



The Challenges of Using IP Address for Audience Identification and Measurement

An in-depth analysis of the accuracy of IP linkages to both email and postal addresses

November 05, 2025

Proprietary & Confidential – all results preliminary and subject to change

Truthset works closely with leading data providers to measure and improve the quality and performance of their data.



Six data providers joined this IP linkage study to:

- Gain a better understanding of the **accuracy of identity data**
- **Identify the factors** that contribute to data inaccuracy
- Determine **how to improve** the accuracy of identity data

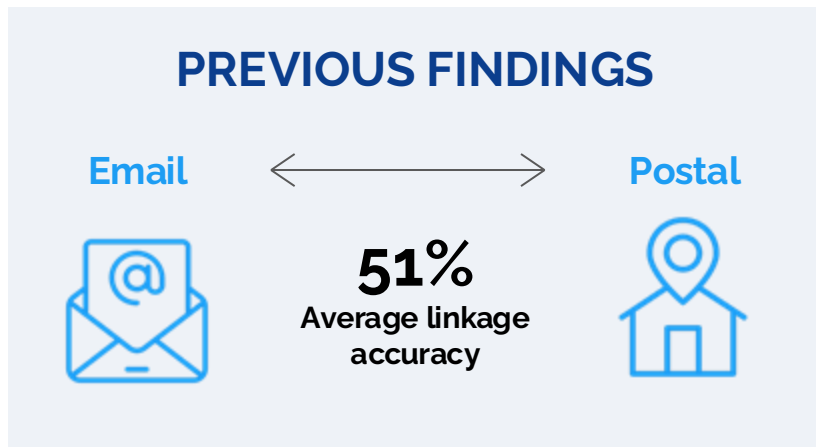
The study is meant to shed light on a critical component of CTV advertising and work toward solutions to improve the CTV industry as a whole.

Study: Assessing Identity IP-to-HH Accuracy

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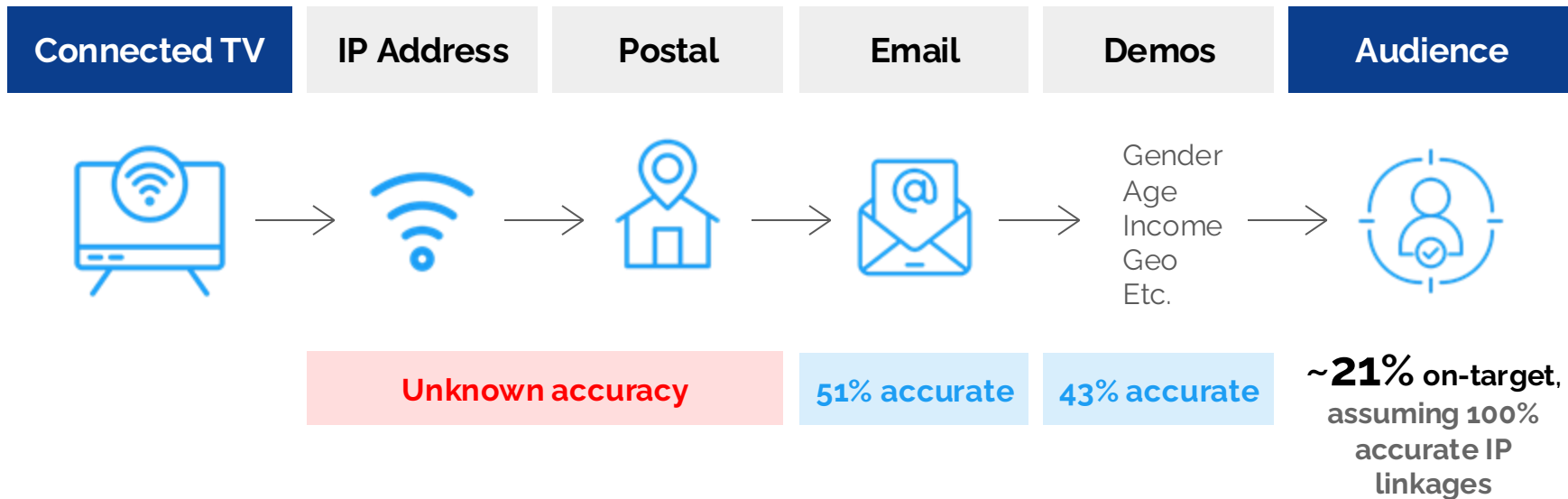
Identity graphs enable advertisers to reach and measure demographic audiences.

A 2023 study by Truthset and CIMM quantified the accuracy of email-to-postal linkages.



The Next Question for CTV: IP Linkage Accuracy

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How accurately do we connect IPs to postals and emails
to improve on-target audience reach?

Setting the Stage: Known Limitations of IP Address Data Accuracy `truth{set}`



Stale Linkages

Providers often prioritize match rate and scale over recency and accuracy



Address Changes

Consumer moves create postal and demographic mismatches



Rotating IPs

ISPs & MVPDs frequently reassign IPs for privacy, security, and limited IP pool management



Probabilistic Models

Linking based on inference reduces precision



IP Geolocation

Used to infer location from IPs, but accuracy is limited to city-level and unreliable in dense or border regions



VPN Use

Masks true household IPs by routing through remote servers; only ISPs and MVPDs can see the real household IP

1

IP-to-Postal Linkages

IP Address



HOUSEHOLD
Postal



2

IP-to-Email Linkages

IP Address



PERSON
Email





Data & Methodology



DATA PROVIDERS

Large-scale vendors of IP linkage data



ISPs & MVPDs

Authoritative ground-truth validation sets

Inference Set

All vendor linkages pooled together

- 6 Data Providers
- Focused on IPv4
- **Date range: 12/1/2024-2/28/2025**

Truth Set

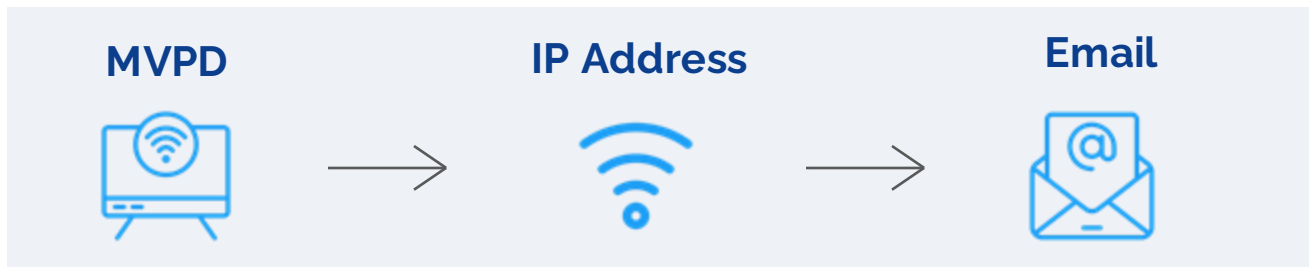
Linkages to train and test our ML models

- 2 ISPs (Internet Service Providers)
- 1 vMVPD
- Random sample of subscriber data with IPs assigned to postals and HEMs
- **Date range: 12/1/2024-2/28/2025**

Comparing Data Providers to Ground Truth

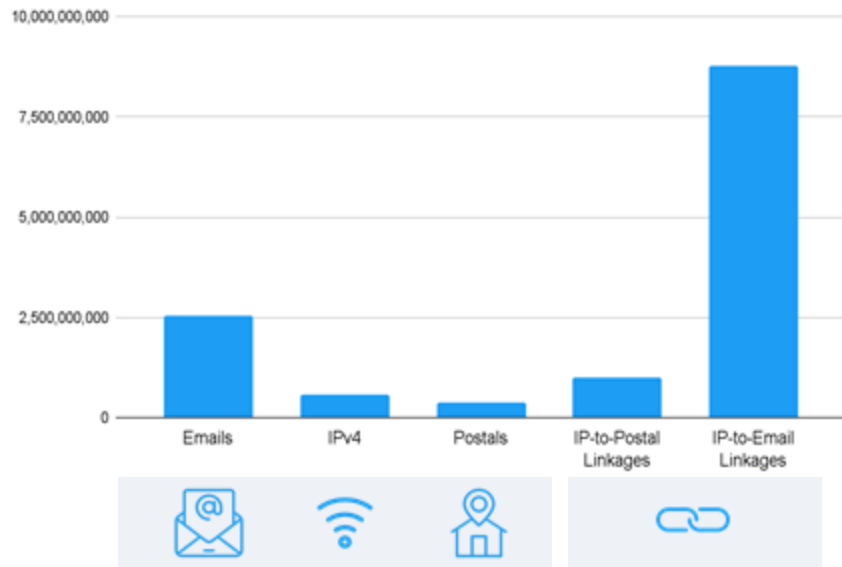
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ISPs and MVPDs know which household each router IP is assigned to. We compared provider linkages against ISP and MVPD data to measure IP-to-postal and IP-to-email accuracy.

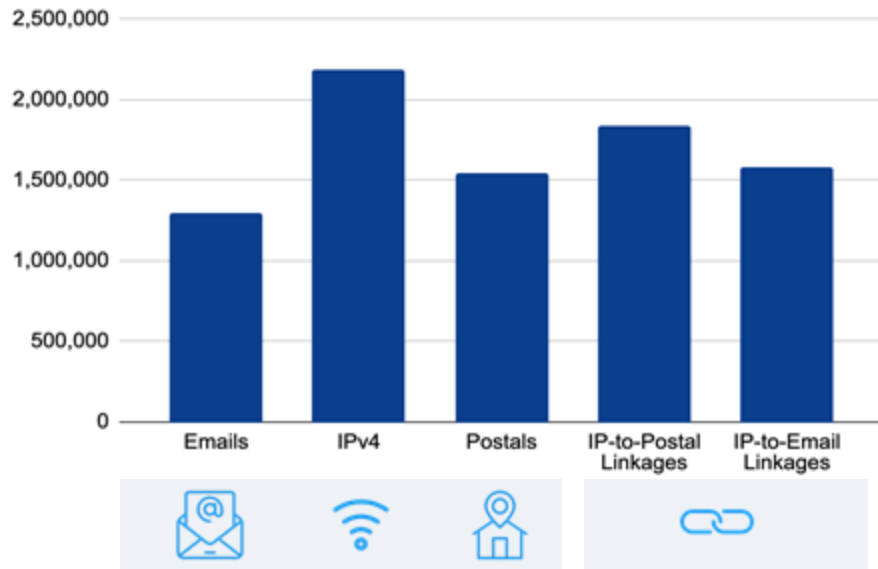


Total Scale of IDs Submitted

6 DATA PROVIDERS



2 ISPs + 1 vMPVD



Methodology Overview

Large Data Vendors

- 1B distinct email addresses
- 247M distinct IP addresses
- 164M distinct postal addresses

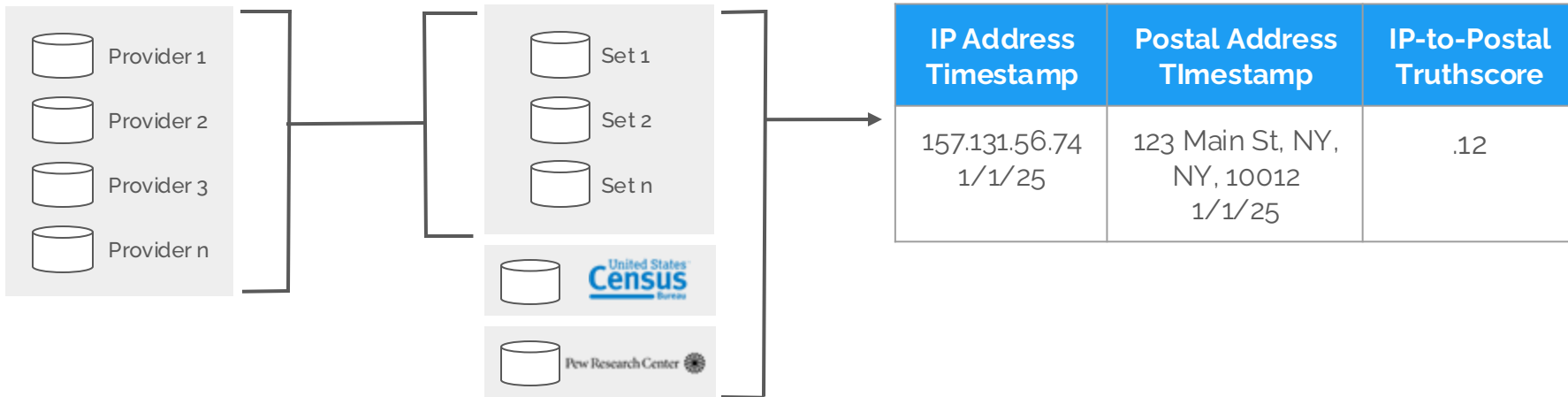
Validation Sets

- Two ISPs
- One vMVPD
- Postal addresses, IP addresses, email addresses, IP lease times

Truthscores™



- .00-1.0 accuracy scores
- 938M distinct IP-to-postal linkage pairs
- 5.6B distinct IP-to-email linkage pairs



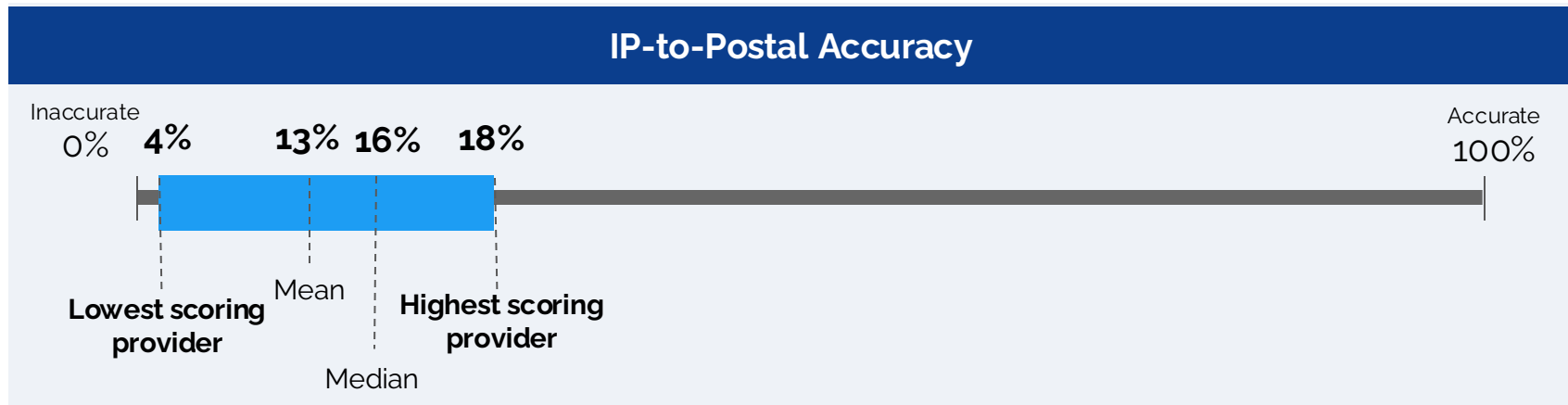


Results: IP Linkage Accuracy

Results: IP Accuracy

-  **IP-to-postal** linkages are accurate, on average, **13%** of the time
-  **IP-to-email** linkages are accurate, on average, **16%** of the time
-  Significant **variation in accuracy** exists across and within different **data providers**
-  **When** (time of year) and **where** (state-level geography) both impact IP linkage accuracy

Significant Variation Across Providers: IP-to-Postal

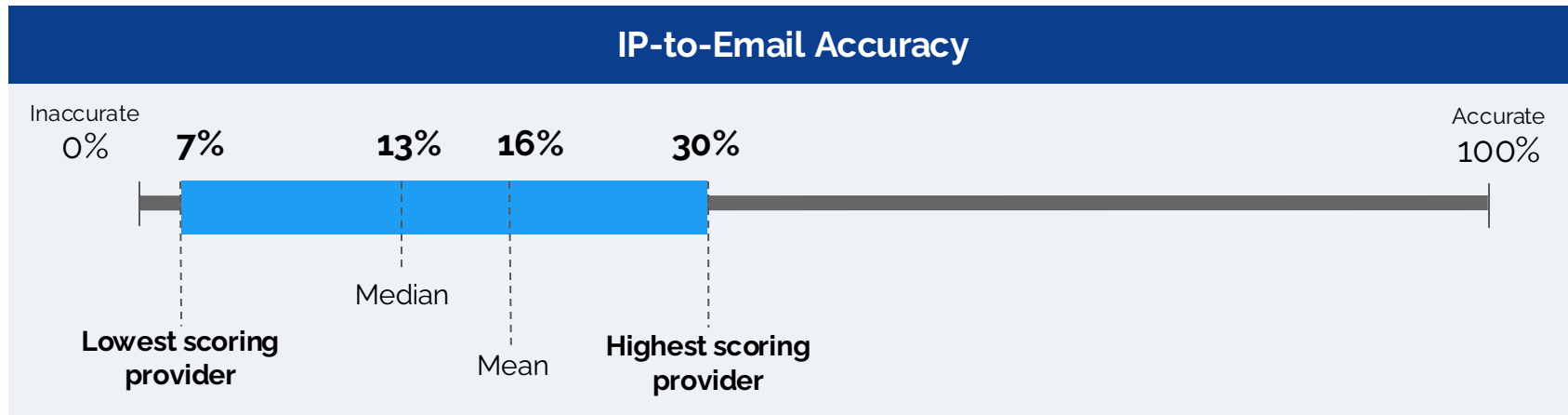


On average, across all providers, **IP-to-postal linkages are accurate only 13% of the time**

Accuracy varies by **14 percentage points across providers** — ranging from **4% to 18%**

The most **accurate provider is 4.5x more accurate** than least accurate provider

Significant Variation Across Providers: IP-to-Email



On average, **IP-to-email linkages are accurate only 16% of the time**

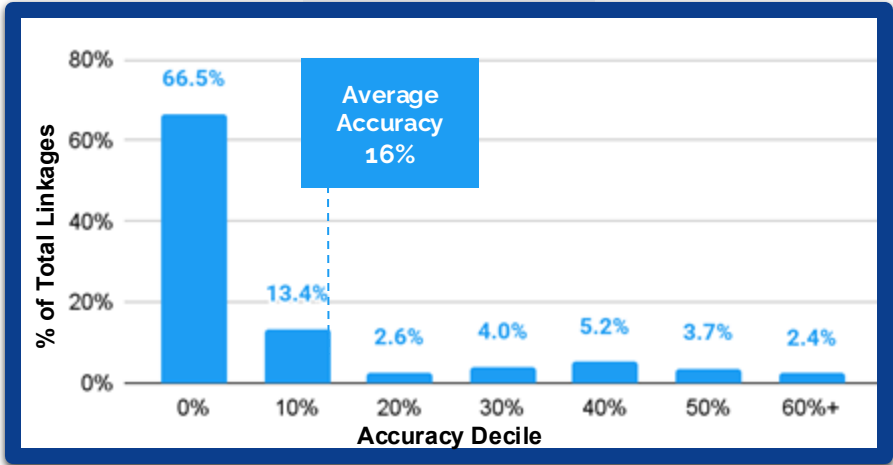
Accuracy varies widely across providers — a **23-point range** (from **7% to 30%**)

The most **accurate provider is 4.3x more accurate** than least accurate provider

IP-to-Email Accuracy Distribution

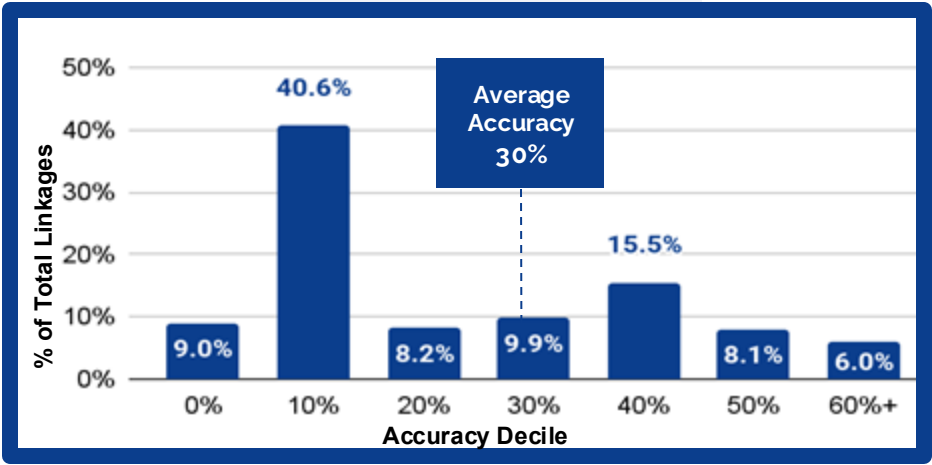
Accuracy is not uniform, even within a single provider's dataset, linkage accuracy fluctuates significantly

All Providers



Across providers, both high- and low-accuracy linkages are present, with the majority scoring below 10%

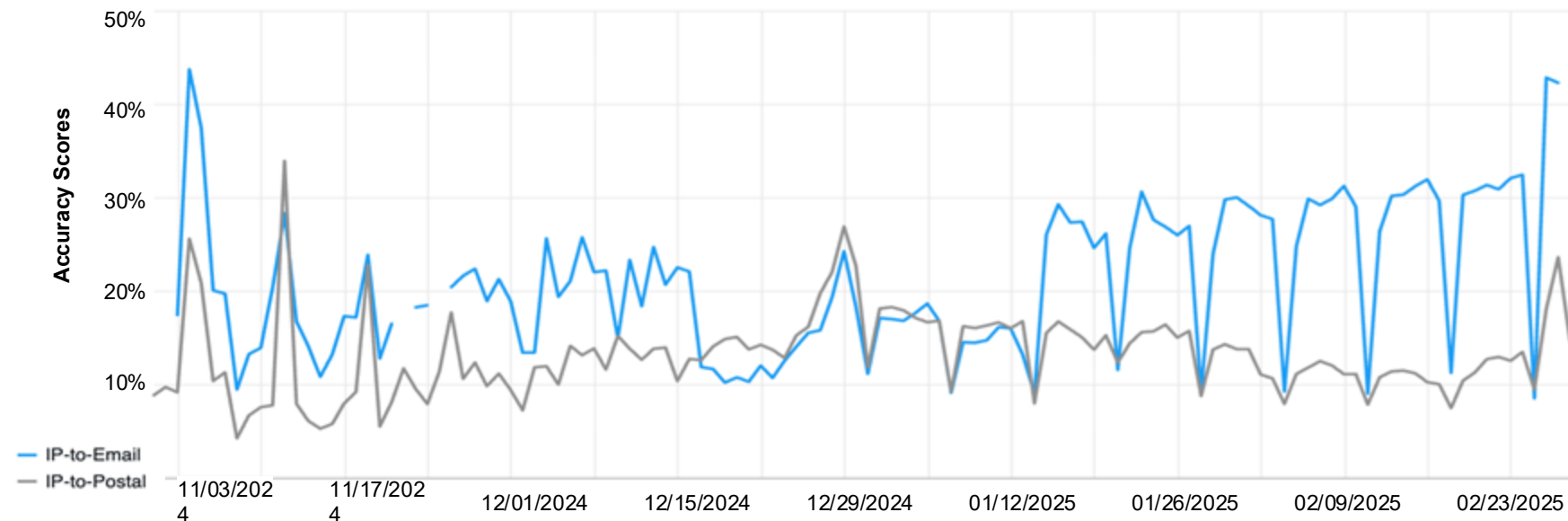
Individual Provider



The most accurate provider (30% avg.) still showed notable variation and fewer linkages falling below 10% accuracy

IP Linkage Accuracy Varies Over Time

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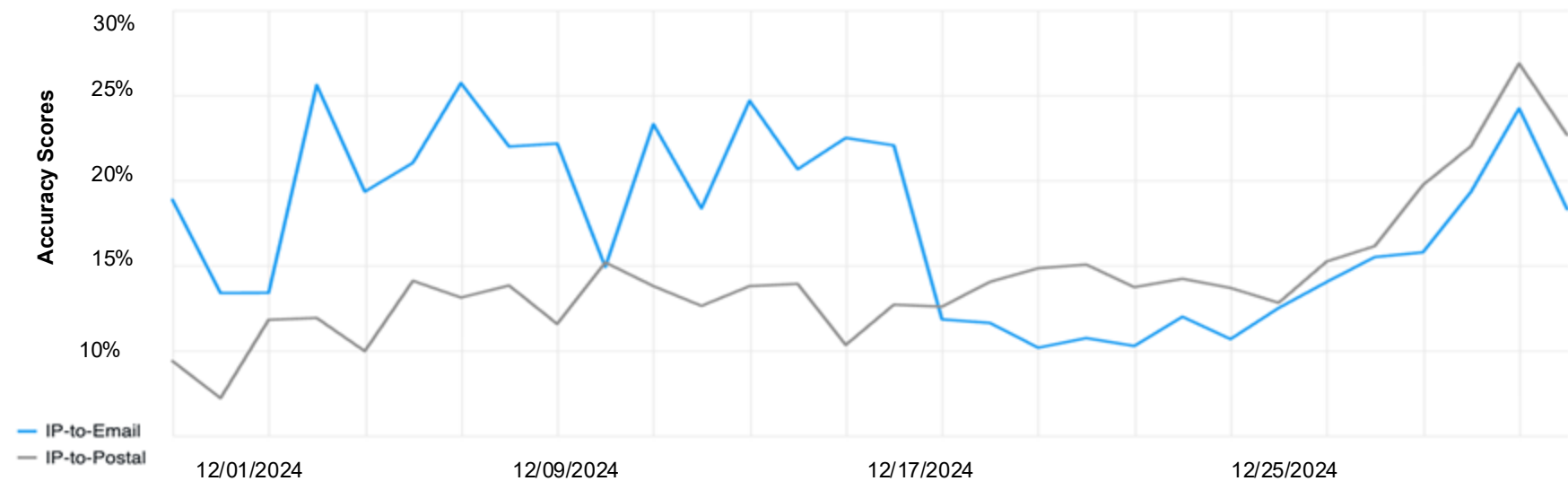
IP linkage accuracy fluctuates day to day, influenced by normal changes in network activity, address rotation, and consumer behavior

These shifts are expected but understanding and accounting for them is key

(Average accuracy measured across all providers, daily; only days with minimum 300 linkages shown)

Practical Example: IP Linkage Accuracy – 2024 Holiday Season

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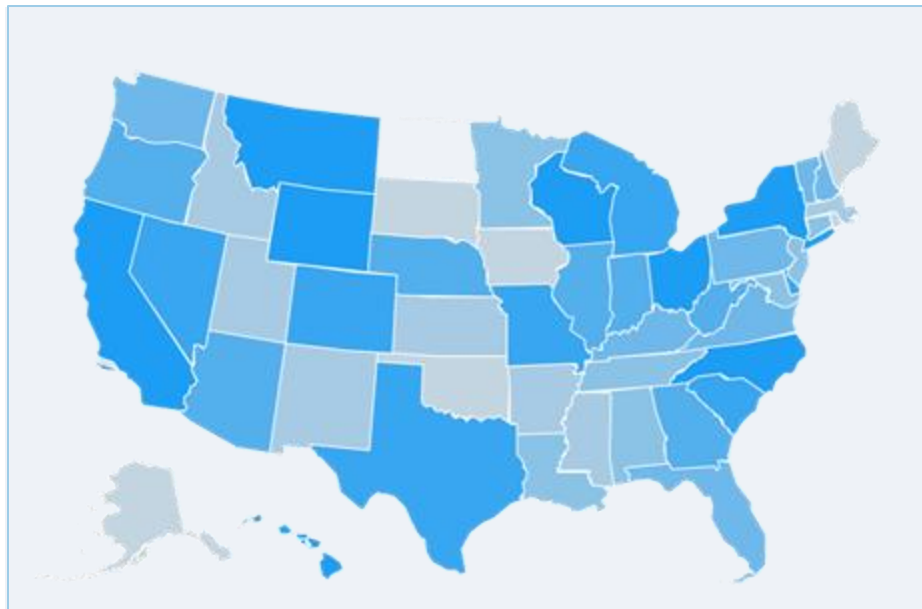
IP data accuracy fluctuates daily, and timing can make or break campaign effectiveness.

During high-demand periods like the holidays, buying data even a day apart (Dec 7 vs. Dec 8) can change who actually sees your ads.

That's why **timestamp standardization is important** – it ensures consistency and reliability in IP linkage accuracy and campaign measurement.

IP-to-Postal Accuracy Varies By State

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Less Accurate  More Accurate

IP linkage accuracy fluctuates by geographic region (US state) and ranged **from 5% to 17%**

Higher population states have marginally higher IP-to-postal linkage accuracy, on average

States with population centers close to state borders (e.g., MA, RI, CT) often show **reduced IP linkage accuracy**, as location precision decreases -- especially when IP-based geolocation technologies are used



Location Matters: where your audience is located matters if you're trying to find them via IP address



Key Findings & Implications



There are **3x more IPs-per-postal** than there should be



Providers agree only **6.4% of the time** on IP-to-postal linkages; 2.8% of the time on IP-to-email linkages



IPv6s are **under-represented by 72%** in large datasets



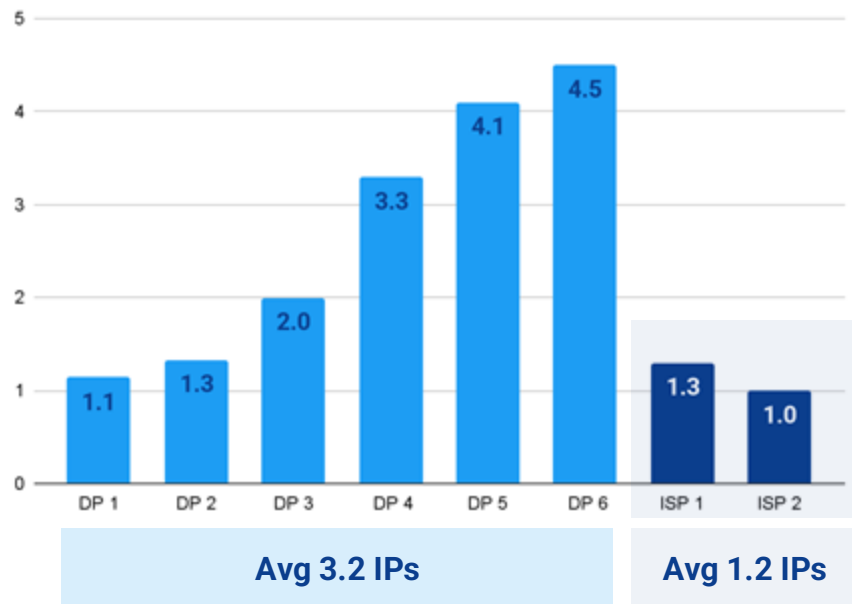
IP timestamp reporting is **wildly inconsistent across providers**

There Are Too Many IPs per Postal

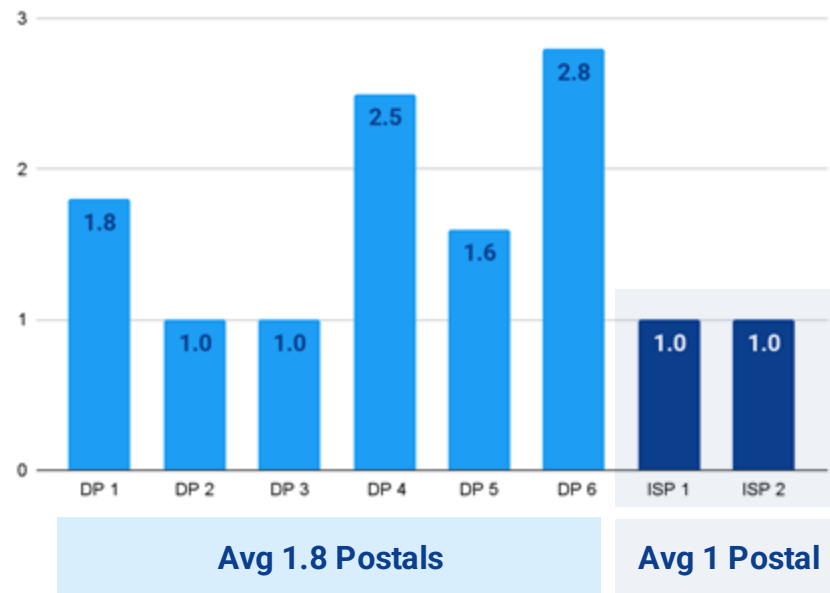
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DATA PROVIDERS vs. ISPs

IPs per Postal

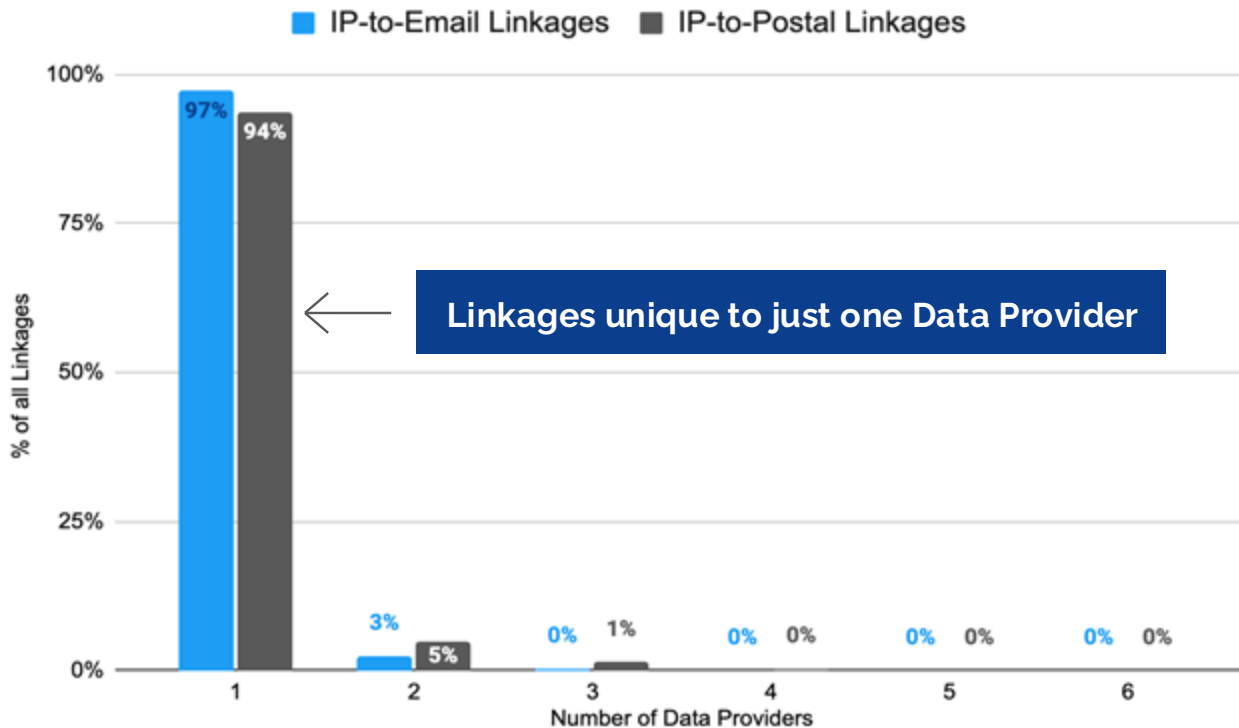


Postals per IP



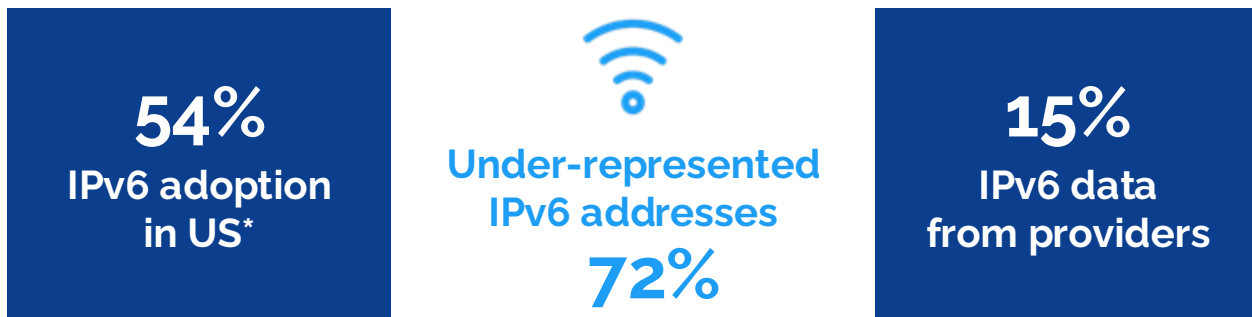
Data Providers Rarely See the Same Linkages

Most IP-to-postal and IP-to-email linkages are unique to one data provider, showing little overlap and wide methodological variation.



Most IPv6 Addresses Are Missing

Some data providers do not see the latest IP address version, IPv6.

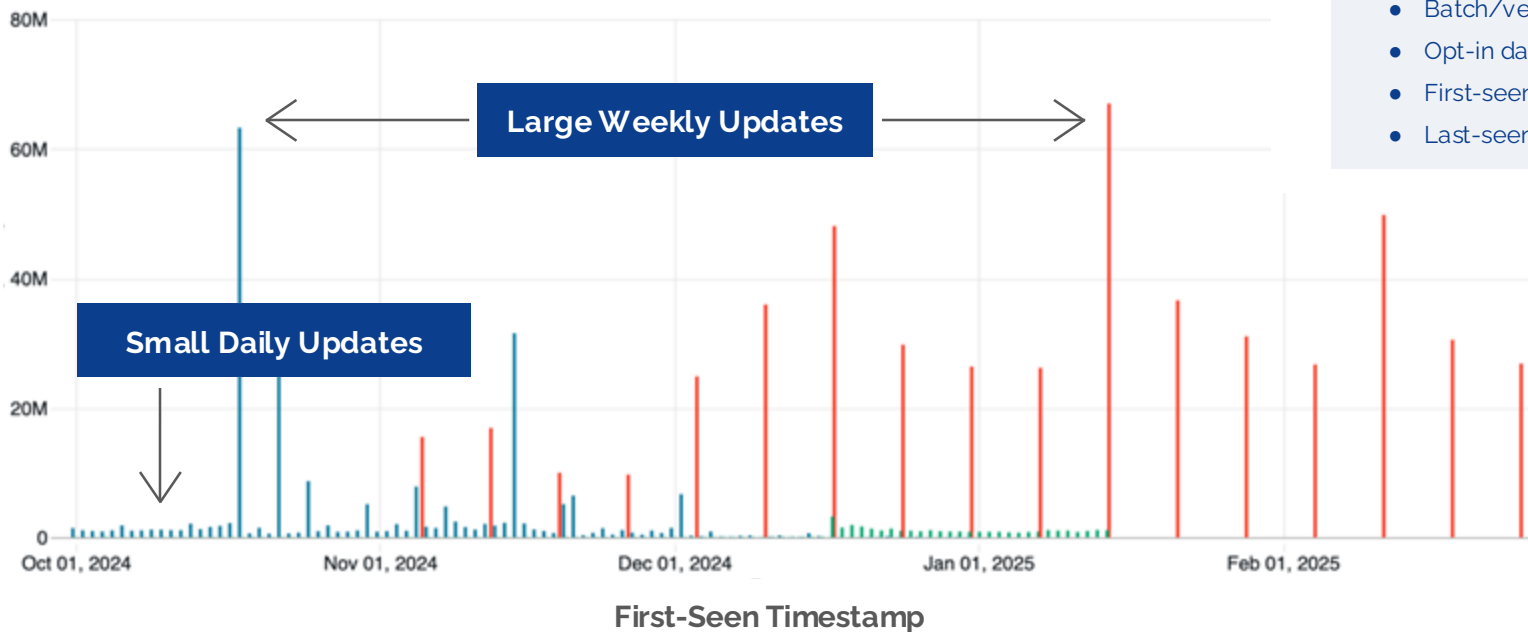


IPv6 addresses range from **0-32%** of different data provider files.

* **Source:** Google, "Per Country IPv6 adoption", [link](#), accessed on 10.21.25

Timestamp Assignments Are Inconsistent

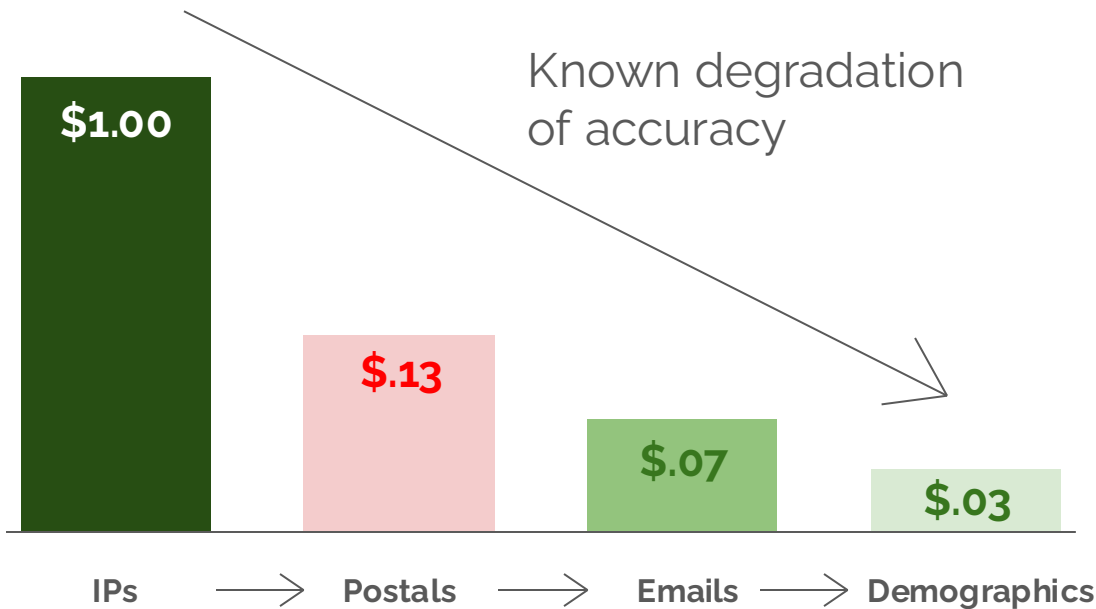
Lack of standardization in what “timestamp” means and how often they are updated.



\$.03 of every dollar reaches the intended audience

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Media
Investment



On-Target
Audience



IMPLICATIONS

IP Address is an Unreliable ID for Targeting & Measurement

- With 13-16% average linkage accuracy, most audiences built on IP data will be wrong
- This impacts any system that relies on IP-to-postal or IP-to-email mappings to build or measure digital audiences

Take Control of Data Quality: It Matters

- Develop a POV on data accuracy and understand how it impacts your business
- Select partners carefully. The most accurate provider measured was 4.5x better than the least
- Prioritize sources such as MVPDs with deterministic IP linkage data that will perform better

OPPORTUNITIES

Test the Impact of IP Data Accuracy

- Conduct real-world tests to measure how IP data accuracy affects campaign and business outcomes
- Quantify the financial impact of accurate vs. inaccurate IP linkages on media performance and ROI
- Partner with CIMM to design the framework and recruit participants across the ecosystem

Develop a Collaborative IP Validation Product

- Truthset to assess the feasibility of a collaborative IP validation asset – an independent, privacy-safe source of truth
- The asset would serve as an industry benchmark for validating IP linkages and improving IP-driven advertising accuracy

Why Has Accuracy Been Overlooked?

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The market has long **prioritized scale and price over accuracy**, since they're the easiest metrics to measure and sell.



Measuring accuracy is difficult, as few enterprises have verified 1P IP-to-household mappings.



Without standard benchmarks, **vendors are trusted by default**, not by proven accuracy.



Campaign performance is the proxy for data quality, masking upstream accuracy issues.



Too many variables affect campaign results, making it hard to **see data quality as the root issue**, so teams have **optimized around inaccuracies** instead of **fixing flawed data**.



Even **post-campaign measurement depends on IP linkages**, further obscuring data accuracy problems.

cimm go addressable
Coalition for Internet Marketing Measurement

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Thank You





Appendix



Validating the Validation Sets

Data Provided:

- ISPs and MVPDs provided (simple) random samples of data – not their full subscriber footprints.
- Data vendors supplied their entire identity graphs for Truthset's analysis.

To confirm the ISP/MVPD samples were truly random, we:

- Compared their geographic distribution to public data on each ISP's active states.
- Analyzed household demographics and postals to check for population skew.
- Evaluated all data vendors against each validation set individually and against a combined ISP + MVPD validation set.

Result:

- Accuracy results were consistent across all validation methods, confirming the reliability of the sampling process.

A Practical Example: IP Address Inaccuracy

A typical household has only 1-2 IPs for an address in a 90-day timeframe. But for a known person, we saw 11 IPs in the study time range.

9 out of 11 IPs for this *actual* household are wrong.

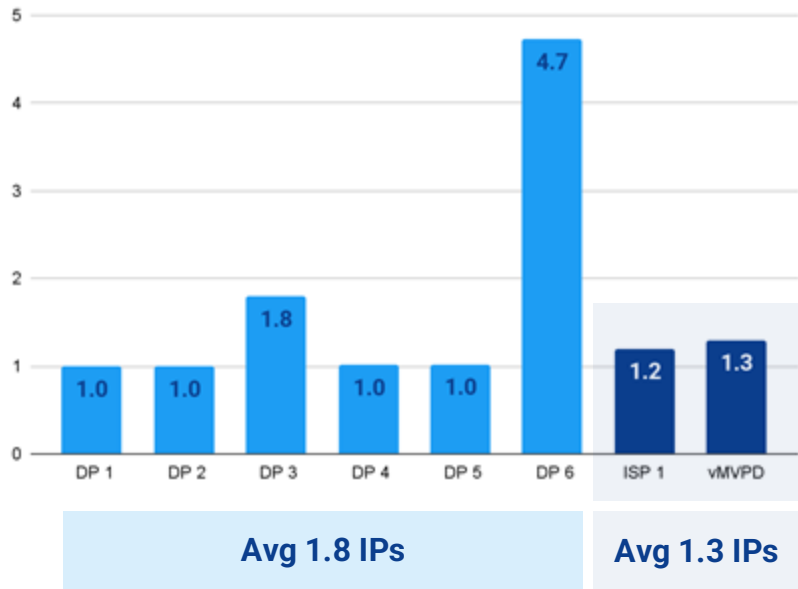
You're spending money targeting all these IPs, and most of them are wrong.

		
Postal	Timestamp	IPv4
123 Main St., Menlo Park, CA	2024-11-19	107.139.35.203
123 Main St., Menlo Park, CA	2024-12-17	24.4.197.6
123 Main St., Menlo Park, CA	2025-02-04	204.63.225.171
123 Main St., Menlo Park, CA	2025-03-11	198.199.98.29
123 Main St., Menlo Park, CA	2025-01-14	204.63.227.85
123 Main St., Menlo Park, CA	2025-02-11	204.63.227.130
123 Main St., Menlo Park, CA	2024-12-24	204.63.225.9
123 Main St., Menlo Park, CA	2024-12-10	204.63.225.159
123 Main St., Menlo Park, CA	2024-12-31	24.5.145.234
123 Main St., Menlo Park, CA	2025-02-25	204.63.225.242
123 Main St., Menlo Park, CA	2025-01-07	204.63.225.200

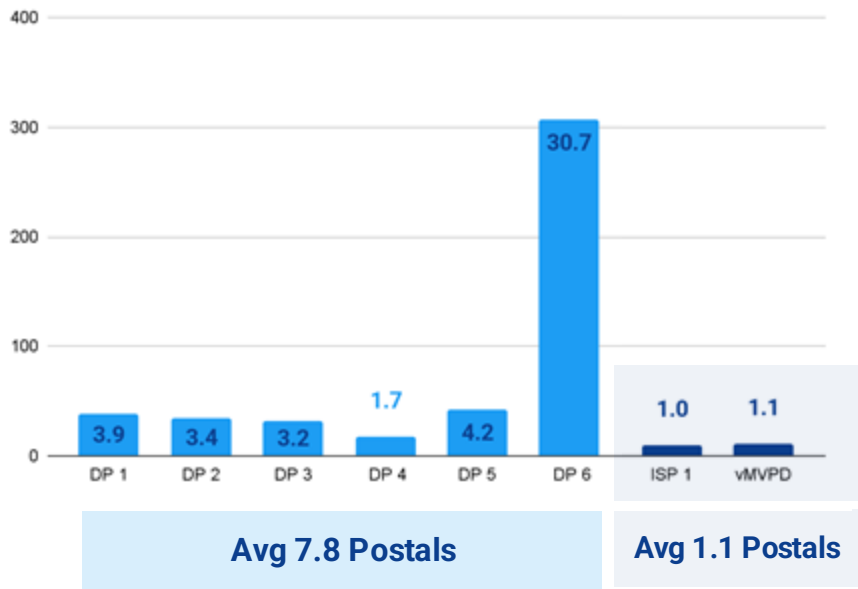
IPs per Email vs. Emails per IP

DATA PROVIDERS vs. ISPs

IPs per Email



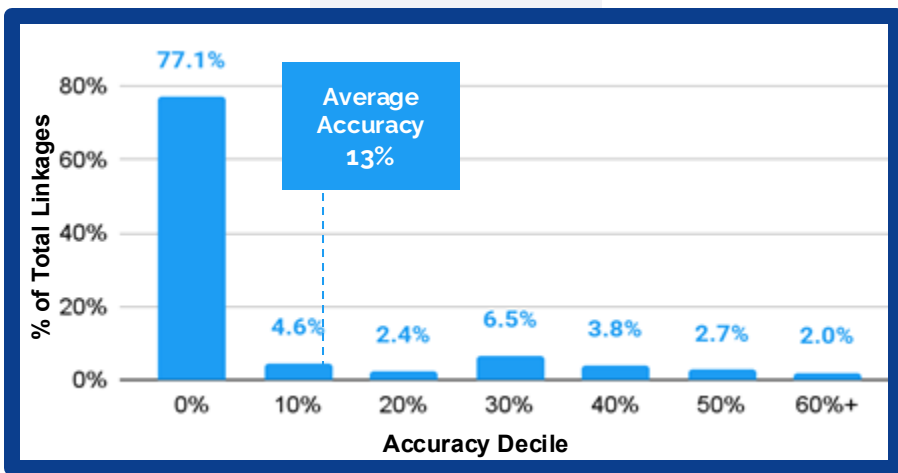
Emails per IP



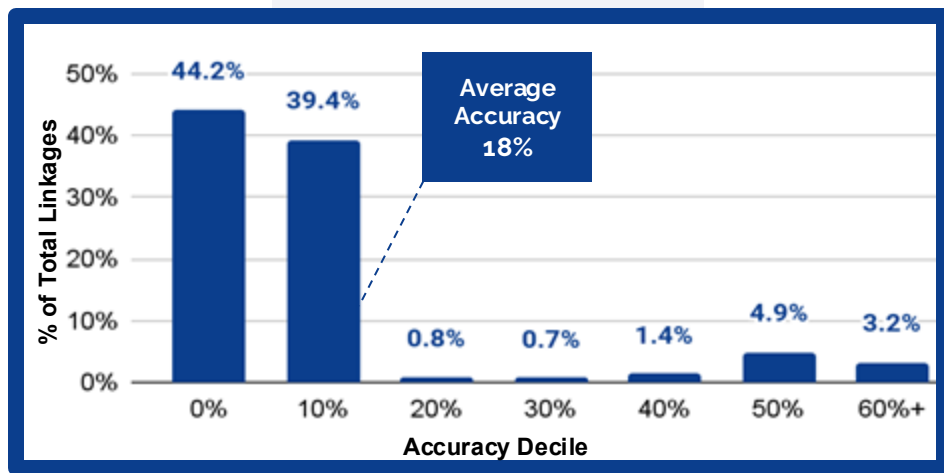
IP-to-Postal Accuracy Distribution

Accuracy varies widely – across providers and within individual datasets

All Providers



Individual Provider



Across all providers, most IP-to-postal linkages are concentrated in the lowest accuracy deciles – **77% score under 10% accuracy**.

Average accuracy across all providers is **13%**, highlighting broad inconsistency.

When isolating a single provider, we still see **significant variation** across deciles – even with a higher **average accuracy of 18%**.