

Telecommunication Technologies and Network Development Division



Our mandate

The Technology and Network Development Division, under Objective 2/2 Telecommunication/ICT networks, including conformance and interoperability and bridging the standardization gap, provides applied research and transfer of technological know-how, which is an indispensable part of the task of expediting the access to new technologies on a non-discriminatory basis for developing countries and countries with economies in transition.



What we do for our members

We assist Member States and ITU-D Sector Members and Associates to maximize the utilization of appropriate new technologies for the development of their information and communication infrastructure and services. We also assist Member States and ITU-D Sector Members and Associates to plan, build, operate, upgrade, manage and maintain technologies applicable in their networks and services. This includes the development of the Telecommunications and Information infrastructure and applications Internet Exchanges and the Transition from IPv4 to IPv6

For more information: <http://www.itu.int/en/ITU-D/Technology/Pages/default.aspx>

Telecommunication Technologies and Network Development Division

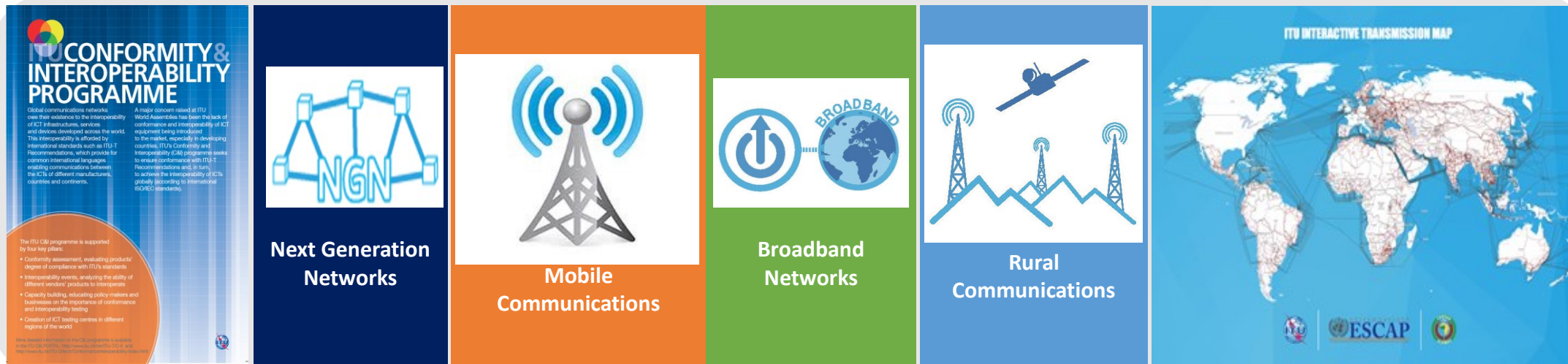


Key activities



Projects in focus

Our work is carried out by various means, including symposia, workshops, conferences, seminars and expert advice as well as information sharing, creation of tools and training material, direct assistance, partnership, publications and events. Our priority areas are as follows:



- [Next Generation Networks](#)
- [Conformity and Interoperability](#)
- [Mobile Communications](#)
- [Broadband Networks](#)
- [Rural Communications](#)
- [WSIS Action Line C2: Information and Communication Infrastructure](#)
- [Conformity and Interoperability Assessment Study on Regional Basis: Collaboration with Regional and Subregional Organizations for establishing a common C&I Regime and Mutual Recognition Agreements](#)
- [Training Activities on Conformance and Interoperability](#)
- [ITU-McCaw Foundation Broadband Wireless Network Project for Africa](#)
- [ITU Interactive Transmission Map](#)

Telecommunication Technologies and Network Development Division

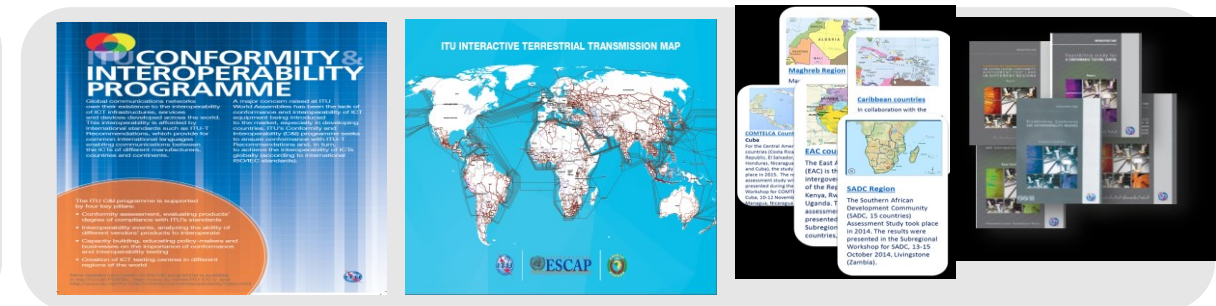
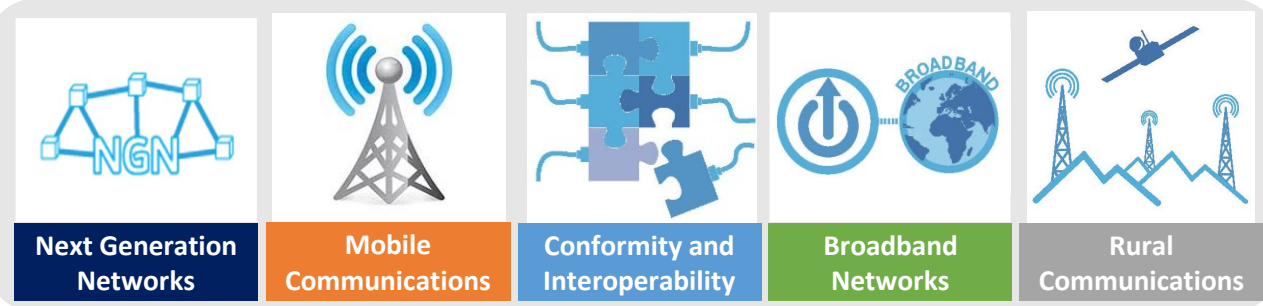


Key Areas



Products and Services in Focus

Our work is carried out by various means, including symposia, workshops, conferences, seminars and expert advice as well as information sharing, creation of tools and training material, direct assistance, partnership, publications and events. Our priority areas are as follows:



Next-Generation Networks: assistance on planning, deployment, migration, interoperability, digitization and evolution of networks, network elements and applications

Broadband Networks (wired and wireless technologies including IMT): assistance with planning, implementation and development of national ICT broadband networks, including promoting IXPs

Rural communications: provision of information on access and backhaul technologies and source of power supply, latest technologies and best practice, implementation of projects on public community broadband access points

Conformance and interoperability (C&I): assistance on the establishment of national, regional or subregional C&I programmes, assessment and feasibility studies, providing information and training to technicians, policy-makers and businesses on C&I, providing guidelines on C&I

Bridging the Standardization Gap: Increasing the knowledge and capacity of developing countries for the effective application/implementation of standards developed by ITU

- **ITU Guidelines on Conformity and Interoperability:** Different Guidelines relating to best practice for planning and review of C&I regimes, Mutual Recognition Agreements, establishment of C&I Test Labs and others
- **ITU Trainings on C&I:** provision of trainings to enhance knowledge, increase awareness, promote experience sharing, present practical learning on standards, regulations, real lab experience and accreditation procedures; provision of Lecture on C&I Regimes; and C&I Testing Domains
- **ITU C&I Regional Assessment Studies/ Conformity Interoperability Programme:** to promote Harmonized C&I Programmes in collaboration with Regional Organizations
- **ITU Broadband, IPv6 and Internet Exchange Implementations:** to provide broadband connectivity free or low cost digital access for schools, hospitals, underserved populations; IXPs to reduce transmission costs, optimize Internet traffic, improve QoS
- **ITU Interactive Transmission Maps:** cutting-edge ICT-data mapping platform to take stock of national backbone connectivity and other key ICT metrics.

Priority areas

➤ Next-generation networks

- providing assistance to Member States on deployment and migration of their existing networks to NGN and further evolutions
- assisting countries in planning the introduction and continuous adoption of new network elements and applications by making use of specialized planning tools
- assisting countries in the digitization of analogue networks and in applying affordable wired and wireless technologies, including interoperability of ICT infrastructure

➤ Broadband networks: Wired and wireless technologies, including IMT

- providing assistance to developing countries in their medium- to long-term planning for the implementation and development of national ICT broadband network plans
- collecting and disseminating information and analyses on the current status of broadband backbone and submarine cables, in order to assist members in network planning
- promoting Internet exchange points (IXPs) as a long-term solution to advance connectivity including the Transition from IPv4 to IPv6

➤ Rural communications

- providing information on suitable technologies for access, backhaul and source of power supply to bring telecommunications to rural, unserved and underserved areas
- implementing projects on public/community broadband access points, in close relation with local experts and communities themselves
- disseminating information and analyses of the latest technologies and best practices through methods such as publications, symposia, seminars and workshop,

➤ Conformance and interoperability (C&I)

- Conformance with international standards maximizes the probability that an ICT vendor's products will interoperate with those of other vendors
- educating technicians, policy-makers and businesses on the importance of C&I procedures and testing, mobilizing the resources required to implement regional and national C&I programmes, in cooperation with other relevant regional and international organizations
- providing assistance to developing countries in the establishment of national, regional or subregional C&I programmes, and conducting assessment studies for facilitating the establishment of common conformance and interoperability regimes at national, regional and subregional level
- preparing guidelines on this process which outline the technical and human resources required and the international standards to be applied

Tasks

- Creation of training material
- Creation of tools and Guidelines
- Assistance to members
- Information sharing

The tasks are carried out by various means, including symposia, workshops, conferences, seminars and expert advice.

Study Group Questions

- **Question 1/1:** Policy, regulatory and technical aspects of the migration from existing networks to broadband networks in developing countries, including next-generation networks, m-services, OTT services and the implementation of IPv6
- **Question 2/1:** Broadband access technologies, including IMT, for developing countries;
- **Question 5/1:** Telecommunications/ICTs for rural and remote areas
- **Question 4/2:** Assistance to developing countries for implementing conformance and interoperability programmes

Regional Initiatives

- **AFR1:** Strengthening human and institutional capacity building
- **AFR3:** Development of broadband access and adoption of broadband
- **AMS3:** Development of broadband access and adoption of broadband
- **ARB1:** Development of broadband access and adoption of broadband
- **ASP3:** Harnessing the benefits of new technologies
- **ASP4:** Development of broadband access and adoption of broadband
- **CIS4:** Development of broadband access and adoption of broadband
- **EUR2:** Development of broadband access and adoption of broadband

Main Activities (link)

- Training: Events and/or producing material
- Publications/Tools: Manuals, Guidelines, Case Studies
- Direct Assistance to members for all domains of competence (Network Engineering, Master Plan, etc)
- Projects: Managing and collaborating
- Partnerships: United Nation agencies, international and regional organizations
- Collaboration and sharing information with other BDT Divisions and with other ITU Bureaux
- Collaboration with Regional Offices
- Focal Points for ITU-D SGs and WSIS

Guidelines

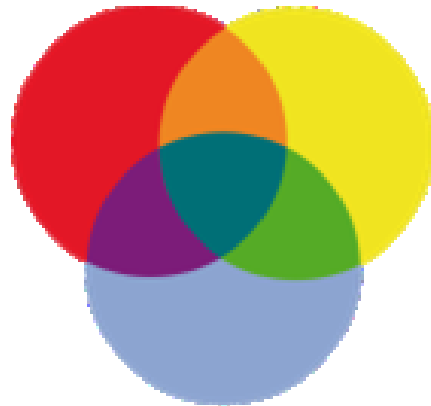
- [Guidelines for developing countries on establishing conformity assessment test labs in different regions](#)
- [Guidelines for the development, implementation and management of Mutual Recognition Agreements \(MRAs\)](#)
- [Feasibility Study for Conformance Testing Center](#)
- [Conformity and Interoperability assessment on Regional basis: Collaboration with Regional and Subregional Organizations for establishing a common C&I Regime and Mutual Recognition Agreements](#)
- [Establishing Conformity and Interoperability Regimes: Basic Guidelines Complete Guidelines](#)
- [Guidelines on the smooth transition of existing mobile networks to IMT-2000 for developing countries \(GST\)](#)
- Strategy for migration from existing networks to next-generation (NGN) for developing countries ([Final Report](#) - [Annexes](#))
- [Guidelines for the preparation of National Wireless Broadband Masterplans for the Asia Pacific Region](#)
- [Report on implementation of evolving telecommunication/ICT infrastructure for developing countries: Technical, economic and policy aspects](#)

ITU C&I Programme

- To tackle different obstacles to the achievement of conformity and interoperability, expressed by member states in ITU's Decisions.



Regional Presence



C&I Task Force

Conformity Assessment benefits

- **Conformity assessment builds consumers' trust and confidence in tested products and consequently strengthens business environment and, thanks to interoperability, the economy benefits from business stability, scalability and cost reduction of systems, equipment and tariffs.**
- **While economically Conformance and Interoperability (C&I) increase market opportunities, encourage trade and technology transfer and contribute to the removal of technical barriers, they socially help spreading ICT services availability and affordability to all people at a good level of quality.**

Telecommunication Technologies and Network Development Division



Key activities

ITU Trainings on Conformity and Interoperability

- MoUs signed with Testing Centers in the Regions to promote human capacity building in real testing laboratories
- Objectives: Enhance knowledge; increase awareness; promote experience-sharing, present practical learning on standards, regulations, real lab experience and accreditation procedures
- Lectures on C&I Regimes (e.g. Regulatory framework, market surveillance); and C&I Testing Domains (e.g. mobile, EMC, broadband, and NGN)



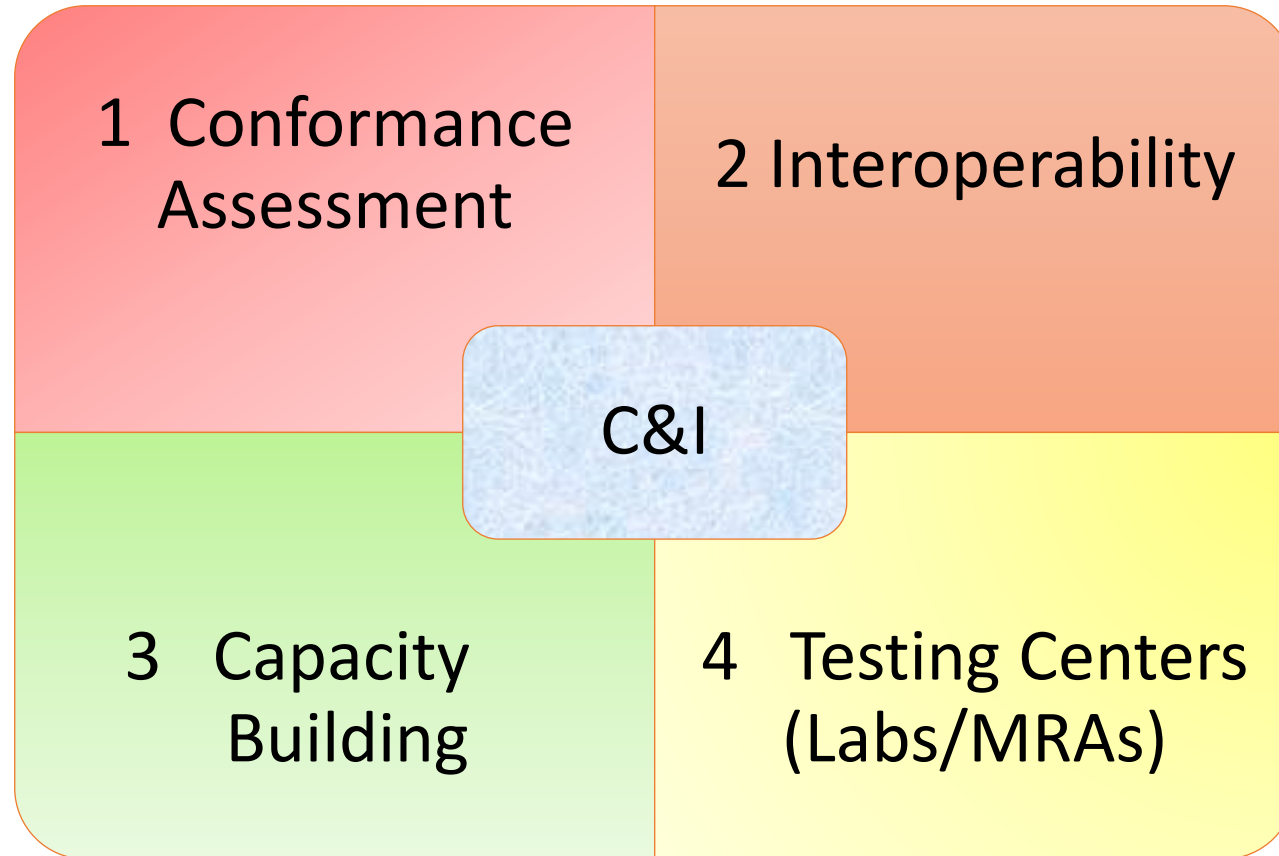
Projects in focus



ITU's Decisions – C&I Action Plan

- **Resolution 177** ITU Plenipotentiary Conference (PP-14)
- **Resolution 47** ITU World Telecommunication Development Conference (WTDC-10, rev. WTDC-14)
- **Resolution 76** ITU World Telecommunication Standardization Assembly (WTSA-08 rev. WTSA-12)
- **Resolution 62** Radiocommunication Assembly (RA-2012, Rev. 2015)
- **ITU Council Decisions** (2009, 2010, 2011, 2012, 2013, 2014, 2015)

“The ITU 4 Pillars”



The ITU 4 “Pillars”

- **The Standardization Sector Side**

- ❖ Conformity Assessment

- ❖ Interoperability Events

- **The Development Sector Side**

- ❖ Capacity building

- ❖ Establishing C&I programmes in developing countries

Capacity building and test centres

- ❖ ITU is implementing proposals on human **capacity building**
- ❖ ITU will assist developing countries in the establishment of test facilities and in cooperation with **international institutions**:
 - UNIDO
 - International Laboratory Accreditation Cooperation (ILAC)
 - International Accreditation Forum (IAF),...
 - Labs and R&D institutions

The Telecommunication Development Bureau Side

- ❖ Capacity building
- ❖ Establishment of test centres and appropriate C&I Regimes including MRAs in developing countries.

ITU [Forums](#) with in-deep consideration for test centres and Capacity Building in the Regions

Held 2010 -2013:

- ❖ Africa (Kenya 2010, Ghana 2011)
- ❖ CIS (Moscow 2011)
- ❖ Americas (Brasilia 2012)
- ❖ Arab States (Tunis 2012) Forum and Training
- ❖ Asia Pacific (Myanmar 2013)

Held 2014:

- ❖ CIS (Moscow)

Needs in Developing Countries for Test Labs and/or MRAs

- Conformity Assessment Bodies to contribute to create an orderly telecom apparatus market place
- Once reference standards and procedures are in place, test labs and/or MRAs can approve equipment for compliance
- Sharing test labs resources and using same procedures amongst countries and regions may lowering overall costs while continuing addressing regional priorities
- A robust framework (following international procedures – ISO/CASCO) needed for trust and confidence in test results and among test labs (MRAs)

ITU Training activities on C&I – until 2014

- **CIS Countries NGN integration testing, Moscow (Russian Federation), 2010 and 2011**
- **Africa and Arab Regions, Tunis 5-7 Nov 2012**
- **ARB Region, Tunis 2-6 April 2013 (EMC Compatibility)**
- **Africa Region, Tunis 28 October-1st November 2013 (EMC Compatibility)**
- **Americas Region, Campinas, 24-28 June 2013 (EMC Compatibility)**
- **ARB Region, Tunis, 17-22 March 2014 (Mobile terminals)**
- **Americas Region, Campinas, 12-16 May 2014, (Mobile terminals)**
- **Training Course on Conformance and Interoperability Testing for the Africa Region, 23-27 June 2014, Tunis (Tunisia)**
- **CIS Region: ITU Virtual Laboratory for Remote Tests of Equipment, New Technologies and Services", 10-12 November 2014, Moscow (Russian Federation)**

ITU Training activities on C&I for 2015

- **Training Course for the Arab Region on Type Approval Testing for Mobile Terminals, Homologation Procedures and Market Surveillance, 20-24 April 2015, Tunis (Tunisia)**
- **Training Course for the Americas Region on Type Approval Testing for Mobile Terminals, NGN integration and interoperability testing, Homologation Procedures and Market Surveillance, 8-12 June 2015, Campinas**
- **Training Course for CIS Region, Moscow, 7-9 July 2015**
- **Training Course for ASP Centres of Excellence Region, Beijing, P.R. China 12-16 October 2015**
- **Training Course for the Africa Region on Type Approval Testing for Mobile Terminals, Homologation Procedures and Market Surveillance, 14-18 December 2015**

http://www.itu.int/en/ITU-D/Technology/Pages/CI_Events.aspx

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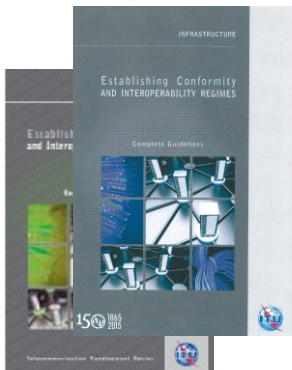


Key activities



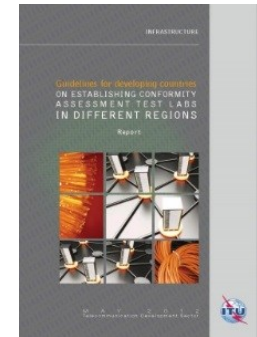
Projects in focus

ITU Guidelines on Conformity and Interoperability



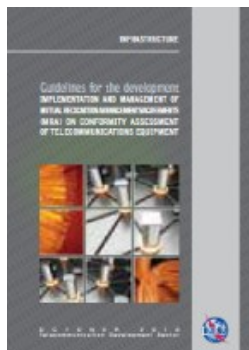
Establishing Conformity and Interoperability Regimes – Basic and Complete Guidelines

These Guidelines compiled from a careful collection of international best practices, address challenges faced by developing countries as they plan and review their own C&I regimes



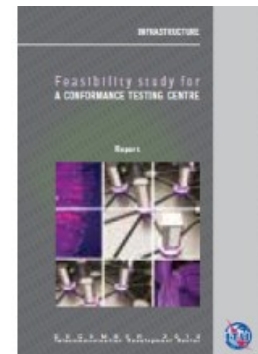
Guidelines for developing countries on Establishing Conformity assessment Test Labs in Different Regions

These Guidelines includes: processes for building testing labs; site analysis; collaboration mechanisms; best practices; reference standards and ITU Recommendations



Guidelines for the Development, Implementation and Management of MRAs

These guidelines promote the understanding and establishment of Mutual Recognition Agreements (MRAs) to promote efficiency and resource sharing of C&I related infrastructure, such as laboratories.



Feasibility Study for the establishment of a Conformance Testing Centre

This feasibility study describes environments, procedures and methodologies to be adopted to establish, manage and maintain a testing center

Telecommunication Technologies and Network Development Division

ITU C&I Regional Assessment Studies

- [The C&I Assessment Studies](#) looks for promoting the establishment of Harmonized C&I Programmes, collaborate to improve regional integration and fostering the availability of highly qualified institutions (as Laboratories, Certification and Accreditation Bodies)
- Activity conducted in close collaboration with Regional Organizations in addressing capacity building activities, accreditation and type approval testing for moving forward to establishing national, regional test centers and/or Mutual Recognition Agreements - MRAs as appropriate



SADC Region

The Southern African Development Community (SADC, 15 countries) Assessment Study took place in 2014. The results were presented in the Subregional Workshop for SADC, 13-15 October 2014, Livingstone (Zambia).



Caribbean countries

In collaboration with the Caribbean Telecommunication Union (CTU), the ITU C&I Assessment Study covered the Caribbean region in 2014. The results were presented in the Subregional Workshop for the Caribbean, 2-4 December 2014, in Trinidad and Tobago



Maghreb Region

Mauritania, Morocco, Algeria, Tunisia, Libya participated in the ITU Assessment Study for the Maghreb Region. The results of the Study were presented during the Subregional Workshop for Maghreb Countries, Tunis 9-11 December 2014



EAC countries

The East African Community (EAC) is the regional intergovernmental organization of the Republic of Burundi, Kenya, Rwanda, Tanzania, and Uganda. The results of the Study were presented during the Subregional Workshop for EAC countries, Nairobi October 2015



COMTELCA Countries and Cuba

For the Central American countries (Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Panama and Cuba), the study is taking place in 2015. The results of the Study will be presented during the ITU C&I Workshop for COMTELCA and Cuba, 7-9 December, Tegucigalpa, Honduras

C&I Regional Assessment Studies

The C&I Assessment Studies looks for promoting the establishment of Harmonized C&I Programmes, when possible.

It will collaborate to improve **regional integration** and foster the availability of highly qualified institutions (as Laboratories, Certification and Accreditation Bodies)

In an overall analysis, the Assessment Studies contributes to:

- **Bridging the Standardization Gap,**
- **reducing the Digital Divide, and**
- **as is inherent to ICT technologies development, strengthens business environment for global players.**

C&I Regional Assessment Studies

- C&I infrastructure in regions/sub-regions/countries are being assessed
- Analysis of the status in the regions are being conducted
- Looking for promoting regional agreements about possible locations for resources (Labs), agreements and testing capabilities
- Close collaboration with regional experts in addressing capacity building activities, accreditation and type approval testing.
- Moving forward to establishing regional test centers and/or MRAs as appropriate

C&I Regional Assessment Studies

Calendar

□ Assessment Study for SADC Region completed 2014)

- The results of the Assessment Study have been presented during the Subregional Workshop for SADC (Southern African Development Community), 13-15 October 2014, Livingstone (Zambia)



C&I Assessment Study for SADC

- [Final Report](#)
- [Survey Findings](#)
- [Outcomes of the Workshop for SADC, Livingstone, Zambia, 13-15 October, 2014](#)
 - [Recommendations: In Country C&I Test Lab](#)
 - [Criteria for selecting countries for establishing regional test centres](#)
 - [Proposed plan for a SADC framework MRA](#)
- [Media statement on the meeting of SADC Ministers Responsible for Communications, Postal and ICTs. Mangochi, Malawi, 21 November 2014](#)

□ **Assessment Study for Maghreb countries**

Mauritania, Morocco, Algeria, Tunisia, Libya (completed 2014)

The results of the assessment study have been presented during the Subregional Workshop for Maghreb Countries, Tunis 9-11 December 2014



- Assessment Study for AMS (Caribbean) conducted in 2014, Assessment Studies for AMS (Central America) and AFR (EAC countries) are being conducted during 2015

C&I Assessment Study for Maghreb

- [Final Report](#)
- [Survey Findings](#)
- [Outcomes of the workshop for Maghreb, Tunis 9-11 December 2014](#)
 - [Recommendations: In Country C&I Test Lab](#)
 - [Criteria for selecting countries for establishing regional test centres](#)
 - [Proposed plan for a Maghreb framework MRA](#)

Follow-up of Assessment Study for Maghreb

- Joint declaration signed between ITU Regional Office of Cairo and UMA the Secretariat General of the Arab Maghreb Union (UMA) for collaboration and support to Maghreb countries for establishing a common MRA
- **First meeting of C&I Expert Committee for Maghreb, Rabat (Morocco), 23-25 November 2015**

Assessment Studies for the Caribbean

- The results of the first assessment were presented during the ITU C&I Workshop for Caribbean (2-4 December 2014, in St. Augustine, Trinidad and Tobago)



- [Assessment Study on C&I for the Caribbean Report Outcomes](#)

Follow-up of Assessment Study for the Caribbean



As one of the results of the assessment and workshop held for the Caribbean was the cooperation between an ITU Academia member, CPqD with Caribbean countries in regard to homologation and testing procedures. A high level Caribbean mission visited the laboratories of the CPqD in Campinas, Brazil, during the C&I training for the region in June 2015

□ Assessment Studies for EAC countries:

The East African Community (EAC) is the regional intergovernmental organization of the Republics of **Burundi, Kenya, Rwanda, the United Republic of Tanzania, and the Republic of Uganda**, with its headquarters in Arusha, **Tanzania. (ongoing 2015)**

The results of the assessment study was presented during the Subregional Workshop for EAC countries, Nairobi 21-23 October 2015. **EAC Secretariat will call for Ministerial Meeting early 2016**



Assessment Studies

- **Assessment Studies for [Central America](#)**
- The results of the first assessment will be presented during the ITU C&I Workshop for Central America [Tegucigalpa, Honduras 7 – 9 December 2015](#)



Costa Rica
El Salvador
Guatemala
Honduras
Nicaragua
Panama
Dominican Republic
+
Cuba

Follow-up of C&I Assessment Studies on Regional Basis



SADC

- [Final Report](#)
- [Survey Findings](#)
- [Outcomes of the Workshop for SADC, Livingstone, Zambia, 13-15 October, 2014](#)
 - [Recommendations: In Country C&I Test Lab](#)
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 - [Proposed plan for a SADC framework MRA](#)
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Maghreb

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Caribbean

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EAC

- [C&I Assessment Study for EAC: Survey Findings](#)
- [Outcomes](#)
- [Recommendations: In Country C&I Test Lab](#)
- [Criteria for selecting countries for establishing regional test centres](#)
- [Proposed plan for EAC framework MRA](#)
- [EAC Task Force on Conformity and Interoperability \(C&I\): Terms of Reference](#)

Direct Assistance on C&I

A number of countries have expressed strong interest and requested direct assistance (e.g. Sri-Lanka, Kiribati, Mongolia, Zambia, Cameroon, Cote d'Ivoire, Ghana) in establishing C&I infrastructure and procedures

The Direct Assistance provided through the Regional Offices will provide support taken into consideration all C&I aspects, as:

- **Regulatory framework**
- **Institutions roles and typical procedures**
- **Mutual Recognition Agreements**
- **Funding**
- **National and Regional test centres and harmonized C&I programmes: Roadmap and Feasibility Study**

Telecommunication Technologies and Network Development Division



Bridging the Standardization Gap

- Standardization capabilities contributes to reduce the digital divide between the developed and developing worlds.
- The activities from ITU Regional Offices and Areas Offices is key. Tailored capacity building events and assistance to developing countries will increase inputs from developing countries into ICT standards.



- [WTDC-14](#), Dubai, highlighted the relevance of regional activities and engagement on bridging the standardization gap between developing and developed countries.
- The [Dubai Declaration](#) specifically asserts that *“increased participation of developing countries in ITU activities to bridge the standardization gap is needed to ensure that they experience the economic benefits associated with technological development, and to better reflect the requirements and interests of developing countries in this area;”*
- Fostering *“the development of telecommunication/ICT networks as well as relevant applications and services, including bridging the standardization gap”* is the **new ITU-D Objective 2**;
- **Approval of the Recommendation ITU-D 22** , *“Bridging the standardization gap in association with regional groups of the study groups.”*
- **Programme: Telecommunication/ICT networks, including conformance and interoperability and bridging the standardization gap:** The objective of BDT's work in this area is to assist Member States in the implementation of evolution to these future network architectures and technologies, in accordance with the applicable standards (Recommendations) developed in ITU-T and ITU-R, for bridging the standardization gap, making better use of and managing infrastructure and resources as well as addressing interconnection issues of emerging networks.
- **Resolution 47** on the enhancement of knowledge and effective application of ITU Recommendations in developing countries, was revised to stress of the usefulness of ITU guidelines on the application of ITU Recommendations;

BDT activities in BSG

In collaboration with Regional Offices, BDT coordination to organize Regional Standardization Forums:



- [ITU Regional Standardization Forum for Americas, 21 September 2015, Washington D.C., United States](#)
- [ITU Regional Standardization Forum for Asia Pacific region, 27-28 October 2015, Jakarta, Indonesia](#)

And capacity building events available at ITU Academy (e.g. Working Methods of ITU-T Study Groups; an training on NGN has been planned).

ITU-D Study Group Questions

Q1/1



Question 1/1: Policy, regulatory and technical aspects of the migration from existing networks to broadband networks in developing countries, including next-generation networks, m-services, OTT services and the implementation of IPv6

Q2/1



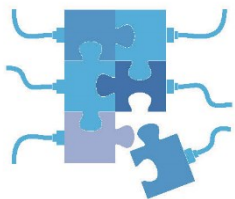
Question 2/1: Broadband access technologies, including IMT, for developing countries

Q5/1

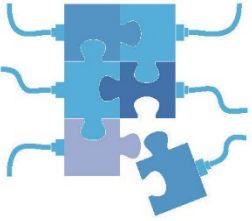


Question 5/1: Telecommunications/ICTs for rural and remote

Q4/2



Question 4/2: Assistance to developing countries for implementing conformance and interoperability programmes



Question 4/2: Assistance to developing countries for implementing conformance and interoperability programmes



WTDC-14, Outcomes on C&I

- Dubai Declaration
- Amendment of Resolution 47
- New ITU-D Study Group Question on C&I
- Objective 2, Output 2.2, Programme
- Regional Initiatives for AFR and ARB Regions

WTDC-14 outcomes on C&I

- **The Dubai Declaration** recognized that conformance and interoperability of telecommunication/ ICT equipment and systems can increase market opportunities and reliability and encourage global integration and trade.
- **Resolution 47** was amended, reaffirming the importance of collaboration and coordination between the three ITU Bureaux in implementing the ITU C&I programme.

WTDC-14 outcomes on C&I

- **Study Group Question 4/2**, mandate:

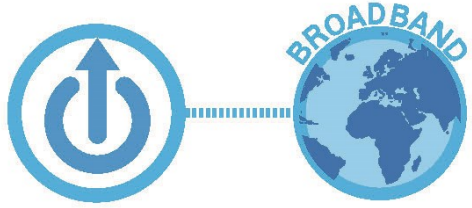
“Studies of various issues related to conformance and interoperability are to be reported, and among others the description of the technical, legislative and regulatory framework that would be needed to implement appropriate C&I programmes by developing countries. Specifically, the following outputs are envisaged:

- ***a) Harmonized Guidelines on technical, legal and regulatory aspects of C&I Regime;***
- ***b) Feasibility studies regarding establishment of laboratories in different C&I Domains;***
- ***c) Guidance on the framework and procedures to establish MRA;***
- ***d) C&I Regimes, case studies established at national, regional or global levels;***
- ***e) Development of a methodology for assessing the situation of C&I regimes in place in the regions (or sub regions);***
- ***f) Experience sharing and case studies reports on C&I programmes implementation.”***

WTDC-14 outcomes on C&I

Outcomes of Objective 2, Output 2.2 of the Dubai Action Plan,
focusing on the following issues:

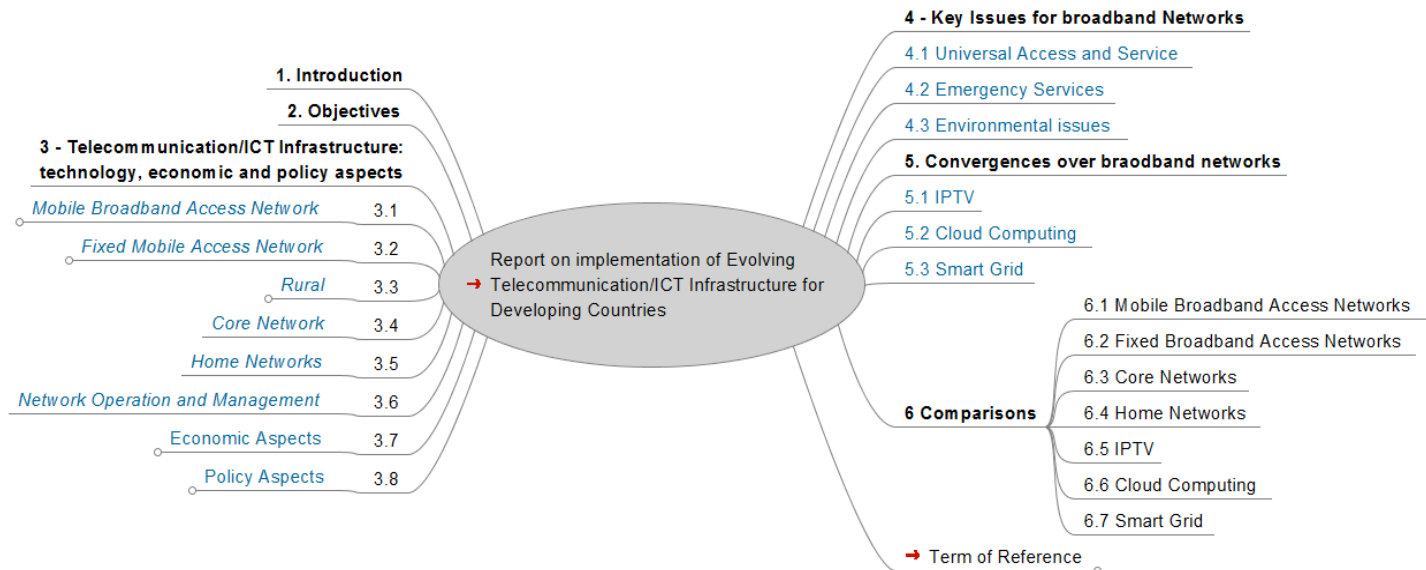
- a) **Educating** technicians, policy-makers and businesses on the importance of C&I procedures and testing, mobilizing the resources required to implement regional and national C&I programmes, in cooperation with other relevant regional and international organizations;
- b) **Providing assistance** to developing countries in the establishment of national, regional or subregional C&I programmes, and conducting assessment studies for facilitating the establishment of common conformance and interoperability regimes at national, regional and subregional level;
- c) **Preparing guidelines** on this process which outline the technical and human resources required and the international standards to be applied.



ITU-D Q.1/1 – Migration to Broadband Networks

- [Q1.1](#): Policy, regulatory and technical aspects of the migration from existing networks to broadband networks in developing countries, **including next-generation networks**, m-services, OTT services and the implementation of IPv6
- [New report](#) on Implementation of Evolving Telecommunication/ICT Infrastructure for Developing Countries has been finalized.

- The Report covers essential telecommunication/ICT infrastructure aspects, considers key convergence technologies and ITU standards liable for adoption by developing countries;
- The Report was presented at the [ITU SG 1 meeting](#) (14-18/Sep) and considered a living document. Q1/1 and Q2/1 participants have asked ITU to update and present it at the next ITU SG meetings, in 2016.





Question 2/1: Broadband access technologies, including IMT, for developing countries

- Target audience

Target audience	Developed countries	Developing countries
Telecom policy-makers	Yes	Yes
Telecom regulators	Yes	Yes
Service providers/operators	Yes	Yes
Manufacturers	Yes	Yes

Details at :

<http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG01-RGQ02.1&stg=1>

Issues for study

- Identify the factors influencing the effective deployment of wireline and wireless, including satellite, broadband access technologies and their applications.
- Examine broadband access technologies and their future trends.
- Identify methodologies for migration planning and implementation of broadband technologies, taking into account existing networks, as appropriate.
- Consider trends in the various broadband access technologies, deployments, services offered and regulatory considerations.
- Continue to identify ways and means of implementing IMT, using terrestrial and satellite links.
- Identify key elements to be studied in order to facilitate the possible deployment of systems integrating the satellite and terrestrial components of IMT.
- Provide information on the specific impact of the deployment of all broadband access technologies on underserved populations, including persons with disabilities.
- Provide information on IMT-Advanced systems, based on the advice of Working Party 5D of ITU-R Study Group 5 and working parties of ITU-R Study Group 4.



Question 5/1: Telecommunications/ICTs for rural and remote

- Target audience

Target audience	Developed countries	Developing countries
Relevant policy-makers	Yes	Yes
Telecom regulators	Yes	Yes
Rural authorities	Yes	Yes
Service providers/operators	Yes	Yes
Manufacturers, including software developers	Yes	Yes
Vendors	Yes	Yes

- Known challenges

that developing countries planning to extend ICTs to rural and isolated areas must be tackle are the following:

- 1) Shortage of power
- 2) Expense of maintaining power backup - usually diesel - and environmental hazards thereof
- 3) Difficult terrain
- 4) Difficult access and transportation
- 5) Lack of skilled manpower
- 6) Installation and maintenance of networks is quite challenging and difficult
- 7) Very high operating cost
- 8) Low potential ARPU
- 9) Sparsely populated areas and scattered population clusters.

Issues for Study: Progress in stages, to cover a four-year cycle in the following manner:

- **Step 1:**
Continue identification of the full range of potential techniques and sustainable solutions that can significantly impact on the provision of telecommunication/ICT applications in rural and remote areas, with emphasis on those that employ the latest broadband technologies designed to lower infrastructure capital and operating costs, assisting convergence between services and applications, taking into considerations reducing greenhouse gas emissions.
- **Step 2:**
Continue to investigate and report on how the techniques identified above can be used to best deliver the range of services and applications required by rural and remote communities and adapted to the needs of their users.
- **Step 3:**
Identify, assess and consolidate the challenges faced by developing countries in setting up or upgrading telecommunication infrastructure in rural areas, including those aimed at providing enhanced broadband connectivity through networks based on suitable interoperable IMT frequency bands, such as 450-470 MHz and other frequency bands identified for IMT.
- **Step 4:**
Report on the public policies and regulatory measures carried out by developing countries to overcome or mitigate the above-mentioned challenges.
- **Step 5:**
Describe the evolution of system requirements for rural network systems specifically addressing such identified challenges of rural deployment.
- **Step 6:**
Continue consideration of the quality of the services provided, and the cost effectiveness, degree of suitability in different geographies and sustainability of the techniques and solutions identified in the above-mentioned steps.
- **Step 7:**
Augment the report on the set of case studies that clearly demonstrate how a range of techniques, based on new technology aimed at providing reduced capital and operating cost solutions, reducing GHG emissions and enhancing community participation, can maximize the benefits of broadband telecommunication/ICT infrastructure in rural and remote areas.
- **Step 8:**
Identify business models for sustainable deployment of networks and services in rural and remote areas, taking into consideration priorities based on economic and social indicators.

Details at : <http://www.itu.int/net4/ITU-D/CDS/sg/rgqlist.asp?lg=1&sp=2014&rgq=D14-SG01-RGQ05.1&stg=1>

Telecommunication Technologies and Network Development Division

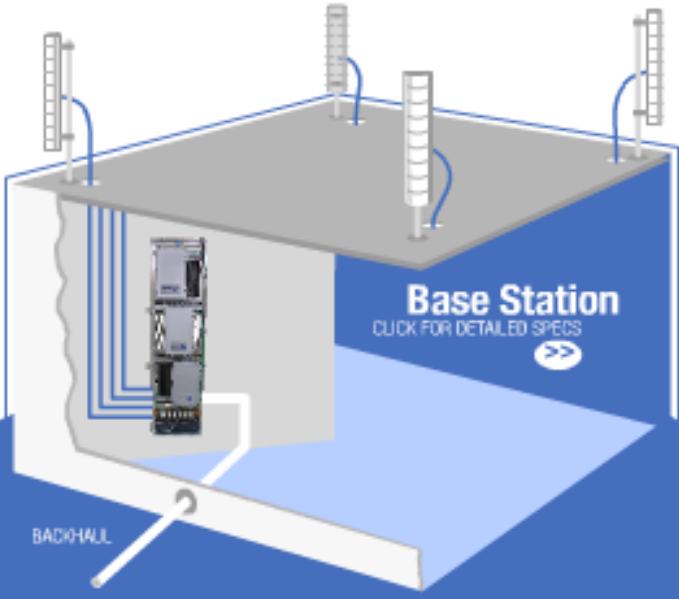
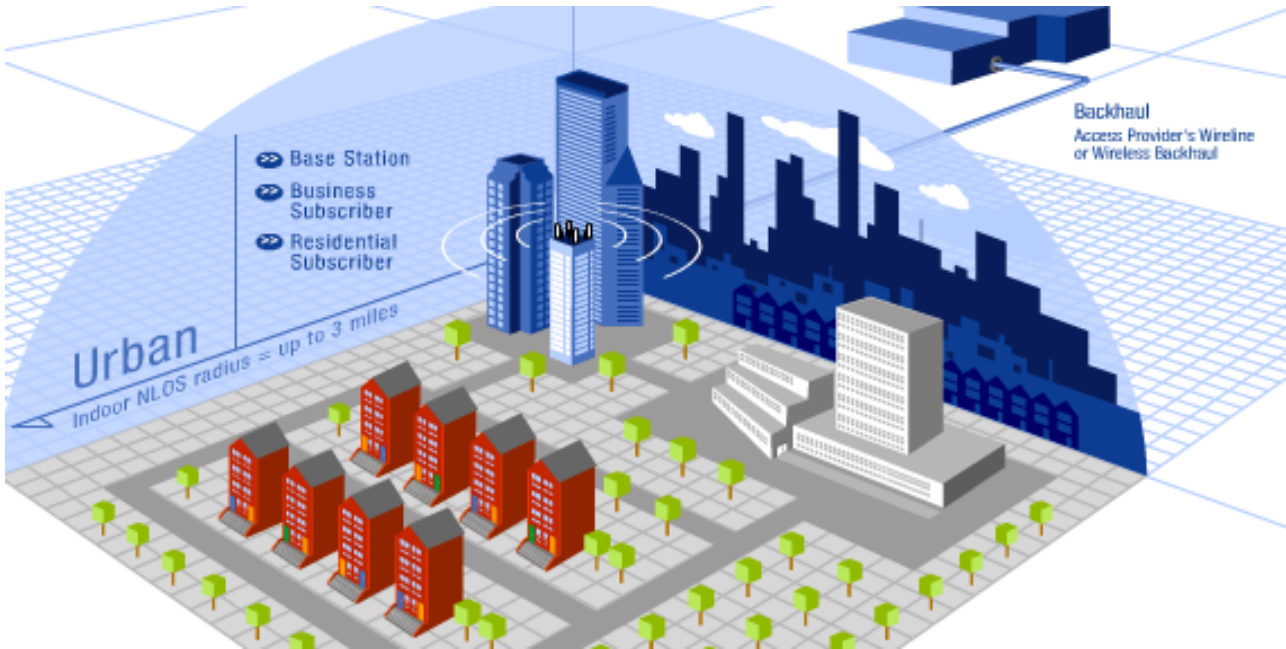
ITU Broadband, IPv6 and Internet Exchange Implementations

- **Broadband Wireless Networks Implementation:** To provide broadband connectivity free or low cost digital access for schools and hospitals, and for underserved populations in rural and remote areas in selected countries.
- **Internet Exchange Development:**

To bring the value of IXPs in leveraging the benefits of connectivity through potentially reduced transmission costs, optimized Internet traffic, improved Quality of Service. Widely accepted best practices for the design, installation and operation of IXPs. peering as an effective way for Internet Service Providers (ISPs) to improve the efficiency of operations and interconnection business relationships



Broadband Wireless Network _ ITU/ McCaw Project



URBAN Base Station

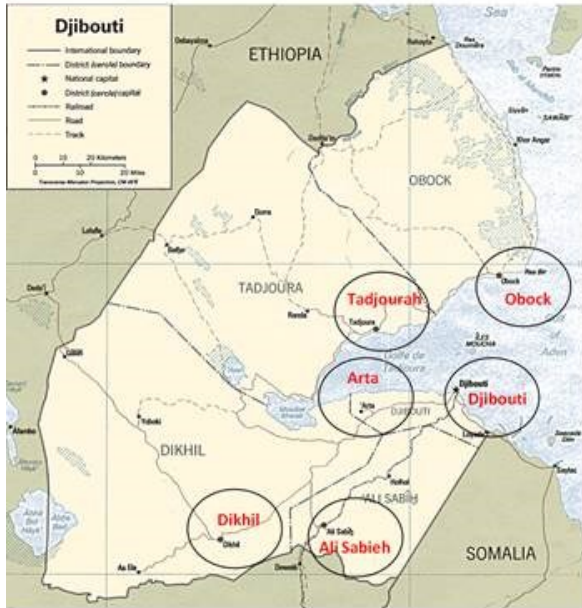
- NLOS (non line-of-sight) with consistent throughput to edge of cell
- Fully-integrated base station transceiver
- Reliable OFDM radio transmission
- Omnidirectional or sector applications
- Spectrally efficient, scalable, expandable
- Configurable TDD uplink/downlink capacity
- Least cost installation
- Standards-based network management SNMP and Web-based
- Dual redundant 48 volt DC power supply



URBAN Business

- Indoor, NLOS coverage up to 3 miles from base station
- Consistent throughout performance to edge of cell
- Configurable service levels (QoS) to support small and medium enterprises
- Plug-and-play subscriber unit (CPE) connects to computer or LAN through standard Ethernet port
- Self-installable subscriber unit – no truck rolls required
- Outdoor NLOS subscriber unit available

Djibouti 4G Broadband Wireless Network (Mobile WiMax standard IEEE802.16e)



Djibouti : inauguration du réseau WiMax du projet "Village du Millénaire" :

http://french.china.org.cn/foreign/txt/2013-12/20/content_30950430.htm

<http://www.lanationdj.com/djibouti-connecte-ses-villages/#>:

In the International press:



TUESDAY, JANUARY 21ST

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La Nation
Le Quotidien Djiboutien

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ACTUALITÉS INTERNATIONALES

ANNONCE: Pour toutes vos annonces ou publicités veuillez contacter le service commercial. Email : nation

Djibouti connecte ses villages

© 22 DÉCEMBRE 2013 15 H 37 MIN 0 COMMENTS

VIEWS: 254

Le président Ismaïl Omar Guelleh a inauguré jeudi dernier à Arta, chef-lieu de la région du même nom, sa première station Wimax destinée à connecter l'ensemble de la province du pays. La cérémonie d'inauguration a eu lieu en présence du secrétaire général de l'Union internationale des télécommunications, le Dr hamadoun Ibrahima Touré qui, dans son discours a salué en Ismaïl Omar Guelleh un visionnaire qui a su partager son rêve avec son peuple. Fruit du partenariat entre la RDD et l'UIT, le projet Wimax permettra au pays d'offrir à ses populations rurales et surtout aux écoles et aux hôpitaux régionaux un accès Internet haut débit. Compte-rendu.

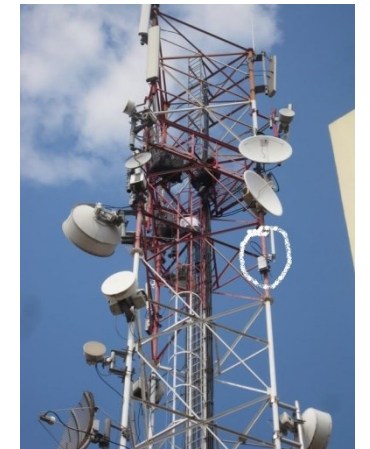
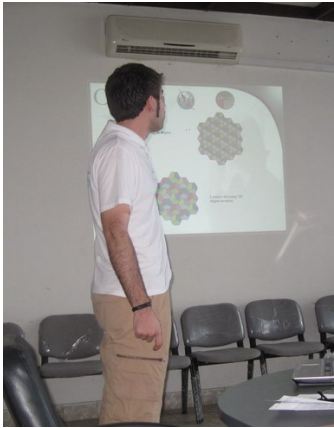
The Speech on the project by HE Ismaïl Omar Guelleh, President of Djibouti is available at:

<http://www.youtube.com/watch?v=OepKBSKWReQ>

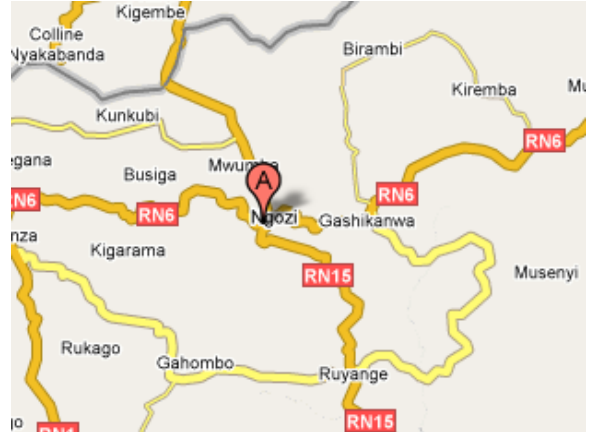
Broadband Wireless Network Project Implementation Team during the needs Assessment field Missions in Swaziland



Broadband Wireless Network Installation in Burundi

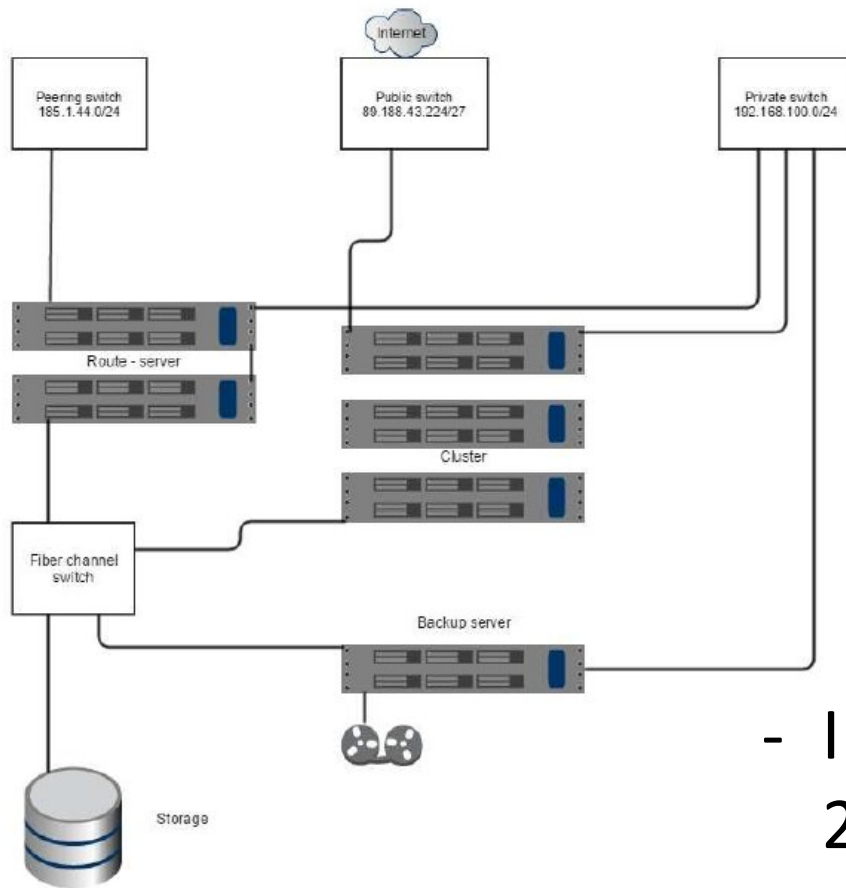


Connecting Hospitals for E-Health in Burundi



*** Schools & Schools connected in 10 provinces
(free of charge)
* The network is generating USD 45'000 / month
as revenues for ONATEL (Telecom operator and
partner)**

IXP In Montenegro



- Implemented and operational since July 2015
- Extension, Cashing machines under consideration for 2016

Telecommunication Technologies and Network Development Division



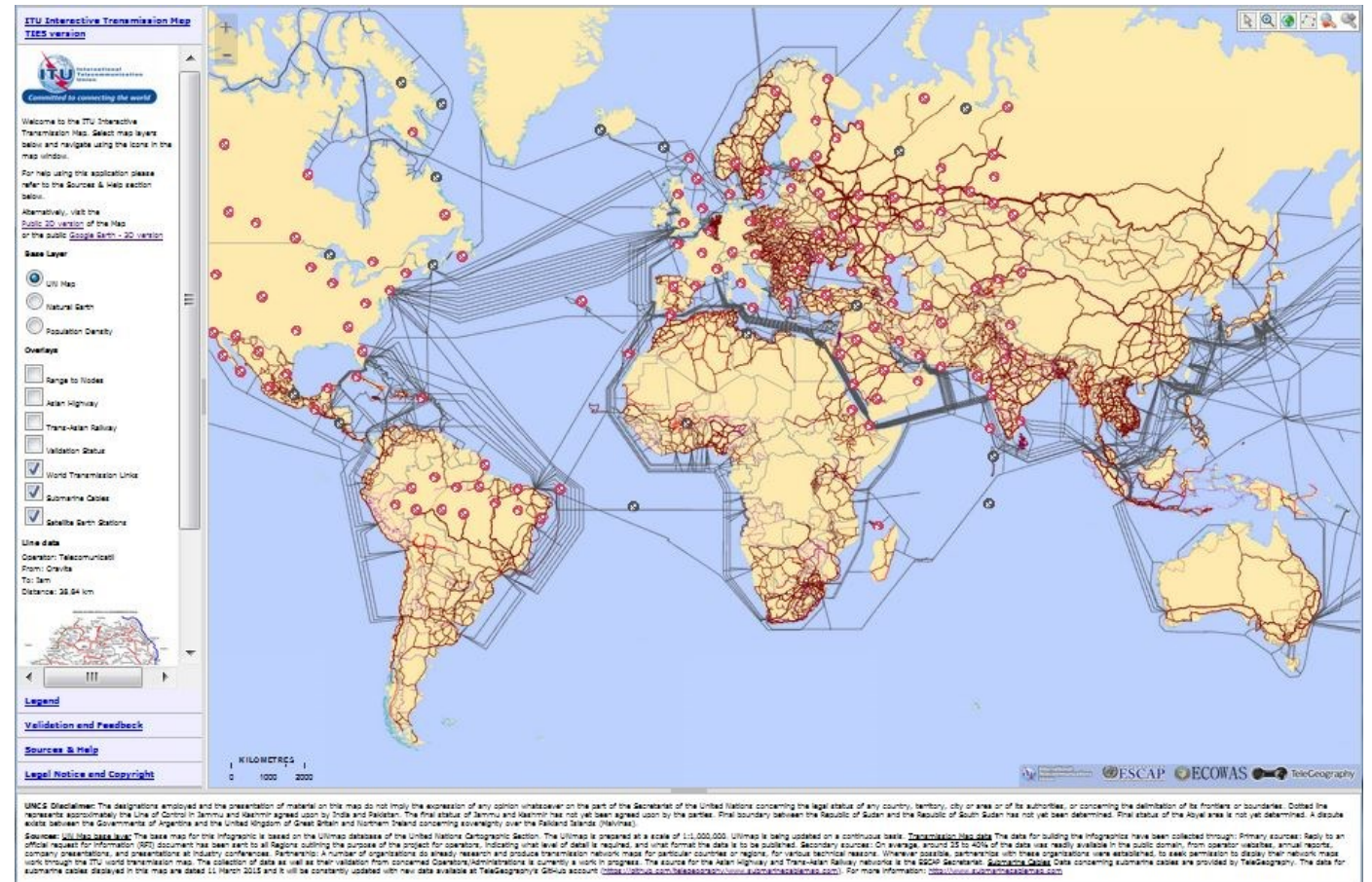
Key activities

ITU Interactive Transmission Maps

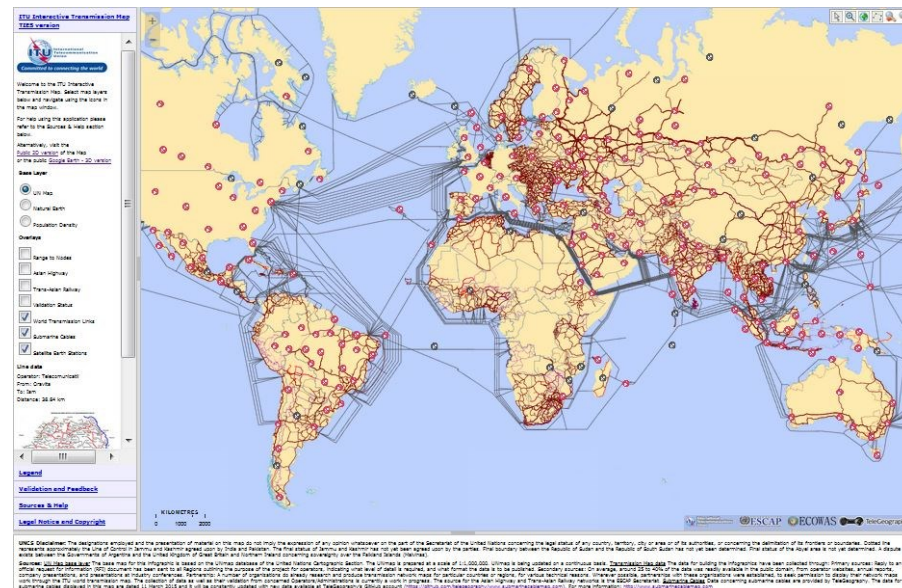
- The Interactive Transmission Maps are a cutting-edge ICT-data mapping platform to take stock of national backbone connectivity (Optical Fibres, Microwaves and Satellite Earth Stations) as well as of other key metrics of the ICT sector. Data concerning submarine cables are also included as provided by TeleGeography
- The Scope of this ITU project is to research, process and create maps of core transmission networks worldwide
- The Objectives of this ITU project are:
 - to assess the status of national connectivity and to identify gaps enabling the design of targeted strategies and implementation programs for increasing the use of broadband.
 - to assess market opportunities, thus serving as a management tool for making investment decisions, promoting broadband and achieving universal connectivity.
 - to be used as a source of abundant and current data on global ICT connectivity.



Projects in focus



Introduction



1) Purpose: To quantify supply-side indicators for the reach of broadband networks.

2) Research: Desk research, primary research in conjunction with ITU Regional Offices, and working with partner organisations.

3) Validation: The map is validated by network operators and administrations through the ITU Regional Offices and recorded in the Validation Framework.

4) Outputs: Broadband Capacity Indicators.

Broadband Transmission Capacity Indicators

Underneath the map is a database, containing records of each individual link. The following indicators are either compiled or calculated from this database:

Indicator 1: Transmission network length (Route kilometres)

Indicator 2: Node locations

Indicator 3: Equipment type of terrestrial transmission network

Indicator 4: Network capacity (bit rate)

Indicator 5: Number of optical fibres within the cable

Indicator 6: Operational status of the transmission network

Indicator 7a: Percentage of population within reach of transmission networks

Indicator 7b: Percentage of area within reach of transmission networks

ITU Interactive Transmission Map
 TIES version

Welcome to the ITU Interactive Transmission Map. Select map layers below and navigate using the icons in the map window.

For help using this application please refer to the Sources & Help section below.

Alternatively, visit the [Public 2D version of the Map](#) or the public [Google Earth - 3D version](#).

Base Layer

- UTM Map
- Natural Earth
- Population Density

Overlays

- Range to Nodes
- Asian Highway
- Trans-Asian Railway
- Validation Status
- World Transmission Links
- Submarine Cables
- Satellite Earth Stations

Line data

Operator: Telecommunications
 From: Onvita
 To: Sam
 Distance: 26.94 km

Legend

Validation and Feedback

Sources & Help

Legal Notice and Copyright

ITU Interactive Transmission Map Research Status: September 2015


Region	CIS	ARB	AFR	ASP	LAC	EUR	Total
Operators	35	32	61	68	62	52	310
Links	2,097	1,058	3,118	5,555	3,376	3,227	18,431
Nodes	1,148	665	2,308	3,567	2,504	2,164	12,356
Route Kms	330,839	147,907	251,977	567,841	306,567	254,429	1,868,560
Total Kms	861,408	272,776	329,624	11,109,733	787,886	865,051	14,226,478
Population within range of operational fibre node (millions), Dec 2014							
10-km	96.6	72.2	158.3	574.4	176.8	62.8	1,141,123.8
25-km	181.8	168.2	328.8	1,479.6	363.2	111.0	2,632,601.3
50-km	229.2	241.1	508.1	2,488.6	467.0	142.7	4,076,667.8

KILOMETRES
 0 1000 2000

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Source: [ITU Data](#), [ITU Data](#), [ITU Data](#). The base map for this infographic is based on the UTMmap database of the United Nations Cartographic Section. The UTMmap is prepared at a scale of 1:1,000,000. UTMmap is being updated on a continuous basis. [Transmission Links data](#). The data for building the infographic have been collected through: Primary sources: Reply to an official request for information (RFI) document has been sent to all Regions outlining the purpose of the project for operators, indicating what level of detail is required, and what format the data is to be submitted. Secondary sources: On average, around 25 to 40% of the data was readily available in the public domain, from operator websites, annual reports, company presentations, and presentations at industry conferences. Partnership: A number of organizations do already research and produce transmission network maps for particular countries or regions, for various technical reasons. Whenever possible, partnerships with these organizations were established, to seek permission to display their network maps through the ITU world transmission map. The collection of data as well as their validation from competent Operators/Administrations is currently a work in progress. The source for the Asian Highway and Trans-Asian Railway networks is the ESCAP Secretariat. [Submarine Cables](#). Data concerning submarine cables are provided by TeleGeography. The data for submarine cables displayed in this map are dated 11 March 2015 and it will be constantly updated with new data available at TeleGeography's GitHub account (<https://github.com/telegeography/ituuw-submarinecablemap>). For more information: <http://www.submarinecablemap.com>.

ITU Interactive Transmission Map
TEES version



Connected to connecting the world

Welcome to the ITU Interactive Transmission Map. Select map layers below and navigate using the icons in the map window.

For help using this application please refer to the Sources & Help section below.

Alternatively, visit the [Public 3D version of the Map](#) or the public [Google Earth - 3D version](#)

Base Layer

UTM Map

Natural Earth

Population Density

Overlays

Range to Nodes

Asian Highway

Trans-Asian Railway

Validation Status

World Transmission Links

Submarine Cables

Satellite Earth Stations


Line data

Operator: Telecommunif

From: Oravita

To: Sam

Distance: 25.64 km

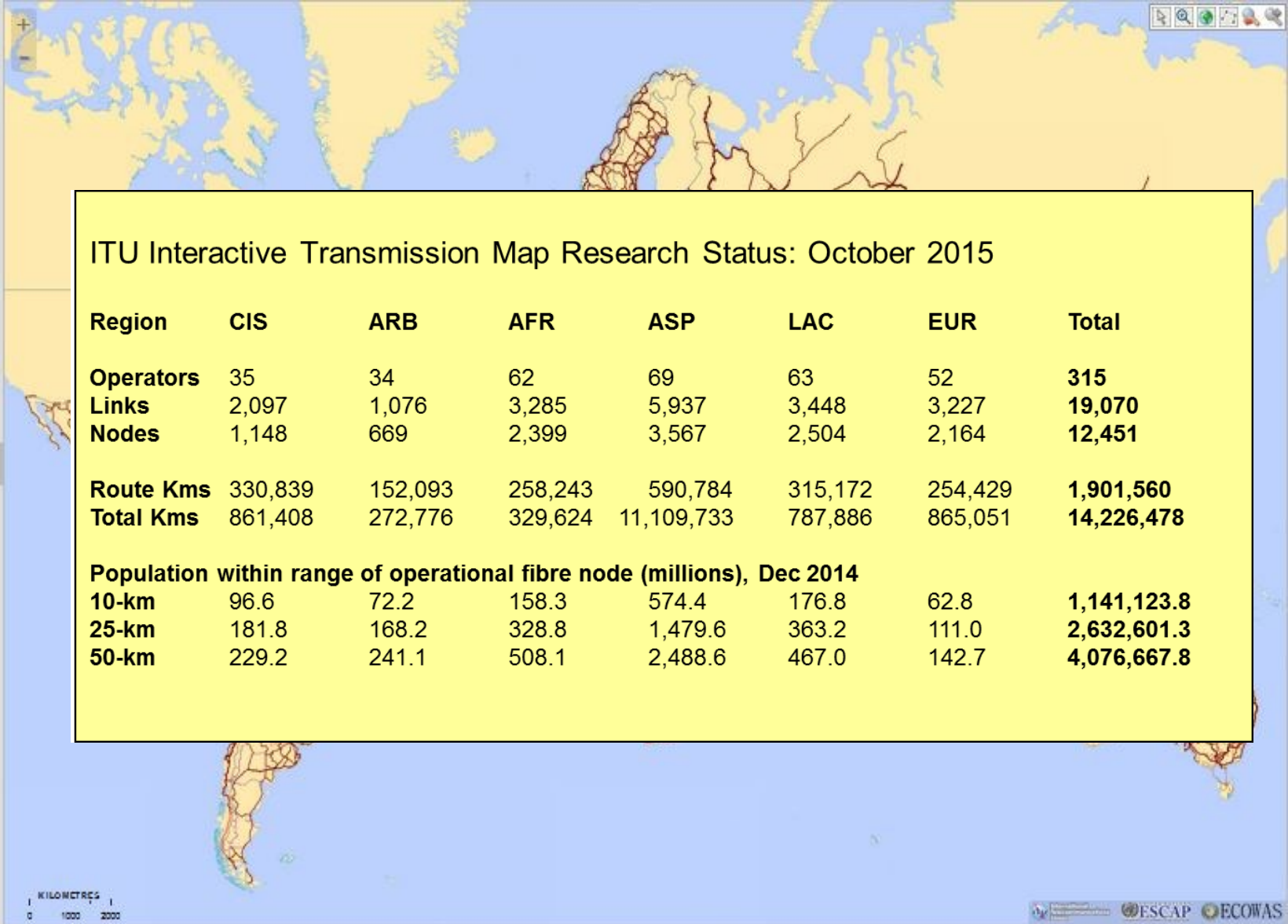


[Legend](#)

[Validation and Feedback](#)

[Sources & Help](#)

[Legal Notice and Copyright](#)




ITU Interactive Transmission Map Research Status: October 2015

Region	CIS	ARB	AFR	ASP	LAC	EUR	Total
Operators	35	34	62	69	63	52	315
Links	2,097	1,076	3,285	5,937	3,448	3,227	19,070
Nodes	1,148	669	2,399	3,567	2,504	2,164	12,451
Route Kms	330,839	152,093	258,243	590,784	315,172	254,429	1,901,560
Total Kms	861,408	272,776	329,624	11,109,733	787,886	865,051	14,226,478
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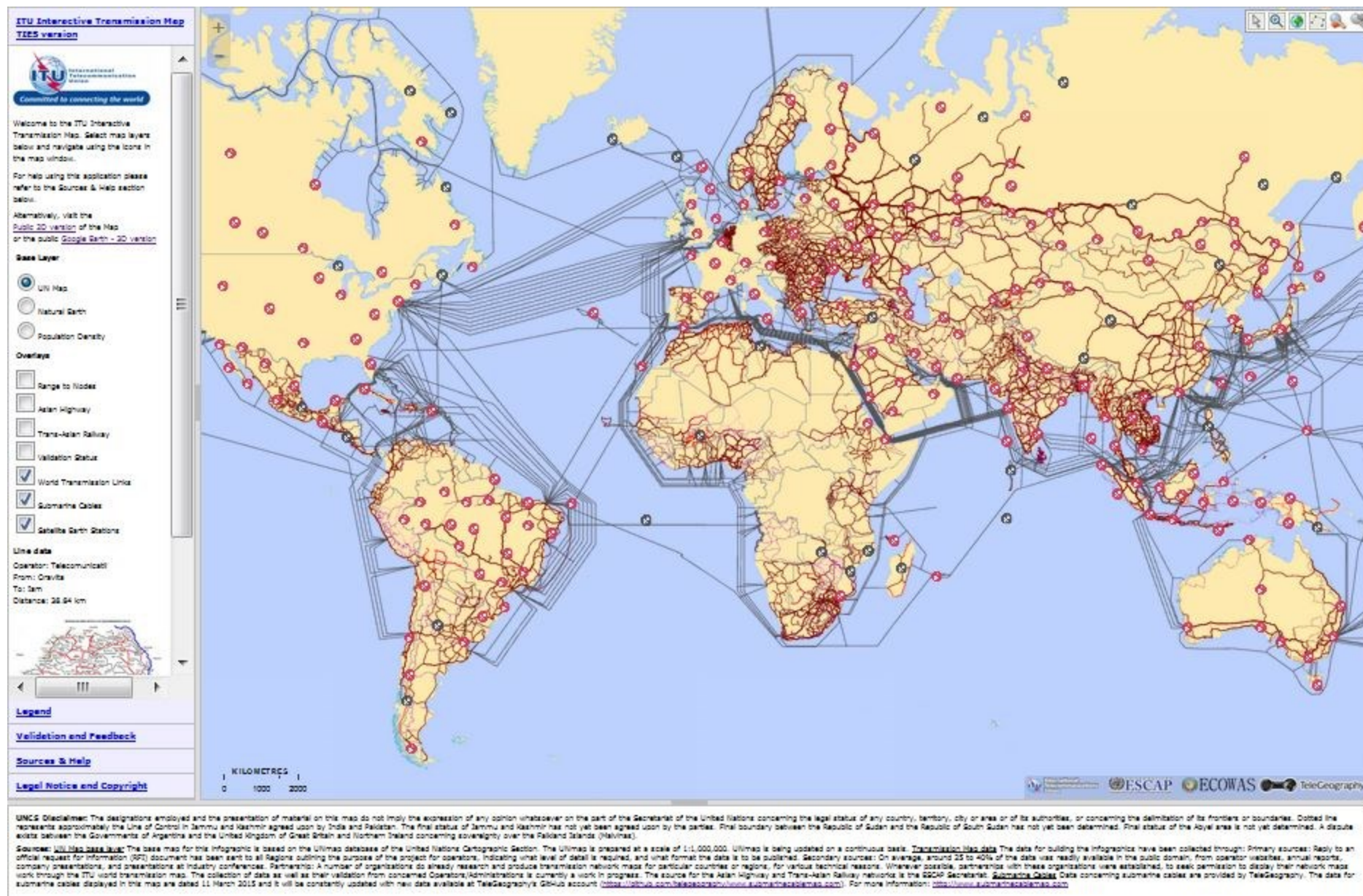
KILOMETRES

0 1000 2000



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Sources: [UTM Map Data Layer](#): The base map for this Infographic is based on the UTM database of the United Nations Cartographic Section. The UTM map is prepared at a scale of 1:1,000,000. UTM map is being updated on a continuous basis. [Transmission Map data](#): The data for building the Infographic have been collected through: Primary sources: Reply to an official request for information (RFI) document has been sent to all Regions outlining the purpose of the project for operators, indicating what level of detail is required, and what format the data is to be published. Secondary sources: On average, around 25 to 40% of the data was readily available in the public domain, from operator websites, annual reports, company presentations, and presentations at industry conferences. Partnerships: A number of organizations do already research and produce transmission network maps for particular countries or regions, for various technical reasons. Whenever possible, partnerships with these organizations were established, to seek permission to display their network maps work through the ITU world transmission map. The collection of data as well as their validation from concerned Operators/Administrations is currently a work in progress. The source for the Asian Highway and Trans-Asian Railway networks is the SSCAP Secretariat. [Submarine Cables](#): Data concerning submarine cables are provided by TeleGeography. The data for submarine cables displayed in this map are dated 11 March 2015 and it will be constantly updated with new data available at TeleGeography's GitHub account (<https://github.com/telegeography/world-submarine-cables-map>). For more information: <http://www.submarinecables.com>



Validation – TIES Password Protected Map and Validation Framework

ITU Interactive Transmission Map
TIES version

Legend

Validation and Feedback

Validation

We use a simple traffic light system to show the status of each piece of network infrastructure. To display the current status of a particular network link, enable the 'Validity' layer checkbox. For a detailed description of the traffic light symbology, please refer to the [validation framework](#).

Feedback

If you notice that a line should be added or corrected, or other edits are needed, please use the line slot to add new lines on to the map screen, paste into an email address to be contacted, which are slots which are only temporary. For further data feedback loop of

Line slot
Line slot

Click this link here to open the Validation Framework, or go to <https://www.itu.int/itu-d/tnd-map/validation/>

Sources & Help

Legal Notice and Copyright

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ESCAP
ECOWAS
TeleGeography

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Source: [ITU Data Base](#). The base map for this infographic is based on the UTM database of the United Nations Cartographic Section. The UTM is prepared at a scale of 1:1,000,000. UTM is being updated on a continuous basis. [Transmission Map Data](#). The data for building the infographic have been collected through: Primary sources: Reply to an official request for information (RFI) document has been sent to all Regions outlining the purpose of the project for operators, indicating what level of detail is required, and what format the data is to be published. Secondary sources: On average, around 25 to 40% of the data was readily available in the public domain, from operator websites, annual reports, company presentations, and presentations at industry conferences. Partnerships: A number of organizations do already research and produce transmission network maps for particular countries or regions, for various technical reasons. Whenever possible, partnerships with these organizations were established, to seek permission to display their network maps work through the ITU world transmission map. The collection of data as well as their validation from concerned Operators/Administrations is currently a work in progress. The source for the Asian Highway and Trans-Asian Railway networks is the ESCAP Secretariat. [Submarine Cables](#). Data concerning submarine cables are provided by TeleGeography. The data for submarine cables displayed in this map are dated 11 March 2015 and it will be constantly updated with new data available at TeleGeography's GitHub account (<https://github.com/telegeography/itu-tnd-map-public>). For more information: <http://www.submarinecables.com>

<http://www.itu.int/itu-d/tnd-map-public/>

Validation – TIES Password Protected Map and Validation Framework


ITU Interactive Transmission Map
TIES version

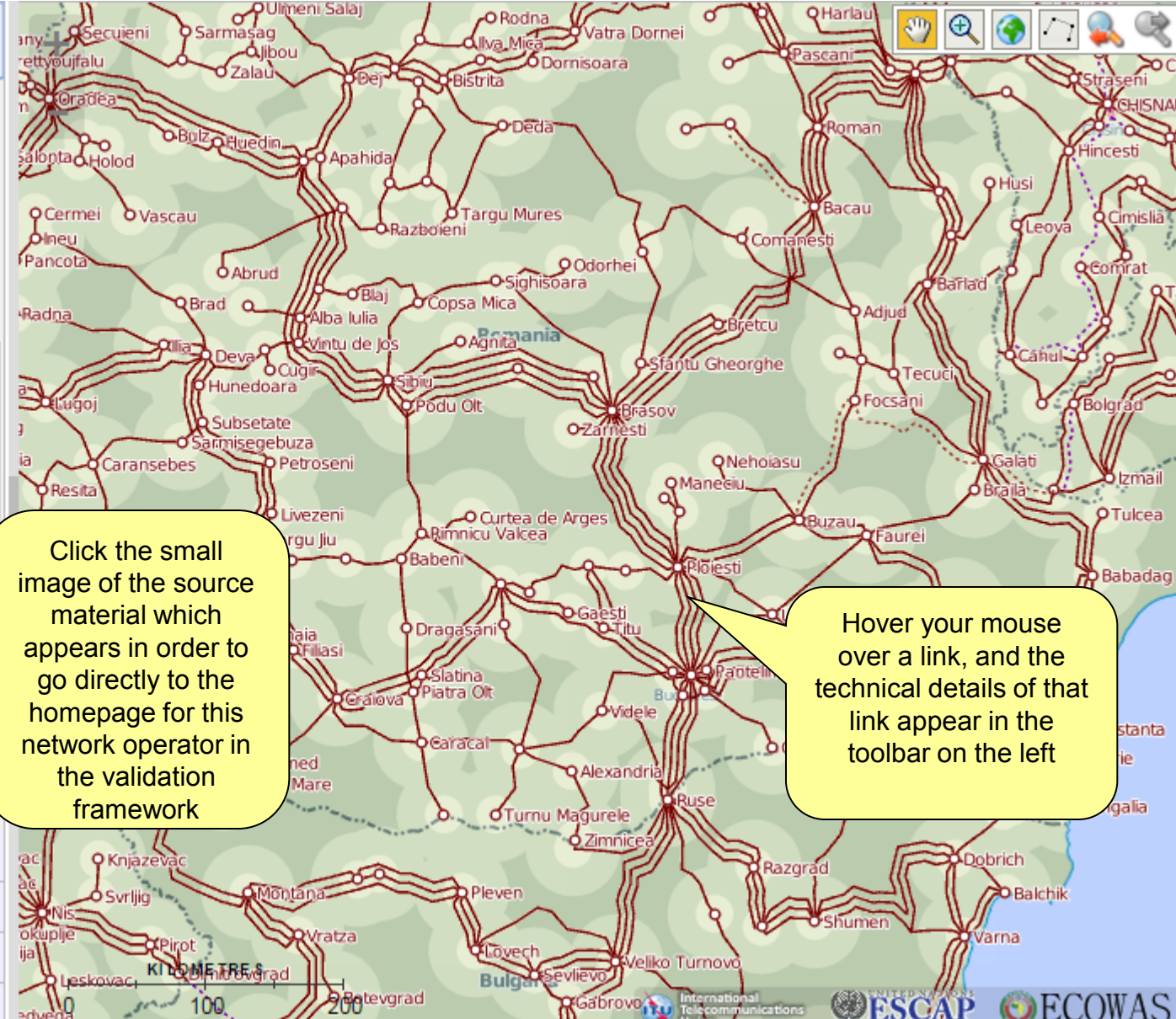
- UN Map
- Natural Earth
- Population Density

Overlays

- Range to Nodes
- Asian Highway
- Trans-Asian Railway
- Validation Status
- World Transmission Links
- Submarine Cables

Line data
Operator: Telecomunicatii
From: Bucharest
To: Ploiesti
Distance: 84.73 km





Click the small image of the source material which appears in order to go directly to the homepage for this network operator in the validation framework


Hover your mouse over a link, and the technical details of that link appear in the toolbar on the left

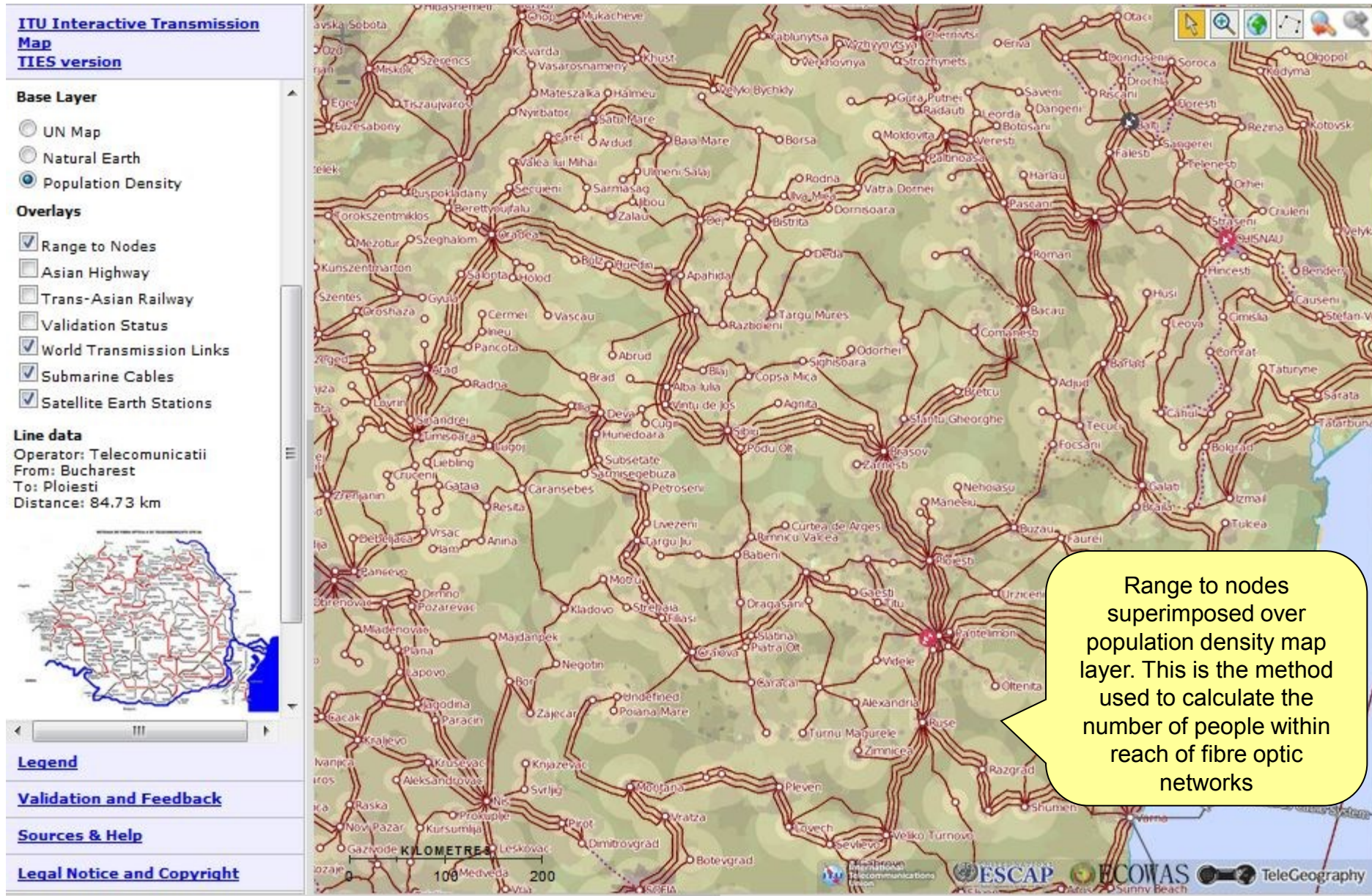
[Legend](#)

[Validation and Feedback](#)

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Indicators

ITU Interactive Transmission Map – Validation

[VALIDATION HOME](#)
[TRANSMISSION MAP](#)
[LATEST ACTIVITY](#)
[USER GUIDE](#)
[INDICATORS](#)
[RESEARCH STATUS](#)

Indicator 1: Route Kilometres

Indicator 1: Transmission network length (Route kilometres)

Show entries

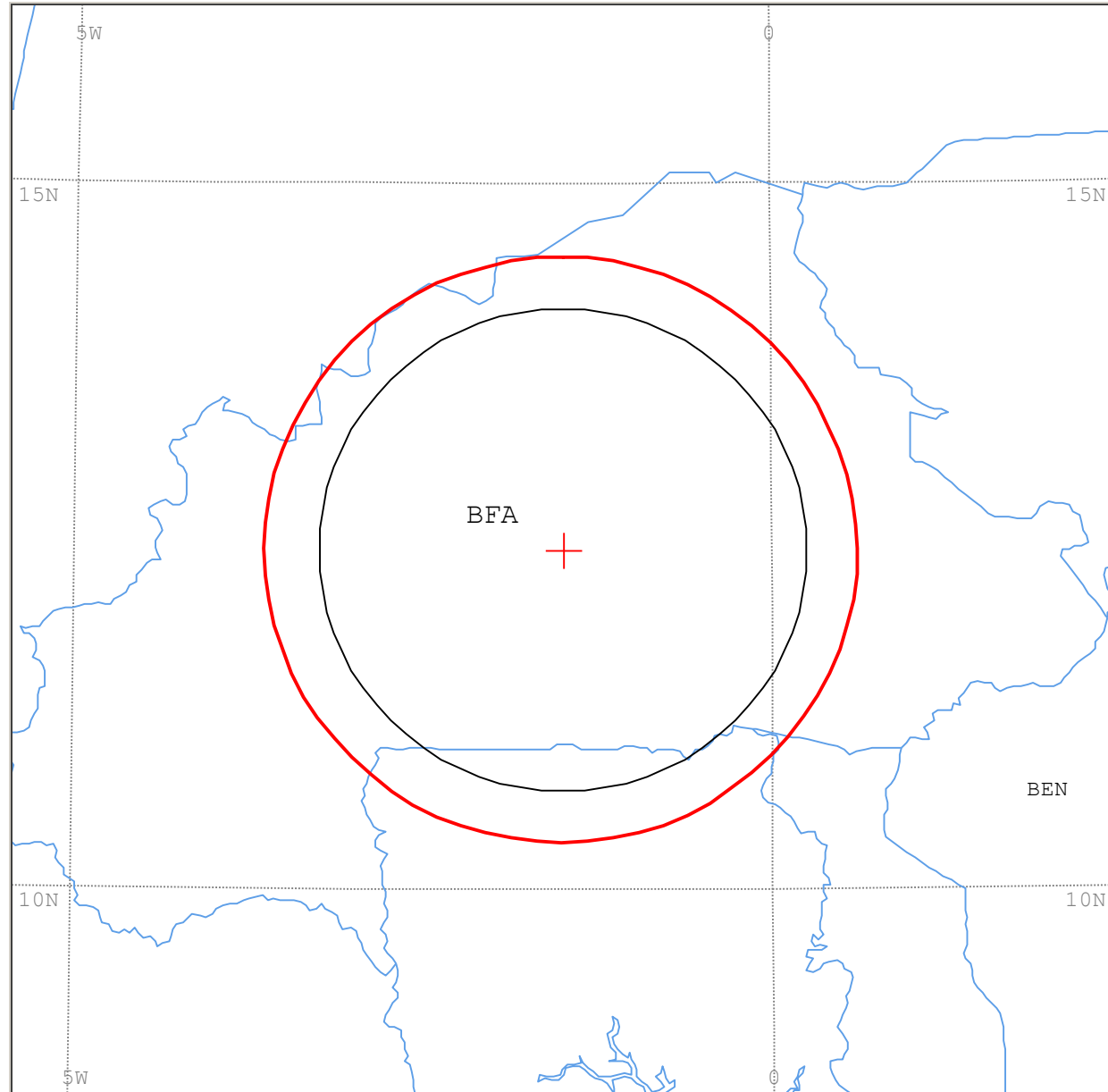
Search:

COUNTRY	REGION	ROUTE KMS	OPERATORS
Angola	AFR	7,000	Angola Cables
Benin	AFR	1,694	Benin Telecom SA, Phase 3 Telecom
Botswana	AFR	5,000	Botswana Telecom
Burkina Faso	AFR	1,300	ONATEL
Burundi	AFR	417	Burundi Backbone System
Cameroon	AFR	5,141	CAMTEL
Cape Verde	AFR	1,500	Cape Verde Telecom
Central African Rep.	AFR	287	Socatel
Chad	AFR	830	SITCOM-CHAD

COUNTRIES

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[Burundi](#)
[Cambodia](#)
[Cameroon](#)
[Cape Verde](#)
[Central African Republic](#)
[Chad](#)
[Chile](#)
[China](#)
[Colombia](#)
[Comoros](#)
[Costa Rica](#)
[Cuba](#)
[Côte d'Ivoire](#)
[Djibouti](#)
[Dominica](#)
[Dominican Rep.](#)
[Ecuador](#)
[Egypt](#)
[El Salvador](#)
[Equatorial Guinea](#)
[Ethiopia](#)
[French Guiana \(France\)](#)
[Gambia \(the\)](#)
[Georgia](#)
[Ghana](#)
[Grenada](#)
[Guatemala](#)
[Guinea](#)
[Guinea Bissau](#)
[Guyana](#)
[Haiti](#)
[Honduras](#)
[Hong Kong](#)
[India](#)
[Indonesia](#)
[Iran](#)
[Iraq](#)
[Jamaica](#)
[Japan](#)
[Jordan](#)
[Kazakhstan](#)
[Kenya](#)
[Kuwait](#)
[Kyrgyzstan](#)
[Lao PDR](#)
[Liberia](#)
[Libya](#)
[Madagascar](#)
[Malawi](#)
[Malaysia](#)
[Maldives](#)
[Mali](#)
[Mauritania](#)
[Mexico](#)
[Moldova](#)
[Mongolia](#)

Earth station name: SOMGANDE A (Burkina Faso)

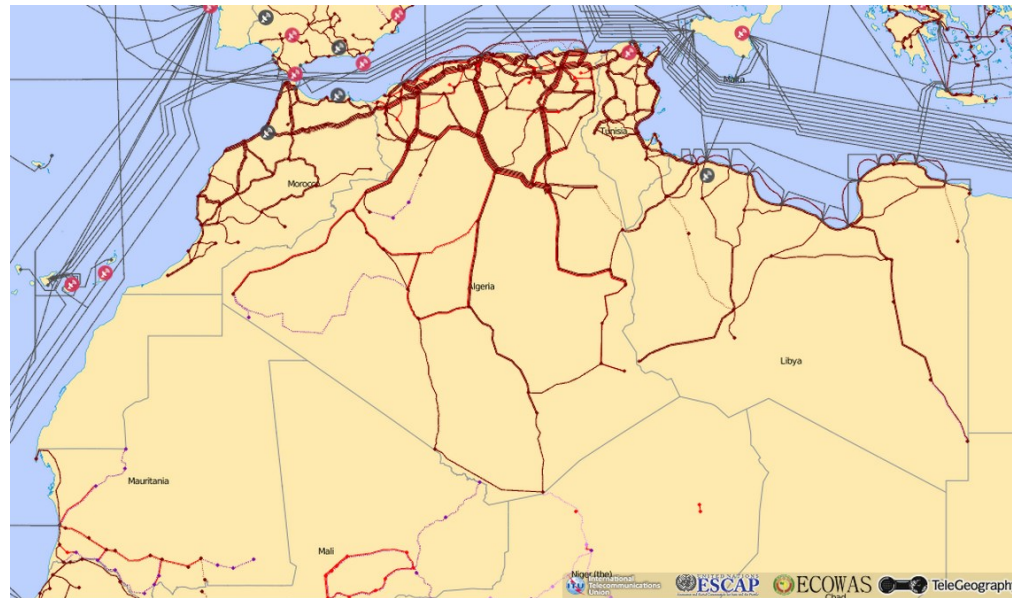


PROBABLY AFFECTED COUNTRIES: NONE

Broadband Infrastructure Network Planning

ITU is going to make use of the Maps together with data related to traffic exchanged between countries for identifying missing links on regional / subregional basis and developing case studies for Planning Broadband Infrastructures

Candidate Regions for 2016: North African and Asian-pacific countries





World Summit on the Information Society

- ITU is the sole Facilitator of Action Lines C2 (Information and communication infrastructure)
- WSIS Forum 2015
 - [Action Line C2 Facilitators Meeting](#)
- [Open Consultation Process](#)
 - Opening: 04/11/2015
 - Deadline: 30/01/201
- ITU [Contribution to the Implementation of WSIS Outcomes](#)
 - 2015 edition: soon to be released
- WSIS – [Sustainable Development Goals Matrix](#)

