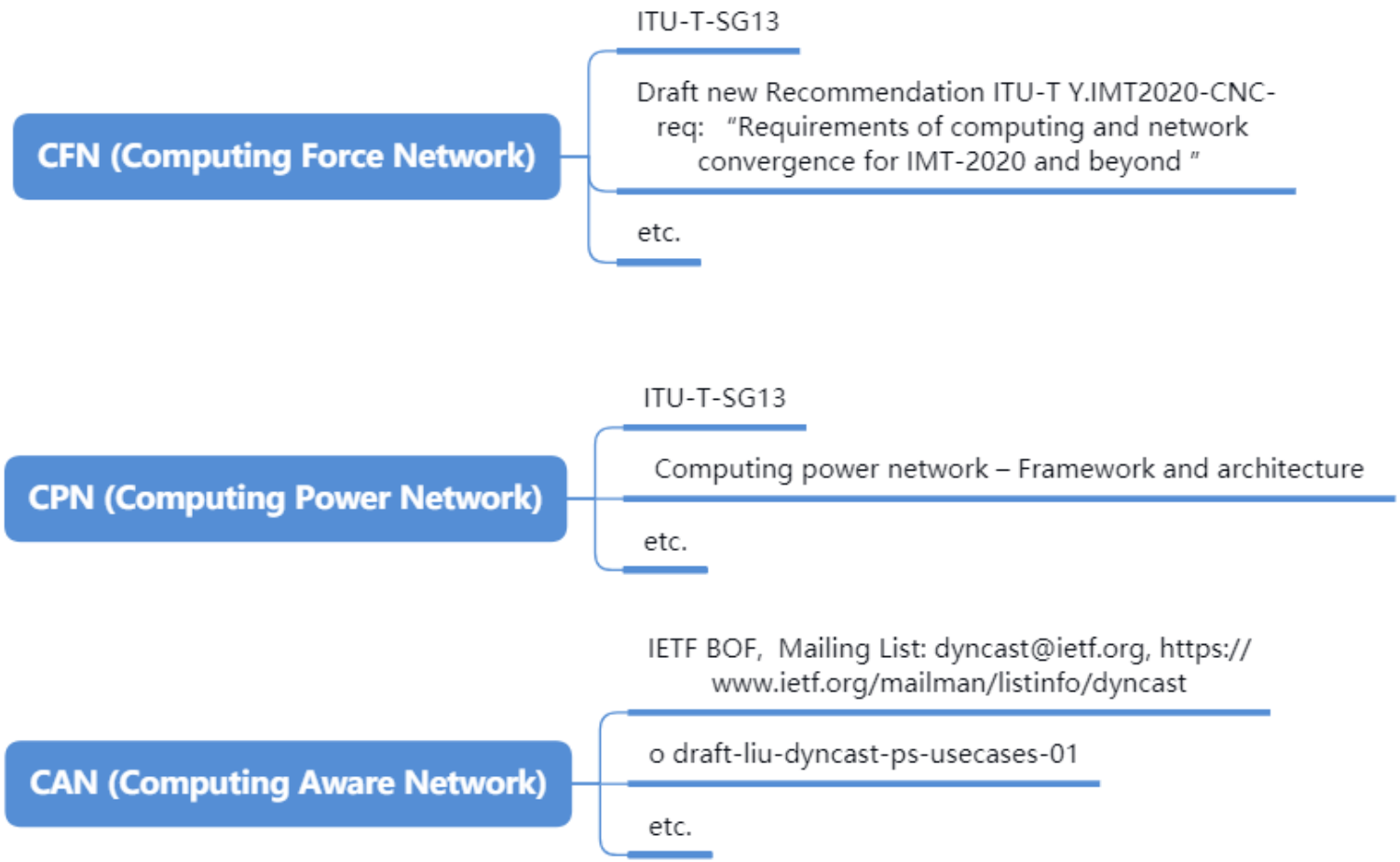
Confidential Computing in Computing Aware Network

draft-yang-teep-ccican-00

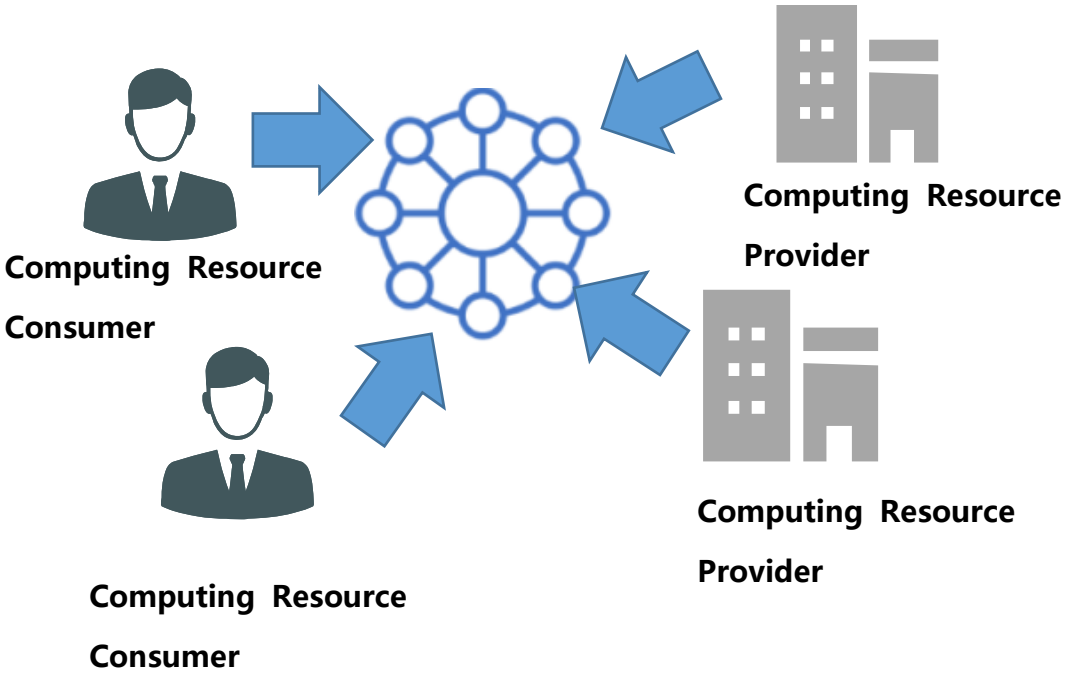
What is CAN



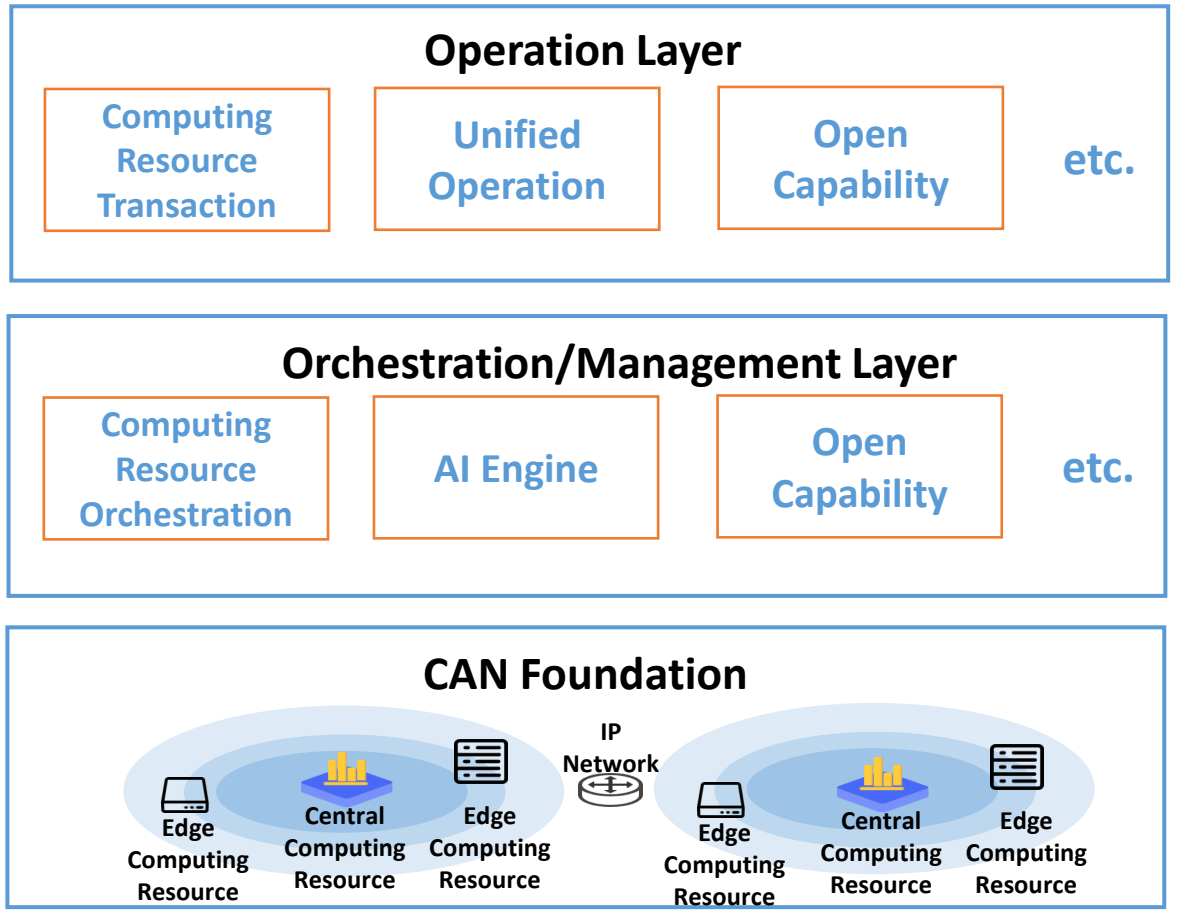
Computing-aware Networking (CAN), which is computing and network resource joint optimization based on the awareness, control and management over network and computing resources, to determine the appropriate service node， dispatch the service request and provide a better user experience.

What is CAN

Brief Architecture of CAN



Logic Layers of CAN



Difference between CAN and Cloud Computing:

CAN is based on network layer, computing task requirement and scheduling are carried by protocols in IP network. From the perspective of network layer, cloud computing is just application layer data which cannot be aware by network.

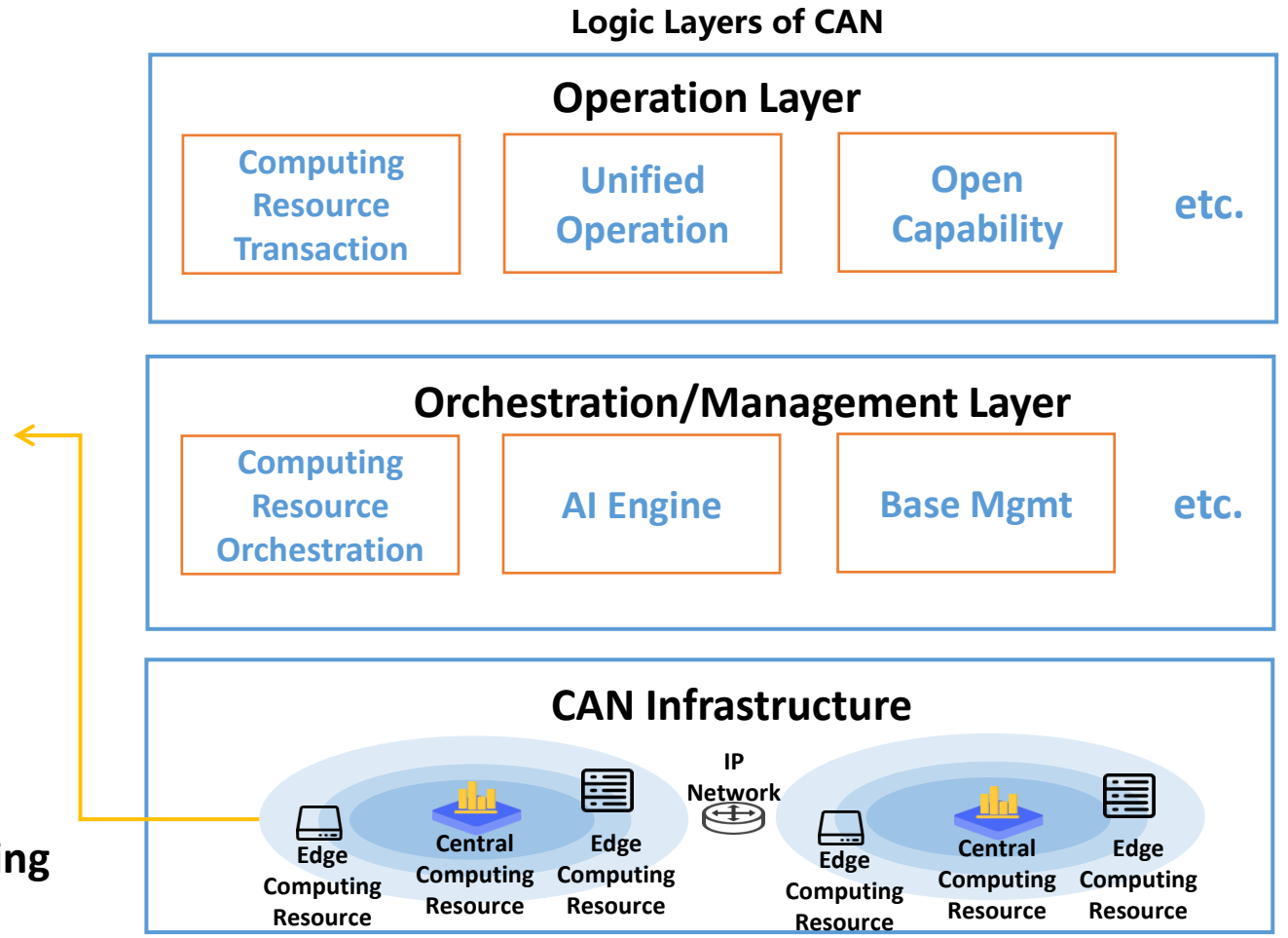
Advantage: Network latency awareness; Network topology awareness; Convergence with network resource and computing resource

Confidential Computing in CAN

Requirements for Confidential Computing

- **If the computing resource is a third party source like the edge CR, which both the CAN and the network user cannot trust its security, then the Confidential Computing technique is needed.**

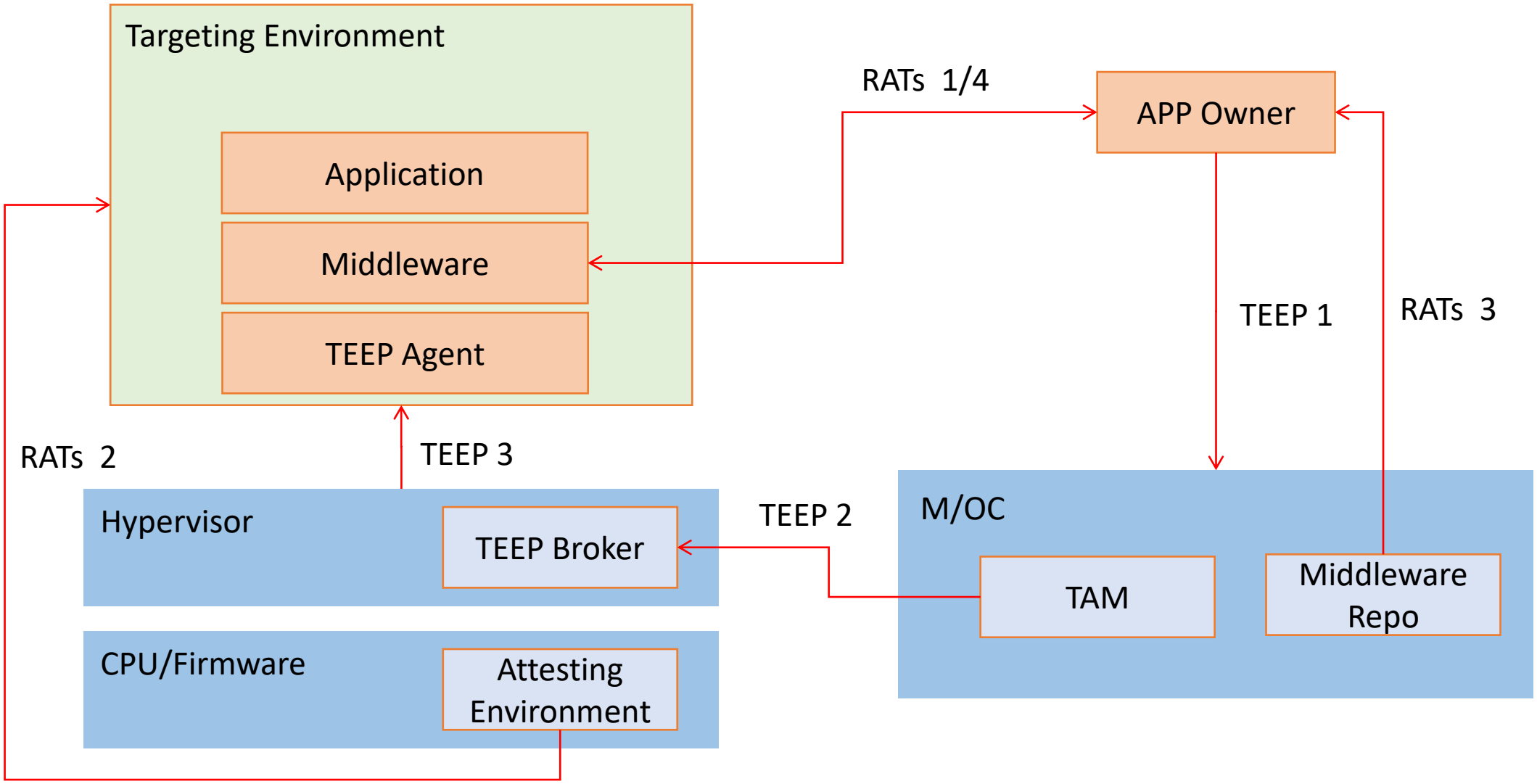
- **If the network user cannot trust the computing resource controlled by CAN like Central CR, then the Confidential Computing technique is needed.**



Two components in CAN are mostly involved when using confidential computing :

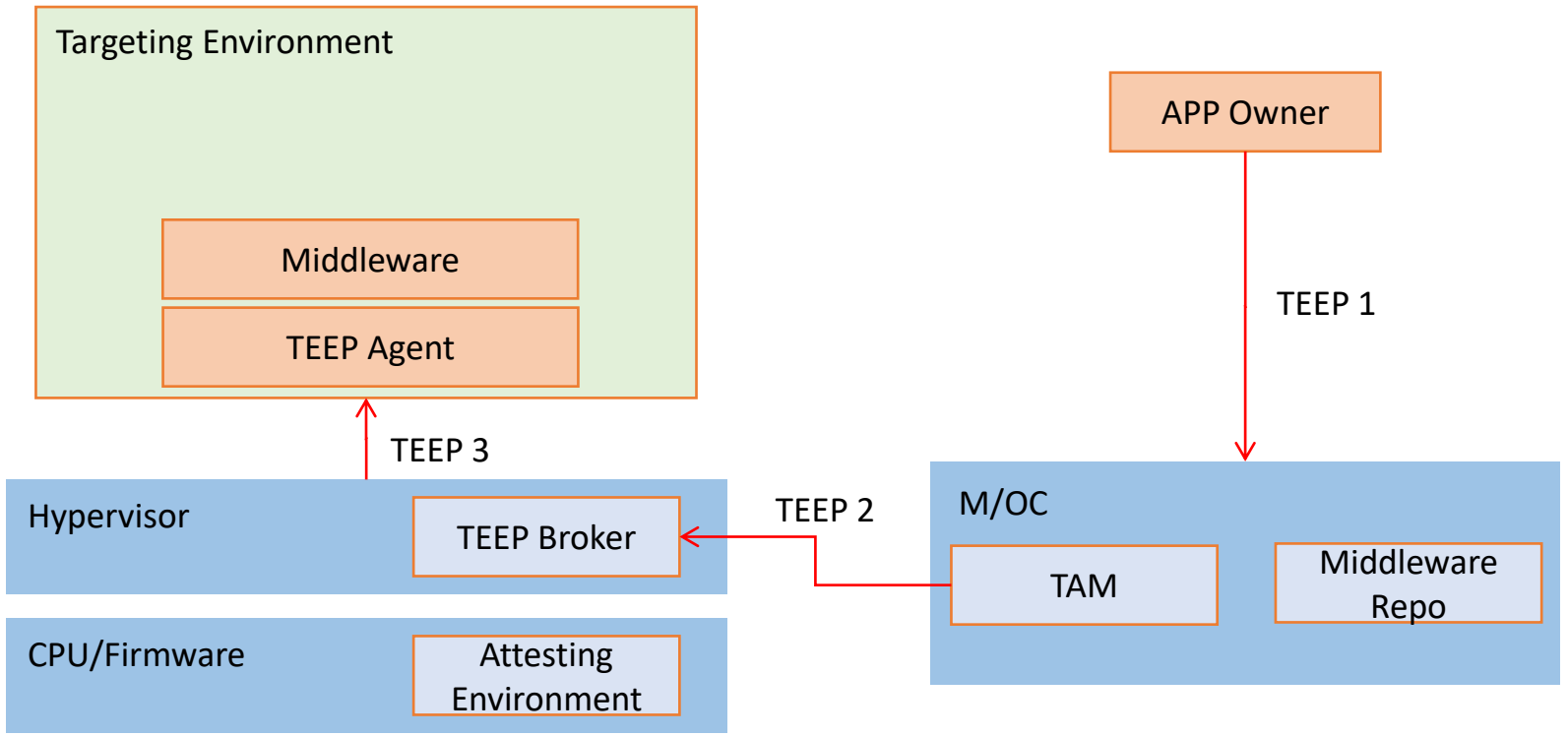
- CPU of Computing Resource with confidential computing feature, like SGX, TDX, SEV, CCA, etc.
- O/M with confidential computing feature, like TEEP and RATs.

Confidential Computing in CAN



The confidential computing architecture in CAN based on TEEP and RATs working group.

TEEP in CAN



➢Step 1: App Owner request for CC resource.

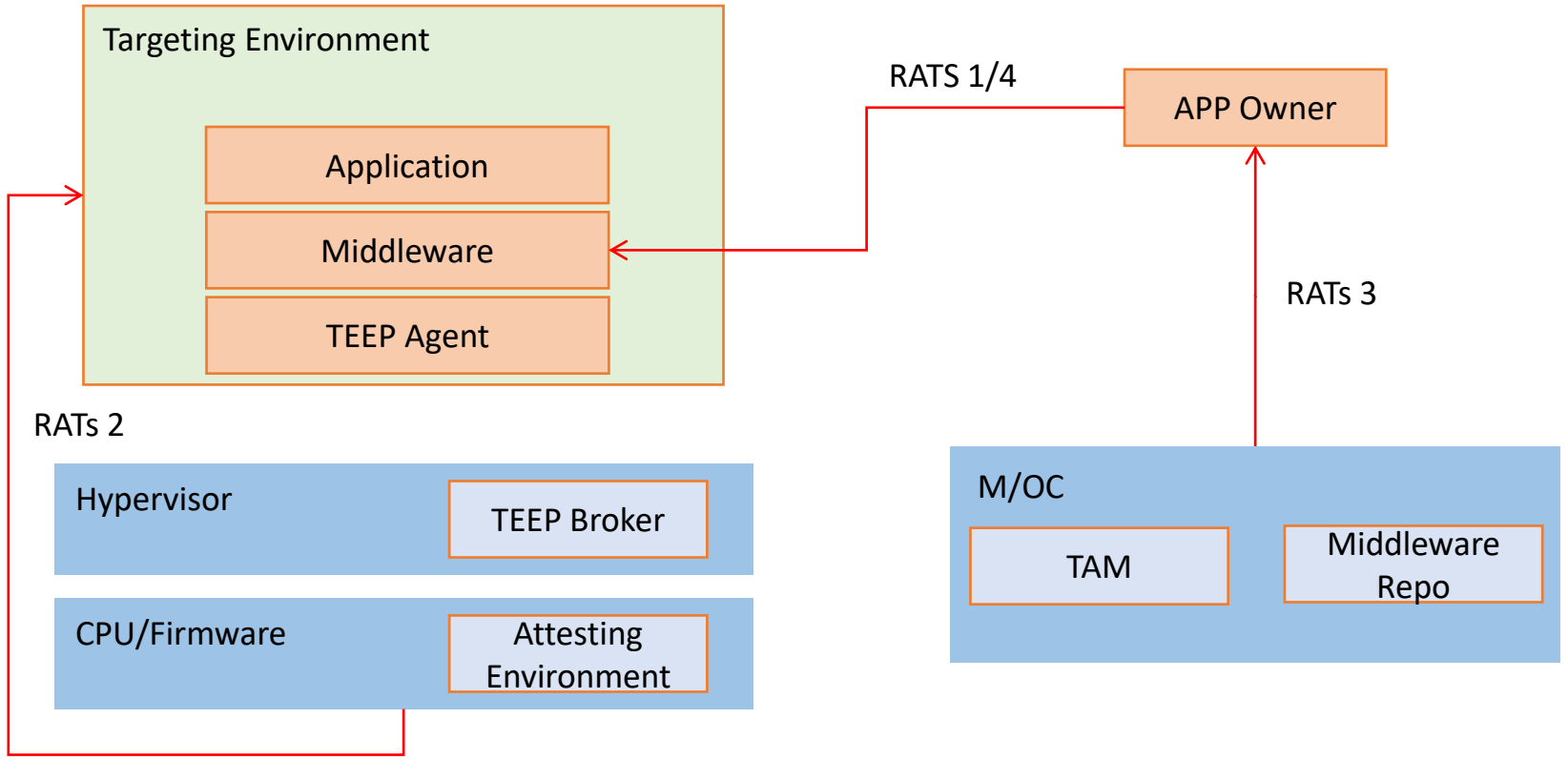
➢Step 2: TAM establishes connection to TEEP Broker and send the provisioning information like the Middleware to TEEP Broker.

➢Step3： TEEP Broker triggers the Hypervisor to establish the Targeting Environment with TEEP Agent and Middleware.

Mapping between TEEP Concept and Instantiation:

TEEP Concept	Instantiations
M/OC, TAM and Middleware Repo	Computing Resource Orchestration in CAN
TEEP Broker	Function in OpenStack
TEEP Agent	OpenStack initiates guest VM, which includes TEEP Agent and specific Middleware like Enarx, Gramine, Occlum, etc.
Middleware	

RATs in CAN



➢**Step 1:** App Owner asks for remote attestation.

➢**Step 2:** Middleware triggers Attesting Environment to generate remote attestation evidence for Targeting Environment.

➢**Step3：** APP Owner gets the reference value, which the APP owner could generate with the source code and images, or could query from third party authority.

➢**Step 4：** Middleware return the evidence to App Owner. The Owner could match it with the reference value.

Mapping between RATs Concept and Instantiation:

RATs Concept	Instantiations
Attesting Environment	TDX/SGX: Quote Enclave, SEV: SP, CCA: RMM, etc.
Targeting Environment	Guest VM, which includes TEEP, Middleware and Application

Potential Next Step about confidential computing in network

- Specify TEEP use case about confidential computing.
- Specify RATs use case about confidential computing.
- A unified tool or specification for APP Owner to execute remote attestation and provisioning.

Thanks