AXIS Q1686-DLE Radar-Video Fusion Camera

Monitor traffic and identify hazardous vehicles 24/7

AXIS Q1686-DLE uses a 60 GHz radar to monitor vehicle speeds up to 200 km/h (125 mph), 24/7. It can accurately track speed and direction with a minimum false alarm rate. Featuring a varifocal tele lens with 46°–9° horizontal FoV and traffic-optimized IR illumination kit, it can reliably identify an offending vehicle, 24/7. Built on an open platform, you can use AXIS Q1686-DLE with license plate recognition software to connect the speed and direction to a specific license plate. This enables reliable identification of a vehicle, on the edge – in the camera itself. Furthermore, it offers easy installation and configuration.

- > Merge vehicle speed and license plate – on the edge
- > Radar tracking of speed and direction
- > Monitor speeds up to 200 km/h (125 mph)
- > Reliable license plate capture and recognition 24/7
- > Open platform for third-party software

AXIS Q1686-DLE Radar-Video Fusion Camera

Camera

Image sensor
1/1.8" progressive scan RGB CMOS
Pixel size 2.9 µm

Lens
Varifocal, 9–50 mm, F1.5
Horizontal field of view: 46°–9°
Vertical field of view: 26°–5°
Minimum focus distance: 3 m (9.8 ft)
Autofocus, i-CS lens, IR corrected, remote zoom and focus, P-Iris control

Day and night
Automatic IR-cut filter
Hybrid IR filter

Minimum illumination
4 MP 25/30 fps with Forensic WDR and Lightfinder 2.0
Color: 0.05 lux at 50 IRE, F1.5
B/W: 0.01 lux at 50 IRE, F1.5
4 MP 50/60 fps with Lightfinder 2.0
Color: 0.1 lux at 50 IRE, F1.5
B/W: 0.02 lux at 50 IRE, F1.5
0 lux with IR illumination on

Shutter speed
1/47500 s to 1 s

License Plate Capture

Detection range
Up to 50 m (164 ft) day and night

IR illumination
OptimizedIR with power-efficient, long-life 850 nm IR LED's with adjustable angle of illumination and intensity. Range of reach 50 m (164 ft) or more depending on the scene.

Vehicle speed
Up to 200 km/h (125 mph) with optional edge analytics
More than 200 km/h (125 mph) available with optional server based analytics

Coverage
Up to two lanes with optional edge or server based analytics
Supports front and rear license plate capture

Installation
Center or side mounted
Mounting height: Up to 12 m (39 ft)
Lateral distance from road: Up to 7 m (23 ft)[1]
Camera detects tilt and roll angle automatically
Built-in traffic camera installation assistant optimizes video settings based on mounting height, distance to vehicle, and expected vehicle speed

Radar

Profiles
Road monitoring
Area monitoring

Sensor
FMCW (Frequency Modulated Continuous Wave)

Object data
Object type (classes: humans, vehicles, unknown), range, direction, velocity

Frequency
61.0–61.5 GHz[2]

RF transmit power
<100 mW (EIRP)
License-free. Unharmful radio waves.

Recommended mounting height
3.5–12 m (11–39 ft)[1]

Recommended mounting tilt
Up to 18°[1]

Detection range
Road monitoring profile: Up to 150 m (492 ft) when detecting a vehicle[3]
Area monitoring profile: 5–60 m (16–200 ft) when detecting a person[4]
5–90 m (16–300 ft) when detecting a vehicle[4]

1. *See the user manual at axis.com for mounting recommendations*
2. *For road monitoring, center frequency is 61.340 GHz for channel 1 and 61.140 GHz for channel 2.*
3. *Measured at 7 m mounting height, with 15° tilt. The mounting height, tilt and placement of the radar-video fusion camera affects the detection range. See the user manual at axis.com for more information.*
4. *Measured at 5 m mounting height, with 25° tilt. See user manual at axis.com for more information.*

Radial speed
Road monitoring profile: Up to 200 km/h (125 mph)
Area monitoring profile: Up to 55 km/h (34 mph)

Field of detection
Horizontal: 95°

Speed accuracy
+/- 2 km/h (1.25 mph)
Fulfills all requirements in section 7.3 of OIML R91:1990[5]

Distance accuracy
Road monitoring profile: 0.8 m (2.6 ft)
Area monitoring profile: 0.5 m (1.6 ft)

Angle accuracy
1°

Spatial differentiation
3 m[6]

Data refresh rate
10 Hz

Coverage
Road monitoring profile: See the product's user manual at *axis.com*[7]
Area monitoring profile: 2700 m^2 (29000 sq ft) for persons
6100 m^2 (65600 sq ft) for vehicles

Coexistence zone
Frequency band: 60 GHz
Radius: 350 m (1148 ft)
Recommended number of radars: up to 8

Radar controls
Multiple detection zones, line crossing detection with one or two lines, exclude zones with filters for short-lived objects, object speed, and object type, configurable trigger duration
Radar transmission on/off, grid opacity, zone opacity, color scheme, trail lifetime, detection sensitivity, swaying object filter, small object filter, frequency channel, reference map calibration with options to scale, pan, and zoom map

System on chip (SoC)

Model
ARTPEC-8

Memory
2048 MB RAM, 8192 MB Flash

Compute capabilities
Deep learning processing unit (DLPU)

Video

Video compression
H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles
H.265 (MPEG-H Part 2/HEVC) Main Profile
Motion JPEG

Resolution
16:9: 2688x1512 to 160x90
16:10: 1280x800 to 160x100
4:3: 2016x1512 to 160x120

Frame rate
WDR: Up to 25/30 fps (50/60 Hz) in all resolutions
No WDR: Up to 50/60 fps (50/60 Hz) in all resolutions

Video streaming
Up to 20 unique and configurable video streams[8]
Axis Zipstream technology in H.264 and H.265
Controllable frame rate and bandwidth
VBR/ABR/MBR H.264/H.265
Low latency mode
Video streaming indicator

Signal-to-noise ratio
>55 dB

WDR
Forensic WDR: Up to 120 dB depending on scene

Noise reduction
Spatial filter (2D noise reduction)
Temporal filter (3D noise reduction)

5. *For access to METAS test report No. 258-44378, contact your sales representative.*
6. *Minimum distance between moving objects.*
7. *The radar coverage for road monitoring depends on factors like the mounting height of the device and speed of vehicles. For more information, see the user manual.*
8. *We recommend a maximum of 3 unique video streams per camera or channel, for optimized user experience, network bandwidth, and storage utilization. A unique video stream can be served to many video clients in the network using multicast or unicast transport method via built-in stream reuse functionality.*

Image settings
Saturation, contrast, brightness, sharpness, white balance, day/night threshold, local contrast, tone mapping , exposure mode, exposure zones, defogging, compression, dynamic text and image overlay, polygon privacy mask,target aperture
Scene profiles: forensic, vivid, traffic overview, license plate

Image processing
Axis Zipstream, Forensic WDR, Lightfinder 2.0, OptimizedIR

Audio

Audio features
Automatic gain control
Speaker pairing

Audio streaming
Two-way (full duplex)
Noise reduction

Audio input
10-band graphic equalizer
Input for external balanced or unbalanced microphone, optional 5 V microphone power
Digital input, optional 12 V ring power
Balanced or unbalanced line input
Input through speaker pairing

Audio output
Line output
Output through speaker pairing

Audio encoding
24bit LPCM, AAC-LC 8/16/32/48 kHz, G.711 PCM 8 kHz, G.726 ADPCM 8 kHz, Opus 8/16/48 kHz
Configurable bitrate

Network

Network protocols
IPv4, IPv6 USGv6, ICMPv4/ICMPv6, HTTP, HTTPS[9], HTTP/2, TLS[9], QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, mDNS (Bonjour), UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS/DNSv6, DDNS, NTP, NTS, RTSP, RTP, SRTP/RTSPS, TCP, UDP, IGMPv1/v2/v3, RTCP, ICMP, DHCPv4/v6, ARP, SSH, LLDP, CDP, MQTT v3.1.1, Secure syslog (RFC 3164/5424, UDP/TCP/TLS), Link-Local address (ZeroConf), IEEE 802.1X (EAP-TLS), IEEE 802.1AR

System integration

Application Programming Interface
Open API for software integration, including VAPIX®, metadata and AXIS Camera Application Platform (ACAP); specifications at *axis.com/developer-community*.
One-click cloud connection
ONVIF® Profile G, ONVIF® Profile M, ONVIF® Profile S, and ONVIF® Profile T, specifications at *onvif.org*

Video management systems
Compatible with AXIS Camera Station Edge, AXIS Camera Station Pro, AXIS Camera Station 5, and video management software from Axis' partners available at *axis.com/vms*.

Onscreen controls
Privacy masks
Radar picture-in-picture
Augmented overlay (radar)
Media clip

Edge-to-edge
Speaker pairing
PTZ camera pairing

Event conditions
Application
Audio: audio clip playing
Device status: above/below/within operating temperature, casing open, IP address blocked, IP address removed, new IP address, live stream active, network lost, ring power overcurrent protection, system ready, radar data failure: interference, no data, tampering
Digital audio input status
Edge storage: recording ongoing, storage disruption, storage health issues detected
I/O: digital input, manual trigger, virtual input
MQTT: subscribe
Radar motion
Scheduled and recurring: schedule
Video: average bitrate degradation, day-night mode, tampering

9. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*

Event actions
Audio clips: play, stop
Day-night mode
Defog mode
I/O: toggle I/O once, toggle I/O while the rule is active
LEDs: flash status LED
MQTT: publish
Notifications: HTTP, HTTPS, TCP and email
Overlay text
Radar: radar autotracking, radar detection
Recordings: SD card and network share
SNMP traps: send, send while the rule is active
Upload of images or video clips: FTP, SFTP, HTTP, HTTPS, network share and email
WDR mode

Built-in installation aids
Traffic camera installation assistant, pixel counter, remote zoom and focus, level grid, leveling assistant

Analytics

Applications
Included
AXIS Object Analytics, AXIS Scene Metadata, AXIS Image Health Analytics, AXIS Video Motion Detection, AXIS Speed Monitor[10], AXIS Radar Integration for Microbus[10], active tampering alarm, audio detection, orientation aid
Supported
AXIS License Plate Verifier,
Support for AXIS Camera Application Platform enabling installation of third-party applications, see *axis.com/acap*

AXIS Object Analytics
Object classes: humans, vehicles (types: cars, buses, trucks, bikes, other)
Scenarios: line crossing, object in area, time in area, crossline counting, occupancy in area
Up to 10 scenarios
Key features: detection sensitivity, object speed
Other features: triggered objects visualized with trajectories, color-coded bounding boxes and tables
Polygon include/exclude areas
Perspective configuration
ONVIF Motion Alarm event

AXIS Image Health Analytics
Detection settings:
Tampering: blocked image, redirected image
Image degradation: blurred image, underexposed image
Other features: sensitivity, validation period

AXIS Scene Metadata
Object classes: humans, faces, vehicles (types: cars, buses, trucks, bikes), license plates
Object attributes: vehicle color, upper/lower clothing color, confidence, position, speed, distance, direction, longitude and latitude, license plate information[11]

Approvals

Product markings
CSA, UL/cUL, CE, RCM

Supply chain
TAA compliant

EMC
CISPR 24, CISPR 35, EN 55035, EN 55032 Class A, EN 50121-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2
Australia/New Zealand: RCM AS/NZS CISPR 32 Class A
Canada: ICES-3(B)/NMB-3(B)
USA: FCC Part 15 Subpart B Class B

Safety
CAN/CSA C22.2 No. 62368-1 ed. 3, IEC/EN/UL 62368-1 ed. 3, IEC/EN 62471 risk group 2, IS 13252

Environment
IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-6, IEC 60068-2-14, IEC 60068-2-27, IEC 60068-2-78, IEC/EN 60529 IP66, IEC/EN 62262 IK10, NEMA 250 Type 4X, NEMA TS 2 (2.2.7-2.2.9), ISO 21207 (Method B)

Wireless
EN 305550, EN 301489-1, EN 301489-3, EN 62311, FCC Part 15 Subpart C

Network
NIST SP500-267

Cybersecurity
ETSI EN 303 645

10. Available for download
11. Only available with AXIS License Plate Verifier

Cybersecurity

Edge security
Software: Signed OS, brute force delay protection, digest authentication and OAuth 2.0 RFC6749 Client Credential Flow/OpenID Authorization Code Flow for centralized ADFS account management, password protection
Hardware: Axis Edge Vault cybersecurity platform
TPM 2.0 (CC EAL4+, FIPS 140-2 Level 2), secure element (CC EAL 6+), system-on-chip security (TEE), Axis device ID, secure keystore, signed video, secure boot, encrypted filesystem (AES-XTS-Plain64 256bit)

Network security
IEEE 802.1X (EAP-TLS, PEAP-MSCHAPv2)[12], IEEE 802.1AE (MACsec PSK/EAP-TLS), IEEE 802.1AR, HTTPS/HSTS[12], TLS v1.2/v1.3[12], Network Time Security (NTS), X.509 Certificate PKI, host-based firewall

Documentation
AXIS OS Hardening Guide
Axis Vulnerability Management Policy
Axis Security Development Model
AXIS OS Software Bill of Material (SBOM)
To download documents, go to *axis.com/support/cybersecurity/resources*
To read more about Axis cybersecurity support, go to *axis.com/cybersecurity*

General

Casing
IP66-, NEMA 4X- and IK10-rated
Aluminum casing, weathershield (ASA) with black anti-glare coating
Color: white NCS S 1002-B
For repainting instructions, go to the product's support page. For information about the impact on warranty, go to *axis.com/warranty-implication-when-repainting*.
This product can be repainted.

Power
Power over Ethernet (PoE) IEEE 802.3at Type 2 Class 4
Typical 10 W, max 25.5 W
10–28 V DC, typical 9.5 W, max 25.5 W

Connectors
Network: RJ45 10BASE-T/100BASE-TX/1000BASE-T PoE
I/O: Terminal block for two supervised and two unsupervised configurable inputs / digital outputs (12 V DC output, max load 50 mA)
Audio: 3.5 mm mic/line in, 3.5 mm line out
Serial communication: RS485/RS422, 2 pcs, 2 pos, full duplex, terminal block
Power: DC input, terminal block

IR illumination
OptimizedIR with power-efficient, long-life 850 nm IR LEDs
Range of reach 50 m (164 ft) or more depending on the scene

Storage
Support for microSD/microSDHC/microSDXC card
Support for SD card encryption (AES-XTS-Plain64 256bit)
Recording to network-attached storage (NAS)
For SD card and NAS recommendations see *axis.com*

Operating conditions
Temperature: -40°C to 60 °C (-40 °F to 140 °F)
Start-up temperature: -25 °C (-13 °F)
Maximum temperature according to NEMA TS 2 (2.2.7): 74 °C (165 °F)
Humidity: 10–100% RH (condensing)
Wind speed (sustained): 60 m/s (134 mph)[13]

Storage conditions
Temperature: -40 °C to 65 °C (-40 °F to 149 °F)
Humidity: 5–95% RH (non-condensing)

Dimensions
For the overall product dimensions, see the dimension drawing in this datasheet.
Effective Projected Area (EPA): 0.063 m^2 (0.67 ft^2)

Weight
5100 g (11.2 lb)

Box content
Camera, weathershield, AXIS TQ1003-E Wall Mount, installation guide, resistorx® T20 tool, terminal block connectors, connector guard, cable gaskets, owner authentication key

12. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*
13. *The values shown are based on results from actual wind tunnel testing. The maximum wind speed when the unit is stationary is not known due to wind speed limit of 60 m/s (135 mph) at the test lab. For drag force calculations, use Effective Projected Area (EPA).*

Optional accessories
AXIS T8415 Wireless Installation Tool
AXIS Surveillance Cards
AXIS Bird Control Spike
AXIS P13 Weathershield Extension A
For more accessories, go to *axis.com/products/axis-q1686-dle#accessories*

System tools
AXIS Site Designer, AXIS Device Manager, product selector, accessory selector, lens calculator
Available at *axis.com*

Languages
English, German, French, Spanish, Italian, Russian, Simplified Chinese, Japanese, Korean, Portuguese, Polish, Traditional Chinese, Dutch, Czech, Swedish, Finnish, Turkish, Thai, Vietnamese

Warranty
5-year warranty, see *axis.com/warranty*

Part numbers
Available at *axis.com/products/axis-q1686-dle#part-numbers*

Sustainability

Substance control
PVC free, BFR/CFR free in accordance with JEDEC/ECA Standard JS709
RoHS in accordance with EU RoHS Directive 2011/65/EU and 2015/863, and standard EN IEC 63000:2018
REACH in accordance with (EC) No 1907/2006. For SCIP UUID, see *echa.europa.eu*

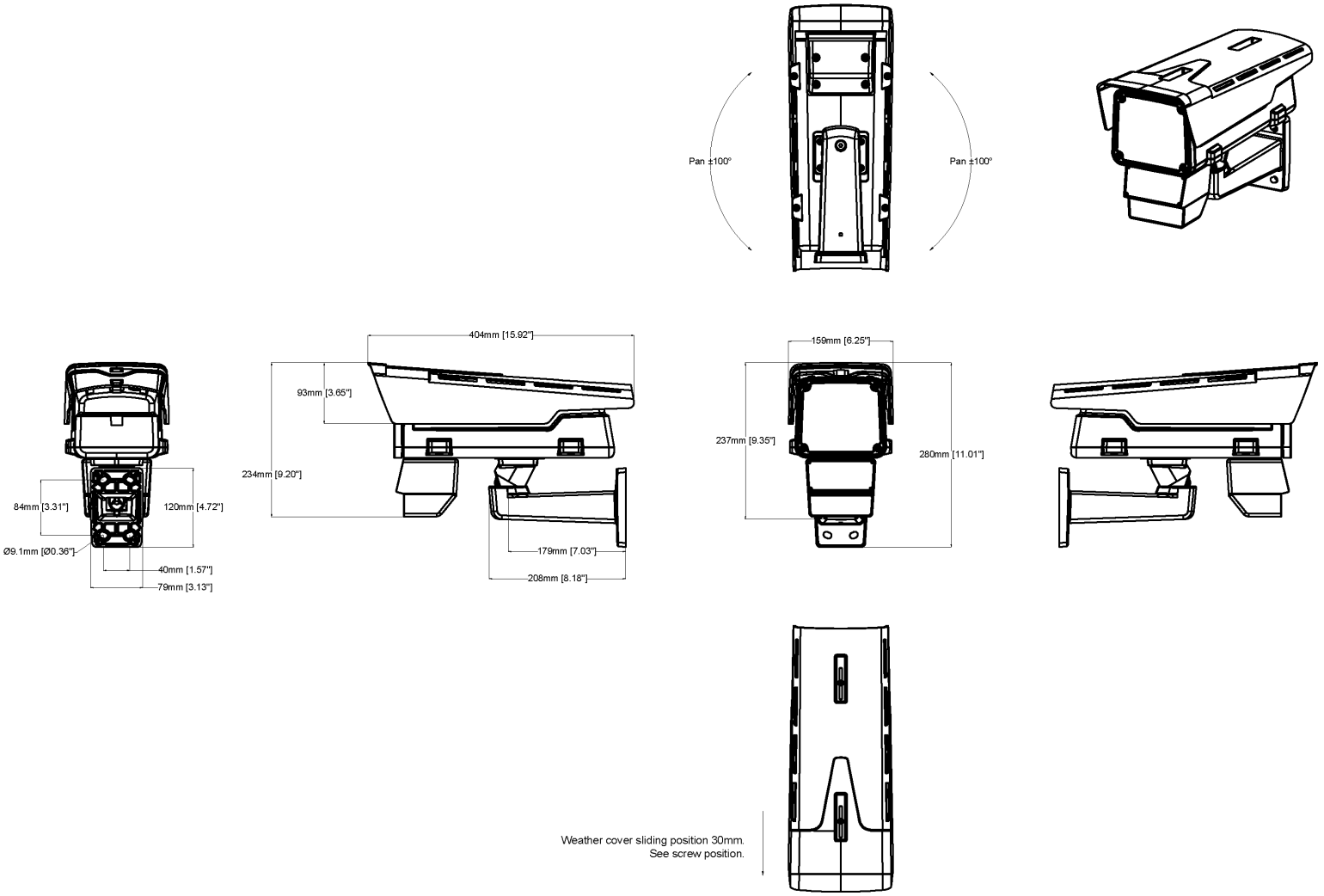
Materials
Renewable carbon-based plastic content: 5% (biobased)
Screened for conflict minerals in accordance with OECD guidelines
To read more about sustainability at Axis, go to *axis.com/about-axis/sustainability*

Environmental responsibility
axis.com/environmental-responsibility
Axis Communications is a signatory of the UN Global Compact, read more at *unglobalcompact.org*

Detect, Observe, Recognize, Identify (DORI)

	DORI definition	Distance (wide)	Distance (tele)
Detect	25 px/m (8 px/ft)	130.2 m (427.1 ft)	664.4 m (2179.2 ft)
Observe	63 px/m (19 px/ft)	51.6 m (169.2 ft)	263.6 m (864.6 ft)
Recognize	125 px/m (38 px/ft)	26 m (85.3 ft)	132.9 m (436 ft)
Identify	250 px/m (76 px/ft)	13 m (42.6 ft)	66.5 m (218.1 ft)

The DORI values are calculated using pixel densities for different use cases as recommended by the EN-62676-4 standard. The calculations use the center of the image as the reference point and consider lens distortion. The possibility to recognize or identify a person or object depends on factors such as object motion, video compression, lighting conditions, and camera focus. Use margins when planning. The pixel density varies across the image, and the calculated values can differ from the distances in the real world.



AXIS Q1686-DLE Radar-Video Fusion Camera

Revision	v.01	Revision date	2024-01-25
Paper size	A4	Release date	2024-01-25
Created by	MS	Scale	1:8

www.axis.com

Highlighted capabilities

Axis Edge Vault

Axis Edge Vault is the hardware-based cybersecurity platform that safeguards the Axis device. It forms the foundation that all secure operations depend on and offer features to protect the device's identity, safeguard its integrity and protect sensitive information from unauthorized access. For instance, **secure boot** ensures that a device can boot only with **signed OS**, which prevents physical supply chain tampering. With signed OS, the device is also able to validate new device software before accepting to install it. And the **secure keystore** is the critical building-block for protecting cryptographic information used for secure communication (IEEE 802.1X, HTTPS, Axis device ID, access control keys etc.) against malicious extraction in the event of a security breach. The secure keystore and secure connections are provided through a Common Criteria or FIPS 140 certified hardware-based cryptographic computing module.

Furthermore, signed video ensures that video evidence can be verified as untampered. Each camera uses its unique video signing key, which is securely stored in the secure keystore, to add a signature into the video stream allowing video to be traced back to the Axis camera from where it originated.

To read more about Axis Edge Vault, go to *axis. com/ solutions/edge-vault*.

For more information, see *axis.com/glossary*