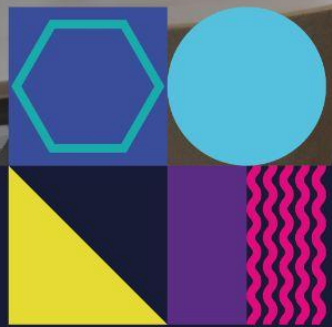


CLEVERTOUCH[®]
by Boxlight[®]



Clevertouch[™] Network Requirements, Security and Privacy

The purpose of this document is to quickly assist IT administrators in understanding the basic network requirements (IP's and ports) for each of the Clevertouch services.

Using the information provided below we hope will help with successfully integrating Clevertouch products onto customers networks.

Over the air updates

- Server IP: 134.213.213.174
- TCP Port: 80 (HTTP).

NTP Server used on all Clevertouch LUX OS for keeping time in sync

- Server hostname: 2.android.pool.ntp.org
- UDP Port: 123 (NTP)

CleverLive

At the time of writing (11/04/2023) ClevertouchLive and Sedaolive are scheduled to be repointed to the domain <https://www.cleverlive.com>

Customers are therefore requested to ensure that access on ports 80 (http) and 443 (https) are enabled for all the following:

- www.cleverlive.com
- live.cleverlive.com
- www.sedaolive.com
- live.sedaolive.com
- www.clevertouchlive.com
- live.clevertouchlive.com
- IP addresses:
 - 87.106.215.81
 - 217.160.168.158

Cleverstore – On Plus LUX only

The Cleverstore app connects to our servers over port 443 (standard https); The NewRelic and Google Analytics analytic packages use 443 (https) and 80 (http) (but these are not critical for Cleverstore to function)

Cleverstore Hosts:

- prod.sahara-admin.appcarousel.com
- sahara-stage-public.s3.amazonaws.com
- Ports: 80 (HTTP) & 443 (HTTPS)

URL's to whitelist if preferred over the hosts above:

<https://prod.sahara-admin.appcarousel.com/api/v1/export-products>

<https://prod.sahara-admin.appcarousel.com/api/v1/export-categories>

<https://sahara-stage-public.s3.amazonaws.com>

LYNX – Annotation and Lesson Planning Software

Please ensure the firewall permits access to the following websites:

Lynx Hosts:

- auto.saharasupport.com
- registration.saharasupport.com
- Ports: 80 (HTTP) & 443 (HTTPS)

Clevershare 2nd & 3rd Generation Service and Applications

Important Note

No matter which Clevershare Generation software or hardware (dongle) is being used, the Clevershare (server) application on the Clevertouch display should be activated first.

Network requirement of activation:

1. TCP Port: 80 & 443 & 5224
2. DNS: linkmsg.seewo.com/seewo-link/api/v1/register
3. IP: Access using DNS
 - a. a. IP number you will see are likely to see are
 - b. i. Subnet starting 203.xx.xx.xx
 - c. ii. 116.62.84.143
 - d. iii. 101.37.44.92
 - e. iv. 121.199.255.161
 - f. v. 118.178.158.12

Please Note:

If activation fails, visit <https://linkmsg.seewo.com/seewolink/api/v1/register> via the Clevertouch Browser to check and test whether or not the network connectivity between Clevertouch and the activation server is ok.

Clevershare previously could only work when both the Clevershare receiver (Clevertouch Display) and the Clevershare client (Windows, Apple or mobile) were on the same subnet*, in our latest version of Clevershare receiver v1.0.8.2070 we removed the boundary within our 'Advanced

Other notes of importance

Mode' option within the settings menu of the Clevershare receiver app. This means that the Clevershare receiver and client can now be on totally different subnets on the same LAN, as long as those subnets are routable and the ports are allowed to traverse those subnets. This is accomplished by the new 9 digit code required to be used, it decodes all 32bits of the Clevershare receiver IP instead of the first 13bits as previously.

The Following ports are required to be open between the display network and device network only. There is no requirement to make these ports available externally:

- TCP connection, command transmission service, ports are {7385, 29736, 2067, 39458}, it will try to open the 4 ports one by one, if one of them is opened successfully, the rest of the ports will not be opened.
- TCP connection, Video stream data transmission service, ports dynamic allocated by the system {49200-49400}, if multiple users share the screen, there will be multiple ports allocated, maximum 4 ports currently.
- TCP connection, Audio stream data transmission service, ports dynamic allocated by the system {49200-49400}, if multiple users share the screen, there will be multiple ports allocated, maximum 4 ports currently.
- TCP connection, Desktop synchronization, ports dynamic allocated by the system {49200-49400}. One of the ports generated by the system that is not occupied by other services.
- UDP connection, Mouse control, ports dynamic allocated by the system {49200-49400}. One of the ports generated by the system that is not occupied by other services.

- UDP connection, Touch feedback, ports dynamic allocated by the system {49200-49400}. One of the ports generated by the system that is not occupied by other services.
- Chromecast function, port occupation (8008, 8009, and randomly try from 8009 onwards until an available port is found). Chromecast is a UDP connection.
- Airplay function, port occupation (monitoring 7000, randomly connecting after successfully projected). Airplay video transmission uses TCP connection, audio is UDP. Airplay/Chromecast function, multicast DNS needs to occupy port {5353}

MDM – Mobile Device Management

There are two areas to be considered for network requirements: -

- Browser Side = MDM web portal that the Agent Side communicates to.
- Clevertouch LUX (Android) Agent Side = The service running on Clevertouch Android Module which communicates to the Browser Side.

Browser Side:

1. MDM Application Server: <https://clevertouch.glbth.com> – If possible we recommend to whitelist
2. https://*.glbth.com (Port: 443 & dynamic IP)
3. Location resolve by IP service: <https://pro.ip-api.com>
4. Open Street Map: https://*.tile.openstreetmap.org
5. Online chat: <https://static-v.tawk.to>
6. Streaming protocol servers to support “Remote” function: Webrtc over UDP *.glbth.com (Port: 443 & dynamic IP)
7. 443 & dynamic IP)
 - a. a. 52.11.103.125
 - b. b. 34.240.200.142
 - c. c. UDP ports range: 30100-40000

Clevertouch LUX (Android) Agent Side:

- MDM Application Server: <https://clevertouch.glbth.com> – If possible we recommend to whitelist https://*.glbth.com (Port: 443 & dynamic IP)
- Streaming protocol servers: https://*.glbth.com (Port: 443 & dynamic IP)
- Push notification system:
 - Primary: Port 443 to clevertouch.glbth.com or preferably *.glbth.com
 - Secondary: Should the primary fail or be too slow uses Google's Firebase Cloud Messaging (FCM), for completeness of setup please read the following and allow the three ports either to all public IP's are just the Google ASN ranges as listed below.
 - The ports to open are: 5228, 5229, and 5230. GCM typically only uses 5228, but it sometimes uses 5229 and 5230.
- Google ASN:
 - 104.132.0.0/23
 - • 104.132.11.0/24
 - • 104.132.141.0/24
 - • 104.132.34.0/24
 - • 104.132.5.0/24
 - • 104.132.51.0/24
 - • 104.132.7.0/24
 - • 104.132.8.0/24
 - • 104.133.0.0/24
 - • 104.133.2.0/23

CleverLive & Clevertouch Security and Privacy

Clevertouch provides digital signage solutions for every business sector from primary schools and small businesses through to universities and major corporations. The digital signage requirements of such a large user base are varied as are the security concerns of customers when adding Media Players (or any third-party device) to their network.

There are many solutions to customer's potential security concerns, the most secure but least recommended digital signage solution is to have a stand-alone system not connected to the customer's network. Whilst this is effective, and in use by a number of Clevertouch customers, it defeats the major advantage of being able to update sales or communications messages across your business, in seconds and without having to leave your desk.

Clevertouch solutions are designed on top of the Microsoft windows operating system in order that they can be:

- Easily added to your network using standard procedures
 - In most networks they simply need plugging in and will connect automatically using DHCP
- Any network administrator can add standard security policies, such as adding the player to their domain, although to do this it is essential they follow the Clevertouch recommended procedure to ensure 24/7 signage operation. For example your standard PC build might save power by turning the screen off after an hour, or turn on a screen saver, which would stop the system working
- Players can be added to VLANs, WAN, connected over VPNs or in any other way IT want to operate

CleverLive Advantage

There are many advantages of using a CleverLive Cloud attached digital signage systems such as

- Ease of use
- Ease of scalability to larger networks
- Ease of use across multiple geographic sites
- Clevertouch managed maintenance
- Automated Software updates
- Global access

The very low cost of controlling a network of players via CleverLive means that the only reason not to do so are security concerns of using a Cloud based solution.

CleverLive Methodology

The widespread adoption of Cloud solutions such as Office365, Dropbox, OneDrive, Salesforce, EMIS Web and many more shows that most businesses accept that correctly designed Cloud solutions can be used and trusted with business data held off-premises and also having that off-site data kept synchronised with data on-site.

This is identical to the way the CleverLive works:

1. You upload your digital signage channels, images and messages to CleverLive, which acts like a digital signage equivalent of Dropbox/OneDrive.
2. All your Clevertouch players connect to your CleverLive account and are instructed to download the content you have uploaded, exactly like synchronising multiple computers using Dropbox/OneDrive
3. You then login to your CleverLive control panel and tell which screen to play which channel. It's beautifully simple and very reliable.

Account Security Settings

IP Whitelisting

CleverLive includes an IP whitelisting feature that enables users to lock down accounts specifically to the IP address of an internet connected device. Only users with a specific “allowed” IP address of their device (PC, laptop etc) can successfully log in to the CleverLive account. A user with the correct login credentials will not be able to access the account, unless their device IP address is whitelisted.

MFA/2FA

Multi-Factor Authentication (MFA) is a mechanism to allow an even stronger level of protection for users of the CleverLive (CL) digital signage portal.

- Level 1 security – User name and password
- Level 2 security - User name and password + IP address locking
- Level 3 security - User name and password + MFA
- Level 4 security - User name and password + MFA + IP address locking

Every player holds a copy of the data on CleverLive and plays it out as requested. There is no bandwidth required to stream the data off the network as only new updates need to be downloaded.

If the internet fails the player continues to play perfectly (although won't be updated with new content). Hence there are three sides to the system which need to be addressed to understand potential security:

1. Player connecting to CleverLive and downloading content
2. Users uploading (updating) content on the site
3. Data storage on the site

Device connecting to CleverLive (and downloading content)

CleverLive uses 2048 bit SSL encryption for communication between CleverLive.com and a Clevertouch Cloud connected player inside the customer's network.

When a brand new player is connected to the internet it makes a connection request to CleverLive.com which generates a unique 8 digit alpha-numeric pin code. When this pin code is typed into a CleverLive account that in turn generates an industry standard OAuth2.0 authentication token which is sent to the player. Both the player and CleverLive then destroy the 8 digit code and use the OAuth token to validate all communications between them giving a fully secure, authenticated and encrypted communications mechanism. Digital signage media, as well as server client communications messages, are also sent via this mechanism.

The server always validates that the token is correct before allowing any communication with the player.

For network security, all communications between the customer's player and the CleverLive server originate on the player. Hence for firewalls there are no unsolicited in-bound communications from the internet. The player continually issues requests to the CleverLive server using long-polling requests lasting up to 30 seconds. When the server has new instructions for the player that need to be acted upon it responds and the instructions are received and processed by the player. If the instruction includes a requirement to download updated content then a new secure connection is created and the media is downloaded.

The local player always keeps open a long-polling push notification connection with the server. This has added the advantage of allowing almost instantaneous player reaction to requests such as changing channels as well as allowing for a real-time status view of the customer's entire network via the CleverLive control panel.

When a player is removed from the customer's account (by the customer through the CleverLive control panel) the OAuth token is removed and the

player cannot be reconnected using it. Hence if the player is physically stolen the customer simply needs to delete it from their account thereafter there is no potential for connection to their account.

For this communication system to work ports 80 (http) and 443 (https) must be open through firewalls and access to the CleverLive servers allowed. A document details the required servers names and IP address can be found here <https://www.CleverLive.com/firewall> as well as how to use the CleverLive player built in diagnostics to test the firewall is correctly configured.

CM Pro

As an Android 9 device, the CM Pro allows 802.1x. support utilising EAP method: PEAP and Phase2 auth: MSCHAPv2 for additional security and privacy.

Live Rooms

The MFA/2FA access is a privileged operation, meaning that the organisation administrator must agree to the access. For an organisation whose setup requires the use of Booking Delegates, the organisation administrator must authorise the connection in the first instance. You can then connect the delegate.

Users uploading (updating) content on the site

There are two cases for user uploading content using their own PCs and devices

1. Managing the signage network, or uploading content, using a Web browser
2. Creating and uploading signage channels using the Clevertouch Windows desktop application called ImageFlyer Cloud Master

Managing the signage network, or uploading content, using a Web browser

CleverLive allows users to update content on signage screens, and switch what is playing on screen, by logging into the control panel on their CleverLive account.

The system uses username and password authorisation. During the session, the customer can upload new content from their device (any device running a modern browser).

All user passwords on CleverLive are hashed and no password is stored in the CleverLive database in plain text. Users are automatically redirected to a secure HTTPS URL even if an attempt is made to login via insecure HTTP.

The security system is only as good as the customer's own password policy and the user should choose suitably secure passwords and not reveal these to unauthorised personnel. Passwords for CleverLive must be at least 6 digits in length and can be reset at any time.

To facilitate ease of use, and also security, the admin user can allow unlimited sub users, with their own unique username and password, to update signage content on zones within channels. This makes the system flexible for admin to limit user privileges and also negates the need to share the administrator credentials.

Creating and uploading signage channels using the Clevertouch Windows desktop application called ImageFlyer Cloud Master

ImageFlyer Cloud Master is a windows desktop application which allows users to create fully bespoke signage channels.

It works by allowing users to draw, on their own Windows desktop, multiple communications zones in the form of slideshows, text zones, moves, web pages, news feeds and more. When the user selects to 'publish' the channel they have created (or modified) a connection to the user's CleverLive account is made, all the elements and media are packaged together and everything is uploaded to the account using 2048 bit SSL encryption.

The first time the publish button is used, ImageFlyer Cloud master requests a

username and password pair from the user. This is encrypted and passed to CleverLive which checks the credentials for an account of CleverLive. If they match an OAuth security token is returned and all future communications with CleverLive are authenticated. All communications between the ImageFlyer Cloud master and CleverLive are initiated by this software on the user's Desktop.

For this ImageFlyer cloud master system to work, ports 80 (http) and 443 (https) must be open through firewalls and access to the CleverLive servers allowed. A document details the required servers names and IP address can be found here <https://www.CleverLive.com/firewall> The ImageFlyer cloud master does NOT include diagnostics for debugging firewall issues.

Data Storage

All customer's data on CleverLive held on dedicated servers in the EU, at the time of writing (23/03/2017) in Baden Baden Germany. Whilst the data is backed up daily it is the customer's responsibility to ensure they have copies of any media which is of value a Clevertouch accept no financial responsibility for the loss of the Media and the event loss. It is worth noting that every player on a customer's network has a copy of the data in their account as if in effect a back-up in its own right

Privacy Concerns

Digital signage is not, under normal circumstances, used to convey very highly sensitive or confidential information. For example, a hospital may use signage to call patients into clinics but would not use it to display the patient's ailments. Most privacy concerns are alleviated if the customer considers what is going to be on screen, bearing in mind the end result is normally shown on a huge screen designed to draw attention to communications in a public, office, retail or educational space.