

Lecture #10

MQTT

Android Things 2023

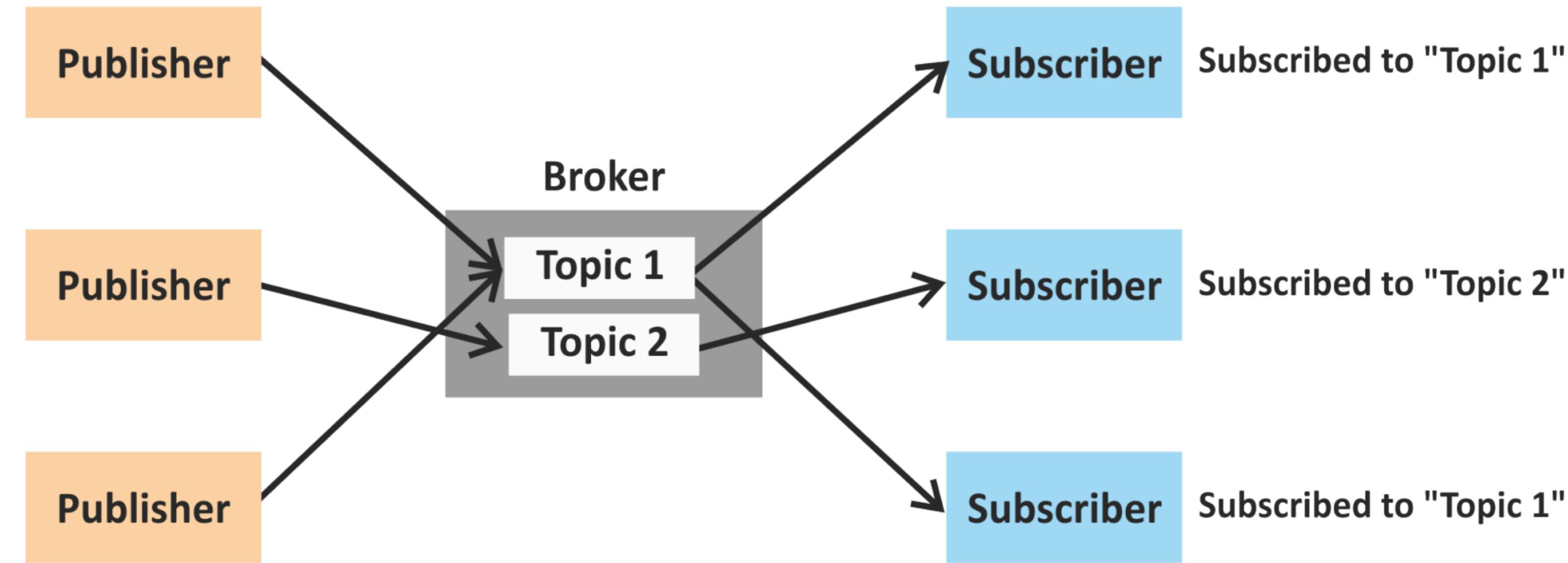
MQTT

Message Queue Telemetry Transport



- Publish-subscribe.
- A message **broker** is required.
- Standard: ISO/IEC PRF 20922.
- Developed in 1999 (and released royalty free in 2010).
- Small code footprint.
- Limited network bandwidth / constrained environments.
- Data agnostic.

Model



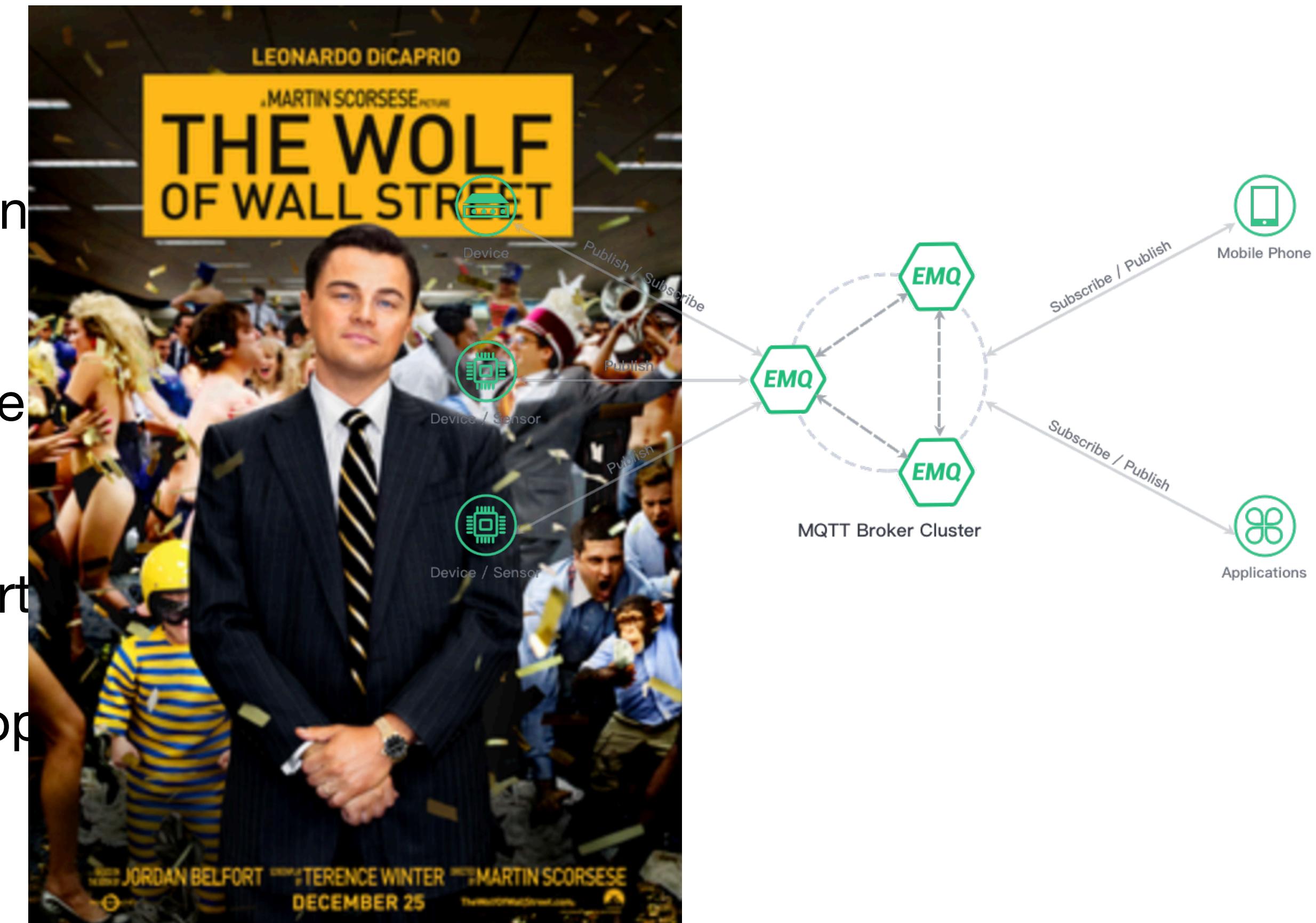
Broker Benefits

- Eliminates insecure connections.
- Easily scales.
- Manages client connect states.
- Reduce network strain.

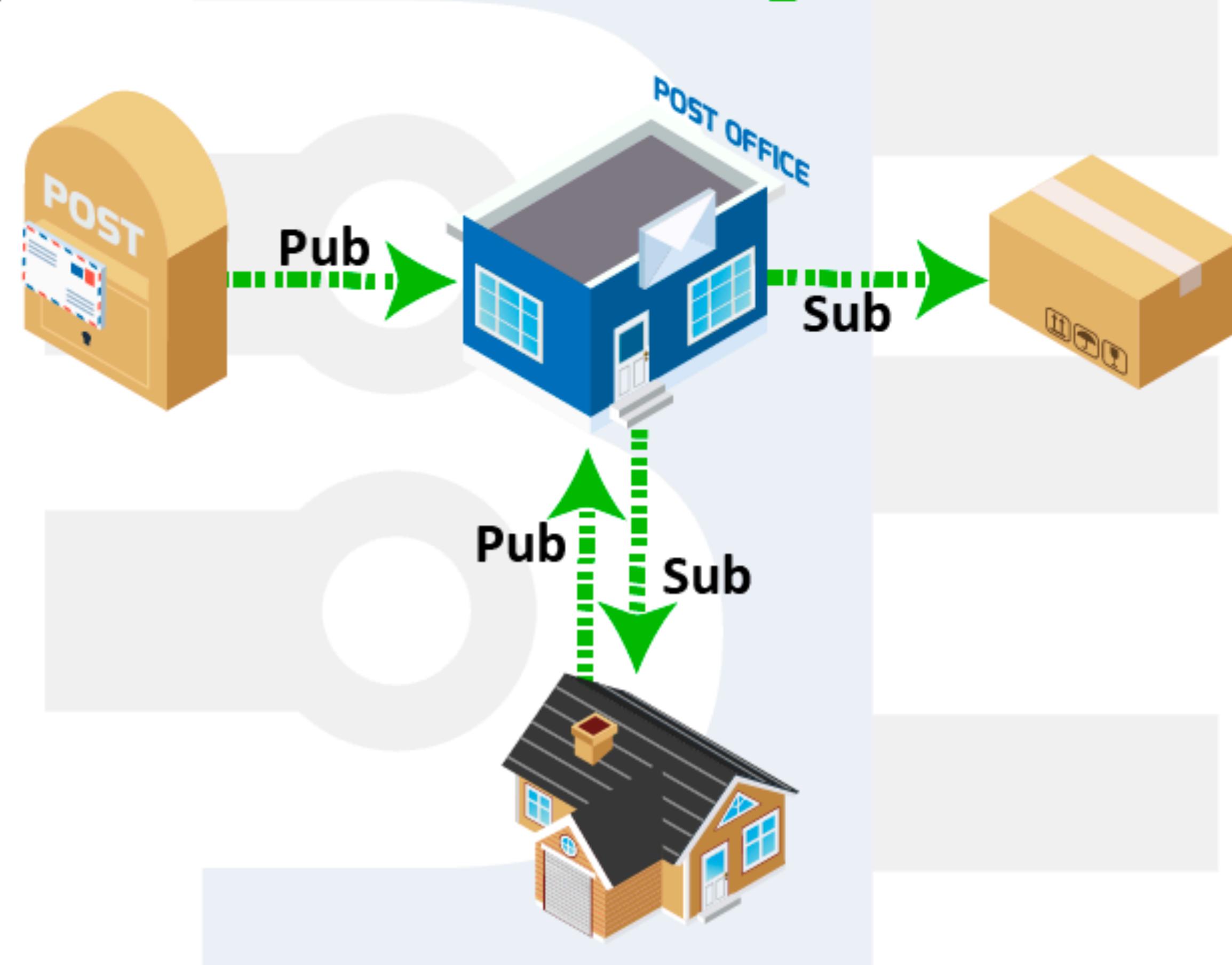


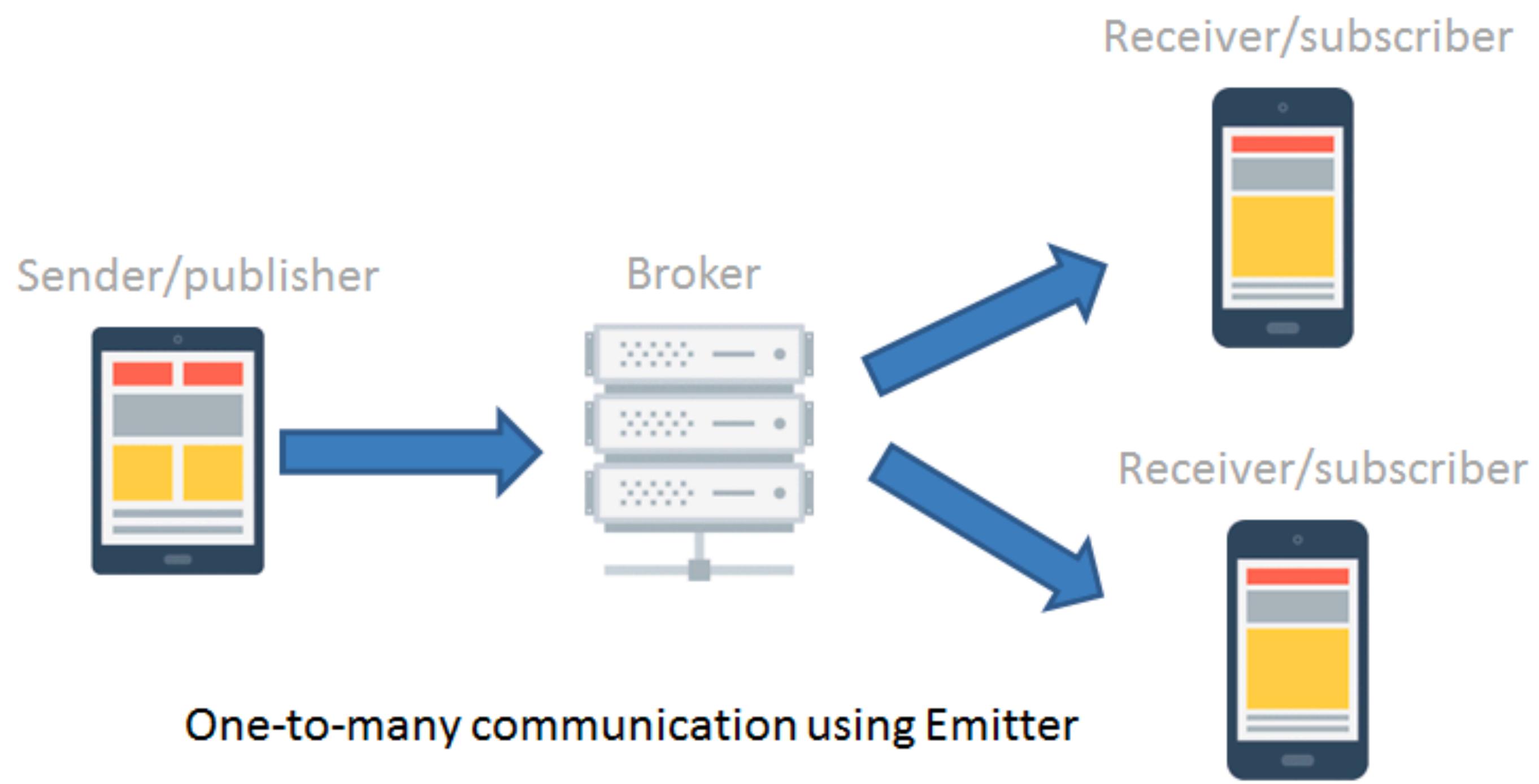
What is a broker

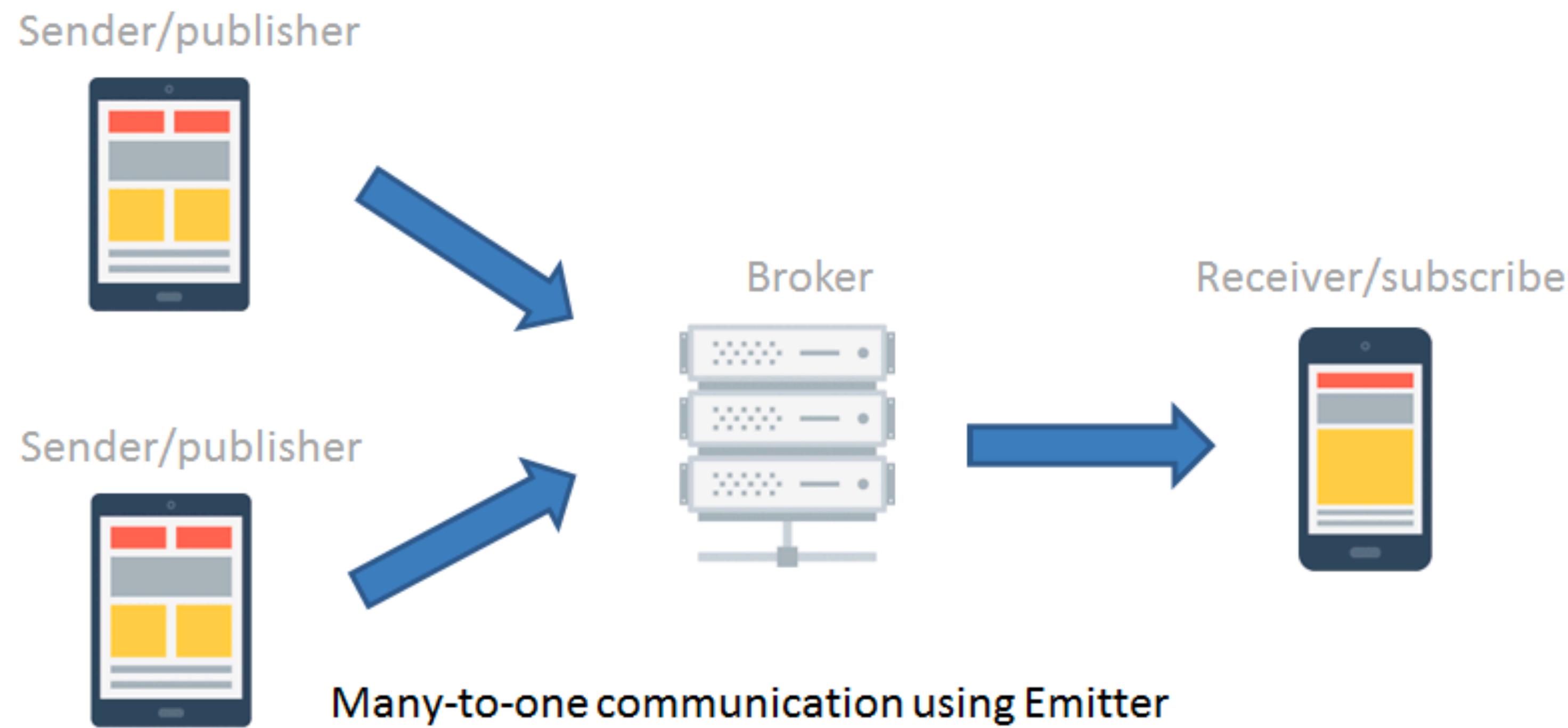
- Software running on computer.
- Running on premise cloud.
- Self-Built or 3rd party.
- Open source or propri

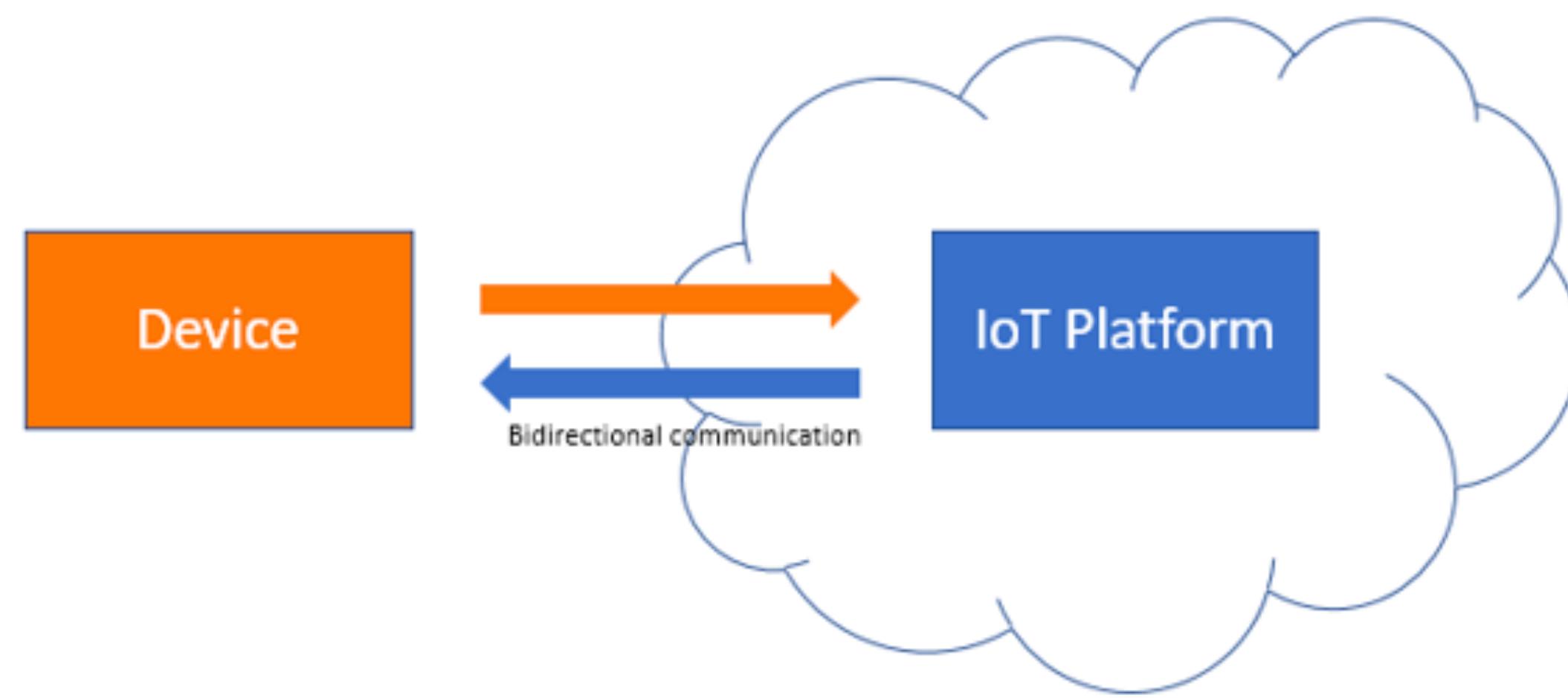


`mqtt://broker/topic/message`









Connecting to the broker

Value	Return Code Response	Description
0	0x00 Connection Accepted	Connection accepted
1	0x01 Connection Refused, unacceptable protocol version	The Server does not support the level of the MQTT protocol requested by the Client
2	0x02 Connection Refused, identifier rejected	The Client identifier is correct UTF-8 but not allowed by the Server
3	0x03 Connection Refused, Server unavailable	The Network Connection has been made but the MQTT service is unavailable
4	0x04 Connection Refused, bad user name or password	The data in the user name or password is malformed
5	0x05 Connection Refused, not authorized	The Client is not authorized to connect
6-255		Reserved for future use

Publishing to a topic



Subscribing to a topic

- Example:
 - Topic #1: home/groundfloor/kitchen/temperature
 - Topic #2: office/conferenceroom/luminance
- Wild cards
 - Single-level:
 - home/groundfloor/+/temperature (to subscribe to **all the temperature readings** in all the rooms of the ground floor)
 - Multi-level:
 - home/groundfloor/# (to subscribe to **all the readings** in all the rooms of the ground floor, **not only the temperature**)

Quality of Service

- **0:** The broker/client will deliver the message once, with no confirmation.
- **1:** The broker/client will deliver the message at least once, with confirmation required.
- **2:** The broker/client will deliver the message exactly once by using a four step handshake.



Last will and testament

MQTT-Packet:	
CONNECT	
contains:	Example
<code>clientId</code>	"client-1"
<code>cleanSession</code>	true
<code>username</code> (optional)	"hans"
<code>password</code> (optional)	"letmein"
<code>lastWillTopic</code> (optional)	"/hans/will"
<code>lastWillQos</code> (optional)	2
<code>lastWillMessage</code> (optional)	"unexpected exit"
<code>keepAlive</code>	60

Learn More

- Learn more: mqtt.org
- Software: mqtt.org/software
- Recommended broker (C):
[Mosquitto \(mosquitto.org\)](https://mosquitto.org)
- Lots of good tutorials out there
on Android Things, Python,
Java and Mobile.



Lecture outcomes

- MQTT Protocol details.
- Create MQTT Raspbian and Android Things clients.
- How to control from a mobile app the IoT devices using MQTT.

