# IoT Product Pitch

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The Problem

- Most houses in the UK rely on the flow of hot water through a series of radiators for heat - per the diagram alongside.

- The issue is that these systems often only have a single thermostat often located in the hallway (or near the boiler) to control the heat throughout the house which is inefficient as normally not all rooms need to be at the same temperature   eg. People often prefer their bedrooms to be cooler than the living room.

  - N.B> It is possible to fit thermostatic valves to each radiator allowing rudimentary adjustment of the water flow of each radiator & hence the room temperature.
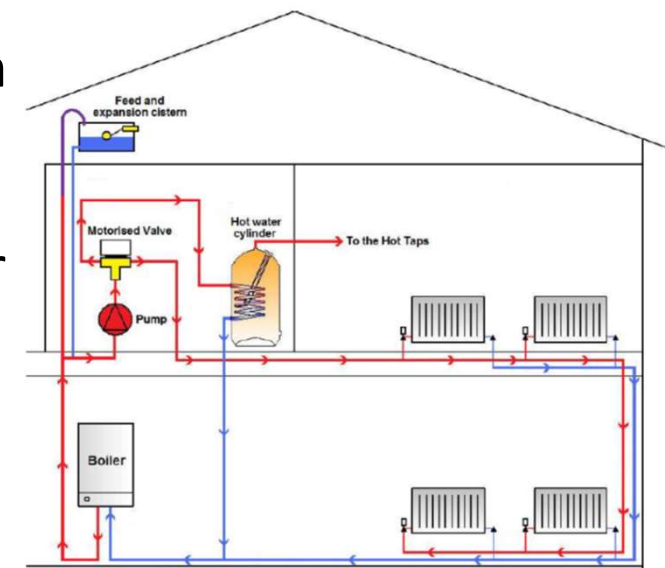
Product Proposition

- A motorised radiator (smart) valve equipped with heat and water flow sensors and short range radio communication capabilities.

- These would be fitted to every radiator.

- Temperature readings would be communicated to a central controller which would compare them with user programmed settings for each room and respond with control signals to the appropriate valve motor to adjust the water flow (and hence room temperature) as required – in nr real-time!

- The system would be able to take temperature readings from thermostats elsewhere in the house and not connected to a radiator eg. on the stairs

- The water in these systems tends to 'fur' up (ferric oxide build up) - flow readings from the valves would be collected to build up a picture over time of the system efficiency, enabling preventative maintenance to be scheduled ('flushing' the system)and also forewarning of valve and other system element (eg. pump) malfunctions (preventing leaks and ensuing insurance claims).

The SCP Stack: Product Infrastructure

- A gateway controller featuring
  - CPU
  - Memory
  - Storage
  - Webserver
  - Security eg. Firewall etc
  - Internet access
    - WiFi
    - Ethernet
  - Short range radio
    - See next slide
  - Micro USB power port

- IoT (radiator) valves featuring
  - Mechanical valve
  - Motorised screw adjuster
    - To control hot water flow
  - Motor position controller IC
  - Heat sensor
  - Flow rate sensor
  - Short range radio
  - Thermoelectric generator chip
    - To trickle charge battery
  - Rechargeable battery

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The SCP Stack: Sensors

- Temperature
- Water flow
- Valve position

The SCP Stack: Connectivity

- Short range radio
  - Technology choices
    - Zigbee
    - BlueTooth Low Energy
    - WiFi
    - Z-wave

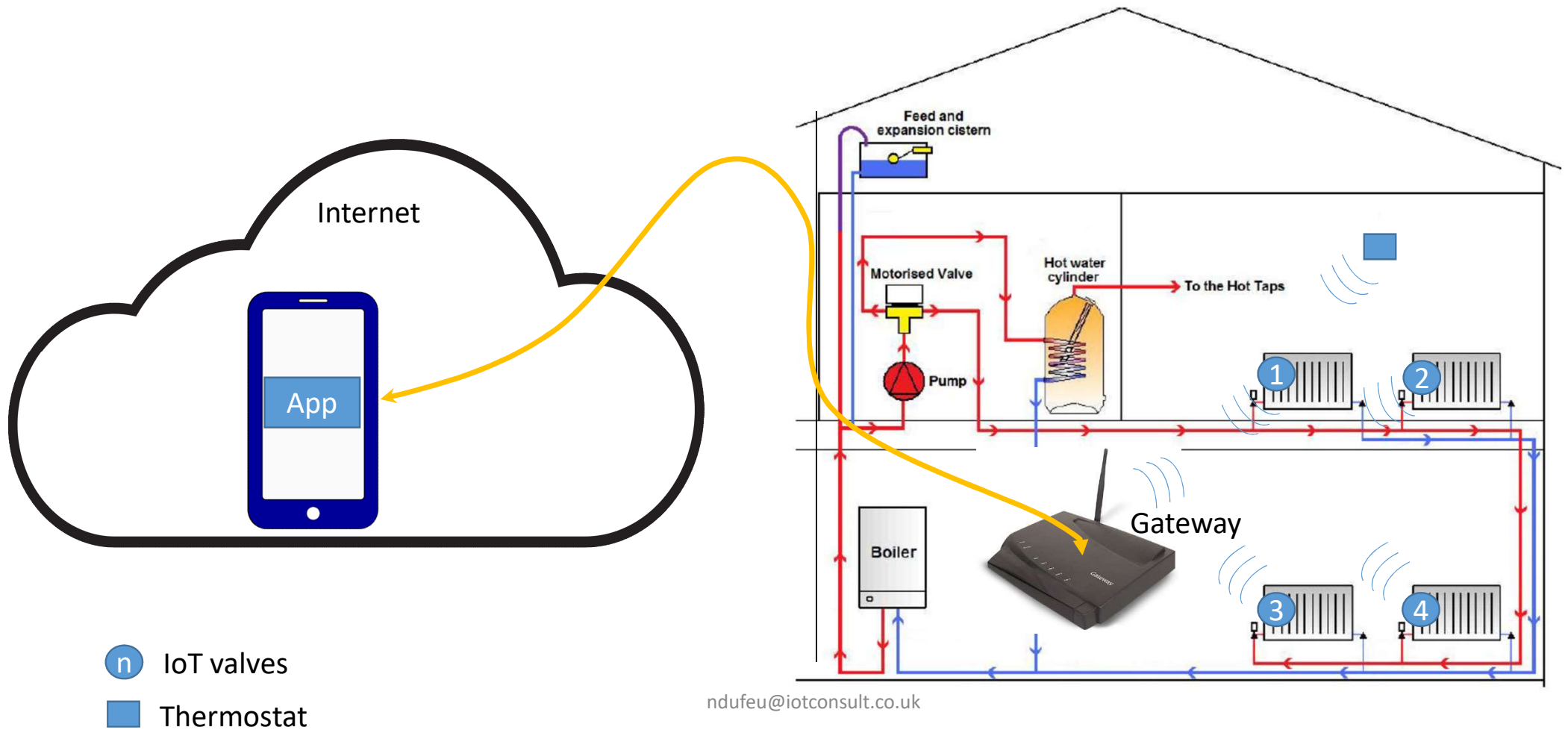- Secure valve addressing scheme

The SCP Stack: Analytics

- Database
  - Records temperature and flow readings from valves,
  - Organises data by valve address
  - Processes readings
  - compares to user settings
  - issues control signals to valves to raise or lower temperature
  - Notifies trends

The SCP Stack: SmartApp

- IOS &/or Android app provides User Interface enabling
    - configuration of gateway controller,
    - setting preferred temperature for each room,
    - reviewing historic temperature and flow readings per room,
    - User defined naming of valves eg. by room name
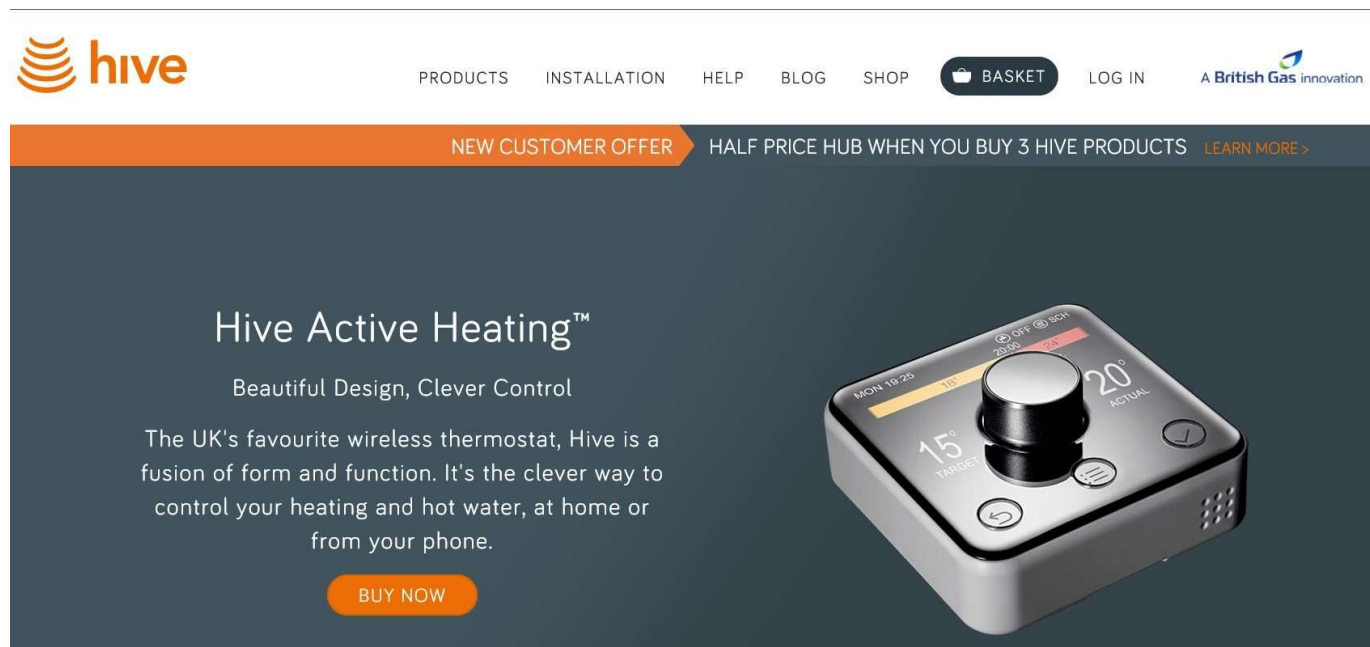   - backup of readings database.

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System Schematic

Internet

App

Feed and expansion cistern

Motorised Valve

Hot water cylinder

To the Hot Taps

Pump

Boiler

Gateway

① ② ③ ④

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n IoT valves

■ Thermostat

Challenges

- Achieving a cost of <=£15 per valve
- Power budget

Competition

- British Gas have a similar product called HIVE

hive

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BUT Hive doesn't adjust the water flow through each radiator

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