

White paper

More than one Yota of difference

Russian WiMAX service provider Yota succeeds by offering an innovative service—and exporting it abroad



- With 350,000 subscribers, Yota is one of the fastest growing WiMAX service providers—and one with a highly innovative business model.
- Yota continues to expand. In Russia, its network will cover 180 cities by 2012. It has just launched a network in Nicaragua, and next on its list are Belarus and Peru.
- At Yota, the focus is not on technology, but on the customers: making sure they have the devices, applications, and bandwidth they want, making it easier for them to sign up, and giving them a compelling service.

Yota is busy these days. The first Russian service provider to deploy a mobile WiMAX network, Yota has signed up over 350,000 customers in the six months since its commercial launch in June 2009 (Table 1). It continues to sign up 3,000 customers a day, and is the first service provider to have launched a WiMAX/GSM smartphone. While expanding domestically, Yota has also soft-launched a WiMAX network in Managua, Nicaragua, and is planning for networks in Belarus and Peru.

As a greenfield service provider new to the telecom market, deploying a new technology and a new type of service, Yota's success is remarkable. The company has avoided the common trend among emerging market operators of focusing on basic fixed broadband connectivity in underserved areas. Instead it offers mobile broadband connectivity in cities where 3G is available, and where wireline broadband, including residential fiber in some areas, is available and cheap.

This paper explores what made Yota's achievements possible, and what lies at the core of its unique market approach. We look at the market in which it operates, at how it is building and expanding its network, and at the proposition it offers to its customers in terms of services, devices, content and applications. Finally we widen the scope to follow Yota's activities in markets outside Russia and to look at future prospects.

Winning market share in the Russian market

Russia has one of the highest levels of WiMAX activity worldwide. More than 20 operators have declared ambitious deployment plans, often backed by deep-pocket investors or parent companies.

While Russia has great growth prospects, it is also a challenging market (Table 2). Outside Moscow and St. Petersburg, broadband penetration is still very low (6.4% of population, compared to 20% of population in Moscow). Yota targeted these two urban areas initially for a mobile broadband service intended for the affluent and technology-savvy customer segment. As it moves to second

tier cities, it will face a more price-sensitive, but largely underserved market.

The Russian wireline fixed market is very competitive. In Moscow and St. Petersburg, multiple service providers offer broadband services over different access technologies (DSL, fiber, fixed wireless), often at rock-bottom prices. In this market, Yota does not aim to be the lowest-cost provider, betting that customers are willing to pay for the benefit of unlimited access and mobility.

Table 1. Key Yota facts as of December 2009

Key Yota facts as of December 2009
Commercial launch: June 2009
Spectrum: 30-40 MHz in the 2.5 GHz band
Customers: more than 350,000
Average traffic per customer: 10 GB/month
Employees: 1,200
Domestic coverage: Moscow, St. Petersburg, Ufa (commercial), Sochi and Krasnodar (soft launch)
Vendors: Samsung (WiMAX RAN), Cisco (fiber backhaul, core), Bridgewater (authentication, authorization and accounting [AAA])
Pops covered: 23 million
Backhaul: built 3,000 km own-fiber backhaul network with up to 180 Gbps bandwidth
Devices supported: over 50 laptops, 1 WiMAX/GSM smartphone, 2 laptop dongles, 2 desktop modems with Wi-Fi
Service plans: US\$29 for laptops or desktop modems, US\$16 for smartphones
Investment: US\$470 million for Russian market invested to date, plus an additional US\$350 million for further Russian expansion and US\$500 million for international deployments
Ownership: WiMAX Holding Ltd., with a 25.1% share owned by Rostecnoologii State Corporation
International markets: Belarus, Nicaragua (soft launch), Peru
2012 target: service available in 180 Russian cities with a population of over 100,000

Source: Yota

Fixed wireless and wireline operators are not Yota's only competitors. Yota's primary targets are mobile users who want to have a broadband connection everywhere they go. As a result, Yota competes also with cellular operators, although their propositions to subscribers vary. After years of operation, cellular operators boast excellent coverage, but they charge premium prices. With the more advanced WiMAX technology, Yota offers higher data speeds at lower per-MB prices than cellular operators, but cannot yet compete on nationwide coverage.

3G has been introduced only recently in Russia and so far only in urban areas. Construction of 3G networks in Moscow was approved in December 2009, and three operators (Mobile TeleSystems, Vimpelcom and Megafon) have launched in early 2010 their 3G networks. Despite a mobile penetration well over 100%, cellular data revenues are still low compared to developed countries. As a result, competitive pressure forces Yota to keep prices relatively low compared to mobile WiMAX operators in developed countries. In the markets where 3G is available, Yota has not seen any impact of the 3G service availability on its customer take up, suggesting that Yota has been successful at differentiating its services from those offered by mobile operators.

Table 2. Russian telecoms market

Russian telecom market
Broadband penetration: 6.4% of population, with approximately half of subscriptions in Moscow and St. Petersburg. In Moscow, broadband penetration is over 20% of population, equivalent to more than 60% of households
Internet penetration: 32%
Mobile phone penetration: 144%
Fixed phone penetration: 23%
3G networks recently launched in urban areas
Mobile ARPU: US\$9
Data ARPU: 17% or US\$1.53
Other mobile WiMAX operators: Comstar (commercial, 2.5 GHz), Freshtel (soft launch, 3.5 GHz), Synterra (commercial, 2.5 GHz, mostly pre-WiMAX)

Source: ITU, mobile operators, Ovum,

Russian Federal State Statistics Service, WiMAX Forum, Yota

There are many fixed BWA and WiMAX operators in urban areas, but they are mostly niche market operators, with fewer than 10,000 subscribers. Three other IEEE 802.16e WiMAX operators, Comstar, Freshtel and Synterra, have announced network launches. They have not released subscriber numbers, but their marketing efforts are much less aggressive than Yota's.

A new breed of mobile broadband service provider

Dennis Sverdlov, Yota's General Director, tirelessly promotes Yota's vision to audiences worldwide. His focus is not on what WiMAX—or technology in general—allows a service provider to do; instead, he talks about what customers want, and what they are willing to pay for. The challenge for a service provider is to find the most suitable technologies to meet these requirements—and Sverdlov believes that WiMAX fits the bill. While this may seem like an obvious approach, it can be revolutionary for operators accustomed to loudly advertising the technology—3G, WiMAX, or LTE—rather than the services that they sell.

Perhaps not surprisingly, Yota insists that it is not a WiMAX operator. It claims to be a mobile service provider that decided to use WiMAX to meet the needs of its customers (Yota is very careful not to refer to them as subscribers). Yota does indeed have a strong commitment to WiMAX, but the distinction reflects the company belief that a successful service provider needs much more than a good radio access network (RAN) to attract customers.

"This approach has led the management team to work sometimes against the accepted wisdom of what can and cannot be done, and chart a new path," explains Shane Kwon, Senior Manager in the CIS/EMEA Sales and Marketing Group at Samsung, who has been working with Yota during the rollout of the network. The prevalent IT and consulting—as opposed to telecom—background of Yota's management has been instrumental in creating a culture focused on results and with little respect for legacy offerings. Risk taking

What makes Yota stand out among mobile data operators?
“A group of young ambitious people excited to be in a startup company but with limited telecoms background, supported by brave investors, focused on a single goal: to provide great service to their customers,”
says Dennis Sverdlov, Yota’s General Director.

and acknowledgement of unresolved problems are equally encouraged.

Yota’s vision is based on few simple tenets:

- Simplicity
- Unlimited access
- Mobility
- Focus on services

Innovation at Yota springs from the team’s commitment to execute on these principles, no matter what it takes.

Building the network

Since launch, Yota has promised unlimited, high-speed, mobile access to its customers. Careful planning was necessary to meet customers’ expectations.

The planning started with the backhaul. Yota wanted to use fiber but was unable to find a suitable service provider that both had fiber connectivity to most urban planned cell sites and could provide effective support services. To ensure it had the required backhaul capacity and service level guarantees, Yota decided to build its own backhaul network, which links all urban and most suburban cell sites through fiber. Yota uses just a few microwave links in suburban locations where fiber is not available. Yota’s 3,000

km backhaul network can carry up to 180 Gbps and provides 200 Mbps per cell site. While this is more throughput than the current RAN can generate, it will allow Yota to increase RAN capacity without having to upgrade the backhaul.

The deployment of the backhaul network required a substantial effort—about half of the capex invested to date in the project was allocated to backhaul.

With the backhaul in place, Yota started to deploy the RAN WiMAX network with IEEE 802.16e equipment from Samsung. From the very beginning, Yota decided to work with a single vendor in all markets to speed up the deployment process. Using the same equipment, Yota has been able to expand to new markets and to take advantage of experience gained in previous installations. This approach, which worked well given Yota’s initially limited staff resources for installation, has also been followed in the international expansion. Samsung is providing the WiMAX base stations both in Nicaragua and Belarus.

The network expansion in the served markets is still ongoing to improve coverage and to increase capacity. Today, Yota estimates to have 3,000 base stations in Moscow alone, with a density of up to 10 base stations per 1 km² in some certain areas. Most base stations in urban areas are on buildings’ roofs.

Table 3. Yota’s chronology

Yota’s chronology
September 2008: Moscow and St. Petersburg soft launch
April 2009: Business users commercial launch
June 2009: Residential users commercial launch in Moscow and St. Petersburg
August 2009: 100,000 customer mark reached
October 2009: Ufa commercial launch
October 2009: 200,000 customer mark reached; operational break-even point reached
November 2009: Sochi and Krasnodar soft launch
December 2009: Soft launch in Managua, Nicaragua

Source: Yota

To provide better indoor coverage, Yota has started to install picocells in public buildings like airports and malls, but dealing with real estate owners can be challenging and picocells do not always provide cost savings over the macro cell network. According to Yota, the lower power of picocells makes them less well suited for outdoor coverage.

Traffic: too much of a good thing?

Yota customers are heavy users, and the traffic they generate is increasing at a fast pace. In May 2009, the average traffic per customer was 8 GB/month—a mere seven months later, average traffic per customer had reached 10 GB/month. As is typically the case, only a small percentage of users generate most of the traffic—26% of its users generate more than the average 10 GB/month in May 2009 (Figure 1).

High traffic levels are a sign that customers use the service extensively and value it. As long as customers are few, high traffic levels are easily accommodated within the infrastructure. As customer numbers increase, congestion rapidly becomes an issue if the network capacity does not grow.

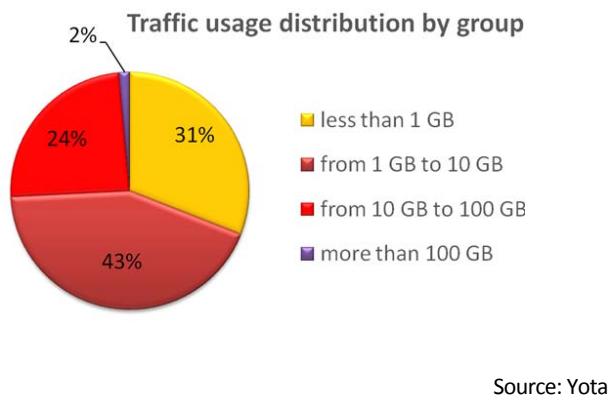


Figure 1. Traffic usage distribution among customers

All wireless operators—especially successful ones that see rapid customer growth—face this issue regardless of technology they use. Yota has been more open than most operators in discussing the implications of the growth in data traffic.

The growth in traffic is mainly driven by video content. Cellular operators have also discovered that video is a major contributor to network congestion. For a WiMAX service provider like Yota, the increase in traffic from video content has an even more profound impact than for cellular operators: most WiMAX devices are laptops, with large screens and capable of handling high video resolutions, which raises the throughput requirements of these devices.

As video is a main driver of the demand for service, Yota is committed to support high-quality video streams, and to avoid throttling or assigning a lower priority to video.

The levels of traffic Yota experiences are 20% higher than those generated by xDSL customers. According to Yota's estimates, the traffic generated by their customers is 100 times the data traffic generated by GPRS, EDGE and 3G customers. Network capacity limitations alone explain to a large extent the lower traffic level for cellular customers. The higher usage compared to DSL customers is interesting, however, because DSL is more often shared among multiple PCs in a household or office than is WiMAX. A likely reason for the difference is the impact of mobility on usage and the prevalence of traffic caps for DSL plans in Russia.

Mobile broadband is still a new service. Service providers still are learning how to best market it and price it. Customers are learning, too—and finding out that mobility is highly valuable. Data collected by Yota in April and September 2009 (Figure 2) show that the percentage of fixed customers—i.e., those who access the network from the same cell site—quickly decreases over time as customers learn to make wider use of their connection and log in from multiple locations. The increasing maturity of the market means more online time and further increases in traffic, spread over a wider geographical area.

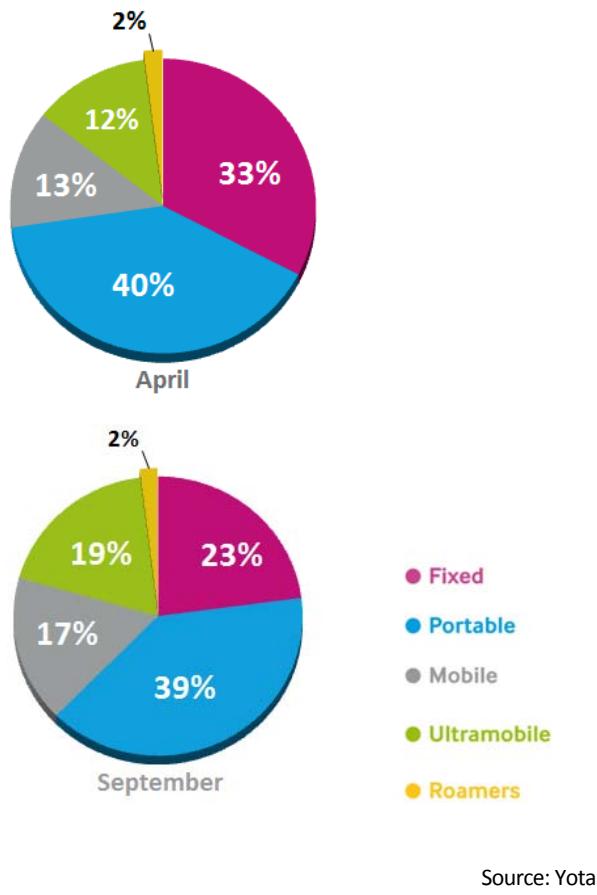


Figure 2. Users by categories in April and September 2009

Ivanov estimates that Yota needs 100 customers per base station sector to be profitable.

Even if the additional investment in capex to install additional base stations were not an issue, spectrum availability would quickly become a barrier. In some areas in Moscow, there are already 10 base stations per km², and such high density can easily lead to interference. Ivanov estimates that Yota would need to deploy six times as many base stations to meet the expected demand in the long term. To do so, Yota would need additional spectrum.

This position reflects an increasing realization among WiMAX and LTE operators that operators need large spectrum allocations—over the 30 MHz that they initially considered sufficient—to support wireless broadband services.

Yota is also working to increase capacity within each base station by deploying multiple input, multiple output (MIMO) and beamforming (BF). Furthermore, Yota has announced a trial of WiMAX Release 2.0 (IEEE 802.16m) for late 2010 and expects to upgrade to the new technology in 2011. WiMAX 2.0 is expected to more than double the capacity of base stations.

More base stations, more spectrum, and higher base station capacity will make it possible for Yota to increase network capacity as it signs up new customers. But will this increased capacity be enough to keep pace with the growth in traffic? If not, will Yota decide to introduce fair-usage policies or traffic caps, or to manage traffic from heavy users and during peak hours?

Expanding capacity

What can be done to accommodate the additional traffic generated by new customers and to support increasing individual traffic levels?

According to Yegor Ivanov, Vice President of Business Development at Yota, the network was planned to support a contention ratio (or oversubscription) of 10, which is generous compared to prevailing practice among broadband service providers worldwide. Currently, Yota's customers generate traffic levels that require a contention ratio of 3—and Yota expect this figure to decrease further in the future as individual traffic levels grow. Adding base stations will increase the capacity, but eventually profitability comes into play.

Reaching out to customers

During the initial phase of a market launch, Yota makes its service available for free, to get potential customers interested and committed beyond the initial phase. A restricted group of friendly users receive a free device in exchange of feedback on network performance. However, free service before commercial launch is available to everybody who applies; but as a sign of commitment,

users have to buy their own device (i.e., laptop dongle, WiMAX laptop, smartphone, or desktop modem).

This approach gives Yota the opportunity to optimize its network during the installation phase on the basis of real user data—where they are, what they do, what can go wrong. As network is still being rolled out, Yota believes it is fair not to charge users as the service provider cannot guarantee the levels of coverage and performance that are expected from commercial paid service.

In Krasnodar, 6,000 people signed up on the first day the free service became available. Yota had to stop user devices sales during the first month as the traffic already exceeded the planned level of network capacity at commercial launch.

In the markets where service is commercially available, the only choice that Yota customers need to make is about the device to use—no further decision on contract options is needed. For each device type—i.e., smartphone or laptop—there is only one plan (Yota Max and Yota Mini), which includes unlimited service and is offered on the same terms to all customers (Table 4). The only exception is a daily pass that occasional users can purchase for a 24-hour access to the network.

Simplicity is one of the most important guiding principles at Yota. The service has to be simple to buy, to connect, and to use. When a customer is ready to sign up and pay for service, Yota's commitment to simplicity stands out.

Yota Mini and Yota Max fees must be paid at the beginning of every month to keep the service active. There is no penalty for discontinuing or for temporarily deactivating the service, and there is no signup fee. Because there is no long-term contract and the service is prepaid, customers' credit history is not verified, making it easier and cheaper for Yota to sign up customers. The signup process is similar to that for prepaid cellular accounts.

The customer has the freedom to buy a device online or from a store, and directly from Yota or from an independent retailer. Devices are not subsidized, and the service plans available are the same regardless of the retail channel chosen.

To further simplify the process, customers can choose among a variety of payment options (Source: Yota

Table 5). They can pay directly at the store, by credit card, by short message service (SMS), at automated teller machines (ATMs), or at a cash machine. Because this is predominantly a cash market, many customers pay for their subscriptions at instant payment terminals, as they do for their mobile phones.

Table 4. Service plans

Plan	Description
Yota Mini RUB900 (US\$29)	<u>For laptops and desktops:</u> Unlimited internet access Yota Music, Yota Video Demo, Yota TV, Yap-Yap
Yota Max RUB500 (US\$16)	<u>For smartphones:</u> Unlimited internet access Yota Music, Yota Video Demo, Yota TV, Yap-Yap Use as modem for laptop connection allowed
Yota Day RUB60 (US\$1.60)	Unlimited internet access for 24 hours

Source: Yota

Table 5. Payment options

How to pay for service: making it easy for customers
Instant payment terminals
Bank ATMs
Yota's offices, stores and customer service centers
Electronic money (Yandex Money, Webmoney, RBK Money, MoneyMail, WebCreds)
Credit cards
Internet banking
SMS
Bank transfer (business subscriptions)

Source: Yota

Going the extra mile: devices, content and applications

While there is only one service plan per device type, customers can have their pick of devices, ranging from US\$65 for a dongle, to US\$850 for a WiMAX/GSM smartphone, to over US\$2,500 for a WiMAX-enabled laptop (Table 6). Yota worked with multiple device vendors to ensure that, from the beginning, customers would have access to a wide choice of devices. “We work very closely with device vendors, from the design stage all the way to the development of applications. This is crucial to the development of the services we bring to the market, as well as a valuable learning experience,” says Sverdlov.

A device that has attracted international attention in the industry is the WiMAX/GSM phone, which Yota developed with HTC specifically for the Russian market. The phone was available at launch and is still the only WiMAX/GSM phone available worldwide. Despite the cost, over 35,000 phones have been sold by Yota and its retail partners to date.

The phone service plan provides extreme flexibility to the customer and to the service provider. Basically the phone acts as two separate devices housed in the same hardware. The customer buys the phone, signs up for Yota service, and then, independently, signs up for cellular service. To activate the cellular service, the customer simply needs to install the SIM card in the phone. In most cases customers use their existing cellular subscription, and all they have to do is to transfer their current SIM card to the new phone. This approach allows customers to keep their mobile plans and simply acquire the additional Yota service on the smartphone. No barrier to adoption is created by forcing customers to move to a different operator or a different plan.

The independent GSM interface translates into a huge advantage for Yota, too. Many operators are reluctant to offer WiMAX/cellular phones because cellular operators are competitors, and therefore not interested in establishing a partnership or a roaming relationship with them. Or, because the WiMAX operator is tied to one mobile operator, it tries to steer

subscribers to sign up for a plan that includes its mobile operator partner. Customers who want to keep their existing mobile plan often find this approach irritating.

By leaving the smartphone unlocked, Yota did not need to establish partnerships or even roaming agreements with cellular operators. Complex plans that bundle WiMAX and cellular services (which typically have different service features, such as traffic allowances) were unnecessary. Furthermore, Yota did not need to worry about handoffs between interfaces. Having skirted these barriers, Yota was able to offer a WiMAX phone at launch.

Despite the funding and efforts devoted to supporting the HTC smartphone, “the WiMAX-connected laptop is the device that will dominate in the market,” Ivanov said. While there is a clear increase in the use of smartphones and wireless data, Yota customers prefer to use their laptops as their main device, even though the phone can be used as a modem to provide an internet connection to the laptop. For this reason, Yota strived to work with many manufacturers to provide a wide choice for its customers of over 50 laptop models with a built-in WiMAX module which on average adds only US\$10 to the total cost of the device. To facilitate adoption among laptop users, Yota now offers to install WiMAX modules in the laptops of new customers.

Table 6. User devices

Device type	Description and price
Laptops	Over 50 laptops with built-in WiMAX module from Acer, Asus, E-machines, Lenovo, MSI, Samsung, Toshiba (RUB9,990 to RUB75,000; US\$330 to US\$2,500)
Smartphone	HTC MAX 4G (RUB26,000; US\$845)
Dongle	4G USB Samsung dongle (RUB1,990; US\$ 65)
Desktop modem	Yota Egg, Wi-Fi access point with WiMAX modem (RUB5,990; US\$195) Asus Mobile WiMAX/Wi-Fi Center (RUB9,500; US\$310)

Source: Yota

Content and applications represent another area in which Yota has dedicated substantial effort in multiple directions:

- **Partnerships with content providers.** Paramount, Disney, Universal, Sony pictures are Yota's video content partners. Yota is the exclusive provider in Russia of digital content from Universal and Disney studios. In addition to the on-demand video service, Yota has a catalogue of over 700,000 music titles, available to customers for streaming. EMI, Warner music, Universal music, Sony music are the main music partners. According to Yota, this is the largest catalogue of digital content in Russia.
- **Access to content as an integral part of the service plan.** Access to music and selected other content is included in the basic subscription at no additional charge.
- **In-house development of content distribution and communication applications.** Yota Star Lab is the R&D unit of the service provider tasked to work on the Yota portal and new applications, including a VoIP service to be launched in the near future.

Yota's expansion to new markets

Over US\$500 million in funding has been earmarked for international rollouts. While Yota is actively exploring opportunities in other markets in CIS, Latin America and Asia, it has announced three deployments to date:

- **Nicaragua.** In December 2009, three months after the award of a license in the 2.5 GHz band for 60 MHz of spectrum, Yota announced the soft launch of a network in Managua. During the initial stage, the network supports only wireless data connectivity, but the addition of VoIP services is expected to follow shortly. "Along with mobile high-quality data services, the focus of the service in Nicaragua is on affordable fixed voice connectivity, for which there is a huge demand in the country." Yota retains 75% of ownership in the Nicaraguan operation, with the remaining 25% owned by a local partner

who provides support in local market knowledge, authorities' relations, legal issues, distribution and retail. According to Ivanov, "a local retail player is an extremely valuable partner as it can leverage a deep knowledge of the domestic market to drive adoption."

While the market approach is quite different from that in Russia, Yota relied on the experience acquired in its first market to build the WiMAX network. To facilitate the knowledge transfer, Yota sent a country manager along with marketing and RF experts to Managua to work with the local staff. Yota built its own fiber backhaul first and then added the WiMAX base stations in the RAN. The flat terrain in Managua made it possible to deploy the network in a very short time—initial 100% coverage of the city only required the installation of 20 greenfield cell sites.

- **Belarus.** Yota has a 60 MHz spectrum allocation in the 2.5 GHz band. It plans to offer service in mid 2010 as a fully owned subsidiary.
- **Peru.** After recently winning a license in the 2.5 GHz band, Yota plans to roll out services under the Yota brand. As in Nicaragua, Yota plans to retain a controlling equity stake (88%) in the local company.

These three deployments illustrate key strategic principles of Yota's international expansion. When entering a market, Yota has no commitment to replicate the Russian business model. Instead, it develops a new approach, taking into account local specific demand, competition, and performance requirements.

At this time, Yota is primarily interested in partnerships in which it can retain a controlling role and be responsible for the network rollout. Spectrum requirements are equally important. Yota is particularly interested in the 2.5 GHz band and will only consider opportunities in countries where sufficient spectrum is available. Initially it required 30 MHz; but in light of the traffic demand seen in the Russian market, Yota has reevaluated its position, and requires a minimum 60 MHz of spectrum allocations in order to enter a market.

Looking at the future

Yota has identified and tightly targets an attractive market segment of users who need a ubiquitous broadband connection and who are currently underserved both by wireline broadband operators (no mobility) and by cellular operators (insufficient bandwidth and/or high per-MB cost). Its proposition of simple, unlimited, mobile access resonates well with this audience, as the impressive growth in the number of customers attests.

Countering a widespread belief that emerging markets are not yet ready for mobile broadband access, Yota has demonstrated that at least in some of these markets users are willing to pay a premium for mobility and high-bandwidth connectivity. "People want the freedom that only mobility brings. This is true in every market regardless of the availability of wireline broadband," says Sverdlov. The results so far prove that this is the case at least in Russia.

Fueled by revenues from customers, Yota reached the operational break-even point after only five months of commercial service. Such an achievement is rare for a greenfield service provider. Typically customer acquisition costs are high as the service providers invest heavily in marketing to get a brand established and increase the number of customers.

Will Yota be able to maintain its momentum over the coming years? Several challenges lie ahead:

- Maintain the current growth rate in customers, by successfully moving beyond the early adopters and addressing the larger, more price-sensitive consumer market.

- Add capacity to the network and manage the data flows to accommodate the rapidly increasing traffic volume.
- Secure additional funding to expand the network in Moscow and St. Petersburg, and to meet the goal of 180 cities covered by 2012.
- Upgrade to WiMAX Release 2.0 when equipment becomes available to increase capacity and throughput.
- Face increased competition from cellular operators—which are expanding and improving 3G service and coverage elsewhere—and from other mobile WiMAX operators.
- Avoid losing focus in the current markets by overly aggressive international expansion plans.

Yota has built an innovative business model designed to capitalize on the growing demand for mobile broadband access. This model has won the attention of WiMAX operators in both emerging and developed markets. As Yota grows, it will have the opportunity to demonstrate that this model is sustainable—and that it can be successfully implemented in other markets.

Let's Yota!



About Senza Fili Consulting



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We provide a bridge between technologies and services, helping our clients assess established and emerging technologies, leverage these technologies to support new or existing services, and build solid, profitable business models. Independent advice, a strong quantitative orientation, and an international perspective are the hallmarks of our work. For additional information, visit www.senzafiliconsulting.com or contact us at info@senzafiliconsulting.com or +1 425 657 4991.

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