

INVENTION DISCLOSURE

1. Invention Title.

Method for IP Content Delivery Using Existing Cable Networks

2. Invention Summary.

System to support IP-only delivery of media content within the home, allowing IP-only set-top boxes, TVs and other presentation devices, while simultaneously supporting delivery to homes supporting legacy devices.

3. Invention Description.

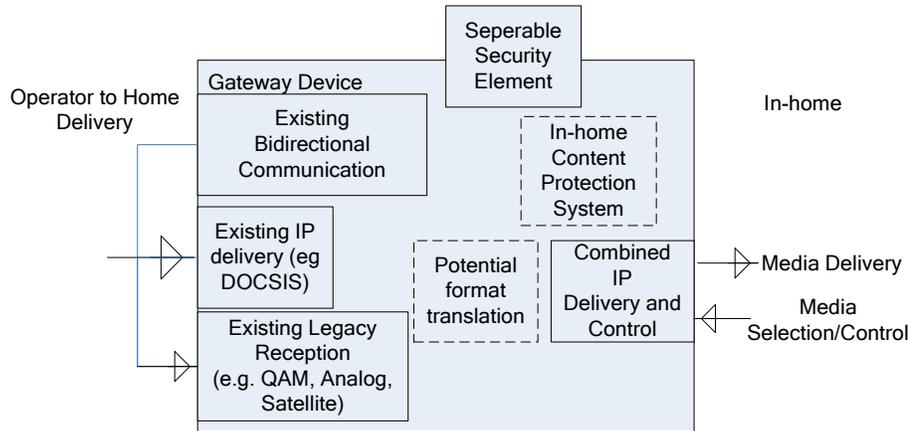
- a. **Describe the invention in detail and/or attach a description, drawing(s) and/or diagram(s), if available. Please include flow charts for descriptions of software processes, and block diagrams for descriptions of hardware systems. Include the description/attachments in electronic form if possible.**

Current content delivery mechanisms for Cable content focus around delivery of MPEG transport streams over QAM modulation-based cable networks. Recent inventions (Switched Digital Video) extend these delivery mechanisms to support more content choices than can be simultaneously broadcast on traditional cable plant, and still use QAM modulation. Some Video On Demand systems currently make use of IP communication for request and control of content, but make use of QAM based transmission. While it is possible to deliver video content over IP networks (using DOCSIS modems), the equipment cost of delivering content over DOCSIS-based IP networks is approximately double that of traditional QAM based MPEG transport stream video. Alternative solutions for all-IP delivery have been proposed, such as DOCSIS IP Bypass Architecture (DIBA), but these suffer from not supporting legacy homes on the same network segment, and do add bandwidth overhead compared to the invention.

This invention is for the modification of the traditional home IP gateway (the DOCSIS cable modem) into a device which accepts traditional DOCSIS, broadcast QAM, switched video QAM, VOD over QAM, and even Analog channels, and unifies the command, control and delivery within the home to be wholly based upon IP protocols. As such, new lower-cost devices can be developed for the home, for content presentation, which only require IP connectivity and do not require cable-specific hardware for content reception.

The home IP gateway contains multiple of QAM receivers for use with DOCSIS and for traditional QAM content delivery (broadcast, SDV and VOD), and optionally analog video decoders paired with digital video encoders (typically MPEG2). The QAM receivers can be statically allocated to DOCSIS or QAM content, or can be dynamically re-purposed dependent on the dynamic content delivery needs and sources. The home IP gateway contains the separable security

elements traditionally required for Cable TV (CableCARD, likely Multi-stream, or DCAS) and translates to a content protection system for use within the home, such as a Digital Rights Management system or a link-protection system.



The Home IP gateway abstracts all forms of content selection into IP-based protocols, such as Multicast group membership as a form of channel selection. For consumer-unique content, such as Video On Demand, IP unicast is a suitable mechanism. The gateway device converts such IP based selection and control protocols into appropriate legacy mechanisms, removing the need for the presentation device to understand the details of the legacy transmission mechanisms and protocols.

The invention allows co-existence of legacy and IP-only based homes within a single network segment, and does not require expensive equipment upgrades within the cable operator's delivery infrastructure. Legacy homes have access to traditional QAM Broadcast, Switched and VOD services and Analog channels, while IP-only homes have access to the same content at no additional delivery-network bandwidth cost, and have access to DOCSIS IP delivered content in addition.

The invention allows a sliding migration from legacy delivered content to all-IP delivered content through the gradual migration of content from QAM delivery to IP based delivery, similar to the sliding migration from broadcast to switched delivery in legacy networks.

The invention insulates presentation equipment from changes in operator-to-home delivery mechanisms, as the translation from the delivery mechanism to in-home IP distribution is made in a single device, the home gateway. As an example, at a future point the operator could transition from QAM-based transmission of transport streams to alternate forms (as examples 8PSK modulated transport streams, pure IP delivery such as 10Gigabit Ethernet over Fiber), and the only change within the home would be the gateway device (the subject of the invention).

Existing presentation appliances within the home (TV, game console, mobile handset) would not require changes

The invention eliminates the need to simultaneously deliver content in legacy forms and IP-only forms, thereby dividing delivery capacity between legacy and IP-only delivery and reducing the number of services available to each on existing delivery systems.

The invention requires no changes to legacy equipment in legacy homes, and also allows homes with a mixed legacy and IP-only base of equipment.

The invention allows existing IP-only devices such as personal computers and game consoles to take advantage of cable content.

The invention is not specific to a physical transmission mechanism within the home (such as Ethernet), and as such a suitable gateway equipped with Wi-Fi or GSM/CDMA transmission equipment can extend the cable content to portable devices (mobile phones, mobile game consoles such as PlayStation Portable, Nintendo DS or successors), along with wireless-only fixed devices (WiFi attached display).

The invention can support transcoding from the natively received cable content to formats appropriate for certain families of devices (eg MPEG4 AVC to MPEG4 ASP) to enable a wide variety of devices within the home without the transmission bandwidth overhead of supplying multiple formats to the home in order to support a variety of devices.

While expressed above in terms of legacy Cable transmission technologies, the invention is broad enough to be expressed in parallel fields such as satellite TV. The invention would apply to receiving satellite TV using existing standards (QPSK, 8PSK etc) and converting the delivery within the home to IP-based protocols. In isolating the physical transmission methods, protocols and standards from the devices used for presentation of the content, devices need not be "Cable Ready" or "Satellite Ready" as the invention allows content delivery to devices which have no specific tie to the physical transmission mechanism between the operator and the home.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?

The invention was developed in trying to determine how cable operators could cost-effectively transition from existing delivery mechanisms to IP-based delivery of services. Use of existing standards for unified IP delivery of all content within the home (through a DOCSIS modem) are not cost effective. The problems solved include:

1. The infrastructure costs associated with conversion to all-IP distribution within the home (through using an existing approach of all-IP delivery to the home)
2. The reduction in service necessary to support simultaneously supporting delivery of substantially the same content through traditional (legacy) and IP-based formats to the home
3. The inability to transition from one delivery format to the home to another without updating substantially all equipment used for media presentation within the home (Set-Top Boxes, operator (cable or other)-ready TVs)
4. The ability to provide full operator services to non-cable-ready devices such as PC's game consoles, portable media players or handsets
5. The cost adder associated with making a media presentation device "cable ready" - any device with a network connection can now be "cable ready" (extend to "Satellite ready" or "TelcoTV ready")
6. Economies of cost associated with putting multiple reception devices (tuners/demods) into a single device rather than smaller numbers in each device
7. Economies of cost that a home may have 12 media presentation devices. In a traditional model, each would need 1 or 2 tuner/demods, though only 6 may be used at any one time. Using the invention, a home with 12 media presentation devices may require a gateway with only 8 tuner/demods
8. Ability to extend operator content to existing unsupported devices such as mobile handsets
9. Ability to serve legacy homes and devices along with new IP-only devices with little or no additional transmission-network costs.
10. Economies of cost relating to a lower number of separable security elements per home – the gateway contains the separable security element rather than one element per served device

c. Briefly outline the potential commercial value and customers of the invention.

The invention provides considerable competitive advantage to the owners over competing service providers such as satellite and existing legacy or partial legacy-based optical telco providers (Verizon FiOS is partial legacy, using QAM over optical fiber), as it allows providing media services to a variety of currently unsupported device classes (game consoles, portable media devices and handsets within the home). If this advantage can result in a transition of 20% of competing providers to a cable platform, this might result in additional annual revenues of \$5bn considering existing revenues for Dish Network and DIRECTV. Additional competitive gains would increase this number.

The invention could result in additional revenue for cable operators through fees associated with delivery of content to additional devices throughout the home. This might result in a gain of 10% in revenues for cable operators, approximately \$3bn for Comcast alone, perhaps \$10bn for the entire cable industry.

The ability to view media on more devices is likely to make more "sticky" customers, reducing churn in subscribers. No estimate is provided for the cost savings associated with reducing churn.

Customers for the invention include cable operators, satellite TV operators, and certain Telco-TV operators. The invention could also apply to other providers of media services, such as Broadband Power Line and Fixed Mobile media delivery, depending on the technologies used within these environments