

# An Anycast Federation for DNS Resolvers

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# Where are people using public resolvers?

<https://stats.labs.apnic.net/rvrs>



Code	SubRegion	sameas	samecc	googlepdns	diffcc	diffccneu	cloudflare	diffcceu	opendns	onedns	114dns	Samples	Weight	Weighted Samples
QP	Australia and New Zealand, Oceania	87.224%	11.299%	4.923%	1.148%	1.118%	0.813%	0.030%	0.592%	0.000%	0.004%	208,973	1	201,741
QO	Western Europe, Europe	87.221%	12.840%	6.617%	2.745%	0.672%	3.966%	2.074%	0.397%	0.002%	0.004%	1,261,908	1	1,219,101
QM	Northern Europe, Europe	85.217%	11.991%	4.805%	2.407%	0.791%	2.561%	1.616%	0.477%	0.001%	0.003%	759,844	1	733,970
QN	Southern Europe, Europe	83.928%	9.099%	8.805%	1.576%	0.575%	2.323%	1.000%	0.792%	0.000%	0.000%	841,968	1	814,109
XS	Eastern Asia, Asia	83.640%	22.890%	2.790%	1.278%	1.211%	0.302%	0.067%	0.125%	3.028%	2.464%	7,541,307	1	7,290,576
XW	Eastern Europe, Europe	78.287%	14.094%	12.547%	7.542%	0.737%	3.897%	6.805%	1.183%	0.003%	0.027%	829,212	2	1,617,767
XQ	Northern America, Americas	78.230%	17.872%	8.359%	1.513%	1.447%	3.074%	0.066%	1.072%	0.016%	0.030%	2,196,332	1	2,120,764
QS	Polynesia, Oceania	77.889%	7.047%	11.588%	8.049%	8.049%	0.626%	0.000%	1.347%	0.000%	0.000%	3,193	1	3,095
XO	Central America, Americas	77.500%	10.889%	23.046%	19.272%	19.257%	0.946%	0.014%	0.272%	0.000%	0.000%	849,750	1	821,687
QQ	Melanesia, Oceania	72.801%	1.066%	25.335%	19.313%	19.302%	2.279%	0.006%	0.398%	0.000%	0.000%	17,817	1	17,238
XL	Western Africa, Africa	70.950%	3.575%	29.745%	4.442%	2.808%	3.265%	1.634%	7.857%	0.000%	0.001%	914,900	1	898,520
XR	Central Asia, Asia	69.147%	28.397%	19.537%	17.122%	5.365%	0.112%	11.757%	0.197%	0.000%	0.001%	314,905	1	316,490
XN	Caribbean, Americas	68.018%	0.325%	30.000%	24.651%	24.618%	3.026%	0.033%	1.004%	0.000%	0.000%	135,537	1.3	169,894
XV	Western Asia, Asia	62.796%	26.365%	14.576%	2.096%	0.976%	0.608%	1.120%	0.818%	0.000%	0.001%	1,580,350	1	1,539,095
XJ	Northern Africa, Africa	61.166%	19.098%	25.326%	3.728%	2.606%	1.145%	1.122%	0.374%	0.001%	0.000%	994,778	1	969,311
XU	South-Eastern Asia, Asia	59.770%	24.477%	19.876%	16.104%	13.929%	0.670%	2.176%	0.702%	0.003%	0.010%	2,650,154	1	2,565,044
XP	South America, Americas	57.019%	34.338%	27.221%	6.470%	6.425%	3.615%	0.045%	1.425%	0.001%	0.001%	2,371,285	1	2,293,382
XK	Southern Africa, Africa	56.926%	22.658%	24.044%	14.615%	14.440%	12.819%	0.175%	0.622%	0.000%	0.006%	294,898	1	284,971
XH	Eastern Africa, Africa	56.773%	7.866%	43.851%	14.153%	13.882%	4.250%	0.271%	3.863%	0.001%	0.003%	744,362	1	734,926
QR	Micronesia, Oceania	56.086%	5.871%	55.036%	8.831%	8.831%	2.100%	0.000%	2.959%	0.000%	0.000%	2,095	1	2,025
XT	Southern Asia, Asia	55.482%	35.358%	22.373%	10.788%	6.227%	1.406%	4.561%	0.234%	0.000%	0.001%	5,516,372	1	5,423,878
XI	Middle Africa, Africa	52.563%	0.270%	46.737%	14.412%	13.448%	4.794%	0.964%	0.234%	0.000%	0.004%	220,155	1	213,238

Global North

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Global South

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# Learning from the source

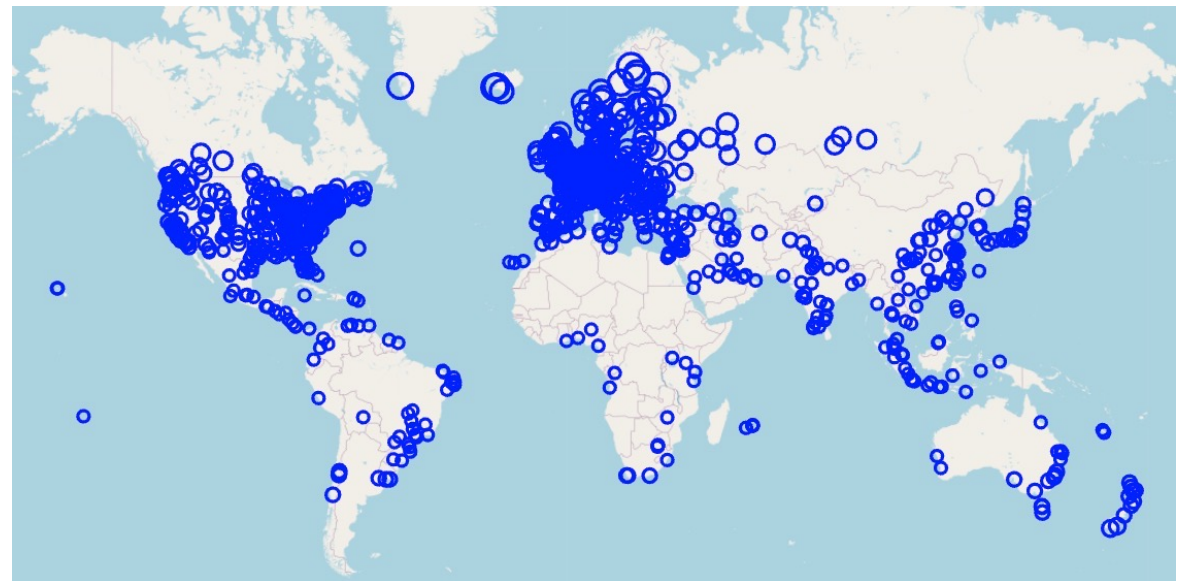
## Main points we have learned so far

- Hosting place is challenging for resolvers
- Public resolvers are beneficial
- DNS is not a priority, and lack of specialized DNS people
- Small operations ignore best practices for DNS (eg KINDNS)
- They are reactive (eg., open resolvers)
- Public resolvers are 20-80ms far away
- Target is 5ms for structured operations
- Up to now, we have talked to:
  - 35 small ISPs (10-50k users),
  - 1 medium ISP (80k users),
  - 2 universities
  - 1 academic network,
  - 1 private DNS anycast provider
  - 2 global public resolvers
- South America and Africa

Best case scenario: Worldwide cities with at least one datacenters providing hosting ( $5\text{ms} < 300\text{ km}$ )

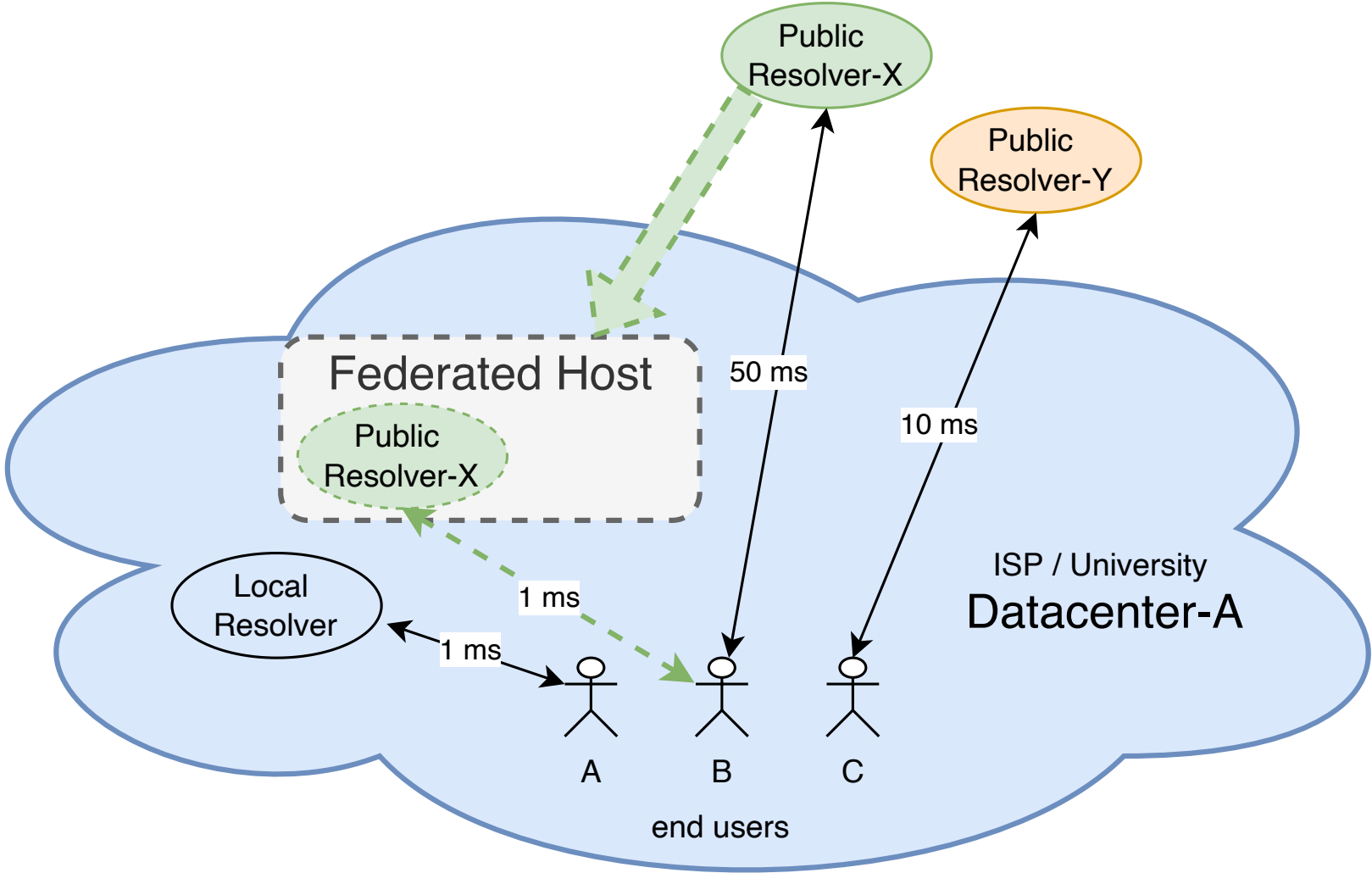


Anycast well-know instances

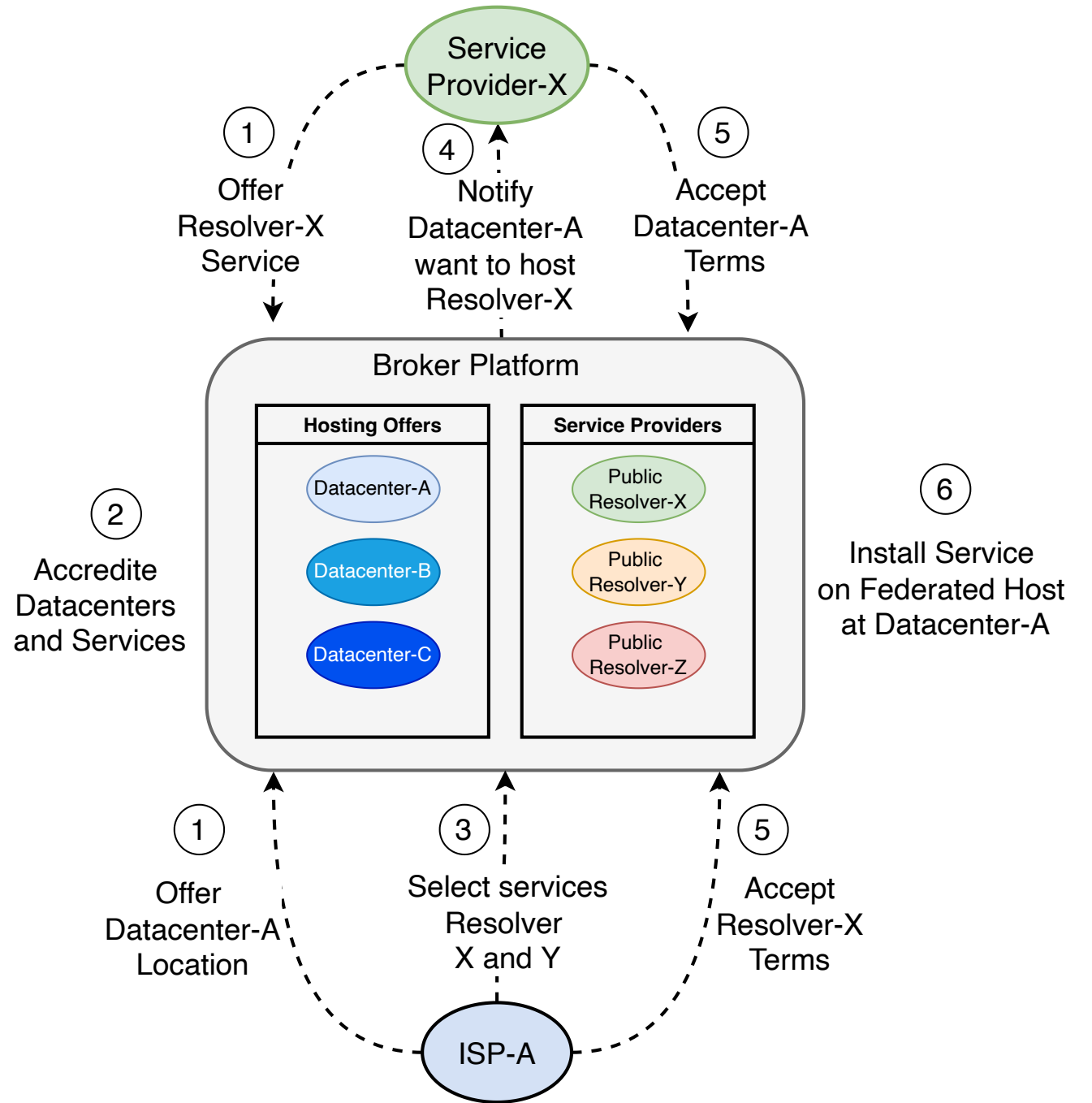


Worldwide datacenter available for hosting

# How Anycast Federation works



# How the Broker works



# Discussion and Challenges

- How to facilitate the entry of new players in the DNS market?
- How to make it attractive for hosting institutions?
- How to make attractive for DNS service providers?