

# **MulteFire Alliance**

## **Certification Program Management Document**

MFA PD MF.001

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## REVISION HISTORY

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<b>REVISION HISTORY .....</b>	<b>2</b>
<b>RESTRICTIONS ON USE .....</b>	<b>6</b>
<b>1. REFERENCES.....</b>	<b>7</b>
1.1 OVERVIEW.....	8
1.2 DOCUMENT SCOPE.....	8
<b>2. TERMS, ABBREVIATIONS AND ACRONYMS .....</b>	<b>10</b>
2.1 COMPLIANCE NOTATION .....	10
2.2 TERMS .....	10
2.3 ABBREVIATIONS .....	11
2.4 ACRONYMS.....	11
<b>3. ROLES AND RESPONSIBILITIES.....</b>	<b>13</b>
3.1 CERTIFICATION AUTHORITY .....	13
3.1.1 Overview.....	13
3.1.2 Certification Authority Requirements .....	14
3.1.3 Application Process .....	14
3.1.4 Qualifications .....	15
3.1.5 Service Level .....	15
3.1.6 Renewal of Certification Authority Status.....	15
3.1.7 Certification Authority Organizational Structure .....	16
3.2 AUTHORIZED TEST LABORATORIES.....	16
3.2.1 Overview.....	16
3.2.2 ATL MulteFire Alliance Membership .....	17
3.2.3 ISO/IEC 17025 Accreditation Scopes .....	17
3.2.3.1 The ATL Candidate must have all of the test equipment required to be able to perform all tests in each test plan for the scopes to which it is accredited. ....	17
3.2.4 Specific Scope Criteria for Laboratory Authorization .....	17
3.2.5 MulteFire Alliance ATL Application .....	17
3.2.6 Authorized Test Lab Approval .....	18
3.2.7 Financial Responsibility .....	18
3.2.8 MulteFire Alliance Authorized Test Lab Listing .....	18
3.2.9 Delisting of ATLs .....	18
3.2.10 Reauthorization of ATLs .....	19
3.2.11 Interlab Comparison Program (ILCP).....	19
3.2.12 ATL Meeting Attendance.....	19
3.2.13 Test Reporting Requirements.....	20
3.3 AUTHORIZED TEST EQUIPMENT VENDORS .....	20
3.3.1 Requirements .....	20
3.3.2 Initial Program Needs.....	20
3.3.3 Validation of Test Cases .....	20
3.4 LABORATORY PROGRAM MANAGER .....	21
3.4.1 Overview.....	21
3.4.2 Qualifications .....	21
<b>4. CERTIFICATION PROCESS .....</b>	<b>22</b>
4.1 CONCEPTS AND ELEMENTS.....	22
4.1.1 Types of Approvals .....	22
4.1.1.1 Building Block Approval.....	22
4.1.1.2 End Product Approval.....	22
4.1.2 The Compliant Portion.....	22
4.1.3 Implementation Conformance Statement (ICS) .....	23

4.1.4	Implementation Extra Information for Testing (IXIT).....	23
4.1.5	Eligibility for Certification.....	23
4.1.5.1	Regulatory.....	23
4.1.6	Types of Tests.....	23
4.1.6.1	Protocol Conformance Tests .....	23
4.1.6.2	Radio Conformance Tests.....	24
4.1.6.3	Interoperability Tests.....	24
4.1.7	Changes to the Certification Program.....	24
4.1.8	Financial Responsibility .....	24
4.1.9	Multiple Certification Programs.....	25
4.2	BUILDING BLOCK TEST WORKFLOW OVERVIEW .....	26
4.3	END PRODUCT CERTIFICATION WORKFLOW OVERVIEW.....	27
4.4	APPLYING FOR CERTIFICATION .....	28
4.5	LABORATORY SELECTION .....	28
4.6	TEST PLAN GENERATION AND EVALUATION.....	28
4.7	EXTENSION OF CERTIFICATION AND REUSE OF RESULTS .....	28
4.7.1	Product Variants.....	28
4.7.2	Rebranded Products.....	28
4.8	WAIVERS.....	29
4.9	ENGINEERING CHANGE ORDERS (ECOs) .....	29
4.10	TERMINATION, REDUCTION, SUSPENSION AND WITHDRAW OF CERTIFICATION .....	29
4.10.1	Termination of Certification .....	30
4.10.2	Suspension of Certification .....	30
4.10.3	Withdraw of Certification.....	30
4.10.4	Reduction of Certification.....	30
<b>5.</b>	<b>SUPPORTING PROCESSES.....</b>	<b>31</b>
5.1	COMPLIANCE FOLDER .....	31
5.1.1	Overview.....	31
5.1.2	Folder Contents .....	31
5.1.3	Structure.....	32
5.2	TEST REQUIREMENT MANAGEMENT PROCESS .....	32
5.2.1	TRSL Structure .....	32
5.2.2	Test Case Categories .....	33
5.2.2.1	Category A .....	33
5.2.2.2	Category B.....	33
5.2.2.3	Category C.....	33
5.2.2.4	Category D .....	33
5.2.2.5	Category E.....	33
5.2.2.6	Category N .....	33
5.2.2.7	Category P.....	34
5.2.3	Test Case Validation and Verification Processes.....	34
5.2.3.1	Conformance Test Case Validation.....	34
5.2.3.2	Interoperability Test Case Verification .....	34
5.2.4	Test Case Status Transitions.....	34
5.2.5	Test Case Validation Challenge Process.....	36
5.2.6	TRSL Release Schedule.....	37
5.3	INTEROPERABILITY DEVICE LIST (IDL) MANAGEMENT PROCESS .....	39
5.3.1	Interoperability Devices.....	39
5.3.2	Establishment of Initial Interoperability Device List (IDL) for New Specification Release.....	39
5.3.3	IDL Sunset Requirements.....	39
5.4	APPEALS, COMPLAINTS AND DISPUTES.....	40
5.4.1	Appeals.....	40
5.4.2	Complaints.....	40

5.4.3	<i>Disputes</i> .....	40
5.5	LOGO USE .....	41
5.5.1	<i>Use of the MulteFire Alliance Certification Logo</i> .....	41
5.5.2	<i>Labeling of Certified Products</i> .....	41
5.6	PLUGFESTS .....	41
5.6.1	<i>Logistics</i> .....	42
5.6.2	<i>Ground Rules</i> .....	42
5.6.3	<i>Non-Disclosure Agreements (NDAs)</i> .....	43
5.6.4	<i>Goals and Outcomes</i> .....	43
5.7	LAUNCHING CERTIFICATION FOR NEW SPECIFICATION VERSIONS.....	43
5.8	RETIREMENT OF OLD SPECIFICATION VERSION (SUNSETTING).....	43
5.9	CERTIFICATION REFERENCE NUMBER (CRN) ASSIGNMENT .....	44
5.9.1	<i>CRN Process</i> .....	44
<b>APPENDICES</b> .....		<b>45</b>
APPENDIX A - CERTIFICATION CHECK LIST .....		46
APPENDIX B - APPLICATION FOR CERTIFICATION.....		47
APPENDIX C - APPLICATION FOR ECO .....		48
APPENDIX D - AUTHORIZED TEST LAB APPLICATION FORM.....		49
APPENDIX E – MULTEFIRE TEST SPECIFICATIONS.....		50

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## Overview and Scope

### 1.1 Overview

This document defines the policies that govern the MulteFire Alliance Certification Program. The MulteFire Alliance Certification Program is a voluntary program which verifies conformance to defined requirements and standards, and provides an assurance of device interoperability among MulteFire user equipment and base stations.

This Program Management Document provides process descriptions for:

- The selection criteria for the person(s) operating as MulteFire Alliance Certification Authority(ies)
- The application, auditing, approval and surveillance processes for Authorized Test Laboratories performing MulteFire certification testing
- The selection criteria for the person(s) operating as MulteFire Alliance Laboratory Program Manager(s)
- The recognition of specialized test system vendors
- The validation and continuing management of test cases used for MulteFire Certification Testing
- The submission and approval of new user equipment, base stations and building blocks as MulteFire Certified
- Product change management for Certified user equipment, base stations and building blocks
- Certification termination, reduction, suspension or withdraw for user equipment, base stations and building blocks
- The reporting of certification status to the MulteFire Alliance and its members
- The filing complaints and appeals regarding the awarding and maintenance of certification of user equipment, base stations and building blocks
- The operation of test events

### 1.2 Document Scope

This Program Management Document (PMD) for MulteFire Alliance defines the requirements and processes of its Certification Program for user equipment, base stations and building blocks.

This document addresses specific processes depending on the audience:

- For product vendors, this document describes application for and maintenance of certification status, the management of test cases, and documentation requirements.
- For test laboratories, this document describes the requirements for application, acceptance and operation as an Authorized Test Laboratory (ATL).



- For Certification Authorities (CAs), this document outlines the overall processes to apply for and maintain CA status as well as the CAs responsibility in the overall work processes.
- For Test Equipment Vendors (TEV), this document describes the process by which a TEV gains MulteFire recognition and by which test cases are implemented and validated for use.

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## 2. TERMS, ABBREVIATIONS AND ACRONYMS

### 2.1 Compliance Notation

The key words MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL in this document are to be interpreted as described in (Bradner, March 1997).

### 2.2 Terms

**Accreditation Body (AB)** – authoritative bodies that provide official recognition for laboratory organizations seeking to provide conformity assessment services.

**Building Block** – a software and/or hardware element that contains some sub-set of functionalities to enable MulteFire on an end product. Building Blocks include, but are not limited to chipsets, software stacks and radio elements.

**Certification** – The process by which a product is evaluated and authorized to carry a specific set of credentials that indicate that it is conformant with a set of standards and practices.

**Certification Authority (CA)** – the entity authorized to act on behalf of the MulteFire Alliance to perform and manage the day to day Certification processes.

**Certified Product Listing** – The list of certified products maintained by the MulteFire Alliance and published.

**Certification Program** – The process and documents associated with the certification of devices implementing a specific technology standard or version. Multiple certification programs can be run simultaneously by the MulteFire Alliance.

**Compliance Folder** – The set of evidence demonstrating a MulteFire Alliance device's compliance to the Certification Criteria, which includes the ICS, test reports, technical documentation, change management documentation and certification information.

**Compliant Portion** – Only those specific portions of an MulteFire Alliance device (hardware, software or the combination of the two) that are certified by the Certification Program and are within the bounds of the Compliant Scope.

**Compliant Scope** – The protocols, data formats and physical layer parameters needed for MulteFire interoperability as defined in the MulteFire Specifications. The Compliant Scope does not contain enabling technologies or implementation of specifications defined outside of MulteFire Alliance.

**End Product** – A fully integrated, finished, commercially available product that includes a compliant portion and may include an approved Building Block.

**Executive Committee** – A group of persons representing MulteFire Member companies which reviews and advises on operational matters for the MulteFire Board of Directors.

**Laboratory Program Manager (LPM)** – the entity authorized to act on behalf of the MulteFire Alliance to perform and manage the Authorized Test Laboratory Program.

**Module** – See Building Block.

**Parent Product** – The initial version of an end product that is presented for MulteFire Alliance certification.

**Test Plan** – A list of test cases that are to be completed as part of a candidate product's Certification Process.

**Variant Product** – A version of an end product that is based on a Parent Product which uses, to a great extent, the same hardware, software and firmware of the Parent. The initial certification of a Variant may re-use results from the certified parent product.

## 2.3 Abbreviations

This section intentionally left blank.

## 2.4 Acronyms

AB – Accreditation Body

ATL – Authorized Test Laboratory

BoD – Board of Directors

CA – Certification Authority

CRN – Certification Reference Number

DCT – Digital Conformance Testing

DUT – Device Under Test

ECO – Engineering Change Order

IDL – Interoperability Device List

ICS – Information Conformance Statement

ILAC – International Laboratory Accreditation Cooperation

ILCP – Interlab Comparison Program

IOT – Interoperability Testing

IUT – Implementation Under Test, synonymous with Equipment Under Test – EUT or System Under Test - SUT

IXIT – Information Extra Information for Testing

LPM – Laboratory Program Manager

NDA – Non Disclosure Agreement

ODM – Original Design Manufacturer

OEM – Original Equipment Manufacturer

PMD – Program Management Document

SDO – Standards Development Organization

SME – Subject Matter Expert

XGP – Extended Global Platform

TRSL – Test Requirements Status List

UE – User Equipment

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## 3. ROLES AND RESPONSIBILITIES

### 3.1 Certification Authority

MulteFire Certification Authorities (CA) are directly authorized by the MulteFire Alliance Board of Directors or their designated representative(s). The organizational structure under which the CAs operate will be reported openly to the MulteFire Alliance membership and published.

Upon approval, the candidate entity is granted CA status for the period of one (1) year. Approved CAs are listed on the MulteFire Alliance website. The CA status is renewed on a yearly basis. Status is subject to revocation as determined by the MulteFire Alliance Board of Directors or their designated representative(s) for cause.

#### 3.1.1 Overview

CAs are entrusted with the authority to render decisions regarding certification for a candidate product and are responsible for administering the process of MulteFire Alliance Certification described in Section 5 of this document. The CAs must be knowledgeable of the technologies, independent, impartial, and competent to evaluate initial and on-going compliance against the MulteFire Alliance Certification Requirements. The MulteFire Alliance is fully committed to supporting the impartial and equitable judgements of the CA. If, at any time, the impartiality of the CA is judged to be in question the processes of Section 5.4, Appeals, Complaints and Disputes, should be applied.

The specific processes that the CA administers includes:

- the recognition of new building blocks (i.e. modules or chipsets)
- the approval of new End Products
- the review of changes and approval of changes to already recognized building blocks and certified products
- the determination of degree of reuse of results from certified products for other certification purposes
- The termination, reduction, suspension and withdraw of certification

The CAs make their assessment of compliance based on multiple factors. The primary method of assessment and generating a certification verdict is accomplished by reviewing the test results generated by the execution of the test plan as described in Section 4.6. There are, however, additional elements that the CA may consider. These include:

- Issues observed and reported by the ATL in the process of testing
- Significance of any failure results
- Errors in the MulteFire Alliance Normative Documents – i.e. Baseline Specification(s) and/or Test Specification(s)
- Errors in the MulteFire Alliance Conformance Test System that may generate challenges to the validation status of one or more test cases as listed in the Test Requirements Status List (TRSL)
- The input of relevant technical experts from MulteFire Alliance as needed. The CA will protect the identity of the product in question.

Upon review and acceptance of all supporting information, the CA will grant certification and is responsible for placing the product on the MulteFire Alliance Certified Products List. The CA will retain a record of the Certification Request, a list of the objective evidence reviewed and their certification verdict. This evidence is to be stored in a secure compliance folder within the MulteFire Alliance.

All reasonable steps shall be taken to resolve any disagreements with the judgments and decisions of the CA in seeking a mutually agreeable solution. When it is not possible to resolve issues in a cooperative manner, the CA is subject to Section 5.4 (Appeals, Complaints and Disputes) of this document. These procedures should be used as a last resort in cases where the vendor believes the CA's judgments are in error or do not follow the spirit of letter of the processes contained in this Program Management Document.

### **3.1.2 Certification Authority Requirements**

Each Certification Authority:

- Is an entity which successfully completes the process outlined in this section of the Program Management Document
- Provides a service to the MulteFire Alliance membership and non-member licensees
- Is independent of any activities which may influence their judgement. If part of a larger organization there must be documented separation between their activities and the business goals of the larger organization
- Must protect the confidential information and proprietary rights of their clients
- Must be free of undue internal/external pressures (commercial, financial or any other) that adversely impacts the quality of their work
- Is free from involvement in any activities which might diminish confidence in their impartiality or integrity as a CA
- Is responsible for the accuracy of their work and their entries into the Certified Product Listing
- Coordinates with the Laboratory Program Manager (LPM) on Authorized Test Lab (ATL) and Test Equipment Vendor (TEV) matters
- Works with the various technical working groups and committees on specification issues
- Required to participate in MulteFire Alliance technical and certification committee meetings on a regular basis.

### **3.1.3 Application Process**

Potential Certification Authority candidates are identified and recruited by the MulteFire Alliance. If the target Candidate is interested in pursuing CA status in MulteFire, the Candidate shall provide a CV or Resume which outlines their personnel qualifications, organizational affiliations, statements regarding objectivity and a letter from the candidates employer (if applicable) in support of the application.

Upon receipt of the application the MulteFire Executive Committee will determine how to proceed with the candidate entity's application. If the application does not meet the requirements for selection the candidate will be notified. Candidates who are rejected at this step shall not re-apply for consideration for the role of CA for a period of six (6) months unless invited by the Executive Committee.

As part of the selection process a personal interview may be scheduled by a committee defined by the MulteFire Alliance Certification Working Group. The interview team will be selected based on knowledge of the MulteFire Alliance Certification Processes and technical background on the supported technologies. Committee members shall not have any potential conflicts of interest in executing the interview process.

Upon completion of the personnel interview the interview committee will discuss the candidate's qualifications and make a recommendation on granting CA status. The recommendation is reviewed and approved by the MulteFire Alliance Board of Directors. The candidate entity will be notified regarding the decision on their application. Successful candidates are authorized for a period of 1 which is renewable, see Section 3.1.6.

#### **3.1.4 Qualifications**

- All personnel acting on behalf of the CA entity shall meet the following qualifications:
- Three (3) years relevant professional work experience
- Relevant technical degree or equivalent
- Specific experience in product evaluation and testing
- Specific experience in product certification or type acceptance regimes
- Specific project management experience
- Proficient in reading and writing English language documentation
- Ability to clearly discuss technical issues with clients and other MulteFire Alliance stakeholders
- Where the candidate is part of a larger organization, documentation of arrangements of operational integrity and an employer statement of commitment to the principles of outlined in this section. The freedom of judgement and organizational commitment must be specifically addressed
- Capability to maintain confidential information through the availability of isolated and secure workspace and a plan for secure data storage
- Required to participate in MulteFire Alliance technical and certification committee meetings on a regular basis.

#### **3.1.5 Service Level**

The Certification Authority (CA) is expected to provide professional and prompt service to the members of the MulteFire Alliance. Acknowledgement of initial certification or ECO requests should be made within five (5) business days of the request. Responses to questions or other communication with the CA should be made within two (2) business days unless otherwise agreed with the vendor. Concerns with the service level of the CA should be communicated to the Certification Working Committee Chairman.

#### **3.1.6 Renewal of Certification Authority Status**

The MulteFire Alliance Certification Working Group may, at its discretion, request the active CAs to submit the following information for each individual acting on behalf of the CA entity:

- A current CV or Resume
- A letter, in writing, outlining their continued commitment to the principles outlined in Section 3.1.2.

- A summary of their product certification activities over the previous year.

If requested, the MulteFire Alliance Certification Working Group will review the submitted documentation along with any other information provided by member companies which have utilized the services of the CA in question during the past year.

CA status is automatically renewed for serving CAs for a subsequent year unless notification is provided by the Board of Directors that CA status has been revoked.

### **3.1.7 Certification Authority Organizational Structure**

The MulteFire Certification Program operates with a minimum of one Certification Authority on staff at any given time. As it becomes necessary to replicate the role of Certification Authority additional persons may be added as described by Section 3.1 of this document.

When the program is operating with multiple Certification Authorities, the most senior Certification Authority shall be nominated as “Lead Certification Authority”. The Lead Certification Authority shall develop policies for the distribution of work among CAs. The Lead CA shall collect workload data, certification status summaries and provide a periodic certification summary report for use by the MulteFire Alliance. The Lead CA shall also coordinate with CAs to resolve certification issues and develop certification policy as needed.

## **3.2 Authorized Test Laboratories**

### **3.2.1 Overview**

All MulteFire Alliance Authorized Test Laboratories (ATL) must seek and maintain laboratory accreditation, from an International Laboratory Accrediting Cooperation (ILAC) Accrediting Body, under ISO/IEC 17025 (ISO/IEC, 2005). The required scope of accreditation is defined by the MulteFire Alliance, see section 3.2.3 ISO/IEC 17025 Accreditation Scopes. The purpose of this accreditation is to ensure that labs:

- have a functioning quality system,
- are technically competent, and
- are compliant with Certification Program requirements and industry standards.

Test labs are authorized on a per-certification program basis, where the different certification programs supported by the MulteFire Alliance have different requirements for ATLs (see 4.1.9 Multiple Certification Programs, below).

The Laboratory Program Manager (LPM) shall work with labs to coordinate with Accreditation Bodies, where possible, to provide a Technical Assessor for a site assessment to evaluate laboratory competence for MulteFire Alliance test requirements. When not possible, the Technical Assessor will perform a separate independent technical assessment of MulteFire Alliance scope. Technical Assessors shall have experience in similar consumer electronics testing programs, have ISO 17025 auditor qualifications and be recognized by the MulteFire Alliance.



### 3.2.2 ATL MulteFire Alliance Membership

Test lab organizations must join the MulteFire Alliance as a Test Lab Participant. Only those test labs which have joined the MulteFire Alliance and are members in good standing may be considered for Authorized Test Labs status.

### 3.2.3 ISO/IEC 17025 Accreditation Scopes

A candidate ATL must be accredited by an ILAC designated Accreditation Body (International Laboratory Accreditation Cooperation, n.d.) and must add the following standards or test methods to its ISO 17025 (ISO/IEC, 2005) Scope of Accreditation:

Test Name	Test Method
MulteFire Alliance Interoperability Testing	MulteFire Alliance Interoperability Test Methods
MulteFire Alliance Protocol Testing	MulteFire Alliance Protocol Test Methods
MulteFire Alliance RF Conformance Testing	MulteFire Alliance RF Conformance Test Methods

MulteFire Alliance may require addition of other scopes as they become available. Certification Authority(s) will depend on the ATL's compliance with ISO/IEC-17025 (ISO/IEC, 2005) Section 5.4.2 to ensure labs always use the latest revision of the test plans.

#### 3.2.3.1 The ATL Candidate must have all of the test equipment required to be able to perform all tests in each test plan for the scopes to which it is accredited.

### 3.2.4 Specific Scope Criteria for Laboratory Authorization

There are currently no specific scope criteria defined for Laboratory Authorization.

### 3.2.5 MulteFire Alliance ATL Application

Those labs which wish to become MulteFire Alliance ATLs must complete the following steps before being recognized by the MulteFire Alliance as ATLs:

- Obtain appropriate test equipment and/or systems for the desired scope of accreditation. When available, labs must use a MulteFire Alliance authorized test platform for certification testing,
- Provide appropriate training and build competence in the desired MulteFire Alliance scope of testing among their personnel,
- Seek and obtain accreditation for the desired scope of accreditation with an ILAC Member Accreditation Body (AB) (International Laboratory Accreditation Cooperation, n.d.) utilizing an MulteFire Alliance Technical Assessor dependent or independent of the AB assessment,
- Provide the link from the Accrediting Body for the ATL's Certificate of Accreditation which includes the MulteFire Alliance testing scope
- Make application to the MulteFire Alliance, providing the information as described in Appendix D - Authorized Test Lab Application Form,

- Submit their facility for review by the MulteFire Alliance Laboratory Program Manager (LPM), and
- Complete all business and membership agreements with the MulteFire Alliance.

### **3.2.6 Authorized Test Lab Approval**

The MulteFire Alliance Laboratory Program Manager (LPM) will review the completed application. If the application is complete and satisfactory the LPM will make a recommendation to the MulteFire Alliance Executive Committee to accept candidate lab as an ATL. Once accepted, the LPM will notify the lab regarding their status. Those labs which successfully complete the application process will be listed on the MulteFire Alliance website.

It may be necessary to conditionally approve a candidate laboratory that meets all requirements of Section 3.2.5, but is still in the process of completing the formal scope expansion with their Accrediting Body. In these cases, the candidate laboratory will provide information regarding their scope expansion plans to the LPM. The LPM will use this information to determine if conditional approval should be recommended. The candidate laboratory shall complete the scope expansion as per the provided plan or risk having their conditional acceptance revoked.

### **3.2.7 Financial Responsibility**

ATL Candidate Laboratories are responsible to cover the costs associated with the MulteFire Alliance accreditation scope expansion. This includes, but is not limited to, travel and time expenses incurred by the Laboratory Program Manager's audit of their facilities. MulteFire Alliance will provide an invoice for these actual incurred costs to the candidate laboratory. The LPM will provide an invoice to the candidate lab for these expenses.

ATL Candidate Laboratories are responsible for the set-up and purchase of all necessary test equipment, systems and software needed to perform testing as a MulteFire Authorized Test Laboratory.

### **3.2.8 MulteFire Alliance Authorized Test Lab Listing**

The MulteFire Alliance shall maintain a current list of all approved Authorized Test Labs. This list will be published by the MulteFire Alliance and will include:

- Name of lab
- Region/Location
- Contact Information
- Scope of MulteFire Alliance Authorization

### **3.2.9 Delisting of ATLs**

ATLs may lose their MulteFire Alliance Authorized status for cause or by request. Laboratories which do not follow the guidelines provided by the MulteFire Alliance may be delisted for cause. Reasonable efforts will be made by the MulteFire Alliance to rectify any issues or disputes with an ATL. In those situations, however, where the issues are too significant to rectify or there is a lack of willingness by the laboratory to correct problems the MulteFire Alliance Laboratory Program Manager (LPM) may recommend to the MulteFire Alliance Executive Committee that the ATL status be revoked.

Laboratories may also voluntarily surrender their ATL status as a result of changing business conditions. If an ATL wishes to surrender their recognized status they shall notify the MulteFire Alliance Laboratory Program Manager (LPM) of such a decision in writing. The LPM will notify the MulteFire Alliance Executive Committee.

Upon confirmation by the MulteFire Executive Committee, the LPM will take appropriate and prompt actions to remove the laboratory from the list of Authorized Test Laboratories. Test reports from delisted labs will not be accepted by a MulteFire Alliance Certification Authority after the delisting date.

### **3.2.10 Reauthorization of ATLs**

It is the policy of MulteFire Alliance to accept the reaccreditation of ATLs by their AB's as completion of the MulteFire Alliance reauthorization requirement. ATLs are required to notify the MulteFire Alliance Laboratory Program Manager (LPM) at least 3 months prior to any re-accreditation or surveillance audits performed by their Accreditation Body that are related to their MulteFire Alliance Scope. The MulteFire Alliance LPM reserves the right to perform on-site audits as needed.

### **3.2.11 Interlab Comparison Program (ILCP)**

The MulteFire Alliance may, upon announcement, engage upon a round of interlab comparison testing among the Authorized Test Laboratories. ATLs must participate if requested and are responsible for covering their own costs for participation. The Interlab Comparison Program will be administered by the Laboratory Program Manager (LPM) on behalf of the MulteFire Alliance. The LPM will be responsible for the following:

- the creation of the ILCP test plan based on a select subset of validated test cases,
- a schedule of testing coordinated with the ATLs,
- the device(s) for testing. Note: ILCP test devices shall be commercial devices (with possible known defects), and all ILCP tests will be conducted on the same type of device, and
- compiling results from all ATLs and generating a detailed report of the results to the MulteFire Alliance Certification Working Group.

Where any concerns are identified as a result of the ILCP with a specific ATL, the LPM will issue an Interlab Comparison Program Finding. The ATL is expected to exercise their internal corrective action and root cause analysis procedures and respond in a timeframe agreed with the LPM.

Failure to respond to an Interlab Comparison Program Finding in either a timely or effective manner may result in the ATL being de-listed as described in Section 3.2.9.

### **3.2.12 ATL Meeting Attendance**

Authorized Test Labs (ATLs) shall participate in the MulteFire Alliance Certification Working Group teleconferences and face to face meetings. Additionally, the ATLs shall participate in ATL task group. The purpose of these meetings is to discuss Certification Program Policy changes, upcoming certifications, waivers, the status of the Interoperability Device List and any other topics related to the operation of the Certification Program.

### 3.2.13 Test Reporting Requirements

In addition to complying with the requirements of Section 5.10 of ISO 17025 (ISO/IEC, 2005), the Authorized Testing Laboratory shall include the following information in the test report:

- Device Type: End Product or Building block
- Functional and Test Specification Versions Used in Testing
- TRSL Version
- Compliance Test Time [hours]
- Debug Test Time [hours]

The Certification Authority (CA) will utilize this information to provide metrics to the MulteFire Alliance.

## 3.3 Authorized Test Equipment Vendors

### 3.3.1 Requirements

In order to reliably and successfully execute the Test Cases identified by the MulteFire Alliance Test Specifications (see Appendix E) specialized test equipment is needed. Test Equipment identified by this section needs to meet specific criteria and be designed in such a way as to execute the test cases identified. The implementation of these test cases is then validated as described in Section 5.2.3.

The MulteFire Alliance Certification Program does not certify test equipment, but qualifies it based on which validated test cases are available. Acceptance of new systems is addressed on a case by case basis. A list of qualified test equipment for which validated Test Cases exist will be maintained on the Test Requirement Status List (TRSL).

### 3.3.2 Initial Program Needs

Since MulteFire leverages LTE as its foundational technology, it may be possible for Test Equipment Vendors (TEVs) to modify existing test systems for MulteFire Alliance use. MulteFire Alliance will maintain discussions with TEVs regarding plans for supporting MulteFire technology. Once a test tool is available, a process of system and test case validation will be undertaken. See Section 3.3.3.

Those test systems and tools that provide validated MulteFire test cases shall be listed by the MulteFire Certification program via the Test Requirements Status List.

### 3.3.3 Validation of Test Cases

The following guidelines apply to the validation of test cases to be used in the MulteFire Alliance Certification Program:

- Full Validation of conformance test cases requires test results from a minimum of two (2) unique UEs or Base Stations.

- In cases where only a single unique UE or Base station is available validation may be completed with a single set of test results and the test case moved to Category B on the TRSL.
- Validation samples must be unique HW/SW builds, not relabeled devices or otherwise similar.
- The Certification Authority (CA) will review the initial conditions, test logs and test results.
- Validation tests must result in a minimum of two (2) valid pass verdicts.
- The CA will present those test cases that are candidates for approval to the CWG for acceptance.

Any issues that arise during the validation process will be either resolved between the lead Certification Authority (CA), the Test Equipment Vendor and/or involved UE vendor. If the issue's root cause is in either the test or functional specification then the CA will provide information to the relevant group within MulteFire Alliance.

### **3.4 Laboratory Program Manager**

#### **3.4.1 Overview**

The MulteFire Alliance Laboratory Program Manager (LPM) role is to be the primary interface between the Alliance and the Authorized Test Labs (ATLs). Specifically the LPM shall:

- Help the MulteFire Alliance define and develop the MulteFire Alliance ATL Program
- Manage the ATL Program on behalf of the MulteFire Alliance
- Act as primary point of contact with ATLs for MulteFire Alliance
- Manage the MulteFire Alliance's recognition status of the ATLs
- Be a subject matter expert on testing MulteFire Alliance technology
- Provide updates to the PMDs for ATL selection and management
- Assist Accreditation Body in performing onsite audits of ATLs as technical assessor
- Manage an interlab comparison program for MulteFire Alliance
- Coordinate with relevant working groups on technical and practical matters related to labs and testing
- Coordinate with Certification Authority on laboratory matters related to certification
- Collect technical and process feedback on program from ATLs
- Manage an ATL task team within the Certification Working Group

#### **3.4.2 Qualifications**

The LPM shall meet the following qualifications:

- Five (5) years relevant professional work experience
- Relevant technical degree or equivalent
- Specific experience in test laboratory accreditation assessments.
- Knowledge of in product certification or type acceptance regimes
- Experience in Quality Control and inter-laboratory comparison programs

- Specific project management experience
- Proficient in reading and writing English language documentation
- Ability to clearly discuss technical issues with clients and other MulteFire Alliance stakeholders
- Capability to maintain confidential information through the availability of isolated and secure workspace and a plan for secure data storage
- Required to participate in relevant MulteFire Alliance teleconferences and face to face meetings on a regular basis

## **4. CERTIFICATION PROCESS**

### **4.1 Concepts and Elements**

#### **4.1.1 Types of Approvals**

##### **4.1.1.1 Building Block Approval**

The MulteFire Certification Program recognizes the need for formal approval of hardware and software elements that contain some subset of functionality to enable MulteFire on an End Product. Building Blocks include, but are not limited to, chipsets, software stacks and radio elements. An ICS must be completed, and necessary testing identified as part of the approvals process. The ICS should contain responses for all features supported by the Building Block.

All testing on a Building Block is facilitated by the responsible vendor by placing the implementation into a reference design or end product. All considerations to making the building block testable using the same methods, test equipment and facilities as an End Product.

The ICS and a complete set of test results for the Building Block can be leveraged by end product integrators to facilitate End Product Certification.

##### **4.1.1.2 End Product Approval**

The MulteFire Alliance Certification Program certifies End Products for use by consumers and service providers. Such products are, typically, commercially available and ready for use. Certification shall be applied to end user terminals and may be applied to base stations. The MulteFire Alliance shall maintain a listing of commercially available certified products and publish such a list as agreed.

The location of the list may be searchable online or published electronically by other means. All certified products will be published unless the responsible vendor explicitly notifies the MulteFire Alliance they wish to be excluded from listing. Alternatively, the responsible vendor may notify the MulteFire Alliance that they wish their listing to be made public at a later date that they provide.

#### **4.1.2 The Compliant Portion**

The Compliant Portion of a MulteFire Alliance device is that portion that is the result of MulteFire Alliance specification implementation. The Compliant Portion of a device

submitted for Certification shall be defined completely so that there is clear definition of what is within and outside of the Compliant Portion. Where possible a model number, hardware revision number and software revision number shall be associated with the Compliant Portion rather than the higher level assembly.

If the Compliant Portion is to be integrated into another end product, the application for certification shall clearly describe the appropriate interfaces to the higher level assembly so that compliance can be ensured.

#### **4.1.3 Implementation Conformance Statement (ICS)**

A key element in determining which test cases will be executed on a particular product is the Implementation Conformance Statement (ICS). This document is completed by the vendor responsible for the product being submitted for Certification. The ICS is the statement by the vendor company which defines which features are supported in the specific implementation.

The ICS is maintained by the Certification Working Group. Features listed on the ICS are identified as “Mandatory”, “Optional” or Conditional. MulteFire Alliance expects that all features identified as “Mandatory” must be supported to be considered for Certification.

Where situations arise where a mandatory feature is not supported and the vendor still wishes to make a claim of Certification, the vendor will need to discuss the possibility of a waiver with the Certification Authority. Waivers are a significant exception for the rules of the MulteFire Alliance and are not granted except in unusual circumstances.

Where a previously certified chipset is to be implemented in an end product, it is important for end product developer to have access to the chipset’s certification test results. Arrangements between chipset suppliers and end product implementers are outside the scope of the MulteFire Certification program.

#### **4.1.4 Implementation Extra Information for Testing (IXIT)**

The Implementation Extra Information for Testing (IXIT) is information which allows the vendor’s device to be effectively tested. The IXIT form will be maintained by the Certification Working Group and available as part of the application process.

#### **4.1.5 Eligibility for Certification**

All members of MulteFire Alliance which are in good standing are eligible to utilize the Certification Program. When submitting a product for MulteFire Alliance Certification, there may be additional requirements that will be communicated to the membership.

##### **4.1.5.1 Regulatory**

Regulatory approvals are outside the scope of MulteFire Alliance Certification.

#### **4.1.6 Types of Tests**

There are multiple categories of tests within the MulteFire Alliance Certification Program. These are detailed in the following sections.

##### **4.1.6.1 Protocol Conformance Tests**

Test cases for the evaluation of protocol conformance for terminals, base stations or building blocks that support MulteFire are specified in Appendix E. These test cases are to be run on representative devices using a MulteFire Alliance authorized test system.

#### 4.1.6.2 Radio Conformance Tests

Test cases for the evaluation of radio conformance for terminals, base stations or building blocks that support MulteFire are specified in Appendix E < These test cases are to be run on representative devices using a MulteFire Alliance authorized test system.

#### 4.1.6.3 Interoperability Tests

Test cases for end-to-end operation of MulteFire end products using reference devices are specified in Appendix E. These test cases are performed using devices from the MulteFire Alliance Interoperability Device List (IDL). Devices selected for the IDL shall be unique implementations and not variants or otherwise similar.

Terminals and Base Stations shall be tested against a minimum of three (3) corresponding devices from the IDL. Where three devices are not available for interoperability testing, the Certification Authority shall determine the minimum set needed for compliance.

#### 4.1.7 Changes to the Certification Program

Changes to the MulteFire Alliance Certification Program are defined as Certification Change Requests (CCRs). Each CCR is assigned a serial number and tracked by the Certification Working Group. CCRs may be raised by any member of the Certification Working Group.

CCRs are individual requests and should not cover multiple change requests. CCRs may fall into one of two categories. These include the following:

- Changes to the Program Management Document – this category includes any recommended edit to this document. The change should reference the impacted section, clearly define the requested edit and include references to other related change requests (if any).
  - The CWG will review the PMD CCRs on a regular basis and accept or reject the comments. Accepted comments will be reflected in an edited version of the PMD.
  - There is no minimal time interval for accepting and publishing changes to the PMD.
  - The CWC will determine when sufficient changes have been collected in order to issue a new release of the PMD.
- Changes to the status of Test Cases – any request to change the validation status of a test case. The change should reference the test case in question and the requested change in status. These CCRs should include any supporting references as appropriate. The formal process for challenging the validity of a test case is defined in Section 5.2.5.
  - CCRs for Test Cases are required for validation reports and the associated upgrade requests.
  - All CCRs raised against the status of a Test Case will be reviewed at the TRSL status meeting defined by Section 5.2.

#### 4.1.8 Financial Responsibility

It is the responsibility of the device or chipset manufacturer submitting a product for consideration by MulteFire Alliance's Certification Program to bear all expenses and costs associated with the completion of the certification process. These fees include but are not limited to the following:



- costs levied by the CA and MulteFire Alliance for the initial parent product certification, and subsequent variant product certification(s),
- fees and expenses charged by an ATL for performing product certification services, and
- Other fees and expenses not specifically listed that are incurred by the vendor due to the certification process.

**Please note: Certification listing fees must be paid prior to MulteFire Alliance Certification being granted.**

It is the responsibility of Test Equipment Vendors to cover costs related to test case validation. These fees include but are not limited to the following:

- Costs levied by the CA to cover travel expenses related to test case validation.
- Costs due to specific contractual arrangements for validation services

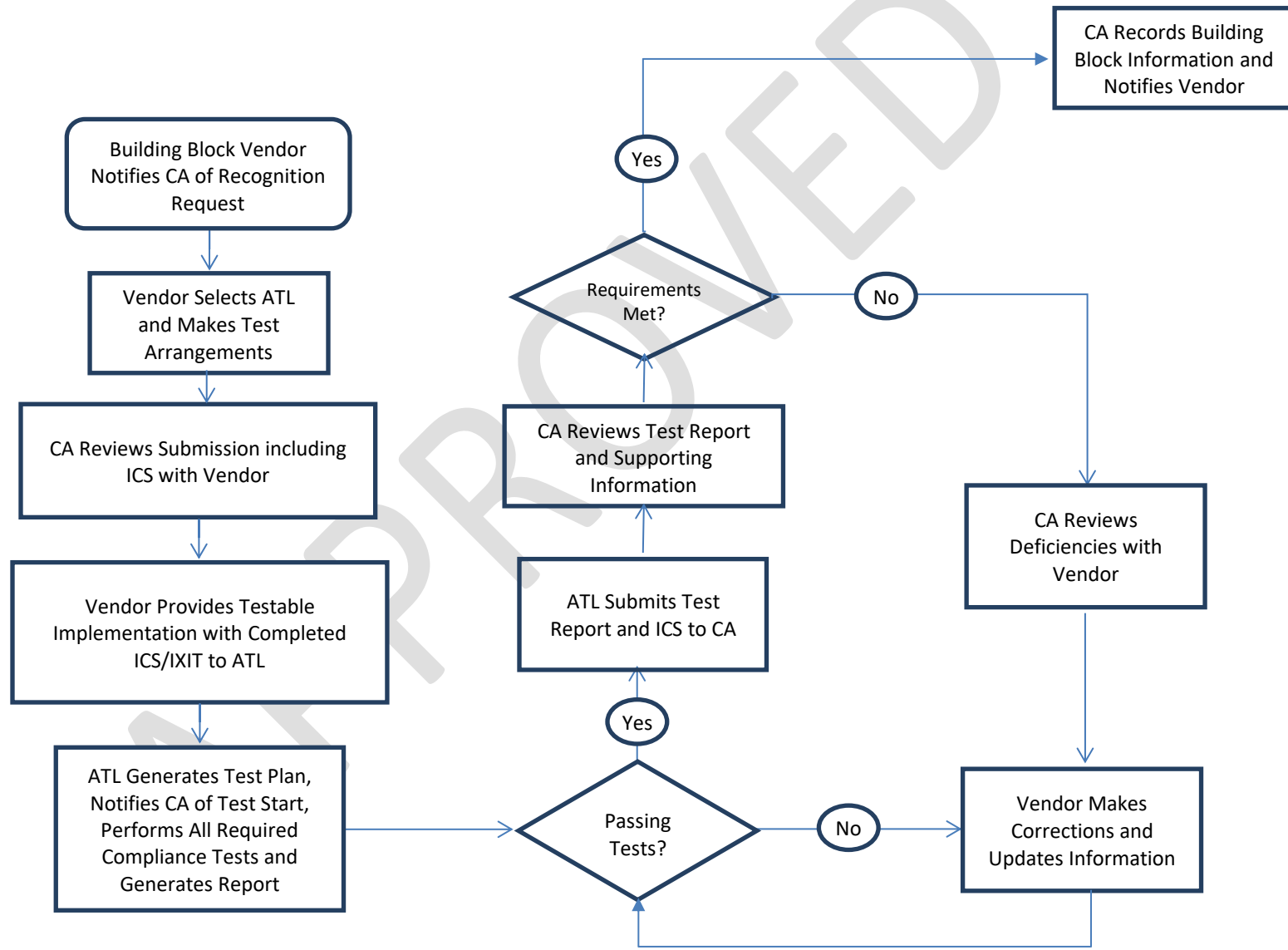
#### 4.1.9 Multiple Certification Programs

The MulteFire Alliance may operate multiple different certification programs in parallel, each focused on a different version of the MulteFire standards, or associated technologies. Each of the processes of the certification program, as described in this document, will be run in parallel, treating each certification program independently. Where appropriate, separate instances for key elements of the certification program will be maintained, such as ATLs, ATL requirements, ICS, IXIT, TRSL and IDLs.

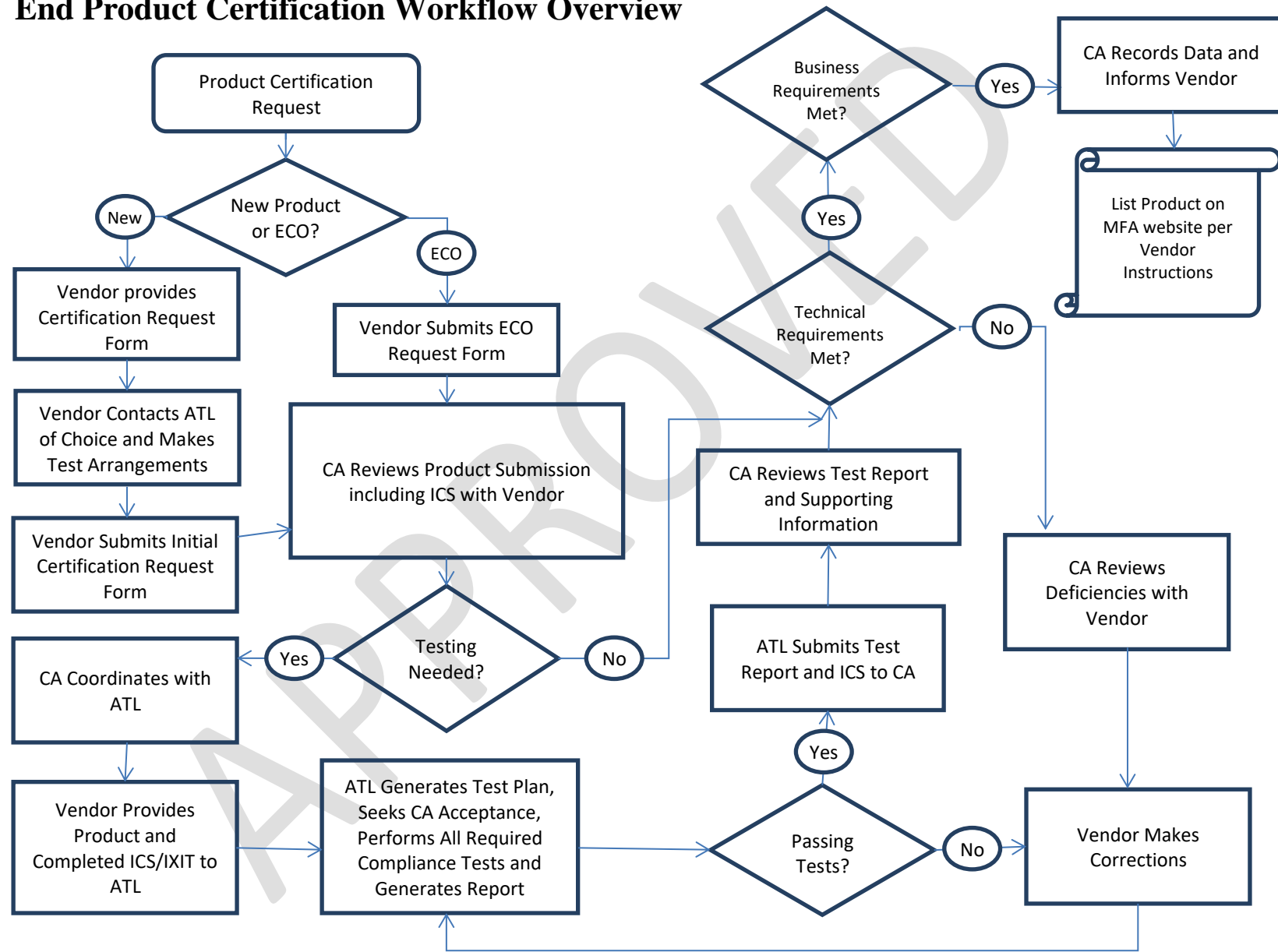
The current certification programs of the MulteFire Alliance are listed in the below table:

Certification Program	Description
MulteFire 1.9 GHz Certification	Certification of eNB devices for use in the sXGP 1.9 GHz Band in Japan. Testing is interoperability-based.
MulteFire 1.0 Certification	Certification of eNB and UE devices for MF 1.0 compliance. Testing is primarily interoperability-based, with some conformance testing.

## 4.2 Building Block Test Workflow Overview



### 4.3 End Product Certification Workflow Overview



## **4.4 Applying For Certification**

Vendors applying for MulteFire Alliance Certification shall use the checklist in Appendix A - Certification Check List, and the application form in Appendix B - Application for Certification.

The application shall be submitted via e-mail to the Certification Authority. The e-mail address for the Certification Authority is located on the MulteFire Alliance website.

## **4.5 Laboratory Selection**

The product vendor is responsible for selection of an ATL. The product vendor must select an ATL from the list provided by the MulteFire Alliance. The product vendor then makes all necessary business and scheduling arrangements with the ATL for the evaluation of their product. The Certification Authority shall be kept apprised of the certification testing activities in order to provide timely certifications.

## **4.6 Test Plan Generation and Evaluation**

The vendor's selected ATL is responsible for creation of a Certification Test Plan. The Test Plan is created through a combination of the supplied ICS and the current version of the TRSL.

The Vendor is responsible for reviewing the test plan and commenting on any concerns. The Test Plan is submitted to the Certification Authority for official acceptance. Testing can commence after official CA acceptance of the Certification Test Plan. Acceptance is denoted by direct communication from the Certification Authority via e-mail to the ATL and vendor.

Upon acceptance, the ATL may immediately begin executing the Test Plan. The ATL is responsible for preparing an evaluation report and submitting to the vendor and the CA when testing is completed.

It is the responsibility of the vendor to complete all necessary business relationship issues with the ATL in a timely manner. It is not the responsibility of the CA or MulteFire Alliance to engage in business relationship issues between the ATL and the vendor.

## **4.7 Extension of Certification and Reuse of Results**

### **4.7.1 Product Variants**

A product variant is defined as a product that is electrically and mechanically similar to a parent product that has already received certification. The variant product also significantly reuses the same software to implement MulteFire Alliance functionality. The variant product has a different name, model number or revision number than the parent product and the mechanical, electrical and software differences are minor. Variant products are branded by the same manufacturer as the parent product.

The MulteFire Alliance CA shall determine the testing required to certify the variant. If the changes are minor or insignificant, an Engineering Change Order may be submitted to the MulteFire Alliance CA to obtain certification for the variant. Please see Section 4.8 for details.

### **4.7.2 Rebranded Products**

For Future Use

## 4.8 Waivers

A MulteFire Alliance Member which is unable or unwilling to comply with a specific requirement or set of requirements for Certification of their product may apply for a Certification Waiver. Certification Requirements that are not compliant and are not corrected, must have an accepted Waiver in place if Certification is to be granted to the End Product in question.

Waiver requests are reviewed by the Waiver Review Board and judged for merit. The Waiver Review Board is composed of the Certification Authority, Executive Committee and relevant technical resources within the MulteFire Alliance. Any requests for assistance must be respectful of confidentiality and not create any conflicts of interest for the members of the Waiver Review Board.

The Waiver Review Board renders a judgement based on the review of material provided by the vendor, the impact of the Waiver on other Certified Products in the field, and the input provided by relevant technical resources. The judgement of the Waiver Review Board is communicated by the CA to the vendor.

Waivers may be permanent or temporary. If a Temporary Waiver is granted, a specific date is agreed by which the waived Certification Requirements must be in compliance. Objective evidence of compliance before the agreed expiration date of the temporary Waiver must be provided to the CA. Failure to do so may result in the Termination, Reduction or Revocation of Certification for that product (see Section 4.10).

The decision of the CA in regard to the granting of Waivers is subject to Appeals, Complaints and Disputes processes in Section 5.4 of this document.

## 4.9 Engineering Change Orders (ECOs)

In order to retain certification or reuse results as per Section 4.7, the manufacturer shall create an Engineering Change Order (ECO) and submit to the CA. The ECO will identify the change(s) in the hardware (HW), software (SW), firmware (FW), form and/or function of the certified product.

The Certification Authority will reference the originally certified product in the processing of the ECO request. The Certification Authority makes the determination if retesting is needed and the scope of retesting.

The process flow of Section 4.3 applies to ECOs.

## 4.10 Termination, Reduction, Suspension and Withdraw of Certification

Certification may be terminated, suspended or withdrawn either for cause or by request of the certifying vendor. When Certification is terminated, suspended or withdrawn the MulteFire Alliance Certification Authority will take appropriate actions to remove the effected products from the public listing of certified products as well as make appropriate notations on any MulteFire Alliance internal product listings. The vendor shall be notified by the Certification Authority of their status change. Upon notification, the vendor must discontinue any claims of certification for the effected End Products or chipsets.

The CA's decisions made as part of the processes described in this section are subject to the Appeals, Complaints and Disputes Processes described in Section 5.4.

#### **4.10.1 Termination of Certification**

Termination is the permanent, non-voluntary loss of Certification status by a vendor for a specific End Product or group of End Products. Termination is the result of an unresolved non-conformance on a Certified End Product. Termination may follow the Suspension of Certification as described in Section 4.10.2 or may be immediately implemented by the Certification Authority as appropriate.

#### **4.10.2 Suspension of Certification**

Suspension is the non-voluntary loss of Certification status by a vendor for a specific End Product or group of End Products. Suspension of Certification is intended to be a temporary status change while resolution of an issue regarding the certified status of the product is resolved. The Certification Authority is responsible for communicating the status change to the effected vendor and for providing a list of actions needed to restore Certification status.

Where the issues resulting in suspension of Certification are not resolved the CA may undertake the Termination of Certification as described in Section 4.10.1.

#### **4.10.3 Withdraw of Certification**

Withdraw is the voluntary removal of a Certified End Product from certification status. In the case where a vendor wishes to withdraw a product from certified status, they are responsible for notifying the Certification Authority. The CA then undertakes the actions necessary to remove the product from appropriate lists as described in Section 4.10.

#### **4.10.4 Reduction of Certification**

A multi-mode End Product that is certified for multiple MulteFire Alliance technologies may have the Certification Status removed for one of the technologies without impacting the Certification Status of other technologies. Where a Reduction in Certification Status is performed, the Certification Authority executes the relevant sections of Section 4.10.

## 5. SUPPORTING PROCESSES

### 5.1 Compliance Folder

#### 5.1.1 Overview

The Compliance Folder is an electronic collection of all relevant documentation for a product submitted for Certification. The concept utilized is that of the European Telecom Directive 1999/5/EC Annex II & IV Technical Construction Files. It is the responsibility of the supplier to create and maintain the Compliance Folder. The Compliance Folder must be maintained for a period of no fewer than six years, and must be available for audit upon demand of the Certification Authority.

The manufacturer appoints a Certification Officer (however named) who is responsible within the manufacturer's organization for all matters related to the submission, execution and maintenance of the terminal device's certification. Manufacturer shall provide evidence that a Quality Management System (QMS), i.e. ISO9001 or equivalent recognized standard.

The Compliance Folder shall be uniquely identified, included in the manufacturer's document control system, and available for inspection. The build state of the terminal device shall be traceable to the device covered by the Compliance Folder.

#### 5.1.2 Folder Contents

The Compliance Folder shall contain the following items:

- Index of contents
- Completed ICS with IXIT information
- Model/type numbers
- Brand name
- Manufacturer detail
- Technical description including a block diagram, circuit diagram
- Details of significant design aspects (features, specifications, installation measures, control of variants and manufacturing)
- Variant description (as applicable)
- Software version(s) / SVN
- Reference to versions of MulteFire Alliance Certification Criteria used
- User, installation, or special instructions
- Test data
- Internal and third party test reports
- Products tested for interoperability
- Details of changes in hardware and/or software configuration together with evidence of continued compliance
- MulteFire Alliance Client version number and release notes
- Evidence that the device has been developed and tested according to the Quality Management Program requirements
- A copy of the Certification Declaration

### 5.1.3 Structure

The compliance folder is to be maintained in electronic format as a collection of documents, spreadsheets, digital images and or scanned copies of document. Only electronic formatted documents may be part of a Compliance Folder and all paper copies shall be scanned.

## 5.2 Test Requirement Management Process

Test requirements for MulteFire Alliance Certification are managed via the Test Requirements Status List (TRSL). The TRSL communicates the validation status of the test cases used in the MulteFire Alliance Certification Program. The TRSL does not define the required tests needed for completing certification, but instead, provides information regarding the current validation or verification status of those test cases.

The TRSL in concert with the ICS document generates the test plan that ATLs will execute. Each ATL is responsible for verifying that all test cases implied by the ICS are included in each Test Plan for which they are responsible. This includes all mandatory and conditionally-mandatory test cases for the features supported by the product. Those test cases that are currently not in service may be executed at a later date or waived as determined by the Certification Authority.

The TRSL is owned by the Certification Working Group. Regular status meetings (nominally on a weekly basis) shall be held to review changes to the TRSL. This meeting is managed by the Certification Authority. This meeting will be used to review the CCRs raised against Test Cases as described by Section 5.

### 5.2.1 TRSL Structure

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

- Designator – test case identifier
- Name – descriptive text from test specification
- Current requirement
  - Test specification number and version
  - Test Case Category (see Section 5.2.2)
  - Available date is the date at which the test case may be used at the indicated Test Case Category
  - Active date is the date at which the test case shall be used at the indicated Test Case Category
  - Associated notes
- Previously published requirement
  - Test specification number and version
  - Test Case Category (see Section 5.2.2)
  - Status
  - Active date
  - Associated notes
- Informative
  - Test Platform – validated test platforms for both current and previous ones



The following applies for each test case requirement:

- Prior to the Available date of the current requirement, the previously published requirement shall apply;
- From the Available date until the active date of the current requirement, the vendor shall choose to apply either the previously published requirement or the current requirement; and
- From the Active date, the current requirement shall apply.

Issue of an update to the TRSL is managed and approved by the Certification Authority. Updates to the TRSL include changes to test case categories to reflect the addition of new validated test cases, the downgrade of previous validated test cases, and the re-validation of downgraded test cases.

The TRSL will include information and validation status for each MulteFire Alliance authorized test platform.

## **5.2.2 Test Case Categories**

Test Case Categories defined below show the statuses of each test case. The statuses are maintained in the TRSL.

### **5.2.2.1 Category A**

The device shall pass each category A test case at an ATL on an MulteFire Alliance authorized test platform. These are validated test cases.

### **5.2.2.2 Category B**

The device shall pass each category B test case at an ATL. Pass/Fail verdict is assigned and the test report generated using ISO 17025 [1], Section 5.10 as a guideline. These are typically test cases which have been verified, and can be executed, but for which a test case implementation validation may be incomplete or only one implementation is available and used for validation. This category can also be used whenever a test is performed using an acceptable alternative method, i.e. best available means. This category is also used for required interoperability test cases.

### **5.2.2.3 Category C**

The device shall pass each category C test case, and the test report supplied to the ATL, using ISO 17025 [1], Section 5.10 as a guideline. Pass/Fail verdict is assigned.

### **5.2.2.4 Category D**

Category D test case is a test case that is downgraded from A or B or C and must be revalidated and reinstated to its prior status at the assigned active date.

### **5.2.2.5 Category E**

Category E test case shall be performed at an ATL and a test report generated however a pass/fail verdict is not assigned for Category E test case.

### **5.2.2.6 Category N**

Category N test case not yet planned for development (information only).

#### **5.2.2.7 Category P**

Category P test case is planned for validation or awaiting approval but currently for information only.

### **5.2.3 Test Case Validation and Verification Processes**

Test cases used in the MulteFire Alliance Certification Program are included in the list of requirements for certification by completing a process of validation or verification. This list is called the Test Requirements Status List (TRSL). Further details of the TRSL are contained in section 5.2.

Validation is specifically defined as the process by which conformance test cases are evaluated for suitability and correct implementation. Verification is specifically defined as the process by which interoperability test cases are evaluated for suitability and correct implementation. Details for each of these processes are contained in the following sections.

#### **5.2.3.1 Conformance Test Case Validation**

Before a protocol or radio conformance test case shall be taken into use by the Certification Program a validation process shall be executed. The term validation may be applied to initial validation or revalidation as appropriate. Upon successful completion of the validation process the test case may be taken into use either as a new or revalidated test case.

The process of test case validation is a rigorous process that requires that a competent person or persons execute the candidate test case on a test platform. The test case must be executed on a minimum of two (2) different implementations with a passing verdict. Evidence of the passing result as well as logs of both the test platform and implementation protocol interactions is required. All evidence is then analyzed by the Certification Authority.

The CA will make a recommendation for accepting the test case as validated to the CWG. The CWG will then list the test case as “validated” for the test platform upon which it was executed.

#### **5.2.3.2 Interoperability Test Case Verification**

Before an interoperability test case shall be taken into use by the MulteFire Alliance Certification Program a verification process shall be executed. Verification is similar to validation, but without the same level of rigor.

In order for a test case to be verified, the test case steps shall be examined to determine their suitability against the relevant standard and test purpose. If the test case steps meet the stated test purpose, then the test case is verified.

The CA will perform this analysis and make a recommendation for accepting the interoperability test case as “verified”.

### **5.2.4 Test Case Status Transitions**

Test cases may change category over time. The TRSL communicates the current status as well as when newly validated test cases will come into use. The following list describes the general work flow for transition between test case categories. In addition, Figure 5.1 shows the acceptable test case transitions in a graphical manner.

- All TCs start as Cat “N”. There is no prioritization, available date, effective date, and version control or test platform information associated with TCs at this point.
- The only legal move from Cat “N” is Cat “P”. This indicates that the test case is now prioritized for validation.
- From Cat “P” the TC may be legally transitioned to any of the following Categories: A, B, C, E or N.
  - When a TC is transitioned from Cat “P” to one of the legal Categories (except Cat “N”) the effective date is set by the CA.
  - The available date is set to the date at which the transition was finalized.
  - Where the TC is transitioned to Cat “N” all other information is cleared.
- From Cat “E” the TC may be legally transitioned to any of the following Categories: A, B, C, D or N.
  - The same rules for setting the effective date for transitions from Cat “P” apply where the TC is moved to Category A, B or C.
  - Where the TC is moved to Cat “D” or “N” the effective date is immediate. Test platform info and available date is cleared.
- From Cat “C” the TC may be legally transitioned to any of the following Categories: A, B, D or N.
  - The same rules for setting the effective date for transitions from Cat “P” apply where the TC is moved to Category A or B.
  - Where the TC is moved to Cat “D” or “N” the effective date is immediate. Test platform info and available date are cleared.
- From Cat “B” the TC may be legally transitioned to any of the following Categories: A, D or N.
  - The effective date is immediate. The TC info and available date is cleared in the transition to Cat D or N.
- From Cat “A” The TC may be legally transitioned to Cat “D” or “N”.
  - The effective date is immediate. The TC info and available date is cleared.
- From Cat “D” The TC may be legally transitioned as per one of the following conditions:
  - To the TC status it held prior to being assigned to Cat “D”. The effective date in this case is the same as at the previous TC Cat, but the available date is set to the current date. All other fields are populated with current information
  - To a TC status “higher” than previous TC status as long as the rules 5, 6 or 7 as outlined above are respected
  - To a TC status “lower” than previous TC status with immediate effect.
  - To TC Cat “N” with immediate effect. All other information is cleared.

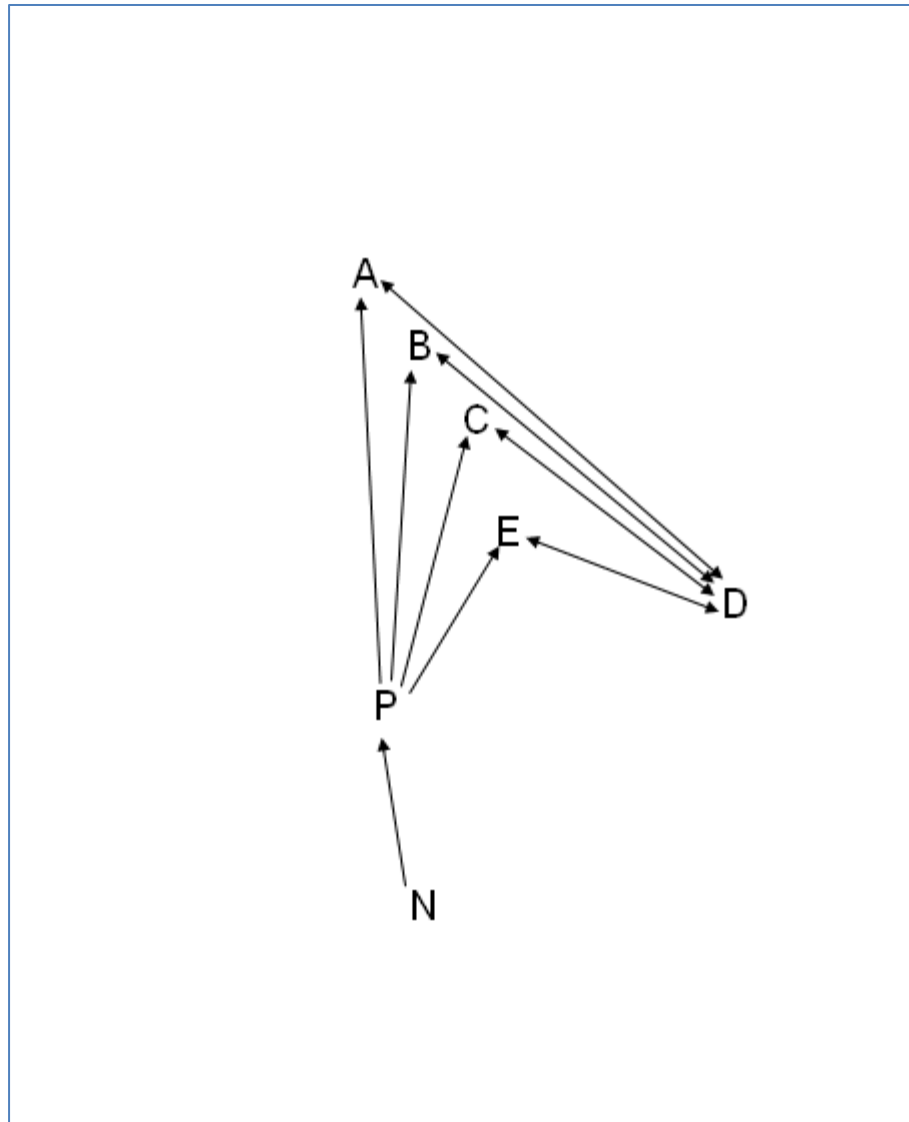


Figure 5.1 - Test Case Transitions

### 5.2.5 Test Case Validation Challenge Process

It is not the responsibility of the MulteFire Alliance or the ATL to debug and root-cause failures in products submitted for certification. ATLs may offer debug, root cause analysis or other services but negotiation of these services is strictly between the ATL and the vendor. The MulteFire Alliance is responsible to investigate challenges to its test methods and procedures but vendors must provide adequate supporting evidence to the challenge. Challenging a Test Case for the purpose of debugging a failure is not permitted.

Supporting evidence must include:

- identification of the Test Case
- identification of the test tool versions and/or test procedure versions
- identification of hardware and software involved
- description of the failure
- steps to reproduce the failure

- full and complete explanation of the challenge including references to supporting documentation
- description of the expected result from the product's perspective

Additional supporting evidence may be required. Supporting evidence may include, but is not limited to:

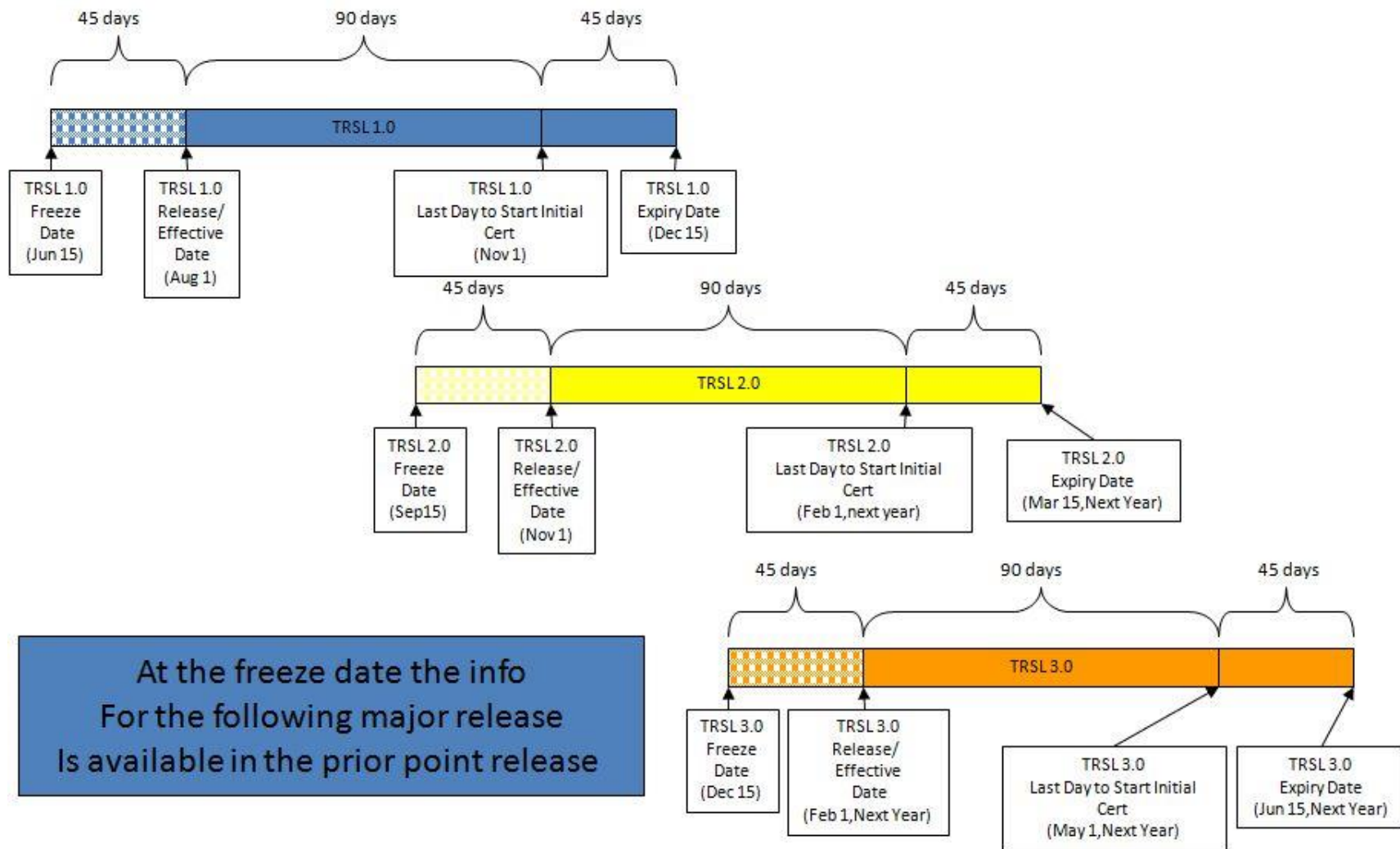
- test logs of the failure
- traces of the failure
- samples of the product exhibiting the failures being challenged

Assessment of the challenges will have one of three possible outcomes:

- The Test Case is downgraded. This means the challenge is valid and the test case is taken out of service until it can be corrected and revalidated.
- The challenge is denied. The product is the source of failure and corrective actions may be required.
- The challenge is conditionally approved. The Test Case is valid for certain hardware or software implementations and not for others. Improvements in the wireless charging test or procedure may be needed to eliminate false failures. Whether the product that is challenging the test is granted a pass depends on the implementation and is decided by the CA.

#### **5.2.6 TRSL Release Schedule**

Dates shown in the schedule are for example purposes only. Actual dates to be determined and communicated to the MulteFire Alliance membership. In general, releases will be targeted on a quarterly cycle.



### **5.3 Interoperability Device List (IDL) Management Process**

The Certification Authority shall manage the Interoperability Device List (IDL). The list shall contain terminals and base stations that have successfully completed certification and whose vendors have granted permission for use in the Certification Program, Authorized Test Laboratories shall be responsible for securing samples from the list for use in their testing. ATLs should maintain sufficient device diversity as determined by the CA.

#### **5.3.1 Interoperability Devices**

Vendors of devices included in the Interoperability Device List (IDL) agree to make sufficient quantities available to MulteFire Alliance Authorized Test Labs under reasonable commercial and delivery terms for use in performing interoperability testing – at least three (3) unique devices per test lab. Once the Certification Authority assigns IDL status to a device, the vendor shall have 30 days to deliver the IDL devices to each of the ATLs. If the vendor is unable to provide sufficient quantities or meet the delivery terms, the Certification Authority, at their discretion, may remove the device from the Interoperability Device List.

#### **5.3.2 Establishment of Initial Interoperability Device List (IDL) for New Specification Release**

Where a new release of a specification requires the identification of IDL devices interoperable to that release, the MulteFire Alliance CWG designates a plugfest event, as defined in Section 5.6 of this document, to support this activity. The same criteria used to determine compliance with the relevant Interoperability Test Specification shall be used in the evaluation of candidate devices for the IDL in these cases. The CA shall administer this process specifically, in addition to the activities defined in Section 4.1.6. All candidate devices which are tested and successfully meet the interoperability criteria as documented by the relevant test specifications are offered the opportunity to be listed in the IDL. Analysis of any failures encountered during this event will be performed and will be considered by the CA in assessing the suitability of a device for listing in the IDL. The vendor of the candidate product has final right of refusal regarding their listing in the IDL.

It is expected that all devices selected for inclusion in the IDL by this method shall complete the full MulteFire Alliance certification as quickly as possible, but in no case more than 45 days. Any device which is later withdrawn or does not complete certification will be removed from the IDL.

#### **5.3.3 IDL Sunset Requirements**

In order to manage the breath of IDLs that each ATL needs to maintain over time, the Certification Authority shall have the discretion to direct ATLs to remove IDL devices from their IDL testing inventory. While specific expiration periods are not defined, it is envisioned that different sunset periods will be administered based on type of IDL device, for example:

- 2-3 years for consumer electronics (CE) devices, and
- 5-7 years for installed infrastructure devices.

## **5.4 Appeals, Complaints and Disputes**

The procedures of this section are to be used when all other avenues for resolution of any dispute have been exhausted. These processes should not be undertaken without seeking less formal conflict resolution.

### **5.4.1 Appeals**

Any decision of the Certification Working Group (CWG), the Certification Authority (CA), or any other entity is always open for appeal. A member company which has exhausted all available avenues for resolution of an issue with a decision made by the Certification Authority may appeal that decision. The process to file an appeal to notify the MulteFire Alliance Certification Working Group Chairman via the e-mail contact info on the MulteFire Alliance Members Website.

An appeal shall include contact information, a description of the issue, any supporting evidence for the appeal and the desired outcome from the appellant. The CWG Chairman notifies the MulteFire Alliance Executive Committee that an appeal has been formally filed and requests the Executive Committee hear the appeal. The MulteFire Alliance Executive Committee resolution of the appeal can only be appealed to the MulteFire Board of Directors. If needed, the Board of Directors decision is final, and their ruling is final.

### **5.4.2 Complaints**

In situations where the CA or CWG are not following the letter or spirit of this Program Management Document, it may be necessary for a member company to seek recourse with the MulteFire Alliance. In this situation a formal complaint may be registered with the MulteFire Alliance.

Complaints are not necessarily about a certification decision that the CA has made, but may reflect concerns about the CA's service level or their administration of the policies documented in this PMD.

A compliant shall include contact information and a description of the issue. The CWG Chairman notifies the MulteFire Alliance Executive Committee that a complaint has been formally filed and begins review of the issue.

### **5.4.3 Disputes**

All members of the MulteFire Alliance have a responsibility to ensure that those products that claim to be certified live up to the letter and the spirit of the Certification Process. In light of this responsibility, any member may challenge the claim of certification of any product.

When a vendor determines that they wish to initiate a challenge, they will notify the CA.

If the challenge to the certification status is founded, upon review of the test results then the vendor of the challenged product is responsible for the testing expenses. If the challenge



is determined to be unfounded after review of the test results, the challenging company is responsible for the test fees incurred as a result of the process.

If the case of a successful challenge the responsible vendor will have a reasonable amount of time to make corrective actions on the product and submit for consideration under the Engineering Change Order process as outlined in Section 4.8.

## **5.5 Logo Use**

After the appropriate MulteFire Alliance agreements are signed and the CA awards certification to a specific product, the manufacturer is allowed to use the MulteFire Alliance Certification Logo on the certified product. The MulteFire Alliance trademark guidelines provide further details.

Digital files for preproduction of the logo will be supplied to manufacturers upon request.

### **5.5.1 Use of the MulteFire Alliance Certification Logo**

Manufacturers must sign and return a copy of the appropriate legal agreements before using the MulteFire Alliance Certification Logo on certified products. The logo may be used as long as the product maintains its MulteFire Alliance Certified status.

The MulteFire Alliance Certification Logo may be used in manufacturer's marketing material. The MulteFire Alliance Certification Logo is not transferable to another product.

### **5.5.2 Labeling of Certified Products**

Use of the logo is governed by the MulteFire Alliance Certified Logo Usage Guidelines [REF].

## **5.6 PlugFests**

PlugFests are periodic, MulteFire Alliance-sponsored events at which product vendors come together to evaluate their products for interoperability and conformance. These events are typically scheduled to support changing test requirements or new version of the specification and the associated test tools and product implementations. PlugFests are typically located at ATL or candidate ATL facilities. If designated in advance, these events may also support other related activities. These may include:

- evaluation of new test cases and methods
- generating performance metrics as agreed

PlugFests, however, may be scheduled at any time as deemed necessary by the MulteFire Alliance.

A key element of a PlugFest is Interoperability Testing. MulteFire Alliance provides an environment for vendors to evaluate interoperability of their products with complimentary implementations. MulteFire Alliance fully expects that vendors who experience interoperability issues will seek solutions which address the root cause of the issue.

Participation in PlugFests is restricted to members in good standing of the MulteFire Alliance. Non-members may not participate in PlugFests.

#### **5.6.1 Logistics**

The selection of the venue for PlugFests is determined by ease of access for all visitors and suitability for the purposes of testing products and discussing results. Facilities will include accommodation for meals and breaks as well as sufficient power and open internet access. Facilities will also make available reasonable arrangements for security and privacy for participants and their products.

PlugFests will be planned within MulteFire Alliance and communicated via e-mail and meetings. Information will also be maintained on the MulteFire Alliance website. The length of the event is determined by the number of participants.

PlugFests are open to all MulteFire Alliance member companies. PlugFest registration will be announced and a cut-off date for declaring participation in the event will be set. After the cut-off date additional participants may be added at the discretion of the MulteFire Alliance staff. There may be a nominal fee associated with participation in the PlugFest to offset venue and catering costs. The fee will be announced as part of the registration for the event.

#### **5.6.2 Ground Rules**

PlugFests are scheduled to allow for member companies to evaluate their products readiness for Certification and to perform interoperability testing in a single setting. The following principles apply:

- PlugFests are not an alternative path to receive product Certification. Product Certification testing must be completed at an ATL.
- The CA, CWG Chair and MulteFire Alliance Administrative Staff will coordinate PlugFest scheduling.
- The list of participating companies will be shared approximately one month prior to the event with the registered PlugFest participants.
- To participate in the PlugFest, the participant must have a product to test, be a test lab supporting the testing activities or a test equipment vendor with a recognized MulteFire test platform.
- All participants are expected to conduct themselves professionally and with respect for the private information of all involved.
- All parties are expected to conduct themselves in an ethical manner with the integrity befitting a member of the MulteFire Alliance. Breaches of behavioural ethics will be investigated vigorously and offending individuals or member companies may be removed from participation in current and future PlugFest.
- The minimum participation threshold for holding a PlugFest is determined by the coordinators of the PlugFest and communicated to the membership of MulteFire Alliance
- Participating companies are expected to provide sufficient support personnel to facilitate their testing, but should limit their participation in a reasonable way. The

target participation should be 2 to 4 persons per product, but at least one unique person must be designated to support each product.

- Participating companies are responsible for providing all necessary support equipment for the PlugFest. Specific equipment requirements (if any) are communicated via the PlugFest registration website, teleconferences and e-mail communication.

Vendors participating in the plugfest must be members of MulteFire Alliance in good standing. Each individual that participates in the event must also complete a PlugFest Rules of Engagement form prior to the start of the event. This form will be distributed to PlugFest participants prior to the event and must be collected no later than the start of the event.

#### **5.6.3 Non-Disclosure Agreements (NDAs)**

The MulteFire Alliance will provide each participating company with a copy of the PlugFest NDA. Each company must complete, sign and return the NDA prior to being permitted to participate in the PlugFest. The PlugFest NDA will be distributed to the participating companies prior to the event. A copy of the NDA is available from the PlugFest coordinator or the MulteFire Alliance Administrative Staff.

#### **5.6.4 Goals and Outcomes**

The goals of PlugFest events include:

- Provide an opportunity for MulteFire Alliance end products to test conformance and interoperability in an MulteFire Alliance-sanctioned manner.
- Provide an environment to evaluate the suitability of Test Equipment Vendor solutions.
- Provide an opportunity for providing training to Authorized Test Lab personnel on the MulteFire Alliance technologies and the testing methodologies.
- Review and provide feedback on technology specifications, and to identify any systematic interoperability issues.
- Additional goals may be defined and agreed as necessary.

### **5.7 Launching Certification for New Specification Versions**

The MulteFire Alliance will, as necessary, issue new versions of its functional specifications. As a result, the MulteFire Alliance may determine that it will launch an updated version of its Certification Program.

### **5.8 Retirement of Old Specification Version (Sunsetting)**

The MulteFire Alliance will, as necessary, determine that an existing version of its functional specification is no longer viable and should be taken out of service for product development and certification. As a result the MulteFire Alliance may determine when the specification is to be taken out of service.

## 5.9 Certification Reference Number (CRN) Assignment

The purpose of the CRN is to identify, track, and to query information related to a MulteFire Alliance certified product. During product certification, the CRN is the project tracking number. Each CRN is unique and never re-issued. The CRN is a twelve-digit alphanumeric code with the following structure:

CRNyy#####

where:

CRN	CRN identifier
yy	identifies the least significant digits of the year of issue
#####	sequential seven digit serial number within the year of issue

The CRN is assigned when the MulteFire Alliance Member requests certification and the same number is used on the final Certification Certificate. However, since some products may not complete the certification process, the CRNs on the Certification Certificates may not be sequential.

### 5.9.1 CRN Process

Product vendors who are MulteFire Alliance Members that wish to certify their product shall request a CRN. The request shall be made with sufficient lead-time to allow the incorporation of the CRN into their devices during the manufacturing process. The MulteFire Alliance Member website provides the method to obtain a CRN.

A product vendor must supply the following information when applying for a CRN:

- Product vendor name.
- Product model number.
- Device type; Terminal, Base Station, Building Block.
- Product description.
- Vendor contact information.
- Optional additional information as requested by the MulteFire Alliance.

The MulteFire Alliance will respond to the vendor with a document that includes the submitted information and an assigned CRN. The product vendor may update the additional information at any time prior to submission to the Certification Authority. Each time a vendor submits a product for certification, a new CRN is required.

MulteFire Alliance Members that wish to utilize extend the certification of a parent device (See Section 4.7) shall request a unique CRN. The family device members CRN Compliance Folder shall be included in the base model Compliance Folder.

## **APPENDICES**

## Appendix A - Certification Check List

- Application Form
- Initial communication with Certification Authority
- Identification of Authorized Test Lab
- Business Arrangements/Contract with Authorized Test Lab
- Secure Samples (at least two)
  - Additional samples may expedite testing
- Samples HW/SW/FW information is same as on application form
- Secure supporting equipment for operation of samples (i.e. batteries, charger, cables, documentation, etc.)
- Set of operating instructions
- ICS
- IXIT

## Appendix B - Application for Certification

Company: \_\_\_\_\_

Contact Name: \_\_\_\_\_

Contact e-mail: \_\_\_\_\_

Contact Address: \_\_\_\_\_

Contact Phone: \_\_\_\_\_

Product Name/Model: \_\_\_\_\_

Product Software/Firmware Version: \_\_\_\_\_

Product Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date of Submission: \_\_\_\_\_

Date of expected start of testing: \_\_\_\_\_

Preferred ATL: \_\_\_\_\_

Device Type:

If the product uses certified building blocks or wishes to reuse results from an already certified/tested product, provide a description of the sub-assembly/building block and identify the source certified/tested product(s). Include any potential differences, changes or other factors that may impact the definition of needed regression testing:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Additional information: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## **Appendix C - Application for ECO**

### Contact Information

Company Name:

Contact Name:

Contact Email:

Preferred ATL: \_\_\_\_\_

### Base Certified Product Information

Product Name:

Product Model:

Product Revision:

### Updated Product Information

Product Name:

Product Model:

Product Revision:

### Description of Changes:

(Please provide a detailed description of the changes being made to the Base Certified Product.)

Additional questions will be included on the web-based submission tool.



## Appendix D - Authorized Test Lab Application Form

Applicant Labs shall supply the following information:

- Laboratory Name and Location
- URL for Laboratory Location (if any)
- Primary Point of Contact
  - Name
  - Phone
  - E-mail
  - Mailing Address
- Background Information of Laboratory
  - Date Established
  - Physical location(s) of Test Facility
  - Photo(s) of testing area
  - Floor plan of testing area
- Functional Organizational Chart of Laboratory
- CV or Resume of those individuals responsible for providing service to the MulteFire Alliance Certification Program
- Explanation of business or testing arrangements with other laboratories
- Elaboration on any potential conflicts of interest – demonstration of independence from commercial or other influence on objectivity
- List of other consumer electronics technologies supported
- List of accreditations and industry association recognitions
- Statement of support for the MulteFire Alliance technology
- Complete the MulteFire Alliance Company Info Form
- Complete Authorized Test Lab Agreement document
- Arrange with your laboratory's Accreditation Body for a timely scope expansion to include the MulteFire Alliance Specifications.
- Interest to support test case validation activities.

## **Appendix E – MulteFire Test Specifications**

- MulteFire RF Conformance Test Specifications
  - In development
- MulteFire Protocol Test Specifications
  - In development
- MulteFire Interoperability Test Specifications
  - MFA TS MF.501 – MulteFire Alliance Interoperability Test Specification

APPROVED