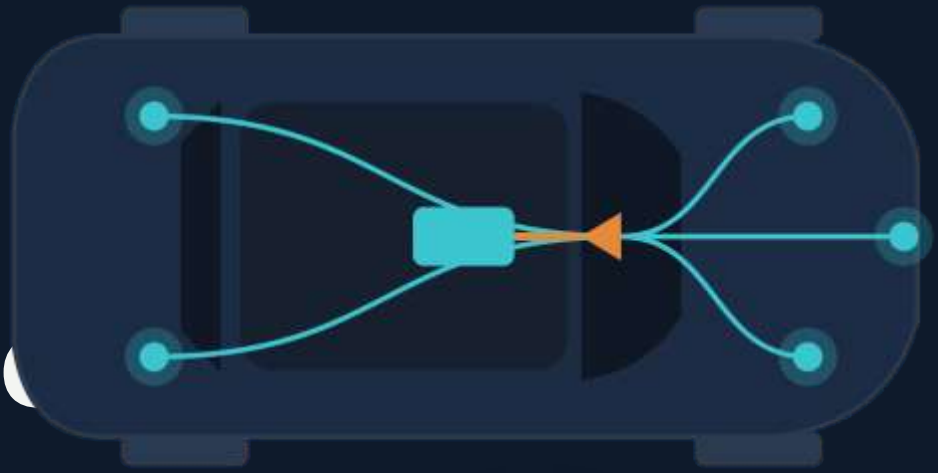
PONCAN SEMICONDUCTOR

PONCAN · PHYSICAL AI

Connecting Intelligence to the Physical World

- An optical nervous system for Physical AI





AI is moving beyond data centers and software into the physical world, and it needs new chips and new connectivity

[Ivan Lee] · [Oct 22, 2026]

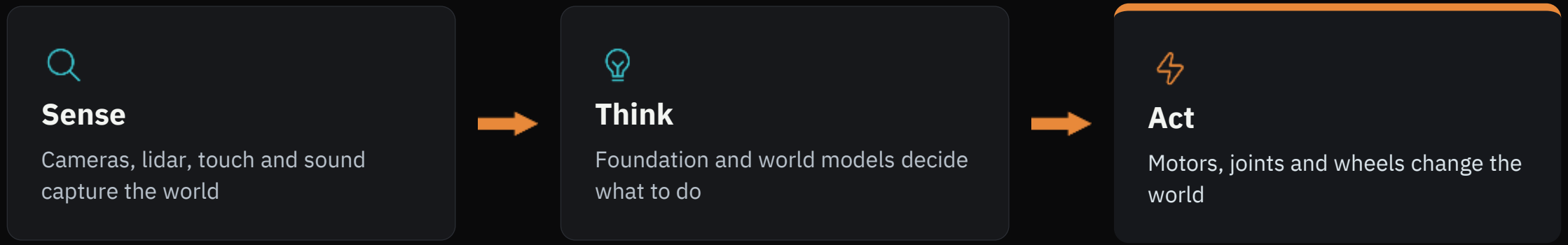
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WHAT IS PHYSICAL AI

Intelligence with a body

AI that perceives the real world, reasons about it, and acts on it through a physical physical body.

AI is moving beyond data centers and software into robots, vehicles and intelligent machines.



Takes many forms: **Humanoids** **Robot arms** **Autonomous vehicles** **Drones** **Mobile robots**

WHY IT MATTERS IN THE AI AGE

AI’s next wave is physical

Wave 1
Perception AI
Understands images, words and sounds

→

Wave 2
Generative AI
Creates text, images and sound

→

Wave 3 · now
Physical AI
Perceives, reasons, plans and acts

“The ChatGPT moment for general robotics is just around the corner.” — Jensen Huang, NVIDIA, CES 2025

New semiconductor demand

Robots, intelligent machines and autonomous systems need new sensing, compute and connectivity silicon.

Cloud-to-edge connectivity

The intelligence economy needs faster, more efficient links from data centers to edge networks.

New architectures inside machines

Future vehicles and robots may need fundamentally different communications architectures.

Source: NVIDIA CES 2025 keynote, as reported on the NVIDIA blog

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WHY IT MATTERS IN THE AI AGE

Physical AI needs new connectivity at every layer

Data center

Trains and simulates the models that robots and vehicles run.

Needs faster, more efficient optical interconnect

Edge networks

Connect factories, campuses, homes and roads where machines work.

Needs high-capacity, low-latency fiber access

PONCAN: PON · F5G

Inside the machine

Links sensors, AI computer and actuators in vehicles and robots.

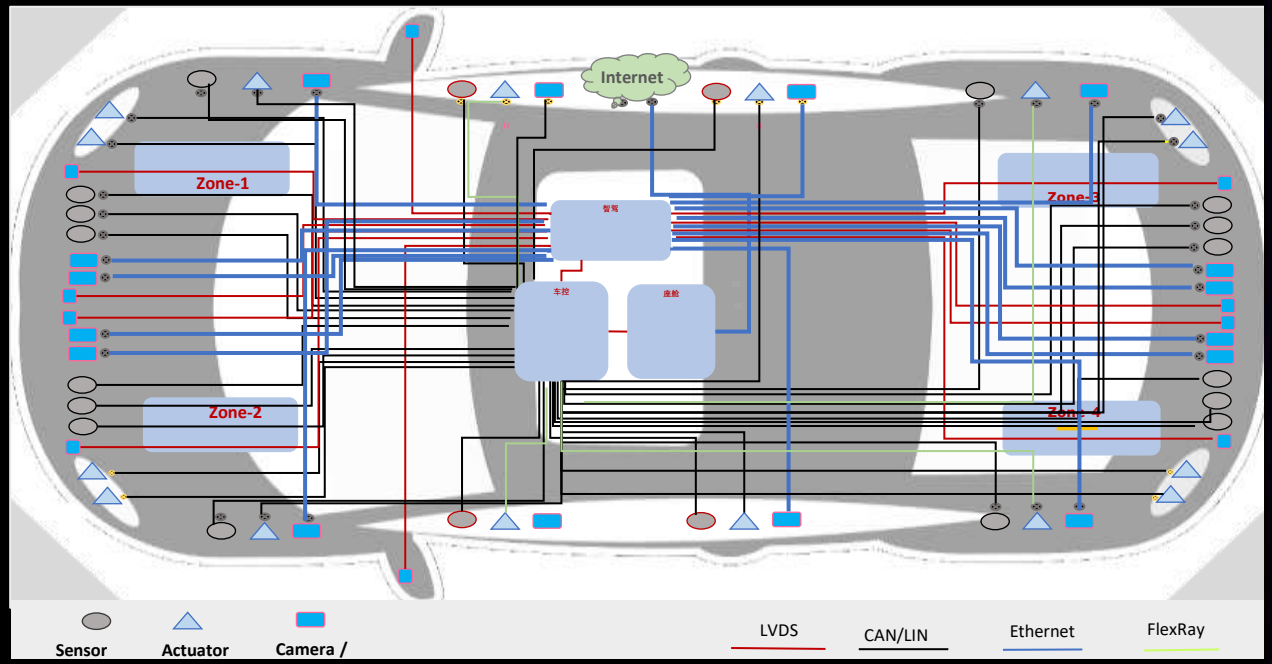
Needs a new, deterministic network architecture

PONCAN: TS-PON

Each layer is a new semiconductor opportunity, and optical links run through all three.

EV DEVELOPMENT REQUIREMENTS

Connectivity Challenges of Today's Intelligent Vehicles



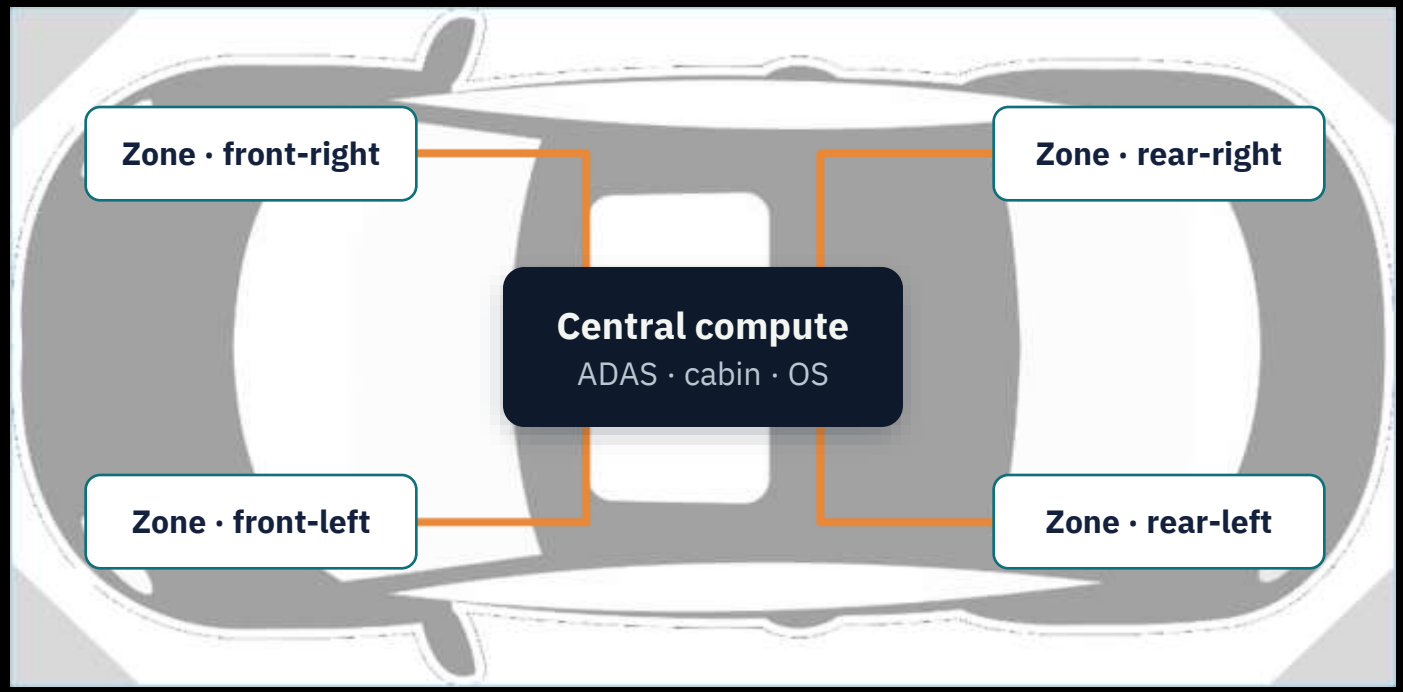
Challenge	Key Issue
Physical Topology	Distributed ECUs and sensors increase **wiring and network complexity.**
Cable Weight & Bulk	Copper cables, connectors, and shielding add **weight and packaging demands.**
EMI Vulnerability	Electrical links require protection from **electromagnetic interference.**
Protocol Fragmentation	CAN, LIN, LVDS, FlexRay, and Ethernet **complicate system integration.**
Bandwidth Scalability	Higher data rates challenge **copper reach, signal integrity, and power.**
Deterministic Communication	Real-time control demands **bounded latency and precise synchronization.**

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EV DEVELOPMENT REQUIREMENTS

The EV is re-wiring around zones and central compute compute



Orange lines = backbone links that move to optical

Fewer, faster links

Dozens of domain ECUs consolidate into a few zonal controllers feeding one central computer — the backbone becomes a small number of very high-bandwidth links.

Software-defined

OTA updates and new features depend on a backbone with headroom for a decade of growth.

Sensor-heavy

Higher-resolution cameras, radar and lidar push raw data toward central compute.

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EV DEVELOPMENT REQUIREMENTS

Copper is running out of headroom

COPPER AT MULTI-GIG

- Shielding and twisted-pair control add weight and cost
- Tops out at 10Gb/s, and only within 15m (MultiGBASE-T1)
- Susceptible to high-voltage powertrain noise
- Each speed step needs new cable and connectors

GLASS OPTICAL FIBER

- Galvanic isolation — no EMI emitted or received
- About 1/5 the weight of copper: ~13kg saved per car (est.)
- Same fiber scales from 2.5 to 50 Gb/s
- Standardized for cars in IEEE 802.3cz (2023)

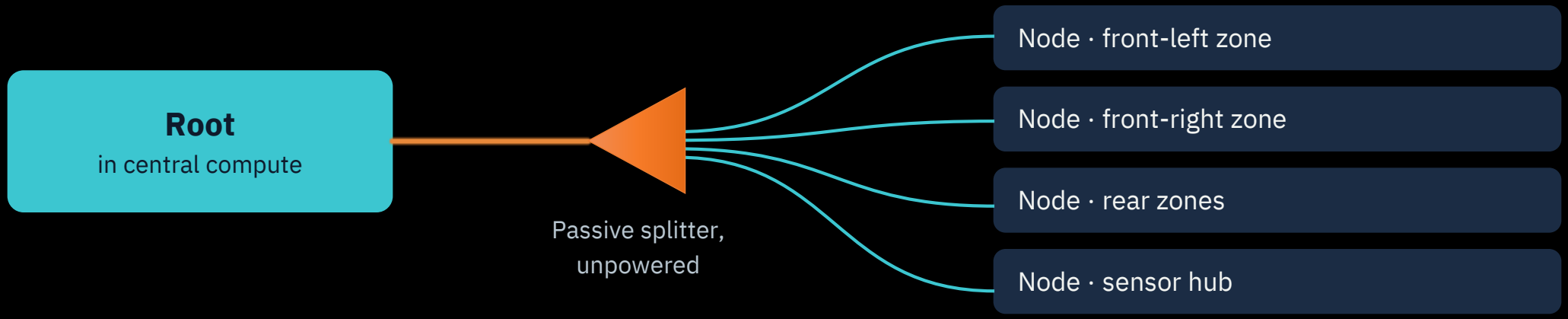
Source: IEEE Std 802.3cz-2023, multi-gigabit glass optical fiber automotive Ethernet

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TS-PON NETWORKING ADVANTAGES

TS-PON: one deterministic fiber tree



Deterministic latency

Time-aware scheduling at the Root, synced to central time, bounds latency and jitter for every zone.

Built-in reliability

Redundant trunk protection and per-Node fault detection keep safety traffic flowing.

Passive in the middle

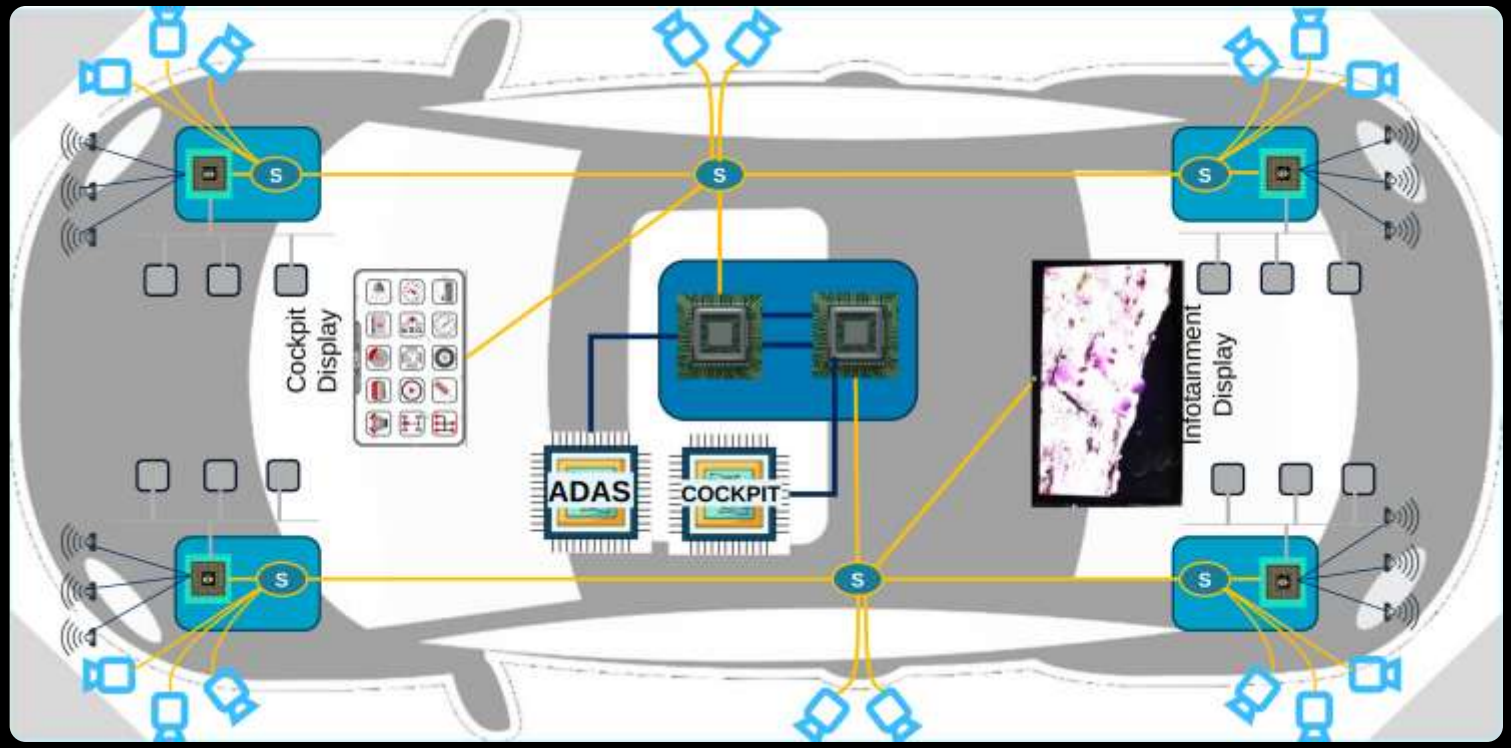
No switch silicon, power or cooling between compute and zones.

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TS-PON NETWORKING ADVANTAGES

TS-PON across the whole vehicle



Two Roots, one brain

Root chips in central compute feed the ADAS and cockpit SoCs.

Splitters, not switches

Passive splitters branch the fiber to four corner Nodes, the side cameras and both displays.

Nodes gather the edge

Each corner Node aggregates cameras, radar and ultrasonic sensors, and local ECUs.

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ROBOT DEVELOPMENT TRENDS

Smarter brains, busier bodies





Foundation models for action

Vision-language-action models turn what the robot sees and hears directly into motion.

Two-speed control

A slow “thinking” loop plans at Hz rates; a fast motor loop acts at kHz rates.

Dexterous hands

11 to 22 degrees of freedom per hand, each joint with its own sensors and motor.

Multimodal sensing

Cameras, lidar, tactile skin and IMUs feed gigabytes per second to the brain.

Source: SPE System Alliance, humanoid robot white paper (Aug 2026)

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NETWORKING REQUIREMENTS

A 100-port network inside a moving body

50–80

linear and rotary actuators in a typical humanoid

72+

degrees of freedom, counting two dexterous hands

4–8k

control cycles per second, all joints in sync

100+

network ports inside one robot

Source: SPE System Alliance, humanoid robot white paper (Aug 2026)

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NETWORKING REQUIREMENTS

What the robot’s network must deliver

Requirement	Why it matters in a robot	Design target
Bandwidth	Cameras, lidar and tactile skin stream GB/s	10–25 Gb/s backbone
Determinism	Motor loops run at 4–8 kHz	Bounded latency and jitter
Time sync	Every joint must move in lockstep	Sub-µs clock sync
Flex & torsion	Cables cross every joint, millions of bends	Thin, bend-tolerant links
EMI	50–80 motors switch inside the body	Immune by physics
Weight & space	Every gram in a limb costs torque and battery	Fewer, lighter links
Safety	Robots work beside people	Fault detection, redundancy

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PON NETWORKING ADVANTAGES

A fiber nervous system for the robot

Root in the torso

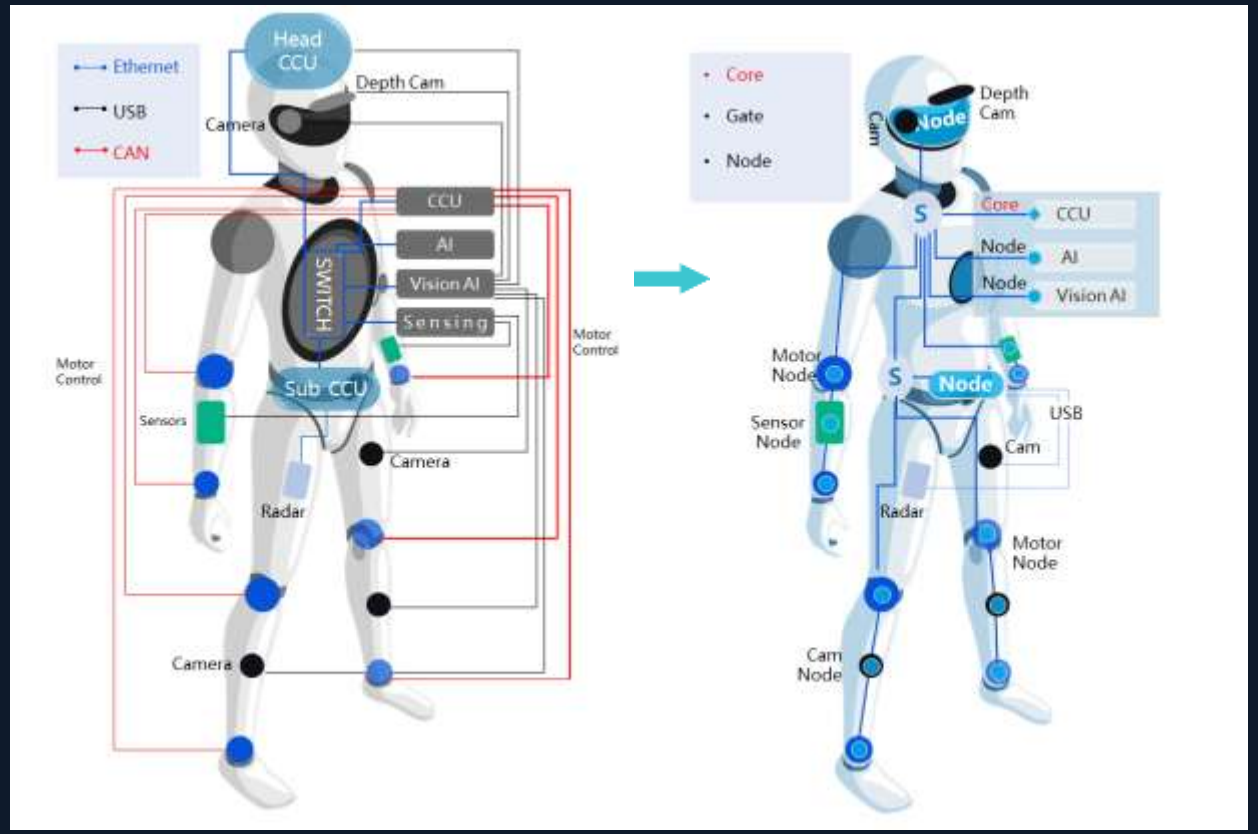
One Root chip beside the AI computer schedules every Node in time slots synced to the motor loop.

Passive splitter, hair-thin fiber

One unpowered splitter fans fiber out through the shoulders, neck and hips.

Nodes at the edge

Nodes in the head, hands and feet gather cameras, tactile sensors and joint drives.



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RISK MITIGATION

Fiber in motion: what we must prove

IN THE CAR · BUILDS ON OUR AUTOMOTIVE PROGRAM

Temperature and lifetime

–40 to +125 °C over a 15-year vehicle life, with AEC-Q102 optics.

Factory assembly

Fast, clean connector mating on the line; dirt on a fiber end kills the link.

Hinges and harness routing

Bend-insensitive fiber through doors, seat rails and tight body channels.

IN THE ROBOT · NEW QUALIFICATION WORK

Tight bends

Bend-insensitive fiber (ITU-T G.657) through shoulders, elbows and wrists.

Rotation and flex life

Spinning joints need fiber rotary joints or contactless links; flex life to millions of cycles.

Shock and impact

Falls and collisions; sealed, vibration-rated car connectors carry over.

Both Power stays on copper: fiber replaces the data cables, not the power feed to each Node.

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PRODUCT ROADMAP

Why Poncan can lead

ALREADY TESTING IN THE CAR

- **Our last-generation PON chips are widely used by OEMs to test TS- to test TS-PON for in-vehicle networking**
- **Our latest 25G TS-PON chip is being tested by a leading OEM OEM**

PON

Access-network heritage

Shipping ONU/OLT silicon, scheduling and OAM know-how from PN180X/PN110X PON programs — the base for TS-PON.

F5G

Industrial ruggedization

Extended temperature, long life and deterministic timing already proven in F5G industrial deployments.

Auto

OEM test-bed incumbent

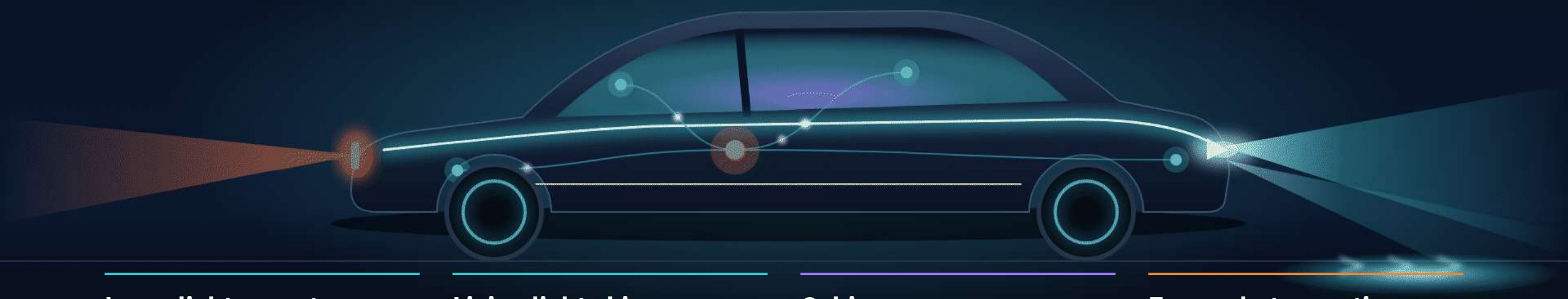
Our chips sit in OEM in-vehicle PON evaluations today: 10G and 25G at multiple OEMs

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VISION · THE OPTICAL CAR

A car that speaks in light



Laser light carpet

Headlights project turn arrows, crosswalks and warnings onto the road.

Living light skin

Fiber light lines pulse with charge level, greetings and turn signals.

Cabin aurora

Ambient light moves with music, alerts and ADAS in perfect sync.

Every photon on time

TS-PON timing keeps hundreds of light points in lockstep.