A FAIR APPROACH TO NET NEUTRALITY

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The Network Neutrality Debate remains unresolved in the US and elsewhere with views widely polarised. Approaches we recommended to the FCC in 2007 remain valid for bringing fairness to broadband networks whilst at the same time providing appropriate ways to manage traffic. This paper provides a background and outlines those approaches.

SOME HISTORY

TelecomView is a telecom industry analysis firm that has been following the development of wireline and wireless broadband services with a special interest in the delivery of TV and broadband multimedia services including IPTV and Mobile TV. We found the discussion of Net Neutrality quite interesting but that it lacked rigour. This discussion did not focus on the key issues of providing choice to consumers and fostering competition on an equal basis.

In 2007 we offered our comments on Net Neutrality to the Federal Communications Commission (FCC), the communications regulator in the U.S. that oversees telecom, cable, and wireless technologies. This was in response to the FCC’s efforts to gauge public and industry opinions on this subject.

It was clear to us that the nature of services offered over broadband networks was fundamentally changing. Broadband networks such as the FiOS network provided by Verizon and the U-verse network provided by AT&T offered multimedia services in addition to and independent of their basic Internet services. In 2007, both AT&T and Verizon offered IPTV services over these new networks, and have added voice over IP (VoIP) services more recently. We felt that it was important to consider these new broadband services independently of the basic Internet access service.

It also appeared that the cable companies were moving in the same direction with their 100 Mbps DOCSIS 3.0 based data services. At least some of them were considering offering TV services over this broadband connection using IPTV technologies. It seemed likely that this would lead to a partitioned broadband service similar to the new telco broadband services.

Today, the Net Neutrality issue has not yet been resolved and the approaches that we recommended remain valid methods for bringing fairness to broadband networks while providing appropriate ways to manage traffic.

DEFINING INTERNET AND BROADBAND SERVICES

The ADSL and cable modem broadband services introduced in the late 1990s supported only Internet services, which provided only undifferentiated ‘best efforts’ services. The guarantees for these services were low and it was at least implied that they were lower priority than other services, such as enterprise business services, that might also be carried on the networks that carried Internet traffic to the broadband access networks.

By 2007, new kinds of service were starting to be offered that had more stringent packet delivery requirements than web browsing, file transfer, email and other traditional Internet services. These traditional Internet services provided acceptable levels of service because they did not require
large amounts of bandwidth and they could be supported by the excess capacity provisioned into Internet networks to handle the bursty nature of the traffic.

In 2000 and 2001 some telcos started to provide IPTV services over their broadband networks. Many of them, including a trial deployment at Qwest Communications, used a higher speed access technology, VDSL, to support these IPTV services. Others offered IPTV services over their ADSL broadband networks with fair to good results. While ADSL can support a single Standard Definition (SD) TV, it does not have enough bandwidth to support multiple SD TVs or any High Definition (HD) TVs. Consequently, ADSL has not proved to be a sufficient technology to support a competitive IPTV service in the U.S.

Higher speed broadband technologies have been introduced that provide more bandwidth, enough to support HD TV along with multiple SD TVs. AT&T is using VDSL for its new U-verse service, which provides a minimum of 25 Mbps with a single pair and 40 Mbps when bonding two pairs. Verizon is using Passive Optical Network (PON) technology that uses a fibre optic cable to bring 100 mbps to each home.

| Company | Broadband Link Speed | Internet Service | Downstream Speed | TV Channels | Unlimited Voice | Monthly Price | Service Name |
|---------|----------------------|------------------|------------------|-------------|----------------|--------------|--------------|
| AT&T    | 25 Mbps              |                  | 1.5 Mbps         | 120         | Yes            | $104.00      | U-verse U100 + Voice + Express |
|         |                      |                  | 3 Mbps           | 120         | Yes            | $109.00      | U-verse U100 + Voice + Pro |
|         |                      |                  | 6 Mbps           | 120         | Yes            | $114.00      | U-verse U100 + Voice + Elite |
|         | 40 Mbps              |                  | 10 Mbps          | 120         | Yes            | $134.00      | U-verse U100 + Voice + Max |
|         |                      |                  | 18 Mbps          | 120         | Yes            | $144.00      | U-verse U100 + Voice + Max 1B |
| Verizon | 100 Mbps             |                  | 10 Mbps          | 295         | Yes            | $99.99       | FiOS Internet 10/2 + TV Essentials + Home Phone |
|         |                      |                  | 20 Mbps          | 348         | Yes            | $109.99      | FiOS Internet 20/5 + TV Extreme + Home Phone |

Table 1 AT&T and Verizon Internet Service Structures
Source: AT&T & Verizon (2009)

Both the AT&T U-verse and the Verizon FiOS services are offered on a bundled or an unbundled basis. Table 1 shows similar bundles for both services. A key point from this table is that AT&T is reserving at least 19 Mbps for its U-verse IPTV services and Verizon is reserving at least 80 Mbps for its FiOS TV IPTV service today. Neither company is making this bandwidth available for Internet services.

TelecomView believes that this is an appropriate service structure. Both AT&T and Verizon along with the many smaller U.S. telcos investing in VDSL or fibre technologies in their broadband networks need the revenue from IPTV services to recoup this investment. Separating the Internet and IPTV services from each other and reserving bandwidth for each also makes sense because it virtually eliminates any contention between them. A teenager downloading a large file on the computer in her room will not interfere with the HD TV program that her parents are watching in the living room.
This arrangement has put companies offering TV services over the Internet at a disadvantage. Given the capabilities of the popular video streaming systems, a typical 6 Mbps ADSL broadband service can support only a single SD TV. An HD TV requires 8 to 10 Mbps of bandwidth, which is beyond virtually all ADSL and cable modem services, at least with good quality. The AT&T VDSL U-verse service shown in Table 1 can support it only with its 18 Mbps service and Verizon only with its 20 Mbps data service.

A few cable companies have created similar service structures when they introduced higher speed data services using DOCSIS 3.0 technology. In particular, this is happening with small cable systems that have limited spectrum available for on demand and HD services. Several cable providers are experimenting with usage caps that will significantly raise the cost of using these higher data speeds for watching TV programming over the Internet.

**SERVICE DIFFERENTIATION**

One of the issues with Net Neutrality is whether or not all packets on an Internet service should receive equal treatment. TelecomView believes that the answer to this is no; that there should be service differentiation that gives the packets for some services higher priority over other services. However, this must be done in a way that provides fairly-priced equal access to all service providers and that does not discriminate against one or the other. In particular, this approach should not enable the broadband service provider to offer a better level of service for its own services and relegate its competitors to a lower level of service.

Most traditional Internet data services such as email, web browsing and file transfer have a high tolerance for packet errors and delays in the network. These services are able to mask many of these problems and, in fact, users will generally tolerate a significant amount of delay. This is why a best-effort strategy works for these services.

VoIP services are much more sensitive to packet error and delay. Network problems that would not be noticeable with web browsing could cause noise or other defects in a voice call. However, VoIP calls require a relatively small amount of bandwidth and can typically be carried without much problem over most broadband services.

Things are different with IPTV services, which require up to 10 Mbps of bandwidth. In fact, IPTV users are rather intolerant of defects compared to voice or data services. They expect a flawless rendering on their HD screens. Allocating large amounts of bandwidth separate from the Internet services is how most telcos provide a high level of quality on their IPTV services.

Users who play networked games over the Internet are particularly sensitive to delays. A delay can put a player at a disadvantage and cause them to lose the game. In addition, there are times when game players might like to speed up their Internet connection for a period of time using a ‘turbo button’ service that speeds up the connection as a chargeable event.

TelecomView believes that giving priority or reserving bandwidth for VoIP, IPTV or gaming packets are reasonable approaches. TelecomView also believes that providing a ‘turbo’ service that temporarily speeds up the speed of the connection is a reasonable service offering. Both of these preferential service offerings will improve the broadband experience for significant sets of users and if they are properly engineered should not negatively affect the service for other users.

When considering this, it is important to note that the bottleneck for most broadband services is the broadband connection itself. These broadband networks are generally supported by networks
with more than enough capacity to meet the needs of the subscribers. It is the connection to the user that limits bandwidth and where congestion is most likely to occur.

With a telco broadband service, the broadband connection is dedicated to each subscriber. This is specifically true for DSL and Ethernet access services. Fibre-based PON systems share connections using optical splitters, but there is a fixed amount of bandwidth that is allocated to each subscriber. Consequently, providing differentiated services over telco broadband services will affect only the other users at the subscriber’s location. In this situation, most families would agree that a clear VoIP telephone connection for one family member is worth a minor slow down of file transfer speeds for the rest of the family.

Cable modem services are aggregated and share the same bandwidth across several hundred homes. This will permit the usage in one home to affect the performance of the service seen at another home. Providing differentiated services for VoIP and gaming should also prove quite acceptable in this environment since it will account for a relatively small portion of the traffic and the effects of prioritisation should be easily absorbed.

Independent of whether the broadband service provider is a telco or a cable company, differentiated services will have to be carefully engineered. This can certainly be done for either type of network.

EQUAL ACCESS FOR INTERNET AND BROADBAND NETWORKS

Competition is an important force in providing the best and most cost effective set of services to the consumer. However, competition must be structured in ways that stimulate rather than discourage investment in new broadband infrastructure. These principles have been the basis for the current set of broadband regulations.

The current regulations protect the incumbent telcos from the requirement to provide unbundled access to the new VDSL and fibre-based broadband networks that they are building. This has reduced the amount of competition within the telco broadband markets compared to Europe, for instance, where unbundling has become a significant method for increasing competition. The FCC is encouraging technologies such as cable modems and broadband wireless to create competition with the telcos rather than encouraging competition based on unbundled access to the telco broadband networks.

TelecomView believes that there are now new opportunities for stimulating service competition by extending the principle of equal access that was developed as part of the AT&T divestiture in 1984 to broadband services. Service providers should be able offer services over any broadband network on an equal basis and with the broadband service provider itself. This would apply to the Internet service, to the IPTV service and to any other service offered over a broadband network.

The Internet, and therefore the broadband Internet services, have a long tradition of equal access. Internet service providers regularly peer with each other and exchange traffic at both public and private peering points. Web-based service providers such as Google, Yahoo!, Ebay and Amazon can purchase connections to the Internet and make their services available to the full population of Internet users. These Internet interconnection services have been on an equal basis without preference in the past. TelecomView believes that this practice should continue for best efforts traffic.
TelecomView believes that differentiated services can be added that permit VoIP telephony and gaming services to offer preferential services that improve the experience of their users. These services should be offered on an equal basis to all companies and should not be part of exclusive agreements between the broadband operator and a few others, or used only by the broadband carrier itself. This means that Internet VoIP providers such as Vonage and Packet8 should be able to provide priority treatment for their VoIP services delivered over AT&T’s broadband network and that AT&T should not be able to provide this preferential service only for its own VoIP service.

TelecomView also believes that the IPTV services that the broadband service providers offer today should be opened up on an equal access basis. It should be possible for Hulu or MovieLink to offer a supplementary video on demand service through AT&T’s U-verse or Verizon’s FiOS TV service through an open interface and with a fair set of access charges. It should also be possible for a video service provider to offer an alternative video offering to the AT&T U-verse or the Verizon FiOS TV offering, again through an open interface and with a fair set of access charges.

IP networks allow for straightforward peering arrangements of services between service providers. The peering arrangements can be made at a public peering service or on a private basis. These peering arrangements may be made with or without co-location. Internet service providers have been able to work out co-location arrangements with private peering arrangements, so this should not be a significant problem.

CONCLUSIONS

TelecomView believes a combination of appropriate differentiated services and equal access approaches will create a more competitive environment, which will provide more choice to consumers. The broadband service providers have been provided significant accommodation that eliminated the requirement to provide competitive unbundled access to their broadband networks to encourage investment in these networks. Given that, it is fair that these networks be open to third party services to maximise the choices open to consumers.

The Net Neutrality issue has not been resolved over the last two years. The FCC decided not to do anything about it based on its study of the issue two years ago. Net Neutrality remains a hot issue and will have a strong influence over future network regulation in the U.S. and globally. In the U.S., the Obama administration is likely to take a new approach to these issues. It will be interesting to watch.

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