



White Paper

Turning Copper to Gold

The age old technology known to everyone knowing internet is DSL /broadband. But technology is always running fast. The need to bandwidth has been increasing, ever since the term "bandwidth" has been coined. Especially after the advent of internet. I guess one of the key contributors to give an idea to Thomas L. Freedman for writing the international best seller "the world is flat" would be the internet only. It's all due to the internet that the world has become a small village of the cyberspace. No one is too far to reach.

But as users, we are only bothered about the availability of internet. How it reaches/why is it slow/how to make it fast — are the questions we leave to the service providers. We take it to be too technical to indulge in. The reasoning is very simple — why should we bother? How does that affect us? Even if we know it — will that make any difference? Anyways, that's not our cup of tea, since even if we know it — we can't do anything about it till the service provider is not having the service. — Right?

User Ignorance

But we have this view point only for the internet.

Why not for the car? Why not for the television? Why not for the play station? Why not for the home theatre? We feel that automobile and consumer electronics and certain things, in which we need to understand it better, as a user in order to enjoy them better. So the first aid is what we learn. Like we learn to get into setup and configure channels on our TV, we learn to change tires of the car, we learn to set up and change games in play station, we learn to change sources in the home theatre. But we don't do the same in case of internet. And that's what the service providers take advantage of.

Do you know that in a recent survey done by an organization, yet to start their services commercially, they could find that the data services /or the internet services are the most highly paid consumer service? Three times of what people are willing to pay to the service providers for the voice connectivity and almost five times of what people are willing to pay for television/cable/DTH. It's all because of the consumer ignorance on the subject.

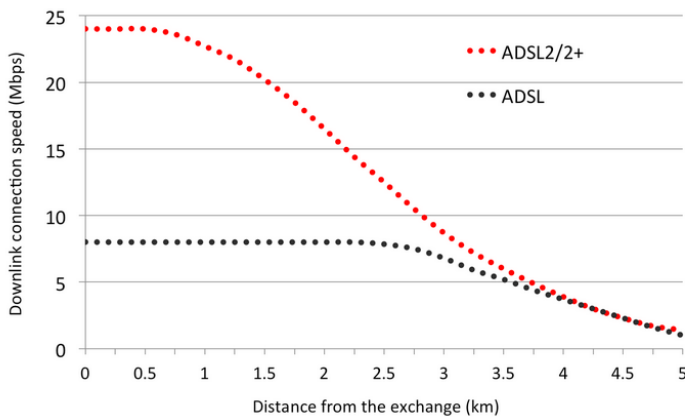
ISP Behaviour

For example, the existing broadband line at your home, might not be giving you the performance of the internet at par with the internet at your office. But if you ask the same from your service provider, they would take a standard plea — "Sir, your office would be having a fiber connectivity but your home is on copper connectivity on your phone line. For us to upgrade you to fiber, there would be an additional expenditure of 10-15K". and we believe it, as we don't have any knowledge on the subject.

Or when you check the speed of the internet through some of the websites like speedtest.net or bandwidthplace.com it shows less than 2 Mbps on download and less than 1 Mbps on upload and when we talk to the service provider, their standard gyan is — "Sir, 2 Mbps is on 1:8 compression ratio, that is the phone line limitation, we can't help it. You pay more and take a fiber connection Sir, and then you will experience the speed."

The Real Scenario

So let me give you the exact capacity of your exiting phone line, you would be amazed to know this. It's a free data available on the internet, no rocket science, no proprietary data, you can visit the following website to cross-verify yourself <http://www.increasebroadbandspeed.co.uk/>



As you can see, your home broadband, which works on ADSL2+ technology, is capable for giving bandwidth up to 24 Mbps. So no upgrade required, no media change, no fiber necessity for giving you up to 24 Megs.

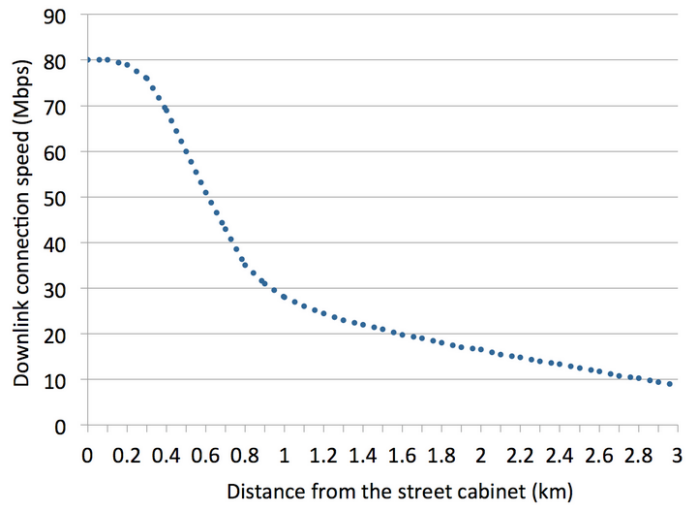
Step-II

Now let's explore it a bit further.

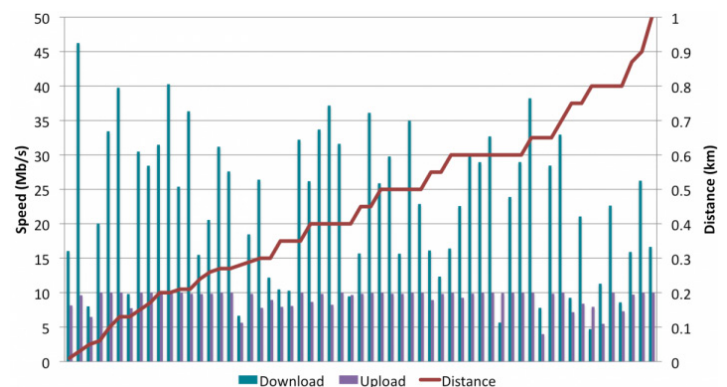
In xDSL technology, the next technology, working on the same telephone copper is VDSL — Very-high-bit-rate Digital Subscriber Line (VDSL or VHDSL) is a Digital Subscriber Line (DSL) technology providing data transmission faster than ADSL over a single flat untwisted or twisted pair of copper wires (up to 52 Mbit/s downstream and 16 Mbit/s upstream), and on coaxial cable (up to 85 Mbit/s down-and upstream) using the frequency band from 25 kHz to 12 MHz. These rates mean that VDSL is capable of supporting applications such as high-definition television, as well as telephone services (voice over IP) and general Internet access, over a single connection. VDSL is deployed over existing wiring used for analog telephone service and lower-speed DSL connections. This standard was approved by ITU in November 2001. — Sounds like rocket science — isn't it?

Well that was the official definition, the summary is — VDSL is the technology which can give you up to 90 megs on the same telephone cable. So till the time your bandwidth requirement is not beyond the said limit, you still don't need to replace your cable. — surprised?

Check it yourself; visit <http://www.increasebroadbandspeed.co.uk/> or <https://www.truenet.co.nz>. if you find the subject more interesting, you may also visit the following website <http://www.broadband-forum.org/> for an in-depth study. The graph below would give you more clarity on distance v/s. speed vector on the VDSL technology.



The data on trunet is further more descriptive, as they explain, not just the downlink, but uplink v/s. downlink v/s. speed v/s. distance.



Step-III

All that you have read till now was yesteryears technology. But now that you know the past very well, we can take it forward to the present. The present for those who are latest in technology deployment and future for the countries like us, who are still struggling for nationwide coverage.

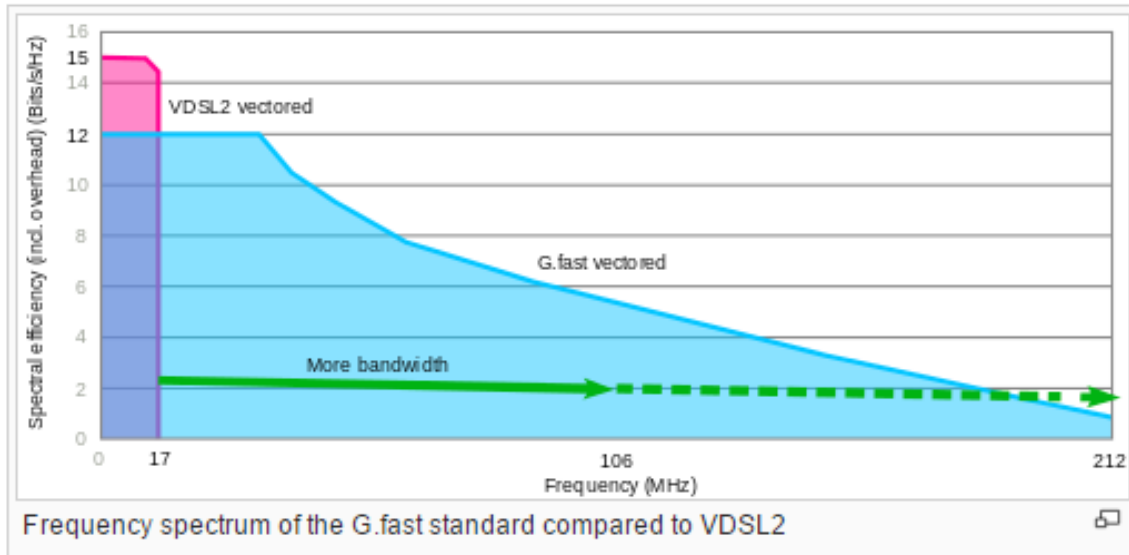
The modern day technology in this regards is — G.fast.

G.fast is a digital subscriber line (DSL) standard for local loops shorter than 500 m, with performance targets between 150 Mbit/s and 1 Gbit/s, depending on loop length. High speeds are only achieved over very short loops. Although G.fast was initially designed for loops shorter than 250 meters, Sckipio in early 2015 demonstrated G.fast delivering speeds over 100 megabits nearly 500 meters and the EU announced a research project. Formal specifications have been drafted as ITU-T G.9700 and G.9701, with approval of G.9700 granted in April 2014 and approval of G.9701 granted on December 5th 2014. Development



was coordinated with the Broadband Forum's FTThp (fiber to the distribution point) project. The name G.fast is a recursive acronym for fast access to subscriber terminals; the letter G stands for the ITU-T G series of recommendations. Limited demonstration hardware was

demonstrated in mid-2013. The first chipsets were introduced in October 2014, with commercial hardware expected in 2015, and first deployments planned for 2016 — As per the initial study, says the wi-ki.



All the above complex description means — on the same copper we can go up to 150 mbps now.

Reality Today

Now let's talk on the practical deployment scenario;

British Telecom has already undertaken trials of G.fast at Adastral Park area in United Kingdom, where they have their research and development facility. During the G.fast trials, downstream speeds of around 800 Mbps were achieved over a 19 meter length of copper, combined with upstream speeds of more than 200 Mbps. Speeds of around 700 Mbps (download) and 200 Mbps (upload) were also achieved over longer lines of 66 meters. Following is a link to the video shared on youtube.com by BT about their testing at Adastral Park on G.fast. <https://youtu.be/AWcb5TkftEU>

A yet another deployment scenario is from Chunghwa Telecom of Taiwan, which is launching its G.fast service on 300 Mbps connectivity across Taiwan from September, 2015, as announced during Computex Taiwan, 2015 ended last week.

About ZyXEL Communications

ZyXEL Communications Corp., founded in 1989 and headquartered in Taiwan, is the leading provider of complete broadband access solutions. As one of the early modem manufacturers, ZyXEL has gone through transformations in the fast-paced networking industry. Delivering cutting-edge communications innovations to more than 400,000 businesses and more than 100 million consumers throughout the world, today ZyXEL is one of the few companies in the world capable of offering complete networking solutions for Telcos, small to medium-sized businesses, and digital home users for a wide range of deployment scenarios. Telco solutions include Central Office Equipment, Customer Premise Equipment, Wired and Wireless Access Network Devices, and Carrier Switches. SMB and Enterprise solutions include Unified Security Gateways, LAN Switches, WLAN, and IP Telephony. Digital Home solutions include Network Connectivity Devices and Multimedia Solutions.

The company has more than 1000 employees and distributors in 70 countries, reaching more than 150 regional markets. The ZyXEL Communications Corp. includes 35 subsidiaries and sales offices and two research and development centers worldwide. For more information, visit the company's Website, <http://www.zyxel.com>.

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