H2020 5G-TRANSFORMER Project

Grant No. 761536

Demonstrations at Mobile World Congress'19 and EuCNC'19 or equivalent

Abstract

One of the dissemination goals of 5G-TRANSFORMER is to present technical demonstrations of project results in relevant events. This document briefly explains the demonstration activities carried out during MWC 2019 in Barcelona and EuCNC 2019 in Valencia as well as the web and social media-related metrics gathered during these periods, which substantially improved. Other information related with the demonstrations carried out by the project is also provided.

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Disclaimer

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1 Introduction

As part of the Communication, Dissemination, and Exploitation Plan (CoDEP) [1] of the project, one of the dissemination goals of 5G-TRANSFORMER is to present technical demonstrations of project results in relevant events. They are used to showcase in a tangible way what is presented in the form of deliverables, papers, talks, etc. in other venues. This document briefly explains the demonstration activities carried out during MWC 2019 in Barcelona and EuCNC 2019 in Valencia. During MWC 2019 in Barcelona, two demonstrations were showcased, namely:

- AI-based Overbooking of Network Slices;
- Deploying a containerized ns-3/LENA-based LTE mobile Network Service through the 5G-TRANSFORMER platform.

During EUCNC 2019 in Valencia, 5G-TRANSFORMER had a booth in collaboration with 5G-CORAL. Multiple demonstrations from both projects were shown as well as a joint demo on cloud robotics.

News were generated in the project website during the event [3]. Additionally, web and social media-related metrics gathered while MWC 2019 was taking place are also presented. As observed in the statistics graphs, the main conclusion is that web and social media metrics improved during MWC 2019 and EuCNC 2019. Furthermore, links to videos on the project YouTube channel [4] and posters of the demos are also provided below.

Information on other demonstrations carried out by the project as well as a summary of communication, dissemination, and exploitation activities can be found in D6.5 [1] and D7.3 [2].

2 Demonstrations at MWC'19

The following sections briefly explain the scope of each demonstration presented at MWC 2019. A sample of the pictures taken at the booth during the event follow.

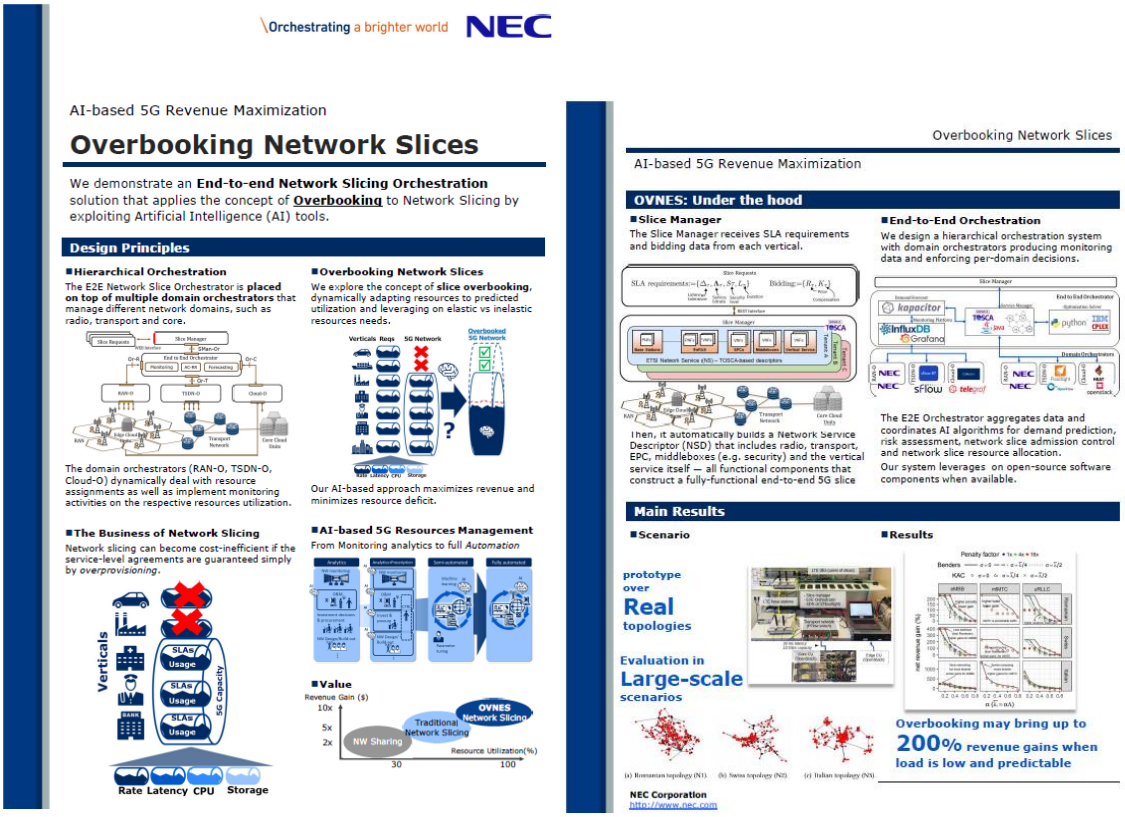
2.1 AI-based overbooking network slicing

This demonstration shows an experimental proof-of-concept of network slicing orchestration by leveraging 5G-TRANSFORMER´s hierarchical control plane to manage the orchestration of end-to-end network slices, including radio access, transport network, and distributed computing infrastructure. The demo shows a novel approach based on stochastic yield management theory to support the concept of slice overbooking. Overbooking is hence demonstrated as a new business model that can be built around 5G network slicing to increase the revenue of mobile operators. As a result, the demo shows practical admission control and resource allocation algorithms that exploit a recurrent neural network periodically trained for tenants demand inference.

FIGURE 1: ABOVE, (FROM LEFT TO RIGHT) ANDRES GARCIA SAAVEDRA, VINCENZO SCIANCALEPORE AND XAVIER COSTA FROM NEC, PRESENTING THE "OVERBOOKING NETWORK SLICES" POC AT MWC 2019

2.1.1 Demonstration Poster

A poster was generated to support the explanations given to visitors.



Also available at:

https://www.nec.com/en/event/mwc2019/leaflet/pdf_2019/Overbooking_Network_Slices.pdf

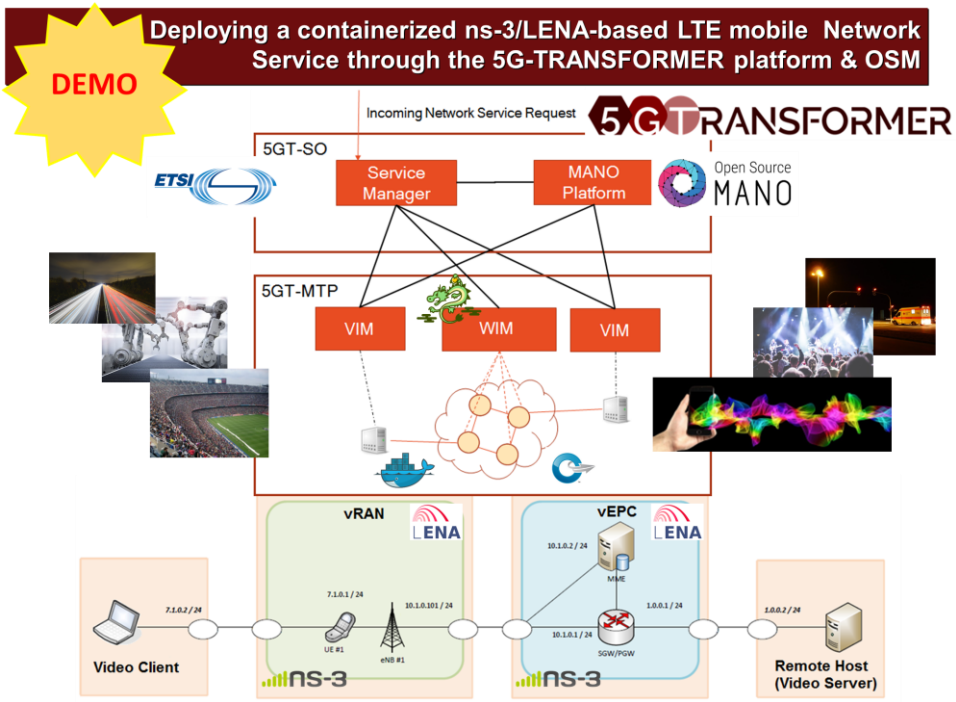
2.2 Deploying a containerized ns-3/LENA-based LTE mobile Network Service through the 5G-TRANSFORMER platform

This demo focuses on at-the-time an ongoing prototype implementation of the Service Orchestrator (SO) building block of the 5G-TRANSFORMER (5GT) architecture. The 5GT-SO includes the Service Manager (SM), which hosts the intelligence of the 5GT-SO and interacts with the other architectural blocks of the 5GT architecture through the defined APIs. The aim of defining the SM is to decouple the 5GT-SO implementation from the associated MANO platform (OSM in this case), allowing the interoperability with other MANO platforms, hence increasing the scope of the 5GT solution. This demo shows how the current ongoing implementation of the 5GT-SO, using the SM, is able to automate the orchestration of both computing and networking resources to deploy a virtualized mobile network service based on ns-3/LENA network simulator/emulator in minutes over an emulated environment consisting of a multi-point of presence infrastructure connected by a custom transport network.

FIGURE 2: ABOVE, JORDI BARANDA FROM CTTC PRESENTING THE 5G-TRANSFORMER SERVICE ORCHESTRATOR DEMO AT MWC 2019

2.2.1 Demonstration Poster

A poster was generated to support the explanations given to visitors.



Also available at: https://sites.cttc.es/mwc2019/images/TESTBEDS/demo_1.png

2.3 Other presence at Mobile World Congress

5G-TRANSFORMER was also present at MWC'19 at various booth as part of its dissemination activities. The following figures shows booths at which information on the project was available (e.g., flyers, videos).

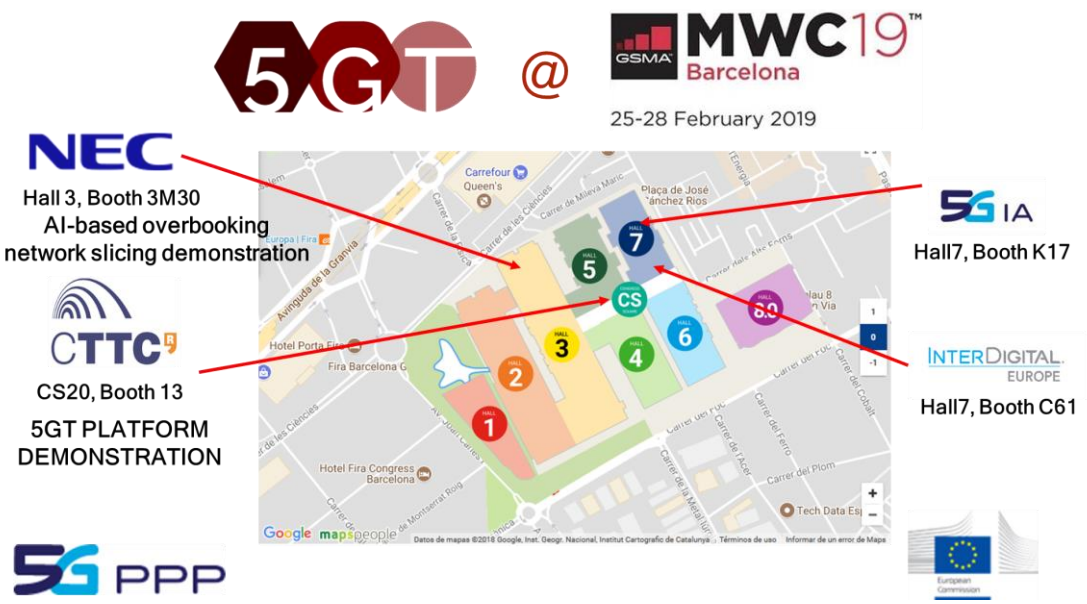


FIGURE 3: 5G-TRANSFORMER PRESENCE AT MWC 2019

3 Demonstrations at EuCNC19

The following sections briefly explain the scope of each demonstration presented at EuCNC 2019. A sample of the pictures taken at the booth during the event follow.

3.1 5G-TRANSFORMER and 5G-CORAL booth

This section presents demos from two different projects that are collaborating in the area of multi-domain, multi-provider orchestration of services and resources in cloud, edge and fog environments: 5G-TRANSFORMER and 5G-CORAL.

To show how the 5G-TRANSFORMER platform can orchestrate heterogeneous resources, several Proofs of Concept (PoCs) based on vertical-oriented use cases have been shown:

- The Automotive PoC demonstrates the deployment and management of the EVS (Extended Virtual Sensing) application on edge cloud. EVS is a road safety application designed to alert drivers about the presence of unseen vehicles or other unexpected obstacles at intersections;
- The Entertainment PoC describes the provision of a high definition content distribution service with very low latency and service creation time. The virtual appliances are dynamically deployed allowing the streaming service provider to deploy the different components in edge clouds close to the user;
- The MNO/MVNO PoC demonstrates the deployment of 3 network slices (echographer (URLLC), video (eMBB) and IoT devices (mMTC)).

5G-CORAL demonstrates the concepts behind the next generation of 5G Extreme Edge, composed of different tiers of Fog, MEC and Cloud with the following two demos:

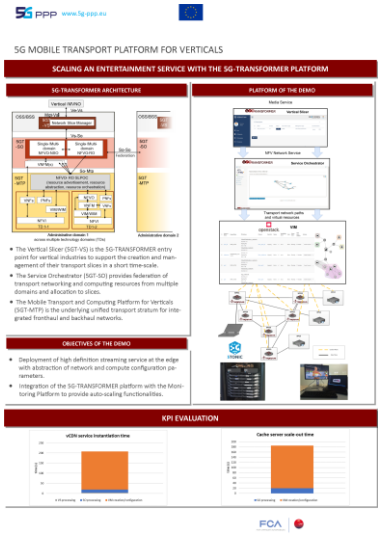
- The use of 5G-CORAL infrastructure for the deployment of Point of Service applications;
- The use of publish/subscribe mechanisms applied to the vehicular scenario, for the fast distribution of emergency information.

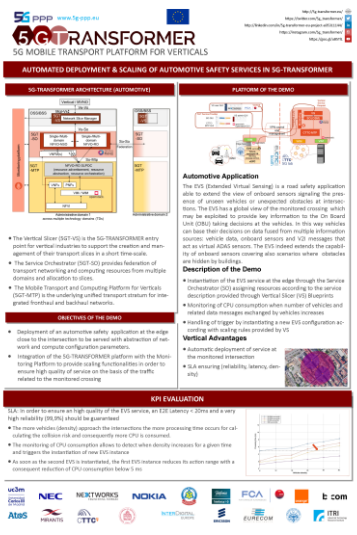
Finally, a joint 5G-CORAL/5G-TRANSFORMER PoC, focusing on the e-Industry (Cloud/Edge Robotics), demonstrates remote robotic control and actuation based on adaptive 360º video technology involving simultaneously two 5G slices (eMBB and URLLC) over an automated and distributed edge.

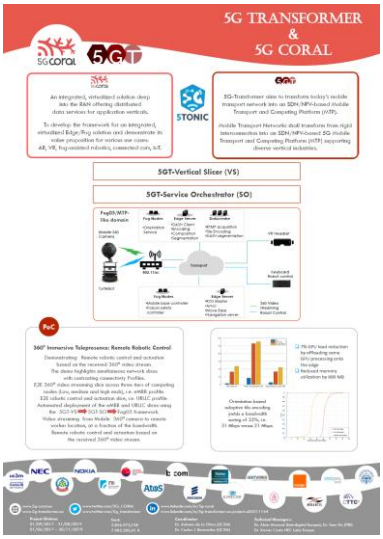
FIGURE 4: PANORAMIC VIEW OF THE JOINT BOOTH BETWEEN 5G TRANSFORMER AND 5G CORAL AT EUCNC 2019

3.1.1 Demonstration Posters

Posters to support the explanation of the demos were also prepared. Some examples follow:







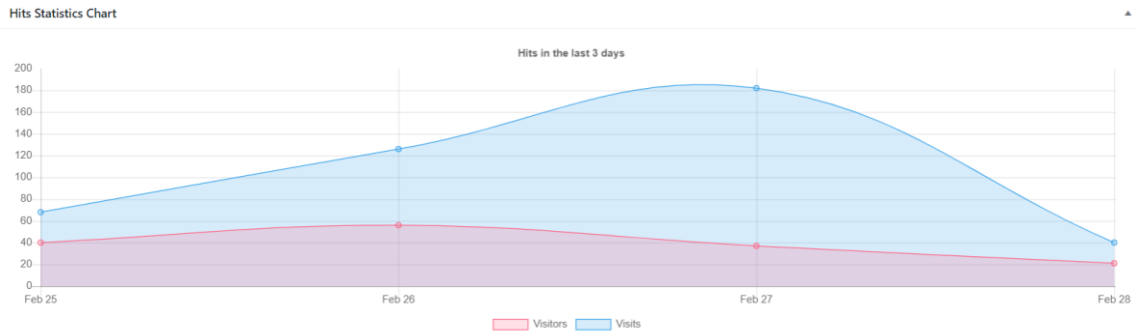
4 Web and social media

The project also evaluated the impact of demonstrating its technology in public, and, in general, participating in MWC 2019 and EuCNC 2019 through paper presentations, project overview talks, etc. This section presents some of the statistics gathered for the web and social media of the project. As can be observed, the main conclusion is that web and social media metrics improved during MWC 2019 (February 25-28) and EuCNC 2019 (June 18-21), showing peaks of various metrics during the days of the conferences.

4.1 MWC 2019

In what follows we show the metrics for the website and social media (Twitter, LinkedIn, Instagram and YouTube) during the dates of MWC 2019. We can observe how the number of visits and engagement increased during the dates of the event. In detail, the website peaked to 180 views (Figure 5) and the number of downloads (project factsheet, leaflet and brochure) increase to 30 in just one day (Figure 8). Figure 6 and Figure 7 show the most popular pages of the website. On the social media side, we improved average metrics during conference days. On Twitter, we got more *followers* and *retweets* (Figure 9) although the engagement rate decreased during the dates of the event. Figure 10 show the interests of the audience during those dates. Figure 11 shows the summary of all tweets during MWC 2019. We got 35 new followers and 35k tweet impressions. On LinkedIn, we increased the number of profile visualizations in comparison with the month average (Figure 12). On Instagram we got more followers (Figure 13). Finally, we increased the number of viewers in the YouTube channel (Figure 14).

4.1.1 Website



Hits Statistics Summary

	Visits	Visitors
Chart Total:	416	154
All Time Total:	46,067	20,008

FIGURE 5: VISITS TO WEBSITE DURING MWC 2019

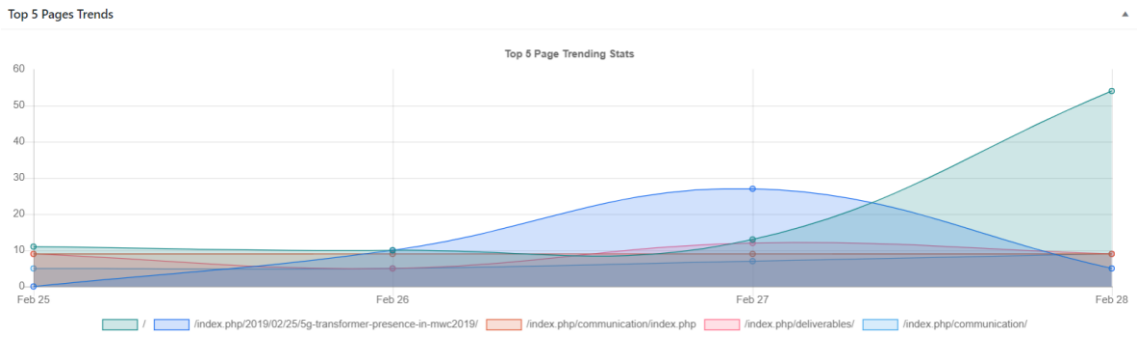


FIGURE 6: TOP 5 TRENDING PAGES DURING MWC 2019

Top Pages

ID	Title	Link	Visits
1	Project	/	88
2	5G-TRANSFORMER presence in MWC2019	/index.php/2019/02/25/5g-transformer-presence-in-mwc2019/	42
3	Project	/index.php/communication/index.php	36
4	Deliverables	/index.php/deliverables/	35
5	Communication	/index.php/communication/	26
6	Conferences	/index.php/dissemination/publications/conferences/	19
7	Journals and Magazines	/index.php/dissemination/publications/journals-and-magazines/	16
8	News	/index.php/news/page/4/	13
9	Demos	/index.php/dissemination/demos/	12
10	News	/index.php/news/	11

FIGURE 7: TOP 10 PAGES DURING MWC 2019

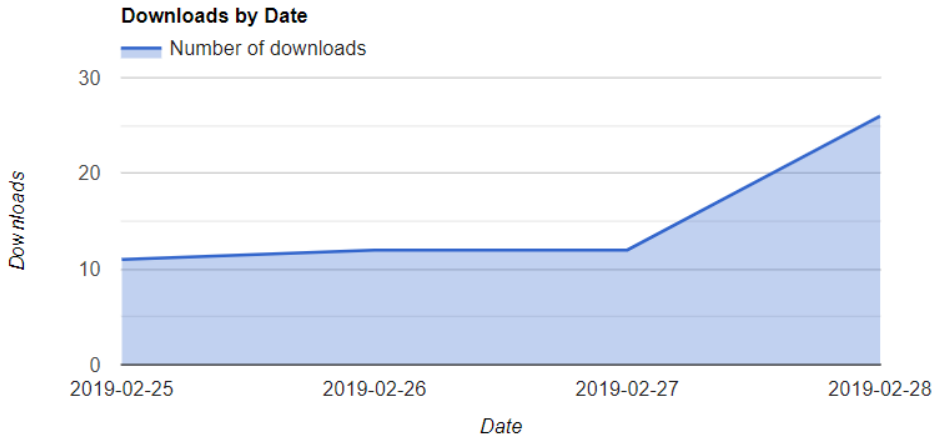


FIGURE 8: DOWNLOADS DURING MWC19 (PROJECT FACTSHEET, LEAFLET AND BROCHURE)

4.1.2 Twitter

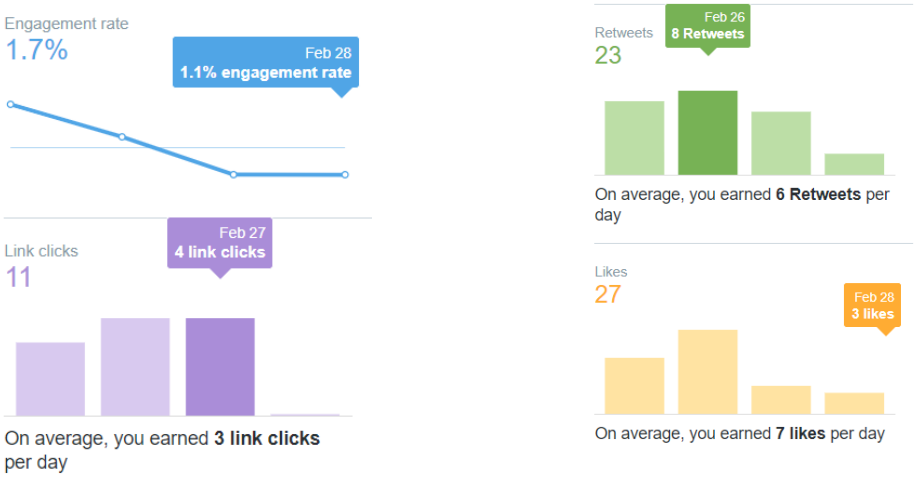


FIGURE 9: TWEET ANALYSIS DURING MWC 2019

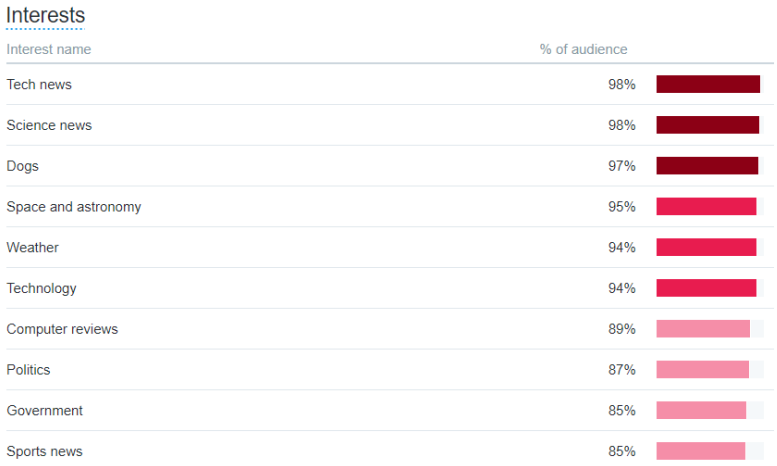


FIGURE 10: INTERESTS OF TWITTER'S AUDIENCE DURING MWC 2019

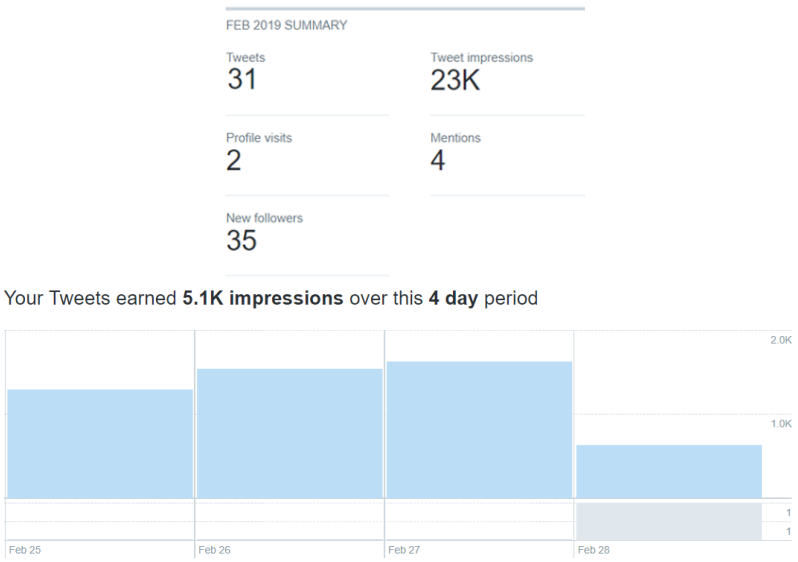


FIGURE 11: TWITTER SUMMARY AFTER MWC 2019

4.1.3 LinkedIn

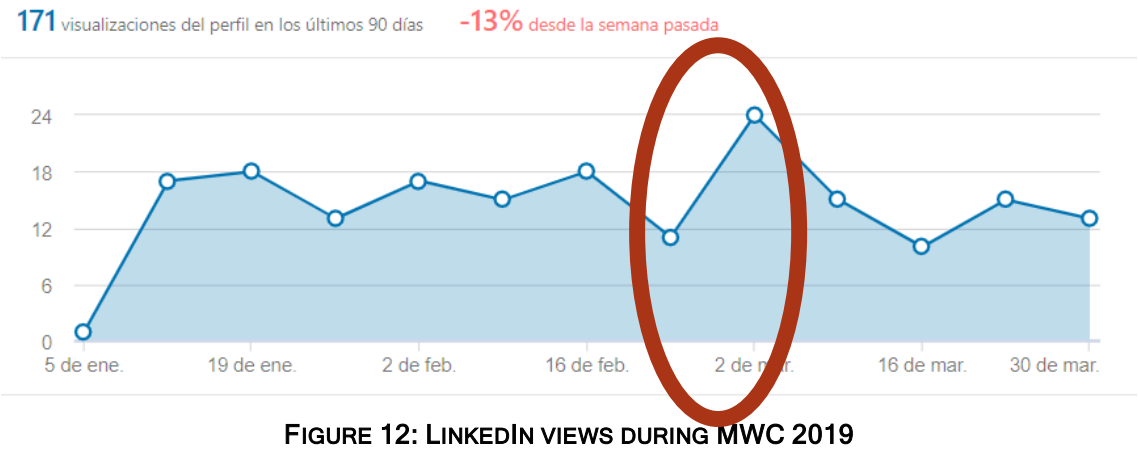


FIGURE 12: LINKEDIN VIEWS DURING MWC 2019

4.1.4 Instagram

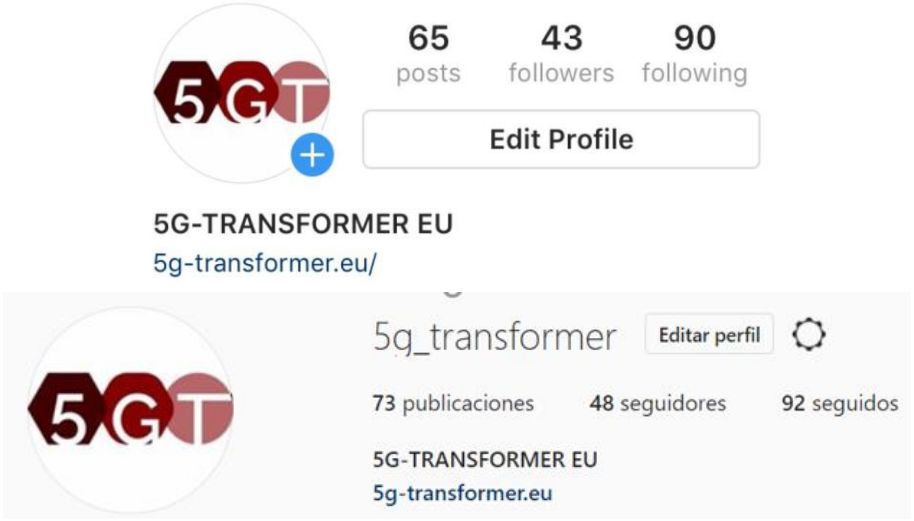


FIGURE 13: INSTAGRAM BEFORE (TOP) AND AFTER (DOWN) MWC 2019

4.1.5 YouTube

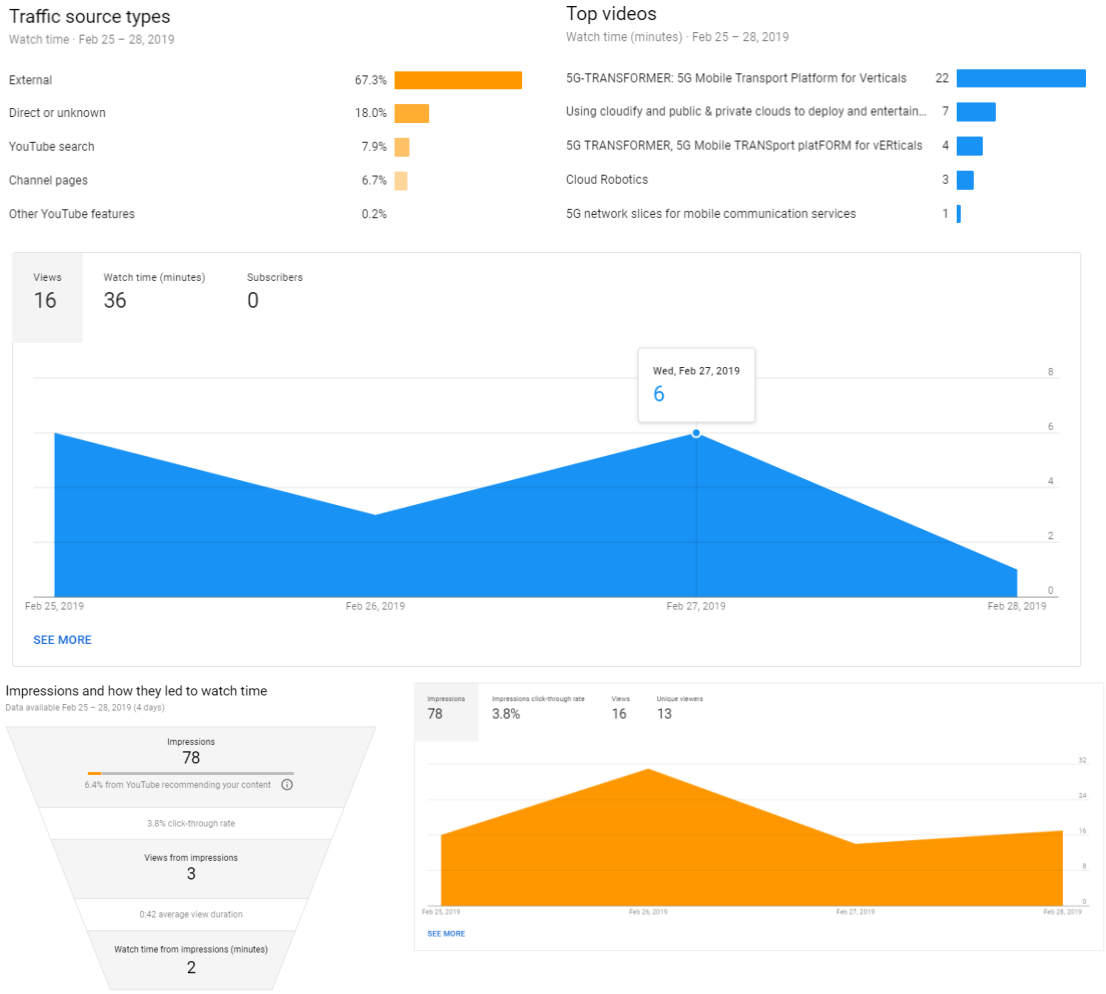


FIGURE 14: YOUTUBE VIEWERS AND WATCH TIME DURING MWC 2019

4.2 EuCNC 2019

Following, we show the detailed metrics of the website and social media (Twitter, LinkedIn, Instagram and YouTube) during EuCNC 2019. Website and social media increased their visualization during the dates of the event. Specifically, the website peaked to a bit more than 350 views (Figure 15). In fact, the number of downloads also increased (project factsheet, leaflet and brochure) and peaked to 18 in one day (Figure 18). Figure 16 and Figure 17 show the most popular pages of the website during the dates of the event. On twitter, we increased the number of retweets, likes and link clicks (Figure 19). Actually, we had and engagement rate of approximately 2%. Figure 21 shows the Twitter summary for the dates of the conference while Figure 20 shows the interests of our audience. On LinkedIn, we peaked to 27 profile views during the dates of the conference (Figure 22). This peak is way above the month average. On Instagram, we got 4 more followers (Figure 23). Finally, on YouTube, we got 22 viewers and 37 minutes of videos and we increased the impressions during the dates of the conference (Figure 24).

4.2.1 Website

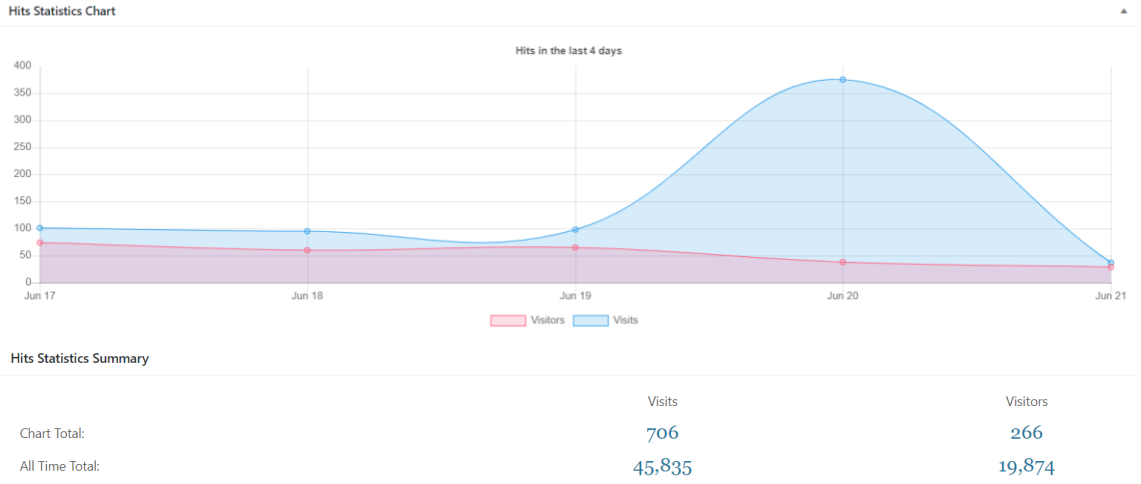


FIGURE 15: VISITS TO THE WEBSITE DURING EUCNC 2019

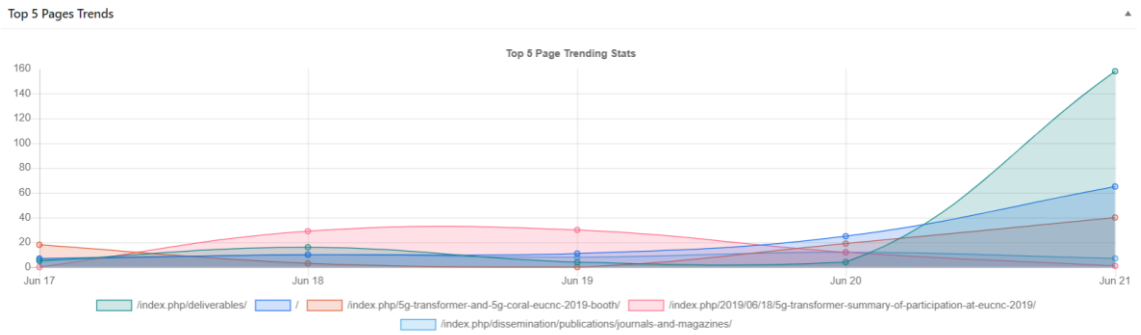


FIGURE 16: TOP 5 TRENDING PAGES DURING EUCNC 2019

Top Pages

ID	Title	Link	Visits
1	Deliverables	/index.php/deliverables/	187
2	Project	/	118
3	5G-TRANSFORMER and 5G-CORAL EuCNC 2019 booth	/index.php/5g-transformer-and-5g-coral-eucnc-2019-booth/	80
4	5G-TRANSFORMER summary of participation at EuCNC 2019	/index.php/2019/06/18/5g-transformer-summary-of-participation-at-eucnc-2019/	72
5	Journals and Magazines	/index.php/dissemination/publications/journals-and-magazines/	43
6	News	/index.php/news/	28
7	Publications	/index.php/dissemination/publications/	26
8	Communication	/index.php/communication/	14
9	Contacts	/index.php/contacto/	11
10	Consortium	/index.php/consortium/	11

FIGURE 17: TOP 10 PAGES DURING EUCNC 2019

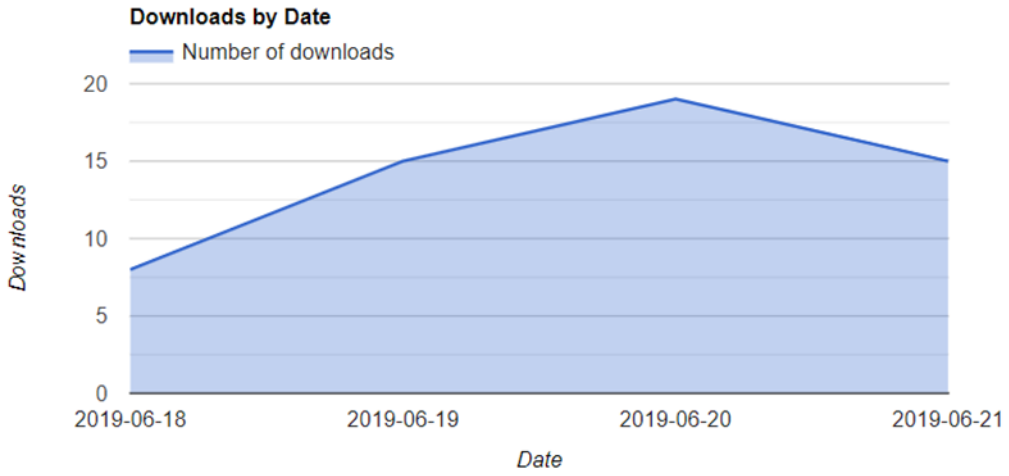


FIGURE 18: DOWNLOADS DURING EUCNC 2019 (PROJECT FACTSHEET, LEAFLET AND BROCHURE)

4.2.2 Twitter

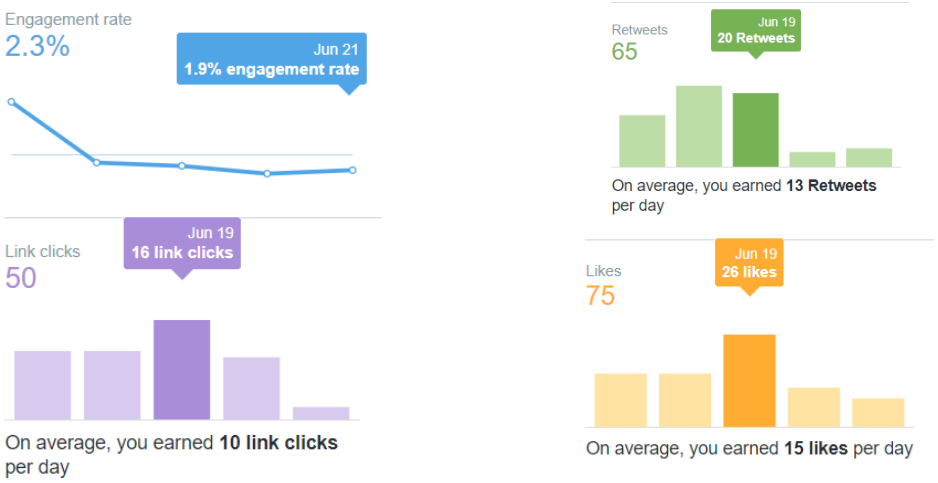


FIGURE 19: TWEET ANALYSIS DURING EUCNC 2019

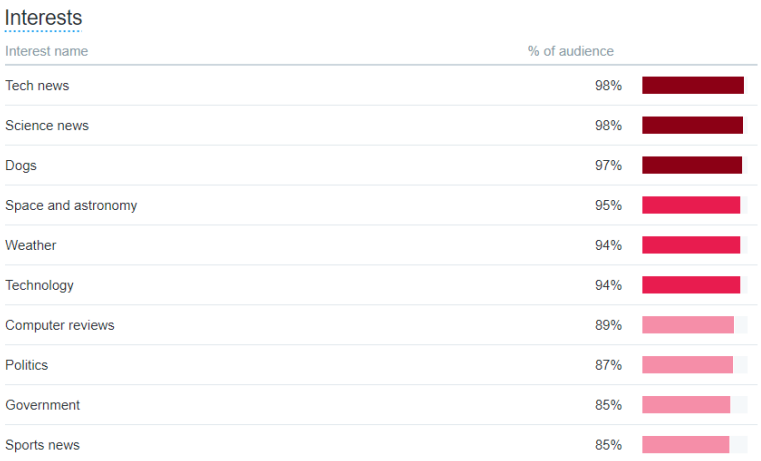


FIGURE 20: INTERESTS OF TWITTER'S AUDIENCE DURING EUCNC 2019

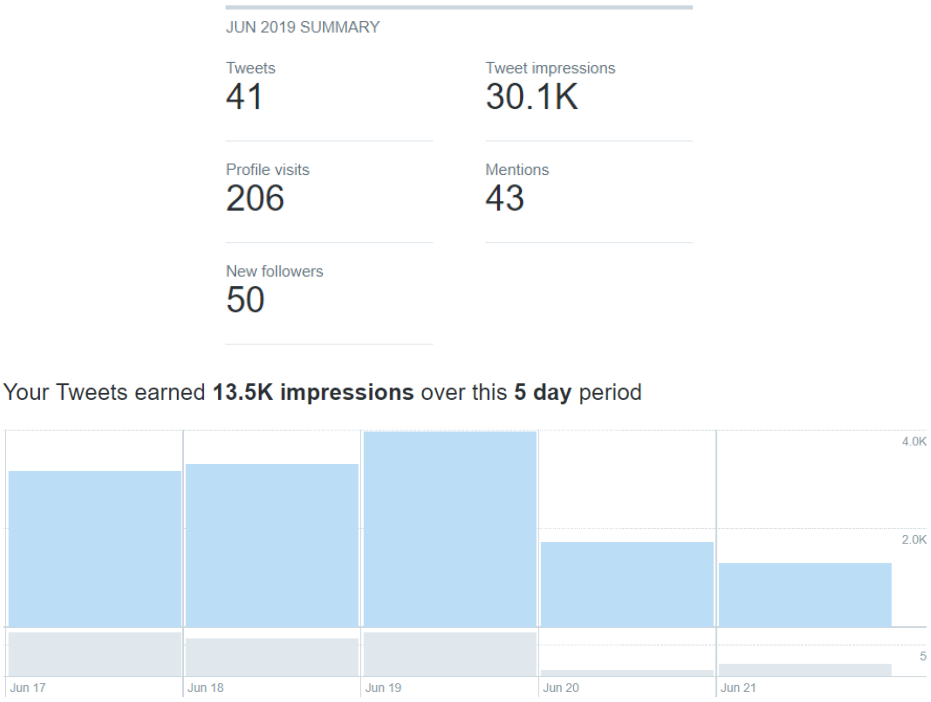


FIGURE 21: JUNE 2019 TWITTER SUMMARY AFTER EUCNC 2019

4.2.3 LinkedIn

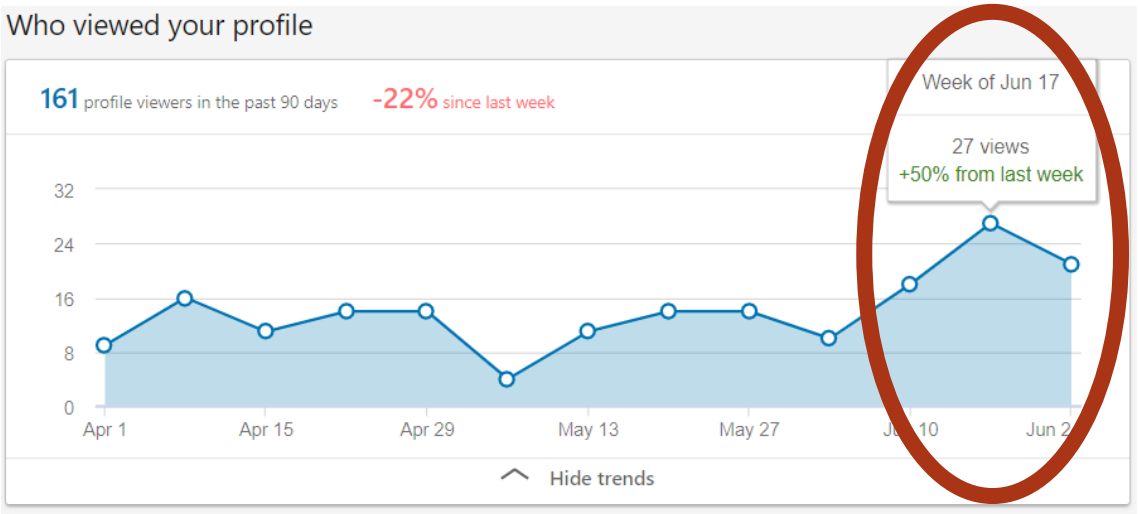


FIGURE 22: LINKEDIN VIEWS DURING EUCNC 2019

4.2.4 Instagram

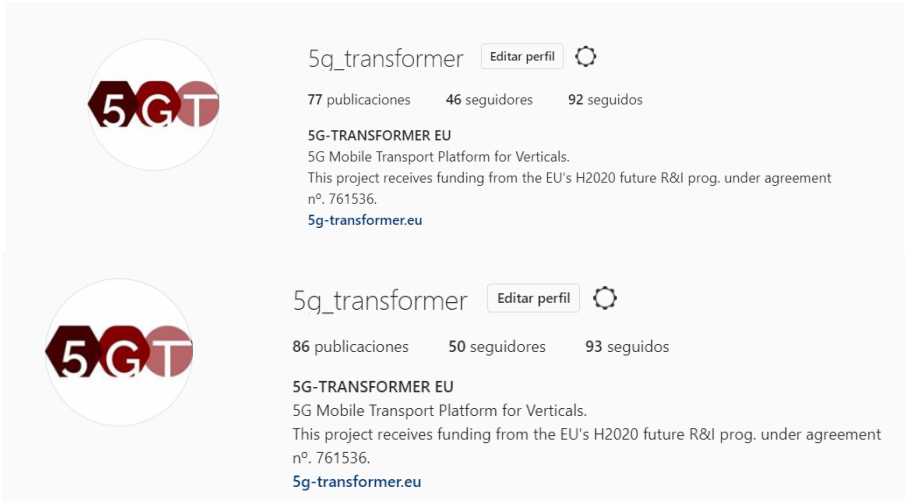


FIGURE 23: INSTAGRAM BEFORE (TOP) AND AFTER (DOWN) EUCNC 2019

4.2.5 YouTube

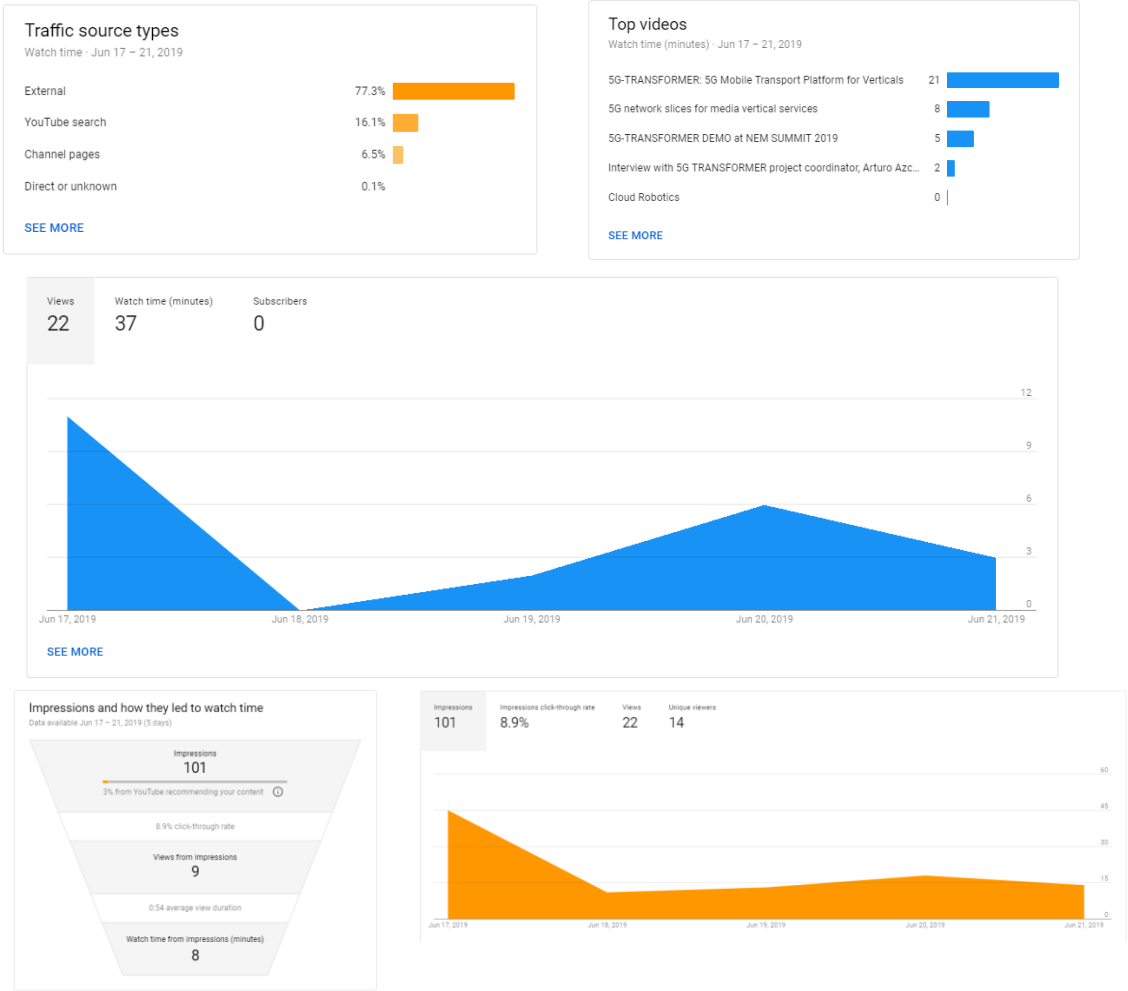


FIGURE 24: YOUTUBE VIEWERS AND WATCH TIME DURING EUCNC 2019

5 References

[1]. 5G-TRANSFORMER. "Report on WP6 progress and update of CoDEP" Deliverable D6.5, May 2019.

[2]. 5G-TRANSFORMER. "First periodic report of the project." Deliverable D7.3, June 2018.

[3]. 5G-TRANSFORMER News. Available at: http://5g-transformer.eu/index.php/news/

[4]. 5G-TRANSFORMER YouTube channel. Available at: https://www.youtube.com/channel/UCIQXD0ICxTK9eh_mQzMweww