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Cross-Device Methodologies: Deterministic vs. Probabilistic

Overview

"Cross-device" refers to the various device graphs meant to join fragmented device-based customer data. Across the leaders in this industry, there are two methodologies used to resolve devices to individuals, each with fundamentally different goals and use cases: **Deterministic** and **Probabilistic**.

This document
- provides a summary of each technology's methodology
- describes use cases appropriate for each
- helps you identify which methodology a vendor is using

1. Deterministic

Goal: Tie all marketing data to a consistent, people-based ID, which enables accurate tracking and control of customer engagement over time. This is similar to what Google and Facebook leverage with massive amounts of authenticated user traffic.

Methodology: Deterministic methodologies create device relationships by joining devices using PII (personally identifiable information: email, name and postal, phone), attempting to create a long-term, accurate view of an individual's behavior.

Devices are only linked when they can confidently be tied to an individual, prioritizing accuracy and limiting false positives. This enables people-based use cases that are usually only available to platforms with huge amounts of cross-device authenticated traffic (e.g. Google, Facebook).

> Measured against a panel of ~12 million verified devices and individuals, LiveRamp's graph was tested by comScore to have an industry leading 95%-98.9% precision (depending on quality of sample data).

Advantages:
- Limits false positives
- Makes Identity available without high volumes of authenticated traffic
- Accurate, suitable for measurement and precise targeting

- Data tracked over time
  - Device data is stored on a consistent ID representing an individual; new device data is matched to old device data via people-based matching, building a historic view of the customer journey
- Can accurately align with offline customer records

Disadvantages
- Relatively fewer cross-device relationships
- Higher complexity

2. Probabilistic

Goal: Create device groupings with high numbers of linkages, enabling high cross-device reach use cases with relatively more false positives. This is dissimilar to what Google and Facebook offer, as it does not primarily rely on authenticated user traffic.

Methodology: Most probabilistic vendors use a deterministic base as the foundation for their graph. From there, devices are tied to terminal device groups, representing a collection of devices matched together implicitly via device fingerprinting and IP matching; data is run through statistical modeling at a given confidence level.

Since deterministic accuracy is traded for a high volume of linkages in probabilistic matching, these graphs are not suitable for use cases requiring people-based data. Instead, they're useful when the goal is to target a large number of devices that have some chance of belonging to a single individual.
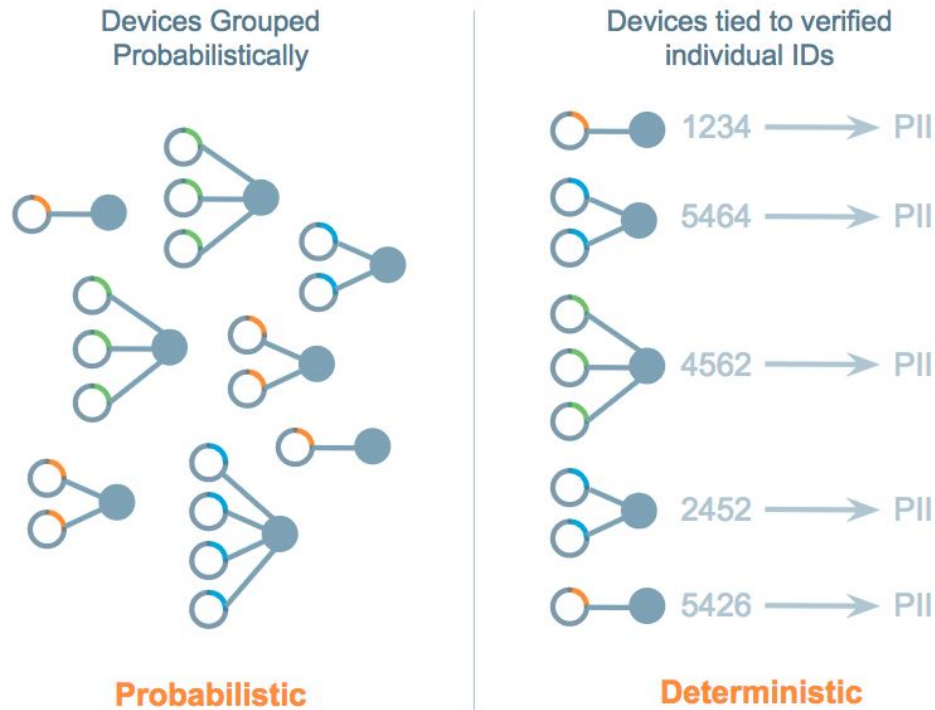
Advantages:
- High number of cross-device relationships
- Greater targeting reach
- Lower complexity

Disadvantages
- Higher number of false positives
- Does not provide people-based data
- Less accurate measurement and targeting
- Data lost over time

- - Device data is stored on device groups; device groups are created to store implicit device relationships and do not represent an individual, so an individual's new and old device data may not be joined or stored over time
- Does not accurately align with offline customer records

Devices Grouped Probabilistically

Devices tied to verified individual IDs

1234 → PII
5464 → PII
4562 → PII
2452 → PII
5426 → PII

Probabilistic

Deterministic

How to Choose

Deterministic and probabilistic are suited for different use cases and goals. Marketers and platforms may find themselves using both for different campaigns or aspects of their product offering.

Deterministic Use Cases	Probabilistic Use Cases
Exclusively targeting intended audience	High reach mass messaging
Deterministic targeting (like Google and Facebook) without mass authenticated traffic	Targeting based off a probability of reaching the intended audience

Offline to online matching	Generalized measurement with higher sample sizes
Sequential messaging	
Exposure capping	
Closed-loop measurement	
Suppression based on offline sales	

Marketer Demand

Marketer demand is generally moving toward deterministic use cases.

- 92% of Media Planners in North America are increasing their people-based advertising buys this year
- 1 in 4 Media Planners reported people-based advertising comprises more than half of their digital spend
- 7 in 10 North American advertisers are buying people-based ad already
- 83% of advertisers report that people-based ads outperform traditional digital media.
- Companies like Google and Facebook have capitalized on people-based marketing budgets. They have a tremendous amount of logged in users making it easy for them to deliver people-based marketing solutions at scale to brand advertisers

Determining What a Vendor is Using

It can be difficult to determine from marketing language what methodology a device graph is using. Ask these questions to make sure your vendor is using practices that are in line with your goals and use cases:

- What data is used to join devices?
    - Deterministic:
        - PII: email, name and postal, phone
        - Devices only joined on explicitly observed PII
    - Probabilistic:
        - Deterministic foundation, with scale achieved via statistical modeling

■ IP address, device fingerprinting

- How is data maintained over time?
  - Deterministic:
    - Consistent IDs: old and new devices matched to individuals
  - Probabilistic:
    - Terminal device groups: an individual's new device may not be tied to the same group as their old device

- How many devices are tied to each person / group?
  - Deterministic:
    - Usually a handful of cookies and mobile devices, matching to an individual
  - Probabilistic:
    - Groupings with as many as 50 devices

Next Steps and More Resources

Reach out to LiveRamp at info@liveramp.com for more information about enabling Identity in your platform or marketing stack.

Get more information about Identity and Cross-Device options and evaluation from DMA and IAB.