Developing of energy resources accounting and controlling system for the Internet of Things

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Smart grid for local energy consumers

- Poll energy consumption data (statistics, alerts) from local facilities

- Provide bidirectional communication between energy consumers and producers

- Integrate local facility devices to the country-scale smart grid

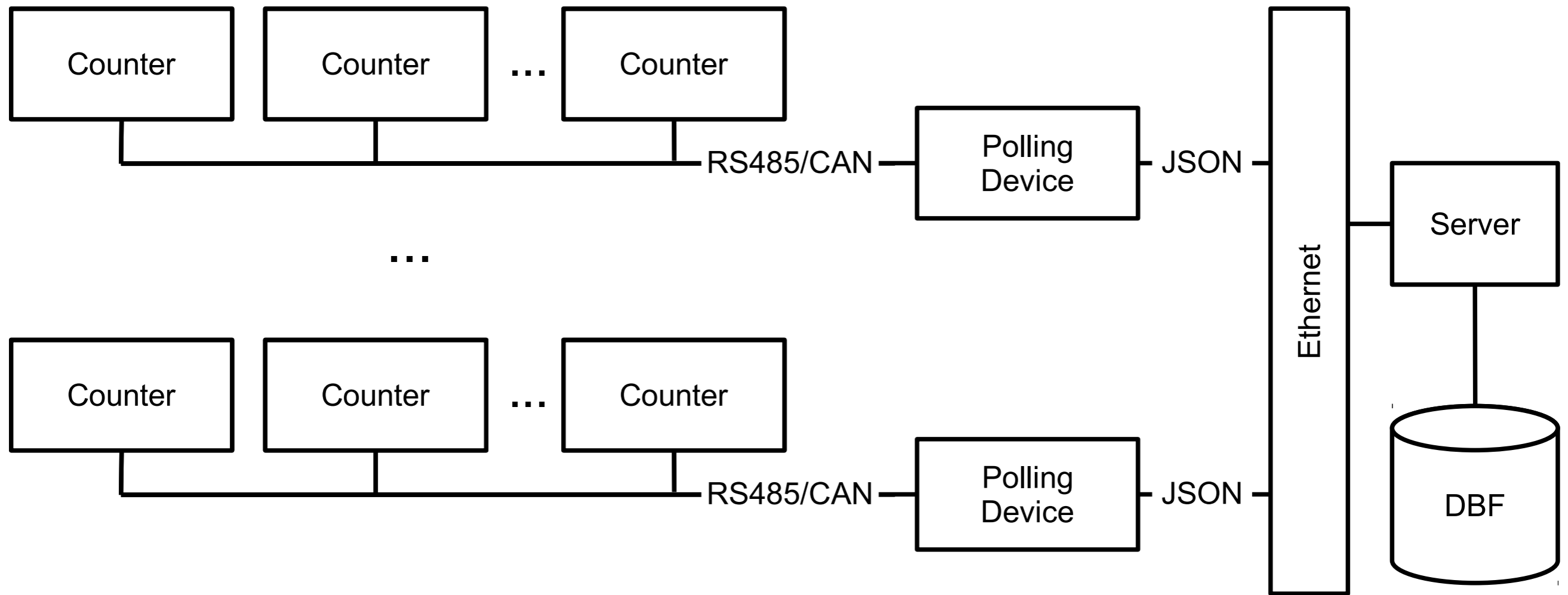# Current state of electric energy consumers in Russia

- According to Russian government regulation #442 from 04 may 2012 all consumers with energy consumption over 670 kW/hr. should switch to an hourly rate of pay

- Existing solutions require upgrade of metering equipment on the whole facility and aimed primarily for automatic reports generation

Current work

- At this point we're working on energy data polling

- Our system polls data from 70 electricity meters from 4 power stations at LenPoligrafMash's (LPM) facility

- This data are sent to company's accounting system (1C based) and used for visualising and reports generation
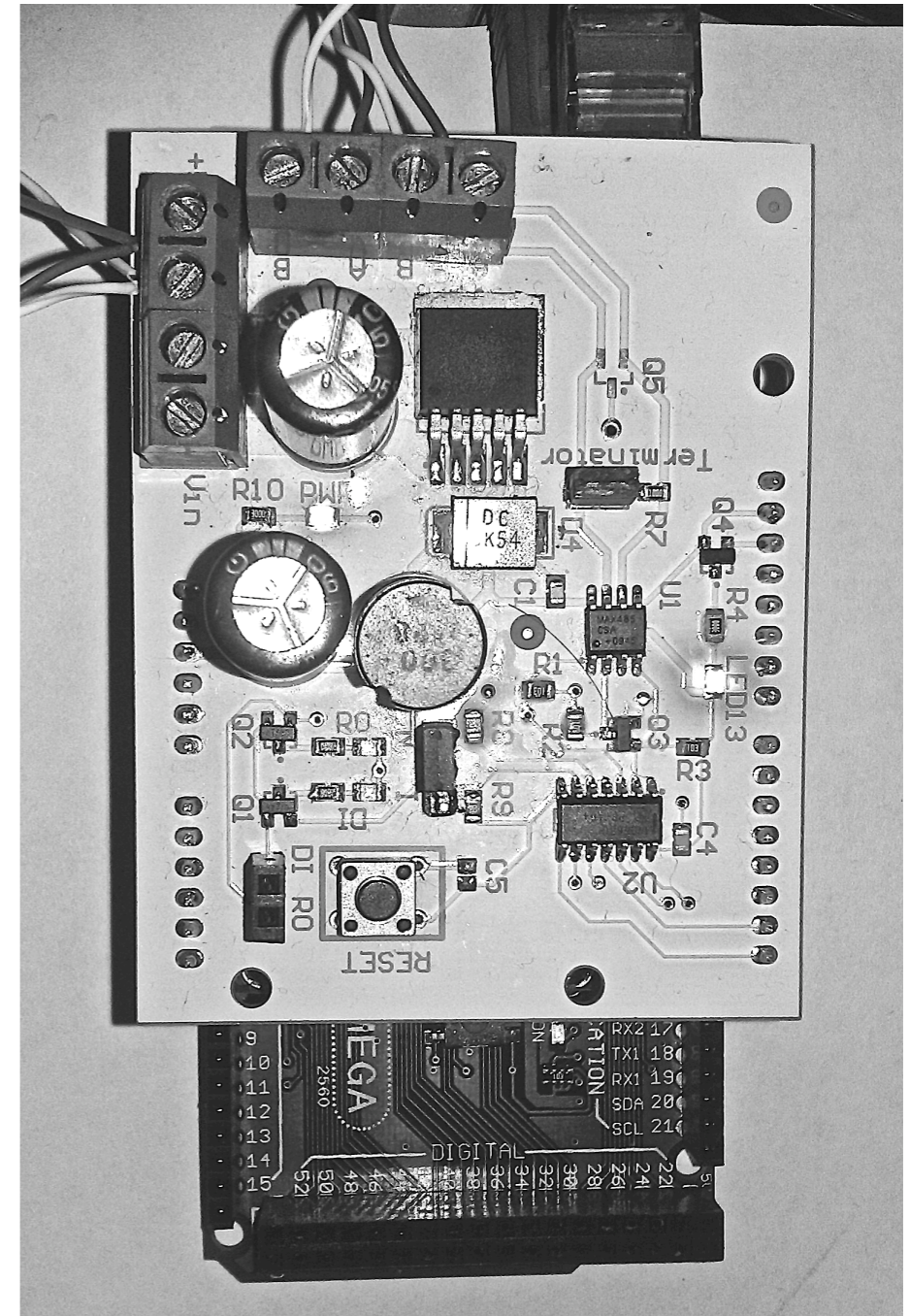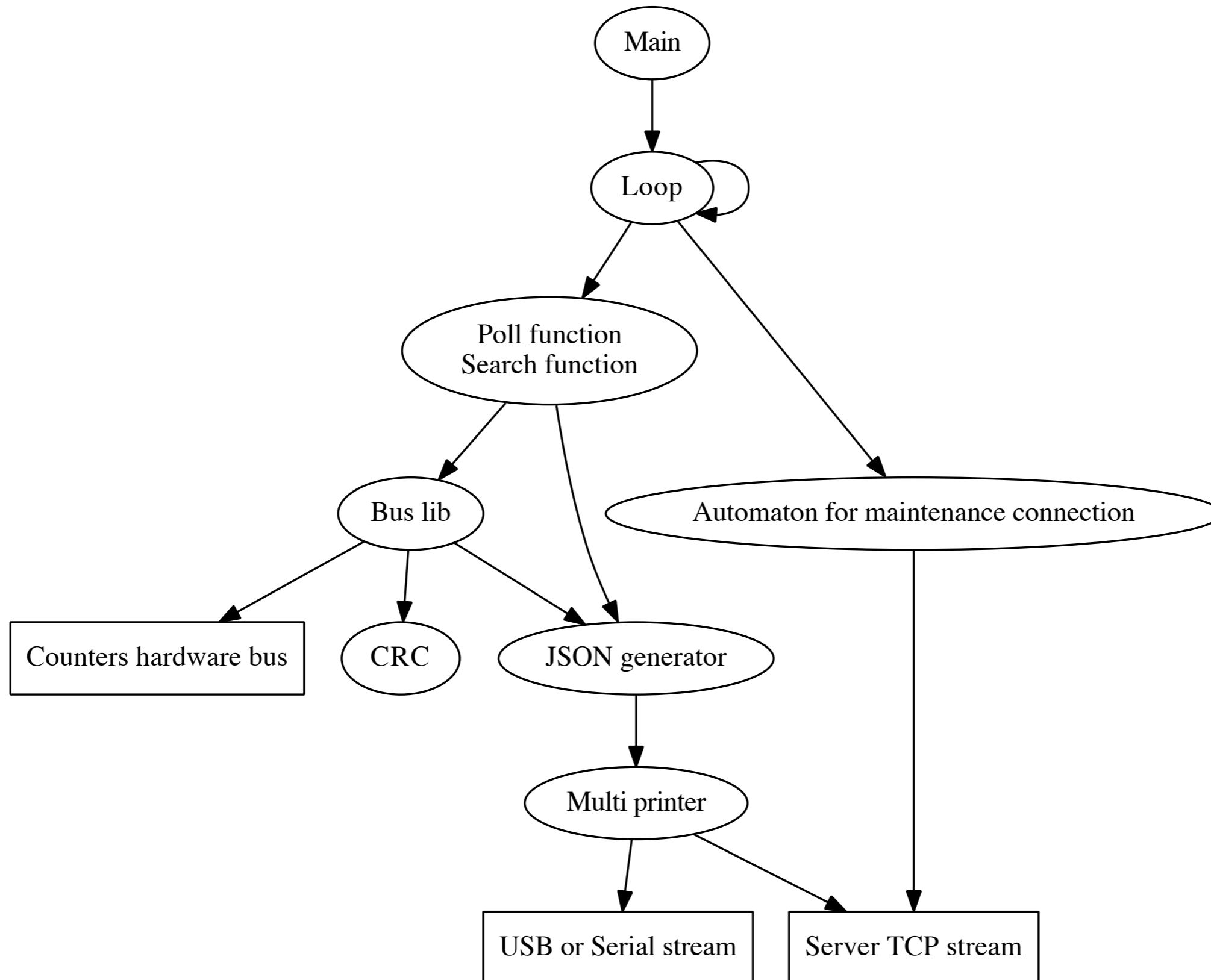
Polling system (1/3)

Polling system (2/3)

```
{
"CounterAddress__" : 95,
"LoginAction__" : "Logged in",
"SerialNumber__" : 13535895,
"ManufactureDate__" : "5-2-13",
"Timestamp__Date" : "14-8-13",
"Timestamp__Hour" : 18,
"Timestamp__Min" : 25,
"Timestamp__Sec" : 28,
"Now_Power_P_SUM_____value" : 28.82,
"Now_Power_Q_SUM_____value" : -26.2,
"Now_Power_S_SUM_____value" : 38.96,
"Now_Voltage_Phase_1_value" : 11.15,
"Now_Voltage_Phase_2_value" : 0.0,
"Now_Voltage_Phase_3_value" : 239.13,
"Now_PowerFactor_SUM_____value" : 0.739,
"Now_Frequency_value" : 50.01,
"Uptime" : "30039"
}
{
"type" : "debug",
"Address" : "0x5Eh",
"CountersSearch_SearchRequest_Error" : "No answer
from - 94", "CountersSearch_SearchRequest_Buffer" :
"5E 0 39 D0 ",
"Uptime" : "27998"
}
```

Polling system (3/3)

Achievements

- Universal JSON-based counter data representation

- System is up 24/7 for about 4 months (of course with a little downtimes)

- Partnership with LPM gives us access to all of facility resources, e.g. lab for testing devices in extreme environment conditions

- Preliminary agreements with two other facilities about deployment of our system

Future work

- Develop:

  - more utility meter's protocol implementations

  - real-time monitoring and alarming system

  - custom ARM-based polling device with all ports on the same board

  - universal polling device firmware that can be updated remotely

  - Boxed Solution

Thank you!
Any questions?

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