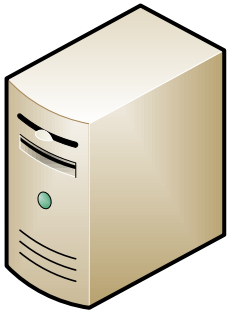
Location-based event system for mobile phones



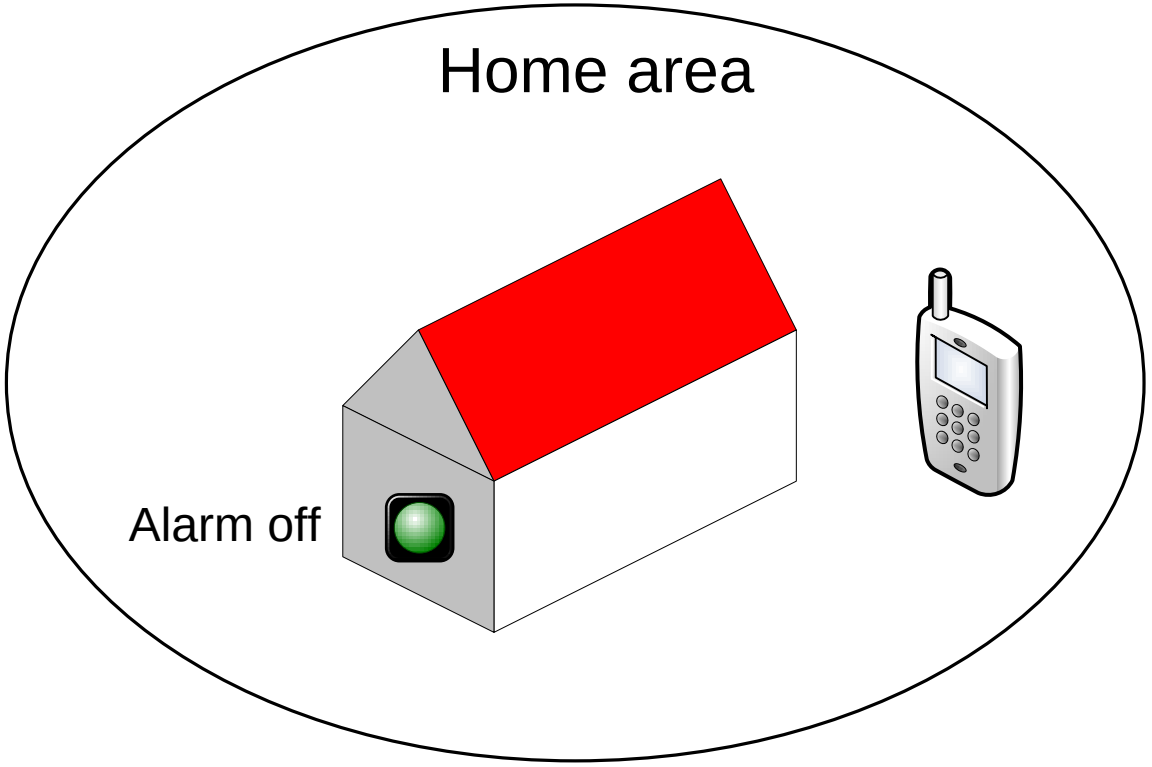
Home server

Mobile phone

- Directory of registered mobile phones
- Directory of available services: Alarm, light, garage door and heating systems
- Publish-subscribe based event system
  - Service subscriptions for each phone
  - Mobile phone connectivity
  - Event dispatcher
  - Event listener for phones and underlying systems
- Event processing logic

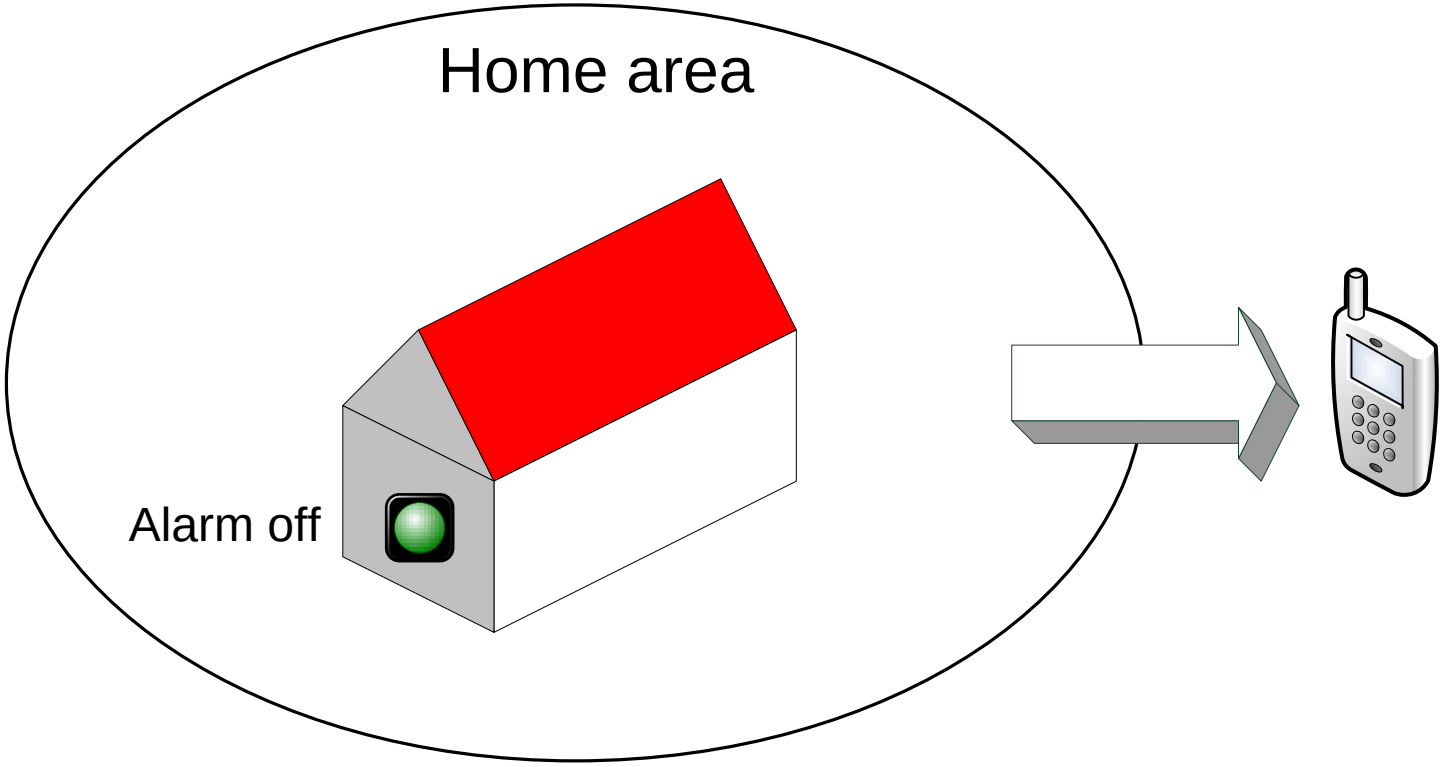
- Home server connectivity
- Event dispatcher (enter/exit area events)
- Event listener (home service events)
- Location update service
  - GPS, WiFi, Bluetooth interfaces
- Home service event notification UI
- Home control application
  - Request status of home service
  - Modify status of home service

1 Location awareness



Bluetooth, WiFi or GPS can be used to detect when the phone leaves the home area. For Bluetooth and WiFi the home area is defined by the coverage area of the network they provide.

2 Location update



The location update service on the mobile phone determines that the user exited the home area, and sends an ”area exited” event to the home server.

3

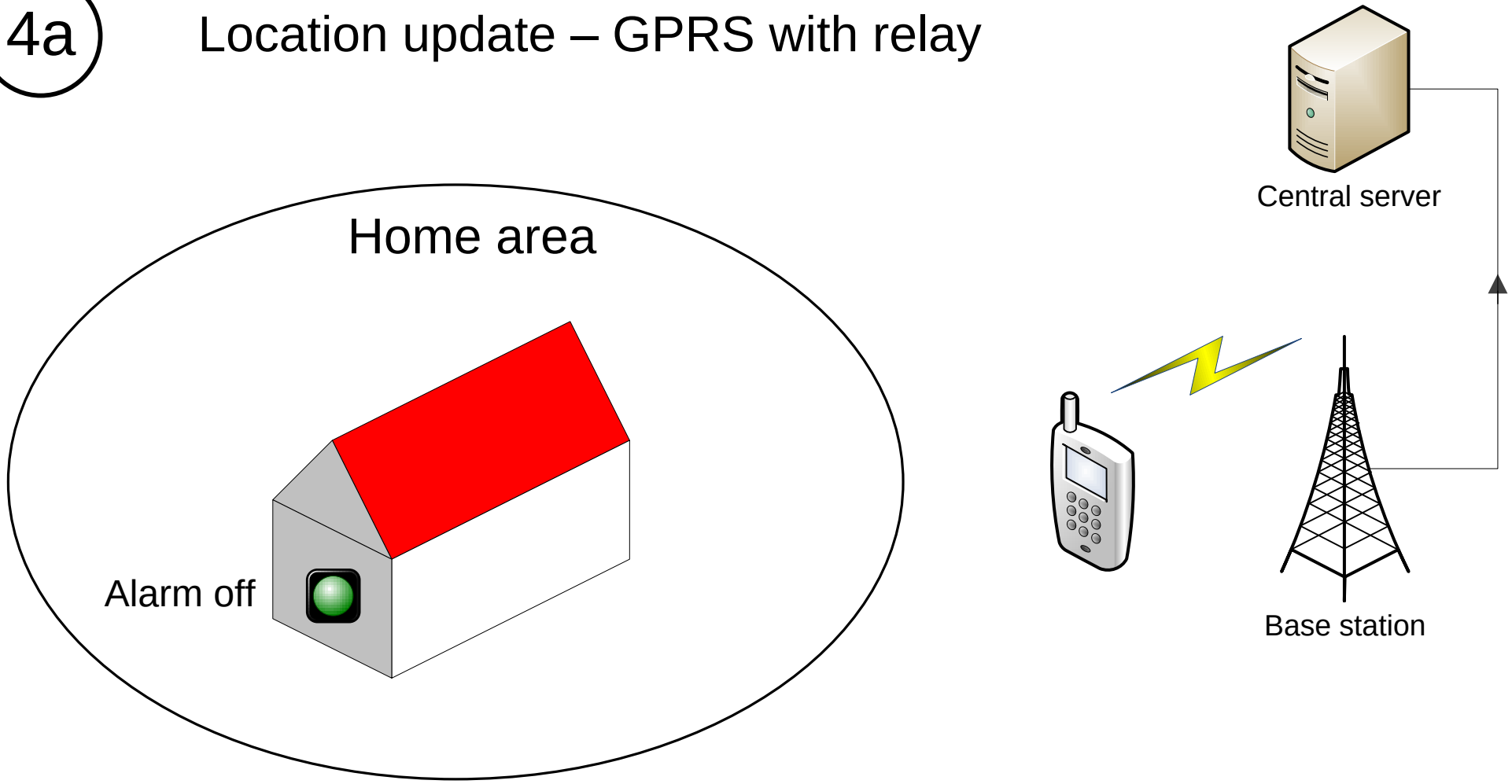
Communication with home server outside home area

- GPRS with relay (4a-d)
- GPRS without relay (5a-c)
- SMS (6a-d)

Communication with home server inside home area

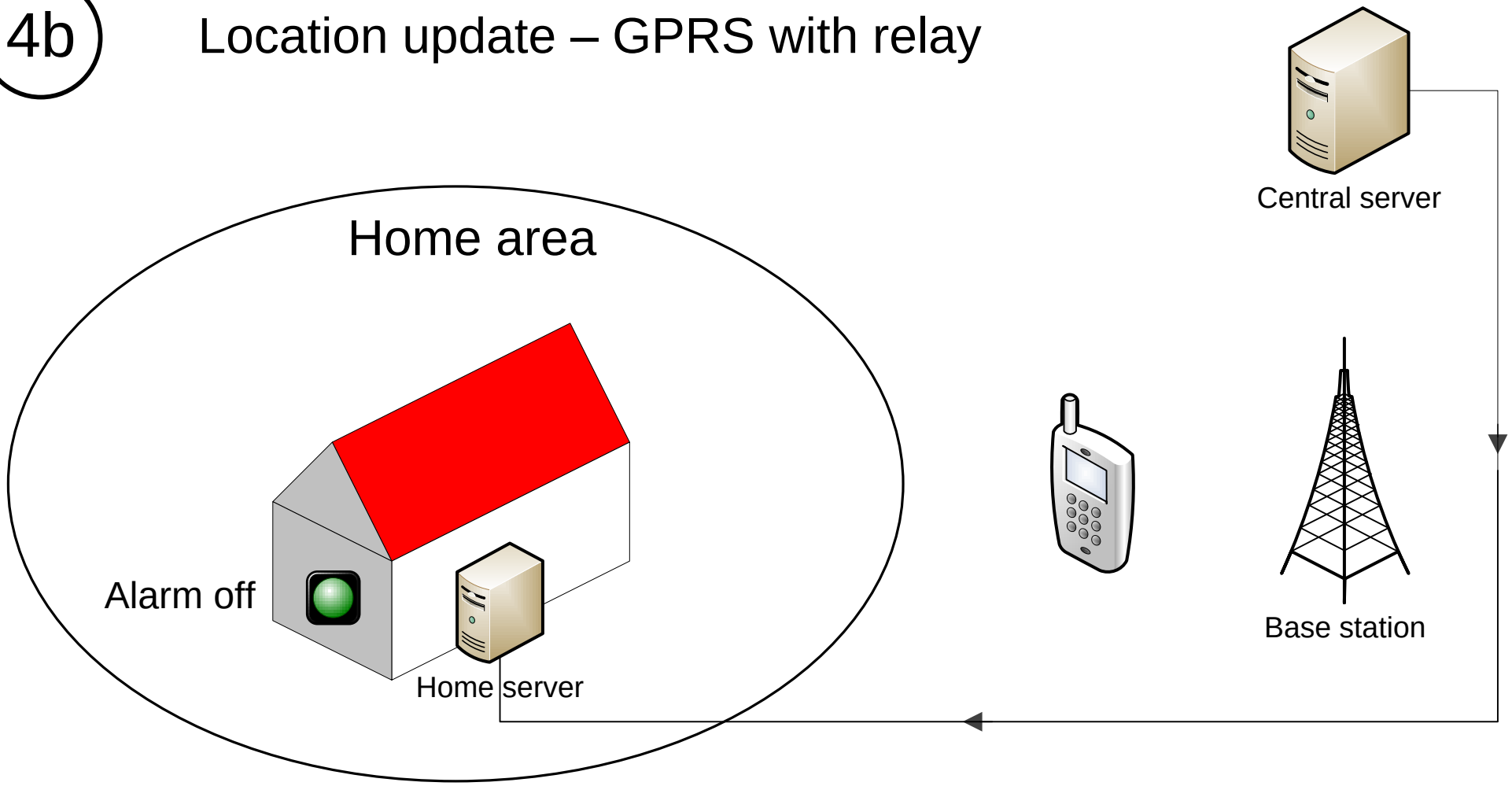
- GPRS with relay
- GPRS without relay
- SMS
- Local Bluetooth connection
- Local WiFi connection
- +++

4a Location update – GPRS with relay



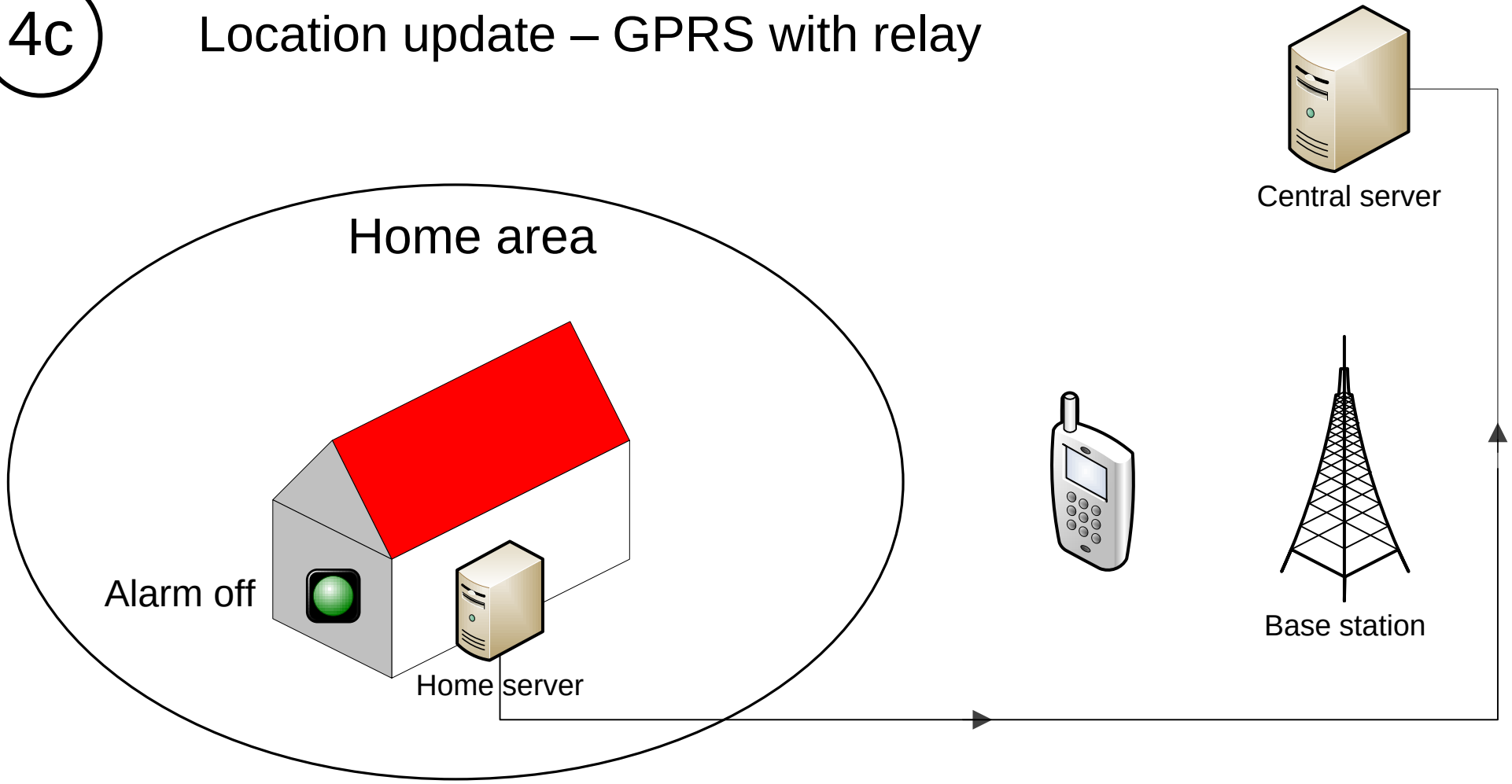
Phone uses TCP/IP over GPRS to communicate with a central server to deliver the event.

4b Location update – GPRS with relay



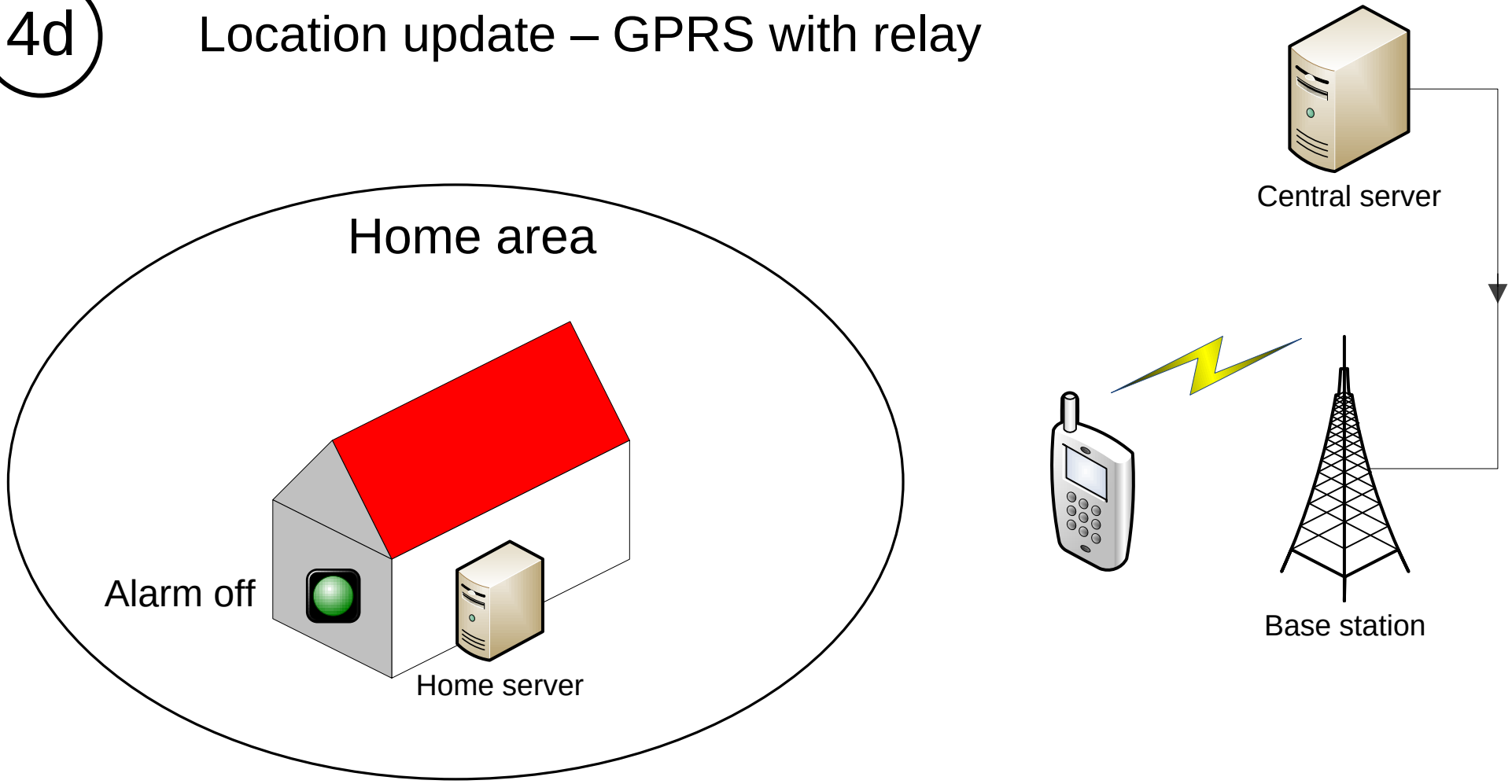
Central server knows the IP address of the home server which it uses in order to forward the event.

4c Location update – GPRS with relay



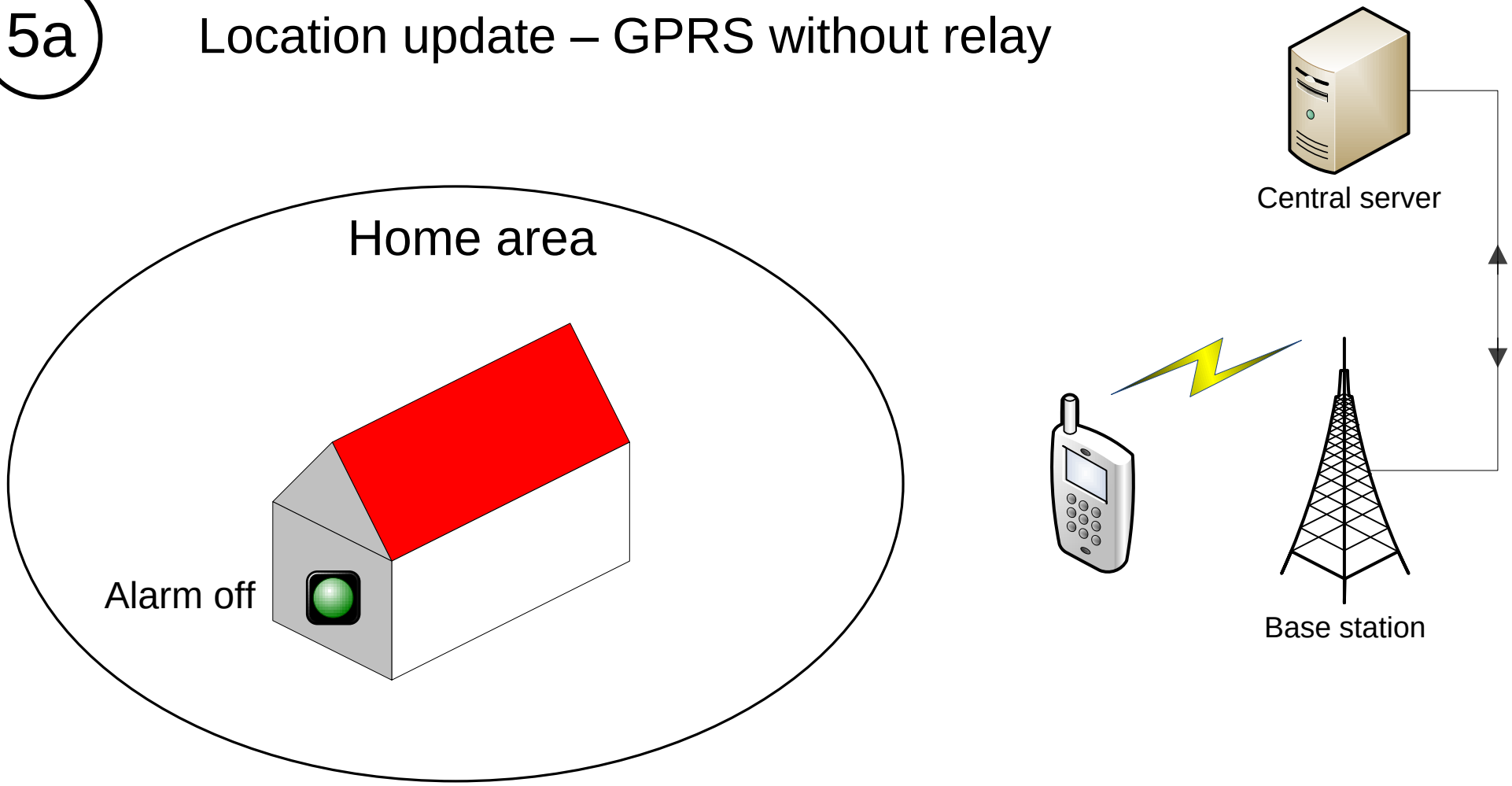
Home server processes the ”area exited” event and generates a new ”alarm off” event. This tells the phone that it left the home area without turning on the alarm.

4d Location update – GPRS with relay



Central server forwards the event to the phone.

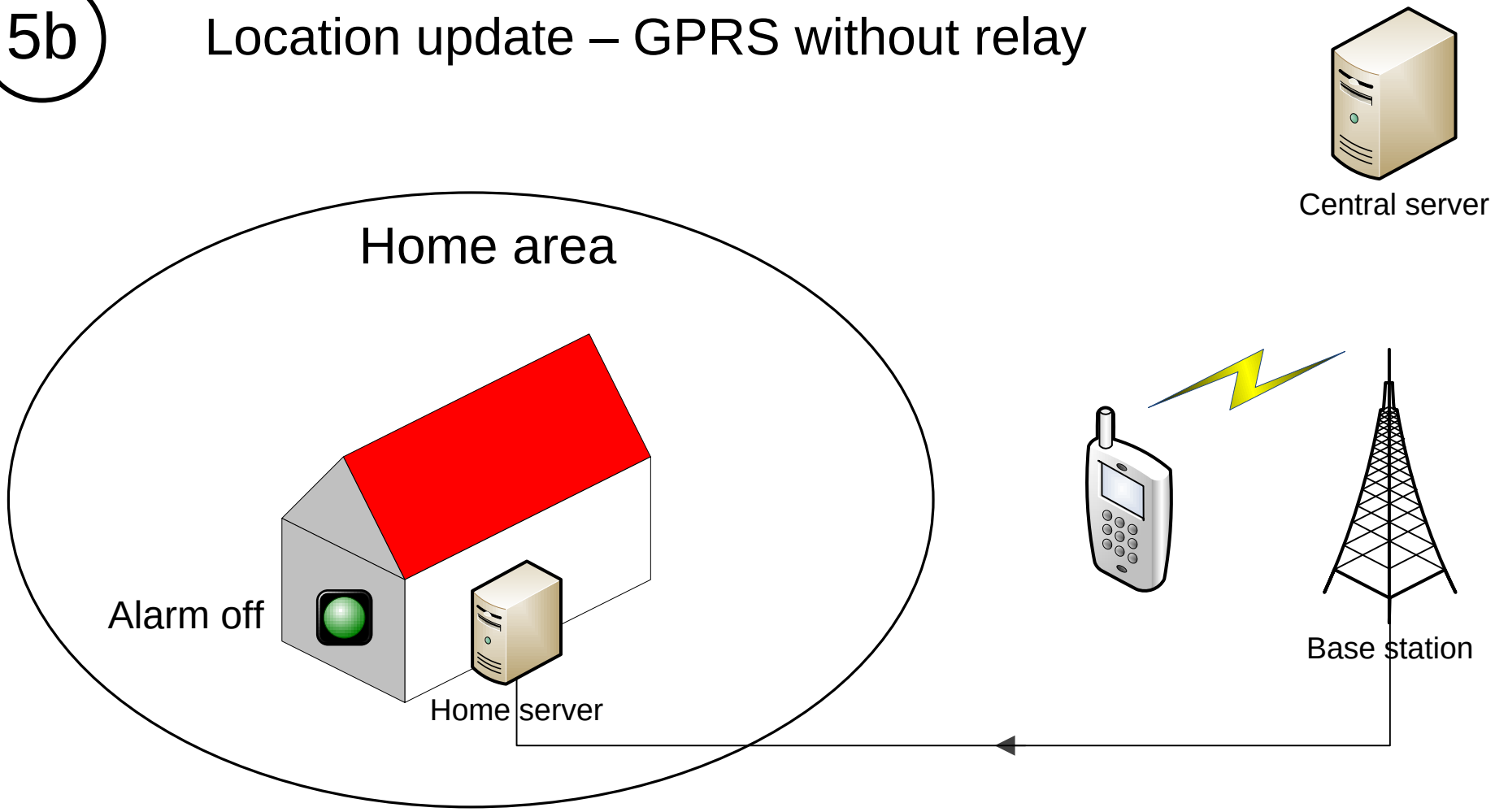
5a Location update – GPRS without relay



Phone uses TCP/IP over GPRS to communicate with a central server.
Central server provides the IP address to the home server.

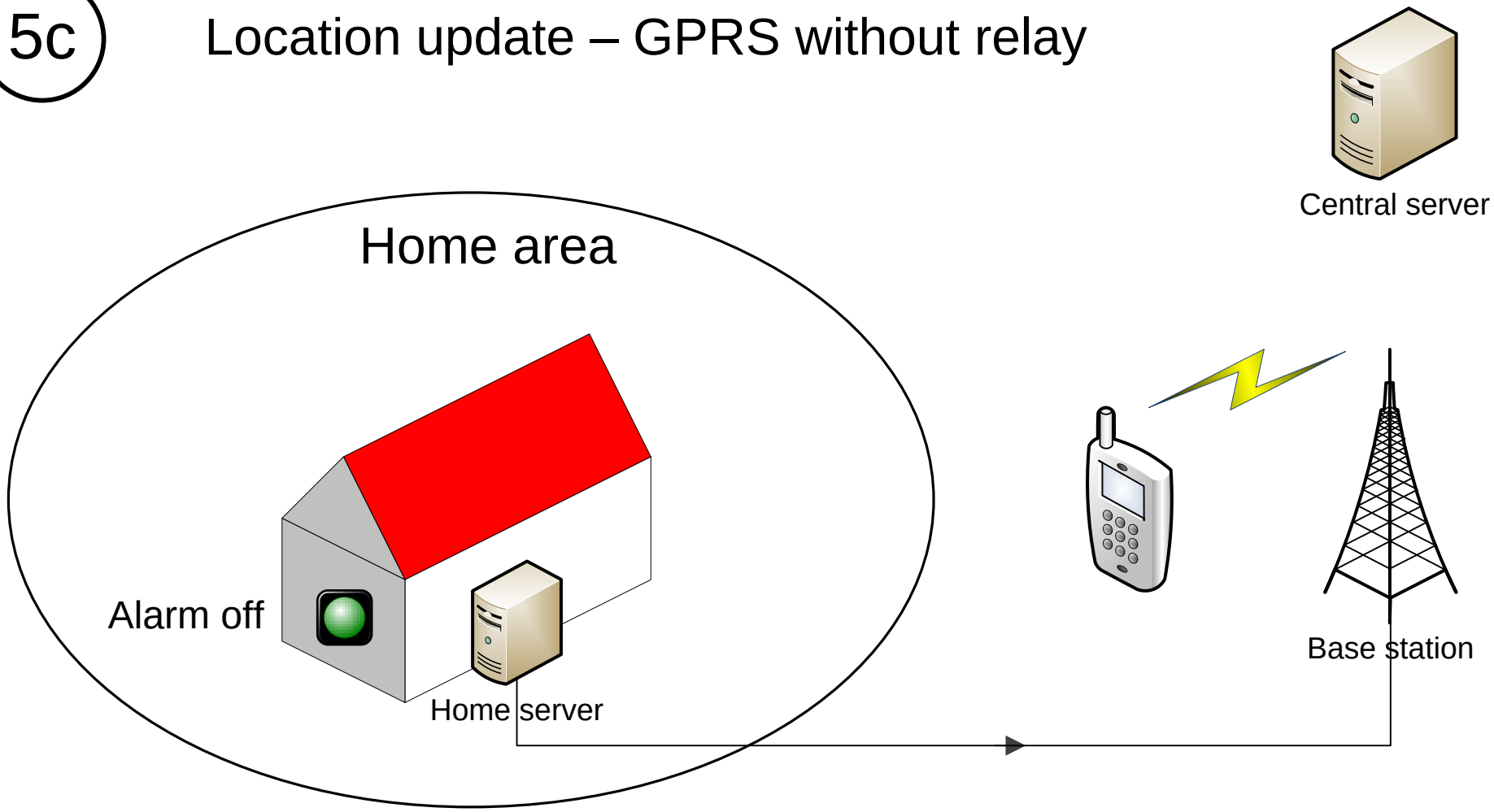
Note: This step can be omitted if the home server has a static IP address or host name known by the phone.

5b Location update – GPRS without relay



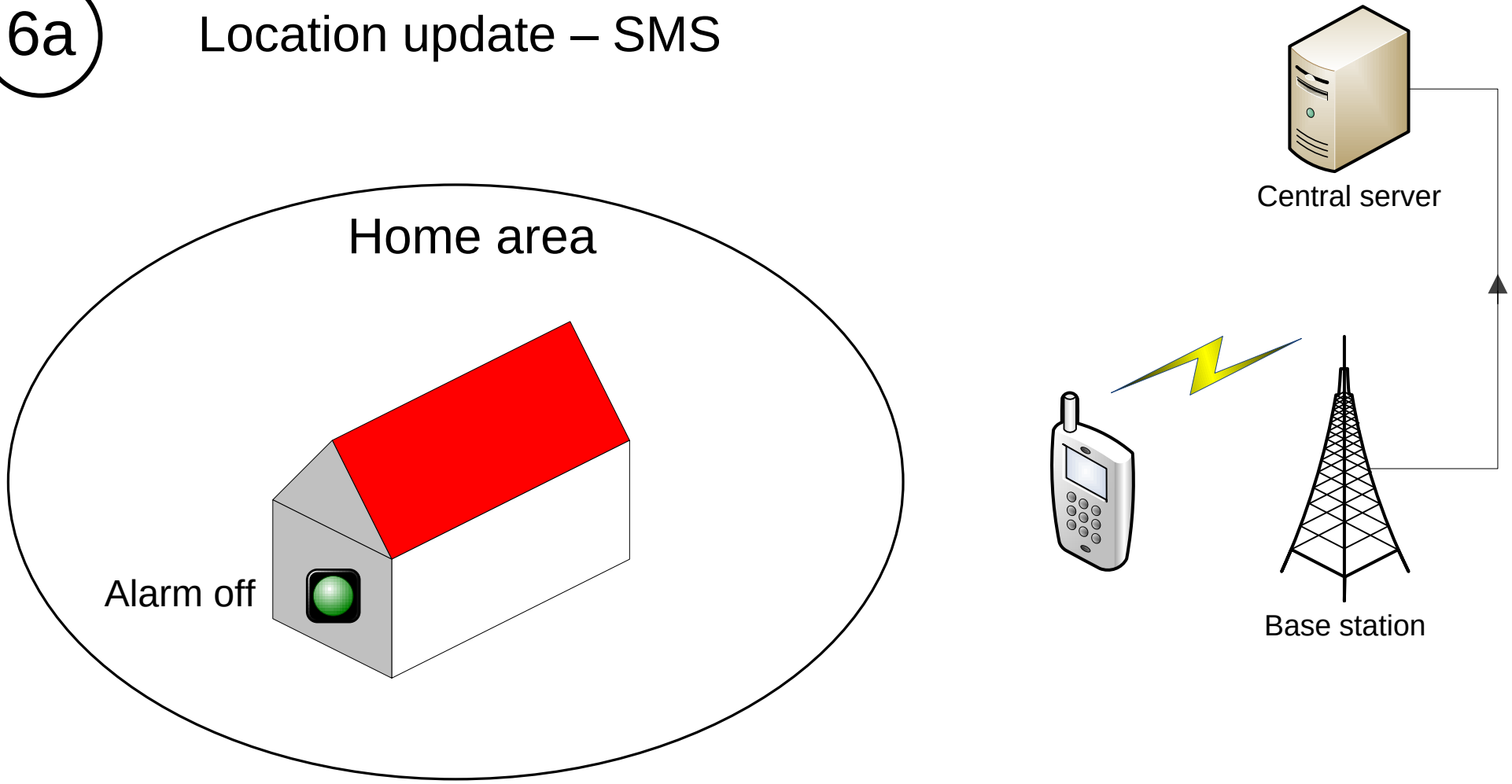
Phone contacts the home server directly and delivers the event.

5c Location update – GPRS without relay



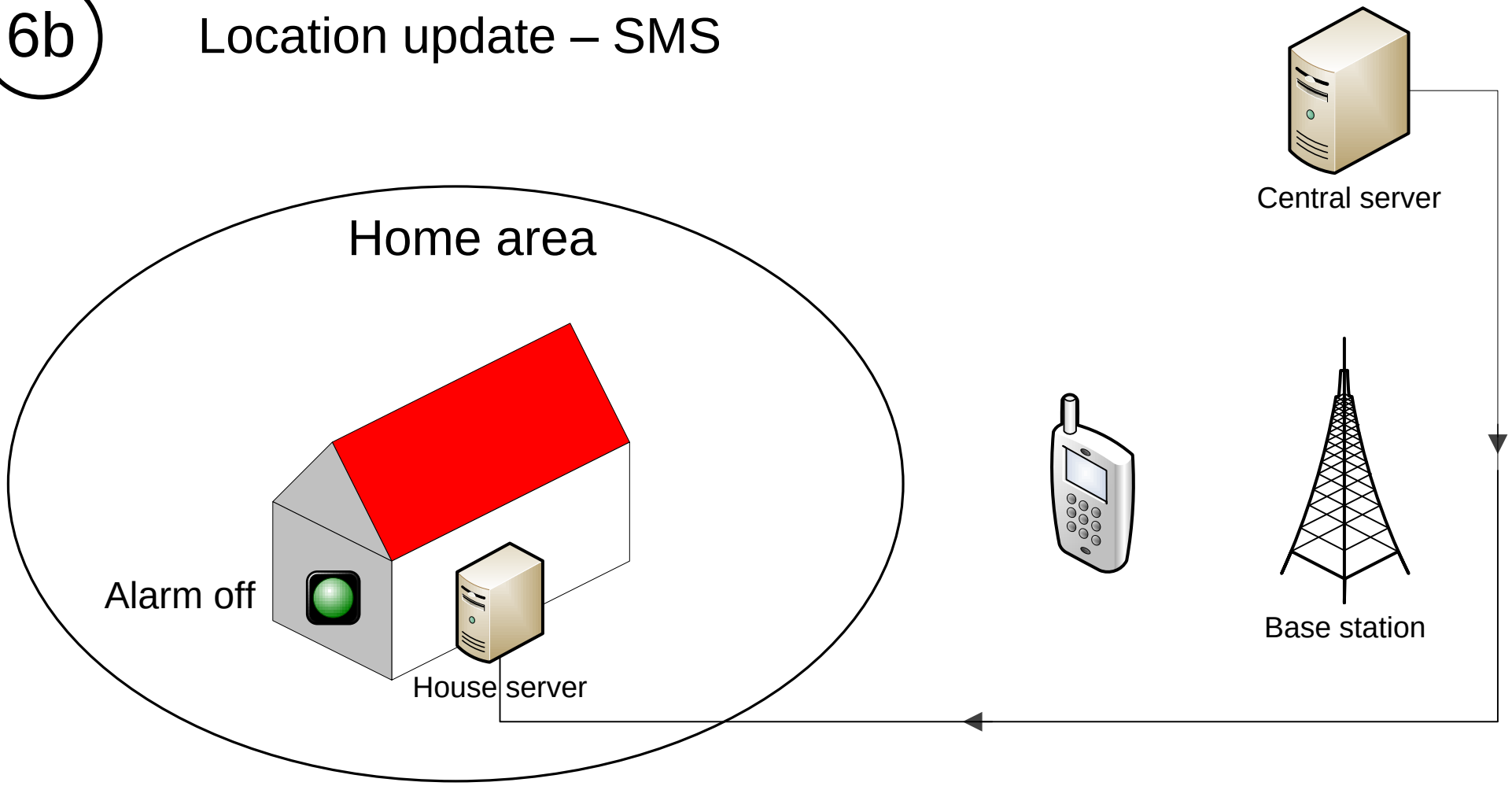
Home server processes the ”area exited” event and returns the new ”alarm off” event directly to the phone.

6a Location update – SMS



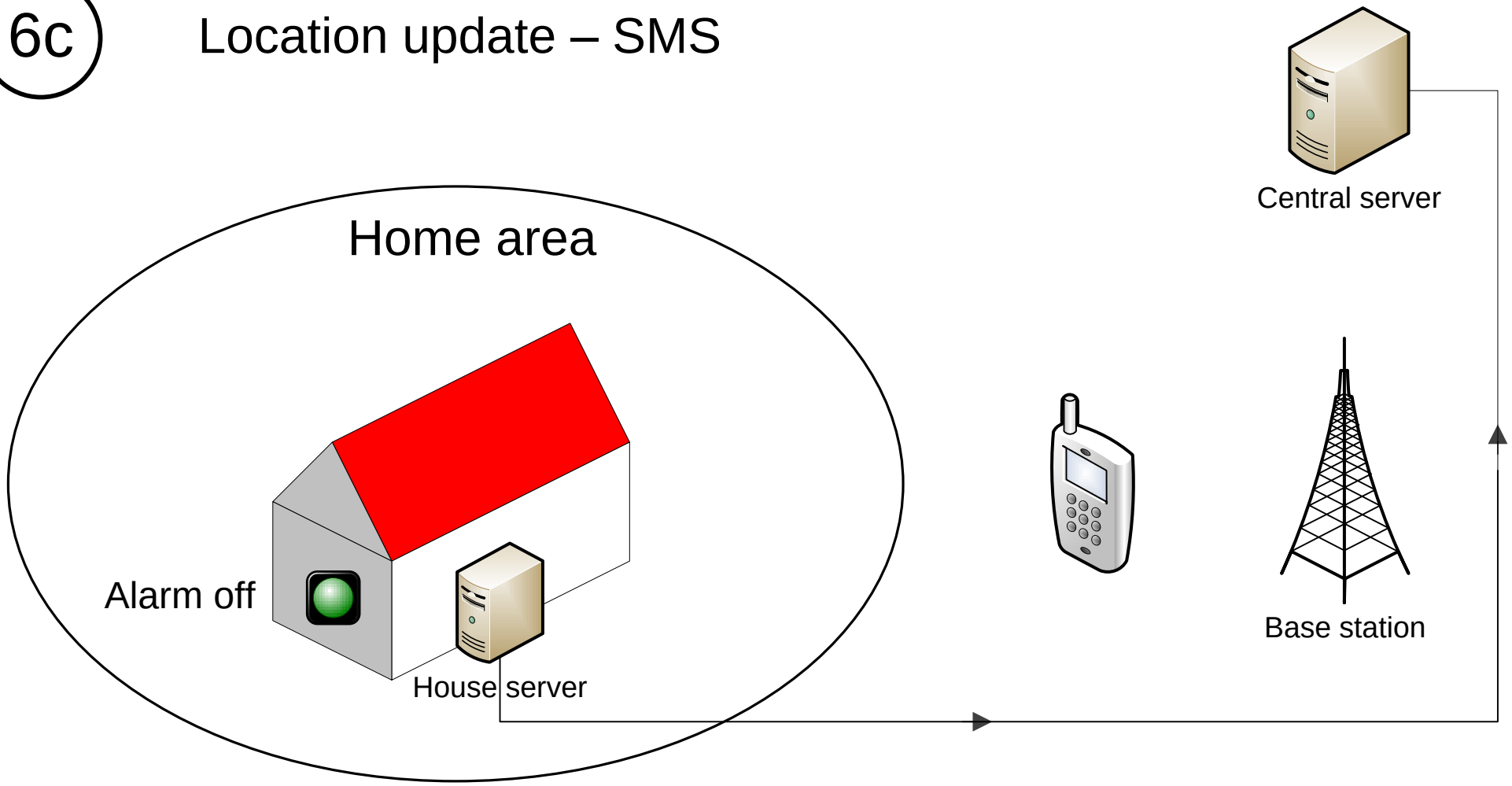
Phone uses SMS (generated by application) to communicate with a central server to deliver the event.

6b Location update – SMS



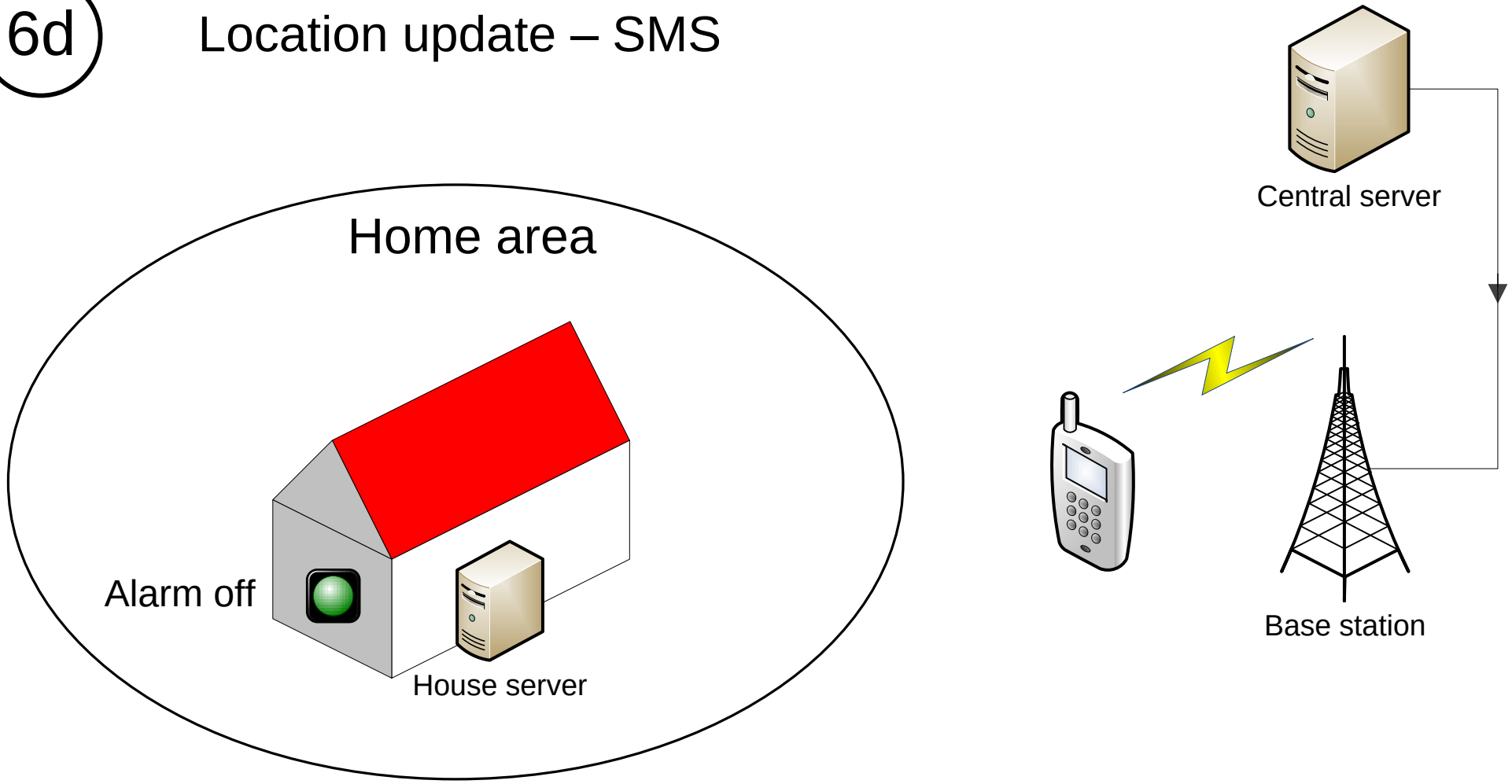
Central server knows the IP address of the home server and through TCP/IP it forwards the event.

6c Location update – SMS



Home server processes the ”area exited” event and returns the new ”alarm off” event to the central server.

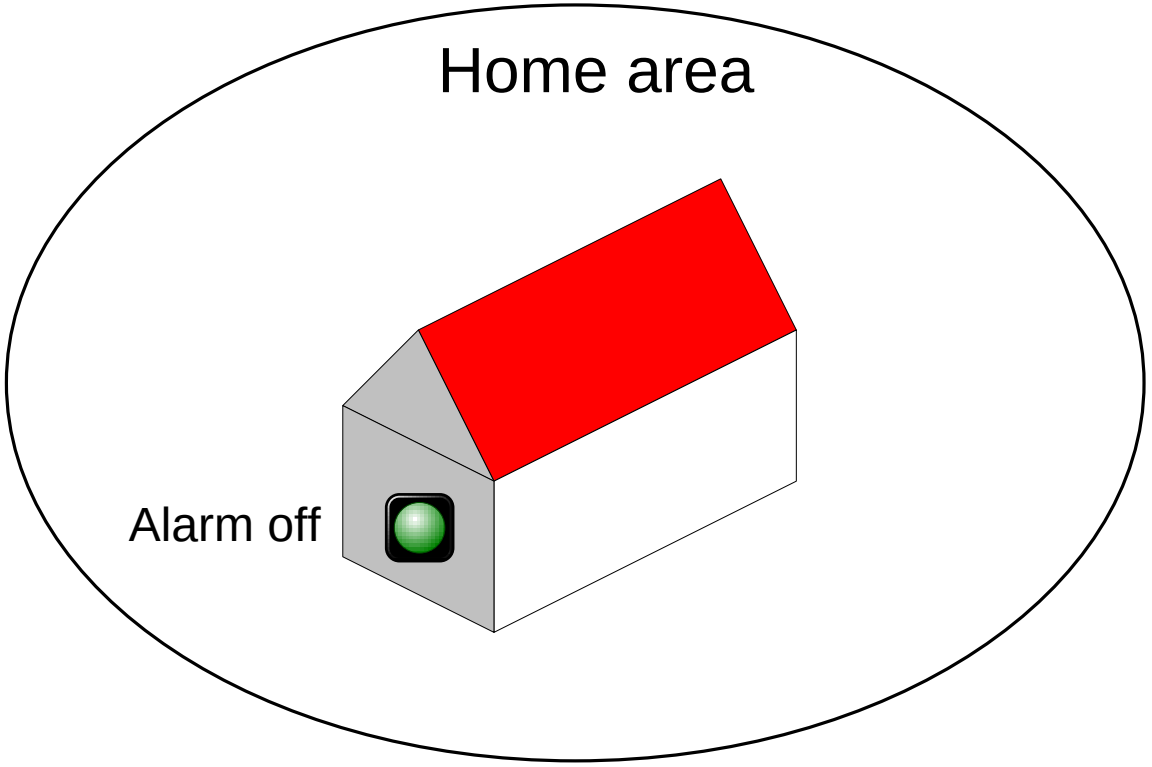
6d Location update – SMS

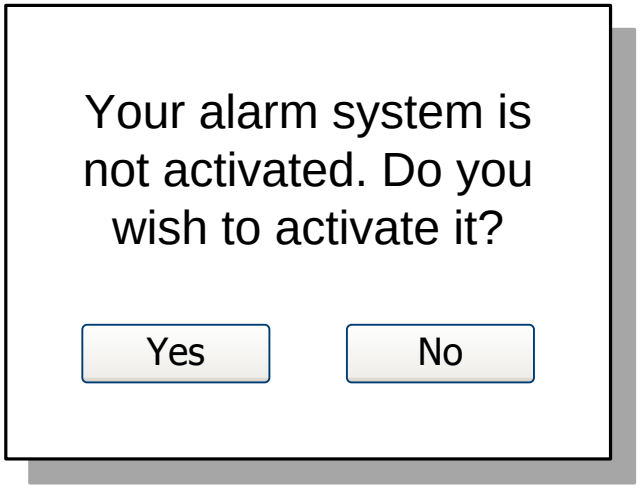


Central server forwards the event to the phone by SMS. The SMS is captured and processed by the application on the phone.

7

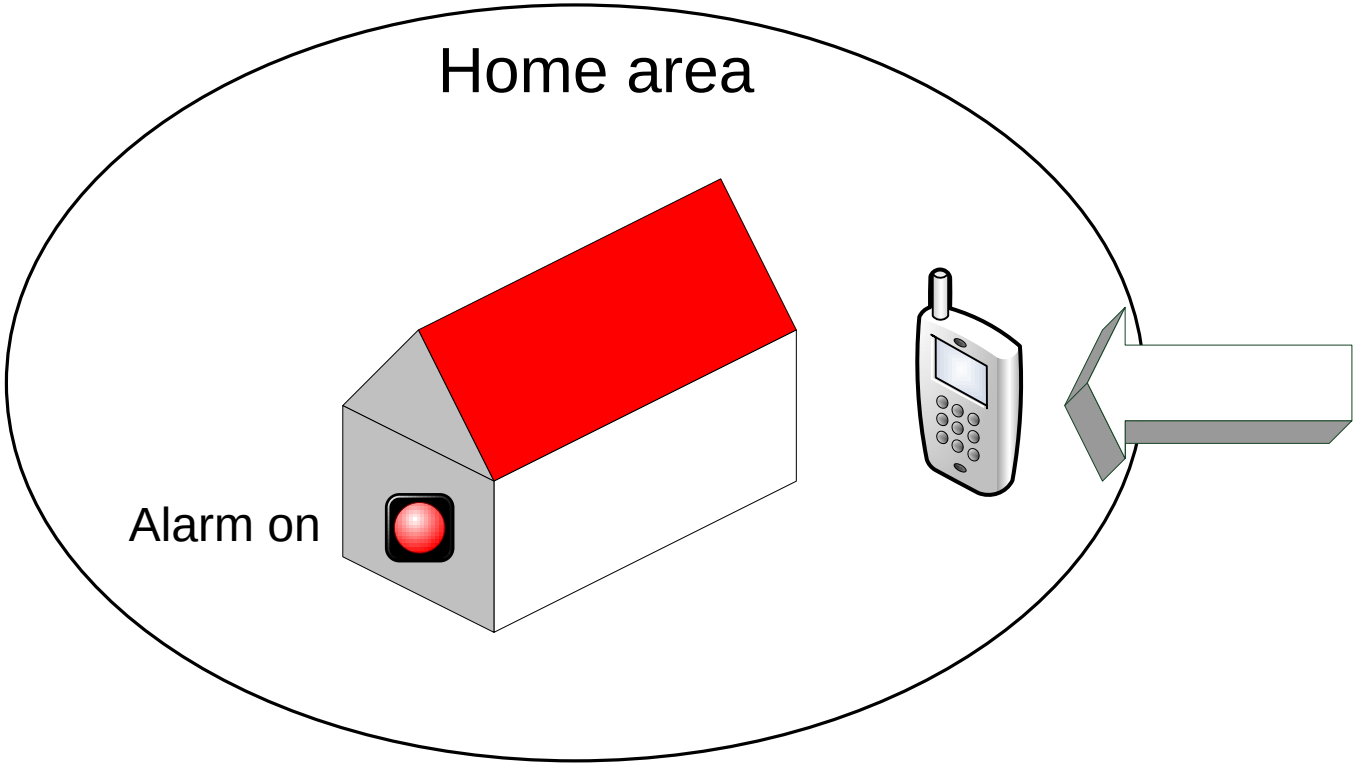
Activation notification

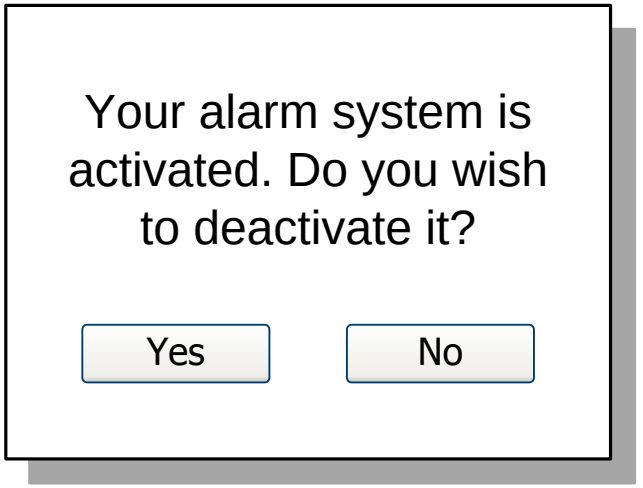




User is notified that the alarm system was not activated when he left home. He is also presented with the option of turning it on.

8 Deactivation





When the user moves back inside the home area the phone generates a ”area entered” event which is sent to the home server. It can then use the same communication paths as show earlier, or the local WiFi or Bluetooth connection.

9 Remarks

- The house server can track the presence of several mobile phones and only show the activation notification when the last phone leaves the home area.

- The user can activate, deactivate and check the alarm status regardless of location.

- This location based scheme can also be used to activate/deactivate the alarm without user intervention.

- Connect the system to the garage door opener, light system, toaster, coffee maker, microwave, heating system, automatic door opener and the user doesn’t have to lift a hand when he comes home.