

# Technical Overview

## ZetaDisplay Digital Signage System

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## 1 INTRODUCTION

ZetaDisplay is a full-service supplier of communication solutions designed to influence behavior in a physical shop, public space or office environment. We act based on a deep understanding of human behavior in decision-making situations. We deliver our insights with the aid of a smart technical platform which generates engaging Digital Signage solutions.

This technical overview document assists you in understanding the ZetaDisplay Digital Signage software solutions and the IT requirements

## 2 DEFINITIONS

### 2.1 Generic

Client	The company that either purchased or is interested in the use of the ZetaDisplay Digital Signage solution, in whole or in part.
Digital Signage	Digital Signage or, in short, DS is the integrated solution formed by the digital LCD and/or LED display devices, software and other related technology and services delivered by ZetaDisplay.
Data connection	In order for the DS system to function properly, a data connection that complies with ZetaDisplay requirements is required. This data connection is always under the Client's responsibility
Power supply	In order to function properly, the DS system requires uninterrupted 24/7 power supply to all hardware that requires a power supply, such as display units, players, base stations and other data communications devices. This 24/7 power supply is always under the Client's responsibility.
Presentation content	All content in any format that is displayed on the screens, such as news, commercials, signage, etc., is collectively referred to as "presentation content". The timing of presentation content onto the screens is carried out by the Client using the Zeta Digital Signage software
Hardware	Collective terms for the DS displays, Players and other devices included in the ZetaDisplay DS solution.

Player A computer needed for controlling the DS display device; may be external or integrated as part of the DS display device.

## 2.2 Software

Zplayer/ZetaPlayer Display driver software that runs on displays equipped with an integrated Player (e.g. Samsung Tizen and LG WebOS) and external Linux-based Players and displays, the presentation content in accordance with the timing parameters set via ZetaCast.

ZetaCast A web browser-based user interface that, depending on the user rights assigned, can be used for managing the entire system: presentation devices, content and schedulings. Locations, presentation lists, presentation times and user rights can be defined and grouped with a high level of flexibility: for example, a specific user can be given the rights to maintain the presentation lists of a specific location, or part of the content can be shared by all locations while some of the content remains region-specific.

ZetaCloud A server software that controls the presentation devices and the presentation content. The server automatically converts the presentation content into a format that is suitable for the presentation device and takes care of supplying the presentation content to the presentation devices equipped with ZPlayer/ZetaPlayer.

ZetaCore ZetaCloud's database section

API The API (Application Programming Interface) between data systems is a definition that allows different programs to submit requests to, and exchange information or communicate with, one another. Responsibility for the proper functioning of the interface and the correctness of its information rests with the party that administers the interface and its use.

Zeta API Server An interface server developed by ZetaDisplay that integrates with the Client's API and distributes the data further into the ZetaDisplay DS system. The Zeta API Server is realised as a separate project under a separate agreement included in the customer-specific development of interface integration.

## 2.3 Content / Templates

Content Management	Responsibility for Content Management i.e. uploading of presentation content to the system and timing it on the screens, will primarily rest with the Client, but if separately agreed in a separate contract, the Client's content management can also, in whole or in part, be the responsibility of ZetaDisplay
Content production	Upon request, ZetaDisplay can provide content production services in accordance with the Client's specifications and site-specific requirements. ZetaDisplay will charge the client for such services in accordance with its applicable price list or pricing principles to be agreed on in advance. The Client, together with its partners, is responsible for acquiring and producing the presentation content, but if separately agreed in a separate contract, content production can also, in whole or in part, be the responsibility of ZetaDisplay.
Template	Developed by ZetaDisplay, Template is a content template that operates in ZetaCast and can be used by ZetaCast's users to produce presentation content by adding content to the predefined text and image fields included in the Template and to define properties such as colours and special effects. Templates only operates with the ZetaCast software and it can only be used with a valid licence.
Integrated Template	Template can be integrated into the Client's interface or that of a third party with the Zeta API Server or a direct interface connection, enabling automatic data transfer to Template. Integrated Template is developed as a separate client-specific project under separate agreement and it can only be used with a valid licence.

## 2.4 Fees

Template licence

The operating cost of Template consists of a commissioning fee and a monthly licence fee, which gives the Client the right to use the Templates

ZetaDisplay DS user licence

A display-device specific licence fee that is charged on a monthly basis. The licence fee includes the right to use the ZPlayer and ZetaCast software and passive network monitoring and maintenance.

### 3 GENERAL DESCRIPTION – ZETADISPLAY DS SYSTEM

The ZetaDisplay DS system is a cloud based system used for operating the digital display devices installed on the Client’s sites as shown in Fig. 1.

The management, uploading and scheduling of content is carried out by the Client using the ZetaCast software.

The system comes with a feature for uploading still images and video content and scheduling it as a standard feature but there can be a multitude of data/content sources, as shown in Figure 1.

Templates are enabling end users to create content to the screens that drives their business. Content can be for example menuboard, price lists, ad’s and textual/pictorial information/announcements. Use of ZetaCast Templates does not require any specific media or editing skills.

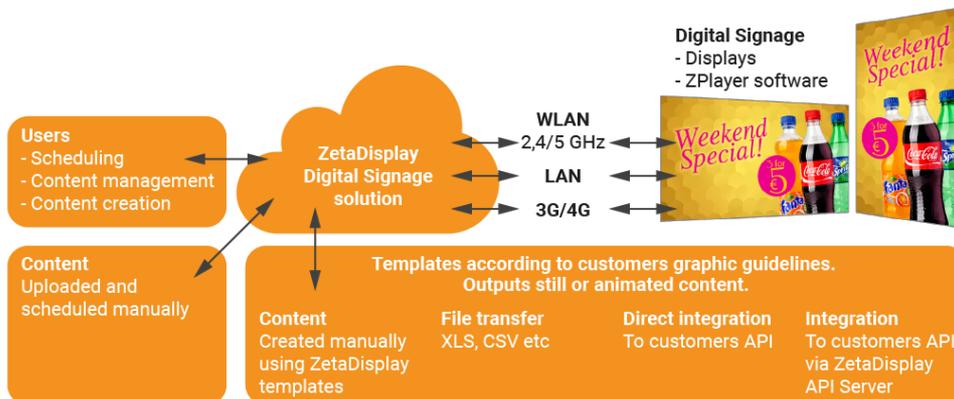
The server environments of the System are maintained in the cloud service provided by ZetaDisplay.

ZetaDisplay develops display device solutions designed for information display and advertising purposes and software designed for distributing media content on a constant basis. Our aim is to enable as versatile and comprehensive management and production of presentation content as possible from a single location.

New functionalities may be implemented free of charge for the users. Such updates will not call for any action on the users’ part but will occur automatically.

Additionally, ZetaDisplay will introduce new functionalities from time to time at a premium. The implementation of such functionalities are always optional.

#### 3.1 Figure 1: Diagram of the ZetaDisplay DS system and possible data sources



## 4 ZETADISPLAY ZETASERVER AND ZPLAYER SYSTEM SECURITY

### 4.1 ZetaDisplay ZetaServer, Zeta API Server and Zplayer technical informtion

ZetaDisplay Zplayers are deployed in physical locations where they are connected to the Client’s network or they set up a secure wireless network using wireless Cisco Meraki routers which functions as wireless access points and provides the players with internet access. The ZetaServer is the central point of the infrastructure, allowing management of the content and deployment of the content to respective players. Solution users can connect to the ZetaServer through secure, encrypted channels to upload content, manage content and deploy content to their players.

### 4.2 ZetaDisplay Solution Security

- Only ports needed for functionality are exposed.
- No default user names and password exist for the components in use.
- All traffic is encrypted, using client certificates, SSH, SFTP, HTTPS or WPA2.
- Players are uniquely identifiable through client certificates that can be revoked on the server side if a player is stolen or otherwise corrupted.
- Operating system services are set up with least privilege.

### 4.3 ZetaServer

The ZetaServer is the central server for handling all content management and content distribution to the players.

#### 4.3.1 ZetaServer Security

The ZetaServer is protected by a Firewall set up to allow only the required ports needed for the system to function.

The ZetaServer has the following open ports:

Port	Function
21/tcp	FTP, WeOnlyDo FreeFTFd.
22/tcp	SFTP, WeOnlyDo FreeFTPd, Protocol version 2.
80/tcp	ZetaDisplay own protocol using client certificates.
443/tcp	HTTPS to Microsoft IIS/7.5
8181/tcp	SMIL server
37/tcp	RFC 868 - Time server

## 4.4 ZetaDisplay ZPlayer

ZetaDisplay ZPlayer is an HTML5 digital signage player used to show content on the screen. Zetadisplay ZPlayer can be installed to dedicated external industrial computer and it can utilize LG or Samsung display’s SoC (system-on-chip), to integrate the displays as players to ZetaServer. All systems are linux based open-source system and they use a web browser to show content like html 5 and flash on the screens.

### 4.4.1 ZetaDisplay ZPlayer security

The player does not have any open ports as all communication with ZetaServer or third party data sources is always initiated from the player to the source.

The players open a socket to the ZetaServer which it keeps open at all times. Whenever there is new content available, the players pulls this from the server. The player receives video files and scheduling files through this channel. No push technology is used from the server to the players.

The ZetaDisplay ZPlayer needs following outgoing ports to be open:

Port	IP	Function
8181/tcp	secure.zetadisplay.com	Interact with ZetaServer
443/tcp	secure.zetadisplay.com	Interact with ZetaServer and Zeta API Server
80/tcp	137.116.197.29 70.37.81.153	Time sync from Samsung server
53/udp	DNS Server IPs	Resolving DNS server

## 4.5 ZetaCast Portal Clients

The clients can be any PC, Laptop, Tablet or Smart Phone owned by content uploaders or content users. Portal application is run through any web browser

Clients interact with the ZetaServer in two ways:

- Browser over HTTPS
- SFTP client

#### 4.5.1 ZetaCast Portal Security

HTTPS access requires a user name and password for the portal to use the application. SFTP uses a global account for content upload of files. This is a calculated risk as unique user names and passwords would still have to be distributed in large quantities to external parties, e.g. advertising agencies where they are prone to compromise. Compensating controls are in place with a per-session directory structure using a strong RNG for generation of directory names. Additionally, uploaded material cannot be accessed from the portal before passing through a transcoder that works by whitelist to ensure that only valid files are accepted. The advantage of this approach is that parties that only need to upload material do not need an account in the application itself, thus minimizing the exposure of custom application code to external parties.

## 4.6 Wireless Network

### 4.6.1 WiFi security

Wireless devices use WPA2-AES to secure the wifi connections from player to wireless routers. Each location will have its own SSID and authentication password and all wireless access point devices are centrally managed from Cisco Meraki Cloud service where only technical personnel will have access to. Password length in both passwords is (minimum) 14 characters, consisting of both uppercase and lowercase letters, numbers, and at least one symbol character. No dictionary words will be used in passwords.

All usernames and passwords will be stored in a secure location to which only essential technical personnel will have access to.

### 4.6.2 WLAN router: network and firewall configuration

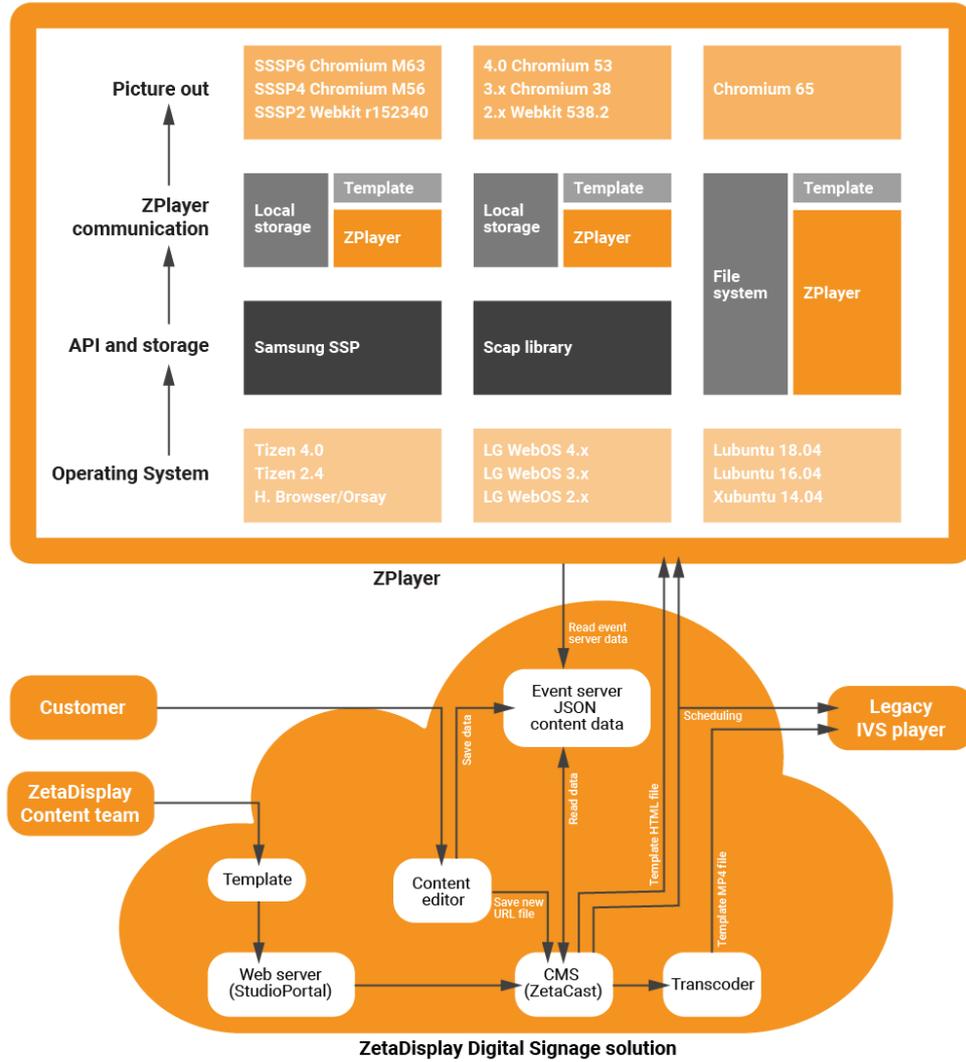
The wireless routers provide the players with local IP-addresses using DHCP. Firewalls of the wifi routers are configured to block all incoming traffic from the internet allowing only outbound traffic from the players (to the internet).

### 4.6.3 WLAN router configuration access

WLAN routers are configured from Cisco Meraki Cloud service which is located in tier-1 SAS70 type II /SSAE16 certified datacenters. Cisco Meraki Cloud service authentication requires a user name and password which has to be change every 90 days.

Cisco Meraki uses an out of band management architecture, meaning that only management data flows through the Meraki cloud infrastructure. No user traffic passes through Meraki's datacenters.

4.7 Figure 3: ZetaDisplay DS Functional Architecture



## 5 CLIENT SPECIFIC NETWORK REQUIREMENTS - IKEA

### 5.1 General

- Local Area Network connection speed  $\geq 100$  Mbit/s
- Maximal cable length to next network device 70m / 230feet
- Wi-Fi wireless network connection speed  $\geq 10$  Mbit/s

### 5.2 Stores

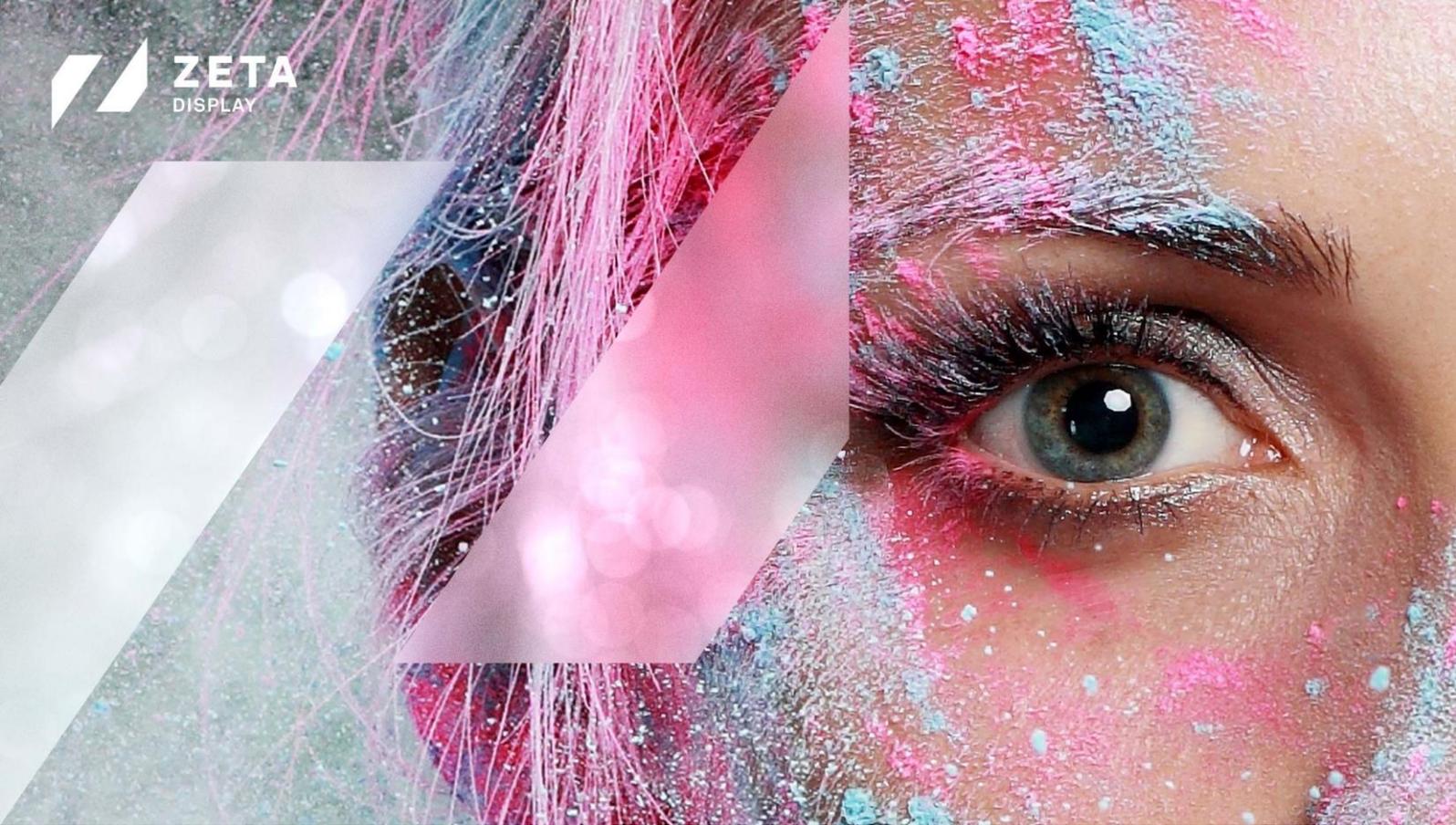
- Create or use Digital Signage VLAN : **VLAN 132** on dedicated access switches
- If more than 125 screens/players are going to be used a secondary subnet is required
- DHCP enabled
- **VLAN 132** added to IKEA firewall
- DNS ports towards local NSB and ICE NSB opened for **VLAN 132**
- DNS updated in DHCP scope

### 5.3 Service Offices

- Create or use Digital Signage VLAN : **VLAN 332** on dedicated access switches
- If more than 125 screens/players are going to be used a secondary subnet is required
- DHCP enabled
- **VLAN 332** added to IKEA firewall
- DNS ports towards local NSB and ICE NSB opened for **VLAN 332**
- DNS updated in DHCP scope

### 5.4 Required Network Ports

Port	IP	Function
8181 / tcp	secure.zetadisplay.com	Interact with ZetaDisplay ZetaServer
443 / tcp	secure.zetadisplay.com samsungcloudsolution.com	Interact with ZetaDisplay ZetaServer Remote management for Samsung screens
80 / tcp	137.116.197.29 70.37.81.153 tme.samsungcloudsolution.com time.trafficmanager.net	Time sync from Samsung server
53 / udp	DNS Server IPs	Resolving DNS server
1337-1359 / udp 1337-1359 / tcp 7070 / tcp	secure4.zetadisplay.com	Port-range used by debug/diagnostic-tools
7001-7002 / tcp	samsungrm.zetadisplay.com	Remote management for Samsung screens



**We live in a highly visual world.** And we work with the most complex and confusing of all technology: humans and their behavior. Yet for our customers we make it feel clear, natural, and achievable.

We insist on dreaming beyond what is seen. That is where behaviors change. That is where magic happens. We know, better than anyone, the fundamental elements of our industry and consumer needs. We seek not simply to inform, but to inspire. Ours is a culture of constant evaluation and renewal, empowering people to progress.

From deep study of the science of human behavior, we have sharpened a unique intuition. Combining that intuition with flawless technical skill allows us to surprise even as we deliver what we promise. To orchestrate that final nudge that seems to work **like magic**.