



macula®

# A&E SPECIFICATIONS

Revision 3.0

23 Jan 2020

## Document Title

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| MACULA-A&E-Rev3.0.docx |
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## Document Revision

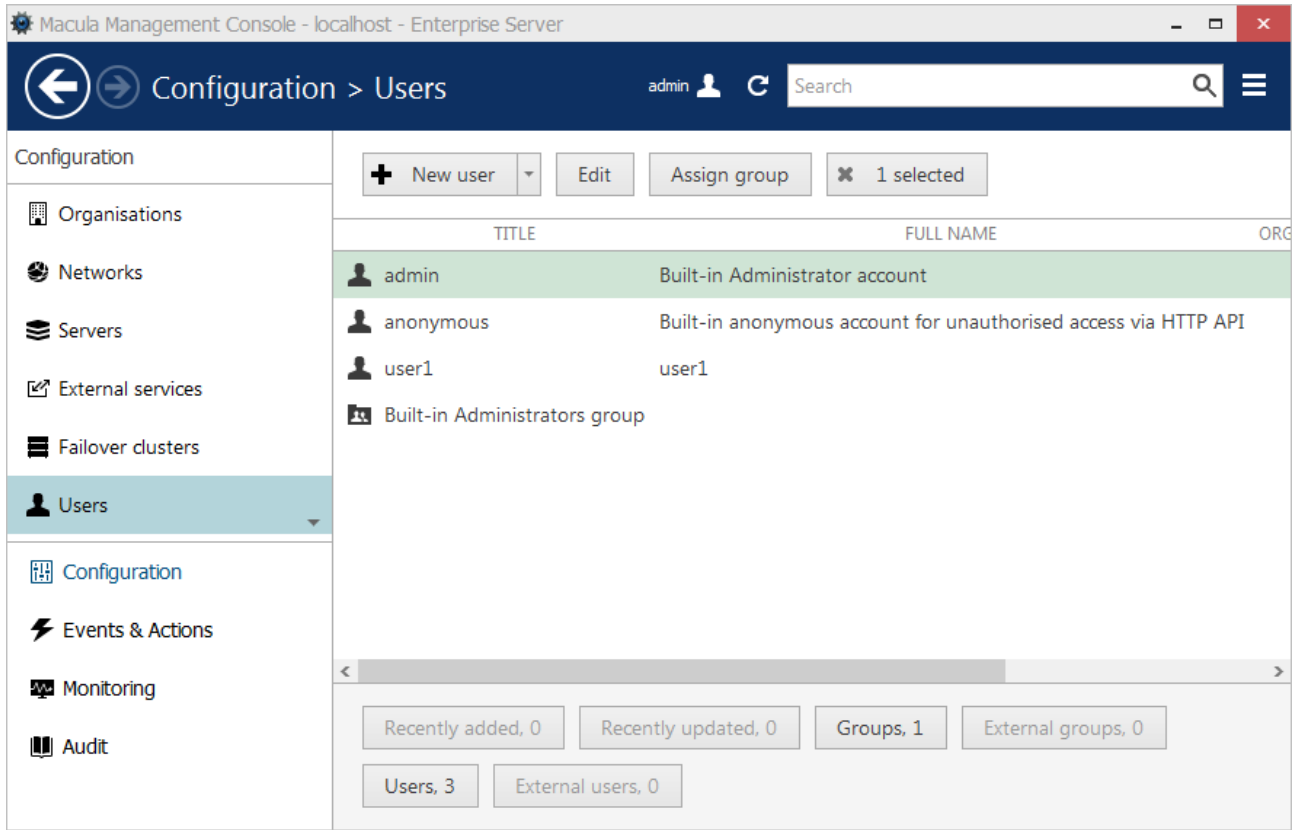
| <b>Date</b> | <b>Revision</b> | <b>Description</b>           | <b>Author</b>    |
|-------------|-----------------|------------------------------|------------------|
| 3 Nov 2017  | 1.0             | First release                | Keong@gscorp.com |
| 7 Nov 2017  | 2.0             | Added Supported Cameras list | Keong@gscorp.com |
| 26 Feb 2018 | 2.1             | Updated Content & Cover Page | Keong@gscorp.com |
| 23 Jan 2020 | 3.0             | Updated Content              | Keong@gscorp.com |

## Table of Contents

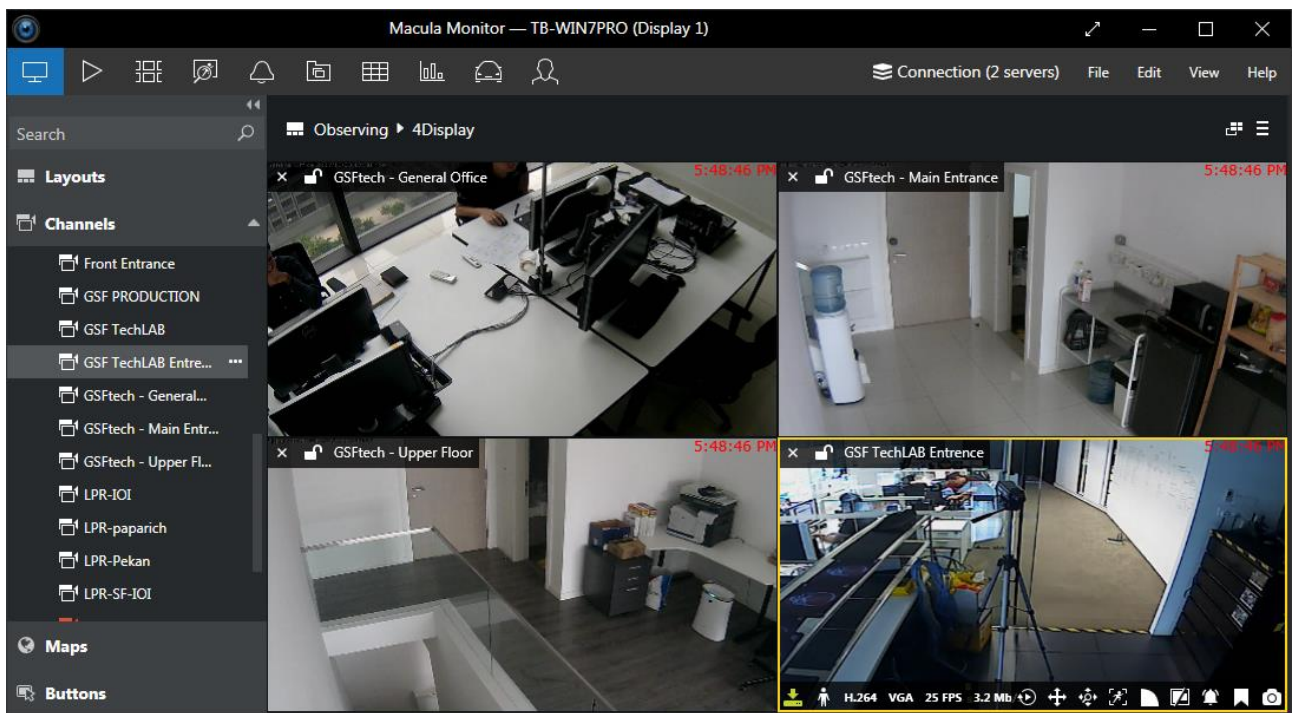
|    |                                      |    |
|----|--------------------------------------|----|
| 1  | Interface .....                      | 3  |
| 2  | General Information .....            | 4  |
| 3  | Macula Server & Macula Console ..... | 6  |
| 4  | Client: Macula Monitor.....          | 16 |
| 5  | Video Wall.....                      | 22 |
| 6  | Watermark Validation.....            | 23 |
| 7  | Portable Player .....                | 24 |
| 8  | HTTP API.....                        | 25 |
| 9  | Mobile Applications .....            | 26 |
| 10 | MacOS Thin Client.....               | 27 |
| 11 | Web Client .....                     | 28 |
| 12 | License Plate Recognition .....      | 29 |
| 13 | Face Recognition .....               | 30 |
| 14 | Visual Data Solutions.....           | 31 |
| 15 | Visual Access Solutions.....         | 32 |
| 16 | TrueBlue Care .....                  | 33 |

# 1 Interface

## Macula Console



## Macula Monitor



## 2 General Information

Macula is a highly stable software, easy to use on any network and very easy to deploy with the advanced Auto Detection feature for IP cameras. Macula also provides extreme flexibility as it can manage unlimited servers, sites, and cameras remotely, quickly and efficiently. Macula is an open architecture Video Management Software (VMS) for Windows. Macula accepts MJPG, MPEG-4, H.264 and H.265, as well as Full HD and megapixel video streams from Network (IP) cameras, encoders and capture boards. This, along with Macula client-server architecture, allows you to build hybrid scalable solutions from a single NVR/DVR to multiple servers handling thousands of cameras.

Macula accepts video streams from Network (IP) cameras from 90+ manufacturers including all major manufacturers such as Axis, Arecont Vision, Pixord, SONY, JVC, Panasonic, IQinVision, Toshiba, Zavio, Acti, Vivotek and UDP (more than 4000+ models supported) Macula also works with several DVR cards, like H.264, SDI "HDCCTV" (up to 960fps and up to 64 channels at D1 resolution) boards from UDP and other manufacturers. Moreover Macula is considered to be a hybrid system, since a DVR card with analog cameras, IP cameras, webcams and IP megapixel cameras, could be combined together on a single server.

**Optimized and designed** for Microsoft Windows Server 2008/2012/2016, and Microsoft Windows 7/8.1 and Windows 10.

**Surveillance from anywhere:** multiple client options are supported, including Windows-based Macula Monitor, Web browser client, Macula Mobile client app for IOS, and Android, and OS X client. Web client for Macula Streaming Server supports Chrome, FireFox, Safari, iOS, Android, etc.

**Server core:** accepts and handles incoming channels, provides recording and streaming functionality. Runs silently as Windows service. Macula interfaces are: Macula Console application for Macula server administration, and Macula Monitor application as rich Windows-based client.

**Dedicated configuration interface:** separate Macula Console application for secure server administration, unified interface for all product editions. Detailed permissions for resource access and configuration.

**Full-featured Client application** – unified interface for all Macula editions. All server resources can be accessed both locally and remotely (only one user interface). Anyone operating the client application can connect to the server, access live and recorded video, as well as other server contents in accordance with granted user rights. Macula Monitor enables quick navigation between resources from any server and allows easy and intuitive remote video wall management.

**Full range of editions:** for all needs and budgets from home users to large enterprises.

**32- and 64-bit support** for all components.

**Multi-Language Support:** Czech, Dutch, English, French, German, Italian, Korean, Russian, Latvian, Polish, Spanish and Turkish localisations, with many more to be added.

**Enterprise Scalability and Monitoring:** All functions such as: Screen Mapping, Layout Sequencing, Alert Notifications, PTZ Control, Camera Configuration, Video Wall control and more without exception may be accessed and administered both locally and remotely allowing management and administration for an unlimited number of servers around the world. Flexible Event & Action configurator enables you to manage events and notifications such as emails, text messages and more tasks for multiple servers from a single, user friendly interface.

**Macula simplified HTTP API** allows implementation of many different features for third party applications and systems.

## 3 Macula Server & Macula Console

### Server core with Remote & Local System Configuration

- Configuration import/export via XML file
- Database import
- Server runs as Windows Service
- Automatic and manual configuration backup
- Manual configuration restore from a previously created restore point
- Remote upgrade for servers and configuration reset
- Remote upgrade for Macula Console and Macula Monitor applications
- Service watchdog for operation monitoring
- Native archive backup tool for selective footage backup in the proprietary format
- Redundancy features on all levels
- Encryption for all databases, the recorded archive and all connections

### Central Server Management via Console Application

- Macula Enterprise server provides ability to combine virtually unlimited number of servers under centralized management
- Configurable TCP port (default is 60554)
- Unlimited number of recording servers and failover nodes can be involved without any imposed limitations
- Central server mirroring for enhanced stability
- Resource grouping for easy permission management
- Automatic discovery for servers and devices
- Advanced permission management and user audit
- Option to import external AD/LDAP users

### Video Support

- Supported codecs: H.264, H.265, MPEG4, MJPEG, JPEG, MxPEG
- RTSP, HTTP, and native video transport supported
- Configurable compression, resolution, FPS, bitrate (exact available settings depend on camera)

### Support for IP and Analog Devices

- Support of wide range of IP cameras and video encoders: all IP cameras on the LAN may be configured via Auto Search Wizard. Using the Wizard a user is able to find all Network IP cameras

available within the network. The user can configure them and connect them in no time and with little effort.

Each device is individually configurable

Support for video, audio, hardware-side motion detectors and digital I/O

Link to the supported camera list: <http://www.gsfcorp.com/macula/Macula-supported-cameras.pdf>. The list is constantly updated

ONVIF Profile S support

Generic drivers (RTSP, MJPEG, ONVIF)

Support for Direct Show compatible devices: the list of these devices includes everything from very basic USB cameras to camcorders to advanced multichannel video capture boards. These devices can be used alone or together with supported hardware and/or IP cameras, including GigE cameras installed via DirectShow driver.

Capture boards

External I/O devices via TCP/IP

Video streaming from Android and iOS phones and tablets

Camera search (automatic discovery)

Single and multiple (bulk) device and channel configuration

Copy device and channel configuration

Video stream preview in Macula Console

Easily combine video stream with textual data overlay and visual channel shortcuts on the configuration stage for later usage in Macula Monitor application

## Archive Recording

Flexible recording setup: built-in and custom recording profiles, recording schedules, individual recording quotas

Video, audio, motion, VCA and external textual data recording, all supplementary streams being synchronised with the video

Main video stream and substream recording

Schedules on a weekly basis with convenient graphical (grid view) configuration

Reduced frame rate recording

Dedicated storage per channel, channel group or individual main/secondary stream

Recording by motion and alarms of different kinds (DI, VCA events, custom events)

Bookmarks: manual, automatic, semi-automatic (user comment required)

Channel replication in Macula Enterprise (automatic scheduled archive backup) - unlimited number of channel copies can be created

Replication to multiple servers with different settings



Replication from regular recording servers and from failover nodes

Manual archive backup tool with local and remote access options

Encryption for the proprietary archive and archive backups Storage

## Edge Recording Support

For ONVIF Profile G conformant devices

Native edge recording support for the following manufacturers: UDP Technology, Axis, Bosch, Dahua, ArecontVision, Vivotek, Uniview (more coming)

Separate storage for the edge stream, if required

Ability to upload offline-recorded videos from Macula Mobile

## Recording Options

Recording of video, audio, VCA streams, motion information, as well as VDS data streams

Configurations and profiles

Pre- and post-recording for event-based recording plans

Automatic triggering of unlimited number of recording profiles for a wide variety of events on any server in the system

Manual controlling of recording profiles via Macula Monitor application, e.g., emergency recording start/stop

Duration and storage amount quotas per disk, per recording plan (for individual channels or streams, also channel groups)

Configurable storage cleanup hours

Fully independent recording, storage and quota setup for dual streaming (main and secondary stream)

Archive replication: automatic backup of the footage. Each channel can be copied unlimited number of times with different stream and frame rate choice.

Fallback storage: a special storage location that will be used for recording only if all specified target storages of the certain type have failed (storage failover within one server)

## Watchdog

For every Macula server and Macula Monitor application

Protects the software from certain types of failures by automatically attempting to restart the service and the server machine, if required

Scheduled restarts (default maintenance restart period is one week) with configurable time limitations

Operates based on the software and system overall health monitoring

Default trigger values selected based on extensive tests run on systems of different configuration and stability levels

Configured for each server independently

Logging of watchdog activity

Individual watchdog for the Macula Monitor application that observes software behaviour and restarts the application in case of certain failures

Watchdog can be used by License Plate Recognition module if it is installed on the same machine

## Motion Detector

Camera-side motion detection support for most devices: analysis of raw (non-compressed) video stream on the device side decreases resource usage on the server side and provides best detection results

High performance software motion detector mode: analysis of key frames only, lower CPU and memory usage, limited accuracy

High accuracy software motion detector mode: analysis of the whole video stream, maximum accuracy for motion detection on a compressed video stream. Recommended for use cases where motion shorter than 1 second must be detected.

Ability to use lower resolution stream for server-side motion detection to decrease server resource usage, both for high performance and high accuracy modes

## Camera-side VCA Event Support

Multiple vendors (including ONVIF Profile S devices)

Data mining for post event analysis and data management

Sensitive tracking with a low false alarm rate

VCA adapts automatically to varying lighting and weather conditions

Simple detection zone setup

Fire and Smoke – WARNING - The smoke and fire video analytics do not comply with any detection standards and should not be used as a safety device. VCA should only be installed in addition to certified safety devices and used only to supply additional information.

VCA enabled encoder/camera can be used as a stand-alone intruder sensor or digital output contact can be set to react to specific triggers

Analytics stabilization allows software to work effectively on swaying cameras

Rapid 'learning time' of just a few seconds. Can be used with PTZ cameras - detection is suppressed during camera movement

Unique features - PTZ auto tracking, fog and smoke reduction, image stabilization and camera tamper

VCA has NO single point of failure, because the Analytics is integrated on the Edge HW; Video server or into the Camera

VCA is very easy and simple to configure even for installers with limited experience

VCA fits many market segments without modifications

## Software VCA Support (requires additional license)

Video Analytics with Data Mining Filters

Built into the server core - no extra installation required

No extra hardware required

Zones and lines: virtual fences, trip wires, perimeter protection, intrusion detection, behavior detection, non-detection zones

Counting lines

Camera Tamper Detection

Camera Shake Cancellation

Surveillance tracker

Presence filter

Appear and Disappear Filters

Abandoned Object Detection

Removed Object Detection

Class and speed filters + calibration

Direction filter

Dwelling (loitering) detection

Tail-gating filter

On-screen counters

Object Meta data

Counting (people, cars, object counting): highly accurate information on the number of people who enter their premises to use their facilities. It can apply to different applications, such as airports, bus and train stations, bars and clubs, car parks, retail stores and shopping malls, museums and tourist attractions, sports and leisure facilities, and many more.

VCA event investigation in Macula Monitor application

VCA filters can be used as event basis for automated server-side scenarios (Events & Actions)

## Events & Actions (E&A)

Send emails notifications: text macros are supported for automatic insertion of such data as timestamp, event source etc. with an option to attach a snapshot from any available main or secondary stream

Send custom notifications via Run third party program feature, for example, using telnet or generic socket connections

Events: recording errors, disk excluding, video lost, video restored, motion events, VCA events, digital input, user's events (user button pressed), scheduled and periodic event (clock event), events from external services (LPR, FR, API, OPC, access control), events from video walls, events

based on logical comparison of a variable value where the variable is extracted from external textual data stream

Actions: PTZ preset, digital output, write to application/event log, activate layout, popup live channel/layout, pop up instant playback, send email notification, send email notification with attached snapshot, run third-party program, activate any recording profile for any stream, highlight object on the map, send SNMP trap to a third-party SNMP manager, send HTTP request, create a bookmark for any channel, save frame to FTP, send a textual and/or audio notifications to any Macula Monitor application, send live/pre-defined audio to camera, send notification to an external service (API, OPC, access control), send push notification to mobile application

Multiple SMTP server configuration: use many different email servers for notification sending

Rule schedules: configured rules can be triggered on weekends or working days only, or follow a fully custom time schedule on a weekly basis

Global events: share events between servers and make events from one server trigger actions on another one

Indicators: items with multiple states, which can be changed based on external events and displayed on maps

Rule combining (conditions): use two events (event conditioning) to trigger a single action

Event postponing and aggregation (timers): action execution may be postponed for the required amount of time

Single event can trigger an unlimited number of actions on one or multiple servers

## Audio Support

Receive audio from device: supported compressions are G.711 (PCM a-law and u-law) and raw audio.

Transmit to device (two-way audio), including mobile devices via Macula Mobile application

External audio source support (microphone connected to the server directly or using additional hardware)

Combine video channel(s) with audio source from a different device

## Organisations

Enterprise feature in Macula Enterprise for hosted solution providers or projects that require splitting of resources on a logical basis

Sub-administrator role with the ability to create/manage new user accounts inside the organization and also manage resource permissions

Resource management: channels, sub-administrators and regular users can be assigned to organisations

## Failover Clustering (does not require additional license)

Failover setup for recording servers

Unlimited number of failover clusters and failover nodes (servers) available for Macula Enterprise without any extra fee

1-to-many, many-to-1 configurations supported

Automatic failover server starts in case of a failure with an option to define time for failover event triggering

Automatic or manual switch back after main server recovery

Zero downtime (immediate substitution)

Failover server can be forcibly (manually) started to take over operation of a recording server, allowing server hardware maintenance procedures without any system downtime

Real-time node status monitoring

## Central Server Mirroring

Redundancy feature for the central management server in Macula Enterprise

Temporary solution for Central Server out of order situation and limits some of the features.

## Multicast Support

Video via multicast from cameras to server(s)

Server-client multicast (for Macula Monitor applications)

## Networks

Enterprise feature for sites with multiple different networks: provides centralized connection via central server address

TCP/IP routing configuration for Macula Enterprise installation

Makes system infrastructure transparent for the user

## Groups

For easy resource management via Macula Console

Grouping available for: servers, users, devices, channels, e-maps, shared layouts, layout templates, video walls, user buttons

Visual groups for resource arrangement in Macula Monitor application

## Users

User details: login, password, email, organisation attachment, PTZ priority, number of incoming connections, group membership

Advanced permission control with detailed access levels

Detailed resource permissions for organizations, servers, networks, devices, channels, e-maps, user buttons, layout groups, video walls, and other resources

Administration profile for creating sub-administrator roles with limited management permissions

Membership in groups, nested and/or overlapping groups can be configured

Virtually unlimited number of users

User account control via server policy, global and per-user

Server policy includes password complexity settings for enhanced security and password expiration

Server policy allows to define a maximum number of simultaneous connections from a single user account, with the ability to override the global setting for individual users

## AD & LDAP

Export of users from Active Directory or LDAP

Support for Active Directory groups

Automatic synchronization for the deleted and newly created users

Active Directory accounts can be used for local and remote login via Macula Console and Macula Monitor applications regardless of used Windows account

## Health Monitoring

Real-time monitoring of servers, devices, channels, user sessions, recording status, storage health, reports, indicators, video walls and external services (LPR, FR), as well as access control and OPC servers

Centralized monitoring for all servers in Macula Enterprise

Statuses and hardware load for remote servers

Connectivity, failover, video stream status

Recording information per stream and storage report

Live stream statistics for main and secondary video stream

Detailed recording statistics per-channel and per-storage, including total size and estimated data per day

Current client, video wall, external service connections

Connections from access control and OPC servers

Status and last execution time for automatic reports based on counters' data

Current states of all indicators in the system

## Audit Log

Logging of a vast variety of important events, such as: user actions related to server administration, resource management and access, archive access, internal system events like server connection/disconnection and configuration synchronization

Logging of any user-defined events, including external, via Event & Action configuration

Event reports for servers and users

Event filtering by period, by event or by server/user

Audit export to a CSV file

## E-Maps

Bitmap based maps, all popular image types supported: JPG/JPEG, PNG, TIFF, BMP, static GIF; images of size up to 8.25 megapixels

Geo maps based on the OpenStreetMap under the Creative Commons CC BY-SA license: any sector of the world map can be used as the map basis instead of the image

GPS tracking of mobile devices for geo maps

Map grouping for easier permission management

Interactive and multilayer maps: markers for channels, layouts, user buttons and links to other maps for easy navigation, as well as access control doors and indicators

Variety of icons and colors to choose from for each object placed on the map

## User buttons

User button grouping for easier permission management

Manual action controls for Macula Monitor and Macula Mobile applications: user buttons are used to manually trigger events, which can be linked to any available action including DO control, activation of recording profiles, various notifications etc.

Schedules, timers and conditions can be applied in the Event & Action Configurator for user button related rules just as for any other regular Event & Action scenarios

User buttons can be bound to any channel(s) and appear attached to these automatically in the Macula Monitor application

## Live Podcasts

Streaming of any live channel to third-party RTMP servers (e.g., Youtube, Wowza) for further broadcasting Video (main, secondary) stream and audio casting supported

## Reports

Daily, weekly, or monthly reports based on VCA or software counters

Graphical representation: bar, line, pie type diagrams

Reports are automatically sent to the specified email address in PDF format after the reporting period is over

Get reports for any type of event, internal or external

## Layout Templates

Custom layout templates for the Macula Monitor application

Up to 20 rows/columns, up to 100 viewports per layout in total

## Layouts

Groups for sharing layouts between multiple Macula Monitor applications throughout the whole system

## Visual Groups

Special group type for arranging resources on the Macula Monitor application side

Grouping of channels, maps, layouts and user buttons

## Addon App (Applications)

LPR - Macula License Plate Recognition software (separate application and license)

FR - Macula Face Recognition module (separate service and license)

VDS – Visual Data Solutions (separate application and license)

VAS – Visual Access System (separate application and license)

## Integrations

Connection to OPC servers (OPC client functionality): support for multitude of industrial hardware devices

Possibility to build automated Event&Action scenarios based on triggered external events, and send requests to external systems



## 4 Client: Macula Monitor

Free distribution - license free application

Multiple servers can be connected to a single Macula Monitor and many Macula Monitor applications can connect to a single server

Multiple displays for live view and main multi-purpose window

Local and remote video wall control

Automatic connection to all resources via central server - full system hardware and architecture transparency

Automatic re-connection to the mirroring server in case of main central management server failure

Automatic re-connection to recording servers for live view and playback in case of the central management server failure

Direct connection to recording servers supported for live view and archive access

Configurable viewport overlay controls in live mode and playback mode

Application themes: fully customizable interface colors with the ability to save a scheme for future reference

Application administration tool for choosing what functionality is available in every application instance

Single- and multichannel snapshot and video export from multiple archive investigation modes

Channel online/offline status reflected in the channel list and on interactive maps

Export of the search results to a comma separated value file for VCA, VDS, access control, license plate recognition and face recognition service data

Access to archive backup in native format with provided user account

### Live View

- Live video streaming from server(s) to one or multiple client applications without delays, unicast or multicast

- Dual streaming support with automatic switching mode for optimal resource and bandwidth usage

- Overlay controls and stream statistics

- Snapshot export

- Two-way audio support, also for mobile phones

- Global and individual stream aspect ratio

- PTZ and digital PTZ, dewarp for fisheye and panomorph lenses

- Layouts (stored locally) and shared layouts (stored on the server)

- Layout sequences

Channel shortcuts: video overlay elements that act as links to other channels when clicked

Configurable time presentation (local/server/UTC)

## Instant Playback

Playback of the newest footage simultaneously with the live view

Supported for one or multiple viewports

Used for presentation when investigating results from external services and data sources

Configurable instant playback timeline duration and rewind interval

Instant playback pop up on screen based on configured events

## Archive Playback

Multichannel playback with layout templates and a calendar for footage summary

Channel layout is retained from live view mode

Main or secondary stream playback preference

Dual timeline presenting the currently selected channel and the summary for all channels present on the layout, with a possibility to disable the summary timeline

Up to 128x speed playback in both directions

Video, audio, VCA metadata, bookmark and motion marking on the timeline

Controls for browsing timeline in both directions step by step

Snapshot and video clip export

Bookmark search

Server-side VCA event investigation

Archive calendar

Archive interval protection and manual deletion (using special permissions)

## Sequence Explorer

Footage sequencing: splitting the video from specified time range into specified number of pieces

Quick visual investigation of the footage by the means of repeated sequencing

Down to 2 minutes each portion of footage

Only video stream required, no extra prerequisites

Instant playback and video export options

## Smart Search

Advanced archive investigation mode

Search by motion region based on motion detection metadata

Configurable threshold for distance between consecutive motion events

Works for both device-side and server-side motion detection

## Video and Snapshot Export

Single snapshot export available in live view and in any archive view mode

Multichannel snapshot export from multichannel archive playback

Single channel video export from instant playback, multichannel playback, sequencing and smart search modes

Multichannel video export with or without merging all channels into one picture, with the ability to combine video with audio from different source

Video export in AVI, MKV, MP4 formats, as well as video export as frame series

Supported codecs: native, JPEG, VP8

Soft and hard subtitles

Post-export watermark validation tool for all exported files to prove footage authenticity

Exported files can be later played by common media players

Portable player tool to ensure playback on computers without Macula installed

Export-time motion blur (privacy masking) with configurable blur level and sensitivity

## Joysticks and DCZ Keyboard Support

Default set of commands for keyboards and DCZ keyboards

Custom command mapping for any type of keyboard/joystick

All main application related actions can be bound to the keyboard shortcuts, e.g., archive navigation, channel control, PTZ presets and layout related actions

Generic DirectShow compatible controller devices are supported

Multiple application windows can be controlled with joysticks and DCZ keyboards

## Operation Modes

Always on top: application window stays on top of other windows

Exclusive: application does not allow accessing other applications until a pre-defined password is provided

Locked: application controls are not available until a pre-defined password is provided

Combined settings for operation modes

Startup operation mode setting

Screen saver overriding

Admin tool for the Macula Monitor application allows to define available interface elements and functionalities regardless of user permissions (Windows administrator right required to run the tool)

## Screen Layouts

Built-in layout templates for each Macula Monitor application

Custom layouts that can be saved locally on the client workstation or shared via central server

Shared layouts: layouts are shared between all Macula Monitor applications via central server

Individual viewport settings (e.g., aspect ratio, map zoom) in the live view are saved with the layout

PTZ presets and DPTZ positions for each individual camera are saved with the layout

Layout sequences: automatically loaded series of layouts with the possibility of manual control and controllable time period per layout

Default startup layouts and layout sequences

## PTZ

Generic PTZ: pan, tilt and zoom controls available for PTZ-capable devices

PTZ controls for Macula Monitor as well as for Macula Mobile and Web clients

DCZ keyboard and generic joystick support for PTZ control and related actions, such as calling presets

HUD: Heads Up Display control overlay for Macula Monitor application

Classic virtual PTZ sphere as an alternative to HUD mode

PTZ controls can be hidden via application settings for Macula Monitor

Presets with the option to save the last used preset with the layout

PTZ Tours: custom sets of presets for the PTZ camera to follow, with users able to override these

## Digital PTZ

Supported for any video stream

For live view and playback modes

DPTZ settings saved and loaded with the layout for both channels and maps

DPTZ presets

Single video stream can be displayed multiple times with different regions of interest

Zoom by mouse wheel

Region mode with picture-in-picture preview

Point-to-Click mode with picture-in-picture preview

## Fisheye Dewarping

Generic dewarp for any fisheye image with any resolution and aspect ratio

Configurable via Macula Console application using simple, user-friendly visual controls

Region mode, 180-degree and 360-degree panorama

## ImmerVision Enables® Panomorph lens support

## E-Maps and Geo Maps

Can be displayed in any viewport just like any regular channel, with the ability to use digital zoom

Interactive map contents: click markers on the maps in order to display related contents, e.g. other maps and channels, and to trigger custom actions assigned to user buttons placed on the map

Interactive markers for channels, layouts, links to other maps, user buttons, doors from access control integration

Location of mobile devices is displayed on geo maps if GPS tracking is enabled

## User Buttons

Software buttons defined for each server via Macula Console application and bound to any available action

User buttons can be triggered from the button list, attached to any channel(s) in the viewports, and also activated from interactive maps

## Alerts

Alerts section for server connection errors and logging of user actions

Client notifications from server E&A scenarios: popup messages, write to Alerts section, per-channel notifications, configurable sound alerts

Individual notification area for each live channel

## Library

Pre-configurable library directory

Pre-configurable default settings for snapshot and video export

File export from the library to the external folder/disk, as well as removable media, CD and DVD burning included

Watermark Validator and Portable Player tools can be included with the files copied externally

## External Services

Representation of data from LPR, FR and VDS

Live results in the notification area of each related channel

Archive investigation with search options

## VCA

VCA metadata overlay for server-side Open VCA

Playback mode: VCA search for counters and rules with instant playback with an option to export search results in CSV format

Report generation based on counters for the desired period with configurable days/hours of interest

Report export in PDF format

## Access Control

- Live statuses

- Archive navigation based on events

- Cardholder information

## Reports

- Graphs: build diagrams based on VCA or software counters (counter data present in the archive)

- Bar, line and pie type charts for the selected time period

- Heatmaps: visual reporting of motion intensity in the scene for the specified time period, based on recorded software-side motion metadata

- In-application reports and image export (JPG format for heatmaps, PDF format for graphs)

## 5 Video Wall

Convenient management of monitoring workstations in big installations with large number of displays in Macula Enterprise

Unlimited number of video walls - no extra fee

Up to 100 physical displays per each video wall - up to 20 rows/columns and up to 100 viewports per layout in total (**theoretically up to 100 physical displays x 100 viewports per each video wall**)

Quick intuitive setup, configuration and management

Send individual channels to the video wall manually via user interaction from the Macula Monitor application or automatically via Event & Action scenarios, including half-automated solution with user buttons

Use video wall events in Events & Actions: detect if certain channel was placed onto a specific video wall screen or even a specific viewport on a video wall screen

Instantly share the contents of any application window with any video wall screen

Once set up, remote video wall screens can be easily managed from any other Macula Monitor application connected to the same server - no need to configure every display individually using local mouse/keyboard

Each video wall can be driven by any number of physical machines - no hardware dependencies

## 6 Watermark Validation

Portable tool provided with files exported to external media to prove footage authenticity

All data is signed while received and recorded

AVI, MKV, MP4 containers; JPEG and VP8 codecs supported for exported video data

Native archive validation



## 7 Portable Player

Independent lightweight tool for playing back files exported via Macula Monitor application, as well as viewing native Macula archive

Multichannel layout templates for the proprietary archive playback with synchronous playback of multiple channels

Own library for snapshots and video clips exported from the native archive playback mode

## 8 HTTP API

Simplified API for third party software integration that allows interaction of third party services and Macula servers

Receive list of resources permitted for user account used

Retrieve live main and sub video streams in HTML5 compatible format

Retrieve archive video streams in HTML5 compatible format

Receive and transmit audio data

Stream video and audio to Macula servers

Retrieve snapshots (JPEG) from live and recorded video

An option for unauthorized access to public resources

Control pan, tilt, zoom, focus and presets (PTZ)

Trigger actions on Macula servers

Receive Macula events

Push live data from third party software (e.g., Access Control, Point of Sale, Building Management, License Plate Recognition, Face Recognition and others)

Retrieve third party recorded data in Macula Monitor application

## 9 Mobile Applications

Android & iOS ready

Connect over WiFi, 3G and 4G

Multiple server setup

Live video streaming for the main or secondary stream, stream preference based on output window size or manual setting

Live video statistics

Video playback - access to recorded main video streams with audio

Two-way audio in live view and audio playback for the recorded streams

PTZ control for live view: pan, tilt and zoom for PTZ-capable devices

PTZ presets and tours

Visual group support (channel grouping)

Chromecast support in the local network

Live video and audio streaming from mobile app to the server using the mobile phone's camera(s)

Edge video recording (live or offline)

GPS data transmission to the server

HTTPS support

No stream re-compression on the server side - no extra CPU or memory usage

1x1, 2x1, 2x2 and 3x2 stream layout templates

Custom layouts based on available templates

Snapshot saving

Widgets for single channel view with refresh rate from 30 seconds to 1 hour

Support for H.265

Per codec decoder configuration (software/hardware)

Battery usage monitoring when software decoding (battery-intensive) is used

User button support - any action defined on the Macula server can be triggered from Macula Mobile

Push notifications with an option to open archive for the corresponding camera and time

## 10 MacOS Thin Client

OS X and macOS compatible

Connect over cable, WiFi, 3G and 4G

Multiple server setup

Live video streaming for the main or secondary stream, stream preference based on output window size or manual setting

Live video statistics

Video playback - access to recorded main video streams with audio

Two-way audio in live view and audio playback for the recorded streams

PTZ control for live view: pan, tilt and zoom for PTZ-capable devices

PTZ presets and tours

Visual group support (channel grouping)

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1x1, 2x1, 2x2 and 3x2 stream layout templates

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Per codec decoder configuration (software/hardware)

Battery usage monitoring when software decoding (battery-intensive) is used

User button support - any action defined on the Macula server can be triggered from Macula Mobile

Push notifications with an option to open archive for the corresponding camera and time

## 11 Web Client

Local and remote access via dedicated configurable HTTP port

HTTPS support

Live video streaming to browser Client application

Access to recorded video streams

Pan, tilt and zoom control for PTZ-capable devices

1x1, 1x2, 2x1, and 2x2 stream layouts

Main and sub stream switching

No stream re-compression on the server side - no extra CPU usage

## 12 License Plate Recognition

Designed to detect, recognize and register vehicle license plates with a high level of reading reliability

Intuitive installation process

Designed to work with Macula with both live and recorded streams

64-bit

Runs as Windows service

Simple Web user interface for local or remote configuration

Works with any camera Macula supports

Live result presentation in Macula

Result browsing in Macula

Can be used for vehicle access, traffic control and enforcement applications

Can be used for vehicle access, traffic control and enforcement applications

High performance recognition with low error rate

Frame engine for accurate detection of fast moving vehicles

Configuration presets for typical scenarios based on the vehicle speed

Recognizes license plates from multiple countries

Supported countries: AL DZ AR AU AT AZ BH BY BE BO BA BR BN BG CA CL CO CG CD CR HR CZ CU  
DK EG EE EC FN FR DE GE GH GR GT GG HK HR HU IN ID IR IE IM IL IT JE JO KZ KP KR KW LV LB LT LU  
MK MY MX MD MC NZ NL NG NO PK PY PE PH PL PT QA RO RU SA RS SG SK SL ZA ES SE CH TW TZ TN  
TR UA GB US UY VE VN

Recognition area adjustment for system load optimization

Lighting conditions adaptive algorithm

Support for local and remote unlimited “White” and “Black” lists

Result re-filtering

Interface to external applications and devices

Storing recognized license plates and snapshots on local or central database

No imposed limitation on the number of cameras

## 13 Face Recognition

Designed to work with Macula Professional and Macula Enterprise

Suited for human resource control applications as well as for security and enforcement applications

64-bit

Runs as Windows service

Simple Web user interface for local or remote configuration

Works with any camera Macula supports

Simultaneous multiple face recognitions

1-to-1 and 1-to-N face matching modes

Simultaneous processing of multiple video streams

Connection to one or more Macula servers

Live result presentation of both tags and pictures in Macula

Result browsing in Macula

Result search based on the user-defined picture containing a face

Event & Action (E&A) scenarios of Macula server can be based on the recognition events

Local or central database

No imposed limitation on the number of cameras

## 14 Visual Data Solutions

Visual Data Solutions (VDS) is the integration of useful information into CCTV visual

The combination of data information with video proof makes daily production process more effective on identifying potential loss or problems

Evidence can be stored for months to years, depend on design

Easily retrieval of evidence, by simply key in the data like product Barcode, Invoice No., Serial No., Person Name, Sensor Values, etc

Some of the potential integration: Barcode System, Weight Bridge System, Access Control System, Sensors, Serial No., Invoice/Delivery Order No. and PLC/SCADA... etc

With SQL database structure, virtually you can integrate any set of data you want with pair with visual from any camera

Transmit/receive and data over the TCP/IP with SSL secured connection



## 15 Visual Access Solutions

Instant search on access control events log plus video footage simultaneously

List of doors with status

Cardholder names with photo

Smart Filter – filter by Doors, Cardholders, Events, and Period of times

Trigger an alert that brings relevant events into effective action

Perform quick and easy access validation audit

## 16 TrueBlue Care

Come with 2 years TrueBlue Care support pack

Remote software configuration support, phone or email or Carry IN support

User operation training at GSF

Come with 2 years software updates plan