University of Catania, Catania (Italy)
Department of Electrical, Electronics and Computer Engineering

Industrial Data Communication Networks

Raspberry Pi
Sensor Network / Internet-of-Things
Gateway

A framework

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Overview

- Framework for implementing a *Sensor Network / Internet-of-Things* gateway running on a Raspberry Pi platform.

- Remote monitoring and control of sensors / actuators over the Internet.

- Several network interfaces, as well as local GPIO control.

Overview (cnt'd)
-Requirements

- Web-based (indirectly) or stand-alone client (directly) control panel.

- Database back-end, for historical data storage and monitoring.

- Cell phone-suited 3G network access.

- Activate link periodically to send data and retrieve tasks.

General
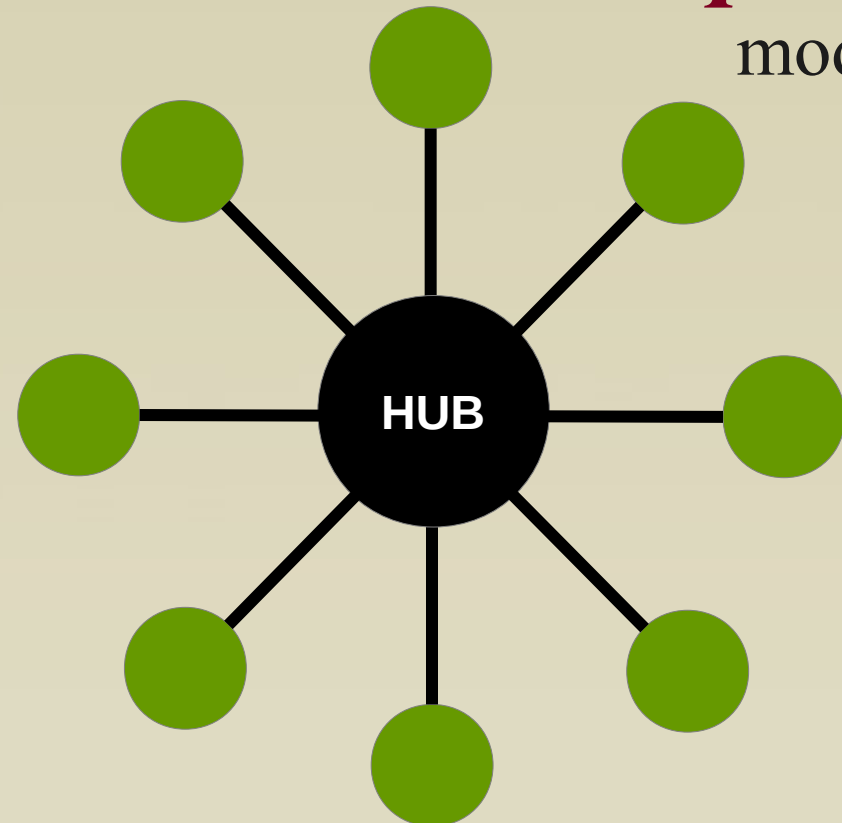# *architecture*

General architecture

Main architectures for IoT designs:

- *Hub-and-spoke*
- *Front-loaded embedded devices*
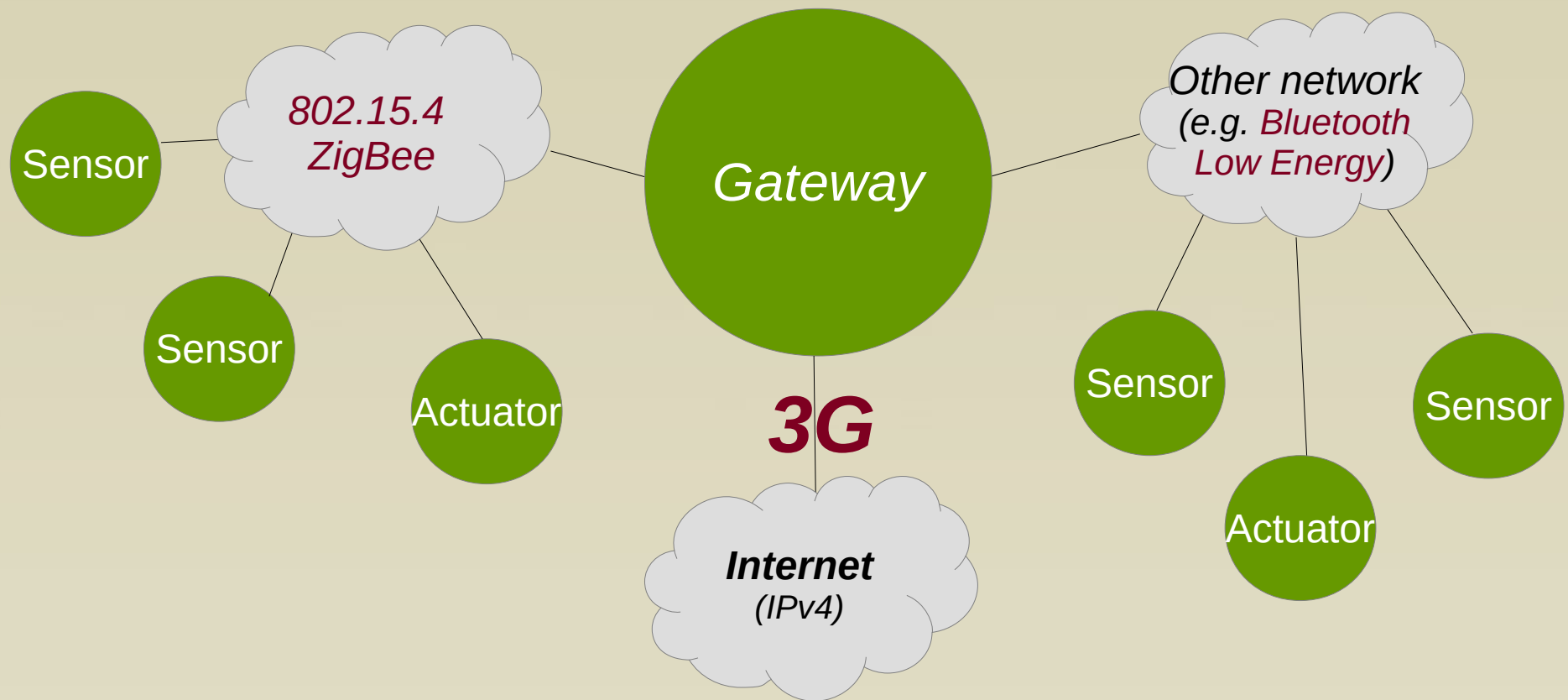- *Smart client*

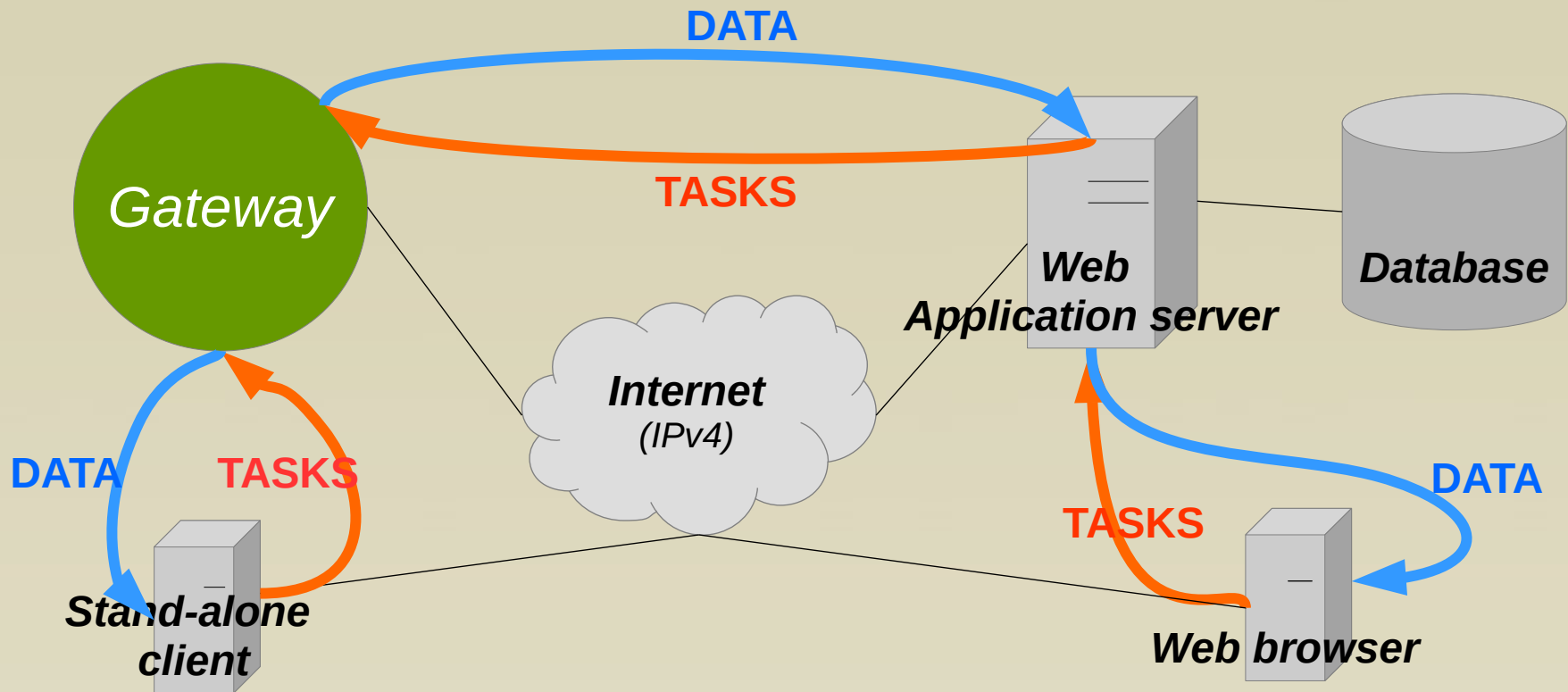Source: *www.iotworld.com*

The classic
hub and spoke
model

General architecture (cnt'd)

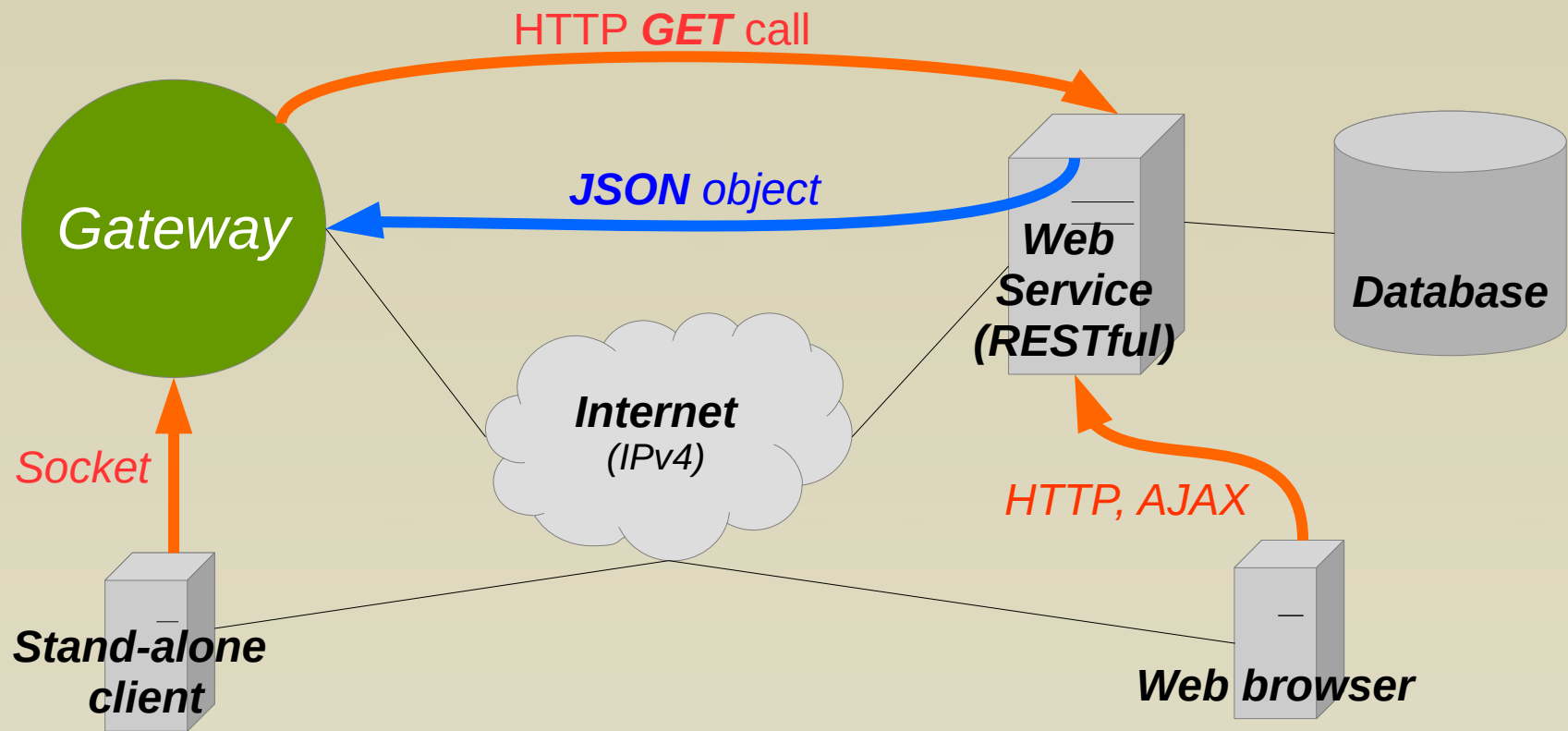- The general application architecture is the classic ***hub and spoke*** model:

802.15.4 ZigBee

Sensor

Sensor

Actuator

Gateway

3G

Internet (IPv4)

Other network (e.g. Bluetooth Low Energy)

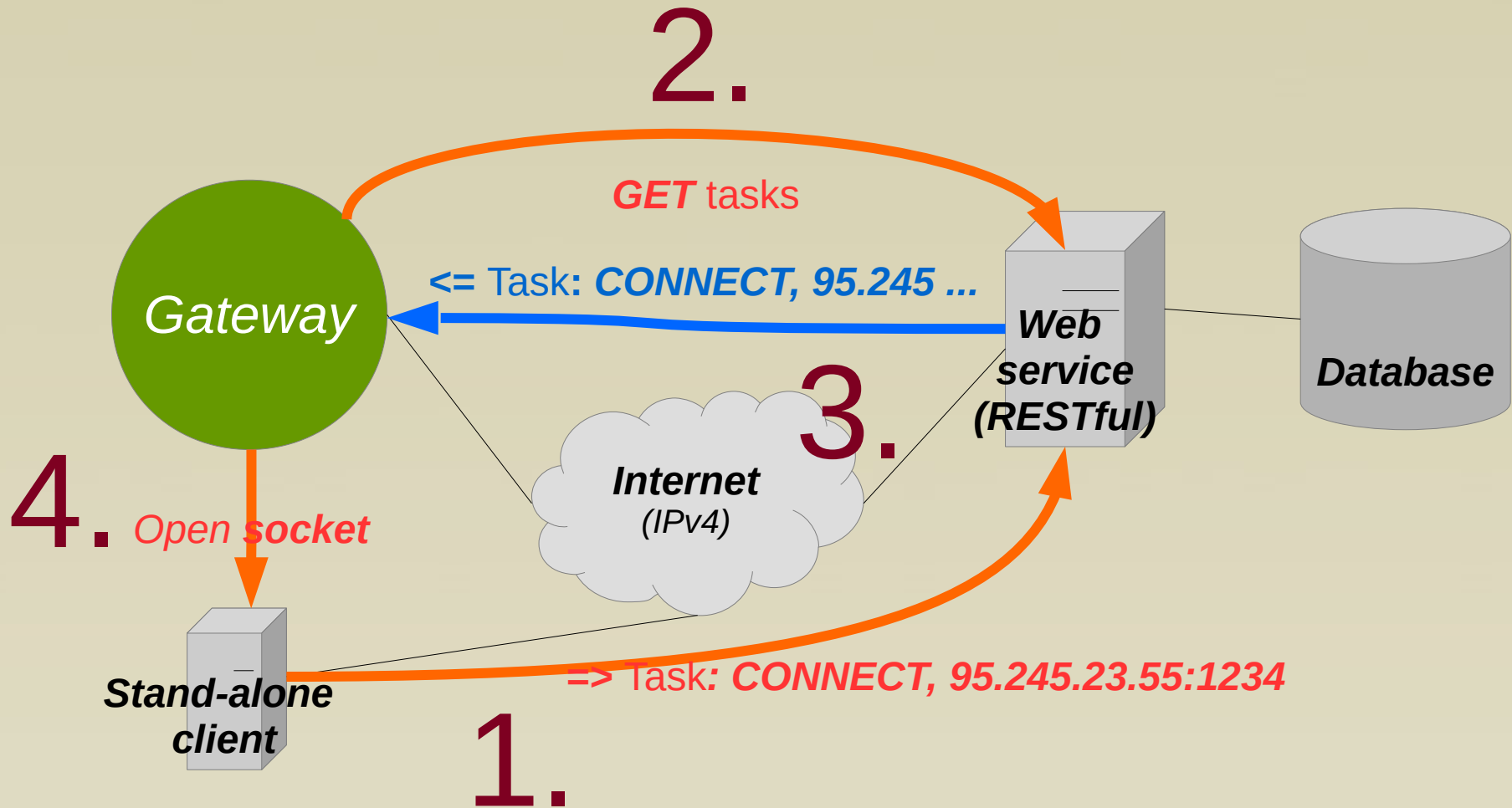Sensor

Actuator

Sensor

General architecture (cnt'd)

General architecture (cnt'd)
-interactions

General architecture (cnt'd)

Gateway.java

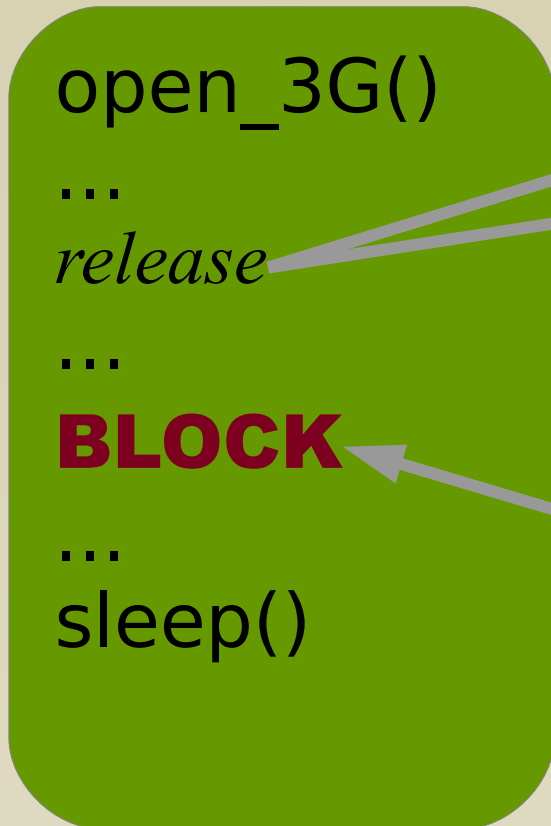Nodes management, GPIO, xBee interface, 3G link and socket management.

It spawns 3 threads:

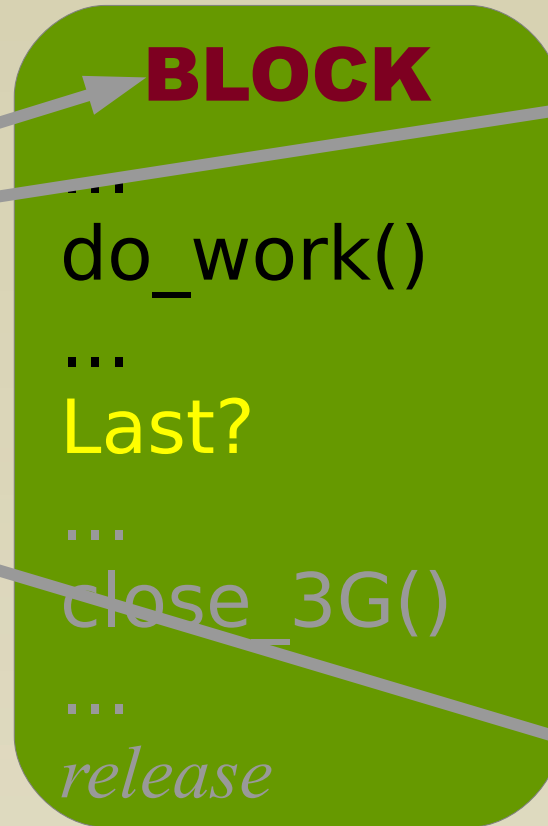*SensorDataPollerAndSender*
TaskPollerAndExecutor
MainSequencer
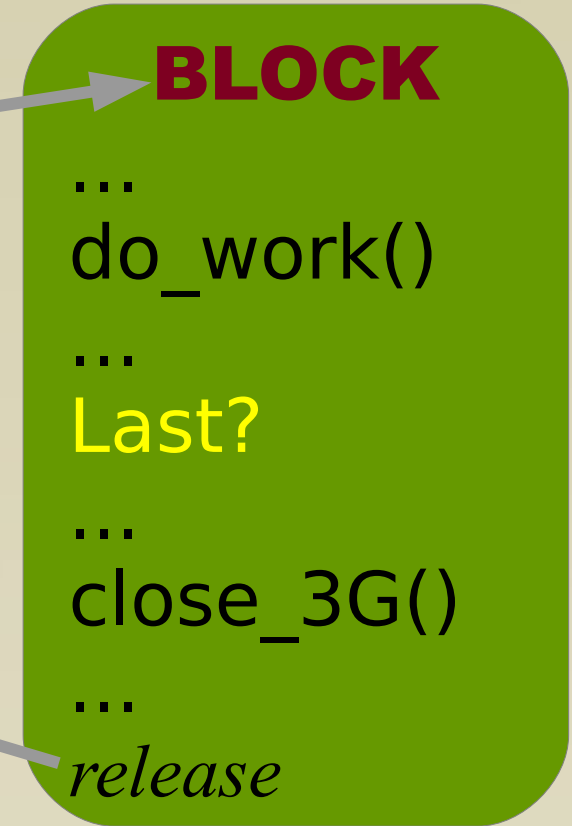
Gateway.java (cnt'd)

Do forever:

MainSequencer thread

open_3G()
...
release
...
BLOCK
...
sleep()

Do forever:

PeriodicThread 1

BLOCK
...
do_work()
...
Last?
...
close_3G()
...
release

Do forever:

...   PeriodicThread n

BLOCK
...
do_work()
...
Last?
...
close_3G()
...
release

Web Control Panel

Technologies