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HW Solution for distributed edge data centers

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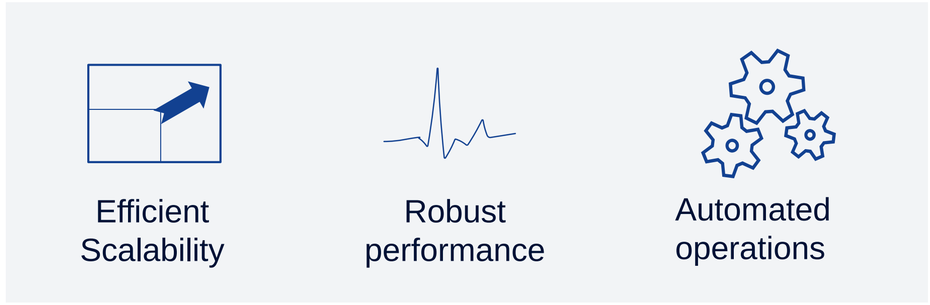
Introduction

In this presentation Nokia will share design considerations for distributed edge data center servers and calls for comments from the OCP community to ensure open collaboration within this important next OCP form factor development

Cloud infrastructure for high performance requirements
Scalable, efficient and real-time

Address fast growing capacity demand



Cloud infra that incorporates webscale best practices

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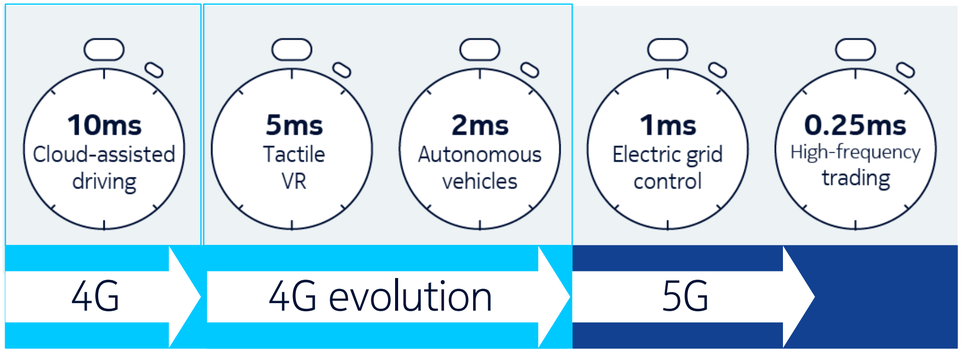
Centralized data centers, efficient capacity

- Cloud for highly scalable workloads, no compromise to core design
- Design for performance with lowest TCO

Drive latency reduction to enable new use cases



Cloud infra that delivers low latency

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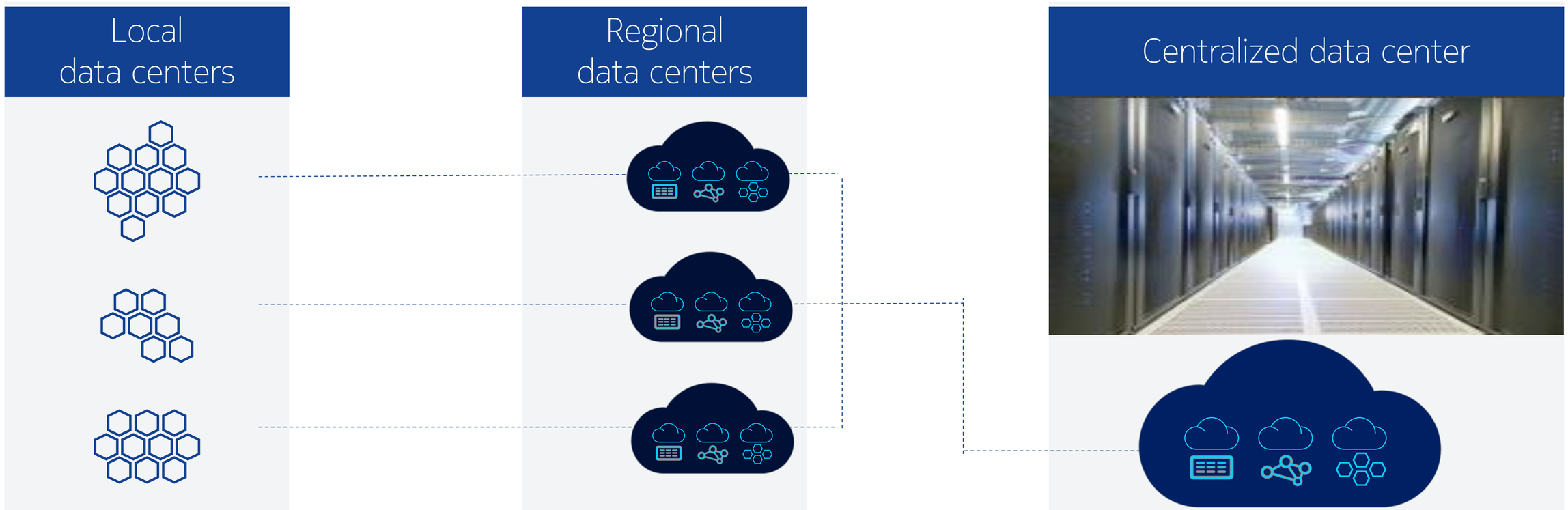
Distributed data centers, low latency

- Cloud at network edge for radio and mobile edge computing apps
- Exploiting cloud infrastructure synergies between distributed and centralized sites

NOKIA

Multi-layer cloud architecture driven by performance and facility requirements

Scalable data center architecture from hyper-scale DC to the local edge



Edge Datacenter Definition

“Edge-of-network data centers, or simply edge data centers - small data centers (about 10–100kW IT load) geographically located close to end users and intended to reduce latency, decrease network congestion, keep mission-critical applications on premises, and/or act as a data-aggregation and content-caching point between a user and a central data center, connected via a programmable optical interconnect.”

Open Rack evolution to support edge datacenters

Central Datacenters
- OCP OpenRackv2 racks
- AC or 400VDC power feed

Regional Datacenters
- -48VDC, AC or 400VDC power feed
- Liquid Cooling on rack-level to remove heat constraints
- Modular storage JBODs for efficient downward scalability

Edge Datacenters
- Compact single socket servers optimized for far edge deployment
- High efficiency for I/O intensive applications with moderate RAM and compute requirement
- Compact and fault tolerant design:
- Optimal support for applications such as VRAN, vEPC, MEC, CDN, VR/AR, distributed IOT etc.

Why different kind of server HW is needed for Edge Cloud?

- Mainstream servers are general purpose servers based on dual-socket technology.
  - Typical 2P server design is optimal for compute oriented use cases with large RAM memory and a lot of parallel applications but with limited I/O needs. This is typical in cloud computing use cases.
  - Typical 2P server design is not optimal for high throughput packet processing based applications with modest compute needs and potential HW acceleration needs.

- Main challenges of the dual-socket server design in high throughput use case are related to
  - Performance degradation due to NUMA architecture.
  - Hardware cost of performance
- Other challenges related to edge cloud are related to the mobile edge physical environment where the equipment needs to be more compact (depth, height, weight, …) and fault tolerant (e.g. NEBS) than in typical data center sites.

Edge server high level requirements

- Remove NUMA problem: Use single-socket architecture that is optimal for high throughput applications.
- Compact and fault tolerant design: Enable high density compact rack solution with NEBS compliance (thermal requirements, zone 4 seismic tolerance, humidity, etc.)
- Support for several power feed options for all continents and locations; from -48VDC, 208VAC, 230VAC, 380VAC, single phase, three phase, 50/60 Hz, different wattages, … (several different kinds of PDUs/PSUs).
- Follow open compute project design guidelines for vanity free cost optimized design with tool-less (front) maintenance.
- Flexibility is needed to be able to support different use cases
- Acceleration capability for generic (e.g. storage, networking) and application specific functionalities

Summary

- Nokia is proposing form factor that fulfils requirements of far edge sites
  - Fits into rack with limited depth
  - NEBS compliancy
  - Front serviceability
  - High performance
  - High density
  - High efficiency
  - Throughput optimized
  - Vanity free design

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