

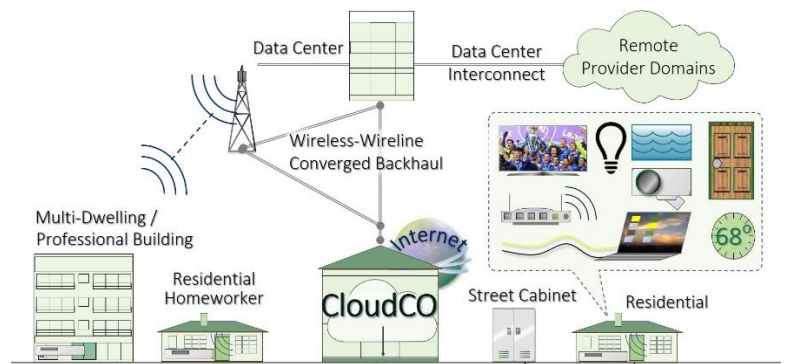
## Cloud Central Office (CloudCo)

Bringing the Cloud to your  
Broadband neighborhood

This is an introduction to a major industry initiative that brings new services, ultrafast home and access networks closer together as the next phase of the deployment of broadband.

The Increasingly wide distribution of Cloud Services promises responsiveness, higher performance and rapid availability of new revenue generating services.

**CloudCO** has been designed to enable just that: dramatically faster & more efficient provisioning of new, Cloud-based services. This document explores the value to industry stakeholders, and provides an overview of the technical and deployment considerations and the deliverables jointly being developed by members of the Broadband Forum.



CloudCO at the heart of new broadband networks

### The value of CloudCO: the Broadband context

The BBF's focus is always on new profitable, revenue-generating broadband services not technology innovation for its own sake.

CloudCO is not only located in the heart of the broadband network but is a unifying framework for all of the service developments of importance to providers that fall under the Broadband Forum's umbrella of projects

#### Virtualization projects

- New Virtual Business Gateway - standard for distributed vCPE, Fiber Access Network Sharing (FANS), Virtual Residential Gateway

#### Building the Gigabit Society

- Delivering gigabit across a wide variety of copper fiber and wireless access technologies

#### Broadband User Services

- The new User Services Platform expands management well beyond gateways (TR-069), controlling processes in large numbers of devices, IoT and carrier-grade in-premises Wi-Fi addresses performance, installation and monitoring projects

#### 5G wireless-wireline convergence

- CloudCO is a natural focal point for converged networks for the new generation of hybrid wireless-wireline services that will be the key to 5G success.

### Technology: frameworks and projects

The Cloud CO's functionality can be accessed through a northbound API, allowing Operators, or third parties, to consume its functionality, while hiding how the functionality is achieved from the API consumer and runs on a cloud-like infrastructure deployed at Central Offices.

CloudCO is an open interface and Cloud-based broadband framework and a Cloud consumption interface.

#### Design principles:

- Software Defined Networking (SDN) and Network Functions Virtualization (NFV) techniques
- Leverages commodity compute and networking platforms;
- Access and network facing I/O connects directly to top of rack switches
- Virtualizes network functions that traditionally lived in monolithic devices
- Disaggregates physical network functions (L2/L3 data plane) using SDN
- Cloud-like APIs for Self-Service 3rd party service on-boarding and delivery

#### CloudCO 2017-2018 projects with Broadband Forum number

- Definition of a reference architectural framework (WT-384)
- Functional module Interface definitions (WT-411)
- Co-existence with/migration from legacy systems (WT-408)
- Test cases and application notes for Cloud CO system (collaborating with Open Broadband Lab WT-412)
- CloudCO: Use Cases and Scenarios (WT-416)
- Migration to SDN-enabled management and control;
- Software reference implementation of the framework;
- Hardware reference implementation of the framework;

## Value of CloudCO (continued)

Providers have always wanted their networks to be adaptable, agile, scalable and dynamic, while reducing CapEx, migration and OpEx costs with fast time to market. The unifying nature of CloudCO, the common platform and its re-use of core functions addresses all these issues for the above services. This gives Operators the opportunity to run a single network with all varieties of access technologies, and flexibly deploy innovative services.

This is why the role of the Forum's CloudCO initiative is so important in the shaping the future of broadband.

Anything-as-a-Service to 3<sup>rd</sup> parties. 3<sup>rd</sup> parties can be easily inserted into the Cloud CO platform, enabling innovative business models.

Some specific benefits brought by Cloud CO are

- New value-added services
- Accelerate new function time-to-market.
- Resource pooling/sharing/scalable computing.
- OAM automation.
- Open eco-system.
- New "sharing" & SaaS model based on public cloud

## Technology: Architecture Overview

### CloudCO logical and functional reference architecture:

- Cloud CO reference architecture is a combination of an SDN and NFV applied over a hybrid physical and NFV infrastructure.
- NFV portion is used to orchestrate and manage the virtual functions and infrastructure (closely follows MANO, NFVI)
- SDN portion is used to manage and control mostly data plane interactions among the PNFs, the VNFs and the switch fabric.
- CloudCO Domain Orchestrator is the central function in the whole architecture and also home to the North Bound API by orchestrating across the southbound SDN Controllers and the NFV MANO functions. PNF SDN Manager & Controller interfaces with the access node and Network I/O devices, as well as any other devices that have PNFs that are deployed inside the Cloud CO.
- VNF SDN Manager & Controller interfaces with the VNF to handle related operation dynamics of the VNF instantiated by VNFM within the Cloud CO.
- DC SDN Manager & Controller directly accesses the NFVI networking resources to implement functions (e.g. L3 routes in the switch fabric) that the VIM is not supposed to do.

## Use Cases

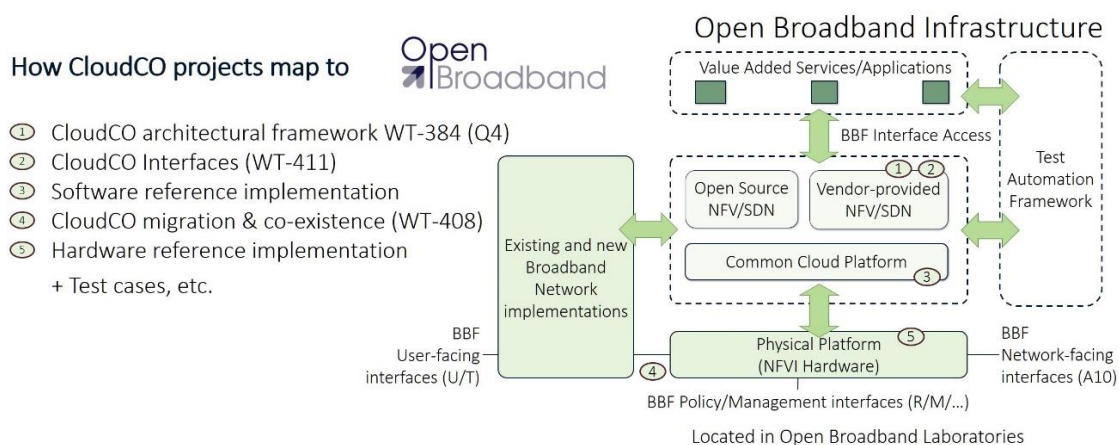
There are 10-15 related use cases for Cloud CO. Here are 3 important ones

- Home cloud service: Network Enhanced Residential Gateway (TR-317) where the gateway is separated into two functional elements
- Business cloud service: virtual Business Gateway (TR-328) where some BG functions are virtualized to provide more flexibility to business users.
- Fixed Access Network Sharing (FANS) allows hosting multiple VNOs - at least one virtual access node per VNO - on a single physical access node

## Major building blocks in CloudCO

- Include Cloud CO Domain Orchestrator, NFVI, Network I/O (specialized nodes to interface to the core network), Access Nodes (specialized nodes), and physical CPE manage by the provider as appropriate

**Accelerating deployment:** CloudCO has been designed to leverage the BBF's **Open Broadband Program** - a collaborative space for integration, interop, testing of open source, vendor and standards-based implementations



Further information on CloudCO including engineering, migration and deployment visions and challenges and the other concepts discussed here may be found at [broadband-forum.org](http://broadband-forum.org)

