Detecon Consulting Co., Ltd.

Cloud Innovation Limited

Project Report

September, 2022

This report provides the following: (I) an overview of Detecon Consulting Co., Ltd. and Detecon's Project Manager, designated for producing this report, background and qualifications; (II): an analysis of publicly available Cloud Innovation Internet Protocol ("IP") address routing information, which indicates fair amount of space being used within AFRINIC region; (III): an analysis of the type of websites associated with IP address space assigned to Cloud Innovation which indicate two key findings: (1) that not a single case of images of child abuse had been detected, and (2) vast majority is advertisement websites and Content Websites (video or text based); and (IV) Afterword.

I. Background

Detecon Consulting Co., Ltd. is a subsidiary and an integral part of Detecon International GmbH ecosystem, recognized among world's best management consulting firms (Forbes, 2022) and an independent company within the Deutsche Telekom Group. Detecon provides state of art solutions within its key area of expertise – ICT (information and communications technologies). Detecon is considered an industrial expert for network infrastructure, 5G networks, smart mobility solutions, digital ecosystems design and more.

Mr. Rzadkiewicz, Fabian Michal is a Senior Manager at Detecon Consulting Co., Ltd. with active years of working with Detecon: 2018–2019 and 2021–now. Mr. Rzadkiewicz obtained MA in Economics from Poznan University of Economics in 2014 and Post-Graduate Diploma in Business Intelligence from Warsaw School of Economics in 2017, with a paper on using quantitative methods in financial risk management (The Use of Monte Carlo Method in Valuation of Portfolios of Receivables, 2017).

Mr. Rzadkiewicz has over 10 years of IT & Business consulting experience as Data Analyst, Digital Project Manager, Process Manager and Management Consultant. He brings in extensive experience in Big Data Anlaysis, Business Intelligence, Data Modelling, Risk Control, Algorithms, Quantitative Research, Process Design, Product and Service Development and Innovation Management. He is a certified Project Manager and Product Owner (PSM, PSPO).

As of April 2022, Mr. Rzadkiewicz assumed the role of Head of Customer Centric Product and Service Design at Detecon Consulting Co., Ltd., making Qualitative and Quantitative Research a backbone of his business practice.

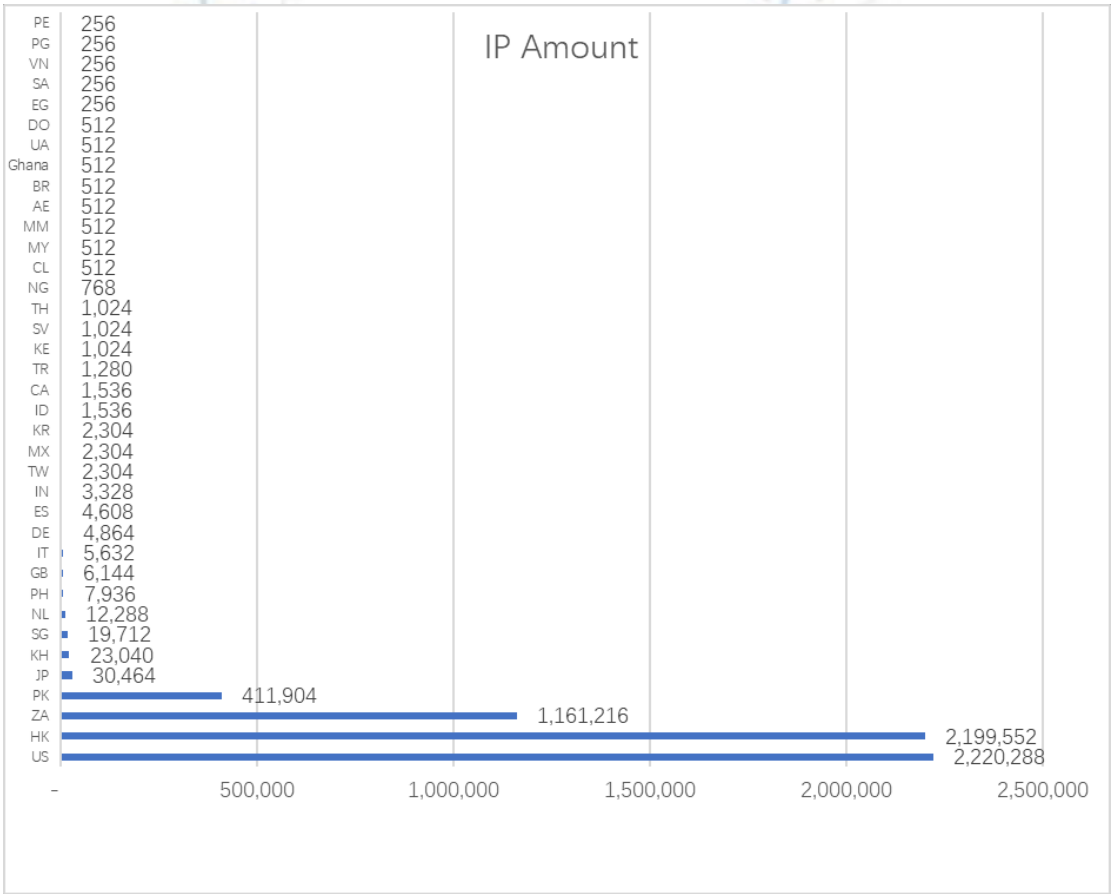
II. Analysis of Cloud Innovation Routing Information

a) Origination of Routes

Route origination is the location where an IP address is originated and used. In this section, Detecon collected the data from RIPE NCC (http://ff stat.ripe.net) for the analysis. RIPE NCC is the regional Internet registry (RIR) for Europe, the Middle East and parts of Central Asia, where the data provided by it shall be regarded reliable. The data is public that anyone can access the data for verification.

On 9th of August 2021, the majority countries of the route origination of the Cloud Innovation IP addresses are shown below (full data listed in Appendix A – Countries-Regions of Route Origination 2021).

Country / Region	Amount of IP Addresses	% of Routing
United States	2,220,288	36%
Hong Kong	2,199,552	36%
South Africa	1,161,216	19%
Pakistan	411,904	7%



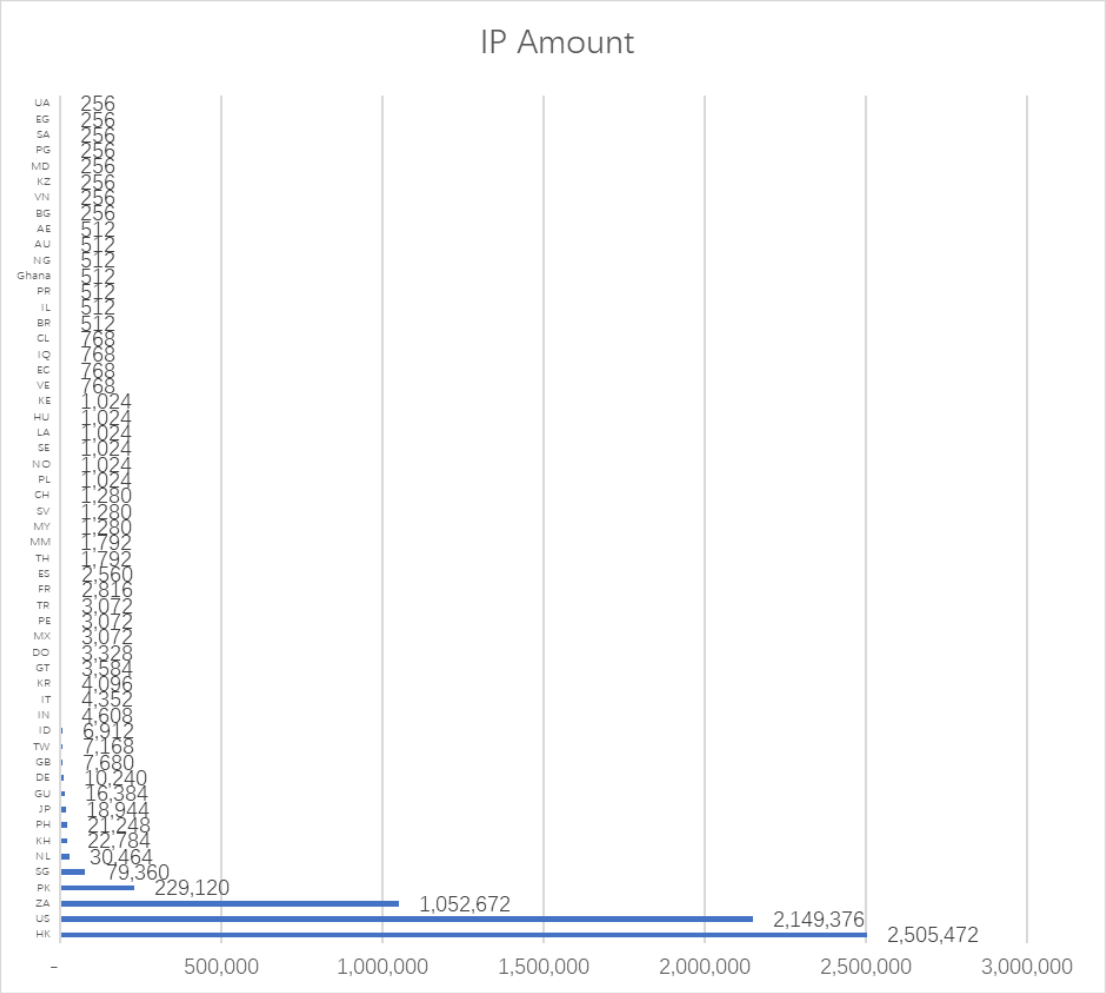
The table below further lists the route origination of the Cloud Innovation IP addresses on the same date within the AFRINIC countries.

AFRINIC Country	Amount of IP Addresses	% of Routing
South Africa	1,161,216	18.94%
Kenya	1,024	0.02%
Nigeria	768	0.01%
Ghana	512	0.01%
Egypt	256	0.00%

In more recent time, on the 25th of August 2022, the majority countries of the route origination of the Cloud Innovation IP addresses are shown below (full data listed in Appendix B – Countries-

Regions of Route Origination 2022).

Country / Region	Amount of IP Addresses	% of Routing
Hong Kong	2,505,472	40%
United States	2,149,376	35%
South Africa	1,052,672	17%
Pakistan	229,120	4%



The table below further lists the route origination of the Cloud Innovation IP addresses on the same date within the AFRINIC countries:

AFRINIC Country	Amount of IP Addresses	% of Routing
South Africa	1,052,672	16.94%
Kenya	1,024	0.02%
Ghana	512	0.01%
Nigeria	512	0.01%
Egypt	256	0.00%

Therefore, the analysis provides irrefutable evidence that as of 9th of August 2021, nearly 20% of

Cloud Infrastructure-associated IP addresses were routed from AFRINIC region.

As of 9th of August 2021, the top 5 of the Autonomous System (AS) numbers that the most Cloud Innovation IP addresses were routed from are shown below (full data listed in Appendix C – ASN 2021).

	ASN	AS Number Registrant	Total IP Amount	Country
#1	328608	Africa on Cloud	1,152,256	ZA
#2	35916	MULTACOM CORPORATION	910,848	US
#3	134548	DXTL Tseung Kwan O Service	875,264	HK
#4	132839	POWER LINE DATACENTER	621,056	US
#5	139879	Galaxy Broadband	352,256	PK

As of 25th August 2022, the top 5 of the Autonomous System (AS) numbers that the most Cloud Innovation IP addresses were routed from are shown below (full data listed in Appendix D – ASN 2022).

	ASN	AS Number Registrant	Total IP Amount	Country
#1	35916	MULTACOM CORPORATION	1,038,848	US
#2	328608	Africa on Cloud	1,030,912	ZA
#3	134548	DXTL Tseung Kwan O Service	414,976	HK
#4	135097	LUOGELANG (FRANCE) LIMITED	385,792	HK
#5	132839	POWER LINE DATACENTER	337,152	US

b) The IP addresses that AFRNIC allocated to Cloud Innovation

In the hypothetical situation of receiving claims or accusations that Cloud Innovation was announcing the 4 parent IP blocks from certain ISPs (see table below), and then allegedly announced more specific aggregates from those same given blocks from ISPs outside of the region of origins, e.g. Hong Kong and for the United States, an alleged statement of Cloud Innovation making these announcements is factually incorrect.

Block	Origin AS Number	AS Number Registrant
154.80.0.0/12	AS16637 (FALSE)	MTN Network Solutions
45.192.0.0/12	AS16637 (FALSE)	MTN Network Solutions
156.224.0.0/11	AS16637 (FALSE)	MTN Network Solutions
154.192.0.0/11	AS37353 (FALSE)	Seacom Western Cape (Pty) Ltd

According to our analysis done for the 2 given timestamps: 9th of August 2021 and 25th of August 2022, there were no Cloud Innovation IP addresses routed from the AS numbers listed above to begin with.

Furthermore, it had not been observed that Cloud Innovation's IP ranges had been announced as $154.80.0.0/12, 45.192.0.0/12, 156.224.0.0/11, 154.192.0.0/11$. In fact, the biggest announcement we saw in Cloud Innovation's IP ranges is only a $/14$, 8 times smaller than the alleged $/11$

announcement, in which was announced by AS35916, an American provider.

And none of the IP ranges within Cloud Innovation's 6.2 million IPs, was announced by any of above network as mentioned, while it was announced by nearly 300 networks worldwide, but MTN Network Solutions and Seacom Western Cape (Pty) Ltd were not among them.

In fact, during our research, Cloud Innovation did not make any announcement on its own (No ASN of Cloud Innovation was found). Instead, its IP addresses were leased though LARUS Limited, to third party network operators such as telecoms, ISPs, and hosting providers, whom would use them as part of their infrastructure service offering, such as hosting, to the end customers, who would use the IP addresses to host websites or provide all kinds of Internet related service, or simply use the IP addresses for connecting to the Internet.

On the route origination data, it is factually wrong to conclude that the announcement of the concerned specific aggregates are associated with Cloud Innovation because in its business Cloud Innovation provided its IP addresses via LARUS Limited to the customers. In reality, the announcement shall be more likely associated with these customers because these customers or these customers' customers were de facto end users of those IP addresses. The route origination analysis above that shows a large number (Almost 300 networks, see Appendices C and D) of different AS numbers *ƒ* AS registrants *ƒ* companies has proven this point.

It is not uncommon of an announcement made in a way in order to announce a covering aggregate for a parent prefix so to prevent any lost entries in the global routing table on the unannounced IP addresses.

Our analysis was conducted upon the more specific aggregates which is the precise way to find out the real routing situation, in which we have attached in our Appendices with real amount of IP addresses announced by each network (i.e., how many IP addresses actually reaching that network discounting the more specific routes).

c) Summary

Our analysis of publicly accessible data provides irrefutable evidence that nearly 20% of Cloud Innovation IP addresses are used in Africa.
Our analysis of publicly accessible data provides irrefutable evidence that Cloud Innovation's customers spread over almost 60 countries across the five continents, announcing the Cloud Innovation IP addresses in nearly 300 different networks.

III. Analysis of Websites Hosted on Cloud Innovation-Assigned IP Address Space

a) Methodology and Analysis

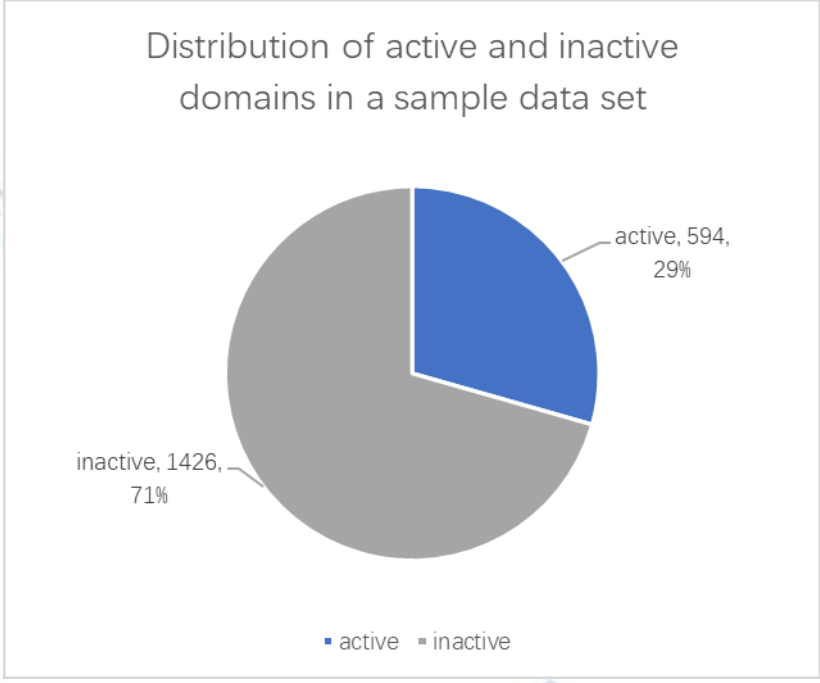
Based on the raw data sets retrieved from the most popular domain*ƒ*IP address research company "Domain Tools" (Domaintools.com) with 2 different timestamps, respectively, July 2021 and August 2022, cleaned (here: merged with duplicates removed) with Python script (Appendix E

– Python Script for Data Cleaning) and randomized (here: created randomly selected sample size of 2020 domains associated with corresponding Cloud Innovation IP address space) with another Python script (Appendix F – Python Script for Statistical Sample Selection), Appendix G – Statistical Sample (Randomized), had been concluded.

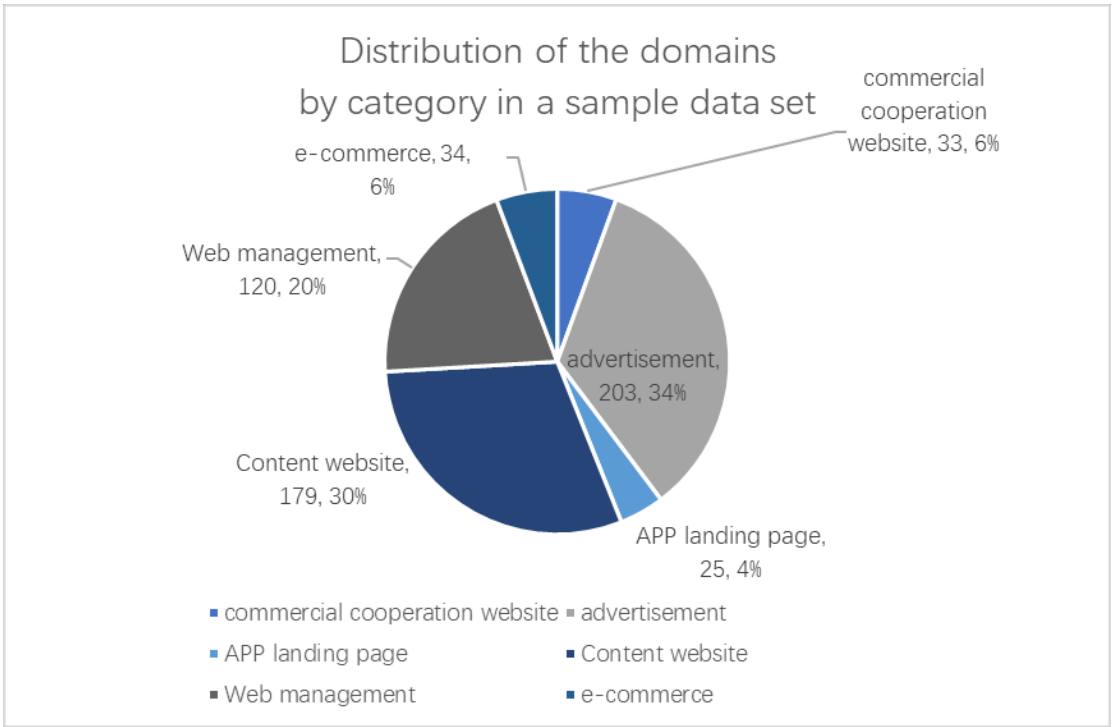
Base on raw data from "Domain Tools", across total 6,291,456 IP addresses assigned by Cloud Innovation to its customers, there were total 7.3M websites in July 2021, and 6.6M websites in August 2022, across nearly 300 different networks and almost 60 different countries/economies in all five continents.

As a result of manual verification of 2020 websites associated with Cloud Innovation IP address space, and to the best knowledge and understanding of Detecon Consulting Co., Ltd. the following had been discovered:

1. Inactive domains comprise of 71% or 1426 websites, of the given sample data set.



2. Distribution of the domains by category indicates the following pattern:



Based on the statistical sample analysis, Detecon was able to provide the estimates of the website categories among all the active websites within the total population of Cloud Infrastructure IP address space at 95% confidence level:

According to the statistics textbook “Statistics for Business and Economics (13e)”, for an interval estimate of a population proportion, $E = z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$ $n = \frac{(z_{\alpha/2})^2 \bar{p}(1-\bar{p})}{E^2}$

with a confidence level equal to 95%, $\alpha = 0.5\%, (z_{\alpha/2})^2 = 3.8416$ (according to Normal distribution Z−value table), a calculation for the error of the population proportion for each category can be conducted:

Category	Distribution	Distribution [%]	Error [E]	left side of the range	right side of the range
commercial cooperation website	33	5.56%	1.84%	3.71%	7.40%
advertisement	203	34.18%	3.81%	30.36%	37.99%
APP landing page	25	4.21%	1.61%	2.59%	5.82%
Content website	179	30.13%	3.69%	26.44%	33.82%
Web management	120	20.20%	3.23%	16.97%	23.43%
e-commerce	34	5.72%	1.87%	3.86%	7.59%
SUM TOTAL	594				

With $n = 594$ active websites, the errors are distributed from 1.61% to 3.81%.

b) Conclusions

Therefore, we are coming to a conclusion:

- At 95% confidence level, the total distribution of “commercial cooperation websites” among all the active domains within Cloud Infrastructure IP address space, ranges

between 3.71% and 7.40%

- At 95% confidence level, the total distribution of "advertisement" websites among all the active domains within Cloud Infrastructure IP address space, ranges between 30.36% and 37.99%
- At 95% confidence level, the total distribution of "APP Landing page" websites among all the active domain within Cloud Infrastructure IP address space, ranges between 2.59% and 5.82%
- At 95% confidence level, the total distribution of "content websites" among all the active domain within Cloud Infrastructure IP address space, ranges between 26.44% and 33.82%
- At 95% confidence level, the total distribution of "Web Management" websites among all the active domain within Cloud Infrastructure IP addresses, ranges between 16.97% and 23.43%
- At 95% confidence level, the total distribution of "E-commerce" websites among all the active domain within Cloud Infrastructure IP addresses, ranges between 3.86% and 7.59%

No Indecent Images of Children (IIoC) or Child pornography websites of any kind have been found during this research. There is also no terrorist related content being found during this research.

c) Summary

The evidence of manual verification of the statistical sample can be found in Appendix H – Statistical Sample (Randomized) – VERIFIED.

During manual verification of statistical sample, no Child Pornography or Terrorism-related websites had been identified.

IV. Afterword

This concludes the Project Report.