From			Nuremberg
BT-VS/MKP	Product Management		29.11.2022

Release Letter

Products:	***H.264/H.265 Firmware for CPP13 INTEOX cameras***
Version:	***8.46.0030***

This letter contains latest information about the above-mentioned firmware version.

1 General

This firmware release is a release based on FW 8.46.0030.

INTEOX cameras are based on our **open Common Product Platform 13** (CPP13). It combines the strengths of our Bosch firmware with the openness ecosystem provided by Azena company, formerly known as Security & Safety Things.

Before upgrading the firmware version 8.46.0030, make sure your INTEOX camera has the firmware version 8.12.0005 or higher installed. The reasons behind this prerequisite can be found on page 9 of this release letter, on the section 8.1 "Changes with 8.40.0029".

Changes since last release are marked in blue.

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2 Applicable products:

- Fixed cameras
  - FLEXIDOME inteox 7100i IR
  - DINION inteox 7100i IR

- Moving Cameras (PTZ)
  - AUTODOME inteox 7100i - 2MP
  - AUTODOME inteox 7100i - 8MP
  - AUTODOME inteox 7000i
  - MIC inteox 7100i - 2MP
  - MIC inteox 7100i – 8MP

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3 Important notes:

3.1 Two-factor authenticated firmware signature

The security of the signature of the firmware file has been strengthened by using a two-factor authentication process for signing the final released firmware file.

The new signature protects from non-released versions being installed in production systems. As a result, pre-release (beta) versions, required sometimes in projects, need to have a special license installed prior to the firmware update. Requests for pre-release versions need to be handled via tech support tickets in order to allow tracking and require a concession signed by the customer.

3.2 "Originally manufactured" certificate

Since firmware version 6.30 all cameras are prepared to receive a unique Bosch certificate during production, assigned and enrolled by Escrypt LRA. These certificates prove that every device is an original Bosch-manufactured and untampered unit.
Escrypt is a Bosch-owned company, providing the Bosch certificate authority (CA).
Enrollment of the certificates in production is asynchronous to this firmware release.

3.3 Secure Element (TPM)

All CPP13 devices incorporate a new secure microcontroller, which we call our Secure Element.
"A Secure Element is a tamper-resistant platform capable of securely hosting applications and their confidential and cryptographic data (for example cryptographic keys) in accordance with the rules and security requirements set by well-identified trusted authorities.[1]
In this specific case the requirements are defined in the Trusted Platform Module library specification defined by the Trusted Computing Group (TCG). As the Secure Element supports the main functionalities specified by TCG, the ones needed for an IoT device, it is often referred to as a "TPM".
Due to security reasons, the firmware or functionality of the secure crypto-microcontroller cannot be altered in the field.
Thus, not all new security features become available on devices with older secure crypto-microcontroller hardware or firmware revisions.

3.4 Open Source Software

Bosch Security Systems is an advocate of integrating open source software into its products. The use of open source software is noted in the *Service* menu on the *System Overview* page of every camera's web interface. For general information regarding open source software in Bosch Security Systems products, please visit http://www.boschsecurity.com/oss .[2]

[1] https://globalplatform.org/wp-content/uploads/2018/05/Introduction-to-Secure-Element-15May2018.pdf, page 1.
[2] Examples: This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This software is based in part on the work of the Independent JPEG Group.

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4 New Features

- Better performance on detection and metadata handling for stationary objects using Intelligent Video Analytics:
  - Correcting wriggling bounding boxes of stationary objects to stay still
  - Allowing users to output stationary objects in the metadata or not, separated by person / vehicle. If vehicle is enabled, all subclasses are enabled as well.
  - Possibility to set stationary flag in the metadata for 2D and 3D tracking.

- 3D Measurements of width, height and depth, for objects detected by the traffic detectors (Object Classifier).

- Improvement on the performance of the 2D traffic tracking mode:
  - to output color and direction.
  - to get a shape polygon in addition to the bounding box.
  - to count a single object when a motorcycle or bicycle is detected – don't count the rider separately as a new object.

- For the static privacy masks of CPP13 cameras a new pattern based on a blur filter is now available.

- For the permanent metadata display of CPP13 cameras, available on the "encoder streams" menu, an extension has been implemented in a way that besides the privacy pattern ,using pixelization of video, a pattern based on a blur filter can be selected for masking objects detected by the camera.

  - In order to ensure a reliable performance of the Privacy mode, the permanent metadata display feature that applies a mask over objects detected by the camera, we restricted the simultaneous usage of the feature to two streams. From 8.46.0030 on, in order to be able to activate the feature is necessary to first select the Privacy mode option on the "Installer Menu" and then set the desired permanent metadata display configuration on the "Encoder Menu".

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5 Changes

- The implementation for network authentication using the 802.1x protocol, available since the firmware version 8.40.0029, from now on offers support for the SHA384 (Secure Hash Algorithm).
- SD card Auto-formatting, removed from 8.45.0032, is now re-enabled for all CPP13 camera models.
- A bug that caused loss of camera calibration after a camera reset has now been fixed.
- The MTU minimum size accepted by INTEOX cameras is now 1280.

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6 System Requirements

For configuration purposes:

- Bosch Project Assistant 2.0.1 or higher
- Bosch Configuration Manager 7.60 or higher
- Web Browsers:
  - Google Chrome
  - Microsoft Edge (chromium based)
  - Mozilla Firefox

For operation purposes:

- Bosch Video Security app 3.2.1 or higher
- Bosch Video Security Client 3.2.2 or higher
- Bosch Video Management System 10.0.1 or higher
- Bosch Video Management System Viewer 10.0.1 or higher

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7 Restrictions; Known Issues

Video Content Analysis (VCA)

- Accuracy of dynamic privacy masking of VCA shapes relies on the scene-specific performance of Intelligent Video Analytics.
- Steering direction issue for displayed field of Global VCA in inverted mode of PTZ cameras
- Intelligent Tracking performance will receive upgrades on upcoming releases in order to boost its performance.

3rd party apps

- For app deployment in offline, LAN scenarios it is possible to use the S&ST Device Management Tool as an alternative to Configuration Manager.
- Stream/encoder settings as well as permanent metadata display has no effect on the video stream processed by 3rd party apps – only privacy masks apply to 3rd party apps
- 3rd party app ONVIF events can be sent to clients, ONVIF metadata will follow in a later release.
- Part of the dedicated hardware for accelerated neural-network-based Video Analytics is reserved to Bosch in this firmware release. It will be made available in a subsequent release allowing for even better performance for specific apps from Azena which make the use of the neural-network accelerator.
- Traffic detection provided by IVA and AI detectors can be affected when the camera simultaneously operates its maximum resolution and 3rd party apps

Encoding

- Encoder region configuration settings will be added in a later release.

Recording

- Long-term rate control and low bitrate feature have been excluded from this release.
- Possibility that in certain cases non-recording profiles are not correctly displayed.
- Small deviations between the selected frame rate and the fps provided by the camera may be noticed during recording

DIVAR hybrid / network

- DIVAR hybrid/network is not compatible to the new encoder concept of the cameras.

Miscellaneous

- Basic VMS integration at the start, full integration in progress with VMS partners.
- Dashboard – Device status can indicate active streams without an actual live connection.
- After changing IP address to a fixed IP via DHCP, the syslog may continue to output the DHCP address as identifier. To fix it a reboot must be performed.
- NTP server cannot be set via DHCP.
- “Double-tap” feature for inverted mode moves in opposite direction
- Updating a configured traffic detector from FW 7.75 to FW 8.10 is not possible. The traffic detector needs to be configured newly.
- Setting a MTU-size lower than the standard may affect the network functionality of the camera.

- CPP13 Fixed camera models do not support the Toshiba SD card model "*Exceria M301-EA R48 microSDHC 32GB, UHS-I U1, Class 10*" .
- For both moving and fixed camera models, NTCIP commands related to adjust lens position/configuration are still operating with restrictions. In that sense, unexpected behaviors may be experienced.
- For fixed camera models, the list of NTCIP commands is still restrict. An update of the list, with clear capabilities and limitations will be provided on the upcoming releases.
- ~~The SD card auto-formatting feature has been temporally disabled on all CPP13 camera models for 8.45.00xx release. The feature will be immediately enabled again on the next CPP13 firmware release.~~
    - ~~The limitation relates to the introduction of the new mechanism for SD card management, which would imply on a new auto-formatting mechanism as well. Delivering both enhancements on the same release would lead to an auto-formatting of the SD card after the FW upload and consequently loss of data stored on the SD card. By splitting the releases of the new mechanisms, we would be able to prevent this unwanted auto-formatting of the SD cards of the cameras already operating on the fied.~~
    - ~~The impact for the user would be that after a new SD card is introduced on a CPP13 camera with the 8.45.00xx version, the user would need to perform a manual format (via Web-UI or Configuration Manager) in order to enable the SD card recording.~~
- When requesting a JPEG snapshot the privacy masks generated by the Privacy Mode (based on object detection) won't be displayed.

Note: Some of the above-mentioned issues are deviations from the datasheet.

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8 Previous Releases

8.1 Changes with 8.45.0032

- The settings of the feature “Sector and Preposition”, available on the INTEOX moving camera models, support now up to 40 characters as an input on the “titles” field.
- An enhancement on the “Privacy Mode” was introduced in order to improve the stability of the privacy masks, generated via object detection, on scenes with more than 30 objects. In that sense, we aim to prevent potential glitches on the mask’s generation even on complex scenes.
- A new mechanism for SD cards recording and management was introduced in order to fix undesired behaviors observed in previous versions of the firmware, especially when the cameras were set to the maximum of their streaming/recording capabilities.
- 4CIF aspect ratio is now a supported resolution (704x576).

8.2 New features with 8.45.0032

- This release introduces the core functionality of the new INTEOX cameras - AUTODOME inteox 7100i.
- An IR intensity control via slider was introduced on the “Imaging” menu of the INTEOX fixed camera models.
- Certificates and Certificate Signing Requests (CSRs) with key length of 4096 bit can now be used on all the CPP13 camera models. For the CPP13 products which are equipped with the FIPS certified secure element the possibility of generating keys is limited to 3072 bit length; those with the standard secure element allow generation up to 4096 bit key length. Using hashing algorithm of up to SHA256, those certificates can be applied for HTTPS, EAP-TLS and user authentication usages.
- Since firmware version 8.40.0029, TLS 1.3 is supported, including the possibility to set either TLS 1.3 or TLS 1.2 as the minimum TLS version. An UI to support this selection on CPP13 camera models is now available via Configuration Manager and Web-UI.

8.3 Changes with 8.41.0029

- There was an enhancement on the Privacy Mask solution offered for the fixed camera models. From now on, users can configurate up to 8 independent masks and adjust their shapes by using geometrical nodes around the area they want to protect.

- Due to an increase on the security restrictions related to the most common web-browsers, the options to exchange BOSCH logo for a “Company logo” or “Device logo” were removed of our Web-Interface (Web Interface > Appearance Menu).

8.4 New features with 8.41.0029

- A mechanism to allow the IR leds of the fixed camera models to be either automatically set or permanently disabled was introduced. This functionality is initially available via Web Interface (image settings), but soon will be available as well via Configuration Manager, on an upcoming release of the software.

- In addition to the ONVIF Profile M support available since version 8.40.0029, the possibility to forward MQTT events is now enabled on CPP13 cameras. Currently the events covered by the implementation are restricted to events generated exclusively by the BOSCH Firmware like the VCA alarms.

  The MQTT configuration via Configuration Manager will be available from the Configuration Manager version 7.60 or higher, however, it is already possible to configurate the MQTT of the camera while using ONVIF tools to configure it.

  Initially this implementation doesn’t include support to forward MQTT events generated by 3rd party Apps. The support for this kind of event should be available on an upcoming release. Meanwhile the metadata forwarding options from data generated by Azena’s 3rd party Apps is restricted to:

  - ONVIF pull-point for events and notifications generated by Apps, to be configurated according to ONVIF tools capabilities.
  - App message forwarding based on Azena’s “Message Broker” solution, which includes the possibility to share messages and data with 3rd party devices*. This service must be configurated via Azena’s Integration Assistant, and in case of trouble integrating the data Azena’s Tech support team should be contacted.

    *In order to guarantee integrability via “Message broker”, it is necessary that the 3rd party App used allows the use of the functionality.

8.5 Changes with 8.40.0029

- At the last release, entitled 8.12.0005, it had been reported that releases of firmware related to INTEOX cameras would start providing customers with 3 different firmware files options, so that the users would need to choose which file to upload according to the type of camera to be updated:

  - A file exclusive for fixed cameras.
  - A file exclusive for moving cameras.
  - A combined file valid for both fixed and moving cameras.

However, due to a system upgrade, this change has been reverted and the universal file system, which allows the latest version of firmware to work on all INTEOX camera regardless of model type, is back. So, from version 8.40.0029 onwards there will be offered only one kind of firmware file:

- A combined file valid for both fixed and moving cameras.

- Our partner, formerly known as Security & Safety Things, went through a name change process and is now called Azena. The functionalities, features and dependences between the camera's firmware and the Azena ecosystem remain the same, in a way that the only change was the updating of the name of the references to this partner in our interfaces.

- A dynamic privacy mask enhancement has been introduced in this new FW version. The maximum number of objects that can be detected and protected by the privacy mask (Encoder Stream privacy mode) has been increased, while the accuracy of mask placement on the image has been improved.

- The icon typically displayed on-screen in order to represent the feature "Intelligent Tracking" has been changed.

- Due to a change in the Dropbox API, the support for Dropbox will be deprecated.
  We are working on providing an alternative, which will be announced with a future firmware version.

8.6 New Features with 8.40.0029

- ONVIF Profile M is now supported by INTEOX cameras.

- Intelligent Tracking Introduced into CPP13 moving cameras. This feature allows the camera to automatically zoom-in and to follow a selected Intelligent Video Analytics object, as far as possible with the camera. Information on how to operate and configure this feature is available on the following link:
  - How to configure Intelligent Tracking for Bosch cameras? *(link)*

- SNMPv1 and SNMPv3 are now included on the list of protocols supported by CPP13.

- NTCIP is now included on the list of protocols supported by CPP13. For moving cameras models most of the commands associated to this protocol are now fully supported, while for the fixed cameras the support for this protocol is still limited. It's expected to enhance the support offered via this protocol in upcoming firmware releases. NTCIP must be activated on the cameras via a license.

- ~~SD Card recording with the MIC inteox 7100i models is now enabled.~~

- Support for communication between the “MIC inteox 7100i – 8MP” and external Alarm I/O Box has been introduced.

- A framerate switch mechanism was introduced into this firmware version, in a way that now it is possible to change the video frame rate scale according to the options offered by the camera model used:

Camera Model	Default framerate (fps)	Other framerate scales available(fps)
MIC inteox 7100i – 2MP	30	25 / 50 / 60
MIC inteox 7100i – 8MP	30	25
FLEXIDOME inteox 7100i IR	30	25
DINION inteox 7100i IR	30	25
AUTODOME inteox 7000i	30	-

Notes:

- A video framerate change can be performed either via Web-UI or Configuration Manager (version 7.60 or higher).
- A system reboot will be enforced in order to confirm the selected video frame rate configuration.
- Before performing a firmware downgrade from version 8.40.0029 to 8.12.0005 or older version, its necessary to configurate the video frame rate to 30 fps in advance. When this condition is not fulfilled the camera may show no video after the re-start and, in order to bring the camera back to former operating status, a configuration reset would need to be performed – a factory default reset is not required.
- When using configuration upload option to change de video frame rate configuration, two enforced reboots may be required to get video.

8.7 Changes with 8.12.0005

~~This release adds the tools and features which allow us to offer in the next INTEOX firmware releases three options of firmware files. This alternative will give the user the freedom to choose between uploading the file according to the product type or opting for the combined version that covers the entire INTEOX platform.~~

~~From the next release there will be three options of INTEOX firmware file:~~

~~- A file exclusive for fixed cameras.~~
~~- A file exclusive for moving cameras.~~
~~- A combined file valid for both fixed and moving cameras.~~
Change reverted with 8.40.00029.

8.8 New Features with 8.10.0005

This release introduces:

- the core functionality of the two new INTEOX camera products - ***FLEXIDOME inteox 7100i IR***; and ***DINION inteox 7100i IR.***
- the support for the new ***Bosch Security and Safety Systems AI detectors,*** and its functionalities.
- features associated with traffic detection have been implemented in the new version of the *Intelligent Video Analytics (IVA),* as part of the support for the new AI detectors. To have access to the details of these changes please refer to the IVA 8.10 release letter.

8.9 Changes with 8.10.0005

- The license ID for 3rd party apps is now displayed on Remote Portal.
- The alarm stamping size is now configurable.
- An alternative to factory reset through the Web interface has been developed, eliminating the need to perform the reset by means of the physical boot of the device.
- China standard GB/T 28181 has been put under a global license. When GB/T 28181 shall not be available it can be disabled with a global license key. This is irreversible for customers and can only be reversed via service and repair. The license also prohibits downgrading to earlier versions which provided GB/T 28181 as standard feature.

  License key to disable GB/T 28181 is:

  22-01.47.01-BF365391-21ABCB3D-28699CE4-3BD3AB09-FE25CD61

8.10 Changes with 7.75.0008

During a penetration test, Kaspersky Lab, who was contracted by Bosch for IP camera security maturity certification, detected some vulnerabilities which required immediate actions to ensure the security of installations using our cameras.

For more details refer to our Security Advisory BOSCH-SA-478243-BT, published at our Security Advisory web page
https://www.boschsecurity.com/xc/en/support/product-security/security-advisories.html
or visit our PSIRT website at https://psirt.bosch.com.

- An issue with reflected XSS in URL handler is fixed (CVE-2021-23848).
- An issue with denial of service due to invalid web parameter is fixed (CVE-2021-23852).
- An issue with improper input validation of HTTP header is fixed (CVE-2021-23853).
- An issue with reflected XSS in page parameter is fixed (CVE-2021-23854).

8.11 Changes with 7.75.0006

- Fixed a few bugs and first and foremost further enhanced computational acceleration of analytics workloads for even better AI performance.
- Added enhanced vehicle detector functionality available with "-OC" (Object Classification) CTN cameras. The AI-based vehicle detector identifies vehicles with more accuracy than the core IVA. Even in dense traffic, the AI-based vehicle detector reliably separates vehicles for accurate counting results.

8.12 New Features with 7.70.00098 – very first release for INTEOX cameras

Note: This section uses the feature set of FW 7.61 for CPP7.3 as a baseline.

Camera functionality customization via secure execution of 3rd party apps from trusted sources

- Sandboxed environment protects Bosch firmware functionality from malfunctioning apps
- Trusted apps can be found at the Security & Safety Things App Store
- Integration into Security & Safety Things ecosystem via Bosch Remote Portal (cloud-connected app deployment) or via Configuration Manager 7.20 and above (app deployment in local network)

Security

- Support for next generation Secure Element microcontroller ("TPM")
  - Secure storage of cryptographic keys (supporting up to 4096 bit RSA keys)
  - Future-proof until 2031 and beyond[3]
  - High risk target protection-grade, certified with Assurance Level (EAL) 6+[4]
  - Please also refer to section 3.3. in this document

- Remote Device Management (p.14) via Bosch Remote Portal supported as well (feel free to check out this webinar)

Streaming

- More flexibility
  - Full triple streaming with stream prioritization
  - Selectable H.264/H.265 coding standard per stream

[3] According to NIST Special Publication 800-57, part 1, p. 56
[4] Based on Common Criteria for Information Technology Security Evaluation out of 7 levels according to ISO/IEC 15408

- 8 independent Encoder profiles per stream
- Frame and bit rate test functionality to analyse stream performance and bitrates

Video Content Analysis (VCA)

- Support of Artificial Intelligence based analytics for Bosch Intelligent Video Analytics and 3rd party apps
  - Better detection performance
  - Detection of moving and still objects
  - No need for calibration for use cases where object size and speed do not matter
- Permanent metadata display *per stream* for visualization of metadata and object trajectories, for easy and quick integration into VMS systems and recordings
- Dynamic privacy masking of VCA shapes per stream

On-screen Display

- Custom size fonts [1-1000] for On Screen Display text for better readable OSD on big monitors
- Increased embedded Logo resolution (1024x1024) and color depth (16M) on video streams
- Mosaic Privacy Masks to still see movement behind a mask