

Obonok Technologies

Blu-Wire[™] Series

USER MANUAL

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Notice

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Introduction

Obonok Technologies is dedicated to develop core technologies to enable the large-scale high-definition digital video switching, distributing and extending over a single CAT5e/CAT6 UTP cable. Obonok Technologies provides high-quality and reliable equipment based on its patent pending technologies to meet the needs of commercial, professional and consumer applications, from one-to-one extenders, one-to-multiple daisy-chainable distributors to non-blocking expandable large matrix video switches.

All Blu-Wire™ products use the same HDMI-over-single-UTP technology. All products in this product line are interoperable at the UTP level.

The HDMI signals are neither compressed nor buffered, so video quality is not degraded and no delay is introduced even when daisy-chained. It can extend 1080p with HDCP to 50 meters (164 feet) for each hop with single UTP cable.

Blu-Wire™ products provide very cost-effective solutions to distribute HDMI video and audio to ≈ 250 displays within about 300 meters (1000 feet) over UTP.

Blu-Wire Series Product Summaries

Blu-Wire T1 Single-port HDMI Transmitter

(Part number: HD-EX0101T)

- One RJ45 output
- One HDMI input
- One 12VDC input
- Fully HDCP-compliant
- Supports 1080p and WUXGA to 150 feet¹
- Supports 1080i and XGA to 150 feet¹



(Back side)



Blu-Wire R1 Single-port HDMI Receiver

(Part number: HD-EX0101R)

- One RJ45 input
- One HDMI output
- No power supply is needed
- Fully HDCP-compliant
- Supports 1080p and WUXGA to 150 feet¹
- Supports 1080i and XGA to 150 feet¹



(Back side)



Blu-Wire RD1 and RD1-XP Single-port Daisy-chain Receivers

(Part numbers: HD-EX0101RD, HD-EX0101RD-XP)

- One RJ45 input
- One HDMI output
- One RJ45 output
- One 12VDC input (only every 3rd receiver in chain needs power)
- One RJ-45 AUX port – for future support of USB, IR, RS-232 (RD1-XP only)
- Support 1080p and WUXGA to 100 feet / daisy-chain 5 times²
- Support 1080i and XGA to 150 feet / daisy-chain 8 times³



Front/Back Connections (RD1-XP)



Blu-Wire T4 Four-port Transmitter

(Part number: HD-EX0104T)

- One HDMI input
- One HDMI output
- Four RJ45 outputs
- One 12VDC input
- Fully HDCP-compliant
- Supports 1080p and WUXGA to 150 feet¹
- Supports 1080i and XGA to 150 feet¹



(Back side)



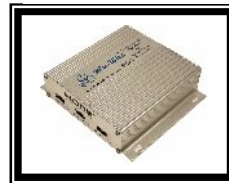
BW-RD3 and RD3-XP Three-port Daisy-chain Receivers

(Part numbers: HD-EX0103RD, HD-EX0103RD-XP)

- One RJ45 input
- Three HDMI outputs
- One RJ45 output
- One 12VDC input
- Fully HDCP-compliant
- Supports 1080p and WUXGA to 100 feet / daisy-chain 5 times²
- Supports 1080i and XGA to 150 feet / daisy-chain 8 times³



(Back side)



Notes:

1. CAT6 solid 24AWG cables are recommended. Obonok qualified CAT6 cables are preferred.
2. 5 times if qualified CAT6 cables are used. 4 to 5 times for other CAT6 solid 24AWG cables.
3. 8 times if qualified CAT6 cables are used. 6 to 8 times for other CAT6 solid 24AWG cables.

How to Connect Blu-Wire T1 and R1

1. Connect your source to BW-T1 through HDMI;
2. Connect your display to BW-R1 through HDMI;
3. Connect BW-T1 and BW-R1 through CAT5/CAT6 cable;
4. Connect the 12VDC power supply to BW-T1 and power on the source and display;
5. You should now see the picture on each display. If you do not see a picture, try unplugging and re-plugging the HDMI on BW-T1 or unplugging and re-plugging the 12VDC power on the BW-T1. Make sure the CAT5/CAT6 cable is connected.

How to Connect Multiple Displays with Blu-Wire T1, RD1 and R1

1. Connect your source to BW-T1 through HDMI;
2. Connect your display to BW-R1 through HDMI;
3. Connect your display to BW-RD1 through HDMI (can connect multiple displays to multiple BW-RD1);
4. Connect BW-T1 and BW-RD1 through CAT5/CAT6 cable;
5. Connect multiple (if more than one) BW-RD1s through CAT5/CAT6 cables;
6. Connect the last BW-RD1 to BW-R1 through CAT5/CAT6 cables;
7. Connect the 12VDC power supply to BW-T1;
8. Connect the 12VDC to each BW-RD1 (each only one BW-RD1 in the middle, power supply not needed);
9. Power on the source and display;

10. You should now see the picture. If you do not see a picture, try unplugging and re-plugging the HDMI on BW-T1 or unplugging and re-plugging the 12VDC power on the BW-T1. Make sure the CAT5/CAT6 cables are all connected.

How to Connect Multiple Displays with Blu-Wire T4 and RD3

1. Connect your source to BW-T4 through HDMI Input;
2. Connect up to three displays to BW-RD3 through HDMI;
3. Connect BW-T4 and (up to four) BW-RD3 through CAT5/CAT6 cable;
4. Connect multiple (if more than four) BW-RD3s through CAT5/CAT6 cables;
5. Connect the 12VDC power supply to BW-T4;
6. Connect the 12VDC to each BW-RD3;
7. Power on the source and display;
8. You should now see the picture on each display. If you do not see a picture, try unplugging and re-plugging the HDMI on BW-T1 or unplugging and re-plugging the 12VDC power on the BW-T1. Make sure the CAT5/CAT6 cables are all connected.

Features

1. Transmit HDMI signals (audio, video and HDCP) over a single CAT5e/6 UTP cable.
2. No need for special cables like STP or screened CAT6
3. Automatic compensation for cable length and no need for manual adjustment. (Auto EQ / auto gain.)
4. Patent-pending technologies (U.S. 6,0956,684 and U.S. 6,0968,046).
5. Extend high definition displays to 150 feet from the source at 1080p.
6. Extend high definition displays to 150 feet from the source at 1080i.
7. Support resolutions up to 1080p, WUXGA (1920x1200)
8. Support HDMI v1.3 and v1.2
9. Support HDCP 1.1

Specifications

1. Total Bandwidth: 4.8Gbps
2. Maximum resolution: 1080P/1920 x 1200
3. HDMI Connector: Type A 19 pin female
4. Link Connector: RJ-45
5. Power Supply: 12V DC
6. Power Consumption: 6 watts (max)
7. Operation Temperature: -15 c to 50C
8. Storage Temperature: -40 c to 85 C

LED's

The two LED's on the RJ45 connectors of the Blu-Wire models T1, R1, RD1, T4, RD3 and RD3-XP have the following meaning:

T1 Transmitter: Green (Right) = Power on, Yellow (Left) = Transmitting (It is always on the current version, and will change to indicate the HDMI source attached).

R1 Receiver: Green (Right) = Power On, Yellow (Left) = Receiving HDMI signals.

RD1 Receiver: (Yellow and Green will swap in the next rev)

RJ45-In: Yellow (Left) = Power On, Green (Right) Flashing = Receiving HDMI signals from transmitter; Solid = Display is attached to the RD1, EDID is validated, HDCP is active and working.

RJ45-Out: Yellow (Left) = Power On, Green (Right) Flashing = Transmitting HDMI signals to the downstream receiver; Solid = downstream receiver is attached to the RD1, EDID is validated, HDCP is active and working.

T4 Transmitter: All ports:

Green (Right) = Power On, Yellow (Left) Flashing = Transmitting HDMI signals to the receiver; Solid = Receiver is attached to the port, EDID is validated, HDCP is active and working.

RD3 & RD3-XP Receivers:

RJ45-In: Green (Right) = Power On, Yellow (Left) Flashing = Receiving HDMI signals from transmitter; Solid = Display is attached to the RD1, EDID is validated, HDCP is active and working.

RJ45-Out: Green (Right) = Power On, Yellow (Left) Flashing = Transmitting HDMI signals to the downstream receiver; Solid = Downstream receiver is attached to the RD1, EDID is validated, HDCP is active and working.

Troubleshooting

What Kind of CAT5/CAT6 should be used?

Solid core CAT5e/6/7 should be used. For resolutions greater than 1280x1024 or 1080i, Obonok Technologies recommends solid CAT6 cables. Obonok Technologies also has qualified certain cables; see below or refer to its web site for the latest reference list.

DO NOT use “soft” network jump cables with a stranded (multi-wire) core, which are designed for flexibility but do not carry the HDMI signal properly.

DO NOT use screened or shielded cable, unless tested in advance. With Obonok’s technology, there is a “built-in” resistance to outside electrical interference.

“Skew-free” cables, commonly used for analog video, are not recommended due to high levels of cross-talk.

Current qualified cables include:

- 1) Belden Home Choice (HC) 2510 Cat6
- 2) MicroConnector Cat6
- 3) Belden CDT 1872A E108998 Cat6
- 4) Shaxon E210587 Cat6
- 5) Superior Essex Cat6
- 6) Belden CDT 1583A Cat5e
- 7) Belden 7988R/P Bonded Cat5e
- 8) Systimax 1061C+ Cat5e
- 9) Siemon STP 11801 Cat7

Solid, bonded Cat6 recommended for 1080p or WUXGA applications

I’m getting no video on the display or one of the displays, what do I do?

First thing to check is to make sure the display supports the resolution by connecting the display directly to the source. (Note: if the direct connection does not work, then the HDMI connection of the display may have a problem or does not work with the source).

Other things to check include the CAT5e/CAT6 cable connecting the transmitter and receiver, the HDMI connections, and turning the power of the transmitter off and back on.

The best practice regarding the power up sequence is: power up the extenders, then the display/HDTV, then the source last. This eliminates possible problems with the source going into a “sleep” or “standby” mode before signal extension, which can cause miscommunication.

With some non-qualified CAT5e/6 cables, there may be a minimum 10m length required due to the Auto EQ function of the Blu-Wire Series.

It is possible that same-brand source and display applications may require the disabling of custom intra-brand communication, which may require extra bandwidth.

The picture blanks out sometimes, what do I do?

Blinking images result from loss of sync between the source and display. Try to lower the resolution to see whether it solves the problem. If it does, the CAT5e cables you are using cannot handle high resolution. You need to use the recommended CAT6 cables.

I'm getting a 4:3 image and/or no sound; how can this be corrected, and avoided?

This can be an issue when connected to some DVD players, especially when they go into sleep or standby modes and/or they are non-HDMI conforming. This is caused by the improper reporting of format information between the source and display.

There are two methods to "reset" the system and correct the issue:

- a) Disconnect the HDMI IN cable on the transmitter, wait 5 seconds and reconnect. This can be done a second time or third time if needed, without powering down.
- b) Power everything down, then power up all but the DVD source, then power the DVD source last.

To avoid the issue, you can either:

- a) Leave the Blu-Wire Series units powered up at all times (does not void the warranty).
- b) (If everything is powered down) - when powering up the connected system, supply power to the DVD source last.

Directly connecting a Blu-Ray source and HDTV works, but with the Blu-Wire T1 and R1 in between, it does not work. What is the reason and how can I solve the problem?

When T1 and R1 are used to extend the video from the source to the display, the source and the display will negotiate a proper video and audio format to use. Basically, the display will provide the EDID that indicates what kind of the capabilities the display has, such as

the max resolution (i.e. 1920 x 1080), the refresh rate (i.e. 60 frame per second, 24 frame per second, or interlaced 30 frame per second), the audio capabilities (e.g. Dolby 5.1), the video encoding scheme (RGB or YPbPr), and the pixel format (24-bit, 36-bit or 48-bit color depth). Required bandwidth depends on the format. For example, if the display can only support 1080i or 720p and stereo audio, then the aggregated bandwidth is only about 2.4Gbps.

However, if the format is 1080p at 60 frames per second with 48-bit color, in RGB encoding, plus 5.1 Dolby surround sound, the aggregated bandwidth will be beyond

10Gbps. With proper UTP cables, the Blu-Wire products are able to support about 4.8Gbps bandwidth that is the HDMI 1.2 standard color depth with 1080p/60 format. At reduced distances, 6.6Gbps bandwidth can be achieved, which can include HDMI 1.3 deep-color. However 10Gbps is beyond a UTP cable's capability. At 10Gbps, even directly

connected with HDMI cable, the cable needs to be special High-speed HDMI cable, and the distance should be less than six feet. So, when T1-R1 is between a standard HDMI display and deep-color video player, or between a deep-color display and standard HDMI player, the player will use standard 24-bit color, so that the system will work. However, if both source and display are 1080p/60 with 48-bit, RGB deep-color, the bandwidth will be beyond the capability.

To enable a deep-color source to work with a deep-color display, the player needs to be configured to use 24 frames per second, or limited to 36-bit color depth, or set to YPbPr instead of RGB, or set to 1080i.

For the Blu-Ray DVD, the cable/satellite STB, 48-bit color depth doesn't give any better video quality because the video content is highly compressed, and the actual color resolution is much less than 24-bit. Also, the original movie is taken at 24 frames per second. The 60 frames per second video is repeating the same image. So, to get most

effective results, set the video source to output the following formats:

- 1. 1080p/24, 24-bit (standard) color, RGB or YPbPr (best)
- 2. 1080i, 24-bit color (standard), RGB or YPbPr
- 3. 1080p/60, 24-bit color (standard), RGB or YPbPr
- 4. 1080p/24, 36-bit color, YPbPr

5. 1080i, 36-bit color, YPbPr
6. 1080p/24, 48-bit color, YPbPr
7. 1080i, 48-bit color, YPbPr
8. 1080i, 48-bit color, RGB
9. 1080p/60, 36-bit color, YPbPr (@ reduce distance)
10. 720p (all formats)

Directly connecting Blu-Ray and HDTV, or using Blu-Wire T1 and R1 product in between works, but not with Blu-Wire daisy chain products such as RD1-XP and RD3-XP. What is the reason and how to solve the problem?

As mentioned in previous answer, when source and display are connected directly or connected through our T1/R1 products, the source and display will negotiate a proper video and audio format to use. However, when the source and display are connected through our daisy products, a generic EDID is provided through our daisy chain products,

which will support the audio and video format from the source. In this case, if the HDTV connected with the receiver does not support that audio or video format, it will not work.

The solution in this case is either reconfigure the audio and video format of the source to whatever supported by the HDTV or switch to a HDTV that supports the Audio and Video format from the source.

Terminology

CAT5

Category 5 cable, commonly known as Cat5, is an unshielded twisted pair type cable designed for high signal integrity. The actual standard defines specific electrical properties of the wire, but it is most commonly known as being rated for its Ethernet capability of 100 Mbit/sec. Its specific standard designation is EIA/TIA-568. Cat5 cable typically has three twists per inch of each twisted pair of 24 gauge copper wires within the cable.

CAT5e

Similar to Cat5 cable, but is enhanced to support speeds of up to 1000 megabits per second.

CAT6

Similar to Cat5 cable, but is certified to support speeds of 1000 megabits per second.

HDMI

The High-Definition Multi-media Interface (HDMI) is an industry-supported, uncompressed, all-digital audio/video interface. HDMI provides an interface between any compatible digital audio/video source, such as a set-top box, DVD player, and A/V receiver and a compatible digital audio and/or video monitor, such as a digital television (DTV).

HDCP

High-Bandwidth Digital Content Protection - Created by Intel, HDCP is used with HDTV signals over HDMI and HDMI connections and on D-Theater D-VHS recordings to prevent unauthorized duplication of copy written material.

HDTV

High-Definition Television - The high-resolution subset of our Digital TV system. The ATSC defines HDTV as a 16:9 image with twice the horizontal and vertical resolution of our existing system, accompanied by 5.1 channels of Dolby Digital audio. The CEA defines HDTV as an image with 720 progressive or 1080 interlaced active (top to bottom) scan lines. 1280:720p and 1920:1080i are typically accepted as high-definition scan rates.

Warranty

Obonok Technologies warrants the equipment it manufactures to be free from defects in material and workmanship.

If equipment fails because of such defects and Obonok Technologies is notified within one (1) year from the date of shipment, Obonok Technologies will, at its option, repair or replace the equipment, provided that the equipment has not been subjected to mechanical, electrical, or other abuse or modifications.

Equipment that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of reshipment to the Buyer.

This warranty is in lieu of all other warranties expressed or implied, including without limitation, any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.

- 1 Proof of sale may be required in order to claim warranty.
- 2 Customers outside China are responsible for shipping charges to and from Obonok Technologies.
- 3 Copper cables are limited to a 30 day warranty and cable must be free from any scratches, markings, and neatly coiled.

The information in this manual has been carefully checked and is believed to be accurate. However, Obonok Technologies assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will Obonok Technologies, be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. The technical information contained herein regarding the Blu-Wire™ products features and specifications is subject to change without notice.

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