

**ITU-T Workshop on Delivering Good Quality
Telecommunication Service
In a Safe Environment in Africa
(Nairobi, Kenya, 26 July – 27 July 2010)**

End to End Testing

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Senior Sales Consultant
Ibys Technologies**



PLORES
2005

System



System Definition

Xplorer QoS is a system designed to provide a clear and objective vision of Quality of Service, as perceived by the end user.

***Intended for Telecom Operators,
Service & Content Providers, as well
as Telecom Regulators.***

Why a QoS Tool

- *Constant competitive pressures of the fast-moving wireless industry.*
- *More sophisticated/complex services and mobile terminals being launched to the market.*
- *Automatic monitoring/supervision of services*
- *Helps establish a standard testing methodology*
- *Provides customized reports and statistics.*
- *Allows benchmarking in multi-operator, multi-technology environments.*
- *Helps control services and check Service provider's compliance with Telecom Authority's regulatory guidelines.*
- *Less number of human resources needed for Testing and associated tasks.*

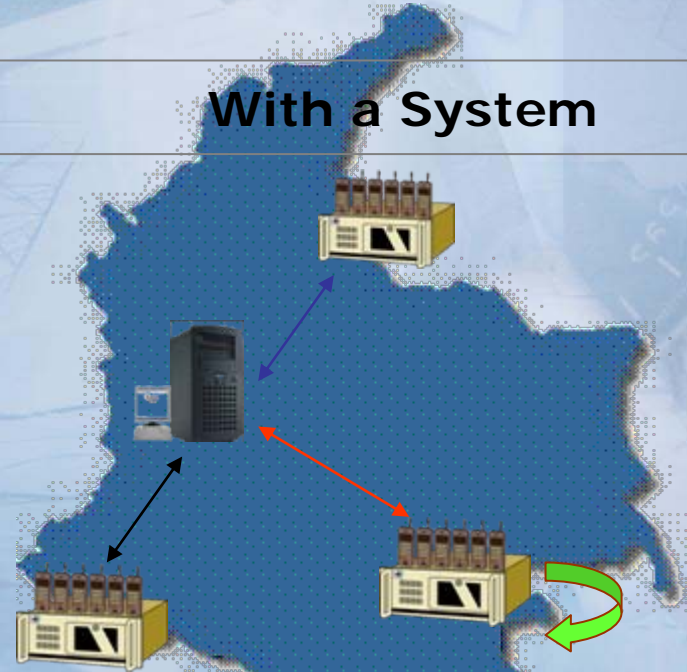
Automation Advantages

Without a System



- ✓ Inexact procedure of Testing
- ✓ Human errors
- ✓ Tests limited in time
- ✓ Subjective results
- ✓ Many man-hours resources

With a System

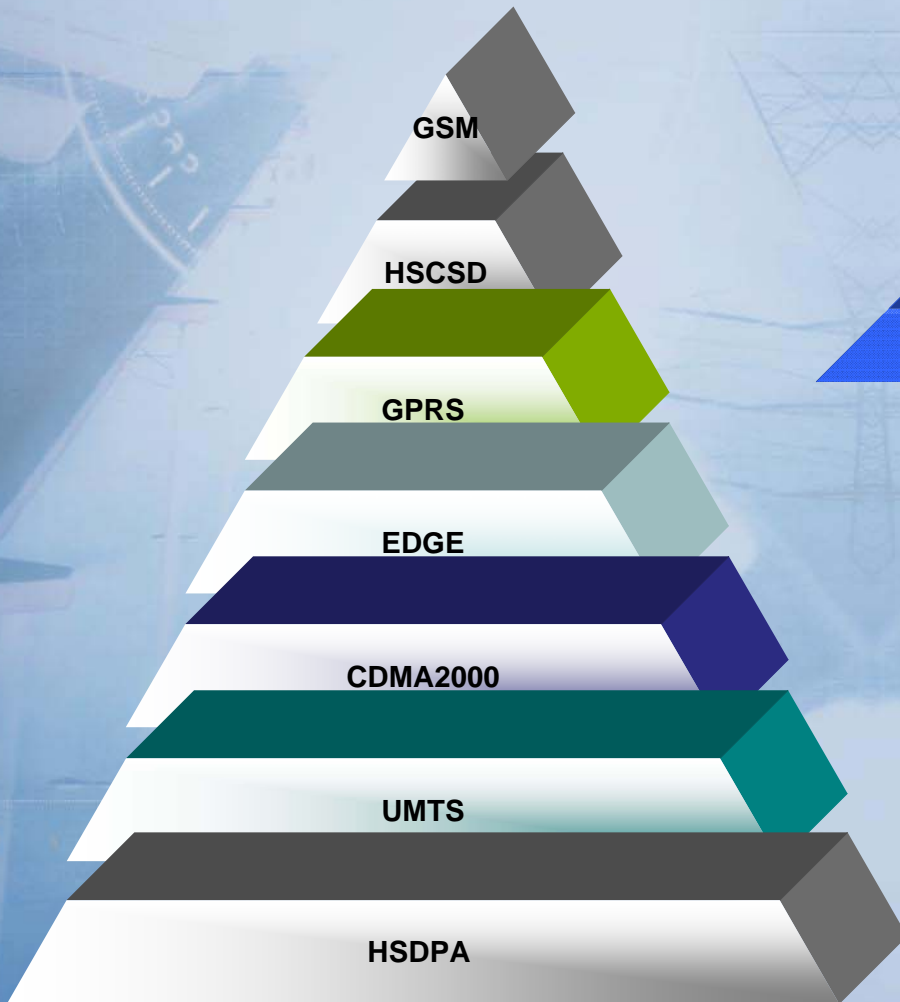


- ✓ Programmable test units
- ✓ Strict procedure of Testing
- ✓ Human errors reduced to minimum
- ✓ No time limits for testing
- ✓ Objective results
- ✓ OPEX reduction

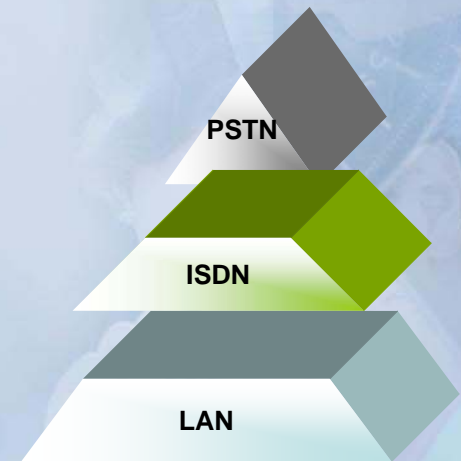
Main Features

- ↗ Very Friendly GUI
- ↗ Extremely Flexible, HW/SW Straightforward Scalability
- ↗ Advanced Scripting Tool for Testing Purposes
- ↗ Mobile/Fixed/ADSL/VoIP/Wimax Testing
- ↗ Up to Eight Testing Interfaces Capability
- ↗ Simultaneous Testing Execution for Different Services and Technologies
- ↗ Industrial/Commercial Handset Interfaces Availability
- ↗ One-4-All Fixed-Mobile-Portable HW Unit
- ↗ Google-Map GIS solution
- ↗ Can be customized According to Client's Specific Requirements
- ↗ Complete Alarm System Management
- ↗ Multi_Sim Server Capability
- ↗ Multi Terminal Emulation and Embedded OS-Mobile Testing
- ↗ Billing Module (time leakage analysis)
- ↗ Prepaid Balance Checkout
- ↗ Out/inbound Roaming Tests
- ↗ Best Proven Cost-Benefit Relation in the Market

Mobile



Fixed



Services Supported

- Messaging Services (SMS, EMS, MMS)
- VoIP
- Voice Services (Voice Mail, Speech Quality, Echo...)
- IVR Services (DTMF, Voice Navigation/Recognition...)
- Prepaid Services
- WAP Services
- Internet Services (HTTP, FTP, UDP, Web, email...)
- Media Streaming (Audio, Video)
- Video Telephony
- BlackBerry
- Location, Fax, i-mode
- PTT, Instant Messaging, Mobile TV
- Roaming, IREG, TADIG
- xDSL
- DVB-H Support
- Fixed/Wimax services

Control Unit:
System Management

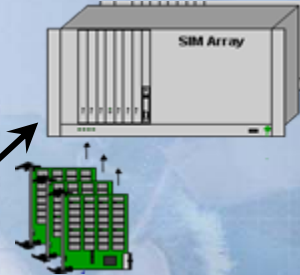
Control Unit functions:

- PUs Control
- External System Comm.
- Test Case Definition
- Test Case Scheduling
- Results Access
- Alarm Management



Sim_Server functions:

- Accommodates physical SIM-cards (hundreds)
- Allocates SIM-card resources



Portable Remote Unit, for Coverage monitoring & Network availability at public places



Remote Access



HW Equipment - External Appearance



Rack mounted Probes



Sim-Server



Fixed-Portable-Mobile Probe



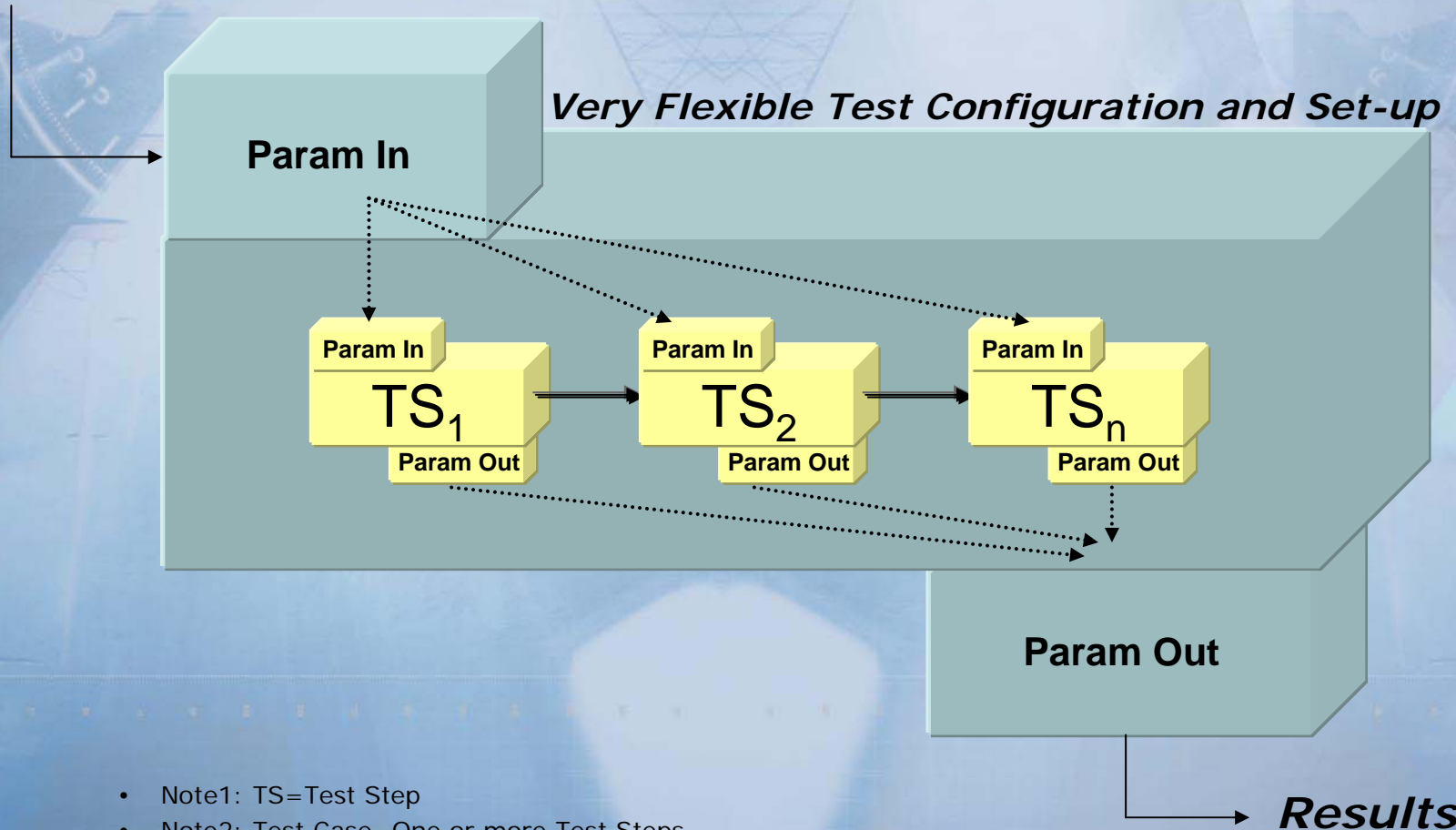
Rack mounted Control Center
(Server)



Standalone PDA Probe

Test Case Edition

Configuration



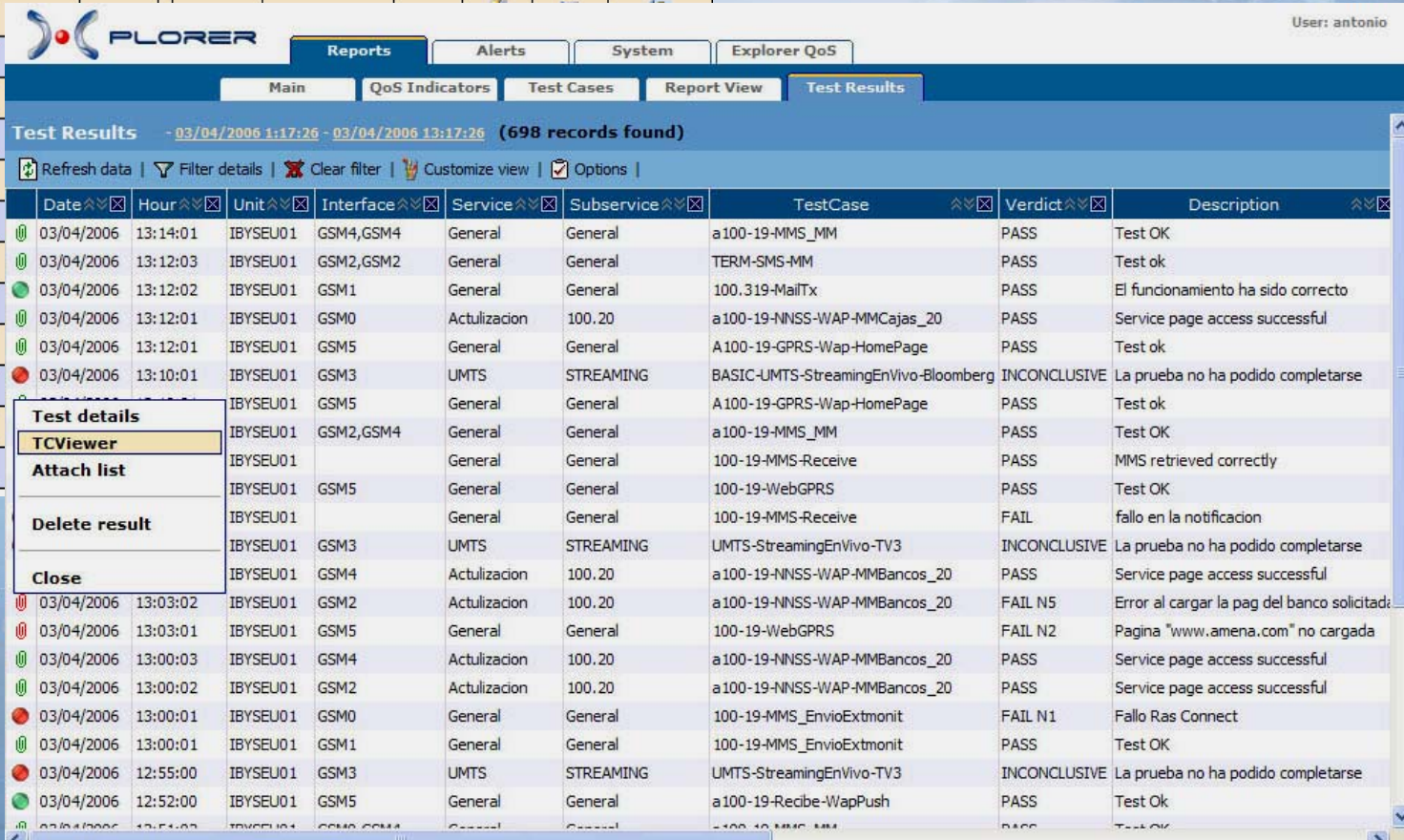
- Note1: TS=Test Step
- Note2: Test Case=One or more Test Steps

Supervision Capabilities

Reports, Alarms, SLAs

- Global Service Indicators
- Real Time Alarms, Events and SLAs.
- Graph Generation
- System Information
- Etc

Service	SLI %	Dif %	SLA %	Date	Hour	Alert	Filter	Graphic
GPRS	■	■	98	03/01/2005	0:00			
SubService	SLI (%)	Dif (%)	SLA (%)	Date	Hour	Alert	Filter	Graphic
AmenaMail	■	■	98	03/01/2005	0:00			
TestCase	SLI %	Dif %	SLA %	Date	Hour	Alert	Filter	Graphic
EnvioEmail_GPRS_CuentaGMail	■	■	98	03/01/2005	0:00			
EnvioEmail_GPRS_test11_CuentaExterna	■	■	98	03/01/2005	0:00			
EnvioEmail_GPRS_test11_CuentaInterna	■	■	98	03/01/2005	0:00			
EnvioEmail_GPRS_test2_CuentaExterna								
EnvioEmail_GPRS_test2_CuentaInterna								
EnvioEmail_GPRS_test5_CuentaExterna								
EnvioEmail_GPRS_test5_CuentaInterna								
EnvioEmail_GPRS_test8_CuentaExterna								
EnvioEmail_GPRS_test8_CuentaInterna								
RecibeMail_GPRS								
RecibeMail_GPRS_CuotaExcedida								
RecibeMail_GPRS_test11_POP3								
RecibeMail_GPRS_test2_POP3								
RecibeMail_GPRS_test5_POP3								
RecibeMail_GPRS_test8_POP3								



User: antonio

Reports Alerts System Explorer QoS

Main QoS Indicators Test Cases Report View **Test Results**

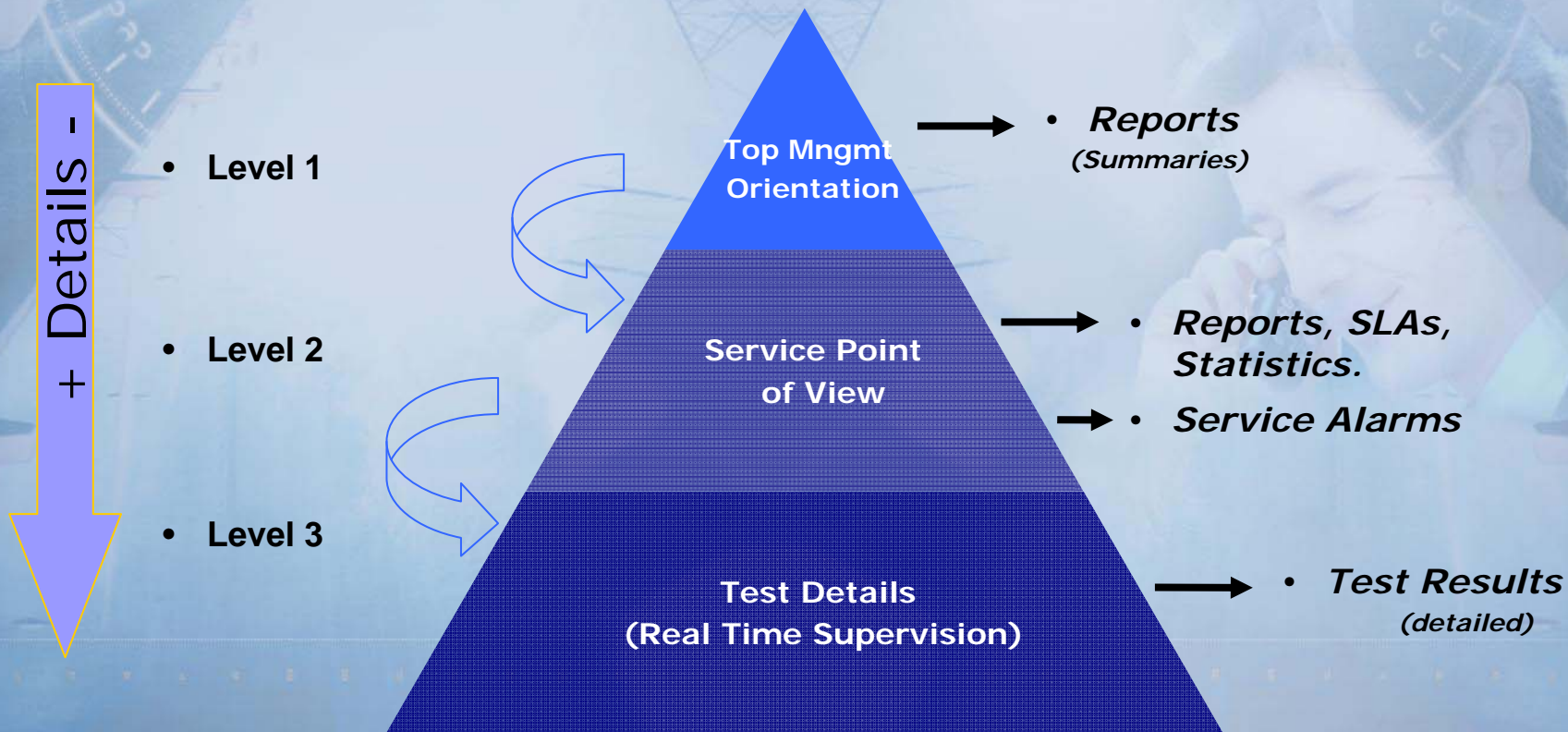
Test Results - 03/04/2006 1:17:26 - 03/04/2006 13:17:26 (698 records found)

Refresh data | Filter details | Clear filter | Customize view | Options

Date	Hour	Unit	Interface	Service	Subservice	TestCase	Verdict	Description
03/04/2006	13:14:01	IBYSEU01	GSM4,GSM4	General	General	a100-19-MMS_MM	PASS	Test OK
03/04/2006	13:12:03	IBYSEU01	GSM2,GSM2	General	General	TERM-SMS-MM	PASS	Test ok
03/04/2006	13:12:02	IBYSEU01	GSM1	General	General	100.319-MailTx	PASS	El funcionamiento ha sido correcto
03/04/2006	13:12:01	IBYSEU01	GSM0	Actualizacion	100.20	a100-19-NNSS-WAP-MMCajas_20	PASS	Service page access successful
03/04/2006	13:12:01	IBYSEU01	GSM5	General	General	A100-19-GPRS-Wap-HomePage	PASS	Test ok
03/04/2006	13:10:01	IBYSEU01	GSM3	UMTS	STREAMING	BASIC-UMTS-StreamingEnVivo-Bloomberg	INCONCLUSIVE	La prueba no ha podido completarse
		IBYSEU01	GSM5	General	General	A100-19-GPRS-Wap-HomePage	PASS	Test ok
		IBYSEU01	GSM2,GSM4	General	General	a100-19-MMS_MM	PASS	Test OK
		IBYSEU01		General	General	100-19-MMS-Receive	PASS	MMS retrieved correctly
		IBYSEU01	GSM5	General	General	100-19-WebGPRS	PASS	Test OK
		IBYSEU01		General	General	100-19-MMS-Receive	FAIL	fallo en la notificacion
		IBYSEU01	GSM3	UMTS	STREAMING	UMTS-StreamingEnVivo-TV3	INCONCLUSIVE	La prueba no ha podido completarse
		IBYSEU01	GSM4	Actualizacion	100.20	a100-19-NNSS-WAP-MMBancos_20	PASS	Service page access successful
03/04/2006	13:03:02	IBYSEU01	GSM2	Actualizacion	100.20	a100-19-NNSS-WAP-MMBancos_20	FAIL N5	Error al cargar la pag del banco solicitada
03/04/2006	13:03:01	IBYSEU01	GSM5	General	General	100-19-WebGPRS	FAIL N2	Pagina "www.amena.com" no cargada
03/04/2006	13:00:03	IBYSEU01	GSM4	Actualizacion	100.20	a100-19-NNSS-WAP-MMBancos_20	PASS	Service page access successful
03/04/2006	13:00:02	IBYSEU01	GSM2	Actualizacion	100.20	a100-19-NNSS-WAP-MMBancos_20	PASS	Service page access successful
03/04/2006	13:00:01	IBYSEU01	GSM0	General	General	100-19-MMS_EnvioExtmonit	FAIL N1	Fallo Ras Connect
03/04/2006	13:00:01	IBYSEU01	GSM1	General	General	100-19-MMS_EnvioExtmonit	PASS	Test OK
03/04/2006	12:55:00	IBYSEU01	GSM3	UMTS	STREAMING	UMTS-StreamingEnVivo-TV3	INCONCLUSIVE	La prueba no ha podido completarse
03/04/2006	12:52:00	IBYSEU01	GSM5	General	General	a100-19-Recibe-WapPush	PASS	Test Ok
03/04/2006	12:51:00	IBYSEU01	GSM4,GSM4	General	General	a100-19-MMS_MM	PASS	Test OK

Test details
TCViewer
Attach list
Delete result
Close

Report Management



- Verdict Distribution Report (Daily, Hourly)
- KPIs (Real Time or Historical Information)
- Test Parameters Average Report
- SLIs (Service level indicators)

Statistical reports

Refresh data | Report | Test Results | Report View | Auto Refresh | Historic

◀ 2006 ▶

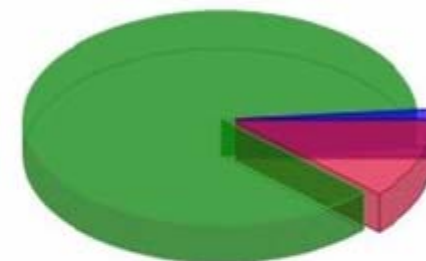
Jan	Feb	Mar	Apr	May	Jun	
Jul	Aug	Sep	Oct	Nov	Dec	
Mo	Tu	We	Th	Fr	Sa	Su
25	26	27	28	29	30	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	1	2	3	4	5

From: 25/09/2006 To: 05/11/2006

Group by: Service/SubService/TestCase SLI [Historic mode] at 2006-11-05 23:59:59

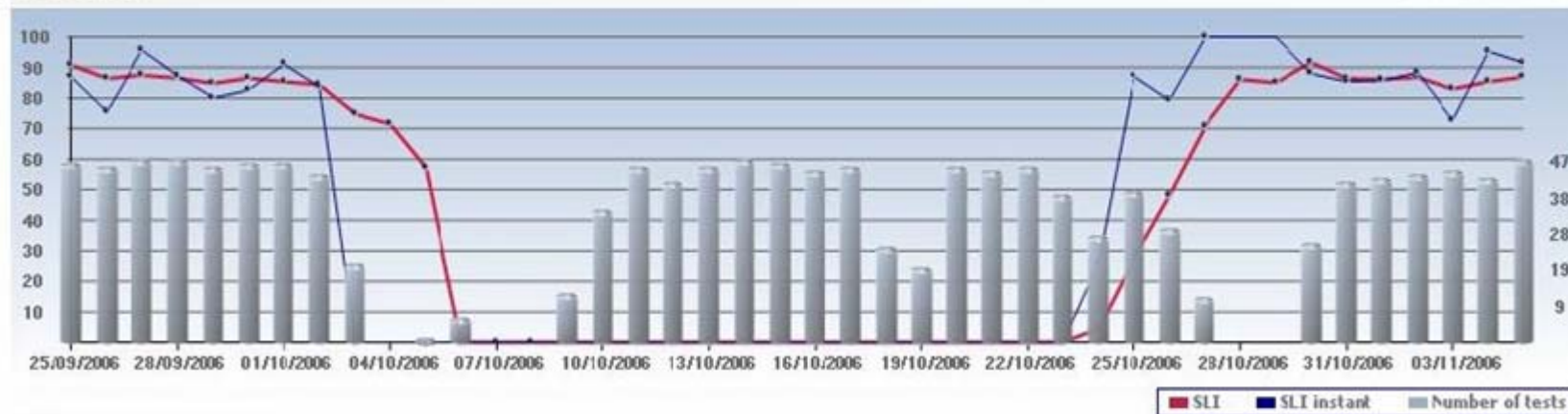
Services	% SLI	Subservices	% SLI	TestCases	% SLI
Actualizacion	80,89%	100-22	80,89%	GPRS..FoundTripTI	98,81%
General	100,00%			MMS_Donde_Wap2.0	0,00%
WAP	68,62%			MMS_MV	100,00%
WEB	0,00%			NINSS..IVR..Cazap	80,90%
				SMS..Conf..MMS	0,00%
				SMS-MN	100,00%
				WAP..GPRS..Desc..	97,92%
				WAP-GSM	86,47%
				WAP..VideoStream	97,21%

Verdict Distribution | Show legend |



Actualizacion / 100-22 / WAP-GSM

SLI Evolution



SLI | Verdict distribution | Mean statistics | Success Only | Show number of tests serie | Show SLI instant serie |

Reports statistics

[Refresh data](#) | [Report](#) | [View Test Results](#)

◀ 2006 ▶

Jan	Feb	Mar	Apr	May	Jun
Jul	Aug	Sep	Oct	Nov	Dec
		27	28	1	2
		3	4	5	6
		7	8	9	10
		11	12	13	14
		15	16	17	18
		19	20	21	22
		23	24	25	26
		27	28	29	30
		31	1	2	

From: 13/03/2006 To: 19/03/2006

Select viewer

 View: Test cases

Services

Actulizacion	94%
General	91%
MMS	98%
UMTS	84%

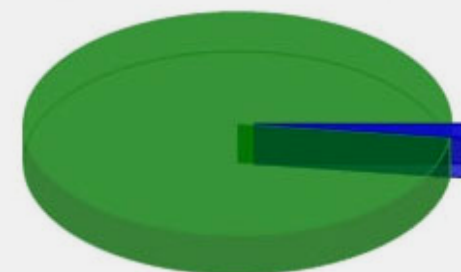
Subservices

General	91%
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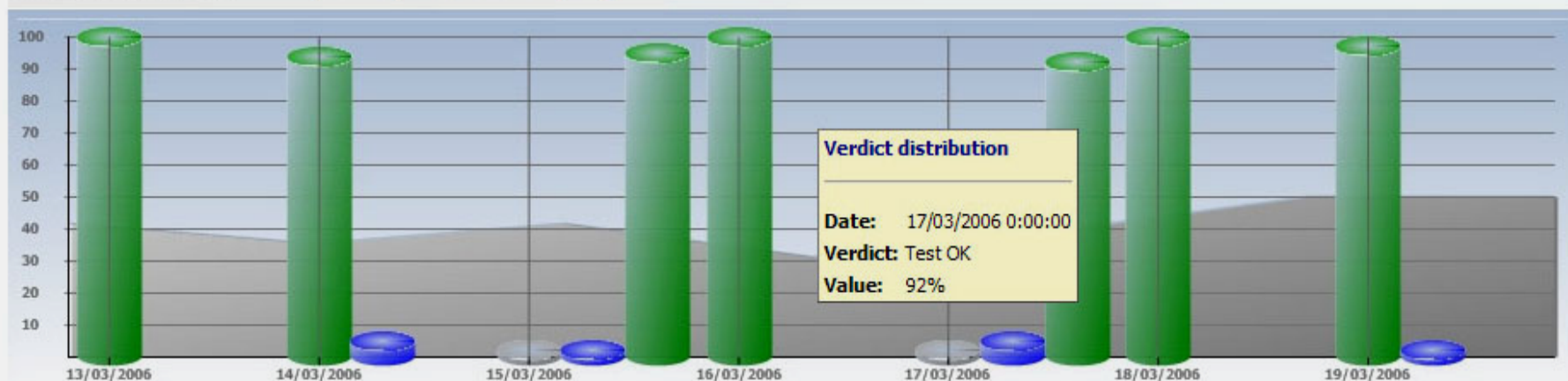
Test Cases

100.319-MailTx	100%
100-19-MMS_EnvioE...	82%
100-19-MMS-Receive	75%
100-19-RecibeMail...	97%
100-19-Solicita_W...	99%
100-19-WebGPRS	72%
A100-19-GPRS-Wap...	96%
a100-19-MMS_MM	97%
100-19-RecibeMail	100%

Verdict distribution | Legend



Verdict distribution General / General / 100-19-WebGPRS (72%)



About Pre-/Post-paid Subscribers and Billing

■ **Intregating Xplorer - Billing System**

1. Xplorer receives via FTP 2 types of files from the operator's system: Call & SMS CDRs.
2. Xplorer validates and imports these records into the database.

■ **Xplorer generates its own internal CDRs that are also stored in the database.**

■ **The external and internal CDR are consolidated and analyzed.**

■ **Relevant data of the consolidation is displayed in the Billing Report Screen.**

■ **The Billing Report Screen shows the possible inconsistencies detected, such as:**

1. The call duration is different (a configurable error margin is applied)
2. Calls and SMS generated by Xplorer but not detected in the external CDR (not charged)
3. Calls and SMS detected in external CDR but no internal CDR exists (extra charge)
4. Other data can be also validated...

■ **Prepaid Subscribers:** Xplorer also validates subscribers' balance, before and after making a call, executes "recharge tasks" and check consistency.

■ **The scripting functionality of Xplorer allows users to build up test-cases for the corroboration of certain billing scenarios.**

Billing - 27/11/2006 0:00:00 - 20/02/2007 23:59:59 (8637 results found)

 | | |

	TsInit	Type	ProbeUnit	Interfaces	Verdict	Info	Eval	NA	NB	BSC	MSC	SMSC	Test-Duration	SOX-Duration	Difference
✓	17/01/2007 14:16:10	SMS	IBYSEU01	GSM1,GSM0	PASS	SMS MM	OK	635001068	615976470			SMSMORDOR			
✓	17/01/2007 14:15:13	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 14:13:16	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 14:11:14	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,407		1
✓	17/01/2007 14:09:18	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 14:07:16	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,407		1
✓	17/01/2007 14:06:10	SMS	IBYSEU01	GSM1,GSM0	PASS	SMS MM	OK	635001068	615976470			SMSMORDOR			
✓	17/01/2007 14:05:15	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 14:03:13	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,407		1
✓	17/01/2007 14:01:14	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,407		1
✓	17/01/2007 13:47:14	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 13:46:10	SMS	IBYSEU01	GSM1,GSM0	PASS	SMS MM	OK	635001068	615976470			SMSMORDOR			
✓	17/01/2007 13:45:14	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,407		1
✓	17/01/2007 13:43:16	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 13:41:14	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 13:39:13	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 13:37:16	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 13:36:10	SMS	IBYSEU01	GSM1,GSM0	PASS	SMS MM	OK	635001068	615976470			SMSMORDOR			
✓	17/01/2007 13:35:16	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,406		1
✓	17/01/2007 13:33:12	MOC	IBYSEU01	GSM0,GSM1	PASS	CALL 400 ms	OK	615976470	635001068	BSCIBYS	MORDOR		0,407		1

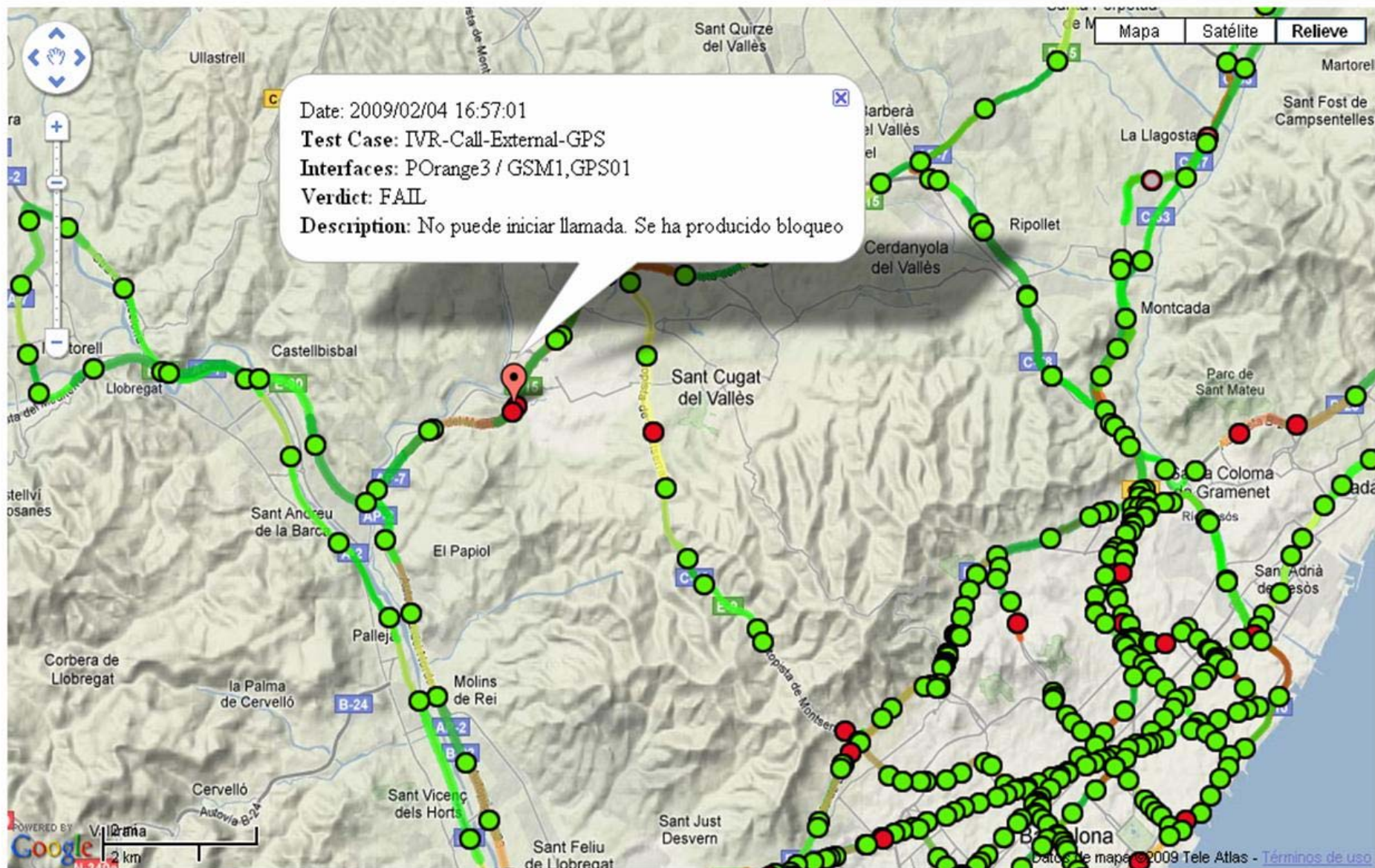
Map Representation

***Test results and associated GPS coordinates
are represented on maps.***

***The views and results depicted on the map
can be personalized***

See some screenshots on next slides

Source : Test File: IVR-Call-External-GPS-Barcelona (04-02-2009)



Map Type:

Path Size: Opacity:

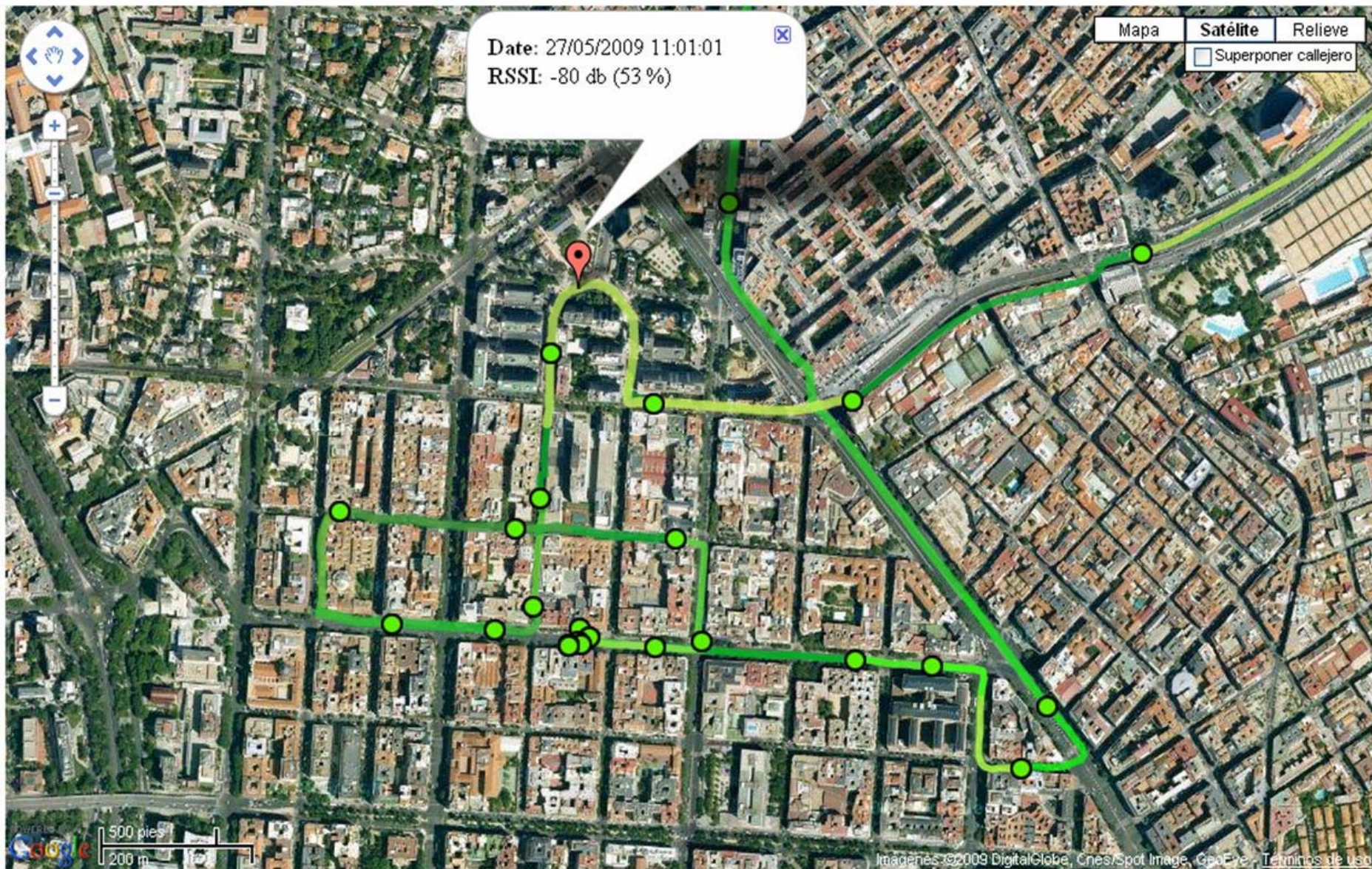
Source : Coverage: Vigo 31-05-2009



Map Type:

Path Size: Opacity:

Source : Test File: IVR-Call-External-GPS-Madrid (27-05-2009)



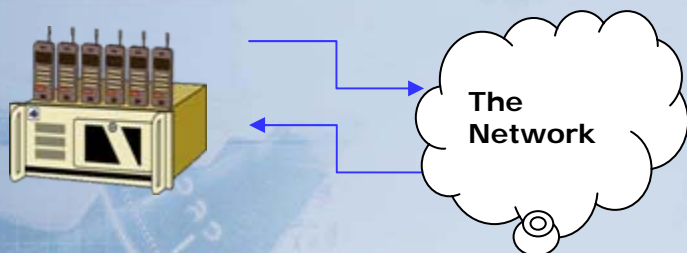
Map Type:

Path Size: Opacity:



KPIs Examples

1.- GSM A sends SMS to GSM B



2.- GSM B receives SMS from GSM A

•Verdict

•Pass

•Fail

•Sending error
•Receiving error
•Content error
•Etc

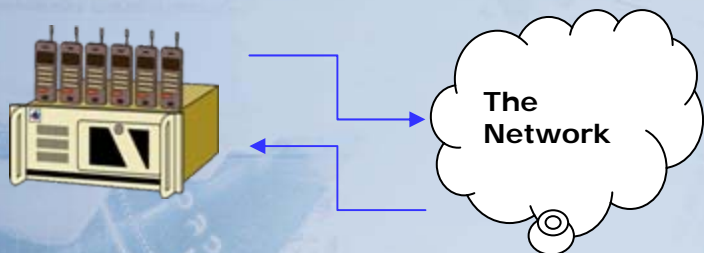
Test
Results

•Error Id
•Sending Time
•Delivery Time
•Etc

SMS KPIs Generated

- **SMS Service Non-Accessibility MO (%)**
- **SMS Service Send Time MO [average seconds]**
- **SMS Delivery Failure Ratio MT (%)**
- **SMS End-to-end Delivery Time [average in seconds]**
- **SMS Correct Reception Ratio (%)**

1.- GSM A makes a CALL to GSM B



2.- GSM B receives a CALL from GSM A
3.- GSM B accepts the CALL
4.- GSM B releases the CALL

Test
Results

•Verdict

•Pass

•Fail

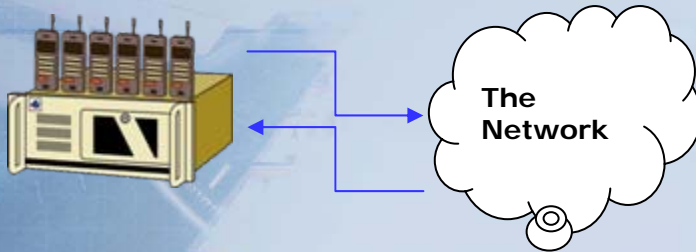
•Calling error
•Receive Call error
•Dropped Call
•Etc

•Establishment Time
•Etc

Voice Call KPIs Generated

- **Voice Service Accessibility [%]**
- **Voice Call Establishment Ratio [%]**
- **Voice Call Establishment Time Average [seconds]**
- **Voice Drop Call Ratio [%]**

- 1.- GSM A Attaches to GPRS Network
- 2.- GSM A Activates PDP Context
- 3.- GSM A Starts a FTP download
- 4.- FTP download finishes



Test
Results

•Verdict

•Pass

•Fail

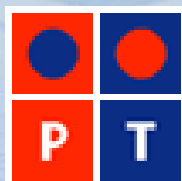
- Attach error
- PDP Activation error
- FTP Service error
- Service Cut-off
- Etc

- FTP Throughput
- Time to Activate PDP
- Time to Init FTP
- Etc

GPRS Service KPIs Generated

- **GPRS Service Accessibility [%]: When FTP Starts correctly**
- **GPRS Access Time Average [seconds]**
- **GPRS FTP Throughput Average [bps]**

Key References



Telecom Regulator
of Jordan



Jordan and Zambia Telecom Authorities Success case brief presentation

The following presentation is a “case study” of the use of the System Xplorer QoS for the generation of service quality parameters and statistics, and for benchmarking, in one case (Zambia), of local mobile operators and in the other case (Jordan), of Wimax Service Providers.

The platform “Xplorer QoS” allows obtaining E-2-E parameters as perceived by end users.



***A Success Story:
Communication Authority of Zambia
(CAZ)***

Objective

To validate and monitor the Quality o Service of all regional Operators:



CELTEL



ZAMTEL - CELZ



MTN

Services to be considered:

- IVR
- SMS
- Voice
- Prepaid Service
- Internet

Main Objective is to **standardize** procedures and measurements.

System Overview



Deployed System

Probe Units

- 6 fix Probe Units
- 4 Mobile Phones connected at each probe
- Using SIM Server for SIM card simulation

Portable Probe Units

- 4 Mobile Probe Units
- 4 Mobile Phones connected to each probe

Control Server

- 1 Control Center
- Central Management and Supervision of the whole system

Sim Server

- 1 SIM Server
- Central SIM Card Management
- 32 SIM cards slots availability (224 slots = if fully equipped)

Tested Services

- ✓ **IVR**
- ✓ **SMS**
- ✓ **Voice**
- ✓ **Prepaid Balance**
- ✓ **Internet**



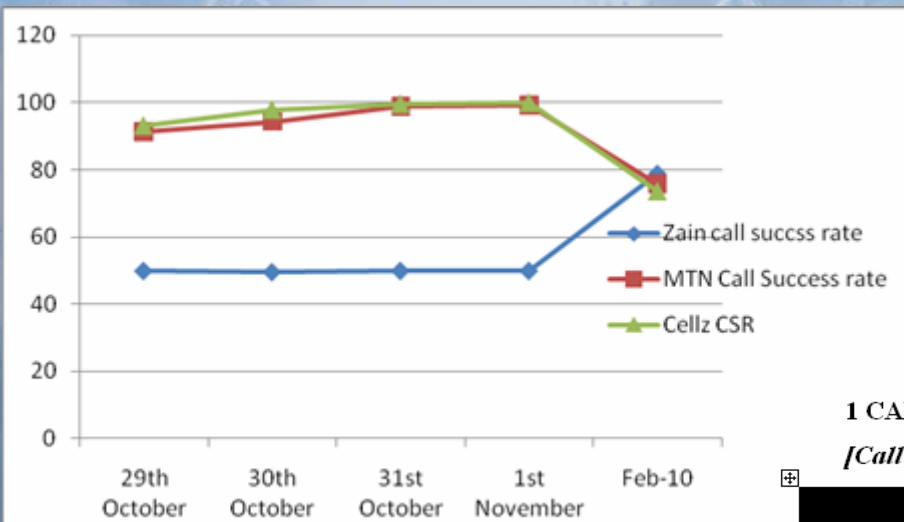
CAZ executes 800 tests per Probe Unit per Day

Quality Parameters

These are some of the KPIs generated:

- ✓ **Call Success Rate**
- ✓ **Voice quality (PESQ)**
- ✓ **SMS Delivery**
- ✓ **IVR Call Time**
- ✓ **Internet availability**
- ✓ **Data Throughput**

Call Setup Report



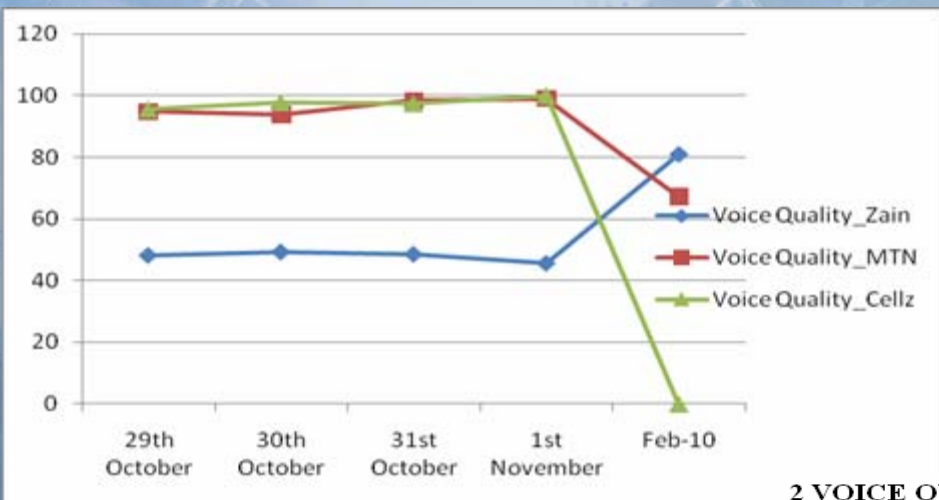
1 CALL SETUP SUCCESS

[Call Setup success should be >95% as stipulated in Standard]



CALL-SUCCESS RATE (%):

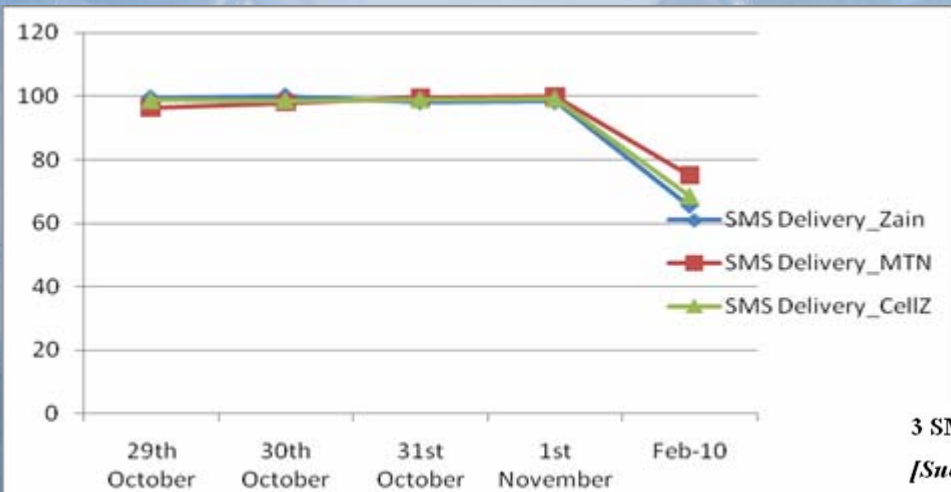
Originating network	Terminating Network(s)	29 th October	30 th October	31 st October	1 st November	FEB 2010
ZAIN	ZAIN	50	48.96	50	50	72.18
	MTN	50	50	50	50	82.60
	CELLZ	-	-	-	-	78.63
	ALL	50	49.65	50	50	78.63
MTN	MTN	95.45	96.88	100	100	86.65
	CELLZ	81.31	91.15	97.40	97.50	1
	ZAIN	96.43	94.79	98.96	100	81.23
	ALL	91.19	94.27	98.78	99.17	75.93
CELLZ	CELLZ	98.11	100	100	100	80.87
	ZAIN	-	-	-	-	82.71
	MTN	90.74	96.88	99.48	100	-
	ALL	93.17	97.92	99.65	100	73.76



2 VOICE QUALITY

[Voice quality should be >95% as stipulated in Standard]

VOICE QUALITY (%):						
Originating network	Terminating Network(s)	29 th October	30 th October	31 st October	1 st November	FEB 2010
ZAIN	ZAIN	46.43	50	50	50	21.12
	MTN	49.09	48.94	47.78	43.24	76.59
	CELLZ	-	-	-	-	-
	ALL	48.19	49.30	48.55	45.61	80.76
MTN	MTN	100	96.88	97.100	100	80.76
	CELLZ	84.62	88.60	98.72	96.88	-
	ZAIN	98.18	95.83	97.92	100	70.48
	ALL	94.74	93.83	98.34	99.01	67.21
CELLZ	CELLZ	100	100	100	100	=
	ZAIN	-	-	-	-	=
	MTN	94.00	96.81	96.43	100	=
	ALL	95.52	97.71	97.39	100	=



3 SMS SENDING SUCCESS

[Success rate should be > 95% as stipulated in Standard]



SMS DELIVERY (%):

Originating network	Terminating Network(s)	29 th October	30 th October	31 st October	1 st November	FEB 2010
ZAIN	ZAIN	100	100	100	97.50	54.80
	MTN	99.11	100	97.37	98.75	66.7
	CELLZ	-	-	-	-	74.55
	ALL	99.40	100	98.25	98.33	65.53
MTN	MTN	95.45	98.96	98.96	100	90.67
	CELLZ	95.00	98.96	100	100	-
	ZAIN	98.21	95.81	99.48	100	75.46
	ALL	96.27	97.91	99.48	100	75.21
CELLZ	CELLZ	98.00	96.88	100	97.50	77.62
	ZAIN	-	-	-	-	84.53
	MTN	99.00	99.48	98.44	100	-
	ALL	98.67	98.61	98.96	99.17	68.71

Benefits

- Automated way to test and monitor the quality of service as the end-user perceives
- Objectively measured quality of services with standardized KPIs (as defined by ITU)
- Fixed and Drive Tests within the same solution
- No manual tests needed. CAZ's staff would be able to get objective results
- Real-machine
- With these statistical objective results CAZ is able to "force" Telecom Operators to comply with standards
- They are able to generate objective reports for consumers and give them a real overview about the quality of service of the different Operators. User will be able to go for the best one.
- Improve the global telecommunication service in the whole country.
- Promote competitiveness
- Allow CAZ to achieve one of its main objectives: to look after the telecom services delivered to national end customers



***A Success Story:
Telecommunication Regulation
Commission of Jordan (TRC)***

Objective

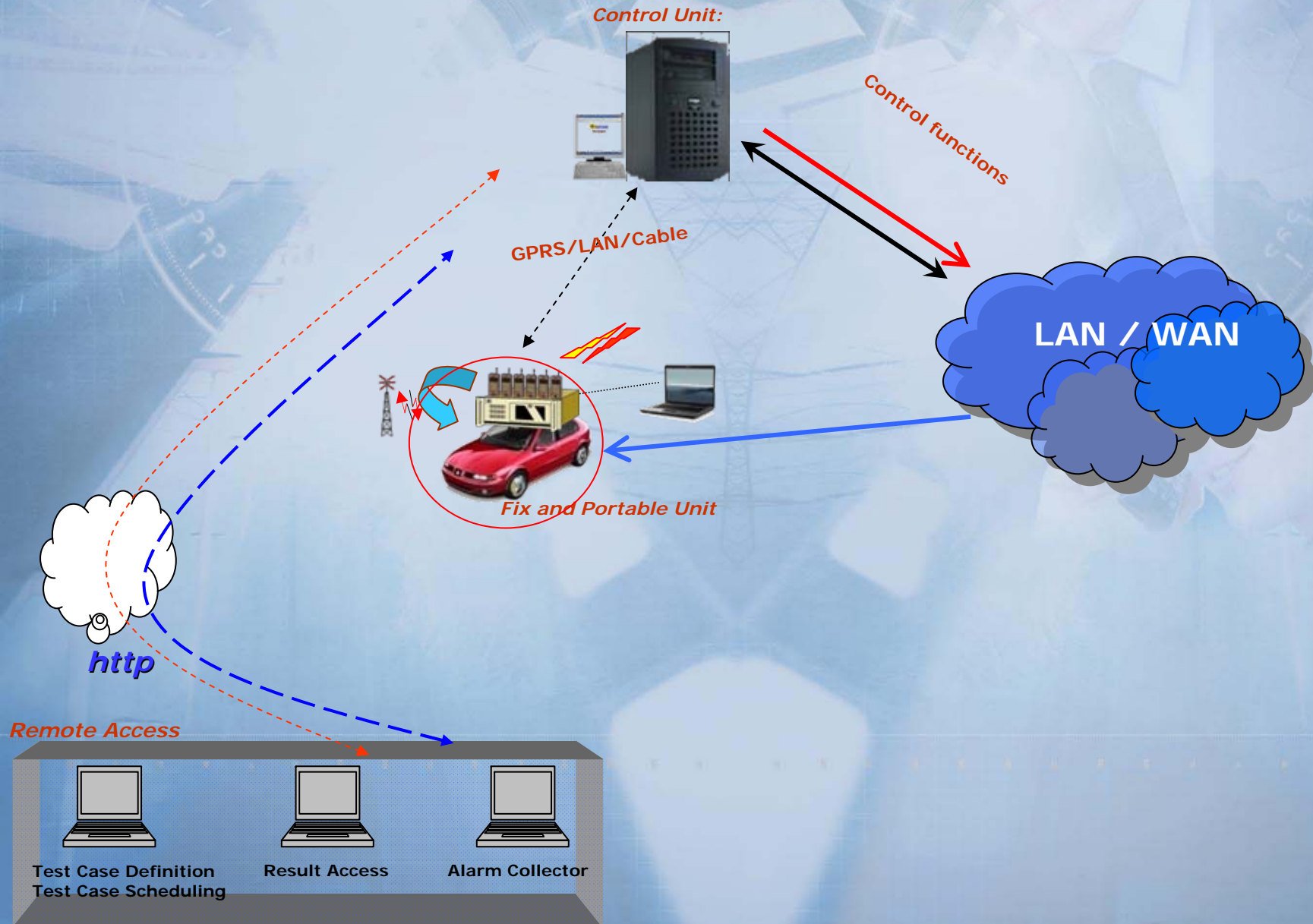
To validate and monitor the Quality of Service of all regional WiMAX Operators:



WiMAX Services to be considered:

- VoIP and Voice Quality (PESQ)
- Video Streaming
- RSSI Level
- Internet Services (http, email, ftp, ping roundtrip, etc.)

Main Objective is to **standardize** procedures and measurements.



Deployed System

Portable Probe Units

- 1 Mobile and Fix Probe Unit
- 4 WiMAX CPE's connected

Control Server

- 1 Control Center
- Central Management and Supervision of the whole system

1 Laptop

- Local control of Probe Unit
- Manual execution of Test Cases
- Real-time monitoring during Drive Test

WiMAX Test Interfaces



AirSpan EasyST



USB W100 WiMAX



**InfoMark C100
(InfoMark C22SA5)**



Motorola CPEi 775

Tested Services

- ✓ VoIP
- ✓ Video Streaming
- ✓ Service Availability
- ✓ Internet Services



TRC executes tests at fixed locations and on the road

Quality Parameters

These are some of the KPIs generated:

- ✓ **RSSI Level**
- ✓ **Voice quality (PESQ)**
- ✓ **Web Download Rate**
- ✓ **Internet availability**
- ✓ **Data Throughput**
- ✓ **...**


Indicators - Windows Internet Explorer

http://127.0.0.1/EisReports/Reports/testResult/testresults.aspx

File Edit View Favorites Tools Help

★ Favorites Indicators

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QoS/QoE Testing

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[Alerts](#)
[System](#)
[Settings](#)
[Administration](#)

[Main](#)
[Indicators](#)
[QoS Indicators](#)
[Test Cases](#)
[Report View](#)
[Test Results](#)

Date filter: 24/05/2010 18:08:41 - 26/05/2010 18:08:41

Real Time
 Report type: [Daily report](#)
Group type: [All](#)

Refresh

Service	Test Count	SLI	TRC					
General	837	<div style="width: 82.29%;"><div style="width: 82.29%;"></div></div> 82,29%	Show Report					
Subservice	SLI	Test Count	DRWeb	RssiLV	DNSRT	DRFTP	Test Cases	Results
Kulacom	<div style="width: 97.31%;"><div style="width: 97.31%;"></div></div> 97,31%	205	1.033.541,12 bps	-75,03 dBm	0,00 ms	76.501,13 bps	Test Cases	Results
Mada	<div style="width: 97.92%;"><div style="width: 97.92%;"></div></div> 97,92%	204	701.615,26 bps	-72,67 dBm	-	274.713,89 bps	Test Cases	Results
Umnia	<div style="width: 62.55%;"><div style="width: 62.55%;"></div></div> 62,55%	245	180.315,00 bps	-87,39 dBm	-	123.132,85 bps	Test Cases	Results
WITnbe	<div style="width: 76.80%;"><div style="width: 76.80%;"></div></div> 76,80%	183	-	-	-	232.621,07 bps	Test Cases	Results


iFrameStatisticsSLI - Windows Internet Explorer

http://127.0.0.1/EisReports/Reports/ReportsStatistics/iFrameSLI.aspx

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QoS/QoE Testing

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Reports Alerts System Settings Administration


Main Indicators **QoS Indicators** Test Cases Report View Test Results

Refresh data Report Test results Report View Auto refresh Historic Help

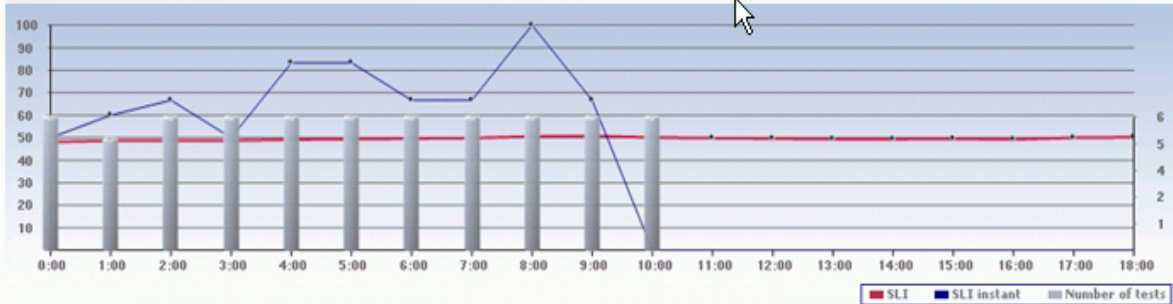
Group by: Service/SubService/TestCase SLI [Real Time mode / 3 days] at 2010-05-26 18:12:26

Services	% SLI	Subservices	% SLI	TestCases	% SLI
General	78,10%	Kulacom	97,20%	Umnia-FTP-Get	20,93%
		Mada	98,67%	Umnia-Ping	73,08%
		Umnia	58,13%	Umnia-Web	56,35%
		WITba	75,09%		

Verdict Distribution | Show legend




SLI Evolution | General / Umnia



Legend: SLI (red line), SLI instant (blue line), Number of tests (grey bars)

SLI |
 Verdict distribution |
 Mean statistics |
 Success Only |
 Show number of tests serie |
 Show SLI instant serie




iFrameStatisticsSLI - Windows Internet Explorer

http://127.0.0.1/EisReports/Reports/ReportsStatistics/iFrameSLI.aspx

File Edit View Favorites Tools Help

★ Favorites iFrameStatisticsSLI


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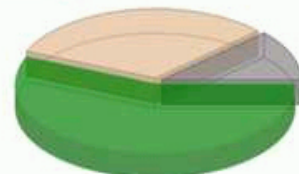
Reports Alerts System Settings Administration
 Main Indicators **QoS Indicators** Test Cases Report View Test Results

Refresh data Report Test results Report View Auto refresh Historic Help

Group by: Service/SubService/TestCase SLI (Real Time mode / 3 days) at 2010-05-26 18:14:27

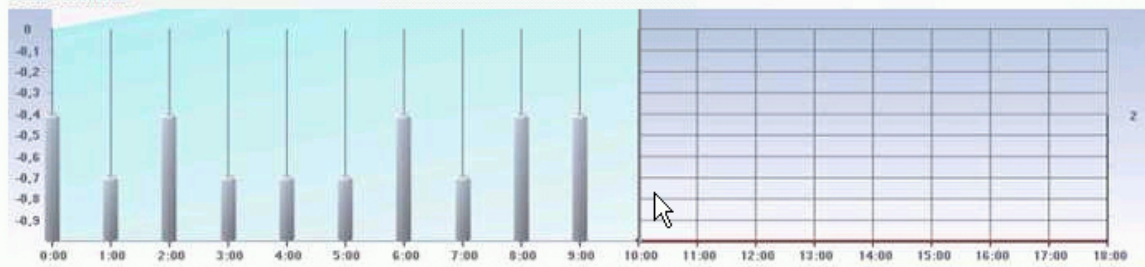
Services	% SLI	Subservices	% SLI	TestCases	% SLI
General	78,09%	Kulacom	97,20%	Ummiah-FTP-Get	20,93%
		Mada	99,67%	Ummiah-Ping	72,07%
		Ummiah	50,00%	Ummiah-Web	56,35%
		WTRbe	75,09%		

Verdict Distribution | Show legend




General / Ummiah / Ummiah-Web

Mean Statistics



Parameter evolution | Number of tests

SLI | Verdict distribution | **Mean statistics** | BytesDownloaded | Success Only | Show number of tests serie | Show SLI instant serie



Test Detail - Windows Internet Explorer
_ □ ×

Test details

Close

Test Case: Kulacom-FTP-Get

Service: General / Kulacom

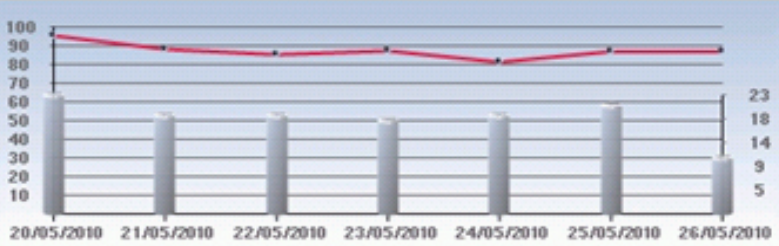
Location: JOPU01

Verdict: PASS (Test OK)

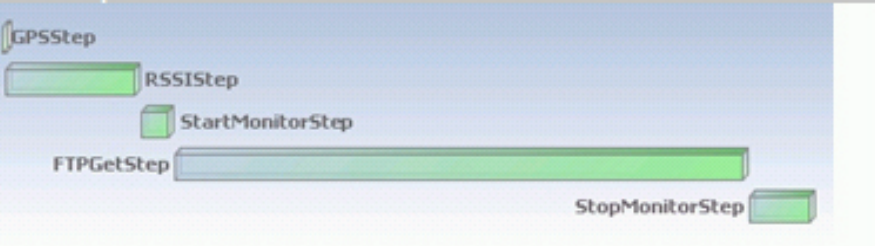
Date: 26/05/2010 10:10:00

Duration: 00:00:24.4530000

SLI Evolution



Test Steps execution times



Used Interfaces

NA -
NB -

Attached Data

Type	Content	Description
CAP	T0000005661201005261010000_TS2.cap	TSID:TS2 Title:Start Monitor
FTP	KulacomGet.dat	TSID:TS3 Title:Rtp Step

Test Details

Test Case	Result	Duration	Incidences	Time reference
Kulacom-FTP-Get	PASS	00:00:24.4530000	No execution incidences	

Test Step	Result	Duration	Incidences	Time reference
GPSStep	PASS	00:00:00	Gps works successfully	
RSSISStep	PASS	00:00:04	Rssi level read Ok	
StartMonitorStep	PASS	00:00:01	Monitor capturing	
FTPGetStep				

Params Details

- Output parameters (Kulacom-FTP-Get)

Name	Description	Value
TSInitTest	Test starting Time Stamp	2010/05/26 10:10:00.374
TSEndTest	Test ending Time Stamp	2010/05/26 10:10:24.827
TestVerdict	Test verdict	PASS
Incidences	Incidences during the test	No execution incidences
Latitude	Latitude of current position	31.94989500000000
Longitude	Longitude of current position	35.85759333333333
RssiLevel	Coverage level of interface	-72
BytesDownloaded	Number of bytes downloaded	102400


NewKPI - Windows Internet Explorer

http://127.0.0.1/EisReports/Settings/KPIs/NewKPI.aspx?IdKPI=2

File Edit View Favorites Tools Help

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Reports Alerts System **Settings** Administration

Main **KPI Management** KPI Groups Templates TemplateMasters Configuration Client Software

Save Delete Reload Back

General Data

Name:	<input type="text" value="Umniah:DownloadRateWeb"/>	Enabled:	<input checked="" type="checkbox"/>
Group:	<input type="text" value="Download Rate Web [DRWeb]"/>	Description:	<input type="text" value="Umniah Download Rate for HTTP"/>
Alarm Warning:	<input type="text" value="5"/>	Algorithm Type:	<input type="text" value="Weight Average"/>
Alarm Critical:	<input type="text" value="5"/>	Type:	<input checked="" type="radio"/> Verdict <input type="radio"/> Param

TestCase

Service / Subservice	Name
[General / Umniah]	Umniah-Web

Param

Param:	Name	Description	Unit	
	DownloadRate	Download Rate in bits per second	bps	X

Related verdicts:

Verdict name	
PASS	X

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- No manual tests needed. TRC's staff would be able to get objective results
- Real-machine measured values → Objective Results
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