

IPTV/VOD over DOCSIS Network using IRIS CMTS

What is IPTV?

IPTV (Internet Protocol Television) is a method of securely distributing video content to televisions over a managed two-way network IP infrastructure that enables a more customized and interactive user experience.

IPTV can enable interactive content, such as interactive advertisements and real-time network based PVR functionality, on a regular TV set. IPTV can allow people who are separated geographically to watch a movie together, while instant messaging and exchanging files simultaneously. IPTV can enable providing a mosaic of multiple video sessions on screen at the same time. It can support a richer VOD storefront and features like photo sharing.

IPTV uses a two-way path using a downstream multicast or unicast video signal sent through the provider's backbone network over IP and from IP-based video servers, allowing viewers to select content on demand, time-shift, and take advantage of other trick and interactive TV options. At the access interface, IPTV is a unicast service; only one copy of a program is sent at a time on the access pipe connecting the user to the network. When a viewer changes the channel or selects a program, a new stream of content is transmitted directly to the viewer's set-top box. There may be a large number of streams of video being sent into the IP core network, but only one is switched into the user's access network.

IPTV enables more interactivity and flexibility, but also introduces the requirement for more intelligence in the network. It should be noted that, in all IPTV delivery mechanisms, the intent is to deliver video to the user's TV, not just to the user's computer.

Overview

DOCSIS cable network modulates one downstream channel to provide an effective data rate of 37Mbps using QAM 256 modulation profile for North American cable plants. Under European cable plants it can provide 52Mbps of effective bandwidth utilizing one available channel. The number of available channels available in a cable network is more than 100.

To provide IPTV or VOD over IP multiple IRIS CMTS are stacked thus effectively increasing the total bandwidth required to provide such services.

Requirements

In order to provide IP data services over cable network the cable network should be compliant to DOCSIS standards. This essentially means that the cable network be two way ready. Power levels available at the tap locations in each room be between +/-15 dBmV with a signal to noise ratio (SNR) above 24 in the downstream direction.

The cable network can be "Home Run" or "Looped". DOCSIS data networks will work in both these scenarios.

Technology Description

With the patent pending "IRIS Traffic Scheduler" each IRIS CMTS is constantly monitored so that bandwidth and traffic utilization information is available and key decision can easily and quickly made.

During the initial start of the network, the total numbers of cable modems at each service location (room or apartment) are evenly terminated on the total number of CMTSes on the cable network. As VOD or IPTV streams are requested to be watched at any service location IRIS Traffic scheduler gathers network utilization on each coax channel. If one of the CMTS has reached the threshold level of the available bandwidth on that channel, remaining modems on that CMTS are requested using the DOCSIS Management message to be moved to a CMTS that is still below the threshold levels. To calculate the threshold, Traffic scheduler includes both multicast and unicast streams being sent through a single CMTS.

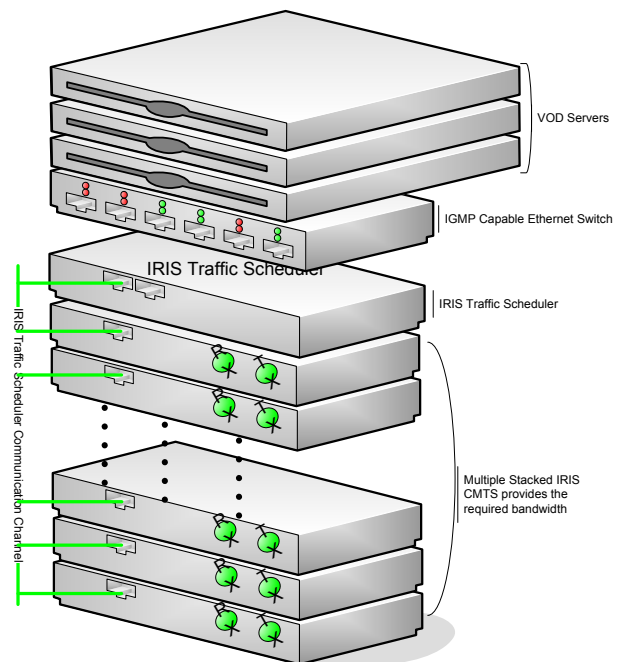


Figure 1

IPTV/VOD over DOCSIS Network using IRIS CMTS

Using the network intelligence gathered by IRIS Traffic Scheduler the network can avoid latency issues and the need to move cable modem from one CMTS to another at the time user requests to watch a VOD stream. Before each IRIS CMTS reaches a threshold level that it cannot provide the required bandwidth to watch a VOD stream, the remaining cable modems are requested to move to other CMTSes that can effectively carry the VOD traffic if requested by the end user.

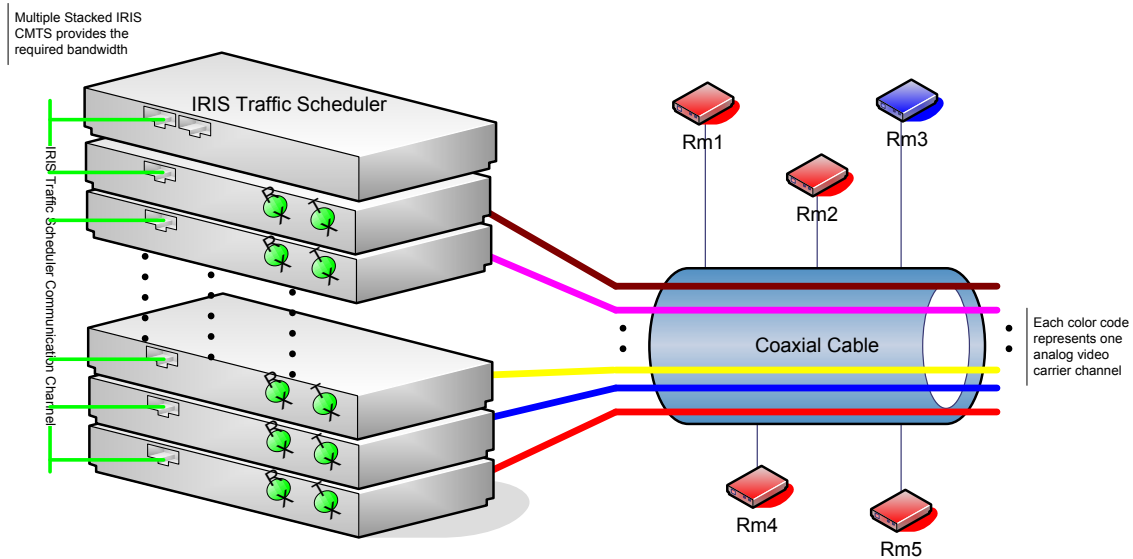


Figure 2

In the above diagram (Figure 2) cable modems in Rm1, Rm2, Rm4 and Rm5 are connected to one downstream channel (shown in Red). For example purposes we set the threshold limit to say 80% of the total available bandwidth on that channel. If Rm1, Rm4 and Rm5 are watching VOD channels each utilizing a bandwidth of 10Mbps, then IRIS Traffic scheduler will instruct to move cable modem in Rm2 to a CMTS which has the lowest amount of bandwidth utilization. If bandwidth utilization happens to be similar across multiple CMTSes, a second factor of the number of cable modems terminating on it will be taken into account.

Return Frequency in DOCSIS

The DOCSIS protocol uses frequency range of 88-850 MHz for downstream and return frequency of 5-42 MHz for upstream communication. While each downstream port utilizes a 6MHz (8MHz for Euro) wide channel to achieve the required data rates, each upstream port utilizes upto 3.2 MHz wide channel