



Alliance for IoT  
and Edge Computing  
Innovation

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# Converged Networks for IIoT Applications leveraging Immersive Technologies

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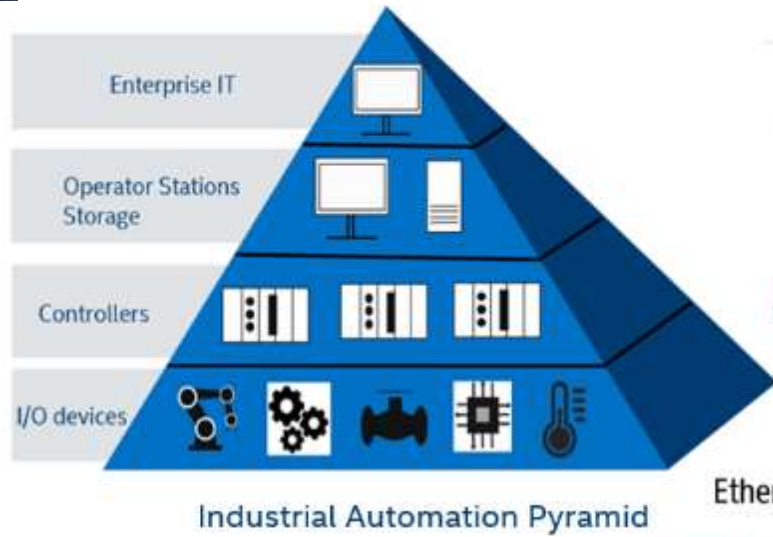


# Converged Networks for IIoT of the future

- General purpose networks where different types of traffic (mixed criticality) coexist



**Purpose Built  
Proprietary  
Rigid**



Industrial Automation Pyramid

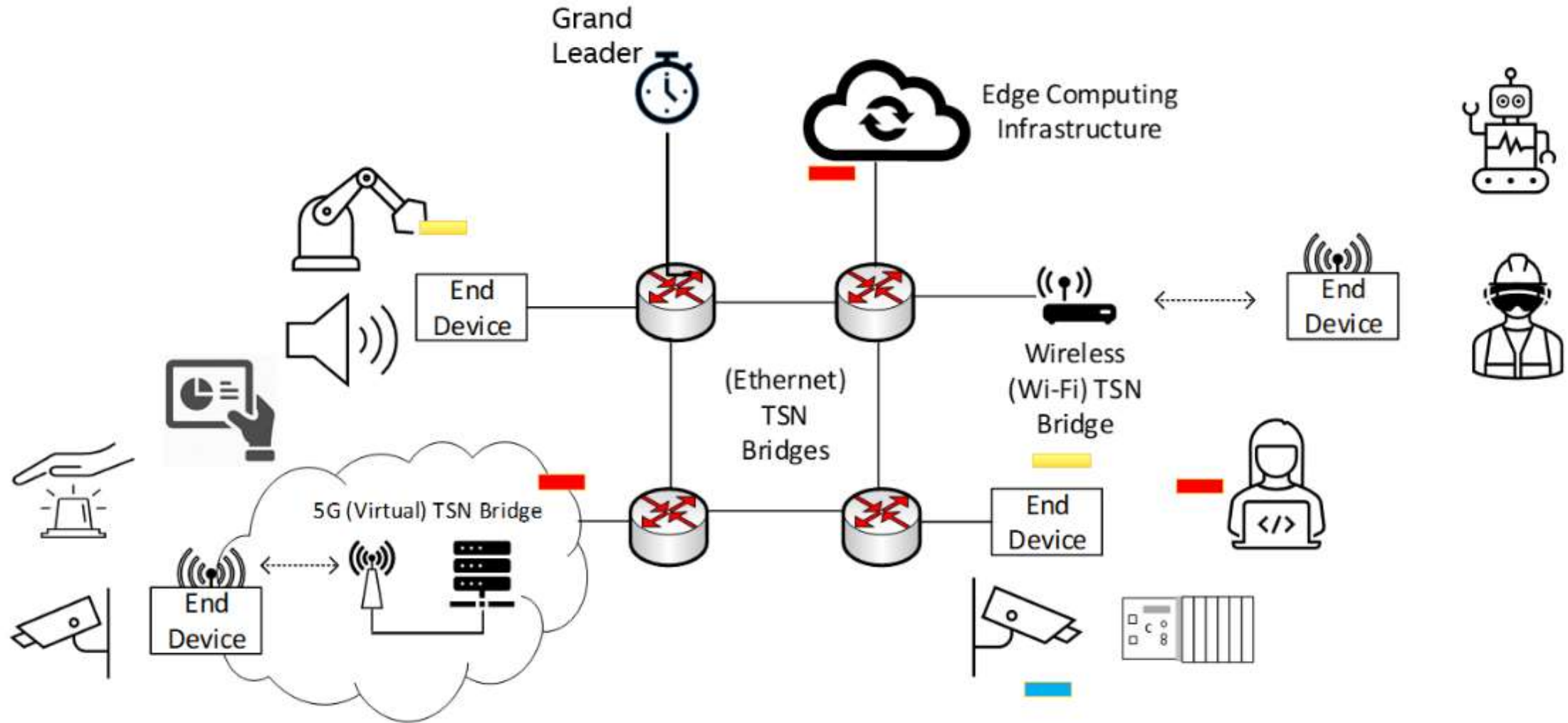


**Standards-based  
Interoperable  
Flexible and Software-Defined**



Source: Avnu Alliance

# Example of a mixed criticality network





# Time-Sensitive Networking (TSN)



STANDARD  
EDGE  
NETWORKS



Time  
Synchronization



Latency



Availability/  
Reliability



Resource  
Management

Enhancements to *standard networking* enabling *deterministic performance on convergence of networks* supporting *mixed criticality* workloads

# Time-Coordinated Computing and TSN

## Time Synchronization

Access to a trusted time source



SW applications need trusted time with quantified accuracy

## Timeliness

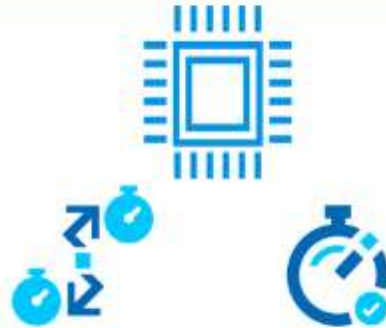
The ability to produce the expected result by a deadline



Distributed SW applications also depend on information delivered with timelessness

## Determinism within the system

### Time Coordinated Computing



## Determinism between systems

### TSN (Time-Sensitive Networking)

Synchronization

Reliability

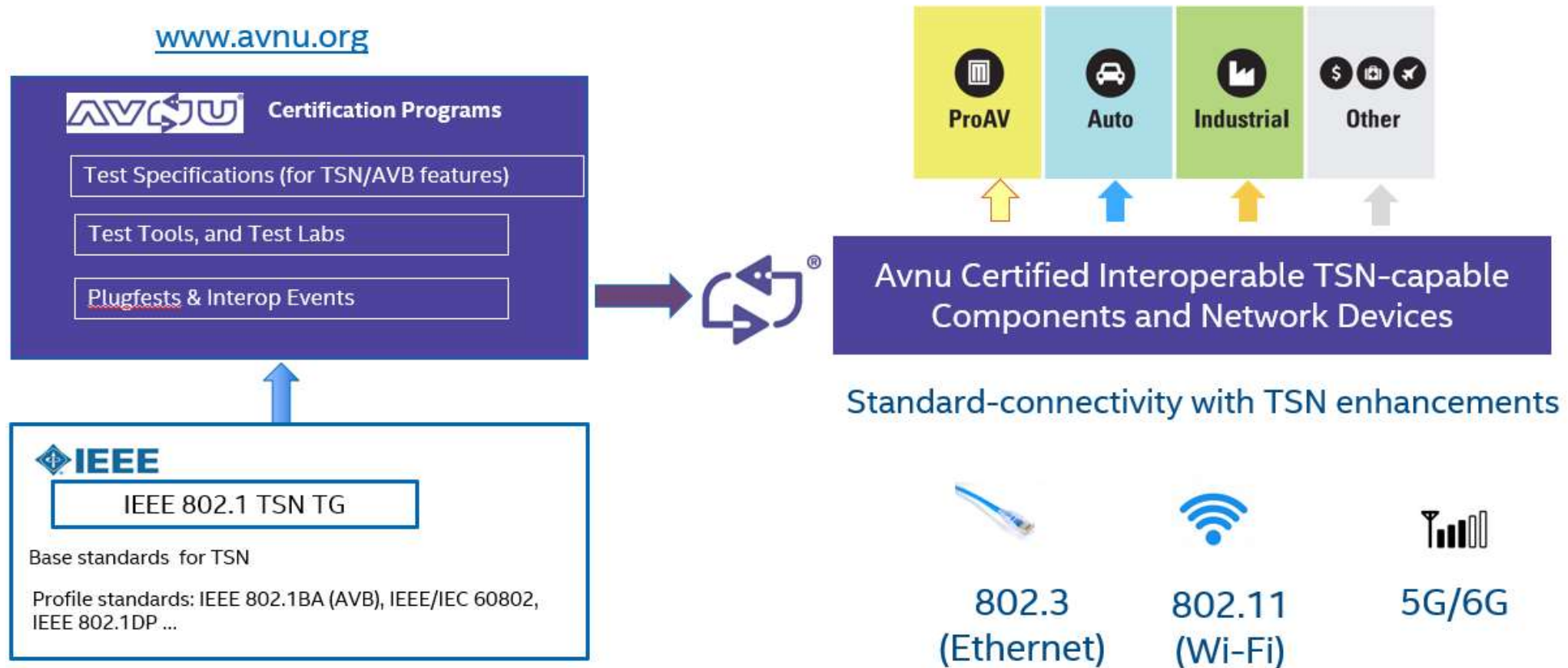
Bounded Latency

Resource Mgmt

+

Computing and network infrastructure shared by time-critical and other applications

# Industrial ecosystem enabling Converged Networks and TSN



# Some Research Challenges

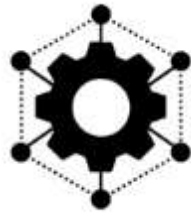
Time



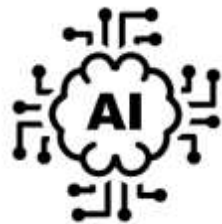
Latency



Dynamic  
Configuration



Automation &  
Learning



- Complex networks with heterogeneous links (wired and wireless)
- Device mobility and dynamics of stochastic wireless communications
- Run-time onboarding of new devices and applications
- Support for legacy and new applications
- Complex network optimization problems (resource allocation with multiple objectives and tradeoffs)
- Easy of deployment and management (zero-touch management)



# 6G-XR 6G eXperimental Research infrastructure to enable next-generation XR services

- **EU-funded project** under the SNS Call Stream C-01-01
- **Duration:** 01.01.2023 – 31.12.2025
- **Objective:** enable B-SotA capabilities towards 6G, by:
  - Building a multisite research infrastructure
    - Provide a validation platform for 6G use cases
    - Develop 6G XR Enablers
    - R&I for consortium members and 3<sup>rd</sup> parties via the open calls
  - Validating & demoing MEC scenarios & innovative 6G apps
    - Integration in cloud continuum
    - Beyond 5G capabilities
    - Holographics, digital twins, XR/VR
    - **Use cases** with selected vertical actors



**8**  
countries

**36**  
months



# 6G-XR Use Cases



- SOUTH NODE:  
real-time holographics communications



- NORTH node:  
Digital twin & Energy consumption



## UC1: Resolution Adaptation or Quality on Demand (QoD)

- Detect cell congestions and adapt XR resolutions or XR traffic priority



## UC2: Routing to the Best Edge

- Select and make use of the most appropriate Edge based on specific goals



## UC3: Control Plane Optimizations

- Integrate holographic communications to the network control plane



## UC4: Collaborative 3D Digital Twin-like Environment

- Enable real-time collaboration and control of physical assets in virtual reality



## UC5: Energy Measurement Framework for Energy Sustainability

- Measure and optimise end-to-end energy consumption in mobile networks

# 6G-XR System Architecture

- Synoptic view at the 6G-XR System Architecture, Objectives, and Tasks (T)
- Adaptable to heterogenous access systems, composed of cellular, Wi-Fi, IoT, ...
- Spanning different families of technologies: 4G, 5G, forthcoming 6G to ensure backward compatibilities
- Edge-cloud continuum
- **Open Call III approaching soon: <https://www.6g-xr.eu/open-calls>**

