



StarlingX

Akraino & Starlingx: A Technical Overview

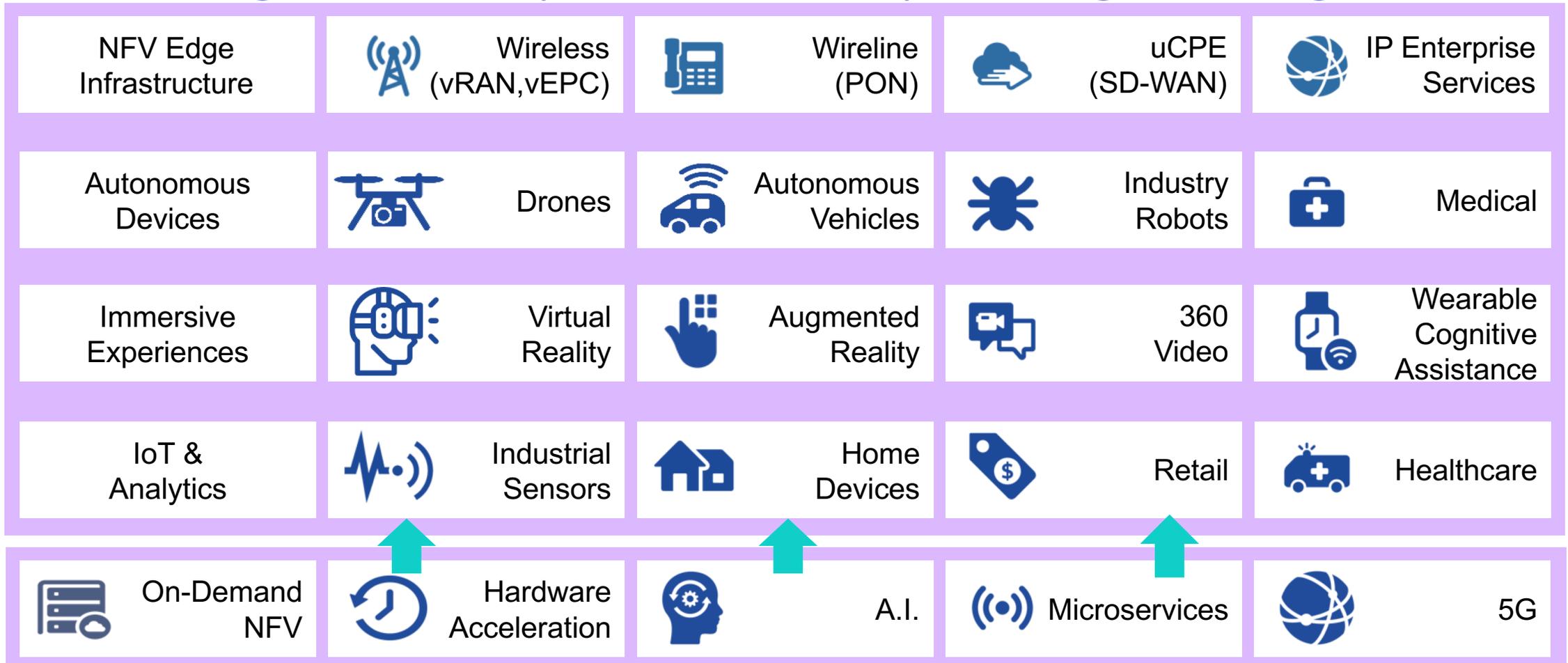


Agenda

- ▶ Why Edge Computing?
- ▶ What's Edge Computing?
- ▶ Akraino and Its Building Blocks
- ▶ StarlingX Technical Overview
- ▶ Collaboration in Akraino Community

Emerging Technologies in IoT and Networks

are demanding lower latency and accelerated processing at the edge



Why Edge Computing?

Emerging technologies are demanding lower latency and accelerated processing at the edge



Edge Cloud

Performs data processing at the edge of the network, near data sources

Low Latency
< 20ms

Optimal

High Latency
~25 – 200ms

Not Optimal



Central Cloud

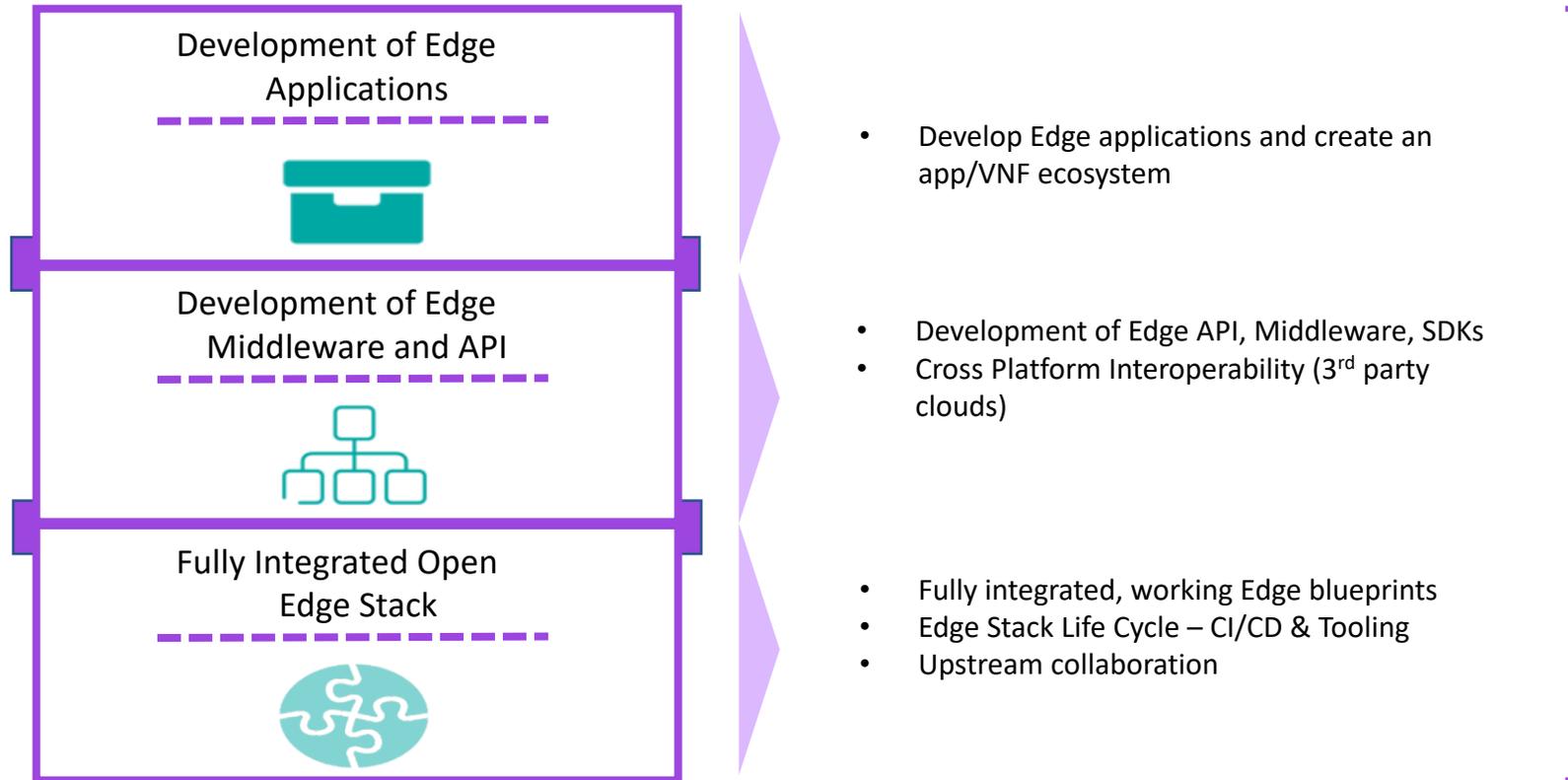
Highly centralized computing resources of cloud service providers

Requirements of Edge Computing

- ▶ Extensions beyond Cloud Computing and Data Centers
- ▶ Edge Side: Close to Users and Data Sources
- ▶ Converged Platform of Networks, Compute, Storage and Applications
- ▶ Real-Time, Optimized, Data Localization, Intelligence, Security and Privacy
- ▶ High Performance and Low Latency
- ▶ Large-Scale but Small-Size
- ▶ Zero Touch Provisioning and Automation: Remote Management, Autonomous Devices
- ▶ Self-Healing, Easy Upgrading, and Long Life Power Supplier

What is Akraino?

Everything about edge – Akraino is the edge stack



The new edge requirements for Akraino project

Edge Challenges



Large Scale
>1000 Locations



Need Simple Operations
Zero-touch provisioning
Zero-touch operations
Zero-touch lifecycle



Low Cost
Start-up, Build, Run



Multiple Edge Use Cases
Faster innovation but with right integration

Akraino Edge Stack is the first open source collaborative community project exclusively focused on integrated distributed cloud edge platform.

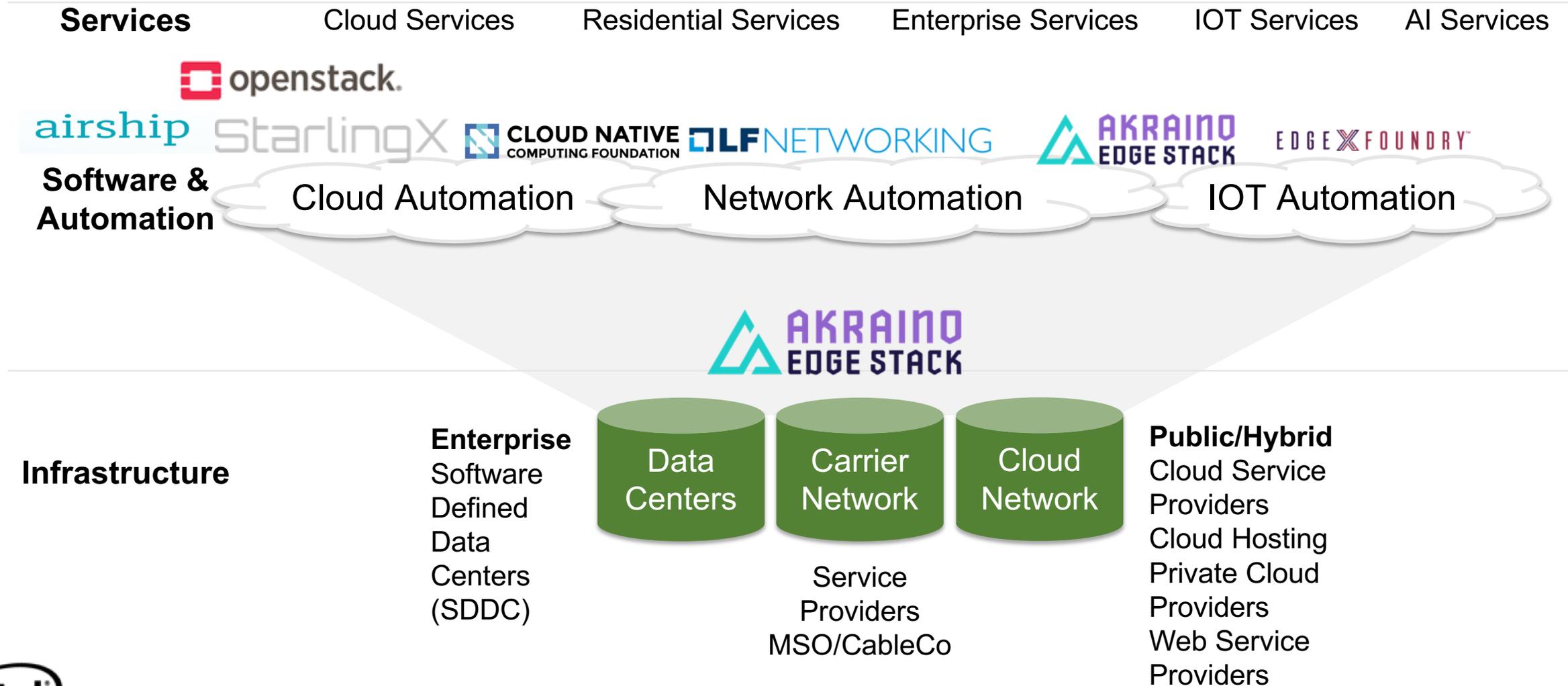


Solution



Akraino Edge Stack integrates multiple open sources to supply holistic Edge Platform, Edge Application, and Developer APIs ecosystem.

End-to-End, Automation, Interworking



LF Announcement march 2018

- ▶ First Open Source Project at Edge gathers momentum, complements other standards & consortiums
- ▶ Edge now an integral part of Open Source Software Ecosystem

The Linux Foundation Announces Expanded Industry Commitment to Akraino Edge Stack

ALTIOSTAR



ES1 北京赛西认证有限责任公司
CESI CERTIFICATION CO.,LTD.



H3C



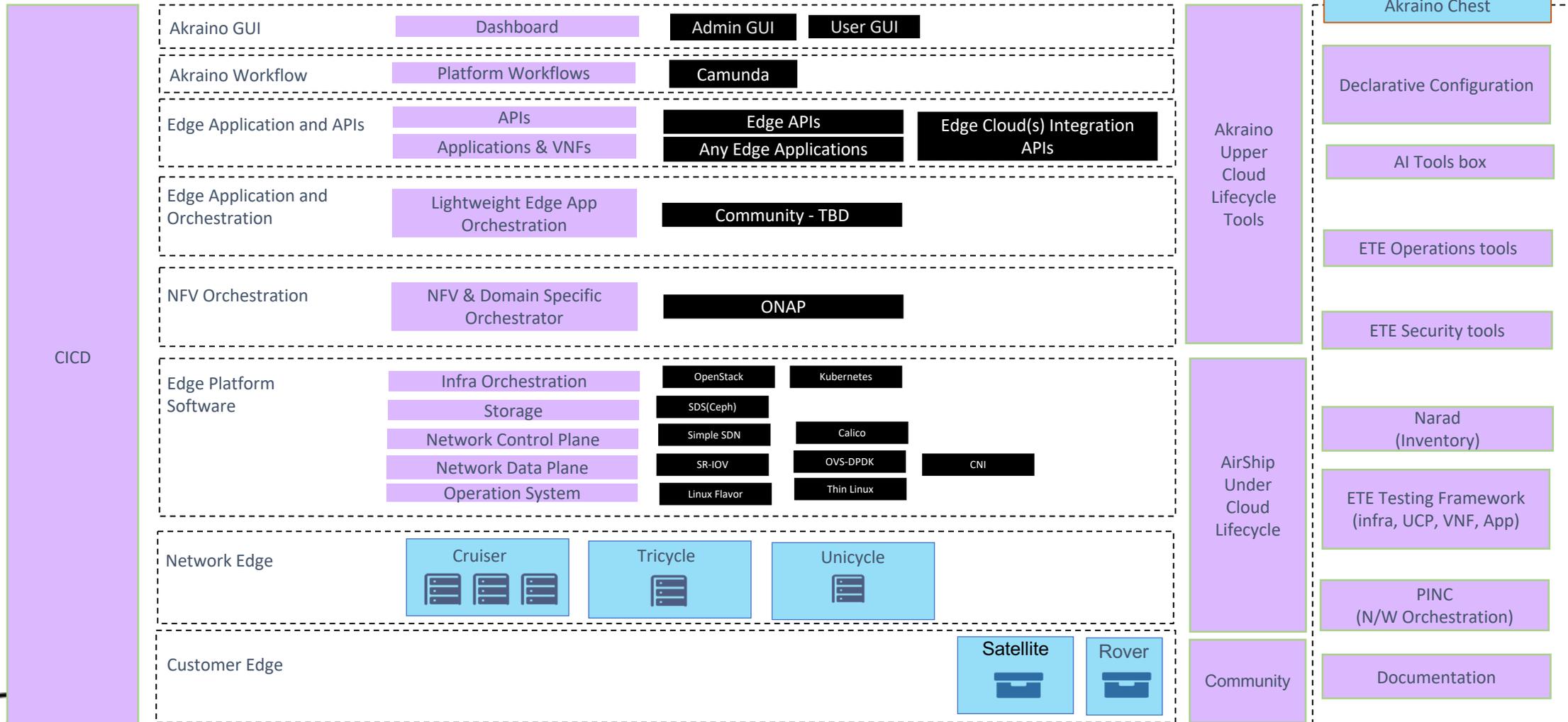
Tencent 腾讯

WIND™

ZTE



Akraino building blocks



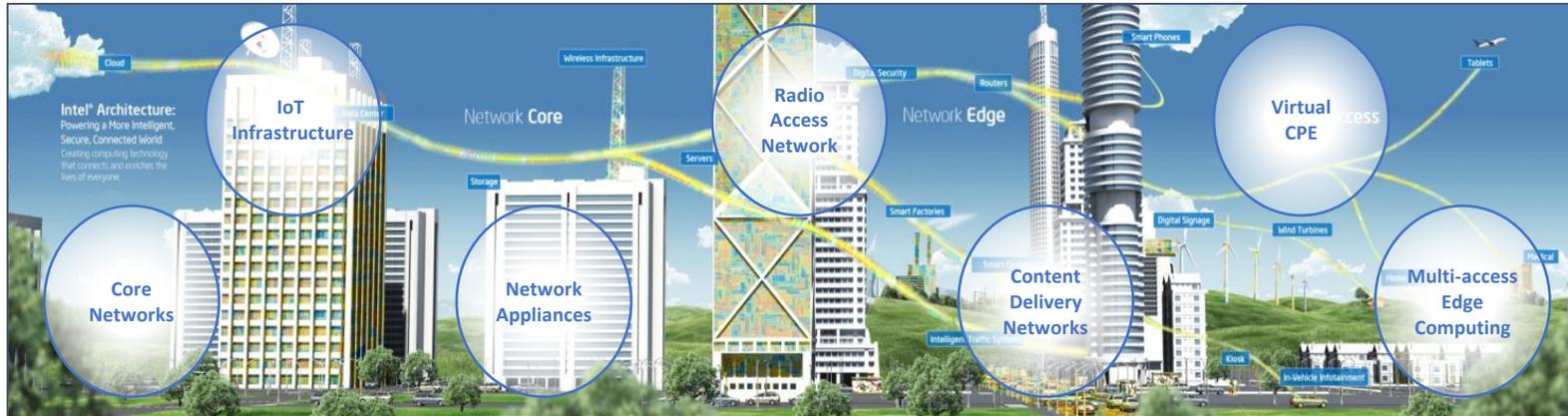
What is StarlingX?

- ▶ StarlingX is a new project being hosted by the OpenStack Foundation
- ▶ Formed with seed code from the Wind River Titanium Cloud portfolio
- ▶ Project will provide a fully integrated OpenStack platform with focus high availability, Quality of Service, performance and low latency needed for industrial and Telco use cases
- ▶ Aligned with the OpenStack Foundation Edge Working Group and the Linux Foundation Akraino Edge Stack

StarlingX addresses Edge Gaps

Based on Wind river titanium cloud

Telco Infrastructure



Energy



Smart Buildings

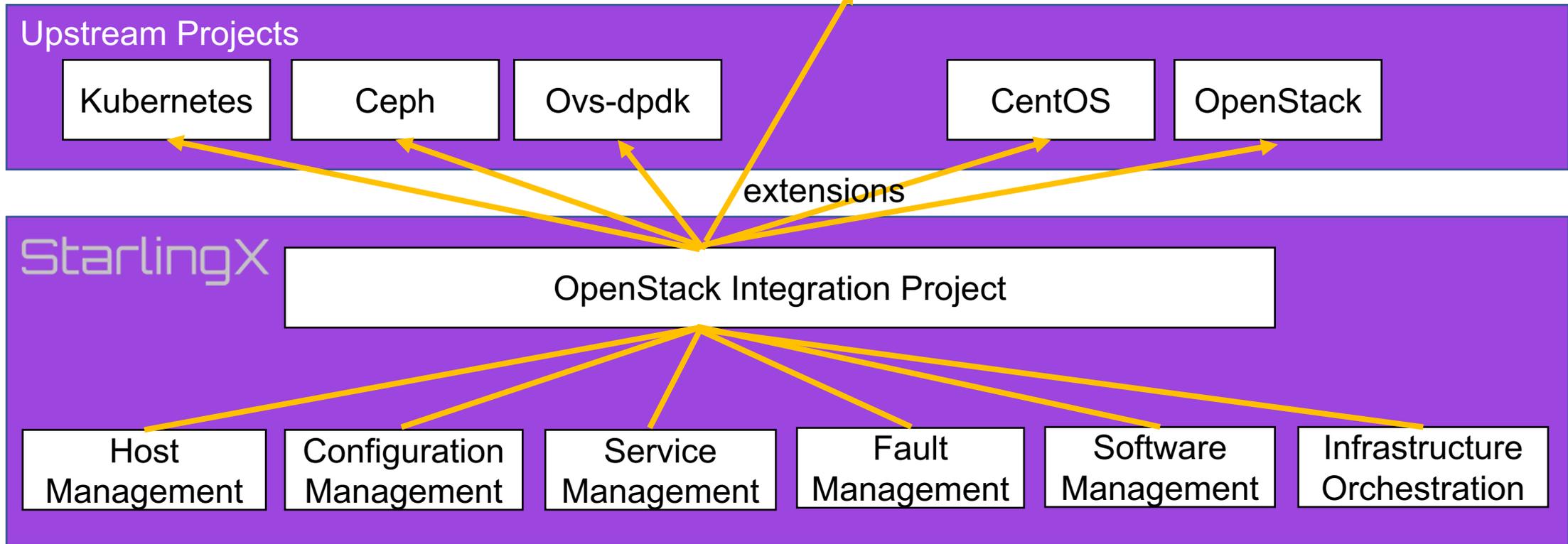


Manufacturing

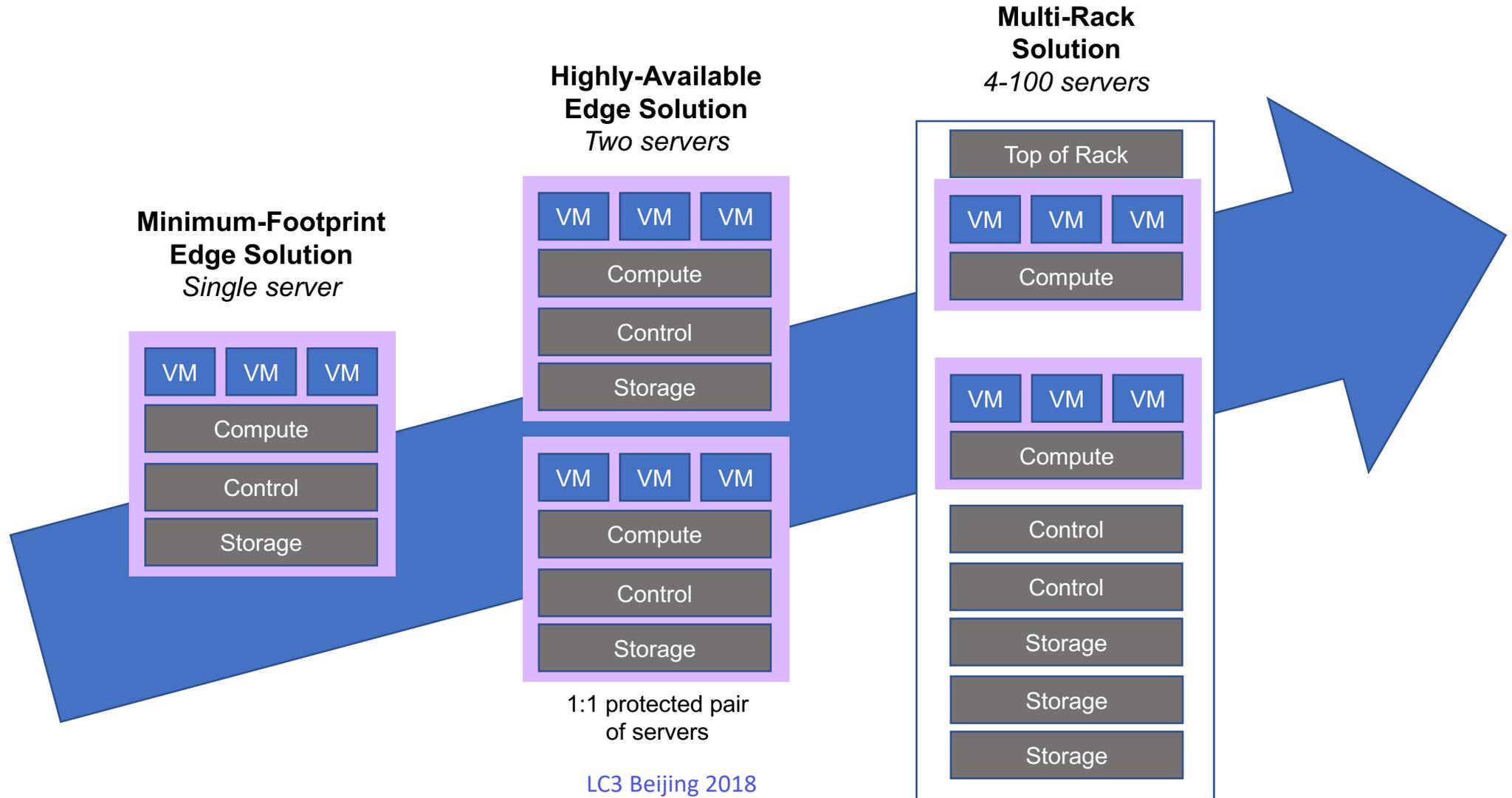


- ▶ Proven, Integrated virtualization platform saves Time-To-Market
- ▶ Delivered latency, resiliency and performance for Edge use cases
- ▶ Streamlined installation, commissioning and maintenance
- ▶ End-to-End security and Ultra-low latency for Edge applications
- ▶ 100% compatible with open industry and de facto standards
- ▶ Full support for multi-layer HW and SW decoupling

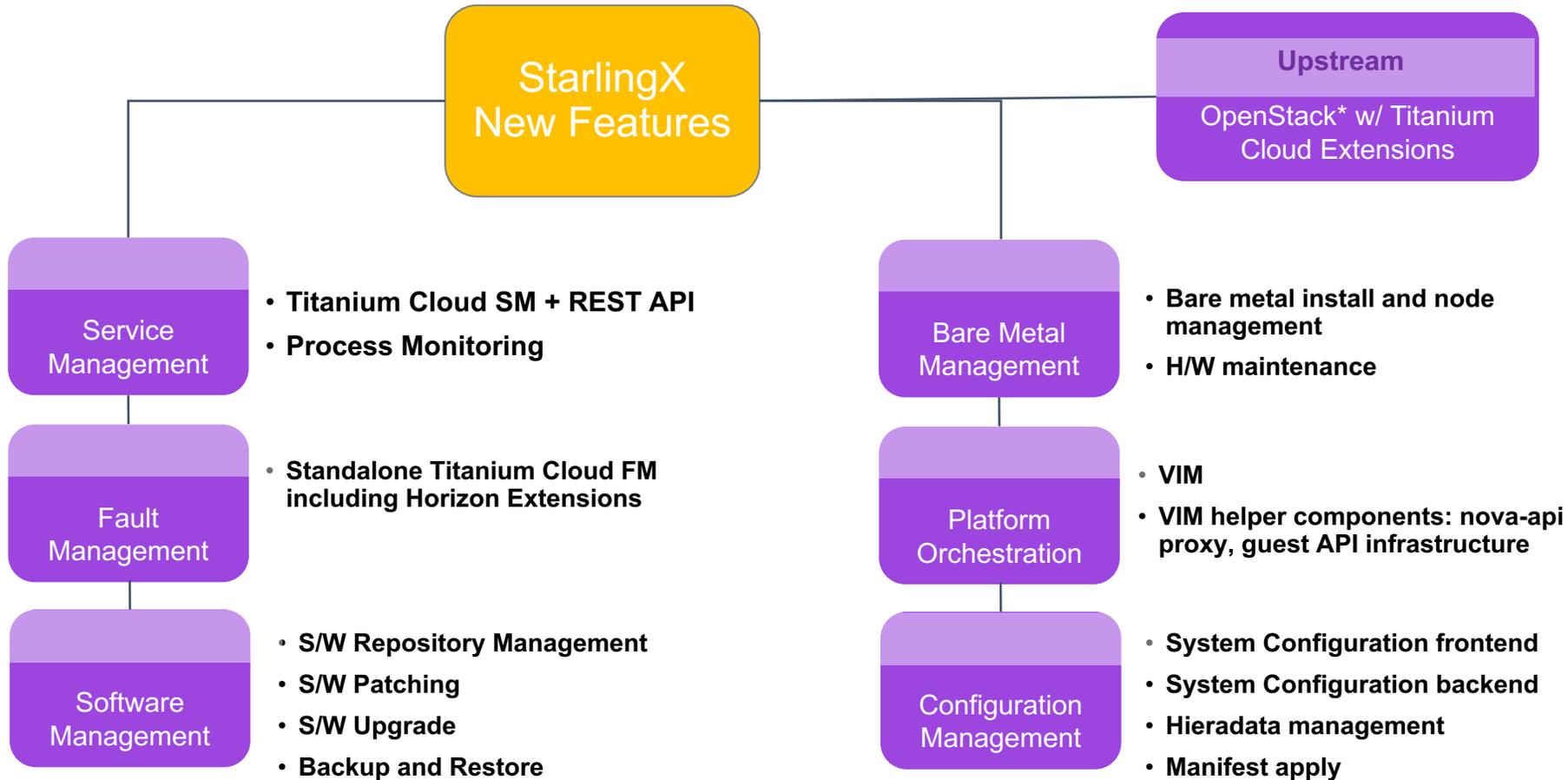
High level Project Architecture



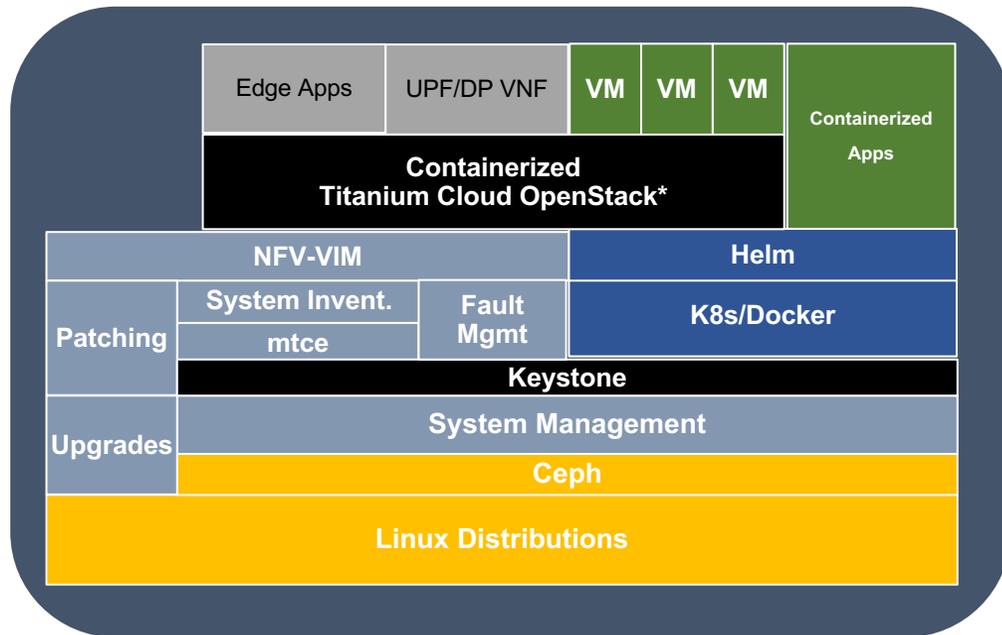
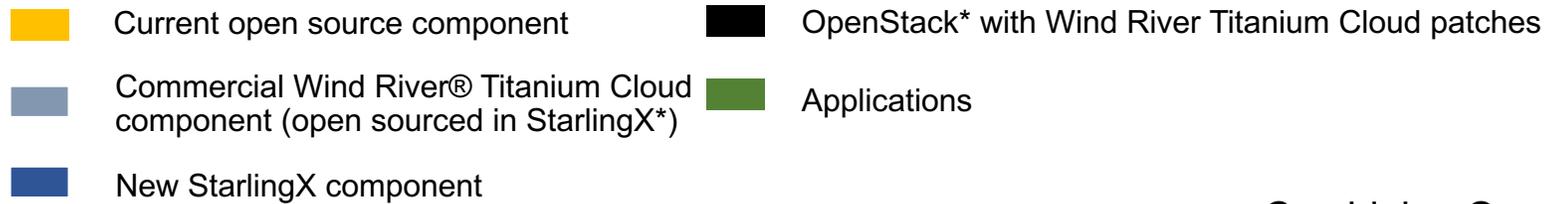
Scalability for all edge use case deployment models



Key Capabilities for Edge Stack



Directional Vision for Akraino



- Combining OpenStack* with components from Wind River® Titanium Cloud with new extensions to support k8s with Docker* runtime
- Keystone runs as a shared service on the platform with Ceph for persistent storage
- Kubernetes* applications deployed by Helm
 - OpenStack is containerized
 - Calico used for container networking backend
- Retains Wind River Titanium Cloud installation mechanism for bare metal installation
- Deployment for Intel seed will use Puppet for bare metal and Helm for OpenStack and Containerized Apps
- Lifecycle for Intel seed will use existing Wind River Titanium Cloud services for bare metal and K8s for remaining

Performance features

- ▶ Compute node performance profiles
 - ▶ Select performance characteristics that match the workload requirements
 - ▶ Optional RT KVM support
 - ▶ House keeping functions including interrupts offloaded to dedicated CPU(s)
 - ▶ Huge page backend VM's (2M or 1G)
 - ▶ Dedicated and shared VM CPUs
 - ▶ Including hybrid model for VM
 - ▶ High Performance Networking
 - ▶ OVS-DPDK
 - ▶ SR-IOV
 - ▶ PCI-passthrough
 - ▶ GPU passthrough support
- ▶ EPA Features
 - ▶ HT placement/scheduler policy support
 - ▶ Ability to specify CPU models for VMs to leverage advanced features of CPU architectures
 - ▶ NUMA node awareness
 - ▶ Specify multiple virtual NUMA nodes and required memory per virtual NUMA node
 - ▶ Specify mapping of a virtual NUMA node to a physical NUMA node
 - ▶ NUMA affinity (relative to vswitch and/or PCI-PT/SRIOV)
 - ▶ Network load balancing across NUMA nodes
 - ▶ vcpu scale up/down
 - ▶ Nova-api extension with Heat integration
 - ▶ RDT cache allocation technology (CAT) support
 - ▶ Enable VMs to reserve slice of L3 cache

Delivering Predictable Performance At The Edge

Vision for future collaboration

- ▶ Ubuntu OS support
- ▶ Edge deployment simplification enabling zero touch provisioning
- ▶ Centralizing infrastructure management of Edge deployments
- ▶ Securing the edge
 - ▶ Remote attestation
- ▶ Identify and work to drive synergies with EdgeX and NEV SDK within Akraino
- ▶ Enable 5G use cases at the Edge vRAN

Akraino is complementary

Akraino interfaces with adjacent projects standards, ref arch and ref impl

DLF NETWORKING

ONAP
OPEN NETWORK AUTOMATION PLATFORM




kubernetes
Container Orchestration
Multi-cloud portability

EDGE X FOUNDRY™
IIOT Framework at Edge

 **ceph**

 **openstack.**
Open Source Software for
Creating Private and Public

 **Acumos AI**

AI Framework Across Projects
Networking
Analytics/Automation

 **DANOS**  **airship**  **StarlingX**

Disaggregated Networking
Whitebox Operating Systems

For More Information, Please
Visit www.akraino.org and www.starlingx.io

