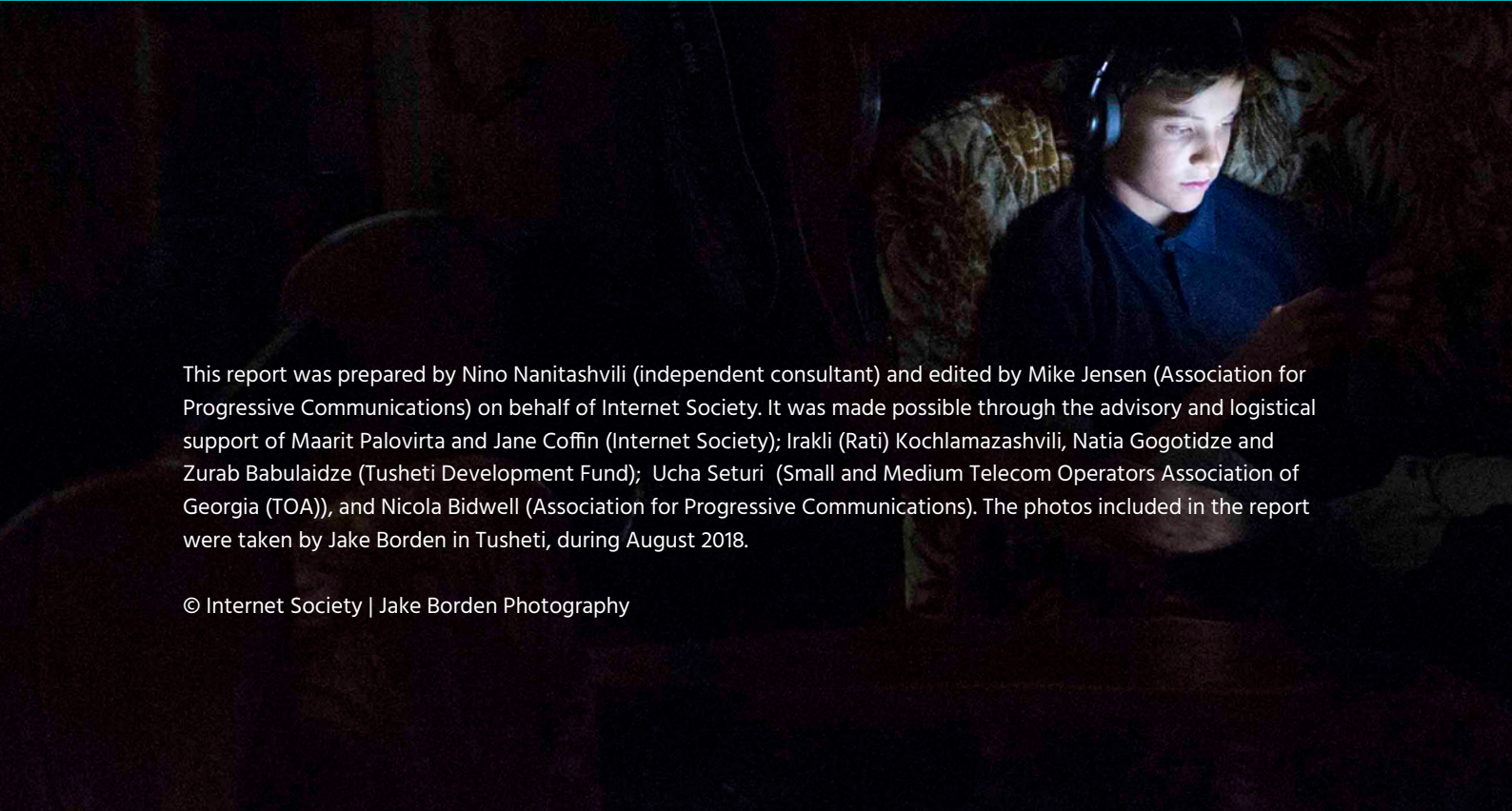


# Connecting

# Tusheti

The Impact of Community  
Networking in Europe's  
Highest Settlements



This report was prepared by Nino Nanitashvili (independent consultant) and edited by Mike Jensen (Association for Progressive Communications) on behalf of Internet Society. It was made possible through the advisory and logistical support of Maarit Palovirta and Jane Coffin (Internet Society); Irakli (Rati) Kochlamazashvili, Natia Gogotidze and Zurab Babulaidze (Tusheti Development Fund); Ucha Seturi (Small and Medium Telecom Operators Association of Georgia (TOA)), and Nicola Bidwell (Association for Progressive Communications). The photos included in the report were taken by Jake Borden in Tusheti, during August 2018.

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Dec 2 2018





## Introduction

# Tusheti is one of the highest and most isolated settlements in Europe —

an ecologically unspoiled community of historical and cultural significance in the Greater Caucasus Mountains of Georgia.

The area's sparse population and rugged topography has meant that it has been left unconnected by commercial operators for both Internet and often mobile voice services. To help address the isolation of the area, an independent locally operated wireless Internet service was set up in August 2017 with in-kind support from members of the community, the Georgian Telecom Operators Association, the ISOC Georgia Chapter and other local stakeholders as well as financial support from Internet Society (ISOC).

A year later, the Internet service continues to operate and has already provided a variety of benefits to Tusheti's residents and visitors, particularly in the hospitality sector. These and other impacts and outcomes are described below in more detail in this status report which examines how access to the Internet in remote and rural areas such as Tusheti can help to foster social and economic development.



## Background

Covering 969 square kilometers bordered by the Russian republics of Chechnya and Dagestan, Tusheti is one of the most isolated areas of Georgia. Nevertheless it is well known for its protected areas, agricultural produce and authentic handicrafts. It is part of the Tusheti Nature Reserve and National Park, which is the largest protected region in Europe, and at 2,345 metres, the village of Bochorna is the highest settlement in Europe. Traditionally, the Tushs were sheep herders who made cheese and high-quality wool for export. Sheep and cattle breeding are still the leading part of the economy, however employment opportunities are limited.

Tusheti, similarly to other mountain areas of Georgia, has been depopulating in the last decades. Encouraged by the urbanisation strategies of the earlier Soviet Union regime, and unable to deal with the harsh climate conditions and/or to generate income, most of the local population moved to lowland areas. As a result, more recently, providing new social and economic opportunities for those in bordering regions has become one of the key national priorities. Fortunately the hospitality and accommodation sector has increased with the region's growing number of temporary visitors; especially hikers and agro/eco tourists. However most locals spend the summer months in the highland areas of Tusheti while living in the lowland villages of Zemo Alvani, Kvemo Alvani and Laliskhuri in wintertime. As a result the population of Tusheti fluctuates considerably, with only a few dozen residents during the winter months when the road becomes impassable<sup>1</sup>, while around fifteen thousand tourists visit each year during the few warmer months along with 3-4 thousand locals who reside in their villages during summertime.

Although signals from Georgia's mobile operators are present in most parts of the country, coverage is limited in Tusheti and only reaches about 40% of the 52 villages

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in the region. Not only are the roads challenging for the locals or visiting tourists, but also for telecom operators, and combined with the fluctuating demand, has kept the area disconnected, hindering vital communication both locally and with the rest of the country. In particular

there are many villages with very few inhabitants, and during the seven months of winter they need to be able to call for help should an accident occur.

To exploit the potential of low cost wireless networking technologies to connect Tusheti to the Internet, a partnership was formed in 2017 between the Tusheti Development Fund (a local grassroots organization), the Small and Medium Telecom Operators Association of Georgia (TOA), the ISOC Georgian Chapter, the Ministry of Economy and Sustainable Development, the Georgian

National Communication Commission and the Internet Society. After a series of meetings with all the stakeholders, the strategy for the project was formalised in a Memorandum of Understanding with the Tusheti Development Fund (TDF) which it was decided would operate and manage the network.



[PHOTO] - Eliko Gagoidze (63) and her husband Kako (64) are the only humans staying year-round in the village of Shenako, Tusheti.

<sup>1</sup> This road is considered one of the most dangerous roads on earth (BBC, 2014). Only a few elder residents and border guards stay in the remote villages throughout the winter, with temperature dropping to minus twenty Celsius degrees. At these times the only way to get to the administrative center is by helicopter.



## The Tusheti Network

Establishing the network involved mounting 5.8 GHz long distance wireless transmission equipment to link a tall mast in the town of Ruispiri with a mast in the Abano Pass, the highest road in Georgia, at an altitude of more than 2,800 meters. TOA member LTD "FreeNet", is an ISP in Kakheti which has donated free co-location on its 15 metre mast in Ruispiri village and offered free IP peering and transit - to the upstream Internet at cost (without charge). The signal was then beamed across Tusheti which required that masts be constructed at high points across the region. The area was partly surveyed by helicopter and the equipment was transported via 4-wheel-drive, and on site by pack horse. Several horses ran off with the packs on their backs and equipment fell off the animals when they couldn't keep their balance, smashing on the rocks of the mountainside. The equipment and solar panels were designed to withstand intense thunder/lightning, wind, very low temperatures (max -40C) and snow.

In total six masts with wireless radio equipment were installed from June to August 2017 across the Abano pass and then on to Diklo, Chiglaurta, Makratela and Koklata mountains. With Freenet's high mast in Ruispiri this was the most appropriate point for the Internet connection to Abano Pass which had an existing 10metre mast no longer in use by the local mobile operator. The link was established over a distance of 42km using 5.8Ghz radio equipment initially provisioned to run at 120 Mbps. In the space of two months 44 out of 52 villages spread across the 4 gorges were connected, comprising 260sq Kms covering 100% of the villages that had at least one continuous inhabitant, providing end-user services of up to 10Mbps.

Mobile coverage reaches only 40% of the villages with voice and a low speed Internet connection, while broadband wireless Internet now covers more than 20 villages without mobile access. However, not all villages with Internet coverage are making use of the Internet connection, mostly due to lack of electricity

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transported  
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pack horse

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or because few or no villagers visit their homes during summer, or for very short periods of time. In particular, lack of electricity in many villages poses a considerable obstacle to obtaining Internet due to the relatively high cost of solar power equipment. As a result, the Internet is currently operating in 14 villages, including a number of outlying farms, as well as 7 villages where the Internet is the only connection with outside world, due to the lack of mobile coverage.

Access points were also installed in hotels (guesthouses) in the region, as well as in businesses, and private residences. About 25 hotel owners (over 40%) installed Wi-Fi access points for their guests in 2017, and in 2018 the total number of Internet links, both business and residential, increased to 48, with 43 of those opting for the business service and 5 the residential/individual service<sup>2</sup>. A few end-user computers for the most vulnerable villages were purchased and they were also used for site and network checking and testing.

## Internet is currently operating in 14 villages

The main start-up costs for Tusheti's network were for the wireless network devices, antennae, solar/battery equipment and masts, along with the transportation costs. One of the significant additional investments made was equipping the masts with suitable cabling and earthing rods to allow the radio equipment to withstand the lightning that is common in the area, and especially at some sites where there is high mineral content in the ground. This cost an additional USD 230-250 per mast. In total the equipment for the backbone cost about USD 9,000, and the total project financing including installation and technical support was about USD 40,000. In addition voluntary activities provided considerable in-kind support for the network from TDF, local community members and other local stakeholders, as well as the TOA and FreeNet.

The Mayor's office of the municipal authority leases land to TDF to build masts and repeaters and will also finance the costs for the Internet access of locals living in Tusheti over the winter period this year, from November 2018 to May 2019. The Tusheti Development Fund is responsible for pricing and maintaining the service. Users can opt for two different access speeds – 3Mbps or 5Mbps – with subscriptions that currently cost about 20 USD or 40 USD per month respectively. During the first year of deployment the service was offered at a subsidized rate of 12 USD per month for users to encourage them to install a connection. The set-up fee of 80 USD was also waived during the deployment period. Similarly, residents who stay in Tusheti for the whole year do not have to pay the monthly fee during the 8 winter months, and received the wireless equipment for free. In addition the World Bank, together with Georgia's Innovation and Technology Agency (GITA), also offer internet vouchers of USD 70 for their e-business training participants as a contribution towards end-user equipment and connectivity costs.

[Graphic – Tusheti Network Map]



2 As there was no technical difference between the business or individual plans the individual plan has since been dispensed with.

Monthly traffic on the backhaul link to the rest of the Internet (not including domestic transit in Georgia) has risen from 3Mbps initially, to 15Mbps at the end of the 2018 summer season, after being increased to 10Mbps in August. During winter, when only a few people stay in Tusheti, traffic runs at about 3Mbps.

TDF purchases upstream capacity at a discounted rate from ISP FreeNet at 15 USD /1 Mbps global and 3Mbps domestic traffic /month. Currently efforts are under way to liberalize the wholesale market segments and to institute price caps, which are expected to further decrease the cost of IP transit and interconnection fees for Tusheti.

Other operating costs for the network comprise TDF's staff time, which is mostly in-kind, and for one local technical support during the summertime (4 months), which amounts to 300 USD/month (incl. taxes). There is also a regulation fee of 1.5-3 USD/month (0.5% of revenues) payable to the Georgia National Communications Commission (GNCC), as well as some accounting costs. In addition, TOA and the ISOC Georgia chapter continue to provide in-kind support to TDF remotely for economic, technical, and legal advice.

An unexpected and major operating cost this year has been for battery replacement, which exceeded TDF's income from the network and it was necessary to obtain about USD 2000 externally. Two high-altitude sites (the masts in Abano Pass and Diklo) needed their batteries replaced and additional solar panels installed because of a lack of sunlight in the wintertime, and over periods of heavy snowfall. Other than this, the radio equipment and other devices have continued to work without issues.

This year TDF employed and trained Iason Gatsiridze (29), a ranger with the Tusheti Protected Areas



Iason Gatsiridze (29), a Tusheti ranger.

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administration, who now also works as the local technical coordinator. In addition, TOA hired a local specialist who works in Akhmeta city to train TDF staff. This has helped improve technical support for the service while building local capacity and providing additional employment. In addition this cut costs compared to hiring IT personnel from the capital.

TDF's sustainability model includes being able to cover all of the operating costs and to have a small reserve fund from the money accumulated from the users. The profit generated from the network is not allowed to exceed 10% of all operational and capital expenses, and any profit made is used to develop the network further, repair or replace equipment, or for other activities that promote and develop the

network. However this year TDF has not been able to achieve a positive balance sheet because there were unforeseen costs related to the battery replacement and additional technical support. On the positive side, unexpected income was obtained from the Agency of Protected Areas which contracted TDF to install two repeaters in order to link the Ranger Unit at "Tusheti Gate".

Despite its sustainable business model, Tusheti Development Fund still faces infrastructural and resource-based challenges. The maintenance of the network requires renewal of the energy panels and radio equipment to improve reliability and to support increased traffic on the network. Extending reliable and higher speed Wi-Fi across additional villages of Tusheti and to fill the gaps in Shenako village will require further investment for masts and antennas. In addition, obtaining a vehicle to provide transport for technical support is an outstanding issue.

The Tusheti project benefits from a liberal communications environment and variety of state support mechanisms. It does not need a license to use wireless spectrum, and does not need any permission to set up a community Wi-Fi network or to operate as an internet service provider (ISP). A simple online General Authorization is all that is required. The special tax

regime of 0% value-added tax for small and medium-sized enterprises (SMEs) applies to community Wi-Fi networks. Settlements in high mountainous regions also receive other special tax cuts, such as being exempt from income tax. As it is a protected area, legislation also allows for some benefits for the residents in Tusheti. Finally, the Georgian Government has allocated up to 4 million USD to support households in rural areas install broadband access and give them knowledge in digital literacy as part of its GENIE Project.

It is noteworthy that for those inhabitants staying during the whole year (7-10 users), the Internet is being provided for free. During the first winter this cost was covered by the Tusheti Development Fund's 'reserve fund'. However, this winter, residents' costs are being covered by the local government (Akhmeta Municipality) which has voluntarily agreed to cover the connectivity costs of any residents who remain over the winter.





## Outcomes & Impacts

A year after connectivity arrived in Tusheti it is already clear that access to the Internet has had a variety of positive impacts, including supporting new business possibilities and improving living conditions. Irakli (Rati) Kochlamazashvili of the Tusheti Development Fund observed that: “Internetization in Tusheti has had positive direct or indirect effects on economic and living conditions of local residents and family-owned businesses,”

[PHOTO] - 77-years-old Irakli Khvedaguridze overlooks Bochorna from his balcony. He is the only continuous resident in Bochorna - a village acknowledged as the highest inhabited settlement in Europe, thanks to him (2 345 meters above the sea level). Irakli was one of the first to have Internet installed for free at his house.

## Supporting Tourism and E-commerce

The most significant economic impacts of the Internet connection have been seen in the hospitality sector where the number of tourists in Tusheti has been increasing. Based on statistics from the Tusheti Protected Areas Administration, in 2018 Tusheti welcomed more than 15 000 visitors, a 10% increase from 2016. This year up to 10 new hotels started operating in Tusheti. This translates to improved local incomes and some of this growth is likely to be the result of the new connectivity which has allowed improved online presence and promotion, a better booking process and also a more attractive offering for guests who can now have Internet access.

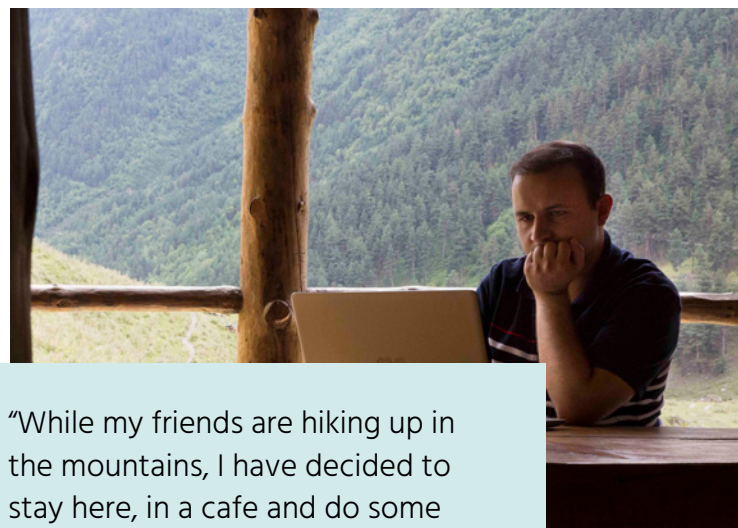
Since 2017, many more Tusheti hotels and guesthouses can now be found online and listings have appeared on Booking.com, Airbnb and via Facebook pages. Some hotels have had an online presence prior to the establishment of the Internet link, but the platforms were coordinated by their family members or contractors from a distance. Internet access has made it possible for local business owners to manage their bookings on-line more efficiently, and maintain connections with their prospective or former visitors. In the villages of Jvarboseli, Koklata, Verkhovani and

Alisgori, availability of the Internet, as the only electronic connection to the village, has inspired several locals to invest in guesthouse construction and numbers will probably further increase in the next year. A similar pattern is emerging in the villages in Pirikiti gorge: Chesho, Parsma, Baso, and Girevi.

While challenging to accurately count the number of bookings and revenues received via online reservations across Tusheti, estimates shared by hotel owners indicate these are a significant part of the total number of bookings. Natia Bakuridze, manager of Shina Hotel in Zemo Omalo estimates that 25% of the total reservations come from booking.com, or approximately six thousand dollars gross revenue generation per season.

It was also observed that availability of Internet connectivity has increased the time span each tourist spends in Tusheti. Having the opportunity of staying connected with family and work appears to encourage more tourists to travel to Tusheti, and for many working Georgians a long-weekend in Tusheti is now an attractive option. In addition to encouraging more longer-stay visitors, a spillover effect has been reported in cafes and food units across Tusheti as guests connected to Wi-Fi, tend to stay longer, order more meals and refreshments and hence pay more.

[PHOTO] - Karin Podevym and Danny Colman, a couple from Belgium, reading about the local news back home, cafe "Tishe", Kvemo Omalo, Tusheti



"While my friends are hiking up in the mountains, I have decided to stay here, in a cafe and do some work on my computer. It's great and very unexpected possibility to be able to spend a Tuesday afternoon in Dartlo while working from distance."

-Sulkhan Inaishvili (27), a clinical auditor from Batumi, Georgia.

Internet has also facilitated support for sales of local produce and non-tourist services. In 2017, the World Bank and Georgia's Innovations and Technologies' Agency (GITA) carried out an educational component of the project "Internet for Development". Trainings in e-literacy, e-commerce, e-governance and social media marketing were provided to 25 small and medium-sized businesses in Tusheti.

As reported by GITA, all of the participating SME's have created e-mails and corporate Facebook pages and 80% registered on at least one global e-commerce platform such as Booking.com or Airbnb. Of these 60% made their first sales through the platform, and a month after the training their sales grew by 11%, according to GITA.

As many of Tusheti's Internet users are entrepreneurs they use the Internet to attract new customers or maintain existing ones, and to make their business operations more efficient. Most use electronic banking, digitally pay for their utility bills, send invoices and coordinate with travel companies, make transactions, and do financial accounting on the e-government portal of the national revenue service. As there are no banks in Tusheti, for many guest-house owners operations related to paperwork had constant delays and inconvenience until the arrival of the Internet in 2017.



"I manage the guest house during the summer. The rest of the time, I work as an accountant in Alvani. This year, having internet connection here has made it possible for me to keep my regular job on distance-part-time bases."

—Makvala Melaidze (53) manager of the Hotel "Visitor Centre", Kvemo Omalo, Tusheti

Tushetians are also now able to be better informed about government programs and donor supported business funding opportunities - residents can benefit from public or other donor funding to start eco and agro tourism or to expand an existing enterprise. Internet access has also created room for online collaboration or coordination, and guesthouse owners and Internet users have come together in a Facebook group to do so. The group was originally created for reporting any problems or challenges with Internet connectivity, but now the group is using the online space for sharing other useful information with each other.

## Better Livelihoods

Linked to economic development, job creation and access to better communications, the many social benefits to the community are highlighted in a selection of the personal experiences of residents outlined below.



1. Irakli Khvedaguridze is Tusheti's 76-year-old doctor. He is the sole inhabitant of Bochora in the winters, paid to stay and tend to the few others who stay in their respective villages. Electronic communications is a vital means for residents to obtain Irakli's medical advice, and for him to reach outside support when needed. There are also times when immediate communication is a matter of life and death. If hikers or locals have an injury or a trauma, it is now possible to call for help.



2. For Natia Jagodanidze (18), coming to Tusheti to help her family run a guest house meant complete isolation. Until last year she used to hand-write letters for her friends and ask other villagers to carry them down to the city, while going for a next supply run. Sometimes this might have taken a week or two. Now communications can be instantaneous.

3. The Internet has become a blessing for shepherds and border guards who live particularly isolated lives. Shepherds in Gometsari, Piriki and Tsovata gorges, spend months up in the hills and in the past, they would have to walk for 2-3 hours to obtain a mobile connection, similarly for the villages of Chesho, Parsma, Baso and Girevi. These days shepherds visit the guesthouse “Posholi” in Jvarboseli, for instance, to connect with their families over Viber and hear the local news.

4. Lasha Gagoidze, a local mountain guide in Shenako, Tusheti points out that “Several years ago having an Internet connection in Tusheti might have been a luxury, a good-to-have amenity. But today, Internet serves as a fundamental necessity for doing business and staying connected.”



5

Anzor Kritiuli (71) was the “last child” born in his village Verkhovani. He thinks that **Internet can bring life back to the abandoned houses**, indicating that many young people can be seen giving back to their home region, such as those involved in Tusheti Development Fund, and more youngsters are starting their eco-agro tourism enterprises in Tusheti.



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6. In this region of deep valleys stretched across the Great Caucasus Mountains, some unique settlements are extremely hard to notice. Kvavlo is one of the hidden gems. The sole guest house on top of a hill, it can only be accessed via a mountain trail. Run by three sisters during the summer, Marita Gatsiridze, who is just 21-years-old, is the oldest, coordinating errands with her two younger sisters Mariam (17) and Salome (15). Their home can fit 15 persons at once. Marita daily checks on inquiries on booking.com and Facebook. Last summer, just as they installed the Wi-Fi, more than 100 bookings came via these platforms. This year, the number of visitors has increased further.

7. Archil Elizbaridze, a sheep farmer, says he enjoys the conversation with his family and friends every evening after he takes care of his sheep.

8. Natia Bakuridze (42), Manager of Hotel “Shina”, Zemo Omalo says: “Because Internet has become available in the village of Iliurta, I have applied for government funding to open another guest house there. Until now, there was not even a mobile connection. Now I plan to hire my neighbour to be a hostess, others will bring supplies and thanks to the Internet I will be able run two hotels in Tusheti simultaneously.”

[PHOTO] - Marita Gatsiridze (21), checking on online reservations, Kvavlo, Tusheti.



10

For Nunu Saghiridze (63) it was near a **miracle when his long-missed son was able to virtually attend a village feast** over a video-chat, while singing local folk songs with his neighbours. This happened in the high mountains of Verkhovani where even mobile phones have no signal.

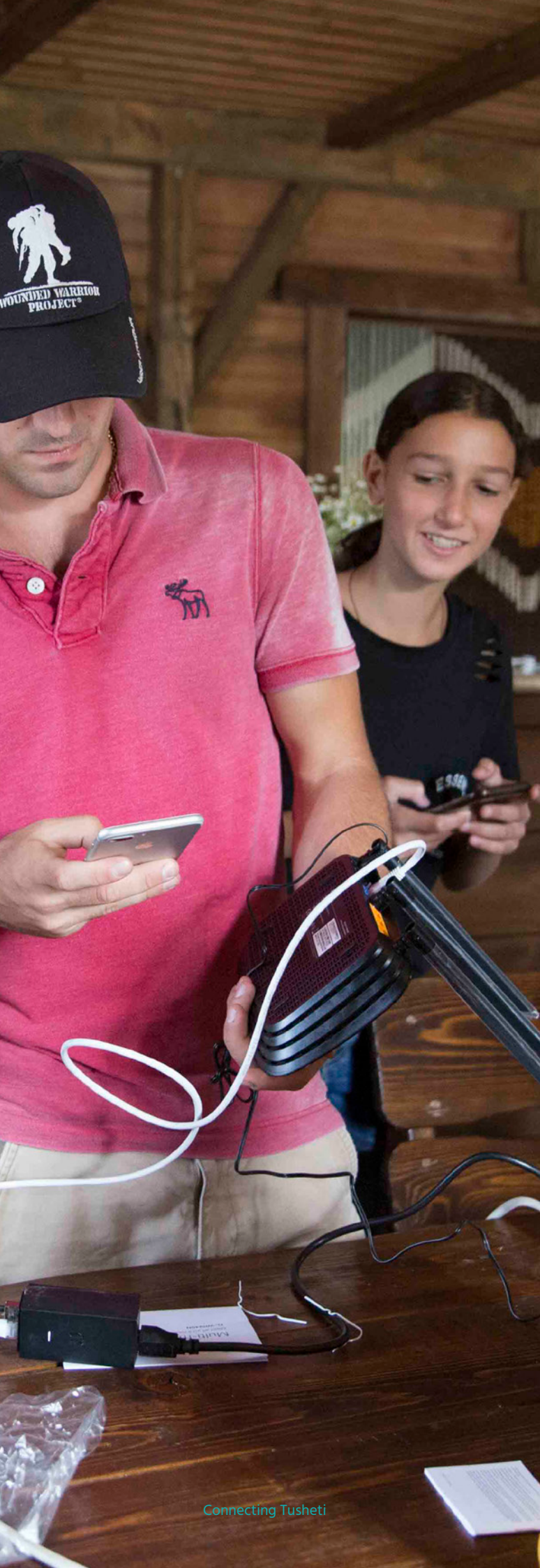
9. 50 years old, Ramaz Aliadze has decided to open a guesthouse in Zemo Omalo. The location of his family-owned house is central, giving him a competitive advantage. But he thinks in order to solidly enter the hospitality market, he has to keep up with the others. That is why even before welcoming the first visitor or putting up a sign of guest house "Gordila", he is having Wi-Fi installed at his place.

[PHOTO] - Ramaz watching as youngsters choose a password for the Wi-Fi. Saba (6) is ready to pull up his favorite cartoons on Youtube. While Sopo (14), is calling her mom in the USA over Viber and Mari (13), can't wait to catch up with her friends over Facebook messenger.

11. 47-year-old Eter Markhvaidze found a way to generate revenue from Wi-Fi, by putting a price on the password in her cafe. She also offers guests to use the laptop at an extra charge per hour. Visitors of her guesthouse or locals coming out to work or connect with their families, kids from Omalo neighborhood are eager to watch online movies or soccer games online and hikers catching a breath are often spotted at her terrace. The price she puts on a Wi-Fi password is minimal (40 cents, USD) and everyone seems to be happy to pay this one-time fee for lifetime access. With the revenue generated from these "password rentals" alone, Eter pays for the monthly Internet fee and is even able to make some savings.

[PHOTO] - Eter Markhvaidze (47), posing in front of her Wi-Fi sign, cafe "Tishe", Kvemo Omalo, Tusheti.

12. Bringing the Internet to one of Georgia's most remote and preserved settlements has also resulted in some controversies because some people have said that being disconnected is part of the authentic Tushetian experience where tourists come to detach from city life and to find inner peace in the mountains. Hersh Patel (30), a traveler from New York, USA, thinks that even though he mostly prefers to be out of reach during his time in Tusheti, it is still good to have an option to switch the Internet on or off. Thus, for many locals Internet is a necessity, for others it can be a choice.



## Conclusions & Outlook

Bringing Internet to Tusheti has not been an easy quest. It took joint effort of multiple stakeholders and skilled staff to ensure technically appropriate and efficient operations. As Ucha Seturi, Executive Director of Small and Medium Telecom Operator's Association of Georgia, points out, there are multiple lessons learned from this project, which could also be taken into account in other community network initiatives, in Georgia and other isolated areas.

Highlighting the emphasis on the sustainability and business model of the community network, Seturi says "Firstly, it is important to involve the local community in the project – in conceptualizing the project, in installing the network, and in managing the project's finances. The community needs to have a good understanding of the idea of the social ownership of the network. The Tusheti Development Fund works well as a mechanism to manage the network and this way the community is able to manage the project on its own, whether it comes to technical or managerial skills."

The Tusheti project also required detailed consideration of the local climate, geography, topography, and an assessment of the potential demand. In addition a key need was to determine the best way to safely carry and install the equipment up the high mountains. Dimensioning of solar systems and batteries sufficient for winter conditions is also clearly a necessity.

One year after the deployment of the network is not enough time to fully observe the potential impact of the availability of better connectivity. Moreover, as Tusheti is characterized by a short season of economic and tourist activities, we are in fact looking at an even shorter time span (the last two summers). Nevertheless it would not be an

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overstatement to say that broadband Internet has already changed the dynamics of livelihoods in Tusheti in this short space of time.

As many locals have left Tusheti seeking work, for almost every family living in Tusheti, Internet access means an ability to stay connected with their loved ones who could be thousands of miles away, and provides an essential communication channel for healthcare. The project has opened up new development opportunities for tourism and agriculture, while helping to preserve the unique local culture. Connectivity is seen as an additional incentive to go back to the mountains, travel for longer durations or even start a small family business, and is creating a variety of other livelihood opportunities for the local community, benefiting trade in products and access to services. Internet presence has also triggered the general capacity of the local population, especially as it relates to e-literacy.

From a broader perspective, the project is also a successful example of a public-private partnership that includes the participation of the local community, the municipal and central governments of Georgia, the Georgian National Communications Commission, private businesses and international donors that helped with equipment and the training of members of the community in using the Internet, and in e-business skills. In this respect it will help to demonstrate sustainable business models that are the result of community-led development.

In the future it is hoped that more villages will be covered and speeds upgraded. In addition to having a physical space, a common Internet connection point for everyone could serve as a catalyst in the community. This could encourage more collaboration among the villagers, as well as provide more room for educational, social or economic empowerment. The Georgian Government's efforts to implement its Broadband for Development Programme, a component of the World

Bank supported GENIE project<sup>3</sup>, has already helped consolidate the use of the Tusheti network and could help extend connectivity further.

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3 <http://documents.worldbank.org/curated/en/320681467987898858/Georgia-National-Innovation-Ecosystem-GENIE-Project>

## Further Information

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