Austria & Switzerland
On network test.

In the Alpine republics, the developments in recent years have given a clear indication of how the future of mobile telephony in Germany will look like. Were Switzerland and Austria able to stay ahead of the game again in the 2011 network test? *connect* put them to the test.

A mountain is good for mobile communications. If you put a transmission tower on it, its signals can reach the entire region, which means large areas can be covered through one station. Things get difficult, however, if many people live at the foot of the mountain. That is because they have to share the transmission capacity of the radio station, something which modern Germans like to refer to as "shared medium". What will complicate the matter even further is if there's a second mountain of similar dimensions: this will result in blackspots without reception. The population distribution, in conjunction with the mountainous landscape, requires network planners in Switzerland and Austria to take particularly careful optimisation measures. But there are also important differences between the Alpine regions and Germany when it comes to mobile communications.

Switzerland

With eight million inhabitants, Switzerland boasts just under one-tenth of the German population, yet it generates a gross domestic product (GDP) per capita of around $ 70000 U.S. This exceeds the German economic performance by 50 percent, which is a good indication for the mobile network operators that solvent customers abound in the country. Network operators also benefit from the dense population of Switzerland: with 188 inhabitants per square kilometre, the country ranks only just behind Germany, one of the most densely populated countries in the world. The majority of Swiss residents are based in the central Mittelland region, while the Alpine areas are comparatively sparsely populated. The mountains, more than 3000 of which stand over 2000 metres tall, certainly don't make coverage an easy task to achieve. Three network operators currently share the country between them: Swisscom, which has emerged from a former state-run company, services around 60% of all customers, with the rest being split between Sunrise and Orange in roughly equal shares.

Austria

Austria has slightly more inhabitants than Switzerland. With a density of 100 persons per square kilometre, the population is spread over a much larger area on what network operators consider difficult terrain due to its almost 1,000 mountains that are over 3000 metres tall. The gross domestic product per capita is about $ 33000 U.S., which is almost 20 percent lower than that of Germany. As DSL has never been as widespread in Austria as it is in Germany, fast mobile data services could be established much quicker there. There are four network operators who share the Austrian market. The two major operators, A1 Telekom Austria AG and T-Mobile Austria GmbH, together hold about 75% of the market share; about 20% goes to Orange, and Hutchison 3G (or simply "3"), a pure 3G network operator, comes in at 6%. Irrespective of the very different geographical conditions and the population distribution, *connect* and our reliable network test partner P3 communications tried to carry out the test in similar conditions as far as possible. Find out more on page 6. The results of the network tests are presented on the following pages. Please go to page 10 to read our comments on the country comparison, and to page 8 for the responses of the German network operators' technical experts on last issue's network test.

Switzerland.

Can the Swiss network operators top the success rates of 97% or higher in the cities this year?

Smartphone & Telephony

In 2010, the results of the telephony measurements in the urban areas of Switzerland ranged from good to impressive. Error rates of between 1 and 3% for connections between two mobile phones are astonishing. Having said that, the situation was somewhat different in the challenging rural areas: here, more than seven out of every 100 calls experienced problems – and this applied to two of the three network operators. In 2011, the conditions had become even tougher. The regular data traffic throughout the measurement period (Multi-RAB: see "How *connect* tests", page 6) posed even greater challenges for the networks.

Telephony in urban areas

When carrying out the measurements in the cities, one of the two measuring vehicles visited a range of busy locations to simulate making phone calls under load. The other vehicle drove through the city following a predefined list of locations in order to test the stability of the network during handover and in the entire city area. Naturally, this posed little problem for the market leader Swisscom. Compared to last year's easier test conditions, Swisscom succeeded in setting up 98.8% of all calls which is only half a percent less than in 2010, thus still securing its position at the top. Orange achieved a 97.9% success rate, which is an improvement on 2010 and still better than the top German network operator. Sunrise, on the other hand, experienced a sharp decline, failing to successfully set up 4.4% of all measured calls. In terms of voice quality, which was on a relatively high level throughout, Swisscom once again topped the rankings. Here, 10% of all measurements fell short of the limit, with Sunrise achieving a better rate than Orange. The call set-up times are very similar and slightly faster than in Germany. With a waiting period of around 6 seconds, the slowest network operator in Switzerland, Swisscom, comes in at the same level as the fastest provider in Germany.

Telephony – urban/rural mix

All network operators lost some ground in the urban/rural mix measurements. Here, the routes covered by both vehicles independently also include smaller towns. Swisscom achieved decent success rates of 96.4%, while with around 93% Orange and Sunrise were only able to improve slightly on their already poor results of the previous year.

Swisscom & Co. should really be able to deliver data to a smartphone at gross speeds of 3.6 Mbit/s, shouldn't they?

Smartphone & Data

The Smartphone Samsung Wave II (Test *connect* 3/11), which was used during the tests, supports HSDPA up to 3.6 Mbit/s. That means the higher data rates that are frequently offered by the mobile networks these days were capped. But even if the achievable net data rates are by default lower than the available gross rate of 3.6 Mbit/s, they are nonetheless sufficient to provide a fantastic user experience. The table on page 10 illustrates the average data rate as well as the limits that are exceeded or fallen short of in one third of the measurements. While the top data rate shows which speed can be expected under favourable conditions, the basic data rate is the more important figure. It reveals the limit that was exceeded in only two thirds of the measurements. If this figure is very low, inadequate speeds for mobile surfing are to be expected in one of three cases.

Data rates in urban areas

In terms of average data rates, the Swiss network operators are shaping up well in the cities, although Orange is noticeably ahead of Swisscom – which, in turn, is holding Sunrise at bay. As regards the top transfer rates that are exceeded in one third of the measurements, the differences between the network operators and the order of their results remain unchanged. Orange comes in around 230 kbit/s ahead of Swisscom, which on the other hand outperforms Sunrise significantly with 200 kbit/s. The limit that one third of the results fall short of is critical; for Swisscom, this figure is 1 Mbit/s. This means that one third of all measurements fell short of the limit that is usually considered critical for surfing enjoyment.

Transfer route data rates

Naturally, this issue intensified even more when assessing the smartphone data transfers on the transfer routes. Sunrise just about managed to reach the top third above the 1 Mbit/ s limit, while the slowest third came in under 141 kbit/s – which is certainly not enough for reliable Internet usage beyond the cities. Even Orange and Swisscom did not manage to set any speed records on the transfer routes. Swisscom outperformed Orange slightly in terms of large area coverage, and two thirds of all measurements were higher than 771 kbit/s. Orange, on the other hand, provided higher data rates as well as higher top speeds in areas with good coverage.

Switzerland.

It is clear who will come out on top in Switzerland once speed limits are becoming less of an issue.

Notebook & Data

Measurements with Windows machines and fast USB data sticks as UMTS/HSPA modems are better able to illustrate top performance rates than smartphone measurements with a focus on broad network coverage. Here, *connect*'s measurement partner P3 communications ensured that neither the industrial computers used for the measurements nor the server units became bottlenecks. In the interests of their customers, the network operators themselves are sure to provide sufficiently fast modems.

Data rates in urban areas

When calling up Internet pages, the slowest network operator, Orange, took 50% longer than the fastest provider, Swisscom; Sunrise finished in between its two competitors, but slightly closer to the fast end. The pages took between 2.1 and 7.7 seconds to load. Ranging from 99.1 and 99.3%, the success rates were very close together and entirely satisfactory. Orange and Sunrise achieved even better success rates in the file download category, while Swisscom dropped to a surprising 97.8%. Instead, however, it impressed with high speeds and took only 10 seconds on average to download the file; this took Sunrise 16 seconds and Orange as long as 20 seconds. In the upload category, all three Swiss network operators achieved success rates of more than 99%. Here, Swisscom and Orange were about level with 16 and 17 seconds, respectively. At 23 seconds, Sunrise was significantly slower. Swisscom's performance dropped dramatically in the YouTube video test. Almost 7% of all attempted playbacks could not be completed successfully. Sunrise, on the other hand, delivered a particularly convincing performance: a success rate of over 98% and just under 97% of interruption-free playback are figures that speak for themselves, especially as the time elapsed until the start of the video was desirably short with 2.3 second on average.

Data rates on motorways

On the routes between the cities, the mobile broadband measurements revealed similar figures to those of the smartphone test. Sunrise again experienced an extremely sharp decline in the slowest third, and Orange still a sizeable decline. As expected, the mean transfer rates and the measured top transfer rates were significantly higher than those of the smartphones.

Conclusion

swisscom

This year Swisscom has once again successfully defended its position as the top Swiss network operator. However, in 2010 Swisscom had a huge advantage over its competitors with a huge market share of 62% and – at least on the basis of points awarded – coming in on par with the technical standard-setter A1 Telekom Austria.
This year, the company has lost some of this dominance and, despite of the good results in telephony and mobile broadband services, Swisscom was forced to concede its top position to its smaller competitor Orange in the category for data transfers on smartphones.

orange™

Orange's leap forward comes as a surprise initially. After all, Oranges strength lies in smartphone coverage. In terms of voice communication in cities, the smallest Swiss network operator comes comparatively close to Swisscom, but outside of the urban areas the gap is significant. The situation is different, however, when looking at the data measurements carried out with smartphones. Here, Orange ranks slightly ahead of Swisscom, leaving it far behind in the urban/rural mix. Orange achieves good results or better with USB stick data transfers.

Sunrise

Following a good result in the previous year, Switzerland's second largest network operator loses ground in 2011. In the telephony category, Sunrise only managed adequate results, irrespective of whether the calls were made in urban areas or beyond. Even in the smartphone data transfer test Sunrise delivered a poor result. This surprises, as broadband coverage in the cities is generally good as the convincing results for the website or file downloads have demonstrated. Sunrise even ranks top among all Swiss operators in the YouTube video test.

Austria.

A1 established itself as the best in class in the 2010 network test. Can the company defend its position in 2011?

Smartphone & Telephony

A look across the border already proved to have a rather sobering effect on German mobile communications enthusiasts even in previous years. The top Austrian and Swiss network operators demonstrate what is technologically possible. The same also rings true for 2011, although this time all competitors are separated by only a hair's breadth. As a result, even Austria's weakest network operator comes in far ahead of the best German provider in individual measurements.

Telephony in urban areas

This applies, for example, for inner-city calls between two smartphones which are in each case measured by the measuring vehicles while they are located in different areas. Under these difficult conditions, T-Mobile Austria achieved a success rate of 98.2% – which is 0.6% more than the best German operator, Telekom. But even this good result was not enough for T-Mobile to outperform the other Austrian network operators. The purely 3G network operator Hutchison 3G, widely known under its brand name "3", leads the field with an impressive 99.5% of successful calls, from call set-up right through to call termination. And in terms of call set-up times, Austria's network operators certainly don't let down their guard either. On average, it takes less than 6 seconds for a call to be established. Orange and T-Mobile even manage to achieve this in around 5.5 seconds. T-Mobile Austria's excellent voice quality is still trumped by A1 Telekom Austria and Hutchison 3G. But even so it comes in ahead of its German sister company Telekom, the best German network operator in this category.

Telephony – urban/rural mix

Considering the top-notch results in the urban areas throughout, the question arises whether Austria has lost some of its perfection in the countryside. After all, the mostly mountainous terrain results in quite a few blackspots and several tunnels where coverage is difficult. At least one network operator's results give an indication of the coverage issue: with 94.8% of successful calls, Orange only manages to achieve an "adequate" result in this discipline. The remaining three network operators achieved very similar results with success rates of 97.4 to 97.6%, thus outclassing the entire field of Swiss and German operators.

Data usage on smartphones is all the rage. So are Austria's network operators ready for this onrush?

Smartphone & Data

When it comes to smartphone data measurement, one can expect a levelling effect. After all, the capacities of the Samsung Wave II, which was used to carry out the measurements, is limited to the HSPDA mode with 3.6 Mbit/s max. Does this mean the differences in performance among the Austrian network operators or even internationally will be swallowed up? Or does the highly developed network in the Alpine republic imply that the mean data rate, the data rate of which one third of all measurements fall short, and the data rate which one third of all measurements exceed, will be virtually identical as all providers practically offer the same speed?

Data rates in urban areas

At first glance, the four network operators appear to come in with pretty similar results, although there certainly are subtle differences. A1 Telekom Austria leads the way with the best mean data rata of 1680 kbit/s, followed closely by Hutchison 3G with 1611 kbit/s. Orange and then T-Mobile rank some 200 kbit/s behind Austria's largest and smallest network operators, respectively. These are solid results, although Telekom in Germany still achieves slightly better rates in this category. The figure that will interest mobile phone customers is the limit of which one third of all measurements fell short. It indicates which minimum speed customers can expect for two-thirds of their usage period. In Austria, this figure exceeds 1 Mbit/s with every network operator, whereby Hutchison and – to an even larger extent – A1 deliver significantly higher speeds. What is noteworthy is that many experts consider 1 Mbit/s the absolute minimum speed that is necessary to enjoy surfing the Internet on PCs. A1 Telekom Austria even manages to double this value in the fastest third of the measurements carried out, Hutchison is not far behind, and even the remaining two operators look really good here.

Data rates on transfer routes

It goes without saying that the network operators are faced with particular challenges on the transfer routes. A1 Telekom Austria and Hutchison 3G again deliver a solid performance and lose only about 200 kbit/s in each individual category, which is almost negligible. And the differences are set to dwindle even more. The same does not ring true for their competitors Orange and especially T-Mobile though: they are experiencing particularly severe losses here – most notably in the slowest third.

Austria.

All in all, Austria's network operators achieved excellent results in 2010 in terms of speed and reliability. Can this high level be pushed even further?

Notebook & Data

Data access through mobile networks is widespread in Austria, as DSL is not as established in the Alpine republic as it is in Germany. That means data tariffs in Austria are cheaper, not least due to lower UMTS licence fees. But with lower prices comes increased demand. And for a shared medium such as mobile communications, this may lead to bottlenecks.

Data rates in urban areas

There was, however, no evidence of this when calling up Internet pages in the cities with success rates of between 99.5 (A1) and 99.9% (H3G). The loading times of between 1.4 and 5.1 seconds were impressive. For each of the three test pages, all competitors were no further than 1 second apart. And file downloads and uploads proved to be even more reliable than calling up Internet pages. The times for downloading a 5 megabyte file turned out to be very different for the various operators though: Hutchison 3G and A1 Telekom Austria took 5.2 seconds on average, T-Mobile required almost twice as much time, and Orange yet another 4 seconds more. What is noteworthy is that the top data rates for H3G and T-Mobile in these networks indicate a significant dual-carrier expansion of the HSPA network, with the maximum gross data rate being increased from 21.6 to 43.2 Mbit/s. In terms of uploads, the field is spread between Hutchison 3G with 8 seconds for the 2 megabyte file and Orange with double that time. Even the YouTube challenge could not faze the Austrians. Even T-Mobile Austria's results would have been enough for a place at the top in Germany and Switzerland.

Data rates on motorways

The data measurements on motorways delivered some disappointing results, at least for Orange. The network operator had to face up to extremely slow rates with its slowest third falling short of 83 kbit/s. In the light of the fairly solid mean transfer rate, this indicates that in certain sections the 3G network is very poorly developed or not developed at all. The A1 and Hutchison 3G networks, on the other hand, appear to be developed very well throughout. At least this is suggested by the mean rates of between 7 and 9 Mbit/s and the top data rates of between 9 and 12 Mbit/s. T-Mobile ranks in between Orange's disappointing figures and the top results of A1 Telekom Austria and Hutchison 3G.

Conclusion

Last year, Hutchison 3G came in a "good" last place, but this time the provider tops the ranking by a hair's breadth. It is said that "3" has upgraded its entire network with ZTE technology over the course of last year. The result sets new standards in every respect. A pure 3G network trumps the network test with the highest number of points ever awarded by *connect*. Who would have thought that possible?

Though set on winning, A1 Telekom Austria has had to concede to Hutchison 3G – albeit marginally. And this despite the excellent performance displayed by Austria's largest network operator. In every category, A1 was hot on the heels of its only serious competitor, a few times both were on par, and in the rural telephony rating A1 even managed to scrape past Hutchison. Had it not been for "3"s performance, A1 would have topped the points ranking with a record result.

After Telekom's leap forward in Germany, the testers were particularly interested to find out T-Mobile Austria's results. It turns out that T-Mobile Austria is still right in the midst of the process which the company has already brought to a successful conclusion in Germany. In three cities, the consequences of a dual-carrier expansion were obvious. If T-Mobile continues on this path, the results of the 2012 network test in Austria will be unpredictable.

Those who stand still will fall behind. This proverb best reflects the situation Orange has found itself in because there is now a huge gap between Orange and the top two Austrian providers – and even T-Mobile is set to pull away. At present, the number two of the 2010 network test is a "good network operator", but in the light of its competitors' quality drive, customers are expecting ever higher standards.

How connect tests.

A variety of different requirements apply to a mobile network test. The test should, for example, provide information as to to what extent a user's typical standards are met. In addition, it should deliver findings regarding what sophisticated users can expect if they need a fast mobile communications service beyond the usual trodden paths.

The test is intended to cover the needs of city travellers looking for the opening times of an exhibition and those of a photo journalist who needs to upload images of the local football club's latest match. Two measuring vehicles of *connect* network test partner P3 communications ensured that this standard was upheld. Both travelled along different routes to the cities of Basel, Bern, Geneva, Lausanne and Zurich in Switzerland, and Graz, Linz, Innsbruck, Salzburg and Vienna in Austria. Measurements are carried out both on the connecting and on the main roads, whereby the routes within and outside of the cities are predefined in detail. One of the vehicles is equipped with ten smartphones, five of which are controlled by dedicated industrial computers to carry out the voice quality measurements, while the remaining five are configured for smartphone data measurements. Three to four units were used to automatically measure the three to four network operators, with one extra spare unit. The first test vehicle, which is equipped with nothing but smartphones, covered so-called category 2 connections that also include smaller towns in between the major destinations.

The second vehicle travels on motorways between major cities, and within the cities it heads for hotspots, i.e. locations such as railway stations and airports where increased mobile traffic is to be expected. It then carries out measurements in these places for extended periods of time. This vehicle is also equipped with five smartphones, which are controlled by five industrial PCs to carry out automated voice measurements. In the process, the voice measurements are always carried out between the two measuring vehicles in different positions in the same area.

For the inner-city measurements both vehicles are in the city, and for the urban/rural mix the first vehicle travels through the surrounding areas, while the second vehicle is in the city or travels on motorways to the next city. That means that each call involves two mobile communication transmissions. The quality is calculated according to the advanced POLQA algorithm and evaluated on the basis of the Mean Opinion Score (MOS). In the second vehicle, five further industrial PCs run the network operators' latest (dashboard) software to control the best available USB data sticks from the test participants' product ranges as sold in-store at the start of each measurement process. These are used to test the services measured as part of the mobile broadband category in the cities, and broadband downloads on the motorways. The sticks are mounted with brackets in a special box on the roof of the measuring vehicle. The same box also houses the roof antennae that are used for the smartphones. 12 decibel attenuators ensure that the measurements are carried out with relative levels ranging from those inside of typical vehicle interiors to those in average apartments.

Next to the basic tests, a number of details need to be taken into consideration in order to generate realistic results. One of those details, for example, is called Multi-RAB. It addresses a particular challenge the smartphones pose for the networks: they support simultaneous telephony and data transfers. While only a few users surf the Web or send emails while they make phone calls, smartphones also transmit data independently in the background – for example to update weather information in an app, to receive a new e-mail or to automatically synchronise the calendar. All this happens without direct control by the user. In this case, the network has to maintain and manage two connections: one for telephony and one for data. This is called Multiple Radio Access Bearer. If a network is not up to the task, this leads to deterioration of the quality of service, which for the users manifests itself in an increased number of failed attempts to set up a call, poorer accessibility, or an increased number of dropped calls.

To be able to assess smartphone telephony from the users' perspective, *connect* has expanded its network test by a Multi-RAB component. One of the two phones, which take turns calling each other, is configured so that the mail app is permanently connected with an e-mail account (push mail) and regularly receives short e-mail messages to ensure the quality and validity of the collected data. The interval at which new e-mails are sent to the e-mail account has been defined so that exactly one e-mail is received during the timeframe of test call at a randomly chosen point in time.

In the case of YouTube videos, on the other hand, it must be borne in mind that both the YouTube server farms and several upstream network operators endeavour to deliver versions of the videos that are optimised for the terminal device and the connection. To capture this, P3 communications measures downloads of original YouTube videos while monitoring the quality parameters relevant for users, such as availability and completeness, delayed start and interference through interruptions. The objective: reliable, fast videos that are as smooth as possible. In the test case, only Vodafone used compression. The data reduction amounted to only 4%, and the critical testers did not experience any noticeable losses.

National Roaming.

Hutchison 3G has chosen to go for a pure UMTS network.

Under the brand name “3”, it is the only network provider in Austria not to use a GSM network at all. Not at all? Not quite, because the smallest network provider in the Alpine republic has entered into a so-called national roaming agreement with A1 Telekom Austria. Whenever there is no 3G network available, the user’s mobile phone, smartphone or data stick will dial into the 2G network of “3”s national roaming partner. So it’s business as usual, the only difference being that Hutchison 3G does not operate the 2G network itself. That is why the network provider strives to remain within its own network as much as possible. This is facilitated by the specially adjusted firmware on most of the mobile phones sold by “3”. This firmware searches for networks more frequently than in the usual 10-minute intervals in order to find back into its own network as quickly as possible. Of course there are exceptions: Apple, for example, does not allow its iPhone firmware to be adapted. The smartphones we used for our measurements were also running standard firmware. Hutchison 3G might have achieved better results with shorter network search intervals, although the smartphones’ use of its competitor’s 2G network was extremely limited anyway. Reason enough for all other network operators to take a very close look at Hutchison 3G’s results. Because once the 2G licences expire – in Germany this will be in December 2016 – pure 3G operation will become a reality. And Hutchison 3G has already successfully tried and tested this scenario.

Interviews.

In the light of the delays the 2011 network test brought to light in Germany, *connect* spoke to those responsible at the networks about their take on the results and strategy.

Telekom

Dr Bruno Jacobfeuerborn: Chief Technology Officer, Telekom Germany

Do our measurement results match your expectations?
In recent years, we have consistently upgraded and expanded our network in order to provide our customers with the best network and to meet the standards we place on ourselves as the quality leader in the mobile communications segment. The impressive results of the *connect* test have confirmed that our strategy is the right one.

In which segment did you invest the most in 2011?
Today, two out of every three of our customers choose a smartphone. For this reason, we have continually expanded the existing UMTS and increased our network coverage to 42 Mbit/s nationwide, alongside our continuous LTE expansion.

Where will you invest next year?
We will continue to invest in all our networks. Our concept includes expanding our fixed and mobile networks as we are in the process of becoming a "gigabit society". In terms of dead spots, we will continue to focus on our technology mix of LTE, DSL, VDSL and fibre optics in 2012 in order to be able to provide nationwide broadband solutions.

Which new challenges do you anticipate for 2012, and how will you counteract them?
In the mobile communications segment, for example, the rapid increase in mobile data traffic is going to pose a huge challenge in the next few years. We have the most powerful network in Germany in this respect, and we are continually improving its quality and availability. In this way, users are set to benefit from the best possible experience – just like they already do in the mobile telephony segment thanks to HD Voice.

Vodafone

Hartmut Kremling, Chief Technology Officer, Vodafone Germany

Do our measurement results match your expectations?
We carry out continuous quality checks and measurements to ensure that our network meets our customers' high standards. The test verdict reinforces our own perception and demonstrates that Vodafone is the most stable network operator when it comes to downloads, provides the most reliable connections for surfing the Internet, and offers very high data rates and excellent voice quality.

In which segment did you invest the most in 2011?
In the last ten years, Vodafone Germany has invested up to two million euros into its networks each year. In 2010, we spent 1.43 billion euros at auctions to acquire new digital frequencies. We used them to expand the ultrafast LTE, i.e. the next generation of mobile communications. And in 2011 alone we spent a three-digit million sum on the expansion of our existing network.

Where will you invest next year?
Our focus is on LTE and thus on the mobile network of the future. Next year the white spots will have disappeared. In addition, we will further reinforce our strong position in UMTS and upgrade our entire network infrastructure and move towards "all-IP".

Which new challenges do you anticipate for 2012, and how will you counteract them?
Our biggest challenge is the rapid data growth. To tackle this growth, Vodafone is investing as heavily in LTE as no other network provider. At the same time, we ensure that the network quality will continue to meet the high expectations placed on it, and we offer broadband plus mobility in both rural and urban areas.

Interviews.

In the light of the delays the 2011 network test brought to light in Germany, *connect* spoke to those responsible at the networks about their take on the results and strategy.

O2

Heribert Dumont, Head of Quality Assurance, Networks, Telefónica Germany

Do our measurement results match your expectations?
Telefónica Germany is currently experiencing above-average data growth: We sell smartphones almost exclusively. This could not have been expected or predicted, which is why we may experience individual bottlenecks at certain base stations. The network test has also confirmed this. For this reason, we are continually optimising our network, further expanding our 2G and 3G capacities, and upgrading the most heavily used base stations in the major cities.

In which segment did you invest the most in 2011?
We have started to develop LTE, on the one hand, and expanded our capacities in our existing networks significantly, on the other. In particular, we have boosted the core network considerably.

Where will you invest next year?
The smartphone boom is set to continue, which is why we are continually expanding our UMTS capacities. At the same time, we are bringing LTE to those cities with a particularly high demand for broadband services, and we are pressing ahead with our work to eliminate dead spots. Telefónica Germany continues to support the Federal Government's broadband initiative, which strives to bring fast Internet access to rural areas.

Which new challenges do you anticipate for 2012, and how will you counteract them?
We need to advance the development of LTE in the cities, because the first LTE smartphones are about to hit the market. The use of UMTS phones is also set to increase rapidly, so we will continually optimise our network and adapt it to the new challenges.

E-Plus

Rafal Markiewicz, Chief Technology Officer groupe E-Plus

Do our measurement results match your expectations?
Yes, the test provides a realistic picture of the situation which fundamentally matches our own measurements. The grading system, on the other hand, is rather subjective.

In which segment did you invest the most in 2011?
We are right in the middle of the largest network expansion programme our company has ever seen. Our investments focus distinctly on data protection. And this not only applies to the radio network, where we are expanding HDPA considerably, increasing data speeds and extending our coverage regions. So a lot of money also goes into the transport network. In this area, technology is becoming increasingly important.

Where will you invest next year?
In recent months, we clearly focused on increasingly fast data transmission and better coverage. And we will systematically continue along this path. In the future, quality will also play an even more important role. Again, the rule of thumb is: we strive to give our customers the performance and quality exactly where they expect it.

Which new challenges do you anticipate for 2012, and how will you counteract them?
Despite all the data growth we are experiencing, we must not let voice traffic suffer. All customers share this minimum expectation. And we will put a lot of effort and expertise into consistently looking at matters from our customers' perspective. Ultimately, we are creating a positive customer experience by expanding the network – after all, that is what our customers pay their bills for month in and month out.

Network test Switzerland/Austria 2011

COUNTRY		Switzerland			Austria			
Provider		Swisscom	Orange	Sunrise	Hutchison 3G	A1 Telekom Austria	T-Mobile Austria	Orange
SMARTPHONE TELEPHONY								
Tariff used for measurements		Business Classic+Data Option	Orange ME+ Data Option	Sunrise Flat Basic+Flat Surf Option	3SuperSIM Superphone 4000	A1 Smart 9000	Call 2000	Supernet 4000
Price/included volume*	CHF/€/GByte	67.59/2	105.–/1	43.99/2	18.–/5	54.90/3	29.90/3	25.–/2
Inner city areas								
Success rate	(%)	98,8	97,9	95,6	99,5	98,8	98,2	98,6
Call set-up time	(s)	6,02	5,42	5,76	5,86	5,88	5,47	5,56
Voice quality (MOS-LQO)		3,80	3,66	3,61	3,83	3,91	3,78	3,57
10% of voice samples worse than (MOS-LQO)		3,40	3,04	3,27	3,37	3,51	3,33	3,21
Urban/rural mix								
Success rate	(%)	96,4	93,0	93,1	97,4	97,6	97,6	94,8
Call set-up time	(s)	6,15	5,64	6,48	5,97	6,35	5,93	6,33
Voice quality (MOS-LQO)		3,71	3,59	3,57	3,80	3,79	3,69	3,58
10% of voice samples worse than (MOS-LQO)		3,29	2,93	3,08	3,38	3,36	3,23	3,17
SMARTPHONE DATA								
Urban								
Mean data rate	(kbit/s)	1396	1562	1201	1611	1680	1416	1476
Basic data rate (slowest third slower than)	(kbit/s)	1093	1219	902	1265	1408	1053	1162
Top data rate (fastest third faster than)	(kbit/s)	1675	1901	1460	1903	1966	1757	1771
Transfer routes								
Mean data rate	(kbit/s)	1095	1191	786	1442	1426	847	863
Basic data rate (slowest third slower than)	(kbit/s)	771	639	141	1107	1165	186	384
Top data rate (fastest third faster than)		1449	1642	1149	1782	1869	1065	1143
MOBILE BROADBAND URBAN								
Tariff used for measurements		NATEL® Data Premium	Internet Everywhere Max	Sunrise T@keaway MAX	3Data Super Speed Flat	A1 Mobile Broadband Speed	Surf Extreme	Mobile Internet 15 GB
Price/included volume*		85.–/5	49.–/5	49.–/10	29.90/ unlimited	34.90/30	25.–/15	15.–/15
Modem		Huawei E372	Huawei E352	Huawei E367	Huawei E372	Huawei E372	Huawei E372	Huawei E182E
Urban data								
Internet page call-up								
Success rate overall	(%)	99,2	99,1	99,3	99,9	99,5	99,6	99,8
Session time page 1 (Kepler)	(s)	2,1	3,4	2,7	1,9	1,4	1,4	2,4
Session time page 2 (Facebook)	(s)	3,0	4,7	3,3	2,7	2,5	3,5	3,1
Session time page 3 (iGoogle)	(s)	4,4	7,7	5,4	4,4	4,3	4,8	5,1
File download								
Success rate	(%)	97,8	99,6	99,9	99,9	99,9	99,9	100,0
Mean session time	(s)	10,3	19,5	15,9	5,2	5,2	10,1	14,1
Basic data rate (slowest third slower than)	(kbit/s)	5320	2536	2835	8632	8949	7255	2908
Top data rate (fastest third faster than)	(kbit/s)	7918	3576	4188	12080	13030	12543	4635
File upload								
Success rate		99,6	99,2	99,8	99,9	99,4	100,0	99,9
Average session time	(s)	16,0	17,0	23,1	8,0	8,6	10,9	15,7
Basic data rate (slowest third slower than)	(kbit/s)	1271	1180	1095	2307	2349	1549	1063
Top data rate (fastest third faster than)	(kbit/s)	2193	1618	2175	2712	3009	2691	2026
YouTube								
Success rate	(%)	93,1	96,1	98,3	99,8	99,2	97,7	98,7
Start time	(s)	2,3	3,5	2,6	2,7	2,8	2,7	2,8
Proportion of interruption-free playback	(%)	91,9	92,4	96,9	99,5	98,9	95,1	96,9
MOBILE BROADBAND MOTORWAY								
Mean data transfer rate	(kbit/s)	3215	1503	1359	8988	6828	2153	1353
Basic data rate (slowest third slower than)	(kbit/s)	2017	700	161	4470	3779	315	83
Top data rate (fastest third faster than)		4014	2062	1908	12326	8908	1825	1671
TEST RESULTS								
Smartphone telephony	**max. 180**	155	133	119	164	161	157	146
Inner city areas	90	81	75	61	86	82	78	80
Urban/rural mix	90	74	58	58	78	79	79	66
Smartphone data	**max. 120**	100	105	76	115	118	81	90
Urban	60	52	56	47	57	59	52	54
Transfer routes 60		48	49	29	58	59	29	36
Mobile broadband urban	**max. 150**	130	120	131	147	145	141	135
Internet page call-up	60	57	50	56	59	59	58	58
File download	30	22	22	22	28	28	27	23
File upload	30	26	23	25	30	29	28	25
YouTube	30	25	25	28	30	29	28	29
Data motorways	**max. 50**	41	28	14	50	48	20	11
Broadband download (motorway)	50	41	28	14	50	48	20	11
connect VERDICT	**max. 500**	**426 very good**	**386 good**	**340 adequate**	**476 very good**	**472 very good**	**399 good**	**382 good**

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Conclusion.

Bernd Theiss, connect editor

Last year, the test results of many Austrian and Swiss network operators were already far ahead of the German figures. The 2011 network test revealed the reason, which can be summarised in just one sentence: they're proactive.
Of course, we cannot tar all of the seven network providers in the Alpine regions with the same brush, but the technological leap forward of individual mobile phone companies is all the more evident.

In Switzerland, for example, Swisscom was able to defend its dominant position, although its advantage over the best Germany operator and over the second best company on a national level is melting away. The runner-up in Switzerland this year is Orange; the provider has made a huge leap forward. Sunrise, however, is clearly lagging behind the other network operators, especially in the smartphone measurements. Orange in Austria continues its positive trend, although the competition is pulling away. One of these competitors is T-Mobile Austria, which has completed an expansion programme in several cities, similar to that of the German Telekom. It will be interesting to see what else lies ahead – and whether the consistent expansion will turn the company into a serious threat for A1 Telekom Austria, which – with 472 points – still holds a significant lead over most of the rest of the field. But not over Hutchison 3G – a huge lead of 476 points catapulted the provider's pure 3G network into first place in the network test in Austria and in the country comparison overall. This deserves our highest respect.

Source: *connect* 1/2012