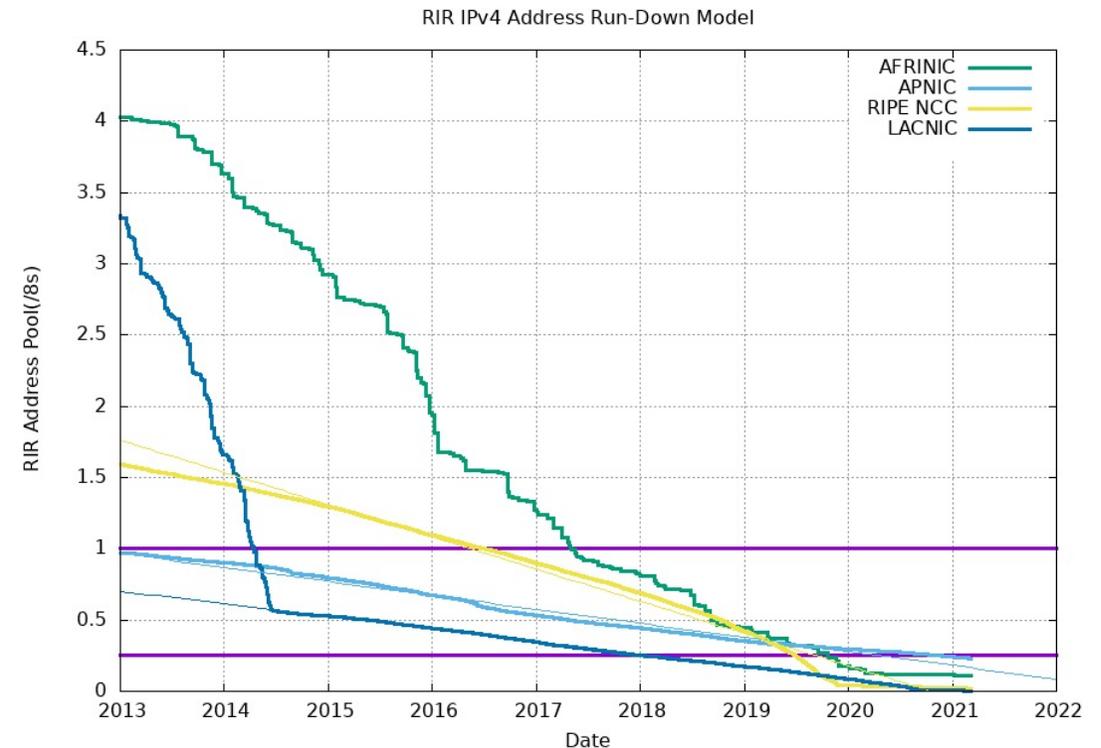


A few thoughts on IPv6 deployment and discussion

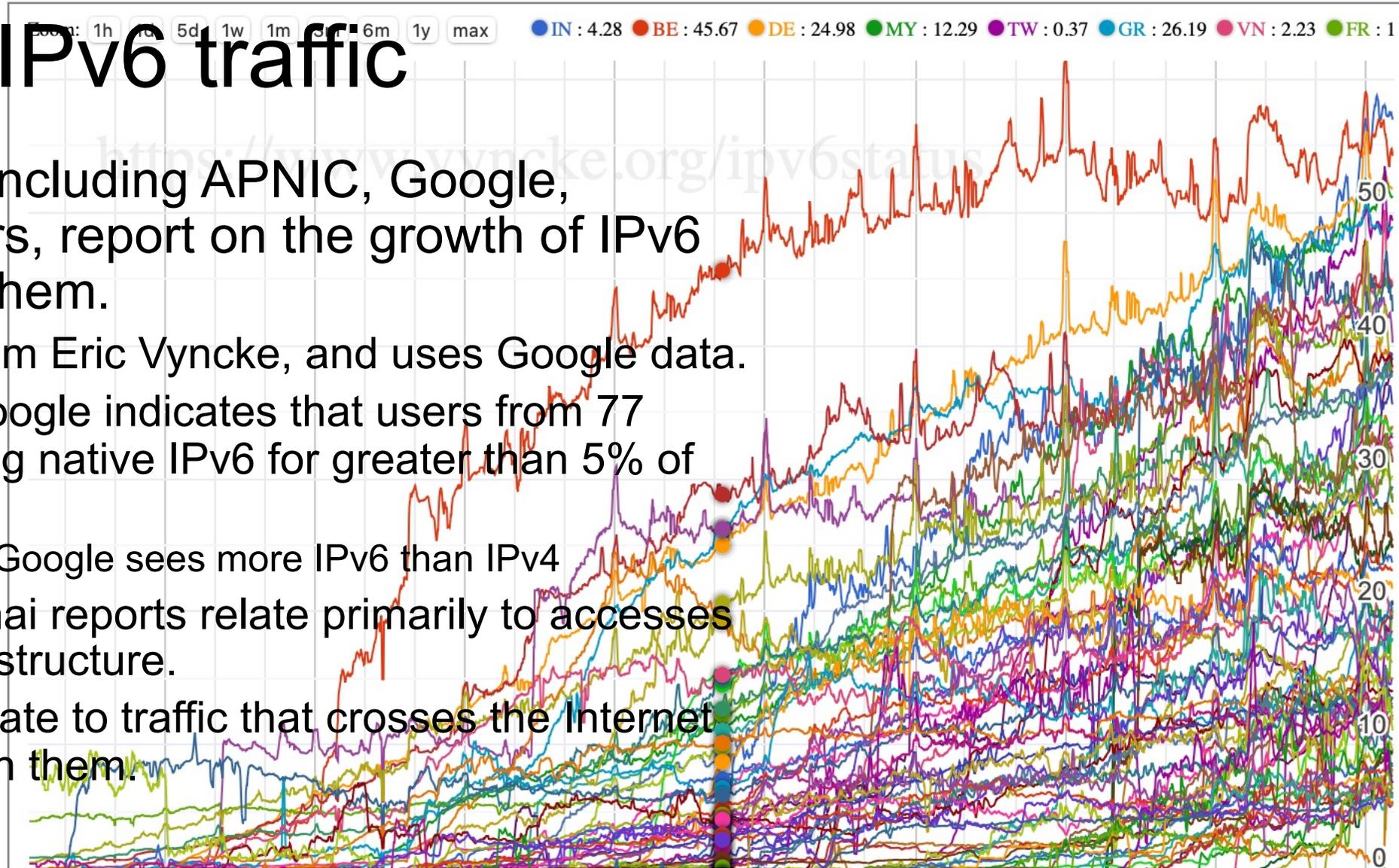
Observing IPv6 demand

- Operators in emerging economies are pressed for address space
 - We see frequent proposals to use reserved IPv4 prefixes as private address space
 - example: <https://tools.ietf.org/html/draft-wilson-class-e-02>
 - We also see frequent proposals to use assigned but unannounced (at least in some parts of the Internet) IPv4 prefixes as private address space
- Both are bad ideas
 - They provide a band-aid to extend the utility of IPv4 but ultimately do not solve exhaustion



Observing IPv6 traffic

- Several sources, including APNIC, Google, Akamai, and others, report on the growth of IPv6 use in accessing them.
 - This graphic is from Eric Vyncke, and uses Google data.
 - As of March 8, Google indicates that users from 77 countries are using native IPv6 for greater than 5% of their accesses,
 - In some cases, Google sees more IPv6 than IPv4
 - Google and Akamai reports relate primarily to accesses to their CDN infrastructure.
 - APNIC reports relate to traffic that crosses the Internet backbone to reach them.



<https://www.vyncke.org/ipv6status/compare.php?metric=p&countries=in,be,de,my,tw,gr,vn,fr,us,gf,ch,fi,lu,th,pt,mx,sa,jp,br,lk,ae,gb,hu,nl,uy,ca,ee,mq,ec,re,gp,ie,au,tt,py,pr,no,pe,mc,il,ro,nz,ga,at,bo,cz,sg,np,tg,mo,pl,ph,co,si,kr,om,bt,ar,is,gt,kw,ru,md,se,lv,ke,mm,sx,by,bz,cg,sk,zw,am,rw,ba,mv>

The business case for IPv6 in <redacted>

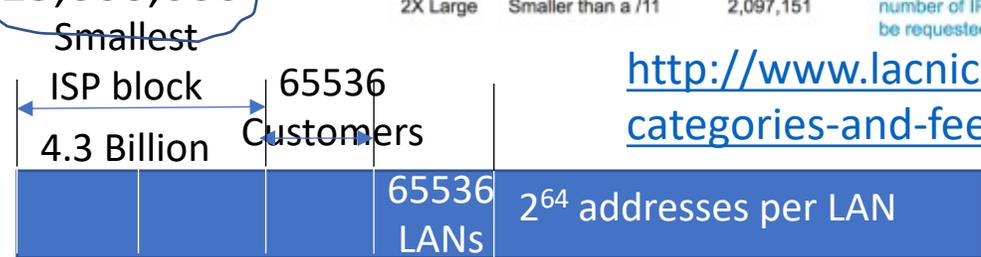
- IPv4

- 5000 /24 prefixes = 1,280,000 addresses
- \$45,000 Annually, **but LACNIC doesn't have them to provide**
- Open Market:
 - At \$14/address, \$17,920,000
 - At \$20/address, \$25,600,000

Category	IPv4 Prefix	IP Addresses (up to and including)	Initial Assignment Fee (USD)	Annual Renewal Fee (USD)	Payment before due date (discount)	Payment more than 30 days overdue (surcharge)
*Nano	Smaller than a /22	1,023	600	600	570	630
*Micro	Smaller than a /20	4,095	1,000	1,000	950	1,050
Small	Smaller than a /18	16,383	IPv4 Depletion Phases: This number of IP addresses may not be requested	2,100	1,995	2,205
Medium	Smaller than a /16	65,535	IPv4 Depletion Phases: This number of IP addresses may not be requested	5,700	5,415	5,985
Large	Smaller than a /14	262,143	IPv4 Depletion Phases: This number of IP addresses may not be requested	14,000	13,300	14,700
X Large	Smaller than a /12	1,048,575	IPv4 Depletion Phases: This number of IP addresses may not be requested	28,000	26,600	29,400
2X Large	Smaller than a /11	2,097,151	IPv4 Depletion Phases: This number of IP addresses may not be requested	45,000	42,750	47,250

- IPv6

- \$2100 Annually



<http://www.lacnic.net/2399/2/lacnic/membership-categories-and-fees>

Category	IPv6 Prefix	Initial Assignment Fee (USD)	Annual Renewal Fee (USD)	Payment before due date (discount)	Payment more than 30 days overdue (surcharge)
Small	Smaller than or equal to a /32	2,100	2,100	1,995	2,205
Medium	Smaller than a /30	5,700	5,700	5,415	5,985
Large	Smaller than a /28	14,000	14,000	13,300	14,700

IPv6 in the IETF

- Much discussion on IPv6 as an underlay technology
- Less discussion on IPv6 as an overlay technology
 - And the impediments to deployment
 - This is the primary reason we (v6ops chairs) invite speakers to talk about IPv6 deployments, and prefer enterprise or ipv6-only deployments
- Internet drafts:
 - 1805 posted internet drafts
 - 199 mention SRv6
 - 581 mention IPv6 without SRv6

The Question:

- IPv6 in the overlay will help network operators address the problem of address space scarcity
 - We see it in ISP, residential, and other networks
 - We also see it in common applications, but not all
 - But not usually in enterprise networks
- IPv6 in the underlay will not help network operators address the problem of address space scarcity
- Are we collectively doing something wrong?