



Interconnection and Traffic exchange towards **80%** locally accessed Internet traffic in Africa by 2020

Internet Interconnection challenges in Africa?

Available data shows that Africa imports more than 99% of the Internet content consumed creating an Internet Transit Deficit – where significantly less traffic is generated locally than accessed internationally. Further, despite phenomenal growth of national and regional infrastructure, most of the cross-border Internet traffic exchange is done in Europe and North America. This is a clear indication that the legacy Internet business strategies and policies are still

predominant, despite these terrestrial and submarine fiber infrastructure developments in the region.



>99%

Percentage of imported Internet content consumed in Africa.

Vision of ISOC's Interconnection and Traffic Exchange (ITE) program

An Africa that's not just an **'Internet Consumer'** but an **'Internet Creator,'** on par with the rest of the world. Thereby attaining a **80% local** and **20% international** traffic balance by **2020**.



● Participants at the AfPIF 2015 event in Maputo, Mozambique.

ISOCs ITE works in Africa

AfPIF

The **Africa Peering and Interconnection Forum (AfPIF)** is an annual three-day forum that aims to address the key Interconnection opportunities and challenges that exist in the region. Further, it seeks to identify the technical challenges as well as the solutions for regional interconnection, including Internet Exchange Points. As a multi-stakeholder forum, the event seeks to foster the national and cross-border interconnection opportunities by ensuring the key players such as; infrastructure providers, Service Providers, IXPs and regulators are present at the event. Further, it seeks to identify the technical challenges as well as the solutions for regional interconnection, including Internet Exchange Points.



The Africa Peering and Interconnection Forum

The inaugural AfPIF event was held in 2010 in Kenya. It has since been held annually in Ghana, South Africa, Morocco, Senegal, Mozambique and presently scheduled for Tanzania in 2016.

6

Number of Africa Peering and Interconnection Forum (AfPIF) events held so far.

Human capacity building

The capacity building activities are aimed at bridging the information asymmetry on interconnection business strategies and technical best practices for operators and IXPs.

Between 2008 and present the Internet Society with the support of partners has facilitated the delivery of **18 workshops** in DRC, Djibouti, Egypt, Gambia, Ghana, Kenya, Lesotho, Malawi, Morocco, Nigeria, Rwanda, Sierra Leone, Tanzania, Tunisia, Uganda, Zambia and Zimbabwe. These workshops have helped train over **350 engineers** and policy makers on interconnection technologies.



>350

Engineers and policy makers on interconnection technologies trained.

18



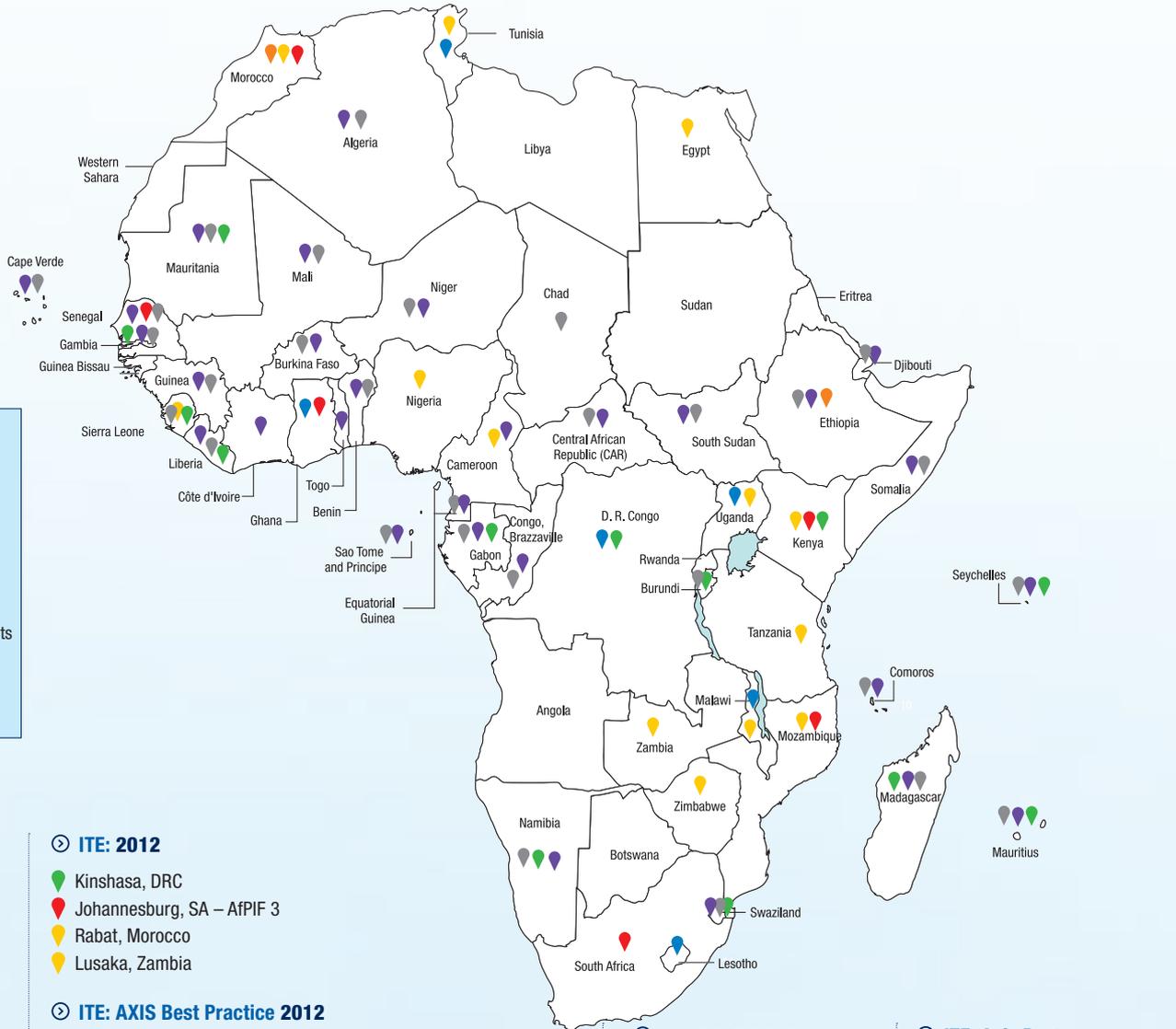
Number of workshops facilitated by the Internet Society with the support of partners between 2008 and present in 15 African countries.

(This does not include AXIS workshops).

Map showing ISOC ITE work from 2008 – 2016 (Including Axis-related work)

Legend

- Technical/Best Practice Workshops
- New IXP Assistance
- Technical Assistance/IXP Equipment
- IXP Meetings
- AfPIF Events
- ITE: AXIS Technical Aspects
- ITE: AXIS Best Practice
- ITE: Axis Axis-RIXPs/RICs



ITE: 2008-2009

- Blantyre, Malawi
- Kampala, Uganda
- Freetown, Sierra Leone
- Sharm el-Sheikh, Egypt
- Nairobi, Kenya
- Rabat, Morocco

ITE: 2010

- Nairobi, Kenya – AfPIF 1
- Dar-es-Salaam, Tanzania
- Mombasa, Kenya
- Freetown, Sierra Leone
- Maputo, Mozambique (P)

ITE: 2011

- Maseru, Lesotho
- Kampala, Uganda
- Blantyre, Malawi
- Accra, Ghana – AfPIF 2
- Accra, Ghana
- Addis Ababa, Ethiopia
- Douala, Cameroon

ITE: 2012

- Kinshasa, DRC
- Johannesburg, SA – AfPIF 3
- Rabat, Morocco
- Lusaka, Zambia

ITE: AXIS Best Practice 2012

- Ouagadougou, BF: AXIS-BP
- Dakar, Senegal: AXIS-BP
- Bujumbura, Burundi: AXIS-BP
- Banjul, Gambia: AXIS-BP
- Conackry, Guinea: AXIS-BP
- Windhoek, Namibia: AXIS-BP
- Niamey, Niger: AXIS-BP
- Cotonou, Benin: AXIS-BP

ITE: AXIS Best Practice 2013

- Swaziland: AXIS-BP
- Mauritania: AXIS-BP
- Mali: AXIS-BP
- Algeria: AXIS-BP
- Seychelles: AXIS-BP
- Brazzaville, Congo: AXIS-BP
- Gabon: AXIS-BP
- Chad: AXIS-BP
- Liberia: AXIS-BP
- Sao Tome and Principe: AXIS-BP
- Sierra Leone: AXIS-BP

ITE: AXIS Technical Assistance 2013-2016

- Gambia: AXIS-TA
- Burkina Faso: AXIS-TA
- Namibia: AXIS-TA
- Burundi: AXIS-TA
- Togo: Axis-AXIS-TA
- Guinea: AXIS-TA
- Cote d'Ivoire: AXIS-TA
- Niger: AXIS-TA
- Senegal: AXIS-TA
- Benin: AXIS-TA
- Swaziland: AXIS-TA
- Mauritania: AXIS-TA
- Mali: AXIS-TA
- Equatorial Guinea: AXIS-TA
- CAR: AXIS-TA

ITE: 2013-2016

- Malawi
- Ghana
- Lesotho
- DRC
- Tunisia
- Namibia – AXIS-New IXP
- Burundi – AXIS-New IXP
- Gambia – AXIS-New IXP
- Swaziland – AXIS-New IXP
- Gabon – AXIS-New IXP
- Seychelles – AXIS-New IXP
- Mauritius – AXIS-New IXP
- Liberia – AXIS-New IXP
- Mauritania – AXIS-New IXP
- Madagascar – AXIS-New IXP
- Tunisia
- Morocco – AfPIF 4
- Senegal – AfPIF 5
- Mozambique – AfPIF 6
- Nigeria
- Zimbabwe

ITE: Axis Best Practice 2014-2016

- Comoros: AXIS-BP
- Madagascar: AXIS-BP
- Mauritius: AXIS-BP
- Cape Verde: AXIS-BP
- Ethiopia: AXIS-BP
- Somalia: AXIS-BP
- South Sudan: AXIS-BP
- Djibouti: AXIS-BP
- CAR: AXIS-BP
- Equatorial Guinea: AXIS-BP
- SADC: AXIS-RIXPs/RICs
- East Africa: AXIS-RIXPs/RICs
- North Africa: AXIS-RIXPs/RICs
- West Africa: AXIS-RIXPs/RICs
- Central Africa: AXIS-RIXPs/RICs



● Technical Setup of Kinisha IXP (KINIX).



● Technical Setup of Namibia IXP (WH-IXP).

Creation of New IXPs and Leveling-up existing IXPs

In 2008, the Internet Society conducted a survey and established that, there were **17 IXPs** in **15** African countries representing **23%** penetration rate. Of these, only **12 IXPs (70%)** were considered operationally responsive. According to African IXP Association (Af-IX) information and an ongoing survey, there are **34 IXPs** in **27** African countries representing a **49%** penetration rate.

The growth in number of IXPs is as a result of the sustained efforts of the Internet Society in collaboration with other partners such as the African Union AXIS project, PCH and AfriNIC, in supporting the creation of new IXPs and existing IXPs with technical assistance, equipment and capacity building.

23%

Rise in African IXP penetration from 23% in 2012 to 40% in 2015.

Measurement

Of the **34 IXPs** in Africa, less than **50%** of them provide publicly accessible data on current traffic statistics and many IXP managers were not able to monitor pre-IXP traffic and post-IXP traffic.

This means that efforts to measure and monitor the progress on domestic traffic growth against the international traffic are less than optimal, but can be improved with assistance and good regional practice documentation.

The IXP measurements initiative is aimed at advancing Internet traffic measurements in Africa to strengthen national and regional data-collection through collaboration and partnerships.

The project seeks to increase and support the deployment of globally recognized measurement infrastructure, tools and services at defined vantage points to enhance visibility of Internet traffic flow and exchange in the African Region.

34

Number of IXPs in 27 African countries as of May 2015 - African IXP Association (Af-IX) survey.

»» What is AXIS?

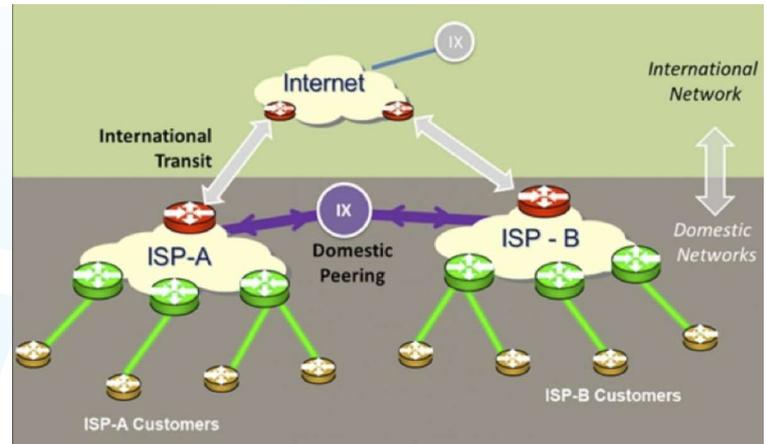
The African Internet Exchange System is an African Union project aiming at keeping Africa's Internet traffic local to the continent by providing capacity building and technical assistance to facilitate the establishment of Internet Exchange Points in Africa. As countries establish their own IXPs, local Internet traffic will be routed locally rather than through exchange points generally located outside the continent, creating downward pressure on costs and stimulating growth in and distribution of local Internet content.

- ⌚ A primary role of an IXP is to keep local Internet traffic within local infrastructure and to reduce costs associated with traffic exchange between networks.
- ⌚ Improve the quality of Internet services and drive demand in by reducing delay and improving end-user experience
- ⌚ Convenient hub for attracting hosting key Internet infrastructures within countries
- ⌚ Catalyst for overall Internet development

Internet Society and AXIS

The African Union Commission awarded the implementation of the first phase of the African Internet Exchange System (AXIS) project to the Internet Society in **2012** to provide capacity building and technical assistance to facilitate the establishment of IXPs in **30** AU Member State countries.

Over the span of the project period, the Internet Society African Regional Bureau was able to conduct capacity building and technical assistance in **30** African countries training **1,300** people while significantly contributing to the establishment of national IXPs, which are expected to create downward pressure on costs and stimulate growth in and distribution of local Internet content.



(Picture take from Busaca.com)

The Internet Society was again selected in 2014 by the African Union Commission to conduct the second phase of the AXIS Project which focused on supporting the establishment of Regional Internet Exchange point (RIXP) and Internet Carriers (IC) by providing **5** Capacity building workshops on best practice and benefits of setting up RIXP/IC in the **5** AU Geographical Regions. (See Project Map on page 6).

AXIS Best Practice Workshops

- ⌚ The Best Practices workshops conducted by the Internet Society trained more than **750** people from **30** African countries (Burkina Faso, Senegal, Burundi, the Gambia, Namibia, Guinea, Niger, Benin, Swaziland, Mauritania, Mali, Algeria, Cameroon, Seychelles, Congo Brazzaville, Gabon, Liberia, Chad, Sierra Leone, Sao Tome, Comoros, Madagascar, Cape Verde, Ethiopia, South Sudan, Somalia, Djibouti, Mauritius, Equatorial Guinea and Central African Republic)

 **1,300**

People trained by the Internet Society African Regional Bureau in 30 African countries from 2012-2014 under the capacity building and technical assistance programme.

AXIS Project map



Legend

- | | | | | |
|---|---|--|---|--|
| <ul style="list-style-type: none"> ■ • Best Practice completed • Technical Training completed • IXP is launched | <ul style="list-style-type: none"> ■ • Best Practice completed • Technical Training completed | <ul style="list-style-type: none"> ■ • Technical Training completed • Best Practice not completed | <ul style="list-style-type: none"> ■ • Best Practice completed • Technical Training at planning stage | <ul style="list-style-type: none"> ■ • IXPs awarded grants to grow into RIXPs |
|---|---|--|---|--|



● ISOC Technical Workshop in Malawi.



● ISOC Technical Workshop in Zambia.

- ⊙ With the goal of creating a consensus between the main actors on the need to establish an IXP, all workshops have reached their intended target population and brought enhanced knowledge on the advantage of connecting to a local exchange point, which will bring about more content, enhanced reliability and faster internet speed with cheaper costs to local communities and businesses.
- ⊙ All countries, where the Best Practices workshops have taken place, have been able to reach an agreement to establish a taskforce to enhance the establishment and management of Internet Exchange Points in their respective countries.

AXIS Technical Aspects workshops

- ⊙ The Internet Society conducted capacity building workshops in **30** countries where Best Practice workshops have already taken place.
- ⊙ With the objective of creating the requisite local technical expertise to support the IXP interconnections and operations, the workshops provided hands on trainings to a total of **550** African experts.
- ⊙ The project awarded a certificate of recognition to all trainees equipped with the right tools to become future network engineers who will be directly or indirectly involved in the operation of IXPs in their respective countries.

RIXs and RIXPs

- ⊙ **5** Regional Internet Exchange point (RIXP) and Internet Carries (IC) workshops took place in 2014
 - Gaborone, Botswana, 3-7 February 2014
 - Kigali, Rwanda, 26-30 May 2014
 - Nouakchott, Mauritania, 8-12 June 2014
 - Abuja, Nigeria, 16-20 June 2014
 - Libreville, Gabon, 21-25 July 2014
- ⊙ The RIXP and IC workshops were designed to convene governments, regional organizations, experts, and companies to discuss:
 - Better cross-border connectivity
 - Promote IXPs that include regional players
 - Promote Regional Carriers
 - Create competitive and collaborative relationships
- ⊙ More than **350** targeted experts from Ministries responsible of ICT, regulatory agencies, IXPs, Internet Service Providers (ISPs), Telecommunication Operators, civil society and academic members attended the **5** Regional workshops.
- ⊙ All **5** workshops mainly aimed at discussing on the best approach to develop Regional IXP using a natural growth path from local IXP, which grows into a Regional one. At the same time,

support the development of existing operators to become Regional Internet Carriers who will be responsible to optimally transport internet traffic within a region.

- ⊙ Each workshop was able to adopt and reach agreements on a number of decisions regarding the establishment of Regional Internet Carriers and Regional IXPs according to the needs of each respective Region.

Inauguration of IXPs

As a result of the AXIS project, a new initiative in Africa that has utilized the multi-stakeholder approach towards the implementation of IXPs has been developed. The collaboration between experts, concerned Institutions and Governments playing a facilitative role have led to date, under the assistance of the AXIS project, towards the establishment of IXPs in **10** countries since 2014 namely Namibia, Burundi, Swaziland, Gambia, Gabon, Seychelles, Mauritius, Liberia, Mauritania and Madagascar. Four (4) others, namely; Burkina Faso, Benin, Republic of the Democratic Republic of Congo and Cote D'Ivoire have also launched their IXPs following AXIS capacity building workshops. Senegal and Guinea are making strides towards realizing their IXPs in 2016.



● The launch of Gambia IXP.



● The launch of Namibia IXP.

For more information:

Internet society Interconnection and Traffic Exchange (ITE)

<http://www.internetsociety.org/what-we-do/internet-issues/interconnection-and-traffic-exchange-ite>

About AXIS:

<http://pages.au.int/axis/about>

<http://pages.au.int/axis/ixp/regional>

Partners:

The Internet Society would like to thank our partners, members, individual experts, the African Union and its member states for whom, without their support and collaboration our Interconnection and Traffic exchange work would not have been possible.



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