



# Perspectives on the Edge Cloud

Panel Discussion

Moderated by Larry Peterson, ONF

## Panelists



John Dilley  
Chief Architect  
Rafay Systems



Wiqar Chaudry  
COO  
NALEJ



Zack Butcher  
Founding Engineer  
Tetrade

# Edge Cloud: Where the Hype Is

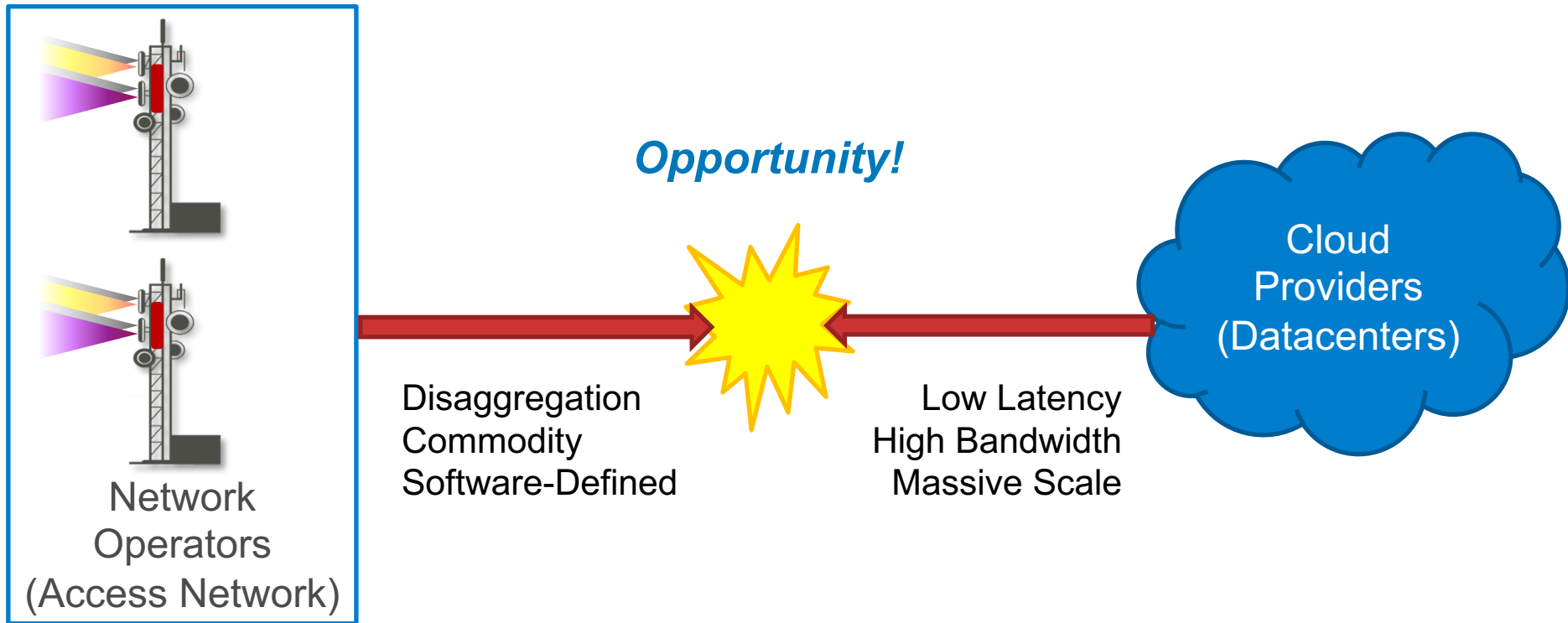
*The Edge Will Eat the Cloud*

John Bittman, Gartner Blog Network

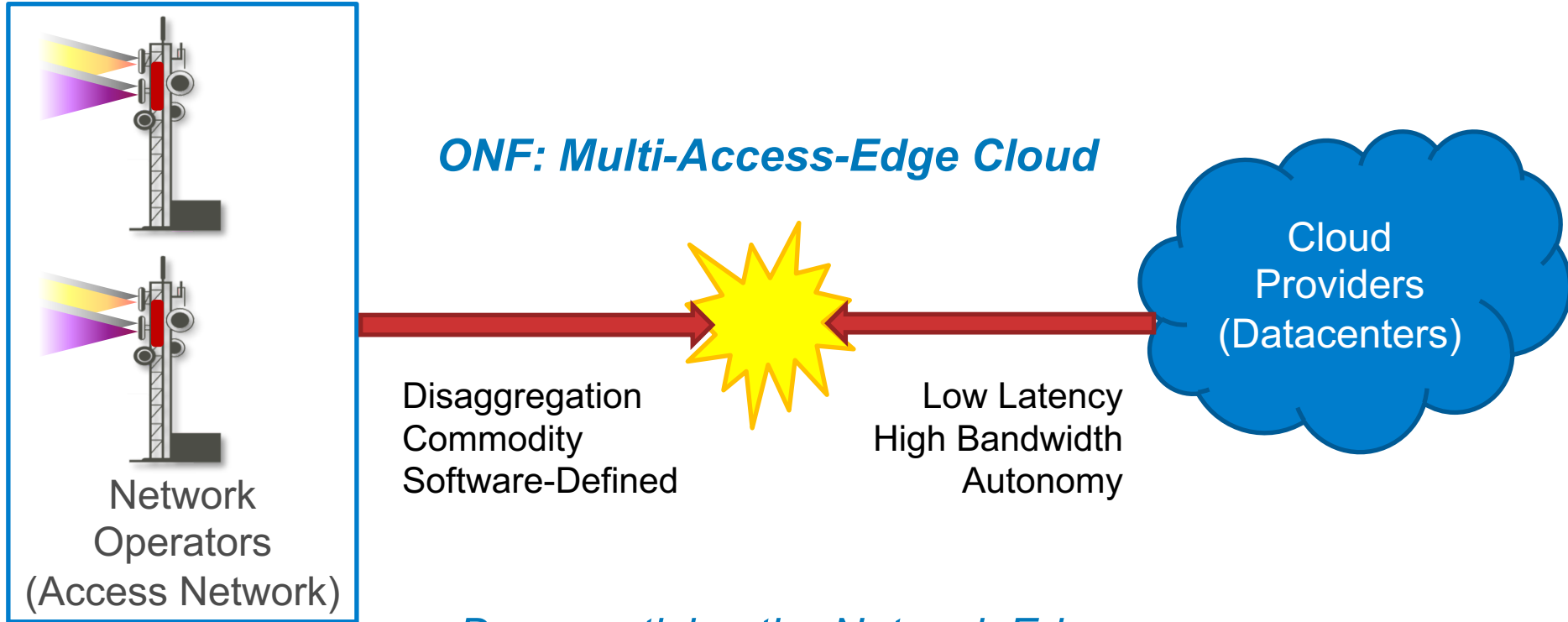
*Return to the Edge and the End of Cloud Computing*

Peter Levine, Andreessen Horowitz

# Collision Course

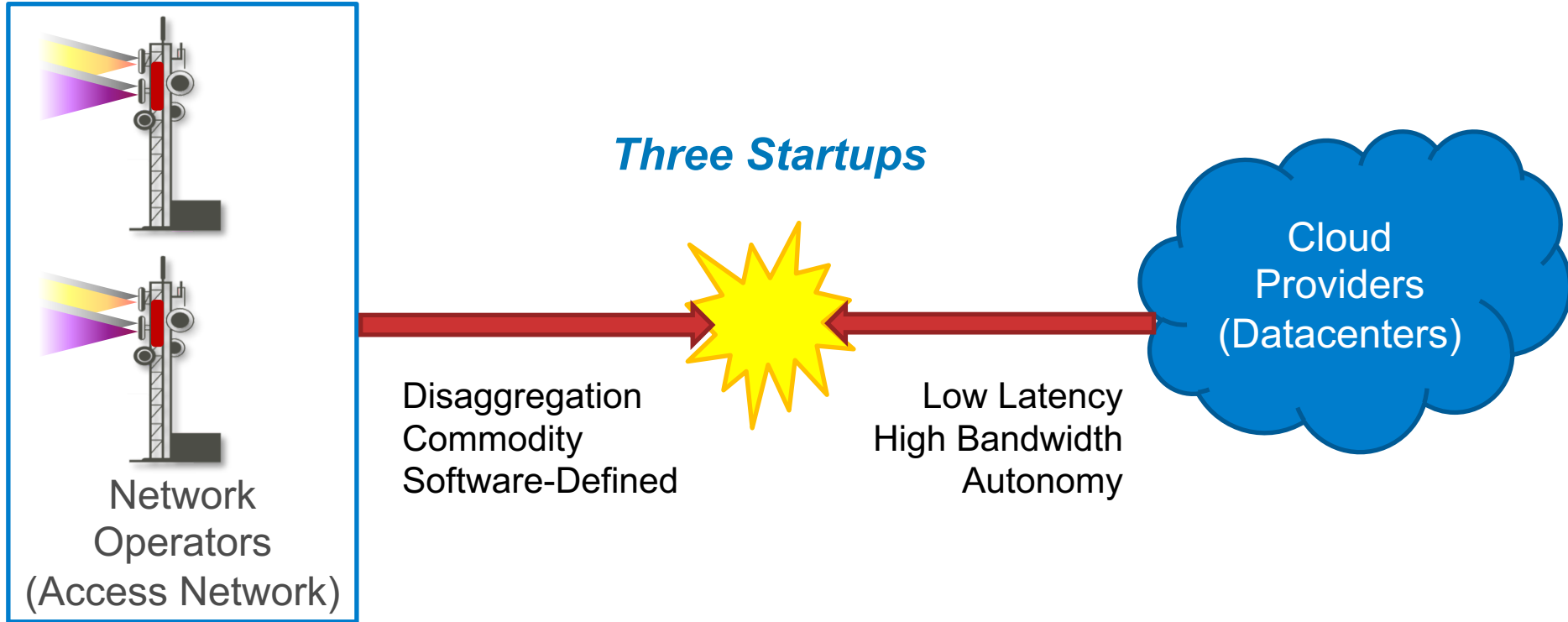


# Convergence

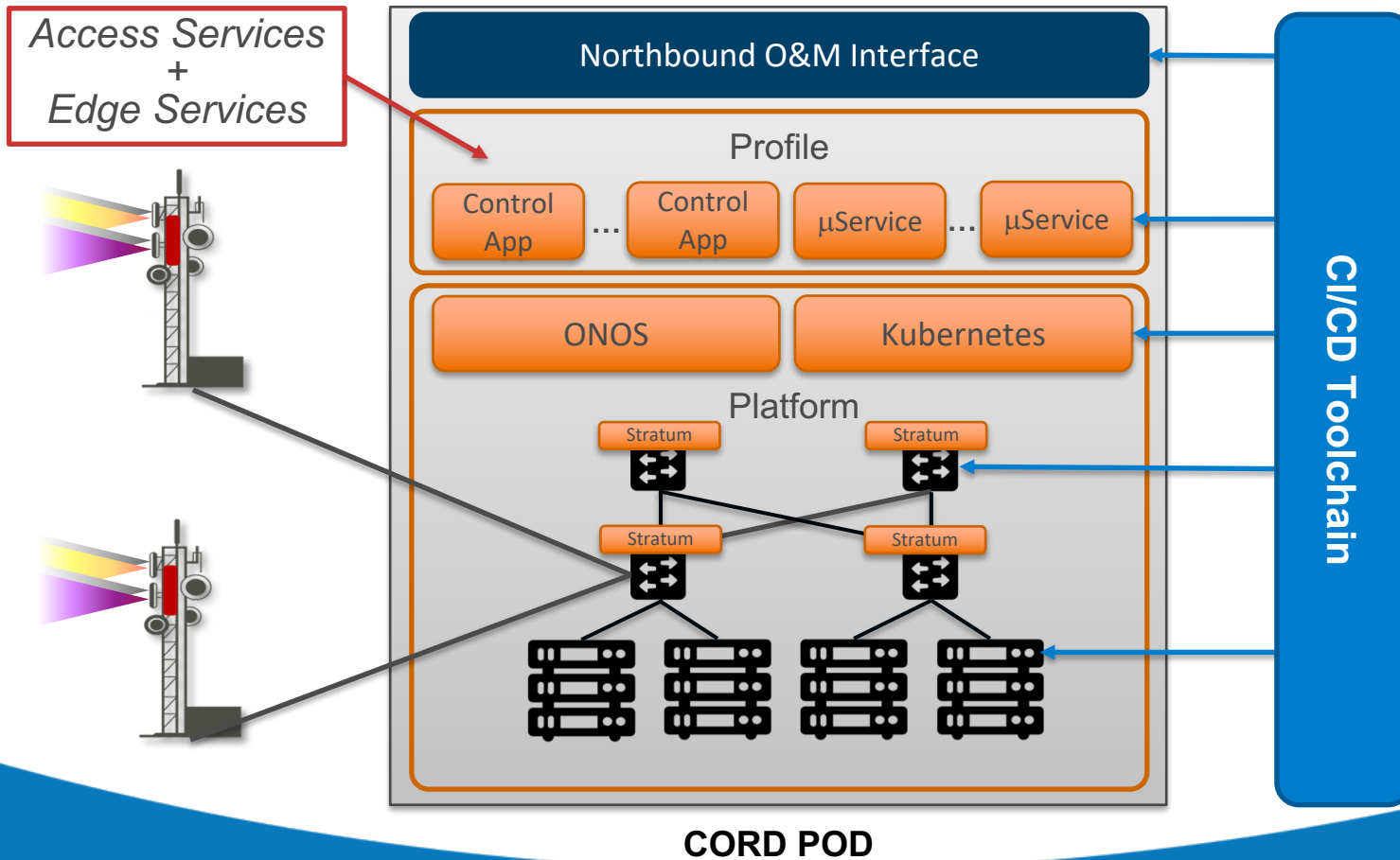


*Democratizing the Network Edge*  
*SIGCOMM CCR, April 2019*

# Create Value



# Convergence: Access-Edge Cloud Platform





John Dilley, Chief Architect  
Rafay Systems



# Convergence: MEC to Cloud

- IoT/end user device → 5G MEC
  - “access meets edge” (cloud)
- MEC → Internet edge
  - Scalable compute resource (CPU, RAM, TPU...)
- Internet edge → Public cloud
  - Stable, reliable compute, storage, and services

# A funny thing happened...

- ...on the way to edge cloud
  - Container distribution and placement
  - In-cluster scheduling and orchestration
  - Infrastructure and platform abstraction
- Edge cloud depends on *app lifecycle management*
  - Network operators that solve for this win more apps

# App Lifecycle Management

- On “Day 1” you get the app running
  - Infrastructure setup, application distribution
- Lifecycle management happens every day after
  - Configuration updates
  - Container updates (patches, features)
  - Ongoing monitoring and tuning
- More on ALM in my talk after lunch



# NALEJ<sup>®</sup>

## BEYOND SMART

EDGE CLOUD | PUBLIC | PRIVATE | HYBRID

# UNIFIED RESOURCE & APP LIFECYCLE MANAGEMENT



# INFRASTRUCTURE IS EVERYWHERE



Unify, monitor, and orchestrate your apps across all of your computing resources with NALEJ.



CLOUD  
THINGS  
BARE METAL  
**WHATEVER COMES NEXT!**

# RUN APPS ANYWHERE

cloud, IoT and everything in between



```
$SESSION['CAPTCHA']['config'] = serialize($captcha_config);  
    . ltrim(preg_replace('/\\\\\\\\/', '/', $image_src), '/');  
return array(  
    'code' => $captcha_config['code'],  
    'image_src' => $image_src  
);  
  
( !function_exists('hex2rgb') ) {  
function hex2rgb($hex_str, $return_string = false, $separator = ',') {  
    $hex_str = preg_replace("/[A0-9A-Fa-f]/", "", $hex_str); // Gets a proper hex string  
    $rgb_array = array();  
    if ( strlen($hex_str) == 6 ) {  
        $color_val = hexdec($hex_str);  
        $rgb_array['r'] = 0xFF & ($color_val >> 0x10);  
        $rgb_array['g'] = 0xFF & ($color_val >> 0x08);  
        $rgb_array['b'] = 0xFF & $color_val;  
    } elseif ( strlen($hex_str) == 3 ) {  
        $rgb_array['r'] = hexdec(str_repeat(substr($hex_str, 0, 1), 2));  
        $rgb_array['g'] = hexdec(str_repeat(substr($hex_str, 1, 1), 2));  
        $rgb_array['b'] = hexdec(str_repeat(substr($hex_str, 2, 1), 2));  
    } else {  
        return false;  
    }  
    return $return_string ? implode($separator, $rgb_array) : $rgb_array;  
}
```

**NALEJ unifies and manages  
the operational life cycle for  
all your applications.**

**EDGE COMPUTING WITH NALEJ & 5G LETS YOU...**

**RUN EVERYTHING LIKE AN APP**

**Secure, low-latency, high-performance digital experiences, everywhere**



# UNDER THE HOOD

# SYSTEM COMPONENTS

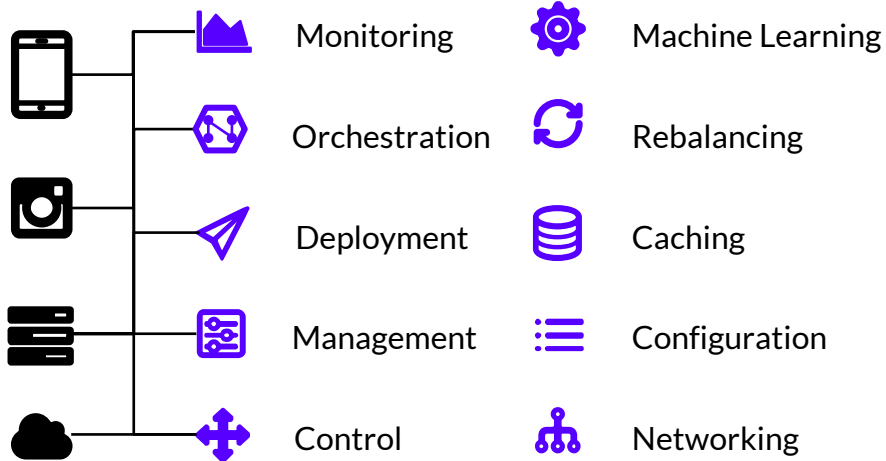
## Core Components

Data Plane - dynamically optimized user space for deploying applications on edge infrastructure.

Control Plane - secure managed network for all your compute & storage resources.

Management Plane - intuitive design environment for configuring, deploying, and monitoring edge services.

## Functional Components



# LOGICAL MODEL

## SERVICE PROFILE



Resources



Capabilities



Connectivity



Cost

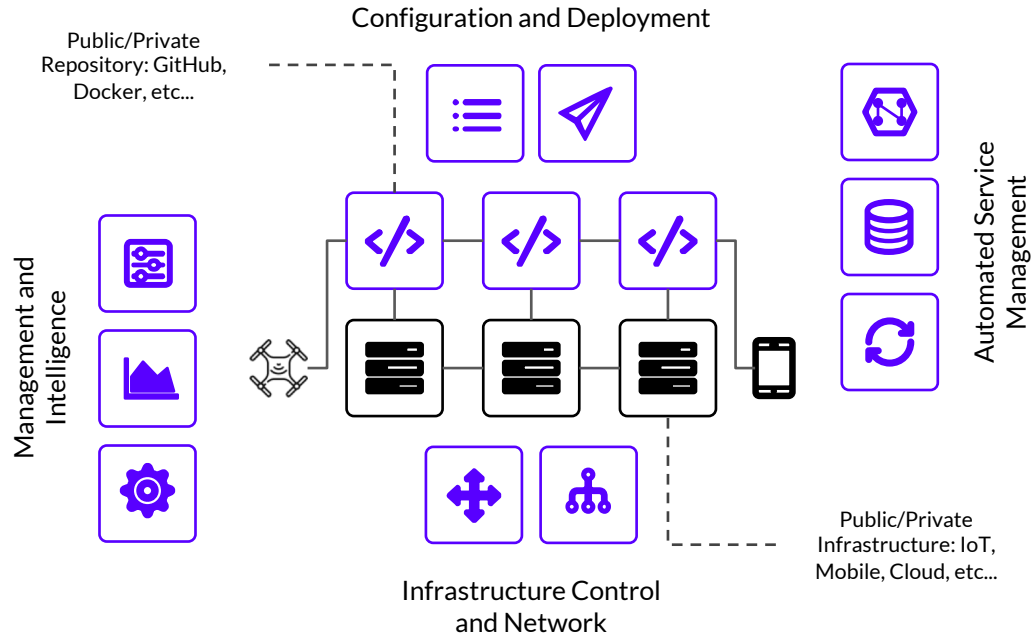


Performance

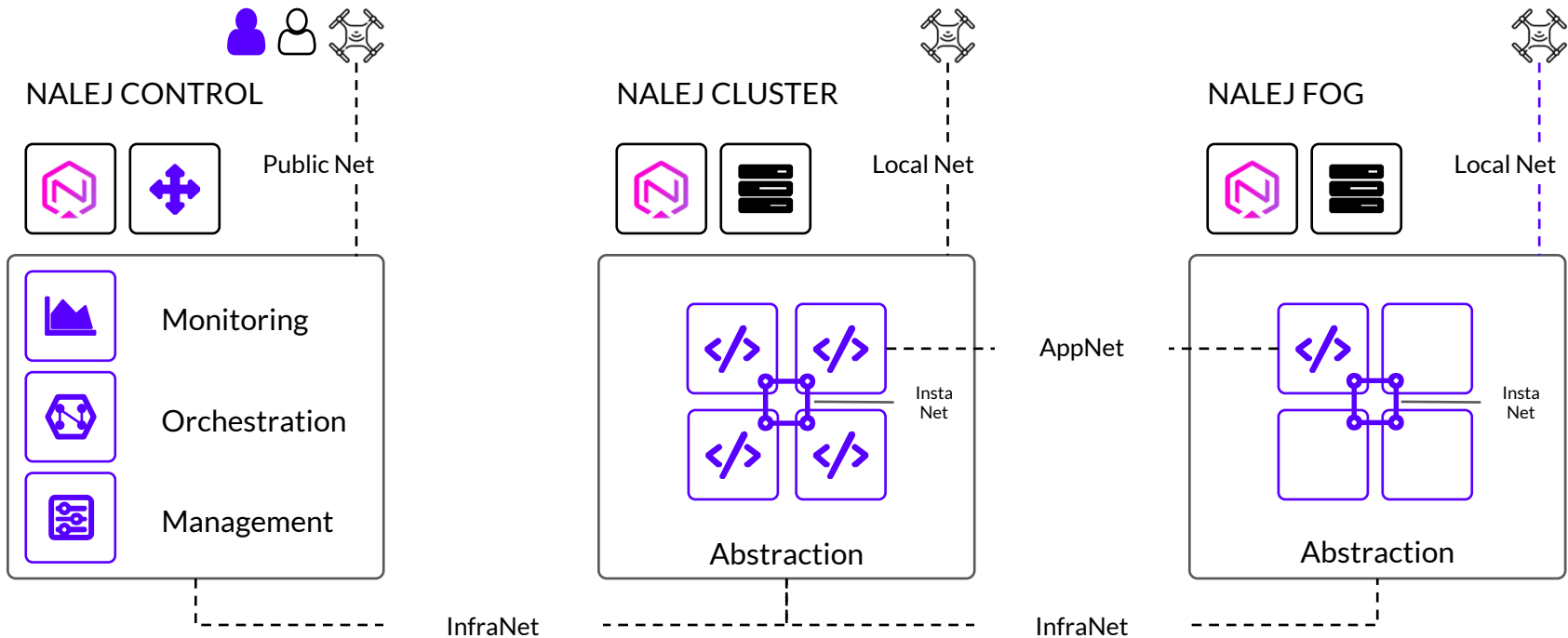


Security

## EDGE SERVICE GRAPH



# PHYSICAL MODEL





**NALEJ<sup>®</sup>**

**Thank You**



# Zack Butcher

Founding Engineer, Tetrade  
Core Contributor to Istio  
Author, *Istio: Up and Running*  
(O'Reilly, Oct 2019)

Previously at Google Cloud; worked on  
central resource hierarchy, policy (IAM),  
service management, and Istio

@ZackButcher | [zack@tetrade.io](mailto:zack@tetrade.io)



# Tetrade

## Team of 23 across 10 countries

- From Google, Twitter, Huawei, and more
- Core contributors/maintainers/creators:  
Envoy, Istio, Apache SkyWalking,  
go kit, SPIFFE

## Mission:

- Accelerate application deployment agility for all applications across any compute



# Tetrate

## Key Insights and Challenges

- What CORD is tackling at L2/3, mesh is tackling at L4/7
  - We've disaggregated; now how do we fit it back together? (monolith → microservices)
  - Blackbox appliances → software + whiteboxes
  - Goal: Enable Service Chains
- Shifting security boundary
  - From network identity to application identity
- Enabling mobility
  - Connectivity
  - Policy (Access Control, etc.)
- Service Model