

Blackout analysis and impact assessment on Mobile Networks: Spain and Portugal

[FINAL REPORT]

28th of April, 2025

MedUX



Blackout Analysis and Impact on Mobile Networks | Intro

On April 28, a major power outage swept across Spain and Portugal — and the effects went far beyond the electricity grid.

The outage affected telecom networks and customer experience for all operators in both countries.

This Executive Insights Report covers our preliminary analysis and **impact assessment of the mobile services outage**.

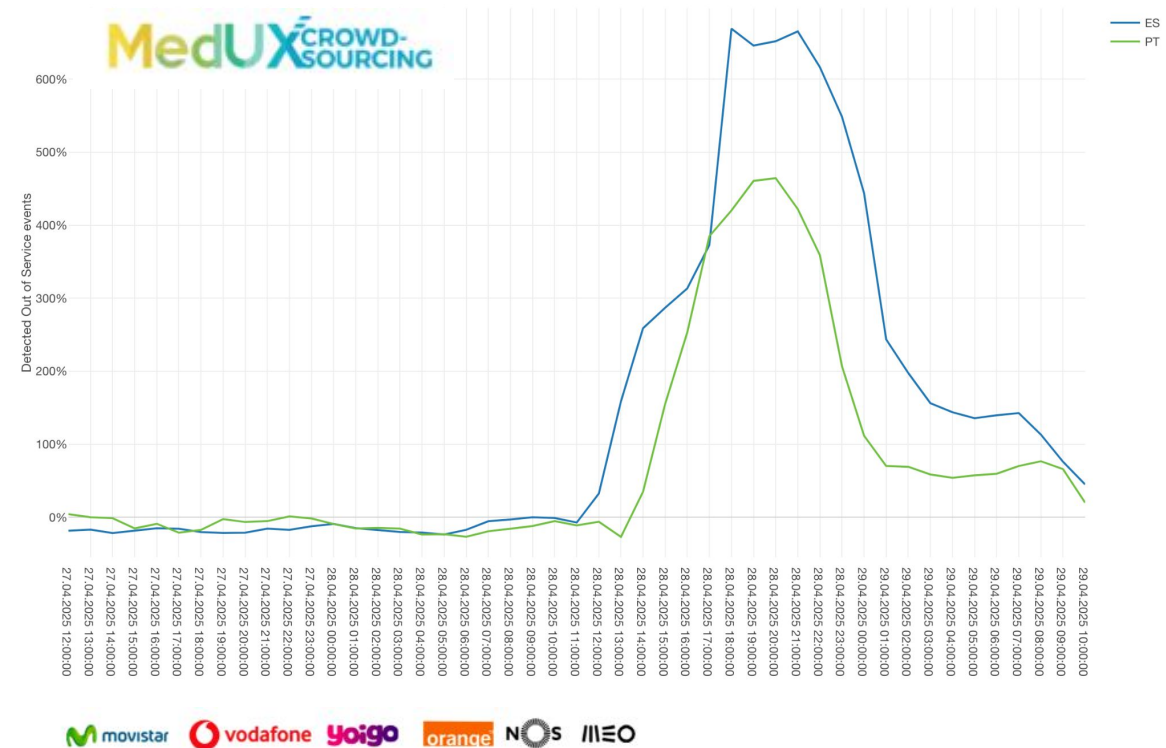
At MedUX, our real-time crowdsourced data captured how mobile and fixed network services in both countries were severely disrupted. In the early afternoon, "Out of Service" events began to surge — climbing rapidly and peaking in the evening.

In Spain, the number of disruptions skyrocketed to record levels, with hundreds of thousands of users affected. Portugal also experienced a steep rise, with network outages multiplying nearly sevenfold compared to normal days.

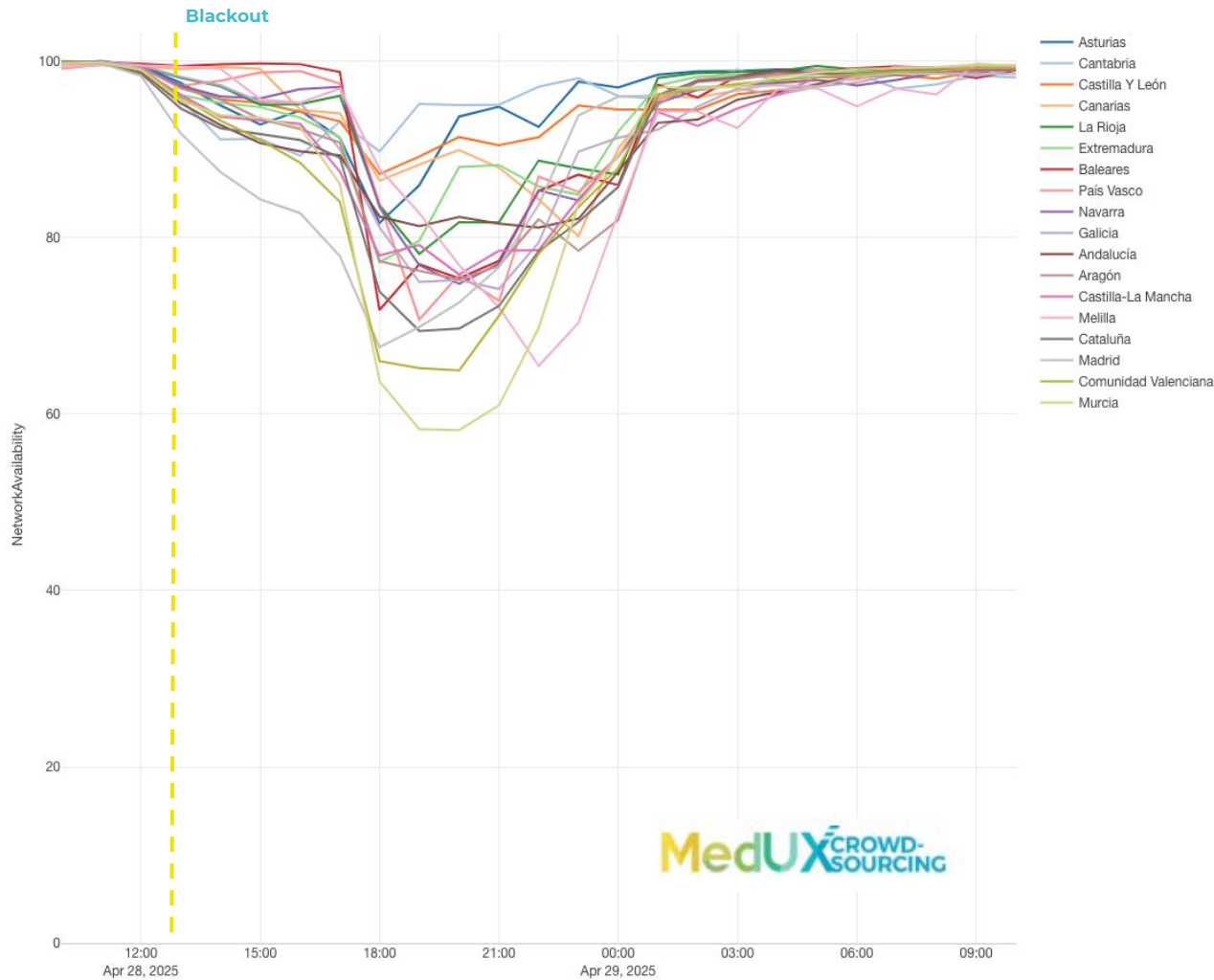
Thanks to the efforts of countless teams working to restore services, the situation is gradually improving. However, our data still shows elevated levels of "No Service" events compared to typical days — a clear sign of the ongoing recovery process.

"The April 28 power blackout across Spain and Portugal severely disrupted mobile network experience, revealing a significant increase in reliance on legacy 2G and 3G networks. Our real-time data captured major drops in network availability and speeds, along with sharp surges in response times, highlighting how essential continuous Quality of Experience monitoring is to ensure resilience and fast recovery in times of crisis." — Jaime González, CMO at MedUX

MedUX Reveals True Network Impact of Spain and Portugal's April 28 Blackout



Regional Network Availability analysis



MedUX's crowdsourced data reveals interesting regional differences in how the April 28 outage affected mobile network availability across Spain. Service availability and customer experience were worse than what is reflected by simple network availability metrics.

Regional Dynamics of the Blackout:

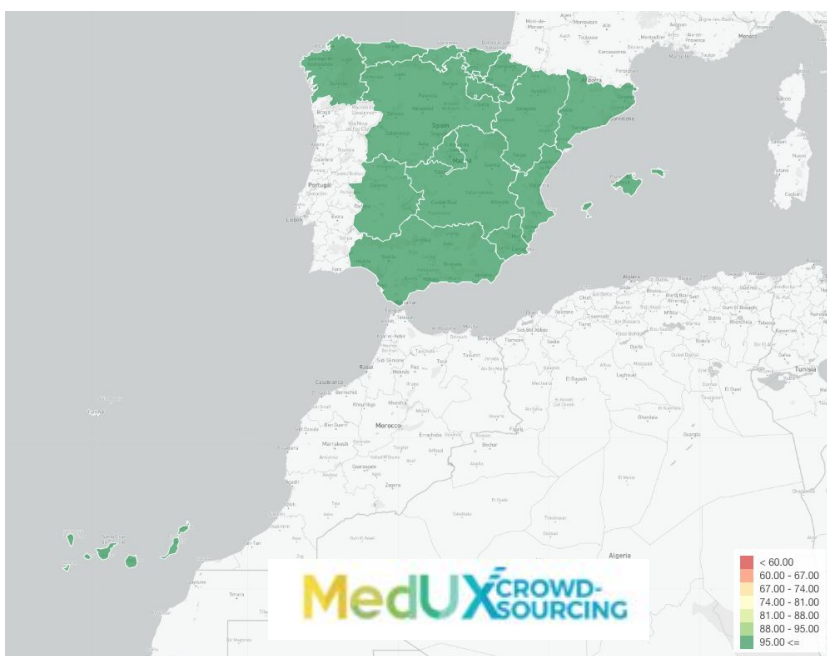
- Early afternoon (15:00 and 16:00)
Some regions still maintained almost full mobile network availability, such as the Balearic and Canary Islands (the least impacted regions by the power blackout) and País Vasco, while others already showed significant signs of service disruption.
- Between 16:00 and 17:00 (peak outage):
A clear pattern emerged nationwide — network availability dropped below 80%, except in the northern regions and the islands. The most impacted regions were Murcia, Valencia, Madrid, and Cataluña.
- Between 19:00 and 22:00:
Service began recovering in some regions. For example, Cantabria, Asturias, Canary Islands, Ceuta and Melilla, and Castilla y León showed a less pronounced decrease in network availability and a faster recovery compared to other regions.
- From 23:00 onward:
Recovery gained momentum across the country. However, some regions, such as Aragón and Cataluña, took longer to recover above 90% network availability.
- Still, even by the morning of April 29, our data indicated that full service restoration had not yet been achieved.

The least impacted regions were Asturias and Cantabria.

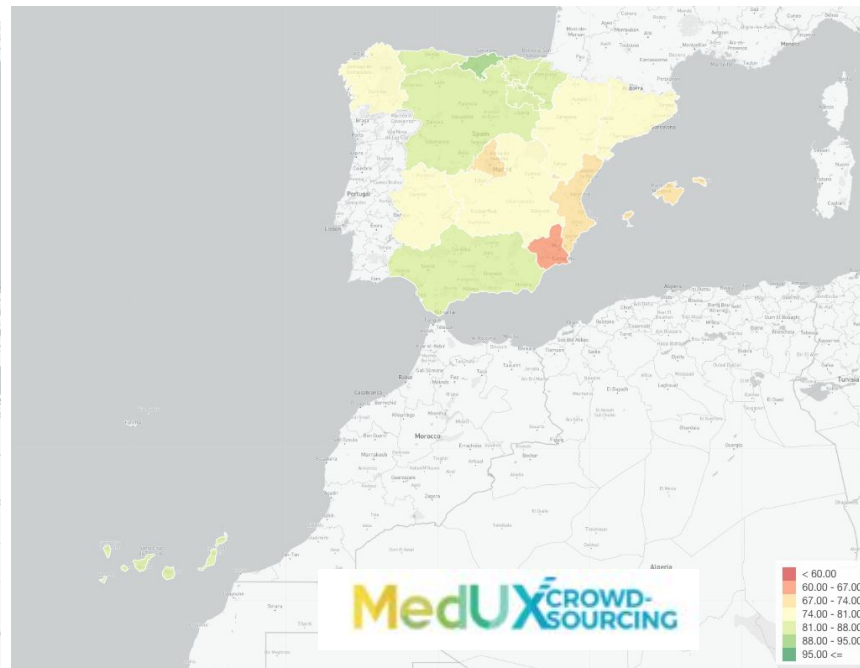


Regional Network Availability analysis

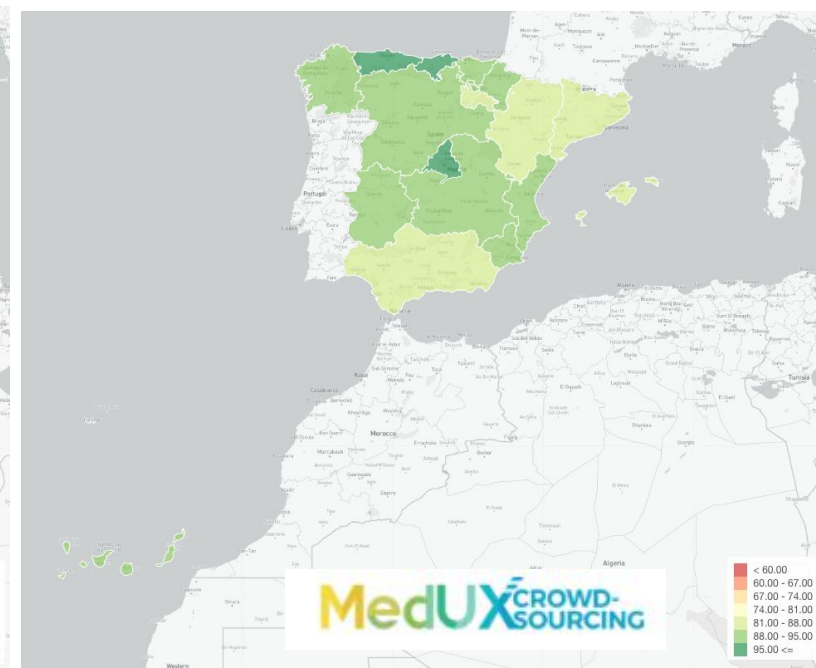
10:00h 29th April



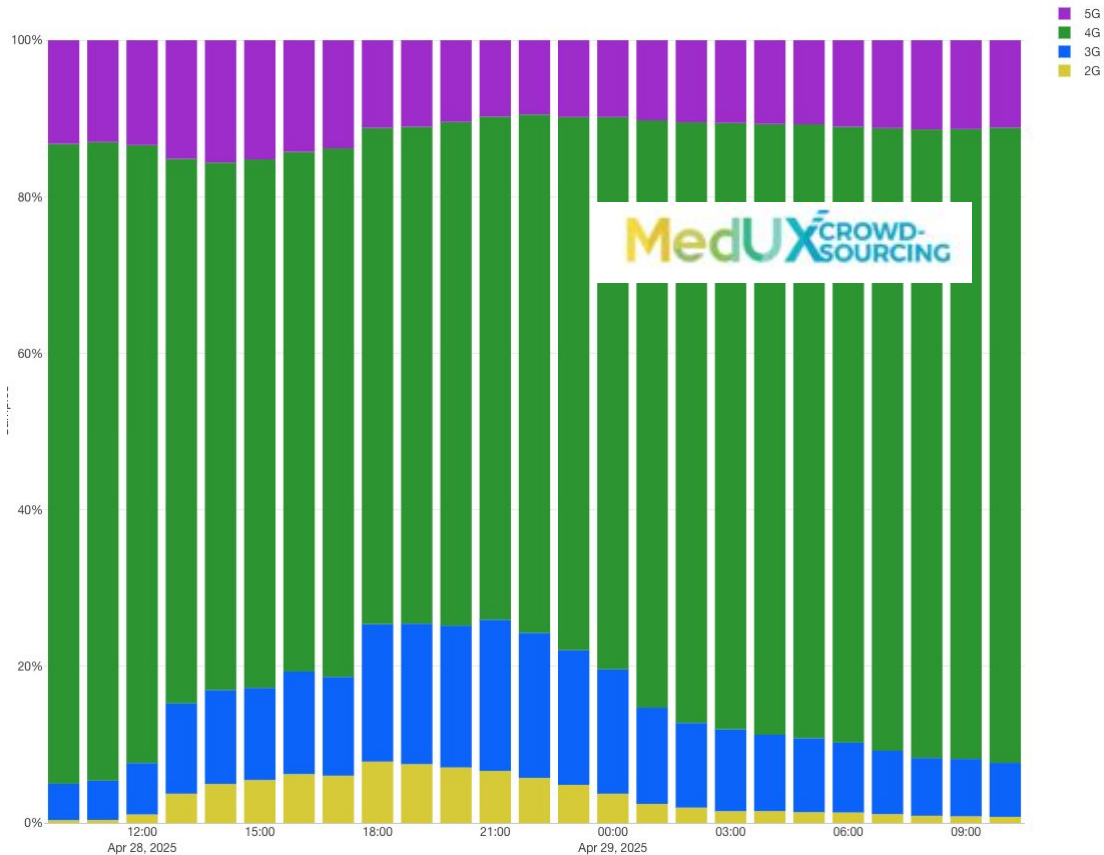
18:00h 29th April



00:00h 29th April



Technology Usage Patterns During the Blackout:



Beyond overall network availability, MedUX's crowdsourced data reveals how mobile networks dynamically rebalanced connections across available technologies during the outage.

During the critical hours, we observed a clear increase in the use of legacy 2G and 3G networks. This fallback behavior highlights the networks' resilience mechanisms under extreme conditions.

Even by the morning of April 29, the distribution of connections across technologies had not fully returned to pre-outage patterns, indicating an ongoing recovery process and continued reliance on older network layers to support mobile connectivity.



Impact on Service Quality: Basic performance KPIs

While many users lost connectivity entirely during the blackout, those who remained connected also experienced significant service degradation, as captured by MedUX crowdsourced data.

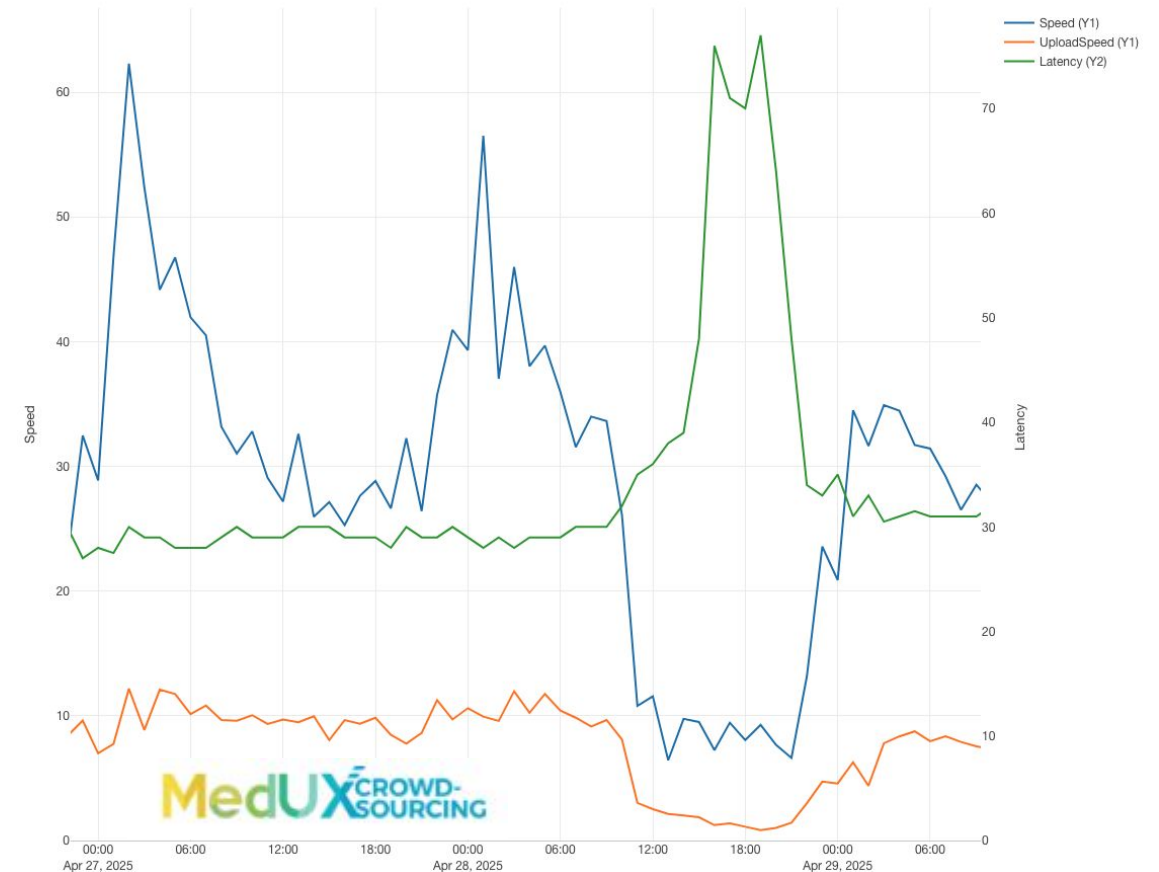
- Download and upload speeds dropped by up to 35% compared to the day before, with average speeds falling to around 8 Mbps (download) and 1.5 Mbps (upload) during peak disruption hours.
- Network latency spiked dramatically, increasing by over 250% and reaching an average of 73 ms — directly impacting the responsiveness of services.

Although all indicators started to recover after the outage, they had not fully returned to normal by the morning of April 29.

Moreover, customer experience metrics reflected the strain on the network:

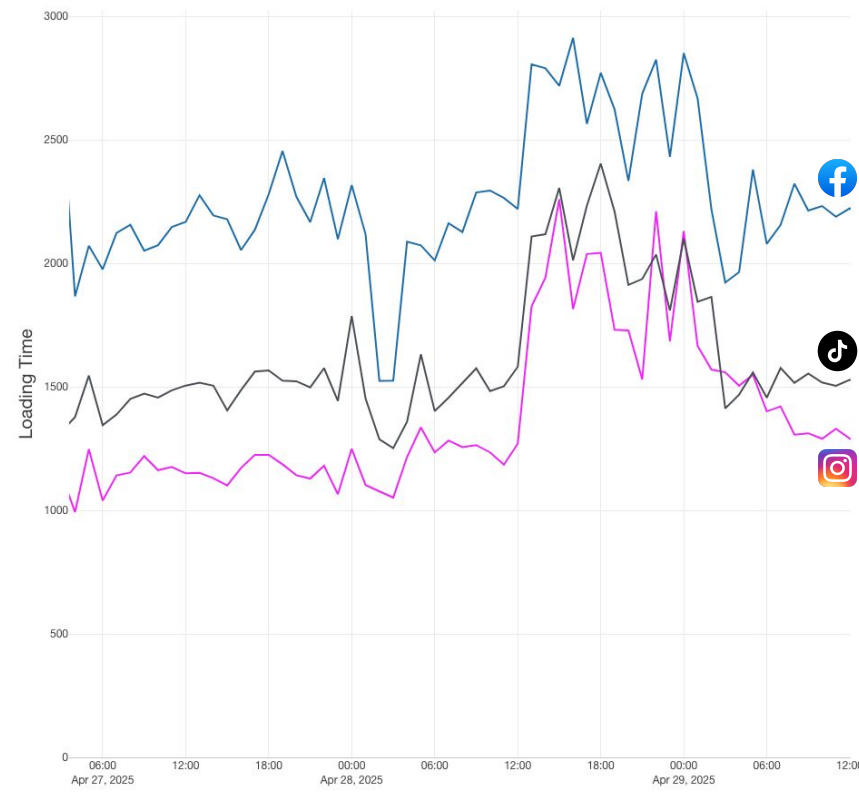
- Web browsing times increased
- Streaming services suffered higher stall rates
- Among other degradations affecting digital experience.

These insights underline how not only availability, but also network quality and real user experience, are deeply vulnerable to large-scale external disruptions — and how essential it is to have continuous, real-world monitoring to truly understand the user impact.

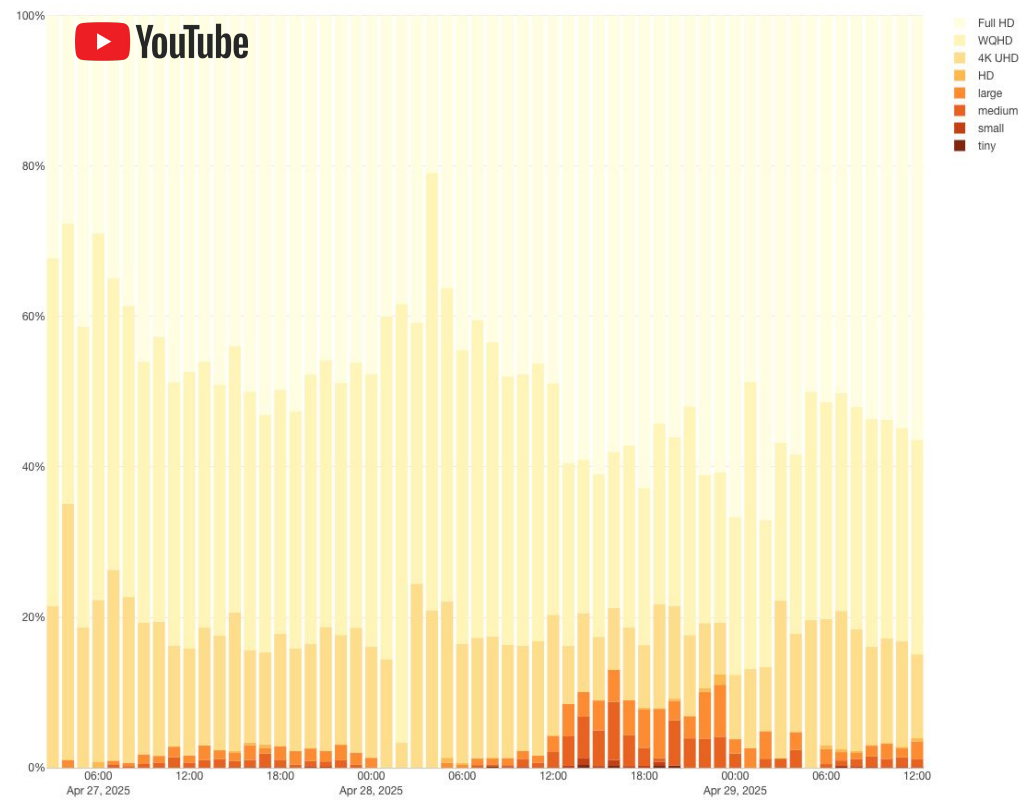


Impact on Quality of User Experience

Web Browsing time (ms)



Number of video playbacks by quality (%)



Impact on Speed Performance: Regional Evolution

REGIONAL EFFECT OF THE BLACKOUT ON MOBILE NETWORK DOWNLOAD SPEED

Five main phases can be distinguished:

1. **Pre-Blackout (from 6:00 to 12:00 on the 28th):** The average reference values for download speed can be observed in each autonomous community before the blackout.
2. **Blackout (from 12:00 to 18:00):** In the first hours of the blackout—the most critical—there is a noticeable degradation in performance across virtually all regions of the country. A decrease in the number of successfully completed tests is also recorded, which leads to slight temporary increases in some regions, but as the hours pass, the aforementioned performance degradation remains evident.
3. **Recovery Begins (from 18:00 to 00:00):** In general, in the northern part of the country, we begin to see an improvement in network performance, with the regions in this area being the first to have power restored.
4. **Stabilization (from 00:00 to 06:00 on the 29th):** There are slight variations in the aggregated values, but both the north and south of the country appear to start converging in terms of average values.
5. **Normalization (from 6:00 to 12:00):** Finally, from 6:00 on the 29th onward, we can confirm that service is practically restored across the entire national territory, reaching almost the same levels recorded in the first phase.

In the islands, both the Balearic and Canary Islands, although no supply issues were recorded, there were indeed connectivity problems with the mainland, which also led to degradation in both fixed and mobile internet services.



Performance Regional Evolution

Pre-Blackout (from 6:00 to 12:00 on the 28th)



Performance Regional Evolution

Blackout (from 12:00 to 18:00)



Performance Regional Evolution

Recovery Begins (from 18:00 to 00:00)



Performance Regional Evolution

Stabilization (from 00:00 to 06:00 on the 29th)



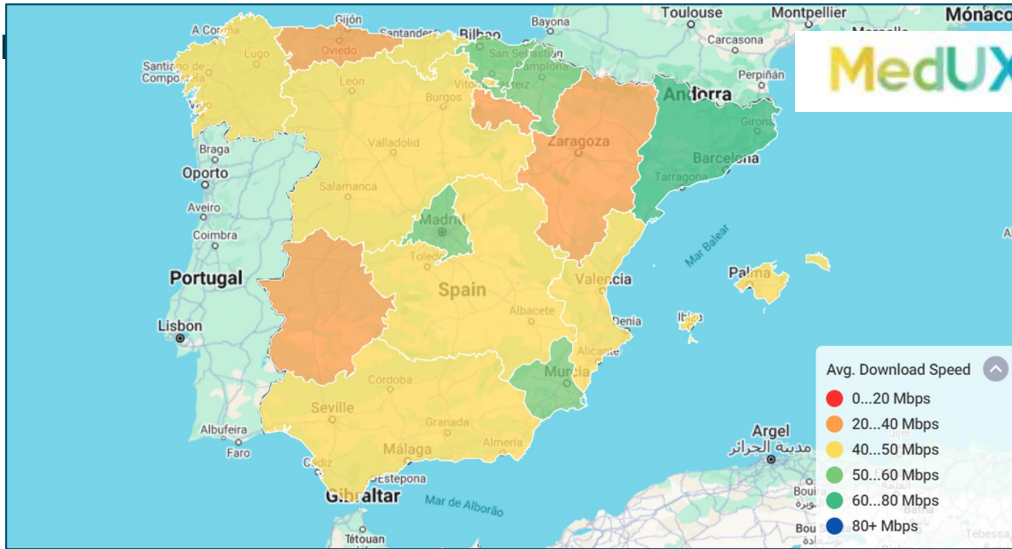
Performance Regional Evolution

Normalization (from 6:00 to 12:00)



Performance Regional Evolution

Blackout (from 12:00 to 18:00 on the 28th)



Recovery Begins (from 18:00 to 00:00)



Stabilization (from 00:00 to 06:00 on the 29th)



Normalization (from 6:00 to 12:00)



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