

TTCN-3 @ Ericsson

or...

How to get 1500 TTCN-3 users?

Make sure you have the
right tools!

Make sure you have the right tools!



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Some about Ericsson...

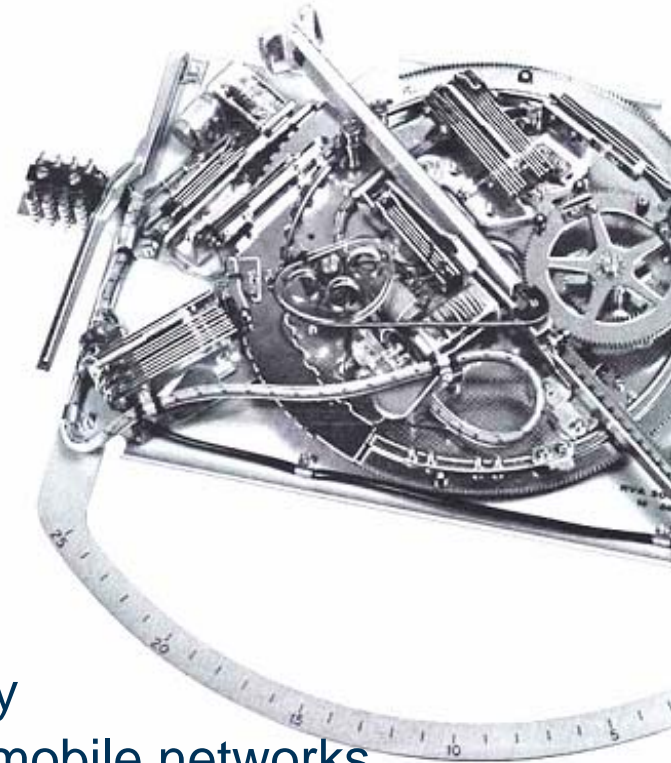
Technology Leadership for 130 years



Ericsson history

130 years of leadership

- 1878 Telegraph to telephone
- 1923 Manual to automatic
- 1968 Electro mechanics to computer control
- 1978 AXE first deployment
- 1981 Fixed to mobile
- 1991 1G analog to 2G digital mobile technology
- 1998 Converge telecom and data in fixed and mobile networks
- 1999 Moving toward 3G and mobile Internet
- 2000 First large scale layered architecture
- 2001 First 3G WCDMA call on public network, operator Vodafone
- 2002 Carrier class IP DSLAM
- 2003 First mobile softswitch deployment
- 2004 Breakthrough of WCDMA
- 2005 Mobile Broadband with HSDPA
- 2006 First field deployment of VDSL2 in Europe



Ericsson drives telecommunication evolution



Standardization Landscape



Some about Testing...

The testing challenge

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A lot more to test...

- Telecom represents an ever increasing network complexity
- Test are expected under customer like (load test) behaviour
- Agile development methods drives more testing (daily test)
- New platforms and processors (multi-core) are non-deterministic

...in a lot less time!

- Ericsson R&D are on the path to reduce lead-time by 50%



The test tool challenge

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Once upon a time...

- Lack of good tools for test automation (true automation)
- Several scripting languages with different logics, capabilities and syntax
- Each tool had its own user interface, formats of logging and configuration
- Tools were stand alone monoliths incapable of communicating

...but now with **TTCN-3** !

- One scripting language
- One user interface
- One logging format
- One configuration format
- One tool integration technology

eclipse



TTCN-3

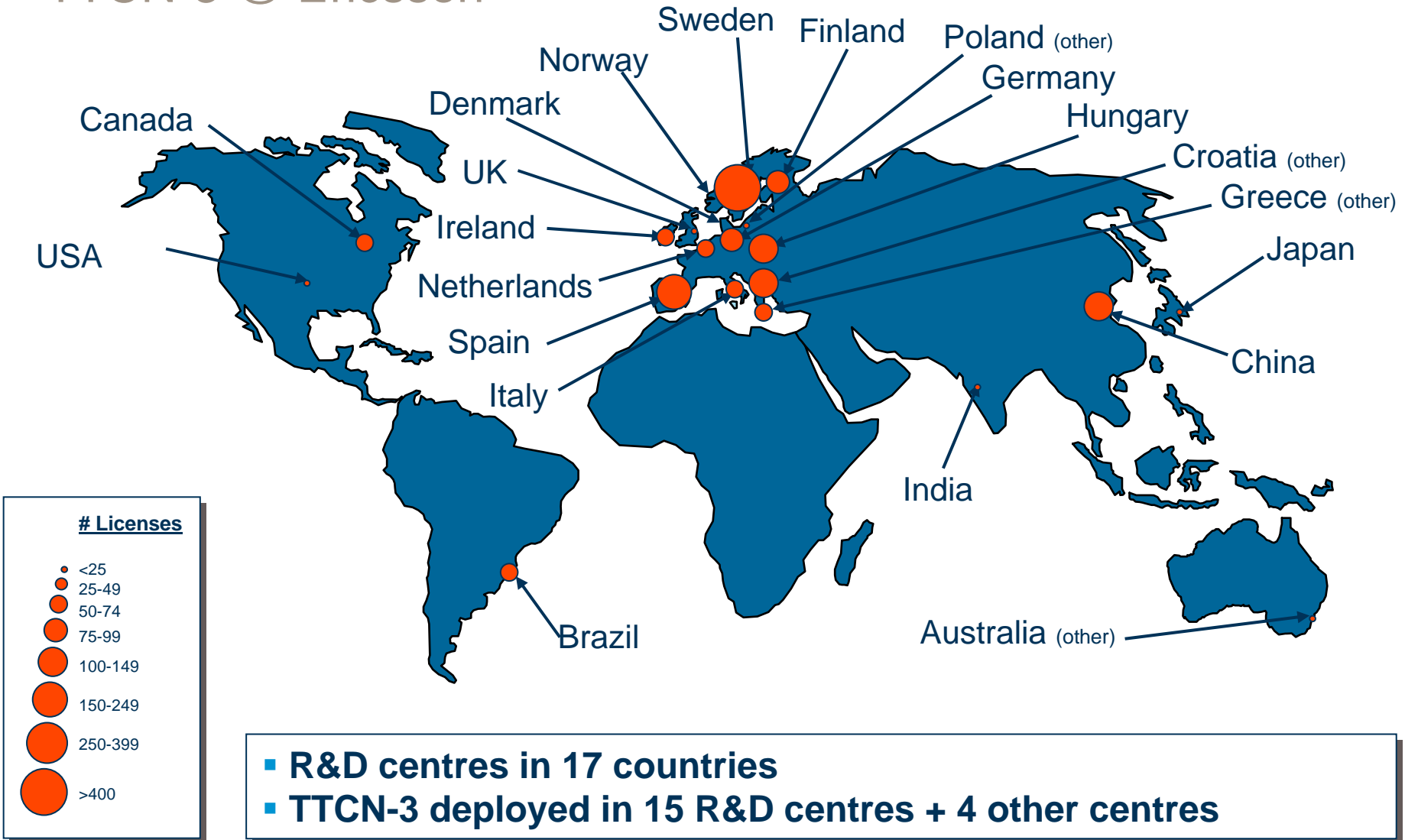
History

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- 1992 Development **start of a TTCN-2 toolset**, the *System Certification System (SCS)*, at Ericsson, Finland
- 1993 First release of SCS
- 1997 Development responsibility of SCS is moved from Finland to the *Test Competence Center (TCC)* at Ericsson, Karlskrona, Sweden. The *Conformance Test Lab* (research) is established in Ericsson, Hungary
- 2000 As a part of a master thesis the *Conformance Test Lab* develops a **TTCN-3 tool prototype called TITAN**
- 2002 The *TITAN* tool is presented at the *ETSI* launch event of *TTCN-3* as the only functional tool
- 2003 The whole *TCC* operation and *SCS* responsibility is moved from Sweden to Ericsson, Hungary, and the first official *TITAN* release is made
- 2004 No further development of the *SCS* tool, full focus on *TITAN*.
- 2006 First *TITAN* load solution launched.
- 2007 The *SCS* tool is put at end-of-life, while **TITAN has gained 1500+ Ericsson users**, provided solutions for large number of *Protocol* and *Test Ports* with supports for multiple *platforms* and supplied an *Eclipse IDE* and *log viewer*

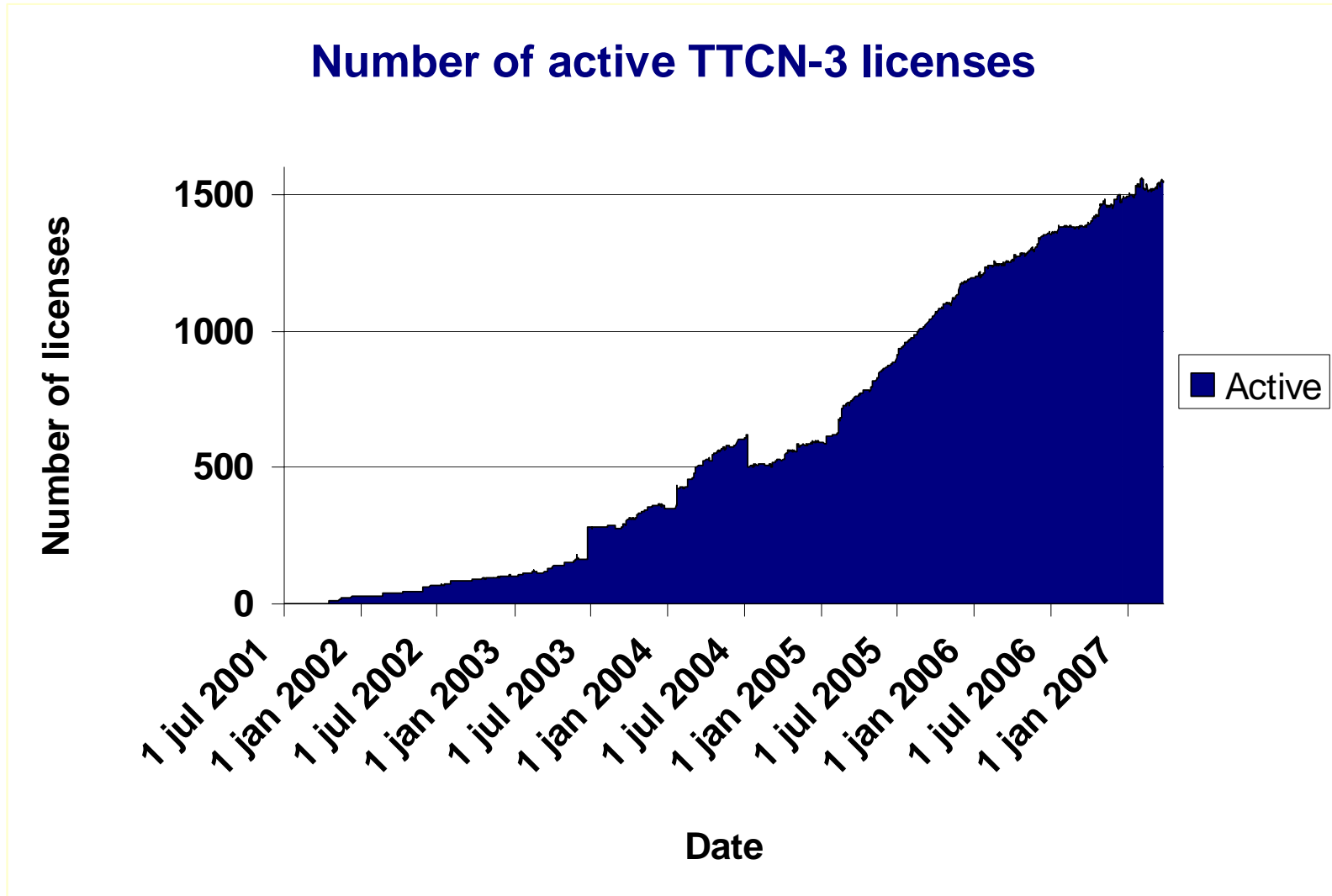
Deployment geographically

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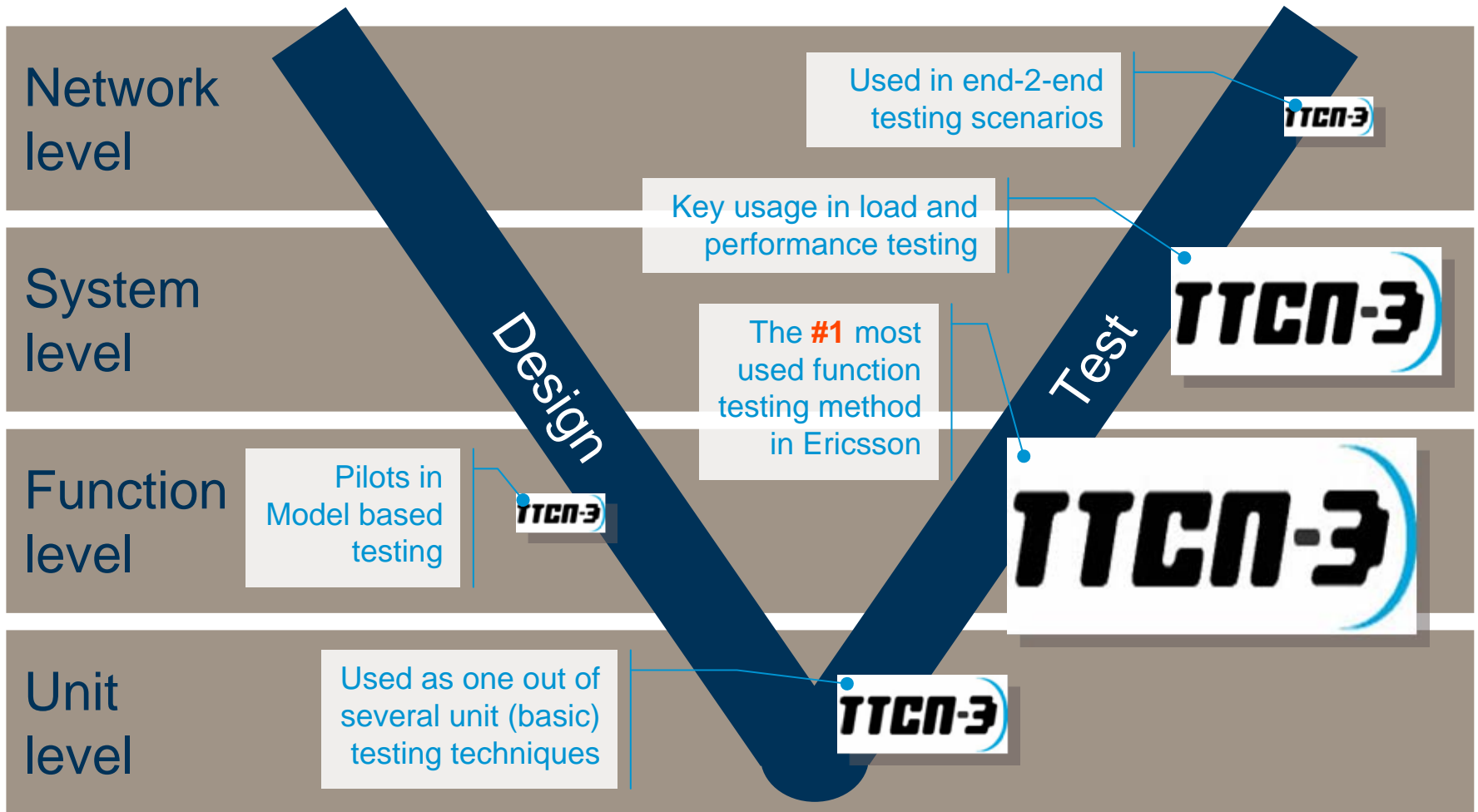
Deployment over time

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Deployment in test phases

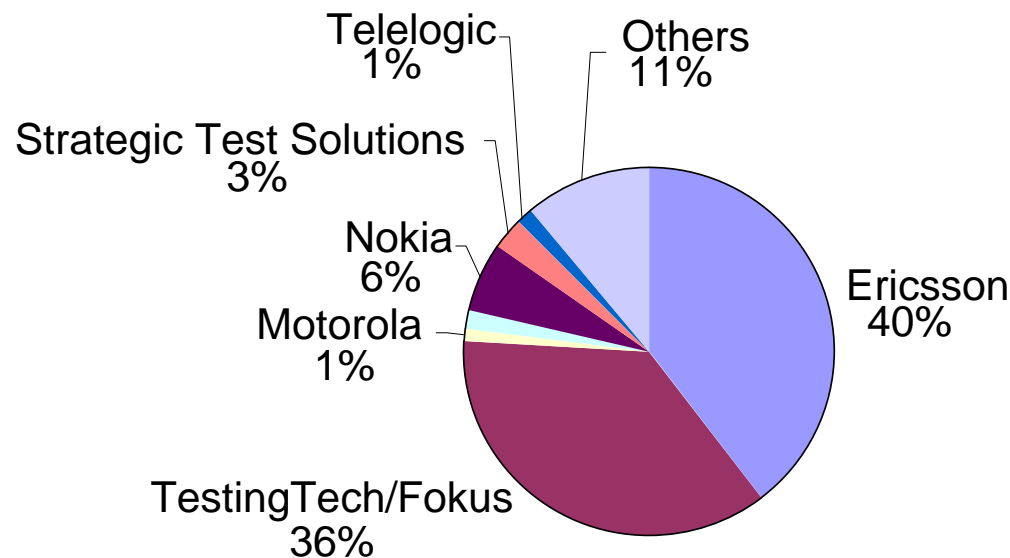
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Standardization

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- Ericsson/TCC actively participates in
 - TTCN-3 language specification (standards making)
 - TTCN-3 language maintenance (decision of CR)
 - TTCN-3 language usage (writing standard test suites in TTCN-3)



Accepted CRs to TTCN-3 ed.3 in the parts (part 1, 4 and 7) where Ericsson is active - Core language, Operational semantics and mapping TTCN-3 to ASN.1

TITAN

What is TITAN?

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- **World's first** fully functional TTCN-3 test tool!
 - Was the only one supporting edition 1 of the language (2000-2002)
 - The only functional tool presented at the TTCN-3 Launch event of ETSI (2002)
- A **software test tool** capable of load
 - Supports multiple platforms: Solaris, Linux SUSE9.x, SLES8, RedHat9, FreeBSD, Windows (cygwin) and proprietary platforms
 - Load capabilities thanks to an efficient (C/C++) run-time-environment
- An **Ericsson proprietary tool**, not available outside Ericsson*



* Except ETSI and BUTE

More than just a test tool

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Applications
(ready load tools)

Test Suites
(ETSI SIP CTS)

Libraries
(useful functions, load)

Servers
8

Protocol emulations
2

Test Ports (adapters)
60+

Protocol support
120+

TTCN-3 Executor (compilers, RTE,
Developer GUIs, Execution GUIs, utilities)

Efficient test design and execution

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The screenshot displays the Eclipse IDE interface for TTCN-3 test execution. The main window is titled "TITAN Executing - User_side.ttcn - Eclipse SDK".

TITAN Executor monitor view: Shows the test execution environment details:

- State: HC connected
- Host Controller:
 - IP address: a98015.eth.ericsson.se
 - IP number: 159.107.198.15
 - Local host name: E-041DCB66A4094
 - operating system: CYGWIN_NT-5.0 1.5.24(0.156/4/2)
 - HC state: not configured
 - pause function: disabled
 - console logging: enabled

TITAN Executed tests view: Shows the execution results for two test cases:

- tc_testutils_resetAllUes:** Shows a sequence of messages (IDEP_MESSAGE, N_UNITDATA) and a final verdict of **pass**.
- tc_multiRab_PsIntFachThenCs12ToSp0PsRelFirst:** Shows a sequence of messages (IDEP_MESSAGE, N_UNITDATA) and a final verdict of **fail**.

Code Editor: Shows the source code for the test module:

```

6 // Module Parameters
7 //=====
8 modulepar
9 {
10     float tsp_t_basedelay := 2.0;
11     integer tsp_noOfRegPPTCs := 3,
12         tsp_noOfRegUnregPPTCs := 2
13 }
14
15 //=====
16 // Imports
17 //=====
18 import from System_side all;
19
20
    
```

Console: Shows the output of the test execution:

```

Synchronization [Mctr_cli launcher] Main Controller
pause function: disabled
console logging: enabled
MC2>
    
```

Efficient test result analysis

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Log window: [/home/ethgry/SYNC/bin/SYNCHRO._mtc.log] TITAN LogBrowser

Time	Type	Src. info	Event
282	PARALLEL	User_side.ttcn:163(function:)	Disconnect operation finished.
283	PARALLEL	-	Function f_PTCregUnreg finished. PTC remains alive and is waiting for next start.
284	VERDICTOP	User_side.ttcn:166(function:)	setverdict(pass): none -> pass
285	PORTEVENT	User_side.ttcn:163(function:)	Port SYNCm was disconnected from 3:SYNCm.
286	USER	User_side.ttcn:164(function:)	PTC[4](): Component has unregistered
287	PARALLEL	User_side.ttcn:163(function:)	Disconnect operation finished.
288	PORTEVENT	User_side.ttcn:163(function:)	Port SYNCp was disconnected from 3:SYNCp.
289	PORTEVENT	User_side.ttcn:163(function:)	Terminating the connection of port SYNCp to 3:SYNCp. No more messages can be sent through this connection.
290	PORTEVENT	System_side.ttcn:108(function:)	Operation with id 3 was extracted from the queue of SYNCp.
291	PORTEVENT	System_side.ttcn:108(function:)	Operation with id 3 was extracted from the queue of SYNCp.
292	PORTEVENT	System_side.ttcn:74(function:)	Call received on SYNCp from 4 @System_side.S_Sync : { } id 3
293	PORTEVENT	System_side.ttcn:74(function:)	Call received on SYNCp from 4 @System_side.S_Sync : { } id 3
294	TIMEROP	System_side.ttcn:127(function:)	Start timer T_GUARD: 10 s
295	TIMEROP	System_side.ttcn:127(function:)	Start timer T_GUARD: 10 s
296	PORTEVENT	User_side.ttcn:143(function:)	Called on SYNCp to 3 @System_side.S_Sync : { }
297	TIMEROP	User_side.ttcn:139(function:)	Timeout T_WAIT: 2 s
298	USER	User_side.ttcn:141(function:)	PTC[0](): Component reached the 2nd sync point, waiting for green light
299	PARALLEL	User_side.ttcn:241(testcase)	PTC with component reference 7 is done.
300	PARALLEL	User_side.ttcn:241(testcase)	Waiting for PTCs to finish.
301	PARALLEL	User_side.ttcn:241(testcase)	Component type User_side.MTC_CT was shut down.
302	PARALLEL	User_side.ttcn:241(testcase)	Terminating component type User_side.MTC_CT.
303	VERDICTOP	User_side.ttcn:241(testcase)	setverdict(pass): none -> pass
304	PARALLEL	User_side.ttcn:241(testcase)	PTC with component reference 3 was stopped.
305	PARALLEL	User_side.ttcn:241(testcase)	Stopping PTC with component reference 3.
306	PARALLEL	User_side.ttcn:241(testcase)	PTC with component reference 8 is done.
307	PARALLEL	User_side.ttcn:241(testcase)	PTC with component reference 4 is done.
308	PARALLEL	User_side.ttcn:241(testcase)	PTC with component reference 5 is done.
309	PARALLEL	User_side.ttcn:241(testcase)	PTC with component reference 6 is done.
310	PARALLEL	-	Kill was requested from MC. Terminating idle PTC.
311	PARALLEL	-	Terminating component type User_side.PTC_CT.

2007/Apr/23 13:07:19.61718 EXECUTOR unknown TTCN-3 Parallel Test Component started on E-041DC866A4094. Component reference: 6, component type: User_side.PTC_CT, component name: PTC2. Version: 1.7.pl0.

Load capabilities

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- The load solution, *TITANsim*, is tailored to different telecom system characteristics

Titan Runtime GUI test frame

Input parameters Stats

Signalling link status Call group stats

Groups	Orig. static (1-20)	Term. static (21-40)	Orig. load (41-60)	Term. load (61-80)
Groups with line index #0	20 / 20 calls	20 / 20 calls	1.9 / 2.0 / 2 cps	1.0 / 1.0 / 1 cps
Groups with line index #1	20 / 20 calls	20 / 20 calls	1.8 / 2.0 / 2 cps	1.0 / 1.0 / 1 cps
Groups with line index #2	17 / 100 calls	0 / 100 calls	0.0 / 2.0 / 2 cps	0.0 / 0.0 / 1 cps
Groups with line index #3	100 / 100 calls	100 / 100 calls	1.7 / 2.0 / 2 cps	1.0 / 1.0 / 1 cps
Groups with line index #4	0 / 10 calls	0 / 10 calls	0.0 / 0.0 / 0 cps	0.0 / 0.0 / 0 cps
Groups with line index #5	10 / 10 calls	0 / 10 calls	0.0 / 0.0 / 0 cps	0.0 / 0.0 / 0 cps
Groups with line index #6	0 / 0 calls	0 / 0 calls	0.0 / 0.0 / 0 cps	0.0 / 0.0 / 0 cps
Groups with line index #7	0 / 0 calls	0 / 0 calls	0.0 / 0.0 / 0 cps	0.0 / 0.0 / 0 cps
Groups with line index #8	0 / 0 calls	0 / 0 calls	0.0 / 0.0 / 0 cps	0.0 / 0.0 / 0 cps
Groups with line index #9	0 / 0 calls	0 / 0 calls		
Groups with line index #10	0 / 0 calls	0 / 0 calls		
Groups with line index #11	0 / 0 calls	0 / 0 calls		
Groups with line index #12				
Groups with line index #13				
Groups with line index #14				
Groups with line index #15				
Groups with line index #16				
Groups with line index #17				

TTCN changed call_group_status_table.7.4 to [led:blue]0.0 / 0.0 / 0 cps

Start test Stop test Snapshot Exit TTCN

Titan Runtime GUI test frame

Input parameters Stats

Orig. static call groups Term. static call groups Orig. load call groups Term. load call groups Signalling link logs

GroupID	Start CIC	End CIC	Start B#	End B# (calculated fr...	Call intensity (CPS)
Index#0:Group1	8	27	9086000	9086019	1
Index#1:Group2	1	20	9091000	9091019	1
Index#2:Group3	1	100	9118000	9118099	3
Index#3:Group4	1	100	9143000	9143099	3
Index#4:Group5	1	10	9156000	9156009	1
Index#5:Group6	1	10	9164000	9164009	1
Index#6:UnallocGrou...	8	31	00	23	0
Index#7:UnallocGrou...	1	31	00	30	0
Index#8:UnallocGrou...	1	310	00	309	0
Index#9:UnallocGrou...	1	310	00	309	0
Index#10:UnallocGrou...	1	31	00	30	0
Index#11:UnallocGrou...	1	31	00	30	0

TTCN changed call_group_status_table.7.4 to [led:blue]0.0 / 0.0 / 0 cps

Start test Stop test Snapshot Exit TTCN

example from an existing load solution

Successes

How to get 1500 TTCN users?

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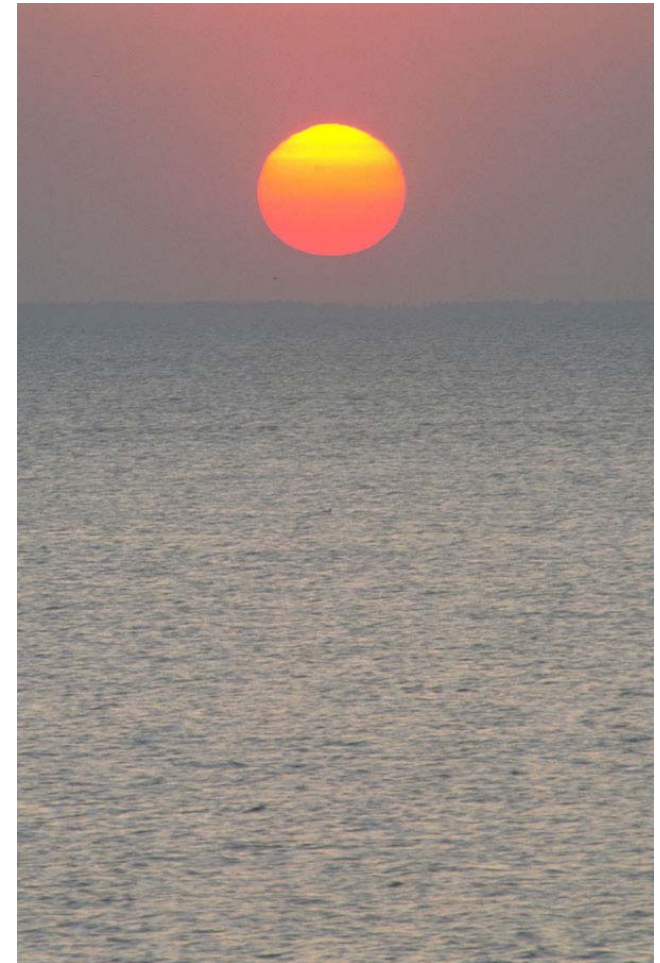
- Long **TTCN history** generating high maturity
 - Research even before commercial vendors
- Pushing for the use of a **standard test notation**
 - Easy reuse, competence build-up, a single tool
- Active participation in **ETSI**
 - To grant the Ericsson needs
- In-house **tools development**
 - For fast provisioning, test port development, training, etc
- Dedicated **support group**
 - The Test Competence Centre and local groups
- Reference **network**
 - Truly committed TTCN champions, yearly internal TTCN conference
- An R&D all **management commitment**
 - Long term granted funding



Contact

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