



Virtual Central Office Looking Ahead to the 5G Edge

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- Cloud Native approach to deploying NFV closest to subscriber
- One of the Edge Blueprints as discussed in the community
- Based on OpenStack and Kubernetes
- Massive Scale => Large Number of sites

What is VCO?



>10,000 Central Offices in US Alone

• Primary Gateway to Customers for a Telco Operator





COs Serve Residential, Business & Mobile Customers

Telco CO - Traditional Status Telco COs - Modernization

- Closed, Rigid and Complex
- Variety of Access & Speeds
- Wide variety of hardware -
 - routers, switches, gateways, servers etc
- Lack of standard interfaces
 => lack of programmability

- Virtualization
- Reduction in CAPEX and OPEX by >30%
- Open and Flexible & Standardized
- Software Defined
 - Network
 - Orchestration
- Programmability

Telco COs - Cloud Native

- Fully Software Defined
- Further Reduction in CAPEX and OPEX
- Disaggregated and flexible
- Massive Scale
- Edge Blueprint





VCO 1.0



- 2017 OPNFV Summit in Beijing: Phase I of the Project: Residential Services and Enterprise Business Services live on stage (vOLT, VNFaaS, BNG, etc)
- Generic blueprint for Central Office with open source components and OpenDaylight SDN controller
- Focus on residential and enterprise VNF on-boarding and assurance





VCO 1.0 Use Cases

Residential

Business







OPEN

Mellanox



OPEN. FOR BUSINESS

Research^{**}

MITAC COMPUTING TECHNOLOGY CORP.

Ettus

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Telecom Provider Requirements

- Massive Scale \rightarrow "Distributed Hyperscale"
- Common deployment model for Data Center and CO locations
- OpenStack and/or Kubernetes
- Flexible and Agile
- LTE and 5G Radio with vEPC & NG-Core
- Centralized Management and Troubleshooting
- Service assurance Metrics and Events
- End-to-End Orchestration

VCO Demo Checklist

- vRAN/CRAN for LTE
- vRAN LTE low layer split (RoE)
- vRAN LTE high layer split (F1-like)
- Low latency service
- Network slicing*
- Single LTE vEPC
- IMS and VoLTE*
- Ansible based orchestration
- Service assurance & monitoring
- Mix of bare metal, VMs, (containers*)
 - * Goal for future VCO demo











Virtual Branch Hardware Rack







Off the shelf OpenRACK Server Sleds

MITAC *MCT* provided 4 Open RACK servers

- CPU: Dual Intel Xeon Gold 6130 (Skylake),16 cores, 22N cache
- **Memory:** 16x16GB, 256GB
- **Storage:** 1 Intel M.2 SSD 1TB for boot drive
- NIC Card: 1 Intel OCP X520-DA2 Dual 10Gig network







ESA Chassis and Network card

- MITAC S MCT provided ESA Chassis
- Uses OCP Open Rack sleds into an EIA-310 19" rack.
- Ideal for Telecom and Enterprise with legacy requirements
- Includes the rail kit, shelves and 12V DC bus bar.
- Power shelf with power supplies to convert 230V AC to 12V DC



• Edgecore AS-6712 (32 X 40Gig) provided by B CIRCLE B Revolutionary IT Infrastructures













Lessons Learned

- Awesome teamwork across the board
- Plan, plan and plan ... if you feel it is enough and then plan some more
 - Specifications and diagrams upfront need the hardware finalized before planning
- Don't assume things are available until you can see, touch & use them
 - HW availability limited what we could include, network testbeds need resources
 - Plan accordingly !
- Software works !!!!
 - Full interoperability of Open Source vRAN with commercial handsets & vEPC
- Technical considerations
 - Upgraded Openstack Pike to Openstack Queens
 - Need high performance machines for DU, vBBU functions
 - o Baremetal the best option for RU, BM or containers for DU, VMs/containers for CU





Get Involved!

- Join VCO Demo Mailing List: opnfv-vco@lists.opnfv.org
- Join the OPNFV CRAN, Edge, Rocket projects
- Operationalize CI/CD, Automated Testing, Pharos Labs
- Define cross-project Cloud Native evolution
- Join the OCP Networking and Server Projects:

https://www.opencompute.org/projects









A Cross-Community Open Source Collaboration











