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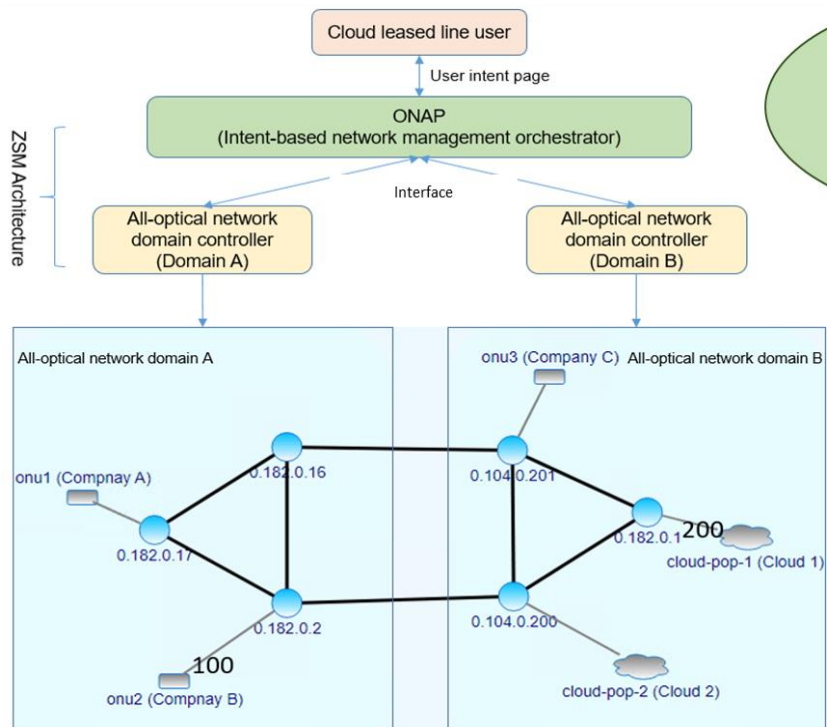
LFN Developer & Testing Forum

ONAP: Deployment and Enhancement Plan of IBN with CCVPN use case

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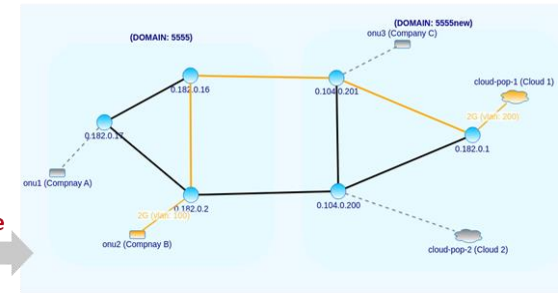
- **Introduction of IBN with CCVPN use case**
- **Deployment of IBN with CCVPN use case**
- **Enhancement plan of intent translation**

Introduction of the Use Case

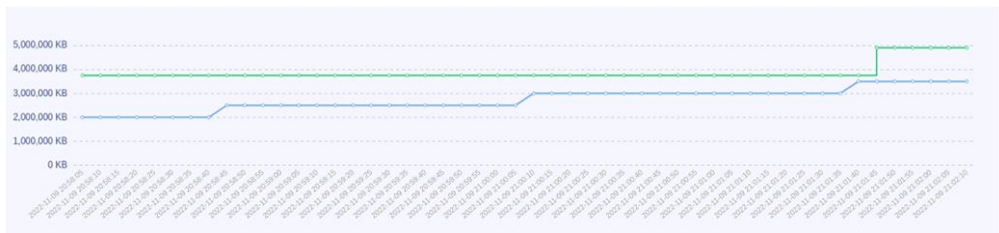


I need a connection from company B to Cloud one, with a bandwidth of 2Gbps

Translate and create

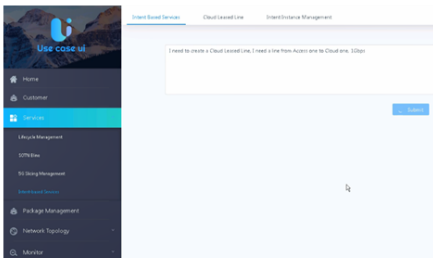


Bandwidth monitoring and guarantee

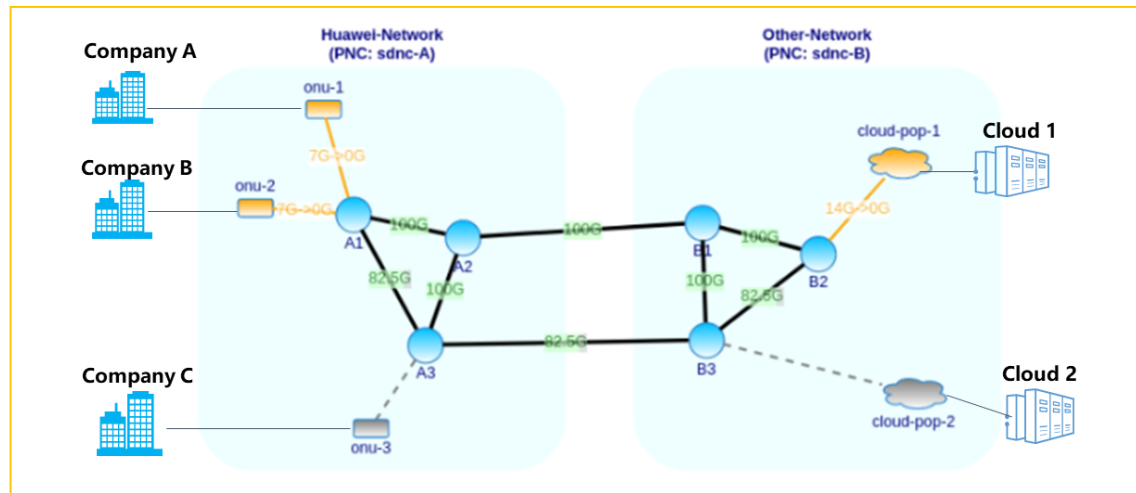


Introduction of the Use Case

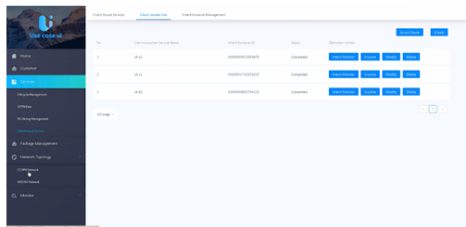
1. Create Cloud Leased Lines



Text: I need to create a Cloud Leased Line. From Company A to Cloud one, 1Gbps.



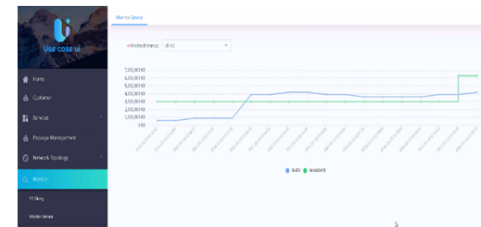
2. Closed-loop operation of CLL



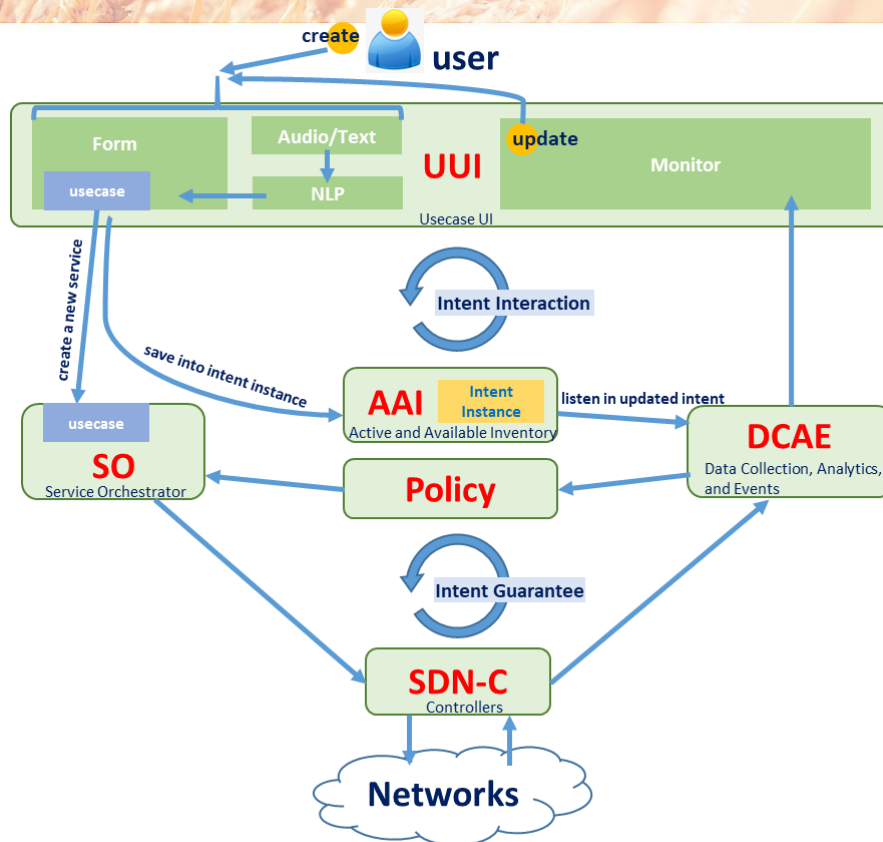
3. User modify bandwidth of CLL



4. Bandwidth Monitor & Guarantee



Deployment of IBN with CCVPN use case



Architecture of Intent-driven Closed-loop Autonomous Networks

Deployment of IBN with CCVPN use case

- **configurations in AAI**

Add IBN Customer

```
curl -k -X PUT
https://127.0.0.1:30233/aai/v24/business/customers/
customer/IBNCustomer \
-H 'Accept: application/json' \
-H 'Authorization: Basic QUfJOkFBSQ== ' \
-H 'Content-Type: application/json' \
-H 'X-FromAppld: AAI' \
-H 'cache-control: no-cache' \
-d '{
  "global-customer-id": "IBNCustomer",
  "subscriber-name": "IBNCustomer",
  "subscriber-type": "INFRA"
}'
```

Add Service-subscription

```
curl -k -X PUT
https://127.0.0.1:30233/aai/v24/business/customers/cust
omer/IBNCustomer/service-subscriptions/service-
subscription/IBN \
-H 'Accept: application/json' \
-H 'Authorization: Basic QUfJOkFBSQ== ' \
-H 'Content-Type: application/json' \
-H 'X-FromAppld: AAI' \
-H 'cache-control: no-cache' \
-d '{
  "service-type": "IBN"
}'
```

Deployment of IBN with CCVPN use case

configurations in AAI

- Get IBN Customer

GET `{{aaurl}}/aa/v24/business/customers/customer/IBNCustomer/` Send

Params Authorization Headers (13) Body Pre-request Script Tests Settings Cookies

Query Params

KEY	VALUE	DESCRIPTION	...	Bulk Edit
Key	Value	Description		

Body Cookies Headers (6) Test Results (0/1) Status: 200 OK Time: 76 ms Size: 386 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "global-customer-id": "IBNCustomer",
3   "subscriber-name": "IBNCustomer",
4   "subscriber-type": "INFRA",
5   "resource-version": "1684218256856"
6 }
```

- Get Service-subscription

GET `{{aaurl}}/aa/v24/business/customers/customer/IBNCustomer/service-subscriptions/service-subscription/IBN` Send

Params Authorization Headers (13) Body Pre-request Script Tests Settings Cookies

Query Params

KEY	VALUE	DESCRIPTION	...
Key	Value	Description	

Body Cookies Headers (6) Test Results (0/1) Status: 200 OK Time: 87 ms Size: 313 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "service-type": "IBN",
3   "resource-version": "1684218281075"
4 }
```


Deployment of IBN with CCVPN use case

configurations in Policy

```
kubectl expose deployment/dev-policy-api --type="NodePort" --port 6969
```

```
kubectl expose deployment/dev-policy-pap --type="NodePort" --port 6969
```

```
kubectl get pods,svc -o wide -A | grep dev-policy
```

```
onap          service/dev-policy-api          NodePort    10.1.168.61    <none>       6969:32626/TCP
p=policy-api
onap          service/dev-policy-mariadb-metrics ClusterIP    10.1.239.234  <none>       9104/TCP
p.kubernetes.io/instance=dev,app.kubernetes.io/name=policy-mariadb
onap          service/dev-policy-pap          NodePort    10.1.223.101  <none>       6969:32224/TCP
p.kubernetes.io/instance=dev,app.kubernetes.io/name=policy-pap
```

- Create the modifyCll policy

```
curl -k --user 'policyadmin:zb!XztG34' -X POST
```

```
"https://172.30.3.12:32626/policy/api/v1/policytypes/onap.policies.controlloop.operational.common.Drools/version
s/1.0.0/policies" -H "Accept:application/json" -H "Content-Type:application/json" -d @modifycll.json
```

<https://wiki.onap.org/display/DW/CCVPN+Usecase+Policy+Setup>

Deployment of IBN with CCVPN use case

configurations in Policy

- Enable the modifyCll policy

```
curl -k --user 'policyadmin:zb!XztG34' -X POST "https://172.30.3.12:32224/policy/pap/v1/pdps/policies" -H "Accept:application/json" -H "Content-Type:application/json" -d @push_modifycll.json
```

- Retrieval the modifyCll policy

```
curl -k --user 'policyadmin:zb!XztG34' -H "Content-Type:application/json" -H "Accept:application/json" -X GET https://172.30.3.12:32626/policy/api/v1/policytypes/onap.policies.controlloop.operational.common.Drools/versions/1.0.0/policies/operational.modifycll/versions/1.0.0
```

```
{ "tosca_definitions_version": "tosca_simple_yaml_1_1_0", "topology_template": { "inputs": {}, "policies": [ { "operational.modifycll": { "type": "onap.policies.controlloop.operational.common.Drools", "type_version": "1.0.0", "properties": { "operations": [ { "id": "unique-policy-id-1-modify-cll", "description": "Modify resource allocation for a slice subnet instance", "operation": { "actor": "SO", "operation": "ModifyCloudLeasedLine", "target": { "targetType": "VNF" }, "timeout": 1200, "retries": 0, "success": "final_success", "failure": "final_failure", "failure_timeout": "final_failure_timeout", "failure_retries": "final_failure_retries", "failure_exception": "final_failure_exception", "failure_guard": "final_failure_guard" }, "controllerName": "usecases", "id": "ControlLoop-CCVPN-CLL-227e8b00-dbeb-4d03-8719-d0a658fb846c", "trigger": "unique-policy-id-1-modify-cll", "abatement": false, "timeout": 1200, "name": "operational.modifycll", "version": "1.0.0", "metadata": { "policy-id": "operational.modifycll", "policy-version": "1.0.0" } } } ] }, "name": "ToscaServiceTemplateSimple", "version": "1.0.0" } ] }
```

Deployment of IBN with

configurations in SDNC

- Upgrade the SDNC image version to 2.4.1

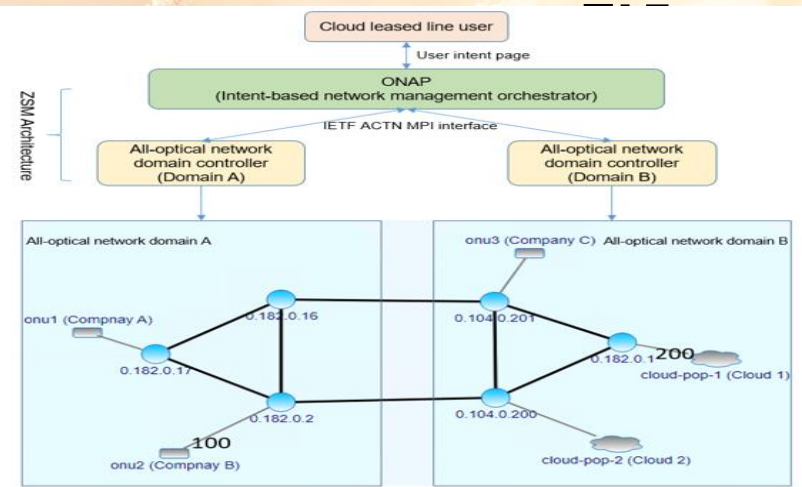
```
kubectl -n onap get statefulsets dev-sdnc  
kubectl -n onap edit statefulsets dev-sdnc
```

- Registration of the third-party domain controllers

```
curl -k -X PUT https://127.0.0.1:30233/aai/v16/external-system/esr-thirdparty-sdnc-list/esr-thirdparty-sdnc/sdnc1 -u "AAI:AAI" -H "X-FromAppId:postman" -H "Content-Type:application/xml" -H "Accept:application/xml" -H "X-TransactionId:9999" -d @esr-registration-controller-1.xml
```

```
curl -k -X GET https://127.0.0.1:30233/aai/v16/external-system/esr-thirdparty-sdnc-list/esr-thirdparty-sdnc/sdnc2 -u "AAI:AAI" -H "X-FromAppId:postman" -H "Content-Type:application/xml" -H "Accept:application/xml" -H "X-TransactionId:9999"
```

<https://wiki.onap.org/display/DW/Cloud+Leased+Line+%28CLL%29+Configuration+and+Operation+Guidance>



Deployment of IBN with CCVPN use case

configurations in SDNC

- Creating Endpoints

<https://wiki.onap.org/display/DW/Cloud+Leased+Line+%28CLL%29+Configuration+and+Operation+Guidance>

- For Domain A: ↴
- transportEp_src_ID_111_1 (onu1) (LEAF) is mapped to Company A ↴
- transportEp_src_ID_111_2 (onu2) (LEAF) is mapped to Company B ↴
- transportEp_src_ID_113_1 (onu3) (LEAF) is mapped to Company C ↴
- For Domain B: ↴
- transportEp_src_ID_212_1 (cloud-pop-1) (ROOT) is mapped to Cloud 1.
- transportEp_src_ID_213_2 (cloud-pop-2) (ROOT) is mapped to Cloud 2.

GET `{[aaiurl]}/aai/v24/network/network-routes/network-route/transportEp_dstID_212_1` Send

Params Authorization Headers (15) Body Pre-request Script Tests Settings Cookies

Key	Value	Description
<input checked="" type="checkbox"/> Content-Type	application/json	
<input checked="" type="checkbox"/> X-FromAppId	ying	
<input checked="" type="checkbox"/> X-TransactionId	9999	
<input checked="" type="checkbox"/> Accept	application/json	
<input type="checkbox"/> X-ECOMP-InstanceID	777	
<input type="checkbox"/> Authorization	Basic YWFpOktwOGJKNFNYc3pNMFMdYbGhha2NISG...	

Body Cookies Headers (6) Test Results Status: 200 OK Time: 105 ms Size: 618 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "route-id": "transportEp_dst_ID_212_1",
3   "type": "ROOT",
4   "role": "3gppTransportEP",
5   "function": "3gppTransportEP",
6   "ip-address": "10.2.3.4",
7   "prefix-length": 24,
8   "logical-interface-id": "47",
9   "next-hop": "networkId-providerId-20-clientId-0-topologyId-2-nodeId-10.2.1.2-ltpId-512",
10  "address-family": "ipv4",
11  "data-source": "cloud-pop-1 (cloud 1)",
12  "resource-version": "1684218768930"
13 }
```

DELETE `{[aaiurl]}/aai/v24/network/network-routes/network-route/transportEp_src_ID_114_1?resource-version=1629461611024` Send

Params Authorization Headers (16) Body Pre-request Script Tests Settings Cookies Beautify

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   "route-id": "[[ep[1][name]]]",
3   "type": "3gppTransportEP",
4   "role": "3gppTransportEP",
5   "function": "3gppTransportEP",
6   "ip-address": "10.2.3.4",
7   "prefix-length": 24,
8   "next-hop": "[[ep[1][ip]]]",
9   "address-family": "ipv4"
10 }
```

Response

Deployment of IBN with CCVPN use case

configurations in SDNC

Creating Endpoints

<https://wiki.onap.org/display/DW/Cloud+Leased+Line+%28CLL%29+Configuration+and+Operation+Guidance>

- For Domain A: ↴
- tranportEp_src_ID_111_1 (onu1) (LEAF) is mapped to Company A ↴
- tranportEp_src_ID_111_2 (onu2) (LEAF) is mapped to Company B ↴
- tranportEp_src_ID_113_1 (onu3) (LEAF) is mapped to Company C ↴
- For Domain B: ↴
- tranportEp_src_ID_212_1 (cloud-pop-1) (ROOT) is mapped to Cloud 1.
- tranportEp_src_ID_213_2 (cloud-pop-2) (ROOT) is mapped to Cloud 2.

GET {aa[url]}aa/n/24/network/network-routes/network-route/transportEp_dstID_212_1

Send

Params Authorization Headers (15) Body Pre-request Script Tests Settings

Key	Value	Descrip
<input checked="" type="checkbox"/> Content-Type	application/json	
<input checked="" type="checkbox"/> X-FromAppId	ying	
<input checked="" type="checkbox"/> X-TransactionId	9999	
<input checked="" type="checkbox"/> Accept	application/json	
<input type="checkbox"/> X-ECOMP-InstanceID	777	
<input type="checkbox"/> Authorization	Basic YWFPdGktwOGJKNFNyYzNpNmFidVbGhhazNISG...	

Body Cookies Headers (6) Test Results Status: 200 OK

Pretty Raw Preview Visualize JSON

```
1 {
2   "route-id": "tranportEp_dst_ID_212_1",
3   "type": "ROOT",
4   "role": "SgppTransportEP",
5   "function": "SgppTransportEP",
6   "ip-address": "10.2.3.4",
7   "prefix-length": 24,
8   "logical-interface-id": "47",
9   "next-hop": "networkId-providerId-20-clientId-0-topologyId-2-nodeId-10.2.1.2-ltpId-512",
10  "address-family": "ipv4",
11  "data-source": "cloud-pop-1 (cloud 1)",
12  "resource-version": "1684218768938"
13 }
```

Create Cloud Leased Line

* Communication Service Name :

* Intent Instance ID : 6000000959482631

* Resource Protect Level : Protect Non-Protect

* Access Point 1 :

Bandwidth:

Name:

tranportEp_src_ID_113_1(onu-3 (company C))
tranportEp_src_ID_111_1(company A)
tranportEp_src_ID_111_2(company B)

* Cloud Point Name :

Cancel OK

Deployment of IBN with CCVPN use case

Launch the pnc-simulator

- Fetch the simulator docker image

```
docker pull dzhanguawei/pncsimulator:latest
```

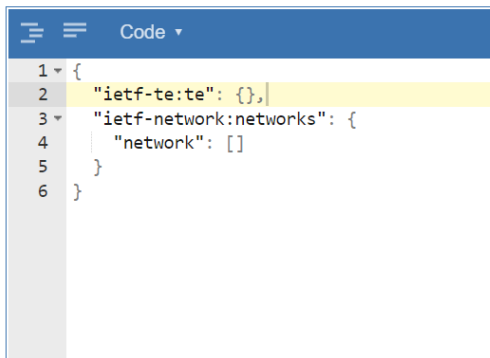
- Start the simulator containers

```
docker run -p 18181:8181 -d --name pncsimu-18181 -t  
dzhanguawei/pncsimulator:latest
```

```
docker container ps -a | grep pncsimu
```

- Initialize the simulators

```
curl -X POST -H "content-  
type:application/json" http://${SERVER_IP:S  
ERVER_PORT}/pncsimu/v1/reload-data -d  
@INITIAL_DATA_FILE
```



```
Code ▾  
1 {  
2   "ietf-te:te": {},  
3   "ietf-network:networks": {  
4     "network": []  
5   }  
6 }
```

- Download the file and unzip it

<https://wiki.onap.org/display/DW/CCVPN+Closed-Loop+PNC+simulator+QuickStart>

- Start and initialize the pnc-simulators

```
> cd pnc-simulator  
> ./run.sh  
> ./init.sh
```

Deployment of IBN with CCVPN use case

Registration of AAI and SO services

AAI registration

Link: <https://{{master server ip}}:30284/iui/microservices/default.html>

1. Select 'Service Discover' in the left pane
2. Click 'Service Register' button.
3. Input the basic info as the picture shows

序号	IP	PORT	主备状态	weight	max_fails	fail_timeout(s)	policy	URL	Interval	Timeout	操作
1	10.21.19.83	30233									<input type="checkbox"/> <input type="checkbox"/>

SO registration

Link: <https://{{master server ip}}:30284/iui/microservices/default.html>

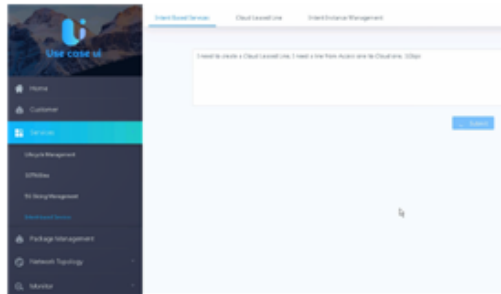
1. Select 'Service Discover' in the left pane
2. Click 'Service Register' button.
3. Input the basic info as the picture shows

序号	IP	PORT	主备状态	weight	max_fails	fail_timeout(s)	policy	URL	Interval	Timeout	操作
1	10.21.19.83	30277									<input type="checkbox"/> <input type="checkbox"/>

Deployment of IBN with CCVPN use case

Run the pm-mock (bandwidth usage generator)

1. Create Cloud Leased Lines



2. Closed-loop operation of CLL



3. User modify bandwidth of CLL



4. Bandwidth Monitor & Guarantee



- Download the file and unzip it

<https://wiki.onap.org/display/DW/CCVPN+Closed-Loop+PNC+simulator+QuickStart>

- Start the bandwidth usage generator

```
> cd pm-mock-executable  
> ./run.sh
```


Deployment of IBN with CCVPN use case

Experiences in use case deployment

- Kubectl Basic Usage

kubectl describe pod XXX
kubectl logs XXX
kubectl exec -it XXX

- Reinstall ONAP

helm undeploy dev -n onap
rm -rf /dockerdata-nfs/*

- Ensure the version

Pod	Version
dev-so-bpmn-infra	1.10.0-20220507T0009
dev-sdnc-0	2.4.1
dev-dcae-slice-analysis-ms	1.1.2

Enhancement plan of intent translation

BERT (Bidirectional Encoder Representations from Transformers): developed by researchers at Google AI Language. BERT's key technical innovation is applying the bidirectional training of Transformer, a popular attention model, to language modelling.

- **Fine-tune BERT model**
- **Collaborate Word2vec**

Thank you.



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