# Boundless broadband

The WiBACK network transmitting into the valleys from the peak of the Kronplatz. © *mauritius images/Alamy*

A new data transfer technique connects even remote alpine farms to the internet.

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Blue skies, sunshine, well-groomed ski runs, lodges with atmosphere, all backed by the snow-crowned peaks of the Dolomites. The quilt of grazing meadows and fields in the valley are showing signs of spring. Just like out of a glossy travel brochure for South Tyrol. Perfect for skiing or simply just relaxing. The cable-drawn funicular railway is already bringing thousands of skiers and visitors up to the top of Kronplatz in early morning. Including Eric Schütz from the Fraunhofer Institute for Open Communication Systems FOKUS. He is not there for the scenery, however. Schütz is visiting a client.

The researcher, along with Florian Niederbacher from the Bruneck municipal works, steps out. His destination: the nearby transmission tower, a steel monster over 260 feet high that was erected in its time to send out the broadcast signals from television stations. The men carefully climb up the stairs in their heavy boots. A breathtaking panorama greets them from the first platform at this rarefied elevation. At the foot of the Kronplatz lies Bruneck, the center of a broad network of roads that snake through the valleys. “Many secluded farmyards and companies lie miles from Bruneck. Linking to a network that makes a fast Internet connection possible is therefore often involved and expensive,” explains Schütz, a commercial communications engineer. “Installation of fiber optic cable is too expensive, the distances are too great for copper cable, and cell phone networks are too expensive and do not have sufficient transmission capacity.”

## Just don’t drop the connection

It’s got to be broadband. Without a fast Internet connection, companies today are no longer able to compete effectively. If the infrastructure needed is not provided, companies move away, and the region’s connection to the outside drops in both meanings of the word. Florian Niederbacher and his colleagues therefore decided to do something to ensure the future of the South Tyrol municipal district. In conjunction with Fraunhofer researchers from Berlin, they started a pilot project they named WiBACK. The abbreviation stands for Wireless Backhaul, a transmission system based on radio relay links. “Using a radio relay system between various nodes that can be separated from one another by up to 12 miles, you can bridge great distances simply and cost-effectively and service entire regions,” explains Schütz. The advantage of the WiBack technology is its user-friendliness: “The installation of a network is normally quite involved, requiring trained technical personnel. In contrast, our system installs itself. It is so simple and easy that communities do it independently and can thus operate their own network.”

The essence of the WiBACK technology is the radio relay nodes, white cabinets each not much larger than a shoebox. Four of them are attached to the tower on the peak of the Kronplatz. They are connected via a fiber optic cable with the electronic controller in Bruneck that manages the transmitting and receiving of the radio signals and data. The wireless transmission takes place from node to node: each box is equipped with a directional antenna that focuses the signals and sends them right to the next node. There, they are received and transformed by a router into WLAN that can be used by cell phones, tablets, or desktop computer users.

Because the system can operate at the same frequencies as traditional WLAN, there is no need to have a transmitting license. And the system is also secure: the data are encrypted along their journey from node to node.

## Boxes manage themselves

In addition, installation and operation are cost-effective. “The boxes are able to manage themselves. You only have to set them up so that the antennas are in each other’s line-of-sight and the radio link works – the network then installs itself autonomously. If a new node is added, it is integrated within a few minutes. So it means little effort, high reliability, and secure data,” Schütz summarizes.

That all worked out smoothly in Bruneck: “WiBACK is simple to install and maintain, and allows high data transmission rates with very little latency,” Niederbacher confirms. A single radio link can carry 100 Megabit/s – a luxury for the district of Bruneck. It was even free up to now, because users were not obliged to pay any fees during the pilot project. In future, the broadband connection will without doubt not be free because the municipal works now operates WiBACK commercially. However, pricing is expected to be significantly below what other telecommunications providers charge for comparable services elsewhere. The numerous requests from neighboring communities for a WiBACK connection demonstrate that the new technology is more than competitive.

The system can be expanded without difficulty: every box that is connected via radio link to a node can service households and companies within a radius of over 500 yards. And a connection can be made from any node to additional stations – as long as they are no further than 20 kilometers (12 miles) away and in line-of-sight. This way, the network can continually grow.

## Greetings from Facebook

Not only alpine farmers, residents, and companies in remote regions will benefit in future from the new technology, but tourists as well: the Bruneck municipal works have now installed a WiBACK node at the earthen pyramids near Oberwielenbach that draw thousands of visitors each year on account of their bizarre shapes and their impressive colors. The box is powered using solar cells and provides WLAN for visitors to use free of charge. It is perfect for people who want to immediately share their photos taken beside the pyramids with their friends or upload photos to social networks. ■