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THE JOURNEY FROM VCCAP TO VHUB

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# CABLE ACCESS NETWORK VIRTUALIZATION - HEADEND RE- ARCHITECTED AS A DATA CENTER

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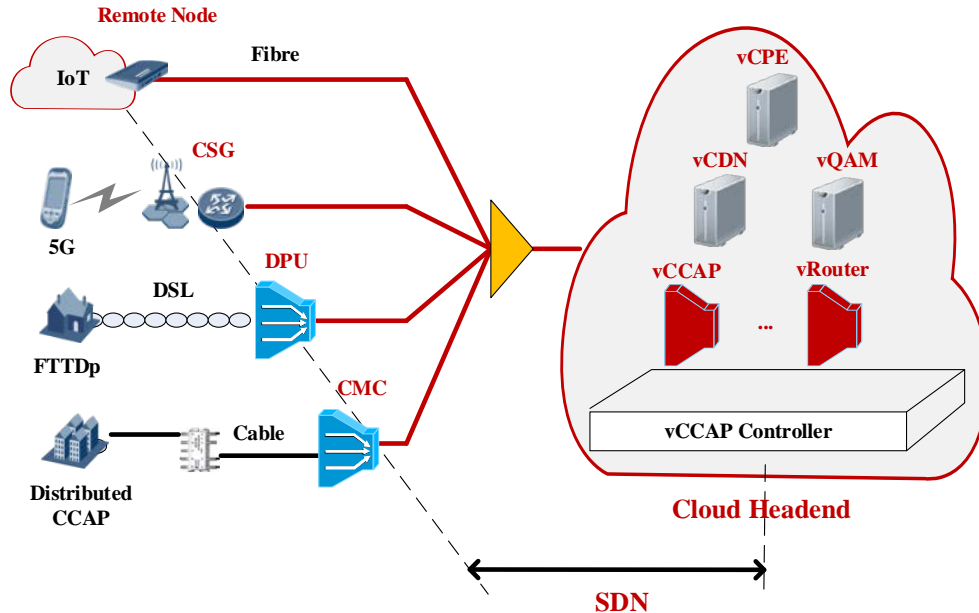


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## Access Network Evolution Challenges

- Management Complexity for Multi-service and Multi-access
  - Multi-service: residents, enterprises, mobile backhaul, and wholesale services.
  - Multi-Access media: HFC, PON, Active ETH, and etc.
  - Multi-Access devices: CMTS/CCAP, CMC, OLT, Remote ETH Node, Edge Router, and etc.
- Scalability and Energy Efficiency in Remote Nodes
- Big Gap between Slow Network Evolution and Rapid Service Innovation Requirements
- Sharing Difficulty of Access Network

## High-level Architecture

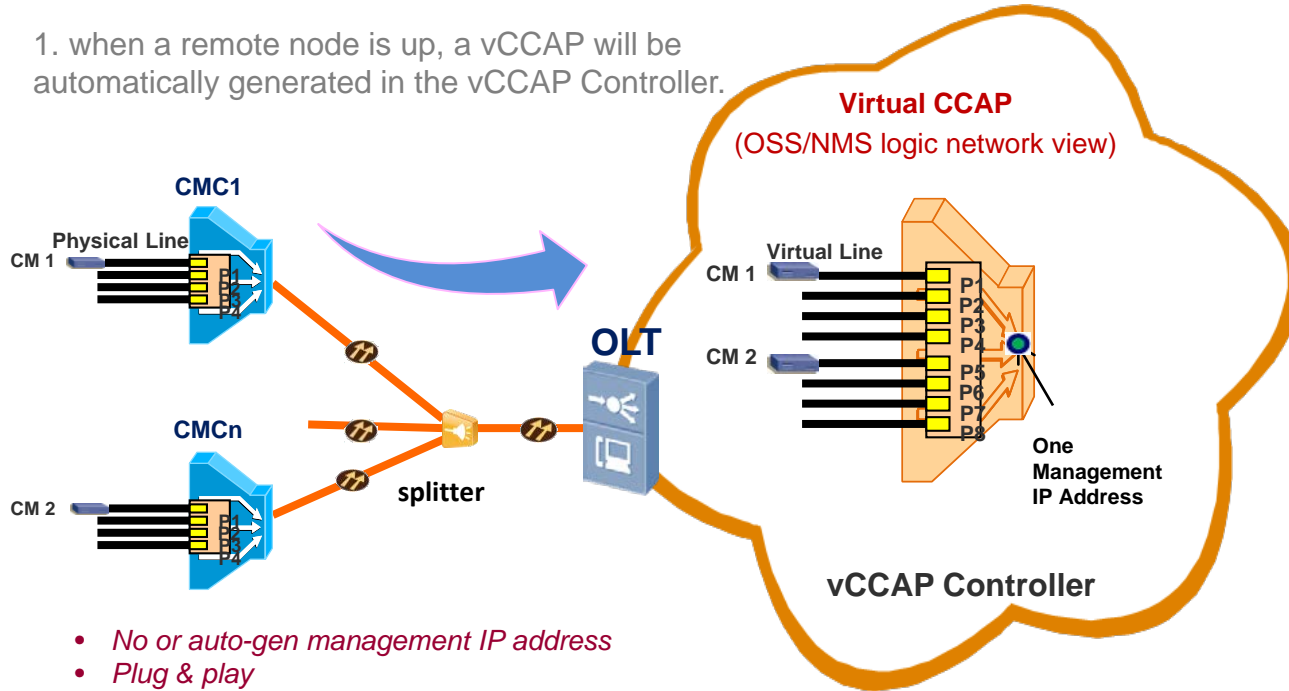


- Separation of control plane and forwarding plane
- Control plane relocated and centralized to a vCCAP Controller
- Applications running on the vCCAP controller: vCCAP, vCPE, vCDN, vRouter, vQAM
- vCCAP controller can also act as a vCCAP Hypervisor

Headend re-architected as a data center

## Concept of vCCAP and virtual line

1. when a remote node is up, a vCCAP will be automatically generated in the vCCAP Controller.



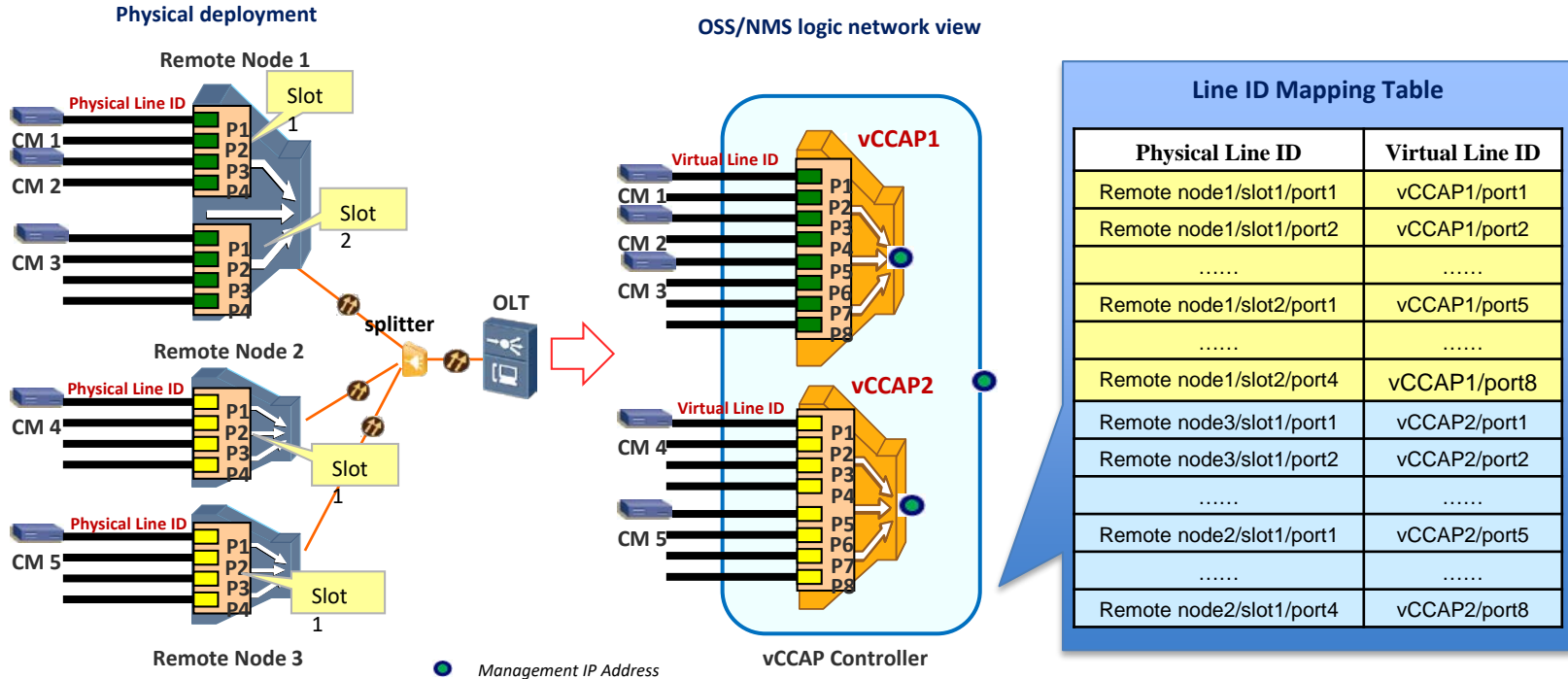
2. vCCAP will automatically get a **management IP** for itself.

3. vCCAP initiates **self-configuration and self-service provisioning** to support remote node plug & play.

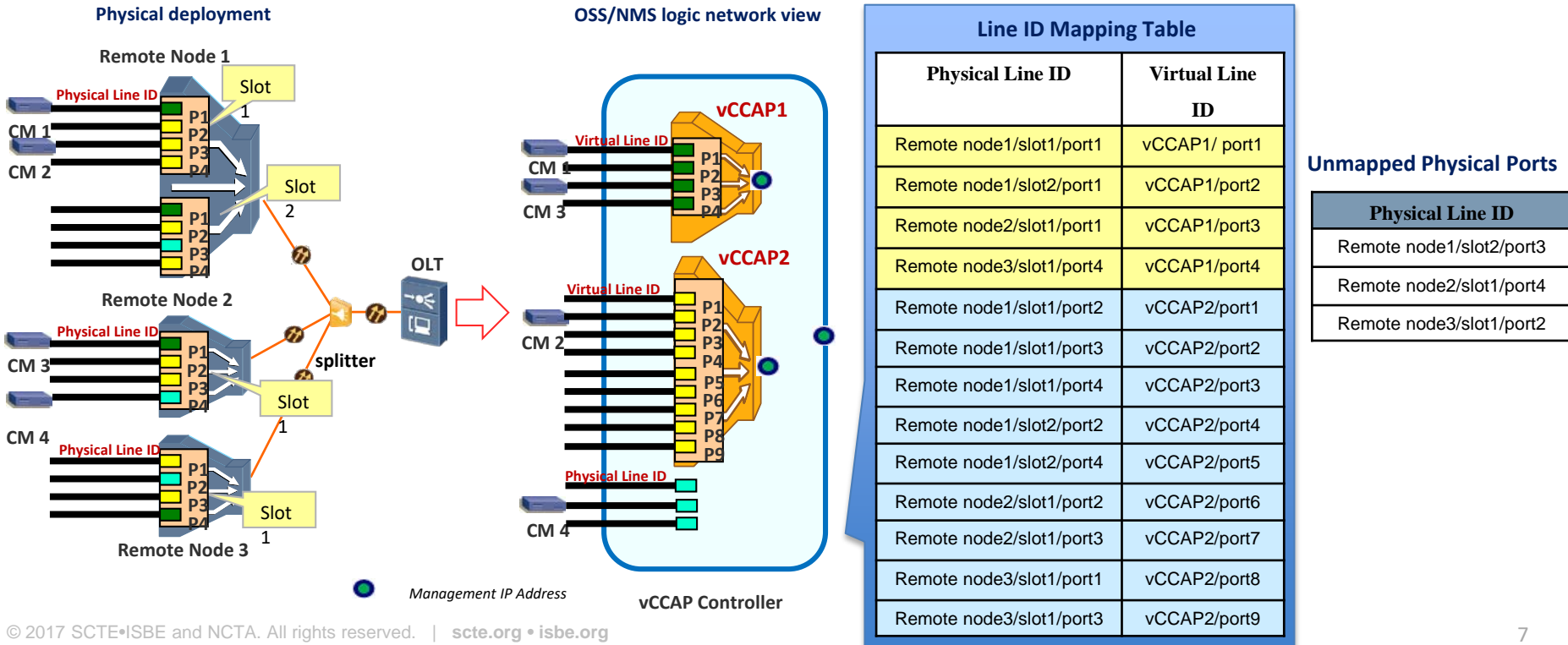
4. **New functions or new protocol enhancement** can be implemented in vCCAP.

- *No or auto-gen management IP address*
- *Plug & play*
- *No complex protocol*

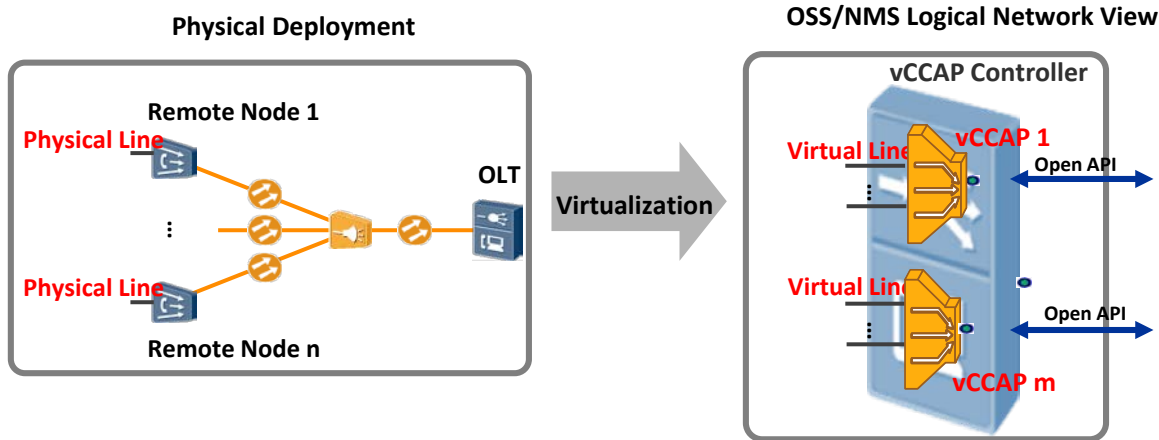
## Type 1 vCCAP - represents one or more than one physical nodes



## Type 2 vCCAP - represents more than one physical interfaces on more than one physical nodes



## “Traditional Access Network Sharing” → “NaaS”



Network Function Set:  
{F1, F2, F3, F4, F5, F6, ..., Fn}

Network Function subset of vCCAP1:  
{F1, F3, F5, ...}

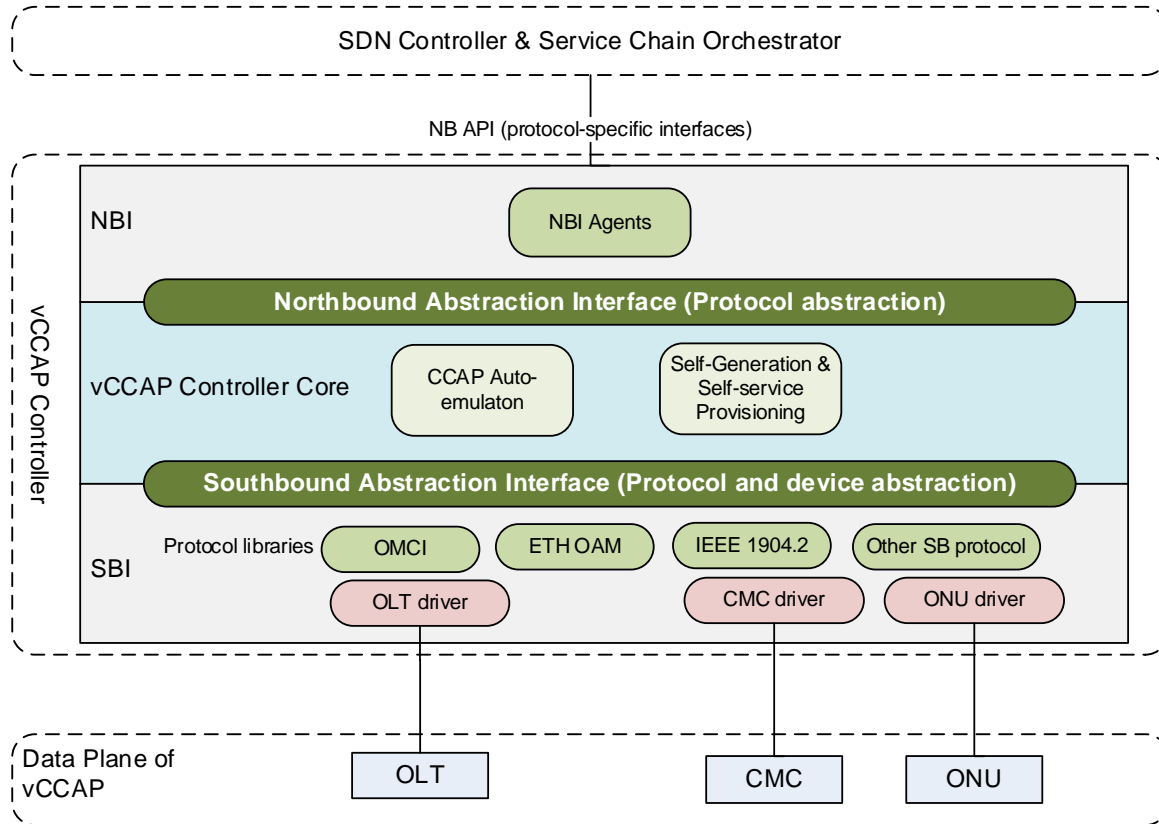
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Network Function subset of vCCAPm:  
{F1, F2, F6, ...}

Network function subset can be defined by the infrastructure provider based on:

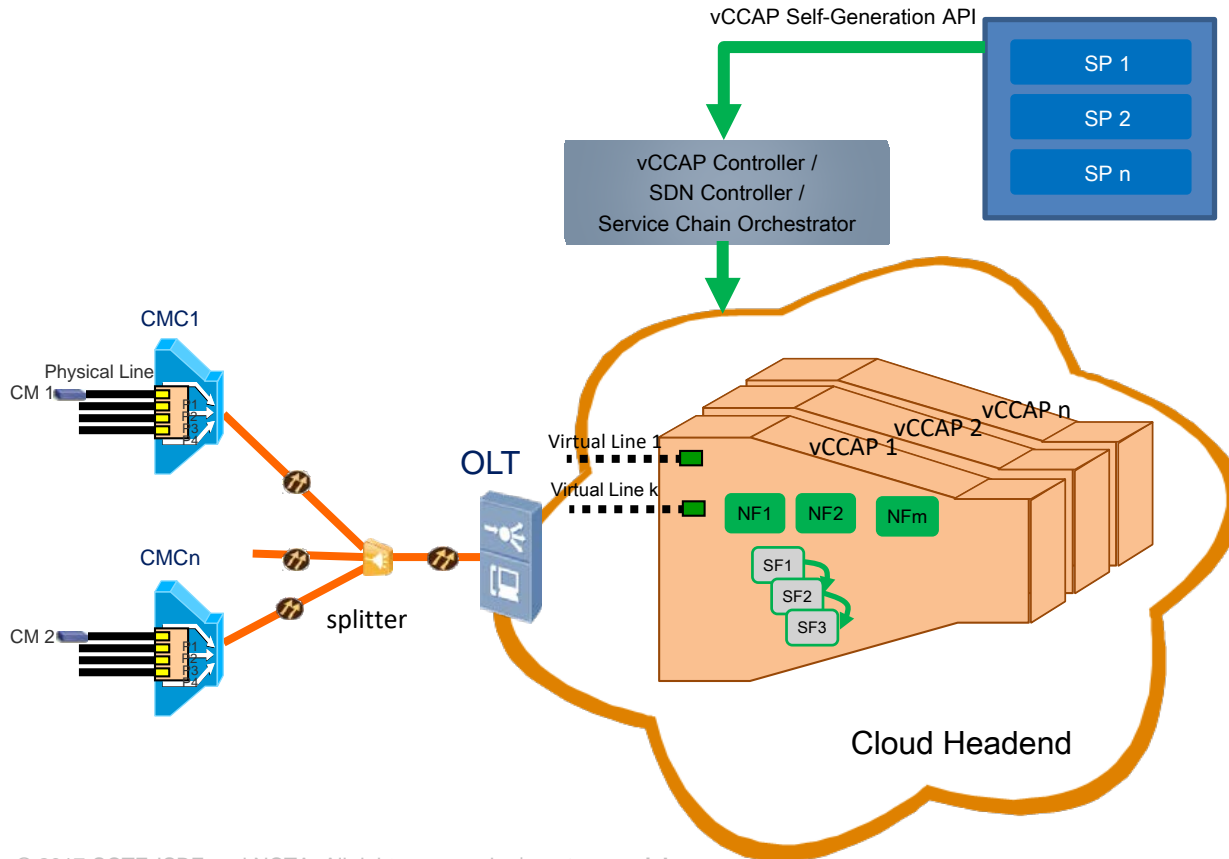
- Service requirements
- Infrastructure network capability





## Innovation of the vCCAP controller:

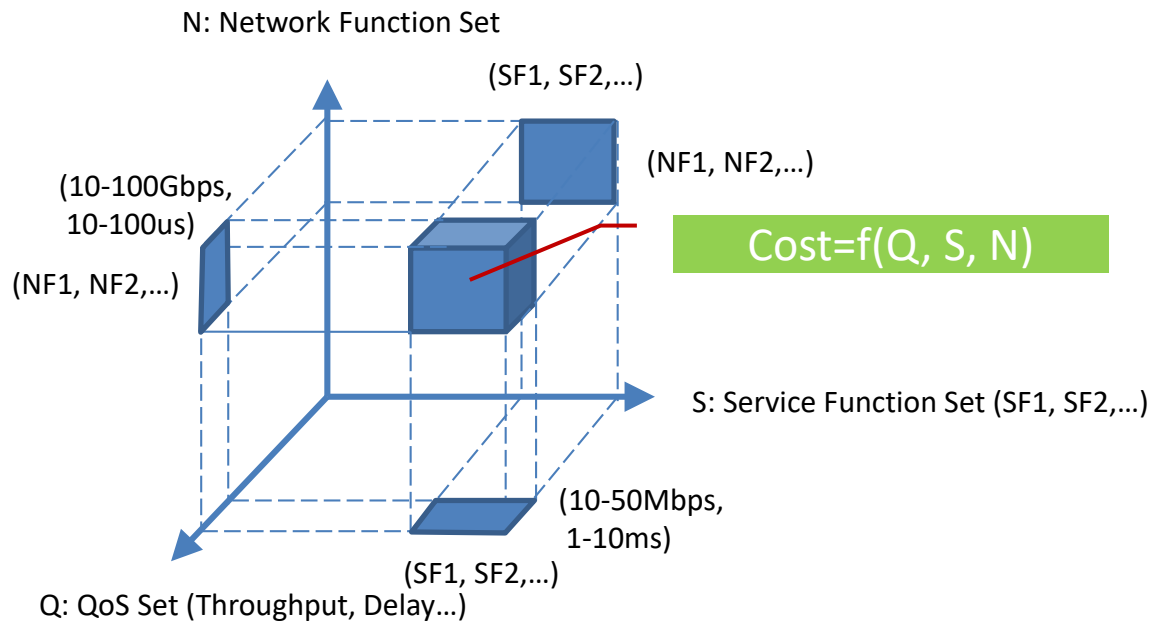
- CCAP Auto-emulation module
- vCCAP Self-Generation and Self-Service Provisioning module.



## Intelligent vCCAP Self-Generation:

- SP:
  - Customize its vCCAP device according to business needs
- The control system (*vCCAP controller, SDN controller, and Service Chain Orchestrator*):
  - Automatically generate new vCCAP
  - Allocate suitable NF, SF and virtual line resources to the vCCAP

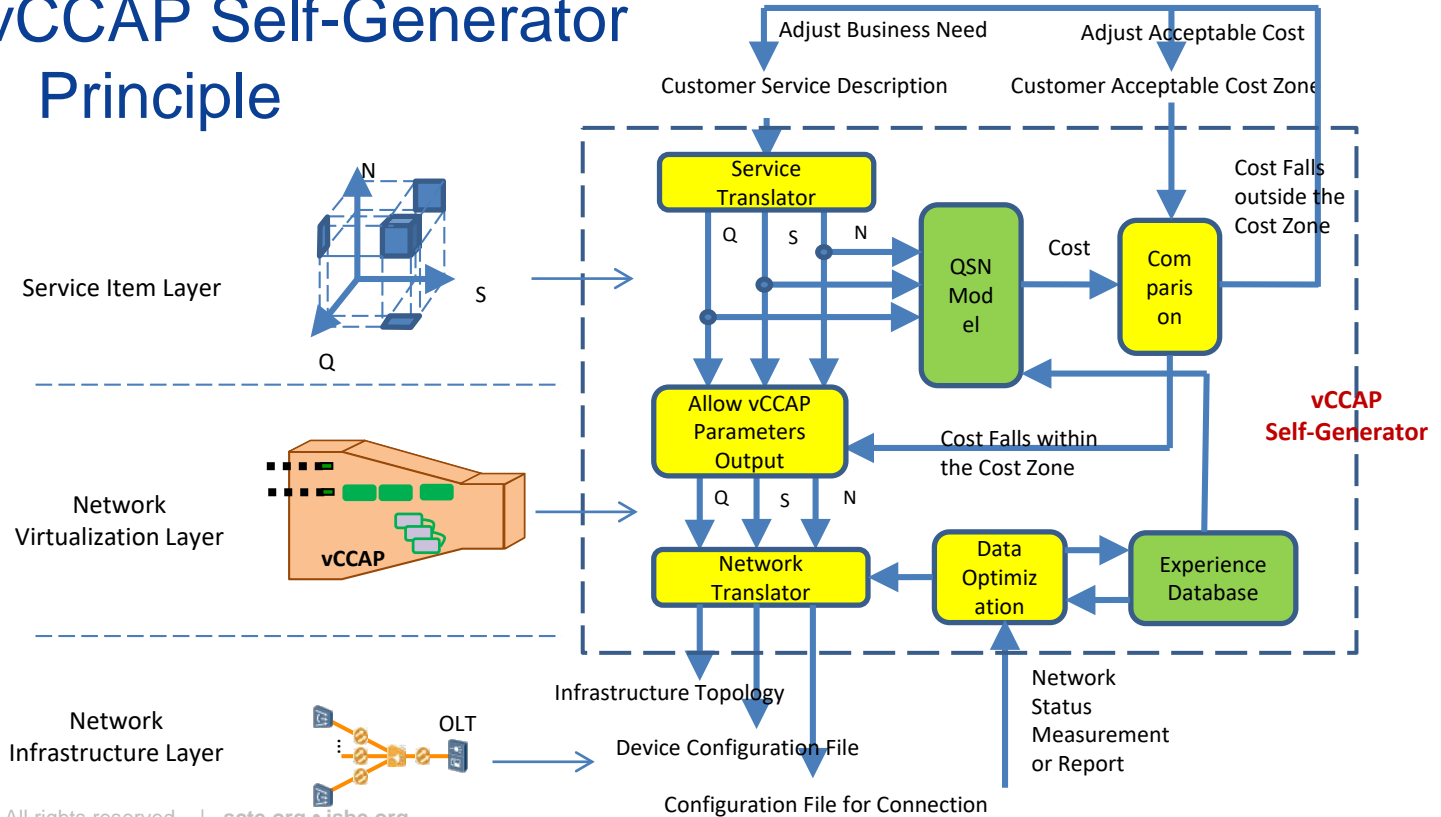
## QSN Model – Compute the cost of network resources



The cost is determined by 3 items:

- Quality of Service (QoS)
- Service function
- Network function,

## Intelligent vCCAP Self-Generator Principle



## ★ Simple, Green and OPEX reduction

- Common infrastructure with commodity building blocks
- Remote node plug and play

## ★ Smooth Migration

- Coexistence and smooth migration of traditional integrated CCAP to distributed CCAP without any impacts on OSS

## ★ Network Innovation Acceleration

- Accelerate Innovation and new service launch with programmable, flexible networks

## ★ Value-added: NaaS

- Turn the traditional access network sharing into NaaS
- Support multi-operator / multi-service in one access network

- Legacy access network architecture is hard to involve all the new technologies.
- In the cloud era, the access network will be transformed into a data center-based architecture. Network functions and services will run in the cloud.
- The Programmable vCCAP is a cloud solution with a future-proof access network architecture, which is expected to lead the way in access network evolution.

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**THANK YOU!**

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