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Netflix's bet on streaming video spooks customers and investors -- but maybe for the wrong reason

Reed Hastings, the founder and CEO of Netflix, built an incredibly successful enterprise by figuring out a way to marry a suite of sophisticated high-tech IT-driven management systems with a low-tech delivery system – snail-mail. When Netflix initiated its DVD rental-by-mail service back in 1998, the US postal service offered an efficient and (by 1998 standards) a very inexpensive means for delivering 4- to 6-Gigabytes of digital data to the mass market. With most consumer Internet access being accomplished either on a 56 kbps dial-up basis or via a relatively low-speed DSL service offering download speeds of 1 or 2 mbps, downloading a full-length movie would have taken a minimum of 1-1/2 to 2 hours – and probably a good deal longer depending upon Internet traffic loads. Real-time streaming was not possible, because the download could not occur as fast as the film, resulting in long and annoying pauses. Mailing out the DVDs in those red envelopes was a good solution. You ordered the movie over the Internet, but the "download" was via the US mail.

The rapid growth in broadband subscribership coupled with a significant jump in download speeds being offered to many residential consumers (sometimes as fast as 15 to 25 mbps or more), coupled with orders-of-magnitude increases in Internet backbone capacity, has dramatically improved the user experience with streaming and has created a whole new means of delivering video entertainment – electronically rather than via a physical medium such as a DVD. These services – referred to generically as "TVE" (for "TV Everywhere") enable users to receive video on a broad range of fixed and mobile devices – and include, in addition to Netflix, such other players as Hulu, Amazon, cable operators such as Comcast and Time Warner, as well as TV networks and motion picture studios that own some or all of the content that they offer.

Netflix began offering its customers the ability to download ("stream") movies over the Internet as an alternative to DVDs-by-mail beginning in 2007, and has been encouraging its customers to shift their viewing away from DVDs as a means of reducing Netflix's postage costs. This effort was advanced to the next level this past summer, when Netflix announced that it would unbundle the DVD-by-mail from the streaming video services and subject each to its own separate pricing. For subscribers who wanted to maintain both services, the change amounted to a 60% rate hike. (Netflix even made an abortive attempt to re-brand its DVD-by-mail service as "Qwikster" but abandoned that scheme upon encountering widespread and certainly unanticipated adverse customer reaction.)

On-demand mass market video content distribution operates in much the same way as Netflix's once-revolutionary DVD distribution system. Rather than shipping DVDs across the country to and from its Los Gatos, California headquarters, Netflix supplies DVDs in bulk to distribution warehouses located around the country. Each center maintains its own inventory of DVDs. Customer orders for specific DVDs are routed to the distribution point that is geographically closest (or certainly close) to the customer's location, and the requested DVD is mailed from, and returned to, that nearby distribution point. This design permits Netflix to provide next-day DVD delivery to its customer, and to receive the returned DVD the day after the customer mails it back. This mailing strategy also minimizes the work of the US Postal Service in handling Netflix mail, a condition that is likely reflected in the postage rates that Netflix has negotiated with the Postal Service for the DVD mailings. On those rare occasions where the requested DVD is not in the local center's inventory, the order is fulfilled from another distribution facility.

Similarly, the video streaming service involves a decentralized delivery mechanism that puts content as close to the end user as possible, both to minimize Internet backbone use and maximize the quality and speed of the download stream to each individual customer. Much like the DVD business, rather than originate massive outbound traffic serving multiple downloads of the same content from a single data center location, copies of the movie or program are distributed to numerous local "caching sites" each of which is connected with a local distribution network providing broadband service to end users. These "content delivery networks" ("CDNs") such as Akamai and Level3 acquire a single digital copy of each video from Netflix, and distribute copies of each piece of content once to each of the thousands of local download sites. These local sites interconnect directly with the numerous broadband providers around the country. The local broadband service provider (typically a cable company or a local telephone company) carries the on-demand programming from the caching site to its individual customers, without ever needing to communicate directly with Netflix. In fact, Netflix has been so successful at eliminating its own data center needs that it no longer hosts its own web servers, choosing instead to use Amazon's cloud computing infrastructure. The financial arrangement for streaming roughly tracks the physical networking (and the DVD business) – the content provider pays for the delivery of its programming to the caching sites, and the end user customer of the local broadband service provider pays for the delivery from the caching site to the customer's premises.

This model results in a least-cost routing situation for all of the parties involved. Netflix itself requires very little bandwidth, as it delivers only copy of content to the CDN. The CDN's localized architecture allows it to circumvent almost all long-haul backbone transport, because local customers are served by local content servers. The ultimate broadband network provides only the bare minimum last mile connectivity by connecting with the CDNs in many locations.

Today, most wireline broadband services are offered to end users on a flat-rate, unlimited use basis. These flat monthly rates do vary with the upload/download speed selected by the customer, but are otherwise not affected by the aggregate quantity of data that is carried over the customer's broadband connection in a given billing cycle. Once having committed to a particular flat monthly charge, the incremental telecom charge to the end user for downloading a movie or other program content is zero.

Is streaming actually less expensive than mailing?

When Netflix provides a DVD by mail, it pays the postage in both directions – the door-to-door round trip from Netflix to its customer and back from its customer to Netflix. However, when Netflix provides a movie via Internet streaming, it pays for transport only as far as the local caching site – the Netflix customer pays his or her local broadband service provider for the final leg of the trip between the caching site and the customer's home. So while Netflix's own costs for streaming would *appear* to be less than for mailing, that "appearance" may be misleading in that there is no direct apples-to-apples comparison. But the as-yet unanswered question is, who exactly is the one being misled?

As long as the end user customer buys broadband access on a flat-rate basis, the fact that Netflix does not have to pay for the entirety of the delivery is of no great consequence, since the customer's bill for broadband service would be the same whether or not the Netflix download service had been utilized. *But what if the customer were not being charged on a flat-rate basis, but were instead subject to broadband pricing based upon the volume of data being transmitted*? In that event, there would be some non-zero incremental cost to the customer for downloading a movie from Netflix.

How much might that cost be? Although a few US wireline broadband providers have tiptoed into usage-sensitive pricing via limited trials, the practice seems to have become more institutionalized in Canada. Cable TV/wireless/Internet giant Rogers Communications Inc. has adopted a broadband pricing regime that offers some insight into how usage-based broadband pricing might work.

Service	Download/Upload speeds	Usage cap	Monthly rate	Overage rate per GB
Ultra-Lite	500 kbps / 256 kpbs	2 GB	$27.99	$5.00
Lite	3 mbps / 256 kbps	15 GB	$35.99	$4.00
Express	12 mbps / 512 kbps`	60 GB	$46.99	$2.00
Extreme	24 mbps / 1 mbps	100 GB	$59.99	$1.50
Extreme Plus	32 mbps / 1 mbps	150 GB	$69.99	$1.25
Ultimate	50 mbps / 2 mbps	250 GB	$99.99	$0.50

As summarized in the table above, Rogers offers six different broadband service packages at prices ranging from C$27.99 to C$99.99 per month. Each successively higher-priced package offers faster upload and download speeds and, of direct relevance to the matter of usage-based pricing, a larger block of usage. For example, for $46.99 per month, a customer gets up to 60 GB of data transmission. For $13 more ($59.99 per month), the included volume increases by 40 GB, to 100 GB. The bandwidth requirement for a high-definition streaming download varies between 1 and 2 GB per hour (depending upon the quality available from the content provider and from the ISP, whichever is lowest), so an average feature-length high-definition film could consume between 2 and 4 GB. If we assume the highest quality download, the $59.99 a month Rogers customer could watch about 25 movies, representing an average per-download cost of $2.40. Another way to look at this is by examining the incremental capacity one obtains for the extra $13 per month relative to the $36.99 60 GB service – i.e., 40 GB in this instance. That's enough for about 10 additional downloads at $1.30 each – again assuming that the entire usage allowance (100 GB in this example) is used, no more, no less; if something short of the full usage cap is actually utilized, the average per-GB charge would be commensurately higher. If a subscriber to the 100 GB service were to exceed the 100 GB limit, the overage charge would be $0.50 per GB, or around $2.00 for each additional download. But the overage charges for the lower-priced packages are considerably higher. In the case of the $46.99 Express plan, the per-GB overage charge is $2.00, so the per-download payment for usage above the cap could be as much as $8.00!

Usage-based pricing has been slow to emerge for wireline broadband in the US, but is now the norm, rather than the exception, for *wireless* broadband. After some initial flirting with unlimited wireless data plans, all of the major US wireless carriers have moved over to usage-based pricing. (See the accompanying article below.) Verizon charges $50 per month for its 3G/4G data card service, with a 5 GB usage cap and overage charges of $10/GB. For an additional $30 per month, Verizon offers a 10 GB 3G/4G plan. Even for a relatively low quality download (around 1 GB per hour), Verizon's $80 plan would support only 5 or 6 full-length movie downloads, approaching $15 per film.

The trend toward more usage-based pricing of wireline broadband is likely to persist and to escalate. Customers' ability to use their broadband Internet access service to stream movies from Netflix and other TVE providers takes revenue away from cable TV operators' video-on-demand (VOD) and premium channel revenues – and sometimes encourages customers to "cut their cable TV cord" altogether. As customer usage shifts from the MSOs' cable TV services over to their Internet service, the providers will likely seek to recover the forgone VOD and premium channel revenues by charging customers to download competing content over the Internet. And one does not have to look very far to see other examples of strategies that shift formerly "free" elements of a service to fee-based pricing. Airlines used to include meals, baggage, seat assignments, telephone reservation services, and more in their basic ticket prices. Now most of these are subject to additional charges. There is no reason to believe that providers of broadband Internet access won't engage in

similar pursuits.

What are the implications for Netflix and other internet-enabled businesses?

So what does this mean for Netflix and other TVE content providers? If their business models are premised upon their customers' ability to download content free of additional charges by the customer's Internet access provider, these businesses may well be in for a rude awakening. Given the fuss that Netflix subscribers made when confronted with a $6 per month price increase, consider how they will react when confronted with additional usage-based charges by their broadband service provider equivalent to $2 to $4 per movie download.

Another possibility is that the providers of consumer broadband Internet access might charge the video content provider when customers download their programming. Certainly the broadband access providers – both telcos and cable operators – have expressed interest in such arrangements. The FCC's *Open Internet Order* adopted in December 2010 (see *Views and News*, January 2011) may impose certain limitations on that option (at least for wireline broadband), but that ruling is currently being appealed by Verizon. In any event, there is nothing in the FCC's ruling that would preclude the broadband provider from imposing usage-based charges on its own customers. And if that happens, Netflix and others might well learn that snail-mail "downloads" are still the least expensive means of delivering video content to the mass market.

But Netflix is in some ways just the tip of the iceberg. As consumers become more comfortable downloading apps, working online "in the cloud," posting and consuming social media, and with all the other myriad online services that are emerging, companies that rely on their consumers having unlimited, unfettered access to the Internet could be in for quite a surprise. Just as Netflix subscribers might be shocked to pay an additional $2 to watch a movie, people on Facebook might become quite upset if posting a new photo of a night on the town causes them to exceed their bandwidth cap and incur a $10 overage charge. Similarly, companies like Google may see customers revolt if cloud products like Google Docs begin to cause bandwidth overages. iTunes downloads, Amazon cloudplayer, and even basic email services will all face similar business model challenges if consumers are forced to pay effective per-use charges to accommodate the bandwidth required for these otherwise low-cost offerings. It is not at all clear that what consumers presently view as cheap or free Internet-based alternatives to traditional products will remain the clear choice as bandwidth becomes limited and more expensive.

As discussed above, it seems very likely that broadband providers will continue to put pricing pressure on bandwidth. Comcast just announced that in the third quarter of 2011 it had lost some 250,000 valuable video subscribers, but added nearly as many broadband subscribers. Without the myriad upcharges available in the video business, broadband providers will be forced to turn to bandwidth caps and overage charges to make up the difference as more video customers defect.

Businesses relying upon consumer access to broadband connections will need to both develop business models that contemplate eventual increases in bandwidth costs (either directly or indirectly) and contemplate participating in the development of network neutrality rules at the FCC and before the courts.

Sprint yanks unlimited data plans for existing mobile hotspot customers

Not more than two weeks after it started selling the iPhone for the first time, Sprint announced that the days of unlimited data are over, at least for users of laptop cards and mobile hotspots. Unlimited data will still remain available for smartphones – including the iPhone–at least for now.

From an industry-wide perspective, the move comes as no surprise. The nation's number three wireless carrier is simply following in the footsteps of AT&T Mobility and Verizon Wireless, which abandoned unlimited data plans some time ago. As consumers' appetite for mobile data grows exponentially, the major wireless carriers have had to limit data consumption in order to maintain overall network quality as backhaul deployments have failed to keep pace with growing demand. But from a marketing perspective, this about-face by Sprint comes as a bit of a shock. Sprint CEO Dan Hesse, famous for taking the time to star in TV commercials for the ailing company, ran an advertisement about the meaning of the word "unlimited," and flaunted Sprint as the only provider to offer truly unlimited calling, texting and data. Sprint's website (sprint.com/unlimited) still highlights this product differentiation. Whether predictable or a surprise, this move has larger repercussions beyond Sprint's own marketing strategy.

The end of all unlimited plans

First, it seems almost certain that this move portends the eventual elimination of Sprint's unlimited plans for smartphones, be it in a month or in a year. Even Verizon kept its unlimited data offerings around for a while after it started selling the iPhone – it's a clear way to gain market share in an increasingly undifferentiated market. But just like AT&T and Verizon before it, Sprint will likely be forced to cap data consumption. Why were smartphone plans spared from the chopping block this time? Although smartphones aim to handle the same tasks as laptops and other computers, they function differently, sometimes requiring less bandwidth than a full-on computer counterpart for the same application. A computer would be capable of displaying 1080p Hi-Definition video, while an HD capable phone, with its small screen, needs fewer pixels and thus less bandwidth to max out its video resolution. But it is only a matter of time before smartphone usage either forces massive network upgrades or exceeds available capacity. With the elimination of unlimited bandwidth in wireless all but complete, it seems inevitable that major wireline broadband carriers begin to adopt this metered pricing regime.

The end of grandfathering?

This move represents a sea change in how alterations to consumer wireless plans are handled. When AT&T eliminated its unlimited data offerings, it grandfathered existing customers on the unlimited plan, and started signing up new customers on the capped plans. Existing customers could switch to a new plan if they wanted, but were not forced to do so. Grandfathering has been a longstanding industry practice for more than a decade. Sprint, on the other hand, has made a unilateral, mid-contract, no-discussion change to existing customers plans. Sprint announced:

"If you have a mobile broadband device such as a tablet, netbook, notebook, USB card, connection card or Mobile Hotspot device, effective beginning with your next bill following notification, your on-network monthly data allowance will no longer include unlimited 4G."

Although Sprint didn't change the dollar amount of the base price for these plans, the elimination of unlimited 4G in combination with the use of the existing 3G bandwidth cap for both 3G and 4G bandwidth usage results in a major devaluation of the plans. It's hard to imagine how Sprint believes this maneuver will be financially successful, unless it believes it can exercise substantial market power over consumers. Sprint seems to be giving up any sort of first mover advantage it gained by being the first to market with true 4G service.

Sprint 3G/4G Mobile Broadband Plans, eff. November 2011

Old Service	New Service	Price	Overage Charge
3 GB of 3G Unlimited 4G	3 GB of combined 3G and 4G	$45	$0.05 Per MB
5 GB of 3G Unlimited 4G	5 GB of combined 3G and 4G	$60	$0.05 Per MB
10 GB of 3G Unlimited 4G	10 GB of combined 3G and 4G	$90	$0.05 Per MB

This means that existing Sprint customers, having purchased a laptop card or mobile hotspot and having likely signed a two-year contract, are now stuck without a good option. Consumers can either pay an early termination fee and sacrifice their investment in the mobile hotspot device (perhaps as much as $500 in total), or accept the substantially less favorable terms and remain with Sprint.

The $51 Gigabyte

Finally, Sprint's pricing structure is quite out of touch with that of its Big Three compatriots, at least with regards to the overage cost of data for 4G laptop cards and hotspots. Whereas Verizon and AT&T have both settled on $10/GB as the overage price for these services, Sprint has maintained its legacy 3G overage price of $0.05 per megabyte. While five cents certainly sounds low in the abstract, a gigabyte is 1,024 megabytes. This translates into a little over $50 for an extra GB of data above and beyond the basic allowance. This is more than five times the price Sprint's competitors are charging for overage, and is roughly the same magnitude in price as the first 5GB of data allotted in Sprint's middle usage plan. This would result in overage charges of more than $100 for a consumer watching a 2GB HD movie above and beyond the monthly data allowance.

It will be interesting to see if Verizon and AT&T follow Sprint and move to eliminate the longstanding practice of grandfathering older rate plans and whether they maintain current overage rates or take advantage of Sprint's substantial overcharging to increase prices industry-wide.

ETI to present at 2011 NASUCA Annual Meeting

Colin B. Weir, Vice President at ETI, will join panelists including Commissioner James H. Cawley of the Pennsylvania Public Utility Commission and State Chairman on the Federal-State Joint Board on Universal Service; David C. Bergmann, Counsel to NASUCA, formerly of the Office of Ohio Consumers' Counsel and Chairman of NASUCA's Telecommunications Committee; and others at NASUCA's November Annual meeting in Saint Louis. The group will address the FCC's recent order on Universal Service and Intercarrier Compensation in a panel discussion entitled:

"Broadband or Bust at the FCC: Forward-Looking Telecom Reform, or The Great Telecom Robbery of 2011"

On October 27, the FCC voted out an order intended to tackle the vital and extremely complex issues of high cost Universal Service Reform, broadband deployment and revisions to the federal Intercarrier Compensation structure. The FCC's NPRM focused almost exclusively on the ILEC's "ABC Plan," a regulatory backward proposal to shift over $4 billion of high cost rural telephone service support to broadband, and reducing interstate access charges to near-zero. In its public meeting, the FCC signaled that it would not wholly adopt the ABC Plan, but would order significant revisions to the access charge structure and an additional customer surcharge, relying on "competition" to force carriers to pass through access charge reductions in the form of reduced rates. Key elements of the plan are being pushed into a further NPRM.

ETI previously discussed the ABC plan at length in *Views and News*, September 2011, and in the paper the *Price Cap LECs' "Broadband Connectivity Plan": Protecting Their Past, Hijacking the Nation's Future*, also published in September.

The paper, a detailed examination of the large ILECs' "ABC Plan" as submitted in FCC WC Docket No. 10-90 is available at www.econtech.com/pubs.php

An archive of *Views and News*, including the September issue, is available at www.econtech.com/newsletter

Although the complete text of the FCC's order is not yet available, it is clear from the FCC's public meeting and executive summary of the order that ETI's original fears have been borne out. It appears that the majority of the ABC plan has been adopted in whole by the FCC, with only minor changes that do not address the fundamental lack of competitive and technology neutrality, nor the ILEC "make-whole" provisions embedded in the original ABC plan.

About ETI. Founded in 1972, Economics and Technology, Inc. is a leading research and consulting firm specializing in telecommunications regulation and policy, litigation support, taxation, service procurement, and negotiation. ETI serves a wide range of telecom industry stakeholders in the US and abroad, including telecommunications carriers, attorneys and their clients, consumer advocates, state and local governments, regulatory agencies, and large corporate, institutional and government purchasers of telecom services.