IPTV: a brief description

Minu Pradhan
Deputy Manager
SPID

What is IPTV:

IPTV (Internet Protocol Television) is a system where a digital television service is delivered by using Internet Protocol over a network infrastructure, which may include delivery by a broadband connection. A general definition of IPTV is television content that, instead of being delivered through traditional broadcast and cable formats, is received by the viewer through the technologies used for computer networks.

For residential users, IPTV is often provided in conjunction with Video on Demand and may be bundled with Internet services such as Web access and VoIP. The commercial bundling of IPTV, VoIP and Internet access is referred to as "Triple Play" service (adding mobility is called "Quadruple Play"). IPTV is typically supplied by a service provider using a closed network infrastructure. This closed network approach is in competition with the delivery of TV content over the public Internet, called Internet Television. In businesses, IPTV may be used to deliver television content over corporate LANs.

How it works

One set-top box at subscriber side will be necessary for IPTV systems. The box will connect to the home DSL line and is responsible for reassembling the packets into a coherent video stream and then decoding the contents. The computer could do the same job, but most people still don't have an always-on PC sitting beside the TV, so the box is neccesary. Where will the box pull its picture from? To answer that question, let's start at the source.

Most video enters the system at the telcom operator's national headend in the most of the cases , where network feeds are pulled from satellites and encoded if necessary (often in MPEG-2, though H.264 and Windows Media are also possibilities). The video stream is broken up into IP packets and sent to into the telecoms' core network, which is a massive IP network that handles all sorts of other traffic (data, voice, etc.) in addition to the video. Here the advantages of owning the entire network from end to end(as most of the telcom operators do) really come into play, since quality of service (QoS) tools can prioritize the video traffic to prevent delay or fragmentation of the signal. Without control of the network, this would be unpredictable, since QoS requests are not often recognized between operators. With end-to-end control, the telcos can guarantee enough bandwidth for their signal at all times, which is key to providing the "just works" reliability consumers have come to expect from their television sets.

The video streams are received by a local office, which has the job of getting them out to the consumers. This office is the place that local content (such as TV stations, advertising, and video on demand) is added to the mix, but it's also the spot where the IPTV middleware is housed. This software stack handles user authentication, channel change requests, billing, VoD requests, etc.-basically, all of necessary infrastructure.

All the channels in the lineup are multicast from the national headend to local offices at the same time, but at the local office, a bottleneck becomes apparent. That bottleneck is the local DSL loop, which has nowhere near the capacity to stream all of the channels

at once. Cable systems can do this, since their bandwidth can be in the neighborhood of 4.5Gbps, but even the newest ADSL2+ technology tops out at around 25Mbps (and this speed drops quickly as distance from the DSLAM [DSL Access Multiplier] grows).

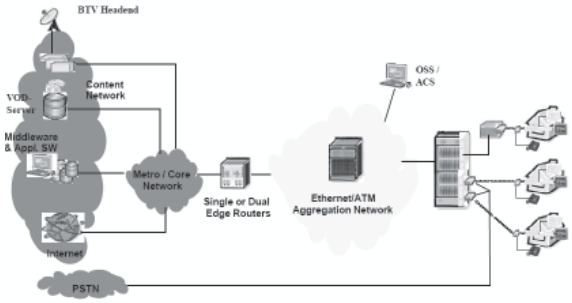
So how do you send hundreds of channels out to an IPTV subscriber with a DSL line? Simple: you only send a few at a time. When a user changes the channel on their set-top box, the box does not "tune" a channel like a cable system. (There is in fact no such thing as "tuning" anymore-the box is simply an IP receiver.) What happens instead is that the box switches channels by using the IP Group Membership Protocol (IGMP) v2 to join a new multicast group. When the local office receives this request, it checks to make sure that the user is authorized to view the new channel, then directs the routers in the local office to add that particular user to the channel's distribution list. In this way, only signals that are currently being watched are actually being sent from the local office to the DSLAM and on to the user.

Though multicast technology provides the answer to the problem of pumping the same content out to millions of subscribers at the same time, it does not help with features such as video on demand, which require a unique stream to the user's home. To support VoD and other services, the local office can also generate a unicast stream that targets a particular home and draws from the content on the local VoD server. This stream is typically controlled by the Real Time Streaming Protocol (RTSP), which enables DVD-style control over a multimedia stream and allows users to play, pause, and stop the program they are watching.

The actual number of simultaneous video streams sent from the local office to the consumer varies by network, but is rarely more than four. The reason is bandwidth. A Windows Media-encoded stream, for instance, takes up 1.0 to 1.5Mbps for SDTV, which is no problem; ten channels could be sent at once with bandwidth left over for voice and data. But when HDTV enters the picture, it's a different story, and the 20-25Mbps capacity of the line gets eaten up fast. The bandwidth situation is even worse when you consider MPEG-2, which has lower compression ratios. MPEG-2 streams will require almost twice the space (3.5 Mbps for SDTV, 18-20 Mbps for HDTV).

Simultaneous delivery of channels is necessary to keep IPTV competitive with cable. Obviously, multiple streams are needed to support picture-in-picture, but they're also needed by DVRs, which can record one show while a user is watching another. For IPTV to become a viable whole-house solution, it will also need to support enough simultaneous channels to allow televisions in different rooms to display different content, and juggling resulting bandwidth issues is one of the trickiest parts of implementing an IPTV network that will be attractive to consumers.

Architecture of IPTV



Application and Service

Live TV

"Live TV" refers to traditional service offered by off-air TV, cable TV companies and Digital Broadcast Satellite (DBS) providers. It is the most basic service that DSL Service Providers require in order to be able to match the service offerings of competing cable operators and satellite service providers.

Network Based-PVR (N-PVR)

In addition to live broadcast TV, Time-Shift TV services, allowing subscribers to enjoy everyday TV programs - in real-time, or through time-deferred streaming - with a number of advantages. The network based PVR service frees viewers from the restrictions of a conventional TV broadcast schedule. The solution enables subscribers to pause and rewind live TV programs, adding fast-forward functionality at the moment the subscriber's instance of the program falls behind the system-wide live presentation. It also offers substantially more functionality than conventional PVR devices, which have recording capacity and simultaneous multi-channel recording limitations.

Video On Demand (VOD)

"ANY program, ANY time from ANYWHERE"

In contrast to cable television Pay Per View (PPV) services, in which programs are broadcast according to a pre-set schedule and tend to be focused on feature film presentations,. This gives subscribers complete control over the times and types of content they wish to view, via simple, remote control-based selection. This makes traditional program schedule times irrelevant except for users who wish to view the program the instant it becomes available, i.e. the instant a weekly program airs. Furthermore, two neighbours (or even two viewers in the same household) may elect to watch identical content, and exercise personal control over their distinct unicast video stream, using features such as Pause, Rewind, and Fast-Forward.

Near Video On Demand (NVOD)

The IPTV system enables Service Providers multicast identical video content with staggered start times over a block of virtual channels. Depending on the number of incremental multicast channels, subscribers can begin watching a program within a few minutes of making its selection via the Electronic Programming Guide (EPG). In addition, NVOD format gives subscribers the enhanced functionality of being able to incrementally advance forward or backward within a selected program, by essentially switching between virtual time-staggered channels.

Virtual Channel

Similar to live TV channel, virtual channel is a set of VoD programs that is multicast on schedule. From viewer's perspective, it works like real TV channel.

IPTV based Converged Services

Another advantage of an IP-based network is the opportunity for integration and convergence. Converged services imply interaction of existing services in a seamless manner to create new value added services. One good example is On-Screen Caller ID, getting Caller ID on your TV and the ability to handle it (send it to voice mail, etc). IP-based services will help to enable efforts to provide consumers anytime-anywhere access to content over their televisions, PCs and cell phones, and to integrate services and content to tie them together. Within businesses and institutions, IPTV eliminates the need to run a parallel infrastructure to deliver live and stored video services.

IPTV business and Nepal Telecom:

In Global telecom market, telecom operators are investing in the IPTV infrastructure, as, IPTV is seen as new revenue stream.

Nepal Telecom is already building its broadband network with xDSL project and NG-SDH network. Nepal Telecom is also planning to expand its voice and data netwokr with NG Network comprising of all IP based transport, softswitches,Media gateways and broad band -network. Nepal Telecom already has large copper access network.

New access network is being designed to cater broadband services, the last mile will have not more than two kilometers of copper network, so it will be able to carry the bandwidth allowed by ADSL 2+ (ie 24Mbps downlink). Hence, there is ample possibility to run IPTV services over the network. There are two possibilities that we can deliver the IPTV services:

1. Invest on IPTV infrastructure eg equipments like, head end, middleware and other setups, make business plans and run services by Nepal Telecom.
2. Tie up with other operator who would set up the IPTV infrastructure .Nepal telecom will let its broad band network to deliver the IPTV contents. All business plans, tariff schemes will be designed by the Other IPTV operator, NT will just get some share of revenue for leasing its network.

NT's Business infrastructure is not ready yet for point one, though NT could invest n the technical infrastructure and to get real revenue stream from IPTV service one has to have its own network.

One big challenge is the existing cable tv operators who are giving the services since long time, and have network virtually every where. To compete with existing ones the service shall be with prompt response, good quality, more features and yet with competitive price.

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