ITU-T Recommendations Cup on Global Interoperability Testing from SG11 WP4.

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ITU Forum on Conformance and Interoperability Testing in CIS and EUR Regions

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PSTN Testing Methodology (1995)

Conformance Testing as a base:

ISO/IEC 9646 – 1	EUT - Equipment Under Test
ITU-T X.290 series	
ETSI ETS 300 406	SUT – System Under Test

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NGN Testing Methodology

1. PSTN: combinations number 45 (10 vendors)
   NGN: combinations number 4500 (100 vendors)

2. NGN Interoperability Testing First Experiences:
   ZNIIS (2004 год, SoftSwitch) – 1016 tests, 8,1% unsuccessful
   Plug Test ETSI (Slovenia, 10 -14 November 2008 , IMS) – 410 tests, 18% unsuccessful
   (Joint ITU-T/ETSI meeting, Moscow, ZNIIS, 10 April, 2009).

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WTSA 2008

Resolution 76 “Studies related to conformance and interoperability testing, assistance to developing countries, and a possible future ITU mark program” was approved at the World Telecommunication Standard Assembly (Johannesburg, 2008).

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Interoperability History

"The interoperability of international telecommunication networks was the main reason to create ITU in the year 1865 (International Telegraph Union), and that this remains one of the main goals in the ITU strategic plan".

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What is the interoperability today?

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Interoperability Definition

Recommendation Y.101 “Global Information Infrastructure terminology: Terms and definitions” Interoperability is the ability of two or more systems or applications to exchange information and to mutually use the information that has been exchanged”. This Recommendation was approved at March 2000. It’s so long ago from today point of view.

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NGN Concept

The NGN concept is the real implementation plan for network modernization . The full NGN definition could be found in the Recommendation Y.2001. The NGN concept includes the some QoS guarantees levels in according with Y.1540 and Y.1541 and very widely services set, in principle unlimited. Both of them points request to consider NGN interoperability as a complex definition, including technical means, services and QoS interoperability.

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Basic Ideas for Q.39xx series

First:

Network Under Test (NUT) and Model Network Creation

Second:

Global Interoperability

(Technical Means, Services, QoS classes and parameters testing)

The Q.39xx overview

- Q.3900: Methods of testing and model network architecture for NGN technical means testing as applied to public telecommunication networks
- Q.3901: Testing topology for networks and services based on NGN technical means
- Q.3902: Operational parameters to be monitored when implementing NGN technical means in public telecommunication networks

The Q.39xx overview (2)

- Q.3903: Formalized presentation of testing results
- Q.3904: Testing principles for IMS model networks, and identification of relevant conformance, interoperability and functionality tests
- Q.3906.1: Test scenarios and catalogue for testing fixed-broadband access networks using a model network – Part1

The Q.39xx overview (3)

- Q.3910: Parameters for monitoring NGN protocols
- Q.3911: Parameters for monitoring voice services in NGN
- Q.3931.1: Performance benchmark for the PSTN/ISDN emulation subsystem of an IP multimedia system - Part 1: Core concepts

The Q.39xx overview (4)

- Q.3931.2: Performance benchmark for the PSTN/ISDN emulation subsystem of an IP multimedia system - Part 2: Subsystem configurations and benchmarks
- Q.3941.1: Network integration testing between SIP and ISDN/PSTN network signalling protocols – Part 1: Test suite structure and test purposes for SIP-ISDN
- Q.3941.2: Network integration testing between SIP and ISDN/PSTN network signalling protocols – Part 2: Abstract test suite and partial protocol implementation extra information for testing proforma specification for SIP-ISDN

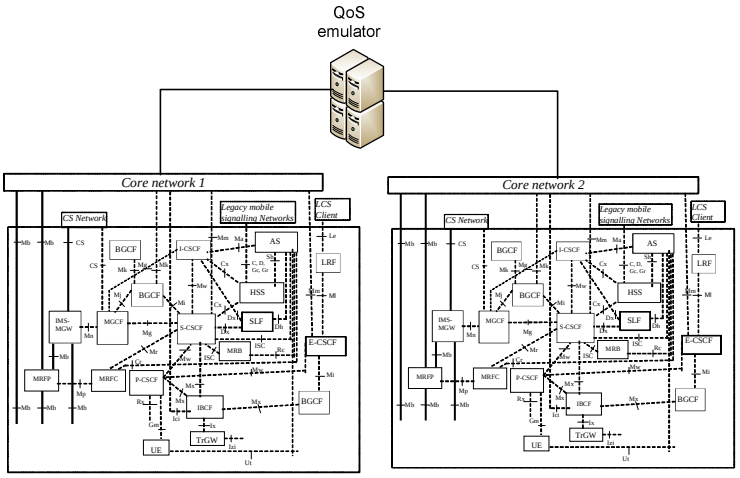
The Q.39xx overview (5)

- Q.3941.3: Network integration testing between SIP and ISDN/PSTN network signalling protocols – Part 3: Test suite structure and test purposes for SIP-SIP
- Q.3941.4: Network integration testing between SIP and ISDN/PSTN network signalling protocols – Part 4: Abstract test suite and partial protocol implementation extra information for testing proforma specification for SIP-SIP
- Q.3948: Service testing framework for VoIP at NGN UNI

The new Q.39xx Recommendations (October 2011)

1. Draft Recommendation Q.3909 The framework and overview on NGN conformance and interoperability testing
2. Draft new Recommendation ITU-T Q.3945 The types and list of NGN services testing on the Model networks. Test set 1
3. Draft Recommendation ITU-T Q.3950 (Q.nid-test-arch) Testing and model network architecture for tag-based identification systems and functions

IMS Testing scheme (Q.3904)



Test content example (Q.3904)

- **Test number**
- F_I_AUTH-5
- **Reference**
- [ETSI TS 124 229], section 4.2B
- Clause 9.3.3.1.1 of [ITU-T Y.2012]
  Clause 9.3.3.1.2 of [ITU-T Y.2012]
- **Test name**
- Function of the encryption of the signalling information between P-CSCF and SIP-telephone
- **Test purpose**
- Check the realization of the encryption of the signal information between P-CSCF and SIP-telephone.
- **Initial condition**
- 1) Ensure that the test equipment and the SUT correspond to Figure 1.
- 2) The traffic analyser is switched to the Ethernet interface of the local network. This interface has to be configured as a mirror to the P-CSCF.
- 3) The traffic analyser is configured for analysing the signalling information between P-CSCF and SIP-telephone.
- **Test procedure**
- 1) Overview of signaling information between P-CSCF and the SIP-telephone.
- **Expected result**
- 1) The encryption procedure is realized between P-CSCF and the SIP-telephone.

Services Testing (Q.3945)

1. Service access scenarios testing
2. Logic of service implementing testing
3. Call flow testing for different types of signaling protocols which is used for providing services
4. Access to emergency services testing
5. Customer identification procedure testing.
6. Coding testing.
7. Numbering and addressing testing
8. Tariffication and service's statistic growth procedure testing
9. Security testing
10. Subscriber profile testing (Subscriber Database)
11. Service profile testing (Subscriber Database)

QoS and Benchmarking Testing

- Draft Recommendation ITU-T Q.3925 “The types of traffic flows which should be generated for voice, data and video on the Model network for testing QoS parameters”

Traffic Flow Types for PSTN (Q.543)

Traffic flow classes	Flow type	Average traffic intensity, Erl	Average number of call attempts in BHCA
1	P	0.03	1.2
2	P	0.06	2.4
3	P	0.10	4
4	P	0.17	6.8

Traffic Flow Types for NGN (draft Q.3925)

- WWW traffic is self-similarity with Hurst parameter H=0.7 – 0.9 [Crovella, 1997; Ho,1999].
- E-mail traffic is self-similarity with Hurst parameter H=0.9 [Ho,1999].

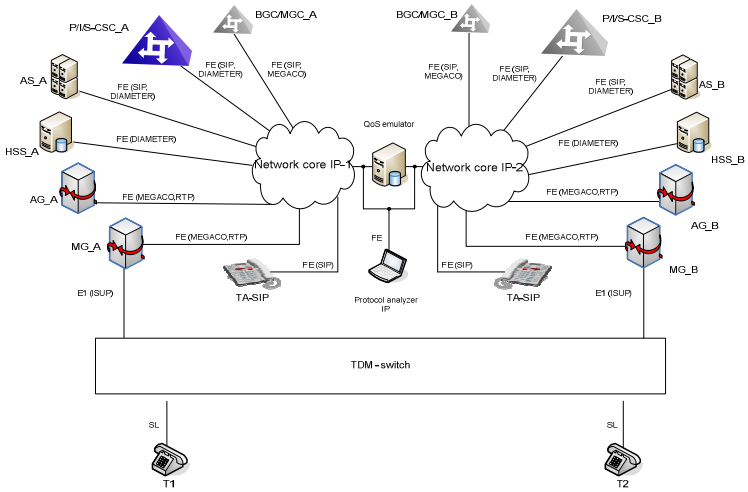
IPTV Traffic Flow Types (draft Q.3925)

Traffic types	Flow types	H values
Multicast	Self-similar	0.55-0.6
Unicast	Self-similar	0.75-0.8

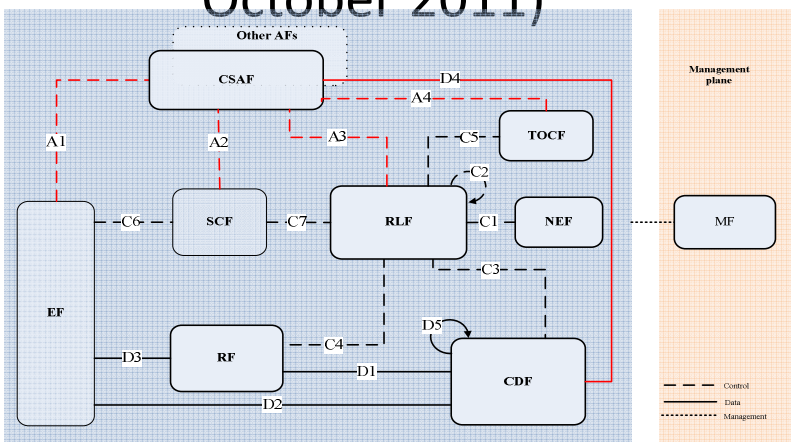
USN Traffic Flow Types (draft Q.3925)

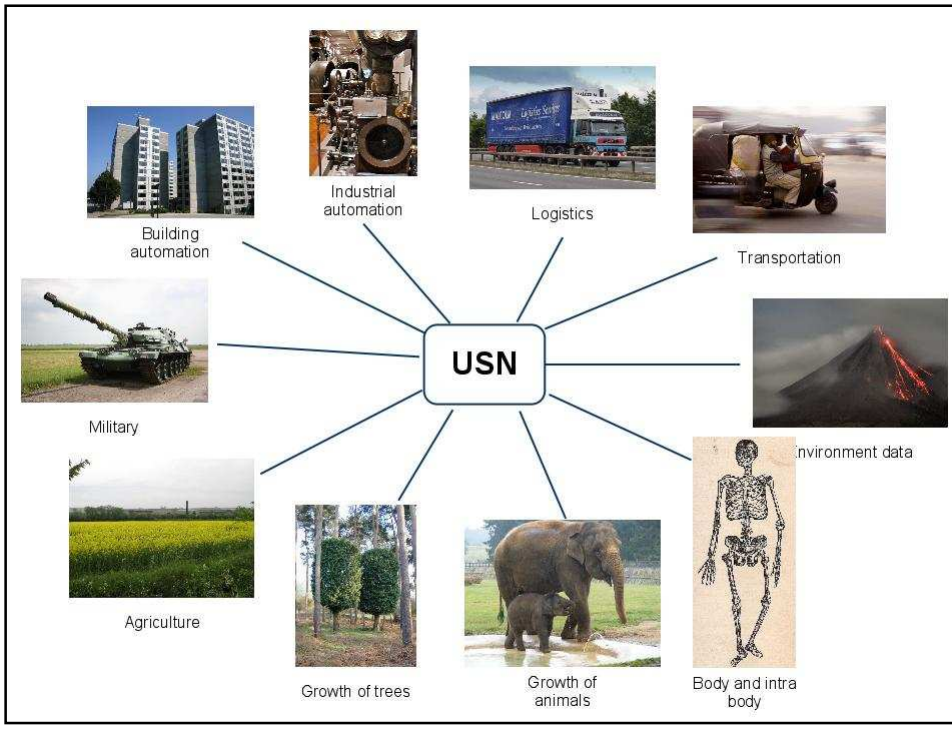
USN traffic classes	Flow type	H values
Voice	For further study	For further study
Signaling	~~For further study~~ Self-similar	~~For further study~~ 0.83
Telemetry Stationary sensors	Self-similar	0.67
Telemetry Mixed sensors	Self-similar	0.69
Pictures (photo)	For further study	For further study
Reconfiguration	~~For further study~~ Self-similar	~~For further study~~ 0.83
Local positioning	For further study	For further study

Handbook on Testing

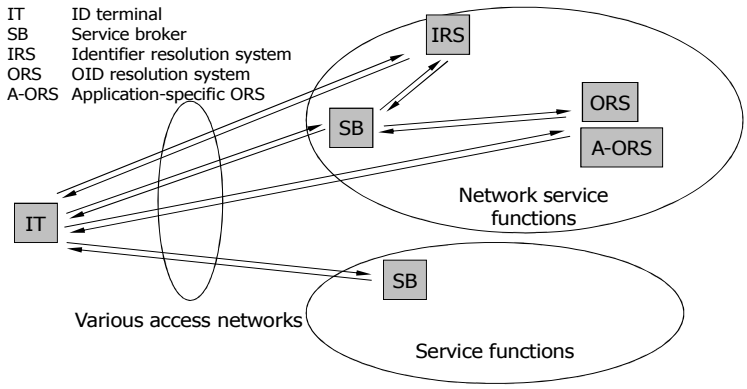


DSN Functional Architecture (Draft Recommendation Y.dsn-arch, October 2011)





The model network architecture for tag-based USN (Q.3950)



Conclusions.

1. The basic ideas Q.39xx recommendation series are the model networks creation and Global interoperability testing.
2. The overview Q.39xx recommendation cup is considered.
3. The DSN functional architecture and the model network architecture for tag-based USN are considered as a future SG11 WP4 topics for testing.