Tensor Networks

PTCP + TNQG

Horizontal tensor technologies for predictive networking, topology-native security, and emergent simulation.

Confidential & Proprietary

Company Overview

A practical guide to Tensor Networks' horizontal platform across AI/HPC, defense, telecom, autonomy, manufacturing, financial services, semiconductor, and spatial-computing markets.

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CAGE: 8FD88
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A horizontal tensor infrastructure company

PTCP and TNQG are designed as reusable mathematical layers, not one-off vertical products.

Core thesis

Modern digital systems fail when classical scalar control planes cannot see, predict, or compress hyper-dimensional state. Tensor Networks turns system behavior into geometry: observe the fabric, predict the stress, and act safely.

P PTCP

Compresses telemetry, forecasts risk, and recommends bounded routing or security actions.

T TNQG

Tensor-network reconstruction for diagnostics and simulation.

H Horizontal

Works across AI, defense, telco, autonomy, FSI, and manufacturing.

S Pilotable

Start in shadow mode; graduate to guarded actuation only after validation.

Strategic outcomes

More throughput
Reduce stragglers and tail latency.

Less lock-in
Run as an overlay on existing infrastructure.

Faster detection
Use topology defects instead of only signatures.

Lower compute burn
Simulate and optimize only where interactions matter.

The bottleneck is no longer only compute - it is coordination

AI, autonomy, and distributed infrastructure need predictive control of state, not just faster links.

1 AI / HPC synchronization

Large training and inference systems suffer when the last 1 percent of traffic is delayed. Classical routing reacts after congestion has already formed.

2 Edge and DIL operations

Ships, robots, factories, and mobile devices may be disconnected, intermittent, or bandwidth limited. They need local autonomy, not cloud-dependent signatures.

3 Security without signatures

Zero-day and encrypted attacks often evade semantic inspection. A topology-native layer watches structural behavior and cuts off anomalous paths.

Classical control
scalar counters -> reactive alerts -> manual/late remediation

→

Tensor-native control
joint state -> predicted geometry -> bounded automated action

→

Lower risk

PTCP + TNQG: observe, reconstruct, predict, act

A modular architecture that can be run in shadow mode before trusted actuation.

Design principle: keep operational control bounded, auditable, and reversible.

Bounded outcomes
route recommendation, quarantine, traffic drain, energy-aware placement, synthetic simulation or decision support

TNQG reconstruction layer
Tensor-network geometry, interaction-weighted distance, cut/path diagnostics, simulation state

PTCP control plane
POL-TT compression + CVaR routing + D_topo defect scoring + policy envelope

Telemetry ingestion
Flow-level network metrics, device posture, link quality, queue depth, jitter, loss, identity and provenance

Existing infrastructure
SONiC leaf/spine switches, cloud fabrics, mobile endpoints, RF/edge nodes, robotics fleets

PTCP: Predictive Tensor Control Plane

PTCP models the joint state of a system, predicts stress, and projects every action into a safe policy envelope.

P

POL-TT

Pattern-of-Life Tensor Train compresses high-dimensional telemetry into a bounded probability model for normal behavior.

C

CVaR geodesic routing

Predicts future tail-risk scenarios and selects paths that minimize expected cost plus adverse-risk exposure.

D

D_topo defect score

Combines anomaly likelihood, graph curvature, and cut-shift signals to flag structural deformation.

O

Omnibus Cage

A containment pattern for local, payload-blind quarantine and segmentation when a topology defect appears.

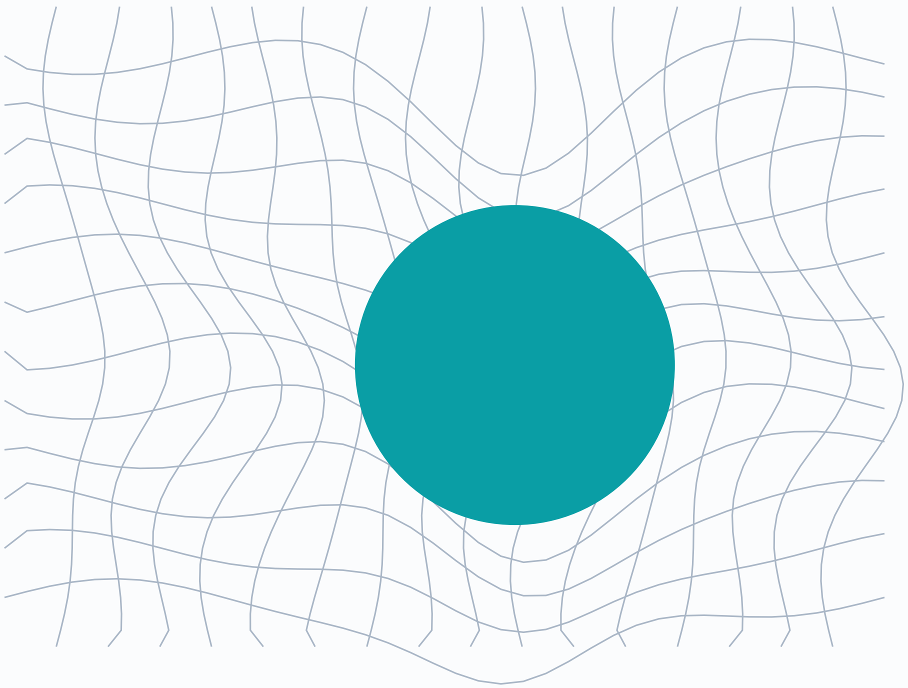
Operational math

state compression: O(d n r^2) memory | path choice: expected cost + CVaR | security action: D_topo -> bounded policy envelope

TNQG: Tensor Network Quantum Gravity

Tensor Network Quantum Gravity is presented here as an operational reconstruction and simulation framework.

Positioning: TNQG is not marketed as a completed proof of quantum gravity; it is a testable reconstruction approach used as a computational and operational layer.



TNQG treats geometry as derived from relationships, capacity, and interaction structure.

Reconstruct geometry

Fit candidate distances, cuts, and curvatures from tensor-network observables and graph structure.

Reduce simulation burn

Spend high-fidelity compute where agents interact; coarse-grain inactive sectors instead of rendering everything continuously.

Diagnose topology

Use cut/path and curvature residuals as system-health diagnostics across networks, robotics, and synthetic environments.

One mathematical layer, many markets

PTCP + TNQG adapts the same tensor-native foundation to multiple industry verticals.

AI / HPC

Tokens/sec, tail latency, GPU utilization

Predictive routing and telemetry compression for large training and inference fabrics

Defense

DIL nodes, contested comms, edge autonomy

Local topology-aware containment and resilient mission networking

Semiconductor

Design/test data, fab telemetry, EDA cycles

Compression and topology diagnostics for complex process and network state

Autonomy

Swarms, vehicles, robots, edge inference

CVaR routing, POL-TT fleet state, TNQG simulation reconstruction

Manufacturing

Factories, industrial IoT, quality systems

Predictive flow control and anomaly isolation across cyber-physical operations

Financial Services

Low-latency trading, risk, fraud topology

Risk-aware pathing and topology-native anomaly detection

Telecom

5G/6G, SONiC, edge exchange, fiber

No-rip-and-replace overlays for dynamic traffic and interference-aware operations

Gaming / Spatial

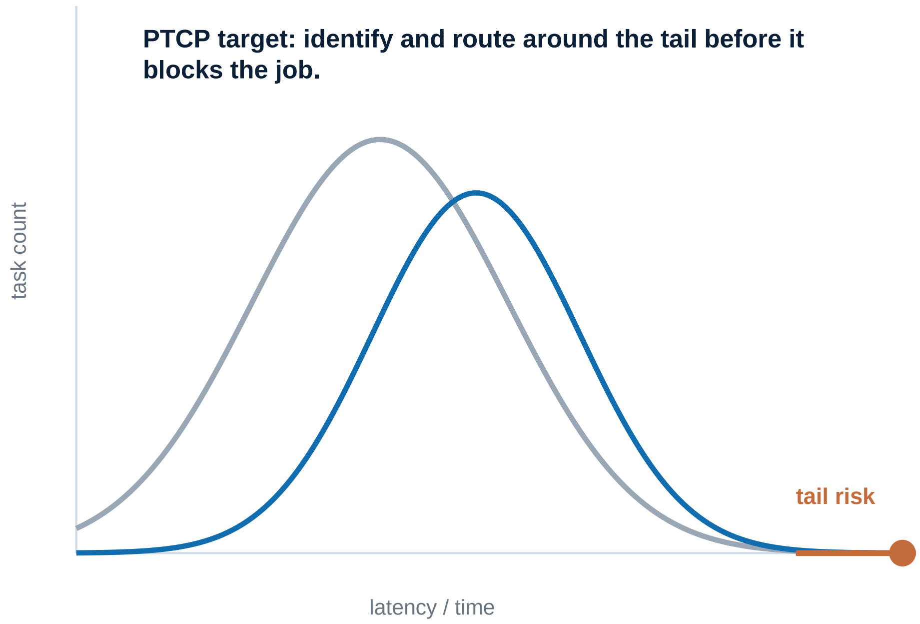
Digital twins, simulation, multiplayer state

Emergent geometry for scalable environments and synchronized state

Increase useful compute by reducing coordination loss

For large AI clusters, the difference between reactive and predictive networking appears as idle GPU time.

Business translation: more completed AI work per dollar of GPU, power, and network infrastructure.



Where it fits

SONiC leaf/spine, enterprise data centers, GPU fabrics, cloud AI fleets, inference clusters.

What it measures

Queue depth, jitter, loss, link quality, route churn, energy cost, endpoint trust, and service dependencies.

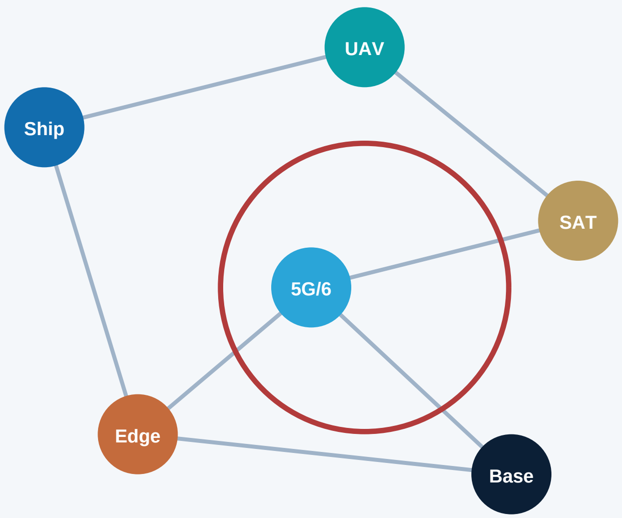
Pilot metric

Compare predicted congestion and recommended paths against classical routing in shadow mode.

Resilient control when the network is contested

PTCP + TNQG can be adapted to disconnected, intermittent, low-bandwidth, and high-interference environments.

Horizontal insight: the same algorithmic layer can support assured communications, autonomous edge decisions, and commercial network resilience.



Contested or degraded regions are treated as geometry: longer, riskier, and subject to policy constraints.

Defense edge

Containment for maritime and tactical edge networks.

Telecom edge

Dynamic traffic control for 5G/6G, fiber, satellite broadband, and exchange points.

Common benefit

Local predictive control that does not require a cloud call to understand changing geometry.

From pre-programmed systems to topology-aware operations

The same tensor foundation supports robot fleets, cyber-physical factories, and high-fidelity synthetic environments.

1

Observe

POL-TT compresses fleet or factory state from sensors, routes, devices, and process telemetry.

→

2

Coordinate

CVaR routing and D_topo scoring support low-latency swarm/factory orchestration and anomaly isolation.

→

3

Simulate

TNQG reconstructs geometry only where interactions matter, lowering simulation and digital twin compute burn.

Application examples autonomous vehicles | drone swarms | warehouse robotics | smart factories | industrial IoT | quality/inspection systems | digital twins

Payload-blind security for unknown attacks

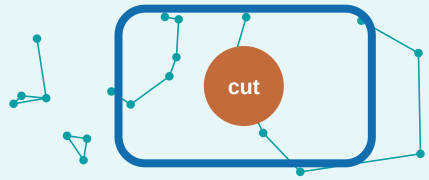
Topology-native security focuses on behavior and geometry, not only known signatures or payload inspection.

Mobile edge extension: a device can become a local topology sensor using loopback/VPN-style traffic control and on-device acceleration.

Traditional security

Looks for recognizable indicators. Strong for known threats, but less effective when malware is novel, encrypted, or hidden behind valid-looking sessions.

PTCP + TNQG security



Detects structural defects and can project responses into a bounded quarantine policy without needing to read the payload.

Start in shadow mode, graduate to bounded actuation

Tensor Networks can engage as a software/IP overlay without forcing customers to rip and replace infrastructure.

01
Discovery
Map target vertical, telemetry sources, existing controls, and success metrics.

→

02
Shadow-mode pilot
Ingest telemetry and compare PTCP/TNQG recommendations against current operations without actuation.

→

03
Guarded deployment
Enable bounded route/security actions with rate limits, rollback, logs, and human approval thresholds.

→

04
Scale + license
Commercialize through enterprise licenses, federal programs, OEM/channel partners, and vertical solution bundles.

Engagement models

Platform pilot
30-90 days, telemetry-only validation.

Vertical solution
AI/HPC, defense, telco, autonomy, FSI, manufacturing.

IP licensing
Algorithmic overlay, embedded module, or partner channel.

Federal transition
SBIR/DIU/OTA follow-ons and program integration.

Tensor Networks is positioned as a horizontal IP and platform company

The company packages tensor-native methods as deployable infrastructure, not just research artifacts.

Professional caveat: all performance statements should be validated in customer-specific pilots using customer baselines and agreed metrics.

Company identifiers

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Technical differentiation

Tensor compression + risk-aware routing + topology-native detection + emergent geometry.

Deployment posture

Hardware-agnostic overlay that starts in shadow mode and integrates with existing tools.

IP posture

PTCP and TNQG are Tensor Networks background IP; pilot terms should define data rights and deployment scope.

Source notes and distribution notice

Prepared as a polished company overview for Tensor Networks, Inc.

Public website

PTCP.ai describes PTCP + TNQG as the solution, identifies multiple vertical focus areas, and emphasizes existing-hardware deployment.

Uploaded whitepapers

Mobile edge, tensor-native AI infrastructure, intelligent topology, predictive network gravity, and autonomy/robotics materials supplied by the requestor were used as input.

Technical positioning

TNQG is defined as Tensor Network Quantum Gravity and is framed as an operational reconstruction / simulation framework.

Use restrictions

This PDF contains proprietary positioning language. External distribution should be approved by Tensor Networks, Inc.

Next step

Select one target vertical, define the performance baseline, and run a shadow-mode proof of value before any production actuation.