LoRa Alliance™ Certification update
LoRaWAN® Live

Derek Hunt – Certification Committee Chairman

LoRaWAN®

Creating Valuable IoT Connections

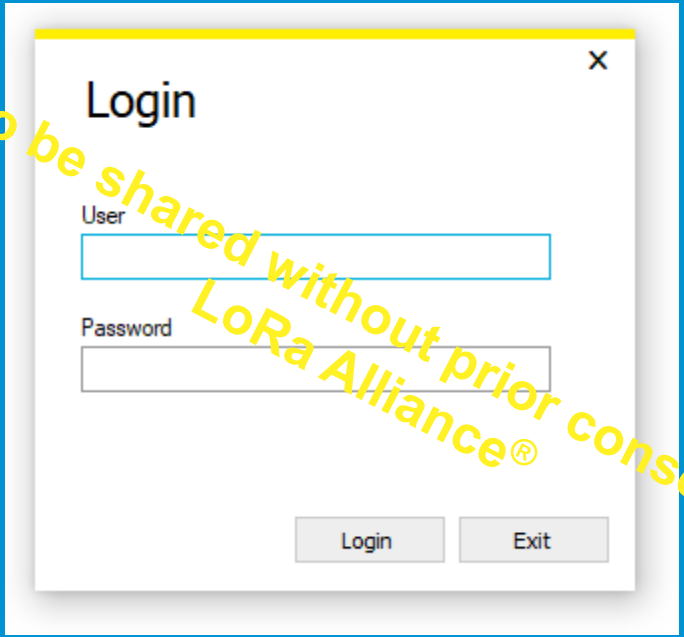
Topics

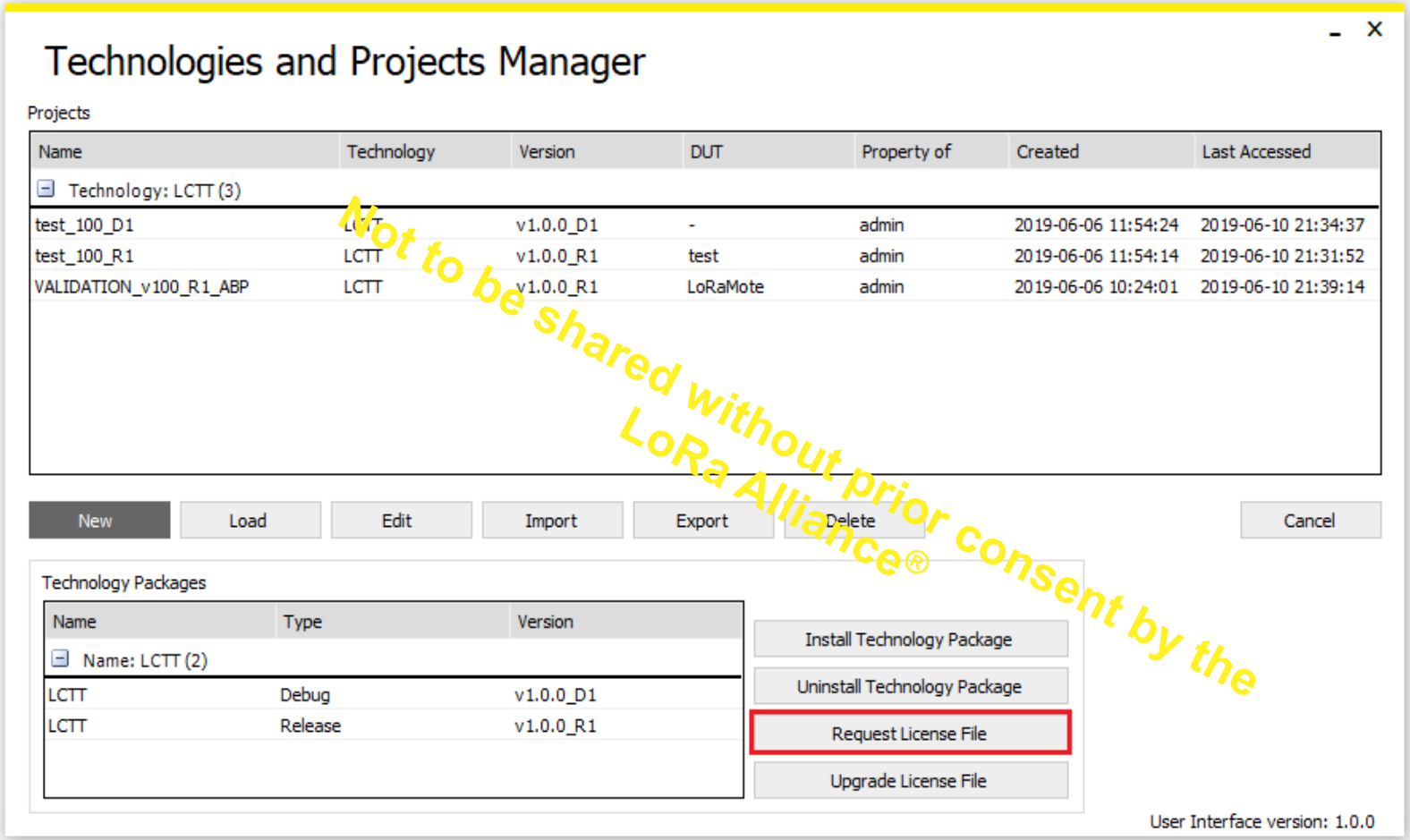
- LoRaWAN® Certification Test Tool Now Available (LCTT)
- Collective LoRaWAN® Device Qualification Program (CLDQP)
- Enhancements of Interoperability test
- Mandating RF testing
- New LoRaWAN1.0.4

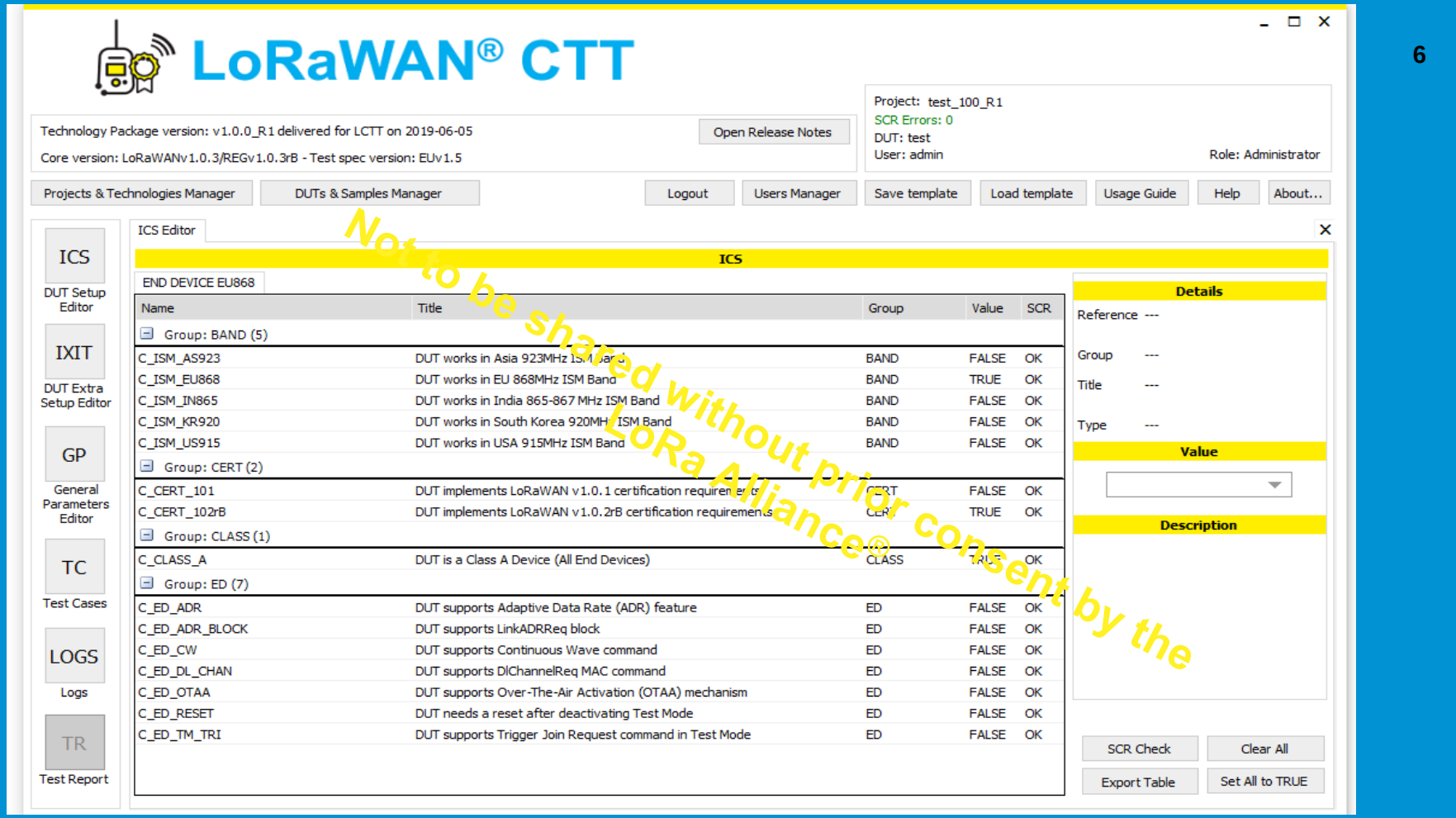
LoRaWAN® Certification Test Tool Now Available (LCTT)

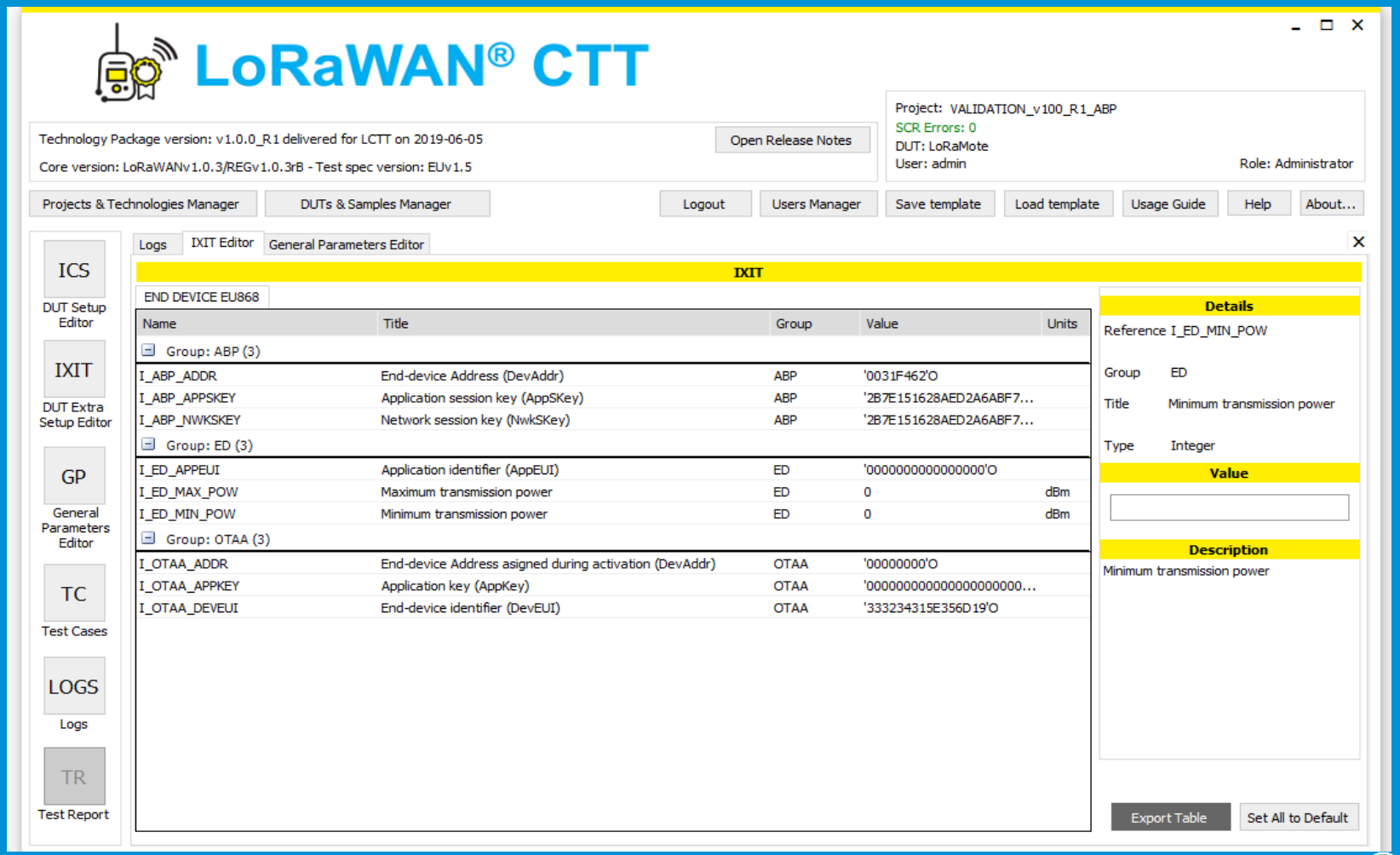
- LoRa Alliance™ is Developing the LCTT for all LoRa Alliance device manufactures to pre-test their device before sending it the Authorised test Houses (ATHs) for the LoRaWAN® Certification testing .
  - It will accelerate the certification process
  - Provide significant benefit to LoRa Alliance members
  - Will save time and money allowing devices to debug and design finalize prior to starting the formal certification process
- The LCTT is a precertification and regression testing tool
  - Used at a device manufacturer's own facility
  - Will enable manufactures to prove the design a device design before shipping it for formal certification testing.
  - The LCTT will have a precertification mode and a debug mode
  - Initial release this week for testing in specific regions,
  - With full global availability of LCTT and final release September 2019.
  - Test tool which will run on a local PC and LoRaWAN Gateway connection for Licence etc. via a central server
- The LCTT will also be made available to the ATHs if they wish to use it instead of their own test harness.
- DEKRA selected as vendor of LCTT and the tool is based on their LoRaWAN Certification test harness which is already approved for LoRaWAN Certifications.

LCTT Screen shots






LoRaWAN® CTT
Technology Package version: v1.0.0_R1 delivered for LCTT on 2019-06-05
Core version: LoRaWANv1.0.3/REGv1.0.3rB - Test spec version: EUv1.5
Open Release Notes
Project: test_100_R1
SCR Errors: 0
DUT: test
User: admin
Role: Administrator
Projects & Technologies Manager
DUTs & Samples Manager
Logout
Users Manager
Save template
Load template
Usage Guide
Help
About...
ICS
DUT Setup Editor
IXIT
DUT Extra Setup Editor
GP
General Parameters Editor
TC
Test Cases
LOGS
Logs
TR
Test Report
ICS Editor
ICS
END DEVICE EU868
Name
Title
Group
Value
SCR
Group: BAND (5)
C_ISM_AS923
DUT works in Asia 923MHz ISM Band
BAND
FALSE
OK
C_ISM_EU868
DUT works in EU 868MHz ISM Band
BAND
TRUE
OK
C_ISM_IN865
DUT works in India 865-867 MHz ISM Band
BAND
FALSE
OK
C_ISM_KR920
DUT works in South Korea 920MHz ISM Band
BAND
FALSE
OK
C_ISM_US915
DUT works in USA 915MHz ISM Band
BAND
FALSE
OK
Group: CERT (2)
C_CERT_101
DUT implements LoRaWAN v1.0.1 certification requirements
CERT
FALSE
OK
C_CERT_102rB
DUT implements LoRaWAN v1.0.2rB certification requirements
CERT
TRUE
OK
Group: CLASS (1)
C_CLASS_A
DUT is a Class A Device (All End Devices)
CLASS
TRUE
OK
Group: ED (7)
C_ED_ADR
DUT supports Adaptive Data Rate (ADR) feature
ED
FALSE
OK
C_ED_ADR_BLOCK
DUT supports LinkADRReq block
ED
FALSE
OK
C_ED_CW
DUT supports Continuous Wave command
ED
FALSE
OK
C_ED_DL_CHAN
DUT supports DlChannelReq MAC command
ED
FALSE
OK
C_ED_OTAA
DUT supports Over-The-Air Activation (OTAA) mechanism
ED
FALSE
OK
C_ED_RESET
DUT needs a reset after deactivating Test Mode
ED
FALSE
OK
C_ED_TM_TRI
DUT supports Trigger Join Request command in Test Mode
ED
FALSE
OK
Details
Reference ---
Group ---
Title ---
Type ---
Value
Description
SCR Check
Clear All
Export Table
Set All to TRUE
Not to be shared without prior consent by the LoRa Alliance®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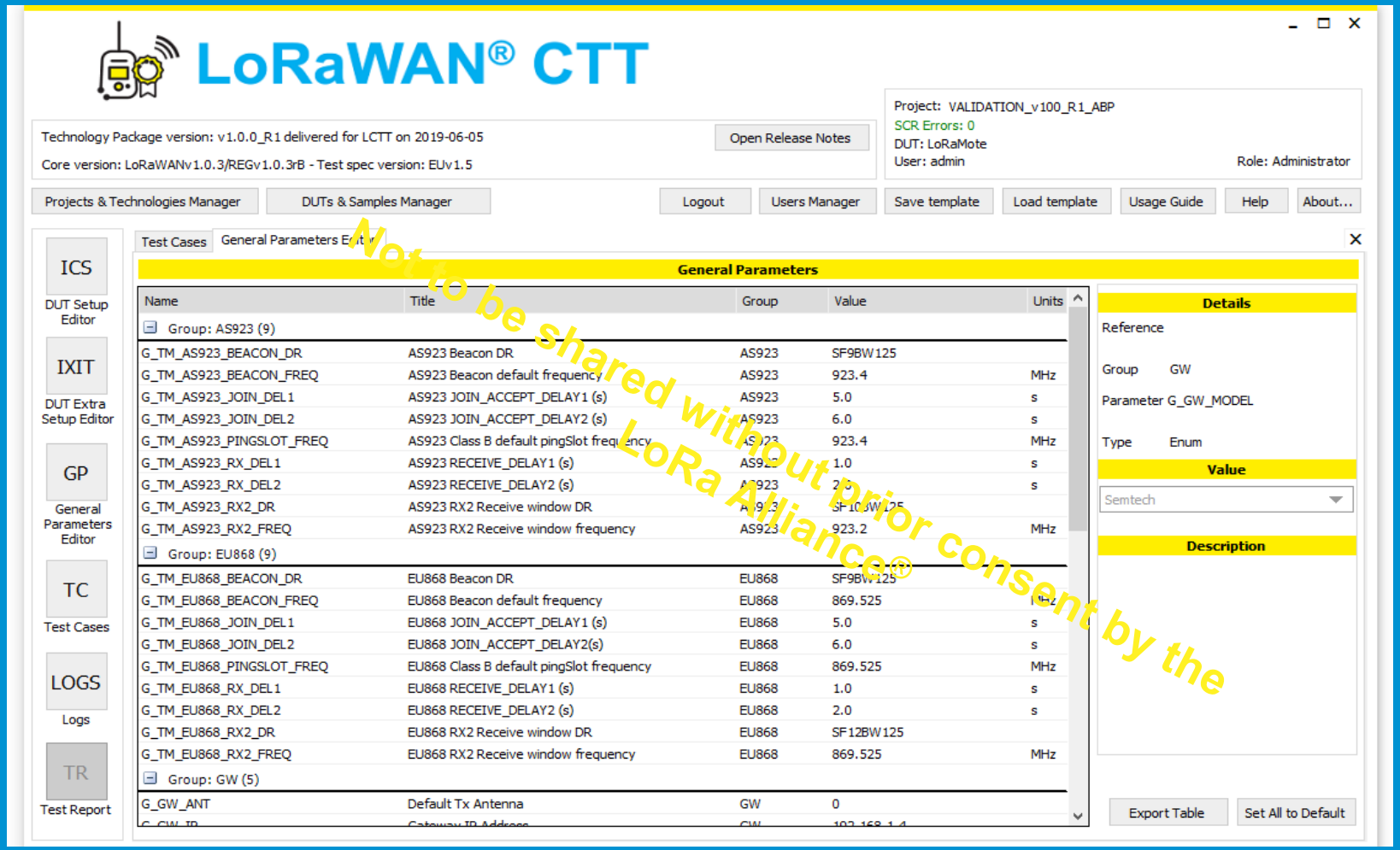
Open Release Notes
Project: VALIDATION_v100_R1_ABP
SCR Errors: 0
DUT: LoRaMote
User: admin
Role: Administrator
Projects & Technologies Manager
DUTs & Samples Manager
Logout
Users Manager
Save template
Load template
Usage Guide
Help
About...
ICS
DUT Setup Editor
IXIT
DUT Extra Setup Editor
GP
General Parameters Editor
TC
Test Cases
LOGS
Logs
TR
Test Report
Logs
IXIT Editor
General Parameters Editor
IXIT
END DEVICE EU868
Name
Title
Group
Value
Units
Group: ABP (3)
I_ABP_ADDR
End-device Address (DevAddr)
ABP
'0031F462'O
I_ABP_APPSKEY
Application session key (AppSKey)
ABP
'2B7E151628AED2A6ABF7...
I_ABP_NWKSKEY
Network session key (NwkSKey)
ABP
'2B7E151628AED2A6ABF7...
Group: ED (3)
I_ED_APPEUI
Application identifier (AppEUI)
ED
'0000000000000000'O
I_ED_MAX_POW
Maximum transmission power
ED
0
dBm
I_ED_MIN_POW
Minimum transmission power
ED
0
dBm
Group: OTAA (3)
I_OTAA_ADDR
End-device Address asigned during activation (DevAddr)
OTAA
'00000000'O
I_OTAA_APPKEY
Application key (AppKey)
OTAA
'00000000000000000000...
I_OTAA_DEVEUI
End-device identifier (DevEUI)
OTAA
'333234315E356D19'O
Details
Reference I_ED_MIN_POW
Group ED
Title Minimum transmission power
Type Integer
Value
Description
Minimum transmission power
Export Table
Set All to Default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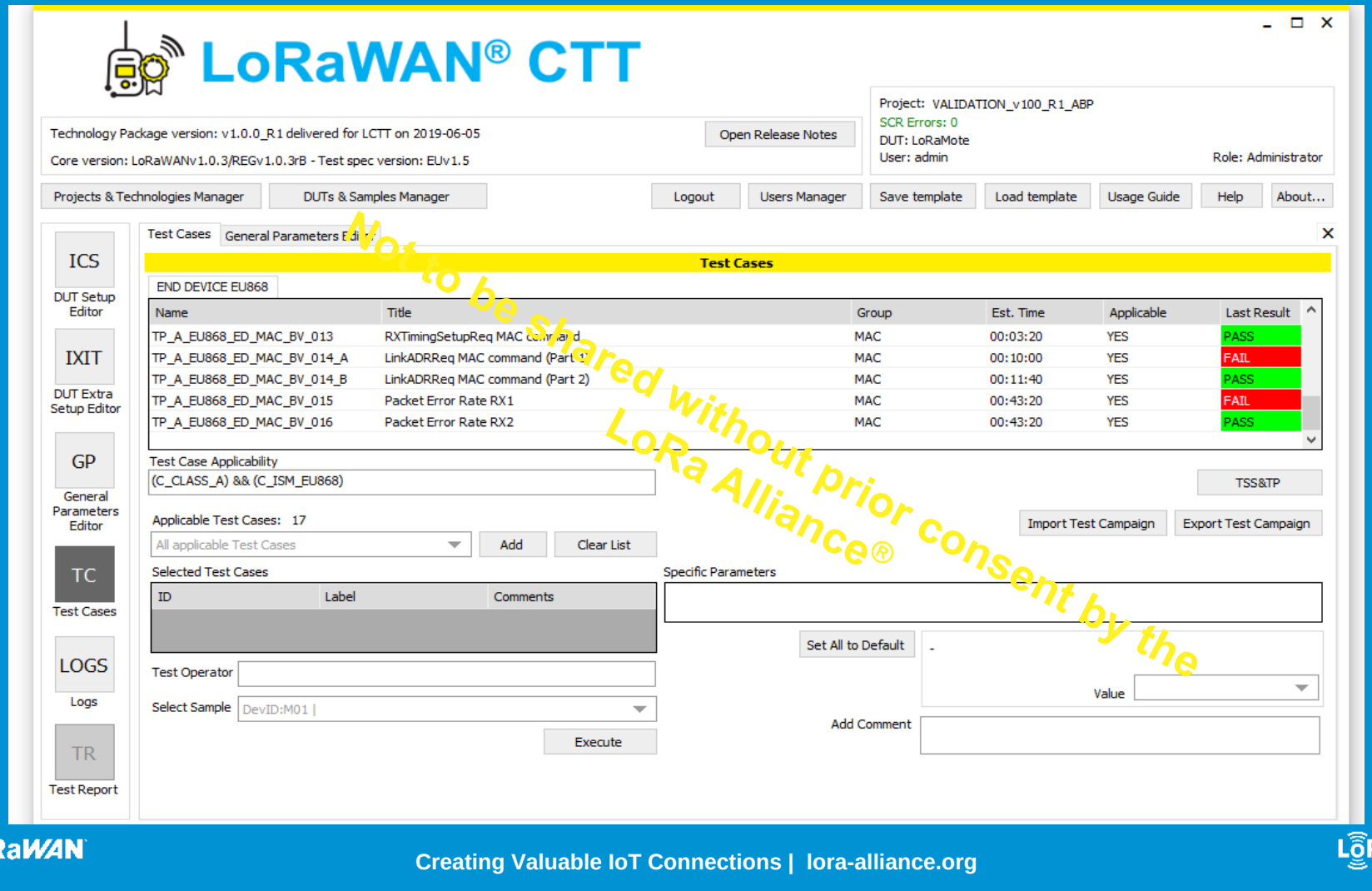
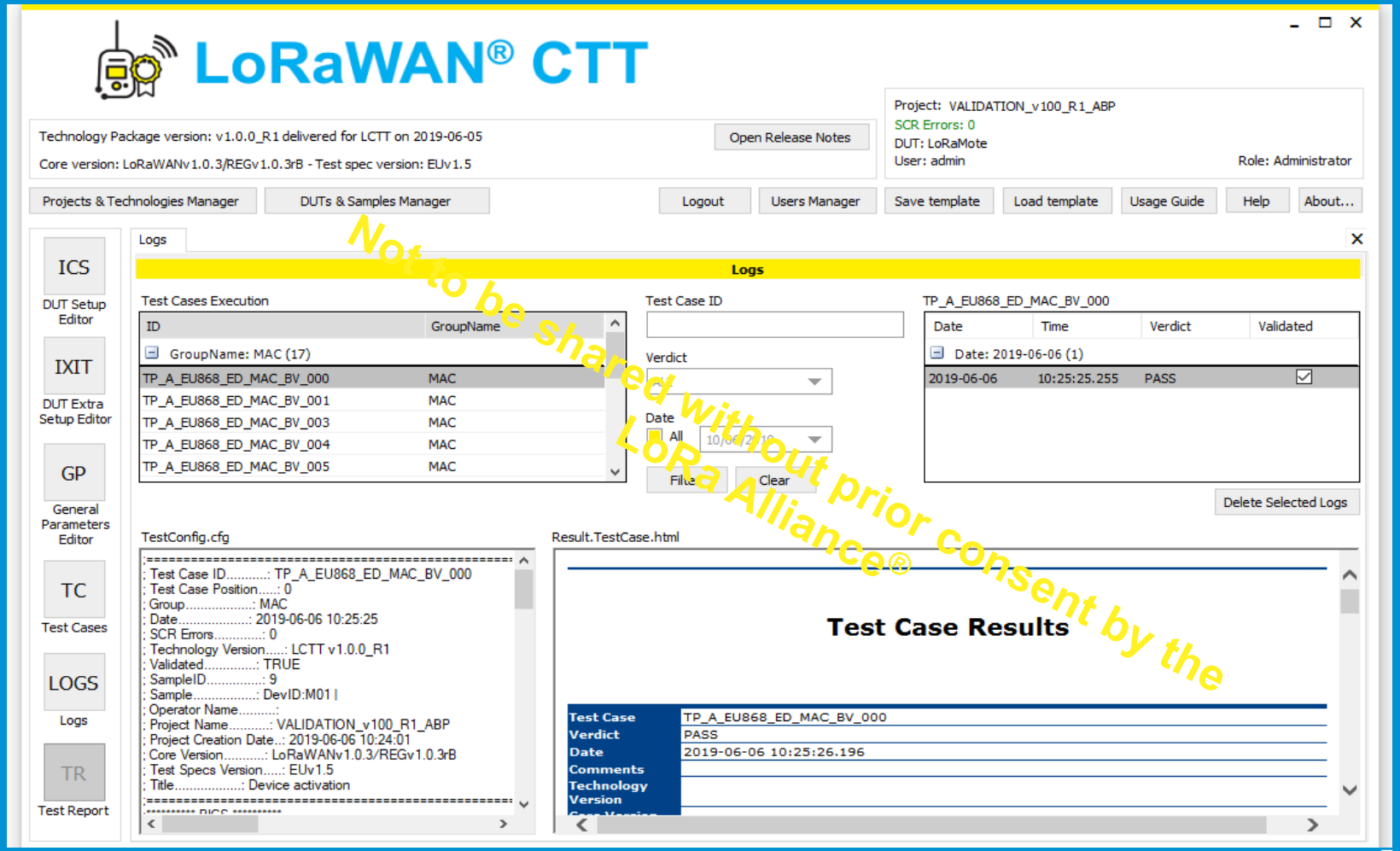
GP
General Parameters Editor
TC
Test Cases
LOGS
Logs
TR
Test Report
Test Cases
General Parameters Editor
General Parameters
Name
Title
Group
Value
Units
Group: AS923 (9)
G_TM_AS923_BEACON_DR
AS923 Beacon DR
AS923
SF9BW125
G_TM_AS923_BEACON_FREQ
AS923 Beacon default frequency
AS923
923.4
MHz
G_TM_AS923_JOIN_DEL1
AS923 JOIN_ACCEPT_DELAY1 (s)
AS923
5.0
s
G_TM_AS923_JOIN_DEL2
AS923 JOIN_ACCEPT_DELAY2 (s)
AS923
6.0
s
G_TM_AS923_PINGSLOT_FREQ
AS923 Class B default pingSlot frequency
AS923
923.4
MHz
G_TM_AS923_RX_DEL1
AS923 RECEIVE_DELAY1 (s)
AS923
1.0
s
G_TM_AS923_RX_DEL2
AS923 RECEIVE_DELAY2 (s)
AS923
2.0
s
G_TM_AS923_RX2_DR
AS923 RX2 Receive window DR
AS923
SF10BW125
G_TM_AS923_RX2_FREQ
AS923 RX2 Receive window frequency
AS923
923.2
MHz
Group: EU868 (9)
G_TM_EU868_BEACON_DR
EU868 Beacon DR
EU868
SF9BW125
G_TM_EU868_BEACON_FREQ
EU868 Beacon default frequency
EU868
869.525
MHz
G_TM_EU868_JOIN_DEL1
EU868 JOIN_ACCEPT_DELAY1 (s)
EU868
5.0
s
G_TM_EU868_JOIN_DEL2
EU868 JOIN_ACCEPT_DELAY2(s)
EU868
6.0
s
G_TM_EU868_PINGSLOT_FREQ
EU868 Class B default pingSlot frequency
EU868
869.525
MHz
G_TM_EU868_RX_DEL1
EU868 RECEIVE_DELAY1 (s)
EU868
1.0
s
G_TM_EU868_RX_DEL2
EU868 RECEIVE_DELAY2 (s)
EU868
2.0
s
G_TM_EU868_RX2_DR
EU868 RX2 Receive window DR
EU868
SF12BW125
G_TM_EU868_RX2_FREQ
EU868 RX2 Receive window frequency
EU868
869.525
MHz
Group: GW (5)
G_GW_ANT
Default Tx Antenna
GW
0
Details
Reference
Group GW
Parameter G_GW_MODEL
Type Enum
Value
Semtech
Description
Export Table
Set All to Default
Not to be shared without prior consent by the LoRa Alliance®





TP_A_EU868_ED_MAC_BV_000 Report

Generated
20190606 10:25:54 UTC+02:00
4 days 11 hours ago

Summary Information

Status:	All tests passed
Documentation:	TP_A_EU868_ED_MAC_BV_000 - Device activation Enter test mode
Start Time:	20190606 10:25:25.888
End Time:	20190606 10:25:54.778
Elapsed Time:	00:00:28.890
Log File:	log.html

Test Statistics

Total Statistics	Total	Pass	Fail	Elapsed	Pass / Fail
Critical Tests	3	3	0	00:00:27	
All Tests	3	3	0	00:00:27	

Statistics by Tag	Total	Pass	Fail	Elapsed	Pass / Fail
Step 01 - Device activation	1	1	0	00:00:00	
Step 02 - Test mode activation	1	1	0	00:00:17	
Step 03 - Test mode deactivation	1	1	0	00:00:11	

Statistics by Suite	Total	Pass	Fail	Elapsed	Pass / Fail
TP_A_EU868_ED_MAC_BV_000	3	3	0	00:00:29	

Test Details

Totals | Tags | Suites | Search

Type:
- Critical Tests
- All Tests

Statistics by Suite	Total	Pass	Fail	Elapsed	Pass / Fail
TP_A_EU868_ED_MAC_BV_000	3	3	0	00:00:29	

REPORT

Log level: INFO

Test Execution Log

SUITE TP_A_EU868_ED_MAC_BV_000 — 00:00:28.890

Full Name: TP_A_EU868_ED_MAC_BV_000

Documentation: TP_A_EU868_ED_MAC_BV_000 - Device activation

Enter test mode

Source: C:\Program Files (x86)\LoRaAlliance\LCTT\Technologies\LCTT\v1.0.0_R1\Content\tests\EU868\TP_A_EU868_ED_MAC_BV_000.robot

Start / End / Elapsed: 20190606 10:25:25.888 / 20190606 10:25:54.778 / 00:00:28.890

Status: 3 critical test, 3 passed, 0 failed
3 test total, 3 passed, 0 failed

- SETUP Setup. Test Suite Init — 00:00:01.112
- TEARDOWN Setup. Test Suite End — 00:00:00.010
- TEST Device activation — 00:00:00.065

  Full Name: TP_A_EU868_ED_MAC_BV_000.Device activation

  Documentation: Device activation process

  Tags: Step 01 - Device activation

  Timeout: 2 minutes

  Start / End / Elapsed: 20190606 10:25:27.307 / 20190606 10:25:27.372 / 00:00:00.065

  Status: PASS (critical)

  - SETUP Setup. Test Step Init — 00:00:00.011
  - KEYWORD DeviceActivation. DUT activation process — 00:00:00.036
  - TEARDOWN Setup. Test Step End — 00:00:00.016
- TEST Test mode activation — 00:00:16.563
- TEST Test mode deactivation — 00:00:10.831

LCTT Tool

- The LCTT will be accessible to download via link on LoRa Alliance certification web page at :

https://lora-alliance.org/lorawan-certification

- Bugzilla tracking system being set up to record any issues with the tool.

Collective LoRaWAN® Device Qualification Program (CLDQP)

- A significant group of Public Network Operators have collaborated to roll-out the “Collective LoRaWAN® Device Qualification Program”
  - This will support manufacturers
  - Ensure that devices work as intended
  - Significantly simplify and speed up the process required to devices connected to their networks.

Collective LoRaWAN® Device Qualification Program (CLDQP)

- Why have they announced this?
  - Issues have been encountered with devices not complying to the LoRaWAN® protocols and with RF performance. Both are crucial for successful IoT deployments.
- What does it mean ?
  - Instead of each network operator having their own device testing, they have agreed to use a common qualification process to approve the installation of LoRaWAN® devices onto their networks
- What is the process ?
  - The network operators have mandated that for any device to be accepted onto their networks it must already be :
    - LoRaWAN Certified™ through the LoRa Alliance certification program using a LoRaWAN version 1.0.1 or newer (test mode and continuous wave mode must be supported)
    - Interoperability tested using the actual functionality on the device during real network operation (using the App S/W)
    - RF Performance tested using the guidelines defined by the LoRa Alliance

Enhanced certification program to include Interoperability test

- Why enhance the certification program ?
  - Current LA Certification tests concentrates full protocol testing of the LoRaWAN® Specification (using the using the Certification Test Application S/W).
  - Operators have seen issues when the device is using the application software during real network operations that is not always picked up by the current Certification tests and this is the focus on the Interoperability tests that have been identified.
  - The operators do not want to do this additional interoperability testing of the devices before allowing them onto their networks.
  - Device manufactures will not need to wait for their device to be tested on every network before freezing their design.
- What going to change ?
  - Enhance the existing LA Certification tests to include the additional tests that the operators are currently doing so that they do not need to do them.
  - Include some Interoperability tests are going to be run using only the Device Application S/W.
  - The Certification Committee is currently incorporating the tests that are performed by the operators into the Certification program

New LoRa Alliance™ Certification test stages:

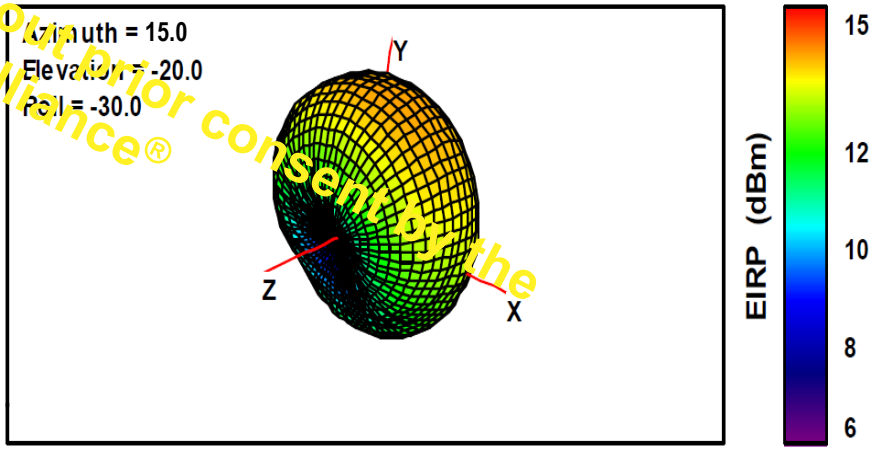
1. Pre-test by device Manufactures at their own locations using the LCTT.
2. Conformance tests Enhanced and run at Authorised test Houses (ATHs)
   - Full protocol testing (using the Certification Test Application S/W)
3. Interoperability tests run at ATH :
   - Testing functionality on the device during real network operation (using the App S/W)
   - New test plan based on what operators are currently using.
4. RF Performance tests.

Mandating RF testing

- Every device must be tested to ensure that it does not exceed the maximum regulatory requirements before being able to be used, but does not state what the actual output power and sensitivity are.
- The RF performance is crucial for successful deployments of IoT applications. Poor performance due to the antenna designs or sizes results in inadequate RF emission power and sensitivity. This leads to inefficient energy management in the device and causes network coverage issues as only the devices close to the gateway are usable.

Radiated RF Performance Evaluation Procedure

- Created by the Certification Committee to a harmonise approach to the measurement of the Transmit and Received performance of a LoRaWAN® Product.
- Used by the LoRa Alliance™ ATHs or other parties.
- Transmission Performance is measure as EIRP in a full 3D radiation power pattern
- Received performance is measured by detecting the point that the product reached a packet error rate (PER) of 10 percent
- Measurement performed on RX1 and RX2.
- The angle used for the test is from a region where the antenna gain is stable.
- Tested Devices displayed on the LoRa Alliance website (Manufactures may declare results or give contact details to obtain them.)
- RF Performance test Mandatory as part of the LoRa Alliance EU863-870 Certification from July 2019



LoRaWAN1.0.4

- Devices currently deployed (and earning revenue) are based on the LW1.0.x platform and this will continue for the foreseeable future, especially for those device/services that don't require handover roaming (passive roaming is supported on LW1.0.x).
- LW1.0.4 is an update to the L2 specification to clean up the LW1.0.x and resolve LoRaWAN® ambiguities.

In Scope

- Normative Cleanup
- Specification and Behavior Clarifications
  - ADR
  - JoinEUI vs AppEUI
  - Class B/C receive windows
  - CFList Error handling and restart behavior
  - 32 bit FCnt only
  - Retransmission behavior
  - MAC Command processing/response
  - ABP FCnt requirements (persistence required)
  - DevNonce increments

Out-of-Scope

- New MAC commands
- New key hierarchy
- New MIC calculation (split MIC)
- Handover Roaming features
- LW 1.1 protocol identifiers
- Issues that introduce compatibility problems

To be released soon with certified reference stack and the certification program

LoRaWAN®

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@LoRaAlliance

linkedin.com/company/loraalliance/

marcom@lora-alliance.com

lora-alliance.org

LoRa Alliance™