

# Developer Tools and Resources

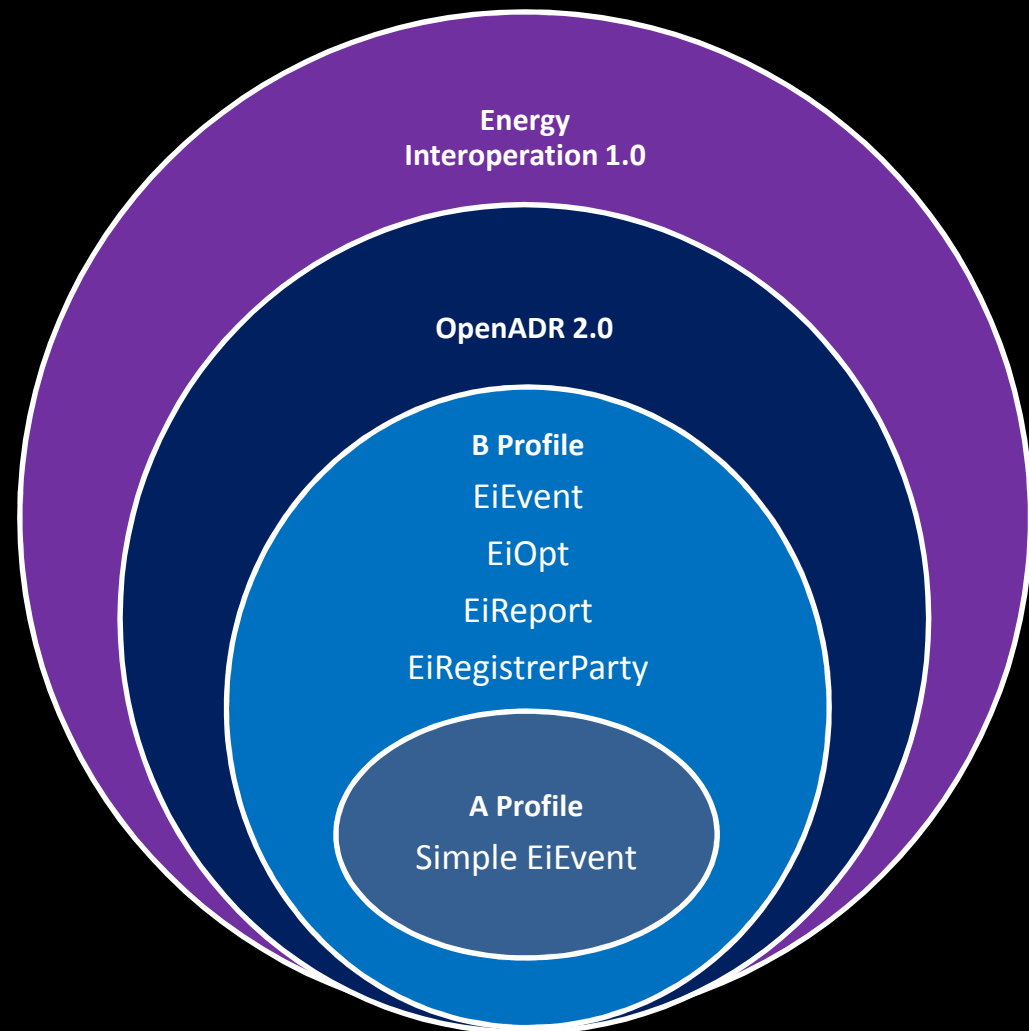
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QualityLogic, Inc.

# Topics

- Open ADR Requirements Docs
- Testing Tools
- VTN in the Cloud
- Other Tools
- Resource Summary

# OpenADR Profiles

- “A” profile is targeted at limited resource devices and simple DR applications
- “B” profile is targeted at robust devices and sophisticated DR applications



# Optional Feature Support



		B VTN	B VEN	B VEN Report	A VEN
Services	EiEvent - Simple	M	M	NA	M
	EiEvent – Full	M	M	NA	NA
	EiOpt	M	M	NA	NA
	EiRegistraton	M	M	M	NA
	EiReport	M	M	M	NA
Security	RSA and ECC Ciphers	M	One(1)	One(1)	One(1)
	XML Signatures	O	O	O	NA
Transport	SimpleHTTP Only	NA	NA	NA	M
	XMPP and SimpleHTTP	M	One(1)	One(1)	NA
Exchange Model	Pull - SimpleHTTP	M	M	M	M
	Push - SimpleHTTP	M	O	O	O
Profile	B support for A profile	M	NA	NA	NA

(1) Must support at least one , but can support both.

O=Optional M=Mandatory

# OpenADR Requirements

- OpenADR requirements are defined in the OpenADR Schema and Profile Specification
- The Schema describes the payload structure
- The Profile Specification defines sequence of payload exchanges and the business rules
- "A" and "B" profiles have separate specifications and schemas

# PICS and Test Specification



- PICS
  - Listing of all testable requirements
  - Manufacturer declares conformance prior to certification
- Test Specification
  - A set of tests that validates all of the testable requirements defined in the PICS
  - Positive tests including limited boundary testing
  - Negative tests focused on graceful error handling
  - Security and Transport Tests

# A Profile Conformance Rules



<b>20</b>	At any time, a VTN can change any element or attribute of a pending or active event as long as it does not pertain to the past
<b>57</b>	If the VTN sends an oadrEvent with an eventID that the VEN is already aware of, but with a higher modification number, then the VEN should replace the previous event with the new one in its list of known events

# Typical VEN Test Case

**E0\_0040 –Send 24\_Prices Event, VEN Push oadrDistributeEvent**

**E1\_0040 –Send 24\_Prices Event, VEN Pull oadrDistributeEvent**

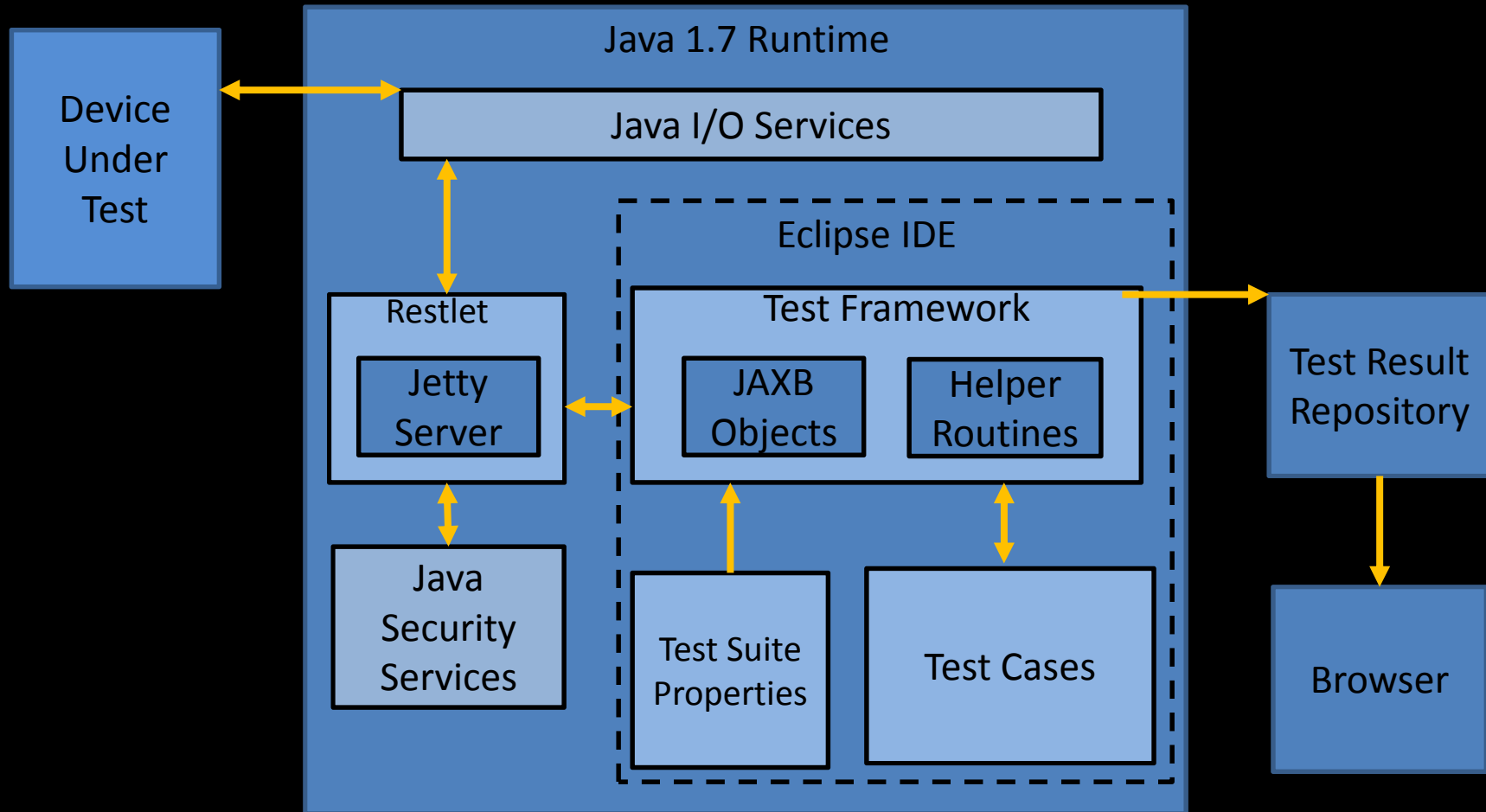
Prerequisites	- DUT_VEN has no pending or active events
Scenario	<p>{DUT_VEN: <u>oadrRequestEvent</u> }</p> <p>TH_VTN: <u>oadrDistributeEvent</u> – 24 Prices Event, “always”</p> <p>{DUT_VEN: Transport Acknowledgement}</p> <p>DUT_VEN: <u>oadrCreatedEvent</u></p> <p>TH_VTN: <u>oadrResponse</u> , success</p> <p><b>Note: set the <u>responseRequired</u> element in the <u>oadrDistributeEvent</u> to “always” for this test case. Set <u>signalType</u> to “prices”</b></p>
Expected Results	<p>1)Common Pass/Fail verdicts</p> <p>2)Received <u>oadrCreatedEvent</u> with <u>optType</u> equal to <u>optIn</u></p>
Notes	-A basic 24 hour pricing event transaction



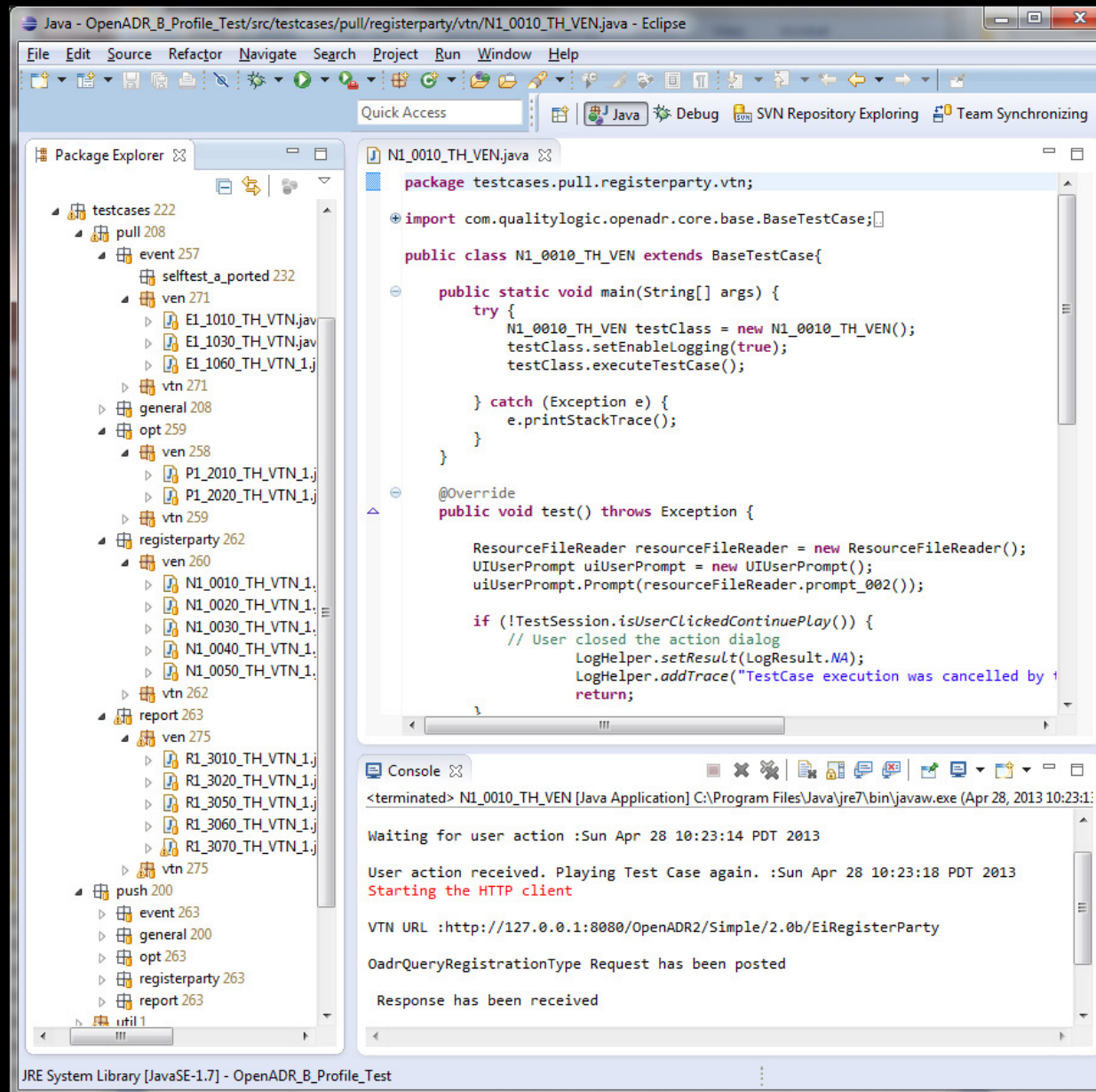
# Test Harness

- Implementation of the test cases defined in the Test Specification
- Used for certification and available Pre-certification test tool
- Each test case validates...
  - Payloads validate against the OpenADR Schema
  - Correct message interaction pattern
  - OpenADR Conformance rules are followed
  - The intent of the test case is achieved

# Test Harness



# Test Harness



```
Java - OpenADR_B_Profile_Test/src/testcases/pull/registerparty/vtn/N1_0010_TH_VEN.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access Java Debug SVN Repository Exploring Team Synchronizing

Package Explorer
testcases 222
├─ pull 208
│   └─ event 257
│       └─ selftest_a_ported 232
│           └─ ven 271
│               ├── E1_1010_TH_VTN.jav
│               ├── E1_1030_TH_VTN.jav
│               ├── E1_1060_TH_VTN_1.j
│               └─ vtn 271
│                   └─ general 208
├─ opt 259
│   └─ ven 258
│       ├── P1_2010_TH_VTN_1.j
│       └─ P1_2020_TH_VTN_1.j
├─ vtn 259
├─ registerparty 262
│   └─ ven 260
│       ├── N1_0010_TH_VTN_1.
│       ├── N1_0020_TH_VTN_1.
│       ├── N1_0030_TH_VTN_1.
│       ├── N1_0040_TH_VTN_1.
│       └─ N1_0050_TH_VTN_1.
├─ vtn 262
├─ report 263
│   └─ ven 275
│       ├── R1_3010_TH_VTN_1.j
│       ├── R1_3020_TH_VTN_1.j
│       ├── R1_3050_TH_VTN_1.j
│       ├── R1_3060_TH_VTN_1.j
│       └─ R1_3070_TH_VTN_1.j
├─ vtn 275
├─ push 200
│   ├── event 263
│   ├── general 200
│   ├── opt 263
│   ├── registerparty 263
│   └─ report 263
└─ util 1

N1_0010_TH_VEN.java
package testcases.pull.registerparty.vtn;

import com.qualitylogic.openadr.core.base.BaseTestCase;

public class N1_0010_TH_VEN extends BaseTestCase{

    public static void main(String[] args) {
        try {
            N1_0010_TH_VEN testClass = new N1_0010_TH_VEN();
            testClass.setEnableLogging(true);
            testClass.executeTestCase();

        } catch (Exception e) {
            e.printStackTrace();
        }
    }

    @Override
    public void test() throws Exception {

        ResourceFileReader resourceFileReader = new ResourceFileReader();
        UIUserPrompt uiUserPrompt = new UIUserPrompt();
        uiUserPrompt.Prompt(resourceFileReader.prompt_002());

        if (!TestSession.isUserClickedContinuePlay()) {
            // User closed the action dialog
            LogHelper.setResult(LogResult.NA);
            LogHelper.addTrace("TestCase execution was cancelled by user");
            return;
        }
    }
}

Console
<terminated> N1_0010_TH_VEN [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (Apr 28, 2013 10:23:11:
Waiting for user action :Sun Apr 28 10:23:14 PDT 2013

User action received. Playing Test Case again. :Sun Apr 28 10:23:18 PDT 2013
Starting the HTTP client

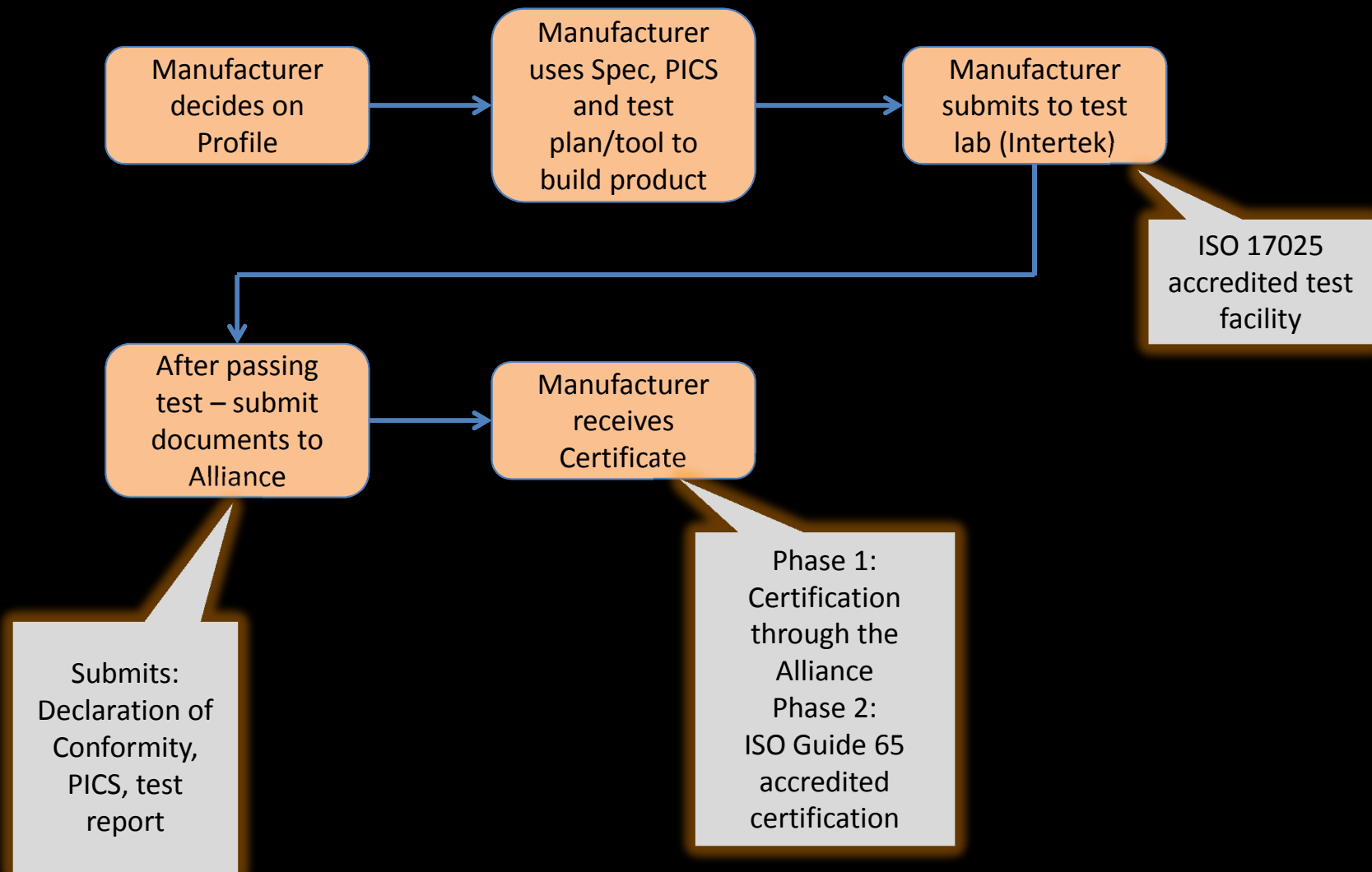
VTN URL :http://127.0.0.1:8080/OpenADR2/Simple/2.0b/EiRegisterParty

OadrQueryRegistrationType Request has been posted

Response has been received

JRE System Library [JavaSE-1.7] - OpenADR_B_Profile_Test
```

# Certification Process



# OpenADR Cloud Server (EPRI VTN)

▪

# The need...

- OpenADR Adoption can be accelerated by...
  - Making it easy for interested parties to “play” with the technology
  - Providing OpenADR developers with readily accessible VENs and VTNs to interoperate with
  - Enabling small scale pilot programs utilizing OpenADR VEN and VTNs
  - Enabling utilities to do “what if” experiments with different OpenADR program characteristics

# VTN in the Cloud

- QualityLogic now offers a pre-installed EPRI VTN on the Amazon cloud infrastructure
- Eliminates a somewhat lengthy VTN installation process and gets you going instantly
- QualityLogic's roadmap for the EPRI VTN includes..
  - Adding more ad hoc testing and diagnostic capabilities
  - Adding “personalities” that model well known DR program behavior

# Instance Management

- Users can manage their cloud VTN using the QualityLogic instance management page
  - Generate backups
  - Restore backups
  - Reboot, start and stop the server
  - Disable unsecured access
  - Access a support forum for help



# Instance Management



## Instance Management Page For test (test@test12.com)

System Message:

---

Time Check

Status: Instance exists and is **running** with status check result **ok**

Unsecured access: [VTN URL: http://54.172.125.180:8080](http://54.172.125.180:8080)

Secured access: [VTN URL: https://54.172.125.180:443](https://54.172.125.180:443)

---

Instance Control:

Messages:

---

Timestamp	Message
11/4/2014 1:11:57 AM	this is a test

# EPRI Open Source VTN




**EPRI** | ELECTRIC POWER RESEARCH INSTITUTE

Logged in as **admin**   [Log out](#)   [About](#)

---

Menu

- [Accounts](#)
- [VENs](#)
- [Events](#)
- [Schedules](#)
- [Admin](#)
- [Dashboard](#)**

 **QualityLogic**  
Putting Technology to the Test

Resources

- [Getting Started Video](#)
- [Cloud Admin/Forum](#)
- [VTN User's Guide](#)
- [Premium Support](#)
- [OpenADR Training](#)
- [Download EPRI VEN](#)

### Dashboard: Test\_VEN\_Name (offline) (2014-10-30 11:27:47 UTC)

Event ID	Start Time	Duration (minutes)	Status	Test Event	Opt State
----------	------------	--------------------	--------	------------	-----------

### Dashboard: TH\_VEN (offline) ()

Event ID	Start Time	Duration (minutes)	Status	Test Event	Opt State
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Last Refreshed: January 27, 2015 03:32

Copyright © 2015 EPRI v0.9.3

# Cloud VTN Availability Details

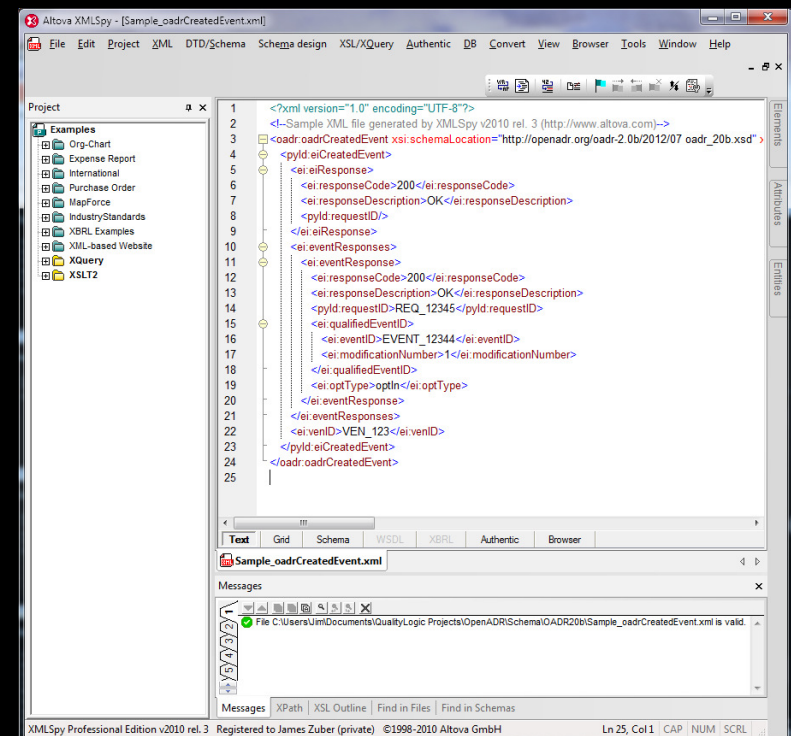


- Monthly fee of \$100
- 10% OpenADR member discount
- Free 2<sup>nd</sup> months use for completing survey on VTN enhancement preferences
- Easy on-line purchase at [www.qualitylogic.com](http://www.qualitylogic.com)
  - Look for “OpenADR VEN Tester”

# Other Tools

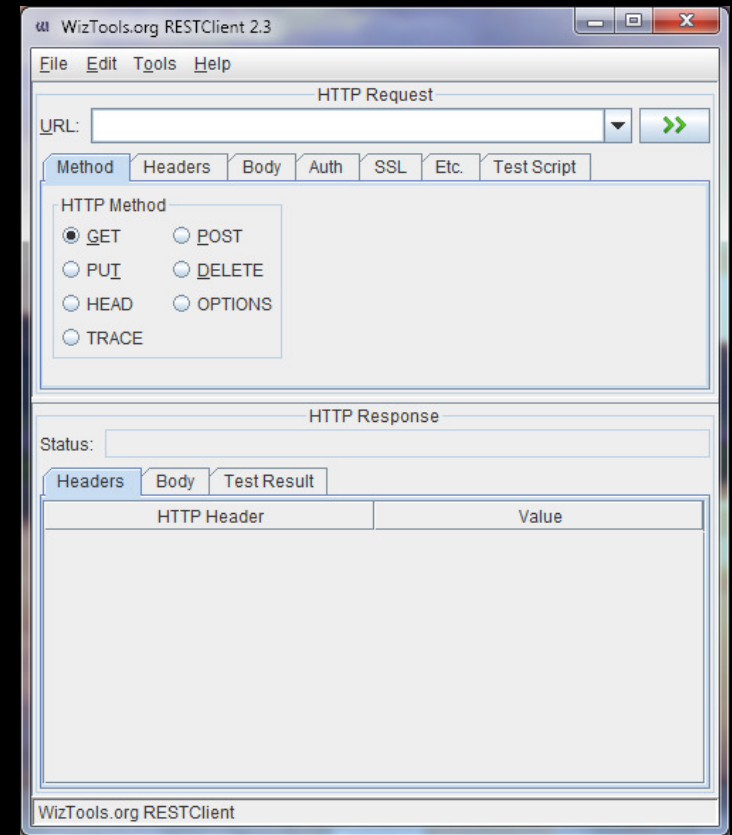
# XMLSpy

- Used for working with XML
- Edit Schemas
- Generate sample XML document from schema
- Edit XML Documents
- Check for well-formed XML
- Validate XML payloads against schema
- Free XML editors available



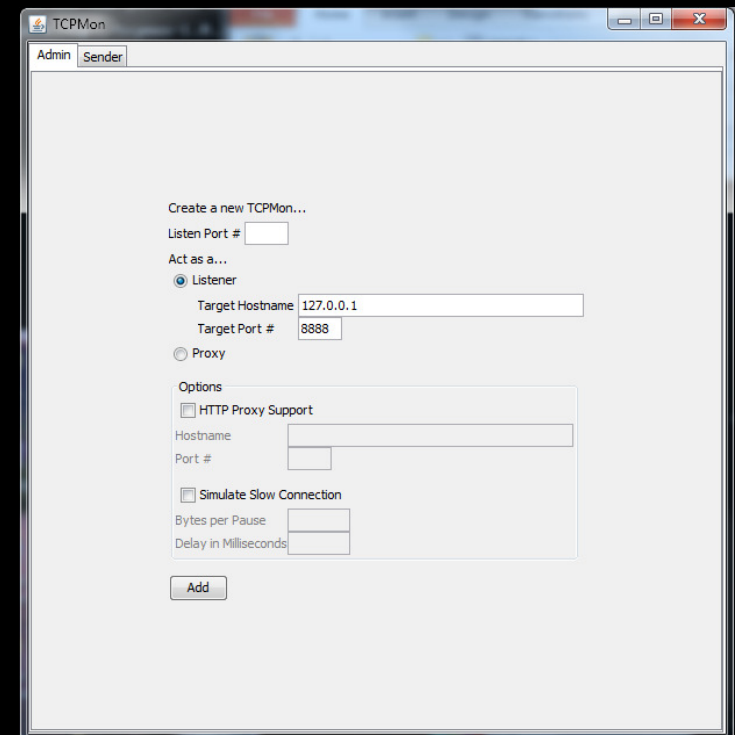
# Rest Client

- A very simple, easy to use Java Rest Client
- Available for free from [code.google.com](http://code.google.com)



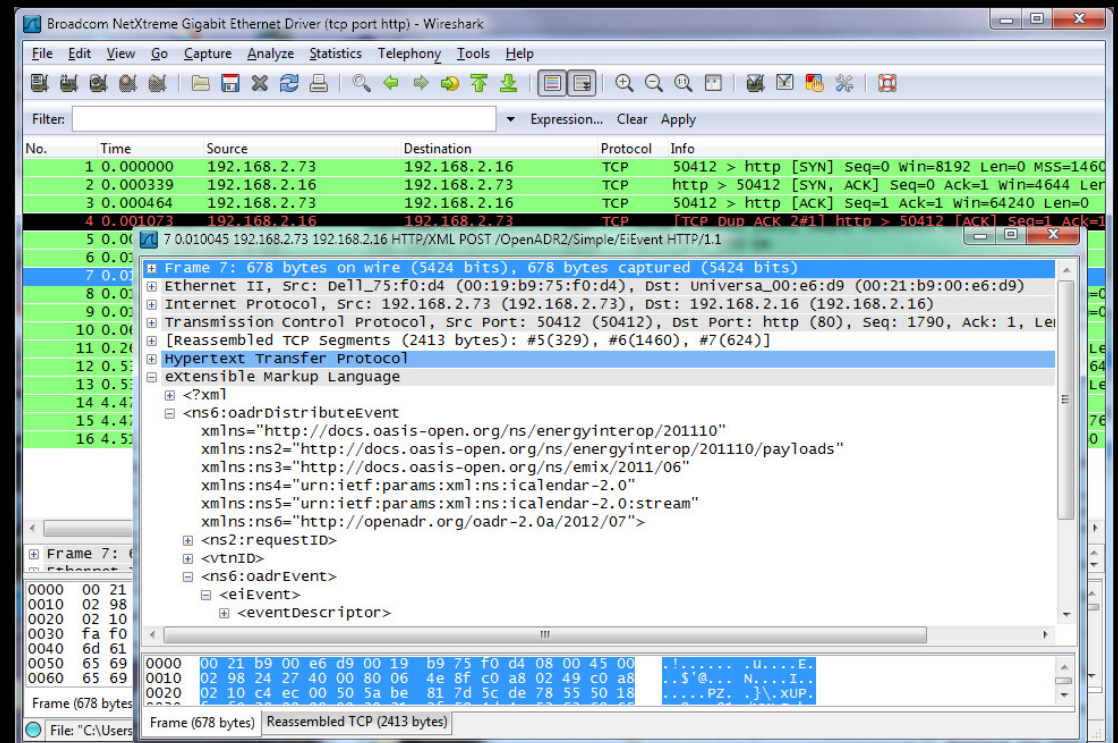
# TCPMon

- Monitor http traffic when communicating with localhost devices
- Redirects TCP Port



# WireShark

- WireShark packet Analyzer
- Use capture filter “tcp port http”



The screenshot displays the Wireshark interface with a capture filter set to "tcp port http". The packet list pane shows several captured packets, with packet 7 selected. The packet details pane shows the structure of the selected packet, including Ethernet II, Internet Protocol, Transmission Control Protocol, and Hypertext Transfer Protocol. The raw data pane shows the hexadecimal and ASCII representation of the packet data.

No.	Time	Source	Destination	Protocol	Info
1	0.000000	192.168.2.73	192.168.2.16	TCP	50412 > http [SYN] Seq=0 win=8192 Len=0 MSS=1460
2	0.000339	192.168.2.16	192.168.2.73	TCP	http > 50412 [SYN, ACK] Seq=0 Ack=1 win=4644 Len=0
3	0.000464	192.168.2.73	192.168.2.16	TCP	50412 > http [ACK] Seq=1 Ack=1 win=64240 Len=0
4	0.001073	192.168.2.16	192.168.2.73	TCP	[TCP Dup ACK 2#1] http > 50412 [ACK] Seq=1 Ack=1
5	0.010045	192.168.2.73	192.168.2.16	HTTP/XML	POST /OpenADR2/Simple/EiEvent HTTP/1.1

Frame 7: 678 bytes on wire (5424 bits), 678 bytes captured (5424 bits)

- Ethernet II, Src: Dell\_75:f0:d4 (00:19:b9:75:f0:d4), Dst: Universa\_00:e6:d9 (00:21:b9:00:e6:d9)
- Internet Protocol, Src: 192.168.2.73 (192.168.2.73), Dst: 192.168.2.16 (192.168.2.16)
- Transmission Control Protocol, Src Port: 50412 (50412), Dst Port: http (80), Seq: 1790, Ack: 1, Len: 2413
- [Reassembled TCP Segments (2413 bytes): #5(329), #6(1460), #7(624)]
- Hypertext Transfer Protocol
- extensible Markup Language
- <?xml
- <ns6:oadrDistributeEvent xmlns="http://docs.oasis-open.org/ns/energyinterop/201110" xmlns:ns2="http://docs.oasis-open.org/ns/energyinterop/201110/payloads" xmlns:ns3="http://docs.oasis-open.org/ns/emix/2011/06" xmlns:ns4="urn:ietf:params:xml:ns:icalendar-2.0" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns6="http://openadr.org/oadr-2.0a/2012/07">
- <ns2:requestID>
- <vtnID>
- <ns6:oadrEvent>
- <eiEvent>
- <eventDescriptor>



# Resources

# Other Resources

- [www.openadr.org](http://www.openadr.org)
  - Schema and profiles specifications (public)
  - Certification documentation package
  - Join working groups, email reflectors
  - Implementation guides (reporting, certs)
  - DR Program Guide
  - Pre-Certification Test Harness

# Other Resources

- [www.sourceforge.com](http://www.sourceforge.com)
  - EPRI VTN
  - EPRI VEN
  - EPRI VEN C++ Library
- [www.github.com](http://www.github.com)
  - EnerNOC "A" Profile VEN and VTN (only useful for XMPP implementation details)

# Other Resources

- [www.qualitylogic.com](http://www.qualitylogic.com)
  - OpenADR Developer Workshop
  - OpenADR Developer Support
  - OpenADR VTN in the Cloud
  - Pre-Certification Test Harness
- [www.universal-devices.com](http://www.universal-devices.com)
  - Off the shelf certified VEN

# Questions?