Case of the Malawi Internet Exchange (MIX)

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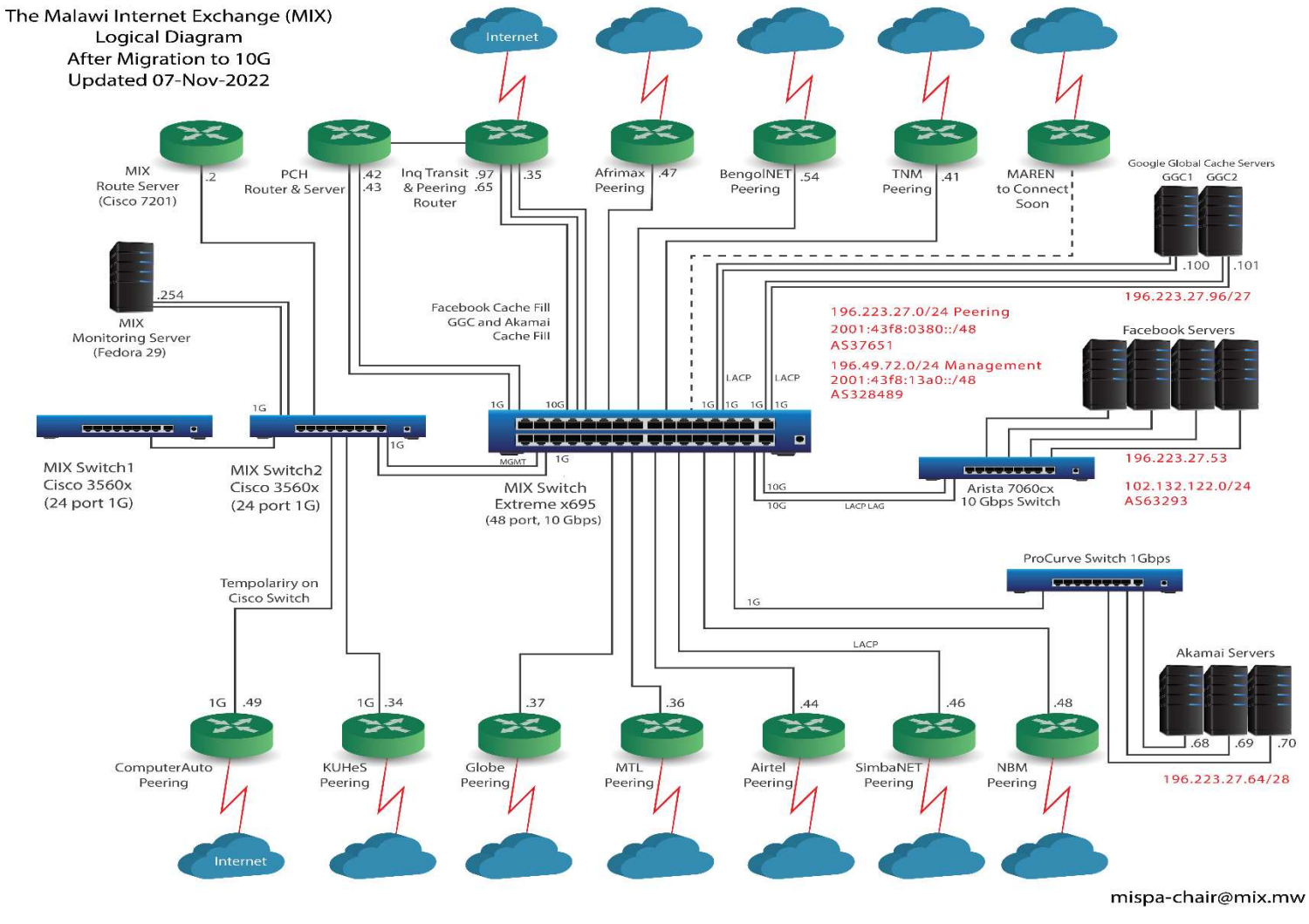
Internet access in Malawi

- Malawi has functional Internet services, provided locally and internationally by Internet Service Providers (ISPs)
- There are multiple ISPs in Malawi each with multiple international connections who also interconnect locally
- Such local interconnections are made locally using the Malawi Internet Exchange (MIX) – since 2008
- The Malawi Internet Exchange (MIX) successfully keeps local traffic local
- Local connection still works even if international link breaks
- I present here the case of the MIX and Internet in Malawi

What is an IXP

- A physical and usually neutral location where different networks meet to exchange local traffic via a switch.
- Helps to keep local traffic local
- Offers more affordable alternative to sending local Internet traffic via abroad.
- IXPs create shorter routes for Internet traffic.
- Offer better and improved resilience, stability, efficiency and quality all at a lower cost.
- We show the case of the Malawi Internet Exchange (MIX)

Malawi IXP – MIX



Malawi Internet Exchange - MIX

- Installed, owned and operated by the Malawi ISP Association (MISPA) – since 2008
- Admission on MISPA membership with exceptions
- Policy: must peer with everyone
- Peering: on a route server – BGP
- All ISPs connected: even small ISPs via bigger ones
- MIX – keeps local traffic local – successfully
- ISP connections use fiber, some wireless in the past
- MIX offers services to peers, caches, DNS

Services at MIX

- MIX only offers local connections – not international
- However MIX provides international CDN caches:
  - Google, Facebook, Akamai,
  - Voluntary access to caches – big problem on cache fill
  - Cache fill requires an international transit connection
  - Internet users can access CDNs locally - better efficiency
  - Help to save international bandwidth for ISPs
  - Plan to have local CDNs as well e.g. on education
- DNS root: d.root-servers.net, e.root-servers.net, anycast
- .mw ccTLD secondary: pch1.nic.mw, anycast
- No international Internet connection for users at MIX

CDN trouble issues at MIX

- After MISPA had demonstrated around 2015 that having CDN caches is a very good idea for your network, the two big MNO procured their own CDN caches.
- Since then supporting CDNs at the MIX and getting ISPs to participate on them has become difficult
- Problem for Malawi is that it causes multiple duplicate cache fill international Internet connections
- Many say the CDNs in such cases are playing one ISP against another – that, so, CDNs are not your friend, as a country
- Solution: increase sharing such as at the MIX or by pooling transit or by opening CDN access by those that have a CDN or by attracting CDNs to connect and peer at the IXP

Malawi International Internet Connection

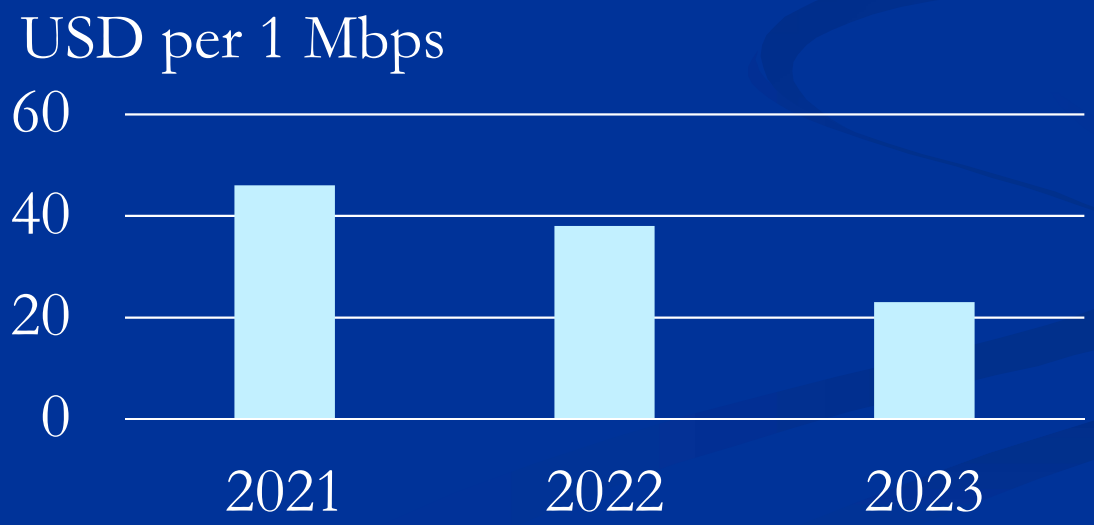
- Malawi is a land locked country
- Has no direct connection to undersea fibre cables
- There are more than 15 active ISPs in Malawi
- Dominated by 2 mobile network operators - MNOs
- Many ISPs have multiple international Internet gateways
- Malawi as a country is no longer party to major international bandwidth arrangements or providers like WIOCC or EASSy – lost in past privatization battles
- Significant bandwidth price increase at boarder – study tour
- Around $3 per Mbps in neighbors but >$30 in Malawi
- Around $1 at undersea fibre cable landing stations

ISP bandwidth in Malawi

- Current aggregated bandwidth capacity, March 2024
- Data collected from almost all active ISPs with an international Internet connection ~ aggregated
- Downlink ~ 250 Gbps
- Usage ~ 74 % average – range 60-90%
- Uplink usage~ 27 Gbps ~ 10% of down link capacity
- MIX connection usage ~ 1.1 Gbps
- CDN caches egress ~ 50 Gbps
- **Bandwidth is scarce and expensive**

Price for 250 Mbps International Transit

- Data from MISPA cache fill project with ISOC at MIX over yearly contract from 2021 to 2023
- Based on MISPA RFQ to fill CDN caches at MIX
- Best price offered by ISPs – MK converted to USD
- Price per Mbps – expensive ?



Diplomatic Internet Corridors

- Initiative by MACRA with MISPA and Government
- Establish Internet data corridors from sea to Malawi
- Strategic aim to reduce Internet data prices
- Toured neighbors Tz, Mz, Zm and others Za, Ls, Na
- Negotiating MoUs with neighbors – diplomatic
- Proposal to distribute landed corridor connection ESCOM fibre – policy ?
- Malawi-2063 – MIP1 – build Nacala to Lilongwe fibre
- Implementation period in MIP1: 2021-27 – behind ?

MW local connections – Expensive

- ISPs at MISPA observe problems with local connections within Malawi
- Price is high – often higher than international connection even though fiber is widely available
- Puts limitations on connections to the MIX
- Puts limitation on providing access to end users
- Need for better policy – e.g.
  - On ESCOM fibre
  - On better sharing of available fibre backbone – duplicates?

Building an IXP in Lilongwe

- MISPA has started an initiative to build a second IXP in Lilongwe, LLIX, with support from MACRA, ISOC, etc
- Still discussing feasibility for an IXP in Mzuzu
- Now in equipment procurement phase for LLIX
- Building a successful IXP is not just an engineering job. It takes time and effort to develop trust, common understanding, and mutual agreements in local communities, reasons we are here.

IXPs and International Connections

- As we have seen in the case of the MIX, IXPs are normally used for local connections to keep local traffic local
- IXPs are not normally used for international Internet connection
- Except where the IXP hosts CDNs that need international transit connections for cache fill
- Best practice is then to have the CDNs to connect to and peer at the IXP

Thank you

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