



SA WG2 Meeting #S2-147E
18 - 22 October, 2021, Electronic meeting

S2-2108619 中信科移动
CICT Mobile

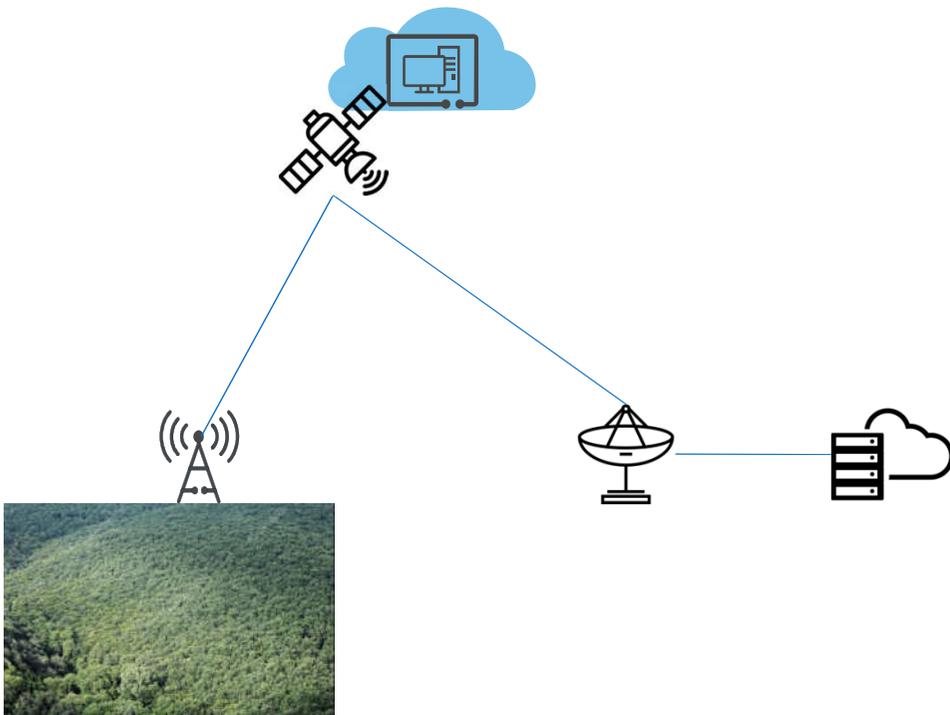
Motivation of supporting UPF on-board CATT

Use cases of using UPF on-board

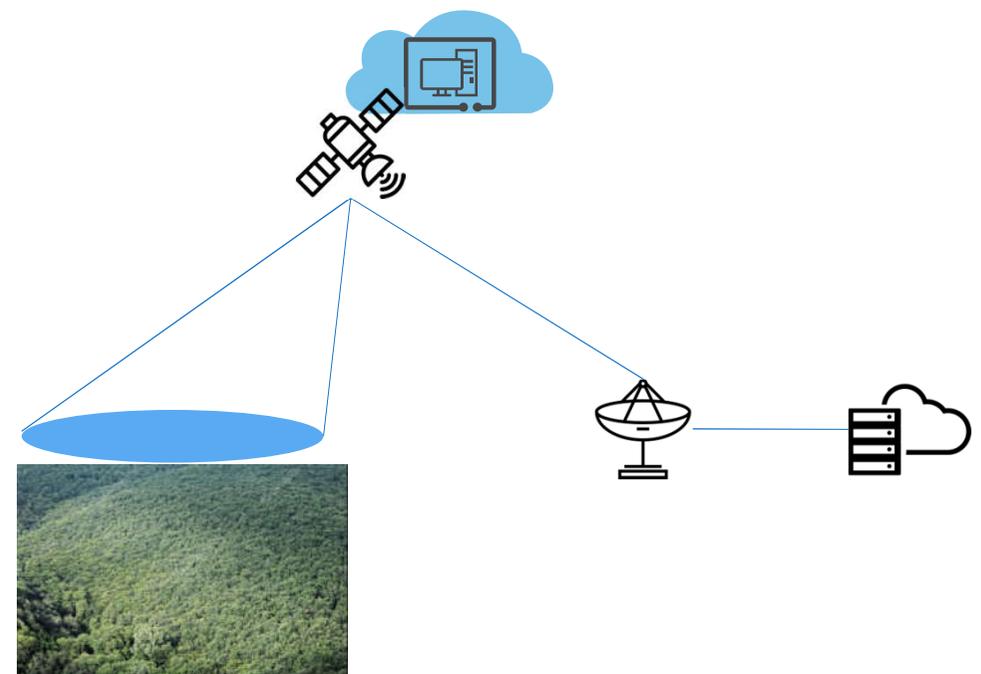
- Satellite link may have long packet delivery latency and limited bandwidth, so when satellite backhaul is used for a UE, it would be beneficial to shorten the backhaul connection, e.g. via providing EC(edge computing) service or enabling local switching on the satellite.
- To shorten user plane backhaul connection and save backhaul resources(including resources of ISL and Feeder link), using UPF on-board has been proved as an efficient and economic way according to the following use cases.

Use case 1: satellite enabled edge computing

Edge computing service deployed on the satellite can be used to pre-process application layer monitoring/sensing data, e.g., before sending the data back to the remote data center.



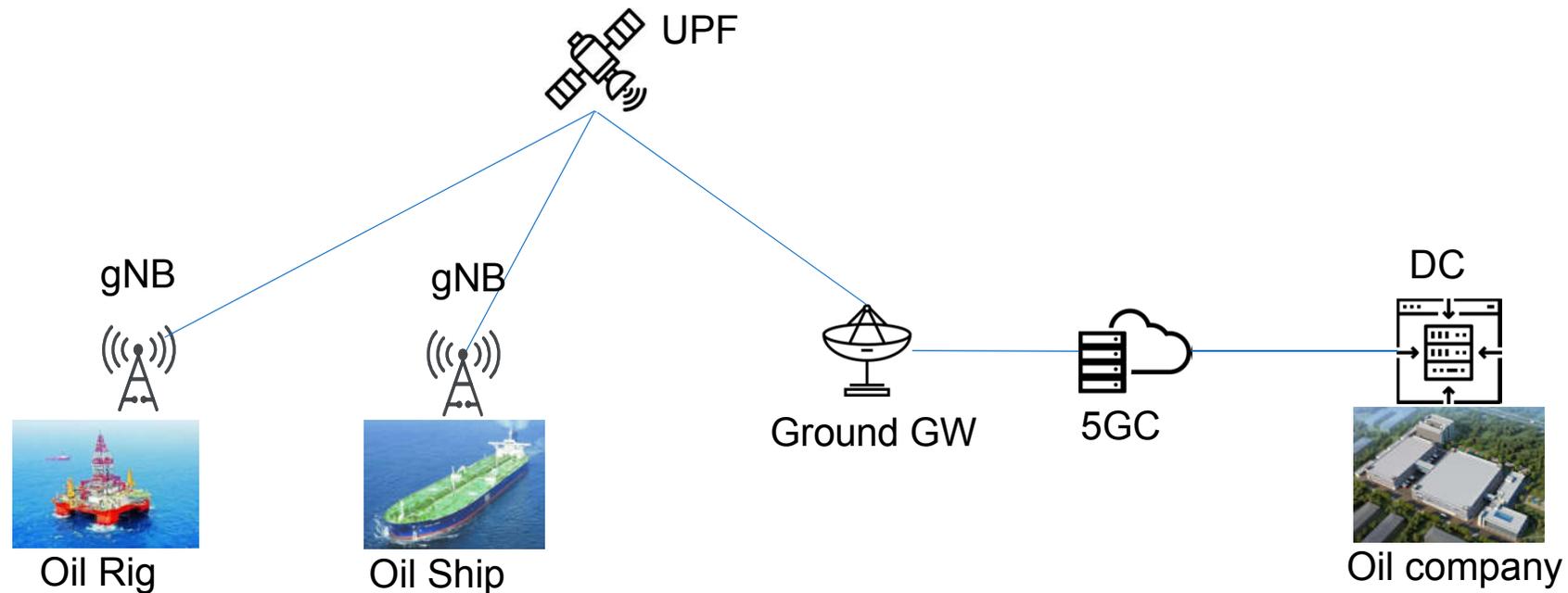
Only UPF is on the satellite to access local DN



Not only a UPF is on the satellite to access local DN, but also a gNB is deployed on the satellite

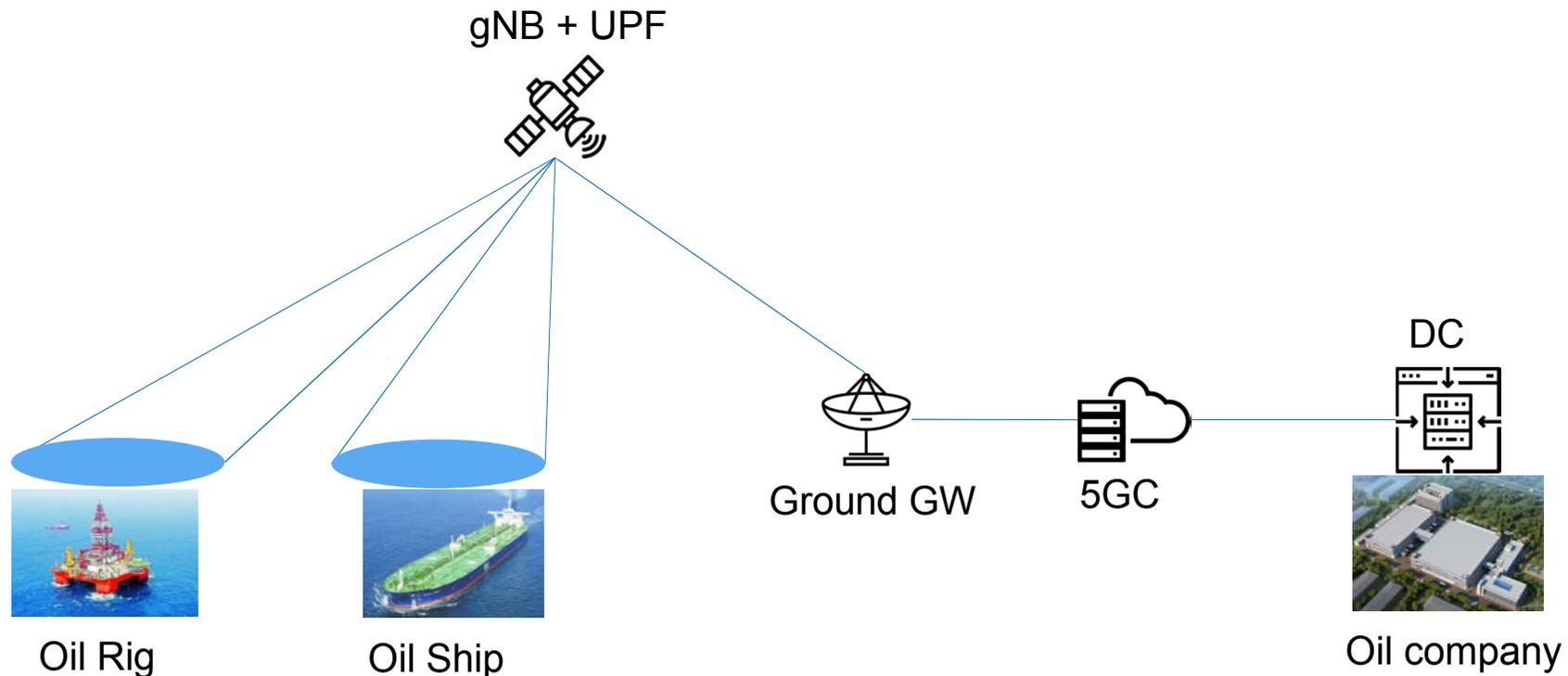
Use case 2: enabling LAN service via satellite(s)(1)

Global users belonging to same enterprise or organization can share information via LAN, e.g., users on the oil rig and users on the oil ship may belong to a same 5G VN group, and the LAN service may be provided between them.



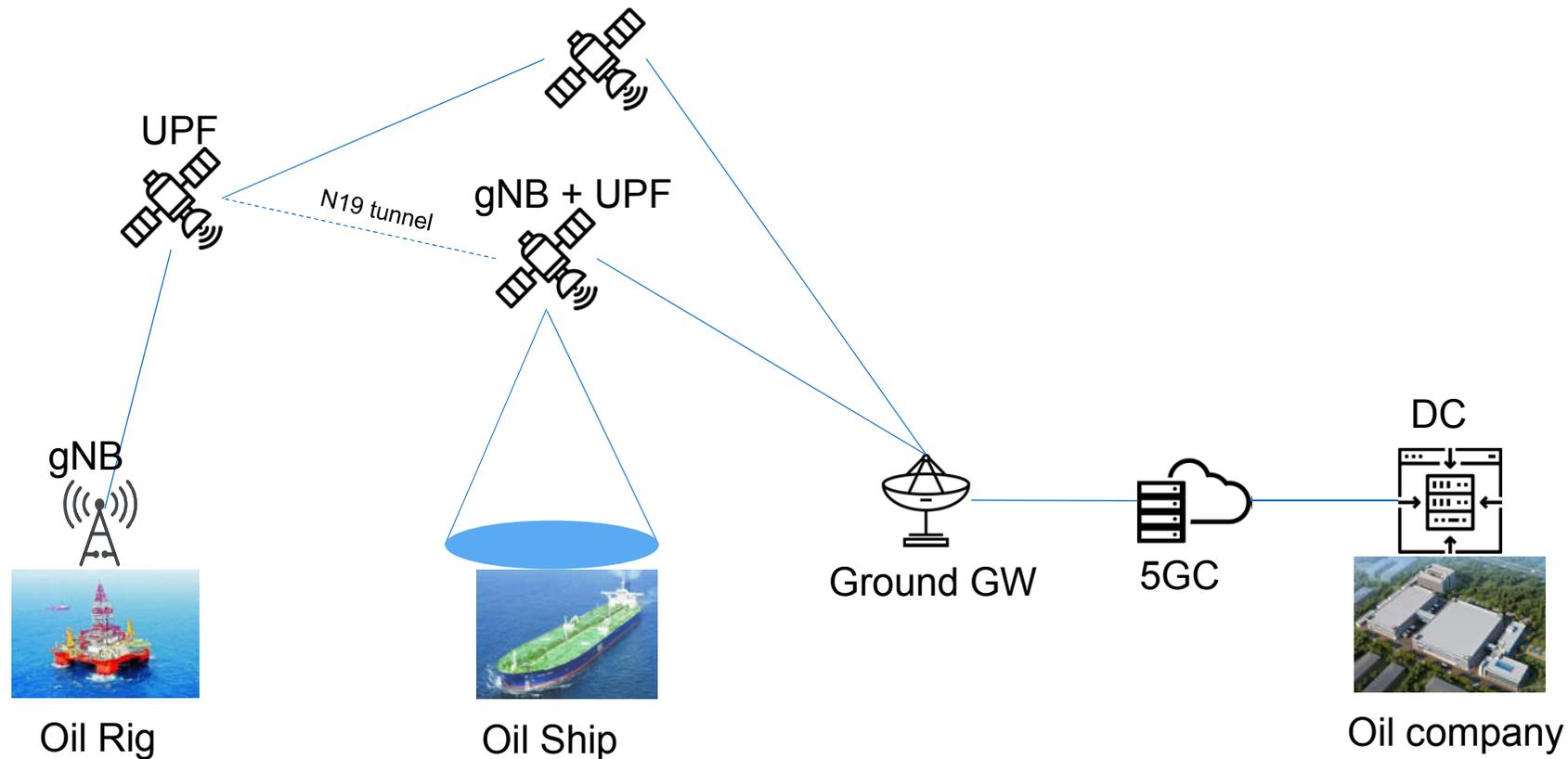
- ❑ Satellite is not only providing backhaul connection for UEs, e.g., on the oil rig or oil ship, but also enabling local switching between users via on-board UPF.
- ❑ NOTE: the PSA may be still within 5GC for accessing remote data center, e.g. oil company.

Use case 2: enabling LAN service via satellite(s)(2)



- ❑ Global users belonging to same 5G VN group may access remote data center via satellite access.
- ❑ If UPF is also deployed on the satellite providing satellite access, then local switching can be enabled by on-board UPF, and no backhaul resources are required.

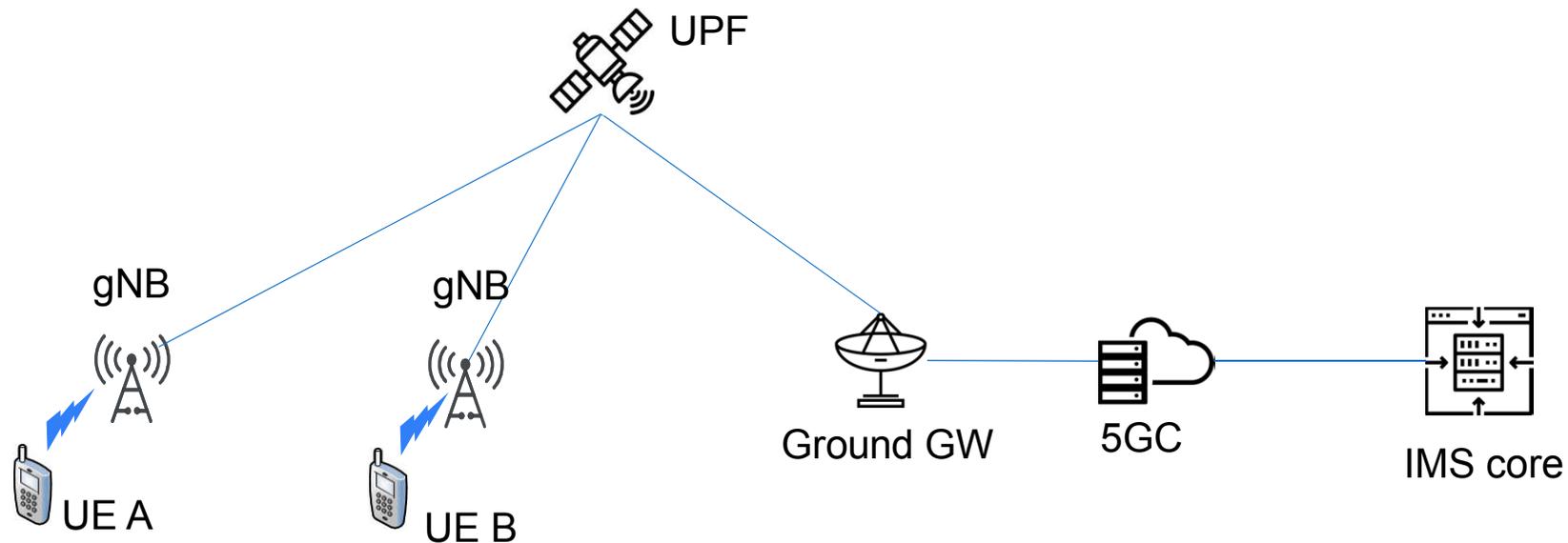
Use case 2: enabling LAN service via satellite(s)(3)



- Global users may be served by different satellites, some of them may use satellite access, and others are served by satellite backhaul only. To enable local switching between them, N19 forwarding should be supported between different on-board UPFs.

Use case 3: enabling local call local switch via satellite(s)

While users using satellite access or served by satellite backhaul, if they are closing to each other, it should be possible to enable local call local switch for system efficiency and QoE improvement.



- ❑ In case of satellite access/ satellite backhaul, using UPF on-board to enable local call local switch might be the way with minimized standard impacts.
- ❑ This case could be studied in the future.

The need of supporting UPF on-board

- Motivations:
 - 1. According to current architectural requirements of supporting satellite edge computing or local switch on the satellite, a UPF needs to be deployed on the satellite, which requires enhancing 5GS to support UPF on-board.
 - 2. For gNB deployed in remote area, e.g. ocean or forest, it is not feasible to deploy UPF closing to the gNB, considering the cost for network construction, operation and maintenance.
 - 3 For gNB on board case, using UPF on-board would be the best choice to enable satellite edge computing or local switch.

- Proposal:
 - Based on the above considerations, it is proposed to include WT#4 into the SID 5GSAB.

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Thank you!