

WHATEVER EVERY CARRIER SHOULD LIVE BY

(AND WHY YOU SHOULD CARE)

**WE TOOK A LONG
HARD LOOK
AT OURSELVES AND AT WHAT WE DO.
AND WE SAW YOU.**

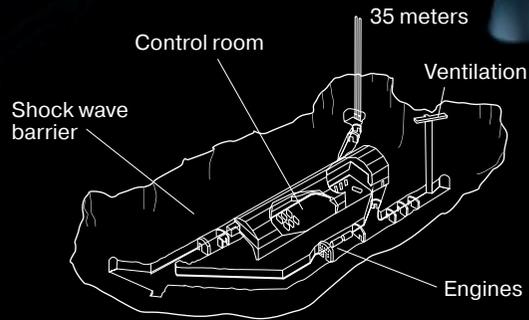
THE FUTURE YOU.

The one who wants smell via the Internet, and a 3D yoga instructor streamed live to your home. Or something else we can't predict right now. What demands will it put on us as a network provider? On all of us in the carrier industry?

We started thinking about those demands. And we thought about the small ideas of today which by tomorrow will be billion-dollar industries. The next SMS or social media networks and what they will require. How do we make sure we can meet those demands? By making demands on ourselves. By raising the bar in this industry. We have identified ten principles that we believe every premium carrier should live by.

**WE CALL THEM THE
CARRIER DECLARATIONS.**

Fort NOC's inner secrets



The elevator takes us 35 meters underground. Down to a rock shelter. The walls are built of 2-meter thick concrete. It's nuclear bomb-proof with a shock wave barrier system. And it took two years to build.

We are in TeliaSonera's NOC (Network Operations Center). This is where the TeliaSonera International Carrier global network is monitored. Day and night, all year round.

Global data traffic is monitored by multiple systems. Media monitoring is vital to be able to respond quickly to events that might cause disturbances.

Even weather reports are thoughtfully considered and analyzed so that data traffic can be proactively re-routed if a potential interruption is detected, such as a thunderstorm.

Around 70 people work here. They make sure the facility keeps operating in case of, well, anything.

It is self-sustaining for weeks with food supply, diesel generators and water. Some might call that overly cautious. But the truth is that the NOC can't go down.

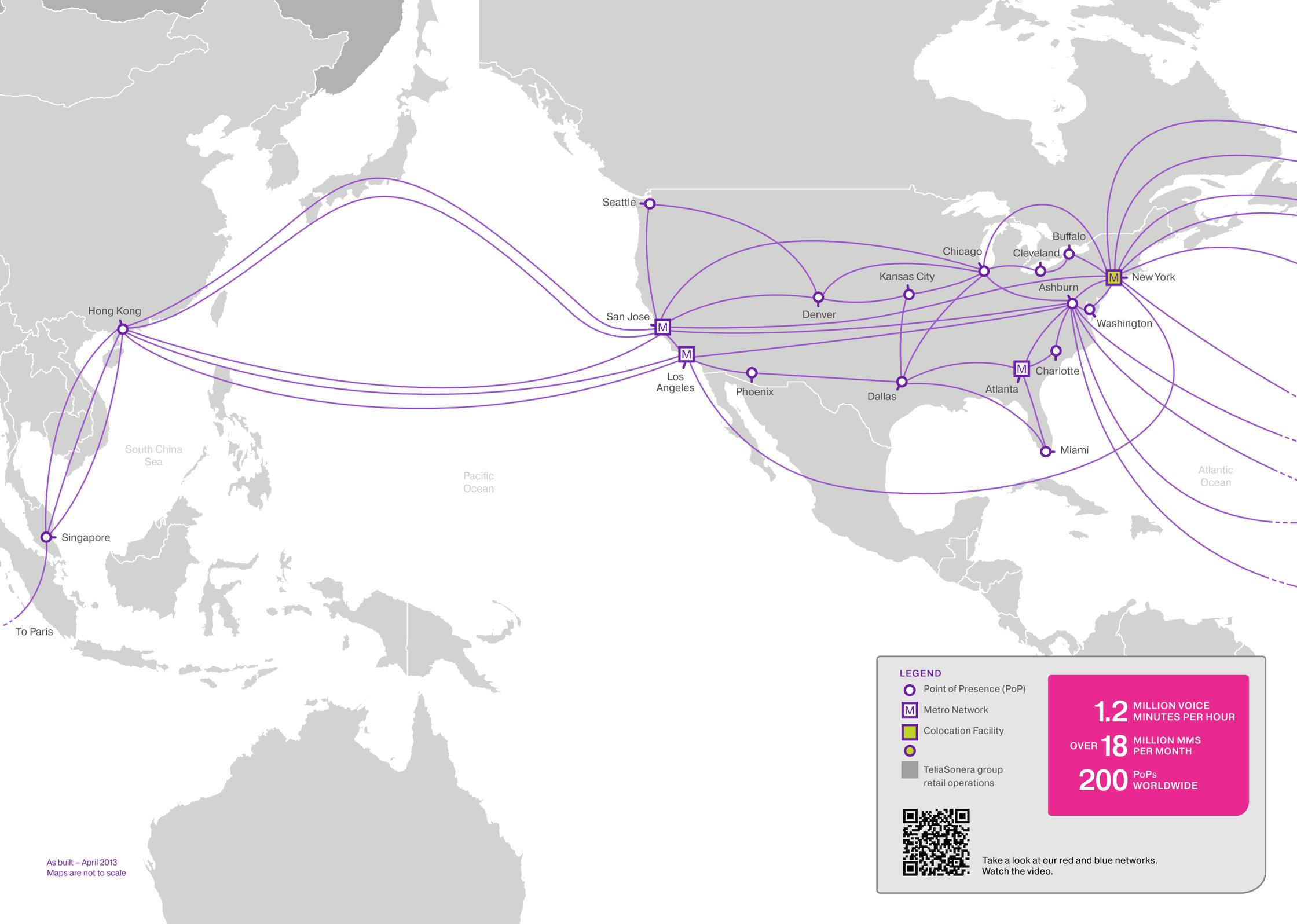
ENOUGH
IS NOT
ENOUGH

A network should always have full redundancy at the physical fiber level, ensuring your communication never goes down. This is why we have our red and blue networks.

OWN

If you are serious about quality of service, you own your network end to end.
No matter where you enter our network, you can be sure of the same quality
– it's one unbroken highway!

**YOUR
OWN**



LEGEND

-  Point of Presence (PoP)
-  Metro Network
-  Colocation Facility
-  TeliaSonera group retail operations

1.2 MILLION VOICE MINUTES PER HOUR

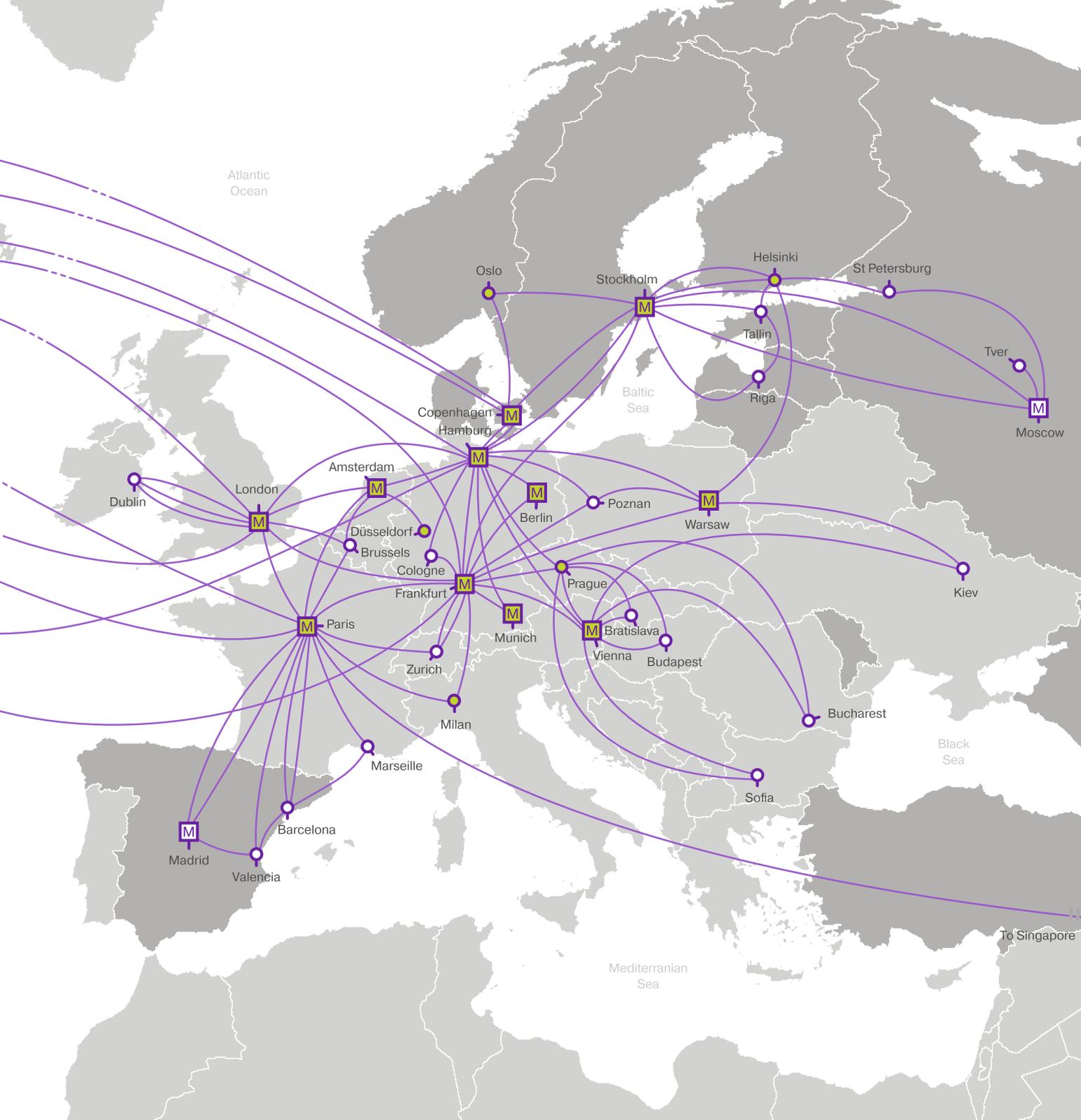
OVER 18 MILLION MMS PER MONTH

200 PoPs WORLDWIDE



Take a look at our red and blue networks. Watch the video.

As built – April 2013
Maps are not to scale



How much data does our network carry?

EACH:	WE CARRY:	WHICH IS MORE THAN:
Minute	23 Terabytes	61 million MP3s.
Hour	1.4 Petabytes	A digital library with two copies of every book ever written in any language.
Day	33 Petabytes	54 million CDs. Enough to make seven stacks taller than Mt Everest if they were stacked on top of each other – without cases.
Week	233 Petabytes	218 trillion pages of text.
Month	1 Exabyte	200 billion four-door cabinets full of pages of text.
6 Months	6 Exabytes	The estimated size of a transcript of every word ever spoken.



OVER **20,000** SONGS ADDED EVERY DAY
28 COUNTRIES
OVER **20** MILLION SONGS*
OVER **24** MILLION ACTIVE USERS
OVER **6** MILLION PAYING SUBSCRIBERS

The record deal

Ever since the invention of music piracy, the music industry has been scrambling for a new business model. Although online music stores have had some success, they are essentially just a legal way for people to do what piracy lets them do for free. The music industry needed to offer consumers something that was better than piracy. They needed Spotify.

Spotify offers a huge library of music that can be accessed instantly. No download. No buffering. No delay. But for this idea to become a reality, they needed allies – both to provide the music and to deliver it.

The first challenge was to do a deal with the record labels. We spoke to Spotify about this:

“Naturally, we needed to get the four major labels on board. At the same time, indie label content would allow our users to experience a hugely diverse catalogue spanning every musical genre.”

Fortunately, the record companies shared in Spotify’s vision and the new revenue model it proposed. They signed up and the music library began to grow.

The next challenge was delivering music instantly. To do this, Spotify needed a network provider capable of delivering seamlessly high quality. TeliaSonera International Carrier was an obvious choice.

“The most important thing is to give our users the feeling that their music is instant. As soon as you press play, you should hear the music. This means that our network provider has an extremely important role.”

When Spotify launched in 2008, its impact was immediate. Music fans were indeed

willing to pay for something that was better than what they could illegally get for free. Today, the service has over 24 million active users and over 20 million songs* that it delivers instantly... with a little help from its friends.

* Number of tracks licensed globally. Catalogue size varies per market.

CHOOSE YOUR ALLIES.

A network is only as strong as its weakest link.
We only work with leading technology partners
to ensure the highest quality, from the
infrastructure to the managed service layer.

CAREFULLY

[219,315 people like this]

Reach. The Holy Grail.

“Just climbed Everest”...it’s hard to top that for a status update.

Mt Everest is a long way up to take a network. But it’s about more than just connecting the world’s highest mountain – it’s bigger than that. It’s Metcalfe’s law. Every connected user strengthens the network.

In 2010 we connected Everest Base Camp to our mobile network, taking mobile broadband to new heights – 5,364 meters above sea level to be exact. Thanks to a solar-powered base station designed to survive the extremes of temperature and altitude, it is now possible to browse the Internet and upload videos fresh off the mountain.

It connects a lot more than just the 150 people who climb Mt Everest each year though. It also connects the surrounding valleys, villages, and towns; all the way to Kathmandu. Connecting more eyeballs to the network and increasing its value.

Metcalfe’s law works the other way too. Just as connected users increase the value of the network, so does connected content. Our network connects directly to most of the world’s most popular content. This means the highest quality experience for our end-users wherever in the world they are.

Not that any of this means anything to someone who has just climbed Mt Everest – they are just happy that they can update their status.



SIZE UP

The value of a network is proportional to the square of the number of connected users.
We live by Metcalfe's law, continuously expanding the reach of our network to meet the
demands of an increasingly online society.

Rise of the ~~machines~~ *people*

"Computers are useless.
They can only give answers."
Pablo Picasso

While many Internet providers try to automate customer support, we are going the other way – investing in people. Real people who drink too much coffee and tell bad jokes and sometimes leave dishes in the sink. But people who can also listen and communicate and solve problems better than a computer ever will.

Revolutionary thinking it may be, but we believe that when customers have a problem, they should be able to talk to a real person who can actually help – not just a computer that can raise a ticket.

That is why we have moved our tech-team, the real problem-solvers, to the front line of customer support. The results are impressive. 80% of problems solved without needing to escalate.

And because problems don't keep business hours, you can call us 3600/24/7. Which, in case you didn't pick it up, is every second of every hour of every day. But even a computer could have told you that.



3600/24/7

Customer care must be 3600/24/7.
Personal, close and direct.
We are proactive, multilingual and
responsive, with the convenience
of a single point of contact.



Go!

The margin of Olympic success is 150 milliseconds – and you always need more than one way to the finish line. Obviously, this is not the 100 meters – Usain Bolt only knows one way to the finish. This is broadcasting the world's largest sporting event, London 2012.

Whereas the Beijing Olympics were heralded as the first digital Olympics, London saw the coming of age of multi-feed live HD and on-demand content delivery.

The technical requirements were unprecedented. Delivering multiple live HD feeds simultaneously and then having them available for on-demand viewing, meant bandwidth demand that grew as the games progressed. So that feed could be localized and still be live for international markets, latency could never exceed 150 milliseconds.

But most importantly, reliability was non-negotiable. Missing the most important 9.63 seconds, or any moment of the Olympics, was simply not an option.

TeliaSonera International Carrier was selected as the contribution supplier of choice for 13 international broadcasters. This was partly due to the capabilities of our fiber backbone; but moreso, it was due to our expertise in media network operations.

Beyond the Olympics, we deliver more than 2000 live feeds each year ranging from NHL to Wimbledon. This provides a thorough understanding of the quality and reliability that media companies require.

In August 2012, we established a partnership with Hibernia Media. We provide Hibernia with capacity on our European network so they can deliver live, high-quality, managed media contribution services to broadcasters, right holders and production companies worldwide.

“This gives our customers extraordinary access to content origination, aggregation, and distribution channels over a robust fiber backbone,” says Bjarni Thorvardarson, CEO of Hibernia Media

A supplier should strive to understand its customers,
not push products. Our sales force are not sales people;
they are highly skilled problem solvers working together
with solution engineers.

UNDERSTANDING IS KING

“The flow of Internet

content has traditionally been one-way traffic from Europe and the US into Latin America. But this is beginning to change. A combination of economic growth, regulatory reform and consumer demand for digital content makes Latin America one of the most exciting emerging markets.”

Edison De Leon
Teliasonera International Carrier
Panama

“A lot of companies make the mistake

of treating Asia as a single market. But every country is different. In the same region we have South Korea, which has the fastest home Internet connections in the world; and Myanmar, which has one of the lowest rates of Internet penetration in the world. It is a region full of challenges and opportunities.”

Wee Kwan Ee
Teliasonera International Carrier
Singapore

“Some countries in Africa have never

had fixed telephone or Internet services – mobile got there first. This has led to an explosion of opportunities. For the first time, farmers can monitor markets thousands of kilometres away, remote villages can access banking via their mobiles and schools can send out maths lessons via social media.”

Robert Borkowicz
Teliasonera International Carrier
On an airplane somewhere near you

Vive la différence!

In Turkey it is unlucky to stand on a piece of bread. In Malawi they make soup from flies. In Papua New Guinea they have more than 820 spoken languages. The world is still a very big place.

The Internet may be bringing us together, but the last thing anyone wants is for it to make us all the same. It is the differences between cultures that make the world an interesting place. In business, under-

standing these differences is a key to understanding customers. And you can't do that from an air-conditioned office on the other side of the world.

LOCAL,
LOCAL,
LOCAL,

To develop great global solutions you need deep local understanding. Our account managers are placed close to our customers, with expert knowledge of the markets they manage.

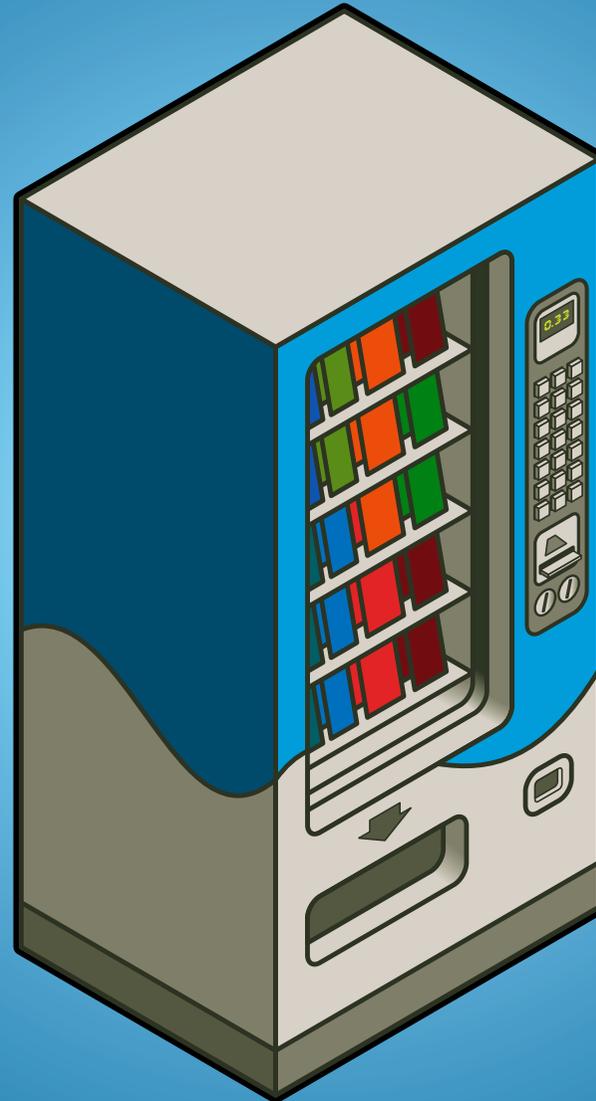
Rise of the machines

In a small town in Central Africa, in a time not too far from now, stands a vending machine. No ordinary vending machine. It dispenses cash and saves lives.

In remote areas, patients have to travel long distances for medication. Imagine if they could just get it from a vending machine.

Facial recognition could ensure the right medicine is dispensed to the right patient. And if they missed a dose, an SMS would automatically be sent to remind them. The course of treatment could be remotely monitored by a computer in a hospital 800km away – or 8000km away. And if a patient needed to talk to a doctor, they would simply turn on the live video feed.

As for dispensing cash – why not? A partnership between a bank and a hospital makes a lot of sense. Cash and medicine are both high-value items with similar security



and resupply requirements. One machine, two sets of independent functions. Welcome to the new world of M2M.

Machine-to-machine means a world of opportunities limited only by imagination. At home it will mean appliances that talk to one another and can all be controlled by a smartphone. For shops it will mean self-monitoring stock that orders its own replacement. For businesses it will mean electronic billboards that use facial recognition to detect the age and sex of passers-by and customize messages accordingly.

The challenge for carriers lies in supporting converging services. Delivering video, voice and data over a single network to meet diverse and constantly evolving needs. And doing so with absolute reliability. Because a life-saving vending machine can never be “Out of stock”.

MORE

IS

The future network should support the convergence of multiple services. We are at the forefront of this change, constantly upgrading our network to meet diverse and evolving customer needs.

MORE



Breaking the terabit barrier

The growth of online video content, HD-everything and an increasingly connected world have led to a bandwidth explosion. The implication for underlying networks is that they need to drastically scale up capacity to keep up with demand. Late in 2011 we took a giant leap towards making this possible.

Together with Infinera, we successfully carried out the world's first terabit per second optical transmission using two 500 Gb/s super-channels. Something that even experts said was impossible – until we did it.

To give an idea of what this means, 1 terabit per second means we could send the entire contents of Wikipedia in English (4.1 million articles) in 0.14 seconds.

The terabit trial was not a lab test. It was a real-world transmission which sent traffic on a 1,105km section of our production network between San Jose and Los Angeles. The key to making this possible, was Infinera's photonic integrated circuit (PIC) technology, which integrates over 600 optical functions onto a pair of tiny chips to deliver more capacity in less space using less power than conventional

approaches. Two 500Gb/s line cards were combined to create a 1Tb/s super channel. By combining multiple wavelengths on the same fiber, super channels enable the operator to provision large amounts of data with a single operational maneuver. For our customers, this will mean a cost-efficient way to scale up capacity without scaling up complexity.

By challenging the status quo, we provided a glimpse of the future and expanded the boundaries of what is possible.

“Conventional wisdom said it was impossible to produce photonic integrated circuits (PICs) in production volumes. We proved the industry wrong with our first generation PICs, improving optical capacity and reliability.

Next, conventional wisdom said that PICs couldn't scale to deliver coherent 100Gb/s transmission.

Last year, along with TeliaSonera International Carrier, we smashed that 100Gb/s and demonstrated 1Tb/s.”

Tom Fallon, CEO of Infinera

CHALLENGE

When it comes to innovation, questioning the status quo is everything. We set our standards high and constantly push the boundaries of what it is possible to do with our fiber network.

EVERY

THING

Bad ping kills the game

Meet a legend. As a world champion computer gamer, he needed bodyguards to fend off screaming girls and fanatical fans wherever he went. Even Chinese soldiers stopped him to ask for his autograph. His name is Emil Christensen, but the world knows him as HeatoN. Today he's a 28-year-old veteran in eSports.

How did it all begin?

As a kid, I was more focused on becoming a professional hockey player than playing computer games. After a ruptured tendon, I was stuck at home for an entire summer and spent most of it playing Counter Strike. Suddenly, it was like I crossed a line – I got really good.

A year later I was recruited by NiP (Ninjas in Pyjamas) – the No. 1 Counter Strike team in Sweden. That was in 2001 and I was just seventeen. That same year we won the World Series and I became a full-time professional player. Today I manage and coach NiP. And NiP continues to be strong. We just won the Electronic Sports World Cup 2012.

Tell us a bit about the development and impact of eSports from when you started playing up 'til now?

It has exploded! From a hobby to an established sport. Today, tournaments are played in arenas with thousands of spectators and broadcast live to over a million viewers. In South Korea, online gaming is a national sport and they have four TV channels dedicated to showing live eSport tournaments. Everything you can imagine in a physical sport, you find in eSports – professional players, coaches and game tactics varying between countries.

How is the evolution of Internet and broadband a factor in eSports?

Well, I would say everything. The best teams when I started playing came from Sweden, because we had really good broadband connections. Interestingly enough, Telia became famous amongst gamers worldwide, as our ping always gave us an advantage when competing against players sitting on slower connections.

How does connectivity affect the development of the games?

There are obviously some important milestones, such as being able to talk with your teammates via headsets. But what really pushes eSport forward is better ping. Bad ping kills the game.

How much time do you have to spend to be as good as you were in your prime?

It's different for different people, just like when I played hockey. For me personally, I had to put in a lot of hours. I spent around 15 hours a day playing Counter Strike.

Lastly, what achievement are you most proud of from your career?

Winning at the World Cyber Games in South Korea. WCG is the equivalent of the eSport Olympics. We played in the former Olympic Village in Seoul. That recognition was amazing!



POWER TO THE USER!

Products and services should always have the end-user in mind. As an enabling infrastructure company, our product development is customer driven. We bundle delivery of multiple services, and provide pay-as-you-grow models that are clear and transparent.

