TOVITECH
SECURE NVR

NQ SERIES

AI · CYBER-SECURE NETWORK VIDEO RECORDER

TNR-1600

AI-powered, security-hardened NVR

A next-generation network video recorder that unites intelligent video analytics (VCA) with strong encryption. Running on standard x86 hardware with **Ubuntu 24.04 LTS and an Intel Core i3 or better**, it records **up to 64 RTSP/ONVIF cameras** in real time while on-device AI identifies people, vehicles, plates and fire with no cloud. **AES-256-GCM end-to-end encryption, TLS 1.2/1.3 and integrity verification**, applied from the design stage, meet the strict security demands of government and finance.

★ Security-hardened by design
AES-256-GCM end-to-end encryption
5 AI detectors (OpenVINO · NPU)
TLS 1.2 / 1.3
Ubuntu 24.04 LTS · Intel i3+

64ch	5	256bit	i3↑	24.04
Max camera channels	AI detectors	GCM encryption	Recommended Intel CPU	Ubuntu LTS

Manufactured & supplied by **TOVITECH** | Product line **TOVITECH Secure NVR** Model **TNR-1600**

01

PRODUCT OVERVIEW

Overview and core values

TOVITECH TNR-1600 is an **intelligent, security-hardened NVR** that runs on standard x86 hardware with **Ubuntu 24.04 LTS and an Intel Core i3 or better**. Beyond recording and playback it performs **AI video analytics (VCA)** on the device and protects storage, transport and key management end to end with **AES-256-GCM**. The recording engine, management console, live viewer, search, backup, remote API and watchdog run as separate processes, so a fault in one function never spreads — a **resilient multi-process architecture**.

Security by design

End-to-end encryption is built into the architecture, not added on. Private keys and credentials never touch disk in plain text.

Built-in AI analytics

Identifies **people, vehicles, plates and fire** on the device with no cloud dependency. **Intel CPU (OpenVINO)** by default, with **Hailo-8 NPU** acceleration for more.

Multi-process resilience

Function-level modules supervised by a **watchdog**. Repeated failures trigger an **automatic rollback** to the previous version for continuous operation.

Two-tier data layer

Configuration and users are **stored separately** from video indexes and events. Audit logs live in their own database and **survive a factory reset**.

Standard camera support

ONVIF · RTSP · RTSP-over-HTTPS supported. Choose secure mode or general IP-camera compatibility mode to suit the site.

Secure remote operation

Remote search/playback and an **HTTPS REST API**, with access controlled by a **default-deny IP allow-list** and Digest authentication.

At a glance

From cameras to storage, analytics and remote access — every path passes an encryption and authentication gate.

- **Input** — ONVIF/RTSP cameras → thermal cameras
- **Video pipeline** — Hardware decoding → AI detection → encrypted storage
- **Access** — Local GUI · remote HTTPS · REST API · events (HTTP/MQTT)

02

AI VIDEO CONTENT ANALYTICS

Built-in AI video analytics (VCA)

YOLO-family deep-learning models run **on the device (on-premise)**, identifying objects in the video as it is recorded. **Multi-object tracking** gives every target a unique ID, and per-channel **intrusion zones and counting lines** turn detections into meaningful events. Every rule change is **applied instantly without a restart**.

Five AI detection engines

Person detection

Real-time people detection · basis for intrusion/counting

Vehicle detection

Vehicle detection · entry/exit and traffic analysis

Face detection

Face region detection · best-shot crop

Fire detection

Flame/smoke detection + thermal temperature link

License plate recognition (LPR)

Korean plate detection + character reading

Intrusion detection · line counting

Draw a **polygon zone** to raise an “intrusion” event on entry, and a **counting line** to tally uni- or bi-directional traffic. Precise position judgement keeps false alarms low.

Plate recognition (Korean LPR)

Detects and tracks the plate, picks the sharpest frame and reads it with a **dedicated Korean plate** model. Saves the vehicle front and plate as **cropped JPEGs** and raises a “plate recognized” event.

Best shots · search

Crops the object at the moment of the event and keeps it as a **thumbnail with metadata**. **Search** in the viewer by date, channel, type and object, then preview the original.

Event output · integration

Events are written to the NVR event store and pushed to external systems over **HTTP POST and MQTT** for easy integration with control and integration platforms.

Inference engine — Intel CPU by default, optional NPU acceleration

OpenVINO (Intel CPU)
Default · Core i3 or better

Hailo-8 NPU
Optional acceleration · M.2/PCIe card

Picks the model for the installed accelerator **automatically** — an NPU is used when present, otherwise detection continues on the Intel CPU.

03

CYBER SECURITY & CRYPTOGRAPHY

Cyber security · cryptography

Security-hardened by design

Encryption, authentication, access control, integrity and audit — the core security requirements are built directly into the product architecture.

AES-256-GCM everywhere

Recorded and backed-up video, credentials and configuration backups are all protected by the **same authenticated encryption** across the product.

TLS 1.2 / 1.3

Only modern cipher suites are allowed and weak ciphers are blocked. The same policy applies to every remote access path.

Account protection · auto-lock

Account lockout after repeated failed logins and **automatic lock** after prolonged inactivity. The reason is never shown on screen, only written to the audit log.

Access control · separation of privileges

IP allow-list + **Digest authentication** + **per-function permissions** provide layered control of every user's access.

Integrity verification

Installed files are checked for **tampering** at boot and periodically, and the results are written to the audit log.

Audit trail · preserved through reset

Administrative actions and security events go to a **separate audit database** that is **preserved through factory reset**, guaranteeing forensic traceability.

Keys and credentials never leave the device

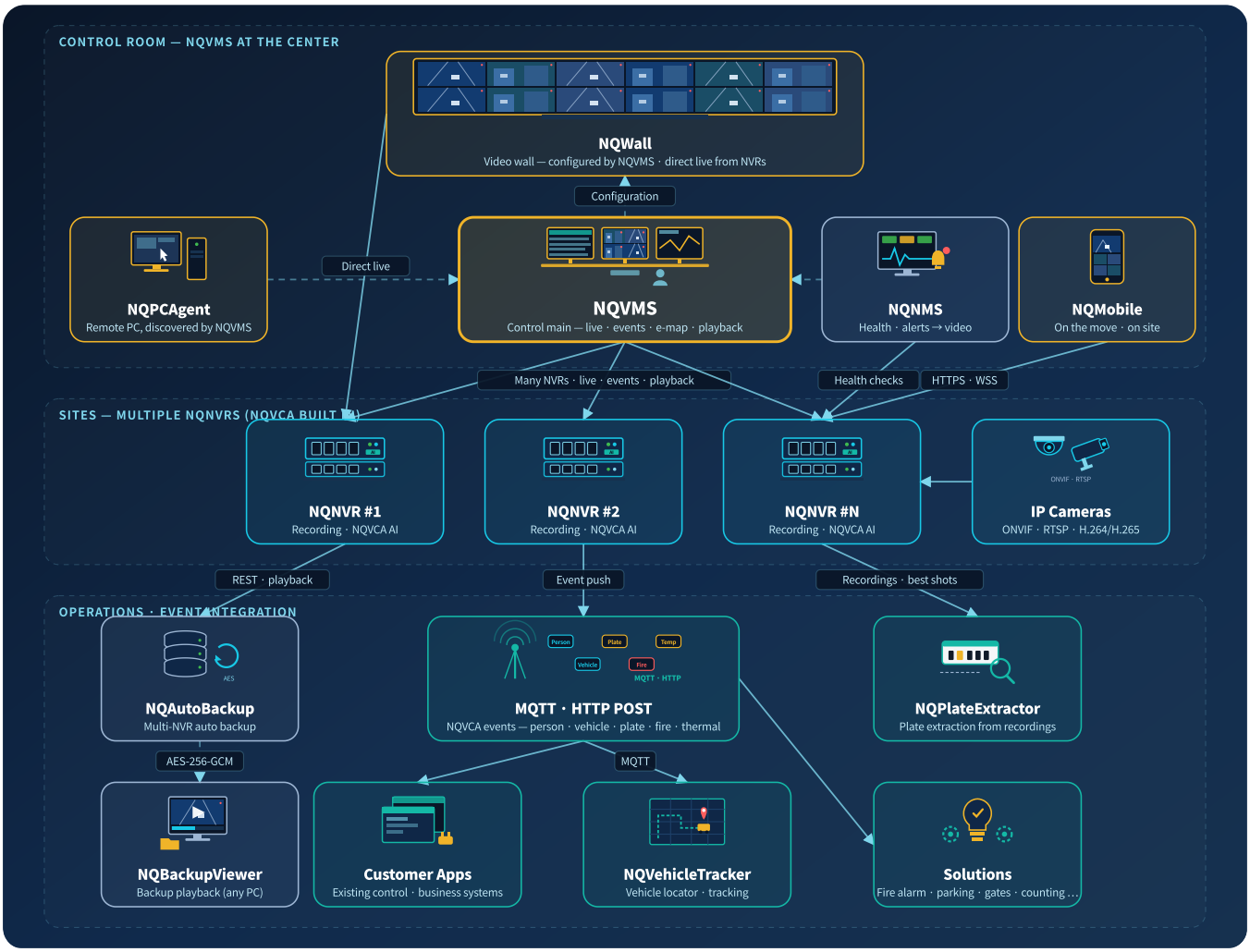
Configuration backups never contain keys and private keys are never written to disk in plain text — the **generate → encrypt → wipe** principle applies to every module.

04

SYSTEM ARCHITECTURE

System architecture

In a real control center **NQVMS** is the main console: it registers **many NQNVRs** and handles live video, events, e-map and playback on one screen. NQVMS discovers and configures video walls (NQWall) and remote PCs (NQPCAgent), while NQNMS watches NVR health. Events from the **NQVCA** built into each NVR reach customer applications and solutions over MQTT and HTTP POST. A single NQNVR can of course also run on its own.



Inside NQNVR — independent modules by function

Recording engine · Live viewer · PTZ · Search · playback · export · Backup (encrypted) · Management console · Remote playback service · REST API service · Watchdog · self-healing · rollback · AI analytics engine · viewer (NQVCA)

Processes are separated by function so that one module's fault never spreads. Configuration, video indexes and audit records are kept apart, and audit records survive a factory reset.

05 SPECIFICATIONS

Specifications

General / environment	
Product / model	**TOVITECH Secure NVR · TNR-1600**
Operating system	**Ubuntu 24.04 LTS (x86-64)**
Recommended CPU	**Intel Core i3 or better**
Max channels	**64 channels**
Video · recording	
Camera protocols	ONVIF · RTSP · RTSP-over-HTTPS
Codecs	H.264 · H.265(HEVC)
Hardware acceleration	Intel hardware decoding · software fallback
Key functions	Continuous recording · event recording · PTZ · search/playback · backup · remote playback · auto-delete · N+1 failover
Recording security	I-frame**AES-256-GCM**encrypted storage
AI video analytics (VCA)	
Detectors (5)	Person · Vehicle · Face · Fire · Plate (Korean)
Inference backends	**OpenVINO (Intel CPU, default)** · **Hailo-8 NPU (optional)**— automatic selection and fallback
Tracking / rules	Multi-object tracking · intrusion (zone) · counting (line) · plate · fall · wrong-way · **rules apply instantly**
Additional analytics	Korean LPR · best-shot store/search · thermal temperature link
Event output	NVR event store · HTTP POST · MQTT
Security · cryptography	
Cipher	**AES-256-GCM**(end to end) · password-based key derivation
Key handling	Private keys and credentials never stored in plain text · wiped from memory after use
Transport security	TLS 1.2 / 1.3 — modern cipher suites only
Authentication / access control	HTTP Digest authentication · IP allow-list · per-function permissions
Account policy	Lockout after repeated failures · idle auto-lock
Integrity / audit	Installed-file integrity check · separate audit DB (survives factory reset)
Data · operations	
Data storage	Separate configuration DB, video index and audit DB
Availability	Watchdog self-healing · automatic rollback after repeated failures · N+1 failover · upgrade packages

※ Channel count and retention depend on storage and video bitrate; inference capacity scales with CPU and an optional NPU.

TOVITECH
SECURE NVR

Model TNR-1600

SECURE · INTELLIGENT · ON-PREMISE NVR

Security and intelligence, in one device.

A next-generation security NVR that unites built-in AI video analytics (VCA), **AES-256-GCM end-to-end encryption** and integrity verification. **TOVITECH TNR-1600** runs reliably on Ubuntu 24.04 LTS with an Intel Core i3 or better and meets the demands of high-security environments.

★ Security-hardened by design
5 AI detectors
AES-256-GCM end-to-end encryption
TLS 1.2 / 1.3
Up to 64 channels