TIME-SENSITIVE NETWORKING / INDUSTRIAL WIFI

Wireless flexibility. Time-aware engineering.

TELCOSIS TSN WiFi connects industrial wireless research with the real timing, reliability and mobility needs of the factory.



Start with the process. Engineer the network.

Our development approach combines AP firmware, centralized management and TSN-aware integration to evaluate predictable service across a hybrid wired and wireless network.

01

Mobile logistics

Explore application continuity for AGVs, AMRs and moving production assets.

02

Flexible automation

Assess time-sensitive coordination where reconfigurable layouts create value.

03

Industrial visibility

Connect sensors and monitoring systems while separating critical and bulk traffic.

Development scope: industrial WiFi and TSN integration. Performance is validated per application and platform.

REFERENCE ARCHITECTURE

One service path. Every timing dependency visible.

TELCOSIS Controller | Configuration, telemetry & integration

Management plane: policy orchestration and operational visibility

WIRED DOMAIN	WIRELESS BOUNDARY	MOBILE DOMAIN
Application + TSN bridge	**AP / industrial gateway**	**WiFi endpoint / robot**

Application data traverses the forwarding path; it does not have to pass through the controller.

ENGINEER THE COMPLETE END-TO-END DELAY BUDGET

HOST	WIRED	RADIO	ENDPOINT
Stack & processing	Queues & bridges	Access & retries	Receive & act

Track one-way delay, jitter and deadline misses; report clock error and measurement uncertainty.



INDUSTRIAL AP CONCEPT

Designed as a development portfolio.
Hardware specifications vary by platform.

Time & traffic engineering

Define stream period, payload, deadline and failure policy. Evaluate clock transport and timestamp support across all hops.

Firmware & radio integration

Investigate queue mapping, scheduling hooks and RF behavior. Software priority alone cannot guarantee a wireless deadline.

Operations & resilience

Observe load, interference and mobility. Define fallback, degraded operation and recovery before expanding the pilot.

Proposed architecture. TSN mechanisms require implementation and validation in the selected switches, APs, drivers and endpoints.

TECHNICAL SCOPE & VALIDATION

From engineering targets to measured evidence.

TSN is a set of network mechanisms, not a WiFi generation. The following items define the TELCOSIS development and PoC scope; they are not a certified feature list.

Platform foundation	TIP OpenWiFi / OpenWrt AP firmware; TELCOSIS controller, telemetry and configuration integration.
Wireless platform	Evaluate compatible WiFi 6 / 6E / 7 hardware. Bands, OFDMA, MLO and driver control are platform-dependent.
Time synchronization	IEEE 802.1AS / gPTP alignment; assess clock distribution, hardware timestamping and synchronization error.*
Scheduled traffic	IEEE 802.1Qbv time-aware scheduling as an integration candidate; validate queue gates and radio coordination.*
Stream protection	IEEE 802.1Qci per-stream filtering / policing and IEEE 802.1CB replication / elimination as evaluation candidates.*
Traffic & QoS	Define periodic flows; classify VLAN / priority and map Ethernet queues to WiFi WMM access categories.*
Security & separation	Evaluate WPA2 / WPA3, external RADIUS / 802.1X and VLAN isolation with the selected AP firmware.*
Industrial hardware	Select mounting, power, Ethernet interfaces, temperature, ingress protection and EMC requirements by site.*
Measurement & recovery	Collect per-stream delay, loss, deadline misses, queue / RF state, mobility events and recovery traces.

* Implementation and interoperability are subject to platform selection and PoC validation. No fixed latency, packet-loss, clock-accuracy, environmental certification or functional-safety claim is made.

POC ACCEPTANCE: AGREE THE THRESHOLDS BEFORE TESTING

Timing
One-way p99 / p99.9 delay, jitter and deadline-miss ratio

Stress
Interference, motion and concurrent best-effort traffic

Recovery
AP / path interruption and time to stable application service

Build a bounded pilot. Validate the application. Define the operating envelope.

TELCOSIS Networks | Wireless Broadband Alliance Member
BUDOTEK, Dudullu Organized Industrial Zone, Istanbul, Türkiye

Technical references: IEEE 802.1 TSN standards overview / NIST industrial wireless TSN testbed.
Standards are architectural references; their inclusion does not assert TELCOSIS conformance. October 2026.