

Network Integration

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1. Basics

Before starting, check the existing infrastructure and define the required equipment and settings.

Various examples in this document show the different ways in which Cynap can be integrated into the network.

When connecting Cynap to LAN and WLAN at the same time, please use different IP ranges in order to prevent address conflicts.

The listed IP addresses are only examples.

Cynap can be treated as a standard network device and it is as secure as the supporting network. Cynap cannot be considered as a router, switch or firewall. Communication to other networks and access must to be controlled using your existing equipment (firewall, router, switch).

2. Glossary

This glossary will assist you in setting up the network correctly. Please note that in order to connect Cynap to an existing company network, some information from the local administrator is required.

2.1. Ethernet settings

DHCP	Cynap will get all network settings automatically from the DHCP server in the existing network. Switch it to OFF to set the addresses manually.
IP address	Unique address in the network, like 192.168.0.100. The IP address of Cynap can for example be set to 192.168.0.1.
Subnet mask	Available IP addresses can be limited. A commonly used subnet mask would be 255.255.255.0
Gateway	Defines the IP address of the server / connection to other networks (such as the internet). When Cynap is directly connected only to a PC, then enter the IP address of the PC.
Name server	Input the IP address of the preferred Domain Name System (DNS). This Server translates domain names into corresponding IP addresses.

2.2. Security settings

Admin password	Defines the necessary password for administrator access. This login data is needed to change the Ethernet Mode, and an existing administrator password. Using the login data, an administrator can connect to Cynap at any time. The default password is "Password". Remember to make a note of any changed passwords!
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2.3. WLAN settings – access point

Channel	Defines the channel used for wireless communication. For optimum performance, select a currently unused channel.
SSID Auto	If activated, an automatic SSID is generated using the Cynap serial number
SSID Manual	Defines the network name in plain text for easy identification of the WLAN network.
IP address	Defines the IP address of the access point. Cynap acts as a DHCP server and provides the necessary network settings to the connected devices.
Subnet mask	Available IP addresses can be limited. A commonly used subnet mask would be 255.255.255.0

Encryption Defines encryption for safe network traffic. All connected devices must use the same algorithm (WPA).

2.4. WLAN settings – infrastructure (Cynap acts as client)

SSID Defines the network name in plain text for easy identification of the WLAN network. Check existing WLAN infrastructure to get SSID.

Subnet mask Available IP addresses can be limited. A commonly used subnet mask would be 255.255.255.0

Gateway IP Defines the IP address of the server / connection to other networks (such as the internet). When Cynap is directly connected only to a PC, then enter the IP address of the PC.

Name server Input the IP address of the preferred Domain Name System (DNS). This Server translates domain names into corresponding IP addresses.

Encryption Defines encryption for safe network traffic. All connected units must use the same algorithm (WEP, WPA, WPA Enterprise).

2.5. Date and time

Time source Cynap has a built-in battery-buffered RTC clock (Real Time Clock). Settings will only be lost if the battery is empty. To eliminate the risk of incorrect time stamps, Cynap can be synchronized to an external time server. Select external and input a valid IP address of a NTP time server.

2.6. Host name

Host name The Host name can be changed in the settings under general settings. The host name can be useful for network administrators to see the device name in plain text in the list of clients. Please note, this host name is not automatically listed in the DNS list, and therefore cannot be used in a browser without DNS registration.

2.7. LAN / WLAN port

The LAN port enables integration of Cynap into an internal network. Administrators of a large number of Cynap systems can use the LAN port to control, support and update all of their units from their local desktop PC.

The list of applications for the Cynap LAN port is constantly increasing. It can be used for controlling, capturing still images, viewing live video streams, firmware updates, adjustments, menu settings and for maintenance purposes. Some features are only supported when using vSolution Link software.

The following protocols are supported: TCP/IP, IGMP, UDP and ARP.
Supported (tested) internet browsers are: Internet Explorer, Firefox, Chrome, and Safari.
By default, DHCP is activated to receive all network settings automatically from the server.

2.8. FTP Client settings

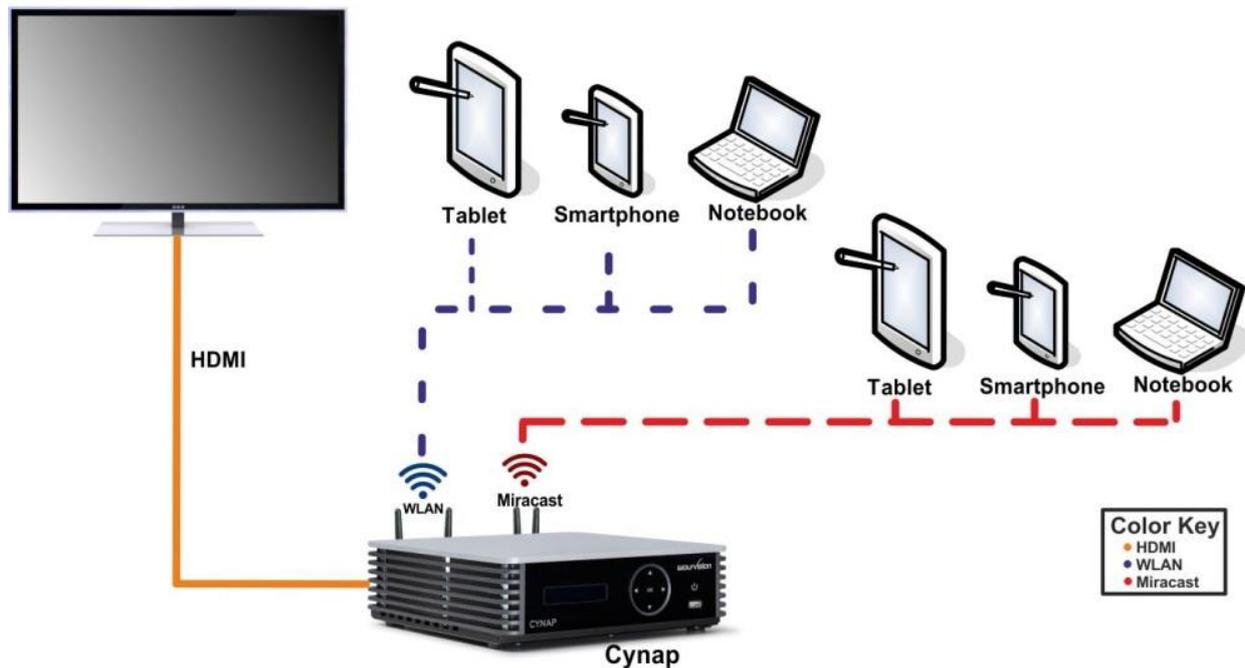
FTP enable	Enable or disable FTP client functionality to backup and share recorded videos and taken snapshots.
URL	Address of your FTP server in your network, like 192.168.0.100. (up to 256 characters, no space between the characters)
Username	Input the username according your FTP server settings.
Password	Input the password according your FTP server settings.
Test it now	During the test, Cynap will upload a text file onto the FTP-server ("cynap.txt" without content)

3. Network integration (examples)

The following examples of network integration show the different ways in which Cynap can be integrated. Various operating systems can each connect to Cynap to transfer different information from different sources onto a large monitor.

3.1. Stand-alone access point mode (without network integration)

Cynap is operated in stand-alone access point mode. The network settings must be set manually on Cynap (no DHCP server is available). Cynap generates an independent WLAN, and WLAN enabled devices (BYOD) can connect to Cynap.



Advantages:

- No complex network infrastructure necessary
- Cynap generates its own stand-alone access point
- No connection to internal IT infrastructure
- Security issues - no other unit from the internal IT infrastructure can access Cynap

Disadvantages:

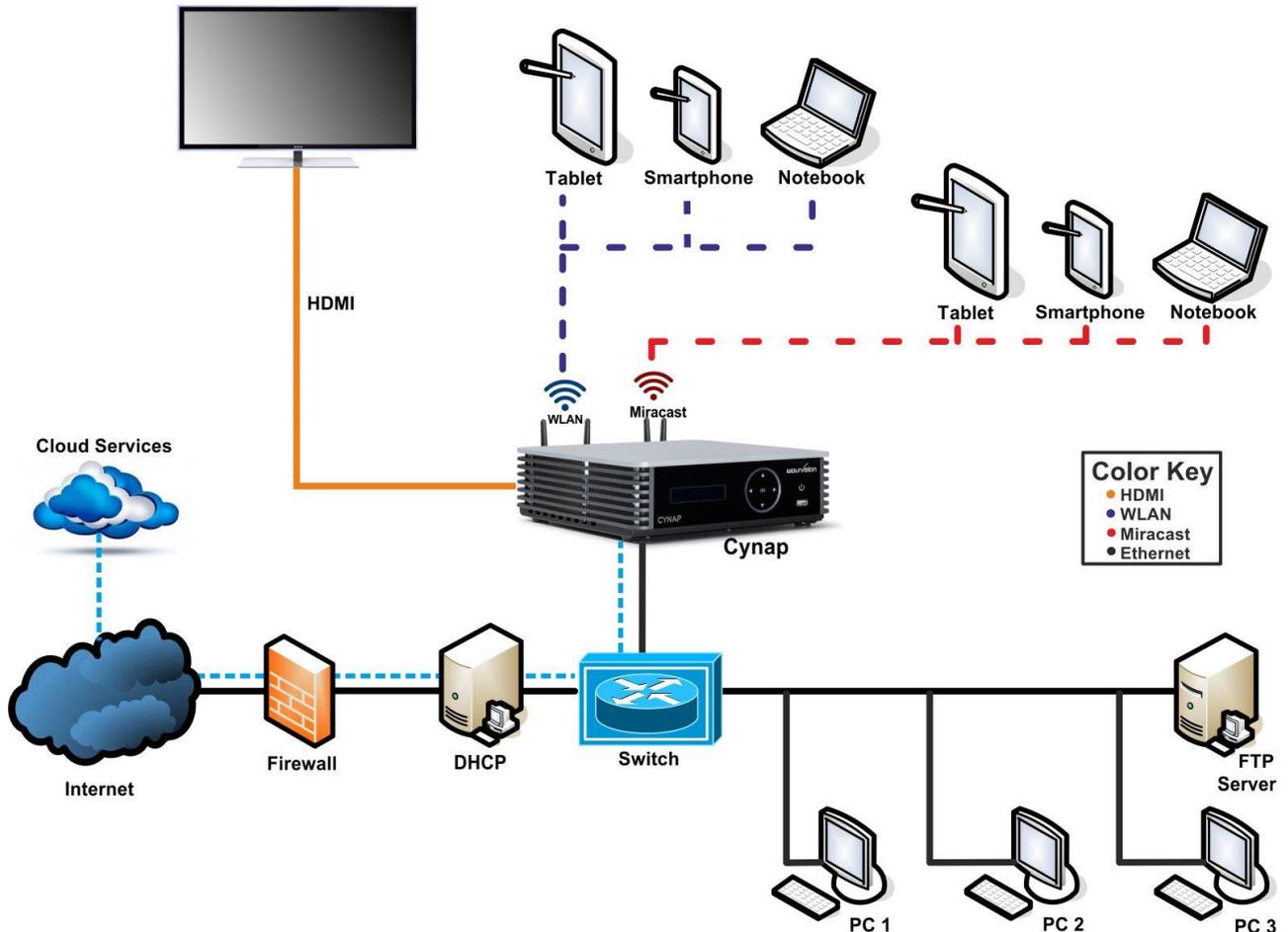
- No devices have internet access
- Cloud services cannot be used

Required settings:

DHCP	Switch to OFF to enable manual setting of addresses
IP Address	Unique address in the network, like 192.168.0.100. The IP address of a connected PC could be set to 192.168.0.1 for maintenance purposes
Subnet Mask	Available IP addresses can be limited. A commonly used subnet mask would be 255.255.255.0
Gateway	Enter the IP address of a directly connected PC for maintenance purposes
Name server	Not needed

3.2. Cynap wireless network access point mode

Cynap is integrated via a cable connection into an existing network, and is operated in wireless network access point mode. LAN settings for Cynap can be provided by the DHCP server. Cynap generates an independent WLAN, and WLAN enabled devices (BYOD) can connect to Cynap.



Advantages:

- All devices can communicate with each other
- Cynap has access to the Internet and cloud services can be activated
- Cynap can access the internet to check for firmware updates without using additional devices

Disadvantages:

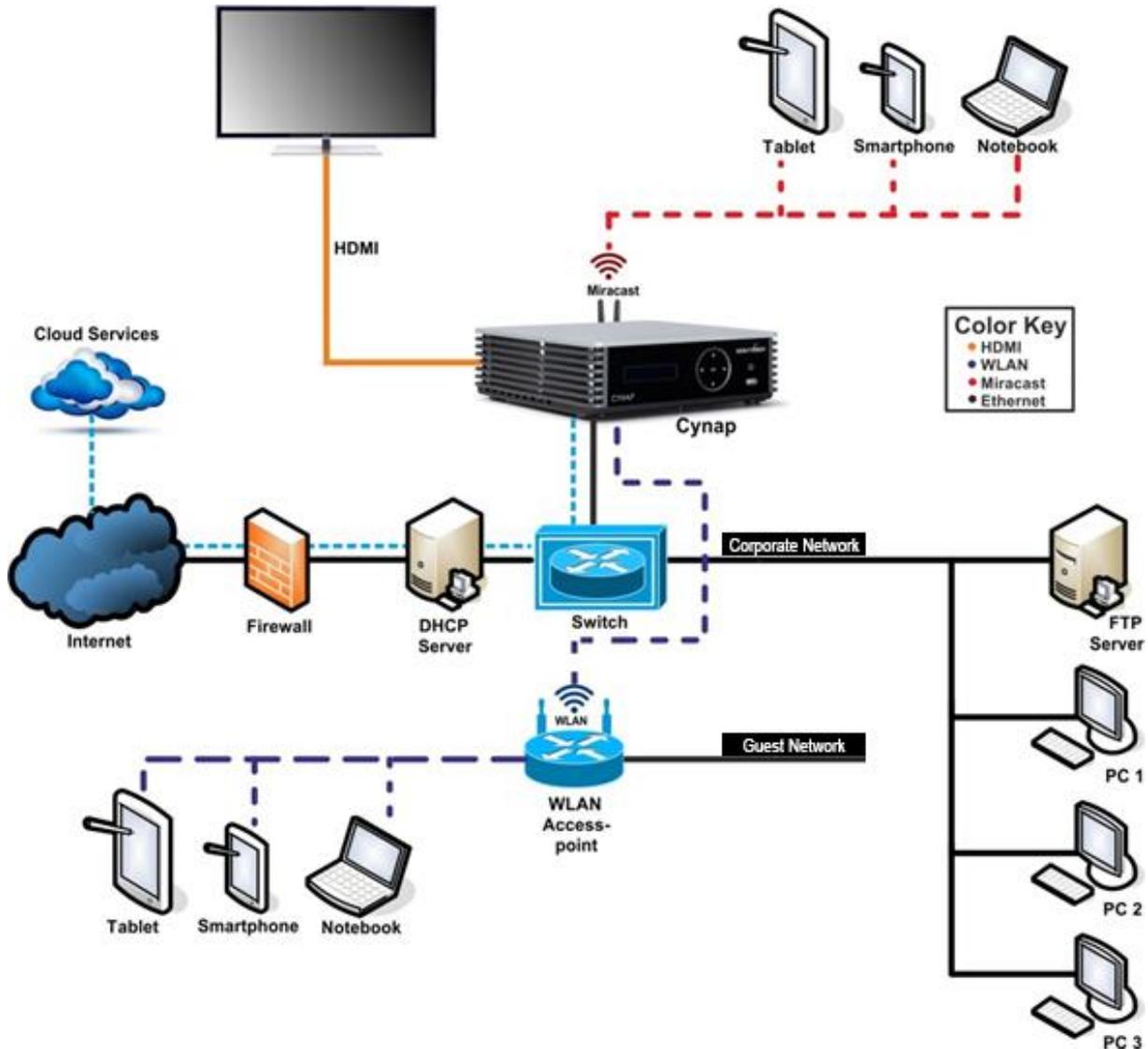
- Performance issues (all traffic is on the same network)

Hint:

If the units are in different subnets, Cynap might not be able to be discovered automatically by vSolution applications.

3.3. Cynap network infrastructure mode

Cynap is integrated via a cable connection into an existing network, and is operated in network infrastructure mode. LAN settings for Cynap can be provided by the DHCP server. In infrastructure mode, Cynap is connected to an existing wireless access point in the existing network.



Advantages:

- All devices can communicate with each other
- Cynap has access to the internet and cloud services can be activated
- Cynap can be moved within the range of the access point
- Cynap can access the internet to check for firmware updates without using additional devices

Disadvantage:

- Performance issues (all traffic is on the same network)

Hint:

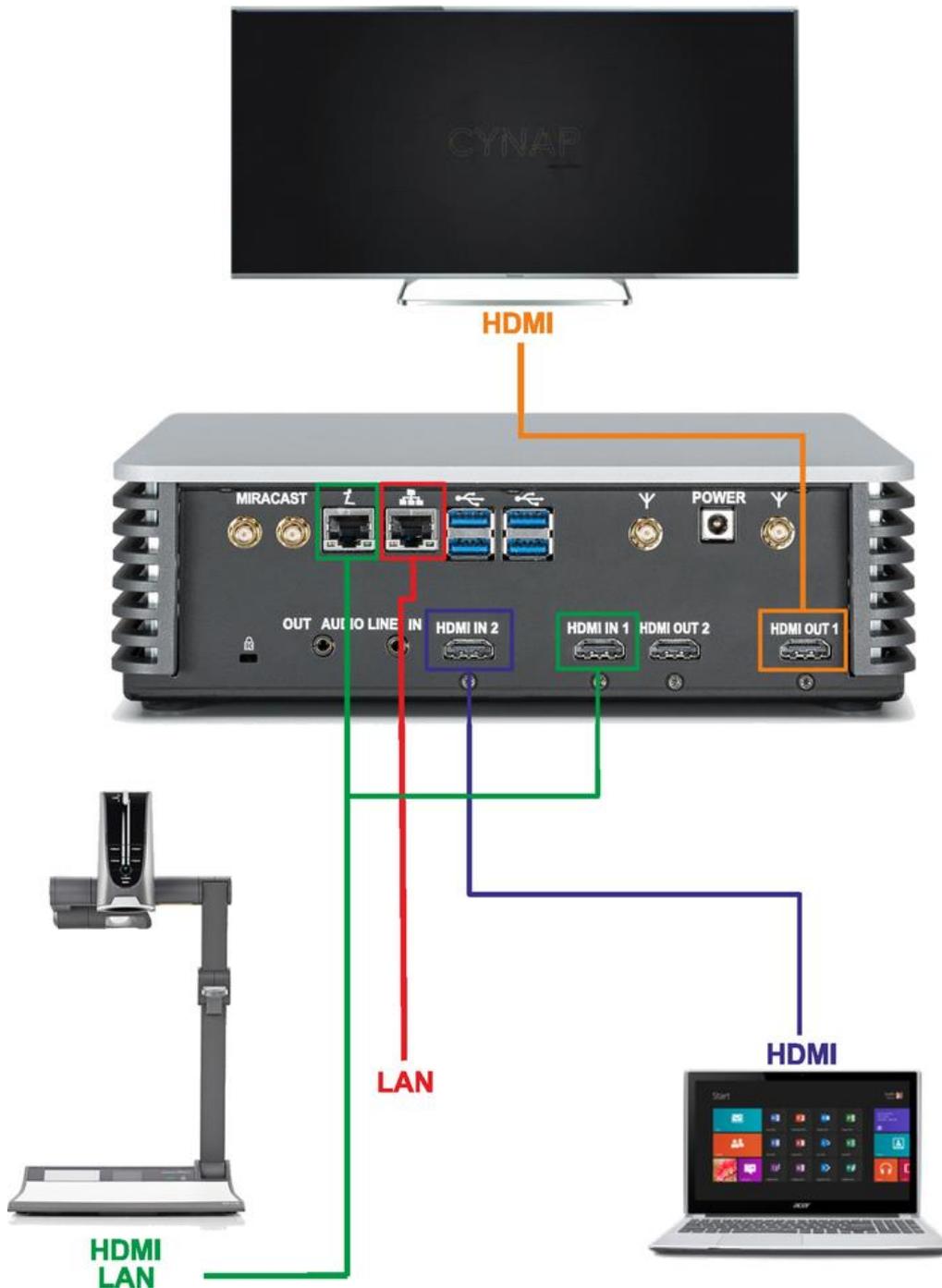
If the units are in different subnets, Cynap might not be able to be discovered automatically by vSolution applications.

Cynap can also be installed in a VLAN.

3.4. Cynap connection to a Visualizer

Cynap has a dedicated LAN port for connecting to a Visualizer with built-in DHCP server functionality. Activate on the Visualizer to obtain all necessary network settings from Cynap automatically. Communication between Visualizer and Cynap is over the Wolfprot protocol. The connection between Cynap and the Visualizer is a direct connection (point to point) and shouldn't be made through a switch or similar device.

More information on this protocol can be found on our website in the support section www.wolfvision.com.



Attention:

Never connect the LAN port for the Visualizer to your existing network infrastructure. Cynap acts as DHCP-server on this port and this could cause conflicts with the existing infrastructure.

Hint:

- Connect the Visualizer straight to the dedicated port. Do not add switchers, hubs, routers or similar between Cynap and the Visualizer to prevent error sources.
- Cynap can be controlled with the keys of the Visualizer. The function of keys from the camera head are dedicated to control Cynap. These keys are note have no effect to the Visualizer anymore. The IR-remote control of the Visualizer is not effective in this setup.
- Visualizer can be controlled with Cynap.
- Cynap and Wolfvision Visualizer are supporting cable runs up to 100m according Ethernet specification.

4. Firewall rules

Cynap has firewall rules that must be adhered to in order to allow successful network communications, and the corresponding services to be used.

Port	Type	Function	Description
21	TCP	FTP	Connection to FTP Server
80	TCP	http, Cynap control	This port is used to connect to the Cynap web interface (httpd). If this port is blocked, no connection can be made.
111 2049	TCP/UDP	NFS	Connection to network drives
137 – 139	TCP/UDP	CIFS	Connection to network drives
443	TCP/UDP	https	Connection to SSL secured sites (Cloud services, etc.)
1900	UDP	Discovery Multicast	Chromecast Device Discovery
4100	TCP/UDP	Chromecast/Airplay	Audio
5353	UDP	Multicast DNS	Bonjour Airplay to Cynap
8800 – 9000	UDP	Multicast/Unicast Streaming	Used for Multicast/Unicast Audio/Video Streaming
10000 – 16000 50000 – 65000	TCP/UDP	WebRTC	Communication Port
50000	UDP	Discovery Multicast	WolfVision Device Discovery by vSolution application
50913	UDP	Device Discovery	WolfVision Device Discovery
50915	TCP	Control	Control purposes (e.g. room control system)
50916	TCP/UDP	WolfVision App Cynap – Visualizer	Communication Port, no firmware update possible
50921	TCP	Video Streaming	Video stream between WolfVision App to Cynap and Visualizer
7000 7100 8009 47000	TCP	Chromecast/Airplay	Communication Chromecast/Airplay

5. Differences in Open Mode / Protected Mode

When using Cynap, it is possible to choose between either open mode or protected mode. This different mode can be selected using Cynap settings.

Modes:

- Open Mode
 - Is an open mode and all available devices can connect to Cynap
- Protected Mode
 - Is a locked mode. Only selected devices can be connected to Cynap

For more information, please refer to the manual.

6. BYOD

Cynap is designed to make it as easy as possible for users to connect to it. Cynap supports integrated mirroring protocols in its operating system. Users can connect to Cynap without needing any additional software. The mobile platforms are AirPlay for iOS devices and Miracast for Android and Windows devices. Regarding laptop and computer operating systems, AirPlay is also supported for Mac OS X. Windows Intel Wireless Display is also supported, and this integrates natively with Windows 8.1.

AirPlay Support for iOS 5.0 (released 2011) and above, or OS X 10.8 Mountain Lion (released 2012) and above. AirPlay is transmitted via Ethernet / WLAN. It can be used for displaying up to four sources.

vSolution Cast for iOS (App) For use in network environments where the Bonjour service (device discovery protocol) has been disabled.

Miracast Miracast is based on a Wi-Fi direct connection. This means that Miracast can only be used in close proximity to Cynap. Due to the direct communication with a device, only one connection to Cynap is possible at the same time (HDCP will be not supported). When using Microsoft Windows PCs or tablets, the use of vSolution Cast is recommended.

vSolution Cast In applications where a Wi-Fi direct connection is not possible due to the installation, multiple Windows devices can be connected at the same time using the alternative vSolution Cast.

vSolution Connect vSolution Connect is a professional presentation tool which offers an alternative to mirroring for Android and iOS. Mirroring has some disadvantages, and can, for example, allow incoming messages or calendar pop-ups to be visible on-screen to all participants during a presentation.

Chromecast Screen Mirroring Support for Chromecast capable devices. Chromecast is transmitted via Ethernet / WLAN. It can be used for displaying up to four sources.

AirPlay, Chromecast, Miracast and vSolution Cast are based on device discovery technologies for maximum ease of use. Therefore it is necessary that the appropriate services (See 4. Firewall rules) are available. Alternatively, when using vSolution Cast, a Cynap IP address can be entered manually. On Windows systems, vSolution Cast can either be run temporarily by users, or permanently installed (copied). The application can also be used from a USB stick without needing administrator rights, however with the restriction that no sound is transmitted.

7. Document and media player

Cynap can present almost all commonly used document and video file formats. This functionality is built in to Cynap and no additional applications need to be installed.

Cynap also supports different storage media for presentation of documents and video.

The following storage media are available for Cynap.

- USB flash drive (supported file system: FAT 32)
- Internal storage
- Cloud services

The following media formats are supported:

- Supported document file formats: PDF, Word, PowerPoint, Excel
- Supported video file formats: AVI, WMV, MOV, MP4, DivX, MKV, M4V, OGV

8. Streaming

Cynap has a built-in streaming server which is capable of broadcasting audio and video content over the network.

Prepare Ethernet connection (wired or wireless) and select the setting on Cynap. In the settings, you can assign the IP address of the destination (for multicast select: 225.0.0.0 to 238.255.255.255, with all other addresses the stream can be received at the entered destination only, 224.x.x.x and 239.x.x.x are reserved), port, resolution, frame rate and format of the stream (up to RTP H.264). Select the settings for resolution, frame rate and format. Cynap broadcasts the currently shown content of video and audio files to the network. All necessary settings will be provided to the player / browser in a file: <http://192.168.0.100/stream.sdp> (exchange the example address with the IP address of your Cynap).

Streaming settings

Destination	Defines streaming functionality. Depending on the entered address, Cynap streams in unicast or multicast mode. For unicast mode, input the IP address of the unique listening PC.
Port	Defines the port used for streaming. Be sure that the ports are not blocked by a firewall.
Resolution	Defines the resolution of the system.
Frame rate	Defines the max. frame rate (refresh rate) of the sent stream (LOW=10, MEDIUM=20, HIGH=30).

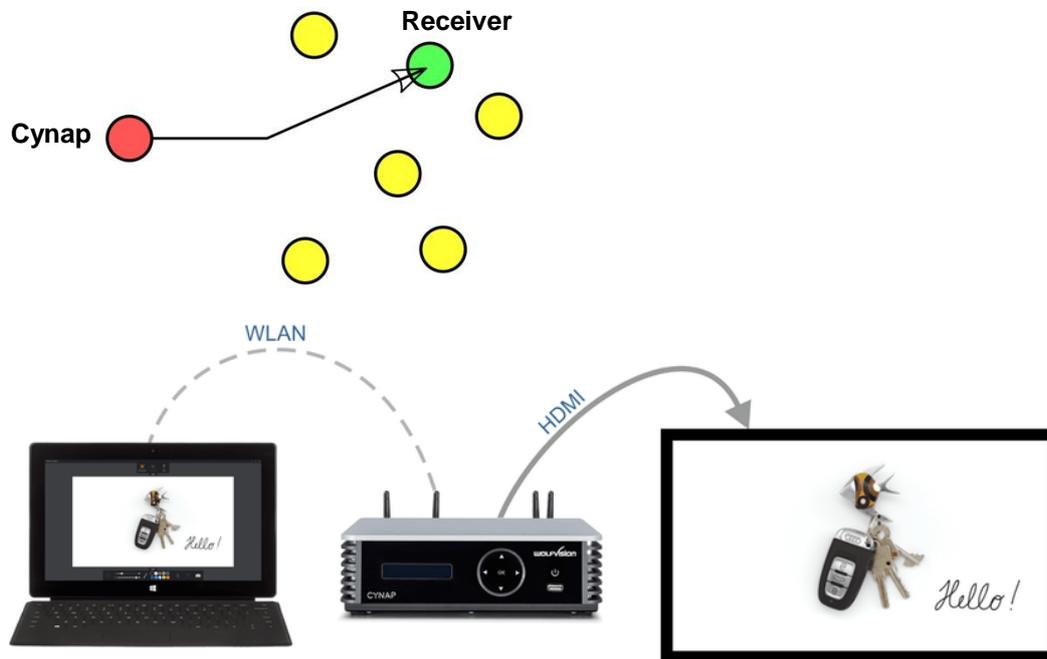
Streaming bandwidth:

Overview of Streaming bandwidth in relation to resolution.

Resolution	Mbit/s
360p	4
540p	6
720p	8,5
1080p	14

8.1. Unicast Streaming

Cynap's sending stream to a single receiver. That's a one to one connection. The IP address the unique listening receiver can be adjusted in the streaming settings.



Hint:

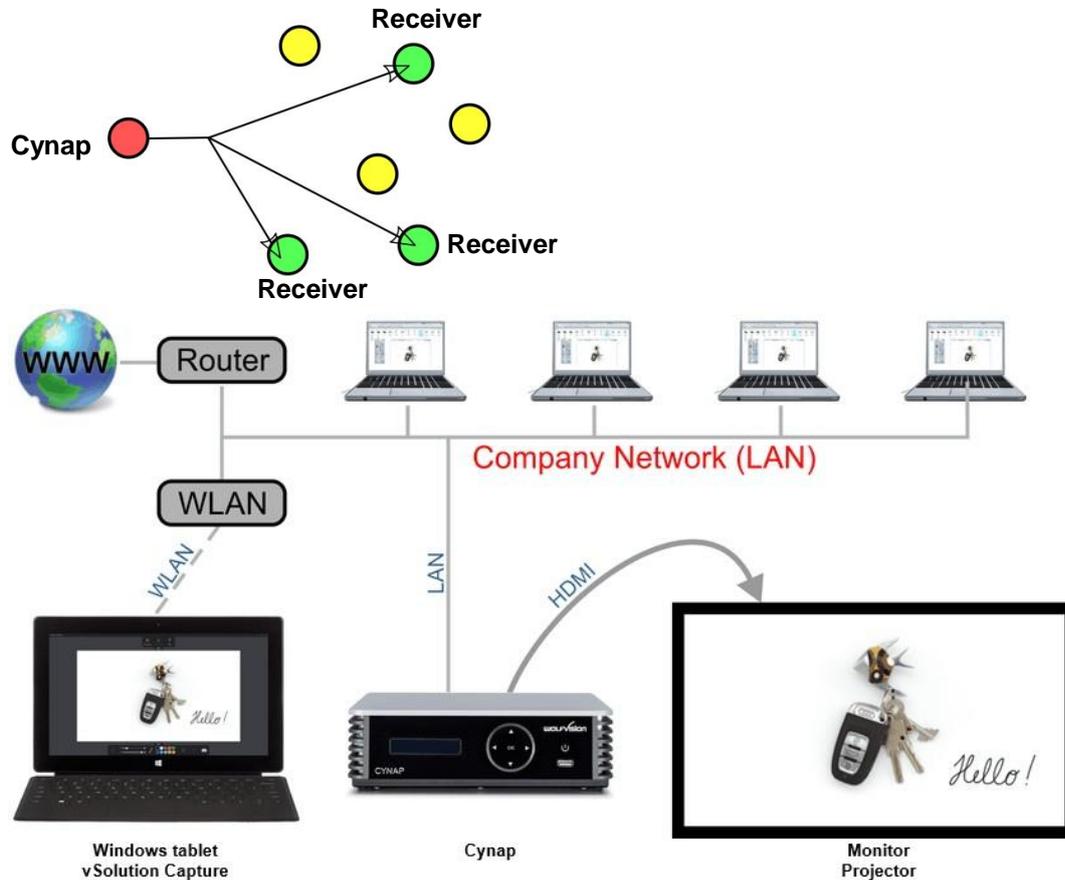
Cynap in Access point mode, UDP-streams over WLAN are limited to Unicast. Multicast not supported on Cynap Access point.

8.2. Multicast Streaming

Cynap's sending stream to a Multicast group. That's a one to many connection. The IP address of the Multicast group can be adjusted in the streaming settings.

Multicast stream is being sent over LAN interface only.

Note: 224.x.x.x and 239.x.x.x are reserved IP areas and should not be used.



Important:

Activate IGMP snooping.

Normally (without IGMP snooping) a switch will forward a multicast frame to all switch port (except incoming port). IGMP snooping allows the switch to send multicast frames only to those receivers that join a particular group by listening leave messages from the hosts.

9. Recording

Cynap has a recording function to record presentations. All types of content can be stored internally. The resolution of recordings can be adjusted in the settings.

Streaming settings

Resolution Defines the resolution of the system.
Frame rate Defines the max. frame rate (refresh rate) of the sent stream (LOW=10, MEDIUM=20, HIGH=30).

Example:

Video	Power Point
Source: Big Buck Bunny 1080p (file size 885 MB)	Source: Presentation with text and a few graphics, 60 pages (file size 863 KB)
Settings: Resolution 720p30	Settings: Resolution 720p30
Recording: For one hour	Recording: For one hour
Result: File size recording 1,43 GB	Result: File size recording 596 MB

Please note:

A new video file will be generated each time when recording is started. If file size exceeds 3.8GB, a new file will be created automatically.

10. Cloud services

Cynap supports Google Drive and Dropbox cloud services. These services can be enabled or disabled in the settings. For specific firewall settings, check the individual manufacturer guidelines.

11. Network Drive

Cynap allows direct access to network drives as read only accounts. Up to 10 network drives can be configured in the network drive settings.

CIFS and NFS file system are supported.

12. User interface

You can adjust Cynap basic settings using the function keys on the front of the device. Cynap can be controlled using any current standard browser. The user interface has been developed using the latest web programming standards, and this means that there is no need for additional add-ons or plugins such as Java, in order to have full control of Cynap. HTML5 technology only requires a browser that can handle JavaScript and Websockets, and this has been state-of-the-art for the last few years. You can also adjust the settings using the remote control. The remote control uses the 2.4 GHz band. The remote control has a built-in gyro sensor and can be used as a digital laser pointer.

Cynap can also be used in combination with room management systems. Communication is possible via the Wolfprot protocol. More information about this protocol can be found in the support section of our website www.wolfvision.com.

The vSolution Control app allows smartphones / tablets (iOS, Windows, Android) to control Cynap directly via WLAN. More information about the vSolution Control App can be found on in the support section of our website www.wolfvision.com.

13. Hardware and OS

Cynap uses a Linux operating system. The distribution is a WolfVision specific variant, which in addition to the Linux kernel contains only the individual libraries and packages required for the functionality of Cynap. This operating system is efficient, secure and lean. The operating system is installed after the installation process, and every update is installed to a read-only partition that cannot be changed after the installation process. This feature and the strict separation of system and user data, such as pictures, videos etc. ensures a very high level of system security. The system structure is protected against any external access, and it does not require additional security programs (antivirus, firewall, etc.). The Cynap system includes all viewer and software packages, and no additional licenses are required.

The current hardware specifications, connectors, delivery, and technical specifications can be found on our website www.wolfvision.com.

A 19" rack mount is available as an optional accessory if required for installing Cynap (2HE).

14. Administration

Cynap can be managed using the vSolution Link software. With vSolution Link software, administration tasks can be performed for multiple Cynap systems. With this admin tool, you can perform central firmware upgrades as well as determining the state of Cynap. You can also create, manage, and distribute a settings profile to all Cynap systems using vSolution Link software.

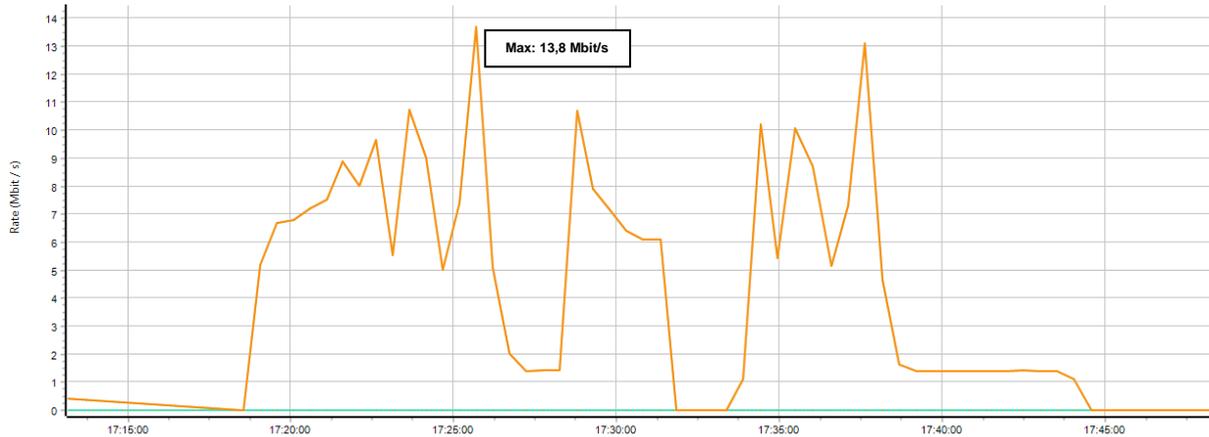
More information about vSolution Link software can be found in the support section of our website www.wolfvision.com.

15. Bandwidth Measurement Data

This bandwidth measurement data has been taken using a notebook PC with a Windows operating system. The computer was connected to Cynap via WLAN, and was operating in network infrastructure mode.

15.1. Multimedia streaming (Multicast)

1080p video (Big Buck Bunny) is displayed on the Cynap and streamed to the notebook using vSolution Capture Software to a single connected client. (Traffic In)



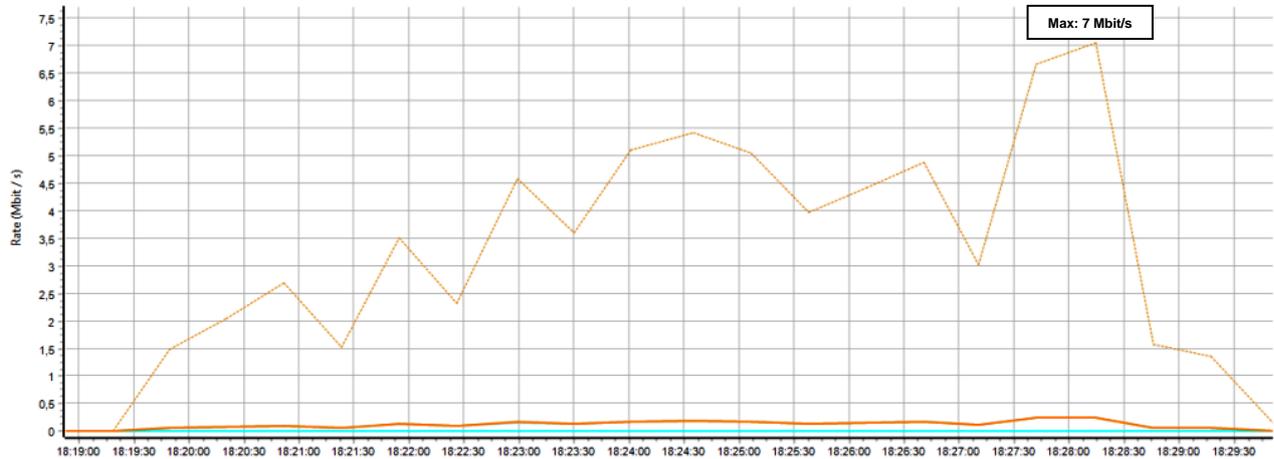
15.2. PowerPoint Presentation

Presentation with text and a few graphics are displayed from the notebook and are mirrored to Cynap using vSolution Cast Software to a single connected client. (Traffic Out)



15.3. Multimedia from Notebook to Cynap using vCast Software

1080p video (Big Buck Bunny) is displayed on the notebook and is mirrored using the vSolution Cast Software to a single connected client. (Traffic Out)



16. Client System Requirements

Requirement Airplay Mirroring OS X Mountain Lion v10.8 (Release 2012) or later:

Product	Version
iMac	Mid 2011 or later
Mac mini	Mid 2011 or later
MacBook Air	Mid 2011 or later
MacBook Pro	Early 2011 or later
Mac Pro	Late 2013 or later

Requirement Airplay Mirroring iOS 5.0 (Release 2011) or later:

Product	Version
iPhone	4 or later
iPad	2 or later
iPad	mini or later
iPod touch	5 th generation or later

Requirement Miracast:

Product	Version
Android	4.4.2 or later
Microsoft Windows	8.1, 10 Hardware with Miracast support required
Windows Phone	8.1, 10
Blackberry	10.2.1 or later

Requirement Chromecast:

Product	Version
Android	4.0.3 or later (Google Cast required)
Microsoft Windows	7, 8.1, 10 (Google Cast Browser Plugin required)

17. Index

Version	Date	Changes
1.0	04.05.2015	Created
	05.05.2015	Minor text edits
1.1	16.07.2015	- Change images page 4 / 5 / 6 / 7 / 8 / 9, 2 antennas to 4 antennas - Page 10, Port 50921, 50916 added
1.2	13.08.2015	- Addition to recording, video and power point example (file size) - Client system requirements, added point 15
1.3	02.10.2015	Minor text edit
1.4	04.11.2015	- Minor text edits - 2.8 FTP Client settings added - 3.6 Cynap connection to Visualizer added (Attention, Hint) - 5 Meeting Mode / Lecture Mode change in Open Mode / Protected Mode
1.5	03.02.2016	- Minor text edits - 2.3 WLAN settings – access point, removed WEP, WPA Enterprise encryption
1.6	20.06.2016	- Minor text edits - 3.4 Cynap VLAN wireless network access point mode delete (obsolete) - 3.5 Cynap VLAN wireless network infrastructure mode delete (obsolete) - 4 Addition Firewall rules - 6 Addition BYOD, vSolution Cast for iOS, Chromecast - 8 Addition Streaming bandwidth - 8.1 Addition Unicast Streaming - 8.2 Addition Multicast Streaming - 11 Addition network drive - 16 Addition Requirement Chromecast