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## Introduction

With an average of 2-3 TV sets in every home and a growing number of portable media devices, consumers expect to receive TV channels and services on any device in a seamless way.

In the recent past and still today, TV home distribution is successfully supported with analog TV signals over coax cables which are commonly installed in most western countries.

As opposed to analog TV, digital TV home distribution represents a difficult problem to solve, not well addressed today, due to the bandwidth increase, the physical media, and content protection.

The bandwidth increase stems from High Definition (HD) or 3D HD and soon to come Ultra-HD resolution. A physical media should carry multiple high bandwidth continuous channels and finally, as the signal is digitalized, the content should be protected along the whole transport chain by advanced crypto engines.

In this white paper, we present analog TV home distribution using RF modulators devices prior to highlighting the challenges of digital video distribution.

## Analog TV Home Distribution

Despite the emergence of digital TV, there are still many legacy analog TV sets in the house. These TV sets have been connected via an analog signal distribution using RF coax cable since the early days of television. The RF analog modulation is an efficient and robust solution for video home distribution.

RF modulation consists of modulating the analog TV signal in the UHF/VHF range, using PAL, SECAM or NTSC encoding standards.

RF modulation offers the following - advantages:

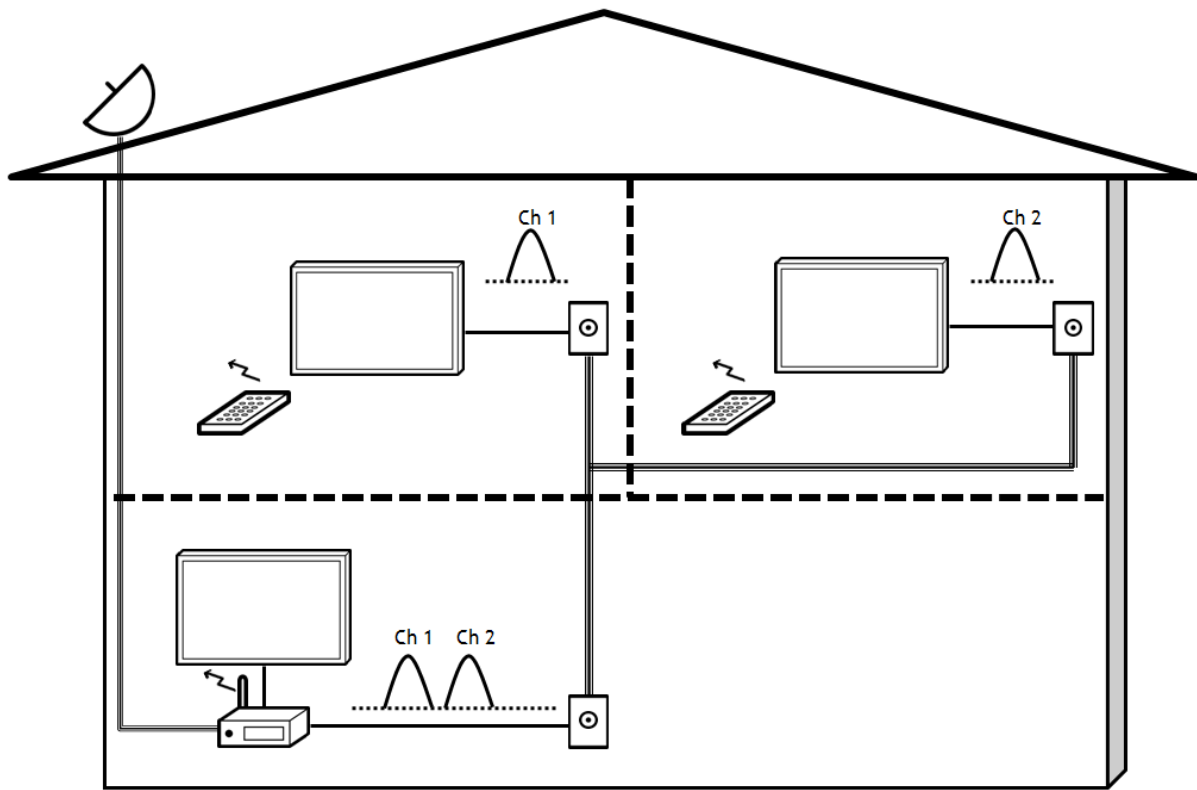
- Compatible with billions of TV sets deployed worldwide
- Low cost with no need of additional Set-Top-Box (STB)
- Ease of use with simple cable connection to the plug
- Scalability to many TV sets in the home

As opposed to digital technology, the distribution of analog TV does not require a stringent content protection mechanism, thus keeping the system very simple and transparent to existing Consumer Electronic (CE) devices.

The Abilis product portfolio includes a family of programmable RF-modulators that support PAL, SECAM, and NTSC standards. Applications for RF modulators include universal video interface to TV sets (CRT and flat-panels), Digital Transport Adapter (DTA), and home distribution.

The figure below shows a typical analog home distribution network with coax cables, for the re-distribution of a premium service to different rooms with a single main STB.

# Good old analog TV home distribution goes digital



**Figure 1: Home analog based distribution system over coax cable**

The main STB centralizes the home distribution TV sources and performs all the conditional access operations to decrypt the signal and correctly decode audio and video signals. For each TV set in the home the main STB has a specific decoding and modulation link.

The RF modulator's outputs are combined on a RF coax cable in order to be re-distributed to the other rooms in the home. Each TV is set to a specific RF channel and the user has a dedicated remote control that communicates with the main STB to perform standard operations. The return path is generally done on ISM bands (typically 433.05-434.79 MHz or 902-928MHz) with off the shelf remote controllers.

This solution allows the distribution of TV content and services to any TV sets in the house without breaking the security along the transmission chain. It represents a cost effective solution as on the client site, no additional specific hardware box is required. Additionally, the main receiver can supply extra added value features like PVR, IP content, catch-up TV.

This analog TV home distribution solution is used by satellite or IPTV operators where the single access point does not allow easy multi-screen deployment.

## Challenges of digital video distribution

As stated in the introduction, the main challenges of digital home distribution are increasing bandwidth, physical transport media, and content protection.

In order to distribute digital content, a TV distribution system should be capable of delivering high bandwidth signals carrying High Definition (HD), 3D or the new Ultra-HD for multiple concurrent streams. This means ensuring high Quality of Service (QoS) at greater than 100Mbps, error free, and with continuous video streams distribution.

Many physical transport media have been used today, but none are fully meeting the requirements of the next digital home distribution needs. Basically, three approaches are being developed, the no-new-wire, the wireless and new-wire.

The no-new-wire focuses on using existing cable network such as coax, phone, and or power lines. Industrial efforts resulted in standards such as MOCA, HomePlug or G.hn. The wireless effort is mainly on WiFi, overcrowded unlicensed band, 60GHz technologies limited to point to point or recently the white space spectrum freed by the FCC in the USA. The new wires camp is counting on the adoption of 1 Gbps Ethernet cables or low cost fiber based on Plastic Over Fiber (POF) cables.

We are of the opinion that only wire technology would meet the requirements for high quality digital distribution whereas wireless technology would address portable, lower resolution devices. The white space spectrum could meet the requirements but it is location dependent and today only released in the USA.

Content protection is of major concern when it comes to digital TV distribution. In the media industry the content providers are fighting against piracy and internet sharing to keep their added value business and avoid the "bit-to-bit" copy problem. In the digital home distribution, end to end security must be ensured which requires advanced crypto techniques. The industry has tackled the content protection problem for many years and has established standards for securing video packets, such as DTCP-IP or Digital Rights Management (DRM) schemes.

Digital Home distribution is challenging and the media industry has still to provide technological solutions for a seamless, high quality service to the consumers.

## Conclusion

The analog video home distribution based on RF modulation is a cost effective, truly universal and readily available solution. Abilis provides the key technologies and products, with the world leader RF modulator product portfolio, for analog home distribution.

Digital home distribution has technological challenges for supporting high bandwidth, high quality distribution while ensuring content protection. Today, most solutions deployed do not fully meet the stringent requirements of high quality digital video distribution and the industry is actively developing solutions converging through standardization efforts.

Abilis is developing technologies and products for digital home distribution, particularly on bridging broadcast to broadband, providing last generation digital receivers, while addressing access and content protection.