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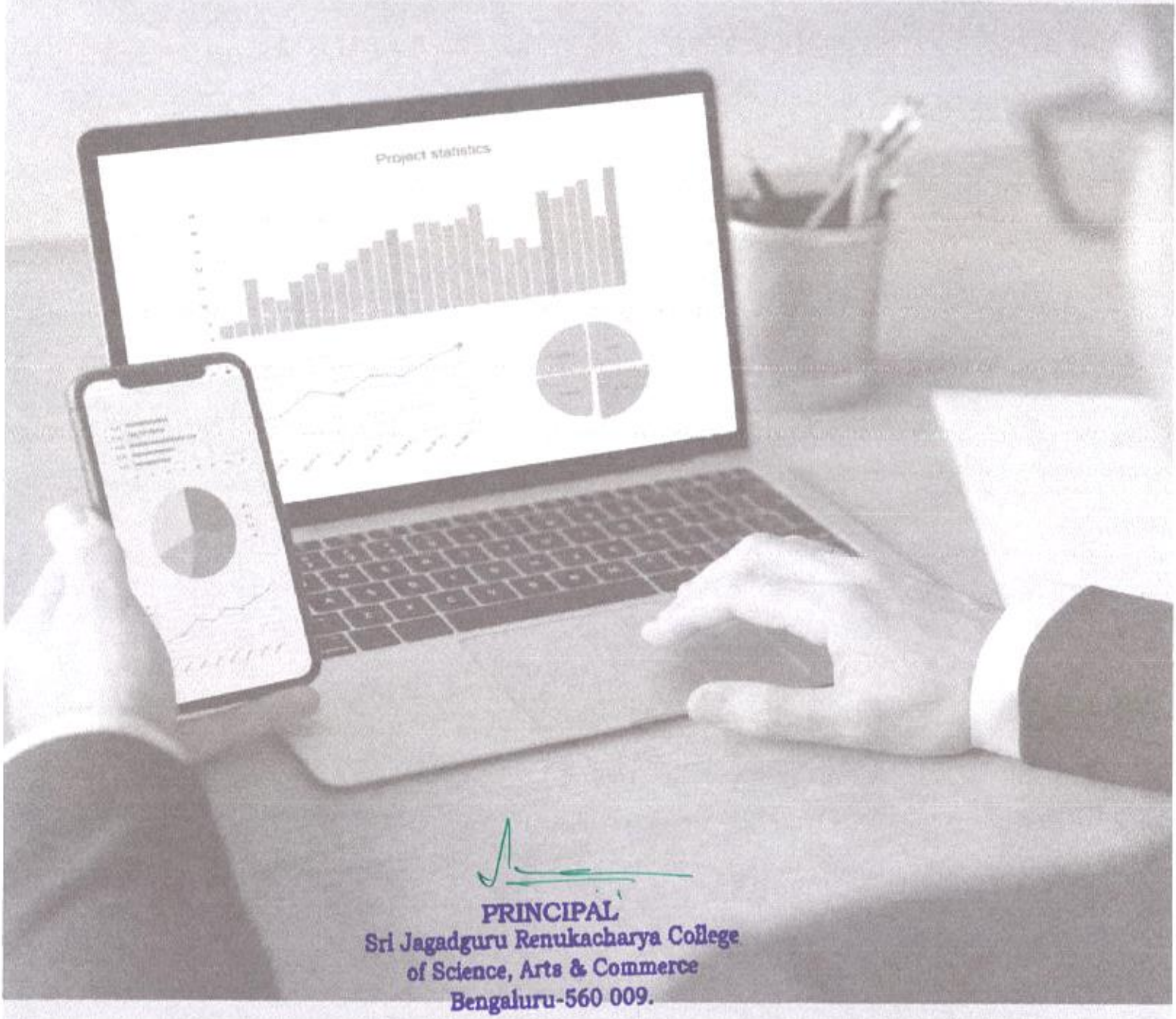

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in the book titled
"Emerging Trends in Business and Technology"

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Title 5	AN OVERVIEW OF APPLICATION OF INTERNET OF THINGS (IOT) IN MODERN ERA
Author/s	Dr. RAMESHA A.V Librarian, SJR College, Bengaluru City University, Bengaluru, India, Mob: 9448579465, E-Mail: librarian.sjrc@gmail.com HEMANTH KUMAR K.G Lecturer, Dept. of Computer Science, SJR College, Bengaluru City University, Bengaluru, India, Mob:9844742665, E-Mail:hemanth.blr@gmail.com ANUSHA S Lecturer, Dept. of Computer Science, SJR College, Bengaluru City University, Bengaluru, India, Mob: 9901769403, E-Mail:anushas06211@gmail.com

ABSTRACT :

The Internet of Things (IoT) heralds the possibility of remotely interacting with real (things) via the Internet and checking them. The term "smart" is used in various contexts and is often understood as "knowledge". The brilliant home help, one of the booming IoT applications, has transformed home hardware into something smarter, more remote, connected and coordinated. Smart devices like cell phones and PCs limit most smart home frames. The use of remote correspondence association processes. A sophisticated mobile phone application is used to control and monitor the capabilities of the home.

Keywords: Smart home, Automatic Control, IOT, Smoke Detectors, Cloud and IOT Contribution for smart home.

INTRODUCTION

The Internet of Things (IoT) is the network of physical objects or *"things"* embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The concept of the Internet of Things first became popular through Auto-ID Centre at MIT and related market-analysis publications. Internet of things, when more or less anything will be connected and managed in the virtual world. In the series of ITU Internet Reports IOT was originally was launched in 1997 under the title *"Challenges to the Network"* and it was first Coined by Kevin Ashton in the RFID Journal 1999.In 2005 the name was changed to Internet of Things. Actually, the definition of IoT varies based on who you talk, but formally, it can be defined as a dynamic global network infrastructure with self-

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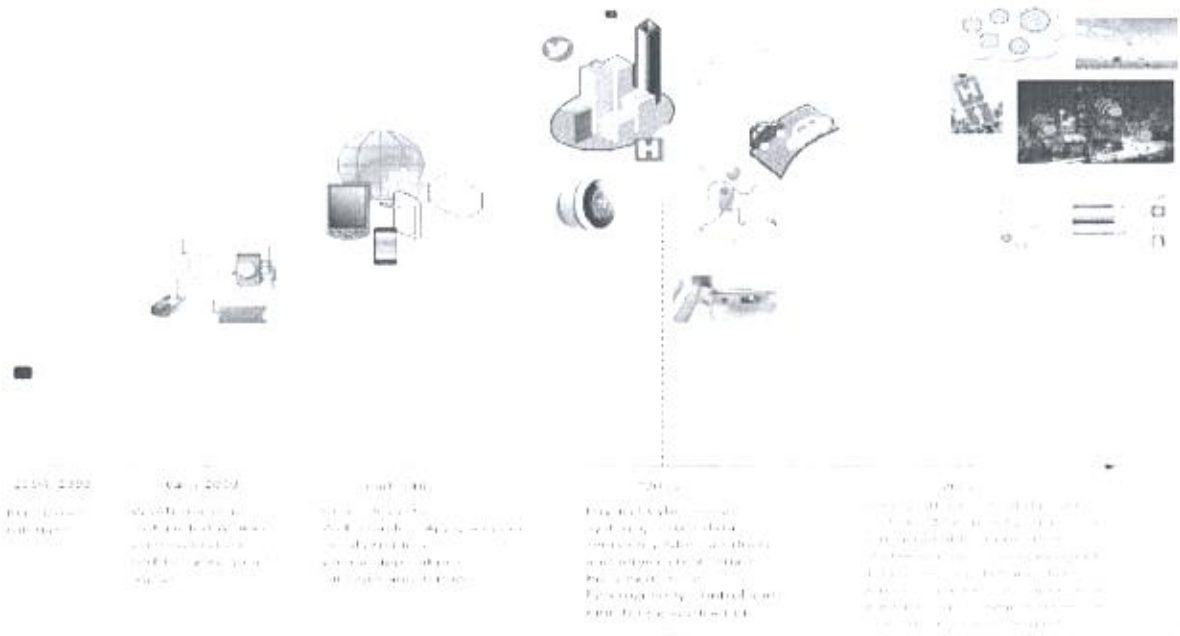
configuration and interoperable communication. Simply, IoT means the ability to make everything around us starting from (i.e. Machine, Devices, Mobile phone and Cars) even (Cities and Roads) are expected to be connected to the Internet with an intelligent behavior and taking into account the existence of the kind of autonomy and privacy.

CHARACTERISTICS

IoT objects are sensed and controlled through remote network infrastructure, creating opportunities for direct integration between the physical world and computer-based systems, resulting in efficiency, accuracy and economic benefit. The combination of technologies, wired and wireless communications at low cost sensing devices on Internet to make *Internet of Things (IoT).*

DIFFERENT WAVES OF IOT DEVELOPMENT

Raw IoT data is not what the IoT user wants; it is mainly about ambient intelligence and actionable knowledge enabled by real world and real time data. The IoT is already around us. It is not one solution or a unified technology; it involves several domains, various technologies and different coordinated and uncoordinated efforts to connect and exploit the Things' data. In the past few years there has been significant progress in standardizing wireless communication technologies and providing efficient solutions for low power, resource-constrained IoT devices. IoT research and development is now moving from infrastructure and baseline



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technology development, or early adoption of standalone solutions, towards the standardization of solutions and the definition of common components and practices.

ARCHITECTURE OF INTERNET OF THINGS

Architecture of Internet of Things contains 4 layers:

- Application Layer
- Gateway and the network layer
- Management Service layer
- Sensor layer

Application layer: The application layer is responsible for *delivering application specific services to the user*. It has the responsibility to provide the services to the applications. Here IoT systems get connected with *middleware or software*. This layer acts as the interface between IoT devices and the network with which they communicate, the application layer handles data formatting and presentation, serving as a conduit between what the device is doing and the network's handling of the data. It defines various applications in which the Internet of Things can be deployed, for example, smart homes, smart cities, and smart health.

- Lowest Abstraction Layer
- With sensors we are creating digital nervous system.
- Incorporated to measure physical quantities
- Interconnects the physical and digital world
- Collects and process the real time information

Gateway and the network layer: In its simplest form, an IoT gateway connects Internet of Things devices to one another and to the cloud, translating the communication between the devices and managing data. This layer consists of a physical device or software program that collects data from smart devices and transmits it to the cloud. The network layer consists of two sublayers - *the routing layer*, responsible for routing packets from source to destination, and the *encapsulation layer*, responsible for packaging packets.

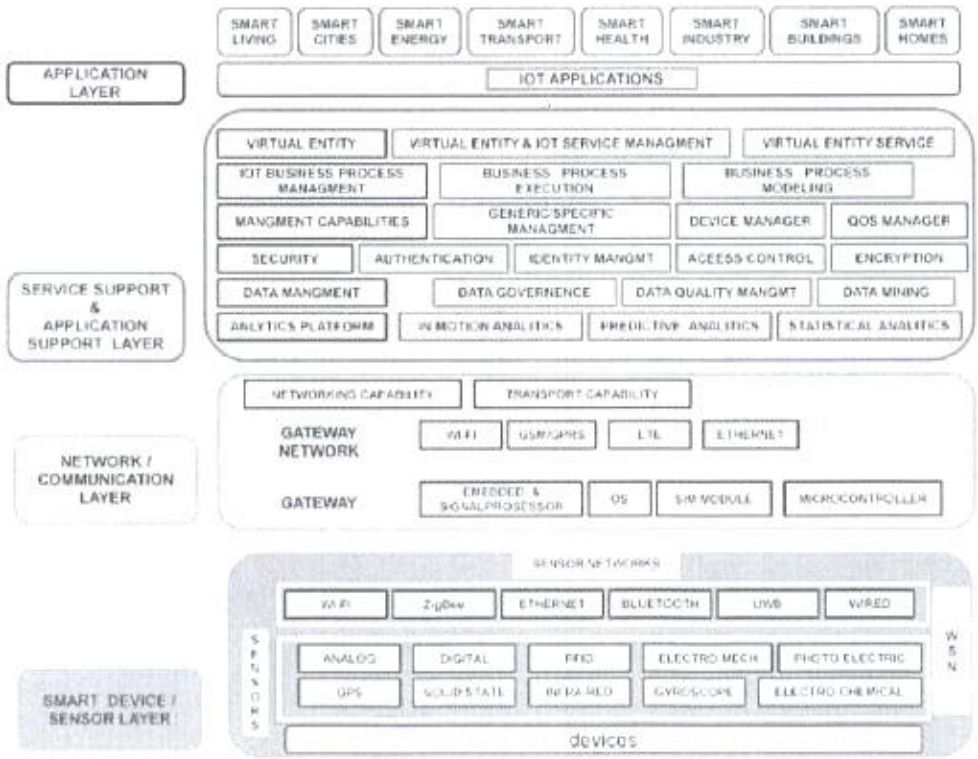
- Robust and High-performance network infrastructure
- Supports the communication requirements for latency, bandwidth or security
- Allows multiple organizations to share and use the same network independently

Management layer: A management layer is used for managing IoT services. The layer allows for Securing Analysis of IoT devices, Analyzing Data and managing devices. Business and process rule engines are important features of the management service layer. Through the Internet of Things, objects and systems can be connected and interacted with, providing information in the form of events and contextual data such as temperature of goods, current location, and traffic data.

- Capturing of periodic sensory data
- Data Analytics (Extracts relevant information from massive amount of raw data)
- Streaming Analytics (Process real time data)
- Ensures security and privacy of data.

Sensor layer: The lowest layer consists of smart objects that are integrated with sensors; the sensors enable real-time data collection and processing. The sensors can measure temperature, air quality, speed, humidity, pressure, flow, movement, and electricity. A sensor can measure the physical property and convert it into signal that can be understood by an instrument.

- Provides a user interface for using IoT.



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- Different applications for various sectors like Transportation, Healthcare, Agriculture, Supply chains, Government, Retail etc.

APPLICATIONS:

The applications can be classified based on the type of network availability, coverage, scale, Heterogeneity, repeatability, user involvement and impact.

Smart energy and smart grid:

The biggest problem in the sensors world is power consumption, the battery in sensors may drain very quickly.

1) **Personal and home :** It uses WiFi as a backbone providing higher bandwidth data transfer as well as higher sampling,the healthcare sector is considered as the most popular example of this category.

2) **Enterprise:** The information may be collected from the networks, the environment monitoring such as video surveillance is a common example.

3) **Mobile :** The information can be obtained from large scale WSN for online monitoring of travel time the popular example of this category is transportation.

4) **Utilities:** The information can be obained from networks to achieve serviceoptimization and power consumption.

Healthcare:

It is used to diagnosis, treatment and tracking the status of the patients remotely. The paradigm must serve four pivots namely are:

1) **Tracking:** It is a function aimed to identify the patient in motion.
2) **Identification and Authentication:** Identification aimed to reduce mistakes in diagnosis and authentication used to meet with security requirements,
3) **Data collection:** It aims to reduce processing time and it is related to integrating RFID technology with other health information.
4) **Sensing:** It is used to provide real time information about the patient.

Smart environment (i.e. Smart city, smart home):

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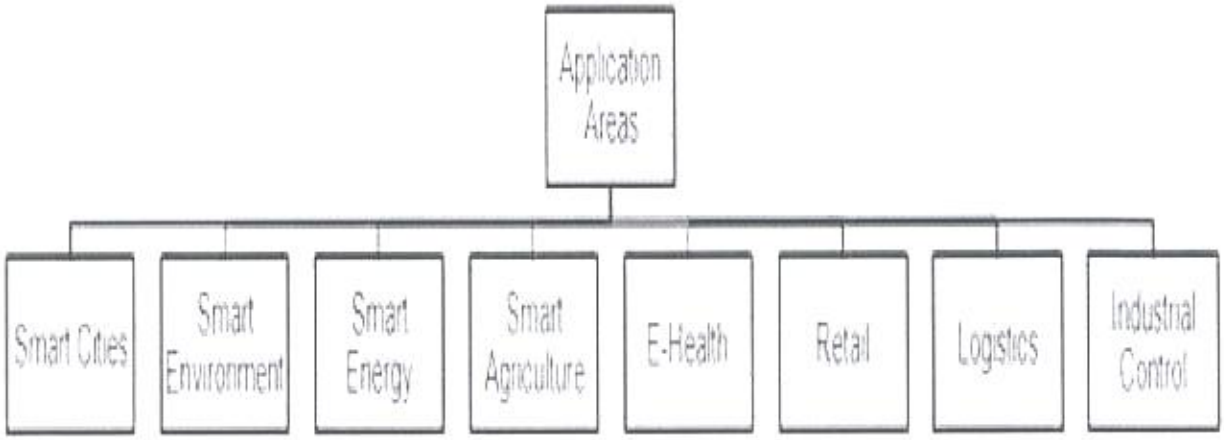
The idea to gain the smart environment such as smart city or smart home while maintaining the level of service without degradation has relied on the integration between both IoT and cloud computing.

Automotive and smart mobility:

The aim of this function concentrated on the improvement of transportation and transport through increasing safety road, reducing congestion, and control traffic.

The internet enables sharing of data between different service providers in a seamless manner creating multiple business opportunities.



ADVANTAGES

- Improved citizen's quality of life for healthcare from anywhere Better safety, security and productivity.
- New business opportunities IoT can be used in every vertical for improving the efficiency Creates new businesses, and new and better jobs.
- Economic growth has billions of dollars in savings and new services.
- Better environment saves natural resources and trees and helps in creating a smart, greener and sustainable planet.
- Improved competitiveness in providing cutting edge products/services.

CHALLENGES OF IOT ENVIRONMENT

Networking: Networking issue has a great relevance in the Internet because of it includes some of the important factors which uses to manage networks. First of all, traffic and protocols that

have a significant impact on the behavior of the network. Network challenges are handled by mobile and Ad-Hoc Network.

Interoperability: Interoperability concept can be defined as the ability to create systems or devices cooperating with each other in an efficient way. The principle idea of the proposed architecture relies on dividing IoT environment into small spaces to facilitate their management process. Semantic Information Broker SIB is used to provide methods for agentsto share semantic information with each other and also provides monitoring and updating of the physical world in real time.

Heterogeneity: The IoT environment is the best-known example to represent the heterogeneity issue because it contains a plethora of the different devices in their nature; the main objective of IoT is creating a common way to abstract the heterogeneity of these devices and achieving the optimal exploitation of their functionality. In this vein, the researchers always seek to find an effective method to deal with these devices regardless of their nature

Routing: Routing process means selecting the best path between the source and the destination to complete the communication process successfully. There are various ways to determine the best path based on the communication protocol type such as a number of hops, costs,and bandwidth.

Quality of Service (QoS): QoS is defined as "the amount of time that is taken to deliver the message from the sender and the receiver" if this time is equal or less than pre-specified time requirement the QoS is achived. ITU re-defined QoS concept as adegree of conformance of delivering service to the user by the provider with agreement between them.

Scalability: Scalability is one of the most important challenges of IoT, which means how to deal with the sustainable growth of the Internet in an efficient manner."It is the ability of a system or network to handle the growing scale of any environment without an effect on performance"

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Cloud Computing: Cloud computing is a way to access large amount of computational resources and supports a large number of users in a reliable and decentralized manner; it's also provide software cheaply.

Power Consumption: The power consumption issue is a critical point in wireless networks the efficiency of the work of sensors depends on the lifetime of the battery the efficiency of the work of sensors depends on the lifetime of the battery.

Security and privacy: The security rule aims to protect it from threats; these threats classify into two kinds are: the external threats such as attacks on system form attackers and the internal threats represented in misuse of the system or information.
Privacy is defined as a control access to personal data; and it allows keeping certain information and data confidential; the features of privacy are secrecy, anonymity and solitude.

Radio frequency Identification (RFID) : RFID is a breakthrough in embedded communication and WSN, RFID is used to generate a unique ID for the object in WSN. It contains three key elements are: the RFID tag or transponder that carries object, the RFID tags reader or transceivers that read and write tags and back-end database.

Wireless Sensor Networks (WSN): It is considered as a core to build the IoT block, it consists of a group of specialized sensor data are shared among sensor nodes with communication infrastructure for monitoring some of events or states of objects such as temperature, sound, pressure. WSN hardware contains a sensor interface, processing units, transceiver units and power supply. Secure data aggregation; it is a very important to ensure reliable data collected from sensors.

CONCLUSION:

This revolution will be the Net's largest enlargement ever and will have sweeping effects on every industry. The proliferation of devices with communicating–actuating capabilities is bringing closer the vision of an Internet of Things, where the sensing and actuation functions work in background with new capabilities to access different information sources. IoT is a one

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the main techniques that is used to express the ubiquitous computing approach, but it still not popular like the cloud computing technology the future of the IoT structure relies on the integration among real or physical worlds, cyber-world and social world. "The Hot Topics and Related Challenges" which includes more related challenges to the IoT environment. Finally, reviewed a set of the popular applications which are offered by IoT such as healthcare, smart city, smart grid, smart transportations, etc.. Based on the above, can be considered the IoT environment as a rich search point, and flourishing area to the research in particular in the integration topic with cloud computing, which provides the new sceneries to handle the smart services and applications.

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