

Creating National & Regional 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.
- Places where ISPs come to interconnect with each other.
- “Clearing House” for Internet traffic
- IXPs “keep local traffic local”

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

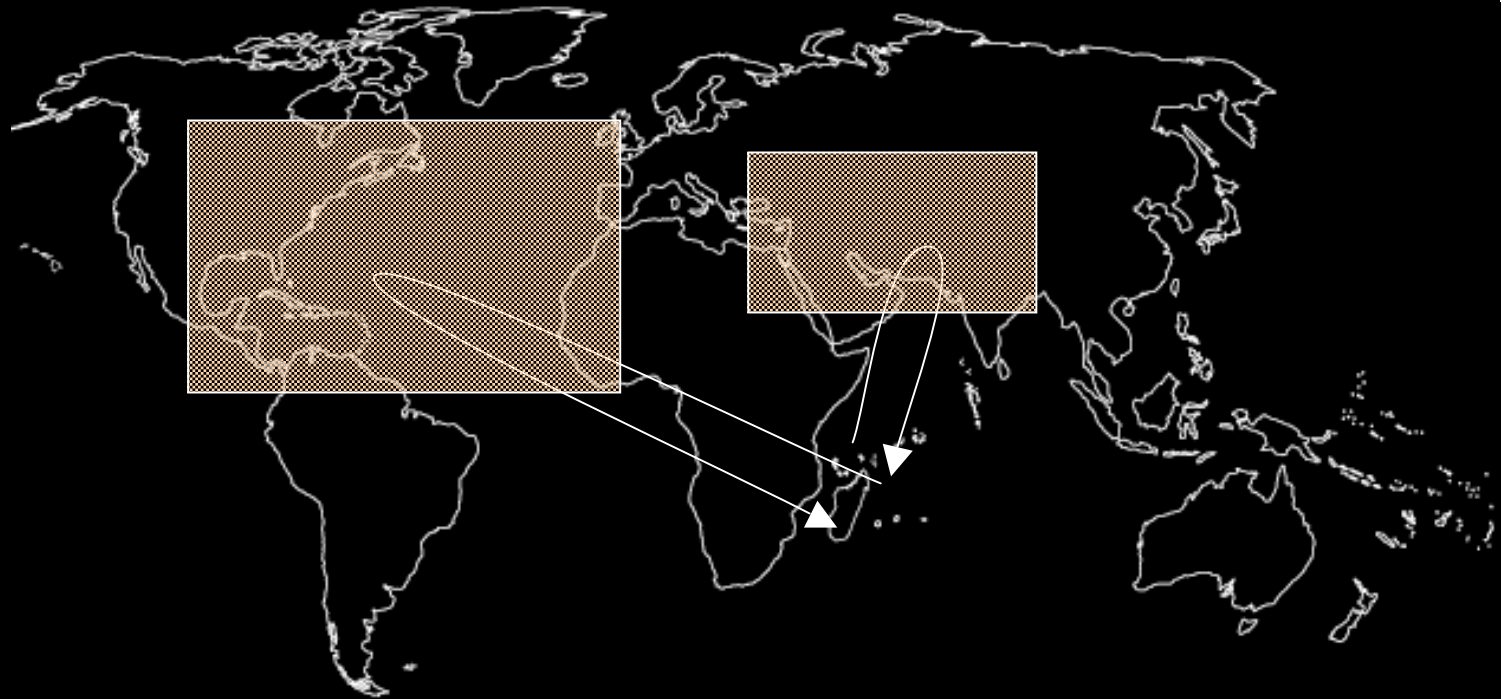
Cisco Systems

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:

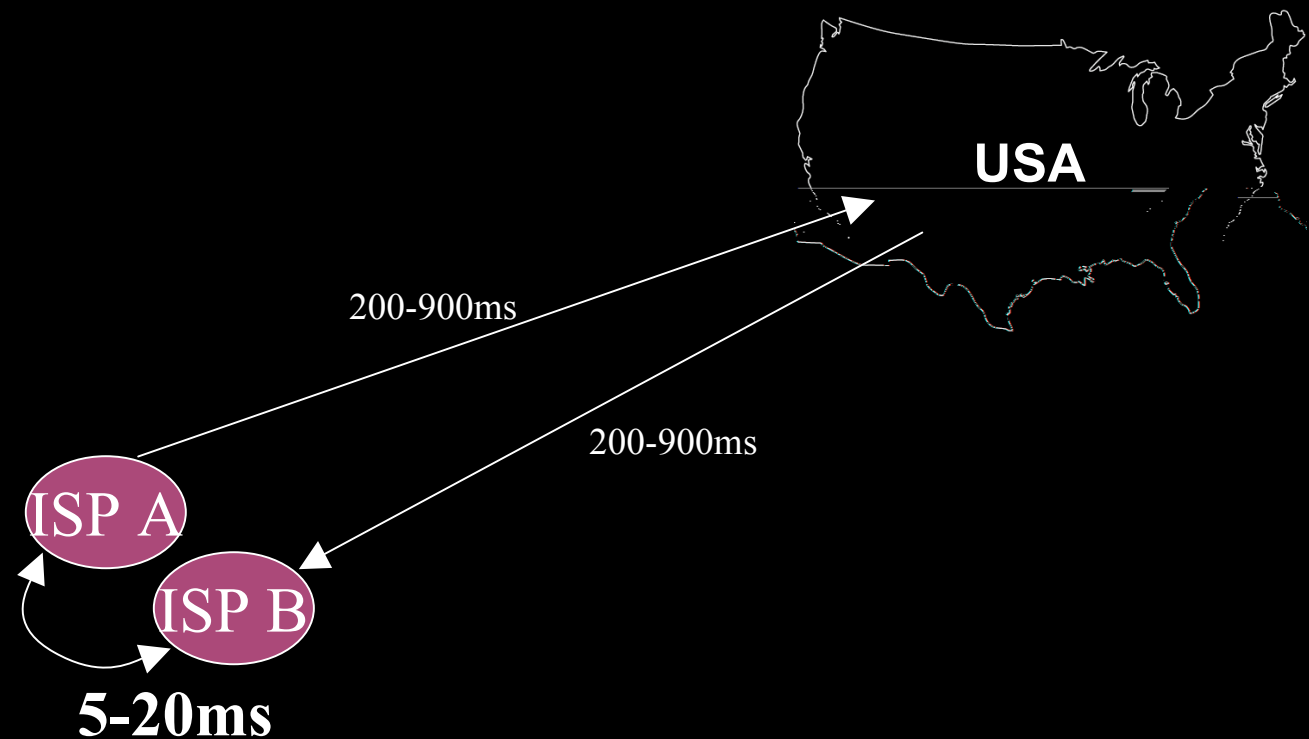
- ~\$4,000 / Mbps, with at least one (West Coast, SAT3 access) for \$2,000

SA and Kenya pay:

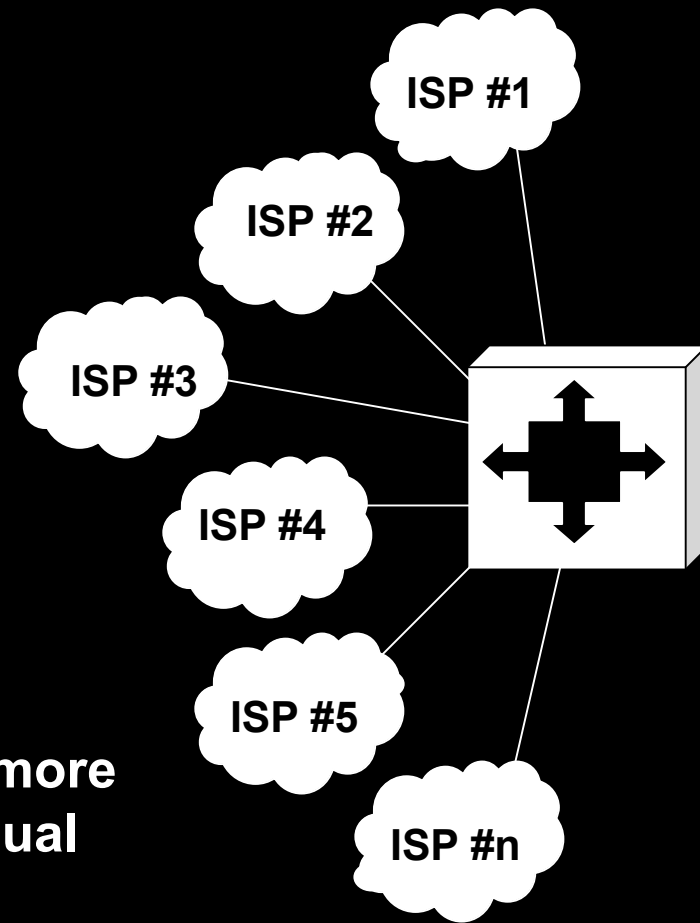
- ~\$20,000 / Mbps from our respective Telkoms

IXPs add value

- reduce delays
- improve performance



More ISPs, More Value!



The more ISPs
interconnect, the more
value each individual
ISP can offer it's
customers!

The Law of Disruption

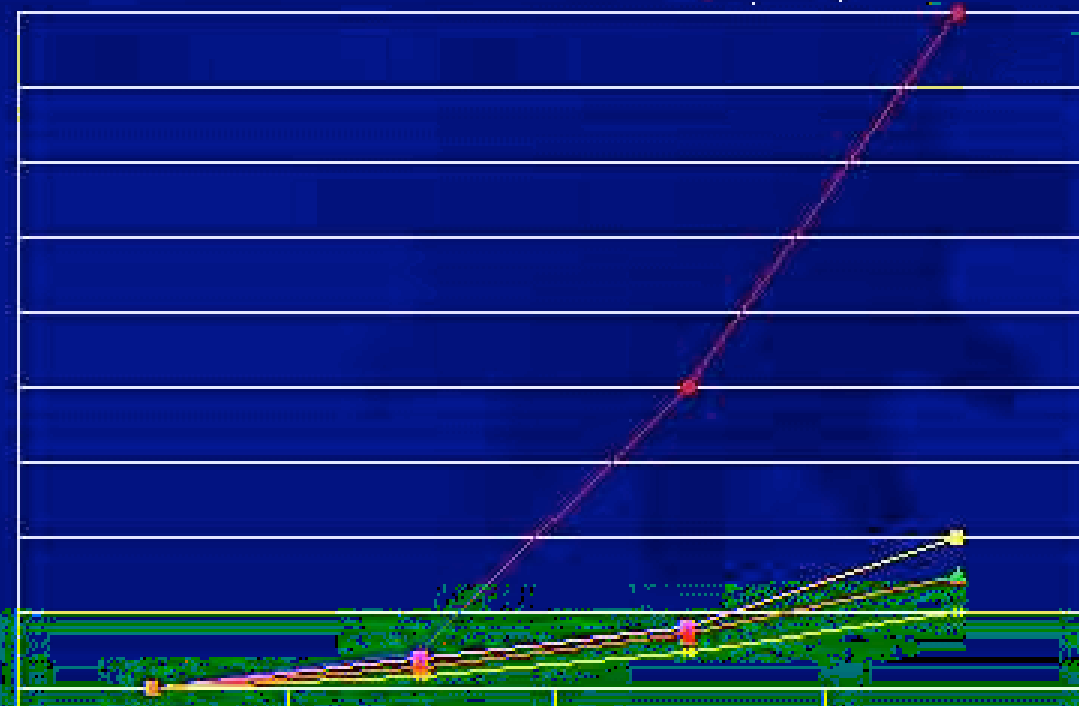
“Social, political, and economic systems change incrementally but technology changes exponentially” Downes & Mui

Once there is a critical mass of users, the rate-of-change (disruption index) accelerates exponentially. It is in the growing chasm between the different rates of change that a second-order effect occurs

The Law of Disruption

Change

Change
Change
Change
Change



- Technology Change
- Social Change
- Business Change
- Political Change

Trade

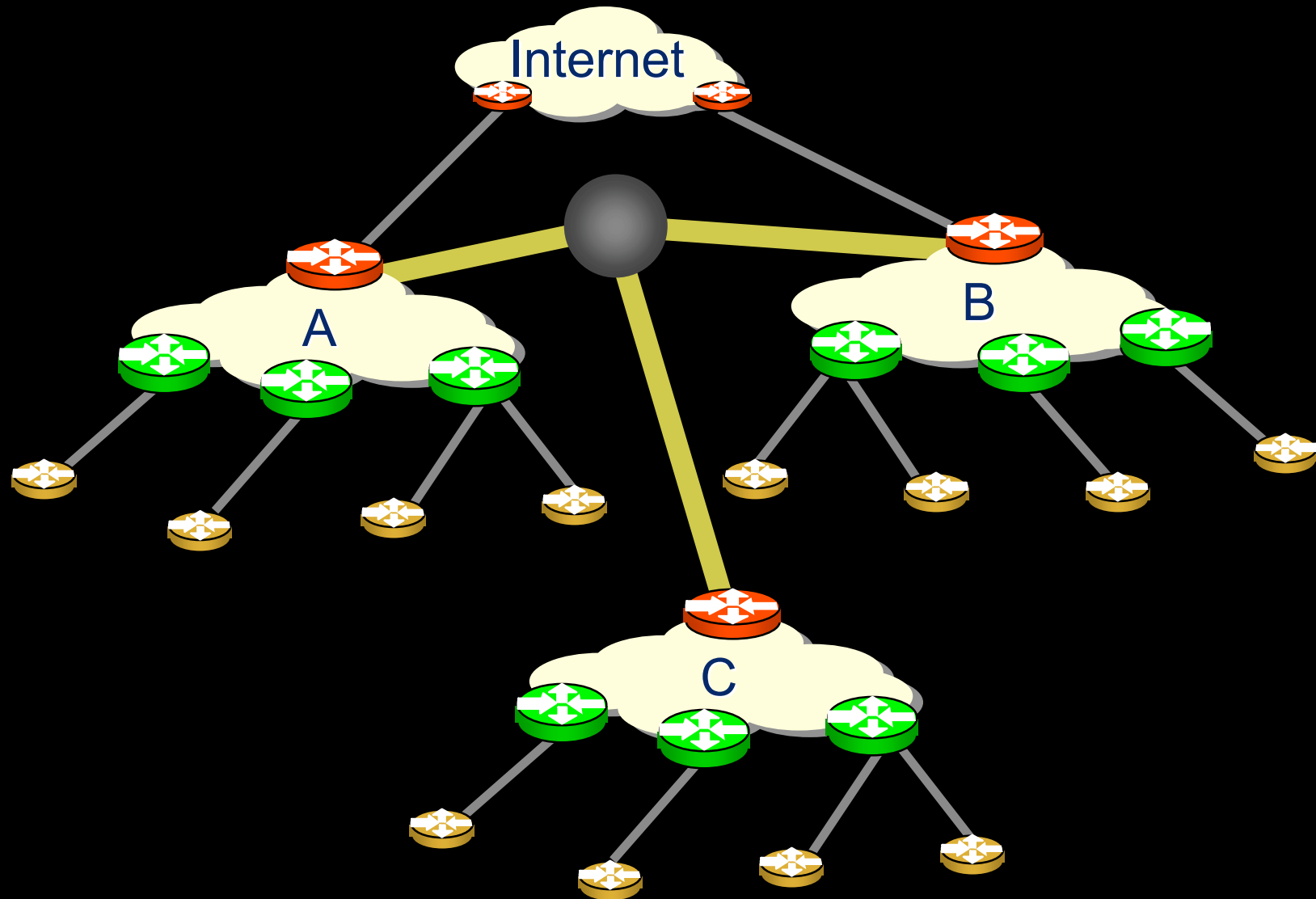
new with old

- Novelty
- Technology Upgrade or new technology
- Do something new

Source: Downes, L & Muir, C. (2009) - Unleashing the killer app: Digital strategies for market dominance © 2009 James Hoggins University

Tiers of ISPs

abha ahuja



Ethan Zuckerman & Andrew McLaughlin

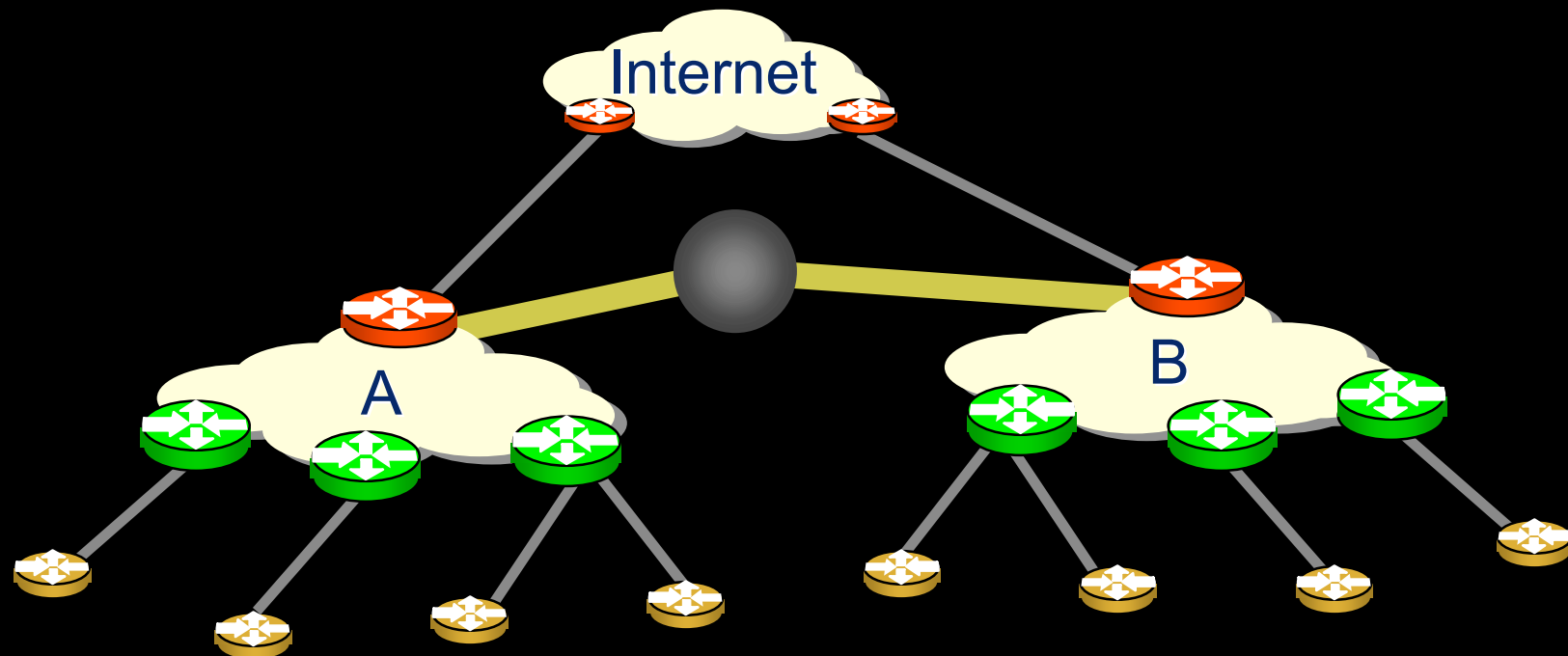
Introduction to Internet Architecture and Institutions, Aug 2003
Harvard

“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.”

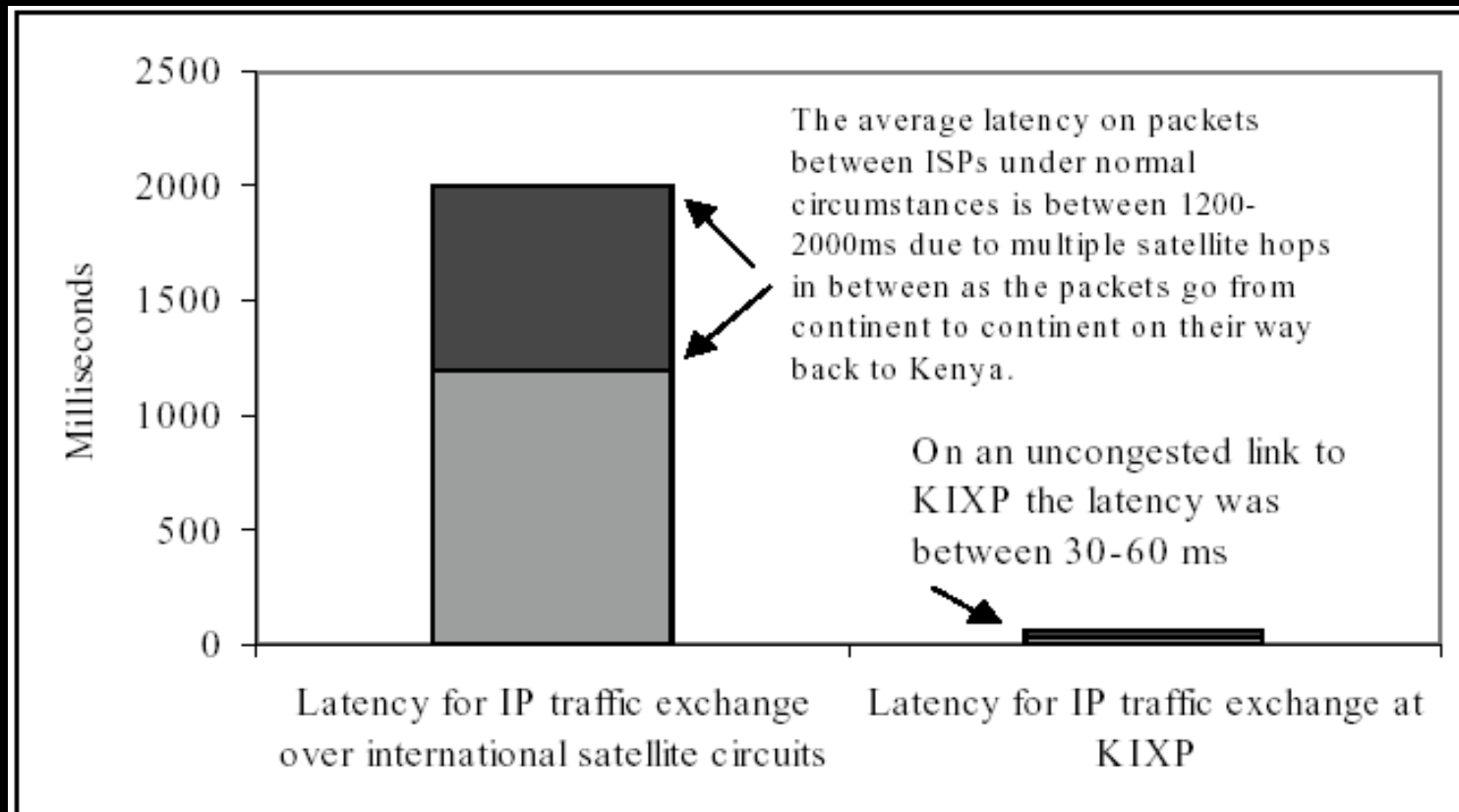
IXPs can create new development opportunities

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

Case Study: KIXP

- 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 Study: KIXP



Quality of service and exchange of domestic Kenyan IP traffic

Case za - mu

- land 1 Mbps of bandwidth in Mauritius, with peering in Europe and world-wide transit, for \$5000 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.

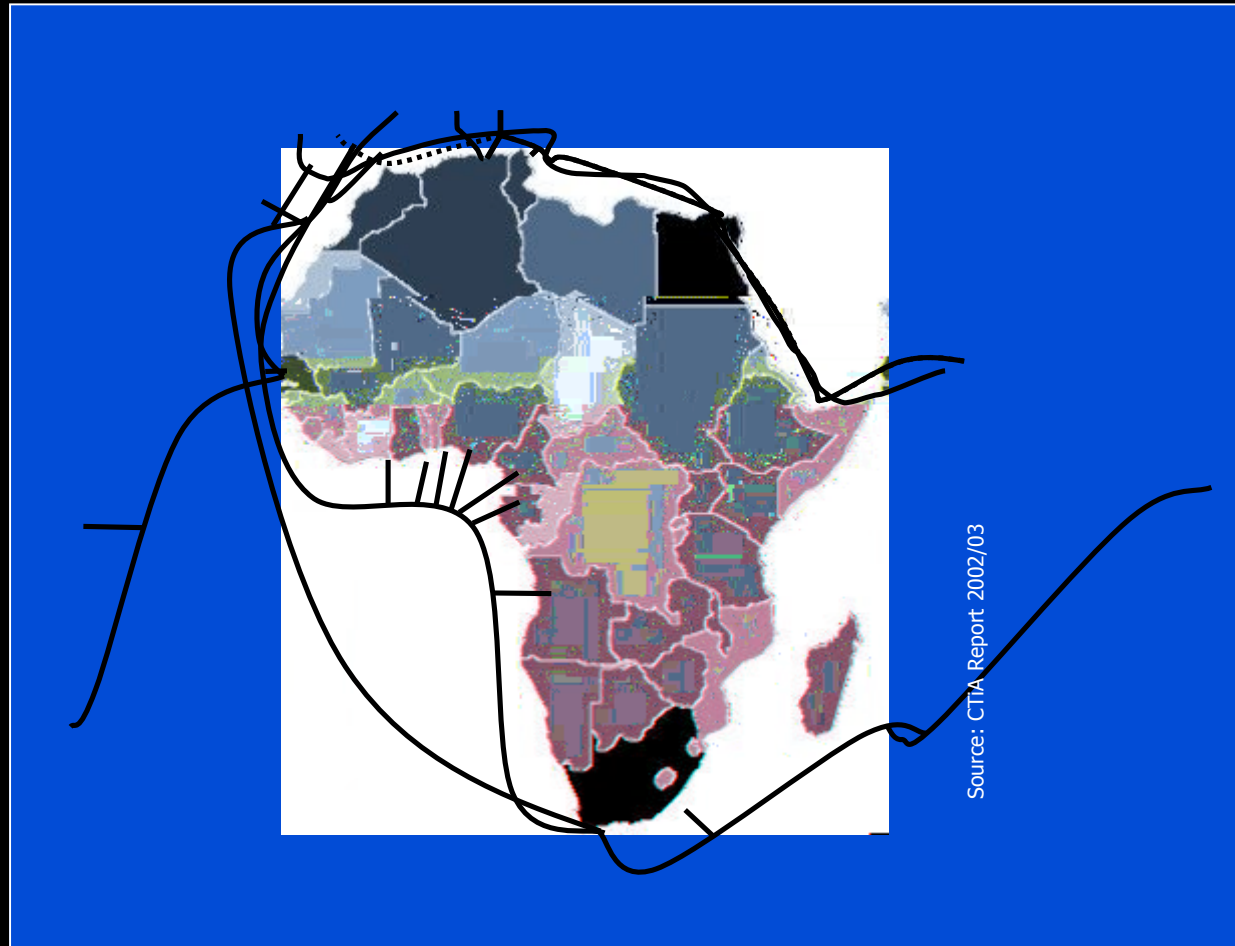
IXPs In Africa

- Uganda: UIXP
- Tanzania: TIXP
- South Africa: JINX
- Mozambique: MOZ-IX
- Zimbabwe: ZIX
- Egypt: EG-IX
- Nigeria: “small” Ibadan IX
- Kinshasa: operational
- Rwanda: RINEX

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

SAT-2, SAT-3/WASC/SAFE, SEA-ME-WE, ATLANTIS 2, FLAG



Current African Submarine Fibre Connectivity: Mostly “Perimeter”

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

Regional exchange point

- With growth in new applications at the edge, we hope inter-African peering potential grows sufficiently to establish a regional peering point.
- NEPAD has expressed interest in such a project

Questions or Comments

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My question for the GAC

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