

Grenoble

6 et 7 juillet
2023



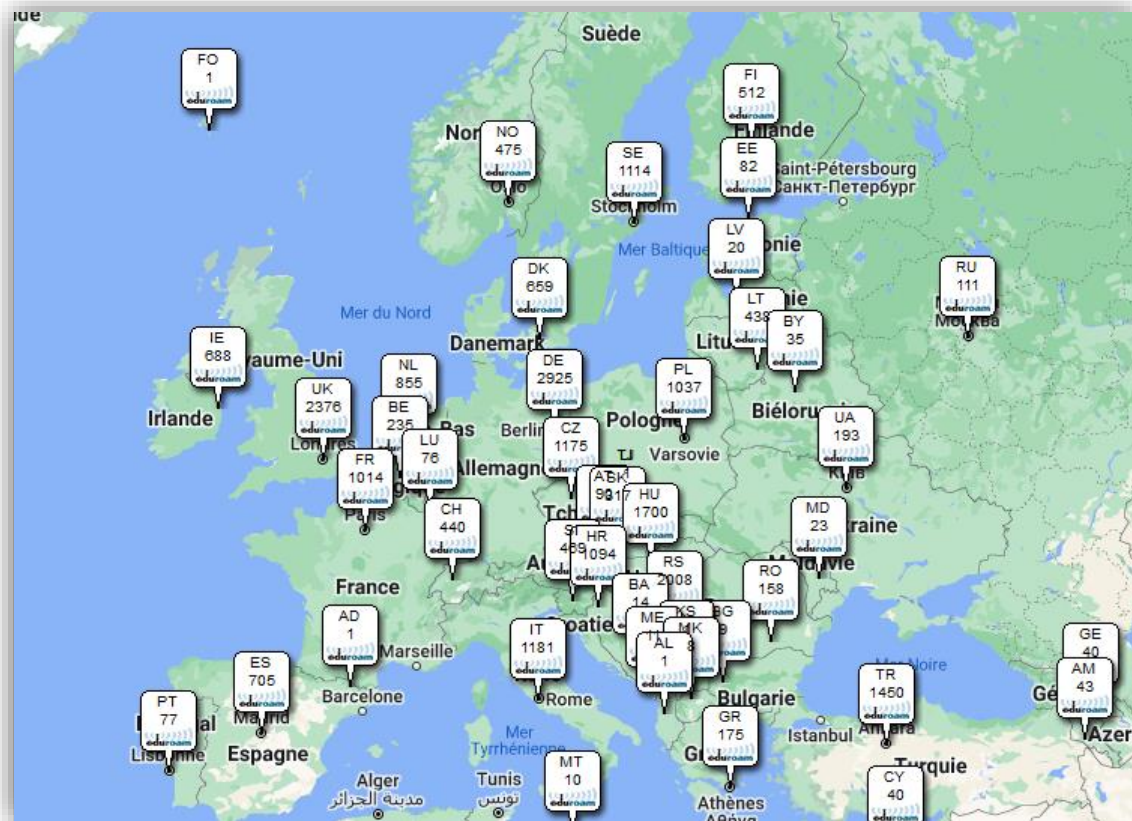
Journées LPWAN IoT Roaming

Ibrahim AYOUB

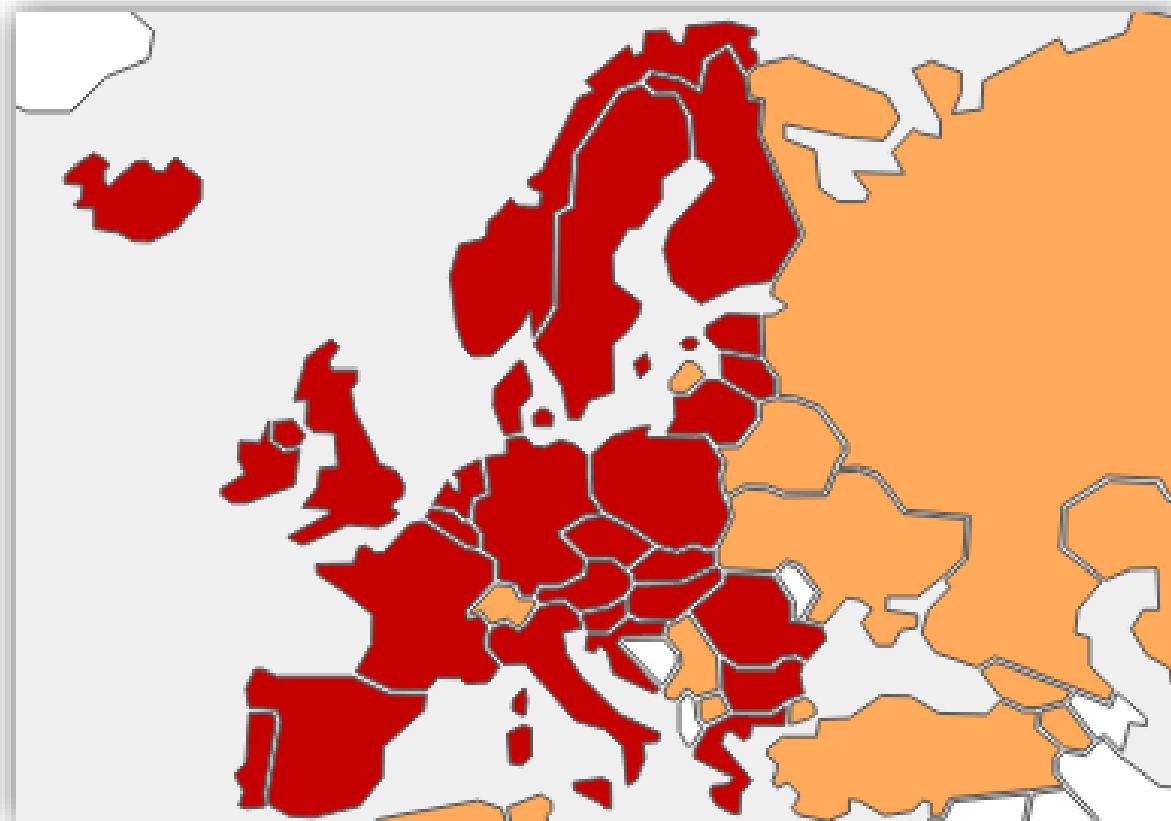
Sandoche BALAKRICHENAN

Benoît AMPEAU

Euroam Europe¹



Free mobile roaming²

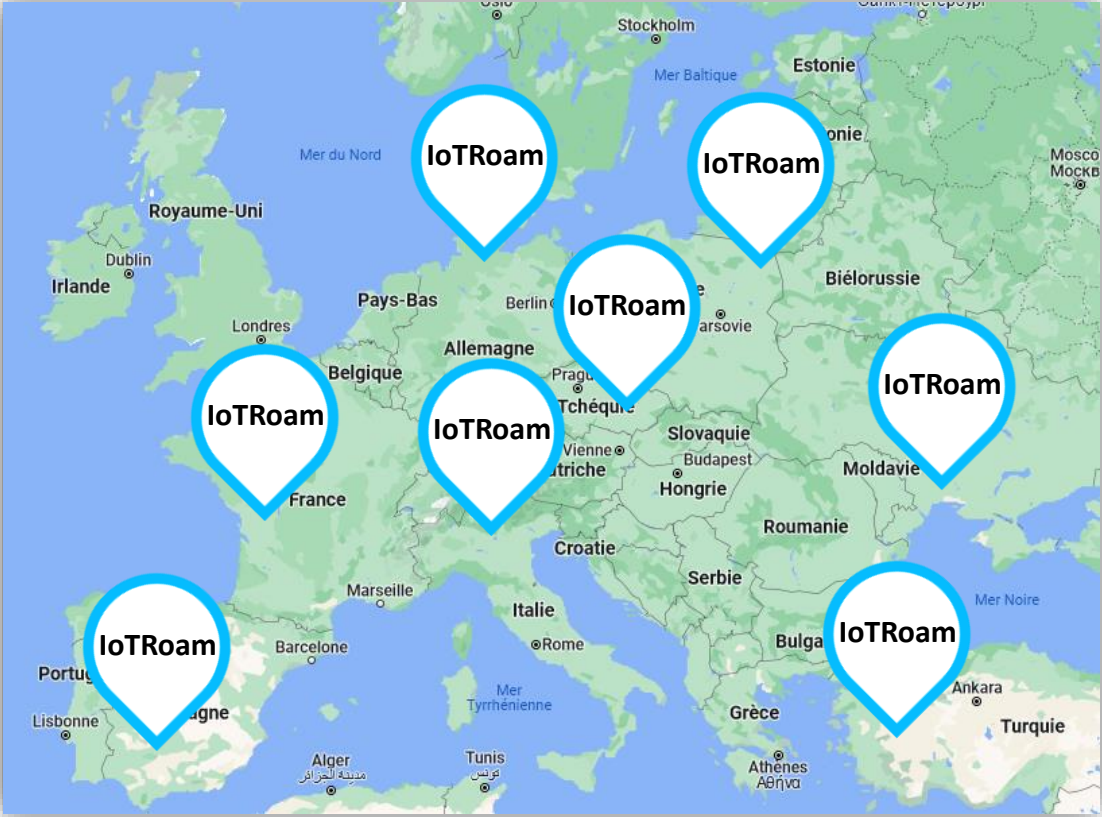


- Internet 25Go/mois + Appels, SMS, MMS illimités
- Internet 25Go/mois

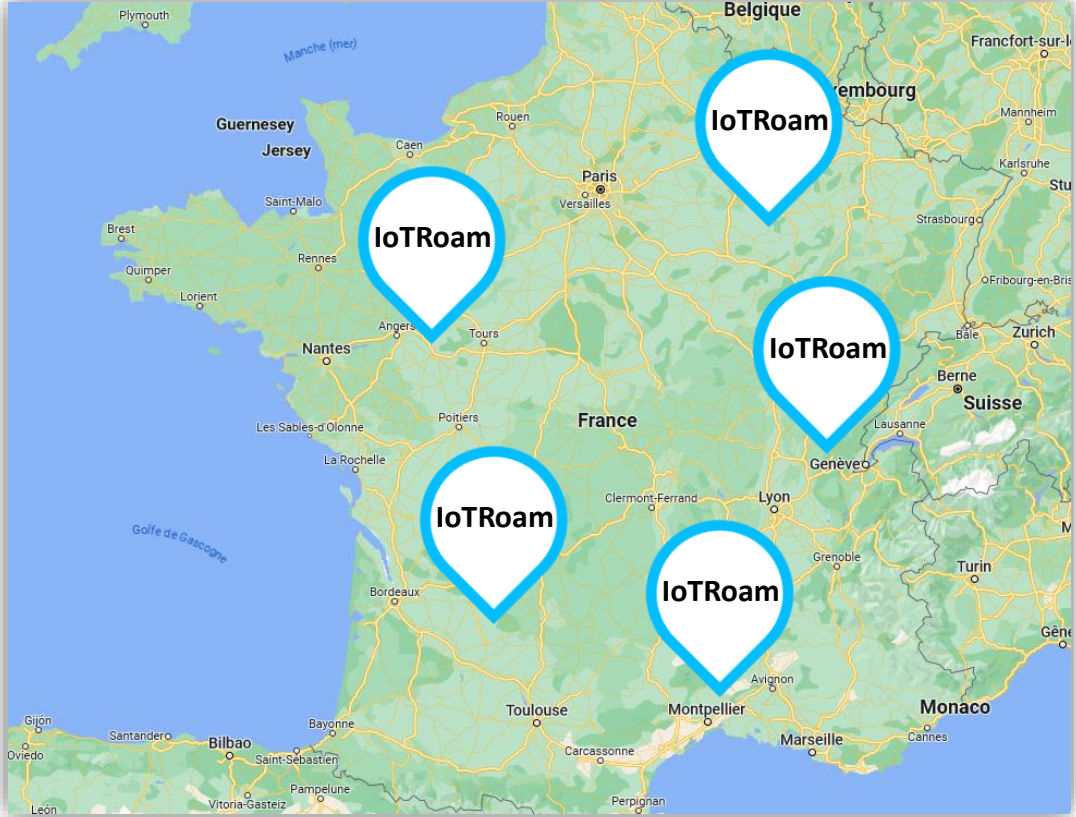
¹https://monitor.eduroam.org/map_service_loc.php

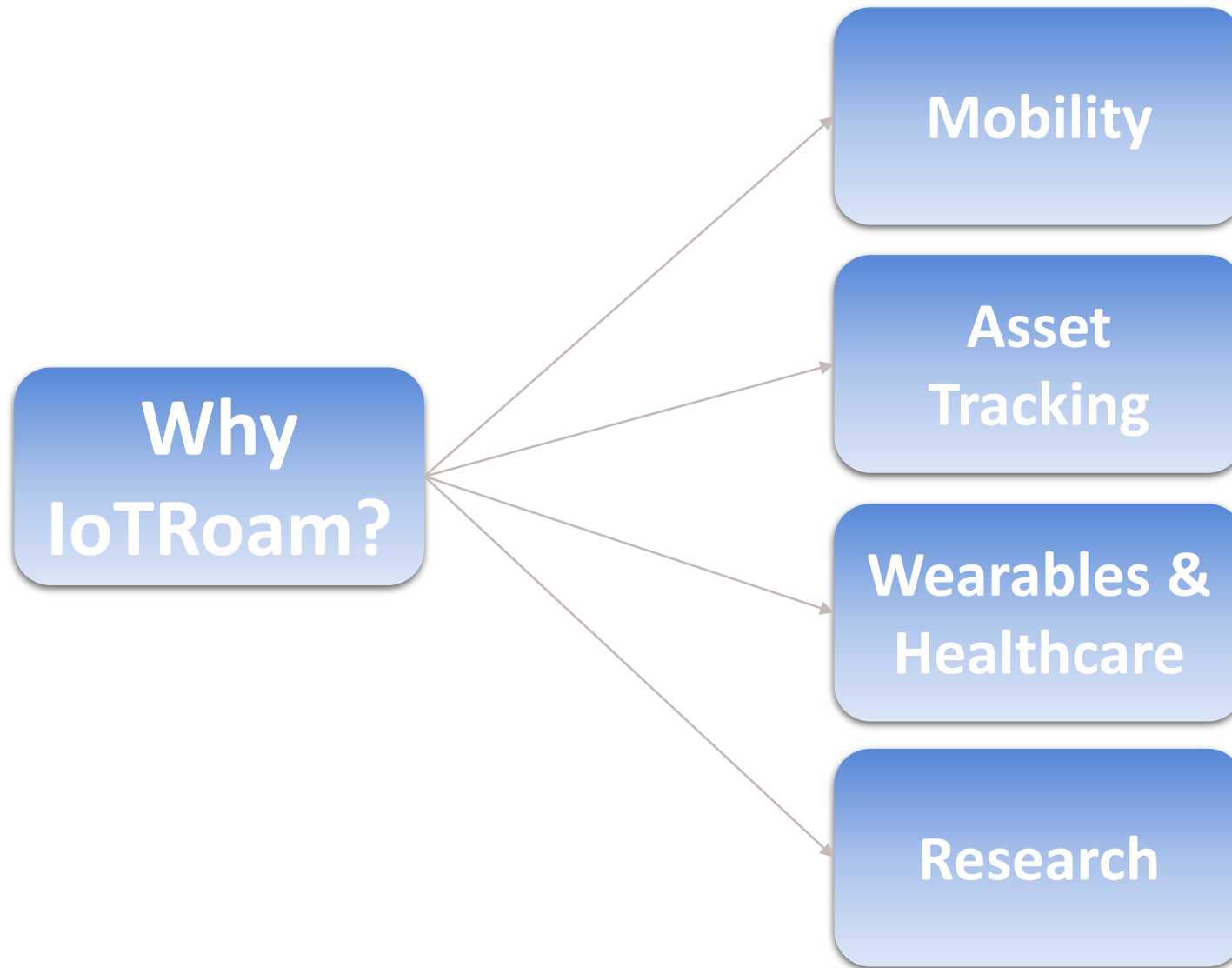
²<https://assistance-1.free.fr/mobile/freeroaming/>

IoTRoam Europe



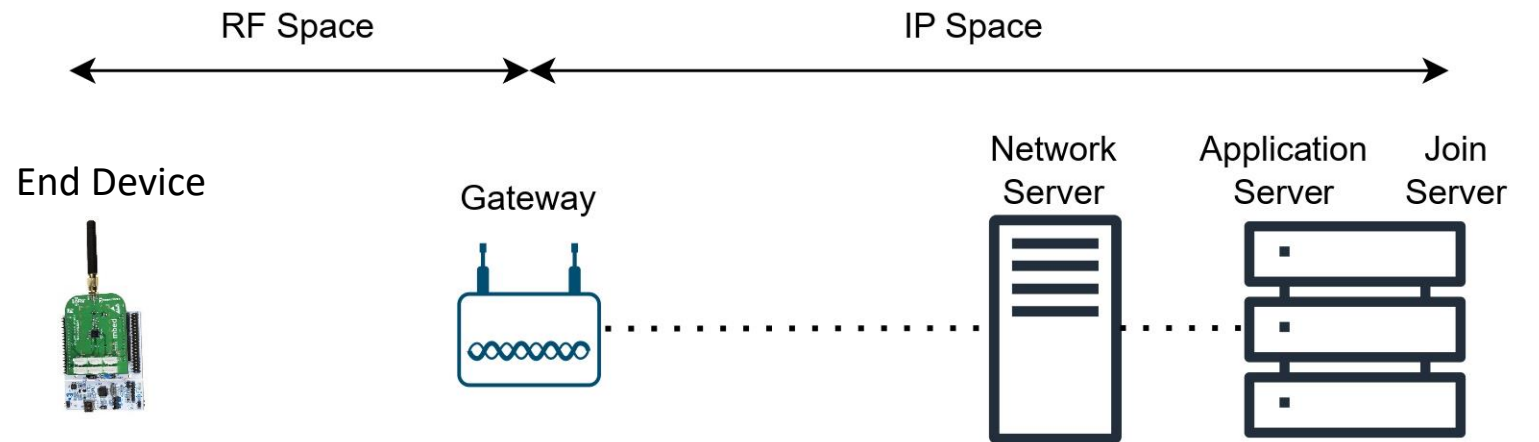
IoTRoam France





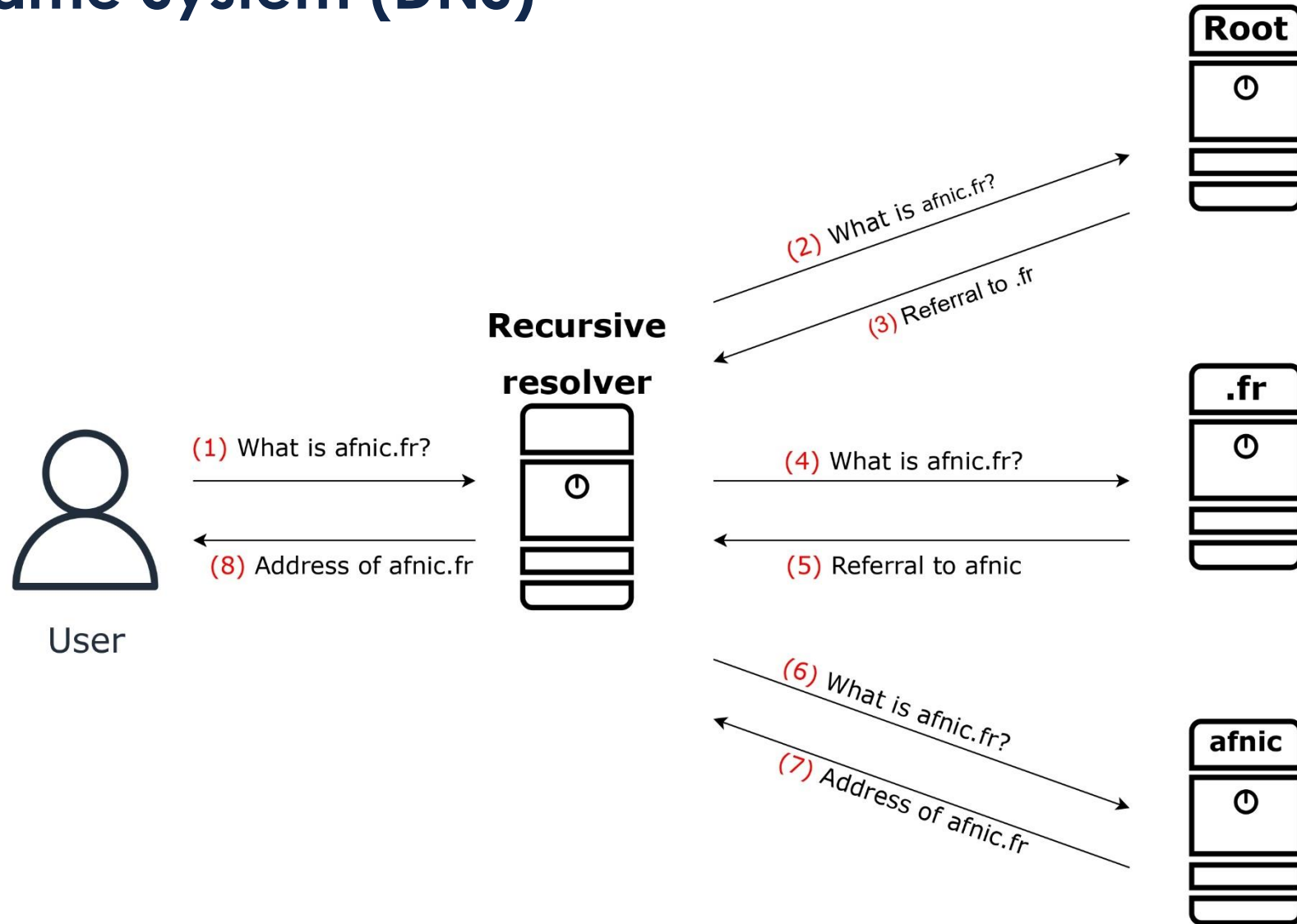
IoTRoom: LoRaWAN

- Long range
- Cost effective
- Diverse use cases
- Widely researched

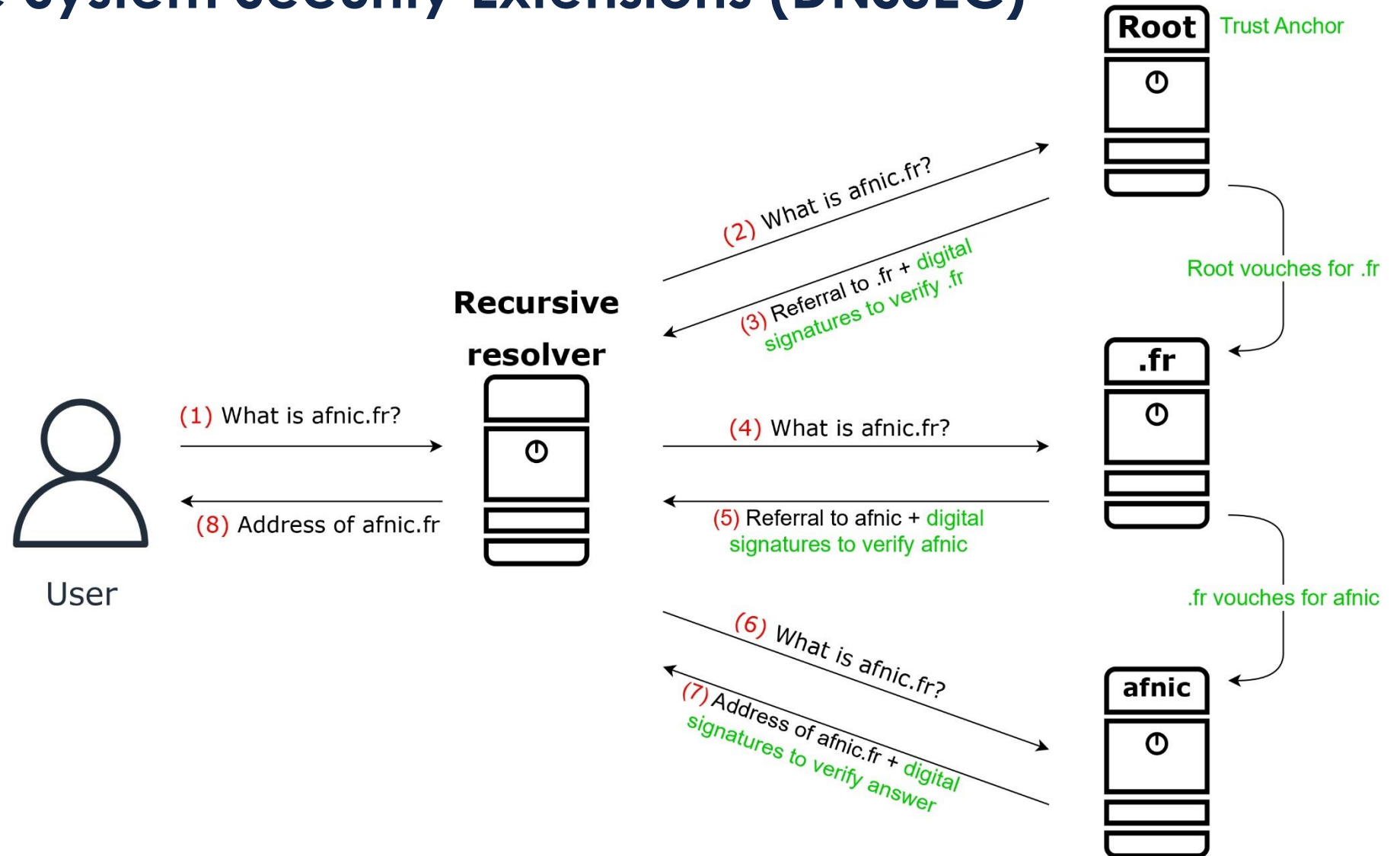


DNS for IoT Roaming

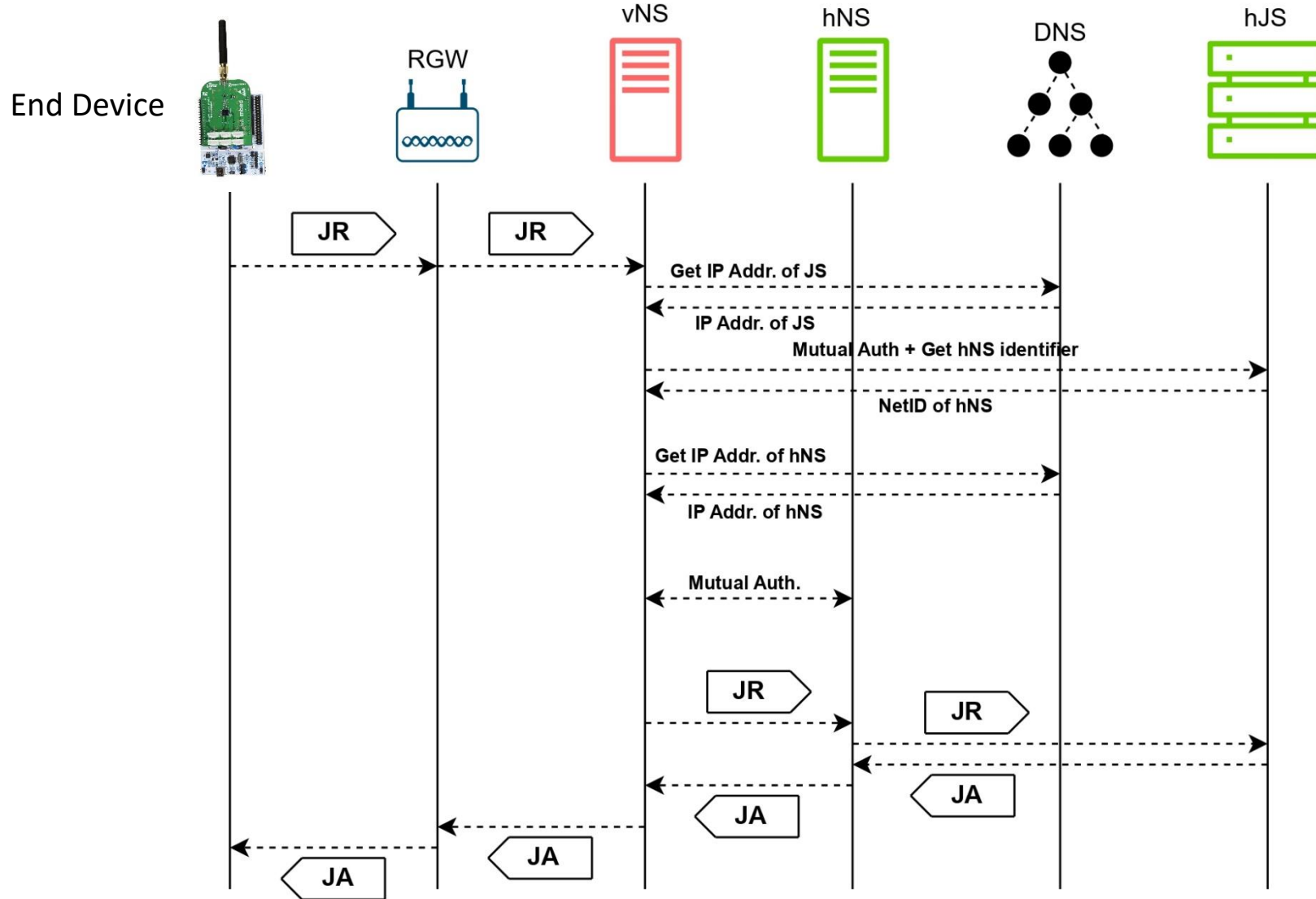
The Domain Name System (DNS)



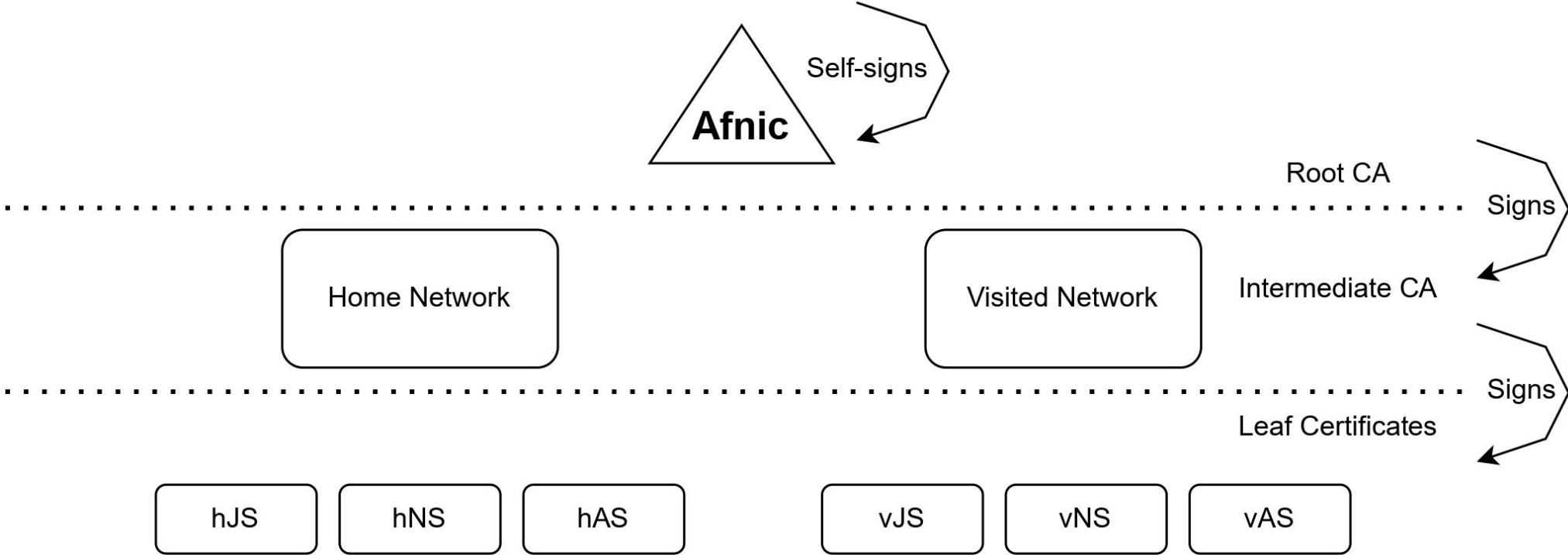
Domain Name System Security Extensions (DNSSEC)



Message Flow using DNS for Passive Roaming

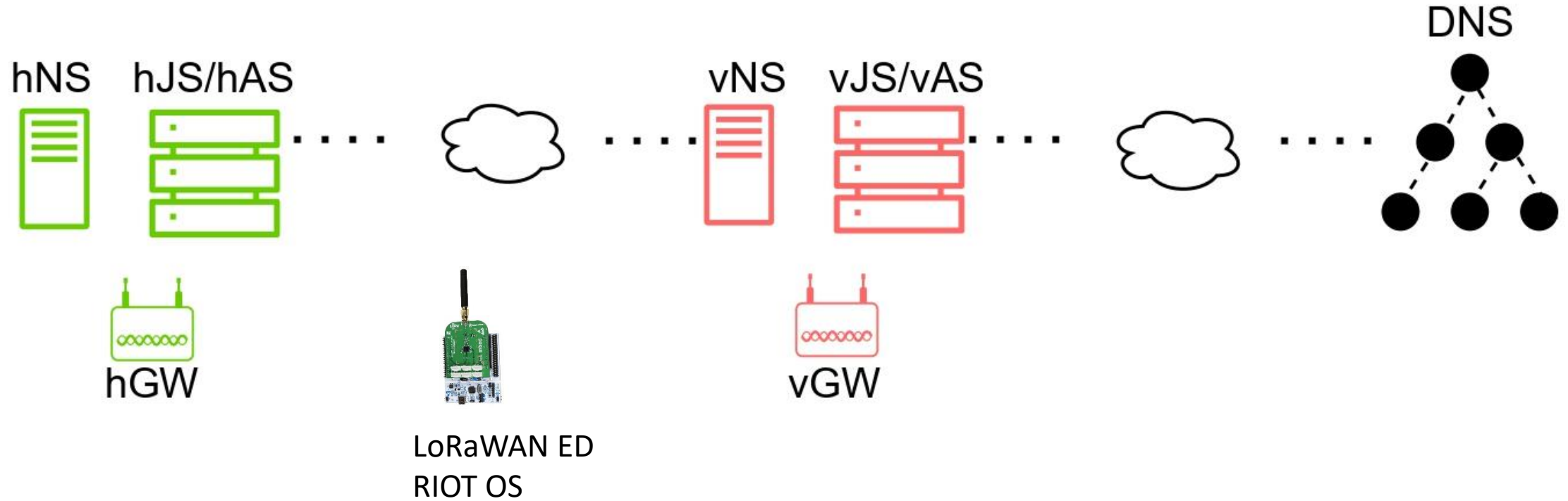


Mutual Authentication – Certificate Provisioning

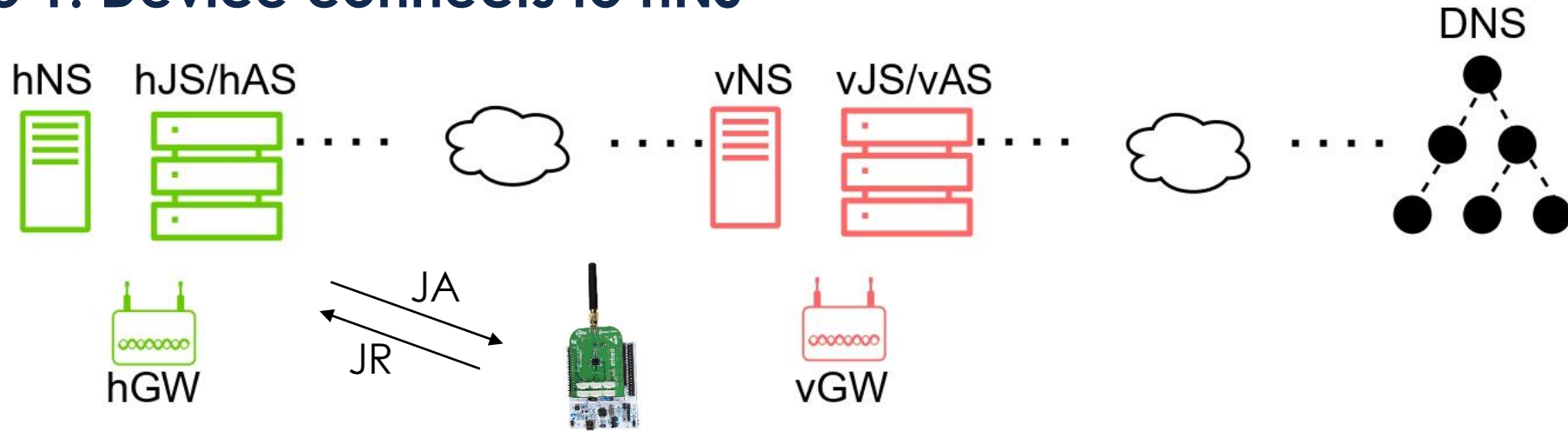


IoT Roam: Demonstration

IoTRoam: Demonstration



Scenario 1: Device connects to hNS



DEVEUI = 5817b1c3eb890bc4
JOINEUI/APPEUI = 0000000000000001

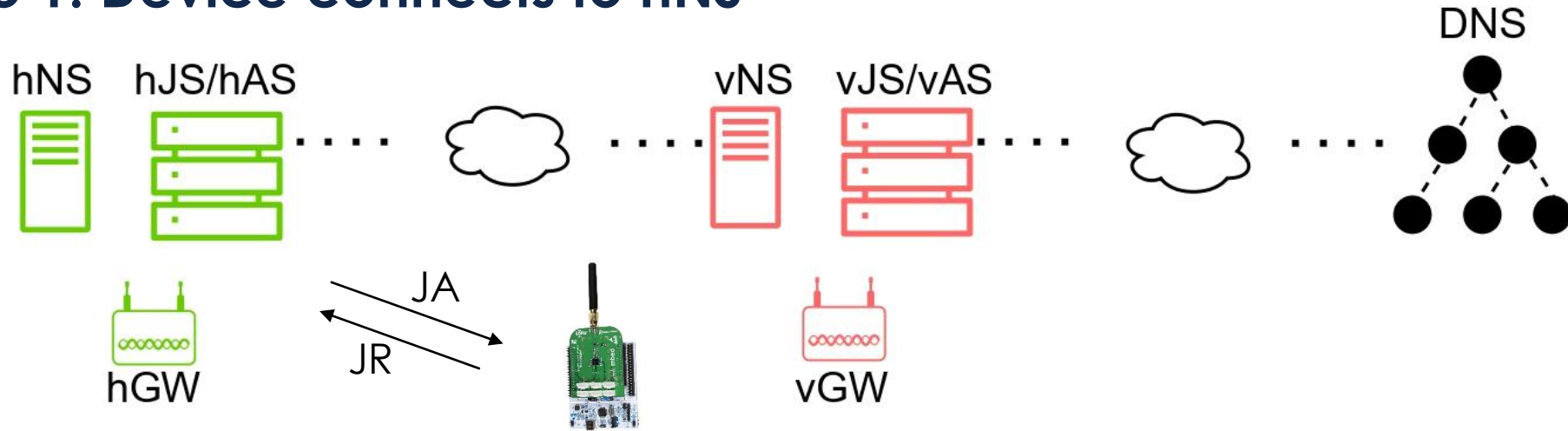
```
.Jun 14 08:30:02 hns.roaming.iot.rd.nic.fr chirpstack-network-server[218102]: time="2023-06-14T08:30:02.623024948Z" level=info msg="uplink: frame(s) collected" ctx_id=6c86812a-7d36-4297-b663-f40553e2ffa4 mtype=JoinRequest uplink_ids="[2b79af03-348c-40e6-8652-828707012484]"
```

```
.Jun 14 08:30:02 hjs.roaming.iot.rd.nic.fr chirpstack-application-server[194946]: time="2023-06-14T08:30:02.742770291Z" level=info msg="backend/joinserver: request received" message_type=JoinReq receiver_id=0000000000000001 sender_id=000001 transaction_id=2315653393
```

```
.Jun 14 08:30:02 hjs.roaming.iot.rd.nic.fr chirpstack-application-server[194946]: time="2023-06-14T08:30:02.749611809Z" level=info msg="device-keys updated" ctx_id="<nil>" dev_eui=5817b1c3eb890bc4
```

```
.Jun 14 08:30:02 hjs.roaming.iot.rd.nic.fr chirpstack-application-server[194946]: time="2023-06-14T08:30:02.749981371Z" level=info msg="backend/joinserver: sending response" dev_eui=5817b1c3eb890bc4 message_type=JoinAns receiver_id=000001 result_code=Success sender_id=0000000000000001 transaction_id=2315653393
```

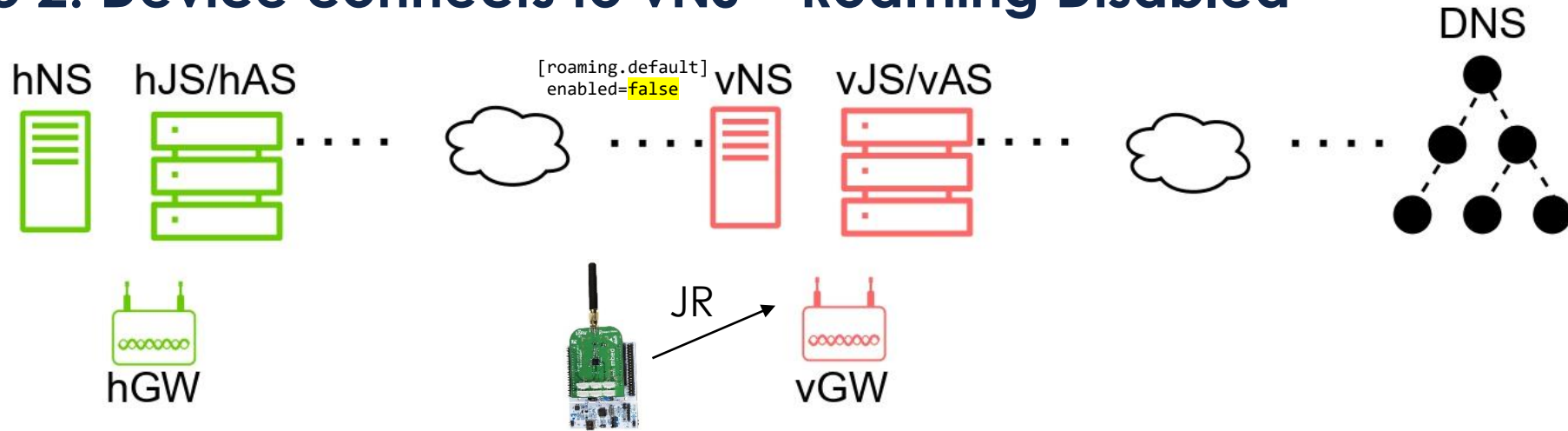
Scenario 1: Device connects to hNS



DEVEUI = 5817b1c3eb890bc4
JOINEUI/APPEUI = 0000000000000001

```
2023-06-14 10:30:02,279 # main(): This is RIOT! (Version: 2022.07-devel-726-g8e1f9)
2023-06-14 10:30:02,282 # LoRaWAN Class A low-power application
2023-06-14 10:30:02,286 # =====
2023-06-14 10:30:02,288 # Starting join procedure
2023-06-14 10:30:07,470 # Join procedure succeeded
```


Scenario 2: Device connects to vNS – Roaming Disabled

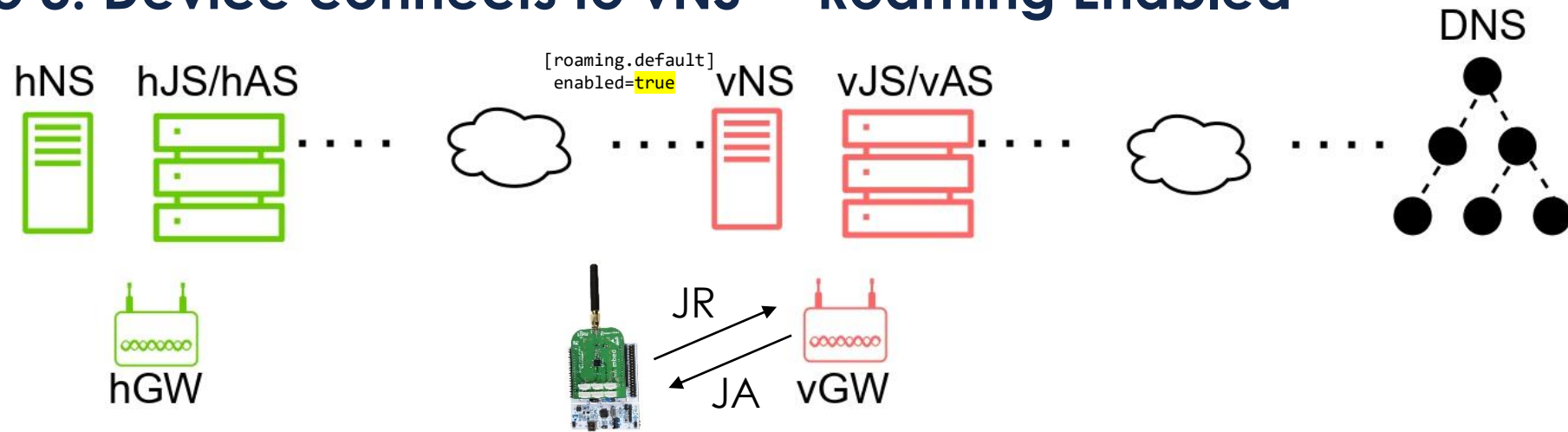


DEVEUI = 5817b1c3eb890bc4
JOINEUI/APPEUI = 0000000000000001

```
.Jun 14 08:49:21 vns.roaming.iot.rd.nic.fr chirpstack-network-server[296100]: time="2023-06-14T08:49:21.111014404Z" level=info msg="uplink: frame(s) collected" ctx_id=dd07ed75-28d8-4fdf-897c-599b69915d9a mtype=JoinRequest uplink_ids="[e54928b9-40d9-477e-b926-f481c473eb66]"  
.Jun 14 08:49:21 vns.roaming.iot.rd.nic.fr chirpstack-network-server[296100]: time="2023-06-14T08:49:21.1128373Z" level=error msg="uplink: processing uplink frame error" ctx_id=dd07ed75-28d8-4fdf-897c-599b69915d9a error="get device error: object does not exist"
```

```
2023-06-14 10:49:20,775 # Starting join procedure  
2023-06-14 10:49:27,821 # Join procedure failed
```


Scenario 3: Device connects to vNS – Roaming Enabled



DEVEUI = 5817b1c3eb890bc4
 JOINEUI/APPEUI = 0000000000000001

```
.Jun 14 08:55:38 hjs.roaming.iot.rd.nic.fr chirpstack-application-server[194946]: time="2023-06-14T08:55:38.680082801Z" level=info msg="device-keys updated" ctx_id="<nil>" dev_eui=5817b1c3eb890bc4

.Jun 14 08:55:38 hjs.roaming.iot.rd.nic.fr chirpstack-application-server[194946]: time="2023-06-14T08:55:38.680286508Z" level=info msg="backend/joinserver: sending response" dev_eui=5817b1c3eb890bc4 message_type=JoinAns receiver_id=000001 result_code=Success sender_id=0000000000000001 transaction_id=830546021
```

```
2023-06-14 10:55:36,888 # main(): This is RIOT! (Version: 2022.07-devel-726-g8e1f9)
2023-06-14 10:55:36,891 # LoRaWAN Class A low-power application
2023-06-14 10:55:36,895 # =====
2023-06-14 10:55:36,897 # Starting join procedure
2023-06-14 10:55:42,081 # Join procedure succeeded
```



Thank you!

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