

# Nesnelerin İnterneti Uygulamaları

Nesnelerin İnternetine Giriş  
Introduction to Internet of Things (IoT)

# Nesnelerin İnterneti (Internet of Things (IoT))

Üzerlerinde **algılayıcı/eyleyici/denetleyici** bulunabilen, **haberleşme** yeteneğine sahip **cihazların/nesnelerin** veri toplama, görüntüleme, karar verme, denetim ve süreçlerin en iyilenmesi amacıyla oluşturdukları, **internet** altyapısını kullanan ağlardır.

Nesnelerin İnterneti; akıllı fabrikalardan, bina enerji yönetim sistemlerine, hassas tarımdan, akıllı şehir sistemlerine kadar hayatımızın her alanına dokunmaya devam etmektedir.

# Tarihsel Gelişim

- \* Telemetri Sistemleri, M2M, Ubiquitous Computing...
- \* Nesnelerin interneti kavramı ilk olarak 1999 yılında Kevin Ashton tarafından bir firma için hazırlanmış olduğu sunumda geçmiştir. Firmanın tedarik zincirinin eniyilenmesinde kullanılmak üzere Radyo Frekansı ile Tanımlama (Radio Frequency Identification, RFID) teknolojisi önerilmiştir.
- \* 2005 yılında Uluslararası Telekomünikasyon Birliği (ITU) IoT ile ilgili rapor yayınlamıştır.
- \* 2010 yılında Çin hükümeti 5 yıllık planlarında IoT konusuna stratejik öncelik verdiğini duyurdu

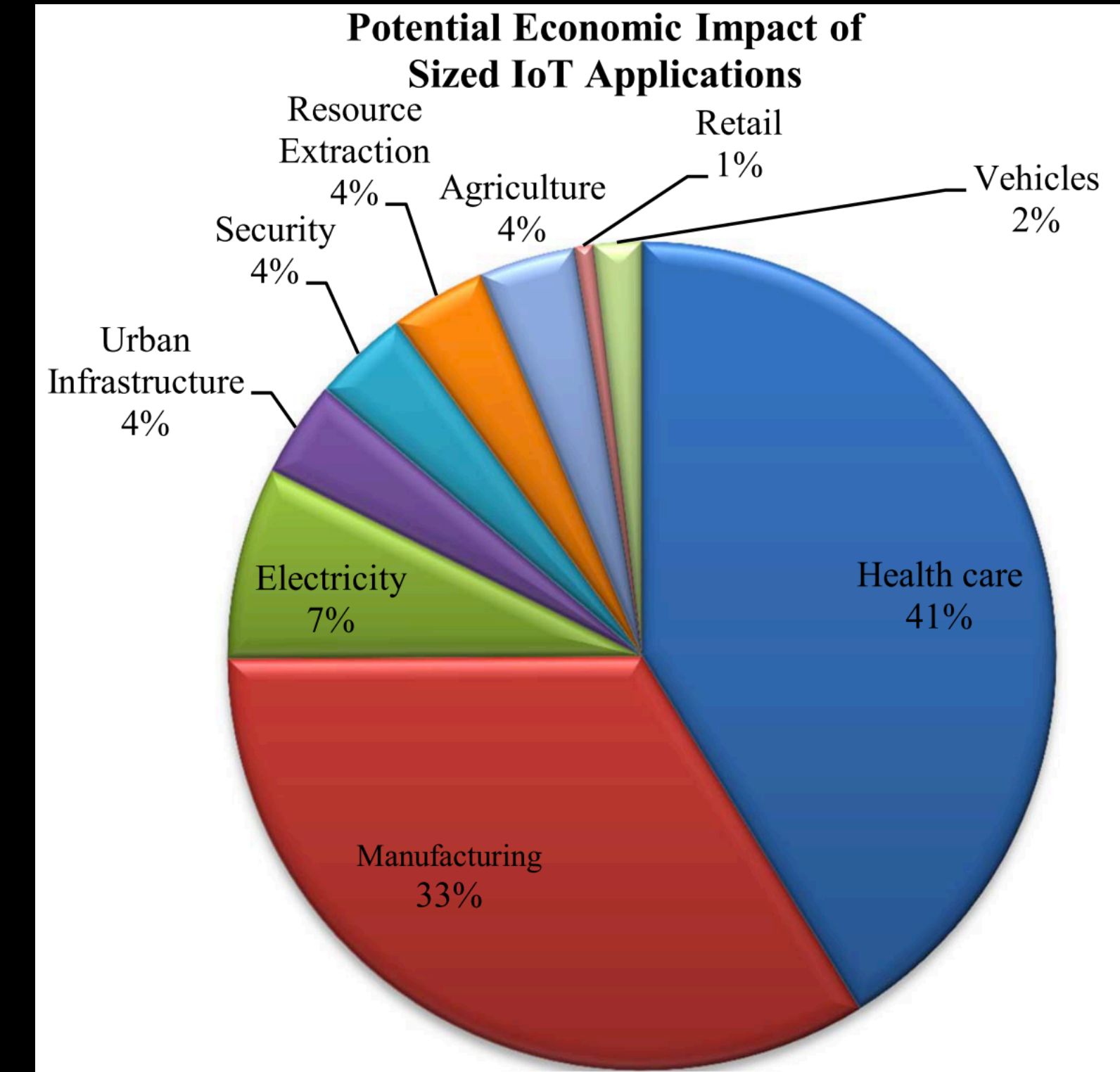
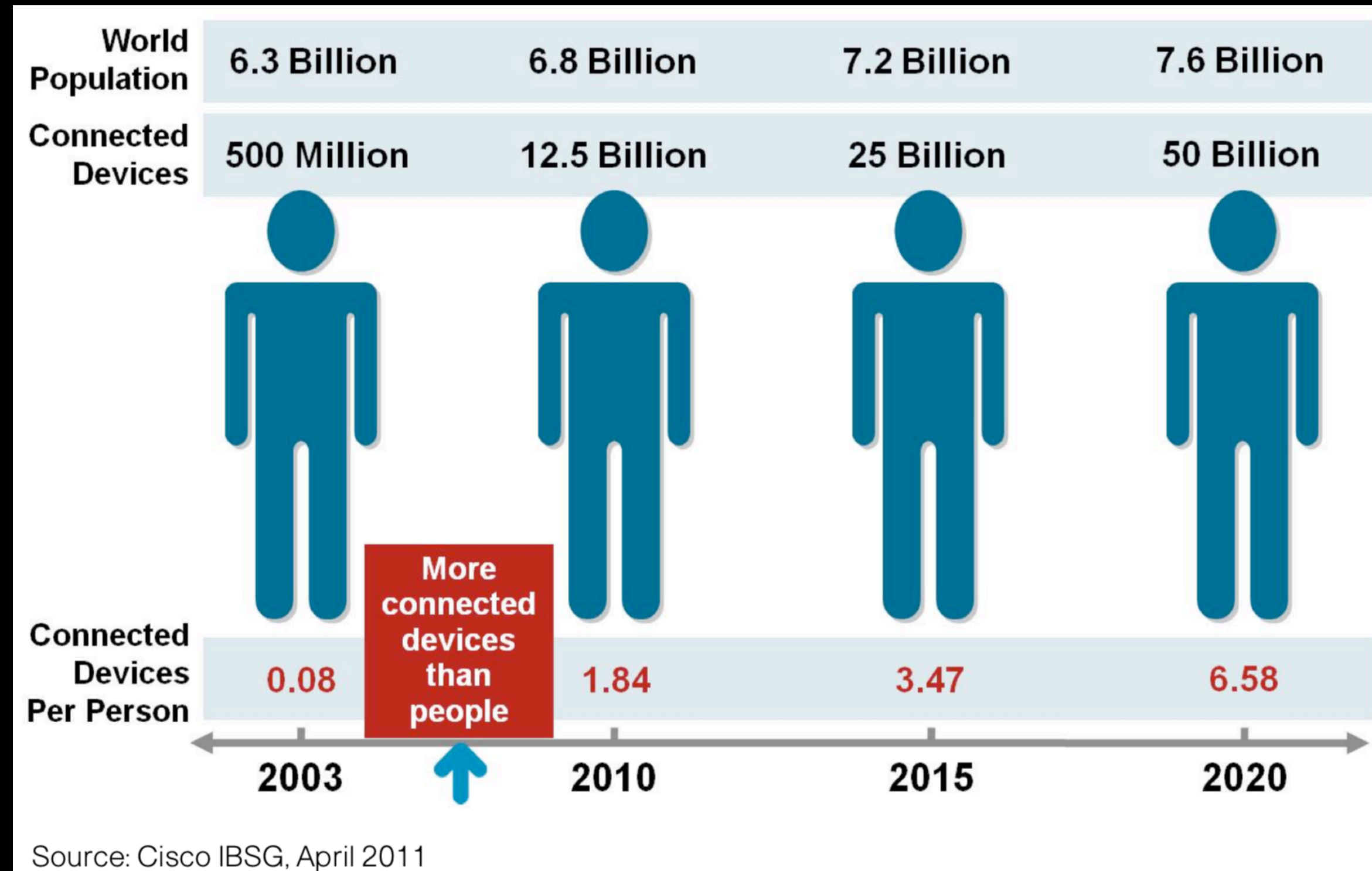
# Tarihsel Gelişim

Internet of People (2000 li yılların başına kadar)

Internet of Things ( 2000 li yılların başından itibaren)

İnternet = IoP + IoT

# Nesnelerin İnterneti (Internet of Things (IoT))



2025 yılı için öngörülen pazar payları [A. Fuqaha et al. 2015]



# Uygulama Alanları

- \*Healthcare
- \*Industrial Automation and Manufacturing
- \*Building/Home automation
- \*Smart cities & infrastructures
- \*Military
- \*Smart logistics
- \*Agriculture
- \*Robotics
- \*Air pollution monitoring
- \*Environmental sensing
- \*Location tracking
- \*Smart Vehicles

# Nesnelerin İnternetini Oluşturan Bileşenler

\* Kolaylaştırıcı/Yardımcı Teknolojiler (IoT Enabling Technologies)

\* Makine Öğrenimi (Machine Learning)

\* Büyük Veri (Big Data)

\* Bulut Bilişim (Cloud Computing)

\* IoT Sistemlerinin Güvenliği (IoT Security)

- Wireless Sensor and Actuator Networks (WSAN)
- RFID
- WiFi
- Cellular Systems (3G, 4G - LTE, 4.5G, Small Cell)
- Beacon (iBeacon, Eddystone)
- NFC
- Tablets, Phones, PCs



# Nesnelerin İnterneti

Internet of things (IoT): A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies.

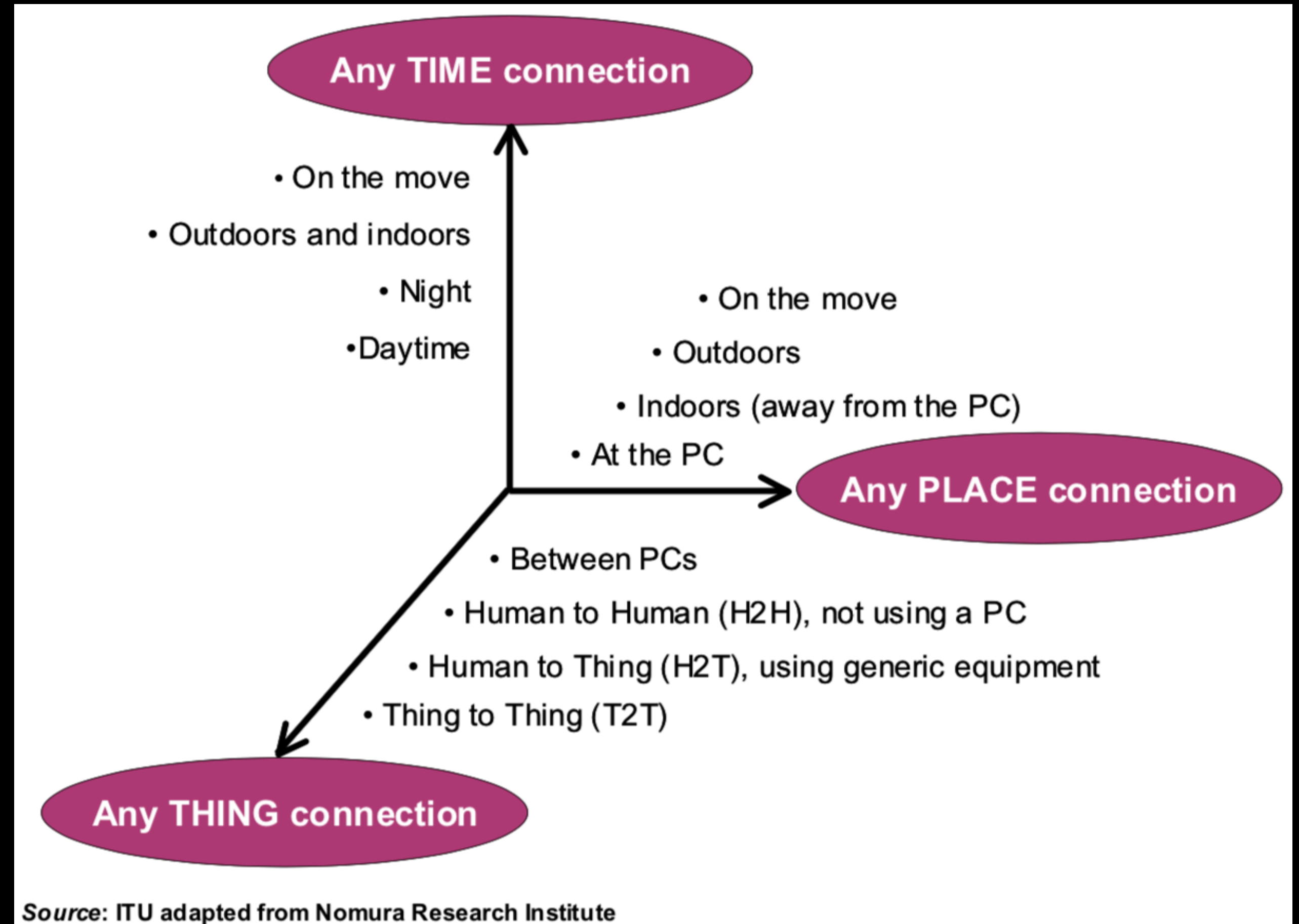
\* International Telecommunication Union Recommendation ITU-T Y.2060 (06/2012)



# Nesnelerin İnterneti

\* IoT, bilgi ve iletişim teknolojilerine yeni bir boyut eklemiştir.

Any **THING** communication



International Telecommunication Union Recommendation ITU-T Y.2060 (06/2012)

# Nesnelerin İnterneti

- \* Regarding the IoT, things are objects of the physical world (physical things) or of the information world (virtual things) which are capable of being identified and integrated into communication networks. Things have associated information, which can be static and dynamic.
- \* Physical things exist in the physical world and are capable of being sensed, actuated and connected. ( industrial robots, goods and electrical equipment)
- \* Virtual things exist in the information world and are capable of being stored, processed and accessed.(multimedia content, application software)



# Uygulama Alanları

## Libelium Smart World

### Air Pollution

Control of CO<sub>2</sub> emissions of factories, pollution emitted by cars and toxic gases generated in farms.

### Forest Fire Detection

Monitoring of combustion gases and preemptive fire conditions to define alert zones.

### Wine Quality Enhancing

Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

### Offspring Care

Control of growing conditions of the offspring in animal farms to ensure its survival and health.

### Sportsmen Care

Vital signs monitoring in high performance centers and fields.

### Structural Health

Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

### Quality of Shipment Conditions

Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

### Smartphones Detection

Detect iPhone and Android devices and in general any device which works with Wifi or Bluetooth interfaces.

### Perimeter Access Control

Access control to restricted areas and detection of people in non-authorized areas.

### Radiation Levels

Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

### Electromagnetic Levels

Measurement of the energy radiated by cell stations and WiFi routers.

### Traffic Congestion

Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

### Smart Roads

Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

### Smart Lighting

Intelligent and weather adaptive lighting in street lights.

### Intelligent Shopping

Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

### Noise Urban Maps

Sound monitoring in bar areas and centric zones in real time.

### Water Leakages

Detection of liquid presence outside tanks and pressure variations along pipes.

### Vehicle Auto-diagnosis

Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

### Item Location

Search of individual items in big surfaces like warehouses or harbours.

### Waste Management

Detection of rubbish levels in containers to optimize the trash collection routes.

### Smart Parking

Monitoring of parking spaces availability in the city.

### Golf Courses

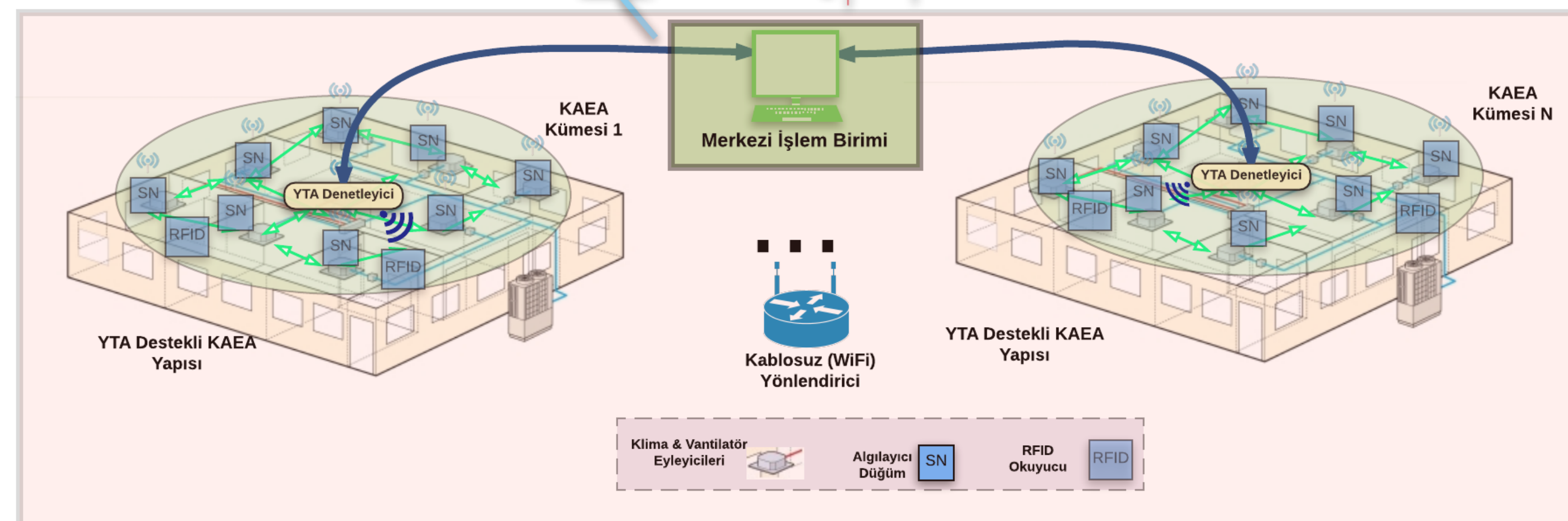
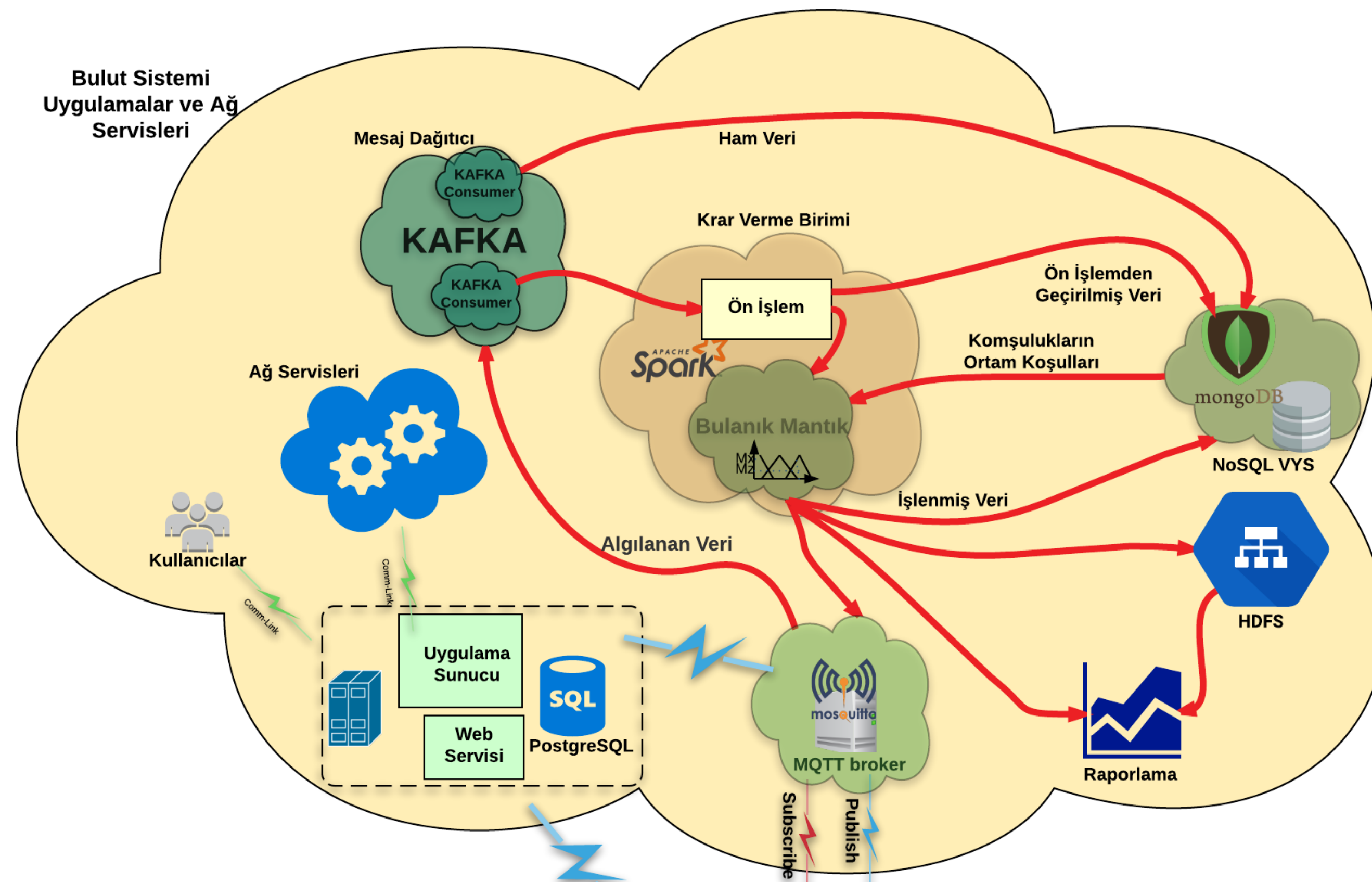
Selective irrigation in dry zones to reduce the water resources required in the green.

### Water Quality

Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.



# Uygulama Alanları



### Dikey Boyut - Bina İçerisi (Things)

# Uygulama Alanları

**Future RFID Store**

**<https://www.youtube.com/watch?v=rBXJ9Razofw&t=40s>**

# Kaynaklar

- ✓ International Telecommunication Union Recommendation ITU-T Y.2060 (06/2012)
- ✓ Source: Cisco IBSG, 2011
- ✓ J. Manyika et al., Disruptive Technologies: Advances that Will Transform Life, Business, and the Global Economy. San Francisco, CA, USA: McKinsey Global Instit., 2013.
- ✓ A. Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari, M. Ayyash, “Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications”, IEEE Communication Survey&Tutorials, vol. 17 (4), 2347-2376 ,2015.