oneM2M-Advance

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Allow CoAP on MN

- By default CoAP is not allowed on MN
- To enable it edit:

  $HOME/git/org.eclipse.om2m/org.eclipse.om2m.site.mn-cse/om2m.product

- Add CoAP plugin

```
<plugins>
…
    <plugin id="org.eclipse.jetty.util"/>
    <plugin id="org.eclipse.om2m.binding.coap"/>
    <plugin id="org.eclipse.om2m.binding.http"/>
…
</plugins>
```

Allow CoAP on MN (2)

- Edit Configurations

```
<configurations>
…
<plugin id="org.eclipse.equinox.http.jetty" autoStart="true"
startLevel="1" />
<plugin id="org.eclipse.om2m.binding.coap" autoStart="true”
startLevel="2" />
<plugin id="org.eclipse.om2m.binding.http" autoStart="true"
startLevel="2" />
…
</configurations>
```

- Note that default port for MN is 5684

Allow CoAP on MN (3)

- Edit the code:
  - org.eclipse.om2m.binding.coap.CoAPServer
  - Change line 145:
    - requestPrimitive.setTo(request.getUri());
  - To:
    - requestPrimitive.setTo(targetId);

Clean and rebuild

- Open a shell and issue:

$ cd $HOME/git/org.eclipse.om2m

$ mvn clean install

- Reconfigure oM2M
  - IN-CSE

$HOME/git/org.eclipse.om2m/org.eclipse.om2m.site.in-cse/target/products/in-cse/linux/gtk/x86

  - MN-CSE

$HOME/git/org.eclipse.om2m/org.eclipse.om2m.site.mn-cse/target/products/in-cse/linux/gtk/x86

Configure oM2M

- In the IN-CSE folder edit the file:

  configuration/config.ini

  - Edit:
    - org.eclipse.om2m.dbReset=**true**
    - org.eclipse.om2m.cseBaseId=**yourname-in-cse**
    - org.eclipse.om2m.cseBaseName=**yourname-in-name**

- In the MN-CSE folder edit the file:

  configuration/config.ini

  - Edit:
    - org.eclipse.om2m.dbReset=**true**
    - org.eclipse.om2m.cseBaseId=**yourname-mn-cse**
    - org.eclipse.om2m.cseBaseName=**yourname-mn-name**
    - org.eclipse.om2m.remoteCseId=**yourname-in-cse**
    - org.eclipse.om2m.remoteCseName=**yourname-in-name**

Discovery of resources

- IN connection: All resources
  - GET to 127.0.0.1:5683/~/yourname-in-cse/?fu=1
- IN connection: AE resources
  - GET to 127.0.0.1:5683/~/yourname-in-cse/?fu=1&rty=2
- IN connection: Container resources
  - GET to 127.0.0.1:5683/~/yourname-in-cse/?fu=1&rty=3
- IN connection: Container resources on MN
  - GET to 127.0.0.1:5683/~/yourname-mn-cse/?fu=1&rty=3

Exercise 1

- Modify the Exercise of last lesson to register the AE (and its container) on the MN
  - MN CoAP port 5684
  - Last lesson Exercise

    https://github.com/IoTLabUnipi/IoT-Lab/tree/master/2016/03-oneM2M/adn
- Write another application that retrieve Container registered in the MN by connecting to the IN.
  - IN CoAP port 5683

Subscriptions

- Subscriptions are used by Applications to receive asynchronous updates on the status of resources
- AEs can create subscriptions for “any” kind of event. We will focus on contentInstance subscriptions to retrieve updated readings.
- Notification messages are always in XML
- Two type of subscriptions for two type of AEs:
  - Server capable
  - Server incapable

Subscriptions – Server capable

- In order to receive notifications a CoAP server is needed
- The server must expose a resource which allows POST requests
- The server must respond with 2.01 CREATED

- Choose a port that is not already used on your machine (Ex. 5685)

Create a subscription

- Create a subscribtion for Container resources in the MN by interacting with the IN:
  - POST to 127.0.0.1:5683/~/yourname-mn-cse/yourname-mn-name/TempApp/DATA
  - Payload in json:

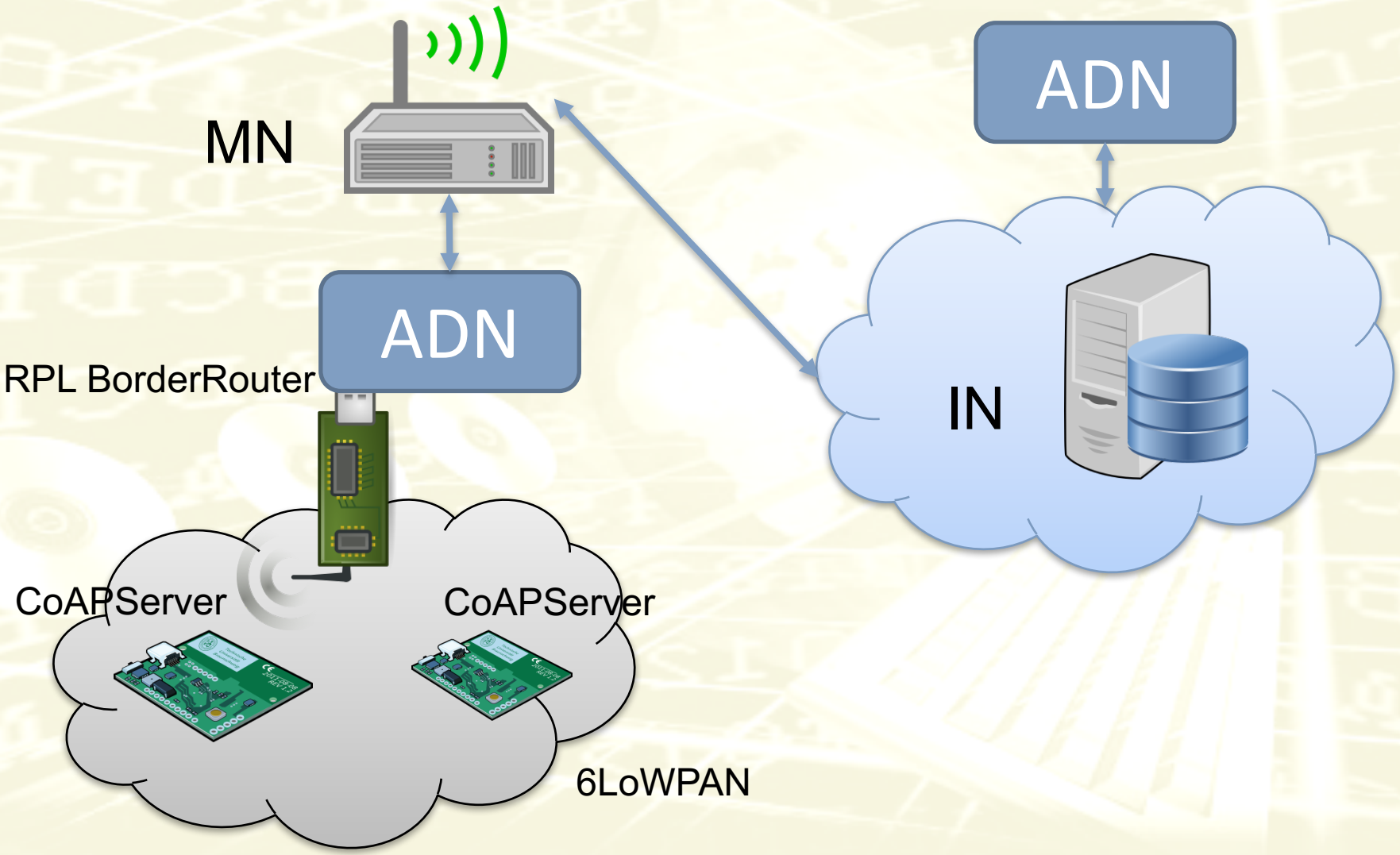
```
{
    “m2m:sub”:{
        “rn”: “Monitor”,
        “nu”: “coap://127.0.0.1:5685/yourResourceName”,
        “nct”: 2
    }
}
```

rn = ResourceName
nu = NotificationURI
nct = NotificationContentType

Exercise 2

- Edit the Exercise of last lesson to periodically publish new contentInstances.
- Edit the previous Exercise to create an application that:
  1. Issue a Discovery request to the IN for Container Resources hosted by the MN
  2. Start a CoAP server, in a separate Thread, on port 5685 with a resource that accept POST and replies with 2.01 CREATED
  3. Create a subscription on the URI retrieved at point 1.

All together



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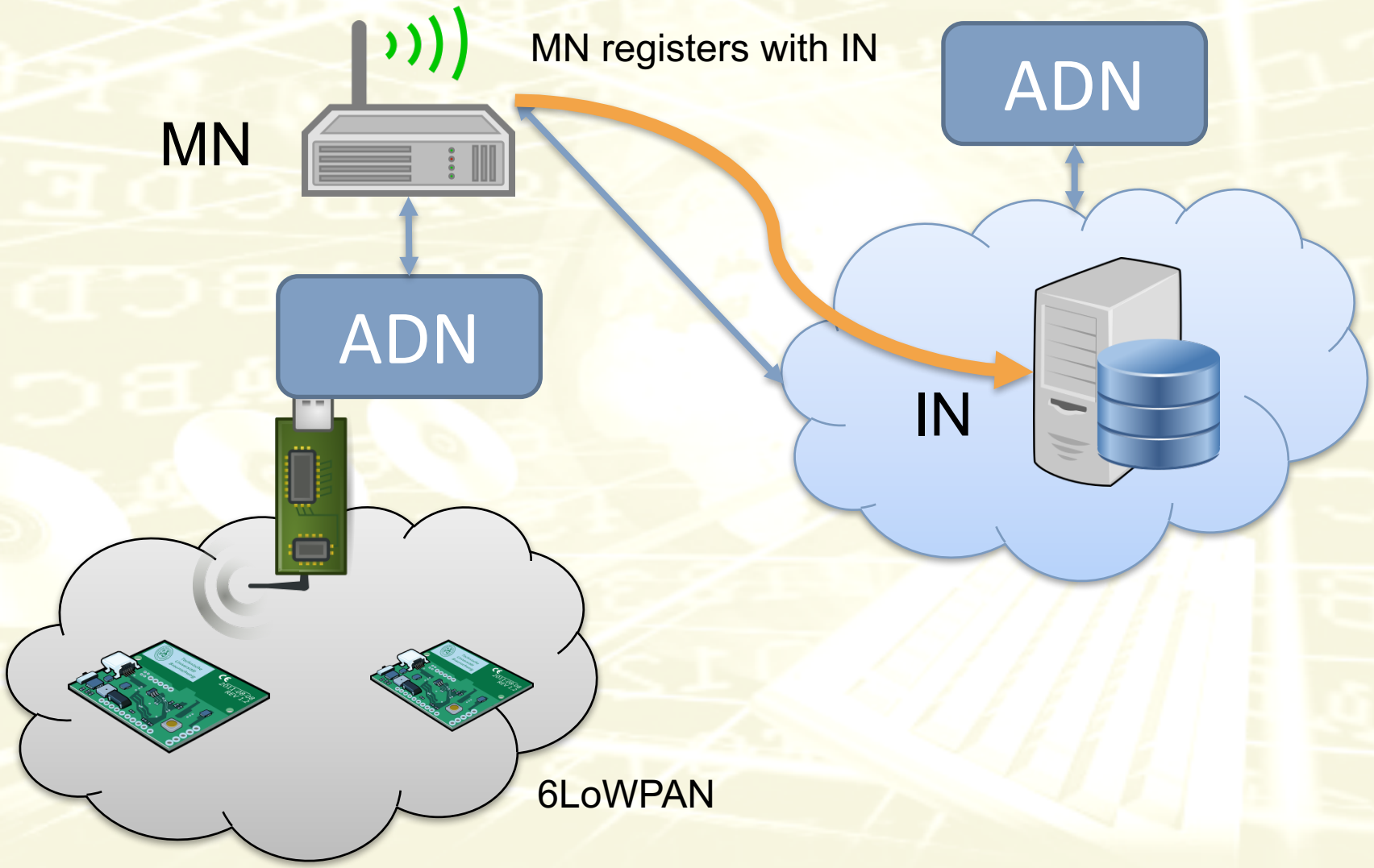

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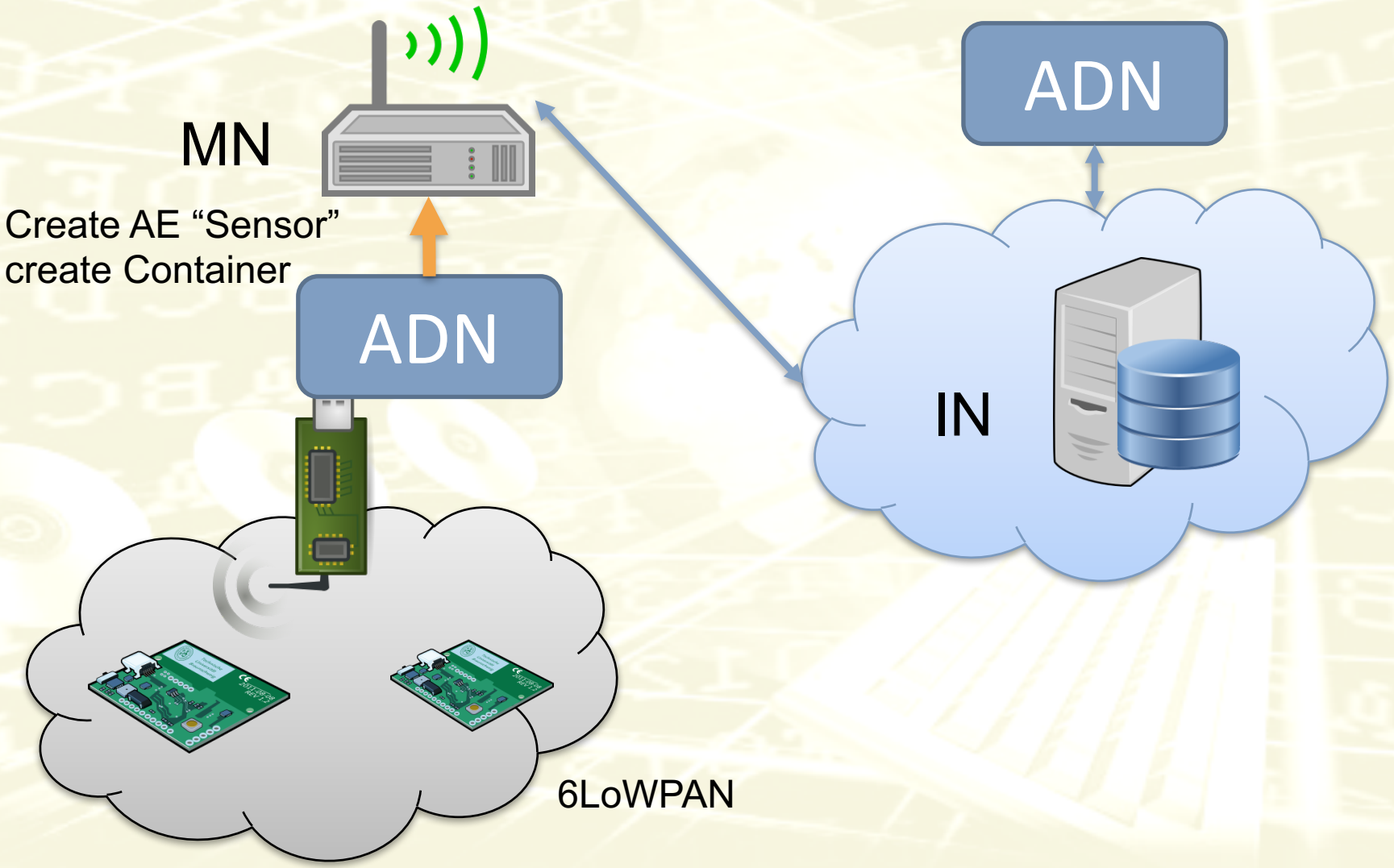

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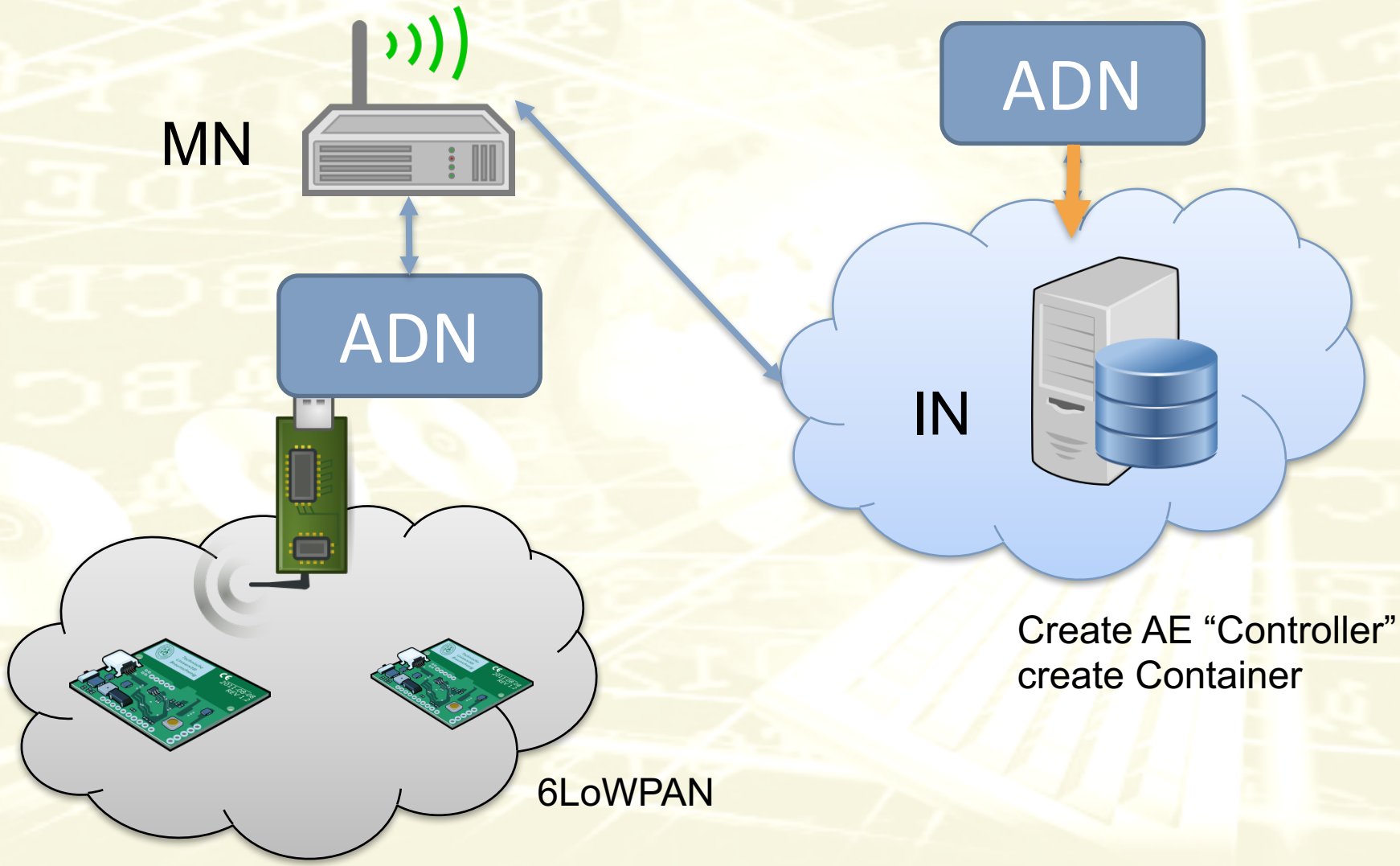

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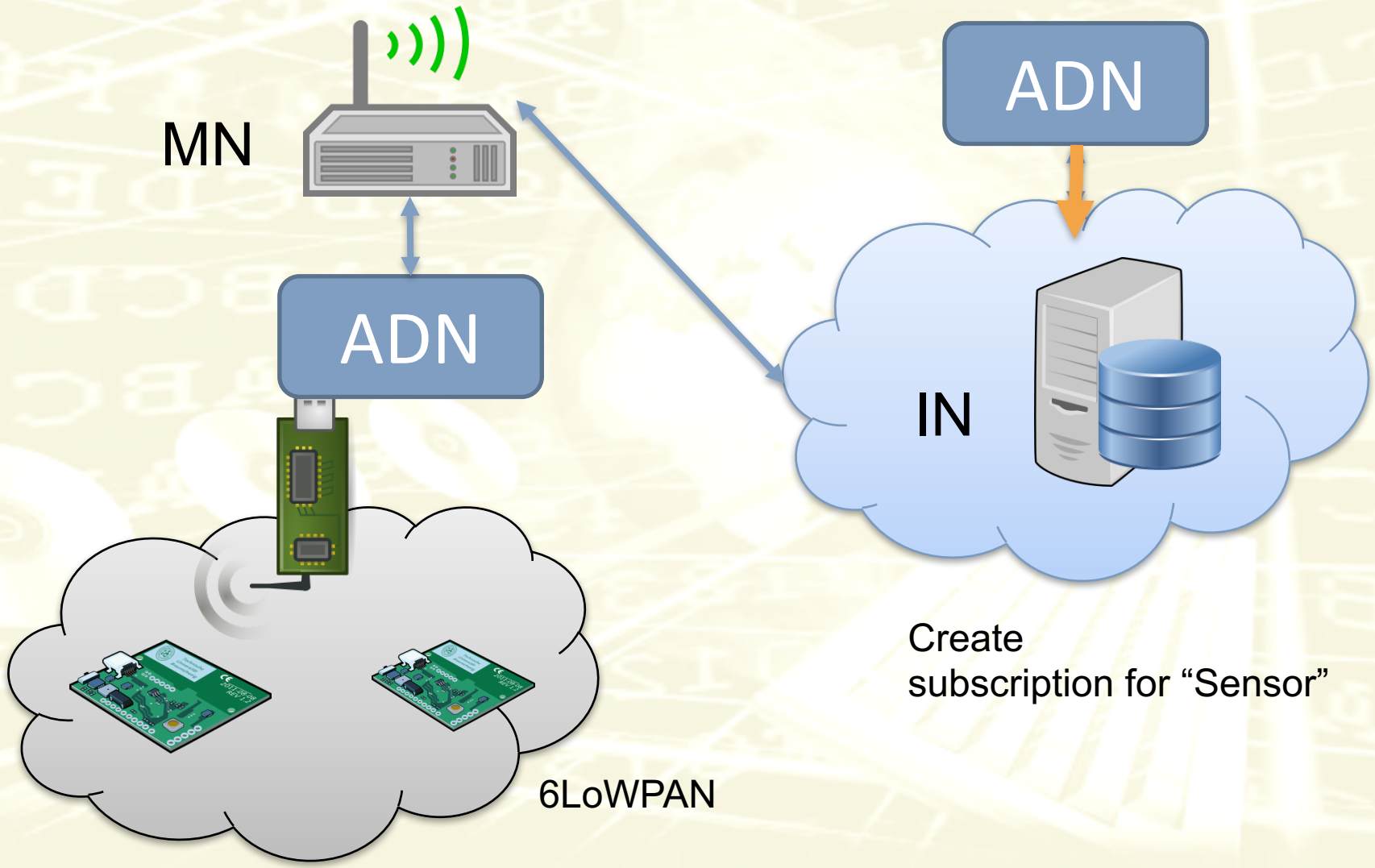

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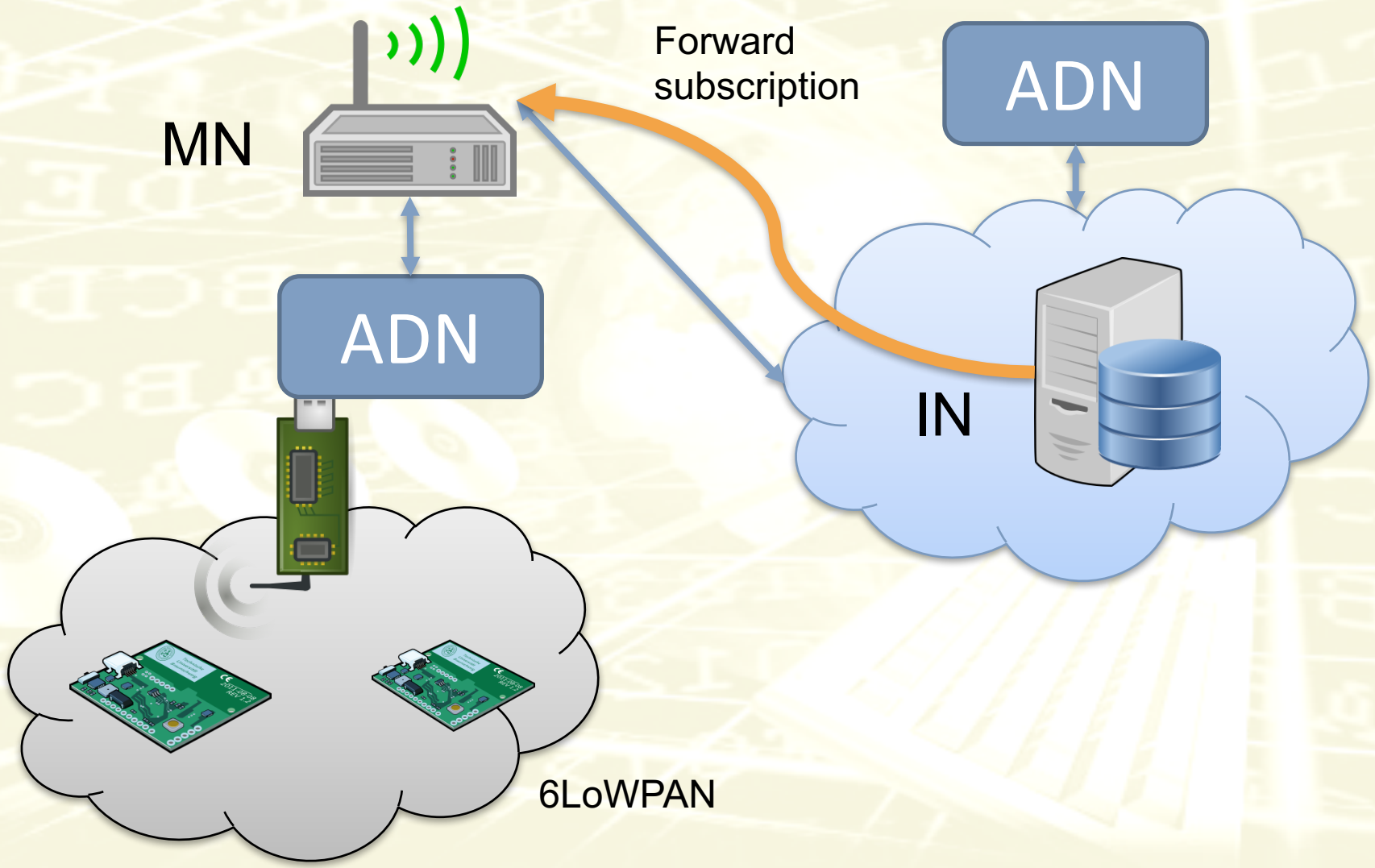

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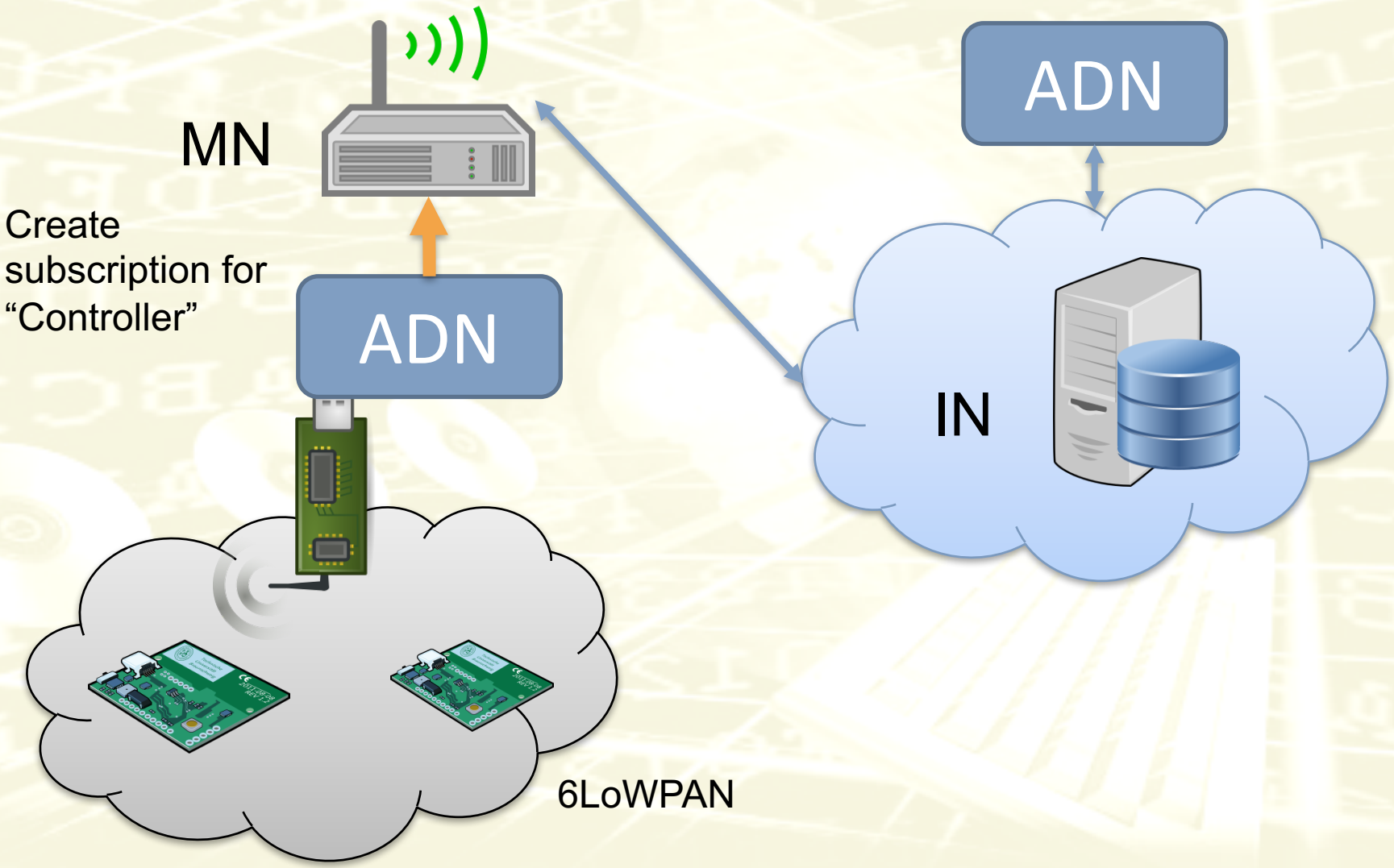

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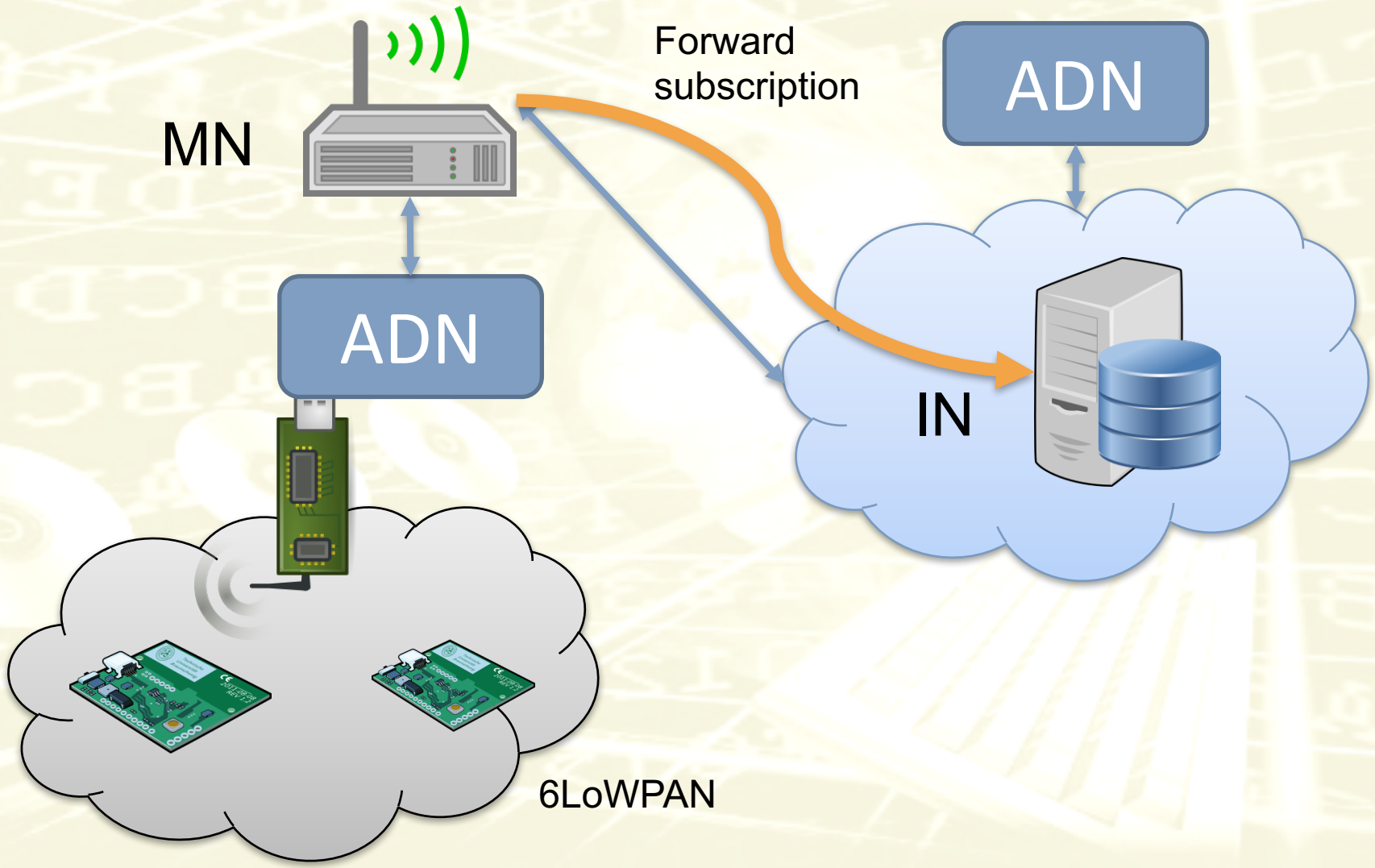

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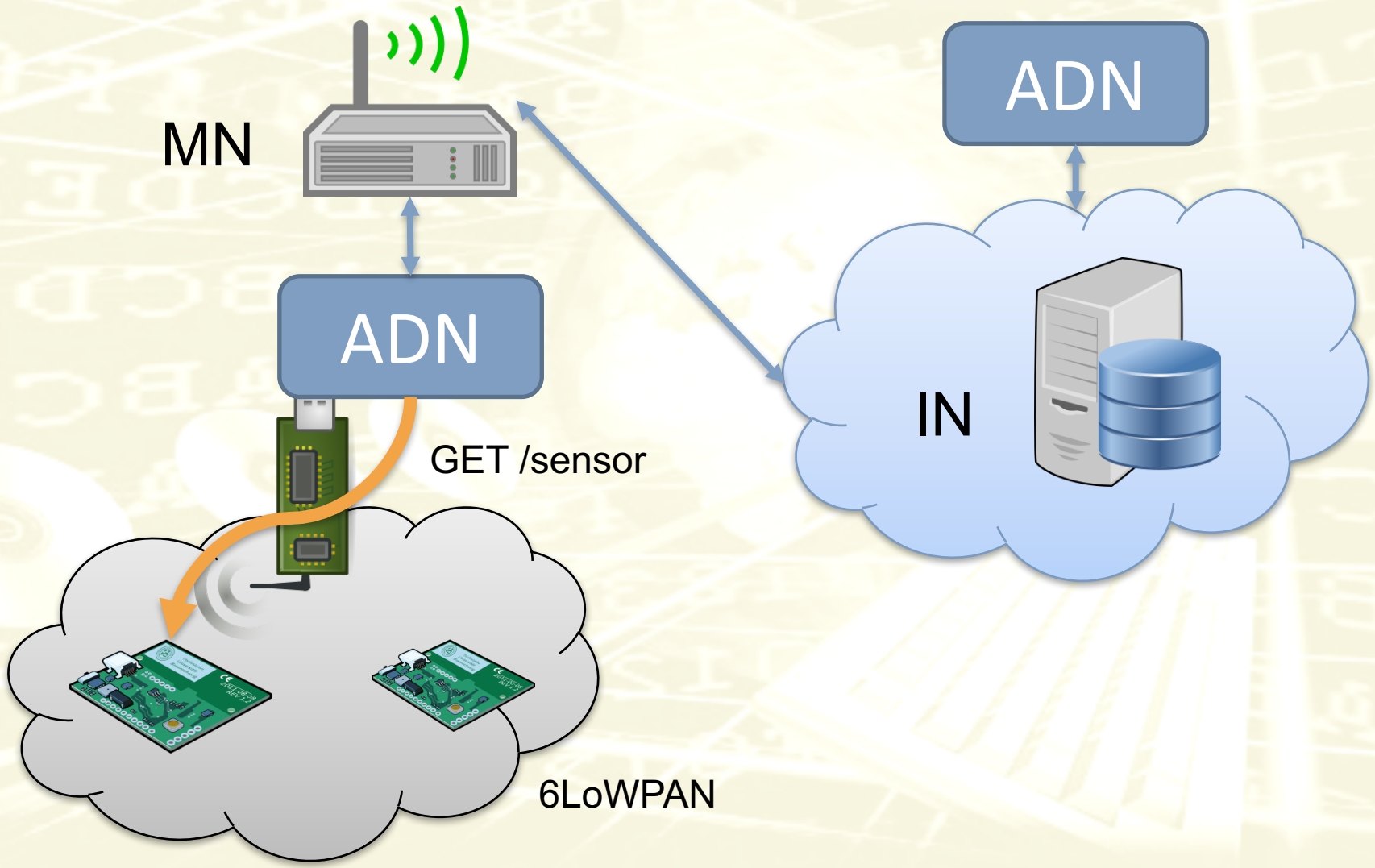

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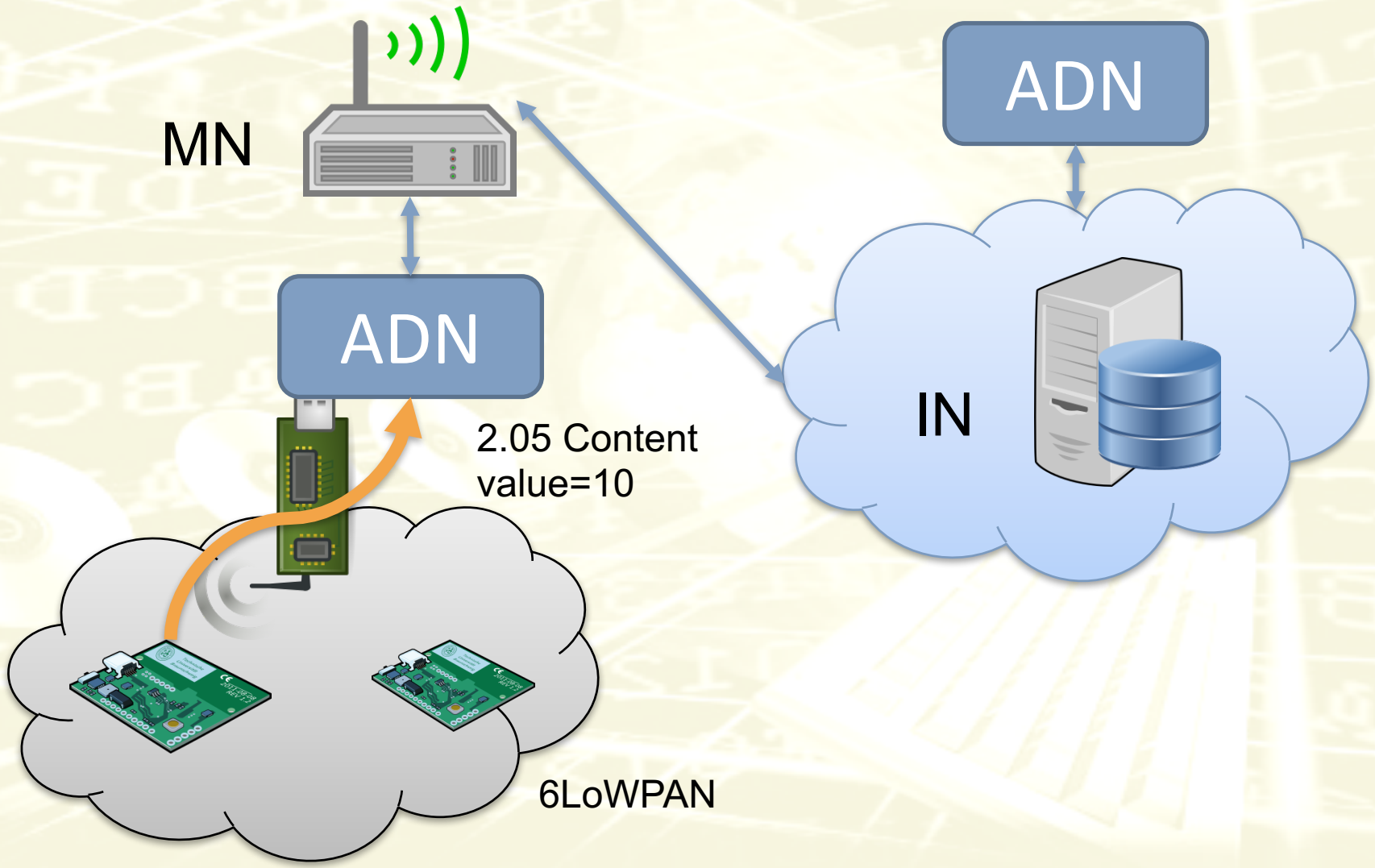

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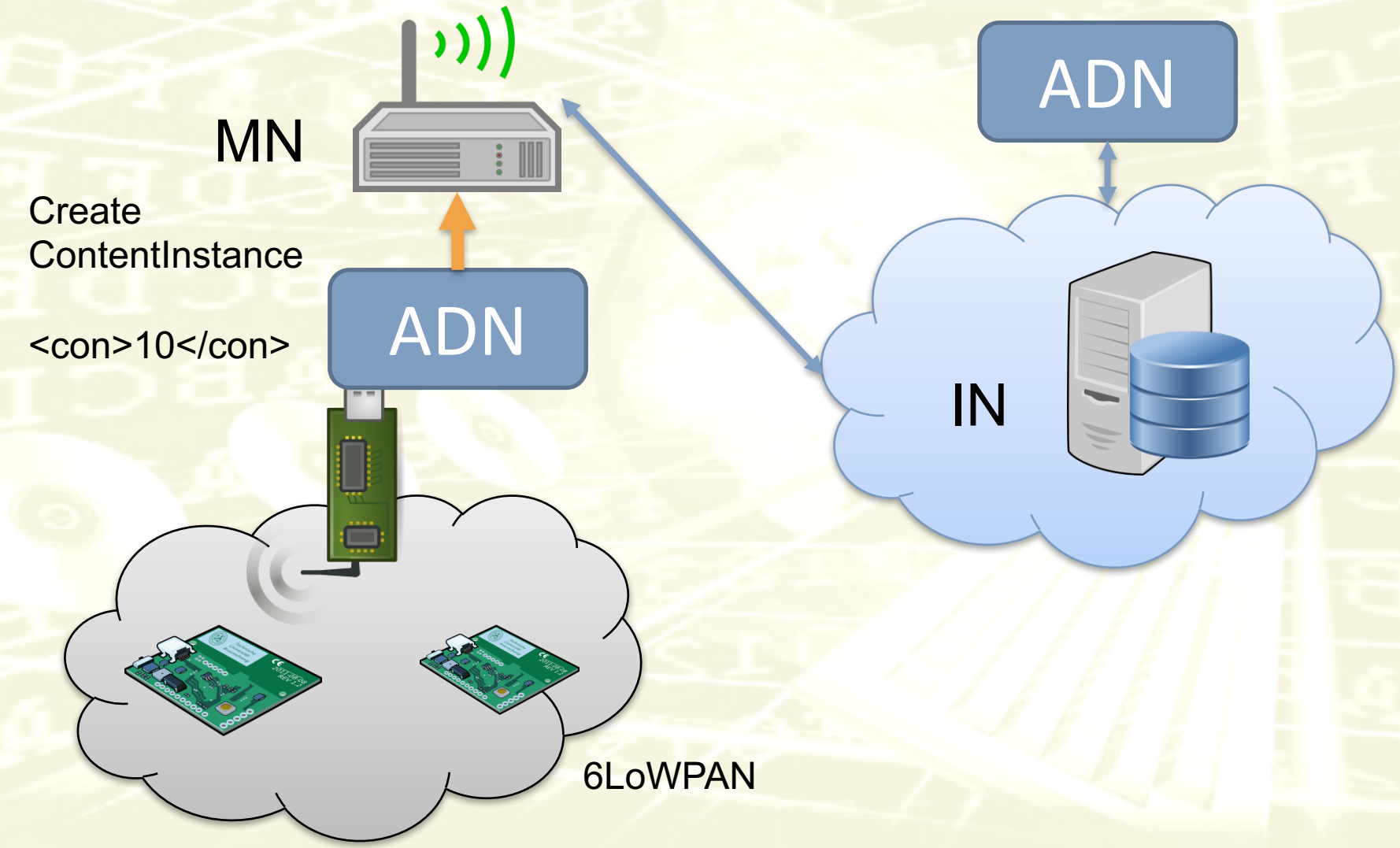

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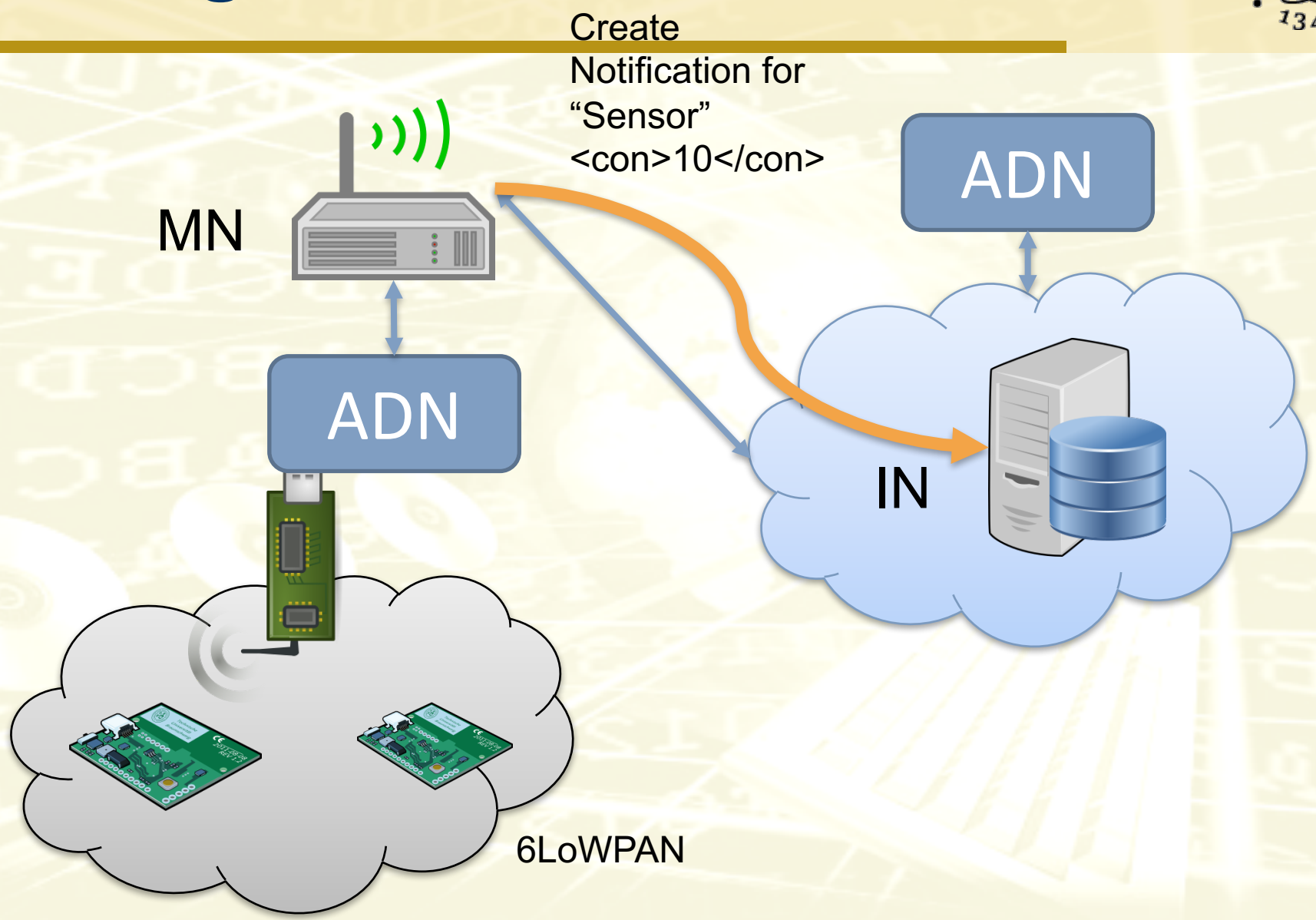

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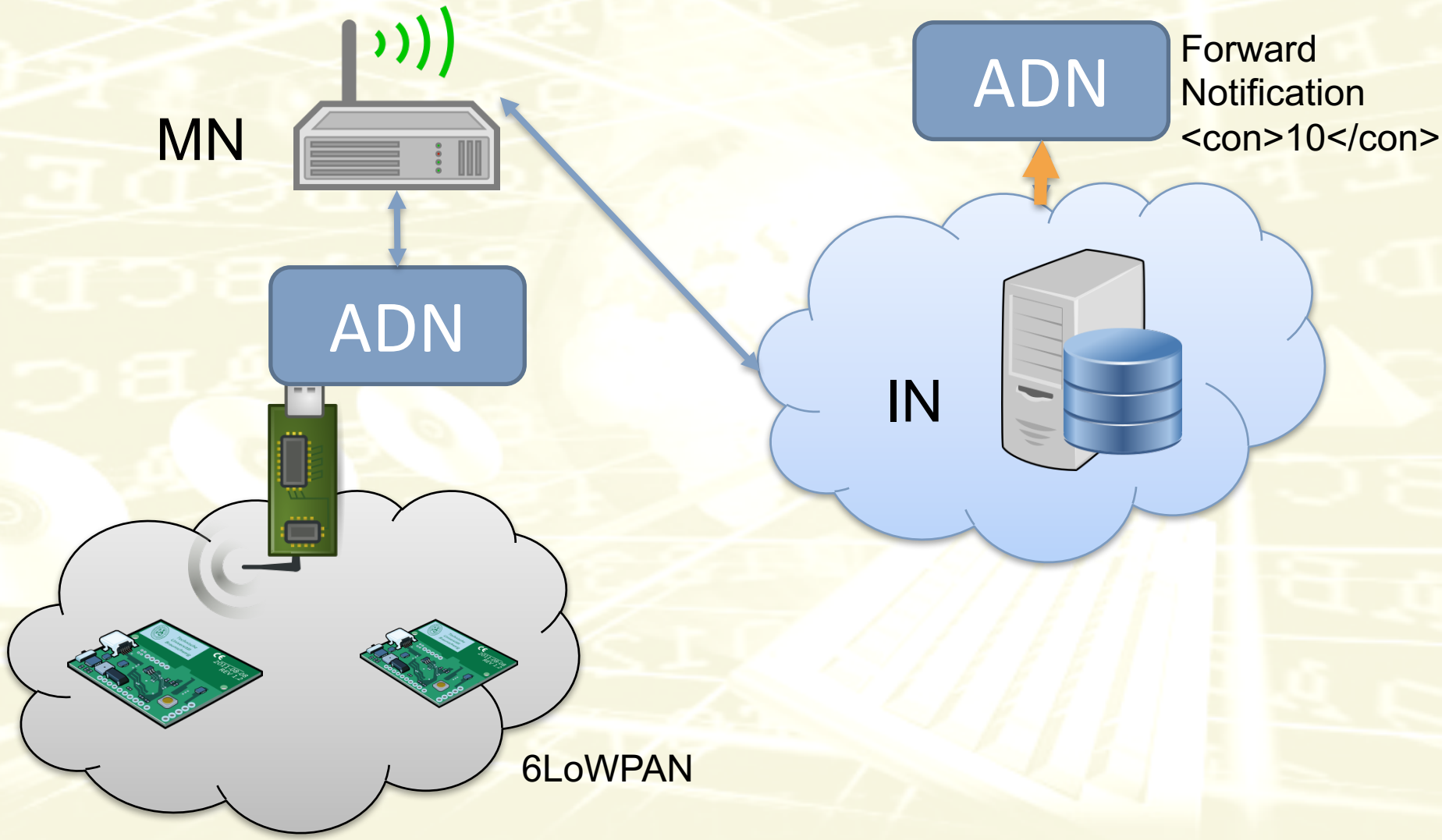

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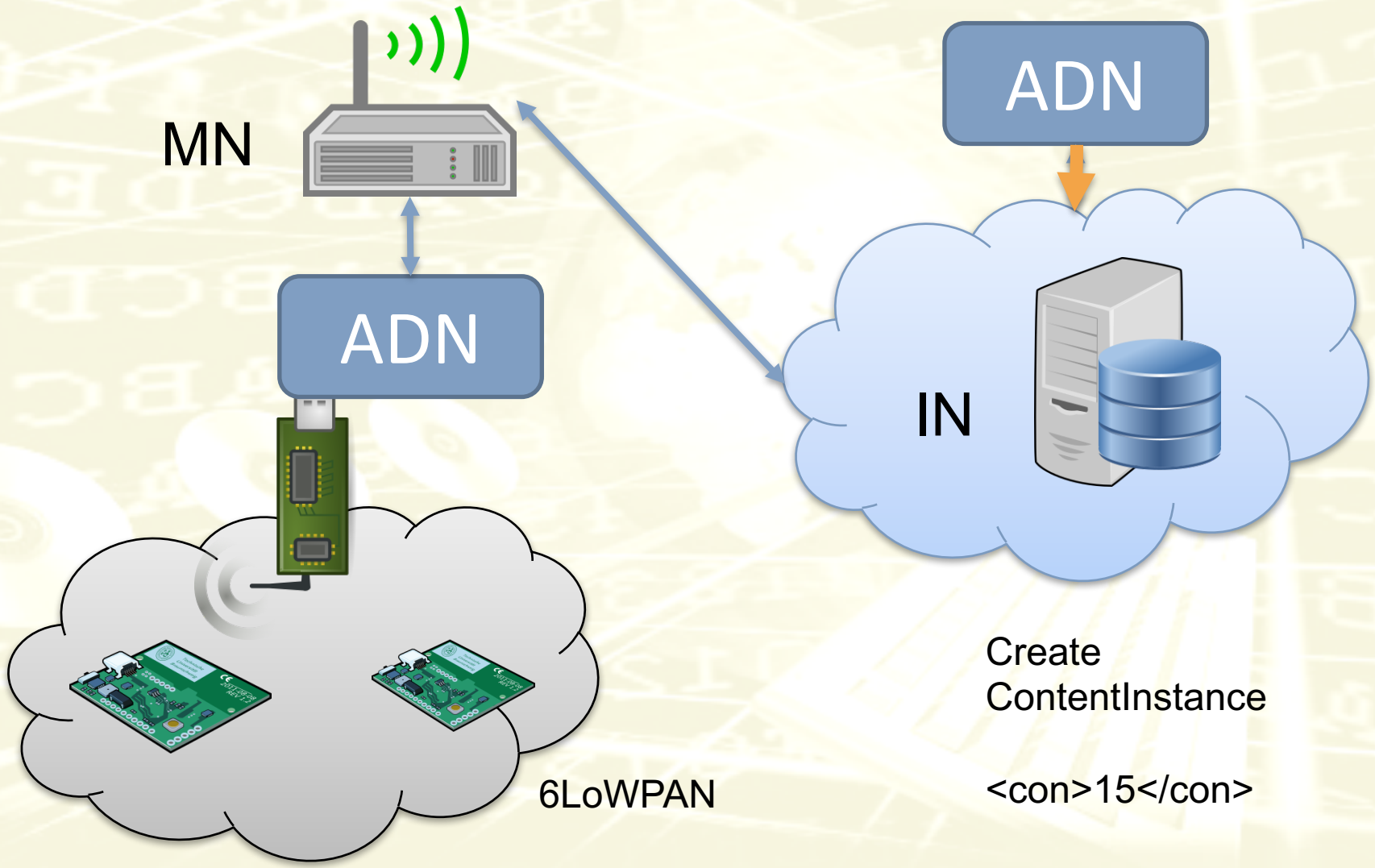

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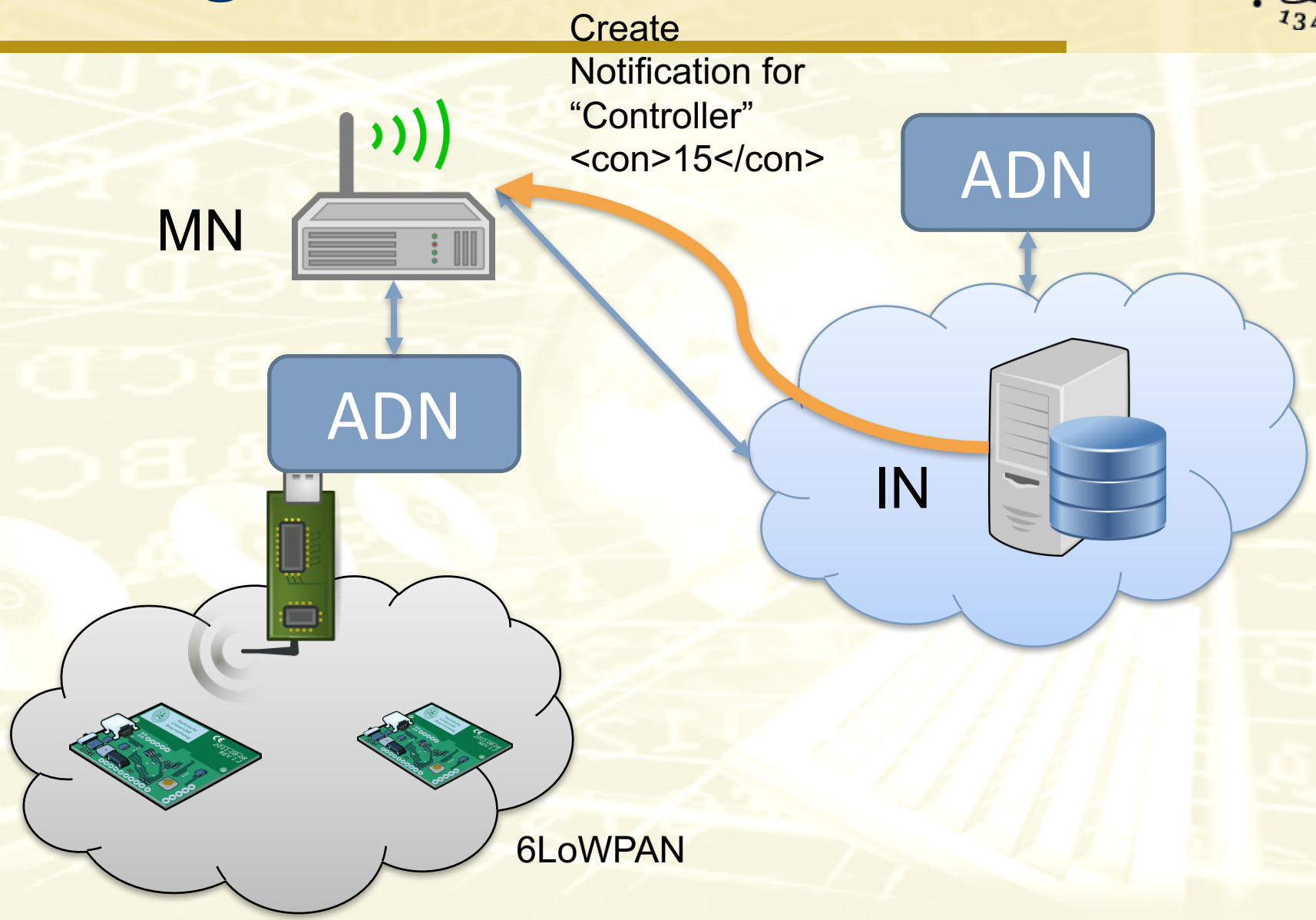

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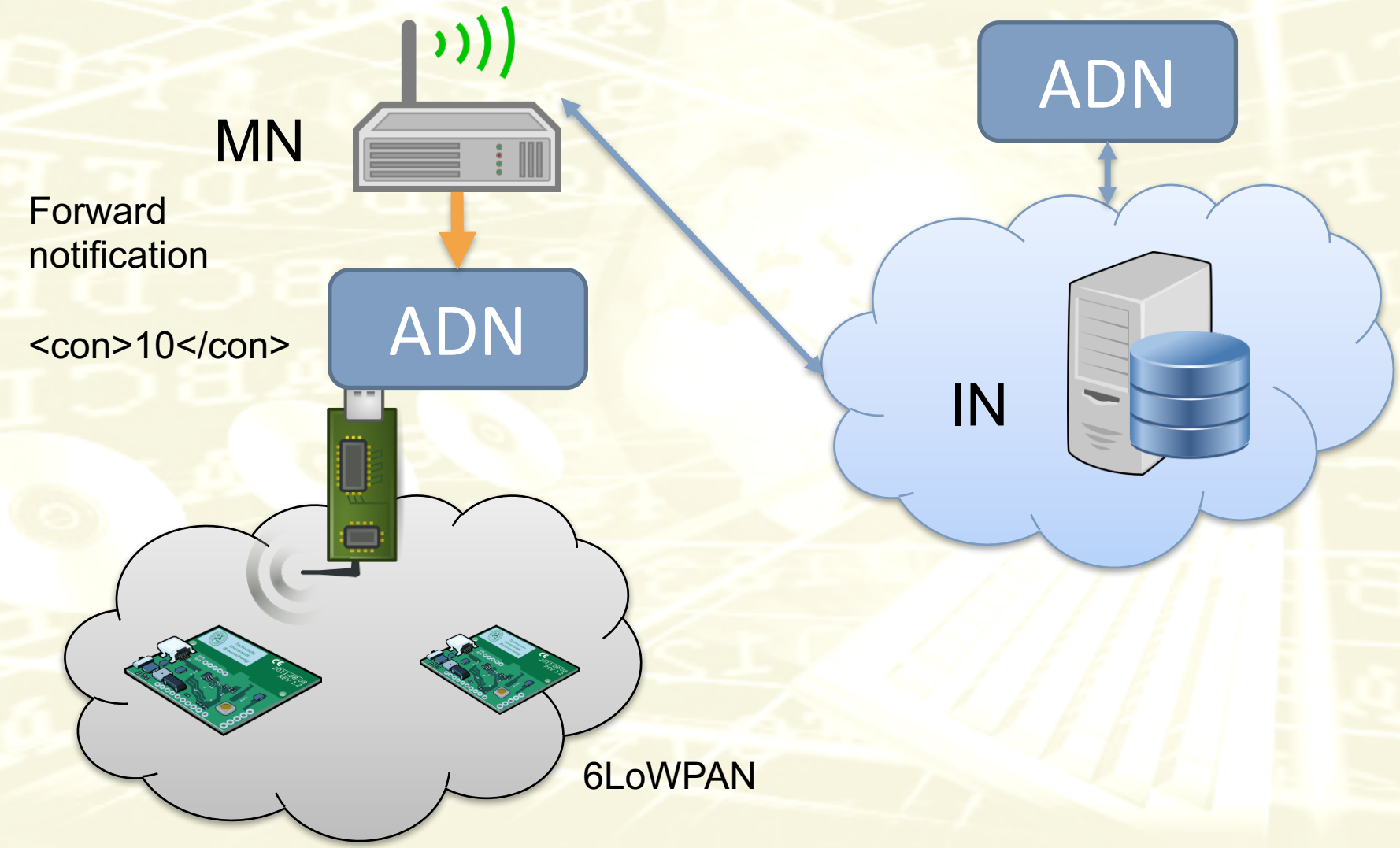

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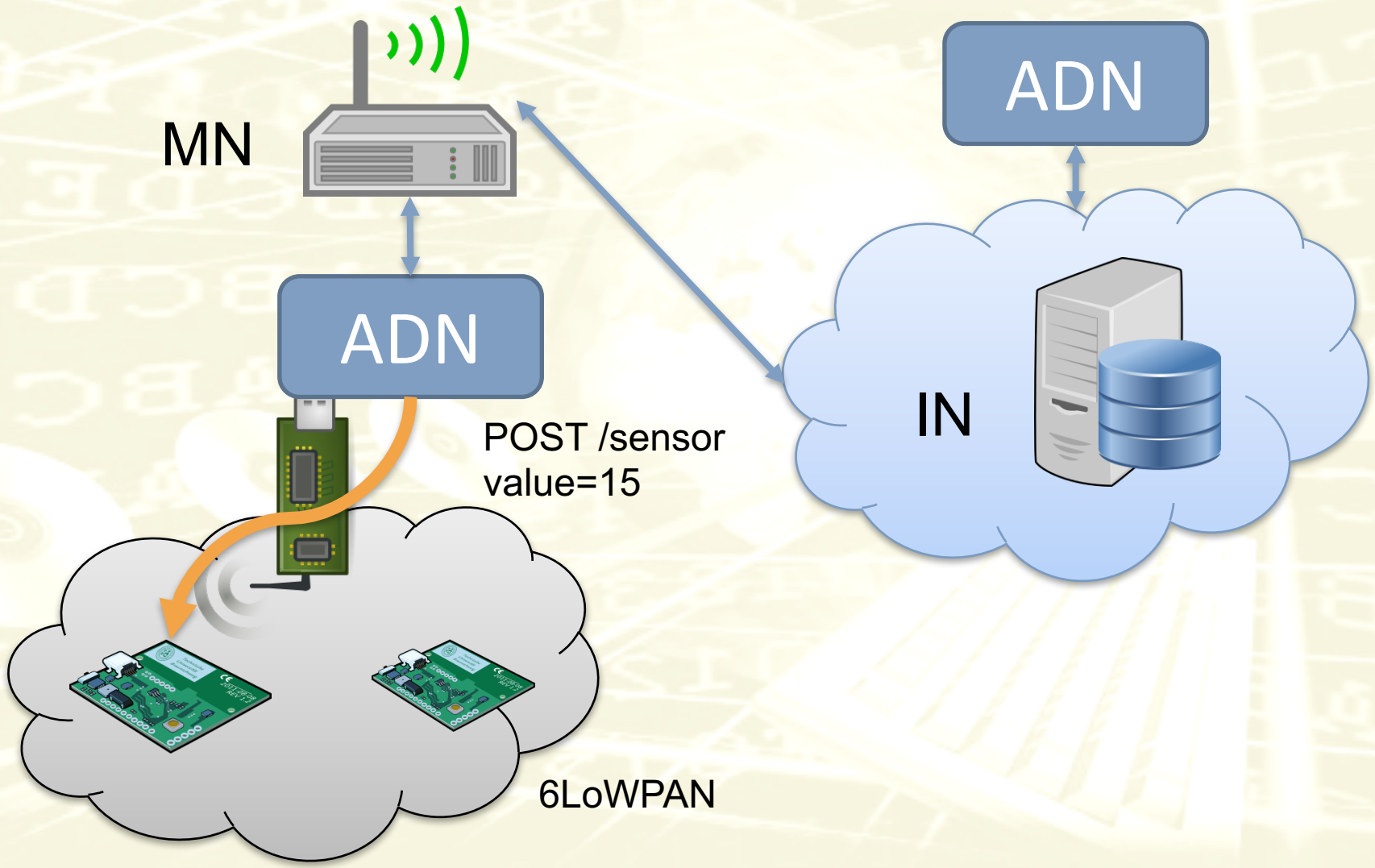

Exercise 3

- Write a CoAP Server on Contiki with an internal integer value that can be retrieved with a GET and set with a POST.
- Deploy everything in Cooja. Remember the border router.

Exercise 3 (2)

- Write an ADN that:
  - Creates AE on the MN (Sensor)
  - Create a Container on the MN
  - Read data from the CoAP Server every minutes and publish the values as contentInstance.
- Write an AND that:
  - Connects to the IN to subscribe for Container resources on the MN

Exercise 4

- Modify the IN AND to:
  - Creates AE on the IN “Controller”
  - Create a Container on the IN
  - Create contentInstances on the IN each one with the value set equal to the value obtained by notifications incremented by 1.
- Modify the MN AND to:
  - Subscribe for Container resources hosted by the IN
  - Updates values on sensors through POST requests where the value is equal to the value of received notifications