
unplugged

# Mobile Device Assessment

August 22, 2025

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Table 1: Points of Contact

**Raxis LLC**

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# Engagement Scope Overview

## Rules of Engagement and Assumptions

- Testing to occur during normal business hours.
- No Denial of Service (DoS) attacks.

## Accounts

- No accounts were provided.

## Scope Targets

- See Appendix B: Scope Targets.

# Executive Summary

Raxis conducted a mobile device assessment to assess third-party tracking connections of Unplugged's UP Phone device against a Google Pixel 9a with GrapheneOS installed from August 21st through August 22nd, 2025. This test was designed to provide Unplugged with an independent, point-in-time, assessment of third-party tracker calls from mobile applications and network telemetry from each device.

Raxis conducted two stand-alone tests of GrapheneOS and compared the results with that from the previous assessment. The first test was the default install for GrapheneOS. The second test was GrapheneOS with GMS sandboxed. Raxis performed packet captures on the device and used custom scripts to examine all captured packets to assess third-party tracker connections against a list of 223,218 known third-party tracking domains, including wildcard domains. Raxis installed and tested 33 mobile applications to the device and interacted with each app for approximately two-minutes while performing packet captures from the device.

Raxis found that GrapheneOS with the default installation performed 1,209 DNS requests to third-party tracking domains and sent and received a total of 156,554 packets to the trackers during testing. Raxis also found that seven of the tested apps either crashed or wouldn't load during testing. Two tested apps performed slowly or did not function as intended.

Raxis found that GrapheneOS with GMS sandboxed performed 2,073 DNS requests to third-party tracking domains and sent and received a total of 273,916 packets to the trackers during testing. Raxis found that one app would not install from the Play store and had to be sideloaded for testing. Raxis also found that one other app crashed and would not load during testing.

Based on the testing performed by Raxis, the overall risk to Unplugged's UP Phone is "Low."

## Assessment Objectives

- Document and demonstrate likely attack vectors.
- Quantify the impact of successful attacks through active exploitation.
- Identify specific vulnerabilities that can be remediated to improve security.
- Recommend ways to improve Unplugged's overall security posture.

## Risk Summary

The following chart provides a summary of Unplugged's risk ratings:

| CRITICAL | SEVERE | MODERATE | LOW |
|---|---|---|---|
| 0 | 0 | 0 | 0 |

Table 2: Risk Summary

Unplugged's overall risk rating is:


Risk ratings are based on the vulnerabilities and technical risks observed during this assessment, including:

- The ease with which attacks can be executed.
- The impact of the executed attacks on information security.
- The organization's ability to detect and react to executed attacks.
- A comparison of Unplugged's security posture against other organizations of similar size.

While organizations may not be able to fully remediate all findings because of circumstances beyond their control, Raxis recommends that action be taken to secure all vulnerable systems and services.

- Fully remediate the finding using the steps in this report or other solutions.
- Remove the vulnerable system or software and replace with secure alternatives.
- Mitigate the risk by implementing other protections to segment or block exploitation of the finding.
- Purchase insurance to protect the organization in the event the risk is exploited.

## Positive Observations

This table notes positive findings discovered during testing, including controls that correctly restricted testing activities.

| # | Finding | Positive Finding Description |
|---|---|---|
| 1 | DNS Lookups | Raxis found that the UP Phone did not perform any DNS lookups to sites on the provided blocklist. |
| 2 | TCP Connections | Raxis found that the UP Phone did not connect to any trackers on the provided blocklist. |
| | | |

Table 3: Positive Observations

# Engagement Storyboard

This section explains the steps that Raxis performed during the device assessment.

## Testing Methodology

Unplugged provided Raxis with a newly purchased, unopened Google Pixel 9a to test GrapheneOS with the default installation and another test with GMS Sandboxed. Raxis deployed an isolated network for testing with a dedicated ISP, firewall, network switch, wireless access point, and a computer to capture all traffic during the assessment. Raxis loaded GrapheneOS on the device and ensured all updates were installed. Raxis installed 33 scoped mobile applications across the devices for testing and performed actions within each application for approximately two minutes each.

Raxis connected the wireless access point and computer to the same switch. Raxis then configured a port mirror to mirror all traffic from the wireless access point to the computer for packet captures, as shown in Figure 1:


Figure 1: Port Mirror

Raxis ensured only the testing device was connected to the network during testing to isolate traffic from the provided phone. Raxis used Wireshark on the connected computer to capture all traffic from the phones and wireless access point. Figure 2 shows the captures for the Pixel 9a:

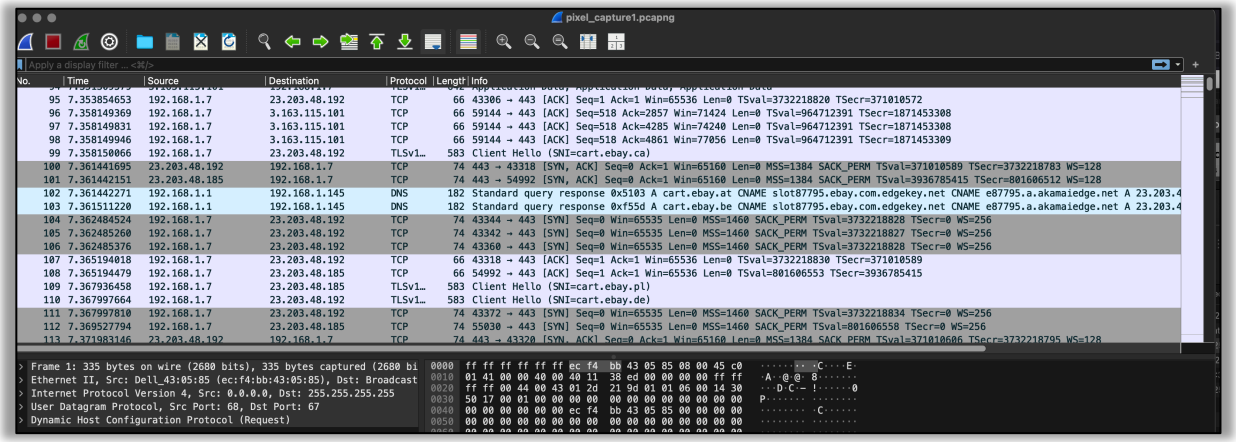


Figure 2: Packet Capture

Next, Raxis loaded and interacted with the scoped mobile applications for approximately two-minutes before moving to the next mobile application. Figure 3 shows Raxis interacting with DuoLingo:


Figure 3: DuoLingo

Raxis used custom python scripts to extract and analyze captured data. Raxis first extracted all DNS requests from the packet captures, as shown in Figure 4:

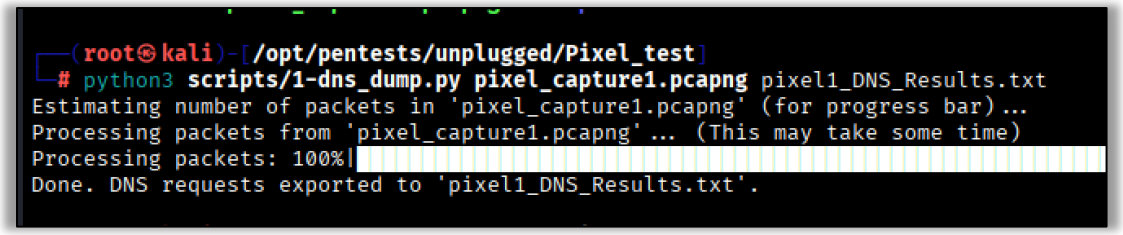


Figure 4: DNS Dump

Raxis then compared the dumped DNS records and matched those to hostnames in the provided blocklist, as shown in Figure 5:

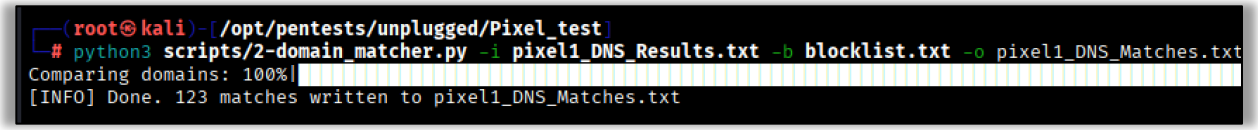


Figure 5: Domain Matcher Script

Raxis then used the results from the matched DNS domains to determine IP addresses associated to tracker A records from the capture files, as shown in Figure 6:

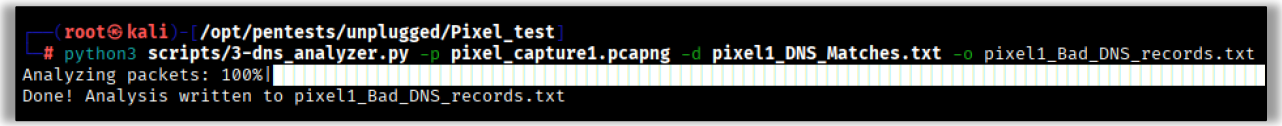


Figure 6: IP Address Information

Raxis then performed a total count on how many times a tracker A record was queried, as shown in Figure 7:

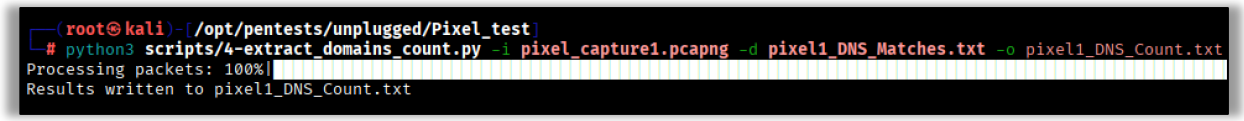


Figure 7: Tracker A Record Count

Raxis then used the output from the "DNS_analyzer" script and created a list of all third-party tracker IP addresses, as shown in Figure 8:

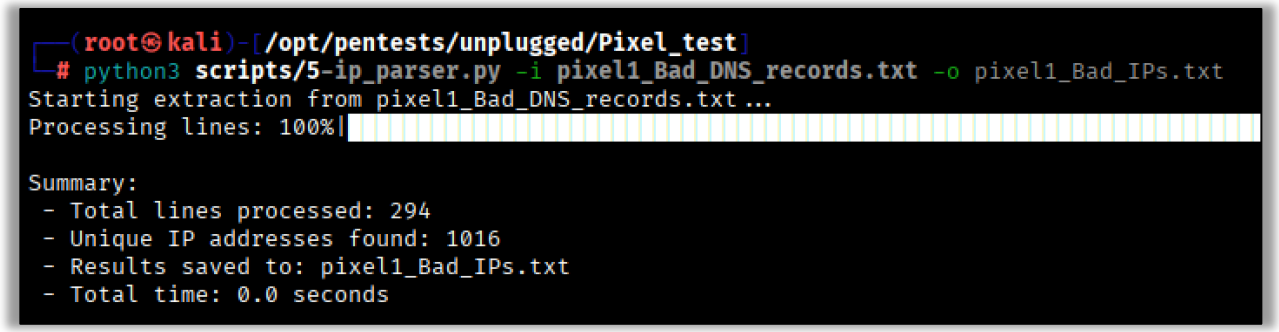


Figure 8: IP Parser

Lastly, Raxis used the list of third-party tracker IP addresses and the packet capture files to determine the total number of times the IPs were the source or destination and the total number of packets sent and received, as shown in Figure 9:

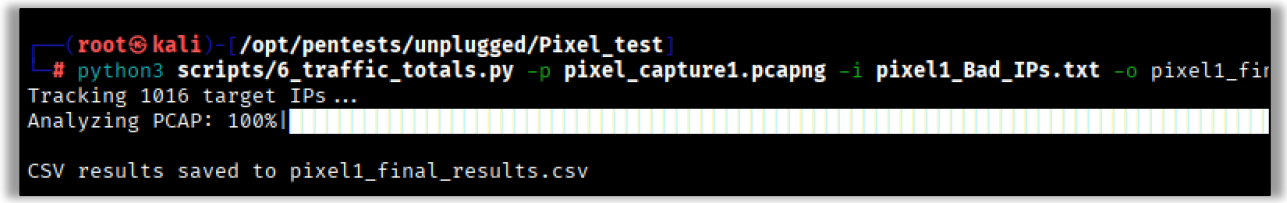


Figure 9: Total Traffic Count Script

## Assessment Results

Raxis used a list of 223,218 provided third-party tracker domains to correlate results from the packet captures for the tested device. Raxis found that GrapheneOS with the default installation performed 1,209 DNS requests to third-party tracking domains and sent and received a total of 156,554 packets to the trackers during the testing window. Raxis found that GrapheneOS with GMS sandboxed performed 2,073 DNS requests to third-party tracking domains and sent and received a total of 273,916 packets to the trackers during testing.

Figure 10 shows an excerpt from the DNS lookups discovered during testing for the GrapheneOS with the default installation:

| | Domain | DNS Query Count |
|---|---|---|
| 2 | otpi0g-dlsdk.appsflyersdk.com | 2 |
| 3 | h64.online-metrix.net | 4 |
| 4 | jarlio-conversions.appsflyersdk.com | 2 |
| 5 | ups.analytics.yahoo.com | 2 |
| 6 | ct.pinterest.com | 2 |
| 7 | pagead2.googlesyndication.com | 14 |
| 8 | firebaselogging.googleapis.com | 24 |
| 9 | tpc.googlesyndication.com | 20 |
| 10 | ae.iads.unity3d.com | 4 |
| 11 | cds.taboola.com | 2 |
| 12 | cdn-settings.appsflyersdk.com | 2 |
| 13 | nativesdks.mparticle.com | 6 |
| 14 | sb.scorecardresearch.com | 20 |
| 15 | 29773.v.fwmrm.net | 2 |
| 16 | trackdownload.startappservice.com | 2 |
| 17 | pacc6p-cdn-settings.appsflyersdk.com | 2 |
| 18 | 32200.content.swrve.com | 2 |
| 19 | o13855.ingest.sentry.io | 2 |
| 20 | sdk.iad-01.braze.com | 6 |
| 21 | zugkc4.launches.appsflyersdk.com | 2 |
| 22 | cm.g.doubleclick.net | 4 |
| 23 | otpi0g-conversions.appsflyersdk.com | 2 |

Figure 10: DNS Results

Figure 11 shows an excerpt from the total connection count from the Pixel running GrapheneOS with GMS sandboxed to third-party tracker resolved IP addresses:

| 1 | Target IP | As Source | As Destinati | Total |
|---|---|---|---|---|
| 1559 | 98.82.156.20 | 10 | 13 | 23 |
| 1560 | 98.82.157.13 | 18 | 25 | 43 |
| 1561 | 98.82.158.24 | 9 | 13 | 22 |
| 1562 | 98.82.98.111 | 0 | 0 | 0 |
| 1563 | 98.83.226.21 | 0 | 0 | 0 |
| 1564 | 98.84.227.22 | 0 | 0 | 0 |
| 1565 | 98.84.66.252 | 8 | 10 | 18 |
| 1566 | 98.85.137.12 | 33 | 38 | 71 |
| 1567 | 98.85.155.10 | 14 | 15 | 29 |
| 1568 | 98.85.196.47 | 0 | 0 | 0 |
| 1569 | 98.85.72.33 | 0 | 0 | 0 |
| 1570 | 98.87.111.6 | 0 | 0 | 0 |
| 1571 | 98.87.128.35 | 0 | 0 | 0 |
| 1572 | 99.28.14.242 | 0 | 0 | 0 |
| 1573 | 99.83.154.14 | 0 | 0 | 0 |
| 1574 | 99.83.181.31 | 0 | 0 | 0 |
| 1575 | 99.83.205.94 | 64 | 63 | 127 |
| 1576 | | | | |
| 1577 | **Total** | **143955** | **129961** | **273916** |

Figure 11: Traffic Totals

# Risk Analysis

Each area of risk is analyzed using the DREAD framework. This framework is adaptive, allowing these risk findings to be rated based on the context of the affected environment. For example, a vulnerability that affects a non-critical system located in a heavily protected subnet has a lower risk score than a critical system affected by the same issue. The following charts describe how the DREAD framework is applied when calculating technical risk as well as the remediation efforts associated with each finding. See Appendix A: DREAD Overview for a detailed explanation of the framework.

## DREAD Scoring Criteria

| Damage Potential | Reproducibility | Exploitability | Affected Users | Discoverability |
|---|---|---|---|---|
| If a threat occurs, how much damage will be caused? | How easy is it to reproduce the threat? | What is needed to exploit this threat? | How many users will be affected? | How easy is it to discover this threat? |

Table 4: DREAD Scoring Criteria

## Composite Risk Categories

| Risk Score | Risk Description |
|---|---|
| **Critical** 40-50 | Critical risk findings must be considered a high priority when assessing overall security posture and risk remediation. These vulnerabilities can be easily exploited and may negatively impact business operations and continuity. |
| **Severe** 25-39 | Severe risk findings should be reviewed and remediated within a short time frame. These vulnerabilities may allow access to organizational assets and data or be leveraged to create further issues within the security posture. |
| **Moderate** 11-24 | Moderate risk findings should be addressed after critical and severe findings have been remediated. While these findings may allow exploitation of other vulnerabilities, they do not pose a substantial threat to business operations and continuity. |
| **Low** 1-10 | Low risk findings are informational and do not pose a significant risk to business operations and continuity. These vulnerabilities should be considered for remediation on a case-by-case basis. |

Table 5: Risk Categories

## Remediation Effort Key

| Effort | Description |
|---|---|
| High | High remediation effort findings are significant, multi-resource endeavors that may span over a considerable amount of time. Each finding may require a large overhaul in network architecture or security practices. |
| Medium | Medium remediation effort findings can take several days to remediate and require a moderate amount of resources. |
| Low | Low remediation effort findings require minimal resources and can be remediated in less than a day. |

Table 6: Remediation Effort

## Security Risk Findings

| Security Risk Finding | Risk Score | Effort |
|---|---|---|
| CRITICAL | (40-50) | |
| | | |
| SEVERE | (25-39) | |
| | | |
| MODERATE | (11-24) | |
| | | |
| LOW | (1-10) | |
| | | |

Table 7: Risk Summary

# Detailed Assessment Methodology

Unplugged provided Raxis with a testing methodology as follows:

### Apps Tested

| | | | | |
|---|---|---|---|---|
| American Airlines | Bloomberg | Booking.com | Bumble | Camscanner |
| Candy Crush | Canva | CNN | Duolingo | Ebay |
| ESPN | Etsy | Expedia | Foxnews | Hilton |
| Kayak | Marriot Bonvoy | NBC News | Nike | NY Times |
| Outlook | Pinterest | Quizlet | Roblox | Shein |
| Snapchat | Southwest Airlines | Spotify | The weather channel | Tripadvisor |
| United Airlines | Words with friends | Yelp | | |

Raxis performed isolated packet captures against the three devices using Wireshark. Raxis followed the following testing sequence for each device:

1. Login to the app.
2. Select “Ask App to not track” when prompted.
3. Use the app for at least two minutes each:
    a. In news apps, navigate to at least five pages.
    b. In travel apps, perform at least three searches and view one item from each set of results.
    c. In games, play the game and navigate the game menus.
    d. In shopping apps, use search at least three times and visit at least three item pages. Add to cart and go through the order process as far as possible without making an order.

# Detailed Assessment Results

## GrapheneOS Default Installation

### Domain Tracker Lookups

| Domain | DNS Query |
|---|---|
| app-measurement.com | 34 |
| firebaselogging-pa.googleapis.com | 28 |
| firebaselogging.googleapis.com | 24 |
| api2.branch.io | 24 |
| googleads.g.doubleclick.net | 24 |
| dpm.demdex.net | 22 |
| tpc.googlesyndication.com | 20 |
| sb.scorecardresearch.com | 20 |
| cdn.branch.io | 18 |
| collector.cdp.cnn.com | 18 |
| sdk.iad-05.braze.com | 16 |
| pagead2.googlesyndication.com | 14 |
| mobile-data.onetrust.io | 14 |
| cdn.optimizely.com | 14 |
| device-api.urbanairship.com | 14 |
| pubads.g.doubleclick.net | 14 |
| c.amazon-adsystem.com | 12 |
| remote-data.urbanairship.com | 12 |
| s.amazon-adsystem.com | 12 |
| rl.quantummetric.com | 12 |
| securepubads.g.doubleclick.net | 10 |
| mobile-collector.newrelic.com | 10 |
| ib.adnxs.com | 10 |
| api.apptentive.com | 10 |
| yildun.iad-03.braze.com | 10 |
| config2.mparticle.com | 10 |
| sdk.iad-03.braze.com | 10 |

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|---|---|
| ingest.quantummetric.com | 10 |
| browser-intake-datadoghq.com | 10 |
| 0.datadog.pool.ntp.org | 10 |
| crashlyticsreports-pa.googleapis.com | 10 |
| cdn.quantummetric.com | 10 |
| www.google-analytics.com | 10 |
| www.googletagservices.com | 8 |
| ping.chartbeat.net | 8 |
| identity.mparticle.com | 8 |
| mads.amazon-adsystem.com | 8 |
| info.startappservice.com | 8 |
| o-sdk.mediation.unity3d.com | 8 |
| aax-events-cell01-cf.us-east.aps.axp.amazon-adsystem.com | 8 |
| aax.amazon-adsystem.com | 8 |
| nativesdks.mparticle.com | 6 |
| sdk.iad-01.braze.com | 6 |
| logs.ads.vungle.com | 6 |
| a-n5s7n.data.emb-api.com | 6 |
| analytics.nike.com | 6 |
| api.iterable.com | 6 |
| www.googleadservices.com | 6 |
| sdk.iad-06.braze.com | 6 |
| api-sdk.datadome.co | 6 |
| combine.urbanairship.com | 6 |
| 32200.api.swrve.com | 6 |
| vision.fn-pz.com | 6 |
| cdn.doubleverify.com | 6 |
| ad.doubleclick.net | 6 |
| tps.doubleverify.com | 6 |
| configv2.unityads.unity3d.com | 5 |
| h64.online-metrix.net | 4 |
| ae.iads.unity3d.com | 4 |
| cm.g.doubleclick.net | 4 |
| adsmetadata.startappservice.com | 4 |

| | |
|---|---|
| impression-east.liftoff.io | 4 |
| rest.locuslabs.com | 4 |
| prod-mediate-events.applovin.com | 4 |
| cdn-lb.vungle.com | 4 |
| x51r0f.launches.appsflyersdk.com | 4 |
| sessions.bugsnag.com | 4 |
| fundingchoicesmessages.google.com | 4 |
| webview.unityads.unity3d.com | 4 |
| cdn.iads.unity3d.com | 4 |
| infoevent.startappservice.com | 4 |
| scripts.webcontentassessor.com | 4 |
| httpkafka.unityads.unity3d.com | 4 |
| analytics.tiktok.com | 4 |
| sdk-api-v1.singular.net | 4 |
| braze-images.com | 4 |
| zion.api.cnn.io | 4 |
| servedby.flashtalking.com | 4 |
| pixel.adsafeprotected.com | 4 |
| cdn.taboola.com | 4 |
| bcp.crwdcntrl.net | 4 |
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| config.ads.vungle.com | 4 |
| www.googletagmanager.com | 4 |
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| trk.pinterest.com | 4 |
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| bat.bing.com | 4 |
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| ct.pinterest.com | 2 |
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| 29773.v.fwmrm.net | 2 |
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| api.mixpanel.com | 2 |
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| match.adsrvr.org | 2 |
| js.adsrvr.org | 2 |
| nbcume.hb-api.omtrdc.net | 2 |
| www.srmdata-us.com | 2 |
| cvhcs0-launches.appsflyersdk.com | 2 |
| cvhcs0-inapps.appsflyersdk.com | 2 |
| live.chartboost.com | 2 |
| web.btncdn.com | 2 |
| licensing.bitmovin.com | 2 |
| otpi0g-cdn-settings.appsflyersdk.com | 2 |
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| dlsdk.appsflyer.com | 2 |
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| events.brightline.tv | 2 |
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| c.riskified.com | 2 |
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| metered.urbanairship.com | 2 |
| servicelayer.king.com | 2 |
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| flag.lab.amplitude.com | 2 |
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| log.espn.com | 2 |

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|---|---|
| cache-ssl.celtra.com | 2 |
| 84xhw4.gcdsdk.appsflyersdk.com | 2 |
| ads.rubiconproject.com | 2 |
| oa.openxcdn.net | 2 |
| telemetry.sdk.inmobi.com | 2 |
| cdn.flashtalking.com | 2 |
| gum.criteo.com | 2 |
| otpi0g-gcdsdk.appsflyersdk.com | 2 |
| cdn.confiant-integrations.net | 2 |
| init.supersonicads.com | 2 |
| ssl.google-analytics.com | 2 |
| 23q9j8-conversions.appsflyersdk.com | 2 |
| sdk-04.moengage.com | 2 |
| sync.intentiq.com | 2 |
| vod-media-aka.warnermediacdn.com | 2 |
| zugkc4.conversions.appsflyersdk.com | 2 |
| ms4.applovin.com | 2 |
| log.go.com | 2 |
| pjgiyz-launches.appsflyersdk.com | 2 |
| 84xhw4.cdn-settings.appsflyersdk.com | 2 |
| inapps.appsflyer.com | 2 |
| static.criteo.net | 2 |
| adservice.google.com | 2 |
| 23q9j8-gcdsdk.appsflyersdk.com | 2 |
| cvhcs0-conversions.appsflyersdk.com | 2 |
| fmrqkz-cdn-settings.appsflyersdk.com | 2 |
| nbcume.sc.omtrdc.net | 2 |
| img.applovin.com | 2 |
| fmrqkz-gcdsdk.appsflyersdk.com | 2 |
| live-media-aka.warnermediacdn.com | 2 |
| 23q9j8-launches.appsflyersdk.com | 2 |
| cdn.cookielaw.org | 2 |
| gcdsdk.appsflyer.com | 2 |
| sdk.iad-04.braze.com | 2 |

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|---|---|
| x51r0f.conversions.appsflyersdk.com | 2 |
| api.sprig.com | 2 |
| cvhcs0-gcdsdk.appsflyersdk.com | 2 |
| hybird.mtgglobals.com | 2 |
| cdn-store-icons-akamai-prd.unityads.unity3d.com | 2 |
| k3c2rk-cdn-settings.appsflyersdk.com | 2 |
| k3c2rk-inapps.appsflyersdk.com | 2 |
| network.bazaarvoice.com | 2 |
| ads.celtra.com | 2 |
| res1.applovin.com | 2 |
| usllpic0vpjvz26ctf5muopo3ev75vaj66wq4tjz19f0152665579fc0sac.d.aa.online-metrix.net | 2 |
| tnvjqk-launches.appsflyersdk.com | 2 |
| als-svc.nytimes.com | 2 |
| d.applovin.com | 2 |
| prod.cm.publishers.advertising.a2z.com | 2 |
| cdn-adn-https.mtgglobals.com | 2 |
| fmrqkz-conversions.appsflyersdk.com | 2 |
| launches.appsflyer.com | 2 |
| scar.unityads.unity3d.com | 2 |
| s.go-mpulse.net | 2 |
| cdn-settings.segment.com | 2 |
| configure.rayjump.com | 2 |
| kvinit-prod.api.kochava.com | 2 |
| csi.gstatic.com | 2 |
| ml314.com | 2 |
| udm.scorecardresearch.com | 2 |
| trc.taboola.com | 2 |
| video-player.aps.amazon-adsystem.com | 2 |
| szgi2u-cdn-settings.appsflyersdk.com | 2 |
| insight.adsrvr.org | 2 |
| cdn.id5-sync.com | 2 |
| dt.adsafeprotected.com | 2 |
| a-j45jo.data.emb-api.com | 2 |

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|---|---|
| app.adjust.net.in | 2 |
| pjgiyz-gcdsdk.appsflyersdk.com | 2 |
| zugkc4.dlsdk.appsflyersdk.com | 2 |
| resources.xg4ken.com | 2 |
| adx.g.doubleclick.net | 2 |
| cvhcs0-cdn-settings.appsflyersdk.com | 2 |
| config.inmobi.com | 2 |
| oajs.openx.net | 2 |
| ms.applovin.com | 2 |
| jarlio-gcdsdk.appsflyersdk.com | 2 |
| dmp.truoptik.com | 2 |
| widget.fitanalytics.com | 2 |
| smetrics.foxnews.com | 2 |
| fw.adsafeprotected.com | 2 |
| foxnews.demdex.net | 2 |
| www.datadoghq-browser-agent.com | 2 |
| dls2s.appsflyer.com | 2 |
| i-sdk.mediation.unity3d.com | 2 |
| otpi0g-inapps.appsflyersdk.com | 2 |
| tr.snapchat.com | 2 |
| turnip.cdn.turner.com | 2 |
| warp.media.net | 2 |
| static.cloudflareinsights.com | 2 |
| s0.2mdn.net | 2 |
| msft-ssp.adnxs.com | 2 |
| zugkc4.inapps.appsflyersdk.com | 2 |
| api.lab.amplitude.com | 2 |
| meter-svc.nytimes.com | 2 |
| images.taboola.com | 2 |
| jarlio-inapps.appsflyersdk.com | 2 |
| pi6zts-cdn-settings.appsflyersdk.com | 2 |
| | |
| **Total** | **1209** |

Total Tracker TCP Connections

| Tracker As Source | Tracker As Destination | Total Connections |
|---|---|---|
| 85331 | 71223 | 156554 |

## GrapheneOS With GMS Sandboxed

### Domain Tracker Lookups

| Domain | DNS Query |
|---|---|
| app-measurement.com | 32 |
| firebaselogging-pa.googleapis.com | 30 |
| pagead2.googlesyndication.com | 28 |
| dpm.demdex.net | 26 |
| firebaselogging.googleapis.com | 24 |
| securepubads.g.doubleclick.net | 24 |
| sb.scorecardresearch.com | 24 |
| googleads.g.doubleclick.net | 24 |
| tps.doubleverify.com | 22 |
| tpc.googlesyndication.com | 22 |
| cdn.doubleverify.com | 20 |
| cdn.branch.io | 20 |
| device-api.urbanairship.com | 20 |
| api2.branch.io | 20 |
| pubads.g.doubleclick.net | 20 |
| www.googletagservices.com | 18 |
| remote-data.urbanairship.com | 16 |
| aax.amazon-adsystem.com | 16 |
| c.amazon-adsystem.com | 14 |
| mobile-data.onetrust.io | 14 |
| sdk.iad-06.braze.com | 13 |
| combine.urbanairship.com | 12 |
| aax-events-cell01-cf.us-east.aps.axp.amazon-adsystem.com | 12 |
| prebid-server.rubiconproject.com | 12 |
| sdk.iad-05.braze.com | 12 |
| adx.g.doubleclick.net | 12 |
| ad.doubleclick.net | 12 |
| ib.adnxs.com | 12 |
| cdn.liftoff-creatives.io | 10 |

| | |
|---|---|
| s.amazon-adsystem.com | 10 |
| ts.amazon-adsystem.com | 10 |
| aax-dtb-mobile-geo.amazon-adsystem.com | 10 |
| csi.gstatic.com | 10 |
| cdn.optimizely.com | 10 |
| impression-east.liftoff.io | 10 |
| mads.amazon-adsystem.com | 10 |
| static.adsafeprotected.com | 10 |
| cm.g.doubleclick.net | 10 |
| widgets.outbrain.com | 8 |
| pixel.rubiconproject.com | 8 |
| logs.ads.vungle.com | 8 |
| s0.2mdn.net | 8 |
| ssum-sec.casalemedia.com | 8 |
| yildun.iad-03.braze.com | 8 |
| config.aps.amazon-adsystem.com | 8 |
| www.googleadservices.com | 8 |
| vision.fn-pz.com | 8 |
| tag.researchnow.com | 8 |
| www.google-analytics.com | 8 |
| dt.adsafeprotected.com | 8 |
| pagead2.googleadservices.com | 8 |
| cdn-f.adsmoloco.com | 8 |
| d.agkn.com | 8 |
| ping.chartbeat.net | 8 |
| www.googletagmanager.com | 8 |
| cdn.quantummetric.com | 8 |
| api.apptentive.com | 8 |
| pixel.adsafeprotected.com | 8 |
| mobile-collector.newrelic.com | 8 |
| adservice.google.com | 6 |
| api-sdk.datadome.co | 6 |
| identity.mparticle.com | 6 |
| gateway.unityads.unity3d.com | 6 |

| | |
|---|---|
| jadserve.postrelease.com | 6 |
| sync.intentiq.com | 6 |
| mobile.adsafeprotected.com | 6 |
| track.activemetering.com | 6 |
| idsync.rlcdn.com | 6 |
| ads.rubiconproject.com | 6 |
| eus.rubiconproject.com | 6 |
| prod-mediate-events.applovin.com | 6 |
| image8.pubmatic.com | 6 |
| ingest.quantummetric.com | 6 |
| ms4.applovin.com | 6 |
| fundingchoicesmessages.google.com | 6 |
| beacons.gvt2.com | 6 |
| analytics.nike.com | 6 |
| crashlyticsreports-pa.googleapis.com | 6 |
| rtb.openx.net | 6 |
| odb.outbrain.com | 6 |
| cdn.indexww.com | 6 |
| ml314.com | 6 |
| nativesdks.mparticle.com | 6 |
| rl.quantummetric.com | 6 |
| cdn-gl.imrworldwide.com | 6 |
| ade.googlesyndication.com | 6 |
| o-sdk.mediation.unity3d.com | 6 |
| images.outbrainimg.com | 6 |
| sdk.iad-03.braze.com | 6 |
| cdn.taboola.com | 6 |
| x.bidswitch.net | 6 |
| 0.datadog.pool.ntp.org | 6 |
| js-sec.indexww.com | 6 |
| sync.1rx.io | 6 |
| 32200.api.swrve.com | 6 |
| beacons.gcp.gvt2.com | 6 |
| fw.adsafeprotected.com | 6 |

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|---|---|
| creativecdn.com | 4 |
| config.ads.vungle.com | 4 |
| adsmetadata.startappservice.com | 4 |
| dsum-sec.casalemedia.com | 4 |
| gum.criteo.com | 4 |
| pub.doubleverify.com | 4 |
| et-l.w.inmobi.com | 4 |
| video-ads-module.ad-tech.nbcuni.com | 4 |
| adexp.liftoff.io | 4 |
| ssbsync.smartadserver.com | 4 |
| vtrk.doubleverify.com | 4 |
| config2.mparticle.com | 4 |
| bcp.crwdcntrl.net | 4 |
| rtb.mfadsrvr.com | 4 |
| 885e2dd94adb263c2321d2d0f3778d18523bce4a.ipv6.cws.conviva.com | 4 |
| lb.eu-1-id5-sync.com | 4 |
| 885e2dd94adb263c2321d2d0f3778d18523bce4a.cws.conviva.com | 4 |
| c.bing.com | 4 |
| cdn.id5-sync.com | 4 |
| vi.ml314.com | 4 |
| ae.iads.unity3d.com | 4 |
| cm.adform.net | 4 |
| ap.lijit.com | 4 |
| wave.outbrain.com | 4 |
| events.browsiprod.com | 4 |
| configv2.unityads.unity3d.com | 4 |
| libs.outbrain.com | 4 |
| mv.outbrain.com | 4 |
| amplify.outbrain.com | 4 |
| o13855.ingest.sentry.io | 4 |
| h64.online-metrix.net | 4 |
| pixel-sync.sitescout.com | 4 |
| direct.adsrvr.org | 4 |
| infoevent.startappservice.com | 4 |

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|---|---|
| httpkafka.unityads.unity3d.com | 4 |
| api.iterable.com | 4 |
| images.taboola.com | 4 |
| c.aps.amazon-adsystem.com | 4 |
| scar.unityads.unity3d.com | 4 |
| sessions.bugsnag.com | 4 |
| match.sharethrough.com | 4 |
| ups.analytics.yahoo.com | 4 |
| sdk.iad-01.braze.com | 4 |
| rest.locuslabs.com | 4 |
| cdn.cookielaw.org | 4 |
| et-eus.w.inmobi.com | 4 |
| a-n5s7n.data.emb-api.com | 4 |
| trc.taboola.com | 4 |
| ads.pubmatic.com | 4 |
| p.tvpixel.com | 4 |
| info.startappservice.com | 4 |
| htlb.casalemedia.com | 4 |
| cdn-lb.vungle.com | 4 |
| sw88.espn.com | 4 |
| logx.optimizely.com | 4 |
| secure-us.imrworldwide.com | 4 |
| app.adjust.com | 4 |
| browser-intake-datadoghq.com | 4 |
| rt.applovin.com | 4 |
| control.kochava.com | 4 |
| aa.agkn.com | 4 |
| scripts.webcontentassessor.com | 4 |
| kvinit-prod.api.kochava.com | 4 |
| sync.crwdcntrl.net | 4 |
| sdk-04.moengage.com | 4 |
| network.bazaarvoice.com | 4 |
| client.aps.amazon-adsystem.com | 4 |
| fastlane.rubiconproject.com | 4 |

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|---|---|
| p1.parsely.com | 4 |
| webview.unityads.unity3d.com | 4 |
| cadmus.script.ac | 4 |
| b.sharethrough.com | 4 |
| nbcu.demdex.net | 4 |
| hbopenbid.pubmatic.com | 4 |
| static.chartbeat.com | 4 |
| cdn.iads.unity3d.com | 4 |
| id5-sync.com | 4 |
| cds.taboola.com | 4 |
| beacon.taboola.com | 4 |
| 885e2dd94adb263c2321d2d0f3778d18523bce4a.ipv4.cws.conviva.com | 4 |
| ch-trc-events.taboola.com | 4 |
| pixel.tapad.com | 4 |
| trk.pinterest.com | 4 |
| ads.stickyadstv.com | 4 |
| sdk-api-v1.singular.net | 4 |
| k3c2rk-inapps.appsflyersdk.com | 4 |
| iteratehq.com | 4 |
| pandg.tapad.com | 4 |
| gw.geoedge.be | 4 |
| img.riskified.com | 4 |
| image2.pubmatic.com | 4 |
| sync-t1.taboola.com | 4 |
| token.rubiconproject.com | 4 |
| tlx.3lift.com | 4 |
| i.clean.gg | 4 |
| www.datadoghq-browser-agent.com | 4 |
| telemetry.sdk.inmobi.com | 2 |
| pjgiyz-launches.appsflyersdk.com | 2 |
| cvhcs0-gcdsdk.appsflyersdk.com | 2 |
| match.adsrvr.org | 2 |
| jarlio-register.appsflyersdk.com | 2 |
| api.rlcdn.com | 2 |

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|---|---|
| a-z4ngy.data.emb-api.com | 2 |
| reachms.bfmio.com | 2 |
| pacc6p-cdn-settings.appsflyersdk.com | 2 |
| view.adjust.com | 2 |
| 8168974.fls.doubleclick.net | 2 |
| t2.chartboost.com | 2 |
| cdn-adn-https.mtgglobals.com | 2 |
| jarlio-cdn-settings.appsflyersdk.com | 2 |
| cdn.parsely.com | 2 |
| ats.rlcdn.com | 2 |
| zugkc4.inapps.appsflyersdk.com | 2 |
| acdn.adnxs.com | 2 |
| video-player.aps.amazon-adsystem.com | 2 |
| 8tvl3e-conversions.appsflyersdk.com | 2 |
| signal-metrics-collector-beta.s-onetag.com | 2 |
| pippio.com | 2 |
| zion.api.cnn.io | 2 |
| as-sec.casalemedia.com | 2 |
| cs.media.net | 2 |
| tnvjqk-launches.appsflyersdk.com | 2 |
| msft-ssp.adnxs.com | 2 |
| ads.yieldmo.com | 2 |
| a-j45jo.data.emb-api.com | 2 |
| fkvufv-cdn-settings.appsflyersdk.com | 2 |
| nbcume.hb-api.omtrdc.net | 2 |
| widget-pixels.outbrain.com | 2 |
| static.criteo.net | 2 |
| servedby.flashtalking.com | 2 |
| px.ads.linkedin.com | 2 |
| szgi2u-cdn-settings.appsflyersdk.com | 2 |
| jarlio-conversions.appsflyersdk.com | 2 |
| sync.richaudience.com | 2 |
| hilton.data.adobedc.net | 2 |
| init.supersonicads.com | 2 |

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|---|---|
| lightning.cnn.com | 2 |
| cdn3.optimizely.com | 2 |
| apex.go.sonobi.com | 2 |
| bh.contextweb.com | 2 |
| x51r0f.gcdsdk.appsflyersdk.com | 2 |
| espn.hb-api.omtrdc.net | 2 |
| entitlements.jwplayer.com | 2 |
| rumcdn.geoedge.be | 2 |
| otpi0g-pia.appsflyersdk.com | 2 |
| js-agent.newrelic.com | 2 |
| 23q9j8-launches.appsflyersdk.com | 2 |
| i.liadm.com | 2 |
| btloader.com | 2 |
| segment-data-us-east.zqtk.net | 2 |
| widget.fitanalytics.com | 2 |
| servicelayer.king.com | 2 |
| odr.mookie1.com | 2 |
| api.sprig.com | 2 |
| 84xhw4.conversions.appsflyersdk.com | 2 |
| ak.sail-horizon.com | 2 |
| a1253.casalemedia.com | 2 |
| prg.smartadserver.com | 2 |
| st.pubmatic.com | 2 |
| page.cdnbasket.net | 2 |
| cvhcs0-conversions.appsflyersdk.com | 2 |
| t.adx.opera.com | 2 |
| imprchmp.taboola.com | 2 |
| fmrqkz-conversions.appsflyersdk.com | 2 |
| dls2s.appsflyer.com | 2 |
| connect-metrics-collector.s-onetag.com | 2 |
| eq97f.publishers.tremorhub.com | 2 |
| imtwjwoasak.com | 2 |
| 84xhw4.pia.appsflyersdk.com | 2 |
| grid-bidder.criteo.com | 2 |

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|---|---|
| gcdsdk.appsflyer.com | 2 |
| api.lab.amplitude.com | 2 |
| szgi2u-dlsdk.appsflyersdk.com | 2 |
| u.cdnwidget.com | 2 |
| observe-tcp.mtgglobals.com | 2 |
| sync.taboola.com | 2 |
| 84xhw4.gcdsdk.appsflyersdk.com | 2 |
| id.rlcdn.com | 2 |
| tag.wknd.ai | 2 |
| onsiterecs.api.boomtrain.com | 2 |
| k3c2rk-cdn-settings.appsflyersdk.com | 2 |
| nbcume.sc.omtrdc.net | 2 |
| pjgiyz-cdn-settings.appsflyersdk.com | 2 |
| ipds.adrta.com | 2 |
| ch-vid-events.taboola.com | 2 |
| mwzeom.zeotap.com | 2 |
| targeting.unrulymedia.com | 2 |
| ping-meta-prd.jwpltx.com | 2 |
| hybird.mtgglobals.com | 2 |
| sync.srv.stackadapt.com | 2 |
| s-static.innovid.com | 2 |
| s.go-mpulse.net | 2 |
| analytics-tcp.mintegral.net | 2 |
| pi6zts-cdn-settings.appsflyersdk.com | 2 |
| 84xhw4.cdn-settings.appsflyersdk.com | 2 |
| l.evidon.com | 2 |
| zugkc4.cdn-settings.appsflyersdk.com | 2 |
| usasync01.admantx.com | 2 |
| ow.pubmatic.com | 2 |
| cdn.browsiprod.com | 2 |
| smetrics.cnn.com | 2 |
| zugkc4.launches.appsflyersdk.com | 2 |
| yield-manager.browsiprod.com | 2 |
| ad.360yield.com | 2 |

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|---|---|
| adrta.com | 2 |
| i.l.inmobicdn.net | 2 |
| udm.scorecardresearch.com | 2 |
| k3c2rk-conversions.appsflyersdk.com | 2 |
| warp.media.net | 2 |
| zugkc4.pia.appsflyersdk.com | 2 |
| 8tvl3e-cdn-settings.appsflyersdk.com | 2 |
| jssdks.mparticle.com | 2 |
| k3c2rk-launches.appsflyersdk.com | 2 |
| eventlog.outbrain.com | 2 |
| us-wf.taboola.com | 2 |
| r.casalemedia.com | 2 |
| registry.api.cnn.io | 2 |
| ad-delivery.net | 2 |
| p.rfihub.com | 2 |
| geolocation.onetrust.com | 2 |
| pangolin16.isnssdk.com | 2 |
| jarlio-pia.appsflyersdk.com | 2 |
| beacon.tru.am | 2 |
| i.l-new.inmobicdn.net | 2 |
| amprtc.media.net | 2 |
| fkvufv-inapps.appsflyersdk.com | 2 |
| metered.urbanairship.com | 2 |
| oajs.openx.net | 2 |
| sofia.trustx.org | 2 |
| taboola-d.openx.net | 2 |
| config.inmobi.com | 2 |
| c.betrad.com | 2 |
| pr-bh.ybp.yahoo.com | 2 |
| cdn.confiant-integrations.net | 2 |
| tagan.adlightning.com | 2 |
| x51r0f.conversions.appsflyersdk.com | 2 |
| cookiesync.mparticle.com | 2 |
| in.treasuredata.com | 2 |

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|---|---|
| com-quizlet-prod1.collector.snplow.net | 2 |
| z.moatads.com | 2 |
| s.ad.smaato.net | 2 |
| tr.outbrain.com | 2 |
| zugkc4.conversions.appsflyersdk.com | 2 |
| a2.adform.net | 2 |
| ids.cdnwidget.com | 2 |
| secure.insightexpressai.com | 2 |
| log.espn.com | 2 |
| platform.iteratehq.com | 2 |
| id.sv.rkdms.com | 2 |
| sync.outbrain.com | 2 |
| www.ugdturner.com | 2 |
| log.outbrainimg.com | 2 |
| tr-us.adsmoloco.com | 2 |
| pjgiyz-conversions.appsflyersdk.com | 2 |
| smetrics.foxnews.com | 2 |
| sdk.iad-04.braze.com | 2 |
| fmrqkz-gcdsdk.appsflyersdk.com | 2 |
| live.rezync.com | 2 |
| c.riskified.com | 2 |
| hblg.media.net | 2 |
| ssl.google-analytics.com | 2 |
| c.tvpixel.com | 2 |
| configure.rayjump.com | 2 |
| api.mixpanel.com | 2 |
| log.go.com | 2 |
| flag.lab.amplitude.com | 2 |
| x51r0f.cdn-settings.appsflyersdk.com | 2 |
| zugkc4.register.appsflyersdk.com | 2 |
| people.api.boomtrain.com | 2 |
| cdn.ml314.com | 2 |
| szgi2u-register.appsflyersdk.com | 2 |
| beacon-iad2.rubiconproject.com | 2 |

| | |
|---|---|
| www.srmdata-us.com | 2 |
| vidstat.taboola.com | 2 |
| b1sync.zemanta.com | 2 |
| meter-svc.nytimes.com | 2 |
| otpi0g-gcdsdk.appsflyersdk.com | 2 |
| tnvjqk-gcdsdk.appsflyersdk.com | 2 |
| otpi0g-conversions.appsflyersdk.com | 2 |
| ce.lijit.com | 2 |
| ms.applovin.com | 2 |
| cms.analytics.yahoo.com | 2 |
| k3c2rk-attr.appsflyersdk.com | 2 |
| widgetmonitor.outbrain.com | 2 |
| cnn.bounceexchange.com | 2 |
| jssdkcdns.mparticle.com | 2 |
| google-bidout-d.openx.net | 2 |
| images.mediago.io | 2 |
| otpi0g-cdn-settings.appsflyersdk.com | 2 |
| fkvufv-register.appsflyersdk.com | 2 |
| jarlio-inapps.appsflyersdk.com | 2 |
| inapps.appsflyer.com | 2 |
| eb2.3lift.com | 2 |
| prd.jwpltx.com | 2 |
| events.bouncex.net | 2 |
| sync.bfmio.com | 2 |
| foxnews.demdex.net | 2 |
| cdn-settings.appsflyersdk.com | 2 |
| aa.online-metrix.net | 2 |
| otpi0g-dlsdk.appsflyersdk.com | 2 |
| a.et.nytimes.com | 2 |
| usllpic0ivcq5t7whmgfashgd77vwv37tcqqhtsl8b2451cb95183dcbsac.d.aa.online-metrix.net | 2 |
| metrics.roblox.com | 2 |
| 23q9j8-cdn-settings.appsflyersdk.com | 2 |
| cdn2.inner-active.mobi | 2 |

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|---|---|
| aamt.nbcnews.com | 2 |
| tapestry.tapad.com | 2 |
| k3c2rk-gcdsdk.appsflyersdk.com | 2 |
| fmrqkz-cdn-settings.appsflyersdk.com | 2 |
| gcdn.2mdn.net | 2 |
| z.cdp-dev.cnn.com | 2 |
| cdn.prod.uidapi.com | 2 |
| oa.openxcdn.net | 2 |
| ps.eyeota.net | 2 |
| cdn.segment.com | 2 |
| prod.us-east-1.cxm-bcn.publisher-services.amazon.dev | 2 |
| api.btloader.com | 2 |
| tpsc-ue1.doubleverify.com | 2 |
| tags.crwdcntrl.net | 2 |
| cdn.boomtrain.com | 2 |
| rules.quantcount.com | 2 |
| tnvjqk-register.appsflyersdk.com | 2 |
| sdk.sharethrough.com | 2 |
| cms.quantserve.com | 2 |
| bat.bing.com | 2 |
| static.cloudflareinsights.com | 2 |
| k3c2rk-register.appsflyersdk.com | 2 |
| supply.inmobicdn.net | 2 |
| s.cdn.turner.com | 2 |
| loadm.exelator.com | 2 |
| ssp-sync.criteo.com | 2 |
| exchange.mediavine.com | 2 |
| tnvjqk-cdn-settings.appsflyersdk.com | 2 |
| dfp.bouncex.net | 2 |
| c.evidon.com | 2 |
| bea4.v.fwmrm.net | 2 |
| bidder.criteo.com | 2 |
| d.applovin.com | 2 |
| fkvufv-dlsdk.appsflyersdk.com | 2 |

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|---|---|
| cdn.adsafeprotected.com | 2 |
| dis.criteo.com | 2 |
| pjgiyz-gcdsdk.appsflyersdk.com | 2 |
| pxl.connexity.net | 2 |
| americanairlines.sc.omtrdc.net | 2 |
| prebid.adnxs.com | 2 |
| onetag-geo.s-onetag.com | 2 |
| signal-beacon.s-onetag.com | 2 |
| app.adjust.net.in | 2 |
| u.openx.net | 2 |
| collector.cdp.cnn.com | 2 |
| doregtzfgpfpzb3mcuylrhbfmcticsparnkma6zz6f3fdb01e3762721sac.d.aa.online-metrix.net | 2 |
| assets.bounceexchange.com | 2 |
| gw-is.iads.unity3d.com | 2 |
| www.i.cdn.cnn.com | 2 |
| bid.g.doubleclick.net | 2 |
| data.cdnbasket.net | 2 |
| cvhcs0-inapps.appsflyersdk.com | 2 |
| o1118521.ingest.us.sentry.io | 2 |
| get.s-onetag.com | 2 |
| loadus.exelator.com | 2 |
| als-svc.nytimes.com | 2 |
| cs.lkqd.net | 2 |
| turnip.cdn.turner.com | 2 |
| ch-wf.taboola.com | 2 |
| 8tvl3e-inapps.appsflyersdk.com | 2 |
| mab.chartbeat.com | 2 |
| dlsdk.appsflyer.com | 2 |
| pixel.onaudience.com | 2 |
| 8tvl3e-adrevenue.appsflyersdk.com | 2 |
| 23q9j8-conversions.appsflyersdk.com | 2 |
| pixel-us-east.rubiconproject.com | 2 |
| a125375509.cdn.optimizely.com | 2 |

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|---|---|
| 8tvl3e-gcdsdk.appsflyersdk.com | 2 |
| zugkc4.dlsdk.appsflyersdk.com | 2 |
| tr.snapchat.com | 2 |
| www.srmdata.com | 2 |
| fkvufv-conversions.appsflyersdk.com | 2 |
| mb.moatads.com | 2 |
| tnvjqk-conversions.appsflyersdk.com | 2 |
| view.cdnbasket.net | 2 |
| fkvufv-launches.appsflyersdk.com | 2 |
| jarlio-gcdsdk.appsflyersdk.com | 2 |
| pixel.quantserve.com | 2 |
| s.ntv.io | 2 |
| cdn-settings.segment.com | 2 |
| grid.bidswitch.net | 2 |
| fei.pro-market.net | 2 |
| www.lightboxcdn.com | 2 |
| x51r0f.dlsdk.appsflyersdk.com | 2 |
| us-u.openx.net | 2 |
| i-sdk.mediation.unity3d.com | 2 |
| mcdp-chidc2.outbrain.com | 2 |
| sslwidget.criteo.com | 2 |
| s2s.singular.net | 2 |
| conversions.appsflyer.com | 2 |
| braze-images.com | 2 |
| s2.adform.net | 2 |
| sync.graph.bluecava.com | 2 |
| t.pubmatic.com | 2 |
| api.sail-personalize.com | 2 |
| foxnews-d.openx.net | 2 |
| rtr.innovid.com | 2 |
| app-analytics-v2.snapchat.com | 2 |
| dmp.truoptik.com | 2 |
| live.chartboost.com | 2 |
| sync.go.sonobi.com | 2 |

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|---|---|
| tru.am | 2 |
| cvhcs0-cdn-settings.appsflyersdk.com | 2 |
| 23q9j8-dlsdk.appsflyersdk.com | 2 |
| jarlio-launches.appsflyersdk.com | 2 |
| 8tvl3e-dlsdk.appsflyersdk.com | 2 |
| otpi0g-inapps.appsflyersdk.com | 2 |
| pixel.advertising.com | 2 |
| nbcuni.demdex.net | 2 |
| nondescriptnote.com | 2 |
| 32200.content.swrve.com | 2 |
| static-content-1.smadex.com | 2 |
| prebid.media.net | 2 |
| 32200.identity.swrve.com | 2 |
| 23q9j8-gcdsdk.appsflyersdk.com | 2 |
| trackdownload.startappservice.com | 2 |
| secure.quantserve.com | 2 |
| cdn.flashtalking.com | 2 |
| contextual.media.net | 2 |
| pjgiyz-attr.appsflyersdk.com | 2 |
| rp.liadm.com | 2 |
| cvhcs0-launches.appsflyersdk.com | 2 |
| | |
| **Total** | **2073** |

**Total Tracker TCP Connections**

| Tracker As Source | Tracker As Destination | Total Connections |
|---|---|---|
| 143955 | 129961 | 273916 |

# Appendix A: DREAD Overview

| Damage Criteria | Critical<br>40–50 | Severe<br>25–39 | Moderate<br>11–24 | Low<br>1–10 |
|---|---|---|---|---|
| **Damage Potential**<br>If threat occurs, how much damage will be caused? | Attacker has full system access and ability to execute root commands | Attack has non-privileged user access and sensitive information leakage | Potential for information leakage and Denial of Service (DoS) | Potential for trivial information leakage |
| **Reproducibility**<br>How easy is it to reproduce the threat? | The attack can be reproduced every time | The attack can be reproduced frequently | The attack can be reproduced only during a certain window | The attack is very difficult to reproduce even with knowledge of the breach |
| **Exploitability**<br>What is needed to exploit this threat? | Automated tools exist for an attack and programming skills are not needed | A novice programmer can execute an attack in a short time | A skilled programmer can execute an attack and a novice can emulate it | The attack requires a skilled hacker with an in-depth understanding |
| **Affected Users**<br>How many users will be affected? | All users can be affected, and default configurations are in use | Most users can be affected, and common configurations are in use | Some users can be affected, and non-standard configurations are in use | A small percentage of users can be affected |
| **Discoverability**<br>How easily can the threat be discovered? | The threat can be identified with an automated scanning tool | The threat is published or found in commonly used features | The threat is rarely found or encountered | The threat is obscure and unlikely to be discovered |

Table 8: DREAD Score Overview

# Appendix B: Targets

## Tested Phones

- Google Pixel 9A

## Tested Mobile Apps

| | | | | |
|---|---|---|---|---|
| American Airlines | Bloomberg | Booking.com | Bumble | Camscanner |
| Candy Crush | Canva | CNN | Duolingo | Ebay |
| ESPN | Etsy | Expedia | Foxnews | Hilton |
| Kayak | Marriot Bonvoy | NBC News | Nike | NY Times |
| Outlook | Pinterest | Quizlet | Roblox | Shein |
| Snapchat | Southwest Airlines | Spotify | The weather channel | Tripadvisor |
| United Airlines | Words with friends | Yelp | | |

# Appendix C: Mobile Application Problems Report

### GrapheneOS Default Installation

| Mobile App | Problem |
|---|---|
| Bloomberg | App kept crashing during testing. |
| Booking.com | App slow to search. |
| CNN | App kept crashing during testing. |
| Ebay | All searches returned invalid request |
| Expedia | Won't run without google play services, which are not supporter by your device. |
| Hilton | Won't run without google play services, which are not supporter by your device. |
| NBC News | App kept crashing during testing. |
| Snapchat | Won't run without google play services, which are not supporter by your device. |
| Southwest Airlines | App kept crashing during testing. |

### GrapheneOS with GMS Sandboxed

| Mobile App | Problem |
|---|---|
| Ebay | Had to be sideloaded. Would not install from Playstore. |
| Southwest Airlines | App kept crashing during testing. |