Avnu Alliance Introduction

AVNU®

RELIABLE SYNCHRONIZED NETWORKING

Announcing a Liaison between Edge Computing Consortium and Avnu Alliance

What is Avnu Alliance?

Creating a certified ecosystem to bring precise timing, reliability and compatibility to networks

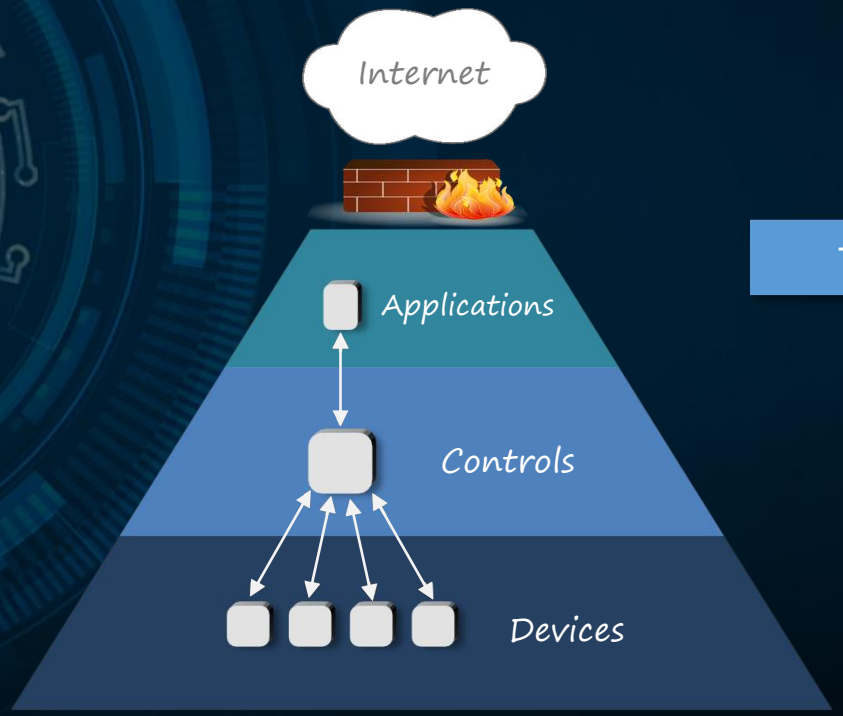
- Team of 80+ companies promoting open standards for deterministic networking, such as AVB/TSN
- Spans many industries: pro A/V, consumer A/V, automotive, energy, manufacturing, and more
- Certifies products to ensure interoperability and compatibility among models and brands

Spanning Verticals

- **Professional audio/video**
- **Consumer audio/video**
- **Automotive**
- **Industrial**

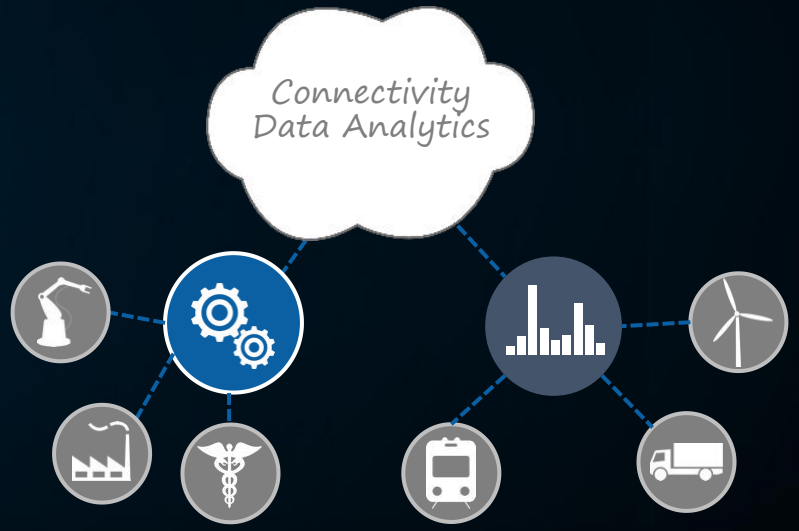
Industrie 4.0 Requires Flexible Data Access

TRADITIONAL
Industrial System Design



Transition

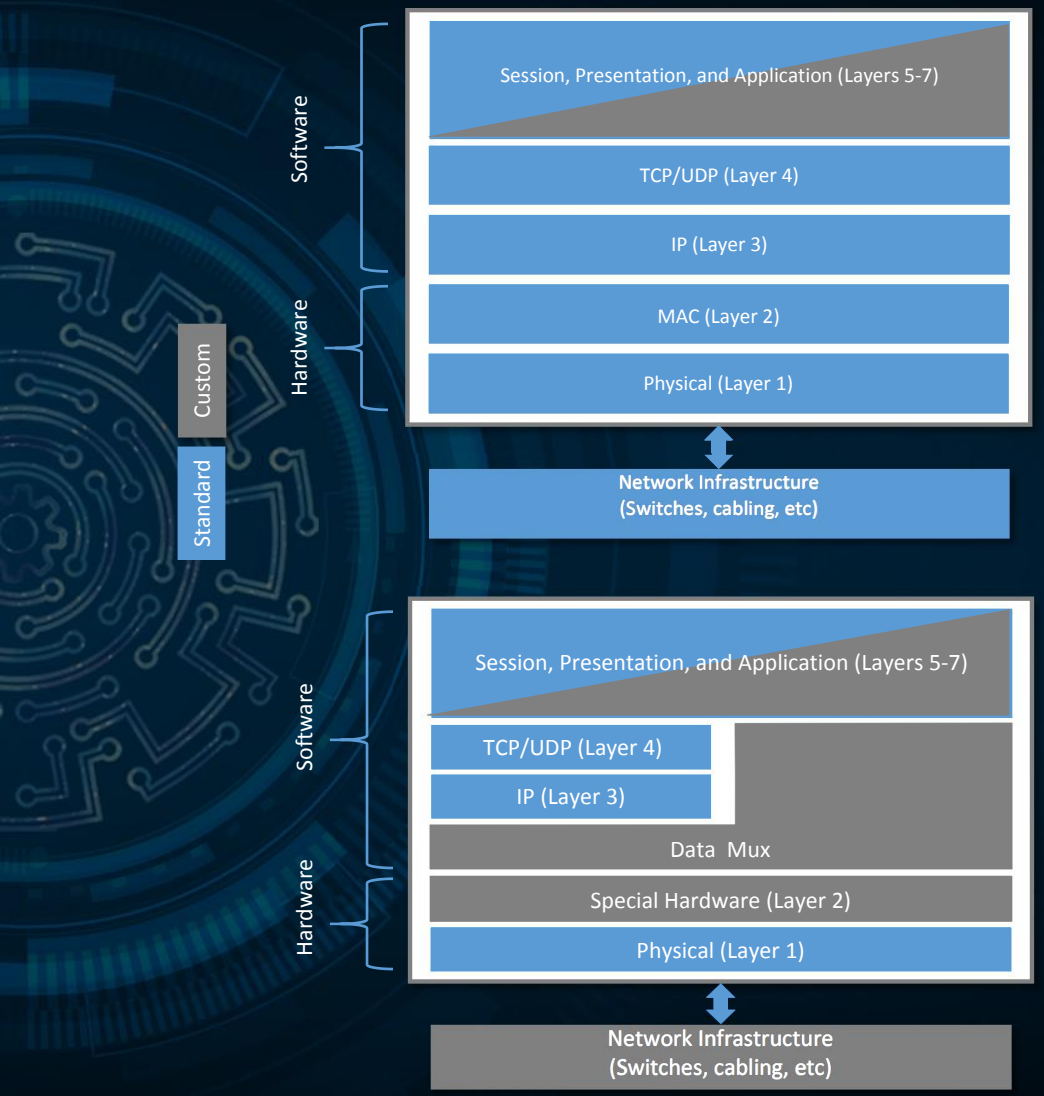
Industrie 4.0
Converged IT and OT network with TSN



Technical Needs of Communications

Requirement	Benefit
Time synchronization	Enables common clock for transmission scheduling, correlated I/O, etc.
Latency provisions	Enables deterministic control loops
Reserved bandwidth	Enables applications to operate reliably in the presence of network congestion or network component failures
Redundancy	Enables fault tolerance due to component failures, etc.
Converged network	Enables coexistence with best effort traffic and potentially multiple industrial protocols
Topology flexibility	Enables common industrial network topologies including line, ring, tree
Scalability	Can grow from small systems to large systems (in both node and stream count)
Security	Support safely integrating into IIoT systems

The Challenge



"Standard" Ethernet

- Best-in-class approach for openness and interoperability
- Cannot bound latency (needed for control applications)
- Cannot guarantee bandwidth (needed for reliability)

"Hard Real-Time" Ethernet

- Best-in-class approach for latency and control
- Cannot "share the wire" (no third party devices)
- Cannot scale with Ethernet (e.g. limited to 100 Mb/s)
- Proprietary HW/SW increases costs

Standards Efforts

- Standards effort through IEEE 802 to improve latency and performance while maintaining interoperability and openness
- Time Sensitive Networking (TSN) will provide:
  - Time synchronization
  - Bandwidth reservation and path redundancy for reliability
  - Guaranteed bounded latency
  - Low latency (cut-though and preemption)
  - Bandwidth (Gb+)
  - Routable to support complex networks and wireless

IEEE Time Sensitive Networks Overview

Standard	Area	Title
IEEE 802.1ASrev, IEEE 1588	Timing & Synchronization	Enhancements and Performance Improvements
IEEE 802.1Qbu & IEEE 802.3br	Forwarding and Queuing	Frame Preemption
IEEE 802.1Qbv	Forwarding and Queuing	Enhancements for Scheduled Traffic
IEEE 802.1Qca	Path Control and Reservation	Path Control and Reservation
IEEE 802.1Qcc	System Configuration	Enhancements and Performance Improvements
IEEE 802.1Qci	Time Based Ingress Policing	Per-Stream Filtering and Policing
IEEE 802.1CB	Seamless Redundancy	Frame Replication & Elimination for Reliability
…	Additional Projects	Continual Evolution of the Standard

Time Sensitive Networking: Key Elements

Time Synchronization

802.1 AS

Traffic Scheduling

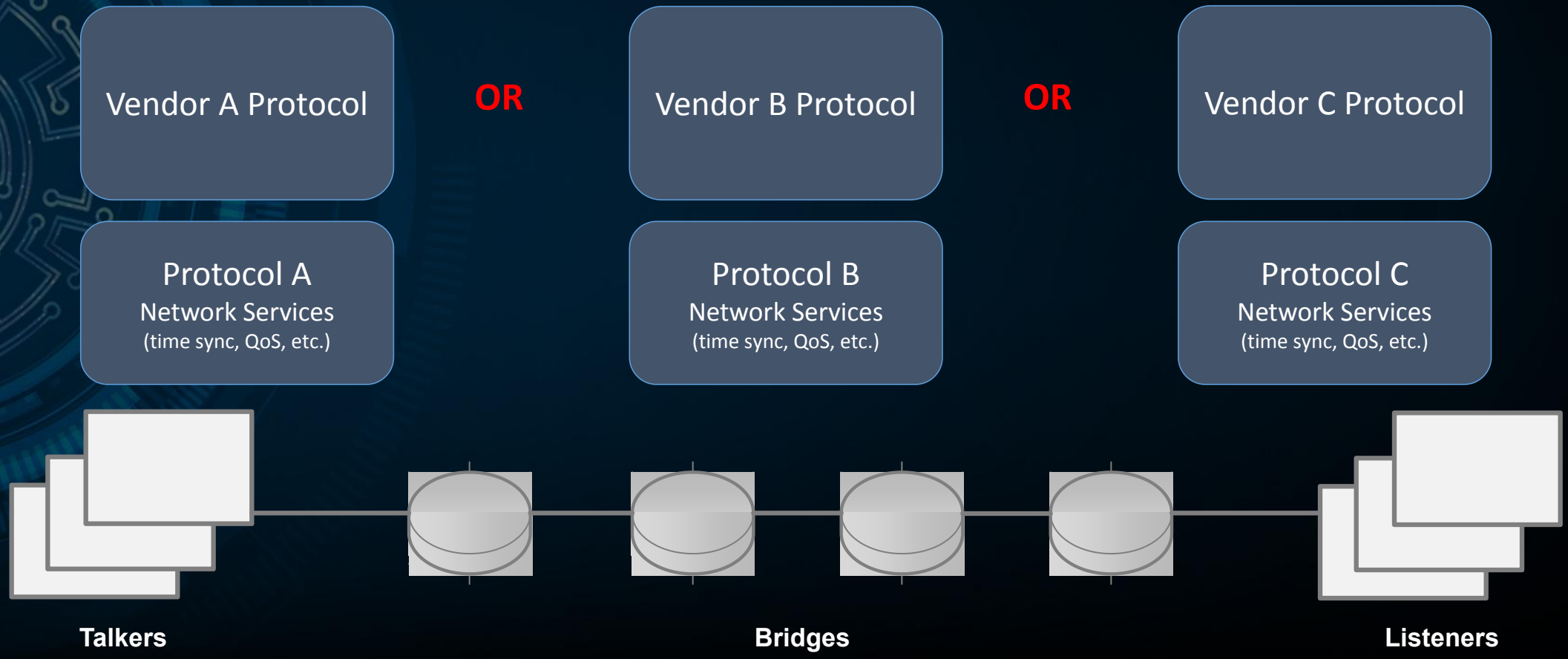
802.1 Qbv

System Configuration

802.1 Qcc

Lack of Common Technical Foundation

Applications use TSN networks in a potentially incompatible manner and cannot coexist on a shared network



Avnu Common Technical Foundation

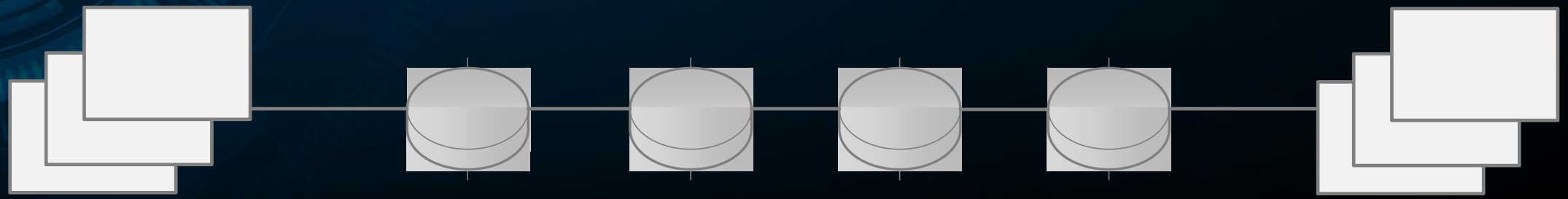
With Avnu, applications can coexist on a shared AVB/TSN network

Vendor A Protocol **AND** Vendor B Protocol **AND** Vendor C Protocol

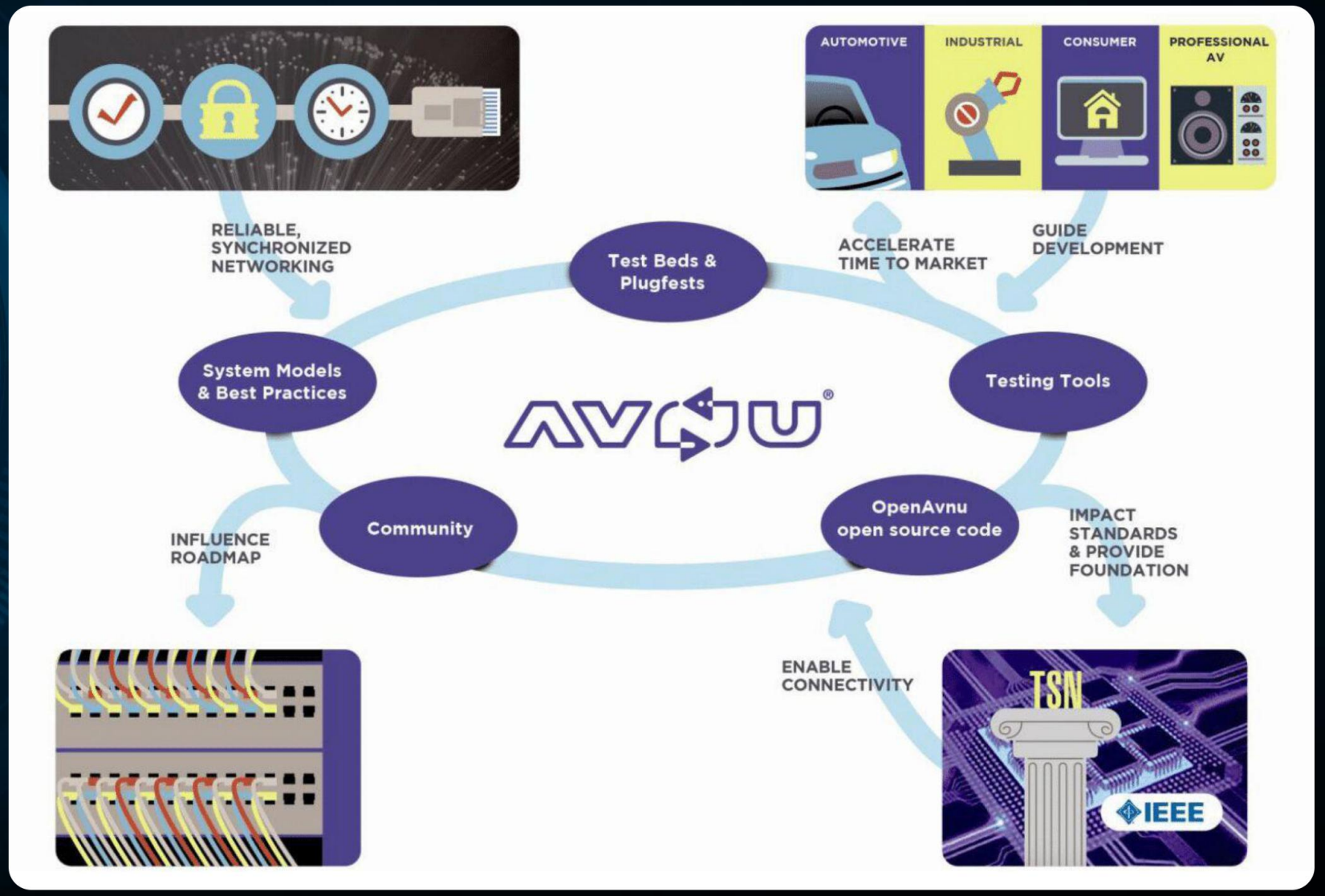
IEEE/IETF Defined, Avnu Certified Common Network Services

Market-specific interoperability profiles for time sync, QoS, etc. and corresponding Test Plans

Certifiable open source software implementations with standardized APIs, HW reference designs, etc.



AVNU: Converged TSN Ecosystems



Collaboration with Testbeds using TSN such as IIC and future ECC

Join the Effort

- AVnu Alliance has created an **Industrial Advisory Council** for manufacturers and end users to learn more about the Alliance and the standards and to get involved with shaping the future of industrial networking.
  - Be informed of the evolutions happening in standard Ethernet to support converged time-synchronized networking.
  - Provide input and feedback to influence the on-going activities for conformance and certification of products coming to market.
  - Network with other thought leaders in the areas of converged, time-synchronized communications.
  - Gain visibility into suppliers and consultants when looking to build a conformant system
  - Learn tips and best practices on building and maintaining converged time-synchronized systems.
- If you or someone you know is interested in joining (no fee) or finding out more, please contact administration@avnu.org.

The Foundation of Avnu: Our Members

Board of Directors

Promoters

Adopters