

# PROTOPLATZ

System Specification Summary — Toyada Technologies Pvt Ltd

**Disclosure Level:** Architectural + Behavioural | **Hardware Ref:** HRS V5.0 (AM69A) | **Date:** May 2026

## Product Overview

**Protoplatz** is a production-grade, multi-protocol IoT gateway system engineered to operate as the physical execution boundary between heterogeneous field devices and upstream enterprise or cloud systems. It provides deterministic multi-protocol connectivity, protocol termination and isolation, canonical data normalisation, embedded governance and policy enforcement, and hardware-enforced security — all within a single controlled runtime environment.

**ProtoAccess** is an optional edge intelligence layer that runs on top of Protoplatz. When enabled, it provides on-device AI inference using a dedicated 32 TOPS hardware accelerator, with every inference result governed by the Protoplatz policy engine before action. ProtoAccess can be enabled per customer requirement.

## Compute Platform

Specification	Detail
System-on-Chip	TI AM69A (J784S4) — Jacinto 7 family
Application Cores	8x Arm Cortex-A72 @ 2 GHz (two quad-core clusters, 2 MB L2 each)
Real-Time Cores	4x Arm Cortex-R5F @ 1 GHz (lockstep-capable)
Safety Core	1x Arm Cortex-M4F @ 400 MHz (independent safety monitoring)
AI Accelerator	C7x DSP + 4x MMAv2 — 32 TOPS INT8 / 16 TOPS INT16 / 8 TFLOPS FP16
System Memory	8 GB LPDDR4 (64-bit dual-channel)
Storage	32 GB eMMC 5.1 (HS400) + MicroSD expansion slot
Functional Safety	SIL-3 / ASIL-B capable (R5F lockstep + M4F isolation)

## Multi-Protocol Connectivity

Protocol	Capability
Zigbee / Thread	IEEE 802.15.4 mesh networking; Matter-over-Thread ready
LoRa / LoRaWAN	LPWAN gateway-class 8-channel concentrator
Wi-Fi / BLE	Local connectivity, device commissioning, BLE scanning
Cellular LTE	Cat-4 WAN backhaul (150 / 50 Mbps)
Modbus RTU	Industrial field bus; galvanically isolated RS-485
Ethernet	Dual Gigabit Ethernet with TSN (IEEE 802.1AS, 802.1Qbv)
CAN-FD	Automotive / industrial expansion (future-ready)

## System Interfaces

Interface	Detail
Ethernet Ports	2x RJ45 Gigabit Ethernet (primary + secondary) with TSN
USB	USB 3.0 (5 Gbps) for service / expansion
PCIe	PCIe Gen 3 x 4 lanes (future: NVMe, FPGA, external accelerator)
Industrial I/O	RS-485 (isolated), CAN-FD, GPIO
Debug / Service	USB Type-C (service), JTAG header, MicroSD
RF Connectors	SMA (LoRa antenna, cellular antenna), chip antenna (Zigbee/BLE, Wi-Fi)

## Security Architecture

Capability	Detail
Hardware Root of Trust	AM69A HS-FS secure boot + dedicated secure element
Signed Boot Chain	Complete chain: ROM → SPL → TF-A → U-Boot → Linux → R5F/M4F/C7x
Domain Isolation	Silicon-level hardware firewall between Protoplatz and ProtoAccess domains
Communication Security	TLS 1.3 for all cloud communication; mutual TLS with per-device certificates
Storage Encryption	Encrypted sensitive partitions (dm-crypt with device-unique key)
Access Control	Role-based access (admin / operator / viewer) with JWT authentication
AI Model Security	RSA-2048 signature verification; 10-stage OTA approval with mandatory human sign-off
Audit Trail	Immutable audit log: model lifecycle (1 year), inference actions (90 days)

## ProtoAccess — Edge Intelligence (Optional)

Capability	Specification
AI Compute	32 TOPS INT8 / 16 TOPS INT16 / 8 TFLOPS FP16 (on-chip C7x DSP + MMA)
Inference Runtime	TI TIDL (TFLite and ONNX models compiled to TIDL format)
Concurrent Models	Up to 4 models loaded simultaneously
End-to-End Latency	< 60 ms (event → governed action) for 95th percentile
Governance	Every inference result evaluated by policy engine before action; AI cannot bypass governance
Model Deployment	10-stage OTA approval chain; mandatory human approval; 24-hour burn-in; auto-rollback
Pre-Validated Models	Anomaly detection, threshold prediction, vibration classification, Modbus pattern detection, power

## Environmental & Mechanical

Parameter	Specification
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +105°C
Enclosure	Aluminium, IP54 rated
Mounting	DIN-rail clip + wall mount option
Power Input	24V DC industrial (locking connector); LiFePO4 battery backup
Power Consumption	< 15W typical (Protoplatz); < 25W peak (ProtoAccess active inference)
Cooling	Passive (heatspreader); thermal management firmware with throttling

## Edge Autonomy & Lifecycle

Capability	Detail
Offline Operation	Full local control loops execute independently of cloud state
Local Telemetry Retention	Up to 90 days store-and-forward on 32 GB eMMC
AI Independence	All inference runs on-device (C7x DSP); no cloud ML dependency
Cloud Protocols	MQTT 5.0 (TLS 1.3), HTTPS REST, WebSocket (WSS)
OTA Updates	Dual-bank firmware with automatic rollback on failure
Lifecycle States	Manufacture → Provision → Operate → Update → Recover → Decommission

**Toyada Technologies Pvt Ltd** | [protoplatz.com](https://protoplatz.com) | Disclosure: Architectural + Behavioural (non-replicable)

*This document provides a system-level specification summary intended for architectural evaluation and technical due diligence. It does not disclose implementation details, schematics, firmware internals, or component-level bill of materials. All specifications subject to change without notice.*