

**ITU WORKSHOP ON NGN CONFORMITY AND  
INTEROPERABILITY TESTING CENTRE (S)  
FOR THE AFRICA REGION**

**Nairobi, Kenya  
August 2 - 4, 2010**

**Approach of service and QoS Testing**

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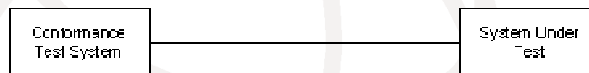
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## Conformance testing

- **The purpose of conformance testing is to determine to what extent a single implementation of a particular standard conforms to the individual requirements of that standard**



- **able to show that a particular implementation complies with all of the protocol requirements specified in the associated base standard**
- **difficult for such testing to be able to prove that the implementation will interoperate with similar implementations in other products**

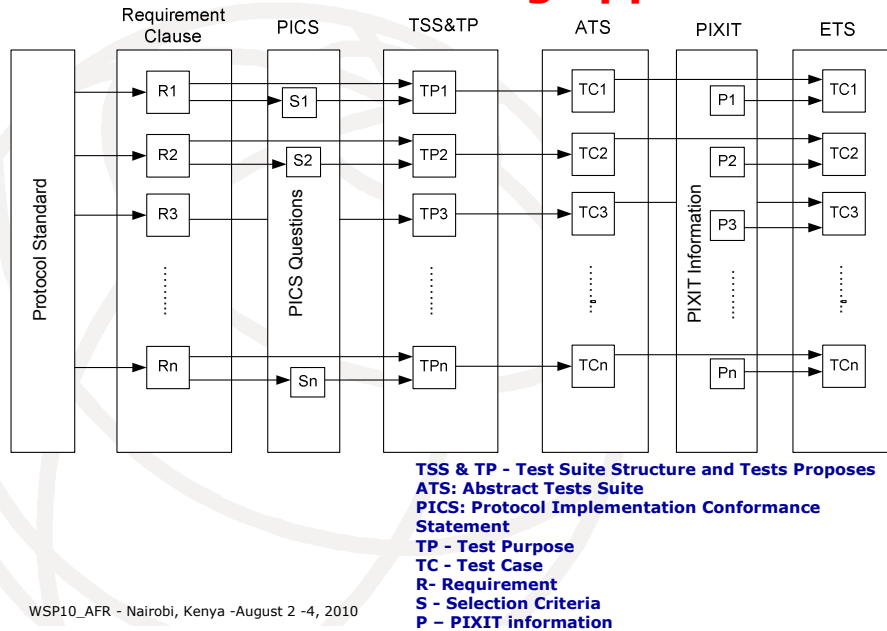
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## Conformance testing for interoperability testing

- **ETSI test specifications are designed to concentrate on areas critical to interoperability, including testing an implementation's reaction to erroneous behaviour. The goal is conformance testing for interoperability**
- **This should not be confused with interoperability testing, which is a useful, but different activity. The two approaches are complementary rather than competitive, which is why ETSI also provides a Plugtests Service for interoperability events for standards and product validation.**
- **Focussed set of conformance tests can provide an excellent framework for subsequent interoperability testing.**

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## Conformance testing approaches



## What is PICS, PIXIT and Test Suite?\*

- **ICS Proforma – Implementation Conformance Statement Proforma**
  - formatted questionnaire for declaring what optional features have been implemented
- **ICS Filled-out ICS Proforma**
- **IXIT Proforma**
  - Additional information required before testing can proceed
  - administrative: identification of client, laboratory staff
  - technical: adrees of IUT, timer values, configuration, parameters, procedures
- **IXIT – ICS Filled-out IXIT Proforma**

**A test suite** is a collection of test cases, one for each test purpose

**A test case** verifies conformance/interoperability for a particular Requirement or Option according to the test purpose

\*Note: Martin Brand, Test creation principles, International training seminar "Testing of System and Network Solutions" ZNIIS, Moscow, December 10-11 2009

## Test Suite Development Procedure\*

### Start with a PICS

- This ensures that complete coverage is obtained

- **Develop Test Suite Structure**

- This logically groups the test cases

- **Develop Test Purposes**

- This defines the objectives of the *test cases*

### Develop ATS

- This are automated test cases written in abstract language like TTCN-3

### Develop PIXIT

- This defines the additional information required before testing can proceed address of IUT, timer values, configuration, parameters, procedures

### Production of ETS

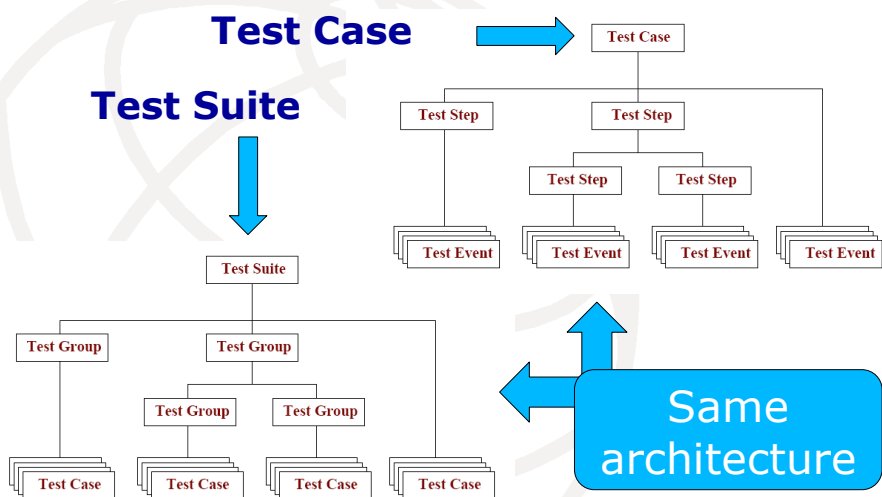
- "Compiled" ATS to run on specific test equipment

\*Note: Martin Brand, Test creation principles, International training seminar 'Testing of System and Network Solutions' ZNIIS, Moscow, December 10-11 2009

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## Test Suite and Test Case structure



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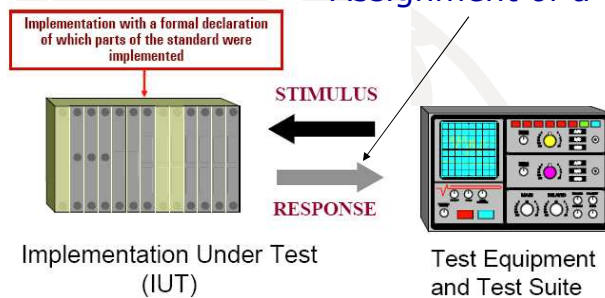
## Test Case Architecture

One Test Case for each Test Purpose representing one Requirement from the Requirements Clause

- To get a Pass verdict, the Implementation Under Test (IUT) must respond correctly when the Tester exhibits three different kinds of behaviour:
  - Valid
  - Invalid
  - Inopportune
- For each of the three Tester behaviours, the IUT may be assigned a Pass, Fail or Inconclusive verdict

## Test Case Architecture

### Assignment of a Test Verdict



### Abstract Tests Suite (ATS)

- automated test cases defined by a standard organization, written in abstract language like TTCN-3

### Executable Tests Suite (ETS)

- .mp file „compiled“ to run on specific test equipment
- creation of the ETS is proprietary to the test equipment vendor

## Test Technologie



- **The Testing and Test Control Notation**
- **A standardized alternative to proprietary test systems**
  - ✓ Developed by a large group of testing experts
  - ✓ Used by a growing community
  - ✓ Proven by tools
  - ✓ Maintained at ETSI
- **TTCN-3 is a test specification and implementation language**

## The TTCN-3 Standards

- ES 201 873-1 (Z.140)**  
TTCN-3 Core Language
- ES 201 873-2 (Z.141)**  
TTCN-3 Tabular Presentation Format (TFT)
- ES 201 873-3 (Z.142)**  
TTCN-3 Graphical Presentation Format (GFT)
- ES 201 873-4 (Z.143)**  
TTCN-3 Operational Semantics
- ES 201 873-5**  
TTCN-3 Runtime Interface (TRI)
- ES 201 873-6**  
TTCN-3 Control Interfaces (TCI)
- ES 201 873-7 and onwards (under development)**  
Using ASN.1, XML, IDL, C/C++ with TTCN-3

## Main Capabilities of TTCN-3\*

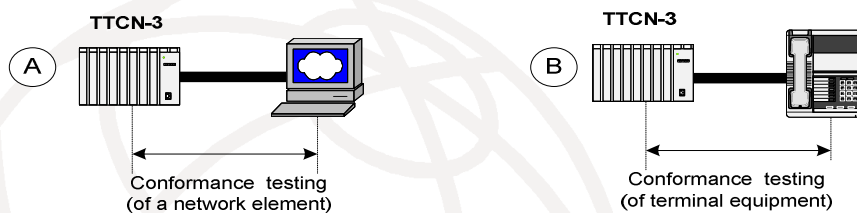
- Dynamic concurrent test configurations
- Synchronous and asynchronous communication mechanisms
- Data templates with powerful matching mechanism
- Assignment and handling of test verdicts
- Testcase selection mechanisms
- Test suite and test data parameterization

\*Note: Martin Brand, Test creation principles, International training seminar 'Testing of System and Network Solutions' ZNIIS, Moscow, December 10-11 2009

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## TTCN-3 can automate Conformance Testing



### Areas of Testing in the Telecom

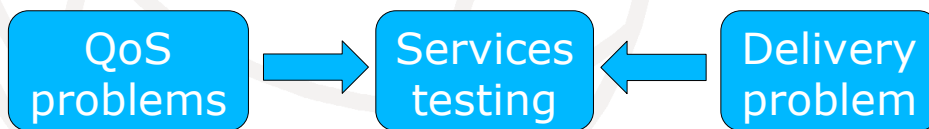
- Regression Testing
- **Conformance/Functionality Testing**
- Interoperability/Integration Testing
- Load/ Stress Testing

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## Typical problems with new services delivering

- Absence of roaming between operators different networks while moving from one operator to another
- Incompatibility of different services or some capabilities between operators
- Guarantee QoS for services in NGN packet networks



## Main reasons of problems

- Absence of standard algorithms for signaling messages for new services delivery
- Incompatibility of different vendors service delivery solutions and platforms
- Different operators differently realized the same services (with different technical means or different technology)
- Vendors realize their services based on proprietary equipment and software technological, functional and architectural features



## General and functional targets of the services conformance testing\*

### General targets

- Running testbed for network, operation and IT components
- Safeguarding of vendor selection
- Compression of short list
- Analysis of investment and production costs for the offered components

### Functional targets

- Compatibility of the call-control with the available terminals (for example TOI-Client, Speedport...)
- Interconnection with PSTN/ISDN through MGC/MG
- Compliancy to regulatory requirements (LI, emergency call)
- End-to-end quality assessment from the customer view
- Proof of general component interoperability in a multivendor environment

\*Note: Denis Alexeitsev, European operators services conformance testing experience, International training seminar 'Testing of System and Network Solutions' ZNIIS, Moscow, December 10-11 2009  
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## The existing international standards for services

### ■ ITU-T (general principles for services)

Y.2006 Description of capability set 1 of NGN release 1  
Y.2007 NGN capability set 2  
F.7xx multimedia service requirements

### ■ ETSI (requirements for protocol implementation)

SIP/ ISUP Interworking conformance Tests (based on the EN 383 001/Q.1912.5) (TSS&TP, PICS, ETS)  
OIP/OIR Conformance Tests (TSS&TP, PICS, ETS) Rel.1  
TIP/TIR Conformance Tests (TSS&TP, PICS, ETS) Rel.1  
HOLD Conformance Tests (TSS&TP, PICS, ETS)  
MCID (TSS&TP and PICS)  
SUB (TSS&TP and PICS)  
ACR-CB (TSS&TP and PICS)  
CUG (TSS&TP and PICS)

Supplementary services mostly

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## The instance of service standards «Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR)» ETSI TS 186 005

- ✓ PICS – the set of function to be tested for service (ETSI TS 186 005 01)
- ✓ TSS/TP – the list of tests for service functionality testing and common parameters (ETSI TS 186 005 02)
- ✓ ATS/PIXIT – the approach of testing, testing scheme, automatic scripts for realizing testing procedure (ETSI TS 186 005 03)

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## The set of function to be tested for service (ETSI TS 186 005 01 - PICS)

### TIP/TIR user capabilities

Table 2: TIP/TIR user capabilities

Item description	Reference	Status	Support
Does the originating user subscribe the TIP service?	4.3.1.1/ [10]	o	
Does the terminating user subscribe the TIR service in permanent mode?	4.3.1.2/ [10]	o	
Does the terminating user subscribe the TIR service in temporary mode with default value "presentation not restricted"?	4.3.1.2/ [10]	o	
Does the terminating user subscribe the TIR service in temporary mode with default value "presentation restricted"?	4.3.1.2/ [10]	o	
Does the originating user subscribe the override category for the TIR service?	4.6.3/ [10]	o	
Does the user equipment supports the "from-change" tag in the Supported header?	4.5.2.12 [10]	o	
[2/6] Does the terminating user equipment send an UPDATE request if a "from-change" tag was received in the initial INVITE?	4.5.2.12 [10]	o	
The terminating user subscribes "special arrangement"?	4.5.2.9 [10]	o	

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## The list of tests for service functionality testing and common parameters (ETSI TS 186 005 02 - PICS)

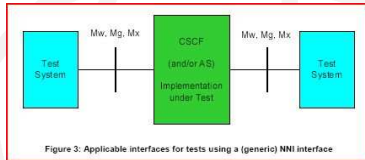


Figure 3: Applicable interfaces for tests using a (generic) NNI interface

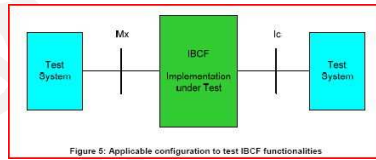


Figure 5: Applicable configuration to test IBCF functionalities

TSS	TP	TIP/TIR reference	Selection expression
User/TermUserE	TIP_U01_002	4.5.2.12	PICS 2/6, 1/2, 2/7
<b>Test purpose:</b>			
The Terminating UE sends an UPDATE request with an updated From and To header. Ensure that the Terminating UE supports the "from-change" tag in the Supported header. If the UE receives a "from-change" tag in a Supported header in an initial INVITE, the user equipment sends an UPDATE request after the ACK for the 200 OK INVITE was received containing a connected identity in the From header.			
<b>SIP messages:</b> INVITE: Supported: from-change 18x200: Supported: from-change UPDATE: From <identity user equipment>			
<b>Comments:</b>			
<b>Test equipment</b>			<b>User equipment</b>
INVITE with "from-change" tag		→	
180 Ringing		←	
200 OK INVITE		→	
ACK		←	
UPDATE		←	
with updated From and To header		→	
200 OK UPDATE		→	

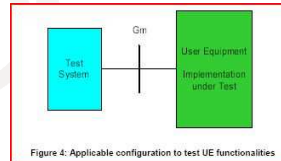


Figure 4: Applicable configuration to test UE functionalities

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## The approach of testing, testing scheme, automatic scripts for realizing testing procedure (ETSI TS 186 005 03)

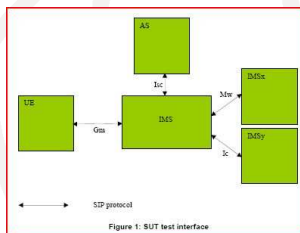


Figure 1: SUT test interface

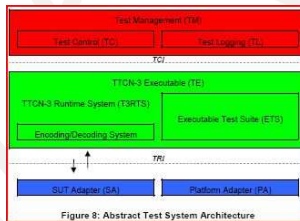


Figure 8: Abstract Test System Architecture

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Module Class	Module Id	Description
AtsCommon	SS_ImS_PICs	Module Parameter declarations associated with PICS
	SS_ImS_PIXITs	SIP common Module Parameter declarations associated with PIXIT
	SS_ImS_TestConfiguration	Functions which implement the configuration of the SUT adapter and mapping of test components for establishing and tearing down different test configurations
	SS_ImS_TestSystem	TSS components, test system internal ports
	SS_ImS_TestCases	Test case definitions
	SS_ImS_TestFunctions	Test case functions
LibImS	LibImS_PIXITs	IMS specific common Module Parameter (e.g. addresses related to SUT components and TSS) declarations associated with PIXIT
	LibImS_Interface	IMS component
	LibImS_SIPTypesAndValues	IMS specific user and interface specific profile data (see note)
	LibImS_Templates	Modified templates with IMS specific header fields
LibSIP	LibSIP_Steps	Functions using IMS specific types
	LibSIP_PIXITs	SIP general common Module Parameter (e.g. SDP/SIP procedure options) declarations associated with PIXIT
	LibSIP_Interface	SIP component
	LibSIP_SIPTypesAndValues	SIP message types and constants, simple user profiles (see note)
	LibSIP_SDPTypes	SDP types and constants
	LibSIP_Templates	Basic and modified templates with SIP specific header fields
LibSIP	LibSIP_Steps	SIP specific behaviour function library
	LibSIP_XMLTypes	XML types for SIP tests
	RESULT	Basic types used in IMI
	LibCommon	LibCommon_AbstractData
LibCommon	LibCommon_BasicTypesAndValues	Basic type and value definitions (integer and Boolean)
LibCommon	LibCommon_DataStrings	Rx and Octet string types
LibCommon	LibCommon_Sync	Co-ordination/synchronization of test components
LibCommon	LibCommon_TextStrings	Basic character and string types with fixed length
LibCommon	LibCommon_Time	Time handling functions and module parameter
LibCommon	LibCommon_VerdictControl	Basic functions for setting of test component verdicts

NOTE: In order to build a comprehensive library all SIP message header (incl. IMS specific) have been defined in LibSIP\_SIPTypesAndValues only.

## The scenarios of services standardization

### ■ International standardization ITU-T

SG13 Q.14/13 "Service scenarios and deployment models of NGN"

SG11 WP 4/11 Q.10/11 "Service test specification for NGN"

### ■ EU ETSI TISPAN WG6

Produces manual and automatic test suites to ensure the conformance to TISPAN, 3GPP and ITU standardized protocols. These tests ensure the global interoperability of ISDN, PES and IMS Core NGN R1/R2, QoS between networks and Performance Benchmarking for NGN.

### ■ Corporate standards (ISP standards)

Additional requirements for equipment, protocols and solutions to service delivery

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## The instance of service standards «Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR)»

### Y.2211 Next Generation Networks – Service aspects: Service capabilities and service architecture. IMS based real-time conversational multimedia services over NGN

#### 9.6 Terminating identification presentation (TIP)

##### 9.6.1 Description

The TIP simulation service provides the originating party with the asserted identification information of the terminating party.

##### 9.6.2 TIP service interactions with other ISDN/PSTN simulation services (NGN)

Terminating identification restriction (TIR): TIR shall have precedence over TIP.

Communication DIVERsion (CDIV): if forwarding party B chooses to restrict the presentation of the forwarded-to party, i.e., C's identification information, the originating party A does not receive the terminating party C's identification information irrespective of whether the terminating party C has TIR activated or not.

##### 9.6.3 TIP interoperability with PSTN/ISDN networks

The NGN supports the interoperability of the TIP services with the PSTN/ISDN supplementary service COLP and vice-versa. The scope of this interworking may result in a limited service capability.

#### 9.7 Terminating identification restriction (TIR)

##### 9.7.1 Description

The terminating identification restriction (TIR) enables the terminating party to withhold presentation of its asserted identification information to the originating party.

NOTE: The requirements for support of emergency telecommunications may over-ride the user request for suppression.

##### 9.7.2 TIR service interactions with other PSTN/ISDN simulation services

Terminating identification presentation (TIP): TIR shall have precedence over TIP.

##### 9.7.3 TIR interoperability with PSTN/ISDN networks

The NGN supports the interoperability of the TIR services with PSTN/ISDN supplementary service COLR and vice-versa. The scope of this interworking may result in a limited service capability.

In case of limited interoperability, TIR.COLR shall have precedence over TIP.COLP.

### Basic requirements to services

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## Future ITU-T approach of service standardization

Q.14/13



Q.10/11

The structure of ITU-T standard for service

- **Service definition** and its compatibility
- **Network structure** and network elements (equipment, FE) and performance requirements for realizing the service
- **Access network requirements** including AP and TE
- **Service delivery scenarios**
- **Call flows requirements**
- **Protocol requirements** for realizing service (etalon points)

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## The relevance of service's standards development (01)

### The global problems of service realization

- ✓ Each vendor to realize service base on the functional and technological features of self equipment
- ✓ The similar services to realize on the exist ISP networks by different equipment and different network solutions (for instance – voice: TDM, SSW, IMS, ISP, PS and etc.)
- ✓ Lack of complete service realization in “end to end” scenarios trough the different ISP (roaming of services unavailable)

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## The relevance of service's standards development (02)

### The typical problems of ISP for realizing new services

- ✓ The new technology to form new classes of services which change the typical operation and business process in accordance with achieve the new characteristics and type of parameters of new services based on the new technology
- ✓ The new characteristics require to develop special requirements for quality parameters and network performance which have to be include to SLA and have to be control via providing

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## The instance of service which is could be realized via service roaming

**UPT – mobility service which to allow customer to connect via different access network (different operators networks) to the traditional set of services which is available on home network**

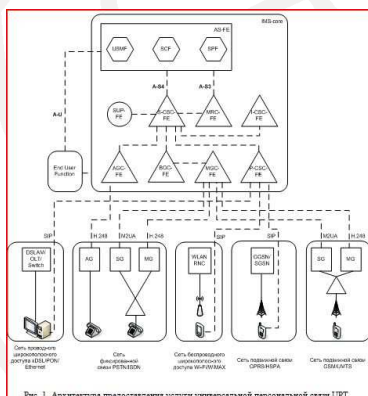


Рис. 1. Архитектура предоставления услуги универсальной персональной связи UPT



Рис. 2. Диаграмма установления связи связи при синхронии параллельного вызова



Рис. 4. Диаграмма установления связи связи при синхронии с приоритизацией персональной методии контроля поиска вызова

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## The service testing approaches

- ❑ **Protocol and call flow testing under simulator based on TTCN-3**
- ❑ **Functional testing ("end-to-end")**
- ❑ **Emulation critical parameters of networks for determine require parameter of quality for service (benchmarking testing)**
- ❑ **Testing procedure of control QoS on the network for this service**
- ❑ **Testing interaction with ISP network systems for providing this service:**
  - ❑ **Billing system**
  - ❑ **Statistic system**
  - ❑ **OSS/BSS and control system**

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## QoS testing and monitoring

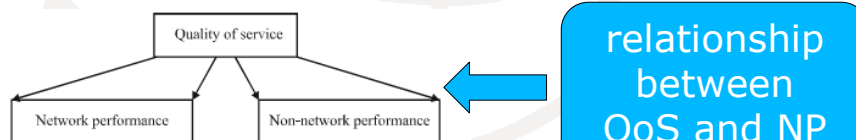
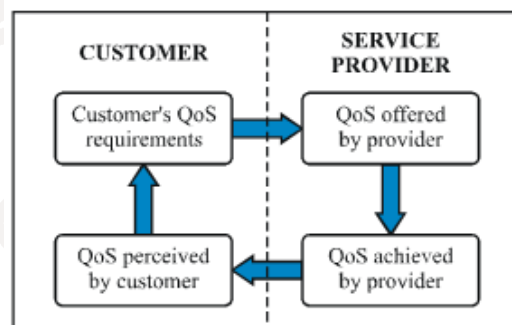
- **Delivering new services with guaranteed QoS is one of the problems in NGN packet networks**
- **Terms and definitions related to quality of service and network performance including dependability ITU-T rec. E.800 (09/2008)**

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## QoS terminology (E.800)

- **Quality of service (QoS)** - Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service.
- **QoS experienced/perceived by customer/user (QoSE)** - A statement expressing the level of quality that customers/users believe they have experienced.
- **Network performance (NP)** - The ability of a network or network portion to provide the functions related to communications between users.

## Four viewpoints of QoS





## Customer's requirements of QoS

**From the customer's point of view, quality of service is expressed by parameters, which:**

- ✓ focus on user-perceived effects, rather than their causes within the network
- ✓ do not depend, in their definition, on assumptions about the internal design of the network
- ✓ take into account all aspects of the service from the customer's point of view
- ✓ may be assured to a user by the service providers, sometimes in contractual terms
- ✓ are described in network-independent terms and create a common language understandable by both the user and the service provider

## VoIP QoS testing methods and rating

- Estimation, E-model, R-factor (G.107)
- Subjective, MOS
- Objective, PESQ (P.862)

Correlation:



## **MOS (Mean Opinion Score)**

The mean of opinion scores, i.e., of the values on a predefined scale that subjects assign to their opinion of the performance of the telephone transmission system used either for conversation or for listening to spoken material

True MOS values can only be derived from **subjective** tests

Usefulness of MOS values outside the original subjective test depends on statistical exercises:

- ✓ Selection of subjects
- ✓ Compilation of speech samples
- ✓ Normalization of results
- ✓ Language Dependency

## **Subjective Tests**

- Require large group of people
- Very costly and time-consuming
- Cannot be done in real-time

But it is the Reference for the other methods:

- Objective models
- Estimation models

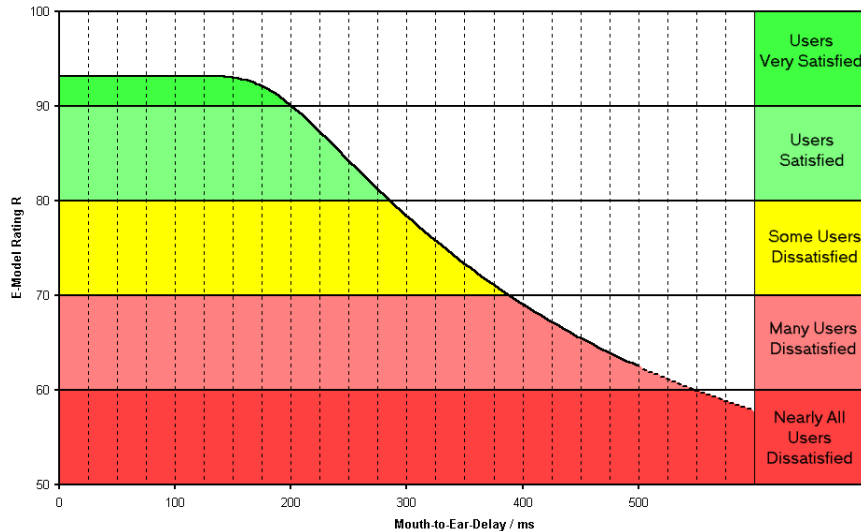
## Objective Models

- ✓ **Reproducing the human vocal generation, reception at the ear and perception at the brain as accurate as possible**
- ✓ **Real-time Recording or Monitoring of Waveform Signals**
- ✓ **Use an algorithm to predict the results of a subjective test**
- ✓ **Faster but correlation with subjective test may vary**
- ✓ **May have a large computational footprint**
- ✓ **Current Models include P.862 (PESQ), P.563 (both between electrical interfaces), TOSQA (also suitable for acoustical interfaces)**
- ✓ **Obsolete Models include P.861 (PSQM, for Codec Validation only) and a variety of vendors' proprietary Models**

## Estimation Models

- ✓ **Estimation or Parametric Models are based on combination of parameters that again can be measured, estimated or pre-determined by separate means**
- ✓ **Use the actually measured parameter values such as echo, delay, noise, levels etc.**
- ✓ **Probably has an even lower correlation with subjective testing than objective testing**
- ✓ **Requires lower computational effort than objective testing**

## Estimation Models Example Delay\*



\*Note: Joachim Pomy, End-to-End Voice Quality, AVAYA Global technical Conference, 2007

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## Example of service QoS testing (ETSI STF392)

### Perceptual Impact of End-to-End Delay and End-to-End Delay Variation on Fax-over-IP (FoIP) and Modem-over-IP (MoIP)

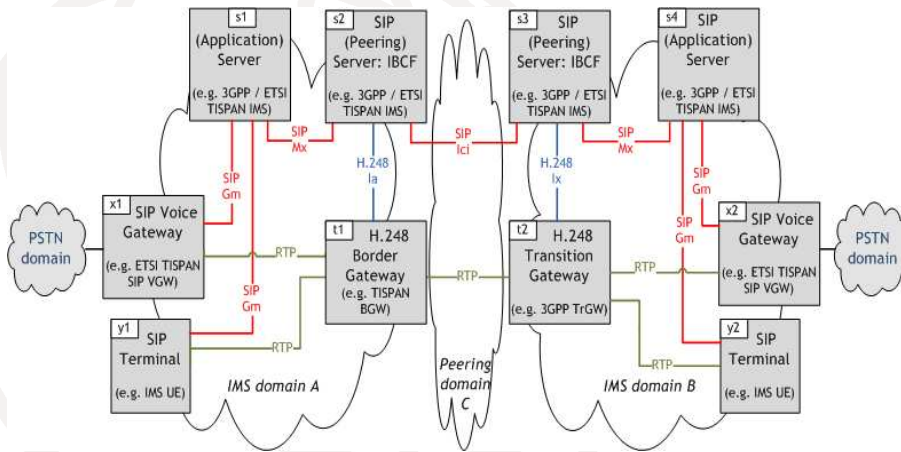
#### ME: IXIA 400T chassis for Fax-over-IP simulation

**Purpose:** Emphasis is on the modem/facsimile transmission using different codecs and media gateways and gateways in order to determine the margins of the media gateways and gateway parameters that enable a successful and reliable real-time modem/facsimile transfer over packet-based networks.

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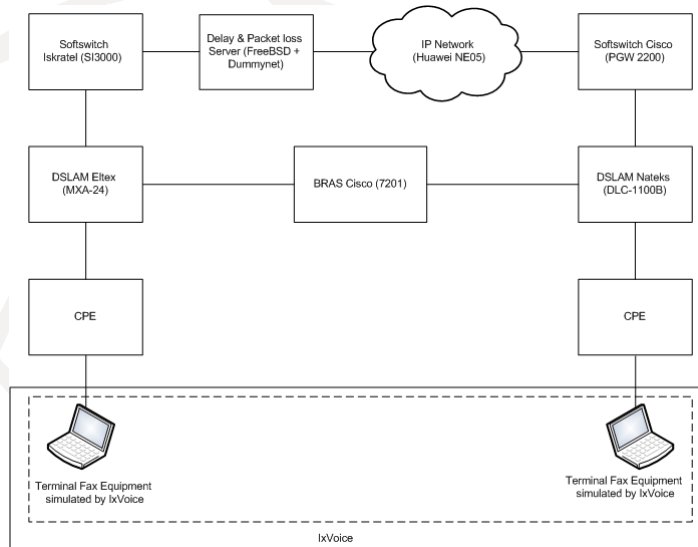
## ETSI STF392 FoIP scheme



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## FoIP testing scheme on the ZNIIS Model network

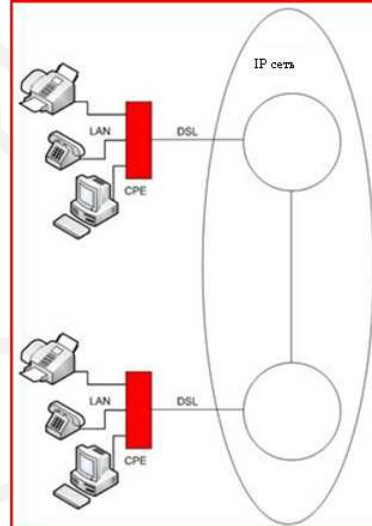


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## FoIP testing methodology

F T38 T38_XX	
TSS reference:	T.38 [i8] T.38 [i8] FAX G3 Tests
Preconditions	Bit rate for uplink (side A): <b>DSL_UP_Rate_A</b> Bit rate for downlink (side A): <b>DSL_DOWN_Rate_A</b> Bit rate for uplink (side B): <b>DSL_UP_Rate_B</b> Bit rate for downlink (side B): <b>DSL_DOWN_Rate_B</b> T.38 [i8] version (side A): Edition 4 (2005) T.38 [i8] version (side B): Edition 4 (2005) Jitter Buffer Type/Size (side A): <b>JITTER_BUFF_T_S_A</b> Jitter Buffer Type/Size (side B): <b>JITTER_BUFF_T_S_B</b> Packet Formation Time: 20ms Number of Variation-sensitive channels - Voice (side A): <b>VA_Channel_Voice_A</b> Number of Variation-sensitive channels - Data (side A): <b>VA_Channel_Data_A</b> Variable for Codecs for Voice: <b>Codec_Voice_VA</b> Number of Variation-sensitive channels - Voice (side B): No channel Number of Variation-sensitive channels - Data (side B): No channel Variation-insensitive packet traffic uplink (side A): <b>VA_Insens_Data_UL_A</b> Variation-insensitive packet traffic uplink (side B): <b>VA_Insens_Data_UL_B</b> Variation-insensitive packet traffic downlink (side A): <b>VA_Insens_Data_DL_A</b> Variation-insensitive packet traffic downlink (side B): <b>VA_Insens_Data_DL_B</b> Jitter Core: 0 ms End-to-End delay Core: 0 ms Modem Type: V.17 [i12], 14.4 kbit/s FAX Error correction: Redundancy 1
Comments:	



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## FoIP testing results

### Parametres measured for different test cases

- Delay
- Delay variation
- FOM (Figure of Merrit)
- ECM errored frames
- Total transmission time
- Variances if more than one test run has been achieved for the individual test case
- Duration of transmission of test page in seconds
- Visual inspection of received page for visible errors and missing information.
- In cases with additional voice channels, record the listening quality according to ITU-T P.862.1

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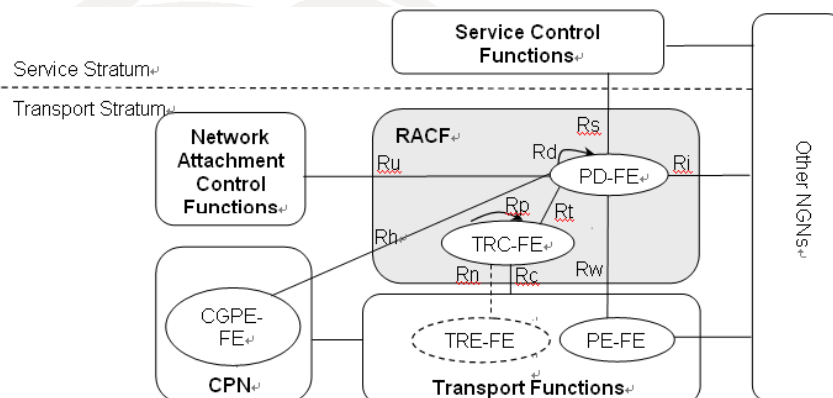
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## RACF

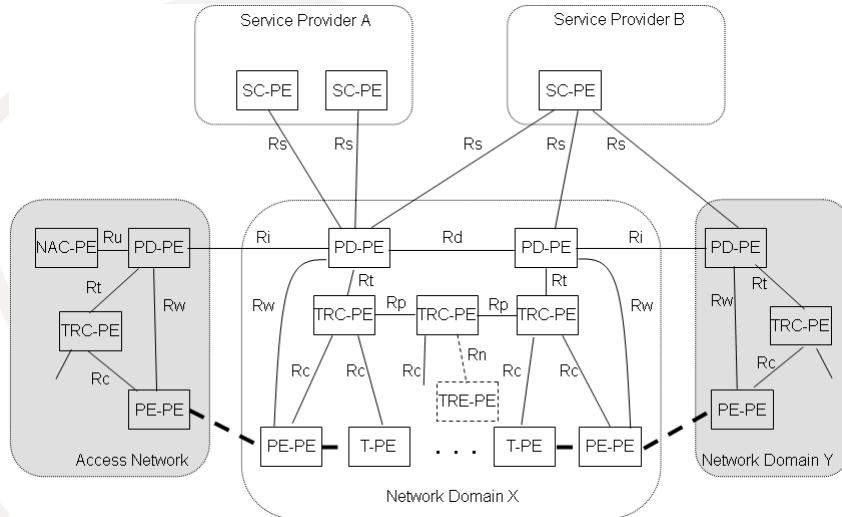
### RACF (Resource and Admission Control Functions) can provide guaranteed QoS for services in NGN

- Application-driven (network-independent) real-time control
- Management of transport resources within networks (access or core) and at network boundaries
- Policy-based authorization and allocation of resources supporting
- Dynamic control of NAPT, firewalls and NAT traversal

## RACF architecture



## RACF example of technical realization



The heavy dashed lines denote packet flows

## RACF protocols and interfaces

Interface	Supporting Entities	Protocol Base (Note)	Rec. No.	Status
Rs	SC-PE, PD-PE	Diameter	Q.3301.1	Published
Rp	Between TRC-PE	RCIP	Q.3302.1	Published
Rw	PD-PE, PE-PE	Introduction	Q.3303.0	Published
		COPS-PR	Q.3303.1	Published
		H.248	Q.3303.2	Published
		Diameter	Q.3303.3	Published
Rc	TRC-PE, T-PE	COPS-PR	Q.3304.1	Published
		SNMP	Q.3304.2	Published
Rt	PD-PE, TRC-PE	Diameter	Q.3305.1	Published
Rd	PD-PE to PD-PE (intra-domain)	Diameter	Q.3306.1	Published
Ri	PD-PE to PD-PE (inter-domain)	Diameter	Q.3307.1	Published
Q.QCP	QoS Coordination Protocol	RSVP	Q.3309	Published
Rn	TRC-PE, TRE-PE	Interface is for further study	--	--



## RACF recommendations

Draft	Title	Timing for approval
Q.3308.1	Draft Q.3308.1: Protocol at the interface between Resource Admission Control Physical Entity (RAC-PE) and CPN Gateway Physical Entities (CG-PE) (CGPE-PE and CGPD-PE ) (Rh/Rh' interface)	2010-01
Q.3320	Draft Q.3320: Architectural framework for the Q.332x series of Recommendations	2010-01
Q.3321.1	Draft Q.3321.1: Protocol at the interface between Service Control Physical Entity (SC-PE) and Resource and Admission Control Physical Entity (RAC-PE) (Rs interface)	2010-2Q
Q.3322.1	Draft Q.3322.1: Resource control protocol no. 2 (rcp2), Protocol at the interface between Transport Resource Control Physical Entities (TRC-PEs) (Rp interface)	2010-01
Q.3323.1	Draft Q.3323.1: Resource control protocol no.3: COPS Profile, Protocol at the Rw interface between Policy Decision Physical Entity (PD-PE) and Policy Enforcement Physical Entity (PE-PE)	2010-2Q
Q.3323.2	Draft Q.3323.2: Resource control protocol no.3 (H.248 Rw Profile), Protocol at the Rw interface between a Policy Decision Physical Entity (PD-PE) and a Policy Enforcement Physical Entity (PE-PE) (Rw interface)	2010-2Q
Q.3323.3	Draft Q.3323.3: Resource control protocol no. 3 (rcp3)	2010-2Q

## RACF recommendations

Draft	Title	Timing for Approval
Q.3324.1	Draft Q.3324.1: Resource Control Protocol no. 4 (rcp4), Protocol at the interface between a Transport Resource Control Physical Entity (TRC-PE) and a Transport Physical Entity (T-PE) (Rc interface): COPS alternative	2010-2Q
Q.3324.2	Draft Q.3324.2 : Resource control protocol no. 4 SNMP Profile, Protocol at the Rc interface between a Transport Resource Control Physical Entity (TRC-PE) and a Transport Physical Entity (T-PE) (Rc interface)	2010-2Q
Q.3325.1	Draft Q.3325.1: Resource Control Protocol no. 5 (rcp5), Protocol at the interface between a Transport Resource Control Physical Entity (TRC-PE) and a Policy Decision-Physical Entity (PD-PE) (Rt interface): Diameter based	2010-2Q
Q.ANCP	Draft Q.ANCP: Use of the Access Node Control Protocol on the Rp Interface	2010-2Q
Q.FlowStateSig	Draft Q.Flowstagesig: Resource control protocol for Flow State Aware Access QoS Control in an NGN	2010-01
Q.PCNApp	Draft Q.PCNApp: Enhancement of resource admission control to use pre-congestion notification (PCN)	2010-01
Q.rstcm	Draft Q.rstcm: Signalling flows and protocols for support of IPTV services	2010-2Q
Q.sigafmob	Draft Q.sigafmob: Signalling architecture and signalling flows for mobility	2010-2Q

## **RACF conclusions**

- **RACF designed to provide QoS in NGN**
- **RACF systems should be tested for protocol conformance**
  - Diameter: RFC 3588;
  - COPS-PR: Common Open Policy Service – Policy Provisioning (RFCs 2748, 3084)
  - SNMP: Simple Network Management Protocol (RFC 3410 and many others)
  - RCIP: Resource Connection Initiation Protocol, (Q.3302.1/Q.3322.1)

## **Conclusions**

- **Services in NGN should be tested for conformance to solve interoperability issues**
- **To control QoS level it should be tested and rated**
- **RACF systems should be tested for protocol conformance**

**ITU WORKSHOP ON NGN CONFORMITY AND  
INTEROPERABILITY TESTING CENTRE (S)  
FOR THE AFRICA REGION**

**Nairobi, Kenya  
August 2 - 4, 2010**

**Thank you for your  
attention !!!**

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