In my view, competition and the quality and availability of telephone and internet services as part of the communications sector will be severely negatively impacted by the current NBN "Multi-technology Mix" (MTM), which as it stands includes FTTP, FTTN, HFC and other components. These impacts will result in increasingly unsatisfactory and substandard telephone and internet services for both residential and business premises in the short, medium and long term.

The key aspects of the NBN MTM that I am concerned with are the FTTN and HFC components, which largely comprise of old technology and infrastructure from the 1900s that NBN Co is attempting to retrofit and upgrade for use from now and into at least the next 20 years.

From the perspective of a consumer, at home we currently have access to the ADSL2+ internet with a connection speed of about 13 Mbps. Over the past three years the number of internet-connected devices in my house that my family use has more than tripled, going from a PC, laptop and mobile to 2 PCs, 2 laptops, 3 mobiles, 1 FetchTV box and another 2 IPTV devices. In the meantime, however, my connection speed has dropped from about 16 Mbps to the current 13 Mbps and continually experiences slowdowns during the evenings (we have been with TPG and Optus and both have had these problems). As such, it is barely possible to use just two of these FetchTV/IPTV devices simultaneously without experiencing buffering every 30 seconds or so. In addition, the internet sometimes slows down to 3-4 Mbps on rainy days.

According to the current plan for NBN, my ADSL2 connection will be upgraded to FTTN sometime in the next years. I have a number of concerns with this, including:

- FTTN still depends on the copper network, and this will do nothing to fix the issues we experience on rainy days.
- FTTN provides little guarantee for internet speed due to uncertainties relating to the distance of my home from the node, the condition of the copper and congestion.
- The lack of speed guarantees could result in us wasting money by signing a contract for a higher-speed FTTN plan, and then finding out that our house can only receive 25 Mbps or something.

Only FTTP will ensure that the above are no longer issues.

The above reasons will probably relate not only to my family and home, but also to most other homes that receive FTTN or HFC. In general, I think there will be a lot of general negatives consequences with the rollout of FTTN and HFC, including:

- NBN Co suggests that in the future FTTN and HFC could be upgraded to “up to 1 Gbps”; if users on FTTN/HFC are not able to get anywhere near 100 Mbps today, they will probably be sceptical of paying more for the gamble of only getting close to 1 Gbps if they’re lucky.
- The average consumer connected to FTTN/HFC will see ads like “up to 100 Mbps” and expect to receives speeds close to this, just like their family and friends who are

connected to FTTP do, and if they don't then this could create a perception of a digital divide.

- Over the medium to long term this will probably start to impact house prices – 10/15 years from now I certainly won't be looking to buy or rent a property with FTTN/HFC that only has "up to" 100 Mbps or 1 Gbps, I'll be going for the one with 10/40/100 Gbps FTTP or whatever is offered then.

Other general concerns:

- The world is becoming increasingly digitised and these new technologies are demanding more data and bandwidth. I feel that only FTTP will be able to meet these due to its vast bandwidth capabilities, reliability and ease of upgrading to higher speeds in the future. In contrast, FTTN and HFC have much smaller bandwidth capabilities that can only guarantee "up to" speeds, suffer from the same weather-related problems that ADSL and HFC experience now, and in general have fundamental physical limitations on how much they can be upgraded.

- In the future there will 4K and 8K television broadcasts (e.g. Japan is planning to offer 8K for the 2020 Olympics). Traditional over-the-air TV will not able to handle the bandwidth required by these, so the only real option will be to stream them via the internet.
  It will be hard for consumers on FTTN and HFC to view these due to the unreliable/limited internet speeds (especially on more than one TV).
  - This will prevent businesses from offering such services to those people – some people on FTTN/HFC will in large be stuck on SD or HD while those on FTTP will have access to 4K and onwards, which is bad for both consumers and businesses. With FTTP there would be a level field for all, and more opportunities for businesses and hence competition.

- The construction of FTTN and HFC can unfairly benefit Telstra over other ISPs:
  - Telstra is winning large and profitable contracts to upgrade the copper network to handle FTTN.
  - The government has said FTTP is the end game so over the long-term this is effectively free taxpayer money for Telstra.
  - Telstra has intimate knowledge about the operation and limitations of the ADSL and HFC networks and in the future they could use this to their advantage against other (smaller) ISPs, such as building towers for 5G mobile internet in locations they know cannot receive high speeds over FTTN/HFC.

- In general, the government and the ACC tend to look at other Western countries such as USA, UK, NZ, Canada for ideas about infrastructure and competition for telecommunications and the internet. I think it would be beneficial to start looking more into the Asian markets as well. For instance, South Korea's communications market is closely regulated by the government but is still hugely competitive particularly in areas

such as fixed-line internet and mobile speeds, WiFi internet and IPTV services, which have helped reduce prices for consumers while improving the service they use.

- From a business perspective, there are countless small TV broadcasting businesses whose channels can easily be accessed via ISP-provided IPTV boxes – perhaps Australia could mandate that devices such as Telstra TV and Fetch TV must provide access to such small broadcasters (maybe with a government regulated access fee).
- These will all become significant in Australia as the NBN is rolled out and so I think it would be a good idea to take guidance on what does and does not work in the market over there.