



STATE OF ZERO-RATING

2019 EDITION





WELCOME

Welcome to the first edition of Selfie Networks' **"State of Zero Rating Report"**, an annual publication covering zero-rating programs and differentiated network services worldwide.

WHY HAVE WE CREATED THIS REPORT?

To improve zero-rating programs in the presence of net neutrality, and help different stakeholders prepare for similar 5G-enabled services.

WHAT DO WE CONSIDER ZERO-RATING?

Any data plan or promotion where users are charged differently for data from certain application(s) (either at no cost, or at a discounted price compared to generic data).

TL; DR

Zero-rating is widely deployed worldwide, with more than 160 operators in 85 countries offering zero-rating plans to almost 3 billion users, and 1,000+ applications participating in them. Being the first large-scale network traffic differentiation service it has also been a focal point for the net neutrality debate, and a use case as we prepare for 5G-enabled services.

Unlike previous reports that analyze available zero-rating offerings and data plan pricing, we focus on the actual process for application providers to participate into zero rating plans, and respectively for mobile operators to offer them.

We focus on Europe, and through the efforts of a music streaming service with millions of users to participate in zero rating plans, show that despite a net neutrality framework that favors category-based and inclusive zero rating plans, the barrier for application providers to participate in such plans is high, raising concerns around compliance.

To better understand why this happens, we breakdown the onboarding process from an operator's perspective, and show how poor coordination among internal teams, a manual and error-prone integration process, and unclear compliance requirements contribute to long delays for new partners to participate in zero rating plans. We complement these observations with best practices when applicable.

Through this report and future ones, we want to share our insights as we enable real-world partnerships between app providers and mobile operators.

Our mission is to encourage more inclusive zero-rating programs and preserve user choice, improve net neutrality policy and compliance practices, and accelerate deployment of new innovative services as we transition to 5G.

HOW DO WE COLLECT DATA?

Selfie Networks' Zero Rating Toolkit allows app providers and mobile operators to participate in and offer zero-rating programs. Data in this report is collected from:

1 Our global directory of available zero-rating programs, which we maintain by periodically reviewing the websites of hundreds of major mobile operators worldwide.

2 Data we collect while trying to onboard multiple app providers in existing zero-rating programs. This reveals real-world insights from existing commercial practices, emphasizing on compliance issues around net neutrality, and challenges faced by app providers (and operators) to participate (and offer) such programs today.

3 Detailed user sessions and traffic analysis from the most popular applications participating in zero-rating programs today, and how accurately they can be zero-rated by mobile operators.



SELFIE
NETWORKS



TABLE OF CONTENTS

SECTION 1:
WHY CARE ABOUT ZERO-RATING?

SECTION 2:
ZERO RATING AND NET NEUTRALITY

SECTION 2.1:
FOCUS ON EUROPE

SECTION 2.2:
PARTICIPATION, DISCRIMINATION, AND COMPLIANCE

SECTION 3:
ONBOARDING AND INTEGRATION INSIGHTS

SECTION 3.1:
COORDINATION AND FRAGMENTATION

SECTION 3.2:
NEW PARTNER OVERHEAD

SECTION 3.3:
ZERO RATING AND DEEP PACKET INSPECTION

SECTION 3.4:
UNCLEAR REGULATORY REQUIREMENTS

SECTION 4:
ABOUT SELFIE NETWORKS

SECTION 5:
SUMMARY



WHY CARE ABOUT ZERO-RATING?



Zero-rating is widely deployed worldwide, with more than 160 operators offering zero-rating plans to almost 3 billion users, and 1,000+ applications participating in them. Table 1 provides details for the most popular categories and sample applications (Table 1). What are the main drivers?



CATEGORY / APP	PLANS	COUNTRIES	AUDIENCE (MILLIONS)	TOTAL APPS
Social	130	75	2090	25
Chat	124	70	2060	32
Music	68	42	1580	469
Video	79	48	1703	384
Transportation	21	16	478	39
Gaming	17	14	562	70
Other	22	21	447	103
Facebook	119	70	1950	
WhatsApp	112	67	1860	
YouTube	52	36	1080	
Apple Music	36	25	534	
TOTAL	167	85	2850	1109

(Table 1).

SUMMARY: there is a very large audience that has access to zero-rating plans worldwide; app providers work with operators to improve user acquisition and engagement; and operators use it to differentiate from competitors and add new products and promotions.

ZERO RATING AND NET NEUTRALITY



Zero rating is the first widely deployed, large scale service falling under the net neutrality regime that involves partnerships between app providers and mobile operators. As such, it is critical to look at the interplay between regulation and commercial offerings, both to improve existing services, as well as to inform future offerings around 5G-enabled services.

The regulatory framework has a strong impact on the characteristics of zero-rating plans. India for example, outright banned such plans, while others give full freedom to the operators to dictate which app providers are included and how (e.g. handpick applications they want to zero-rate, or charge app providers to participate in such programs). We consider Europe an interesting use case --- defining a framework where zero rating is allowed under certain requirements.

In the long run, much like privacy, most countries will have a net neutrality framework that dictates partnerships between content and application providers and mobile operators at the network level.





SELFIE
NETWORKS

SECTION 2.1:
FOCUS ON EUROPE

SECTION 2.2:
PARTICIPATION, DISCRIMINATION, AND COMPLIANCE



A FOCUS IN EUROPE

The European Commission's [Open Internet Regulation](#) (and subsequent implementation guidelines by the Body of European Regulators for Electronic Communications --- [BEREC](#)) [defined a net neutrality framework](#) for zero-rating plans and eligibility criteria for app providers to participate in such plans, posing three main requirements for zero-rating plans:



Category-based (i.e. a music plan and not a Spotify plan)



Free for app providers



No discrimination - eligible app providers within a category should be able to participate

The vast majority of zero rating plans in Europe are indeed category-based and, to the best of our knowledge, free for app providers. But despite the existing net neutrality framework, the barrier for new applications to participate in such programs is high, raising compliance and discrimination concerns. [We will discuss this more in the next section.](#)





PARTICIPATION, DISCRIMINATION AND COMPLIANCE

“Zero rating is critical yet hard for any music service. At the end, we want to compete fairly with other music apps that already participate in such zero rating plans and help our users listen to their favorite artists while on the go.”

Dave Macli,
CEO and co-founder of Audiomack

Working with multiple application providers in different categories (social, chat, music), we are in a unique position to understand the challenges Content and Application Providers (CAPs) face to participate in existing zero-rating programs. To demonstrate this, we will look at a specific example: Audiomack, a growing music streaming service with tens of million of users worldwide, that is trying to participate in all music-related zero-rating plans over the last several months.

From the 34 music-related available zero-rating plans in Europe, Audiomack has been able to participate only in three of them so far. 70% of them (25 out of 34) have either no means to apply, or never responded to the original inquiry to participate in the program. We don't have definite results on the remaining 7 as we are currently trying to integrate in their plans, but in some cases this process has already taken several months so far. Table 2 outlines detailed progress on a per-operator basis, recording the first day Audiomack applied to participate in a program, and checkpoints for the first response from an operator and time it took for the final launch.

WHY IS THIS IMPORTANT FOR AUDIOMACK?

80% of music listening at Audiomack's platform happens either on WiFi or offline, a strong indication that users are concerned to use the app while on the go because of data usage. Unlike Audiomack that participates in 3 zero rating plans, competitor platforms like Spotify or Apple Music participate in 23 and 26 respectively.

DAYS TO LAUNCH:

describes how inclusive a program is. Unlike other metrics (like number of applications in a plan) it captures the current state of the program, and whether it is open for application partners (and their users).



The chart below details the efforts of a music streaming service to participate in 34 zero rating plans in Europe (as of September 26th, 2019). After several months it has been able to participate only to three of them; 25/34 do not offer online means to apply or didn't respond to the original inquiry. Despite the existing net neutrality framework, application providers face a high barrier to participate in zero rating plans.

NAME	COUNTRY	STATUS	DAYS TO LAUNCH (OR REJECT)	DATE APPLIED	DAYS TO FIRST RESPONSE
A1	Austria	Pending	107 and counting...	11-Jun-19	107 and counting...
Three	Austria	No Means to Apply	N/A		N/A
Proximus	Belgium	Pending	23 and counting...	3-Sep-19	0
Telenor Bulgaria	Bulgaria	No Means to Apply	N/A		N/A
Hrvatski	Croatia	Pending	65 and counting...	23-Jul-19	65 and counting...
A1	Croatia	No Means to Apply	N/A		N/A
Vodafone	Czech	Pending	107 and counting...	11-Jun-19	107 and counting...
T-Mobile	Czech	No Means to Apply	N/A		N/A
EE	GB	Pending	29 and counting... (**)	28-Aug-19	1
Three	GB	Pending	107 and counting...	11-Jun-19	107 and counting...
Telekom	Germany	Launched	24	5-Feb-19	0
Vodafone	Germany	Pending	283 and counting...	17-Dec-18	0
Cosmote	Greece	Launched	44	11-Jun-19	1
Vodafone	Hungary	No Means to Apply	N/A		N/A
Simin	Iceland	No Means to Apply	N/A		N/A
Vodafone	Italy	No Means to Apply	N/A		N/A

(Table 2).

** There was a 3-week delay from Audiomack to review EE's NDA that mostly contributed to this delay.





NAME	COUNTRY	STATUS	DAYS TO LAUNCH (OR REJECT)	DATE APPLIED	DAYS TO FIRST RESPONSE
TIM	Italy	Pending	107 and counting...	11-Jun-19	27
Tango	Luxembourg	Pending	65 and counting...	23-Jul-19	65 and counting...
post	Luxembourg	Pending	65 and counting...	23-Jul-19	65 and counting...
Telenor	Montenegro	No Means to Apply	N/A		N/A
Telenor	Norway	Pending	107 and counting...	11-Jun-19	62
Telia	Norway	Pending	66 and counting...	22-Jul-19	66 and counting...
Orange	Poland	No Means to Apply	N/A		N/A
TMobile	Poland	Pending	107 and counting...	11-Jun-19	107 and counting...
Plus	Poland	No Means to Apply	N/A		N/A
Vodafone	Portugal	No Means to Apply	N/A		N/A
MEO	Portugal	Pending	107 and counting...	11-Jun-19	107 and counting...
Yorn	Portugal	Pending	107 and counting...	11-Jun-19	30
Vodafone	Romania	Pending	107 and counting...	11-Jun-19	107 and counting...
Telenor	Serbia	No Means to Apply	N/A		N/A
Telekom	Slovakia	Pending	65 and counting...	23-Jul-19	65 and counting...
A1	Slovenia	Launched	29	23-Jul-19	8
Vodafone	Spain	Pending	107 and counting...	11-Jun-19	107 and counting...
Threee	Sweden	Pending	66 and counting...	22-Jul-19	66 and counting...

Continuation (Table 2).

SUMMARY: Despite existing net neutrality regulation in Europe, the barrier for application providers to participate in such programs is high even for eligible and highly popular commercial applications.

ONBOARDING AND INTEGRATION INSIGHTS



We already saw that there is a high-barrier for CAPs to enter existing zero-rating plans, even when this is dictated by regulation. We will try to provide insights on why operators are slow to add CAPs in their zero-rating programs from our own experience, along with recommendations on best practices.

SECTION 3.1:
COORDINATION AND FRAGMENTATION

SECTION 3.2:
NEW PARTNER OVERHEAD

SECTION 3.3:
ZERO RATING AND DEEP PACKET INSPECTION

SECTION 3.4:
UNCLEAR REGULATORY REQUIREMENTS

COORDINATION AND FRAGMENTATION



There are many roles and functions involved to add new partners. Table 3 outlines typical roles we've seen across several zero-rating programs. Lack of a streamlined, well-maintained process and coordination across these teams often results in long delays and inefficiencies.

	PRODUCT MANAGEMENT	Take incoming requests from app providers, coordinate with internal stakeholders, contact point for app partners
	IT / OPERATIONS	Configure network infrastructure. Test app workflows and evaluate accuracy. Configure production network, re-test app workflows periodically and adjust configuration, triage billing issues on customer complaints.
	COMMUNICATIONS & MARKETING TEAM	Update website and social feeds, configure SMS campaigns and messaging
	CUSTOMER SUPPORT	Receive customer calls related with billing / inaccuracy issues, and coordinate with IT/Operations
	LEGAL	Review NDAs and contracts, address change requests from app providers
	REGULATORY & COMPLIANCE	Coordinate with regulators for audits and complaints, review and define requirements for compliance.
	NETWORKING VENDOR / CONSULTANTS	Testing and configuration is occasionally performed by networking vendors and/or consultants as part of professional services.
	DESIGN AGENCY	In cases where the operator and app provider enter into a further agreement with marketing activities, a design agency is often involved from the operator's side.
	BUSINESS DEVELOPMENT / PARTNERSHIPS	Manage relationships with large CAPs, and actively try to engage with new partners.

(Table 3).

RECOMMENDATION FOR OPERATORS: Appoint an internal owner for the program; use simple Terms & Conditions instead of NDA; list an email or portal for application partners to apply for participation on your website; schedule a monthly date to launch new partners in the program; commit to a one-month limit from participation request to launch.

NEW PARTNER OVERHEAD

Adding a new partner comes with overhead for an operator. Unlike other countries where the cost of zero-rated data can be viewed as overhead, this is not the case in most European countries. Highly popular apps (e.g., Facebook, Spotify, YouTube, Apple Music) already participate in equivalent offerings, and adding new partners would not add significant volume on top of what is already zero rated.

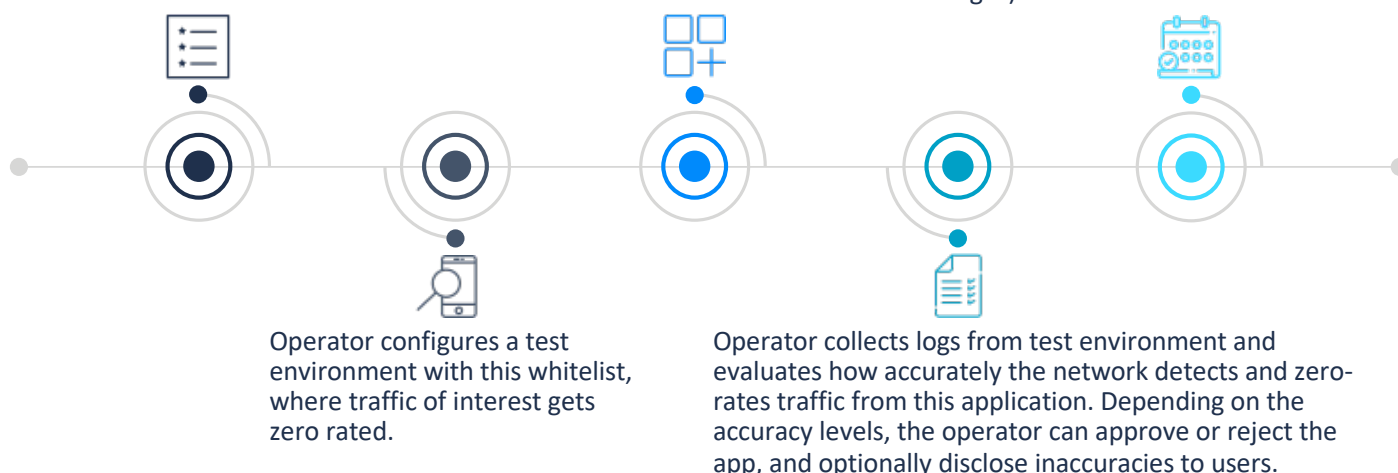


The main overhead comes in terms of testing and integration from the IT department. It is worth looking a bit closer to what this entails. The typical IT workflow to add a new partner is below:

CAP provides a whitelist of URL/SNI/IP that uniquely characterize the traffic of its application.

Operator uses the app on test phone(s) and manually executes representative user workflows.

Ideally, this process is repeated periodically (to account for changes in an application's backend or verify correctness after network configuration changes).



Testing requires to setup test phones and manually execute user workflows within the app of interest, which is time consuming (there is no easy way to replicate all different user workflows for a specific application, other than actually use it for a long time and exhaust all different features).

As accuracy levels are very dependent on the workflow under consideration, things get worse when testing is insufficient. In one case, an application was rejected from an operator because of low accuracy. When applied again a few months later (without changing anything in terms of features and traffic), it got approved. The only thing that changed was that the operator tested a different workflow that provided better coverage.

While most operators want to periodically test zero rating accuracy, they lack the resources to do it and fallback waiting for customer complaints to identify potential issues. Furthermore, exchange of traffic whitelists between app providers and operators happens manually (over email and spreadsheets), and traffic changes from applications are frequently not communicated ahead of time.

RECOMMENDATION FOR OPERATORS: Automate the process to run application-specific tests, collect traffic logs and video captures, and analyze traffic breakdown; Use open-source frameworks like Appium to record tests, and re-run them periodically to detect changes or network misconfigurations; provide an API for application providers to notify you on traffic changes instead of depending on emails and spreadsheets.

ZERO RATING AND DEEP PACKET INSPECTION



We already discussed how inaccuracies on traffic detection make adding new partners to zero rating programs harder. These inaccuracies are largely due to Deep Packet Inspection (DPI), the underlying mechanism used to enable zero rating.

DPI methods try to “outsmart” what end users and applications do, i.e., they maintain application whitelists and map network packets to an application by examining IP addresses, URLs, and SNI fields. Besides privacy concerns that are widely discussed, DPI has fundamental limitations that lead to zero rating inaccuracies:

THIRD-PARTY TRAFFIC: Every application uses third-party services which generate traffic that is not detected by DPI and therefore not zero rated. Typical examples include advertisements, Google Maps traffic on the Uber app, and video gifs loaded as a keyboard feature.

TRAFFIC NOT COVERED BY AN APPLICATION'S WHITELIST: this can be peer-to-peer traffic, or traffic shared with servers of the same company that are not part of the zero rating offer.

APPLICATION CHANGES: application whitelists often become obsolete as application providers make changes on their infrastructure (for example adding new servers and IP addresses).

Note that outsmarting the endpoints is not necessary for zero rating --- every zero rating partnership requires explicit coordination between CAPs and operators at the human level (at the very least for exchange of application whitelists and approval of terms and conditions).

While there is no short-term fix for this, we encourage stakeholders to work together and develop a new mechanism that allows users, CAPs and operators to explicitly share context in a secure, scalable, and privacy-respectful way.



UNCLEAR COMPLIANCE REQUIREMENTS

BEREC's net neutrality guidelines in Europe state that eligible CAPs should not be discriminated from zero rating programs. But the current recommendations on commercial practices are not clear enough to encourage proper implementation. First, they recommend a case-by-case approach for enforcement on local regulators, and second, do not put any time limits for an operator to onboard a new partner. This reduces accountability on the operator side, makes it hard for internal teams to secure the appropriate resources and budget, and often leads to an under maintained onboarding process. It also discourages CAPs from participating in such programs, as most of them do not have the resources (or knowledge) to file a complaint with the appropriate regulator.



RECOMMENDATION FOR REGULATORS: check that local operators offer online means for applications providers to participate in programs; enforce clear time-based requirements for operators to onboard a new partner; encourage the community to develop new mechanisms that will streamline provision and participation in differentiated network services.



SELFIE
NETWORKS



About Selfie Networks

Selfie Networks, founded by Yiannis Yiakoumis (Stanford PhD) and Nick McKeown (Stanford Professor and serial entrepreneur) builds technology to democratize partnerships between application providers and mobile operators, and enable innovative network services in the presence of net neutrality. Selfie Networks is headquartered in San Francisco, California, and funded by top-tier investors, including Bowery Capital, Lightspeed Ventures, and several luminaries in the networking and systems space.

Visit <https://selfienetworks.com/> or follow us at @Selfie_Networks

Contact

info@selfienetworks.com

Jennifer Scotsman



SELFIE
NETWORKS

SUMMARY



Zero-rating is widely deployed worldwide, with more than 160 operators in 85 countries offering zero-rating plans to almost 3 billion users, and 1,000+ applications participating in them.



Despite EU's Open Internet Guidelines, existing zero rating plans make it hard for application providers to participate, raising concerns around compliance and inclusiveness.



Compliance issues are largely due to a manual, error-prone, and poorly maintained process from most mobile operators. Most of these issues can be fixed through automation, better processes, and stricter regulatory enforcement.



Addressing the existing flaws of zero rating programs will be critical to enable successful, 5G-enabled services.