INVENTION DISCLOSURE

1. **Invention Title.**

Media CM that Supports Streaming Video over IP

2. **Invention Summary.**
This invention incorporates streaming video server inside a CM. Streaming video server gets video from broadcast, multicast, and single cast carriers on the downstream Cable system. Streaming video may be sent to a single subscriber or to several subscribers.

3. **Invention Description.**
   a. See description below.

   b. Why was the invention developed? What problem(s) does the invention solve? How is it better?
   See pros and cons sections. Idea started as a power-saving idea by making the STB disappear, but operational advantages make the idea valuable for Cable operators.

   c. Briefly outline the potential commercial value and customers of the invention.
   Huge. Makes STBs go away, while preserving most of a Cable operator's network infrastructure. For shared Media CMs, the savings for operators is even greater.

4. **How is this invention different from existing products, processes, systems?**
Ultra high-speed A-D converter makes idea attractive, but is not a requirement. Idea may be considered to have borrowed elements from gateways, OTT applications, and IP TV.

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A Product Idea: Media CM that Supports Streaming Video over IP

The basic idea is to make a CM additionally produce one or more IP video streams that will replace the functionality delivered by conventional power-hungry STBs. The video IP streams are sourced from the many entertainment QAM carriers, and delivered over IP to video consuming devices in the home.

See block diagram in Fig. 1. By taking advantage of new high speed analog-to-digital (A-D) converter chips coming to market, the entire downstream band (54-860MHz) is converted into a very high-speed digital stream. From this digital stream, entertainment carriers having video content are digitally demodulated, as well as the current DOCSIS downstream carriers. This new high-speed Analog to Digital (A-D) converter saves the substantial cost of multiple RF tuners.

The Media CM eliminates the need for a conventional STB in customers' homes by providing the functionality of the conventional STBs in the CM's media server, or in the Cloud. This saves a lot of electricity.

The selected video programs from decrypted entertainment carriers are re-encrypted in the Media CM into a secure format, (e.g. using Microsoft's Silverlight or other) and sent over wired or wireless IP over Ethernet to one of the home's devices that can make a picture and sound.

Ideally the home's devices will be owned by the subscriber. These devices can be PCs, I-Pads, Roku boxes, Blu-Ray players, or game platforms such as X-Boxes, Wii boxes, or Playstations. They can also be IP enabled TVs (e.g., from Samsung, Sharp), or IP STB such as are available from Amino or Android vendors (see Fig. 2 and Fig. 3). The media server's output from the Media CM can utilize the same wired or wireless Ethernet connection that is provided today for connecting CPE (customer premise equipment) devices in home networks. This system will also work with the home's receiving devices that currently receive Over-The-Top (OTT) streaming video services, such as Netflix, Hulu, or Amazon.

The Media CM will produce video streams that may be broadcast streams, single-cast streams (VOD) or multicast streams.

Another shared application that can be enabled with this invention is to provide cable services, both broadcast and switched, wirelessly to several subscribers with a single Media CM. For example, a Cable operator could provide Wi-Fi connectivity to subscribers, and they could stream the video service that they desired from the Media CM. This allows Cable operators to deploy their services to Parks, airports, and shopping malls, as well as residential neighborhoods. Because of bandwidth constraints, it is impossible to stream all video channels wirelessly to subscribers, but Wi-Fi networks are capable of handling selected video programming. For this application to be deployed, the Cable operator must authenticate the user's device (I-Pad, for example).

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In this shared application, every even-numbered home could be wired with a Media CM using a wireless Ethernet. Odd-numbered homes would use the wireless connection from the even-numbered homes. This would result in a 50% reduction in drop cable usage.

In a wired application, one apartment building could be provided with a single Media CM and several apartments could be provided with an Ethernet connection to the single Media CM. This reduces equipment cost to the Cable operator, and reduces power consumption even more.

Pros:

- Power savings from eliminating the STB (with a slight increase in Media CM's power consumption, which can be switched off when no video is being served)
- Cable Operators carrying video over QAMs can keep most of their headend components unchanged and, from a customer's perspective you can still look like you have an IP Video roll-out. Instead of the RF to IP transition happening at the headend, it is happening at the CM. It gives an operator more options for an IP video strategy.
- Cost savings to Cable operator by eliminating the operator-owned STB
- Large network cost advantage to Cable operator because conventional video delivery using E-QAMs is much cheaper than DOCSIS OTT delivery.
- Renewable separable security requirement from FCC may be changed (see Cablevision Exemption)
- Beats existing OTT-only services, because you can also get real-time programming, like news or sportscasts, from the same devices.
- Digital video recording can be done in the cloud.
- One device (Media CM) can provide OTT delivery as well as serving broadcast QAMs
- Can be made user-friendly for non-technical savvy subscribers, or powerful and feature-rich for technically savvy subscribers.
- Media Server can also perform the elusive measurement of delivered video quality for MSO by tracking dropped Ethernet frames.
- Fast channel switching. The fact that you have at your disposal the entire spectrum, channel changing is going to happen very fast as you only have to switch from stream to stream that you already have available.

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- Current channel guide grid may be downloaded over the Internet via the browser. Because you have all the channels available, your capability to design an elaborate TV guide is facilitated.
- Long-term, the broadcast tier can be eliminated when all subscribers are 2-way connected and report what they are watching.
- Idea provides a good presentation to the FCC on why they should not try to regulate our industry.
- Enables shared wired and wireless connections between multiple subscribers.

Cons:

- Need app loaded onto Wii, X-Boxes, and Blue Ray players to securely get video from entertainment CM
- IP delivery replaces coax/RF delivery inside house

Comment:

If Cablelabs can standardize the media server app. interface, Cable operators can control the user's experience.

Description of IP STBs:

Devices that convert IP streams into video pictures can be relatively inexpensive IP-STB devices such as Amino boxes (see Fig. 2). These are used by some service providers that use Ethernet connectivity for providing entertainment. The Amino boxes have a Linux OS can be loaded with a browser. Another IP-STB choice is an Android-based IP STBs (see Fig. 3). These devices may typically be viewed on E-Bay. Also see the Google TV offering.

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Figure 1 Block Diagram of a Media Cable Modem Showing Media CM on Top and Home Video Consuming Devices on Bottom

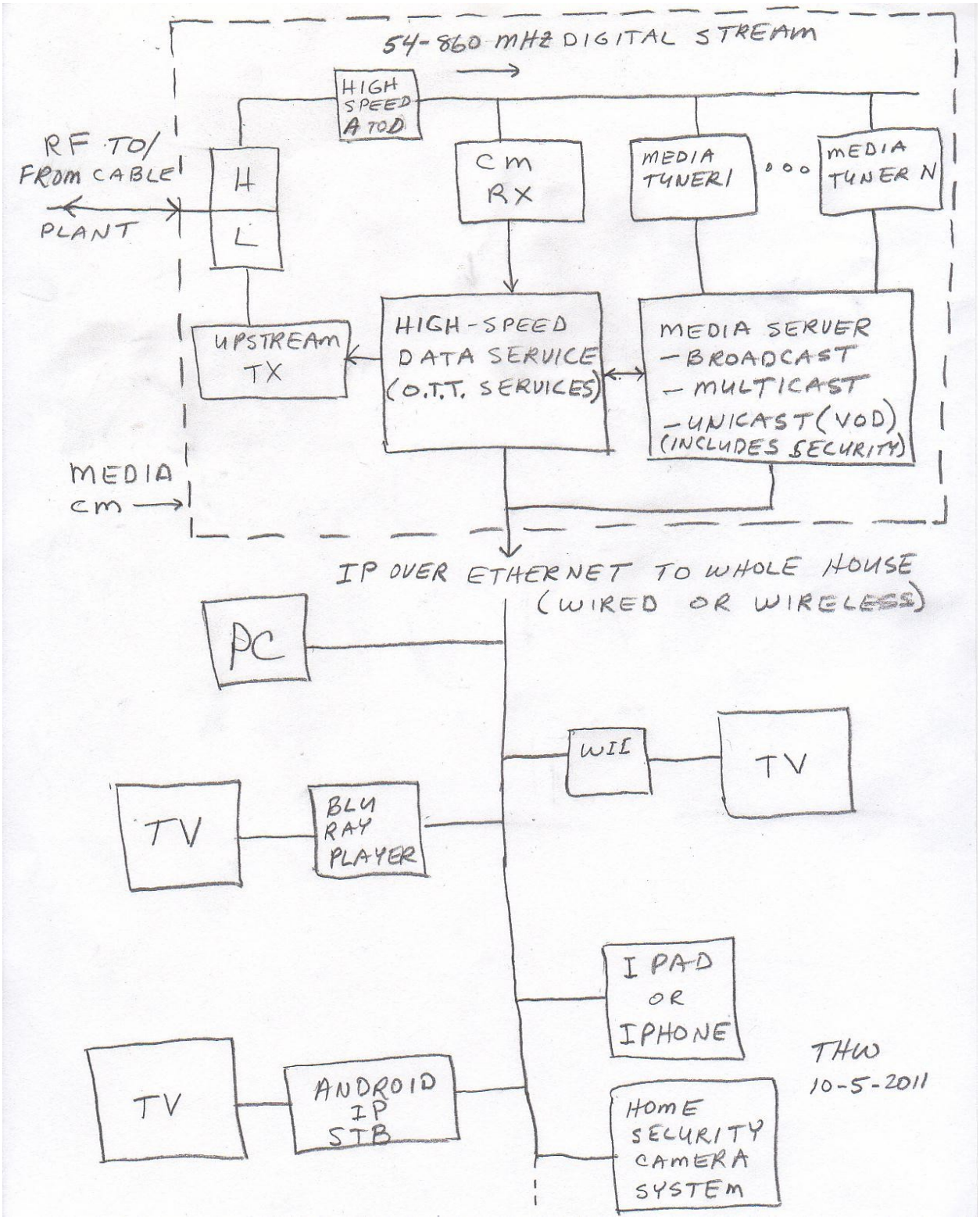

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Fig. 2 Amino Ethernet to Video Conversion Box

Description of Amino HD STB:

The A130 is a highly specified IP-STB offering service providers a cost effective means of delivering end-to-end digital HD TV as multicast, Video-on-Demand (VoD) and multi-room IPTV services. With high definition, and advanced codec support, it allows operators to maximize their revenues through advanced service features. Using the latest high-performance system-on-chip (SoC) generations, the A130 will continue to deliver the high performance required by the fast developing demands of the IPTV market. It is supported by a comprehensive ecosystem of middleware, browser and security applications.

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Fig. 3 Android STB

Functions of Android STB:

1. Support video formats include H.264, VC-1, Real Video, VP6, MPEG-1/2/4, DivX4/5/6, Sorenson, and Motion JPEG. Support various image formats as JPEG, BMP, GIF, TIFF, PNG, and RAW without size limitation. Support audio processing on MP3, WMA, WMV, AMR, AAC, OGG Vorbis, PCM/ADPCM, AC-3, DTS, and RealAudio.
2. Android 2.3 build- in.
3. Provide web browsing function.

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