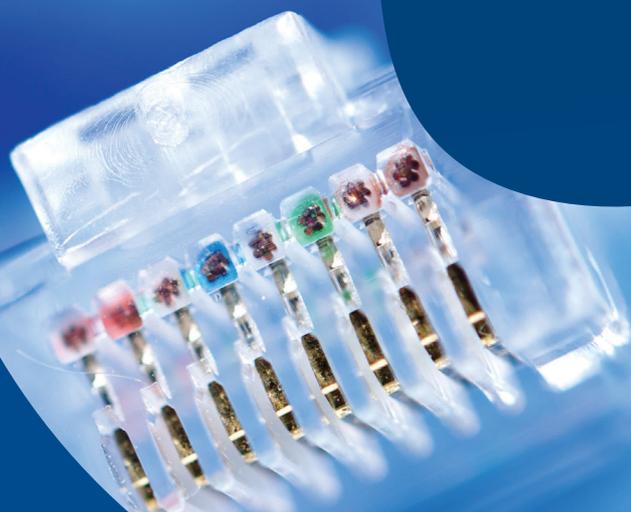


Dissecting Interoperability for HDBaseT Projects



White Paper
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Executive Summary

Interoperability is a hot subject whenever a complex system is involved. Interoperability is defined as the ability of systems and equipment to work together. Once two devices are interoperable, they can share information and data seamlessly.

Without interoperability, complementary equipment (say, an AV receiver and a display) will not work together, and will not produce the desired results. This can cause many hours of frustration and unnecessary work, not to mention excessive costs and sometimes less-than-optimal solutions.

The goal of this paper is to look at the concept of interoperability as it relates to the HDBaseT standard, and how installers and integrators can guarantee overall system interoperability by following a few steps. By making sure equipment is interoperable, installers and integrators can save time, money and face vis-à-vis their customers.

Interoperability provides many benefits, not only to the vendors themselves (for example, guaranteeing that a new generation product will work seamlessly with an older generation one), but mostly to the installer, integrator and end user. It provides a freedom of choice among brands and among product types. This freedom of choice promotes competitiveness, which translates into better pricing and more options.

It also means that expansions and additions become easier and more straightforward, as not only different vendors' equipment but different generations can be interwoven in any system, new or otherwise. Interoperability also reduces overall costs, as less equipment and less adaptors are needed, and the same infrastructure can be used for the whole system. Another benefit of interoperability is ease of management and maintenance over time, as interoperability can reduce integration and operational complexities.

Although some stakeholders may argue against the need for interoperability (having in mind company-specific economic interests), the goal of the Alliance is to promote industry-wide HDBaseT interoperability. Such an interoperable ecosystem is beneficial to the whole market and all end users.

The Concept of Interoperability

In terms of an HDBaseT installation, interoperability is crucial as there is an increasingly large number of HDBaseT-enabled products, all featuring some or all of the 5Play feature set that characterizes the technology: audio/video, controls, Ethernet, USB and up to 100W of power.

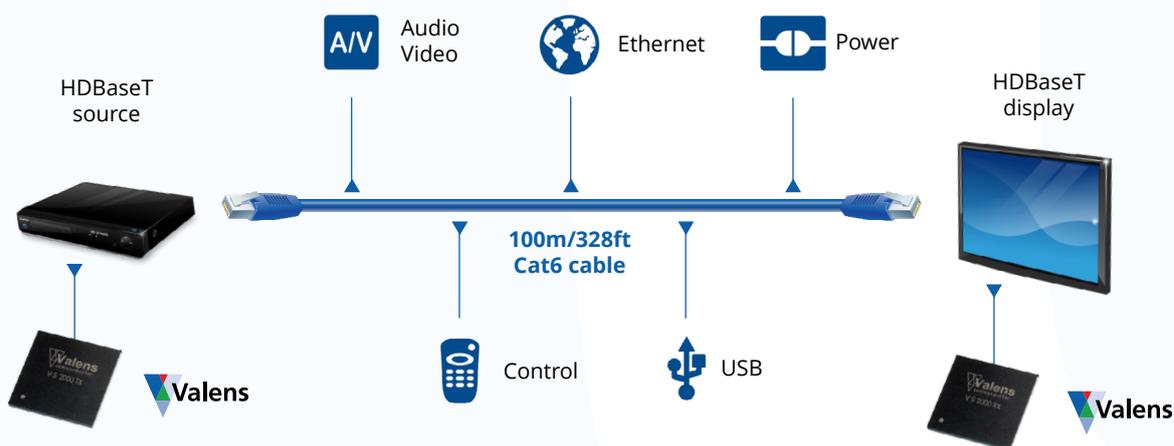


Figure 1: HDBaseT 5Play Features

Interoperability is not necessarily an all or nothing affair. Products can be interoperable for some features and not for others. Of course, this puts the burden on the installer, integrator or end user: it is a matter of reading the fine (and not-so-fine) print to determine interoperability. Sometimes this may be a daunting effort, but it can save hours of unnecessary work and thousands of dollars.

HDBaseT, Certification and Interoperability

HDBaseT technology was introduced in 2010, and since then has become the de-facto connectivity standard for the pro-AV and consumer electronics market, as an increasing number of installers and integrators recognized the technology's benefits for digital connectivity.

HDBaseT enables all-in-one transmission of ultra-high-definition video through a single 100m/328ft Cat6 cable (or several kms of fiber,) delivering uncompressed 4K video & audio, USB, Ethernet, control signals, and up to 100W of power – what we call the 5Play feature set. HDBaseT is the only technology in the market today that allows for the transmission of all these features over one single cable, and over these distances, which explains the rapid adoption and ever-increasing popularity.

The HDBaseT standard is defined by the HDBaseT Alliance, a cross-company, global organization whose goal is to advance and promote the adoption of HDBaseT as the global standard for ultra-high definition, digital connectivity. Member companies are entitled to adopt the standard in their products, and commercialize them, after receiving certification from the Alliance's Recognized Testing Facility.

In 2011, the Alliance introduced the HDBaseT Certification Program, with the goal of promoting standardization and product compliance with the HDBaseT specifications. The certification process involves testing of the products against a Golden Unit, to verify proper operation and feature functionality. The Golden Unit is a device used as a comparison reference for HDBaseT products, based on the 5Play evaluation kit. The Golden Unit can simulate several different HDBaseT scenarios. Once certified, products can display the HDBaseT logo.

1. Pre-certification Product



2. Certification Process



3. HDBaseT-certified Product



Figure 2: The Certification Process

Are all certified products interoperable with each other?

No. And that's where the confusion starts.

Certification and interoperability are two related, but distinct concepts. Certification only ensures compliance to the HDBaseT standard, i.e., it verifies that some, or all, of the product's features were implemented according to the HDBaseT specifications. However, not all HDBaseT-certified products support the full 5Play feature set, or are certified for all features. Certification is the first step towards interoperability, but definitely not the only step.

The HDBaseT 5Play... or 4, or 3 or 2?

As we explained above, HDBaseT supports the transmission of the 5Play feature set: audio & video, controls, Ethernet, USB and power. However, manufacturers have the option of implementing one or more of the 5Play features. That means that some products may be certified for audio & video only, while others can be certified for audio & video and control. And others may be certified for the full 5Play feature set.

Each manufacturer can decide which of the 5Play features it wants to implement into which products. Although this can cause some initial confusion, it is still the most flexible and cost-effective way to promote the adoption of the standard. Some pundits in the industry have suggested that the Alliance should mandate full 5Play implementation, but that would have not worked to the benefit of the industry as a whole.

It has also been suggested that the Alliance should create specific certifications to account for these differences – so we would have 2Play or 3Play products. However, there are many possible configurations on the possible “plays,” which would lead neither to more clarity nor to interoperability. For example:

- Product A supports and is certified for AV and IR control. Product B supports and is certified for AV and CEC control. Both of them support three features, but although they may be interoperable for audio & video, they will not be interoperable for controls.
- Product A supports and is certified for AV, IR control, and Ethernet. Product B supports and is certified for AV, IR control, and USB. Neither Ethernet nor USB will work, even though both products are certified for three features of the 5Play, since they are not the same three features.
- Product A supports and is certified for AV, and supports but it is not certified for CEC. Product B supports and is certified for AV and CEC. The products may or may not be interoperable, as Product A's support for CEC has not been implemented according to the HDBaseT specification.

There are numerous scenarios for this, and while some are related to the HDBaseT standard, many are not (as is the case of the last bullet). In addition, manufacturers may add other features that are not HDBaseT-related that may prevent the product from interoperating with others. Sometimes this is unintentional, as they add attractive features to customers, and sometimes is done intentionally so as to lock in customers to their brand. Again, the HDBaseT Alliance has no control over this, as the products still implement the HDBaseT standard as specified.

Towards HDBaseT Interoperability

Despite the complexities involved with interoperability, it is clear that the benefits outweigh any concerns, and it is a goal of the Alliance to promote interoperability of HDBaseT-certified products. As such, the Alliance created the Certified Product List. The list has two main purposes:

1. Provide a centralized, independently-maintained and updated list of all HDBaseT-certified products; and
2. Promote interoperability by providing a transparent list of all features supported by each certified product.

The Certified Product List includes all products that have been successfully tested in an HDBaseT Alliance Recognized Testing Facility, listed according to the features they support (including whether it is an HDBaseT Class A or Class B product¹, Ethernet, control (IR Type A or B, CEC, RS232), and power².

In practical terms, it means that an installer must first check whether the products in consideration are certified by the Alliance, through the HDBaseT logo and by checking in the Certified Product List at http://hdbaset.org/products_list. Because the Certified Product List contains a detailed list of features supported, the installers can then verify whether two (or more) products support and are certified for the same features. The list also lists maximum resolutions, and can be sorted by product type, by manufacturer, and by features supported.

Figures 3, 4 and 5 show some examples of how the List can be used to eliminate uncertainty about certification.

Manufacturer	Product Category	Product Name	HDBaseT Class	Max Resolution	IR Transmitter	IR Receiver	Features
	Matrix	VS1818T	Class A	4k2k			CEC
	Matrix	AT-PR02HD1616M	Class A	1080p			RS232
	Matrix	C4-8x8HDMI/VSW-B	Class A	1080P			Ethernet RS232
	Matrix	DMPS-100-C	Class A	1080p			Ethernet PoE/PoH
	Matrix	CMSI-8H8CVE	Class A	1080p	Type B	Type B	Ethernet IR RS232
	Matrix	LT2020E System	HDBaseT	1080P	No	No	Ethernet
	Matrix	HDBaseT Input Card OW16 TPI	Class A	1080P			RS232 PoE/PoH

Figure 3: Looking for HDBaseT-certified Matrixes

By selecting Matrix under Product Category, installers and integrators can see the full list of all manufacturers and the relevant matrixes that are HDBaseT-certified.

¹ HDBaseT Class A supports all 5Play feature set over 100m¹ category cable. Class B does not support Ethernet, and distances are up to 70m.

² Since USB is part of Specification 2.0 of the standard, released in 2013, it is not yet part of the Certified Product List. This will be added in the beginning of 2015, as new Spec 2.0 products hit the market.

Manufacturer	Product Category	Product Name	HDBaseT Class	Max Resolution	IR Transmitter	IR Receiver	Features
NEC	Display	SB-07BC	Class A	1080P	Type B	Type B	Ethernet IR RS232
ORION ORION CO., LTD.	Display	OLM-5520X	Class A	1080p			Ethernet RS232
Panasonic	Display	TH-50LFB70	Class A	1080p			Ethernet RS232
TPV VISION INNOVATOR	Display	OPS module - HDBaseT Receiver for BDL4271VL Display	Class A	1080p	No	No	IR

Figure 4: Looking for Displays that Support IR and RS232

When choosing displays, installers and integrators can choose the control protocol, in addition to choosing whether either IR or RS232 is acceptable, or both should be certified (by selecting the “any of selected features” or “all selected features”).

Manufacturer	Product Category	Product Name	HDBaseT Class	Max Resolution	IR Transmitter	IR Receiver	Features
Integra.	AV Receiver	DTR-60.5	Class A	4k2k			
Integra.	AV Receiver	DHC-60.5	Class A	4k2k			

Figure 5: Checking all Certified AV Receivers from a Specific Manufacturer

Another option is to check all AV Receivers from a specific manufacturer that have been certified by the Alliance. The list is comprehensive and constantly updated.

A final point regarding interoperability: Because vendors may have added other features that are not HDBaseT-related and yet may prevent it from interoperating with another one, it is paramount to check the vendor's collaterals for any disclaimers regarding the desired functionality that may prevent it from working with another vendor's products.

- 1  Logo
- 2 Certified List
- 3 Vendor's Collaterals

Figure 6: The Interoperability Process

Non-certified, HDBaseT-logo-bearing Products?

Is HDBaseT certification mandatory?

Yes. According to HDBaseT Alliance bylaws, all HDBaseT-enabled products must be tested and certified before being released to the market.

Are there non-certified HDBaseT products that still bear the HDBaseT logo?

Unfortunately yes. HDBaseT is a fairly new technology, but it has grown to an unprecedented level of adoption in such a short time that it has made the HDBaseT Alliance's job of safeguarding compliance and certification almost impossible.

These are the HDBaseT growing pains. The Alliance is going out of its way to track all non-certified HDBaseT products, and bring them for certification. Our goal is to eliminate any non-certified HDBaseT product from the market. It will not be overnight, but we are confident that most manufacturers understand the importance of certification and, even more, of interoperability.

To avoid any issues with non-certified products, make sure to check the Certified Product List (http://hdbaset.org/products_list), which lists only products that have successfully passed the certification process. In case there any questions or uncertainty, please contact the Alliance at installers@hdbaset.org.

Conclusion

Interoperability is now a reality as HDBaseT systems grow and multiply in AV implementations. There are some basic steps that must be taken by installers to guarantee interoperability, namely checking the logo, establishing certification and features supported, and verifying manufacturers' collaterals.

These three simple steps takes out the guess work out of an HDBaseT project, and guarantee a cost-effectively and timely implementation as interoperability is concerned.

As more and more vendors implement HDBaseT in their solutions, it is critical for this information to be as transparent and as available as possible. The HDBaseT Alliance's goal is to make sure it is.