Challenges Analyzing Connectivity in Africa

Theophilus A. Benson

(CMU/CMU-Africa)
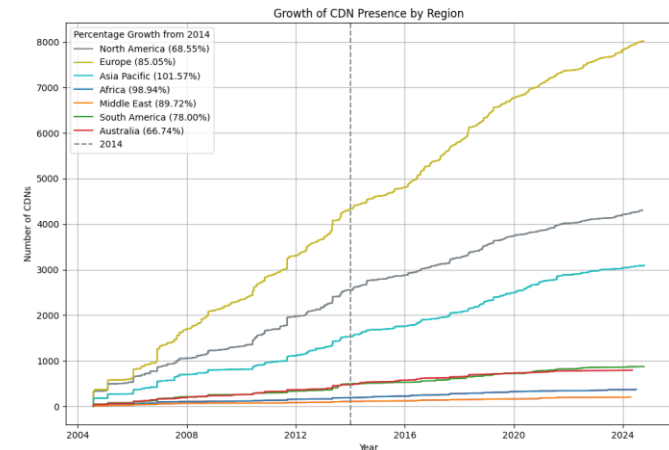
Carnegie Mellon University

Africa leapfrogging into the future

Growing ecosystem of digital public services

Explosive Infrastructure Growth
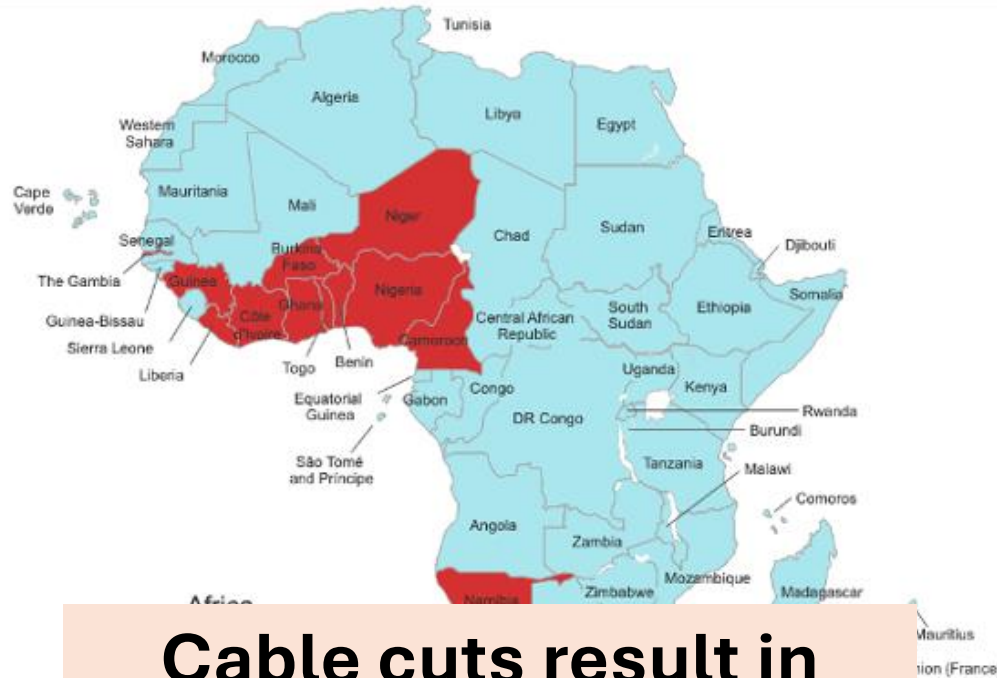

98% growth in CDNs

92% growth in AS

Africa leapfrogging into t[...]

Reduced Internet capacity - Main ISP faulty ➤ Inbox ×

Good Morning All,

Our main Internet Service Provider (ISP) link to the Internet is down due to some faults in the

This means that we are currently using our backup link which is 25% of our normal capacity.
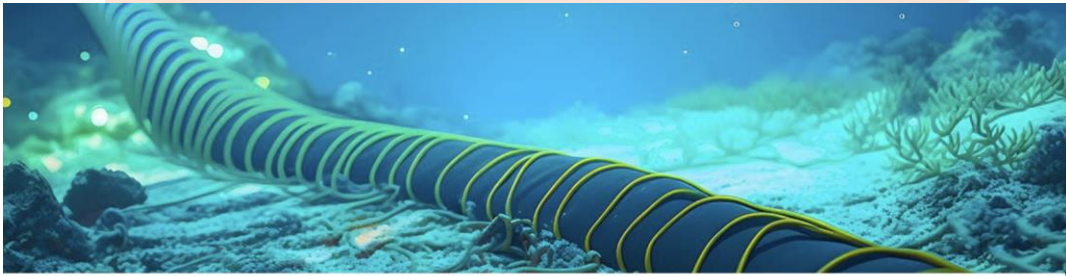dependent services until the main link is restored.

Cable cuts result in billions of revenue lost

Cable cuts highlight unaddressed resilience challenges

Regulatory interest in Monitoring/Assessment

Working group/advisory bodies

NEWS

ITU launches advisory body to support submarine comms cable resilience
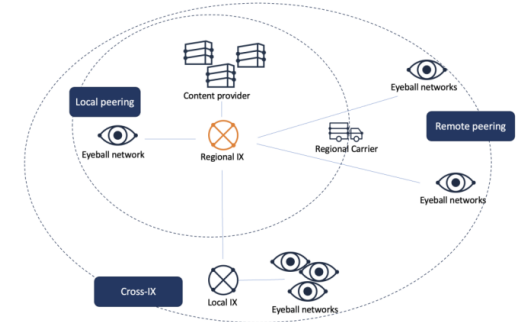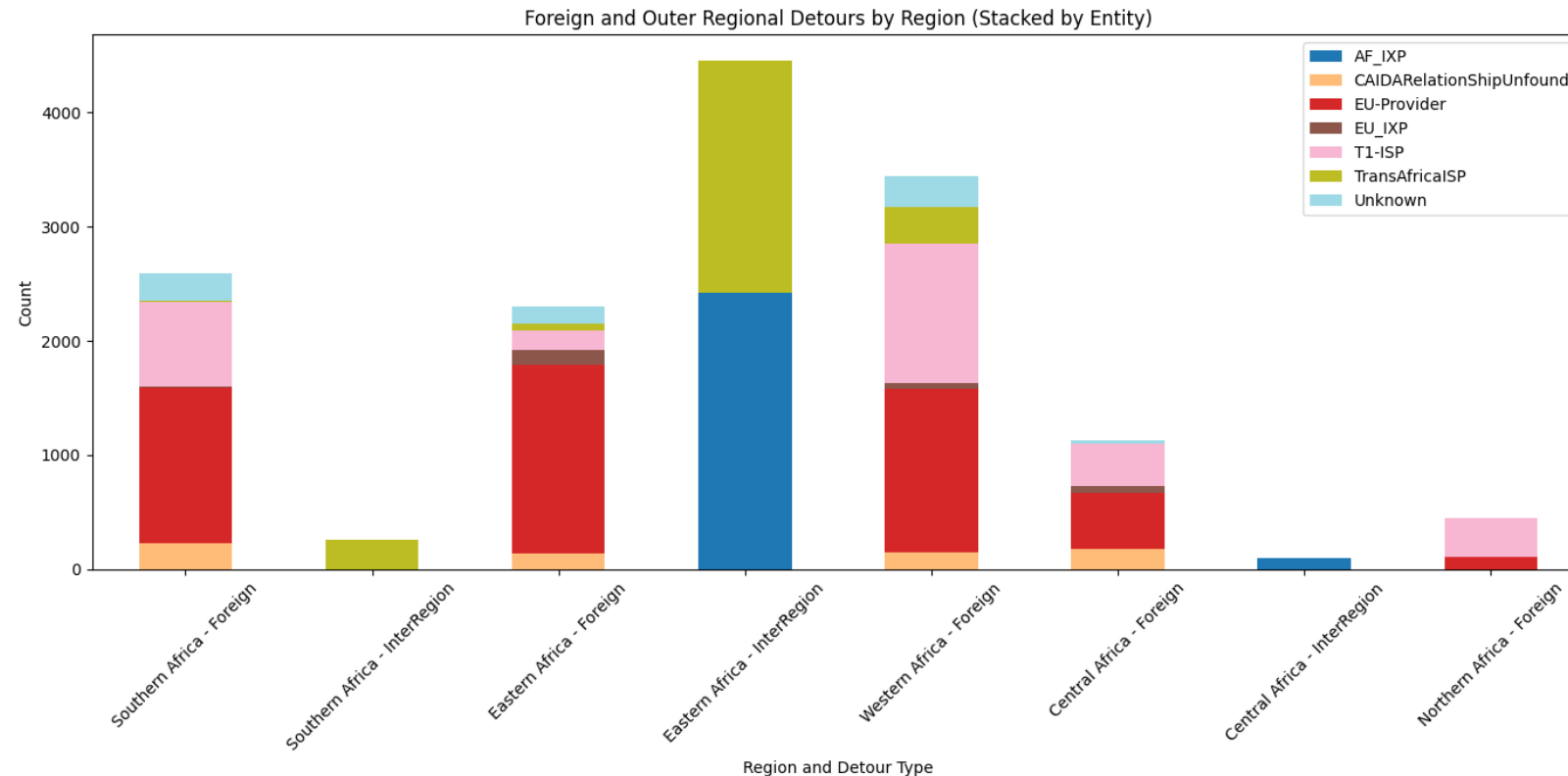
UN (ITU) and National regulatory agencies

Funding monitoring research
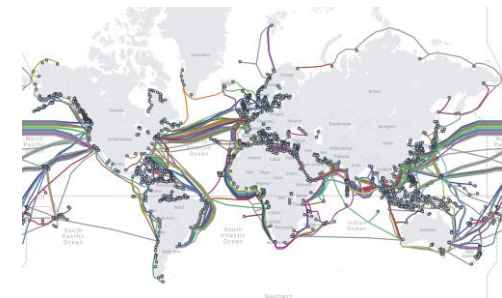
ICANN Announces First Cohort of Grant Program Recipients

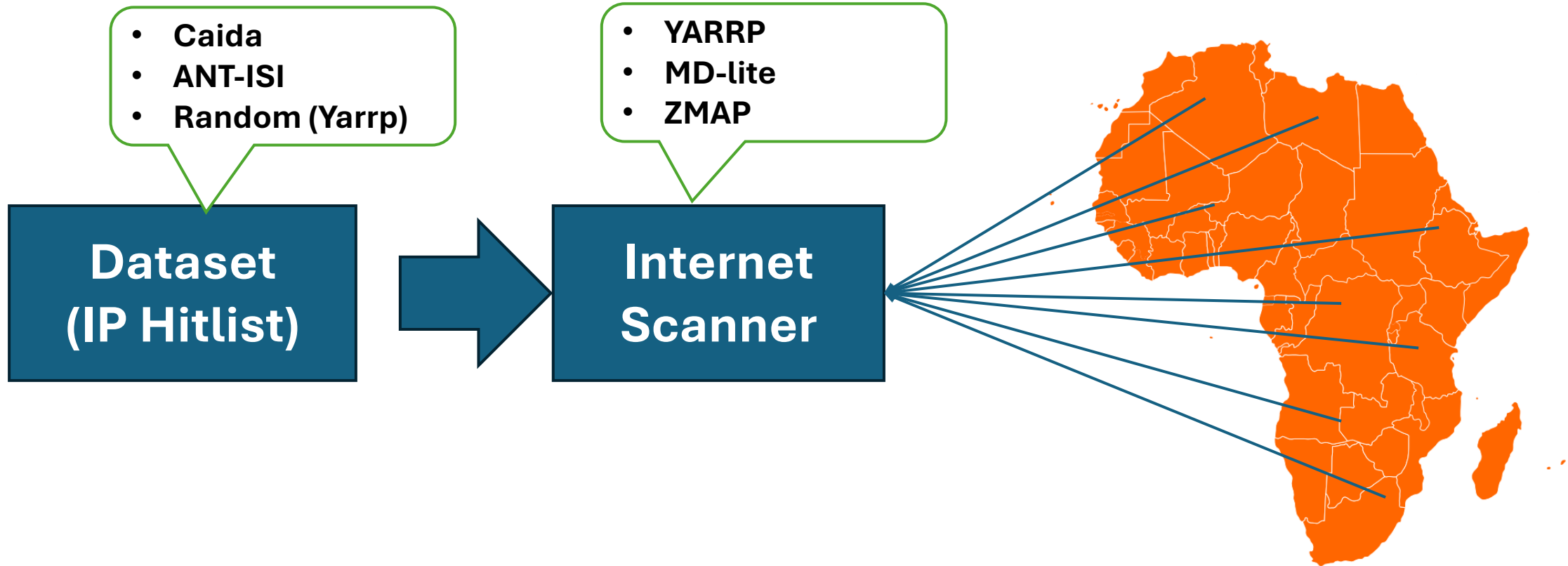29 May 2025

Foundations and NGOs

What should we monitor?

Foreign and Outer Regional Detours by Region (Stacked by Entity)

Legend:
- AF_IXP
- CAIDARelationShipUnfound
- EU-Provider
- EU_IXP
- T1-ISP
- TransAfricaISP
- Unknown

IXP (+offnets): Localize traffic

Subsea Cables (Access to External resources)

How should we monitor the Internet?
(pick a random* IMC paper)

- **Caida**
- **ANT-ISI**
- **Random (Yarrp)**

- **YARRP**
- **MD-lite**
- **ZMAP**

Dataset (IP Hitlist) → **Internet Scanner**

How well do existing tools work (in Africa)?

Dataset	Entries	Coverage (in Africa)		
		Mobile ASN	Non-mobile ASN	IXP
CAIDA Hitlist [6]	3,908,236	64.4%	35.45%	7.8%
ANT Hitlist [23]	5,999,014	96%	71.4%	23.5%
YARRP [4]	766,263	56.10%	27.2%	2.9%

Table 1: Dataset size and coverage.

IXP Challenges

- Addresses are not public advertised
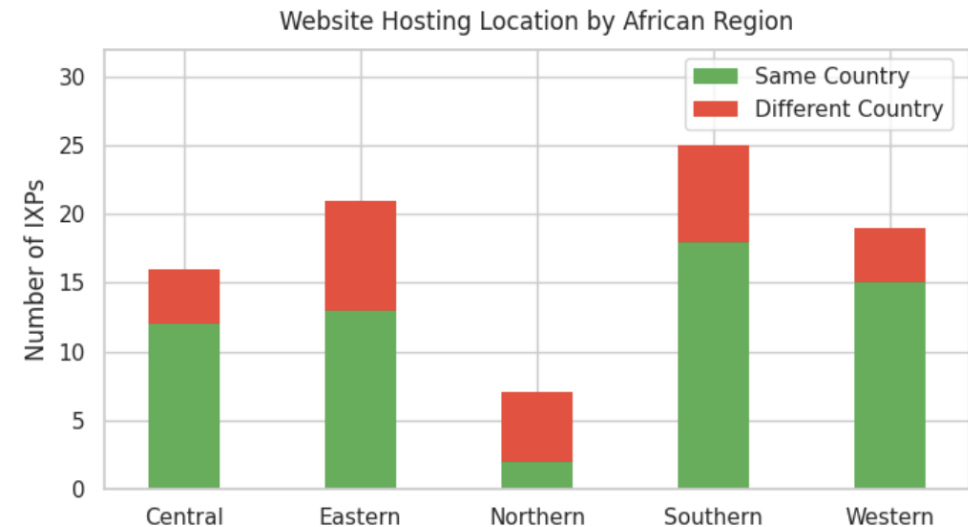
- Advertised address not picked up

Figure 1: location of IX hosting services.

How well do existing tools work (in Africa)?

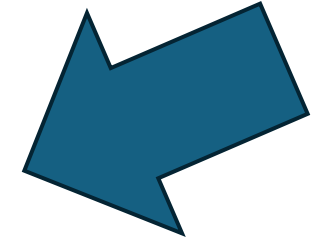| Dataset	Entries	Coverage (in Africa)		
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IXP Challenges

- Addresses are not public advertised

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Intentional Probing

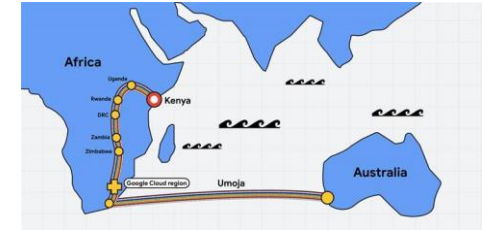- Focus on the critical (not everything)

- Endpoint selection is crucial

The Road Ahead

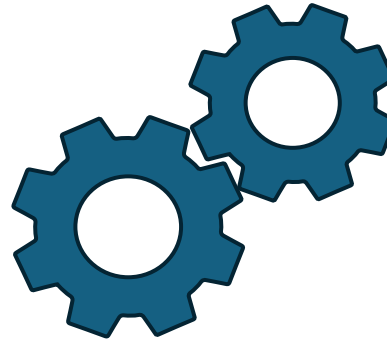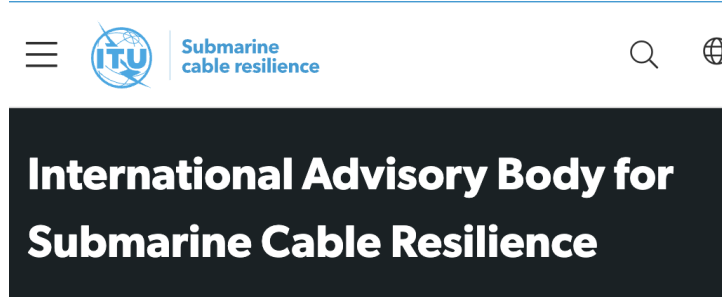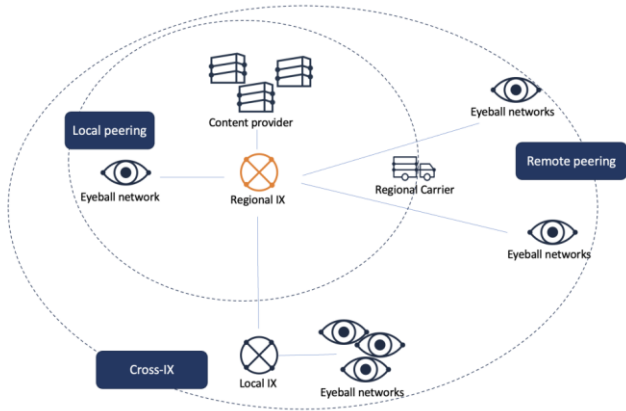Tailor measurements to Africa's unique Ecosystem

Testbed to **access resilience** across layers

We need a **systematic** analysis of alternatives (e.g., terrestrials, Starlink)

Come work with us to analyze and understand Africa's connectivity challenges

Data-driven Resilience Index for Africa

Enable operators to design more efficient infrastructure

Aid policy makers in making informed decisions

Allow regulators to assess capabilities