

ITU-T testing activities

SGs actions for the implementation of the ITU C&I Programme



The scope of conformance testing

Conformance testing is a procedure of product testing on compliance with requirements specified in applicable standards. The requirements should correspond to the common requirements for conformance testing with ISO/IEC 9646-1 and define some more criteria and characteristics in accordance with telecommunication features (ITU-T Handbook “Testing of Next Generation Networks”, 2011)

The main goal of conformance testing of ICT Products is to increase the probability that different implementations of the same standard will interoperate

The ITU-T applied standards in the conformance testing area by defining testing procedures, scenarios and lists of tests for concrete telecommunication technology (ITU-T Handbook “Testing of Next Generation Networks”, 2011)

For instance, the conformance testing of signaling protocols is based on the checking the ability of system under test (SUT) to react to the commands which have been sent from the measurement equipment in a proper way. The basic methodological standards in the conformance testing of signaling protocols are the Rec. ITU-T X.290 and ETSI ETS 300 406 (PICS, PIXIT, ATS proforma)



The scope of interoperability testing

Interoperability is the ability of two or more systems or applications to exchange information and to mutually use the information that has been exchanged (Rec. ITU-T Y.101)



The scope of other type of testing is defined by ITU-T

Rec. ITU-T Q.3900, 2006

Handbook “Testing of Next Generation Networks”, 2011

- testing of equipment and network functionality on conformance with functional NGN model, which is standardized by ITU-T
- testing of QoS and QoE
- services and service parameters testing, including Network Performance parameters (NP)
- service interoperability testing, including roaming and nomadic features testing
- benchmarking testing
- load and stress testing



Background

WTSA-12 designated the ITU-T Study Group 11 as a lead group on test specifications, conformance and interoperability testing which coordinates ITU-T activities related to the ITU C&I programme across all SGs and review the recommendations in the Conformance and Interoperability Business Plan for the long term implementation of the C&I programme

Council-12 decided to agree the Action plan on the implementation of the ITU C&I Programme, including following tasks:

- ITU-T to run a pilot of the conformity assessment programme for key technologies for which there is a market demand for such a programme
- ITU-T study groups to identify further technologies for which there is a market demand for a conformity assessment programme and to identify whether test specifications are available and if not, to explore the provision of test specifications”
- ITU-T to run a pilot of the conformity assessment programme for key technologies for which there is a market demand for such a programme



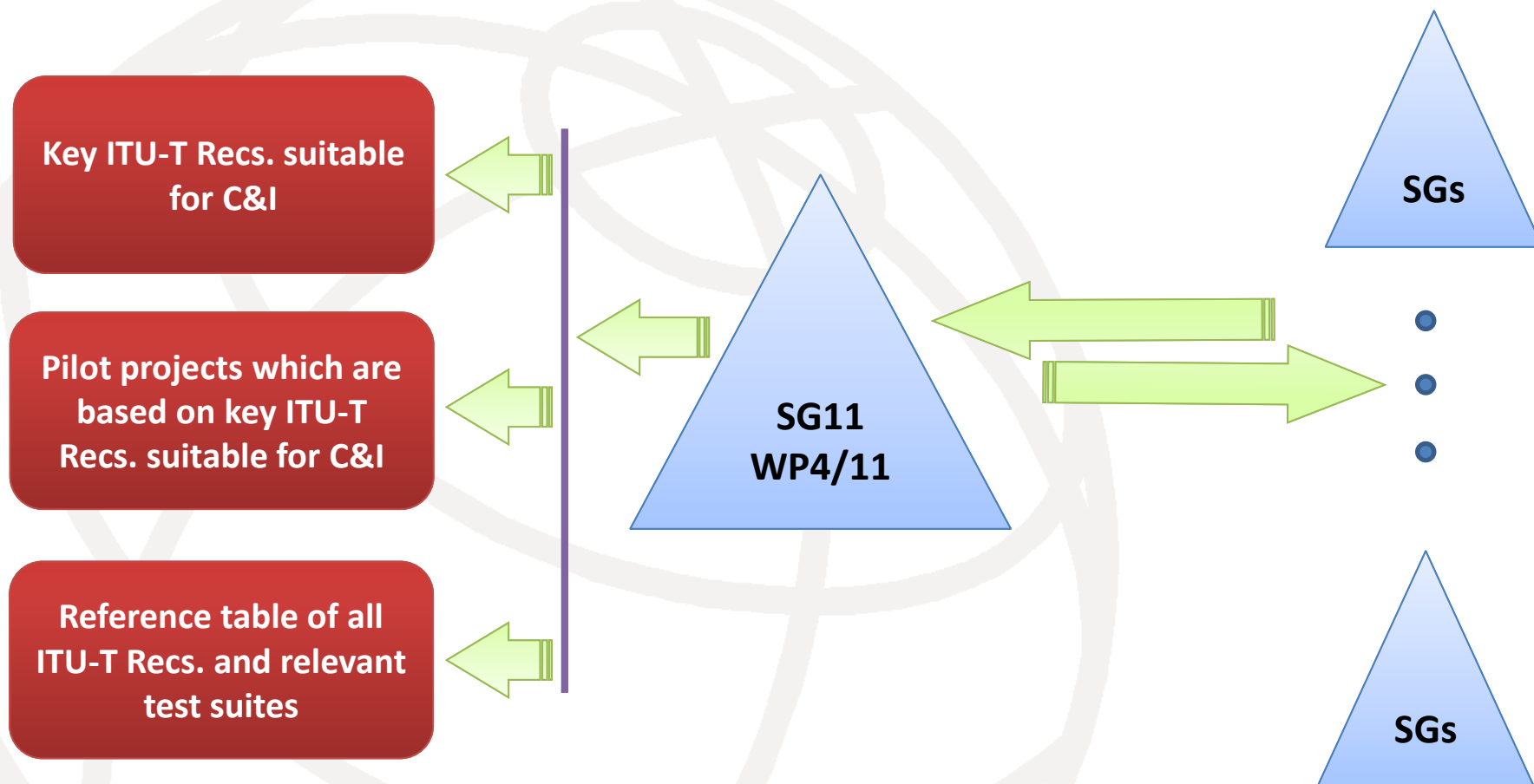
SG11 Action plan on C&I

- to collect input from other ITU-T SGs about **key technologies (ITU-T Recommendations)** to be tested for conformance and/or interoperability
- to collect the proposals from other ITU-T SGs concerning the status on **possible pilot projects of conformance testing** against Recommendations ITU-T
- to update the **reference table of ITU-T Recommendations and relevant parameters to be tested for conformance/interoperability** and references to the applicable test suites (ITU/other SDOs) based on information provided by the SGs especially for key ITU-T Recommendations



SG11 Action plan

Principles of SG11 cooperation among other SGs





The outcomes of ITU-T meetings related to C&I activities, 2013

SG11 (February 2013) – agreed its Action plan and forwarded requests to all SGs to update the relevant living lists

JCA-CIT (April 2013) – agreed to extend the list of conformance testing (conformance of ICT's equipment, conformance of Telecommunication services, benchmarking, QoS/QoE/NP), encouraged relevant SGs to develop the framework and methodology of Internet speed quality measurement usable by end-users

TSAG-13 (June 2013) – agreed the revised ToR of JCA-CIT

Council-13 (June 2013) – agreed status report and action plan on C&I



Next ITU-T meetings

SG11 (November 2013) – is going to update the living lists, to present new test suites, including the methodology of Internet speed measurement and to discuss the criteria for Route 4 (SDoC), including relevant recognition procedure of TL's competence for testing against ITU-T Recs.

JCA-CIT (November 2013) – is going to discuss a common terminology and methodology for C&I testing and proposals for organizing the pilot projects



The list of key Technologies for C&I

Network and equipment performance (benchmarking) – Req: Draft Q.39zz-1; TS:Q.3930, Q.3931.1-4, Q.3932.1-4,

QoS/QOE/NP – Req: Q.3925, Y.1541, Y.1542, Y.1543, draft Q.MSPQuality, Q.NP-req; TS:Q.QMS, Q.3930, Q.3931.1, Q.3931.2

NGN Functionality – Req: Y.2201, Y.2012; TS: Q.3909; TS: Q.3900; Q.3901

Functions of broadband network as a part of NGN – Req: Y.2012; TS: Q.3906.1

IMS architecture, signaling protocols, interfaces – Req: Y.2012; TS: Q.3904

IMS basic call – Protocol conformance testing – Req: Draft Q.39xx-1; TS: Q.3904

IMS supplementary services. Protocol specifications – Req: -; TS: Q.3943.1/2/4, Q.3942.1

IMS interconnection – Re: Q.3401; TS: -

Interoperability testing – Req: - ; TS: Q.3940, Q.3941.1-4

NGN monitoring system – Req: Q.3902, Q.3910, Q.3911, Q.3912; TS: -

Interworking of signaling protocols of NGN – Req: Q.1912.5, Q.3401, Q.3402; TS: Q.1912.5
B-F

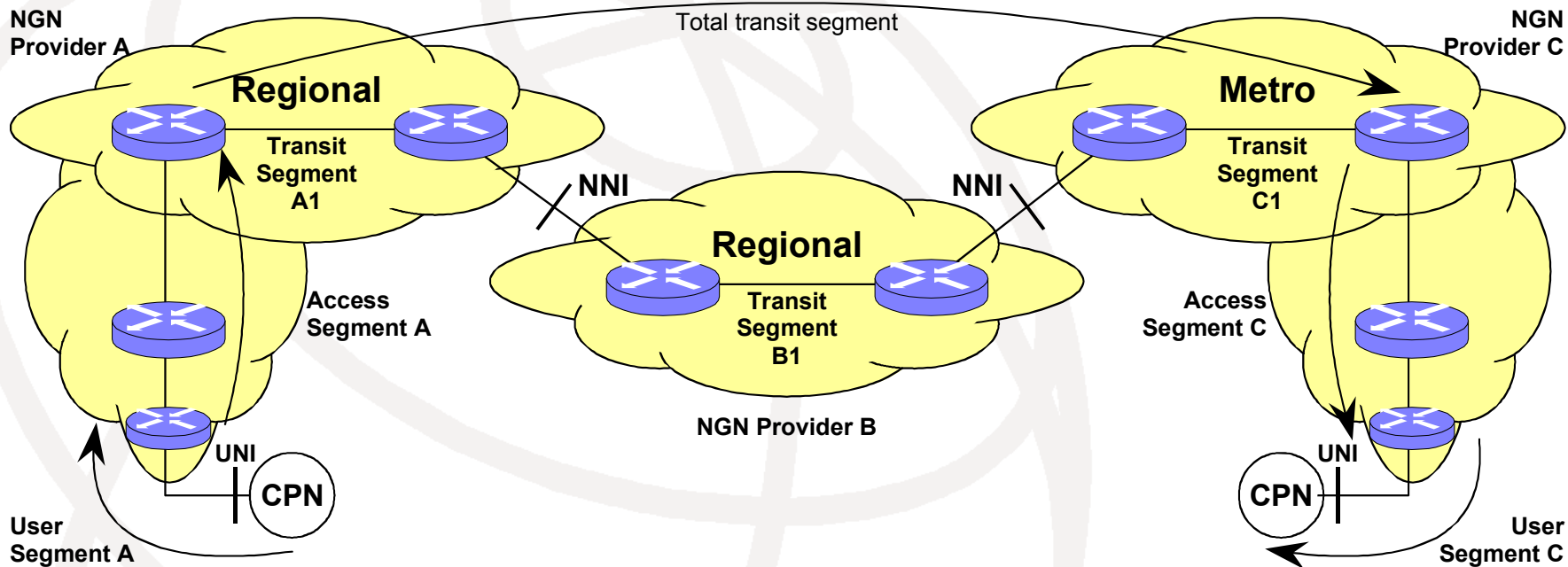
RFID – Req: - ; TS: Q.3950

Internet speed access – Req: - ; TS: Q.InSpMs

Internet Access as perceived by user – Req: G.1000; TS: -

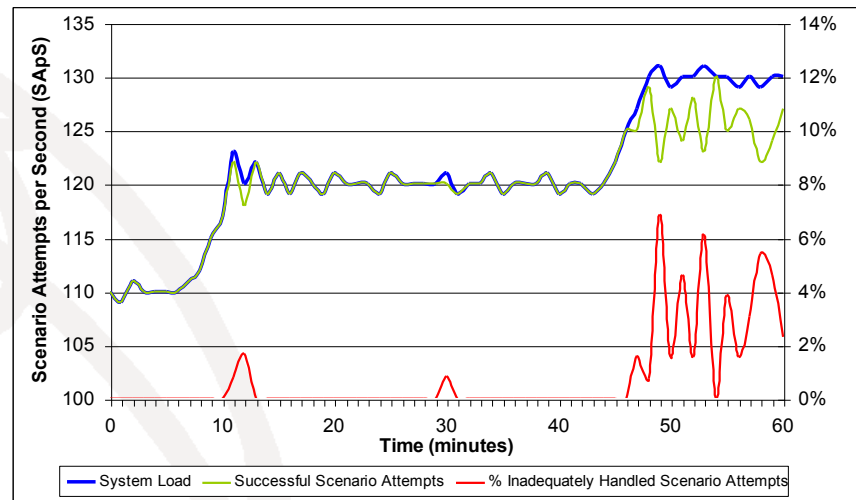
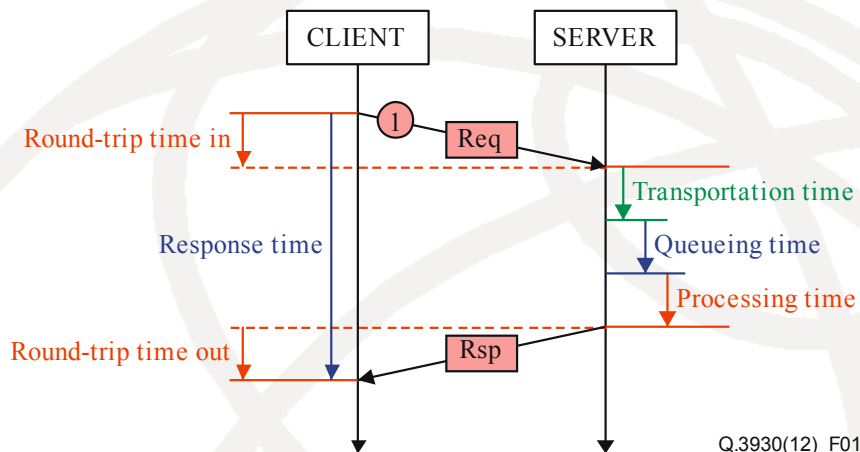


The key Technologies for testing Network Performance testing (QoS/QoE/NP)





The key Technologies for testing Benchmarking



Recommendations ITU-T Q.3930 and Q.3931.x series

Benchmark information model

- use-cases: describe the behavior of an individual user, and in turn define scenarios
- benchmark tests: generate a workload by aggregating the behavior of individual scenarios in a controlled manner, and collect log files of measurements during the tests
- benchmark test reports: report metrics interpreted from the benchmark test log files



The key Technologies for testing Subjective test method

Rec. ITU-T P.800 – subjective tests of transmission quality

Rec. ITU-T P.805 – methods and procedures for conducting conversation tests to evaluate communication quality

Rec. ITU-T P.830 – evaluating digital speech codecs

Rec. ITU-T P.832 – assessing the subjective performance of hands-free terminals

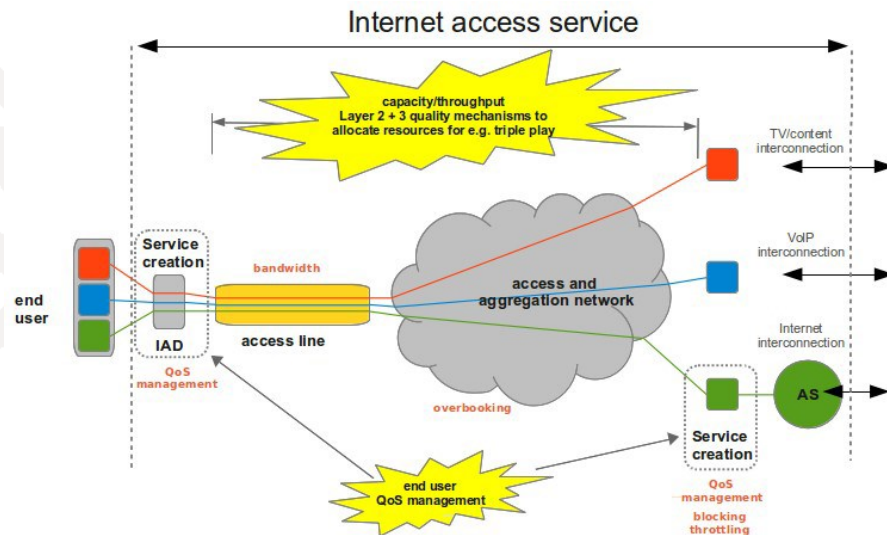
Rec. ITU-T P.835 – assessing the subjective performance algorithms including Noise Suppression Algorithms (NSA)

The key Technologies for testing Internet speed testing



The key reasons

- Internet access speed which is provided by fixed and mobile operators should be compared to advertised/contracted broadband speeds
- Appearing the degradation of Internet speed access bandwidth due to in parallel offered services (VoD, VoIP, Gaming, etc.)
- Different achievable throughput ratios with respect to destinations, content and applications used (net neutrality)
- ICT market required the unified, global standardized methodology of Internet speed quality measurement usable by end-users (JCA-CIT report)



Federal Network Agency Internet economics, Federal Republic of Germany, JCA-CIT, 25 April 2013
 "Study on the quality of broadband Internet access services"



The pilot projects of conformance testing against ITU-T Recommendations

Title of planned/on going Pilot Project under C&I Programme	ITU-T Recs.	SGs focal point	Interested companies	Motivations	Short-term strategy
The title of planned or on-going Pilot Project which SG is going to start and maintain		The contact of responsible person/expert (rapporteur, editor, etc)	The companies are going or have already involved to the project	The reason and specify expecting results under ITU C&I Programme	The short-term strategy (one year) for achieving the goals of the Pilot Project



The joint APT/ITU event is the one of the possible pilot project on conformance/interoperability against ITU-T Recommendations

Technologies under test

- **NGN (VoIP, Video conference)**

Req: Rec. ITU-T Q.3948 Annex C

Test suites: Recs. ITU-T Q.3948, Q.3949

- **IPTV (including IPTV-MAFR (Multimedia Application Framework))**

Test suites (conformance testing specifications): Rec. ITU-T H.701, H.721, H.762, H.770

Expected results for market

Tested scenarios (for Interoperability)

Tested parameters (for C&I)



JCA-CIT decided to extend the list of testing against ITU-T Recs. to:

- **ICT's equipment (signalling protocols, interfaces, codecs, etc.)**
Benefit: the possibility to reduce the test attempts (tested once - accepted everywhere)
- **Telecommunication Services**
Benefit: increasing type of interconnection among operators network (interconnection on the service level), to facilitate the distribution of nomadic services provided on the fixed and mobile networks
- **The performance of system/network/equipment (benchmarking)**
Benefit: to reduce the operator's risk of the purchasing equipment with unexpected performance
- **QoS/QoE/NP**
Benefit: to increase the level of customer loyalty for services provided by operators

[Report of JCA-CIT \(25 April 2013\)](#)



The possible data structure of C&I Product Database

Conformance

ITU ICT product /service code	Vendor	ICT product title	Software /patches	Type of ICT product	ITU-T Recs. (Req./TS)	Parameters (suppl.)	Value (suppl.)



The possible data structure of C&I Product Database

Interoperability

Side A

ITU ICT product /service code	Vendor 1	ICT product title	Software/ patches	Type of ICT product	Parameters (suppl.)	Value (suppl.)



Testing based on ITU-T Recs. (Req./TS)

Side B

ITU ICT product /service code	Vendor 2	ICT product title	Software/ patches	Type of ICT product	Parameters (suppl.)	Value (suppl.)



The application of ITU ICT Product Databases

Operators may use it as a short list of selected equipment

Type of Equipment Vendor 1	ITU ICT Product code Vendor 1	Type of equipment Vendor 2	ITU ICT Product code Vendor 2
MGC	ALTI-5698	MG	ZHM-1534
ONU	SADR-4678	OLT	CIST-4759
...

Certifiers may use it as a testing results against international standards

ITU ICT Product code	Type of ICT Product	ITU-T Recs.
ALTI	MGC	ITU-T Rec. Y.2012, ITU-T Rec. Q.3901

Conclusion



Conformance testing still remains one of the most important task for ICT market

Interoperability testing gives ICT customers more credibility to ICT products

Following the definition, a conformance testing is an ability to test product against any standards, it is not limited by equipment and can cover different standardized issues (e.g. ICT services, QoS, benchmarking, etc.)

ITU-T has already standardized several technologies with the relevant test suites which market requested. Testing Laboratory can use it for testing and distributing the test results through the ITU C&I Programme (list of key ITU-T Recommendations/technologies is already available on the ITU web site)

The ICT customers can select the equipment, which might be integrated to their existing networks, based on the Interoperability testing results which have been achieved by ITU C&I Programme



**International
Telecommunication
Union**



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Background slides



ITU web sources related to C&I Programme

ITU C&I resources

C&I Portal - <http://www.itu.int/en/ITU-T/C-I/Pages/default.aspx>

JCA-CIT - <http://www.itu.int/en/ITU-T/jca/cit/Pages/default.aspx>

SG11 (lead group on testing) - <http://www.itu.int/en/ITU-T/studygroups/2013-2016/11/Pages/default.aspx>



<http://www.itu.int/en/ITU-T/C-I/Pages/CI-living-list-table.aspx>

The living list of Recommendations and related specifications within key technologies suitable for C&I testing

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ITU-T SGs outputs:

Living List of key technologies to be tested on C&I (SG11 output, 25 February - 1 March 2013)

JCA-CIT updates (25 April 2013)

#	Title	Focal Point	Other SDOs	ITU-T SGs	References to SDOs docs	References to ITU-T Recs.
1	Network and equipment performance (Benchmarking)	Martin Brand Vice-chairman of SG11 (Austria) martin.brand@A1telekom.at Michael Mild Rapporteur of Q10/11 (Sweden) michael.mild@softwell.se	ETSI (INT; STQ; MTS)	SG11	ETSI (Requirements) DTR/STQ-207 (draft) ETSI (Test suites) ETSI TR 101 577 TS 186 025-1 TS 186 025-2 TS 186 025-3 TS 186 025-4 TS 186 008-1 TS 186 008-2 TS 186 008-3 TS 186 008-4	ITU (Requirements) Draft Q.39zz-1 ITU (Test suites) Q.3930 Q.3931.1 Q.3931.2 Q.3931.3 (draft) Q.3931.4 (draft) Q.3932.1 (draft) Q.3932.2 (draft) Q.3932.3 (draft) Q.3932.4 (draft)
2	QoS/QoE and NP	Martin Brand Vice-chairman of SG11 (Austria) martin.brand@A1telekom.at Eva Ibarrola (Spain) eva.ibarrola@ehu.es Minrui Shi (China)	ETSI	SG12 SG11	ETSI (Requirements) - - - TR 102 775 TS 101 563 TS 102 928 (draft) - -	ITU (Requirements) Q.3925 Y.1542 Y.1543 Y.1541 Y.1541 - Q.MSPQuality Q.NP-req



<http://www.itu.int/en/ITU-T/C-I/Pages/CI-projects.aspx>

List of Pilot projects for conformity assessment against ITU-T Recs

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[The living list of technologies to be tested on C&I](#)

[List of Pilot projects for conformity assessment against ITU-T Recs](#)

[The reference table of standards are used for C&I assessment](#)

[SG11 Action plan on C&I](#)

[ITU-T meeting schedules on C&I activities](#)

Resolution 76 of WTSA-12 resolves that "ITU-T Study Group 11 coordinates the sector's activities related to the ITU C&I programme across all study groups and reviews the recommendations in the Conformance and Interoperability Business Plan for the long term implementation of the C&I programme".

The C&I action plan agreed by the Council-12 C12/48 includes:

- ▶ "ITU-T to run a pilot of the conformity assessment programme for key technologies for which there is a market demand for such a programme"
- ▶ "ITU-T study groups to identify further technologies for which there is a market demand for a conformity assessment programme and to identify whether test specifications are available and if not, to explore the provision of test specifications"

Following the WTSA-12 and Council-12 decisions, SG11 established the [SG11 Action plan](#) for implementation of C&I Programme which will help to achieve the goals of [Resolution 76 \(WTSA-12\)](#) which will assist ITU-T SGs in their work concerning the development of ITU C&I Programme within their responsibilities and is aimed at helping developing countries in the implementation of their C&I plans in the regions.

The one of the most important part of the [SG11 Action plan](#) is a [living list of possible pilot projects of conformity assessment](#) against ITU Recs. The pilot projects can be based on the key technologies determined by ITU-T SGs as a technologies are suitable for conformity and/or interoperability testing.

The living list is mantling by TSB in accordance with information provided by all ITU-T SGs and JCA-CIT on the SG11 requests with the template is provided in Annex C of [SG11 Action plan](#).

QUICK LINKS

- ▶ [C&I Portal home page](#)
- ▶ [ITU C&I databases](#)
- ▶ [Guidances and information on C&I](#)
- ▶ [JCA-CIT](#)
- ▶ [BDT C&I Activities](#)
- ▶ [ITU Promotional materials](#)
- ▶ [TSB Circular 98](#)
- ▶ [ITU-T SG11 \(lead group on testing\)](#)

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<http://www.itu.int/en/ITU-T/C-I/Pages/CI-reference.aspx>

The reference table of standards are used for C&I assessment

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Resolution 76 of WTSA-12 resolves that "conformance and interoperability testing requirements shall provide for verification of the parameters defined in the current and future ITU-T Recommendations as determined by the Study Groups developing the Recommendations, and for interoperability testing to ensure interoperability taking into account user needs and in consideration of the market demand, as appropriate".

The C&I Action Plan agreed by Council-12 requests "ITU-T study groups to identify further technologies for which there is a market demand for a conformity assessment programme and to identify whether test specifications are available and if not, to explore the provision of test specifications. If test specifications are available, they may be turned into e.g. ITU-T Recommendations or supplements".

Following the WTSA-12 and Council-12 decisions, SG11 established the SG11 Action plan for implementation of C&I Programme which will help to achieve the goals of Resolution 76 (WTSA-12) and will assist ITU-T SGs in their work concerning the development of ITU C&I Programme within their responsibilities. The Action plan also is aimed at helping developing countries in the implementation of their C&I plans in the regions.

The one of the most important part of the SG11 Action plan is a Reference Table showing list of ITU-T Recs and relevant parameters to be tested for conformity/interoperability and references to the applicable test suites (ITU/other SDOs). These information will be used for filling out the ITU conformity Database by results of conformity assessment against ITU Recs.

The Reference Table is maintained by TSB in accordance with information provided by all ITU-T SGs and JCA-CIT on the SG11 requests with the template is provided in Annex B of SG11 Action plan.

QUICK LINKS

- [C&I Portal home page](#)
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