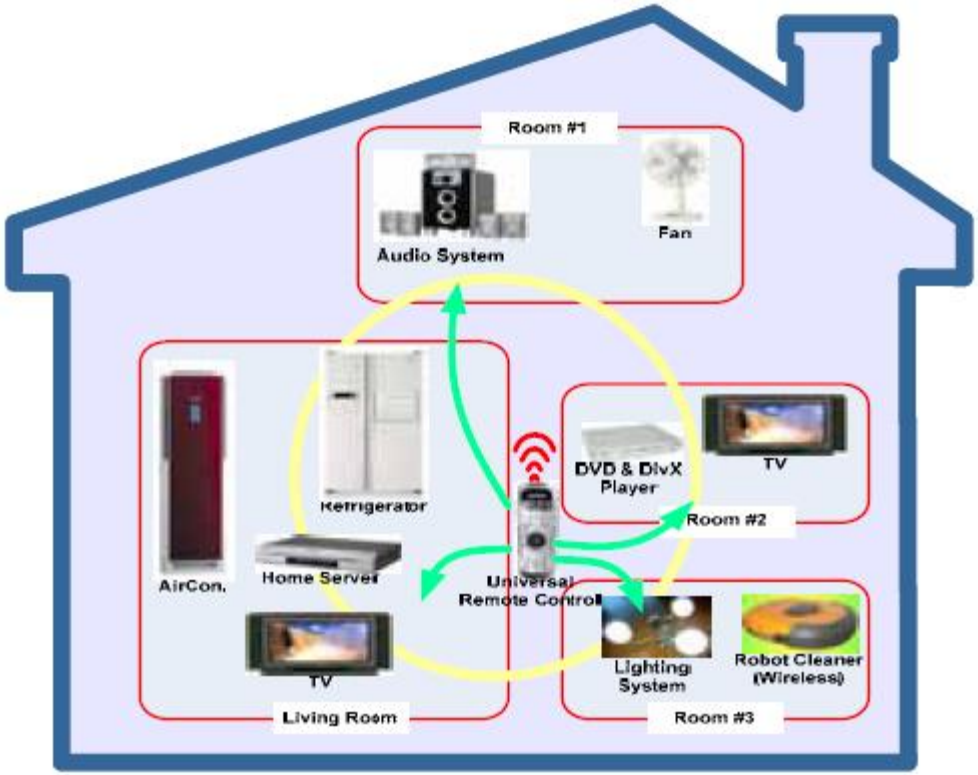
Zigbee Based Universal Remote Controller



Introduction

- What is a Universal Remote Controller?
- Why is a Universal Remote Controller required?
- Zigbee based URC system

  The 2 main modules in this system are:

  - Zigbee based Universal Remote Controller(Z-URC)
  - Zigbee to Infrared(Z2IR) conversion module

Remote Control

- Infrared light is used.
- Basics:
  - Carrier frequency

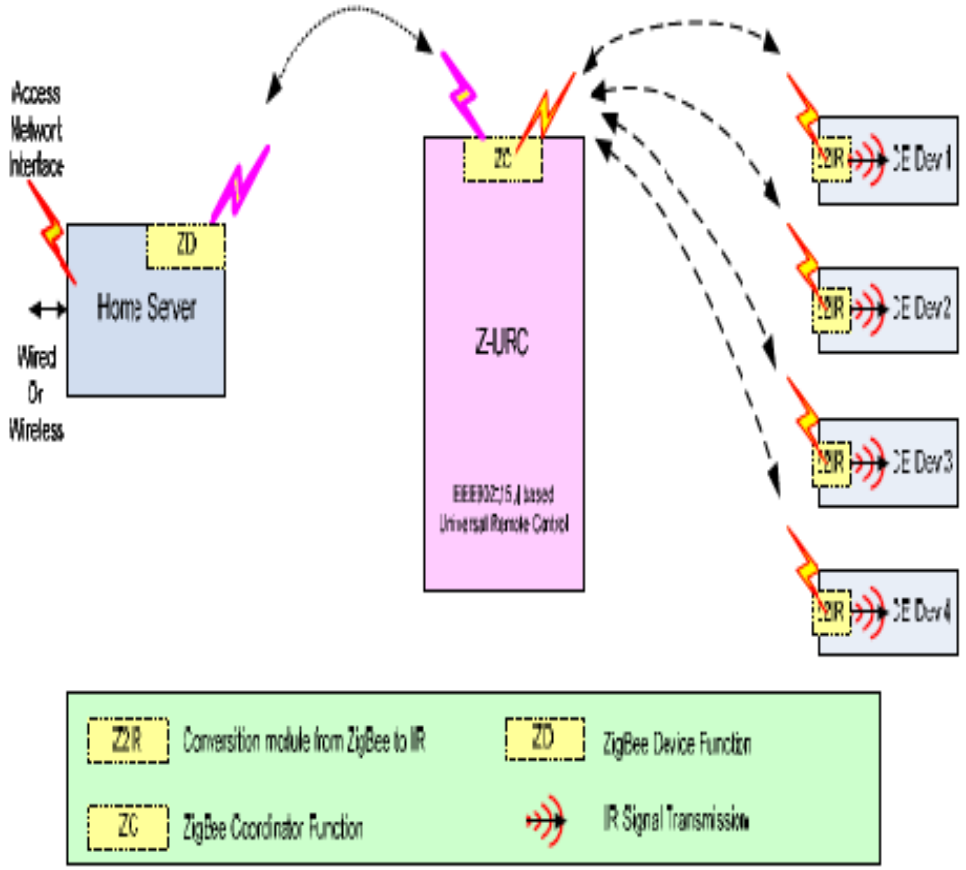
    In the range of 30kHz-40kHz. Typically it is 36kHz.
  - Data rate is usually between 100 – 2000bps.
  - Control Stream consists of following bits:
    - Lead code
    - Address bits
    - Command bits

Zigbee

- IEEE 802.15.4
- Low power and low rate WPAN
- Type of network topologies
  - Star
  - Mesh
  - Tree
- Network Elements
  - Network Coordinator
  - Router
  - End Device

Universal Remote Controller

- Traditional Universal Remote Controller
- Zigbee based URC
  - Home Server
  - Z-URC
  - Z2IR



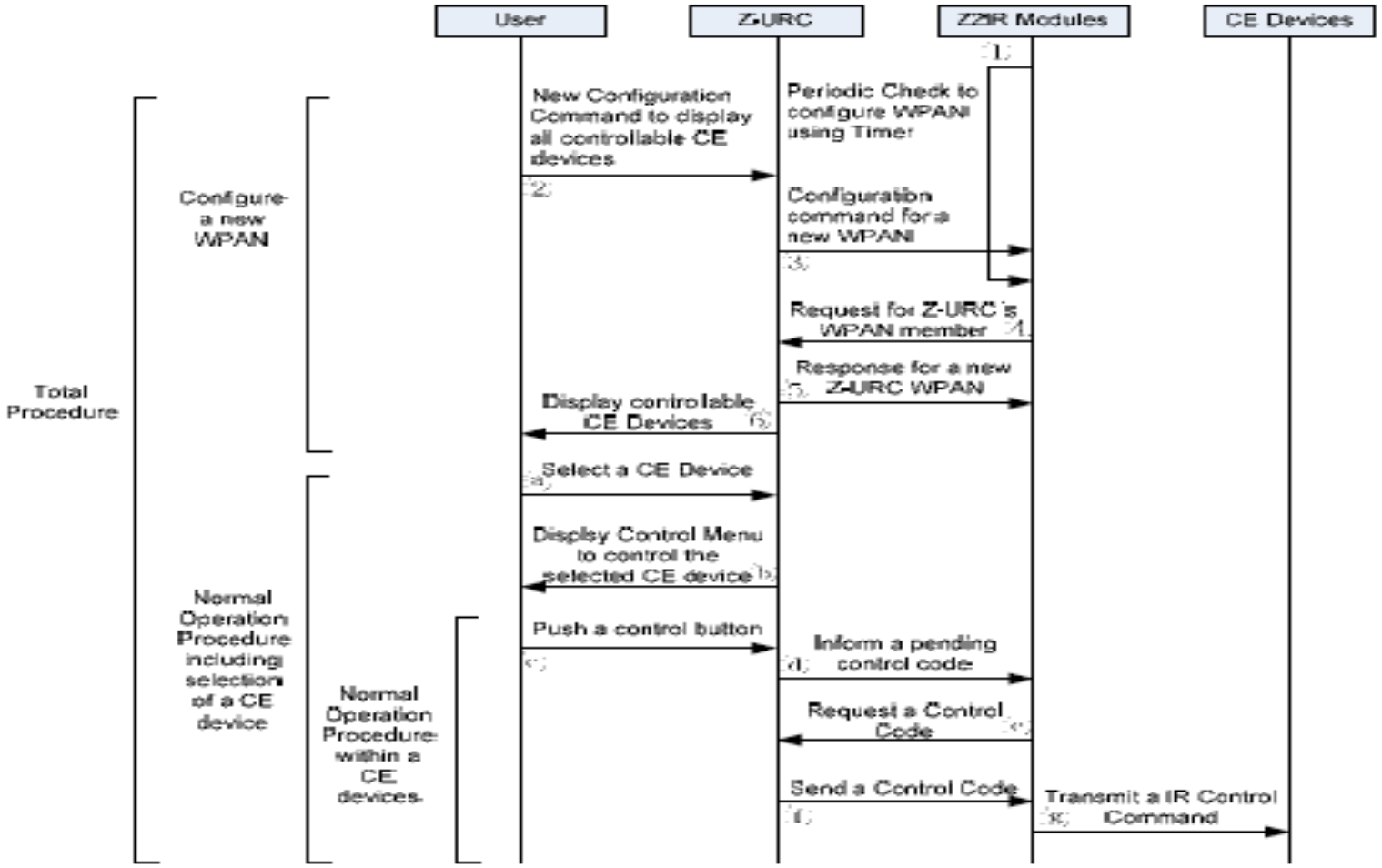
Z2IR Conversion Module

Configured using 2 configuration parameters

- Product ID
- Vendor ID

Configuration Phase

- The Product ID and Vendor ID are configured by Z2IR
- Configuration command is issued by the ZURC
- Z2IR requests to be a member of the network

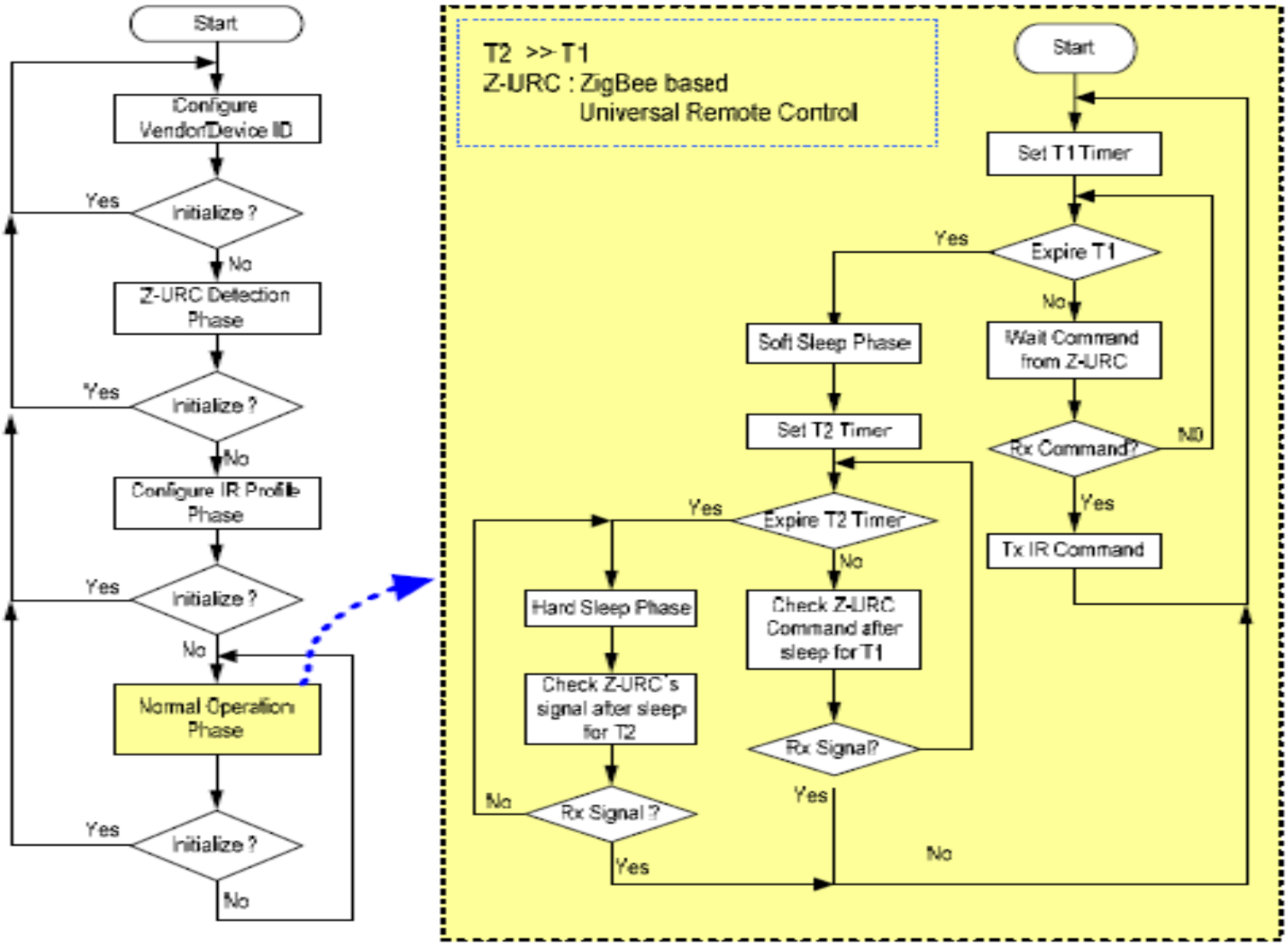

User
Z-URC
Z2IR Modules
CE Devices
1)
New Configuration Command to display all controllable CE devices
2)
Periodic Check to configure WPAN using Timer
Configuration command for a new WPAN
3)
Request for Z-URC's WPAN member
4)
Response for a new Z-URC WPAN
5)
Display controllable CE Devices
6)
Select a CE Device
7)
Display Control Menu to control the selected CE device
8)
Push a control button
9)
Inform a pending control code
10)
Request a Control Code
11)
Send a Control Code
12)
Transmit a IR Control Command
13)
Total Procedure
Configure a new WPAN
Normal Operation Procedure including selection of a CE device
Normal Operation Procedure within a CE devices

Normal Operation Phase for Z-URC

- Display Controllable Devices
- Select a device
- Select and Send Command

Normal Operation Phase for Z2IR

- Soft Sleep phase
- Hard Sleep phase


Start
Configure Vendor/Device ID
Initialize ?
Yes
No
Z-URC Detection Phase
Initialize ?
Yes
No
Configure IR Profile Phase
Initialize ?
Yes
No
Normal Operation Phase
Initialize ?
Yes
No
T2 >> T1
Z-URC : ZigBee based
Universal Remote Control
Start
Set T1 Timer
Expire T1
Yes
No
Soft Sleep Phase
Set T2 Timer
Expire T2 Timer
Yes
No
Hard Sleep Phase
Check Z-URC's signal after sleep for T2
Rx Signal ?
No
Yes
Check Z-URC Command after sleep for T1
Rx Signal?
Yes
No
Wait Command from Z-URC
Rx Command?
NO
Yes
Tx IR Command

Advantages

- Dynamically reconfigured list
- Product ID and Vendor ID inform Z-URC about the devices that can be controlled
- Minimum power consumption