

Creating National Internet Exchange Points in Africa

Reducing costs and speeding up content delivery

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Introduction

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What is an IXP?

- Internet Exchange Point
- Interconnection points of the Internet (min 3).
- Places where ISPs come to interconnect with each other.
- “Clearing House” for Internet traffic
- IXPs “keep local traffic local”
- What is NOT an IXP: IP backbone, or where transit is charged for (i.e. not peering) is not an IXP

“IXPs are the keystone of the entire Internet economy.”

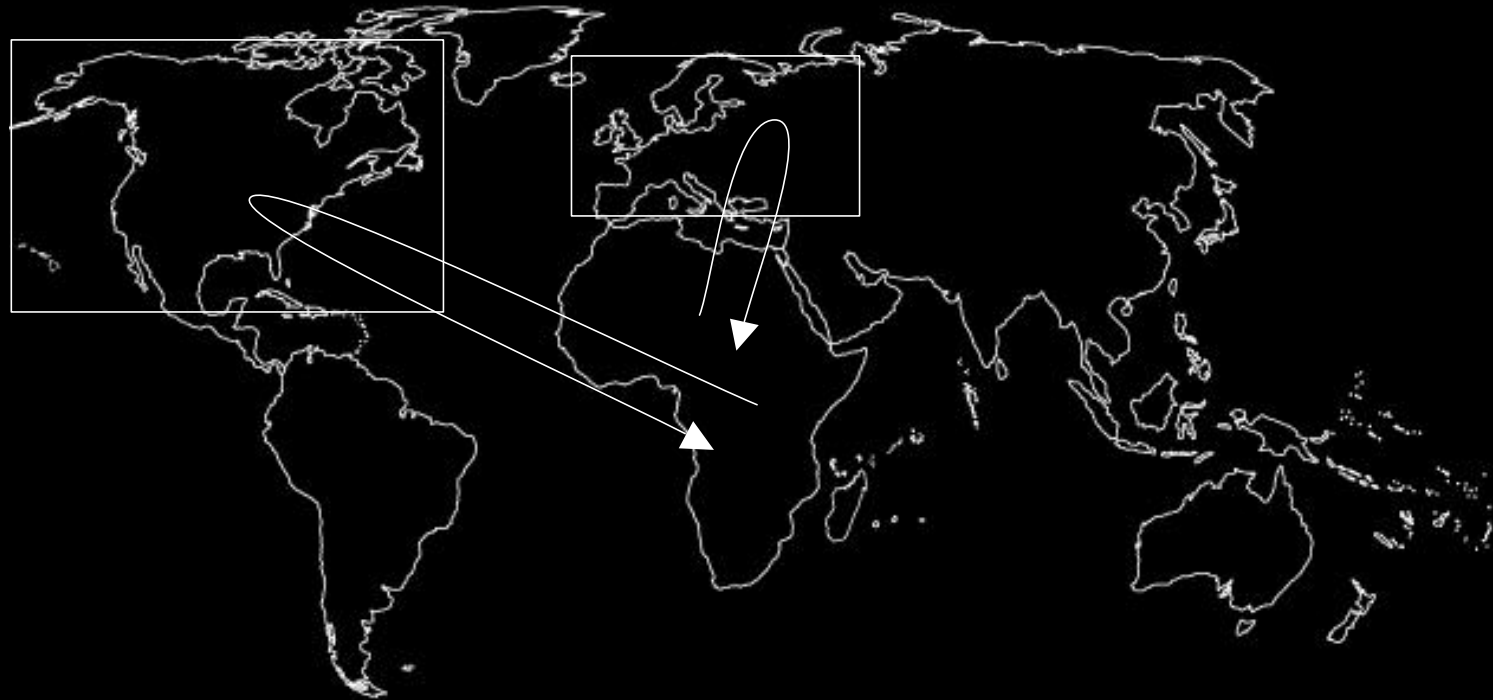
Cisco Systems

What does an IXP do for me?

- ...improve quality
- ...save money
- ...add value
- ...create new growth and development opportunities

IXPs Save Money

- For many years the USA has been referred to as the “backbone” of the Internet.
- As more European countries established IXPs, some countries began using Europe for their backbone connectivity.



Overseas Interconnection Costs \$\$\$\$\$

Most African countries can buy international bandwidth for:

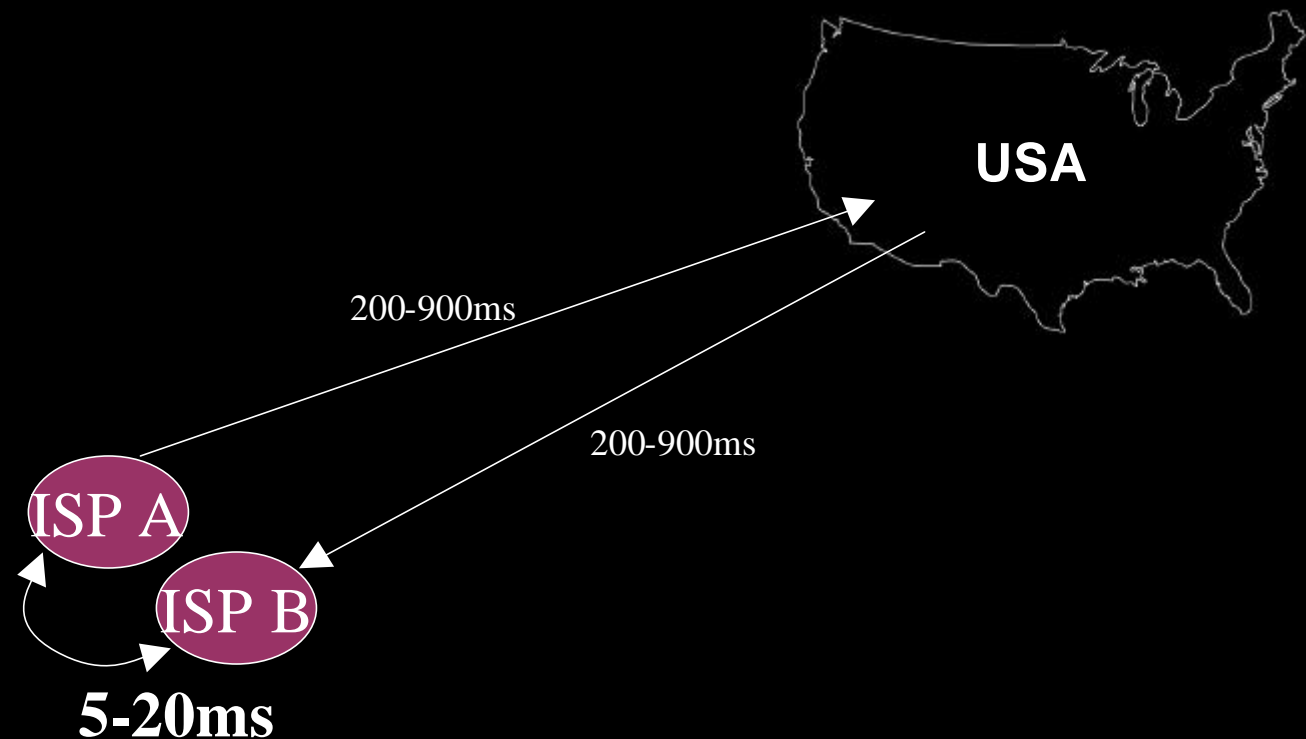
- ~\$4,000 / Mbps, with at least one (West Coast, SAT3 access) for \$2,000

SA and Kenya pay:

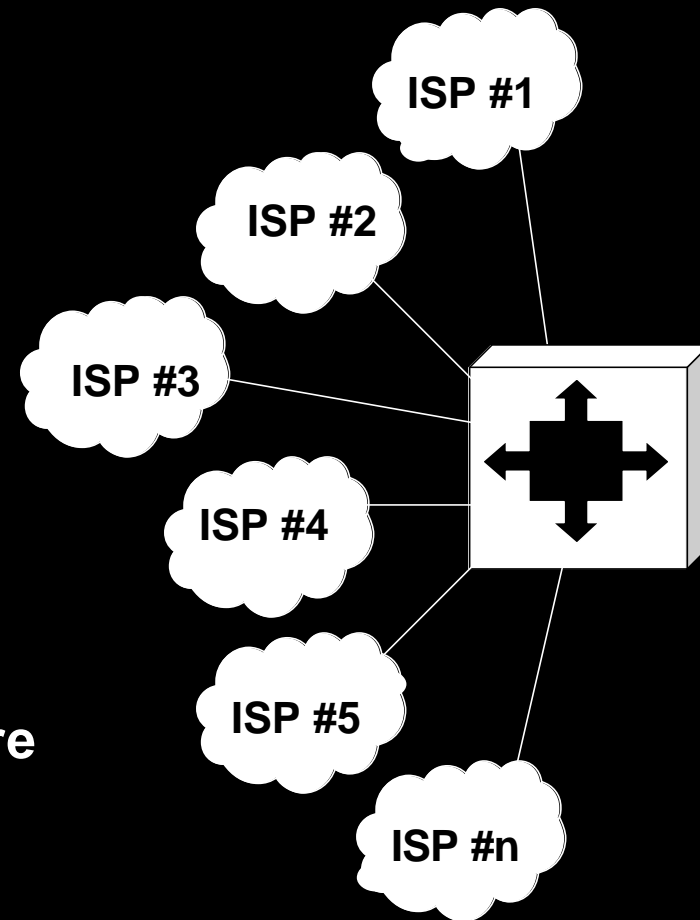
- ~\$15,000 / Mbps from our respective Telkoms

IXPs add value

- reduce delays
- improve performance



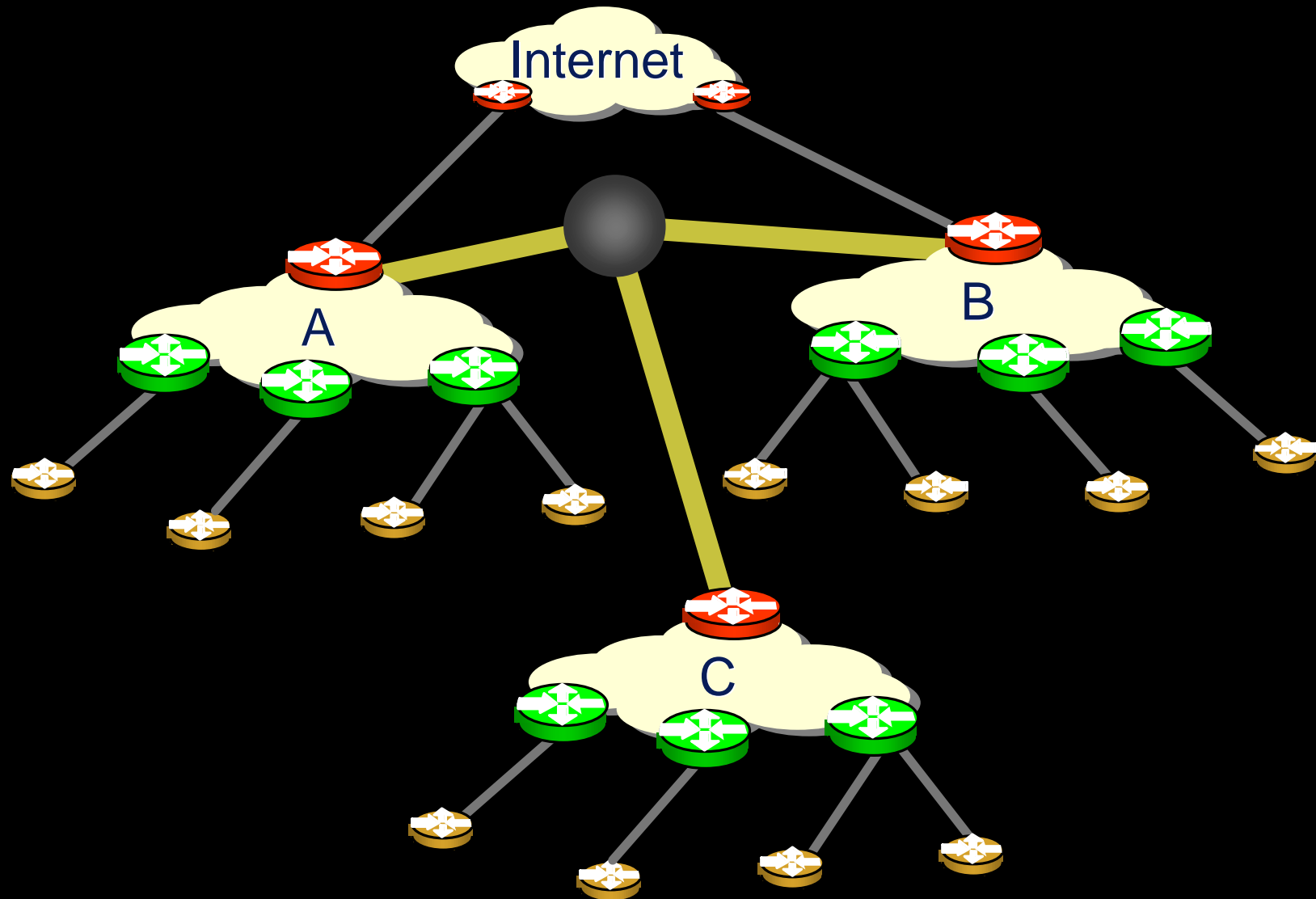
More ISPs, More Value!



The more ISPs
interconnect, the more
value each individual
ISP can offer its
customers!

Tiers of ISPs

abha ahuja



Ethan Zuckerman & Andrew McLaughlin

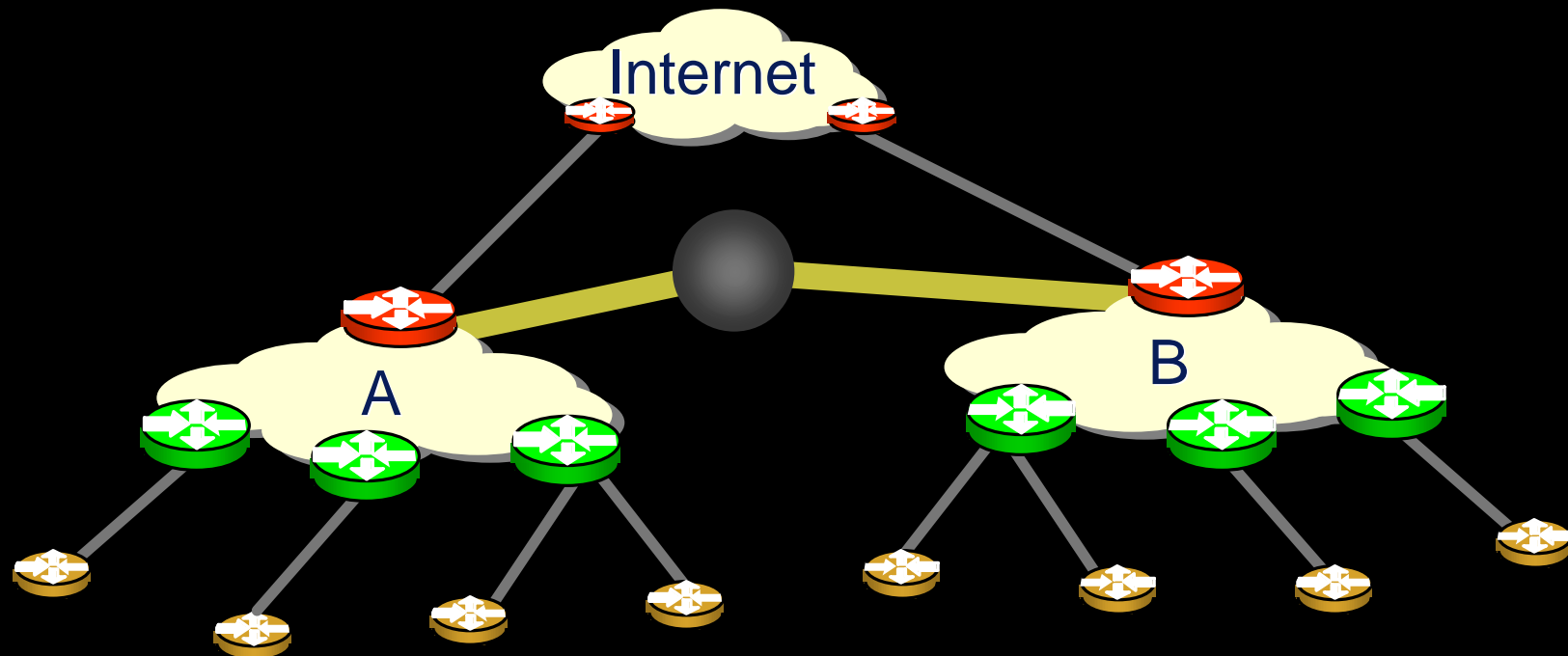
Introduction to Internet Architecture and Institutions, Aug 2003
Harvard

“For virtually all developing country ISPs, the only option for connectivity to the global Internet is a transit agreement.

That is, a developing country ISP has such a small customer base that the international Tier-1 and Tier-2 providers have no business incentive to enter a shared-cost peering agreement with it.

Many of MCI's criteria for no-cost peering are difficult or impossible for developing country ISPs to satisfy, e.g., a Traffic Exchange Ratio not exceeding 1.5:1”

Tiers of ISPs



Ethan Zuckerman & Andrew McLaughlin

Introduction to Internet Architecture and Institutions, Aug 2003
Harvard

“The result (to over simplify slightly) is that developing country ISPs must pay 100% of both outbound and inbound traffic; under the terms of the transit agreement, the ISP on the other end of the international link does not share the cost of exchanged traffic”

Ethan Zuckerman & Andrew McLaughlin

Introduction to Internet Architecture and Institutions, Aug 2003
Harvard

“For Africa, then, the result is a massive outflow of capital, amounting to perhaps hundreds of millions of dollars per year -- the amount paid by African ISPs to send domestic traffic over international connections. In other words, the perverse situation is that African Internet service providers -- small companies struggling to provide network services to the poorest populations in the world --are effectively subsidizing the largest, richest ISPs in Europe and the United States.”

IXPs can create new development opportunities

- Voice
- Streaming Video/Audio
- Video-conferencing
- Telemedicine
- On-demand entertainment
- E-Commerce
- E-Learning
- E-Government
- E-Banking

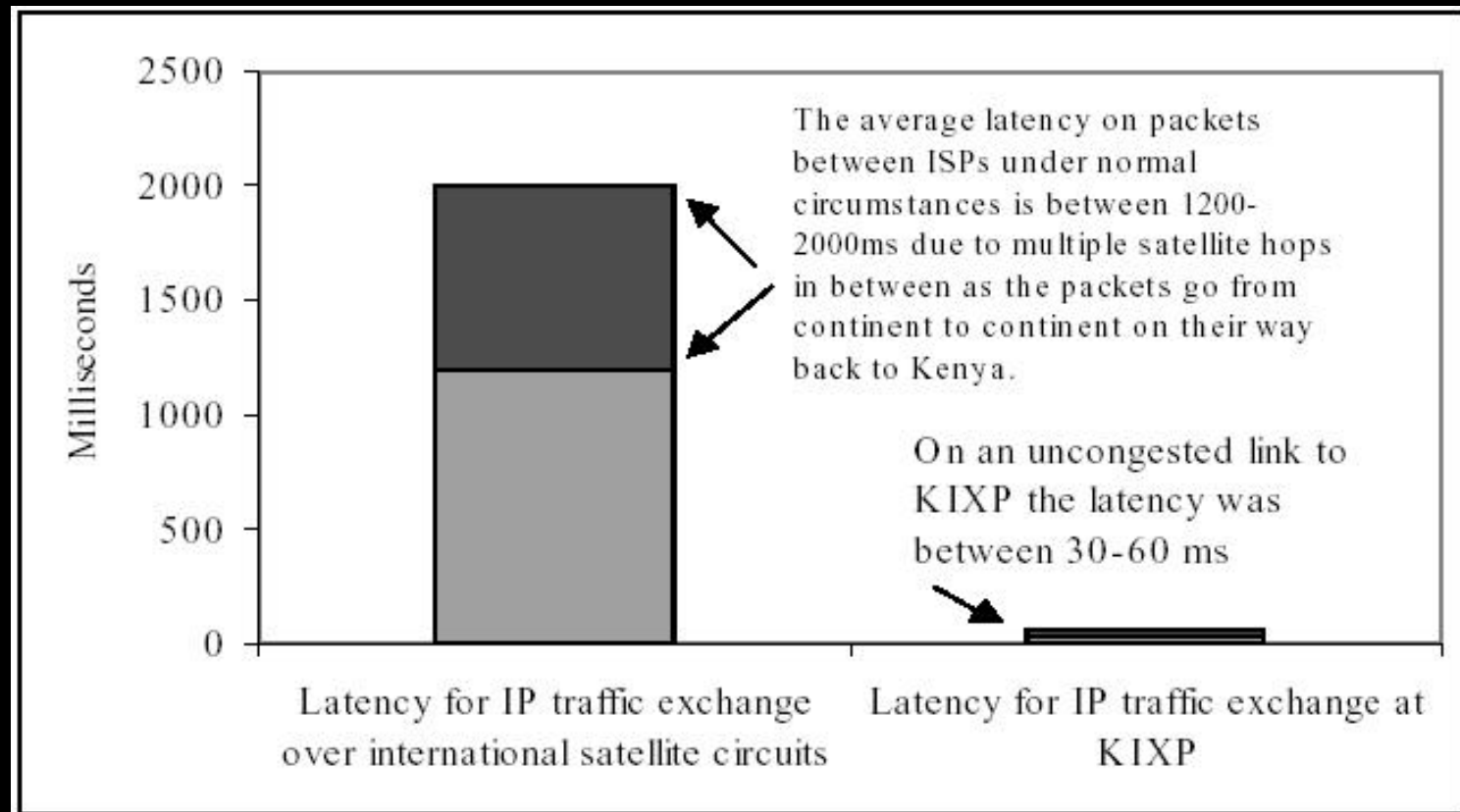
Case: Botswana

- Based on local costs of transit and connectivity, as well as assumption of 30% local traffic
- Small ISP (0.5Mbps) save \$51,480 p.a.
- Medium ISP (1Mbps) saves \$106,272
- Large ISP (8Mbps) saves \$377,208
- Annual savings to the economy due to peering in this scenario \$822,240

Case: Kenya

- KIXP: online 14th February 2002
- Initially four ISPs were exchanging traffic
- Currently ten are exchanging traffic
 - ◆ SwiftGlobal
 - ◆ Kenyaweb
 - ◆ ISPKenya
 - ◆ UUNET Kenya
 - ◆ Interconnect
 - ◆ Wananchi Online
 - ◆ AccessKenya
 - ◆ Nairobinet
 - ◆ Mitsuminet
 - ◆ Insight Kenya

Case: Kenya



Quality of service and exchange of domestic Kenyan IP traffic

Case: African connectivity

- To land 1 Mbps of bandwidth in Mauritius, with peering in Europe and world-wide transit, for \$5,000 per month.
- To get that 1 Mbps from Mauritius to SA would cost an additional \$11,500 per month.
- Both Mauritius and SA have monopoly telcos. The distance from SA to Mauritius is a small fraction of that from Mauritius to Europe and the rest of the world. The Mauritius - SA leg includes no peering, no transit, only carrier service, over a small fraction of the distance, but it costs more than twice as much.

IXPs In Africa

- Kenya: KIXP
- Uganda: UIXP
- Tanzania: TIXP
- South Africa: JINX
- Mozambique: MOZ-IX
- Zimbabwe: ZIX
- Egypt: EG-IX
- Nigeria: “small”
Ibadan IX
- Kinshasa: operational
- Rwanda: RINEX
- Swaziland: SZIX
- Ghana: GIX, GIXP

IXPs: Things to Do

- Any Peering/IX initiative involves **10%** technical work
- The remaining **90%** is relationships (socio-political engineering)
- Official regulatory support
- Definition of internal peering policy framework

Route from here to au

- traceroute to x.com.au (203.102.166.12), 30 hops max, 40 byte
- 1 172.16.0.1 (172.16.0.1) 3.399 ms 2.908 ms 3.275 ms
- 2 wbs-146-128-01.telkomadsl.co.za (165.146.128.1) 11.055 ms 11.009
- ...
- 4 ash-ip-dir-equinix-pos-6-1.telkom-ipnet.co.za (196.43.9.146) 365.52 ms
- 5 pos2-0.cr02.ash01.pccwbtn.net (63.218.94.17) 385.372 ms 386.85 ms
- 6 204.255.175.17 (204.255.175.17) 388.503 ms 391.946 ms 356.398
- 7 0.so-1-0-0.xl1.dca6.alter.net (152.63.41.230) 370.025 ms 368.953 ms
- 8 0.so-0-0-0.tl1.dca6.alter.net (152.63.38.69) 382.719 ms 380.617 ms
- 9 0.so-5-1-0.tl1.lax9.alter.net (152.63.0.141) 449.439 ms 431.539 ms
- 10 152.63.0.145 (152.63.0.145) 470.22 ms 464.871 ms 456.013 ms
- 11....
- 19 hops

Questions or Comments

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My question for the ITU

Since there is a disincentive for some ISPs to peer,
should IXPs be regulated by an Internet
governance institution?