

INVENTION DISCLOSURE

1. Invention Title.

Hybrid IP CableCARD

2. Invention Summary.

The present invention describes a IP enabled CableCARD™ that allows legacy CableCARD devices to operate without modification on a cable system that has been converted or is in the process of being converted from QAM to IP delivery. The invention considers both unidirectional and bidirectional CableCARD devices. Furthermore, the invention considers operation through a home gateway as well as through direct “cloud to ground” delivery.

3. Invention Description.

a. Describe the invention in detail.

The Hybrid IP CableCARD (HICC) provides a gateway function that allows a CableCARD host device to function without modification on a cable system that has been fully or partially converted to IP. The HICC supports two basic architectures for IP delivery – a “cloud-to-ground” architecture whereby content is delivered directly from the MSO’s network to the in-home client device and a gateway architecture whereby content is transmitted to an in-home gateway via QAM or IP and then delivered within the home using IP. When operating in a cloud-to-ground architecture, the HICC can support a plant that is not converted to IP – in other words, a plant that still uses only QAM delivery, a plant that is partially converted to IP (content is transmitted from the network to the home using both QAM and IP delivery methods), and a plant that has been fully converted to IP. When operating in a gateway architecture, the HICC receives IP delivered content from the in-home gateway and/or QAM delivered content directly from the plant. HICCs operating in both major modes – cloud-to-ground delivery and gateway delivery – may be present simultaneously in a home. In both major modes, the HICC decodes IP delivered content and presents it to the host device using legacy CableCARD formats. The control functions are proxied to the host device so that it is not aware that content is being received over an IP interface. For QAM delivered content, the HICC functions as a legacy CableCARD. Within the two major modes of operation, a HICC may either be a unidirectional or bidirectional device. A mapping function within the HICC allows it to discern whether a particular channel or on-demand program will be delivered via QAM or via IP.

In a preferred embodiment of the invention, delivered content would be received by the HICC over a WiFi interface. A HICC in such a configuration would contain a small antenna. This may be the most aesthetically pleasing design. Other possible IP interfaces on the HICC include, but are not limited to, Ethernet, MOCA, and DOCSIS.

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The attached document entitled “Hybrid IP CableCARD: Detailed Description” provides additional architectural detail regarding the described invention. In addition to the overall architecture patent, it is envisioned that individual patents or claims may be made that cover the address mapping function, the function that proxies for legacy head-end operation, the initialization and localization procedures (including local network connectivity, head-end localization, device authentication, and guide & channel map loading/updates), and the antenna design which allows a small antenna to protrude from the CableCARD slot.

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

The purpose of the invention is to provide a transition device that MSOs could use, if needed, to support legacy leased or retail CableCARD devices during and/or after a transition to IP. Some consumers will likely want to keep using their CableCARD devices (such as a Tivo) even though the MSO has begun or completed a transition to IP. Likewise, MSOs may want to retain some legacy CPE even though they are executing a transition to IP.

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

Primary customers for the invention would be MSOs and consumers who wish to retain legacy equipment in operation during or following a transition to IP. For MSOs the value of the invention could be quite high, as it can help to maintain customer satisfaction during a IP transition process, can preserve existing deployed capital, can reduce truck rolls, and could be used to satisfy CableCARD requirements should they still apply in an IP environment.

4. HOW is this invention different from existing products, processes, systems?

A similar concept was developed by the Alliance for Telecommunications Industry Solutions known as the ATIS-POD or APOD or VueKey solution. That standard describes itself as backward compatible with CableCARD standards:

“It achieves a physically separable security solution for IP-TV that is harmonized with and backwards compatible to the existing unidirectional and multi-stream, CableCARD™ standards.” [Quoted from Abstract section of V12R2, approved April 25,2008]

With the APOD an important distinction exists in the purpose of backward compatibility that distinguishes the present invention. In the case of the APOD, an entirely new Host device is necessary which conforms to additional requirements in the APOD specification. In the case of the present invention, the value derives from enabling existing host devices to work without any modification by only exchanging the CableCARD. This difference in approach makes the APOD solution insufficient to enable access to IP video services with legacy CableCARD receivers (Host devices).

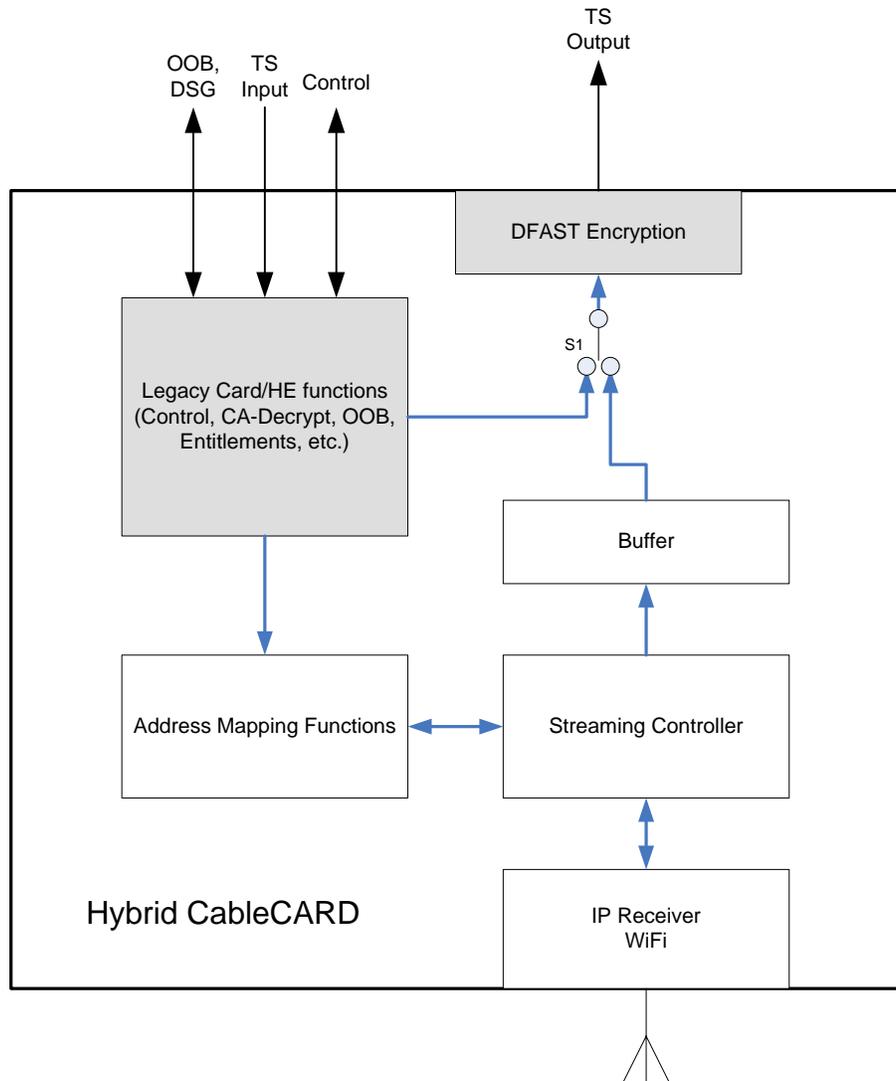
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The present invention improves upon the APOD specifications in several important elements:

- 1. The HICC adds the IP receiver function and associated interface (antenna) to the CableCARD (this function is part of the Host device under the APOD approach).*
- 2. The HICC adds the stream management and buffering functions necessary to handle adaptive bit-rate streaming to the CableCARD (this function is part of the Host device under the APOD approach).*
- 3. The HICC adds a mapping function to the CableCARD that enables traditional channel maps for QAM services to be mapped to IP addresses thus enabling operation in hybrid QAM/IP systems. (There is no comparable function in APOD system.)*
- 4. The HICC preserves all the traditional CableCARD functionality and adds a switching function, controlled by the mapping function, which enables seamless integration between IP and traditional QAM delivery in a hybrid environment.*

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Hybrid IP CableCARD: Detailed Description



The legacy functions of the CableCARD are shown in the grey boxes. The additional functions are illustrated with the white boxes along with S1 in the figure above. The IP Receiver function provides the WiFi interface and IP-control functions to connect to the local network and the internet. The Streaming Controller provides the stream-management functions and maintains the manifest files. This stream management function derives the necessary IP addresses for the content from the Address Mapping Function, which translates the legacy channel map info into IP address for the streaming content through a look-up table which is downloaded via the IP channel. The video chunks from the Streaming Controller are reassembled into MPEG2 TS in the Buffer stage. The Address Mapping Function also controls S1 to determine if the legacy MPEG stream or the IP stream is selected to feed the legacy DFAST Encryption circuit by monitoring the selected channel to enable hybrid operation with some legacy QAM channels and other IP streaming channels. In the case of IP operation, the legacy card/HE functions run in a proxy mode to simulate QAM operation for the host device.