Netvox IoT Solution Overview

Taiwan Head Office: No. 21-1, Chung - Hua West Rd. Tainan, Taiwan
China Factory: Xiamen Torch High Technology Industrial Development Zone

IECQ QC 080000

Company Facts

Founding Date: <u>Jan., 1996</u>

◆Annual Turnover: <u>USD 15,000,000</u>

◆Factory Space: <u>15,600 square meters in China and 5000 square meters in Taiwan</u>

◆Employees: <u>250 including 140 Direct Labors, 10 QCs, 60 Engineers, 10 PE, 30 staff</u>

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Customers

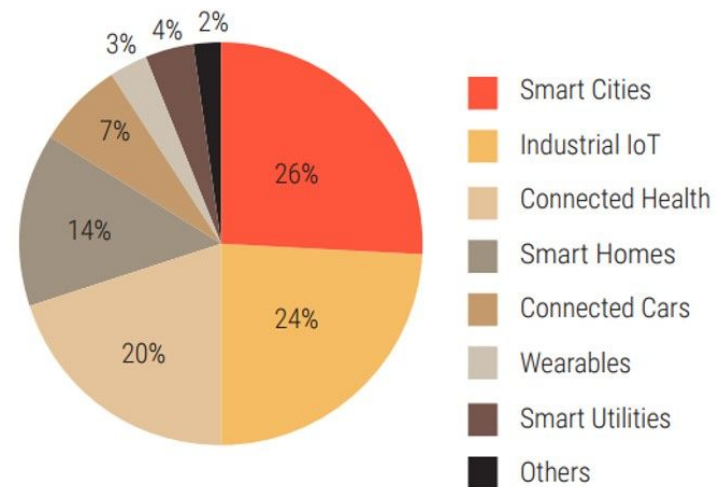**We deliver IoT applications all over the world**

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The Value of IoT Applications

- IoT spending will grow at double-digit numbers until at least 2020
- IoT applications grows rappidly across different market sector
- A future trend leads the way
- A great impact to multiple industries
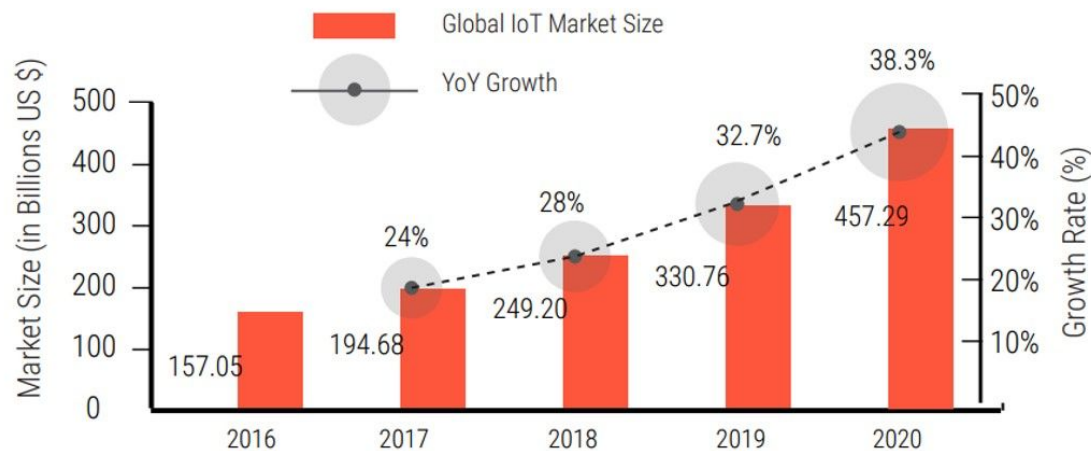
[Sources: GrowthEnabler Analysis/MarketsandMarkets]
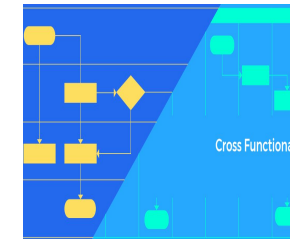

[Source: GrowthEnabler Analysis]

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Dilemma of Starting an New IoT Application

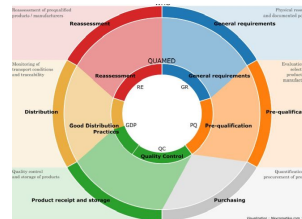➤ **High cost** to develop and maintain a new IoT system

➤**Technical difficulties** of assuring a reliable, end-to-end communication network for IoT devices

➤**Complicated and multiple cross-functions work** involving hardware, firmware, cloud, software...etc.

➤**Complicated interoperability** of IoT devices from different suppliers

➤**Complicated quality assuring process** due to the cross-funtion application, including hardware and software

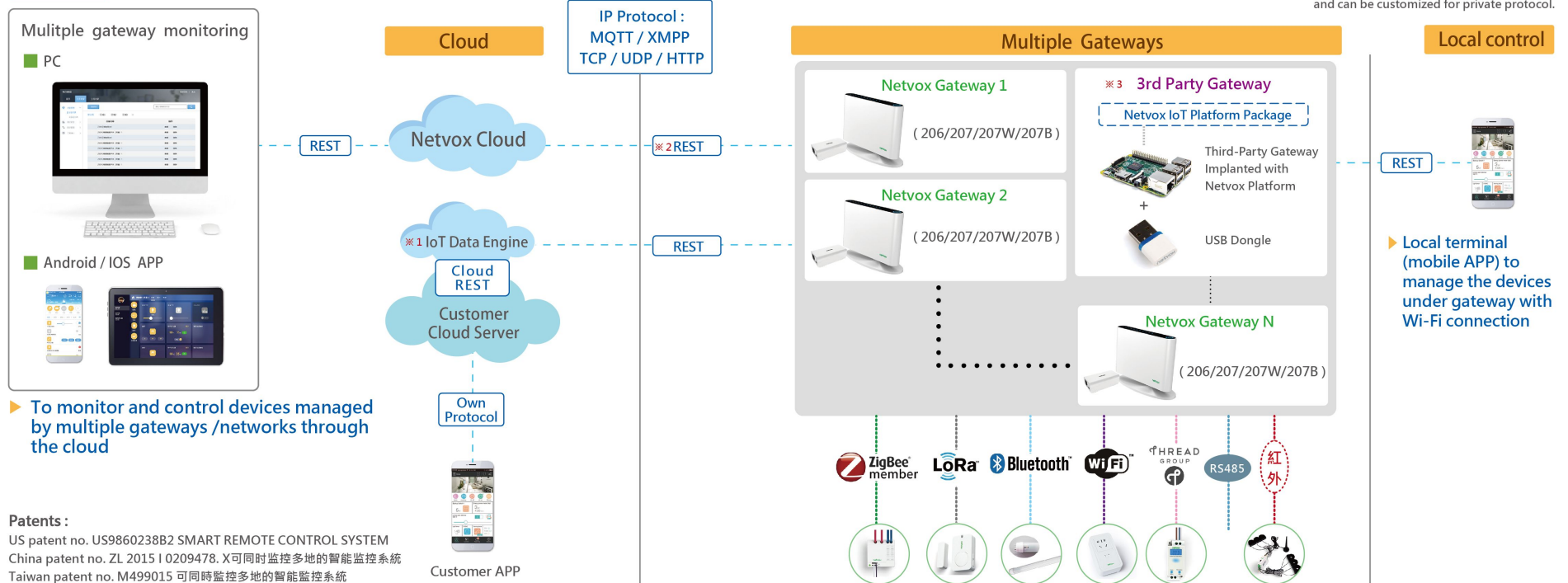➤**Proper availability, security, and scalability?** If the backend isn't constantly working, they could be worst.

Netvox IoT System Architecture

Netvox IoT Total Solution

Mulitple gateway monitoring

Cloud

IP Protocol : MQTT / XMPP TCP / UDP / HTTP

Multiple Gateways

Local control

- PC

REST

Netvox Cloud

※2 REST

Netvox Gateway 1
(206/207/207W/207B)

※3 3rd Party Gateway
Netvox IoT Platform Package

Third-Party Gateway Implanted with Netvox Platform
+
USB Dongle

REST

- Android / IOS APP

※1 IoT Data Engine

Cloud REST

Customer Cloud Server

REST

Netvox Gateway 2
(206/207/207W/207B)

► Local terminal (mobile APP) to manage the devices under gateway with Wi-Fi connection

► To monitor and control devices managed by multiple gateways /networks through the cloud

Own Protocol

Netvox Gateway N
(206/207/207W/207B)

Customer APP

ZigBee member · LoRa · Bluetooth · WiFi · THREAD GROUP · RS485 · 紅外

Patents :
US patent no. US9860238B2 SMART REMOTE CONTROL SYSTEM
China patent no. ZL 2015 I 0209478. X可同时监控多地的智能监控系统
Taiwan patent no. M499015 可同時監控多地的智能監控系統
Taiwan patent no. I560659 支持消息推送的監管系統

Mulitple gateway monitoring platform functions :

1.Data Checking
2.Data Reporting
3.Centralizing Warnings and Handling
4.Failure Reporting and Processing

※1 **IoT Data Engine**   For more effective third-party cloud integration through provided Cloud REST API.
※2 **REST API**   For application integrators to develop their own Smart Home system and mobile app faster.
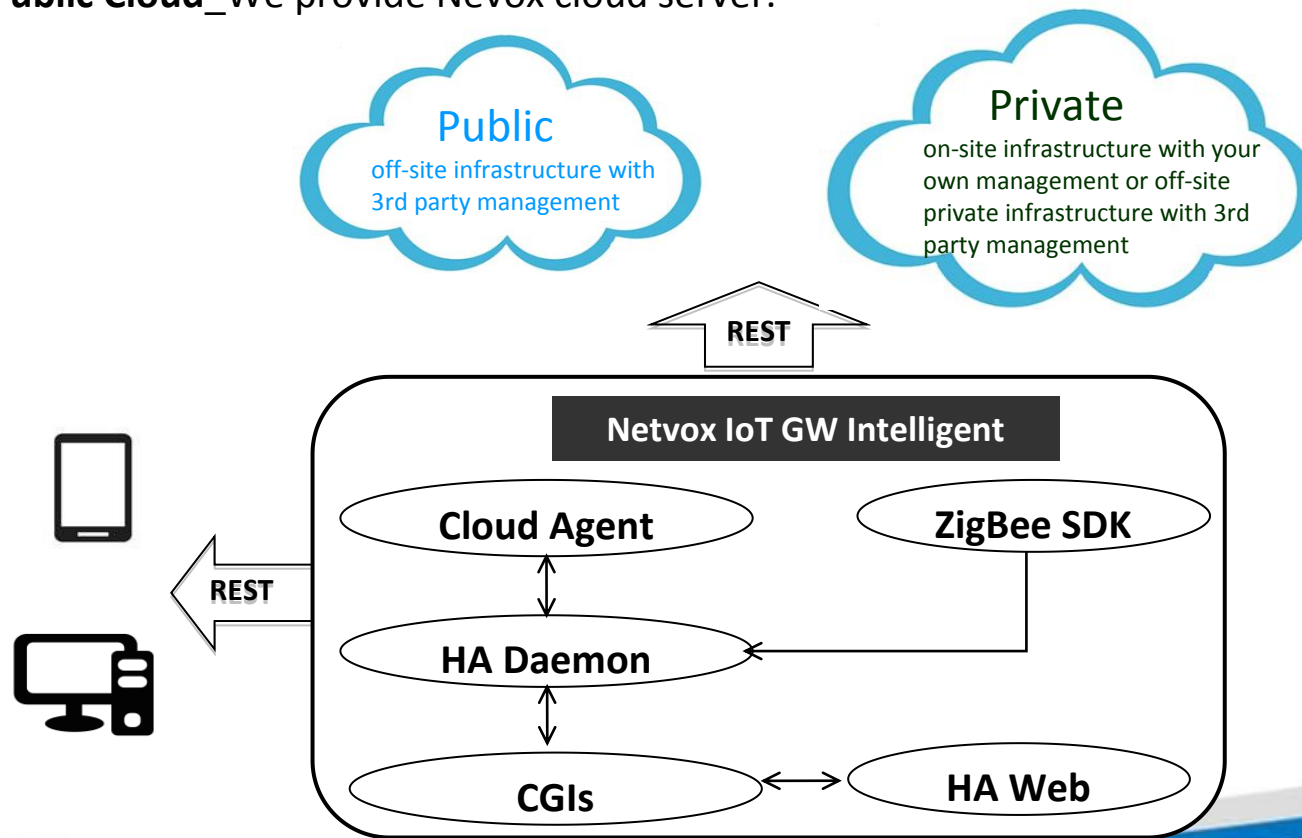※3 **IoT Platform**   For third-party Gateway to controller Netvox IoT devices.

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Netvox IoT Solution for Private or Public Cloud

We help design a cloud platform customized to meet your needs whether it is

1. **Private Cloud_**We will embed IoT Data Engine into your cloud and provide Cloud Restful API for cutomers to design own UI.

2. **Public Cloud_**We provide Nevox cloud server.

Public
off-site infrastructure with 3rd party management

Private
on-site infrastructure with your own management or off-site private infrastructure with 3rd party management

REST

Netvox IoT GW Intelligent

Cloud Agent

ZigBee SDK

REST

HA Daemon

CGIs

HA Web

Advantages of Netvox IoT Solution

✓ **A Total Solution** includes IoT devices, IoT gateways, cloud apllications, and Apps for both PC and Mobile

✓ Netvox supplies **more than 250 types** of IoT devices for smart home, security, smart office, smart classroom, agrriculture application, and multiple sensor applications

✓ Netvox has **in-depth knowledge of wireless communication**, building an optimal IoT network for devices

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Advantages of Netvox IoT Solution

•**Flexible Choices** for different applications including, smart

home, office, smart aggriculture, etc.

Choosing differnet devices combinations, it is easy for customer to start a new IoT application at low cost and in short time and ensure availability, security, and scalability.

Advantages of Netvox IoT Solution

•**Flexible choices for system customization**, depending on the needs of customers'

- Working with Netvox IoT Solution depend on your need

    - Netvox IoT devices + your cloud with Netvox IoT data engine + your App

    - Netvox IoT devices + Netvox Cloud + your App

    - Netvox IoT Total Solution

- REST API for developing your applications

- Assuring your data privacy by creating your cloud with Netvox IoT Data Engine

•**A most fast, economic, efficient way** to own your IoT application, rather than build

one from scratch

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Advantages of Netvox IoT Solution

- **Flexible to leverage different communication protocol in one network**
    - **LoRa and Zigbee Hybrid Application**
- A combination of the strength of both protocol, LoRa® zigbee
- LoRa® Long-distance communication, low power consumption feature for sensors
- zigbee The steady, short-response time, mesh network feature for devices to control
- Netvox IoT gateway as bridge of both protocol
- An easy way to setup and a thrifty way to build

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Advantages of Netvox IoT Solution

LoRa and Zigbee Hybrid Application

Netvox IoT Gateway

LoRa® Sensors

zigbee Devices

Their Choice —
# Telecom Operator and Several System Integrators

➢ Well-tested, reliable system already used by **telecome operator and several system integrators in China.**

➢ Years of experience of IoT system implementation, optimizing stablity of Netvox IoT Solution

➢ Selected and implemented by well-known telecom operator**, and other well-known companies**
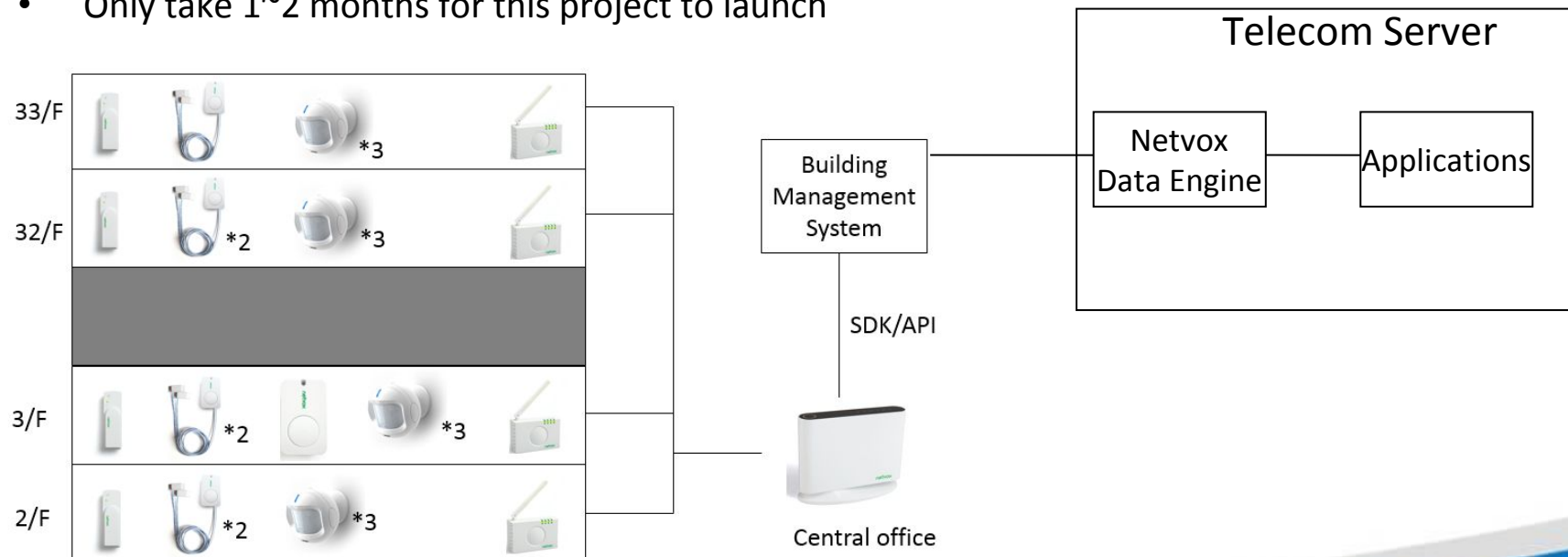

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Real Cases with Netvox IoT Solution

➢ Clean room dust detection system

➢ Beijing car dealers air filter

➢ Security system

➢ Environmental monitoring system for orchid farm

➢ NCKU IoT experience house

➢ Hsinchu Cathay General Hospital asset tracking solution
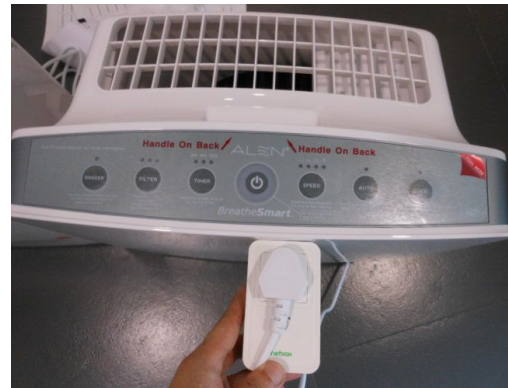
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Netvox IoT Solution With Telecom Company

- An elder caring project for more than 1000 apartments

- Using multiple sensors from Netvox to capture life style of elder residents who live alone

- Using Netvox IoT Data Engine as data collecting engine, customer designs their own algorithm to find if the pattern of life style changes

- Netvox only provide turn-key solution, all data are owned by customer; and customer maitains the IoT server

- Only take 1~2 months for this project to launch

33/F

32/F

3/F *2 *3

2/F *2 *3

Building Management System

SDK/API

Central office

Telecom Server

Netvox Data Engine

Applications

Netvox IoT Solution With Telecom Company
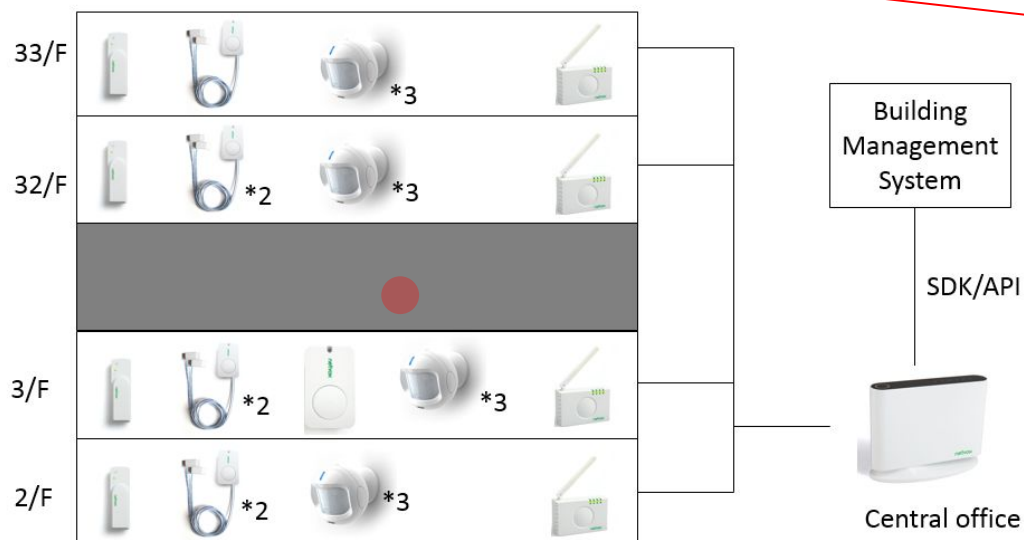## - Interviewed by Local TV Show

➢ Automatic detection of kitchen temperature
Prevent the elderly from forgetting to turn off the burner and trigger a fire alarm

➢ Automatically detection of water level at the location
Reduce the possibility of flooding in the kitchen and washroom

➢ Install sensors in different locations in the home
Detect and track the activities and living habits of the elderly at home

33/F

32/F

3/F

2/F

Building Management System

SDK/API

Central office

➢ When an abnormal situation is detected, the system will immediately issue an alarm
Notify the relevant caregiver

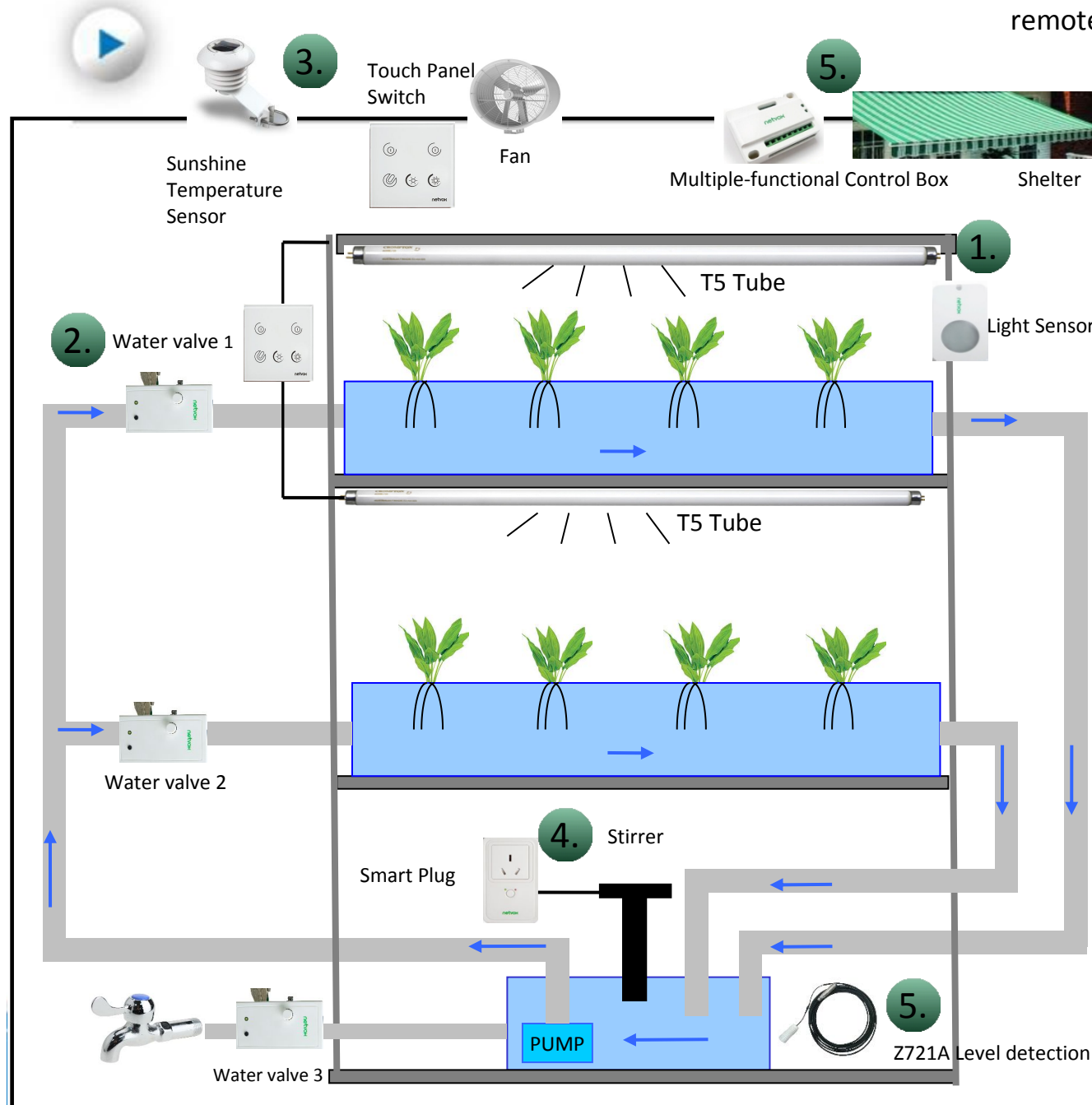➢ Trcking of the elderly, especially to prevent the loss due to dementia

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Customer-Netvox IoT for Smart Agriculture
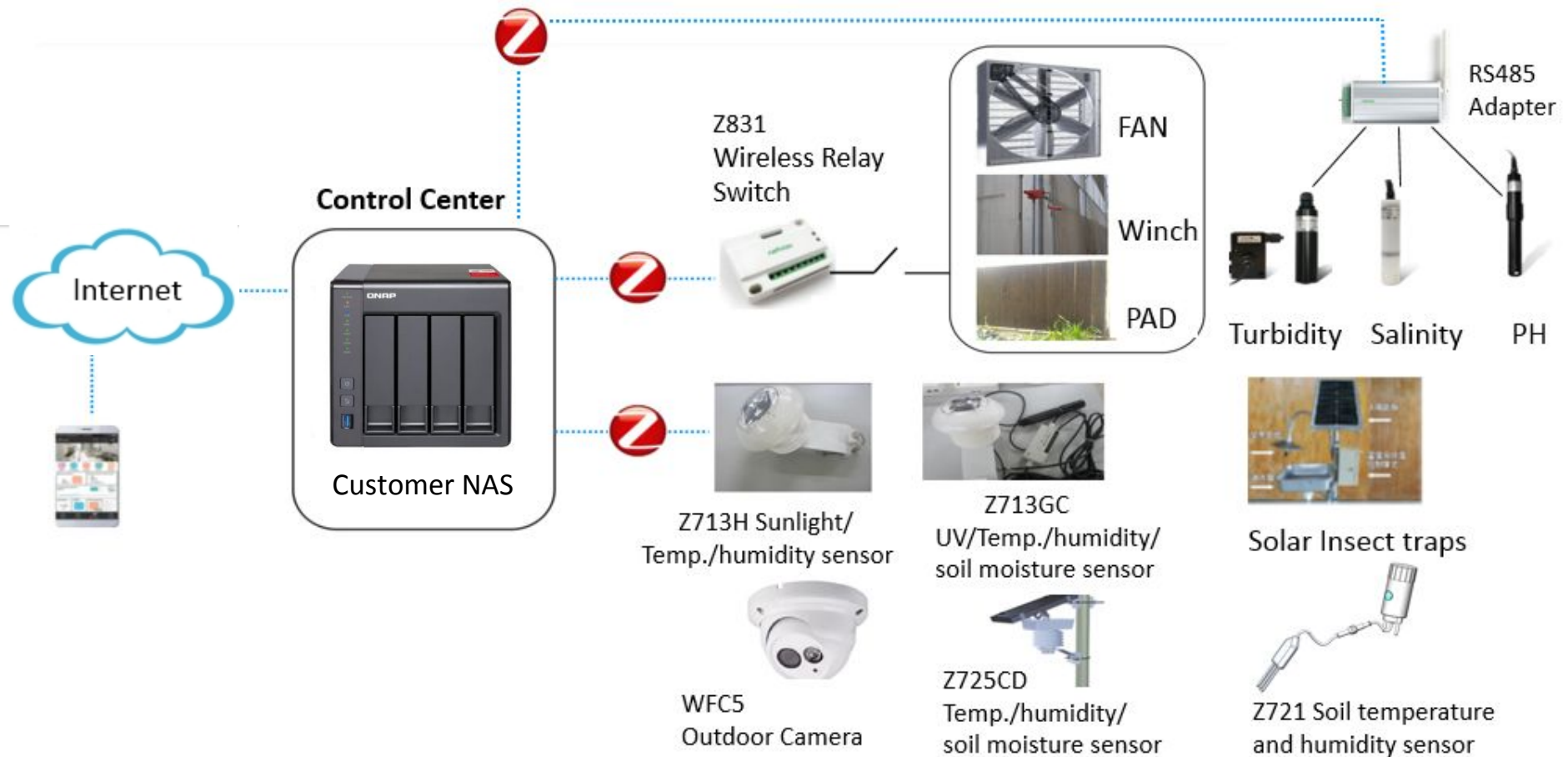
- **Simple structure**: with only one control center connected to internet via Ethernet, WIFI or 3G / 4G to replace the PC and PLC to perform timing and other correlation control.
- **Device monitoring feedback**: current / voltage characteristic / operating status monitoring.
- **Remote monitoring**: a plurality of remote simultaneously greenhouses, farms and crop conditions can be observed and recorded with images.
- **High mobility:** the device can be any places consuming less space and less wire.
- **Situation automatically adjustment**: to adjust automatically according to the season, climate, specific factors (flood, drought) and different environments.

Customer-Netvox IoT for Hydroponics

Use the phone APP, locally or remotely control and set:

3. Touch Panel Switch

Sunshine Temperature Sensor

Fan

5.

Multiple-functional Control Box

Shelter

T5 Tube

1.

Light Sensor

2. Water valve 1

T5 Tube

Water valve 2

4. Stirrer

Smart Plug

PUMP

Z721A Level detection

5.

Water valve 3

1. T5 lamp lighting settings:
> 20,000 Lux touch switch off lights
<1000 Lux touch switch on lights

2. Water valve switch time setting:
Odd o'clock: Valve 1 on valve 2 off
Even o'clock: Valve 1 off the valve 2 on

3. Temperature and fan linkage control
> 33 ℃ fan on
<= 25 ℃ fan off

4. Smart Plug Control Fertilizer Mixer:
• 10 minutes before water cycle, Z809A on, stir the fertilizer.
• 10 minutes after the water cycle, Z809A off, close the mixing.

5. Z721A detects water level
• Water is too low Water: valve 3 ON to replenish water
• The water is too high: Z831 opens shelter

Netvox IoT for Home Automation

Functional classification

Community Security

Light Control

Surveillance System

Clock Time Control

Door/Window Sensor

Watering Automation

IP Cam Monitoring

Scenario Mode Control

Elderly Care

Energy Managment

Remote Control

IFTTT Link

Messaging / Alarm System

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Netvox IoT for Smart Grocery Store

R206 acts as a private gateway for the entire LORA device; it can also link or control ZigBee devices.

R311A door and window magnetic monitoring the security of the doors and windows of the restaurant.

R311W flooding alarm Monitors whether there is flooding (whether the freezer leaks).

R718A if the temperature of the freezer exceeds the range, an alarm message will be sent.

R718DA vibration monitor monitors whether the mousetrap catches the mouse and catches the alarm through the alarm message.
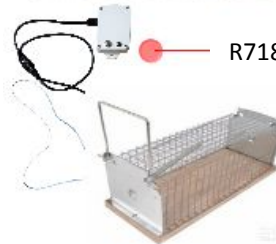
R718A Temp./Humi. Sensor

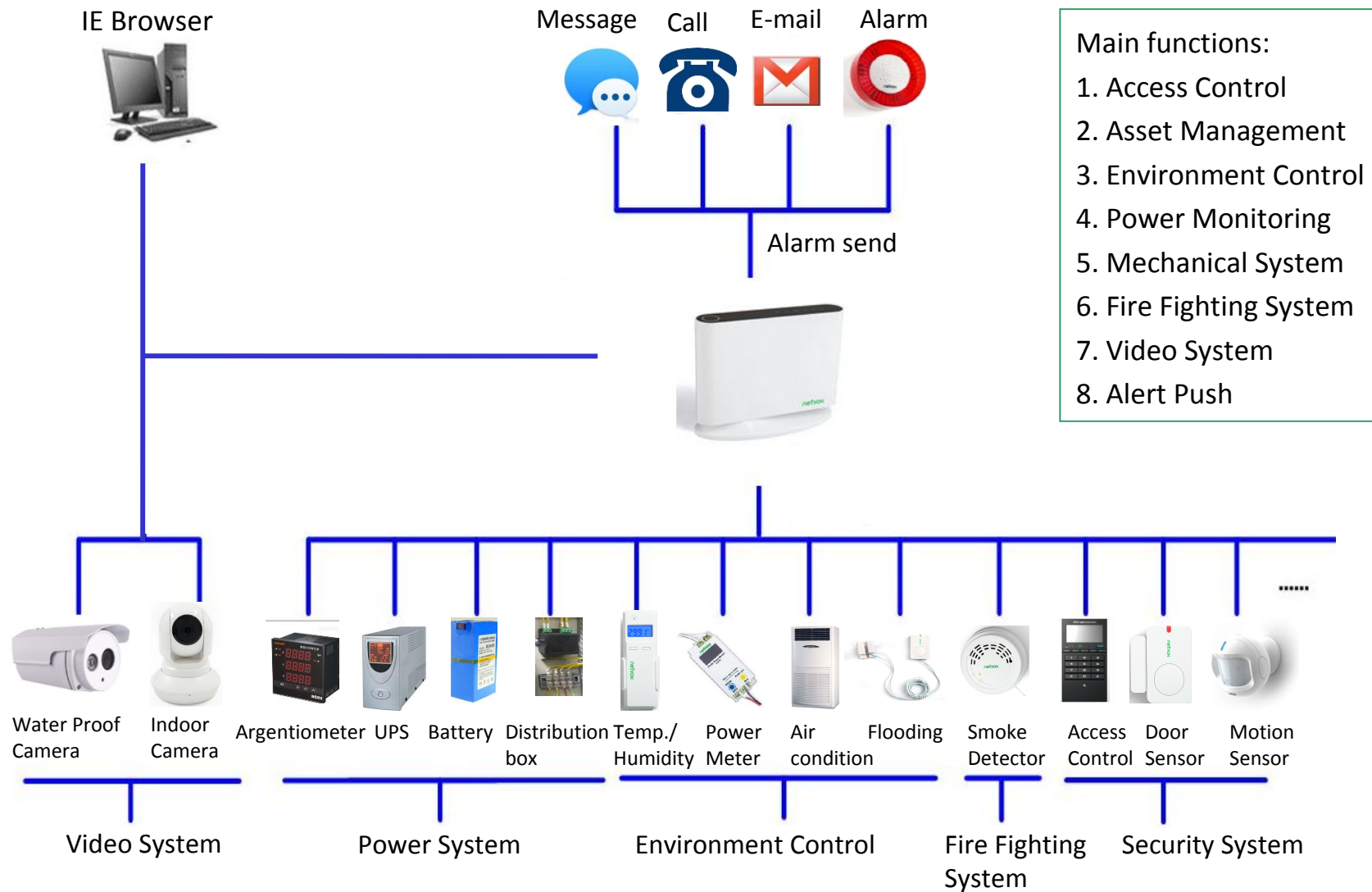Camera

R311A Window/Door Sensor

R718DA Vibration Sensor

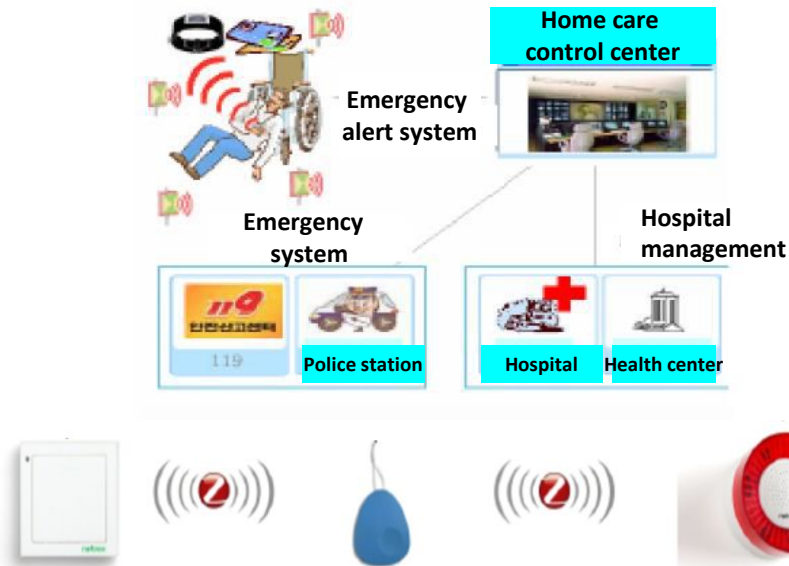R311W Flood Sensor

R206 Smart Gateway

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Netvox IoT for IDE Data Room

IE Browser

Message　Call　E-mail　Alarm

Alarm send

Main functions:
1. Access Control
2. Asset Management
3. Environment Control
4. Power Monitoring
5. Mechanical System
6. Fire Fighting System
7. Video System
8. Alert Push

Water Proof Camera　Indoor Camera　Argentiometer　UPS　Battery　Distribution box　Temp./Humidity　Power Meter　Air condition　Flooding　Smoke Detector　Access Control　Door Sensor　Motion Sensor

Video System　Power System　Environment Control　Fire Fighting System　Security System

Netvox IoT for Emergency Notification

Home care control center

Emergency alert system

Emergency system

Hospital management

119 **Police station**

Hospital **Health center**

ZigBee + IEEE 11073 = Health

- Sensing emergency situation using the fall sensor and the bracelet with panic button
- Transit emergency response via ZigBee technique
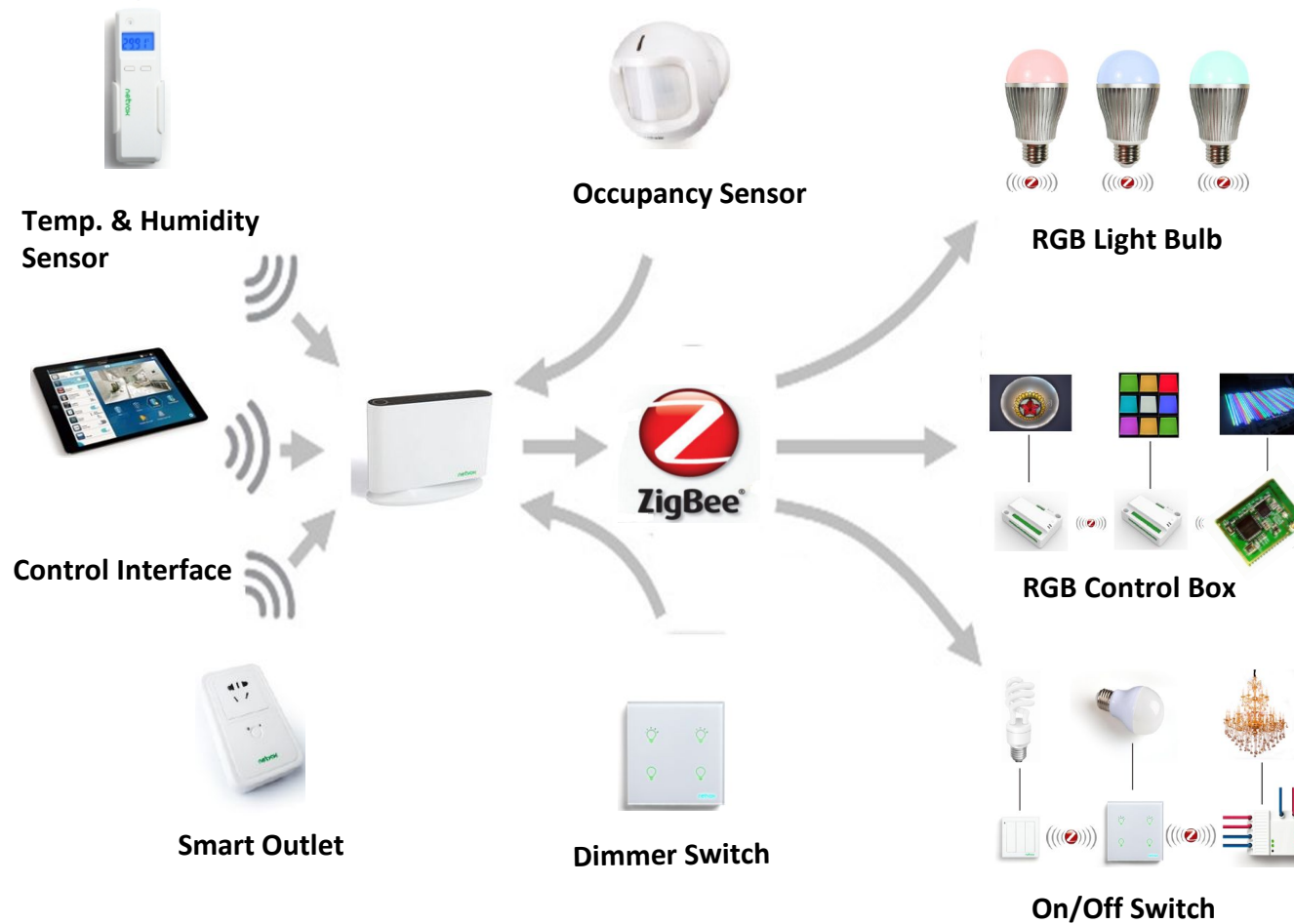- Send out alert notifications while emergency situation occurs

- Provide immediate assistances
- 24-hour caregivers

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Netvox IoT for Smart Lighting

Temp. & Humidity Sensor

Occupancy Sensor

RGB Light Bulb

Control Interface

ZigBee

RGB Control Box

Smart Outlet

Dimmer Switch

On/Off Switch

- Control luminance value according to the environment
- Adjust the lighting based onmotion
- Supports location tracking

- Energy saving
- Extend device lifetime
- Easy to manage
- Convenient

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Netvox IoT for Clean Room Dust Detection

1. Dust sensor detects dust concentration.

2. Once the system finds that the dust concentration is too high, it will issue warning.

3. Z602A sound and light alarm will push the alarm information to the relevant personnel

Internet

Local

Remote Control

Android   Iphone   Ipad

Z602A
Sound and Light Alarm

Dust Sensor
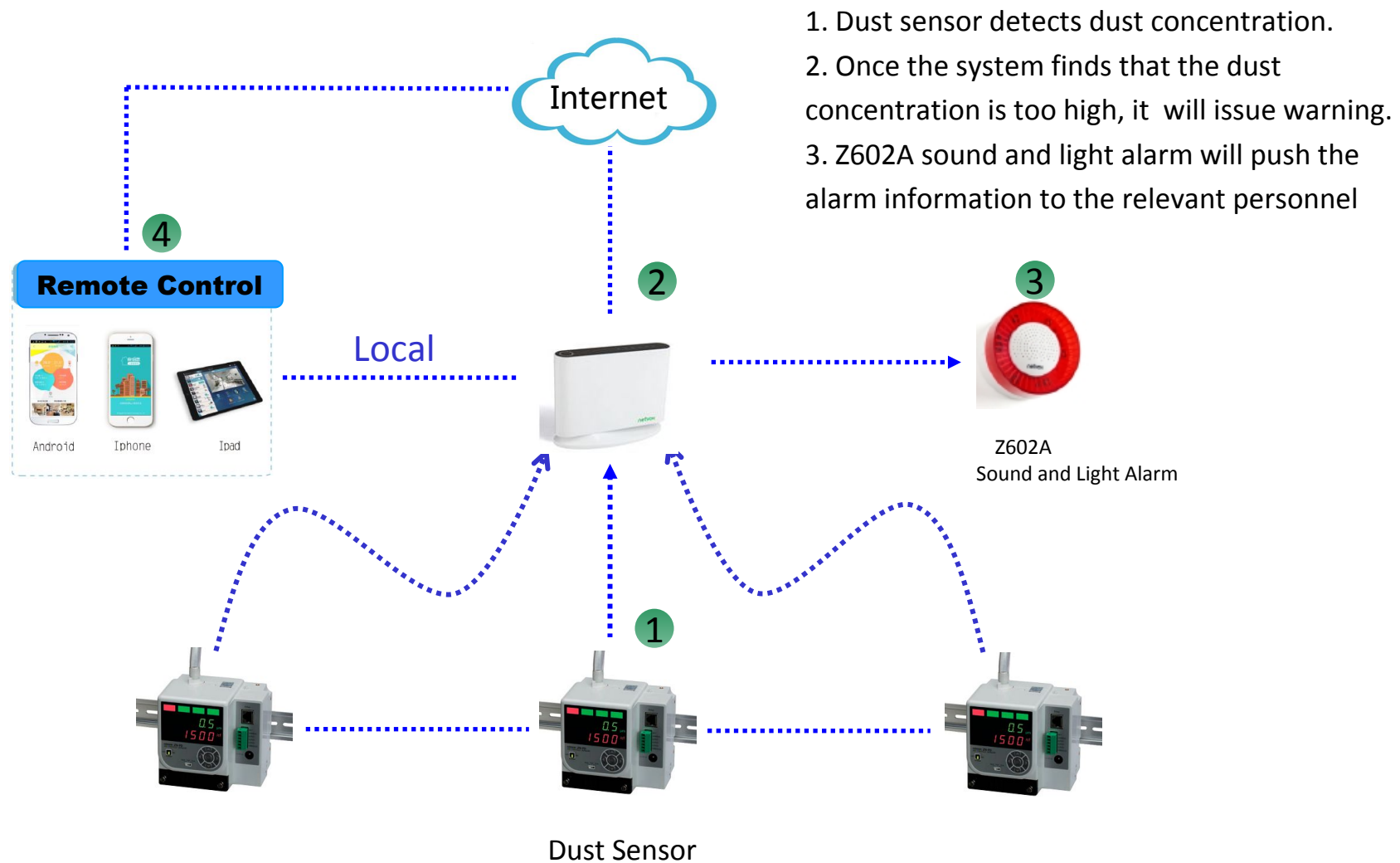
Netvox IoT App Control

• Mobile App: Android, iOS, and Windows OS.

• Supports customized user interface.

• Standard App interface:
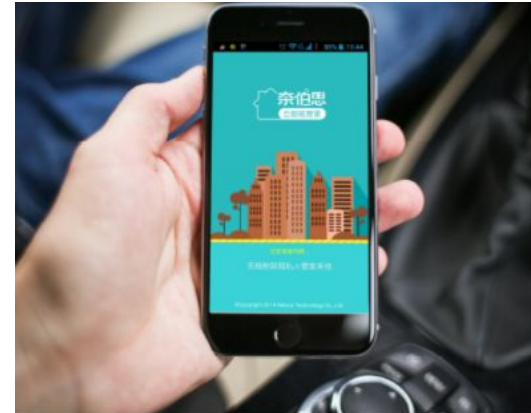
Netvox App for IoT Control Center

➢ Standard WEB interface:

Introduction of Netvox IoT Data Engine

IoT Data Engine provides customers with *more flexible and diverse applications,* and the data upload client cloud uses the client terminal control system.

You can also use Netvox APP directly, and the system stability is as Netvox system, *proper availability, security, and scalability.*

✓The technical architecture of the IoT data engine

✓The communication principles between the smart devices

✓How the third-party cloud connects to the IoT data engine

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Overall Architecture of IoT data engine
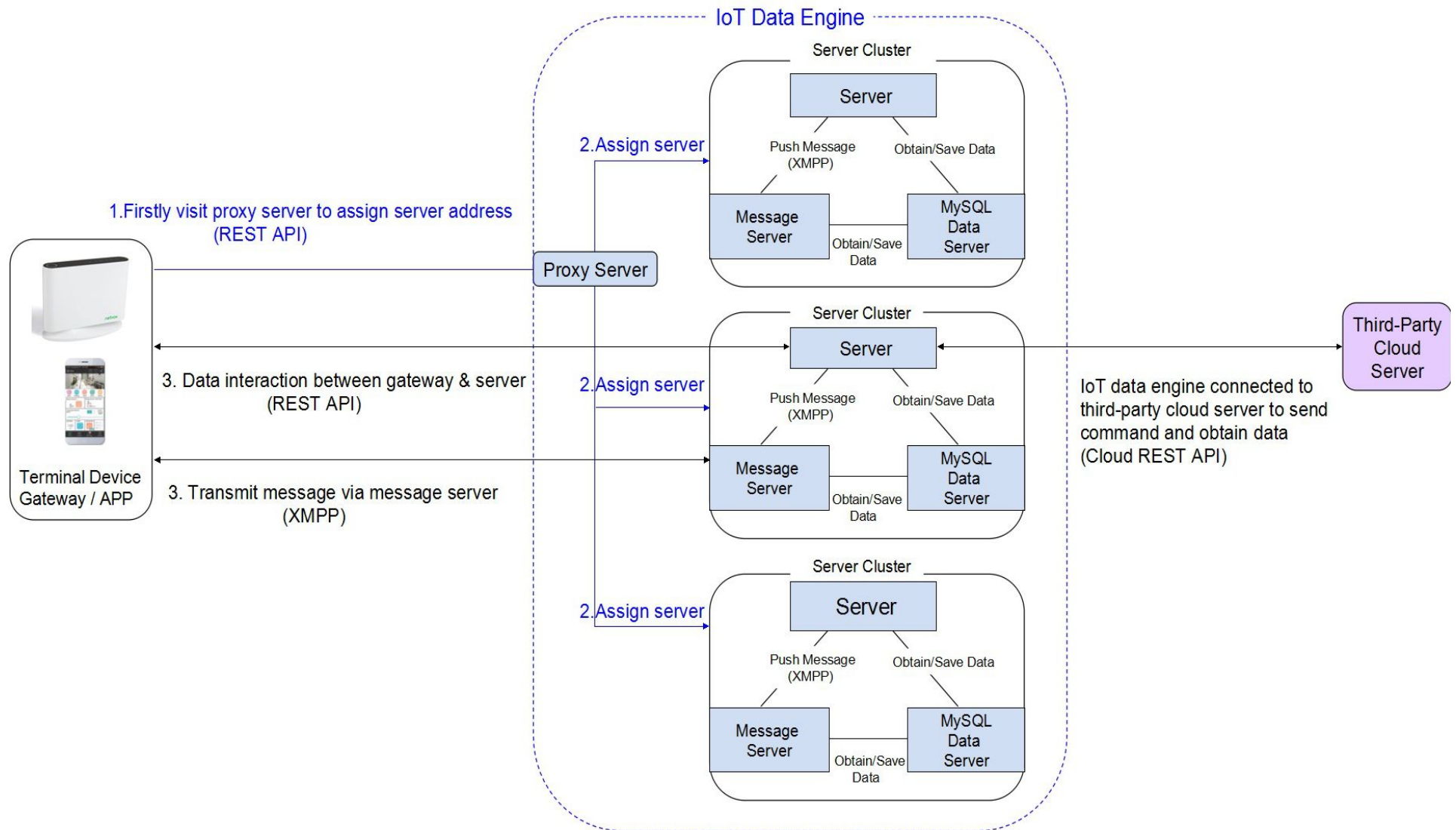
Overall Architecture of IoT data engine

Terminal Device
Third-party cloud server which is connected to IoT Data Engine.

Proxy Server
Responsible for managing and assigning the actual server address to which the terminal device is connected.

Server
The server consists of one or more service clusters, and the smart gateway reports data to The server, and APP can obtain data from the server.

Message Server
The server can communicate with the message server directly for device control, and upgradinghost. The current message communication protocol is XMPP.

MYSQL Data Server
Responsible for storing all the server data, the database is MYSQL based data.

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IoT Data Engine communication principles

■ **Smart Gateway**

Smart gateway firstly visit proxy server to assign server address, and the proxy server will assign a server address. Smart gateway uploads data to IoT Cloud Engine via REST API interface through the assigned server address.

■ **APP**

To communicate with IoT Data Engine, APP firstly visits proxy server to obtain an assigned server address. APP gets data to via REST API interface and builds a communicating channel with message server through the assigned address

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IoT Data Engine communication principles

■ **System Security Terminal**

There are two kinds of communication between IoT Data Engine and terminal devices.

(1)Rest API interface

The Rest API interface encrypts the interface via AES to ensure access to the security.

At the same time, the system also provides HTTPS transport encryption to ensure system security.

(2)XMPP protocol communication

XMPP communication in the establishment of the channel before the need for user login authentication,

the transmission process using encryption algorithm to encrypt the transmission of data to ensure data security.

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IoT Data Engine communication principles

■ **Interfaces Used to Connect to IoT Data Engine**

There are mainly two types of interface for third-party cloud to connect to IoT Data Engine via REST API.

(1)the interface that directly calls IoT Data Engine for data acquisition or device control.

(2)that third-party cloud to achieve a specified HTTP interface, the news of the IoT Data Engine will be push to third-party platform which has been achieved on this interface, with this mode, the timeliness of the message is relatively high.

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IoT Data Engine Function Demonstration

IoT data engine offers mainly <u>five functions</u> as following

| Remote online upgrade | Family registration | Reliability platform | User management | Authority management |

IoT Data Engine Function Demonstration

✓ **Reliability Managing Platform**

Select "Devices status list" to check individual device status under certain gateway as shown .

Select a certain device option, users are able to monitor device attribute report/operation history/alarm history list/network quality/list of monitoring log/RSSI list of each device.

Netvox ZigBee Product Catalogue

Please refer to http://www.netvox.com.tw/down/Catalog(English%20Version).pdf
for over 250 devices and sensors.

Thank you !!

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