



Epson Wireless Presentation System Security White Paper

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1. Introduction

This document explains the security measures provided by the Epson Wireless Presentation System.

1.1. Purpose of this Document

The purpose of this document is to allow users to:

- understand the system configuration of the Epson Wireless Presentation System.
- check the Epson Wireless Presentation System security measures.

This document is intended for technical vendors, IT network managers, IT security professionals, and customers interested in the Epson Wireless Presentation System.

2. Epson Wireless Presentation System

Epson Wireless Presentation System allows you to perform simple wireless screen sharing, thereby eliminating cable clutter and frustration due to damaged or missing adaptors & cables. This system realizes high-performance wireless screen sharing with multi-user screen switching and an easy-to-understand user interface at a low cost.

This chapter explains the components of Epson Wireless Presentation System and provides system configuration examples.

For more information about Epson Wireless Presentation System, see the User's Guide.

2.1. Components

Epson Wireless Presentation System consists of the following software and equipment:

- (1) Epson Wireless Presentation(software)
- (2) Epson iProjection(software)
- (3) Transmitter
- (4) Receiver
- (5) Computer (connected to the transmitter)
- (6) Computer and smart device (execute Epson iProjection)

(1) Epson Wireless Presentation(software)

Epson Wireless Presentation(software) is software that runs on computers (Windows/Mac). It is provided in the transmitter's built-in storage. Epson Wireless Presentation(software) converts screen content on your computer into a transmitted data that can be transmitted to the network. Epson Wireless Presentation then transmits the data from the transmitter to the receiver over a wireless LAN (Wi-Fi).

Epson Wireless Presentation(software) does not require installation or administration privileges, nor does it access any content stored on the computer.

(2) Epson iProjection(software) * *This document covers Ver. 3.0 and later.*

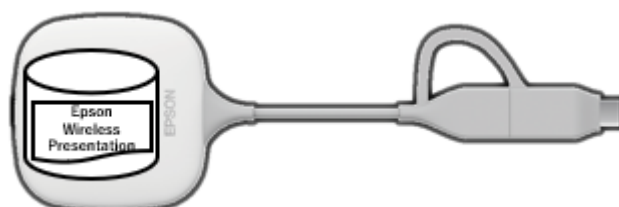
Epson iProjection is software that runs on computers (Windows/Mac/Chromebook) and smart devices (iOS/Android). In the same way as Epson Wireless Presentation(software), Epson iProjection(software) converts content on your computer and smart devices into a transmitted data that can be transmitted to the network. Epson iProjection then transmits the data to the receiver using your computer or smart device network functions.

For more information on Epson iProjection, see the Epson iProjection Operation Guide.

(3) Transmitter

The transmitter connects to the USB interface of your computer (Windows/Mac). Epson Wireless Presentation(software) is provided in the transmitter's built-in storage. The transmitter sends the transmitted data converted by Epson Wireless Presentation(software) to the receiver over a wireless LAN(Wi-Fi).

Figure 1 Transmitter



(4) Receiver

There are two models of receivers; a base unit and a supported Epson projector.

<Base unit>

When the receiver(base unit) is connected to a display that doesn't support the Epson Wireless Presentation System with a HDMI cable, images on the computer(Windows/Mac) connected to the transmitter, or a transmitted data sent from a computer(Windows/Mac/Chromebook) or a smart device(iOS/Android) that are running Epson iProjection(software), can be displayed.

Figure 2 Receiver (Base Unit)



<Supported Epson Projector>

If the display is a supported Epson projector, the function of the receiver(Base unit) can be built into it. The base unit model and supported Epson projector model receivers have the same function, to receive a transmitted data over the network. The base unit model and the supported Epson projector model are both described as “receivers” unless otherwise noted. Illustrations used show the base unit model receiver. Replace these with illustrations of the supported Epson projector model receiver if necessary.

Figure 3 Receiver (Supported Epson projector)



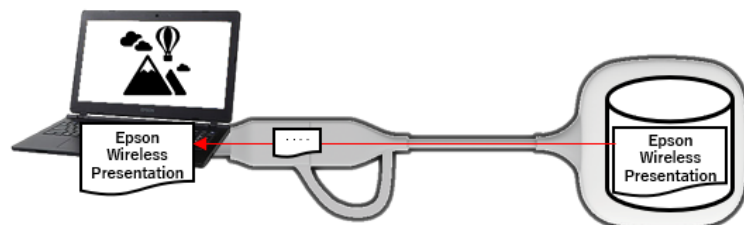
* The photo is an example image of the built-in receiver (base unit) function. The receiver (base unit) is not supplied with supported Epson projectors.

(5) Computer (connected to the transmitter)

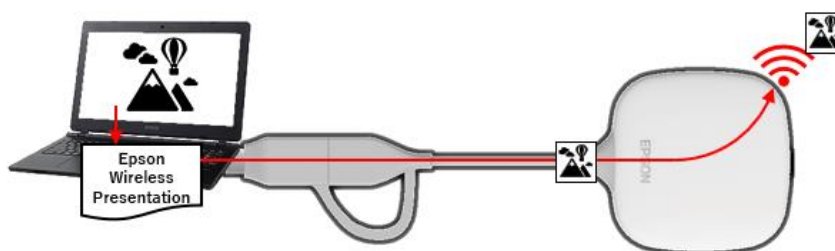
The computer (Windows/Mac) connected to the transmitter runs Epson Wireless Presentation (software) from the transmitter's built-in storage.

Figure 4 Computer connected to transmitter

(a) The computer (Windows/Mac) runs Epson Wireless Presentation (software) from the transmitter's built-in storage.



(b) Epson Wireless Presentation (software) converts content on your computer (Windows/Mac) into the transmitted data and transmits the data from the transmitter to the receiver over a wireless LAN (Wi-Fi).



(6) Computer and smart device (with Epson iProjection installed)

This is the computer (Windows/Mac/Chromebook) or smart device(iOS/Android) on which EPSON iProjection is installed. Epson iProjection converts the content on the computer or the smart device into transmitted data that can be transmitted to the network, and Epson iProjection transmits the data to the receiver using your computer or smart device network functions.

Figure 5 Computer with Epson iProjection installed

Epson iProjection converts content on your computer into transmitted data and transmits the data to the receiver over a wireless LAN (Wi-Fi) or wired LAN.



3. System Configuration Examples

Epson Wireless Presentation System can use two different system configurations, a local network and an infrastructure network, separately or at the same time.

- (1) Connecting to a local network.
- (2) Connecting to an infrastructure network.

(1) Local Network Connection

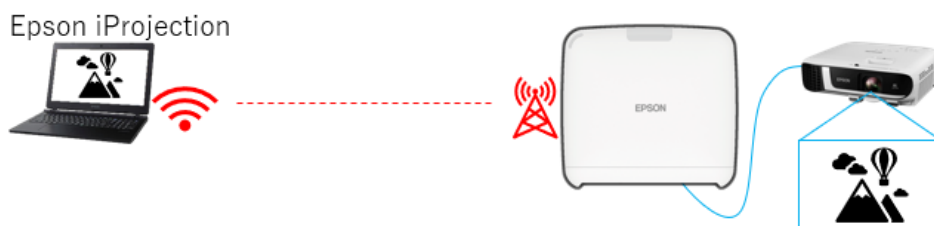
Devices such as, the computer (Windows/Mac/Chromebook) or the smart device(iOS/Android) on which Epson iProjection is installed, or the transmitter connected to a computer (Windows/Mac) operate as wireless LAN (Wi-Fi) adapters. These devices connect to a single receiver that acts as a Wi-Fi access point over a wireless LAN (Wi-Fi) to configure a local network connection. Local network connections are limited to wireless LAN (Wi-Fi) communications.

Figure 6 Local network connection

(a) Wireless LAN (Wi-Fi) connection between a transmitter connected to a computer and the receiver



(b) Wireless LAN (Wi-Fi) connection between a computer with Epson iProjection installed and the receiver

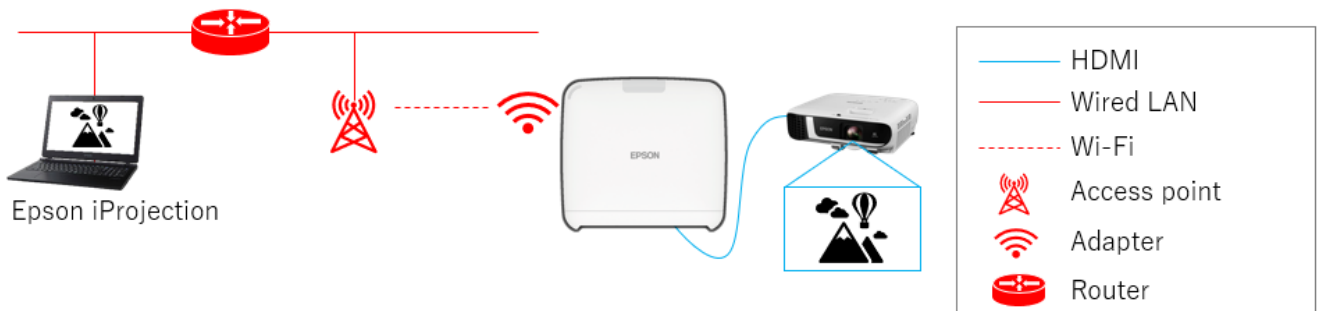


(2) Infrastructure Network Connection

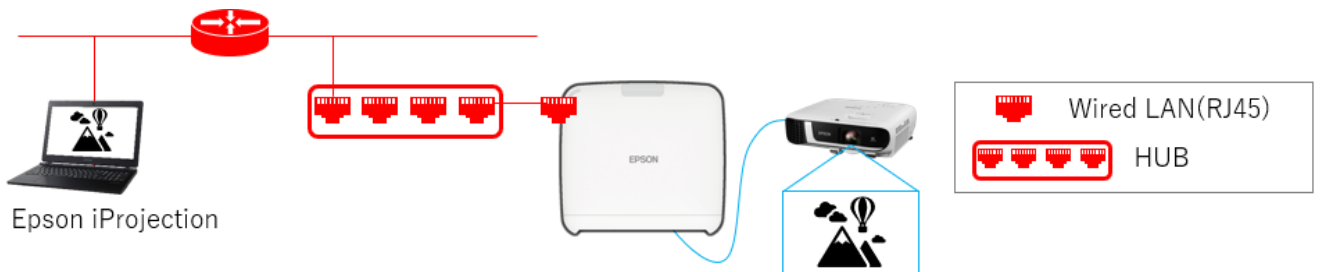
Devices such as the computer (Windows/Mac/Chromebook) or the smart device(iOS/Android) on which Epson iProjection is installed connect to the infrastructure network using a Wi-Fi access point or wired LAN hub. The receiver also connects to the infrastructure network. The computer or the smart device transmits a transmitted data to the receiver over the infrastructure network.

Figure 7 Infrastructure network connection

(a) Wireless LAN (Wi-Fi) connection between the receiver and the infrastructure network



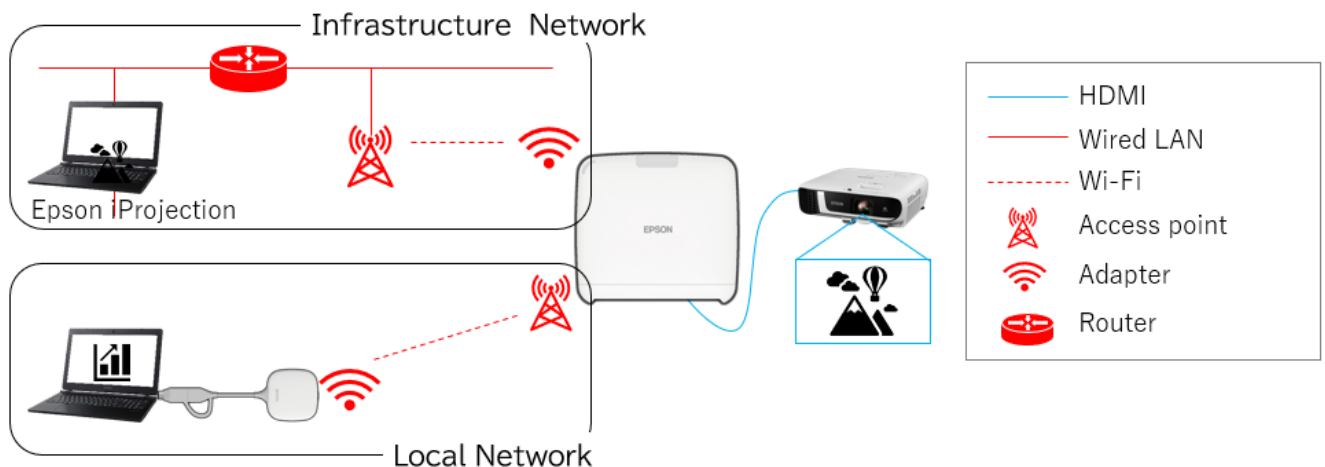
(b) Wired LAN connection between the receiver and the infrastructure network



The transmitter connected to the computer (Windows/Mac) cannot connect to the infrastructure network because it cannot pair with a Wi-Fi access point on the infrastructure network.

(3) Simultaneous Use of Local Network Connection and Infrastructure Network
The local network connection (1) and the infrastructure network connection (2) can be used together.

Figure 8 Combined use of local network configuration and infrastructure network connection



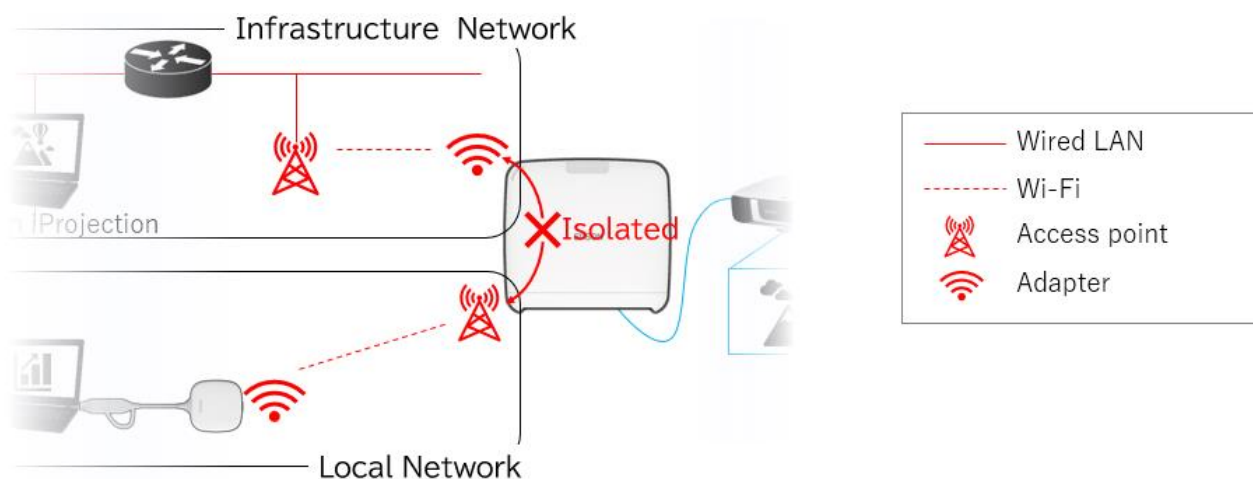
4. Security

4.1. Separation of Local Network and Infrastructure Network

On the local network connection, the receiver acts as a Wi-Fi access point. However, the receiver does not have a router function. As a result, the local network is completely isolated from the wireless or wired LAN interfaces that are connected to the infrastructure network.

A computer connected to the local network cannot connect to the infrastructure network through the receiver.

Figure 9 Separation of local network configuration and infrastructure network



4.2. Local Network Connection Security

The local network connection explained earlier is limited to wireless LAN (Wi-Fi) communications.

Because the communication path uses WPA2-PSK, an encryption protocol developed by the Wi-Fi Alliance, it is difficult to decrypt and retrieve the content from the transmitted data even if wireless LAN signals are intercepted and captured.

4.3. Infrastructure Network Connection Security

4.3.1. Encryption

There is a concern that the communication path for the infrastructure network connection may be intercepted and the content from the transmitted data may be acquired by a third party.

Epson iProjection(software) and Epson Wireless Presentation(software) encrypt

the transmitted data and transmit it to the network. Therefore, it is difficult to recover the content from the transmitted data even if the communication path is intercepted. The encryption algorithm uses AES-128. The encryption key is created on a per-session basis. A session-specific private key is prepared and transmitted using keyword information to transmit the encryption key.

4.3.2. Protocol Port Number

The following ports are used by Epson iProjection(software) and the Epson Wireless Projection(software) to communicate with the receiver.

See the following settings and open the ports for the router and firewall.

Table 1 Ports used by Epson iProjection(software) and Epson Wireless Projection(software)

Protocol	Port	Direction (*1)	Description
ECON (TCP)	3620	T->R	Network Projection (Control Transfer)
ECON(UDP)	3620	T->R R->T (*2)	Service Discovery
PCON(TCP)	3621	T->R	Network Projection (Image / Audio Transfer)
ESC/VP.net(TCP)	3629	T->R	Receiver control

(*1) R = Receiver, T = Epson iProjection(software)
and Epson Wireless Presentation(software)

(*2) not used in Epson Wireless Presentation(software)

4.4. Pairing Security

After you have paired the transmitter and the receiver, you can transmit the transmitted data. The transmitted data cannot be transmitted without pairing.

4.4.1. Pairing the Transmitter and the Receiver

(1) Connecting and pairing the transmitter and receiver

Since the transmitter is connected to USB directly and paired with the receiver automatically, no pairing information leaks out of the communication path.

Figure 10 Connecting and pairing the transmitter and the receiver

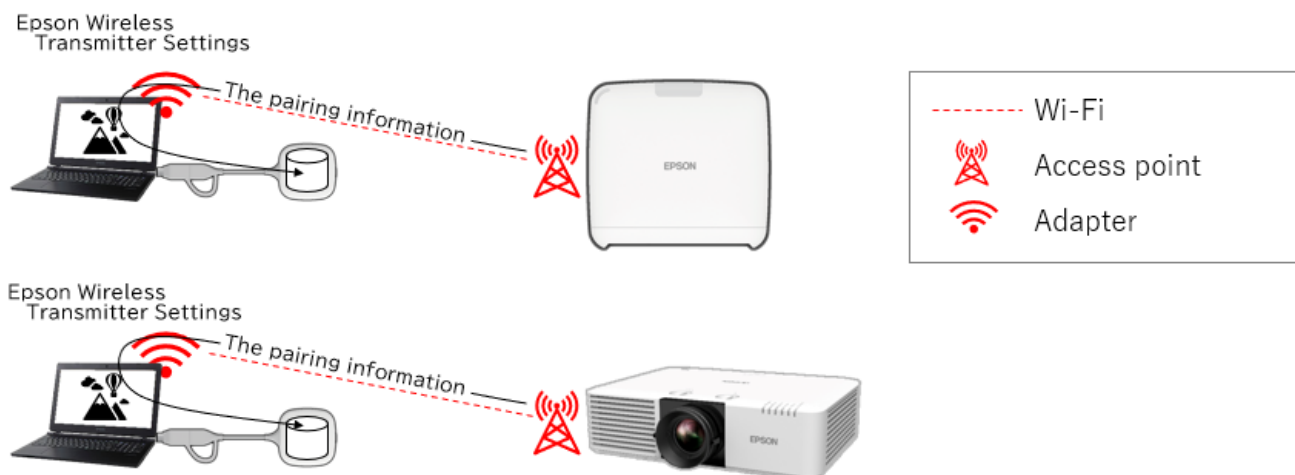


(2) Pairing using the Epson Wireless Transmitter Settings(software)

Epson Wireless Transmitter Settings(software) is administration software that runs on your computer (Windows/Mac) and enables user to pair the receiver and the transmitter.

The signals(beacons) sent by the receiver that acts as an access point contain encrypted pairing information. As the pairing information is encrypted, it is difficult to intercept the signal(beacon) to obtain the pairing information. Epson Wireless Transmitter Settings(software) decrypts the pairing information and saves it in the transmitter.

Figure 11 Pairing using Epson Wireless Transmitter Settings(software)



4.4.2. Pairing Information Saved in the Transmitter

The following pairing information is saved in the transmitter after pairing. The pairing information is saved in the receiver's built-in memory. Since this memory cannot be accessed from the outside, it is difficult for a third party to obtain the pairing information in the transmitter.

- SSID of the receiver
- Base unit name of receiver
- Passphrase for WPA2
- Unique ID (serial number)

4.5. Security for the Transmitter's Built-in Storage

The transmitter's built-in storage contains the Epson Wireless Presentation(software). The computer (Windows/Mac) connected to the transmitter can execute the Epson Wireless Presentation(software) from the transmitter's built-in storage, but it cannot write files to the storage. This also prevents Epson Wireless Presentation(software) from being tampered with.

4.6. Firmware Analysis and Tampering

Users can use the Epson Wireless Presentation System in a stable state by updating the transmitter's firmware and the receiver's firmware.

4.6.1. Transmitter's Firmware

The transmitter's firmware is supplied in a binary file with header information and checksum encrypted with AES-128. Therefore, it is difficult to analyze and tamper with the firmware.

4.6.2. Receiver's Firmware

The receiver's firmware is supplied in a binary file encrypted with DES-56. Therefore, it is difficult to analyze and tamper with the firmware.

4.7. Epson Web Control Feature

The receiver includes the Epson Web Control feature that allows you to check and change the receiver settings in a web browser on a networked computer or smart device.

Epson Web Control uses the following protocols and ports:

Table 2 Ports used in Epson Web Control

Protocol	Port	Direction (*1)	Description
HTTP(TCP)	80	T->R	HTTP request and response
HTTPS(TCP)	443	T->R	HTTPS request and response

(* 1) R = Receiver, T= a computer or a smart device

The default protocol of Epson Web Control is HTTPS. You can change to HTTP from the following menu, but it is recommended to use HTTPS.

OSD menu: [Network]

- [Network Settings]
- [Base Unit]
- [Secure HTTP]

Settings: On HTTPS connection (default)

Off HTTP connection

5. Appendix

5.1. List of Protocols and Ports

This is the list of protocols and ports that Epson Wireless Projection System uses. For the protocols and ports not used by Epson Wireless Projection System, refer to the projector's User's Guide and other documents.

Table 3 Ports Used by the Video Transmission Software

Protocol	Port	Direction (*1)	Description
ECON (TCP)	3620	T->R	Network Projection (Control Transfer)
ECON(UDP)	3620	T->R R->T (*2)	Service Discovery
PCON(TCP)	3621	T->R	Network Projection (Image / Audio Transfer)
ESC/VP.net (TCP)	3629	T->R	Receiver control

(*1) R = receiver,

T = Epson iProjection(software) and Epson Wireless Projection(software)

(*2) not used in Epson Wireless Projection(software)

Table 4 Ports Used in Web Configuration

Protocol	Port	Direction (*1)	Description
HTTP(TCP)	80	T->R	HTTP request and response
HTTPS(TCP)	443	T->R	HTTPS request and response

(* 1) R = Receiver, T= a computer or a smart device

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7. Revision

March 15, 2021: Rev.A First Edition