

APP NOTES

# CloudCO-APPN-001 Establish High Speed Internet Access (HSIA) Service

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## 1 Summary/Objective

This application note establishes the High Speed Internet Access (HSIA) service for a tenant within a CloudCO domain instance.

Interactions for the creation and activation of the service are provided.

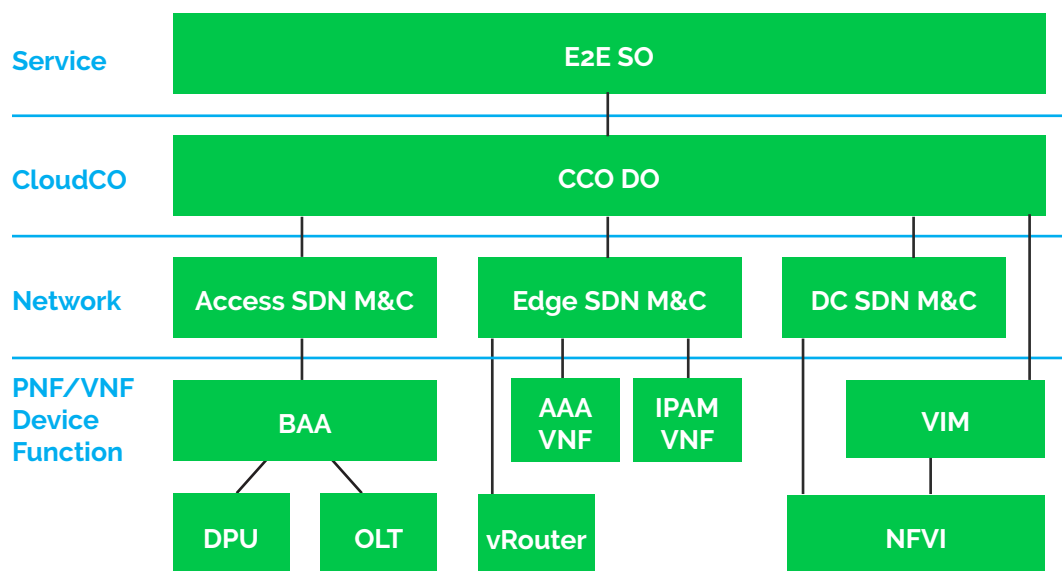
## 2 Assumptions and Preconditions

1. The address and QoS information for the trail is assigned by an IPAM (IP Address Management) VNF. DHCP will be used to request and deliver IPAM requests to the Premise PNF (RG)
2. Enduser(tenant) access is authorized by a AAA VNF using EAP. The AAA VNF can use a local database or use Radius. 802.1x will be used to send EAP requests and responses to the Premise PNF/RG.
3. The Premise PNF/RG is managed using legacy Management techniques (ACS/TR-69), is using an untagged UNI, and needs to support 802.1x based authentication and DHCP for IP address assignment.
4. A simple router VNF, vRouter, is used to allow communication with the Internet. This function is also managed through the Edge SDN M&C.
5. An S-VLAN is connecting the NFVI with the Internet Namespace and is preconfigured towards the Network I/O (latter is not part of the system description below).
6. The physical connectivity between Premises, Access PNFs, Switch Fabric, and Network I/O has been established.
7. All Controllers are applications running inside the NFVI, Controllers can talk to the elements they manage. This was all deployed in a previous bootstrapping stage (See CLOUDCO-APPN-000).

### 3 Description of the System

The E2E SO issues a HSI service creation request to the CCO DO which orchestrates the establishment of appropriate network service by requesting the:

- Access and Edge SDN M&C and VIM to configure a pre-activation trail (control and user plane) from the customer premises to the Access PNF and from the Access PNF to the multi-enduser(tenant) AAA and multi-enduser(tenant) IPAM VNFs.
- Edge SDN M&C to configure the AAA VNF with the enduser (tenant)'s authentication credentials and account. The controller also configures the IPAM VNF with the policy and address information for the enduser(tenant).
- Leveraging Edge, DC and Access SDN M&C Controllers, as well as the VIM to establish end to end user-plane connectivity



When activating the service, the Access SDN M&C authenticates the enduser(tenant) with the AAA VNF. The Access SDN M&C reports the enduser(tenant) attachment to the CCO DO. The CCO DO orchestrates the instantiation of the activated user plane from the enduser(tenant) through the Premises PNF, Access PNF, vRouter, across the NFVI switch fabric, to enable internet connectivity.

## 4 Components

Component Framework Name	Component Description
CCO DO	TR-384, WT-411
Edge SDN M&C	Edge SDN Management and Control: TR-384, WT-411, WT-413 - Provides SDN Management and Control of the Routing and RG, as well as control plane functions that have been virtualized such as DHCP and AAA VNFs.
Access SDN M&C	Access SDN Management and Control: TR-384, WT-411, WT-413 - Provides SDN Management and Control of the DPU and OLT via the BAA
DC SDN M&C	Data Center SDN Management and Control: WT-411 - Provides SDN Management and Control of the NFVI , in this case the physical network fabric.
VIM	Virtualized Infrastructure Manager: WT-411, ETSI NFV - Controls the NFVI, deploys VNFs and interconnects them.
BAA	Virtualized Infrastructure Manager: WT-411, ETSI NFV - Controls the NFVI, deploys VNFs and interconnects them.
DPU	Access PNF
OLT	OLT PNF
vRouter	Router VNF
RG	Premises PNF

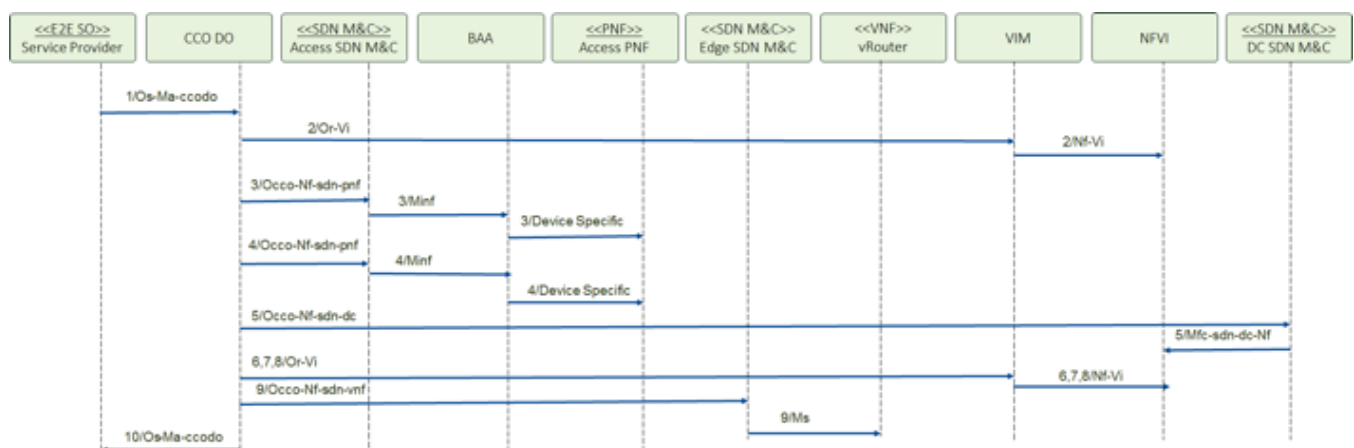
## 5 Actors

Actor Name	Actor Description	Actions at CCO Perimeter (CCO DO NBI, User action)
CloudCO Domain Operator	The Service provider creates the service, and also creates service users.	1. The Service provider creates the service, and also creates service users
Service Provider	Describe Actor and how it interacts with the system, responsibilities.	2. Create service 3. Creates service user for a enduser(tenant) with the rate, quality of service and type of protection. User credentials are set at this point. 4. User connects the Premises PNF to the network and enters the service provider supplied user credentials into the Premises PNF.

## 6 Interactions

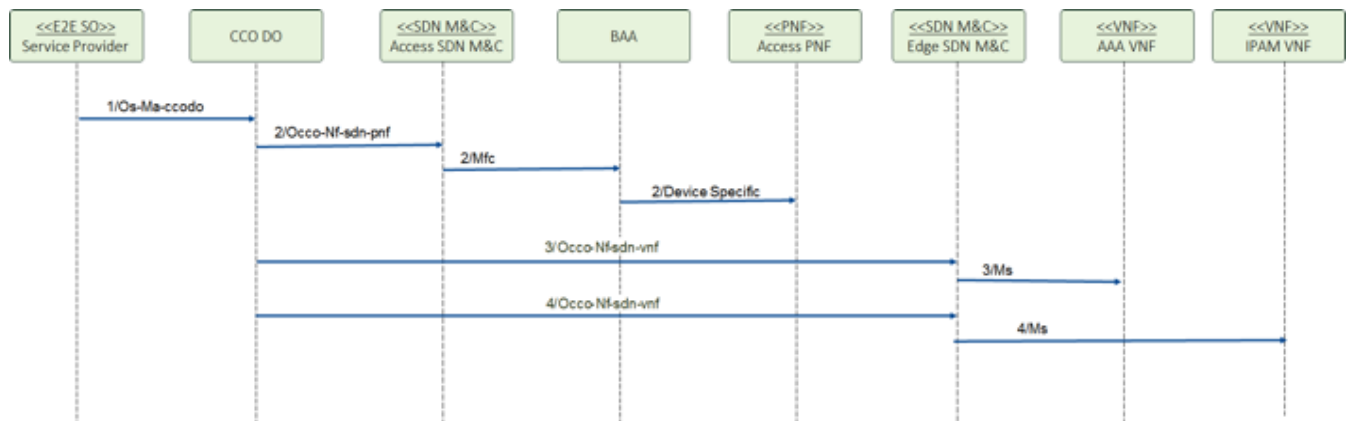
### 6.1 Interaction 1 : Create HSIA Service

1. CCO DO receives a HSIA Service creation request.
2. CCO DO requests the VIM to establish connectivity between the Access SDN M&C and the AAA VNF and DHCP VNF, with the appropriate security
3. CCO DO requests the Access SDN M&C to create an S-VLAN on the Access PNF (through the BAA) for that HSIA Service; assign Access UNIs to that S-VLAN and enable split-horizon forwarding on that S-VLAN.
4. Access SDN M&C provisions the Access PNF via the BAA to redirect 801.1x and DHCP packets within the context of that S-VLAN to it, while blocking all the rest.
5. CCO DO requests the DC SDN M&C to configure that S-VLAN on the switch attached to the Access PNF on all of its ports.
6. CCO DO requests the VIM to create two virtual networks as well as a virtual bridge between said S-VLAN and one of the aforementioned virtual networks
7. CCO DO requests the VIM to deploy a vRouter VNF and connect it to the two virtual networks.
8. CCO DO requests the VIM to deploy a virtual bridge and configure bridging between the Internet Namespace S-VLAN and the 'other' virtual network
9. CCDO requests the Edge SDN M&C to configure the vRouter interfaces and other configuration.
10. CCDO reports 'Service Ready'



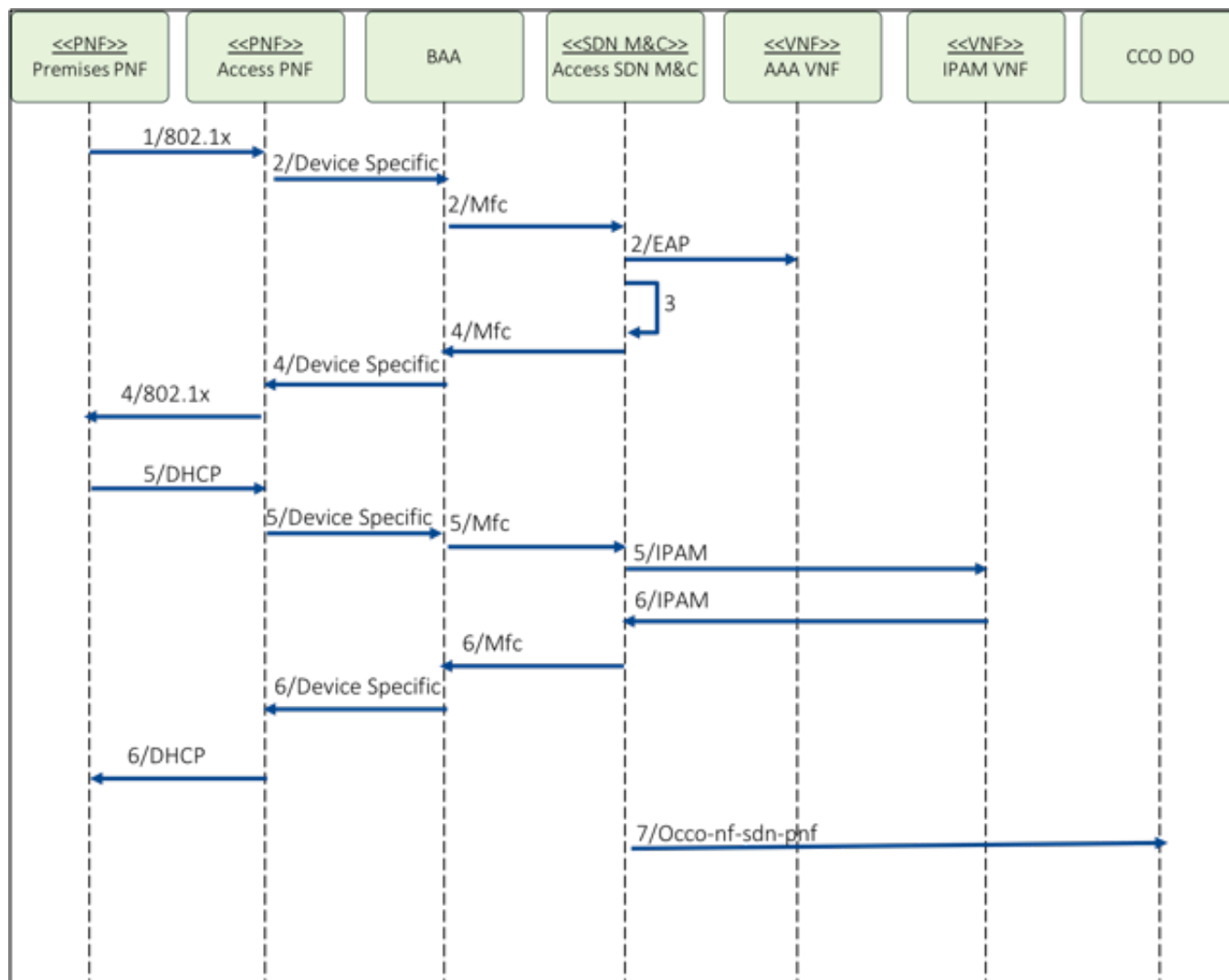
## 6.2 Interaction 2 : Create HSIA Service User

1. CCO DO receives a HSIA Service User creation request with enduser(tenant) information; rate/quality of service, type of protection, and user credentials.
2. CCO DO requests the Access SDN M&C to configure the Access PNF via the BAA layer the users C-VLAN and forwarding connectivity though the Access NNI's S-VLAN
3. CCO DO requests the Edge SDN M&C to configure the AAA VNF with the enduser(tenant) credentials
4. CCO DO requests the Edge SDN M&C to configure the DHCP VNF with the enduser(tenant) addresses and policies (rate/quality of service, type of protection)



### 6.3 Interaction 3 : Activating HSIA Service (Successful authentication)

1. User attaches the Premises PNF to the Access Network
2. Access PNF sends, via the BAA and Access SDN M&C, the EAP information from the 802.1x packet toward the AAA VNF. The AAA VNF authenticates the enduser(tenant) and returns the response
3. Upon successful authentication, to the Access SDN M&C registers a port activation i.e allowing now other type of packets on the Access UNI port.
4. The Access SDN M&C reports a port activation to the BAA which reports it to the Access PNF which establishes L2 connectivity between the enduser port and the Access PNF NNI via S-VLAN forwarding.
5. Access PNF relays, via the BAA and Access SDN M&C, the DHCP request to the DHCP VNF; DHCP VNF responds with the address information and policies for the enduser (tenant).
6. The DHCP response is send downstream, via the Access SDN M&C and BAA, from the Access PNF to the Premises PNF.
7. Access SDN M&C reports a enduser(tenant) activation to the CCO DO with the attachment point.





## 7 Success Criteria

### Interaction 1:

1. CCO DO maintains the HSIA service request
2. Control plane packets (802.1x and DHCP) can be exchanged between the Premises' physical termination and Access SDN M&C, via the BAA.
3. Control plane packets (802.1x and DHCP) can be exchanged between the Premises PNF and the control plane VNFs.
4. Routed User Plane Connectivity is created, initially with no packet forwarding from the premises PNFs (except 802.1x and DHCP)

### Interaction 2:

1. HSIA Service User is created
2. AAA and DHCP VNFs are configured with the enduser(tenant) information

### Interaction 3:

1. HSIA service is established for that user at the requested rate, quality of service and protection scheme.

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