IPv6 – The Challenges we need to talk about

Building Africa's digital future

Wednesday 4th June 2014

Introduction

Andrew Alston

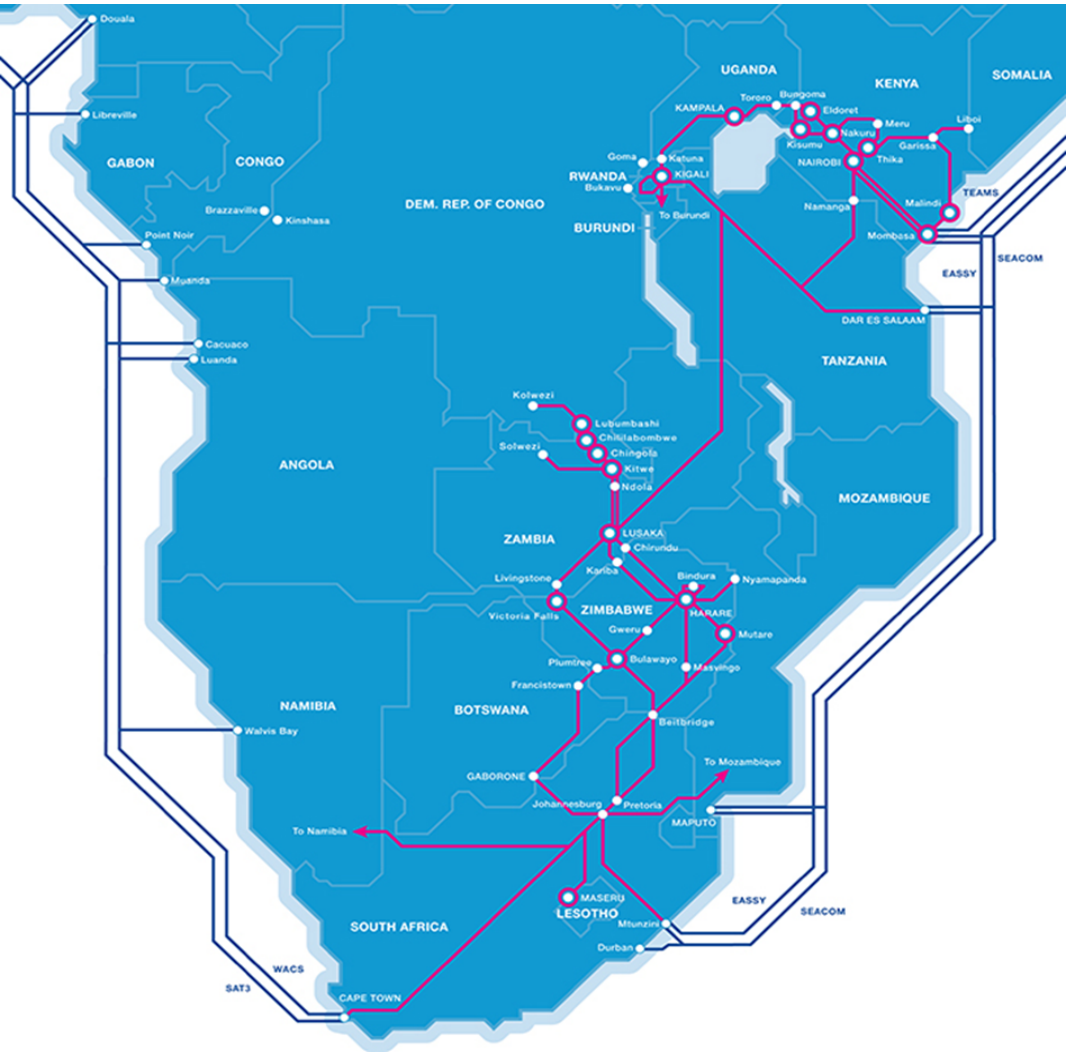
Liquid Telecom Group – Head of IP Strategy

All of us should know by now that IPv6 is critical to the future of the Internet. IPv4 resources are fast dwindling, and indeed in many parts of the world have run out. That being said, if we wish to truly promote IPv6 and facilitate its rollout, we need to be honest and transparent about the challenges so that solutions and workarounds can be found.

Introduction – Liquid Telecom
Our history with IPv6

- IPv6 was first looked at in 2008.
- The first IPv6 block within the Liquid Group was applied for in 2008.
- Initial IPv6 deployment was done in 2009
- First IPv6 customer came in 2012
- Currently IPv6 is deployed natively in South Africa, Zambia, Zimbabwe, Kenya, Uganda, Rwanda, Tanzania, London and to cross border customers in Burundi
- IPv6 and IPv4 are deployed in single topology mode across the network

Foundations – Robust and Reliable Network Infrastructure – Economy of Scale



- Fully IPv6 enabled
- One topology
- To the Edge

The Liquid IPv6 Strategy

- IPv6 is not optional, an add-on, or anything “special”.
- All hardware purchased and deployed must be IPv6 capable
- IPv6 deployed as part of the standard rollout procedure.
- Where replacing / upgrading / rebuilding sections of the network, IPv6 always forms part of the thought process.
- Where networks are gained through acquisition IPv6 deployment is done as soon as practically possible

The basic challenges

The basic challenges

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- Access networks are a major challenge, with legacy hardware that will probably NEVER be upgraded to support IPv6. (V-SAT platforms, legacy switching gear etc)
- Protocol immaturity – there is STILL no VPNv6, LDP6, MPLS-TEv6 etc on large amounts of legacy hardware (and some new hardware!).
- Where rebuilding / upgrading networks acquired through acquisition deployment can be complicated by the shear scale of the currently deployed networks and the wide disparity in vendor hardware.
- Customer adoption can be slow because of lack of resources, skills, and the realization that IPv6 is actually necessary.
- V6 features are STILL sometimes licensed as "optional extras" by vendors, pushing up the cost

The different types of challenges

- Protocol immaturity
- Vendor bugs
- Customer resistance
- Human resources and skills
- Migration of legacy networks in a single topology environment

Specific Examples

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- We made the decision to go single topology – to change now would be a step backwards and require a significant and extremely complex maintenance window with the possibility of significant outage
- One of our vendors, particularly used within one of our op-co's only supports IP dampening on IPv4.
- When a link flaps, the Interface gets dampened, however, because IS-IS is in single topology mode, if the link comes back up while the interface is dampened, IS-IS still established and the IPv4 routes effectively became invalid, causing an IPv4 blackhole.
- The vendor's solution was to go multi-topology, which wasn't an option we could realistically take
- The final work around while we wait for a permanent fix was to run those particular routers in transition mode to allow us to remain in single topology mode on the rest of the network.

Specific Examples (2)

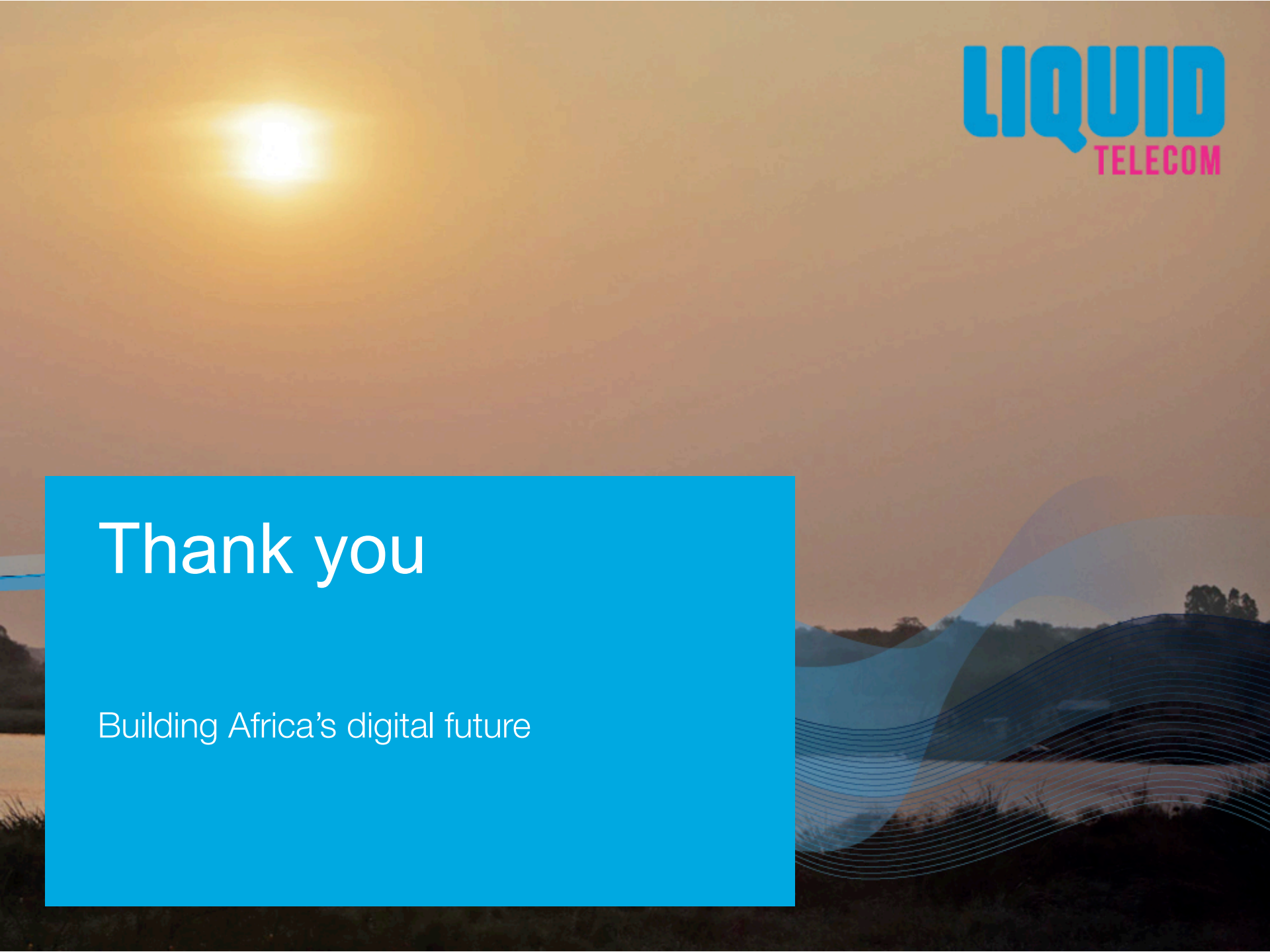
- We are unable to use IPv6 addressing on sub-interfaces on a particular vendor. Physical loopbacks with VLAN's then terminating on direct access interfaces solved this – but at a significant cost of interfaces
- IPv6 deployment on our satellite platforms is hampered by lack of support on v-sat terminals etc – something that will likely never be there.

Where to from here

- We're still migrating acquired networks to IPv6 – where necessary investing heavily to replace legacy hardware where support is non-existent.
- One of the primary drivers behind certain upgrades was IPv6 and has come at a price tag in excess of $10 million dollars – but we'll keep going until we succeed.
- We would like to start removing any IPv4 from metro edge devices in the near future – this will free up IPv4 resource we desperately need for use in other parts of the network.
- To do this with current network design and implemented technologies we need LDP6 – This is on vendor roadmaps for 2015, so we hope to walk this path either late 2015 or early 2016.

The conclusions

- Liquid does not view IPv6 as a revenue driver – but rather revenue protection. When IPv4 runs out anywhere in the world, our customers will still need to be able to communicate, and if they can't they will move to somewhere where they can.
- Liquid has a strict no-NAT policy, end to end communications are critical in the modern world and the operational complexities and expense of NAT simply aren't worth it.
- IPv6 only networks are closer than most people imagine, particularly in segments that are designed as transport layers rather than routing layers.
- While deployment can be complicated and potentially expensive, we believe it will stand us in good stead moving into the future.



Thank you

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