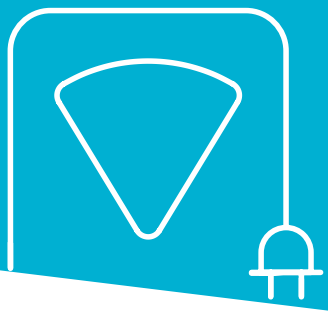

DT, 1&1, Vodafone and O2: Internet outage in Germany

- ***Operators impacted:*** *Deutsche Telekom, Vodafone, 1&1 and O2*
- ***Date****: February 12th, 2020*
- ***Duration****: approx. 7 hours, mostly between 2 AM and 9 AM*
- ***Access technologies affected****: ADSL and VDSL*
- ***Potential impact****: 25 million DSL lines*
- ***Most impacted regions****: Nordrhein-Westfalen, Rheinland-Pfalz, Hessen, Mecklenburg-Vorpommern, Berlin, Brandenburg and Munich.*

On February 12th, many Internet users in Germany woke up frustrated, as they were unable to get online, as a significant outage disrupted Internet service across several regions of the country. Some national newspapers echoed the Internet issue and complains towards the four operators filled the Internet. According to the German newspaper Morgenpost, 78% of Telekom and O2 customers reported Internet problems, 82% for 1&1 and 65% for Vodafone.

German provider Deutsche Telekom (DT) worked hard to solve the issue after many clients were hit by the Internet outage starting in early morning hours. The company stated that a software update in a technical facility caused the outage. The rest of ISPs were mainly affected because of their use of DT's wholesale services, which were also affected by the network outage.

Check our impact assessment and the value of MedUX solutions to monitor, analyse and troubleshoot network issues in real-time, by delivering end-to-end performance and Customer Experience insights based on objective network measurements and not exclusively on users' reports/complaints. MedUX insights help our clients reduce the time to insight to obtain meaningful information on impacted customer services and the time to resolution to quickly respond to customer issues and improve the Customer Experience.

About MedUX

MedUX is the next generation specialist in customers' digital-experience measurement and improvement, providing cutting-edge tools and innovative solutions for telecom operators, governments and companies. The company is present in more than 15 countries, with a strong presence in Latin America and Europe. Today, MedUX has been deployed for clients such as Telefónica, AT&T, Claro Colombia (Grupo América Móvil), Vodafone and Orange.

Our innovative system for the measurement, prediction and analysis of fixed and mobile telecommunications lines obtains reliable, real-time data on operators' networks and the quality of service offered. This enables our clients to stand out from their competitors, reduce costs and enhance their value propositions, keeping their customers happy and satisfied by anticipating problems and avoiding complaints.

Go beyond measurements and analytics, discover MedUX!

Fly with Data!

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Broadband market intro by BNETZA

According to BNETZA statistics[1], the number of broadband connections increased by 0.4 million in the first half of 2019, bringing the total to around 34.6 million by mid of 2019.

All non-DSL technologies accounted for approximately 9.4 million connections. Most of these were based on HFC networks (around 8.1 million), while approximately 1.2 million were based on fibre-to-the-building (FTTB) or fibre-to-the-home (FTTH).

Deutsche Telekom's competitors market some DSL connections to customers on the basis of specific wholesale products and alternative carriers. Out of approximately 25 million operational DSL connections at the end of June 2019, around 7 million lines were offered by Deutsche Telekom's competitors based on bitstream and resale wholesale reference offers.

VDSL accounted for a share of around 56% of all DSL connections by mid of 2019. Around 6.3 million VDSL connections were provided by Deutsche Telekom's competitors and around 7.7 million direct VDSL connections by DTAG. The rise in the spread of VDSL is due mainly to vectoring technology, which currently enables transmission rates of up to 250 Mbps. The increasing significance of VDSL was also reflected at the wholesale level.

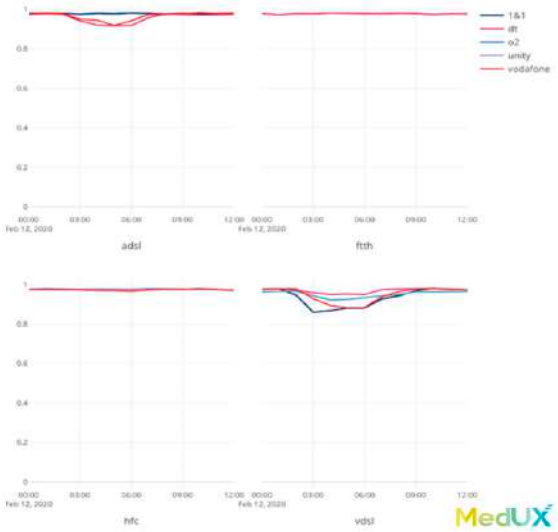
The above gives an idea about the potential size of a DSL service degradation or outage, and about the degree of dependency from Deutsche Telekom in DSL service provision for Vodafone, 1&1 and O2, among other.

Overview of the network outage

MedUX observed a service outage during morning hours, mostly between 2 and 9 a.m. on 12th of February. This service degradation varied across technologies, operators and regions. It significantly affected Customer Experience due to lack of Internet connectivity. Service availability was at the lowest level between 3 a.m. and 7 a.m. and gradually recovered afterwards.

All operators were somehow affected, but DT and O2 apparently had a less severe degradation in VDSL services, and 1&1 ADSL services suffered no relevant degradation as per our estimates.

Figure 1: Network stability by operator, technology access and time of day.



1 Tätigkeitsbericht Telekommunikation 2018/2019, 03.12.2019 https://www.bundesnetzagentur.de/SharedDocs/Mediathek/Taetigkeitsberichte/2019/TK_20182019.pdf

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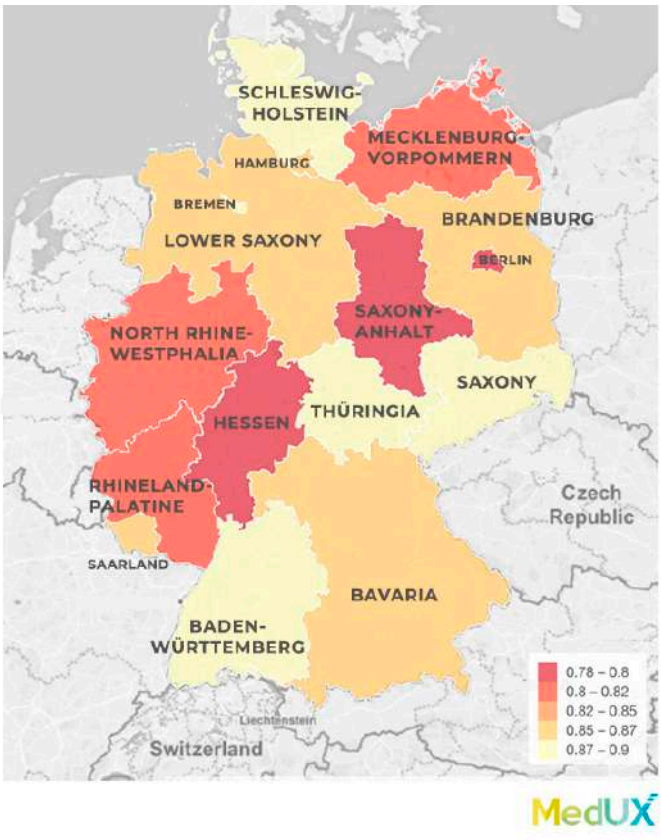
Network Service outage in all xDSL operators affected the network and Customer Experience in Germany, especially in the regions of Nordrhein-Westfalen, Rheinland-Pfalz, Hessen, Mecklenburg-Vorpommern, Berlin, Brandenburg and Munich, as it is shown in Figure 2.

Figure 2: Estimated xDSL outage at peak time



For the most affected regions, service disruption reached its peak between 3 and 4 a.m., with connectivity ratios of 83% of network accessibility. Naturally, the majority of the users was not so heavily affected as the network accessibility recovered over 90% after 8 a.m.

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Internet service monitoring and troubleshooting

MedUX monitors OTT applications, including Web Browsing, YouTube, Dropbox, among others. In addition, the MedUX solutions' analytical capabilities enable locating and resolving incidents affecting service quality and Customer Experience.

As it can be seen in the following Figure 3, most basic Internet services were affected by this outage. However, the extent of the outage depends mainly on each operator and service region. All basic activities were affected across the panel at a similar level because of the lack of Internet connectivity.

Figure 3: Internet service performance

For the most affected regions, service disruption reached its peak between 3 and 4 a.m., with network connectivity ratios around 80% on average (see figure below). According to our data, service availability was even below 60% in certain regions during outage peak time, which is considerably higher than national average values. Notwithstanding this event, most users would have not been so heavily affected as the network accessibility recovered over the 90% after 8 a.m.

MedUX insights pointed at lack of connectivity as the root cause for this service outage. This finding was later confirmed by public statements from ISPs' customer care teams.

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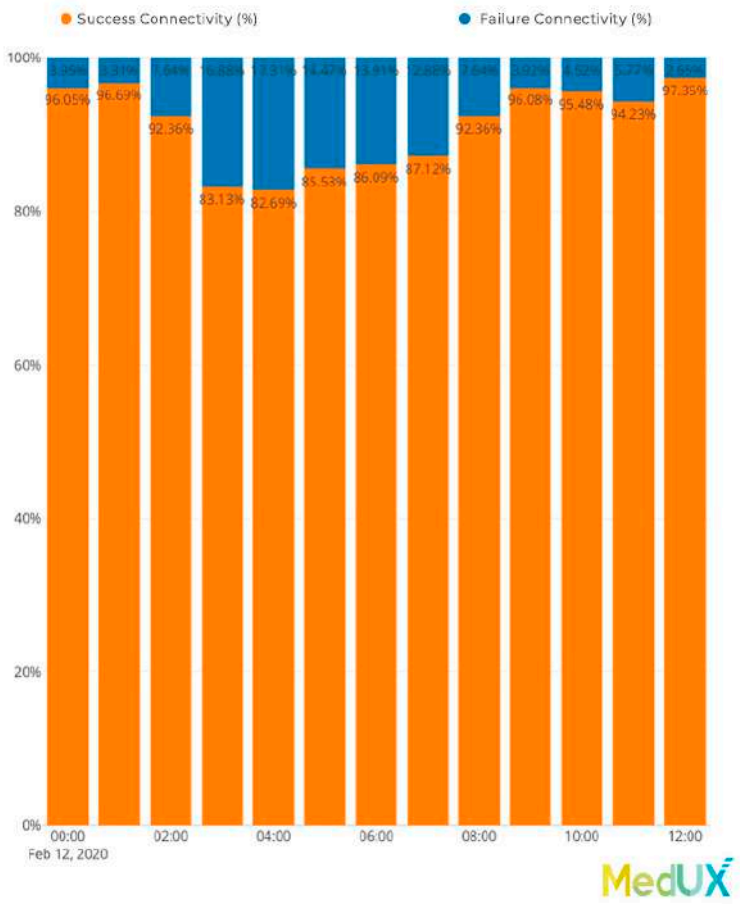
Figure 4: Network accessibility in heavily affected regions (mentioned above)



MedUX technology helps ISPs analyse the Quality of Experience with performance insights from the end-user perspective. To achieve that, users' reports/complains by themselves or simple monitorization is not enough to solve and prevent network issues.

Our insights help our clients to reduce the time to insight when obtaining meaningful information on impacted services and the time to resolution to respond to users complaints and improve the Customer Experience.

MedUX analyse network performance based on the real-time information and results obtained from 5.000 MedUX HOME devices, deployed in 8 countries in Europe, from which over 800 measurement points evaluate German networks. These devices allowed MedUX to measure, in real-time, the broadband experience in the customers' premises.

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