Intro and Dive with free5GC

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About me

- Project Coordinator of free5GC
- Research Assistant [at] NYCU
  - B5G Solution
  - Cloud/Container integration

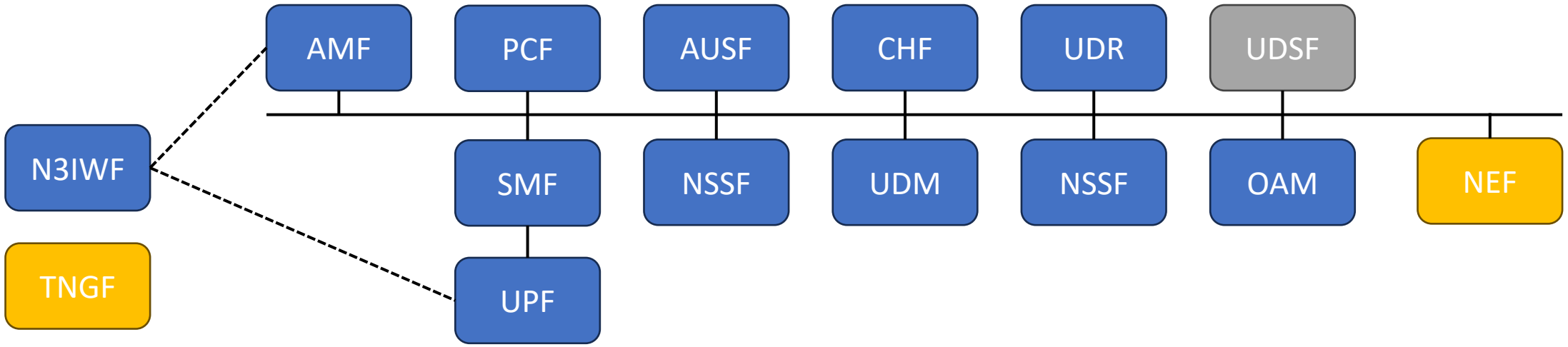
Outline

1. What is free5GC
2. Architecture of free5GC
3. New features released in v3.4.x
4. Future works
5. Roadmap

What is free5GC

- Open Source 5C Core Network Project
- Implement the functionalities defined in 3GPP release 15 ~ 17
- Most of developers are from NYCU 🇹🇼

Architecture of free5GC



released

public but need to be integrated

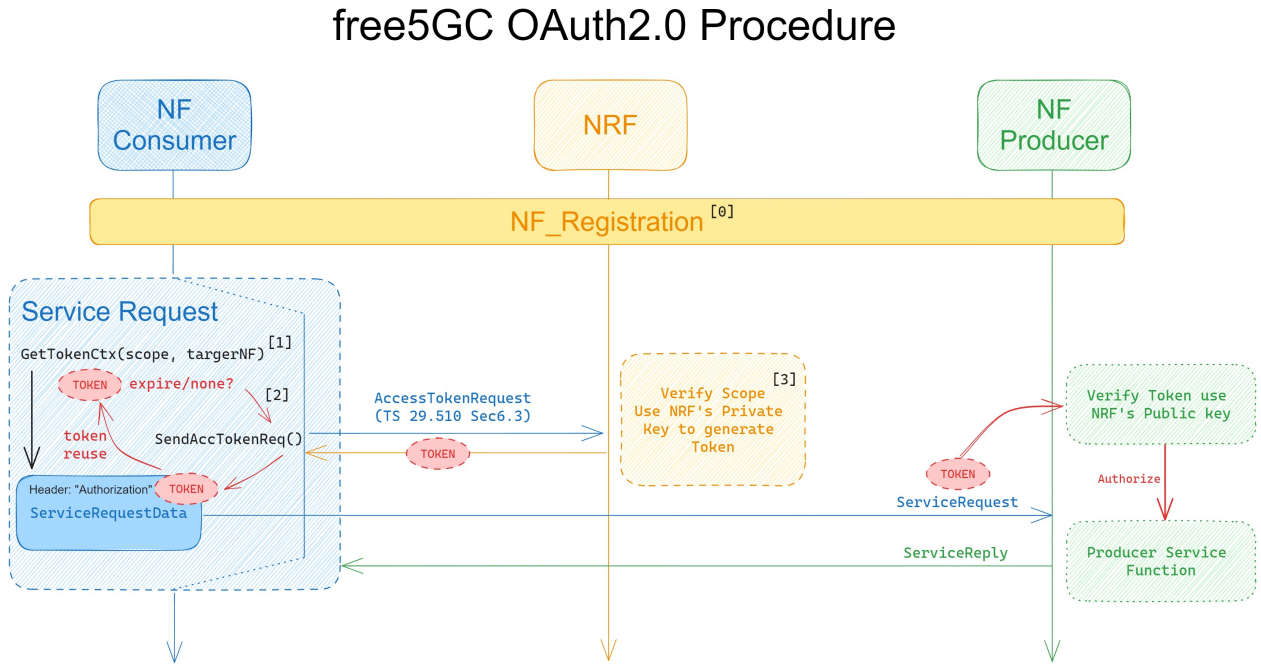
being developed

New features released in v3.4.x

- OAuth (v3.4.0)
- Convergent Charging (v3.4.1)
- free5GC helm (will be released soon)

OAuth supported

- NRF is in charge of token generation
- To consume dedicated NF service, the Service consumer must request the token (signed by NRF's public key) from NRF
- Once the service producer receives the access token, it will verify the token by using NRF's private key.
- Support client credentials type

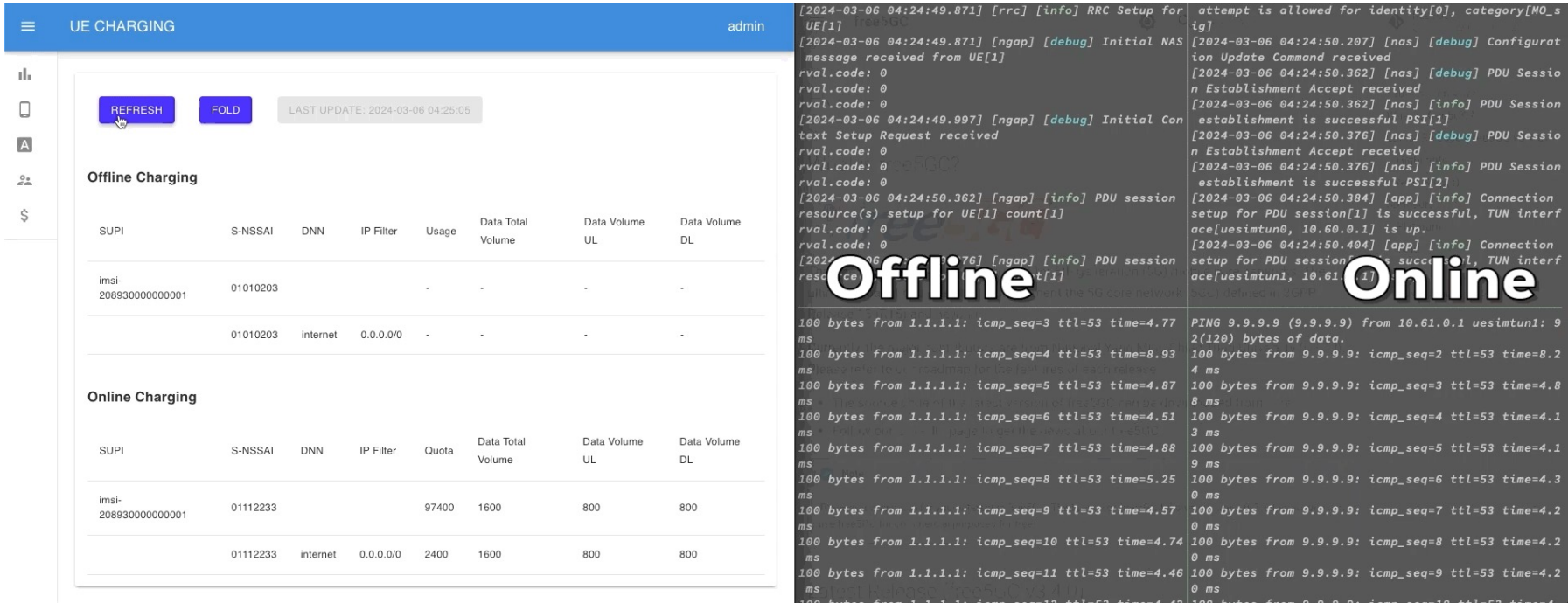


Note:

- All design document(s) are available on free5gc.org/guide
- We're welcome any form of the contributions

Convergent Charging

- Support online/offline charging on data usage (PDU Session)
  - User can configure charging rules of the subscription data via Webconsole



Convergent Charging

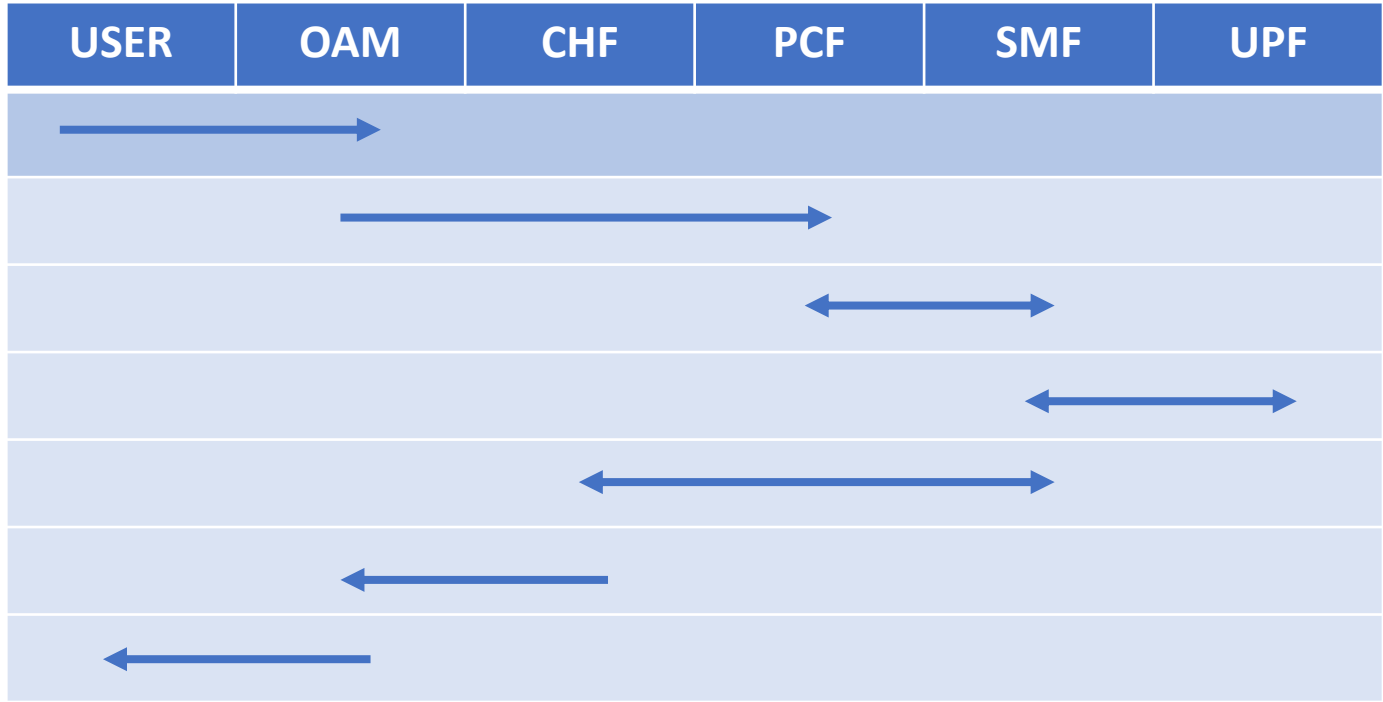
- PCF
  - Apply charging rule(s), from Billing Domain, to PCC Rule
- SMF
  - Send/Handle charging data request
  - Apply usage quota to UPF
  - Handle usage report(s) form UPF
- UPF
  - Perform the usage calculation
  - Send usage report to SMF basing on the triggering condition(s)

Convergent Charging

- CHF
  - Online/Offline/Convergent charging
  - RF + ABMF + CGF
- Webconsole
  - Read charging data record, is sent from CHF
  - Billing Domain

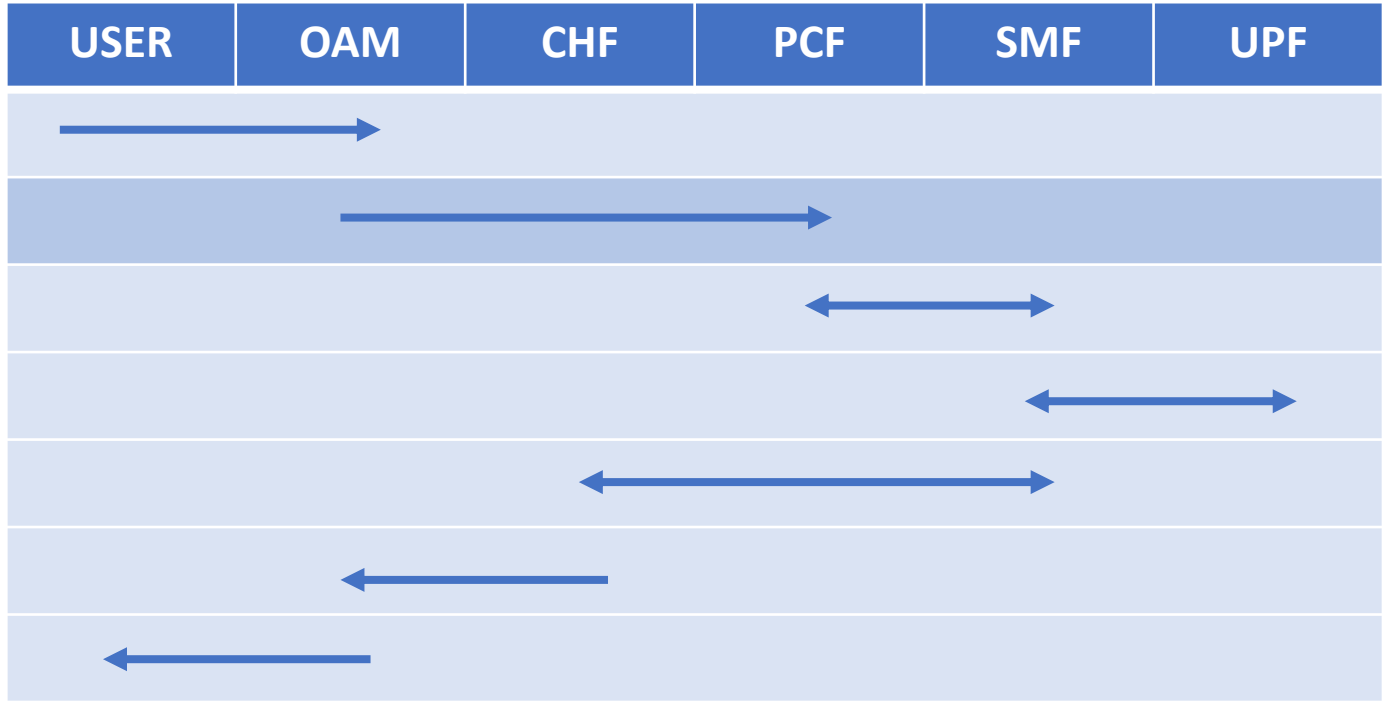
Convergent Charging

- Charging Config
  - SNSSAI
  - Charging method
  - Quota and Unit Cost
  - Flow rule



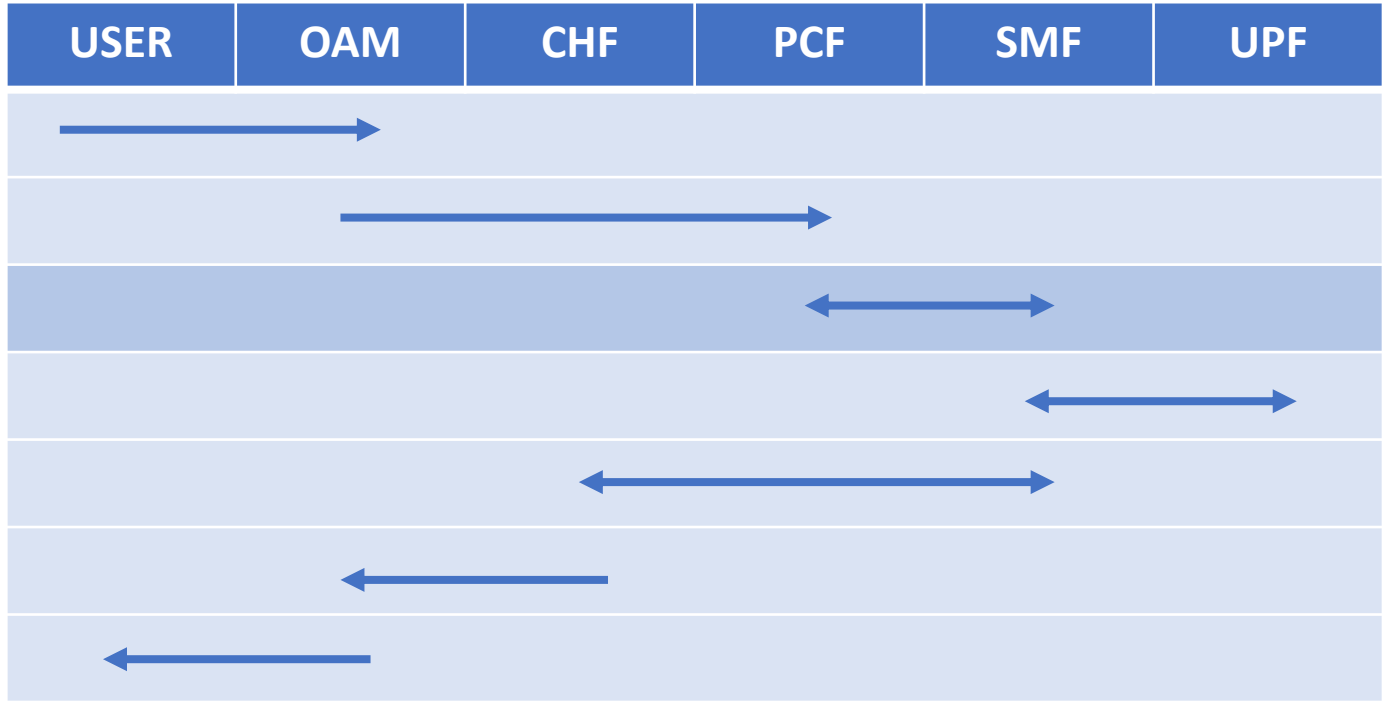
Convergent Charging

- PCF apply charging config to the PCC rule
- PCC Rule will be attached into SM Policy Decision and sent to SMF



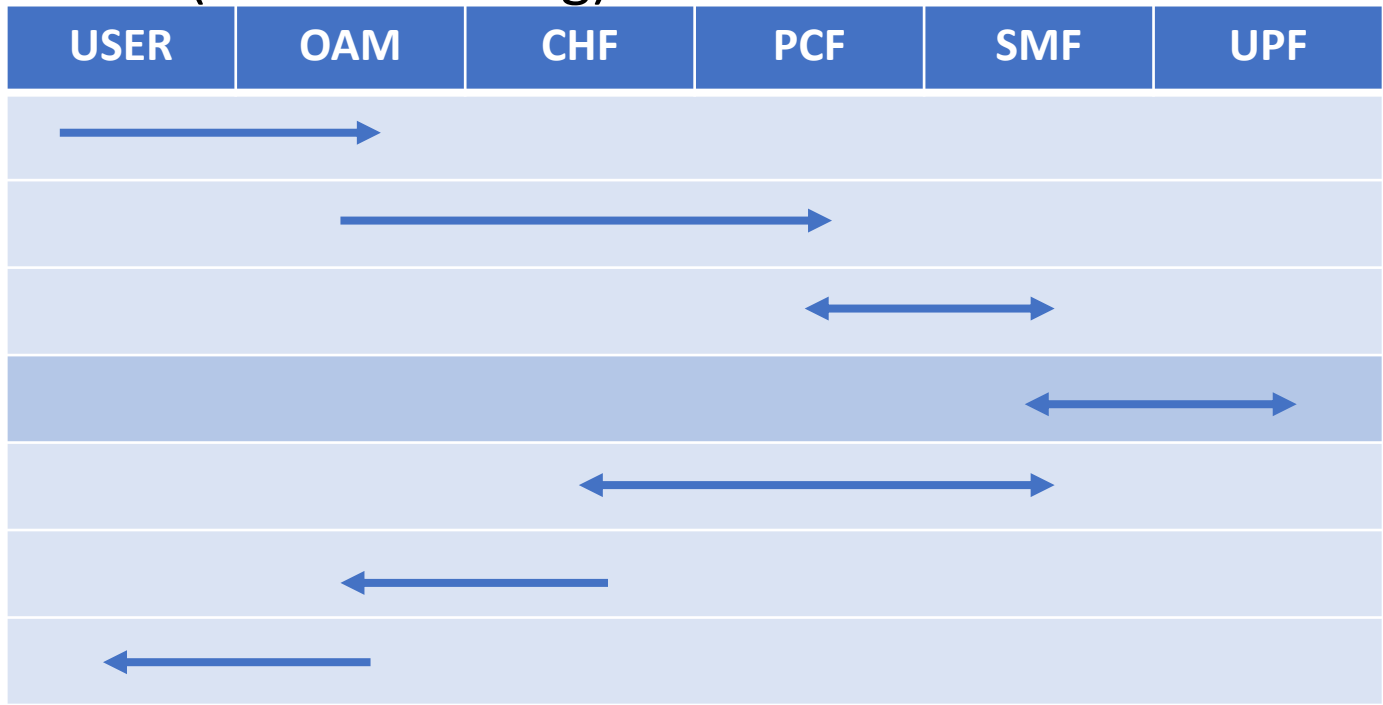
Convergent Charging

- SMF initiates SM Policy Association once it received PDU Sess Est req
  - PCF responds the decision to SMF
  - SMF apply the decision to packet rules (PDR, QER, FAR, URR…)



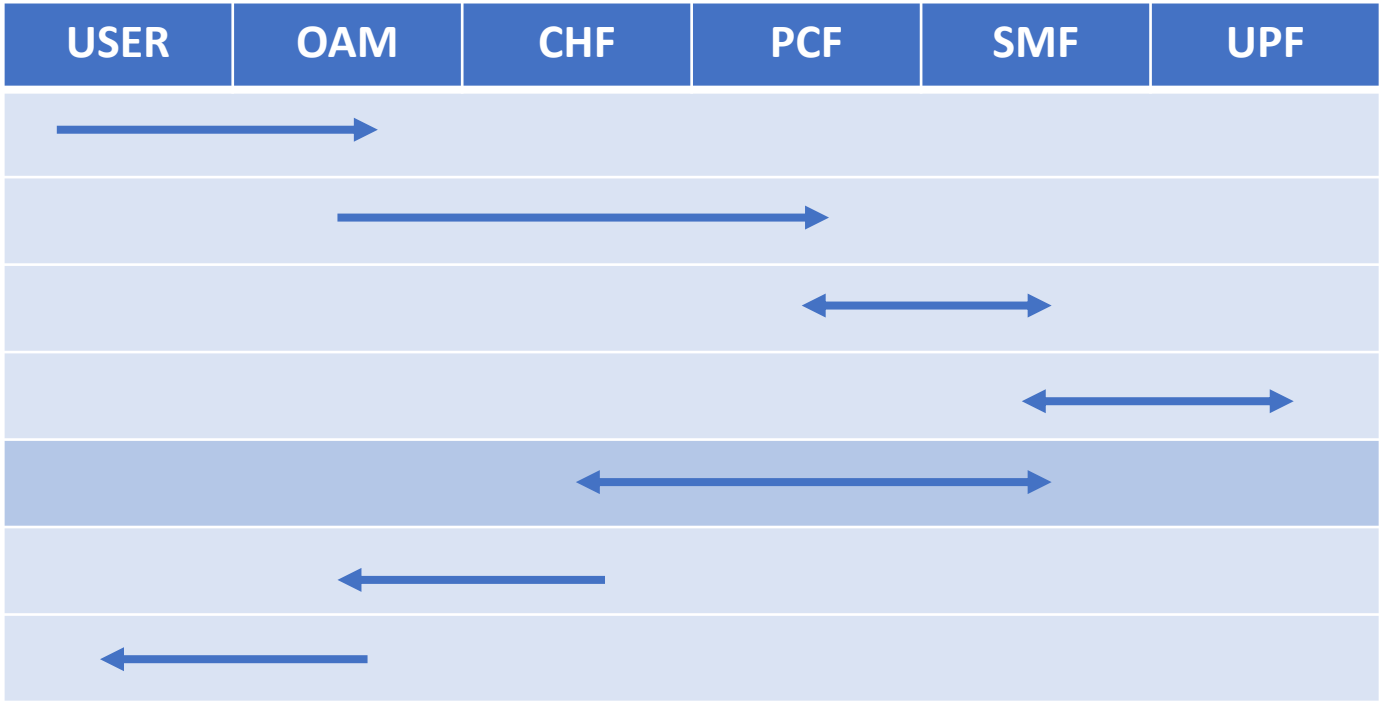
Convergent Charging

- UPF performs the packet processing based on the provided rules
- And send usage report to SMF
  - Periodically (Offline Charging)
  - Data usage is going meet the threshold (Online Charing)



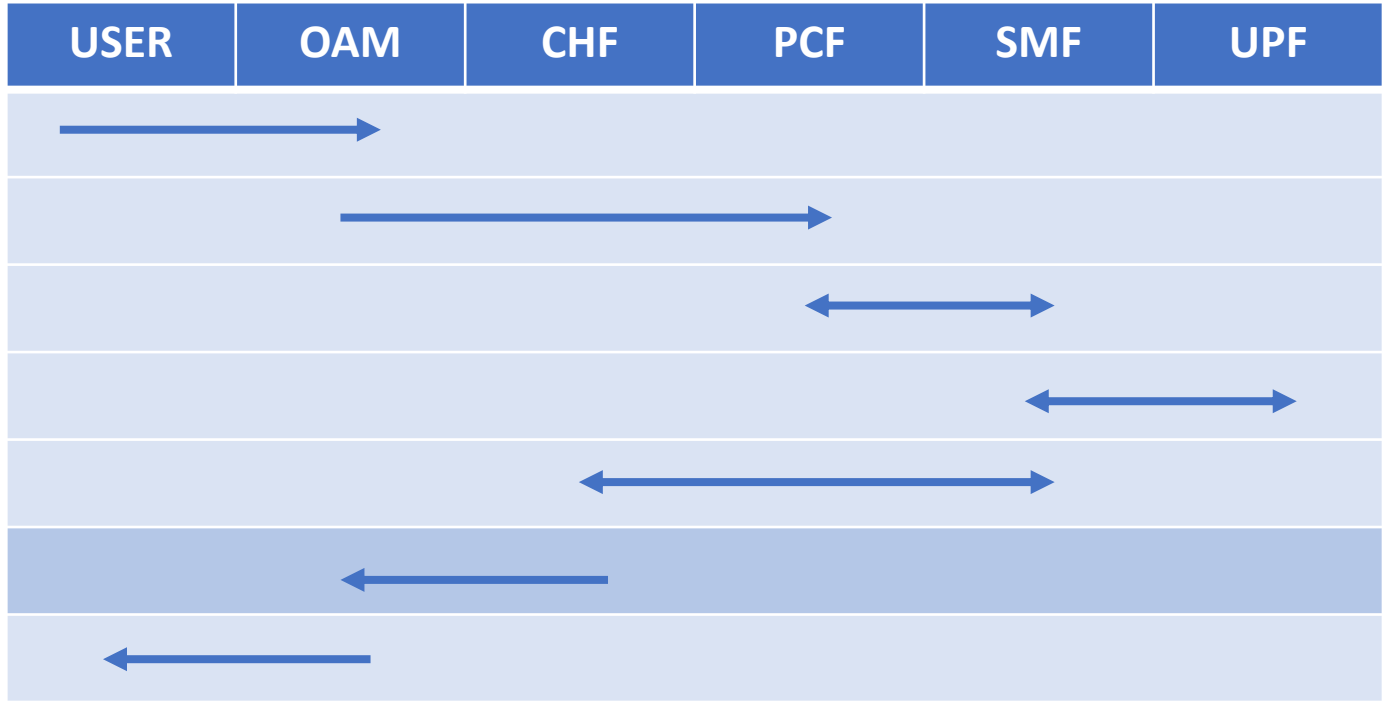
Convergent Charging

- SMF will tries to grant the quota if the quota used up
- SMF sends the data usage records to CHF



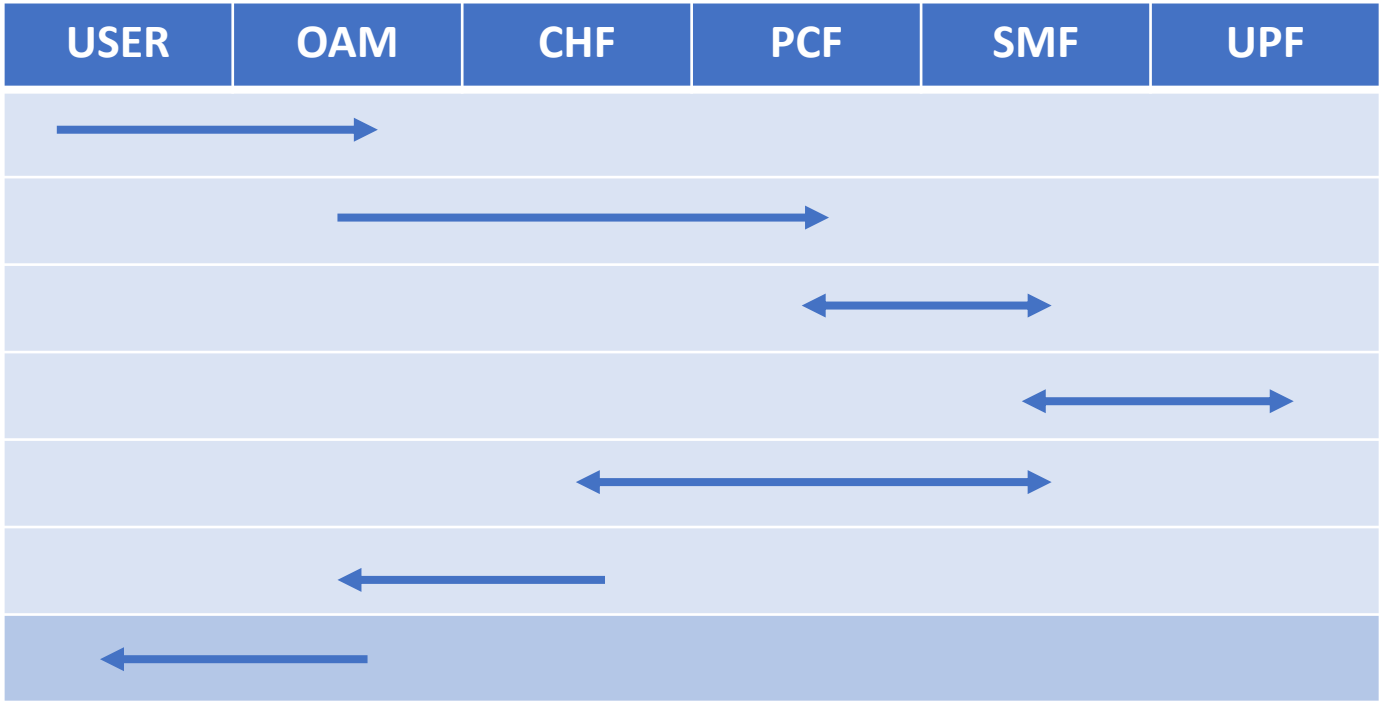
Convergent Charging

- CHF sends the CDR file to the Billing Domain (OAM)
- OAM embeds with the FTP server for receiving CDR files



Convergent Charging

- OAM shows the result on the web page
- User can observe the status of the quota comsumption



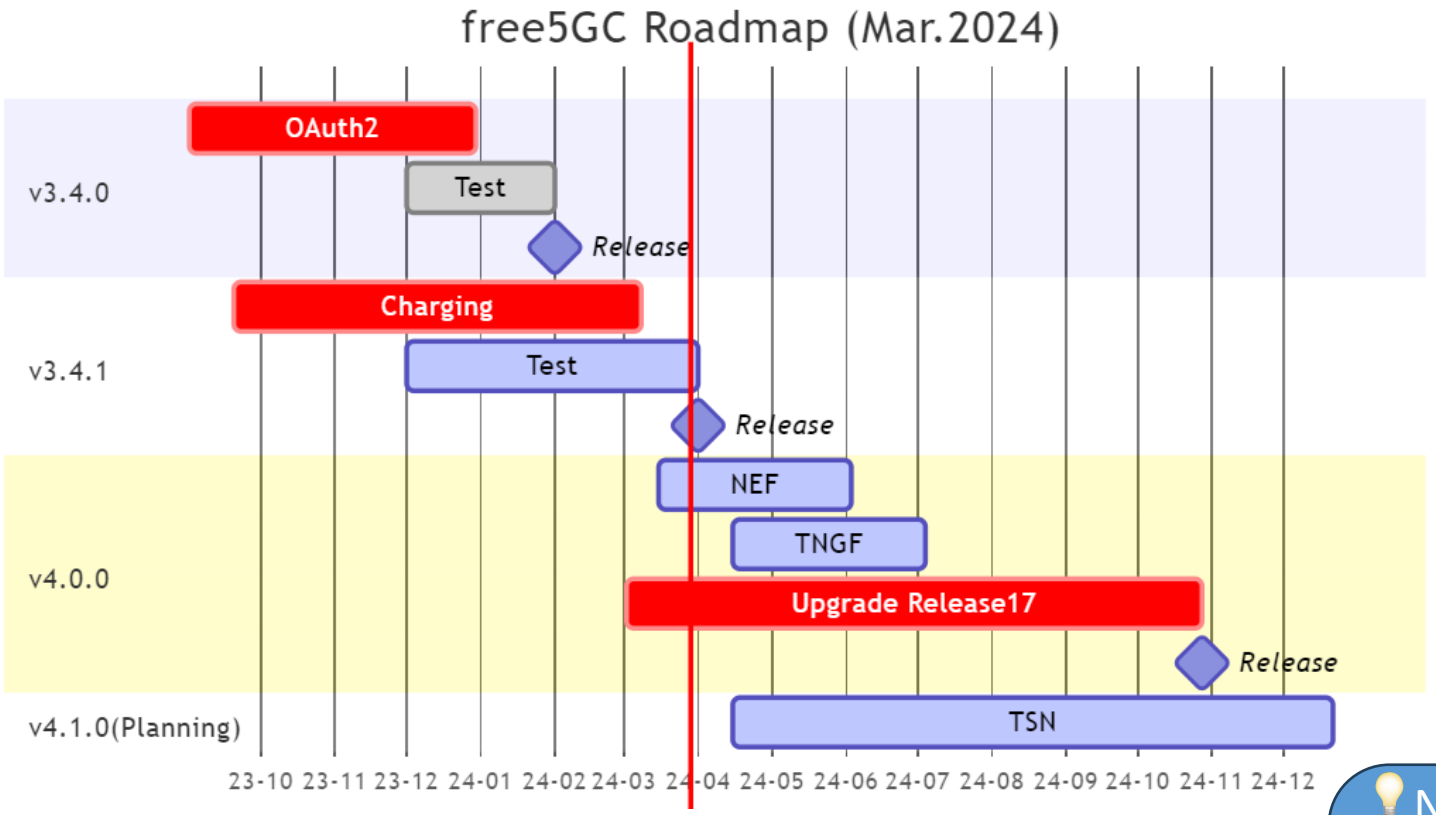
Kubernetes Deployment & CI

- CI Enhancement
  - Integrate the Packet Rusher project, released by HPE (Hewlett Packard Enterprise).
- Officially support Kubernetes deployment
  - We’re planning to provide a quick installation package
    - Launch VM
    - Setup k8s environment
    - Install free5GC
  - It’s based on the towards5gs project, developed by Orange.

Next Step(s)

- Network Exposure Function
- R17 Upgrade
  - The progress of R17 Upgrade can be found at free5GC Dashboard.
  - We have designed the software architecture, and now we working on the implementation works.

Roadmap



💡Note:

- All of tasks are managed by using GitHub dashboard
- The dashboard is visible for anyone: https://github.com/users/ianchen0119/projects/4