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5G Edge Implementation in AWS

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AGENDA

- Overview of 5G and Edge Computing
- AWS Solutions for 5G and Edge Computing
- Implementation Strategy
- Key Takeaways

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About me

- AWS Ambassador
- Director | Chief Architect- Wipro AWS Business Group
- Distinguished Member of Technical Staff (DMTS)
- Author and Blogger
- 5G Edge SME

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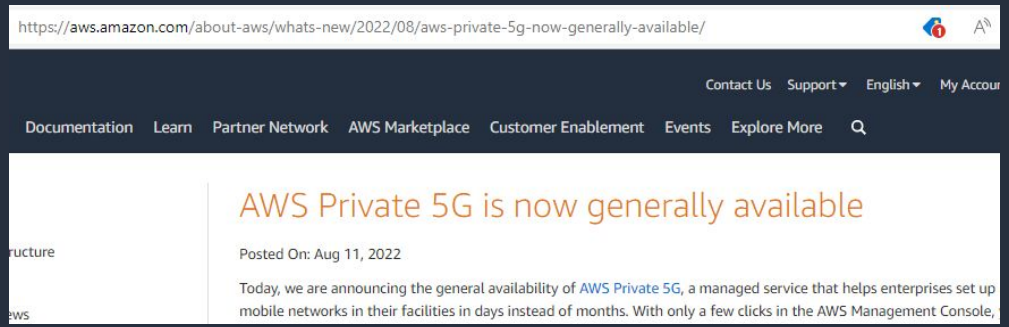
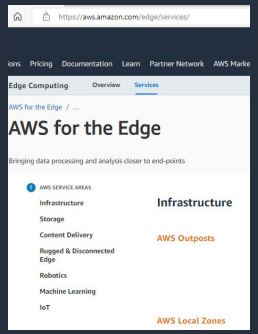
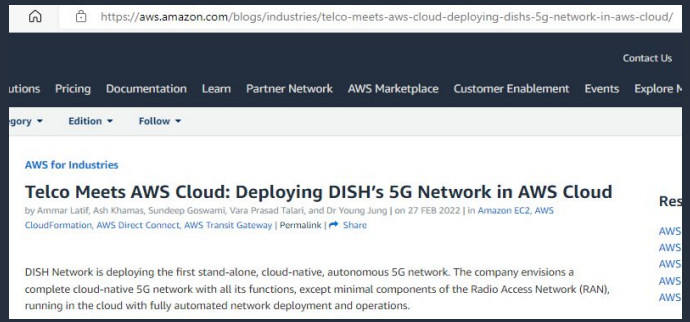
News At a Glance







5G Overview

- Next Generation of Mobile network
- Revolution and not evolution from previous generation
- Already roll out in several countries
- eMBB will be initial driver for 5G Adoption

Key Capabilities expected from 5G

- Enhanced Mobile broadband (eMBB)
- Massive Machine-type Communications (mMTC)
- Ultra-reliable and Low Latency Communications (URLLC)

Edge Computing

- Bringing Cloud capabilities at the Edge
- Complementary to Centralized Cloud computing
- Useful for Low latency and real time application
- Several possible use cases- Cloud gaming and high-quality Video delivery will be early adopters As LF Edge's State of the Edge 2021 report*-

75% of enterprise-generated data will be created and processed at the edge by 2025, up from 10% in 2018**

* Reference- https://stateoftheedge.com/reports/state-of-the-edge-report-2021/
** As per Gartner Study- https://www.gartner.com/smarterwithgartner/what-edge-computing-means-for-infrastructure-and-operations-leaders

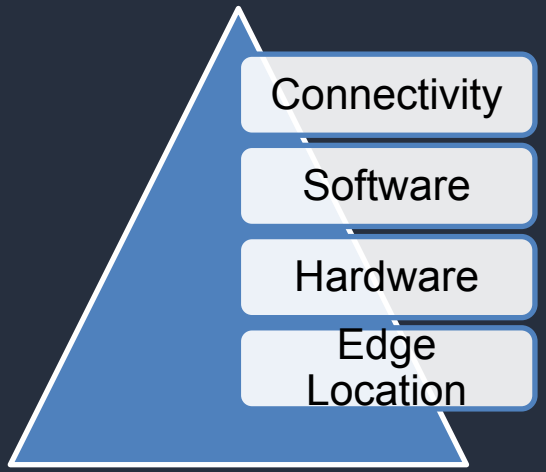
Edge Computing and 5G

- Edge computing is commonly referred as Multi-access Edge computing (MEC) in Telco context
- European Telecommunications Standards Institute (ETSI) defined MEC reference architecture and MEC APIs
- Telco edge is also known as service provider edge. Here edge location is within Telco network.
- It could be near edge or far edge
- Far edge could be at customer premises or at exchange sites
- To achieve URLLC (Ultra reliable low latency communication) capability of 5G, MEC is absolutely

AWS Key Offerings in this space

Wavelength	Outposts	Local Zone
Good option for low latency apps	Good option for low latency and data localization requirement	Good option for low latency app hosting requirement
Comes with pre-configured H/W, S/W and telco network integration	Comes with pre-configured H/W and S/W	It is only data center location covering the areas where there is no AWS Region
Currently available in US (19 cities), Canada, Tokyo, Seoul, London and Frankfurt	Widely available across the world	GA in 16 locations in US. 33 locations announced include 3 locations in India.
Consistent AWS experience Flexible and Scalable	Consistent AWS experience Flexible and Scalable	Consistent AWS experience
Limited AWS service availability	Limited AWS service availability	Limited AWS service availability

5G Edge Implementation Strategies



Requirements

- Do it Yourself
- Using Cloud Providers like- AWS
- Hybrid Approach

Approach

5G Edge Implementation Strategies

Edge Location	Could be Edge Data Center, Small cabinets on road side like- Smart pole, Could be at Base stations or at Regional Data Center
Hardware	Could be rugged H/W, hyper converged infrastructure, specially purposed H/W
Software	Includes everything from OS till Application and entire management layer
Connectivity	Could be 5G but not limited to it

5G MEC Application and Platform Types

Cloud Native

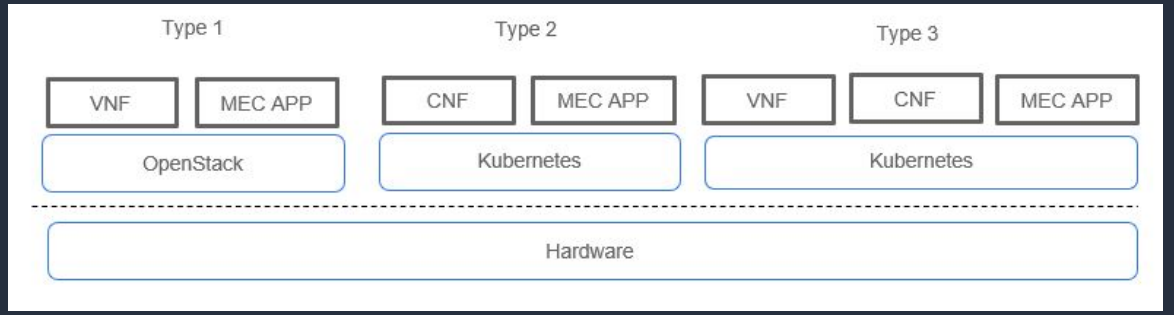
- May be k8s native
- May support k8s as one of the option
- May be based on non-k8s technologies

Kubernetes Native

- Design and built specifically for Kubernetes
- Deep Integration with k8s features
- Works on all hosting platforms

Edge Native

- Cloud Native Apps with unique edge specific requirements like- low latency, Data privacy, high bandwidth etc.



Why Kubernetes at the Edge

Expectations from Edge Platform	Available in Kubernetes Based Edge
Lightweight (small memory footprint)	Yes
Open source based (Optional)	Yes
Easy installation and configuration	Yes
Offline mode operations	Yes
ARM based device support	Yes
Scalability	Yes
Low touch operations	Yes
Works on different hosting platform (Public cloud, Private cloud, Baremetal, Virtual environment)	Yes
Supports several use cases like- CNF, AR/VR, vRAN, AI/ML, Serverless, Industrial IoT	Yes

AWS Outposts and EKS based Edge Platform

- AWS Outposts is available in multiple form factor- 1U, 2U and 42U
- EKS is supported on AWS Outposts Rack
- EKS-D can be used on AWS Outposts servers
- Now, EKS cluster can be entirely hosted on AWS Outposts
- Network Edge implementation options-
  - EKS on Outposts
  - EKS anywhere on any baremetal server or on Vmware vsphere

Private 5G Network on AWS

- Private 5G means deploying your own mobile network
- AWS Private 5G offering is managed service offering that provides everything from H/W to S/W that is required to run private 5G. E.g. small cell radio unit, RAN software, Core software, SIM cards etc.
- It is pay as you go offering and available in Ohio, N. Virginia and Oregon region.
- Use cases of private 5G- Manufacturing plants with lots of IoT devices, Connecting various devices in given enterprise/industrial environments.
- AWS is responsible for managing the spectrum allocation for CBRS Comes with 2 deployment options- control plane in AWS region and local control plane

Key Takeaways

- Deployment cost, deployment complexity and Security are 3 key challenges
- There is no killer use case for edge computing/MEC however Video analytics and cloud gaming would be the early use cases
- AWS wavelength helps in reducing the deployment cost and complexity.
- Kubernetes based Edge platforms are gaining momentum due to its rich eco system
- World is moving from Cloud Native to Kubernetes Native to bring Edge Native application into life.

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Questions?

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Thank you!

See you at the AWS Community Day Pune 2023