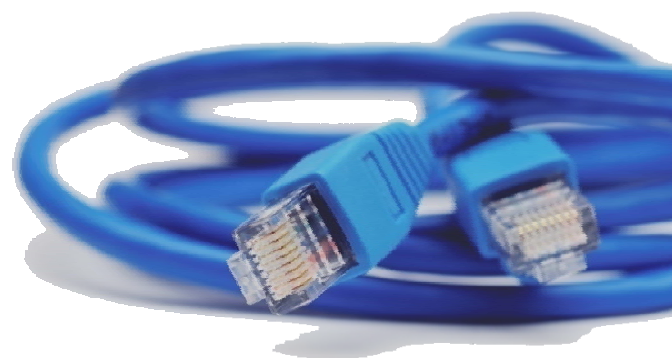# [THE NEED FOR UNCOMPRESSED HOME NETWORKING]

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HDBaseT – The ultimate uncompressed solution

Introduction

Clearly, wired home networking technologies are everywhere. MoCA is using coax, HomePlug rides over power lines, HomePNA is using telephone lines and G.hn claims to be able to work with all infrastructures. Some are more popular in North America and some in Europe, some provide more bandwidth and some offer more reliability, but all of them can fall into the category of compressed networking technologies. Sent over coax, power, telephone lines and more, most existing technologies lack the bandwidth to support uncompressed, full high-definition (HD) content and require some level of compression.

This raises the question: Why is uncompressed necessary? If the video arrives to the home in a pre-compressed form, why not deliver it to the TV or projector in the compressed format?

The short answer: An uncompressed interface is the only way to provide a universal video interface which can support all video sources–legacy, new and future. Whereas, a compressed video interface has very limited applications since compressed video is rarely provided at the output of video sources.
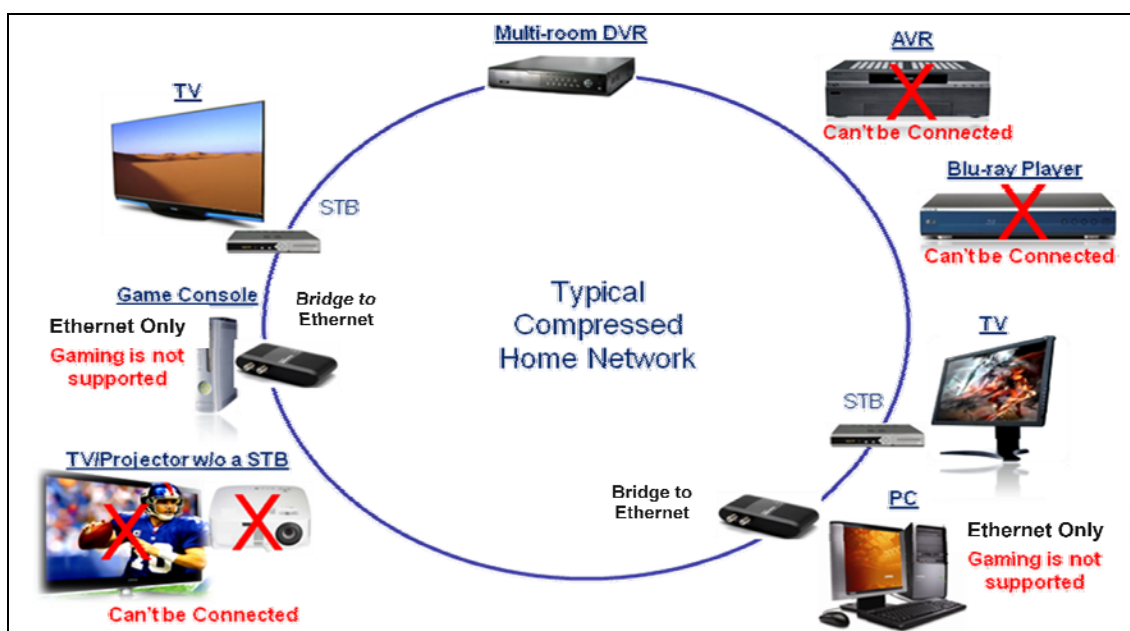

Figure 1: Limitations of a Compressed Network

MOCA, Home Plug and G.hn are used for connections between set top boxes (STBs) and for distributing Ethernet over different infrastructures. While this concept answers the need of the service providers and operators, it is still far from the vision of an ideal whole-home network. The

vision is a self-installed network that allows you to connect all your consumer electronics devices together, including all video sources whether they are legacy devices or new.

HDBaseT, the first technology to enable 5Play™ convergence, sending *uncompressed* HD video, audio, Internet, controls and power over a single, long reach cable, enables a network connecting game consoles, PCs, storage devices and STBs to various TVs and projectors around the home. HDBaseT also supports multi-room distribution using a multi-room DVR without the need for complex remote client STBs.

Advantages and Disadvantages of a Compressed Network

A compressed network has both its advantages and disadvantages.

Advantages of a compressed network:

- Requires less transmission throughput:
    - Can utilize existing, non-dedicated cable installations (CATV/DBS/IPTV coax cables, phone lines, power lines) and wireless solutions
    - Can support more streams per link, bi-directionally

Disadvantages of a compressed network:

- Real-time, low-latency, high-quality, deep-compression encoding and trans-coding is not cost effective thus a compressed network cannot support:
    - The huge (and growing) install base of uncompressed-only-output consumer electronics (CE) source devices (i.e. game consoles, Blu-ray players, etc.)
    - Existing and new devices which generate on-the-fly, interactive HD-audio and video (AV) (game box, PC, electronic program guides (EPG) and rich custom GUI overlays)
- Large variety of compression methods, profiles and levels exist
    - Decoder must match the encoder's exact method, profile and level
    - TV hardware infrastructure must provide scalability for future methods (pre-paid cost for future needs)
    - TV must support frequent decoder software downloads

The Compressed vs. Uncompressed Debate

The debate about compressed vs. uncompressed in video connectivity resembles a similar debate about HDMI vs. IEEE1394 (i.e. FireWire). FireWire was the first attempt to provide a digital connection between digital source and digital displays and seemed to have all that was needed to become the dominant industry standard for connecting HD video sources to displays.

Although it had moderate success in digital video cameras and PC accessories, FireWire encountered extreme pushback based on its delivery of compressed video and in turn never took off as a mainstream HDTV video interface.

Many display manufacturers chose not to use it because it required an additional codec and there was no easy way to bridge legacy analog uncompressed video outputs and FireWire.

Many years later, a new digital video interface was introduced to the CE world, HDMI. This interface was an immediate success in the CE world because it was based on uncompressed video as opposed to compressed video connectivity. The uncompressed interface made interoperability much simpler and content providers not only endorsed the new standard, but also encouraged its use in CE devices.

A similar debate exists today in home networking, and although an uncompressed interface is key, the need goes well beyond compressed vs. uncompressed into requirements regarding extended length, enhanced feature support, reduced cable clutter and lowered installation cost. All technologies, but one, fail to provide an adequate solution that can answer *all* of these needs.

HDBaseT, a new uncompressed, wired home networking technology is challenging the dominance of compressed and uncompressed technologies alike and overcoming the prominent home networking challenges facing manufacturers, installers and consumers.

	Uncompressed	Compressed
Cost	HDBaseT supports real time, high quality content over a single low cost cable	Real-time, low-latency, high-quality, deep-compression encoding and trans-coding is not cost effective
Performance	Supports the large and growing install base of uncompressed-only-output CE source devices	Cannot support the uncompressed-only-output CE source base
Interoperability	Interoperability is simple and content providers encouraged its use in CE devices	Large variety of compression methods, profiles and levels exist: – Decoder must match the encoder's exact method, profile and level – TV hardware infrastructure must provide scalability for future methods (pre-paid cost for future needs) – TV must support frequent decoder software downloads
Interactive AV Support	Inherent	Cannot support devices which generate interactive HD-audio AV (game box, PC, electronic program guides (EPG) and rich custom GUI overlays)

Figure 2: Compressed vs. Uncompressed Technologies

The Benefits of HDBaseT

HDBaseT is the first technology to enable 5Play™ convergence–video, audio, Internet, high-power and controls–and allows the home network to cut the cables down to one, all-inclusive, long-reach LAN cable using the standard RJ45 connector, commonly known for Ethernet LAN connections.

HDBaseT supports TV and PC video formats including standard, enhanced, high-definition and 3D video, and also supports all standard audio formats.

HDBaseT delivers Full HD/3D and 2K/4K uncompressed video to a network of devices or as a point-to-point connection. Uncompressed content supports all video sources, including legacy products, accurately renders gaming graphics and features such as EPGs, and does not degrade video quality or add latency.

HDBaseT supports 100Mb Ethernet capabilities, enabling televisions, hi-fi equipment, computers and other CE devices to communicate with each other and access multimedia content, including video, pictures and music stored around the house. All existing home networking methods have native bridges to Ethernet, therefore, can continue to work seamlessly over the HDBaseT network. This enables a smooth transition path where HDBaseT can be utilized incrementally over the existing solutions with full, backward compatibility for legacy applications. The combination of uncompressed networking and Digital Living Network Alliance (DLNA) over the same HDBaseT network enhances the user flexibility by providing an over-the-network path for routing rendered video streams from a Digital Media Renderer (DMR) to non-DLNA TVs (shared DMR).

Driving power over the same CAT5e/6 cable gives people the option to forego plugging devices into the wall outlet for power, allowing greater mobility. HDBaseT can power remote TVs and other devices up to 100 watts, meaning a certified electrician is no longer required for wall mounted installations; a regular installer can finish the job on the spot.

HDBaseT delivers various types of control signals for various purposes, from CEC, to RS232/USB and IR that operate remote equipment even when located in a different room.

All-in-one Single Cable Connectivity

While the typical TV is equipped with multiple connectors of different types, HDBaseT enables connectivity with a variety of video sources through a single connection, supporting a large and growing number of use cases.

An HDBaseT connection to the TV is needed in the following cases:

- When the TV is mounted on the wall to promote invisible connections–Installation is simplified and less expensive given the single cable installation requirement which also supplies power, removing the electrician from the process

- When the video source boxes are located far from the display–100m cable lengths can send features to a TV located rooms away

- When the video source boxes are shared over a network–HDBaseT enables each source box to be connected to multiple displays

- In commercial installations such as corporate, education, hospitality digital signage and others, where there's a need for performance over longer distance, ease of installation, reliability, flexibility and low cost of installation, without compromising on quality

In all of the above cases a single AV connection is ideal. HDBaseT also promotes cost effective, real-time, low-latency, uncompressed transcoding to be performed when needed at the network attachment points (i.e. switches, bridges), supporting the large variety of legacy sources.

When connected over a long-distance the display's single AV interface would also provide a bi-directional return control channel, enabling the user at the display's location to control the remote sources using IR, USB or CEC. Power delivery over the same interface completes the offering as a true all-in-one display interface.

HDBaseT: The AV Connectivity Solution for All Players in the CE Industry

With support from consumer electronics manufacturers, content providers and organizations, HDBaseT is revolutionizing the multimedia distribution of uncompressed HD multimedia content in the home entertainment environment via a single LAN cable.

HDBaseT technology is the industry's most advanced, cost effective, easy to use, all-in-one solution for whole-home converged distribution of HD multimedia content, with inherent support for the huge install base of uncompressed CE sources and real-time interactive devices.