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Digifort Video Management System

ARCHITECTURAL AND ENGINEERING SPECIFICATION

Video Surveillance - Control and Management Systems

digifort

Section 1- Products

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1.1 Video Management System General Description

A. The video management system (VMS) specified shall be a hardware agnostictruly open IP video security solution that provides seamless management of digital video, audio, plus other security disciplines such as access control across an IP network.
The VMS is designed to provide the ultimate in flexibility from a standalone system through to a multi sited geographically dispersed fully integrated package.
The VMS shall be truly open in terms of device support with over 300+ manufacturers and 6000+ devices.

B. The VMS manufacturer shall be of Global repute and incorporated for at least 10 years from the date of publish of tender.

C. The VMS shall have at least one city surveillance application installation globally in operation for at least 24 months with a minimum of 5000 cameras as on the date of bid submission.

D. The VMS software shall run on COTS (commercial off the shelf) hardware.

E. The VMS software shall be ONVIF profile S, G, and T compliant and listed on the ONVIF web site.

F. The VMS system shall feature client / server architecture and distribute server configuration updates to all connected clients automatically.

G. The VMS software shall require only three types of servers, with the following roles.
   a. Recording server. This incorporates all necessary VMS function and management.
   b. VCA / LPR server. This performs all video analytics / LPR related functions.
   c. Failover server (optional)

H. The VMS software shall have its own database management tools, including a maintenance scheduler.

I. The VMS software shall not require any MS software to operate other than the MS operating system. In particular it shall not require MS SQL or Frameworks.

J. The VMS server application shall run on any MS Windows OS version from Windows 10 and for from Windows Server 2003 to current (Server 2019)

K. VMS Clients shall run on any MS software in 32- and 64-bit modes from Windows XP through to Windows 10.

L. The VMS software shall use a single executable installer package that contains all required VMS system software elements.

M. All VMS software updates and upgrades shall be supplied as a single executable installation package. The only exception being small patches required for small or urgent features.

N. The VMS shall feature the following licensing model:
    a. Licensing systems shall be offline based on a physical USB dongle key.
    b. Unlimited surveillance clients with no charge for the software.
    c. Free software support free of charge for project lifetime.
    d. Free of charge upgrades within the same version for minimum of 6 years.
    e. The software shall not command any ongoing maintenance fees or similar charges.

O. The VMS shall feature an embedded web client object to allow for display and navigation of web pages within the surveillance client. This also allows for integration with 3rd party web-based systems.

P. The VMS shall provide a fully documented API (application programming interface) document to allow 3rd party software integration. There shall be no charge for the API document or support relating to it.

Q. For larger systems the VMS shall support centralized surveillance client configuration.

R. For larger systems the VMS shall support centralized server registration.

S. The VMS shall allow the creation and display of an instruction / disclaimer message that will be displayed to a user at login. The user must accept the instruction / disclaimer before they can proceed.

1.2 Architecture and Security

The VMS system shall allow:

A. An overall unlimited system size in terms of cameras and supported devices. Expansion shall be supported via camera license packs.

B. Images to beviewed and recorded at up to 30fps per camera.

C. Devices such as IP cameras, video encoders, DVRs, NVRs,video interphones, and cameras in supported Android and Apple mobile devices.

D. Live video display and recording of Windows computer desktop screen.

E. Storage and transmission of images in MJPEG, MPEG4, MxPEG,H.264 and H.265 formats and at any available resolution.

F. Multi streaming where media devices such as cameras feature multiple streams with differing resolutions and compression methods.

G. Live viewing and recording of Fisheye, panomorphic and multi imager cameras, having the benefit of deep integration of the manufacturer's SDK / API.

H.   Tools to set filters and effects on camera images.

I.   Alarm I/O boards to an overall unlimited number. Expansion shall be supported via softwarelicense packs.

J.   Multi-tasking, meaning all processes are autonomous and do not affect any other processes.

K.   Utilization of multiple processors where fitted. The software shall divide its tasks between processors to improve performance and can decode multi-threaded-multicore with a definable RTP timestamp buffer available for its camera connections.

L.   Compatibility with Unicode characters.

M.   An integrated embedded RTSP media server. Allowing the software to provide real time streaming via RTSP from the recording server(s) to any 3rd party software application.

N.   Support for RTSP and RTSPS with TLS/SSL.

O.   Support for IPV6.

P.   Support for remote access to the server with no software-imposed limit of connections per server.

Q.   Support forIP filters.

R.   The software tomaintain a comprehensive log which contains and monitors items such as:
       a.   Access to servers.
       b.   User actions.
       c.   System alerts.
       d.   System errors.
       e.   Device activity.
       f.   VCA and LPR recognition and classes.
       g.   Google maps coordinates for events.

S.   Support for DNS.

T.   Support of TCP and UDP (unicast and multicast) protocols between clients and servers.

U.   Support SRTP for surveillance clients in Multi-cast.

V.   Support for the distribution of video via multicast on demand.

W.   A complete user rights system with an unlimited number of individual user profiles. User profiles shall denote which aspects and features are allowed for every user profile.

X.   A complete audit system for control of users and groups.

Y.   Support for user groups to allow the allocation of the same user configuration and permissions for all users within a group.

Z.   A schedule to control user logins.

AA. Support of the expiry and blocking of user accounts.

BB. Support for at least 999 levels of PTZ control priority, with a priority allocated to each user. PTZ usage per user may also be calendar controlled.

CC. Inclusion of users through auto synchronization of Windows active directory users.

DD. Support for double factor of authentication using an integrated one-time password application based on 2FA authenticator.

EE. Capability of enforcing the use of strong passwords.

FF. Support ofa user-based privacy mode, privacy shall be enforced based on user privileges and specific cameras.

GG. Support for unidirectional and bidirectional audio with audio zoning.

HH. Integrated software services control application.

II. Cyber Security:
    a.   The software must support a strong password policy and must be stored in a salted MD5.
    b.   The software shall support AES256 encryption in Unicast when it is available in the camera.
    c.   The software shall support recording encryption AES128 and AES256.
    d.   The software shall support SSL encryption server to sever and server to clients.
    e.   The integrated web server shall support Https and SSL.
    f.   The passwords for all connected devices shall be stored with encryption.
    g.   The passwords for server access, stored in client computers (when using auto login) shall be stored with encryption.
    h.   The software shall support encryption for export using AES256.

JJ. The softwaretosupport standard native privacy blurring of images for selected users and user groups. The privacy blurring is CPU based and requires no extra hardware, and is included with each channel license.

KK. The software shallprovide options to disable certain Windows features such as print screen. It must also be possible to modify the client behavior to prevent it being minimized or closed.

LL. Whenemail is to be included in event actions the software shall include a playback link for video and embedded VCA.

MM. The softwareshall support activation or de activation of any object on event. Objects types are cameras, alarm devices, and analytics configurations.

NN. The VMSshall support report authentication through a bar code feature. The system shall create a bar code to all issues reports and each report is then saved on the server. To later check on a report that has been issued by the system, simply request the report through the bar code and the system will recover and display the report.

OO. The VMS shallinclude useful engineering tools so speed up installation in the camera registration screen, such as Ping of the device IP address and media (stream) preview.

PP. The softwareshall support SNMP trap version 2.0/3.0.

QQ. The VMS shallsupport the export of information about installed objects, such as cameras etc. The export shall be to a .csv file including details such as:
   a. Model.
   b. Port.
   c. IP address.
   d. Camera name.
   e. Description.
   f. Users.
   g. Status (activated or de activated).
   h. Shortcut.
   i. Recording path.
   j. Relay details.
   k. Media (stream) profiles.
   l. Recording type.
   m. Recording days.
   n. Recording pre and post times.

RR. The software to showthe operational status of very camera on the system via the admin client, on demand.

SS. The software shallbe capable of triggering events on failure and re instatement of connected devices.

2.1 Failover

A. The software must have a failover system that does not rely on any third-party software utility such as MS Cluster.In addition:
   a. The failover system shall be fully customizable and can be 1:1, 1: N, and N: N.
   b. A failover server should take over the operation of a failed server within 3-10 seconds of the failure being detected.
   c. The failover server will take over all programmed duties of the failed server unless programmed otherwise.
   d. It must be possible to create events on failover to inform operators of a failover situation.
   e. The configuration for desired failover cameras shall be achieved with a simple export feature. This will inform the failover server of the active (alive) server and cameras it will replace in the event of the active (alive) server failure.
   f. After a failover when the previously failed server is back in service a fail back will take place within 3-10 seconds of the re instatement of the live server.
   g. It must be possible to create events on failback to inform operators of a failback situation.
   h. Failover capability must take over not only the VMS and I/O devices, but also VCA, LPR, maps and operational maps.

3.1 Recording
A. The softwareshall manage the storage of content with unlimited size per camera. It shall also indicate the actual output size to each connected logical dive.

B. Provision of a timeline of recorded images showing the points where there are recordings, as well as audio, motion or analytic metadata and bookmarks.

C. Recording triggered by motion detection.

D. Event recording.

E. Audio recording from supported devices.

F. Pre and post alarm image timer with up to 60 seconds pre alarm and 60 seconds post alarm.

G. Scheduled recording.

H. Digital certificate for recordings.

I. Automatic disk management using asystem with programmable record period settings (such as 30 days)

J. Protection against the natural deletion of recordings. In such cases images can only be deleted by a user with sufficient rights.

K. Automatic changing of recorded frame rate and resolution on any event condition.

L. Bookmarking of recordings as follows:
    a. Creation of bookmark when recording profile is changed. This may be automatically triggered by any type of event or manually by an operator with sufficient rights.
    b. Automatic placement of bookmarks on the video time line for playback purposes.
    c. Bookmarks may also be created simultaneously across multiple cameras.
    d. Bookmarks also allow for choice of colour, initial and final times, and operator observations.
    e. Option for locking bookmarks against the natural deletion process.

M. Edge recording, where the VMS system will allow:
    a. The automatic downloading and merge of recordings stored in the memory cards of supported devices.
    b. A self-healing option where the system can be configured to automatically download recordings from edge device media following a communications system failure. Downloaded footage will then fill in the gaps in local recording.
    c. Automatic downloading of recordings from edge media on any VMS system event.
    d. Downloading of recordings via scheduled events, creating a scenario where recordings can be downloaded automatically at a scheduled time.
    e. Automatic creation of bookmarks whenever downloaded video is merged with the main recordings, allowing a clear identification on the time line to distinguish between the main recordings and downloaded recordings.
    f. A complete activity log and capable of triggering specific events when edge recording becomes active.
    g. Support for direct playback from the edge device media.

N. Support for recording video from the cameras of Android and Apple mobile devices is enabled so that.
    a. Video and audio from any supported mobile device shall be treated as any VMS camera channel with the same feature set.

> b. The mobile camera application must send video transcoded into H.264 to the server at a resolution and frame rate which is user selectable up to full HD (1920x1080) and up to 30fps. Bi directional audio and GPS coordinates must also be included where the mobile device supports them.

O. Support for metadata recoding, allowing the marking of the video content and time line with event information from motion detection,VCA, plus other applications that are capable of generating metadata.

P. The software tosupport video archiving to secondary storage. Archiving must secure the video as well as audio and metadata. The archiving must be able to schedule the operation over the seven days of a week and synchronized for a required number of days. The VMS must allow archiving in any cloud base storage.

4.1 Clients,Live Displays, and Events

A. The client software shall support Nvidia and Intel quick sync GPU decoding for video processing of live views and also playback functions.

B. The client software shall support multi CPU thread decoding for multi megapixel cameras.

C. The client software shall support video buffering with different settings for mixed and moving (PTZ) cameras.

D. The client software shall support the viewing of cameras from various servers in the same screen display.

E. The client software shall allow users to select the desired video stream for live viewing when multiple video streams are available. The software may also be programmed to automatically change the viewed media stream when a camera is selected.

F. The client software shall support the creation of a view that mixes cameras, maps, web pages, VCA, LPR, operational maps, and audio devices.Views can be saved as private or public.

G. The VMS software shall provide object links navigation (navigate through objects by using overlay links in both live and playback modes) These links can be related to cameras, I/O, VCA, LPR, Maps, Events, Http commands, and views.

H. The client software shall support up to eight monitors per client workstation with customizable screen styles up to a 400 image (20x20) screen mode.

I. The client software shall feature an embedded-on screen keyboard that can be accessed by a simple two keys combination.

J. The software shall support sequence views as follows:
  a. A sequence of single screen images, which can be cycled on a timed basis. PTZ cameras that support preset positions can have these presets cycled on a time basis.
  b. A sequence view can combine single cameras, multiscreen views, VCA views, LPR views, Maps, and operational maps.
  c. Sequence views can be defined as private or public.
  d. The sequenced view must have no delay more than half a second to display the next view using background buffering.

K. The VMS software shall support a purpose designed fully integrated system control keyboard that is USB connected. The keyboard must be preprogrammed with dedicated buttons for direct access of features of the client. The keyboard shall provide access to live view, playback, cameras and screen selection, virtual matrix control, and playback. The keyboard shall also feature a multi axis PTZ twist top joystick to allow simultaneous pan, tilt, and zoom control of a camera. This keyboard must have at least 24 keys providing direct access to client functionalities.

L. The client software shall feature a dedicated PTZ control keyboard setup page, to allow precise control should network latency be encountered.

M. The software shall support operation via a virtual matrix (video wall), this feature shall be included with the software and command no license fee.
a. The virtual matrix must not require any additional server hardware.
b. The virtual matrix shall be presented to clients as a list of monitors that aredefined for this purpose, where the operator can select a desired monitor and send live images, playback sessions, maps, and screen styles via the clients keyboard and mouse or dedicated control keyboard.
c. Virtual matrix features shall also include:
    i. Programmable titles for all monitors that comprise the video wall.
    ii. The name of the object being displayed on the monitor or video wall.
    iii. TheVisible status of objects in the list of video wall monitors.

N. The software shall feature an alarm "pop up" window, which when triggered by any event may be distributed to any number of operators.
    The pop-up window shows alarm information, including:
    a. A live steam from the camera relating to the event. In cases where multiplecameras relate to an event, they will be presented in a multiscreen format suited to the total number of cameras for the event.
    b. The name of the server that issued the event notification.
    c. The camera name(s) and date and time at the point of event trigger.
    d. A playback button to allow access to recorded video from the start of the event.

O. The client software shall allow the display of all cameras, including VCA cameras in the same screen layout. In the case of VCA cameras it must be possible to play back VCA related incidents and events from the client screen layout.

P. The VMS shall provide a security feature that shall disconnect a specific user after a pre-defined period of inactivity has elapsed.

Q. The software shall support a web-based surveillance client in HTML5 capable of receiving live video in H.264, H.265, and MPEG4 decoding in the web client.

R. Client applications for mobile devices shall be free of charge and available by the app store on supported devices.

S. The software shall feature customizable camera events to allow support for features that do not fit into a cameras pre-defined event types. For instance, creation of an event for a video intercom call button.

T. The software shall, on event be capable of communicating with 3rd party systems via Http and Https.

U. The software shall support a virtual I/O feature to allow the combination of differing alarm triggers, for instance a sensor with a VA trigger. This provides the possibility of logical

AND or "double knock" between event types.

5.1 Playback and Export

A. The software shall permit the playback and export of various cameras simultaneously, synchronized together, and in any available screen style.

B. The software shall support an instant playbackfeature via right click of a camera in live mode. Each client will allow programming of what happens on instant review by starting from 5-20 seconds before the point of playback.It shall also be possible to start instant review playing backwards from the moment selected.

C. The software shall support instant access to playback by right click of a camera along with useful pre-selected times (such as 5 minutes ago)

D. The software shall feature a thumbnail search with programmable times that can be adjusted down to 1 second.

E. The software shall support a colour coded timeline when playing back video. Different colours shall denote different types of recording such as video, audio, motion or analytic metadata.

F. The software shall support the placement of bookmarks on the playback timeline.

G. The software shall support dragging and dropping of cameras from the tree and a live viewinto the player to facilitate rapid playback access.

H. The software shall feature search toolsutilizing comprehensive search filters.

I. The software shall provide a number of security features that may be applied to video exports.
    a. The software shall provide encryption of exported video in AES256.
    b. The software shall be capable of splitting a video export based on the size of the media used.
    c. The software must allow native export by default as well as AVI, MP4 and JPEG formats.
    d. The software shall provide password protection for video exports.
    e. The software shall provide a watermark feature for video exports.
    f. The software shall support JPEG time lapse export from video exported in native format.

J. The software shall support sequence exporting. This allows the export of a sequence of cameras by following the progress of an event from camera to camera as it took place. The exported media will then reflect the actual event as it unfolded and was observed by an operator.

K. The software player shall support turbo exporting.

L. The software player shall be able to play back archived media with direct access.

M. The software shall provide the facility for local recording to the local hard disk drive of the client machine. This shall be achieved by asingle click on the record icon (per camera) in live mode.

N. The client software shall support direct playback of video analytics cameras with all analytics features including object trails and other metadata features.

6.1 Maps

A. The VMS shall support maps with the following features:
   a. The synoptic map shall allow the use of images in many formats such as JPEG, WMF, BMP, GIF, and PNG.
   b. The map engine must support Google map import engine and must be able to populate cameras based on the location coordinates of each camera.
   c. The map engine must support multiple layers of google map allowing specific zoomed map region. The layers will automatically allign positions based on the under-layer map coordinates.
   d. The software shall support online Google map with automatic camera and event positioning. A Google API key is also required for this feature.
   e. There shall be allowance for an unlimited number of maps.
   f. Links shall allow navigation of maps as well as operational online Google maps.
   g. Icons placed on a static map may have a static beam dynamic beam denoting direction and approximate lens coverage, this requires the retrieval of absolute position coordinates.
   h. Camera dynamic beams may be changed in terms of colour and opacity.
   i. Visual status of icons for IP Pingable devices such as switches, routers, servers etc.
   j. Support of both static (synoptic) and active (operational Google online maps).
   k. Static (synoptic) maps shall support the field of view representation for fixed cameras.

6.2 Video Content Analysis (Video Analytics)

A. The VCA shall be fully integrated into the VMS.

B. The configuration of VCA must be available directly in the VMS interface, either embedded or directly displayed. A separate GUI for the VCA application is not acceptable.

C. The VCA shall be processed on dedicated server(s).

D. The software shall record VCA and motion metadata, linked to the relevant camera images.

E. The VCA shall support up to 40 user defined zones and lines per channel.

F. The VCA configuration shall support detection and non-detection zones.

G. The VCA shall support simultaneous tracking of up to 100 objects per channel.

H. The VCA object tracking engine shall support configurable object trails per channel to support different camera fields of view.

I. The VCA shall support tamper detection with configurable parameters for each channel.

J. The VCA shall support scene change detection with configurable parameters for each channel.

K. The VCA shall support 3D calibration of a scene to optimize analytics performance.

L. The VCA shall support classification of objects via area and speed, and/or deep learning filters.

M. The VCA Deep Learning filter classifications shall be individually selectable and support user definable confidence levels to trigger notifications.

N. The VCA shall support algorithms consisting of basic rules, filters and conditional rules to create custom and application specific rules.

O. The VCA shall support the following basic rules and can apply to specific object types (as defined during setup):
    a. Abandoned.
    b. Appear.
    c. Deep learning presence.
    d. Direction.
    e. Disappear.
    f. Dwell.
    g. Enter.
    h. Exit.
    i. Presence.
    j. Stopped.
    k. Tailgating.
    l. Counting line.

P. The VCA shall support the following filters:
    a. Speed.
    b. Object.
    c. Colour.
    d. Deep learning.

Q. The VCA shall support the following conditional rules:
    a. And.
    b. Or.
    c. Continuously.
    d. Previous.
    e. Counter.

R. The VCA shall support concurrent rules running on the same channel, zone, or overlapping zones.

S. The VCA shall provide metadata to the VMS for overlay and recording purposes:
    a. Zones.
    b. Line counters.
    c. DL classification.
    d. Colour signature.
    e. Object speed.
    f. Object height.
    g. Object area.
    h. Object class.

T. The VCA shall support configurable stationary object hold times to continue tracking objects that have become stationary.

U. The VMS shall support fully integrated edge device (camera) VCA with metadata for supported cameras with embedded VCA.

V. The VMS shall support deep integration of edge analytic servers based on DL (deep learning) and AI (artificial intelligence) including the tracking of objects or faces with metadata.

6.3 *License Plate Recognition*

A. The VMS shall natively integrate at least three LPR engines:
    a. Carmen ARH.
    b. Neurallabs VPAR.
    c. Open ALPR.

B. The software shall be able to create vehicle categories in clear text based on the type, background colour, and size of plates.

C. The software shall allow surrounding cameras to be included in an LPR configuration and link such cameras to live screens and playback.

D. The software shall allow Google coordinates to be linked to any LPR configuration.

E. The software shall allow the tracing of a plate showing the route followed on Google map.

F. The software shall support image cropping to select the area of plate capture.

G. The software shall support library selection for different regions of the world for the ones supported by the LPR engines.

H. The software shall support the creation of user profiles with plate number and related information.

I. The software shall support the creation of lists of user profiles with a valid start and end date for the profiles to be active.

J. The software shall allow the user lists to be colour coded.

K. The software shall support three methods for plate triggering:
    a. Video motion detection.
    b. External trigger.
    c. API trigger.

L. The software shall provide a report of all captured plates with advanced multi criteria filtering capability.

M. The VMS shall display a live list of all LPR events on a FIFO basis with the following items:
    a. Image of the captured plate characters.
    b. Plate capture static image.
    c. Level of confidence.
    d. Images from associated cameras.

N. The software shall feature event actions that relate to plate black and white lists as defined by the user.

O. The software shall support rules to trigger LPR events such as speed and plate validity.

P. The VMS shall support edge LPR integration where the LPR engine is onboard the camera. This integration must be available for at least 5 manufacturers.

Q. The VMS shall feature an integrated edge traffic analytic with the following rules for violations:
    a. Red light violation.
    b. Illegal turning.
    c. Wrong direction.
    d. Speed violation.
    e. Illegal parking.
    f. Stop sign violation.

R. The VMS shall feature an integrated edge LPR server that is also capable of reading shipping container numbers and can match them to vehicle and trailer number.
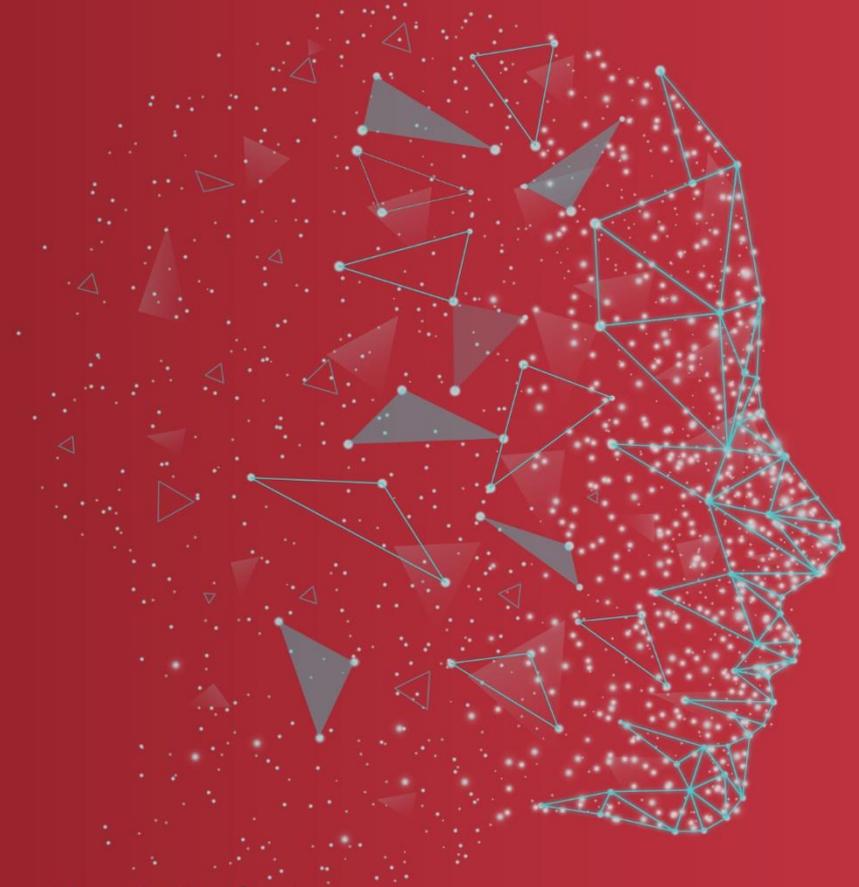
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About Digifort

Digifort is an award-winning software development company that specializes in video surveillance software and video monitoring intelligence.

Digifort is represented in 100+ countries through our Distributors and our platform is translated into 18 languages.

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