dBm069, a new TR-069 testing concept

dBm069 is a tool that validates TR-069 protocol behavior of a CPE (a router or a LAN device) in a fast, simple, and reliable way. It includes auxiliary tools to provide a full testing scenario.

dBm069 is an essential tool for those laboratories who want to optimize and speed up their TR-069 testing process.

TR-069

TR-069 protocol enables visibility across service providers, providing full access to CPE configurations.

CPE Validation

TR-069 protocol testing is a complex and meticulous task, which makes manual execution of these tests to be an exhausting, long, and high cost process.

Telecom Operators

Due to CPE's requirements' continuous evolution, Telecom Operators often need to perform CPE's SW or FW upgrades (e.g. to update WPA2 module). These upgrades are performed remotely, so they need to strongly rely on the TR-069 management protocol implementation.

Testing CPE's TR-069 behavior is a must. TIER 1 Telecom Operators are very concerned about the implications of this management protocol in their daily operations. If TR-069 is not correctly implemented in the CPE, it can generate serious problems to customers, Customer Support Department, and technicians.

In addition, TR-069 is an OPEN PROTOCOL and the Vendor NEVER tests the CPE according to the SP particular needs. Therefore, it is very important to rationalize and optimize the testing process, and the best way to do this is through automation.

CPE Vendors

They are responsible of tuning the CPE according to the Telecom Operator requirements. They know all about the CPEs they offer and are conscious that each customer is different.

TR-069 implementation task can be long and tedious, but **dBm069** eases it substantially by providing all information the technician needs during the debugging process in a detailed but friendly way, speeding up the CPE validation process.

"With dBm069, TR-069 testing will become one of the most optimized processes at the Telecom Operator Lab premises"

Automation

The efficient way to optimize TR-069 testing process is through automation. Automation is the key to improve CPEs validation process and achieve a faster execution and better quality results. Technicians can focus their efforts on results analysis instead of wasting their time in repeating tests manually. Tests reports will be automatically generated, and all information will automatically be stored for future possible reviews.

Test Plan Customization

There is always need of a certain degree of customization when talking about Test Plan design. dBm069 provides the easiest way to build customized libraries. In addition dBm is a customer oriented company always ready to help the user, providing our know how to help build the right test cases for every single need.

A Lab in a nut

dBm069 includes all the tools needed to perform TR-069 tests in a CPE. This means that just a PC would be enough to run the tests in a CPE.

Libraries

A Library contains the Test Cases related to a Data Model. Tester can execute a standard Test Plan or build their own libraries with customized Test Cases. Libraries can be shared among different users.

Services oriented Test Cases

Many Test Cases can be created based on specific Telecom Operator services. For example:

- Evidence related to the Identification and Registration of CPE in the ACS
- Portmapping Tests where real traffic is sent to check if the configured ports have been really opened or not.
- Tests related to the password to access the CPE.
- QoS Tests.
- LAN Configuration Tests.
- Diagnostic Tests: Throughput Performance Tests and Ping Tests.
- Test where the CPE's configuration file is read/restored via TR-069 parameters.
- Statistics Tests where different TR-069 "stats" parameters are read.
- HostLAN Tests where information of the host connected to the CPE LAN is checked.
- Checking configuration changes that do not require CPE Reboot.
- Tests related with different DHCP configuration options and DHCPOptions/DHCPAlternatives configuration.
- WAN Tests
- Wireless Tests where functioning of the new WIFI network configured is checked.
- TR-111 Tests where the correct connection and information in both router and LAN device are checked.
- STB Tests related to the configuration of different parameters (e.g. AudioOutput, Videomode).

Most of these tests are included in the standard Libraries, but they can be customized to better adjust to specific particular needs.

Test Cases building

- Users can create customized Test Cases adapted to their particular needs. It is not necessary to be a SW engineer to build Test Cases because they are created in XML following very simple rules. They are formed by three kind of different blocks:
- Sessions: contain RPC methods.
- Sequences: allow performing automatically actions that would normally be performed manually.
- Requirements: contain the conditions that need to be fulfilled for the test to pass.

Execution

dBm069 provides real time visibility of the full testing process.
User can follows step by step the full communication between the ACS and the CPE. The user interface includes several windows where it can be seen:

- The list of Test Cases that are being executed in the Test Plan.
- ACS logs in an structured way.
- Execution details including each sub test and the Pass/Fail status.
- Test steps that will be performed as described in the Test Case.
- Summary of WireShark logs.
- Important Events that happen during the execution.

In addition user can stop, re-execute or activate any Test Case during the test execution.
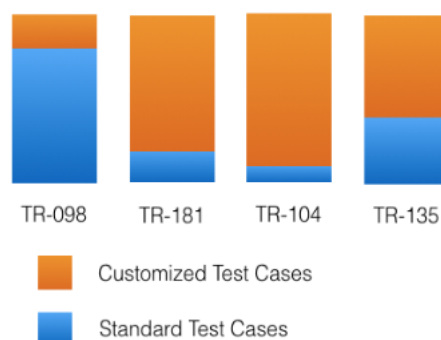

Fig.1: Percentage of test cases to be customized if needed to perform functionality tests using Vendor-Specific parameters.
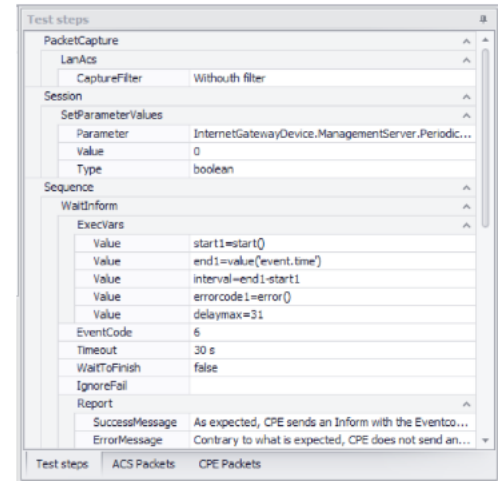

Figure 2: "Test Steps" window shows the Test Case syntax and allows tester to see all the details of the test to be performed.

ACS

dBm069 includes an ACS that fully conforms to BBF. It has been designed for testing purposes and supports one single CPE at a time.

ACS Interface

dBm069 has an interface that allows the connection to any commercial ACS. A customized module can be built to interface with a specific ACS. Already included in the **dBm069** catalog, a module to connect **dBm069** to Nokia ACS (Motive) is already available. Test Cases do not need to be modified to be executed gainst different ACS.

Scenario

dBm069 includes all the tools required to allow validation of TR-069 correct implementation in a CPE:

- Proprietary ACS
- HTTP, FTP and STUN server
- Traffic generator and analyzer
- Scripts editor (Telnet, ssh, or RS232)
- Execution engine
- Pass/Fail engine
- Data base for results storage
- Automatic report generator
- WireShark connection

dBm069 guides users to set the correct scenario for the Test Plan execution. Everything is under control during the execution of each test case.

Results Analysis

dBm069 does not only automate testing, furthermore, it eases the **ACS** logs review process identifying and showing the parts of the report the **Tester** need to manually review. There is no need to read dozens of pages of **ACS** logs looking for the right information. Anything can be found at a glance.
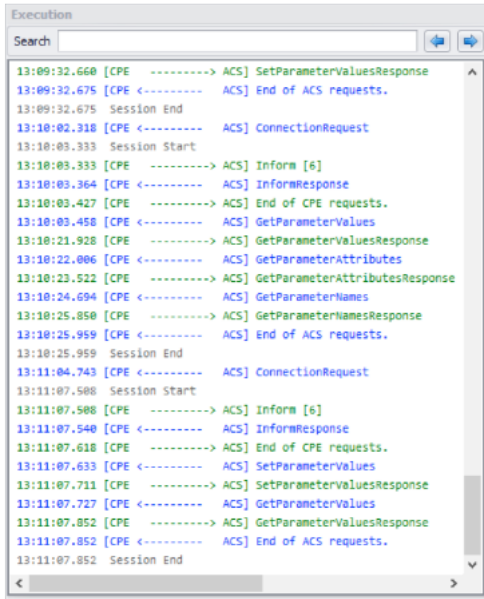

Figure 3: Detail of the "Execution". It shows a simplified list of the transaction between the ACS and CPE.

Pass/Fail Analysis

dBm069 has the ability to analyze whether a result passes or fails. This is done using the criteria specified in the "Requirements" block defined at each Test Case. Test Cases may include several sub tests and thus it may generate many partial results. The user can easily identify which condition has not been fulfilled and in which step of the Test Case the test has failed.

WireShark

dBm069 is always connected and synchronized with WireShark. The debugging process becomes smoother and faster since everything is recorded and stored. The user does not have to worry about loosing data. If the user needs to see the details of what happened during the execution of a test case, a Wireshark record is available with a simple click.

Comparative Analysis Tool

Comparative Analysis tool allows to compare different Test Plans results by creation of **comparatives** (group of Test Plans to be compared) allowing users to easily compare if a test case result has improved or worsened in the different Test Plans performed.

A comparative shows:

- All general data of the Test Plans included in the comparative: FW version, model, etc.
- Test Plans results, showing each test case result.
- Comparative conclusions for each Test Plan.

Comparative results can be displayed in an integrated spreadsheet, where the user can add notes, change colors, etc. From there they can be saved in XSLX, XSL, CSV or text format.
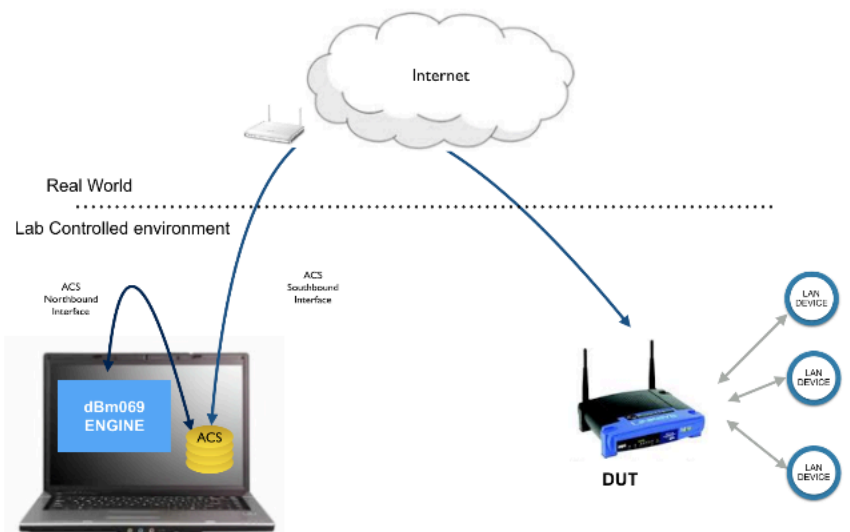

Fig.4: Typical dBm069 Scenario. Real world and Lab controlled environment are combined to have a more realistic testing experience.

KEY FEATURES
Tests the TR-069 behavior of a CPE with almost no manual interaction
Tests a CPE against your deployed ACSs in an automatic way (*)
Includes all necessary tools to setup a complete testing scenario
Allows the easy creation and execution of customized Test Cases according to the user needs (no need of a SW engineer)
Provides full real time visibility of all process and variables
Provides debugging tools to help fix problems
Supports all TR-069 Data Models
(*) Nokia (Motive) ACS interface available. Others under special request.

BENEFITS
Reduces testing time by 85%
Tests a CPE against your deployed ACSs in an AUTOMATIC way (*)
Increases traceability and reliability of results
Consolidates results interpretation based on the automated PASS/FAIL criteria
Saves thousands of dollars by testing a CPE on time
Optimizes Vendor & Telecom Operator coordination

USERS
CPE Vendors
Telecom Operators
Testing Labs
Chipset Vendors
ACS Vendors

dBm069 SPECIFICATIONS (short list)

| FEATURE	DESCRIPTION
POTENTIAL USERS	CPE Vendors, Telecom Operators, Laboratories and ACS vendors
APPLICATIONS	TR-069 CPE pre-certification, tuning, debugging and final validation
SCOPE OF USE	TR-069 testing, functional testing and custom tests using Vendor specific parameters
TOOLS INCLUDED	dBm069 ACS, dBm-STUN server, HTTP & FTP servers, traffic generator and script editor
SYNCHED WITH	Nokia (Motive) ACS (optional). Any commercial ACS (by special request) and WireShark
MAIN FUNCTIONALITY	Scenario configuration, automatic and manual execution of tests cases, log captures, real time visualization of every test step, storage of results in a data base, comparative analysis of Test Plans results, automatic and customizable generation of reports
LIBRARIES	Related with data models TR-098, TR-104, TR-111, TR-135, TR-098-IPV6, and more
TEST CASES DESIGN	Based in XML. No need to be a SW programmer to build a Test Case
AUTOMATION	85% test time reduction with almost no need of user interaction
VISIBILITY	Several windows to help user to easily access all important process information (see below)
ANALYSIS OF RESULTS	Information is filtered and ordered to assist debuggers
FINAL REPORTS	Full or partial reports can be automatically generated and user customized
COOPERATIVE TESTING	Test Plans can be shared among users maintaining full visibility of the entire testing process

List of real time windows that provides full visibility to the user

Table 1: Test Plan Information at the Configuration tab	
Program Variables	List of program variables according to the testing scenario and their values (IPs, host name, current date, etc.)
Library Variables	List of library variables defined specifically in the library associated to the Test Plan. Allows library variables edition
Scripts	List of scripts that will be executed during the Test Plan Execution (if there are test cases that use them)
ACS	ACS and CPE data and status (first connection time, if it is active or not, SN, CR URL, etc)
Test Plan Data	Test Plan general information: name, owner, CPE type and SN, library to which it is associated, etc

Table 2: Different kind of logs available at dBm069	
Script Log	List of program variables according to the testing scenario and their values (IPs, host name, current date, etc.)
Traffic Log	Available at Execution tab. Shows script logs of those automatic test cases that includes them (set of commands to communicate directly with the CPE via telnet, SSH or RS232)
dBm STUN Log	Available at Servers tab. Shows Traffic logs related to all traffic sent/received by the http/ftp servers and the traffic generator/analyzer during Test Plan execution
ACS Log	Available at Serves tab. Shows Traffic logs related to the traffic sent/received by the STUN server during Test Plan execution
HTTP Log	dBm069 shows ACS logs corresponding to the whole automatic Test Plan (at the ACS tab) or to each test case (at the Execution tab). Logs are shown in a friendly and structured way

Table 3: List of dBm069 windows that provide real time information about automatic execution	
Test Plan	List of test cases to run in a CPE. Full Test Plan and status of Test Cases
Test Log	Full test logs captured in a Test Case execution. Includes RPC methods and Actions
Conditions	List of conditions that the CPE must pass to mark an executed Test Case as PASS specifying the values obtained
Execution Variables	List of execution variables of the Test Case and their values
Test Report Variables	List of the Test Report variables of a Test Case and their values
Script Log	Script logs corresponding to all Test Cases executed in a Test Plan
Text/Grid	ACS logs in text/grid view corresponding to the RPC method/Action selected at the Test Log window
Test Steps	Test steps as they are defined in the .xml library
ACS Packets	Sent and received messages by the ACS related to a Test Case (not only SOAP)
CPE Packets	Sent and received messages by the CPE related to a Test Case (not only SOAP)
Execution Details	Real time view of all RPC methods and actions executed in a Test Case, their results, and specific messages about their execution
Test description	Test Case description, aim of the test
Error Message	Detailed error messages associated to a Test Case in case it has failed
Notes	Field for the tester to write any comment/note associated to the Test Case
Events	General information about the Test Plan execution in real time: errors, warnings, and other messages associated to it

For more information please contact:
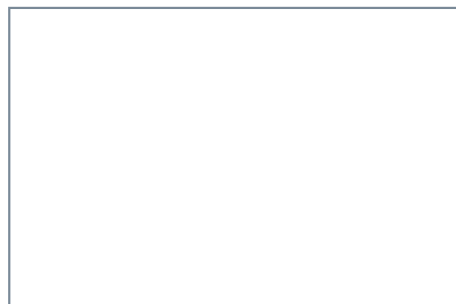
ORDER INFORMATION		
dBm069-Engine+ dBmACS	069-A001	Main automation tool
dBm069-ACS-MOT	069-A012	Interface to connect dBm069-Engine to NOKIA ACS
dBm069-EDIT	069-A021	Allows importing new libraries created in .xml and export them in a .lib format
Libraries		Contact us for more information
Contact info@dbmingenieros.com to receive complete information		

www.dBm069.com
Dual Beam Merger Ingenieros SL
Tel. +34 638743807
C/ Ayala 75
28670 MADRID
SPAIN

Rev. 2018_10