amended Compliant Portion or End Product / Module description as applicable
 - 1005 • amended PICS if applicable
 - 1006 • product change description, and
 - 1007 • executed revised Declaration of Conformity
- 1008

1009 The product/module change description shall be sufficient to determine the scope of testing
1010 required to determine that the change device is compliant.
1011

1012 The APCB may request additional information as needed to complete the review. The APCB
1013 shall determine additional testing as deemed required.
1014

1015 **C. Device Certification Requirements** 1016

1017 Product/module certification is associated with (a) a category (such as a device class as defined
1018 by the SSO/SDO), (b) a particular System Profile Release number and version and (c) one or
1019 more Certification Profile(s). To certify a product/module, a vendor completes the applicable
1020 PICS forms.
1021

1022 In the PICS, the vendor states the functions supported by the product/module to be certified.
1023 The completed PICS is used to generate a list of applicable Test Cases based on the test case
1024 mapping table (contact the APCB for a copy) within the online certification system.
1025

1026 The list of applicable test cases is used in conjunction with the current CRSL to determine which
1027 test cases shall be performed. See section [3.3.6](#) ~~3.4.10~~ for detailed information on the CRSL.
1028

1029 **3.3.2.2. Software Systems** 1030

1031 A certified system for OpenADR or OpenADE consists of a Compliant Portion that implements
1032 features according to requirements for their server and/or client system.
1033

1034 A vendor system is evaluated and judged to be a Certified System when found to be in
1035 compliance by an APSCL; evaluation is performed against Reference System for
1036 interoperability, when available, and test suites derived from abstract test suites from OpenADR
1037 and OpenADE as relevant. It is not necessary to attain an equivalence with the reference
1038 system, i.e. all feature sets are functionally identical, but that those features sets represented in
1039 the vendor system be evaluated to be equivalent to the reference system implementation.
1040

1041 An instantiation of the reference system itself is not considered to inherit any Compliant Portion;
1042 that instantiation must be evaluated and judged as any vendor system for equivalent portions.
1043

1044 **Reference Systems** 1045

1046 Reference system(s) is(are) defined to be compliant implementation of the specification either
1047 by evaluation or by definition by the sponsoring SSO. The reference system, as a rule, need to
1048 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.

1049 **Candidate Reference Systems**

1050 Candidate reference system(s) is(are) defined to be a conforming implementation of the
1051 specification. Candidate reference systems are by definition not reference systems, though
1052 they may be evaluated for equivalence to reference systems, and compliance to requirements
1053 of OpenADR or OpenADE.
1054

1055 **Changes to Certified System**

1056 | Any change to the System shall be reviewed by APSCB. When a listed system is changed, the
1057 vendor responsible for the listing shall complete an application for Certification Change online.
1058

1059 A Change application shall include the following:

- 1060 • Identify pertinent System record
- 1061 • amended Compliant Portion description as applicable
- 1062 • system change description
- 1063 • amended PICS as applicable
- 1064 • executed revised Declaration of Conformity

1065 | Unless member is willing to perform code review with the APSCL, changes to System shall
1066 require complete regression testing of the certification tests cases.
1067
1068

1069 **System Certification Requirements**

1070 System certification is associated with a server or a client implementation of OpenADR or
1071 OpenADE or AMI-ENT requirement.
1072

1073 In the PICS, the vendor stipulates the functions supported by the system to be certified. The
1074 completed PICS is used to generate a list of applicable Test Cases based on the test case
1075 mapping table within the online Certification System. The list of applicable test cases is used in
1076 conjunction with the current CRSL to determine which test cases shall be performed.
1077

1078 **3.3.3. Self Testing and Certification**

1079 To be determined once the third party testing and certification system is sufficiently mature and
1080 products and systems objectively show an acceptable degree of interoperability throughout the
1081 program over extended periods of time.
1082

1083 **3.3.4. Device Compliant Portion Testing**

1084 The End Product or Module is subject to testing for its proposed compliant portion. The testing
1085 involves layers, from the physical all the way to the network interfaces.

1086 **3.3.4.1. Physical Conformance (PhyCT): Radio, PLC, wireline**

1087 Physical Conformance Testing assesses the compliance of the physical layers of an
1088 implementation seeking certification to the applicable base or core specification of the
1089 mandatory and optional features of the physical transport layer PHY (IEEE 802.15.4, IEEE
1090 802.11, etc), as applicable to the type of End Product or module.
1091

1092 Typically, Physical (RF, wireline, or PLC) Conformance Testing is not concerned with and does
1093 not cover assessment of performance, reliability or robustness of the entity under test, unless
1094 explicitly stated as a conformance requirement in the conformance testing specification.

1095
1096 Physical Conformance Testing does not add constraints to those stated in the core
1097 specifications and consists of a series of tests against the physical conformance requirements
1098 stated in the applicable radio/plc/wireline conformance testing specification.

1099
1100 A radio/plc conformance requirement is an elementary piece of the core specification stating
1101 what a SE implementation seeking certification is required to do or not to do.

1102
1103 An implementation is found as conformant with the physical layer core specifications when it
1104 satisfies all the selected physical layer conformance requirements contained in the CRSL based
1105 upon completing the required tests and executing the DoC.

1106
1107 For example, the radio physical layer conformance requirements of ZigBee devices are derived
1108 from the basic IEEE802.15.4 radio layer specification over the operational temperature and
1109 humidity range of the device as declared in the PIXIT, and include: power spectral mask and
1110 density, center frequency and tolerance, sensitivity/packet error rate, modulation/demodulation,
1111 error vector magnitude, adjacent and alternate channel rejection, turnaround time, clear channel
1112 assessment, energy detection, and link quality indication.

1113
1114 An implementation is found as conformant with the physical conformance related core
1115 specifications when it satisfies all the selected physical conformance requirements contained in
1116 the CRSL based upon completing the required tests and executing the DoC.

1117 **3.3.4.2. Protocol Conformance Testing (PCT)**

1118 Protocol Conformance Testing assesses the compliance of the protocols implementing the MAC
1119 layer and Network Layer of the implementation seeking certification to the applicable base and
1120 core specification (IEEE802.15.4:2006 and ZigBee IP for ZigBee, HomePlug SE Specification
1121 for HomePlug, IEEE802.11b/g for Wi-Fi).

1122
1123 Protocol Conformance Testing does not add constraints to those stated in the core
1124 specifications and consist of a series of tests against the protocol conformance requirements
1125 stated in the applicable protocol conformance testing specification.

1126
1127 A protocol conformance requirement defines the core specification stating what an
1128 implementation seeking certification is required or not to support.

1129
1130 For example, The ZigBee-related protocol conformance requirements are derived from the
1131 IEEE802.15.4 MAC layer and ZigBee IP specification along with the PICS and PIXIT documents
1132 relating to those MAC and NWK layers.

1133
1134 An implementation is found as conformant with the protocol-related core specifications when it
1135 satisfies all the selected protocol conformance requirements contained in the CRSL based upon
1136 completing the required tests and executing the DoC.

1137 **3.3.4.3. Interoperability Testing (IOT)**

1138 Interoperability is key to customer acceptance. Interoperability testing for ~~Logo~~-Certification
1139 requires a minimum of three different golden unit vendor devices. The interoperability

1140 configuration scenario must include at least two different physical layer chipset vendors. Each
1141 end product/module must demonstrate interoperability with at least three different certified
1142 Energy Service Interface (ESI) if it is not an ESI; if an ESI, it shall demonstrate interoperability
1143 with at least three different PCT and IHD combination. This enables the basic network
1144 interoperability.

1145
1146 Additional to the above requirement, each product/module must demonstrate interoperability
1147 with at least two different certified end product/module (from at least two vendors) and at least
1148 one device should be the reference unit selected by industry WG. This enables general market
1149 device interoperability.

1150
1151 Interoperability testing is enhanced as more vendor equipment is made available from different
1152 vendors.

1153
1154 The interoperability certification test bed shall be available at each APCL for all currently
1155 required interoperability tests. The tests shall include all relevant profile device roles and
1156 application functionality declared in the PICS and PIXIT, and test for: trust center policy,
1157 network management policy, commissioning and installation, power failure/start-up, use cases,
1158 stress cases, over-the-physical media download.

1159
1160 A implementation is found as conformant with the interoperability core specifications when it
1161 satisfies all the selected interoperability requirements contained in the CRSL based upon
1162 completing the required tests and executing the DoC.

1163 **3.3.4.4. Physical Performance Testing (PhyPT)**

1164 Physical Performance Testing (PhyPT) requirements provide physical layer performance
1165 metrics intended to determine the limits of performance of End Products and modules, for
1166 example in an over-the-air (RF) environment. In such case, tests are intended to determine the
1167 transmitter and receiver performance and sensitivity in normal operation in the presence of far-
1168 field (for RF case) interferers causing transceiver desensitivity. PhyPT tests are critical in that
1169 they provide necessary information on the radiation pattern of the device as used, and the
1170 effect of interaction factors between the radiated field and the circuitry of the device.

1171
1172 The PhyPT shall include the following based on the PIXIT and PICS declarations: range and
1173 directionality (link budget and sensitivity verification), and immunity/desensitivity to known
1174 interferers.

1175
1176 PhyPT is required for the Certification of End Product/module. The test report will be included in
1177 the Compliance Folder and test results become part of the Compliant Portion of the end
1178 product/module. It is the intent of industry WG to conduct a regression analysis across the
1179 applicable Certification profiles on data collected during PhyPT. Industry WG will then request
1180 an approval of a baseline criteria for example, Smart Energy 2.0 for future PhyPT testing.

1181

1182 **3.3.4.5. Network Conformance Testing (NCT)**

1183 Network Conformance Testing (NCT) complements PhyCT, PCT, IOT as a system level
1184 conformance testing for end-to-end from the utility head end to the HAN network.

1185

1186 NCT ensures that compatible state machines and protocols are employed at the product level,
1187 as with the utility head end. This includes frame compatibility with communication between the
1188 servers and client applications.

1189 Network Conformance Testing does not add constraints to those stated in the core
1190 specifications and consist of a series of tests against the network conformance requirements
1191 stated in the applicable network conformance testing specification.

1192
1193 A network conformance requirement defines the core specification stating what an
1194 implementation seeking certification is required or not to support.

1195
1196 For example, The ZigBee-related network conformance requirements are derived from the
1197 ZigBee IP and SE 2.0 application protocol specification along with the PICS and PIXIT
1198 documents.

1199
1200 An implementation is found as conformant with the network-related core specifications when it
1201 satisfies all the selected network conformance requirements contained in the CRSL based upon
1202 completing the required tests and executing the DoC.

1203

1204 **3.3.5. Software System Compliant Portion Testing**

1205 The system is subject to testing for its proposed compliant portion. The testing involves the
1206 entire set of use case tests as derived from relevant abstract test suites.

1207 **3.3.5.1. Authentication and Encryption**

1208 The system is subject to testing the mechanism for establishing secure sessions. Testing
1209 involves negotiating key, access level, and establishing a session for a specific account.

1210 **3.3.5.2. Protocol Conformance**

1211 Verify that the system implements methods, data frames, and interfaces of the prescribed in the
1212 communication method.

1213 **3.3.5.3. Network Interoperability**

1214 Communication between Server to Client reference systems. Network API shall be consistent
1215 with ~~SE-2.x~~appropriate application layer implementations and shall ~~either comply with~~
1216 appropriate transport protocol e.g. ~~be~~ RESTful or SOAP but not both.

1217 **3.3.5.4. System Functional Testing**

1218 | Verification of state machine according to requirements of OpenADR, ~~or~~ OpenADE or AMI-
1219 ENT. The testing shall be based on defined test cases derived from abstract test case
1220 scenarios of the System Requirements from OpenSG. Use cases shall be derived from the
1221 various functional requirements as stipulated by the abstract test cases, and such testing shall
1222 be performed using a Reference System or a validated Test Harness agreed by the SSO.

1223

1224 **3.3.6. Certification Requirements Status List (CRSL)**

1225 **3.3.6.1. Definition**

1226 | The ~~Logo~~ Certification Program currently certifies devices on 3 levels of conformance and
1227 interoperability test specifications. The corresponding PICS documents specify the mandatory

1228 and optional requirements for all the test specification documents. The Certification
 1229 Requirements Status List (CRSL) specify the testing requirements at any given time, and gives
 1230 guidance to [the](#) APCL and APCB on testing and recommendation for certifications. The CRSL
 1231 is maintained by the LL.

1232
 1233 CRSL versions include changes to the test requirements and test specifications. Requirements
 1234 for certification are set by the CRSL version effective on the date that the device is certified.

1235
 1236 A CRSL Interim Release includes the results of the CCB process, and introduces new
 1237 requirements that will become active in future CRSL Major Releases. A (x.0.0) of the CRSL
 1238 shall occur twice annually. A public interim release of the CRSL (x.y.0) shall occur no more
 1239 frequently than once per month.

1240
 1241 Requirements upgraded in Major Release (x.0.0) shall be available in an interim release of the
 1242 Major Release (x-1.y.0) effective 45 days prior to Major Release (x.0.0). Vendors have 90 days
 1243 to submit their equipment for certification to be tested against this major release.

1244
 1245 [An](#) IUT undergoing certification testing when the next major release becomes effective have 45
 1246 days to complete testing. Test requirements are defined by the major release under which the
 1247 IUT is submitted. Test cases which become active after the next major release are not required.

1248 **3.3.6.2. CRSL Structure**

1249 The CRSL defines the current status of each test case in a list. The list contains the following
 1250 information:

1251
 1252 Designator - test case identifier
 1253 Name - descriptive text from the test specification
 1254 Current [specification](#) requirement – [document, version and requirement](#)
 1255 Test specification number and version
 1256 Test Case Category
 1257 Available date: date at which the test case may be used as the indicated Test Case Category
 1258 Active date: date at which the test case shall be used at the indicated Test Case Category
 1259 Associated notes
 1260 Previously published [specification](#) requirements¹
 1261 -Test specification number and version
 1262 -Test Case Category
 1263 -Status
 1264 -Active date
 1265 -Associated notes
 1266 Informative
 1267 -Test Case Priority
 1268 -Test Platform: Validated test platforms for both the current and previous test case

1269
 1270
 1271 The following applies for each test case requirement:
 1272 • Prior to the Available date of the current [specification](#) requirement, the previously
 1273 published [specification](#) requirement shall apply.

¹ [Included to ensure backward compatibility](#)

1274 • From the Available date until the active date of the current specification requirement, the
1275 vendor shall choose to apply either the previously published specification requirement or
1276 the current specification requirement.

1277 • From the Active date, the current specification requirement shall apply.

1278 • Products will support previous, current and future versions. Products that are not
1279 forwardly compatible will NOT be considered for testing under the CPRM program.

1280 Issue of an update to the CRSL is managed and approved by the industry WG. Updates to the
1281 CRSL include changes to test case categories to reflect the addition of new validated test
1282 cases, the downgrade of previous validated test cases, and the revalidation of downgraded test
1283 cases. The LL shall implement the CRSL updates.
1284

1285 **3.3.6.3. Test Case Categories**

1286 | The ~~Logo~~ Certification Program assigns each test case from the test specification a Test Case
1287 Category. A test case is validated when a validated test platform is available, and required for
1288 implementation.

1289 **Category A**

1290 The device shall pass each Category A test case at the APCL on a validated test platform.
1291 These are the validated test cases. A test report shall be generated according to ISO Guide
1292 17025.
1293

1294 **Category B**

1295 The device shall pass each Category B test case at the APCL. Pass/Fail verdict is assigned
1296 and the test reported generated according to ISO Guide 17025. These are typically test cases
1297 that have been verified and can be executed with unambiguous results, but for which test case
1298 validation is incomplete.
1299

1300 **Category C**

1301 The device shall pass each Category C test case either at the manufacturer or the APCL. In
1302 | case the test is ~~performed~~ by the manufacturer, a test report shall be submitted to the
1303 APCL. Pass/Fail verdict shall be assigned.
1304

1305 **Category D**

1306 Test cases may be downgraded from A or B or C by the LL, but must be revalidated and
1307 reinstated to its prior status without delay, upon resolution of any issues.
1308

1309 **Category E**

1310 The device shall perform Category D tests at the APCL and a test report generated. However
1311 there is no Pass/Fail verdict assigned.
1312

1313 **Category I**

1314 Test cases planned for further development and listed for informational purpose.
1315

1316 **Category P**

1317 Test case planned for validation or awaiting approval but currently listed for informational
1318 purposes.

1319

1320 **3.3.6.4. Test Case Category Transition**

1321

1322 | A Test Case Category for -a test case may or may not change over time. Test Case Status is
1323 communicated using the CRSL Interim and Major release. The following list describes, in part,
1324 the typical assignment and re-assignment of test case categories:

1325

1326 • All test cases start as Category I.
1327 • Test cases selected from development are moved to Category P in the next major
1328 release.

1329 • If a test case upgrade proposal from Category B to Category A is accepted for inclusion
1330 in the next Interim Release of the CRSL, the following rule shall apply

1331 • The upgrade is effective immediately

1332 • Testing underway may (test start date prior to upgrade) may continue their certification
1333 testing without regression testing.

1334 • The initial Available Date shall not precede the CRSL publication date. Test cases may
1335 be immediately downgraded temporarily to Category D in specific circumstances under
1336 the authority of LL and reinstated without delay, maintaining the original active date if the
1337 reinstatement does not occur past the original active date. Test cases are not
1338 necessarily downgraded due to a single test platform losing validated status.

1339 | • All other category transitions (upgrades) are effective at the next Major Release of the
1340 CRSL.

1341

1342 **3.3.7. Testing and Interoperability Principles**

1343 The ultimate goal of the ICP is an eco-system of *interoperable* devices and systems. For the
1344 purpose of this discussion, interoperability may be loosely defined as a correspondance of
1345 interfaces between two abstract functional units, of which communication is possible.

1346

1347 | To this end, it is important for the certification program to assure a well--defined minimum
1348 interoperable set of features, whether it be functionality, user interface, or application interface.

1349 **3.3.7.1. Non-overlapping Feature Set**

1350 | A simple set of best practice principles helps facilitate a robust interoperable interface. These
1351 are:

1352

1353 a) a specific set of functions shall be defined into "profiles". A profile is a finite set, or grouping,
1354 of functionality.

1355

1356 | b) any function belonging to a profile shall be reproduced by implementing the entire profile of
1357 mandatory functions by another device sharing that function. In other words, profiles are
1358 exclusionary of other like functions. For example, a mandatory function A, belonging to a profile
1359 X can be implemented in another device via the entire profile X, and never a partial
1360 implementation of X. A device adopting profile X must therefore implement the whole
1361 mandatory function set that includes function A.

1362
1363 | c) A function in profile X shall not be duplicative of another function in profile Y, if that function is
1364 already existing in profile Y.

1365
1366 The above principles dictate that extreme care must be taken to design profiles; in other words,
1367 profiles need to be designed to coexist with other profiles; functions within profiles X and Y need
1368 to be exclusionary yet complimentary, but never overlapping.

1369
1370 Test suites shall evaluate individual profiles, with test cases addressing functions of said profile.

1371
1372 | The non-overlapping feature set may be coupled with a branding or Logo program. However,
1373 there is no mandatory requirement for a Logo program.
1374

1375 **3.3.8. Certified Product Listing**

1376 | When the ~~Logo~~-Certification criteria are satisfied, and with the agreement of the vendor, the
1377 APCB shall post the product / module onto the ~~Logo~~-Certified Product registry with the following
1378 information:

1379
1380 Product Name
1381 Certified Product Type
1382 Certification Number
1383 Date of Certification
1384 CRSL date
1385 CRSL associated version number
1386 Detailed product information in text form (not more than 200 words)
1387 Product image in jpg format no larger than 300 x 300 pixels
1388 Company logo in jpg format no larger than 300 x 300 pixels

1389
1390 The APCB shall ensure, prior to completing the product certification process, that the equipment
1391 vendor is still a member in good standing with the ~~logo-certification~~ program, and that the
1392 certification testing fee and certification logo fee (if appropriate) are collected per certification.
1393 With the explicit agreement of the applicant, the APCB will enter the data into the ~~Logo~~-Certified
1394 Product registry and create an electronic ~~Logo~~-Certification Certificate from this data.
1395

1396 **3.3.8.1. Digital Certificates**

1397 | Once a product enters the ~~Logo~~-Certified Product registry, the CA shall generate a digital
1398 certificate for that product and issue it to the applicant.

1399 **3.3.8.2. Compliance Folder**

1400 The Compliance Folder shall provide the actual Record of Work for conformance to the
1401 certification process. The minimum required information is listed below. For additional
1402 information, see Annex.

1403
1404 Minimum contents in the Compliance Folder:

1405
1406 Member name
1407 Exact model number
1408 Exact kit number if applicable (i.e. variant number)

1409 Hardware version and change history
1410 Software version and change history
1411 CRSL version number
1412 PICS
1413 PIXIT
1414 Test Report
1415 Applicable waivers and their descriptions and reasons, and any change requests
1416 Declaration of Conformance

1417
1418 All vendors shall maintain a duplicate set of Compliance Folder for their certified product. The
1419 ~~logo-certification~~ program, at its discretion, may order additional reviews of the Compliance
1420 Folder. Any such additional Compliance Folder reviews shall be at the expense of the ~~logo~~
1421 ~~certification~~ program and be conducted by a mutually agreeable third party contractor that is not
1422 an employee of another manufacturer.
1423

1424 **3.3.8.3. ~~Logo~~ Certificate**

1425 After the ~~Logo~~-Certified product is listed in the ~~Logo~~-Certified Product List, the Certification
1426 Program Manager shall issue a hard copy of the Certification to the vendor with special heavy
1427 stock paper.
1428

1429 **3.3.8.4. Removal of Products from Certified Product List**

1430 The primary contact for the particular product posted on the ~~Logo~~-Certified Product List may
1431 request that the product be removed from public view anytime. The removal request should be
1432 sent to the Certification Program Manager. This action only affects the public view of the
1433 product on the List.
1434

1435 **3.3.8.5. Changes to Certified Products**

1436 Any change to a certified product falls under one of two classes: Class I or Class II.
1437

1438 **3.3.8.6. Determining Class of Change**

1439 All devices put on the market shall meet the requirements for which the product has been
1440 certified. The ~~Logo~~-Certified Product List registers products/modules having a specific hardware
1441 and software version. The product manufacturer is responsible to ensure that the Compliant
1442 Portion of all production units are identical to the certified version in all material aspects.
1443

1444 Any change to the Compliant Portion of the ~~Logo~~-Certified Product shall be documented in the
1445 Compliance Folder of the manufacturer, and the manufacturer shall notify the APCB of those
1446 changes. The manufacturer may initially classify the class of change; however the classification
1447 noted by the APCB shall be the class of record. The APCB shall determine what additional
1448 testing is required, according to the Annex guidelines and documentation provided.

1449 **Class I Changes**

1450 A Class I change is a product change that has no impact to the hardware or software within the
1451 Compliant Portion and no change to the declared functionality in the PICS.
1452

1453 For Class I change, no testing is required. For any change in the product name or product
 1454 version, the Compliant Folder will be revised to reflect the change, and the APCB is responsible
 1455 to effect the change in the ~~Logo~~-Certified Product List.

1456 **Class II Changes**

1457 A Class II change is a software or hardware change to the Compliant Portion or to the
 1458 functionality declared in the PICS.

1459
 1460 The member shall supply the APCB with the detailed change description, and estimated impact
 1461 to the results of the tests implemented according to the CRSL in effect at the time of the
 1462 certification testing at the APCL. The member may add a proposal on the scope of required re-
 1463 testing.

1464
 1465 The recertification testing is done by the APCL using the current CRSL. Based on the technical
 1466 evaluation of the supplied change documentation, the APCB may determine that certain prior
 1467 test results may be reused.

1468
 1469 The test requirements shall be determined by the APCB based on the current CRSL. Test
 1470 reports from the former certification testing may be reused in portions or in its entirety
 1471 depending on the test requirements and judgement of the APCL.

1472
 1473 Based on the review of product change documentation, the APCB shall determine test cases to
 1474 be conducted on the product.

1475
 1476 The APCB may require additional information as necessary to determine test cases to be
 1477 conducted.

1478 **3.3.8.7. Re-certification versus Change to Certification**

1479 The change classification to a certified product is determined by the impact of that change on
 1480 the Compliant Portion as shown in the table below.

1481

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
----	---	-----	--

1482
1483
1484
1485
1486
1487

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.

1488 **3.3.8.8. Module Policy**

1489 | A ~~Logo~~-Certified Product may be designated as a Module at the option of the member
1490 | responsible for the listing. Designating the ~~Logo~~-Certified Product as a Module facilitates the
1491 | reuse of the Module in a broader range of End Products. Certification requirements for the
1492 | Module include all requirements for the ~~Logo~~-Certified Product, and additionally information
1493 | described in this section.

1494
1495 | A Module is a hardware and software combination that constitutes a Compliant Portion when
1496 | installed within a specified hardware and software environment. Typically, a Module will include
1497 | a software driver, hardware module, and, for radio based products, an -antenna. The Annex
1498 | gives an informative guideline on Modules.

1499
1500 | The description of the Module on the ~~Logo~~-Certified Product List shall identify:

- 1501
1502 | • hardware and software comprising the entire Compliant Portion,
1503 | • description essential to operation of the module,
1504 | • hardware and software versions certified.

1505
1506 | To certify a Module, the APCB shall determine that

- 1507
1508 | • the vendor supplied product satisfies all current certification requirements,
1509 | • the entire Compliant Portion is contained within the Module,
1510 | • the hardware and software environment required for the Module is sufficiently specified
1511 | to ensure adherence of the Compliant Portion to the certified conditions.

1512
1513 | The same Product change rules apply to Modules.

1514

1515 **3.3.8.9. Inheritance of Compliant Portion of Modules**

1516 | When a certified Module is incorporated into a product, the integrator may, for example, change
1517 | the antenna front end to the module. The integrated product may be certified as an End
1518 | Product when the APCB determines that an APCL RPT test yields results with acceptable
1519 | outcomes. An eException applies when there are no changes to the antenna front end,
1520 | housing, or any characteristics impacting the Compliant Portion.

1521
 1522 An example for a streamlined process for OEMs using a previously certified Module is shown in
 1523 the table below as a guide.
 1524

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

1525

1526 3.3.8.10. Integrated Products and Re-Branded Products

1527
 1528 During its life cycle in the market, certified products may at times be integrated into larger
 1529 systems, or re-branded without the Compliant Portion undergoing any material change. In order
 1530 to maintain traceability of the certified product through the market place, and to ensure that
 1531 Compliant Portion certified status is indeed maintained, it is necessary to manage the
 1532 integration and re-branding processes.

1533
 1534 Using a new brand name for a previously certified product is allowed without additional logo fee
 1535 if a new listing is not requested. However, in such cases, the product shall bare clearly the
 1536 original certification ID. If a new listing is requested, a ~~logo~~-listing fee shall be charged, and a
 1537 replica record created in the ~~Logo~~-Certified Product list with the new brand information.

1538
 1539 Additionally, original design manufacturers (ODM) may design, manufacture, and certify a
 1540 product or module for a second client company. In such cases, the client company is
 1541 responsible to create a new listing request for the product to be ~~Logo~~-Certified Product under
 1542 the client company.

1543
 1544 Any change in the Compliant Portion shall be processed under the change classifications
 1545 scheme.
 1546

1547 3.3.9. Certified System Listing

1548 When the ~~Logo~~-Certification criteria are satisfied, and with the agreement of the vendor, the
 1549 ~~AP~~SCL shall post the system onto the ~~Logo~~-Certified System registry with the following
 1550 information:

1551
 1552 System Name
 1553 Name of each System Component
 1554 Version, release and variant identifier for each System Component
 1555 Certified Feature Set
 1556 Date of Certification
 1557 CRSL date
 1558 CRSL associated version number
 1559 Detailed system information in text form
 1560 Company logo in jpg format
 1561

1562 The APSCB shall ensure, prior to completing the system certification process, that the system
 1563 vendor is still a member in good standing with the ~~logo-certification~~ program, and that the
 1564 certification testing fee and any appropriate certification logo fee are collected per certification.
 1565 With the explicit agreement of the applicant, the APSCB will enter the data into the ~~Logo~~
 1566 Certified System registry and create an electronic ~~Logo~~-Certification Certificate from this data.

1567 3.3.9.1. Compliance Folder

1568 The Compliance Folder shall provide the actual Record of Work for conformance to the
 1569 certification process. The minimum required information is listed below.

1570
 1571 Minimum contents in the Compliance Folder:

1572
 1573 -Member name
 1574 -System name
 1575 Name of each System Component
 1576 -Software execution environment
 1577 -Software version and change history including MD5 Hash
 1578 Version, release and variant identifier for each System Component
 1579 -CRSL version
 1580 -PICS
 1581 -PIXIT
 1582 -Test Report
 1583 -Applicable waivers and their description and reasons, and any change requests
 1584 -Declaration of Conformance
 1585

1586 All vendors shall maintain a duplicate set of Compliance Folder for their certified system. The
 1587 ~~logo-certification~~ program, at its discretion, may order additional reviews of the Compliance
 1588 Folder. Any such additional Compliance Folder reviews shall be at the expense of the
 1589 ~~certification logo~~ program and be conducted by mutually agreeable third party contractor that is
 1590 neither an employee of another vendor.

1591 3.3.9.2. ~~Logo~~-Certificate

1592 After the ~~Logo~~-Certified system is listed in the ~~Logo~~-Certified System List, the Certification
 1593 Program Manager shall issue a hard copy of the Certification to the vendor with special heavy
 1594 stock paper.

1595 3.3.9.3. Removal of Systems from Certified List

1596 The primary contact for the particular system posted on the ~~Logo~~-Certified System List may
 1597 request the system be removed from public view any time. The removal request should be sent

1598 to the Certification Program Manager. This action only affects the public view of the system on
1599 the List.

1600 **3.3.9.4. Changes to Certified System**

1601 Any change to the system shall require regression testing as a rule, unless deemed
1602 unnecessary by the APSCB.

1603 **3.3.9.5. Reference System Instantiations**

1604 Vendor systems derived from Reference System is considered an instantiation of the Reference
1605 System and not the Reference itself. As such, the practical status of instantiated reference
1606 system is the same as any system claiming conformance to specification.

1607 **3.3.9.6. Equivalent Clean Room Implementations**

1608 Vendor systems implementing a parallel Reference System is the same as any system claiming
1609 conformance to the specification.

1610 **3.3.9.7. Candidate Reference Implementations**

1611 Vendor systems implementing a Candidate Reference System is the same as any system
1612 claiming conformance to the specification.

1613 **3.3.10. Validation of Test Harness for Device Testing**

1614 **3.3.10.1. Submittal Process**

1615
1616 A test harness subject to consideration as part or whole of a validated test system for ~~Logo~~
1617 Certification shall satisfy the following submittal criteria:

- 1618
- 1619 a) ~~B~~be available for commercial purchase by testing laboratories and Member
1620 companies or be available publically through free and open source agreements.
 - 1621 b) ~~S~~support the Test Control Interface (TCI) for relevant Primary Test Categories and
1622 protocol layers
 - 1623 c) ~~I~~include scripting capability for automated test runs
 - 1624 d) ~~S~~supply test cases in accordance with the CRSL; implementation must be at least
1625 one complete test category out of five Primary Test Categories¹
 - 1626 e) as appropriate, subject to calibration cycles

1627
1628 The CPM shall review the test harness submittal for the above minimum submittal criteria (may
1629 be outsourced to LL), to be an eligible candidate system of detailed evaluation for
1630 validation as an official ~~Logo~~-Certification Test Harness.
1631

1632 **3.3.10.2. Evaluation Process**

1633
1634 A test harness, accepted for consideration as part or whole of a validated test system for ~~Logo~~
1635 Certification, shall undergo technical evaluation by the LL, and the LL is responsible to sign-off
1636 on the technical viability of the system as a test harness for the industry.
1637

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.

1638 The validation process shall at minimum involve the following steps:

- 1639
- 1640 1. Execution of the relevant CRSL scope, through a Test Control Interface (TCI), as
- 1641 implemented for the Primary Test Category of the test harness, and obtaining the
- 1642 expected results that include the use of the Golden Units designated by the CPM for
- 1643 the Product ~~Logo~~-Certification Program.
- 1644 2. Examination of the upper tester and lower tester logs, along with the over-the-
- 1645 air/physical media results, to determine the proper recording and evaluation of the
- 1646 test results.
- 1647 3. Test harness shall exhibit a Gauge R&R of relevant reference Primary Test
- 1648 Category tests of less than 5%.
- 1649 4. Test harness shall exhibit a Gauge R&R of relevant reference Primary Test
- 1650 Category tests of less than 10% between homogenous and heterogenous test
- 1651 harness set-ups at different laboratory locations (i.e. in APCLs).
- 1652

1653 Note that the procedure to perform the Gauge R&R using the reference Primary Test Category

1654 tests are the responsibility of the LL.

1655

1656 3.3.11. Validation of Test Harness for System Testing

1657 In order to institute a stable ~~Logo~~-Certification Program, a reliable testing program is essential.

1658 One basis of such a program is the use of well defined “test harness”. Any such test harness

1659 shall be officially “validated” by the CPM as capable of performing the required testing. All

1660 APSCLs are required to have access to and use a reference system or validated test harness to

1661 perform ~~Logo~~-Certification testing for relevant test categories.

1662

1663 System tests are required for the following:

1664

1665 A/E : Authentication and Encryption

1666 PCT : Protocol Conformance

1667 NIOT: Network Interoperability

1668 FUNC: Functional Testing

1669

1670 All test harnesses tasked to perform the test need to be able to complete the entire set of tests

1671 as described in the applicable CRSL for at least one primary test category.

1672

1673 Once a test harness(es) is validated to perform the CRSL tests, all such instances of the test

1674 harness at or accessed by the APSCL need to be monitored for continual validity of the entire

1675 ~~Logo~~-Certification Program. Therefore, -it is critical that tests be repeatable and reproducible,

1676 i.e. repeated measurement results are consistent, and that those measurements are

1677 reproducible by other laboratories that may be using different instances of the validated test

1678 harnesses. The Certification Program shall maintain a specific level of software version for all

1679 testing. The representative tests (reference primary category tests) shall be selected by the LL

1680 on an ongoing basis, and verification performed across the APSCL at least once a year.

1681

1682 3.3.11.1. Submittal Process

1683

1684 A test harness subject to consideration as part or whole of a validated test system for ~~Logo~~

1685 Certification shall satisfy the following submittal criteria:

- 1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
- A. be available for commercial purchase by testing laboratories and Member companies
 - B. support the Test Control Interface (TCI) for relevant Primary Test Categories and protocol layers
 - C. supply test cases in accordance with the CRSL; implementation must be at least one complete test category out of Primary Test Categories
 - D. maintain strict version control ~~through using a version control tool such as~~ CVS or SVN

1696
1697
1698
1699

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

1700 **3.4. Improvement and Corrective Action / Feedback**

1701 **3.4.1. Certification Process Exceptions**

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

1707
1708
1709

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

1710
1711
1712

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

1713
1714
1715

The following describes the nominal process to handle such contingencies.

1716 **3.4.1.1. Process Problem Resolution**

1717
1718
1719
1720

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

- 1721
1722
1723
1724
1725
- Test Harness issues,
 - Interoperability issues between optional or conditional features of vendor devices and implementations
 - Specification issues, etc.

1726
1727
1728

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

1729 **Change Request Process**

1730 In order to provide a solution to a problematic component of the certification process, the
 1731 program provides its members the possibility to go through the Certification Change Request
 1732 process (CCR). The CCR process is based on three steps: generation, evaluation, and
 1733 resolution.

- 1734
- 1735 1. CCR generation: Vendor issues a CCR describing the problem and the test cases,
 1736 PICS, specifications affected by this problem to the APCB. The APCB is responsible
 1737 to review the CCR and consult with the LL.
 - 1738 2. CCR evaluation: The LL, along with the APCB evaluates the CCR and endorses or
 1739 rejects the CCR. In the case of endorsing the CCR, the LL shall recommend a
 1740 resolution. The endorsement is forwarded to the TAB. The process shall take place
 1741 within 5 business days from reception of the CCR.
 - 1742 3. CCR resolution: The LL has further 5 business days to implement any technical
 1743 resolution to the CCR under the LL's direct control and implement any necessary
 1744 CRSL revisions. The TAB shall locate, as necessary a sponsor within the industry
 1745 WG to affect any change in the technical specifications by the CCB process to
 1746 institute a permanent fix to the problem.

1747 **CCR**

1748 | The SSO and CPM must implement ~~a~~ the submittal and template for the Certification Change
 1749 Request (CCR).
 1750

1751 **3.4.1.2. Process Dispute Resolution**

1752 | All disputes relating to product certification shall be resolved by the following process:-

1753 **Overview**

1754 Disputes not immediately affecting the certification process, but nonetheless are deemed
 1755 serious enough for a vendor to raise, can be processed in a procedural way. The following is
 1756 | essentially a formalized dispute resolution, when other alternatives methods of are not
 1757 available.

1758 **Binding Resolution**

1759 | t.b.d.

1760 **3.4.1.3. Jurisdiction**

1761 A vendor may initiate a dispute resolution proceeding in accordance with this section for a
 1762 dispute that relates to a certified feature or aspect of a Certified Product.
 1763

1764 **Informal Dispute Resolution**

1765 | Prior to initiating a formal dispute resolution the member ~~-~~ shall seek in good faith to resolve
 1766 disputes informally.
 1767

1768 **A. Dispute Resolution Demand**

1769 If parties are unable to resolve the dispute within 30 days after the parties commenced informal
 1770 efforts to resolve the dispute, either party may demand formal dispute resolution
 1771 by delivering a demand in writing to the other party and to the Certification
 1772 Program Manager.

1773

B. Hearing by Dispute Resolution Committee

1774
1775 Each dispute brought pursuant to this section shall be heard by a dispute resolution committee
1776 defined by these rules. The decision ~~of~~ the Dispute Resolution Committee
1777 shall be final and binding to both parties with respect to all certification matters.
1778 The Dispute Resolution Committee is formed by the Certification Program
1779 Manager at his/her discretion.
1780

C. Dispute Resolution Fee

1781
1782 Before the Dispute Resolution Committee considers the dispute, the party demanding
1783 adjudication of the dispute shall pay a non-refundable processing fee. The
1784 Certification Program Manager and the Dispute Resolution Committee shall not
1785 act unless the fee has been paid. Where the final decision is deemed favorable
1786 to the party demanding adjudication, the fee shall be reimbursed.
1787

D. Hearing Schedule

1788
1789 Upon receipt of the demand notice for the dispute resolution and payment of the processing fee,
1790 the Certification Program Manager shall promptly set up the Dispute Resolution
1791 Committee and send a copy of notice to parties involved via email with
1792 acknowledgement. This notice shall define a "Notice Date" for purpose of
1793 calculating all further actions in the dispute resolution process.
1794

1795 If the decision for the Dispute Resolution Committee requires action by a product manufacturer
1796 in order to bring a Certified Product into conformity with applicable certification
1797 requirements, the manufacturer shall either implement those changes with in
1798 ninety days of the Notice Date, or submit a schedule that is deemed acceptable
1799 by the Dispute Resolution Committee and commence diligent efforts to
1800 implement the change in accordance with the imposed or submitted timeline.
1801

E. Revocation of Certification

1802
1803 If the Dispute Resolution Committee deems that a manufacturer has failed to implement
1804 corrections as required by the binding resolution within the imposed or submitted
1805 timeline, and the Committee determines that no viable corrective action plan is in
1806 progress to resolve the dispute, the Dispute Resolution Committee can
1807 recommend to the Certification Program Manager that the product in question
1808 may be removed from the ~~Logo~~-Certified Product List. The Certification Program
1809 Manager may then remove the product from the ~~Logo~~-Certified Product List until
1810 the Dispute Resolution Committee deems that the manufacturer has rectified the
1811 problem.
1812

Dispute Resolution Committee**A. Composition**

1815 The Dispute Resolution Committee shall have the following composition:
1816 - Lead Lab Representative

- 1817 | - APSCL Representatives
 1818 | - SSO/SDO Representative
 1819 |

1820 | **B. Committee Actions**

1821 | In considering a dispute, the Dispute Resolution Committee shall consider the materials
 1822 | presented by each party involved to the dispute, and may in addition consider
 1823 | such other materials and information as it deems appropriate to settle the
 1824 | dispute.

1826 | A copy of all associated documents used in resolving the dispute shall be maintained by the
 1827 | vendor and APCB in the Compliance Folder.

1828 | **(C) Committee Decisions**

1829 | The Dispute Resolution Committee shall decide on matters by a majority vote.
 1830 |

1831 | **(D) Role of Certification Working Group**

1832 | All decisions of the Dispute Resolution Committee shall be binding and final upon the parties,
 1833 | provided however that it becomes evident that the dispute may be related to a
 1834 | flaw in the certification test or the certification process. In that case, the Dispute
 1835 | Resolution Committee or either party in the dispute may request that the matter
 1836 | be transferred to the industry WG for consideration.

1837 | **3.4.2. Certification Requirement Waiver Process**

1838 | The waiver process allows a manufacturer to apply for a dispensation (exception) from a
 1839 | specific certification requirement that the manufacturer is unable to meet and that will prevent or
 1840 | delay certification. The waiver process is intended to be used in cases where a manufacturer
 1841 | believes it has a justifiable reason that a waiver should be granted. The waiver process is not
 1842 | intended to deal with test harness or test case problems that are preventing a device from
 1843 | achieving certification. Such issues are dealt with using the CCR process.

1844 |
 1845 | Waiver requests are reviewed by an independent body, the Waiver Review Board (WRB) which
 1846 | reviews and takes decisions on waiver requests. This body must be independent of the
 1847 | manufacturer submitting the waiver request, and have no conflict of interest with respect to the
 1848 | waiver request application for the device. Waiver requests are confidential and are not shared
 1849 | between manufacturers.

1850 |
 1851 | Waiver requests are submitted to the Certification Program Manager through the APCB, using
 1852 | ~~the a suitable~~ Waiver Template. ~~(see Annex A2.4)~~. The Program Manager forwards the request
 1853 | to the Waiver Review Board for consideration. Waivers are reviewed on a ~~case-by-case~~
 1854 | ~~by-case~~ basis. Submission of a waiver request does not guarantee consideration ~~nor~~ approval
 1855 | of the waiver request by the WRB. A waiver request can be submitted at any time in the
 1856 | certification testing process and the process can be applied for during both initial and re-
 1857 | certification of ~~Logo~~-Certified Products.

1858 3.4.3. Surveillance of Certified Product Validity

1859 | The ICP is responsible to ensure the continued validity of certified products, modules and
1860 software systems in the market.

1861
1862 | The ICP is responsible to compile an ongoing verification record of certified products out in the
1863 market.

1864
1865 | The CPM is responsible to take mitigative, corrective and preventive action to the non-compliant
1866 Member, the APCB, and the APCL involved using the following procedure outlined, upon
1867 discovery of a certified product that breaches the original certified condition of the product.

1868
1869

1870 3.4.3.1. Corrective and Preventive Action

1871 | The CPM shall discuss with the involved APCB & APCL the issuance in writing of the Mitigation,
1872 Corrective, and Preventive Action Request (MCPAR), to the APCB & APCL, the non-compliant
1873 Member and the APCL. The MCPAR shall indicate the following:

- 1874
- 1875 • Detail on the observed breach of certification requirements
 - 1876 • Assigns APCB & APCL as party responsible to close the open action item identified
1877 on the MCPAR
 - 1878 | • Orders- Member to account for units already in the market
 - 1879 • Orders APCB, APCL Member to institute corrective action of this event and
1880 preventive action of similar events
 - 1881 • Order APCB, APCL -to work with Member to mitigate the impact of released devices
 - 1882 • Order APCB, APCL -to institute corrective action for this event, and preventive action
1883 to forestall future similar events
 - 1884 • After set date, obtain the report on the corrective and preventive action from
1885 Member, APCB, APCL
 - 1886 | • The CPM shall evaluate validity and effectiveness of the response.

1887
1888 | The APCB & APCL -shall monitor the corrective and preventive action after a set time indicated
1889 by response on the MCPAR. When subsequent verification determines that corrective and
1890 preventive actions are effective, the APCB & APCL -shall report to the CPM, and the case can
1891 be closed; if it is found to be insufficient, the CPM shall initiate a complete review of the APCB,
1892 APCL appointed status.

1893

1894 3.5. Security Considerations

1895 t.b.d.

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1914 **4. ANNEX**

1915 **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

1916 * Either Test Harness or Reference System may be used
 1917
 1918