A one-way street to failure: Why redundant connectivity is essential in the digital age

In the age of cloud and software-as-a-service (SaaS), reliable connectivity plays a business-critical role for enterprises. Outages, even if not self-inflicted, can lead to serious consequences. Dr. Thomas King, CTO at DE-CIX, explains why companies should secure their IT infrastructure via redundant lines, and what exactly lies behind the term redundancy.

Twice in February, damaged fiber optic cables caused widespread connection failures alone in Germany. An incident in Dusseldorf affected up to 15,000 Internet connections, and another accident during construction work in Frankfurt led to Internet outages especially in the northern districts of the city. But why do individual issues relating to the Internet infrastructure trigger such serious incidents? The answer: if you only set up your IT infrastructure as a company in a "one-way" manner, you are taking a big risk and making your company particularly vulnerable to outages. The solution: building redundant structures – a must in the digital age!

Redundancy creates resilience

Redundancy is key to protection against the effects of incidents that paralyze parts of the Internet infrastructure, as in the Frankfurt and Dusseldorf examples. But what does that mean in concrete terms? In common parlance, "redundant" is usually equated with "superfluous", but not in IT: The point here is that there should always be at least two paths leading to the destination. In a communications network, two locations should be physically connected via multiple independent cables. The system should be operated in an active/active mode by default. This means that all available lines are always partially utilized, and, in the event of an incident, the traffic of the failed line is redirected via the other transmission paths. This has advantages over an active/passive mode, where it is not automatically guaranteed that the alternative cable, which does not carry any data traffic until the time of switchover, will work completely reliably at the required moment. Transmission paths do not necessarily have to be fiber optic cables; depending on the application, DSL and mobile communications can also be considered.

Redundancy is not automatic

While redundancy through geo-diverse, i.e., geographically separated, data pathways is the standard between data centers and/or Internet Exchanges on the major data highways, this does not apply to what is known as the "last mile", such as DSL connections to end users. If a connection is interrupted on the last mile – for example, if a cable is severed during construction work – it is often not possible to reroute the data traffic on the network side via an Internet Exchange. Instead, users themselves need to ensure that there is already a connection to a higher level of the network via a second redundant line. In the private sector or in small businesses, this can be achieved via 5G-capable routers, for example.

Larger companies, on the other hand, should ensure that they are connected to the Internet via multiple, high-performance geo-diverse lines. However, initiative is required here: A resilient infrastructure must be planned, built, and regularly tested, in cooperation with one or more providers. Companies that connect directly to an Internet Exchange such as DE-CIX, and thus take a shortcut through the Internet, should also pay attention to redundant connectivity. The DE-CIX infrastructure, for example, is spread across close to 40 data centers in Frankfurt am Main alone. Depending on how critical an application is, companies can thus establish multiple redundant, geo-diverse connections between themselves and DE-CIX.

The next step is to check whether any affected applications will also work over a redundant line. This should be checked regularly, especially if changes have been made. If companies fall under the category of critical infrastructure [(CRITIS)](#) in Germany, independent audits are organized regularly. These include, for example, sectors such as energy and drinking water supply, and transport, but also food supply and finance.

Cloud and SaaS create entirely new connectivity requirements

In today's digital age, the loss of an Internet connection is comparable to a power outage for many companies. In times of Office 365 and cloud storage, office computers are more or less useless without an Internet connection. As a result, companies that want to be on the safe side for their business activities should treat the topic of redundancy as a top priority.

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success story in Germany and around the world. Since the beginning of the commercial Internet, DE-CIX has had a decisive influence – in a range of leading global bodies, such as the Internet Engineering Task Force (IETF) – on co-defining guiding principles for the Internet of the present and the future. As the operator of critical IT infrastructure, DE-CIX bears a great responsibility for the seamless, fast, and secure data exchange between people, enterprises, and organizations at its locations around the globe.
Further information at www.de-cix.net

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