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Digital Divide and IXPs in West Africa

The role of IXPs in bridging the Digital Divide

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How we work

Operating at the intersection of **policy, technology and development**, allows the Internet Society to be a thought leader on issues key to the Internet's continued growth and evolution.

Our mission

*Promoting **the open development, evolution, and use of the Internet** for the benefit of all people throughout the world.*

Global Presence

2015

Updated March



108

Chapters
Worldwide

More than
70k

Members and
Supporters

145

Organization
Members

6

Regional
Bureaus

What is a Digital Divide

- Digital Divide is the gap between those who have access to the Internet and those who don't
- Growth and social inclusion which are critical for many African countries are expected to be promoted by bringing non-Internet users around the continent online
- Digital Divide becoming more and more significant than in the past 5 years

What are the challenges

- Availability of Access
- Affordability
- Lack of Interest



What are the primary roles of IXPs?

- An **Internet exchange point** is a physical infrastructure through which **Internet** service providers (ISPs) and Content Delivery Networks (CDNs) **exchange Internet** traffic between their networks
- Keep local Internet traffic within local infrastructure and reduce costs associated with traffic exchange between networks
- Improve the quality of Internet services and drive demand by reducing delay and improving end-user experience
- Create a convenient hub for attracting key Internet infrastructures within countries
- Act as a catalyst for overall Internet development including commercial, governmental and academic stakeholders

How can IXPs address the issues of Digital divide?

- **Access**

- Enable local ISPs to connect directly together and exchange domestic traffic
- Improve the quality of user experience through quality service (Speed of access to content (google cache, Akamai), Reliability and Promotion of local content hosted locally)
- Attract more content providers along with business, academic, and government users – contributing to a vibrant Internet ecosystem
- Attract more connectivity providers- creating an opportunity for a regional hub for Internet traffic

- **Cost of Access/Affordability**

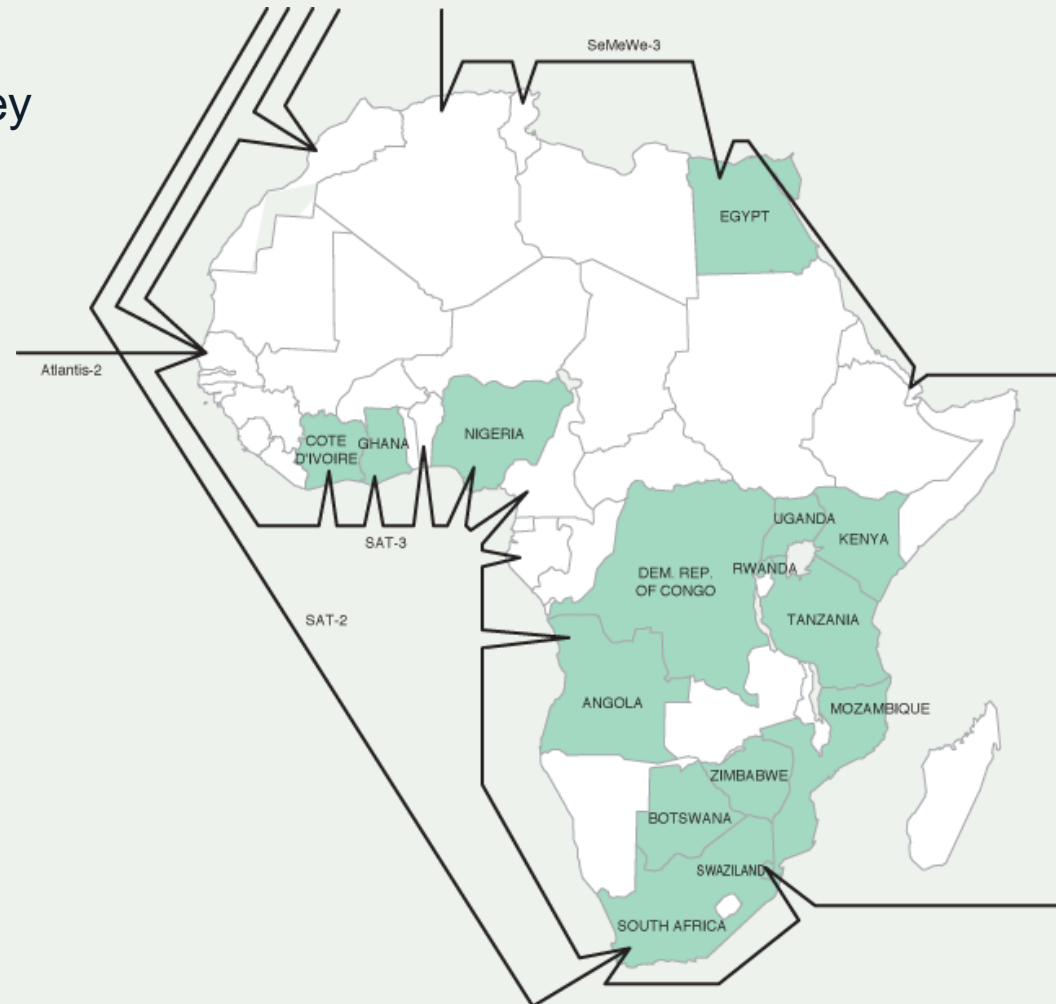
- ISPs benefiting from the savings on international capacity costs, along with an improved quality of service resulting in additional revenues
- Lower of ISP operational costs leading to lower end user costs



Survey conducted in 2008

- 17 IXPs in 15 African Countries-
- 12 were considered responsive based on a survey conducted in 2008
- Average number of years across all IXPs was 4.1yrs
- 10 of 12 IXPs provided traffic stats
 - Highest had 200Mbps and lowest was 300Kbps
- 1/3 of the IXPs had an open membership policy. Remaining 2/3's were subject to regulatory or membership set criteria
- 75% of the respondents had a Mandatory Multilateral peering policy
- Copper and wireless connectivity was predominant over fiber
- 41% of the IXPs did not charge fees and the highest fees were \$9,000 and lowest was \$50
- 75% were ran by ISPA. Others by NREN, Govt. and by a not-for-profit (non-ISPA)

What is happening in West Africa?



1993 – 2001: SAT2 Total Capacity 560Mbps

2001 – 2008: SAT3 Total Capacity 340Gbps

2001 - 2008: SAFE Total Capacity 440Gbps

Gaps identified

- Central, North and West Africa were lagging behind in IXP deployment
- In 2008 only 3 west African countries had IXPs i.e. Nigeria, Cote D'Ivoire and Ghana

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



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
- Conakry, 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

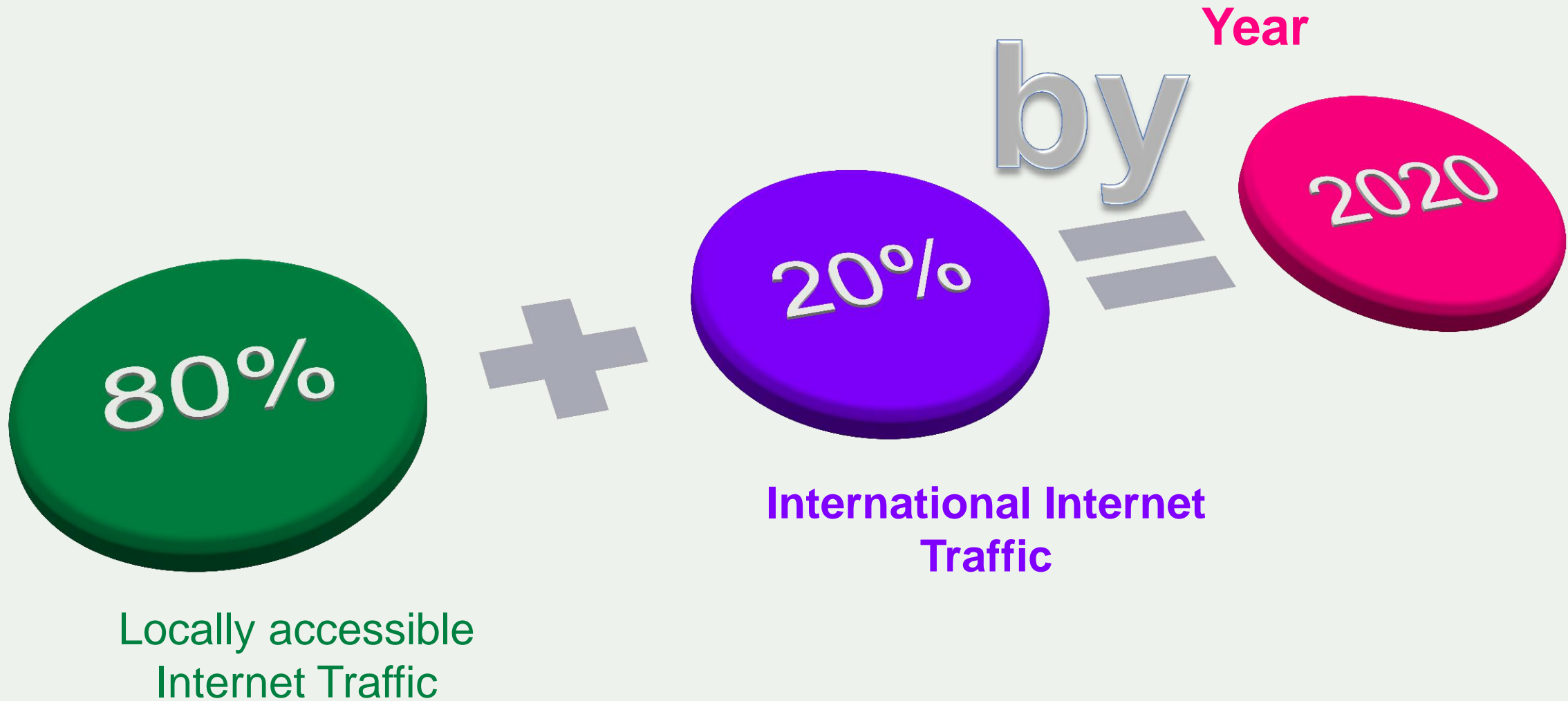
ITE: 2013-2016

- 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


The Vision



Impact on Africa's Interconnection Scene

- Conducted 15 workshops in 15 Africa countries on Technical and policy issues related to IXP development
- Workshops trained over 300 engineers and policy makers
- Established and organized 7 AfPIF events
- Supported the establishment and activities of the Africa IXP association (Af-IX)
- Provided technical assistance, equipment support to at least 10 IXPs
- Created awareness with key policy stakeholders i.e UNECA, African Union, Regional Regulatory Associations, Regional Economic Communities (RECs)
- Contributed to the overall growth of the African peering ecosystem
- Work lead the Internet Society to be awarded to implement African Union AXIS

AXIS project

- African Union awarded Internet Society two (2) contracts to implement AXIS project between 2012 – 2014
- Project focused on Capacity building and technical assistance in establishing IXPs
- Overall, phase 1 of the AXIS project trained over 1,200 people from 30 African Countries over the 2 year period
- AXIS Best practice workshops covered 30 African countries and trained over 700 people in English, French and Portuguese
- AXIS Technical Aspects workshops covered 30 African countries and trained over 500 engineers in interconnection technologies in English, French and Portuguese
- Phase 2 of AXIS conducted 5 workshops across the 5 geographic regions of Africa (Central, East, North, South and West Africa)
-  Engaged over 350 experts from relevant public and private sector to discuss regional interconnection issues in English and French

AXIS Project Map



Legend

- Best Practice completed
 - Technical Training completed
 - IXP is launched
-
- Best Practice completed
 - Technical Training completed
-
- Technical Training completed
 - Best Practice not completed
-
- Best Practice completed
 - Technical Training at planning stage
-
- IXPs awarded grants to grow into RIXPs

AXIS project - Phase I Outcomes

- 10 new IXPs have been established as a result of the AXIS project
- Most successful IXP project in the region and raised importance of IXPs across the board
- Established new partnerships to enable deliver workshops in different languages (French & Portuguese)
- In the process, we also developed regional francophone IXP expertise with support of partners

AXIS project - Phase II Outcomes

- At least 2 IXPs per region will receive financial assistance to enable them evolve and grow to become regional IXPs
- Project will provide technical assistance to ISPs to enable them evolve and become regional carriers
- Project established and supported work of 5 regional task-forces to review policy and regulatory barriers that inhibit national and cross-border interconnection in their respective regions.

Where are we today?

- Increase from 17 to 35 IXPs in 27 Countries
- 50% of countries in Africa now have an IXP or 48% increase since 2008
- Total Traffic exchanged at African IXPs >160Gbps
- More IXPs in West & Central Africa - 7 IXPS in 5 West African countries from only 3 in 2008 -*Gambia, Cote d'Ivoire, Ghana, Benin and Nigeria (Lagos, Abuja and Port Harcourt)*



What are the next steps?

- Getting countries establish their Internet Exchange Points
- Getting more cross boarder interconnection
- Increasing traffic at IXPs
- Leveling up of the IXPs
- Promoting local content- Ex e-government
- Developing content hosting infrastructure- Ex carrier neutral data center
- Developing better policies

Thank you.

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