
Databases
ORCHESTRATION
NETWORKING
RUNTIME
PROVISIONING
STORAGE
Docker
CLOUD NATIVE
COMPUTING FOUNDATION
OPEN I/O
LINUX
LF
5G
intel
arm
XILINX


KubeCon | CloudNativeCon

Europe 2019

# The Edge is Open

The Edge is Open

Open Source

Open to All

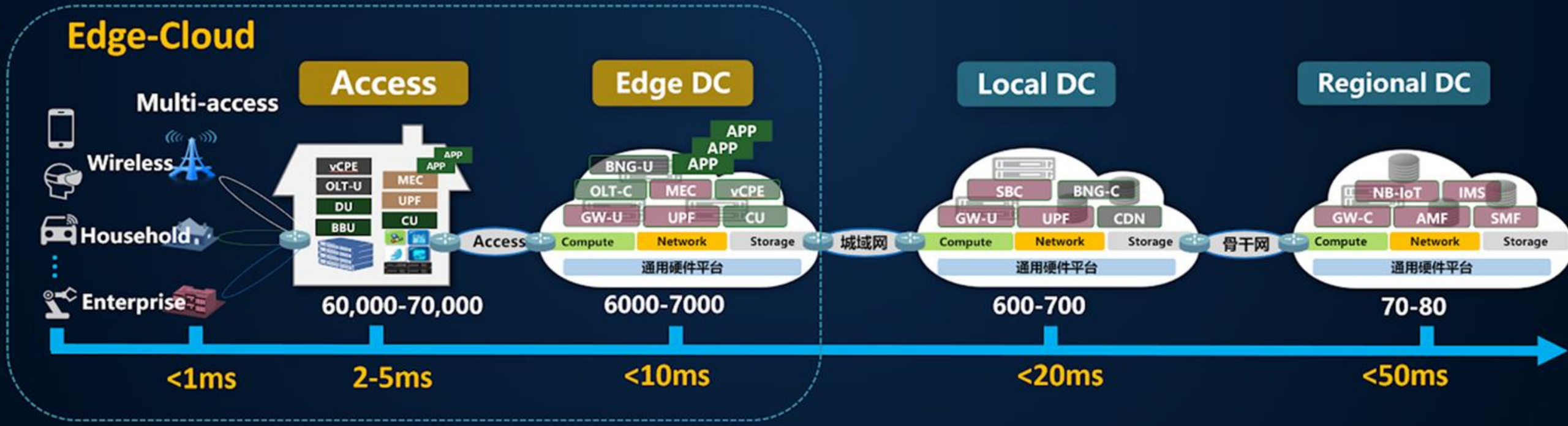
Open for Business

Open for Improvements

# China Unicom's Carrier Cloud Architecture

China unicom中国联通 创新·改变世界

- China Unicom released 'Network Reconfiguration plan — CUBE-NET2.0', supporting digital transformation.
- 5G network will be constructed based on three-tier data centers at the regional, local, and edge levels.




Sprint
USDOT 1160122


LEO'S FORTUNE
SPACE MARSHALS
MONUMENT VALLEY


ATTENTION
CAUTION
NO TRESPASSING
AUTHORIZED ENTRY ONLY
WARNING
ANTENNAS MAY BE ACTIVE

# How Autonomous Cars Helped Pave The Way For Edge Computing

By Zenlayer | January 9, 2018 | 0

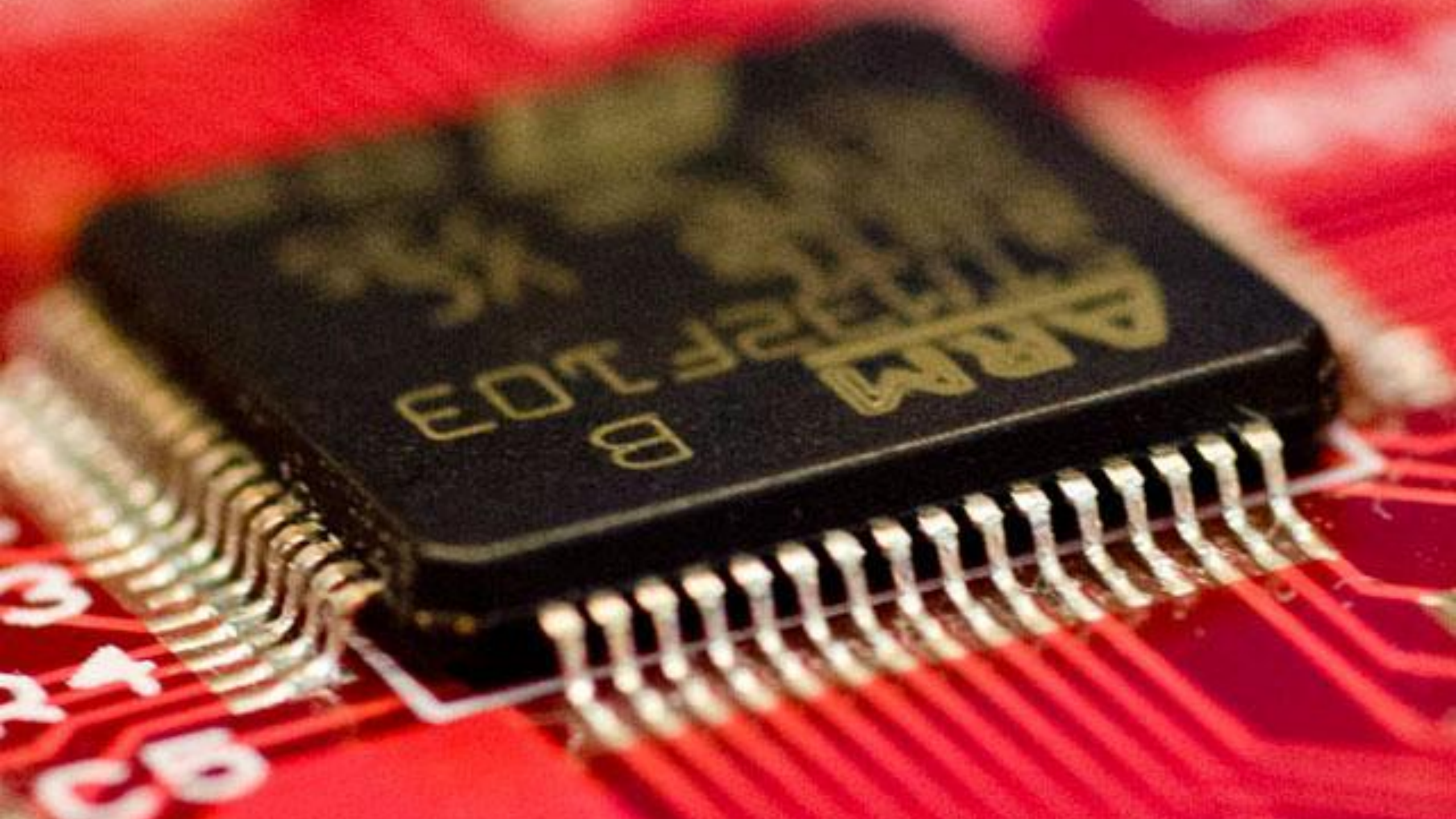

Autonomous cars are becoming mainstream every day. Autonomous cars aren't just tangible Artificial Intelligence, they're also paving the way for edge computing.

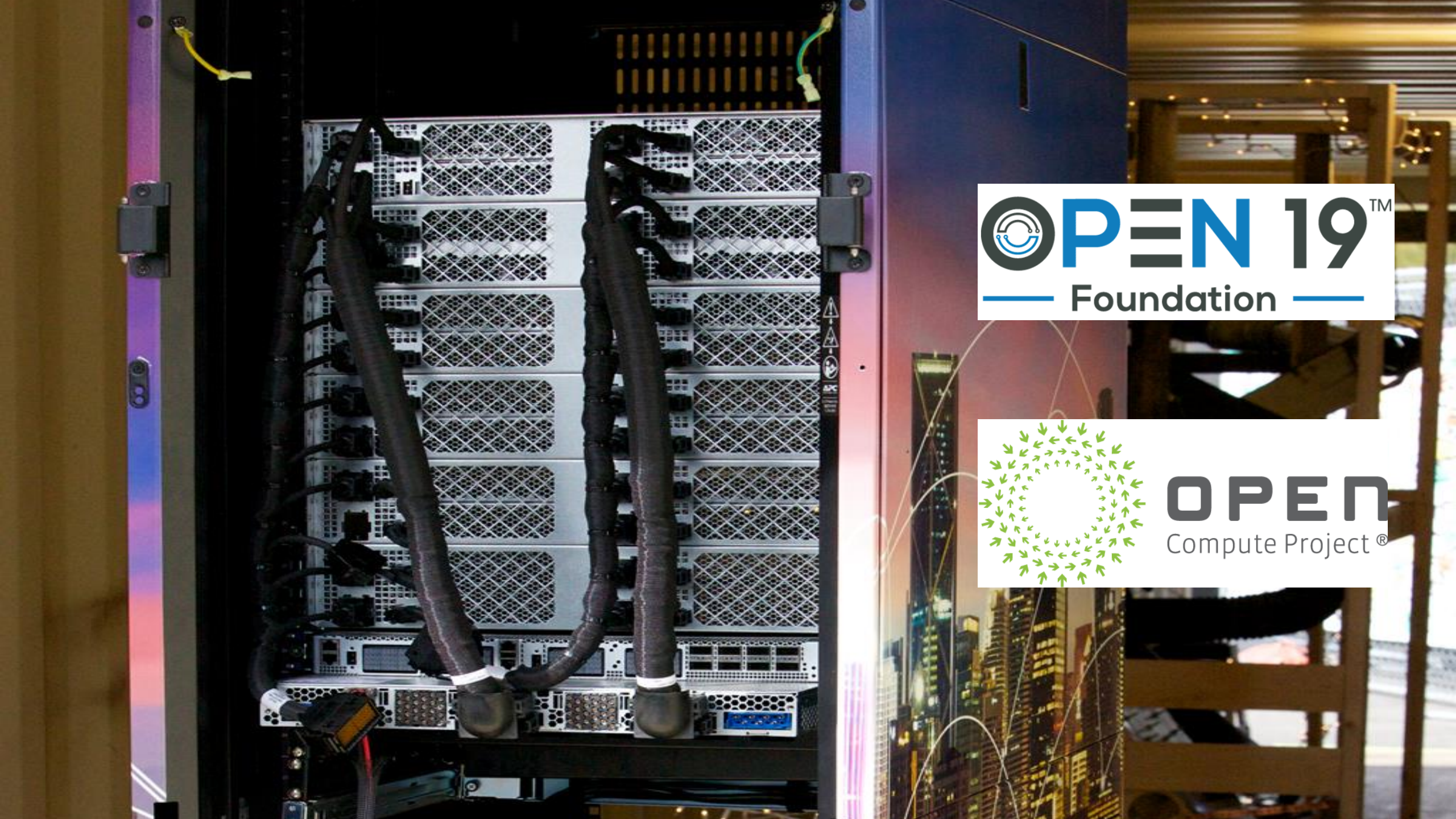
As producers of autonomous cars quickly discovered, edge computing and autonomous cars go hand-in-hand. It's only by working together that mass adoption is achievable.

## When The Cloud Isn't Fast Enough

It's one thing for a video game to have a millisecond lag. It's another for an autonomous car to experience a lag. A lapse for a fraction of a second is the difference between colliding into a wall and avoiding a collision. It's literally a matter of life and death.

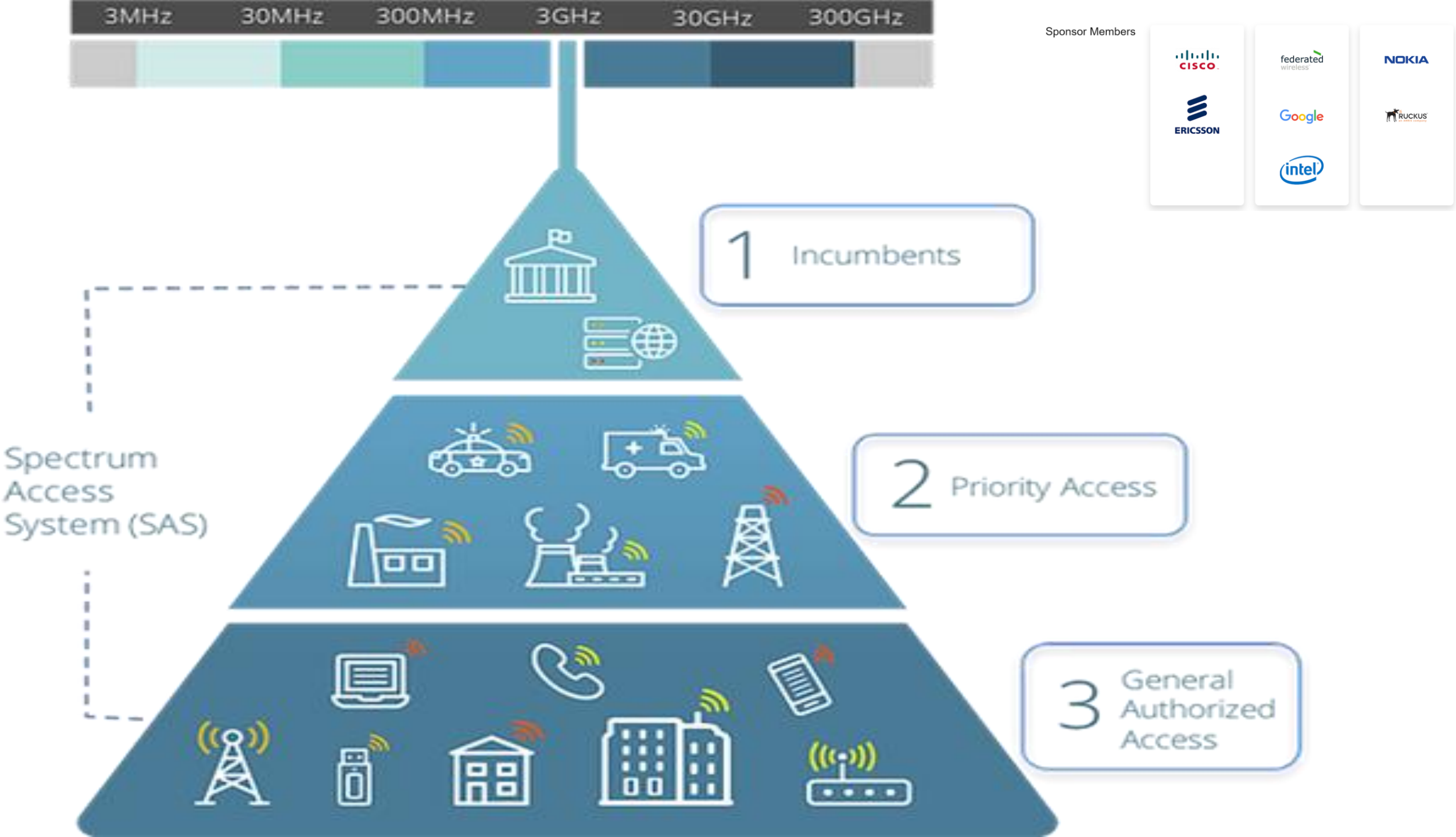

The Edge
Where the digital and physical worlds intersect, namely at the physical locales where data is created, processed, and/or consumed
The Edge




OPEN 19™
Foundation
OPEN
Compute Project ®


Vapor
volutus


# Wireless Spectrum


3MHz
30MHz
300MHz
3GHz
30GHz
300GHz
Sponsor Members
CISCO
federated wireless
NOKIA
ERICSSON
Google
RUCKUS
intel
1 Incumbents
Spectrum Access System (SAS)
2 Priority Access
3 General Authorized Access

# Collaboratively deploying the new edge

CROWN CASTLE

America's largest provider of shared communications infrastructure. 40,000 cell towers and 60,000 miles of fiber infrastructure.

packet

Packet is widely known for its developer-friendly, API driven cloud, which is available in 18 global locations and supports over 60,000 bare metal installs each month.

federated wireless™

Federated Wireless is leading the wireless industry through the shared spectrum revolution, eliminating the decades-old problem of spectrum scarcity. The Company offers the industry's only end-to-end Spectrum Controller, enabling government and commercial users to securely share the same spectrum band.

AMERICAN TOWER®

Owns and operates over 170,000 sites in 16 countries positioning it as one of the largest tower operators in North America.

SBA

Managing over 25,000 cell towers across U.S., Canada, Central and South Americas.

# CBRS edges - est 2018 – BOS1

**Packet** @packethost · 9 Nov 2018
"Hey ops team, I'm gonna need a few more racks out by the cell tower, okay?" Installation with @sbasite in Foxborough coming along nicely!

**Packet** @packethost · 12 Nov 2018
A beautiful day in Boston. It's about time to get BOS1 lit up!

Foxborough, MA

This site is located next the home of the New England Patriots (Gillette Stadium) in a mobile edge datacenter at an SBA Communications tower site.

Chicago, IL

This site is located in a densely populated area of North Chicago, about a mile from the home of the Chicago Cubs (Wrigley Field) in a Vapor IO chamber.

Chicago, IL

This site is located near Chicago's O'Hare International Airport, inside a Vapor IO chamber.

New sites are being added regularly, please contact us for further details.

# Edge Alliance Program

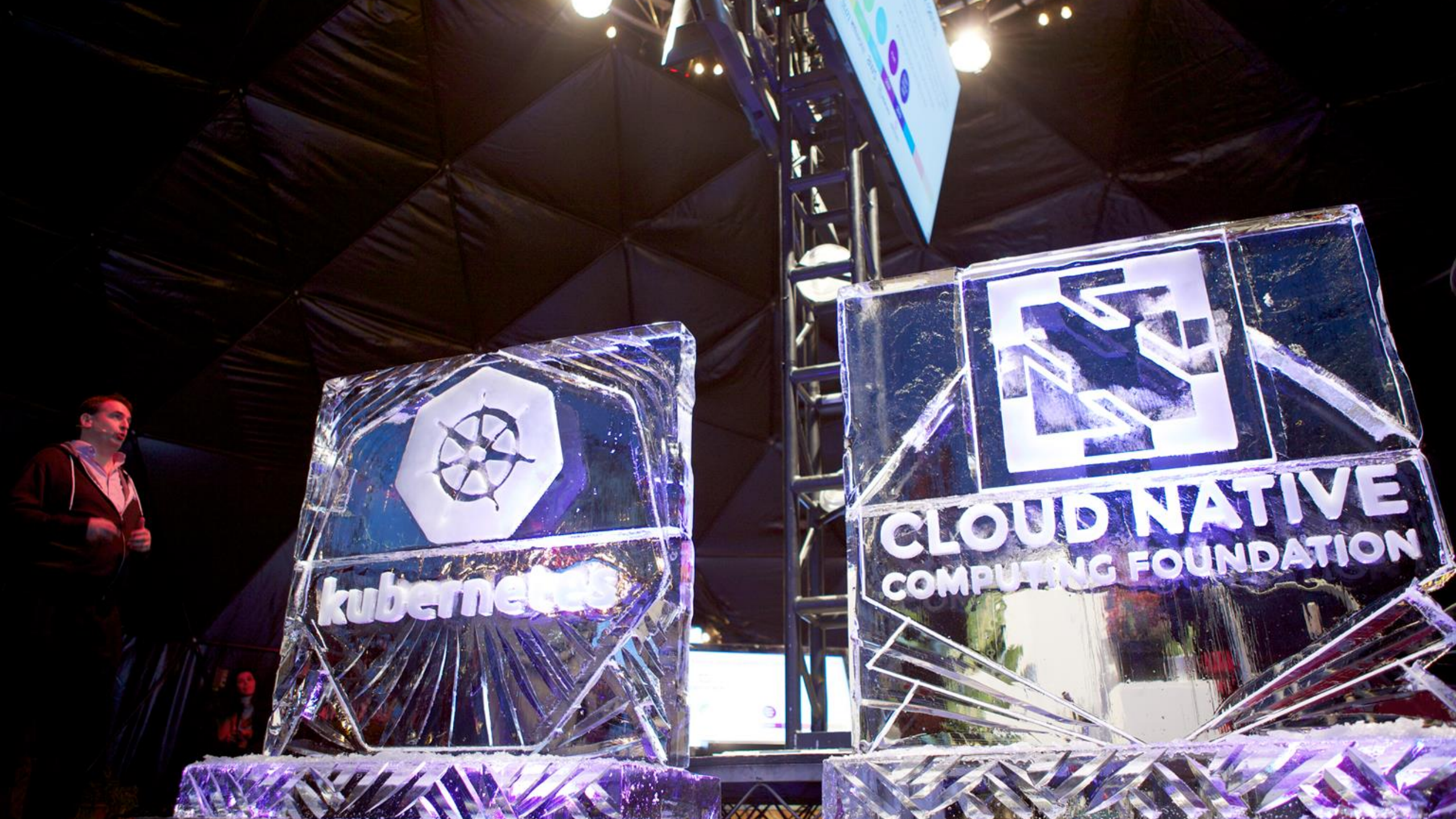
Our Edge Access Program accelerates open source and commercial use cases by providing access to edge infrastructure, technology partnerships and expertise.

## Request Access

**First name*** John

**Last name*** Studarus


SOFTWARE IS EATING
THE WORLD


kubernetes
CLOUD NATIVE
COMPUTING FOUNDATION

StarlingX | StarlingX

https://www.starlingx.io

Join the StarlingX Community at the Open Infrastructure Summit Denver, April 29 - May 1. Register before prices increase on February 27 at 11:59pm PT LEARN MORE

STARLINGX

LEARN SOFTWARE DOCUMENTATION COMMUNITY FAQS BLOG

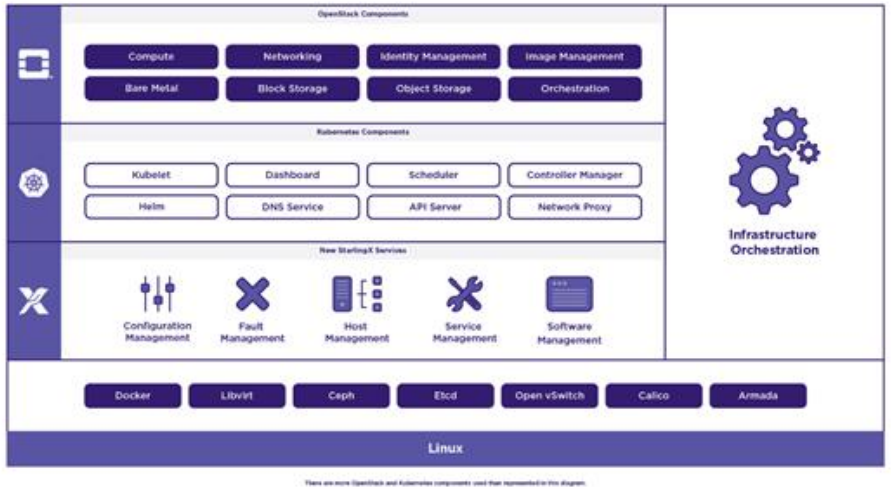
# A fully featured cloud for the distributed edge

VIEW THE CODE →

## About StarlingX

StarlingX is a complete cloud infrastructure software stack for the edge used by the most demanding applications in industrial IOT, telecom, video delivery and other ultra-low latency use cases. Based on mature software deployed for mission critical applications, newly open sourced StarlingX code is the base for edge implementations in scalable solutions that is ready for production now.

LEARN MORE >



# Projects

LF Edge brings together top edge projects across IoT, cloud, and the enterprise to increase unification across platforms, communities and ecosystems. These projects address the challenge of industry fragmentation and will collaborate with end users, vendors, and developers to transform all aspects of the edge and accelerate open source developments.

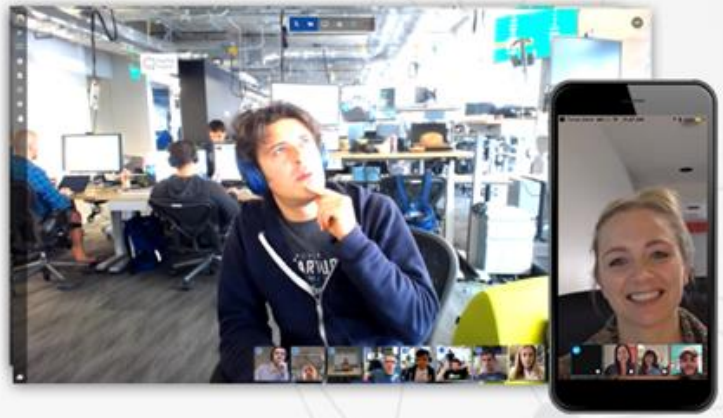
AKRAINO EDGE STACK

EDGE X FOUNDRY™

EDGE VIRTUALIZATION ENGINE

# Multi-platform open-source video conferencing

At Jitsi, we believe every video chat should look and sound amazing, between two people or 200. Whether you want to build your own massively multi-user video conference client, or use ours, all our tools are 100% free, open source, and WebRTC compatible.



START A CALL

FEATURED PROJECT

Jitsi Meet

Run your own conferencing service

- Web, Android, iOS, React-native, and Electron apps
- Ubuntu and Debian Packages install in minutes
- Customize with config files or change the code

Learn More

POPULAR ON GITHUB

jitsi-meet
Secure, Simple and Scalable Video Conferences

jitsi-videobridge
Multiuser video XMPP server component

jibri
Recording and live streaming for Jitsi Meet

libjitsi
Java media library for secure audio/video communication

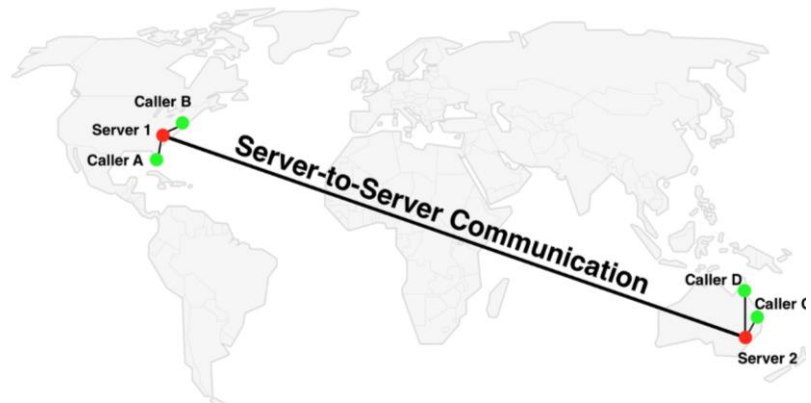
jitsi desktop
Our legacy SIP and XMPP user agent (not compatible with Jitsi

## The Star Problem

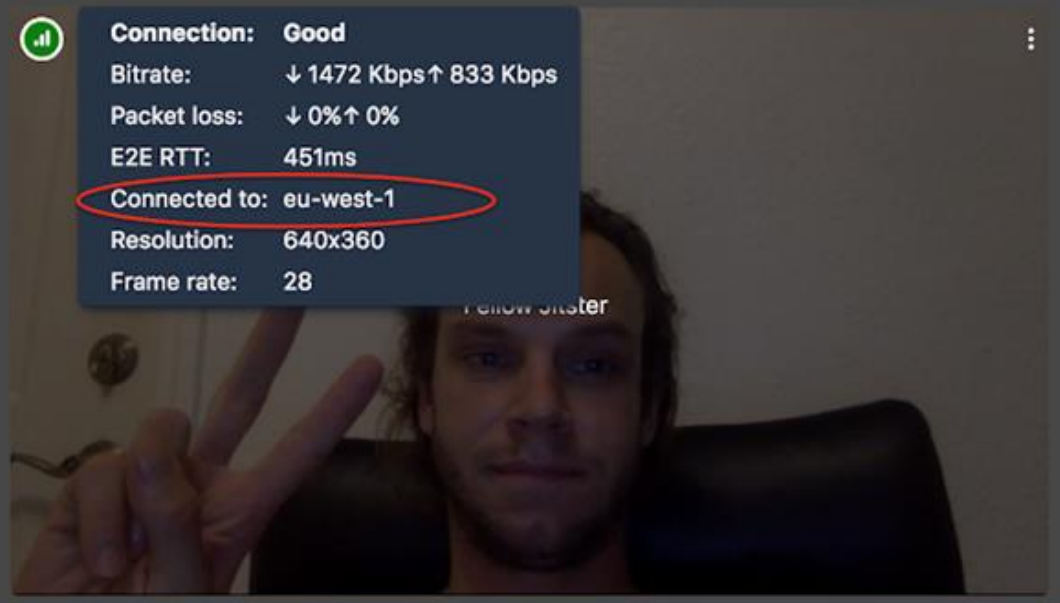
In this case all endpoints connect to a central server (in a star topology) with which they exchange multimedia. It should be obvious that selecting the location of the server has a huge impact on user experience — if all participants in the conference are located in the US, using a server in Sydney is not a good idea.

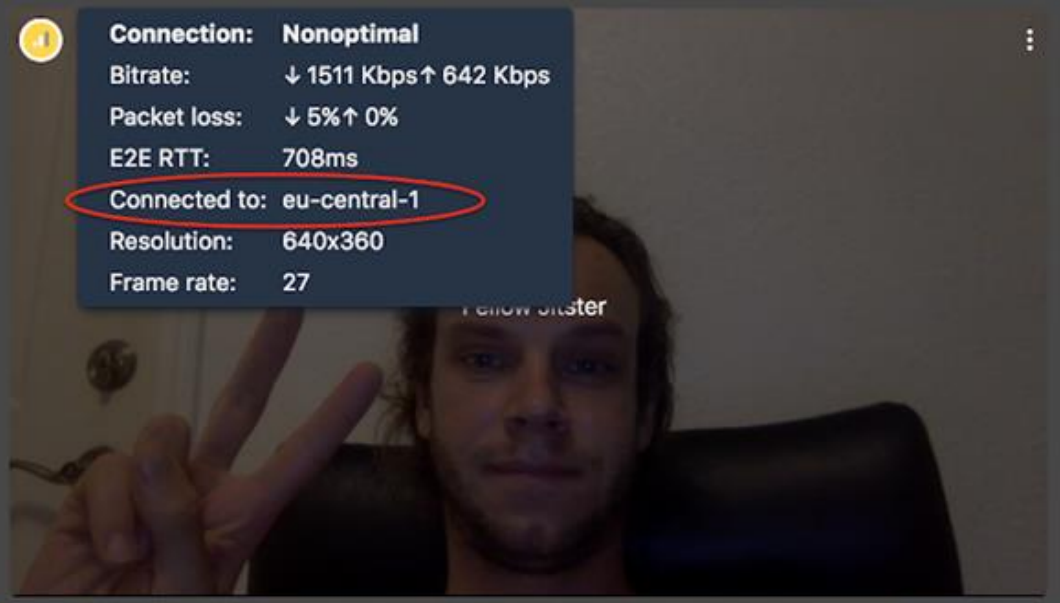

## Solution: Cascading

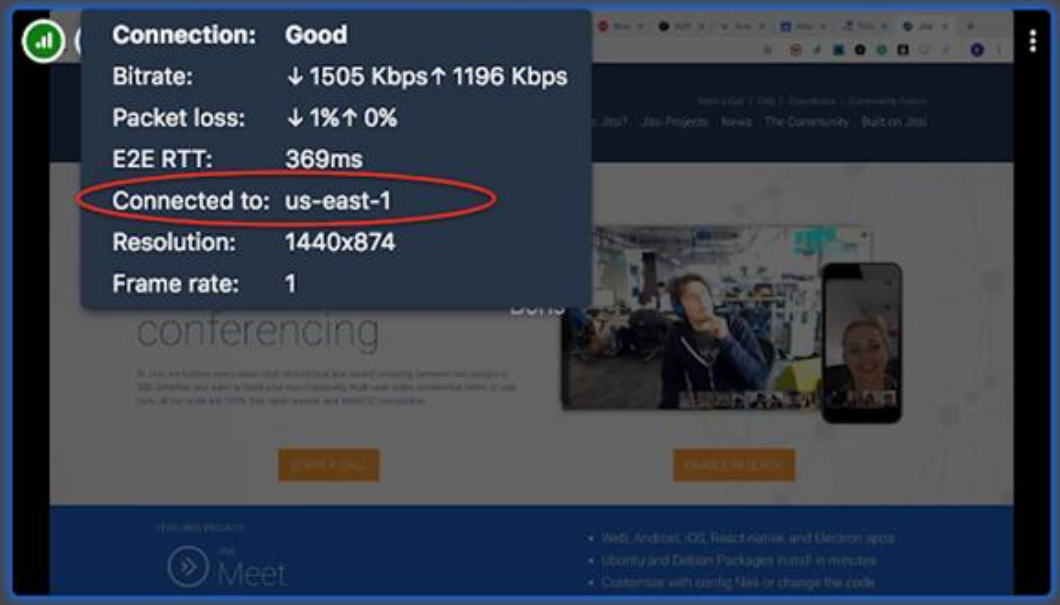
Postponing the question of how do we actually interconnect the servers, let's first look at what effect this has on the conference.



jitsi.org


Connection: Good
Bitrate: ↓1472 Kbps↑ 833 Kbps
Packet loss: ↓0%↑ 0%
E2E RTT: 451ms
Connected to: eu-west-1
Resolution: 640x360
Frame rate: 28


Connection: Nonoptimal
Bitrate: ↓1511 Kbps↑ 642 Kbps
Packet loss: ↓5%↑ 0%
E2E RTT: 708ms
Connected to: eu-central-1
Resolution: 640x360
Frame rate: 27


Connection: Good
Bitrate: ↓1505 Kbps↑ 1196 Kbps
Packet loss: ↓1%↑ 0%
E2E RTT: 369ms
Connected to: us-east-1
Resolution: 1440x874
Frame rate: 1
conferencing
Meet

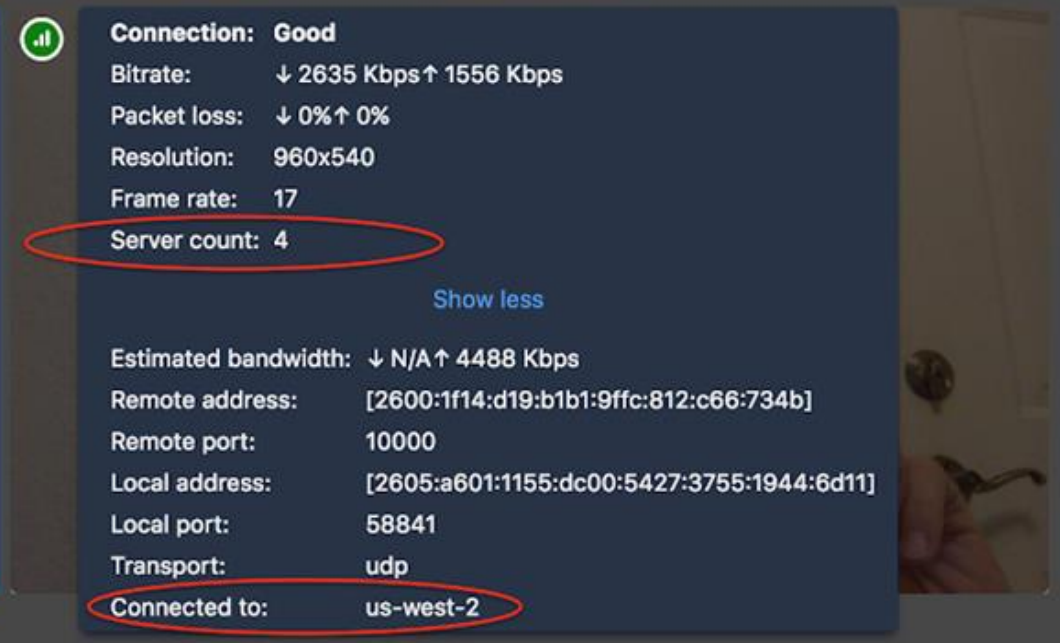
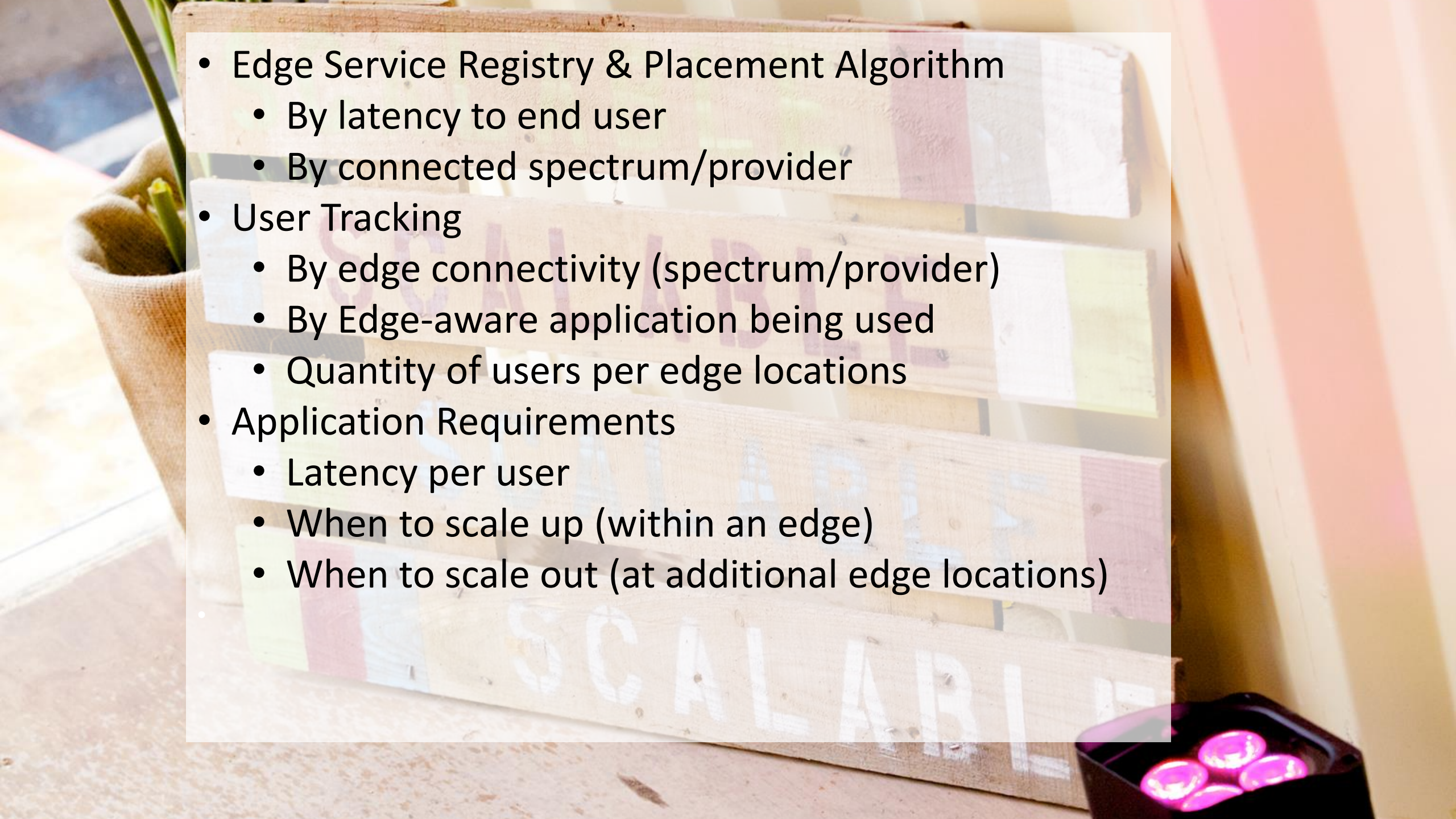

Connection: Good
Bitrate: ↓2635 Kbps↑ 1556 Kbps
Packet loss: ↓0%↑ 0%
Resolution: 960x540
Frame rate: 17
Server count: 4
Show less
Estimated bandwidth: ↓N/A↑ 4488 Kbps
Remote address: [2600:1f14:d19:b1b1:9ffc:812:c66:734b]
Remote port: 10000
Local address: [2605:a601:1155:dc00:5427:3755:1944:6d11]
Local port: 58841
Transport: udp
Connected to: us-west-2

Photo by Miguel Ángel Hernández on Unsplash

Glenesk Hotel, Edzell, United Kingdom

Photo by Adam Wilson on Unsplash




- Edge Service Registry & Placement Algorithm
  - By latency to end user
  - By connected spectrum/provider
- User Tracking
  - By edge connectivity (spectrum/provider)
  - By Edge-aware application being used
  - Quantity of users per edge locations
- Application Requirements
  - Latency per user
  - When to scale up (within an edge)
  - When to scale out (at additional edge locations)

# Edge Alliance Program

Our Edge Access Program accelerates open source and commercial use cases by providing access to edge infrastructure, technology partnerships and expertise.

Participants in the program get first access to Packet edge sites as they become available and can work collaboratively with a broad range of ecosystem partners to influence deployment and characteristics and product development.

The program is free. The only requirement is a willingness to engage, to prove out big ideas, and to share learnings as possible!

AKASH
catchpoint
DNSFilter
federated wireless
fly.io
MACROMETA
MobiledgeX
MUTABLE
NODEWEAVER
OORT
OpenNebula

## Request Access

First name*
Last name*
Email*
Phone number*
Company name*
Describe Your Needs*

SUBMIT


BUILD a
BETTER
INTERNET
LAYER
ION
TION