

Mission Report

ITU Workshop on Conformance and Interoperability Testing Requirements for IoT product solutions within CARICOM (aka Innovation for Youths) 25 - 27 June 2018, TATT Offices, Barataria, Trinidad & Tobago

Since 2014, the ITU has engaged in Conformance and Interoperability (C&I) related activities within the region which indicates that Internet of Things (IoT) products use is of particular concern to regional regulators. Simultaneously, the CTU has been promoting Youth Innovation using ICTs. This event was intended to determine C&I issues which may impact youth who are innovating in the IoT space. The specific goals of the 3-day youth event were to:

- OBJ-1. sensitise product-developers with pre-sale IoT products to C&I requirements for sale;
- OBJ-2. identify C&I-related issues which may hinder the ability of product-developers to distribute, deploy, or sell their IoT product;
- OBJ-3. establish low-resource spectrum-related pre-compliance testing protocols which lower the barrier to market entry by reducing risk of certification test failure;
- OBJ-4. gather insights into the coverage, relevance, and challenges of existing national C&I regimes for IoT products

The Workshop Agenda (see attached) was designed to accommodate a maximum of 16 regional developers alongside the facilitators and other stakeholders. The final attendance, across the 3 days, included 9 regional developers presenting 5 distinct products (presented under a non-disclosure agreement). In addition regulators representing 5 regional jurisdictions (Jamaica, Bahamas, Belize, Trinidad & Tobago, Suriname) were present and participated in the the workshop activities. Finally, parts of the event were streamed via Zoom to accommodate viewing by persons in Guyana.

The ITU was represented at this event by Cleveland Thomas and Vladimir Daigele. The facilitating team included: CpQD - Victor Vellano, Sergio Rubio (remote); UWI - Cathy Radix, Sean Rocke, Janine Jaggernaut, Sanjeev Ragoonath, Aaron Roopnarine, Kadesha Gay. The CpQD team provided specific technical expertise concerning relevant standards and test procedures. The UWI team demonstrated low-resource pre-compliance test equipment (on loan from UWI - see attached), for four IoT product cases, created specifically to foster discussion. The proposed suite of pre-compliance tests (see attached) was chosen to address the issues perceived to be of major concern to regulators (spectrum and standards), and for which IoT products are likely to fail testing.

The 5 IoT products, as well as the sample products made extensive use of off-the-shelf RF modules and RF-enabled processors/boards in initial prototype(s) and for customer validation. All items were pre-certified by the FCC. Only two of the developers reported having had discussions with their local regulator prior to creating, or during testing of their products. Notably, all of the developers, and some regulators, were not aware that inclusion of a pre-certified module in their device potentially rendered any existing FCC Certification invalid. Two of the 5 products were intended for worldwide sale, starting with the US market; the remaining three products were not intended for use outside of CARICOM. Only one of the products had undergone C&I testing - carried out at a lab in the USA - and was unsuccessful.

The five regulators have processes that focus on the importation of products already certified for use in other "larger" jurisdictions. The processes consist primarily of verifying that the device is consistent with the relevant national spectrum plan - it was noted that the CTU has been engaged in a spectrum harmonisation exercise for some time and that the task has proven challenging.

Discussion throughout the workshop was centered around 4 themes:

- 1) Demand for, Availability of, and Effective Access to, Regional Equipment and Expertise
- 2) Developer + Regulator Perspective(s) - Current Experience with C&I and Way Forward
- 3) Target Market C&I Requirements for IoT - What are they? Can we meet them?
- 4) Utility of pre-compliance vs. full test services for CARICOM IoT developers

A short summary of the discussion points and suggested actions was presented at the ITU MRA Forum on 28 June 2018 (see attached).

Appendix 1: Workshop Agenda (3 pages)

Appendix 2: List of Equipment (1 page)

Appendix 3: List of pre-compliance tests demonstrated at workshop (1 page)

Appendix 4: Outcomes Presentation (7 pages)

**ITU Workshop on Conformance & Interoperability
Testing Requirements for IoT product solutions within
CARICOM
25 – 27 June 2018**

Day 1 - 25 June 2018

Opening ceremony:

- 8:00- 8:30 Registration + Tour/familiarization with lab equipment
- 8:30 –9:00 Opening Session (*Master of Ceremonies – Kirk Sookram, TATT*)
- National Anthem & Safety Briefing
 - Opening Remarks from **Dr. Cathy-Ann Radix, UWI at St. Augustine**
 - Brief Remarks from ITU by **Mr. Cleveland Thomas, ITU Area Office Representative for the Caribbean**
 - Welcome Address – **Dr. John Prince, Chief Executive Officer, TATT**
- 9:25 Group Photo
- 9:30 CpQD: IoT C&I Test Processes, Procedures and Equipment
- 10:30 BREAK**
- 10:45 Rapporteur: IoT C&I - Regional Equipment, Expertise and Demand
- 11:45 Facilitator Discussion Recap
- Noon LUNCH**
- 1:00 TATT: Equipment Certification Application Process
- 1:30 Small Groups: Case Study Overview
- (Parallel 4 cases – completing EC-10 form(s))
- 2:00 Small Groups: Use Case Testing Scenarios
- 2:30 BREAK**
- 2:45 Small Groups: Use Case Testing Scenarios (continued)
- 3:15 Rapporteur: Reflection on 'Bring-Your-Own-Device' (BYOD)
- 3:50 Facilitator Discussion Recap
- 4:00 End of Day

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Day 2 - 26 June 2018

8:00	Feedback: Show + Tell – BYOD Overview
9:00	CpQD (Remote) : Beyond RF Testing - Hazards and CyberSecurity
9:45	Beyond RF Testing: Protocol Compliance & Pre-Certified Modules
10:00	Beyond RF Testing: Performance Metrics and Susceptibility
10:15	BREAK
10:30	Rapporteur: Beyond RF Testing - Regional Expertise and Demand
11:45	Facilitator Discussion Recap
Noon	LUNCH
1:00	Small Groups: BYOD RF/Protocol C&I Requirements (EC-10)
1:45	Small Groups: BYOD Pre-Compliance Tests (start)
2:30	BREAK
2:45	Small Groups: BYOD Summary Preparation (start)
4:00	End of Day

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Day 3 - 27 June 2018

- 8:00 Small Groups: BYOD Pre-Compliance Tests + Summary (complete)
- 9:00 Small Groups: BYOD Summary Presentations
- 10:30 BREAK**
- 10:45 Rapporteur: BYOD Way Forward
- 11:45 Feedback Recap
- Noon LUNCH**
- 1:00 Rapporteur: Market Requirements for IoT devices/applications
- 1:45 Rapporteur: Utility of pre-compliance vs. full test services
- 2:30 BREAK**
- 2:45 Rapporteur: Access to/Effective provision of regional services
- 3:30 Facilitator Discussion Recap
- 4:00 End of Day

Equipment/Software Listing

Equipment/ Software	Description	Conducted Emissions	Radiated Emissions	Radiated Immunity	RF Safety	Comments
TDs 2024B/C	Tektronix Oscilloscope	▲		▲		Approx. price range: 2,880.00 USD Lower cost alternative: Tektronix TBS1072B 70MHz 2 Channel Digital Oscilloscope: 623.00 USD
MS 2720T	Anritsu Spectrum Analyser		▲			Approx. price range: 27,100.00 USD Lower cost alternative: Triarchy USB Mini Spectrum Analyzer TSAxG1 Series: 580-680 USD
ZX60-V62+	Minicircuits Pre-amplifier	▲		▲		Approx price: 49.95 USD
FMCOMMS4 Zedboard	Software-defined Radio RF front end and FPGA board			▲		Approx. Price: 416.56 USD for FMCOMMS4 Approx Price: 474.99 USD for Zedboard Lower Cost Alternative: Adalm Pluto SDR: 149.00 USD
5uH LISN	Line Impedance Stabilising Network	▲				Approx. Price: 250.00 USD Lower Cost Alternative: Building your own for approximately 50 USD.(Note that this is only for in-house testing and that TekBox has provided schematics with the legally bounded agreement that it cannot be replicated for marketing purposes).
7405 Probe Kit	Ets Lindgren EMC Probe Kit	▲		▲		Approx. Price: 2095.00 USD Lower Cost Alternative: Tekbox TBPS01 EMC Near-Field Probe Set : 199.00 USD
COMSOL	Multiphysics simulator		▲		▲	Approx Price: 1790.00 USD Lower Cost Alternative: Kratos Multiphysics (open source framework) : free.
WA5VJB	Log periodic antenna		▲			Approx. Price: 29.00 USD

Lab Procedure Overview

This document describes the following list of the procedures required for C&I pre-compliance testing for the Use Cases created for the IoT Workshop:

- Design, construct and document procedure/equipment to conduct pre-compliance conducted emissions test(s)
- Design, construct and document procedure/equipment to conduct pre-compliance test(s) for unintentional radiated emissions
- Design, construct and document procedure/equipment to conduct pre-compliance test(s) for intentional radiated emissions @ 900MHz and 2.4 GHz
- Design, construct and document procedure/equipment to conduct pre-compliance immunity test(s) @ 60Hz, 900MHz, 2.4 GHz
- Design, construct and document procedure/equipment to conduct pre-compliance RF Safety test(s) (simulation using ICNIRP Guidelines)

Additional procedures which can be considered for C&I pre-compliance testing are:

- Design, construct and document procedure/equipment to conduct pre-compliance ESD test(s) (simulation)
- Design, construct and document procedure/equipment to conduct pre-compliance battery test(s) (short circuit, oven heat stress, etc)
- Design, construct and document procedure/equipment to conduct performance susceptibility tests related to terrain (e.g. urban buildings, hills, water), deployment density (congestion and fairness) and environment(e.g. Salt water corrosion)

Outcomes

Forum on C&I in IoT Innovation for Youths

What we did ...

Developers

Test Equipment

Sample Products

C&I Experts

Real Cases

Regulators

The discussions ...

C&I

Perspectives

Target Market

IoT C&I Requirements

Regional Equipment

&

Expertise

Pre-compliance

vs.

Certification

C&I Perspectives

Developers

Paperwork!

Regulators

Protect Spectrum!

- 1) Continual education
- 2) Low friction “SANDBOX”
- 3) Pre-qualification for
SANDBOX ala HAM

Regional Equipment + Expertise

Developers

Late in cycle

Look extra-regional

Regulators

Layer 2 + 3?

accept FCC ...

1) Make the demand

2) Capacity building for regulators

3) Regional
Pre-compliance testing services

Target Market IoT C&I Requirements

Developers

3/5 CARICOM only

Regulators

National processes

Common position/process:

- 1) Exp'l Frequency Band(s)
- 2) Entry into the SANDBOX
- 3) Compliance/Recognition
leaving the SANDBOX

Pre-compliance vs. Certification

Developers

reliable product

Regulators

Reliable spectrum

- 1) Pre-Compliance test-centers
- 2) Partner to perform CARICOM (or Int'I) compliance testing using a single process
- 3) Focus on specific RF-modules/platforms