IPv6 deployment at Xphone

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Agenda

- Xphone & Oasis background
- Status and stats
- Technical details
- Summary

Oasis background

- Oasis is a systems integrator specializing in xSP networks.
- We are in business since 2006.
- IPv6 is both a personal passion (past), as well as a business differentiator (present).
- We spend time and money training our staff and staying up to date.
- I like IPv6 because it reminds me of the early internet days

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Xphone background

- Xphone is a provider of Long distance voice calls and ISP services.
- Recently won LTE spectrum tender and will add mobile services soon.
- Oasis built the network for Xphone in 2008 and is operating it since.
- The network is built using gear from Juniper (mainly), F5, Ericsson and Cisco.

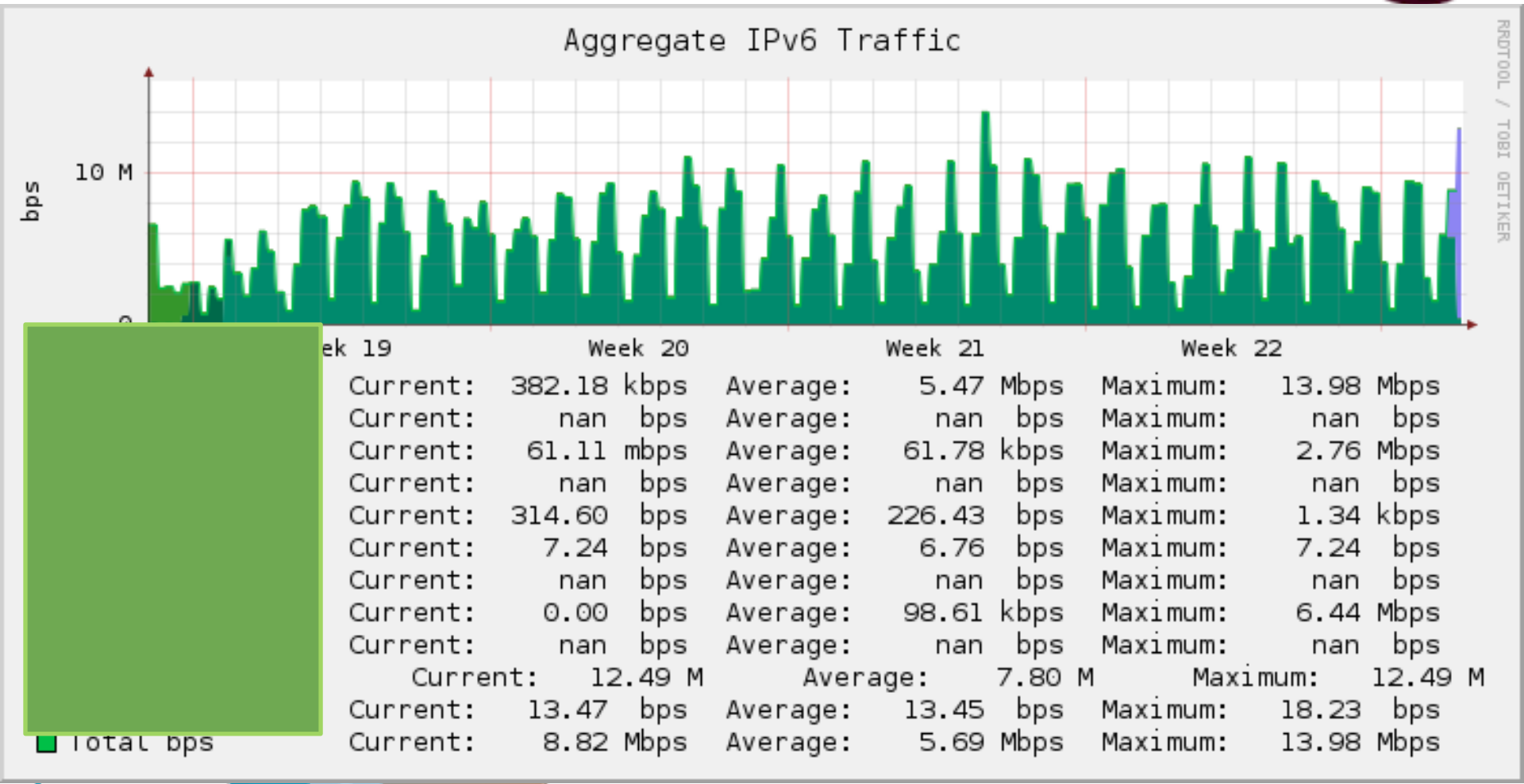
Xphone background

- IPv6 was added to the network since day 1.
  - There was really no traffic other than our ping tests and some dancing turtles.
- About 100K subscribers, mostly DSL, but also cables and FTTH.
- Which means they exhausted their RIPE assigned IPv4 pool ~3 years ago and are doing CGNAT for most users.
  - This is when things started to get interesting, more on this later.

Status and stats

- IPv6 is deployed end to end within the Xphone network:
  - All core links.
  - All transit and peering links if the other side support it.
  - For DSL and FTTH users, cables coming soon.
  - On Xphone caching/resolver DNS servers.
  - On Xphone Authoritative DNS servers.
  - On CDNs hosted within the Xphone network.
  - On Xphone mail server (obsolete).

Status and stats -2012

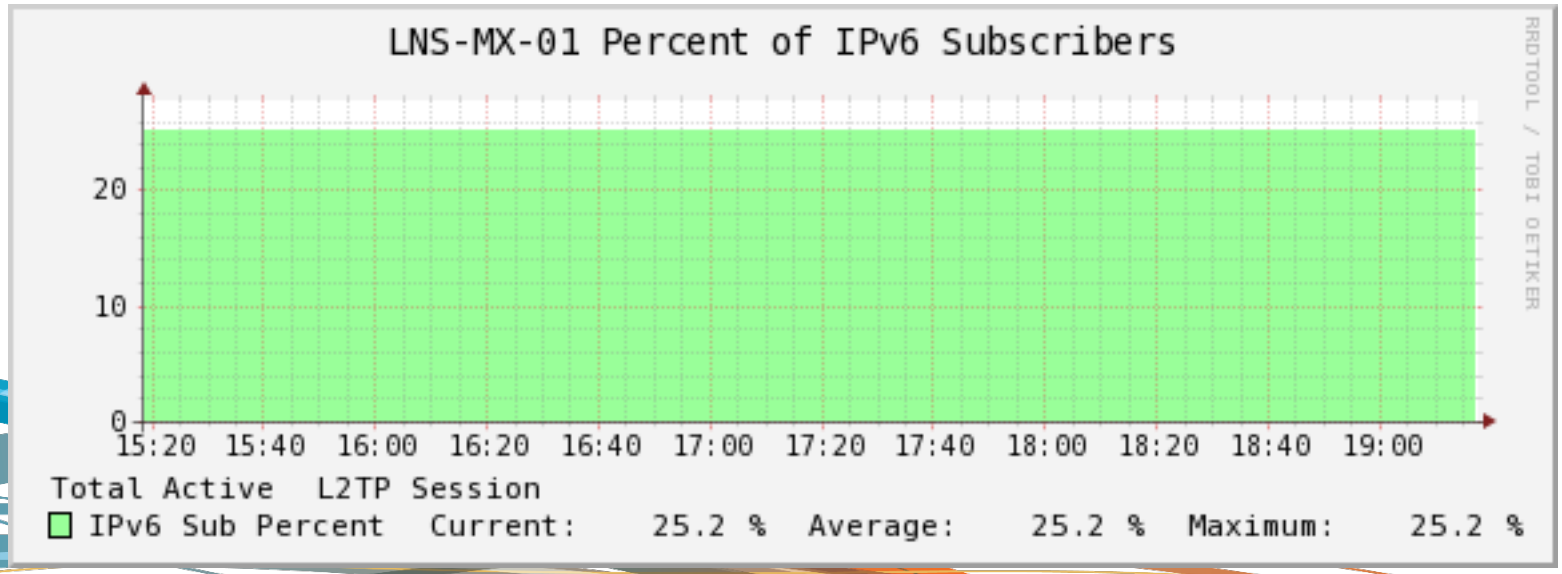


Status and stats -2016

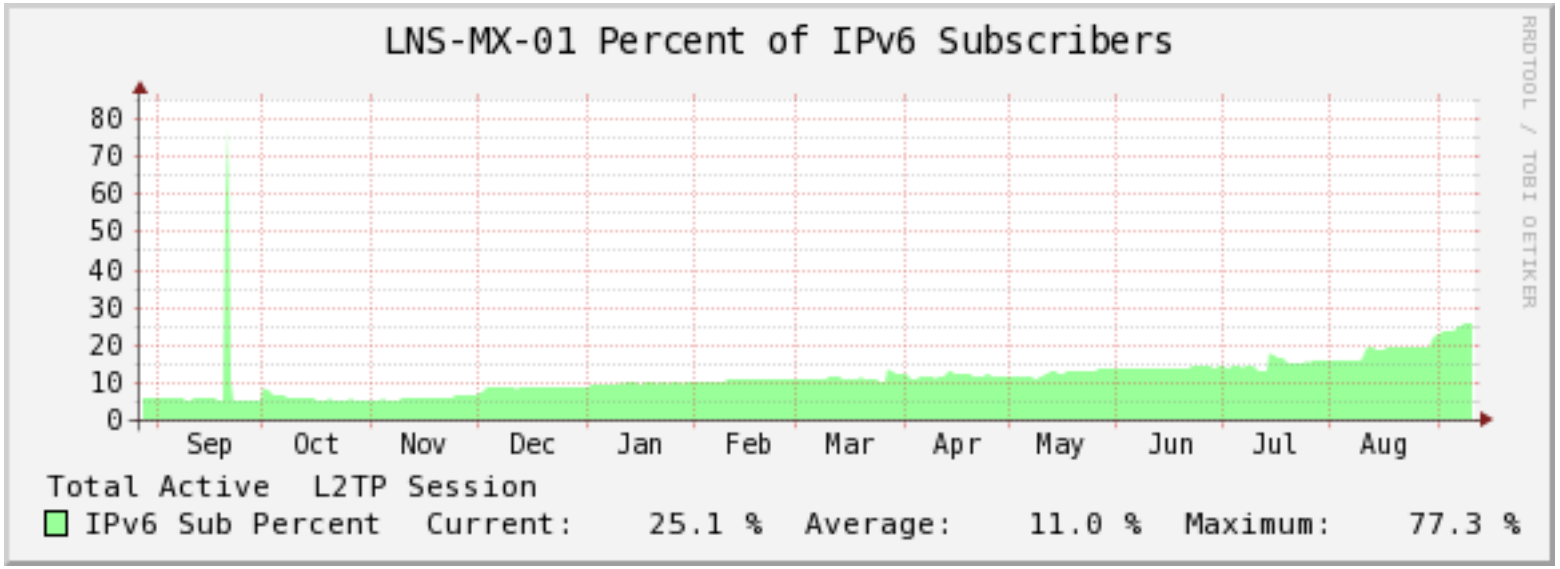
Code	Region	IPv6 Capable	IPv6 Preferred	Samples	Weight	Weighted Samples
XA	World	6.56%	5.81%	643,326,138	1	643,326,138
XD	Asia	2.38%	1.68%	342,473,601	1	341,840,993

Code	SubRegion	IPv6 Capable	IPv6 Preferred	Samples	Weight	Weighted Samples
XV	Western Asia, Asia	2.35%	0.84%	23,511,928	1	23,497,551

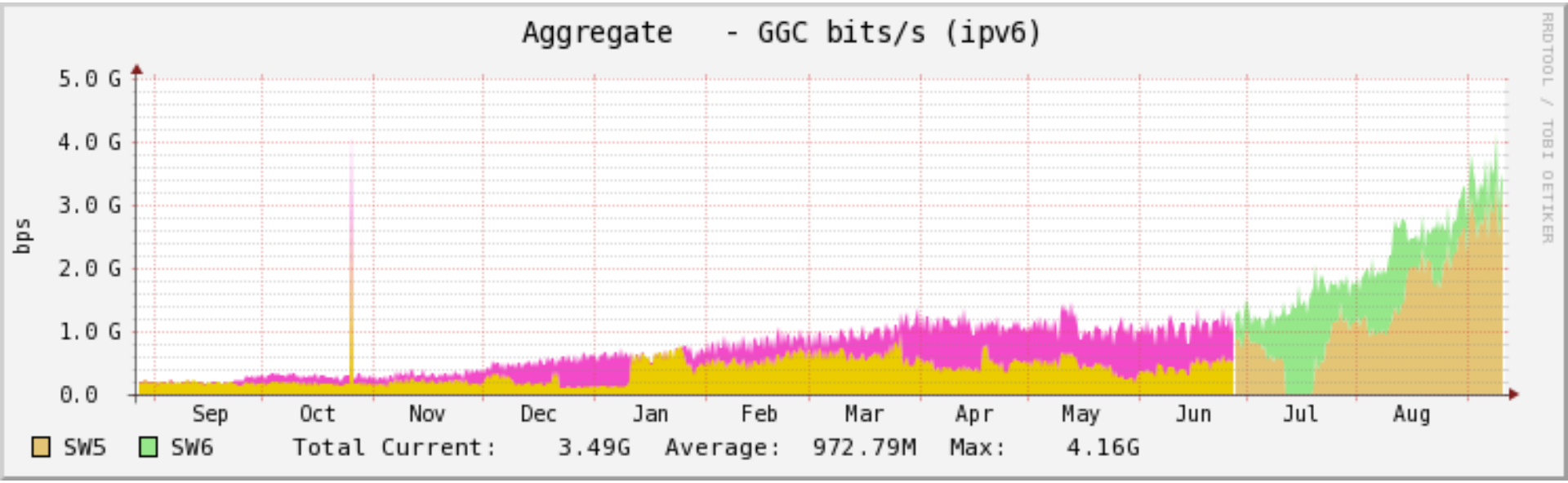
ASN	AS Name	IPv6 Capable	IPv6 Preferred
AS47956	XFONE XFone 018 Ltd	21.32%	19.93%



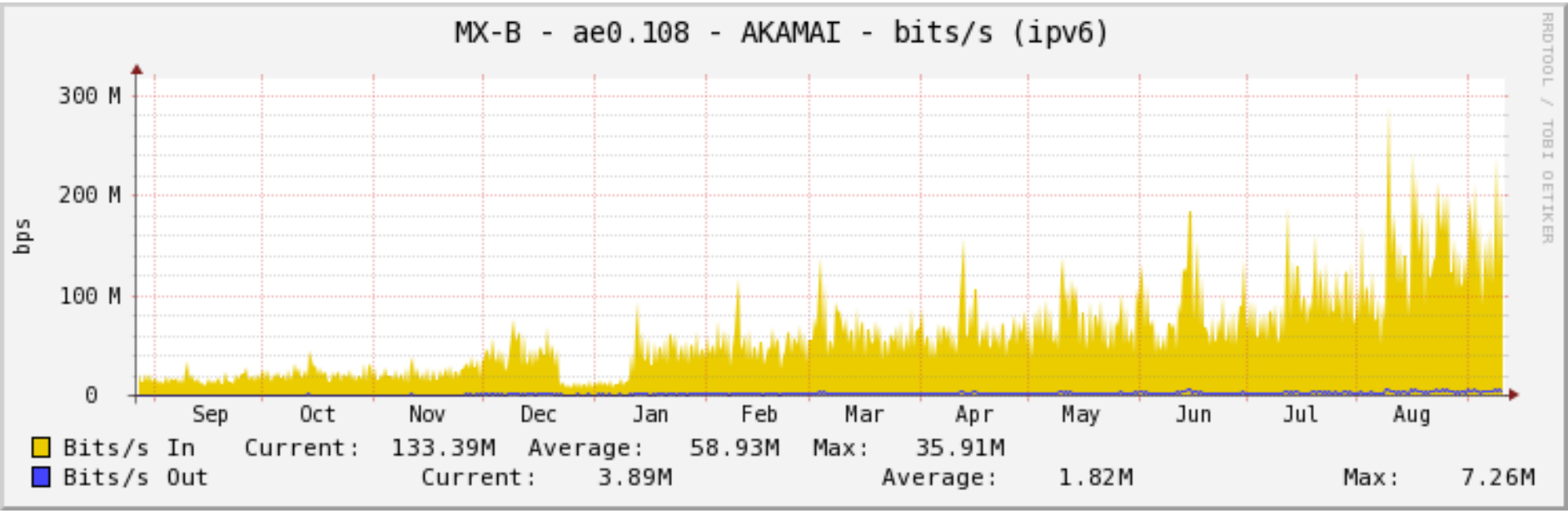
Status and stats -2016



Status and stats -2016



Status and stats -2016



Technical details

- Core and peering (AKA routing and switching) are pretty straight forward and mostly work out of the box.
  - OSPFv3 as the IGP.
  - MP-BGP for customer routes (no 6PE/6VPE as the network does not implement MPLS).
  - P2P links are assigned /64, we might move to /126

Technical details

- The complexity (and problems) are in the access network.
  - PPP users get a /64 prefix for the WAN link and /56 for the LAN using DHCPv6-PD (/48 is available per request).
  - DNS is assigned through stateless DHCPv6 (other config flag).
  - IPv6 support is controlled by Radius attribute.
- Not surprisingly, the open source software (Radius and DNS) worked flawlessly.

Lessons learned: technical

- Many deployment options, use the one that addresses your biggest issues use others ad hoc.
- Addressing design is tricky, BCPs change frequently.
  - How to subnet my allocation ? - on nibble boundaries
  - What prefix length to assign?
  - This is getting better these days.

Lessons learned: technical

- Access is messy (2012).
  - Address assignment is challenging, RA alone doesn't work as it has no way to assign additional configuration parameters.
  - DHCPv6 is getting to be OK, we are almost there (2012). (2016 – we are there).
  - Many software bugs:
    - Client ignores prefix in RA if it's not a /64.
    - DHCPv6 implementation only handle PD DHCP requests.
    - Wonderful interactions between Juniper BNG and DLINK CPE (Router lifetime=0)

Lessons learned: technical

- Data center is surprisingly good, if you choose the right vendors (2012).
  - Some voodoo exists though (2016).
- CGNAT boxes are necessary, but evil:
  - They get overloaded (bots??) - implement connection limiting and connection rate limiting.
  - Let's try to assemble fragmented SIP packets.
  - What's your score on Xbox Live ?
  - They cost quite a bit.

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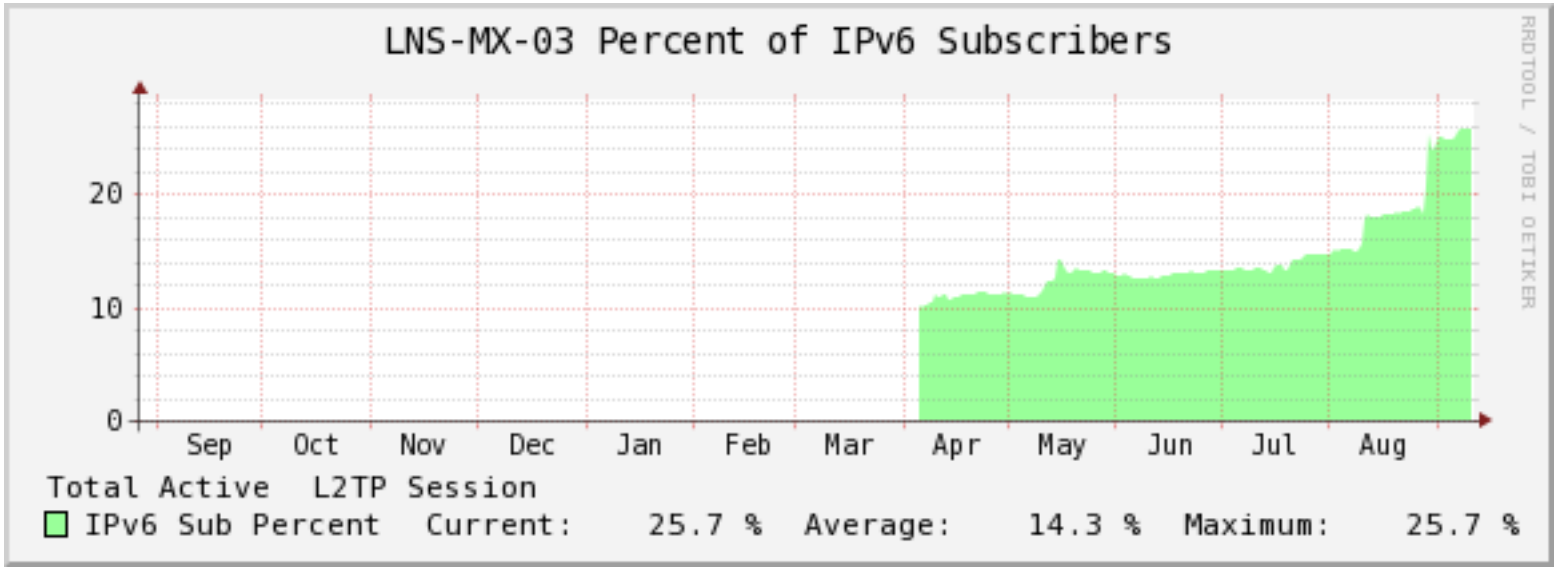
Lessons learned: non-technical

- The number one problem for IPv6 adoption is lack of content (2012).
  - There is no justification for this, for a content provider it's pretty easy to at least experiment with ipv6.
  - Global content providers (e.g Google, Facebook, Yahoo) have been a major force behind IPv6 in recent years, and are making a huge leap forward today (2012).
  - Israeli content providers ? (2012 & 2016)

Lessons learned: non-technical

- The second biggest issues is customer equipment readiness: (2012)
  - PCs with old OS. (2016 - no longer an issue).
  - Home routers – there are tens of thousands of unmanaged devices already deployed (2012).
  - What is the incentive to upgrade ?
    (TR69 might be your friend)
  - Mobile phones.(2016- this is no longer an issue).
- Globally, governments have been a driving force for IPv6, in Israel the government techs and regulators are very silent about it.

We are getting better…



Nightly upgrades of CPEs, thanks Yariv and Amir.

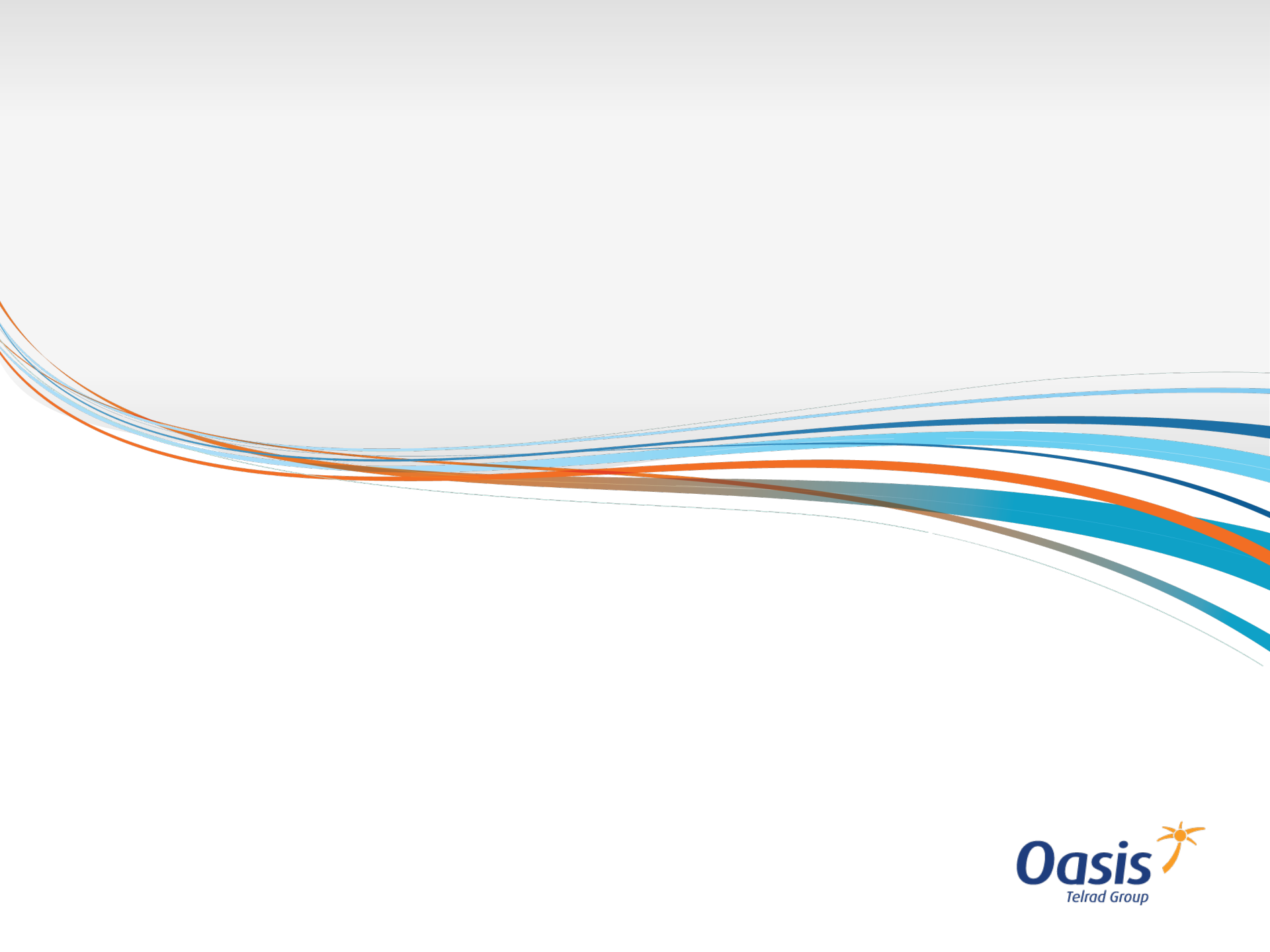
Summary

- Israel is way behind the leaders.
  - But we are heading in the right direction
  - And recently also in the right speed.
  - Hopefully by end of the year the game will completely change.

- Locally our next challenge is with the content providers and mobile operators.

- Implementation is still complex, and since no network is like other, you'll have your own problems and will need to gain your own operatiuonal experience.

- We are here to help ☺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